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# Coopers Paddock, Warwick Farm

# Noise Impact Assessment

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# 1 INTRODUCTION

The report presents our acoustic assessment of potential noise impacts form the operation of the proposed Coopers Paddock, Warwick Farm development located on Governor Macquarie Drive, Warwick Farm.

This report addresses the following noise elements relating to the operation of the facility:

- Internal operations within the facility;
- Truck movements within the loading dock areas and on the access roads;

In addition, noise emission objectives have been established to govern the operation of mechanical plant.

Noise emissions from the operation of the facility have been assessed against the Environmental Protection Authority's (EPA) Industrial Noise policy (INP).

# 2 SITE DESCRIPTION

The proposed warehouse facility is located on Governor Macquarie Drive, Warwick Farm. The potentially worst affected residential receiver is located to the east of the site across the Georges River. See Figure 1 below for the site location.

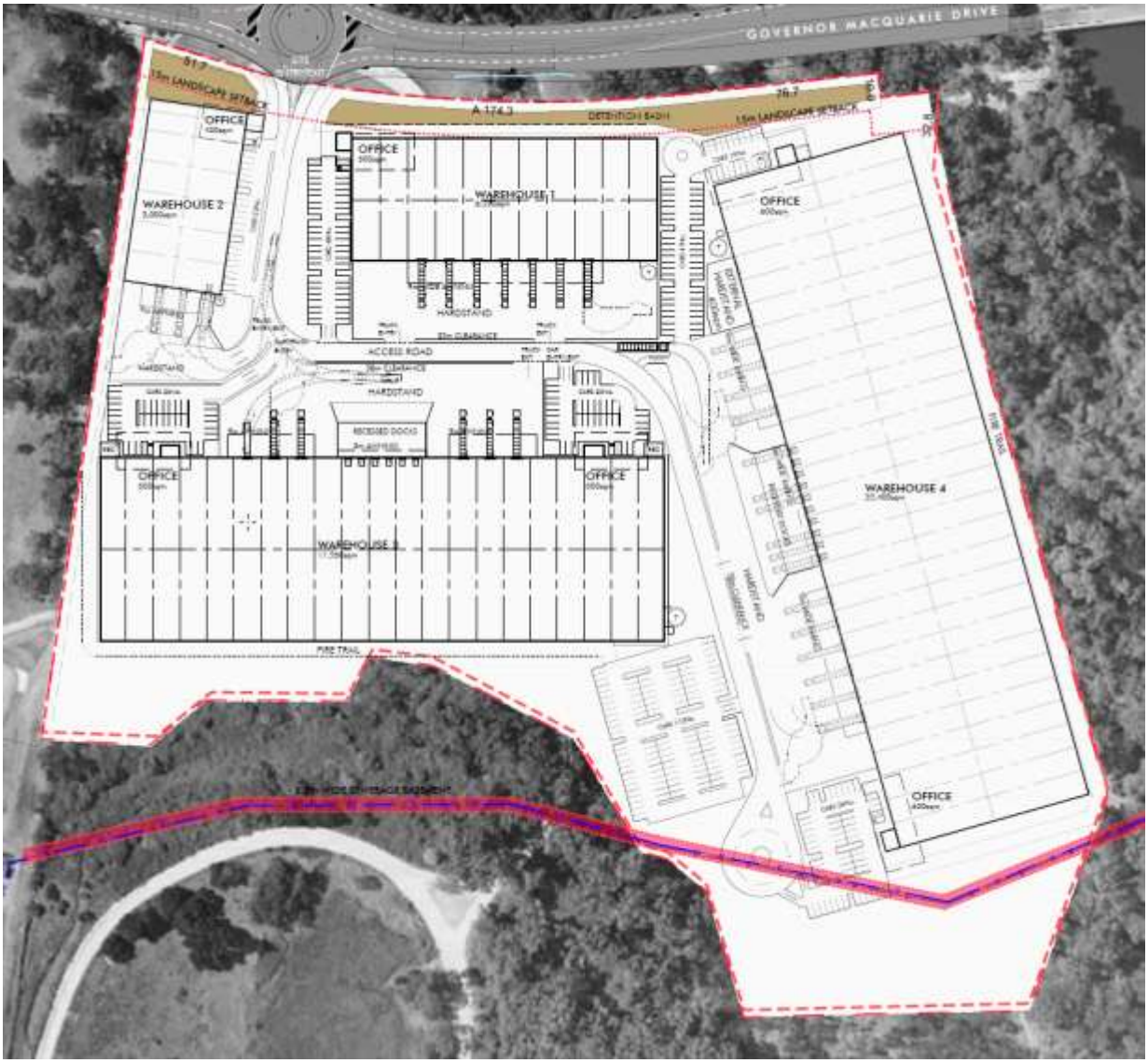
The proposed development is to include up to 4 warehouse tenancies which may be used as storage and distribution facilities. The proposed operation hours are 24 hours a day on any given day of the week.

Access to and from the facility is via the site access off Governor Macquarie Drive to the north of the proposed facility, which currently carries high volumes of traffic.

Figure 1 below shows the site map and background noise measurement locations.


**Figure 1: Site Survey and Surrounding Land Uses**

The proposed bulky good development is detailed in Figure 2 below.



# 3 ENVIRONMENTAL NOISE DESCRIPTORS

Environmental noise constantly varies. Accordingly, it is not possible to accurately determine prevailing environmental noise conditions by measuring a single, instantaneous noise level.

