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Noise Impact Assessment

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DOCUMENT CONTROL REGISTER

Project Number	20160598.1
Project Name	28A McPherson Street, Banksmeadow
Document Title	Noise Impact Assessment
Document Reference	20160598.1/2704A/R0/JS
Issue Type	Email
Attention To	Qanstruct (Aust) Pty. Ltd. Aldo Kersovanic

Revision	Date	Document Reference	Prepared By	Checked By	Approved By
0	27/04/2016	20160598.1/2704A/R0/JS	JS		JS

TABLE OF CONTENTS

1	INTRODUCTION	4
2	PROPOSED DEVELOPMENT AND SITE LOCATION	5
2.1	SURROUNDING USES	5
3	EXISTING ACOUSTIC ENVIRONMENT.....	7
3.1	ENVIRONMENTAL NOISE DESCRIPTORS	7
4	NOISE EMISSION CRITERIA	8
4.1	BOTANY BAY COUNCIL	8
4.2	EPA - INDUSTRIAL NOISE POLICY	9
4.2.1	Intrusiveness Criterion	9
4.2.2	Amenity Criterion	9
4.3	NOISE FROM INCREASED TRAFFIC GENERATION ON PUBLIC STREETS	11
5	ASSESSMENT OF NOISE IMPACTS	12
5.1	NOISE ASSESSMENT METHODOLOGY	12
5.2	DOG NOISE EMISSIONS FROM KENNELS	12
5.2.1	Noise Emission Levels	12
5.2.1.1	Breakout from Internal Spaces within the Kennels	12
5.2.1.2	Noise from External Runs and Exercise Yards	13
5.2.2	Corrections for Annoying Characteristics	13
5.3	NOISE EMISSION PREDICTIONS	14
5.4	TRAFFIC NOISE GENERATION	15
6	DISCUSSION	15
6.1	MODELLING RESULTS	15
7	RECOMMENDATIONS	16
7.1	MECHANICAL PLANT	16
8	CONCLUSION	17

1 INTRODUCTION

Acoustic Logic Consultancy (ALC) have been engaged to conduct an acoustic assessment of noise impacts associated with the proposed kennel facility to be located at 28A McPherson Street, Banksmeadow.

This assessment will address noise impacts associated with:

- Dogs within external yards during the day and evening period;
- Dogs housed within kennel buildings during the night time period;
- Traffic noise generation; and
- Mechanical plant noise in principle.

Noise impacts have been addressed in accordance with:

- Botany Bay City Council Development Control Plan;
- Environment Protection Authority (EPA) Industrial Noise Policy; and
- Environment Protection Authority (EPA) Road Noise Policy.

Predicted noise levels from the operation of the facility as presented in this report indicate that the proposed development can comply with the aforementioned authorities and regulations for all periods of the day, evening and night.

General Note

The facility is not intended as a commercial boarding kennel. In this respect, ALC note the following:

- Noise predictions have been based on noise monitoring conducted by ALC at commercial boarding facilities.
- On the basis that dogs will be permanently located in the facility, it is expected that dogs will be more comfortable in the surrounds and familiar with staff and other dogs within the facility.
- In this regard, ALC would suggest that dogs would be unlikely to bark as frequently as in a normal commercial boarding kennel where dogs only temporarily reside.
- In this report, in predicting noise emissions using data from commercial kennels as a basis, it is likely that predicted noise levels will in fact be louder than what is likely to be generated by the proposed site. The assessment is therefore conservative. If compliant noise levels can be demonstrated using the commercial kennel as a basis for prediction, then compliant levels will also be achieved under the proposed operation.

2 PROPOSED DEVELOPMENT AND SITE LOCATION

The proposed site is located on the currently unoccupied parcel of land located at 28A McPherson Street, Banksmeadow. The proposal is to incorporate the following uses:

- Kennel housing for up to 84 dogs;
- Outdoor runs and exercise yards;
- Office and meeting rooms;
- On grade car parking; and
- Associated amenities.

2.1 SURROUNDING USES

The surrounding uses of the development include the following:

- Industrial uses on the North, South and West boundaries;
- Botany rail corridor to the East of the site.

