

Appendix 18

**Acoustic Report (prepared by
Marshall Day) prepared for past land
use consent**

Attachment B
Noise Assessment
Marshall Day Acoustics Ltd

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ACOUSTICS



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Date: 4 April 2006

Project: **Molesworth Drive, Mangawhai**

Report No.: **2006089A (i)**

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1.0 Introduction

Marshall Day Acoustics has been engaged by Resource Management and Assessment Ltd (RMA) on behalf of Sandway Developments Ltd and Metcalf Developments Ltd to provide an environmental noise assessment of the proposed development on Molesworth Drive, Mangawhai.

This report assesses the effects of noise on nearby residential areas as a result of noise from the proposed development. This includes the effects of noise from site traffic, mechanical plant and other sources.

2.0 Proposal

The proposal consists of the development of a number of buildings at the site to incorporate the service station (relocated from Wood Street), motel accommodation and a commercial and retail complex. Included as part of the service station facilities are a car grooming service, including car wash and vacuum service.

The proposed development site is located on Molesworth Drive, Mangawhai, and is bounded to the north by Molesworth Drive, to the south and east by land zoned as residential, and to the west by Estuary Drive and further, land zoned as rural residential. The proposed development is located on land zoned as residential.

In general, the buildings on the site are located adjacent to the south/east boundary and most traffic using the site would be located away from this boundary, adjacent to Molesworth Drive.

3.0 Consultants Brief

MDA has the following project brief:

- Calculate the noise levels at the residential boundary based on the predicted traffic flows from the development
- Calculate the noise levels at the residential boundary from other on-site noise sources, such as the car wash, vacuum and air conditioning units
- Provide design advice on mitigation treatment if required
- assess compliance with the District Plan noise criteria

The assessment is based on the documentation listed in Table 3-1.

Table 3-1: List of Documentation referred to in the assessment.

Company	Document	Date	Subject
Cook Costello	Emails	various	Confirmation of mechanical plant, site layout etc,
RMA	Report	31/10/2005	Assessment of Effects on the Environment
Cook Costello	Report	25/10/2005	Traffic Assessment Report
Cook Costello	Drawings	14/09/2005 Aug 2005	10416 Sk1 Site Plan 10416 Sk2 Elevations and Sections

4.0 Noise Performance Standards

The relevant District Plan criteria are those contained within the Kaipara Operative District Plan 1997. The noise rules for residential zones are:

"Rule 3.5.5.5 - Noise Emissions

(a) Noise Limits

All activities shall be conducted so as to ensure that noise from the site shall not exceed the following limits, neither at nor within the boundary of any other site zoned Residential:

7.00 am to 7.00 pm Monday to Saturday 50 dBA L10

All other times and on public holidays 40 dBA L10

Any day from 10.00 pm to 7.00 am the following day 65 dBA Lmax

(b) Measurement of Noise

Subject to the express provisions of this rule, sound levels shall be measured in accordance with New Zealand Standard NZS 6801:1991 Measurement of Sound and assessed in accordance with NZS 6802:1991 Assessment of Environmental Sound.

(c) Construction Noise

Construction noise shall meet the limits recommended in, and shall be measured and assessed in accordance with, NZS 6803P:1984 The Measurement and Assessment of Noise from Construction, Maintenance and Demolition Work."

There is also land zoned as Rural Residential to the west, on the opposite side of Estuary Drive. The noise rules for rural-residential zones are:

**Rule 3.6.5.3 - Noise Emissions*

(i) Noise Limits

All activities shall be conducted so as to ensure that noise from the site shall not exceed the following limits, neither at nor within the boundary of any other site zoned Residential or Rural-Residential (Landscape and Ecological Enhancement):-

7.00 am to 7.00 pm Monday to Saturday 50 dBA L10

All other times and on public holidays 40 dBA L10

Any day from 10.00 pm to 7.00 am the following day 65 dBA Lmax

(ii) Measurement of Noise

Subject to the express provisions of this rule, sound levels shall be measured in accordance with New Zealand Standard NZS 6801:1991 Measurement of Sound and assessed in accordance with NZS 6802:1991 Assessment of Environmental Sound.

(iii) Construction Noise

Construction noise shall meet the limits recommended in, and shall be measured and assessed in accordance with, NZS 6803P:1984 The Measurement and Assessment of Noise from Construction, Maintenance and Demolition Work."

As well as these rules, there has been a request for further information relating to the noise effects of the proposed development from Kaipara District Council and this is reproduced below:

"A report from a noise consultant (with appropriate experience) of the expected noise levels at the boundary of the site. This report should address the levels of compliance with the District Plan standards and possible mitigation measures and their likelihood of success.

