3 Quarry Road and 4 Vineys Road, Dural

DA Environmental Noise Impact Assessment

SYDNEY
A: 9 Sarah St
MASCOT 2020
T: (02) 8339 8000

ABN: 11 068 954 343

DOCUMENT CONTROL REGISTER

Project Number	20180361.1
Project Name	3 Quarry Road and 4 Vineys Road, Dural
Document Title	DA Environmental Noise Impact Assessment
Document Reference	20180361.1/0106A/R1/GC
Issue Type	Email
Attention To	Sunglow RV One Unit Trust

Revision	Date	Document Reference	Prepared By	Checked By	Approved By
0	28/03/2018	20180361.1/2803A/R0/GC	GC		BW
1	1/06/2018	20180361.1/0106A/R1/GC	GC		BW

TABLE OF CONTENTS

1 INTRODUCTION

This report presents an analysis of acoustic impacts associated with the proposed aged care facility at 3 Quarry Road and 4 Vineys Road, Dural.

In this report we will:

- Conduct an external noise impact assessment (primarily traffic noise) and recommend acoustic treatments to ensure that a reasonable level of amenity is achieved for future tenants.
- Identify potential noise sources generated by the site, and determine noise emission goals for the development to meet Council and NSW EPA acoustic requirements to ensure that nearby developments are not adversely impacted.

Traffic noise at the site have been measured and assessed in accordance with Hornsby Shire council DCP and Australian Standard AS2107:2016 and AS3671:1989.

The environmental noise emission criteria will be assessed in accordance with the requirements of NSW EPA Industrial Noise Policy.

The assessment is based on architectural drawings presented in the table below.

Table 1 – Referenced Drawings

Consultant	Drawing Number	Revision	Date
Marchese Partners (Job no. 16033)	DA 0.00	F	29/05/2018
	DA 0.01	F	29/05/2018
	DA 1.01	F	29/05/2018
	DA 1.02	F	29/05/2018
	DA 1.03	F	29/05/2018
	DA 1.04	F	29/05/2018
	DA 1.05	F	29/05/2018
	DA 2.01	F	29/05/2018
	DA 2.02	F	29/05/2018
	DA 2.03	F	29/05/2018
	DA 2.04	F	29/05/2018
	DA 2.05	F	29/05/2018
	DA 2.06	F	29/05/2018
	DA 2.07	F	29/05/2018
	DA 4.01	F	29/05/2018
	DA 4.02	F	29/05/2018
	DA 4.03	F	29/05/2018

2 SITE DESCRIPTION

The proposed development consists of a multi-storey aged care facility located between Quarry Road and Vineys Road, Dural. The southern façade faces Quarry Road which is a two lane road with low to medium traffic volumes. The northern façade faces Vineys Road which is primarily used for local residential access while remaining facades are bounded by the existing residential and commercial buildings.

Noise potentially generated by the site will consist primarily of noise from mechanical plant;

The nearest potentially affected noise receivers are:

- Receiver 1 - Residences and commercial properties bounding the site to the north west;
- Receiver 2 - Residences and commercial properties bounding the site to the south west;
- Receiver 3 - Residences properties bounding the site to the north east;
- Receiver 4 - Commercial properties bounding the site to the south east;
- Receiver 5 - Residences on the northern side of Vineys Road;

Refer to Figure 1 below, which is an aerial photo of the existing development.

Figure 1 – Site Map

3 NOISE DESCRIPTORS

Traffic noise constantly varies in level, due to fluctuations in traffic speed, vehicle types, road conditions and traffic densities. Accordingly, it is not possible to accurately determine prevailing traffic noise conditions by measuring a single, instantaneous noise level. To accurately determine the effects of traffic 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. These parameters are used to measure how much annoyance would be caused by a particular noise source.

In the case of 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 interval.

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 measurement 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 traffic noise.

Current practice favours the L_{eq} parameter as a means of measuring traffic noise, whereas the L_{10} parameter has been used in the past and is still incorporated in some codes. For the reasons outlined above, the L_{90} parameter is not used to assess traffic noise intrusion.

4 EXTERNAL NOISE INTRUSION ASSESSMENT

Significant external noise sources in the vicinity of the site are as follows:

- Traffic noise from Quarry Road, on the southern property boundary, which carries medium to high traffic flows.

Noise intrusion should comply with the requirements of Hornsby Shire Council DCP and Australian Standard AS2107:2016 and AS3671:1989.

4.1 ACOUSTIC OBJECTIVES

The determination of an acceptable level of traffic noise within the residential spaces requires consideration of the activities carried out within the space and the degree to which noise will interfere with those activities

As sleep is the activity most affected by traffic noise, bedrooms are the most sensitive rooms. Higher levels of noise are acceptable in living areas without interfering with activities such as reading, listening to television, etc. Noise levels in utility spaces such as kitchens, bathrooms, laundries, etc can be higher.

Traffic noise will be assessed to the following criteria for this project:

- Hornsby Shire Council DCP;
- Australian Standard AS2107:2016 & AS3671:1989;

4.1.1 Hornsby Shire council DCP

Hornsby Shire council has no relevant acoustic controls for traffic noise impacts affecting aged care centres. In absence of relevant acoustic controls, the Australian Standard AS2107:2016 & AS3671:1989 will be used for this assessment.

4.1.2 Australian Standards Criteria

The Australian Standards recommend maximum design sound levels for different areas of occupancy in the residential development while AS 3671 -1989 "Road Traffic Noise Intrusion - Building Siting and Construction" recommends that an appropriate L_{eq} for traffic noise descriptor be used for the occupancy being assessed.

Based on AS2107-2016 and AS 3671-1989 the following assessment criteria would apply to the proposed development based on developments near minor roads.

Table 2 - AS2107:2000 Internal Traffic Noise Criteria

Space/ Activity Type	Time of Day	Noise Level dB(A)$L_{eq(1\ hour)}$	
		Satisfactory	Maximum
Living Areas	Day (7am to 10pm)	30	40
Sleeping Areas	Night (10pm to 7am)	30	35
Public Lobby	Anytime	50	55
Restaurant	Anytime	40	50
Bar	Anytime	-	<50
Office	Anytime	35	40
Boardroom	Anytime	30	40

4.2 TRAFFIC NOISE MEASUREMENT

As part of this investigation, traffic noise from the surrounding perimeter roadways has been measured. The results of this measurement will be used to determine the treatments required to reduce noise levels to within the project acoustic objectives.

Measurements included attended and unattended noise levels measurements conducted at the locations as detailed in Figure 1 above. Measurements were performed generally in accordance with the Australian Standard AS 1055 - "Description and measurement of environmental noise - General Procedures".

4.2.1 Measurement Location

Traffic noise measurement locations are detailed above in Figure 1.

4.2.2 Attended Measurements

Measurements were taken using a Norsonic-140 precision sound level analyser, set to A-weighted fast response. The sound level meter was calibrated before and after the measurements using a RION NC73 precision sound calibrator and no significant drift was recorded. Measurements were on the 20th March 2018 between 4:30pm and 5:30pm. There were no periods of adverse weather during the measurement.

4.2.3 Unattended Measurements

Unattended noise measurements were obtained using an Acoustic Research Laboratories Pty Ltd noise logger. The logger was programmed to store 15-minute statistical noise levels throughout the monitoring period. The noise monitors were calibrated at the beginning and the end of the measurement using a Rion NC-73 calibrator. No significant drift was detected. All measurements were taken on A-weighted fast response mode. There were no significant periods of adverse weather conditions during the measurement period. The logger was on site from the 13th March 2018 till the 20th March 2018. Refer to Appendix 1 for unmanned noise monitoring data.

4.2.4 Results of Traffic Noise Level Measurements

The results of measured traffic noise levels at the locations around the site as detailed in Figure 1 above are detailed in the Table 3 below.

Table 3 – Measured Traffic Noise Levels

Location	Time	Traffic Noise Level
Approx. 4m from curb at boundary (on Quarry Road side of property)	Day (7am – 10pm)	59 dB(A)$L_{Aeq\ (1\ hour)}$
	Night (10pm – 7am)	55 dB(A)L_{Aeq} ($_{1\ hour}$)

4.3 RECOMMENDATIONS

Traffic noise intrusion into the proposed development was assessed using the measured external noise levels reported above as a basis.

Calculations were performed taking into account the orientation of windows, the total area of glazing, facade transmission loss, roof, barrier effects (where applicable) and room sound absorption characteristics. In this way the likely interior noise levels can be predicted. Acoustic treatment required to ensure compliance with the assessment criteria are detailed in this section.

Internal noise levels will primarily be as a result of noise transfer through the windows and doors as these are relatively light building elements that offer less resistance to the transmission of sound. Noise transfer through the masonry elements will not be significant and need not be considered further.

The constructions necessary to achieve the noise levels are detailed below. The predicted noise levels have been based on the expected level and spectral characteristics of the external noise, the area of building elements exposed to traffic noise, the absorption characteristics of the rooms and the noise reduction performance of the building elements.

4.3.1 Glazed Windows and Doors

The following constructions are recommended to comply with the naturally ventilated traffic noise objectives stated in Section 4.1, for both the windows open and windows closed criteria. Aluminium framed/sliding glass doors and windows will be satisfactory provided they meet the following criteria listed below.

Table 4 - Recommended Glazing (Building A and D)

Façade	Floor	Room	Glazing	Seals
Southern (Facing Quarry Road)	Ground	Board Room	10.38mm Laminated	Yes
		Office	6.38mm Laminated	Yes
		Restaurant	6mm Toughened	Yes
		Bar	6mm Toughened	Yes
		Lobby	6mm Toughened	Yes
	All floors	Living Area	6.38mm Laminated	Yes
		Bedroom	6.38mm Laminated	Yes
Eastern	All Floors	Bedroom	6mm Toughened	Yes
		Living Area	6mm Toughened	Yes
Western	All Floors	Dining	6mm Toughened	Yes
		Bedroom	6mm Toughened	Yes
Northern	All Floors	Dining	4mm Toughened	Yes
		Bedroom	4mm toughened	Yes
Remaining (inward Facing)	All Floors	Dining	4mm Toughened	Yes
		Bedroom	4mm toughened	Yes

Table 5 - Recommended Glazing (Remaining Buildings)

Façade	Floor	Room	Glazing	Seals
Southern	All floors	Living Area	4mm Toughened	Yes
		Bedroom	4mm toughened	Yes
Eastern	All Floors	Bedroom	4mm Toughened	Yes
		Living Area	4mm toughened	Yes
Western	All Floors	Dining	4mm Toughened	Yes
		Bedroom	4mm toughened	Yes
Northern	All Floors	Dining	4mm Toughened	Yes
		Bedroom	4mm toughened	Yes
Remaining (inward Facing	All Floors	Dining	4mm Toughened	Yes
		Bedroom	4mm toughened	Yes

In addition to meeting the minimum glazing thickness requirements given, the design of the window mullions, perimeter seals and the installation of the windows/doors in the building openings shall not reduce the STC rating of the glazing assembly below the values nominated in the Table 4 and 5 above. Note that mohair type seals will not be acceptable for the windows requiring acoustic seals.

The window/door suppliers should provide evidence that the systems proposed have been tested in a registered laboratory with the recommended glass thicknesses and comply with the minimum listed STC requirements. Also, the glazing installer should certify that the window/doors have been constructed and installed in a manner equivalent to the tested samples.

Table 6 – Minimum STC of Glazing

Glazing Assembly	Minimum STC of Installed Window	Acoustic Seals
4mm toughened	27	Yes
6mm toughened	29	Yes
6.38mm laminated	31	Yes
10.38mm laminated	35	Yes

4.4 EXTERNAL WALLS

External walls composed of concrete or masonry elements will not require acoustic treatment. Any penetrations in the skin of the wall should be acoustically sealed.

4.5 EXTERNAL ENTRY DOORS

It is recommended that full perimeter acoustic seals are used for all external entry doors. Timber doors shall be a minimum of 40mm solid core timber with Raven RP10 to the top and sides, and Raven RP38 to the underside of the door.

Glazed doors shall have glazing thicknesses equal to those recommended in Table 3 and are to have Raven RP10 to the top and sides, and Raven RP38 to the underside of the door.