The nearest noise sensitive residential uses are located approximately 480m to the East of the site beyond the industrial uses across the rail corridor. (Refer Figure 1)

Receiver locations used as a basis for this assessment include the dwellings approximately 480m to the East of the development along Denison Street.



Figure 1: Site Survey and Monitoring Position

3 EXISTING ACOUSTIC ENVIRONMENT

The acoustic environment is categorised by high background noise levels during the day, evening and night due to surrounding industrial uses and traffic along Denison Street.

3.1 ENVIRONMENTAL NOISE DESCRIPTORS

Environmental noise constantly varies. Accordingly, it is not possible to accurately determine prevailing environmental noise conditions by measuring a single, instantaneous noise level.

To accurately determine the environmental noise a 15-20 minute measurement interval is utilised. Over this period, noise levels are monitored on a continuous basis and statistical and integrating techniques are used to determine noise description parameters.

In analysing environmental noise, three-principle measurement parameters are used, namely L_{10} , L_{90} and L_{eq} .

The L_{10} and L_{90} measurement parameters are statistical levels that represent the average maximum and average minimum noise levels respectively, over the measurement intervals.

The L_{10} parameter is commonly used to measure noise produced by a particular intrusive noise source since it represents the average of the loudest noise levels produced by the source.

Conversely, the L_{90} level (which is commonly referred to as the background noise level) represents the noise level heard in the quieter periods during a measurement interval. The L_{90} parameter is used to set the allowable noise level for new, potentially intrusive noise sources since the disturbance caused by the new source will depend on how audible it is above the pre-existing noise environment, particularly during quiet periods, as represented by the L_{90} level.

The L_{eq} parameter represents the average noise energy during a measurement period. This parameter is derived by integrating the noise levels measured over the 15 minute period. L_{eq} is important in the assessment of environmental noise impact as it closely corresponds with human perception of a changing noise environment; such is the character of environmental noise

4 NOISE EMISSION CRITERIA

Noise emissions from the site will be assessed in accordance with the requirements of the Botany Bay Council and the EPA Industrial Noise Policy.

4.1 BOTANY BAY COUNCIL

The Botany Bay Development Control Plan 2013 describes the following requirements for noise emissions from a residential and non-residential interface

5.3.2.7 Residential and Non Residential Interface

- C3 *The design and positioning of all mechanical plant and equipment (i.e. air conditioning units, mechanical ventilation, duct work and exhausts) must be taken into account early on in the design process. The non residential use must not have a negative influence on residential uses concerning noise or odour.*
- C4 *Noise emissions are to comply with the following noise criteria:*
- (i) *The operation of all plant and equipment shall not give rise to an equivalent continuous (LAeq sound pressure level at any point on any residential property greater than 5dB(A) above the existing background LA90 level (in the absence of the noise under consideration).*
 - (ii) *The operation of all plant and equipment when assessed on any residential property shall not give rise to a sound pressure level that exceeds LAeq 50dB(A) day time and LAeq 40 dB(A) night time.*
 - (iii) *The operation of all plant and equipment when assessed on any neighbouring commercial/industrial premises shall not give rise to a sound pressure level that exceeds LAeq 65dB(A) day time/night time.*
- C5 *For assessment purposes, the above LAeq sound levels shall be assessed over a period of 10-15 minutes and adjusted in accordance with EPA guidelines for tonality, frequency weighting, impulsive characteristics, fluctuations and temporal content where necessary.*

The aforementioned criteria will be applied to plant and equipment servicing the site. Noise from dogs barking will be assessed against the requirement so the EPA Industrial Noise Policy.

4.2 EPA - INDUSTRIAL NOISE POLICY

The INP provides guidelines for assessing noise impacts from industrial developments. The recommended assessment objectives vary depending on the potentially affected receivers, the time of day, and the type of noise source. The INP has two requirements which both have to be complied with, namely an amenity criterion and an intrusiveness criterion.

4.2.1 Intrusiveness Criterion

The guideline is intended to limit the audibility of noise emissions at residential receivers and requires that noise emissions measured using the L_{eq} descriptor not exceed the background noise level by more than 5 dB(A).

