Acoustic Assessment - Proposed Industrial Re-Zoning
Mamre West Land Investigation Area

Operational Noise Assessment

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1 INTRODUCTION

Acoustic Logic Consultancy has been engaged to undertake an assessment of operational noise associated with a proposed rezoning of the properties at 585-649 Mamre Road, Orchard Hills and adjoining Rural residential land to the north from Rural Landscape (RU2 Zone) to General Industrial (IN1 Zone).

This property forms the Mamre West Land Investigation Area (Precicnt) which is being assessed for its appropriateness for proposed rezoning under the State Environmental Planning Policy (Western Sydney Employment Area). 585-649 Mamre Road, Orchard Hills is currently subject to a State Significant Development application within the Precinct.

In this report, we will:

- Identify nearby noise sensitive receivers and operational noise sources with the potential to adversely impact nearby development.
- Identify relevant Penrith City Council and EPA acoustic criteria applicable to the development
- Predict typical operational noise emissions and assess them against acoustic criteria to determine if the site is capable of meeting typical noise emission requirements.
- Identify potential building and/or management controls necessary to ensure ongoing compliance with noise emission goals.

2 SITE DESCRIPTION AND PROPOSED WORKS

The site is located on Mamre Road, Orchard Hills.

The site is currently used for rural purposes.

For the purpose of this assessment, the site will be broken into two parts:

- Stage 1, at the southern end of the site.
- Stage 2 in the middle and north of the site.

This is demonstrate in Figure 1.

The proposal involves:

- The rezoning of the Stage 1 from Rural Landscape (RU2 Zone) to General Industrial (IN1 Zone). This will facilitate the creation of future industrial lots and internal roadways.
- The proposed future rezoning of Stage 2 from Rural Landscape (RU2 Zone) to General Industrial (IN1 Zone) which will form part of a separate Planning Application.
- The number of industrial lots and any future internal road layout has not been finalised. This will form part of Development Applications from the applicants..

- This will also involve the acquisition of a residential property by the RMS in the middle third of the site (Stage 2) for future Precinct Access. There is no immediate plan to commence civil works or construction on this Stage.

- The northern portion of Stage 2 encompasses Mandalong Close, an area currently consisting of rural residential dwellings. Although this land is proposed to be rezoned, the residential dwellings will remain for the immediate future (through existing use rights). Ultimately, a number of the residential lots will be acquired and developed for industrial use. Further consultation is required between the DPE and the owners to finalise an appropriate rezoning strategy.

Vehicular access to the site will be as follows:

- Initially, Stage 1 will be served by an internal roadway at an intersection towards to the southern end of the site. The industrial allotments in Stage 1 will be served by this road.

- Stage 2 South will use the existing road serving stage 1. In addition, a second connection to Mamre Road (at the James Erskine Drive Intersection) is proposed during development of Stage 2 South.

- Ultimately (subject to a future Planning Application), once Stage 2 North is developed, a connection from Stage 2 South to Mandalong Close will be established.

In line with the objectives in the State Environmental Planning Policy (Western Sydney Employment Area), the site is proposed to operate twenty four hours per day.

This site is bounded as follows:

- To the east by Mamre Road. Further to the east (on the far side of Mamre Road) lies industrial/commercial development.

- The site is bounded to the west and south by rural development.

- The nearest rural residential development to the north of the site is on Mandalong Close, which is approximately 450m north of Stage 1. Some existing rural residential development will be rezoned as part of a future proposal, and will form part of Stage 2. Depending on the timing of land acquisitions, industrial lots in Stage 2 South/North will potentially adjoin residential development on Mandalong Close.

- We also note that there is another rural residential development to the north which is closer to the site (573-577 Mamre Road). Although this is expected to be acquired prior to commencement of work at the subject site, noise impacts on this residences will still be reviewed in this report.

- We note that there is rural residential development to the west of the site, approximately 250m west of Stage 1.

- In addition, we note that there is a child care centre, approximately 270m from Stage 1, and will be adjoined either by industrial development or new roadways once Stage 2 is developed.

The primary noise source in the vicinity of the site is road traffic from Mamre Road.

See aerial photograph below.

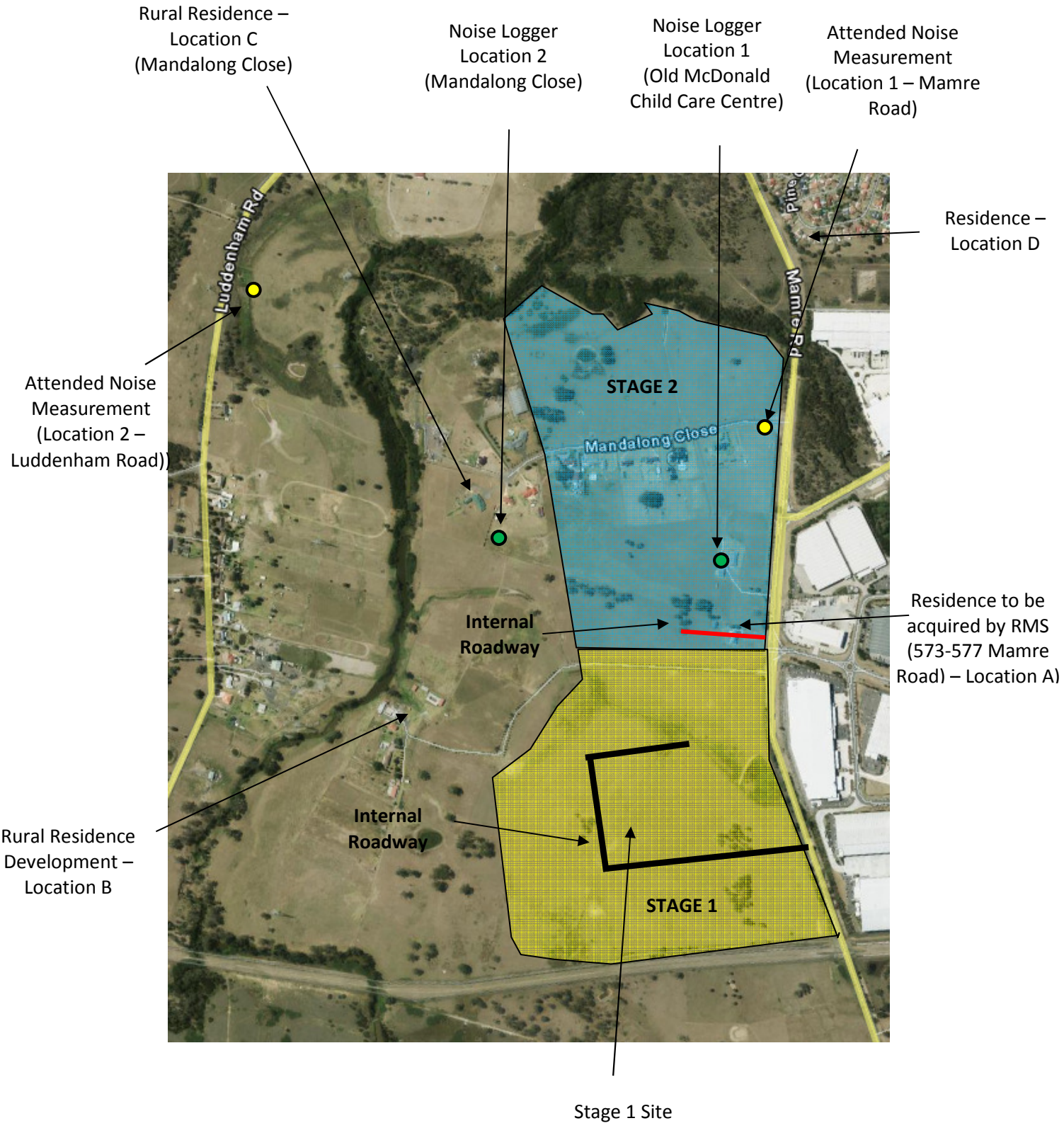


Figure 1: Site Photo

3 NOISE DESCRIPTORS

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

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

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

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

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

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

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

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

4 SURVEY OF AMBIENT NOISE

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

Unattended noise monitoring was conducted between 4 to 11 September 2015. Monitoring was conducted using two Acoustic Research Laboratories monitors set on A-weighted fast response mode. The monitors were calibrated before and after the measurements using a Rion Type NC-73 calibrator. No significant drift was recorded. The monitoring location is shown in section 2.

In addition, an attended measurement was made on 11 September 2015 to measure existing noise levels generated by traffic on Mamre and Luddenham Roads. This measurement was made using a Norsonic 118 Type 1 Sound Analyser set on A-weighted, fast response mode.

All measurement locations are marked in the aerial photograph in Section 2.

Periods of adverse weather have been eliminated when determining the rating background noise level at the site, which is presented below.

Measured noise levels (both the average/L_{eq} and rating background noise level) are presented below. Average/L_{eq} noise levels at the site are dominated by road traffic noise.

Table 1 – Long Term Noise Logging Data

Location	Time of Day		
	Daytime (7am-6pm)	**Evening (6pm-10pm)**	**Night (10pm-7am)**
Noise Logger Location 1	50dB(A)$L_{eq(Period)}$ 38dB(A)L_{90}	50dB(A)$L_{eq(Period)}$ 38dB(A)L_{90}	46dB(A)$L_{eq(Period)}$ 33dB(A)L_{90}
Noise Logger Location 2 (applicable to Rural residence Locations 1 and 2)*	50dB(A)$L_{eq(Period)}$ 38dB(A)L_{90}	50dB(A)$L_{eq(Period)}$ 34dB(A)L_{90}	46dB(A)$L_{eq(Period)}$ 34dB(A)L_{90}

*See aerial photo, section 2.

Table 2 – Attended Noise Measurement (Road Traffic Noise)

Location	Measured Noise Level - Daytime
Attended Measurement – Location 1 (40m from Mamre Road)	64dB(A)L_{eq}
Attended Measurement – Location 1 (10m from Luddenham Road)	68dB(A)L_{eq}

5 NOISE EMISSION CRITERIA

The following noise controls and guidelines will be used in the acoustic assessment of the site:

- The Penrith DCP.
- The EPA Industrial Noise Policy
- The EPA Road Noise Policy
- EPA guidelines for sleep arousal (Application Notes to the Industrial Noise Policy).
- The EPA document –Assessing Vibration, A Technical Guideline.
- The EPA Interim Construction Noise Guidelines.

5.1 THE PENRITH DCP

It is noted that the Precinct will have a site specific Development Control Plan (DCP) which will inform the development of General Industrial development within the Precinct. Notwithstanding – the following sections of the Penrith Council DCP have been considered.

Sections 12.1 and 12.4 of the Penrith DCP address noise impacts associated with industrial development.

Both sections of DCP note the importance of maintaining residential amenity.

Section 12.4 refers to the EPA Industrial Noise Policy in the assessment of plant and equipment noise generated by the site. This is discussed in detail below.

Section 12.1 deals with noise from traffic associated with a site, and refers to the guidelines of relevant state government authorities. In this case, this will be the EPA Road Noise Policy (also discussed below).

5.2 EPA INDUSTRIAL NOISE POLICY

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

5.2.1 INP - Intrusiveness Assessment

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

Table 3 – EPA Intrusiveness Criteria (Residential Receiver A – 573-577 Mamre Road)

Location	Time of Day	Background noise Level - dB(A)L_{90}	Intrusiveness Noise Objective dB(A)$L_{eq(15min)}$ (Background + 5dB)
All Potentially Affected Residential Properties	Day Time (7am - 6pm)	38	43
	Evening (6pm - 10pm)	38	43
	Night (10pm - 7am)	33	38

Table 4 – EPA Intrusiveness Criteria (Residential B and C)

Location	Time of Day	Background noise Level - dB(A)L_{90}	Intrusiveness Noise Objective dB(A)$L_{eq(15min)}$ (Background + 5dB)
All Potentially Affected Residential Properties	Day Time (7am - 6pm)	38	43
	Evening (6pm - 10pm)	34	39
	Night (10pm - 7am)	34	39

5.2.2 INP - Amenity Assessment

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

Amenity criteria are as follows:

Table 5 – EPA Amenity Criteria

Receiver Location	Land Type	Time of Day	Amenity Noise Objective dB(A)$L_{eq(Period)}$
All Potentially Affected Rural Residences	Rural Residential	Day Time (7am – 6pm)	50
		Evening (6pm – 10pm)	45
		Night (10pm-7am)	40
Commercial	All	When in use	65
Industrial	All	When in use	70
Active External Recreation Areas (Child Care Centre)	All	When in use	55 (external areas) 35 (sleeping areas)

5.3 SLEEP AROUSAL ASSESSMENT

Potential sleep arousal impacts should be considered for noise generated before 7am or after 10pm.

