Business Hub, Fifteenth Ave, West Hoxton

Operational Noise Impact Assessment

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1 INTRODUCTION

Acoustic Logic Consultancy have been engaged by Western Sydney Parklands Trust to undertake an assessment of operational noise likely to be associated with the proposed Business Hub, Fifteenth Ave, West Hoxton development.

In this report, we will:

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

This report has been prepared to address Secretary's Environmental Assessment Requirements (SEAR) number 7 from the Department of Planning and Environmental dated 11 February 2013 and the operational and construction noise impact assessment as requested by the NSW EPA in their letter dated 11 March 2014.

2 SITE DESCRIPTION AND PROPOSED WORKS

The site is located north-east of the intersection of Fifteenth Avenue and Twenty-seventh Avenue, West Hoxton.

The proposed development consists of:

- A supermarket, retail/commercial shops and a loading dock along the northern boundary.
- A food outlet in the south-eastern corner of the site.
- A large format retail building along the north-eastern corner of the site.
- Retail outlets and a services station located in the centre of the site.
- A childcare facility along the western boundary of the site

The site is serviced by an on-grade car park (approx. 320 spaces).

Primary Vehicular access to/from the site is via an estate road from Fifteenth Avenue at the existing Twenty Second Avenue intersection. The food outlet and service station have separate access points.

This site is bounded as follows:

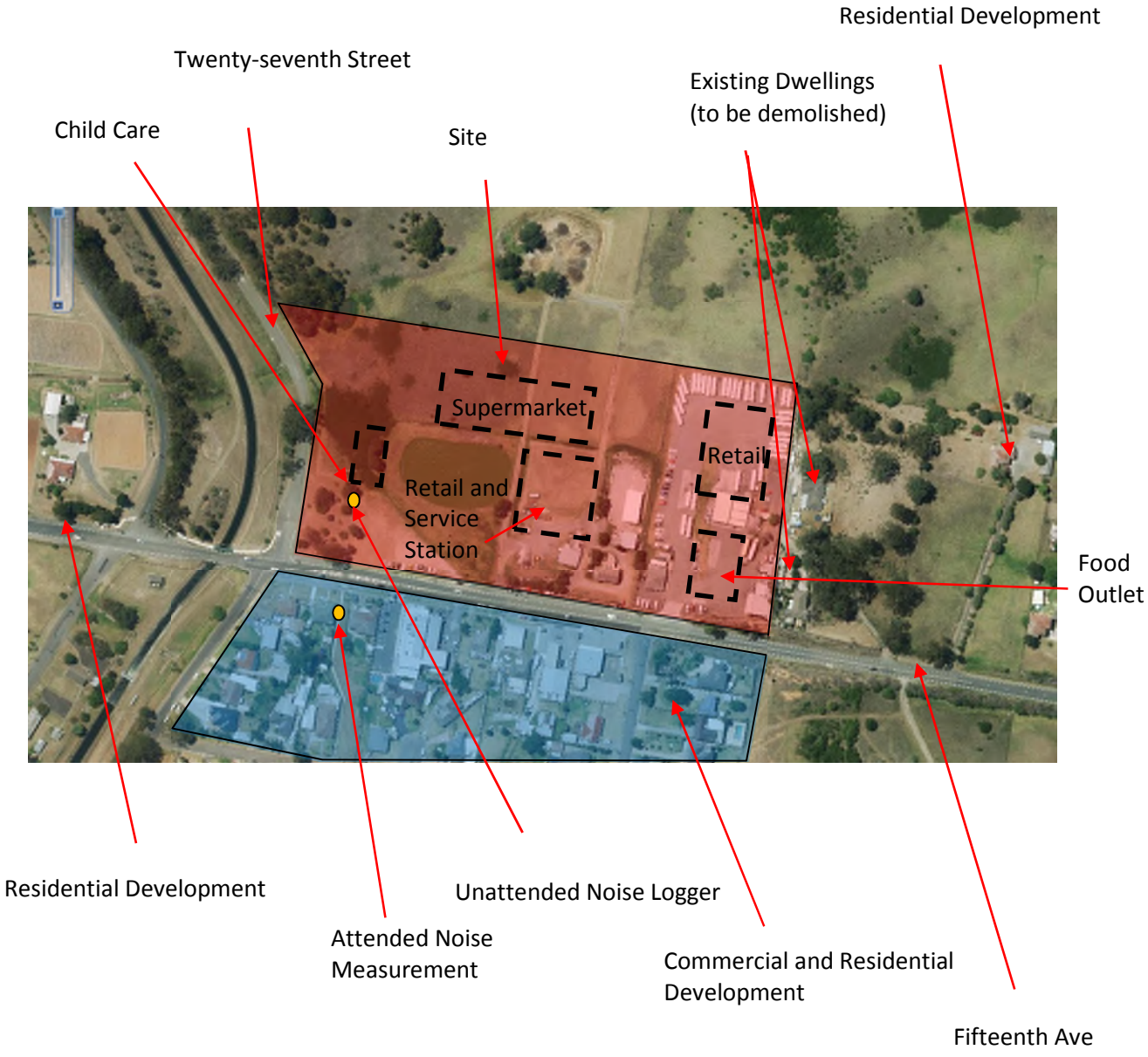
- To the north is vacant land. The nearest resident to the north is approximately 300m away.

- To the immediate south is Fifteenth Avenue, which carries moderate traffic volumes. Further on the opposite side of Fifteenth Avenue along the road is a mixture of commercial and residential development.

- To the west is Twenty-seventh Avenue, which carries low traffic volumes. The nearest resident to the west is approximately 150m away.

- To the east by residential development. We note that the residences immediately to the east are owned by the Western Sydney Parklands Trust and are proposed to be demolished as part of the development. The nearest residential dwellings after the development of the site will be approximately 120m away.

See aerial photograph below.



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 18 and 24 May 2015 using an Acoustic Research Laboratories monitor set on A-weighted fast response mode. The monitor was calibrated before and after the measurements using a Rion Type NC-73 calibrator. No significant drift was recorded.