Background noise levels and traffic noise levels have been adopted from the approved Wilkonson Murray 'Noise & Vibration Impact Assessment' dated November 2013 and 'Supplementary Traffic Noise Monitoring' report dated August 2014 for an adjoining site. Background noise levels detailed in the report for the residents along Denison Street will be acoustically acceptable.

Intrusive criteria based on the noise monitoring conducted at the site are detailed in Table 1.

Table 1 – INP Intrusiveness Criteria

Time of day	Background Noise Level dB(A) L_{90}	Intrusiveness Criteria (Background+5dB(A)) dB(A) L_{eq}
Day	45	50
Evening	45	50
Night	45	50

4.2.2 Amenity Criterion

The guideline is intended to limit the absolute noise level from all noise sources to a level that is consistent with the general environment.

The Industrial Noise Policy sets out acceptable noise levels for various land uses. Table 2.1 on page 16 of the policy has four categories to distinguish different residential areas. They are rural, suburban, urban and urban/industrial interface.

ALC would consider the receiver as Urban given that receivers are susceptible to an acoustic environment which:

- Has through traffic characteristically heavy and continuous traffic flows during peak periods
- Is near commercial districts or industrial districts

Table 2 – INP Amenity Criteria

Type of Receiver	Time of day	Recommended Acceptable Noise Level dB(A) L_{eq}
Residential (Urban)	Day	60
	Evening	50
	Night	45
Industrial	When in use	70

Further to above, given that the site is located within a high traffic noise impact zone, the amenity criterion shall be adjusted accordingly as per Section 2.2.3 of the INP. The INP states that high levels of transportation noise may render an industrial source effectively inaudible even though the L_{Aeq} noise level from that industrial noise source may exceed the recommended acceptable amenity noise level. The methodology associated with this assessment is as follows:

- Establish the L_{Aeq} (time period) noise level at the most affected residence from the operation of the facility.
- If the L_{Aeq} (time period) is more than 10dB(A) above the established recommended amenity criterion for the area, the new planning objective becomes 10dB(A) below the L_{Aeq} (time period).

Utilising the modification factors in Table 2.2 of the INP and the traffic noise levels as per above, the amenity criteria becomes the following:

Table 3 – INP Adjusted Amenity Noise Criteria

Time of Day	Acceptable noise level, dB(A) L_{eq} (period)	Existing L_{eq} noise level from industrial noise sources, dB(A)	Existing L_{eq} noise level from traffic sources, dB(A)	Modification factor	Adjusted Amenity criterion, dB(A) L_{eq} (period)
Day	60	Negligible	70	$L_{eq} - 10\text{dB(A)}$	No adjustment
Evening	50	Negligible	70	$L_{eq} - 10\text{dB(A)}$	60
Night	45	Negligible	67	$L_{eq} - 10\text{dB(A)}$	57

4.3 NOISE FROM INCREASED TRAFFIC GENERATION ON PUBLIC STREETS

Council has no specific noise criteria with respect to traffic generation associated with developments. In the absence of this, EPA guidelines can be used for assistance.

For land use developments with the potential to create additional traffic the development should comply with the requirements for new developments detailed in the EPA Road Noise Policy, when measured at the façade of the nearest residences.

Table 4 - Criteria for Traffic Noise for New Developments

Time of day	Criteria for Acceptable Traffic Noise Level Sub-arterial Roads - dB(A)
Day (7am to 10pm)	60 L _{Aeq} (15hr)
Night (10pm to 7am)	55 L _{Aeq} (9hr)

However, if existing noise levels exceed those in the table above, the provisions of section 3.4 of the Road Noise Policy will apply.

If practicable, noise on public roads as a result of increased traffic generation should not result in an increase in traffic noise level of more than 2dB(A). In this regard, the Policy relevantly states *“an increase of up to 2dB represents a minor impact that is considered barely perceptible to the average person”*.