To accurately determine the environmental noise a 15-20 minute measurement interval is utilised. Over this period, noise levels are monitored on a continuous basis and statistical and integrating techniques are used to determine noise description parameters.

In analysing environmental noise, three-principle measurement parameters are used, namely $L_{10}$, $L_{90}$ and $L_{eq}$.

The $L_{10}$ and $L_{90}$ measurement parameters are statistical levels that represent the average maximum and average minimum noise levels respectively, over the measurement intervals.

The $L_{10}$ parameter is commonly used to measure noise produced by a particular intrusive noise source since it represents the average of the loudest noise levels produced by the source.

Conversely, the $L_{90}$ level (which is commonly referred to as the background noise level) represents the noise level heard in the quieter periods during a measurement interval. The $L_{90}$ parameter is used to set the allowable noise level for new, potentially intrusive noise sources since the disturbance caused by the new source will depend on how audible it is above the pre-existing noise environment, particularly during quiet periods, as represented by the $L_{90}$ level.

The $L_{eq}$ parameter represents the average noise energy during a measurement period. This parameter is derived by integrating the noise levels measured over the 15 minute period. $L_{eq}$ is important in the assessment of environmental noise impact as it closely corresponds with human perception of a changing noise environment; such is the character of environmental noise.

The $L_1$ parameter (or the noise level exceeded for 1% of the time) is used during the night period to assess potential sleep arousal effects due to transient noise sources.

# 4 EXISTING ACOUSTIC ENVIRONMENT

The acoustic environment in the vicinity of the development is predominantly as result of noise from surrounding roadways including the traffic associated with the Governor Macquarie Drive to the north and other surrounding roadways.

## 4.1 NOISE LEVEL MEASUREMENTS

The background noise monitoring undertaken as part of this assessment was conducted between 8th April and 13th April, 2015 using an unattended noise monitor, the monitor was installed at the south eastern site of the site as detailed in Figure 1 above. Equipment used consists of an Acoustic Research Laboratories Pty Ltd noise logger, the logger was calibrated before and after the measurement using a Rion NC-74 calibrator; no significant drift was detected. Details of the recorded noise levels are included in Appendix 1.

**Table 1 – Measured Background Noise Levels**

| Location | Period | Measured Background $L_{90,15min}$ dB(A) |
|---|---|---|
| Coopers Paddock, Warwick Farm | Day (7am – 6pm) | 46 |
| | Evening (6pm-10pm) | 42 |
| | Night (10pm to 7am) | 34 |

# 5 ACOUSTIC CRITERIA

The assessment of the operational noise levels are based on the following documents:

- The NSW Environmental Protection Authority (EPA) Industrial Noise Policy (INP); and
- The NSW Road Noise Policy (RNP).

## 5.1 NSW EPA INDUSTRIAL NOISE POLICY

The INP provides guidelines for assessing noise impacts from different areas of occupancy. The recommended assessment objectives vary depending on the potentially affected receivers, the time of day, and the type of noise source. The INP has two requirements which both have to be complied with, namely an amenity criterion and an intrusiveness criterion.

### 5.1.1 Intrusiveness Criterion

The guideline is intended to limit the audibility of noise emissions at residential receivers and requires that noise emissions measured using the $L_{eq}$ descriptor not exceed the background noise level by more than 5 dB(A).

### 5.1.2 Amenity Criterion

The guideline is intended to limit the absolute noise level from all industrial noise sources to a level that is consistent with the general environment.

The INP sets out acceptable noise levels for various localities. Table 2.1 on Page 16 of the policy indicates four categories to distinguish different residential areas. They are rural, suburban, urban and urban/industrial interface.

- Day is defined as the period from 7am to 6pm Monday to Saturday and 8am to 6pm Sundays and Public Holidays; and

The acoustic objectives for this assessment will be based on the surrounding acoustic amenity of the area as detailed within the INP. The acoustic amenity for specific areas are detailed within the INP and are determined by the time of day and the receiver potentially affected by noise emissions from the development. The amenity criteria are detailed in the Table 2 below.

**Table 2 – INP Amenity Criteria**

| Type of Receiver | Indicative Noise Amenity Area | Time of Day | Recommended $L_{Aeq}$ Noise Level, dB(A) | |
|---|---|---|---|---|
| | | | Acceptable | Recommended Maximum |
| Residence | Suburban | Day | 55 | 60 |
| | | Evening | 45 | 50 |
| | | Night | 40 | 45 |
| Commercial premises | | When in Use | 65 | |

### 5.1.3 Traffic Noise Policy – Sleep Disturbance Criteria

The traffic noise policy does not provide a clear recommended method of assessing sleep arousal from night time vehicle movements. On this basis, ALC have adopted the approach outlined in the NSW Environmental Criteria for Road Traffic Noise (ECRTN) which is referenced in the RNP. The guideline nominates a 2 stage approach to assess the potential for adverse night-time sleep arousal impacts.

Firstly, the expected noise level from the events is compared to the ambient $L_{90}$ noise level. If the source noise level emerges less than 15 dB(A) above the night time background noise level (10pm and 7am) when measured as an $L_1$ then there is minimal potential for sleep arousal to occur.

Where the "emergence test" indicates the potential for sleep impacts, the number and noise level associated with the new noise events should be assessed, including factors such as the number and level from the events, the existing noise environment, etc to determine if there is significant impact.

Figure B3 of the ECRTN shows the relationship between the number of maximum internal noise levels and sleep awakening events based on a field study and has been used as a basis for this assessment.

