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Aged Care and Independent Living Development

Acoustic Report for Site Compatibility Certificate

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LONDON DUBAI SINGAPORE GREECE

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1 INTRODUCTION

Acoustic Logic Consultancy has been engaged by Catholic Healthcare Limited to conduct an acoustic assessment for a proposed Residential Aged Care Facility and Independent Living Units at 2B West Street, Lewisham.

In this report we will:

- Identify noise sources which may impact on the site (aircraft, traffic and rail) and determine whether there are feasible building treatments to ensure that these impacts can be reduced to suitable levels (compliant with relevant state and Australian Standard acoustic guidelines).

- Identify noise sources generated by the site and determine whether noise emissions from the site are capable of complying with relevant EPA and Council noise emission guidelines.

In the event that compliance with the relevant noise impact and noise emission guidelines referred to above can be achieved, the site would be considered suitable for its intended use with respect to acoustics.

This assessment has been carried out based on the architectural drawings produced by Jackson Teece dated September 2018.

2 SITE DESCRIPTION / PROPOSED DEVELOPMENT

The proposed Residential Aged Care Facility (RACF) and Independent Living Units (ILUs) redevelopment project will be located at 2B West Street, Lewisham.

The development is bounded as follows;

- To the south by the T2 Airport, Inner West and South Line, servicing passenger train services
- Further to the south by Railway Terrace, carrying high volumes of traffic flow
- To the east by West street, carrying high volumes of traffic flow

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

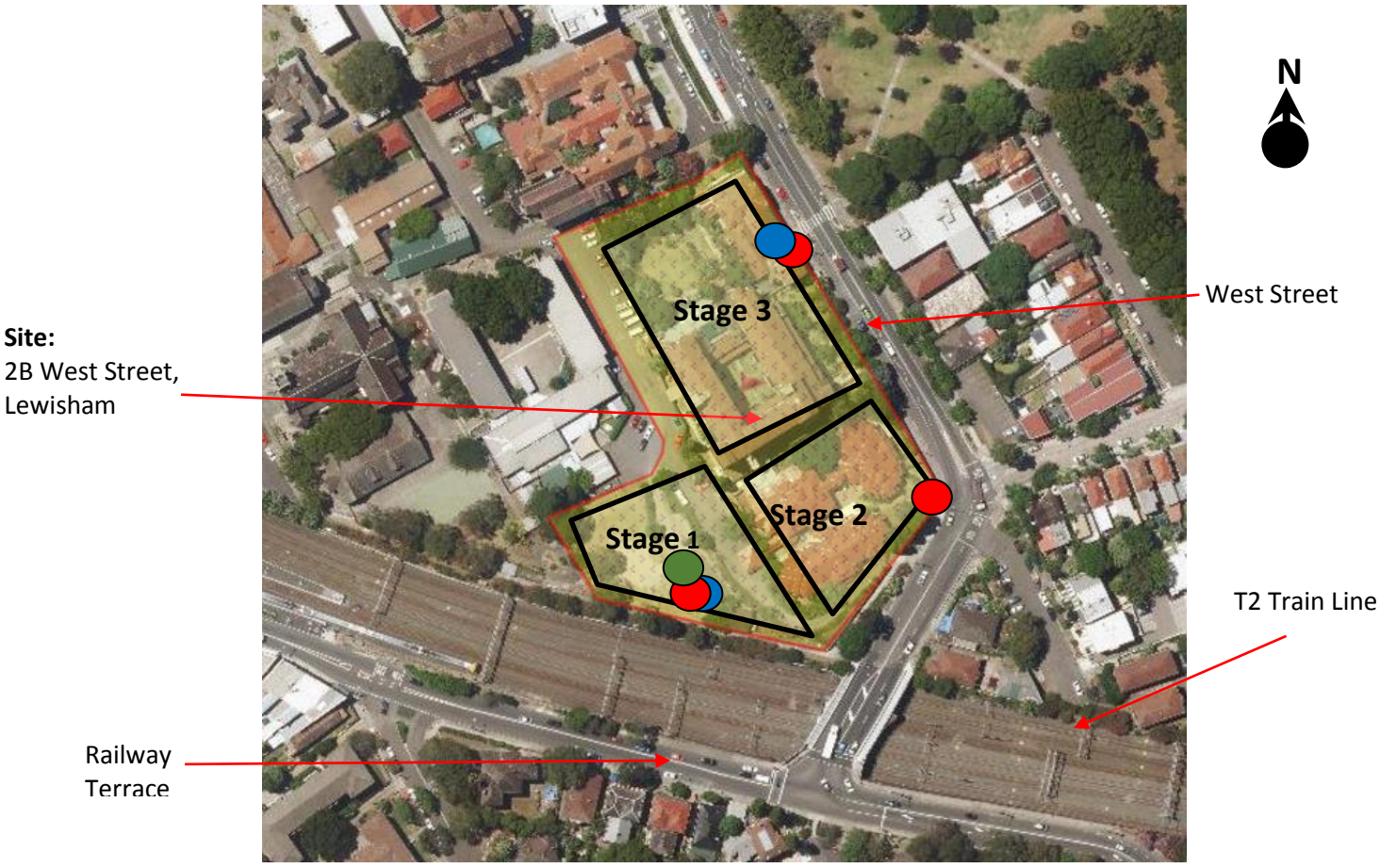


Figure 1 – Site Map

Attended Vibration Measurement Location

Attended Noise Measurement Locations

Unattended Noise Measurement Locations

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 NOISE INTRUSION ASSESSMENT

4.1 PROJECT ACOUSTIC OBJECTIVES

The assessment of traffic, rail and aircraft noise is conducted with reference to the following documents:

- Inner West Council (Previously Marrickville City Council) DCP 2011.
- NSW State Environmental Planning Policy Infrastructure (2007).
- AS2107:2000 Acoustics – Recommended design sound level and reverberation times for building interiors.
- AS3671:1989 Road traffic noise intrusion - Building siting and construction
- AS2021:2000 Acoustics – Aircraft noise intrusion – Building siting and construction.

4.1.1 Inner West Council (Previously Marrickville City Council) DCP 2011 – Section 2.6 Acoustic and Visual Privacy

Section 2.6 of the Marrickville DCP states that new developments must be designed in accordance with the following requirements;

- State Environmental Planning Policy Infrastructure (2007) – with regard to developments adjacent to a busy roadway or railway corridor.
- Australian Standards AS2170 and AS3671 with regard to recommended internal noise levels.
- Australian Standard AS2021 – with regard to developments within an Aircraft Noise Exposure Forecast (ANEF) affected area.

4.1.2 State Environmental Planning Policy 2007

The NSW Department of Planning's policy, Development Near Rail Corridors And Busy Roads – Interim Guideline, sets out internal noise level criteria adapted from the State Environmental Planning Policy (Infrastructure) 2007 (the 'Infrastructure SEPP') for developments with the potential to be impacted by traffic or rail noise and vibration.

The Infrastructure SEPP defines busy roads that are subject to an acoustic assessment as:

"Clause 102: development for any of the following purposes that is on land in or adjacent to a road corridor for a freeway, a tollway or a transit way or any other road with an annual average daily traffic volume of more than 40,000 vehicles (based on the traffic volume data available on the website of the RTA) and that the consent authority considers is likely to be adversely affected by road noise or vibration:

- *building for residential use*
- *a place of public worship*
- *a hospital*
- *an educational establishment or childcare."*

The Infrastructure SEPP sets out the following criteria for internal noise levels from airborne traffic noise:

> *"For Clauses 87 (Rail) and 102 (Road):*
>
> *"If the development is for the purpose of a building for residential use, the consent authority must be satisfied that appropriate measures will be taken to ensure that the following L_{Aeq} levels are not exceeded:*
>
> *in any bedroom in the building : 35dB(A) at any time 10pm–7am*
>
> *anywhere else in the building (other than a garage, kitchen, bathroom or hallway): 40dB(A) at any time."*

Internal requirements are for residential spaces and are measured internally with windows closed.

4.1.3 Australian Standard AS3671:1989 and AS2170:2000

AS3671 documents the process for calculating internal noise levels based on existing external traffic noise. This standard recommends that the building shell be acoustically designed such that internal noise levels comply with the requirements of AS2107.

In addition, AS3671 recommends that a noise time descriptor which is appropriate for the type of road and type of use be selected.

Table 1 – Internal Noise Level Criteria

Type of Occupancy	Space	Time Period	Internal Traffic Noise Criteria
Houses and apartments near major roads	Sleeping Areas (Bedroom)	Night 10pm – 7am	35 dB(A)$L_{eq(9\ hour)}$
	Living or any other Habitable Areas	Day 7am – 10pm	40 dB(A)$L_{eq(15\ hour)}$

4.1.4 Australian Standard 2021:2015 (Aircraft Noise Intrusion)

As the proposed site is located between ANEF 20 and 25 contours based on the Sydney Airport 2033 ANEF contour map, AS2021 states that a full evaluation of internal noise levels is carried out. This evaluation requires an examination of the likely levels of internal noise from aircraft flyovers.

AS2021 stipulates the internal noise levels listed in the table below for residential buildings. These levels will be used to assess aircraft noise intrusion into the residential levels of the development.

Table 2 – Indoor Design Sound Levels for Aircraft Noise Reduction Assessment

ACTIVITY	INDOOR DESIGN SOUND LEVEL FROM AIRCRAFT FLYOVER, dB(A)L_{max}
Sleeping areas, dedicated lounges	50 dB (A)
Other habitable spaces	55 dB (A)
Bathrooms, toilets, laundries	60 dB (A)

4.1.5 Summary of Criteria

The governing project criteria are presented in the table below.

