

SYDNEY FISH MARKET REDEVELOPMENT

NOISE ASSESSMENT

ACOUSTICS AND AIR

REPORT NO. 01192-DA
VERSION A

WILKINSON  MURRAY

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PREPARED FOR

SYDNEY FISH MARKET LTD
PYRMONT BRIDGE ROAD
PYRMONT NSW 2009

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ACOUSTICS AND AIR

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1 INTRODUCTION

Wilkinson Murray has carried out a noise assessment to assess the potential noise impacts on the surrounding area of the proposed redevelopment at Sydney Fish Market, Black Wattle Bay, Pyrmont. This report has been prepared under the Director General's Requirements for Application MP10_0060.

It is understood that the development will happen in stages. The first stage is the construction of a Tavern and retail building to be followed by three subsequent stages to completion. This report presents an assessment of the redevelopment with all stages completed. It is assumed that Stage 1 alone will comply, given the compliance of all completed stages.

The report will address the following activities associated with the Sydney Fish Market for their potential noise impact on the surrounding area.

- Site Operational Noise
 - Mechanical plant
 - Delivery activities
 - Trawler activities
 - Restaurant and Tavern activities
 - Visitor car activities
- Off-Site Noise
 - Trawlers in Black Wattle Bay

The report presents a noise model to indicate the likely effect on surrounding residents from noise generated by the new development using noise contours.

The vibration associated with the redevelopment operational activities has been considered and will not be addressed further in this report as it has been deemed insignificant to the surrounding vibration sensitive receivers.

2 SITE AND OPERATIONS DESCRIPTION

The Sydney Fish Market is located in Pyrmont. It is bordered by Black Wattle Bay to the west, Pyrmont Bridge Road to the south, Bank Road to the east and a concrete processing facility to the north.

The Sydney Fish Market is a major inner city tourist attraction and active market. It currently operates as a seafood distribution and retail premises. It features several commercial premises which include retail, wholesale and restaurants in addition to car parking facilities for visitors. It also features loading bays for delivery trucks, a jetty for trawlers with associated loading facilities, processing and storage facilities for seafood.

Deliveries and trawlers operate on a 24 hour basis. Market activity peaks before 9.30am in the early morning with external traders and wholesalers attending the market. Wholesale activity is not expected to change with the redevelopment.

The retail premises operate normal working hours between 9.00am and 5.00pm. Tourist bus trade arrives on site throughout the day in addition to non wholesale customers. A peak in non wholesale customers occurs during the middle of the day on Sunday between approximately 12.00pm and 2.00pm. The redevelopment will allow for more customer parking and easier parking access for tourist buses.

The redevelopment will increase the number of restaurants present on site and it is expected that they will remain open into the evening. At present, not all of the restaurants operate during the evening. It is expected that restaurant visitor activity will increase due to the redevelopment.

The new development proposes a Tavern which will is expected to open until 12.00am. The Tavern will have an outdoor seating area.

Seasonal peaks at Christmas time and around New Year and Easter significantly increase activity. However, as they do not represent typical operation they will not be discussed further.

The proposed and existing development is shown in Figure 2-1. The finished new development will consist of two separate buildings located in the northern and eastern parts of the site. The north building will contain a retail premises on level 1 and a Tavern on level 2 which will include outdoor seating. The larger east building will contain the following:

- Restaurants with indoor and outdoor dining areas on level 2.
- Retail premises on level 1.
- Wholesale premises on level 1.
- Outdoor retail kiosks.
- Multi storey carpark.
- Plant rooms and building services infrastructure.

This report addresses the potential impact from the redeveloped site. It has identified the following locations as the nearest representative noise sensitive receivers most likely to be affected by noise from the Sydney Fish Market, shown in Figure 2-2.

- Receiver 1 – The apartments at 17 Jones Road.
- Receiver 2 – The apartment building on Wattle Crescent.
- Receiver 3 – The residential developments in the vicinity of Ferry Road and Griffin Place across Black Wattle Bay.
- Receiver 4 – The residential buildings on Bulwarra Road.

Figure 2-1 Existing and Proposed Development



Figure 2-2 Location of Residential Receivers



3 EXISTING NOISE ENVIRONMENT

The existing noise environment was measured using unattended and attended measurements. The background noise was measured using unattended noise loggers and, for the assessment of entertainment noise where octave band information is required, this was obtained by attended measurements. Attended measurements were also used to establish the noise levels currently emanating from the site and to understand the cause of ambient noise in the area.

3.1 Background Noise Measurements

Noise loggers were used to measure the background noise between 11 June and 18 June 2010 at the following locations.

- Receiver 1 – 7/17 Jones Road.
- Receiver 2 – 60 Bulwarra Road.
- Receiver 4 – 5 Griffin Place.

The noise logger locations are shown in Figure 3-1.

The noise monitoring equipment used for unattended measurements consisted of environmental noise loggers set to A-weighted, fast response, continuously monitoring over 15-minute sampling periods. This equipment is capable of remotely monitoring and storing noise level descriptors for later detailed analysis. The equipment calibration was checked before and after the survey and no significant drift was noted.

The logger determines L_{A1} , L_{A10} , L_{A90} and L_{Aeq} levels of the ambient noise. L_{A1} , L_{A10} and L_{A90} are the levels exceeded for 1%, 10% and 90% of the sample time respectively (see Appendix A for definitions). The L_{A1} is indicative of maximum noise levels due to individual noise events such as the occasional pass-by of a heavy vehicle. This is used for the assessment of sleep disturbance. The L_{A90} level is normally taken as the background noise level during the relevant period.

A summary of background noise levels is presented in Table 3-1. The full unattended results are given in Appendix B.

Table 3-1 Background Noise Levels

Location	Time Period	$L_{Aeq,period}$ Level, dBA	Rating Background Level, dBA
Jones Street	Daytime (7.00am-6.00pm)	62.5	59.0
	Evening (6.00pm-10.00pm)	63.5	58.0
	Night time (10.00pm-7.00am)	58.3	52.5
Bulwarra Road	Daytime (7.00am-6.00pm)	62.4	58.5
	Evening (6.00pm-10.00pm)	60.3	55.3
	Night time (10.00pm-7.00am)	58.2	48.5
Griffin Place	Daytime (7.00am-6.00pm)	57.2	52.0
	Evening (6.00pm-10.00pm)	56.2	58.5
	Night time (10.00pm-7.00am)	53.0	47.5

3.2 Attended Measurements

Attended measurements were carried out on 16 June and 25 June 2010 at the following locations.

- Position 1 – in front of the residential buildings at 17 Jones Road.
- Position 2 – in front of the terraced house on Bulwarra Road.
- Position 3 – Beside the apartment building on Wattle Crescent at the height of level 1 apartments
- Position 4 – On the quay side in front of house on Ferry Road, equivalent to the measurement position at Griffin Place.

The attended measurement locations are shown in Figure 3-1. The measurements are summarised in Table 3-2.

The attended measurements were conducted using Bruel and Kjaer Type 2250 and 2260 Sound Level Meters. The sound level meters conform to Australian Standard 1259 *Acoustics - Sound Level Meters* as a Type 1 Precision Sound Level Meter which has an accuracy suitable for field and laboratory use. The A-Weighting filter of the meter was selected and the time weighting was set to "Fast". The calibration of the meters was checked before and after the measurements with a Bruel and Kjaer Type 4231 sound level calibrator and no significant drift was noted.

The Bruel and Kjaer Type 2250, 2260 and Type 4231 have been laboratory calibrated within the previous two years in accordance with our in-house Quality Assurance Procedures.

Table 3-2 Attended Measurement Results

Location	Date	Time	Noise Descriptor	Noise Level	SFM Noise Source	Ambient Noise Source
1 (Jones St)	16/06/10	12.10am	L _{Amax}	62.0	Truck enters SFM	
		12.14am	L _{Amax}	72.7	Truck enters SFM	
		12.21am	L _{Amax}	60.0	Truck leaves SFM	
		12.07-12.21am	L _{A90}	51.0	SFM mechanical services	Anzac Bridge
	25/06/10	12.12am	L _{Amax}	69.0	Truck enters SFM	
		12.23am	L _{Amax}	71.4	Truck leaves SFM	
		12.45am	L _{Amax}	42.4	Truck leaves SFM	
		12.55	L _{Amax}	41.6	Truck enters SFM	
		12.56	L _{Amax}	63.3	Truck leaves SFM	
		2.05	L _{Amax}	61.0	Small truck leaves SFM	
		2.08	L _{Amax}	61.0	Small truck enters SFM	
		2.12	L _{Amax}	56.5	Truck enters SFM	
2 (Bulwarra Rd)	16/06/10	1.00-1.15am	L _{A90}	48.0		Anzac Bridge
3 (Wattle Cres)	16/06/10	1.23-1.38am	L _{A90}	51.8	SFM mechanical services	Anzac Bridge, Pyrmont Bridge Rd
	25/06/10	2.42am	L _{Amax}	65.2		Truck on Anzac Bridge

Location	Date	Time	Noise Descriptor	Noise Level	SFM Noise Source	Ambient Noise Source
		2.44	L _{Amax}	70.4		Taxi on Pyrmont Bridge Rd
		2.33-2.48am	L _{A90}	53.0	SFM mechanical services	Anzac Bridge, Pyrmont Bridge Rd
4 (Ferry Rd)	16/06/10	2.13am	L _{Amax}	55.6		Loud truck on Anzac Bridge
		2.00-2.15am	L _{A90}	48.4		Anzac Bridge
	25/06/10	1.03am	L _{Aeq}	42.4	Trawler leaves SFM	Anzac Bridge
		1.08am	L _{Aeq}	41.6	Trawler enters Black Wattle Bay towards SFM	Anzac Bridge

The following octave band background noise levels in Table 3-3 were measured at the residential receivers on 16 June 2010 between 12.00am and 2.00am and 25 June 2010 between 2.00am and 3.00am.

Table 3-3 Octave Band Background Measurements

Location	Octave Band Centre Frequency L _{A90} Noise Level (dB)								
	31.5	63	125	250	500	1K	2K	4K	8K
1 (Jones St)	22.0	33.5	37.5	41.9	44.8	48.2	44.0	34.5	21.2
2 (Bulwarra Rd)	16.3	29.5	34.4	34.7	40.8	44.2	40.5	29.6	15.4
3 (Wattle Cres)	22.3	39.6	38.6	41.8	44.2	46.7	42.7	31.8	17.5
4 (Ferry Rd)	19.2	32.1	35.2	39.0	41.2	43.5	40.3	27.9	15.0

For the majority of the time at the measurement positions, traffic noise dominated the noise measurements. The most significant contributor is noise from traffic on the Anzac Bridge.

At Jones Street during the daytime and evening periods, the noise environment is dominated by road traffic noise from the Anzac Bridge. During the night time when traffic volumes decrease, the mechanical plant from the Sydney Fish Market is audible but this plant will be replaced by new plant. Delivery trucks are also audible from this receiver position, entering and leaving the premises.

At Bulwarra Road, there is insignificant industrial noise existing in the area and the existing noise levels are dominated by road traffic noise.

At Wattle Crescent the Anzac Bridge and Pyrmont Bridge Road dominate the noise environment during the daytime and evening periods. During intermittent traffic at night time, mechanical noise from the Sydney Fish Market is just audible.

At Ferry Road, the Anzac Bridge dominates the noise environment during all assessment periods and industrial noise from the Sydney Fish Market does not significantly contribute to the overall noise at this location. During the measurements, trawlers were measured but these movements were inaudible.

Figure 3-1 Measurement Positions



4 CRITERIA

The *NSW Industrial Noise Policy (INP)* recommends two criteria, “Intrusiveness” and “Amenity”, both of which are relevant for the assessment of noise. In most situations, one of these is more stringent than the other and dominates the noise assessment. The criteria are based on the L_{Aeq} descriptor, which is explained in Appendix A.

4.1 Intrusiveness Criterion

An intrusiveness criterion applies for residential receivers only.

The intrusiveness criterion requires that the L_{Aeq} noise level from the source being assessed, when measured over 15 minutes, should not exceed the Rating Background Noise Level (RBL) by more than 5dBA. The RBL represents the ‘background’ noise in the area, and is determined from measurement of L_{A90} noise levels, in the absence of noise from the source. The definition of L_{A90} and the procedure for calculating the RBL is given in Appendix A.

Where the noise level from the source varies over time due to changes in operating conditions, meteorological conditions or other factors, the upper 10th percentile of 15 minute L_{Aeq} noise levels can be used for comparison with the criterion.

4.2 Amenity Criterion

The amenity criterion sets a limit on the total noise level from *all industrial noise sources* affecting a receiver. Different criteria apply for different types of receiver (e.g. residence, school classroom); different areas (e.g. rural, suburban); and different time periods, namely daytime (7.00am-6.00pm), evening (6.00pm-10.00pm) and night time (10.00pm-7.00am).

The noise level to be compared with this criterion is the L_{Aeq} noise level, measured over the time period in question (normally daytime, evening or night time), due to all industrial noise sources, but excluding non-industrial sources such as transportation.

Where a new noise source is proposed in an area with negligible existing industrial noise, the amenity criterion for that source may be taken as being equal to the overall amenity criterion. However, if there is significant existing industrial noise, the criterion for any new source must be set at a lower value. If existing industrial noise already exceeds the relevant amenity criterion, noise from any new source must be set well below the overall criterion to ensure that any increase in noise levels is negligible. Methods for determining a source-specific amenity criterion where there is existing industrial noise are set out in the *INP*.

4.3 Determination of Criteria

Table 4-1 and Table 4-2 show the relevant noise criteria for this project.