4.6 ROOF/ CEILING CONSTRUCTIONS

The recommended roof/ceiling construction is shown below in Figure 2 below:

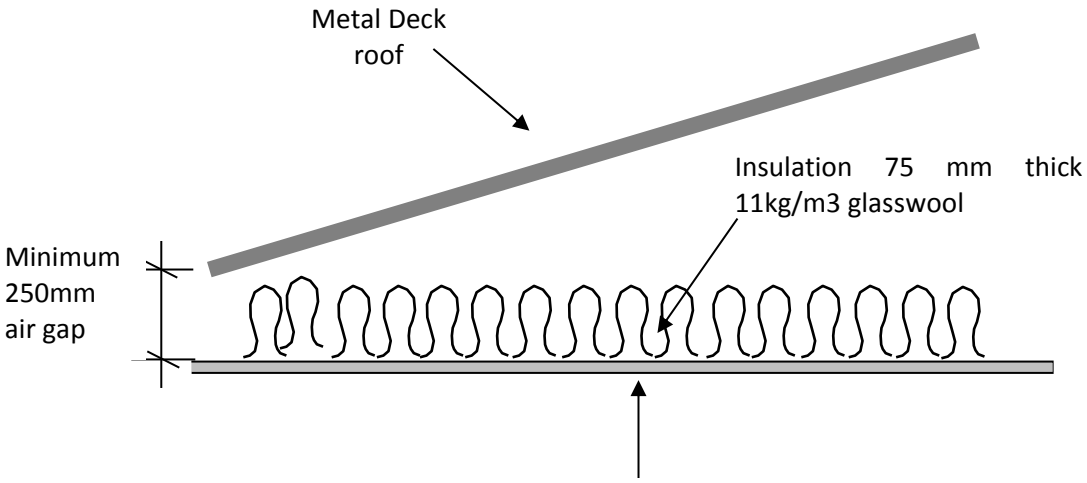


Figure 2 - Roof / Ceiling Construction

Table 7 – Ceiling Plasterboard Thickness

Building	Façade	Room	Thickness
A and D	Southern	Bedrooms	1 Layers of 16mm Thick Plasterboard Sheeting
	Southern	Living Area	1 Layer of 16mm Thick Plasterboard Sheeting
	Remaining	All	1 Layer of 13mm Thick Plasterboard Sheeting
Remaining	All	All	1 Layer of 13mm Thick Plasterboard Sheeting

Penetrations in ceilings (such as for light fittings etc.) must be sealed gap free with a flexible sealant. Any ventilation openings in the ceilings would need to be acoustically treated to maintain the acoustic performance of the ceiling construction.

4.6.1 Plasterboard Corner Details

The recommended plasterboard ceiling/wall corner construction options over the top floor rooms are shown in Figure 3.

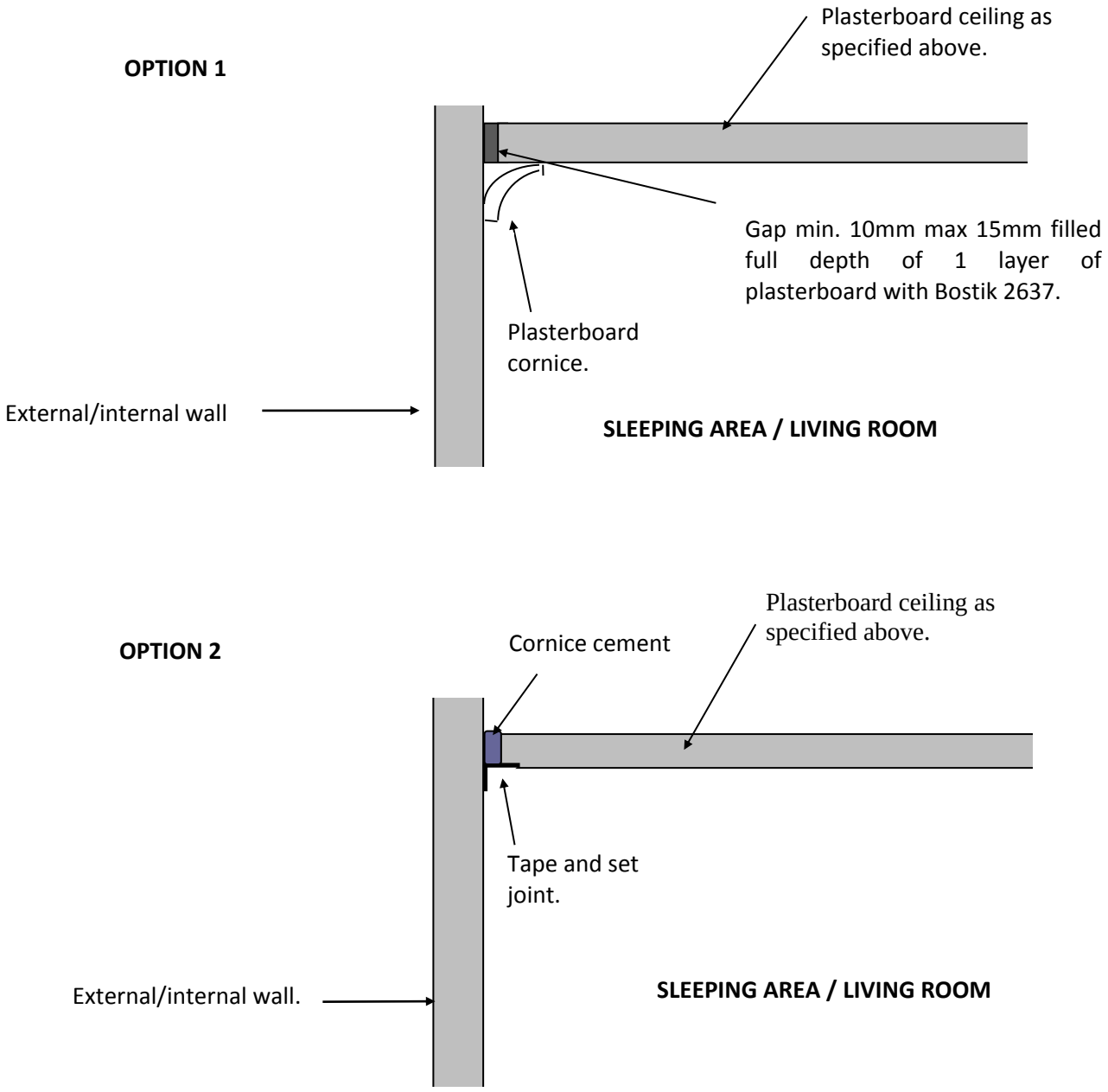


Figure 3- Plasterboard Corner Details

5 EXTERNAL NOISE EMISSION ASSESSMENT

5.1 BACKGROUND NOISE MONITORING

Long term background noise monitoring was undertaken to establish noise emission criteria in accordance with the guidelines within the NSW EPA Industrial Noise Policy.

5.1.1 Measurement Locations

The unattended monitor measurement location is indicated in Figure 1. The monitor was setup at a location close to receiver 1.

5.1.2 Equipment Used

Background noise was recorded using an Acoustic Research Laboratories Pty Ltd noise logger. The logger was programmed to store 15-minute statistical noise levels throughout the unmanned monitoring period. The equipment was calibrated at the beginning and the end of the measurement using a Rion NC-73 calibrator; no significant drift was detected. All measurements were taken on A-weighted fast response mode.

5.1.3 Measurement Time Period

Unattended measurements were conducted between the 13th March 2018 till the 20th March 2018.

5.1.4 Measured Rating Background Noise Level

The measured background noise levels (dB(A) L_{90}) for day, evening and night time periods are shown in the table below.

- Day is defined as the period from 7am to 6pm Monday to Saturday and 8am to 6pm Sundays and Public Holidays;
- Evening is defined as the period from 6pm to 10pm; and
- Night is defined as the period from 10pm to 7am Monday to Saturday and 10pm to 8am Sundays and Public Holidays.

The rating background noise levels calculated in accordance with the guidelines contained in the EPA Industrial Noise Policy are summarised in Table 8.

Table 8– Rating Background Noise Levels

Location	Time	RBL L_{90} dB(A)
Unattended noise monitor along western boundary of the site	Day	45
	Evening	41
	Night	30

5.2 NOISE EMISSION CRITERIA

5.2.1 Requirements by NSW EPA INP

The EPA Industrial Noise Policy provides guidelines for assessing noise impacts from residential and commercial developments. The recommended assessment objectives vary depending on the potentially affected receivers, the time of day, and the type of noise source. The EPA Industrial Noise Policy has two requirements which both have to be complied with, namely an amenity criterion and an intrusiveness criterion. In addition, the EPA in its Environmental Noise Control Manual states that noise controls should be applied with the general intent to protect residences from sleep arousal.

5.2.1.1 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). Where applicable, the intrusive noise level should be penalised (increased) to account for any annoying characteristics such as tonality.

5.2.1.2 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 EPA's Industrial noise policy sets out acceptable noise levels for various localities. Table 2.1 on page 16 of the policy indicates 4 categories to distinguish different residential areas. They are rural, suburban, urban and urban/industrial interface.

Table 9 below provides the recommended ambient noise levels for the suburban residential receivers for the day, evening and night periods. For the purposes of this condition:

- Day is defined as the period from 7am to 6pm Monday to Saturday and 8am to 6pm Sundays and Public Holidays;
- Evening is defined as the period from 6pm to 10pm; and
- Night is defined as the period from 10pm to 7am Monday to Saturday and 10pm to 8am Sundays and Public Holidays.

Table 9 – EPA Recommended Amenity Industrial Noise Levels - External

Type of Receiver	Time of Day	Recommended Acceptable Noise Level dB(A) L_{eq}
Residential	Day	55
	Evening	45
	Night	40
Commercial	When In Use	65

5.2.2 Requirements by Hornsby Shire Council Policy and Guidelines for Noise and Vibration Generating Development

Hornsby Shire Council Policy and Guidelines for Noise and Vibration Generating Development (Acoustic Guideline V.5. 2000) does not provide specific noise criteria for aged care facilities.

5.2.3 EPA's Noise Guide for Local Government (2004)

5.2.3.1 Assessment of sleep Disturbance

Currently, there is no definitive guideline to indicate a noise level that causes sleep disturbance and more research is needed to better define this relationship. Where likely disturbance to sleep is being assessed, a screening test can be applied that indicates the potential for this to occur. For example, this could be where the subject noise exceeds the background noise level by more than 15 dB(A). The most appropriate descriptors for a source relating to sleep disturbance would be LA1 (1 minute) (the level exceeded for 1% of the specified time of 1 minute) or L_{Amax} (the maximum level during the specified time period) with measurement outside the bedroom window.

5.2.4 Summary of Assessment Criteria

EPA Industry Policy requirements will be used as acoustic assessment criteria for this project. The intrusiveness, amenity and sleep arousal criteria for this project have been determined using these guidelines and the noise monitoring results. These are summarised below. We note that the formulation of the assessment criteria has been based on the lowest background noise levels determined from all monitoring data.

The table below provides a summary of the criteria applicable to the proposed development based on the information documented above.

Table 10 - Noise Objectives for Residential Receivers Near Proposed Development

Day time Noise Objective dB(A) L_{eq}	**Evening Noise Objective dB(A) L_{eq}**	**Night Noise Objective dB(A) L_{eq}**	**Night Noise Objective dB(A) $L_{1(1min)}$**
50	46	35	45

Table 11 - Noise Objectives for Commercial Receivers Near Proposed Development

Type of Receiver	Time of Day	Recommended Acceptable Noise Level dB(A) L_{eq}
Commercial	When In Use	65

5.3 NOISE EMISSION ASSESSMENT

The nearest potentially affected noise receivers are:

- Receiver 1 - Residences and commercial properties bounding the site to the north west;
- Receiver 2 - Residences and commercial properties bounding the site to the south west;
- Receiver 3 - Residences properties bounding the site to the east;
- Receiver 4 - Commercial properties bounding the site to the east;
- Receiver 5 - Residences on the northern side of Vineys Road;

Refer to Figure 1 for locations of the affected receivers.

