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Noise Emission Assessment

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1 INTRODUCTION

Acoustic Logic Consultancy have been engaged by Flower Power Pty Ltd to undertake an assessment of operational noise likely to be associated with the proposed Garden Retail Centre and associated car parking development at 127 Cosgrove Road, Strathfield South.

In this report, we will:

- Identify nearby noise sensitive receivers and anticipated operational noise sources with the potential to adversely impact nearby development.
- Identify relevant Council and EPA acoustic criteria applicable to the development.
- Predict operational noise emissions and assess them against acoustic criteria.
- If necessary, determine building and/or management controls necessary to ensure ongoing compliance with noise emission goals.

This report has been prepared to address Strathfield Council requirements as they are stated in Section 5 "Operational Matters" in their letter dated 23rd December 2015:

> *"A future development application should be accompanied by the following documentation in order to justify that the proposed use is suitable for the site, noting the nearby residential properties:*
>
> *An Acoustic Report including recent noise monitoring to establish the true indication of the proposed use on the residential amenity of nearby properties. The Acoustic Report should include an assessment of the proposed PA system in the open yard, reversing beepers, trucks delivering to the site and all plant and machinery to provide a "worst case" scenario noise generation".*

2 SITE DESCRIPTION AND PROPOSED WORKS

The site is located on the western side of Cosgrove Road at the corner of Punchbowl Road, Strathfield South.

The development will be a retail garden centre, comprising of:

- A garden store, including indoor and outdoor areas, café, and gardening hardware;
- Three associated shops:
    - Fruit and vegetables
    - Pool shop
    - Pet shop
- An outdoor bulk landscape storage area;
- Car parking for 216 cars, including 8 spaces for the disabled;
- A two space loading dock catering for articulated vehicles and heavy rigid vehicles.

Primary vehicular access to/from the site is via Cosgrove Road.

This site is bounded as follows:

- To the north-west there are existing commercial buildings. The nearest resident to the north-west is approximately 2km away.
- To the immediate east is Cosgrove Road, which carries moderate traffic volumes. Further on the opposite side of Cosgrove Road are residential buildings. The nearest resident to the north-east is approximately 20m away.
- To the south is Punchbowl Road, which carries high traffic volumes. The nearest resident to the south is approximately 70m away and on the opposite side of Punchbowl Road.
- To the west of the site is the Intermodal Logistics Centre (ILC) at Enfield. The nearest residential dwellings after ILC is approximately 450m away.

The proposed Centre is planned to operate during the following hours:

- Nursery, café, pet shop, pod shop: 7am to 6pm, 7 days
- Fruit and veg shop: 7am to 9pm, 7 days

See aerial photograph below.

Figure 1 – Site Map and Noise Measurement Locations (Sourced from Six Maps NSW)

3 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 traffic noise impact as it closely corresponds with human perception of a changing noise environment; such is the character of environmental noise.

L_1 levels represent is the loudest 1% noise event during a measurement period.

4 SURVEY OF AMBIENT NOISE

Both long term unattended noise logging, and attended noise measurements were conducted to quantify the existing acoustic environment at the site.

Unattended noise monitoring was conducted between 6th and 13th April 2016 using an Acoustic Research Laboratories monitor set on A-weighted fast response mode. The monitor was calibrated before and after the measurements using a Rion Type NC-73 calibrator. No significant drift was recorded. Background noise and road traffic noise levels measured at the noise logger position will be indicative of the noise levels which would be received at the nearest residences (on the opposite side of Cosgrove Road).

The most affected sensitive location would be the residential buildings located opposite the proposed development. The front façade of the residential buildings facing Cosgrove Road are approximately 7m away from Cosgrove Road curb. Given that the site is not affected by any other noise source apart of traffic noise from Cosgrove Road, placing a noise monitor 7m away from the curb on the opposite site of the residential buildings would give the same traffic and background noise levels as placing the noise monitor at the front façade of the residential buildings.

All measurement locations are marked in the aerial photograph (Figure 1). Measurements were made away from any building façade and so no correction for façade reflection is required.

Measured noise levels (ambient and rating background noise level) are presented below.

Table 1 – Long Term Noise Logging Data

Location	Time of Day		
	Daytime (7am-6pm)	**Evening (6pm-10pm)**	**Night (10pm-7am)**
127 Cosgrove Road (7m away from Cosgrove Road curb)	65dB(A) $L_{eq(15min)}$ 45dB(A) L_{90}	64dB(A) $L_{eq(15min)}$ 41dB(A) L_{90}	60dB(A) $L_{eq(15min)}$ 33dB(A) L_{90}

Table 2 – Attended Noise Measurement

Location	Time of Day
	Daytime (10am-11am)
127 Cosgrove Road (3m away from Cosgrove Road curb)	70dB(A) $L_{eq(15min)}$ 48dB(A) L_{90}

5 NOISE EMISSION CRITERIA

The following noise controls and guidelines will be used in the acoustic assessment of the site, in order to address the Strathfield Council requirements as they are stated in Section 5 "Operational Matters" in their letter dated 23rd December 2015:

- Strathfield Council DCP 2005
- EPA Industrial Noise Policy
- EPA Road Noise Policy
- EPA guidelines for sleep arousal (Application Notes to the Industrial Noise Policy).

5.1 STRATHFIELD COUNCIL

There are no specific noise emission criteria for commercial developments set out in the Strathfield DCP. Given this, appropriate EPA noise controls will be used to develop noise emission criteria.

5.2 EPA INDUSTRIAL NOISE POLICY

Noise sources covered by this code will include vehicle noise (generated on the site) and mechanical services noise. Both the Intrusiveness and the Amenity criteria (as set out below) must be complied with.