Short duration, intermittent noise events (typically trucks starting and the noise from the pneumatic break release valve, which engages when a truck leaves a stationary position) are typically assessed for potential sleep disturbance.

Potential impacts are assessed using the recommended procedure in the Application Notes to the EPA Industrial Noise Policy. As recommended in the Application Notes, when assessing 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 6 – Sleep Arousal (Emergence Criteria)

Location	Background Noise Level (10pm-7am) dB(A)$_{L90}$	Emergence Level dB(A) $L_{1(1min)}$
Residential Receiver A (573-577 Mamre Road)	33	48
Residential Receivers – B and C	34	49

- 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 of 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 the EPA Road Noise Policy. Most relevantly, the Road Noise Policy states:

  For the research on sleep disturbance to date it can be concluded that:

  - *Maximum internal noise levels below 50-55dB(A) are unlikely to awaken people from sleep.*

  - *One to two noise events per night with maximum internal noise levels of 65-70dB(A) are not likely to affect health and wellbeing significantly.*

The internal noise level guidelines have also been adopted in this assessment.

5.4 NOISE FROM INCREASED TRAFFIC GENERATION ON PUBLIC STREETS

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

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

Table 7 – Criteria for Traffic Noise Impact from New Developments

Noise Receiver	Road Type	Time of day	Permissible Noise Generation (External Noise Level)
Residential Generally	Sub-Arterial (Mamre Road)	Day (7am to 10pm)	60dB(A)$L_{eq(15hr)}$
		Night (10pm to 7am)	55 dB(A)$L_{eq(9hr)}$
	Local Roads (Mandalong Road)	Day (7am to 10pm)	55dB(A)$L_{eq(1hr)}$
		Night (10pm to 7am)	50 dB(A)$L_{eq(1hr)}$
Isolated residences in industrial areas	All	All	External noise targets listed above may be exceeded. AS2107 internal noise goals to be adopted.
Child Care Centre Play Area	All	When in use	55dB(A)$L_{eq(1hr)}$

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

5.5 CONSTRUCTION NOISE AND VIBRATION IMPACTS

5.5.1 EPA Interim Construction Noise Guidelines

EPA guidelines adopt differing strategies for noise control depending on the predicted noise level at the nearest residences:

- *"Noise affected" level*. Where construction noise is predicted to exceed the "noise effected" level at a nearby residence, the proponent should take reasonable/feasible work practices to ensure compliance with the "noise effected level". For Rural residences, the "noise effected" level occurs when construction noise exceeds ambient levels by more than:
    - 10dB(A)$L_{eq(15min)}$for work during standard construction hours (7am-6pm Monday to Friday and 8am to 1pm on Saturdays) and
    - 5dB(A)$L_{eq(15min)}$for work outside of standard construction hours.
- "*Highly noise affected level".* Where noise emissions are such that nearby properties are "highly noise effected", noise controls such as respite periods should be considered. For Rural residences, the "highly noise effected" level occurs when construction noise exceeds 75dB(A)$L_{eq(15min)}$ at nearby residences.

A summary of noise emission goals for both standard hours of construction and outside standard hours are presented.

Table 8 – Construction Noise Emission Goals

Location	**"Noise Affected" Level - dB(A)$L_{eq(15min)}$**	**"Highly Noise Affected" Level - dB(A)$L_{eq(15min)}$**
Residences	48 (Standard Construction Hours)	75
Commercial	70	N/A
Industrial	75	N/A

5.5.2 Construction Vibration

Vibration goals for the amenity of nearby land users are those recommended by the EPA document *Assessing Vibration: A technical guideline.* These levels are presented below:

Table 9 – Construction Vibration Goals

Location	Time	Peak velocity (mm/s)	
		Preferred	Maximum
Continuous Vibration			
Rural Residences	Daytime	0.28	0.56
Commercial/Industrial	When in use	0.56	1.12
Impulsive Vibration			
Rural Residences	Daytime	8.6	17
Commercial/Industrial	When in use	18	36

6 NOISE EMISSION ASSESSMENT

It is expected that a Development Application will be required to be lodged for the use of any individual industrial tenancy in the development. Any development application would be expected to include an acoustic report which addresses the specific activities to be conducted in that particular lot and to present noise emission controls to ensure that the site in isolation (and when assessed cumulatively with other industrial lots) will meet Council/EPA noise emission requirements.

At present, road alignments and industrial lot boundaries for Stage 1 have been determined sufficiently to enable noise emission analysis. This is presented in section 6.1. However, an assessment of typical operational and construction noise is presented below in order to demonstrate that an industrial use of the site is capable of meeting noise emission requirements.

With respect to Stage 2 (North and South), noise emission impacts will vary greatly depending on the boundaries of the lots, the position of internal roads and degree to which the existing development on Mandalong Road has changed from residential to industrial. A discussion of noise impacts is presented in section 6.2, although highly detailed noise emission analysis can only be conducted at Development Application stage for specific lots (when lot sizes, specific uses of the lots and whether the adjoining development is residential or industrial is known).

6.1 STAGE 1 NOISE EMISSION ASSESSMENT

The following noise sources are assessed:

- Vehicular noise on site (trucks driving on internal roadways, noise from use of forklifts).
- Noise created on public roads as a result of traffic generated by the site.
- A preliminary assessment of noise from mechanical plant.
- A preliminary assessment of construction noise and vibration.

6.1.1 On-site Vehicle Noise (trucks driving on internal access roads and on-site, noise from forklifts).

Noise generated by vehicles manoeuvring on the site is assessed with reference to the EPA Industrial Noise Policy.

In predicting operational noise emissions, the following assumptions have been made:

- That there is an articulated truck movement to/from the site:
    - Up to five times in any fifteen minute period (at night time) and
    - Up to eighteen times in any fifteen minute (during the daytime/evening).
- Articulated trucks are assumed to have a sound power level of 105dB(A)L_{eq}, inclusive of a 5dB(A) penalty for a tonal reversing beacon when driving on the site or on internal roadways within the development..

- That there is a forklift continuously in operation in the hardstand area on the Lots (facing the internal roadways). Forklifts are assumed to have a sound power level of 90dB(A)L_{eq}.

Predicted noise levels are set out below.

Noise emissions are predicted on the assumption that there is no noise screening provided by any future warehouses on the northern or western boundaries of the industrial precinct (which will ultimately provide some noise screening).

As is consistent with EPA guidelines when assessing rural development, the noise emissions are assessed at point on the residential properties which is 30m from the location of the house.

Table 10 – Vehicle Noise Impact Assessment (Day/Evening Time)

Noise Source	Noise Receiver Location	Predicted Noise Level – dB(A)$L_{eq(15min)}$	Compliance
Articulated trucks driving to/from site, forklift operating on site.	Residential Receiver A (573-577 Mamre Road)	39dB(A)$L_{eq(15min)}$	Complies – Night time criteria (43dB(A)$L_{eq(15min)}$, table 3)
	Residential Receiver B (west of site)	39dB(A)$L_{eq(15min)}$*	Complies – Night time criteria (39dB(A)$L_{eq(15min)}$, table 4)
	Residential Receiver C (Mandalong Close)	36dB(A)$L_{eq(15min)}$*	Complies – Night time criteria (39dB(A)$L_{eq(15min)}$, table 4)

Table 11 – Vehicle Noise Impact Assessment (Night Time)

Noise Source	Noise Receiver Location	Predicted Noise Level – dB(A)$L_{eq(15min)}$	Compliance
Articulated trucks driving to/from site, forklift operating on site.	Residential Receiver A (573-577 Mamre Road)	34dB(A)$L_{eq(15min)}$	Complies – Night time criteria (38dB(A)$L_{eq(15min)}$, table 3)
	Residential Receiver B (west of site)	38dB(A)$L_{eq(15min)}$*	Complies – Night time criteria (39dB(A)$L_{eq(15min)}$, table 4)
	Residential Receiver C (Mandalong Close)	34dB(A)$L_{eq(15min)}$*	Complies – Night time criteria (39dB(A)$L_{eq(15min)}$, table 4)

* Prediction takes into account air absorption and adverse weather conditions (temperature inversion). Calculation done as per table 5.10 *Engineering Noise Control* Beis and Hansen 1988. For Receiver A, effect of temperature inversion is less than 3dB(A), and therefore no further analysis required as per section 5.2 of the Industrial Noise Policy.

We note that noise emissions from the proposed Stage 1 (trucks and use of forklifts) indicates that even night time use of the site can be conducted and noise levels compliant with EPA guidelines is achieved.

In addition, we note:

- Noise emissions have been predicted on the assumption that there is a line of sight between the internal roadways/external hardstand areas and the residences to the north and west. This is a conservative analysis.

- As other industrial units in Stage 1 are developed, warehouses along the northern and western boundaries of the site will provide noise screening from vehicle noise and from use of outdoor, hard stand areas (provided that the future warehouse sits between the vehicle and the residences to the north or west). This noise screening will reduce noise emissions by approximately 10dB(A).

- This noise screening will then in turn allow for a higher level of activity within the precinct (as the future industrial units are developed) while still complying with EPA guidelines.

- In the event that the industrial lots along the northern edge of Stage 1 are constructed prior to the acquisition of the residence at 573-577 Mamre Road (Receiver A, immediately north of the site), it is highly likely that either noise screens along the northern boundary or some other form of noise mitigation will be required. Indicatively, a height of 2.4m should be allowed for, however the precise height would be depending on the proposed activity and layout of the individual units.

- Obviously as the individual units are developed, it would be expected that there will be individual noise emission assessments made for the proposed use. The individual assessments would be expected to take into account:

    - The number and type of vehicle movements proposed.

    - The noise screening (if any) provided by the built form of any proposed warehouse.

Analysis indicates that the site is capable of complying with EPA guidelines both initially (when the State Significant Development Lots are the only development in thePprecinct) and in the future (as the remaining Lots within the precinct are developed).

6.1.2 Noise Generated by Additional Traffic on Public Roads

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

The noise impact from trucks driving on Mamre Road on the residential development is assessed below.

Predictions of noise generation are based on the following:

- During a peak one hour, daytime period, there are currently approximately 225 truck movements on Mamre Road, and the proposed development will generate an additional 72 movements (as per the traffic report by Ason Group).

- During the night time period, a total of 180 truck movements will potentially be generated (based on 5 movements per 15 minute periods, as referred to in section 6.1, above).

Based on the above, we note:

- Daytime (7am-10pm) - An increase of 72 truck movements per hour to the existing 225 already on Mamre Road will result in a net increase in noise level of 1dB(A), and so is consistent with EPA guidelines which permit an increase of 2dB(A) as a result of additional traffic generated on an existing road.

- Night time (10pm-7am) - Provided that vehicle movements are limited to 180 per night (equivalent to five in any fifteen minute period), noise emissions will be compliant with a 55dB(A)$L_{eq(Night)}$ noise emission goal, which is consistent with EPA night time noise emission guidelines (refer to table 7).

6.1.3 Transient Noise Events (Sleep Arousal)

Noise events occurring between 10pm and 7am should be assessed for potential sleep disturbance impacts on nearby residents.

The primary potential noise source will be the use of the pneumatic valve which engages when a truck moves from a stationary position. Based on measurements conducted by this office, the sound power of this noise event is 113dB(A)$L_{1(1min)}$.

The noise emissions at the window of the nearest residences are presented below. Predictions take into account distance correction and air absorption.

Table 12 – Sleep Arousal Assessment

Receiver Location	Noise Source	Predicted Noise Level	Emergence Test Level	Compliance
Rural Residence Receiver A (573-577 Mamre Road)	Truck Brake	48dB(A)$L_{1(1min)}$*	48dB(A)$L_{1(1min)}$	Complies with BG+15 test.
Rural Residence Receiver B (West of Site)	Truck Brake	42dB(A)$L_{1(1min)}$	49dB(A)$L_{1(1min)}$	Complies with BG+15 test.
Rural Residence Receiver C (Mandalong Close)	Truck Brake	<40dB(A)$L_{1(1min)}$	49dB(A)$L_{1(1min)}$	Complies with BG+15 test.

*Based on 250m distance between the site and the vehicle travel path (which is equal to the distance to the internal roadway within Stage 1) – see discussion below.

Noise emissions from the truck brake are predicted to be less than 15dB(A) above the night time background noise level, and therefore compliant with the EPA sleep disturbance "emergence" test. Given that compliance with the emergence test is achieved, no further detailed analysis is typically required.

In addition, we note:

- Truck noise to Receiver A (573-577 Mamre Road) has been predicted on the assumption that:
    - 573-577 Mamre Road is not acquired prior to commencement of operations in Stage 1 (and remains residential) and
    - That truck movements within Stage 1 are at least 250m away from the residence.
- In the event there is a truck travel path within a Stage 1 lot is closer than 250m (ie – along the northern boundary of Stage 1), noise screening (either from boundary fencing or warehouse positioning) will be required if trucks are used after 10pm.

