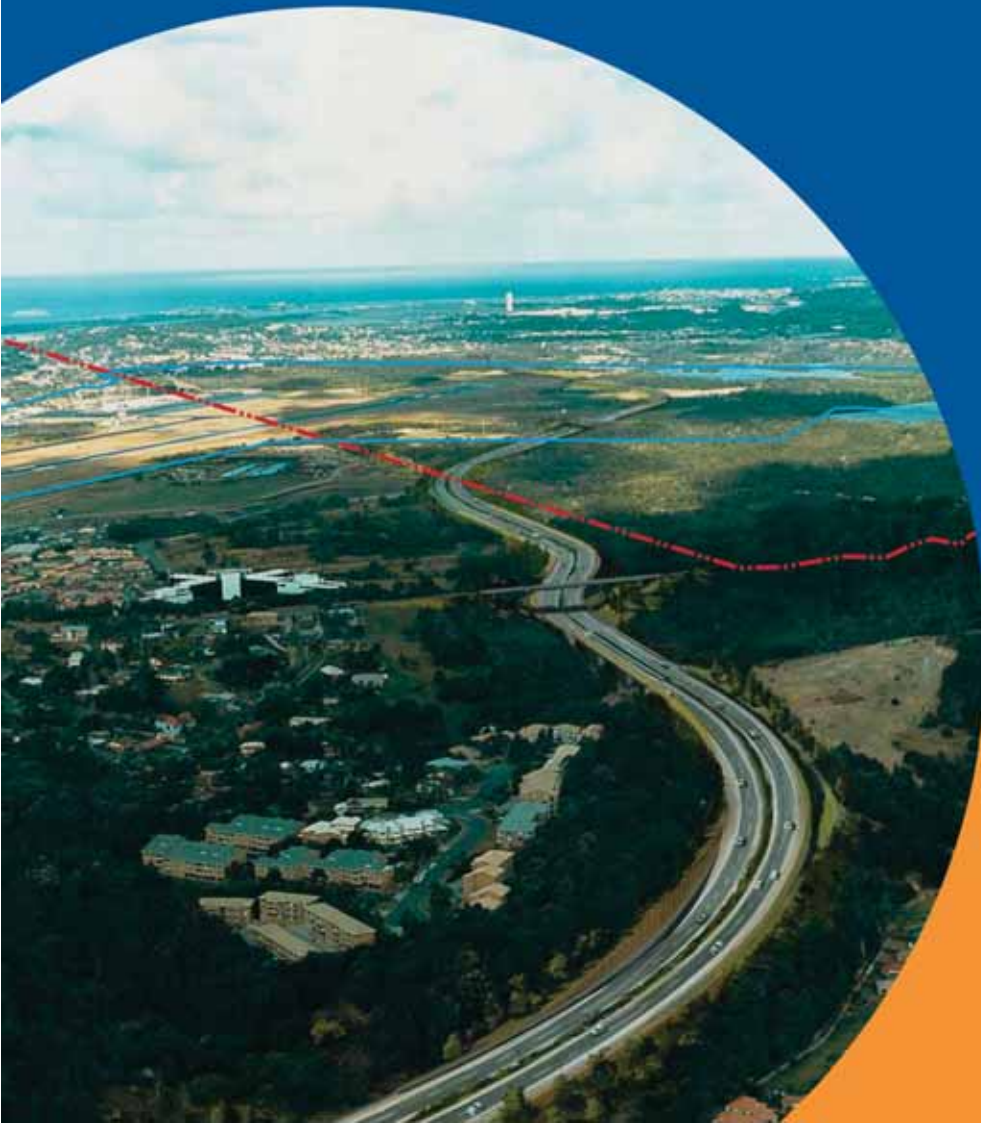


TUGUIN BYPASS

stewart road to kennedy drive



Technical Papers

December 2004

Tugun Bypass Environmental Impact Statement

Technical Paper Number 10 Noise and Vibration



Tugun Bypass Alliance

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Glossary

Term	Meaning
A-Weighting	The acoustic weighting given to measured sound pressure levels to approximate the frequency sensitivity of the human ear to incident sound, i.e. measurements in dB(A) approximate the response of the human ear to incident sound levels
AADT	Annual Average Daily Traffic Volume
Ambient Sound	The totally encompassing sound in a given situation at a given time, composed of sound from all sources near and far.
Background Noise Level	Measured as the $L_{A90,T}$ which is the A-weighted sound pressure level that is equal to or exceeded for 90% of the time interval considered in the absence of the noise under investigation
Day	Queensland - Construction Noise: Reference time interval between 07:00 and 18:00 weekdays; or 08:00 and 18:00 Saturdays NSW - Road Traffic Noise: Reference time interval between 07:00 and 22:00
Evening	Queensland – Construction Noise: Reference time interval between 18:00 and 22:00 weekdays
$L_{Aeq,T}$	The equivalent continuous A-weighted sound pressure (or noise) level for a time interval T. Examples of $L_{Aeq,T}$ used in this report are $L_{Aeq,1\text{ hour}}$, $L_{Aeq,9\text{ hour}}$, $L_{Aeq,15\text{ hour}}$ and $L_{Aeq,24\text{ hour}}$
L_{Amax}	The maximum A-weighted sound pressure level
$L_{A10,T}$	The A-weighted sound pressure (or noise) level that was exceeded for 10% of the measurement time interval T. $L_{A10,T}$ is often considered to approximate the average maximum level and is determined by statistical analysis of the sound pressure levels measured during time interval T. Examples of $L_{A10,T}$ used in this report are $L_{A10,1\text{ hour}}$, $L_{A10,4\text{ hour}}$, $L_{A10,9\text{ hour}}$, $L_{A10,11\text{ hour}}$, $L_{A10,12\text{ hour}}$ and $L_{A10,18\text{ hour}}$
LA10 (18 hour)	The LA10 (18 hour) noise level used in this assessment for the Queensland section of the study area can be defined as the arithmetic average of eighteen hourly LA10(1 hour) noise levels over consecutive hours between 6:00 am and midnight.
$L_{A90,T}$	The A-weighted sound pressure (or noise) level that was exceeded for 90% of the measurement time interval T. $L_{A90,T}$ is considered to approximate the background noise level and is determined by statistical analysis of the sound pressure levels measured during time interval T. Examples of $L_{A90,T}$ used in this report are $L_{A90,1\text{ hour}}$, $L_{A90,4\text{ hour}}$, $L_{A90,9\text{ hour}}$ and $L_{A90,11\text{ hour}}$.
Night	Queensland - Construction Noise: Reference time interval between 22:00 and 07:00 weekdays NSW - Road Traffic Noise: Reference time interval between 22:00 and 07:00
N70	Noise contour drawn around airports based upon the number of aircraft noise events measured that exceed a maximum sound level of 70 dB(A)
RMS	Root Mean Square (e.g. rms vibration levels)
Sound Power Level	The acoustic power level of a source that emits noise quantified as dB re 10^{-12} W
Sound Pressure Level	The sound (or noise) level produced by a noise source, in units of A-weighted decibels dB(A) for this report

1. Introduction

1.1 Purpose and Approach

The purpose of the assessment is to identify and characterise the nature and extent of noise impacts generated by road construction activities and road traffic on the proposed Tugun Bypass with respect to sensitive receptors in the study area. A program of noise mitigation is outlined to manage the predicted noise issues.

The noise assessment was conducted in accordance with the requirements of the terms of reference, and comprised the following:

- collection and review of all documents, drawings and specifications pertinent to the study;
- assessment of construction noise and vibration;
- detailed road traffic noise modelling using the Calculation of Road Traffic Noise (CoRTN) Method (implemented in SoundPLAN software, in accordance with Queensland Main Roads' *Road Traffic Noise Management: Code of Practice*, the *Environmental Criteria for Road Traffic Noise* (NSW Environment Protection Authority 1999) and *Environmental Noise Management Manual* (NSW Roads and Traffic Authority 2001) (NSW RTA);
- verification of SoundPLAN 6.2 noise model against baseline noise monitoring for existing traffic volumes for the Tweed Heads Bypass;
- prediction of noise levels for predicted 2007 and 2017 traffic volumes; and
- evaluation of noise reduction options.

1.2 Summary of the Technical Paper

This technical paper provides an assessment of the noise and vibration impacts associated with the construction and operation of the proposed Tugun Bypass.

The report outlines the relevant legislative and best practice guidelines that regulate noise and vibration for road construction and operation in Queensland, in NSW and on Commonwealth land.

Baseline noise monitoring was conducted at fourteen locations near the proposed corridor (seven in Queensland and seven in NSW). The noise environment along the proposed alignment includes contributions from road traffic, aircraft from Gold Coast Airport, birds, insects, wind movement in trees and general residential noise. In Queensland, road traffic noise from the Gold Coast Highway dominates the ambient acoustic environment in the study area. In NSW, road traffic on the Tweed Heads Bypass dominates ambient noise levels near the noise-sensitive receivers in the study area.

Construction noise would be generated from a number of sources including haulage vehicles, heavy machinery and equipment used for excavation. No blasting is proposed for the construction of the bypass.

In Queensland, standard construction hours are between 7:00 am and 6:00 pm Monday to Friday and between 8:00 am and 1:00 pm Saturdays (adjacent to noise

sensitive areas). Queensland Department of Main Roads would endeavour to undertake construction within these hours wherever possible.

In NSW, standard construction hours are between 7:00 am and 6:00 pm Monday to Friday and between 8:00 am and 1:00 pm Saturdays (adjacent to noise sensitive areas). It is predicted that relevant noise level guidelines would be exceeded at a number of locations during various stages of the work, and hence proper management of noise emissions is required to avoid significant impacts. Mitigation measures would include adherence where possible to recommended standard construction hours, installation of temporary noise barriers, fitting of silencers on mobile equipment engines and maximising distances between potentially noisy plant items and nearby sensitive receivers.

The technical paper also examines the extent and likely impact of vibration from construction activities. Vibration may result from activities such as pile driving and the use of vibrating steel drum rollers. Damage to buildings or sleep disturbance is unlikely considering no blasting works are proposed, the alignment is at least 20 m from sensitive buildings and locations where pile driving may be required are greater than 60 m from sensitive buildings.

The technical paper also addresses operational road traffic noise according to each state's assessment requirements.

In Queensland, road traffic noise criteria are based on the predicted traffic volumes and composition for the 10-year projected design horizon after project completion in 2007, which would be 2017.

In NSW, road traffic noise criteria were derived from 2007 predictions and applied to the year 2017 scenario. NSW criteria are divided into day (7:00 am to 10:00 pm) L_{Aeq} (15 hour) and night-time (10:00 pm to 7:00 am) L_{Aeq} (9 hour) levels.

On Commonwealth land (Gold Coast Airport) the criterion from the Airports (Environment Protection) Regulations 1997 was applied.

NSW RTA noise criteria would be exceeded at 67 dwellings in 2017 without noise mitigation. Recommended noise mitigation measures include the use of low-noise asphalt on carriageways and the provision of noise barriers. The final design of noise mitigation measures would be selected during the detailed design phase following a detailed analysis of practical issues, cost-effectiveness, visual impacts, community and affected-owner preference in consultation with regulatory authorities and with the approval of relevant departments.

Overall, this technical paper makes the following findings:

- All of the residences on the existing Gold Coast Highway and many of the residences along the Tweed Heads Bypass would experience reduced road traffic noise levels in 2007 and 2017 as a result of the bypass.
- In Queensland, residences south of Stewart Road would experience increased road traffic noise levels. Noise mitigation measures would be incorporated to reduce road traffic noise impact for these receptors.
- In NSW, the 'base' noise criteria can be met with 'feasible' mitigation measures, though the 'allowance' criteria is met with 'reasonable' noise mitigation. However, for receptors affected by noise from the new works, noise levels would be

significantly reduced compared with the situation existing prior to opening of the bypass.

- The bypass can be constructed in general compliance with Queensland and NSW construction noise and vibration guidelines using the recommended management measures. However, care would be necessary during the construction process to ensure that potential impacts are minimised.

2. Legislative Requirements and Guidelines

2.1 Queensland

2.1.1 Environmental Protection Act 1994

The Queensland *Environmental Protection Act 1994* provides the legislative framework to protect the environment in Queensland within the context of ecologically sustainable development. Under Section 319 of the Act all persons have a general environmental duty not to carry out any activity that causes, or is likely to cause, environmental harm unless the person take all reasonable and practicable measures to prevent or minimise the harm. In deciding the measures required to be undertaken regard must be had to, for example:

- a) the nature of the harm or potential harm;
- b) the sensitivity of the receiving environment;
- c) the current state of technical knowledge for the activity;
- d) the likelihood of successful application of the different measures that might be taken; and
- e) the financial implications of the different measures as they would relate to the type of activity.

2.1.2 Environmental Protection (Noise) Policy 1997

The *Environmental Protection (Noise) Policy 1997* is subordinate legislation to the *Environmental Protection Act 1994* and has the objective of protecting the acoustic environment. It provides the framework on which planning levels may be determined to protect the ambient noise environment enjoyed by the community.

The long-term objective of the *Environmental Protection (Noise) Policy 1997* is to achieve an ambient L_{Aeq} (24 hour) noise level of 55 dB(A) or less for the majority of Queensland's population living in residential areas.

The *Environmental Protection (Noise) Policy 1997* introduces the concept of 'beneficial assets'. A 'beneficial asset' is an airport, approved industrial estate, navigable waterway, public road or railway. It is recognised that, although the operation or use of beneficial assets may have significantly adverse effects on the environmental values, they are necessary for the community's environmental, social and economic well-being. However, it is intended that, as far as practical, any significantly adverse effects from their use or operations be progressively reduced.

2.1.3 Environmental Protection Amendment Regulation (Number 2) 1999

The Queensland Environmental Protection Agency would expect proponents to meet their general environmental duty under Section 319 of the *Environmental Protection Act 1994* and show due diligence in relation to seeking compliance with the Environmental Protection Regulation 1998.

The Environmental Protection Agency would therefore require that the proponents of the project demonstrate that best practice environmental management be applied to all aspects of construction activities.

2.1.4 Main Roads' Road Traffic Noise Management: Code of Practice

The *Road Traffic Noise Management – Code of Practice* (Main Roads 2000) demonstrates Main Roads' general environmental duty by establishing and implementing best practice environmental management, as required under the Queensland *Environmental Protection Act 1994*.

The purpose of the code is to provide guidance and instruction for the assessment, design and management of the impact of road traffic noise in Queensland. Specifically, the objectives of the code are to:

- advise on the appropriate criteria for road traffic noise;
- establish consistent methodologies for designating priorities for noise attenuation works throughout Main Roads;
- identify amenity and other technical considerations in managing the impact of road traffic noise;
- endeavour to achieve the use of best practice management for road traffic noise issues; and
- recommend criteria to assist in the achievement of desired environmental outcomes for road traffic noise.

2.2 NSW

2.2.1 Environmental Planning and Assessment Act 1979

Under Section 111(1) of the *Environmental Planning and Assessment Act 1979*, a 'determining authority' deciding whether to approve a proposed 'activity' must take into account, to the fullest extent possible, all matters affecting or likely to affect the environment.

2.2.2 Environmental Planning and Assessment Regulation 2000

The Environmental Planning and Assessment Regulation 2000 sets out procedures for the assessment of environmental impacts in NSW. This includes assessment of activities that may involve the pollution of the environment such as the construction and operation of a road.

2.2.3 Protection of the Environment Operations Act 1997

The *Protection of the Environment Operations Act 1997* provides for the control of noise from various sources in NSW. It includes motor vehicles, industry, construction, water craft, products and neighbourhood sources. Under this Act the NSW Environment Protection Authority may issue environment protection licences and notices to control noise.

Anyone carrying out a 'scheduled activity' as listed in Schedule 1 of the Act must obtain an environmental protection licence from the NSW Environment Protection Authority before the activity may commence. Scheduled activities include some types of freeway construction. In issuing an environmental protection licence for a 'scheduled activity' the NSW Environment Protection Authority may impose conditions for the monitoring and mitigation of environmental impacts, including traffic noise and construction noise and vibration.

2.2.4 Environmental Criteria for Road Traffic Noise

The *Environmental Criteria for Road Traffic Noise* was developed by the NSW Environment Protection Authority (1999) in close consultation with the NSW RTA and other stakeholders. It presents comprehensive noise level criteria for:

- new and 'redeveloped' roads of various types in urban and rural areas;
- new residential developments affected by traffic noise;
- land use developments that might create additional traffic on different types of roads; and
- particularly sensitive type of land uses (e.g. school classrooms, hospital wards, churches, active recreation areas, passive recreation areas and school playgrounds).

The *Environmental Criteria for Road Traffic Noise* sets out noise measurement and assessment methodologies and strategies for reducing traffic noise. It also establishes target noise levels for a range of developments and land uses.

Noise levels higher than the target levels may be specified in planning approvals if it can be demonstrated that the target levels cannot be met by applying 'all feasible and reasonable mitigation measures'. In these cases, the target levels should be approached with the aim of adopting strategies that will achieve the criteria in the longer term.

In this context, 'feasibility' refers to engineering practicality, while 'reasonableness' is to be judged by taking account of:

- noise mitigation benefits and costs;
- community views and aesthetic impacts;
- existing and future noise impacts at affected land uses; and
- the benefits of the proposed development.

2.2.5 NSW RTA Environmental Noise Management Manual (2001)

The NSW RTA *Environmental Noise Management Manual* (2001) is primarily intended as a guide for NSW RTA staff, acoustic consultants and other contractors. It defines the NSW RTA's guiding principles in managing noise and vibration from the roads it controls and details the noise and vibration management framework for:

- new, upgraded and existing roads and transitways;
- individual vehicles; and
- road construction and maintenance works.

The NSW RTA *Environmental Noise Management Manual* (2001) therefore provides advice regarding the interpretation and application of the *Environmental Criteria for Road Traffic Noise* to specific situations and circumstances regarding road traffic noise in NSW.

2.2.6 NSW Environment Protection Authority Environmental Noise Control Manual

The NSW Environment Protection Authority *Environmental Noise Control Manual* (1994) provides guidelines for managing noise from a wide variety of environmental noise sources and situations. Parts of the manual have been superseded by the NSW

Industrial Noise Policy 2000 but many of the guidelines are still regularly used for the subject activities or sources.

2.2.7 NSW Industrial Noise Policy 2000

The NSW *Industrial Noise Policy 2000* sets criteria and objectives for the management of noise impacts from industrial and commercial sites. It does not cover the management of road traffic noise or construction noise.

The 'tenth percentile method' for determining the background L_{A90} (15 minute) noise level that is specified in the policy, should be applied, however, in the assessment of construction noise for the proposed bypass.

2.3 Commonwealth

2.3.1 Airports (Environment Protection) Regulations 1997

The relevant road traffic noise criteria for sections of road within Gold Coast Airport are contained in the Airports (Environment Protection) Regulations 1997, Division 2 – Offensive Noise and Schedule 4. These regulations provide noise level criteria for noise generated from road traffic on the site of an operator of an undertaking at an airport.

3. Existing Noise Environment

3.1 Noise Monitoring Procedures

The noise environment along the proposed Tugun Bypass alignment includes contributions from road traffic, aircraft from Gold Coast Airport, birds, insects, wind movement in trees and general residential noise. Road traffic on the Gold Coast Highway and the Tweed Heads Bypass dominates ambient noise levels in the study area.

The noise contribution of aircraft approaching and departing the Gold Coast Airport is included in all monitoring data recorded at unattended monitoring locations. Aircraft noise was manually excluded from all attended monitoring locations as shown in Table 3.1.

Baseline noise monitoring was conducted at seven locations in NSW and seven in Queensland near the proposed corridor. The noise monitoring procedures are detailed in Appendix A. Meteorological data for the monitoring periods, was obtained from the Bureau of Meteorology Station at Gold Coast Airport. Noise levels recorded in periods of wind or rain that exceeded the acceptable meteorological conditions for valid noise measurements specified in AS 1055-1997 were interpolated to complement the data set.

3.2 Noise Monitoring Locations

3.2.1 Queensland

Seven monitoring locations were selected in Queensland to provide an indication of existing baseline noise levels at sensitive receptors along the Queensland section of the proposed corridor. Noise logging was conducted over a series of continuous 24-hour periods.

Monitoring locations were selected in consultation with Main Roads following site inspections along the proposed corridor. The locations are shown on Figure 3.1 and are described as follows.

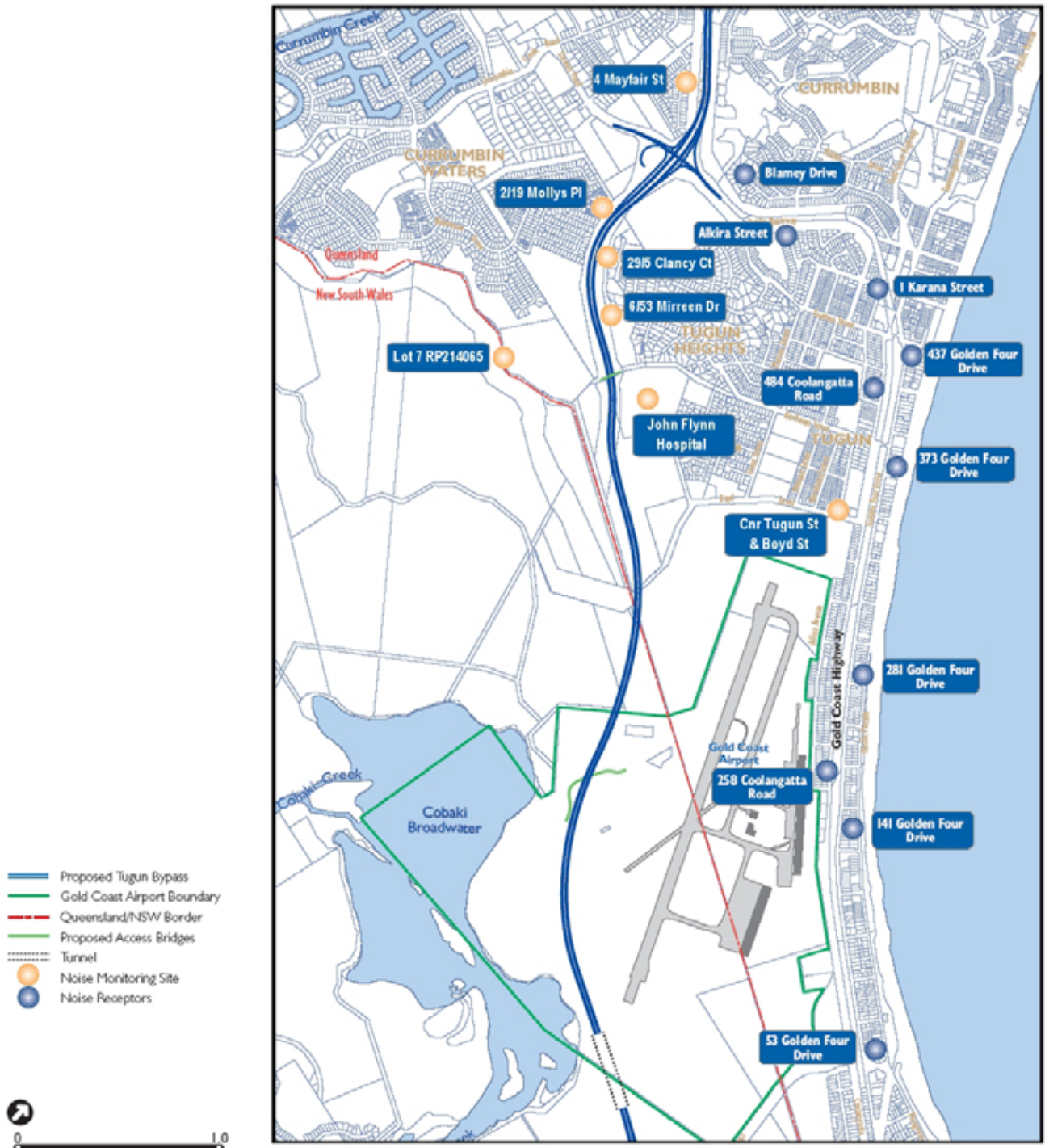


Figure 3.1 Noise Monitoring Locations - Queensland

Figure 3.1: Noise Monitoring Locations – Queensland

4 Mayfair Street, Currumbin Waters, Queensland

Mayfair Street is a residential street north of Stewart Road and to the west of the proposed corridor. The noise logger (ARL EL215 – Serial Number – 194556) was located on the roof of the carport (located adjacent to the two storey residential dwelling) to record noise at the second storey, approximately 1 m from the bedroom window. The monitoring period was from 29 September to 7 October 2000.

2/19 Mollys Place, Currumbin Waters, Queensland

Mollys Place is a residential street located at the northern end and to the west of the proposed corridor. The noise logger (ARL EL315 – Serial Number – 15-299-451) was installed in the backyard of 2/19 Mollys Place. The majority of receptors adjacent to this location are single storey. The monitoring period was from 6 to 14 November 2000.

29/5 Clancy Court, Tugun Heights, Queensland

Clancy Court is a residential street parallel to the proposed corridor. The logger (ARL EL315 – Serial Number – 15-299-444) was installed on the balcony of a third storey dwelling, facing north-east. This position would be directly exposed to traffic noise from the proposed bypass. The monitoring period was from 6 to 14 November 2000.

6/53 Mirreen Drive, Tugun Heights, Queensland

Mirreen Drive is a residential street perpendicular to the proposed bypass corridor. This residential dwelling is located at the southern end of Mirreen Drive and is representative of several dwellings located close to the route. The logger (ARL EL315 – Serial Number – 15-299-443) was located within the patio area overlooking the proposed bypass. The monitoring period was from 6 to 14 November 2000.

Lot 7 RP214065, Currumbin Waters, Queensland

Property Lot 7 RP214065 extends from the proposed corridor boundary to the Queensland-NSW border. The dwelling is a large three-storey sandstone structure with large openable doors and windows. It is located at an elevated position giving direct line of sight to the corridor. The facade is located at a distance of approximately 500 m from the proposed bypass. The noise logger (ARL EL215 – Serial Number – 194556) was located on the patio of the main bedroom on the third floor. Monitoring was conducted over the period 30 May to 8 June 2001.

John Flynn Hospital and Medical Centre, Tugun, Queensland

The logger was installed on the fourth floor balcony of the disused accommodation building facing in a southerly direction. At this location the contribution of noise from hospital plant located on the roof of the main hospital building was minimised. The noise logger (ARL EL215 – Serial Number – 194556) was used over the period from 29 August to 7 October 2000.

Corner of Tugun and Boyd Streets, Tugun, Queensland

The junction of Tugun Street and Boyd Street is located at the northern perimeter of the Gold Coast Airport. The logger (ARL EL315 – Serial Number – 15-299-444) was set up on the north-western corner of the intersection and selected to assess the impact of increased traffic volumes on Boyd Street. The monitoring period was from 21 to 29 August 2000.

3.2.2 NSW

Seven monitoring locations were selected in NSW near the NSW section of the proposed Tugun Bypass corridor to provide an indication of existing baseline noise levels. Five of the noise monitoring locations were suitable for verification of the noise model and the other two were more appropriately used for construction noise level assessment. Unattended noise logging was conducted at four locations over a series of continuous 24-hour periods. Attended noise monitoring was conducted at three locations for 3 hours each.

Monitoring locations were selected following site inspections along the proposed corridor. The locations are shown on Figure 3.2 and are described as follows.

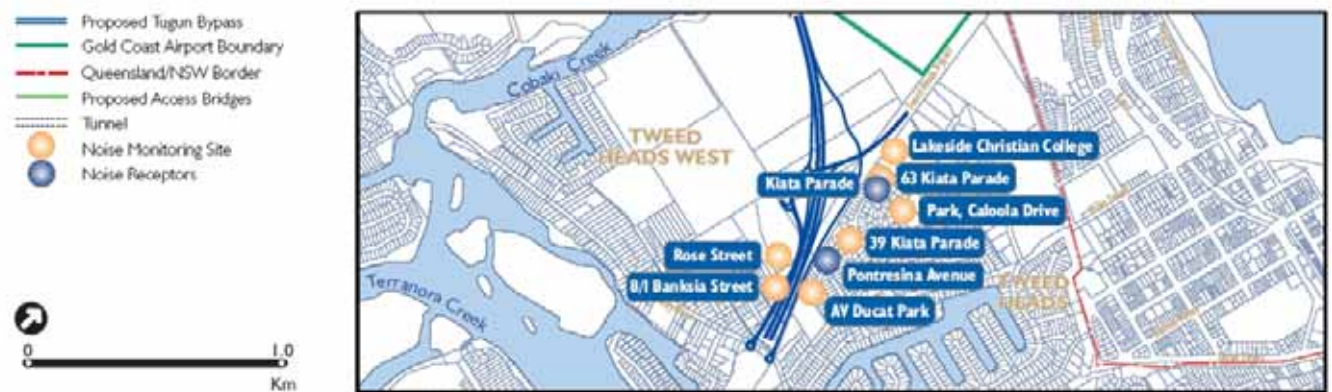


Figure 3-2 Noise Monitoring Locations - New South Wales

Figure 3.2: Noise Monitoring Locations - NSW

Noise Monitoring Locations for Construction Noise Assessment:

- 63 Kiata Parade, Tweed Heads, NSW

Kiata Parade is an urban street parallel to the existing Tweed Heads Bypass and the proposed bypass alignment. The noise logger (ARL EL315 – Serial Number – 15-299-443) was installed to measure noise levels at sensitive receptors adjacent to the Tweed Heads Bypass, NSW and was located approximately 1 m from the most exposed façade of the dwelling. This position has an unobstructed line of sight to the existing Tweed Heads Bypass. The monitoring period was from 21 to 29 August 2000.

- 8/1 Banksia Street, Tweed Heads West, NSW

Banksia Street is an urban street located close to the proposed corridor alignment. The noise logger (ARL EL315 – Serial Number – 19455) was located at the external façade of 8/1 Banksia Street. This location was selected to measure noise levels at sensitive receptors adjacent to the Tweed Heads Bypass, NSW. The monitoring period was from 21 to 29 August 2000.

Noise Monitoring Locations for Noise Model Verification:

- 39 Kiata Parade, Tweed Heads, NSW

Kiata Parade is an urban street parallel to the existing Tweed Heads Bypass and the proposed bypass alignment. The noise logger (ARL EL215 – Serial Number – 194521) was installed to measure noise levels at sensitive receptors adjacent to the Tweed

Heads Bypass, NSW and was located approximately 1 m from the most exposed façade of the dwelling. This position has an unobstructed line of sight to the existing Tweed Heads Bypass. The monitoring period was from 10 to 26 March 2003.

- Lakeside Christian College, Tweed Heads, NSW

Lakeside Christian Centre is located on Caloola Drive at Tweed Heads. The noise logger (ARL EL215 – Serial Number – 194651) was located at the external façade of the school block closest to the Tweed Heads Bypass. This location was selected to measure noise levels at the school so future indoor noise levels can be determined. The monitoring period was from 10 to 26 March 2003.

- AV Ducat Park, Ducat Street, Tweed Heads, NSW

The measurement was taken on the 11 March 2003 at the north-western corner of AV Ducat Park at Tweed Heads. The monitoring point was 11 m south from the neighbouring property boundary (house located on Moolau Avenue) and 5 m from the fence that separates the park from the road reserve. The measurement was started at 10:50 am and continued for 3 hours until 2:00 pm. Aircraft noise from Gold Coast Airport was paused out of the measurement.

- Park, Caloola Drive, Tweed Heads, NSW

The measurement was taken on the 25 March 2003 at the large area of parkland on Caloola Drive at Tweed Heads. The monitoring point was 16 m from the road-side edge of Caloola Drive, in front of number 92. The measurement was started at 10:15 am and continued for 3 hours until 1:15 pm. Any extraneous noise was removed from the measurement.

- Vacant Land, Rose Street, Tweed Heads West, NSW

The measurement was taken on the 24 March 2003 at the small area of land that divides the Tweed Heads Bypass from Rose Street in Tweed Heads. The monitoring point was 13.5 m from the road-side edge of Rose Street, 32 m north of the driveway entrance to Boyds Garden World and 4.5 m from the fence that separates the park from the road reserve. The measurement was started at 11:55 am and continued for 3 hours until 2:55 pm. Aircraft noise from the Gold Coast Airport was paused out of the measurement.

3.3 Baseline Noise Monitoring Results

3.3.1 Queensland

Baseline noise monitoring levels of relevance to the assessment of noise for the Queensland section of the proposed Tugun Bypass are summarised in Table 3.1. The noise levels are reported after removal of data recorded during meteorological conditions that were non-complying for valid noise measurements (in accordance with the methods of Australian Standard AS 1055).

Baseline noise levels were analysed to derive existing levels of noise parameters relevant to the assessment of transportation and construction noise in Queensland.

Noise parameters derived from the noise monitoring data were:

- L_{A10} (18 hour) –Main Roads' primary road traffic noise criteria are based on this parameter; and

- **L₉₀ (DAY)**, **L₉₀ (EVENING)** and **L₉₀ (NIGHT)** – noise parameters based on daily time intervals applied for general environmental noise assessment in Queensland.

Table 3.1: Summary of Baseline Noise Monitoring – Queensland

Monitoring Locations	Baseline Noise Level (dB(A))					
	L _{A10} (18 hour)	L _{Aeq} (24 hour)	L _{A1} ¹	L _{A90} (DAY) ²	L _{A90} (EVENING) ³	L _{A90} (NIGHT) ⁴
4 Mayfair Street	60	56	72	53	50	43
2/19 Mollys Place	43	44	73	36	33	28
29/5 Clancy Court	49	51	77	44	41	39
6/53 Mirreen Drive	43	45	71	34	34	30
Lot 7 RP214065	46	49	73	41	37	37
John Flynn Hospital and Medical Centre	55	61	89	51	50	41
Corner Tugun and Boyd Streets	59	57	73	51	51	48

Note 1: L_{A1} is an approximation of L_{Amax} derived as the maximum L_{A1} level in any 15 minute sample in the monitoring period

2: L_{A90} (DAY) are average values between 7:00 am and 6:00 pm (EPA construction noise)

3: L_{A90} (EVENING) are average values between 6:00 pm and 10:00 pm (EPA construction noise)

4: L_{A90} (NIGHT) are average values between 10:00 pm and 7:00 am (EPA construction noise)

3.3.2 NSW

Baseline noise monitoring levels of relevance to the assessment of noise for the proposed Tugun Bypass are summarised in Table 3.2. The noise levels are reported after interpolation of data recorded during meteorological conditions that were non-complying for valid noise measurements (in accordance with the methods of Australian Standard AS 1055). Graphical representations of all recorded noise monitoring results are included in Appendix B.

Baseline noise levels were analysed to derive existing levels of noise parameters relevant to the assessment of transportation and construction noise in NSW.

Noise parameters derived from the noise monitoring data were:

- **L_{Aeq} (15 hour)**, **L_{Aeq} (9 hour)** – noise parameters applied in NSW Environment Protection Authority and NSW RTA road traffic noise criteria; and
- **L_{A90} (DAY)**, **L_{A90} (EVENING)** and **L_{A90} (NIGHT)** – noise parameters based on daily time intervals applied in NSW Environment Protection Authority and NSW RTA construction noise criteria.

Table 3.2: Summary of Baseline Noise Monitoring – NSW

Monitoring Location	Baseline Noise Level (dB(A))				
	L _{Aeq} (15 hour)	L _{Aeq} (9 hour) ¹	L _{A90} (DAY) ²	L _{A90} (EVENING) ²	L _{A90} (NIGHT) ²
63 Kiata Parade (including façade reflection)	71	67	59	52	37
8/1 Banksia Street (including façade reflection)	67	64	58	51	38
Lakeside Christian College (including façade reflection)	-	66	-	-	-
39 Kiata Parade (including façade reflection)	-	64	-	-	-
AV Ducat Park ^{3,4} (free-field)	70.2	-	-	-	-
Vacant Land, Rose Street ^{3,4} (free-field)	69	-	-	-	-
Park, Caloola Street ^{3,4} (free-field)	52.5	-	-	-	-

Note 1: Actual Time period = 10:00 pm to 6:00 am, to exclude morning aircraft noise from 6:00 am-7:00 am
 2: L_{A90} was determined as the percentile background noise level in accordance with the method of the NSW *Industrial Noise Policy 2000*.
 3: Estimated from short-term attended monitoring results.
 4: Aircraft noise was excluded from these measurements.

Measured noise levels listed in Table 3.2 are used in Section 10.2 for verification of the road traffic noise prediction model, and hence it is important to exclude the effect of aircraft noise from the measurements.

To exclude the effect of aircraft noise as much as possible, measurements conducted during the night were analysed from 10:00 pm to 6:00 am instead of the standard 10:00 pm to 7:00 am, which would exclude the majority of night-time aircraft traffic. Measurements conducted during the day were undertaken with handheld instruments, and aircraft noise was excluded manually using the instrument's 'pause' function.

3.4 Aircraft Noise

The proposed Tugun Bypass is aligned to the west of the main Gold Coast Airport runway. Aircraft operations in the air and on the ground contribute to the ambient noise levels for the areas immediately surrounding the airport.

However, aircraft impacts constitute significant noise events resulting in high maximum levels. These are unlikely to be affected by the underlying continuous noise level generated by traffic on the Tweed Heads Bypass and the proposed Tugun Bypass. Since road and aircraft noise levels are conventionally quantified using different descriptions it is not possible to derive a cumulative index to provide a combined noise exposure at a defined location. In addition, road and aircraft noise are measured using different parameters which are incompatible and their respective impacts are mitigated by different organisations.

As a result, aircraft noise has not been included in this assessment and no changes are proposed to the approach to the mitigation of road noise due to the presence of the airport.

4. Construction Noise and Vibration

4.1 Queensland

There are no quantitative criteria specified in the *Environmental Protection (Noise) Policy 1997* relating to noise or vibration limits for construction activities.

The Environmental Protection Agency would therefore expect the proponents of the project to meet their general environmental duty under Section 319 of the *Environmental Protection Act 1994* and to ensure that best practice environmental management processes are followed for all aspects of construction activities.

Best practice environmental management with respect to noise and vibration would be expected to include, (as a minimum) the following actions:

- implementation of the recommendations given in AS 2436-1981 *Guide to Noise Control on Construction, Maintenance and Demolition Sites*.
- restriction of construction hours;
- Standard hours for noise from construction work in Queensland are:
 - ▶ Monday to Friday, 7:00 am to 6:00 pm;
 - ▶ Saturday, 7:00 am to 12:00 pm if inaudible on residential premises, otherwise: 8:00 am to 12:00 pm; and
 - ▶ not on Sundays or public holidays.
- use of plant and equipment designed with inbuilt attenuation;
- plant and equipment maintained in good working order and compliance with manufacturer's noise ratings for individual plant items; and
- installation of appropriate temporary noise attenuation infrastructure, where necessary (based upon advice from acoustic consultants).

In Queensland, construction of the Bypass would be conducted under a Project Environmental Management Plan (PEMP) which would require the construction contractor to operate under a Construction Environmental (Noise and Vibration) Management Plan. Main Roads will negotiate the Environmental Management Plan conditions with the Environmental Protection Agency during the detailed design of the project.

4.2 NSW

4.2.1 Construction Noise

Standard construction methods and equipment would be used for civil works on the proposed bypass. Blasting is not proposed for construction of the Tugun Bypass.

Sections 5 and 9 of the NSW RTA *Environmental Noise Management Manual* (2001) provides techniques for controlling construction noise and vibration as well as a framework for managing construction noise and vibration from new and upgraded roads.

The criteria for construction noise and vibration impacts as well as noise level and time restrictions are provided in Chapter 171 of the *Environmental Noise Control Manual* (NSW Environment Protection Authority 1994).

Level Restrictions

Noise level restriction criteria are based on the cumulative exposure to construction noise over the duration of construction, as follows:

- for a cumulative period of exposure to construction noise of up to four weeks the $LA_{10(15\text{ minute})}$ level when the construction site is in operation must not exceed the LA_{90} background level by more than 20 dB(A);
- for a cumulative period of exposure to construction noise of between 4 to 26 weeks the $LA_{10(15\text{ minute})}$ level when the construction site is in operation must not exceed the LA_{90} background level by more than 10 dB(A); and
- for a cumulative period of exposure to construction noise of greater than 26 weeks the $LA_{10(15\text{ minute})}$ level when the construction site is in operation must not exceed the LA_{90} background level by more than 5 dB(A).

Background noise levels are to be determined using the tenth percentile method described in the NSW *Industrial Noise Policy* (2000).

Table 4.1 lists construction noise level restriction criteria based on measured background levels ($LA_{90(15\text{ minute})}$) in the NSW section of the proposed corridor based on different lengths of time that construction noise would be present at any given location.

Time Restrictions

The NSW RTA *Environmental Noise Management Manual* (2001) states that construction noise is allowable during the following times:

- Monday to Friday, 7:00 am to 6:00 pm;
- Saturday, 7:00 am to 1:00 pm if inaudible on residential premises, otherwise: 8:00 am to 1:00 pm; and
- construction noise is not allowed on Sundays or public holidays.

Table 4.1: Summary of Construction Noise Level Restrictions for the NSW Section of the Tugun Bypass Corridor

	Monitoring Location	
	63 Katia Parade, NSW	8/1 Banksia Street, NSW
Daytime Noise Levels (7:00 am to 6:00 pm)		
Measured Background LA_{90} (dB(A))	59	58
Construction Period Guidelines $LA_{10(15\text{ minute})}$ (dB(A))		
< 4 weeks	79	78
4 – 26 weeks	69	68
> 26 weeks	64	63
Evening Noise Levels (6:00 pm to 10:00 pm)		
Measured Background LA_{90} (dB(A))	52	51
Construction Period Guidelines $LA_{10(15\text{ minute})}$ (dB(A))		
< 4 weeks	72	71
4 – 26 weeks	62	61
> 26 weeks	57	56

	Monitoring Location	
	63 Katia Parade, NSW	8/1 Banksia Street, NSW
Night Noise Levels (10:00 pm to 7:00 am)		
Measured Background L_{A90} (dB(A))	37	38
Construction Period Guidelines L_{A10} (15 minute) (dB(A))		
< 4 weeks	57	58
4 – 26 weeks	47	48
> 26 weeks	42	43

Where approval for construction works outside the standard construction hours is requested the L_{A10} (15 minute) noise level emitted by the works is generally required not to exceed the L_{A90} level during the relevant daytime, evening or night-time period by a margin of more than 5 dB(A), independent of the duration of the construction activity. Additional procedures for construction works outside normal working hours are outlined in the *Environmental Noise Management Manual* (2001).

The *Environmental Noise Management Manual* (2001) also recommends that a detailed noise and vibration assessment be carried out, prior to commencement of construction works.

A guideline for measuring and assessing vibration is also provided in the *Environmental Noise Management Manual* (2001).

Silencing

All construction equipment should be fitted with suitable engine mufflers with tight fitting engine enclosures and panels. All mobile equipment should be maintained in good mechanical condition. Where equipment would operate near to noise sensitive locations, or outside standard hours of operation, additional noise attenuation measures may be required, such as improved residential mufflers. The construction contractor would be required to monitor construction noise levels at sensitive locations during construction activities to confirm that compliance with the noise criteria is achieved and that additional noise attenuation measures are not required for construction equipment, vehicles or activities. Compliance with the construction noise criteria would be included as a performance specification in the relevant construction tenders.

4.3 Commonwealth

There are no criteria or time restrictions for construction noise specifically stated in the Airports (Environment Protection) Regulations 1997. General duty 4.06 (1) states, however, that the operator of an undertaking at an airport must take all reasonable and practical measures:

- to prevent the generation of offensive noise from the undertaking; or
- if prevention is not reasonable or practicable - to minimise the generation of offensive noise from the undertaking.

In conjunction with general duty, sub-regulation 4.08 states that the operator of an undertaking at an airport is not complying with sub-regulation 4.06 (1) if equipment, the use of which could result in offensive noise being generated from the undertaking:

- is operated in a manner that is not proper and efficient; or
- is not maintained in a proper and efficient condition.

4.4 Construction Noise and Vibration Standards

4.4.1 Noise

Typical strategies for managing noise from construction sites are suggested in AS 2436-1981 *Guide to Noise Control on Construction, Maintenance and Demolition Sites*. Examples of some possible mitigation strategies are outlined in Table 4.2.

Table 4.2: Construction Noise Sources and Possible Mitigation Measures (from AS 2436)

Plant	Source of Noise	Possible Remedies/Alternatives	Typical Reduction in Noise Level (dB(A))
Piling equipment	Pneumatic/diesel hammer or vibrator driver	Enclose hammer head and top of pile in acoustic screen, acoustically dampen sheet steel plies to reduce vibration and resonance	18 – 37
	Impact on pile	Use resilient pad (dolly) between pile and hammer head	5 – 10
	Cables, pile guides	Careful alignment of pile and rig	5
	Power unit	Silenced exhaust, use of acoustic screens	7
Heavy Plant	Engine	Silenced exhaust, closed enclosure panels	5 – 10
Compressor, Generator	Compressor, Generator	Acoustically dampen casing, acoustic screening	20
Batching Plant	Engine	Substitute electric motor	15 – 25
	Filling	Do not let aggregates fall from an excessive height	C
Pumps	Engine pulsing	Acoustic screening	7 – 10
Pneumatic Rock Breakers	Tool	Fit a muffler or silencer, this would reduce the noise without impairing efficiency	20
	Bit	Use dampened bit to eliminate 'ringing'	C
	Air line	Leaks in air line should be sealed	C

Source: AS 2436-1981 *Guide to Noise Control on Construction, Maintenance and Demolition Sites*

Construction Environmental Noise and Vibration Management Plans, incorporating procedures for noise and vibration monitoring as well as other items such as noise and vibration mitigation measures, complaints procedures and delegation of responsibilities, would be prepared for the construction phase of the project. The plans would be a component of the construction environmental management plan and would outline noise and vibration monitoring locations, timing and duration of monitoring, processes for receipt and recording of complaints and corrective actions to be instigated. Noise and vibration monitoring may be expected to include both attended and unattended monitoring, using noise/vibration loggers and frequency analysers, as appropriate.

4.4.2 Vibration

Standards that may be used for measuring and assessing the impacts of vibration are:

- British Standard BS 7385–1993 *Evaluation and Measurement for Vibrations in Buildings – Part 2 Guide to Damage Levels from Ground-Borne Vibration*;
- German Standard DIN 4150, Part 3-1986 *Structural Vibration in Buildings: Effects on Structures*;
- British Standard BS 6472: *Evaluation of Human Exposure to Vibration in Buildings* (1 Hz to 80 Hz); and
- Australian Standard AS 2670.2-1990: *Evaluation of Human Exposure to Whole-body Vibration, Part 2: Continuous and Shock-induced Vibrations in Buildings* (1 Hz to 80 Hz).

Ground vibration of occupied buildings has the potential to cause discomfort to human occupants, to cause damage to sensitive equipment, or in severe cases may cause structural damage to buildings. Ground vibration may also occur continuously or only intermittently, depending on the source. The effect of vibration may also depend on the dominant vibration frequencies.

Three forms of vibration criteria would be applied to construction activities to cover the following effects that may result from construction activities:

- human disturbance;
- building contents damage; and
- structural damage.

Human Disturbance

An individual's perception of vibration is considered to depend very strongly on previous experience and expectations. Table 4.3 provides guidelines for assessing human disturbance impacts from vibration.

Table 4.3: Human Comfort Vibration Criteria

Type of Occupancy	Day or Night	RMS ¹ Vibration Levels in mm/s Corresponding to a 'Low Probability of Adverse Comment' (mm/s)			
		Continuous Vibration (16 hour Day, 8 hour Night)		Transient Vibration Excitation (Several Occurrences per Day)	
		Vertical	Horizontal	Vertical	Horizontal
Critical working areas	Day	0.1	0.3	0.1	0.3
	Night	0.1	0.3	0.1	0.3
Residential	Day	0.2 to 0.4	0.3 to 0.6	6 to 9	18 to 27
	Night	0.14	0.42	0.14 to 2.0	0.3 to 6.0
Offices	Day	0.4	1.2	6 to 13	18 to 38
	Night	0.4	1.2	6 to 13	18 to 38
Workshops	Day	1.2	3.2	9 to 13	27 to 38
	Night	1.2	3.2	9 to 13	27 to 38

Note 1: RMS = Root mean square.
 Source: AS 2670 – 1990

The levels presented in Table 4.3 are based on the RMS vibration level. To determine the allowable peak vibration levels a 'crest' multiplication factor is applied (the ratio of the peak level to RMS level). The crest factor varies from 1.4 for construction activities

of a continuous nature such as vibratory rolling, up to 4 or greater for intermittent activities such as rock-breaking.

Building Contents Damage

The standards do not specify vibration criteria for sensitive equipment inside buildings. Manufacturers of sensitive equipment used for medical diagnostic tests or other scientific research generally specify vibration limits and assessment methods for equipment sensitive to vibration.

Navigation equipment at Gold Coast Airport may be sensitive to vibration. Table 4.4 outlines typical maximum floor vibration levels for satisfactory operation of sensitive equipment.

Table 4.4: Recommended Maximum Vibration Criteria for Sensitive Instruments

Instruments	Vibration Criterion
Optical Microscopes	0.5 mm/s
Precision Balances	0.5 to 2 mm/s
Large Computer Hard Drives	1 to 5 mm/s
Sensitive Electronic Instruments	1 to 5 mm/s

Source: Richard Heggie Associates 2000

Structural Damage

Structural damage due to vibration is assessed using the guidelines present in BS 7385: Part 2 – 1993. This standard sets guideline values for building vibration based on the lowest vibration levels above which damage has been credibly demonstrated (cosmetic damage). Table 4.5 shows guideline vibration levels derived from BS 7385.

Table 4.5: Transient Vibration Guide Values – Minimal Risk of Cosmetic Damage

Type of Building	Peak Component Particle Velocity in Frequency Range of Predominant Pulse		
	Below 4 Hz	4 Hz to 15 Hz	15 Hz and above
Industrial and heavy commercial buildings	3.7 mm/s at 1 Hz or	50 mm/s at 4 Hz and above	
Residential or light commercial type buildings	Maximum displacement of 0.6 mm (zero to peak)	15 mm/s at 4 Hz increasing to 20 mm/s at 15 Hz	20 mm/s at 15 Hz increasing to 50 mm/s at 40 Hz and above

Source: Richard Heggie Associates 2000

Further, BS 7385 states that:

- minor damage is possible at vibration magnitudes greater than twice those listed in Table 4.5;
- major damage to a building may occur at magnitudes greater than four times those listed Table 4.5;
- the guideline values do not take into account fatigue considerations of building materials; and
- the guideline values do not take into consideration resonant response effects of the structure (dynamic magnification).

4.5 Sleep Disturbance

Three characteristics of a noise that are most related to sleep disturbance are:

- the peak level of noise events, described by L_{Amax} ;
- the emergence of noise events above the general noise level, described by measures such as $(L_{Amax}-L_{Aeq})$ or $(L_{Amax}-L_{A90})$; and
- the number of such noise events occurring during the sleeping period.

The NSW Environment Protection Authority *Environmental Noise Control Manual* (1994) incorporates a guideline that aims to limit the level of sleep disturbance due to environmental noise that may be applied to construction noise. The guideline states that the L_{A1} noise level outside a bedroom window should not exceed the L_{A90} background noise level by more than 15 dB(A) to minimise the risk of sleep disturbance. This criterion takes into account the emergence of noise events but does not directly limit the number of such events or their peak levels.

The NSW Environment Protection Authority has also previously applied a night-time requirement that the L_{A10} construction noise level should not exceed the L_{A90} background noise level by more than 5 dB(A).

5. Construction Noise Assessment

5.1 Construction Schedule and Source Levels

The construction plant and equipment expected to be employed on the proposal has been identified and a description of the proposed construction methods included in Technical Paper 2. The final construction and resource utilisation plans would be determined following the appointment of the successful contractor. Table 5.1 lists the likely construction plant and equipment usage at each of the major work sites together with the anticipated duration of the works.

Not all the construction plant and equipment outlined in Table 5.1 would be used at each work site. Details of the likely plant and equipment are presented in Technical Paper 2.

Table 5.1: Equipment Likely to be Used During Various Construction Activities and Locations

Activities	Plant and Equipment	Work Site Location	Duration (Months)
Demolition and Utility Works	Hydraulic Demolition Hammers Trucks Excavators Small equipment	Across site as clearing and preparation works commence	3
Earthworks	Excavators Loaders Dump trucks Vibrating rollers Compactors Road trucks	Chainage 2,500-7,700	18
Cut and Cover Works	Diaphragm wall machines	Chainage 4,500-6,500	6
	Excavators		12
	Concrete pumps		12
	Concrete agitators		12
	Carpenters/formwork		3
	Dump trucks		12
	Loaders		12
	De-watering pumps		18
Haulage of Spoil	Dump trucks	Along the alignment	24
			3
Delivery of Aggregates	Dump trucks		12
Bridges	Piling rigs	All bridges	Average of 3 months per bridge
	Concrete pumps		
	Carpenter/formwork		
	Excavators/rock breaking		
Surface Roadworks	Excavators, graders, water tankers, dozers, asphalt pavers, multi-tyred rollers	Extent of works	9 months per bridge
			2
			4 to 6
			4 to 6

Wherever possible, surface related construction activities would be limited to standard daytime construction hours (Queensland: 7:00 am to 6:00 pm on Monday to Friday)

and 8:00am to 12pm Saturday; NSW: 7:00 am to 6:00 pm Monday to Friday and 8:00 am to 1:00 pm Saturdays).

Work outside these hours may occasionally be required for the following activities:

- relocation of utility services during hours of light traffic where possible;
- preparation of road diversions during off-peak hours;
- construction of project elements which require temporary road closure outside normal hours in order to minimise disruption in traffic;
- delivery of bulk items of equipment during off-peak periods to minimise disruption; and
- concrete cutting.

Each activity undertaken outside the normal work hours would require the regulatory authority and local residents to be informed of the timing and duration prior to the work commencing. Additional noise attenuation measures may be required for equipment used during off-peak construction periods depending on the nature and location of the work.

Table 5.2 lists the typical sound power levels of plant items presented in Table 5.1.

The sound power levels for each item of equipment enabled representative construction noise levels to be calculated at receiver locations.

For assessment of construction noise levels the predicted L_{Amax} level was corrected to a corresponding L_{A10} (15 minute) level by subtracting 4 dB(A) from the predicted L_{Amax} levels. The correction factor was determined from numerous measurements of noise on large construction projects where the difference between L_{Amax} and L_{A10} noise levels for construction equipment and activities has been found to range between 4 and 10 dB(A). The 4 dB(A) was therefore selected as a conservative adjustment.

The noise impact of construction of the bypass was assessed by predicting noise levels for representative sensitive locations adjacent to the corridor working areas for the earthworks and surface road works phases for the project.

Table 5.2: Summary of Sound Power Levels for Construction Equipment

Plant Item	L_{Amax} Sound Power Level (dB(A)) (re 10⁻¹² W)
Asphalt paver	114
Bulldozer CAT D7, D9, D10	113
Compressor 600CFM	100
Concrete pump	109
Concrete truck	108
Crane mounted drilling rig	117
Truck mounted crane	110
30 Tonne crane	110
Diaphragm wall rig	116
Dump truck	121
Excavator	111
Grader	110
Multi-tyred roller	115
Rockbreaker	122
Slurry treatment plant	120
Tipper	108
Water truck	113

Source: Richard Heggie Associates 2000

5.2 Predicted Construction Noise Levels in NSW

Construction noise limits were determined for the receivers in NSW based on the measured daytime background noise levels for the southern section of the bypass. Limits were determined for the preferred construction hours and the expected duration of construction activities for NSW (refer to Table 4.1 for noise limits).

The relevant limits for each location are shown in Table 5.3, together with the predicted L_{A10} (15 minute) construction noise levels. Noise levels, which exceeded the appropriate construction noise limits are highlighted in bold type in the table.

Construction noise levels were predicted for the following areas in NSW:

- Lakeside Christian College and School Buildings;
- Kiata Parade;
- Pontresina Avenue;
- Moolua Avenue;
- Ducat Street;
- Honeysuckle Street; and
- Banksia Street.

The minimum noise level was determined with all plant items for the particular construction activity placed within the work area at the furthest distance from the receptor. Similarly, maximum noise levels were determined with all plants placed at the nearest work area relative to the receptors. Both the minimum and maximum

calculated noise levels represent best and worst-case scenarios with all plant items and equipment assumed to be operating simultaneously.

The predicted noise levels presented in Table 5.3 do not account for any additional noise mitigation measures that may be implemented on equipment by the construction contractor.

Table 5.3: Predicted LA10 Noise Levels for Construction Activities

Receiver Location	Construction Activity	Measurement Period	LA10 (15 min) Criterion or Goal ¹ (dB(A))	Predicted LA10 (15 min) Construction Noise Level (dB(A))	
				From	To
Lakeside Christian College – Church	Earthworks	Day	69	50	62
Lakeside Christian College – School Buildings		Day	69	40	85
Kiata Parade		Day	69	40	74
Pontresina Avenue		Day	69	43	81
Moolua Avenue		Day	68	44	77
Ducat Street		Day	68	49	71
Honeysuckle Street		Day	68	33	81
Banksia Street		Day	68	41	82
Lakeside Christian College – Church		Surface Roadworks	Day	69	48
Lakeside Christian College – School Buildings	Day		69	37	80
Kiata Parade	Day		69	38	72
Pontresina Avenue	Day		69	41	77
Moolua Avenue	Day		68	41	81
Ducat Street	Day		68	47	69
Honeysuckle Street	Day		68	30	81
Banksia Street	Day		68	38	78

Note 1: Based on less than 26 weeks of construction activity and daytime operation.

Given the number of receivers where exceedances are predicted, comprehensive noise mitigation strategies would be investigated by the contractor and implemented prior to the commencement of construction works.

Some possible noise mitigation measures are presented in Table 4.2.

5.3 Tunnel Wall Construction

It was initially proposed that sheet piling techniques would be used as part of the construction of the tunnel walls. This technique would be a major construction noise source as it would need to be undertaken outside normal construction hours due to time constraints imposed by the proximity of the piling to the airport runway. Airport operations and the location of the obstacle limitation surface would prevent sheet piling from being conducted near the runway during daytime hours. Daytime piling could not take place within the 15 m obstacle limitation surface so the sheet piling work would need to be conducted at night when airport operations were significantly reduced.

Table 5.3 shows sound power levels for sheet piling equipment used to determine L_{A10} noise levels at selected receivers.

Table 5.4: Sound Power Levels of Sheet Piling Equipment

Plant Item	L _{Amax} Sound Power Level (re 10 ⁻¹² W) (dB(A))
Diesel Hammer	147
Vibratory System	126
Screened Drop Hammer	94

Source: AS 2436 – 1981

Piling noise levels were calculated for four source locations representing piling activities conducted at the southern end of the main runway 14/32 (chainage 4,900 to 6,700).

Daytime maximum and minimum L_{Amax} noise levels were predicted for the northern and southern limits of the piling works (piling located nearest to and furthest from the identified receivers). Night interval L_{Amax} levels were predicted for the boundaries of the 15 m obstacle limitation surface representing the extent of the night piling works.