5 ASSESSMENT OF NOISE IMPACTS

5.1 NOISE ASSESSMENT METHODOLOGY

Noise from the operation of the kennels has been assessed for residential receivers to the East of the development. The methodology used to assess noise from the kennels is detailed below:

1. Establish noise limits for the day, evening and night time periods for general operation as per the Industrial Noise Policy and Botany Council acoustic guidelines.
2. Conduct a comprehensive assessment of noise emissions from kennel buildings for the night time period. That is; noise transmission through any ventilation openings, walls, ceiling/roof and entry doors. (Assessed in Section 5.2.1.1)
3. Conduct a comprehensive assessment of noise emissions from dogs within runs and the external yards for the day and evening period. (Assessed in Section 5.2.1.2)
4. Recommendation of acoustic treatment, operational and management controls to ensure that the acoustic criteria established in the assessment are maintained. (Detailed in Section 7.)

The specific assumptions of operation including sound levels used for the assessment of the proposed kennel are presented in the discussion following.

5.2 DOG NOISE EMISSIONS FROM KENNELS

Noise from the kennels have been assessed for the following:

- Noise breaking out of the kennel buildings during the night time assessment period with dogs located internally only; and
- Noise from dogs within the external kennel runs and yards during the day time period.

The typical nature of noise and the operation of the kennel during these two periods are discussed in detail below.

5.2.1 Noise Emission Levels

In order to undertake the noise modelling, typical noise emission levels for dogs needs to be established.

5.2.1.1 Breakout from Internal Spaces within the Kennels

Noise from internal spaces in the kennels will potentially be generated at any time of day. Noise impacts will therefore be assessed against the night time acoustic criteria (the strictest acoustic criteria).

Noise emission levels for dogs located internally within the kennel have been assessed based on the following:

- The noise levels in the proposed (enclosed) kennels will be similar to the noise levels measured within an existing operating kennel facility located at Kingsford Smith Airport.

Measured noise levels recorded during operation were 89dB(A) L_{eq} (based on the top 10 percent of events) with maximum noise events of 103dB(A) $L_{1(1min)}$. These levels are based on long term noise monitoring. It is noted that the monitoring indicated that night time noise levels are significantly lower than daytime noise levels, so the use of this highest 10th percentile noise level to predict night time noise impacts (as we have done) produces a conservative assessment.

- The stated noise levels presented above will, in addition be penalised (increased) to account for annoying characteristics (tonality and impulsiveness). Refer below.

5.2.1.2 Noise from External Runs and Exercise Yards

A typical noise emission level for dogs located externally has been determined from long-term data obtained at an existing kennel. A representative noise level for each dog was determined using the following methodology:

- A SoundPlan™ computer model was developed representing the monitored kennels using the number of dogs housed at the kennels during the monitoring period as external noise sources and the layout of the monitored kennels.
- The model was calibrated by varying the noise emission level per dog until the noise level predicted by the modelling at the monitoring location matched the level measured at the monitoring location.

The sound power level determined from this analysis was 96.3 dB(A) L_{eq} per dog housed in the facility and permitted to be use an external run or yard. The noise emission level will be penalised (increased) to account for annoying characteristics (tonality and impulsiveness). Refer below.

This dog noise emission level is the level used in the subsequent modelling to determine the typical worst case noise emission level per dog housed at the proposed kennel.

5.2.2 Corrections for Annoying Characteristics

Noise from dogs barking have been assessed for potentially annoying characteristics as per Table 4.1 of the INP.

Overall, the noise source data presented in sections 5.2.1.1 and 5.2.1.2 will be increased a further 3dB(A) to account for irritating noise qualities (impulsiveness) as is consistent with EPA guidelines.

5.3 NOISE EMISSION PREDICTIONS

Predictions were made for the two following scenarios:

- All dogs located within kennel buildings representing the worst case scenario for night time noise emissions.
- All dogs permitted to be external to model the worst case day scenario.

The assumptions used in the model are:

- Layout of the kennels as depicted in the Qanstruct Pty Ltd drawings circulated 26 April 2016.
- The facility will hold a maximum of 84 dogs at any one time.
- Up to five dogs have been assumed in each external yard with the remainder of the dogs within external runs during the day time period.
- The dog noise emission levels for internal and external dogs as indicated in Section 5.2.1 penalised for impulsiveness.