On this basis, use of the site between 10pm and 7am to allow for vehicles to enter/leave the site) is capable of being compliant with EPA sleep disturbance guidelines.

Given there is the potential that 573-577 Mamre Road will be acquired before any use of Stage 1 commences, the need for boundary screening will potentially be eliminated, emphasizing the importance of a specific noise emission assessment for each industrial lot at Development Approval Stage.

6.1.4 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 required levels set out in section 5 of this report.

Compliance with noise emission requirements will be achievable with appropriate acoustic treatment. However, it is likely that any large roof top equipment which operates 24 hours per day (such as refrigeration plant) will require a noise screens to provide a line of sight break between the equipment and the residences to the north and west of the site (573-577 Mamre Road in particular).

6.1.5 Construction impacts

6.1.5.1 Construction Noise

With respect to construction noise, the impact on nearby development will be dependant on the activity in question and where on the site the activity is undertaken. Excavation and piling works tend to be the loudest typical construction activity. Work close to the northern and western boundaries will have greatest potential impact on residential dwellings. However, a highly detailed acoustic assessment of individual activities cannot be undertaken prior to knowing the activities/construction methods proposed, and their duration and location.

Primary noise emissions will occur during excavation/site levelling. Equipment items will typically have sound power levels of approximately 110-115dB(A)$L_{eq(15min)}$. Predicted noise levels at nearby development are:

- We note that during construction of the industrial development along the northern site boundary, the closest residences will be as close as 70m away (573-577 Mamre Road). At this time, construction noise will be up to 60dB(A)L_{eq}):

- Although this is technically an exceedance of EPA “background+10dB(A)” Noise Effected Level guidelines, we note that at 60dB(A), the construction noise will still be quieter than the daytime traffic noise level from Mamre Road.

- The construction noise will also be well below the EPA “Highly Noise Effected” level of 75dB(A).

- Noise levels at all other residences (to the west, and further to the north on Mandalong Close) will also be compliant with EPA guidelines.

Provided that construction works are limited to standard construction hours (7am-6pm), and use of very noisy equipment such as pneumatic hammers of driven/vibrated piling is suitably managed, excessive construction noise impact will be avoided.

In light of the above, we recommend:

- On completion of a construction program for any given warehouse, acoustic review of proposed construction activities and plant/methods should be undertaken to identify the extent and duration of potential exceedances of EPA Noise Effected levels (ie – “background+10dB(A)”).

- Identify feasible acoustic controls or management techniques (for example, selection of plant, use of screens around static plant, scheduling of noisy works, notification of adjoining land users) when exceedance of Noise Effected levels may occur.

Through adoption of the above, noise impacts on nearby development can be suitably managed to prevent unreasonable impact.

6.1.5.2 Construction Vibration

Excavation, earth retention and civil works are the primary vibration generating activities.

Given the distance between the site and the nearest rural residences, it is unlikely that construction vibration will exceed EPA guidelines (for amenity) and *highly* unlikely to approach vibration levels with the potential to cause building damage.

6.2 STAGE 2 NOISE EMISSION ASSESSMENT

At present, given that development of rural residential properties for industrial purposes in Stage 2 has not commenced, it is not known where the nearest noise sensitive development will be relative to any proposed industrial lot. Given this, it is not feasible to conduct a detailed assessment for Stage 2.

However, a discussion of key issues is presented below.

6.2.1 Stage 2 Impact on Residential Development (Mandalong Close)

These industrial lots are potentially located immediately adjacent to residential development on Mandalong Close.

A number of the Mandalong Close residences at the western end are double storey, and so noise screening provided by boundary fencing or earth mounds on the industrial lots potentially ineffective (if the first floor windows will overlook it).

We note:

- Operational Noise:
    - If an industrial lot is located immediately adjacent to a residence, there is a high chance that EPA noise emission requirements will be exceeded without acoustic treatment. For these industrial lots, this will almost certainly require that the building shell is sized and oriented such that any line of sight between the vehicle/equipment and the residence is achieved (given the likely ineffectiveness of boundary fencing to act as an acoustic screen).
    - Depending on the intensity of use and the equipment selections, the degree that the building shell runs past the “sight line” may need to vary (the further past the sight line, the more effective the noise attenuation). In the event that the building shell cannot provide sufficient attenuation, it will be necessary to consider restrictions in times of use, localised noise screens on site or other acoustic treatments specific to the proposed use of the lot.
- Construction Noise:
    - During civil works/construction of the site, given that it is likely that there will be sight lines between the residences and the work areas, it is likely that exceedance of EPA Construction Noise Guideline’s will occur.
    - This is not uncommon, in fact strict compliance with EPA construction noise guidelines is rarely achievable. However it is typical practice that a Construction Noise Management Plan be prepared at Construction Certificate stage for any particular lot in close proximity to a residence.
    - The Construction Noise Management plan should, at a minimum:
        - Identify the duration of civil works (site levelling) and for erection of building structure (the noisiest typical construction activities).

- Identify whether the proposed construction activities will result in exceedances of EPA construction goal goals, and if so, identify reasonable and feasible noise mitigation techniques (typically relating to equipment selection, timing/scheduling of activities, neighbour notification and potentially temporary noise screens).

- Road Traffic Noise:

  - Depending on the order in which the lots on Mandalong Close are developed, the majority of vehicle movement in the precinct will be within industrial areas.

  - However, potentially, some industrial lots will become operational while there are still residential dwellings remaining on Mandalong Close, requiring vehicles to travel past the residence when driving to/from Mamre Road.

  - In this event, management of truck movements is likely to be required in order to meet the EPA Road Noise Policy acoustic goals (as per table 7).

  - There is a potential exceedance of EPA external noise goals at residences in the event that the developments will generate more than approximately 10 truck movements per hour during the daytime period and 4 per hour during the night time period.

  - While a specific site vehicle management policy would be proposed as part of any Development Application documentation, it is likely that during the interim period (if there is a mixture of industrial and residential interspersed along Mandalong Close), it may be necessary for some truck movements to use the north-south running road to exit the precinct at the James Erskine Drive/Mamre Road intersection.

  - Alternatively, as per table 4 of the EPA Road Noise Policy for isolated residences in industrial areas, an assessment of internal noise levels within the residences can be undertaken (using AS2107 as a guideline) to justify higher noise levels at the residential building façade.

  - Any proposal should examine the proposed vehicle movements and justify any noise impact based on EPA Road Traffic Noise acoustic goals.

  - The specific assessment of the future potential Stage 2 will be subject of another Planning Proposal and individual acoustic assessment.

6.2.2 Stage 2 – Impact on Child Care Centre

Being a commercial development, EPA noise emission requirements are less stringent compared to impacts on residential development.

A primary aim should be to ensure operational or construction noise impacts on the child care centre playground do not exceed 55dB(A)L_{eq} (this being the EPA recommended level for noise impacts on external recreation areas). Provided that this external noise level is achieved, internal noise levels will be less than 35dB(A) in sleeping areas assuming standard building shell construction (with windows to sleeping areas closed).

Similar to development in Stage 2 North, operational noise and construction noise have the potential to exceed EPA noise emission goals. The risk of exceedance is greatly reduced by positioning the building shell of any new development to break the line of site between external vehicles/equipment and the child care centre.

Vehicles would be expected to use the roadway through Stage 1 or the proposed new roadway to the James Erskine Drive intersection. While truck movements using the Stage 1 roadway will not have a significant noise impact, truck movements to the James Erskine Drive intersection bring the vehicles in much closer proximity to the child care centre.

The exact numbers of semi-trailer movements permissible per hour can only be determined following finalisation of road position and completion of the Stage 2 Planning Proposal. Dependant on the amount of semi-trailer movements it is likely that noise screening will be required to achieve compliant noise levels at the child care centre playground. This could take the form of either roadside screens or upgrade of the boundary fencing of the child care centre playground to a lapped and capped/Colour or other solid sheet fence.

Like stage 1, we recommend:

- Any development application for a specific lot would be required to assess the noise impacts on residences as they are at the time of lodgement. The development application would need to assess the proposed activities and number of heavy vehicle movements (day and night). Warehouse positioning and vehicle routes would need to be determined based on the actual proposed use in order to ensure compliant noise emissions.

- Intermittent exceedance of EPA Construction Noise Goals will be likely to occur during civil works and erection of structure in Stage 2. A Construction Noise Management Plan should be prepared at Construction Certificate stage for any lot adjoining the child care centre. In the event that exceedances of EPA Construction noise goals are predicted, the Management Plan is to identify reasonable and feasible noise management techniques, such as timing/scheduling of noisy construction activities (for example, avoiding these works at times of outdoor play), notification and potentially temporary noise screens around fixed plant.

7 RECOMMENDATIONS

7.1 GENERALLY

We recommend that an acoustic assessment should be submitted with any Development Application for use of the industrial facilities on the site. The acoustic assessment should specifically identify:

- Relevant noise emission goals for the site, include EPA Industrial Noise Policy, Road Noise Policy and sleep disturbance guidelines.

- The contribution of any pre-existing mechanical noise from other units should be taken into account when setting noise emission goals, with adjustments to EPA Amenity noise emission goals made as necessary (to avoid “background” creep).

- Proposed numbers of vehicles movements associated with the use of the lot and associated noise generation.

- Identify any noisy activities to be conducted in external areas (such as use of forklifts, truck washes or similar).

- The predicted noise emissions as a result of these activities and the proposed building and/or management controls to be adopted to ensure ongoing compliance (noise screens, time restrictions, acoustic treatment of equipment or similar).

In addition, compliance with EPA noise emission goals for equipment noise should be included in any condition of consent, with detailed acoustic design required to be conducted prior to any Construction Certificate being issued.

In addition to the above, stage specific recommendations are presented below.

7.2 STAGE 1

Noise screen:

- Construct a noise screen along the northern boundary of the site. The screen is to be positioned such that it breaks any line of sight between any internal roadway and the residence at 573-577 Mamre Road (see markup – appendix 3). Screen to be minimum 2.4m high and constructed of lapped and capped timber,Colorbond or masonry.

- In the event that there is any significant outdoor activity near the northern boundary of the north-western lots, those lots will potentially also require a noise screen. The need for this would be determined in any development application for that lot (see markup – appendix 3).

- In the event that 573-577 Mamre Road is acquired prior to commencement of operation of the site, the screen will not be required.

Truck movements (semi-trailer and/or b-double) initially be limited to:

- 72 per hour during the daytime/evening time (10pm-7am) and

- 20 per hour at night time (10pm-7am).

However, these limits can potentially be increased depending on the degree of noise screening provided by development on the site, and would be assessed on a case by case basis as Development Applications are lodged by prospective tenants.

Any development which will result in an exceedance of these truck numbers should demonstrate how compliance with EPA noise emission requirements will be achieved (through screening provided by building form, timing of vehicle movements, re-assessment of ambient conditions or similar).

7.3 STAGE 2

In the event that a new roadway is constructed to the James Erskine Drive intersection:

- The distance from the roadway to the Old McDonald Childcare Centre should be maximised as much as practicable.

- Spatial allocation for either a roadside screen or upgrade of the child care centre boundary fencing (to 2.1m lapped and capped timber) should be considered in the event that vehicle movements will result in an exceedance of EPA Road Traffic Noise levels.

For Stage 2, given the potential proximity of residential development, it is extremely likely that any industrial allotment will need to rely on purpose built acoustic screens or utilising the building shell of any warehouse built on site to provide noise screening to the existing residences.

A separate acoustic assessment will need to be completed for Stage 2 once the exact extent of the rezoning boundaries are known.

8 CONCLUSION

Operational noise emissions associated with the proposed industrial rezoning at 585-649 Mamre Road and existing Rural Residential land to the north (to Mandalong Close) have been assessed with reference to relevant EPA and Penrith Council acoustic guidelines in order to inform the Department of Planning & Environment on the suitability of the site for rezoning to General Industrial under the State Environmental Planning Policy (Western Sydney Employment Area).

Two zones have been assessed:

- Stage 1 (at the southern end of the site) where industrial development is proposed as soon as practicable after rezoning approval and

- Stage 2 (northern portion of the site) which will be subject to a future rezoning application. This Stage will potentially result in industrial development being constructed in close proximity to existing residence, at least for an interim period and a new roadway in close proximity to an existing childcare centre.

An analysis of typical operational noise from Stage 1 (vehicle, mechanical equipment equipment) indicates that the site is capable of complying with relevant noise emission criteria. Acoustic treatments for control of noise emissions have been presented in Section 7 of this report.

