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Noise Impact Assessment

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1 INTRODUCTION

Acoustic Logic Consultancy have been engaged to conduct an acoustic assessment of noise impacts associated with the proposed cold storage facility to be located at Lot 16 Hollinsworth Road, Marsden Park.

This assessment will address noise associated with the following:

- Noise emissions from internal warehousing noise;
- Cars entering and exiting facility;
- Trucks entering and exiting facility;
- Loading dock operations;
- Potential for sleep disturbance associated with heavy vehicle movements between 10pm and 7am; and
- Mechanical plant noise emissions in principle.

Noise impacts have been addressed in accordance with:

- Blacktown City Council Development Control Plan 2006;
- Environment Protection Authority (EPA) Industrial Noise Policy; and
- Environment Protection Authority (EPA) Road Noise Policy.

Predicted noise levels from the operation of the facility as presented in this report indicate that the proposed development can comply with the aforementioned authorities and regulations for all periods of the day, evening and night.

SoundPlan™ Note

Noise levels have been predicted at the receiver locations using SoundPlan™ modelling software implementing the ISO 9613-2:1996 *"Acoustics – Attenuation of Sound During Propagation Outdoors – Part 2: General Method of Calculation"* noise propagation standard. Noise levels presented in the body of this report are the façade incidence levels and do not include façade reflection. However, the grid noise maps appended to this report include façade reflection.

2 SITE DESCRIPTION

The proposed site is located on Lot 16 Hollinsworth Road, Marsden Park. It is proposed to construct the cold storage facility in two stages, which will ultimately incorporate the following uses:

- Cold storage warehousing;
- Loading docks and receiving areas along the East and Western façades of the warehouses.
- Administration offices.
- Car parking.

The development is proposed to operate 24 hours a day, 7 days a week.

The surrounding uses of the development include the following:

- Hollinsworth Road along the Southern boundary of the development;
- Roads 2 and 5A (currently un-named) as part of the Marsden Park industrial precinct along the West and Northern boundaries respectively;
- Access will be provided by Road 5A along the Northern boundary of the site.

Sensitive residential receivers which may have the potential to be impacted by noise from the operation of the site are as follows (Refer Figure 1):

- Existing caravan park approximately 480m to the Southwest;
- 99 Hollinsworth Road approximately 233m to the South; and
- 105 Hollinsworth Road approximately 310m to the South;

The aforementioned sensitive receivers are located on industrially zoned allotments. On this basis, it is not expected that sensitive uses will occupy these allotments in the long term. Notwithstanding, these uses will be used as a basis for the assessment.

Compliance at these receiver locations will indicate compliance at the residential areas South of Hassall Grove.

Figure 1: Site Survey and Monitoring Location

3 EXISTING ACOUSTIC ENVIRONMENT

The acoustic environment is categorised by relatively low to moderate background noise levels during the day and evening and low background noise levels during the night time periods typically associated with a rural environment with some industry.

Acoustic monitoring was conducted at the site to establish the background noise levels which will be used as basis for this assessment.

3.1 ENVIRONMENTAL NOISE DESCRIPTORS

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

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

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

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

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

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

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

3.2 BACKGROUND NOISE LEVELS

Background noise levels which will be used as a basis for this assessment are detailed in the following sections.

3.2.1 Measurement Equipment

Unattended noise monitoring was conducting using Acoustic Research Laboratories Pty Ltd noise logger. The logger was programmed to store 15-minute statistical noise levels throughout the 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.

3.2.2 Measurement Location

A noise monitor was installed adjacent to the eastern boundary of the caravan park, as shown in Figure 1.

3.2.3 Measurement Period

The long-term noise monitor was conducted between 5th May, 2014 and 12th May, 2014.

3.2.4 Background Noise Levels

The background noise levels established from the unattended noise monitoring are detailed in the Table below.

Table 1 – Rating Background Noise Level

Time of Day	Rating Background Noise Level dB(A) L_{90}
Day	38
Evening	35
Night	32

4 NOISE EMISSION CRITERIA

Noise emission objectives have been determined in accordance with the requirements of Blacktown City Council, the EPA Industrial Noise Policy and the EPA Road Noise Policy.

4.1 BLACKTOWN CITY COUNCIL

Blacktown City Council DCP 2006 states the following with regards to mechanical or hydraulic plant items:

"No electrical, mechanical or hydraulic plant or equipment shall generate a noise level greater than 5dBA above the ambient L90 sound level at the boundaries of any allotment at any time of day."

4.2 EPA - INDUSTRIAL NOISE POLICY

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

4.2.1 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 not exceed the background noise level by more than 5 dB(A).

Rating background noise levels for the area have been established from long term unattended noise monitoring as detailed in Section 3.2. Intrusive criteria based on the noise monitoring conducted at the site are detailed in Table 2.

Table 2 – INP Intrusiveness Criteria

Time of day	Background Noise Level dB(A)L_{90}	Intrusiveness Criteria (Background+5dB(A)) dB(A) $L_{eq\ 1hour}$
Day	38	43
Evening	35	40
Night	32	37

4.2.2 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 Industrial Noise Policy sets out acceptable noise levels for various land uses. Table 2.1 on page 16 of the policy has four categories to distinguish different residential areas. They are rural, suburban, urban and urban/industrial interface.

Pursuant to the INP, the residential receivers in the vicinity would be classified as the following:

The existing residences would be considered urban, given their proximity to commercial or industrial districts. ALC notes that the INP also states that for isolated residences within an industrial zone, the industrial amenity criteria would usually apply. Notwithstanding, ALC have adopted the urban amenity to maintain a reasonable level of acoustic amenity.

The caravan park receivers would be considered suburban given:

- some level of latent traffic noise from Richmond Road;
- some limited commerce or industry; and
- the tendency for noise levels to decrease during the evening period.

Corresponding Amenity Criteria noise emission goals are presented below.

Table 3 – INP Amenity Criteria

Type of Receiver	Time of day	Recommended Acceptable Noise Level dB(A) $L_{eq\ period}$
Residential (Urban)	Day	60
	Evening	50
	Night	45
Residential (Suburban)	Day	55
	Evening	45
	Night	40

4.3 SLEEP AROUSAL CRITERIA

Potential sleep arousal impacts should be considered for noise generated after 10pm or before 7am. Sleep arousal is a function of both the noise level and the duration of the noise. To assess potential sleep arousal impacts, a two stage test is carried out:

- Step 1 - An "emergence" test is first carried out. That is, the L_1 noise level of any specific noise source should not exceed the background noise level (L_{90}) by more than 15 dB(A) outside a resident's bedroom window between the hours of 10pm and 7am. If the noise events are within this, then sleep arousal impacts are unlikely and no further analysis is needed. This is consistent with the Noise Guide for Local Government. The guideline level is set out below.

Table 4 - Sleep Arousal Emergence Criteria (6am-7am)

Location	Background Noise Level (6am-7am) - dB(A) $L_{90\ night}$	Emergence Level dB(A) $L_{1(1min)}$
All Potentially Affected Residential Properties	32	47

- Step 2 - If there are noise events that could exceed the emergence level, then an assessment of sleep arousal impact is required to be carried out taking into account the level and frequency of noise events during the night, existing noise sources, etc. This test takes into account the noise level and number occurrences of each event with the potential to create a noise disturbance. As is recommended in the explanatory notes of the EPA Industrial Noise Policy, this more detailed sleep arousal test is conducted using the guidelines in Section 5.4 of the EPA Road Noise Policy (RNP).

Section 5.4 of the RNP states that:

- Maximum internal noise level below 50-55 dB(A) are unlikely to cause awakening reactions.
- One or two noise events per night, with maximum internal noise levels of 65–70 dBA, are not likely to affect health and wellbeing significantly.

ALC have adopted the 55dB(A) L_{Max} internal noise level as a basis for assessing the potential for sleep arousal during the night time period of operation, typically 6am to 7am.

4.4 NOISE FROM INCREASED TRAFFIC GENERATION ON PUBLIC STREETS

Council has no specific noise criteria with respect to traffic generation associated with developments. In the absence of this, EPA guidelines can be used for assistance.

For land use developments with the potential to create additional traffic the development should comply with the requirements for new developments detailed in the EPA Traffic Noise Policy, when measured at the façade of the nearest residences.

Table 5 - Criteria for Traffic Noise for New Developments

Time of day	Criteria for Acceptable Traffic Noise Level Sub-arterial Roads - dB(A)
Day (7am to 10pm)	60 $L_{Aeq\ (15hr)}$
Night (10pm to 7am)	55 $L_{Aeq\ (9hr)}$

However, if existing noise levels exceed those in the table above, the provisions of section 3.4 of the Road Noise Policy will apply.

If practicable, noise on public roads as a result of increased traffic generation should not result in an increase in traffic noise level of more than 2dB(A). In this regard, the Policy relevantly states "*an increase of up to 2dB represents a minor impact that is considered barely perceptible to the average person*".

4.5 SUMMARY OF NOISE EMISSION OBJECTIVES

Based on the requirements stated in the sections above, Table 6 provides a summary of the assessment criteria applicable to the receivers surrounding the project site. The assessment criteria are also based on the background noise monitoring conducted at the site.