Reason: Although adjacent residential neighbours have signed covenants saying that they will not oppose commercial development on the land, Council is obliged to consider the Part II elements of the Act which are overriding and which have sustainable resource management at their "core". For this reason expertise is necessary to be introduced in to the process to determine the degree to which residential amenity would be degraded, - if at all by new noise sources."

5.0 Noise Measurements

Noise measurements were carried out on site during March 2006.

Operator Attended Survey

A noise survey was undertaken at three locations on 20 March 2006. A fourth location was excluded at the time of the survey as a result of construction activity on the residential land to the east. The measurements were carried out in accordance with the New Zealand Standard NZS 6801:1991 "Measurement of Sound".

The measurements consisted of short period measurements undertaken:

- For a representative time period
- In neutral weather conditions
- Without the inclusion of atypical noise from any source in the vicinity (ie exclusion of noise from construction works, waste or recycling truck movements, shouting etc.)

The results of the noise survey can be seen in Table 5-1

Table 5-1: Noise measurements

Descriptor	Noise Sources	Time	Noise Level (dBA)	
			L ₁₀	L ₉₅
Adj Proposed Service Station	Some road traffic	13:24	49	35
Adj Molesworth Drive	Road traffic dominated	13:40	72	38
Adj Turning Head (nr Lot 80 DP 352077)	Some road traffic, some residential activity	13:55	47	34

See Appendix 1 for a definition of terms.

As can be seen, the existing daytime ambient noise level across the site is 47 – 49 dBA L₁₀. This is due to the effects of noise from Molesworth Drive. The noise level close to this road is 72 dBA L₁₀.

Noise loggers

As the proposed development is on residentially zoned land, it was considered necessary to measure the diurnal variations in noise level over a full week (20 – 27 March 2006). This is so an assessment of the appropriate noise criteria to apply to this development can be undertaken.

The noise logger was set up in a location that was also used for the attended noise survey (adjacent to the proposed service station location). The measured noise levels over the whole monitoring period and the average noise levels over a 24 hour period are presented in the graphs in Appendix 2.

As can be seen, the noise level varies over the course of a 24 hour period and as expected the night time noise level is lower than the daytime level. The existing ambient noise level is approximately 55 dBA L₁₀ during the daytime and 45 dBA L₁₀ during the night. The measured noise levels are likely to be influenced mainly by traffic using Molesworth Drive.

The noise levels measured by the logger on the Sunday were influenced by heavy wind and rain and hence were significantly higher than the other equivalent noise levels of all other days. Therefore these results have been discarded.

Recommended Criteria

As can be seen from Table 5-1 and the graphed noise levels in Appendix 2, the ambient noise levels are such that during the daytime the ambient noise levels are similar to the District Plan noise criteria.

The measured night-time noise levels are shown on the graphs in Appendix 2 to be 45 dBA L₁₀ and no less than 35 dBA L₉₅.

For this development it is the opinion of MDA that an appropriate noise limit would be those contained within the District Plan, applicable to residential zoning for all times. This is based on the measured noise levels, the information contained within Section 4 of this report and the guidance contained within New Zealand Standard NZS 6802:1991 'Assessment of Environmental Sound', clause 4.2.

It is predicted that achieving these criteria would ensure that the development does not have a significant noise impact on the surrounding areas.

6.0 Assessment of Noise Effects

6.1 Assessment Procedure

The proposed development contains a number of different noise generating activities and the cumulative effects of these must be considered. The activities with the potential to emit noise are:

- On-site vehicles
- Car grooming services (car wash, air compressor and vacuum)
- Mechanical plant (AHUs, chillers etc.)

Due to the building layout and site topography it was considered appropriate to use computer modeling techniques to calculate the noise levels. The use of such modeling ensures all screening, attenuation and propagation effects are taken into account in the calculation process. The modeling also ensures that the contribution from each individual noise source is considered for each receiver.

6.1.1 Assessment Scenarios

There is a requirement to ensure that all relevant parts of the District Plan noise criteria are not exceeded. As on-site activities occur at various times of the day and week it has been necessary to assess the noise levels in the following three scenarios:

Scenario 1 – weekday daytime activity (includes noise from vehicles using all buildings, mechanical plant, and the car grooming services)

Scenario 2 – Sunday daytime activity (includes noise from the Service Station and Motel traffic, plus mechanical plant, and the car grooming services)

Scenario 3 – Worst night-time hourly activity (includes vehicles using the Motel and the 24 hour self serve swipe card facility at the Service Station, plus mechanical plant)

According to New Zealand Standard NZS 6802:1991 "Assessment of Environmental Sound", it is acceptable to average the noise levels over the entire daytime period for assessment against the relevant criteria. This is possible for Scenario 1 and 2, but not Scenario 3. According to NZS 6802:1991, averaging is not allowed during the night-time where sleep disturbance is to be minimised.