## 5.2 OPERATIONAL NOISE OBJECTIVES

Operational noise objectives have been formulated for the development to comply with the requirements of THSC and the OEH criteria. Noise objectives are detailed in Table 3 below.

**Table 3 – Operational Noise Criteria**

| Noise Source | Governing Criteria | Receiver Location | Time of Day | Background Noise Level $L_{90}$ | Intrusive Criterion $L_{eq\ 15min}$ | Amenity Criterion $L_{eq\ Time\ Period}$ | Noise Objective dB(A) $L_{eq\ 15min}$ |
|---|---|---|---|---|---|---|---|
| Operation of facility | INP | Residential | Day | 46 | 51 | 55 | **51** |
| | | | Evening | 42 | 47 | 45 | **45** |
| | | | Night | 34 | 39 | 40 | **39** |

The amenity criterion is assessed over a longer time period reflective of the time of day (Ie night time 9 hour, day time 11 hour and evening 4 hour) and would not be applicable to a 1 hour shoulder period.

# 6 OPERATIONAL NOISE ASSESSMENT

Noise emissions associated with the development have been assessed for vehicle movements, internal distribution and external loading dock activities. Predicted noise levels at residential facades have been calculated and the assumptions are detailed below.

Predicted noise levels have been presented for the worst case noise receiver in each scenario. Operational noise impacts have been assessed individually for each activity and combined for worst case accumulative noise scenario.

## 6.1 NOISE EMISSIONS FROM VEHICLE MOVEMENTS

Noise emissions associated with vehicles movements within the development have been assessed against the requirement of the INP. The assessment is based on the following assumptions.

- The sound power levels of vehicles operating on site are as following

**Table 4 – Assumed Vehicle Operational Noise Levels**

| Noise Source | Sound Power Level dB(A) | Speed | Area Assessed | Operation Time Duration |
|---|---|---|---|---|
| Semi trailer | 105 | 10km/h | Loading dock and internal road | Any time of the day and night |
| Medium rigid dual axle trucks | 100 | 10km/h | Loading dock and internal road | Any time of the day and night |
| Short base towing vehicles | 95 | 10km/h | Loading dock and internal road | Any time of the day and night |
| Cars/Lt Vehicles | 90 | 20km/h | Internal Road | Any time of the day and night |
| Loading Dock - Forklift operation | 100 per forklift assuming reversing alarms | - | Loading dock | 15min / hour external to building |

### 6.1.1 Predicted Noise Levels

For the purpose of this assessment the following assumptions regarding the movement of vehicles on site:

- Large trucks such as Semi-trailers
- Medium Rigid Truck
- Small Vans
- Cars and courier vehicles

During peak periods the expected traffic movements are expected to include up to 260 vehicle movements per hour.

Noise generated by vehicles driving on the site is presented below. The prediction is based on the assumption that there are, at worst case, the following vehicle movements in any fifteen minute period:

1. Peak Day time periods:
    - 3 semi-trailer (inbound or outbound)
    - 4 medium rigid truck (outbound)
    - 55 cars and vans(inbound or outbound)
2. Evening periods:
    - 1 semi-trailer (inbound or outbound)
    - 1 medium rigid truck (outbound)
    - 1 small vans (outbound)
    - 1 courier (outbound)
    - 15 cars (inbound or outbound)
3. Night time periods:
    - 1 semi-trailer or medium rigid truck (inbound or outbound)
    - 10 cars (inbound or outbound)

The predicted noise levels associated with vehicle movement within development site are presented in Table 5

**Table 5 – Vehicle Movements predicted Noise Levels**

| Worst Case Noise Receiver | Time of Day | Predicted Noise Level dB(A) $L_{eq\ 15\ min}$ | Noise Emission Criteria dB(A) $L_{eq\ 15min}$ | Complies |
|---|---|---|---|---|
| Potentially affected residence | Day | 39 | 51 | Yes |
| | Evening | 39 | 45 | Yes |
| | Night | <35 | 39 | Yes |

## 6.2 SLEEP DISTURBANCE

The potential for sleep disturbance has been assessed for medium rigid trucks entering and exiting along Governor Macquarie Drive during the night time period for sleep disturbance has been based on the following noise levels:

- The background noise level on which to base an emergence level has been determined from the two sets of ambient noise data. It is the median of the 90$^{th}$ percentile of the background noise levels recorded during the night-time period. The emergence level is this level + 15dB(A) $L_1$. This procedure is as recommended in the INP Application Notes.
- Aa Sound Power Level of 105dB(A) SWL assessed as a point source at the boundary of the development. This vehicle is the loudest typical noise source for a vehicle using the access way on the site.

The predicted noise levels for the aforementioned conditions are detailed in the Table below.

**Table 6 – Sleep Disturbance**

| Noise Source | Receiver Location | Predicted Noise Level dB(A) L1 1min | Sleep Emergence Level dB(A) BG (10pmm – 7am) + 15dB(A) L1 1min | Complies |
|---|---|---|---|---|
| Truck on the access road on the site | Worst affected residence | 47 | 49 | Yes |

On the basis that a movement from a rigid vehicle will not exceed the emergence level during the night-time period as they use the access way on the site, it is envisaged that noise emissions from truck movements will not give rise to sleep disturbance.

## 6.3 INTERNAL FACILITY OPERATIONAL NOISE

Internal activities within the warehouse have been assessed. The results of the assessment are presented in this section.