Table 4-1 Intrusiveness Criteria

Receiver	Time Period	RBL (dBA)	Intrusiveness Criterion
			L _{Aeq,15min} (dBA)
1 (Jones St)	Daytime (7.00am–6.00pm)	59	64
	Evening (6.00–10.00pm)	58	63
	Night time (10.00pm–7.00am)	53	58
2 (Bulwarra Rd)	Daytime (7.00am–6.00pm)	59	64
	Evening (6.00–10.00pm)	55	60
	Night time (10.00pm–7.00am)	49	54
3 (Wattle Cres)	Daytime (7.00am–6.00pm)	-	-
	Evening (6.00–10.00pm)	-	-
	Night time (10.00pm–7.00am)	53	58
4 (Ferry Rd)	Daytime (7.00am–6.00pm)	52	57
	Evening (6.00–10.00pm)	59	59
	Night time (10.00pm–7.00am)	48	53

Table 4-2 Amenity Criteria

Receiver	Time Period	Noise Level, L _{Aeq,Period} (dBA)		
		Overall Amenity Criterion	Existing Industrial Noise	Project-Specific Amenity Criterion
1 (Jones St)	Daytime (7.00am–6.00pm)	60	Industrial noise from Fish Market only ¹	60
	Evening (6.00–10.00pm)	50		50
	Night time (10.00pm–7.00am)	45		45
2 (Bulwarra Rd)	Daytime (7.00am–6.00pm)	60	Industrial noise from Fish Market only ¹	60
	Evening (6.00–10.00pm)	50		50
	Night time (10.00pm–7.00am)	45		45
3 (Wattle Cres)	Daytime (7.00am–6.00pm)	60	Industrial noise from Fish Market only ¹	60
	Evening (6.00–10.00pm)	50		50
	Night time (10.00pm–7.00am)	45		45
4 (Ferry Rd)	Daytime (7.00am–6.00pm)	60	Industrial noise from Fish Market only ¹	60
	Evening (6.00–10.00pm)	50		50
	Night time (10.00pm–7.00am)	45		45

Note: 1. The existing Fish Market is being demolished; therefore, new industrial noise must meet the overall amenity criteria.

5 GENERAL NOISE ASSESSMENT OF REDEVELOPMENT

The potential noise levels arising from the Sydney Fish Market activities have been assessed according to the *INP* using 15 minute $L_{Aeq,15min}$ and $L_{Aeq,period}$ levels over the daytime (7.00am-6.00pm), evening (6.00pm-10.00pm) and night time (10.00pm-7.00am) periods. Other noise impacts, including noise from licensed premises and sleep disturbance are assessed below.

5.1 Intrusiveness Assessment

5.1.1 Mechanical Services Plant

Assessment has been based on a preliminary mechanical services schedule provided to Wilkinson Murray by Umow Lai, Building Services Consultants for the Sydney Fish Market redevelopment.

Where refrigeration condensers are used, the noise level for a typical unit has been provided by the building services consultants. Table 5-1 shows a summary of mechanical services equipment.

Due to the uncertainty in operating times, it has been conservatively assumed that the building services will operate continuously during the daytime, evening and night time for the purposes of assessing over 15 minute periods.

Table 5-1 Mechanical Services Schedule

Type	ID	No. Off	Location	Sound Power Level , dBA
Refrigeration Condensers	Wholesalers condensers	20	Located along the north east wall on ground floor	74 per unit
Refrigeration Condensers ⁽¹⁾		30	On ground floor along service lane	74 per unit
Refrigeration Condensers		2	Tavern roof	74 per unit
Supply Air Fan	SAF-1	1	Ground Floor Fan Room ⁽³⁾	71
Supply Air Fan	SAF-2	1	Ground Floor Fan Room ⁽³⁾	67
Supply Air Fan	SAF-3	1	Ground Floor Plant Room ⁽²⁾	71
Carpark Exhaust Fan	CEF-1	1	Ground Floor Fan Room ⁽³⁾	75
Carpark Exhaust Fan	CEF-2	1	Ground Floor Plant Room ⁽²⁾	75
Toilet Exhaust Fan	TEF-2	1	Tavern roof	55
Kitchen Exhaust Fan	KEF-1	4	Top of Riser 3	70
Kitchen Exhaust Fan	KEF-1	4	Top of Riser 4	70
Toilet Exhaust Fan	TEF-1	1	Top of Riser 4	55

Note: 1. These units have not been included in the assessment as their position in the service lane provides adequate shielding.

Note: 2. Exhausted via Riser 1.

Note: 3. Exhausted via Riser 2

5.1.2 Truck Movements

Truck movements are assessed against the INP criteria in addition to sleep disturbance. The assessment of truck movements has been based upon typical levels for a semi-trailer truck. Wilkinson Murray has been advised of truck movements by Halcrow Pacific, traffic consultants for the Sydney Fish Market. Truck movements are not expected to change as a result of the redevelopment. In order to make a conservative assessment, no distinction between small trucks and large trucks has been made and peak hour truck movements are as follows:

- 121 movements per hour during the daytime;
- 8 movements per hour during the evening and; and
- 114 movements per hour during the night time.

The truck noise was modelled using a series of noise source points along the truck access road to the docks and the sound power level at each point took into account the noise level of a truck travelling slowly on site (sound power level 98dBA), and assumed a speed on site of 20km/h, the length of the site access road (120m) and the number of movements indicated above.

5.1.3 Visitor Car Activities

The visitor car activities assessment takes into account the entering and exiting of cars on to the site and their subsequent movements in the carpark.

The number of cars moving in the carpark at anyone time has been conservatively calculated using peak hour traffic predictions as follows:

- 1312 movements per hour during the daytime;
- 123 movements per hour during the evening; and
- 108 movements per hour during the night time period.

Car activity noise was modelled using a typical car noise level (sound power level 92dBA) and assuming that each car would take an estimated one minute on site to park and one minute on site to depart.

5.1.4 Trawler Noise

Fishing trawlers operating in Black Wattle Bay serving the fish market currently operate on a 24 hour basis returning when they have filled their stores. Attended monitoring revealed that they are inaudible at all receivers; therefore, they have not been included in this part of the assessment.

5.1.5 Noise from Restaurant and Tavern Patrons

The new development will contain two restaurants with outdoor seating areas and a Tavern which also has an outdoor seating area. The assessment assumes one person per 1.5m² of the outdoor areas and one in three people talking. Each person talking has been assumed to be using a raised voice (sound power level 79dBA).

Amplified music has been included as part of the Tavern's noise emission at reverberant level L_{10} 90dBA inside the tavern. The transmission of music to outside of the tavern has been calculated assuming 6mm glazing in the frontage to the outdoor seating area with an open door at all times.

For assessment over 15 minute periods during the daytime evening and night time, the restaurants and tavern are assumed to be operating at full capacity

5.1.6 Outdoor Music Performances

The presence of occasional outdoor music performances are not expected to cause a noise disturbance provided that they are an infrequent occurrence and they are limited to daytime.

5.2 Amenity Assessment

5.2.1 Mechanical Services Plant

It is assumed that the main building services will operate continuously during the day, evening and night periods, except for kitchen exhaust fans which are assumed to be turned off at 12.00 midnight and do not operate until the following morning. The details of the plant are given in Section 5.1.1.

5.2.2 Truck Movements

The assessment of truck movements over the daytime, evening and night time has been based upon typical levels for a semi-trailer truck. In order to make a conservative assessment, no distinction between small trucks and large trucks has been made. Wilkinson Murray has been advised of truck movements by Halcrow Pacific, traffic consultants for the Sydney Fish Market. Truck movements are not expected to change as a result of the redevelopment and are summarised as follows:

- 483 movements during the daytime period;
- 32 movements during the evening period; and
- 360 movements during the night time period.

The truck noise was modelled using a series of noise source points along the truck access road to the docks and the sound power level at each point took into account the noise level of a truck moving slowly (sound power level 98 dBA), an assumed speed on site of 20km/h, the length of the site access road (120m) and the number of movements indicated above.

5.2.3 Visitor Car Activities

The visitor car activities are based upon predicted traffic movements. The visitor car activities assessment takes into account the entering and exiting of cars on to the site and their subsequent movements in the carpark. The predicted number of car movements is as follows:

- 4944 movements during the daytime;
- 491 movements during the evening and;
- 975 movements during the night time.

Car activity noise was modelled using a typical car noise level (sound power level 92dBA) and assuming that each car would take an estimated one minute on site to park and one minute on site to depart.

5.2.4 Trawler Noise

Fishing trawlers operating in Black Wattle Bay serving the fish market currently operate on a 24 hour basis returning when they have filled their stores. They do not operate continuously therefore they are not assessed against the amenity criteria.

5.2.5 Noise from Restaurant and Tavern Patrons

The assessment assumes one person per 1.5m² of the outdoor areas and one in three people talking. Each person talking has been assumed to be using a raised voice (sound power level 79dBA).

It is proposed that the Tavern will be open until 12.00 midnight. During the daytime period, it has been assumed that the Tavern will be open for six hours, the whole of the evening period and two hours during the night time. As a conservative estimate, it been assumed that amplified music playing will play at a level of 90dBA inside the Tavern with a door open at all times onto the terrace.

It has been assumed that the restaurants will be open until 12.00 midnight and operate for four hours during the daytime period, the whole of the evening period and two hours during the night time period.

5.2.6 Outdoor Music Performances

The presence of occasional outdoor music performances are not expected to cause a noise disturbance provided that they are an infrequent occurrence and they are limited to daytime.

5.3 Predicted Noise Level Summary

The noise levels have been predicted using modelling software CadnaA. Noise contours are displayed in Appendix C. Predicted levels for the assessment periods are summarised in Table 5-2 and Table 5-3.

Table 5-2 Predicted Noise Level Summary $L_{eq,15min}$

Receiver	Noise Level $L_{eq,15 min}$ dBA					
	Daytime		Evening		Night time	
	Criteria	Level	Criteria	Level	Criteria	Level
1 (Jones St)	64	51	63	49	58	48
2 (Bulwarra Rd)	64	52	60	48	54	48
3 (Wattle Cres)	64 ⁽¹⁾	51	57 ⁽¹⁾	48	58	48
4 (Ferry Rd)	64	43	57	42	53	42

Note: 1. Background Levels have been assumed for day and evening to be the same as Ferry Road.

Table 5-3 Predicted Noise Level Summary $L_{eq,period}$

Receiver	Noise Level $L_{Aeq,Period}$ dBA					
	Daytime		Evening		Night time	
	Criteria	Level	Criteria	Level	Criteria	Level
1 (Jones St)	60	50	50	49	45	48
2 (Bulwarra Rd)	60	50	50	48	45	48
3 (Wattle Cres)	60	49	50	48	45	47
4 (Ferry Rd)	60	39	50	42	45	37

5.3.1 Mitigation

The criteria are exceeded at Jones Street, Bulwarra Road and Wattle Crescent during the night time 9 hour period. It has been determined that the mechanical services noise emitted from the following plant are the most significant contributors:

- Car Park Exhaust Fan (CEF-2), exhausted from Riser 1.
- Supply Air Fan (SAF-3), exhausted from Riser 1.
- Car Park Exhaust Fan (CEF-1), exhausted from Riser 2.
- The wholesalers condenser units on the north east wall.

This plant should be attenuated in order to achieve compliance. The fans CEF-2, SAF-3 and CEF-1 can be attenuated using silencers that give at least 10dBA attenuation either fitted directly to the fan or installed in the riser duct.

There are two attenuation options for the wholesalers' refrigeration condensers.

- 1) Internally line the lightweight construction enclosures using 25mm acoustic insulation. A typical suitable product would be 25mm polyester insulation (eg. Tontine) of density 20-30kg/m³ faced with perforated foil; or
- 2) Install units which each have a total sound power level output less than or equal to 82.5dBA.

6 NOISE FROM LICENSED PREMISES

The Liquor Administration Board (LAB) currently sets criteria for amplified music and patron noise arising from licensed premises as follows.

1. *The L_{A10} noise level emitted from the licensed premises shall not exceed the background noise level in any Octave Band Centre Frequency (31.5 Hz – 8 kHz inclusive) by more than 5dB between 7.00am and 12.00 midnight at the boundary of any affected residence.*
2. *The L_{A10}^* noise level emitted from the licensed premises shall not exceed the background noise level in any Octave Band Centre Frequency (31.5 Hz – 8 kHz inclusive) between 12.00 midnight and 7.00am at the boundary of any affected residence.*

Notwithstanding compliance with the above, the noise from the licensed premises shall not be audible within any habitable room in any residential premises between the hours of 12.00 midnight and 7.00am.

Interior noise levels which still exceed safe hearing levels are in no way supported or condoned by the Liquor Administration Board.

This is a minimum standard. In some instances, the Board may specify a time earlier than midnight in respect of the above condition.

**** For the purposes of this Condition, the L_{A10} can be taken as the average maximum deflection of the noise emission from the licensed premises.***

The octave band criteria and predicted noise levels at each receiver from the restaurants and Tavern are presented in Table 6-1.

The LAB criteria have been assessed against the period 7.00am-12.00am as the Tavern and restaurants will be in operation during this period, but not after midnight. The criteria were set from measurements taken during the night time period. As the background noise is significantly higher during the daytime, it is expected that levels will comply if compliance is achieved during the night time.

Table 6-1 Octave Band LAB Criteria and Predicted Noise Levels

Location	Noise Level	Octave Band Centre Frequency L _{A10} Noise Level (dB)								
		31.5	63	125	250	500	1K	2K	4K	8K
1 (Jones St)	Criteria	32	44	48	52	55	58	54	45	31
	Restaurant			20	26	26	27	20	11	-
	Tavern		30	23	26	27	29	22	13	-
2 (Bulwarra Rd)	Criteria	26	41	45	46	52	55	52	41	26.4
	Restaurant			10	20	24	25	18	8	-
	Tavern		27	20	23	24	24	17	7	-
3 (Wattle Cres)	Criteria	27	45	44	47	49	52	48	37	23
	Restaurant	-	-	36	46	49	51	44	33	12
	Tavern		24	17	20	21	22	15	4	-
4 (Ferry Rd)	Criteria	29	42.1	45.2	49	52	54	50	38	25
	Restaurant			29	38	41	42	34	19	-
	Tavern	-	32	27	33	36	37	28	13	-

7 SLEEP DISTURBANCE

Sleep disturbance is a complex issue and the potential for sleep disturbance depends on both the level of a noise event and the number of noise events.

The DECCW's "*Environmental Criteria for Road Traffic Noise*" (*ECRTN*) indicates that:

"Maximum internal noise levels below 50-55 dBA are unlikely to cause awakening reactions.

One or two noise events per night, with maximum internal noise levels of 65-70 dBA, are not likely to affect health and wellbeing significantly."

Screening criteria is set by RBL + 15dBA during the night time period to identify emergence above the background level, summarised in Table 7-1.

Table 7-1 Sleep Disturbance Criteria

Receiver	Sleep Disturbance Screening Criteria
	(L_{Amax} dBA)
1 (Jones St)	68
2 (Bulwarra Rd)	64
3 (Wattle Cres)	68
4 (Ferry Rd)	62

Noise activity in the carpark during the night time period arises as a result of patrons leaving the Tavern and restaurants. The activities include, cars leaving the carpark, cars starting and accelerating away, door closes and patrons shouting or talking loudly.

