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The Acoustic Group
CONSULTING ACOUSTICAL & VIBRATION ENGINEERING

21st September 2017

Ku-ring-gai Council
818 Pacific Highway
GORDON NSW 2072

Attention: Mr J. Goodwill

Dear Sirs,

REVIEW OF ACOUSTIC ASSESSMENTS
PROPOSED AGED CARE FACILITY 25, 25A & 27 BUSHLANDS AVENUE, GORDON

An application for a proposed aged care facility at 25, 25A and 27 Bushlands Avenue, Gordon, has been submitted to Ku-ring-gai Council and included acoustic reports from Rodney Stevens Acoustics.

The Council's website reveals that Rodney Stevens Acoustics ("RSA") have provided in relation to the subject application three versions of the report, with the latest version on the Council's website identified as report 1502631, Revision 3 *North Shore RCF 25, 25A and 27 Bushlands Avenue, Gordon, Mechanical Services Noise Assessment,* dated 4 July 2017.

Despite the title of the report referring to mechanical services noise assessment, the revision 3 report seeks to address noise associated with the car park entrance (or access driveway) to the facility which is clearly not mechanical services.

The development application has been the subject of objections, of which a report from Acoustic Logic *25 – 27 Bushlands Avenue, Gordon – Proposed aged care facility – review of amended RSA report (revision 3)*, dated 1 August 2007, reference 20170826.1/0801A/R0/TT raises concerns in relation to the revision 3 report from Rodney Stevens Acoustics and identifies inconsistencies in the RSA report and the conclusions (of the RSA report).

In general, I agree with the Acoustic Logic report and have formed the view that the Rodney Stevens Acoustics revision 3 report is inadequate in addressing the relevant acoustic issues for the subject application.

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At the present time I am unable to support this subject application, due to the inadequate acoustic assessment, but note it is possible that the acoustic assessment could be corrected, and with the appropriate information to identify the necessary noise controls that would become conditions of consent for the development (if other matters that are of concern with the development are satisfactorily addressed).

Issues with the RAS Revision 3 Report

An examination of the revision 3 report from RSA reveals a significant number of errors that require correction and highlight the substandard nature of the report.

Page 6 of the RSA report identifies Council's requirements and refers to mechanical exhaust ventilation systems, air conditioning systems, noise from traffic generation, lift motors and the like, with the conclusion from RSA that mechanical ventilation plant associated with the project is the only source of significance in terms of operational noise emissions.

Apart from excluding an assessment of lift motors (or room associated with lift motors), it would appear from material later in the report there is an issue in terms of vehicle movements on site and as such would indicate the problems with the RSA concept of document control through the various versions (4 off) of an acoustic assessment.

The format of the report would appear to be missing information between the text on page 6 and the presentation of environmental data in the form of a summary table and logger graphs commencing on page7.

If one is preparing an acoustic assessment to accord with Australian Standard AS 1055 or EPA criteria, then it is necessary to establish the basis of noise monitoring and instrumentation that has been used for such an exercise. There is no material in the report to identify the instrumentation that has been used for what appears to be two sets of logger measurements conducted between 7 August 2015 and 14 August 2015.

Ambient Noise Data

On page 7 of the report is presented at table under the heading of Existing Noise Environment that relates to measurements relative to the front yard of 25 Bushlands Avenue, Gordon.

The pointed stars shown in the figure on page 3 may relate to noise logger positions with a horizontal and a vertical arrow not having any information as to the purpose of the arrows being on the drawing.

The table on page 7 refers to “on-site” measurements where LAeq and Rating Background Levels are provided for the EPA classified periods of day, evening and night.

The lower section of the table provides results related to a “logger location” that presents data for two different time periods of day and night, with no explanation of why such levels have been provided.

On reading the table, and the absence of any explanatory text, I have difficulty in understanding what was the “on-site” location versus the “logger” location.

In any event, there are some problems with the material in the table on page 7 because of the graphs immediately following the table that are set out on pages 8 to 11 inclusive.

The logger graphs following the table on page 7 contain an LAeq line and in LA 90 line.

Examination of the individual daily logger graphs appear to indicate a background level during most of the day to be around 40 dB(A) and in the early hours of the morning to be around 30 dB(A).

Without access to the actual data one can view the graphs to reveal an approximate rating background level at the logger location for the daily and night time periods to be similar to the average minimum level on those graphs.