5.2.1 INP - Intrusiveness Assessment

Intrusiveness criteria permit noise generation to be no more than 5dB(A) above existing background noise levels. The criteria are as follow:

Table 3 - EPA Intrusiveness Criteria

Location	Time of Day	Background noise Level - dB(A)L_{90}	Intrusiveness Noise Objective dB(A)$L_{eq(15min)}$ (Background + 5dB)
All Potentially Affected Residential Properties	Day Time (7am - 6pm)	45	50
	Evening (6pm - 10pm)	42	47
	Night (10pm - 7am)	34	39

5.2.2 INP - Amenity Assessment

The Amenity criteria set additional criteria based on the land use of the noise sensitive receivers.

Amenity criteria are as follows:

Table 4 - EPA Amenity Criteria

Receiver Location	Land Type	Time of Day	Amenity Noise Objective dB(A)$L_{eq(Period)}$
All Potentially Affected Residential Properties	Suburban	Day Time (7am – 6pm)	55
		Evening (6pm – 10pm)	45
		Night (10pm-7am)	40
Commercial	All	When in use	65

5.3 SLEEP AROUSAL ASSESSMENT

Potential sleep arousal impacts should be considered for noise generated before 7am or after 10pm. Given that the proposed hours of operation of the Centre is from 7am to 9pm for the fruit and veg shop and 7am to 6pm for all the other shops and deliveries to the site are proposed to be between 7am and 4pm, there is no requirement for a sleep disturbance assessment.

5.4 NOISE FROM INCREASED TRAFFIC GENERATION ON PUBLIC STREETS

We note that it is anticipated that the site will rely primarily on passing trade on Cosgrove Road. As the site will potentially generate some additional traffic, an acoustic assessment of this traffic has been conducted.

For land use developments with the potential to create additional traffic on public streets the development should comply with the EPA Road Noise Policy.

Noise levels generated by traffic should not exceed the noise levels set out in the table below when measured at a nearby property.

Table 5 - Criteria for Traffic Noise Generated by New Developments

Road Type	Time of day	Permissible Noise Generation
Sub-Arterial Road* (Cosgrove Road)	Day (7am to 10pm)	60 dB(A) $L_{eq(15hr)}$
	Night (10pm to 7am)	55 dB(A) $L_{eq(9hr)}$

***As defined in the EPA Road Noise Policy, a sub arterial (or collector) road is one that connects local roads to arterial roads. Given that Cosgrove Road is used to feed local traffic to Punchbowl Road (an arterial road), it is reasonable to consider Cosgrove Road a sub-arterial/collector road when classifying the road type. In addition, given the daytime noise level of 70dB(A) on Cosgrove Road (as per table 2), this is indicative of a sub arterial road, not a local road.**

However, if existing noise levels exceed those in the table above, section 3.4 of the Road Noise Policy is applicable, which requires noise impacts are reduced through feasible and reasonable measures. However, in determining what is feasible/reasonable, the Policy notes that an increase of less than 2dB(A) is a minor impact and would be barely perceptible.

6 NOISE EMISSION ASSESSMENT

An assessment of operational noise is presented below. The following noise sources are assessed:

- Vehicular noise on site (use of car parks, vehicle circulation).
- Noise from the loading docks.
- Noise created on public roads as a result of traffic generated by the site.
- A preliminary assessment of noise from mechanical plant and the public address system.

Predictions have been made based on the vehicle types, quantities and noise levels set out below, and predictions of noise emissions have been made taking into account distance (hemispherical spreading and time averaging (for 15 minute time intervals) and noise shielding (for any activity where line of sight is screened from the noise receiver).

6.1 VEHICLE NOISE

We note that both the loading dock and the customer car park is located at the rear of the site, both of which is accessed via a driveway off Cosgrove Road, running along the northern edge of the site.

The primary source of vehicle noise generated on the site will be from vehicles entering/leaving the site via the driveway.

Noise emissions from vehicles using the driveway are assessed below. Noise emissions have been predicted based on the following assumptions:

We note that predicted numbers of vehicle movements associates with the site are set out in the Traffic Impact Assessment Report by Transport and Urban Planning P/L dated March 2016, and are as follows:

- 1 articulated truck per day.
- 26 Rigid vehicle movements per day and
- 202 passenger vehicle movements in a peak

Based on the above, noise emissions from vehicles using the driveway have been predicted based on the following assumptions:

- In a peak 15 minute period, there will be:
  - 1 articulated truck movement.
  - 1 rigid truck movement.
  - 50 passenger vehicle movements.
- The associated noise levels from these vehicles when driving on the site (at 5-10km/h) are:
  - Articulated truck with reversing beacon： 100-105dB(A).
  - Rigid Vehicle: 95dB(A).

- Passenger vehicle: 84dB(A).

Based on the above, the cumulative noise level from vehicles movements is predicted at the nearest residences (directly opposite the driveway, on Cosgrove Road.

Table 6 – Vehicle Noise Emission Assessment

Noise Source	Noise Receiver Location	Predicted Noise Level – dB(A)$L_{eq(15min}$	Compliance
Vehicle entry/exit noise (articulated truck, rigid truck, passenger vehicles).	Cosgrove Road – Residences to the east of the site	49dB(A)$L_{eq(15min)}$	Complies – Day time goal 50dB(A)

Noise emissions from the loading docks are compliant with Industrial Noise Policy requirements during a peak period of use. Obviously the predicted noise emission will further reduce during periods of less intensive use of the driveway.

6.2 NOISE GENERATED BY ADDITIONAL TRAFFIC ON PUBLIC ROADS

Noise created as a result an increase in traffic on public roads is assessed with reference to the EPA Road Noise Policy.

Primary access/egress to the site is via Cosgrove Road. Predictions of noise generation are based on the following:

- An assumed sound power level of a car driving on a public road (at 40-50km/h) of 94dB(A).
- That there are in a peak one-hour period, up to 202 vehicle movements attributed to the site (resulting in 202 vehicle movements generated on Cosgrove Road), one articulated truck and up to 10 rigid truck movements.

Noise emissions are predicted at the building façade of the residences on Cosgrove Road and compared against the acoustic criteria set out in section 5.4.