Levels measured at site were used for the maximum noise level of the truck.

Maximum noise levels for patrons in Taverns were taken from Wilkinson Murray's database measured on previous occasions, assuming the patron is either shouting or using an extremely loud voice.

Maximum noise levels for car activities were taken from Wilkinson Murray's database measured on previous occasions.

Maximum sound power levels used for assessment are summarised in Table 7-2.

Sleep disturbance noise levels have been assessed for trucks, Tavern balcony noise and patron activity in the carpark as summarised in Table 7-3.

Noise from large trucks exceeds the screening criteria at two locations. The difference between indoor and outdoor levels with a window open is approximately 10dBA. Therefore, maximum levels from trucks at Wattle Crescent are 61dBA inside the residences and, according to the *ECRTN*, are unlikely to affect health or well being significantly and at Bulwarra Road are unlikely to cause sleep disturbance.

Table 7-2 Maximum Noise Levels

Activity	Maximum Sound Power Level, dBA
Patron Shout	93
Car Door Close	94
Car Start	98
Large Truck	114
Small Truck	108

Table 7-3 Summary of Sleep Disturbance Levels, L_{Amax} dBA

Noise Source	L_{Amax} Noise Levels							
	1		2		3		4	
	(Jones St)		(Bulwarra Rd)		(Wattle Crescent)		(Ferry Rd)	
	Criteria	Level	Criteria	Level	Criteria	Level	Criteria	Level
Car door close		41		43		41		32
Car start		45		47		45		36
Patron loud voice in carpark	68	40	64	42	68	40	62	31
Patron shout from Tavern		27		25		44		41
Large truck		67		68		71		60
Small truck		61		62		65		53

8 CONCLUSION

A noise assessment of the proposed redevelopment of the Sydney Fish Market has been completed.

Criteria have been set and predicted noise levels have been assessed against them for amenity and intrusiveness. Sleep disturbance and noise arising from licensed premises has also been assessed.

All of the predicted noise levels will comply with the criteria, except mechanical noise at night unless mitigation measures are included in the development. It will be a simple design matter to reduce mechanical plant noise to the criteria as indicated in section 5.3.1.

Note

All materials specified by Wilkinson Murray (Sydney) Pty Limited have been selected solely on the basis of acoustic performance. Any other properties of these materials, such as fire rating, chemical properties etc. should be checked with the suppliers or other specialised bodies for fitness for a given purpose. The information contained in this document produced by Wilkinson Murray is solely for the use of the client identified on front page of this report. Our client becomes the owner of this document upon full payment of our **Tax Invoice** for its provision. This document must not be used for any purposes other than those of the document's owner. Wilkinson Murray undertakes no duty to or accepts any responsibility to any third party who may rely upon this document.

Quality Assurance

We are committed to and have implemented AS/NZS ISO 9001:2008 "Quality Management Systems – Requirements". This management system has been externally certified and Licence No. QEC 13457 has been issued.

AAAC

This firm is a member firm of the Association of Australian Acoustical Consultants and the work here reported has been carried out in accordance with the terms of that membership.

Version	Status	Date	Prepared by	Checked by
A	Draft	12 August 2010	Chris Marsh	Barry Murray
A	Final	19 August 2010	Chris Marsh	Barry Murray

APPENDIX A

GLOSSARY OF TERMS



GLOSSARY

Most environments are affected by environmental noise which continuously varies, largely as a result of road traffic. To describe the overall noise environment, a number of noise descriptors have been developed and these involve statistical and other analysis of the varying noise over sampling periods, typically taken as 15 minutes. These descriptors, which are demonstrated in the graph overleaf, are here defined.

Maximum Noise Level (L_{Amax}) – The maximum noise level over a sample period is the maximum level, measured on fast response, during the sample period.

L_{A1} – The L_{A1} level is the noise level which is exceeded for 1% of the sample period. During the sample period, the noise level is below the L_{A1} level for 99% of the time.

L_{A10} – The L_{A10} level is the noise level which is exceeded for 10% of the sample period. During the sample period, the noise level is below the L_{A10} level for 90% of the time. The L_{A10} is a common noise descriptor for environmental noise and road traffic noise.

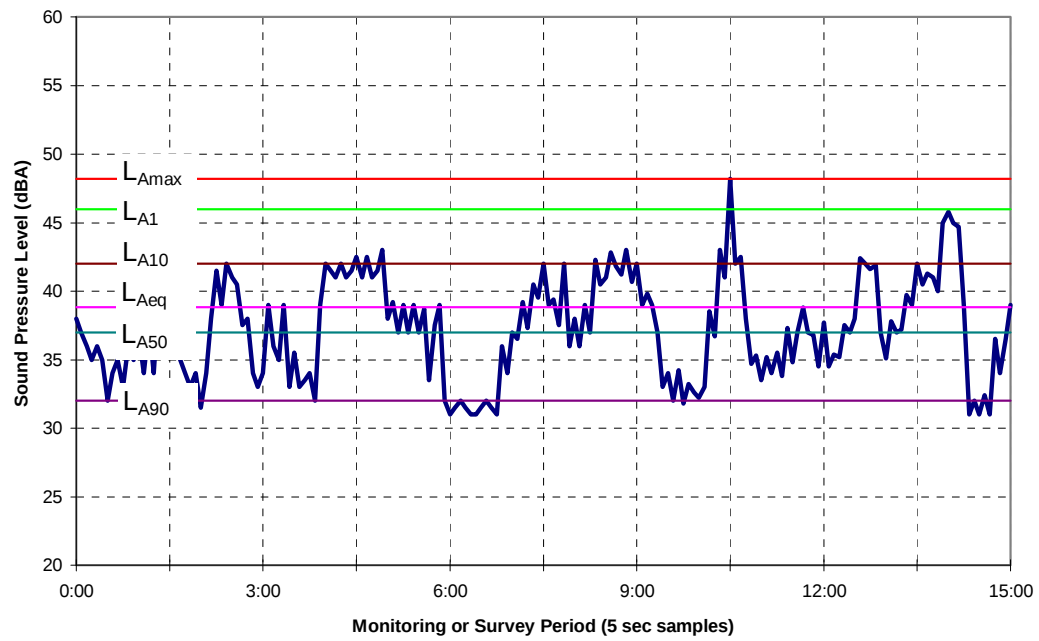
L_{Aeq} – The equivalent continuous sound level (L_{Aeq}) is the energy average of the varying noise over the sample period and is equivalent to the level of a constant noise which contains the same energy as the varying noise environment. This measure is also a common measure of environmental noise and road traffic noise.

L_{A50} – The L_{A50} level is the noise level which is exceeded for 50% of the sample period. During the sample period, the noise level is below the L_{A50} level for 50% of the time.

L_{A90} – The L_{A90} level is the noise level which is exceeded for 90% of the sample period. During the sample period, the noise level is below the L_{A90} level for 10% of the time. This measure is commonly referred to as the background noise level.

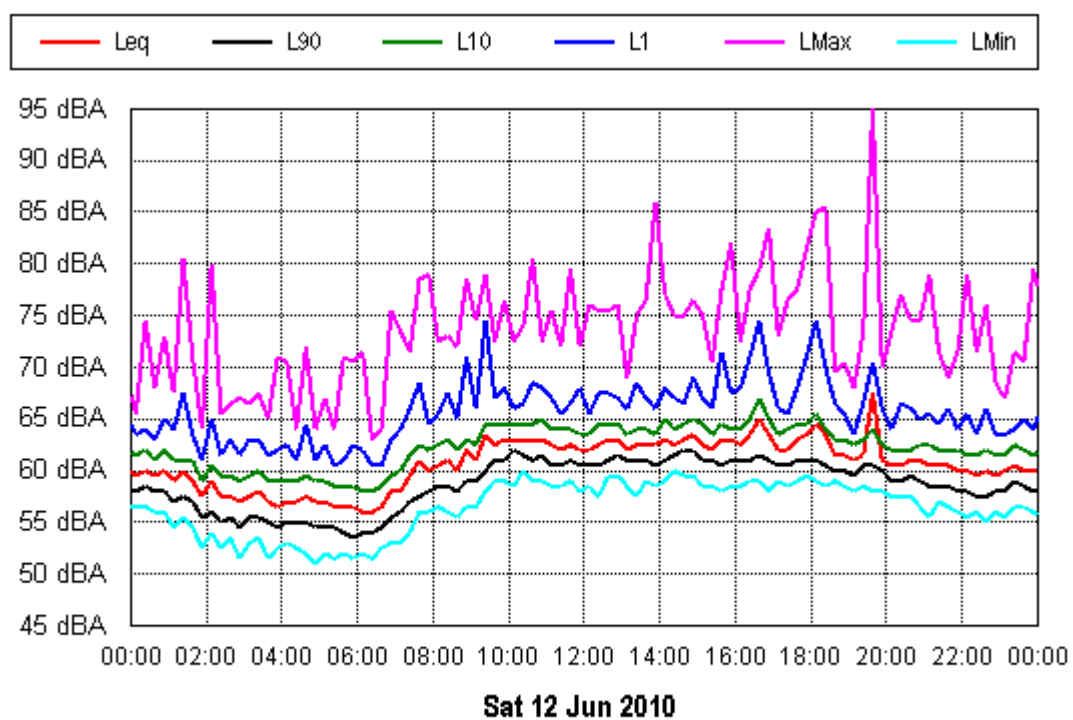
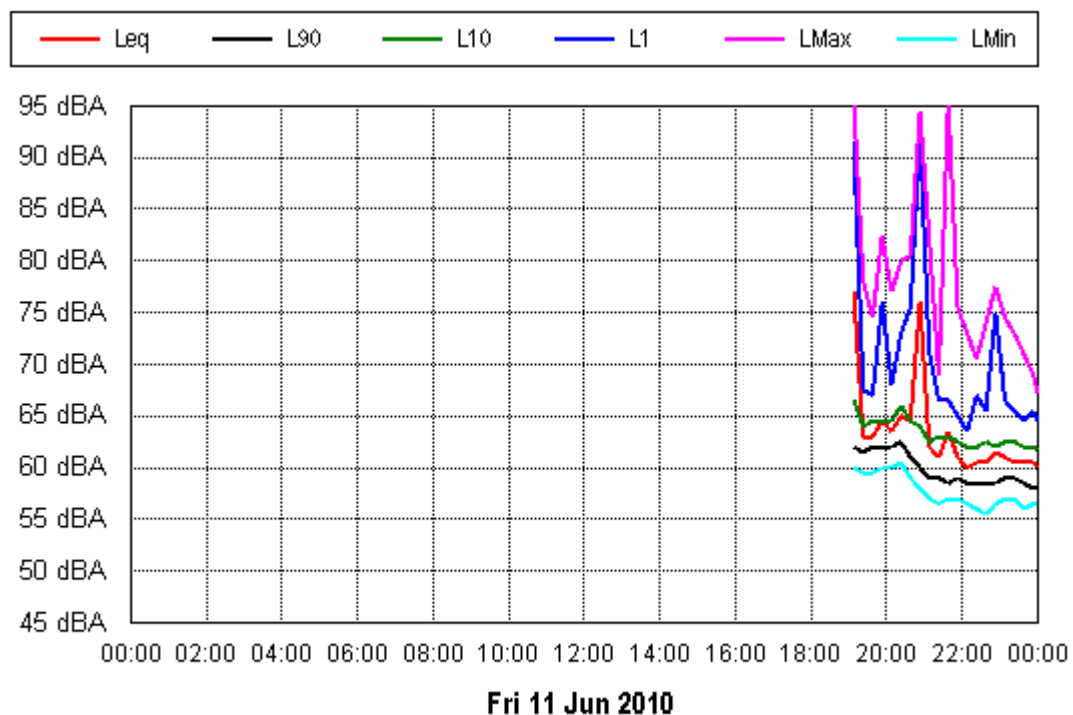
ABL – The Assessment Background Level is the single figure background level representing each assessment period (daytime, evening and night time) for each day. It is determined by calculating the 10th percentile (lowest 10th percent) background level (L_{A90}) for each period.