Table 3 – Internal Noise Level Criteria

Location	Criteria	
	Traffic and Rail Noise Intrusion	**Aircraft Noise Intrusion**
Bedroom	35 dB(A) $L_{eq(9\ hour)}$	50 dB(A)L_{max}
Living Area	40 dB(A) $L_{eq(15\ hour)}$	55 dB(A)L_{max}
Bathrooms	N/A	60 dB(A)L_{max}

Compliance with the criteria in the table above will result in compliance with Council's DCP, the SEPP Infrastructure (2007), and Australian Standards AS2107, AS3671 and AS2021.

4.2 AIRCRAFT, TRAFFIC AND TRAIN NOISE MEASUREMENTS

Traffic and train noise measurements were taken at the site of the proposed development. Measurements were performed generally in accordance with the Australian Standard AS1055 – "Description and measurement of environmental noise – General Procedures".

Noise measurements were conducted at the locations detailed in Figure 1 above.

Aircraft noise was determined in accordance with AS2021.

4.2.1 External Aircraft Noise Levels

Aircraft noise levels at the site were determined using AS 2021. The Standard gives aircraft noise levels for aircraft landing and taking off for locations near airports. The location of the runways was obtained from the Sydney Airport ANEF 2033.

Based on the distance from the site to the runways, the flight path and the site elevation, AS 2021:2015 predicts that the loudest typical aircraft movement will be from a Airbus A380 aircraft taking off from the Main Runway, and veering to the west. The noise level at the site as indicated by the standard is 80dB(A). This noise level will be used to predict the resultant internal noise levels.

4.2.2 Unattended Noise Measurements

Unattended noise measurements were obtained using two Acoustic Research Laboratories Pty Ltd noise loggers. The loggers were programmed to store 15-minute statistical noise levels throughout the monitoring period. The noises 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.

- Monitor 1: This monitor was set-up to measure train noise from the T2 Airport, Inner West and South Line and ambient noise levels, and was on site from the 19th to the 23rd April 2016. The monitor was situated on the southern boundary of the development site, with a clear view of the railway line. Unattended train noise data is presented in Appendix 1.

- Monitor 2: This monitor was set-up to measure traffic noise levels from West Street, between the 20th and 27th April 2016. This monito was situated on the second level balcony of the Anne Walsh Building, with a clear view of West Street. Unattended noise data is presented in Appendix 2.

Location of monitors is indicated in Figure 1 above.

4.2.3 Attended Noise Measurements

Attended noise measurements were undertaken on the 19th April 2016, between the hours of 2:00pm and 5:30pm at various location around the site to supplement unattended noise measurements. Measurements were undertaken using a Norsonics Type 140 precision sound level analyser, set to A-weighted fast response. The precision sound level analyser was calibrated before and after the measurements using a Norsonics 1251 sound level calibrator. No significant drift was recorded. See figure 1 above for location of attended noise measurements.

4.2.4 Measured and Predicted Noise Levels

The measured noise levels have been adjusted for distance and day to night time noise level differences based on previous project experience with the vicinity of the project site.

The following table presents our resultant noise levels;

Table 4 – Resultant Traffic and Train Noise Levels

Location	7am to 10pm -dB(A) $L_{eq(15\ hour)}$	10pm-7am-dB(A) $L_{eq(9\ hour)}$
West Street Future Proposed Façade (Traffic Noise)	69	65
T2 Train Line 15m from rail line (Rail Noise)	64	57

4.3 RECOMMENDATIONS

Internal noise levels will primarily be as a result of noise transfer through the windows and doors and roof, as these are relatively light building elements that offer less resistance to the transmission of sound.

Analysis indicates that through appropriate building shell design, external noise impacts can be reduced such that suitable internal noise levels can be achieved.

Indicative building shell systems are outlined below. Final acoustic design of the building shell should be conducted once all window sizes and building shell materials are finalised.

In determining these acoustic treatments we have taken into account the measured noise level and spectral characteristics of the external noise, the area of building elements exposed to the noise, the absorption characteristics of the rooms and the noise reduction performance of the building elements.

4.3.1 Glazed Windows and Doors

Glazing recommendations are outlined below in the following table, to comply with the noise objectives outlined above in Section 4.1. Aluminium framed/sliding glass doors and windows will be satisfactory provided they meet the following criteria listed below.

Building shell treatments are driven primarily by aircraft noise impacts, which affect all facades within the development (as opposed to road and rail noise which impact some facades more than others).

Table 5 –Glazing Recommendations –Bedrooms

Building/Façade	Room Type	Glazing Area ≤ 7.5m^2	Glazing Area > 7.5m^2	Acoustic Seals
All Buildings, All Facades	Bedrooms	10.38mm laminated	12.38mm laminated	Yes

Table 6 –Glazing Recommendations – Living Rooms

Building/Façade	Room Type	Glazing Area ≤ 15m^2	Glazing Area > 15m^2	Acoustic Seals
All Buildings, All Facades	Living Rooms	10.38mm laminated	12.38mm laminated	Yes

Table 7 –Glazing Recommendations –Bathrooms/Laundry

Building/Façade	Room Type	Glazing Area ≤ 3 m^2	Glazing Area > 3m^2	Acoustic Seals
All Buildings, All Facades	Bathrooms / Laundry	4mm float	6mm float	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 below. 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 8 – Minimum STC of Glazing (with Acoustic Seals)

Glazing Assembly	Minimum STC of Installed Window
4mm float	27
6mm float	29
10.38mm laminated	35
12.38mm laminated	37

4.3.2 External Walls

External walls if proposed to be of a masonry construction will not require further acoustic treatment.

In the event that lightweight walls are proposed, precise construction and internal lining requirements shall be confirmed with an acoustic engineer.

4.3.3 Ceiling/Roof Construction

Roof constructions if proposed to be of a concrete construction will not require further acoustic treatment.

In the event that sheet metal or roof tiles are proposed, it shall be confirmed with an acoustic engineer.

4.3.4 Ventilation requirements

AS2021-2015 requires the installation of ventilation or air conditioning system where aircraft noise exposure exceeds ANEF 20. As internal noise levels cannot be achieved with windows open it is required that an alternative outside air supply system or air conditioning be installed in accordance with AS 1668.2 requirements. Any mechanical ventilation system that is installed should be acoustically designed such that the acoustic performance of the recommended constructions are not reduced by any duct or pipe penetrating the wall/ceiling/roof. Noise emitted to the property boundaries by any ventilation system shall comply with Council requirements.

5 NOISE EMISSION ASSESSMENT

5.1 BACKGROUND NOISE MONITORING

Measured background noise levels were obtained from a nearby site and are presented below.

Table 9 – Measured Background Noise Levels

Location	Period/Time	Background Noise Level dB(A) L_{90}
Project Site	Day (7am-6pm)	50
	Evening(6pm-10pm)	47
	Night(10pm-7am)	38

5.2 ACOUSTIC OBJECTIVES

Acoustic objectives will be based on;

- Inner West Council (Previously Marrickville City Council) DCP 2011.
- The EPA Industrial Noise Policy
- The Protection of the Environment Operations Act 1997
- The Protection of the Environment Operations (Noise Control) Regulation 2008.

5.2.1 Inner West Council (Previously Marrickville City Council) DCP 2011.

Marrickville DCP 2011 does not have specific noise emission goals. As such, we will look at the Industrial Noise Policy presented below.

5.2.2 EPA Industrial Noise Policy

The EPA Industrial Noise Policy has two criteria which need to be satisfied namely Intrusiveness and Amenity. These are described below:

- *Intrusiveness Criteria* - This 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.

- *Amenity Criteria* - This guideline is intended to limit the absolute noise level from all "industrial" noise sources such as mechanical plant 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.

Noise levels are to be assessed at the property boundary or nearby dwelling, or at the balcony or façade of an apartment.

5.2.2.1 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 do not exceed the background noise level by more than 5dB(A). Where applicable, the intrusive noise level should be penalised (increased) to account for any annoying characteristics such as tonality.

Background noise levels adopted are presented in Section 5.1. Noise emissions from the site should comply with the noise levels presented below when measured at nearby property boundary.

Table 10 – Intrusiveness Noise Emission Goals

Location	Period/Time	Background Noise Level dB(A) L_{90}	Intrusiveness Noise Emission Goal dB(A) $L_{eq(15min)}$ Background + 5dB
Project Site	Day (7am-6pm)	50	55
	Evening(6pm-10pm)	47	52
	Night(10pm-7am)	38	43

5.2.2.2 Amenity Criterion

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

The EPA 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. This site is categorised by surrounding receivers as suburban.

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.
- Night is defined as the period from 10pm to 7am Monday to Saturday and 10pm to 8am Sunday and public holidays.

Table 11 - Amenity Noise Emission Goals

Location	Period/Time	Amenity Noise Emission Goal dB(A) $L_{eq(Period)}$
Nearby Residences	Day (7am-6pm)	55
	Evening(6pm-10pm)	45
	Night(10pm-7am)	40

5.2.3 Protection of the Environment Operations Act 1997

The Protection of the Environment Operations Act stipulates that a site should not emit "offensive noise" to a residential receiver, where "offensive noise" is defined as background + 5dB(A), once penalties for tonality, intermittence etc have been taken into account.

In our opinion, compliance with the Industrial Noise Policy is satisfactory to demonstrate that a particular noise is not offensive.

5.2.4 Protection of the Environmental Operation (Noise Control) Regulation 2008

Protection of the Environmental Operations regulation limits the noise levels associated within the operation of domestic air conditioning criteria during night time periods which is presented below:

Protection of the Environmental Operations (Noise Control) Regulation 2008-Sect 52

52 Air Conditioners

(1) A person must not cause or permit an air conditioner to be used on residential premises in such a manner that it emits noise that can be heard within a habitable room in any other residential premises (regardless of whether any door or window to that room is open):

(a) before 8 am or after 10 pm on any Saturday, Sunday or public holiday, or
(b) before 7 am or after 10 pm on any other day.