Table 6 – Environmental Noise Emission Criteria

Receivers	Time Period	Assessment Background Noise Level dB(A)L_{90}	Amenity Criteria dB(A) L_{eq}	Intrusiveness Criteria Background + 5 dB(A) $L_{eq(15min)}$	Sleep Disturbance Criteria
Caravan Park	Day	38	50	43	N/A
	Evening	35	45	40	N/A
	Night	32	40	37	47
Hollinsworth Road Receivers	Day	38	60	43	N/A
	Evening	35	50	40	N/A
	Night	32	45	37	47

The operation noise generated by the site should comply with the above noise emission criteria.

5 ASSESSMENT OF NOISE IMPACTS

Noise impacts associated with the development have been assessed for the following:

- Internal warehouse operations;
- Cars entering and exiting the parking lot;
- Heavy vehicle movements and loading dock operations; and
- Emissions associated with mechanical plant in principle.

Each of these noise sources will be discussed in detail. Noise predictions are presented in Table 9.

5.1 TYPICAL WAREHOUSE OPERATIONAL NOISE LEVELS

Internal noise levels within the proposed warehouse will be typically associated with refrigeration plant equipment.

ALC have been advised that internal noise levels will not typically exceed 75dB(A) L_{eq} sound pressure level. This level will be used as a basis for assessing noise breaking out of the facility.

5.1.1 Warehouse Noise Assumptions.

Internal activities within the warehouse have been assessed using the noise levels above. The following has been assumed:

- A sound pressure level of 75dB(A) L_{eq} adopted within the entire warehouse except for the offices and admin areas.
- Doors to the loading dock and the manufacturing areas are open.
- The walls are constructed from 0.42mm BMT sheet metal.
- The roof has been modelled as 0.42mm BMT sheet metal with 50mm reflective foil insulation blanket underneath.

In all likelihood, the walls and roof constructions will constructed from a metal sheet cladding with a refrigeration panel to maintain internal cold storage requirements. For the purposes of this assessment, only the cladding has been assumed.

5.2 CARS AND TRUCK ENTERING / EXITING THE DEVELOPMENT

Cars and heavy vehicle entering and exiting the facility have been based on the following noise levels as per measurements previously conducted by ALC.

Table 7 – Assumed Vehicle Operational Noise Levels

Noise Source	Sound Power Level dB(A)	Speed	Area of Noise Generation
Semi-trailer / B-Doubles	105	5km/h	Loading dock and internal road
Cars/Lt Vehicles	84	10km/h	Carpark

The table below shows the number of cars and trucks peak hour movements according to the traffic analysis conducted by GTA Consultants.

Table 8 –Trucks and Cars Peak Hour Movements

Noise Source	Period	Number of Peak hour movements*
Trucks	"Day" (4:00 am-2:00 pm)	21
	"Afternoon / Evening" (5:00 pm-9:00 pm)	6
	"Night" (1:00am – 5:00am)	15
Cars	"Day" (4:30 am-5:30 pm)	125
	"Afternoon / Evening" (10:00 pm-11:00 pm)	54
	"Night" (4:30 am-5:30 pm)	93

*A movement corresponds to a vehicle entering the premises, driving around the site, unloading on the eastern or western docks, and leaving the site via the exit gate.

The aforementioned time periods are as per the GTA report and are not reflective of the EPA Industrial Noise Policy time periods. However, the expected peak hour generation of the day/evening/night time periods has been used in accordance with the INP.

Predicted noise levels are presented in Table 9.

5.3 LOADING DOCK OPERATIONS

The loading docks are located on the east and west façades of the facility.

Noise emissions from this use have been predicted to surrounding receiver locations in conjunction with noise associated with cars and heavy vehicles entering and exiting the facility.

The operation of the loading dock assumes the following as a worst case:

- Vehicle movements as per Section 5.1.
- Each semi-trailer will idle for up to 2 minutes with a sound power level of 95dB(A).
- 1 x forklift per heavy vehicle unloading for 15 minutes with a sound power level of 90dB(A). It should be noted that electric forklifts have been selected for the site, however the noise level will typically be associated with reverse beepers.

Predicted noise levels are presented in Table 9.

5.4 MECHANICAL PLANT

The proposal will include ancillary mechanical services plant *(e.g. cooling towers, condensing units, exhaust fans, etc.).* As detailed plant selections and plans are not available at this stage, it is not possible to carry out a detailed examination of the ameliorative measures that may be required in order to achieve the project acoustic objectives.

In order to establish an indicative level of noise impact from the refrigeration plant room, an internal sound pressure level of 90dB(A) has been assumed. This will be representative of a loud plant room.

The plant room has been assumed to be constructed from blockwork or concrete walls with a concrete roof.

5.5 PREDICTED NOISE LEVELS

The predicted noise levels from the aforementioned noise sources are presented in the following Table. The noise levels predicted below, assume the following:

- The peak hour heavy vehicle traffic generation is expected to occur during the 5:00am to 9:00am period.
- Predicted noise levels are assessed against the 'night' time criteria for the period, to encompass the peak hour heavy vehicle generation as per above.
- Compliance during this period will be representative of compliance at all other periods of the day, evening and night.
- Noise sources include:
    - Cars entering / exiting
    - Trucks entering / exiting
    - Forklift in loading dock area
    - Internal warehouse operations
    - Mechanical noise emissions from the plant room in principle.

Table 9 – Predicted Noise Levels

Time of Day	Receiver	Predicted Noise Level, dB(A) $L_{eq\ 15min}$	Intrusive Noise Criteria dB(A) $L_{eq\ 15min}$	Complies
Night	Caravan Park	30	37	Yes
	99 Hollinsworth	36	37	Yes

5.6 BACKGROUND CREEP AND AMENITY CRITERION

The potential for background creep is addressed using the INP amenity criterion. Noise emissions when assessed against the amenity criterion are averaged out over the entire period (ie day, evening or night).

The predicted noise levels in Table 9 are based on the worst one hour noise level and as such will be conservative when using this as a comparison with the amenity criterion. Notwithstanding, ALC have conservatively used this as a basis for assessing potential background creep from the proposed site and future surrounding industrial sites.

With regard to the Hollinsworth Road receivers, we note the following:

- Predicted noise emissions to the Hollinsworth Road receivers from the worst one hour operation is 36dB(A) $L_{eq\ 15min}$.
- The amenity criterion for this receiver during the night time period is 45dB(A) $L_{eq\ (10pm\ to\ 7am)}$.
- Assuming that the worst one hour occurs throughout the entire night time period, noise emissions will be 9dB(A) less than the amenity criterion corresponding to the Hollinsworth Road receivers.

With regard to the caravan park receivers, we note the following:

- Predicted noise emissions to the caravan park receivers from the worst one hour operation is 30dB(A) $L_{eq\ 15min}$.
- The amenity criterion for this receiver during the night time period is 40dB(A) $L_{eq\ (10pm\ to\ 7am)}$.
- Assuming that the worst one hour occurs throughout the entire night time period, noise emissions will be 10dB(A) less than the amenity criterion corresponding to the caravan park receivers.

As per above, noise emissions will be 9dB(A) and 10dB(A) less than the corresponding amenity criterion for the Hollinsworth and caravan park receivers respectively based on the worst one hour operation.

The 9dB(A) and 10dB(A) allowances will be sufficient to ensure that the cumulative noise emissions from future industrial premises in the vicinity of the site can maintain a suitable level of acoustic amenity for existing sensitive receiver locations.

5.7 TRAFFIC NOISE GENERATION

ALC notes that vehicles access routes, either Northeast via Road 5A or Southeast via Hollinsworth Road, will not pass any residential properties in the immediate vicinity of the site. On this basis, the potential for noise impact associated with additional road traffic generated by the development will be negligible and as such will be compliant with the requirements of the Road Noise Policy.

5.8 SLEEP DISTURBANCE

Given the site will be used during the night time period a sleep disturbance assessment has been conducted.

Sleep disturbance to Caravan Park to the West and residences to the South has been assessed for a semi-trailer travelling along the internal access road circulating the site.

An instantaneous noise level of 110dB(A) sound power level has been assumed for the truck, with the primary noise source being the short duration, peak noise event associated with an air brake discharge.

Noise levels are predicted to the façade of the nearest residential dwelling, with each source of the noise at the worst case location relative to the receiver (i.e. each receiver location assessed for worst case noise source location).

Table 10 – Predicted Noise Levels (Sleep Disturbance)

Noise Source	Receiver	Predicted Noise Level dB(A) $L_{1\ 1min}$	Sleep Emergence Level, dB(A) $L_{1\ 1\ min}$
Truck brake discharge	Caravan Park	35	47
	99 Hollinsworth	44	47

6 DISCUSSION

An assessment of noise emissions from the operation of the facility has been conducted. The assessment of noise associated with the aforementioned uses has determined that noise associated with:

- cars entering and exiting the facility;
- heavy semi –trailer trucks entering and exiting the facility; and
- loading dock operations.

will comply with the noise emission requirements without the need for additional acoustic treatments. Noise predictions have been based on all of the worst case operation of each noise source occurring currently during a worst 1 hour period during the night time period.