The following assumptions have been made in the calculation process:

- The site vehicle movements are those provided by Cook Costello in their Traffic Impact assessment report.
- The vehicles speed varies across the site in the range of 5 - 10 kilometres per hour.
- The vehicles move on the site roads as detailed on the plans.
- Truck movements have been taken into account, based on information supplied by Cook Costello.
- Typical truck and car sound power levels have been assumed, based on extensive measurements of these vehicles at similar speeds.
- Noise levels for the car grooming facility are based on previous measurements of similar equipment

- Air conditioning plant noise levels are based on the manufacturer's data and a typical frequency spectrum has been applied.
- The fence located adjacent to the site boundary is an acoustic fence. It is assumed it is a 2.5m high close boarded acoustic fence, with no gaps and constructed with a minimum surface density of 15 kg/m².

The noise levels have been assessed across the site generally and for several discrete receiver locations. These have been chosen to represent the locations exposed to the likely worst case noise levels.

6.2 Assessment Results

The results of the assessment for each scenario are presented in Table 6-1 below for each receiver location. The general noise level across the site is shown in Figure 1-3, Appendix 3.

Table 6-1: Predicted noise levels

Receiver	Predicted Noise Level (dBA)		
	Scenario 1 (L ₁₀ 12 hour)	Scenario 2 (L ₁₀ 12 hour)	Scenario 3 (L ₁₀ 1 hour)
Estuary Drive	48	47	47
Lot 1 DP 341981 (2)	35	33	34
Lot 1 DP 341981 (2) Rear	35	34	34
Lot 1 DP 341981 (3)	39	38	39
Lot 1 DP 341981 (3) Rear	34	33	34
Lot 80 DP 352077 (53)	34	31	34
Lot 80 DP 352077 (53) Rear	30	29	33
Lot 80 DP 352077 (82)	37	34	43
Lot 80 DP 352077 (82) Rear	33	30	39
Lot 80 DP 352077 (83)	36	36	45
Lot 80 DP 352077 (83) Rear	33	31	39

The noise level is predicted to exceed the District Plan noise criteria for Scenario 2 and 3 at *Estuary Drive*. For Scenario 1, the predicted noise levels are lower than the relevant criteria and hence compliance can be achieved.

Compliance is not achieved at receivers Lot 80 DP 352077 (82) and Lot 80 DP 352077 (83) for Scenario 3.

For all other receivers it is predicted that the District Plan noise criteria can be complied with, for all scenarios.

7.0 Discussion

The predicted exceedance of the noise criteria at Lot 80 DP 352077 (82) and Lot 80 DP 352077 (83) is due to the calculations including a truck using the road around the Motel during the night-time. Therefore to achieve compliance at these locations it is recommended that trucks not be allowed to make deliveries to the Motel during the night-time hours.

The reason for exceedance at the Estuary Drive receiver is due to the close proximity of noise sources combined with the lack of screening. However, the contributing sources of noise from the development at this location are traffic exiting the site onto Estuary Drive and then joining Molesworth Drive and these are typical of the existing noise sources in the area.

Further, the predicted noise levels are such that the effects on this location from development traffic are significantly less than those from Molesworth Drive itself (where a daily 18 hour noise level of 65 dBA L₁₀ is predicted). As a result, the impact of noise from the development traffic is considered to be insignificant.

It is also understood that the property owners have given approval for the development and that no mitigation is required.

If the recommendations outlined above are implemented the District Plan noise criteria would be met for all activities occurring on the site.

8.0 Conclusion

Marshall Day Acoustics has undertaken an assessment of the potential noise effects from a proposal to develop a commercial services centre at a site on Molesworth Drive, Mangawhai.

The effects of noise from the proposed service station, shops/offices centre, motel and future services business have been predicted at nearby residential receivers.