### 6.3.1 Proposed Facility Internal Activities

Internal activities within the warehouse have been predicted assuming activities within the proposed facility will include forklifts and other materials movements being conducted. The predicted noise level within the warehouse is a sound pressure level (SPL) of up to 73 dB(A) $L_{eq\ (15min)}$ based on the recorded noise levels conducted by this office of similar facilities.

The following assumptions have been made:

- A sound pressure level of 73dB(A) $L_{eq}$ within the entire facility, which in our experience is the loudest typical noise level we would expect for this type of warehouse.

The predicted noise levels are presented in Table 10 below at the potentially affected residential receivers.

**Table 7 – Warehouse Four Predicted Noise Levels**

| Worst Case Noise Receiver | Internal SPL | Predicted Noise Level dB(A) $L_{eq\ 15\ min}$ | Noise Emission Criteria dB(A) $L_{eq\ 15\ min}$ | Complies |
|---|---|---|---|---|
| Residence to the southwest | 73dB(A) $L_{eq}$ manufacturing area | <30 | Day - 51 | Yes |
| | | <30 | Evening - 45 | Yes |
| | | <30 | Night – 39 | Yes |

### 6.4 MECHANICAL NOISE

As design of the mechanical services and plant to serve the development is yet to be completed, treatment cannot be determined at this time. All plant and mechanical services are to be designed to comply with the noise emission objectives detailed in Section 5 of this report.

## 7 RECOMMENDED TREATMENTS

The noise assessment has been conducted using the architectural documents as a basis for construction. There are no additional acoustic treatments proposed above those presented in Section 6.

# 8 CONCLUSION

This report presents the assessment of noise impacts associated with the Coopers Paddock, Warwick Farm project.

The assessment has been carried out in accordance with the following guidelines:

- New South Wales – Environmental Protection Authority Industrial Noise Policy;
- New South Wales – Road Noise Policy; and
- Environmental Criteria for Road Traffic Noise.

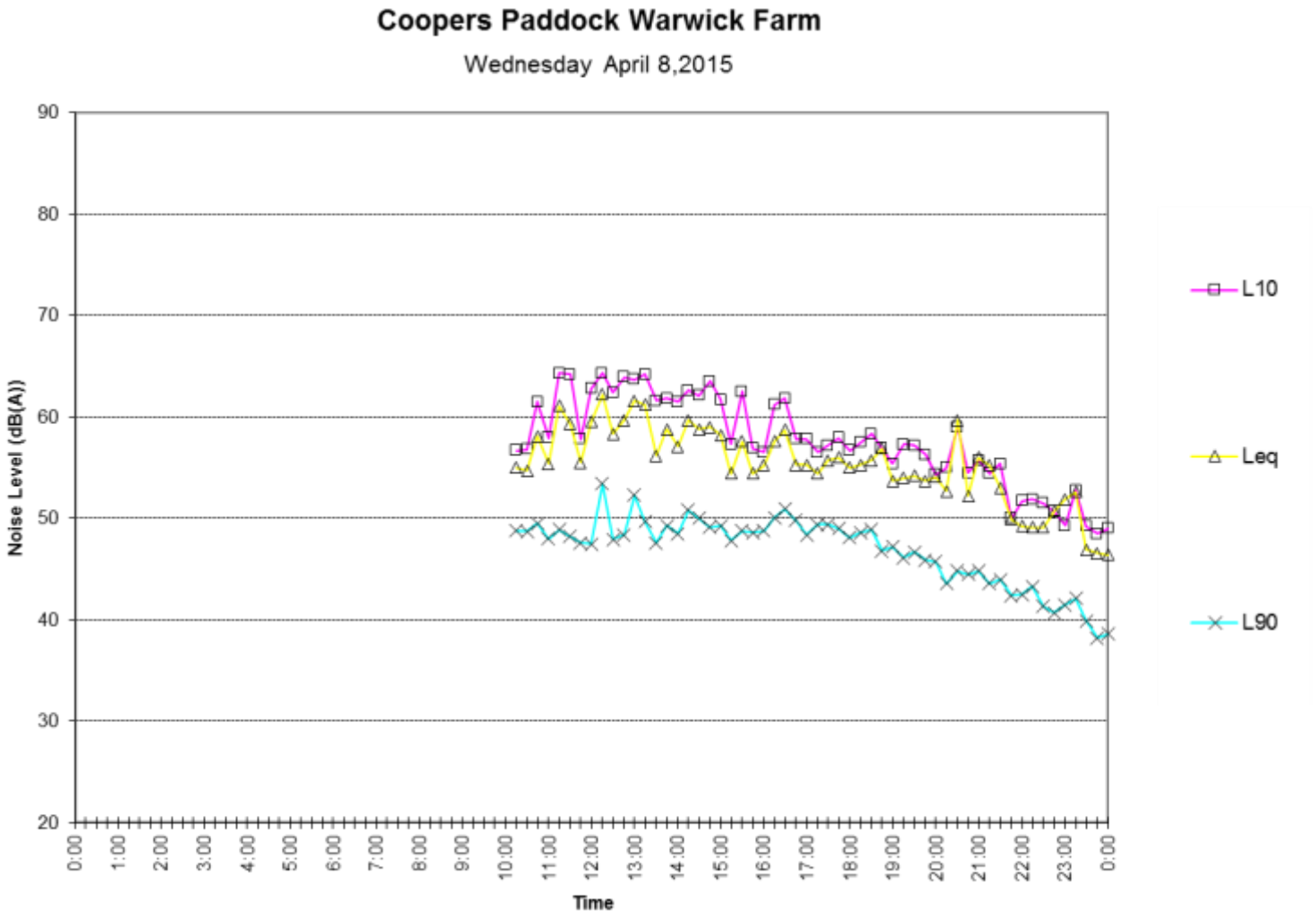
Noise impacts from the general operation of the facility will not have a significant detrimental impact on the residents within the vicinity of the site based on the noise prediction provided in this document.