The model takes into account the noise reduction provided by the building fabric, distance losses, directivity, barrier effects, etc.

The building fabric has modelled as per the following:

- Light weight walls;
- Open air for louvres and metal mesh as indicated on the development application drawings;
- Sheet metal roofs.

Table 5 below shows the predicted noise levels from dog barking.

Table 5 – Predicted Activity Noise Levels At Nearest Noise Sensitive Receiver

Source	Receiver	Time	Predicted Noise Level L_{eq}	Noise Level Criteria $dB(A) L_{eq}$ (period)	Complies
Dogs barking within internal kennels	Denison Street	Night	45	50	Yes
Dogs barking in external runs and yard	Denison Street	Day	46	50	Yes

*NOTE - Predicted levels have been corrected to account for impulsive characteristics for internal and external spaces.

5.4 TRAFFIC NOISE GENERATION

ALC notes that vehicles will exit the development via Nant and McPherson Street will not pass any residential properties in the immediate vicinity of the site.

On this basis, the potential for noise impact associated with additional road traffic generated by the development will be negligible and as such will be compliant with the requirements of the Road Noise Policy.

6 DISCUSSION

6.1 MODELLING RESULTS

The modelling indicates that noise emissions from dogs barking will be 4dB(A) below the assessment criterion during the day and night for residential receivers.

The background noise levels adopted for the assessment are considered conservative. Noise monitoring conducted by Marshall Day along Denison Street for traffic noise indicates background noise levels at these receivers in the order of 55dB(A) L_{90} during the day and 50dB(A) L_{90} during the night time period as opposed to the 45dB(A) L_{90} adopted for this assessment.

The predicted noise levels from the general operation of the kennel facility have been based on worst case scenarios for dog barking for the various periods during the day.

As previously discussed in Section 1, noise predictions have been based off noise monitoring from a commercial boarding kennel. It is likely that dogs within a commercial kennel would be more likely to bark given unfamiliar surrounds when compared to the proposed development. It is therefore likely that the noise generation will be even lower than the levels predicted in section 5.3 of this report.

For night time noise this includes the assumption that all dogs are awake at night, which is a conservative assumption based on long-term monitoring noise of a similar kennel. This monitoring indicated night time noise levels are lower than the maximum level generated throughout the complete day.

7 RECOMMENDATIONS

Given that the kennel buildings are not fully enclosed (i.e. open louvres, chain mesh) and comply with the noise emission criteria for the day, evening and night, no additional acoustic treatments or management conditions are recommended for the kennel buildings.

All dogs have been assessed in outdoor runs and exercise areas during the daytime period and will be compliant with the noise emission criteria. On this basis, no additional acoustic treatments or management controls are recommended for external runs or exercise yards.

7.1 MECHANICAL PLANT

The proposal will include ancillary mechanical services plant (*e.g. condensing units, exhaust fans, etc*). As detailed plant selections and plans are not available at this stage, it is not possible to carry out a detailed examination of the ameliorative measures that may be required in order to achieve the project acoustic objectives.

Mechanical plant servicing the kennel facility is to be designed and installed to ensure compliance with the Botany Bay City Council criteria in conjunction with noise emissions from the general operation of the facility.

Exhaust fans or condensing units not exceeding 95dB(A) sound power level will not warrant any further acoustic assessment given the proximity of residents to the proposed development.

8 CONCLUSION

This report presents the acoustic assessment of noise impacts associated with the proposed kennel facility to be located at 28A McPherson Street, Banksmeadow.

ALC have concluded that:

- Noise from dogs barking externally to the building during the day and evening period and dogs barking within kennels during the night time period will comply with the requirements of the EPA Industrial Noise Policy without the need for additional acoustic treatment or management controls.
- Noise associated with mechanical plant should be assessed upon selection of equipment to ensure compliance with the requirements of Botany Bay City Council
- Traffic generation associated with the site will have negligible noise impact on surrounding residential locations when assessed in accordance with the EPA Road Noise Policy.

We trust this information is satisfactory. Please contact us should you have any further queries.

Yours faithfully,



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