Provided that these recommendations are followed, compliant noise levels will be achievable should the site be developed for industrial purposes. Given the degree of acoustic treatment will be dependant on the timing of commencement of operation and the acquisition of the residence at 573-577 Mamre Road, any development application stage acoustic report would need to address the residential development as it existing at the time of application.

Analysis of potential development in Stage 2 indicates that there are potential exceedances of EPA guidelines with respect to operational noise, vehicle noise and construction noise as a result of residential development being much more proximate. Ultimately vehicle movements will be located away from residential development, as the residential land which will not be rezoned is located at the western end of Mandalong Close (away from industrial lots). However in the interim period there is the potential of there being residential and industrial development interspersed among each other. In this interim period, detailed acoustic analysis will be required for each industrial lot (at Development Application stage) to ensure there is no excessive noise impact in the interim period and for development on the industrial/residential boundary. Use of building form and potential restriction late night use of heavy vehicles where there are still residential dwellings interspersed are likely to be required, with a specific proposed to outlined in any individual development application.

As noted previously, rezoning is not being sought for Stage 2 and a separate acoustic assessment will need to accompany the Planning Proposal. The analysis has been undertaken to review likely considerations for this stage.

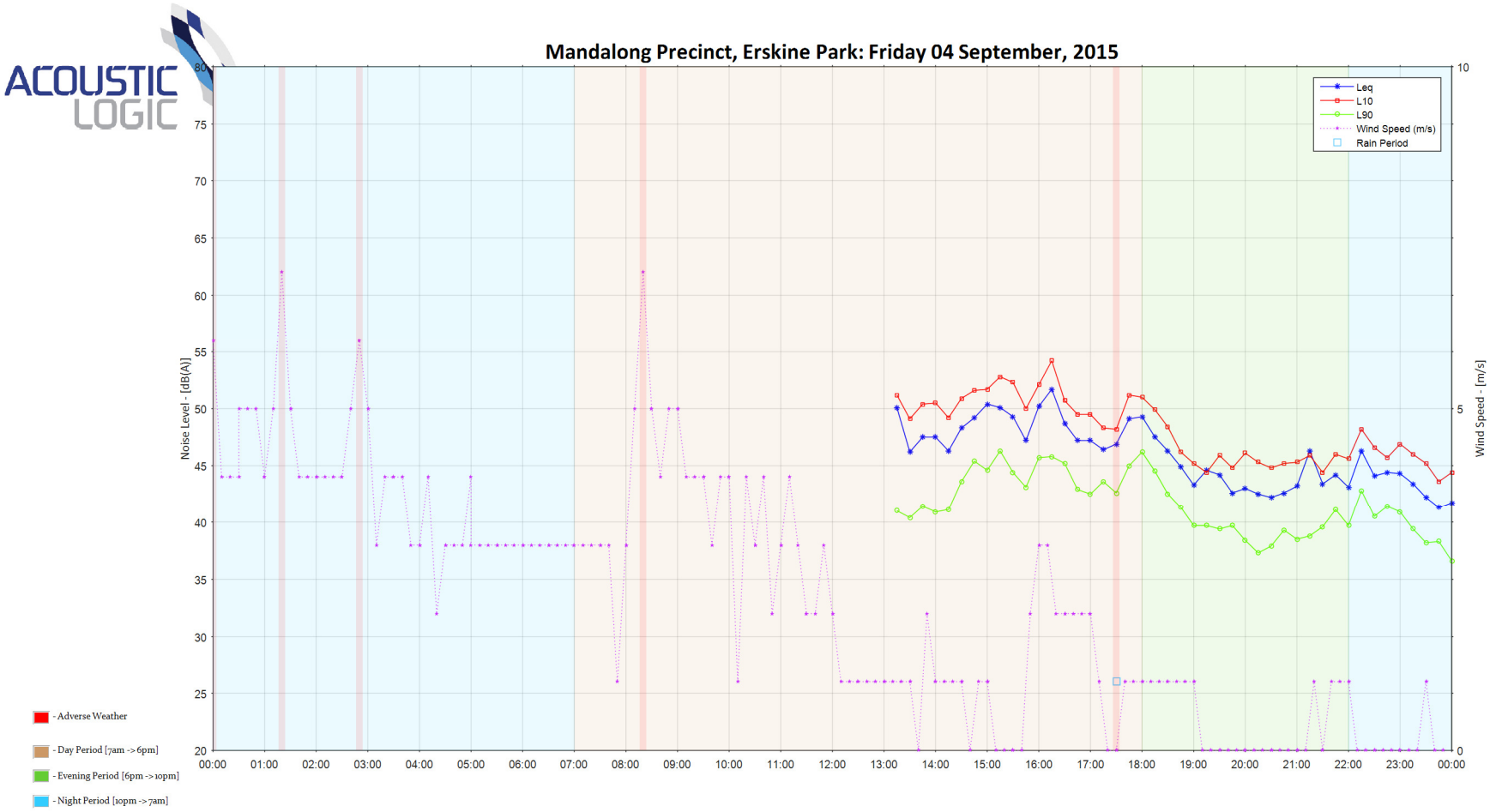
Please contact us if you have any queries.

Yours faithfully,

Acoustic Logic Consultancy Pty Ltd
Thomas Taylor

Appendix 1

Noise Logging Data – Location 1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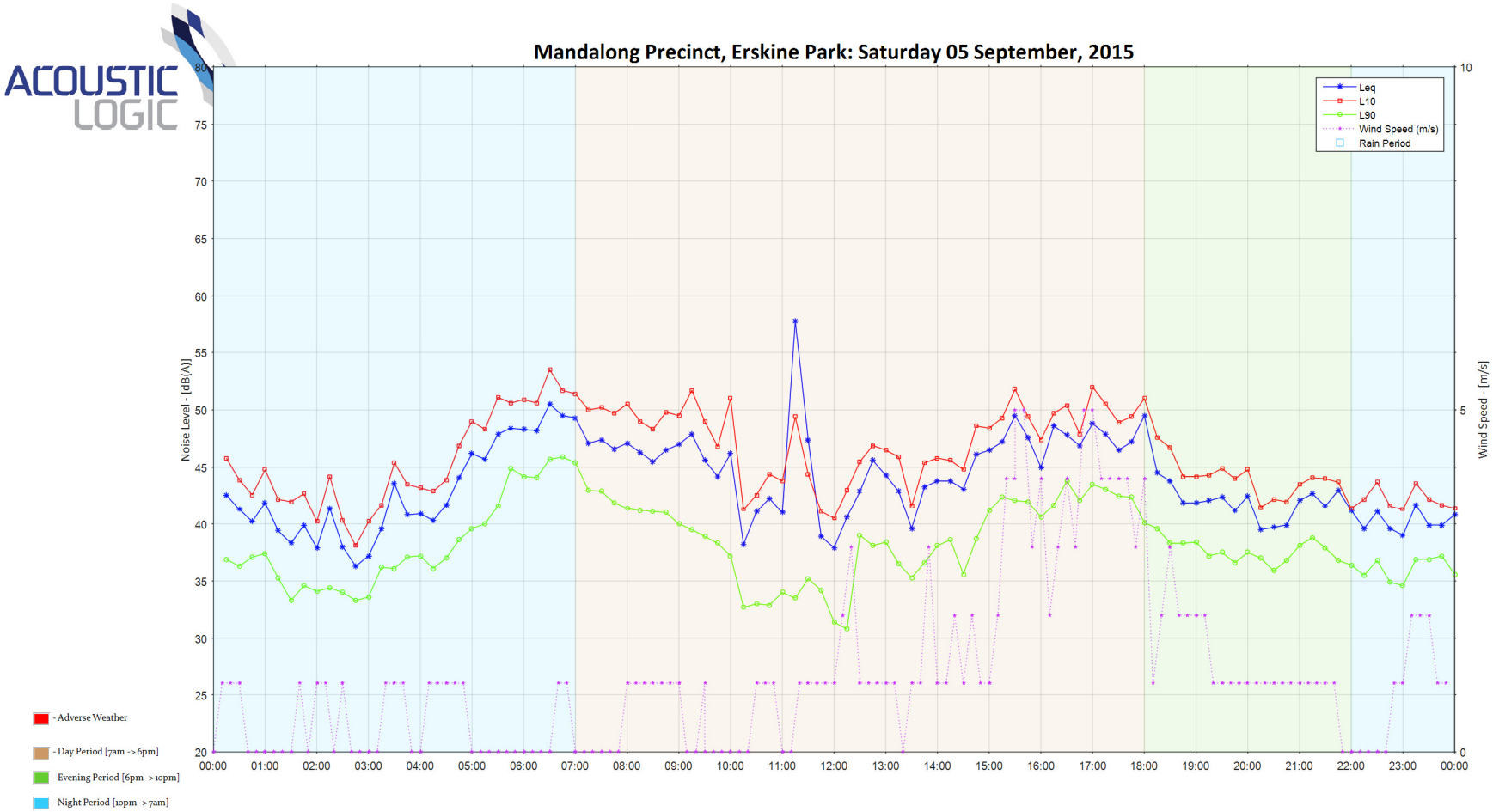
Leq
L10
L90
Wind Speed (m/s)
Rain Period
- Adverse Weather
- Day Period [7am -> 6pm]
- Evening Period [6pm -> 10pm]
- Night Period [10pm -> 7am]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Wind Speed (m/s)
Rain Period
- Adverse Weather
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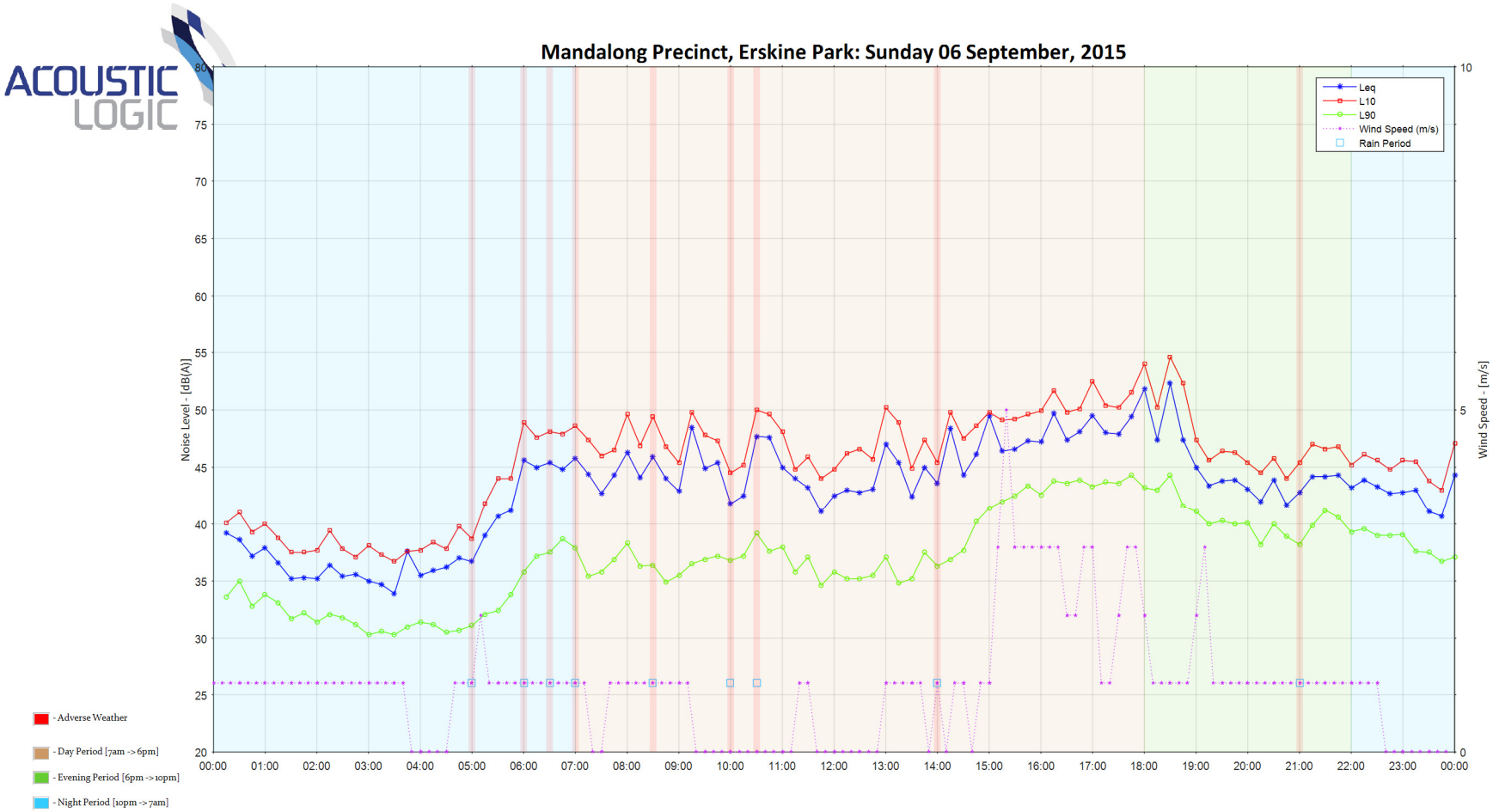
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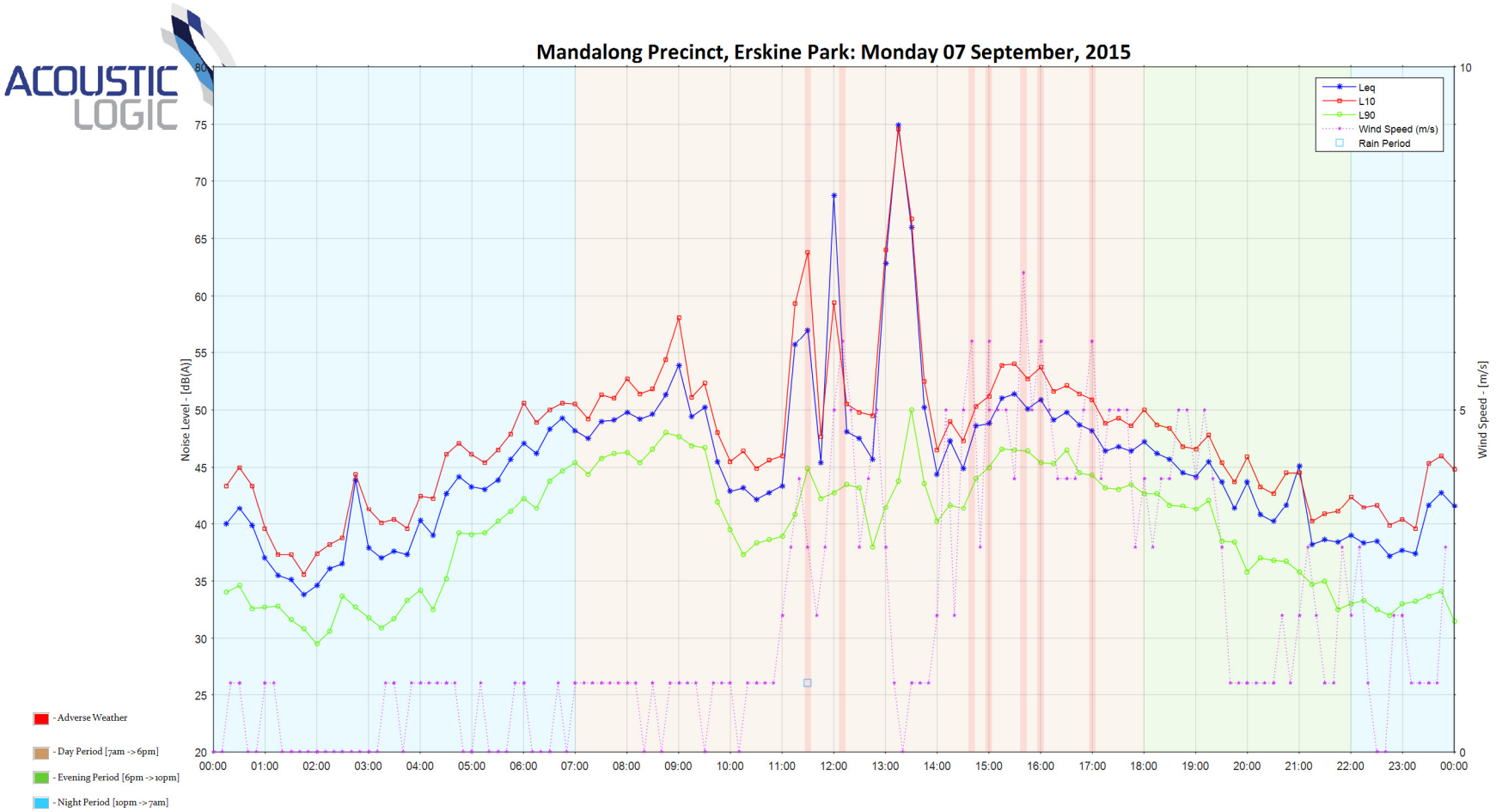
Rain Period
- Adverse Weather
- Day Period [7am -> 6pm]
- Evening Period [6pm -> 10pm]
- Night Period [10pm -> 7am]