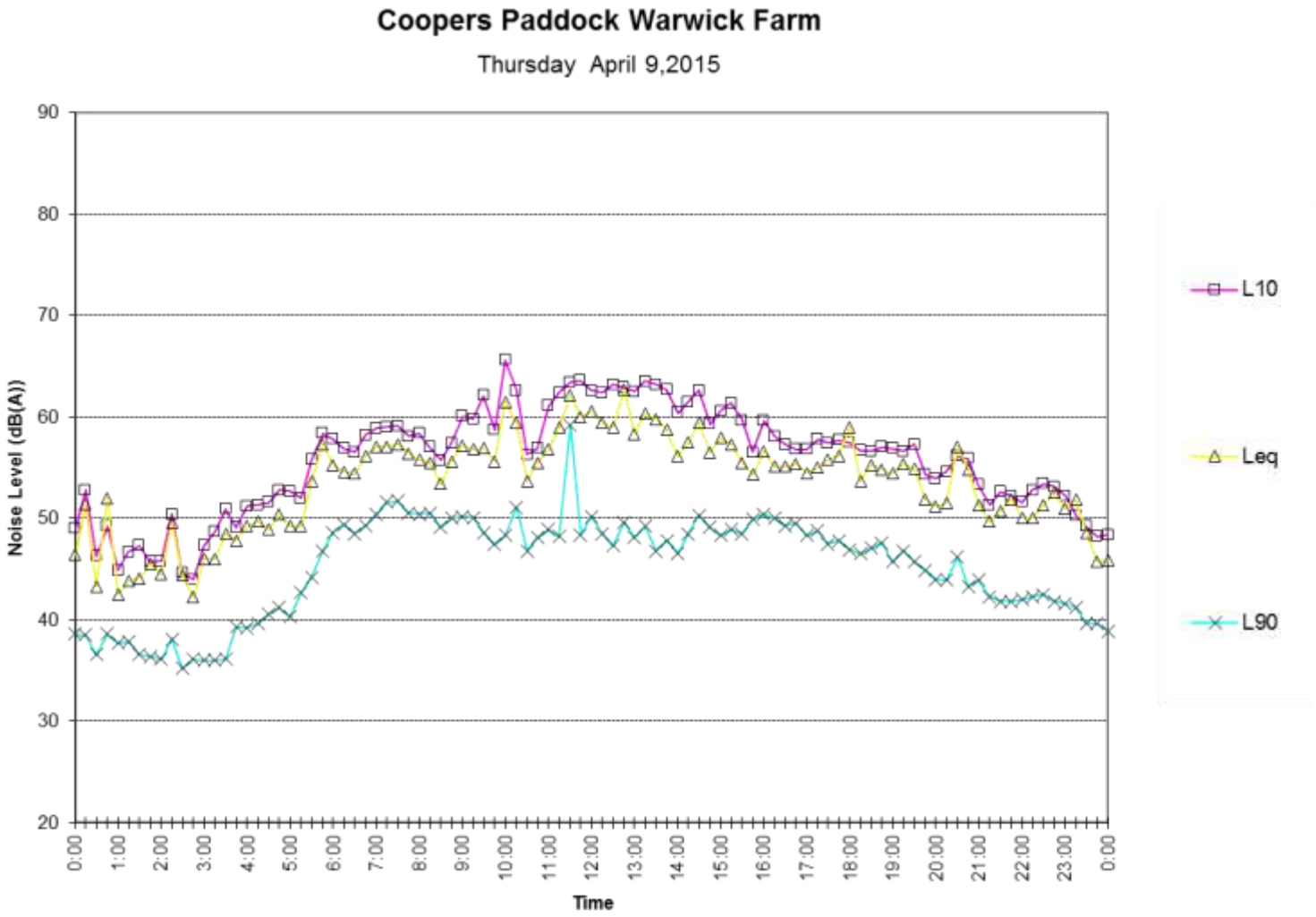
We trust this information is satisfactory. Please contact us should you have any further queries.

Yours faithfully,

Acoustic Logic Consultancy Pty Ltd
Ben White

# APPENDIX 1: BACKGROUND NOISE LOGGING


Coopers Paddock Warwick Farm
Wednesday April 8,2015
Noise Level (dB(A))
90
80
70
60
50
40
30
20
0:00
1:00
2:00
3:00
4:00
5:00
6:00
7:00
8:00
9:00
10:00
11:00
12:00
13:00
14:00
15:00
16:00
17:00
18:00
19:00
20:00
21:00
22:00
23:00
0:00
Time
L10
Leq
L90


