



GHD Pty Ltd ABN 39 006 488 373

2/115 West High Street

Coffs Harbour NSW 2450

T: (02) 6650 5600 F: (02) 6652 6021 E: cfsmail@ghd.com.au

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Volumes 2

14. Planning Stage Acoustic Assessment



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GHD Coffs Harbour

**Sapphire Beach Development,
Coffs Harbour**

Planning Stage Acoustic Assessment

August 2006



INFRASTRUCTURE | MINING & INDUSTRY | DEFENCE | PROPERTY & BUILDINGS | ENVIRONMENT



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A Noise Monitoring Results



Glossary – Acoustics

dB	Decibel, which is 10 times the logarithm (base 10) of the ratio of a given sound pressure to a reference pressure; used as a unit of sound.
dB(A)	Unit used to measure 'A-weighted' sound pressure levels.
L_{A10} (Time)	The sound pressure level that is exceeded for 10% of the time for which the given sound is measured.
L_{A10} (1 hour)	The L_{10} level measured over a 1-hour period.
L_{A10} (18 hour)	The arithmetic average of the L_{10} levels for the 18-hour period between 0600 and 2400 hours on a normal working day. It is a common traffic noise descriptor.
L_{Aeq} (Time)	Equivalent sound pressure level: the steady sound level that, over a specified period of time, would produce the same energy equivalence as the fluctuating sound level actually occurring.
L_{Aeq} (15 hr)	The L_{Aeq} noise level for the period 7 am to 10 pm.
L_{Aeq} (9 hr)	The L_{Aeq} noise level for the period 10 pm to 7 am.
L_{Aeq} (1 hr)	The L_{Aeq} noise level for a one-hour period. In the context of the NSW EPA environmental criteria for road traffic noise, it represents the highest tenth percentile hourly A-weighted L_{eq} during the period 7 am to 10 pm, or 10 pm to 7 am, (whichever is relevant). If this cannot be defined accurately, use the highest A-weighted L_{eq} noise level.
L_{A90} (Time)	The A-weighted sound pressure level that is exceeded for 90% of the time over which a given sound is measured. This is considered to represent the background noise e.g. L_{A90} (15 min)
L_{A10} (Time)	The A-weighted sound pressure level that is exceeded for 10% of the time over which a given sound is measured.
Rating Background Level (RBL)	<p>The overall single-figure background level representing each assessment period (day/evening/night) over the whole monitoring period (as opposed to over each 24 hour period used for the assessment background level). This is the level used for assessment purposes. It is defined as the median value of:</p> <p>All the day assessment background levels over the monitoring period for the day;</p> <p>All the evening assessment background levels over the monitoring period for the evening; or</p> <p>All the night assessment background levels over the monitoring period for the night.</p>
Tonality	Noise containing prominent a prominent frequency or frequencies characterised by definite pitch.



Executive Summary

GHD was commissioned by Sapphire Beach Development Pty. Ltd. to undertake noise monitoring so as to ascertain the existing ambient noise environment and establish project specific noise goals for the land currently occupied by the Pelican Beach Resort, Pacific Highway, Coffs Harbour.

Results of noise monitoring adjacent to the Pacific Highway indicated that existing traffic noise is a feature of the ambient environment in the area, and current traffic noise levels exceed ECRTN criteria at the north-western site monitoring location for a new residential development potentially affected by freeway / arterial road traffic noise.

With likely increased noise effects resulting from assumed future traffic growth along the Pacific Highway, any future building footprints that are situated nearer to the roadway than the site monitoring location may potentially exceed both the ECRTN external and internal residential criteria to a greater extent.

As the ECRTN goals are exceeded, for new residential development with dwellings situated adjacent to the Pacific Highway, GHD suggest that to meet the criteria, all feasible and reasonable noise control options should be investigated.

GHD recommend that a detailed acoustic model be created for the site to establish which buildings are likely to exceed the noise goals and to determine appropriate noise control design measures. Taking into consideration the current design stage of the project, design measures would include:

- ▶ Potential noise barrier configurations;
- ▶ Architectural design treatments for buildings within areas of equal noise impact zones.