Predicted noise levels are as follows:

Table 7 – Noise Generated by Additional Road Traffic – Noise Impact Assessment

Time of Day	Receiver Location	Predicted Noise Level – dB(A)L_{eq}	Compliance
Daytime (7am-10pm)	Cosgrove Road residences	<55dB(A)$L_{eq(Day)}$*	Complies with 60dB(A)$L_{eq(15hr)}$ criteria.

Noise as a result of additional traffic generate by the site is compliant with EPA Road Noise Policy. In addition, we note:

- This predicted noise level presented above is conservative in that it is based on a worst one hour peak. If the traffic generation is averaged over the course of the day (as is consistent for EPA guidelines for developments on arterial roads), the predicted noise level will be approximately 2dB(A) lower than the level predicted above.

- Further, the traffic noise levels on Cosgrove Road as a result of pre-existing traffic are already significantly higher than 55dB(A) (approx. 67dB(A) at the property boundary). The overall increase in traffic noise level as a result of the contribution from the site will result in a overall increase in existing noise levels of less than 1dB(A), which would not be perceptible.

6.3 MECHANICAL PLANT AND PA SYSTEM NOISE

Detailed review of all external mechanical plant should be undertaken at construction certificate stage (once plant selections and locations are finalised). Acoustic treatments should be determined in order to control plant noise emissions to the levels set out in section 3 of this report.

However, based on an indicative analysis, we note:

- With respect to mechanical plant:
    - Detailed acoustic review should be undertaken of any externally located mechanical plant.
    - External plant which is likely to run 24 hours per day will almost certainly need to be located in an enclosure, or positioned on the roof or at the rear of the site such that the building shell provides a screen between the equipment item and the residences on Cosgrove Road.
    - Other air-conditioning equipment (condensers) would typically be operated during business hours (as opposed to at night time). These equipment items will also potentially need to be located such that the building shell breaks any line of sight from the Cosgrove Road residences. However in our experience it is relatively unlikely that additional acoustic treatment will be needed for these plant items.
    - Indicatively, any equipment item with a sound power level exceeding 75dB(A)Leq will need to be located such that the building shell breaks any line of sight between the equipment item and the resident on Cosgrove Road.
- With respect to any proposed PA system:
    - If possible, speakers should be positioned such that the building shell break any line of sight between the speaker and a residence on Cosgrove Road.
    - If there is NO line of sight between the speaker and Cosgrove Road, speaker can generate a noise level of up to 70dB(A) at 5m distance.
    - If there IS line of sight between the speaker and Cosgrove Road, speaker can generate a noise level of up to 65dB(A) at 5m distance.

    Provided that the above is adopted, the cumulative noise impact from plant/PA system *and* vehicular noise will be compliant with EPA requirements.

7 RECOMMENDATIONS

Analysis indicates that the site is capable of meeting EPA noise emission guidelines.

However, we recommend the following to ensure ongoing compliance with EPA requirements:

- Loading docks (including waste removal) not to be used before 7am or after 4pm.
- If a forklift is used in the loading dock, the forklift should be electric or gas powered (not diesel). Forklifts are to be fitted with a low decibel/non-tonal reversing alarm (quacker).
- Detailed acoustic review of all external plant items should be undertaken following equipment selection and duct layout design.
- With respect to any proposed PA system, in order to ensure that noise emissions are compliant at any resident on Cosgrove Road:
    - If there is NO line of sight between the speaker and Cosgrove Road, speaker can generate a noise level of up to 70dB(A) at 5m distance.
    - If there IS line of sight between the speaker and Cosgrove Road, speaker can generate a noise level of up to 65dB(A) at 5m distance.

8 CONCLUSION

Operational and construction noise emissions associated with the proposed Garden Retail Centre at 127 Cosgrove Road, Strathfield South have been assessed with reference to relevant EPA and Strathfield Council acoustic guidelines.

An analysis of typical operational noise (vehicle, loading dock, equipment) indicates that the site is capable of complying with relevant noise emission criteria.

At construction certificate stage, detailed acoustic review of mechanical plant should be undertaken once design is further progressed (plant selections finalised etc). In-principal review indicates that compliance with EPA noise emission requirements can readily be achieved though appropriate equipment selection, location and (if necessary) acoustic treatment.