It is predicted that the District Plan noise criteria can be complied with at the residential receivers with the implementation of the following recommendations:

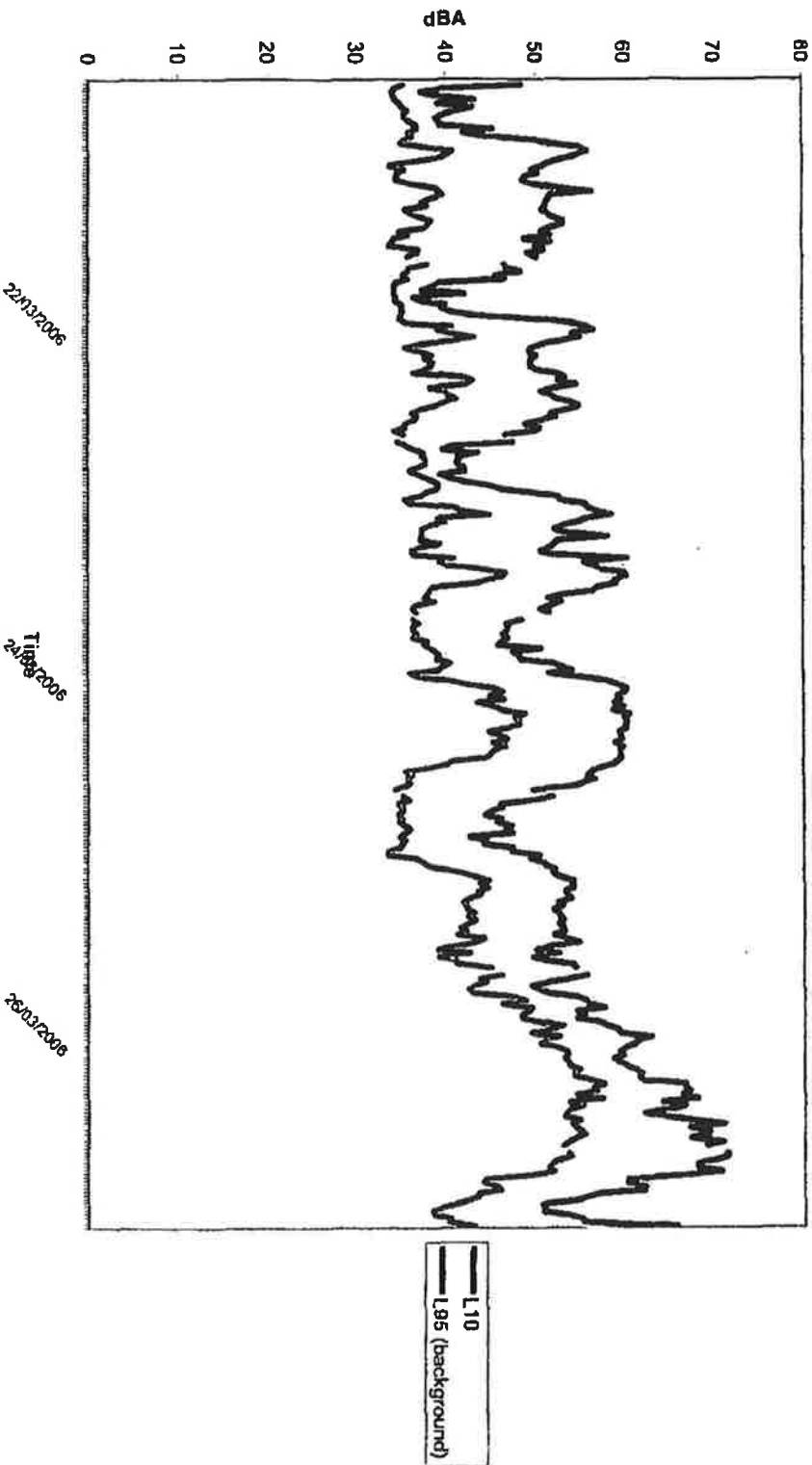
- trucks shall not be allowed to make deliveries to the motel or service station during the night-time hours

