SYNTEGRA CONSULTING

8 Chalcot Road, London, NW1 8LH

Review of Noise Assessments

December 2023

Ref: 23-12398 Review Rev A

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The signatories below verify that this document has been prepared in accordance with our quality control requirements. These procedures do not affect the content and views expressed by the originator.

This document must only be treated as a draft unless it has been signed by the originators and approved by a director.

Revision	*Review*	*Review Rev A*
Date	12/12/2023	12/12/2023
Prepared by	D. Yates MIOA	D. Yates MIOA
Checked by	L. Arez	-
Authorised by	D. Yates MIOA	D. Yates MIOA

1. Professional Statement

1.1.1. I am David Yates BSc Hons (Physics with Acoustics with a year in industry) and I am a full member of the Institute of Acoustics (MIOA) with approximately 15 years' experience in acoustic consultancy. I have particular expertise in environmental noise providing acoustic consultancy for residential and mixed use planning applications, plant noise and vibration, construction noise and the design of acoustic, noise and vibration control. I also have experience in providing sound insulation testing and design advice.

1.1.2. I have significant experience of the assessment of plant and industrial type noise, having advised on numerous projects from small plant installations to very large industrial areas in locations subject to many different noise sources throughout my entire career. I have significant experience in assessing annoying neighbourhood noise and the likelihood of this causing a noise nuisance.

1.1.3. I am familiar with the application of all relevant standards and guidance documents associated with my work, including but not limited to, BS 8233, WHO Guidelines, ProPG, BS 4142, BS 7445, BS 6472, BS 5228, BS 140 series, BS 16283 series and BS 717 series. I maintain familiarity with best practice and updates to standards and guidance documents through being active in general meetings and a member of committees and working groups with both the Institute of Acoustics (IOA) and Association of Noise Consultants (ANC).

1.1.4. I manage Syntegra Consulting's acoustic department and I am responsible for maintaining Syntegra's ANC membership.

2. Introduction

2.1.1. In this document I have presented a review of the acoustic reports carried out in respect of new plant installations at Utopia Village, Chalcot Road, Primrose Hill, London NW1 8LH. Two assessments have been completed by Martyn Ayling of Noico Noise Control and the reports are titled *"Environmental Noise Survey Report"* (report reference 2301061-3_v1, dated 10th February 2023) and *"Plant Noise Assessment Report"* (report reference 2301061-3 Rev C, dated 3rd November 2023). The reports have been submitted in respect of a planning application submitted to the London Borough of Camden, with reference 2023/4757/P.

2.1.2. The Environmental Noise Survey Report details a baseline noise survey carried out in positions around Utopia Village, adjacent to amenity areas of surrounding houses. The Plant Noise Assessment report details the proposed plant installations and derives mitigation measures to reduce noise levels.

2.1.3. This review document first sets out the relevant guidance documents utilised for the assessment of plant noise and provides a point by point analysis of the relevant parts of the Noico reports.

3. Policy Framework, Local Authority Requirements and Guidance Documents

3.1. National Planning Policy Framework

The National Planning Policy Framework (NPPF) was released in March 2012 and last updated in September 2023. The purpose of the planning system is to contribute to the achievement of sustainable development and to encourage good design. There are three dimensions to sustainable development: economic, social and environmental.

Central to the NPPF, paragraph 10 states: *'At the heart of the National Planning Policy Framework is a* ***presumption in favour of*** **[permitting]** ***sustainable development****'*. This is expanded upon in paragraph 11, where it is stated:

'…For ***decision-taking*** *this means:*

- *approving development proposals that accord with an up-to-date development plan without delay; or*
- *where there are no relevant development plan policies, or the policies which are most important for determining the application are out-of-date, granting permission unless:*
    - *the application of policies in this Framework that protect areas or assets of particular importance provides a clear reason for refusing the development proposed; or*
    - *any adverse impacts of doing so would significantly and demonstrably outweigh the benefits, when assessed against the policies in this Framework taken as a whole'*

Paragraph 174 states '*Planning policies and decisions should contribute to and enhance the natural and local environment by… preventing new and existing development from contributing to or being put at unacceptable risk from, or being adversely affected by, unacceptable levels of… noise pollution…*'.

