Project Application

Volume 4

Inner West Marina
Parramatta River, Sydney

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HEGGIES

REPORT 10-5800-R1

Revision 0

Inner West Marina, Kendall Bay
Construction and Operation
Noise Assessment

PREPARED FOR

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23 JULY 2009

Inner West Marina, Kendall Bay
Construction and Operation
Noise Assessment

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1 INTRODUCTION

Breakfast Point Pty Ltd is proposing to build a new Marina (the Project) in Kendall Bay on the Parramatta River in Sydney. The project would include the construction of a car park to facilitate access to the Marina for non residents.

Heggies Pty Ltd (Heggies) has been commissioned by TLB Engineers, on behalf of Breakfast Point Pty Ltd, to undertake a Noise Impact Assessment of the construction and operation of the proposed Marina and of the traffic generated by the proposed Marina. This assessment is required to form part of the Project Application (PA) to be submitted to the NSW Department of Planning for approval.

The proposed Marina will consist of 172 berths catering for vessels between 8 m and 25 m in length (5 temporary and 167 permanent berths), kiosk, managers office, amenities and ferry wharf. A car park located at Rosewater Circuit, Breakfast Point will be built to facilitate access to the Marina.

This report assesses the construction, operation and traffic noise impacts of the proposed Project on the nearby residents.

2 SITE LOCATION AND PROJECT DESCRIPTION

2.1 Site Location

The subject site is located in Breakfast Point and Kendall Bay as shown in **Figure 1**.

Figure 1 Site Location and Sensitive Receivers

2.2 Sensitive receivers

Figure 1 shows the location of the closest receivers to the Project as well as the position of the ambient noise monitoring locations for the purpose of this study**.**

The existing sensitive receivers are located in Peninsula Drive and Kendall Inlet, Breakfast Point, in Delmar Parade and Shackel Avenue, Gladesville, in Tennyson Road and Champion Road, Tennyson Point, in Pellisier Road and in Putney Parade, Putney.

Breakfast Point is essentially a residential development with some relatively minor components of other uses. An overall Concept Plan has previously been approved for the development of some 2,065 dwellings, of which some are already constructed and some are under construction.

All the sensitive receivers described above are best described as suburban, with an environment characterised by local traffic with intermittent traffic flows or with some limited commerce or industry.

2.3 Project Description

2.3.1 Car Park

Parking would be provided for 58 cars. The car park site is located in the Breakfast Point Precinct and is bounded by Peninsular Drive and Rosewater Circuit. The site is situated adjacent to a residential building named “Stilkstone”.

The car park would be constructed using standard equipment and work methods involving:

- Removing existing ground to required levels.
- Placement and compaction of base material.
- Placement and compaction of asphalt.
- Concrete supply for kerbs using standard concrete trucks discharging the concrete directly into kerb forms.

2.3.2 Marina

The Marina will consist of a fixed jetty, 8 arms and a pontoon with a ramp. The floating structures (arms) will accommodate at a total of 172 berths catering for vessels of 8 m to 25 m in length (5 temporary and 167 permanent berths). The associated office and amenities buildings will be located at the end of the fixed jetty.

The area for the waterside works is located adjacent to the foreshore public access zone on the western side of the site. Approximately 250 m east of the mean high water mark, and approximately 90 m east of the site, is the vessel access path of Sydney Ferries vessels moving to and from Cabarita Ferry Wharf.

The proposed construction of the Marina comprises the following elements:

Blanket

The blanket would be constructed using barge mounted equipment, including rolls of geotextile, and an excavator. The geotextile would be laid continuously over the northern side of the barge as it moves slowly from south to north. The geotextile would be laid in continuous sheets (pre-fabricated off-site) of the order of 40 m x 100 m in plan area. Adjacent sheets of geotextile would be overlapped on the bed. The initial section of each sheet would be placed by divers. As the geotextile sheets are laid on the bed, basalt rock gravel would be placed on the geotextile using the excavator with a GPS controlled bucket. This construction method has been used successfully for the placement of a geotextile and basalt rock in the Port of Brisbane.

Piles

Piles would be installed after the placement of the blanket. The piles would be located by GPS. The piles would be driven through the ballast and geotextile. The piles would be placed through the pile guide brackets attached to the floating structure.

Piles would be installed at the average rate of 2 per day. There are approximately 160 piles required for the proposed works

Floating Structure

The floating structure would be assembled in segments off site, and towed to site as required to suit the construction programme. Once the first segment has been secured by two piles, further segments could be brought to site and temporarily moored against the previously installed segments, awaiting final positioning.

Fixed Structure

The piles for the fixed structure would be installed as described above. Once the piles on each line have been installed, the HDPE jacket would be placed over the pile then the steel headstock inserted into the pile and secured into position. Progressively, as the headstocks are installed, the timber beams between the headstocks would be placed by a barge mounted crane, then the timber decking placed over the timber beams.

Mooring of Barges

Barges would be moored using mooring lines to the piles. It is envisaged that initially, up to four temporary piles would be installed to secure and assist in the positioning of the barges for the installation of piles. As piles are progressively installed, the barges could use the piles as mooring points. Mooring blocks on the bed of the bay would not be used.

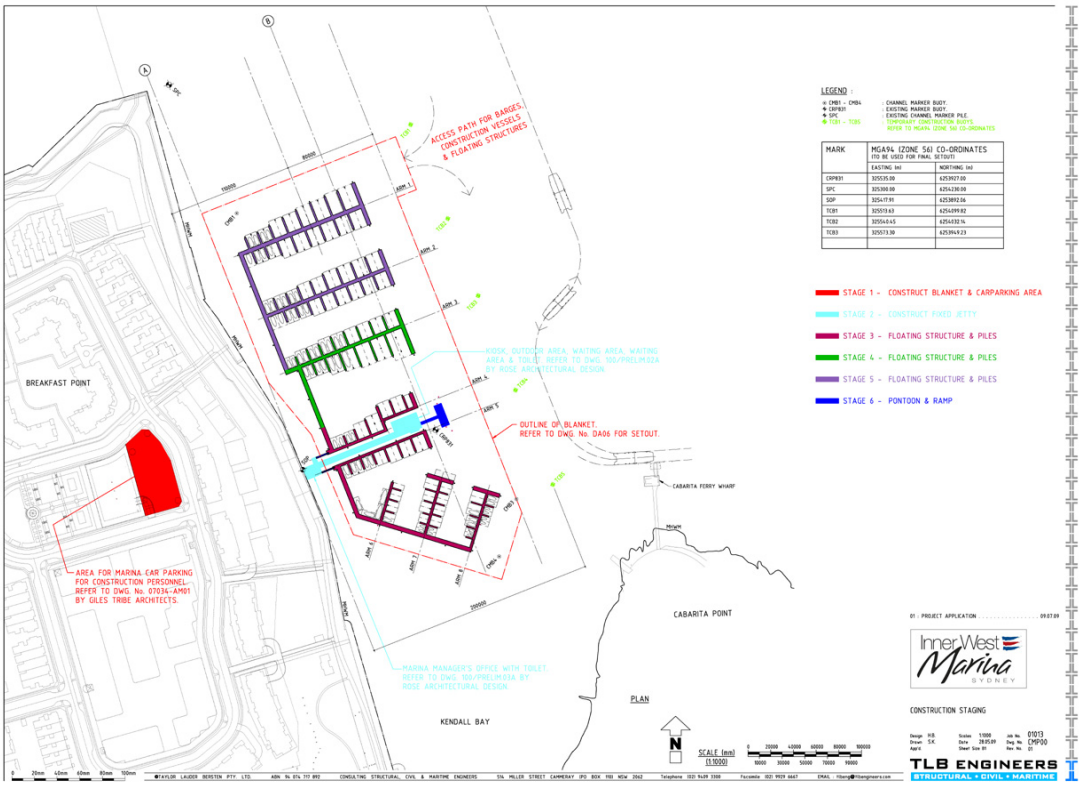
All waterside works will be undertaken using plant and equipment mounted on barges.

Throughout the construction:

- Limited materials would be stored on site.
- Barge mounted cranes would be used for materials handling.
- Contractor personnel vehicles would temporarily park on the street near the site until such time as the carpark is completed. These cars would then park in the carpark.

The project layout is presented in **Figure 2**.

Figure 2 Project Layout



2.4 Hours of Construction

The work hours each day would be determined by the Minister (as the proposal is a Part 3A project) and may be in accordance with the Department of Environment and Climate Change (DECC) guidelines, namely:

Monday to Friday	7.00 am to 6.00 pm
Saturday	7.00 am to 1.00 pm
Sunday	No work

2.5 Construction Periods

The construction period depends on the selected contractor's work sequence and construction method.

In order that there is some understanding of the periods for on-site construction works, the indicative construction periods presented in **Table 1** are noted.

Table 1 Construction Schedule

Stage	Activity	Period of Works
1	Car Park Blanket	8 weeks 30 weeks
2	Fixed Jetty including Kiosk and Managers Office	24 weeks[1]
3	Floating Structures, including piles, for Arms 4, 5, 6, 7 and 8	14 weeks[1]
4	Floating Structures, including piles, for Arm 3	10 weeks
5	Floating structures, including piles, for Arms 1 and 2	18 weeks
6	Pontoon	2 weeks

Notes 1. Activities that could be undertaken concurrently.

2.6 Hours of Operation

The Marina would be accessible anytime, 7 days a week.

The proposed hours of operation for the office are 9.00 am to 6.00 pm, 7 days during summer, and 9.00 am to 5.00 pm, 7 days during winter. For "on boat" maintenance activities the proposed hours are 9.00 am to 6.00 pm Monday to Friday and 9.00 am to 12.30 pm Saturday.

2.7 Transport and Traffic

2.7.1 On Land Transport to Site during Construction

Heavy vehicle access to the site (car park) would be along Tennyson Road as well as into Magnolia Drive and Rosewater Circuit within the Breakfast Point Precinct. Vehicles would turn onto the site at the southern side (Gate 1) and depart from the site via Gate 2, turning left onto Rosewater Circuit.

The number of trucks during construction is estimated to be up to 2 per hour.

2.7.2 On Water Transport to Site during Construction

All vessel access to the site would be from the north. Vessels would travel along the main channel of the Parramatta River until reaching the Headland/Point known as Breakfast Point, then turn south to the site. Vessels would approach the site on a path between 100 m and 190 m east of the foreshore mean high water mark. This is 60 m clear of the ferry access path.

2.7.3 On Land Traffic during Operation

Peninsula Drive, Rosewater Circuit and Magnolia Drive provide access to existing and residential development under construction in Breakfast point. The access to the Marina is also assumed to be through those roads.

It is assumed that no heavy vehicles will be travelling on those routes. Deliveries to the relatively small commercial area would generally be made by vans or couriers sized vehicles and public transport would be travelling on Tennyson Road.

Road vehicle movements to and from the carpark related to marina usage have been estimated based on marina usage in Sydney. The results are presented in **Table 2**.

Table 2 Vehicle Movements Estimated for the Project

Period	Peak Vehicle Movements per Hour
7.00 am to 6.00 pm	20
6.00 pm to 10.00 pm	10
10.00 pm to 7.00 am	3

2.7.4 On Water Traffic during Operation

On water vessel movements to and from the Marina were also estimated based on vessel usage in marinas in Sydney. The results are presented in **Table 3.**

Table 3 Vessel Movements Estimated for the Project

Period	Peak Vessel Movements per Hour
7.00 am to 6.00 pm	17
6.00 pm to 10.00 pm	7
10.00 pm to 7.00 am	3

3 NOISE CRITERIA

3.1 Construction Noise Criteria

3.1.1 Construction Noise Guidelines

When dealing with noise from construction works, the NSW DECC recognises that higher levels of noise are likely to be tolerated by people in view of the relatively short duration of the works. As a result, the DECC has published guidelines in its "*Environmental Noise Control Manual*", 1985 (ENCM) for the control of construction works noise.

Chapter 171-1 of the DECC's ENCM recommends the following approaches to mitigating adverse noise impacts from construction sites.

3.1.2 Noise Emission Objectives

The DECC recommends that the $L_{A10(15minute)}$ noise levels arising from a construction site and measured within the curtilage of an occupied noise-sensitive premises (ie at boundary or within 30 m of the residence, whichever is the lesser) should not exceed the levels indicated in **Table 4**. These noise goals are generally consistent with community reaction to construction noise.

Table 4 Recommended DECC Noise Goals for Construction Works

Period of Noise Exposure	$L_{A10(15minute)}$ Construction Noise Goal
Cumulative noise exposure period not exceeding four weeks	$L_{A90(15minute)}$ plus 20 dBA
Cumulative noise exposure period of between four weeks and 26 weeks	$L_{A90(15minute)}$ plus 10 dBA
Cumulative noise exposure period longer than 26 weeks	$L_{A90(15minute)}$ plus 5 dBA

The DECC guidelines recommend confining permissible work times as outlined in **Table 5**.

Table 5 Preferred Hours of Construction

Day	Preferred Construction Hours
Monday to Friday	7.00 am to 6.00 pm
Saturdays	7.00 am to 1.00 pm (if inaudible at residences) Otherwise, 8.00 am to 1.00 pm *
Sundays or Public Holidays	No construction *

* Except for dust suppression, as required.

3.1.3 Works Undertaken Outside the Preferred Construction Hours

Where it is necessary for construction works to be undertaken outside the DECC's preferred daytime construction hours, the condition normally applied is that:

- $L_{A10(15minute)}$ noise levels emitted by the works should not exceed the L_{A90} level during the relevant evening or night-time period by a margin of more than 5 dBA, *independent* of the duration of the construction activity.

3.1.4 Silencing

All practical measures should be used to silence construction equipment, particularly in instances where extended hours of operation are required.

3.1.5 Impulsive and/or Tonal Noise

For plant or operations with impulsive or tonal noise characteristics, a noise penalty of up to 5 dBA (depending on degree of impulsiveness or tonality) should be added to measured or predicted $L_{A10(15minute)}$ noise levels when comparing L_{A10} noise levels from construction works to the limits presented in **Table 4**.

3.1.6 General Comment on DECC Construction Noise Criteria

In the case of major construction projects in close proximity to residential and even commercial buildings, it can be difficult to comply with the DECC's ENCM construction noise criteria (refer to **Table 4**). However, the following is noted:

- The criteria nominated in the DECC's ENCM are adopted as "noise design goals". Where these goals cannot be achieved in practice, the DECC recommends the use of best practice measures and management measures in order to minimise the risk of potential noise impacts.

The essence of the DECC ENCM-based approach is that:

- The potential for residential (and other receiver) disturbance should firstly be established, regardless of the practicality of achieving the resulting noise goals in specific instances.
- Once the potential exceedances are identified, all possible measures should be investigated to minimise the risk of adverse impacts.

3.2 Operational Criteria

DECC's Industrial Noise Policy 2000 (INP) provides guidelines for the assessment of noise impacts associated with industrial activities and can be applied to commercial activities. It aims to balance the need for industrial activity with the desire for quiet within the community. The criteria selected are designed to protect at least 90 per cent of the population living in the vicinity of the industrial noise sources for at least 90 per cent of the time.

The INP's objectives are:

- To establish noise criteria that would protect the community from excessive noise.
- To preserve the amenity for specific land uses.
- To use the criteria for deriving project specific land uses.
- To promote uniform methods to estimate and measure noise impacts, including a procedure for evaluating meteorological effects.

Implementation is achieved by ensuring:

- That noise from any single source does not intrude greatly above the prevailing background noise level. This is known as the intrusive noise criterion.
- The background noise level does not exceed the level appropriate for the particular locality and land use. This is known as the amenity criterion.

In order to satisfy the above two requirements, an intrusive and an amenity noise criterion is determined of which the lower is adopted as the project specific noise level for the project.

3.2.1 Intrusiveness Criterion

Given the inherent variable character of environmental noise, noise levels are quantified in terms of various statistical descriptors. An explanation of these descriptors and common acoustic terminology is contained within **Appendix A** for the purpose of reference.

In setting the "intrusive" noise goal, the ambient L_{A90} background noise level (in the absence of the noise source to be assessed) generally needs to be quantified at the nearest sensitive receivers. This noise level is termed the Rating Background Level (RBL). It is a single descriptor (based on ambient noise monitoring) for each INP defined daytime (7.00 am to 6.00 pm), evening (6.00 pm to 10.00 pm) and night-time (10.00 pm to 7.00 am) assessment period, representing the typical minimum background sound level within those periods.

The RBL is obtained by calculating the median value of all daytime/evening/night-time Assessment Background Levels (ABLs) for each valid day of an ambient noise survey. The ABL is the background noise level representing each assessment period (daytime, evening and night-time) for each day of the survey. The ABL is determined by calculating the lower 10th percentile level of all the $L_{A90(15minute)}$ samples for each assessment period.

An "RBL plus 5 dBA" criterion is then applied to the 15-minute L_{Aeq} noise emissions of the industrial noise source in question at the receivers of interest (normally at their property boundary). This criterion is consistent with ensuring that industrial noise from any single source does not intrude greatly above the prevailing background noise level.

3.2.2 Amenity Criterion

The "amenity" noise goal seeks to place a limit on noise emissions according to how existing industrial/commercial-related noise levels relate to recommended noise levels for the type of area involved, ie rural, suburban, urban, etc.

The resulting amenity criterion placed upon noise emissions from a new facility then depends upon whether existing industrial/commercial-related $L_{Aeq(period)}$ noise levels are lower or higher than the recommended amenity level.

In areas where existing industrial/commercial-related noise levels are already high, the amenity noise goal acts to limit new industrial noise emissions so that the cumulative impact of all industrial/commercial noise emissions does not increase.

Conversely, in areas where there is no existing industrial/commercial noise, the amenity noise goal would be set at a level which allows new industrial/commercial noise emissions up to recommended amenity levels for the area.

The DECC provides recommended acceptable noise levels for residents located in "Rural", "Suburban", "Urban" and "Urban/Industrial" areas. Consistent with the INP, residences surrounding substation would be considered rural. The associated recommended acceptable levels are shown in **Table 6**.

Table 6 Amenity Criteria - Recommended L_{Aeq} Noise Levels from Industrial Noise Sources

Type of Receiver	Indicative Noise Amenity Area	Time of Day	Recommended L_{Aeq} Noise Level	
			Acceptable	Recommended Maximum
Residence	Rural	Day	50 dBA	55 dBA
		Evening	45 dBA	50 dBA
		Night	40 dBA	45 dBA
	Suburban	Day	55 dBA	60 dBA
		Evening	45 dBA	50 dBA
		Night	40 dBA	45 dBA
	Urban	Day	60 dBA	65 dBA
		Evening	50 dBA	55 dBA
		Night	45 dBA	50 dBA
	Urban/Industrial Interface - for existing situations only	Day	65 dBA	70 dBA
		Evening	55 dBA	60 dBA
		Night	50 dBA	55 dBA

Notes: For Monday to Saturday, Daytime 7.00 am - 6.00 pm; Evening 6.00 pm - 10.00 pm; Night-time 10.00 pm- 7.00 am.

On Sundays and Public Holidays, Daytime 8.00 am - 6.00 pm; Evening 6.00 pm - 10.00 pm; Night-time 10.00 am - 8.00 am.

The L_{Aeq} index corresponds to the level of noise equivalent to the energy average of noise levels occurring over a measurement period.

The residences in the vicinity of the Project Site are best described by the "suburban" receiver type. For "suburban" areas the recommended acceptable noise level is 55 dBA during the daytime period, 45 dBA during evening time period, and 40 dBA during the night-time period.

3.2.3 Modifying Factors

Modifying factors are to be applied if the source is low frequency, tonal or intermittent in nature. No modifying factors need to be applied in the subject assessment.

3.2.4 Sleep Disturbance

In order to minimise the risk of sleep disturbance during night-time activities, the DECC's ENCM recommends that:

- The $L_{A1(60second)}$ noise level outside a bedroom window should not exceed the L_{A90} background noise level by more than 15 dBA. The $L_{A1(60second)}$ noise level may conservatively be estimated by the typical maximum level of noise emission.

Additional guidance as to the potential for sleep arousal and sleep disturbance is provided in the ECRTN. Further information is provided in the RTA's ENMM regarding the assessment of sleep disturbance.

3.2.5 Project Noise Assessment Methodology

The INP states that these criteria have been selected to protect at least 90% of the population living in the vicinity of industrial noise sources from the adverse effects of noise for at least 90% of the time. Provided that the criteria in the INP are achieved, it is unlikely that most people would consider the resultant noise levels excessive.

In those cases where the INP project specific assessment criteria are not achieved, it does not automatically follow that all people exposed to the noise would find the noise unacceptable. In subjective terms, exceedances of the INP project specific assessment criteria can generally be described as follows:

- Negligible noise level increase <1 dBA
  (not noticeable by all people).
- Marginal noise level increase 1 dBA to 2 dBA
  (not noticeable by most people).
- Moderate noise level increase 3 dBA to 5 dBA
  (not noticeable by some people but may be noticeable by others).
- Appreciable noise level increase >5 dBA
  (noticeable by most people).

Based on the foregoing, **Table 7** presents the methodology for assessing noise levels which may exceed the INP project specific noise assessment criteria.

Table 7 Noise Impact Assessment Methodology

Assessment Criteria	Project Specific Criteria	Noise Management Zone		Noise Affectation Zone
		Marginal	Moderate	
Intrusive $L_{Aeq(15minute)}$	Rating Background Level plus 5 dBA	1 dBA to 2 dBA above project specific criteria	3 dBA to 5 dBA above project specific criteria	>5 dBA above project specific criteria
Amenity $L_{Aeq(period)}$	INP based on existing industrial level			

3.3 Traffic Noise Criteria

The NSW Department of Environment and Climate Change's (DECC's) "*Environmental Criteria for Road Traffic Noise*", May 1999 (ECRTN) presents the NSW Government's guidelines for road traffic noise assessment and provides road traffic noise criteria for proposed road or residential land use developments as well as criteria for other sensitive land uses.

The road traffic criteria recommended in the ECRTN are based on the functional categories of the subject roads, as applied by the RTA, namely:

- **Arterial Roads (including freeways and sub-arterial roads)**: These carry predominantly through traffic from one region to another, forming principal avenues of communication for urban traffic movements and are characterised by heavy and continuous traffic flow during peak periods.
- **Collector Roads**: These connect the local road system in built-up areas to freeways, arterial and sub-arterial roads.
- **Local Roads**: These are the subdivisional roads within a particular developed area. These are used solely as local access roads and are characterised by intermittent traffic flow.
- **New Road (any of the above categories)**: These are roads proposed on a corridor which has not previously been used for a freeway, arterial or sub-arterial road.
- **Redeveloped Road (any of the above categories)**: An existing road corridor where, through design or engineering changes, the project is intended to (substantially) increase traffic-carrying capacity or the mix of traffic.

Table 8 presents the corresponding ECRTN criteria for land use developments with potential to create additional traffic on local roads, being the road category applicable to residences near the Marina.

It is noted that the criteria presented within the ECRTN noise policy document are guidelines only and as such are non-mandatory.

Table 8 Traffic Criteria for Residential Land Uses

Type of Development	Criteria		
	Day 7.00 am - 10.00 pm (dBA)	**Night 10.00 pm - 7.00 am (dBA)**	**Where Criteria are Already Exceeded**
13. Land use developments with potential to create additional traffic on local roads	LAeq(1hour) 55 dBA	LAeq(1hour) 50 dBA	Where feasible and reasonable, existing noise levels should be mitigated to meet the noise criteria. Examples of applicable strategies include appropriate location of private access roads; regulating times of use; using clustering; using 'quiet' vehicles; and using barriers and acoustic treatments. In all cases, traffic arising from the development should not lead to an increase in existing noise levels of more than 2 dBA.

3.4 Meteorological Environment - Project Meteorological Conditions

Wind has the potential to increase noise at a receiver when it is light and stable and blows from the direction of the noise source. As the strength of the wind increases the noise produced by the wind will obscure noise from most industrial and transport sources.

When the source to receiver wind component is at speeds of up to 3 m/s for 30% or more of the time in any seasonal period (ie daytime, evening or night-time), then wind is considered to be a feature of the area and noise level predictions must be made under these conditions.

The NSW INP Section 5.3, Wind Effects, states that:

> *"Wind effects need to be assessed where wind is a feature of the area. Wind is considered to be a feature where source to receiver wind speeds (at 10 m height) of 3 m/s or below occur for 30 percent of the time or more in any assessment period in any season."*

An assessment of existing wind conditions has been prepared from the meteorological data recorded by the Bureau of Meteorology at the Sydney Airport weather station for the period June 2007 to June 2009. This weather station is located approximately 12 km from the Marina and the recorded weather conditions are considered representative of those in the vicinity of the Marina. The dominant seasonal wind speeds and wind directions are presented in **Appendix C.**

Any prevailing winds less than (or equal to) 3 m/s with a frequency of occurrence greater than (or equal to) 30%, and considered to be a feature of the Marina site in accordance with the INP, are presented in **Table 9**.

Table 9 Project Site Prevailing Wind Conditions in Accordance with the INP

Period	Winds ± 45° ≤3m/s with Frequency of Occurrence ≥30%		
	Daytime	**Evening**	**Night-time**
Any Season	Nil	Nil	Nil

Temperature inversions, when they occur, have the ability to increase noise levels by focusing sound waves. Temperature inversions occur predominantly at night during the winter months. For a temperature inversion to be a significant characteristic of the area it needs to occur for 30% or more of the total night-time during winter or about two nights per week. The NSW INP states that temperature inversions need only be considered for the night-time noise assessment period ie 2200 hours to 0700 hours.

The NSW INP Section 5.2, Temperature Inversions, states:

> *"Assessment of impacts is confined to the night noise assessment period (10:00 pm to 7:00 am), as this is the time likely to have the greatest impact - that is, when temperature inversions usually occur and disturbance to sleep is possible."*
>
> *"Where inversion conditions are predicted for at least 30% (or approximately two nights per week) of total night-time in winter, then inversion effects are considered to be significant and should be taken into account in the noise assessment."*

In the absence of measured data, the INP nominates default inversion parameters for non-arid areas where the average rainfall is greater than 500 mm namely:

> *"3°C/100 m temperature inversion for all receivers, plus a 2 m/s source-to-receiver component drainage-flow wind speed for those receivers where applicable."*

Noise Modelling Meteorology

The noise modelling meteorological parameters presented in **Table 10** are based on the meteorological conditions presented above.

Table 10 Operational Noise Modelling Meteorological Parameters

Season	Period	Air Temp	Relative Humidity	Wind Velocity	Temperature Gradient
Non-adverse Annual	Daytime	20°C	62%	0m/s	0°C/100m
Non-Adverse Annual	Evening	19°C	68%	0m/s	0°C/100m
Non-Adverse Annual	Night-time	16°C	77%	0m/s	0°C/100m
Adverse Winter Temperature Inversion Only	Night-time	12°C	75%	0m/s	3°C/100m

4 AMBIENT NOISE SURVEY

4.1 Noise Monitoring Location

Environmental noise monitoring was conducted at the potentially most affected (representative) noise-sensitive locations in order to:

- Characterise the existing noise environment in the vicinity of the Marina.
- Establish the noise levels upon which to base the construction and operation noise emission objectives.

The noise monitoring locations were selected after a detailed inspection of the area adjacent to the Marina, with consideration to other noise sources which may influence the recordings and security issues for the noise monitoring devices.

The noise loggers were located at 31/53 Hunters Wharf Apartment, Breakfast Point (Location 1), 172 Tennyson Road, Tennyson Point (Location 2) and 9 Delmar Parade, Gladesville (Location 3). **Figure 1** shows the noise logger positions on a locality aerial photograph.

The noise monitoring was conducted between Friday 22 May 2009 and Friday 29 May 2009.

Continuous weather data was obtained from the nearby Sydney Airport station in order to identify periods of adverse weather during the unattended noise logging survey. The Sydney Airport site was selected as it is a station providing detailed meteorological data that falls within the guideline offset distance nominated in the INP. Data corresponding to periods of high winds and/or rain were excluded from the noise analysis. The removal of the weather affected noise data did not significantly affect the resulting background noise levels.

4.2 Noise Monitoring Instrumentation

Equipment for the continuous unattended noise surveys comprised Acoustic Research Laboratories (ARL) Environmental Noise Loggers Type EL-315 (Type 1) and Type EL-215 (Type 2) fitted with a microphone windshield. Calibration of the loggers was checked prior to and following measurements using a Brüel & Kjær Electronic Calibrator Type 4230.

The EL-316 and EL-215 noise loggers are designed to comply with the requirements of AS 1259.2-1990 "*Acoustics - Sound Level Meters. Part 2: Integrating - Averaging*" and carry appropriate current NATA (or manufacturer) calibration certificates.

The unattended noise loggers were programmed to continuously monitor the ambient noise levels, recording relevant environmental statistical noise descriptors at the end of each 15 minute period throughout the survey.

4.3 Ambient Noise Monitoring Results

The results of the noise surveys are presented in tabular form in **Table 11** and graphically in **Appendix D**. The statistical descriptors shown on the graphs are described below:

L_{A90} The L_{A90} noise level is described as the average minimum background sound level or simply the background level. The L_{A90} is the level of noise exceeded for 90% of the sample time (15 minutes).

L_{A10} The noise level exceeded for 10% of the sample time (15-minute) and is typically described as the average maximum noise level.

L_{A1} The noise level exceeded for 1% of the sample time (15-minute) and is representative of the highest noise level events (eg passing heavy vehicles, aircraft etc).

L_{Aeq} The L_{Aeq} is the energy-average sound level. It is defined as the steady sound level that contains the same amount of acoustical energy as a given time-varying sound.