As part of the detailed design stage of the proposed development GHD also recommend:

- ▶ Detailed monitoring of the night time traffic flow characteristics and maximum noise level in line with the ENMM requirements to attain accurate data to be able to model the potential for sleep arousal at future residential premises;
- ▶ For any future licensed premises proposed on the site, that long-term octave frequencies attended background noise monitoring be undertaken so that Liquor Administration Board licensing requirements be met; and
- ▶ A detailed investigation be conducted during the site detailed design phase as to whether acoustic barriers are potentially required along the proposed on-site roadways to protect the amenity of proposed dwellings.

Due to the close proximity of adjacent resorts and residential receivers, GHD recommend that a site specific Construction Noise and Vibration Management Plan be undertaken prior to construction activities commencing.



1 Introduction

GHD was commissioned by Sapphire Beach Development Pty Ltd. to establish project specific noise goals of land currently occupied by the Pelican Beach Resort, Coffs Harbour.

1.1 Site Description

The proposed development is for the redevelopment of the Pelican Beach Resort to create an upmarket lifestyle resort catering for a mix of both permanent residents and tourists. The redevelopment of the site will be done in stages with the early stages being built on the lower coastal section of the site. This will be followed by developing up the hill to the flat section adjacent to the Pacific Highway.

At completion, it is expected that the development will comprises 117 dwellings and 234 car parks. The dwellings will consist of a mixture of apartments, town houses and houses. There will also be extensive areas of open space and retained vegetation on the site. The layout of the site is provided in Figure 1, below.

The houses will be located along the beachfront and consist of premium 2 storey, 3 bedroom structures. To the west of the houses a series of 2-3 bedroom town houses will be developed and up the hill to the flat section will be groups of 2 and 3 storey apartment complexes. The large complex of apartments at northwest corner of the site will also contain a function centre.

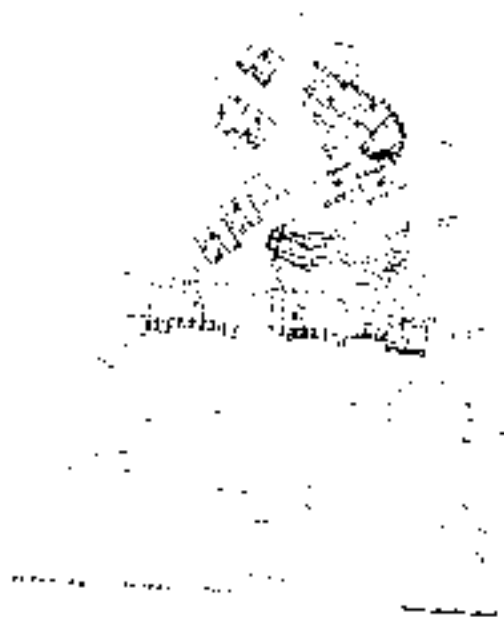


Figure 1 – Site Layout (Cox, 2006)



1.2 Scope of Works

The scope of works for the noise assessment comprised:

- ▶ Unattended noise monitoring at two locations representative of the local noise environment to establish the rating background levels in the vicinity of the development and existing ambient and traffic noise levels;
- ▶ Establishing day, evening and night time noise levels in the vicinity of the development with consideration to the noise criteria in the NSW DEC publications of the Industrial Noise Policy and Environmental Criteria for Road Traffic Noise (ECRTN); and
- ▶ Preparation of a report discussing the results.

1.3 Assessment Methodology

The following steps were undertaken:

- ▶ Unattended site noise monitoring measurements were undertaken;
- ▶ Existing ambient noise sources identified and classified; and
- ▶ Compliance criteria for the proposed development were determined.

1.4 Limitations

This report has been prepared for Sapphire Beach Development Pty Ltd. The purpose of the report is to provide an independent review of the proposed Part 3A Submission of the proposed Pelican Beach Resort development.