Coopers Paddock Warwick Farm
Thursday April 9,2015
Noise Level (dB(A))
90
80
70
60
50
40
30
20
0:00
1:00
2:00
3:00
4:00
5:00
6:00
7:00
8:00
9:00
10:00
11:00
12:00
13:00
14:00
15:00
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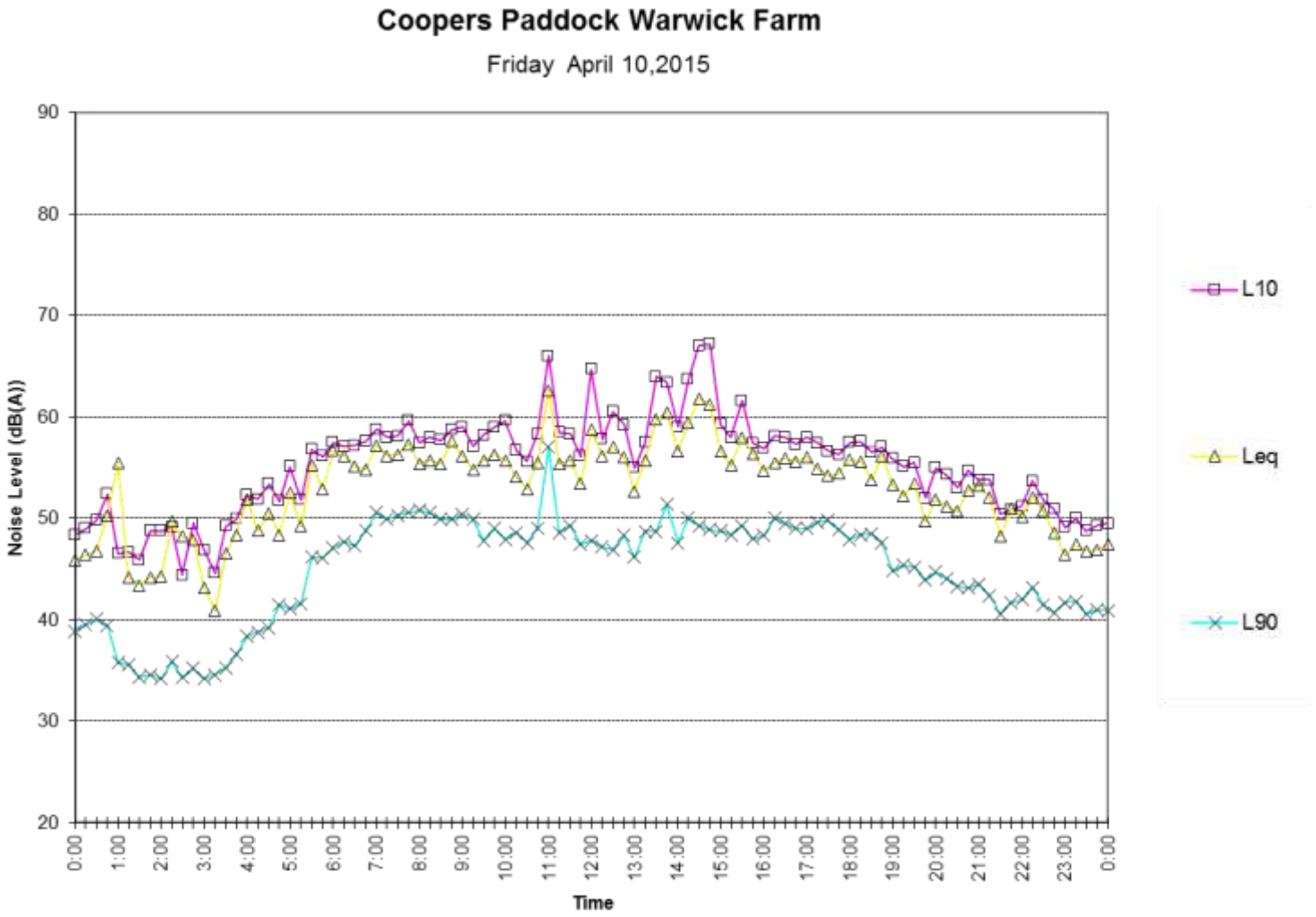
22:00
23:00
0:00
Time
L10
Leq
L90