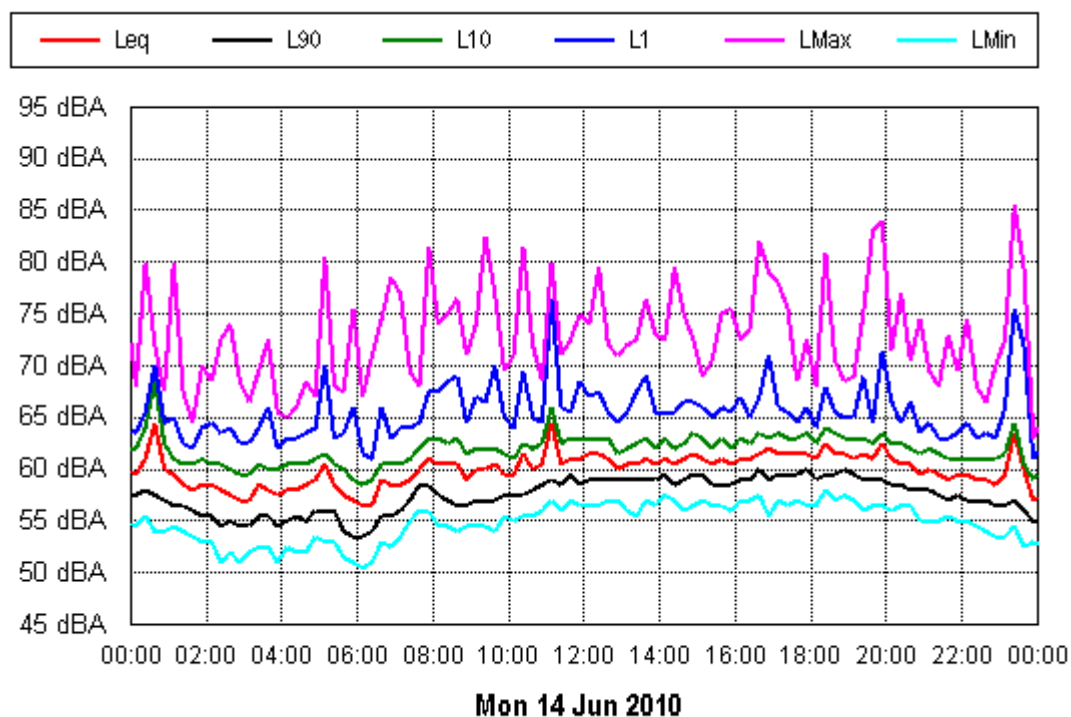
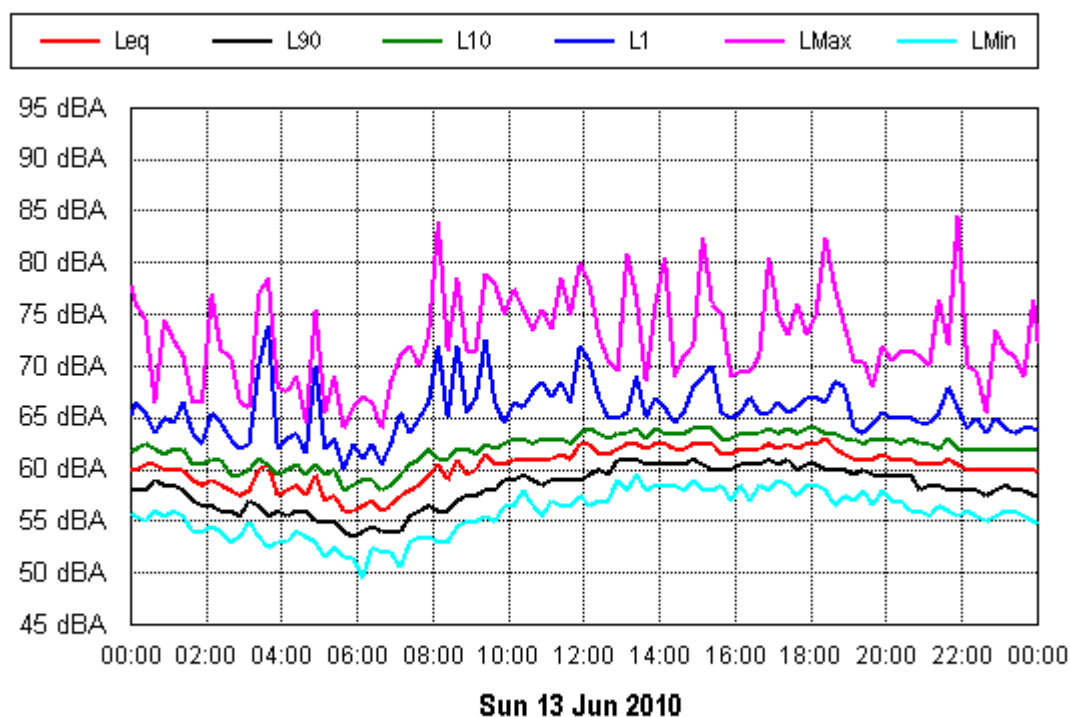
RBL – The Rating Background Level for each period is the median value of the ABL values for the period over all of the days measured. There is therefore an RBL value for each period – daytime, evening and night time.

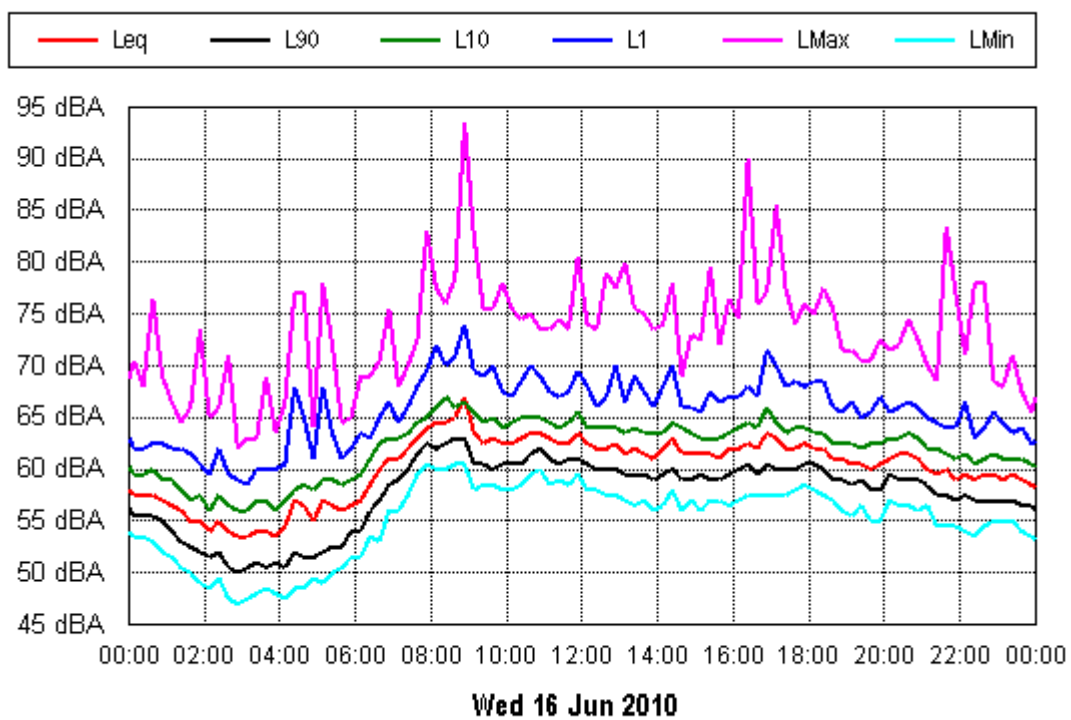
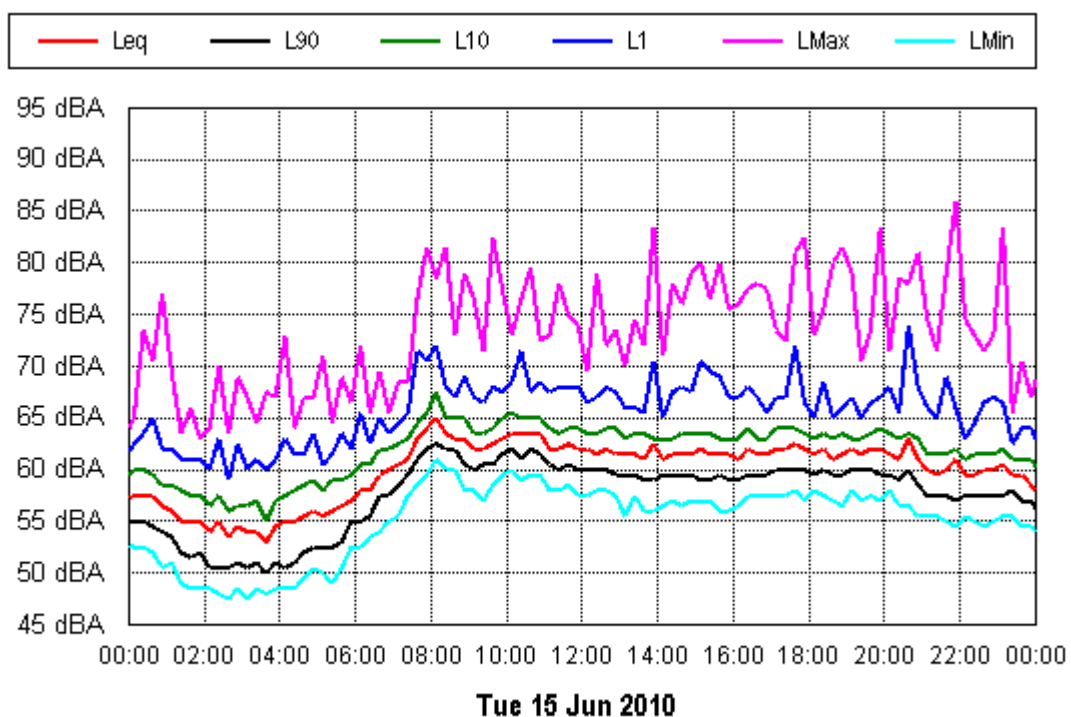


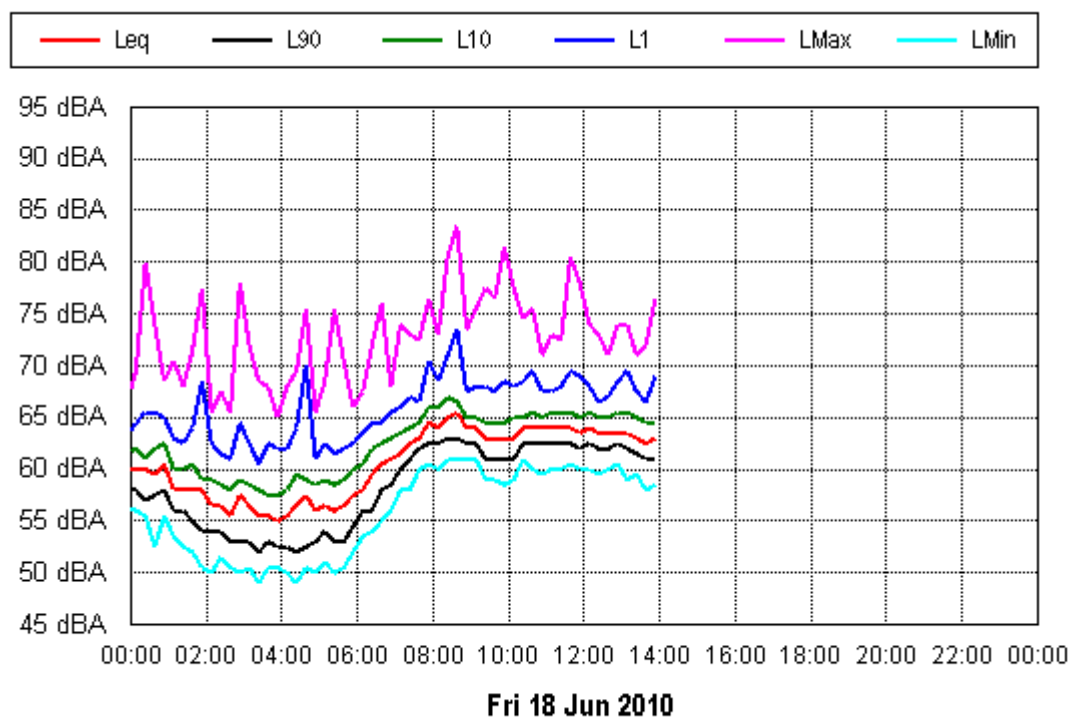
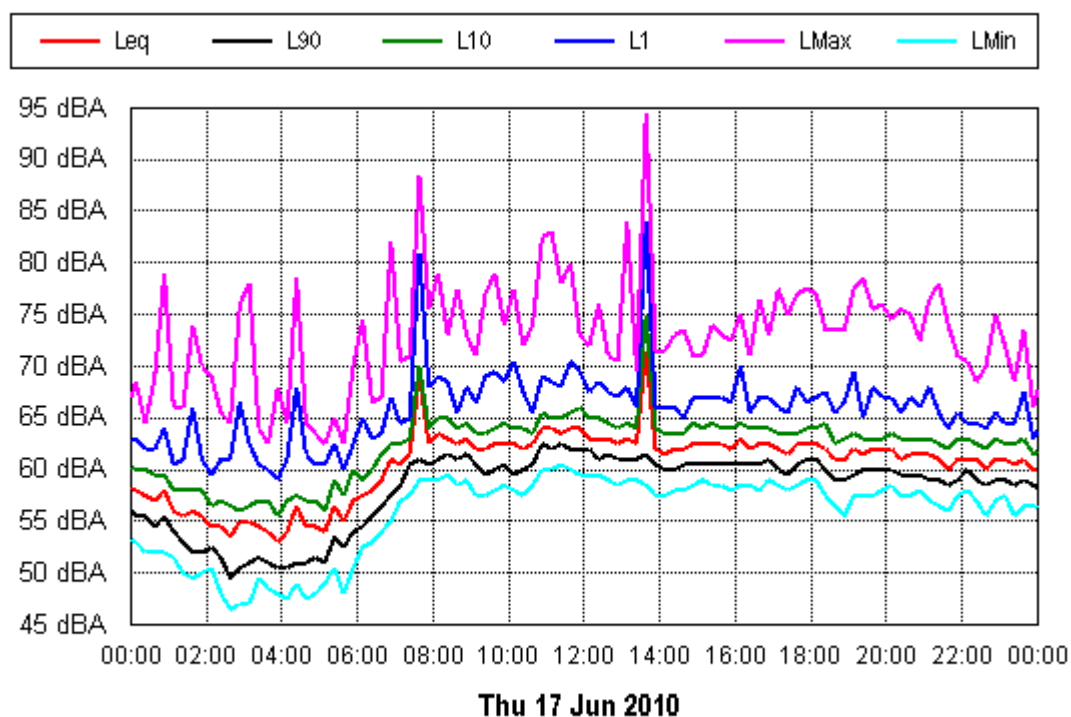
APPENDIX B