5.3 NOISE EMISSION ASSESSMENT

5.3.1 Mechanical Plant

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 5.2 of this report.

While compliance with noise emission requirements will be achievable with appropriate acoustic treatment, it is highly likely that any roof top equipment which operates 24 hours per day (such as refrigeration plant) will require either enclosure in plant rooms or acoustic screens to provide a line of sight break between the equipment and any existing or future residences.

Other equipment external items (fans) would be expected to be capable of compliance through use of internal duct lining and/or in-duct attenuators.

6 RAILWAY VIBRATION ASSESSMENT

Trains induce ground borne vibration that is transmitted through the subsoil. These vibrations can be perceptible close to railways, as tactile vibrations and as structure borne noise.

6.1 PROJECT VIBRATION OBJECTIVES

6.1.1 Tactile Vibration

Human comfort is normally assessed with reference to the British Standard BS 7385 Part 2 1993 or Australian Standard AS 2670.2 1990.

The Interim Guideline references the DECCW *Assessing Vibration- A technical guideline* which recommends that habitable rooms should comply with the criteria therein which is in line with the requirements of British Standard BS 6472:1992 "Evaluation of Human Exposure to Vibration in Buildings (1Hz to 80Hz)".

British Standard BS 6472:1992 "Evaluation of Human Exposure to Vibration in Buildings (1Hz to 80Hz)" is recommended by the RIC's and SRA's Interim Guidelines for Councils "Consideration of rail noise and vibration in the planning process" as this standard includes guidance for the assessment of human response to building vibration including intermittent vibrations such as that caused by trains.

Human response to vibration has been shown to be biased at particular frequencies, which are related to the orientation of the person. This standard provides curves of equal annoyance for various orientations. These curves are applied as correction filters such that an overall weighted acceleration level is obtained. As the orientation of the resident is unknown or varying the weighting filter used is based on the combined base curve as given in ISO 2631 & Australian Standard 2670 "Evaluation of Human Exposure to Vibration and Shock in Buildings (1 to 80Hz)" which represents the worst case of the X, Y and Z axes. Filtered measurements are made in all three co-ordinate axes and the highest value axis used.

This standard assesses the annoyance of intermittent vibration by using the Vibration Dose Value (VDV). Alternatively the VDV may be estimated by the eVDV which is derived by a simpler calculation using an empirical factor. The VDV or eVDV is calculated for the two periods of the day being the "Daytime" (6am-10pm) and "Night time" (10pm-6am). The overall value is then compared to the levels in Table 5. For this project the aim will be for a low probability of adverse comment.

Table 12 - Vibration Dose Values ($m/s^{1.75}$) above which various degrees of adverse comment may be expected in residential buildings.

Place	Low Probability of adverse comment	Adverse comment possible	Adverse comment probable
Residential buildings 16hr day (Daytime)	0.2 to 0.4	0.4 to 0.8	0.8 to 1.6
Residential buildings 8hr night (Night time)	0.13	0.26	0.51

6.1.2 Structure Borne Noise

The Department of Planning 'Development Near rail Corridors and Busy Road – Interim Guideline' only requires structure borne noise assessment to be conducted where buildings or adjacent lands are over railway tunnels. Section 3.6.2 of the standard states the following:

"…Where building are constructed over or adjacent to land over tunnels, ground-born noise may be present without the normal masking effects of air born noise. In such cases, residential buildings should be designed so that the 95th percentile of train pass-bys complies with a ground-born LAmax noise limit of 40 dB(A)(daytime and 35 dB(A) (nigh time)measured using the "slow" response time setting on a sound level meter."

6.2 RAIL VIBRATION MEASUREMENTS

Rail noise measurements were conducted in line with the future proposed north-eastern façade, which is the potentially worst affected façade.

Attended train vibration measurements were conducted approximately 6m from the southern property boundary facing the T2 Railway Line, on the 19th April 2016, between the hours of 2:00pm and 4:00pm. A Svan 958 Vibration Analyser was used for the vibration measurements. The analyser was fitted with a Dytran triaxial accelerometer.

The measured vibration levels, duration of train pass by and the number of rail movements per hour were used to determine the overall vibration dose (VDV) at the proposed development for both daytime and night time periods. The results are presented the table below.

Table 13 - Vibration Dose Values

Time Period	Calculated VDV m/s$^{1.75}$	Criteria VDV m/s$^{1.75}$	Complies
Day (7am – 10pm)	0.07	0.2 to 0.4	Yes
Night (10pm -7am)	0.05	0.13	Yes

In the event the future train use increases, say by 10%, predicted eVDV will not increase significantly (no more than approximately 0.007 more than the levels predicted in the table above) and will not impact recommended vibration isolation treatments.

The calculated levels comply with the tactile vibration requirements listed in Table 10.

7 CONCLUSION

This report presents an acoustic assessment for the proposed Residential Aged Care Facility and Independent Living Units to be located at 2B West Street, Lewisham.

Acoustic analysis of the site indicates that:

- Although the site is impacted by external noise (road, rail and aircraft noise), suitable internal noise levels within the proposed development can still be achieved with an appropriately designed building shell (with acoustic upgrade compared to standard building construction, as outlined in Section 4.3).

- The site is not likely to generate significant noise, and the noise sources are in keeping with typical aged care development (plant noise, vehicle noise). Noise emission goals have been set in Section 5.2 of this report, and a detailed review of all external mechanical plant should be undertaken at construction certificate stage (once plant selections and locations are finalised).

- Although the site lies in the vicinity of a rail corridor, no building vibration isolation is required to ensure that vibration levels in the development are compliant with relevant EPA vibration guidelines.

As such, in our opinion the site is suitable for its proposed use as a residential aged care facility and for independent living units with respect to acoustics.

Please contact us should you have any further queries.