Paragraph 185 states: '*Planning policies and decisions should also ensure that new development is appropriate for its location taking into account the likely effects (including cumulative effects) of pollution on health, living conditions and the natural environment, as well as the potential sensitivity of the site or the wider area to impacts that could arise from the development. In doing so they should:*

- *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 (see Explanatory Note to the Noise Policy Statement for England (DEFRA)).*
- *identify and protect tranquil areas which have remained relatively undisturbed by noise and are prized for their recreational and amenity value for this reason; and*
- *limit the impact of light pollution from artificial light on local amenity, intrinsically dark landscapes and nature conservation.'*

3.2. The London Plan

The London Plan (published March 2021) contains overarching policy for all developments in the Greater London area.

Policies D13 and D14 relate to noise and state:

*"**Policy D13 Agent of Change***

A The Agent of Change principle places the responsibility for mitigating impacts from existing noise and other nuisance-generating activities or uses on the proposed new noise-sensitive development. Boroughs should ensure that Development Plans and planning decisions reflect the Agent of Change principle and take account of existing noise and other nuisance-generating uses in a sensitive manner when new development is proposed nearby.

B Development should be designed to ensure that established noise and other nuisance-generating uses remain viable and can continue or grow without unreasonable restrictions being placed on them.

C New noise and other nuisance-generating development proposed close to residential and other noise-sensitive uses should put in place measures to mitigate and manage any noise impacts for neighbouring residents and businesses.

D Development proposals should manage noise and other potential nuisances by:

1) ensuring good design mitigates and minimises existing and potential nuisances generated by existing uses and activities located in the area

2) exploring mitigation measures early in the design stage, with necessary and appropriate provisions including ongoing and future management of mitigation measures secured through planning obligations

3) separating new noise-sensitive development where possible from existing noise-generating businesses and uses through distance, screening, internal layout, sound-proofing, insulation and other acoustic design measures.

E Boroughs should not normally permit development proposals that have not clearly demonstrated how noise and other nuisances will be mitigated and managed."

*"**Policy D14 Noise***

A In order to reduce, manage and mitigate noise to improve health and quality of life, residential and other non-aviation development proposals should manage noise by:

1) avoiding significant adverse noise impacts on health and quality of life

2) reflecting the Agent of Change principle as set out in Policy D13 Agent of Change

3) mitigating and minimising the existing and potential adverse impacts of noise on, from, within, as a result of, or in the vicinity of new development without placing unreasonable restrictions on existing noise-generating uses

4) improving and enhancing the acoustic environment and promoting appropriate soundscapes (including Quiet Areas and spaces of relative tranquillity)

5) separating new noise-sensitive development from major noise sources (such as road, rail, air transport and some types of industrial use) through the use of distance, screening, layout, orientation, uses and materials – in preference to sole reliance on sound insulation

6) where it is not possible to achieve separation of noise-sensitive development and noise sources without undue impact on other sustainable development objectives, then any potential adverse effects should be controlled and mitigated through applying good acoustic design principles

7) promoting new technologies and improved practices to reduce noise at source, and on the transmission path from source to receiver.

B Boroughs, and others with relevant responsibilities, should identify and nominate new Quiet Areas and protect existing Quiet Areas in line with the procedure in Defra's Noise Action Plan for Agglomerations."

3.3. London Borough of Camden

3.3.1. The requirements of the London Borough of Camden in respect of industrial and commercial noise sources are set out in Policy A4 and Appendix 3 of their Camden Local Plan document (adopted June 2017).

3.3.2. Policy A4 is reproduced below:

"Policy A4 Noise and vibration

The Council will seek to ensure that noise and vibration is controlled and managed.

Development should have regard to Camden's Noise and Vibration Thresholds (Appendix 3). We will not grant planning permission for:

a. development likely to generate unacceptable noise and vibration impacts; or

b. development sensitive to noise in locations which experience high levels of noise, unless appropriate attenuation measures can be provided and will not harm the continued operation of existing uses.