Noise potentially generated by the site will consist primarily of noise from:

- Noise emission from the proposed plant service project building.
- Noise impact from the proposed carpark entry driveway to Receiver 1.
- Noise emission from the operation of the proposed northern loading dock entry to Receiver 3.
- Noise emission from the operation of the proposed southern loading dock entry to Receiver 1.

5.3.1 Noise Generated by the Carpark Entry

A noise assessment of the basement car park entry has been carried out based on assumptions below:

- Peak hour - 146 trips (approximate 50% of carpark capacity).
- Night time 15 trips per hour.
- Vehicles drive in/out at 10km/hour speed with typical sound power level 84dB(A) measured by this office.
- Recommendations in Section 8 are implemented.

The predicted noise levels at the nearby receivers are presented in the table below:

Table 12- Predicted Noise Levels from Car Park Entry – Quarry Road

Noise at Affected Receivers (External Boundary)	Predicted Noise Level	Criteria $L_{eq,\ 15min}$ dB(A)	Complies
Receiver 1 –5m from western boundary (Quarry Road side)	Peak Hour-45	Day-50 Evening -46	Yes
	Night -34	Night 35	Yes

5.3.2 Noise Generated by Loading Dock

This office has been advised that the basement loading dock will be primarily used for garbage truck and truck movements will be typically once per day during day time only.

5.3.2.1 Noise Sources

The potential noise sources associated with the loading dock are listed in table below along with the noise emission levels. The emission levels have been obtained from noise monitoring carried out at similar retail loading dock facilities. Noise measurements were obtained using a Norsonics SA 110 with (serial number 24692) or CEL-593 Type 1 sound level analysers (serial number C1. T 116962), set to fast response. The sound level analysers were calibrated before and after the measurements using a Rion NC-73 calibrator. No significant drift was recorded.

Assessment has been based on rigid trucks up to 8.8m in length and the loading dock operation during day and evening only.

Table 13 -Loading Dock Noise Data

Noise Source	Sound Power Level dB(A)	Type of Noise Source
Truck Idle	99	Quasi-Steady
Trucks Manoeuvring	103	Intermittent

5.3.2.2 Predicted Noise Levels- Day Time Only

The nearest residential noise receivers of the proposed loading docks are below:

- Residential dwellings located along western boundary (Receiver 1 and Receiver 2).
- Residential dwelling located at north eastern corner (Receiver 3).

The noise levels to those receivers were calculated based on the noise emission levels provided in Table 13 above. These levels were corrected for:

- Distance between the noise source and receiver, barrier or directivity effects (when present) and topography.
- Losses from a 2 metre barrier to be installed on the eastern boundary between the Aged Care Facility and the closest residential receivers on Vineys Road.

A worst case 15 minute noise level based on the following for the receivers near the loading area entry doors:

- One Long Rigid Truck arrives during a 15 minute period.
- Long Rigid Truck idling for 20 seconds upon arrival or departure.

The predicted boundary of the nearest noise receiver is summarised below:

Table 14 -Predicted Noise Levels from Loading Docks (dB(A)$L_{eq,\ 15min}$)

Receiver Location	Predicted Noise Level dB(A)$L_{eq,\ 15min}$	Criteria dB(A)L_{eq}	Comply?
Residential dwelling along south western boundary (Receiver 1)	41	50	Yes
Residential dwelling along north western boundary (Receiver 2)	41	50	Yes
Residential dwelling located north eastern corner (Receiver 3)	47	50	Yes
Residential dwelling located north of site (Receiver 5)	44	50	Yes

5.3.3 Plant Noise Emission

As mechanical plant has not yet been selected at this stage, a complete assessment of mechanical noise emissions can not be conducted at this time. Generally, this is undertaken at CC stage, once the plant selections have been undertaken. Notwithstanding, compliance with the mechanical noise emission criteria presented in section 5.2.4 is both practical and reasonable with the use of one or more of (but not limited to) the following:

- Acoustic Barriers/Screens;
- Internally lined ductwork;
- External Lagging;
- Silencers etc.

5.3.3.1 Noise – Air-conditioners

As air conditioning plant has not yet been selected, a complete assessment of air-conditioning noise emissions can not be conducted at this time. Generally, this is undertaken at CC stage, once the plant selections have been undertaken. Notwithstanding, compliance with the air conditioning noise emission criteria presented in section 5.2.4 is both practical and reasonable with the use of one or more of (but not limited to) the following acoustic treatments:

- Acoustic Barriers/Screens;
- Internally lined ductwork;
- External Lagging;
- Silencers etc.

5.4 RECOMMENDATION

The following building and management controls are recommended to ensure no adverse noise impact onto neighbouring receivers:

- Loading dock shall be used during day time only.
- Install 2 metre fence on the western boundary between the Aged Care Facility and the closest residential receiver on Vineys Road. The fence can be constructed by colorbond or equal with all penetrations and junctions acoustically sealed. (maximum 50mm gap at the bottom of the fence to allow water flow).
- Install imperforate barrier to be constructed along eastern boundary between the Aged Care Facility and the closest residential receiver. Barrier shall be minimum 1.8 high from natural ground, the structure of fence can be lapped and capped timber or colorbond or equal.
- Carpark entry door: shall be vibration isolated and Vibration from the operation of automatic doors shall be vibration isolated from the building structure to prevent door operation from being audible within occupied spaces. Doors shall be panel lift. Roller doors are not permitted. In addition, as a minimum suitable rubber isolating element equal to Embelton NRD mounts shall be used where the motors are fixed to the structure and Teflon guides install in all rails. Ensure that door panels do not rattle, and the smooth operation of any door guides, rollers, etc is smooth. Door motors shall be fitted with a soft start/stop controller to minimise noise while the door shall be stopped approximately 5 mm from the slab/ground to ensure the base of the door does not contact the concrete surface.
- Plant noise shall be acoustically designed to comply with NSW EPA Criteria presented in section 5.2.4 at CC stage.

6 CONCLUSION

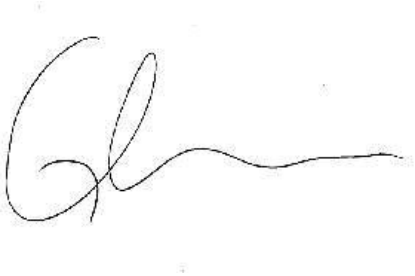
This report presents an analysis of acoustic impacts associated with the proposed aged care facility at 3 Quarry Road and 4 Vineys Road, Dural.

- Noise intrusion impact from traffic noise onto the future occupants of the development has been assessed in accordance with Hornsby Shire Council DCP and Australian Standard AS2107:2016 and AS3671:1989. The acoustic treatments in principle necessary to achieve these guidelines have been set out in Section 4.

- Noise emission criteria for the development site have been determined based on the site noise logging, NSW EPA Industrial Noise Policy and Protection of the Environmental Operation Act Regulation. These requirements have been presented in Section 5.3 with recommendations presented in Section 5.4 of this report.