The noise data were processed in accordance with the procedures documented in the DECC's INP.

Table 11 presents Rating Background Level (RBL) or background (L_{A90}) ambient noise levels for the noise monitoring locations adjacent to the Marina.

Table 11 Summary of Background L_{A90} Unattended Noise Survey Results

Location	RBL or L_{A90} Background Noise Level		
	Daytime	Evening	Night-time
Location 1	42	40	39
Location 2	40	37	34
Location 3	43	38	34

5 PROJECT SPECIFIC NOISE GOAL

5.1 Project Specific Construction Noise Goals

The assessment of the impact from on-site construction works remains according to the DECC's ENCM, Chapter 171, Noise Control Guideline - Construction Site Noise.

The DECC's recommended construction noise criteria are dependent on the duration of the project. For the subject project, the construction works are expected to take longer than 26 weeks. Accordingly, it is considered appropriate to use the "background + 5 dBA" construction noise criterion.

The construction criteria for the proposed Marian are summarised in **Table 12**.

Table 12 Summary of Construction Noise Criteria Noise

Locations	Construction Noise Criteria - dBA
	DECC Preferred Construction Hours [1]
Breakfast Point	47
Tennyson Point	45
Gladesville	48
Putney	45

Note 1: DECC's standard construction hours: 7.00 am to 6.00 pm Monday to Friday, 7.00 am to 1.00 pm (if inaudible at residential premises) otherwise 8.00 am to 1.00 pm on Saturdays and no work on Sundays or Public Holidays.

Note 2: Breakfast Point is represented by measurements conducted at Location 1. Tennyson Point is represented by measurements done at Location 2. Gladesville is represented by measurements done at Location 3. Putney is represented by the measurements conducted at Location 2 as Putney is estimated to have a similar background noise environment to Tennyson Point.

The construction works would be undertaken during daytime hours only as required by the Canada Bay Council requirements and the Condition of Consent for the project.

5.2 Project Specific Operational Noise Goals

The INP-based intrusive and amenity noise assessment criteria in the vicinity of the Marina site are presented in **Table 13**.

At all locations, the amenity criteria noise levels in **Table 13** are higher than the intrusiveness criteria noise levels, except at Breakfast Point during night-time. Compliance with the intrusiveness criteria, therefore, will also demonstrate compliance with the amenity criteria for all locations and all periods of the day, except at Breakfast Point during night-time where compliance with amenity criterion will demonstrate compliance with intrusive criterion. Accordingly, the following assessment is based on the intrusiveness criteria being the controlling noise criteria for all locations and all periods of the day expect at Breakfast Point during night-time where the assessment is based on the amenity criterion being the controlling noise criterion. The Project Specific Noise Levels (PSNLs) for the project are shaded in **Table 13**.

Table 13 INP Project Specific Noise Assessment Criteria (dB(A) re 20 µPa)

Location	Project Specific Assessment Criteria					
	Intrusive $L_{Aeq(15minute)}$			Amenity $L_{Aeq(Period)}$[1]		
	Day	Evening	Night	Day	Evening	Night
Breakfast Point	47	45	44	55	45	40
Tennyson Point and Putney	45	42	39	55	45	40
Gladesville	48	43	39	55	45	40

Note 1: The controlling criteria are highlighted.

6 NOISE MODELLING

6.1 For Construction and Operation

In order to determine the acoustical impact of the Marina project, a spreadsheet computer model was developed to incorporate the significant noise sources and the intervening terrain to the residences.

The spreadsheet computer model was prepared using the CONCAWE noise prediction algorithm, suitable for the assessment of construction plant and activities and has been selected for the construction and operational noise assessment.

The noise modelling takes into account source sound level emissions and locations, screening effects, receiver locations, meteorological effects, ground topography and noise attenuation due to spherical spreading and atmospheric absorption.

Receiver (residence) locations, ground topography, current and future road alignment and other cadastral data (eg property boundaries) were derived from aerial photographs and information supplied by TLB Engineers.

6.2 For Traffic

Traffic noise predictions were based on the methodology endorsed by the US Environmental Protection Agency Report 550/9-74-004 dated March 1974 with modifications based on equations in Appendix A-13 and certain amendments recommended in the UK Calculation of Road Traffic Noise (CORTN). The prediction methodology is generally conservative and takes into account vehicle volume, speed, type, passby duration and facade reflection and assumes no intervening barriers or topography with all receivers having a full angle of view to the road.

7 CONSTRUCTION NOISE IMPACT ASSESSMENT

7.1 Construction Process and Scenarios

Based on the information provided by TLB Engineers and our understanding of the Marina project, the construction is planned to be undertaken sequentially in six stages (there is a possibility that Stage 2 and Stage 3 will be undertaken concurrently). The major plant and equipment to be utilised are presented in **Table 14** for each of the following scenarios, these being representative of the activities presented in **Table 1**:

Scenario 1 (Stage1): Construction of the blanket and of the car park (earthworks)

Scenario 2 (Stage 1): Construction of the blanket and of the car park (pavement and seal)

Scenario 3 (Stage 2): Construction of the fixed jetty including Kiosk and Managers Office

Scenario 4 (Stage 3): Construction of the floating structure (Arms 4 to 8)

Scenario 5 (Stage 2 and Stage 3): Construction of the fixed jetty including Kiosk and Managers Office together with Construction of the floating structure (Arms 4 to 8)

Scenario 6 (Stage 4): Construction of the floating structure (Arm 3)

Scenario 7 (Stage 5): Construction of the floating structure (Arms 1 and 2)

Scenario 8 (Stage 6): Construction of the Pontoon and ramp

The respective groups of plant and equipment would be working independently of each other and it is not expected that any groups would be working concurrently, except for Stage 2 and Stage 3. This possibility has been considered and is presented as Scenario 5.

Table 14 Construction Activities and Corresponding Equipment

Equipment	Activities							
	Scenario 1	Scenario 2	Scenario 3	Scenario 4	Scenario 5	Scenario 6	Scenario 7	Scenario 8
On ground Equipment								

Equipment	Activities							
	Scenario 1	Scenario 2	Scenario 3	Scenario 4	Scenario 5	Scenario 6	Scenario 7	Scenario 8
Dozer	1	-	-	-	-	-	-	-
Front end loader	1	-	-	-	-	-	-	-
Vibrating roller	1	1	-	-	-	-	-	-
Grid roller	1	-	-	-	-	-	-	-
Excavator	1	1	-	-	-	-	-	-
Dump truck	1	1	-	-	-	-	-	-
Grader	1	1	-	-	-	-	-	-
Rubber wheeled roller	-	1	-	-	-	-	-	-
Pavement reclaimer	-	1	-	-	-	-	-	-
Material spreader	-	1	-	-	-	-	-	-
Pavement seal sprayer	-	1	-	-	-	-	-	-
Seal roller	-	1	-	-	-	-	-	-
Concrete truck	-	1	-	-	-	-	-	-
On water Equipment								
Excavator	1	1	-	-	-	-	-	-
Crane	-	-	1	1	1	1	1	1
Hand tools	-	-	1	1	2	1	1	1
Impact pilling rig	-	-	-	1	1	1	1	-

Typical maximum Sound Power Levels (SWLs) of construction plant are shown in **Table 15**.

The sound power levels given in **Table 15** are maximum noise emission levels of plant that will or may be used on this project in typical operation. In order to apply the construction noise goals for the project, it is necessary to convert these levels to equivalent $L_{A10(15minute)}$ noise emissions. From numerous field studies on large construction projects, the measured difference values between the L_{Amax} and $L_{A10(15minute)}$ noise levels have been found to be up to 10 dBA depending on the mixture of the plant, intensity of operation and location of the plant relative to the receiver.

In the present study, where the equipment is generally confined to the Marina area and the receivers are relatively close, adjustments of 2 dBA to typically 5 dBA have been applied to convert the L_{Amax} noise levels shown in **Table 15** to L_{A10} noise levels for comparison with the construction noise design goals.

Note, the sound power levels given in **Table 15** do not take into account any noise mitigation strategies or treatment.

Table 15 Sound Power Level of Construction Plant Items

Plant Item	LAmax
Grader	110
Excavator	105
Dump truck	108
Vibrating roller	114
Grid roller	105
Concrete truck	112
Pavement reclaimer	114
Material spreader	110
Pavement seal sprayer	111
Seal roller	109
Rubber wheeled roller	107
Small crane	110
Impact pilling rig	134
Front end loader	111
Dozer	115
Hand tools	100

7.2 Construction Noise Assessment

With reference to the scenarios presented in **Section 7.1**, the general details of the activities are well known and details of specific phases will be refined by the successful contractors. Most of the construction activity will be over water during the Marina construction. There will be minimal shielding of noise from water activities and noise events on the water will affect most of the residents in the immediate area. There will be some shielding due to buildings and walls for land based demolition work. Construction of the floating structure will be predominately water based, including material and equipment drop off.

There are approximately 160 piles required for the proposed work. Piles would be installed at the average rate of 2 per day.

Noise levels have been predicted at the nearest residences and the results are presented in **Table 16**. The predicted noise levels do not take into account any noise mitigation strategies or treatments.

Table 16 Predicted Construction Noise Levels - dBA re 20 µPa

Location	Criteria dBA	Maximum Predicted LAeq(15minute) Operational Noise Levels								Exceedance
		Scenarios								
		1	2	3	4	5	6	7	8	
Breakfast Point	47	44-75	45-76	27-53	53-80	53-80	53-79	58-80	32-48	Up to 33 dBA
Tennyson Point	45	47-48	48-49	38-41	65-67	65-68	66-69	68-72	39-41	Up to 27 dBA
Gladesville	48	44-45	45-46	35-37	62-64	62-64	61-64	61-64	36-38	Up to 16 dBA
Putney	45	42-43	44-45	35-35	60-62	61-62	62-63	64-65	35-35	Up to 20 dBA

7.2.1 Review of Noise Impacts

A review of **Table 16** indicates that the daytime construction noise goals may be exceeded by up to 33 dBA at the closest residences in Breakfast Point, up to 27 dBA at the closest residences in Tennyson Point, up to 16 dBA at the closest residences in Gladesville and up to 20 dBA at the closest residences in Putney.

The noisiest scenarios are Scenarios 4, 5, 6 and 7 including Impact Piling Rig.

7.2.2 Noise Mitigation of Construction Activities

Significant exceedances of the design goals, by more than 33 dBA, may occur as a result of Impact Piling Rig. Feasible and reasonable noise mitigation strategies should therefore be implemented wherever possible during these construction works.

7.2.3 Noise Mitigation Strategies

AS 2436-1981 "*Guide to Noise Control on Construction, Maintenance and Demolition Sites*" sets out numerous practical recommendations to assist in mitigating construction noise emissions. Examples of strategies that could be implemented on the Marina project are listed below, including the typical noise reduction achieved, where applicable.

Operational Strategies

- Conducting sheet piling only after 8.00 am, and include respite periods.
- Regular compliance checks on the noise emissions of all plant and machinery used for the project would indicate whether noise emissions from plant items were higher than normal.
- Ongoing noise monitoring during construction at sensitive receivers during critical periods (ie times when noise emissions are expected to be at their highest - eg piling) will assist in identifying and controlling high risk noise events.

Source Noise Control Strategies

- Engines and exhausts are typically the dominant noise sources on mobile plant such as graders, excavators, trucks, etc. In order to minimise noise emissions, residential grade mufflers should be fitted on all mobile plant utilised on site.
- Regular maintenance of all plant and machinery used for the project will assist in minimising noise emissions.
- Installation of acoustic enclosures on plant items, where required.

Community Consultation

Active community consultation and the maintenance of positive relations with local residents and building owners would assist in alleviating concerns and thereby minimise complaint.

8 OPERATIONAL NOISE ASSESSMENT

8.1 Operational Activities and Scenarios

Operational noise from the Marina potentially occurs during the daytime, evening and night-time, 7 days a week. Most activity however will occur during daytime when the Marina office is open, from 9.00 am to 6.00 pm 7 days during the summer and 9.00 am to 5.00 pm 7 days during winter. However, there will be occasions when users either leave before or return after office hours

The primary noise sources from the "on water" operation of the Marina are boat engines as boats arrive and leave. People talking with raised voices from and to the car park have been also considered.

Three scenarios have been assessed (daytime, evening and night-time) and the major noise sources are indicated in **Table 17** (with consideration of the motor vehicle and vessel movements presented in **Table 2** and **Table 3**).

Table 17 Operational Activities and Corresponding Noise Sources

Noise Sources	**Activities**		
	Daytime	**Evening**	**Night-time**
Cars in car park	5 movements/15minutes	3 movements/15minutes	1 movements/15minutes
People walking (car park from or to Marina)[1]	10 people/15minutes	6 people/15minutes	2 people/15minutes
Minimal maintenance activity (ie sewage pump)	1	1	0
Boat leaving or arriving	4	2	1
Bow thruster	1	1	0

Note 1: Assume 2 people per car.

Typical maximum Sound Power Levels (SWLs) of operational noise sources are shown in **Table 18** together with the associated $L_{Aeq(15minutes)}$ SWL.

Table 18 Typical Equipment Sound Power Levels for Operational Activities

Plant Item	**LAmax**	**LAeq**
Car	111	95
People talking (car park from or to Marina) - shout and raised voice	90 (shout)	73 (raised voice)
Minimal maintenance activity (ie sewage pump)	75	72
Boat leaving or arriving		
2 knots	93	93
4 knots	95	95
8 knots	100	100
Bow thruster	103	103

There will be no maintenance facilities or boat lift as part of the proposed Marina development.

8.2 Operation Noise Assessment

Operational scenarios have been developed based on the daytime, evening and night-time Marina usage and noise levels predicted at the nearest receivers. Typically the scenarios include the following:

- Carpark activities including cars idling and arriving/leaving.
- Patrons talking and walking from the carpark to their vessel.
- Patrons talking at the vessel and then departing, initially at 2 knots and then ultimately at 8 knots.

Table 19 to **Table 21** summarise the noise levels expected during operation at the nearest residences for the different weather conditions indicated in **Table 10**.

Table 19 Predicted Operational Noise Levels - Daytime - dBA re 20 µPa

Location	Criteria	Maximum Predicted $L_{Aeq(15minute)}$ Operational Noise Levels	Exceedance
		Non Adverse Annual	
Breakfast Point	47	31-46	Complies
Tennyson Point	45	37-38	Complies
Gladesville	48	35	Complies
Putney	45	33-35	Complies

Note 1: The range in noise levels corresponds to that expected at the nearest receivers to the Marina at each receiver area.

Table 20 Predicted Operational Noise Levels - Evening - dBA re 20 µPa

Location	Criteria	Maximum Predicted $L_{Aeq(15minute)}$ Operational Noise Levels	Exceedance
		Non Adverse Annual	
Breakfast Point	45	29-40	Complies
Tennyson Point	42	36	Complies
Gladesville	43	31-32	Complies
Putney	42	31-32	Complies

Note1: The range in noise levels corresponds to that expected at the nearest receivers to the Marina at each receiver area.

Table 21 Predicted Operational Noise Levels - Night-time - dBA re 20 µPa

Location	Criteria	Maximum Predicted $L_{Aeq(15minute)}$ Operational Noise Levels		Exceedance
		Non Adverse Annual	Adverse Winter - Temperature Inversion Only	
Breakfast Point	40	25-37	30-39	Complies
Tennyson Point	39	30-33	34-37	Complies
Gladesville	39	32-33	36	Complies
Putney	39	23-24	28 to 29	Complies

Note1: The range in noise levels corresponds to that expected at the nearest receivers to the Marina at each receiver area.

8.2.1 Review of Operational Noise Impacts

For the scenarios modelled compliance is predicted during the daytime, evening and night-time at all the surrounding receivers.

8.2.2 Noise Mitigation of Operational Activities

The following strategies can be used to reduce the noise at the closest residences:

- Reduce car idling in the carpark and general talking from the carpark to the Marina
- Limit the speed of the boats

8.2.3 Sleep Disturbance

The results for the sleep disturbance assessment together with the sleep disturbance criteria are presented in **Table 22**.

Table 22 Sleep Disturbance Assessment Results

Locations	Criteria (dBA)	Maximum Predicted L_{A1} (dBA)	Exceedance
Breakfast Point	50	53 to 59	Up to 9 dBA
Tennyson Point	49	48	Complies
Gladesville	49	42	Complies
Putney	49	42	Complies

Note 1: The 59 dBA noise level results from a bow thruster operation at berth close to the shore. This will reduce to 52 dBA for operation in an outer berth. The 48 dBA a Tennyson Point is from a bow thruster operating in an outer berth.

A review of **Table 22** indicates that there is a potential for sleep disturbance at Breakfast Point if people are shouting close to the Marina, and also from the use of bow thrusters close to the shore.

It is recommended the Marina noise management plan address the potential issue of patrons shouting during the 10 pm to 7 am night-time period.

The location of vessels with bow thrusters at the outer marina arms will reduce the potential to exceed the sleep disturbance criteria at the surrounding residences. It is recommended that Marina users are not to operate “bow-thrusters” during the 10 pm to 7 am night-time period, except in emergency. However, the likelihood of their frequent use beyond 10 pm is probably small.

9 TRAFFIC NOISE ASSESSMENT

The Marina is accessed via Magnolia Drive and Rosewater Circuit. It is assumed that no heavy vehicles will be travelling on those routes.

The offset distances of existing and proposed residences adjacent to the proposed transport route (Magnolia Drive and Rosewater Circuit) have been estimated from Google Earth and the Concept Plan 2005 to range between 14 m and 33 m**.**

The existing peak hourly and typical hourly vehicle movements for Magnolia Drive and Rosewater Circuit are presented in **Table 23**.

Table 23 Existing Peak Hourly Traffic Movements and Typical Hourly Traffic Movements on Magnolia Drive and Rosewater Circuit

Road	Peak Hour			Typical Hourly Flow		
	Day	Evening	Night	Day	Evening	Night
Magnolia Drive	90	30	12	60	20	8
Rosewater Circuit	45 to 65	15 to 25	5 to 8	30 to 43	10 to 17	3 to 5

Note1: The Peak Hourly Traffic Movements has been provided by TBL Engineers and the Typical Hourly Vehicle Movement has been estimated as 2/3 of the Peak Hourly Flow.

Note 2: Existing traffic levels have been assumed to remain constant throughout the life of the project.

The estimated additional peak hourly vehicle movements generated by the operation of the Marina for Magnolia Drive and Rosewater Circuit are presented in **Table 24**.

Table 24 Estimated Peak Hourly Traffic Movements generated by the Operation of the Marina on Magnolia Drive and Rosewater Circuit

Road	Peak Hour		
	Day	Evening	Night
Magnolia Drive	20	10	3
Rosewater Circuit	20	10	3

Note 1: The Peak Hourly Traffic Movements has been provided by TBL Engineers and the Typical Hourly Vehicle Movement has been estimated as 2/3 of the Peak Hourly Flow.

Note 2: Existing traffic levels have been assumed to remain constant throughout the life of the project.

It is understood that the peak hour on the subject transport routes can be different from the peak hour use of the Marina. Accordingly, the following two situations have to be assessed:

- **Case 1**: The peak hourly traffic movements on the transport routes corresponds to the same peak hour use of the Marina.
- **Case 2**: The peak hourly traffic movements on the transport routes corresponds to a different peak hour use of the Marina.

The cumulative peak hour flows on the transport route when the Marina is operational are presented in **Table 25**.

Table 25 Cumulative Peak Hourly Traffic Movements on Magnolia Drive and Rosewater Circuit

Road	Cumulative Peak Hour Traffic Movements (percentage increase of traffic)					
	Day		Evening		Night	
	Case 1	Case 2	Case 1	Case 2	Case 1	Case 2
Magnolia Drive	110 (22.2%)	80 (33.3%)	40 (33.3%)	30 (50%)	15 (25%)	11 (37.5%)
Rosewater Circuit	65 to 85 (44.4% to 30.8%)	50 to 63 (66.7% to 46.5%)	25 to 35 (66.7% to 40%)	20 to 27 (100% to 58.8%)0	8 to 11 (60% to 37.5%)	6 to 8 (100% to 60%)

The calculated peak hourly daytime, evening and night-time traffic noise levels for both the transport routes are presented in **Table 26**, **Table 27** and **Table 28** respectively.

Table 26 Peak Hourly Daytime Traffic Noise Levels $L_{Aeq(1hour)}$ - dBA

Distance from Road	Daytime Criteria	Existing Vehicles		Cumulative Vehicles		Increase in Noise Level	
		Peak hourly	Typical hourly flow	Case 1	Case 2	Case 1	Case 2
Magnolia Drive							
14 m	55	54.4	52.7	55.3	53.9	0.9	1.2
33 m	55	48.8	47.0	49.7	48.3	0.9	1.3
Rosewater Circuit							
14 m	55	51.4 to 53.0	49.7 to 51.2	53.0 to 54.2	51.9 to 52.9	1.6 to 1.2	2.2 to 1.7
33 m	55	45.8 to 47.4	44.0 to 45.6	47.4 to 48.5	46.2 to 47.2	1.6 to 1.1	2.2 to 1.6

Note: Speed limit on Magnolia Drive and Rosewater Circuit is assumed to be 40 km/h.

Table 27 Peak Hourly Evening Traffic Noise Levels $L_{Aeq(1hour)}$ - dBA

Distance from Road	Evening Criteria	Existing Vehicles		Cumulative Vehicles		Increase in Noise Level	
		Peak hourly	Typical hourly flow	Case 1	Case 2	Case 1	Case 2
Magnolia Drive							
14 m	55	49.7	47.9	50.9	49.7	1.2	1.8
33 m	55	44.0	42.3	45.3	44.0	1.3	1.7
Rosewater Circuit							
14 m	55	46.7 to 48.9	44.9 to 47.2	48.9 to 50.3	47.9 to 49.2	2.2 to 1.4	3 to 2
33 m	55	41.0 to 43.2	39.3 to 41.6	43.2 to 44.7	42.3 to 43.6	2.2 to 1.5	3 to 2

Table 28 Peak Hourly Night-time Traffic Noise Levels $L_{Aeq(1hour)}$ - dBA

Distance from Road	Night-time Criteria	Existing Vehicles		Cumulative Vehicles		Increase in Noise Level	
		Peak hourly	Typical hourly flow	Case 1	Case 2	Case 1	Case 2
Magnolia Drive							
14 m	50	45.7	43.9	46.7	45.3	1	1.4
33 m	50	40.0	38.3	41.0	39.7	1	1.4
Rosewater Circuit							
14 m	50	41.9 to 43.9	39.7 to 41.9	43.9 to 45.3	42.7 to 43.9	2 to 1.4	3 to 2
33 m	50	36.2 to 38.3	34.0 to 36.2	38.3 to 39.7	37.0 to 38.3	2.1 to 1.4	3 to 2.1

The ECRTN states that in any case where the nominated criteria are already exceeded (or are within 2 dBA of the criteria), traffic associated with the project should not lead to an increase in the existing traffic noise levels of more than 2 dBA. As a general rule, traffic noise associated with the project would not increase the existing traffic noise levels by more than 2 dBA so long as the percentage increase in vehicles movements for the project is no greater than 60%.

Magnolia Drive

Review of **Table 26, Table 27** and **Table 28** indicates that the existing traffic noise levels are below the daytime, evening and night-time criteria for both the peak hourly and typical hourly flows.

Review of **Table 26** indicates that the daytime traffic noise levels are below the 55 dBA $L_{Aeq(1hour)}$ criterion at offset distances of 14 m (and greater) from the road for Case 2.

Review of **Table 26** also indicates that the cumulative daytime traffic noise level marginally exceeds the 55 dBA $L_{Aeq(1hour)}$ criterion (by 0.3 dBA) at an offset distance of 14 m (and greater) from the road for Case 1. However, the increase in the existing noise level is only 0.9 dBA and therefore falls within the 2 dBA allowable margin.

Review of **Table 27** indicates that the evening traffic noise levels are below the 55 dBA $L_{Aeq(1hour)}$ criterion at offset distances of 14 m (and greater) from the road in all cases.

Review of **Table 28** indicates that the night-time traffic noise levels are below the 50 dBA $L_{Aeq(1hour)}$ criterion at offset distances of 14 m (and greater) from the road in all cases.

Rosewater Circuit

Review of **Table 26, Table 27** and **Table 28** indicates that the existing traffic noise levels are below the daytime, evening and night-time criteria for both peak hourly and typical hourly flows at offset distances of 14 m (and greater).

Review of **Table 26** indicates that the daytime cumulative traffic noise levels are below the 55 dBA $L_{Aeq(1hour)}$ criterion at offset distances of 14 m (and greater) from the road in all cases.

Review of **Table 27** indicates that the evening cumulative traffic noise levels are below the 55 dBA $L_{Aeq(1hour)}$ criterion at offset distances of 14 m (and greater) from the road in all cases.

Review of **Table 28** indicates that the night-time traffic noise levels are below the 50 dBA $L_{Aeq(1hour)}$ criterion at offset distances of 14 m (and greater) from the road in all cases.

Discussion

Traffic noise impacts associated with the operation of the Marina are considered acceptable (based on the assumptions made) as the daytime, evening and night-time noise levels comply with the recommended criteria at offset distances of 14 m (and greater) respectively on the most impacted roads.

10 SUMMARY OF FINDINGS

Heggies Pty Ltd (Heggies) has been engaged by Breakfast Point Pty Ltd to produce a noise impact assessment for the proposed Marina at Kendall Bay.

The results of the study are summarised in the following points:

- Predicted noise levels at the nearest residences from construction activities are expected to exceed the daytime period noise design goal. Significant exceedances of the design goals by more than 33 dBA may occur as a result of impact piling. It should be noted that it is common for noise from construction activities to exceed the daytime period construction noise goal, being a result of the nature of the activities and the often relative close proximity of sensitive receivers. Noise mitigation strategies have the potential to minimise impacts and should therefore be implemented wherever feasible and reasonable during construction works.
- Predicted noise levels at the nearest residences from operational activities are expected to comply with the noise design goals at during the daytime, evening and night-time.
- There is a potential for sleep disturbance if people are shouting close to the Marina.

- Traffic noise impacts associated with the operation of the Marina are considered acceptable (based on the assumptions made) as the daytime, evening and night-time noise levels comply with the recommended criteria at offset distances of 14 m (and greater) respectively on the most impacted roads.

ACOUSTIC TERMINOLOGY USED IN THE REPORT

1 Sound Level or Noise Level

The terms "sound" and "noise" are almost interchangeable, except that in common usage "noise" is often used to refer to unwanted sound.

Sound (or noise) consists of minute fluctuations in atmospheric pressure capable of evoking the sense of hearing. The human ear responds to changes in sound pressure over a very wide range. The loudest sound pressure to which the human ear responds is ten million times greater than the softest. The decibel (abbreviated as dB) scale reduces this ratio to a more manageable size by the use of logarithms.

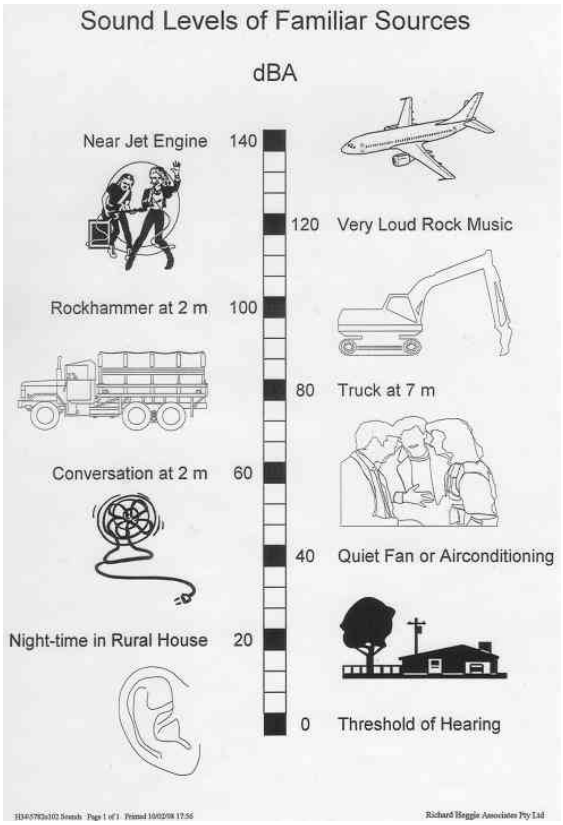
The symbols SPL, L or L_P are commonly used to represent Sound Pressure Level. The symbol L_A represents A-weighted Sound Pressure Level. The standard reference unit for Sound Pressure Levels expressed in decibels is 2×10^{-5} Pa.

2 "A" Weighted Sound Pressure Level

The overall level of a sound is usually expressed in terms of dBA, which is measured using a sound level meter with an "A-weighting" filter. This is an electronic filter having a frequency response corresponding approximately to that of human hearing.

People's hearing is most sensitive to sounds at mid frequencies (500 Hz to 4000 Hz), and less sensitive at lower and higher frequencies. Thus, the level of a sound in dBA is a good measure of the loudness of that sound. Different sources having the same dBA level generally sound about equally loud.

A change of 1 dBA or 2 dBA in the level of a sound is difficult for most people to detect, whilst a 3 dBA to 5 dBA change corresponds to a small but noticeable change in loudness. A 10 dBA change corresponds to an approximate doubling or halving in loudness. The figure below lists examples of typical noise levels



Other weightings (eg B, C and D) are less commonly used than A-weighting. Sound Levels measured without any weighting are referred to as "linear", and the units are expressed as dB(lin) or dB.