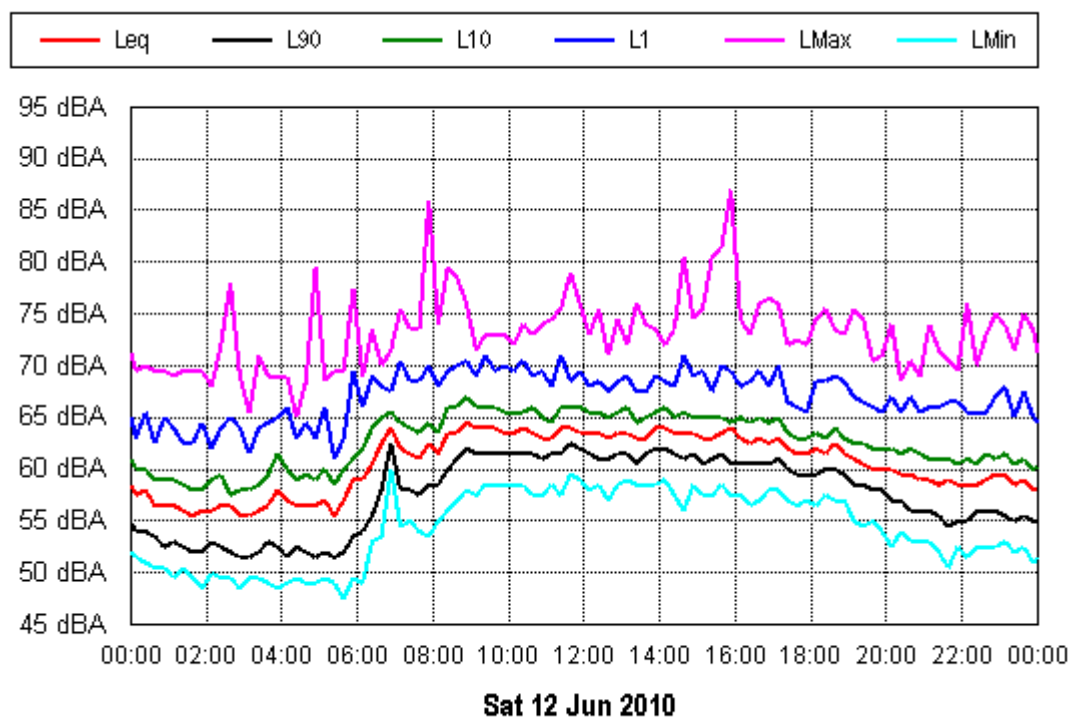
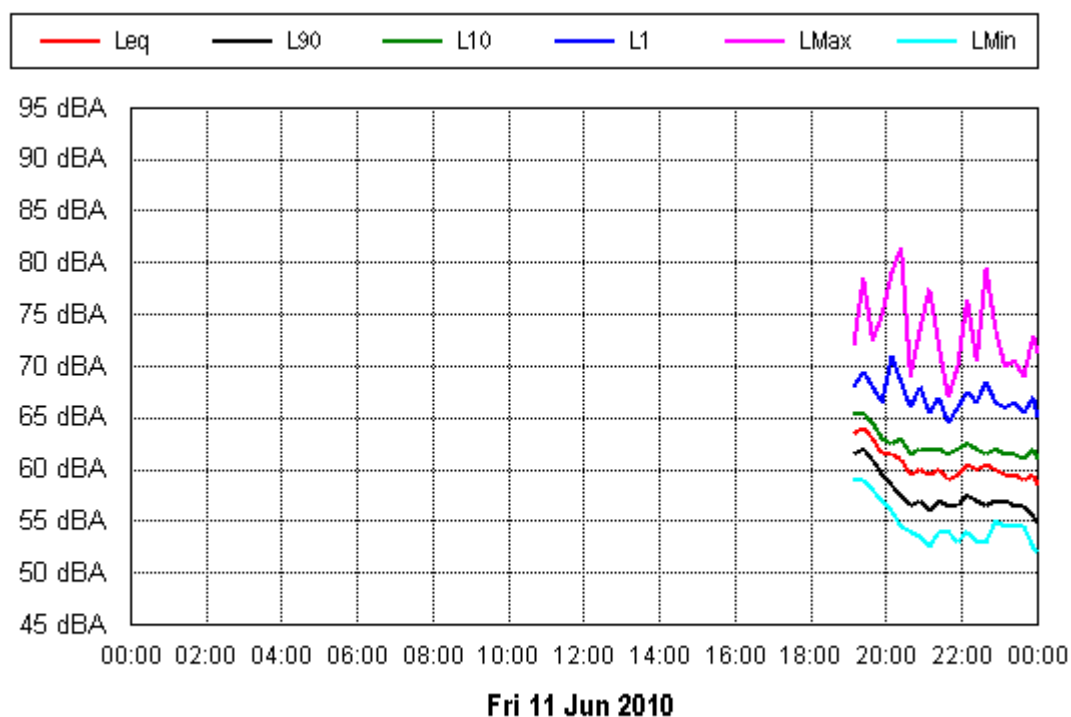
NOISE MEASUREMENT RESULTS

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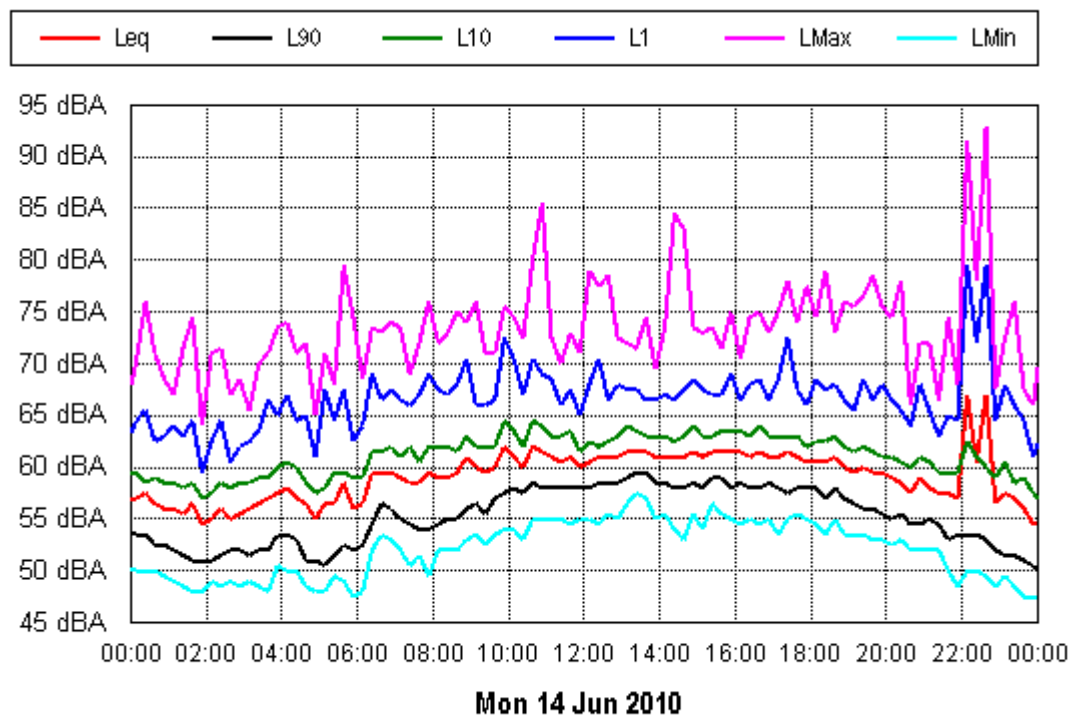
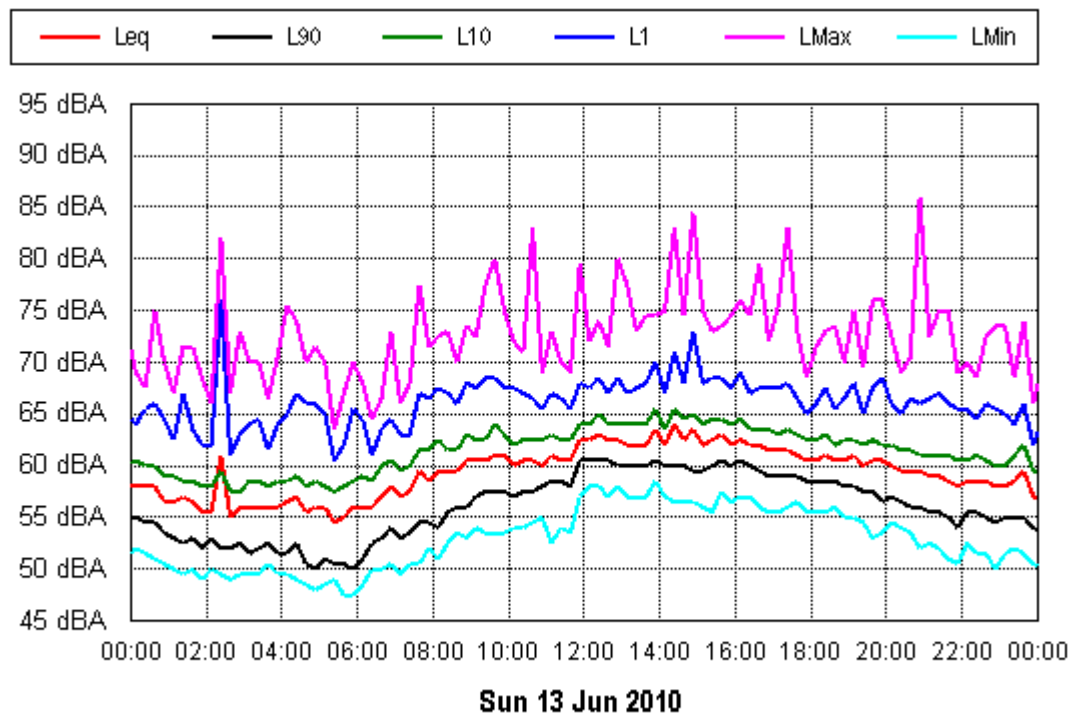
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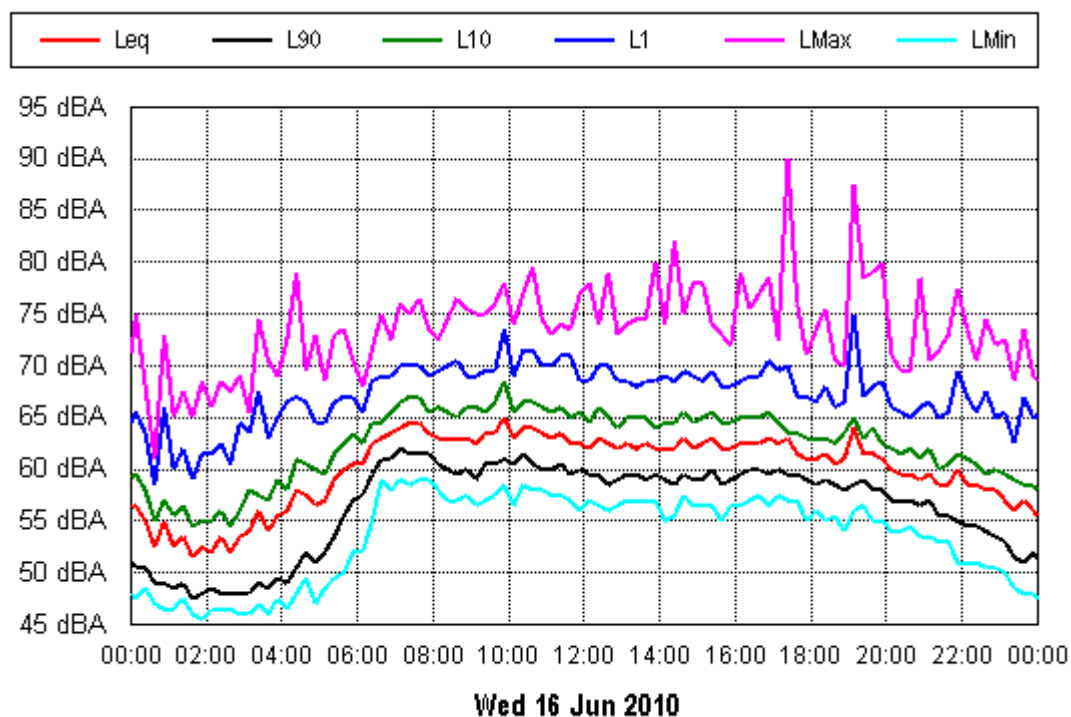
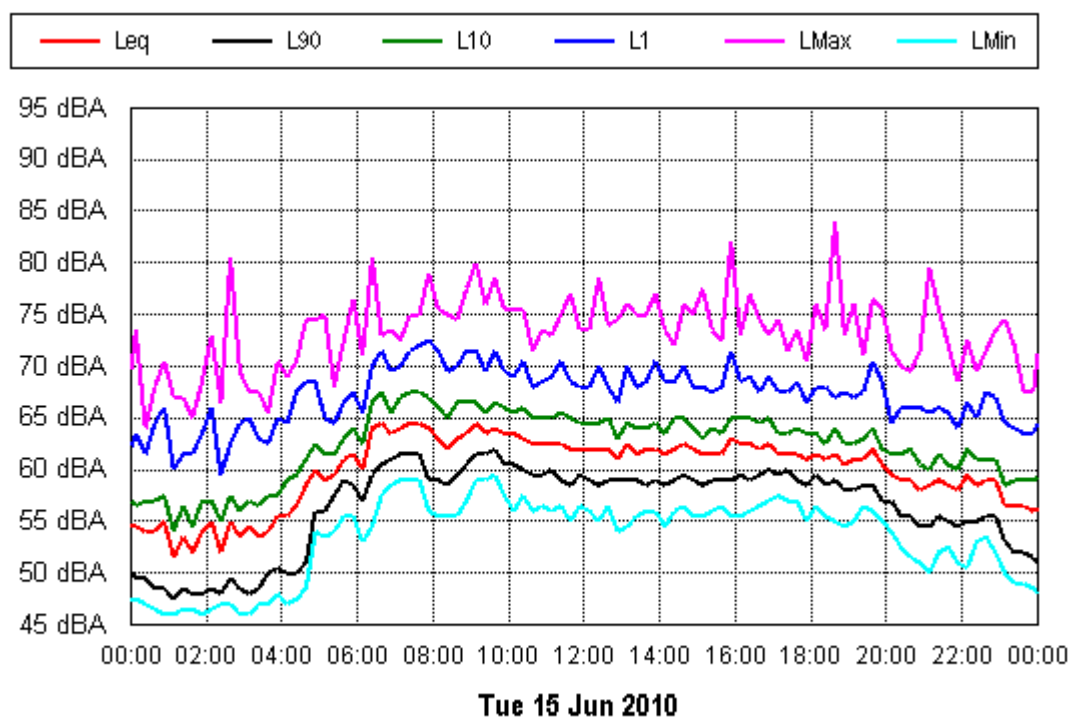
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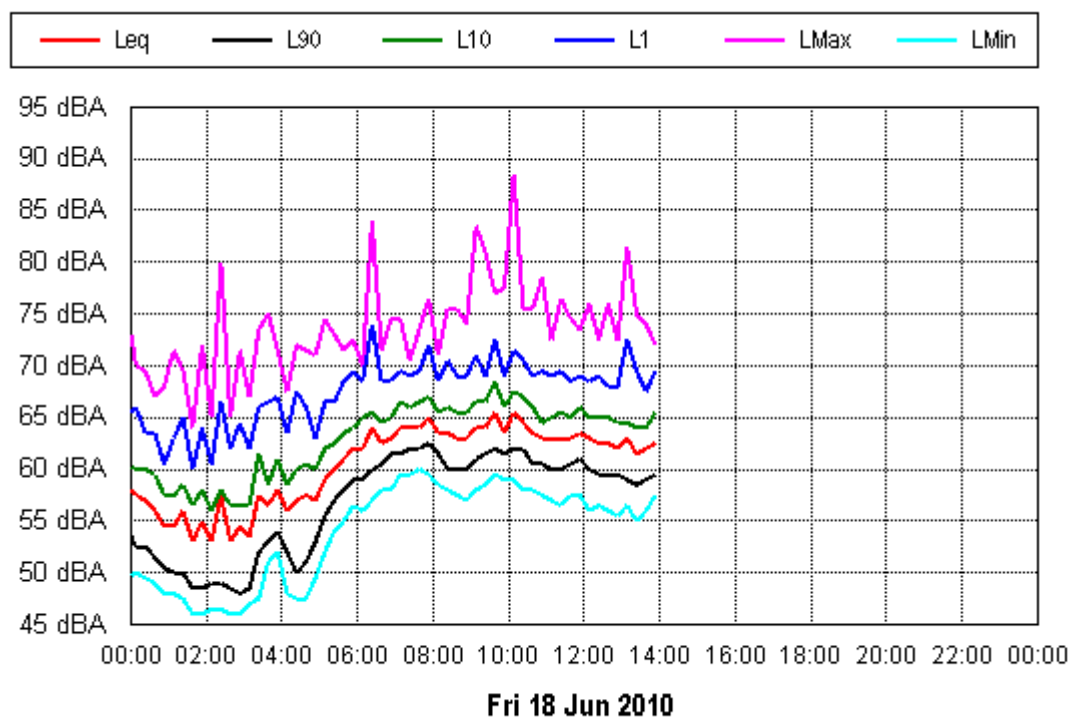
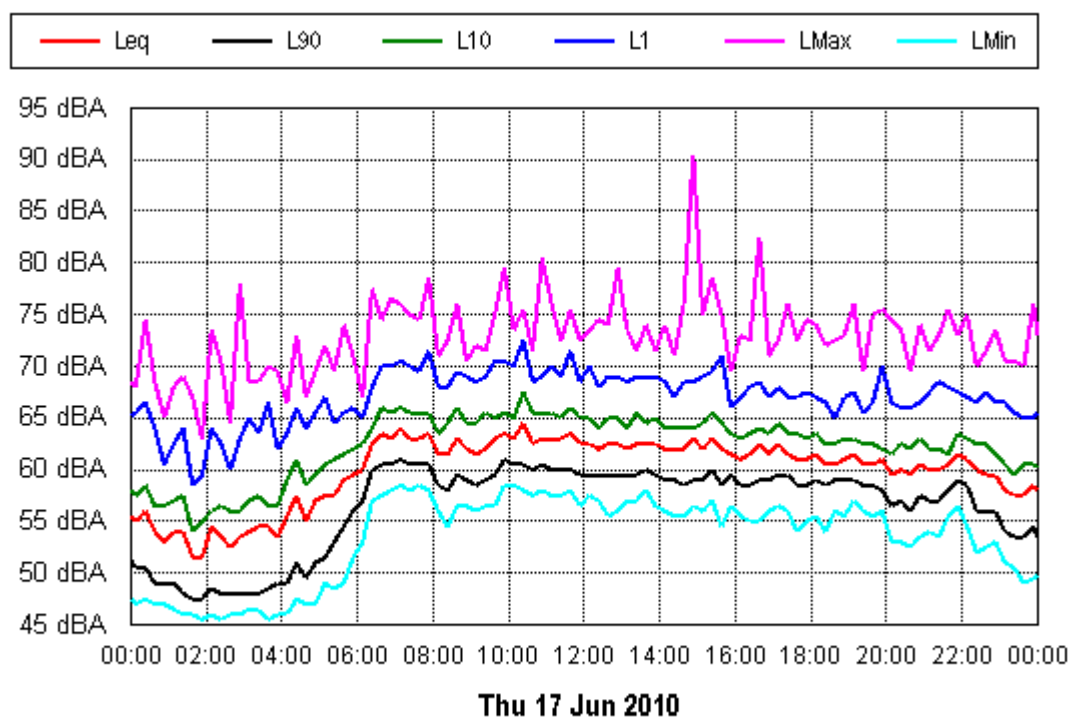
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Project: Sydney Fish Market-DA**Location: Bulwarra Rd****Filter: A**