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

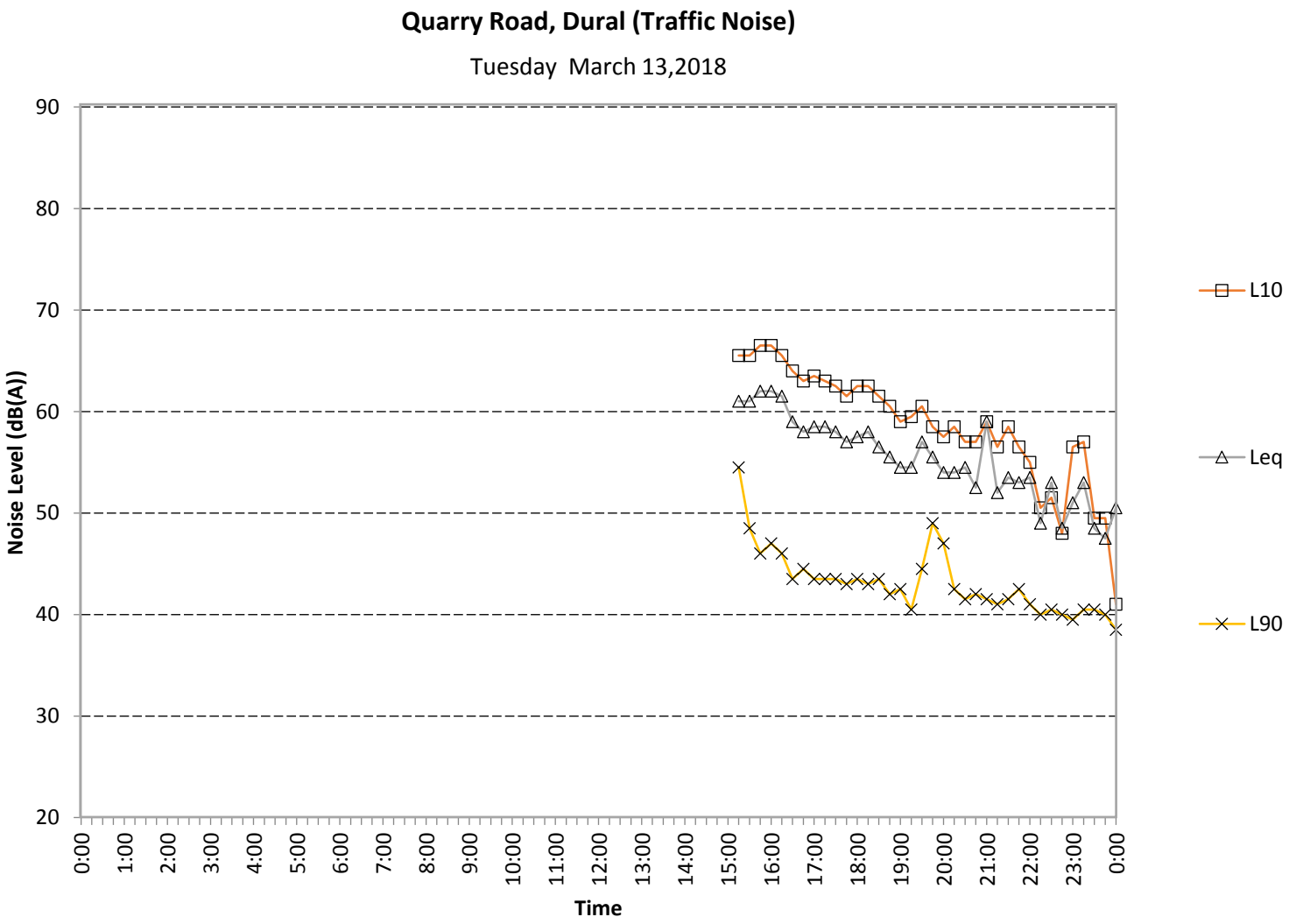
Yours faithfully,

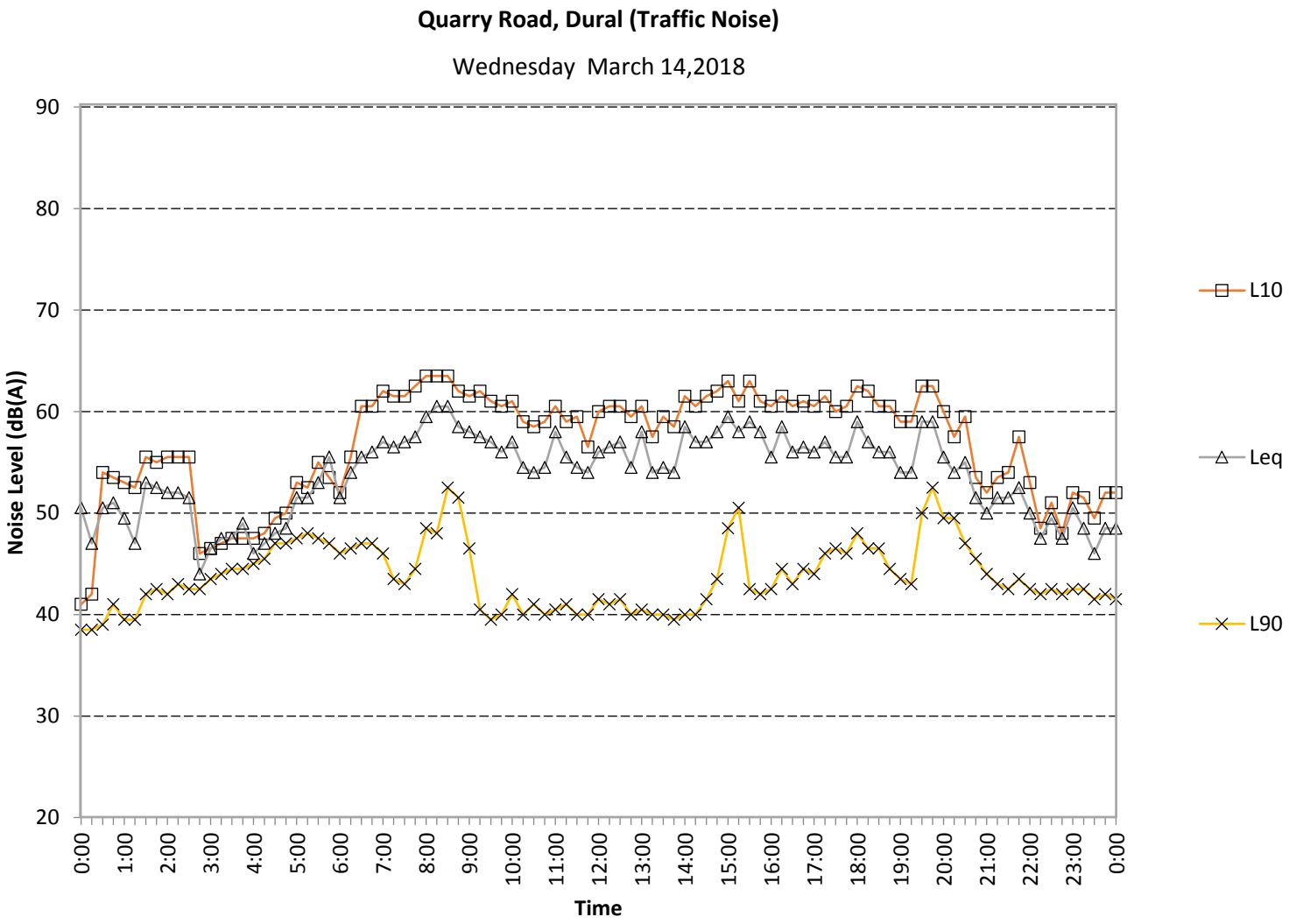


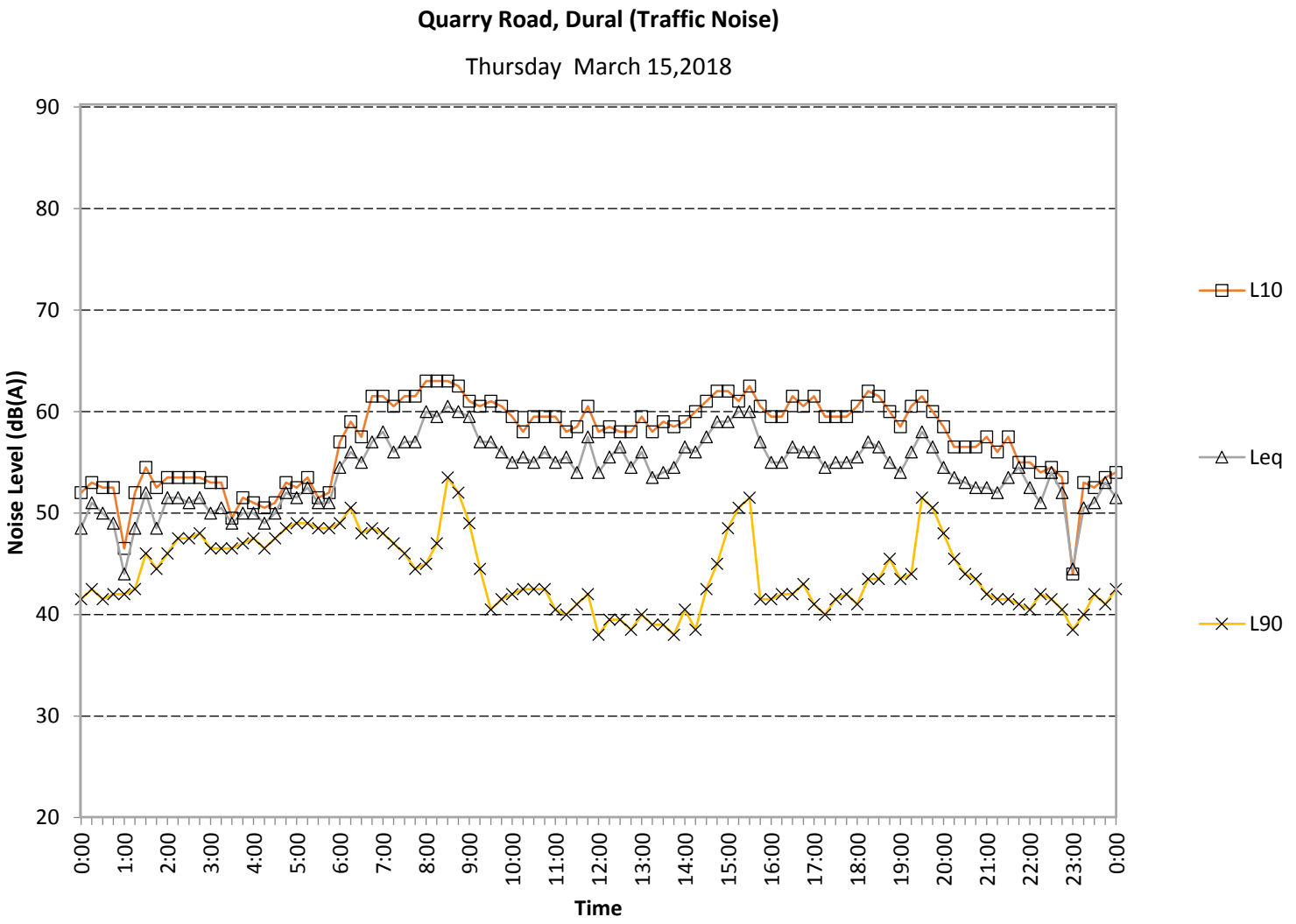
Glen Campbell

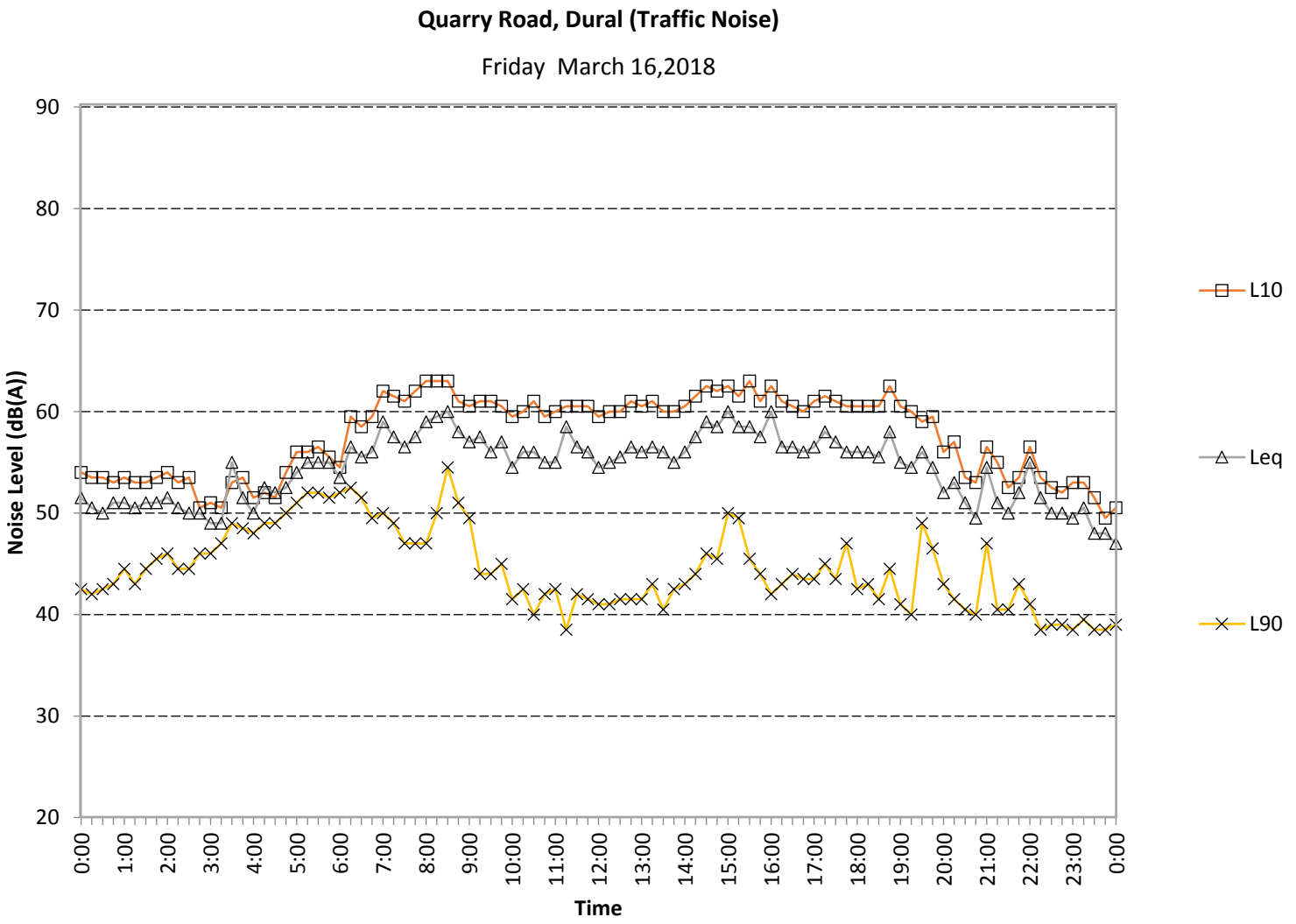
APPENDIX 1

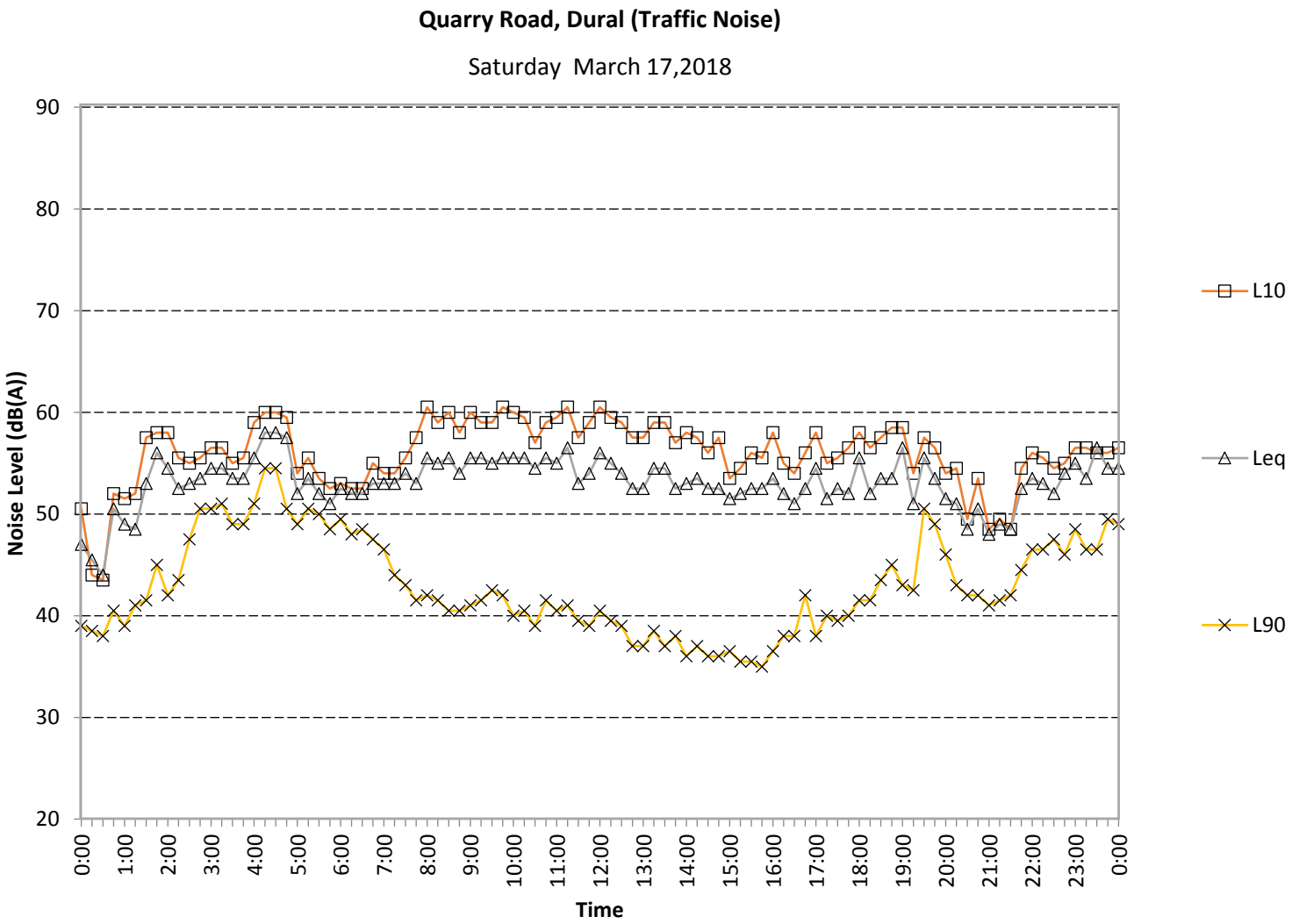
Unattended Noise Monitoring Data

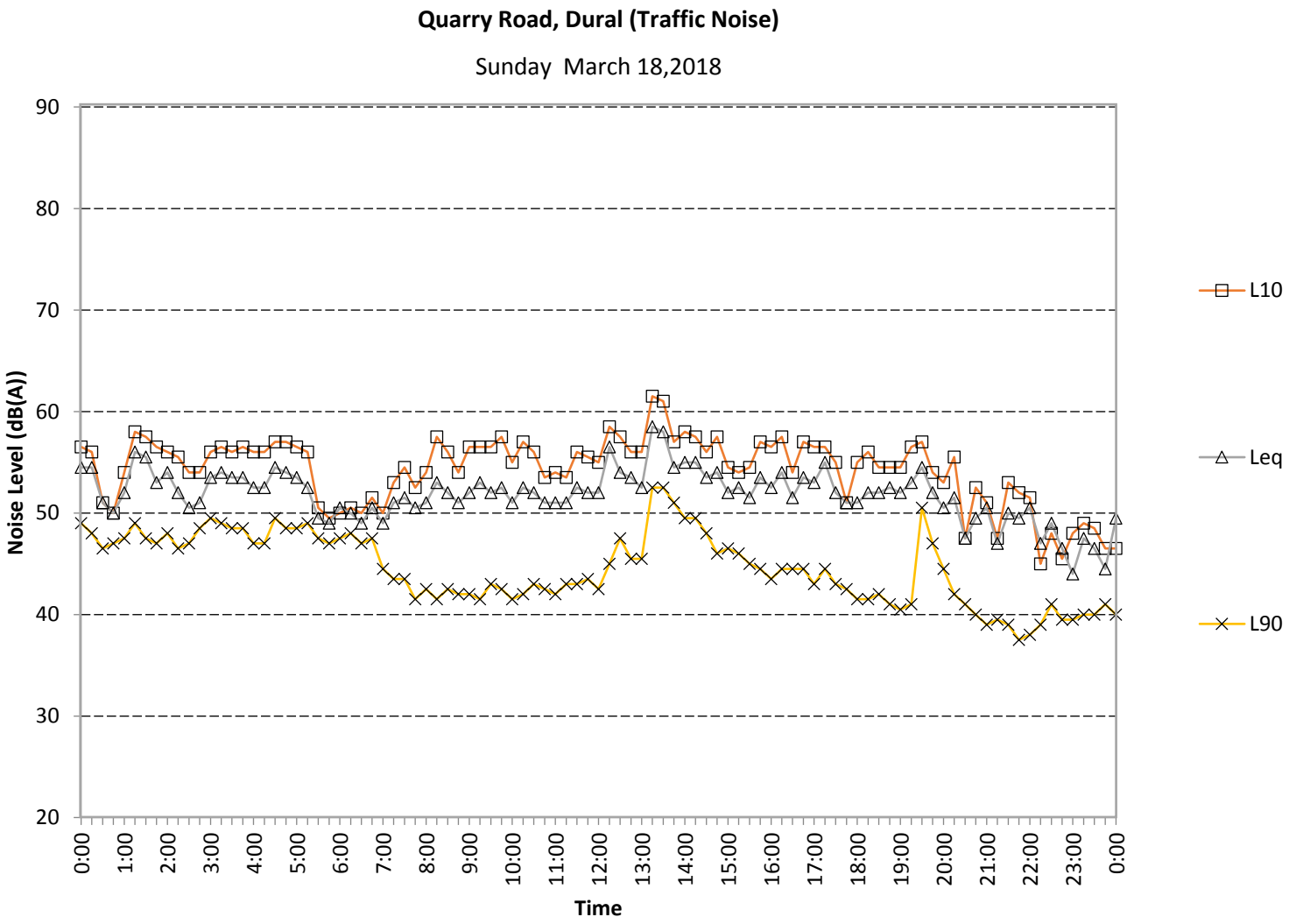

Quarry Road, Dural (Traffic Noise)
Tuesday March 13,2018
Noise Level (dB(A))
90
80
70
60