Coopers Paddock Warwick Farm
Friday April 10,2015
Noise Level (dB(A))
90
80
70
60
50
40
30
20
0:00
1:00
2:00
3:00
4:00
5:00
6:00
7:00
8:00
9:00
10:00
11:00
12:00
13:00
14:00
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16:00
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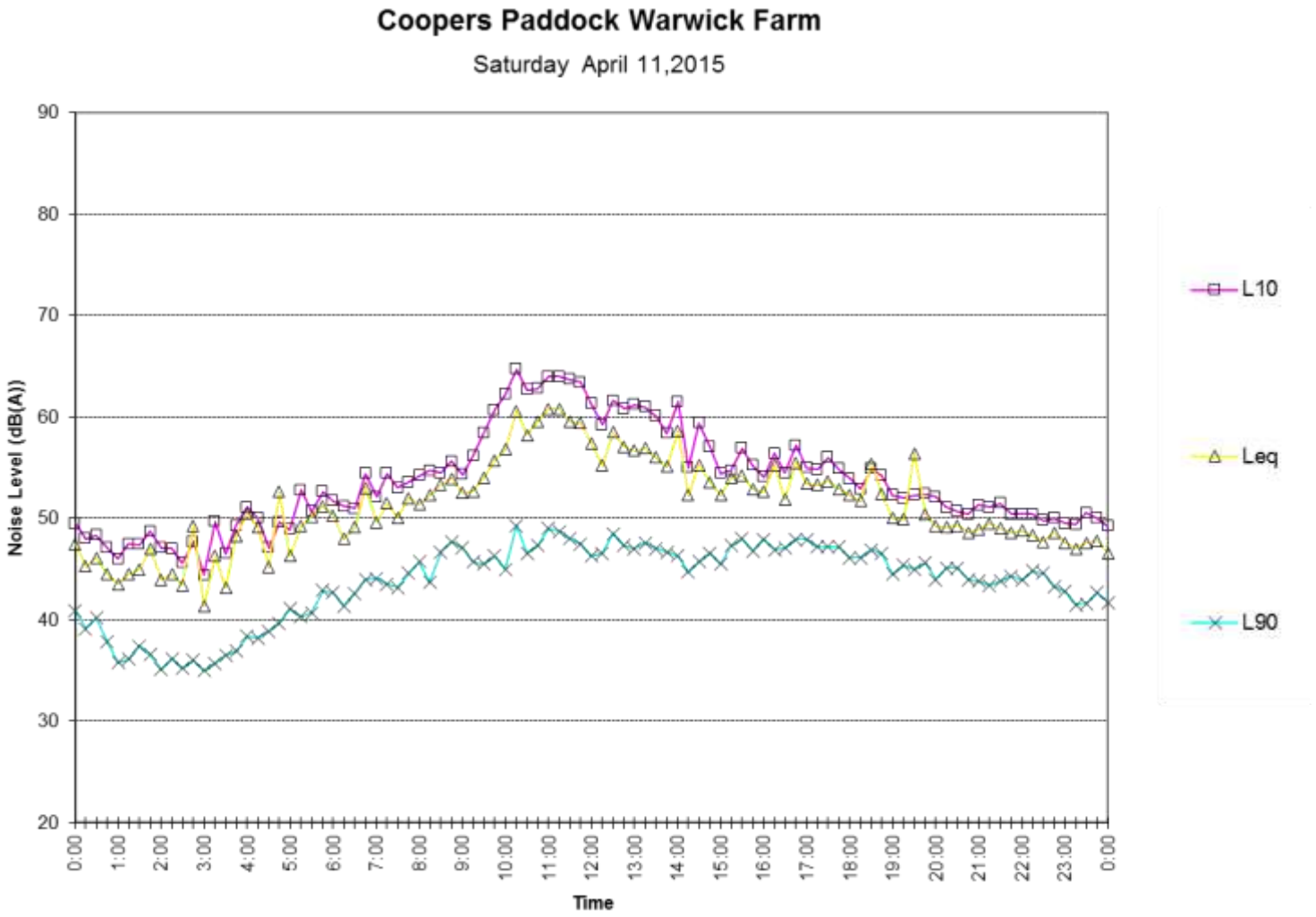
0:00
Time
L10
Leq
L90