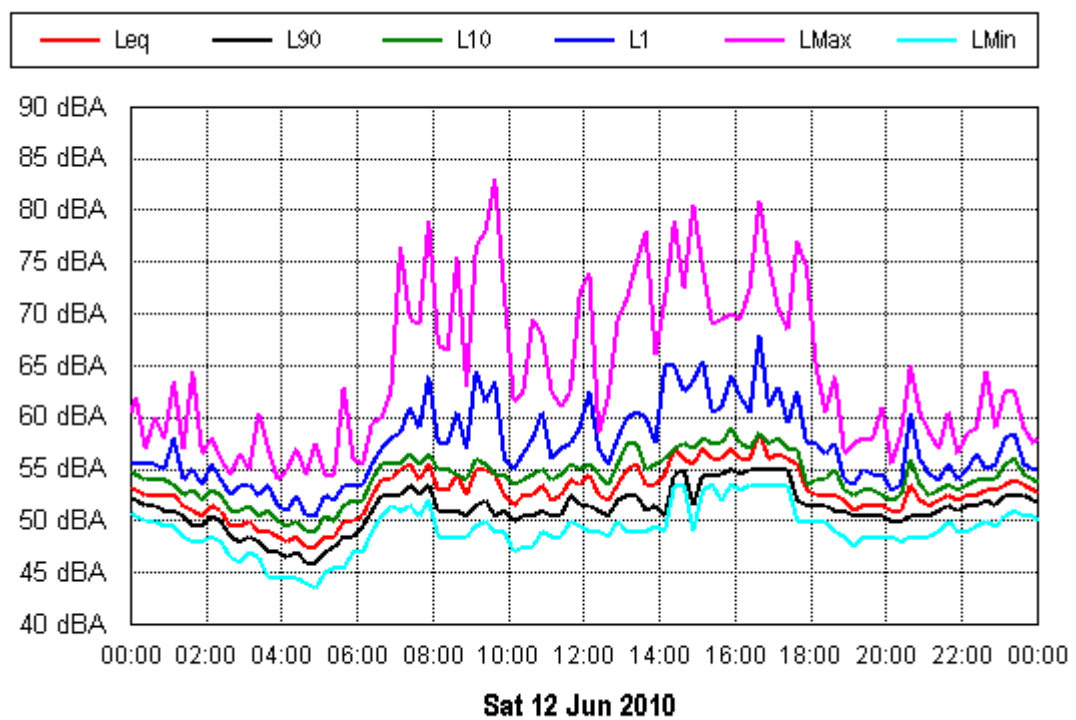
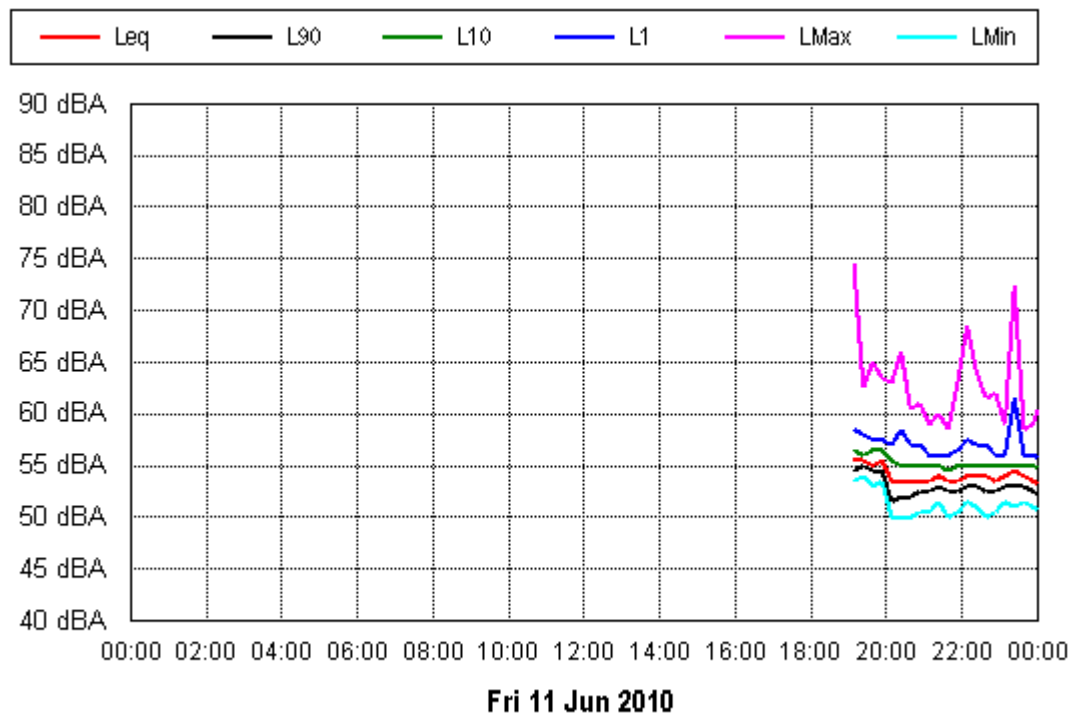
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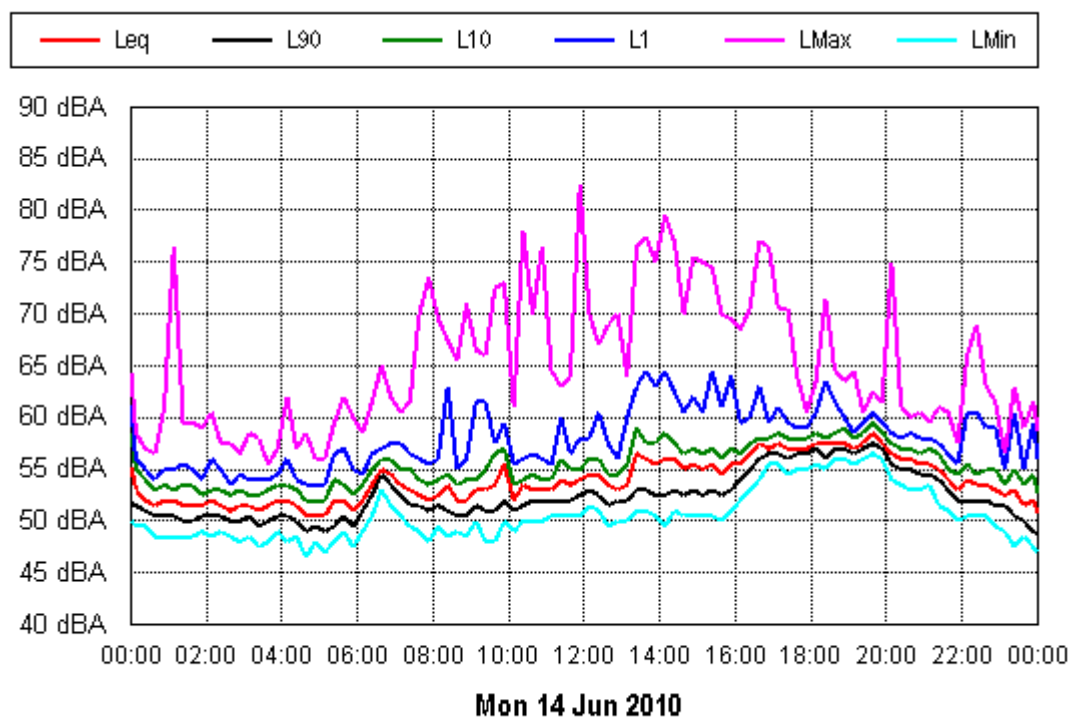
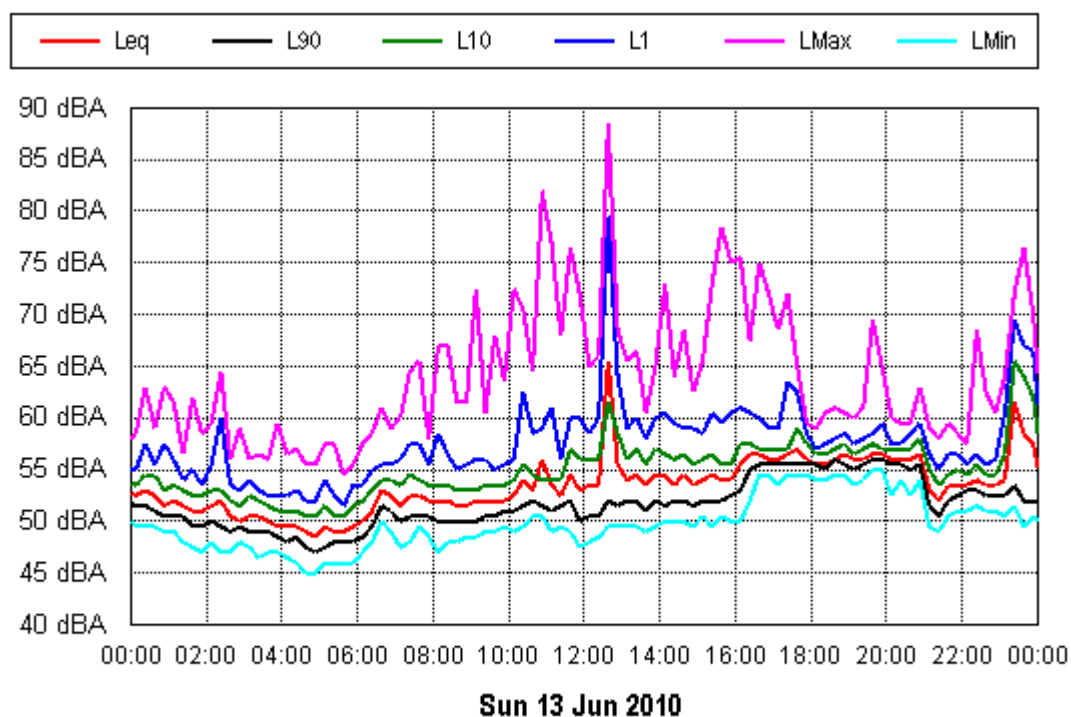