Predicted noise levels were compared with construction noise limits applicable to residential receptors located close to the works area. Table 5.4 shows predicted L_{Amax} noise levels for two representative receivers in the vicinity of proposed sheet piling works. The L_{Amax} levels have been provided for comparison with the NSW Environment Protection Authority external sleep disturbance criterion of background noise level plus 15 dB(A). Because of the highly impulsive nature of the source, L_{Amax} noise levels would be much higher than L_{A10} levels, and criteria based on L_{Amax} are much more significant.

Table 5.5: Predicted L_{Amax} Noise Levels from Sheet Piling Activity

Piling Activity	Receiver Location	Night-Time L _{Amax} Criterion, dB(A)	Predicted L _{Amax} Noise Level from Night-Time Piling Activity	
			Minimum	Maximum
Diesel Hammer	63 Kiata Parade	52	68	77
	8/1 Banksia Drive	53	57	62
Vibratory System	63 Kiata Parade	52	47	56
	8/1 Banksia Drive	53	36	41

Using a standard diesel hammer, noise levels significantly in excess of the NSW Environment Protection Authority criteria for sleep disturbance are predicted to occur over a wide area. Using a vibratory system, exceedances up to approximately 4 dB(A) are predicted over a more limited area.

Given these noise issues and restrictions associated with sheet piling an alternative to sheet piling is now proposed, involving the construction of the external diaphragm walls to higher levels resulting in significantly reduced construction noise levels. This would perform the same role as the sheet piles but would still require restrictions for night-time construction due to the obstacle limitation surface. Night-time noise levels would consequently be significantly lower than the levels predicted above.

In comparison, the noise from a diaphragm wall construction rig is approximately 10 dB(A) less than from vibratory sheet piling, and approximately 31 dB(A) less than diesel hammer sheet piling.

5.4 Potential Impacts from Haulage Routes

While construction would be generally removed from existing roads, haulage of material to the site would add to the traffic on the existing highway and some local roads used to provide access to the alignment.

General construction traffic from workforce, visitors and other deliveries would not result in a significant increase in the traffic currently using the Pacific Motorway, Gold Coast Highway and Tweed Heads Bypass. Boyd Street, Stewart Road and Parkes Drive would be used as major access points to the project and an increase in traffic during construction would require appropriate management. The construction contractor would be required to provide appropriate traffic management at these locations.

During the importation of gravel and aggregates for pavement construction (as well as the batching plant should it be located at the main works compound), a maximum of 150 trucks per day would be required along Boyd Street to deliver material. This period is expected to exceed 12 months towards the end of the overall construction period. It is anticipated that the operation of haul trucks along Boyd Street may require noise monitoring as part of a construction environmental management plan, in order to assess and minimise the potential impacts to sensitive receivers in this area.

Haulage activities would be limited to standard daytime construction hours wherever possible.

Any activity to be undertaken outside the normal work hours would require the regulatory authority and local residents to be informed of the nature, timing and duration prior to the work commencing.

5.5 Construction Noise Mitigation

Australian Standard 2436 – 1981 Guide to Noise Control on Construction Maintenance and Demolition Sites sets out practical recommendations to assist in the mitigation of construction noise. Some possible strategies that could be implemented for the proposed Tugun Bypass are outlined below (where applicable):

- adherence to the recommended standard construction hours (refer Section 4.1–4.3);

- installation of temporary noise barriers adjacent to cut and cover excavation works in order to shield the nearest receivers from noise sources. Vertical noise walls, however, have only limited effectiveness for residential receivers in elevated positions relative to the construction works;
- fitting of more efficient residential silencers or exhausts to mobile equipment engines providing up to 5 dB(A) of additional attenuation compared to a standard silencer;
- checking of engine covers for close fitting, maintenance of silencers and mechanical condition. Regular maintenance and noise testing for major items of construction equipment that are significant contributors to construction noise levels;
- scheduling of construction to minimise the multiple use of the most noisy items of equipment near sensitive receivers;
- enclosing of fixed plant with acoustic enclosures providing from 15 to 30 dB(A) attenuation. Enclosures could be applicable for areas where generators or ventilation systems are operating for long periods during the construction phase;
- maximising the offset distance between noisy plant items and nearby sensitive receivers, where possible; and
- community consultation with local residents and building owners to assist in the alleviation of community concerns.

Table 5.6 provides predicted L_{A10} (15 minute) noise levels using these mitigation techniques where appropriate.

Table 5.6: Predicted L_{A10} Noise Levels for Day Construction Activities with Mitigation Measures in Place

Receiver Location	Construction Activity	L_{A10} (15 min) Criterion or Goal ¹ (dB(A))	Predicted L_{A10} (15 min) Construction Noise Level (dB(A))	
			From	To
Lakeside Christian College – Church	Earthworks	69	41	58
Lakeside Christian College – School Buildings		69	31	76
Kiata Parade		69	36	69
Pontresina Avenue		69	34	73
Moolua Avenue		68	35	71
Ducat Street		68	39	67
Honeysuckle Street		68	23	77
Banksia Street		68	31	78
Lakeside Christian College – Church	Surface Roadworks	69	41	58
Lakeside Christian College – School Buildings		69	28	72
Kiata Parade		69	29	68
Pontresina Avenue		69	32	73

Receiver Location	Construction Activity	LA10 (15 min) Criterion or Goal ¹ (dB(A))	Predicted LA10 (15 min) Construction Noise Level (dB(A))	
			From	To
Moolua Avenue		68	38	65
Ducat Street		68	21	65
Honeysuckle Street		68	21	77
Banksia Street		68	29	74

Note 1: Based on less than 26 weeks of construction activity.

The assumed noise reductions ranged from 4 dB(A) to greater than 10 dB(A). Smaller reductions resulted where space requirements limited the attenuation options available to equipment controls only. Larger reductions resulted where equipment controls could be used in conjunction with noise barriers and management techniques (for example, avoidance of grouped noise sources).

The noise mitigation measures employed in this analysis included only 'standard' attenuation treatments, as outlined in AS 2436 (shown in Table 4.2). In order to maintain a conservative view, when considering the mitigation of plant and equipment, a reduction of only 4 dB(A) was applied to the noise sources. Improvements on this reduction could be achieved through specific actions carried out by the contractor.

The level of potential exceedances presented in Table 5.4 indicate that most of the activities could be controlled to an acceptable noise level by standard noise treatments giving 5 dB(A) or more attenuation (for example, noise barriers, equipment enclosures, silencers and regular equipment maintenance).

Community linked construction management may also be a viable alternative strategy in certain instances as indicated in the work schedule in Table 5.1. Previous experience on similar major projects has demonstrated that affected sensitive receptors, when provided with sufficient warning, may be willing to endure higher construction noise levels for a shorter duration, in lieu of intermittent but extended periods of construction noise at lower levels.

6. Vibration Assessment

6.1 Overview

Vibrations of the ground and/or structures are characterised by frequency and amplitude. Vibrations may be intermittent or continuous in nature depending on the source. The magnitude of nuisance created by vibration depends on the nature of the soils/rocks transmitting the vibration and the distance from the source to the nearest building.

Vibrations may result from several construction activities proposed for the Tugun Bypass, namely:

- pile drivers;
- use of heavy construction equipment; and
- use of vibrating steel drummed rollers.

Machinery such as steel drummed rollers and other heavy equipment would be used throughout the construction process.

The extent to which vibration from these sources is likely to cause vibration nuisance or damage is primarily related to the separation distance between the source and the receiver, for example, residential dwellings. Because it is difficult to predict ground vibration levels accurately due to the dependence of vibration transmissibility on the nature of the intervening soil between the source and receiver, it is normal to monitor vibration levels for sensitive receivers during construction and to maintain adequate separation distances where possible. The simplest method of ensuring that ground vibration nuisance or damage does not occur is to maintain an adequate buffer (or 'safe') distance between the source of vibration and the receptor.

The safe distances recommended by Queensland Department of Main Roads to road contractors are shown in Table 6.1.

Table 6.1: Ground Vibration Safe Distances

Type of Activity	Safe Distance (m)
Heavy vibratory rolling	20
Blasting	Contractor to provide calculations dependent of size of blast
Pile Driving	60
Other	Contractor to Determine

Source: Queensland Department of Main Roads (1999), MRS 11.51-12/99

Inspection of the safe distances for vibration in Table 6.1 indicates that the potential for nuisance or minor damage from vibration is minimal provided a buffer distance of at least 20 m is maintained between the source and the receiver for heavy rollers and 60 m for piling operations.

The initial force of a pile driver results in waves of high acceleration, which are easily absorbed and quickly dissipated in the ground. Typically ground vibrations of up to 25 mm/s are generated adjacent to an operating pile driver and the magnitude of the vibrations decrease rapidly with increasing distance from the source. Ground

vibrations generated by typical construction equipment are therefore likely to be minimal.

The use of heavy plant and equipment in the construction of the bypass would only generate perceptible vibrations at residences closer than 20 m to the road corridor. At the distances recommended in Table 6.1, the ground vibration peak particle velocity due to construction equipment should be below 2 mm/s, the level at which vibration becomes clearly discernible to people (Australian Road Research Board 1974).

6.2 Mitigation of Potential Vibration Impacts

Structural damage to buildings from excessive ground vibration is unlikely, provided that the road alignment does not encroach closer than 40 m to sensitive buildings and that blasting is not undertaken during construction. Monitoring should however, be conducted during all construction activities where there is a potential for complaints that vibrations may exceed the human disturbance criteria.

The Main Roads Standard Specification for Environmental Management (1999), MRS 11.51 [12/99] outlines the following specifications for management of environmental impacts during the construction and/or the maintenance of works. The relevant specifications for ground vibration are as follows:

- the Contractor shall take reasonable actions to ensure that construction works do not result in vibration causing damage adjacent to the site;
- prior to commencement of any activity, the Contractor shall undertake a condition survey of any structure within the zone of influence which is defined as within a radius of three times the safe distance;
- the Contractor shall carry out monitoring at the nearest vibration sensitive receptor on commencement of and during piling or use of vibratory equipment; and
- if vibration levels are monitored and found to exceed the relevant vibration criteria then the contractor would modify the construction activities until compliance with the criteria has been achieved.

7. Road Traffic Noise Criteria

7.1 Queensland Criteria

Main Roads' *Road Traffic Noise Management: Code of Practice 2000* provides guidance and instruction for the assessment, design and management of the impact of road traffic noise. The Code demonstrates general environmental duty by establishing and implementing best practice environmental management.

The noise criteria for specific land uses in the vicinity of roads in Queensland are outlined below.

7.1.1 Existing Residences

The noise criteria applicable to existing residential receivers (or to residential developments that have sealed approval at the time of assessment and are adjacent to new sections of the Tugun Bypass), are detailed in Table 7.1.

Table 7.1: Road Traffic Noise Criteria for New Roads

Type of Development	Criteria
New Road – Access Controlled	<p>≤ 63 dB(A) LA10(18hour) (façade-corrected) when the road traffic noise level within the first 10 year period following construction is predicted to be:</p> <ul style="list-style-type: none"> ▪ 63 dB(A) LA10(18hour) (façade-corrected) or greater; and ▪ an increase of 3 dB(A) or greater above the pre-construction level of greater than 55 dB(A) <p>or</p> <p>≤ 60 dB(A) LA10(18hour) (façade-corrected) when the road traffic noise level within the first 10 year period following construction is predicted to be:</p> <ul style="list-style-type: none"> ▪ 60 dB(A) LA10(18hour) (façade-corrected) or greater; and ▪ an increase of at least 6 dB(A) above the pre-construction level of 55 dB(A) or less.

Source: Main Roads *Road Traffic Noise Management: Code of Practice 2000*

The noise criteria applicable to existing residential receivers adjacent to sections of corridor where the existing road would be upgraded are specified in Section B3 of the Code, *Upgrading Existing Roads*. The criteria are summarised in Table 7.2.

Table 7.2: Road Traffic Noise Criteria for Upgrade of Existing Roads

Type of Development	Criteria
Upgrading Existing Roads	<ul style="list-style-type: none"> ▪ ≤ 68 dB(A) LA10(18hour) (façade-corrected) when the road traffic noise level within the first 10 year period following upgrading is predicted to be 68 dB(A) or greater.

Source: Main Roads *Road Traffic Noise Management: Code of Practice 2000*

7.1.2 Education and Health Buildings

The noise criteria applicable to education and health buildings are specified in Section B4 of the Code. The criteria are detailed in Table 7.3.

Table 7.3: Road Traffic Noise Criteria for Educational and Health Buildings

Type of Development	Criteria
New Road – Access Controlled	When the calculated indoor noise level within the 10 years following construction is predicted to be: <ul style="list-style-type: none"> ▪ 48 dB(A) $L_{A10(1\text{ hour})}$ or greater; and ▪ an increase of at least 3 dB(A) above the pre-construction level. Measures for noise attenuation would be considered as part of initial planning and design, with the aim of reducing indoor noise levels to 48 dB(A) or less.

Source: Main Roads *Road Traffic Noise Management: Code of Practice 2000*

7.1.3 Future Residential Developments

If a residential development has gained approval from the local governing authority at the time of publication of the environmental impact statement, then Main Roads is responsible for mitigation of road traffic noise according to the criteria in Table 7.1.

The noise criteria applicable to future residential developments that do not have final development approval at the time of assessment are specified in Section B6 of the Code. The criteria are detailed in Table 7.4.

7.1.4 Parks and Recreation Areas

The noise criterion applicable to parks and recreational areas is $L_{A10(12\text{ hour})}$ 63 dB(A) (free-field), as specified in Section B5 of the Code.

7.2 NSW Criteria

7.2.1 Existing Residences

Road traffic noise criteria for NSW are contained in *Environmental Criteria for Road Traffic Noise* (NSW Environment Protection Authority 1999) and are outlined in Table 7.5. Guidelines for the management of noise and implementation of noise criteria in NSW are provided in the NSW RTA *Environmental Noise Management Manual* (2001).

In NSW, 'base' road traffic noise level criteria are defined in terms of 'Day' and 'Night' noise level limits, where both conditions must be met.

The design target noise level is therefore the more strict of the two noise level criteria.

Table 7.4: Road Traffic Noise Criteria for Proposed Road

Type of Development	Criteria		Where Criteria are Already Exceeded
	Day 7:00 am to 10:00 pm (dB(A))	Night 10:00 pm to 7:00 am (dB(A))	
New freeway or arterial road corridor	L _{Aeq} (15 hour) 55	L _{Aeq} (9 hour) 50	The new road should be designed so as not to increase existing noise levels by more than 0.5 dB(A). Where feasible and reasonable, noise levels from existing roads should be reduced to meet the noise criteria.
Redevelopment of existing freeway/arterial road	L _{Aeq} (15 hour) 60	L _{Aeq} (9 hour) 55	In all cases, the redevelopment should be designed so as not to increase existing noise levels by more than 2 dB(A). Where feasible and reasonable, noise levels from existing roads should be reduced to meet the noise criteria.

Source: NSW Environment Protection Authority: *Environmental Criteria for Road Traffic Noise 1999*

The L_{Aeq} (15 hour) noise level can be defined as the continuous equivalent sound pressure level over the period 7:00 am to 10:00 pm. L_{Aeq} (9 hour) is the continuous equivalent sound pressure level over the time period 10:00 pm to 7:00 am.

The criteria shown in Table 7.5 are referred to as ‘base criteria’. Where existing traffic noise levels are high, and reduction to meet these criteria is not feasible, ‘allowance criteria’ based on the existing traffic noise level plus 0.5 dB(A) or 2 dB(A) as appropriate are considered. These are based on existing noise levels at the time of opening of the project (nominally 2007), which are individually calculated for each receiver location as described in Chapter 8.

7.2.2 Proposed Residential Developments

The Cobaki Lakes development is located on Boyd Street, NSW, west of the proposed Tugun Bypass alignment. This development has received formal development approval, so the NSW Environment Protection Authority and NSW RTA criteria for existing residences are applicable to assessment of traffic noise and mitigation. Since this proposed residential estate would be affected by noise from both the Queensland and NSW segments of the Tugun Bypass, noise from the bypass was modelled according to NSW RTA requirements.

7.2.3 Sensitive Land Uses

Sensitive land uses include hospital wards, places of worship, active and passive recreation areas and school classrooms. The applicable criteria specified by NSW Environment Protection Authority are given in Table 7.6.

Table 7.5: Road Traffic Noise Criteria for Sensitive Land Uses

Sensitive Land Use	Criteria (dB(A))	
	Day 7:00 am to 10:00 pm	Night 10:00 pm to 7:00 am
Hospital wards	L _{Aeq} (1 hour) 35 (internal)	L _{Aeq} (1 hour) 35 (internal)
Places of worship	L _{Aeq} (1 hour) 40 (internal)	L _{Aeq} (1 hour) 40 (internal)
Active recreation (for example, golf courses)	Freeway/arterial roads L _{Aeq} (15 hour) 60	C
Passive recreation and school playgrounds	Freeway/arterial roads L _{Aeq} (15 hour) 55	C
Existing school classrooms	L _{Aeq} (1 hour) 45 (internal)	C

Source: NSW Environment Protection Authority (1999) *Environmental Criteria for Road Traffic Noise*.

In all these cases, where existing levels of traffic noise exceed the relevant criteria, all feasible and reasonable noise control measures should be evaluated and applied. Where this has been done and the criterion cannot be achieved, the proposed road development should be designed so as not to increase existing road traffic noise levels by more than 0.5 dB(A) for new roads and 2 dB(A) for redeveloped roads. As for residences, these 'allowance' criteria are based on calculated traffic noise levels for 2007, before opening of the proposed bypass.

7.3 Commonwealth Criteria

The relevant road traffic noise criteria for sections of road within Gold Coast Airport are contained in the Airports (Environment Protection) Regulations 1997, as shown in *Division 2 - Offensive Noise* and *Schedule 4*. These regulations state that:

'noise that is offensive occurs when noise is generated at a volume, or in a way, or under a circumstance, that, in the opinion of an airport environment officer, offensively intrudes on individual, community or commercial amenity.'

Noise measured at a sensitive receptor generated from road traffic on the site of an operator of an undertaking at an airport should not exceed:

- L_{Aeq} (24 hour) 60 dB(A); and
- L_{Aeq} (8 hour) 55 dB(A) (10:00 pm to 6:00 am).

7.4 Application of Noise Criteria – Queensland

The Queensland section of the proposed Tugun Bypass alignment comprises sections of new road and the upgrading of existing roads.

The proposed residential development at Pacific Beach has not received formal planning approval, so provision of noise mitigation measures is the responsibility of the developer.

The noise criteria applied to each section of the alignment are set out in Table 7.7 and shown in Figure 7.2.

Table 7.6: Noise Criteria Applied to the Tugun Bypass

Road	Section	New Road/ Upgrading	Jurisdiction	Sensitive Receptors	Noise Criteria (dB(A))
Pacific Motorway/ Tugun Bypass	North of Stewart Road	Upgrading	Queensland	Residential	LA ₁₀ (18 hour) 68 (façade-corrected)
Stewart Road	Intersection with Tugun Bypass	Upgrading	Queensland	Residential	LA ₁₀ (18 hour) 68 (façade-corrected)
Tugun Bypass	Stewart Road to Queensland-NSW border	New Road	Queensland	Residential	LA ₁₀ (18 hour) 60 (façade-corrected)
Tugun Bypass	Park on Mirreen Drive cul-de-sac	New Road	Queensland	Park	LA ₁₀ (12 hour) 63 (free-field)
Tugun Bypass	Stewart Road to Queensland-NSW border	New Road	Queensland	John Flynn Hospital and Medical Centre	LA ₁₀ (1 hour) 48 (internal)

7.5 Application of Noise Criteria – NSW

The NSW section of the proposed Tugun Bypass alignment comprises sections of new road within NSW and on Commonwealth land (Gold Coast Airport) and the upgrading of existing roads in NSW.

All existing residences near the proposed bypass are currently exposed to existing noise from the Tweed Heads Bypass which is from the same direction as noise from the new development. Hence, under guidelines in the NSW RTA's *Environmental Noise Management Manual* (2001), the relevant criteria are those for a 'redevelopment of existing freeway/arterial road'.

The noise criteria applied to each section of the alignment are set out in Table 7.8.

Table 7.7: 'Base' Noise Criteria Applied to the Tugun Bypass

Road	Section	New Road/ Redevelopment	Jurisdiction	Sensitive Receptors	Noise Criteria Day (dB(A))	Noise Criteria Night (dB(A))
Tugun Bypass	Chainage 2,500 to Boyd Street	New Road	NSW	Proposed Residential	L _{Aeq} (15 hour) 55*	L _{Aeq} (9 hour) 50*
Tugun Bypass	Boyd Street to airport boundary	New Road	NSW	None	L _{Aeq} (15 hour) 55*	L _{Aeq} (9 hour) 50*
Tugun Bypass	Within airport boundaries	New Road	Commonwealth	None		
Tugun Bypass	Airport boundary to Tweed Heads Bypass	New Road	NSW	None		
Tweed Heads Bypass	Lakeside to Intersection	Redevelopment	NSW	Existing School	L _{Aeq} (1 hour) 45* (internal)	-
Tweed Heads Bypass	Lakeside to Intersection	Redevelopment	NSW	School Playground	L _{Aeq} (15 hour) 55*	-
Tweed Heads Bypass	Lakeside to Intersection	Redevelopment	NSW	Place of Worship	L _{Aeq} (1 hour) 40* (internal)	L _{Aeq} (1 hour) 40* (internal)
Tugun Bypass	A.V. Ducat Park	Redevelopment	NSW	Active Recreation	L _{Aeq} (15 hour) 60*	-
Tugun Bypass	Tweed Heads Bypass to Kennedy Drive	Redevelopment	NSW	Residential	L _{Aeq} (15 hour) 60*	L _{Aeq} (9 hour) 55*

* These values represent 'base criteria'. Where required, 'allowance criteria' are determined individually for each receiver, as described in Chapter 8.

8. Road Traffic Noise Modelling Methodology

8.1 Introduction

The noise environment for the proposed Tugun Bypass has been modelled based on information derived from monitoring and other technical studies undertaken for the environmental impact statement. The computer software package SoundPLAN v6.2 was used for noise modelling in this assessment with all assumptions documented.

8.1.1 Queensland

Three situations were modelled to satisfy the *Road Traffic Noise Management - Code of Practice* (Main Roads 2000)

Situations modelled comprised:

- *2002 Traffic Horizon – No Tugun Bypass*: Road traffic noise calculations for previously existing conditions on the Pacific Motorway at the northern end of the proposed alignment. Single point noise calculations determined for the facades of buildings where baseline noise monitoring was carried out, under the conditions that were present at the time. A comparison of modelled and measured noise levels was conducted to validate the modelling methods used;
- *2017 Traffic Horizon – No Tugun Bypass*: A simplified assessment of road traffic noise generated on the existing Gold Coast Highway and Pacific Motorway without the Tugun Bypass in place.
- *2017 Traffic Horizon – Tugun Bypass*: A detailed assessment of the tenth year of operation was undertaken. Mitigation options were designed to this horizon in accordance with noise criteria guidelines for Queensland; and

The Tugun Bypass was modelled as a four-lane highway at 2017. Although scope exists for the Tugun Bypass to be eventually upgraded to six lanes it is not anticipated that this would occur before the year 2017.

8.1.2 NSW

Five situations were modelled to satisfy the *Environmental Criteria for Road Traffic Noise* (NSW Environment Protection Authority 1999) and the *NSW RTA Environmental Noise Management Manual* (NSW RTA 2001). Situations modelled comprised:

- *2003 Traffic Horizon – No Tugun Bypass*: Road traffic noise calculations for existing conditions on the Tweed Heads Bypass. Single point noise calculations determined for the facades of buildings where baseline noise monitoring was carried out, under the conditions that were present at the time. A comparison of modelled and measured noise levels was conducted to verify the modelling methods used.
- *2007 Traffic Horizon – No Tugun Bypass*: This model was used to calculate 'future existing' levels of traffic noise, for use in determining 'allowance' noise criteria.
- *2007 Traffic Horizon – Tugun Bypass*: An assessment of road traffic noise generated with the Tugun Bypass in operation. The year 2007 is taken as the proposed year of opening for the project. Predictions were undertaken with and

without mitigation treatments in place, where the mitigation treatments were designed for the 2017 horizon.

- *2017 Traffic Horizon – No Tugun Bypass:* An assessment of road traffic noise which would be generated on the existing Tweed Heads Bypass without the Tugun Bypass in place.
- *2017 Traffic Horizon – Tugun Bypass:* A detailed assessment of the tenth year of operation was undertaken. Predictions were undertaken with and without mitigation treatments. Mitigation options were designed to this horizon in accordance with noise criteria guidelines.

The Tugun Bypass was modelled as a four-lane highway at 2017. Although scope exists for the Tugun Bypass to be eventually upgraded to six lanes it is not anticipated that this would occur before the year 2017.

8.2 Noise Calculation Method

The *Calculation of Road Traffic Noise (CoRTN)* (UK Department of Transport 1988) was selected as the noise calculation method for the operational traffic noise assessment. CoRTN is regarded as an acceptable road traffic noise calculation method in the *Road Traffic Noise Management – Code of Practice* (Queensland Department of Main Roads) and the *Environmental Criteria for Road Traffic Noise* (NSW Environment Protection Authority 1999). The CoRTN method has been validated under Australian conditions. Results of CoRTN are output as L_{A10} (18 hour) or L_{A10} (1 hour) levels and may be transformed to other relevant acoustic parameters by the application of correction factors as discussed in Section 8.4. Basic input data for road sections are presented in Appendix C and Technical Paper 2.

In NSW, modelling of the L_{Aeq} noise levels were undertaken with noise source heights of heavy vehicles separated from other vehicles. Heavy vehicle exhausts were modelled at a height of 3.5 m and the remainder of heavy vehicle noise emissions at a height of 1.5 m. Light vehicle noise source height was 0.5 m above road surface.

This was achieved by modelling 3 source lines:

- At 0.5 m, with traffic volume of light vehicles. %HV = 0%. No correction applied.
- At 1.5 m, with traffic volume of heavy vehicles. %HV = 100%. Correction of -0.8 dB applied.
- At 3.5 m, with traffic volume of heavy vehicles. %HV = 100%. Correction of -8 dB applied.

8.3 Additional Model Inputs

8.3.1 Building Information

All single storey buildings were assigned an arbitrary height of 3.5 m for modelling purposes (including roof height). Two storey dwellings were assigned a roof top height of 6 m.

The majority of buildings were located by digitising from registered aerial photography. Where building information was not available, a representative building envelope was placed in the centre of the cadastral lot boundaries.

8.3.2 Densely Vegetated Areas

There are no areas within the study area considered to be sufficiently densely vegetated to provide attenuation to noise propagation from the bypass.

8.3.3 Proposed Developments

Land parcels proposed for development were located and included in the model. Where further information was not available it was assumed that the worst-case scenario would involve two storey dwellings constructed on the closest cadastral boundary to the proposed road alignment to simulate the most sensitive noise receptors. It was assumed that two-storey buildings would represent the worst-case scenario where building information was not available.

8.4 Conversion of Noise Parameters

Queensland

The CoRTN method as implemented by SoundPLAN calculates average maximum noise levels as $L_{A10 (18 \text{ hour})}$ and $L_{A10 (1 \text{ hour})}$ (façade corrected) noise parameters for known traffic volumes and topography. The calculated noise levels are directly comparable to noise guidelines stated in the *Road Traffic Noise Management: Code of Practice (Main Roads 2000)* for receptors located in Queensland.

For recreational areas in Queensland, the $L_{A10 (12 \text{ hour})}$ (free-field) noise level is required. Based on Queensland Main Roads experience, this is estimated as $L_{A10 (12 \text{ hour})} \sim L_{A10 (18 \text{ hour})} + 2.0 \text{ dB(A)}$.

NSW

The CoRTN method calculates average maximum noise levels as $L_{A10 (18 \text{ hour})}$ and $L_{A10 (1 \text{ hour})}$ (façade-corrected) noise parameters for known traffic volumes and topography. However, traffic noise criteria for NSW require measurement and prediction of noise levels using equivalent continuous noise levels as $L_{Aeq (15 \text{ hour})}$, $L_{Aeq (9 \text{ hour})}$ and $L_{Aeq (1 \text{ hour})}$ (façade-corrected) parameters.

These can be calculated from $L_{A10 (1 \text{ hour})}$ noise levels using the well documented conversion:

$$L_{Aeq (1 \text{ hour})} \sim L_{A10 (1 \text{ hour})} - 3 \text{ dB(A)}.$$

Where L_{Aeq} values are required over other time periods, individual hourly L_{Aeq} noise levels can be logarithmically averaged. This is equivalent to calculating an $L_{Aeq (1 \text{ hour})}$ noise level using the average hourly traffic volume over the required time period.

Further details are provided in Appendix D.

9. Internal Noise Calculations

9.1 Queensland

John Flynn Hospital and Medical Centre

The John Flynn Hospital and Medical Centre comprises four major buildings:

- the main hospital;
- accommodation building;
- medical centre; and
- radiotherapy building.

All buildings have sealed glazing and air-conditioning. An external facade noise level was determined as $L_{A10(1 \text{ hour})}$ 74.2 dB(A) in order for the internal criterion level to be met without alteration to the construction of the existing façade. (Refer to Appendix E for assumptions and method of calculation of the external facade level to achieve the internal noise criterion).

9.2 NSW

Lakeside Christian Church

Internal noise levels for the Lakeside Christian Church were determined in accordance with the methods defined in AS 3671 – 1989, *Acoustics – Road Traffic Noise Intrusion – Building Siting and Construction*.

External facade noise levels at peak one hour traffic volumes were calculated. A traffic noise reduction of 25 dB(A) was assumed for the building construction with doors and windows closed (AS 3671 – 1989, Section 3.2.2). To achieve the internal criterion of 40 dB(A) $L_{Aeq(1 \text{ hour})}$ the external facade noise criterion level was $L_{Aeq(1 \text{ hour})}$ 65 dB(A) for the church with closed windows.

Lakeside Christian College

Internal noise levels for the Lakeside Christian College were determined in accordance with the methods defined in AS 3671 – 1989, *Acoustics – Road Traffic Noise Intrusion – Building Siting and Construction*. To achieve the internal noise level criterion of $L_{Aeq(1 \text{ hour})}$ 45 dB(A), the external facade noise criterion level was $L_{Aeq(1 \text{ hour})}$ 61 dB(A) for the school building constructed of concrete blockwork with closed windows, and $L_{Aeq(1 \text{ hour})}$ 58 dB(A) for the demountable classrooms with closed louver windows. With open windows, the required external noise criterion is $L_{Aeq(1 \text{ hour})}$ 55 dB(A), and this is conservatively assumed in the noise assessment described below.

Detailed calculations for derivation of the school building criteria are given in Appendix E.

10. Road Traffic Noise Assessment

10.1 Previously Existing (2002) Noise Levels

10.1.1 Queensland

Monitoring of existing noise levels was conducted in 2002 for verification of the section of the noise model of the Pacific Motorway north of Stewart Road. Using the receptor at 4 Mayfair Street as the representative location results showed noise levels of $L_{A10(18\text{ hour})}$ 60 dB(A). A 2 m high barrier currently exists at the road shoulder between the traffic noise source and this receptor. In 2002, this receptor currently complied with the Main Roads guideline for a redeveloped road of $L_{A10(18\text{ hour})}$ 68 dB(A) (façade-corrected).

For the proposed new section of highway between Stewart Road just south of the John Flynn Hospital and Medical Centre, there were no locations where monitoring indicated that noise levels currently exceed the criterion noise level $L_{A10(18\text{ hour})}$ 60 dB(A) (façade-corrected) (excluding John Flynn Hospital and Medical Centre). The highest reading over the proposed new section of highway ($L_{A10(18\text{ hour})}$ 50 dB(A)) was observed at the Clancy Court monitoring location.

10.1.2 NSW

The baseline noise level monitoring at some receptors showed daytime and night-time noise levels above the respective 'base' criteria of 60 and 55 dB(A) for the redevelopment of an existing arterial road (NSW Environment Protection Authority 1999) (Table 3.1).

10.2 Predictive Model Verification

The predicted road traffic noise levels were compared to measured noise levels at five locations to verify the SoundPLAN noise prediction model developed for this proposal.

These locations were at the southern end of the proposed alignment in the densely populated suburban area adjacent to the existing Tweed Heads Bypass. The model was verified using traffic volumes existing on the Tweed Heads Bypass in 2003. The comparison between the measured and predicted noise levels is shown in Table 10.1.

Table 10.1: Comparison of Measured and Predicted Noise Levels for Verification of the Tugun Bypass Acoustic Model

Receiver Location	Measurement Unit	Measured Noise Level, dB(A)	Predicted Noise Level, dB(A)	Difference (Measured – Predicted), dB(A)
Lakeside Christian College	L_{Aeq} (9 hour)	66	66	0
39 Kiata Parade	L_{Aeq} (9 hour)	64	65	-1
AV Ducat Park*	L_{Aeq} (15 hour)	70.2	68.4	1.8
Vacant Land, Rose Street*	L_{Aeq} (15 hour)	69	70.8	-1.8
Park, Caloola Street*	L_{Aeq} (15 hour)	52.5	53	-0.5

Note: Attended noise monitoring locations.

Differences between measured and predicted levels are considered to be within the generally-accepted accuracy of the CoRTN model. In most cases, the predicted levels give a conservatively high estimate of measured levels. It is also notable that predicted night-time noise levels are more accurate than daytime levels. Night-time noise levels are typically more crucial for assessment, because this is typically the most critical period in terms of exceedance of 'base' criteria.

10.3 Existing and 'Future Existing' noise mitigation treatments

10.3.1 Queensland

The existing noise barriers on the east and west sides of the existing Pacific Highway immediately north of the Stewart Road interchange have recently been modified as part of recent upgrade works. Part of the existing noise barriers have been demolished and replaced with noise barriers which were designed to mitigate against the ultimate design capacity of the interchange. For verification of this project's noise model, the noise barrier configurations that were present at the time of verification noise monitoring was used. For future noise predictions, modelling was undertaken with the existing (recently modified) noise barriers.

10.3.2 NSW

A 4.5 m high noise barrier is soon to be constructed on the Eastern side of the Tweed Heads Bypass as part of the implementation of the recommendations of the Northern Pacific Highway Noise Taskforce. Noise modelling of the 'future existing' cases in 2007 and 2017 includes the noise mitigation effect of this barrier.

10.4 Noise Levels for Existing Situation, Year 2007

10.4.1 Queensland

Noise levels at receivers along the existing Gold Coast Highway route in Queensland before opening of the Bypass in 2007 are expected to exceed Main Roads criteria of 68 dB(A) $L_{A10(18hour)}$ (façade-corrected) for upgrading existing roads, as shown in Table 10.2.

Table 10.2: predicted 'future-existing' noise levels in Queensland, 2007

Receptor	Floor	Façade	Predicted Noise Level
			$L_{A10(18hour)}$ dB(A) (façade-corrected)
1 Karana Street	1	NE	72.5
1 Karana Street	2	NE	74.7
141 Golden Four Drive	1	SW	71.2
141 Golden Four Drive	2	SW	73.3
258 Coolangatta Road	1	NE	72.5
258 Coolangatta Road	2	NE	74.7
281 Golden Four Drive	1	SW	71.5
281 Golden Four Drive	2	SW	73.7
373 Golden Four Drive	1	SW	73.7
373 Golden Four Drive	2	SW	75.8
437 Golden Four Drive	1	SW	72.0
437 Golden Four Drive	2	SW	74.1
484 Coolangatta Road	1	NE	67.7
484 Coolangatta Road	2	NE	69.9

Receptor	Floor	Façade	Predicted Noise Level
			LA10(18hour) dB(A) (façade-corrected)
53 Golden Four Drive	1	S	65.8
53 Golden Four Drive	2	S	67.9
Alkira Street	1	NW	67.8
Alkira Street	2	NW	70.0
Blamey Drive	1	SE	71.6
Marma Court	1	S	73.1
Marma Court	2	S	75.3
Taperell Drive	1	W	65.6
Taperell Drive	2	W	67.7

10.4.2 NSW

Noise levels were predicted for a time in 2007 immediately preceding the opening of the Tugun Bypass, in order to derive 'allowance' criteria in cases where these 'future existing' noise levels exceed the 'base' criteria. Appendix H details the calculated noise levels for each receiver within NSW, the relevant 'base' criterion and the relevant 'allowance' criterion, based on an increase of 0.5 or 2 dB(A) (depending on the location) above existing noise levels in 2007. The "55/60" noise contour from the existing situation is shown in Figure H-1 in Appendix H. As shown in Figure H-1, the majority of dwellings near the proposed Tweed Heads Bypass Interchange would currently be exposed to noise levels in excess of 60 dB(A) LAeq(15hour) in 2007.

Of the 180 dwellings modelled, 90 residences have predicted existing noise levels in 2007 which exceed the relevant 'base' criteria. Of these, the noise level at 26 dwellings would be considered to be acute.

Calculations were performed for buildings at the Lakeside Christian College and Church to determine 'allowance' criteria. In this case, LAeq (1 hour) noise levels are calculated. Results are shown in Table 10.3. These predictions have not included the effect of any mitigation treatments that may be implemented as part of the recommendations of the Northern Pacific Highway Noise Taskforce.

Table 10.3: Lakeside Christian College and Church – Noise Levels for 2007, Before Opening of the Tugun Bypass

Receptor	Storey	Facade	Predicted LAeq (1 hour) (façade-corrected) Noise Level	'Base' Noise Criterion – External	'Allowance' Noise Criterion
School Building A (northern)	1	Western	70.3	55.0	72.3
School Building B	1	Western	65.9	55.0	67.9
School Building C	1	Western	66.1	55.0	68.1
School Building D	1	Western	66.6	55.0	68.6
	2	Western	68.6	55.0	70.6
School Building E (southern)	1	Western	71.8	55.0	73.8
Church	1	Western	60.3	65.0	62.3
Church	2	Western	63.1	65.0	65.1

All the selected school buildings receiving locations have predicted $L_{Aeq(1\text{ hour})}$ noise levels more than 10 dB(A) in excess of the 'base' criteria. The Church building is not predicted to exceed the 'base' criteria.

10.5 Tugun Bypass Traffic Noise Prediction 2007

10.5.1 Queensland

Tugun Bypass traffic noise levels in Queensland have been predicted only for the 2017 case since the design criteria are based entirely on the predicted traffic volumes 10-years after project opening.

10.5.2 NSW

Noise levels predicted for the proposed year of opening of the Tugun Bypass (2007) at existing residential receiver locations for the NSW section of the Tugun Bypass are listed in Appendix I. Predictions are based on low-noise asphalt road surface with no mitigation measures in place.

The Lakeside Christian Centre receivers, for which $L_{Aeq(1\text{ hour})}$ noise levels are required, are discussed in Section 10.6.2 and outdoor recreation areas in A.V. Ducat Park are discussed in Section 10.7.1.

Table 10.4 summarises the number of residences for which various noise criteria are exceeded (excluding residences scheduled for resumption as part of the proposal).

Table 10.4: Summary of NSW Noise Modelling Results – Year 2007 With Tugun Bypass (No Noise Mitigation)¹

Criterion	Number of Residences
Noise level exceeds base criterion	42
Noise level exceeds allowance criterion	0
Mitigation (apart from traffic management and road design measures) considered 'reasonable' under <i>Environmental Noise Management Manual</i> (2001) due to acute noise impacts (i.e. > 60 dB $L_{Aeq(9hr)}$ or > 65 dB $L_{Aeq(15hr)}$)	6
Total Residences Modelled	180

¹: modelling of 'future existing' case includes the effect of the noise barrier which is soon to be constructed on the Eastern side of the Tweed Heads Bypass

Predicted noise levels exceed the base criterion at a large number of receivers. In most cases, existing traffic noise levels at these receivers already exceed the base criterion. The 'allowance' criterion is not exceeded at any receivers.

The NSW RTA's *Environmental Noise Management Manual* (2001) sets out a method for determining whether noise mitigation (apart from 'feasible and reasonable' traffic management and road design measures) could be considered 'reasonable'. The method takes account of the significance of changes in noise level, and whether existing noise levels would be considered acute. Applying this methodology to the predicted noise levels for 2007, there are 6 receiver locations at which such additional treatment could be considered 'reasonable' (although not necessarily 'feasible'). Generally, this is on the basis that existing traffic noise levels would be considered acute, and hence even though the proposal may of itself reduce these levels, further reductions as part of the project may be considered worthwhile.

10.6 Tugun Bypass Traffic Noise Prediction 2017

10.6.1 Queensland

The predicted noise contours for 10 years following the proposed opening of the Tugun Bypass (2017), in Queensland are shown in Appendix G. The contours are based on low-noise asphalt road surface with no mitigation measures in place.

10.6.2 NSW

The predicted noise contours for 10 years following the proposed opening of the Tugun Bypass (2017) without noise mitigation in NSW are shown in Figure 10.1. Day-time (7:00 am to 10:00 am) situations are represented as this is the most critical period in terms of exceedance of 'base' criteria. The noise predictions are based on low-noise asphalt road surface with no mitigation measures in place.

Noise levels predicted at individual receiver locations for the NSW section of the Tugun Bypass without mitigation are listed in Appendix L. The Lakeside Christian Centre receivers, for which $L_{Aeq(1\text{ hour})}$ noise levels are required, are discussed in Section 10.7.1.

Table 10.5 summarises the number of receiver locations for which various noise criteria are exceeded (excluding residences scheduled for resumption as part of the proposal).

Table 10.5: Summary of NSW Noise Modelling Results – Year 2017 With Tugun Bypass (No Noise Mitigation) ¹

Criterion	Number of Residences
Noise level exceeds base criterion	67
Noise level exceeds allowance criterion	0
Noise level exceeds base criterion and increases compared with Year 2017 no bypass	0
Mitigation (apart from traffic management and road design measures) considered 'reasonable' under <i>Environmental Noise Management Manual</i> (2001) due to acute noise impacts (i.e. > 60 dB $L_{Aeq}(9hr)$ or > 65 dB $L_{Aeq}(15hr)$)	11
Total Residences Modelled	180

¹: modelling of 'future existing' case includes the effect of the noise barrier which is soon to be constructed on the Eastern side of the Tweed Heads Bypass

As expected, the number of receivers at which criteria are exceeded is higher than for the 2007 case, due to predicted traffic growth.

Over 37% of all modelled receivers are predicted to experience traffic noise levels exceeding the base criterion for NSW without noise mitigation. However, there are still no receivers for which predicted noise levels exceed the 'allowance' criterion.

Applying the method in the NSW Road and Traffic Authority's *Environmental Noise Management Manual* (2001) to determine whether further noise mitigation measures would be considered 'reasonable', there are 11 residences. These locations are indicated in Table L-1, together with the maximum change in predicted noise level compared with the 'no bypass' case for 2007.

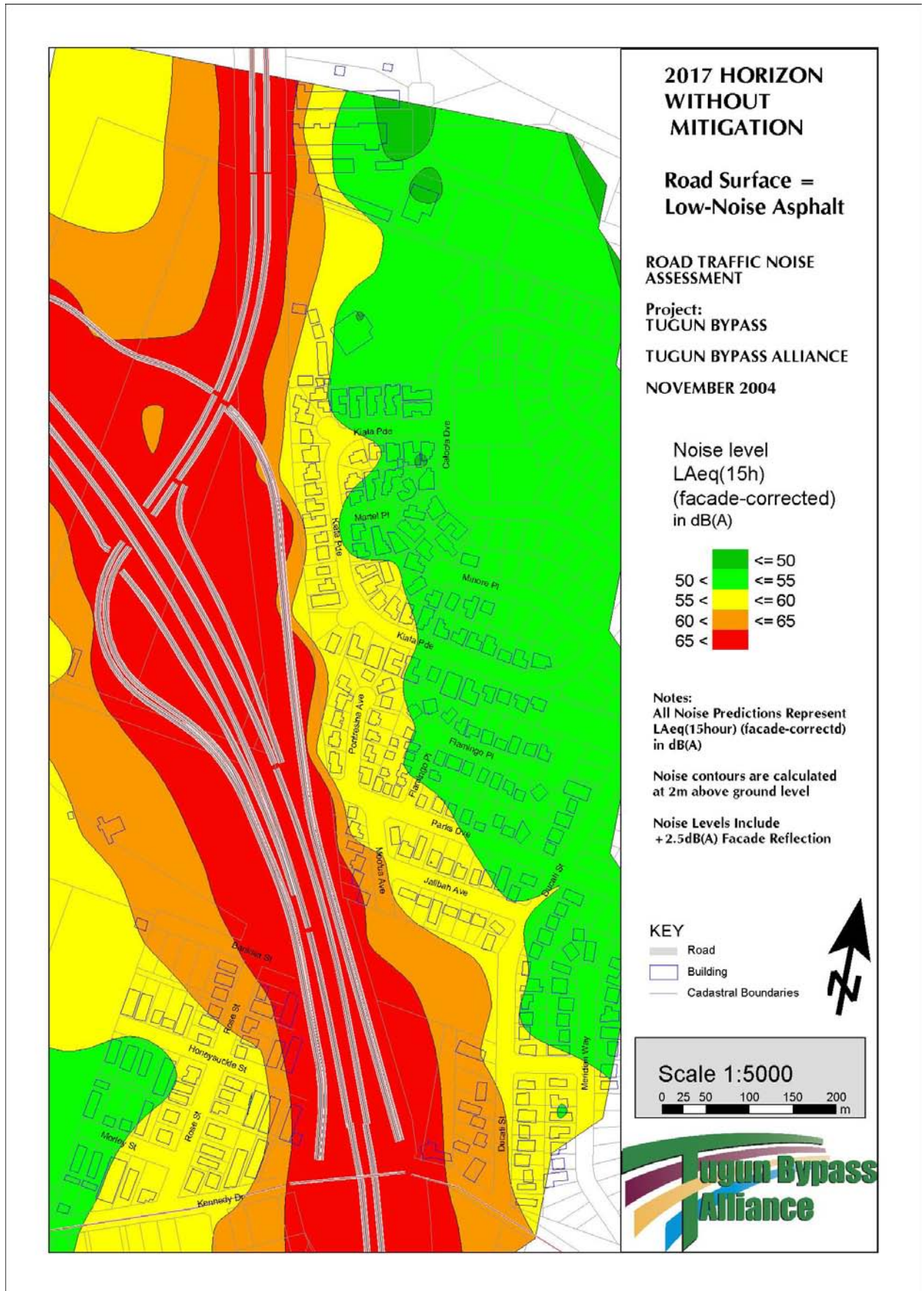


Figure 10.1: NSW 2017 Predicted Noise Contours – No Noise Mitigation

Once again, in most cases residences are in this category due to the fact that existing traffic noise levels would be considered 'acute', and hence any potential reduction in these levels should be considered seriously even though the project without mitigation measures may result in a reduction in noise.

10.7 Outdoor Recreation Areas

10.7.1 Park on Mirreen Drive (Queensland)

A small park exists on the cul-de-sac of Mirreen Drive, adjacent to the proposed bypass. An open field receptor was located in this park. A free-field level of $L_{A10(18\text{ hour})}$ 55.1 dB(A) is predicted for 2017 with no mitigation in place. This level represents an increase of 14.6 dB(A) over the measured façade level $L_{A10(18\text{ hour})}$ 43 dB(A) (equivalent to 40.5dB(A) free-field) recorded at Unit 6, 53 Mirreen Drive (approximately 50 m from the park receptor). Main Roads' criterion for open recreation areas is $L_{A10(12\text{ hour})}$ 63 dB(A). Converting the average maximum traffic noise level over 18 hours to the level over twelve hours the predicted $L_{A10(12\text{ hour})}$ level in 2017 is 57.1 dB(A) with no mitigation measures implemented, which complies with the criterion. .

10.7.2 A.V. Ducat Park

The A.V. Ducat Park is adjacent to the southern end of the proposed bypass on the eastern side. Predicted noise levels and comparison with criteria are presented in Table 10.6. In this case, only daytime ($L_{Aeq(15\text{ hour})}$) noise levels are relevant.

Table 10.6: Predicted Noise Levels in A.V. Ducat Park, $L_{Aeq(15\text{hour})}$ dB(A)

Measured Noise Level, 2003	Predicted Noise Level, 2007 Before Bypass	Noise Level Criteria dB(A)		Predicted Noise Level With Bypass (No Mitigation)	
		Base Criterion	Allowance Criterion	2007	2017
70	68	60	71	65	66

10.8 Internal Noise Assessment

10.8.1 John Flynn Hospital and Medical Centre

Noise levels in 2017 are predicted to be within the calculated external façade criteria with no specific road traffic noise mitigation measures in place. Predicted noise levels are shown in Table G-1 in Appendix G.

10.8.2 Lakeside Christian College and Church

The Lakeside Christian College comprises five school buildings in a north-south alignment offset approximately 10 to 15 m from the existing Tweed Heads Bypass. The school buildings are one storey, demountable structures with louver windows. The exception is school building 'D' which is a two-storey, concrete block construction with aluminium sliding windows. Classroom windows are generally open on the exposed facade during school hours for ventilation purposes. One of the school buildings has air-conditioning installed.

Table 10.6 shows calculated noise levels and criteria at each building. In this case, criteria are in terms of $L_{Aeq(1\text{ hour})}$ noise levels based on the AM peak hour traffic volumes. For school buildings, internal base level noise criteria have been translated to external criteria at a façade by assuming a difference of 10 dB between external and internal noise levels. This is considered appropriate for the case where windows are open to a normal extent. For the church the assumed difference is 25 dB(A) (see Section 9.2).

Predicted noise levels immediately after opening of the bypass are reduced by about 3 dB(A), and subsequently increase with traffic growth to 2017. 'Allowance' criteria are not predicted to be exceeded during that time.

The methodology used above for determining whether provision of further mitigation is considered 'reasonable' applies only to residential land uses. In this case, provision of barriers or other means specifically to protect this park is not considered reasonable, although in practice mitigation measures employed to reduce residential exposure would also reduce noise exposure within the park.

Table 10.7: Predicted Noise Levels at Lakeside Christian College and Church¹

Receiver	Calculated $L_{Aeq(1\text{ hour})}$ Noise Level, 2007 Before Bypass dB(A)	Noise Level Criteria, dB(A)		Calculated $L_{Aeq(1\text{ hour})}$ Noise Level With Bypass (No Mitigation) dB(A)	
		Base Criterion (External Façade)	Allowance Criterion	2007	2017
School Building A (northern)	70.3	55.0	72.3	65.5	66.4
School Building B	65.9	55.0	67.9	60.2	61.1
School Building C	66.1	55.0	68.1	60.1	61
School Building D, Level 1	66.6	55.0	68.6	59.4	60.3
School Building D, Level 2	68.6	55.0	70.6	63	63.9
School Building E (southern)	71.8	55.0	73.8	60.6	61.4
Church, Level 1	60.3	65.0	62.3	54.9	55.8
Church, Level 2	63.1	65.0	65.1	59.4	60.2

¹: modelling of 'future existing' case includes the effect of the noise barrier which is soon to be constructed on the Eastern side of the Tweed Heads Bypass

Table 10.6 indicates that the opening of the bypass would result in a very significant reduction up to approximately 10 dB(A) in noise levels at the complex, due to significantly reduced traffic on the Tweed Heads Bypass. Nevertheless, calculated noise levels at school buildings for 2017 remain up to 11.5 dB(A) above the base criteria, and hence it is considered reasonable to investigate possible additional ameliorative measures.

Within the church, calculated noise levels for 2017 are within the (facade-adjusted) base level criteria, and hence are considered acceptable.

10.9 Change of Acoustic Environment

10.9.1 The Existing Route – Pacific Motorway/Gold Coast Highway/Tweed Heads Bypass

The reduction in traffic volumes along the Pacific Motorway/Gold Coast Highway/Tweed Heads Bypass would result in an improved acoustic environment for residents living on both sides of the existing route. This reduction would be in the order of 3 dB(A) at 2007 and 2017 with the Tugun Bypass in place compared to this situation without it. While improvements of this magnitude would be noticeable immediately the bypass is opened to traffic (a reduction of 3 dB(A) is perceptible as an improvement in the acoustic environment) it is significant that these reductions are not immediately eroded by traffic growth over time. A reduction of approximately 50% in traffic using the existing route is expected in 2007 compared to present volumes and only a small increase to 2017 is expected indicating that the improvements brought about by the diversion of traffic to the Tugun Bypass would be maintained although noise levels would tend to increase slowly as a result of traffic growth along the Gold Coast Highway.

Improvements in noise levels would be experienced by some 800 people living along the Pacific Motorway/Gold Coast Highway/Tweed Heads Bypass in those houses and units directly facing the traffic. Reductions in noise would also assist in improving the amenity of the public areas both for residents and visitors.

Marginal noise level increases would be experienced by residents along the eastern side of the Tweed Heads Bypass north of the proposed Tweed Heads Bypass interchange. It is expected that the magnitude of the noise level increase would not be noticeable by the residents of these dwellings.

Predicted changes at a range of receptors are listed in Table 10.8.

10.9.2 Tweed Heads Bypass

A number of receptors were selected along the Tweed Heads Bypass south of the Lakeside Christian Centre to assess the change of acoustic environment resulting from introduction of the Tugun Bypass. Noise levels were predicted with and without the Tugun Bypass for the 2017 horizon and are shown in Table 10.8.

Table 10.8: Façade Noise Levels for Receptors on the Existing Route, 2017.

Representative Receiver	Floor	Façade Facing	Façade Noise Level (LA10(18 hour))		Change
			Without Tugun Bypass	With Tugun Bypass	
Pacific Motorway					
Alkira Street	2	north-west	70.3	69.9	-0.4
Blamey Drive	One	south-east	72.1	71.6	-0.5
Gold Coast Highway					
1 Karana Street	One	north-east	73.3	71.7	-1.6
	Two	north-east	75.5	73.9	-2.2
437 Golden Four Drive	One	south-west	73.4	71	-2.4
	Two	south-west	75.6	73.1	-2.5
484 Coolangatta Road	One	north-east	69.3	66.5	-2.8
	Two	north-east	71.4	68.6	-2.8
373 Golden Four Drive	One	south-west	74.4	71.9	-2.5
	Two	south-west	76.6	74.1	-2.5
281 Golden Four Drive	One	south-west	72.6	69.2	-3.4
	Two	south-west	74.7	71.3	-3.4
258 Coolangatta Road	One	north-east	73.6	70.2	-3.4
	Two	north-east	75.7	72.3	-3.4
141 Golden Four Drive	One	south-west	72.2	68.8	-3.4
	Two	south-west	74.4	71	-3.4
53 Golden Four Drive	One	south-west	66	65.4	-0.6
	Two	south-west	68.2	67.5	-0.7
Tweed Heads Bypass			Façade Noise Level (LAeq(15 hour))		
37 Kiata Parade	One	west	62.1	59.9	-2.2
51 Kiata Parade	One	west	64.9	59.3	-5.6
63 Kiata Parade	One	south-west	67.7	60.3	-7.4
1 Pontresina Avenue	One	west	63.6	60.7	-2.9
6 Pontresina Avenue	One	west	59.3	58.2	-1.1

Traffic composition and road surface conditions were assumed to be similar for the Tweed Heads Bypass with and without the proposed Tugun Bypass. Traffic speed on the Tweed Heads Bypass would reduce to 70 km/hr with the Tugun Bypass in place. The significant reduction in noise level to the north of the intersection with the proposed bypass is a result of reduced traffic speed and volume on the Tweed Heads Bypass and, in particular, the reduced volume of heavy vehicles at night. Noise level reductions would reduce closer to the proposed intersection, and by approximately the southern end of Pontresina Avenue calculations indicate that 2017 noise levels would be approximately the same with and without the Tugun Bypass.

10.10 Gold Coast Airport

10.10.1 Road Traffic Noise within Gold Coast Airport

Road traffic noise on Gold Coast Airport land would be loudest near the road, on the western boundary and would reduce at a rate of approximately 4 dB(A) per doubling of distance.

The nearest noise sensitive receiver within the airport boundary is the terminal building, which is approximately 850 m from the road at the nearest point. Free-field noise levels at the terminal building are predicted to be approximately 46 dB(A) $L_{Aeq(15\text{hour})}$ during the day and 40 dB(A) $L_{Aeq(9\text{hour})}$ at night, which is significantly less than the NSW RTA residential road traffic noise criteria for new roads.

The majority of airport buildings are air-conditioned with closed windows to attenuate aircraft noise. It is therefore not anticipated that operational or construction noise associated with the Tugun Bypass would present any concerns for users of the airport. Workers on the airport tarmac are required to wear hearing protection and therefore would be unaffected by predicted changes in traffic noise levels. Airport patrons would be exposed to road traffic noise only briefly while entering the airport buildings from the carpark and when boarding aircraft.

10.10.2 Road Traffic Noise from Gold Coast Airport at Nearest Noise-Sensitive Receiver

The nearest noise sensitive receivers to the section of road within the airport boundary are in Tringa Street, Tweed Heads West. Predicted noise levels at these receivers generated from the segment of road on airport property are approximately 38 dB(A) $L_{Aeq(8\text{ hour})}$ and 42 dB(A) $L_{Aeq(24\text{ hour})}$.

These noise levels are well within the criteria shown in Section 7.2

10.11 Pacific Beach Estate

Since this estate has not received formal development approval, the locations of future noise-sensitive receivers are unknown. Predicted noise levels at facades of dwellings located at 20 m progressive intervals from the nearside edge of the southbound carriageway have been calculated to assist the developer to determine the noise mitigation requirements of the estate. The road shoulder of the proposed alignment has been designed to allow for the future construction of noise barriers by others.

10.12 Maximum Noise Levels

Under the guidelines in Practice Note (iii) of the NSW RTA *Environmental Noise Management Manual* (2001), an assessment of maximum noise impacts during the night-time period is required for the NSW section of the project.

In this case, night-time traffic volumes at residences potentially affected by the proposal are predicted to be relatively high, although the predicted proportion of heavy vehicles, at 17%, is not as high as is often encountered on major highways in NSW.

In 2007, it is predicted that the existing Tweed Heads Bypass would carry approximately 120 heavy vehicles per hour between 10:00 pm and 7:00 am. After opening of the Tugun Bypass, the new road would carry 108 heavy vehicles per hour.

The number of heavy vehicles using the existing Tweed Heads Bypass would be reduced to 37 per hour during these hours. For residences facing the existing road, maximum noise levels from these vehicles are calculated to be up to 85 dB(A), and similar levels could be expected after opening of the Tugun Bypass. However, moving north from the intersection with the new bypass, the frequency of these events would dramatically reduce.

For the above groups of residences, additional mitigation measures as discussed in the following chapter to control general traffic noise would also have the effect of reducing maximum noise levels from these events.

11. Road Traffic Noise Mitigation Measures

11.1 Noise Mitigation Options

11.1.1 Road Surface Treatment

The quietest road surface type available during this assessment is open-graded asphalt. For noise predictions, the NSW RTA recommends a noise level reduction of -3 dB(A) for open-graded asphalt. The Queensland Department of Main Roads recommends a noise level reduction of -2 dB(A) for open-graded asphalt for noise predictions.