In addition, an attended measurement was made at the property boundary of the nearest residences (on the southern side of Fifteenth Street) to ensure that the background noise levels measured by the logger are the same as what would be experienced on the other side of the road (at the residences).

All measurement locations are marked in the aerial photograph in Section 2. Measurements were made away from any building façade and so no correction for facade reflection is required.

The measured background noise levels have been corrected for meteorological conditions (excessive wind and/or rain), as required by section 3.4 of the EPA Industrial Noise Policy. Exceedances of the 5m/s average wind speed limit of the EPA were noted and corrected for in determining the background noise levels. These areas are highlighted in the logging data in Appendix 1 and 2 (Note – the site lies midway between the Bankstown Airport and Badgery's Creek weather stations. Both sets of meteorological data are presented).

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

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

Table 1 – Long Term Noise Logging Data

Location	**Time of Day**		
	Daytime (7am-6pm)	**Evening (6pm-10pm)**	**Night (10pm-7am)**
Logger approximately 40m away from Fifteenth Avenue curb	53dB(A) $L_{eq(15min)}$ 45dB(A) L_{90}	50dB(A) $L_{eq(15min)}$ 41dB(A) L_{90}	47dB(A) $L_{eq(15min)}$ 32dB(A) L_{90}

Table 2 – Attended Noise Measurement

Location	**Time of Day**
	Daytime (10am-11am)
Fifteenth Street residences.	60dB(A) $L_{eq(15min)}$ 46dB(A) L_{90}

As expected, we note:

- The background noise level measured at the residences is the same as the level measured at the logger. The logging data is therefore suitable for use to determine background noise levels at the residences near the site.

- The average (ie the L_{eq}) noise level measured at the property boundary of the residences (60dB(A)L_{eq}) is higher than that measured by the logger as the logger was placed further from the road.

5 NOISE EMISSION CRITERIA

SEAR 7 requires that noise and vibration from construction and operation of the site be assessed, and measures outlined to mitigate potential noise and vibration impacts.

Similarly, the acoustic issues raised by the NSW EPA in their letter to NSW Department of Planning & Environment dated 11 March 2015 require assessment of operational and construction noise.

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

- Liverpool Council DCP 2008
- EPA Industrial Noise Policy
- 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.
- Child Care Centre noise emission guidelines recommended by the Association of Australian Acoustical Consultants.

5.1 LIVERPOOL COUNCIL

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

5.2 EPA INDUSTRIAL NOISE POLICY

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

5.2.1 INP - Intrusiveness Assessment

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

Table 3 - EPA Intrusiveness Criteria

Location	Time of Day	Background noise Level - dB(A)L_{90}	Intrusiveness Noise Objective dB(A)$L_{eq(15min)}$ (Background + 5dB)
All Potentially Affected Residential Properties	Day Time (7am - 6pm)	45	50
	Evening (6pm - 10pm)	41	46
	Night (10pm - 7am)	32	37

5.2.2 INP - Amenity Assessment

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

Amenity criteria are as follows:

Table 4 -EPA Amenity Criteria

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

5.3 SLEEP AROUSAL ASSESSMENT

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

Short duration, intermittent noise events (such as cars driving into the car park, doors closing) 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 5 – Sleep Arousal (Emergence Criteria)

Location	Background Noise Level (10pm-7am) dB(A)$_{L90}$	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 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

We note that it is anticipated that the site will rely primarily on passing trade on Fifteenth Avenue, and as such is not expected to create significant amounts of additional traffic.

None the less, as the site will potentially generate some additional traffic, an acoustic assessment of this traffic was be conducted.

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

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

Table 6 - Criteria for Traffic Noise Generated by New Developments

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

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

5.5 NOISE EMISSION OBJECTIVES – CHILD CARE CENTRE NOISE

There are no specific noise emission requirements for child care centre set out in the Liverpool DCP. In the absence of this the acoustic criteria adopted by the Association of Australian Acoustical Consultants will be adopted.

The Association of Australian Acoustical Consultants adopts a "background+10dB(A)" noise emission goal for the use of outdoor spaces of child care centres.

This more lenient goal is in recognition that:

- Noise from children playing is not typically considered as intrusive as industrial noise (or other noise sources typically required to comply with a "background+5dB(A)" criteria), and should therefore not be held to the same criteria;

- There are very limited building controls that can practically be implemented for control of noise from outdoor areas; and

- The outdoor play areas are used only for limited periods of the day, at times when nearby properties are typically less noise sensitive.

The AAAC guidelines recommend a "background +10dB(A)" criteria for periods of 2 hours per day, and "background+5dB(A)" for other periods, or other noise sources at the site (vehicle, plant noise, noise from internal areas).

These criterion have also been adopted by the Land and Environment Court in a number of decisions, including *Mesabo Pty Limited v Mosman Municipal Council* [2004] NSWLEC 492.

Therefore, for this assessment, we propose that:

- Outdoor play areas be permitted to generate a noise level of 10dB(A)L_{eq} above the background noise level for up to 2 hours per day.

- All other noise sources must not generate a noise level exceeding background levels by more than 5dB(A)L_{eq}.

A summary is presented below:

Table 7 - Noise Emission Objectives (Child Care Centre)

Noise Source	Time of day	Background Level dB(A)L_{90}	Noise Emission Objective	
			2 hours per day dB(A)$L_{eq\ (15min)}$	Outside of 2 hour period dB(A)$L_{eq\ (15min)}$
Outdoor Play	7am-6pm	**45**	**55**	**50**
Mechanical Equipment, Indoor Play Areas	7am-6pm	**45**	**50**	**50**

5.6 CONSTRUCTION NOISE AND VIBRATION IMPACTS

5.6.1 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 residential properties, 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 residential properties, 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	55 (Standard Construction Hours)	75
Commercial	70	N/A

5.6.2 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			
Residences	Daytime	0.28	0.56
Commercial	When in use	0.56	1.12
Impulsive Vibration			
Residences	Daytime	8.6	17
Commercial	When in use	18	36

6 NOISE EMISSION ASSESSMENT

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

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

6.1 CAR PARK NOISE (CARS ENTERING/LEAVING THE SITE AND CIRCULATING ON THE SITE)

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

Noise emission predictions are made based on the assumption that in any given 15 minute peak period:

- There are (during a typical peak period) up to 20 cars circulating within the car at any one time, and up to 30 entry or exit movements (a conservatively high assumptions given the size of the car park).
- Cars have an assumed sound power of 82dB(A) per car when driving on the site (5-10km/h).