Traffic generation along Hollinsworth Road will comply with the traffic noise generation requirements as determined in the EPA Road Noise Policy.

The potential for sleep disturbance has been assessed in accordance with the Road Noise Policy and it has been determined that noise associated with the loading dock during the night time period will not have a significant detrimental impact on surrounding receivers.

Noise from mechanical plant should be assessed at a later stage once mechanical selections are made available to ensure compliance with the noise emission objectives.

6.1 RECOMMENDED TREATMENTS

The noise modelling has been conducted using the architectural documents as a basis for construction. There are no additional acoustic treatments proposed above those presented in Section 5.1.1.

7 CONSTRUCTION NOISE EMISSION ASSESSMENT

This section presents processes to manage noise and vibration impacts associated with the proposed construction activities for the Swire cold storage facility and the potential for noise and vibration impact to surrounding receivers.

The principal objective of this study is to undertake an evaluation of works to be performed during the operation of the various activities during construction and develop a management plan to ensure noise and vibration:

1. Does not excessively impact on the sensitive receivers.
2. Is minimised to all surrounding receivers.
3. Does not exceed OH&S standards at surrounding receivers.
4. Is monitored when potentially high noise and vibration generating activities are being used.

This assessment will formulate/present the relevant noise and vibration objectives which construction activities should be managed to comply with. Additionally effective mitigation measures will be recommended where possible to ensure noise and vibration objectives are achieved and impacts are minimised.

The principal issues to be addressed in this report are:

- Identification of the noise and vibration standards which will be applicable to this project.
- Formulation of a strategy for construction activities to comply with the standards identified in the above point.
- Development at demolition and excavation methods which will minimise the impact on other areas of the NRP including the animal research facilities.

The expected activities can be expected to include:

1. Excavation of soil and soft sand stone.
2. Construction of proposed facility.

7.1 CONSTRUCTION NOISE CRITERIA

It is proposed to adopt criteria from the New South Wales Construction Noise Guideline developed by The NSW EPA and the Australian Standard AS2436-2010 *"Guide to Noise Control on Construction Maintenance and Demolition Sites"*.

7.1.1 Australian Standard AS2436

The Australian Standard AS2436 "Guide to noise control on construction, maintenance and demolition sites" states that where all reasonable and available measures have been taken to reduce construction noise, mitigation strategies may be put in place to reduce levels noise levels to within a reasonable and acceptable level.

For the control and regulation of noise from construction sites AS2436:2010 *"Guide to noise control on construction, maintenance and demolition sites"* nominates the following:

1. That reasonable suitable noise criterion is established,

2. That all practicable measures be taken on the building site to regulate noise emissions, including the siting of noisy static processes to locations of the site where they can be shielded, selecting less noisy processes, and if required regulating construction hours, and

3. The undertaking of noise monitoring where non-compliance occurs to assist in the management and control of noise emission from the construction site.

7.1.2 Interim Construction Noise Guideline

The guideline reflects on feasible and reasonable mitigation strategies, management controls and public liaising in the effort to reach realistic compromises between construction sites and potential noise affected receivers.

The guideline refers to a qualitative assessment method in which construction noise is assessed on a case by case basis with regard to various activities to be conducted on site. This assessment method was developed to smaller scale projects.

Essentially this method of assessment requires that the proponent take into consideration and employ all reasonable and feasible measures to ensure that the impact on noise receivers is minimised. This is generally conducted in the following manner:

- Develop a noise management plan outlining all reasonable and feasible mitigation methods for the reduction of noise impact, which are detailed in this report;
- The assessment of high impact equipment such as hammers, saws and the like for lower noise producing methods of construction or locating them in acoustically advantageous positions where possible;
- The implementation of a complaints handling register and community consultation system;
- Employee (builders, contractors etc) education in effective noise reducing techniques and site etiquette; and
- The operation of plant in a quiet and efficient manner (i.e.: Turning off machinery when not in use) where possible.

In addition, the guideline specifies goals which can be used in the effort of minimising noise from construction related activities.

Table 11 - EPA Recommended Construction Noise Objectives

Noise criteria	Receiver	External sound level, $L_{eq\ 15\ min}$ dB(A)
EPA	Residential	Background + 10dB(A)[1]
		75dB(A)[2]
	Retail/Commercial	75dB(A)[2]

1: Where the predicted or measured LAeq (15 min) is greater than the noise affected level, the proponent should apply all feasible and reasonable work practices to minimise noise.

2: Where noise is above this level, the proponent should consider very carefully if there is any other feasible and reasonable way to reduce noise to below this level. If no quieter work method is feasible and reasonable, and the works proceed, the proponent should communicate with the impacted residents by clearly explaining the duration and noise level of the works, and by describing any respite periods that will be provided.

These criteria for resultant noise from construction are aimed at maintaining comfort levels within the surrounding residential dwellings. Additionally, noise mitigation techniques as discussed in Section 7.8 should be used if noise emissions exceed the above criteria. All work is to be carried out in accordance with AS 2436:2010 “Guide to noise control on construction, maintenance and demolition sites”.

7.2 CONSTRUCTION NOISE PROCEDURES

Based on these criteria the following procedure will be used to assess noise emissions:

- Predict noise levels produced by typical construction activities at the sensitive receivers’ locations.
- If noise levels exceed “background + 10 dB(A)” noise goal at sensitive receiver locations, investigate and implement all practical techniques to limit noise emissions. For residential receivers, a background + 10 dB(A) goal has been adopted at all times. When these noise levels cannot be met all possible and practical acoustic treatments/management controls will be investigated.
- If the noise goal is still exceeded after applying all practical engineering controls to limit noise emissions, review the management techniques to mitigate noise emissions in accordance with AS2436.

7.3 POTENTIALLY AFFECTED NOISE SENSITIVE RECEIVERS

The sensitive receivers for construction noise are identical to those detailed in Section 2.

7.4 AMELIORATIVE MEASURES

The analysis indicates that proposed construction work activities will not adversely impact the surrounding receivers. However, when possible, high noise generating activities such as hammering, sawing and concrete pumping should be conducted away from the nearest affected receiver to avoid adverse impacts on residential receivers.

Recommendations are made to reduce noise emissions to the noise goals, and to implement other measures to minimise noise emissions where practicable:

In the event noise levels at receivers exceed criteria the following recommended treatments may be used to minimise noise high noise generating activities:

- Acoustically screen activities from surrounding receivers by using building structures or a specifically constructed screen, which will occur on the site regularly.
- Acoustic testing to plant and equipment to confirm if site noise levels comply with nominated manufacturing noise levels.
- Regular maintenance of equipment.

7.5 VIBRATION ASSESSMENT

Construction vibration criteria associated with works on the site when measured at the potentially affected receivers should not exceed the following sets of vibration criteria to ensure no architectural or structural damage to surrounding buildings. These standards have been selected as they are widely used in the assessment of vibration associated with construction activities within Australia, namely:

- German Standard DIN 4150-3 (1999-02): “Structural Vibration – Effects of Vibration on Structures”; and
- British Standard BS 6472:1992 “Guide to Evaluation of Human Exposure to Vibration in Buildings (1Hz to 80Hz).

The criteria and the application of these Standards are discussed in separate sections below.

7.5.1 German Standard DIN 4150-3 (1999-02)

German Standard DIN 4150-3 (1999-02) provides vibration velocity guideline levels for use in evaluating the effects of vibration on structures. The criteria presented in DIN 4150-3 (1999-02) are presented in the Table below.

It is noted that the peak velocity is the absolute value of the maximum of any of the three orthogonal component particle velocities as measured at the foundation, and the maximum levels measured in the x- and y-horizontal directions in the plane of the floor of the uppermost storey.

Table 12 – DIN 4150-3 (1999-02) Safe Limits for Building Vibration

Type of Structure		Peak Particle Velocity (mms^{-1})			
		At Foundation at a Frequency of			Plane of Floor of Uppermost Storey
		< 10Hz	10Hz to 50Hz	50Hz to 100Hz	All Frequencies
1	Buildings used in commercial purposes, industrial buildings and buildings of similar design	20	20 to 40	40 to 50	40
2	Dwellings and buildings of similar design and/or use	5	5 to 15	15 to 20	15
3	Structures that because of their particular sensitivity to vibration, do not correspond to those listed in Lines 1 or 2 and have intrinsic value (eg buildings that are under a preservation order)	3	3 to 8	8 to 10	8

7.5.2 British Standard BS 6472:1992

British Standard BS 6472:1992 develops criteria relating to levels of building vibration that may be expected to give rise to "adverse comment", in the frequency range most applicable to impacts associated with construction, which is 1 to 80Hz. These threshold values are used as criteria for assessing the loss of amenity and are presented below in Table 3.