It is not the intention of the assessment to cover every element of the acoustic environment, but rather to conduct the assessment with consideration to the prescribed work scope.

The findings of the noise assessment represent the findings apparent at the date and time of the monitoring and the conditions of the existing noise assessment undertaken. It is the nature of environmental monitoring that all variations in environmental conditions cannot be accessed and all uncertainty concerning the conditions of the ambient noise environment cannot be eliminated. Professional judgement must be exercised in the investigation and interpretation of observations.

In conducting this assessment and preparing the report, current guidelines for noise were referred to. This work has been conducted in good faith with GHD's understanding of the client's brief and the generally accepted consulting practice.

No other warranty, expressed or implied, is made as to the information and professional advice included in this report. It is not intended for other parties or other uses.



2 Existing Environment

2.1 Monitoring Locations

Two *Acoustic Research Laboratories (ARL) Pty Ltd EL-315 Type 2* continuous environmental noise loggers, within current calibration, were used to monitor the noise environment at the following locations:

- ▶ **Location 1** (also known as Sapphire 1): A noise logger was placed in the north-west corner of the site, to the north-eastern side of the existing site premises currently used as a restaurant. The logger was placed in a secure location, representative of road traffic noise ingress into the site, with approximately 46m separation distance between the logging location and the Pacific Highway. Terrestrial site photos of this long-term unattended noise monitoring location are shown in Figure 2;
- ▶ **Location 2** (also known as Sapphire 2): The second site noise logger was placed upon the open and flat eastern area of the site in a free field environment adjacent to the existing tennis court facilities. Terrestrial site photos of this long-term unattended noise monitoring location are shown in Figure 3; and
- ▶ Unattended noise monitoring was undertaken over the period 31 May to 7 June 2006. The instruments were programmed to accumulate environmental noise data continuously over sampling periods of 15 minutes for the entire monitoring period. Internal software then calculated and stored the L_n percentile noise levels for each sampling period, which was later retrieved for analysis. The instruments were calibrated before and after the logging periods.

Table 2-1 provides details of the noise loggers and their respective locations, shown graphically in Figure 4.



Figure 2 Traffic Noise Intrusion Environmental Noise Logging Location, Sapphire 1.



Figure 3 Site Ambient Environmental Noise Logging Location, Sapphire 2.



Figure 4 Aerial figure of Existing Site Location and Long-Term Unattended Monitoring Locations.

Table 2-1 Continuous Noise Logger Details

Measurement Title	Sapphire 1	Sapphire 2
Monitoring Location	North-west site corner	Open and flat eastern area of the site, adjacent to the existing tennis court
Logger Serial No.	16-004-049	16-004-036
Environmental Noise Logger Model	<i>EL-315 Type 2</i> [EL-31x Series]	<i>EL-315 Type 2</i> [EL-31x Series]
Measurement period started at	10:45 on 31 st May 2006	12:15 on 31 st May 2006
Measurement period ceased at	13:00, 7 th June 2006	13:15, 7 th June 2006
Frequency Weighting	A	A
Time Response	Fast	Fast
Engineering Units	dB(A) SPL re:20μPa	dB(A) SPL re:20μPa



2.2 Weather Monitoring Results

Meteorological data (wind speed, direction, rainfall) was recorded continuously at noise monitoring ¹location 2 (Sapphire 2), using a Davis Instruments Vantage Pro Weather Envoy weather station set to record 15-minute averages.

The weather station location was in an open area free of intrusions and therefore was considered to be an appropriate location to obtain indicative weather information for the purposes of this study.

The details of the weather data are provided in Table 2-2, terrestrial site photos are shown in Figure 3. Wind speed and rainfall is presented graphically in Figure 5.