Operational noise levels are predicted at the nearest residences (to the south of the site, on the far side of Fifteenth Street).

Table 10 – Vehicle Noise Impact Assessment

Noise Source	Noise Receiver Location	Predicted Noise Level – dB(A)$L_{eq(15min}$	Compliance
Vehicles manoeuvring, driving to/from site	Fifteenth Ave residences	45dB(A)$L_{eq(15min)}$	Complies – Day time and evening goals (50dB()A and 45dB(A) respectively)

Noise emissions from the car park are compliant with Industrial Noise Policy requirements.

6.2 LOADING DOCKS

The loading docks are proposed to be located as follows:

- A loading dock serving the supermarket is proposed to be located towards the northern boundary of the site (the Northern Loading Dock).

- A loading dock serving the large format retail is proposed to be located towards the eastern boundary of the site (the Eastern Loading Dock).

Noise associated with the use of the loading docks will consist of:

- Trucks moving into or out of the loading dock (semi-trailer to have an assumed sound power of 100-105dB(A)L_{eq}). .

- Materials Handling/pallet jacks (with a sound power of 90dB(A)).

- Use of Forklifts, with an assumed sound power of 94dB(A)L_{eq}.

Operational noise levels are predicted and assessed against the INP criteria detailed in section 5.2. Noise from both manual handling in the loading dock, and the noise created by the truck as it enters/leaves the site are assessed.

Operational noise levels are predicted at the nearest residences (to the south of the site.

Table 11 – Loading Dock Noise Impact Assessment

Noise Source	Noise Receiver Location	Predicted Noise Level – dB(A)$L_{eq(15min}$	Compliance
Truck – driving to Northern Loading Dock.	Fifteenth Ave residences	43dB(A)$L_{eq(15min)}$	Complies – Day time and evening goals (50dB()A and 45dB(A) respectively)
Truck – driving to Northern Loading Dock and manual handling noise.	Residences to the North	<35dB(A)$L_{eq(15min)}$	Complies – Day time and evening goals (50dB()A and 45dB(A) respectively)
Truck – driving to Eastern Loading Dock and manual handling noise.	Residences to the North	42dB(A)$L_{eq(15min)}$	Complies – Day time and evening goals (50dB()A and 45dB(A) respectively)
Forklift – Northern Loading Dock	Residences to the North	38dB(A)$L_{eq(15min)}$	Complies – Day time and evening goals (50dB()A and 45dB(A) respectively)
Forklift – Eastern Dock	Residences to the East	41dB(A)$L_{eq(15min)}$	Complies – Day time and evening goals (50dB()A and 45dB(A) respectively)
Forklift – Central Loading Dock	Residences to the South	43dB(A)$L_{eq(15min)}$	Complies – Day time and evening goals (50dB()A and 45dB(A) respectively)

Noise emissions from the loading docks are compliant with Industrial Noise Policy requirements.

6.3 NOISE GENERATED BY ADDITIONAL TRAFFIC ON PUBLIC ROADS

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

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

- An assumed sound power level of a car driving on a public road (at 40-50km/h) of 94dB(A).
- That there are in a peak one hour period up to 443 vehicle movements attributed to the site (refer to page 11 of the *Assessment of Potential Access, Traffic and Transport Implications* report dated June 2015 by Transport and Traffic Planning Associates. .

Noise emissions are predicted at the building facade of the residences on Fifteenth Ave and compared against the acoustic criteria set out in section 5.4.

Predicted noise levels are as follows:

Table 12 – Noise Generated by Additional Road Traffic – Noise Impact Assessment

Time of Day	Receiver Location	Predicted Noise Level – dB(A)L_{eq}	Compliance
Daytime (7am-10pm)	Fifteenth Ave residences	<59dB(A)$L_{eq(Day)}$*	Complies with 60dB(A)$L_{eq(15hr)}$ criteria.

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

Noise as a result of additional traffic generation is compliant with the EPA Road Noise Policy.

6.4 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 therefore be vehicle noise.

With respect to noise from cars:

- As parking spaces are located away from the site boundaries, the worst case noise generation event will occur as the car leaves the site on the Fifteenth Ave driveway.
- The transient noise assessment will be assessed is based on the following assumptions:
    - Noise from the car engine as it leaves the site is 84dB(A) sound power.
    - Noise from the semi-trailer engine as it leaves the site is 100dB(A) sound power.
    - The loudest typical peak noise event from the use of the car park will be from a car door closing or a car starting, both with an approximate sound power level of approximately 95dB(A)$L_{1(1min)}$.

Noise emissions are assessed against EPA Sleep Disturbance guidelines, as presented below.

Table 13 – Sleep Arousal Assessment

Receiver Location	Noise Source	Predicted Noise Level	Emergence Test Level	Compliance
Window of Residential Properties on Fifteenth Ave	Car Engine at Fifteenth Ave Driveway	42dB(A)$L_{1(1min)}$	47dB(A)$L_{1(1min)}$	Complies
Window of Residential Properties on Fifteenth Ave	Car Door Close/Car Start	52dB(A)$L_{1(1min)}$	47dB(A)$L_{1(1min)}$	Exceeds BG+15 test
Window of Residential Properties on Fifteenth Ave	Truck Engine at Fifteenth Ave Driveway	60dB(A)$L_{1(1min)}$	47dB(A)$L_{1(1min)}$	Exceeds BG+15 test

Noise emissions as from a car door slam at the southern most parking space is predicted to be more than 15dB(A) above the background noise level. A more detailed analysis of the probability of sleep disturbance is therefore warranted, as discussed below.

- Although the external noise level of 52dB(A)L_1 exceeds the "background+15dB(A)" emergence test, EPA Sleep disturbance guidelines allow for a second stage of the sleep disturbance test to be undertaken, in which the actual noise level in the bedroom/living room is analysed.