Table 13 – BS 6472:1992 Criteria to Avoid "Adverse Comment"

Type of Occupancy	Time of Day	Peak Particle Velocity (mms^{-1}) between 1Hz to 80Hz Likely to Cause *"Adverse Comment"*			
		Continuous Vibration		Intermittent Vibration and Impulsive Vibration Excitation with Several Occurrences per day	
		Vertical	Horizontal	Vertical	Horizontal
Residential	Day	0.3 to 0.6	0.8 to 0.6	8.4 to 12.6	24 to 36
	Night	0.2	0.6	2.8	8
Offices	Day	0.6	1.6	18	51
	Night	0.6	1.6	18	51
Workshops	Day	1.2	3.2	18	51
	Night	1.2	3.2	18	51

The limits indicate that people in buildings are significantly less susceptible to horizontal vibration than to vertical vibration. Furthermore, Section 4.1 of BS 6472 notes that situations can exist where vibration magnitudes above those generally corresponding to minimal “adverse comment” levels can be tolerated, particularly for temporary disturbances and infrequent and intermittent events such as those associated with construction projects.

Based on the proposed works to be conducted on this site and the proximity to surrounding receiver locations, vibration as a result of works undertaken as part of the facility construction will be negligible.

7.6 NOISE AND VIBRATION MONITORING, REPORTING AND RESPONSE PROCEDURES

Noise and vibration monitoring may either consist of manned and/or unmanned measurements. Active monitoring may be undertaken during the construction work phase of the project if required in the event complaints are received from neighbours. In the event complaint are received from neighbours the following process will be followed:

1. Determining the offending plant/equipment/process

2. Locating the plant/equipment/process further away from the affected receiver(s) if possible.

3. Implementing additional acoustic treatment in the form of localised barriers, silencers etc

4. Selecting alternative equipment/processes

Where monitoring is required and indicates exceedences of the noise limits immediate action should be taken to identify any further controls as required to reduce noise emissions so that the noise limits are complied with. Monitoring of the activities following the implementation of these additional controls will be undertaken to confirm compliance.

7.6.1 Reporting requirements

The following shall be kept on site:

1. A register of complaints received/communication with the local community shall be maintained and kept on site with information as detailed below.

2. Where noise/vibration complaints require noise/vibration monitoring, results from monitoring shall be retained on site at all times.

3. Any noise exceedences occurring including, the actions taken and results of follow up monitoring.

4. A report detailing complaints received and actions taken shall be presented.

5. All monitoring and reporting shall be conducted in conjunction with the conditions of consent.

7.6.2 Response procedures

Complaints associated with noise and vibration generated by site activities shall be recorded on a Noise Complaint Form. The person(s) responsible for complaint handling and contact details for receiving of complaints shall be established on site prior to construction works commencing. A sign shall be displayed at the site indicating the Site Manager and the general public and their contact telephone number

If a noise complaint is received the complaint should be recorded on a Noise Complaint Form. The complaint form should list:

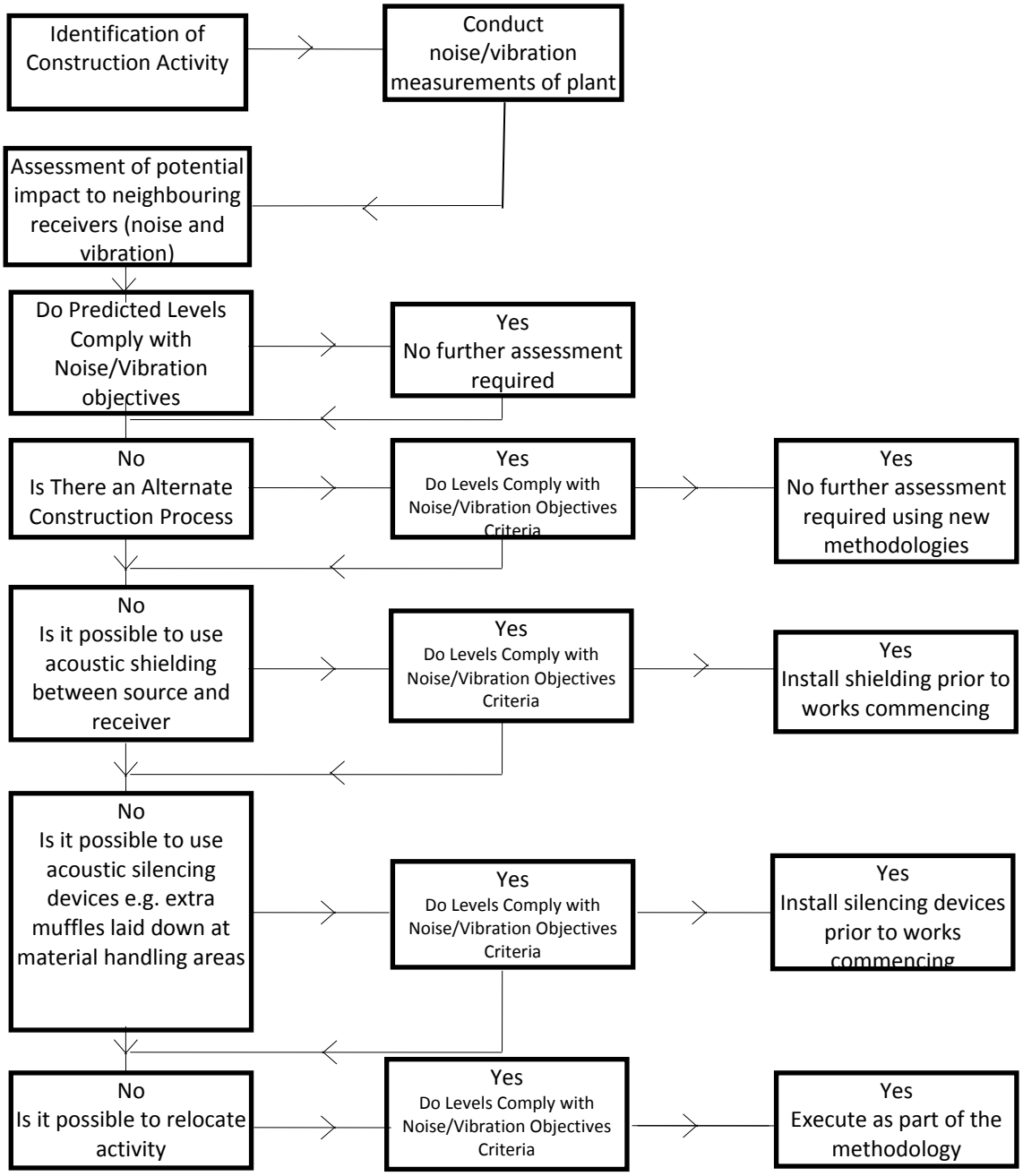
- The name and address of the complainant (if provided).
- The time and date the complaint was received.
- The nature of the complaint and the time and date the noise was heard.
- The name of the employee who received the complaint.
- Actions taken to investigate the complaint, and a summary of the results of the investigation.
- Indicate what operations were occurring on site at the time of the complaint.
- Required remedial action, if required
- Validation of the remedial action.
- Summary of feedback to the complainant.

7.6.3 Control of construction noise

As a part of the noise management plan a detailed study has been undertaken of each of the proposed activities that will occur as a part of the construction work on this project. The execution of this work will facilitate the formulation of noise control strategies for this project.

The flow charts that follow illustrate the process followed to assess construction activities prior to the start of work on site and well as the ongoing investigation into noise during the construction period.

Chart 1 – Initial Assessment of Procedures



7.7 TYPICAL CONSTRUCTION EQUIPMENT

The proposed construction activities typically to be undertaken at the site as summarised below:

7.7.1 Demolition/Excavation/Shoring

- Excavators
- 30 tonne excavators
- Trucks
- Mobile cranes
- Graders
- Compactors
- Rollers

7.7.2 Construction

- Concrete pumps (onroad)
- Concrete mixer trucks (onroad)
- Folk lifts for movement of materials
- Powered hand tools
- Elevated work platforms (boom & scissor lifts);
- Bobcats

7.8 Noise Control Methods

The determination of appropriate additional noise control measures will be dependent on the particular activities and construction appliances identified as requiring future acoustic treatments to those already identified in this report. This section provides an outline of available methods which have previously been used on similar construction sites and may be possible on this site.

7.8.1 Selection of Alternate Appliance or Process

Where a particular activity or construction appliance is found to generate noise levels that exceed the criteria, it may be possible to select an alternative approach or appliance. For example; the use of a hydraulic hammer on certain areas of the site may potentially generate high levels of noise. By carrying this activity by use of pneumatic hammers, bulldozers ripping and/or milling machines lower levels of noise will result.

7.8.2 Acoustic Barriers

The placement of barriers at the source is generally only effective for static plant (tower cranes). Placing barriers at the source cannot effectively attenuate equipment which is on the move or working in rough or undulating terrain.

The degree of noise reduction provided by barriers is dependent on the amount by which line of sight can be blocked by the barrier. If the receiver is totally shielded from the noise source reductions of up to 15 dB(A) can be effected. Where only partial obstruction of line of sight occurs, noise reductions of 5 to 8 dB(A) may be achieved. Where the barrier does not obstruct line of sight, generally no noise reduction will occur.

As barriers are used to provide shielding and do not act as an enclosure, the material they are constructed from should have a noise reduction performance which is approximately 10dB(A) greater than the maximum reduction provided by the barrier. In this case the use of a material such as 10 or 15mm plywood would be acceptable for the barriers. A double paled or lapped and capped fencing construction is recommended for such barriers.

7.8.3 Silencing Devices

Where construction process or appliances are noisy, the use of silencing devices may be possible. These may take the form of engine shrouding, or special industrial silencers fitted to exhausts.