50
40
30
20
0:00
1:00
2:00
3:00
4:00
5:00
6:00
7:00
8:00
9:00
10:00
11:00
12:00
13:00
14:00
15:00
16:00
17:00
18:00
19:00
20:00
21:00
22:00
23:00
0:00
Time
L10
Leq
L90

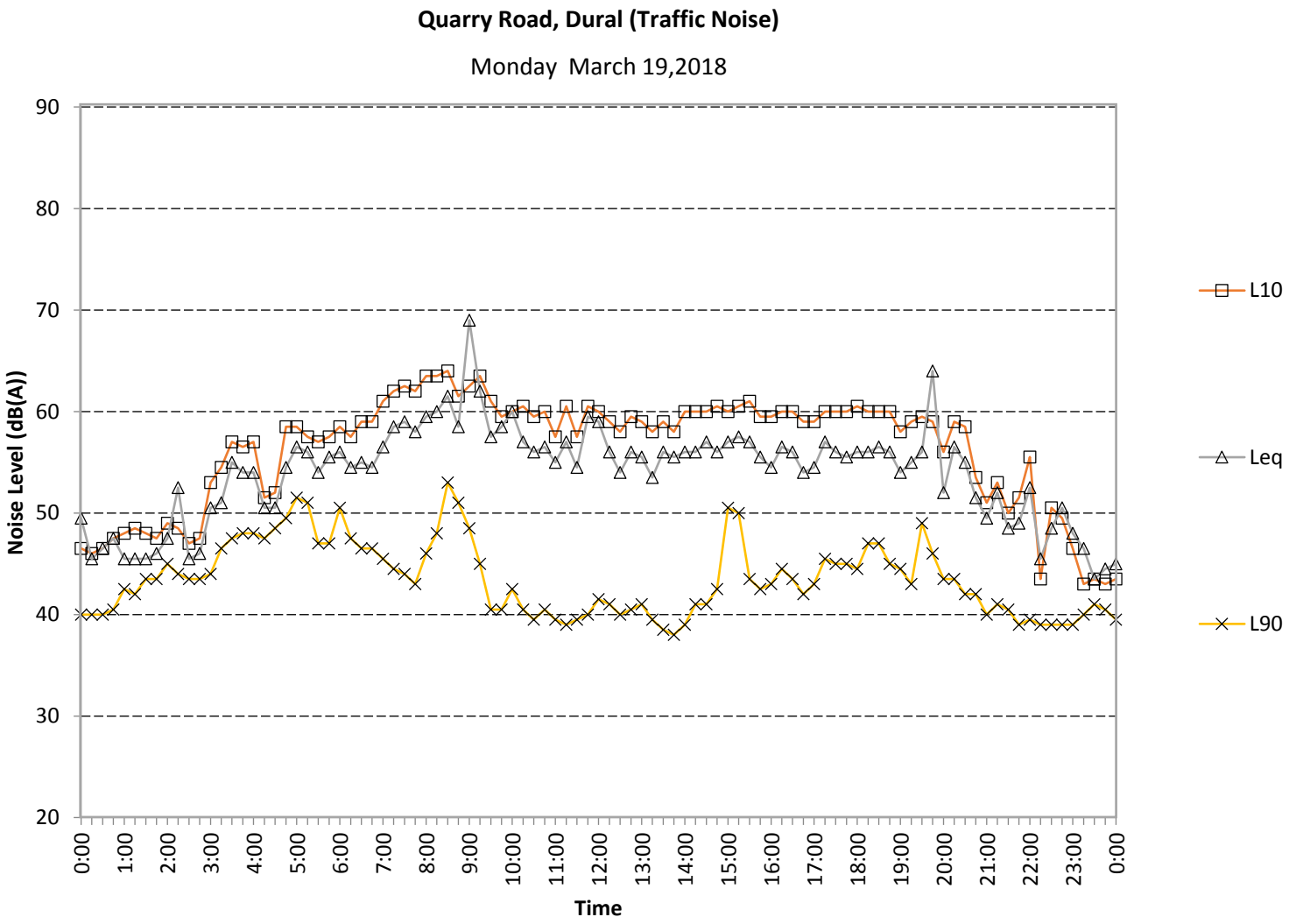

Quarry Road, Dural (Traffic Noise)
Wednesday March 14,2018
Noise Level (dB(A))
90
80
70
60
50
40
30
20
0:00
1:00
2:00
3:00
4:00
5:00
6:00
7:00
8:00
9:00
10:00
11:00
12:00
13:00
14:00
15:00
16:00
17:00
18:00
19:00
20:00
21:00
22:00
23:00
0:00
Time
L10
Leq
L90