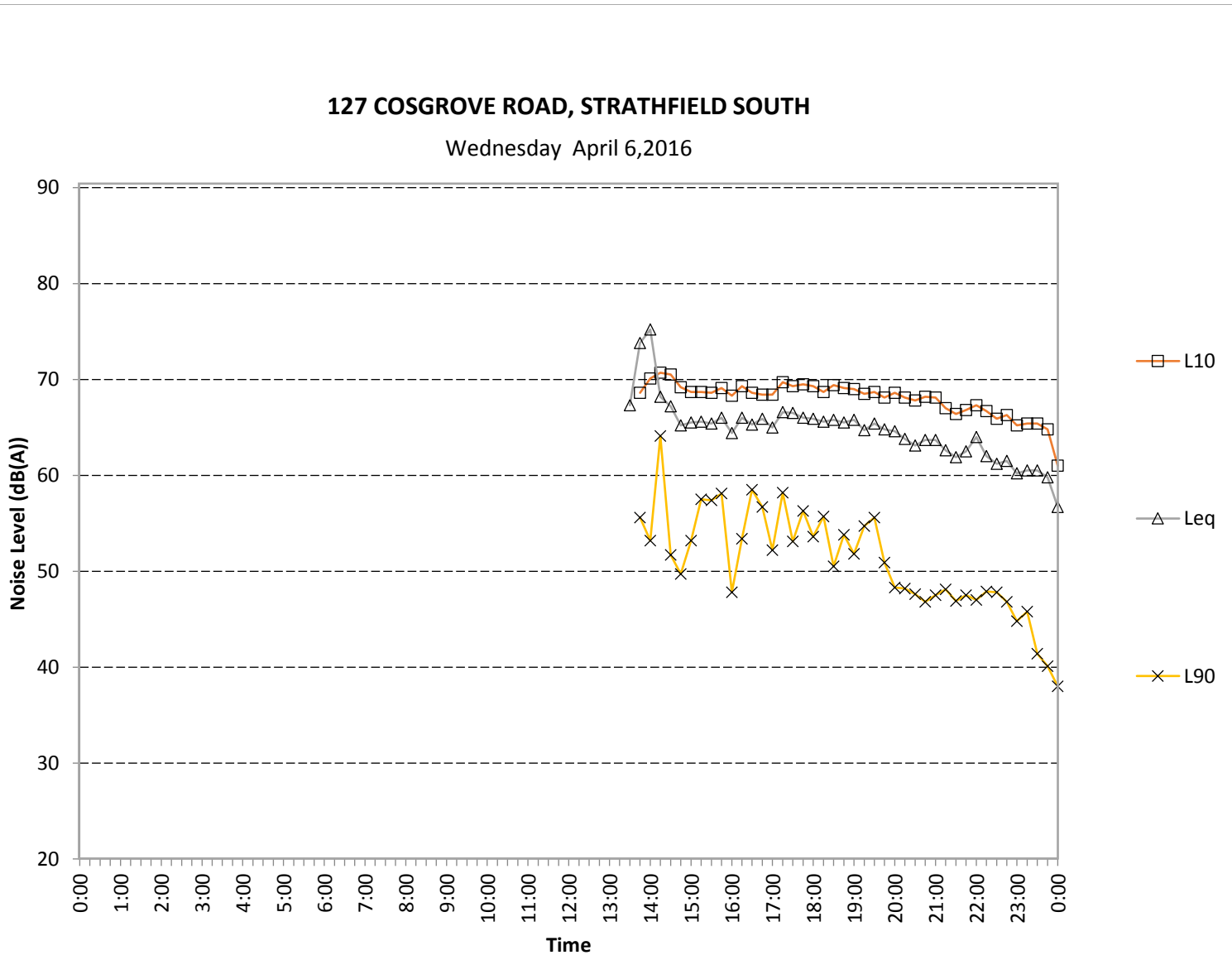
Please contact us if you have any queries.

Yours faithfully,

Acoustic Logic Consultancy Pty Ltd
Eleni Chrysafis

APPENDIX 1

NOISE LOGGING DATA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17:00
18:00
19:00
20:00
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Time
L10
Leq
L90

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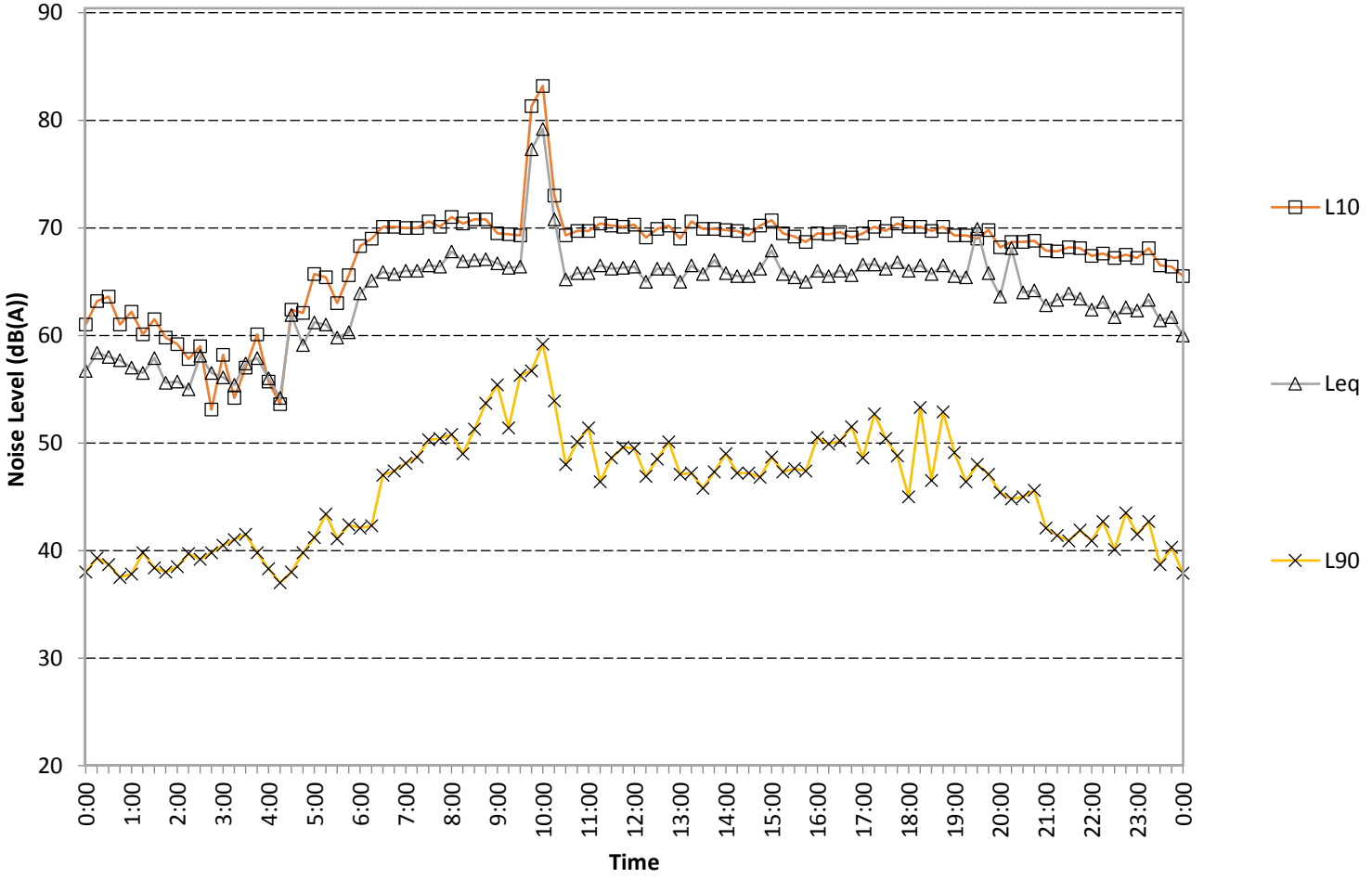
127 COSGROVE ROAD, STRATHFIELD SOUTH