7.8.4 Treatment of Specific Equipment

In certain cases it may be possible to specially treat a piece of equipment to dramatically reduce the sound levels emitted.

7.8.5 Establishment of Site Practices

This involves the formulation of work practices to reduce noise generation. This includes locating fixed plant items as far as possible from residents as well as rotating plant and equipment to provide respite to receivers.

8 CONCLUSION

This report presents the assessment of potential noise impacts associated with the proposed cold storage facility to be located on Lot 16 Hollinsworth Road, Marsden Park.

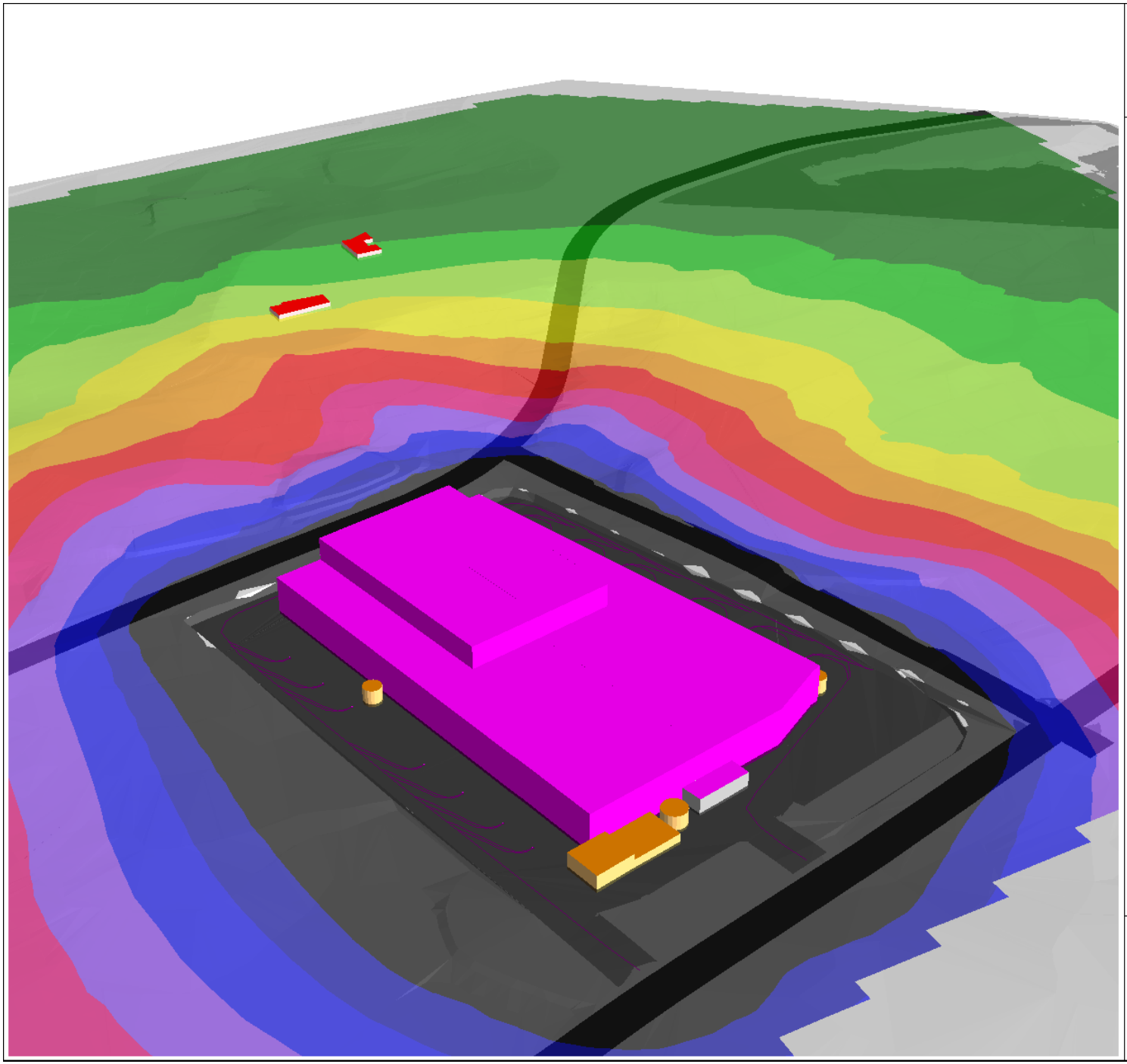
Predicted noise levels from the operation of the facility have indicated that the development will be in full compliance with the EPA Industrial Noise Policy, Road Noise Policy and the requirements of Blacktown City Council without the need for additional acoustic treatment.

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

Yours faithfully,

Acoustic Logic Consultancy Pty Ltd
James Small

APPENDIX ONE – SOUNDPLAN NOISE CONTOURS



SWIRE COLD STORAGE

Operational Noise Prediction

Noise Contours @ 1.8m

Vehicles
As per worst 1 hour

Internal Noise Levels
Warehouse - 75dB(A) SPL
Plant Room - 90dB(A) SPL

Northeast view

Prepared by: J. Small
Date: 04/02/2015

Noise Level
$L_{eq\ 1hour}$
in dB(A)

< 35
35 - 37
37 - 39
39 - 41
41 - 43
43 - 45
45 - 47
47 - 49
49 - 51
51 - 53
53 - 55
>= 55

Signs and symbols

- Surface
- Swire Cold Storage
- Point source
- Line source
- Residential Building
- Area source
- Industrial building