Open graded asphalt surfacing is a commonly used low-noise pavement in noise sensitive areas where noise mitigation is required.

Considerable noise is generated from the use of expansion joints on bridge decks. Bridges located near to noise sensitive receivers should be designed without expansion joints or with joints treated for minimum noise generation.

11.1.2 Noise Barriers and Earthen Berms

The effectiveness and practicality of the range of available noise barriers and berms vary considerably depending on the type of material used, the nature of construction, the nature of the topography and the distance-elevation relationships between source and receptor. However, regardless of the type of barrier or berm selected the anticipated noise reduction works on the same principle of obscuring the line of sight and shading the sensitive receptor, thereby increasing the path difference and reducing the noise level at the facade of the building.

Earthen berms are modelled in the same manner as barriers with corrections for slope and top width of the berm. The latter is the width of the main diffracting edge of the berm.

It has been assumed that any purpose built noise barriers would be constructed of a material with a surface density of a least 12.5 kg/m^2 in such a manner that they are contiguous and flush with the ground at all times. In accordance with usual practice, where changes in height of the barrier are specified, the transition between the different heights may be designed with gradual slopes to satisfy aesthetic considerations.

Where this is the case, the change in height should intrude into the lower of the two sections. In the event that there are discontinuities in the barrier due to the need to provide access points, the ends of each barrier should be flanged and overlap and every effort should be made to ensure that the line of sight of the road from the nearest residences is fully obscured. Any overlap should be designed so that its length is greater than twice the distance of the gap between barriers.

11.1.3 Architectural Acoustic Treatments

Where other noise mitigation options have not been found to be reasonable or feasible, architectural treatment of individual dwellings may also be considered. This process of including suitable architectural treatment options for individual dwellings involves consultation with owners of selected noise affected properties with the objective of treating parts of the buildings or agreeing to alternative noise mitigation

measures. For NSW receivers, the process of including feasible and reasonable treatments, and for the design and provision of architectural acoustic treatment of individual dwellings, is described in Practice Notes iv and iv(b) of the NSW RTA's *Environmental Noise Management Manual* (2001).

11.2 Potential Mitigation Strategy

11.2.1 Queensland

Noise barriers may be required at various locations along the route to minimise operational noise impact. Indicative noise barrier locations are given in Table 11.1 and shown in Figures 11.1a to 11.1b.

Table 11.1: Potential Noise Barrier Locations in Queensland

Location	Descriptor	Side of Bypass	Approximate Length (m)
Station Street/Mayfair Street	NB – 1	east	400
Mollys Place	NB – 2	east	450
Mitchell Avenue	NB – 4	west	550
Clancy Court/Alinjarra Drive	NB – 3	west	1000

The final selection of noise mitigation will be determined during the Detailed Design stage of the project. Determination of suitable noise attenuation measures will give due consideration to technical feasibility, cost effectiveness, aesthetics, equity, community consultation and practicality. Noise attenuation measures may include the following:

- Road pavement surfaces (i.e. Asphalt) that have proven low-noise characteristics when considered against other road pavement surface types.
- Traditional noise barriers within the road reserve where reasonable and feasible
- Innovative noise reducing measures (if determined to be technically feasible and cost effective), where traditional noise barriers and surface treatments do not provide adequate attenuation to achieve the road traffic noise levels defined by the Road Traffic Noise Management: Code of Practice.

If the relevant noise criteria cannot be reasonably achieved using the methods described above, further consideration may be given to the provision of noise attenuation measures outside the road reserve at Queensland Department of Main Roads' discretion.

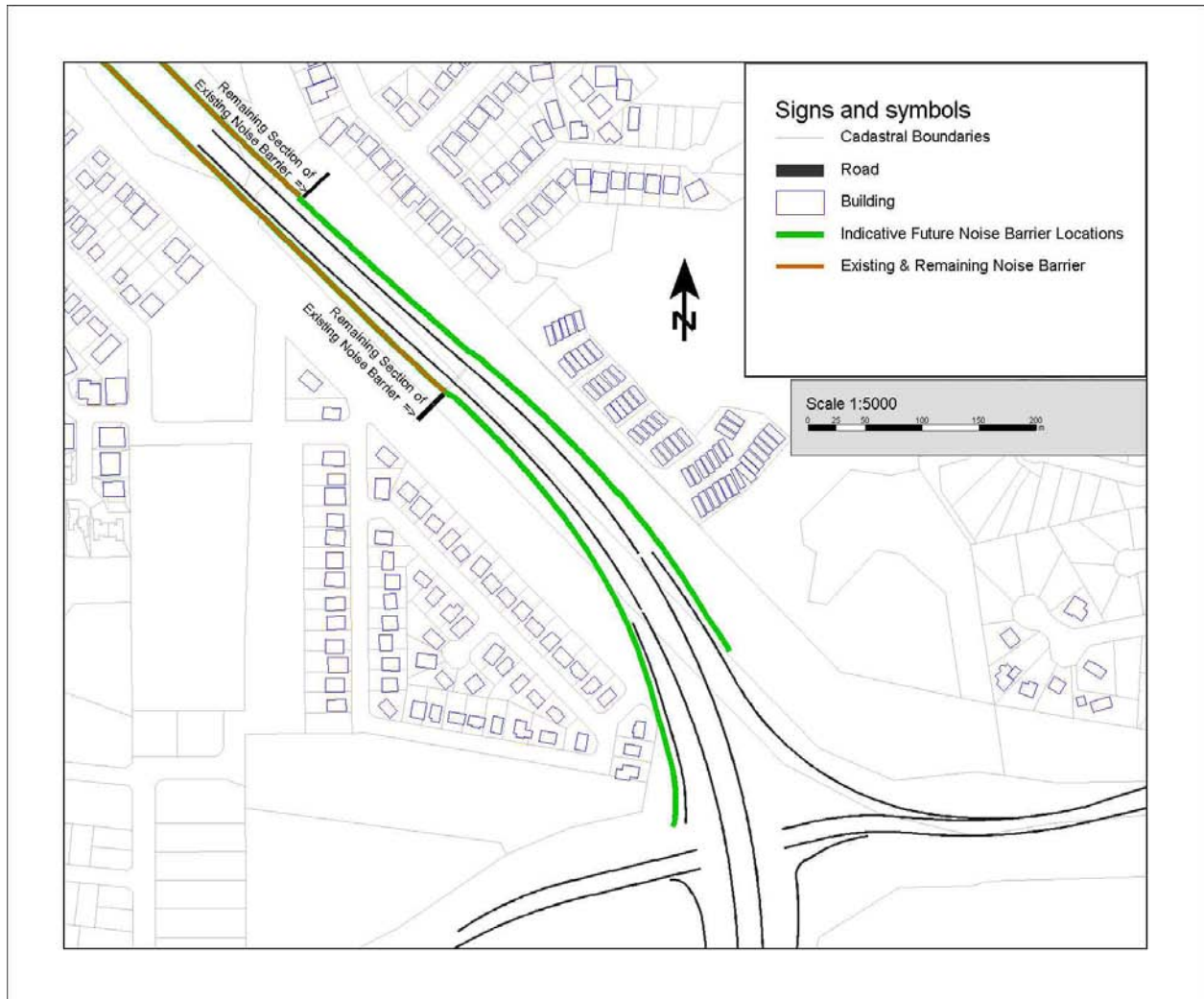


Figure 11.1a: Queensland - Indicative noise barriers – north of Stewart Road



Figure 11.1b: Queensland Indicative noise barriers – south of Stewart Road

11.2.2 NSW

The proposed mitigation strategy for the NSW section of the Tugun Bypass was determined to meet or exceed the noise criteria of the *Environmental Criteria for Road Traffic Noise* (NSW Environment Protection Authority 1999). The 2017 horizon was considered as the worst-case scenario for road traffic noise. The following noise mitigation controls have been developed for receptors in NSW.

The NSW RTA's mitigation treatment selection and design process requires that the final design of noise treatments is selected following further evaluation of community preference, feasibility, visual impacts and cost-effectiveness, in accordance with the *Environmental Noise Management Manual* (2001) during the detailed design phase of the proposal. This process requires that treatments are developed in consultation with the NSW Environment Protection Authority and with the approval of the NSW Department of Infrastructure Planning and Natural Resources.

The use of low-noise asphalt applied as a road surface treatment on both carriageways of the Tugun Bypass through to Kennedy Drive.

The noise barriers proposed for the NSW section of the Tugun Bypass are shown in Table 11.2 and shown in Figures 11.2a-b.

Table 11.2: Proposed Noise Barriers for NSW

Location	Descriptor	Side of Bypass	Height (m)	Length (m)	Area (m ²)
Northern Pacific Highway Noise Taskforce Noise Barrier ('future-existing')	NB – 0	east	4.5	753	3387
Western Service Road	NB – 1	west	3.0-6.5	585	2121
Between Tugun Bypass and Western Service Road	NB – 2	west	3.0-4.0	295	983
Tweed Heads Bypass (southern extension to 'future-existing' noise barrier)	NB – 3	east	4.5	158.7	714
Lakeside Christian College Barrier	NB – 4	east	5.0	250	1250

Appendices J and M provide calculated noise levels for 2007 and 2017 respectively at all receiver locations after application of the mitigation measures.

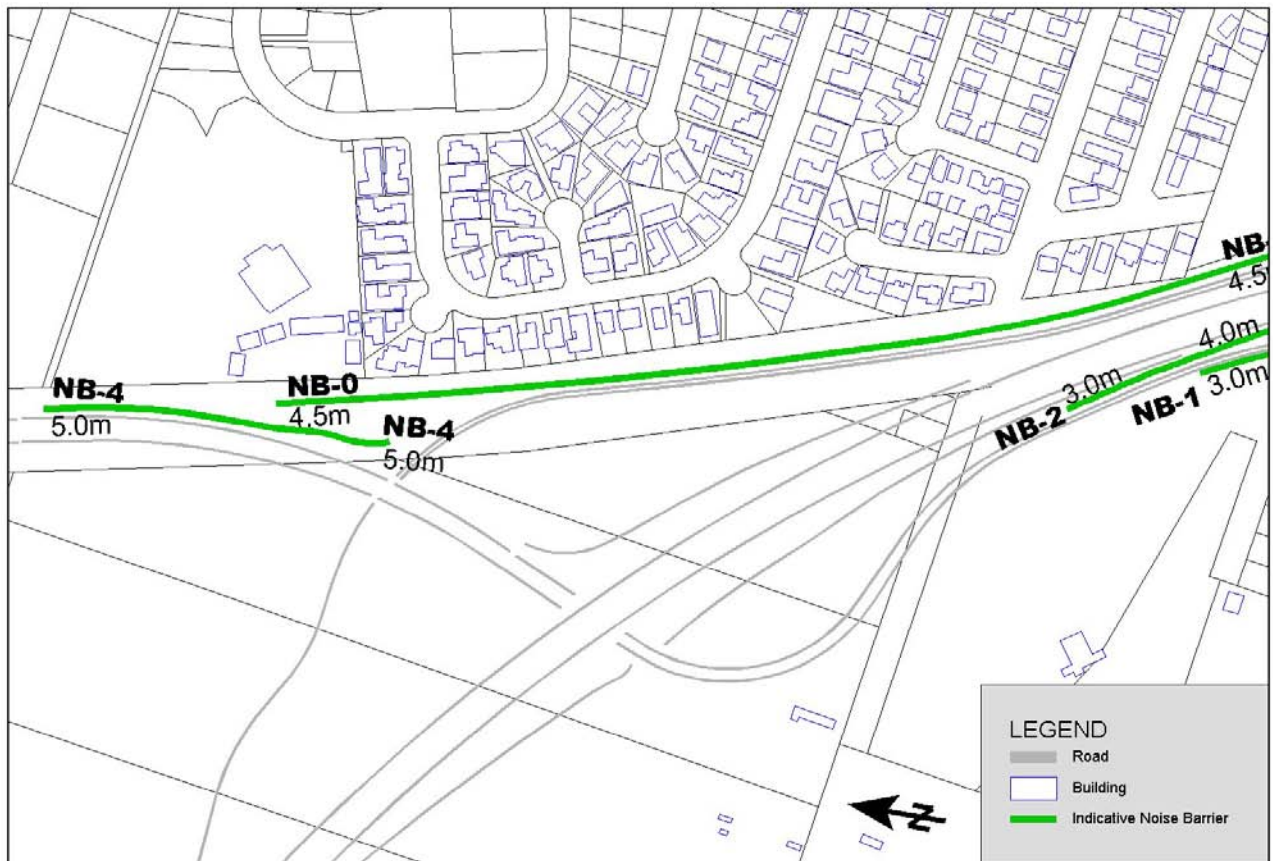


Figure 11.2a: NSW Indicative Noise Barrier Locations (a)



Figure 11.2b: NSW Indicative Noise Barrier Locations (b)

Lakeside Christian College

A barrier was modelled at a location between the college buildings and the Tweed Heads Bypass on the road shoulder. The objective of this barrier was to achieve an external facade level of $L_{Aeq (1 \text{ hour})}$ 55 dB(A) for classrooms, which gives an internal $L_{Aeq (1 \text{ hour})}$ noise level of 45 dB(A) with windows open to a normal extent. Table 11.2 shows the façade noise levels achieved at 2017 with a 5 m high barrier constructed along the road shoulder with hard (reflective) surfaces with the college site.

Table 11.3: Façade Noise Levels for Lakeside College with Five metre Barrier 2017

Receptor	Storey	Façade	Predicted Façade $L_{Aeq (1 \text{ hour})}$ Levels (dB(A))	Criterion (dB(A))	Exceedance (dB(A))
School Building A (northern)	One	western	57	55	2
School Building B	One	western	55	55	nil
School Building C	One	western	55	55	nil
School Building D	One	western	55	55	nil
	Two	western	57.5	55	2.5
School Building E (southern)	One	western	56	55	1

The external façade noise criterion is exceeded for the concrete block classrooms and for the demountable classrooms with windows open, by up to 2 dB(A). Compliance with the internal criterion for all classrooms can be achieved by closing the windows and providing mechanical ventilation in accordance with the requirements of the Building Code of Australia. This would result in a reduction in internal noise levels of approximately 10 dB(A).

Closing the windows implies architectural treatments for the demountable classrooms. This would entail the replacement of the louver windows with glazing in sliding solid frames and the provision of mechanical ventilation.

The noise mitigation measures consisting of a roadside barrier plus architectural treatment would be reviewed in accordance with the NSW RTA *Environmental Noise Management Manual* (2001) procedures during the detail design phase of the proposal.

The 5 m high barrier would also provide a reduction in traffic noise in the playground of the school. With this barrier in place, the maximum $L_{Aeq (15 \text{ hour})}$ noise level within the playground is predicted to be 57.5 dB(A), or 2.5 dB(A) above the relevant base criterion. This represents a reduction up to 16 dB(A) compared to the level in 2007 before opening of the bypass. However, due the height of the barrier there would be afternoon shadowing. It is recommended that consultation with the school stakeholders be undertaken.

Provision of noise mitigation measures by architectural acoustic treatments is currently proposed for the Lakeside Christian College as part of the implementation of the Northern Pacific Highway Noise Taskforce. These treatments are yet to be approved under the Environmental Planning and Assessment Act. If approved, any noise barriers

to be installed would need to be designed in proportion to the attenuation achieved by the installed architectural acoustic treatments.

11.3 Optimisation of Mitigation Measures

11.3.1 Queensland

Once the proposed noise mitigation strategy in Queensland has been identified, the final selection and design of noise mitigation measures will be subject to consultation with relevant stakeholders.

11.3.2 NSW

In accordance with the NSW RTA *Environmental Noise Management Manual 2001*, noise mitigation measures may be rationalised during the detailed design phase for receivers currently exposed to high noise levels.

The NSW Environment Protection Authority *Environmental Criteria for Road Traffic Noise* (1999) sets noise level targets for specific types of projects but allow the acceptance of higher noise levels if it can be demonstrated that it is not feasible and reasonable to meet these targets.

The factors which must be considered in assessing the 'reasonableness' of noise barriers include:

- their benefits, in terms of the noise reductions achieved and the number of people protected; and
- their costs, in terms of their total cost and the variation of this cost with variations in the benefits provided.

The analytical tools described in the Roads and Traffic Authority *Environmental Noise Management Manual – Practice Note (iv)* are based on the interaction between barrier heights and the resulting acoustic benefits within a defined area.

Areas of affected residences are divided into noise 'sub-catchments' likely to have similar noise exposure. The rationalisation process involves an iterative procedure of steadily increasing the noise barrier heights and determining the optimal balance of noise reduction benefit and costs.

An example of the rationalisation process of noise barrier heights is illustrated in Figure 11.3. The chart shows the total noise benefit and marginal noise benefit for all residential receivers affected by the proposal.

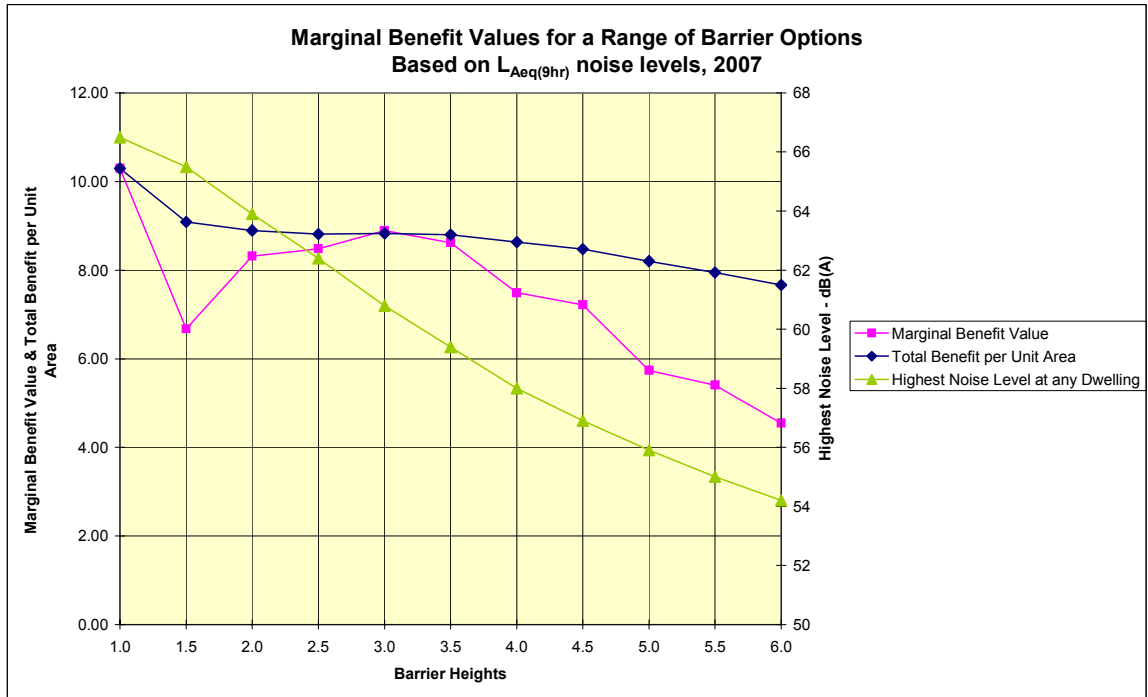


Figure 11.3: Determination of 'Reasonable' Noise Mitigation Treatments

12. Cumulative Noise Impacts

Ambient noise levels for sensitive receptors located near the proposed Tugun Bypass corridor would include contributions from road, aircraft and other local noise sources. The relative contribution from each of these sources would depend on the proximity of the receptor to the proposed road alignment and the aircraft noise contours at that location.

Since road and aircraft noise levels are normally quantified using different descriptors there is no simple method of calculating the accumulated noise exposure at a particular location.

Furthermore, there is no direct relationship between the combination of several noise sources and the corresponding effect on intrusiveness of each of those noise sources or together.

Queensland and NSW authorities recognise that the noise from multiple transportation sources would result in an accumulated transportation noise exposure but there are no recommendations on suitable cumulative criteria, or on the approach to be taken.

Single event maximum noise levels from aircraft or road traffic are generally so much higher than the equivalent continuous noise level from road traffic that the cumulative maximum levels are unaffected by the underlying continuous noise level. It is also unlikely that maximum noise events from each of the transport noise sources would occur simultaneously so that addition of the peak levels from each source would occur.

13. Conclusions

13.1 Road Traffic Noise

Queensland

Road traffic noise levels in 2017 would exceed Main Roads noise criteria at dwellings in Queensland following construction of the proposed Tugun Bypass with no noise mitigation in place.

The project will assess the impact of road traffic noise generated by the Bypass traffic on adjacent existing noise sensitive land uses in accordance with the Queensland Department of Main Roads 'Road Traffic Noise Management: Code of Practice' (Code of Practice).

Determination of suitable noise attenuation measures will give consideration to technical feasibility, cost effectiveness, aesthetics, equity, community consultation and practicality. Noise attenuation measures may include the following:

- Road Pavement Surfaces (i.e. Asphalt) that have proven low noise characteristics when considered against other road pavement surface types.
- Traditional noise barriers within the road reserve where reasonable and feasible.
- Innovative noise reducing measures (if determined to be technically feasible and cost effective), where traditional noise barriers and surface treatments do not provide adequate attenuation to achieve the road traffic noise levels defined by the Code of Practice.

If the relevant noise criteria cannot be reasonably achieved using the methods described above, further consideration may be given to the provision of noise attenuation measures outside the road reserve at Queensland Department of Main Roads' discretion.

NSW

Based on calculated road traffic noise levels in 2017, without noise mitigation, there are 11 residences at which noise levels would be such that ameliorative measures should be considered under guidelines in the NSW RTA's *Environmental Noise Management Manual* (2001). In addition, noise levels exceeding 'base' criteria are predicted at the Lakeside Christian College school complex.

Noise mitigation measures proposed for the affected sensitive receptors include:

- low-noise asphalt on carriageways; and
- noise barriers (or equivalent earthen berms).

At the Lakeside Christian College, noise effects on school buildings would be attenuated below 'base' criteria levels by combining architectural acoustic treatments with the proposed noise barriers. It is recommended that consultation with the school stakeholders takes place to determine the optimum height and location of the barriers due to afternoon shadowing.

The implementation of 'feasible' (though not necessarily 'reasonable') noise mitigation measures would reduce noise levels sufficiently to achieve compliance with 'base' criteria for all receptors. In some cases this represents a very substantial reduction in

noise level compared with the 'before bypass' situation. All road noise mitigation measures proposed in NSW would be reviewed during the detailed design phase of the proposal, in accordance with the noise mitigation methods of the NSW RTA *Environmental Noise Management Manual* (2001).

Noise mitigation measures can be rationalised during the detailed design phase in accordance with the NSW Environment Protection Authority *Environmental Criteria for Road Traffic Noise*.

The final design of noise mitigation measures would be selected during the detailed design phase following a detailed analysis of practical issues, cost-effectiveness, visual impacts, community and affected-owner preference in consultation with regulatory authorities and with the approval of relevant departments.

The implementation of 'reasonable' noise mitigation measures would reduce noise levels sufficiently to achieve compliance with 'allowance' criteria for all receptors and ensure that noise levels at no receptors would be considered acute.

Residents living alongside the existing Gold Coast Highway route from Stewart Road to Kennedy Drive would experience noticeable improvements in noise levels as a result of the opening of the Tugun Bypass. This improvement would be sustained although noise levels would slowly increase as a result of traffic growth.

13.2 Construction Noise and Vibration

Construction of the Tugun Bypass can be undertaken in accordance with the applicable guidelines.

Construction would take place near noise sensitive receptors in Queensland and NSW. Most construction activities are planned to occur during the day within the permitted hours and would require best practice environmental management, as outlined in this report, to minimise the noise and vibration intrusion to the nearby noise sensitive receptors.

The following key findings were made in relation to construction noise:

- construction noise would result in a temporary increase in ambient noise levels at noise sensitive locations adjacent to the bypass corridor;
- construction activities conducted within regulatory hours would generally comply with applicable criteria and guidelines with the use of appropriate noise and vibration mitigation measures outlined in Chapters 5 and 6 of this technical paper. However, significant exceedances are predicted at some locations during specific stages of work;
- construction work on Airport land would need to be undertaken outside of standard hours to avoid/minimise disruption to airport operators; and
- construction contractors would be required to prepare detailed construction noise and vibration management plans to ensure that best practice methods for noise and vibration mitigation are employed during construction.

References

- Albert Shire Council 1995, *Albert Shire Planning Scheme*, February 1995.
- Australian Road Research Board 1974, A.E. Tynan, *Ground Vibration Studies*
- British Standard BS 7385: 1993 *Evaluation and Measurement of Vibration in Buildings – Part 2 Guide to Damage Levels from Ground – Borne Vibration.*
- British Standard BS 6472: *Evaluation of Human Exposure to Vibration in Buildings (1 Hz to 80 Hz)*
- Brown A.L. 1989, Technical Note Number 1: Some Simple Transformations for Road Traffic Noise, *Australian Road Research* 19(4):47.
- Dash, D.M. 1995, Investigation of Noise Levels in Pavement Wearing Surfaces and Development of Low Noise Concrete Roads, *Road and Transport Research*, 4(3).
- German Standard DIN 4150: Part 3:1986, *Structural Vibration in Buildings, Effects on Structures.*
- Gold Coast City Council 1998, *Gold Coast City Transport Plan.*
- Gold Coast Airport 2001, *Coolangatta Airport, Final Master Plan*, August.
- NSW Environment Protection Authority 1999, *Environmental Criteria for Road Traffic Noise.*
- NSW Environment Protection Authority 1994, *Environmental Noise Control Manual.*
- NSW Roads and Traffic Authority 2001, NSW Roads and Traffic Authority *Environmental Noise Management Manual.*
- Queensland Department of Main Roads 2000, *Road Traffic Noise Management - Code of Practice.*
- Queensland Department of Main Roads 1994, Standard Specification for Environmental Management – MRS 11.51.
- Richard Heggie Associates 2000, *Cross City Tunnel Noise and Vibration Technical Paper.*
- Standards Australia 1981 AS 2436: *Guide to Noise Control on Construction, Maintenance and Demolition Sites.*
- Standards Australia 1989 AS 3671: *Acoustics Road Traffic Noise Intrusion-Building Siting and Construction.*
- Standards Australia 1990 AS 2670.2: *Evaluation of Human Exposure to Whole-body Vibration, Part 2: Continuous and Shock-induced Vibration in Buildings (1 Hz to 80 Hz)*
- Standards Australia 1997 AS 1055: *Acoustics - Description and Measurement of Environmental Noise, Parts 1, 2, and 3.*
- Standards Australia 2000 AS 2107: *Acoustics-Recommended Design Sound Levels and Reverberation Times for Building Interiors.*
- UK Department of Transport (Welsh Office) 1988, *Calculation of Road Traffic Noise (CoRTN)*, HMSO, London.

Legislation

Commonwealth

Airports Act 1996

Airports (Environment Protection) Regulations 1997.

NSW

Environmental Planning and Assessment Act 1979.

Environmental Planning and Assessment Regulation 2000.

Protection of the Environment Operations Act 1997.

Industrial Noise Policy 2000.

Queensland

Environmental Protection Act 1994.

Environmental Protection Regulation 1998.

Environmental Protection (Noise) Policy 1997.



Appendix A

Noise Monitoring Procedures

Noise Monitoring Procedures

Baseline noise monitoring was conducted in accordance with the requirements and guidelines applicable in Queensland and NSW. A list of the relevant documents is provided in the references.

Prior to commencement of the monitoring program, permission for access to the proposed monitoring locations was arranged through the individual owners/occupiers of the relevant premises. This was done by site visit and/or phone contact.

For continuous monitoring, noise loggers were set up at the monitoring sites for a minimum period of seven days with samples recorded at 15-minute intervals.

Noise loggers were located 1 m from the most exposed facade of the sensitive receptor. Where this was not possible, the monitoring location was negotiated with the building occupant(s).

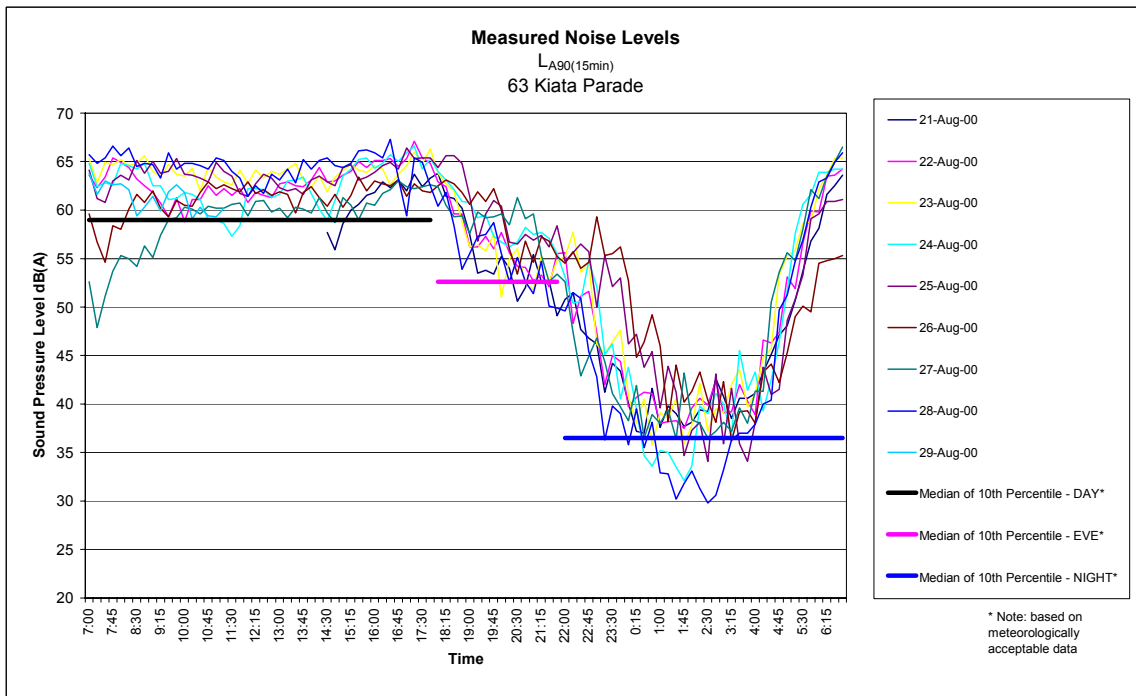
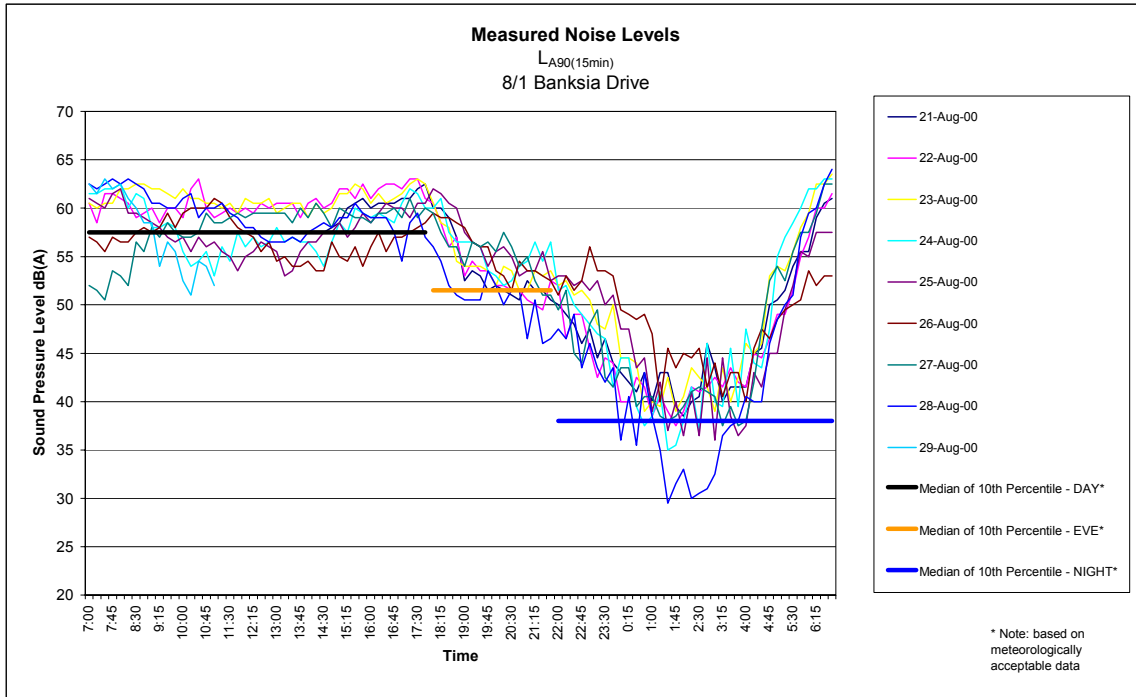
The minimum noise parameters recorded were L_{Amax} , L_{A1} , L_{A10} , L_{A50} , L_{A90} and L_{Aeq} . All noise monitoring equipment carries current laboratory calibration certificates. Prior to and after each monitoring event, field calibration of the logger units was conducted using an acoustic calibrator with current NATA certification in accordance with AS 1259.2-1990.

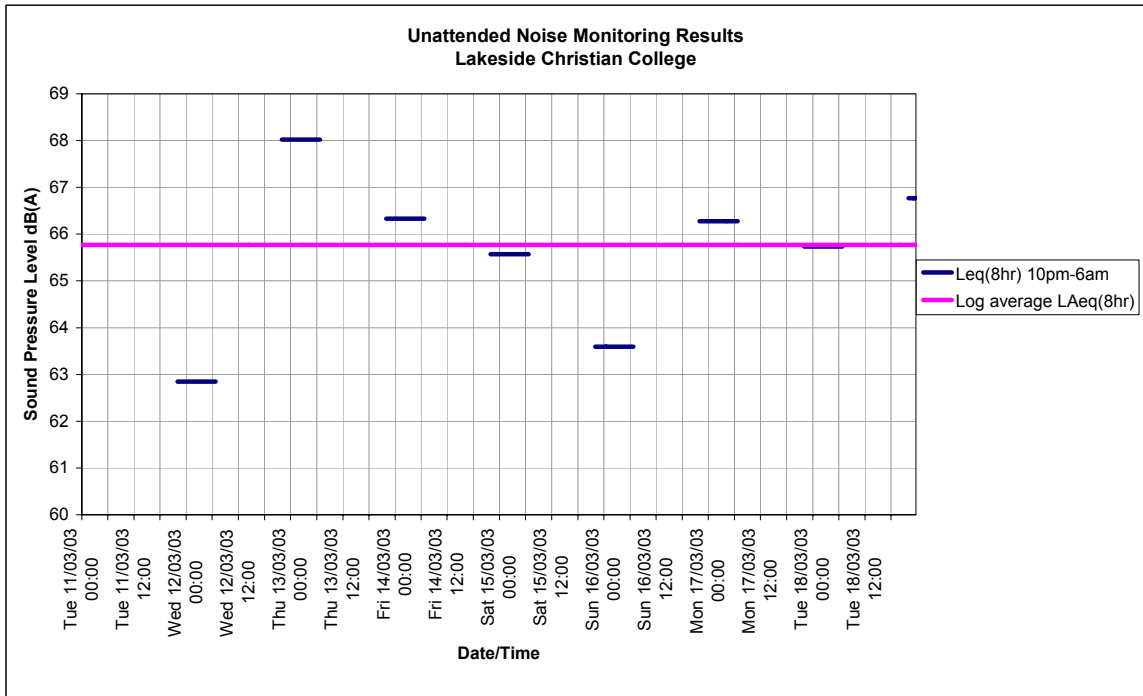
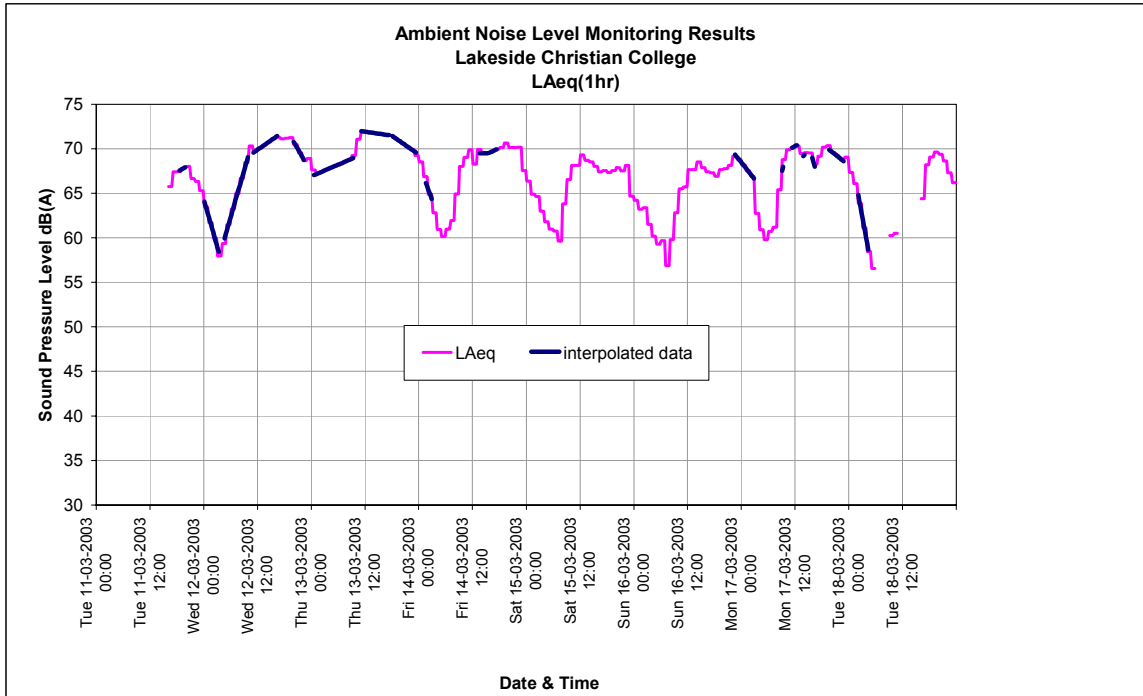
A description of the environment was documented to assist in qualifying the acoustic environment when collecting the noise loggers.

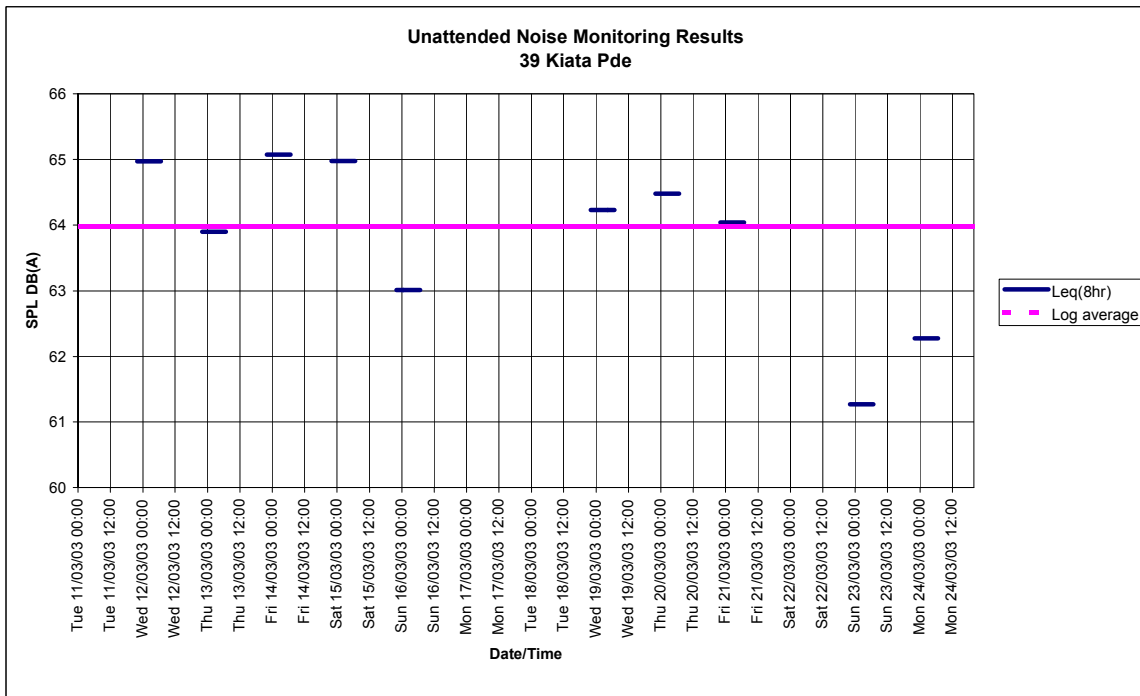
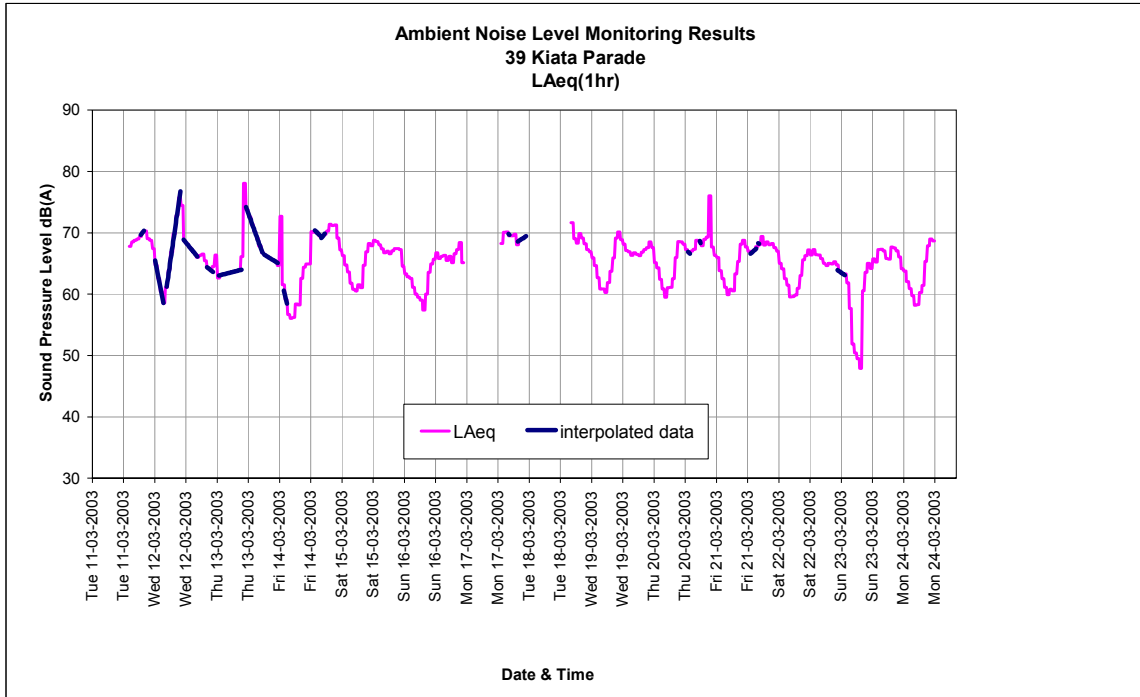
Meteorological data for the monitoring period was obtained from the Bureau of Meteorology site at Gold Coast Airport. Noise levels recorded during wind speeds and/or rainfall that exceeded the specifications of AS 1055:1997 for valid noise measurements were interpolated to complement the data set.

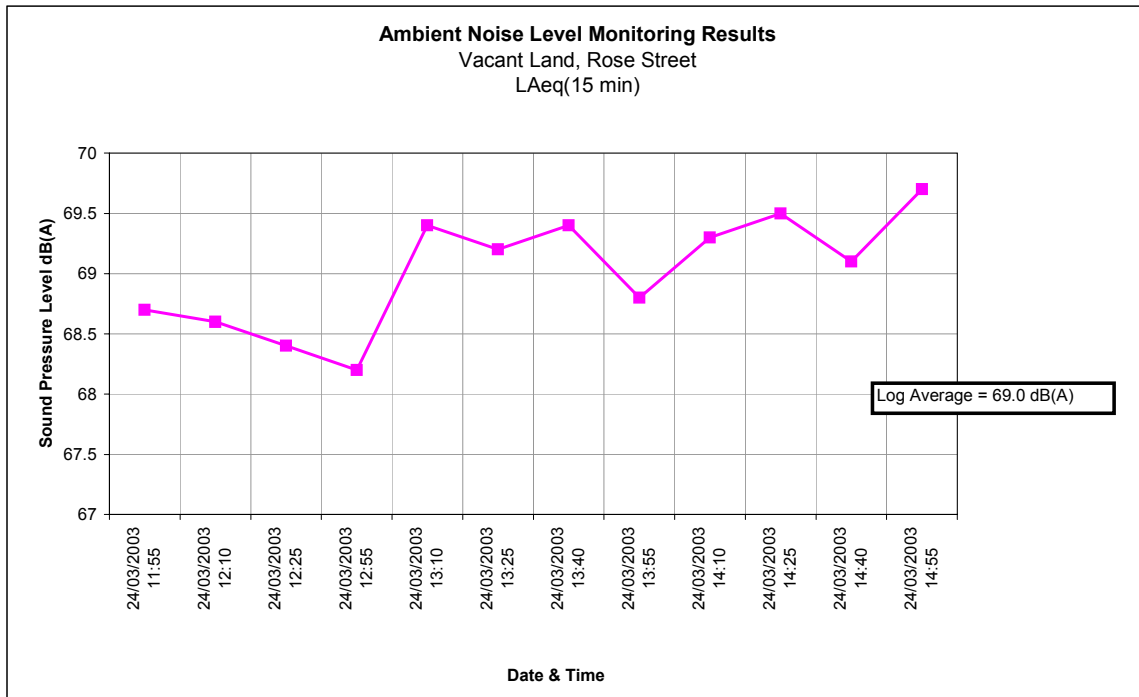
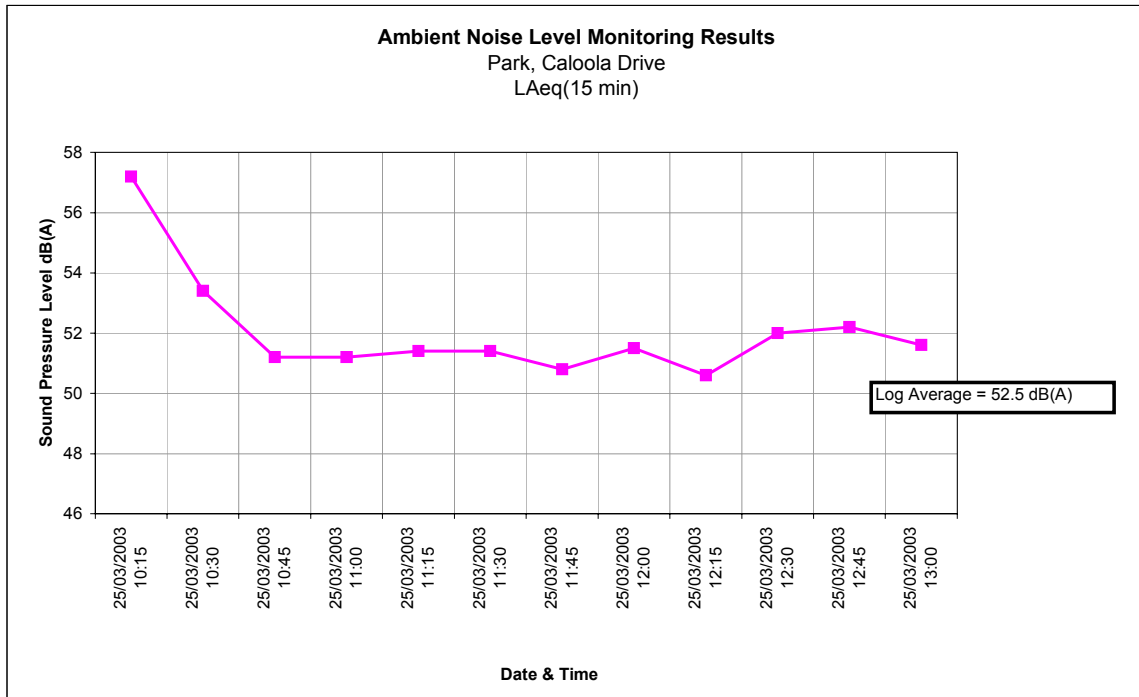
Appendix B

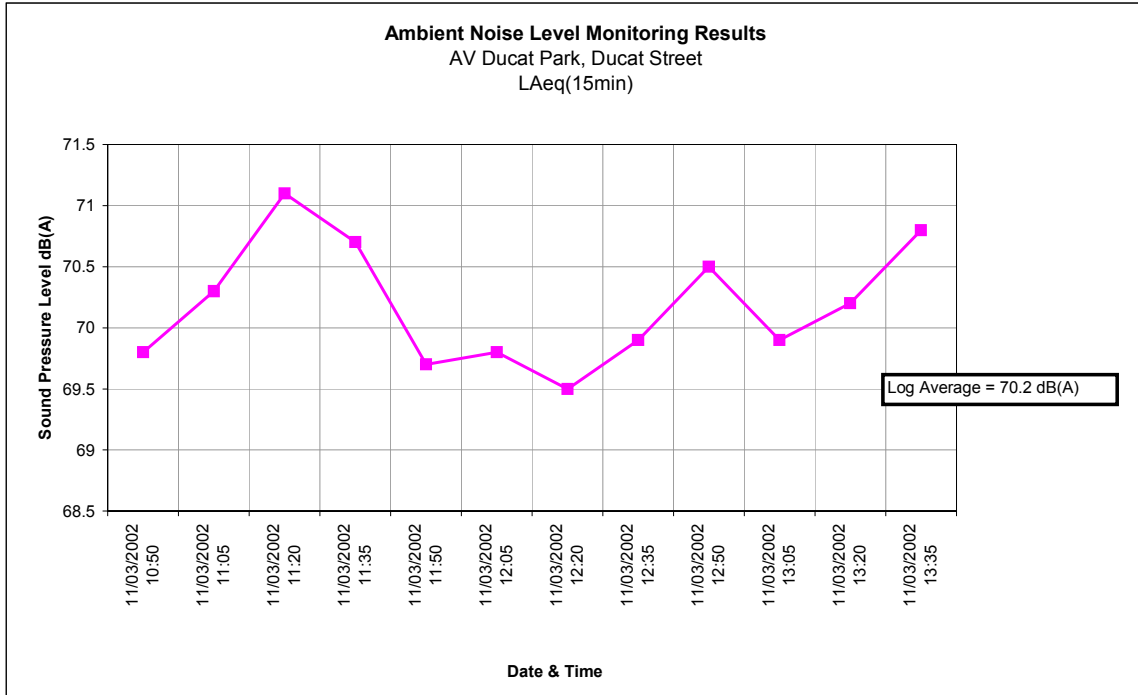
Noise Monitoring Charts











Appendix C

Model Inputs for SoundPLAN Modelling

Appendix C:

Table C1: Road and traffic information used in the SoundPLAN Noise Model

Section	Speed (km/h)	Surface Correction
Carriageways		
North Bound	100	-2 (Queensland) -3 (NSW)
South Bound	100	-2 (Queensland) -3 (NSW)
Service Roads		
West Bound	60	0
East Bound	60	0
Ramps		
On Ramps	80	0
Off Ramps	80	0

Road traffic volumes used in this assessment are found in Technical Paper 2

Additional traffic details such as traffic composition are provided in Appendix D.

Appendix D

Road Traffic Noise Modelling Methodology

Road Traffic Noise Modelling Methodology

General Procedures

Noise modelling was undertaken with the SoundPLAN version 6.2 software, using the CoRTN '88 predictive algorithm.

The CoRTN method (UK Department of Transport 1988) comprises five main stages of predicting road traffic noise:

- division of the road scheme into one or more segments so that the variation in noise levels between segments is less than 2 dB(A). SoundPLAN uses segments that have a one degree angle of view to the receiver;
- calculation of the 'basic noise level' (the noise level at 10 m from the edge of the nearside carriageway) as a function of traffic flow, vehicle speed, traffic composition, road gradient and road surface texture;
- assessment of the noise level for each segment at the receptor point taking into account distance attenuation, topography, screening and vegetation;
- correction of the noise level at the receptor point taking into account the site layout, reflections from adjacent buildings and the angle of view; and
- combination of the noise contributions from each road segment to calculate the predicted noise level at the receptor.

Modifications to the Standard CoRTN Method

Noise Source Lines

The CoRTN method assumes that, for a single carriageway (one lane of each way traffic) road, the source line is 3.5 m in from the nearest kerb to the receiver. This location equates to the centre line of the road for a two lane road. If the lanes were separated by a median strip of more than 5 m width, two separate noise source lines that are 3.5 m from the outside curb was used.

The Tugun Bypass is a two lane carriageway in each direction, therefore the source lines have been split into one source line for each direction. The source line represents a two lane carriageway.

Heavy Vehicle Adjustment

The heavy vehicle component of the total traffic volume for the 18 hour, 15 hour, 9 hour and 1 hour period was based upon traffic count data from the existing Tweed Heads Bypass. For the Queensland section of the Tugun Bypass the noise source lines for all vehicles were placed at a height of 0.5 m above the pavement level. For the NSW section of the Tugun Bypass, noise from heavy vehicles were separated from the traffic stream by placing one source line 1.5 m above the pavement level to represent the truck engine noise and another at 3.5 m above the pavement to represent the truck exhaust noise.

- At 0.5 m, with traffic volume of light vehicles. %HV = 0%. No correction applied.
- At 1.5 m, with traffic volume of heavy vehicles. %HV = 100%. Correction of -0.8dB applied.
- At 3.5 m, with traffic volume of heavy vehicles. %HV = 100%. Correction of -8dB applied.

The heavy vehicle percentages used in this assessment are presented in Table D1.

Table D1 – Heavy Vehicle (HV) Percentages

Time Period	Percentage HV (%)
1 hour	9
9 hour	17
15 hour	11
18 hour	11

Calculation Assumptions

The road traffic noise level at the facade of an affected receptor is determined by:

$$\begin{aligned}
 \text{Reference Level} &= \text{Basic noise level} \\
 &+ \text{speed correction} \\
 &+ \text{heavy vehicle adjustment} \\
 &+ \text{correction for gradient} \\
 &+ \text{road surface correction} \\
 &+ \text{reflection from façade of sensitive receptors} \\
 &+ \text{reflection from other objects} \\
 &+ \text{ground absorption}
 \end{aligned}$$

Traffic data were derived from Technical Paper 3.

Basic Noise Level

Traffic noise levels are calculated at sensitive receptors at a distance of less than 300 m from the bypass carriageway centre line. The traffic volumes sourced from Technical Paper 3 are applied for the calculation of noise levels in this assessment. The highest one hour traffic volume is applied to the one hour traffic noise assessments.

Speed Correction

The proposed sign-posted speed has been adopted as this would give a conservative estimate of traffic noise generated. The modelled speeds are tabulated in Appendix C.

Heavy Vehicle Adjustment

The proportion of heavy vehicles in the traffic mix was based on measured traffic composition on the existing Tweed Heads Bypass.

Correction for Gradient

Gradients are calculated for each individual segment of road, and the appropriate correction applied within the model.

Road Surface Correction

Road surface corrections are used as a noise mitigation strategy in areas difficult to attenuate by other means. The surface corrections factors applied in this assessment are presented in Table D2.

Table D2 – Road Surface Corrections

Road Surface Type	Correction dB(A)
Dense Graded Asphalt ¹	0
Concrete (Tunnel through Gold Coast Airport) ¹	0
Low-noise (e.g. Open-graded) Asphalt (NSW) ¹	-3.0
Low-noise (e.g. Open-graded) Asphalt (Queensland) ²	-2.0

Note 1: Corrections obtained from NSW RTA Environmental Noise Management Manual 2001

Note 2: Corrections obtained from Queensland Department of Main Roads (Mr Arthur Hall, Principal Manager (Infrastructure Design))

Sensitive Receptors

Noise levels at sensitive receptors are calculated at 1 m in front of the worst affected facade.

When complex situations prevail such as:

- multiple sources; or
- exposure of more than one facade of a receptor.

noise levels are calculated at each side of the dwelling to determine the worst affected facade and to ensure that any ameliorative measures are effective.

Sensitive receptors were located 1.5 m above the floor level for ground floor levels of dwellings. The upper floor levels of dwellings were assumed to be an additional 2.8 m higher than the lower floors. Detailed site inspections indicated that these heights were suitable for most dwellings along the bypass alignment.

Determinant Noise Level Criterion

In Queensland, the determinant condition for applicability of the “New Road” or “Upgrading Existing Road” is the intersection with Stewart Road, which currently links to the existing Gold Coast Highway.

In NSW, ‘base’ road traffic noise level criteria are defined in terms of ‘Day’ and ‘Night’ noise level limits, where both conditions must be met.

The design target noise level is therefore the more strict of the two noise level criteria.

Appendix E

Calculation of External Facade Noise Level to Achieve Indoor Noise Criteria

Calculation of External Facade Noise Level to Achieve Indoor Noise Criteria

John Flynn Hospital and Medical Centre

The John Flynn Hospital and Medical Centre is built on sloped topography with the bottom floor (B3) exposed on the southern facade, and buried two storeys on the northern facade. The floor number system from the bottom to top is B4, B3, B2, B1, G, 1, 2, 3, 4, 5, 6, R. Operating theatres are located on Floor B1 and Ground. Wards occur on floors 1 to 6. Plant is located on the roof. The RL at the base of B4 is 9.6 m and the plant is 59.0 m.

The Accommodation Building (Hotel) is a nine storey structure consisting of storeys B1 (RL 26.5 m), G, 1, 2, 3, 4, 5, 6, 7 (55.48 m).

The John Flynn Hospital and Medical Centre is shielded from the proposed bypass by existing topography and the hospital buildings. All hospital buildings are constructed with external sealed glazing (laminated) with a thickness of 10 mm. Ducted air conditioning is present in all buildings.

A maximum indoor design sound level for a representative medical space of L_{Aeq} 45 dB(A) was selected from Table 1 in AS2107. For traffic noise this sound level is equivalent to $L_{10(1 \text{ hour})}$ 48 dB(A). This level is also the Main Roads internal criterion level for hospitals in the Main Roads Road Traffic Noise Code of Practice.

Calculations according to *Australian Standard AS 3671 - 1989* were applied to rooms of dimensions 5 x 5, 10 x 10 and 15 x 15 m to establish the average maximum external noise level that would generate the internal maximum criterion level of $L_{10(1 \text{ hour})}$ 48 dB(A).

The following assumptions were applied:

- ceiling height (h) of 3.0 m;
- reverberation time (T_{60}) of 0.9 second at 500 Hz;
- weighted Sound Reduction Index (R_w) of 10 mm laminated glazing is R_w 33 dB(A).