Appendix 1: Glossary of Terminology

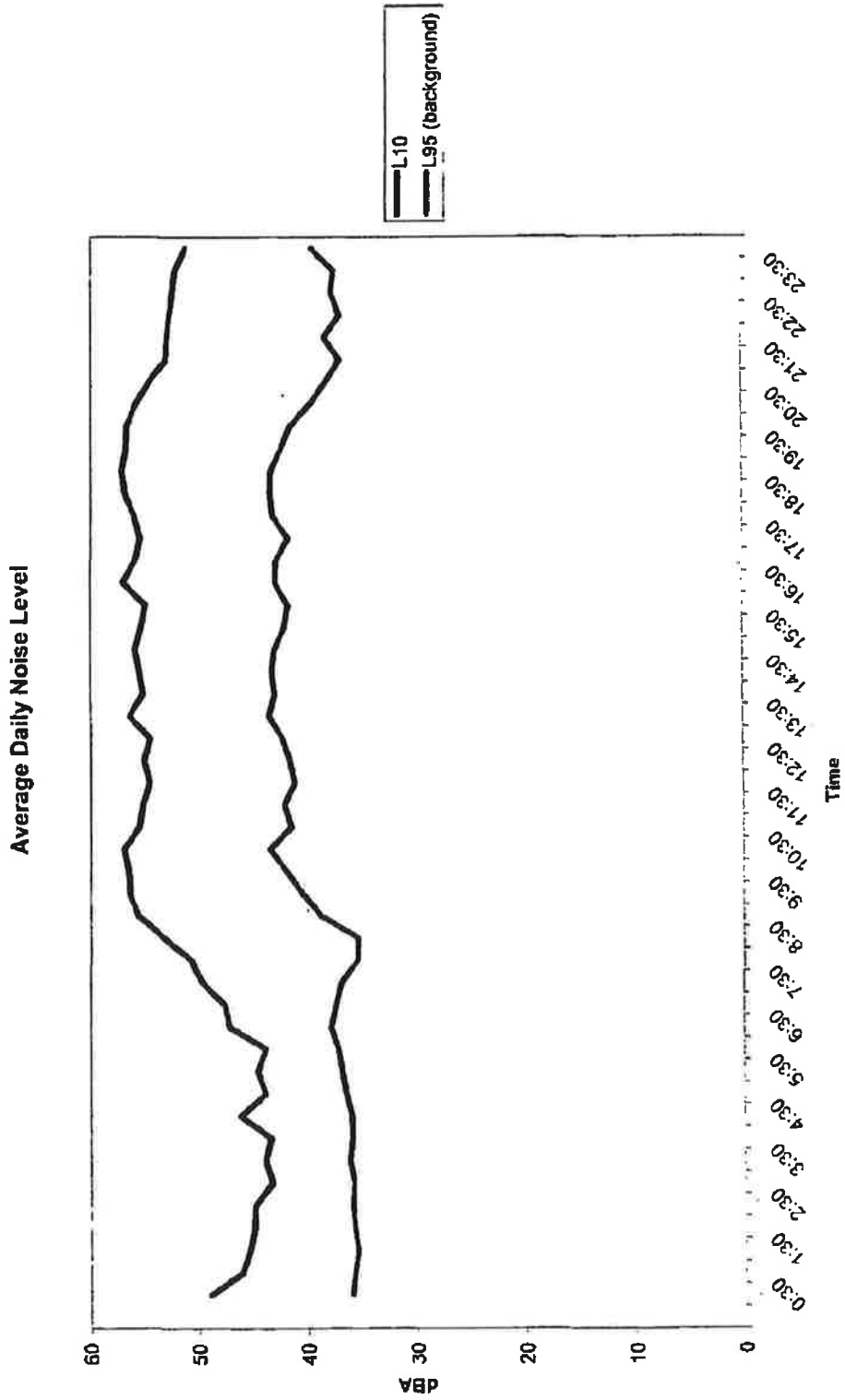
dBA	A measurement of sound level which has its frequency characteristics modified by a filter (A-weighted) so as to more closely approximate the frequency bias of the human ear.
L₉₅	The sound level which is equalled or exceeded for 95% of the measurement period. L ₉₅ is an indicator of the mean minimum noise level and is used in New Zealand as the descriptor for background noise (normally A-weighted).
L₁₀	The sound level which is equalled or exceeded for 10% of the measurement period. L ₁₀ is an indicator of the mean maximum noise level and is used in New Zealand as the descriptor for intrusive noise (normally A-weighted).
L_{max}	The maximum sound level recorded during the measurement period (normally A-weighted).
Noise	A sound that is unwanted by, or distracting to, the receiver.
NZS 6801:1991	New Zealand Standard NZS 6801:1991 "Measurement of Sound"
NZS 6802:1991	New Zealand Standard NZS 6802:1991 "Assessment of Environmental Sound".
NZS 6803P:1984	New Zealand Standard NZS 6803P:1984 "The Measurement and Assessment of Noise from Construction, Maintenance and Demolition Work".
Ambient Noise	Ambient Noise is the all-encompassing noise associated with any given environment and is usually a composite of sounds from many sources near and far.