Table 2-2 Weather Data

Data File Name	Sapphire 1
Measurement period commencement	12:15 on 31 st May 2006
Measurement period cessation	13:15, 7 th June 2006
Percentage of non-affected weather data	100%

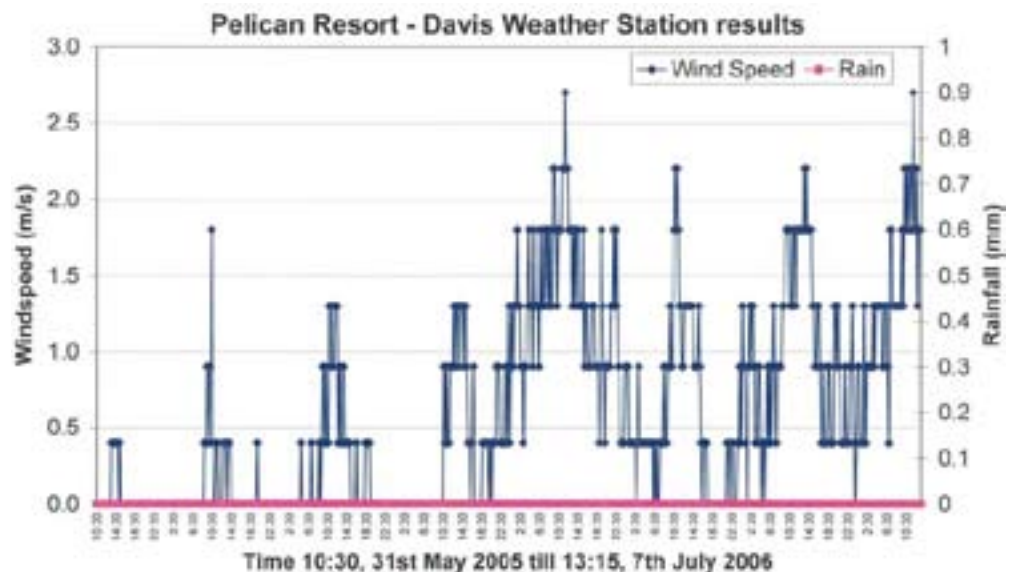


Figure 5 Wind Speed and Rainfall Data Results – Location 2 (Sapphire 2), Pelican Resort, Coffs Harbour

¹ The weather station was positioned within 5m of and at a corresponding height to the noise logging equipment as per requirements of *Appendix B1.1 Instrumentation Requirements and Siting* of the NSW INP.



2.3 Noise Monitoring Results

A graphical summary of the long term noise monitoring results from the site are shown in Figure 6 and Figure 7 provided in Appendix A.

Extraneous noise data where anomalous 'peaks' or 'spikes' were recorded which were not considered to be associated with the ambient background noise, were removed from the data sets.

As per the NSW INP, data was also excluded from the analysis set where wind data in excess of 5m/s was recorded during the monitoring period.

A summary of calculated background L_{A90} and $L_{Aeq(period)}$ day, evening, and night for the monitoring period is provided in the following tables².

Detailed background noise levels for L_{A90} day, evening and night, $L_{Aeq(15hr)}$, $L_{Aeq(9hr)}$, $L_{A10(18hr)}$ and $L_{A10(24hr)}$ are provided in Tables A1 to A6 in Appendix A.

Table 2-3 Noise Monitoring Results – Background L_{A90} Noise Levels

Monitoring	Day 7 am to 6 pm (RBL)	Evening 6 pm to 10 pm (RBL)	Night 10 pm to 7 am (RBL)
Sapphire 1	46.6	44.2	45.1
Sapphire 2	44.0	44.7	46.5

Table 2-4 Noise Monitoring Results – Ambient L_{Aeq} Noise Levels

Monitoring Location	Day 7 am to 6 pm	Evening 6 pm to 10 pm	Night 10 pm to 7 am
Sapphire 1	55.2	55.6	54.5
Sapphire 2	51.0	49.8	50.0

Table 2-5 Noise Monitoring Results –Average Noise Levels

Monitoring location	$L_{Aeq(15hr)}$ 7:00 am to 10:00 pm [Average dB(A)]	$L_{Aeq(9hr)}$ 10:00 pm to 7:00 am [Average dB(A)]	$L_{A10(18hr)}$ 6:00 am to 12:00 pm [Average dB(A)]	$L_{A10(24hr)}$ [Average dB(A)]
Sapphire 1	55.1	54.5	57.6	54.8
Sapphire 2	50.6	50.0	52.1	50.2