The rating background level provided for the daytime, in the table on page 7 indicates 51 dB(A) and for the night time period of 10 pm to 7 am a level of 38 dB(A).

On my view of the logger graphs set out on pages 8 to 11 inclusive, I am unable to accept the figures presented in the table on page 7 and would suggest that the preparation of the report has failed to provide the appropriate figures.

Similarly, on viewing the LAeq level, being the upper graph for each of the seven days of monitoring, set out on pages 8 to 11 inclusive, I am unable to accept that on a logarithmic average concept a level 60 dB(A) in the day, presented in the table on page 7.

On viewing the logger graphs following the table on page 7, it can be seen that Day 3 is missing and Day 2 is shown twice.

The lower set of data in the table on page 7 of the revision 3 RSA report (attributed to the Logger location) has no identification in the text as the basis of the data. It may be that the data relates to the concept of road traffic noise which in any event has not been assessed. The data for the night time background level would not appear to accord with the logger graphs and the daytime LAeq levels do not agree with the graphs. The night-time LAeq level appears to be somewhat higher than indicated by the graphs.

Therefore, I reject the material set out in the table on page 7 of the RSA revision 3 report.

If a similar exercise is undertaken for the table on page 12, that would appear to be for to the backyard of 25 Bushlands Avenue, Gordon, I found from an examination of the logger graphs for the night time period an incorrect rating background level. The night time background level of 41 dB(A) assigned to the period of 10 pm to 7 am would appear to be more in the order of 32 dB(A).

Similarly, from my examination of the logger graphs for the daytime I question the concept of 43 dB(A) as a rating background level during the day.

Therefore, I reject the data set out on page 12 of the report as being valid.

Project Specific Criteria

One finds on page 16 of the RSA report a table headed *Project Specific Noise Criteria for Continuous Operational Noise Emissions* that would appear to relate to the criterion contained in the EPA's *Industrial Noise Policy* document.

Note 3 to the table on the bottom of page 16 identifies the Rating Background Level is based upon Appendix A of the Australian Standard AS 1055.2 – 1997.

I find it strange to utilise an Appendix of AS 155.2 – 1997 when the Appendix states:

- It is not actually part of the Standard but is an informative component of the Standard,
- Appendix A provides estimated average background levels,

- the Appendix specifically identifies it is to be used as a guideline and whenever possible, the values of the LA 90 T should be measured in accordance with clause 4.2.1, and
- that where measured values are obtainable, then the Appendix should not be used.

However, despite the reference to AS 1055 then how does one end up with two background levels for each assessment period?

If one was to utilise the results presented on page 7 and 12 of the RSA report (and ignore Note 3 to the table on page 16), even though the rating background levels do not agree with the logger results, then there is an inconsistency with the presentation of the data from those two table versus the rating background levels on page 16.

To follow the table on page 16, I assume that the first figure under the RBL relates to the front of the property and the second figure relates to the rear.

If I follow the tables on pages 7 and 12 for the “on Site” data then to agree with the first column of the table on page 16, then for daytime the text should have said 51/43, for evening 39/41 and the night 38/41

Comparison of the table on page 16 indicates that at least for the evening there is correlation with the (incorrect) figures on pages 7 and 12, but the data for the daytime has been reversed and the data for the night-time has the incorrect level for the front yard of 25 Bushlands Avenue, Gordon.

However, as discussed above I do not agree with the data presented in the tables on pages 7 and 12, and therefore reject the intrusive noise targets set out on page 16.

If one examines the noise logger graphs a different conclusion is obtained in relation to the appropriate background figures, that in turn leads to incorrect intrusive noise targets on page 16 as the target is background +5 dB(A).

Because of the above, I agree in part with the concept provided by Acoustic Logic that the noise emission criteria set out in the RSA revision 3 report are incorrect. However, I would seek to modify the proposed criteria from Acoustic Logic to separate into the day and evening periods based on a visual approximation of the logger graphs that would suggest the evening is different to the day.

Comparison of the logger graphs reveal similar background levels during the day but for the front logger location the noise levels in the evening and night time periods are lower than at the rear.

By way of the location of the logger identified on page 3 of the report at the rear of 25 Bushlands Avenue there is the possibility the logger was affected by mechanical plant associated with the swimming pool at 23 Bushlands Avenue where on some days there is a noticeable elevation of the background level during the evening.