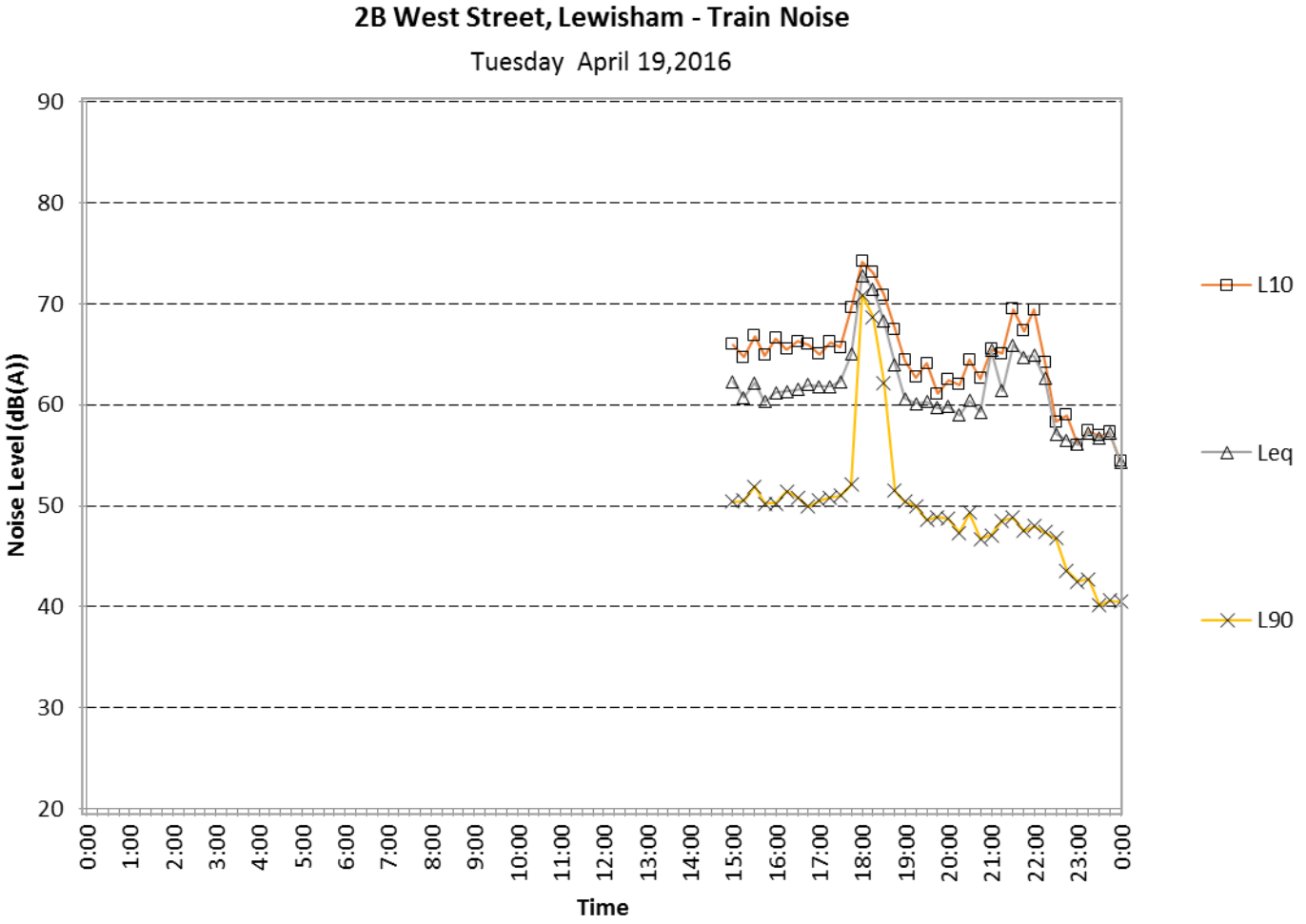
Yours faithfully,

Acoustic Logic Consultancy Pty Ltd
Johan Davydov

Appendix 1

2B West Street, Lewisham

Unattended Noise Measurements – Train


2B West Street, Lewisham - Train Noise
Tuesday April 19,2016
Noise Level (dB(A))
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80
70
60
50
40
30
20
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2:00
3:00
4:00
5:00
6:00
7:00
8:00
9:00
10:00
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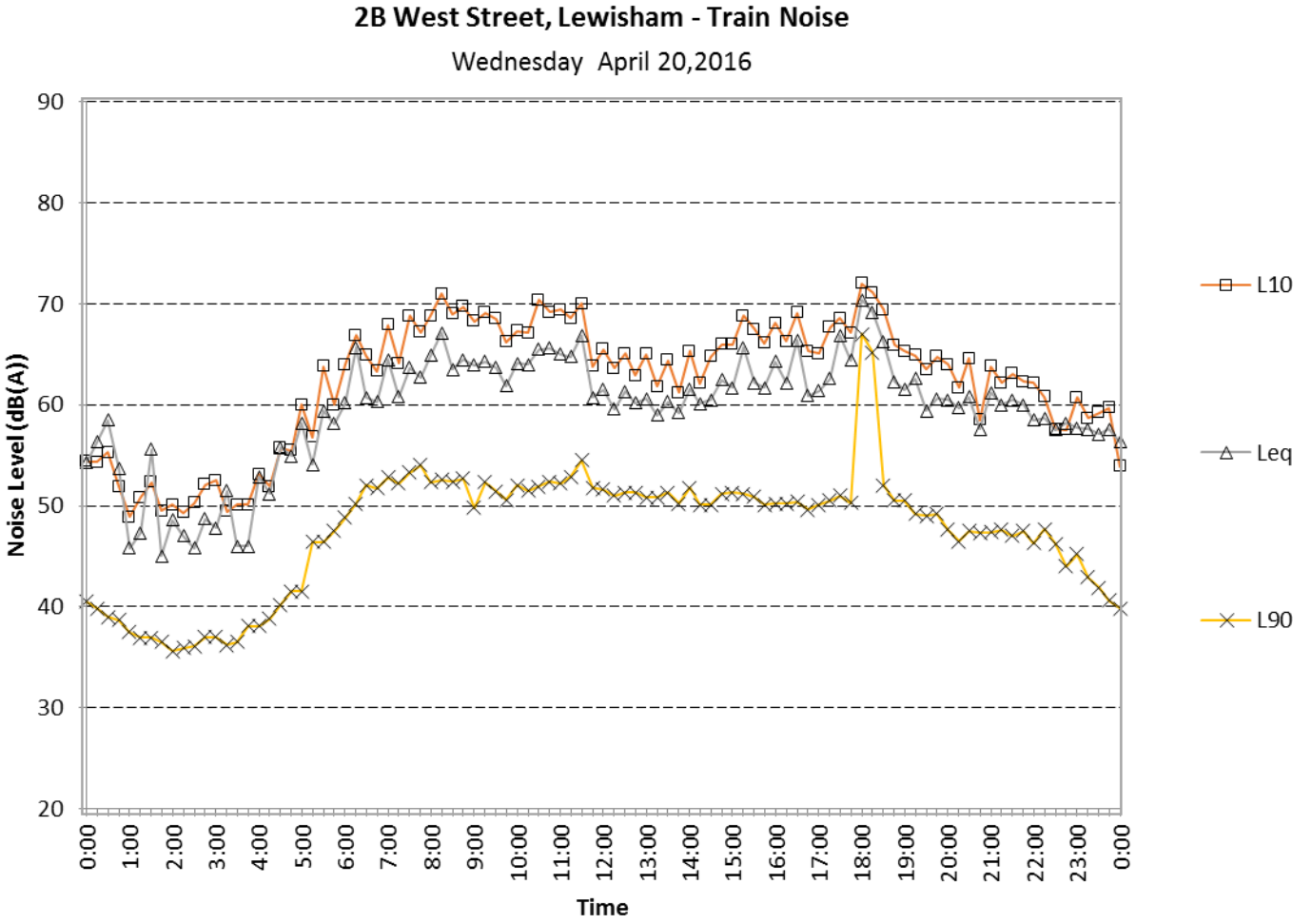
L90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Wednesday April 20,2016
Noise Level (dB(A))
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50
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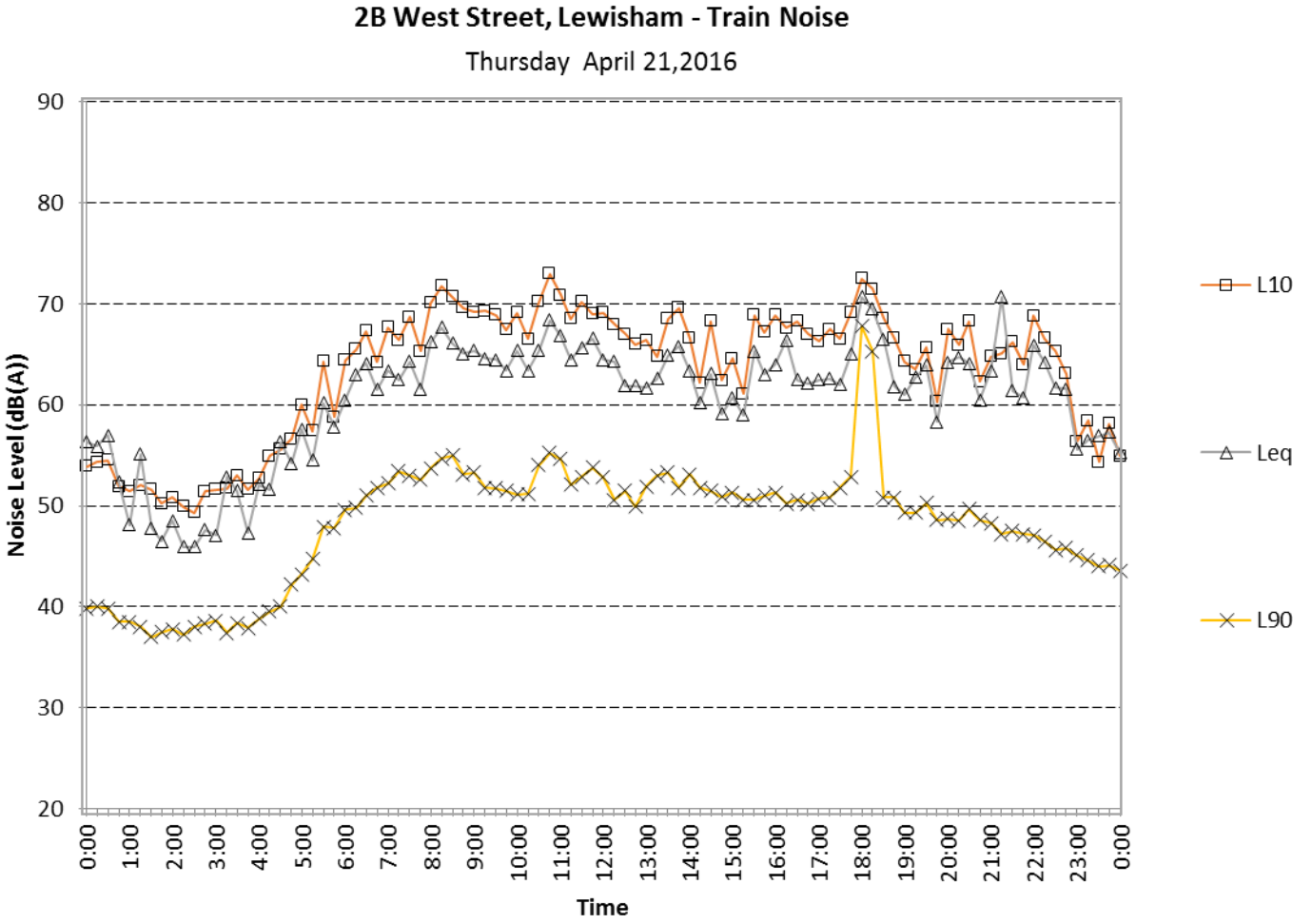
Leq
L90