Appendix 2: Noise Logger Results

Overall Measured Noise levels (total monitoring period)



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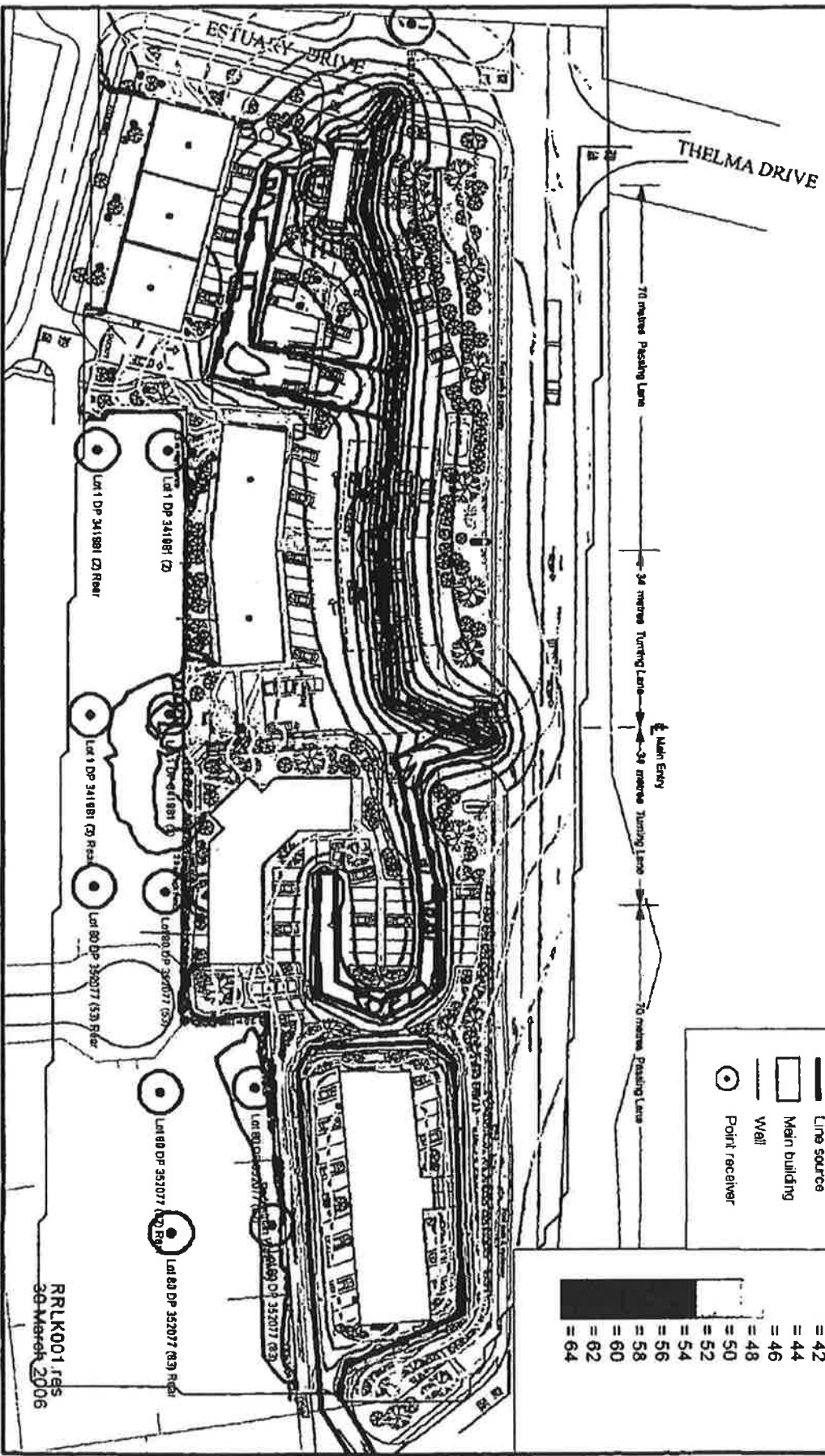
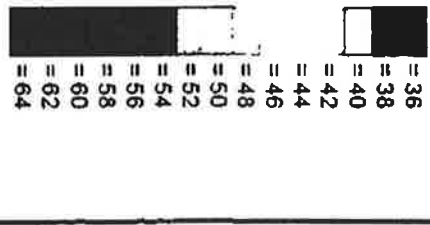
Molesworth Drive - Figure 1
Average Daytime Noise Level (weekday) (L10 dBA)

Scale 1:10000

Average Noise Level
L10 dBA
(Daytime)