- In this case, assuming that the bedroom/living room window is left *open*, the noise level within the residence during door slam noise event is predicted to be 42dB(A)$_{L1}$ for a car and 50dB(A)L_1 for a truck (semi-trailer).

- In this regard we note that the EPA Road Noise Policy states that "*maximum internal noise levels below 50-55dB(A) are unlikely to awaken people from sleep".* The predicted noise level is well below this 50-55dB(A) target for the noise level inside the residence.

On this basis, use of the car park and vehicle movements to and from the site after 10pm is capable of being complaint with EPA sleep disturbance guidelines.

6.5 CHILD CARE CENTRE

Noise associated with the use of the child care centre is assessed below. With respect to this noise source, it will be noise from the use of the outdoor play area which will be critical.

Noise emission predictions have been based on the following assumptions:

- Typical noise level created by a child at play is 78dB(A)L_{eq} with one in two children creating noise at any one time. This level has been determined based on measurements in similar child care centres.
- There are up to 50 children assumed to be playing at any one time.

Predicted noise levels are presented below.

Table 14 – Traffic Noise Impacts From Child Care Centre Outdoor Play

Noise Source	Receiver Location	Predicted Level	Noise Emission Objectives	Comment
Outdoor Play Area	Residences to the West of the Play Area	<40dB(A)$L_{eq(15min)}$	55dB(A) – Daytime ("Background+10" assessment)	Complies with daytime criteria.
Outdoor Play Area	Residences to the South of the Play Area (Fifteenth Street)	47dB(A)$L_{eq(15min)}$	55dB(A) – Daytime ("Background+10" assessment)	Complies with daytime criteria.

Noise emissions for a child care centre are capable of meeting typically adopted noise emission requirements.

6.6 MECHANICAL PLANT

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

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

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

6.7 CONSTRUCTION IMPACTS

6.7.1 Construction Noise

With respect to general construction noise, the impacts 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 southern and eastern 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.

However, based on Initial analysis:

- Excavation/soil retention phase/civil works:

  Primary noise emissions occur during excavation (soil). We note that piling is not liekly to be required. Equipment items will typically have sound power levels of approximately 110-115dB(A)$L_{eq(15min)}$. Predicted noise levels at nearby development are:

  - Up to 57dB(A)L_{eq}, for the residences to the east. A marginal exceedances of EPA "Noise Effected" target levels (see table 8) may intermittently occur when working near the eastern boundary. Excavation in rock is likely to be up to 62dB(A)L_{eq}.

  - Up to 63dB(A), for the residences to the south. Exceedances of EPA "Noise Effected" target levels (see table 8) are likely to intermittently occur when working near the southern boundary. Excavation in rock is likely to be up to 68dB(A)L_{eq}.

- During erection of structure, it is the use of hand tools (angle grinders etc) and concrete pumps which are the loudest typical activity (sound power levels of approximately 105dB(A)$L_{eq(15min)}$). This will generally result in noise levels complying with the Noise Effected goal.

- Once construction of the building shell is complete, noise from hand tools will be relatively low, as the new building façade will provide considerable noise attenuation. Once the building shell is largely complete, use of hand tools in internal areas is unlikely to exceed EPA recommended levels. Vehicle noise and crane noise will create the greatest possibility of noise disturbance during this phase.

In short, noise levels are generally expected to comply with the ICNG Noise Effected noise level (ie – a "Background+10dB(A)" noise goal. Intermittent exceedances will potentially occur during civil/excavation works on the southern property boundary, and to a lesser extent, on the eastern property boundary. However, we note:

- Construction noise is not predicted to exceed the "Highly Noise Effected" level of 75dB(A). Care should be taken in equipment selection, however the use of respite periods and time restrictions would not typically be warranted. (ICNG recommend respite periods once the "Highly Noise Effected" level of 75dB(A) is reached).

- Where exceeedances are predicted on Fifteenth Ave, we note that the predicted noise level of up to 63dB(A) is similar to the existing noise level generated at these residences as a result of road traffic noise.

In light of the above, we recommend:

- On completion of a construction program, 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.

6.7.2 Construction Vibration

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

Given the distance between the site and the nearest residential buildings, 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.

However, as a precaution, if bulk excavation in rock or driven/vibrated piles are proposed, we recommend:

- Where practicable, excavation in rock should be done using rippers/ rock saws as opposed to pneumatic hammers.

- In the event of complaint, an attended measurement of construction vibration should be undertaken, and if excessive vibration levels are measured, reselection of equipment or the introduction of a vibration monitoring system should be introduced. Any vibration monitoring system should allow for rapid feedback to the contractor (for example, SMS notification) in the event that excessive levels are reached.

7 RECOMMENDATIONS

Analysis indicates that the site is capable of meeting EPA noise emission guidelines. In addition, we note that a development application is anticipated to be required for any proposed individual building on the site.

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

- In the event that any building (food, retail outlet or the service station) is proposed to be used before 7am or after 10pm, an acoustic report should be included in any development application for use of the tenancy. The acoustic report should address, at a minimum, the acoustic impact associated with late night truck movements and (if relevant) use of any drive-through food service if located near the site boundary.

- Loading docks (including waste removal) not to be used before 7am or after 10pm.

- Detailed acoustic review of all external plant items should be undertaken following equipment selection and duct layout design.

- Following a development of a construction program for the site (when equipment selections and activity duration is known) a detailed assessment of construction noise is to be undertaken to determine whether any further management of construction activities is warranted in order to mitigate acoustic impacts to nearby residences.

8 CONCLUSION

Operational and construction noise emissions associated with the proposed Fifteenth Avenue Business Hub development at Fifteenth Ave, West Hoxton have been assessed with reference to relevant EPA and Liverpool Council acoustic guidelines, as required SEAR 7 from the Department of Planning & Environment and the submission from the NSW EPA.

An analysis of typical operational noise (vehicle, loading dock, equipment, child care centre) indicates that the site is capable of complying with relevant noise emission criteria. Acoustic treatments for control of vehicle noise has been presented in Section 7 of this report.