We will only grant permission for noise generating development, including any plant and machinery, if it can be operated without causing harm to amenity. We will also seek to minimise the impact on local amenity from deliveries and from the demolition and construction phases of development."

3.3.3. Paragraph 6.88 of the Local Plan is also of note which states:

"The aim within development proposals should be to design out noise prior to proposing mitigation. The effect of noise and vibration can be minimised by separating uses sensitive to noise and vibration from sources that generate them and by taking other design and operational measures to reduce any impact."

3.3.4. The relevant part of Appendix 3 is reproduced below:

"Industrial and Commercial Noise Sources

A relevant standard or guidance document should be referenced when determining values for LOAEL and SOAEL for non-anonymous noise. Where appropriate and within the scope of the document it is expected that British Standard 4142:2014 'Methods for rating and assessing industrial and commercial sound' (BS 4142) will be used. For such cases a 'Rating Level' of 10 dB below background (15dB if tonal components are present) should be considered as the design criterion.

Table C: Noise levels applicable to proposed industrial and commercial developments (including plant and machinery)

Existing Noise sensitive receptor	Assessment Location	Design Period	LOAEL (Green)	LOAEL to SOAEL (Amber)	SOAL (Red)
Dwellings**	Garden used for main amenity (free field) and Outside living or dining or bedroom window (façade)	Day	'Rating level' 10dB* below background	'Rating level' between 9dB below and 5dB above background	'Rating level' greater than 5dB above background
Dwellings**	Outside bedroom window (façade)	Night	'Rating level' 10dB* below background and no events exceeding 57dBL_{Amax}	'Rating level' between 9dB below and 5dB above background or noise events between 57dB and 88dB L_{Amax}	'Rating level' greater than 5dB above background and/or events exceeding 88dBL_{Amax}

**10dB should be increased to 15dB if the noise contains audible tonal elements. (day and night). However, if it can be demonstrated that there is no significant difference in the character of the residual background noise and the specific noise from the proposed development then this reduction may not be required. In addition, a frequency analysis (to include, the use of Noise Rating (NR) curves or other criteria curves) for the assessment of tonal or low frequency noise may be required.*

***levels given are for dwellings, however, levels are use specific and different levels will apply dependent on the use of the premises.*

The periods in Table C correspond to 0700 hours to 2300 hours for the day and 2300 hours to 0700 hours for the night. The Council will take into account the likely times of occupation for types of development and will be amended according to the times of operation of the establishment under consideration.

There are certain smaller pieces of equipment on commercial premises, such as extract ventilation, air conditioning units and condensers, where achievement of the rating levels (ordinarily determined by a BS:4142 assessment) may not afford the necessary protection. In these cases, the Council will generally also require a NR curve specification of NR35 or below, dependant on the room (based upon measured or predicted Leq,5mins noise levels in octave bands) 1 metre from the façade of affected premises, where the noise sensitive premise is located in a quiet background area."

3.4. British Standard 4142:2014+A1:2019

3.4.1. British Standard 4142:2014+A1:2019 "*Methods for rating and assessing industrial and commercial sound*" provides a method for the measurement and rating of industrial type noise sources and background noise levels outside dwellings. The rating level (defined in the BS) is

used to rate the noise source outside residential dwellings (this is defined as the "specific sound level").

3.4.2. The rating level is determined by assessing the character of the noise and applying an acoustic feature correction if appropriate. Corrections are applied for the tonality and intermittency of the noise source which can both make noise more noticeable.

3.4.3. The initial assessment described in BS 4142 to determine whether an adverse impact is likely is based on establishing the difference between the rating level and the background noise level outside the residential property of interest. The British Standard states that the following points should be considered:

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

3.4.4. Where it is considered that the initial assessment of the impact needs to be modified due to the context in which the noise is occurring, BS 4142 suggests that all pertinent factors are taken into consideration, including:

1) *'The absolute level of sound. For a given difference between the rating level and the background sound level, the magnitude of the overall impact might be greater for an acoustic environment where the residual sound level is high than for an acoustic environment where the residual sound level is low.*

   Where background sound levels and rating levels are low, absolute levels might be as, or more, relevant than the margin by which the rating level exceeds the background. This is especially true at night.