Signs and symbols

- Point source
- Line source
- ▭ Main building
- Wall
- ⊙ Point receiver



RRLK001.rgs
30-March 2006

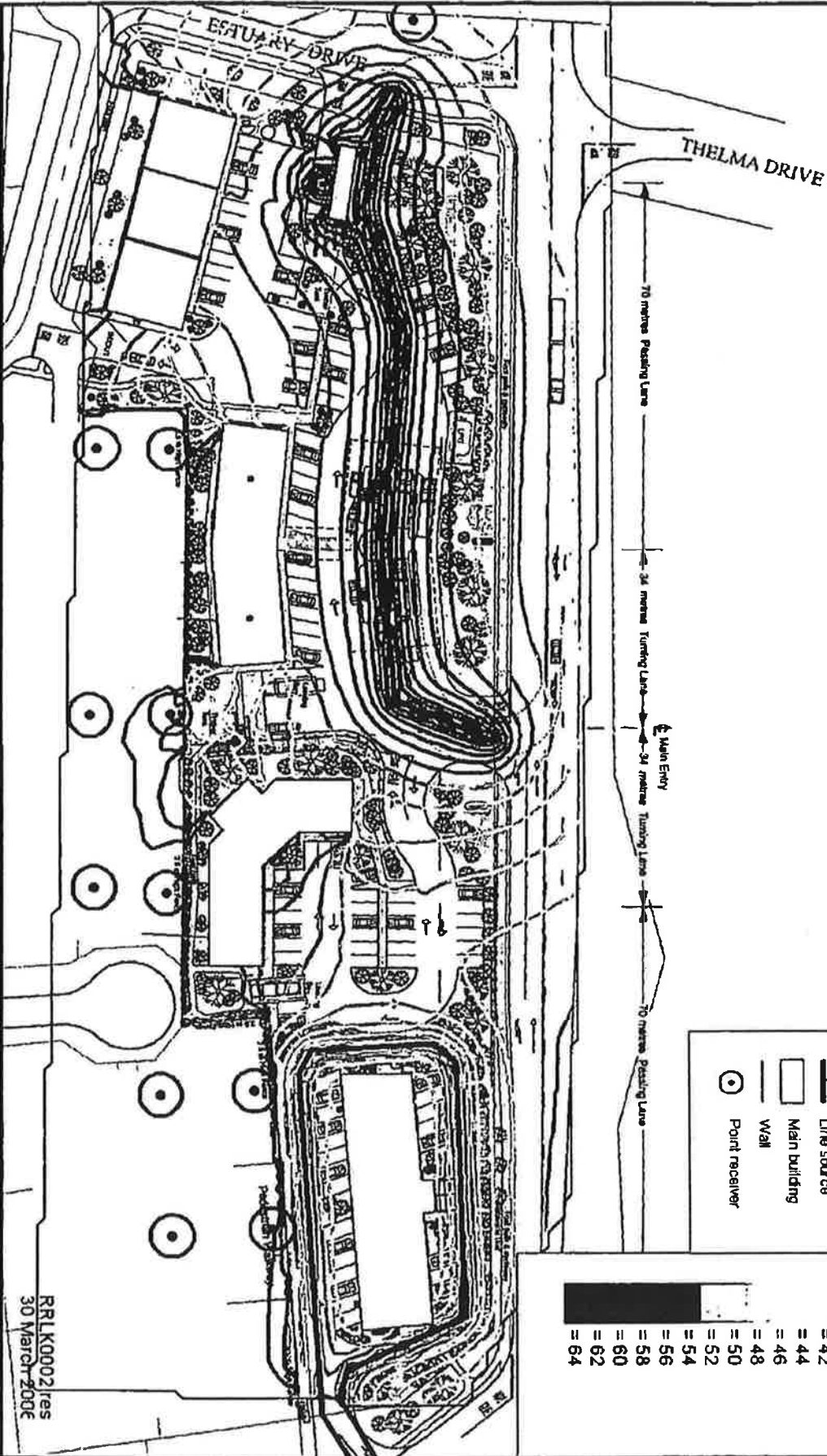
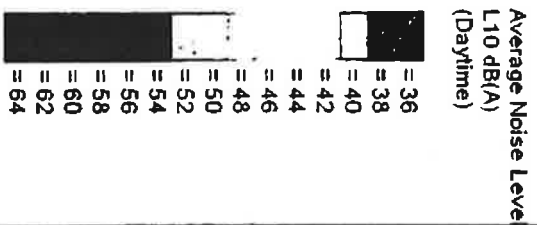
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Molesworth Drive - Figure 2
Average Daytime Noise Level (Sunday) (L10 dB(A))

Scale 1:1000
0 5 10 20 30 m

- Signs and symbols**
- Point source
 - Line source
 - Main building
 - Wall
 - ⊙ Point receiver