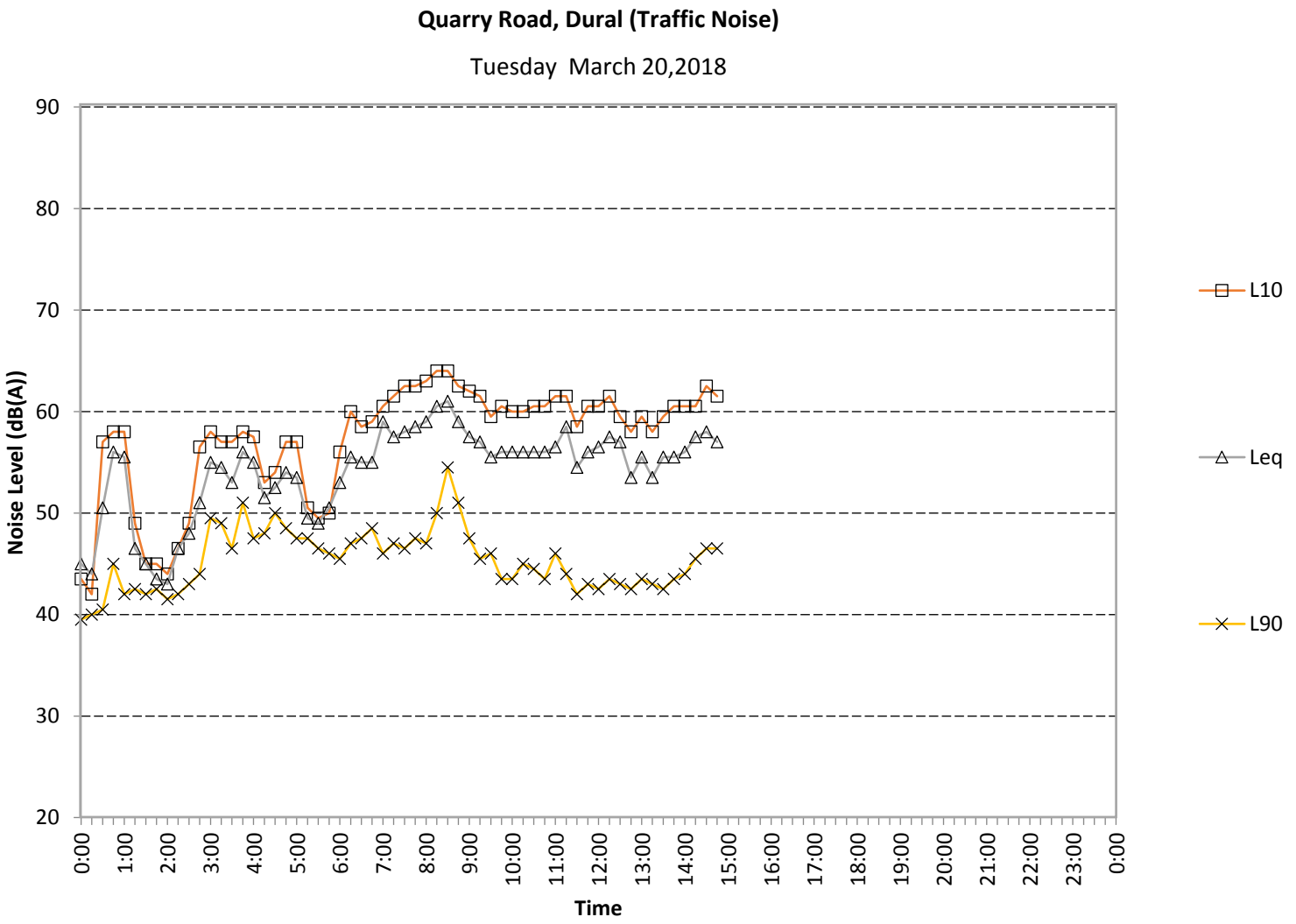

Quarry Road, Dural (Traffic Noise)
Thursday March 15,2018
Noise Level (dB(A))
90
80
70
60
50
40
30
20
0:00
1:00
2:00
3:00
4:00
5:00
6:00
7:00
8:00
9:00
10:00
11:00
12:00
13:00
14:00
15:00
16:00
17:00
18:00
19:00
20:00
21:00
22:00
23:00
0:00
Time
L10
Leq
L90

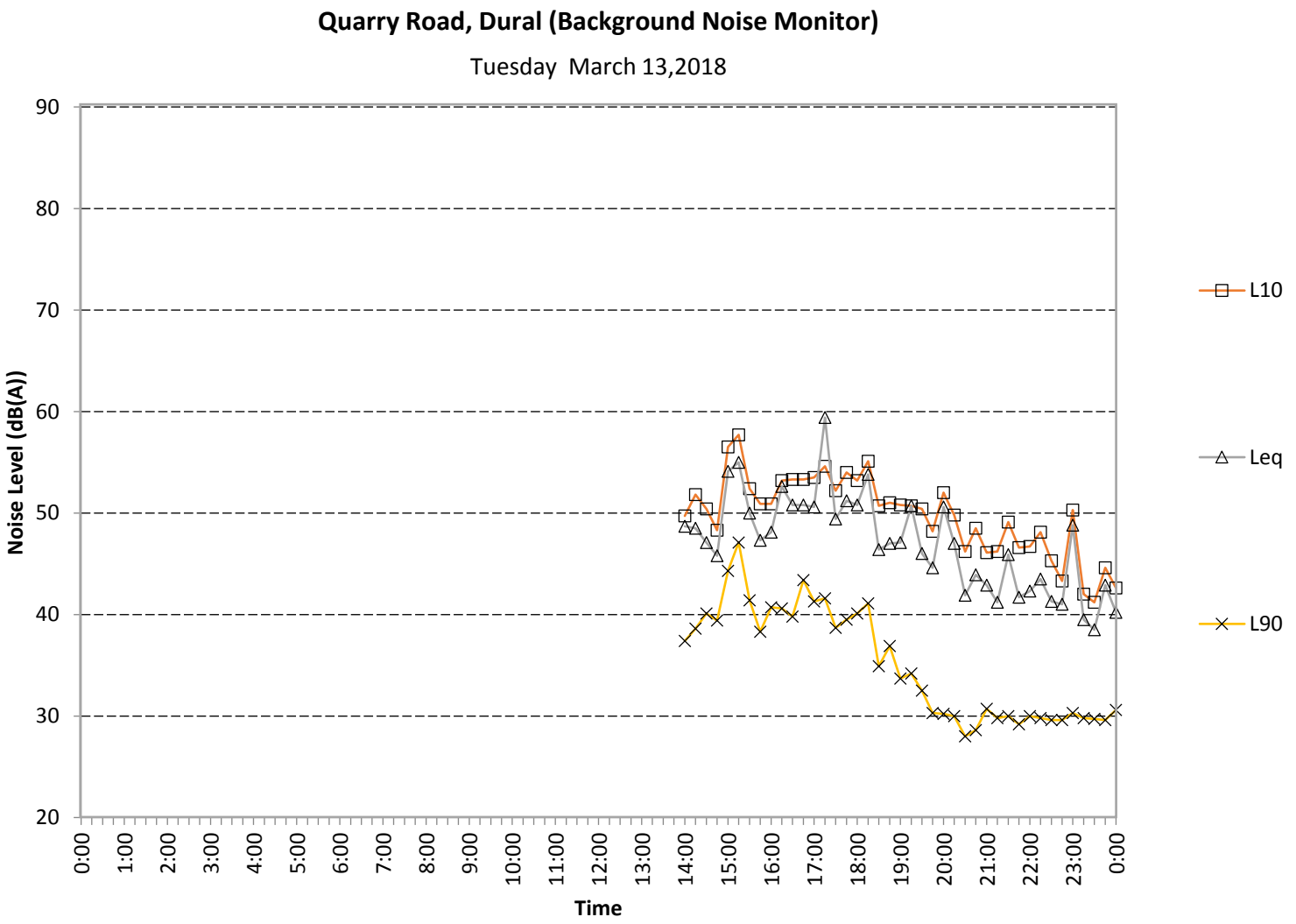

Quarry Road, Dural (Traffic Noise)
Friday March 16,2018
Noise Level (dB(A))
90
80
70
60
50
40
30
20
0:00
1:00
2:00
3:00
4:00
5:00
6:00
7:00
8:00
9:00
10:00
11:00
12:00
13:00
14:00
15:00
16:00
17:00
18:00
19:00
20:00
21:00
22:00
23:00
0:00
Time
L10
Leq
L90

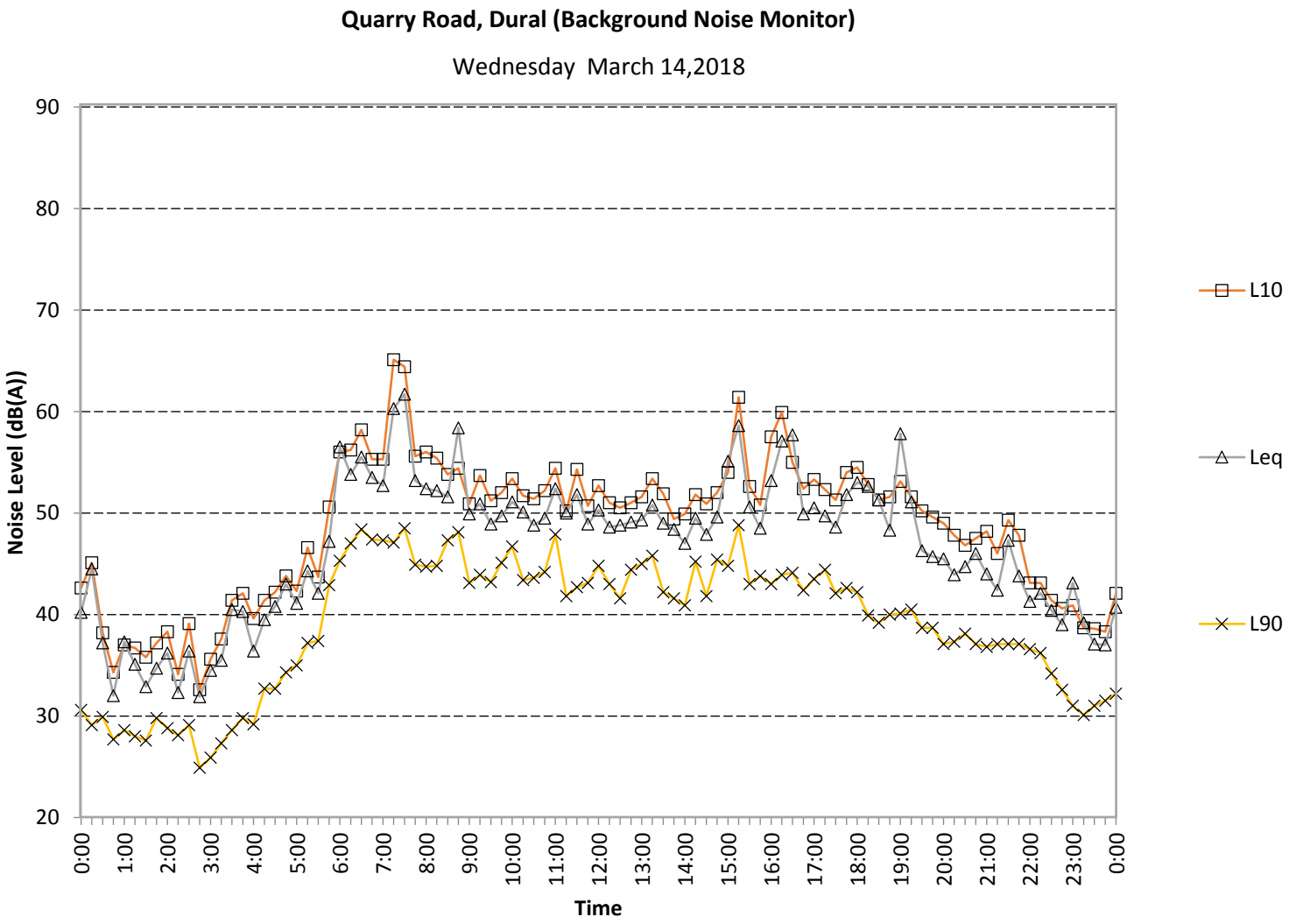

Quarry Road, Dural (Traffic Noise)
Saturday March 17,2018
Noise Level (dB(A))
90
80
70
60
50
40
30
20
0:00
1:00
2:00
3:00
4:00
5:00
6:00
7:00
8:00
9:00
10:00
11:00
12:00
13:00
14:00
15:00
16:00
17:00
18:00
19:00
20:00
21:00
22:00
23:00
0:00
Time
L10
Leq
L90