The failure to correlate the logger results with the table of results, or to undertake attended measurements to validate the logger results and identify the source of the ambient levels, and then utilise those incorrect result to obtain incorrect specific project criteria is totally unacceptable and on that **fact alone warrants rejection of the acoustic report.**

A visual review of the logger results I suggest leads to the following noise targets.

TABLE 1: Noise Emission Criteria – dB(A)

Time of Day	Background Noise Level L90	Intrusive Noise Target Leq, 15 min	Sleep Disturbance L1, 1 min
Day (7am – 6pm)	39	44	NA
Evening (6pm – 10pm)	37	42	NA
Night (10pm – 7am)	30	35	45

The intrusive noise targets are significantly less than the EPA amenity noise targets and have been ignored in the above table.

As it is necessary to consider the sleep disturbance criterion, then that limit applies to the period between 10 pm and 7 am Mondays to Saturdays or to 8 am, on Sundays and public holidays.

The noise targets set out in the above table could form a condition of consent, if approval was to be given to the subject site.

Mechanical Plant

The project specific criteria identified in the table above relate to all activities occurring on site on, including the operation of the aged care centre. Therefore, it is inappropriate for RSA to specify a noise target for mechanical plant to be exclusively taking up all the permitted intrusive noise limits.

I concur with Acoustic Logic who query a car park supply fan having a capacity of 13,060 litres per second being identified in Table 1 as being the car park supply fan for the lower basement, but to only have an exhaust fan for the same area exhausting 60 litres per second.

In an enclosed car parking area, the critical issue is the ability to exhaust fumes from vehicles. Normally one provides a negative pressure in the space to extract the air and then let the replacement air come from various openings and some make up air via a supply fan.

The concept of ventilation for the basement area identified by RSA is not normal. It may be a possibility that RSA have confused the supply fan with the exhaust fan.

For either scenario for the volume of air being supplied (or should it be extracted) there needs to be openings to permit the large volume of air required to exit (enter the basement. Such openings have potential for noise impacts. Is the roller door perforated or are there other opening not identified by RSA?

I note that Table 1 does not include any ventilation fans associated with lift motor rooms (despite having noted Council has identified such noise sources) and has not included any fans associated with exhausting the various bathrooms located in the development.

The RSA report does not identify any mechanical plant associated with the Laundry, the plant room shown on the first floor plan or the mechanical plant exhaust louvres shown on the first floor plan. There is no identification of air conditioning plant which is expected for part of the subject development.

One may consider an exercise of identifying emission from mechanical plant at the DA stage is to identify the feasibility of the project is unusual as one does not normally have specific design requirements at the DA stage.

The mathematics of determining noise emission from the plant is identified in an equation on the bottom of page 17 of the report. The equation is a standard equation for a noise source having hemispherical radiation over a reflecting plane where there is a distance attenuation, being 20 log (r), and a correction from sound power to sound pressure level being an 8 dB correction – not 8 dB(A).

The explanation provided by RSA for the 8 dB correction, is for the conversion of a sound power level to sound pressure level and is not a matter of loss of acoustic energy from hemispherical radiation.

The basis of an accurate assessment and understanding of an assessment procedure is further highlighted in Table 2 on page 18 of the RSA report.

Table 2 purports to be the predicted worst-case mechanical plant operational noise levels (even though not all noise sources have been included) are compared with respect to the noise criterion at receiver locations where the design level of 35 dB(A) has been nominated.

But the levels predicted for 23 Bushlands Avenue, 31 Bushlands Avenue, 28 Bushlands Avenue and 29 Bushlands Avenue are identified as having a level of 36 dB(A) which is higher than the noise criterion of 35 dB(A) and as such does not reveal compliance. Yet the last column of Table 2 says compliance for all assessment locations.

The position of RSA identifying that compliance is satisfied and that no further acoustic treatment is required for mechanical plant is simply not accepted and raises serious questions as to the placing any weight on the RSA report.

Furthermore, for the plant that has been identified as exceeding the noise limit would be further compromised by additional mechanical plant not identified by RSA.

Car Park Entrance

Contrary to the title of the report prepared by RSA, page 18 purports to address the emission of noise from the car park entrance, at least by the heading on page 18.
I would assume that an assessment should not be restricted to the car park entrance itself (unless one is considering activities generated in the basement that is noise emitted by the car park entrance as one source) but one must in an acoustic assessment also then consider noise from the use of the driveway to the car park.