3 Sound Power Level

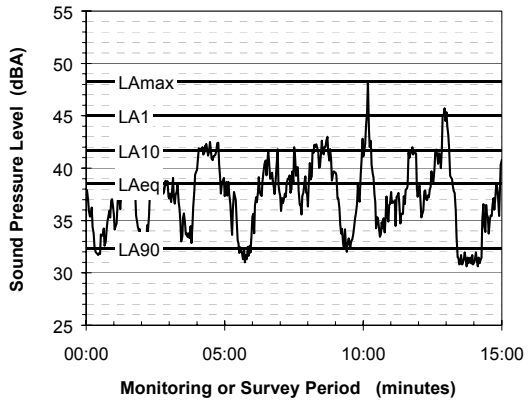
The Sound Power of a source is the rate at which it emits acoustic energy. As with Sound Pressure Levels, Sound Power Levels are expressed in decibel units (dB or dBA), but may be identified by the symbols SWL or L_W, or by the reference unit 10^{-12} W.

The relationship between Sound Power and Sound Pressure may be likened to an electric radiator, which is characterised by a power rating, but has an effect on the surrounding environment that can be measured in terms of a different parameter, temperature.

4 Statistical Noise Levels

Sounds that vary in level over time, such as road traffic noise and most community noise, are commonly described in terms of the statistical exceedance levels L_{AN}, where L_{AN} is the A-weighted sound pressure level exceeded for N% of a given measurement period. For example, the L_{A1} is the noise level exceeded for 1% of the time, L_{A10} the noise exceeded for 10% of the time, and so on.

The following figure presents a hypothetical 15 minute noise survey, illustrating various common statistical indices of interest.



Of particular relevance, are:

L_{Amax} The maximum noise level during the 15 minute interval

L_{A1} The noise level exceeded for 1% of the 15 minute interval.

L_{A10} The noise level exceed for 10% of the 15 minute interval. This is commonly referred to as the average maximum noise level.

L_{A90} The noise level exceeded for 90% of the sample period. This noise level is described as the average minimum background sound level (in the absence of the source under consideration), or simply the background level.

L_{Aeq} The A-weighted equivalent noise level (basically the average noise level). It is defined as the steady sound level that contains the same amount of acoustical energy as the corresponding time-varying sound.

When dealing with numerous days of statistical noise data, it is sometimes necessary to define the typical noise levels at a given monitoring location for a particular time of day. A standardised method is available for determining these representative levels.

This method produces a level representing the "repeatable minimum" L_{A90} noise level over the daytime and night-time measurement periods, as required by the EPA. In addition the method produces mean or "average" levels representative of the other descriptors (L_{Aeq}, L_{A10}, etc).

5 Tonality

Tonal noise contains one or more prominent tones (ie distinct frequency components), and is normally regarded as more offensive than "broad band" noise.

6 Impulsiveness

An impulsive noise is characterised by one or more short sharp peaks in the time domain, such as occurs during hammering.

7 Frequency Analysis

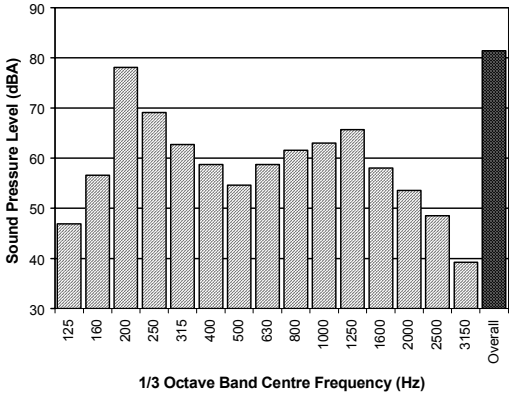
Frequency analysis is the process used to examine the tones (or frequency components) which make up the overall noise or vibration signal. This analysis was traditionally carried out using analogue electronic filters, but is now normally carried out using Fast Fourier Transform (FFT) analysers.

The units for frequency are Hertz (Hz), which represent the number of cycles per second.

Frequency analysis can be in:

- Octave bands (where the centre frequency and width of each band is double the previous band)
- 1/3 octave bands (3 bands in each octave band)
- Narrow band (where the spectrum is divided into 400 or more bands of equal width)

The following figure shows a 1/3 octave band frequency analysis where the noise is dominated by the 200 Hz band. Note that the indicated level of each individual band is less than the overall level, which is the logarithmic sum of the bands.



8 Vibration

Vibration may be defined as cyclic or transient motion. This motion can be measured in terms of its displacement, velocity or acceleration. Most assessments of human response to vibration or the risk of damage to buildings use measurements of vibration velocity. These may be expressed in terms of "peak" velocity or "rms" velocity.

The former is the maximum instantaneous velocity, without any averaging, and is sometimes referred to as "peak particle velocity", or PPV. The latter incorporates "root mean squared" averaging over some defined time period.

Vibration measurements may be carried out in a single axis or alternatively as triaxial measurements. Where triaxial measurements are used, the axes are commonly designated vertical, longitudinal (aligned toward the source) and transverse.

The common units for velocity are millimetres per second (mm/s). As with noise, decibel units can also be used, in which case the reference level should always be stated. A vibration level V, expressed in mm/s can be converted to decibels by the formula 20 log (V/V_o), where V_o is the reference level (10^{-9} m/s). Care is required in this regard, as other reference levels may be used by some organizations.

9 Human Perception of Vibration

People are able to "feel" vibration at levels lower than those required to cause even superficial damage to the most susceptible classes of building (even though they may not be disturbed by the motion). An individual's perception of motion or response to vibration depends very strongly on previous experience and expectations, and on other connotations associated with the perceived source of the vibration. For example, the vibration that a person responds to as "normal" in a car, bus or train is considerably higher than what is perceived as "normal" in a shop, office or dwelling.

10 Over-Pressure

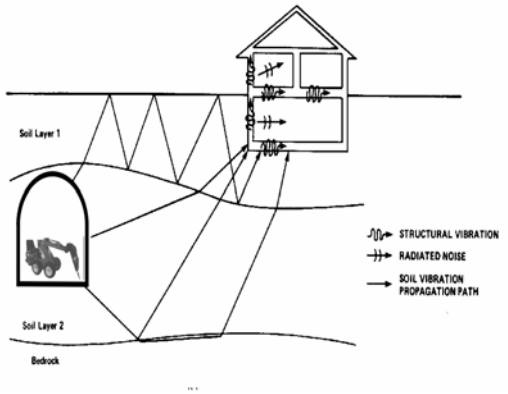
The term "over-pressure" is used to describe the air pressure pulse emitted during blasting or similar events. The peak level of an event is normally measured using a microphone in the same manner as linear noise (ie unweighted), at frequencies both in and below the audible range.

11 Ground-borne Noise, Structure-borne Noise and Regenerated Noise

Noise that propagates through a structure as vibration and is radiated by vibrating wall and floor surfaces is termed "structure-borne noise", "ground-borne noise" or "regenerated noise". This noise originates as vibration and propagates between the source and receiver through the ground and/or building structural elements, rather than through the air.

Typical sources of ground-borne or structure-borne noise include tunnelling works, underground railways, excavation plant (eg rockbreakers), and building services plant (eg fans, compressors and generators).

The following figure presents the various paths by which vibration and ground-borne noise may be transmitted between a source and receiver for construction activities occurring within a tunnel.



ACOUSTIC TERMINOLOGY USED IN THE REPORT

The term "regenerated noise" is also used in other instances where energy is converted to noise away from the primary source. One example would be a fan blowing air through a discharge grill. The fan is the energy source and primary noise source. Additional noise may be created by the aerodynamic effect of the discharge grill in the airstream. This secondary noise is referred to as regenerated noise.

ABL	Assessment Background Level - In accordance with the INP, the single figure background noise level representing each assessment period - day, evening and night. The ABL noise level is determined by calculating the lower 10 percentile level of all $L_{A90(15minute)}$ samples for each assessment period.
Ambient Noise	The all-encompassing noise associated with a given environment. It is the composite of sounds from many sources, both near and far.
Amenity Noise Criteria	Industrial noise level within each INP time period (day, evening and night) deemed acceptable by the INP Policy for specific to land use and area usage.
AS	Australian Standard.
Attenuation	The reduction of noise level.
A-weighting	Adjustment carried out to the measured noise spectra via use of an electronic filter, to approximate the response of the human ear.
Background Noise	The underlying level of noise present in the ambient noise, excluding the noise source under investigation, when extraneous noise is removed. This is described using the L_{A90} statistical noise descriptor.
Compliance	Where noise levels meet noise level goals, noise criteria, or noise requirements.
Concept design	Initial functional layout of a concept, such as a road or road system, providing a level of understanding leading to later establishment of detailed design parameters.
CORTN	Calculation Of Road Traffic Noise - United Kingdom Department of Transport guidelines for the calculation of road traffic noise.
Day	For industrial noise, in accordance with the INP, it is the period from 07.00 am to 6.00 pm (Monday to Sunday).
DECC	NSW Department of Environment and Climate Change formerly known as the Environment Protection Authority (EPA) and Department of Environment and Conservation (DEC).
DIPNR	NSW Department of Infrastructure, Planning and Natural Resources.
dB	Abbreviation for decibel - a unit of sound measurement. It is equivalent to 10 times the logarithm (to base 10) of the ratio of a given sound pressure to a reference pressure.
dBA	A-weighted decibel: A single number measurement of the sound pressure based on the decibel but weighted to approximate the response of the human ear with respect to frequencies.
ECRTN	Environmental Criteria for Road Traffic Noise NSW Government's policy in relation to the assessment of road traffic noise impacts.
EIS	Environmental Impact Statement - A study that assesses potential environmental and social impacts associated with the construction and operation of a project.
EPA	Environment Protection Authority, now known as the Department of Environment and Conservation.
Evening	For industrial noise, in accordance with the INP, it is the period from 6.00 pm to 10.00 pm (Monday to Sunday).

GLOSSARY AND ABREVIATION

Feasible and Reasonable	Terms used in relation to noise mitigation measures: Feasibility relates to engineering considerations and what is practical to achieve in terms of mitigation. Reasonableness relates to the application of judgement in arriving at a decision.
Guideline	Information intended to provide advice on a procedure. Guidelines are non-mandatory.
Heavy Vehicle	A truck, transport or other vehicle with a gross vehicle weight above a specified level (for example over 8 tonnes).
Heggies	Heggies Pty Ltd
INP	Industrial Noise Policy (INP)- the NSW Government's INP is administered by the DECC. The policy provides a framework and process for assessment of industrial noise including deriving noise limits, conditions for consents and licenses that will enable the DECC to regulate premises.
Intrusive Noise Criteria	Noise level for each INP time period (day, evening and night) above which the industrial noise contribution from a particular industrial noise source is expected to clearly noticeable and potentially objectionable. The noise criteria are dependant on the underlying background noise level.
L_{Amax}	Maximum noise level measured at a given location.
L_{AN}	L_{AN} is the A-weighted sound pressure level exceeded for N% of a given measurement period.
L_{A1}	The A-weighted sound pressure level that is exceeded for 1% of the time for which the given sound is measured.
L_{A10}	The sound pressure level that is just exceeded for 10% of the time for which the given sound is measured. This descriptor is often referred to as the average maximum noise level. During a 15 minute survey, it would represent the loudest 90 seconds.
L_{A90}	The A-weighted sound pressure level that is just exceeded for 90% of the time over which a given sound is measured. This is considered to represent the background noise. This descriptor is often referred to as the average minimum noise level. During a 15 minute survey, it would represent the quietest 90 seconds.
L_{Aeq}	Equivalent A-weighted 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 occurring over that period.
$L_{Aeq(15minute)}$	The L_{Aeq} noise level over a 15 minute period. In accordance with the NSW INP's intrusive criteria, $L_{Aeq(15minute)}$ from industry is assessed against the RBL + 5 dBA.
$L_{Aeq(period)}$	The L_{Aeq} noise level over the relevant assessment period. Based on the NSW INP, day is 7.00 am to 6.00 pm, evening 6.00 pm to 10.00 pm and night 10.00 pm to 7.00 am. In accordance with the INP's amenity criteria, $L_{Aeq(period)}$ from industry is assessed against the appropriate day/evening/night amenity goal.
Level	The level of noise, usually expressed in dBA, as measured by a standard sound level meter with a pressure microphone. The sound pressure level in dBA gives a close indication of the subjective loudness of the noise.
Mitigation	Measure to manage and minimise noise impacts.
Night	For industrial noise, in accordance with the INP, it is the period from 10.00 pm to 6.00 am (Monday to Sunday).
Noise Level Goal or Noise Level Objective	A noise level that should be adopted for planning purposes as the highest acceptable noise level for the specific area, land use and time of day.
Noise Logger	An electronic sound level logging device which continuously monitors the ambient noise and stores L_{AN} statistical noise levels over a given pre-set sample time period.

GLOSSARY AND ABREVIATION

RBL	A single statistical noise descriptor describing the L_{A90} background noise level of the relevant assessment period. In accordance with the INP, the Rating Background Level (RBL) for each assessment period is obtained by calculating the median values of the relevant day/evening/night assessment background levels (ABLs), for each day of the survey. For example, for a weeks worth of monitoring, the night RBL is the median of the seven ABLs.
RTA	Roads and Traffic Authority

SITE SPECIFIC CONDITIONS – JUNE 2007 TO JUNE 2009

Table C1 Seasonal Frequency of occurrence Wind Speed Intervals - Daytime

Period	Calm (<0.5m/s)	Wind Direction ±45°	Wind Speed		
			0.5 to 2m/s	2 to 3m/s	0.5 to 3m/s
Annual	0.1%	WNW	1.2%	2.2%	3.4%
Summer	0.2%	W	0.9%	1.3%	2.2%
Autumn	0.0%	WNW	1.7%	3.5%	5.2%
Winter	0.2%	WNW	1.5%	2.4%	3.9%
Spring	0.0%	WNW	0.7%	1.7%	2.4%

Table C2 Seasonal Frequency of occurrence Wind Speed Intervals - Evening

Period	Calm (<0.5m/s)	Wind Direction ±45°	Wind Speed		
			0.5 to 2m/s	2 to 3m/s	0.5 to 3m/s
Annual	0.7%	NNE	2.1%	2.2%	4.2%
Summer	0.1%	NNE	0.2%	0.6%	0.8%
Autumn	1.1%	NNE	3.4%	3.5%	7.0%
Winter	0.9%	WNW	3.1%	3.7%	6.8%
Spring	0.7%	NE	1.8%	2.4%	4.1%

Table C3 Seasonal Frequency of occurrence Wind Speed Intervals - Night-Time

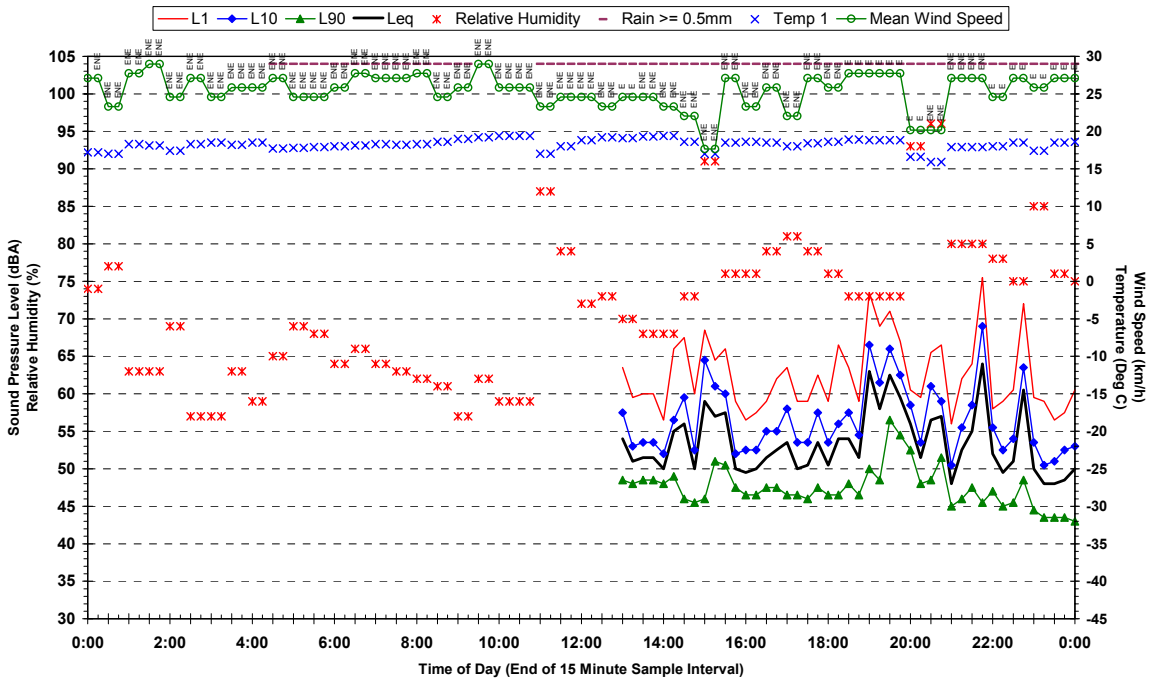
Period	Calm (<0.5m/s)	Wind Direction ±45°	Wind Speed		
			0.5 to 2m/s	2 to 3m/s	0.5 to 3m/s
Annual	1.2%	NNW	4.9%	7.0%	11.8%
Summer	1.6%	N	4.5%	5.1%	9.5%
Autumn	1.3%	NNW	5.7%	8.7%	14.4%
Winter	0.5%	NNW	4.1%	6.8%	10.9%
Spring	1.4%	NNW	5.2%	7.2%	12.4%

Table C4 Summary

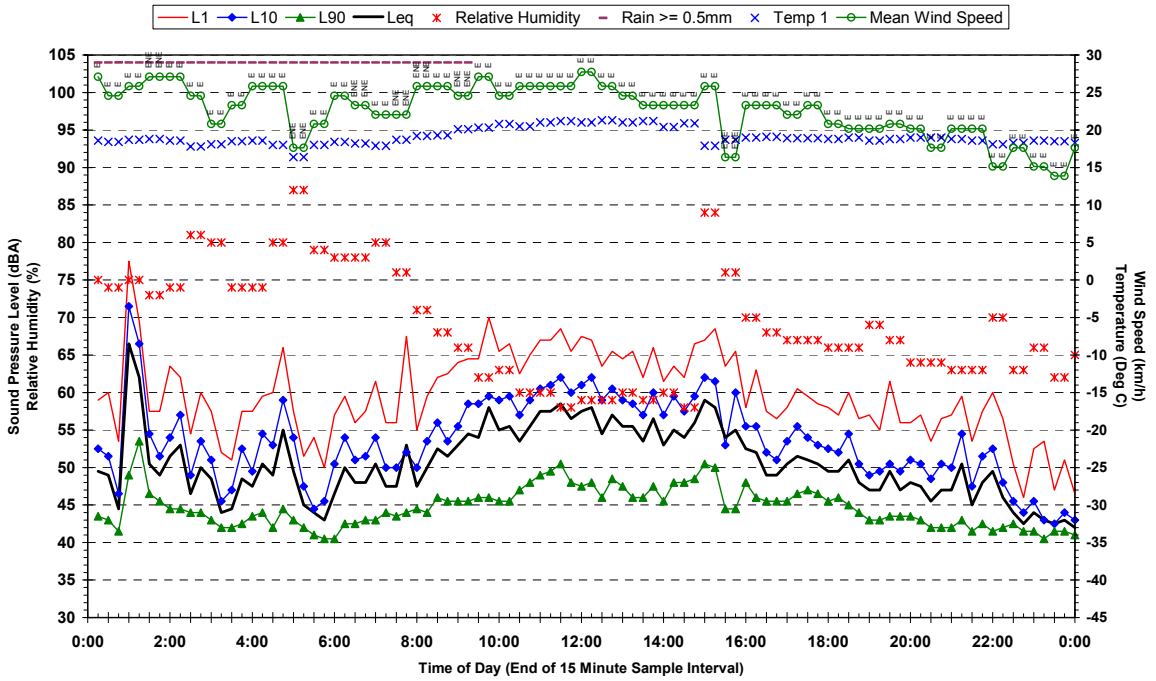
Period	Winds ±45° ≤3m/s with Frequency of Occurrence ≥30%		
	Daytime	Evening	Night-Time
Annual	Nil	Nil	Nil
Summer	Nil	Nil	Nil
Autumn	Nil	Nil	Nil
Winter	Nil	Nil	Nil
Spring	Nil	Nil	Nil

UNATTENDED AMBIENT NOISE AND WEATHER DATA – LOCATION 1

Statistical Ambient Noise Levels
Location 1 - 31-51 Hunters Wharf Apartment - Friday 22 May 2009

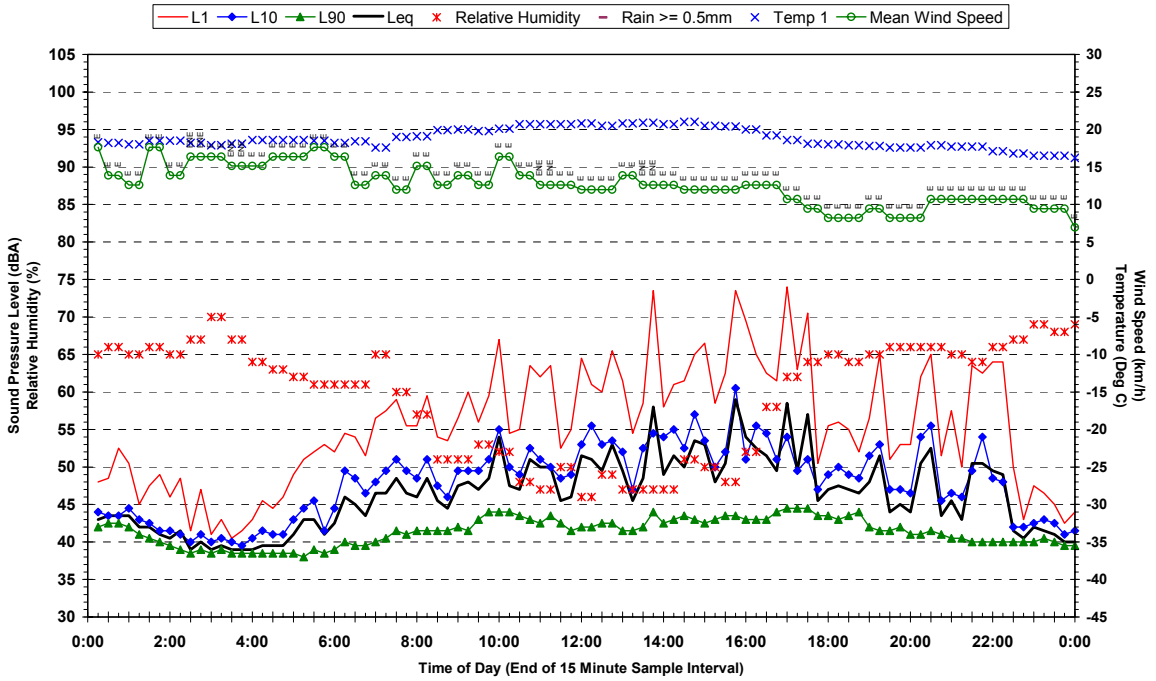


Statistical Ambient Noise Levels
Location 1 - 31-51 Hunters Wharf Apartment - Saturday 23 May 2009

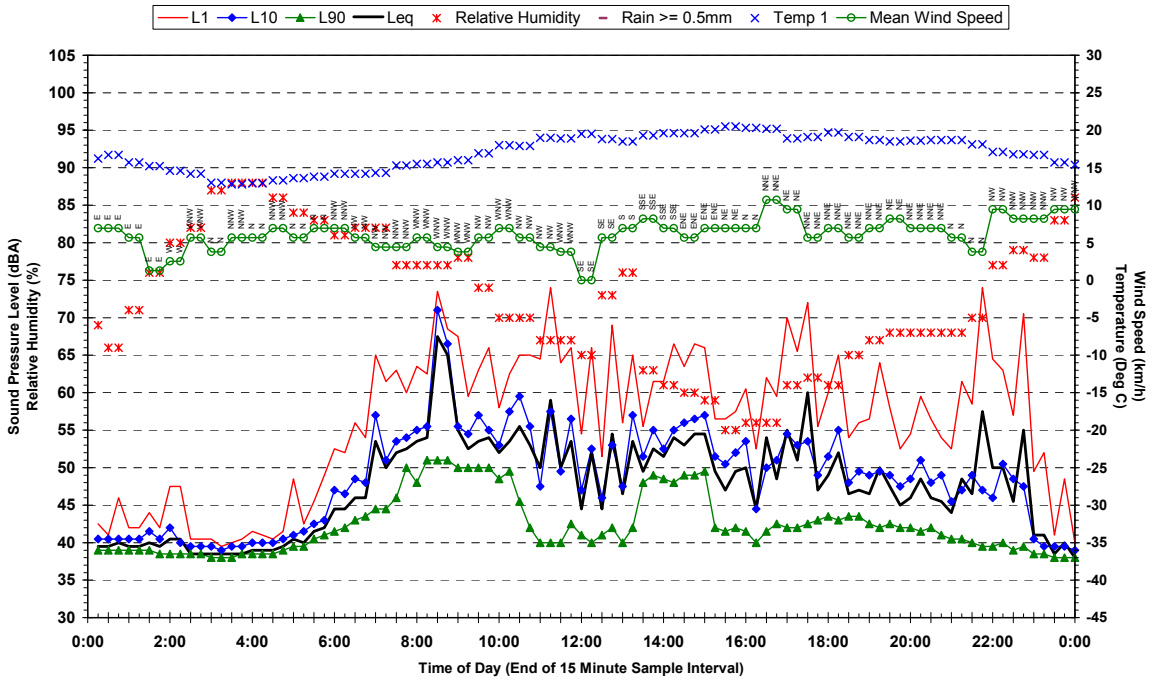


UNATTENDED AMBIENT NOISE AND WEATHER DATA – LOCATION 1

Statistical Ambient Noise Levels
Location 1 - 31-51 Hunters Wharf Apartment - Sunday 24 May 2009

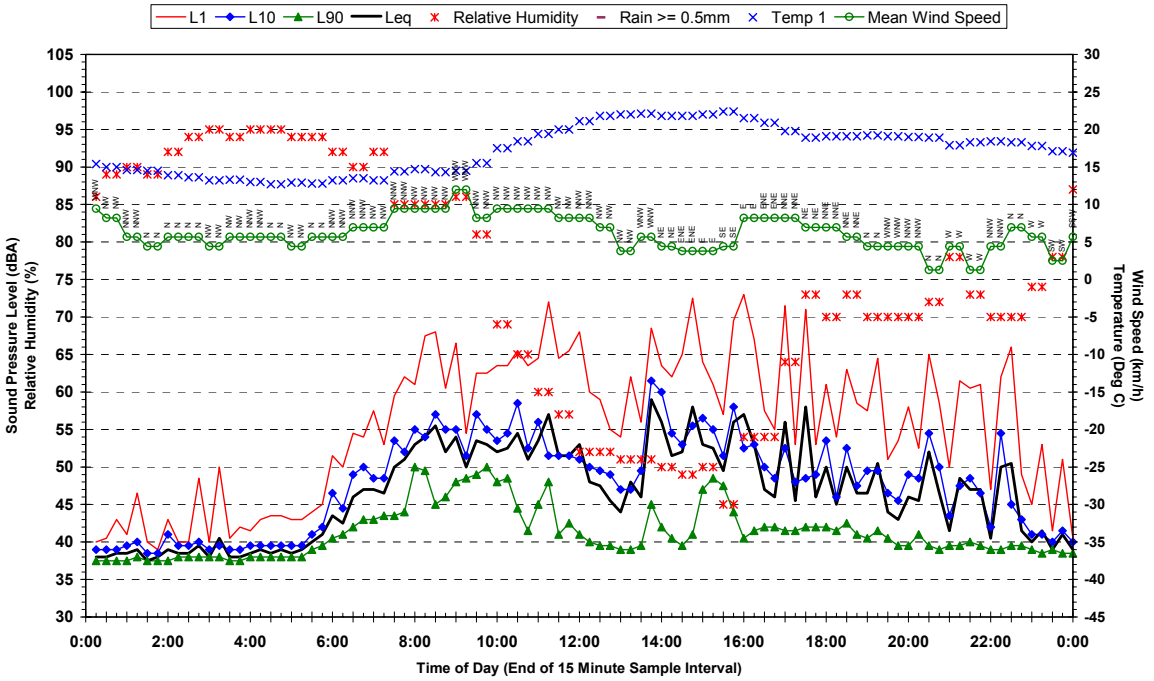


Statistical Ambient Noise Levels
Location 1 - 31-51 Hunters Wharf Apartment - Monday 25 May 2009