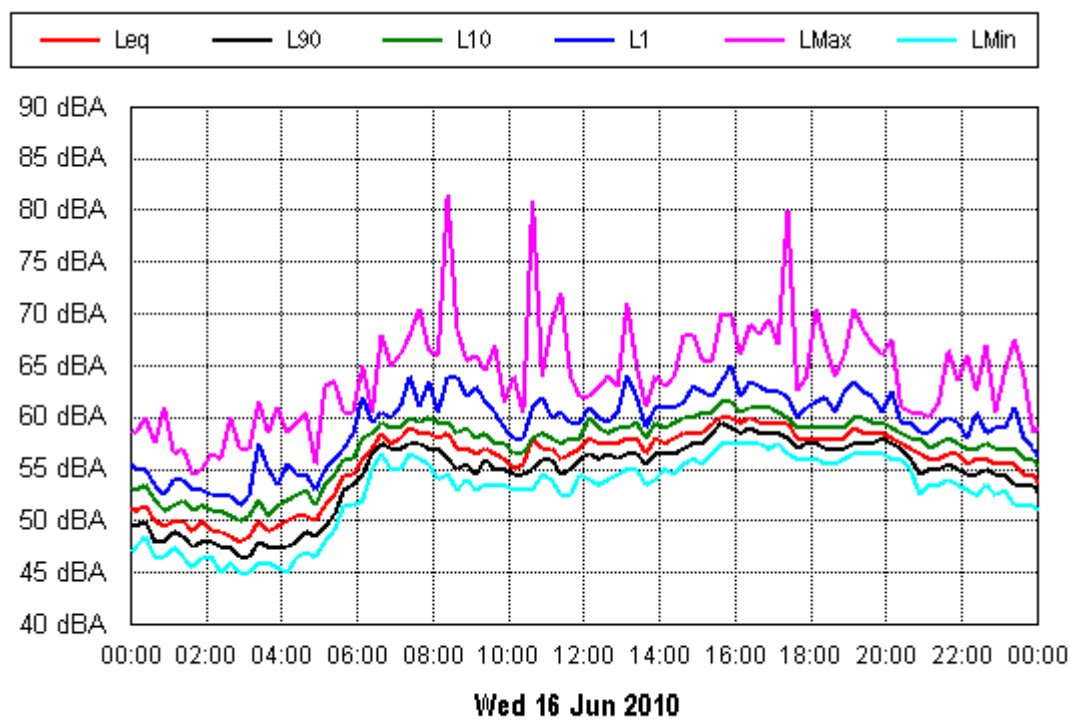
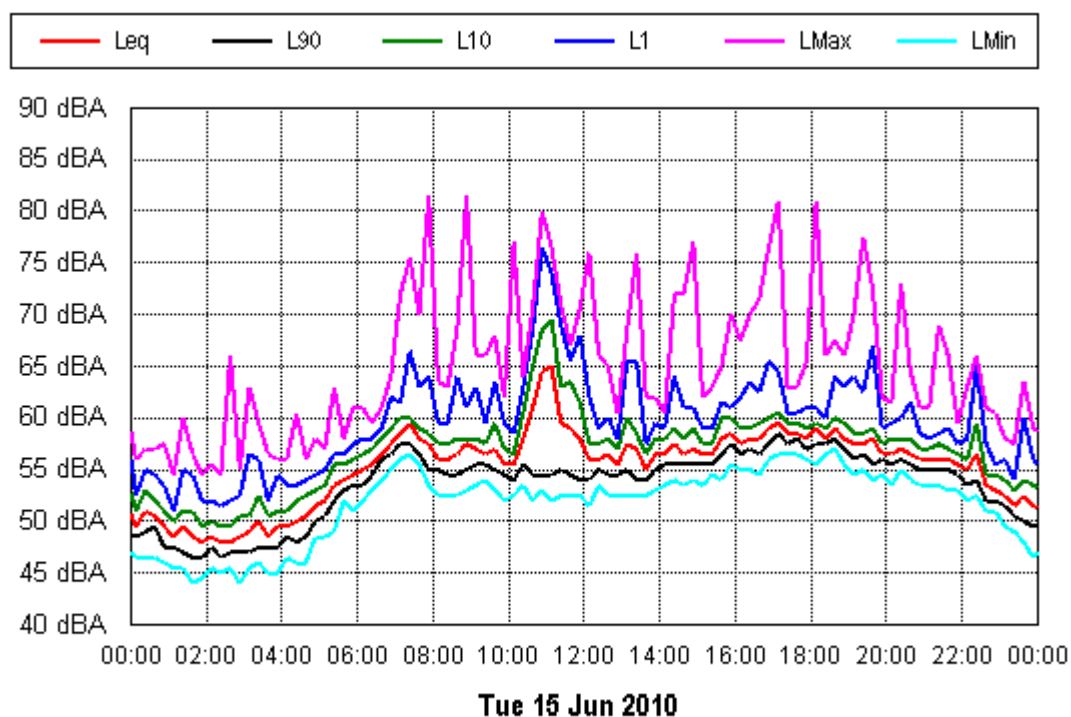
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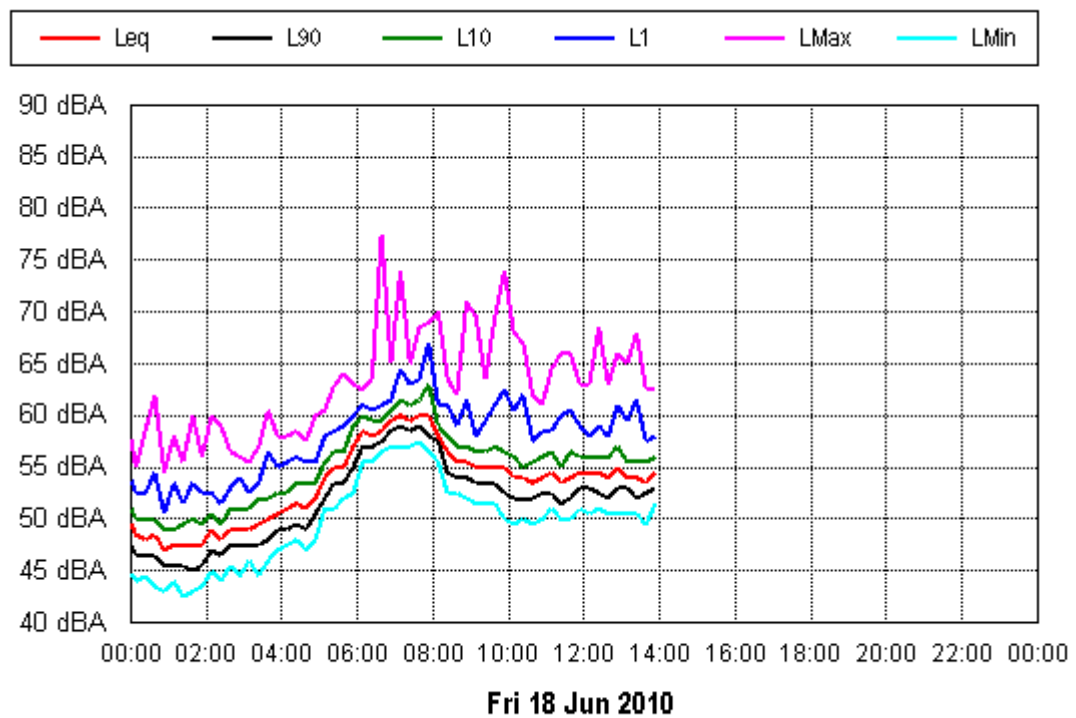
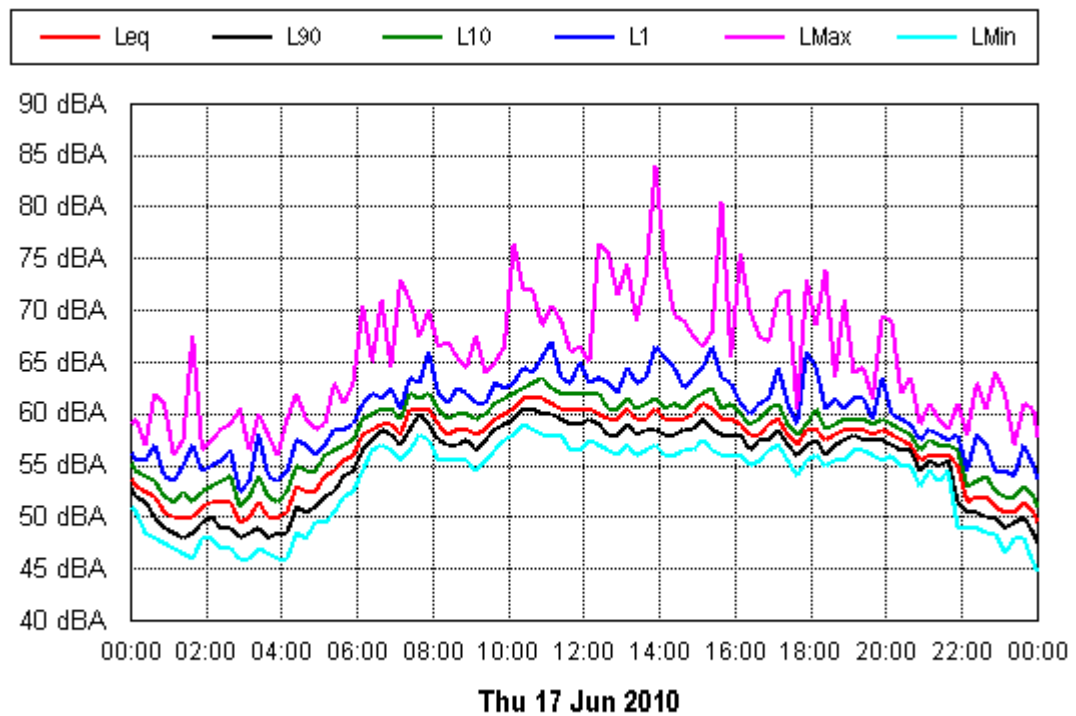
Project: Sydney Fish Market-DA
Location: Griffin Place
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Project: Sydney Fish Market-DA**Location: Griffin Place****Filter: A**