   Where residual sound [1]levels are very high, the residual sound might itself result in adverse impacts or significant adverse impacts, and the margin by which the rating level exceeds the background might simply be an indication of the extent to which the specific sound source is likely to make those impacts worse.

2) *The character and level of the residual sound compared to the character and level of the specific sound. Consider whether it would be beneficial to compare the frequency spectrum and temporal variation of the specific sound with that of the ambient or residual sound, to assess the degree to which the specific sound source is likely to be distinguishable and will*

[1] The residual sound is defined as the ambient sound level at the assessment location in the absence of the specific sound source.

represent an incongruous sound by comparison to the acoustic environment that would occur in the absence of the specific sound. Any sound parameters, sampling periods and averaging time periods used to undertake character comparisons should reflect the way in which sound of an industrial and/or commercial nature is likely to be perceived and how people react to it.

3) *The sensitivity of the receptor and whether dwellings or other premises used for residential purposes will already incorporate design measures that secure good internal and/or outdoor acoustic conditions, such as:*

   i) facade insulation treatment;

   ii) ventilation and/or cooling that will reduce the need to have windows open so as to provide rapid or purge ventilation; and

   ii) acoustic screening.'

3.4.5. There is also a requirement within BS 4142:2014 to consider the uncertainty in the measurement and assessment procedure and it is stated that '*The level of uncertainty associated with a measurement of sound level depends upon a number of factors'*. The most important factor to consider when addressing uncertainty is the extent to which it would influence the overall conclusions of the assessment.

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4. Environmental Noise Survey Report

4.1.1. Noico carried out an unmanned noise measurement survey to determine baseline noise levels at the identified noise sensitive receptor locations.

4.1.2. Noico measured in 3 locations, which appear to be reasonably representative of the nearest noise sensitive receptors from the information presented in the report.

4.1.3. Measurement Locations 1 (Egbert Street) and 3 (Chalcot Road) were located at 2.5m and 2m from the façades of buildings respectively. This is neither free-field nor a façade measurement and so it is unclear of the effect on the noise level measurements this would have. Measurement Location 2 (Edis Street) was located at 1m from a façade, which is considered a façade location and should therefore be corrected by -3 dB to obtain the equivalent free-field noise level due to the influence of reflected noise from the façade. It is noted that Noico have not applied any façade corrections to the measurement data and therefore the measured noise levels are not equivalent free-field noise levels, which is expected for such an assessment.

4.1.4. It is noted that the Noico report refers to a Figure 2 to identify the measurement locations, which does not exist in the report. This should refer to Figure A1.

4.1.5. The noise measurements are reported to have been carried out over a period from *"1215 hrs on Wednesday 25th January 2023 through to early hours of Tuesday 31st January 2023."* There is no mention of the specific times the measurements ceased, or why. Given the unusual timings it is good practice to detail why further measurements were not undertaken, or why they were not reported.

4.1.6. Noico have presented their statistical analysis of background noise levels, which is helpful. It appears, however, that they have in general picked the modal value for the "typical" background noise level. Although there is no set procedure to derive the "typical" value, it is generally accepted to be the level which is most commonly exceeded, which normally is just below the modal value, assuming a typical bell curve. Accordingly, the "typical" background noise levels could be argued to be slightly lower in most cases, however the values derived offer a reasonable estimate of the background noise levels.

4.1.7. Finally, Noico have set plant noise level criteria for the daytime, evening and night-time periods for each of the representative locations. The criteria have been derived from a simple -10 dB correction to the "typical" background noise level, which is partially in line with Camden's requirements however fails to allow for any potential tonality.

5. Plant Noise Assessment Report

5.1.1. Noico have presented all plant noise information and assessments in a separate document which refers back to the criteria derived in the Environmental Noise Survey Report. Whilst this is not necessarily a concern, it does mean that the context of the surrounding area is easily lost as it is not discussed in the Plant Noise Assessment Report.

5.2. Selection of Receptor and Background Noise Levels

5.2.1. The report identifies two plant areas which are described in the report and shown on a plan in the Appendix (Figure A1). The text description, however, does not reference the figure to help describe the plant locations so it makes the locations somewhat unclear.