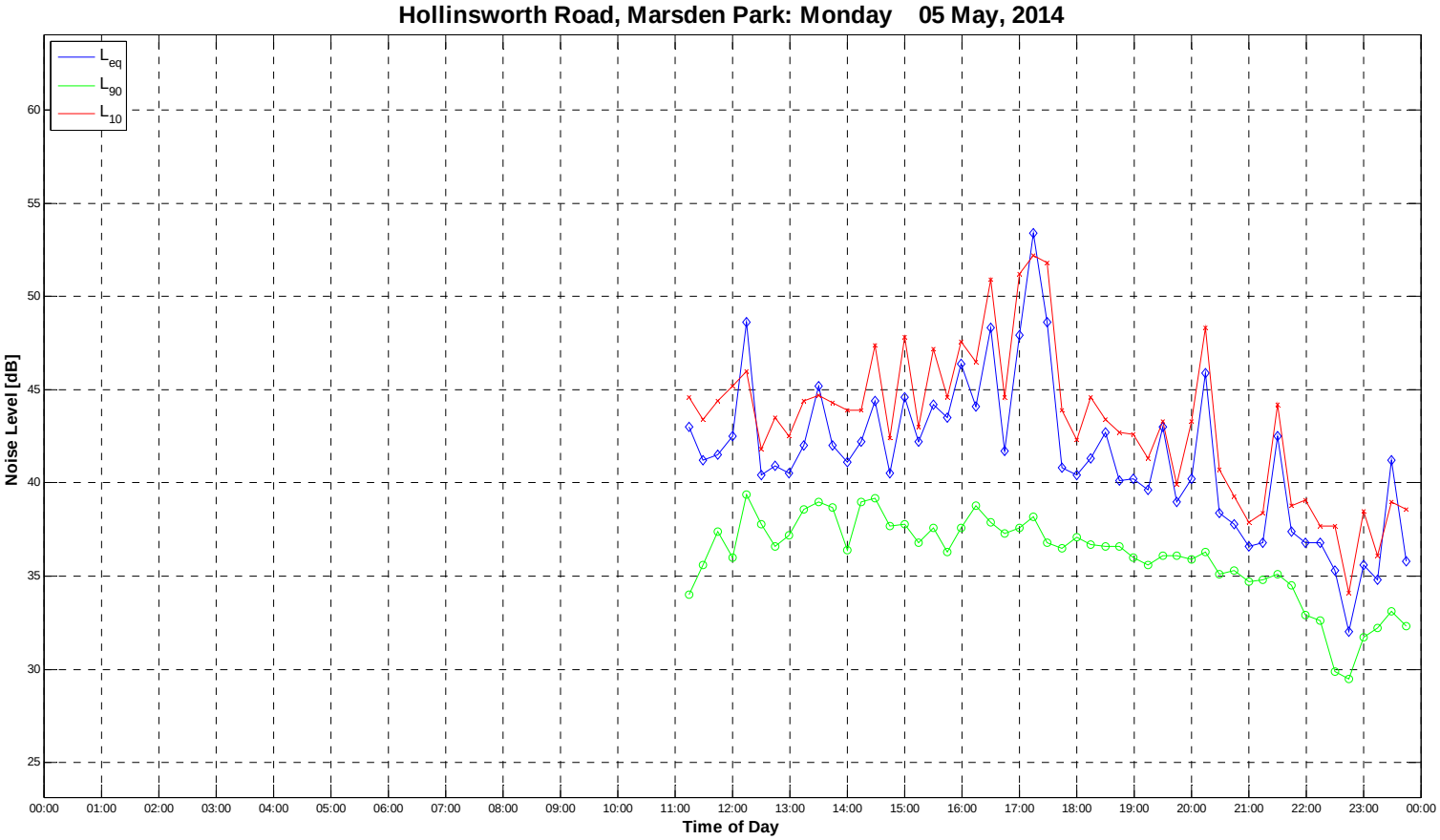
Length scale 1:20013

0 100 200 400 600 m

N

ACOUSTIC LOGIC

APPENDIX TWO – UNATTENDED NOISE MONITORING DATA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Leq
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L10
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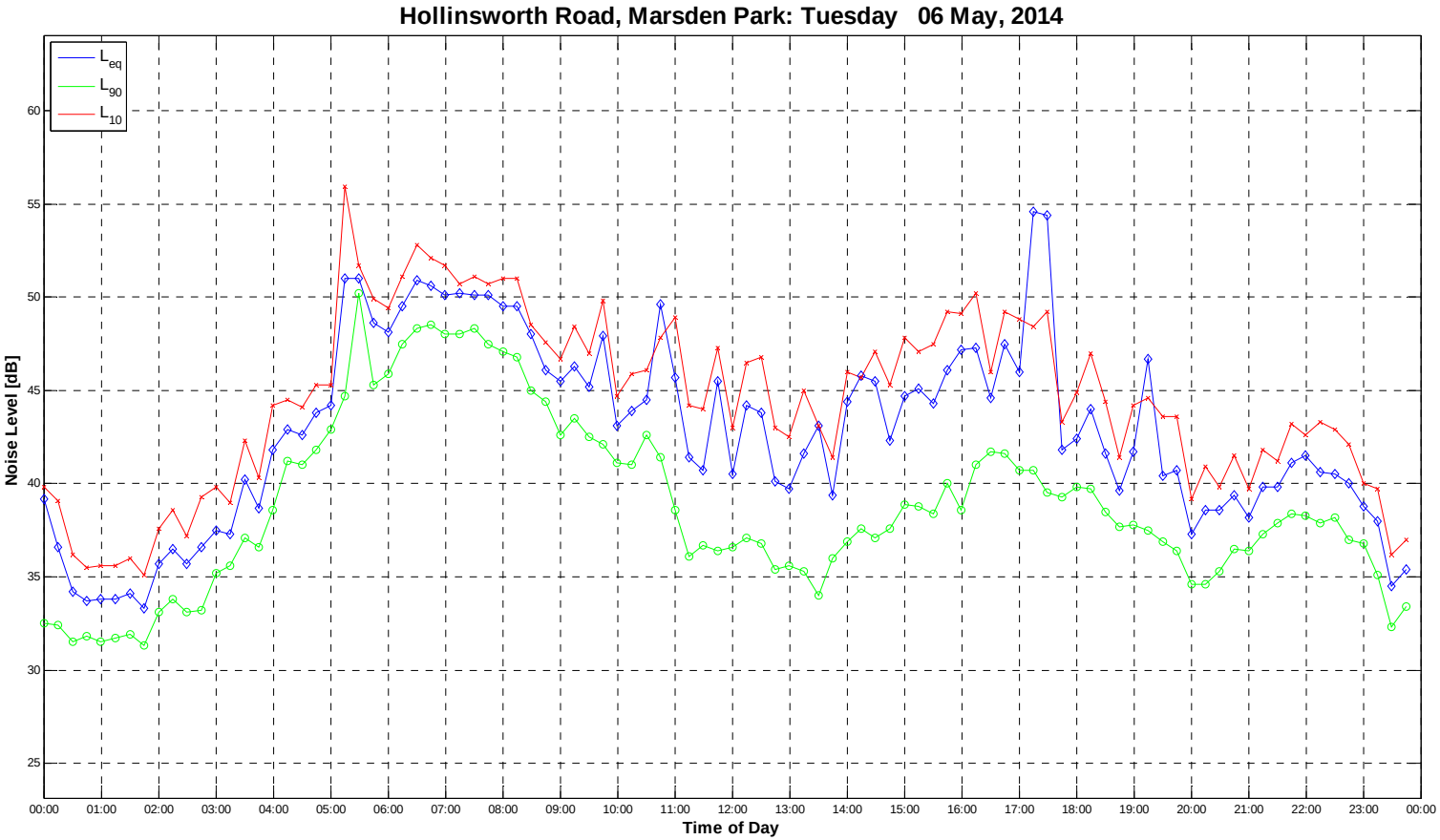