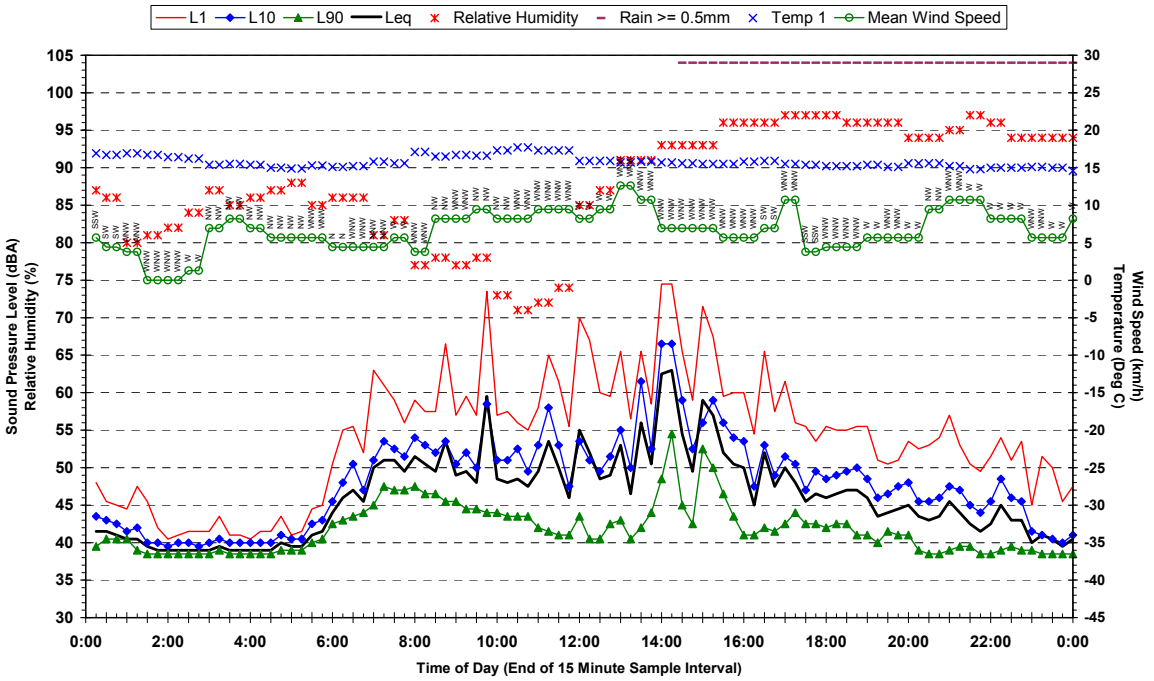


UNATTENDED AMBIENT NOISE AND WEATHER DATA – LOCATION 1

Statistical Ambient Noise Levels
Location 1 - 31-51 Hunters Wharf Apartment - Tuesday 26 May 2009

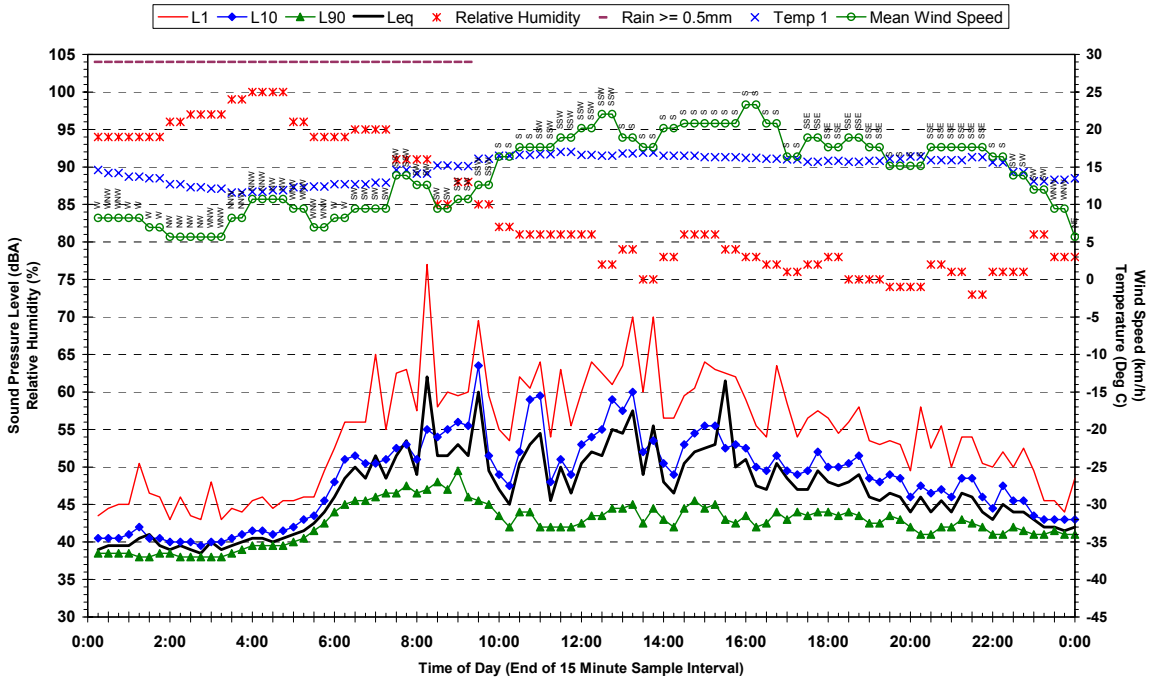


Statistical Ambient Noise Levels
Location 1 - 31-51 Hunters Wharf Apartment - Wednesday 27 May 2009

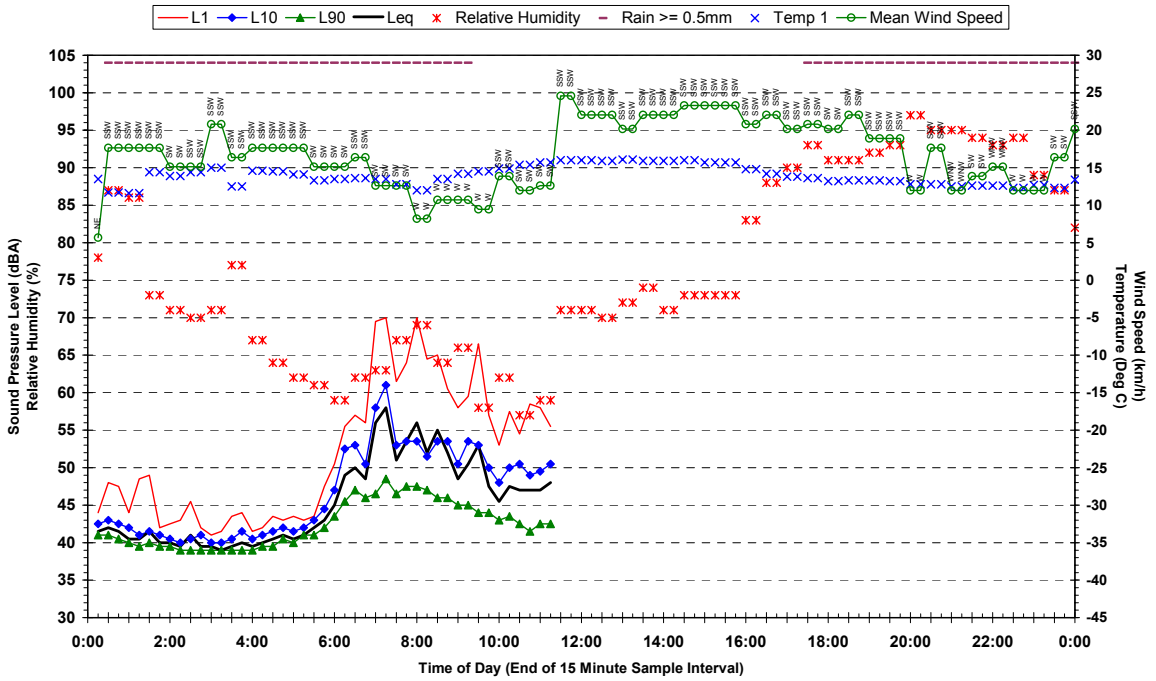


UNATTENDED AMBIENT NOISE AND WEATHER DATA – LOCATION 1

Statistical Ambient Noise Levels
Location 1 - 31-51 Hunters Wharf Apartment - Thursday 28 May 2009

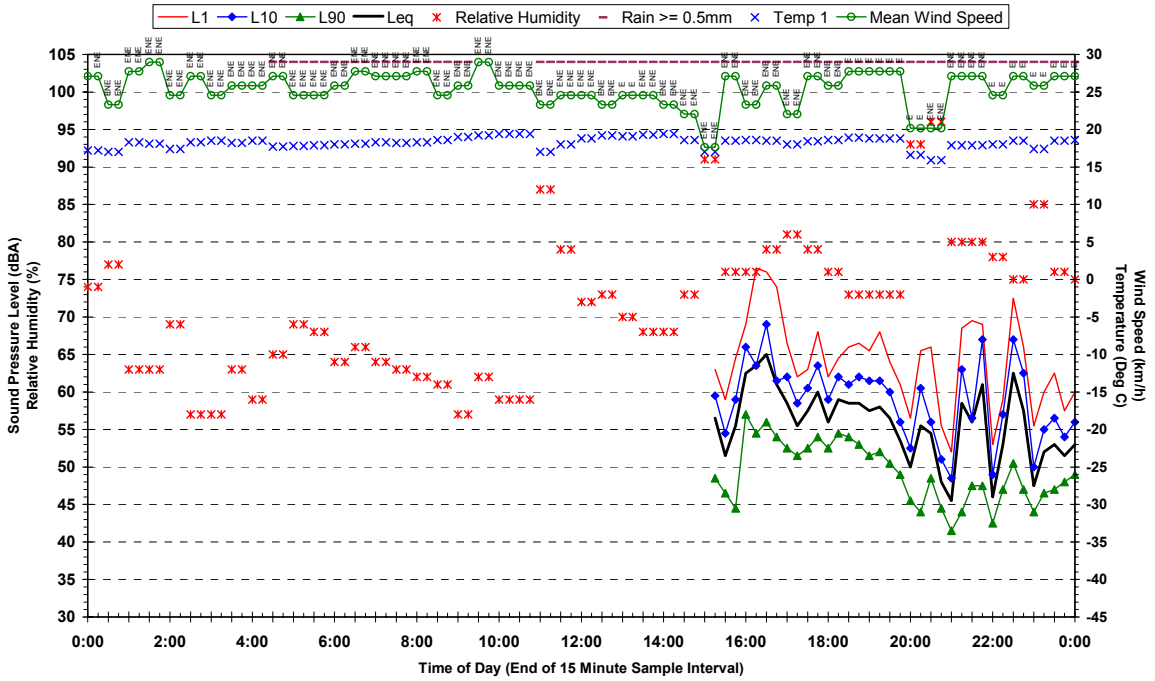


Statistical Ambient Noise Levels
Location 1 - 31-51 Hunters Wharf Apartment - Friday 29 May 2009

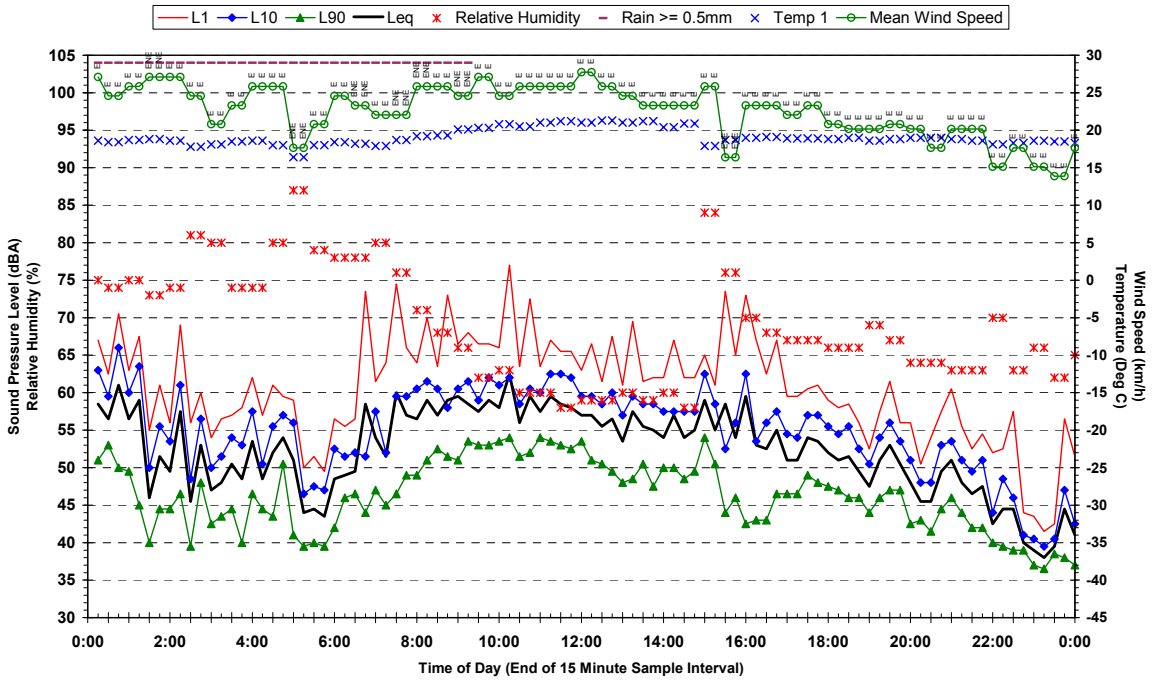


UNATTENDED AMBIENT NOISE AND WEATHER DATA – LOCATION 2

Statistical Ambient Noise Levels
Location 2 - 172 Tennyson Rd, Tennyson Point - Friday 22 May 2009

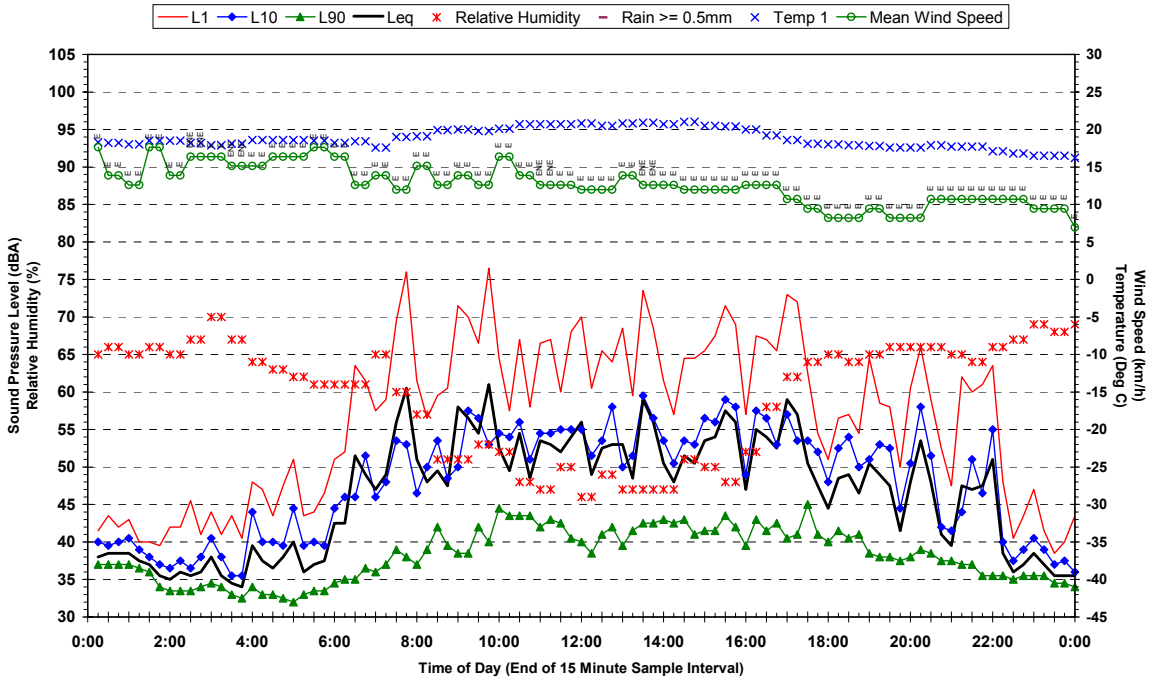


Statistical Ambient Noise Levels
Location 2 - 172 Tennyson Rd, Tennyson Point - Saturday 23 May 2009

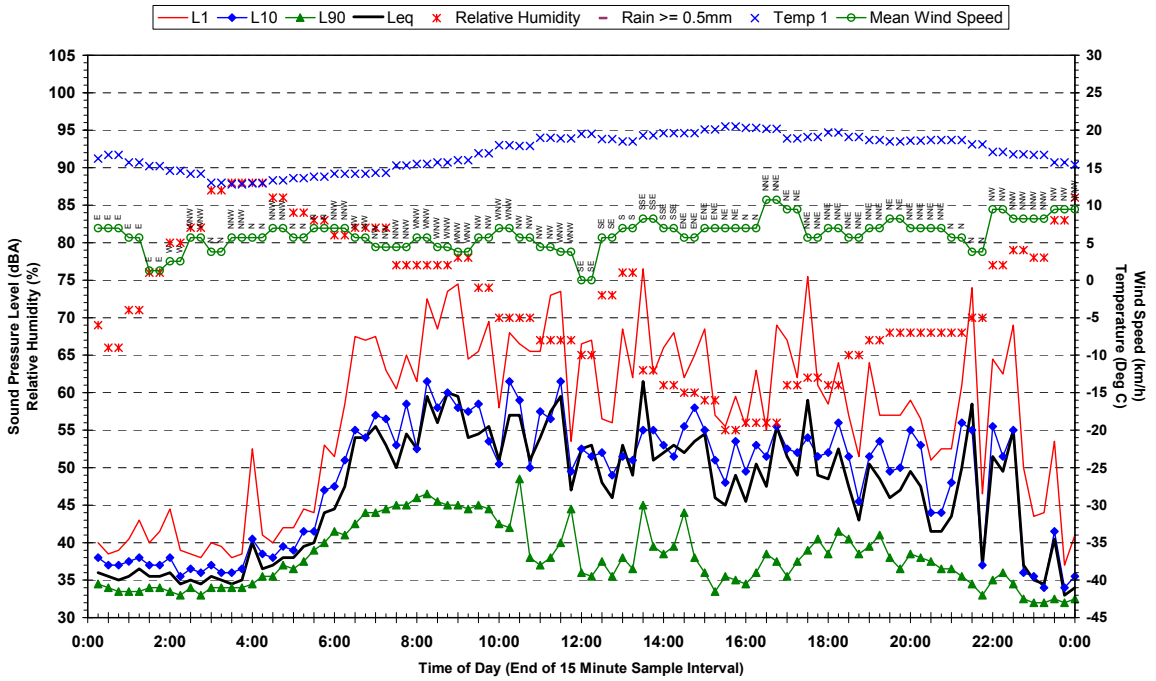


UNATTENDED AMBIENT NOISE AND WEATHER DATA – LOCATION 2

Statistical Ambient Noise Levels
Location 2 - 172 Tennyson Rd, Tennyson Point - Sunday 24 May 2009

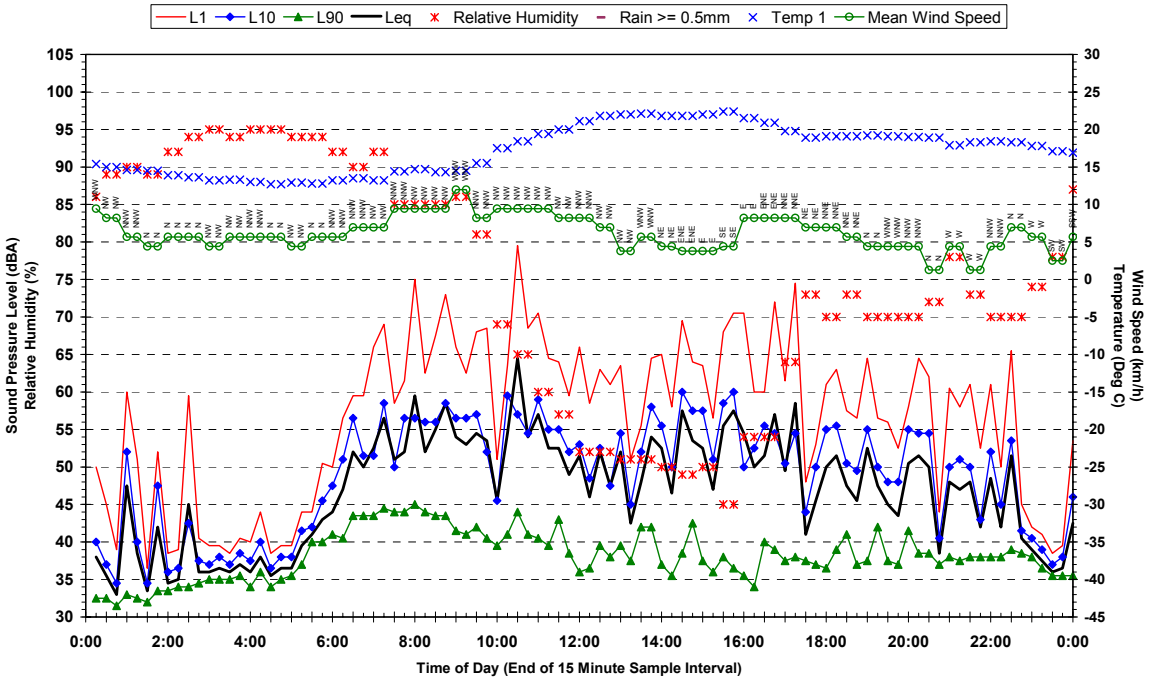


Statistical Ambient Noise Levels
Location 2 - 172 Tennyson Rd, Tennyson Point - Monday 25 May 2009

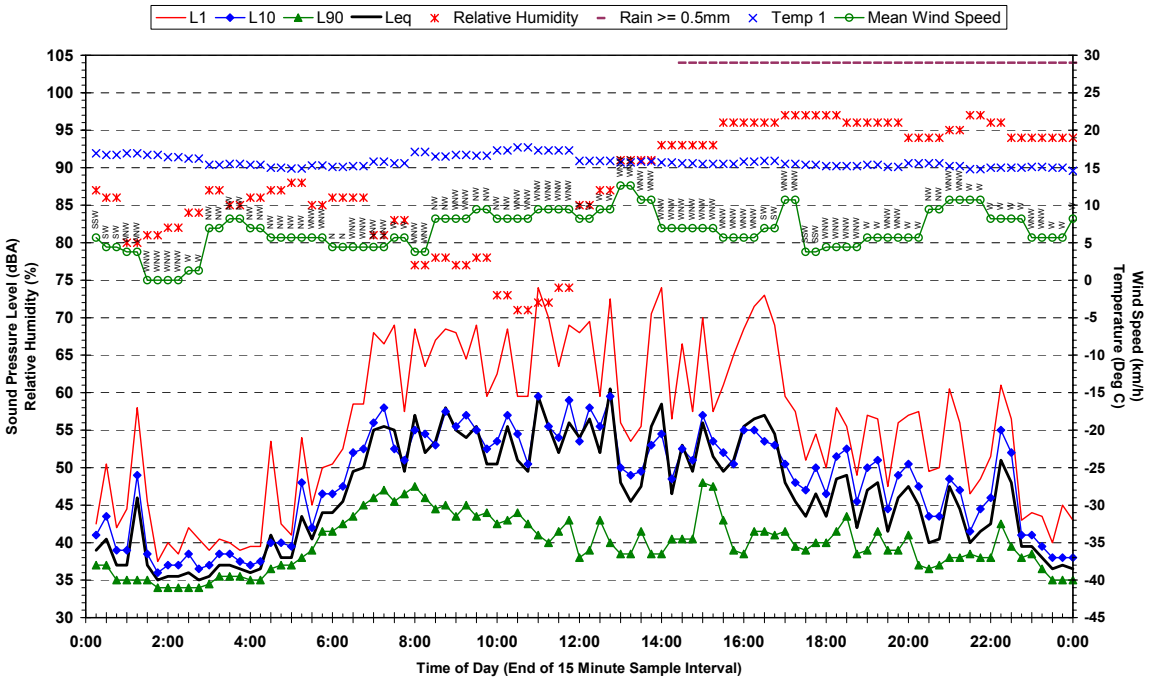


UNATTENDED AMBIENT NOISE AND WEATHER DATA – LOCATION 2

Statistical Ambient Noise Levels
Location 2 - 172 Tennyson Rd, Tennyson Point - Tuesday 26 May 2009



Statistical Ambient Noise Levels
Location 2 - 172 Tennyson Rd, Tennyson Point - Wednesday 27 May 2009



UNATTENDED AMBIENT NOISE AND WEATHER DATA – LOCATION 2

Statistical Ambient Noise Levels
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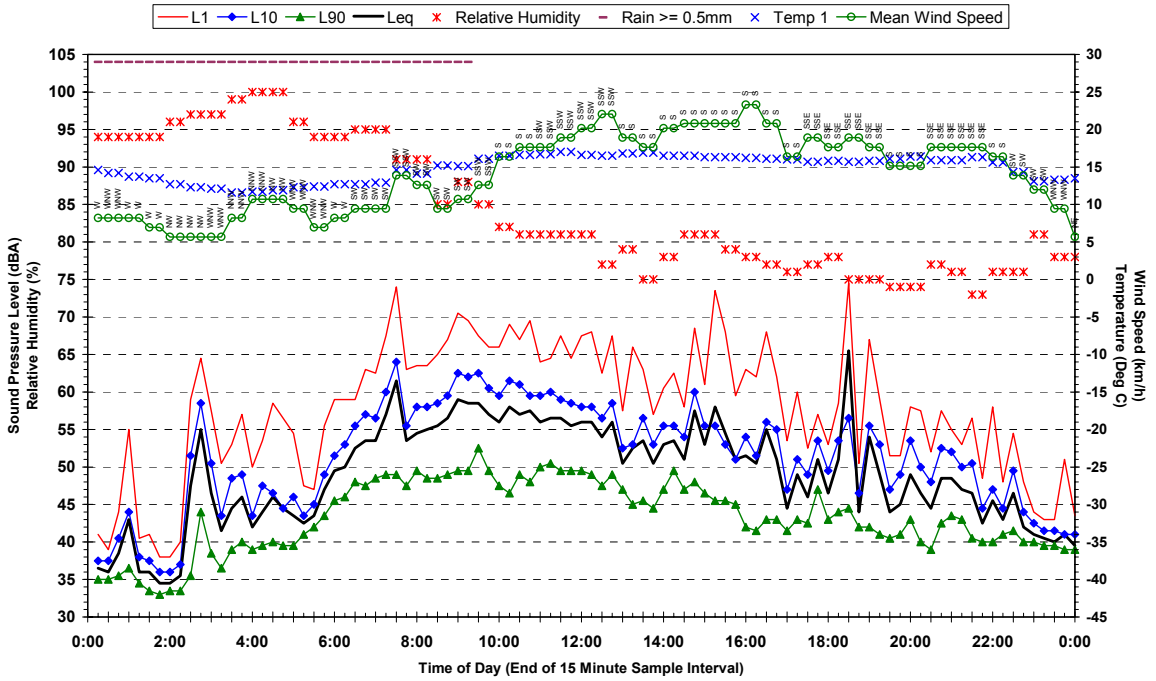
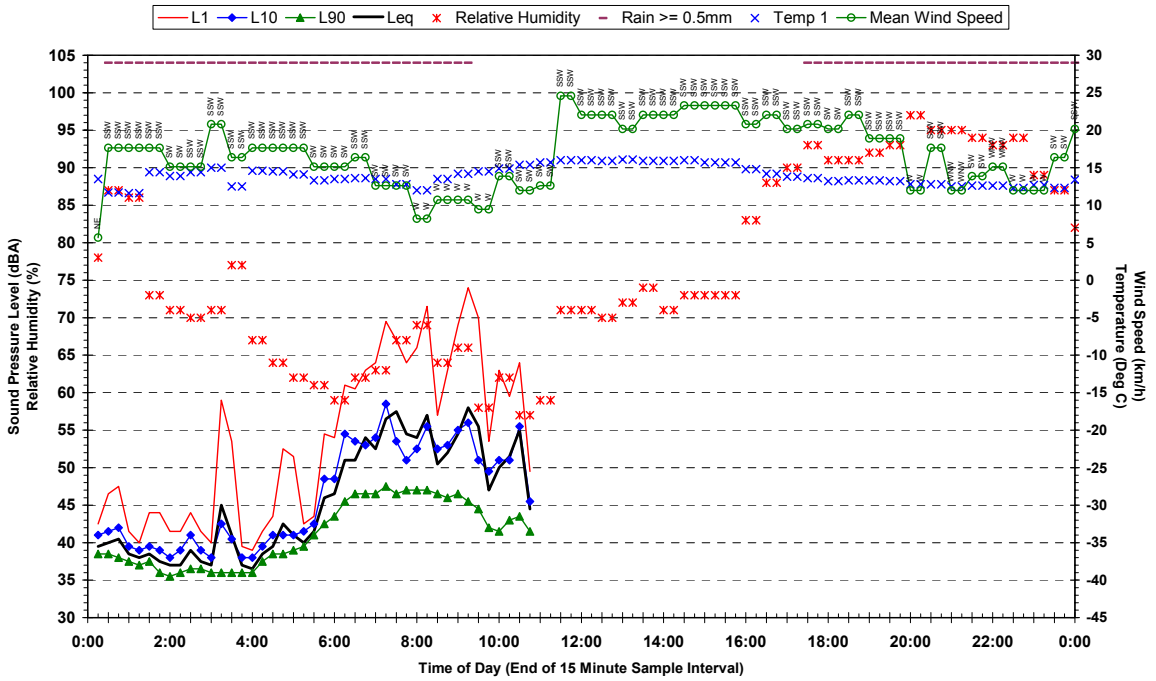