5.2.2. Noise sensitive receptors are identified at Section 3.1.1 and 3.1.2 of the Noico report, however only the distance to the nearest windows have been provided, which means that the gardens have not been considered despite being closer to the plant and potentially in use during the key daytime operating hours of the proposed plant. This also does not meet the requirements of the Local Authority.

5.2.3. The report notes that no plant from the existing Utopia Village was operational during the survey and implies that this means this means that the background noise levels measured during the noise measurement survey and utilised for the assessment would be lower than what has been experienced in the past. This is true and it is a good thing and entirely in line with the assessment methodology as the proposed plant is to replace the existing plant and therefore it is the background noise level without the existing plant operating that is key to understanding the impacts of the proposed plant.

5.3. Initial Plant Noise Assessment

5.3.1. An error is present in the first paragraph of Section 3.2, where the night-time period has been identified at 1900 hrs – 0700 hrs, as opposed to 2300 hrs – 0700 hrs. This is in all likelihood just a typo as the night-time period is correctly identified elsewhere in the report.

5.3.2. Sections 3.2.1 and 3.2.2 of the report identify the plant to be installed and provides noise levels in octave bands. The sections also note that airborne breakout noise will be controlled and acoustic enclosures installed but provides no indication of what measures are assumed. I have inferred from the remainder of the report that the initial assessment has been used to derive the acoustic requirements of the attenuation measures, however this is not stated and is not clear.

5.3.3. There is no discussion of the character of the sound in Sections 3.2.1 and 3.2.2 which is needed to determine any character corrections required to derive the rating level of the noise in accordance with BS 4142 methodologies.

5.3.4. Sections 3.3 and 3.4 of the Noico report provide details of calculations to derive the specific noise level at each of the receptors from the appropriate plant items. The tables display directivity corrections, plenum losses and distance corrections to derive the noise levels at the nearest windows. No detail is provided as to where these corrections have been obtained from and it is therefore impossible to audit these. The distance correction has not been taken using

standard point source attenuation and it is unclear to me how this has been calculated. It appears to be overestimated.

5.3.5. The first table of Section 3.3.1 (Chiller discharge location to Egbert Street) contains a number of basic mathematical errors. The 63 Hz octave band should sum to 72 dB, assuming that the corrections listed are correct, which is 6 dB different to what is reported (78 dB). The 1000 Hz, 2000 Hz, 4000 Hz, 8000 Hz and overall dBA level are all 1 dB out. Whilst this can be accounted for by rounding, it does mean that the derived required reductions are also all 1 dB lower than they should be. The error in 63 Hz does not impact the overall dBA level, which is fortunate. The error does not seem to be repeated in the other tables.

5.3.6. There is no discussion of the character of the noise at this stage of the assessment either and therefore no character correction has been applied to derive a suitable rating level, with the *"required reduction"* being taken only from the specific noise level. This does not align with Camden's requirements.

5.3.7. For the receptors where there are two separate noise sources to consider, being the Chiller discharge and inlets to Egbert Street and Chalcot Street, no consideration have been given to the cumulative effect on the noise level. The derived required reduction reduces both noise sources to the level required by the design criteria and so the cumulative noise level would be 3 dB above the design criteria and would therefore fail to achieve Camden's requirements.

5.3.8. For Egbert Street, it is not made entirely clear, but as long as all of the plant units are contained in a single enclosure the cumulative noise level would not be higher.

5.4. Mitigation Measures

5.4.1. Section 4 presents a list of suggested products to attenuate the plant noise. These are provided in octave bands for both insertion loss of attenuators and enclosures and sound absorption co-efficient for internal linings. No attempt has been made to determine the internal reverberant noise level or to show the impact on receptor noise levels once the mitigation measures are installed, which is standard good practice. It is not possible to audit their calculations as no calculations have been presented. Additionally, noise break out levels have not been presented to determine cumulative noise levels.