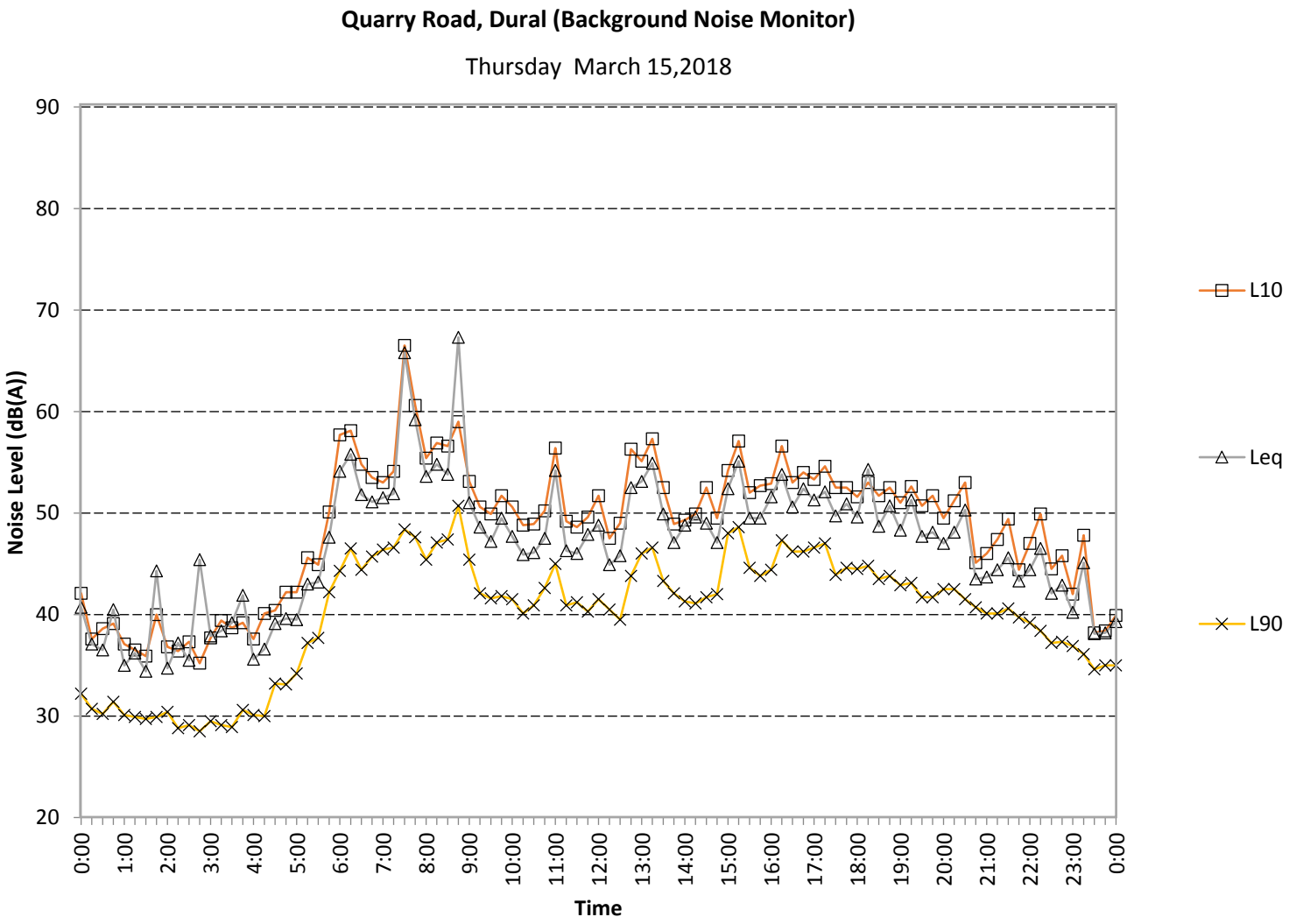

Quarry Road, Dural (Traffic Noise)
Sunday March 18,2018
Noise Level (dB(A))
90
80
70
60
50
40
30
20
0:00
1:00
2:00
3:00
4:00
5:00
6:00
7:00
8:00
9:00
10:00
11:00
12:00
13:00
14:00
15:00
16:00
17:00
18:00
19:00
20:00
21:00
22:00
23:00
0:00
Time
L10
Leq
L90

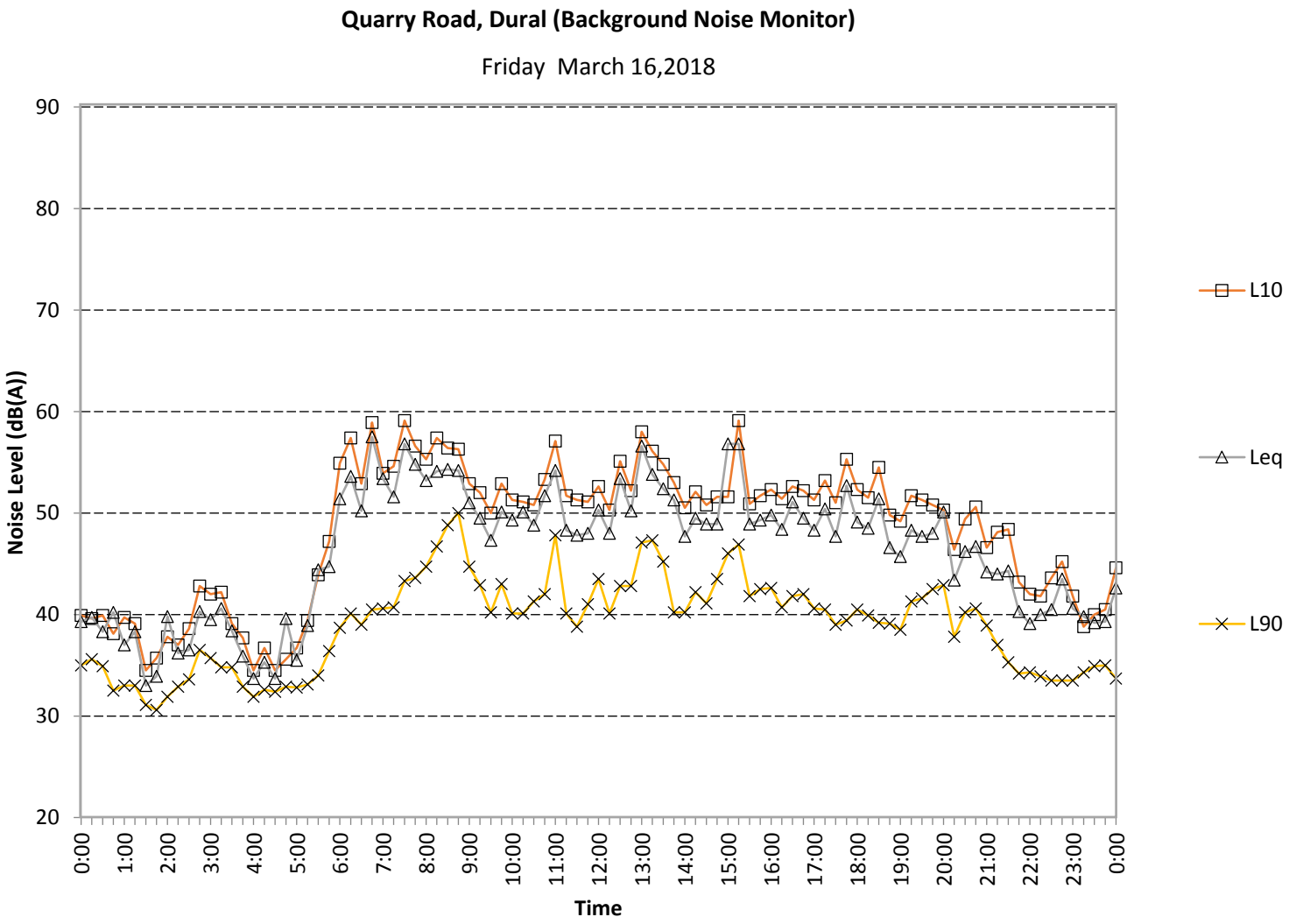

Quarry Road, Dural (Traffic Noise)
Monday March 19,2018
Noise Level (dB(A))
90
80
70
60
50
40
30
20
0:00
1:00
2:00
3:00
4:00
5:00
6:00
7:00
8:00
9:00
10:00
11:00
12:00
13:00
14:00
15:00
16:00
17:00
18:00
19:00
20:00
21:00
22:00
23:00
0:00
Time
L10
Leq
L90

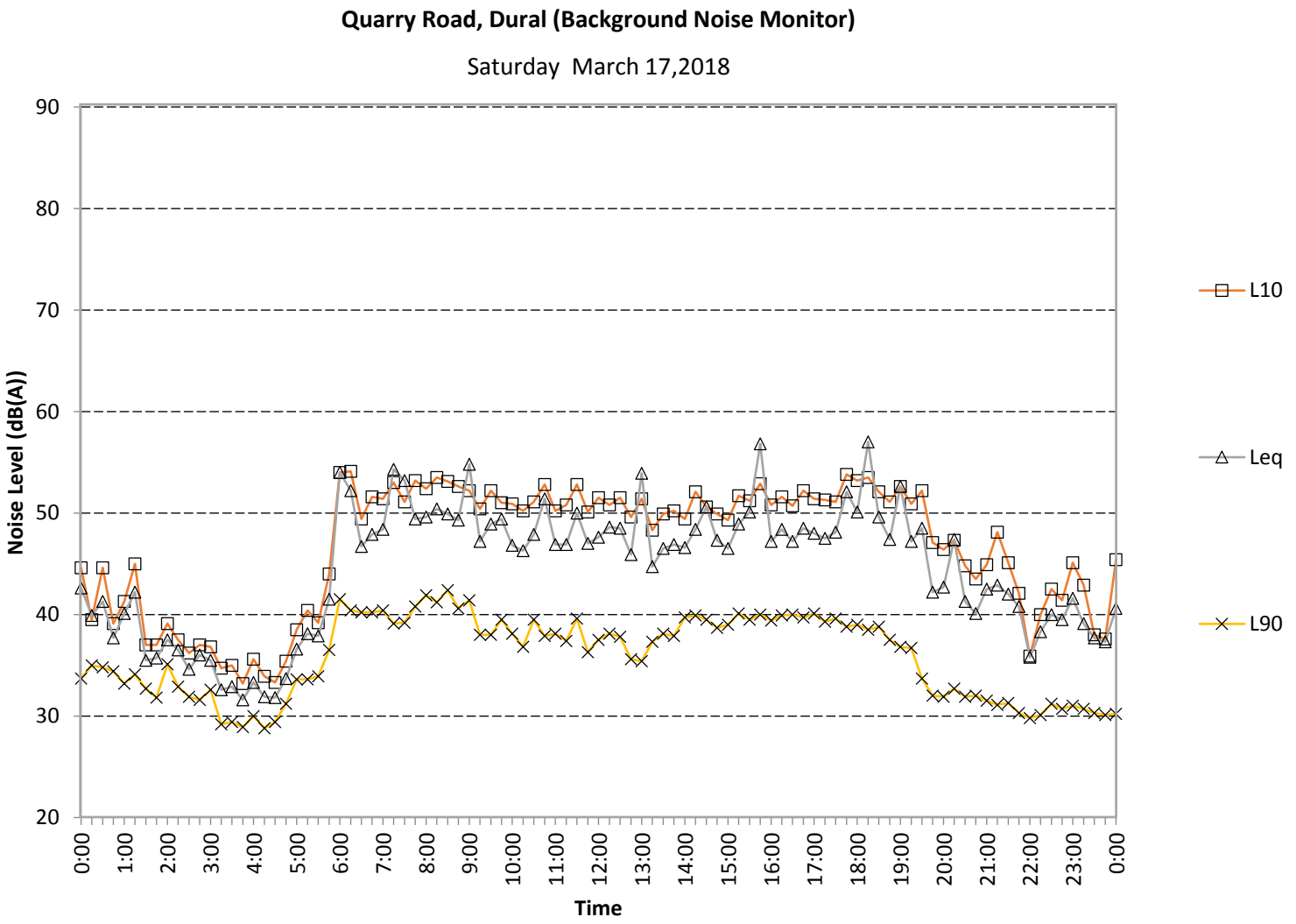

Quarry Road, Dural (Traffic Noise)
Tuesday March 20,2018
Noise Level (dB(A))
90
80
70
60
50
40
30
20
0:00
1:00
2:00
3:00
4:00
5:00
6:00
7:00
8:00
9:00
10:00
11:00
12:00
13:00
14:00
15:00
16:00
17:00
18:00
19:00
20:00
21:00
22:00
23:00
0:00
Time
L10
Leq
L90