Mandalong Precinct, Erskine Park: Monday 07 September, 2015
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L90
Wind Speed (m/s)
Rain Period
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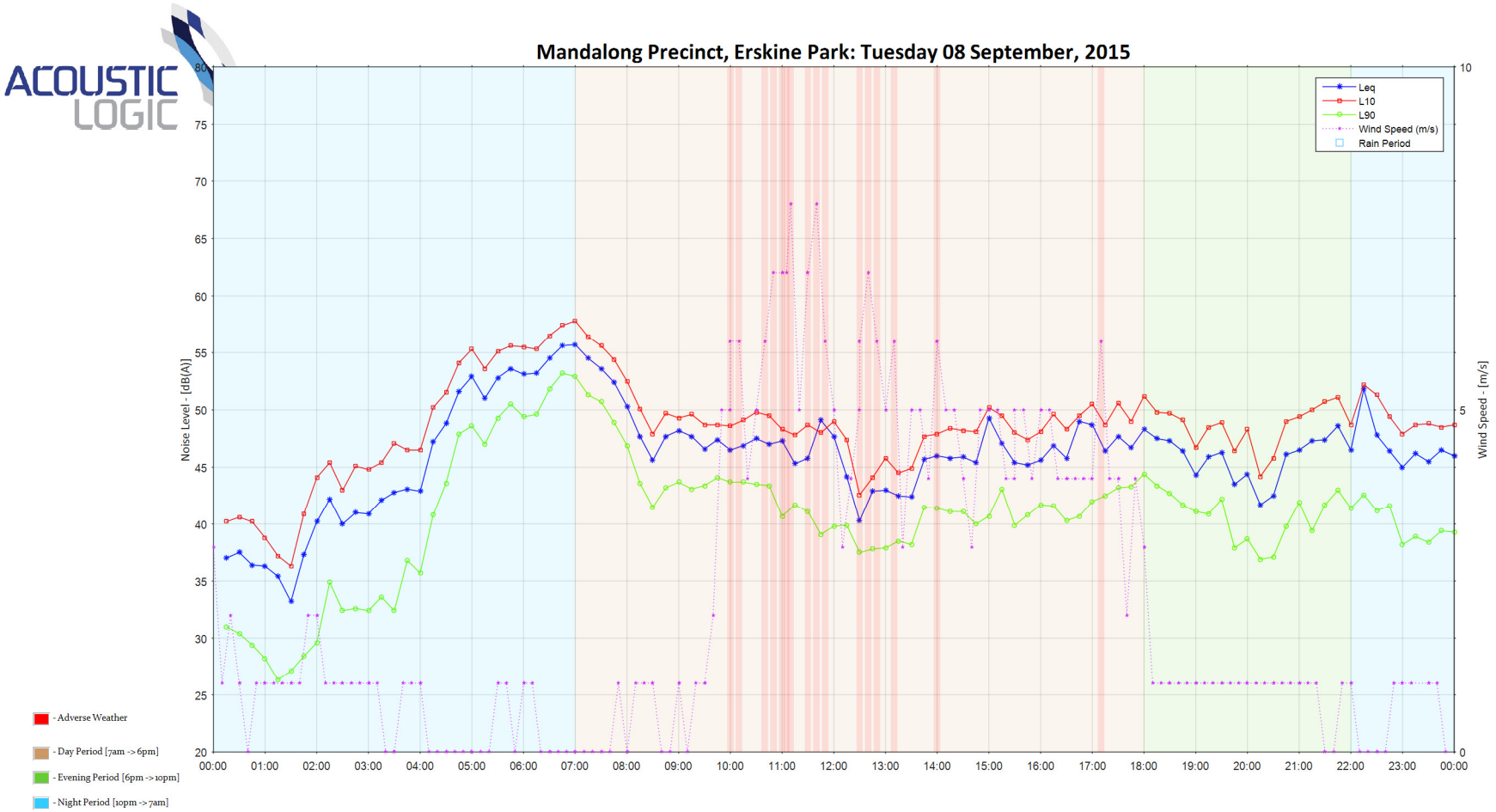
- Evening Period [6pm -> 10pm]
- Night Period [10pm -> 7am]


Mandalong Precinct, Erskine Park: Tuesday 08 September, 2015
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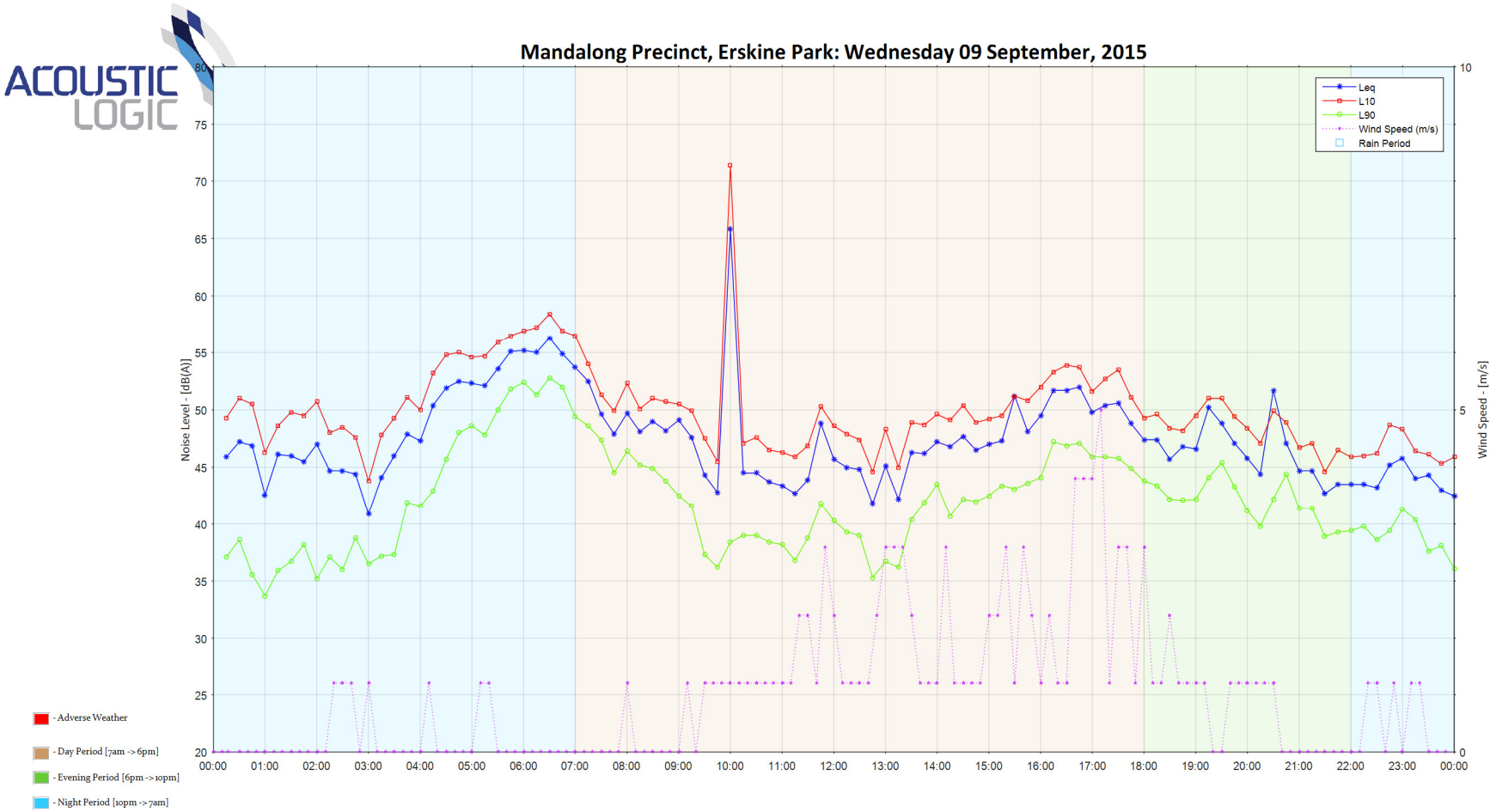
Wind Speed - [m/s]
Leq
L10
L90
Wind Speed (m/s)
Rain Period
- Adverse Weather
- Day Period [7am -> 6pm]
- Evening Period [6pm -> 10pm]
- Night Period [10pm -> 7am]