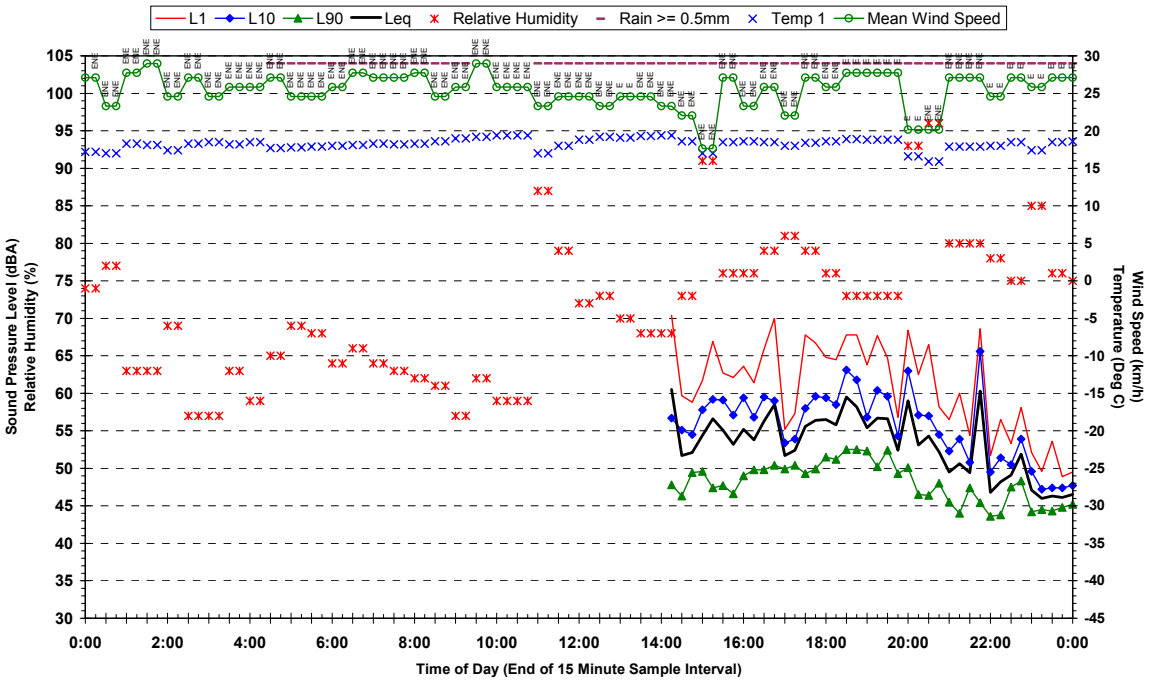
Statistical Ambient Noise Levels
Location 2 - 172 Tennyson Rd, Tennyson Point - Friday 29 May 2009



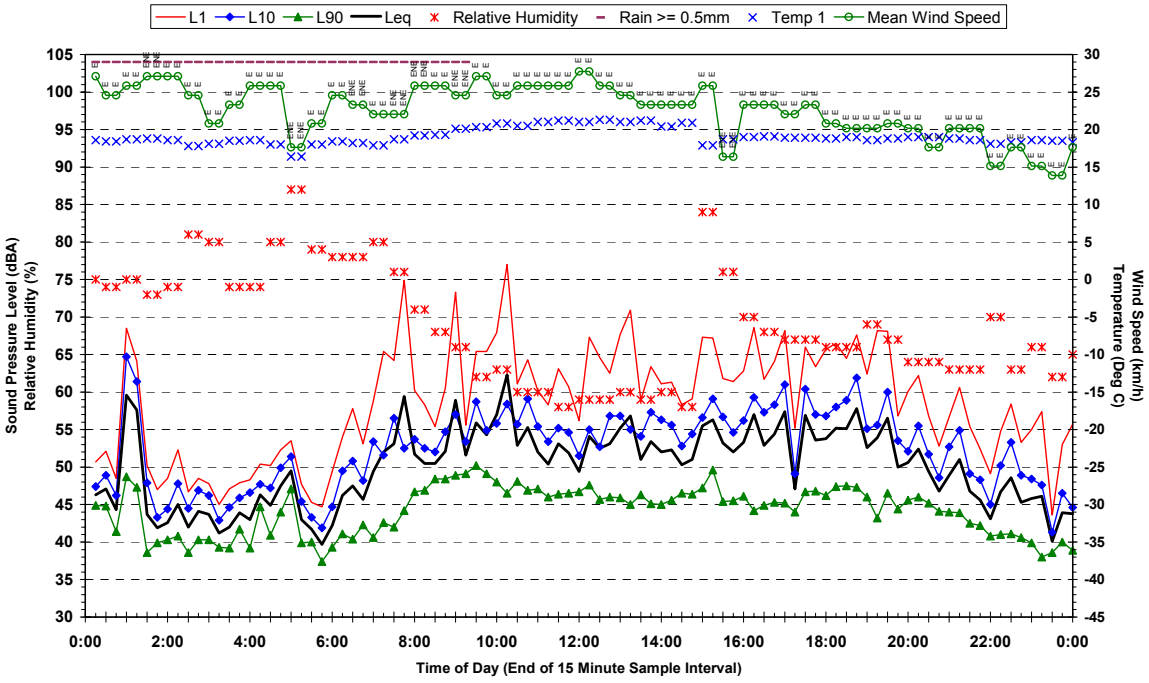
UNATTENDED AMBIENT NOISE AND WEATHER DATA – LOCATION 2

UNATTENDED AMBIENT NOISE AND WEATHER DATA – LOCATION 3

Statistical Ambient Noise Levels
Location 3 - 9 Delmar Pde, Gladesville - Friday 22 May 2009

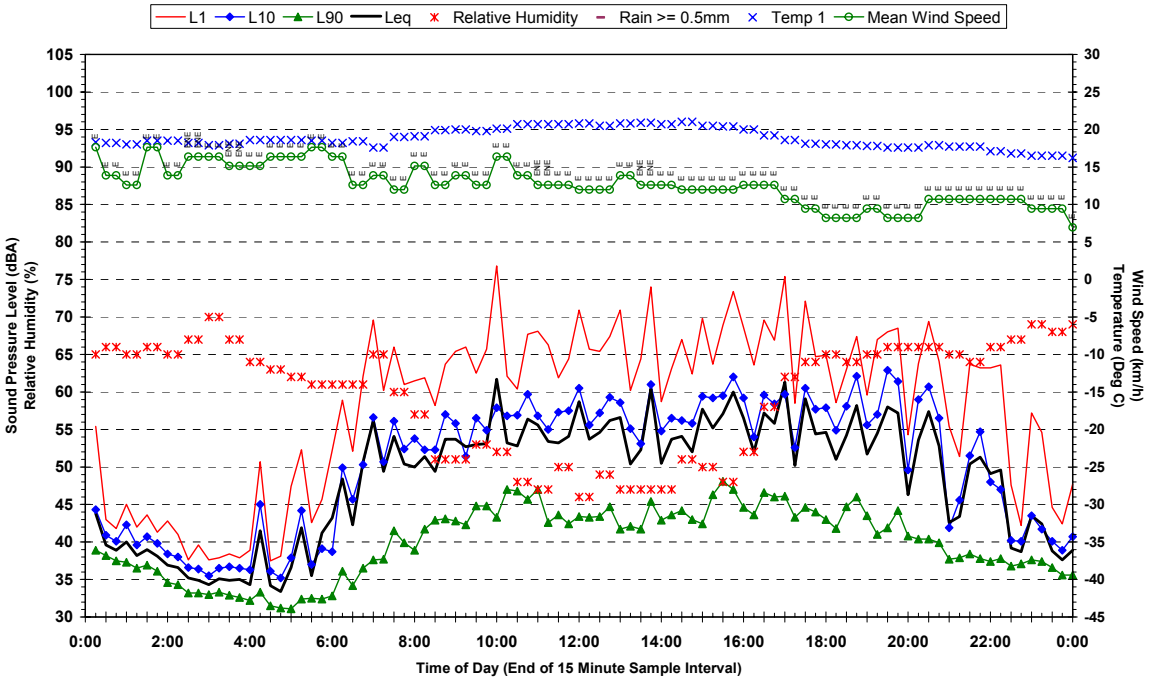


Statistical Ambient Noise Levels
Location 3 - 9 Delmar Pde, Gladesville - Saturday 23 May 2009

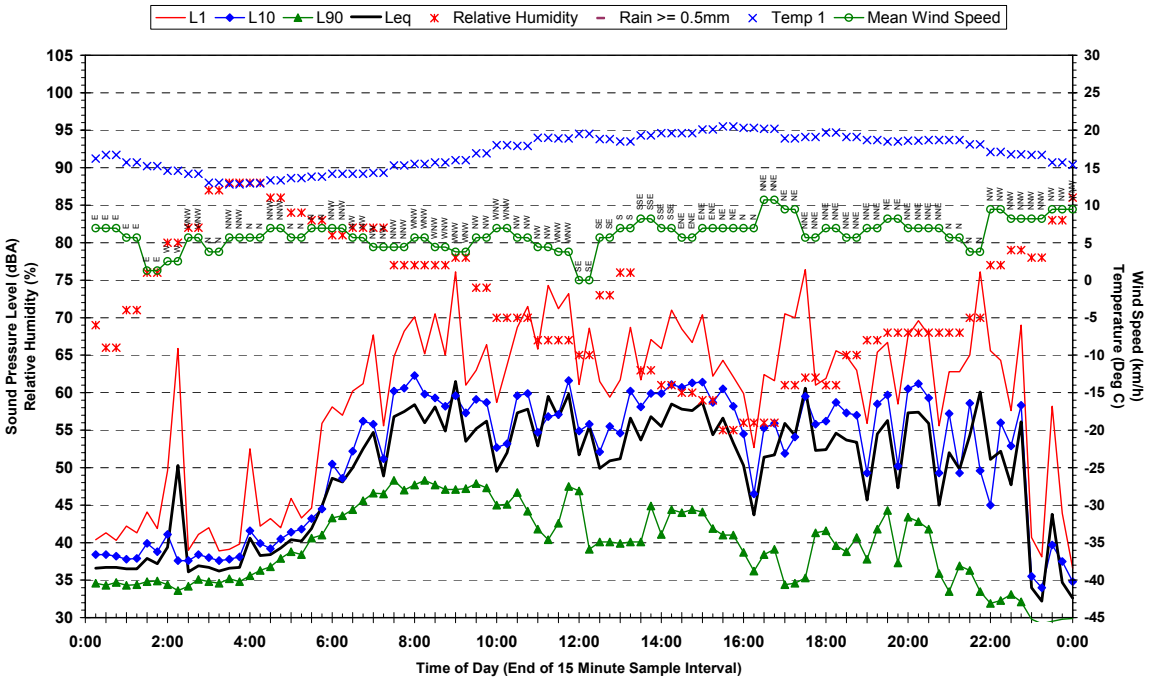


UNATTENDED AMBIENT NOISE AND WEATHER DATA – LOCATION 3

Statistical Ambient Noise Levels
Location 3 - 9 Delmar Pde, Gladesville - Sunday 24 May 2009

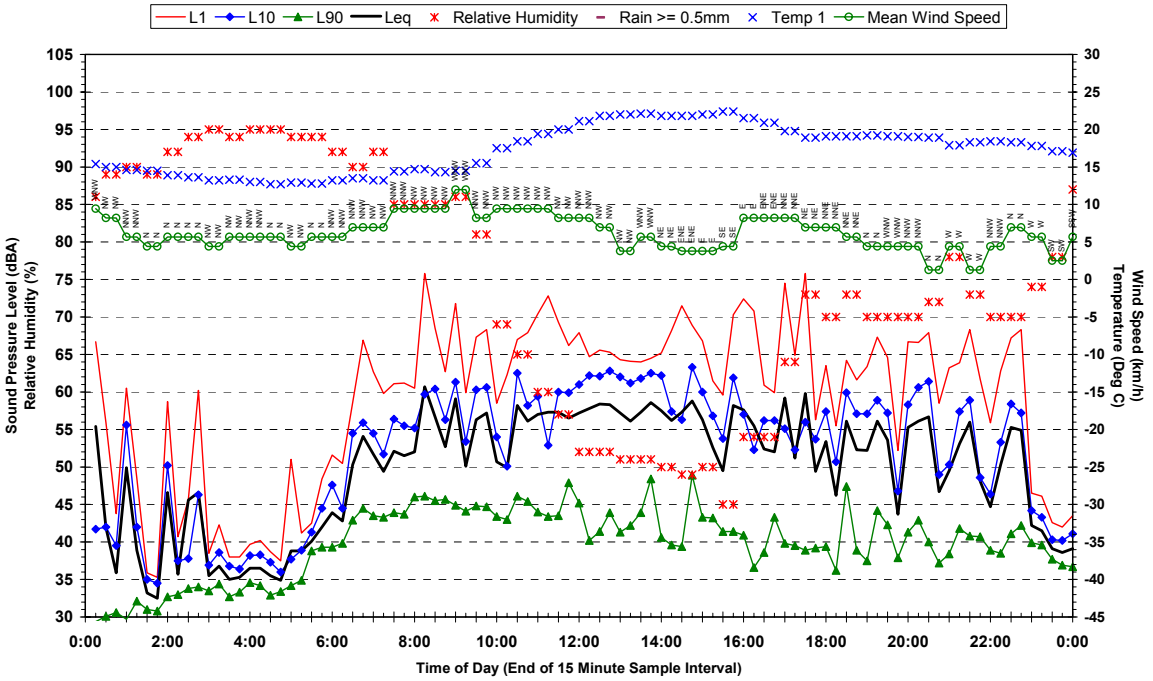


Statistical Ambient Noise Levels
Location 3 - 9 Delmar Pde, Gladesville - Monday 25 May 2009

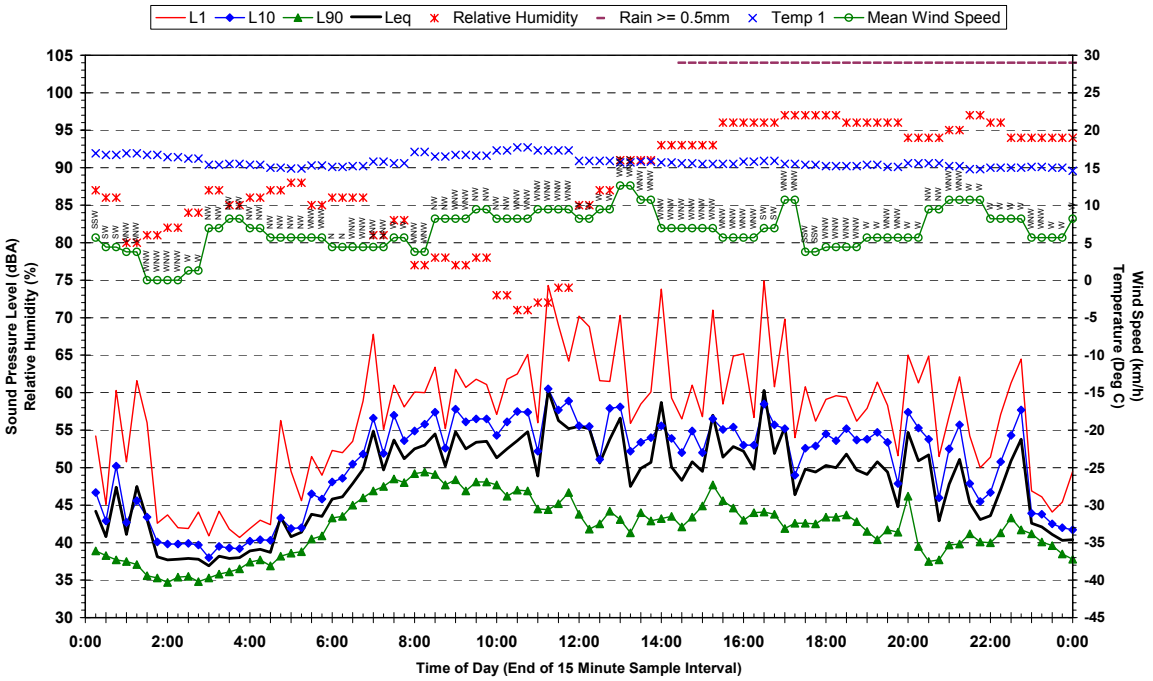


UNATTENDED AMBIENT NOISE AND WEATHER DATA – LOCATION 3

Statistical Ambient Noise Levels
Location 3 - 9 Delmar Pde, Gladesville - Tuesday 26 May 2009

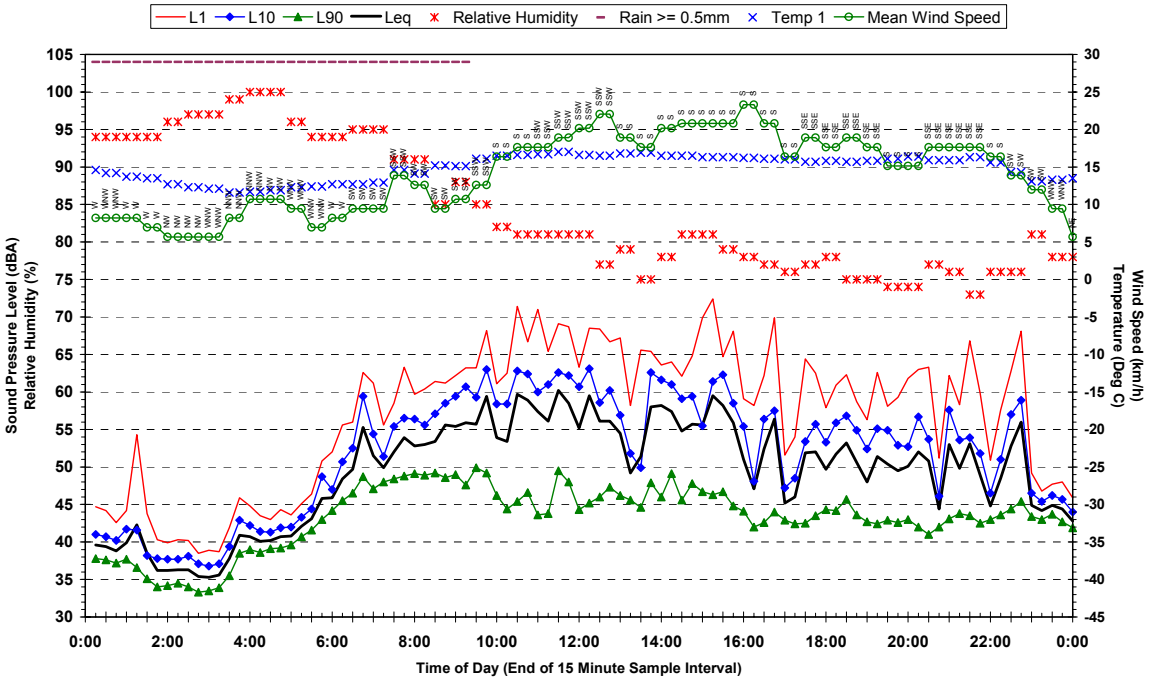


Statistical Ambient Noise Levels
Location 3 - 9 Delmar Pde, Gladesville - Wednesday 27 May 2009

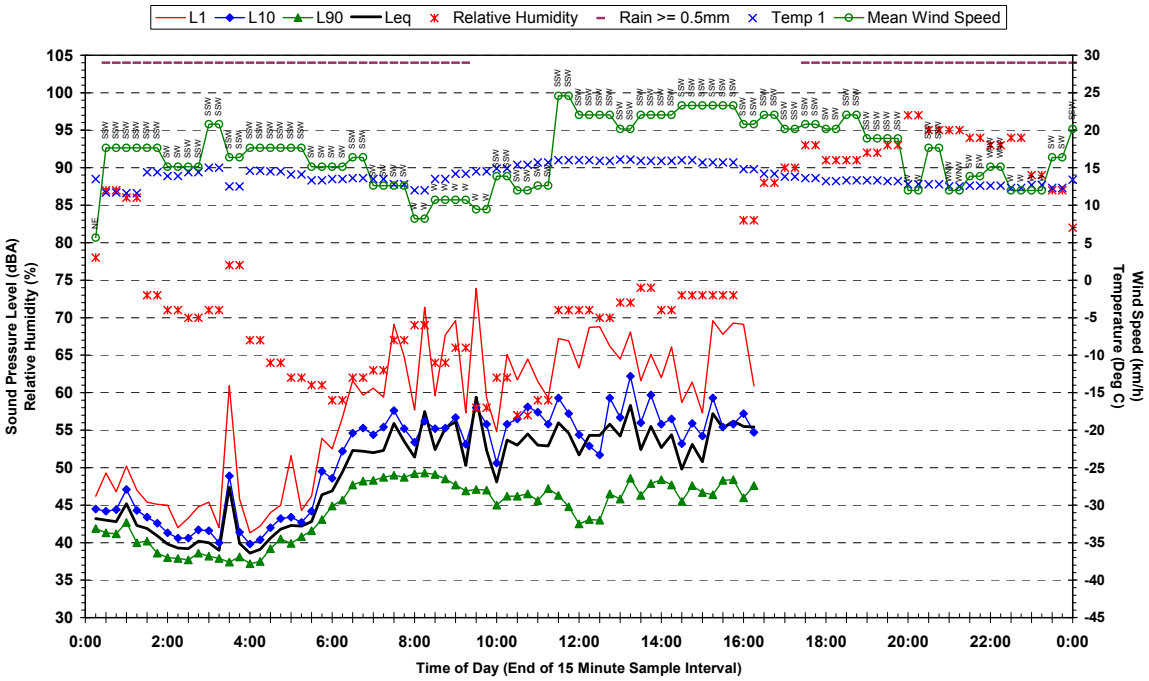


UNATTENDED AMBIENT NOISE AND WEATHER DATA – LOCATION 3

Statistical Ambient Noise Levels
Location 3 - 9 Delmar Pde, Gladesville - Thursday 28 May 2009



Statistical Ambient Noise Levels
Location 3 - 9 Delmar Pde, Gladesville - Friday 29 May 2009



APPENDIX 6:

- **HISTORICAL AND ABORIGINAL HERITAGE IMPACT STATEMENT**

AECOM

Prepared for:

Breakfast Point Pty Ltd

C/o Rose Group Pty Ltd
51 Riley Street
Woolloomooloo, NSW, 2001



Inner West Marina Historical and Aboriginal Heritage Impact Statement Kendall Bay, NSW

Final

AECOM

28 July 2009

Document No.: S7006701_FINAL_HeritrageImpactStatement_28July09

Environment

AECOM

Distribution

Inner West Marina Historical and Aboriginal Heritage Impact Statement
Kendall Bay, NSW

28 July 2009

Copies	Recipient	Copies	Recipient
1	**Ray Kearns** **Development Manager** **Rose Group** 51 Riley Street Woolloomooloo NSW 2011		

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Executive Summary

ENSR Australia Pty Ltd (trading as AECOM and here after referred to as AECOM) was commissioned by Rose Group Pty Ltd (Rose Group), on behalf of Breakfast Point Pty Ltd (BPPL) to undertake a Aboriginal and Historic Heritage Impact Assessment and prepare a Heritage Impact Statement (HIS) for a proposed marina development at Breakfast Point, to be known as the Inner West Marina (the Marina) (see **Figure F1**). This report was commissioned in response to a requirement by the Director-General to address the heritage requirements of the *Sydney Regional Environmental Plan (Sydney Harbour Catchment) 2005.* The REP requires that the setting of historic heritage items be assessed to ensure significant views or the significance of the items is not affected. The consent authority requires a Statement of Heritage Impact (SOHI) to assist in the assessment of the development proposal. In relation to Aboriginal heritage, the REP requires that a full assessment complying with Department of Environment and Climate Change (DECC) guidelines if the works are likely to affect an Aboriginal site or potential Aboriginal site. This assessment determines whether the proposed Marina is likely to affect an item of Aboriginal heritage significance and therefore require further assessment.

The assessment determined that the proposed Marina will be visible from the three historic heritage items, but will not impact on the heritage significance or values of any heritage items in the vicinity. The three items are:

- The Former AGL Powerhouse (City of Canada Bay LEP No. 383).
- Cabarita Park – landscape, rotunda and swimming pool (City of Canada Bay LEP No.58).
- Scots College Boatshed (REP No.48).

The proposed development will have no impact on the heritage significance of the Former AGL Power House, Cabarita Park or Scots College Boatshed as:

1. The significance of the items lies largely in non-tangible historical and cultural associations.
2. It does not physically impact on the heritage items.
3. While there may be limited impediment to the viewing of Cabarita Park, there will be no impediment from existing public vantage points.
4. The view from the items is not considered to be of historical significance. In the case of Cabarita Park and the Boatshed, the significance lies in views towards the item, which may be enhanced through increased visitation.
5. The location of the development within Kendall Bay means the Marina does not impact on sight lines along Parramatta River.

No Aboriginal sites were identified as impacted during the desktop survey. Due to the intensive land use it is considered highly unlikely that an Aboriginal site will remain within the Marina footprint. No further assessment is considered necessary.

As the heritage significance of the historic heritage items will not be affected and there is not considered to be any potential for Aboriginal sites to remain there is no necessity to provide recommendations to mitigate impacts, however, the following are provided to guide the project more broadly:

- It is recommended that no further heritage assessment is required as no historic or Aboriginal heritage impacts have been identified.
- It is a requirement under Section 146 of the *Heritage Act 1977* that any relics discovered during works must be reported to the Heritage Branch, Department of Planning on 02 9873 8500. All works must cease until the relics have been assessed by the Heritage Branch or a qualified professional on their behalf.
- It is a requirement under Section 91 of the *National Parks and Wildlife Act 1974* that any Aboriginal objects discovered during works must be reported to the Department of Environment and Climate Change on 131 555. All works must cease until the Aboriginal objects have been assessed by the DECC or a qualified professional on their behalf.

1.0 Introduction

ENSR Australia Pty Ltd (trading as AECOM and here after referred to as AECOM) was commissioned by Rose Group Pty Ltd (Rose Group), on behalf of Breakfast Point Pty Ltd (BPPL) to undertake a Historic and Aboriginal Heritage Impact Assessment and prepare a Statement of Heritage Impact (SOHI) for a proposed marina development at Kendall Bay, to be known as the Inner West Marina (the Marina) (see **Figure F1**).

The Director-General's Requirements (DGRs) for the project under Part 3A of the *Environmental Planning and Assessment Act 1979* specify that the *Sydney Regional Environmental Plan (Sydney Harbour Catchment) 2005* (REP) must be adhered too. The DGRs do not specifically mention heritage, however, under Part 5 (Heritage Provisions) of the REP the developer is required to assess the heritage impact of the proposal and have a Statement of Heritage Impact (SOHI) prepared for items of historic heritage. Particular import is placed on a visual assessment of the Marina on the surrounding heritage items. An Aboriginal heritage assessment to the Department of Environment and Climate Change (DECC) guidelines is also required if the development is *likely* to have an impact on a place of Aboriginal heritage significance or a potential place of Aboriginal heritage significance, or that will be carried out on an archaeological site of a relic that has Aboriginal heritage significance.

1.1 Project Aims

The aim of the project is to identify historic heritage items that may be affected by the proposed Marina. If historic items are identified, to complete a SOHI, including a visual assessment, and develop mitigation measures to reduce the Marina's impact. The SOHI is to be prepared to meet the DGRs and those under the REP.

Additionally, this assessment will determine whether it is *likely* that an item of Aboriginal heritage will be impacted by the proposed Marina. The report will recommend whether a full Aboriginal heritage assessment with community consultation is necessary.

1.2 Study Area

The proposed Inner West Marina is to be located on the western shore of Kendall Bay (the Bay), which opens off Parramatta River (**Figure F2**). Kendall Bay is created by Breakfast Point to the west and Cabarita Point to the east. The proposed development is located within the Local Government Area (LGA) of the City of Canada Bay. The site has views across the Parramatta River to Tennyson Point and across the Bay to Cabarita Park. The Marina will compliment the existing Breakfast Point residential development, which is being constructed in phases. The foreshore residential complexes have already been completed and will provide a backdrop for the Marina.

1.3 Project Description

The proposed Marina will accommodate berths for 172 vessels. Land access to the Marina will be from one point with a pontoon running parallel to the shore with eight radiating arms. The main arm will accommodate a ferry wharf and a kiosk with public access. Access to the remainder of the Marina being restricted by security gates. **Figure F1** indicates the layout and scale of the proposed Marina.

1.4 Report Structure

The report is structured in the following manner:

- **Section 2.0** provides the legislative and planning background and establishes the requirements for the report.
- **Section 3.0** outlines the methodology used to achieve the requirements.
- **Section 4.0** relays the results of both the desktop assessment and site inspection for historic heritage. This section determines how many sites are affected by the proposed Marina.
- **Section 5.0** provides an analysis of the cultural significance of the affected historic items and a SOHI for those items.
- **Section 6.0** provides a history of the Aboriginal occupation of the area and gives the results of the desktop assessment and site inspection
- **Section 7.0** concludes the report and summarises the findings.
- **Section 8.0** provides a list of references cited in the report.

1.5 Limitations

This report is made on the basis of information included in the construction drawings supplied to AECOM by TLB Engineers on behalf of BPPL in July 2009. AECOM understands that these drawings are to be submitted with the development application. AECOM has not independently verified these drawings for the purposes of this assessment.

This assessment is, by its nature, a subjective interpretation and it is possible that another professional may interpret the historical facts and physical evidence in a different way. In particular, the assessment of visual impact on heritage items can be subject to a number of differing interpretations.

This report includes a summary of the statutory requirements regarding heritage. This is made on the basis of experience with the heritage system in NSW and does not purport to be legal advice. It should be noted that legislation, regulations and guidelines change over time and users of this report should satisfy themselves that the statutory requirements have not changed since the report was written.

This report does not provide a full Aboriginal heritage assessment. The report provides advice as to whether the proposed Marina is likely to impact on an item of Aboriginal heritage, thereby necessitating a full assessment and community consultation.