2B West Street, Lewisham - Train Noise
Thursday April 21,2016
Noise Level (dB(A))
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70
60
50
40
30
20
0:00
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19:00
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21:00
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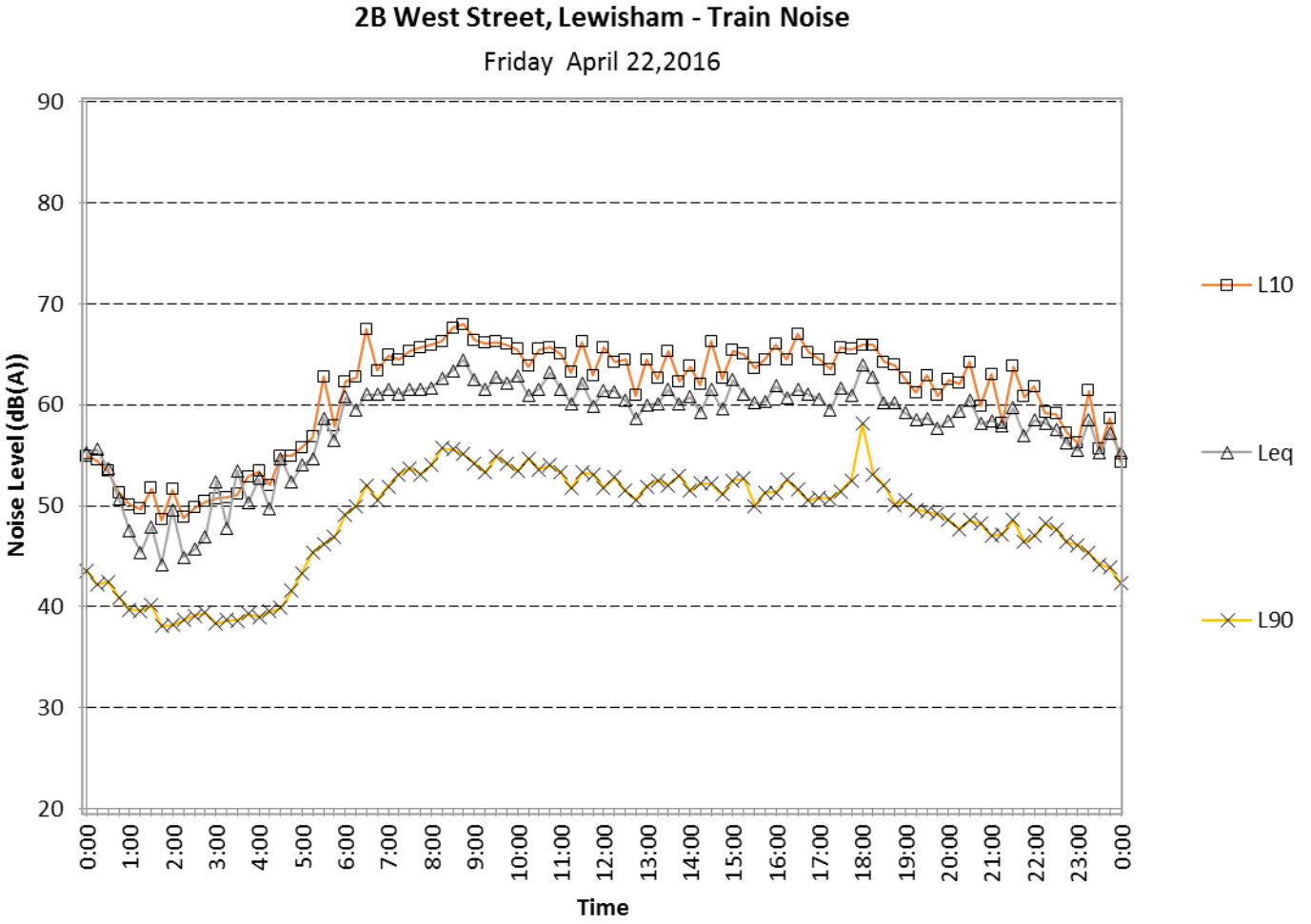
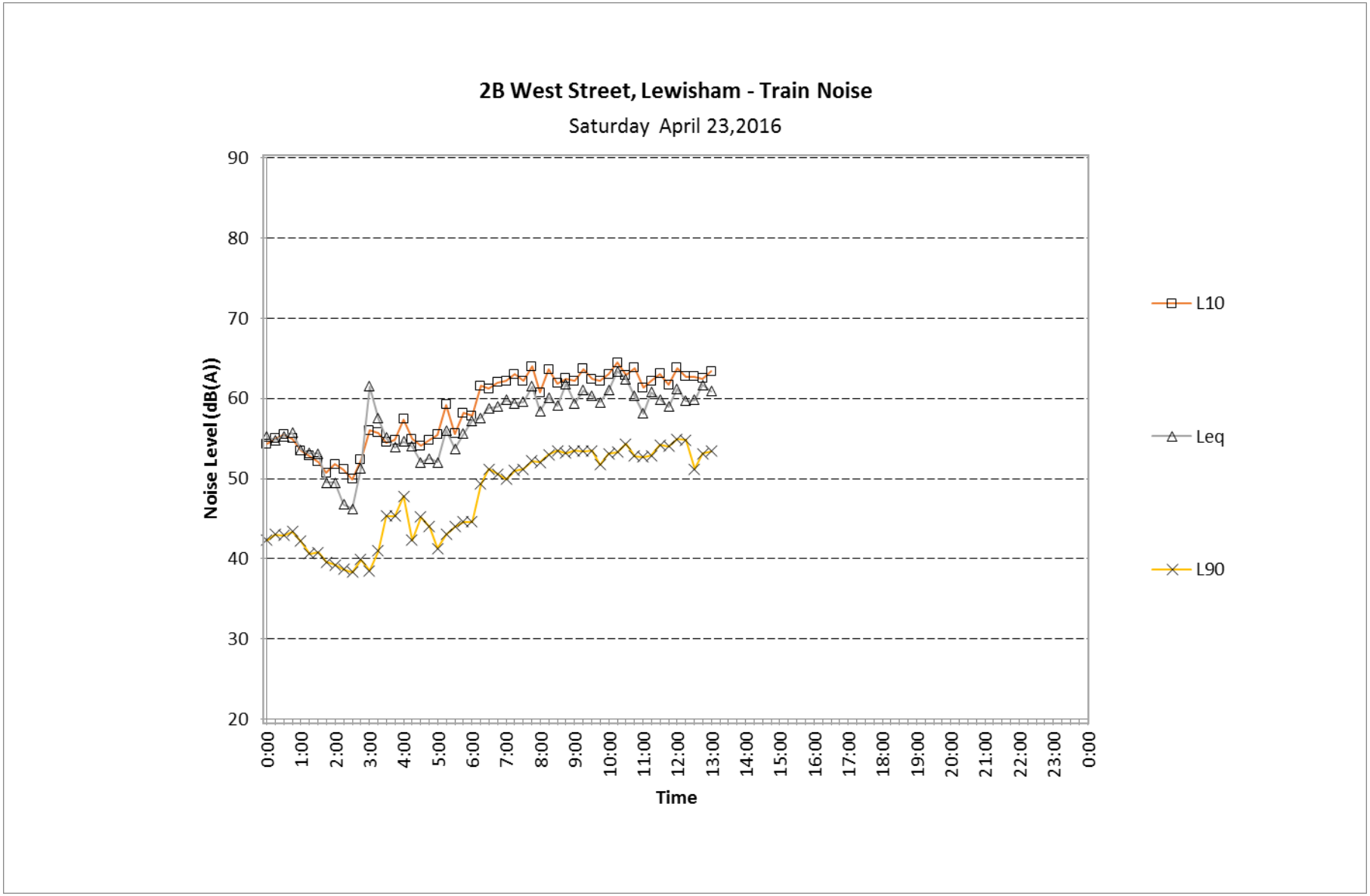
23:00
0:00
Time
L10
Leq
L90

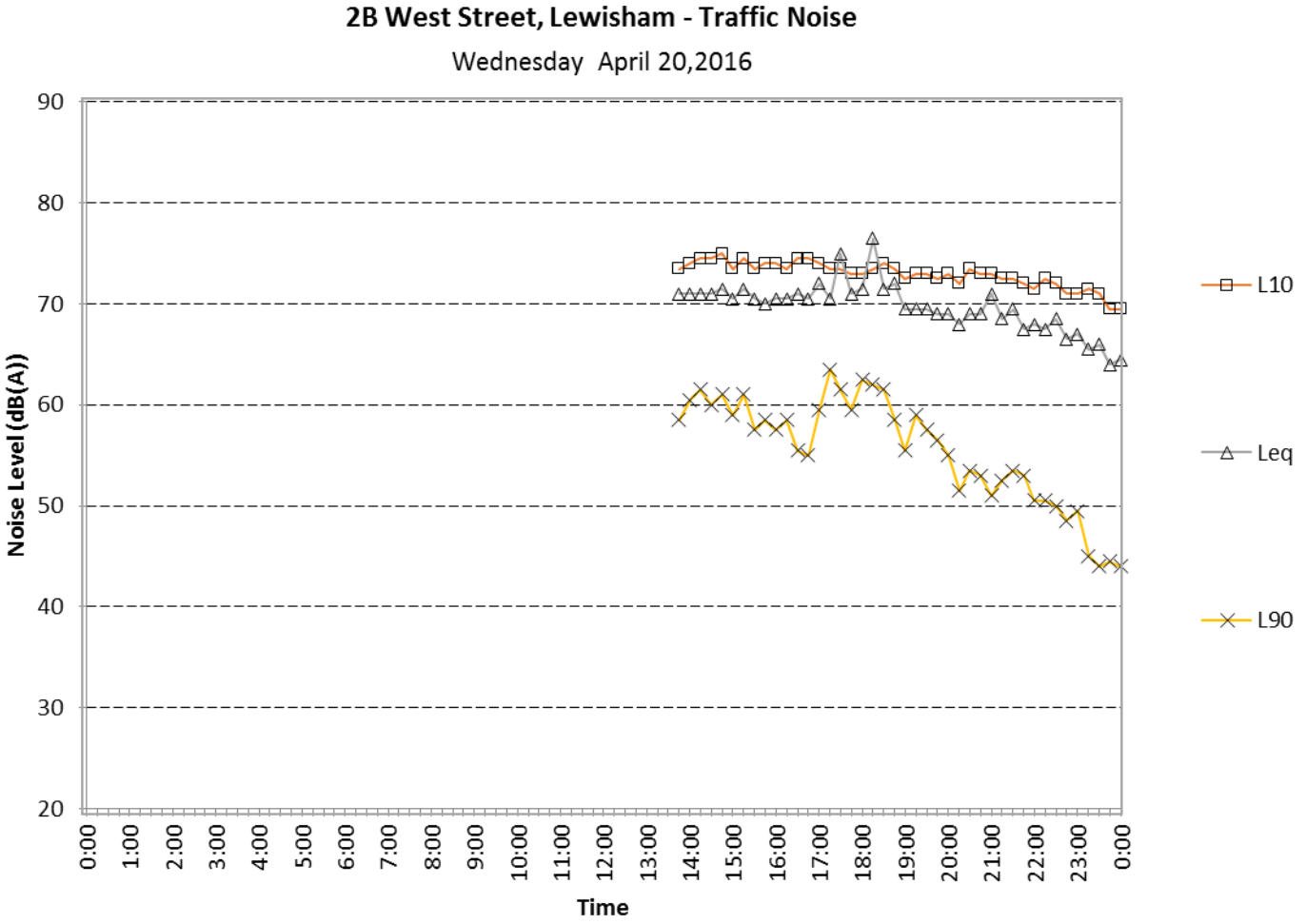

2B West Street, Lewisham - Train Noise
Friday April 22,2016
Noise Level (dB(A))
90
80
70
60
50
40
30
20
0:00
1:00
2:00
3:00
4:00
5:00
6:00
7:00
8:00
9:00
10:00
11:00
12:00
13:00
14:00
15:00
16:00
17:00
18:00
19:00
20:00
21:00
22:00
23:00
0:00
Time
L10
Leq
L90