At construction certificate stage, detailed acoustic review of mechanical plant should be undertaken once design is further progressed (plant selections finalised etc). In-principal review indicates that acoustic treatment to major external plant items is likely to be required (screens, in-duct attenuation and enclosures) however through appropriate treatment, noise emissions are capable of complying with EPA Industrial Noise Policy and Warringah Council requirements.

Similarly, detailed noise management practices should be implemented for the control of construction noise. This should also be determined at Construction Certificate stage. In principal acoustic review indicates that earthworks, piling and (to a lesser degree) erection of structure all have the potential to exceed EPA Interim Construction Noise Policy “Noise Effected” level, particularly when working in areas near the southern property boundaries. Noise mitigation through work scheduling and equipment selection should be considered. This should be implemented via a Noise/Vibration Management Plan, which should be determined once a construction program is complete.

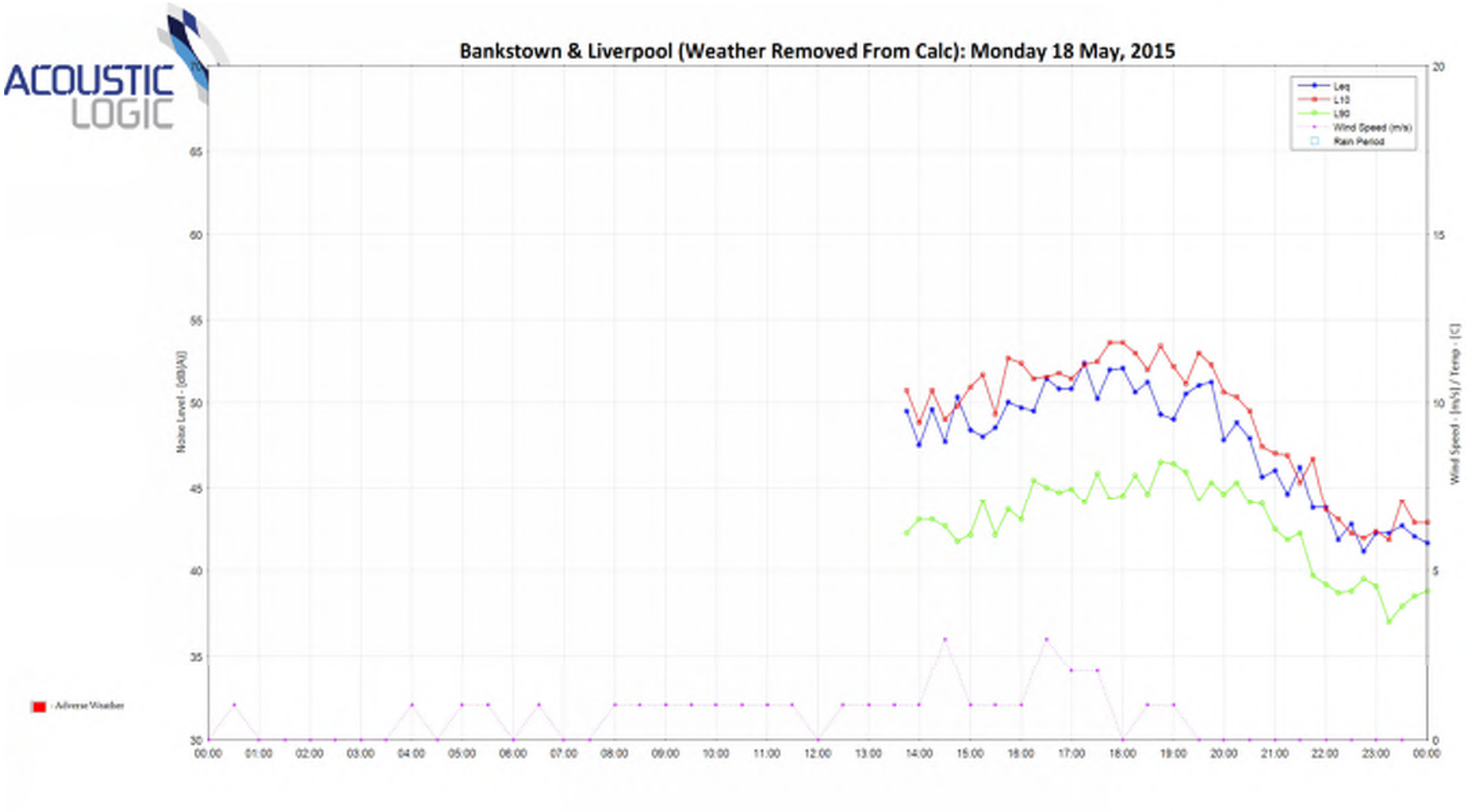
Please contact us if you have any queries.

Yours faithfully,

Acoustic Logic Consultancy Pty Ltd
Thomas Taylor

Appendix 1

Noise Logging Data
(marked up with Bankstown Airport weather data)