2.0 Planning and Legislative Context

A number of planning and legislative documents govern how heritage is managed in NSW and Australia. The following section provides an overview of the requirements under each as they apply to the present development at Kendall Bay.

2.1 Environment Protection and Biodiversity Conservation Act 1999

The Commonwealth *Environment Protection and Biodiversity Conservation Act 1999* (EPBC Act; the Act) took effect on 16 July 2000.

Under Part 9 of the EPBC Act, any action that is likely to have a significant impact on a matter of National Environmental Significance (known as a controlled action under the Act), may only progress with approval of the Commonwealth Minister for the Environment, Water, Heritage and the Arts. An action is defined as a project, development, undertaking, activity (or series of activities), or alteration. An action will also require approval if:

- It is undertaken on Commonwealth land and will have or is likely to have a significant impact;
- It is undertaken outside Commonwealth land and will have or is likely to have a significant impact on the environment on Commonwealth land; and,
- It is undertaken by the Commonwealth and will have or is likely to have a significant impact.

The EPBC Act defines 'environment' as both natural and cultural environments and therefore includes Aboriginal and historic cultural heritage items. . Under the Act protected heritage items are listed on the National Heritage List (items of significance to the nation) or the Commonwealth Heritage List (items belonging to the Commonwealth or its agencies). These two lists replaced the Register of the National Estate (RNE). While the RNE has been suspended and is no longer a statutory list, Section 391A of the Act requires the Minister to consider RNE listing if a referral is made. This requirement expires in 2012, by which time all RNE listings are to be transferred to a relevant heritage register. The development does not require a referral under the Act and the RNE is therefore not relevant, however, the Register was searched for completeness and as an indication of heritage items in the vicinity.

2.2 Sydney Regional Environmental Plan (Sydney Harbour Catchment) 2005

The Director-General has determined the proposed Marina, a major project under Part 3A, is to abide by the regulations contained in the *Sydney Regional Environmental Plan (Sydney Harbour Catchment) 2005.* As such, Part 5, Division 4, Section 59 applies:

59 Development in vicinity of heritage items

1 Before granting development consent to development in the vicinity of a heritage item, the consent authority must assess the impact of the proposed development on the heritage significance of the heritage item.

2 This clause extends to development:

a) that may have an impact on the setting of a heritage item, for example, by affecting a significant view to or from the item or by overshadowing, or

b) that may undermine or otherwise cause physical damage to a heritage item, or

c) that will otherwise have any adverse impact on the heritage significance of a heritage item.

3 The consent authority may refuse to grant development consent unless it has considered a heritage impact statement that will help it assess the impact of the proposed development on the heritage significance, visual curtilage and setting of the heritage item.

4 The heritage impact statement should include details of the size, shape and scale of, setbacks for, and the materials to be used in, any proposed buildings or works and details of any modification that would reduce the impact of the proposed development on the heritage significance of the heritage item.

Of particular note is the requirement to address the visual curtilage and setting of a heritage item. The REP requires a SOHI be prepared for items affected by the proposed development. The REP includes a heritage inventory under Schedule 4. This heritage list is composed of items listed on the SHR, on a *Heritage Act (1977)* Section 170 Register or a LGA heritage inventory as being of State significance.

In relation to Aboriginal heritage the REP requires, under Part 5, Division 3, Section 57 requires that:

57 Development affecting matters of Aboriginal heritage significance

1 Before granting development consent for development that is likely to have an impact on a place of Aboriginal heritage significance or a potential place of Aboriginal heritage significance, or that will be carried out on an archaeological site of a relic [sic] that has Aboriginal heritage significance, the consent authority:

a) must consider an Aboriginal heritage impact assessment that has been prepared in accordance with any relevant guidelines established by the Department of Environment and Conservation [sic] and that documents the views of local Aboriginal communities, and

b) except where the proposed development is integrated development by virtue of the requirement for consent under section 90 of the *National Parks and Wildlife Act 1974*, must notify the local Aboriginal communities (in such way as it thinks appropriate) of its intention to do so and take into consideration any comments received in response within 21 days after the relevant notice is sent, and

c) must be satisfied that any necessary consent or permission under the *National Parks and Wildlife Act 1974* has been granted.

2 The notice referred to in subclause (1) (b) must be sent to the local Aboriginal communities by the consent authority within 2 days after the date of lodgment [sic] of the relevant development application.

Under this section it is necessary to first identify whether a development is likely to have an impact on an Aboriginal site before undertaking a full assessment.

2.3 The Heritage Act 1977

The *Heritage Act 1977* was enacted to conserve the environmental heritage of New South Wales. Under section 32, places, buildings, works, relics, moveable objects or precincts of heritage significance are protected by means of either Interim Heritage Orders or by listing on the State Heritage Register (SHR). Items that are assessed as having State heritage significance can be listed on the SHR by the Minister on the recommendation of the Heritage Council.

Archaeological relics (any relics that are buried) are protected by the provisions of section 139. Under this provision it is illegal to disturb or excavate any land knowing or suspecting that the disturbance or excavation will or is likely to result in a relic being discovered, exposed, moved, damaged or destroyed. In such cases an excavation permit under section 140 is required. Note that no formal listing is required for archaeological relics; they are automatically protected if they are of local significance or higher.

Proposals to alter, damage, move, damage or destroy places, buildings, works, relics, moveable objects or precincts protected by an IHO or listed on the SHR require an approval under section 60. Demolition of whole buildings will not normally be approved except under certain conditions (section 63). Some of the sites listed on the SHR or on LEPs may either be 'relics' or have relics associated with them. In such cases, a section 60 approval is also required for any disturbance to relics *associated* with a listed item. While a permit is not required for a project under Part 3A, it is strongly recommended the proponent liaise with the Heritage Branch, Department of Planning, regarding their proposal should relics be discovered the proponent is still required to report the relic to the Heritage Branch on 02) 9873 8500.

Under Section 170 of the *Heritage Act* NSW Government agencies are required to maintain a register of heritage assets. The Register places obligations on the agencies, but not on non-government proponents, beyond their responsibility to assess the impact on surrounding heritage items.

2.4 National Parks and Wildlife Act 1974

Under the provisions of the NPW Act 1974, Aboriginal archaeological sites are defined as Aboriginal "objects". Aboriginal object "means any deposit, object or material evidence (not being a handicraft made for sale) relating to the Aboriginal habitation of the area that comprises NSW, being habitation before or concurrent with (or both) the occupation of that area by persons of non-Aboriginal extraction, and includes Aboriginal remains".

The most relevant section of the legislation is Section 90, which deals with the destruction of Aboriginal objects and is reproduced below.

> *Section 90 Destruction etc of Aboriginal objects or Aboriginal places*
>
> *(1) A person who, without first obtaining the consent of the Director-General* [of DECC]*, knowingly destroys, defaces or damages, or knowingly causes or permits the destruction or defacement of or damage to, an Aboriginal object or Aboriginal place is guilty of an offence against this Act.*

It should be noted that Section 90 applies to all Aboriginal objects irrespective of whether they are considered to be disturbed or not. The issue is whether reasonable precautions and due diligence were exercised to determine whether an Aboriginal object or place was going to be destroyed, defaced, damaged or desecrated. Thus if an area was identified as having archaeological potential and was disturbed or destroyed, the defence of reasonable precautions and due diligence would not be available.

Section 87 of the Act covers permits to allow certain actions under Section 86. This includes disturbing or excavating any land, or causing any land to be disturbed or excavated, for the purpose of discovering an Aboriginal object.

For investigation of Aboriginal objects, a Section 87 Aboriginal Heritage Impact Permit (AHIP) is required from Department of Environment and Climate Change (DECC). While impact or destruction of Aboriginal objects will require a Section 90 'Consent to Destroy' from the DECC. While a permit is not required for a project under Part 3A, it is strongly recommended the proponent liaise with DECC, regarding their proposal and should Aboriginal objects be discovered the proponent is still required to report the relic to the DECC on 131 555.

2.5 City of Canada Bay Local Environmental Plan 2008

The *City of Canada Bay Local Environmental Plan 2008* is the principal planning instrument for LGA in which the proposed Marina is to be constructed. The LEP guides what development is permitted in different parts of the LGA through zoning of each parcel of land. The Canada Bay LEP, under Part 5 Clause 5.10 Section 5 requires a heritage impact statement be prepared if a heritage item, as listed in Schedule 5, is to be affected.

2.6 Ryde Planning Scheme Ordinance 1979 (as amended)

The *Ryde Planning Scheme Ordinance 1979* (as amended) [1] allows for the consideration of development within the vicinity of a heritage item under Part XI 88 (1). While the proposed Marina is not within the Ryde LGA, the requirement under the REP to take into consideration heritage items in the vicinity necessitated reference to Schedule 15, containing the heritage inventory.

[1] City of Ryde does not currently have a Standard Local Environmental Plan, although a draft is currently on public exhibition. The PSO incorporates amendments to the heritage clauses and schedule gazetted on 17 January 2003 under *Ryde Local Environmental Plan 105.*

3.0 Methodology

3.1 Historic Heritage

The intention of HIS is to determine the extent to which a heritage item or items will be affected by works proposed in relation to the listed values of the heritage item. A HIS advises on whether these affects are acceptable, if they can be mitigated or whether the developer could adjust the design to remove or lessen the impact. To determine the extent of impact the proposed Marina will have on the surrounding heritage items the following is to be undertaken:

- Review the Canada Bay LEP, Ryde Planning Scheme Ordinance (PSO), REP, National Heritage List, Commonwealth Heritage List, Register of the National Estate, SHR and Section 170 Registers to ensure no sites have been overlooked.
    - The review search area was a 1.5 kilometre radius between Cabarita Point in the south east and Mortlake Point in the north west (**Figure F3**). The two termination points were chosen as they block views along the Parramatta River.
- Liaise with Canada Bay and Ryde Council's Heritage Advisors regarding the project and impacts.
- Determine the values (the reason why an item is important and requires heritage listing) of the items to be impacted. This may include research at relevant institutions including local and State libraries.
- Preliminary assessment of the Marina's impact on the values.
- Site visit to assess the visual impact to and from the heritage items and on the listed values and significance.
- Determine items to be affected based on above assessment.
- Liaise with Rose Group and TLB Engineers regarding the initial findings. Continue to inform parties of progress.
- Complete report outlining impacts and assessing the level of impact. Report will comply with the Heritage Office guideline *Statements of Heritage Impact* and REP requirements.

The visual impact assessment worked on the premise that major sight lines occur along the Parramatta River as the direction of river traffic, and from major vantage points, being Tennyson, Cabarita and Breakfast Points. It is also based on the assumption that if the proposed development cannot be viewed from the heritage item and the item cannot be viewed from the proposed Marina, its significance and values will not be impacted.

3.2 Aboriginal Heritage

The Aboriginal Heritage Impact Assessment will undertake the following tasks:

- Synthesis the information regarding Aboriginal heritage sites contained in the REP Aboriginal heritage schedule. It is understood the schedule is the *Parramatta River Regional Environmental Study: Open Space and Recreation Heritage Study* prepared by the Department of Environment and Planning (1986). AECOM is operating on information obtained by Worsley Parsons to this affect and has not independently verified this information. AECOM takes no responsibility for the accuracy of this information.
- Obtain and map current Aboriginal sites identified in the Aboriginal Heritage Information Management System (AHIMS), managed by DECC.
- Analyse the AHIMS data and make a recommendation on whether the proposed Marina is likely to impact on an Aboriginal or potential Aboriginal site necessitating a full Aboriginal assessment and community consultation.

4.0 Historic Heritage Results

The results are divided into two sections: the findings of the desktop review, followed by the results of the site inspection.

4.1 Desktop Review

A search of heritage lists in **Table** 1 revealed a total of 32 heritage items located within a 1.5 kilometre radius between Cabarita and Mortlake Points (**Table T1** and **Figure F4**). This number includes several items that are listed on more than one inventory. Details of the listings are provided below, starting in **Section 4.1.1.**

Table 1: List of Heritage Inventories consulted.

Name of Heritage Inventory
National Heritage List
Commonwealth Heritage List
Register of the National Estate
State Heritage Register
Section 170 Registers (as maintained by Heritage Branch)
Sydney Regional Environmental Plan (Sydney Harbour Catchment)
City of Canada Bay Local Environmental Plan
Ryde Planning Scheme Ordinance

The Ryde and Canada Bay Heritage Advisors were contacted for their advice on sites possibly affected by the proposed Marina. The City of Ryde Heritage Advisor, Mr Gary Stanley, did not think any items on the Ryde PSO would be affected by the development as they would all fall outside the visual catchment. Mr Stanley identified items on Tennyson Point as being most likely to have visual access to the proposed Marina. These are listed as numbers 23 through 25 in **Table T1** and include two houses and a set of shops.

Ms Pamela Hubert of the City of Canada Bay advised that items requiring consideration included Cabarita Park, remains of Cabarita Wharf and the former AGL site (listed items are: Former AGL Power House, Former AGL Blacksmiths' Shop, Former AGL Fence, Former AGL Office No 1 and Former AGL Main Meter Readers' Office). Ms Hubert also raised concern over the junction of the seawall with the proposed Marina, which is on the site of the former AGL jetty, an integral element to the workings of the site.

The following outlines the results from each heritage list.

4.1.1 National Heritage List

No items of National heritage were listed in the vicinity.

4.1.2 Commonwealth Heritage List

No items of Commonwealth heritage were listed in the vicinity.

4.1.3 Register of the National Estate

Items on the RNE can have a variety of statuses, including Registered (it is inscribed on the Register) and Indicative (it is in the database, but no formal nomination has been received). Two items in the vicinity are listed on the Register of the National Estate. The first is the Federation Pavilion in Cabarita Park, also listed on the SHR and the City of Canada Bay LEP. The Pavilion is a Registered place.

The second is the Parramatta and Lane Cove River Landscapes, which is listed as an Indicative place. As the RNE has been frozen and the Landscape is yet to be nominated on another list, no further consideration has been given to the impact of the Marina on the Landscape. A full assessment would be difficult given the incomplete nature of the information provided in the database, which merely states:

> *About 9000ha, comprising the Parramatta and Lane Cove Rivers from North Rocks Road and de Burghs Bridge respectively, to Greenwich and including areas along the banks of both rivers.*

4.1.4 State Heritage Register

One item in the vicinity is listed on the State Heritage Register: the Federation Pavilion in Cabarita Park.

4.1.5 Section 170 Registers

Two items listed on Section 170 Registers refer to the punt/ferry between Putney and Mortlock. The Old Punt at Mortlock is listed as a heritage item on the Maritime NSW database and as the Cable Ferry – Mortlake/Putney on the Road and Traffic Authority Register.

The third item is Rockend Cottage, listed on the Department of Planning Register.

4.1.6 Sydney Regional Environmental Plan (Sydney Harbour Catchment)

Six heritage items are listed on the REP within the area. This includes the Punt Road Wharf, Scots College Boatshed, Sydney Grammar School Boatshed, Cabarita Wharf (former), Sanders Marina and Putney Wharf.

4.1.7 City of Canada Bay Local Environmental Plan

The City of Canada Bay LEP Heritage Schedule lists eight items in the surrounding area. This includes five elements from the former AGL Gasworks site, being:

- Former AGL Power House.
- Former AGL Blacksmiths' Shop.
- Former AGL Fence to Tennyson Road, entrance gates and entry pavilion.
- Former AGL Office No 1.
- Former AGL Main Meter Readers' Office.
- The balance of items is comprised of the Mortlake Punt, Wangal Centenary Bushland Reserve and Cabarita Park.

4.1.8 Ryde Planning Scheme Ordinance

Twelve items on the Ryde PSO fall within the search radius. This includes six houses, two parks, an Aboriginal rock engraving, an archaeological site and a block of shops.

4.2 Site Inspection

A site inspection was undertaken on 30 April 2009 to determine which of the sites identified during the desktop review would have views to or from the proposed Marina. This was achieved by visiting the site of the proposed Marina to gain an understanding of the views from the site, followed by a visual inspection from the heritage items towards the proposed Marina. The visual inspection confirmed no sites would be within the construction footprint of the Marina.

4.2.1 Site of Proposed Marina

Views from the proposed marina are screened on the southern bank of Parramatta River by Cabarita Park to the east and Breakfast Point itself to the west. On the northern bank there are views of much of Morrisons Bay (located between Putney Point and Raven/Tennyson Point), although Putney Point is not visible in the north, to the intersection of Pile and Wharf Roads on the south west aspect of Looking Glass Point.

On this basis a number of heritage items will not be visually or otherwise impacted by the proposed Marina (see **Figure F4** for location of these items). These include:

- The Punt/Cable Ferry. See **Plate P1** for a view from Putney Point Ferry dock towards the site of the proposed marina. The marina will be situated behind the red brick building that can be seen on the left of the image.
- Wangal Centenary Bushland Reserve.
- Punt Road Wharf.
- Sydney Grammar School Boatshed.
- Putney Wharf.
- Monument, Glades Bay Park. See **Plate P2** for a view from the Park towards the site of the proposed Marina. The view is screened by the vegetation, but also obscured by the eastern entrance into Glades Bay.
- Banjo Patterson Park.
- Putney Park.
- Rockend Cottage.
- Cabarita Wharf. See **Plate P3** for a view from the site of the proposed Marina towards Cabarita Wharf. The Wharf is located on the northeast point, which is not visible from the site.
- Sanders Marina. See **Plate P3** for a view from the site of the proposed Marina towards Sanders Marina. The Marina is located on the northeast point, which is not visible from the site.

4.2.2 Visual Catchment Assessment

Topography, vegetation and the orientation of heritage items exclude several more from being impacted by the proposed Marina. These include:

- House (19A Ameins Street). The House has views only of the surrounding houses.
- Houses (23-31 Ameins Street). No water views, screened by houses on opposite side of street.
- Rock Engraving, Glades Bay Native Gardens. Views screened by Breakfast Point.
- "Harwin" House, 79 Champion Road. Views screened by surrounding residential housing.
- House (85 Champion Road). Views screened by surrounding residential housing.
- Shops (113-115 Tennyson Road). Views screened by surrounding residential housing.
- House (139 Tennyson Road). Water views are towards Putney Point and there is no visual access to Breakfast Point or the site of the proposed marina (see **Plate P4**).
- Federation Pavilion. Vegetation completely screens views to and from the Pavilion (see **Plate P3** and **Plate P5**).
- Former AGL Fence. View is screened by residential development and further apartment blocks have been approved between the two (see **Plate P6**).
- Former AGL Office No.1. View is screened by residential development and further apartment blocks have been approved between the two (see **Plate P6**).
- Former AGL Main Meter Readers Office. View is screened by residential development and further apartment blocks have been approved between the two (see **Plate P6**).
- Former AGL Blacksmiths Shop. View is screened by residential development and further apartment blocks have been approved between the two (see **Plate P7**).

4.2.3 Items with visual access to site of proposed marina

The remaining three heritage items, the Former AGL Power House (Canada Bay LEP No.383), Cabarita Park – landscape, rotunda and swimming pool (Canada Bay LEP No.58) and Scots College Boatshed (REP No.48) are in the visual catchment of the proposed marina. As these items are listed on the LEP and REP it is emphasised that they are of local significance. The following chapter provides a Statement of Heritage Impact for each of the three affected heritage items.

4.2.4 Other heritage issues

On advice from Ms Hubert of the City of Canada Bay an inspection of the junction between the seawall and the proposed Marina was undertaken. Ms Hubert raised concern regarding impacting on the location of the former AGL jetty. An inspection of the interface revealed the seawall has recently been replaced with concrete blocks rendered to appear sandstone. Mr Dean Steingold of Rose Group confirmed the seawall was replaced early on in the redevelopment of the site. No remains of the jetty were evident above the water level. Further investigation of the jetty remains below water level was not possible and it is probable they have been completely removed in anticipation of the proposed Marina. An archival recording of the jetty was undertaken prior to its removal by EJE Heritage. A copy of *Kendall Bay coal wharf (Breakfast Point Jetty): photographic archival record* can be found at the Five Dock branch of the City of Canada Bay Library (call no. LH627.31KEN). Given that the jetty has been recorded and the seawall replaced no further investigation is warranted.

5.0 Statements of Heritage Impact for Historic Heritage Items

In order to understand how development will impact on a heritage item it is essential to understand why an item is significant. An assessment of significance is undertaken to explain why a particular site is important and to enable the appropriate site management to be determined. Cultural significance is defined in the *Australian ICOMOS Charter for the conservation of places of Cultural Significance* (the *Burra Charter*) as meaning "aesthetic, historic, scientific or social value for past, present or future generations" (Article 1.1). Cultural significance may be derived from the fabric of a place, association with a place, or the research potential of a place. The significance of a place is not fixed for all time, and what is of significance to us now may change as similar items are located, more historical research is undertaken and community tastes change.

The process of linking this assessment with a site's historical context has been developed through the NSW Heritage Management System and is outlined in the guideline *Assessing Heritage Significance,* part of the *NSW Heritage Manual* (Heritage Branch, Department of Planning). The *Assessing Heritage Significance* guidelines establish seven evaluation criteria (which reflect four categories of significance and whether a place is rare or representative) under which a place can be evaluated in the context of State or Local historical themes. Similarly, a heritage item can be significant at a local level (ie to the people living in the vicinity of the item), at a State level (ie to all people living within New South Wales) or be significant to the country as a whole and be of National or Commonwealth significance.

The NSW Heritage significance criteria are:

Criterion (a) – an item is important in the course, or pattern, of NSW's cultural or natural history (or the cultural or natural history of the local area);

Criterion (b) – an item has strong or special association with the life or works of a person, or group of persons, of importance in NSW's cultural or natural history (or the cultural or natural history of the local to area);

Criterion (c) – an item is important in demonstrating aesthetic characteristics and/or a high degree of creative or technical achievement in NSW (or the local area);

Criterion (d) – an item has strong or special association with a particular community or cultural group in NSW (or the local area) for social, cultural or spiritual reasons;

Criterion (e) – an item has potential to yield information that will contribute to an understanding of NSW's cultural or natural history (or the cultural or natural history of the local area);

Criterion (f) – an item possesses uncommon, rare or endangered aspects of NSW's cultural or natural history (or the cultural or natural history of the local area);

Criterion (g) – an item is important in demonstrating the principal characteristics of a class of NSW's:

- cultural or natural places; or
- cultural or natural environments.

(or a class of the local area's:

- cultural or natural places; or
- cultural or natural environments.)

For each of the three impacted sites their Statement of Significance (SOS – a summary of significance) is presented and discussed in light of the proposed Marina. Following this contextual background the Statement of Heritage Impact is provided.

5.1 Former AGL Powerhouse

The Former AGL Power House is listed on the City of Canada Bay LEP (No. 383). The significance of the item is provided in the Canada Bay heritage inventory as follows:

> *The former AGL Powerhouse was part of the Mortlake gasworks, one of the largest complexes of its kind in the southern hemisphere. The bulding [sic] provides evidence of a major phase in the history of the gasworks – introduction of vertical retorts requiring electrically powered mechanised support services.*
>
> *The former AGL Powerhouse is an important example of the work of engineer E.G. Stone who is known for his work with reinforced concrete. It is one of only two surviving examples of buildings in Australia utilising reinforced concrete roof trusses.*
>
> *The former AGL Powerhouse is a good example of classical design applied to a purpose built industrial structure. Its gabled form echos [sic] those of other major buildings on the site, providing a strong sense of association.*

The significance of the item is as part of a larger complex (criteria a and b) and for its architectural and technical properties (criteria c and f). The only reference in the Statement of Significance (SOS) to setting refers to the relationship between the Powerhouse and other Gasworks elements. The relationship between the remaining elements is to be broken by the construction of approved residential development. The Marina does not intervene between elements will therefore not have an impact on this aspect of the Powerhouse's significance.

The first aspect of the buildings significance refers to the historical place the building holds in the development of the Mortlake gasworks site. This is a non-tangible value, which cannot be impacted by surrounding development. The final element of the Powerhouse's significance relates to the roof trusses being rare surviving examples of reinforced concrete and as a work of the engineer E.G. Stone. Neither of these two aspects can be impacted by surrounding development, as long as the fabric of the building is not disturbed. The proposed marina will have no impact on the building fabric and will not affect the significance of the Powerhouse as identified by the City of Canada Bay.

5.1.1 Statement of Heritage Impact

The Guideline *Statements of Heritage Impact* (Heritage Office and Department of Urban Affairs and Planning 2002:7) outlines a series of questions to be addressed by the SOHI where development is adjacent to the heritage item.

How is the impact of the new development on the heritage significance of the item or area to be minimised?

As discussed above, the proposed Marina will not impact on the listed heritage values of the Powerhouse as they are either non-tangible or relate to the fabric of the building, which will not be disturbed.

Why is the new development required to be adjacent to a heritage item?

The proposed Marina is to be located along the western shore of Kendall Bay. The shore in this location is relatively protected and is out of the Parramatta River navigation channel. The remainder of the shoreline associated with the Rose Group redevelopment is unsuitable for a marina as it is within Parramatta River its self and construction of a marina would impinge on the navigation channel.

How does the curtilage allowed around the heritage item contribute to the retention of its heritage significance?

The proposed Marina falls outside of the curtilage and as the heritage significance will not be impacted the curtilage of the item is irrelevant in this instance.

How does the new development affect views to, and from, the heritage item? What has been done to minimise negative effects?

The proposed Marina will not affect views to or from the Powerhouse along the Parramatta River. The Powerhouse is placed on the tip of Breakfast Point and therefore holds a prominent position on the River foreshore. The Marina will be visible adjacent to the Powerhouse once Cabarita Point is cleared, when travelling in a westerly direction. Views of the Powerhouse will not be obstructed by the Marina in the opposite direction.

Views to and from the Powerhouse will be affected with regard to Cabarita Park and the southern portion of Kendall Bay. The Powerhouse is already partially obscured by the Breakfast Point residential development (see **Plate P8**). The extent to which the Powerhouse can be viewed will depend on where on the Cabarita foreshore the observer is standing; the further north the less the obstruction. Obstruction will not be complete as the Powerhouse is slightly elevated above the Breakfast Point foreshore and from some vantage points, especially those elevated towards the tree line (**Plate P3**), the Powerhouse may be clearly seen above the proposed Marina.

No steps have been taken to mitigate the disruption of views to the Powerhouse as views do not form part of the values and significance as listed by the City of Canada Bay.

Is the development sited on any known, or potentially significant archaeological deposits? If so, have alternative sites been considered? Why were they rejected?

The development is known to be sited on the location of the former Kendall Bay Coal Wharf, also known as the Breakfast Point Jetty. The Wharf was archivally recorded prior to its demolition. The potential remains for elements of the Wharf, for example piles and items lost off the side of the Wharf, to be present on the River bed. The potential for these items to contribute to our understanding of the AGL site or the Wharf is considered to be limited, given the previous archival recording and the nature of any such deposits, which could have been disturbed by the demolition of the Wharf and the actions of the River.

No alternative sites are available, as discussed above. The remaining portions of foreshore associated with the Rose Group Breakfast Point development are within Parramatta River proper and would impinge on the navigation channel.

Will the public, and users of the item, still be able to view and appreciate its significance?

The heritage significance and values of the Powerhouse will not be affected by the proposed Marina. Views from Cabarita Park will be partially obscured. The most prominent sight lines along Parramatta River will be unaffected. The significance of the Powerhouse lies in its architectural and technical elements and, as such, public access to the site through adaptive reuse needs to be addressed to allow the public to fully appreciate the building's significance.

5.2 Cabarita Park

The Cabarita Park – landscape, rotunda and swimming pool is listed on the City of Canada Bay LEP (No.58). The Statement of Significance, as proscribed on the City of Canada Bay heritage inventory is as follows:

> *Park of substantial historic importance reserved as a recreation area in 1856 and dedicated in the 1880s. Used as a venue to watch events on the river. Includes a monument to world champion rower William Pearce and a Victory Coppice. The Federation rotunda is of state significance for its historical importance. The swimming pool is also important for its use since 1937.*
>
> *Parkland retaining some natural foreshore character. Layout and planting from c.1920/30s set in a prominent position on the Parramatta River.*

The significance of Cabarita Park lies mainly in its historical, non-tangible import to the local community (criterion a). At a State level the Federation Pavilion, now located in the Park, is of historical significance as the structure under which the Federation of Australia was inaugurated on 1 January 1901. There are no views between the Marina and Pavilion.

Additionally, the Park is of aesthetic significance (criterion c) as it retains some natural foreshore character and is an example of layout and planting from the 1920s and 1930s. At a local level the Park meets criterion f as it contains a rare Victory Coppice of native trees and criterion g as being representative of plantings and layout from the 1930s. The proposed Marina will not affect the historical values, the rarity or the representativeness.

Views from the eastern foreshore of Kendall Bay will be affected. These views, however, have already been modified by the residential development on Breakfast Point. The proposed Marina is in keeping with the development and will form a riverine aesthetic that is consistent with views in other directions. The main aesthetic element of the Park's significance is the retention of natural foreshore character. This will not be affected by the construction of the Marina as views of the natural foreshore elements will not be obscured when travelling along Parramatta River. The Marina may enhance access to this element by attracting more visitors to the area. The second aesthetic element to the Park's significance is its layout and plantings from the 1920s and 1930s. The proposed Marina will not affect this element of the Park as there will be no physical impact on the Park and views of the plantings from the River will remain unrestricted.

5.2.1 Statement of Heritage Impact

The Guideline *Statements of Heritage Impact* (Heritage Office and Department of Urban Affairs and Planning 2002:7) outlines a series of questions to be addressed by the SOHI where development is adjacent to the heritage item.