Time of Day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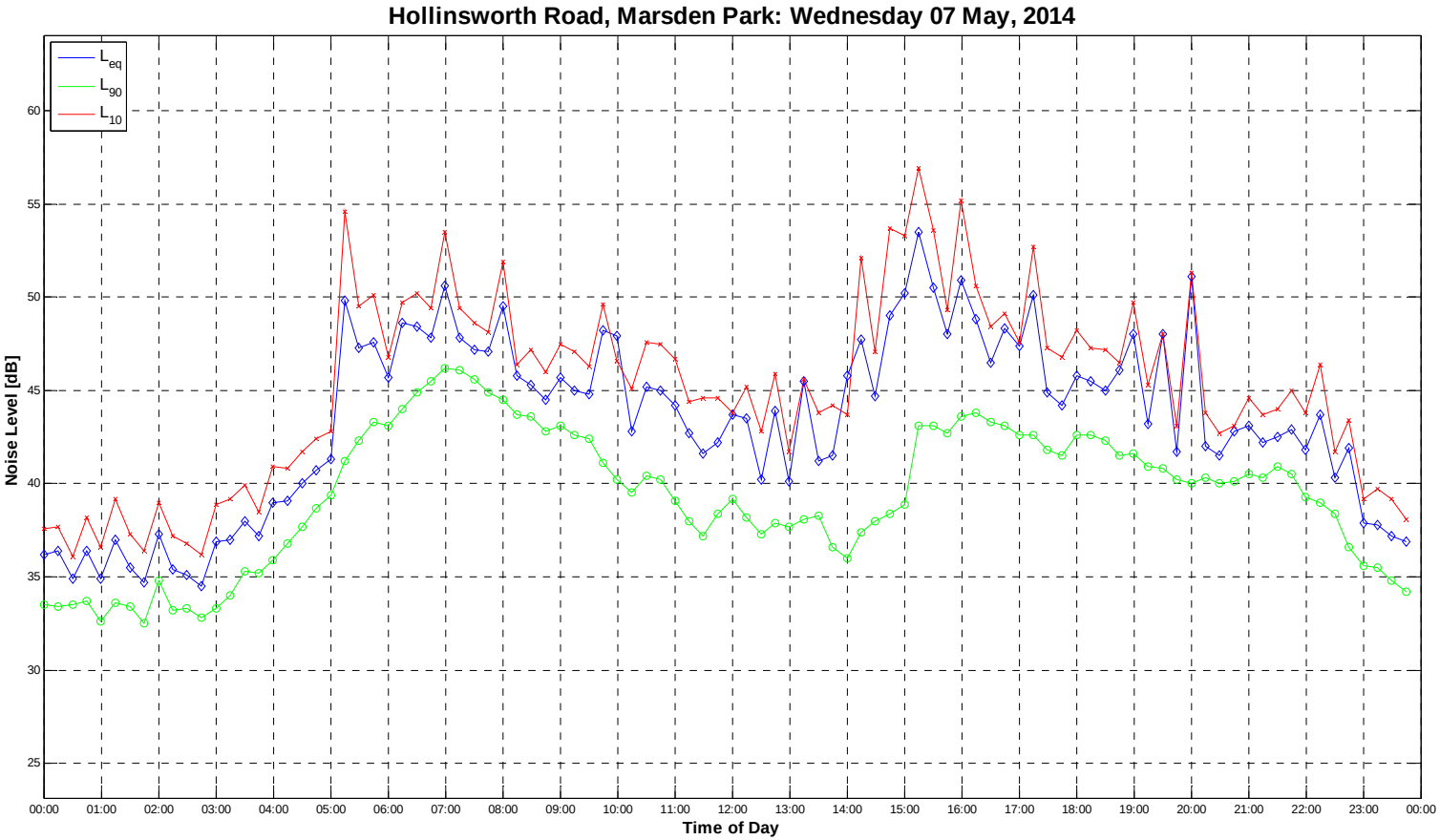
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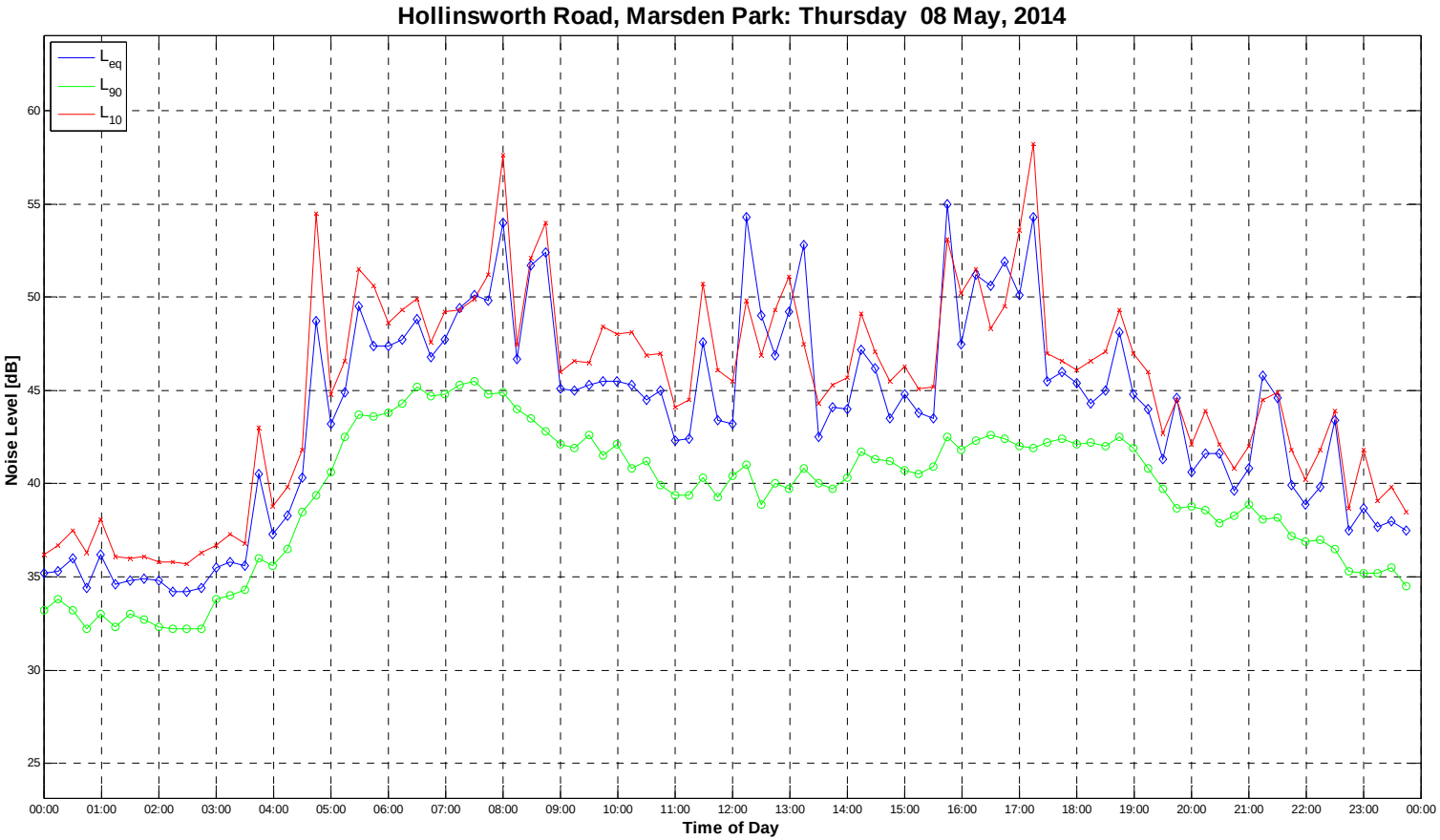
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Noise Level [dB]
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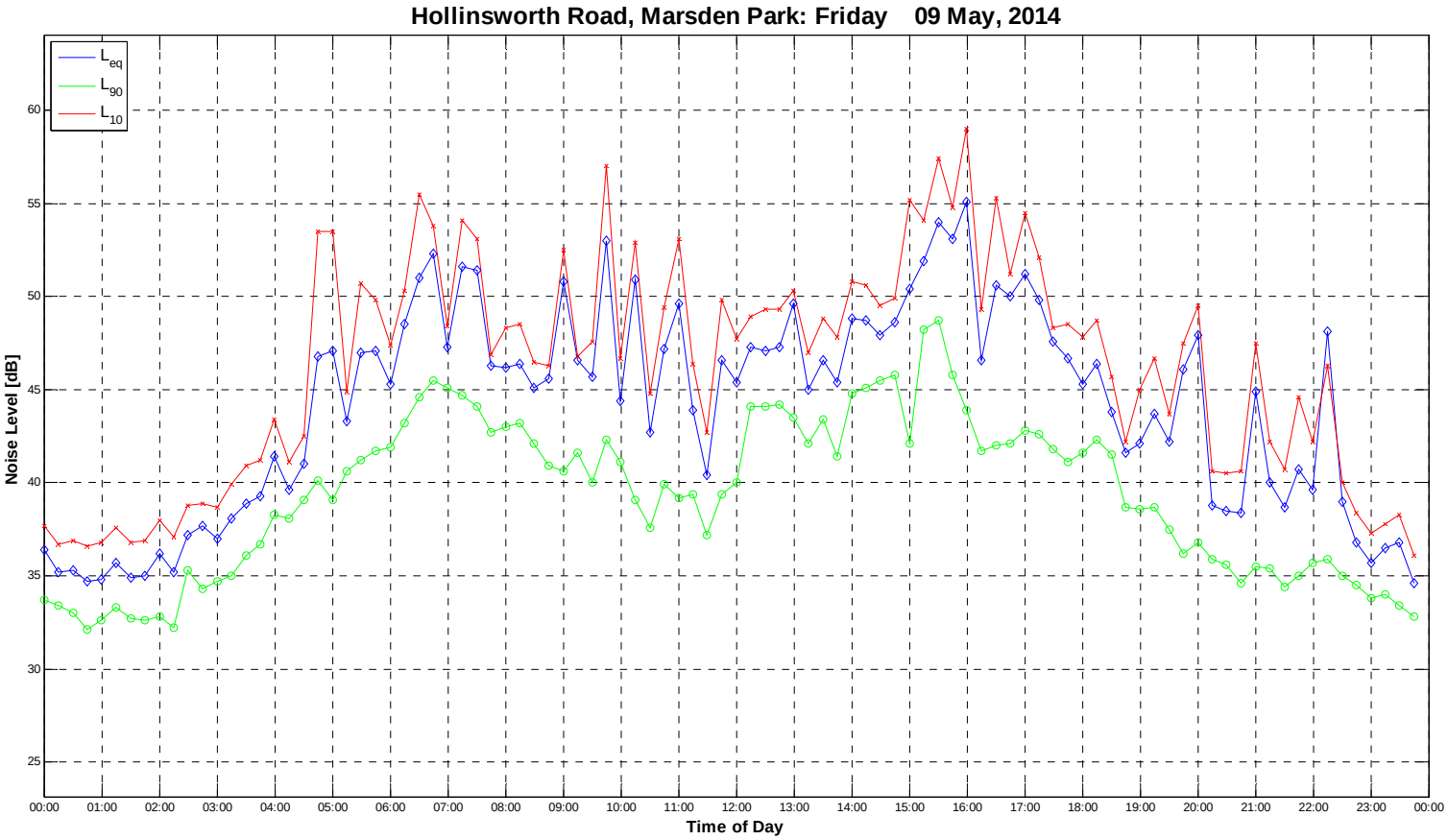