Bankstown & Liverpool (Weather Removed From Calc): Monday 18 May, 2015
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Wind Speed (m/s)
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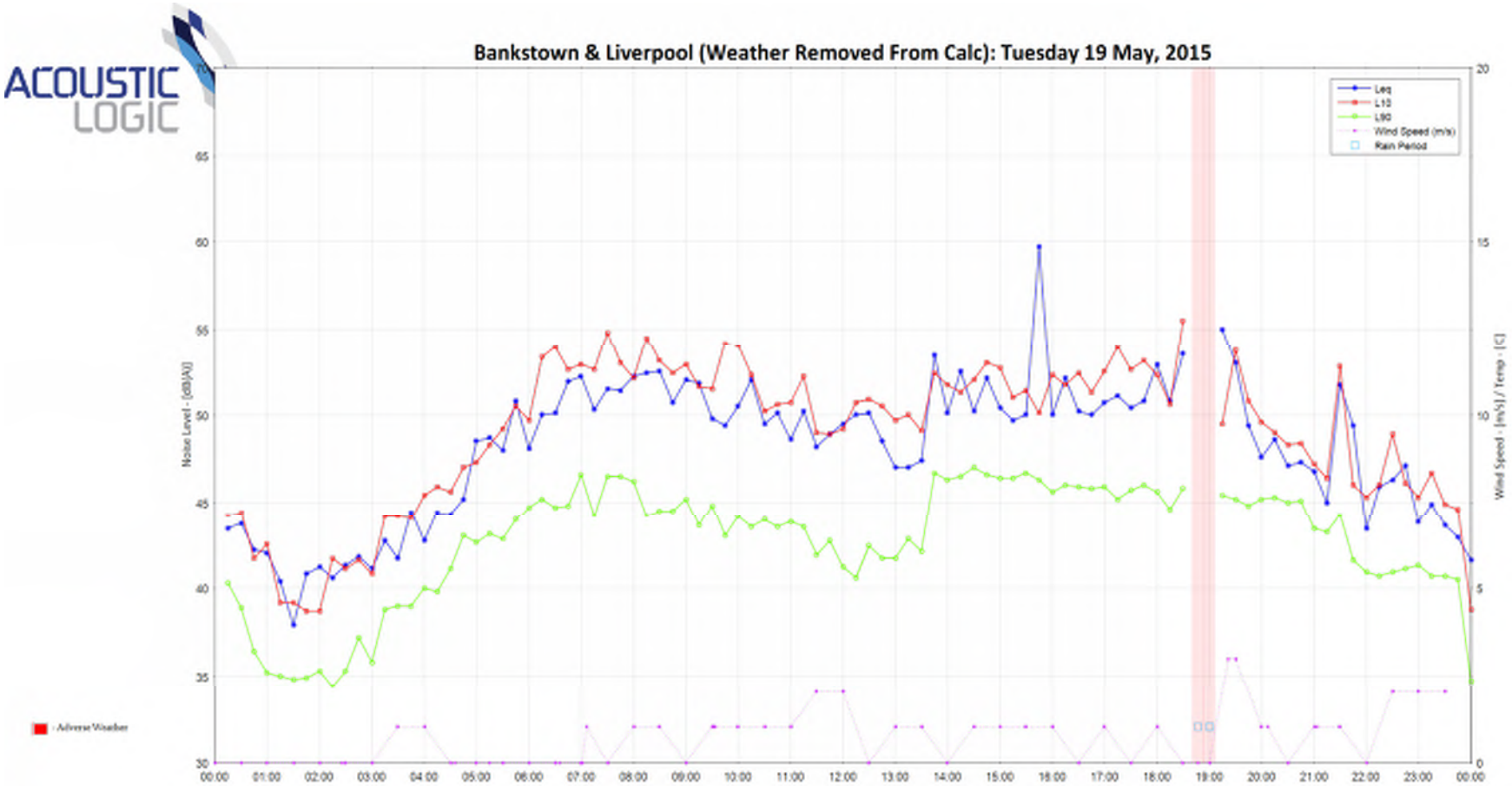