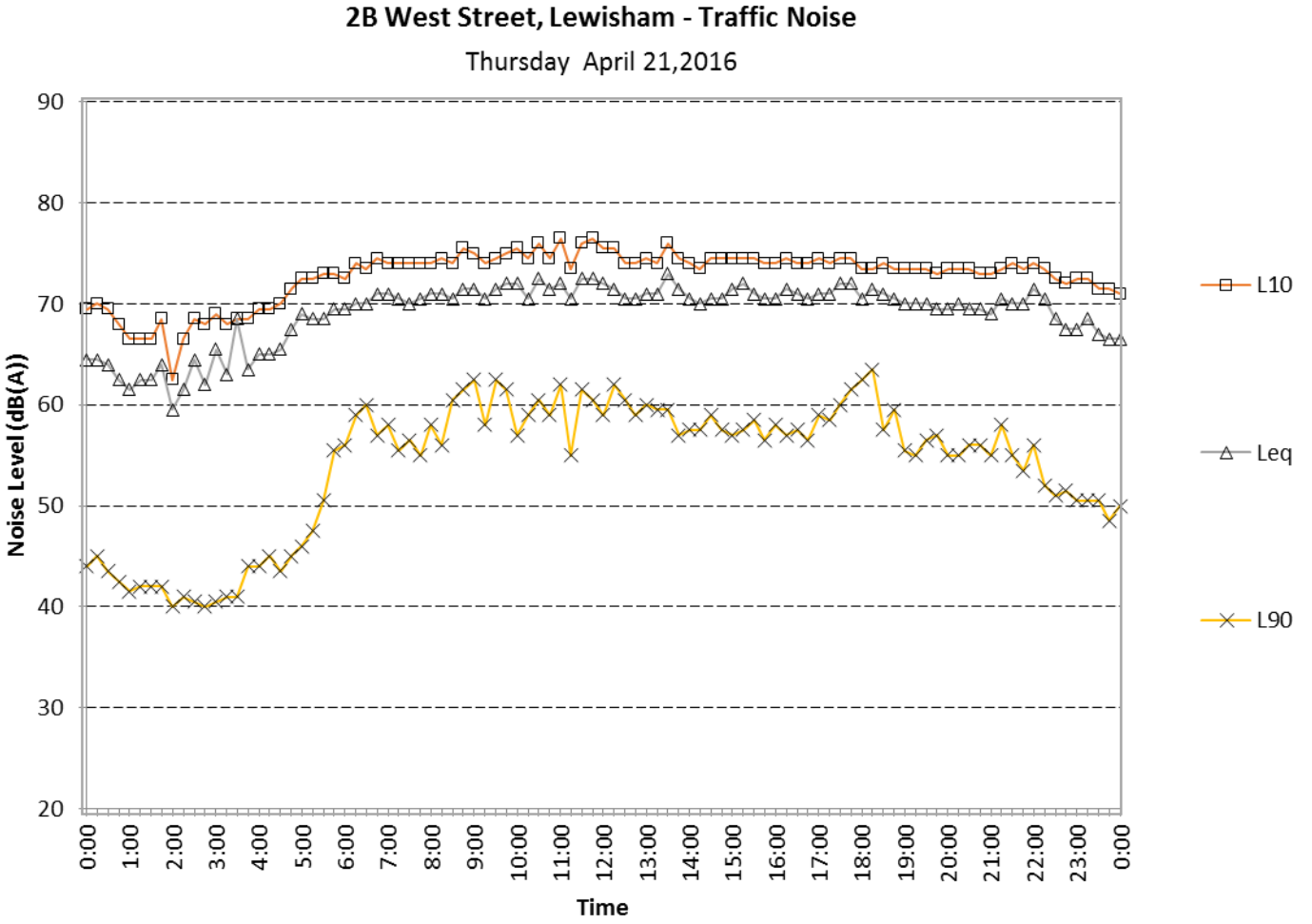

2B West Street, Lewisham - Train Noise
Saturday April 23,2016
Noise Level (dB(A))
90
80
70
60
50
40
30
20
0:00
1:00
2:00
3:00
4:00
5:00
6:00
7:00
8:00
9:00
10:00
11:00
12:00
13:00
14:00
15:00
16:00
17:00
18:00
19:00
20:00
21:00
22:00
23:00
0:00
Time
L10
Leq
L90