Thursday April 7,2016



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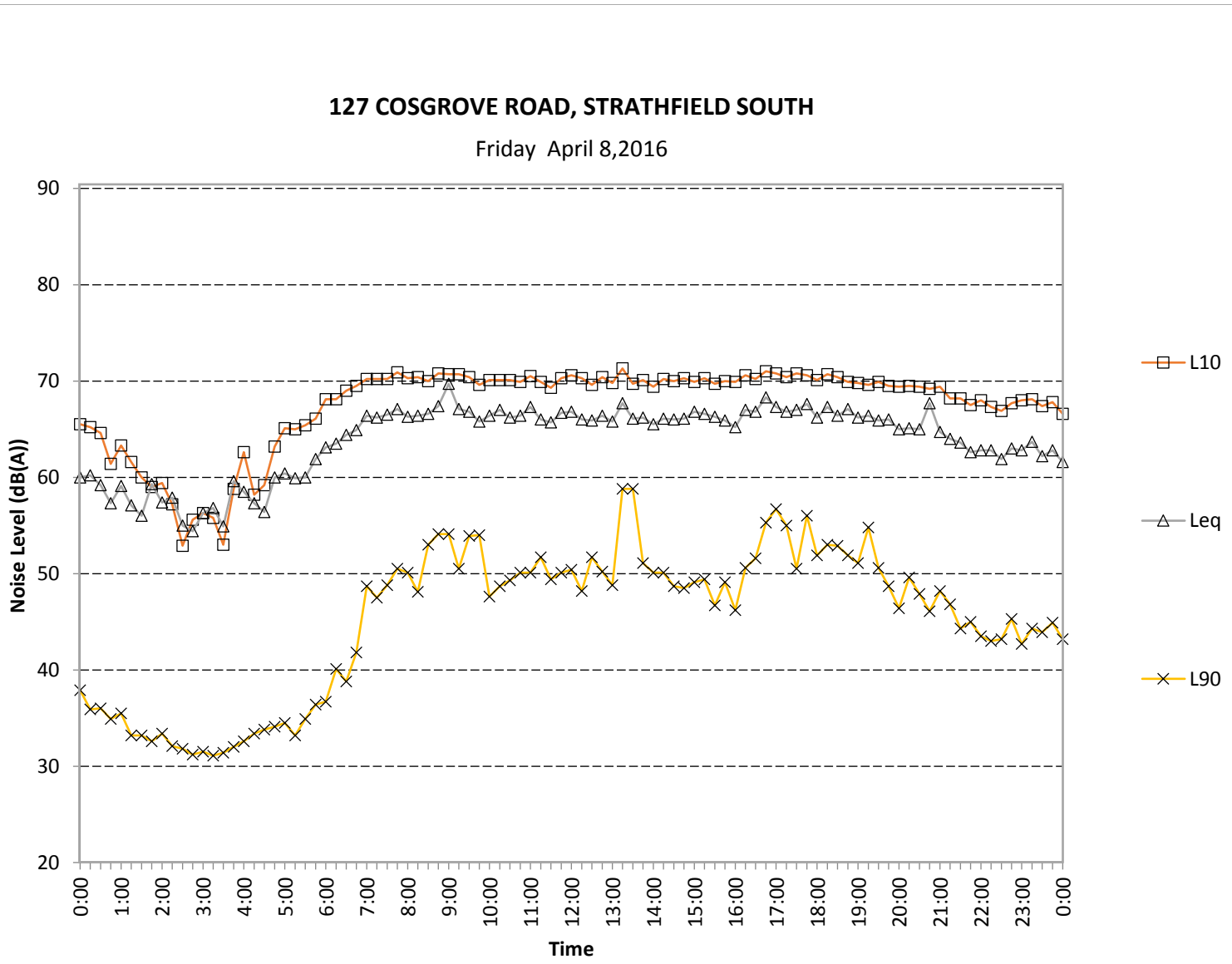
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