The external criterion can be determined by substituting the indoor criterion level for a hospital ($L_{10(1 \text{ hour})}$ 48 dB(A)) as the indoor level (L_{Arec}) for the following equation (Australian Standard AS 3671 - 1989):

$$R_w = L_{A10(1 \text{ hour})} - L_{Arec} + 10 \log_{10}[(S_c/S_f) \times 3/h \times 2T_{60} \times C] + 6$$

where $L_{A10(1 \text{ hour})}$ = traffic noise exposure level (external);

L_{Arec} = indoor sound level (internal);

C = number of components through which traffic noise enters a room; and

S_c/S_f = ratio of component surface area to floor area.

The $L_{A10(1 \text{ hour})}$ noise levels at the external surface of the glass corresponding to the internal noise criterion for rooms of various dimensions are as follows:

- 5 x 5 m floor area = $L_{A10(1 \text{ hour})}$ 74.2 dB(A)
- 10 x 10 m floor area = $L_{A10(1 \text{ hour})}$ 77.2 dB(A)
- 15 x 15 m floor area = $L_{A10(1 \text{ hour})}$ 79.0 dB(A)

The lowest target external noise level was calculated for a room of small floor area, such as a medical examination room. The $L_{10(1\text{hour})}$ 74.2 dB(A) (5 × 5 m room) would therefore be applied to this assessment as a conservative external noise level to achieve the internal noise criterion for the hospital rooms with 10 mm laminated glass as the facade.

Lakeside Christian College

Concrete Block Building

The two-storey structure is constructed of concrete blocks with aluminium horizontal sliding type windows. The windows remain open during school hours on the western facade for natural ventilation. Given the orientation of the building it is reasonable to assume noise would mostly enter the internal space through the northern, western and southern facades as well as the ceiling. It is assumed that:

- both floors are approximately 2.8 m in height;
- the dimensions are estimated at 30 m (western facade) x 10 m (northern and southern facades);
- 50% of the western facade is openable, aluminium sliding type windows;
- carpet on floors and all other surfaces acoustically 'hard';
- sound transmission class (STC) of 45 for concrete block walls;
- STC of 26 for closed sliding windows;
- STC of zero for open sliding windows; and
- STC of 35 for ceiling-roof system.

A reduction of 5 dB(A) from the facade noise level of the most exposed western facade has been assumed for the northern and southern facades and the roof.

Using the methods of Australian Standard AS 3671-1989 for traffic noise intrusion, the external facade noise levels that will achieve the internal noise level criterion of $L_{Aeq(1\text{ hour})}$ 45 dB(A) has been calculated to be 55 dB(A) for windows open and 65 dB(A) for windows closed on the western facing facade.

Demountable Classrooms

These demountables are assumed to consist of metal sheeting over plasterboard internals, with louvred type windows. Given the orientation of the buildings it is reasonable to assume noise would mostly enter the internal space through the northern, western and southern facades as well as the ceilings. It is assumed that:

- ceiling height is 2.4 m;
- the floor dimensions are 15 m x 10 m;
- 50% of the long facade is openable louvre type windows;
- carpet on floors and all other surfaces acoustically 'hard'.
- sound transmission class (STC) of 26 for plasterboard/metal sheeting walls;
- STC of 15 for closed louvred windows;
- STC of zero for opened louvre type windows; and
- STC of 30 for ceiling-roof system.

A reduction of 5 dB(A) from the façade noise level of the most exposed western façade has been assumed for the northern and southern facades and the roof.

Using the methods of Australian Standard AS 3671-1989 for traffic noise intrusion, the external façade noise level that will achieve the internal noise level criterion of $L_{Aeq(1 \text{ hour})}$ 45 dB(A) has been calculated to be 55 dB(A) for windows open and 65 dB(A) for upgraded closed windows on the western facing façade.

Appendix F

Traffic Survey Data
(Abacus Surveys Pty Ltd)

ABACUS SURVEYS MANUAL LINK COUNT

Site No: 1 **Weather:** Fine
Location: Pacific Highway, Tweed Heads, south of Musgrave Road interchange
Day/Date: Wednesday 13 December 2000
PM Peak Hour ending - 4:30PM

Time (1/4 hr end)	Inbound (westbound)						Outbound (eastbound)						2-way volumes					
	Cars/Utens and M/Cycles	Rigid Trucks	Semi Trucks	Buses and Coaches	Total Vehicles	Cyclists	Cars/Utens and M/Cycles	Rigid Trucks	Semi Trucks	Buses and Coaches	Total Vehicles	Cyclists	Cars/Utens and M/Cycles	Rigid Trucks	Semi Trucks	Buses and Coaches	Total Vehicles	Cyclists
12:15PM	183	7	12	0	202	2	234	18	10	0	262	1	417	25	22	0	464	3
12:30PM	217	13	8	0	238	2	305	14	19	0	338	0	522	27	28	0	577	2
12:45PM	210	14	8	0	232	1	174	21	11	1	207	1	384	35	19	1	439	2
1:00PM	218	14	7	1	240	2	230	12	14	0	256	3	448	28	21	1	498	5
1:15PM	208	18	7	0	233	1	259	12	13	2	286	0	457	28	20	2	507	1
1:30PM	291	28	2	0	321	4	212	10	12	0	234	3	443	38	14	0	495	7
1:45PM	269	9	9	2	289	1	248	20	10	0	278	1	517	29	19	2	567	2
2:00PM	247	25	5	3	280	1	260	17	15	1	293	2	507	42	20	4	573	3
2:15PM	298	15	9	0	322	1	201	13	21	1	236	2	499	28	30	1	558	3
2:30PM	207	18	6	1	232	2	271	13	14	2	300	4	478	31	20	3	532	6
2:45PM	271	11	7	1	290	2	239	14	8	1	262	1	510	25	15	2	552	3
3:00PM	262	22	7	0	291	2	244	17	9	2	272	1	506	39	16	2	563	3
3:15PM	292	22	5	1	320	0	300	5	10	3	318	2	592	28	15	4	639	2
3:30PM	292	15	4	1	312	2	317	10	13	2	342	4	609	25	17	3	654	5
3:45PM	280	7	5	0	292	5	328	9	7	2	346	1	608	16	12	2	638	8
4:00PM	294	13	2	4	313	1	341	9	13	1	364	4	635	22	15	5	677	5
4:15PM	329	23	5	0	357	1	352	13	15	1	381	0	681	36	20	1	738	1
4:30PM	347	15	4	1	367	4	321	6	13	2	342	6	658	21	17	3	699	10
4:45PM	254	4	1	0	259	3	314	7	9	4	334	3	568	11	10	4	593	6
5:00PM	238	7	5	2	252	2	357	11	7	4	379	6	595	18	12	6	631	8
5:15PM	238	15	1	0	254	2	359	10	9	4	382	3	597	25	10	4	636	5
5:30PM	198	6	4	0	208	3	371	6	8	1	386	1	567	12	12	1	592	4
5:45PM	203	8	3	2	216	1	289	5	9	2	305	2	492	13	12	4	521	3
6:00PM	134	4	4	1	143	0	317	8	17	0	342	1	451	12	21	1	485	1
6:15PM	173	6	6	1	186	0	271	7	15	0	293	5	444	13	21	1	479	5
6:30PM	185	9	2	0	196	2	205	2	11	0	218	2	390	11	13	0	414	4
6:45PM	143	3	3	0	149	1	157	4	9	0	170	0	300	7	12	0	319	1
7:00PM	123	5	1	0	129	1	136	6	17	1	160	2	259	11	18	1	289	3
7:15PM	93	3	3	0	99	0	147	2	9	2	160	1	240	5	12	2	259	1
7:30PM	95	2	3	0	100	0	124	4	11	1	140	0	230	6	14	1	251	0
7:45PM	81	3	2	0	86	0	109	8	14	1	132	1	190	11	16	1	218	1
8:00PM	66	1	6	0	73	0	94	7	15	0	116	1	160	8	21	0	189	1
8:15PM	69	2	2	0	73	1	95	3	10	0	108	0	164	5	12	0	181	1
8:30PM	65	2	0	5	72	1	98	3	5	2	108	1	163	5	5	7	180	2
8:45PM	69	4	11	2	86	0	91	3	7	0	101	1	160	7	18	2	187	1
9:00PM	66	4	2	1	73	0	84	4	10	0	98	0	150	8	12	1	171	0
9:15PM	74	1	3	0	78	1	89	2	11	1	103	0	163	9	14	1	187	1
9:30PM	57	2	2	1	62	0	72	1	8	2	83	0	129	3	10	3	145	0
9:45PM	74	2	5	0	81	1	78	0	12	1	91	0	152	2	17	1	172	1
10:00PM	61	2	3	0	66	1	75	2	7	0	84	0	136	4	10	0	150	1
10:15PM	47	0	7	0	54	0	67	2	6	0	75	1	114	2	13	0	129	1
10:30PM	29	3	3	0	35	0	63	0	3	0	66	0	92	3	6	0	101	0
10:45PM	28	2	4	0	34	0	64	2	8	0	74	0	92	4	12	0	108	0
11:00PM	17	1	1	0	19	0	49	0	2	0	51	1	66	1	3	0	70	1
11:15PM	21	3	2	0	26	0	45	0	3	0	48	0	66	3	5	0	74	0
11:30PM	16	1	2	0	19	0	38	2	3	0	43	0	56	3	5	0	64	0
11:45PM	18	0	3	0	21	0	31	2	2	0	35	0	49	2	5	0	56	0
12:00AM	14	0	3	0	17	0	16	1	6	0	23	0	30	1	9	0	40	0
12 hr Total	7,664	394	209	30	8,297	54	9,141	347	490	47	10,025	68	16,736	748	700	77	18,261	123
PM Peak	1,250	58	18	5	1,329	11	1,342	37	49	8	1,433	11	2,592	95	64	11	2,752	22

ABACUS SURVEYS MANUAL LINK COUNT

Site No: 1 **Weather:** Fine
Location: Pacific Highway, Tweed Heads, south of Musgrave Road interchange
Day/Date: Thursday 14 December 2000
PM Peak Hour ending - 8:15AM

Time (1/4 hr end)	Inbound (westbound)						Outbound (eastbound)						2-way volumes					
	Cars/Utens and M/Cycles	Rigid Trucks	Semi Trucks	Buses and Coaches	Total Vehicles	Cyclists	Cars/Utens and M/Cycles	Rigid Trucks	Semi Trucks	Buses and Coaches	Total Vehicles	Cyclists	Cars/Utens and M/Cycles	Rigid Trucks	Semi Trucks	Buses and Coaches	Total Vehicles	Cyclists
12:15AM	14	3	8	0	25	1	17	4	2	0	23	0	31	7	10	0	48	1
12:30a	5	3	2	0	10	0	15	1	0	0	16	0	21	4	2	0	27	0
12:45AM	12	3	2	0	17	0	21	1	2	0	24	0	33	4	4	0	41	0
1:00AM	6	1	3	0	10	0	10	1	1	0	12	0	16	2	4	0	22	0
1:15AM	7	2	10	0	19	0	9	1	4	0	14	0	16	3	14	0	33	0
1:30AM	12	2	5	0	19	0	15	1	4	0	20	0	27	3	9	0	39	0
1:45AM	8	0	4	0	12	0	7	0	3	0	10	1	15	0	7	0	22	1
2:00AM	2	2	7	0	11	0	5	0	3	0	8	0	7	2	10	0	19	0
2:15AM	5	0	3	0	8	0	15	2	1	0	18	1	20	2	4	0	26	1
2:30AM	8	0	9	0	17	0	15	3	3	0	21	0	23	3	12	0	38	0
2:45AM	6	2	0	0	8	0	6	0	1	0	7	0	12	2	1	0	15	0
3:00AM	8	3	3	0	14	0	7	5	0	0	12	0	15	8	3	0	26	0
3:15AM	12	3	5	0	20	0	5	2	0	0	7	0	17	5	5	0	27	0
3:30AM	3	2	7	0	12	0	8	5	2	0	15	0	11	7	9	0	27	0
3:45AM	22	5	6	0	33	1	12	3	0	0	15	0	34	8	6	0	48	1
4:00AM	18	8	12	0	38	0	19	2	6	0	27	0	37	10	16	0	63	0
4:15AM	15	0	14	0	29	2	16	5	3	0	24	1	31	5	17	0	53	3
4:30AM	34	2	13	0	49	0	28	0	4	0	32	0	62	2	17	0	81	0
4:45AM	65	9	6	0	80	2	34	3	3	0	40	0	99	12	9	0	120	2
5:00AM	70	3	8	0	81	1	62	5	6	0	73	1	152	8	16	0	176	2
5:15AM	116	2	27	0	145	0	83	8	11	0	102	1	199	8	38	0	245	1
5:30AM	74	2	7	0	83	0	48	9	7	0	64	2	122	11	14	0	147	2
5:45AM	188	12	24	0	224	4	130	16	10	0	156	2	298	28	34	0	360	6
6:00AM	224	21	24	0	269	5	158	8	8	0	174	2	382	29	30	0	441	7
6:15AM	254	13	17	0	284	0	137	11	4	1	153	0	401	24	21	1	447	0
6:30AM	359	20	23	1	403	3	171	9	9	0	189	3	530	29	32	1	592	6
6:45AM	295	20	29	0	344	1	216	20	10	1	247	2	511	40	39	1	591	3
7:00AM	201	9	11	1	222	2	237	5	14	0	256	1	438	14	25	1	478	3
7:15AM	273	7	19	4	303	3	229	13	9	0	251	1	502	20	28	4	554	4
7:30AM	326	9	19	0	354	1	318	11	11	0	340	1	644	20	30	0	694	2
7:45AM	334	11	19	2	366	3	234	16	7	0	257	2	568	29	28	2	627	5
8:00AM	503	8	9	2	522	4	233	13	10	0	256	1	736	21	19	2	778	5
8:15AM	360	9	16	0	385	2	221	14	9	3	247	2	581	23	25	3	632	4
8:30AM	266	6	7	1	280	1	249	15	7	0	271	2	515	21	14	1	551	3
8:45AM	342	13	19	1	375	3	249	8	6	4	267	0	591	21	25	5	642	3
9:00AM	340	22	15	2	379	3	287	14	9	1	311	0	627	36	24	3	690	3
9:15AM	301	14	16	0	331	0	254	20	8	2	284	4	555	34	24	2	615	4
9:30AM	265	3	19	2	289	0	215	9	3	0	227	3	480	12	22	2	516	3
9:45AM	266	10	11	6	293	0	248	16	7	3	274	0	534	26	16	9	585	0
10:00AM	243	21	8	3	275	0	229	14	8	1	252	1	472	35	16	4	527	1
10:15AM	286	8	14	1	309	0	256	9	18	3	286	1	544	17	32	4	597	1
10:30AM	301	13	14	2	330	0	287	20	9	0	316	2	568	33	23	2	626	2
10:45AM	350	17	10	0	377	2	310	19	8	0	337	2	680	36	18	0	734	4
11:00AM	229	20	9	0	258	3	273	10	17	0	300	2	502	30	28	0	560	5
11:15AM	211	9	12	1	233	4	235	6	2	0	243	0	445	15	14	1	475	4
11:30AM	180	11	8	0	199	1	271	13	11	4	299	1	451	24	19	4	498	2
11:45AM	271	11	11	2	295	2	219	19	11	0	249	1	490	24	22	2	538	3
12:00PM	302	20	14	1	337	1	303	20	13	1	337	1	605	40	27	2	674	2
12 hr Total	7,992	394	558	32	8,976	55	6,626	409	304	24	7,363	44	14,650	797	862	56	16,365	99
24 hr Total	22,809	1,175	615	90	24,689	160	27,189	1,023	1,460	141	29,813	203	49,791	2,219	2,078	231	54,319	366
AM Peak	1,523	37	63	4	1,627	10	1,008	68	37	3	1,100	8	5,295	93	100	7	2,731	16



Appendix G

Predicted Traffic Noise Levels in
Queensland, 2017, no mitigation

Table G-1: Predicted Traffic Noise Levels in Queensland, 2017, no mitigation

Receiver	Floor	Façade	Predicted Noise Level LA10(18hour) dB(A)	Criteria dB(A)	Exceedance
Alin Gardens 'A'	1	E	59.4	60	
Alin Gardens 'A'	2		60.7	60	0.7
Alin Gardens 'A'	3		61.5	60	1.5
Alin Gardens 'A'	4		62.2	60	2.2
Alin Gardens Apartments (1, 3, 5)	1	SW	70.3	60	10.3
Alin Gardens Apartments (1, 3, 5)	2		71.3	60	11.3
Alin Gardens Apartments (1, 3, 5)	3		71.9	60	11.9
Alin Gardens Apartments (1, 3, 5)	4		72.4	60	12.4
Alin Gardens Apartments (13, 15, 17)	1	S	69.9	60	9.9
Alin Gardens Apartments (13, 15, 17)	2		71	60	11
Alin Gardens Apartments (13, 15, 17)	3		71.7	60	11.7
Alin Gardens Apartments (13, 15, 17)	4		72.4	60	12.4
Alin Gardens Apartments (14, 16, 18)	1	S	69	60	9
Alin Gardens Apartments (14, 16, 18)	2		70	60	10
Alin Gardens Apartments (14, 16, 18)	3		70.7	60	10.7
Alin Gardens Apartments (14, 16, 18)	4		71.3	60	11.3
Alin Gardens Apartments (19, 21, 23)	1	SW	62.8	60	2.8
Alin Gardens Apartments (19, 21, 23)	2		63.5	60	3.5
Alin Gardens Apartments (19, 21, 23)	3		64.1	60	4.1
Alin Gardens Apartments (19, 21, 23)	4		64.7	60	4.7
Alin Gardens Apartments (2, 4, 6)	1	SW	70.6	60	10.6
Alin Gardens Apartments (2, 4, 6)	2		71.6	60	11.6
Alin Gardens Apartments (2, 4, 6)	3		72.2	60	12.2
Alin Gardens Apartments (2, 4, 6)	4		72.7	60	12.7
Alin Gardens Apartments (20, 22, 24)	1	SW	57.1	60	
Alin Gardens Apartments (20, 22, 24)	2		58.1	60	
Alin Gardens Apartments (20, 22, 24)	3		59.1	60	
Alin Gardens Apartments (20, 22, 24)	4		60.1	60	0.1
Alin Gardens Apartments (25, 27, 29)	1	W	54	60	
Alin Gardens Apartments (25, 27, 29)	2		55.6	60	
Alin Gardens Apartments (25, 27, 29)	3		56.8	60	
Alin Gardens Apartments (25, 27, 29)	4		58.1	60	
Alin Gardens Apartments (26, 28, 30)	1	W	52.9	60	
Alin Gardens Apartments (26, 28, 30)	2		54.6	60	
Alin Gardens Apartments (26, 28, 30)	3		56.5	60	
Alin Gardens Apartments (26, 28, 30)	4		57.8	60	
Alin Gardens Apartments (7, 9, 11)	1	SW	69.7	60	9.7
Alin Gardens Apartments (7, 9, 11)	2		70.8	60	10.8
Alin Gardens Apartments (7, 9, 11)	3		71.5	60	11.5
Alin Gardens Apartments (7, 9, 11)	4		72	60	12
Alin Gardens Apartments (8, 10, 12)	1	SW	70.4	60	10.4
Alin Gardens Apartments (8, 10, 12)	2		71.5	60	11.5
Alin Gardens Apartments (8, 10, 12)	3		72.2	60	12.2
Alin Gardens Apartments (8, 10, 12)	4		72.7	60	12.7
Alinjarra Ct 'A' - 51	1	S	57.2	60	
Alinjarra Ct 'A' - 51	2		58.6	60	
Alinjarra Ct 'A' - 51	1	W	60.8	60	0.8

Receiver	Floor	Façade	Predicted Noise Level LA10(18hour) dB(A)	Criteria dB(A)	Exceedance
Alinjarra Ct 'A' - 51	2		62.3	60	2.3
Alinjarra Ct 'B' - 51	1	NW	53.7	60	
Alinjarra Ct 'B' - 51	2		57.2	60	
Alinjarra Dr - 10	1	SW	50.7	60	
Alinjarra Dr - 11	1	SW	57.5	60	
Alinjarra Dr - 12	1	SW	56.8	60	
Alinjarra Dr - 13	1	SW	57.7	60	
Alinjarra Dr - 14	1	SW	54.7	60	
Alinjarra Dr - 16	1	SW	54.1	60	
Alinjarra Dr - 18	1	S	54.8	60	
Alinjarra Dr - 20	1	NW	52.4	60	
Alinjarra Dr - 22	1	W	53.7	60	
Alinjarra Dr - 24	1	SW	54.6	60	
Alinjarra Dr - 26	1	W	53.3	60	
Alinjarra Dr - 2	1	SE	58.3	60	
Alinjarra Dr - 2	2		60.3	60	0.3
Alinjarra Dr - 30	1	S	53.1	60	
Alinjarra Dr - 3	1	SW	58.1	60	
Alinjarra Dr - 4	1	SW	58.8	60	
Alinjarra Dr - 5	1	SW	58.6	60	
Alinjarra Dr - 6	1	SW	59.2	60	
Alinjarra Dr - 7	1	SW	56.1	60	
Alinjarra Dr - 8	1	SW	60.1	60	0.1
Alinjarra Dr - 9	1	SW	57.4	60	
Alpha Ave - 1	1	SW	61.2	68	
Alpha Ave - 2	1	SW	61.7	68	
Alpha Ave - 2	2		63.2	68	
Alpha Ave - 3	1	SE	59.5	68	
Alpha Ave - 4	1	SE	58.8	68	
Alpha Ave - 5	1	SE	58.3	68	
Alpha Ave - 6	1	SE	58.8	68	
Alpha Ave - 7	1	SE	57.9	68	
Alpha Ave - 7	2		59.2	68	
Alpha Ave - 9	1	SE	57	68	
Alpha Ave - 9	2		58.4	68	
Bienvenue Dr - 139	1	E	60.7	60	0.7
Bienvenue Dr - 141	1	N	62.8	60	2.8
Bob Barnard Dr - 27	1	NW	53.9	60	
Bob Barnard Dr - 28	1	N	50.9	60	
Bob Barnard Dr - 29	1	NW	50	60	
Bob Barnard Dr - 30	1	N	50	60	
Bob Barnard Dr - 31	1	W	48.4	60	
Bob Barnard Dr - 32	1	W	58.6	60	
Bob Barnard Dr - 33	1	SW	56.6	60	
Bob Barnard Dr - 34	1	W	59.6	60	
Bob Barnard Dr - 35	1	SE	48.8	60	
Bob Barnard Dr - 36	1	SE	49.5	60	
Bob Barnard Dr - 37	1	S	48.7	60	
Bob Barnard Dr - 37	2		50.7	60	

Receiver	Floor	Façade	Predicted Noise Level LA10(18hour) dB(A)	Criteria dB(A)	Exceedance
Bob Barnard Dr - 38	1	S	48.5	60	
Bob Barnard Dr - 38	2		51.6	60	
Bob Barnard Dr - 39	1	S	50.1	60	
Bob Barnard Dr - 39	2		53	60	
Bob Barnard Dr - 41	1	SE	52.7	60	
Bob Barnard Dr - 41	2		55.4	60	
Bob Barnard Dr - 42	1	S	52.3	60	
Bob Barnard Dr - 42	2		54.6	60	
Cannon Dr - 64	1	E	61.4	60	1.4
Cannon Dr - 64	2		63.7	60	3.7
Chippendale Cr - 27A	1	NE	61.4	60	1.4
Chippendale Cr - 29	1	NE	61.4	60	1.4
Chippendale Cr - 31	1	NE	61.3	60	1.3
Chippendale Cr - 33	1	NE	61.3	60	1.3
Chippendale Cr - 35	1	NE	60.9	60	0.9
Chippendale Cr - 37	1	NE	61.5	60	1.5
Chippendale Cr - 41	1	E	62.3	60	2.3
Clancy Ct 'A' - 3	1	N	61.6	60	1.6
Clancy Ct 'A' - 3	2		63.2	60	3.2
Clancy Ct 'A' - 3	3		64.8	60	4.8
Clancy Ct 'C' - 5	1	NW	59.2	60	
Clancy Ct 'C' - 5	2		62.8	60	2.8
Clancy Ct 'C' - 5	3		64	60	4
Clancy Ct 'C' - 5	4		64.9	60	4.9
Clancy Ct 'D' - 5	1	NW	62.2	60	2.2
Clancy Ct 'D' - 5	2		63	60	3
Clancy Ct 'D' - 5	3		63.7	60	3.7
Clancy Ct 'D' - 5	4		64.2	60	4.2
Clanugan Apartments (1, 3)	1	SW	72.5	60	12.5
Clanugan Apartments (1, 3)	2		73.3	60	13.3
Clanugan Apartments (1, 3)	3		73.9	60	13.9
Clanugan Apartments (1, 3)	4		74.4	60	14.4
Clanugan Apartments (2, 4, 5)	1	SW	71.9	60	11.9
Clanugan Apartments (2, 4, 5)	2		72.9	60	12.9
Clanugan Apartments (2, 4, 5)	3		73.5	60	13.5
Clanugan Apartments (2, 4, 5)	4		74.1	60	14.1
Clanugan Apartments (6, 7, 10)	1	SW	70.1	60	10.1
Clanugan Apartments (6, 7, 10)	2		71.1	60	11.1
Clanugan Apartments (6, 7, 10)	3		71.9	60	11.9
Clanugan Apartments (6, 7, 10)	4		73.1	60	13.1
Clanugan Apartments (8, 10, 13)	1	SW	70	60	10
Clanugan Apartments (8, 10, 13)	2		71	60	11
Clanugan Apartments (8, 10, 13)	3		71.8	60	11.8
Clanugan Apartments (8, 10, 13)	4		72.3	60	12.3
Clanugan Apartments (9, 12, 14)	1	SW	70.1	60	10.1
Clanugan Apartments (9, 12, 14)	2		71.1	60	11.1
Clanugan Apartments (9, 12, 14)	3		71.9	60	11.9
Clanugan Apartments (9, 12, 14)	4		72.5	60	12.5
Clanview Apartments (1, 5, 9)	1	S	67.7	60	7.7

Receiver	Floor	Façade	Predicted Noise Level LA10(18hour) dB(A)	Criteria dB(A)	Exceedance
Clanview Apartments (1, 5, 9)	2		68.6	60	8.6
Clanview Apartments (1, 5, 9)	3		69.3	60	9.3
Clanview Apartments (13, 15, 17)	1	SE	58.1	60	
Clanview Apartments (13, 15, 17)	2		59.6	60	
Clanview Apartments (13, 15, 17)	3		60.5	60	0.5
Clanview Apartments (13, 15, 17)	4		61.4	60	1.4
Clanview Apartments (14, 16, 18)	1	SE	47.7	60	
Clanview Apartments (14, 16, 18)	2		49.4	60	
Clanview Apartments (14, 16, 18)	3		51.2	60	
Clanview Apartments (14, 16, 18)	4		54.1	60	
Clanview Apartments (19, 21, 23)	1	NW	61.1	60	1.1
Clanview Apartments (19, 21, 23)	2		62.1	60	2.1
Clanview Apartments (19, 21, 23)	3		62.9	60	2.9
Clanview Apartments (19, 21, 23)	4		63.9	60	3.9
Clanview Apartments (2, 6, 10)	1	S	64.9	60	4.9
Clanview Apartments (2, 6, 10)	2		66	60	6
Clanview Apartments (2, 6, 10)	3		66.8	60	6.8
Clanview Apartments (20, 22, 24)	1	NW	62.3	60	2.3
Clanview Apartments (20, 22, 24)	2		63.1	60	3.1
Clanview Apartments (20, 22, 24)	3		63.8	60	3.8
Clanview Apartments (20, 22, 24)	4		64.3	60	4.3
Clanview Apartments (25, 29)	1	N	66.2	60	6.2
Clanview Apartments (25, 29)	2		67	60	7
Clanview Apartments (26, 30)	1	N	64.7	60	4.7
Clanview Apartments (26, 30)	2		65.5	60	5.5
Clanview Apartments (26, 30)	3		66.4	60	6.4
Clanview Apartments (27, 31)	1	N	63.9	60	3.9
Clanview Apartments (27, 31)	2		64.7	60	4.7
Clanview Apartments (27, 31)	3		65.5	60	5.5
Clanview Apartments (28, 32)	1	N	63.2	60	3.2
Clanview Apartments (28, 32)	2		64.1	60	4.1
Clanview Apartments (28, 32)	3		64.8	60	4.8
Clanview Apartments (3, 7, 11)	1	S	62.9	60	2.9
Clanview Apartments (3, 7, 11)	2		64.1	60	4.1
Clanview Apartments (3, 7, 11)	3		65	60	5
Clanview Apartments (4, 8, 12)	1	S	61.6	60	1.6
Clanview Apartments (4, 8, 12)	2		62.9	60	2.9
Clanview Apartments (4, 8, 12)	3		63.7	60	3.7
Cocararra Ct - 10	1	SW	54.3	60	
Cocararra Ct - 11	1	SW	56.2	60	
Cocararra Ct - 12	1	W	55.3	60	
Cocararra Ct - 14	1	NW	57.5	60	
Cocararra Ct - 1	1	SW	56.4	60	
Cocararra Ct - 2	1	NW	55.7	60	
Cocararra Ct - 3	1	SW	55.1	60	
Cocararra Ct - 4	1	SW	55.5	60	
Cocararra Ct - 5	1	SW	52.6	60	
Cocararra Ct - 6	1	SW	54.8	60	
Cocararra Ct - 7	1	SW	55.7	60	

Receiver	Floor	Façade	Predicted Noise Level LA10(18hour) dB(A)	Criteria dB(A)	Exceedance
Cocararra Ct - 8	1	SW	53.9	60	
Cocararra Ct - 9	1	SW	53.7	60	
Coolamon Ct - 11	1	W	45.2	60	
Coolamon Ct - 12	1	SW	55.3	60	
Coolamon Ct - 13	1	SW	56.1	60	
Coolamon Ct - 14	1	SW	57.9	60	
Coolamon Ct - 14	2		59.1	60	
Costelloe St - 17	1	N	52.9	60	
Costelloe St - 18	1	S	52.7	60	
Dinjarra Ct - 10	1	SW	57.7	60	
Dinjarra Ct - 2	1	SW	54.3	60	
Dinjarra Ct - 4	1	SW	56	60	
Dinjarra Ct - 6	1	W	56.5	60	
Dinjarra Ct - 8	1	W	56.8	60	
Dinjarra Ct - 11	1	S	59.8	60	
Dinjarra Ct - 12	1	W	57.5	60	
Dinjarra Ct - 12	2		58.9	60	
Dinjarra Ct - 13	1	W	61.2	60	1.2
Dinjarra Ct - 13	2		62.7	60	2.7
Dinjarra Ct - 14A	1	S	56.9	60	
Dinjarra Ct - 14A	2		58.6	60	
Dinjarra Ct - 14B	1	SW	60.8	60	0.8
Dinjarra Ct - 14B	2		61.9	60	1.9
Dinjarra Ct - 14C	1	SW	57.9	60	
Dinjarra Ct - 15	1	SW	64	60	4
Dinjarra Ct - 15	2		65.2	60	5.2
Dinjarra Ct - 16	1	NW	60.3	60	0.3
Dinjarra Ct - 16	2		61.4	60	1.4
Dinjarra Ct - 1	1	SE	53.9	60	
Dinjarra Ct - 1	2		55.6	60	
Dinjarra Ct - 3	1	SW	58.1	60	
Dinjarra Ct - 3	2		59.3	60	
Dinjarra Ct - 3A	1	SW	52.7	60	
Dinjarra Ct - 3A	2		54.6	60	
Dinjarra Ct - 5	1	S	59	60	
Dinjarra Ct - 5	2		60.2	60	0.2
Dinjarra Ct - 7	1	SW	60.3	60	0.3
Dinjarra Ct - 9A	1	SW	62.4	60	2.4
Dinjarra Ct - 9B	1	SW	56.6	60	
Dinjarra Ct - 9B	1	SW	56.6	60	
Dinjarra Ct - 9B	2		56.3	60	
Elowra Ct - 1	1	SW	54.3	60	
Elowra Ct - 2	1	S	53.9	60	
Elowra Ct - 3	1	W	55.2	60	
Elowra Ct - 4	1	W	53.4	60	
Elowra Ct - 5	1	SW	54.1	60	
Elowra Ct - 6	1	W	52.9	60	
Elowra Ct - 7	1	SW	51.3	60	
Iredale St - 7	1	SE	49.1	60	

Receiver	Floor	Façade	Predicted Noise Level LA10(18hour) dB(A)	Criteria dB(A)	Exceedance
Iredale St - 7	2		51.9	60	
Jarra Gardens Apartments (1, 6, 11)	1	SW	68.5	60	8.5
Jarra Gardens Apartments (1, 6, 11)	2		69.9	60	9.9
Jarra Gardens Apartments (1, 6, 11)	3		70.7	60	10.7
Jarra Gardens Apartments (1, 6, 11)	4		71.3	60	11.3
Jarra Gardens Apartments (2, 7, 12)	1	SW	68.6	60	8.6
Jarra Gardens Apartments (2, 7, 12)	2		70	60	10
Jarra Gardens Apartments (2, 7, 12)	3		70.8	60	10.8
Jarra Gardens Apartments (2, 7, 12)	4		71.4	60	11.4
Jarra Gardens Apartments (3, 8, 13)	1	SW	68.8	60	8.8
Jarra Gardens Apartments (3, 8, 13)	2		70.1	60	10.1
Jarra Gardens Apartments (3, 8, 13)	3		70.9	60	10.9
Jarra Gardens Apartments (3, 8, 13)	4		71.5	60	11.5
Jarra Gardens Apartments (4, 9, 14)	1	SW	68.7	60	8.7
Jarra Gardens Apartments (4, 9, 14)	2		69.9	60	9.9
Jarra Gardens Apartments (4, 9, 14)	3		70.7	60	10.7
Jarra Gardens Apartments (4, 9, 14)	4		71.3	60	11.3
Jarra Gardens Apartments (5, 10, 15)	1	SW	68.4	60	8.4
Jarra Gardens Apartments (5, 10, 15)	2		69.7	60	9.7
Jarra Gardens Apartments (5, 10, 15)	3		70.5	60	10.5
Jarra Gardens Apartments (5, 10, 15)	4		71	60	11
Jarra Views Apartments (1, 3)	1	SW	68.5	60	8.5
Jarra Views Apartments (1, 3)	2		70	60	10
Jarra Views Apartments (1, 3)	3		70.8	60	10.8
Jarra Views Apartments (1, 3)	4		71.4	60	11.4
Jarra Views Apartments (2, 4)	1	SW	68.1	60	8.1
Jarra Views Apartments (2, 4)	2		69.6	60	9.6
Jarra Views Apartments (2, 4)	3		70.5	60	10.5
Jarra Views Apartments (2, 4)	4		71.1	60	11.1
Jarra Views Apartments (5, 7)	1	SW	68.3	60	8.3
Jarra Views Apartments (5, 7)	2		69.8	60	9.8
Jarra Views Apartments (5, 7)	3		70.6	60	10.6
Jarra Views Apartments (5, 7)	4		71.2	60	11.2
Jarra Views Apartments (6, 8)	1	SW	68.3	60	8.3
Jarra Views Apartments (6, 8)	2		69.8	60	9.8
Jarra Views Apartments (6, 8)	3		70.6	60	10.6
Jarra Views Apartments (6, 8)	4		71.2	60	11.2
Kamilaroi Apartments (1, 7, 14)	1	S	52.2	60	
Kamilaroi Apartments (1, 7, 14)	2		54.3	60	
Kamilaroi Apartments (1, 7, 14)	3		55.8	60	
Kamilaroi Apartments (17, 25) - 3	1	W	62.6	60	2.6
Kamilaroi Apartments (17, 25) - 3	2		63.8	60	3.8
Kamilaroi Apartments (17, 25) - 3	3		65.2	60	5.2
Kamilaroi Apartments (18, 26)	1	N	60.1	60	0.1
Kamilaroi Apartments (18, 26)	2		61.4	60	1.4
Kamilaroi Apartments (18, 26)	3		63.2	60	3.2
Kamilaroi Apartments (19, 27)	1	N	59.4	60	
Kamilaroi Apartments (19, 27)	2		60.8	60	0.8
Kamilaroi Apartments (19, 27)	3		62.6	60	2.6

Receiver	Floor	Façade	Predicted Noise Level LA10(18hour) dB(A)	Criteria dB(A)	Exceedance
Kamilaroi Apartments (2, 8, 15)	1	S	52.5	60	
Kamilaroi Apartments (2, 8, 15)	2		54.8	60	
Kamilaroi Apartments (2, 8, 15)	3		56.2	60	
Kamilaroi Apartments (20, 28)	1	N	59.9	60	
Kamilaroi Apartments (20, 28)	2		61.4	60	1.4
Kamilaroi Apartments (20, 28)	3		62.8	60	2.8
Kamilaroi Apartments (21, 29)	1	N	59.3	60	
Kamilaroi Apartments (21, 29)	2		62.2	60	2.2
Kamilaroi Apartments (21, 29)	3		63	60	3
Kamilaroi Apartments (22, 30)	1	N	58.6	60	
Kamilaroi Apartments (22, 30)	2		61.8	60	1.8
Kamilaroi Apartments (22, 30)	3		62.8	60	2.8
Kamilaroi Apartments (23, 31, 36)	1	S	50.1	60	
Kamilaroi Apartments (23, 31, 36)	2		51.5	60	
Kamilaroi Apartments (23, 31, 36)	3		53.9	60	
Kamilaroi Apartments (24, 32, 35)	1	S	51.3	60	
Kamilaroi Apartments (24, 32, 35)	2		52.8	60	
Kamilaroi Apartments (24, 32, 35)	3		55.1	60	
Kamilaroi Apartments (3, 10)	1	N	58.8	60	
Kamilaroi Apartments (3, 10)	2		59.7	60	
Kamilaroi Apartments (3, 10)	3		60.5	60	0.5
Kamilaroi Apartments (33, 34)	1	S	51.9	60	
Kamilaroi Apartments (33, 34)	2		53.6	60	
Kamilaroi Apartments (33, 34)	3		55.7	60	
Kamilaroi Apartments (39, 47)	1	N	59.6	60	
Kamilaroi Apartments (39, 47)	2		60.6	60	0.6
Kamilaroi Apartments (39, 47)	3		61.4	60	1.4
Kamilaroi Apartments (4, 11)	1	N	54.2	60	
Kamilaroi Apartments (4, 11)	2		59.4	60	
Kamilaroi Apartments (4, 11)	3		60.6	60	0.6
Kamilaroi Apartments (40, 48)	1	N	59.7	60	
Kamilaroi Apartments (40, 48)	2		60.7	60	0.7
Kamilaroi Apartments (40, 48)	3		61.4	60	1.4
Kamilaroi Apartments (41, 49)	1	N	59.9	60	
Kamilaroi Apartments (41, 49)	2		60.8	60	0.8
Kamilaroi Apartments (41, 49)	3		61.5	60	1.5
Kamilaroi Apartments (42, 50)	1	N	59.9	60	
Kamilaroi Apartments (42, 50)	2		60.9	60	0.9
Kamilaroi Apartments (42, 50)	3		61.6	60	1.6
Kamilaroi Apartments (43, 51)	1	S	47.4	60	
Kamilaroi Apartments (43, 51)	2		49	60	
Kamilaroi Apartments (43, 51)	3		51.6	60	
Kamilaroi Apartments (43, 51)	4		58.9	60	
Kamilaroi Apartments (44, 52)	1	S	47.3	60	
Kamilaroi Apartments (44, 52)	2		48.9	60	
Kamilaroi Apartments (44, 52)	3		51.6	60	
Kamilaroi Apartments (44, 52)	4		58.9	60	
Kamilaroi Apartments (45, 53)	1	S	46.8	60	
Kamilaroi Apartments (45, 53)	2		48.5	60	

Receiver	Floor	Façade	Predicted Noise Level LA10(18hour) dB(A)	Criteria dB(A)	Exceedance
Kamilaroi Apartments (45, 53)	3		51.4	60	
Kamilaroi Apartments (45, 53)	4		58.9	60	
Kamilaroi Apartments (46, 54)	1	S	47.6	60	
Kamilaroi Apartments (46, 54)	2		49.5	60	
Kamilaroi Apartments (46, 54)	3		52.5	60	
Kamilaroi Apartments (46, 54)	4		59.4	60	
Kamilaroi Apartments (5, 12)	1	N	54.1	60	
Kamilaroi Apartments (5, 12)	2		59.4	60	
Kamilaroi Apartments (5, 12)	3		60.6	60	0.6
Kamilaroi Apartments (6, 13)	1	N	54.1	60	
Kamilaroi Apartments (6, 13)	2		59.3	60	
Kamilaroi Apartments (6, 13)	3		60.5	60	0.5
Kamilaroi Apartments (9, 16)	1	S	52.8	60	
Kamilaroi Apartments (9, 16)	2		55	60	
Kamilaroi Apartments (9, 16)	3		56.4	60	
Mayfair St - 10	1	NE	64.8	68	
Mayfair St - 12	1	NE	65.4	68	
Mayfair St - 13	1	NE	62.9	68	
Mayfair St - 14	1	NE	65.2	68	
Mayfair St - 15	1	NE	62.7	68	
Mayfair St - 16	1	NE	65.3	68	
Mayfair St - 17	1	NE	62.9	68	
Mayfair St - 18	1	NE	65.6	68	
Mayfair St - 19	1	NE	63	68	
Mayfair St - 20	1	NE	65.3	68	
Mayfair St - 21	1	E	63.4	68	
Mayfair St - 22	1	NE	65.5	68	
Mayfair St - 24	1	NE	65.3	68	
Mayfair St - 26	1	NE	65.6	68	
Mayfair St - 28	1	NE	65.9	68	
Mayfair St - 2	1	NE	65.6	68	
Mayfair St - 30	1	NE	66	68	
Mayfair St - 32	1	E	64.7	68	
Mayfair St - 34	1	E	64.2	68	
Mayfair St - 36	1	E	63.4	68	
Mayfair St - 36	2		65.7	68	
Mayfair St - 3	1	NE	62.3	68	
Mayfair St - 4	1	NE	65.5	68	
Mayfair St - 4	2		66.7	68	
Mayfair St - 5	1	NE	62.4	68	
Mayfair St - 6	1	NE	65.3	68	
Mayfair St - 7	1	NE	62.5	68	
Mayfair St - 8	1	NE	65.3	68	
Mayfair St - 9	1	NE	62.6	68	
Mirreen Dr - 31	1	S	54.3	60	
Mirreen Dr - 33	1	S	53	60	
Mirreen Dr - 39	1	SE	55.9	60	
Mirreen Dr - 40	1	SE	53	60	
Mirreen Dr - 40	2		55.3	60	

Receiver	Floor	Façade	Predicted Noise Level LA10(18hour) dB(A)	Criteria dB(A)	Exceedance
Mirreen Dr - 41	1	SE	56.4	60	
Mirreen Dr - 42	1	SE	55.9	60	
Mirreen Dr - 42	2		57.4	60	
Mirreen Dr - 43	1	SW	56.4	60	
Mirreen Dr - 44	1	SE	56.2	60	
Mirreen Dr - 44	2		57.2	60	
Mirreen Dr - 46	1	SE	56.7	60	
Mirreen Dr - 46	2		58	60	
Mirreen Dr - 48	1	SW	58.2	60	
Mirreen Dr - 51 (Units 1 - 4)	1	SE	63.4	60	3.4
Mirreen Dr - 51 (Units 1 - 4)	2		66.2	60	6.2
Mirreen Dr - 51 (Units 1 - 4)	1	SW	68.8	60	8.8
Mirreen Dr - 51 (Units 1 - 4)	2		70.5	60	10.5
Mirreen Dr - 51 (Units 5 - 7)	1	W	66.1	60	6.1
Mirreen Dr Units 'A'	1	NW	58.9	60	
Mirreen Dr Units 'A'	1	SE	60	60	
Mirreen Dr Units 'B'	1	SE	58.8	60	
Mirreen Dr Units 'B'	2		60.5	60	0.5
Mirreen Dr Units 'C'	1	NW	61	60	1
Mirreen Dr Units 'C'	1	SE	61	60	1
Mirreen Dr Units 'C'	1	SW	64.3	60	4.3
Mirreen Dr Units 'D'	1	NW	56.8	60	
Mirreen Dr Units 'D'	1	SE	59.7	60	
Mirreen Dr Units 'D'	1	SW	61	60	1
Mirreen Dr Units 'E'	1	SW	59.7	60	
Mirreen Dr Park	1		56.6 (LA10(12hour))	63 (LA10(12hour))	
Mitchell Ave - 11	1	W	56.1	68	
Mitchell Ave - 13	1	W	56.7	68	
Mitchell Ave - 15	1	W	57.3	68	
Mitchell Ave - 17	1	W	58.4	68	
Mitchell Ave - 19	1	W	58.8	68	
Mitchell Ave - 20	1	W	58.2	68	
Mitchell Ave - 21	1	W	58.8	68	
Mitchell Ave - 23	1	W	59.8	68	
Mitchell Ave - 25	1	W	60.6	68	
Mitchell Ave - 27	1	W	60.9	68	
Mitchell Ave - 29	1	W	61.5	68	
Mitchell Ave - 31	1	W	62.9	68	
Mitchell Ave - 34	1	SW	60.5	68	
Mitchell Ave - 35	1	SW	65.5	68	
Mitchell Ave - 35	2		67	68	
Mitchell Ave - 36	1	SW	60.5	68	
Mitchell Ave - 37	1	SW	64	68	
Mitchell Ave - 37	2		65.5	68	
Mitchell Ave - 39	1	SW	64.9	68	
Mitchell Ave - 39	2		66.2	68	
Mitchell Ave - 41	1	SW	65	68	
Mitchell Ave - 41	2		66.3	68	

Receiver	Floor	Façade	Predicted Noise Level LA10(18hour) dB(A)	Criteria dB(A)	Exceedance
Mitchell Ave - 43	1	SW	64.7	68	
Mitchell Ave - 43	2		66.2	68	
Mitchell Ave - 45	1	SW	65.7	68	
Mitchell Ave - 46	1	SW	60.8	68	
Mitchell Ave - 47	1	SW	65.9	68	
Mitchell Ave - 47	2		67.2	68	
Mitchell Ave - 49	1	SW	65.8	68	
Mitchell Ave - 51	1	SW	65.9	68	
Mitchell Ave - 51	2		67.2	68	
Mitchell Ave - 53 (a)	1	SW	66	68	
Mitchell Ave - 53 (b)	1	SW	65.9	68	
Mitchell Ave - 53 (b)	2		67.3	68	
Mitchell Ave - 55 / 57	1	SW	65.6	68	
Mitchell Ave - 55 / 57	2		66.9	68	
Mitchell Ave - 7	1	W	54.3	68	
Mitchell Ave - 9	1	W	55.2	68	
Mitchell Park - A - 10	1	SE	61.7	68	
Mitchell Park - A - 10	2		63.7	68	
Mitchell Park - A - 11	1	SE	61.6	68	
Mitchell Park - A - 11	2		63.5	68	
Mitchell Park - A - 12	1	SE	61.8	68	
Mitchell Park - A - 12	2		63.7	68	
Mitchell Park - A - 13	1	SE	61.8	68	
Mitchell Park - A - 13	2		63.6	68	
Mitchell Park - A - 14	1	SE	61.3	68	
Mitchell Park - A - 14	2		63.1	68	
Mitchell Park - A - 5	1	SE	60.3	68	
Mitchell Park - A - 5	2		63	68	
Mitchell Park - A - 6	1	SE	59.7	68	
Mitchell Park - A - 6	2		62.2	68	
Mitchell Park - A - 7	1	SE	58.8	68	
Mitchell Park - A - 7	2		61.4	68	
Mitchell Park - A - 8	1	SE	61.6	68	
Mitchell Park - A - 8	2		63.8	68	
Mitchell Park - A - 8	1	SW	63.6	68	
Mitchell Park - A - 8	2		65.6	68	
Mitchell Park - A - 9	1	SE	61.4	68	
Mitchell Park - A - 9	2		63.7	68	
Mitchell Park - A - 1	1	SE	62.7	68	
Mitchell Park - A - 1	2		65.5	68	
Mitchell Park - A - 1	1	SW	66.2	68	
Mitchell Park - A - 1	2		68.6	68	0.6
Mitchell Park - B - 10	1	NW	57.4	68	
Mitchell Park - B - 10	2		58.7	68	
Mitchell Park - B - 1	1	SW	62.9	68	
Mitchell Park - B - 1	2		64.8	68	
Mitchell Park - B - 5	1	NW	57.6	68	
Mitchell Park - B - 5	2		60	68	
Mitchell Park - B - 6	1	NW	57.2	68	

Receiver	Floor	Façade	Predicted Noise Level LA10(18hour) dB(A)	Criteria dB(A)	Exceedance
Mitchell Park - B - 6	2		59.4	68	
Mitchell Park - B - 9	1	NW	58.4	68	
Mitchell Park - B - 9	2		59.8	68	
Mitchell Park - B - 2	1	NW	59.8	68	
Mitchell Park - B - 2	2		62.1	68	
Mitchell Park - B - 3	1	NW	59.3	68	
Mitchell Park - B - 3	2		61.4	68	
Mitchell Park - B - 4	1	NW	58.6	68	
Mitchell Park - B - 4	2		60.8	68	
Mitchell Park - B - 8	1	SW	58.6	68	
Mitchell Park - B - 8	2		60.2	68	
Mitchell Park - C - 2	1	NW	59.7	68	
Mitchell Park - C - 2	2		62.1	68	
Mitchell Park - C - 3	1	NW	58.5	68	
Mitchell Park - C - 3	2		61.2	68	
Mitchell Park - C - 5	1	NW	57.7	68	
Mitchell Park - C - 5	2		60.4	68	
Mitchell Park - C - 1	1	SW	63.8	68	
Mitchell Park - C - 1	2		65.3	68	
Mitchell Park - D - 1	1	NW	63.6	68	
Mitchell Park - D - 1	2		65.5	68	
Mitchell Park - D - 1	1	SE	60.6	68	
Mitchell Park - D - 1	2		63	68	
Mitchell Park - D - 1	1	SW	64.7	68	
Mitchell Park - D - 1	2		66.3	68	
Mitchell Park - D - 2	1	NW	61.4	68	
Mitchell Park - D - 2	2		63.7	68	
Mitchell Park - D - 3	1	NW	60.5	68	
Mitchell Park - D - 3	2		63.1	68	
Mitchell Park - D - 4	1	NW	60.3	68	
Mitchell Park - D - 4	2		63	68	
Mitchell Park - D - 5	1	NW	60.4	68	
Mitchell Park - D - 5	2		62.9	68	
Mitchell Park - E - 1	1	SW	66.1	68	
Mitchell Park - E - 1	2		68.1	68	0.1
Mitchell Park - E - 4	1	NW	59.3	68	
Mitchell Park - E - 4	2		61.9	68	
Mitchell Park - E - 5	1	NW	58.7	68	
Mitchell Park - E - 5	2		61.4	68	
Mitchell Park - E - 2	1	SE	61	68	
Mitchell Park - E - 2	2		63.2	68	
Mitchell Park - E - 3	1	NW	59.7	68	
Mitchell Park - E - 3	2		62.2	68	
Mitchell Park - F - 1	1	NW	62.9	68	
Mitchell Park - F - 1	2		64.9	68	
Mitchell Park - F - 1	1	SW	65.1	68	
Mitchell Park - F - 1	2		66.8	68	
Mitchell Park - F - 2	1	NW	61	68	
Mitchell Park - F - 2	2		63.7	68	

Receiver	Floor	Façade	Predicted Noise Level LA10(18hour) dB(A)	Criteria dB(A)	Exceedance
Mitchell Park - F - 3	1	NW	60.2	68	
Mitchell Park - F - 3	2		63.1	68	
Mitchell Park - F - 4	1	NW	59.7	68	
Mitchell Park - F - 4	2		62.6	68	
Mitchell Park - F - 5	1	NW	59.2	68	
Mitchell Park - F - 5	2		62.1	68	
Mitchell Park - G - 1	1	SE	63.1	68	
Mitchell Park - G - 1	2		65.2	68	
Mitchell Park - G - 1	1	SW	65.7	68	
Mitchell Park - G - 1	2		67.4	68	
Mitchell Park - G - 2	1	NW	62.6	68	
Mitchell Park - G - 2	2		64.6	68	
Mitchell Park - G - 2	1	SE	61.5	68	
Mitchell Park - G - 2	2		63.9	68	
Mitchell Park - G - 3	1	NW	60.6	68	
Mitchell Park - G - 3	2		63.4	68	
Mitchell Park - G - 3	1	SE	61	68	
Mitchell Park - G - 3	2		63.4	68	
Mitchell Park - G - 4	1	SE	60.6	68	
Mitchell Park - G - 4	2		62.9	68	
Mitchell Park - G -5	1	SE	60	68	
Mitchell Park - G -5	2		62.3	68	
Mitchell Park - H - 1	1	S	64.2	68	
Mitchell Park - H - 1	2		66.1	68	
Mitchell Park - H - 1	1	W	65.7	68	
Mitchell Park - H - 1	2		67.2	68	
Mitchell Park - H - 2	1	N	62	68	
Mitchell Park - H - 2	2		63.9	68	
Mitchell Park - H - 2	1	S	62	68	
Mitchell Park - H - 2	2		64.5	68	
Mitchell Park - H - 3	1	N	61.5	68	
Mitchell Park - H - 3	2		63.4	68	
Mitchell Park - H - 3	1	S	61.5	68	
Mitchell Park - H - 3	2		64	68	
Mitchell Park - H - 4	1	N	61.1	68	
Mitchell Park - H - 4	2		63	68	
Mitchell Park - H - 4	1	S	61	68	
Mitchell Park - H - 4	2		63.5	68	
Mitchell Park - H -5	1	N	60.2	68	
Mitchell Park - H -5	2		62.2	68	
Mitchell Park - H -5	1	S	60.1	68	
Mitchell Park - H -5	2		62.4	68	
Mitchell Park A - 2	1	NW	60.5	68	
Mitchell Park A - 2	2		63.9	68	
Mitchell Park A - 2	1	SE	60.6	68	
Mitchell Park A - 2	2		62.8	68	
Mitchell Park A - 3	1	SE	60	68	
Mitchell Park A - 3	2		62.1	68	
Mitchell Park A - 4	1	SE	60.3	68	

Receiver	Floor	Façade	Predicted Noise Level LA10(18hour) dB(A)	Criteria dB(A)	Exceedance
Mitchell Park A - 4	2		62.5	68	
Mitchell Park C- 4	1	NW	58	68	
Mitchell Park C- 4	2		60.7	68	
Mollys PI - 15	1	NE	64.2	60	4.2
Mollys PI - 17	1	E	65.9	60	5.9
Mollys PI - 19A	1	E	66.2	60	6.2
Mollys PI - 19B	1	E	66.2	60	6.2
Mollys PI - 21A	1	E	66.2	60	6.2
Mollys PI - 21B	1	NE	66.6	60	6.6
Mollys PI - 23A	1	NE	66.8	60	6.8
Mollys PI - 23B	1	N	65	60	5
Mollys PI - 25A	1	N	64.6	60	4.6
Mollys PI - 25B	1	N	64.1	60	4.1
Mollys PI - 27A	1	N	63.8	60	3.8
Mollys PI - 27B	1	NE	62.8	60	2.8
Narbine St - 10	1	S	60.3	68	
Narbine St - 12	1	E	61.8	68	
Narbine St - 14	1	N	61.3	68	
Narbine St - 16	1	E	63	68	
Narbine St - 6	1	S	60.3	68	
Narbine St - 8	1	S	60.2	68	
Neeson Place - 16	1	NE	64.2	60	4.2
Neeson Place - 19	1	NE	63.2	60	3.2
Ora Ct - 2	1	NE	62.7	68	
Ora Ct - 3	1	NE	61.1	68	
Ora Ct - 4	1	NE	61.5	68	
Ora Ct - 5	1	E	61.2	68	
Ora Ct - 6	1	NE	61.2	68	
Pacific Beach 020 m offset	1	SW	79.6	60	19.6
Pacific Beach 020 m offset	2		80.6	60	20.6
Pacific Beach 040 m offset	1	SW	73.7	60	13.7
Pacific Beach 040 m offset	2		75.5	60	15.5
Pacific Beach 060 m offset	1	SW	70.6	60	10.6
Pacific Beach 060 m offset	2		72.7	60	12.7
Pacific Beach 080 m offset	1	SW	68.9	60	8.9
Pacific Beach 080 m offset	2		71.1	60	11.1
Pacific Beach 100 m offset	1	SW	67.6	60	7.6
Pacific Beach 100 m offset	2		69.9	60	9.9
Pacific Beach 120 m offset	1	SW	65.4	60	5.4
Pacific Beach 120 m offset	2		67.1	60	7.1
Pacific Beach 140 m offset	1	SW	64.5	60	4.5
Pacific Beach 140 m offset	2		66.4	60	6.4
Pacific Beach 160 m offset	1	SW	64.1	60	4.1
Pacific Beach 160 m offset	2		66	60	6
Pacific Beach 180 m offset	1	SW	63.4	60	3.4
Pacific Beach 180 m offset	2		65.3	60	5.3
Pacific Beach 200 m offset	1	SW	62.5	60	2.5
Pacific Beach 200 m offset	2		64.6	60	4.6
Pacific Beach 220 m offset	1	SW	60.9	60	0.9

Receiver	Floor	Façade	Predicted Noise Level LA10(18hour) dB(A)	Criteria dB(A)	Exceedance
Pacific Beach 220 m offset	2		62.6	60	2.6
Pacific Beach 240 m offset	1	SW	60.8	60	0.8
Pacific Beach 240 m offset	2		62.5	60	2.5
Pacific Beach 260 m offset	1	SW	60.5	60	0.5
Pacific Beach 260 m offset	2		62.3	60	2.3
Pacific Beach 280 m offset	1	SW	60.4	60	0.4
Pacific Beach 280 m offset	2		62.2	60	2.2
Pacific Beach 300 m offset	1	SW	60.1	60	0.1
Pacific Beach 300 m offset	2		61.9	60	1.9
Partridge Place - 1	1	SW	59.2	68	
Partridge Place - 3A	1	SW	59.1	68	
Partridge Place - 5A	1	SW	58.1	68	
Partridge Place - 7A	1	SW	59.2	68	
Pimpala Ct - 1	1	NW	52.8	60	
Pimpala Ct - 2	1	NW	52.3	60	
Pimpala Ct - 2	2		56.3	60	
Pimpala Ct - 3	1	W	53.8	60	
Pimpala Ct - 3	2		57.9	60	
Pimpala Ct - 4	1	NW	58.3	60	
Pimpala Ct - 5	1	SW	56.3	60	
Pimpala Ct - 5	2		58.1	60	
Pimpala Ct - 6	1	W	59.7	60	
Pimpala Ct - 6	2		60.4	68	
Reynton St - 10	1	E	61.3	68	
Reynton St - 1	1	E	65.9	68	
Reynton St - 2	1	NE	66.3	68	
Reynton St - 3	1	N	63.7	68	
Reynton St - 4	1	N	62.7	68	
Reynton St - 5	1	E	63.5	68	
Reynton St - 6	1	N	61.1	68	
Reynton St - 7	1	E	63	68	
Reynton St - 8	1	E	61.7	68	
Reynton St - 9	1	E	62.1	68	
Rosewater - 12	1	SW	59.3	60	
Rosewater - 14	1	SW	58.2	60	
Rosewater - 16	1	S	57.8	60	
Starfish Cr - 20	1	SE	53.9	60	
Starfish Cr - 17	1	SW	54.7	60	
Starfish Cr - 22	1	S	55.6	60	
Starfish Cr - 24	1	SW	57.5	60	
Starfish Cr - 26	1	SW	57.4	60	
Starfish Cr - 28	1	SW	57.6	60	
Station St - 67	1	NE	67	68	
Taperell Dr - 10	1	W	55	60	
Taperell Dr - 12	1	W	52.8	60	
Taperell Dr - 13	1	W	59.8	60	
Taperell Dr - 14	1	W	52.6	60	
Taperell Dr - 15	1	W	59.1	60	
Taperell Dr - 16	1	W	52.2	60	