It would appear from the last paragraph on page 18 that the analysis includes activities occurring in the car park which is clearly unsatisfactory.

However, the last paragraph of the report claims analysis of vehicles entering and leaving the basement that contradicts the last paragraph on page 18, and adds to confusion as to what has been assessed.

The last paragraph of page 18 indicates RSA's noise assessment through the building envelope is insignificant.

The concept of noise attenuation to 29 Bushlands Avenue is based on distance and short duration.

There are no cross sections or calculations contained in the RSA report to substantiate the noise levels that have been determined. I do not see that laminated glazing on the car park entrance wall would have any acoustic benefit with respect to impact of noise from the car park entrance to adjoining properties.

The predicted levels appear to be similar for all locations, despite different distances. This could mean there is some attenuation for barriers that have not been identified.

The report is not clear if there is a barrier on the driveway and/or any basis of acoustic shielding to support the anomaly of similar levels for significantly different distances.

The plans submitted with the application do not indicate in a plan view the provision of a barrier wall along the driveway.

Whilst it is difficult to see, on the Boffa Robinson Group drawing 1506/DA10 on the southern elevation there may be a barrier on the upper wall of the driveway set out slightly to the west of the driveway where that barrier intersects a red line identified as a 3.5 m setback.

If this is the case then there may be some barrier attenuation at the existing ground level and to the west of the western wall of the driveway. That barrier may very well provide acoustic shielding to 27 Bushland's Avenue but could also give rise to reflection (as would the driveway wall) to 23 Bushland Avenue.

The table on page 19 is identified as “Car Park Noise Emissions” and would appear to be addressing vehicles inside the car park and by some form of unsubstantiated calculation to have maximum noise levels for cars accelerating to be right at the sleep disturbance criterion limit of 45 dB(A) for all locations.

It is difficult to comprehend that a community bus will have a lower sound power level than a car accelerating inside the car park. In any event the noise assessment of the car park entrance does not address noise from the driveway.

The nominated source data may be appropriate for the car park but will be different for vehicles ascending the driveway and different to vehicles descending the driveway. Therefore, there would be a range of noise emission levels.

The basis sound level data for community bus and the cars (level ground, ascending the driveway and descending the driveway) needs to be substantiated.

With respect to 29 Bushlands Avenue the noise levels for vehicles ascending the driveway will be different to that descending the driveway because of different sound power levels and different shielding effects. None of this information has been provided by RSA.

On my view of the suggested operations and measurements I have conducted for sloping driveways, I do not accept that the sleep arousal criterion will be satisfied.

Similarly, the number of vehicles utilising the driveway has not been identified. Therefore, there is no basis to check the suggested Leq levels from the car park or the driveway.

An issue of concern, by way of the significant degree of basement car parking area, is an expectation that staff will be utilising the basement area and therefore one could expect as result of a night shift staff to find vehicle movements both into and out of the driveway during the night time period.

There is no assessment of the noise from the roller shutters that are shown in the elevation to the car park entrance. The matter of roller shutters opening and closing has been an issue of disturbance in several commercial premises as well as residential premises.

Activities on the Site

The plans reveal outdoor areas that for daytime use are not expected to result in an acoustic issue.

However, the first floor plan identifies and activity room and associated balcony.

We have found for two aged care/retirement village complexes the requirement to address noise emitted from activities areas/common rooms at night.

It may not be an issue for the subject development. However, clarification of those areas should be addressed in a revised acoustic assessment.

Conclusion

The RSA report (revision 3) that has been submitted with the application for the aged care facility at 25, 25A and 27 Bushlands Avenue, Gordon, is inadequate, flawed, and has a significant number of errors that warrants refusal of the application based on acoustics.

I have provided in Table 1 the likely noise limits that would be applicable to the entire development (based on a visual interpretation of the logger data), as the RSA project specific targets are incorrect.

A proper acoustic assessment is required to identify the likely noise emissions from the site and the noise control measures that are required.

Considering the number of attempts by RSA to provide an acoustic assessment, in my opinion a revised report is required to be prepared and submitted to Council prior to determination of the application.

Yours faithfully,

THE ACOUSTIC GROUP PTY LTD

STEVEN E. COOPER