RRLK0002/res
30 March 2006

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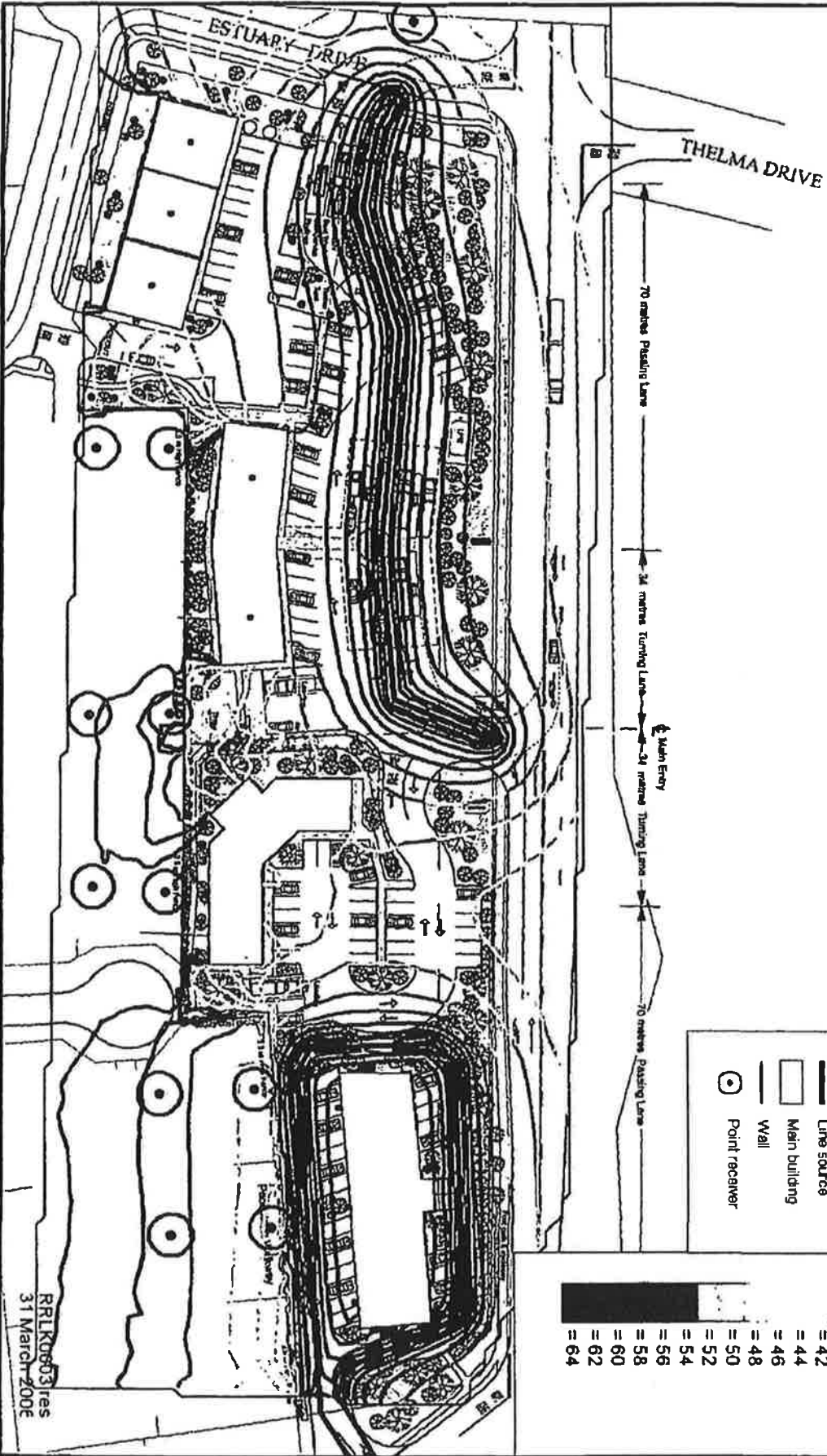
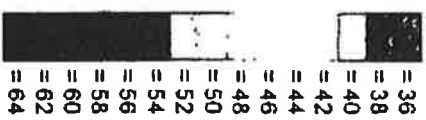
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Molesworth Drive - Figure 3
Night-time Noise Level (worst case hour) (L10 dBA)

Scale 1:1000
0 5 10 20 30 m

Hourly Noise Level
L10 dB(A)
(Night-time)

- Signs and symbols**
- Point source
 - Line source
 - ▭ Main building
 - Wall
 - ⊙ Point receiver



RRLK0603/res
31 March 2006