Mandalong Precinct, Erskine Park: Wednesday 09 September, 2015
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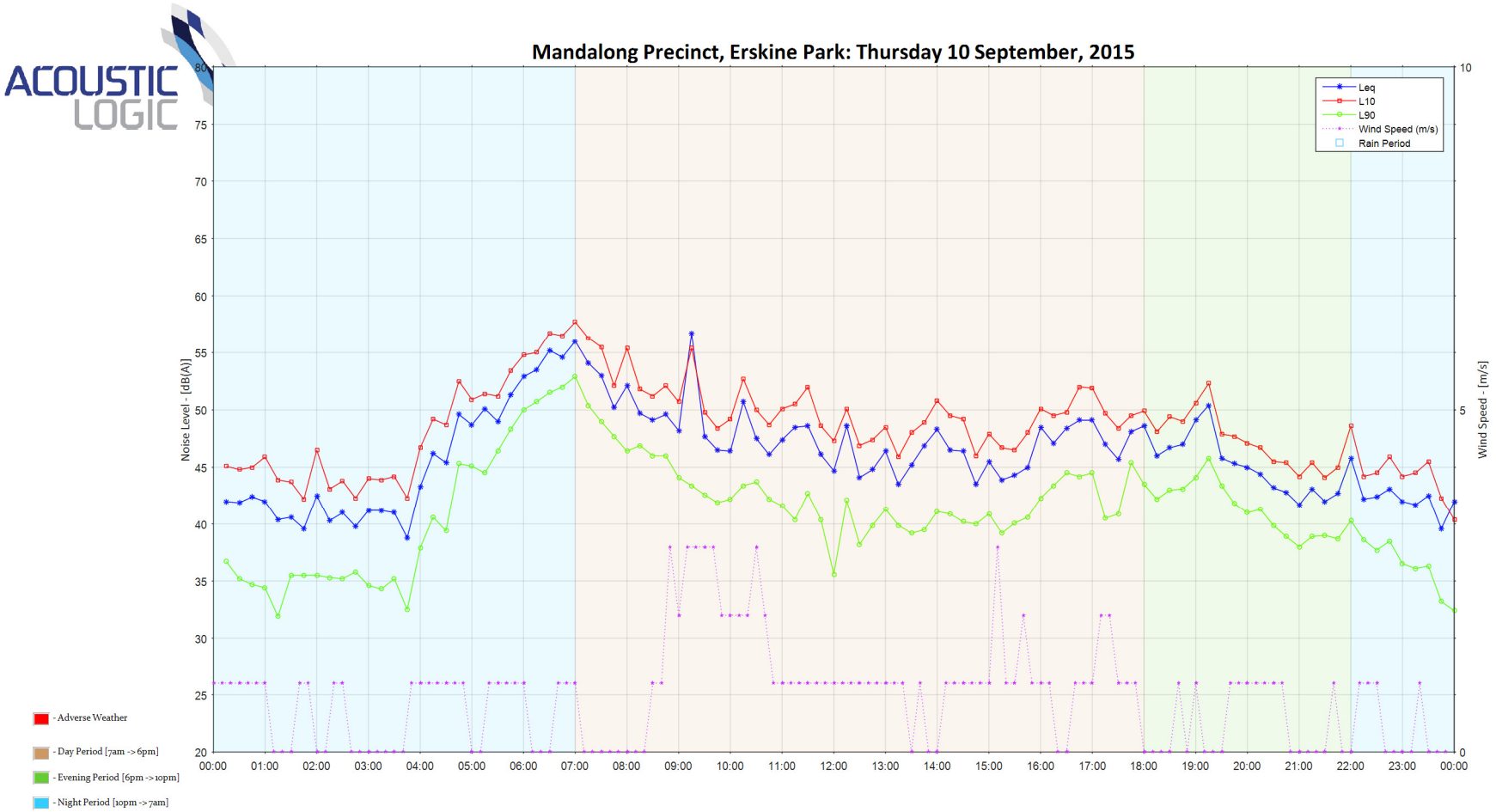
Wind Speed - [m/s]
Leq
L10
L90
Wind Speed (m/s)
Rain Period
- Adverse Weather
- Day Period [7am -> 6pm]
- Evening Period [6pm -> 10pm]
- Night Period [10pm -> 7am]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L10
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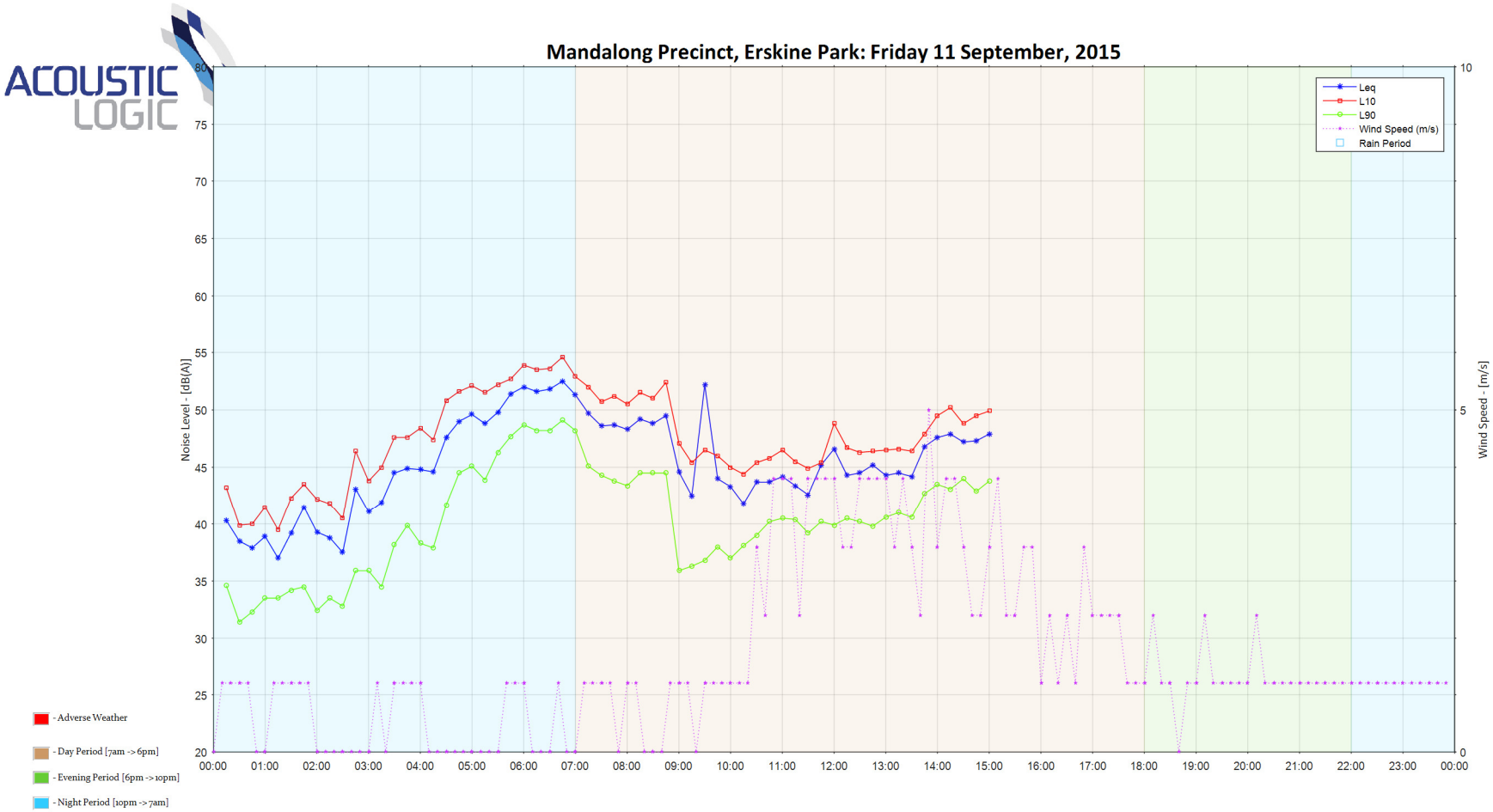
Wind Speed (m/s)
Rain Period
- Adverse Weather
- Day Period [7am -> 6pm]
- Evening Period [6pm -> 10pm]
- Night Period [10pm -> 7am]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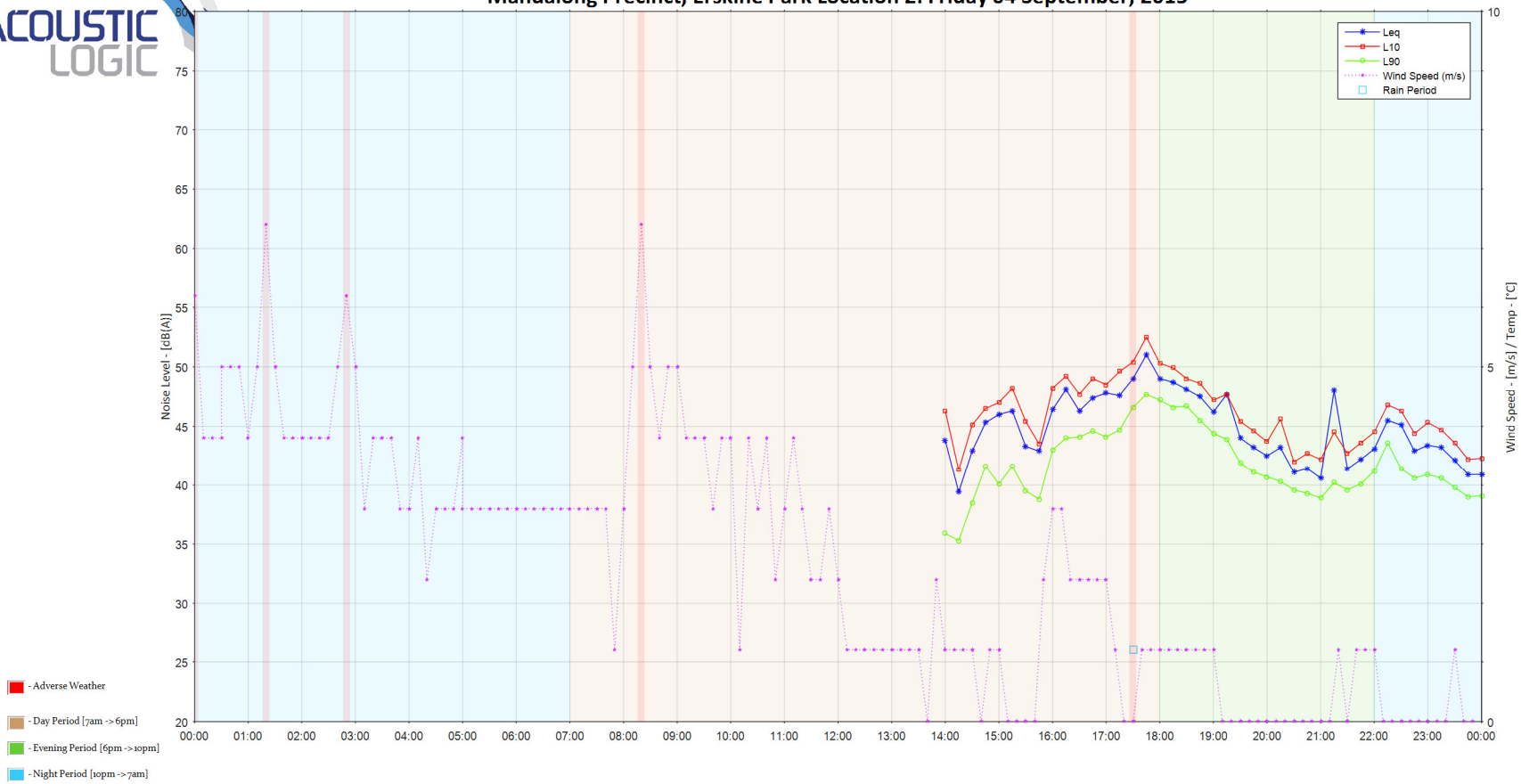
Wind Speed - [m/s]
Leq
L10
L90
Wind Speed (m/s)
Rain Period
- Adverse Weather
- Day Period [7am -> 6pm]
- Evening Period [6pm -> 10pm]
- Night Period [10pm -> 7am]