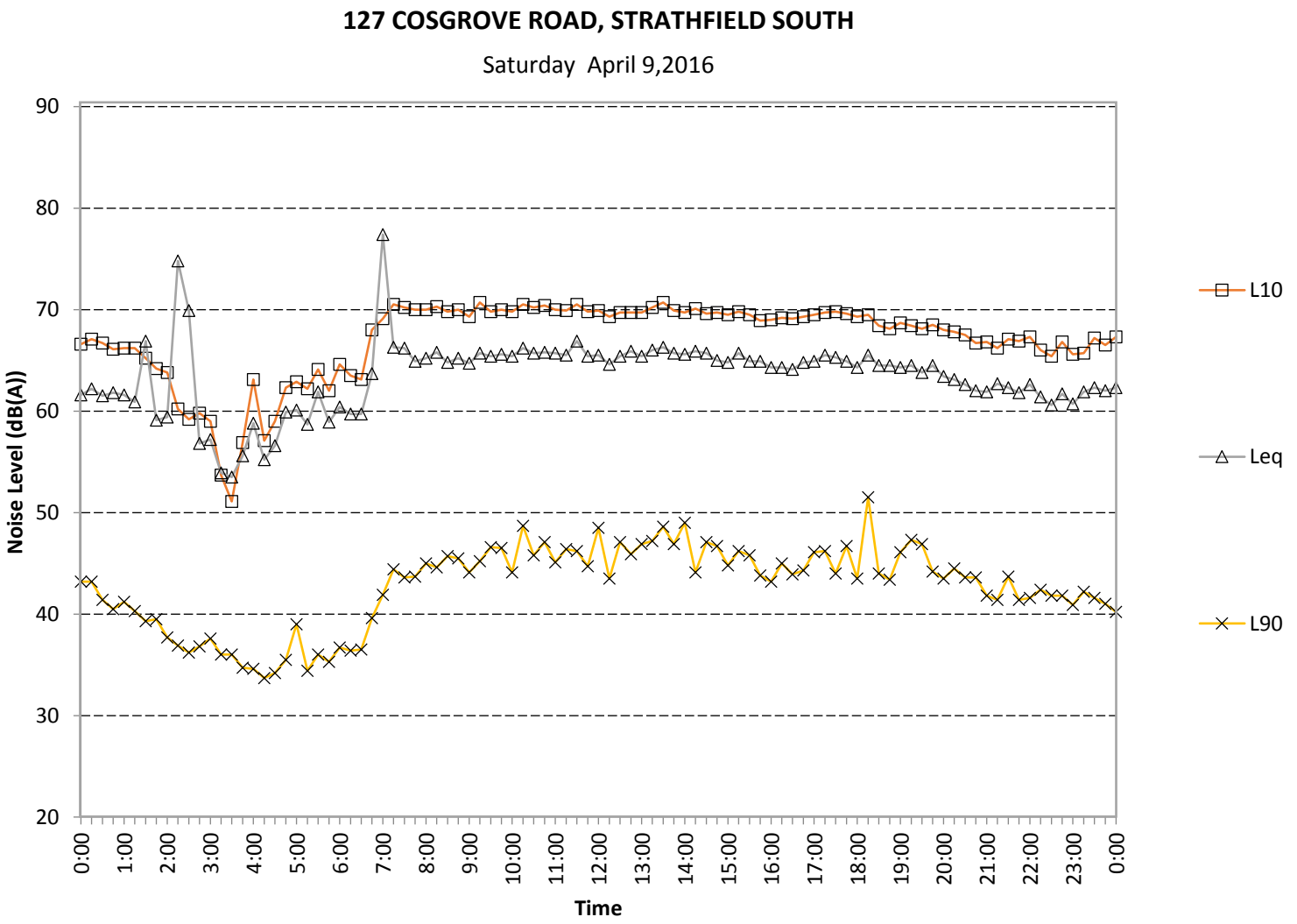
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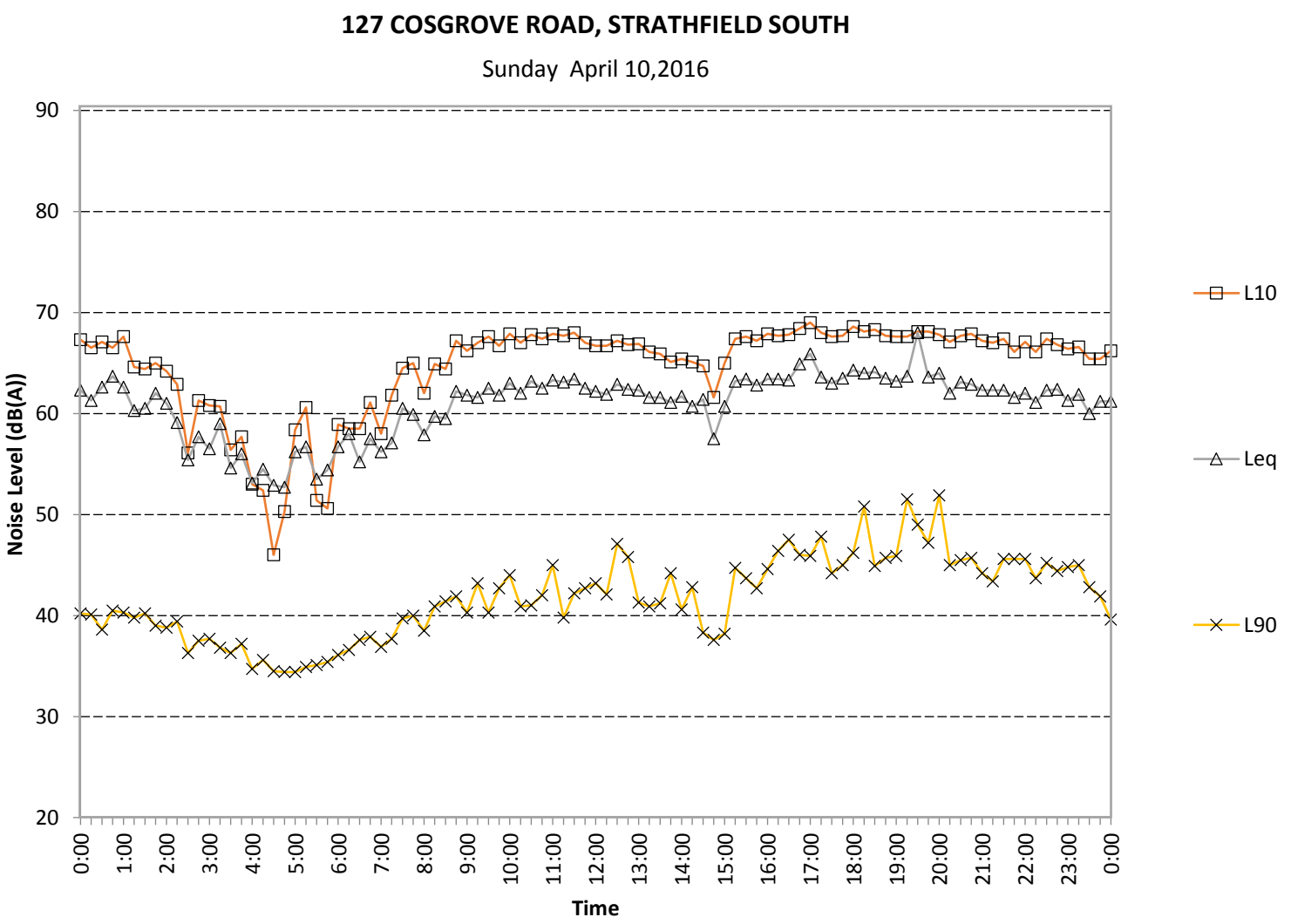