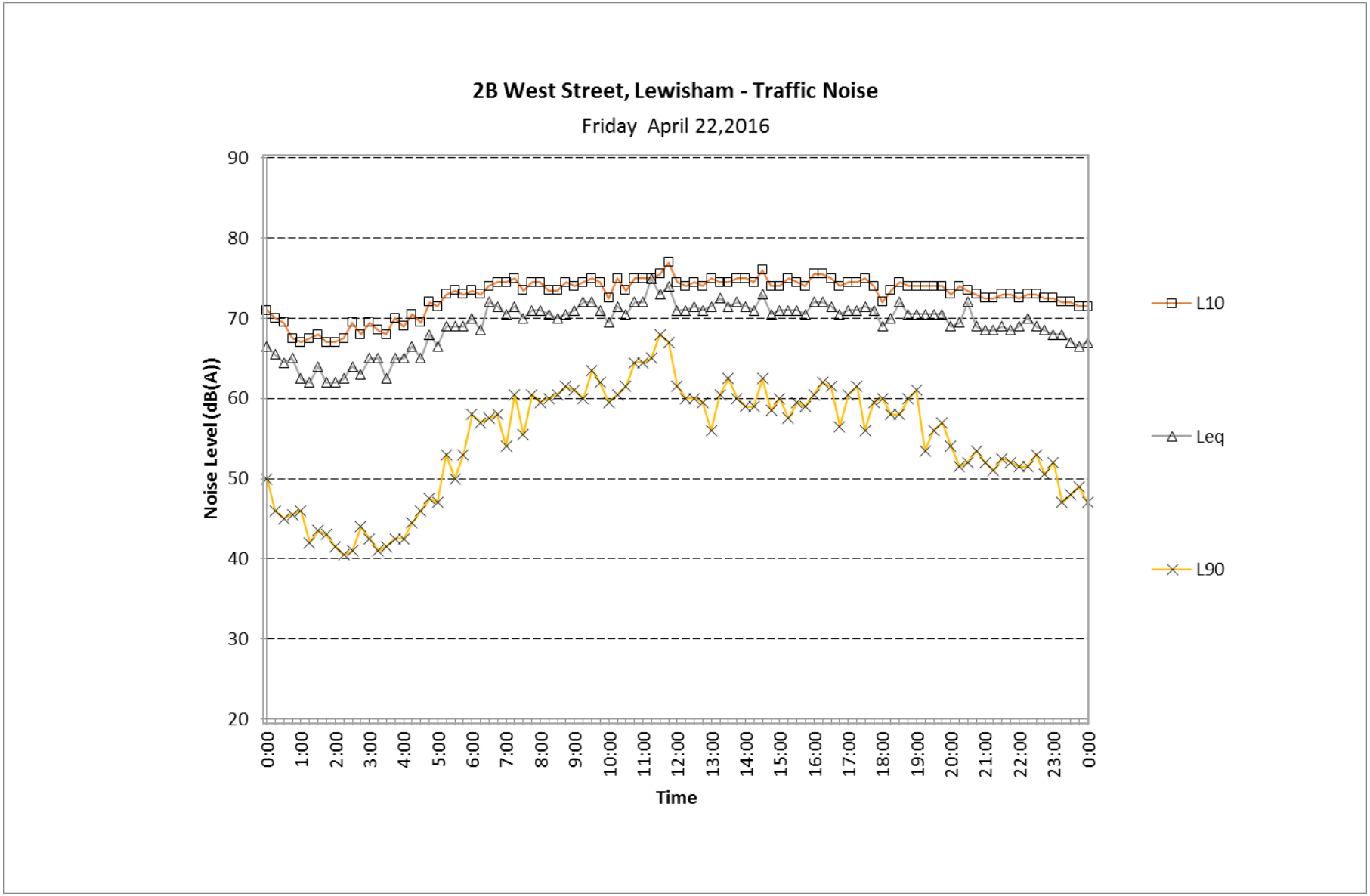
Appendix 2

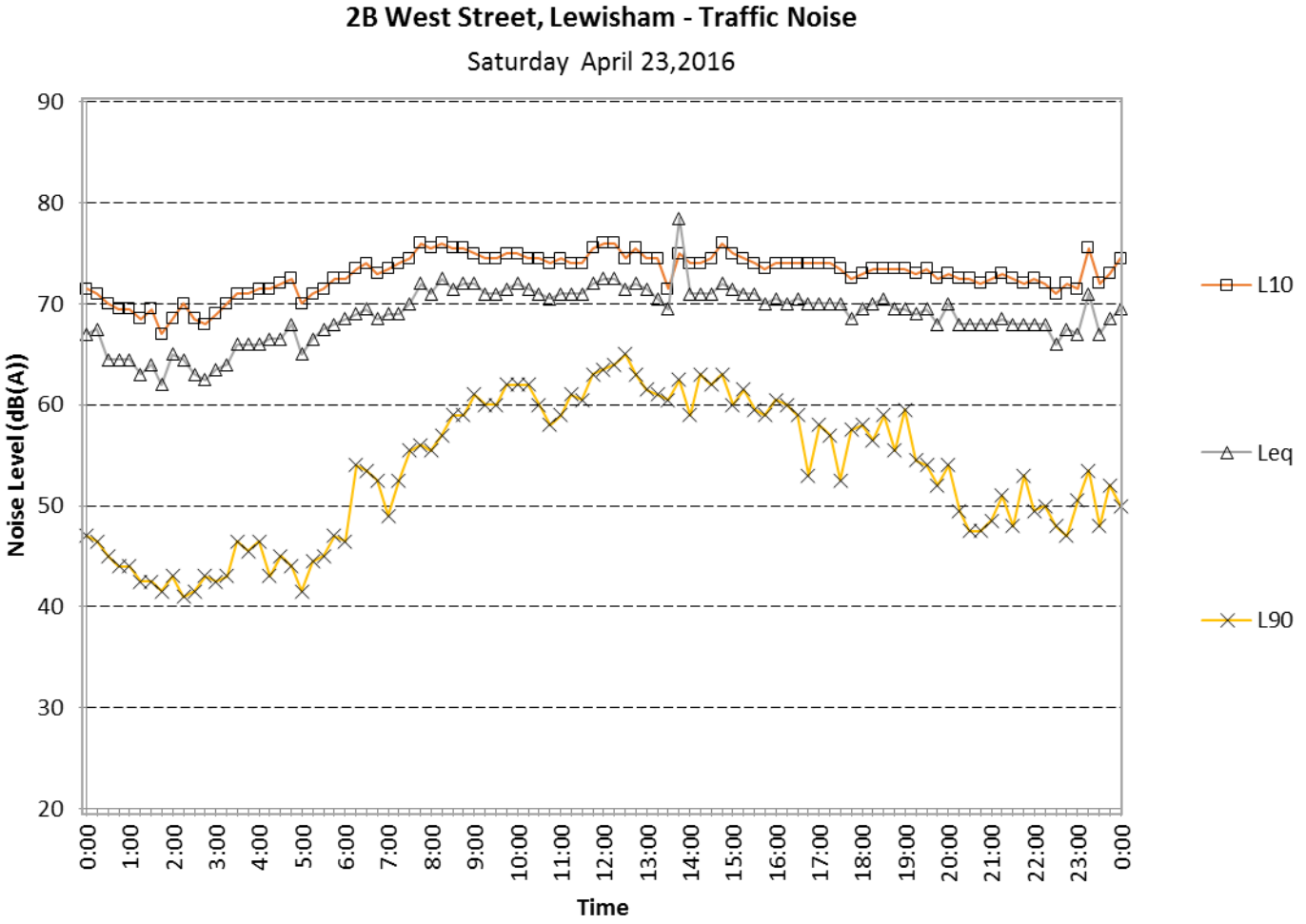
2B West Street, Lewisham

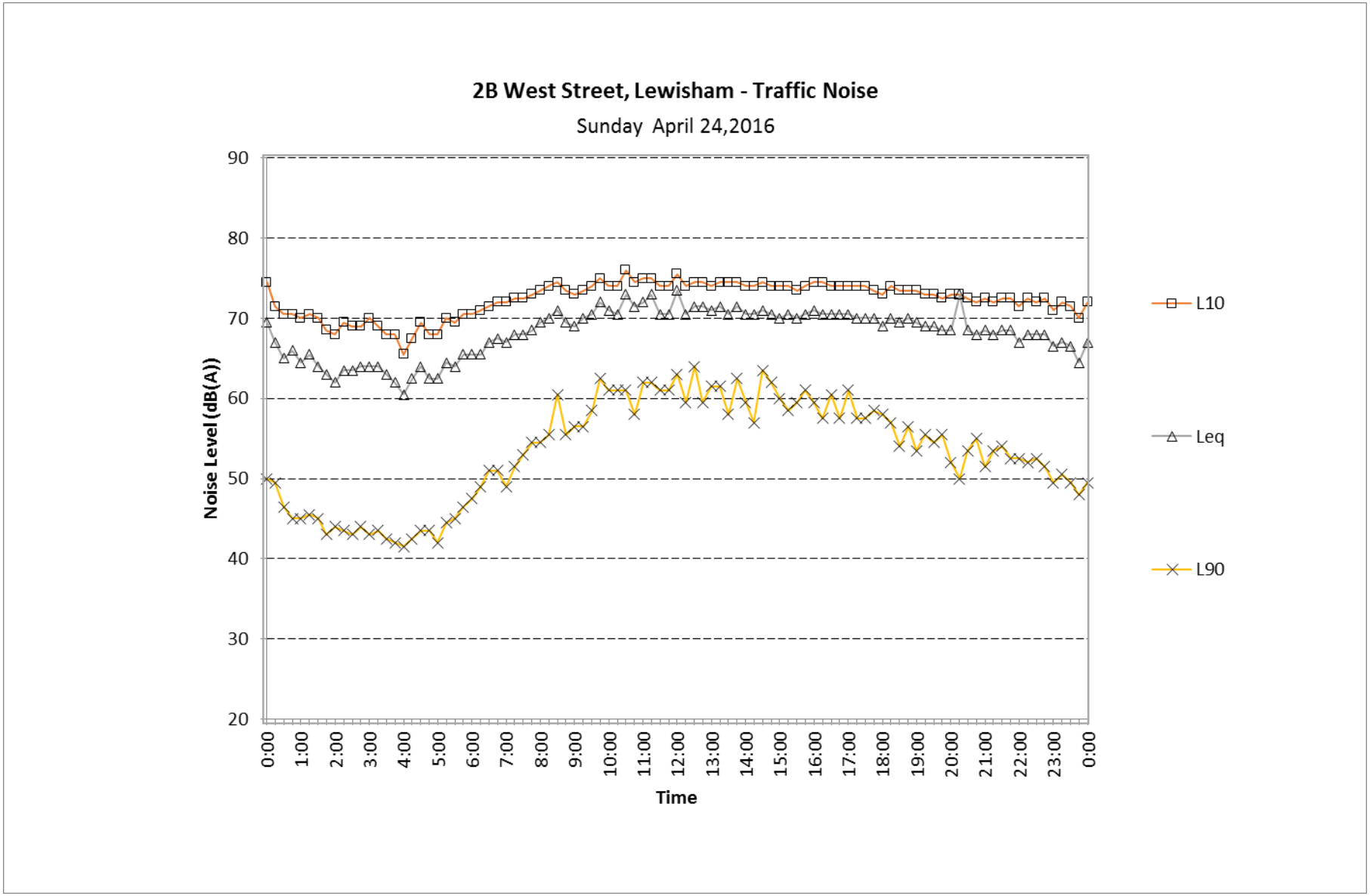
Unattended Noise Measurements – Traffic

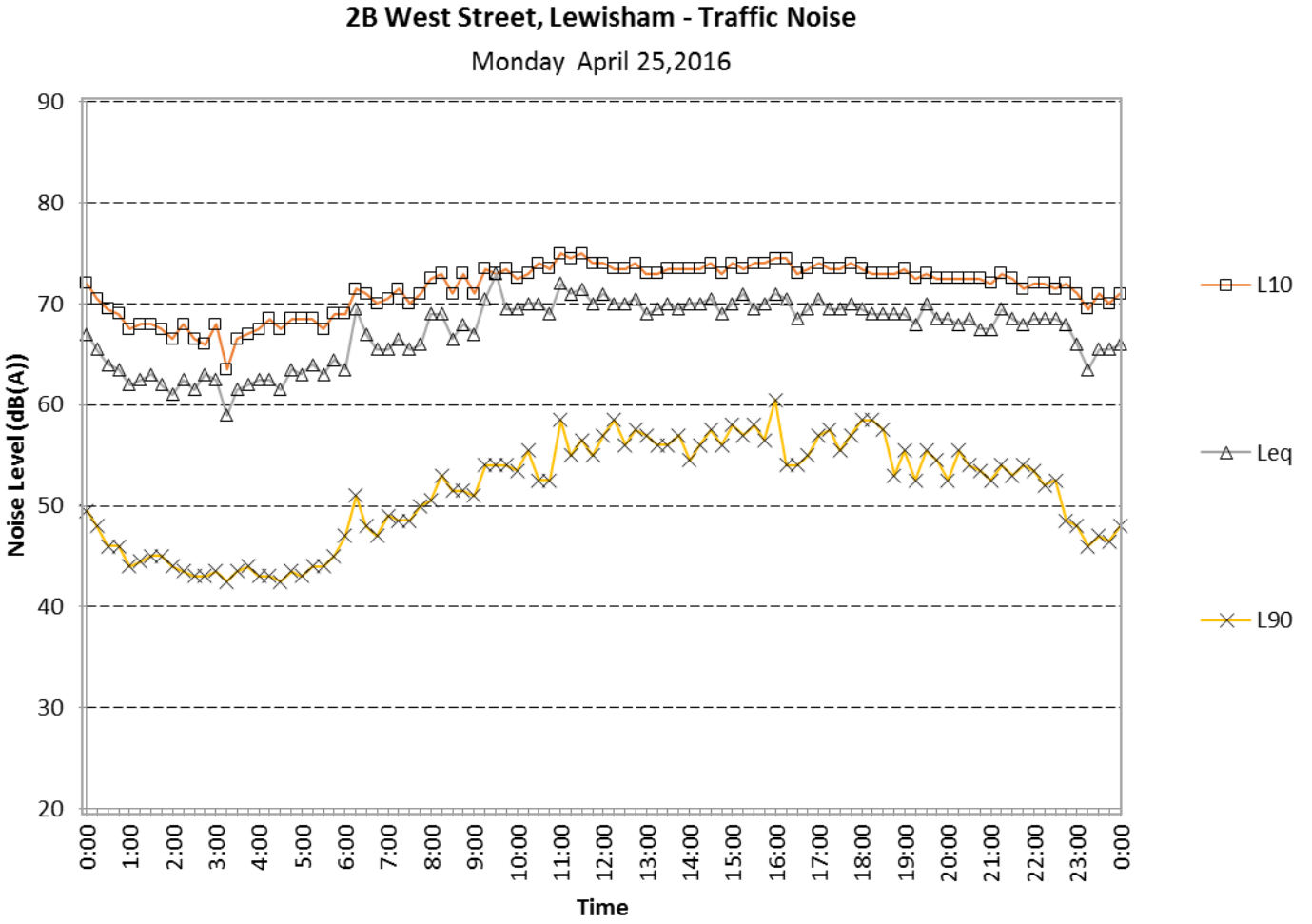

2B West Street, Lewisham - Traffic Noise
Wednesday April 20,2016
Noise Level (dB(A))
90
80
70
60
50
40
30
20
0:00
1:00
2:00
3:00
4:00
5:00
6:00
7:00
8:00
9:00
10:00
11:00
12:00
13:00
14:00
15:00
16:00
17:00
18:00
19:00
20:00
21:00
22:00
23:00
0:00
Time
L10
Leq
L90