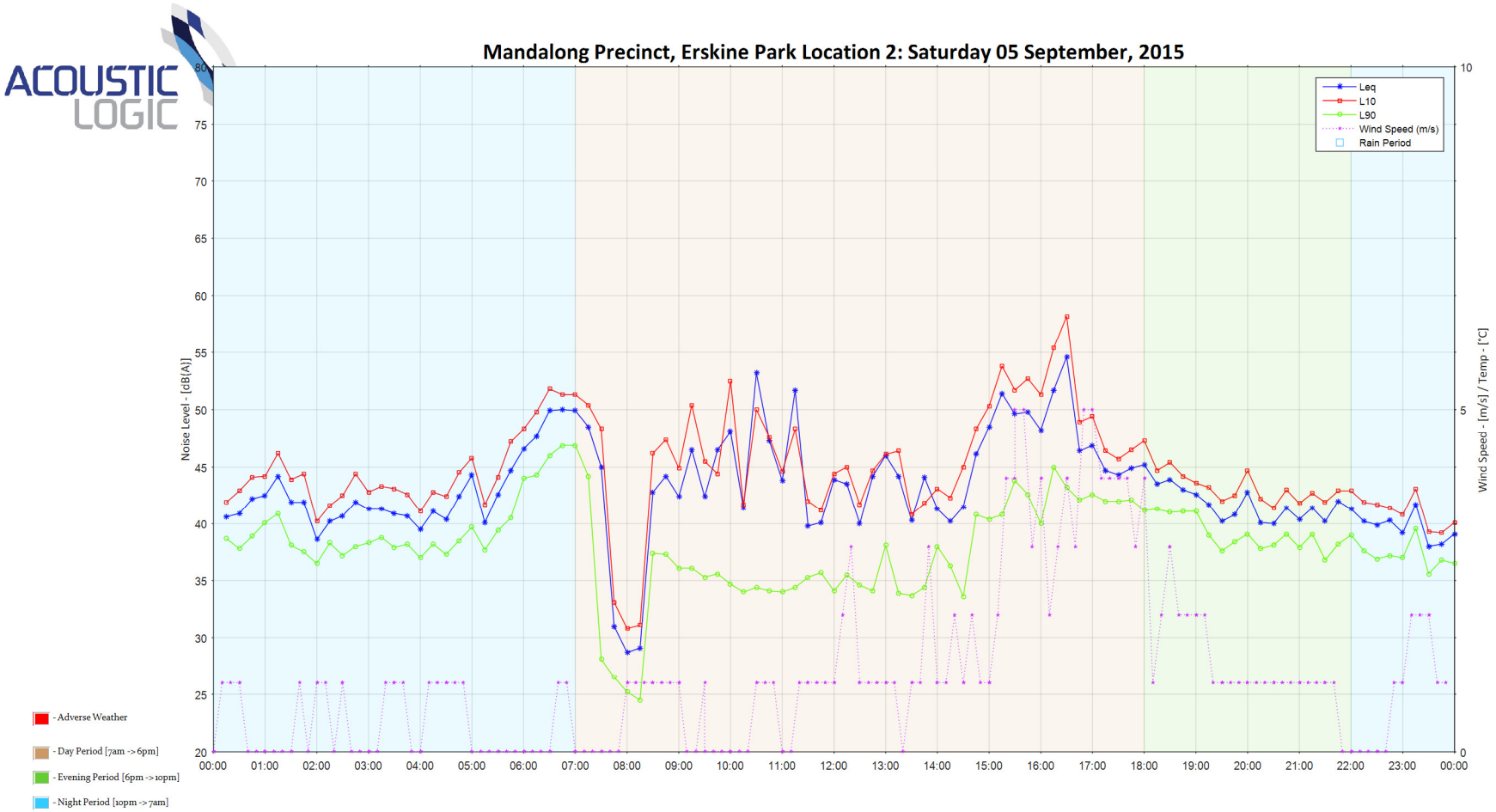
Appendix 2

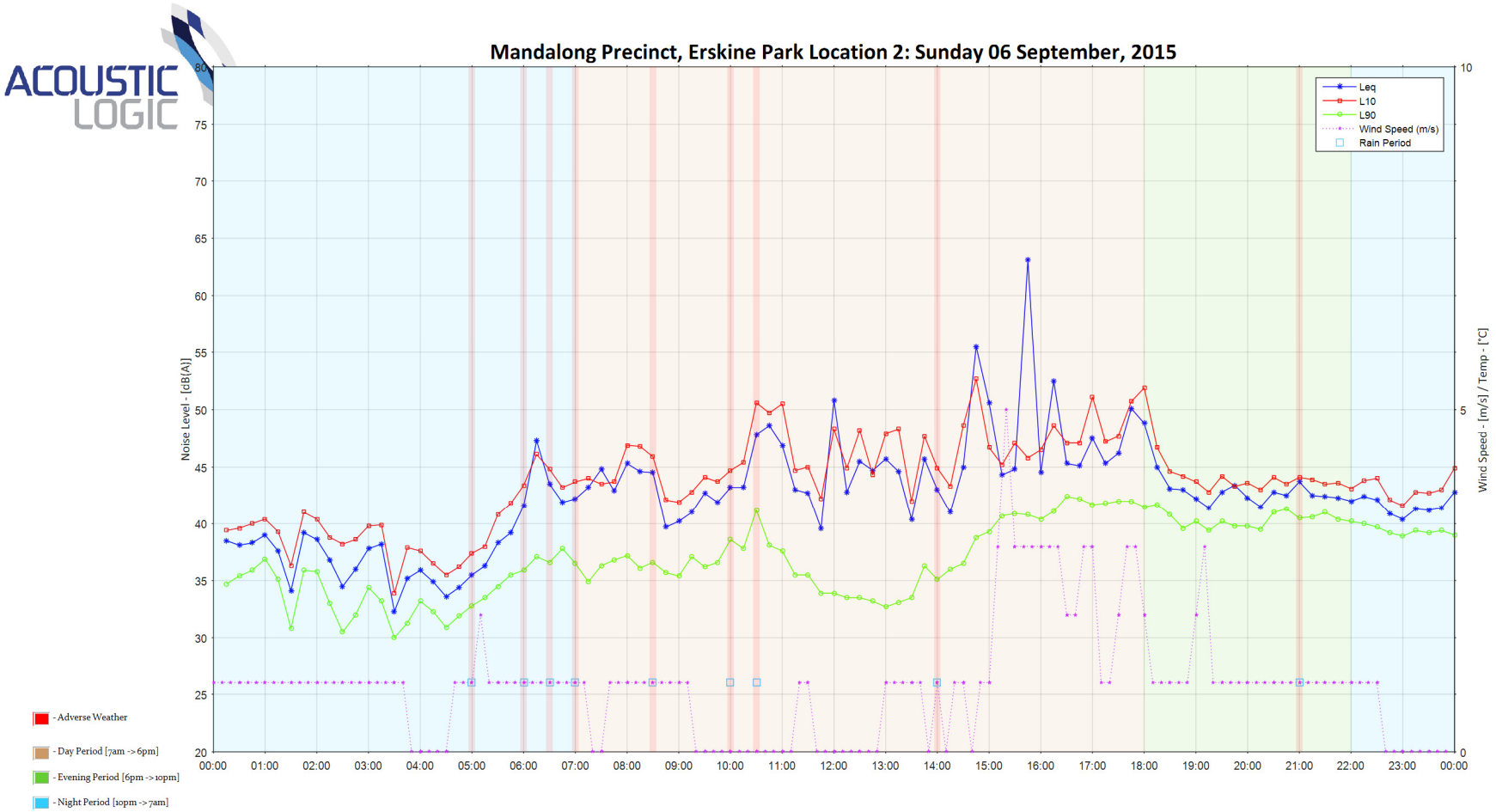
Noise Logging Data – Location 2

ACOUSTIC LOGIC

Mandalong Precinct, Erskine Park Location 2: Friday 04 September, 2015




Mandalong Precinct, Erskine Park Location 2: Saturday 05 September, 2015
Noise Level - [dB(A)]
Wind Speed - [m/s] / Temp - [°C]
Leq
L10
L90
Wind Speed (m/s)
Rain Period
- Adverse Weather
- Day Period [7am -> 6pm]
- Evening Period [6pm -> 10pm]
- Night Period [10pm -> 7am]