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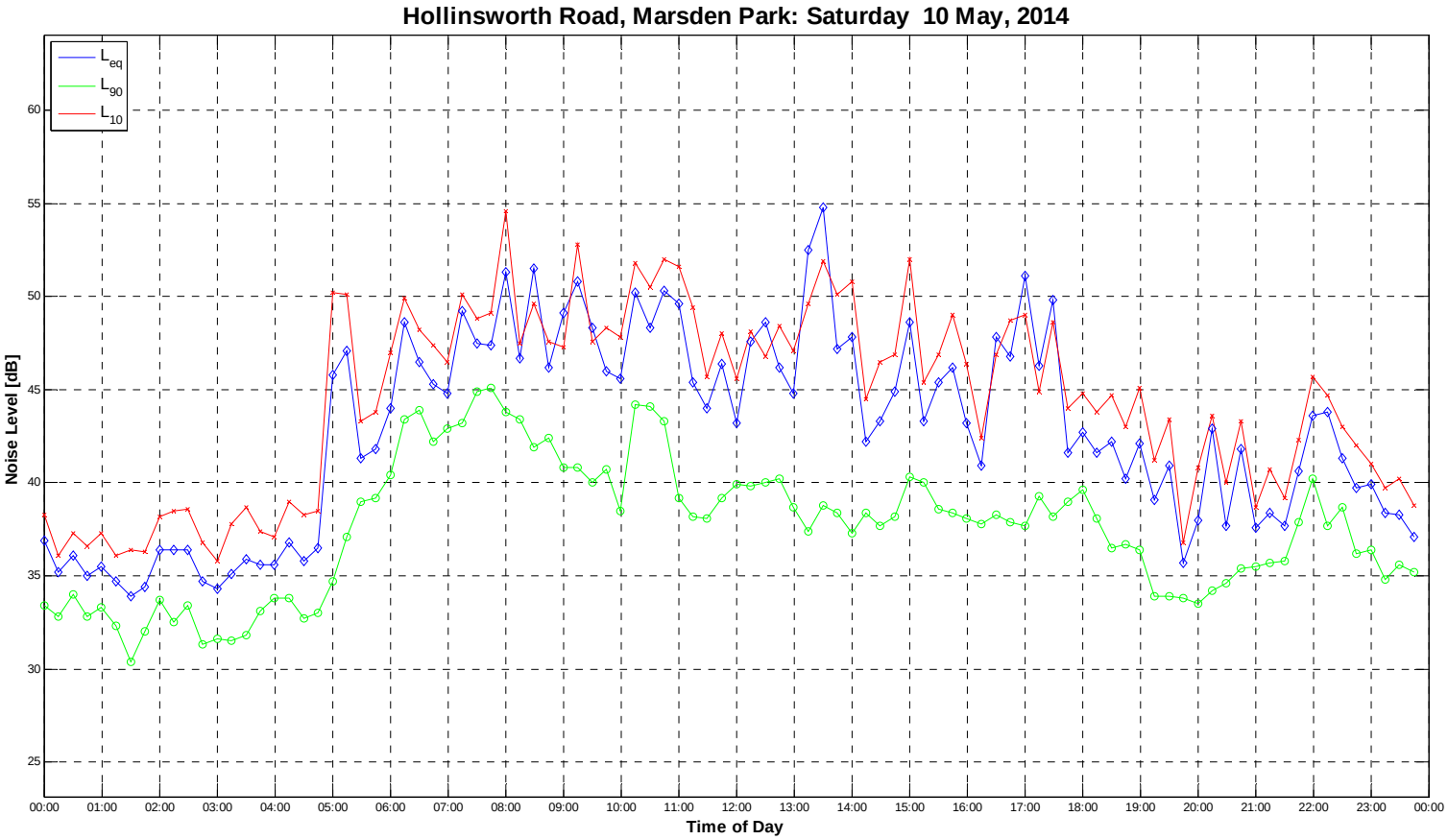
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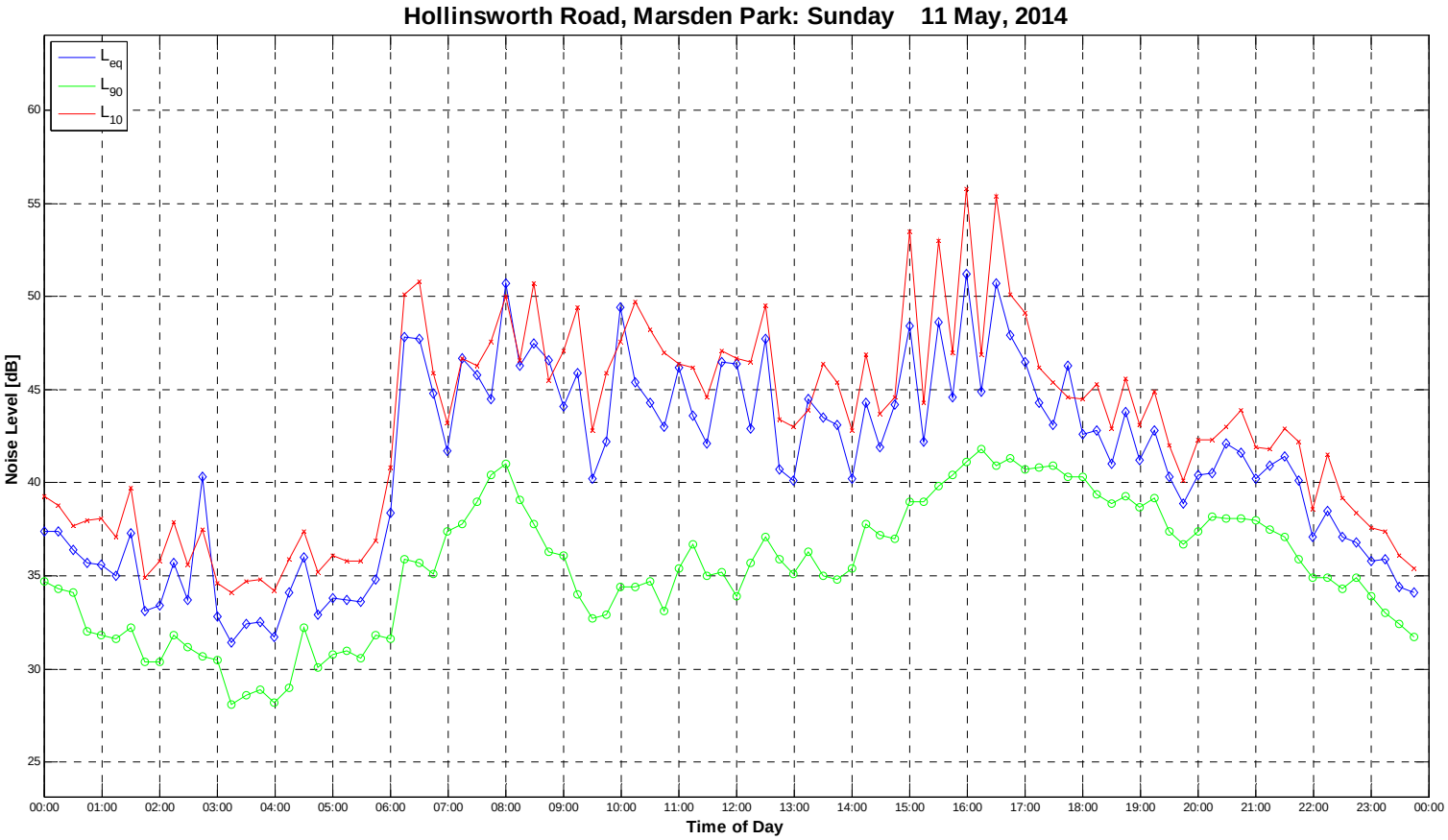
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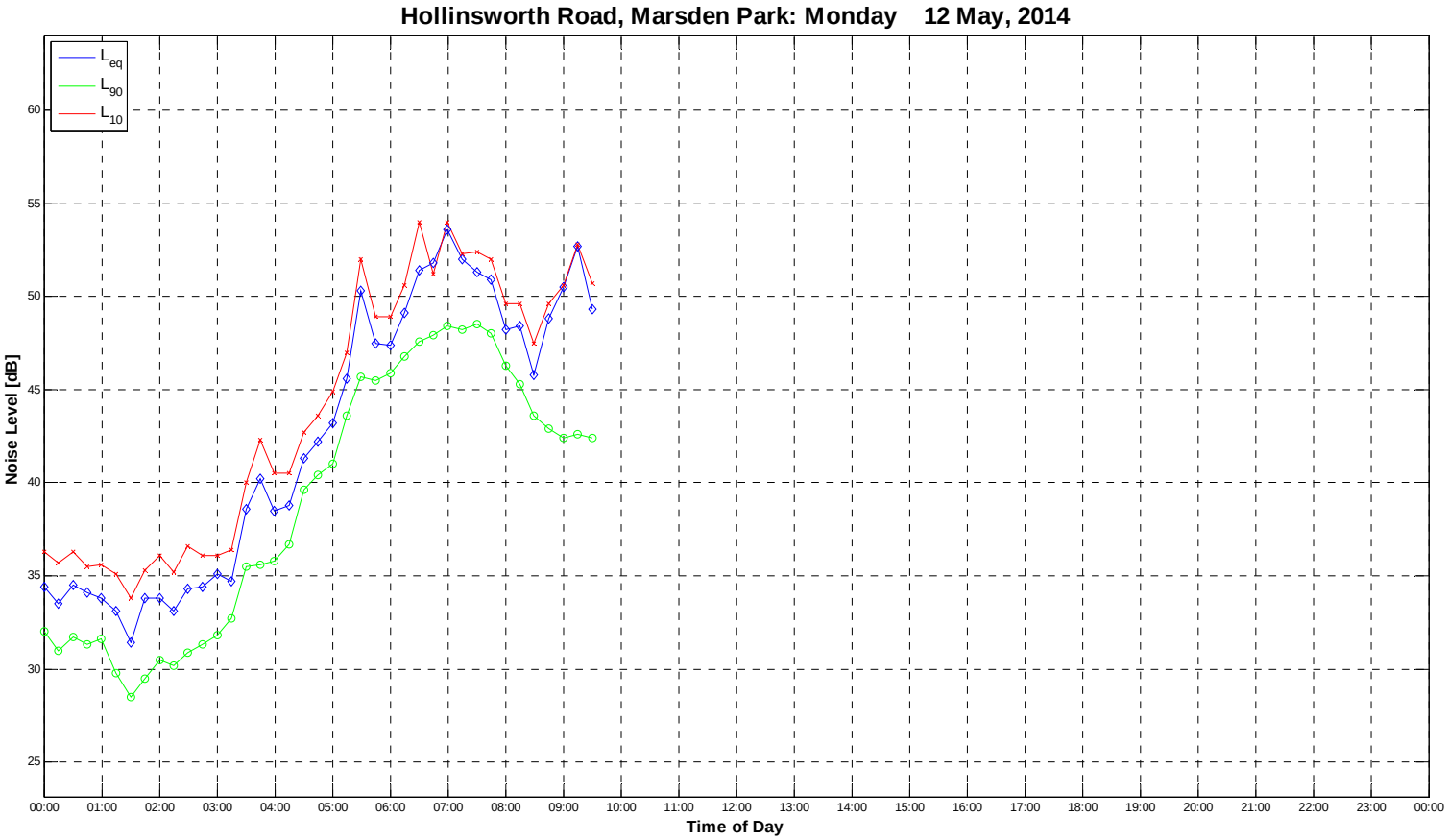
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