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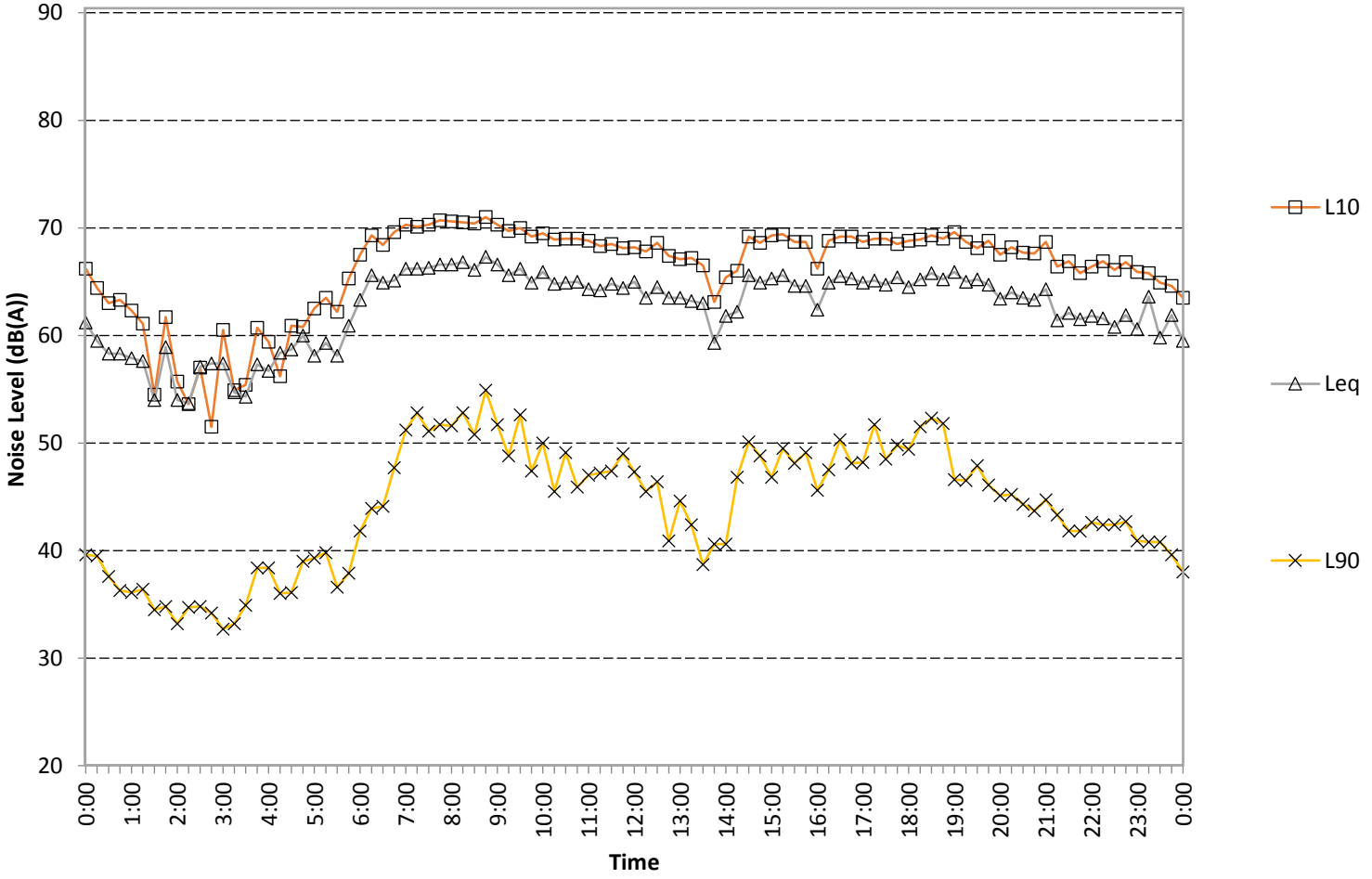
127 COSGROVE ROAD, STRATHFIELD SOUTH