5.4.2. For evening and night-time noise levels, the mitigation measures rely on a reduced operation and "low noise mode" and provides a minimum reduction required. As the resultant receptor noise level has not been provided following installation of the mitigation measures it is not possible to audit if this is sufficient. However, if the mitigation measures reduce receptor noise levels to the daytime criteria then 9 dB reduction would be required to achieve the night-time criteria, and only 6 dB has been specified. It is also not noted anywhere in the report if the equipment has a "low noise mode" and how much the noise would be reduced by.

5.4.3. Not withstanding the fact that the effect of the mitigation measures is unclear, errors identified earlier in the assessment procedure including using the specific noise level rather than the rating level and not adjusting the design criteria to account for the cumulative noise level from two sources, means that the reduction requirement has the potential to be significantly underestimated.

6. British Standard 4142:2014+A1:2019

6.1. Reporting Requirements

6.1.1. BS 4142:2014+A1:2019 contains a list of *Information to be Reported* at Section 12, which is reproduced below:

"Report the following, as appropriate.

a) Statement of qualifications, competency, professional memberships and experience directly relevant to the application of this British Standard of all personnel contributing to the assessment.

b) Source being assessed as follows:

1) description of the main sound sources and of the specific sound;

2) hours of operation;

3) mode of operation (e.g. continuous, twice a day, only in hot weather);

4) statement of operational rates of the main sound sources (e.g. maximum load setting, 50% max rate, low load setting); and

5) description of premises in which the main sound sources are situated (if applicable).

c) Subjective impressions, including:

1) dominance or audibility of the specific sound; and

2) main sources contributing to the residual sound.

*d) The existing context (see Clause **4** and Clause **11**), including an assessment of the sensitivity of the receptor.*

e) Measurement locations, their distance from the specific sound source, the topography of the intervening ground and any reflecting surface other than the ground, including a photograph, or a dimensioned sketch with a north marker. A justification for the choice of measurement locations should also be included.

f) Sound measuring systems, including calibrator or pistonphone used:

1) type and/or model;

2) manufacturer;

3) serial number; and

4) details of the latest verification test including dates.

g) Operational test:

1) reference level(s) of calibrator, multi-function calibrator or pistonphone; and

2) meter reading(s) before and after measurements with calibrator, multi-function calibrator or pistonphone applied.

h) Weather conditions, including:

1) wind speed(s) and direction(s);

2) presence of conditions likely to lead to temperature inversion (e.g. calm nights with little cloud cover);

3) precipitation;

4) fog;

5) wet ground;

6) frozen ground or snow coverage

7) temperature; and

8) cloud cover.

i) Date(s) and time(s) of measurements.

j) Measurement time intervals.

k) Reference time interval(s).
l) Measured sound level(s):
1) residual sound level(s) and method of determination;
2) ambient sound level(s) and method of determination;
3) specific sound level(s) and method of determination;
4) justification of methods; and
5) details of any corrections applied.
m) Background sound level(s) and measurement time interval(s) and in the case of measurements taken at an equivalent location, the reasons for presuming it to be equivalent.
n) Rating level(s):
1) specific sound level(s);
2) any acoustic features of the specific sound; and
3) rating level(s).
o) Excess of the rating level(s) over the measured background sound level(s) and the initial estimate of the impacts.
p) Conclusions of the assessment after taking context into account.
*q) The potential impact of uncertainty (see Clause **10**).”*

6.1.2. Whilst a number of BS 4142 reporting elements are included in the report, a full BS 4142 assessment has not been carried out and therefore significant levels of information are missing.

6.1.3. In respect of Part a) it is noted in Noico’s report that the author holds a Bachelor of Science degree and is MIOA, however no description of experience is noted. Having MIOA status by itself does not necessarily mean that the person is competent to carry out a BS 4142 assessment as the Membership grades can be awarded for work in many different areas of acoustics so they may not be experienced in this area. This is the main reason why a full statement of competence is necessary. As the company producing the report, Noico, are not specifically acoustic consultants but plant attenuation equipment suppliers it is especially important to be able to review the author’s competency and experience to carry out the assessment.