Receiver	Floor	Façade	Predicted Noise Level LA10(18hour) dB(A)	Criteria dB(A)	Exceedance
Taperell Dr - 17	1	W	58.6	60	
Taperell Dr - 18	1	W	53.9	60	
Taperell Dr - 19	1	W	58.3	60	
Taperell Dr - 19	2		59.8	60	
Taperell Dr - 20	1	W	52.4	60	
Taperell Dr - 21	1	W	58.1	60	
Taperell Dr - 21	2		59.6	60	
Taperell Dr - 22	1	W	51.8	60	
Taperell Dr - 23	1	W	57.8	60	
Taperell Dr - 24	1	S	50.8	60	
Taperell Dr - 25	1	W	57.6	60	
Taperell Dr - 26	1	W	51.9	60	
Taperell Dr - 27	1	W	57.6	60	
Taperell Dr - 28	1	NW	57	60	
Taperell Dr - 29	1	W	56.9	60	
Taperell Dr - 2	1	W	58.9	60	
Taperell Dr - 30	1	S	51.7	60	
Taperell Dr - 31	1	W	57.2	60	
Taperell Dr - 33	1	W	57.2	60	
Taperell Dr - 35	1	W	57.7	60	
Taperell Dr - 37	1	SW	57.2	60	
Taperell Dr - 39	1	SW	56.8	60	
Taperell Dr - 41	1	SW	54.4	60	
Taperell Dr - 4	1	W	58.5	60	
Taperell Dr - 8	1	W	56.1	60	
Triton Pde - 1	1	SW	65.6	60	5.6
Triton Pde - 3	1	SW	54	60	
Triton Pde - 5	1	NW	54.5	60	
Unit Complex 'A' (Cnr Inland and Boyd)	1	SW	56.9	60	
Unit Complex 'B' (Cnr Inland and Boyd)	1	SW	50.4	60	
Unit Complex 'C' (Cnr Inland and Boyd)	1	SE	54.3	60	
Unit Complex 'D' (Cnr Inland and Boyd)	1	SE	57.8	60	
Vista Pacific Apartments (3, 9)	1	SW	70.4	60	10.4
Vista Pacific Apartments (3, 9)	2		71.4	60	11.4
Vista Pacific Apartments (3, 9)	3		72	60	12
Vista Pacific Apartments (4, 10)	1	SW	69.6	60	9.6
Vista Pacific Apartments (4, 10)	2		70.6	60	10.6
Vista Pacific Apartments (4, 10)	3		71.3	60	11.3
Vista Pacific Apartments (5, 11)	1	SW	69.1	60	9.1
Vista Pacific Apartments (5, 11)	2		70.1	60	10.1
Vista Pacific Apartments (5, 11)	3		70.8	60	10.8
Vista Pacific Apartments (7, 13)	1	SW	71.1	60	11.1
Vista Pacific Apartments (7, 13)	2		72	60	12
Vista Pacific Apartments (7, 13)	3		72.6	60	12.6
Wickham Cr - 2	1	W	57.4	60	
Yolanta Dr - 1	1	NW	54.2	60	

Table G-2: Queensland Receivers – Predicted Noise Levels 2017 LA10 (1 Hour) No Mitigation, Special Land Uses (John Flynn Hospital and Medical Centre)

2017 1hr - Hospital	Floor	Predicted Noise Level LA10(1hour)	Criteria dB(A)	Exceedance (dB(A))
Accommodation Building	1	58.7	74.2	-
Accommodation Building	2	60	74.2	-
Accommodation Building	3	61	74.2	-
Accommodation Building	4	61.9	74.2	-
Accommodation Building	5	62.7	74.2	-
Accommodation Building	6	63.5	74.2	-
Accommodation Building	7	64.2	74.2	-
Accommodation Building	8	64.8	74.2	-
Accommodation Building	1	60.7	74.2	-
Accommodation Building	2	61.8	74.2	-
Accommodation Building	3	63.1	74.2	-
Accommodation Building	4	64.2	74.2	-
Accommodation Building	5	64.8	74.2	-
Accommodation Building	6	65.2	74.2	-
Accommodation Building	7	65.6	74.2	-
Accommodation Building	8	66	74.2	-
Main Hospital	1	61.2	74.2	-
Main Hospital	2	62.1	74.2	-
Main Hospital	3	63.2	74.2	-
Main Hospital	4	63.8	74.2	-
Main Hospital	5	64.5	74.2	-
Main Hospital	6	65	74.2	-
Main Hospital	7	65.5	74.2	-
Main Hospital	8	65.9	74.2	-
Main Hospital	9	66.3	74.2	-
Main Hospital	10	66.7	74.2	-
Main Hospital	11	67	74.2	-
Main Hospital	1	59.9	74.2	-
Main Hospital	2	60.8	74.2	-
Main Hospital	3	62	74.2	-
Main Hospital	4	62.7	74.2	-
Main Hospital	5	63.5	74.2	-
Main Hospital	6	64.1	74.2	-
Main Hospital	7	64.7	74.2	-
Main Hospital	8	65.3	74.2	-
Main Hospital	9	65.7	74.2	-
Main Hospital	10	66	74.2	-
Main Hospital	11	66.4	74.2	-
Main Hospital	1	60.6	74.2	-
Main Hospital	2	61.5	74.2	-
Main Hospital	3	62.6	74.2	-
Main Hospital	4	63.2	74.2	-
Main Hospital	5	63.9	74.2	-
Main Hospital	6	64.4	74.2	-
Main Hospital	7	64.8	74.2	-
Main Hospital	8	65.2	74.2	-
Main Hospital	9	65.6	74.2	-

2017 1hr - Hospital	Floor	Predicted Noise Level LA10(1hour)	Criteria dB(A)	Exceedance (dB(A))
Main Hospital	10	66	74.2	-
Main Hospital	11	66.3	74.2	-
Radiotherapy Building	1	66.5	74.2	-
Radiotherapy Building	2	67.8	74.2	-
Radiotherapy Building	3	68.6	74.2	-
Radiotherapy Building	1	67.1	74.2	-
Radiotherapy Building	2	68.6	74.2	-
Radiotherapy Building	3	69.5	74.2	-
Radiotherapy Building	1	65.9	74.2	-
Radiotherapy Building	2	67.6	74.2	-
Radiotherapy Building	3	68.4	74.2	-

Figure G-1 – Predicted 2017 LA10(18hour) (façade-corrected) noise levels – Pacific Highway, North of Stewart Road Interchange (With Existing Mitigation)

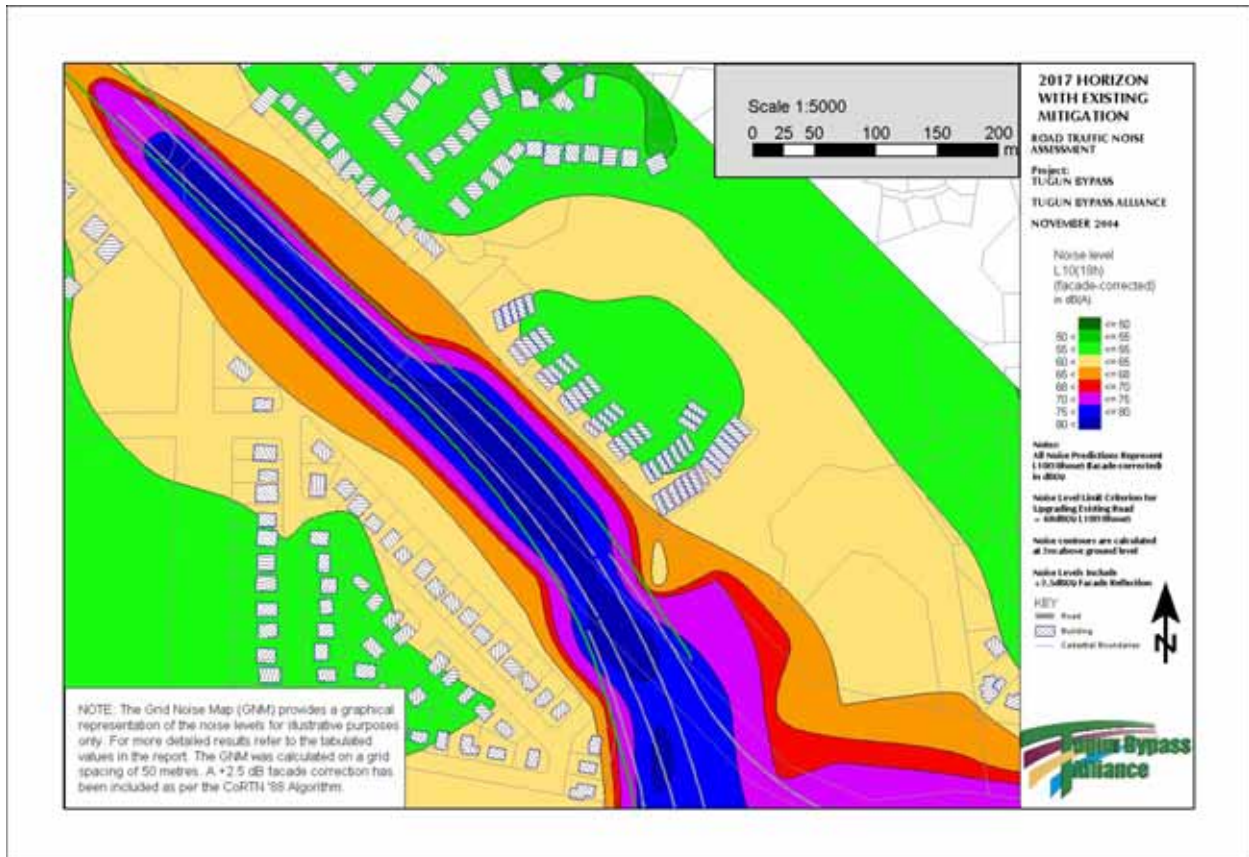


Figure G-2 – Predicted 2017 LA10(18hour) noise levels – Tugun Bypass, South of Stewart Road Interchange (No Mitigation)

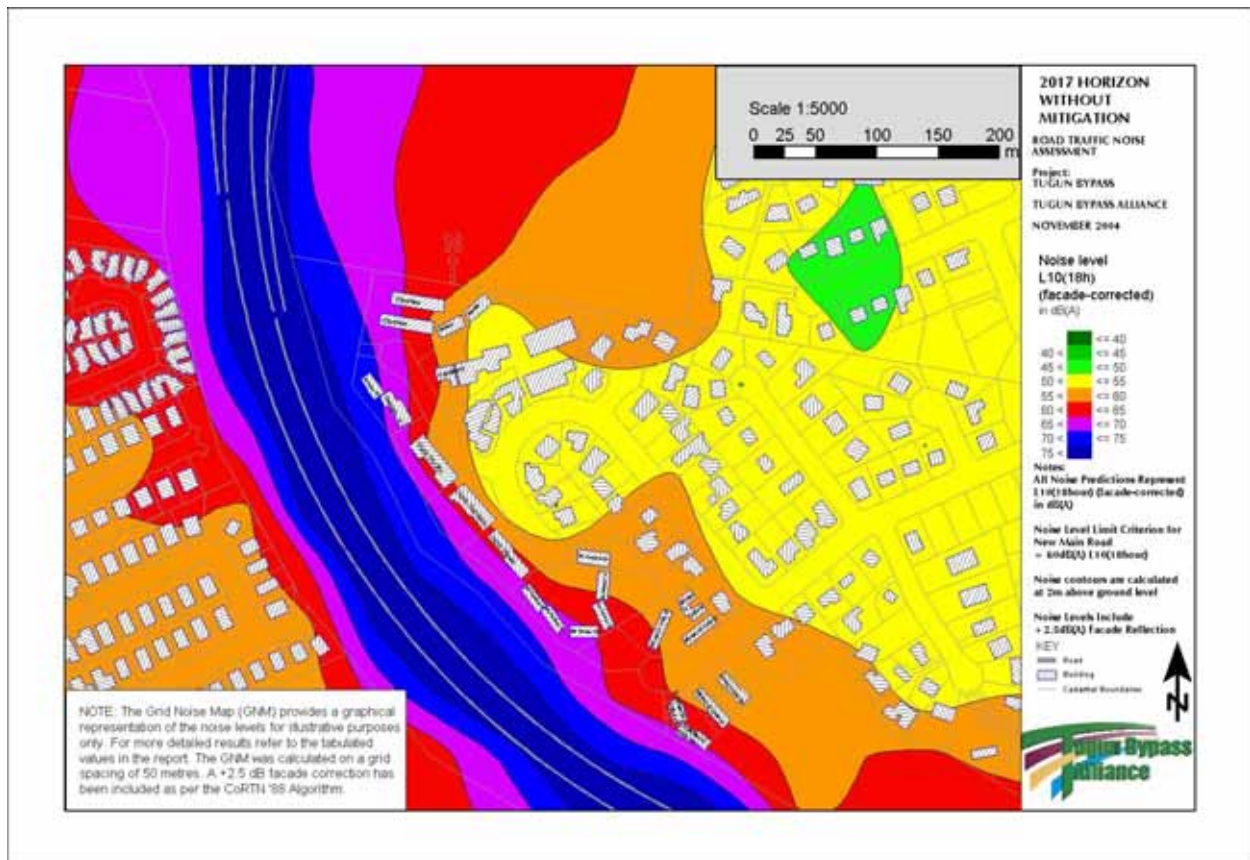
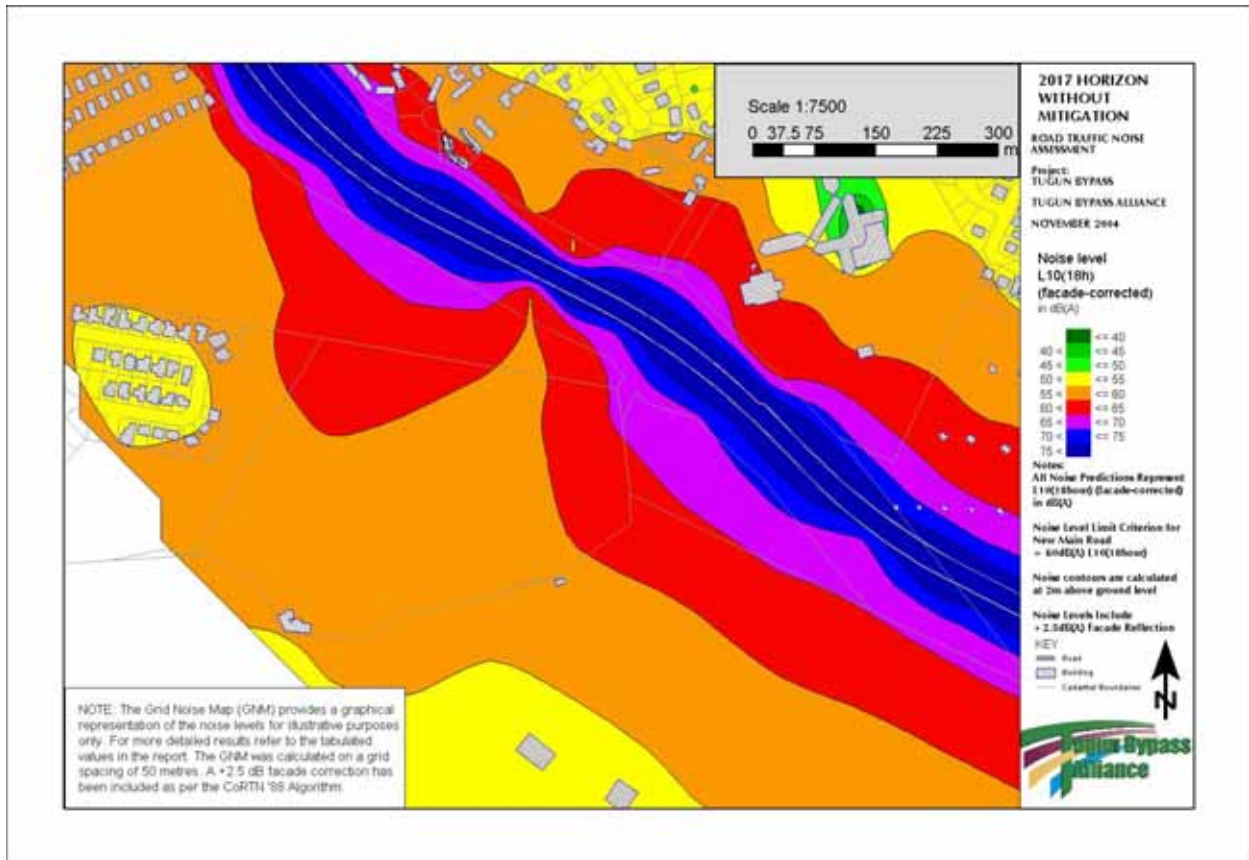


Figure G-3 – Predicted 2017 LA10(18hour) noise levels – Tugun Bypass, South of Stewart Road Interchange (No Mitigation)



Appendix H

Predicted Traffic Noise
Levels in NSW, 2007,
'Future Existing' (No Tugun
Bypass)

Table H1: Predicted Traffic Noise Levels in NSW, 2007, 'Future Existing' (No Tugun Bypass)

Address	Floor	Dir	Night Period (10:00 pm-7:00 am)		Day Period (7:00 am-10:00 pm)	
			Calculated Noise Level	Allowance Criterion	Calculated Noise Level	Allowance Criterion
1 Banksia Street		1 E	65.9	67.9	71.5	73.5
1 Banksia Street		2 E	67.1	69.1	73.5	75.5
1 Banksia Street		1 N	65.8	67.8	72.8	74.8
1 Banksia Street		2 N	67.1	69.1	74.6	76.6
1 Jalibah Avenue		1 N	47.4	55	54.7	60
1 Martel Place		1 N	48.7	55	55.9	60
1 Pontresina Avenue		1 S	54.2	56.2	61.4	63.4
1 Pontresina Avenue		1 W	55.4	57.4	62.6	64.6
1 Rose Street		1 E	59.5	61.5	68.2	70.2
1 Rose Street		1 N	59.4	61.4	68.1	70.1
1/1&2 Flamingo Place		1 W	49	55	56.2	60
1/1&2 Flamingo Place		2 W	51.8	55	59	61
1/10 Flamingo		1 W	49.2	55	56.5	60
1/3 Flamingo Place		1 S	52.2	55	59.5	61.5
1/3 Flamingo Place		2 S	54.5	56.5	62	64
1/4 Flamingo Place		1 S	53	55	60.5	62.5
1/4 Flamingo Place		2 S	54.6	56.6	62	64
1/5 Flamingo Place		1 S	53	55	60.4	62.4
1/5 Flamingo Place		2 S	54.7	56.7	62.1	64.1
1/6 Flamingo		1 W	50.3	55	57.5	60
1/7 Flamingo		1 W	50.4	55	57.6	60
1/8 Flamingo		1 N	48.5	55	55.8	60
1/8 Flamingo		1 W	50.4	55	57.7	60
1/9 Flamingo		1 W	49.4	55	56.7	60
1/9 Flamingo		2 W	52.1	55	59.3	61.3
10 Flamingo Place		1 N	45.4	55	52.8	60
10 Jalibah Avenue		1 N	46.9	55	54.3	60
10 Jalibah Avenue		1 S	51.3	55	58.7	60.7
10 Pontresina Avenue		1 W	52	55	59.2	61.2
10 Rose Street		1 E	55.6	57.6	62.9	64.9
10 Rose Street		2 E	60.1	62.1	67.2	69.2
10 Rose Street		1 N	54.2	56.2	61.6	63.6
10 Rose Street		2 N	58.6	60.6	65.8	67.8
101 Ducati Street		1 W	59.3	61.3	66.2	68.2
103 Ducati Street		1 W	57.9	59.9	64.9	66.9
105 Ducati Street		1 W	57.4	59.4	64.5	66.5
107 Ducati Street		1 W	58.7	60.7	65.4	67.4
11 Jalibah Avenue		1 N	49	55	56.3	60
11 Jalibah Avenue		1 S	55.6	57.6	63.2	65.2
11 Jalibah Avenue		1 W	54.5	56.5	61.9	63.9
11 Moolau Avenue		1 N	50.7	55	57.9	60
11 Moolau Avenue		1 W	54.2	56.2	61.7	63.7
11 Pontresina Avenue		1 W	52.2	55	59.4	61.4
11 Rose Street		1 E	54	56	61.8	63.8
11 Rose Street		2 E	56.8	58.8	64.4	66.4
11 Rose Street		1 S	51.3	55	58.3	60.3
11 Rose Street		2 S	53.9	55.9	60.8	62.8
12 Flamingo		1 N	44.8	55	52.1	60

Address	Floor	Dir	Night Period (10:00 pm-7:00 am)		Day Period (7:00 am-10:00 pm)	
			Calculated Noise Level	Allowance Criterion	Calculated Noise Level	Allowance Criterion
12 Jalibah Avenue	1	N	47.3	55	54.6	60
12 Jalibah Avenue	1	S	51.9	55	59.2	61.2
12 Moolua Avenue	1	N	50.8	55	58	60
12 Moolua Avenue	2	N	53.4	55.4	60.7	62.7
12 Moolua Avenue	1	W	54.4	56.4	61.6	63.6
12 Moolua Avenue	2	W	56.6	58.6	63.9	65.9
12 Pontresina Avenue	1	S	52.5	55	59.9	61.9
12 Pontresina Avenue	1	W	52.7	55	60	62
12 Rose Street	1	E	55.3	57.3	61.9	63.9
12 Rose Street	2	E	58.5	60.5	65.4	67.4
12 Rose Street	1	S	53.7	55.7	60.6	62.6
12 Rose Street	2	S	56.3	58.3	63	65
13 Flamingo Place	1	N	45.6	55	52.9	60
13 Flamingo Place	1	S	48.4	55	55.7	60
13 Flamingo Place	1	W	48.4	55	55.7	60
13 Moolua Avenue	1	W	54.9	56.9	62.1	64.1
13 Rose Street	1	E	54.1	56.1	61.8	63.8
13 Rose Street	1	N	52.9	55	60.7	62.7
131 Kennedy Drive	1	S	65.2	67.2	73.4	75.4
14 Jalibah Avenue	1	N	48	55	55.3	60
14 Moolua Avenue	1	W	55	57	62.3	64.3
14 Moolua Avenue	2	W	57.8	59.8	65	67
14 Rose Street	1	E	55.7	57.7	62.9	64.9
14 Rose Street	1	N	54.9	56.9	62.4	64.4
15 Flamingo Place	1	N	45.4	55	52.7	60
15 Flamingo Place	1	S	48.3	55	55.6	60
15 Moolua Avenue	1	W	55.2	57.2	62.5	64.5
15 Rose Street Unit 4-6	1	E	53.5	55.5	61.1	63.1
15 Rose Street Unit 4-6	2	E	56.3	58.3	63.8	65.8
15 Rose Street Units 1-3	1	E	53.7	55.7	61.4	63.4
15 Rose Street Units 1-3	2	E	56.5	58.5	63.9	65.9
16 Jalibah Avenue	1	S	53.6	55.6	61.3	63.3
16 Jalibah Avenue	1	W	52.4	55	59.9	61.9
16 Minore Place	1	N	45.7	55	53	60
16 Moolua Avenue	1	W	55.2	57.2	62.5	64.5
16 Rose Street	1	E	53	55	60.4	62.4
17 Flamingo Place	1	N	45.5	55	52.8	60
17 Flamingo Place	1	S	48.6	55	56.1	60
17 Moolua Avenue	1	S	55.8	57.8	62.6	64.6
17 Moolua Avenue	2	S	59.2	61.2	66.3	68.3
17 Moolua Avenue	1	W	54.8	56.8	62.1	64.1
17 Moolua Avenue	2	W	58.3	60.3	65.6	67.6
17 Rose Street	1	E	52.3	55	59.8	61.8
18 Minore Place	1	W	47.9	55	55.2	60
18 Rose Street	1	E	52.4	55	59.7	61.7
18 Rose Street	1	S	52	55	59.6	61.6
19 Flamingo Place	1	N	45.2	55	52.5	60
19 Flamingo Place	1	S	48.4	55	55.7	60
19 Minore Place	1	NW	47	55	54.3	60
19 Rose Street	1	E	53.6	55.6	61.1	63.1
2 Honeysuckle Street	1	E	64.4	66.4	71.2	73.2

Address	Floor	Dir	Night Period (10:00 pm-7:00 am)		Day Period (7:00 am-10:00 pm)	
			Calculated Noise Level	Allowance Criterion	Calculated Noise Level	Allowance Criterion
2 Honeysuckle Street		1 N	62.4	64.4	67.9	69.9
2 Martel Place		1 S	48.7	55	56	60
2 Pontresina Avenue		1 W	55.4	57.4	62.5	64.5
20 Minore Place		1 NW	48.6	55	55.9	60
20 Rose Street		1 E	52.7	55	60.1	62.1
20 Rose Street		1 N	52.4	55	59.9	61.9
21 Flamingo Place		1 N	45.1	55	52.4	60
21 Flamingo Place		1 S	48.2	55	55.6	60
21 Minore Place		1 NW	47.8	55	55.1	60
22 Kiata Parade		1 N	44.5	55	51.8	60
22 Kiata Parade		1 S	47.6	55	54.9	60
22 Minore Place		1 W	49.2	55	56.4	60
22 Rose Street		1 E	53.8	55.8	61.3	63.3
22 Rose Street		1 N	51.2	55	58.6	60.6
24 Kiata Parade		1 S	48.7	55	56	60
24 Parks Drive		1 N	46.3	55	53.6	60
24 Parks Drive		1 S	50.9	55	58.2	60.2
24 Rose Street		1 E	51.8	55	59.3	61.3
25 Kiata Parade		1 N	46.7	55	54	60
26 Kiata Parade		1 S	49.4	55	56.6	60
26 Parks Drive		1 N	45.9	55	53.2	60
26 Parks Drive		1 S	50.7	55	58	60
27 Kiata Parade		1 N	47.4	55	54.6	60
28 Kiata Parade		1 SW	50.1	55	57.4	60
28 Parks Drive		1 N	44.6	55	51.9	60
28 Parks Drive		2 N	47.5	55	54.8	60
28 Parks Drive		1 S	50.1	55	57.4	60
28 Parks Drive		2 S	53.2	55.2	60.6	62.6
29 Kiata Parade		1 N	48.5	55	55.8	60
29 Kiata Parade		1 S	49.1	55	56.3	60
3 Jalibah Avenue		1 N	47.5	55	54.8	60
3 Martel Place		1 SW	49.2	55	56.5	60
3 Pontresina Avenue		1 W	54.6	56.6	61.8	63.8
3 Rose Street		1 E	58.2	60.2	66.9	68.9
30 Kiata Parade		1 SW	50.5	55	57.8	60
30 Parks Drive		1 N	46	55	53.4	60
30 Parks Drive		1 S	50.2	55	57.5	60
31 Kiata Parade		1 N	48.8	55	56.1	60
31 Kiata Parade		1 S	49.6	55	56.9	60
32 Kiata Parade		1 SW	50.9	55	58.1	60.1
32 Parks Drive		1 S	50	55	57.4	60
32 Parks Drive		2 S	52.8	55	60.4	62.4
33 Kiata Parade		1 N	49.8	55	57.1	60
33 Kiata Parade		1 S	51.7	55	58.9	60.9
33 Kiata Parade		1 W	51.8	55	59	61
34 Parks Drive		1 N	45.8	55	53.1	60
34 Parks Drive		1 W	49.3	55	56.7	60
34 Kiata Parade		1 SW	51.7	55	58.9	60.9
34 Meridian Way		1 W	52.6	55	60.1	62.1
35 Meridian Way		1 W	51.8	55	59.2	61.2
36 Kiata Parade		1 NW	47.8	55	55.1	60

Address	Floor	Dir	Night Period (10:00 pm-7:00 am)		Day Period (7:00 am-10:00 pm)	
			Calculated Noise Level	Allowance Criterion	Calculated Noise Level	Allowance Criterion
36 Meridian Way	1	W	51.7	55	59.1	61.1
37 Kiata Parade	1	S	53.7	55.7	60.9	62.9
37 Kiata Parade	1	W	53.9	55.9	61.1	63.1
37 Meridian Way	1	W	51.9	55	59.2	61.2
38 Kiata Parade	1	W	51.7	55	59	61
38 Meridian Way	1	W	51.6	55	58.9	60.9
4 Flamingo Place Units 1-4	1	W	49.4	55	56.7	60
4 Flamingo Place Units 1-4	2	W	52.7	55	60.1	62.1
4 Flamingo Place Units 12-15	1	N	45.9	55	53.2	60
4 Flamingo Place Units 5-8	1	N	46	55	53.3	60
4 Flamingo Place Units 5-8	1	W	48.5	55	55.7	60
4 Flamingo Place Units 9-11	1	N	46	55	53.3	60
4 Honeysuckle Street	1	E	63.1	65.1	69.2	71.2
4 Honeysuckle Street	2	E	65.1	67.1	70.9	72.9
4 Honeysuckle Street	1	N	62.8	64.8	68.1	70.1
4 Honeysuckle Street	2	N	64.5	66.5	69.6	71.6
4 Honeysuckle Street	1	S	60.5	62.5	68.6	70.6
4 Honeysuckle Street	2	S	62.4	64.4	70	72
4 Jalibah Avenue	1	N	46.2	55	53.5	60
4 Jalibah Avenue	1	S	50.5	55	57.7	60
4 Martel Place	1	W	49	55	56.2	60
4 Pontresina Avenue	1	W	53.9	55.9	61.1	63.1
4 Rose Street	1	E	59.8	61.8	68.5	70.5
4 Rose Street	1	N	61.6	63.6	70.2	72.2
41 Kiata Parade	1	S	52.6	55	59.8	61.8
41 Kiata Parade	1	W	56.2	58.2	63.5	65.5
42 Kiata Parade	1	W	51.9	55	59.2	61.2
42 Kiata Parade	2	W	54.5	56.5	61.8	63.8
43 Kiata Parade	1	W	53.9	55.9	61.1	63.1
44 Kiata Parade	1	N	50.4	55	57.6	60
44 Kiata Parade	1	W	52.1	55	59.4	61.4
45 Kiata Parade	1	W	54.6	56.6	61.7	63.7
46 Kiata Parade	1	SW	51.4	55	58.6	60.6
47 Kiata Parade	1	W	54.2	56.2	61.4	63.4
48 Kiata Parade	1	N	49.6	55	56.8	60
49 Kiata Parade	1	W	54.2	56.2	61.4	63.4
5 Flamingo Place	1	W	49.7	55	57	60
5 Honeysuckle Street	1	E	65	67	70.1	72.1
5 Honeysuckle Street	1	N	65	67	70.2	72.2
5 Jalibah Avenue	1	N	47.8	55	55.1	60
5 Martel Place	1	NW	49	55	56.3	60
5 Pontresina Avenue	1	W	53.3	55.3	60.5	62.5
5 Rose Street	1	E	56.7	58.7	65	67
50 Kiata Parade	1	N	48.6	55	55.9	60
51 Kiata Parade	1	W	56.5	58.5	63.9	65.9
52 Kiata Parade	1	N	48.2	55	55.5	60
53 Kiata Parade	1	W	55.6	57.6	63	65
54 Kiata Parade	1	N	47.7	55	55	60
55 Kiata Parade	1	W	55.8	57.8	63.2	65.2
57 Kiata Parade	1	W	55.9	57.9	63.3	65.3
59 Kiata Parade	1	W	55.5	57.5	62.7	64.7

Address	Floor	Dir	Night Period (10:00 pm-7:00 am)		Day Period (7:00 am-10:00 pm)	
			Calculated Noise Level	Allowance Criterion	Calculated Noise Level	Allowance Criterion
6 Honeysuckle Street		1 E	56.4	58.4	63	65
6 Honeysuckle Street		2 E	59.1	61.1	65.8	67.8
6 Honeysuckle Street		1 N	59.4	61.4	65.5	67.5
6 Honeysuckle Street		2 N	61.7	63.7	68	70
6 Honeysuckle Street		1 S	56.8	58.8	65.2	67.2
6 Honeysuckle Street		2 S	59	61	66.8	68.8
6 Jalibah Avenue		1 N	46.8	55	54.1	60
6 Jalibah Avenue		1 S	50.8	55	58	60
6 Martel Place		1 N	47.9	55	55.2	60
6 Pontresina Avenue		1 W	51.1	55	58.3	60.3
6 Rose Street		1 E	56.3	58.3	64.6	66.6
6 Rose Street		1 N	58.2	60.2	66.8	68.8
6 Rose Street		1 S	55.1	57.1	62.4	64.4
61 Kiata Parade		1 W	55.1	57.1	62.3	64.3
63 Kiata Parade		1 S	53.3	55.3	60.5	62.5
63 Kiata Parade		1 SW	56.3	58.3	63.8	65.8
63 Kiata Parade		1 W	58.8	60.8	66.7	68.7
65 Kiata Parade		1 W	53	55	60.2	62.2
65 Kiata Parade		1 W	52.6	55	59.8	61.8
67 Kiata Parade		1 N	50.8	55	58.7	60.7
67 Kiata Parade		1 S	50.2	55	57.5	60
69 Kiata Parade		1 N	50.3	55	58	60
69 Kiata Parade		1 S	49.6	55	56.9	60
7 Flamingo Place		1 NW	48.3	55	55.5	60
7 Flamingo Place		2 NW	51.1	55	58.3	60.3
7 Honeysuckle Street		1 N	59.2	61.2	65.5	67.5
7 Honeysuckle Street		1 S	57.3	59.3	63.5	65.5
7 Jalibah Avenue		1 N	48.4	55	55.7	60
7 Jalibah Avenue		1 S	55.9	57.9	63.7	65.7
7 Jalibah Avenue		1 W	55	57	62.5	64.5
7 Martel Place		1 N	49	55	56.2	60
7 Pontresina Avenue		1 NW	48.5	55	55.8	60
7 Pontresina Avenue		1 SW	51	55	58.3	60.3
7 Rose Street		1 E	55.1	57.1	63.2	65.2
71 Kiata Parade		1 N	48.7	55	55.9	60
71 Kiata Parade		1 S	49	55	56.3	60
73 Kiata Parade		1 N	48.3	55	55.6	60
73 Kiata Parade		1 S	48.3	55	55.5	60
74 Ducati Street		1 W	53.3	55.3	61.2	63.2
76 Ducati Street		1 W	53.7	55.7	61.5	63.5
78 Ducati Street		1 W	53.8	55.8	61.7	63.7
78 Ducati Street		2 W	55.9	57.9	63.1	65.1
79 Ducati Street		1 SW	49.2	55	56.5	60
8 Flamingo Place		1 N	45.6	55	52.9	60
8 Honeysuckle Street		1 N	57.6	59.6	64.2	66.2
8 Honeysuckle Street		2 N	60.2	62.2	66.8	68.8
8 Honeysuckle Street		1 S	53.8	55.8	61.8	63.8
8 Honeysuckle Street		2 S	56.5	58.5	64	66
8 Jalibah Avenue		1 N	46.8	55	54.1	60
8 Jalibah Avenue		1 S	51	55	58.2	60.2
8 Kiata Parade		1 N	49.7	55	56.9	60

Address	Floor	Dir	Night Period (10:00 pm-7:00 am)		Day Period (7:00 am-10:00 pm)	
			Calculated Noise Level	Allowance Criterion	Calculated Noise Level	Allowance Criterion
8 Kiata Parade	1	W	51.7	55	58.9	60.9
8 Pontresina Avenue	1	W	50.4	55	57.6	60
8 Rose Street	1	E	56	58	63.3	65.3
8 Rose Street	1	N	53.7	55.7	61.1	63.1
80 Ducati Street	1	W	54	56	61.8	63.8
81 Ducati Street	1	S	54.1	56.1	62.2	64.2
81 Ducati Street	1	W	53.9	55.9	61.9	63.9
82 Caloola Drive	1	N	49.9	55	57.4	60
82 Ducati Street	1	W	54.2	56.2	62	64
82 Ducati Street	2	W	56.5	58.5	63.7	65.7
84 Caloola Drive	1	S	49.8	55	57.1	60
84 Ducati Street	1	W	54.5	56.5	62	64
86 Ducati Street	1	W	54.8	56.8	62.3	64.3
88 Caloola Drive	1	NW	48.8	55	56	60
88 Ducati Street	1	W	54.7	56.7	62.1	64.1
9 Flamingo Place	1	N	46.7	55	54	60
9 Flamingo Place	2	N	49.5	55	56.7	60
9 Jalibah Avenue	1	N	48.6	55	55.9	60
9 Jalibah Avenue	1	S	55.5	57.5	63.3	65.3
9 Pontresina Avenue	1	W	51.5	55	58.7	60.7
9 Rose Street	1	E	54.4	56.4	62.4	64.4
90 Ducati Street	1	W	55.1	57.1	62.6	64.6
92 Ducati Street	1	W	55.6	57.6	63.2	65.2
94 Ducati Street	1	W	56.1	58.1	63.8	65.8
95 Ducati Street	1	W	58.2	60.2	65.2	67.2
96 Ducati Street	1	W	57.3	59.3	64.9	66.9
98 Ducati Street	1	W	57.1	59.1	64.7	66.7
99 Ducati Street	1	W	56.9	58.9	63.5	65.5
Caravan Worst Affected	1	E	56.2	58.2	65	67
Caravan Worst Affected	1	N	55.6	57.6	64.5	66.5
Ducati Street Shops	1	W	60.7	62.7	68.2	70.2
Kennedy Drive 'B'	1	S	67.9	69.9	76.7	78.7
Kennedy Drive 'C'	1	S	65.5	67.5	73.8	75.8
Kennedy Drive 'A'	1	E	62.8	64.8	70.7	72.7
Kennedy Drive 'A'	2	E	64.3	66.3	71.8	73.8
Kennedy Drive 'A'	1	N	55.3	57.3	63.4	65.4
Kennedy Drive 'A'	2	N	57.9	59.9	65.3	67.3
Kennedy Drive 'A'	1	S	65.5	67.5	73.8	75.8
Kennedy Drive 'A'	2	S	66.8	68.8	75	77
Service Station - BP	1	S	66	68	74.7	76.7

No of Residences exceed Base Night Criteria 56	No of Residences exceed Base Day Criteria 90
No. of Residences Acute >60 dB(A) Night 12	No. of Residences Acute >65 dB(A) Day 26

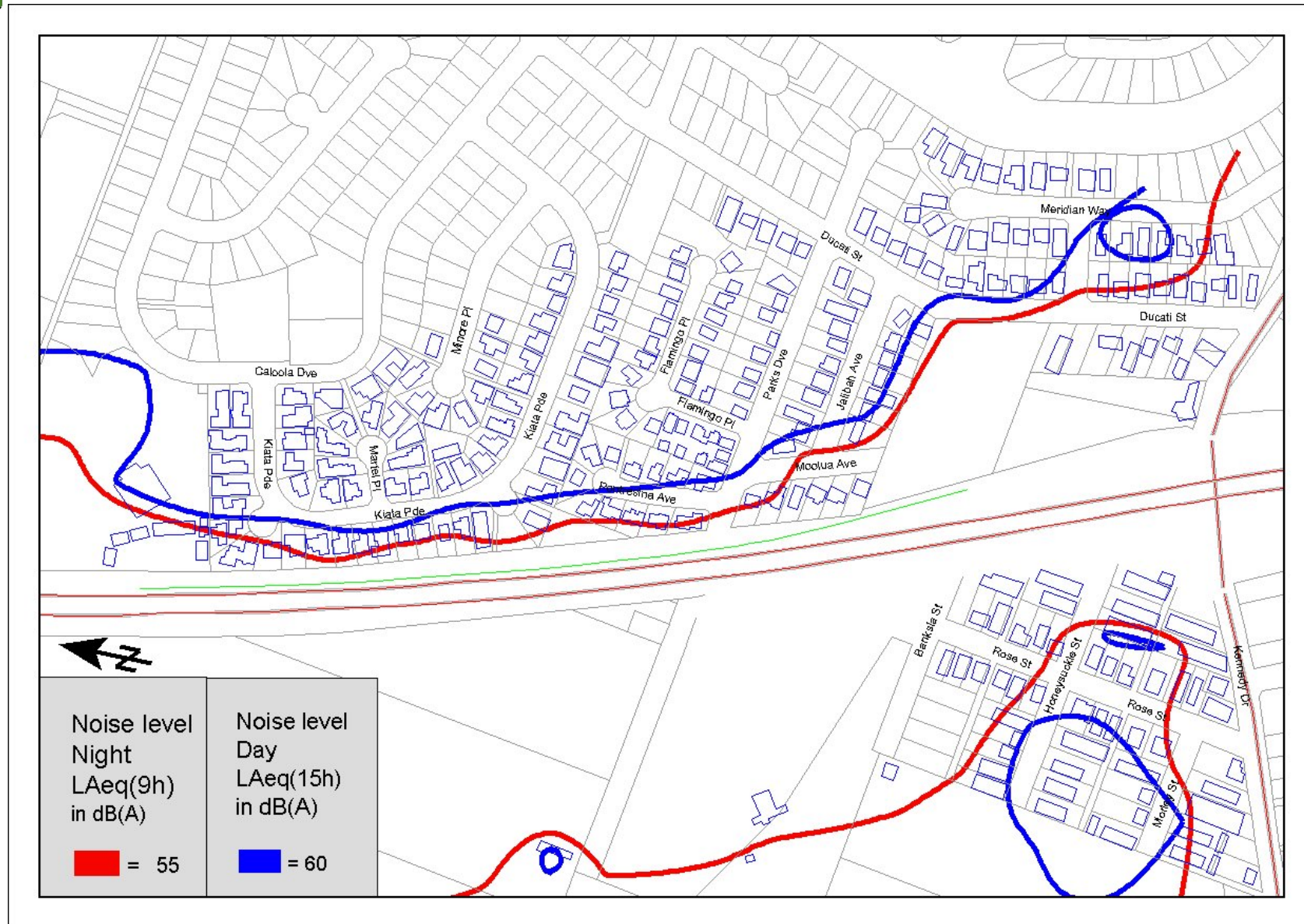


Figure H-1 – Noise Levels in NSW Year 2007 ‘Future-Existing’ (No Tugun Bypass) – 55/60 Noise Contour for Existing Road

Appendix I

Predicted Traffic Noise
Levels in NSW, 2007, with
Tugun Bypass (No
Mitigation)

Appendix I:

Table I1: Predicted Traffic Noise Levels in NSW, 2007, with Tugun Bypass (No Mitigation).

Address	Floor	Dir	NIGHT						DAY					
			L _{Aeq} (9hr)	Criterion	Exceedance	Allowance	2007 Night	Increase/	L _{Aeq} (15hr)	Criterion	Exceedance	Allowance	2007 Day	Increase/
						Criteria	No Bypass	(- Decrease)				Criteria	No Bypass	(- Decrease)
1 Banksia St	1	E	64.3	55	9.3	67.9	65.9	(-2)	70	60	10	73.5	71.5	(-2)
1 Banksia St	2	E	66.5	55	11.5	69.1	67.1	(-1)	72.3	60	12.3	75.5	73.5	(-1)
1 Banksia St	1	N	64.6	55	9.6	67.8	65.8	(-1)	70.4	60	10.4	74.8	72.8	(-2)
1 Banksia St	2	N	66.8	55	11.8	69.1	67.1	(-0)	72.8	60	12.8	76.6	74.6	(-2)
1 Jalibah Ave	1	N	48.1	55	-6.9	55	47.4	0.7	53.6	60	-6.4	60	54.7	(-1)
1 Martel Pl	1	N	49.4	55	-5.6	55	48.7	0.7	54.9	60	-5.1	60	55.9	(-1)
1 Pontresina Ave	1	S	53.8	55	-1.2	56.2	54.2	(-0)	59.3	60	-0.7	63.4	61.4	(-2)
1 Pontresina Ave	1	W	54.2	55	-0.8	57.4	55.4	(-1)	59.7	60	-0.3	64.6	62.6	(-3)
1 Rose St	1	E	58.4	55	3.4	61.5	59.5	(-1)	63.9	60	3.9	70.2	68.2	(-4)
1 Rose St	1	N	58.3	55	3.3	61.4	59.4	(-1)	63.8	60	3.8	70.1	68.1	(-4)
1/1&2 Flamingo Pl	1	W	49.8	55	-5.2	55	49	0.8	55.3	60	-4.7	60	56.2	(-1)
1/1&2 Flamingo Pl	2	W	53.3	55	-1.7	55	51.8	1.5	58.8	60	-1.2	61	59	(-0)
1/10 Flamingo	1	W	49.4	55	-5.6	55	49.2	0.2	55	60	-5	60	56.5	(-2)
1/3 Flamingo Pl	1	S	52.4	55	-2.6	55	52.2	0.2	57.9	60	-2.1	61.5	59.5	(-2)
1/3 Flamingo Pl	2	S	54.8	55	-0.2	56.5	54.5	0.3	60.3	60	0.3	64	62	(-2)
1/4 Flamingo Pl	1	S	53.3	55	-1.7	55	53	0.3	58.8	60	-1.2	62.5	60.5	(-2)
1/4 Flamingo Pl	2	S	55	55	0	56.6	54.6	0.4	60.5	60	0.5	64	62	(-2)
1/5 Flamingo Pl	1	S	53.5	55	-1.5	55	53	0.5	59	60	-1	62.4	60.4	(-1)
1/5 Flamingo Pl	2	S	55.5	55	0.5	56.7	54.7	0.8	61	60	1	64.1	62.1	(-1)
1/6 Flamingo	1	W	51	55	-4	55	50.3	0.7	56.5	60	-3.5	60	57.5	(-1)
1/7 Flamingo	1	W	51	55	-4	55	50.4	0.6	56.5	60	-3.5	60	57.6	(-1)
1/8 Flamingo	1	N	49	55	-6	55	48.5	0.5	54.5	60	-5.5	60	55.8	(-1)
1/8 Flamingo	1	W	51	55	-4	55	50.4	0.6	56.5	60	-3.5	60	57.7	(-1)
1/9 Flamingo	1	W	50.1	55	-4.9	55	49.4	0.7	55.6	60	-4.4	60	56.7	(-1)
1/9 Flamingo	2	W	53.5	55	-1.5	55	52.1	1.4	59	60	-1	61.3	59.3	(-0)
10 Flamingo Pl	1	N	46	55	-9	55	45.4	0.6	51.5	60	-8.5	60	52.8	(-1)

Address	Floor	Dir	NIGHT						DAY					
			L _{Aeq} (9hr)	Criterion	Exceedance	Allowance	2007 Night	Increase/	L _{Aeq} (15hr)	Criterion	Exceedance	Allowance	2007 Day	Increase/
						Criteria	No Bypass	(- Decrease)				Criteria	No Bypass	(- Decrease)
10 Jalibah Ave	1	N	47.2	55	-7.8	55	46.9	0.3	52.8	60	-7.2	60	54.3	(-2)
10 Jalibah Ave	1	S	51.3	55	-3.7	55	51.3	0.0	56.8	60	-3.2	60.7	58.7	(-2)
10 Pontresina Ave	1	W	52.4	55	-2.6	55	52	0.4	57.9	60	-2.1	61.2	59.2	(-1)
10 Rose St	1	E	54.8	55	-0.2	57.6	55.6	(-1)	60.3	60	0.3	64.9	62.9	(-3)
10 Rose St	2	E	59.4	55	4.4	62.1	60.1	(-1)	64.9	60	4.9	69.2	67.2	(-2)
10 Rose St	1	N	54	55	-1	56.2	54.2	(-0)	59.5	60	-0.5	63.6	61.6	(-2)
10 Rose St	2	N	58	55	3	60.6	58.6	(-1)	63.5	60	3.5	67.8	65.8	(-2)
101 Ducati St	1	W	58.5	55	3.5	61.3	59.3	(-1)	64	60	4	68.2	66.2	(-2)
103 Ducati St	1	W	56.8	55	1.8	59.9	57.9	(-1)	62.4	60	2.4	66.9	64.9	(-3)
105 Ducati St	1	W	56.6	55	1.6	59.4	57.4	(-1)	62.2	60	2.2	66.5	64.5	(-2)
107 Ducati St	1	W	57.5	55	2.5	60.7	58.7	(-1)	63.1	60	3.1	67.4	65.4	(-2)
11 Jalibah Ave	1	N	49.4	55	-5.6	55	49	0.4	55	60	-5	60	56.3	(-1)
11 Jalibah Ave	1	S	55.3	55	0.3	57.6	55.6	(-0)	60.8	60	0.8	65.2	63.2	(-2)
11 Jalibah Ave	1	W	54.2	55	-0.8	56.5	54.5	(-0)	59.8	60	-0.2	63.9	61.9	(-2)
11 Moolau Ave	1	N	51.3	55	-3.7	55	50.7	0.6	56.9	60	-3.1	60	57.9	(-1)
11 Moolau Ave	1	W	54.2	55	-0.8	56.2	54.2	0.0	59.7	60	-0.3	63.7	61.7	(-2)
11 Pontresina Ave	1	W	52.7	55	-2.3	55	52.2	0.5	58.1	60	-1.9	61.4	59.4	(-1)
11 Rose St	1	E	53.1	55	-1.9	56	54	(-1)	58.7	60	-1.3	63.8	61.8	(-3)
11 Rose St	2	E	55.9	55	0.9	58.8	56.8	(-1)	61.4	60	1.4	66.4	64.4	(-3)
11 Rose St	1	S	49.7	55	-5.3	55	51.3	(-2)	55.2	60	-4.8	60.3	58.3	(-3)
11 Rose St	2	S	52.4	55	-2.6	55.9	53.9	(-2)	58	60	-2	62.8	60.8	(-3)
12 Flamingo	1	N	44.7	55	-10.3	55	44.8	(-0)	50.3	60	-9.7	60	52.1	(-2)
12 Jalibah Ave	1	N	47.6	55	-7.4	55	47.3	0.3	53.2	60	-6.8	60	54.6	(-1)
12 Jalibah Ave	1	S	51.8	55	-3.2	55	51.9	(-0)	57.3	60	-2.7	61.2	59.2	(-2)
12 Moolua Ave	1	N	50.7	55	-4.3	55	50.8	(-0)	56.2	60	-3.8	60	58	(-2)
12 Moolua Ave	2	N	54.2	55	-0.8	55.4	53.4	0.8	59.7	60	-0.3	62.7	60.7	(-1)
12 Moolua Ave	1	W	54.2	55	-0.8	56.4	54.4	(-0)	59.7	60	-0.3	63.6	61.6	(-2)
12 Moolua Ave	2	W	57.1	55	2.1	58.6	56.6	0.5	62.6	60	2.6	65.9	63.9	(-1)
12 Pontresina Ave	1	S	52.7	55	-2.3	55	52.5	0.2	58.2	60	-1.8	61.9	59.9	(-2)
12 Pontresina Ave	1	W	53	55	-2	55	52.7	0.3	58.5	60	-1.5	62	60	(-2)

Address	Floor	Dir	NIGHT						DAY					
			LAeq(9hr)	Criterion	Exceedance	Allowance	2007 Night	Increase/	LAeq(15hr)	Criterion	Exceedance	Allowance	2007 Day	Increase/
						Criteria	No Bypass	(- Decrease)				Criteria	No Bypass	(- Decrease)
12 Rose St	1	E	54.3	55	-0.7	57.3	55.3	(-1)	59.8	60	-0.2	63.9	61.9	(-2)
12 Rose St	2	E	57.6	55	2.6	60.5	58.5	(-1)	63.1	60	3.1	67.4	65.4	(-2)
12 Rose St	1	S	52.2	55	-2.8	55.7	53.7	(-2)	57.7	60	-2.3	62.6	60.6	(-3)
12 Rose St	2	S	54.7	55	-0.3	58.3	56.3	(-2)	60.2	60	0.2	65	63	(-3)
13 Flamingo Pl	1	N	45.3	55	-9.7	55	45.6	(-0)	50.9	60	-9.1	60	52.9	(-2)
13 Flamingo Pl	1	S	48.9	55	-6.1	55	48.4	0.5	54.4	60	-5.6	60	55.7	(-1)
13 Flamingo Pl	1	W	48.7	55	-6.3	55	48.4	0.3	54.3	60	-5.7	60	55.7	(-1)
13 Moolua Ave	1	W	54.5	55	-0.5	56.9	54.9	(-0)	60	60	0	64.1	62.1	(-2)
13 Rose St	1	E	53.2	55	-1.8	56.1	54.1	(-1)	58.7	60	-1.3	63.8	61.8	(-3)
13 Rose St	1	N	52.4	55	-2.6	55	52.9	(-1)	58	60	-2	62.7	60.7	(-3)
131 Kennedy Dr	1	S	50.2	55	-4.8	67.2	65.2	(-15)	55.8	60	-4.2	75.4	73.4	(-18)
14 Jalibah Ave	1	N	48.8	55	-6.2	55	48	0.8	54.4	60	-5.6	60	55.3	(-1)
14 Moolua Ave	1	W	54.6	55	-0.4	57	55	(-0)	60.2	60	0.2	64.3	62.3	(-2)
14 Moolua Ave	2	W	58.1	55	3.1	59.8	57.8	0.3	63.6	60	3.6	67	65	(-1)
14 Rose St	1	E	54.7	55	-0.3	57.7	55.7	(-1)	60.2	60	0.2	64.9	62.9	(-3)
14 Rose St	1	N	54.4	55	-0.6	56.9	54.9	(-1)	60	60	0	64.4	62.4	(-2)
15 Flamingo Pl	1	N	45	55	-10	55	45.4	(-0)	50.6	60	-9.4	60	52.7	(-2)
15 Flamingo Pl	1	S	48.8	55	-6.2	55	48.3	0.5	54.3	60	-5.7	60	55.6	(-1)
15 Moolua Ave	1	W	55	55	0	57.2	55.2	(-0)	60.5	60	0.5	64.5	62.5	(-2)
15 Rose St Unit 4-6	1	E	52.3	55	-2.7	55.5	53.5	(-1)	57.8	60	-2.2	63.1	61.1	(-3)
15 Rose St Unit 4-6	2	E	55	55	0	58.3	56.3	(-1)	60.6	60	0.6	65.8	63.8	(-3)
15 Rose St Units 1-3	1	E	52.1	55	-2.9	55.7	53.7	(-2)	57.6	60	-2.4	63.4	61.4	(-4)
15 Rose St Units 1-3	2	E	54.8	55	-0.2	58.5	56.5	(-2)	60.3	60	0.3	65.9	63.9	(-4)
16 Jalibah Ave	1	S	53.5	55	-1.5	55.6	53.6	(-0)	59	60	-1	63.3	61.3	(-2)
16 Jalibah Ave	1	W	52.4	55	-2.6	55	52.4	0.0	57.9	60	-2.1	61.9	59.9	(-2)
16 Minore Pl	1	N	45	55	-10	55	45.7	(-1)	50.6	60	-9.4	60	53	(-2)
16 Moolua Ave	1	W	54.9	55	-0.1	57.2	55.2	(-0)	60.4	60	0.4	64.5	62.5	(-2)
16 Rose St	1	E	51.9	55	-3.1	55	53	(-1)	57.5	60	-2.5	62.4	60.4	(-3)
17 Flamingo Pl	1	N	45.3	55	-9.7	55	45.5	(-0)	50.9	60	-9.1	60	52.8	(-2)
17 Flamingo Pl	1	S	49.2	55	-5.8	55	48.6	0.6	54.8	60	-5.2	60	56.1	(-1)

Address	Floor	Dir	NIGHT						DAY					
			L _{Aeq} (9hr)	Criterion	Exceedance	Allowance	2007 Night	Increase/	L _{Aeq} (15hr)	Criterion	Exceedance	Allowance	2007 Day	Increase/
						Criteria	No Bypass	(- Decrease)				Criteria	No Bypass	(- Decrease)
17 Moolua Ave	1	S	55.3	55	0.3	57.8	55.8	(-1)	60.9	60	0.9	64.6	62.6	(-2)
17 Moolua Ave	2	S	58.8	55	3.8	61.2	59.2	(-0)	64.4	60	4.4	68.3	66.3	(-2)
17 Moolua Ave	1	W	54.6	55	-0.4	56.8	54.8	(-0)	60.1	60	0.1	64.1	62.1	(-2)
17 Moolua Ave	2	W	58.3	55	3.3	60.3	58.3	0.0	63.8	60	3.8	67.6	65.6	(-2)
17 Rose St	1	E	49.9	55	-5.1	55	52.3	(-2)	55.5	60	-4.5	61.8	59.8	(-4)
18 Minore Pl	1	W	48.7	55	-6.3	55	47.9	0.8	54.2	60	-5.8	60	55.2	(-1)
18 Rose St	1	E	51.1	55	-3.9	55	52.4	(-1)	56.7	60	-3.3	61.7	59.7	(-3)
18 Rose St	1	S	49.2	55	-5.8	55	52	(-3)	54.8	60	-5.2	61.6	59.6	(-5)
19 Flamingo Pl	1	N	44.9	55	-10.1	55	45.2	(-0)	50.5	60	-9.5	60	52.5	(-2)
19 Flamingo Pl	1	S	48.8	55	-6.2	55	48.4	0.4	54.4	60	-5.6	60	55.7	(-1)
19 Minore Pl	1	NW	46.9	55	-8.1	55	47	(-0)	52.4	60	-7.6	60	54.3	(-2)
19 Rose St	1	E	50.2	55	-4.8	55.6	53.6	(-3)	55.8	60	-4.2	63.1	61.1	(-5)
2 Honeysuckle St	1	E	63.4	55	8.4	66.4	64.4	(-1)	69	60	9	73.2	71.2	(-2)
2 Honeysuckle St	1	N	61.7	55	6.7	64.4	62.4	(-1)	67.2	60	7.2	69.9	67.9	(-1)
2 Martel Pl	1	S	49.1	55	-5.9	55	48.7	0.4	54.6	60	-5.4	60	56	(-1)
2 Pontresina Ave	1	W	54.4	55	-0.6	57.4	55.4	(-1)	59.9	60	-0.1	64.5	62.5	(-3)
20 Minore Pl	1	NW	49.1	55	-5.9	55	48.6	0.5	54.6	60	-5.4	60	55.9	(-1)
20 Rose St	1	E	51	55	-4	55	52.7	(-2)	56.6	60	-3.4	62.1	60.1	(-4)
20 Rose St	1	N	51.1	55	-3.9	55	52.4	(-1)	56.7	60	-3.3	61.9	59.9	(-3)
21 Flamingo Pl	1	N	45.2	55	-9.8	55	45.1	0.1	50.8	60	-9.2	60	52.4	(-2)
21 Flamingo Pl	1	S	48.7	55	-6.3	55	48.2	0.5	54.3	60	-5.7	60	55.6	(-1)
21 Minore Pl	1	NW	48.4	55	-6.6	55	47.8	0.6	53.9	60	-6.1	60	55.1	(-1)
22 Kiata Pde	1	N	44.2	55	-10.8	55	44.5	(-0)	49.8	60	-10.2	60	51.8	(-2)
22 Kiata Pde	1	S	48.8	55	-6.2	55	47.6	1.2	54.3	60	-5.7	60	54.9	(-1)
22 Minore Pl	1	W	49.7	55	-5.3	55	49.2	0.5	55.1	60	-4.9	60	56.4	(-1)
22 Rose St	1	E	50.5	55	-4.5	55.8	53.8	(-3)	56.1	60	-3.9	63.3	61.3	(-5)
22 Rose St	1	N	50.1	55	-4.9	55	51.2	(-1)	55.7	60	-4.3	60.6	58.6	(-3)
24 Kiata Pde	1	S	49.9	55	-5.1	55	48.7	1.2	55.4	60	-4.6	60	56	(-1)
24 Parks Dve	1	N	46.1	55	-8.9	55	46.3	(-0)	51.7	60	-8.3	60	53.6	(-2)
24 Parks Dve	1	S	51.1	55	-3.9	55	50.9	0.2	56.6	60	-3.4	60.2	58.2	(-2)
24 Rose St	1	E	48.2	55	-6.8	55	51.8	(-4)	53.8	60	-6.2	61.3	59.3	(-6)