Mandalong Precinct, Erskine Park Location 2: Sunday 06 September, 2015
Noise Level - [dB(A)]
Wind Speed - [m/s] / Temp - [°C]
Leq
L10
L90
Wind Speed (m/s)
Rain Period
- Adverse Weather
- Day Period [7am -> 6pm]
- Evening Period [6pm -> 10pm]
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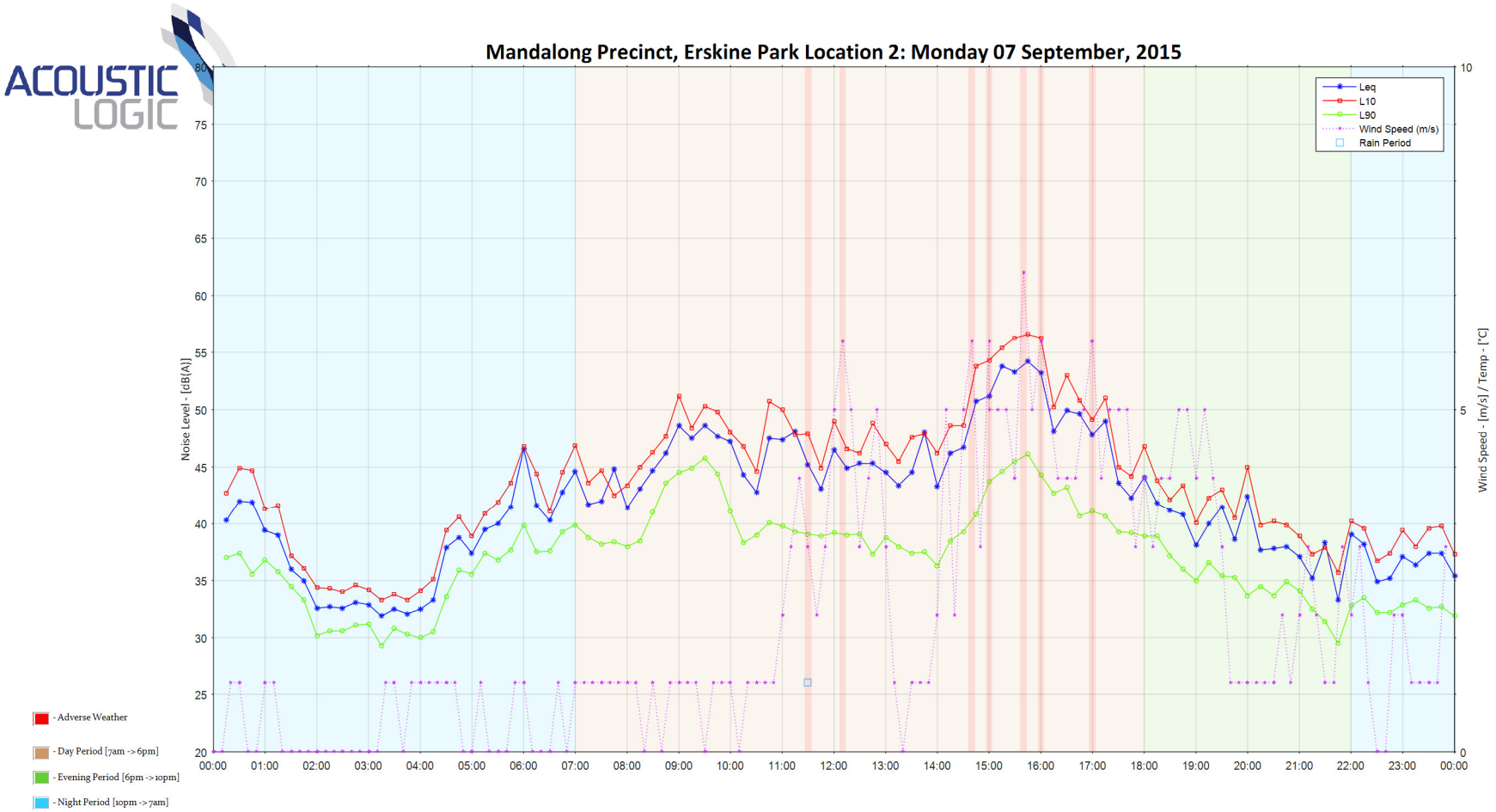
Mandalong Precinct, Erskine Park Location 2: Monday 07 September, 2015
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Leq
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Wind Speed (m/s)
Rain Period
- Adverse Weather
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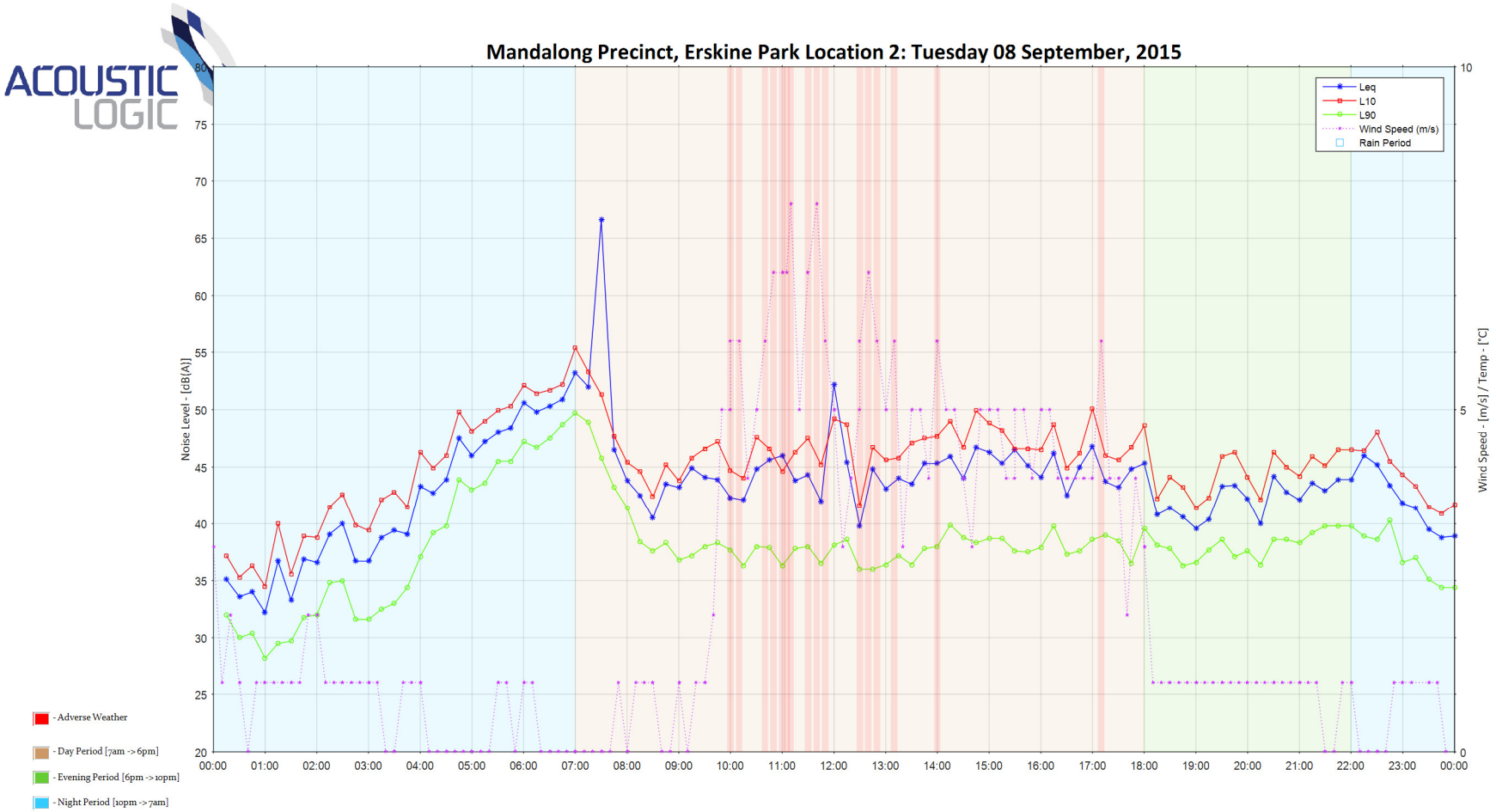
Mandalong Precinct, Erskine Park Location 2: Tuesday 08 September, 2015
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Leq
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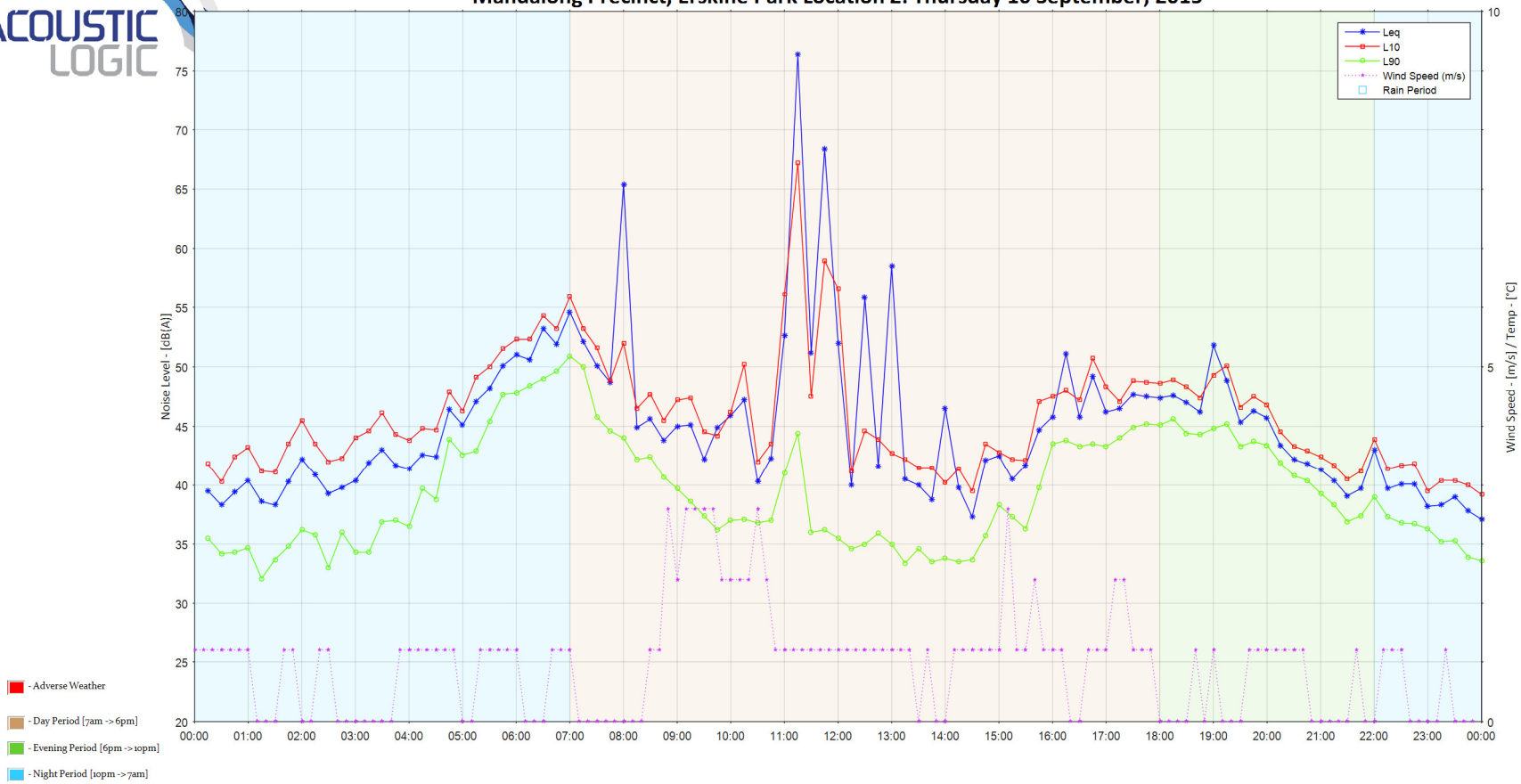
Wind Speed (m/s)
Rain Period
- Adverse Weather
- Day Period [7am -> 6pm]
- Evening Period [6pm -> 10pm]
- Night Period [10pm -> 7am]

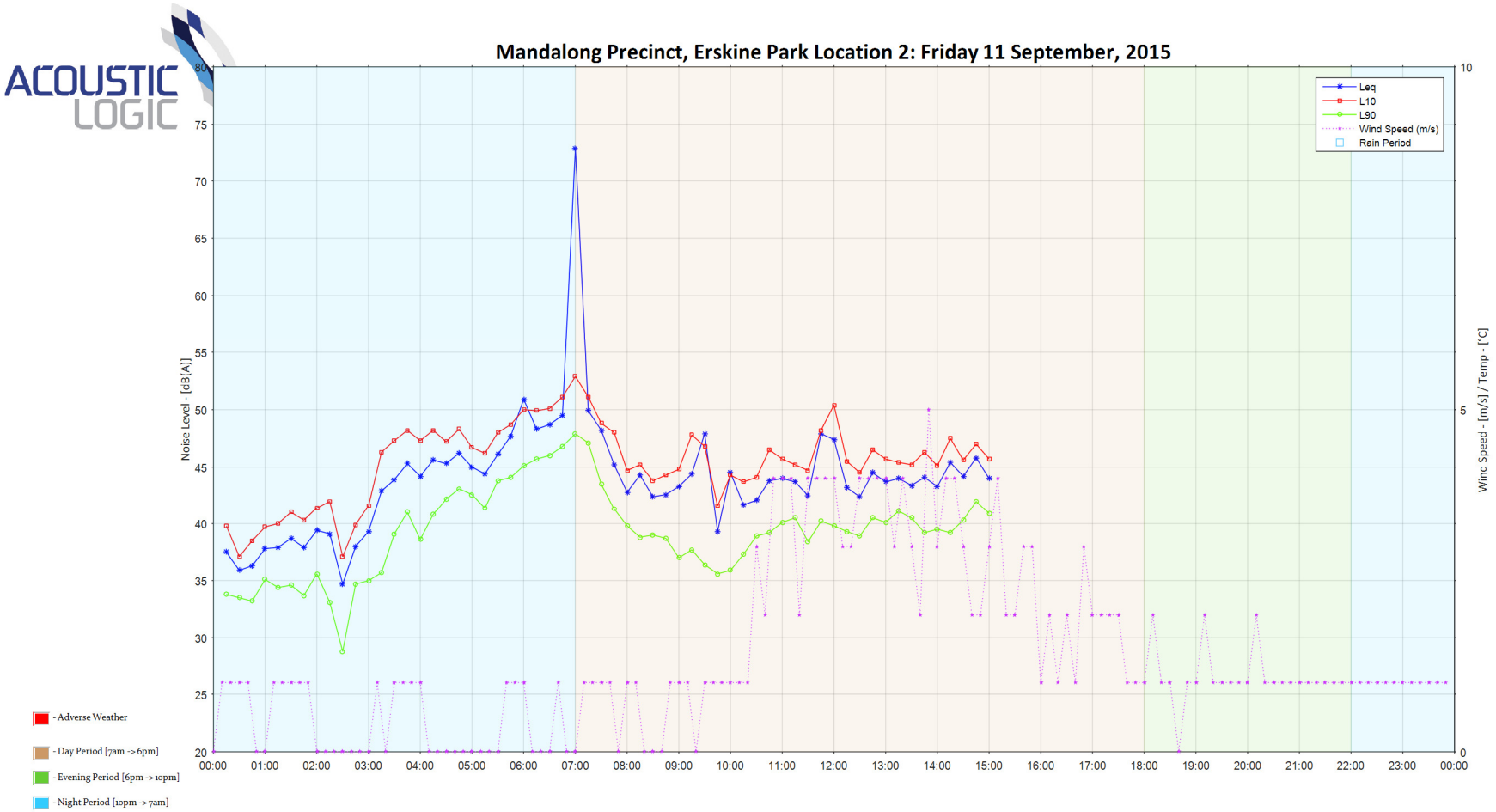
ACOUSTIC LOGIC

Mandalong Precinct, Erskine Park Location 2: Wednesday 09 September, 2015

ACOUSTIC LOGIC

Mandalong Precinct, Erskine Park Location 2: Thursday 10 September, 2015




Mandalong Precinct, Erskine Park Location 2: Friday 11 September, 2015
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Leq
L10
L90
Wind Speed (m/s)
Rain Period
- Adverse Weather
- Day Period [7am -> 6pm]
- Evening Period [6pm -> 10pm]
- Night Period [10pm -> 7am]

Appendix 3

Noise Screens

Mamre West Land Investigation Area

Stage 2
Investigation Area

Old MacDonald
Child Care

573-577 Mamre
Road

Screen potentially required
depending on use of lot

Zoning remains
as per the existing
Penrith Local
Environmental
Plan 2010

Indicative
Road
Layout

SP2

MAMRE RD

ERSKINE PARK RD

IN1

Screen Required

NSW GOVERNMENT Planning & Environment

KEY

Mamre West Land Investigation Area

DCP

IN1 General Industrial

SP2 Infrastructure

Indicative Road Layout

Stage 2 Investigation Area

January 2016

Projection: MGA Zone 56
Datum: GDA94

N

0 100 200 300
M

Draft - for Discussion Purpose

Document Path: G:\GCC\GIS\Projects\WSELA\Mamre West _ WSEA Amendment\Project\BWSEA_DCP_Draft_20160112.mxd