Monday April 11,2016



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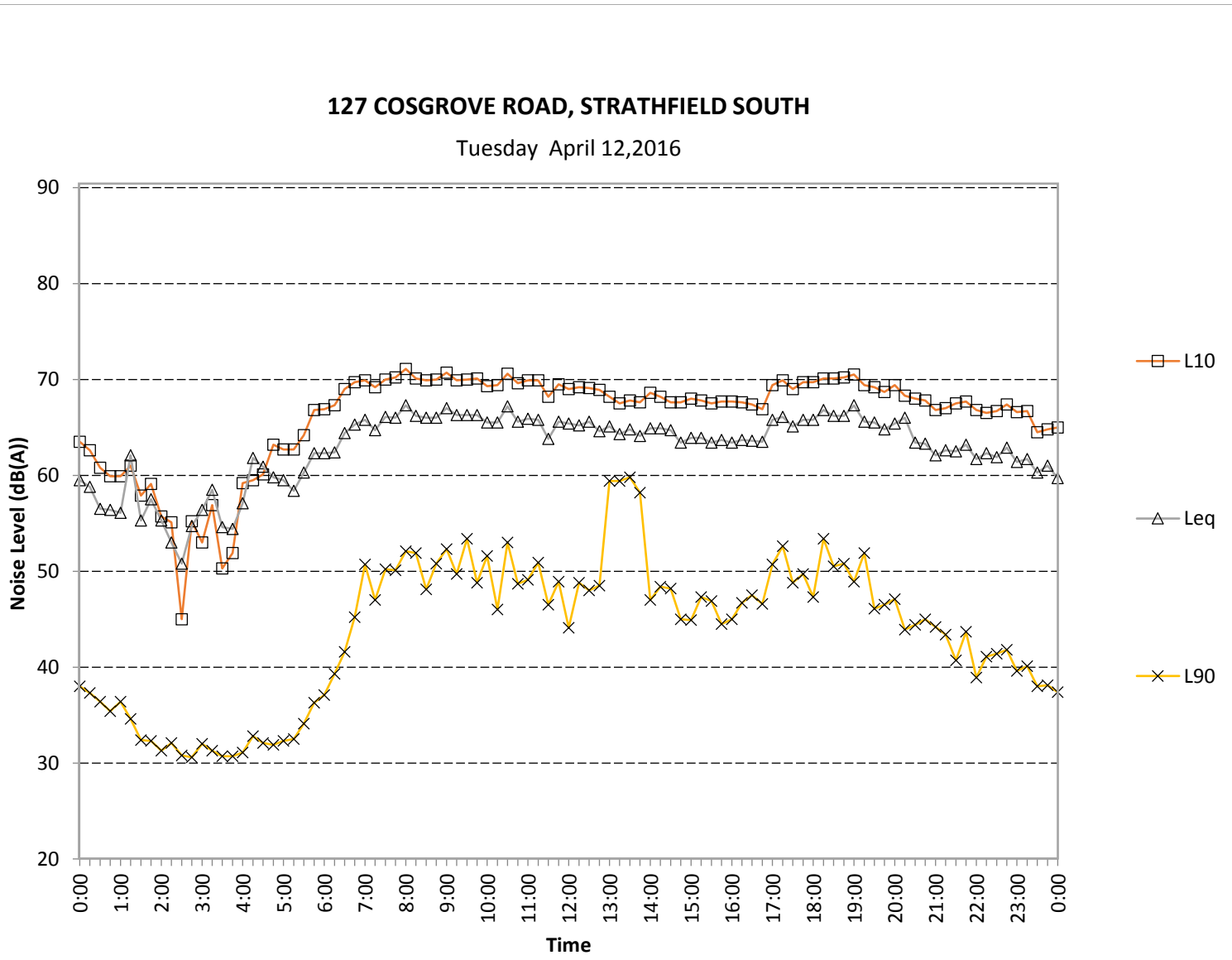
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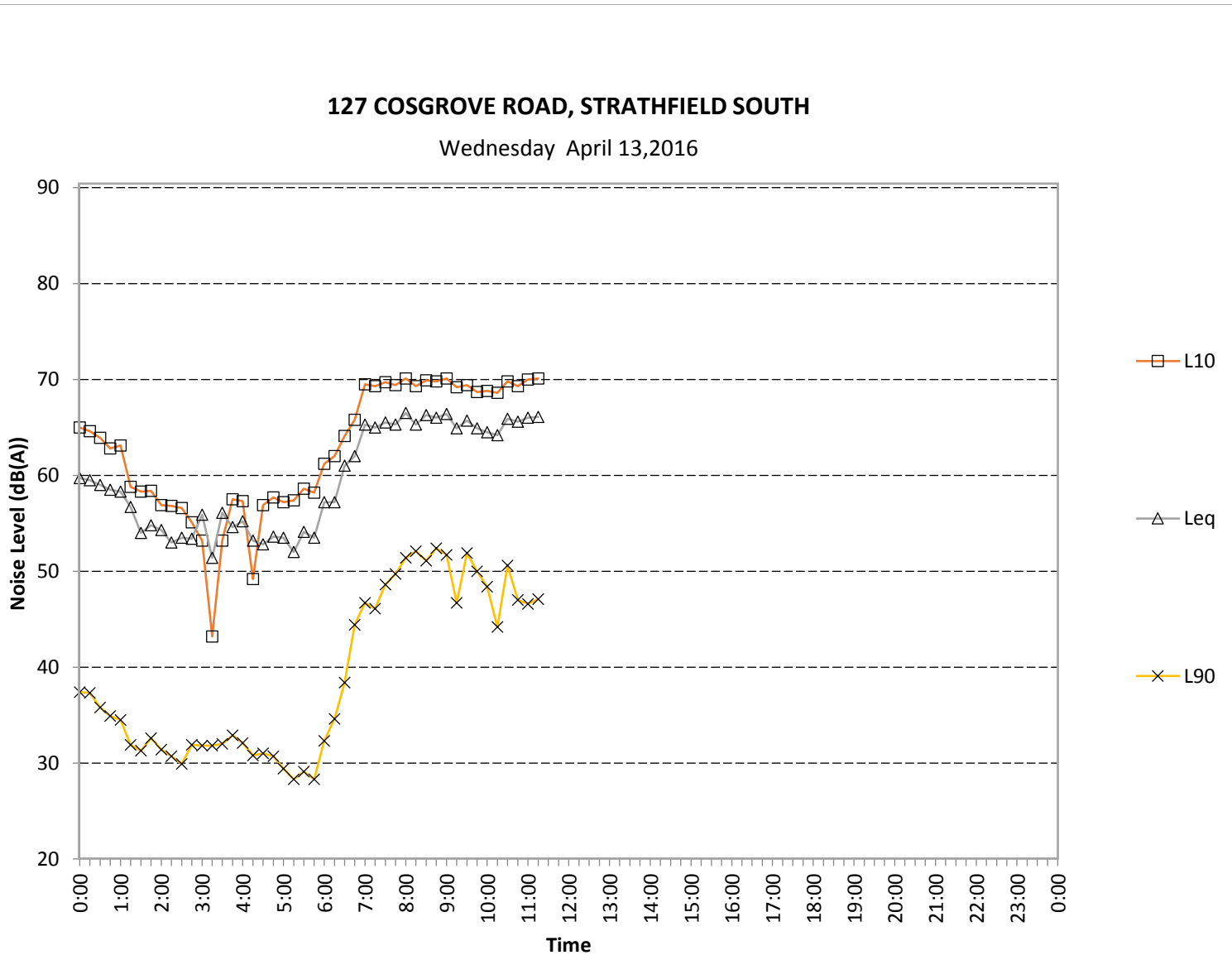
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