Address	Floor	Dir	NIGHT						DAY					
			L _{Aeq} (9hr)	Criterion	Exceedance	Allowance	2007 Night	Increase/	L _{Aeq} (15hr)	Criterion	Exceedance	Allowance	2007 Day	Increase/
						Criteria	No Bypass	(- Decrease)				Criteria	No Bypass	(- Decrease)
25 Kiata	1	N	46.5	55	-8.5	55	46.7	(-0)	52.1	60	-7.9	60	54	(-2)
26 Kiata Pde	1	S	50.5	55	-4.5	55	49.4	1.1	56	60	-4	60	56.6	(-1)
26 Parks Dve	1	N	46	55	-9	55	45.9	0.1	51.6	60	-8.4	60	53.2	(-2)
26 Parks Dve	1	S	51	55	-4	55	50.7	0.3	56.5	60	-3.5	60	58	(-2)
27 Kiata Pde	1	N	47.3	55	-7.7	55	47.4	(-0)	52.8	60	-7.2	60	54.6	(-2)
28 Kiata Pde	1	SW	50.9	55	-4.1	55	50.1	0.8	56.4	60	-3.6	60	57.4	(-1)
28 Parks Dve	1	N	44.5	55	-10.5	55	44.6	(-0)	50.1	60	-9.9	60	51.9	(-2)
28 Parks Dve	2	N	48.1	55	-6.9	55	47.5	0.6	53.7	60	-6.3	60	54.8	(-1)
28 Parks Dve	1	S	50.4	55	-4.6	55	50.1	0.3	55.9	60	-4.1	60	57.4	(-2)
28 Parks Dve	2	S	53.4	55	-1.6	55.2	53.2	0.2	58.9	60	-1.1	62.6	60.6	(-2)
29 Kiata Pde	1	N	48.5	55	-6.5	55	48.5	0.0	54	60	-6	60	55.8	(-2)
29 Kiata Pde	1	S	50.2	55	-4.8	55	49.1	1.1	55.7	60	-4.3	60	56.3	(-1)
3 Jalibah Ave	1	N	48.2	55	-6.8	55	47.5	0.7	53.7	60	-6.3	60	54.8	(-1)
3 Martel Pl	1	SW	49.5	55	-5.5	55	49.2	0.3	55	60	-5	60	56.5	(-2)
3 Pontresina Ave	1	W	54	55	-1	56.6	54.6	(-1)	59.5	60	-0.5	63.8	61.8	(-2)
3 Rose St	1	E	57.2	55	2.2	60.2	58.2	(-1)	62.7	60	2.7	68.9	66.9	(-4)
30 Kiata Pde	1	SW	51.3	55	-3.7	55	50.5	0.8	56.7	60	-3.3	60	57.8	(-1)
30 Parks Dve	1	N	45.9	55	-9.1	55	46	(-0)	51.4	60	-8.6	60	53.4	(-2)
30 Parks Dve	1	S	50.3	55	-4.7	55	50.2	0.1	55.8	60	-4.2	60	57.5	(-2)
31 Kiata Pde	1	N	48.3	55	-6.7	55	48.8	(-1)	53.8	60	-6.2	60	56.1	(-2)
31 Kiata Pde	1	S	50.5	55	-4.5	55	49.6	0.9	56.1	60	-3.9	60	56.9	(-1)
32 Kiata Pde	1	SW	51.2	55	-3.8	55	50.9	0.3	56.7	60	-3.3	60.1	58.1	(-1)
32 Parks Dve	1	S	50.2	55	-4.8	55	50	0.2	55.7	60	-4.3	60	57.4	(-2)
32 Parks Dve	2	S	52.8	55	-2.2	55	52.8	0.0	58.3	60	-1.7	62.4	60.4	(-2)
33 Kiata Pde	1	N	48.6	55	-6.4	55	49.8	(-1)	54.1	60	-5.9	60	57.1	(-3)
33 Kiata Pde	1	S	52	55	-3	55	51.7	0.3	57.5	60	-2.5	60.9	58.9	(-1)
33 Kiata Pde	1	W	51.5	55	-3.5	55	51.8	(-0)	57	60	-3	61	59	(-2)
34 Parks Dve	1	N	46	55	-9	55	45.8	0.2	51.6	60	-8.4	60	53.1	(-2)
34 Parks Dve	1	W	49.3	55	-5.7	55	49.3	0.0	54.9	60	-5.1	60	56.7	(-2)
34 Kiata Pde	1	SW	51.4	55	-3.6	55	51.7	(-0)	56.9	60	-3.1	60.9	58.9	(-2)
34 Meridian Way	1	W	48.3	55	-6.7	55	52.6	(-4)	53.9	60	-6.1	62.1	60.1	(-6)
35 Meridian Way	1	W	50.3	55	-4.7	55	51.8	(-2)	55.9	60	-4.1	61.2	59.2	(-3)

Address	Floor	Dir	NIGHT						DAY					
			L _{Aeq} (9hr)	Criterion	Exceedance	Allowance	2007 Night	Increase/	L _{Aeq} (15hr)	Criterion	Exceedance	Allowance	2007 Day	Increase/
						Criteria	No Bypass	(- Decrease)				Criteria	No Bypass	(- Decrease)
36 Kiata Pde	1	NW	47.8	55	-7.2	55	47.8	0.0	53.4	60	-6.6	60	55.1	(-2)
36 Meridian Way	1	W	50.3	55	-4.7	55	51.7	(-1)	55.9	60	-4.1	61.1	59.1	(-3)
37 Kiata Pde	1	S	53.4	55	-1.6	55.7	53.7	(-0)	58.9	60	-1.1	62.9	60.9	(-2)
37 Kiata Pde	1	W	53	55	-2	55.9	53.9	(-1)	58.5	60	-1.5	63.1	61.1	(-3)
37 Meridian Way	1	W	50.4	55	-4.6	55	51.9	(-2)	56.1	60	-3.9	61.2	59.2	(-3)
38 Kiata Pde	1	W	51.2	55	-3.8	55	51.7	(-1)	56.7	60	-3.3	61	59	(-2)
38 Meridian Way	1	W	50.4	55	-4.6	55	51.6	(-1)	56	60	-4	60.9	58.9	(-3)
4 Flamingo Pl Units 1-4	1	W	49.3	55	-5.7	55	49.4	(-0)	54.9	60	-5.1	60	56.7	(-2)
4 Flamingo Pl Units 1-4	2	W	53.1	55	-1.9	55	52.7	0.4	58.7	60	-1.3	62.1	60.1	(-1)
4 Flamingo Pl Units 12-15	1	N	46.4	55	-8.6	55	45.9	0.5	52	60	-8	60	53.2	(-1)
4 Flamingo Pl Units 5-8	1	N	46.5	55	-8.5	55	46	0.5	52.1	60	-7.9	60	53.3	(-1)
4 Flamingo Pl Units 5-8	1	W	48.5	55	-6.5	55	48.5	0.0	54.1	60	-5.9	60	55.7	(-2)
4 Flamingo Pl Units 9-11	1	N	46.5	55	-8.5	55	46	0.5	52.1	60	-7.9	60	53.3	(-1)
4 Honeysuckle St	1	E	62.1	55	7.1	65.1	63.1	(-1)	67.6	60	7.6	71.2	69.2	(-2)
4 Honeysuckle St	2	E	64	55	9	67.1	65.1	(-1)	69.5	60	9.5	72.9	70.9	(-1)
4 Honeysuckle St	1	N	61.5	55	6.5	64.8	62.8	(-1)	66.9	60	6.9	70.1	68.1	(-1)
4 Honeysuckle St	2	N	63.3	55	8.3	66.5	64.5	(-1)	68.8	60	8.8	71.6	69.6	(-1)
4 Honeysuckle St	1	S	56.2	55	1.2	62.5	60.5	(-4)	61.8	60	1.8	70.6	68.6	(-7)
4 Honeysuckle St	2	S	57.9	55	2.9	64.4	62.4	(-5)	63.5	60	3.5	72	70	(-7)
4 Jalibah Ave	1	N	46.9	55	-8.1	55	46.2	0.7	52.4	60	-7.6	60	53.5	(-1)
4 Jalibah Ave	1	S	50.2	55	-4.8	55	50.5	(-0)	55.7	60	-4.3	60	57.7	(-2)
4 Martel Pl	1	W	49.8	55	-5.2	55	49	0.8	55.3	60	-4.7	60	56.2	(-1)
4 Pontresina Ave	1	W	53.5	55	-1.5	55.9	53.9	(-0)	59	60	-1	63.1	61.1	(-2)
4 Rose St	1	E	58.8	55	3.8	61.8	59.8	(-1)	64.3	60	4.3	70.5	68.5	(-4)
4 Rose St	1	N	60.6	55	5.6	63.6	61.6	(-1)	66.1	60	6.1	72.2	70.2	(-4)
41 Kiata Pde	1	S	52	55	-3	55	52.6	(-1)	57.5	60	-2.5	61.8	59.8	(-2)

Address	Floor	Dir	NIGHT						DAY					
			LAeq(9hr)	Criterion	Exceedance	Allowance	2007 Night	Increase/	LAeq(15hr)	Criterion	Exceedance	Allowance	2007 Day	Increase/
						Criteria	No Bypass	(- Decrease)				Criteria	No Bypass	(- Decrease)
41 Kiata Pde	1	W	53.8	55	-1.2	58.2	56.2	(-2)	59.3	60	-0.7	65.5	63.5	(-4)
42 Kiata Pde	1	W	51.5	55	-3.5	55	51.9	(-0)	57	60	-3	61.2	59.2	(-2)
42 Kiata Pde	2	W	54.8	55	-0.2	56.5	54.5	0.3	60.2	60	0.2	63.8	61.8	(-2)
43 Kiata Pde	1	W	51.9	55	-3.1	55.9	53.9	(-2)	57.4	60	-2.6	63.1	61.1	(-4)
44 Kiata Pde	1	N	50.4	55	-4.6	55	50.4	0.0	55.8	60	-4.2	60	57.6	(-2)
44 Kiata Pde	1	W	51.9	55	-3.1	55	52.1	(-0)	57.3	60	-2.7	61.4	59.4	(-2)
45 Kiata Pde	1	W	52.6	55	-2.4	56.6	54.6	(-2)	58.1	60	-1.9	63.7	61.7	(-4)
46 Kiata Pde	1	SW	51.5	55	-3.5	55	51.4	0.1	56.9	60	-3.1	60.6	58.6	(-2)
47 Kiata Pde	1	W	52.3	55	-2.7	56.2	54.2	(-2)	57.8	60	-2.2	63.4	61.4	(-4)
48 Kiata Pde	1	N	50.1	55	-4.9	55	49.6	0.5	55.6	60	-4.4	60	56.8	(-1)
49 Kiata Pde	1	W	52	55	-3	56.2	54.2	(-2)	57.5	60	-2.5	63.4	61.4	(-4)
5 Flamingo Pl	1	W	50.5	55	-4.5	55	49.7	0.8	56	60	-4	60	57	(-1)
5 Honeysuckle St	1	E	63.3	55	8.3	67	65	(-2)	68.8	60	8.8	72.1	70.1	(-1)
5 Honeysuckle St	1	N	63.2	55	8.2	67	65	(-2)	68.9	60	8.9	72.2	70.2	(-1)
5 Jalibah Ave	1	N	48.4	55	-6.6	55	47.8	0.6	53.9	60	-6.1	60	55.1	(-1)
5 Martel Pl	1	NW	49.7	55	-5.3	55	49	0.7	55.2	60	-4.8	60	56.3	(-1)
5 Pontresina Ave	1	W	53	55	-2	55.3	53.3	(-0)	58.5	60	-1.5	62.5	60.5	(-2)
5 Rose St	1	E	55.9	55	0.9	58.7	56.7	(-1)	61.4	60	1.4	67	65	(-4)
50 Kiata Pde	1	N	48.7	55	-6.3	55	48.6	0.1	54.2	60	-5.8	60	55.9	(-2)
51 Kiata Pde	1	W	53	55	-2	58.5	56.5	(-4)	58.5	60	-1.5	65.9	63.9	(-5)
52 Kiata Pde	1	N	48	55	-7	55	48.2	(-0)	53.5	60	-6.5	60	55.5	(-2)
53 Kiata Pde	1	W	52.3	55	-2.7	57.6	55.6	(-3)	57.7	60	-2.3	65	63	(-5)
54 Kiata Pde	1	N	47.3	55	-7.7	55	47.7	(-0)	52.9	60	-7.1	60	55	(-2)
55 Kiata Pde	1	W	53.1	55	-1.9	57.8	55.8	(-3)	58.5	60	-1.5	65.2	63.2	(-5)
57 Kiata Pde	1	W	53.6	55	-1.4	57.9	55.9	(-2)	59	60	-1	65.3	63.3	(-4)
59 Kiata Pde	1	W	53.8	55	-1.2	57.5	55.5	(-2)	59.2	60	-0.8	64.7	62.7	(-4)
6 Honeysuckle St	1	E	54.5	55	-0.5	58.4	56.4	(-2)	59.9	60	-0.1	65	63	(-3)
6 Honeysuckle St	2	E	57.2	55	2.2	61.1	59.1	(-2)	62.7	60	2.7	67.8	65.8	(-3)
6 Honeysuckle St	1	N	58.2	55	3.2	61.4	59.4	(-1)	63.6	60	3.6	67.5	65.5	(-2)

Address	Floor	Dir	NIGHT						DAY					
			L _{Aeq} (9hr)	Criterion	Exceedance	Allowance	2007 Night	Increase/	L _{Aeq} (15hr)	Criterion	Exceedance	Allowance	2007 Day	Increase/
						Criteria	No Bypass	(- Decrease)				Criteria	No Bypass	(- Decrease)
6 Honeysuckle St	2	N	60.3	55	5.3	63.7	61.7	(-1)	65.8	60	5.8	70	68	(-2)
6 Honeysuckle St	1	S	53.3	55	-1.7	58.8	56.8	(-4)	58.9	60	-1.1	67.2	65.2	(-6)
6 Honeysuckle St	2	S	55.1	55	0.1	61	59	(-4)	60.7	60	0.7	68.8	66.8	(-6)
6 Jalibah Ave	1	N	47.3	55	-7.7	55	46.8	0.5	52.9	60	-7.1	60	54.1	(-1)
6 Jalibah Ave	1	S	50.6	55	-4.4	55	50.8	(-0)	56.2	60	-3.8	60	58	(-2)
6 Martel Pl	1	N	47.6	55	-7.4	55	47.9	(-0)	53.1	60	-6.9	60	55.2	(-2)
6 Pontresina Ave	1	W	51.6	55	-3.4	55	51.1	0.5	57.1	60	-2.9	60.3	58.3	(-1)
6 Rose St	1	E	55.5	55	0.5	58.3	56.3	(-1)	61	60	1	66.6	64.6	(-4)
6 Rose St	1	N	57.3	55	2.3	60.2	58.2	(-1)	62.8	60	2.8	68.8	66.8	(-4)
6 Rose St	1	S	54.5	55	-0.5	57.1	55.1	(-1)	60	60	0	64.4	62.4	(-2)
61 Kiata Pde	1	W	53.5	55	-1.5	57.1	55.1	(-2)	58.9	60	-1.1	64.3	62.3	(-3)
63 Kiata Pde	1	S	52.5	55	-2.5	55.3	53.3	(-1)	58	60	-2	62.5	60.5	(-3)
63 Kiata Pde	1	SW	53.2	55	-1.8	58.3	56.3	(-3)	58.7	60	-1.3	65.8	63.8	(-5)
63 Kiata Pde	1	W	54.1	55	-0.9	60.8	58.8	(-5)	59.5	60	-0.5	68.7	66.7	(-7)
65 Kiata Pde	1	W	50.2	55	-4.8	55	53	(-3)	55.7	60	-4.3	62.2	60.2	(-5)
65 Kiata Pde	1	W	50.5	55	-4.5	55	52.6	(-2)	56	60	-4	61.8	59.8	(-4)
67 Kiata Pde	1	N	48.3	55	-6.7	55	50.8	(-3)	53.8	60	-6.2	60.7	58.7	(-5)
67 Kiata Pde	1	S	50.9	55	-4.1	55	50.2	0.7	56.3	60	-3.7	60	57.5	(-1)
69 Kiata Pde	1	N	47.7	55	-7.3	55	50.3	(-3)	53.2	60	-6.8	60	58	(-5)
69 Kiata Pde	1	S	50.8	55	-4.2	55	49.6	1.2	56.2	60	-3.8	60	56.9	(-1)
7 Flamingo Pl	1	NW	49.2	55	-5.8	55	48.3	0.9	54.7	60	-5.3	60	55.5	(-1)
7 Flamingo Pl	2	NW	52.6	55	-2.4	55	51.1	1.5	58.1	60	-1.9	60.3	58.3	(-0)
7 Honeysuckle St	1	N	58.3	55	3.3	61.2	59.2	(-1)	63.8	60	3.8	67.5	65.5	(-2)
7 Honeysuckle St	1	S	55.9	55	0.9	59.3	57.3	(-1)	61.4	60	1.4	65.5	63.5	(-2)
7 Jalibah Ave	1	N	48.9	55	-6.1	55	48.4	0.5	54.5	60	-5.5	60	55.7	(-1)
7 Jalibah Ave	1	S	55.6	55	0.6	57.9	55.9	(-0)	61.2	60	1.2	65.7	63.7	(-3)
7 Jalibah Ave	1	W	54.7	55	-0.3	57	55	(-0)	60.2	60	0.2	64.5	62.5	(-2)
7 Martel Pl	1	N	49.3	55	-5.7	55	49	0.3	54.7	60	-5.3	60	56.2	(-2)
7 Pontresina Ave	1	NW	49.2	55	-5.8	55	48.5	0.7	54.7	60	-5.3	60	55.8	(-1)

Address	Floor	Dir	NIGHT						DAY					
			LAeq(9hr)	Criterion	Exceedance	Allowance	2007 Night	Increase/	LAeq(15hr)	Criterion	Exceedance	Allowance	2007 Day	Increase/
						Criteria	No Bypass	(- Decrease)				Criteria	No Bypass	(- Decrease)
7 Pontresina Ave	1	SW	51.6	55	-3.4	55	51	0.6	57.1	60	-2.9	60.3	58.3	(-1)
7 Rose St	1	E	54.4	55	-0.6	57.1	55.1	(-1)	59.9	60	-0.1	65.2	63.2	(-3)
71 Kiata Pde	1	N	46.9	55	-8.1	55	48.7	(-2)	52.4	60	-7.6	60	55.9	(-4)
71 Kiata Pde	1	S	50.2	55	-4.8	55	49	1.2	55.7	60	-4.3	60	56.3	(-1)
73 Kiata Pde	1	N	46.9	55	-8.1	55	48.3	(-1)	52.4	60	-7.6	60	55.6	(-3)
73 Kiata Pde	1	S	49.5	55	-5.5	55	48.3	1.2	55	60	-5	60	55.5	(-1)
74 Ducati St	1	W	53.3	55	-1.7	55.3	53.3	0.0	58.9	60	-1.1	63.2	61.2	(-2)
76 Ducati St	1	W	53.7	55	-1.3	55.7	53.7	0.0	59.2	60	-0.8	63.5	61.5	(-2)
78 Ducati St	1	W	53.8	55	-1.2	55.8	53.8	0.0	59.3	60	-0.7	63.7	61.7	(-2)
78 Ducati St	2	W	54.8	55	-0.2	57.9	55.9	(-1)	60.4	60	0.4	65.1	63.1	(-3)
79 Ducati St	1	SW	49.1	55	-5.9	55	49.2	(-0)	54.6	60	-5.4	60	56.5	(-2)
8 Flamingo Pl	1	N	46	55	-9	55	45.6	0.4	51.5	60	-8.5	60	52.9	(-1)
8 Honeysuckle St	1	N	56.8	55	1.8	59.6	57.6	(-1)	62.2	60	2.2	66.2	64.2	(-2)
8 Honeysuckle St	2	N	58.9	55	3.9	62.2	60.2	(-1)	64.4	60	4.4	68.8	66.8	(-2)
8 Honeysuckle St	1	S	49.6	55	-5.4	55.8	53.8	(-4)	55.1	60	-4.9	63.8	61.8	(-7)
8 Honeysuckle St	2	S	52.6	55	-2.4	58.5	56.5	(-4)	58.2	60	-1.8	66	64	(-6)
8 Jalibah Ave	1	N	47.4	55	-7.6	55	46.8	0.6	53	60	-7	60	54.1	(-1)
8 Jalibah Ave	1	S	50.9	55	-4.1	55	51	(-0)	56.4	60	-3.6	60.2	58.2	(-2)
8 Kiata Pde	1	N	49.3	55	-5.7	55	49.7	(-0)	54.7	60	-5.3	60	56.9	(-2)
8 Kiata Pde	1	W	51.2	55	-3.8	55	51.7	(-1)	56.6	60	-3.4	60.9	58.9	(-2)
8 Pontresina Ave	1	W	51.1	55	-3.9	55	50.4	0.7	56.6	60	-3.4	60	57.6	(-1)
8 Rose St	1	E	55.6	55	0.6	58	56	(-0)	61.1	60	1.1	65.3	63.3	(-2)
8 Rose St	1	N	53.6	55	-1.4	55.7	53.7	(-0)	59.1	60	-0.9	63.1	61.1	(-2)
80 Ducati St	1	W	53.9	55	-1.1	56	54	(-0)	59.5	60	-0.5	63.8	61.8	(-2)
81 Ducati St	1	S	54	55	-1	56.1	54.1	(-0)	59.6	60	-0.4	64.2	62.2	(-3)
81 Ducati St	1	W	53.8	55	-1.2	55.9	53.9	(-0)	59.4	60	-0.6	63.9	61.9	(-3)
82 Caloola Dve	1	N	48.8	55	-6.2	55	49.9	(-1)	54.3	60	-5.7	60	57.4	(-3)
82 Ducati St	1	W	53.9	55	-1.1	56.2	54.2	(-0)	59.4	60	-0.6	64	62	(-3)
82 Ducati St	2	W	55.2	55	0.2	58.5	56.5	(-1)	60.8	60	0.8	65.7	63.7	(-3)

Address	Floor	Dir	NIGHT						DAY					
			LAeq(9hr)	Criterion	Exceedance	Allowance	2007 Night	Increase/	LAeq(15hr)	Criterion	Exceedance	Allowance	2007 Day	Increase/
						Criteria	No Bypass	(- Decrease)				Criteria	No Bypass	(- Decrease)
84 Caloola Dve	1	S	50.3	55	-4.7	55	49.8	0.5	55.7	60	-4.3	60	57.1	(-1)
84 Ducati St	1	W	53.9	55	-1.1	56.5	54.5	(-1)	59.5	60	-0.5	64	62	(-3)
86 Ducati St	1	W	54.1	55	-0.9	56.8	54.8	(-1)	59.7	60	-0.3	64.3	62.3	(-3)
88 Caloola Dve	1	NW	49.1	55	-5.9	55	48.8	0.3	54.6	60	-5.4	60	56	(-1)
88 Ducati St	1	W	53.8	55	-1.2	56.7	54.7	(-1)	59.4	60	-0.6	64.1	62.1	(-3)
9 Flamingo Pl	1	N	47.5	55	-7.5	55	46.7	0.8	53	60	-7	60	54	(-1)
9 Flamingo Pl	2	N	50.8	55	-4.2	55	49.5	1.3	56.3	60	-3.7	60	56.7	(-0)
9 Jalibah Ave	1	N	49.2	55	-5.8	55	48.6	0.6	54.7	60	-5.3	60	55.9	(-1)
9 Jalibah Ave	1	S	55.3	55	0.3	57.5	55.5	(-0)	60.8	60	0.8	65.3	63.3	(-3)
9 Pontresina Ave	1	W	52	55	-3	55	51.5	0.5	57.5	60	-2.5	60.7	58.7	(-1)
9 Rose St	1	E	53.7	55	-1.3	56.4	54.4	(-1)	59.3	60	-0.7	64.4	62.4	(-3)
90 Ducati St	1	W	53.9	55	-1.1	57.1	55.1	(-1)	59.4	60	-0.6	64.6	62.6	(-3)
92 Ducati St	1	W	54.1	55	-0.9	57.6	55.6	(-2)	59.7	60	-0.3	65.2	63.2	(-4)
94 Ducati St	1	W	54.3	55	-0.7	58.1	56.1	(-2)	59.8	60	-0.2	65.8	63.8	(-4)
95 Ducati St	1	W	57.8	55	2.8	60.2	58.2	(-0)	63.4	60	3.4	67.2	65.2	(-2)
96 Ducati St	1	W	54.5	55	-0.5	59.3	57.3	(-3)	60.1	60	0.1	66.9	64.9	(-5)
98 Ducati St	1	W	54.1	55	-0.9	59.1	57.1	(-3)	59.7	60	-0.3	66.7	64.7	(-5)
99 Ducati St	1	W	56.2	55	1.2	58.9	56.9	(-1)	61.8	60	1.8	65.5	63.5	(-2)
Caravan Worst Affected	1	E	55.6	55	0.6	58.2	56.2	(-1)	61.1	60	1.1	67	65	(-4)
Caravan Worst Affected	1	N	55.2	55	0.2	57.6	55.6	(-0)	60.7	60	0.7	66.5	64.5	(-4)
Ducati St Shops	1	W	54.9	55	-0.1	62.7	60.7	(-6)	60.5	60	0.5	70.2	68.2	(-8)
Kennedy Dr 'B'	1	S	53.6	55	-1.4	69.9	67.9	(-14)	59.2	60	-0.8	78.7	76.7	(-18)
Kennedy Dr 'C'	1	S	51.4	55	-3.6	67.5	65.5	(-14)	57	60	-3	75.8	73.8	(-17)
Kennedy Drive 'A'	1	E	57.7	55	2.7	64.8	62.8	(-5)	63.3	60	3.3	72.7	70.7	(-7)
Kennedy Drive 'A'	2	E	59	55	4	66.3	64.3	(-5)	64.6	60	4.6	73.8	71.8	(-7)
Kennedy Drive 'A'	1	N	52.8	55	-2.2	57.3	55.3	(-3)	58.3	60	-1.7	65.4	63.4	(-5)
Kennedy Drive 'A'	2	N	55.4	55	0.4	59.9	57.9	(-3)	61	60	1	67.3	65.3	(-4)
Kennedy Drive 'A'	1	S	53.7	55	-1.3	67.5	65.5	(-12)	59.3	60	-0.7	75.8	73.8	(-15)

Address	Floor	Dir	NIGHT						DAY					
			L _{Aeq} (9hr)	Criterion	Exceedance	Allowance	2007 Night	Increase/	L _{Aeq} (15hr)	Criterion	Exceedance	Allowance	2007 Day	Increase/
						Criteria	No Bypass	(- Decrease)				Criteria	No Bypass	(- Decrease)
Kennedy Drive 'A'	2	S	54.9	55	-0.1	68.8	66.8	(-12)	60.5	60	0.5	77	75	(-15)
Service Station - BP	1	S	57.3	55	2.3	68	66	(-9)	62.8	60	2.8	76.7	74.7	(-12)
			# exceed Night Base Criteria						# exceed Day Base Criteria					
			32						42					
			# exceed Night Allowance Criteria						# exceed Day Allowance Criteria					
			0						0					
			No. of Residences Acute >60 dB(A) Night						No. of Residences Acute >65 dB(A) Day					
			6						6					

Appendix J

Predicted Traffic Noise Levels in NSW, 2007, with Tugun Bypass (Mitigation)

Appendix J:

Table J1: Predicted Traffic Noise Levels in NSW, 2007, with Tugun Bypass (With Mitigation).

Name	Floor	Dir	NIGHT						DAY					
			LAeq(9hour)	Base	Exceedance	2007 Night	Allowance	Increase/	LAeq(15hr)	Base	Exceedance	2007 Day	Allowance	Increase/
			dB(A)	Criteria	amount	No Bypass	Criteria	(- Decrease)	dB(A)	Criteria	amount	No Bypass	Criteria	(- Decrease)
1 Banksia St	1	E	52.9	55	-	65.9	67.9	(-13)	58.5	60	-	71.5	73.5	(-13)
	2		55.6	55	0.6	67.1	69.1	(-12)	61.1	60	1.1	73.5	75.5	(-12)
1 Banksia St	1	N	54.1	55	-	65.8	67.8	(-12)	59.6	60	-	72.8	74.8	(-13)
	2		56.3	55	1.3	67.1	69.1	(-11)	61.9	60	1.9	74.6	76.6	(-13)
1 Jalibah Ave	1	N	48	55	-	47.4	55	0.6	53.4	60	-	54.7	60	(-1)
1 Martel Pl	1	N	49.6	55	-	48.7	55	0.9	55	60	-	55.9	60	(-1)
1 Pontresina Ave	1	S	53.7	55	-	54.2	56.2	(-1)	59.2	60	-	61.4	63.4	(-2)
1 Pontresina Ave	1	W	54.2	55	-	55.4	57.4	(-1)	59.7	60	-	62.6	64.6	(-3)
1 Rose St	1	E	52.9	55	-	59.5	61.5	(-7)	58.3	60	-	68.2	70.2	(-10)
1 Rose St	1	N	54.4	55	-	59.4	61.4	(-5)	59.7	60	-	68.1	70.1	(-8)
1/1&2 Flamingo Pl	1	W	49.8	55	-	49	55	0.8	55.3	60	-	56.2	60	(-1)
	2		53.3	55	-	51.8	55	1.5	58.7	60	-	59	61	(-0)
1/10 Flamingo	1	W	49.4	55	-	49.2	55	0.2	54.9	60	-	56.5	60	(-2)
1/3 Flamingo Pl	1	S	52.2	55	-	52.2	55	0.0	57.7	60	-	59.5	61.5	(-2)
	2		54.5	55	-	54.5	56.5	0.0	60	60	-	62	64	(-2)
1/4 Flamingo Pl	1	S	52.7	55	-	53	55	(-0)	58.2	60	-	60.5	62.5	(-2)
	2		54.7	55	-	54.6	56.6	0.1	60.2	60	0.2	62	64	(-2)
1/5 Flamingo Pl	1	S	52.9	55	-	53	55	(-0)	58.4	60	-	60.4	62.4	(-2)
	2		55.2	55	0.2	54.7	56.7	0.5	60.7	60	0.7	62.1	64.1	(-1)
1/6 Flamingo	1	W	50.9	55	-	50.3	55	0.6	56.4	60	-	57.5	60	(-1)
1/7 Flamingo	1	W	50.9	55	-	50.4	55	0.5	56.4	60	-	57.6	60	(-1)
1/8 Flamingo	1	N	49.1	55	-	48.5	55	0.6	54.5	60	-	55.8	60	(-1)
1/8 Flamingo	1	W	50.9	55	-	50.4	55	0.5	56.4	60	-	57.7	60	(-1)
1/9 Flamingo	1	W	50	55	-	49.4	55	0.6	55.5	60	-	56.7	60	(-1)
	2		53.6	55	-	52.1	55	1.5	59	60	-	59.3	61.3	(-0)
10 Flamingo Pl	1	N	46.1	55	-	45.4	55	0.7	51.5	60	-	52.8	60	(-1)

Name	Floor	Dir	NIGHT						DAY					
			L _{Aeq} (9hour)	Base	Exceedance	2007 Night	Allowance	Increase/	L _{Aeq} (15hr)	Base	Exceedance	2007 Day	Allowance	Increase/
			dB(A)	Criteria	amount	No Bypass	Criteria	(- Decrease)	dB(A)	Criteria	amount	No Bypass	Criteria	(- Decrease)
10 Jalibah Ave	1	N	47.1	55	-	46.9	55	0.2	52.6	60	-	54.3	60	(-2)
10 Jalibah Ave	1	S	50.9	55	-	51.3	55	(-0)	56.4	60	-	58.7	60.7	(-2)
10 Pontresina Ave	1	W	52.4	55	-	52	55	0.4	57.8	60	-	59.2	61.2	(-1)
10 Rose St	1	E	50	55	-	55.6	57.6	(-6)	55.4	60	-	62.9	64.9	(-8)
	2		52.4	55	-	60.1	62.1	(-8)	57.8	60	-	67.2	69.2	(-9)
10 Rose St	1	N	49.4	55	-	54.2	56.2	(-5)	54.8	60	-	61.6	63.6	(-7)
	2		53.2	55	-	58.6	60.6	(-5)	58.6	60	-	65.8	67.8	(-7)
101 Ducati St	1	W	57.3	55	2.3	59.3	61.3	(-2)	62.9	60	2.9	66.2	68.2	(-3)
103 Ducati St	1	W	56.2	55	1.2	57.9	59.9	(-2)	61.7	60	1.7	64.9	66.9	(-3)
105 Ducati St	1	W	55.6	55	0.6	57.4	59.4	(-2)	61.2	60	1.2	64.5	66.5	(-3)
107 Ducati St	1	W	56.5	55	1.5	58.7	60.7	(-2)	62	60	2	65.4	67.4	(-3)
11 Jalibah Ave	1	N	49.3	55	-	49	55	0.3	54.8	60	-	56.3	60	(-2)
11 Jalibah Ave	1	S	54.4	55	-	55.6	57.6	(-1)	59.8	60	-	63.2	65.2	(-3)
11 Jalibah Ave	1	W	53.4	55	-	54.5	56.5	(-1)	58.9	60	-	61.9	63.9	(-3)
11 Moolau Ave	1	N	51.2	55	-	50.7	55	0.5	56.7	60	-	57.9	60	(-1)
11 Moolau Ave	1	W	53.6	55	-	54.2	56.2	(-1)	59.1	60	-	61.7	63.7	(-3)
11 Pontresina Ave	1	W	52.6	55	-	52.2	55	0.4	58	60	-	59.4	61.4	(-1)
11 Rose St	1	E	49.3	55	-	54	56	(-5)	54.7	60	-	61.8	63.8	(-7)
	2		51.5	55	-	56.8	58.8	(-5)	56.9	60	-	64.4	66.4	(-8)
11 Rose St	1	S	45.8	55	-	51.3	55	(-6)	51.2	60	-	58.3	60.3	(-7)
	2		48.5	55	-	53.9	55.9	(-5)	53.9	60	-	60.8	62.8	(-7)
12 Flamingo	1	N	44.8	55	-	44.8	55	0.0	50.2	60	-	52.1	60	(-2)
12 Jalibah Ave	1	N	47.5	55	-	47.3	55	0.2	53	60	-	54.6	60	(-2)
12 Jalibah Ave	1	S	51.5	55	-	51.9	55	(-0)	57	60	-	59.2	61.2	(-2)
12 Moolua Ave	1	N	50.7	55	-	50.8	55	(-0)	56.2	60	-	58	60	(-2)
	2		54.2	55	-	53.4	55.4	0.8	59.7	60	-	60.7	62.7	(-1)
12 Moolua Ave	1	W	54	55	-	54.4	56.4	(-0)	59.5	60	-	61.6	63.6	(-2)
	2		57	55	2	56.6	58.6	0.4	62.4	60	2.4	63.9	65.9	(-2)
12 Pontresina Ave	1	S	52.4	55	-	52.5	55	(-0)	57.9	60	-	59.9	61.9	(-2)
12 Pontresina Ave	1	W	52.9	55	-	52.7	55	0.2	58.4	60	-	60	62	(-2)

Name	Floor	Dir	NIGHT						DAY					
			LAeq(9hour)	Base	Exceedance	2007 Night	Allowance	Increase/	LAeq(15hr)	Base	Exceedance	2007 Day	Allowance	Increase/
			dB(A)	Criteria	amount	No Bypass	Criteria	(- Decrease)	dB(A)	Criteria	amount	No Bypass	Criteria	(- Decrease)
12 Rose St	1	E	49	55	-	55.3	57.3	(-6)	54.4	60	-	61.9	63.9	(-8)
	2		51.2	55	-	58.5	60.5	(-7)	56.5	60	-	65.4	67.4	(-9)
12 Rose St	1	S	46.8	55	-	53.7	55.7	(-7)	52.3	60	-	60.6	62.6	(-8)
	2		49.3	55	-	56.3	58.3	(-7)	54.8	60	-	63	65	(-8)
13 Flamingo Pl	1	N	45.4	55	-	45.6	55	(-0)	50.8	60	-	52.9	60	(-2)
13 Flamingo Pl	1	S	48.7	55	-	48.4	55	0.3	54.2	60	-	55.7	60	(-2)
13 Flamingo Pl	1	W	48.6	55	-	48.4	55	0.2	54.1	60	-	55.7	60	(-2)
13 Moolua Ave	1	W	54.3	55	-	54.9	56.9	(-1)	59.8	60	-	62.1	64.1	(-2)
13 Rose St	1	E	49.2	55	-	54.1	56.1	(-5)	54.6	60	-	61.8	63.8	(-7)
13 Rose St	1	N	48.7	55	-	52.9	55	(-4)	54.2	60	-	60.7	62.7	(-7)
131 Kennedy Dr	1	S	48.3	55	-	65.2	67.2	(-17)	53.8	60	-	73.4	75.4	(-20)
14 Jalibah Ave	1	N	48.8	55	-	48	55	0.8	54.3	60	-	55.3	60	(-1)
14 Moolua Ave	1	W	54.5	55	-	55	57	(-1)	60	60	-	62.3	64.3	(-2)
	2		57.9	55	2.9	57.8	59.8	0.1	63.3	60	3.3	65	67	(-2)
14 Rose St	1	E	49.3	55	-	55.7	57.7	(-6)	54.7	60	-	62.9	64.9	(-8)
14 Rose St	1	N	49.5	55	-	54.9	56.9	(-5)	54.9	60	-	62.4	64.4	(-8)
15 Flamingo Pl	1	N	45.2	55	-	45.4	55	(-0)	50.6	60	-	52.7	60	(-2)
15 Flamingo Pl	1	S	48.6	55	-	48.3	55	0.3	54.1	60	-	55.6	60	(-2)
15 Moolua Ave	1	W	54.8	55	-	55.2	57.2	(-0)	60.3	60	0.3	62.5	64.5	(-2)
15 Rose St Unit 4-6	1	E	48.5	55	-	53.5	55.5	(-5)	53.9	60	-	61.1	63.1	(-7)
	2		50.6	55	-	56.3	58.3	(-6)	56	60	-	63.8	65.8	(-8)
15 Rose St Units 1-3	1	E	48.3	55	-	53.7	55.7	(-5)	53.7	60	-	61.4	63.4	(-8)
	2		50.5	55	-	56.5	58.5	(-6)	55.9	60	-	63.9	65.9	(-8)
16 Jalibah Ave	1	S	53	55	-	53.6	55.6	(-1)	58.5	60	-	61.3	63.3	(-3)
16 Jalibah Ave	1	W	52.1	55	-	52.4	55	(-0)	57.6	60	-	59.9	61.9	(-2)
16 Minore Pl	1	N	45.3	55	-	45.7	55	(-0)	50.6	60	-	53	60	(-2)
16 Moolua Ave	1	W	54.7	55	-	55.2	57.2	(-1)	60.3	60	0.3	62.5	64.5	(-2)
16 Rose St	1	E	48.2	55	-	53	55	(-5)	53.7	60	-	60.4	62.4	(-7)
17 Flamingo Pl	1	N	45.5	55	-	45.5	55	0.0	50.9	60	-	52.8	60	(-2)
17 Flamingo Pl	1	S	49	55	-	48.6	55	0.4	54.6	60	-	56.1	60	(-2)
17 Moolua Ave	1	S	54.3	55	-	55.8	57.8	(-2)	59.8	60	-	62.6	64.6	(-3)

Name	Floor	Dir	NIGHT						DAY					
			LAeq(9hour) dB(A)	Base Criteria	Exceedance amount	2007 Night No Bypass	Allowance Criteria	Increase/ (- Decrease)	LAeq(15hr) dB(A)	Base Criteria	Exceedance amount	2007 Day No Bypass	Allowance Criteria	Increase/ (- Decrease)
	2		58.2	55	3.2	59.2	61.2	(-1)	63.7	60	3.7	66.3	68.3	(-3)
17 Moolua Ave	1	W	54.4	55	-	54.8	56.8	(-0)	59.9	60	-	62.1	64.1	(-2)
	2		58	55	3	58.3	60.3	(-0)	63.5	60	3.5	65.6	67.6	(-2)
17 Rose St	1	E	46.7	55	-	52.3	55	(-6)	52.2	60	-	59.8	61.8	(-8)
18 Minore Pl	1	W	48.7	55	-	47.9	55	0.8	54.2	60	-	55.2	60	(-1)
18 Rose St	1	E	48	55	-	52.4	55	(-4)	53.5	60	-	59.7	61.7	(-6)
18 Rose St	1	S	46.7	55	-	52	55	(-5)	52.2	60	-	59.6	61.6	(-7)
19 Flamingo Pl	1	N	45.1	55	-	45.2	55	(-0)	50.4	60	-	52.5	60	(-2)
19 Flamingo Pl	1	S	48.6	55	-	48.4	55	0.2	54.2	60	-	55.7	60	(-2)
19 Minore Pl	1	NW	47.1	55	-	47	55	0.1	52.5	60	-	54.3	60	(-2)
19 Rose St	1	E	47.2	55	-	53.6	55.6	(-6)	52.6	60	-	61.1	63.1	(-9)
2 Honeysuckle St	1	E	55.6	55	0.6	64.4	66.4	(-9)	60.8	60	0.8	71.2	73.2	(-10)
2 Honeysuckle St	1	N	53.5	55	-	62.4	64.4	(-9)	58.7	60	-	67.9	69.9	(-9)
2 Martel Pl	1	S	49.3	55	-	48.7	55	0.6	54.7	60	-	56	60	(-1)
2 Pontresina Ave	1	W	54.3	55	-	55.4	57.4	(-1)	59.8	60	-	62.5	64.5	(-3)
20 Minore Pl	1	NW	49.3	55	-	48.6	55	0.7	54.7	60	-	55.9	60	(-1)
20 Rose St	1	E	48	55	-	52.7	55	(-5)	53.5	60	-	60.1	62.1	(-7)
20 Rose St	1	N	47.8	55	-	52.4	55	(-5)	53.3	60	-	59.9	61.9	(-7)
21 Flamingo Pl	1	N	45.4	55	-	45.1	55	0.3	50.8	60	-	52.4	60	(-2)
21 Flamingo Pl	1	S	48.6	55	-	48.2	55	0.4	54.1	60	-	55.6	60	(-2)
21 Minore Pl	1	NW	48.6	55	-	47.8	55	0.8	54	60	-	55.1	60	(-1)
22 Kiata Pde	1	N	44.2	55	-	44.5	55	(-0)	49.8	60	-	51.8	60	(-2)
22 Kiata Pde	1	S	48.8	55	-	47.6	55	1.2	54.2	60	-	54.9	60	(-1)
22 Minore Pl	1	W	49.8	55	-	49.2	55	0.6	55.2	60	-	56.4	60	(-1)
22 Rose St	1	E	48.1	55	-	53.8	55.8	(-6)	53.6	60	-	61.3	63.3	(-8)
22 Rose St	1	N	47.3	55	-	51.2	55	(-4)	52.8	60	-	58.6	60.6	(-6)
24 Kiata Pde	1	S	49.8	55	-	48.7	55	1.1	55.3	60	-	56	60	(-1)
24 Parks Dve	1	N	46	55	-	46.3	55	(-0)	51.6	60	-	53.6	60	(-2)
24 Parks Dve	1	S	50.8	55	-	50.9	55	(-0)	56.3	60	-	58.2	60.2	(-2)
24 Rose St	1	E	46.4	55	-	51.8	55	(-5)	51.8	60	-	59.3	61.3	(-8)
25 Kiata	1	N	46.8	55	-	46.7	55	0.1	52.2	60	-	54	60	(-2)

Name	Floor	Dir	NIGHT						DAY					
			L _{Aeq} (9hour)	Base	Exceedance	2007 Night	Allowance	Increase/	L _{Aeq} (15hr)	Base	Exceedance	2007 Day	Allowance	Increase/
			dB(A)	Criteria	amount	No Bypass	Criteria	(- Decrease)	dB(A)	Criteria	amount	No Bypass	Criteria	(- Decrease)
26 Kiata Pde	1	S	50.4	55	-	49.4	55	1.0	55.9	60	-	56.6	60	(-1)
26 Parks Dve	1	N	46	55	-	45.9	55	0.1	51.5	60	-	53.2	60	(-2)
26 Parks Dve	1	S	50.7	55	-	50.7	55	0.0	56.2	60	-	58	60	(-2)
27 Kiata Pde	1	N	47.6	55	-	47.4	55	0.2	52.9	60	-	54.6	60	(-2)
28 Kiata Pde	1	SW	50.9	55	-	50.1	55	0.8	56.4	60	-	57.4	60	(-1)
28 Parks Dve	1	N	44.6	55	-	44.6	55	0.0	50.1	60	-	51.9	60	(-2)
	2		48.2	55	-	47.5	55	0.7	53.6	60	-	54.8	60	(-1)
28 Parks Dve	1	S	50.1	55	-	50.1	55	0.0	55.7	60	-	57.4	60	(-2)
	2		53.1	55	-	53.2	55.2	(-0)	58.6	60	-	60.6	62.6	(-2)
29 Kiata Pde	1	N	48.8	55	-	48.5	55	0.3	54.2	60	-	55.8	60	(-2)
29 Kiata Pde	1	S	50.2	55	-	49.1	55	1.1	55.7	60	-	56.3	60	(-1)
3 Jalibah Ave	1	N	48.1	55	-	47.5	55	0.6	53.6	60	-	54.8	60	(-1)
3 Martel Pl	1	SW	49.7	55	-	49.2	55	0.5	55.1	60	-	56.5	60	(-1)
3 Pontresina Ave	1	W	54	55	-	54.6	56.6	(-1)	59.4	60	-	61.8	63.8	(-2)
3 Rose St	1	E	51.9	55	-	58.2	60.2	(-6)	57.3	60	-	66.9	68.9	(-10)
30 Kiata Pde	1	SW	51.4	55	-	50.5	55	0.9	56.8	60	-	57.8	60	(-1)
30 Parks Dve	1	N	45.9	55	-	46	55	(-0)	51.4	60	-	53.4	60	(-2)
30 Parks Dve	1	S	50	55	-	50.2	55	(-0)	55.5	60	-	57.5	60	(-2)
31 Kiata Pde	1	N	48.6	55	-	48.8	55	(-0)	54	60	-	56.1	60	(-2)
31 Kiata Pde	1	S	50.5	55	-	49.6	55	0.9	56	60	-	56.9	60	(-1)
32 Kiata Pde	1	SW	51.4	55	-	50.9	55	0.5	56.8	60	-	58.1	60.1	(-1)
32 Parks Dve	1	S	49.9	55	-	50	55	(-0)	55.4	60	-	57.4	60	(-2)
	2		52.5	55	-	52.8	55	(-0)	58	60	-	60.4	62.4	(-2)
33 Kiata Pde	1	N	48.8	55	-	49.8	55	(-1)	54.2	60	-	57.1	60	(-3)
33 Kiata Pde	1	S	51.9	55	-	51.7	55	0.2	57.4	60	-	58.9	60.9	(-2)
33 Kiata Pde	1	W	51.6	55	-	51.8	55	(-0)	57	60	-	59	61	(-2)
34 Parks Dve	1	N	46.1	55	-	45.8	55	0.3	51.5	60	-	53.1	60	(-2)
34 Parks Dve	1	W	49.1	55	-	49.3	55	(-0)	54.6	60	-	56.7	60	(-2)
34 Kiata Pde	1	SW	51.6	55	-	51.7	55	(-0)	57	60	-	58.9	60.9	(-2)
34 Meridian Way	1	W	48.2	55	-	52.6	55	(-4)	53.8	60	-	60.1	62.1	(-6)
35 Meridian Way	1	W	50.1	55	-	51.8	55	(-2)	55.7	60	-	59.2	61.2	(-4)

Name	Floor	Dir	NIGHT						DAY					
			LAeq(9hour) dB(A)	Base Criteria	Exceedance amount	2007 Night No Bypass	Allowance Criteria	Increase/ (- Decrease)	LAeq(15hr) dB(A)	Base Criteria	Exceedance amount	2007 Day No Bypass	Allowance Criteria	Increase/ (- Decrease)
36 Kiata Pde	1	NW	48.1	55	-	47.8	55	0.3	53.5	60	-	55.1	60	(-2)
36 Meridian Way	1	W	50.1	55	-	51.7	55	(-2)	55.6	60	-	59.1	61.1	(-4)
37 Kiata Pde	1	S	53.3	55	-	53.7	55.7	(-0)	58.8	60	-	60.9	62.9	(-2)
37 Kiata Pde	1	W	53.1	55	-	53.9	55.9	(-1)	58.5	60	-	61.1	63.1	(-3)
37 Meridian Way	1	W	50.2	55	-	51.9	55	(-2)	55.8	60	-	59.2	61.2	(-3)
38 Kiata Pde	1	W	51.5	55	-	51.7	55	(-0)	57	60	-	59	61	(-2)
38 Meridian Way	1	W	50.2	55	-	51.6	55	(-1)	55.7	60	-	58.9	60.9	(-3)
4 Flamingo Pl Units 1-4	1	W	49.1	55	-	49.4	55	(-0)	54.6	60	-	56.7	60	(-2)
	2		52.9	55	-	52.7	55	0.2	58.5	60	-	60.1	62.1	(-2)
4 Flamingo Pl Units 12-15	1	N	46.5	55	-	45.9	55	0.6	52	60	-	53.2	60	(-1)
4 Flamingo Pl Units 5-8	1	N	46.6	55	-	46	55	0.6	52.1	60	-	53.3	60	(-1)
4 Flamingo Pl Units 5-8	1	W	48.4	55	-	48.5	55	(-0)	53.9	60	-	55.7	60	(-2)
4 Flamingo Pl Units 9-11	1	N	46.6	55	-	46	55	0.6	52.1	60	-	53.3	60	(-1)
4 Honeysuckle St	1	E	53.8	55	-	63.1	65.1	(-9)	58.9	60	-	69.2	71.2	(-10)
	2		56	55	1	65.1	67.1	(-9)	61.3	60	1.3	70.9	72.9	(-10)
4 Honeysuckle St	1	N	53.5	55	-	62.8	64.8	(-9)	58.8	60	-	68.1	70.1	(-9)
	2		55.3	55	0.3	64.5	66.5	(-9)	60.6	60	0.6	69.6	71.6	(-9)
4 Honeysuckle St	1	S	51	55	-	60.5	62.5	(-10)	56.5	60	-	68.6	70.6	(-12)
	2		52.6	55	-	62.4	64.4	(-10)	58.1	60	-	70	72	(-12)
4 Jalibah Ave	1	N	46.9	55	-	46.2	55	0.7	52.3	60	-	53.5	60	(-1)
4 Jalibah Ave	1	S	49.8	55	-	50.5	55	(-1)	55.3	60	-	57.7	60	(-2)
4 Martel Pl	1	W	50.1	55	-	49	55	1.1	55.5	60	-	56.2	60	(-1)
4 Pontresina Ave	1	W	53.5	55	-	53.9	55.9	(-0)	59	60	-	61.1	63.1	(-2)
4 Rose St	1	E	51.7	55	-	59.8	61.8	(-8)	57.1	60	-	68.5	70.5	(-11)
4 Rose St	1	N	54.5	55	-	61.6	63.6	(-7)	59.9	60	-	70.2	72.2	(-10)
41 Kiata Pde	1	S	52	55	-	52.6	55	(-1)	57.5	60	-	59.8	61.8	(-2)

Name	Floor	Dir	NIGHT						DAY					
			L _{Aeq} (9hour)	Base	Exceedance	2007 Night	Allowance	Increase/	L _{Aeq} (15hr)	Base	Exceedance	2007 Day	Allowance	Increase/
			dB(A)	Criteria	amount	No Bypass	Criteria	(- Decrease)	dB(A)	Criteria	amount	No Bypass	Criteria	(- Decrease)
41 Kiata Pde	1	W	53.9	55	-	56.2	58.2	(-2)	59.4	60	-	63.5	65.5	(-4)
42 Kiata Pde	1	W	52.1	55	-	51.9	55	0.2	57.5	60	-	59.2	61.2	(-2)
	2		55.3	55	0.3	54.5	56.5	0.8	60.6	60	0.6	61.8	63.8	(-1)
43 Kiata Pde	1	W	52.4	55	-	53.9	55.9	(-2)	57.8	60	-	61.1	63.1	(-3)
44 Kiata Pde	1	N	50.7	55	-	50.4	55	0.3	56.1	60	-	57.6	60	(-2)
44 Kiata Pde	1	W	52.4	55	-	52.1	55	0.3	57.8	60	-	59.4	61.4	(-2)
45 Kiata Pde	1	W	53.2	55	-	54.6	56.6	(-1)	58.6	60	-	61.7	63.7	(-3)
46 Kiata Pde	1	SW	51.8	55	-	51.4	55	0.4	57.2	60	-	58.6	60.6	(-1)
47 Kiata Pde	1	W	53.3	55	-	54.2	56.2	(-1)	58.7	60	-	61.4	63.4	(-3)
48 Kiata Pde	1	N	50.2	55	-	49.6	55	0.6	55.6	60	-	56.8	60	(-1)
49 Kiata Pde	1	W	53	55	-	54.2	56.2	(-1)	58.4	60	-	61.4	63.4	(-3)
5 Flamingo Pl	1	W	50.5	55	-	49.7	55	0.8	55.9	60	-	57	60	(-1)
5 Honeysuckle St	1	E	54.3	55	-	65	67	(-11)	59.7	60	-	70.1	72.1	(-10)
5 Honeysuckle St	1	N	53.4	55	-	65	67	(-12)	58.9	60	-	70.2	72.2	(-11)
5 Jalibah Ave	1	N	48.3	55	-	47.8	55	0.5	53.8	60	-	55.1	60	(-1)
5 Martel Pl	1	NW	50	55	-	49	55	1.0	55.4	60	-	56.3	60	(-1)
5 Pontresina Ave	1	W	53	55	-	53.3	55.3	(-0)	58.4	60	-	60.5	62.5	(-2)
5 Rose St	1	E	50.9	55	-	56.7	58.7	(-6)	56.3	60	-	65	67	(-9)
50 Kiata Pde	1	N	48.8	55	-	48.6	55	0.2	54.2	60	-	55.9	60	(-2)
51 Kiata Pde	1	W	54.7	55	-	56.5	58.5	(-2)	60.1	60	0.1	63.9	65.9	(-4)
52 Kiata Pde	1	N	48.1	55	-	48.2	55	(-0)	53.5	60	-	55.5	60	(-2)
53 Kiata Pde	1	W	54.5	55	-	55.6	57.6	(-1)	59.8	60	-	63	65	(-3)
54 Kiata Pde	1	N	47.5	55	-	47.7	55	(-0)	52.9	60	-	55	60	(-2)
55 Kiata Pde	1	W	55	55	-	55.8	57.8	(-1)	60.3	60	0.3	63.2	65.2	(-3)
57 Kiata Pde	1	W	55.1	55	0.1	55.9	57.9	(-1)	60.5	60	0.5	63.3	65.3	(-3)
59 Kiata Pde	1	W	54.8	55	-	55.5	57.5	(-1)	60.1	60	0.1	62.7	64.7	(-3)
6 Honeysuckle St	1	E	49.3	55	-	56.4	58.4	(-7)	54.8	60	-	63	65	(-8)
	2		51.4	55	-	59.1	61.1	(-8)	56.8	60	-	65.8	67.8	(-9)
6 Honeysuckle St	1	N	51.5	55	-	59.4	61.4	(-8)	56.9	60	-	65.5	67.5	(-9)
	2		53.6	55	-	61.7	63.7	(-8)	58.9	60	-	68	70	(-9)