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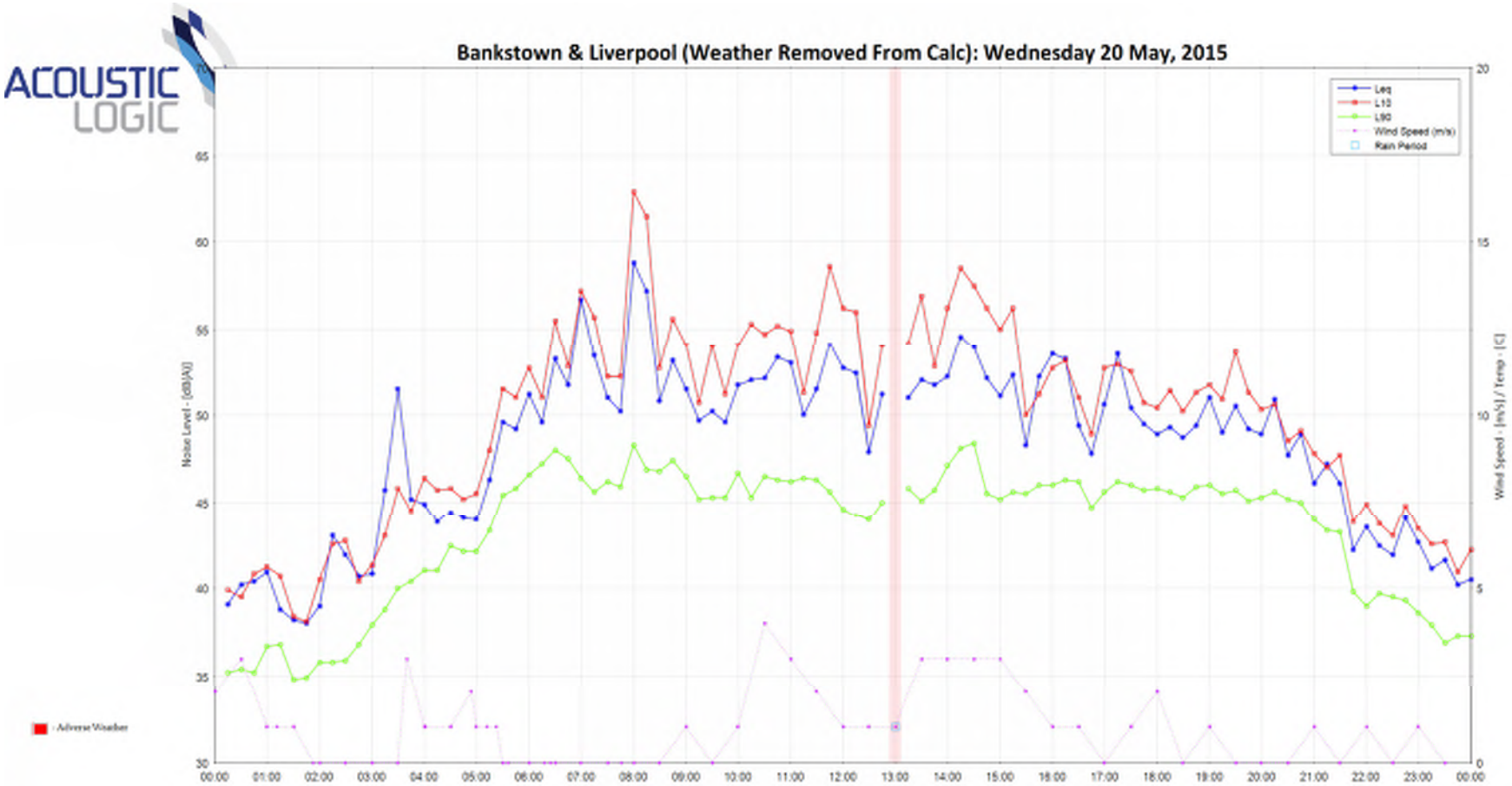
Bankstown & Liverpool (Weather Removed From Calc): Wednesday 20 May, 2015
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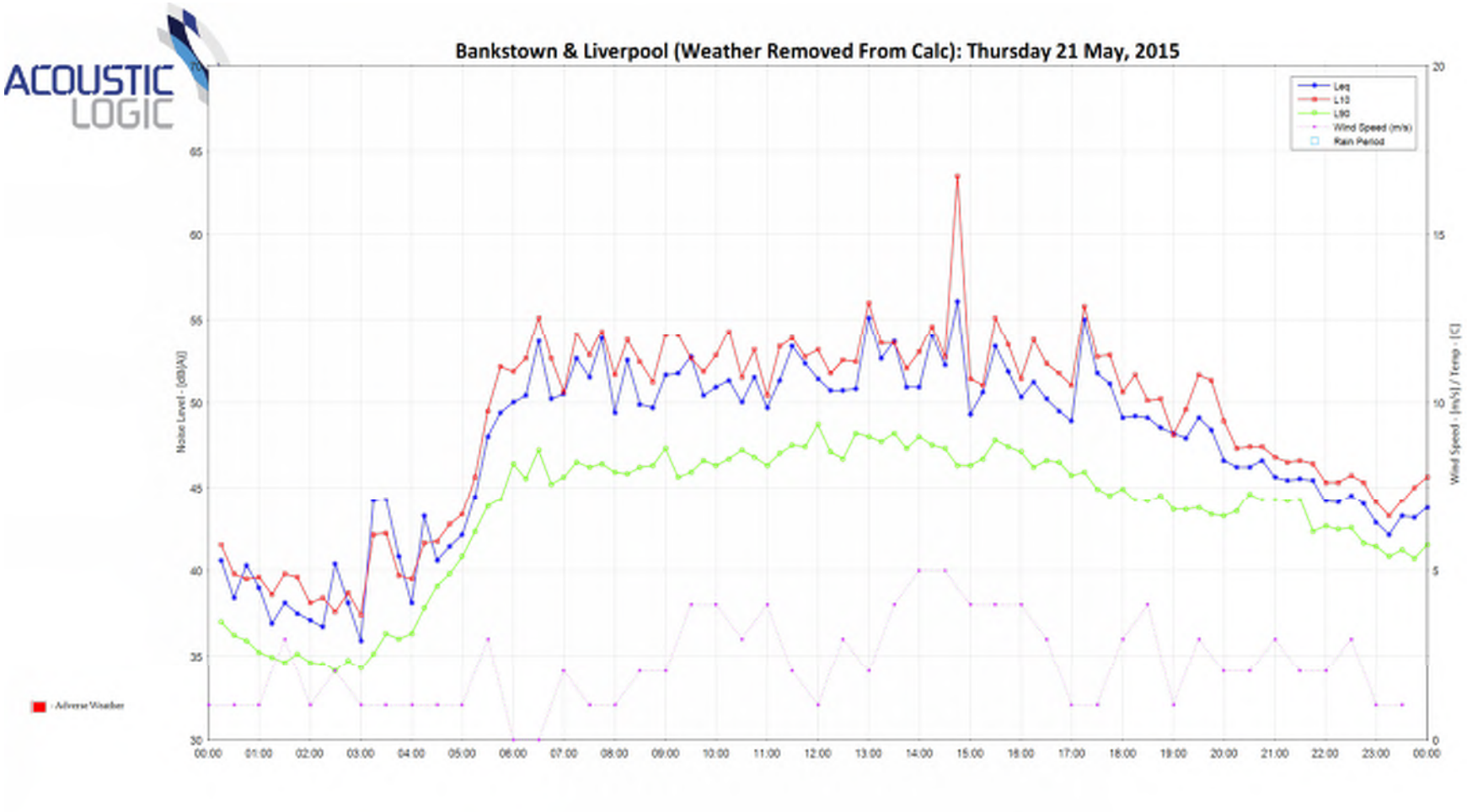