How is the impact of the new development on the heritage significance of the item or area to be minimised?

As discussed above, the heritage significance of the item will not be affected. The aesthetic elements of the Park's significance lie in the public's ability to appreciate the foreshore and plantings of the Park, not in views from the Park, which have already been modified by residential development. The proposed Marina may encourage greater visitation to the area, thereby increasing public appreciation of the Park and its historic significance. The proposed Marina is not inconsistent with current development in the area and the Park itself already contains a marina and moored boats are an integral element of the existing vistas.

Why is the new development required to be adjacent to a heritage item?

The proposed Marina is to be located along the western shore of Kendall Bay. The shore in this location is relatively protected and is out of the Parramatta River navigation channel. The remainder of the shoreline associated with the Rose Group redevelopment is unsuitable for a marina as it is within Parramatta River its self and construction of a marina would impinge on the navigation channel.

How does the curtilage allowed around the heritage item contribute to the retention of its heritage significance?

The proposed Marina falls outside of the curtilage and across Kendall Bay and as the heritage significance will not be impacted the curtilage of the item is irrelevant in this instance.

How does the new development affect views to, and from, the heritage item? What has been done to minimise negative effects?

As the proposed Marina is tucked against the western shore of Kendall Bay, views to Cabarita Park will remain open to people travelling in an easterly direction along Parramatta River, from Breakfast Point and from across the River. For people travelling in the opposite direction, Cabarita Point and the Park itself will screen the Marina for much of their progress, only coming into view as the Park is passing out of view.

Views from the Park will be affected in as much as they will, potentially, include the Marina. The proposed Marina, however, is consistent with the current vistas and use of the Parramatta River. Views from the Park have, in recent years, been extensively modified towards Breakfast Point with the remediation of the former AGL site and the construction of residential housing. The transformation of the derelict industrial site may be seen as an improvement in the view.

Is the development sited on any known, or potentially significant archaeological deposits? If so, have alternative sites been considered? Why were they rejected?

The development is known to be sited on the location of the former Kendall Bay Coal Wharf, also known as the Breakfast Point Jetty. The Wharf was archivally recorded prior to its demolition. The potential remains for elements of the Wharf, for example piles and items lost off the side of the Wharf, to be present on the River bed. The potential for these items to contribute to our understanding of the AGL site or the Wharf is considered to be limited, given the previous archival recording and the nature of any such deposits, which could be disturbed by the demolition of the Wharf and the actions of the River.

No alternative sites are available, as discussed above. The remaining portions of foreshore associated with the Rose Group Breakfast Point development are within Parramatta River proper and would impinge on the navigation channel.

Will the public, and users of the item, still be able to view and appreciate its significance?

The significance of Cabarita Park will be unaffected by the proposed Marina. The Marina may increase the public's appreciation, through the attraction of visitors and the provision of an extended viewing platform.

5.3 Scots College Boatshed

The Scots College Boatshed (the Boatshed) is listed on the *Sydney Regional Environmental Plan (Sydney Harbour Catchment) 2005* (No.48). No assessment of significance is provided in the State Heritage Inventory (Database no.1006). The City of Ryde Heritage Advisor provided AECOM with an as yet unendorsed Inventory listing from a recently completed foreshore heritage assessment by Godden Mackay Logan (2009). The SOS is:

> *The Scots College Boatshed is significant for its continual use as a rowing shed on the Ryde foreshore of the Parramatta River. The boatshed has been on site since the 1930s and represents the ongoing use of the river in this area for social and competitive rowing since the mid-nineteenth century. The boatshed remains are an important contributor to the collection of foreshore boatsheds that are situated up and down the Parramatta River.*

The Boatshed is therefore significant historically (criterion a), for its association with River rowing clubs (criterion b), aesthetically as a group of sheds that occupy the foreshore (criterion c), socially for those who have used the Boatshed (criterion d) and as a representative of similar boatsheds in the area (criterion g). The majority of the Boatshed's significance lies in non-tangible historical and social values. The Boatshed holds aesthetic significance for views towards the item, however, views from the Boatshed are not listed. The proposed Marina will therefore not impact on the ascribed values.

How is the impact of the new development on the heritage significance of the item or area to be minimised?

The proposed marina will not impact on the Boatshed's significance, as discussed above.

Why is the new development required to be adjacent to a heritage item?

The proposed Marina is to be located along the southern side of the Parramatta River, while the Boatshed is located on the northern side. The development is therefore not adjacent to the heritage item, but does fall into the visual catchment of the Boatshed.

How does the curtilage allowed around the heritage item contribute to the retention of its heritage significance?

The proposed Marina falls outside of the curtilage and across Parramatta River and as the heritage significance will not be impacted the curtilage of the item is irrelevant in this instance.

How does the new development affect views to, and from, the heritage item? What has been done to minimise negative effects?

Views from the Boatshed across Parramatta River will be affected and the proposed Marina will be visible. Views from the Boatshed have, in recent years, been extensively modified towards Breakfast Point with the remediation of the former AGL site and the construction of residential housing. The transformation of the derelict industrial site may be seen as an improvement in the view. The proposed Marina, however, is consistent with the current vistas and use of the Parramatta River as a means of transportation, sport and leisure. The aesthetic value of the Boatshed lies in its contribution to the northern foreshore of Parramatta River and no value has been placed on outward views. The aesthetic significance of the Boatshed will therefore not be affected by the proposed Marina.

Is the development sited on any known, or potentially significant archaeological deposits? If so, have alternative sites been considered? Why were they rejected?

The development is known to be sited on the location of the former Kendall Bay Coal Wharf, also known as the Breakfast Point Jetty. The Wharf was archivally recorded prior to its demolition. The potential remains for elements of the Wharf, for example piles and items lost off the side of the Wharf, to be present on the River bed. The potential for these items to contribute to our understanding of the AGL site or the Wharf is considered to be limited, given the previous archival recording and the nature of any such deposits, which could be disturbed by the demolition of the Wharf and the actions of the River.

No alternative sites are available, as discussed above. The remaining portions of foreshore associated with the Rose Group Breakfast Point development are within Parramatta River proper and would impinge on the navigation channel.

Will the public, and users of the item, still be able to view and appreciate its significance?

Yes, the significance of Scots College Boatshed will be unaffected by the proposed Marina as the non-tangible historical and social significance will not be impacted. Additionally it is difficult to view the Marina and the Boatshed at the same time from the River.

6.0 Aboriginal Heritage Background and Results

Investigations of the distribution of Aboriginal objects and places include an analysis of information on the natural resources available in a region to gain an understanding of the range of cultural remains that can be expected. Resources are linked to the hydrology, geology and soil types in a region.

Water availability is a major influence on the intensity of Aboriginal occupation and evidence, usually in the form of flaked stone artefacts, is often associated with permanent or semi-permanent water sources.

The availability of stone sources for artefact manufacture also influences the types and density of sites that may be encountered. Areas in which suitable stone raw materials are available often contain higher concentrations of flaked stone artefacts than regions where stone for artefact manufacture is scarce.

Soil types are influential as accumulating sediments can cover cultural remains while areas of sediment removal through erosion can either uncover buried archaeological material or transport small items away from the original depositional context. Soil analysis has important ramifications for archaeological research through the potential impact of different soils on human activity (such as agricultural exploitation) and the impact of the soils on archaeological evidence (such as post-depositional movement). The soils known to occur throughout the Study Area are identified here in order to delineate their nature and impact on the survival and location of archaeological material.

A short section on the archaeological and historical evidence of area presented below in order to interpret and analyse the likelihood of archaeological material within the proposed Study Area.

Information on the geology and soil landscapes and topography in the region of the Study Area is presented below. This data were used for the discussion of the results of the field inspections.

6.1 Geology and Soils

The study area is located within the Port Jackson Catchment, a geologically, topographically, aquatically, florally and faunally diverse area at the southern end of the Hornsby plateau. The Catchment is made up to two main geological formations: Hawkesbury Sandstone and Wianamatta Shale. Small deposits of silcrete suitable for stone tool production have been found in association with Wianamatta shales, however, the Catchment has very limited sources of suitable stone (Attenbrow 1990:9).

Cabarita Park is dominated by the Oxford Falls soil type, which is moderate to moderately deep (50-150cm) and consisting of Earthy Sands, Yellow Earths and Siliceous Sands. The site of the proposed Marina is mapped on the Sydney 1:100,000 Soil Survey map as ‘Disturbed’, being identified from aerial photography as ‘extensively disturbed by human activity.’

6.2 Vegetation and Fauna

The shallow infertile sandstone soils, such as those of Cabarita, were originally vegetated with woodlands and heaths. Low lying estuarine areas to the west supported mangrove communities.

Cabarita has been cleared and replanted with native and exotic species.

The NSW Wildlife Atlas has 137 species recorded in the City of Canada Bay, the majority of which are birds.

6.3 Ethnography

Excavations indicate the Sydney Basin to have been occupied for 20-30,000 years (Navin Officer 2005:8). The Aboriginal group inhabiting environs of Kendall Bay were the Darug people. More specifically, Attenbrow (2002:23) and Turbet (2001:20) identify the Kendall Bay area as being home of the Wangal band. Bennelong, an Aboriginal captive of Governor Phillip and who adopted European dress and language, was of this band (Attenbrow 2002:34).

The hunter-gather lifestyle focused on small terrestrial mammals, plants and estuarine molluscs and fish. Groups in the area relied on rock shelters formed from the Hawkesbury River sandstone and only constructed bark shelters infrequently. The use of rock shelters is demonstrated by the numerous rock art sites in the Sydney Basin.

6.4 Previous Archaeological Investigations

Previous archaeological investigations in the immediate vicinity of Kendall Bay have been limited to surveys, primarily undertaken in the late 1980s and early 1990s. The most comprehensive and relevant of these being the *Parramatta River Regional Environmental Study: Open Space and Recreation Heritage Study* completed by the Department of Environment and Planning in 1986. This document is also purported to be the Aboriginal heritage schedule for the REP. The aim of the study was to target survey to areas likely to retain evidence of Aboriginal occupation. Cabarita Park was chosen as one of these locations and survey discovered two midden sites on the foreshore to the east of the ferry wharf.

Cabarita Park 1 (45-6-2804) is described as midden site 25 metres long and varying in width between three and five metres. The deposit was estimated to be ten centimetres deep and contained shell. No bone fragments or stone tools were sighted. The site was highly disturbed, especially at the southern end by the construction of a boat ramp and parking area.

Cabarita Park 2 (45-6-0532), also a midden, was located 50 metres to the east of 45-6-2804 and being separated from the first site by a steep slope. The site is described as around 400 metres long and between 20 and 50 metres wide. The site has been disturbed by the construction of a road, boat ramp, toilet block and picnic tables.

These sites are located 250 metres east of the study area.

6.5 AHIMS Search Results

An AHIMS search was undertaken on 29 June 2009 using a five kilometre search radius around Kendall Bay. The search returned 51 results, which have been mapped in **Figure F5**. The AHIMS data places eight of the sites in the Parramatta River. The conversion of imperial data to metric introduced a degree of error to the early listed sites, while data entry errors and map variations prior to the general introduction of Global Positioning Systems (GPS) for recording site locations accounts for the remaining sites. Descriptions of the sites places them on the adjacent foreshore. Given that none of these sites occur within the vicinity of the project site it was not deemed necessary to undertake the task of relocating the sites. As discussed in **Section 6.4** the closest sites occur in Cabarita Park (45-6-0532 and 45-6-2804), approximately 250 metres east of the proposed Marina.

Of the 51 sites the dominant types were middens (16), shelters with middens (10), open camps associated with middens (5) or shelters with rock art (5). As could be expected of an estuarine environment, the sites are predominantly located adjacent to the River to take advantage of the resources provided therein. The balance of sites include open camp sites (4), rock engravings (4), sites with no type recorded (2), axe grinding groove (1), burial/s and midden (1) and a site identified as not been of Aboriginal origination (1).

Given the characteristics of the surrounding sites it could be expected that, were sites to exist in the study area, they would be located along the River foreshore.

6.6 Land Use History

The Australian Gas and Light Company (AGL) began construction of their gasworks on the site in 1883. This involved major earthworks and the site's topography was radically altered. In addition, the construction of various structures associated with the works had a significant impact on the original land surface. This is supported by the Soil Survey map of the area, which designates the study area as being 'extensively disturbed by human activity.'

The gasworks continued to operate until 1990. Extensive remediation works have been undertaken since then to decontaminate the site, followed by the construction of residential housing developments along the foreshore. The foreshore of Kendall Bay its self has undergone substantial changes (**Plate P9**). During the life of the gasworks it was the location of a coal wharf or jetty, which has since been demolished. As discussed in **Section 4.2.4**, the current seawall was probably constructed after the removal of the jetty in 2005.

6.7 Site Inspection

Dr Susan Lampard of AECOM inspected the site on 30 April 2009. The inspection revealed a highly modified landscape, as discussed in **Section 6.6.** The foreshore has been landscaped and grassed (**Plate P9**). There was no evidence of previous Aboriginal occupation.

6.8 Potential for Aboriginal Sites

Given the extensive remodelling of the land surface and foreshore discussed in **Section 6.6** it is considered the potential for intact Aboriginal sites existing in the study area is nil. Any site that formerly existed would have been destroyed by the construction of the Kendall Bay Jetty/Wharf or its subsequent demolition and the construction of the current seawall.

6.9 Conclusion

No Aboriginal sites have been identified within the footprint of the proposed Marina. The proposed Marina is located in a historically created landscape that has no Aboriginal archaeological potential. It is therefore considered unlikely that any Aboriginal sites survive. Under the REP it is necessary to undertake further assessment if it is *likely* the project will impact on Aboriginal heritage. As it is deemed unlikely that Aboriginal sites remain on the western shore of Kendall Bay there is no requirement to proceed to a full Aboriginal heritage assessment or community consultation. There is not considered to be any need for further Aboriginal archaeological investigations in relation to the proposed Marina.

7.0 Conclusion

This report was commissioned in response to a requirement by the Director-General to address Part 5 Section 59 of the *Sydney Regional Environmental Plan (Sydney Harbour Catchment) 2005.* The REP requires that the setting of heritage items be assessed to ensure significant views or the significance of the items is not affected. The consent authority requires a SOHI to assist in the assessment of the development proposal. In relation to Aboriginal heritage the REP requires that full assessment and community consultation be undertaken if the proposed works are likely to impact sites.

The assessment determined that the proposed Marina will be visible from the three heritage items:

- The Former AGL Powerhouse (City of Canada Bay LEP No. 383).
- Cabarita Park – landscape, rotunda and swimming pool (City of Canada Bay LEP No.58).
- Scots College Boatshed (REP No.48).

The SOHIs in **Section 5.0** have determined that while the proposed Marina will be visible from these three historic heritage items there will be no impact on the significance of the items, as listed. The significance lies largely in non-tangible associations. Where the setting of the item is significant, that is for Cabarita Park, it is for views *towards* the heritage item. These views will be unaffected by the proposed Marina due to its sitting within Kendall Bay, without major impact on sight lines along Parramatta River.

The proposed development will have no impact on the heritage significance of the Former AGL Power House, Cabarita Park or Scots College Boatshed as:

1. The significance of the items lies largely in non-tangible historical and cultural associations.
2. It does not physically impact on the heritage items.
3. While there may be limited impediment to the viewing of Cabarita Park, there will be no impediment from existing public vantage points.
4. The view from the items is not considered to be of historical significance. In the case of Cabarita Park and the Boatshed, the significance lies in views towards the item, which may be enhanced through increased visitation.
5. The location of the development within Kendall Bay means the Marina does not impact on sight lines along Parramatta River.

No Aboriginal sites were identified within the footprint of the proposed Marina. The proposed Marina is located on a highly modified landscape that is considered to have no Aboriginal archaeological potential. The REP requires full assessment if there is potential for the project to impact on Aboriginal heritage. As it is deemed unlikely that Aboriginal sites remain on the western shore of Kendall Bay there is no requirement to proceed to a full Aboriginal heritage assessment or community consultation. There is not considered to be any need for further Aboriginal archaeological investigations in relation to the proposed Marina.

As the heritage significance of the historic heritage items will not be affected and there is not considered to be any potential for Aboriginal sites to remain there is no necessity to provide recommendations to mitigate impacts, however, the following are provided to guide the project more broadly:

- It is recommended that no further heritage assessment is required as no historic or Aboriginal heritage impacts have been identified.
- It is a requirement under the *Heritage Act 1977* that any relics discovered during works must be reported to the Heritage Branch, Department of Planning on 02 9873 8500. All works must cease until the relics have been assessed by the Heritage Branch or a qualified professional on their behalf.
- It is a requirement under the *National Parks and Wildlife Act 1974* that any Aboriginal objects discovered during works must be reported to the Department of Environment and Climate Change on 131 555. All works must cease until the Aboriginal objects have been assessed by the DECC or a qualified professional on their behalf.

8.0 References

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Tables

Table T1: Heritage Items identified during desktop review on SHR, LEP, Planning Scheme Ordinance, REP and *Heritage Act* Section 170 Register.

No.	Listing	Item	ID No.	Address	Suburb	Impact?
1	Canada Bay LEP	Mortlake Punt - ramp, slipway, setting	253	Hilly Street	Mortlake	No
2	Canada Bay LEP	Wangal Centenary Bushland Reserve	254	Hilly Street	Mortlake	No
3	Canada Bay LEP	Cabarita Park - landscape, rotunda and swimming pool	58	Cabarita Road	Cabarita	Yes
4	Canada Bay LEP	Former AGL Power House	383	97–99 Peninsula Drive	Breakfast Point	Yes
5	Canada Bay LEP	Former AGL Blacksmiths' Shop	382	123 Peninsula Drive	Breakfast Point	No
6	Canada Bay LEP	Former AGL Fence to Tennyson Road, entrance gates and entry pavilion	437	Tennyson Road (east side) between Peninsula Drive and Emily Street, Magnolia Drive	Breakfast Point	No
7	Canada Bay LEP	Former AGL Office No 1	438	19–21 Tennyson Road	Breakfast Point	No
8	Canada Bay LEP	Former AGL Main Meter Readers' Office	439	19–21 Tennyson Road	Breakfast Point	No
9	REP	Punt Road Wharf	51	Punt Rd	Gladesville	No
10	REP	Scots College Boatshed	48	3 Delmar Pde	Gladesville	Yes
11	REP	Sydney Grammar School Boatshed	50	88 Wharf Rd	Gladesville	No
12	REP	Cabarita Wharf (former)	27	Cabarita Road	Cabarita	No
13	REP	Sanders Marina	28	Cabarita Park, Cabarita Rd	Cabarita	No
14	REP	Putney Wharf	47	Putney Parade, Putney	Putney	No
15	Ryde PSO	House	3	19a Amiens Street	Gladesville	No
16	Ryde PSO	Houses	4	23-31 Amiens Street	Gladesville	No
17	Ryde PSO	Monument, Glades Bay Park	6	45 Ashburn Pl	Gladesville	No
18	Ryde PSO	Rock Engraving	52	Glades Bay Native Gardens	Gladesville	No
19	Ryde PSO	Putney Park (house remains)	87	99 Pellisier Road	Putney	No

No.	Listing	Item	ID No.	Address	Suburb	Impact?
20	Ryde PSO	Banjo Patterson Park	98	Punt Rd	Gladesville	No
21	Ryde PSO	Punt	85	Mortlake Ferry, Pellisier Rd	Mortlake Ferry	No
22	Ryde PSO	"Harwin" House	24	79 Champion Rd	Tennyson	No
23	Ryde PSO	House	25	85 Champion Rd	Tennyson	No
24	Ryde PSO	Shops	121	113-115 Tennyson Rd	Tennyson	No
25	Ryde PSO	House	122	139 Tennyson Rd	Tennyson	No
26	Ryde PSO	Rockend Cottage	99	Punt Rd	Gladesville	No
27	S170 - RTA	Cable Ferry - Mortlake/Putney	4301056	Hilly Street	Mortlake	No
28	S170 - Maritime NSW	Old Punt at Mortlake	4920026			
29	S170 – DUAP	Rockend Cottage	3490024	38-40 Punt Rd	Gladesville	No
30	SHR	Federation Pavilion - Cabarita Park	1454	Cabarita Road	Cabarita	No
31	RNE	Federation Pavilion (former)	102504	Cabarita Road	Cabarita	No
32	RNE	Parramatta and Lane Cove River Landscapes	14309	North Rocks Road to Greenwich	Multiple	No

Figures

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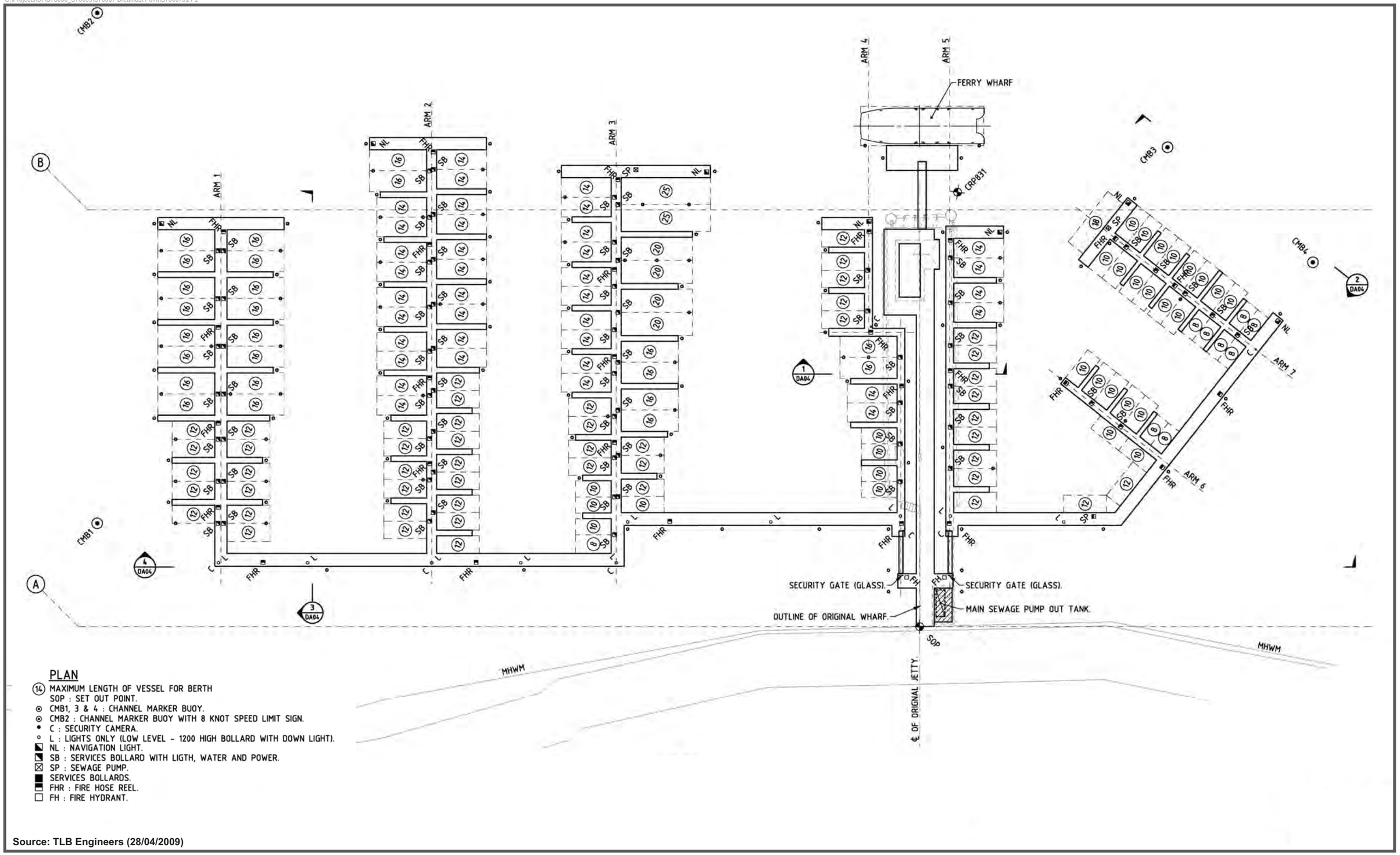

Source: TLB Engineers (28/04/2009)

AECOM

0 25m

Project ID: S70067
Created By: TO
Last Modified: 15/05/2009

Location of Heritage Items

Breakfast Point Pty Ltd

Inner West Marina Heritage Impact Statment

Kendall Bay

Breakfast Point, NSW

Figure F1

AECOM

General Location of Breakfast Point and Kendall Bay

Breakfast Point Pty Ltd

Inner West Marina Heritage Impact Statment

Kendall Bay

Breakfast Point, NSW

Figure **F2**

Project ID: S70067

Created By: TO

Last Modified: 14/05/2009

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AECOM

0 300m

Radius used to Search for Heritage Items

Breakfast Point Pty Ltd

Inner West Marina Heritage Impact Statment

Kendall Bay

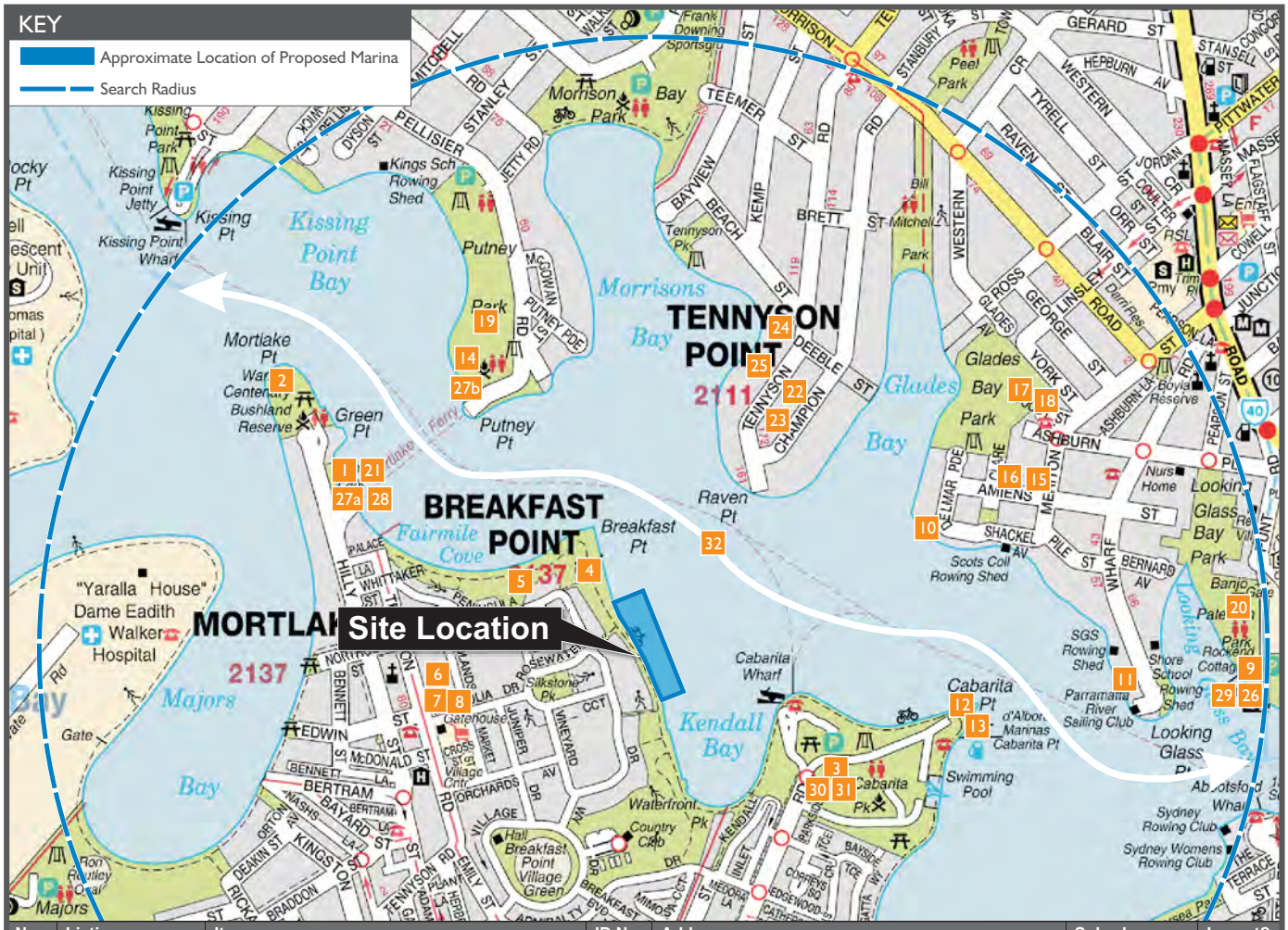
Breakfast Point, NSW

Figure **F3**

Project ID: S70067

Created By: TO

Last Modified: 14/05/2009



No.	Listing	Item	ID No.	Address	Suburb	Impact?
1	Canada Bay LEP	Mortlake Punt - ramp, slipway, setting	253	Hilly Street	Mortlake	No
2	Canada Bay LEP	Wangal Centenary Bushland Reserve	254	Hilly Street	Mortlake	No
3	Canada Bay LEP	Cabarita Park - landscape, rotunda and swimming pool	58	Cabarita Road	Cabarita	Yes
4	Canada Bay LEP	Former AGL Power House	383	97–99 Peninsula Drive	Breakfast Point	Yes
5	Canada Bay LEP	Former AGL Blacksmiths' Shop	382	123 Peninsula Drive	Breakfast Point	No
6	Canada Bay LEP	Former AGL Fence to Tennyson Road, entrance gates and entry pavilion	437	Tennyson Road (east side) between Peninsula Drive and Emily Street, Magnolia Drive	Breakfast Point	No
7	Canada Bay LEP	Former AGL Office No 1	438	19–21 Tennyson Road	Breakfast Point	No
8	Canada Bay LEP	Former AGL Main Meter Readers' Office	439	19–21 Tennyson Road	Breakfast Point	No
9	REP	Punt Road Wharf	51	Punt Rd	Gladesville	No
10	REP	Scots College Boatshed	48	3 Delmar Pde	Gladesville	Yes
11	REP	Sydney Grammar School Boatshed	50	88 Wharf Rd	Gladesville	No
12	REP	Cabarita Wharf (former)	27	Cabarita Road	Cabarita	No
13	REP	Sanders Marina	28	Cabarita Park, Cabarita Rd	Cabarita	No
14	REP	Putney Wharf	47	Putney Parade, Putney	Putney	No
15	Ryde PSO	House	3	19a Amiens Street	Gladesville	No
16	Ryde PSO	Houses	4	23-31 Amiens Street	Gladesville	No
17	Ryde PSO	Monument, Glades Bay Park	6	45 Ashburn Pl	Gladesville	No
18	Ryde PSO	Rock Engraving	52	Glades Bay Native Gardens	Gladesville	No
19	Ryde PSO	Putney Park (house remains)	87	99 Pellisier Road	Putney	No
20	Ryde PSO	Banjo Patterson Park	98	Punt Rd	Gladesville	No
21	Ryde PSO	Punt	85	Mortlake Ferry, Pellisier Rd	Mortlake Ferry	No
22	Ryde PSO	"Harwin" House	24	79 Champion Rd	Tennyson	No
23	Ryde PSO	House	25	85 Champion Rd	Tennyson	No
24	Ryde PSO	Shops	121	113-115 Tennyson Rd	Tennyson	No
25	Ryde PSO	House	122	139 Tennyson Rd	Tennyson	No
26	Ryde PSO & REP	Rockend Cottage	99	Punt Rd	Gladesville	No
27	S170 - RTA	Cable Ferry - Mortlake/Putney	4301056	Hilly Street	Mortlake	No
28	S170 - Maritime NSW	Old Punt at Mortlake	4920026			
29	S170 - DUAP	Rockend Cottage	3490024	38-40 Punt Road	Gladesville	No
30	SHR	Federation Pavilion	1454	Cabarita Road	Cabarita	No
31	RNE	Federation Pavilion (former)	102504	Cabarita Road	Cabarita	No
32	RNE	Parramatta and Lane Cover River Landscapes	14309	North Rocks Road to Greenwich	Multiple	No

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Project ID: S70067
Created By: TO
Last Modified: 14/05/2009

Location of Heritage Items

Breakfast Point Pty Ltd

Inner West Marina Heritage Impact Statment

Kendall Bay

Breakfast Point, NSW

Figure **F4**

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AECOM

0 500m

Project ID: S70067
Created By: TO
Last Modified: 06/07/2009

- Axe Grinding Groove (1)
- Burial/s, Midden (1)
- Midden (16)
- Midden, Open Camp Site (5)
- None (2)
- Not an Aboriginal Site (1)
- Open Camp Site (4)
- Rock Engraving (4)
- Shelter with Art (5)
- Shelter with Deposit (2)
- Shelter with Midden (10)

AHIMS Site Locations

Breakfast Point Pty Ltd

Inner West Marina Heritage Impact Statment

Kendall Bay

Breakfast Point, NSW

Figure F5

Plates

Plate P1: View from Putney Point Punt/Cable Ferry dock towards site of proposed Marina (marked with arrow, behind Breakfast Point).