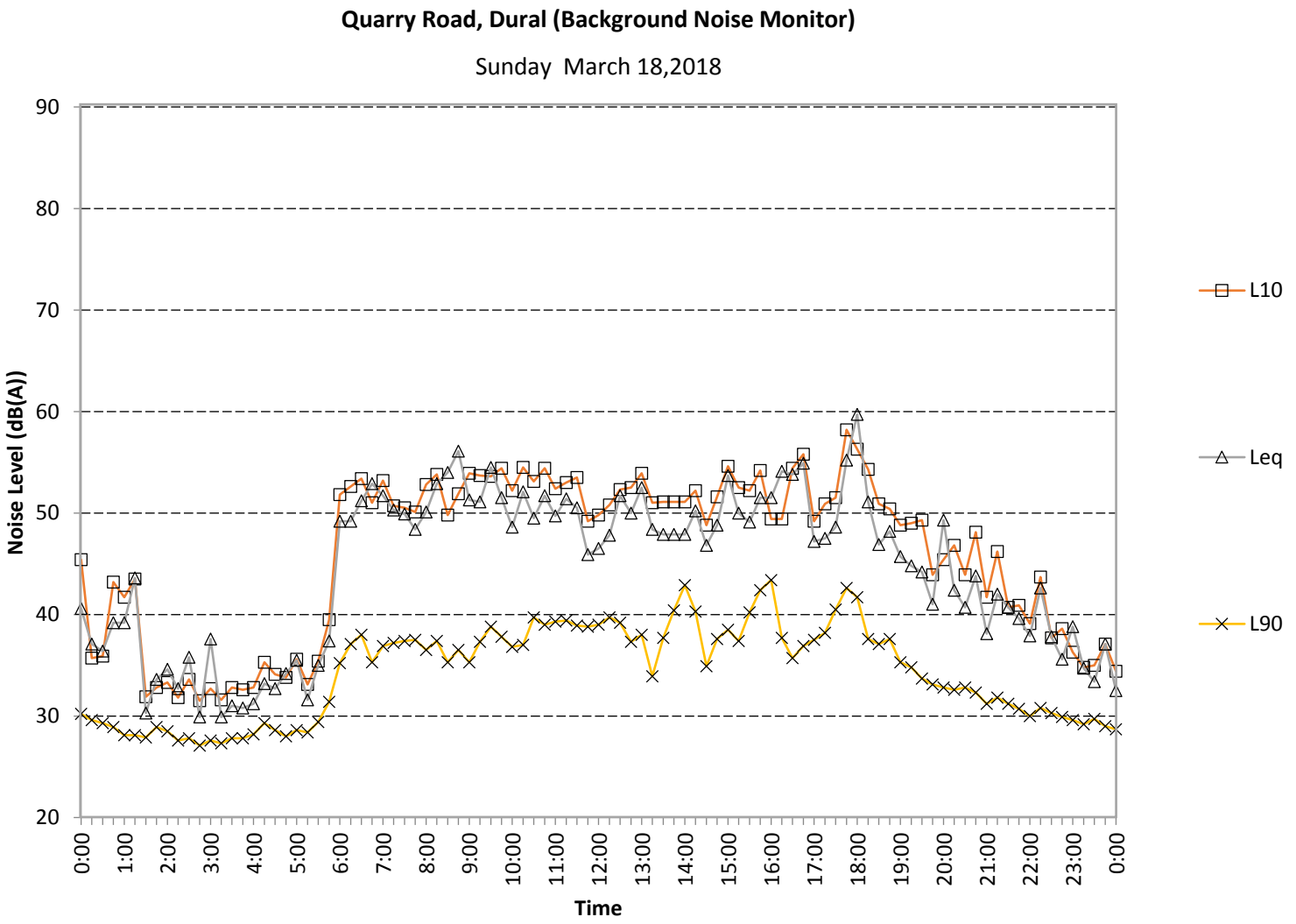

Quarry Road, Dural (Background Noise Monitor)
Tuesday March 13,2018
Noise Level (dB(A))
90
80
70
60
50
40
30
20
0:00
1:00
2:00
3:00
4:00
5:00
6:00
7:00
8:00
9:00
10:00
11:00
12:00
13:00
14:00
15:00
16:00
17:00
18:00
19:00
20:00
21:00
22:00
23:00
0:00
Time
L10
Leq
L90

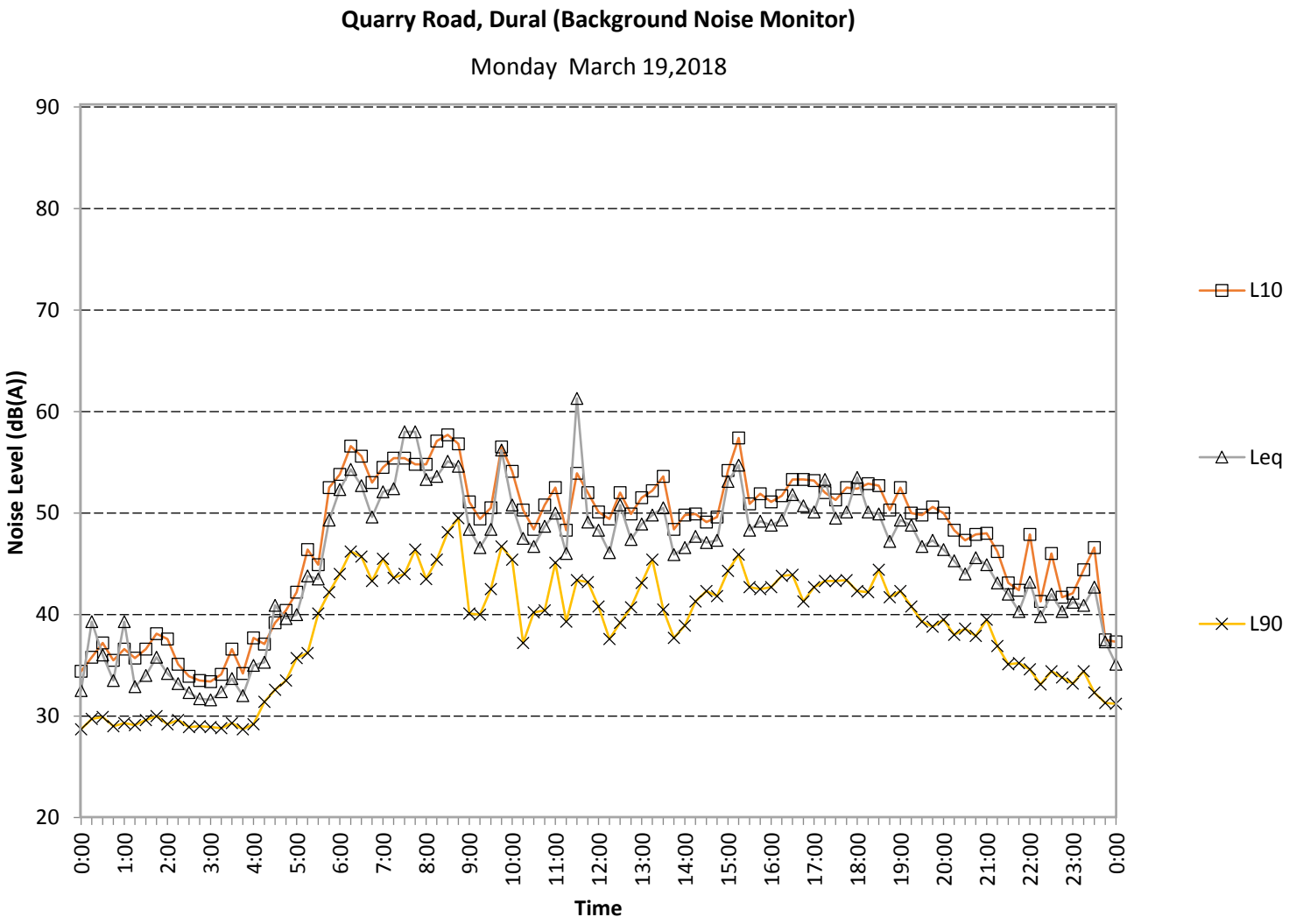

Quarry Road, Dural (Background Noise Monitor)
Wednesday March 14,2018
Noise Level (dB(A))
90
80
70
60
50
40
30
20
0:00
1:00
2:00
3:00
4:00
5:00
6:00
7:00
8:00
9:00
10:00
11:00
12:00
13:00
14:00
15:00
16:00
17:00
18:00
19:00
20:00
21:00
22:00
23:00
0:00
Time
L10
Leq
L90

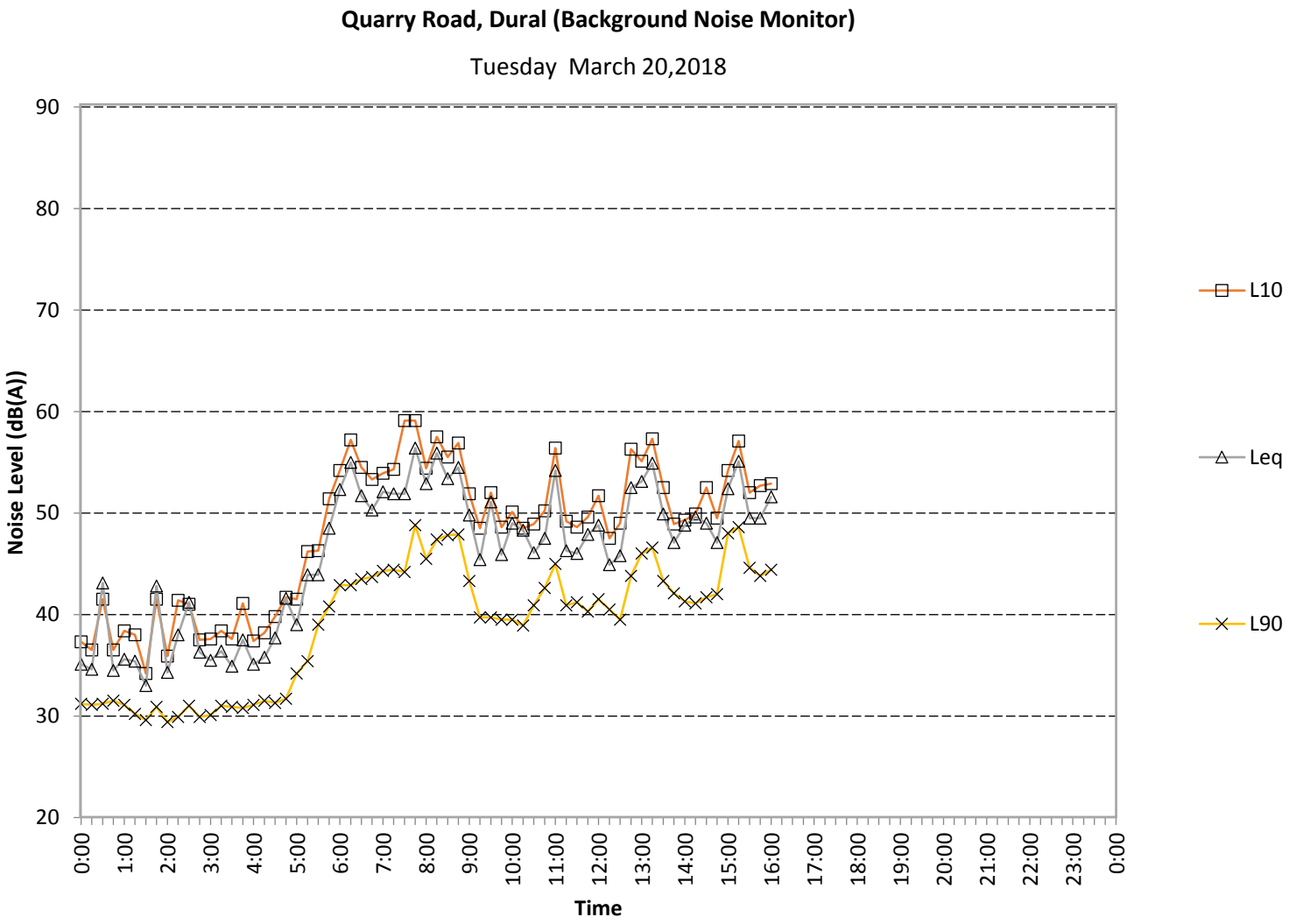

Quarry Road, Dural (Background Noise Monitor)
Thursday March 15,2018
Noise Level (dB(A))
90
80
70
60
50
40
30
20
0:00
1:00
2:00
3:00
4:00
5:00
6:00
7:00
8:00
9:00
10:00
11:00
12:00
13:00
14:00
15:00
16:00
17:00
18:00
19:00
20:00
21:00
22:00
23:00
0:00
Time
L10
Leq
L90


Quarry Road, Dural (Background Noise Monitor)
Friday March 16,2018
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


Quarry Road, Dural (Background Noise Monitor)
Saturday March 17,2018
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


Quarry Road, Dural (Background Noise Monitor)
Sunday March 18,2018
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


Quarry Road, Dural (Background Noise Monitor)
Monday March 19,2018
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


Quarry Road, Dural (Background Noise Monitor)
Tuesday March 20,2018
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