7. Conclusions and Summary

7.1.1. In this document I have presented a review of the acoustic reports carried out in respect of new plant installations at Utopia Village, Chalcot Road, Primrose Hill, London NW1 8LH. Two assessments have been completed by Martyn Ayling of Noico Noise Control and the reports are titled *"Environmental Noise Survey Report"* (report reference 2301061-3_v1, dated 10th February 2023) and *"Plant Noise Assessment Report"* (report reference 2301061-3 Rev C, dated 3rd November 2023).

7.1.2. The Environmental Noise Survey Report details a baseline noise survey carried out in positions around Utopia Village, adjacent to amenity areas of surrounding houses. The Plant Noise Assessment report details the proposed plant installations and derives mitigation measures to reduce noise levels.

7.1.3. This review document first sets out the relevant guidance documents utilised for the assessment of plant noise and provides a point by point analysis of the relevant parts of the Noico reports.

7.1.4. In respect of the noise measurement survey, I have identified that, whilst the locations of measurements appear reasonable, there is considerable uncertainty as to the derivation of typical background noise levels and design noise criteria in accordance with the Local Authority's requirements. It has also been identified that corrections have not been taken to obtain the equivalent free-field noise level, despite none of the locations being free-field. Accordingly, the derived background noise levels should be lower.

7.1.5. In respect of the plant noise assessment, I have comprehensively demonstrated that there are considerable errors and uncertainties in the calculation of plant noise levels. It is not possible to audit the calculations as no detail of the source of the noise level reductions have been provided and the distance calculation method is unclear. Additionally, no correction to the

design criteria has been undertaken to account for multiple sources impacting on the receptors and no attempt has been made to apply a character correction to derive the rating level.

7.1.6. No attempt has been made to calculate noise break out levels from plant rooms and enclosures and so it is not possible to determine the effects of the cumulative noise level.

7.1.7. It is not clear from the information provided whether the proposed mitigation measures would be sufficient in respect of the assessment undertaken or to account for the uncertainties and errors identified in my review.

7.1.8. No assessment has been carried out of the noise impact in gardens, which would be likely to be considerably greater than at the façade of the properties.

7.1.9. I have also highlighted that there has been no attempt to carry out a full BS 4142 assessment, as required by the Local Authority and highlighted concerns with the experience of the author of the Noico report.

7.1.10. It is therefore safe to conclude that there are considerable issues in the Noico assessment and reports and that the conclusions and recommendations in that report are inaccurate and likely unsafe.

7.1.11. As a consequence of the failings/shortcomings identified (and based on the conclusions of those reports), it is likely that the proposed development would generate unacceptable noise and there is no evidence presented that it would not be operated without causing harm to amenity.

8. Appendix 1: Glossary of Acoustic Terminology

Term	Description
'A'-Weighting	*This is the main way of adjusting measured sound pressure levels to take into account human hearing, and our uneven frequency response.*
Decibel (dB)	*This is a tenth (deci) of a bel. The decibel can be a measure of the magnitude of sound, changes in sound level and a measure of sound insulation. Decibels are not an absolute unit of measurement but are an expression of ratio between two quantities expressed in logarithmic form.*
$L_{Aeq,T}$	*The equivalent steady sound level in dB containing the same acoustic energy as the actual fluctuating sound level over the given period, T. T may be as short as 1 second when used to describe a single event, or as long as 24 hours when used to describe the noise climate at a specified location.* $L_{Aeq,T}$ *can be measured directly with an integrating sound level meter.*
L_{A10}	*The 'A'-weighted sound pressure level of the residual noise in decibels exceeded for 10 per cent of a given time and is the* L_{A10T}*. The* L_{A10} *is used to describe the levels of road traffic noise at a particular location.*
L_{A50}	*The 'A'-weighted sound pressure level of the residual noise in decibels exceeded for 50 per cent of a given time and is the* L_{A50T}*.*
L_{A90}	*The 'A'-weighted sound pressure level of the residual noise in decibels exceeded for 90 per cent of a given time and is the* L_{A90T}*. The* L_{A90} *is used to describe the background noise levels at a particular location.*
L_{Amax}	*The 'A'-weighted maximum sound pressure level measured over a measurement period.*