Plate P2: View from Glades Bay Park towards site of proposed Marina (approximate location marked by arrow).

Plate P3: View from site of proposed Marina towards Cabarita Point. Approximate location of Federation Pavilion marked by arrow.

Plate P4: View from 139 Tennyson Road out over water. Proposed Marina will be sited to the left of the image, out of view.

Plate P5: View from Federation Pavilion towards site of proposed Marina.

Plate P6: View from the Former AGL Fence, Office No. 1 and Main Meter Readers' Office. Approximate location of proposed Marina marked with arrow.

Plate P7: View of the Former AGL Blacksmiths' Workshop (right of image) towards site of proposed Marina (approximate location marked with arrow).

Plate P8: View from Cabarita Point towards the Former AGL Powerhouse with the site of the proposed Marina to the left of image (approximate location in bracket).

Plate P9: Western foreshore of Kendall Bay showing modifications to shore line.

AECOM

Worldwide Locations

Australia	+61-2-8484-8999
Azerbaijan	+994 12 4975881
Belgium	+32-3-540-95-86
Bolivia	+591-3-354-8564
Brazil	+55-21-3526-8160
China	+86-20-8130-3737
England	+44 1928-726006
France	+33(0)1 48 42 59 53
Germany	+49-631-341-13-62
Ireland	+353 1631 9356
Italy	+39-02-3180 77 1
Japan	+813-3541 5926
Malaysia	+603-7725-0380
Netherlands	+31 10 2120 744
Philippines	+632 910 6226
Scotland	+44 (0) 1224-624624
Singapore	+65 6295 5752
Thailand	+662 642 6161
Turkey	+90-312-428-3667
United States	+1 978-589-3200
Venezuela	+58-212-762-63 39

Australian Locations

Adelaide
Brisbane
Canberra
Darwin
Melbourne
Newcastle
Perth
Sydney
Singleton

www.aecom.com

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Australian Locations

Adelaide
Brisbane
Canberra
Darwin
Mackay
Melbourne
Newcastle
Singleton
Sydney

APPENDIX 7:

- TRAFFIC AND PARKING REPORT

BREAKFAST POINT PTY LIMITED

TRAFFIC AND PARKING REPORT FOR PROPOSED INNER WEST MARINA, SYDNEY

AUGUST 2009

COLSTON BUDD HUNT & KAFES PTY LTD
ACN 002 334 296
Level 18 Tower A
Zenith Centre
821 Pacific Highway
CHATSWOOD NSW 2067

Telephone: (02) 9411 2411
Facsimile: (02) 9411 2422
Email: cbhk@cbhk.com.au

REF: 6581

TABLE OF CONTENTS

1. INTRODUCTION

1.1 Colston Budd Hunt and Kafes Pty Ltd has been commissioned by Breakfast Point Pty Limited to prepare a report examining the transport implications of a proposed marina at Kendall Bay, adjacent to Breakfast Point. The site location is shown in Figure 1.

1.2 Breakfast Point is located on the southern side of the Parramatta River, and is basically a residential development with some relatively minor components of other uses. It is proposed to develop a marina in Kendall Bay, adjacent to the development. The marina would provide 172 berths, including a small kiosk and manager's office.

1.3 The Director General's Requirements, dated 14 January 2008, include:

- ***Traffic*** *- including details of the traffic volumes likely to be generated during construction and operation, and an assessment of the predicted impacts of this traffic on the safety and capacity of the surrounding road network. Details on site access, internal roadways and parking must also be provided;*

1.4 This report assesses the traffic and parking implications of the proposed development through the following chapters:

- Chapter 2 - describing the existing conditions; and
- Chapter 3 - assessing the implications of the proposed development.

2. EXISTING CONDITIONS

Site Location and Road Network

2.1 Breakfast Point is located on the southern side of the Parramatta River, and is basically a residential development with some relatively minor components of other uses. Various approvals for the site provide for development of some 2,065 dwellings.

2.2 Breakfast Point is accessed from Tennyson Road at Peninsula Drive, Magnolia Drive and Orchards Avenue. It is also accessed from the southern side of the site at Adams Street, Breakfast Point Boulevard, Medora Lane, Admiralty Drive and Kendall Inlet.

2.3 Peninsula Drive, Rosewater Circuit and Magnolia Drive provide access to existing residential development in Breakfast Point, including residential development currently under construction. They provide for one traffic lane and one parking lane in each direction, with on-street parking provided in indented parking bays.

2.4 Intersections within Breakfast Point are unsignalised, and are generally priority or sign controlled.

Traffic Conditions

2.5 Traffic generated by the proposed development will have its greatest effects on weekends when people travel to the marina to use their boats. In order to gauge

traffic conditions, counts were undertaken on a Sunday at the following intersections:

- Tennyson Road/Magnolia Drive;
- Tennyson Road/Orchards Avenue;
- Magnolia Drive/Rosewater Circuit; and
- Rosewater Circuit/Peninsula Drive (both ends).

2.6 The results of the surveys are shown in Figure 2 and summarised in Table 2.1.

Table 2.1: Existing two-way (sum of both directions) peak hour traffic flows

Road	Location	Sunday peak hour
Tennyson Road	North of Magnolia Drive	145
	North of Orchards Avenue	220
	South of Orchards Avenue	300
Magnolia Drive	East of Tennyson Road	145
	West of Rosewater Circuit	90
Orchards Avenue	East of Tennyson Road	130
Rosewater Circuit	East of Magnolia Drive	45 – 65
	West of Peninsula Drive	45 – 65
Peninsula Drive	North of Rosewater Circuit	45
	South of Rosewater Circuit	85

2.7 Table 2.1 shows that Tennyson Road carried some 150 to 300 vehicles per hour two-way during the surveyed peak hour on the Sunday. Flows on Magnolia Drive and Orchards Avenue were lower at some 90 to 150 vehicles per hour two-way.

2.8 Rosewater Circuit and Peninsula Drive carried less than 100 vehicles per hour two-way during the surveyed peak hour.

Intersection Operations

2.9 The capacity of the road network is largely determined by the capacity of its intersections to cater for peak period traffic flows. The surveyed intersections shown in Figure 2 have been analysed using the SIDRA program.

2.10 The SIDRA program simulates the operations of intersections to provide a number of performance measures. The most useful measure provided is average delay per vehicle expressed in seconds per vehicle. Based on average delay per vehicle, SIDRA estimates the following levels of service (LOS):

- For traffic signals, the average delay per vehicle in seconds is calculated as delay/(all vehicles), for roundabouts the average delay per vehicle in seconds is selected for the movement with the highest average delay per vehicle, equivalent to the following LOS:

0 to 14	=	"A"	Good
15 to 28	=	"B"	Good with minimal delays and spare capacity
29 to 42	=	"C"	Satisfactory with spare capacity
43 to 56	=	"D"	Satisfactory but operating near capacity
57 to 70	=	"E"	At capacity and incidents will cause excessive delays. Roundabouts require other control mode.
>70	=	"F"	Unsatisfactory and requires additional capacity

- For give way and stop signs, the average delay per vehicle in seconds is selected from the movement with the highest average delay per vehicle, equivalent to the following LOS:

0 to 14	=	"A"	Good
15 to 28	=	"B"	Acceptable delays and spare capacity
29 to 42	=	"C"	Satisfactory but accident study required
43 to 56	=	"D"	Near capacity and accident study required
57 to 70	=	"E"	At capacity and requires other control mode
>70	=	"F"	Unsatisfactory and requires other control mode

2.11 It should be noted that for roundabouts, give way and stop signs, in some circumstances, simply examining the highest individual average delay can be misleading. The size of the movement with the highest average delay per vehicle should also be taken into account. Thus, for example, an intersection where all movements are operating at a level of service A, except one which is at level of service E, may not necessarily define the intersection level of service as E if that movement is very small. That is, longer delays to a small number of vehicles may not justify upgrading an intersection unless a safety issue was also involved.

2.12 The SIDRA analysis found that the surveyed intersections are operating with average delays for all movements of less than 15 seconds per vehicle during the Sunday peak period. This represents level of service A/B, a good level of service.

Public Transport

2.13 The main spine road and the east-west spine road within Breakfast Point are designed to accommodate bus services. Pedestrian paths are provided throughout the development, including road narrowings at intersections (to reduce pedestrian crossing distances) and pram ramps. In the low speed, low traffic volume environment within Breakfast Point, bicycles are able to travel on-

street, consistent with the principles identified in AMCORD. Bicycle racks and storage areas are provided in each building.

2.14 Pedestrian and cycle links are provided throughout Breakfast Point, including along the foreshore of Kendall Bay. Pedestrian links are also provided between the marina site and Peninsula Drive, in the locations where Rosewater Circuit intersects Peninsula Drive.

3. IMPLICATIONS OF PROPOSED DEVELOPMENT

3.1 It is proposed to develop a marina in Kendall Bay. The marina would provide 172 berths, including five temporary and 167 permanent berths. The development would include a small kiosk of some 76m^2 and a manager's office. Parking would be provided for 58 cars in an area adjacent to Peninsula Drive, with access from Rosewater Circuit. This chapter assesses the implications of the proposed development through the following sections:

- public transport;
- parking provision;
- access, servicing and internal layout;
- traffic generation and effects;
- consultation; and
- summary.

Public Transport

3.2 As previously discussed, the main roads within Breakfast Point have been designed and provided to accommodate buses. There is generally a low speed, low traffic volume environment within Breakfast Point which provides well for cyclists and pedestrians. Pedestrian and cycle links are provided along the foreshore of Kendall Bay, and between the marina site and Peninsula Drive at the Rosewater Circuit intersections.

3.3 Good pedestrian access will therefore be provided between the surrounding area and the proposed marina, including to the proposed parking area for the marina.

Parking Provision

3.4 Parking demands for the proposed development would be highest on weekends in summer when boat owners are using their boats. Australian Standard 3962 – 2002 (Guidelines for design of marinas) indicates that parking for marinas should be provided as follows:

- 0.3 to 0.6 spaces per wet berth; plus
- 0.5 spaces per employee; plus
- one space per 30m^2 for ancillary activities not directly related to boat berthing (i.e. the kiosk).

3.5 AS 3962 – 2002 indicates that the range of parking provision per wet berth depends on the type of facility. For commercial facilities, the lower number of parking spaces should be considered. For racing clubs, the larger number should be considered.

3.6 Based on 0.3 spaces per berth, one employee (the manager) and the kiosk of some 76m^2, the proposed marina would require some 55 parking spaces.

3.7 58 spaces are proposed, including one disabled space, as shown in Figure 3. The proposed provision therefore satisfies this requirement, and is considered to be appropriate.

3.8 We note that a proportion of the berths may be used by residents of the Breakfast Point development. This may reduce the parking demands at the proposed marina as some residents are likely to walk to and from the facility and would therefore not require parking.

Access, Servicing and Internal Layout

3.9 Vehicular access to the proposed parking area for the marina is proposed to be provided from the northern arm of Rosewater Circuit. The proposed driveway will be six metres wide which is in accordance with the Australian Standard for Parking Facilities (Part 1: Off-street car parking), AS 2890.1:2004 to serve a car park of the size and type proposed.

3.10 The development is expected to generate a small number of service vehicles. These would primarily be vans, utilities and courier style vehicles which will be able to use the on-site parking area.

3.11 Parking spaces within the at-grade car park will be 2.5 metres wide and 5.4 metres long. The disabled space will be 3.2 metres wide and the four parallel spaces will be 6.6 metres long. Access aisles will be at least six metres wide. These dimensions are considered appropriate, being in accordance with AS 2890.1:2004.

Traffic Generation and Effects

3.12 Traffic generated by the proposed development will have its greatest effects on weekends when people travel to the marina to use their boats. The majority of vehicles would be inbound in the morning and outbound during the afternoon.

3.13 The marina would generate up to some 20 vehicles per hour at these times. This is a low generation, equivalent to an average of one vehicle every three minutes during peak hours.

3.14 Such a low traffic generation would not have significant effects on the operation of surrounding roads within Breakfast Point or the external road network. Intersections would continue to operate at their existing good levels of service A/B, with average delays of less than 15 seconds per vehicle.

3.15 Traffic flows during construction have been estimated based on information provided by the applicant. Most construction activity is proposed to be undertaken from the water. Piles, floating structure, beams and timber decking would be brought to the site by water.

3.16 The number of employees during the construction period will vary, but is estimated to be up to some 15 at various stages of construction. Peak daily traffic flows during construction are estimated to be up to some 50 vehicles two-way.

3.17 On a typical working day of eight hours, this is equivalent to an average of less than 10 vehicles per hour two-way. The surrounding road network will be able to cater for this low volume of traffic.

Consultation

3.18 In a letter dated 2 June 2009, the RTA has raised a number of matters for consideration in the assessment. A copy of the RTA's correspondence is appended to this report. These matters are discussed below.

1. *Car parking provision should not exceed the maximum identified in the Breakfast Point Master Plan 2002. It is noted that the proposal will provide 50 car parking spaces whereas the Master Plan allows for up to 100 spaces. Is it intended that the remaining 50 spaces allowed will be allocated to other developments in the precinct?*

3.19 Parking provision for future Project Applications within Breakfast Point will be subject to separate consideration and assessment at the time those applications are made.

2. *The proposal indicates there will be approximately 20 vehicles per hour generated in the peak, yet only 50 spaces are proposed. The traffic report should identify where additional vehicles will park.*

3.20 Parking provision is discussed in paragraphs 3.4 to 3.8. The proposed parking provision satisfies the requirements of AS 3962 – 2002, and is considered appropriate.

3. *Consideration should be given to providing bus, pedestrian and bicycle facilities.*

3.21 These matters are discussed in paragraphs 3.2 to 3.3. It is not anticipated that a significant proportion of people will travel to the marina by bicycle. However, a condition of consent could be included requiring the provision of a bicycle rack if appropriate.

4. *The proposed means of vehicular access to/from the site, including facilities for heavy vehicle loading/unloading should be provided.*

3.22 Vehicle access, including service vehicle access, is discussed in paragraphs 3.9 and 3.10.

5. *Likely daily and peak traffic movements (both cars and trucks) generated by the development and the potential increase in the level and type of traffic associated with the proposal.*

3.23 Peak traffic generation and its effects are discussed in paragraphs 3.13 and 3.14. It is at these times that the proposed development will have its greatest traffic effects.

Summary

3.24 In summary, the main points relating to the traffic and parking implications of the proposed development are as follows:

i) good pedestrian access will be provided between the marina, the car park and the surrounding area;

ii) the proposed parking provision is considered appropriate;

iii) access and internal layout will be provided in accordance with AS 2890.1:2004;

iv) the development would have low traffic generation during construction and operation, equivalent to an average of one vehicle every three minutes during peak hours;

v) such a low traffic generation would not have significant effects on the operation of surrounding roads within Breakfast Point or the external road network; and

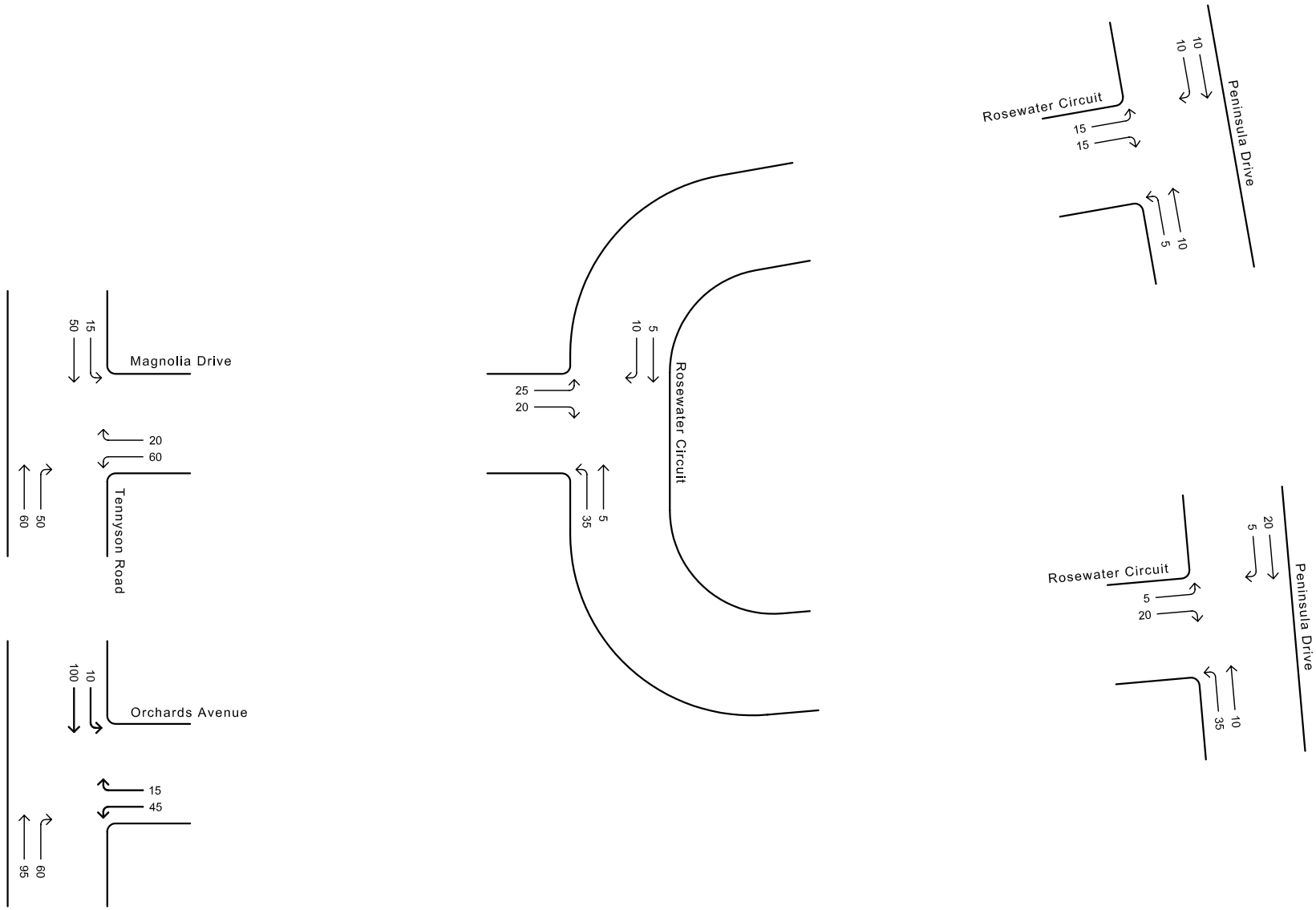
vi) matters raised by the RTA are discussed in paragraphs 3.18 to 3.23.

Location Plan

Colston Budd Hunt & Kafes Pty Ltd

DRAWN BY CBHK Pty Ltd_rh Ref: 6581 03 APRIL 2009

Figure 1



Existing Sunday afternoon peak hour traffic flows

Colston Budd Hunt & Kafes Pty Ltd

DRAWN BY CBHK Pty Ltd_rh Ref: 6581 03 APRIL 2009

Figure 2

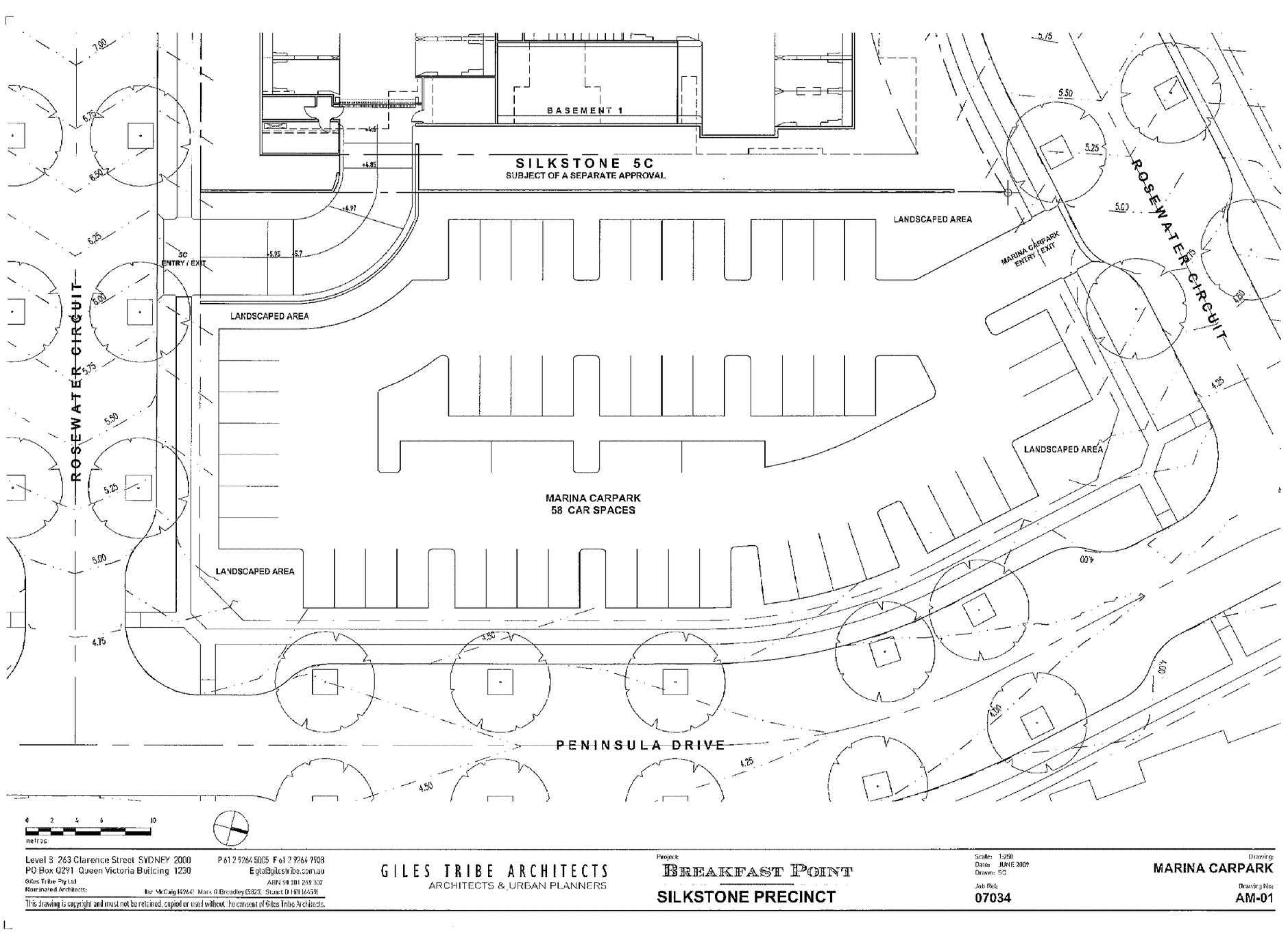

BASEMENT 1
SILKSTONE 5C
SUBJECT OF A SEPARATE APPROVAL
LANDSCAPED AREA
5C
ENTRY / EXIT
MARINA CARPARK
ENTRY / EXIT
ROSEWATER CIRCUIT
LANDSCAPED AREA
MARINA CARPARK
58 CAR SPACES
LANDSCAPED AREA
LANDSCAPED AREA
PENINSULA DRIVE
ROSEWATER CIRCUIT
metres
Level 3 263 Clarence Street SYDNEY 2000
PO Box 0291 Queen Victoria Building 1230
P 61 2 9264 5005 F 61 2 9264 7508
E gta@gilestribe.com.au
Giles Tribe Pty Ltd
ABN 50 001 297 507
Nominated Architects:
GILES TRIBE ARCHITECTS
ARCHITECTS & URBAN PLANNERS
This drawing is copyright and must not be retained, copied or used without the consent of Giles Tribe Architects.
Project:
BREAKFAST POINT
SILKSTONE PRECINCT
Scales: 1:250
Dates: JUNE 2009
Drawn: SC
Job Ref:
07034
Drawing:
MARINA CARPARK
Drawing No:
AM-01

Figure 3

APPENDIX

emailed 2/6

RTA

Our Reference: 09M475
Contact: Iona Cameron
Telephone 8849 2525

Joshua Hollis
Colston Budd Hunt & Kafas Pty Ltd
PO Box 5186
CHATSWOOD NSW 1515

PROPOSED MARINA AT KENDALL BAY

Dear Sir,

I refer to your email dated 27 April 2009 seeking pre-development application advice from the Roads and Traffic Authority (RTA) regarding the proposed Marina at Kendall Bay, adjacent to Breakfast Point.

The RTA provides the following issues to be addressed in the traffic report submitted with the development application to the relevant consent authority:

1. Car parking provision should not exceed the maximum identified in the Breakfast Point Master Plan 2002. It is noted that the proposal will provide 50 car parking spaces whereas the Master Plan allows for up to 100 spaces. Is it intended that the remaining 50 spaces allowed will be allocated to other developments in the precinct?
2. The proposal indicates there will be approximately 20 vehicles per hour generated in the peak, yet only 50 spaces are proposed. The traffic report should identify where additional vehicles will park.
3. Consideration should be given to providing bus, pedestrian and bicycle facilities.
4. The proposed means of vehicular access to/from the site, including facilities for heavy vehicle loading/unloading should be provided.
5. Likely daily and peak traffic movements (both cars and trucks) generated by the development and the potential increase in the level and type of traffic associated with the proposal.

It is emphasised that the comments provided above are informal and of a Pre-DA nature, they are not to be interpreted as binding upon the RTA and may change following formal assessment of submitted development application from the appropriate consent authority. A copy of this letter will be forwarded to the Department of Planning for their information.

Any inquiries in relation to this matter can be directed to Iona Cameron on telephone 8849 2525 or facsimile 8849 2918.

Yours faithfully,

James Hall
A/Senior Land Use Planner
Transport Planning, Sydney Region

2 June 2009

27-31 Argyle Street Parramatta NSW 2150
PO Box 973 Parramatta CBD NSW 2150 DX28555 Parramatta
www.rta.nsw.gov.au | 13 17 82