Name	Floor	Dir	NIGHT						DAY					
			LAeq(9hour)	Base	Exceedance	2007 Night	Allowance	Increase/	LAeq(15hr)	Base	Exceedance	2007 Day	Allowance	Increase/
			dB(A)	Criteria	amount	No Bypass	Criteria	(- Decrease)	dB(A)	Criteria	amount	No Bypass	Criteria	(- Decrease)
6 Honeysuckle St	1	S	47.3	55	-	56.8	58.8	(-10)	52.6	60	-	65.2	67.2	(-13)
	2		49.6	55	-	59	61	(-9)	55	60	-	66.8	68.8	(-12)
6 Jalibah Ave	1	N	47.3	55	-	46.8	55	0.5	52.7	60	-	54.1	60	(-1)
6 Jalibah Ave	1	S	50.3	55	-	50.8	55	(-1)	55.8	60	-	58	60	(-2)
6 Martel Pl	1	N	47.9	55	-	47.9	55	0.0	53.3	60	-	55.2	60	(-2)
6 Pontresina Ave	1	W	51.6	55	-	51.1	55	0.5	57.1	60	-	58.3	60.3	(-1)
6 Rose St	1	E	50.6	55	-	56.3	58.3	(-6)	56	60	-	64.6	66.6	(-9)
6 Rose St	1	N	50.9	55	-	58.2	60.2	(-7)	56.4	60	-	66.8	68.8	(-10)
6 Rose St	1	S	49.7	55	-	55.1	57.1	(-5)	55.1	60	-	62.4	64.4	(-7)
61 Kiata Pde	1	W	53.9	55	-	55.1	57.1	(-1)	59.3	60	-	62.3	64.3	(-3)
63 Kiata Pde	1	S	52.7	55	-	53.3	55.3	(-1)	58.1	60	-	60.5	62.5	(-2)
63 Kiata Pde	1	SW	53.5	55	-	56.3	58.3	(-3)	58.8	60	-	63.8	65.8	(-5)
63 Kiata Pde	1	W	54.3	55	-	58.8	60.8	(-5)	59.6	60	-	66.7	68.7	(-7)
65 Kiata Pde	1	W	50.3	55	-	53	55	(-3)	55.7	60	-	60.2	62.2	(-5)
65 Kiata Pde	1	W	50.5	55	-	52.6	55	(-2)	56	60	-	59.8	61.8	(-4)
67 Kiata Pde	1	N	48.3	55	-	50.8	55	(-3)	53.8	60	-	58.7	60.7	(-5)
67 Kiata Pde	1	S	51.1	55	-	50.2	55	0.9	56.6	60	-	57.5	60	(-1)
69 Kiata Pde	1	N	47.8	55	-	50.3	55	(-3)	53.2	60	-	58	60	(-5)
69 Kiata Pde	1	S	51	55	-	49.6	55	1.4	56.4	60	-	56.9	60	(-1)
7 Flamingo Pl	1	NW	49.2	55	-	48.3	55	0.9	54.7	60	-	55.5	60	(-1)
	2		52.7	55	-	51.1	55	1.6	58.1	60	-	58.3	60.3	(-0)
7 Honeysuckle St	1	N	52.4	55	-	59.2	61.2	(-7)	57.8	60	-	65.5	67.5	(-8)
7 Honeysuckle St	1	S	50	55	-	57.3	59.3	(-7)	55.4	60	-	63.5	65.5	(-8)
7 Jalibah Ave	1	N	48.9	55	-	48.4	55	0.5	54.3	60	-	55.7	60	(-1)
7 Jalibah Ave	1	S	54.7	55	-	55.9	57.9	(-1)	60.2	60	0.2	63.7	65.7	(-4)
7 Jalibah Ave	1	W	53.8	55	-	55	57	(-1)	59.3	60	-	62.5	64.5	(-3)
7 Martel Pl	1	N	49.7	55	-	49	55	0.7	55	60	-	56.2	60	(-1)
7 Pontresina Ave	1	NW	49.2	55	-	48.5	55	0.7	54.7	60	-	55.8	60	(-1)
7 Pontresina Ave	1	SW	51.6	55	-	51	55	0.6	57	60	-	58.3	60.3	(-1)

Name	Floor	Dir	NIGHT						DAY					
			L _{Aeq} (9hour)	Base	Exceedance	2007 Night	Allowance	Increase/	L _{Aeq} (15hr)	Base	Exceedance	2007 Day	Allowance	Increase/
			dB(A)	Criteria	amount	No Bypass	Criteria	(- Decrease)	dB(A)	Criteria	amount	No Bypass	Criteria	(- Decrease)
7 Rose St	1	E	50.1	55	-	55.1	57.1	(-5)	55.5	60	-	63.2	65.2	(-8)
71 Kiata Pde	1	N	47.1	55	-	48.7	55	(-2)	52.4	60	-	55.9	60	(-4)
71 Kiata Pde	1	S	50.4	55	-	49	55	1.4	55.8	60	-	56.3	60	(-1)
73 Kiata Pde	1	N	47	55	-	48.3	55	(-1)	52.4	60	-	55.6	60	(-3)
73 Kiata Pde	1	S	49.7	55	-	48.3	55	1.4	55.1	60	-	55.5	60	(-0)
74 Ducati St	1	W	52.6	55	-	53.3	55.3	(-1)	58.2	60	-	61.2	63.2	(-3)
76 Ducati St	1	W	53	55	-	53.7	55.7	(-1)	58.5	60	-	61.5	63.5	(-3)
78 Ducati St	1	W	53.1	55	-	53.8	55.8	(-1)	58.7	60	-	61.7	63.7	(-3)
	2		54.1	55	-	55.9	57.9	(-2)	59.7	60	-	63.1	65.1	(-3)
79 Ducati St	1	SW	48.8	55	-	49.2	55	(-0)	54.3	60	-	56.5	60	(-2)
8 Flamingo Pl	1	N	46	55	-	45.6	55	0.4	51.5	60	-	52.9	60	(-1)
8 Honeysuckle St	1	N	50.7	55	-	57.6	59.6	(-7)	56.1	60	-	64.2	66.2	(-8)
	2		52.5	55	-	60.2	62.2	(-8)	57.8	60	-	66.8	68.8	(-9)
8 Honeysuckle St	1	S	45.5	55	-	53.8	55.8	(-8)	51	60	-	61.8	63.8	(-11)
	2		48.6	55	-	56.5	58.5	(-8)	54.1	60	-	64	66	(-10)
8 Jalibah Ave	1	N	47.4	55	-	46.8	55	0.6	52.8	60	-	54.1	60	(-1)
8 Jalibah Ave	1	S	50.5	55	-	51	55	(-1)	56	60	-	58.2	60.2	(-2)
8 Kiata Pde	1	N	50	55	-	49.7	55	0.3	55.4	60	-	56.9	60	(-2)
8 Kiata Pde	1	W	51.6	55	-	51.7	55	(-0)	57	60	-	58.9	60.9	(-2)
8 Pontresina Ave	1	W	51.1	55	-	50.4	55	0.7	56.6	60	-	57.6	60	(-1)
8 Rose St	1	E	50.5	55	-	56	58	(-6)	55.9	60	-	63.3	65.3	(-7)
8 Rose St	1	N	49.7	55	-	53.7	55.7	(-4)	55.1	60	-	61.1	63.1	(-6)
80 Ducati St	1	W	53.3	55	-	54	56	(-1)	58.8	60	-	61.8	63.8	(-3)
81 Ducati St	1	S	53.1	55	-	54.1	56.1	(-1)	58.7	60	-	62.2	64.2	(-4)
81 Ducati St	1	W	53	55	-	53.9	55.9	(-1)	58.5	60	-	61.9	63.9	(-3)
82 Caloola Dve	1	N	48.9	55	-	49.9	55	(-1)	54.3	60	-	57.4	60	(-3)
82 Ducati St	1	W	53.3	55	-	54.2	56.2	(-1)	58.8	60	-	62	64	(-3)
	2		54.6	55	-	56.5	58.5	(-2)	60.1	60	0.1	63.7	65.7	(-4)
84 Caloola Dve	1	S	50.5	55	-	49.8	55	0.7	55.9	60	-	57.1	60	(-1)
84 Ducati St	1	W	53.4	55	-	54.5	56.5	(-1)	58.9	60	-	62	64	(-3)
86 Ducati St	1	W	53.5	55	-	54.8	56.8	(-1)	59.1	60	-	62.3	64.3	(-3)

Name	Floor	Dir	NIGHT						DAY					
			L _{Aeq} (9hour)	Base	Exceedance	2007 Night	Allowance	Increase/	L _{Aeq} (15hr)	Base	Exceedance	2007 Day	Allowance	Increase/
			dB(A)	Criteria	amount	No Bypass	Criteria	(- Decrease)	dB(A)	Criteria	amount	No Bypass	Criteria	(- Decrease)
88 Caloola Dve	1	NW	49.3	55	-	48.8	55	0.5	54.7	60	-	56	60	(-1)
88 Ducati St	1	W	53.4	55	-	54.7	56.7	(-1)	59	60	-	62.1	64.1	(-3)
9 Flamingo Pl	1	N	47.6	55	-	46.7	55	0.9	53	60	-	54	60	(-1)
	2		51	55	-	49.5	55	1.5	56.4	60	-	56.7	60	(-0)
9 Jalibah Ave	1	N	49.1	55	-	48.6	55	0.5	54.5	60	-	55.9	60	(-1)
9 Jalibah Ave	1	S	54.4	55	-	55.5	57.5	(-1)	59.9	60	-	63.3	65.3	(-3)
9 Pontresina Ave	1	W	51.9	55	-	51.5	55	0.4	57.4	60	-	58.7	60.7	(-1)
9 Rose St	1	E	49.8	55	-	54.4	56.4	(-5)	55.2	60	-	62.4	64.4	(-7)
90 Ducati St	1	W	53.6	55	-	55.1	57.1	(-2)	59.2	60	-	62.6	64.6	(-3)
92 Ducati St	1	W	53.9	55	-	55.6	57.6	(-2)	59.5	60	-	63.2	65.2	(-4)
94 Ducati St	1	W	54	55	-	56.1	58.1	(-2)	59.6	60	-	63.8	65.8	(-4)
95 Ducati St	1	W	56.3	55	1.3	58.2	60.2	(-2)	61.8	60	1.8	65.2	67.2	(-3)
96 Ducati St	1	W	54.4	55	-	57.3	59.3	(-3)	60	60	-	64.9	66.9	(-5)
98 Ducati St	1	W	53.9	55	-	57.1	59.1	(-3)	59.5	60	-	64.7	66.7	(-5)
99 Ducati St	1	W	55.1	55	0.1	56.9	58.9	(-2)	60.6	60	0.6	63.5	65.5	(-3)
Caravan Worst Affected	1	E	53.1	55	-	56.2	58.2	(-3)	58.6	60	-	65	67	(-6)
Caravan Worst Affected	1	N	53.5	55	-	55.6	57.6	(-2)	58.8	60	-	64.5	66.5	(-6)
Ducati St Shops	1	W	54.7	55	-	60.7	62.7	(-6)	60.3	60	0.3	68.2	70.2	(-8)
Kennedy Dr 'B'	1	S	50.2	55	-	67.9	69.9	(-18)	55.6	60	-	76.7	78.7	(-21)
Kennedy Dr 'C'	1	S	49.1	55	-	65.5	67.5	(-16)	54.6	60	-	73.8	75.8	(-19)
Kennedy Drive 'A'	1	E	52.2	55	-	62.8	64.8	(-11)	57.6	60	-	70.7	72.7	(-13)
	2		53.2	55	-	64.3	66.3	(-11)	58.6	60	-	71.8	73.8	(-13)
Kennedy Drive 'A'	1	N	47.8	55	-	55.3	57.3	(-8)	53.2	60	-	63.4	65.4	(-10)
	2		50	55	-	57.9	59.9	(-8)	55.4	60	-	65.3	67.3	(-10)
Kennedy Drive 'A'	1	S	50.1	55	-	65.5	67.5	(-15)	55.5	60	-	73.8	75.8	(-18)
	2		51.4	55	-	66.8	68.8	(-15)	56.9	60	-	75	77	(-18)
Service Station - BP	1	S	57.2	55	2.2	66	68	(-9)	62.8	60	2.8	74.7	76.7	(-12)

Name	Floor	Dir	NIGHT					DAY					
			LAeq(9hour) dB(A)	Base Criteria	Exceedance amount	2007 Night No Bypass	Allowance Criteria	Increase/ (- Decrease)	LAeq(15hr) dB(A)	Base Criteria	Exceedance amount	2007 Day No Bypass	Allowance Criteria
			total exceedances		15		0	Total Exceedances		26		0	
			total number Acute >60				12	total number Acute >65				26	
			0					0					

Appendix K

Predicted Traffic Noise
Levels in NSW, 2017,
'Future Existing' (No Tugun
Bypass)

Appendix K:

Table K1: Predicted Traffic Noise Levels in NSW, 2017, 'Future Existing' (No Tugun Bypass).

Address	Floor	Dir	Night Period (10:00 pm-7:00 am)		Day Period (7:00 am-10:00 pm)	
			Calculated Noise Level	Allowance Criterion	Calculated Noise Level	Allowance Criterion
1 Banksia St		1 E	65.4	67.4	72.4	74.4
1 Banksia St		2 E	67.4	69.4	74.5	76.5
1 Banksia St		1 N	66.4	68.4	73.7	75.7
1 Banksia St		2 N	68.2	70.2	75.6	77.6
1 Jalibah Ave		1 N	48.5	55	55.7	60
1 Martel Place		1 N	49.8	55	56.9	60
1 Pontresina Ave		1 S	55.4	57.4	62.4	64.4
1 Pontresina Ave		1 W	56.6	58.6	63.6	65.6
1 Rose St		1 E	61.6	63.6	69.1	71.1
1 Rose St		1 N	61.6	63.6	69.1	71.1
1/1&2 Flamingo Place		1 W	50.1	55	57.2	60
1/1&2 Flamingo Place		2 W	53	55	60	62
1/10 Flamingo		1 W	50.4	55	57.5	60
1/3 Flamingo Place		1 S	53.4	55.4	60.5	62.5
1/3 Flamingo Place		2 S	55.7	57.7	62.9	64.9
1/4 Flamingo Place		1 S	54.3	56.3	61.5	63.5
1/4 Flamingo Place		2 S	55.7	57.7	62.9	64.9
1/5 Flamingo Place		1 S	54.2	56.2	61.3	63.3
1/5 Flamingo Place		2 S	55.9	57.9	63.1	65.1
1/6 Flamingo		1 W	51.4	55	58.5	60.5
1/7 Flamingo		1 W	51.5	55	58.6	60.6
1/8 Flamingo		1 N	49.6	55	56.7	60
1/8 Flamingo		1 W	51.6	55	58.7	60.7
1/9 Flamingo		1 W	50.6	55	57.7	60
1/9 Flamingo		2 W	53.2	55.2	60.3	62.3
10 Flamingo Place		1 N	46.6	55	53.7	60
10 Jalibah Ave		1 N	48	55	55.2	60
10 Jalibah Ave		1 S	52.5	55	59.6	61.6
10 Pontresina Ave		1 W	53.1	55.1	60.2	62.2
10 Rose St		1 E	56.7	58.7	63.9	65.9
10 Rose St		2 E	61	63	68.2	70.2
10 Rose St		1 N	55.4	57.4	62.5	64.5
10 Rose St		2 N	59.6	61.6	66.7	68.7
101 Ducati St		1 W	60	62	67.2	69.2
103 Ducati St		1 W	58.6	60.6	65.8	67.8
105 Ducati St		1 W	58.1	60.1	65.3	67.3
107 Ducati St		1 W	58.9	60.9	66.1	68.1
11 Jalibah Ave		1 N	50.1	55	57.3	60
11 Jalibah Ave		1 S	57	59	64.2	66.2
11 Jalibah Ave		1 W	55.7	57.7	62.8	64.8
11 Moolau Ave		1 N	51.8	55	58.9	60.9
11 Moolau Ave		1 W	55.5	57.5	62.7	64.7
11 Pontresina Ave		1 W	53.3	55.3	60.4	62.4
11 Rose St		1 E	55.4	57.4	62.8	64.8
11 Rose St		2 E	58.1	60.1	65.4	67.4
11 Rose St		1 S	52.1	55	59.3	61.3

Address	Floor	Dir	Night Period (10:00 pm-7:00 am)		Day Period (7:00 am-10:00 pm)	
			Calculated Noise Level	Allowance Criterion	Calculated Noise Level	Allowance Criterion
11 Rose St	2	S	54.5	56.5	61.7	63.7
12 Flamingo	1	N	45.9	55	53.1	60
12 Jalibah Ave	1	N	48.4	55	55.6	60
12 Jalibah Ave	1	S	53	55	60.2	62.2
12 Moolua Ave	1	N	52	55	59	61
12 Moolua Ave	2	N	54.6	56.6	61.7	63.7
12 Moolua Ave	1	W	55.6	57.6	62.6	64.6
12 Moolua Ave	2	W	57.8	59.8	64.9	66.9
12 Pontresina Ave	1	S	53.7	55.7	60.8	62.8
12 Pontresina Ave	1	W	53.9	55.9	61	63
12 Rose St	1	E	55.8	57.8	62.9	64.9
12 Rose St	2	E	59.3	61.3	66.4	68.4
12 Rose St	1	S	54.5	56.5	61.6	63.6
12 Rose St	2	S	56.8	58.8	63.9	65.9
13 Flamingo Place	1	N	46.7	55	53.9	60
13 Flamingo Place	1	S	49.4	55	56.6	60
13 Flamingo Place	1	W	49.5	55	56.7	60
13 Moolua Ave	1	W	56	58	63.1	65.1
13 Rose St	1	E	55.5	57.5	62.8	64.8
13 Rose St	1	N	54.5	56.5	61.7	63.7
131 Kennedy Dr	1	S	66.3	68.3	74.3	76.3
14 Jalibah Ave	1	N	49.1	55	56.3	60
14 Moolua Ave	1	W	56.2	58.2	63.3	65.3
14 Moolua Ave	2	W	59	61	66	68
14 Rose St	1	E	56.7	58.7	63.8	65.8
14 Rose St	1	N	56.3	58.3	63.3	65.3
15 Flamingo Place	1	N	46.5	55	53.6	60
15 Flamingo Place	1	S	49.4	55	56.5	60
15 Moolua Ave	1	W	56.4	58.4	63.5	65.5
15 Rose St Unit 4-6	1	E	54.8	56.8	62	64
15 Rose St Unit 4-6	2	E	57.5	59.5	64.7	66.7
15 Rose St Units 1-3	1	E	55	57	62.3	64.3
15 Rose St Units 1-3	2	E	57.6	59.6	64.9	66.9
16 Jalibah Ave	1	S	55	57	62.2	64.2
16 Jalibah Ave	1	W	53.7	55.7	60.9	62.9
16 Minore Place	1	N	46.9	55	54	60
16 Moolua Ave	1	W	56.4	58.4	63.5	65.5
16 Rose St	1	E	54.2	56.2	61.3	63.3
17 Flamingo Place	1	N	46.6	55	53.8	60
17 Flamingo Place	1	S	49.9	55	57.1	60
17 Moolua Ave	1	S	56.4	58.4	63.6	65.6
17 Moolua Ave	2	S	60.2	62.2	67.3	69.3
17 Moolua Ave	1	W	55.9	57.9	63.1	65.1
17 Moolua Ave	2	W	59.4	61.4	66.6	68.6
17 Rose St	1	E	53.3	55.3	60.7	62.7
18 Minore Place	1	W	49.1	55	56.2	60
18 Rose St	1	E	53.4	55.4	60.7	62.7
18 Rose St	1	S	53.2	55.2	60.5	62.5
19 Flamingo Place	1	N	46.3	55	53.4	60
19 Flamingo Place	1	S	49.5	55	56.7	60
19 Minore Place	1	NW	48.2	55	55.3	60

Address	Floor	Dir	Night Period (10:00 pm-7:00 am)		Day Period (7:00 am-10:00 pm)	
			Calculated Noise Level	Allowance Criterion	Calculated Noise Level	Allowance Criterion
19 Rose St		1 E	54.6	56.6	62	64
2 Honeysuckle St		1 E	64.8	66.8	72.1	74.1
2 Honeysuckle St		1 N	61.9	63.9	68.9	70.9
2 Martel Place		1 S	49.9	55	57	60
2 Pontresina Ave		1 W	56.5	58.5	63.5	65.5
20 Minore Place		1 NW	49.8	55	56.9	60
20 Rose St		1 E	53.8	55.8	61.1	63.1
20 Rose St		1 N	53.5	55.5	60.8	62.8
21 Flamingo Place		1 N	46.2	55	53.4	60
21 Flamingo Place		1 S	49.4	55	56.5	60
21 Minore Place		1 NW	49	55	56	60
22 Kiata Pde		1 N	45.7	55	52.8	60
22 Kiata Pde		1 S	48.7	55	55.8	60
22 Minore Place		1 W	50.3	55	57.4	60
22 Rose St		1 E	54.9	56.9	62.2	64.2
22 Rose St		1 N	52.3	55	59.6	61.6
24 Kiata Pde		1 S	49.8	55	56.9	60
24 Parks Dve		1 N	47.4	55	54.6	60
24 Parks Dve		1 S	52	55	59.1	61.1
24 Rose St		1 E	52.8	55	60.2	62.2
25 Kiata		1 N	47.8	55	54.9	60
26 Kiata Pde		1 S	50.5	55	57.6	60
26 Parks Dve		1 N	47	55	54.2	60
26 Parks Dve		1 S	51.8	55	59	61
27 Kiata Pde		1 N	48.5	55	55.6	60
28 Kiata Pde		1 SW	51.3	55	58.4	60.4
28 Parks Dve		1 N	45.7	55	52.9	60
28 Parks Dve		2 N	48.6	55	55.8	60
28 Parks Dve		1 S	51.1	55	58.3	60.3
28 Parks Dve		2 S	54.4	56.4	61.6	63.6
29 Kiata Pde		1 N	49.7	55	56.7	60
29 Kiata Pde		1 S	50.2	55	57.3	60
3 Jalibah Ave		1 N	48.6	55	55.8	60
3 Martel Place		1 SW	50.4	55	57.5	60
3 Pontresina Ave		1 W	55.8	57.8	62.8	64.8
3 Rose St		1 E	60.3	62.3	67.8	69.8
30 Kiata Pde		1 SW	51.7	55	58.7	60.7
30 Parks Dve		1 N	47.1	55	54.3	60
30 Parks Dve		1 S	51.2	55	58.4	60.4
31 Kiata Pde		1 N	50	55	57.1	60
31 Kiata Pde		1 S	50.8	55	57.8	60
32 Kiata Pde		1 SW	52.1	55	59.1	61.1
32 Parks Dve		1 S	51.1	55	58.3	60.3
32 Parks Dve		2 S	54.1	56.1	61.3	63.3
33 Kiata Pde		1 N	51	55	58	60
33 Kiata Pde		1 S	52.8	55	59.8	61.8
33 Kiata Pde		1 W	53	55	60	62
34 Parks Dve		1 N	46.9	55	54	60
34 Parks Dve		1 W	50.4	55	57.6	60
34 Kiata Pde		1 SW	52.8	55	59.8	61.8
34 Meridian Way		1 W	52.8	55	60.3	62.3

Address	Floor	Dir	Night Period (10:00 pm-7:00 am)		Day Period (7:00 am-10:00 pm)	
			Calculated Noise Level	Allowance Criterion	Calculated Noise Level	Allowance Criterion
35 Meridian Way		1 W	52.5	55	59.8	61.8
36 Kiata Pde		1 NW	49	55	56.1	60
36 Meridian Way		1 W	52.4	55	59.8	61.8
37 Kiata Pde		1 S	54.9	56.9	61.9	63.9
37 Kiata Pde		1 W	55.1	57.1	62.1	64.1
37 Meridian Way		1 W	52.6	55	59.9	61.9
38 Kiata Pde		1 W	52.9	55	60	62
38 Meridian Way		1 W	52.3	55	59.7	61.7
4 Flamingo Place Units 1-4		1 W	50.5	55	57.7	60
4 Flamingo Place Units 1-4		2 W	53.9	55.9	61.1	63.1
4 Flamingo Place Units 12-15		1 N	47.1	55	54.2	60
4 Flamingo Place Units 5-8		1 N	47.2	55	54.3	60
4 Flamingo Place Units 5-8		1 W	49.6	55	56.7	60
4 Flamingo Place Units 9-11		1 N	47.1	55	54.3	60
4 Honeysuckle St		1 E	63.1	65.1	70.2	72.2
4 Honeysuckle St		2 E	64.7	66.7	71.8	73.8
4 Honeysuckle St		1 N	62.1	64.1	69	71
4 Honeysuckle St		2 N	63.6	65.6	70.6	72.6
4 Honeysuckle St		1 S	62	64	69.5	71.5
4 Honeysuckle St		2 S	63.4	65.4	70.9	72.9
4 Jalibah Ave		1 N	47.3	55	54.4	60
4 Jalibah Ave		1 S	51.4	55	58.6	60.6
4 Martel Place		1 W	50.2	55	57.2	60
4 Pontresina Ave		1 W	55.1	57.1	62.1	64.1
4 Rose St		1 E	61.9	63.9	69.4	71.4
4 Rose St		1 N	63.6	65.6	71.1	73.1
41 Kiata Pde		1 S	53.8	55.8	60.8	62.8
41 Kiata Pde		1 W	57.4	59.4	64.5	66.5
42 Kiata Pde		1 W	53.1	55.1	60.1	62.1
42 Kiata Pde		2 W	55.7	57.7	62.7	64.7
43 Kiata Pde		1 W	55.1	57.1	62.1	64.1
44 Kiata Pde		1 N	51.6	55	58.6	60.6
44 Kiata Pde		1 W	53.3	55.3	60.4	62.4
45 Kiata Pde		1 W	55.7	57.7	62.7	64.7
46 Kiata Pde		1 SW	52.6	55	59.6	61.6
47 Kiata Pde		1 W	55.4	57.4	62.4	64.4
48 Kiata Pde		1 N	50.8	55	57.8	60
49 Kiata Pde		1 W	55.4	57.4	62.4	64.4
5 Flamingo Place		1 W	50.9	55	57.9	60
5 Honeysuckle St		1 E	64.2	66.2	71.1	73.1
5 Honeysuckle St		1 N	64.2	66.2	71.2	73.2
5 Jalibah Ave		1 N	48.9	55	56.1	60
5 Martel Place		1 NW	50.2	55	57.3	60
5 Pontresina Ave		1 W	54.5	56.5	61.5	63.5
5 Rose St		1 E	58.6	60.6	66	68
50 Kiata Pde		1 N	49.8	55	56.8	60
51 Kiata Pde		1 W	57.8	59.8	64.9	66.9
52 Kiata Pde		1 N	49.4	55	56.5	60
53 Kiata Pde		1 W	56.9	58.9	64	66
54 Kiata Pde		1 N	48.9	55	56	60
55 Kiata Pde		1 W	57.1	59.1	64.1	66.1

Address	Floor	Dir	Night Period (10:00 pm-7:00 am)		Day Period (7:00 am-10:00 pm)	
			Calculated Noise Level	Allowance Criterion	Calculated Noise Level	Allowance Criterion
57 Kiata Pde		1 W	57.2	59.2	64.3	66.3
59 Kiata Pde		1 W	56.7	58.7	63.7	65.7
6 Honeysuckle St		1 E	56.7	58.7	63.9	65.9
6 Honeysuckle St		2 E	59.6	61.6	66.8	68.8
6 Honeysuckle St		1 N	59.4	61.4	66.4	68.4
6 Honeysuckle St		2 N	61.9	63.9	68.9	70.9
6 Honeysuckle St		1 S	58.6	60.6	66.1	68.1
6 Honeysuckle St		2 S	60.2	62.2	67.7	69.7
6 Jalibah Ave		1 N	47.9	55	55	60
6 Jalibah Ave		1 S	51.8	55	59	61
6 Martel Place		1 N	49.1	55	56.2	60
6 Pontresina Ave		1 W	52.3	55	59.3	61.3
6 Rose St		1 E	58.2	60.2	65.6	67.6
6 Rose St		1 N	60.2	62.2	67.8	69.8
6 Rose St		1 S	56.3	58.3	63.4	65.4
61 Kiata Pde		1 W	56.3	58.3	63.3	65.3
63 Kiata Pde		1 S	54.5	56.5	61.5	63.5
63 Kiata Pde		1 SW	57.7	59.7	64.7	66.7
63 Kiata Pde		1 W	60.4	62.4	67.7	69.7
65 Kiata Pde		1 W	54.2	56.2	61.2	63.2
65 Kiata Pde		1 W	53.8	55.8	60.8	62.8
67 Kiata Pde		1 N	52.4	55	59.6	61.6
67 Kiata Pde		1 S	51.4	55	58.4	60.4
69 Kiata Pde		1 N	51.8	55	58.9	60.9
69 Kiata Pde		1 S	50.8	55	57.8	60
7 Flamingo Place		1 NW	49.5	55	56.5	60
7 Flamingo Place		2 NW	52.2	55	59.2	61.2
7 Honeysuckle St		1 N	59.4	61.4	66.4	68.4
7 Honeysuckle St		1 S	57.4	59.4	64.5	66.5
7 Jalibah Ave		1 N	49.5	55	56.7	60
7 Jalibah Ave		1 S	57.5	59.5	64.7	66.7
7 Jalibah Ave		1 W	56.3	58.3	63.4	65.4
7 Martel Place		1 N	50.1	55	57.2	60
7 Pontresina Ave		1 NW	49.7	55	56.8	60
7 Pontresina Ave		1 SW	52.2	55	59.2	61.2
7 Rose St		1 E	56.8	58.8	64.2	66.2
71 Kiata Pde		1 N	49.9	55	56.9	60
71 Kiata Pde		1 S	50.2	55	57.2	60
73 Kiata Pde		1 N	49.5	55	56.5	60
73 Kiata Pde		1 S	49.4	55	56.5	60
74 Ducati St		1 W	55	57	62.2	64.2
76 Ducati St		1 W	55.3	57.3	62.5	64.5
78 Ducati St		1 W	55.4	57.4	62.6	64.6
78 Ducati St		2 W	56.8	58.8	64	66
79 Ducati St		1 SW	50.3	55	57.5	60
8 Flamingo Place		1 N	46.7	55	53.9	60
8 Honeysuckle St		1 N	58.1	60.1	65.1	67.1
8 Honeysuckle St		2 N	60.7	62.7	67.7	69.7
8 Honeysuckle St		1 S	55.2	57.2	62.7	64.7
8 Honeysuckle St		2 S	57.5	59.5	64.9	66.9
8 Jalibah Ave		1 N	47.9	55	55.1	60

Address	Floor	Dir	Night Period (10:00 pm-7:00 am)		Day Period (7:00 am-10:00 pm)	
			Calculated Noise Level	Allowance Criterion	Calculated Noise Level	Allowance Criterion
8 Jalibah Ave		1 S	52	55	59.2	61.2
8 Kiata Pde		1 N	50.9	55	57.9	60
8 Kiata Pde		1 W	52.9	55	59.9	61.9
8 Pontresina Ave		1 W	51.5	55	58.6	60.6
8 Rose St		1 E	57.2	59.2	64.3	66.3
8 Rose St		1 N	54.9	56.9	62.1	64.1
80 Ducati St		1 W	55.5	57.5	62.7	64.7
81 Ducati St		1 S	55.9	57.9	63.1	65.1
81 Ducati St		1 W	55.7	57.7	62.9	64.9
82 Caloola Dve		1 N	51.2	55	58.4	60.4
82 Ducati St		1 W	55.7	57.7	62.9	64.9
82 Ducati St		2 W	57.3	59.3	64.6	66.6
84 Caloola Dve		1 S	51	55	58.1	60.1
84 Ducati St		1 W	55.7	57.7	62.9	64.9
86 Ducati St		1 W	55.9	57.9	63.1	65.1
88 Caloola Dve		1 NW	49.9	55	57	60
88 Ducati St		1 W	55.7	57.7	62.9	64.9
9 Flamingo Place		1 N	47.9	55	54.9	60
9 Flamingo Place		2 N	50.6	55	57.7	60
9 Jalibah Ave		1 N	49.7	55	56.9	60
9 Jalibah Ave		1 S	57.1	59.1	64.3	66.3
9 Pontresina Ave		1 W	52.6	55	59.7	61.7
9 Rose St		1 E	56	58	63.4	65.4
90 Ducati St		1 W	56	58	63.4	65.4
92 Ducati St		1 W	56.6	58.6	63.9	65.9
94 Ducati St		1 W	57	59	64.4	66.4
95 Ducati St		1 W	59	61	66.2	68.2
96 Ducati St		1 W	57.9	59.9	65.3	67.3
98 Ducati St		1 W	57.7	59.7	65.1	67.1
99 Ducati St		1 W	57.3	59.3	64.5	66.5
Caravan Worst Affected		1 E	58.5	60.5	66	68
Caravan Worst Affected		1 N	58	60	65.5	67.5
Ducati St Shops		1 W	60.8	62.8	68.3	70.3
Kennedy Dr 'B'		1 S	69.2	71.2	77.6	79.6
Kennedy Dr 'C'		1 S	66.7	68.7	74.7	76.7
Kennedy Drive 'A'		1 E	64	66	71.6	73.6
Kennedy Drive 'A'		2 E	65.3	67.3	72.7	74.7
Kennedy Drive 'A'		1 N	56.7	58.7	64.2	66.2
Kennedy Drive 'A'		2 N	58.8	60.8	66.2	68.2
Kennedy Drive 'A'		1 S	66.6	68.6	74.7	76.7
Kennedy Drive 'A'		2 S	67.9	69.9	75.9	77.9
Service Station - BP		1 S	65.9	67.9	74.5	76.5

No. of Residences Acute >60 dB(A) Night	No. of Residences Acute >65 dB(A) DAY
18	30

Number of residences exceed Base criteria	80	100
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Appendix L

Predicted Traffic Noise
Levels in NSW, 2017, with
Tugun Bypass (No
Mitigation)

Appendix L

Table L-1: Predicted Traffic Noise Levels in NSW, 2017, with Tugun Bypass (No Mitigation).

Address	Floor	Dir	NIGHT						DAY					
			L _{Aeq} (9hr)	Criterion	Exceedance	Allowance	2017 Night	Increase/	L _{Aeq} (15hr)	Criterion	Exceedance	Allowance	2017 Day	Increase/
						Criteria	No Bypass	(- Decrease)				Criteria	No Bypass	(- Decrease)
1 Banksia St	1	E	65.2	55	10.2	67.4	65.4	(-0)	70.9	60	10.9	74.4	72.4	(-2)
1 Banksia St	2	E	67.4	55	12.4	69.4	67.4	0	73.2	60	13.2	76.5	74.5	(-1)
1 Banksia St	1	N	65.5	55	10.5	68.4	66.4	(-1)	71.2	60	11.2	75.7	73.7	(-3)
1 Banksia St	2	N	67.7	55	12.7	70.2	68.2	(-1)	73.6	60	13.6	77.6	75.6	(-2)
1 Jalibah Ave	1	N	49.1	55	-5.9	55	48.5	1	54.7	60	-5.3	60	55.7	(-1)
1 Martel Pl	1	N	50.2	55	-4.8	55	49.8	0	55.7	60	-4.3	60	56.9	(-1)
1 Pontresina Ave	1	S	54.8	55	-0.2	57.4	55.4	(-1)	60.3	60	0.3	64.4	62.4	(-2)
1 Pontresina Ave	1	W	55.2	55	0.2	58.6	56.6	(-1)	60.7	60	0.7	65.6	63.6	(-3)
1 Rose St	1	E	59.4	55	4.4	63.6	61.6	(-2)	64.9	60	4.9	71.1	69.1	(-4)
1 Rose St	1	N	59.3	55	4.3	63.6	61.6	(-2)	64.8	60	4.8	71.1	69.1	(-4)
1/1&2 Flamingo Pl	1	W	50.8	55	-4.2	55	50.1	1	56.4	60	-3.6	60	57.2	(-1)
1/1&2 Flamingo Pl	2	W	54.4	55	-0.6	55	53	1	59.8	60	-0.2	62	60	(-0)
1/10 Flamingo	1	W	50.5	55	-4.5	55	50.4	0	56	60	-4	60	57.5	(-2)
1/3 Flamingo Pl	1	S	53.5	55	-1.5	55.4	53.4	0	59	60	-1	62.5	60.5	(-2)
1/3 Flamingo Pl	2	S	55.9	55	0.9	57.7	55.7	0	61.4	60	1.4	64.9	62.9	(-2)
1/4 Flamingo Pl	1	S	54.3	55	-0.7	56.3	54.3	0	59.8	60	-0.2	63.5	61.5	(-2)
1/4 Flamingo Pl	2	S	56.1	55	1.1	57.7	55.7	0	61.6	60	1.6	64.9	62.9	(-1)
1/5 Flamingo Pl	1	S	54.6	55	-0.4	56.2	54.2	0	60.1	60	0.1	63.3	61.3	(-1)
1/5 Flamingo Pl	2	S	56.6	55	1.6	57.9	55.9	1	62.1	60	2.1	65.1	63.1	(-1)
1/6 Flamingo	1	W	52	55	-3	55	51.4	1	57.6	60	-2.4	60.5	58.5	(-1)
1/7 Flamingo	1	W	52	55	-3	55	51.5	1	57.5	60	-2.5	60.6	58.6	(-1)
1/8 Flamingo	1	N	50	55	-5	55	49.6	0	55.6	60	-4.4	60	56.7	(-1)
1/8 Flamingo	1	W	52	55	-3	55	51.6	0	57.5	60	-2.5	60.7	58.7	(-1)
1/9 Flamingo	1	W	51.1	55	-3.9	55	50.6	1	56.6	60	-3.4	60	57.7	(-1)

Address	Floor	Dir	NIGHT						DAY					
			L _{Aeq} (9hr)	Criterion	Exceedance	Allowance	2017 Night	Increase/	L _{Aeq} (15hr)	Criterion	Exceedance	Allowance	2017 Day	Increase/
						Criteria	No Bypass	(- Decrease)				Criteria	No Bypass	(- Decrease)
1/9 Flamingo	2	W	54.6	55	-0.4	55.2	53.2	1	60.1	60	0.1	62.3	60.3	(-0)
10 Flamingo Pl	1	N	47	55	-8	55	46.6	0	52.6	60	-7.4	60	53.7	(-1)
10 Jalibah Ave	1	N	48.2	55	-6.8	55	48	0	53.8	60	-6.2	60	55.2	(-1)
10 Jalibah Ave	1	S	52.3	55	-2.7	55	52.5	(-0)	57.9	60	-2.1	61.6	59.6	(-2)
10 Pontresina Ave	1	W	53.5	55	-1.5	55.1	53.1	0	59	60	-1	62.2	60.2	(-1)
10 Rose St	1	E	55.8	55	0.8	58.7	56.7	(-1)	61.3	60	1.3	65.9	63.9	(-3)
10 Rose St	2	E	60.4	55	5.4	63	61	(-1)	65.9	60	5.9	70.2	68.2	(-2)
10 Rose St	1	N	55	55	0	57.4	55.4	(-0)	60.5	60	0.5	64.5	62.5	(-2)
10 Rose St	2	N	59	55	4	61.6	59.6	(-1)	64.5	60	4.5	68.7	66.7	(-2)
101 Ducati St	1	W	59.5	55	4.5	62	60	(-1)	65.1	60	5.1	69.2	67.2	(-2)
103 Ducati St	1	W	57.9	55	2.9	60.6	58.6	(-1)	63.4	60	3.4	67.8	65.8	(-2)
105 Ducati St	1	W	57.7	55	2.7	60.1	58.1	(-0)	63.2	60	3.2	67.3	65.3	(-2)
107 Ducati St	1	W	58.6	55	3.6	60.9	58.9	(-0)	64.1	60	4.1	68.1	66.1	(-2)
11 Jalibah Ave	1	N	50.5	55	-4.5	55	50.1	0	56	60	-4	60	57.3	(-1)
11 Jalibah Ave	1	S	56.4	55	1.4	59	57	(-1)	61.9	60	1.9	66.2	64.2	(-2)
11 Jalibah Ave	1	W	55.3	55	0.3	57.7	55.7	(-0)	60.8	60	0.8	64.8	62.8	(-2)
11 Moolau Ave	1	N	52.4	55	-2.6	55	51.8	1	57.9	60	-2.1	60.9	58.9	(-1)
11 Moolau Ave	1	W	55.3	55	0.3	57.5	55.5	(-0)	60.8	60	0.8	64.7	62.7	(-2)
11 Pontresina Ave	1	W	53.7	55	-1.3	55.3	53.3	0	59.2	60	-0.8	62.4	60.4	(-1)
11 Rose St	1	E	54.2	55	-0.8	57.4	55.4	(-1)	59.7	60	-0.3	64.8	62.8	(-3)
11 Rose St	2	E	56.9	55	1.9	60.1	58.1	(-1)	62.5	60	2.5	67.4	65.4	(-3)
11 Rose St	1	S	50.7	55	-4.3	55	52.1	(-1)	56.3	60	-3.7	61.3	59.3	(-3)
11 Rose St	2	S	53.5	55	-1.5	56.5	54.5	(-1)	59.1	60	-0.9	63.7	61.7	(-3)
12 Flamingo	1	N	45.7	55	-9.3	55	45.9	(-0)	51.3	60	-8.7	60	53.1	(-2)
12 Jalibah Ave	1	N	48.6	55	-6.4	55	48.4	0	54.2	60	-5.8	60	55.6	(-1)
12 Jalibah Ave	1	S	52.9	55	-2.1	55	53	(-0)	58.4	60	-1.6	62.2	60.2	(-2)
12 Moolua Ave	1	N	51.7	55	-3.3	55	52	(-0)	57.2	60	-2.8	61	59	(-2)
12 Moolua Ave	2	N	55.2	55	0.2	56.6	54.6	1	60.7	60	0.7	63.7	61.7	(-1)
12 Moolua Ave	1	W	55.2	55	0.2	57.6	55.6	(-0)	60.7	60	0.7	64.6	62.6	(-2)
12 Moolua Ave	2	W	58.2	55	3.2	59.8	57.8	0	63.6	60	3.6	66.9	64.9	(-1)
12 Pontresina Ave	1	S	53.7	55	-1.3	55.7	53.7	0	59.2	60	-0.8	62.8	60.8	(-2)

Address	Floor	Dir	NIGHT						DAY					
			LAeq(9hr)	Criterion	Exceedance	Allowance	2017 Night	Increase/	LAeq(15hr)	Criterion	Exceedance	Allowance	2017 Day	Increase/
						Criteria	No Bypass	(- Decrease)				Criteria	No Bypass	(- Decrease)
12 Pontresina Ave	1	W	54.1	55	-0.9	55.9	53.9	0	59.6	60	-0.4	63	61	(-1)
12 Rose St	1	E	55.4	55	0.4	57.8	55.8	(-0)	60.9	60	0.9	64.9	62.9	(-2)
12 Rose St	2	E	58.6	55	3.6	61.3	59.3	(-1)	64.2	60	4.2	68.4	66.4	(-2)
12 Rose St	1	S	53.2	55	-1.8	56.5	54.5	(-1)	58.8	60	-1.2	63.6	61.6	(-3)
12 Rose St	2	S	55.7	55	0.7	58.8	56.8	(-1)	61.3	60	1.3	65.9	63.9	(-3)
13 Flamingo Pl	1	N	46.3	55	-8.7	55	46.7	(-0)	51.9	60	-8.1	60	53.9	(-2)
13 Flamingo Pl	1	S	49.9	55	-5.1	55	49.4	1	55.5	60	-4.5	60	56.6	(-1)
13 Flamingo Pl	1	W	49.8	55	-5.2	55	49.5	0	55.3	60	-4.7	60	56.7	(-1)
13 Moolua Ave	1	W	55.5	55	0.5	58	56	(-1)	61	60	1	65.1	63.1	(-2)
13 Rose St	1	E	54.2	55	-0.8	57.5	55.5	(-1)	59.8	60	-0.2	64.8	62.8	(-3)
13 Rose St	1	N	53.5	55	-1.5	56.5	54.5	(-1)	59	60	-1	63.7	61.7	(-3)
131 Kennedy Dr	1	S	51.3	55	-3.7	68.3	66.3	(-15)	56.9	60	-3.1	76.3	74.3	(-17)
14 Jalibah Ave	1	N	49.9	55	-5.1	55	49.1	1	55.4	60	-4.6	60	56.3	(-1)
14 Moolua Ave	1	W	55.7	55	0.7	58.2	56.2	(-1)	61.2	60	1.2	65.3	63.3	(-2)
14 Moolua Ave	2	W	59.1	55	4.1	61	59	0	64.6	60	4.6	68	66	(-1)
14 Rose St	1	E	55.8	55	0.8	58.7	56.7	(-1)	61.2	60	1.2	65.8	63.8	(-3)
14 Rose St	1	N	55.5	55	0.5	58.3	56.3	(-1)	61	60	1	65.3	63.3	(-2)
15 Flamingo Pl	1	N	46	55	-9	55	46.5	(-1)	51.6	60	-8.4	60	53.6	(-2)
15 Flamingo Pl	1	S	49.8	55	-5.2	55	49.4	0	55.4	60	-4.6	60	56.5	(-1)
15 Moolua Ave	1	W	56	55	1	58.4	56.4	(-0)	61.5	60	1.5	65.5	63.5	(-2)
15 Rose St Unit 4-6	1	E	53.3	55	-1.7	56.8	54.8	(-2)	58.9	60	-1.1	64	62	(-3)
15 Rose St Unit 4-6	2	E	56.1	55	1.1	59.5	57.5	(-1)	61.6	60	1.6	66.7	64.7	(-3)
15 Rose St Units 1-3	1	E	53.1	55	-1.9	57	55	(-2)	58.7	60	-1.3	64.3	62.3	(-4)
15 Rose St Units 1-3	2	E	55.9	55	0.9	59.6	57.6	(-2)	61.4	60	1.4	66.9	64.9	(-4)
16 Jalibah Ave	1	S	54.5	55	-0.5	57	55	(-1)	60	60	0	64.2	62.2	(-2)
16 Jalibah Ave	1	W	53.5	55	-1.5	55.7	53.7	(-0)	59	60	-1	62.9	60.9	(-2)
16 Minore Pl	1	N	46	55	-9	55	46.9	(-1)	51.5	60	-8.5	60	54	(-3)
16 Moolua Ave	1	W	55.9	55	0.9	58.4	56.4	(-1)	61.4	60	1.4	65.5	63.5	(-2)
16 Rose St	1	E	53	55	-2	56.2	54.2	(-1)	58.5	60	-1.5	63.3	61.3	(-3)
17 Flamingo Pl	1	N	46.4	55	-8.6	55	46.6	(-0)	51.9	60	-8.1	60	53.8	(-2)

Address	Floor	Dir	NIGHT						DAY					
						Allowance	2017 Night	Increase/				Allowance	2017 Day	Increase/
			LAeq(9hr)	Criterion	Exceedance	Criteria	No Bypass	(- Decrease)	LAeq(15hr)	Criterion	Exceedance	Criteria	No Bypass	(- Decrease)
17 Flamingo Pl	1	S	50.3	55	-4.7	55	49.9	0	55.8	60	-4.2	60	57.1	(-1)
17 Moolua Ave	1	S	56.4	55	1.4	58.4	56.4	0	61.9	60	1.9	65.6	63.6	(-2)
17 Moolua Ave	2	S	59.9	55	4.9	62.2	60.2	(-0)	65.4	60	5.4	69.3	67.3	(-2)
17 Moolua Ave	1	W	55.6	55	0.6	57.9	55.9	(-0)	61.1	60	1.1	65.1	63.1	(-2)
17 Moolua Ave	2	W	59.3	55	4.3	61.4	59.4	(-0)	64.8	60	4.8	68.6	66.6	(-2)
17 Rose St	1	E	51	55	-4	55.3	53.3	(-2)	56.5	60	-3.5	62.7	60.7	(-4)
18 Minore Pl	1	W	49.8	55	-5.2	55	49.1	1	55.3	60	-4.7	60	56.2	(-1)
18 Rose St	1	E	52.2	55	-2.8	55.4	53.4	(-1)	57.7	60	-2.3	62.7	60.7	(-3)
18 Rose St	1	S	50.3	55	-4.7	55.2	53.2	(-3)	55.9	60	-4.1	62.5	60.5	(-5)
19 Flamingo Pl	1	N	45.9	55	-9.1	55	46.3	(-0)	51.5	60	-8.5	60	53.4	(-2)
19 Flamingo Pl	1	S	49.9	55	-5.1	55	49.5	0	55.4	60	-4.6	60	56.7	(-1)
19 Minore Pl	1	NW	47.9	55	-7.1	55	48.2	(-0)	53.4	60	-6.6	60	55.3	(-2)
19 Rose St	1	E	51.3	55	-3.7	56.6	54.6	(-3)	56.9	60	-3.1	64	62	(-5)
2 Honeysuckle St	1	E	64.3	55	9.3	66.8	64.8	(-1)	69.9	60	9.9	74.1	72.1	(-2)
2 Honeysuckle St	1	N	62.6	55	7.6	63.9	61.9	1	68	60	8	70.9	68.9	(-1)
2 Martel Pl	1	S	50.2	55	-4.8	55	49.9	0	55.7	60	-4.3	60	57	(-1)
2 Pontresina Ave	1	W	55.4	55	0.4	58.5	56.5	(-1)	60.9	60	0.9	65.5	63.5	(-3)
20 Minore Pl	1	NW	50.2	55	-4.8	55	49.8	0	55.6	60	-4.4	60	56.9	(-1)
20 Rose St	1	E	52.1	55	-2.9	55.8	53.8	(-2)	57.6	60	-2.4	63.1	61.1	(-4)
20 Rose St	1	N	52.2	55	-2.8	55.5	53.5	(-1)	57.8	60	-2.2	62.8	60.8	(-3)
21 Flamingo Pl	1	N	46.3	55	-8.7	55	46.2	0	51.8	60	-8.2	60	53.4	(-2)
21 Flamingo Pl	1	S	49.8	55	-5.2	55	49.4	0	55.4	60	-4.6	60	56.5	(-1)
21 Minore Pl	1	NW	49.4	55	-5.6	55	49	0	54.9	60	-5.1	60	56	(-1)
22 Kiata Pde	1	N	45.2	55	-9.8	55	45.7	(-1)	50.8	60	-9.2	60	52.8	(-2)
22 Kiata Pde	1	S	49.9	55	-5.1	55	48.7	1	55.4	60	-4.6	60	55.8	(-0)
22 Minore Pl	1	W	50.7	55	-4.3	55	50.3	0	56.2	60	-3.8	60	57.4	(-1)
22 Rose St	1	E	51.5	55	-3.5	56.9	54.9	(-3)	57.1	60	-2.9	64.2	62.2	(-5)
22 Rose St	1	N	51.2	55	-3.8	55	52.3	(-1)	56.8	60	-3.2	61.6	59.6	(-3)
24 Kiata Pde	1	S	51	55	-4	55	49.8	1	56.4	60	-3.6	60	56.9	(-1)
24 Parks Dve	1	N	47.1	55	-7.9	55	47.4	(-0)	52.7	60	-7.3	60	54.6	(-2)
24 Parks Dve	1	S	52.1	55	-2.9	55	52	0	57.6	60	-2.4	61.1	59.1	(-2)

Address	Floor	Dir	NIGHT						DAY					
			LAeq(9hr)	Criterion	Exceedance	Allowance	2017 Night	Increase/	LAeq(15hr)	Criterion	Exceedance	Allowance	2017 Day	Increase/
						Criteria	No Bypass	(- Decrease)				Criteria	No Bypass	(- Decrease)
24 Rose St	1	E	49.3	55	-5.7	55	52.8	(-4)	54.9	60	-5.1	62.2	60.2	(-5)
25 Kiata	1	N	47.6	55	-7.4	55	47.8	(-0)	53.1	60	-6.9	60	54.9	(-2)
26 Kiata Pde	1	S	51.6	55	-3.4	55	50.5	1	57.1	60	-2.9	60	57.6	(-1)
26 Parks Dve	1	N	47	55	-8	55	47	0	52.6	60	-7.4	60	54.2	(-2)
26 Parks Dve	1	S	52	55	-3	55	51.8	0	57.5	60	-2.5	61	59	(-2)
27 Kiata Pde	1	N	48.3	55	-6.7	55	48.5	(-0)	53.9	60	-6.1	60	55.6	(-2)
28 Kiata Pde	1	SW	52	55	-3	55	51.3	1	57.5	60	-2.5	60.4	58.4	(-1)
28 Parks Dve	1	N	45.6	55	-9.4	55	45.7	(-0)	51.2	60	-8.8	60	52.9	(-2)
28 Parks Dve	2	N	49.1	55	-5.9	55	48.6	1	54.7	60	-5.3	60	55.8	(-1)
28 Parks Dve	1	S	51.5	55	-3.5	55	51.1	0	57	60	-3	60.3	58.3	(-1)
28 Parks Dve	2	S	54.4	55	-0.6	56.4	54.4	0	60	60	0	63.6	61.6	(-2)
29 Kiata Pde	1	N	49.5	55	-5.5	55	49.7	(-0)	55	60	-5	60	56.7	(-2)
29 Kiata Pde	1	S	51.3	55	-3.7	55	50.2	1	56.8	60	-3.2	60	57.3	(-1)
3 Jalibah Ave	1	N	49.2	55	-5.8	55	48.6	1	54.7	60	-5.3	60	55.8	(-1)
3 Martel Pl	1	SW	50.5	55	-4.5	55	50.4	0	56	60	-4	60	57.5	(-2)
3 Pontresina Ave	1	W	55	55	0	57.8	55.8	(-1)	60.5	60	0.5	64.8	62.8	(-2)
3 Rose St	1	E	58.2	55	3.2	62.3	60.3	(-2)	63.7	60	3.7	69.8	67.8	(-4)
30 Kiata Pde	1	SW	52.3	55	-2.7	55	51.7	1	57.8	60	-2.2	60.7	58.7	(-1)
30 Parks Dve	1	N	46.9	55	-8.1	55	47.1	(-0)	52.5	60	-7.5	60	54.3	(-2)
30 Parks Dve	1	S	51.3	55	-3.7	55	51.2	0	56.9	60	-3.1	60.4	58.4	(-2)
31 Kiata Pde	1	N	49.4	55	-5.6	55	50	(-1)	54.9	60	-5.1	60	57.1	(-2)
31 Kiata Pde	1	S	51.6	55	-3.4	55	50.8	1	57.1	60	-2.9	60	57.8	(-1)
32 Kiata Pde	1	SW	52.3	55	-2.7	55	52.1	0	57.7	60	-2.3	61.1	59.1	(-1)
32 Parks Dve	1	S	51.2	55	-3.8	55	51.1	0	56.8	60	-3.2	60.3	58.3	(-2)
32 Parks Dve	2	S	53.9	55	-1.1	56.1	54.1	(-0)	59.4	60	-0.6	63.3	61.3	(-2)
33 Kiata Pde	1	N	49.6	55	-5.4	55	51	(-1)	55.1	60	-4.9	60	58	(-3)
33 Kiata Pde	1	S	53.1	55	-1.9	55	52.8	0	58.6	60	-1.4	61.8	59.8	(-1)
33 Kiata Pde	1	W	52.5	55	-2.5	55	53	(-1)	58.1	60	-1.9	62	60	(-2)
34 Parks Dve	1	N	47.1	55	-7.9	55	46.9	0	52.6	60	-7.4	60	54	(-1)
34 Parks Dve	1	W	50.4	55	-4.6	55	50.4	0	55.9	60	-4.1	60	57.6	(-2)
34 Kiata Pde	1	SW	52.4	55	-2.6	55	52.8	(-0)	57.9	60	-2.1	61.8	59.8	(-2)
34 Meridian Way	1	W	49.4	55	-5.6	55	52.8	(-3)	55	60	-5	62.3	60.3	(-5)

Address	Floor	Dir	NIGHT						DAY					
			L _{Aeq} (9hr)	Criterion	Exceedance	Allowance	2017 Night	Increase/	L _{Aeq} (15hr)	Criterion	Exceedance	Allowance	2017 Day	Increase/
						Criteria	No Bypass	(- Decrease)				Criteria	No Bypass	(- Decrease)
35 Meridian Way	1	W	51.4	55	-3.6	55	52.5	(-1)	57	60	-3	61.8	59.8	(-3)
36 Kiata Pde	1	NW	48.9	55	-6.1	55	49	(-0)	54.4	60	-5.6	60	56.1	(-2)
36 Meridian Way	1	W	51.4	55	-3.6	55	52.4	(-1)	57	60	-3	61.8	59.8	(-3)
37 Kiata Pde	1	S	54.4	55	-0.6	56.9	54.9	(-1)	59.9	60	-0.1	63.9	61.9	(-2)
37 Kiata Pde	1	W	54.1	55	-0.9	57.1	55.1	(-1)	59.6	60	-0.4	64.1	62.1	(-3)
37 Meridian Way	1	W	51.5	55	-3.5	55	52.6	(-1)	57.1	60	-2.9	61.9	59.9	(-3)
38 Kiata Pde	1	W	52.2	55	-2.8	55	52.9	(-1)	57.7	60	-2.3	62	60	(-2)
38 Meridian Way	1	W	51.5	55	-3.5	55	52.3	(-1)	57.1	60	-2.9	61.7	59.7	(-3)
4 Flamingo Pl Units 1-4	1	W	50.4	55	-4.6	55	50.5	(-0)	55.9	60	-4.1	60	57.7	(-2)
4 Flamingo Pl Units 1-4	2	W	54.2	55	-0.8	55.9	53.9	0	59.7	60	-0.3	63.1	61.1	(-1)
4 Flamingo Pl Units 12-15	1	N	47.5	55	-7.5	55	47.1	0	53.1	60	-6.9	60	54.2	(-1)
4 Flamingo Pl Units 5-8	1	N	47.6	55	-7.4	55	47.2	0	53.2	60	-6.8	60	54.3	(-1)
4 Flamingo Pl Units 5-8	1	W	49.6	55	-5.4	55	49.6	0	55.1	60	-4.9	60	56.7	(-2)
4 Flamingo Pl Units 9-11	1	N	47.6	55	-7.4	55	47.1	1	53.2	60	-6.8	60	54.3	(-1)
4 Honeysuckle St	1	E	63	55	8	65.1	63.1	(-0)	68.5	60	8.5	72.2	70.2	(-2)
4 Honeysuckle St	2	E	64.9	55	9.9	66.7	64.7	0	70.4	60	10.4	73.8	71.8	(-1)
4 Honeysuckle St	1	N	62.4	55	7.4	64.1	62.1	0	67.7	60	7.7	71	69	(-1)
4 Honeysuckle St	2	N	64.2	55	9.2	65.6	63.6	1	69.7	60	9.7	72.6	70.6	(-1)
4 Honeysuckle St	1	S	57.3	55	2.3	64	62	(-5)	62.8	60	2.8	71.5	69.5	(-7)
4 Honeysuckle St	2	S	59	55	4	65.4	63.4	(-4)	64.6	60	4.6	72.9	70.9	(-6)
4 Jalibah Ave	1	N	47.9	55	-7.1	55	47.3	1	53.5	60	-6.5	60	54.4	(-1)
4 Jalibah Ave	1	S	51.3	55	-3.7	55	51.4	(-0)	56.8	60	-3.2	60.6	58.6	(-2)
4 Martel Pl	1	W	50.8	55	-4.2	55	50.2	1	56.3	60	-3.7	60	57.2	(-1)
4 Pontresina Ave	1	W	54.5	55	-0.5	57.1	55.1	(-1)	60	60	0	64.1	62.1	(-2)
4 Rose St	1	E	59.8	55	4.8	63.9	61.9	(-2)	65.3	60	5.3	71.4	69.4	(-4)
4 Rose St	1	N	61.5	55	6.5	65.6	63.6	(-2)	67	60	7	73.1	71.1	(-4)