² Refer to Glossary page for definition of these parameters



Table 2-6 Highest Hourly L_{Aeq} (1 hour) (10 pm to 7 am)

Date	Sapphire 1
31/05/2006	57.6
01/06/2006	57.5
02/06/2006	54.6
03/06/2006	53.4
04/06/2006	55.1
05/06/2006	56.9
06/06/2006	56.8
Maximum	57.6

Field observations noted that the ambient noise environment at the monitoring locations were typically dominated by relatively low background noise levels with intermittent noise contributions from the likes of Pacific Highway traffic and wave noise. Traffic noise from the adjacent Pacific Highway was more apparent at location Sapphire 1. Wave noise was more apparent at Sapphire 2.



3 Noise Criteria

3.1 Construction Noise Criteria

Criteria for the construction phase applied to the assessment were sourced from Section 171 of the DEC's Environmental Noise Control Manual. The criteria were established using the measured background noise levels and applying a conversion factor based on the expected construction period. Construction noise criteria based on Table 2-3 background noise levels are shown in Table 3-1.

Table 3-1 Construction Noise Criteria
[L₁₀ dB(A) Sound Pressure Level re:20µPa]

Construction Period	Level Restrictions	Sapphire 1	Sapphire 2
Less than 4 weeks	Background + 20 dB	67	64
Less than 26 weeks	Background + 10 dB	57	54
More than 26 weeks	Background + 5 dB	52	49

Normal construction hours are 7 am to 6 pm Monday to Friday, and 8 am to 1 pm Saturday and at no time on Sundays and public holidays. Construction activity outside those hours is not preferred but can usually occur provided the normal operational noise criteria are met and construction noise is not substantially audible or intrusive inside a dwelling.

3.2 Operational Noise Criteria

Discussion with an Environmental Noise Compliance Officer of Coffs Harbour City Council confirmed that Council refers to current DEC guidelines such as the NSW INP.

The INP provides guidance on the assessment of operational noise impacts. The guidelines include both Intrusive and Amenity criteria that are designed to protect receivers from noise significantly louder than the background level and to limit the total noise level from all sources near a receiver.

Intrusive noise limits set by the INP control the relative audibility of operational noise compared to the background level. Amenity criteria limit the total level of extraneous noise. Both sets of criteria are calculated and the lowest of the two in each time period normally apply. Table 2.2 in the INP provides modifications to the amenity criteria for existing levels of industrial noise.

Attended observations noted that existing levels of industrial noise in the area are not a significant contributor to the existing ambient noise level in the vicinity of the development therefore no Table 2.2 adjustments are necessary for the amenity noise criteria.



A high traffic noise criterion applies to areas exposed to dominant traffic noise. Although traffic noise is a contributor to the existing ambient noise level in the vicinity of the development, criteria required to be able to apply the high traffic noise criterion are not met at the monitoring location set-back approximately 46m from the Pacific Highway and therefore have not been addressed to date for this location Sapphire 1.

For any future building facades situated close to the Pacific Highway, the high traffic noise criterion may potentially be required to be applied in the derivation of site criteria.

Otherwise, intrusive criteria are simply 5 decibels above the adopted background level with a minimum of 35 dB(A).

Amenity criteria are determined based on the overall acoustic characteristics of the receiver area and the existing level of noise excluding other noises that are uncharacteristic of the usual noise environment. Residential receiver areas are characterised into 'urban', 'suburban', 'rural' or other categories based on land uses, the existing level of noise from industry, commerce, and road traffic.

The nearest residential receivers to this development are classified as 'Urban'.

The project specific noise levels are provided in Table 3-2 for Residential receivers. For any adjacent commercial or industrial receiver types as specified with respect to Table 2.1 Amenity Criteria of the INP, project specific noise levels are shown in Table 3-3. Table 3-3 also presents amenity criteria for potentially affected areas such as those set aside for passive or active recreation.