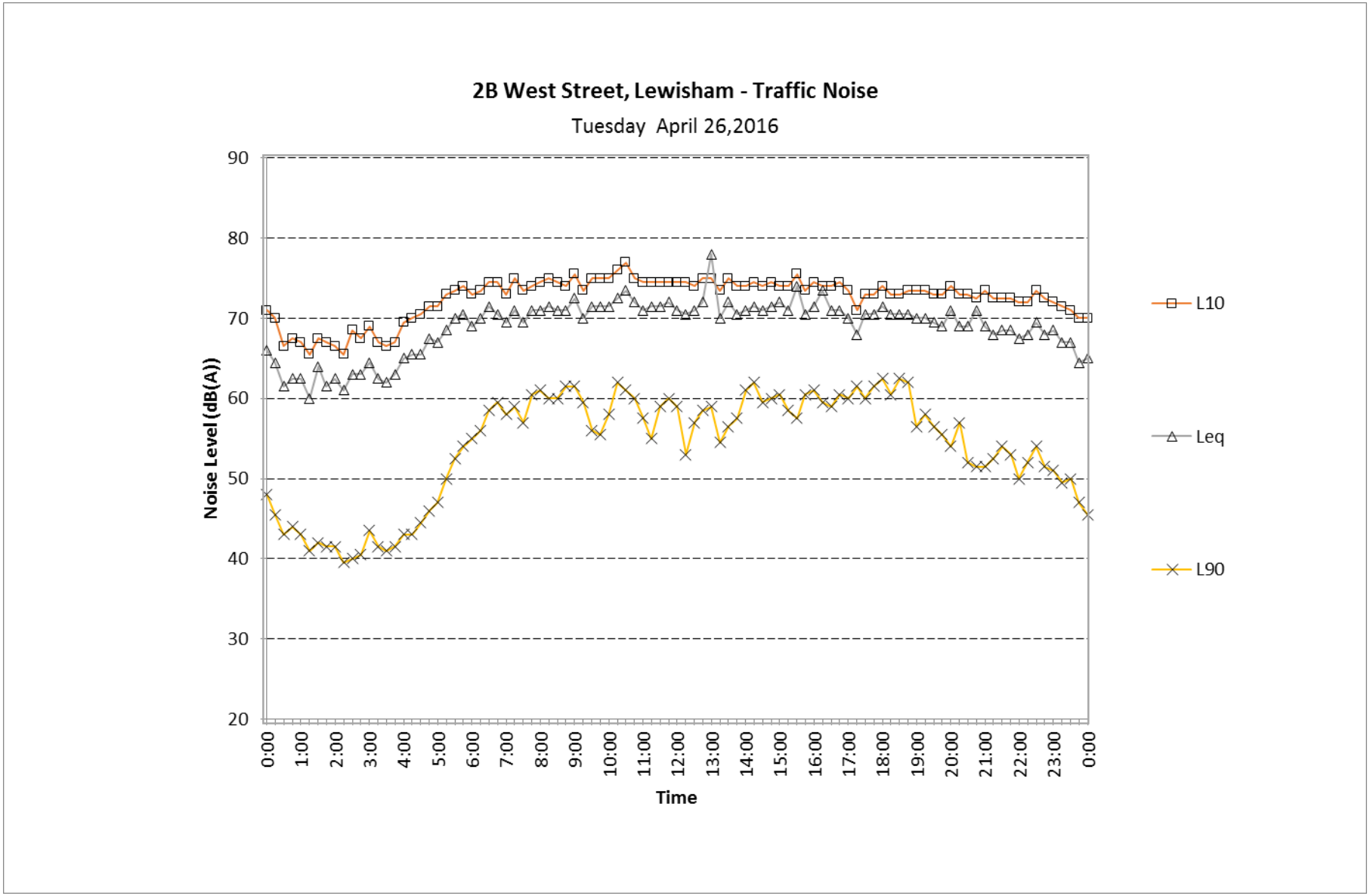

2B West Street, Lewisham - Traffic Noise
Thursday April 21,2016
Noise Level (dB(A))
90
80
70
60
50
40
30
20
0:00
1:00
2:00
3:00
4:00
5:00
6:00
7:00
8:00
9:00
10:00
11:00
12:00
13:00
14:00
15:00
16:00
17:00
18:00
19:00
20:00
21:00
22:00
23:00
0:00
Time
L10
Leq
L90


2B West Street, Lewisham - Traffic Noise
Friday April 22,2016
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


2B West Street, Lewisham - Traffic Noise
Saturday April 23,2016
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


2B West Street, Lewisham - Traffic Noise
Sunday April 24,2016
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


2B West Street, Lewisham - Traffic Noise
Monday April 25,2016
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


2B West Street, Lewisham - Traffic Noise
Tuesday April 26,2016
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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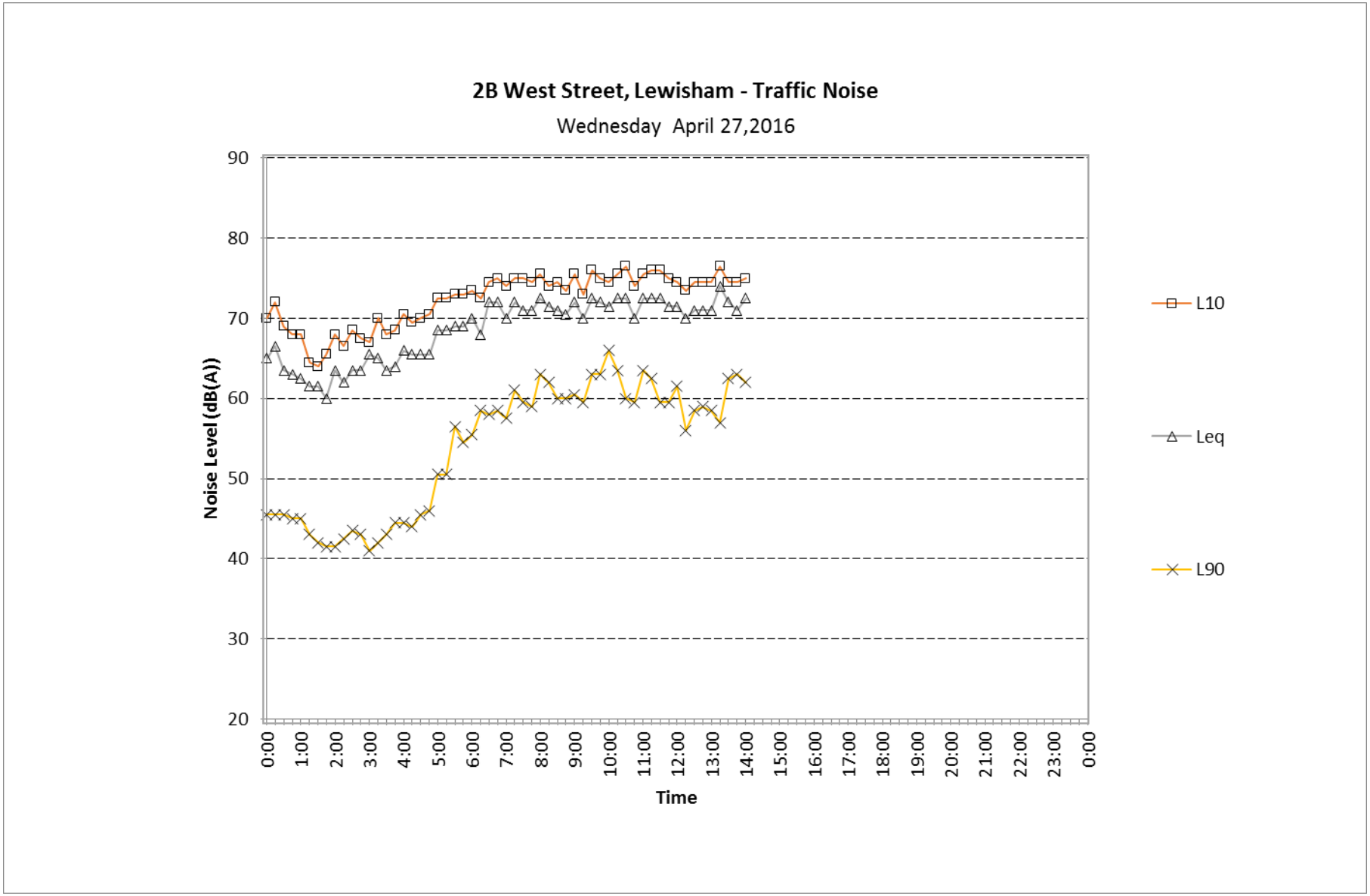
15:00
16:00
17:00
18:00
19:00
20:00
21:00
22:00
23:00
0:00
Time
L10
Leq
L90


2B West Street, Lewisham - Traffic Noise
Wednesday April 27,2016
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