Address	Floor	Dir	NIGHT						DAY					
			LAeq(9hr)	Criterion	Exceedance	Allowance	2017 Night	Increase/	LAeq(15hr)	Criterion	Exceedance	Allowance	2017 Day	Increase/
						Criteria	No Bypass	(- Decrease)				Criteria	No Bypass	(- Decrease)
41 Kiata Pde	1	S	53.1	55	-1.9	55.8	53.8	(-1)	58.6	60	-1.4	62.8	60.8	(-2)
41 Kiata Pde	1	W	54.8	55	-0.2	59.4	57.4	(-3)	60.3	60	0.3	66.5	64.5	(-4)
42 Kiata Pde	1	W	52.5	55	-2.5	55.1	53.1	(-1)	57.9	60	-2.1	62.1	60.1	(-2)
42 Kiata Pde	2	W	55.7	55	0.7	57.7	55.7	0	61.1	60	1.1	64.7	62.7	(-2)
43 Kiata Pde	1	W	52.9	55	-2.1	57.1	55.1	(-2)	58.4	60	-1.6	64.1	62.1	(-4)
44 Kiata Pde	1	N	51.2	55	-3.8	55	51.6	(-0)	56.7	60	-3.3	60.6	58.6	(-2)
44 Kiata Pde	1	W	52.8	55	-2.2	55.3	53.3	(-1)	58.2	60	-1.8	62.4	60.4	(-2)
45 Kiata Pde	1	W	53.6	55	-1.4	57.7	55.7	(-2)	59.1	60	-0.9	64.7	62.7	(-4)
46 Kiata Pde	1	SW	52.4	55	-2.6	55	52.6	(-0)	57.8	60	-2.2	61.6	59.6	(-2)
47 Kiata Pde	1	W	53.3	55	-1.7	57.4	55.4	(-2)	58.8	60	-1.2	64.4	62.4	(-4)
48 Kiata Pde	1	N	51	55	-4	55	50.8	0	56.4	60	-3.6	60	57.8	(-1)
49 Kiata Pde	1	W	53	55	-2	57.4	55.4	(-2)	58.5	60	-1.5	64.4	62.4	(-4)
5 Flamingo Pl	1	W	51.6	55	-3.4	55	50.9	1	57.1	60	-2.9	60	57.9	(-1)
5 Honeysuckle St	1	E	64.2	55	9.2	66.2	64.2	0	69.7	60	9.7	73.1	71.1	(-1)
5 Honeysuckle St	1	N	64.1	55	9.1	66.2	64.2	(-0)	69.7	60	9.7	73.2	71.2	(-2)
5 Jalibah Ave	1	N	49.4	55	-5.6	55	48.9	1	55	60	-5	60	56.1	(-1)
5 Martel Pl	1	NW	50.7	55	-4.3	55	50.2	1	56.2	60	-3.8	60	57.3	(-1)
5 Pontresina Ave	1	W	54	55	-1	56.5	54.5	(-1)	59.5	60	-0.5	63.5	61.5	(-2)
5 Rose St	1	E	56.9	55	1.9	60.6	58.6	(-2)	62.4	60	2.4	68	66	(-4)
50 Kiata Pde	1	N	49.6	55	-5.4	55	49.8	(-0)	55.1	60	-4.9	60	56.8	(-2)
51 Kiata Pde	1	W	53.9	55	-1.1	59.8	57.8	(-4)	59.3	60	-0.7	66.9	64.9	(-6)
52 Kiata Pde	1	N	48.9	55	-6.1	55	49.4	(-1)	54.4	60	-5.6	60	56.5	(-2)
53 Kiata Pde	1	W	53.1	55	-1.9	58.9	56.9	(-4)	58.5	60	-1.5	66	64	(-6)
54 Kiata Pde	1	N	48.3	55	-6.7	55	48.9	(-1)	53.8	60	-6.2	60	56	(-2)
55 Kiata Pde	1	W	53.9	55	-1.1	59.1	57.1	(-3)	59.3	60	-0.7	66.1	64.1	(-5)
57 Kiata Pde	1	W	54.4	55	-0.6	59.2	57.2	(-3)	59.8	60	-0.2	66.3	64.3	(-5)
59 Kiata Pde	1	W	54.6	55	-0.4	58.7	56.7	(-2)	59.9	60	-0.1	65.7	63.7	(-4)
6 Honeysuckle St	1	E	55.5	55	0.5	58.7	56.7	(-1)	60.9	60	0.9	65.9	63.9	(-3)
6 Honeysuckle St	2	E	58.2	55	3.2	61.6	59.6	(-1)	63.8	60	3.8	68.8	66.8	(-3)
6 Honeysuckle	1	N	59.2	55	4.2	61.4	59.4	(-0)	64.6	60	4.6	68.4	66.4	(-2)

Address	Floor	Dir	NIGHT						DAY					
			L _{Aeq} (9hr)	Criterion	Exceedance	Allowance	2017 Night	Increase/	L _{Aeq} (15hr)	Criterion	Exceedance	Allowance	2017 Day	Increase/
						Criteria	No Bypass	(- Decrease)				Criteria	No Bypass	(- Decrease)
St														
6 Honeysuckle St	2	N	61.3	55	6.3	63.9	61.9	(-1)	66.7	60	6.7	70.9	68.9	(-2)
6 Honeysuckle St	1	S	54.4	55	-0.6	60.6	58.6	(-4)	60	60	0	68.1	66.1	(-6)
6 Honeysuckle St	2	S	56.2	55	1.2	62.2	60.2	(-4)	61.8	60	1.8	69.7	67.7	(-6)
6 Jalibah Ave	1	N	48.4	55	-6.6	55	47.9	1	53.9	60	-6.1	60	55	(-1)
6 Jalibah Ave	1	S	51.7	55	-3.3	55	51.8	(-0)	57.2	60	-2.8	61	59	(-2)
6 Martel Pl	1	N	48.5	55	-6.5	55	49.1	(-1)	54	60	-6	60	56.2	(-2)
6 Pontresina Ave	1	W	52.7	55	-2.3	55	52.3	0	58.2	60	-1.8	61.3	59.3	(-1)
6 Rose St	1	E	56.5	55	1.5	60.2	58.2	(-2)	62	60	2	67.6	65.6	(-4)
6 Rose St	1	N	58.3	55	3.3	62.2	60.2	(-2)	63.8	60	3.8	69.8	67.8	(-4)
6 Rose St	1	S	55.6	55	0.6	58.3	56.3	(-1)	61	60	1	65.4	63.4	(-2)
61 Kiata Pde	1	W	54.3	55	-0.7	58.3	56.3	(-2)	59.7	60	-0.3	65.3	63.3	(-4)
63 Kiata Pde	1	S	53.3	55	-1.7	56.5	54.5	(-1)	58.7	60	-1.3	63.5	61.5	(-3)
63 Kiata Pde	1	SW	54	55	-1	59.7	57.7	(-4)	59.5	60	-0.5	66.7	64.7	(-5)
63 Kiata Pde	1	W	54.9	55	-0.1	62.4	60.4	(-6)	60.3	60	0.3	69.7	67.7	(-7)
65 Kiata Pde	1	W	51.1	55	-3.9	56.2	54.2	(-3)	56.6	60	-3.4	63.2	61.2	(-5)
65 Kiata Pde	1	W	51.4	55	-3.6	55.8	53.8	(-2)	56.9	60	-3.1	62.8	60.8	(-4)
67 Kiata Pde	1	N	49.2	55	-5.8	55	52.4	(-3)	54.7	60	-5.3	61.6	59.6	(-5)
67 Kiata Pde	1	S	51.8	55	-3.2	55	51.4	0	57.2	60	-2.8	60.4	58.4	(-1)
69 Kiata Pde	1	N	48.7	55	-6.3	55	51.8	(-3)	54.1	60	-5.9	60.9	58.9	(-5)
69 Kiata Pde	1	S	51.7	55	-3.3	55	50.8	1	57.1	60	-2.9	60	57.8	(-1)
7 Flamingo Pl	1	NW	50.2	55	-4.8	55	49.5	1	55.7	60	-4.3	60	56.5	(-1)
7 Flamingo Pl	2	NW	53.7	55	-1.3	55	52.2	2	59.1	60	-0.9	61.2	59.2	(-0)
7 Honeysuckle St	1	N	59.3	55	4.3	61.4	59.4	(-0)	64.8	60	4.8	68.4	66.4	(-2)
7 Honeysuckle St	1	S	56.9	55	1.9	59.4	57.4	(-1)	62.4	60	2.4	66.5	64.5	(-2)
7 Jalibah Ave	1	N	50	55	-5	55	49.5	1	55.5	60	-4.5	60	56.7	(-1)
7 Jalibah Ave	1	S	56.7	55	1.7	59.5	57.5	(-1)	62.2	60	2.2	66.7	64.7	(-3)
7 Jalibah Ave	1	W	55.7	55	0.7	58.3	56.3	(-1)	61.3	60	1.3	65.4	63.4	(-2)
7 Martel Pl	1	N	50.1	55	-4.9	55	50.1	0	55.6	60	-4.4	60	57.2	(-2)

Address	Floor	Dir	NIGHT						DAY					
			LAeq(9hr)	Criterion	Exceedance	Allowance	2017 Night	Increase/	LAeq(15hr)	Criterion	Exceedance	Allowance	2017 Day	Increase/
						Criteria	No Bypass	(- Decrease)				Criteria	No Bypass	(- Decrease)
7 Pontresina Ave	1	NW	50.2	55	-4.8	55	49.7	1	55.8	60	-4.2	60	56.8	(-1)
7 Pontresina Ave	1	SW	52.7	55	-2.3	55	52.2	1	58.2	60	-1.8	61.2	59.2	(-1)
7 Rose St	1	E	55.4	55	0.4	58.8	56.8	(-1)	60.9	60	0.9	66.2	64.2	(-3)
71 Kiata Pde	1	N	47.8	55	-7.2	55	49.9	(-2)	53.3	60	-6.7	60	56.9	(-4)
71 Kiata Pde	1	S	51.1	55	-3.9	55	50.2	1	56.6	60	-3.4	60	57.2	(-1)
73 Kiata Pde	1	N	47.8	55	-7.2	55	49.5	(-2)	53.3	60	-6.7	60	56.5	(-3)
73 Kiata Pde	1	S	50.4	55	-4.6	55	49.4	1	55.9	60	-4.1	60	56.5	(-1)
74 Ducati St	1	W	54.4	55	-0.6	57	55	(-1)	60	60	0	64.2	62.2	(-2)
76 Ducati St	1	W	54.7	55	-0.3	57.3	55.3	(-1)	60.3	60	0.3	64.5	62.5	(-2)
78 Ducati St	1	W	54.9	55	-0.1	57.4	55.4	(-1)	60.4	60	0.4	64.6	62.6	(-2)
78 Ducati St	2	W	55.9	55	0.9	58.8	56.8	(-1)	61.5	60	1.5	66	64	(-3)
79 Ducati St	1	SW	50.1	55	-4.9	55	50.3	(-0)	55.7	60	-4.3	60	57.5	(-2)
8 Flamingo Pl	1	N	47	55	-8	55	46.7	0	52.6	60	-7.4	60	53.9	(-1)
8 Honeysuckle St	1	N	57.8	55	2.8	60.1	58.1	(-0)	63.2	60	3.2	67.1	65.1	(-2)
8 Honeysuckle St	2	N	59.9	55	4.9	62.7	60.7	(-1)	65.4	60	5.4	69.7	67.7	(-2)
8 Honeysuckle St	1	S	50.6	55	-4.4	57.2	55.2	(-5)	56.2	60	-3.8	64.7	62.7	(-7)
8 Honeysuckle St	2	S	53.6	55	-1.4	59.5	57.5	(-4)	59.2	60	-0.8	66.9	64.9	(-6)
8 Jalibah Ave	1	N	48.4	55	-6.6	55	47.9	1	54	60	-6	60	55.1	(-1)
8 Jalibah Ave	1	S	51.9	55	-3.1	55	52	(-0)	57.4	60	-2.6	61.2	59.2	(-2)
8 Kiata Pde	1	N	50.2	55	-4.8	55	50.9	(-1)	55.6	60	-4.4	60	57.9	(-2)
8 Kiata Pde	1	W	52.2	55	-2.8	55	52.9	(-1)	57.6	60	-2.4	61.9	59.9	(-2)
8 Pontresina Ave	1	W	52.2	55	-2.8	55	51.5	1	57.7	60	-2.3	60.6	58.6	(-1)
8 Rose St	1	E	56.7	55	1.7	59.2	57.2	(-1)	62.2	60	2.2	66.3	64.3	(-2)
8 Rose St	1	N	54.6	55	-0.4	56.9	54.9	(-0)	60.1	60	0.1	64.1	62.1	(-2)
80 Ducati St	1	W	55	55	0	57.5	55.5	(-1)	60.5	60	0.5	64.7	62.7	(-2)
81 Ducati St	1	S	55.1	55	0.1	57.9	55.9	(-1)	60.7	60	0.7	65.1	63.1	(-2)
81 Ducati St	1	W	54.9	55	-0.1	57.7	55.7	(-1)	60.4	60	0.4	64.9	62.9	(-3)
82 Caloola Dve	1	N	49.7	55	-5.3	55	51.2	(-2)	55.3	60	-4.7	60.4	58.4	(-3)
82 Ducati St	1	W	55	55	0	57.7	55.7	(-1)	60.5	60	0.5	64.9	62.9	(-2)

Address	Floor	Dir	NIGHT						DAY					
			L _{Aeq} (9hr)	Criterion	Exceedance	Allowance	2017 Night	Increase/	L _{Aeq} (15hr)	Criterion	Exceedance	Allowance	2017 Day	Increase/
						Criteria	No Bypass	(- Decrease)				Criteria	No Bypass	(- Decrease)
82 Ducati St	2	W	56.3	55	1.3	59.3	57.3	(-1)	61.9	60	1.9	66.6	64.6	(-3)
84 Caloola Dve	1	S	51.2	55	-3.8	55	51	0	56.7	60	-3.3	60.1	58.1	(-1)
84 Ducati St	1	W	55	55	0	57.7	55.7	(-1)	60.6	60	0.6	64.9	62.9	(-2)
86 Ducati St	1	W	55.2	55	0.2	57.9	55.9	(-1)	60.7	60	0.7	65.1	63.1	(-2)
88 Caloola Dve	1	NW	50.1	55	-4.9	55	49.9	0	55.6	60	-4.4	60	57	(-1)
88 Ducati St	1	W	54.9	55	-0.1	57.7	55.7	(-1)	60.5	60	0.5	64.9	62.9	(-2)
9 Flamingo Pl	1	N	48.6	55	-6.4	55	47.9	1	54.1	60	-5.9	60	54.9	(-1)
9 Flamingo Pl	2	N	51.9	55	-3.1	55	50.6	1	57.4	60	-2.6	60	57.7	(-0)
9 Jalibah Ave	1	N	50.2	55	-4.8	55	49.7	1	55.7	60	-4.3	60	56.9	(-1)
9 Jalibah Ave	1	S	56.3	55	1.3	59.1	57.1	(-1)	61.9	60	1.9	66.3	64.3	(-2)
9 Pontresina Ave	1	W	53	55	-2	55	52.6	0	58.5	60	-1.5	61.7	59.7	(-1)
9 Rose St	1	E	54.8	55	-0.2	58	56	(-1)	60.3	60	0.3	65.4	63.4	(-3)
90 Ducati St	1	W	55	55	0	58	56	(-1)	60.5	60	0.5	65.4	63.4	(-3)
92 Ducati St	1	W	55.2	55	0.2	58.6	56.6	(-1)	60.8	60	0.8	65.9	63.9	(-3)
94 Ducati St	1	W	55.4	55	0.4	59	57	(-2)	61	60	1	66.4	64.4	(-3)
95 Ducati St	1	W	58.8	55	3.8	61	59	(-0)	64.4	60	4.4	68.2	66.2	(-2)
96 Ducati St	1	W	55.6	55	0.6	59.9	57.9	(-2)	61.2	60	1.2	67.3	65.3	(-4)
98 Ducati St	1	W	55.2	55	0.2	59.7	57.7	(-3)	60.8	60	0.8	67.1	65.1	(-4)
99 Ducati St	1	W	57.3	55	2.3	59.3	57.3	0	62.8	60	2.8	66.5	64.5	(-2)
Caravan Worst Affected	1	E	56.6	55	1.6	60.5	58.5	(-2)	62.2	60	2.2	68	66	(-4)
Caravan Worst Affected	1	N	56.2	55	1.2	60	58	(-2)	61.7	60	1.7	67.5	65.5	(-4)
Ducati St Shops	1	W	56	55	1	62.8	60.8	(-5)	61.6	60	1.6	70.3	68.3	(-7)
Kennedy Dr 'B'	1	S	54.8	55	-0.2	71.2	69.2	(-14)	60.4	60	0.4	79.6	77.6	(-17)
Kennedy Dr 'C'	1	S	52.6	55	-2.4	68.7	66.7	(-14)	58.2	60	-1.8	76.7	74.7	(-17)
Kennedy Drive 'A'	1	E	58.8	55	3.8	66	64	(-5)	64.4	60	4.4	73.6	71.6	(-7)
Kennedy Drive 'A'	2	E	60.1	55	5.1	67.3	65.3	(-5)	65.7	60	5.7	74.7	72.7	(-7)
Kennedy Drive 'A'	1	N	53.9	55	-1.1	58.7	56.7	(-3)	59.4	60	-0.6	66.2	64.2	(-5)
Kennedy Drive 'A'	2	N	56.5	55	1.5	60.8	58.8	(-2)	62.1	60	2.1	68.2	66.2	(-4)
Kennedy Drive	1	S	54.8	55	-0.2	68.6	66.6	(-12)	60.4	60	0.4	76.7	74.7	(-14)

Address	Floor	Dir	NIGHT						DAY					
			L _{Aeq} (9hr)	Criterion	Exceedance	Allowance	2017 Night	Increase/	L _{Aeq} (15hr)	Criterion	Exceedance	Allowance	2017 Day	Increase/
						Criteria	No Bypass	(- Decrease)				Criteria	No Bypass	(- Decrease)
'A' Kennedy Drive 'A' Service Station - BP	2 1	S S	56 58.4	55 55	1 3.4	69.9 67.9	67.9 65.9	(-12) (-8)	61.7 64	60 60	1.7 4	77.9 76.5	75.9 74.5	(-14) (-11)
			# exceed Night Base Criteria						# exceed Day Base Criteria					
			57						67					
			# exceed Night Allowance Criteria						# exceed Day Allowance Criteria					
			0						0					
			No. of Residences Acute >60 dB(A) Night						No. of Residences Acute >65 dB(A) Day					
			6						11					

Appendix M

Predicted Traffic Noise Levels in NSW, 2017, with Tugun Bypass (With Mitigation)

Appendix M:

Table M1: Predicted Traffic Noise Levels in NSW, 2017, with Tugun Bypass (With Mitigation).

Name	Floor	Dir	NIGHT						DAY					
			LAeq(9hour)	Base	Exceedance	2017 Night	Allowance	Increase/	LAeq(15hr)	Base	Exceedance	2017 Day	Allowance	Increase/
			dB(A)	Criteria	amount	No Bypass	Criteria	(- Decrease)	dB(A)	Criteria	amount	No Bypass	Criteria	(- Decrease)
1 Banksia St	1	E	53.8	55	-	65.4	67.4	(-12)	57.4	60	-	72.4	74.4	(-15)
	2		56.5	55	1.5	67.4	69.4	(-11)	60.1	60	0.1	74.5	76.5	(-14)
1 Banksia St	1	N	54.9	55	-	66.4	68.4	(-12)	58.4	60	-	73.7	75.7	(-15)
	2		57.2	55	2.2	68.2	70.2	(-11)	60.7	60	0.7	75.6	77.6	(-15)
1 Jalibah Ave	1	N	49.1	55	-	48.5	55	0.6	52.4	60	-	55.7	60	(-3)
1 Martel Pl	1	N	50.4	55	-	49.8	55	0.6	53.5	60	-	56.9	60	(-3)
1 Pontresina Ave	1	S	54.7	55	-	55.4	57.4	(-1)	58.1	60	-	62.4	64.4	(-4)
1 Pontresina Ave	1	W	55.2	55	0.2	56.6	58.6	(-1)	58.6	60	-	63.6	65.6	(-5)
1 Rose St	1	E	53.9	55	-	61.6	63.6	(-8)	57.1	60	-	69.1	71.1	(-12)
1 Rose St	1	N	55.3	55	0.3	61.6	63.6	(-6)	58.4	60	-	69.1	71.1	(-11)
1/1&2 Flamingo Pl	1	W	50.8	55	-	50.1	55	0.7	54.1	60	-	57.2	60	(-3)
	2		54.4	55	-	53	55	1.4	57.6	60	-	60	62	(-2)
1/10 Flamingo	1	W	50.5	55	-	50.4	55	0.1	53.8	60	-	57.5	60	(-4)
1/3 Flamingo Pl	1	S	53.3	55	-	53.4	55.4	(-0)	56.6	60	-	60.5	62.5	(-4)
	2		55.6	55	0.6	55.7	57.7	(-0)	59	60	-	62.9	64.9	(-4)
1/4 Flamingo Pl	1	S	53.8	55	-	54.3	56.3	(-1)	57.1	60	-	61.5	63.5	(-4)
	2		55.8	55	0.8	55.7	57.7	0.1	59.2	60	-	62.9	64.9	(-4)
1/5 Flamingo Pl	1	S	54	55	-	54.2	56.2	(-0)	57.3	60	-	61.3	63.3	(-4)
	2		56.3	55	1.3	55.9	57.9	0.4	59.7	60	-	63.1	65.1	(-3)
1/6 Flamingo	1	W	52	55	-	51.4	55	0.6	55.4	60	-	58.5	60.5	(-3)
1/7 Flamingo	1	W	52	55	-	51.5	55	0.5	55.2	60	-	58.6	60.6	(-3)
1/8 Flamingo	1	N	50.1	55	-	49.6	55	0.5	53.4	60	-	56.7	60	(-3)
1/8 Flamingo	1	W	52	55	-	51.6	55	0.4	55.3	60	-	58.7	60.7	(-3)
1/9 Flamingo	1	W	51	55	-	50.6	55	0.4	54.4	60	-	57.7	60	(-3)
	2		54.6	55	-	53.2	55.2	1.4	57.8	60	-	60.3	62.3	(-3)

Name	Floor	Dir	NIGHT						DAY					
			LAeq(9hour)	Base	Exceedance	2017 Night	Allowance	Increase/	LAeq(15hr)	Base	Exceedance	2017 Day	Allowance	Increase/
			dB(A)	Criteria	amount	No Bypass	Criteria	(- Decrease)	dB(A)	Criteria	amount	No Bypass	Criteria	(- Decrease)
10 Flamingo Pl	1	N	47.1	55	-	46.6	55	0.5	50.4	60	-	53.7	60	(-3)
10 Jalibah Ave	1	N	48.2	55	-	48	55	0.2	51.6	60	-	55.2	60	(-4)
10 Jalibah Ave	1	S	52	55	-	52.5	55	(-1)	55.4	60	-	59.6	61.6	(-4)
10 Pontresina Ave	1	W	53.4	55	-	53.1	55.1	0.3	56.7	60	-	60.2	62.2	(-4)
10 Rose St	1	E	51	55	-	56.7	58.7	(-6)	54.2	60	-	63.9	65.9	(-10)
	2		53.4	55	-	61	63	(-8)	56.7	60	-	68.2	70.2	(-12)
10 Rose St	1	N	50.3	55	-	55.4	57.4	(-5)	53.7	60	-	62.5	64.5	(-9)
	2		54.2	55	-	59.6	61.6	(-5)	57.4	60	-	66.7	68.7	(-9)
101 Ducati St	1	W	58.5	55	3.5	60	62	(-2)	61.9	60	1.9	67.2	69.2	(-5)
103 Ducati St	1	W	57.3	55	2.3	58.6	60.6	(-1)	60.8	60	0.8	65.8	67.8	(-5)
105 Ducati St	1	W	56.8	55	1.8	58.1	60.1	(-1)	60.3	60	0.3	65.3	67.3	(-5)
107 Ducati St	1	W	57.5	55	2.5	58.9	60.9	(-1)	61	60	1	66.1	68.1	(-5)
11 Jalibah Ave	1	N	50.4	55	-	50.1	55	0.3	53.8	60	-	57.3	60	(-4)
11 Jalibah Ave	1	S	55.5	55	0.5	57	59	(-2)	58.8	60	-	64.2	66.2	(-5)
11 Jalibah Ave	1	W	54.5	55	-	55.7	57.7	(-1)	57.9	60	-	62.8	64.8	(-5)
11 Moolau Ave	1	N	52.3	55	-	51.8	55	0.5	55.7	60	-	58.9	60.9	(-3)
11 Moolau Ave	1	W	54.7	55	-	55.5	57.5	(-1)	58	60	-	62.7	64.7	(-5)
11 Pontresina Ave	1	W	53.6	55	-	53.3	55.3	0.3	57	60	-	60.4	62.4	(-3)
11 Rose St	1	E	50.3	55	-	55.4	57.4	(-5)	53.6	60	-	62.8	64.8	(-9)
	2		52.5	55	-	58.1	60.1	(-6)	55.8	60	-	65.4	67.4	(-10)
11 Rose St	1	S	46.8	55	-	52.1	55	(-5)	50.2	60	-	59.3	61.3	(-9)
	2		49.6	55	-	54.5	56.5	(-5)	52.9	60	-	61.7	63.7	(-9)
12 Flamingo	1	N	45.8	55	-	45.9	55	(-0)	49.2	60	-	53.1	60	(-4)
12 Jalibah Ave	1	N	48.5	55	-	48.4	55	0.1	52	60	-	55.6	60	(-4)
12 Jalibah Ave	1	S	52.6	55	-	53	55	(-0)	56	60	-	60.2	62.2	(-4)
12 Moolua Ave	1	N	51.7	55	-	52	55	(-0)	55.1	60	-	59	61	(-4)
	2		55.3	55	0.3	54.6	56.6	0.7	58.6	60	-	61.7	63.7	(-3)
12 Moolua Ave	1	W	55.1	55	0.1	55.6	57.6	(-1)	58.4	60	-	62.6	64.6	(-4)
	2		58.1	55	3.1	57.8	59.8	0.3	61.4	60	1.4	64.9	66.9	(-4)
12 Pontresina Ave	1	S	53.4	55	-	53.7	55.7	(-0)	56.8	60	-	60.8	62.8	(-4)

Name	Floor	Dir	NIGHT						DAY					
			LAeq(9hour)	Base	Exceedance	2017 Night	Allowance	Increase/	LAeq(15hr)	Base	Exceedance	2017 Day	Allowance	Increase/
			dB(A)	Criteria	amount	No Bypass	Criteria	(- Decrease)	dB(A)	Criteria	amount	No Bypass	Criteria	(- Decrease)
12 Pontresina Ave	1	W	54	55	-	53.9	55.9	0.1	57.3	60	-	61	63	(-4)
12 Rose St	1	E	50	55	-	55.8	57.8	(-6)	53.2	60	-	62.9	64.9	(-10)
	2		52.2	55	-	59.3	61.3	(-7)	55.5	60	-	66.4	68.4	(-11)
12 Rose St	1	S	47.9	55	-	54.5	56.5	(-7)	51.2	60	-	61.6	63.6	(-10)
	2		50.4	55	-	56.8	58.8	(-6)	53.7	60	-	63.9	65.9	(-10)
13 Flamingo Pl	1	N	46.5	55	-	46.7	55	(-0)	49.8	60	-	53.9	60	(-4)
13 Flamingo Pl	1	S	49.8	55	-	49.4	55	0.4	53.2	60	-	56.6	60	(-3)
13 Flamingo Pl	1	W	49.7	55	-	49.5	55	0.2	53.1	60	-	56.7	60	(-4)
13 Moolua Ave	1	W	55.4	55	0.4	56	58	(-1)	58.7	60	-	63.1	65.1	(-4)
13 Rose St	1	E	50.2	55	-	55.5	57.5	(-5)	53.4	60	-	62.8	64.8	(-9)
13 Rose St	1	N	49.8	55	-	54.5	56.5	(-5)	53.1	60	-	61.7	63.7	(-9)
131 Kennedy Dr	1	S	49.4	55	-	66.3	68.3	(-17)	52.8	60	-	74.3	76.3	(-22)
14 Jalibah Ave	1	N	49.9	55	-	49.1	55	0.8	53.3	60	-	56.3	60	(-3)
14 Moolua Ave	1	W	55.5	55	0.5	56.2	58.2	(-1)	58.9	60	-	63.3	65.3	(-4)
	2		59	55	4	59	61	0.0	62.3	60	2.3	66	68	(-4)
14 Rose St	1	E	50.3	55	-	56.7	58.7	(-6)	53.6	60	-	63.8	65.8	(-10)
14 Rose St	1	N	50.5	55	-	56.3	58.3	(-6)	53.8	60	-	63.3	65.3	(-10)
15 Flamingo Pl	1	N	46.2	55	-	46.5	55	(-0)	49.5	60	-	53.6	60	(-4)
15 Flamingo Pl	1	S	49.7	55	-	49.4	55	0.3	53.1	60	-	56.5	60	(-3)
15 Moolua Ave	1	W	55.9	55	0.9	56.4	58.4	(-1)	59.3	60	-	63.5	65.5	(-4)
15 Rose St Unit 4-6	1	E	49.5	55	-	54.8	56.8	(-5)	52.8	60	-	62	64	(-9)
	2		51.7	55	-	57.5	59.5	(-6)	55	60	-	64.7	66.7	(-10)
15 Rose St Units 1-3	1	E	49.3	55	-	55	57	(-6)	52.6	60	-	62.3	64.3	(-10)
	2		51.5	55	-	57.6	59.6	(-6)	54.9	60	-	64.9	66.9	(-10)
16 Jalibah Ave	1	S	54.1	55	-	55	57	(-1)	57.4	60	-	62.2	64.2	(-5)
16 Jalibah Ave	1	W	53.2	55	-	53.7	55.7	(-1)	56.6	60	-	60.9	62.9	(-4)
16 Minore Pl	1	N	46.2	55	-	46.9	55	(-1)	49.4	60	-	54	60	(-5)
16 Moolua Ave	1	W	55.8	55	0.8	56.4	58.4	(-1)	59.2	60	-	63.5	65.5	(-4)
16 Rose St	1	E	49.2	55	-	54.2	56.2	(-5)	52.5	60	-	61.3	63.3	(-9)
17 Flamingo Pl	1	N	46.5	55	-	46.6	55	(-0)	49.8	60	-	53.8	60	(-4)

Name	Floor	Dir	NIGHT						DAY					
			LAeq(9hour)	Base	Exceedance	2017 Night	Allowance	Increase/	LAeq(15hr)	Base	Exceedance	2017 Day	Allowance	Increase/
			dB(A)	Criteria	amount	No Bypass	Criteria	(- Decrease)	dB(A)	Criteria	amount	No Bypass	Criteria	(- Decrease)
17 Flamingo Pl	1	S	50.1	55	-	49.9	55	0.2	53.6	60	-	57.1	60	(-4)
17 Moolua Ave	1	S	55.3	55	0.3	56.4	58.4	(-1)	58.7	60	-	63.6	65.6	(-5)
	2		59.3	55	4.3	60.2	62.2	(-1)	62.7	60	2.7	67.3	69.3	(-5)
17 Moolua Ave	1	W	55.4	55	0.4	55.9	57.9	(-1)	58.8	60	-	63.1	65.1	(-4)
	2		59.1	55	4.1	59.4	61.4	(-0)	62.5	60	2.5	66.6	68.6	(-4)
17 Rose St	1	E	47.8	55	-	53.3	55.3	(-6)	51.1	60	-	60.7	62.7	(-10)
18 Minore Pl	1	W	49.7	55	-	49.1	55	0.6	53.1	60	-	56.2	60	(-3)
18 Rose St	1	E	49	55	-	53.4	55.4	(-4)	52.3	60	-	60.7	62.7	(-8)
18 Rose St	1	S	47.8	55	-	53.2	55.2	(-5)	51.1	60	-	60.5	62.5	(-9)
19 Flamingo Pl	1	N	46.1	55	-	46.3	55	(-0)	49.4	60	-	53.4	60	(-4)
19 Flamingo Pl	1	S	49.7	55	-	49.5	55	0.2	53.2	60	-	56.7	60	(-4)
19 Minore Pl	1	NW	48	55	-	48.2	55	(-0)	51.3	60	-	55.3	60	(-4)
19 Rose St	1	E	48.2	55	-	54.6	56.6	(-6)	51.6	60	-	62	64	(-10)
2 Honeysuckle St	1	E	56.4	55	1.4	64.8	66.8	(-8)	59.8	60	-	72.1	74.1	(-12)
2 Honeysuckle St	1	N	54.3	55	-	61.9	63.9	(-8)	57.7	60	-	68.9	70.9	(-11)
2 Martel Pl	1	S	50.3	55	-	49.9	55	0.4	53.6	60	-	57	60	(-3)
2 Pontresina Ave	1	W	55.4	55	0.4	56.5	58.5	(-1)	58.7	60	-	63.5	65.5	(-5)
20 Minore Pl	1	NW	50.3	55	-	49.8	55	0.5	53.5	60	-	56.9	60	(-3)
20 Rose St	1	E	49.1	55	-	53.8	55.8	(-5)	52.4	60	-	61.1	63.1	(-9)
20 Rose St	1	N	48.9	55	-	53.5	55.5	(-5)	52.2	60	-	60.8	62.8	(-9)
21 Flamingo Pl	1	N	46.4	55	-	46.2	55	0.2	49.7	60	-	53.4	60	(-4)
21 Flamingo Pl	1	S	49.7	55	-	49.4	55	0.3	53.1	60	-	56.5	60	(-3)
21 Minore Pl	1	NW	49.6	55	-	49	55	0.6	52.8	60	-	56	60	(-3)
22 Kiata Pde	1	N	45.2	55	-	45.7	55	(-1)	48.7	60	-	52.8	60	(-4)
22 Kiata Pde	1	S	49.8	55	-	48.7	55	1.1	53.1	60	-	55.8	60	(-3)
22 Minore Pl	1	W	50.8	55	-	50.3	55	0.5	54	60	-	57.4	60	(-3)
22 Rose St	1	E	49.1	55	-	54.9	56.9	(-6)	52.5	60	-	62.2	64.2	(-10)
22 Rose St	1	N	48.3	55	-	52.3	55	(-4)	51.6	60	-	59.6	61.6	(-8)
24 Kiata Pde	1	S	50.9	55	-	49.8	55	1.1	54.2	60	-	56.9	60	(-3)
24 Parks Dve	1	N	47	55	-	47.4	55	(-0)	50.5	60	-	54.6	60	(-4)
24 Parks Dve	1	S	51.9	55	-	52	55	(-0)	55.3	60	-	59.1	61.1	(-4)

Name	Floor	Dir	NIGHT						DAY					
			LAeq(9hour)	Base	Exceedance	2017 Night	Allowance	Increase/	LAeq(15hr)	Base	Exceedance	2017 Day	Allowance	Increase/
			dB(A)	Criteria	amount	No Bypass	Criteria	(- Decrease)	dB(A)	Criteria	amount	No Bypass	Criteria	(- Decrease)
24 Rose St	1	E	47.4	55	-	52.8	55	(-5)	50.7	60	-	60.2	62.2	(-10)
25 Kiata	1	N	47.8	55	-	47.8	55	0.0	51	60	-	54.9	60	(-4)
26 Kiata Pde	1	S	51.5	55	-	50.5	55	1.0	54.9	60	-	57.6	60	(-3)
26 Parks Dve	1	N	47	55	-	47	55	0.0	50.5	60	-	54.2	60	(-4)
26 Parks Dve	1	S	51.8	55	-	51.8	55	0.0	55.2	60	-	59	61	(-4)
27 Kiata Pde	1	N	48.6	55	-	48.5	55	0.1	51.8	60	-	55.6	60	(-4)
28 Kiata Pde	1	SW	52	55	-	51.3	55	0.7	55.3	60	-	58.4	60.4	(-3)
28 Parks Dve	1	N	45.7	55	-	45.7	55	0.0	49.1	60	-	52.9	60	(-4)
	2		49.2	55	-	48.6	55	0.6	52.6	60	-	55.8	60	(-3)
28 Parks Dve	1	S	51.2	55	-	51.1	55	0.1	54.7	60	-	58.3	60.3	(-4)
	2		54.2	55	-	54.4	56.4	(-0)	57.6	60	-	61.6	63.6	(-4)
29 Kiata Pde	1	N	49.8	55	-	49.7	55	0.1	53	60	-	56.7	60	(-4)
29 Kiata Pde	1	S	51.2	55	-	50.2	55	1.0	54.6	60	-	57.3	60	(-3)
3 Jalibah Ave	1	N	49.2	55	-	48.6	55	0.6	52.5	60	-	55.8	60	(-3)
3 Martel Pl	1	SW	50.7	55	-	50.4	55	0.3	53.9	60	-	57.5	60	(-4)
3 Pontresina Ave	1	W	55	55	-	55.8	57.8	(-1)	58.3	60	-	62.8	64.8	(-5)
3 Rose St	1	E	52.9	55	-	60.3	62.3	(-7)	56.1	60	-	67.8	69.8	(-12)
30 Kiata Pde	1	SW	52.4	55	-	51.7	55	0.7	55.7	60	-	58.7	60.7	(-3)
30 Parks Dve	1	N	46.9	55	-	47.1	55	(-0)	50.3	60	-	54.3	60	(-4)
30 Parks Dve	1	S	51.1	55	-	51.2	55	(-0)	54.5	60	-	58.4	60.4	(-4)
31 Kiata Pde	1	N	49.6	55	-	50	55	(-0)	52.8	60	-	57.1	60	(-4)
31 Kiata Pde	1	S	51.6	55	-	50.8	55	0.8	55	60	-	57.8	60	(-3)
32 Kiata Pde	1	SW	52.4	55	-	52.1	55	0.3	55.7	60	-	59.1	61.1	(-3)
32 Parks Dve	1	S	51	55	-	51.1	55	(-0)	54.4	60	-	58.3	60.3	(-4)
	2		53.6	55	-	54.1	56.1	(-1)	57	60	-	61.3	63.3	(-4)
33 Kiata Pde	1	N	49.8	55	-	51	55	(-1)	53	60	-	58	60	(-5)
33 Kiata Pde	1	S	53	55	-	52.8	55	0.2	56.4	60	-	59.8	61.8	(-3)
33 Kiata Pde	1	W	52.6	55	-	53	55	(-0)	55.9	60	-	60	62	(-4)
34 Parks Dve	1	N	47.2	55	-	46.9	55	0.3	50.5	60	-	54	60	(-4)
34 Parks Dve	1	W	50.2	55	-	50.4	55	(-0)	53.6	60	-	57.6	60	(-4)
34 Kiata Pde	1	SW	52.6	55	-	52.8	55	(-0)	55.8	60	-	59.8	61.8	(-4)
34 Meridian	1	W	49.3	55	-	52.8	55	(-4)	52.9	60	-	60.3	62.3	(-7)

Name	Floor	Dir	NIGHT						DAY					
			LAeq(9hour)	Base	Exceedance	2017 Night	Allowance	Increase/	LAeq(15hr)	Base	Exceedance	2017 Day	Allowance	Increase/
			dB(A)	Criteria	amount	No Bypass	Criteria	(- Decrease)	dB(A)	Criteria	amount	No Bypass	Criteria	(- Decrease)
Way														
35 Meridian Way	1	W	51.2	55	-	52.5	55	(-1)	54.8	60	-	59.8	61.8	(-5)
36 Kiata Pde	1	NW	49	55	-	49	55	0.0	52.4	60	-	56.1	60	(-4)
36 Meridian Way	1	W	51.2	55	-	52.4	55	(-1)	54.7	60	-	59.8	61.8	(-5)
37 Kiata Pde	1	S	54.4	55	-	54.9	56.9	(-1)	57.7	60	-	61.9	63.9	(-4)
37 Kiata Pde	1	W	54.1	55	-	55.1	57.1	(-1)	57.4	60	-	62.1	64.1	(-5)
37 Meridian Way	1	W	51.3	55	-	52.6	55	(-1)	54.9	60	-	59.9	61.9	(-5)
38 Kiata Pde	1	W	52.5	55	-	52.9	55	(-0)	55.8	60	-	60	62	(-4)
38 Meridian Way	1	W	51.3	55	-	52.3	55	(-1)	54.8	60	-	59.7	61.7	(-5)
4 Flamingo PI Units 1-4	1	W	50.2	55	-	50.5	55	(-0)	53.6	60	-	57.7	60	(-4)
	2		54	55	-	53.9	55.9	0.1	57.5	60	-	61.1	63.1	(-4)
4 Flamingo PI Units 12-15	1	N	47.5	55	-	47.1	55	0.4	50.9	60	-	54.2	60	(-3)
4 Flamingo PI Units 5-8	1	N	47.7	55	-	47.2	55	0.5	51.1	60	-	54.3	60	(-3)
4 Flamingo PI Units 5-8	1	W	49.5	55	-	49.6	55	(-0)	52.9	60	-	56.7	60	(-4)
4 Flamingo PI Units 9-11	1	N	47.6	55	-	47.1	55	0.5	51.1	60	-	54.3	60	(-3)
4 Honeysuckle St	1	E	54.6	55	-	63.1	65.1	(-9)	57.9	60	-	70.2	72.2	(-12)
	2		56.9	55	1.9	64.7	66.7	(-8)	60.3	60	0.3	71.8	73.8	(-12)
4 Honeysuckle St	1	N	54.4	55	-	62.1	64.1	(-8)	57.7	60	-	69	71	(-11)
	2		56.2	55	1.2	63.6	65.6	(-7)	59.5	60	-	70.6	72.6	(-11)
4 Honeysuckle St	1	S	52.1	55	-	62	64	(-10)	55.6	60	-	69.5	71.5	(-14)
	2		53.7	55	-	63.4	65.4	(-10)	57.2	60	-	70.9	72.9	(-14)
4 Jalibah Ave	1	N	47.9	55	-	47.3	55	0.6	51.3	60	-	54.4	60	(-3)
4 Jalibah Ave	1	S	50.9	55	-	51.4	55	(-1)	54.4	60	-	58.6	60.6	(-4)
4 Martel PI	1	W	51	55	-	50.2	55	0.8	54.2	60	-	57.2	60	(-3)
4 Pontresina Ave	1	W	54.6	55	-	55.1	57.1	(-1)	57.9	60	-	62.1	64.1	(-4)
4 Rose St	1	E	52.6	55	-	61.9	63.9	(-9)	55.9	60	-	69.4	71.4	(-14)

Name	Floor	Dir	NIGHT						DAY					
			LAeq(9hour)	Base	Exceedance	2017 Night	Allowance	Increase/	LAeq(15hr)	Base	Exceedance	2017 Day	Allowance	Increase/
			dB(A)	Criteria	amount	No Bypass	Criteria	(- Decrease)	dB(A)	Criteria	amount	No Bypass	Criteria	(- Decrease)
4 Rose St	1	N	55.5	55	0.5	63.6	65.6	(-8)	58.7	60	-	71.1	73.1	(-12)
41 Kiata Pde	1	S	53	55	-	53.8	55.8	(-1)	56.4	60	-	60.8	62.8	(-4)
41 Kiata Pde	1	W	54.9	55	-	57.4	59.4	(-3)	58.2	60	-	64.5	66.5	(-6)
42 Kiata Pde	1	W	53	55	-	53.1	55.1	(-0)	56.1	60	-	60.1	62.1	(-4)
	2		56.1	55	1.1	55.7	57.7	0.4	59.2	60	-	62.7	64.7	(-4)
43 Kiata Pde	1	W	53.3	55	-	55.1	57.1	(-2)	56.6	60	-	62.1	64.1	(-6)
44 Kiata Pde	1	N	51.5	55	-	51.6	55	(-0)	54.5	60	-	58.6	60.6	(-4)
44 Kiata Pde	1	W	53.2	55	-	53.3	55.3	(-0)	56.4	60	-	60.4	62.4	(-4)
45 Kiata Pde	1	W	54.1	55	-	55.7	57.7	(-2)	57.4	60	-	62.7	64.7	(-5)
46 Kiata Pde	1	SW	52.7	55	-	52.6	55	0.1	55.8	60	-	59.6	61.6	(-4)
47 Kiata Pde	1	W	54.1	55	-	55.4	57.4	(-1)	57.4	60	-	62.4	64.4	(-5)
48 Kiata Pde	1	N	51.1	55	-	50.8	55	0.3	54.2	60	-	57.8	60	(-4)
49 Kiata Pde	1	W	53.9	55	-	55.4	57.4	(-2)	57.2	60	-	62.4	64.4	(-5)
5 Flamingo Pl	1	W	51.6	55	-	50.9	55	0.7	54.8	60	-	57.9	60	(-3)
5 Honeysuckle St	1	E	55.2	55	0.2	64.2	66.2	(-9)	58.7	60	-	71.1	73.1	(-12)
5 Honeysuckle St	1	N	54.3	55	-	64.2	66.2	(-10)	57.8	60	-	71.2	73.2	(-13)
5 Jalibah Ave	1	N	49.4	55	-	48.9	55	0.5	52.7	60	-	56.1	60	(-3)
5 Martel Pl	1	NW	50.9	55	-	50.2	55	0.7	54.1	60	-	57.3	60	(-3)
5 Pontresina Ave	1	W	54	55	-	54.5	56.5	(-1)	57.4	60	-	61.5	63.5	(-4)
5 Rose St	1	E	51.9	55	-	58.6	60.6	(-7)	55.2	60	-	66	68	(-11)
50 Kiata Pde	1	N	49.7	55	-	49.8	55	(-0)	52.8	60	-	56.8	60	(-4)
51 Kiata Pde	1	W	55.5	55	0.5	57.8	59.8	(-2)	58.8	60	-	64.9	66.9	(-6)
52 Kiata Pde	1	N	49	55	-	49.4	55	(-0)	52.1	60	-	56.5	60	(-4)
53 Kiata Pde	1	W	55.1	55	0.1	56.9	58.9	(-2)	58.3	60	-	64	66	(-6)
54 Kiata Pde	1	N	48.4	55	-	48.9	55	(-1)	51.5	60	-	56	60	(-5)
55 Kiata Pde	1	W	55.6	55	0.6	57.1	59.1	(-2)	58.7	60	-	64.1	66.1	(-5)
57 Kiata Pde	1	W	55.8	55	0.8	57.2	59.2	(-1)	58.8	60	-	64.3	66.3	(-6)
59 Kiata Pde	1	W	55.4	55	0.4	56.7	58.7	(-1)	58.4	60	-	63.7	65.7	(-5)
6 Honeysuckle St	1	E	50.3	55	-	56.7	58.7	(-6)	53.7	60	-	63.9	65.9	(-10)
	2		52.4	55	-	59.6	61.6	(-7)	55.7	60	-	66.8	68.8	(-11)

Name	Floor	Dir	NIGHT						DAY					
			L _{Aeq} (9hour)	Base	Exceedance	2017 Night	Allowance	Increase/	L _{Aeq} (15hr)	Base	Exceedance	2017 Day	Allowance	Increase/
			dB(A)	Criteria	amount	No Bypass	Criteria	(- Decrease)	dB(A)	Criteria	amount	No Bypass	Criteria	(- Decrease)
6 Honeysuckle St	1	N	52.5	55	-	59.4	61.4	(-7)	55.8	60	-	66.4	68.4	(-11)
	2		54.5	55	-	61.9	63.9	(-7)	57.8	60	-	68.9	70.9	(-11)
6 Honeysuckle St	1	S	48.4	55	-	58.6	60.6	(-10)	51.8	60	-	66.1	68.1	(-14)
	2		50.7	55	-	60.2	62.2	(-10)	54	60	-	67.7	69.7	(-14)
6 Jalibah Ave	1	N	48.3	55	-	47.9	55	0.4	51.7	60	-	55	60	(-3)
6 Jalibah Ave	1	S	51.4	55	-	51.8	55	(-0)	54.8	60	-	59	61	(-4)
6 Martel Pl	1	N	48.8	55	-	49.1	55	(-0)	51.9	60	-	56.2	60	(-4)
6 Pontresina Ave	1	W	52.7	55	-	52.3	55	0.4	56	60	-	59.3	61.3	(-3)
6 Rose St	1	E	51.6	55	-	58.2	60.2	(-7)	54.8	60	-	65.6	67.6	(-11)
6 Rose St	1	N	51.9	55	-	60.2	62.2	(-8)	55.2	60	-	67.8	69.8	(-13)
6 Rose St	1	S	50.7	55	-	56.3	58.3	(-6)	54	60	-	63.4	65.4	(-9)
61 Kiata Pde	1	W	54.6	55	-	56.3	58.3	(-2)	57.7	60	-	63.3	65.3	(-6)
63 Kiata Pde	1	S	53.4	55	-	54.5	56.5	(-1)	56.5	60	-	61.5	63.5	(-5)
63 Kiata Pde	1	SW	54.3	55	-	57.7	59.7	(-3)	57.3	60	-	64.7	66.7	(-7)
63 Kiata Pde	1	W	55.1	55	0.1	60.4	62.4	(-5)	58	60	-	67.7	69.7	(-10)
65 Kiata Pde	1	W	51.1	55	-	54.2	56.2	(-3)	54.2	60	-	61.2	63.2	(-7)
65 Kiata Pde	1	W	51.4	55	-	53.8	55.8	(-2)	54.5	60	-	60.8	62.8	(-6)
67 Kiata Pde	1	N	49.3	55	-	52.4	55	(-3)	52.4	60	-	59.6	61.6	(-7)
67 Kiata Pde	1	S	52	55	-	51.4	55	0.6	55.2	60	-	58.4	60.4	(-3)
69 Kiata Pde	1	N	48.7	55	-	51.8	55	(-3)	51.8	60	-	58.9	60.9	(-7)
69 Kiata Pde	1	S	51.9	55	-	50.8	55	1.1	55	60	-	57.8	60	(-3)
7 Flamingo Pl	1	NW	50.3	55	-	49.5	55	0.8	53.6	60	-	56.5	60	(-3)
	2		53.8	55	-	52.2	55	1.6	57	60	-	59.2	61.2	(-2)
7 Honeysuckle St	1	N	53.4	55	-	59.4	61.4	(-6)	56.7	60	-	66.4	68.4	(-10)
7 Honeysuckle St	1	S	51	55	-	57.4	59.4	(-6)	54.3	60	-	64.5	66.5	(-10)
7 Jalibah Ave	1	N	49.9	55	-	49.5	55	0.4	53.3	60	-	56.7	60	(-3)
7 Jalibah Ave	1	S	55.8	55	0.8	57.5	59.5	(-2)	59.2	60	-	64.7	66.7	(-6)
7 Jalibah Ave	1	W	55	55	-	56.3	58.3	(-1)	58.3	60	-	63.4	65.4	(-5)
7 Martel Pl	1	N	50.5	55	-	50.1	55	0.4	53.5	60	-	57.2	60	(-4)

Name	Floor	Dir	NIGHT						DAY					
			LAeq(9hour)	Base	Exceedance	2017 Night	Allowance	Increase/	LAeq(15hr)	Base	Exceedance	2017 Day	Allowance	Increase/
			dB(A)	Criteria	amount	No Bypass	Criteria	(- Decrease)	dB(A)	Criteria	amount	No Bypass	Criteria	(- Decrease)
7 Pontresina Ave	1	NW	50.3	55	-	49.7	55	0.6	53.7	60	-	56.8	60	(-3)
7 Pontresina Ave	1	SW	52.6	55	-	52.2	55	0.4	56	60	-	59.2	61.2	(-3)
7 Rose St	1	E	51.1	55	-	56.8	58.8	(-6)	54.4	60	-	64.2	66.2	(-10)
71 Kiata Pde	1	N	48	55	-	49.9	55	(-2)	51	60	-	56.9	60	(-6)
71 Kiata Pde	1	S	51.3	55	-	50.2	55	1.1	54.4	60	-	57.2	60	(-3)
73 Kiata Pde	1	N	47.9	55	-	49.5	55	(-2)	51.1	60	-	56.5	60	(-5)
73 Kiata Pde	1	S	50.6	55	-	49.4	55	1.2	53.7	60	-	56.5	60	(-3)
74 Ducati St	1	W	53.7	55	-	55	57	(-1)	57.2	60	-	62.2	64.2	(-5)
76 Ducati St	1	W	54.1	55	-	55.3	57.3	(-1)	57.5	60	-	62.5	64.5	(-5)
78 Ducati St	1	W	54.2	55	-	55.4	57.4	(-1)	57.7	60	-	62.6	64.6	(-5)
	2		55.3	55	0.3	56.8	58.8	(-2)	58.7	60	-	64	66	(-5)
79 Ducati St	1	SW	49.9	55	-	50.3	55	(-0)	53.3	60	-	57.5	60	(-4)
8 Flamingo Pl	1	N	47.1	55	-	46.7	55	0.4	50.4	60	-	53.9	60	(-4)
8 Honeysuckle St	1	N	51.7	55	-	58.1	60.1	(-6)	55	60	-	65.1	67.1	(-10)
	2		53.5	55	-	60.7	62.7	(-7)	56.7	60	-	67.7	69.7	(-11)
8 Honeysuckle St	1	S	46.6	55	-	55.2	57.2	(-9)	50	60	-	62.7	64.7	(-13)
	2		49.7	55	-	57.5	59.5	(-8)	53	60	-	64.9	66.9	(-12)
8 Jalibah Ave	1	N	48.4	55	-	47.9	55	0.5	51.7	60	-	55.1	60	(-3)
8 Jalibah Ave	1	S	51.6	55	-	52	55	(-0)	55	60	-	59.2	61.2	(-4)
8 Kiata Pde	1	N	50.8	55	-	50.9	55	(-0)	53.9	60	-	57.9	60	(-4)
8 Kiata Pde	1	W	52.5	55	-	52.9	55	(-0)	55.7	60	-	59.9	61.9	(-4)
8 Pontresina Ave	1	W	52.2	55	-	51.5	55	0.7	55.5	60	-	58.6	60.6	(-3)
8 Rose St	1	E	51.5	55	-	57.2	59.2	(-6)	54.8	60	-	64.3	66.3	(-10)
8 Rose St	1	N	50.7	55	-	54.9	56.9	(-4)	54	60	-	62.1	64.1	(-8)
80 Ducati St	1	W	54.4	55	-	55.5	57.5	(-1)	57.9	60	-	62.7	64.7	(-5)
81 Ducati St	1	S	54.2	55	-	55.9	57.9	(-2)	57.7	60	-	63.1	65.1	(-5)
81 Ducati St	1	W	54.1	55	-	55.7	57.7	(-2)	57.5	60	-	62.9	64.9	(-5)
82 Caloola Dve	1	N	49.8	55	-	51.2	55	(-1)	53.1	60	-	58.4	60.4	(-5)
82 Ducati St	1	W	54.4	55	-	55.7	57.7	(-1)	57.8	60	-	62.9	64.9	(-5)

Name	Floor	Dir	NIGHT						DAY					
			L _{Aeq} (9hour)	Base	Exceedance	2017 Night	Allowance	Increase/	L _{Aeq} (15hr)	Base	Exceedance	2017 Day	Allowance	Increase/
			dB(A)	Criteria	amount	No Bypass	Criteria	(- Decrease)	dB(A)	Criteria	amount	No Bypass	Criteria	(- Decrease)
	2		55.7	55	0.7	57.3	59.3	(-2)	59.2	60	-	64.6	66.6	(-5)
84 Caloola Dve	1	S	51.4	55	-	51	55	0.4	54.5	60	-	58.1	60.1	(-4)
84 Ducati St	1	W	54.5	55	-	55.7	57.7	(-1)	57.9	60	-	62.9	64.9	(-5)
86 Ducati St	1	W	54.7	55	-	55.9	57.9	(-1)	58.1	60	-	63.1	65.1	(-5)
88 Caloola Dve	1	NW	50.3	55	-	49.9	55	0.4	53.4	60	-	57	60	(-4)
88 Ducati St	1	W	54.6	55	-	55.7	57.7	(-1)	58	60	-	62.9	64.9	(-5)
9 Flamingo Pl	1	N	48.7	55	-	47.9	55	0.8	51.9	60	-	54.9	60	(-3)
	2		52.1	55	-	50.6	55	1.5	55.2	60	-	57.7	60	(-3)
9 Jalibah Ave	1	N	50.1	55	-	49.7	55	0.4	53.5	60	-	56.9	60	(-3)
9 Jalibah Ave	1	S	55.6	55	0.6	57.1	59.1	(-2)	58.9	60	-	64.3	66.3	(-5)
9 Pontresina Ave	1	W	53	55	-	52.6	55	0.4	56.3	60	-	59.7	61.7	(-3)
9 Rose St	1	E	50.8	55	-	56	58	(-5)	54	60	-	63.4	65.4	(-9)
90 Ducati St	1	W	54.7	55	-	56	58	(-1)	58.2	60	-	63.4	65.4	(-5)
92 Ducati St	1	W	55	55	-	56.6	58.6	(-2)	58.5	60	-	63.9	65.9	(-5)
94 Ducati St	1	W	55.2	55	0.2	57	59	(-2)	58.7	60	-	64.4	66.4	(-6)
95 Ducati St	1	W	57.4	55	2.4	59	61	(-2)	60.9	60	0.9	66.2	68.2	(-5)
96 Ducati St	1	W	55.5	55	0.5	57.9	59.9	(-2)	59	60	-	65.3	67.3	(-6)
98 Ducati St	1	W	55	55	-	57.7	59.7	(-3)	58.6	60	-	65.1	67.1	(-6)
99 Ducati St	1	W	56.2	55	1.2	57.3	59.3	(-1)	59.7	60	-	64.5	66.5	(-5)
Caravan Worst Affected	1	E	54.1	55	-	58.5	60.5	(-4)	57.4	60	-	66	68	(-9)
Caravan Worst Affected	1	N	54.5	55	-	58	60	(-4)	57.6	60	-	65.5	67.5	(-8)
Ducati St Shops	1	W	55.8	55	0.8	60.8	62.8	(-5)	59.4	60	-	68.3	70.3	(-9)
Kennedy Dr 'B'	1	S	51.3	55	-	69.2	71.2	(-18)	54.7	60	-	77.6	79.6	(-23)
Kennedy Dr 'C'	1	S	50.2	55	-	66.7	68.7	(-17)	53.7	60	-	74.7	76.7	(-21)
Kennedy Drive 'A'	1	E	53.2	55	-	64	66	(-11)	56.7	60	-	71.6	73.6	(-15)
	2		54.3	55	-	65.3	67.3	(-11)	57.7	60	-	72.7	74.7	(-15)
Kennedy Drive 'A'	1	N	48.7	55	-	56.7	58.7	(-8)	52.1	60	-	64.2	66.2	(-12)
	2		51	55	-	58.8	60.8	(-8)	54.3	60	-	66.2	68.2	(-12)

Name	Floor	Dir	NIGHT						DAY					
			LAeq(9hour) dB(A)	Base Criteria	Exceedance amount	2017 Night No Bypass	Allowance Criteria	Increase/ (- Decrease)	LAeq(15hr) dB(A)	Base Criteria	Exceedance amount	2017 Day No Bypass	Allowance Criteria	Increase/ (- Decrease)
Kennedy Drive 'A'	1	S	51.2	55	-	66.6	68.6	(-15)	54.7	60	-	74.7	76.7	(-20)
	2		52.5	55	-	67.9	69.9	(-15)	56	60	-	75.9	77.9	(-20)
Service Station - BP	1	S	58.4	55	3.4	65.9	67.9	(-8)	61.9	60	1.9	74.5	76.5	(-13)
			total exceedances						Total Exceedences					
			37			80	0		10			100	0	
			total number Acute >60 dB(A)						total number Acute >65 dB(A)					
			0			18			0			30		