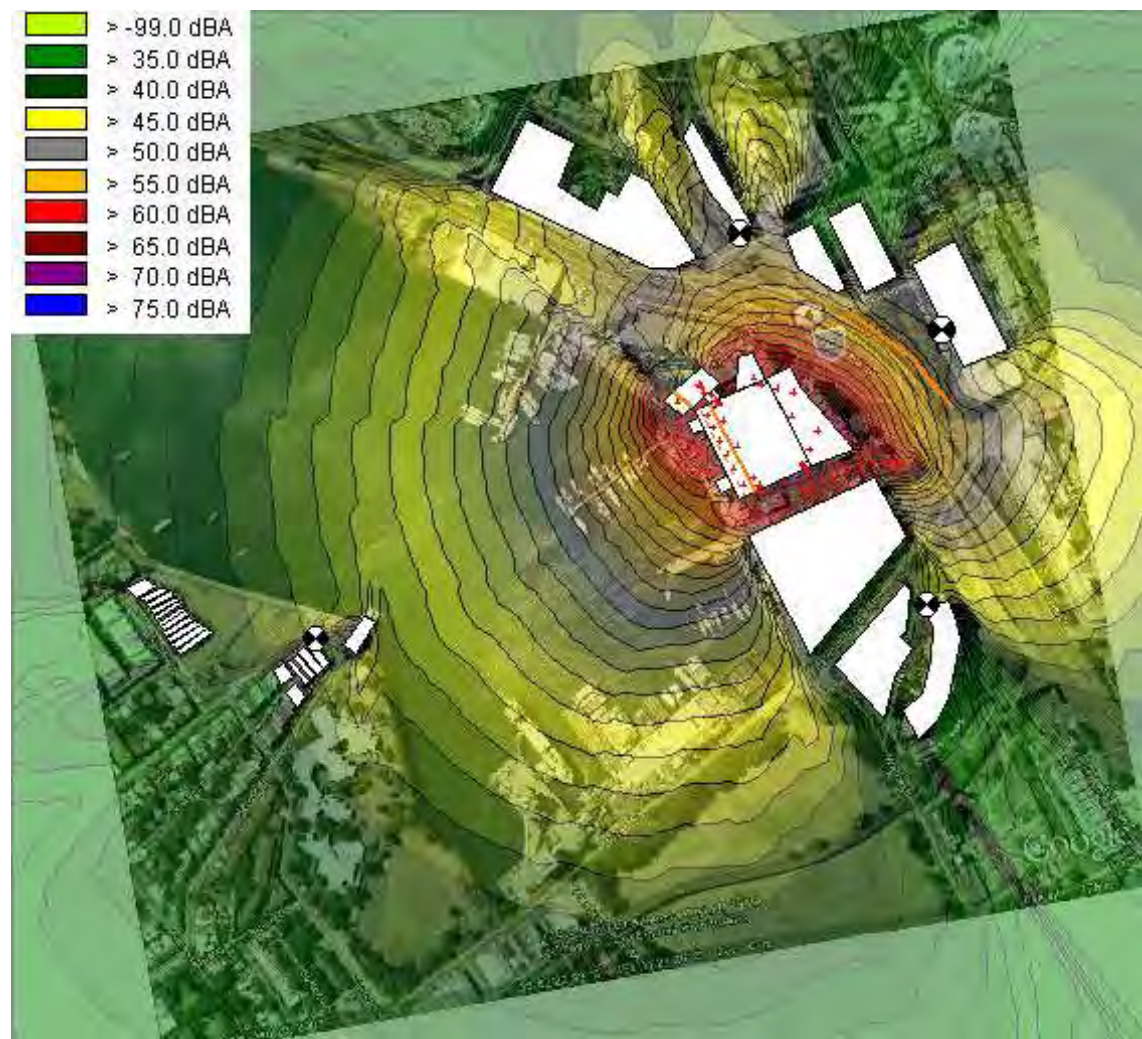
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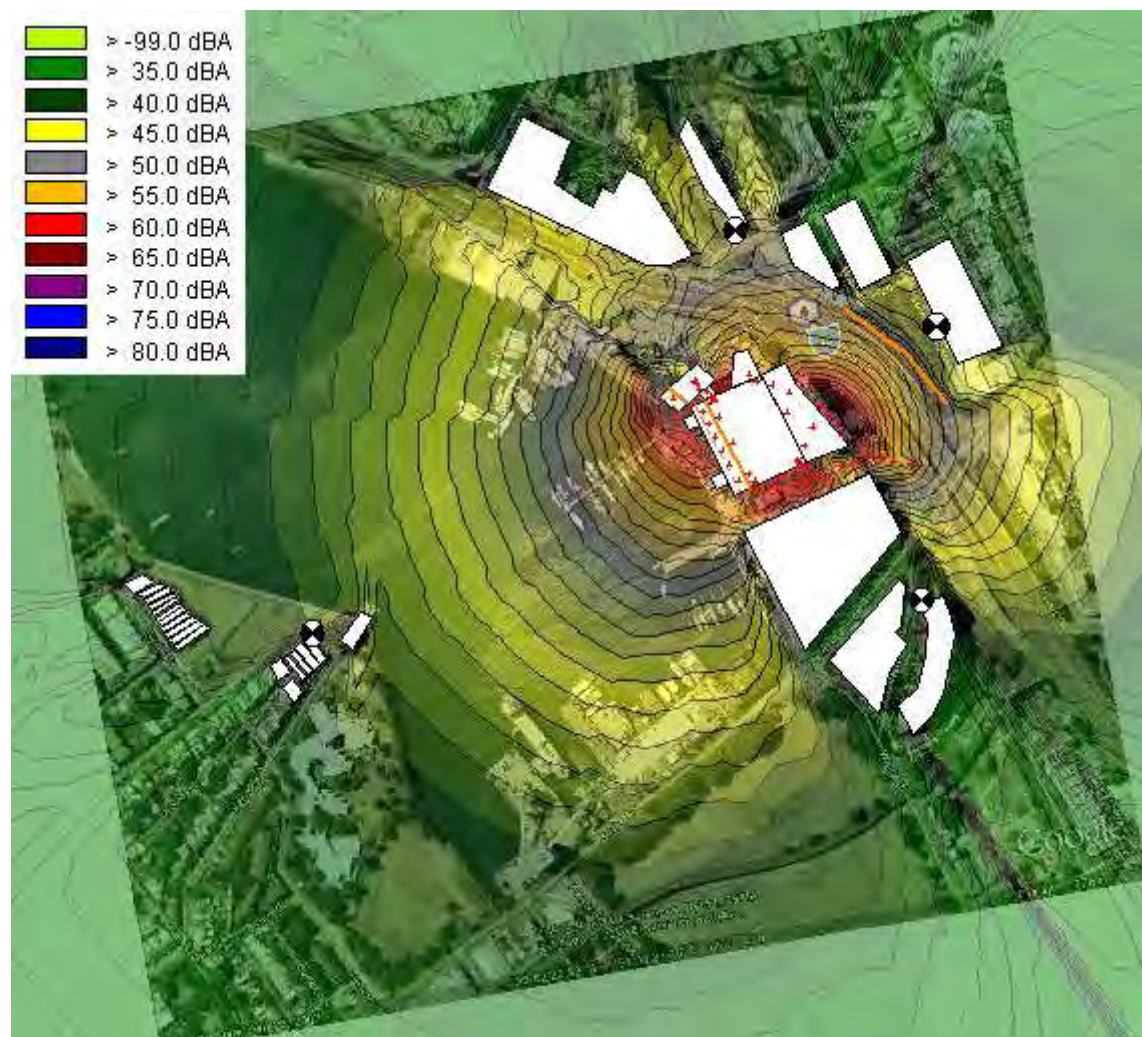
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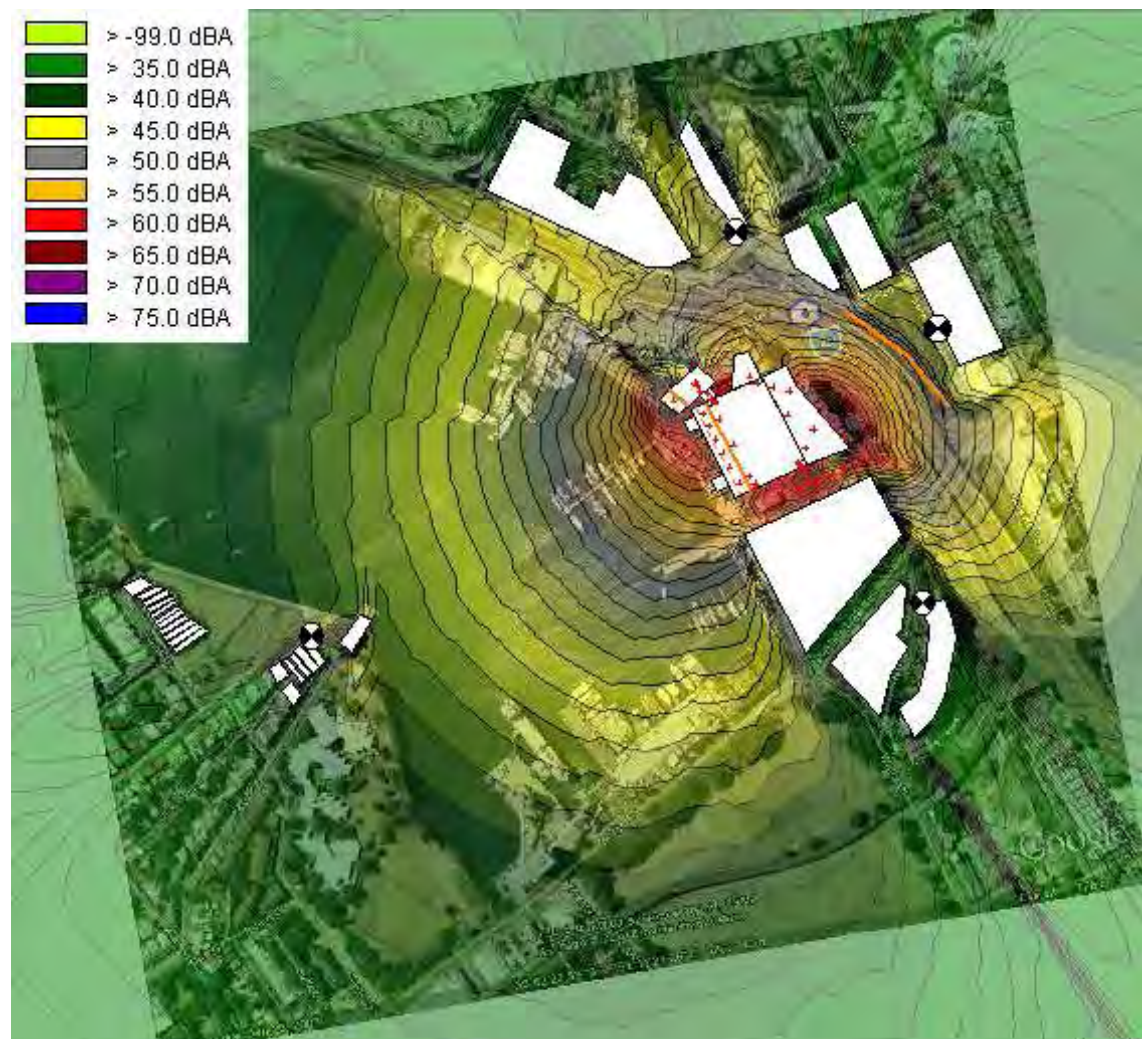


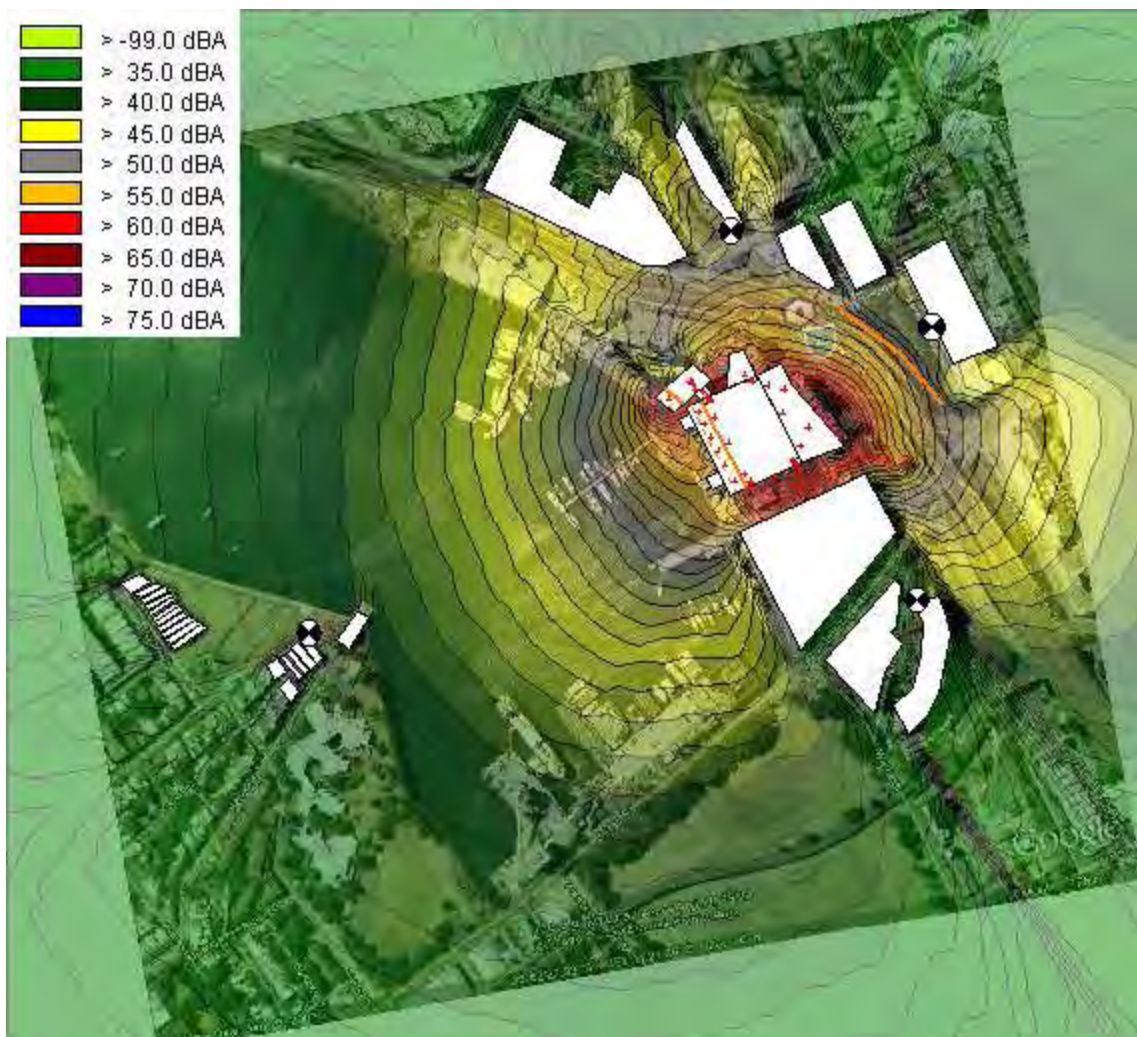
APPENDIX C

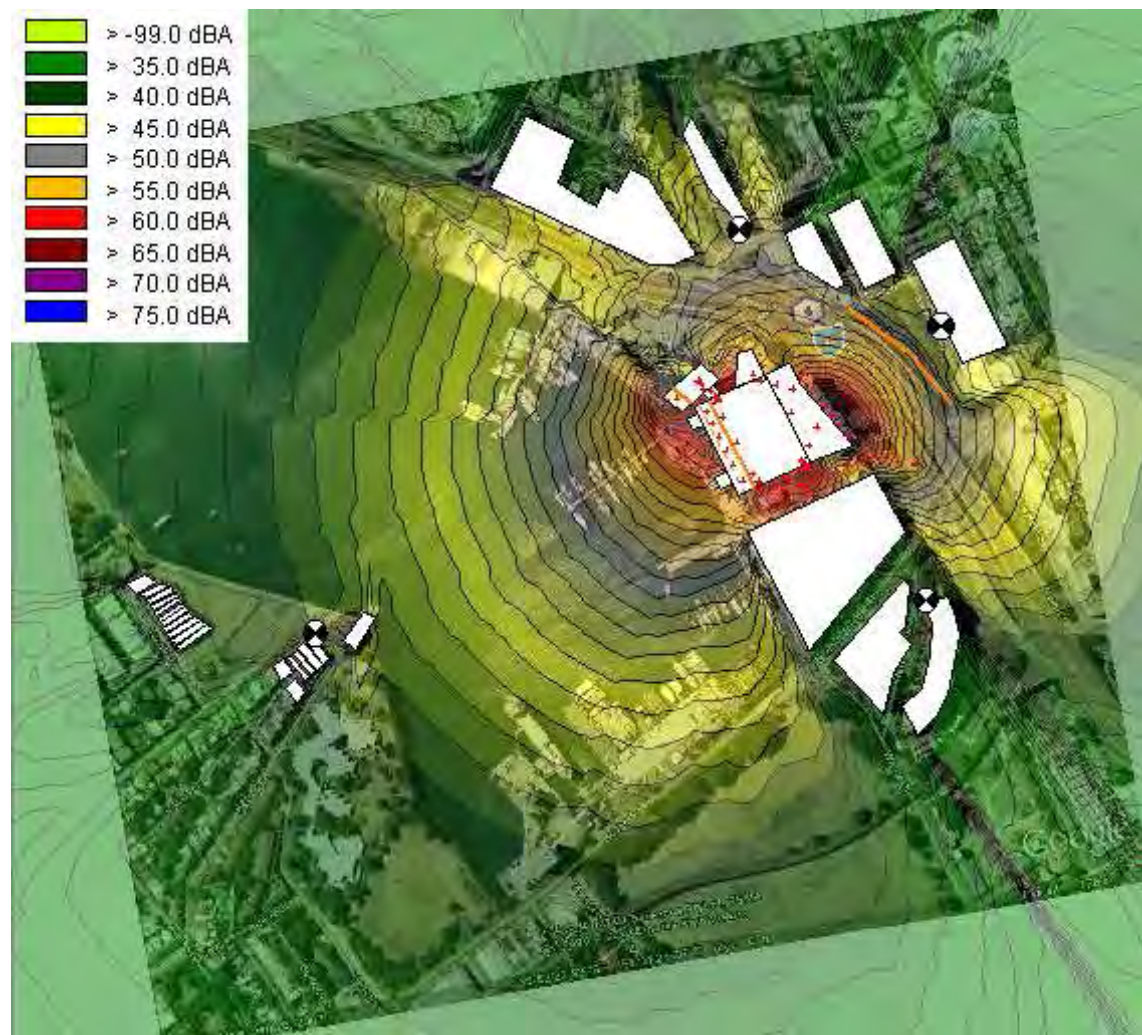
NOISE CONTOUR MAPS

Noise Contour Map for $L_{eq\ 15min}$ Daytime (7.00am-6.00pm)

Noise Contour Map for $L_{eq\ 15min}$ Evening (6.00pm-10.00pm)

Noise Contour Map for $L_{eq\ 15min}$ Night Time (10.00pm-7.00am)

Noise Contour Map for L_{eq} period Daytime (7.00am-6.00pm)

Noise Contour Map for L_{eq} period Evening (6.00pm-10.00pm)

Noise Contour Map for L_{eq} period Night Time (10.00pm-7.00am)