Coopers Paddock Warwick Farm
Saturday April 11,2015
Noise Level (dB(A))
90
80
70
60
50
40
30
20
0:00
1:00
2:00
3:00
4:00
5:00
6:00
7:00
8:00
9:00
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13:00
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Time
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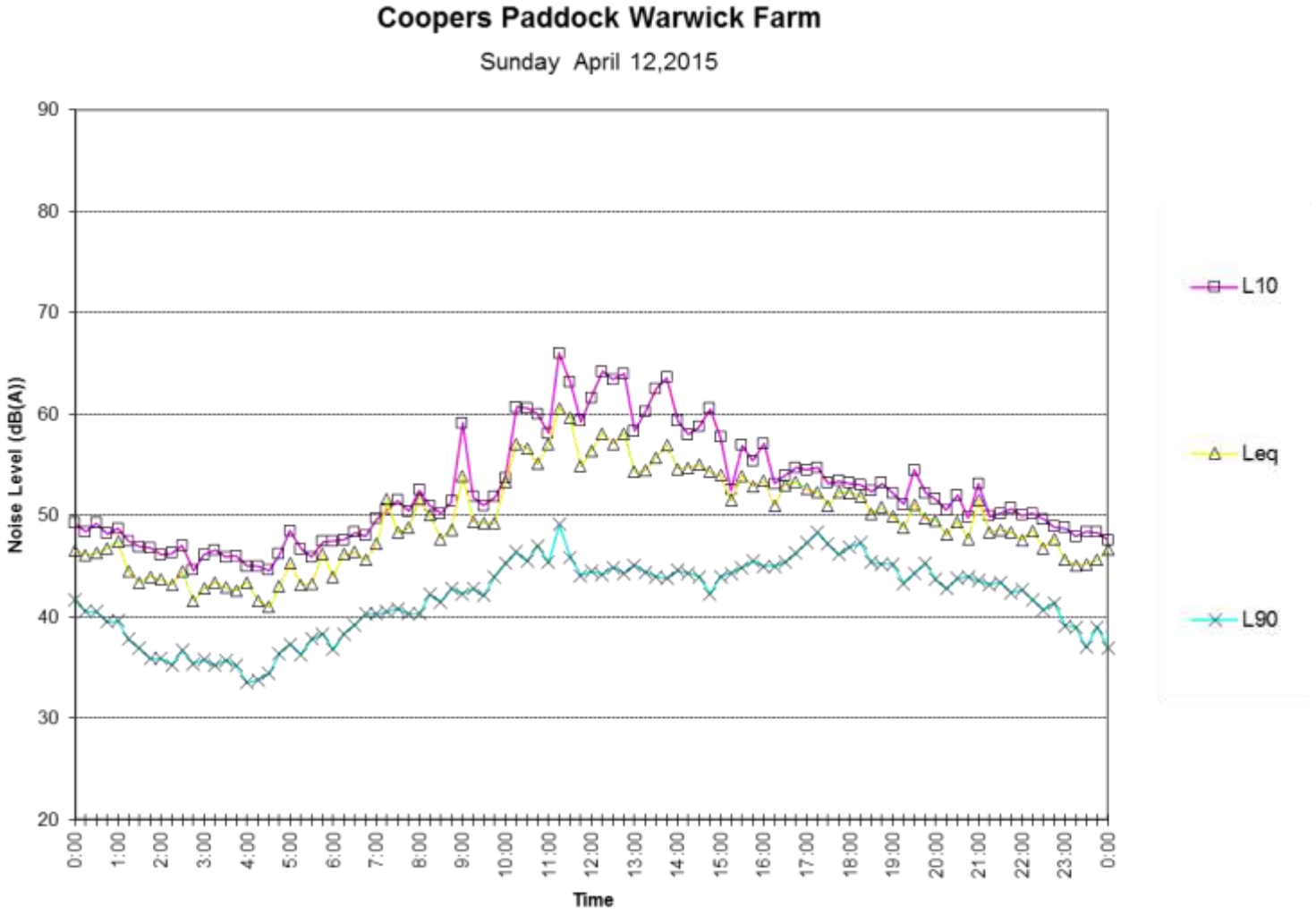
L90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Sunday April 12,2015
Noise Level (dB(A))
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80
70
60
50
40
30
20
0:00
1:00
2:00
3:00
4:00
5:00
6:00
7:00
8:00
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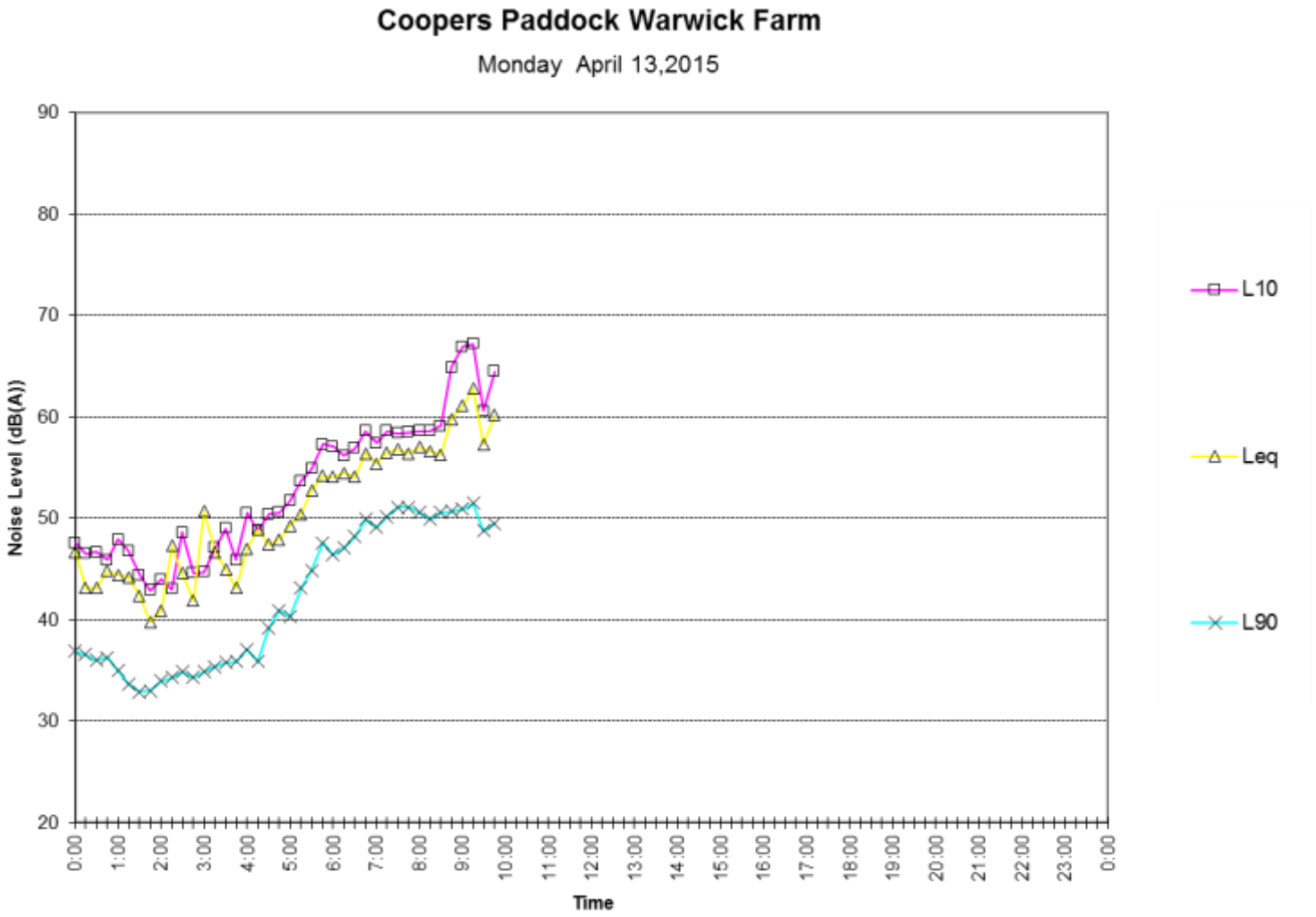
L90


Coopers Paddock Warwick Farm
Monday April 13,2015
Noise Level (dB(A))
90
80
70
60
50
40
30
20
0:00
1:00
2:00
3:00
4:00
5:00
6:00
7:00
8:00
9:00
10:00
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12:00
13:00
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15:00
16:00
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18:00
19:00
20:00
21:00
22:00
23:00
0:00
Time
L10
Leq
L90