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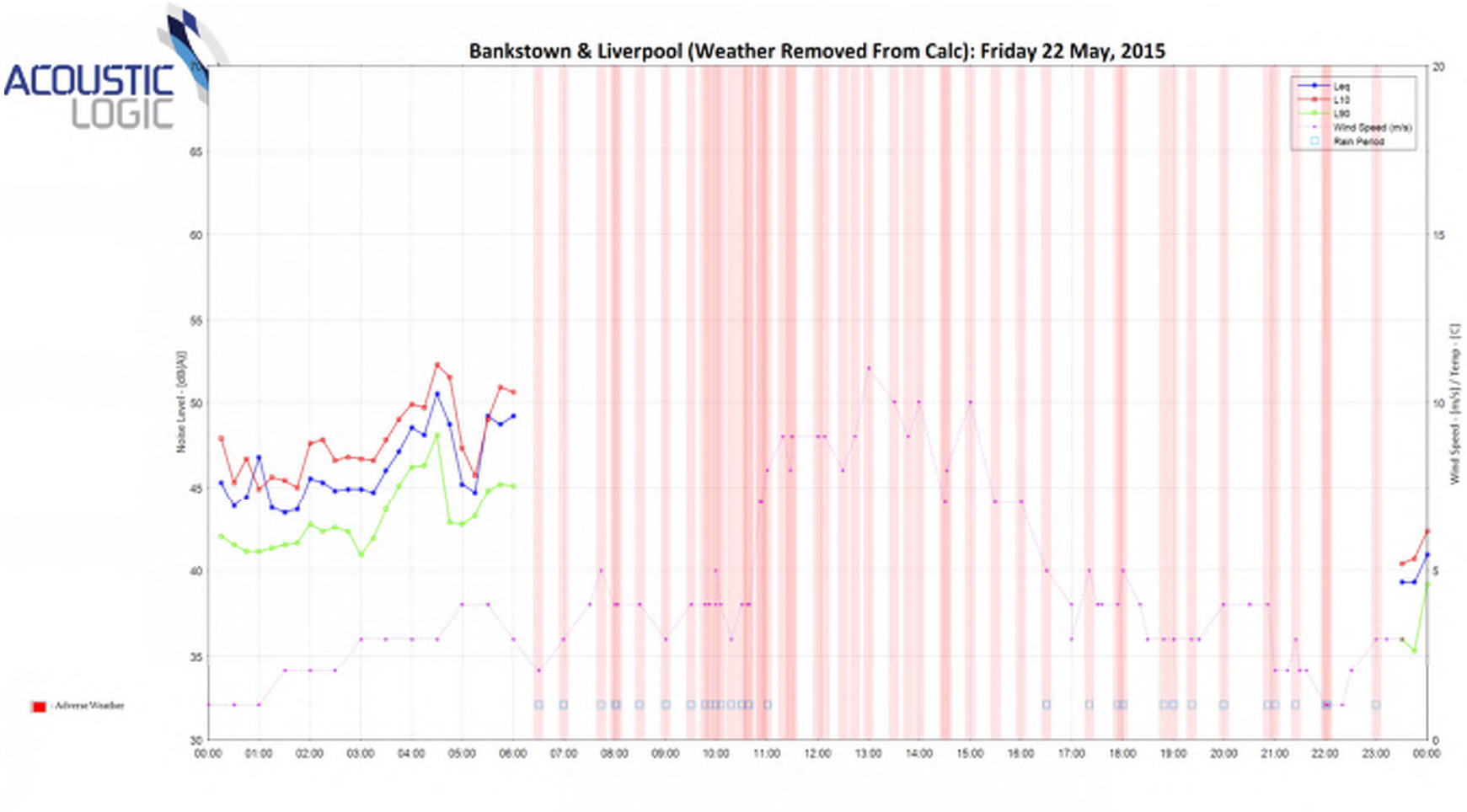
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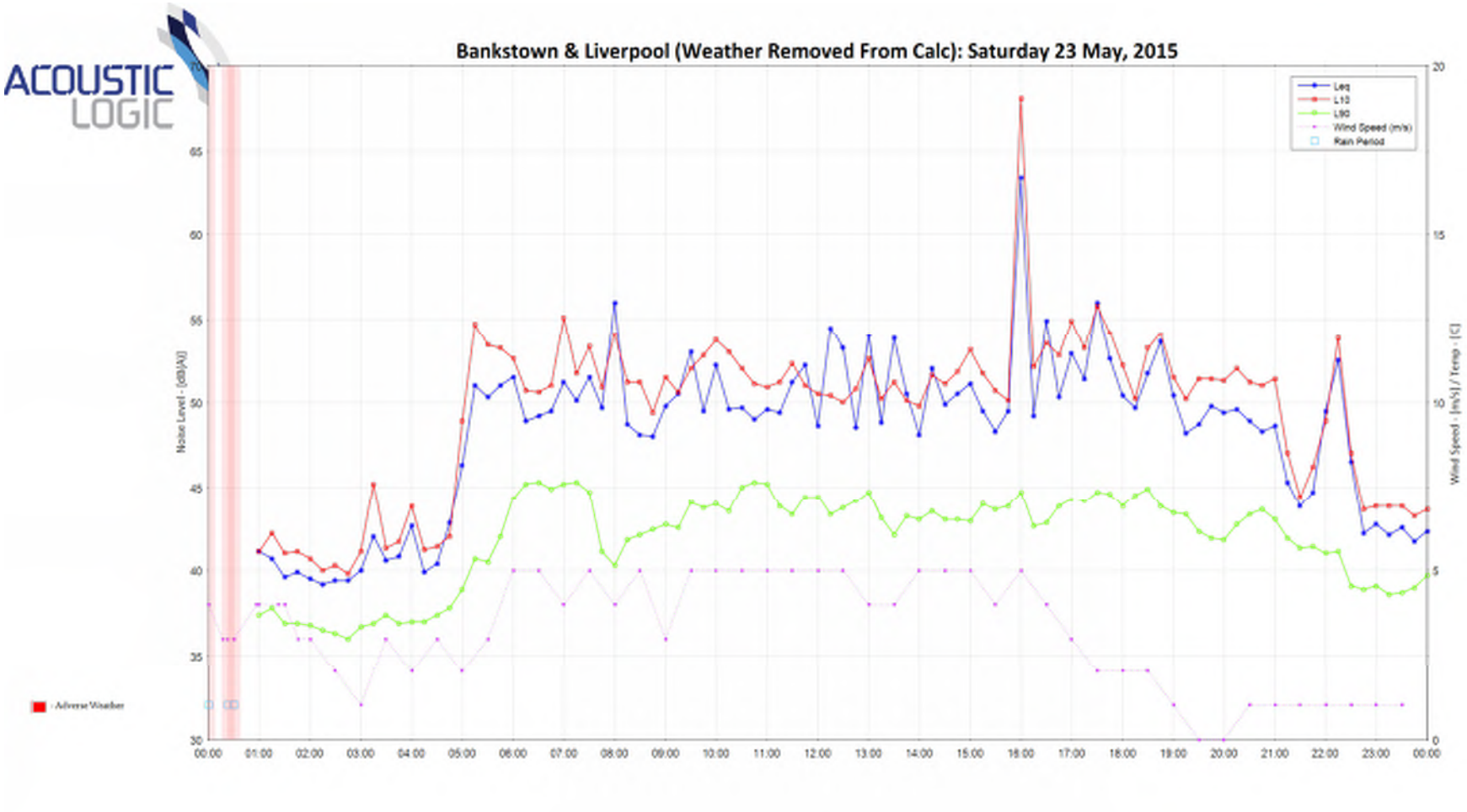
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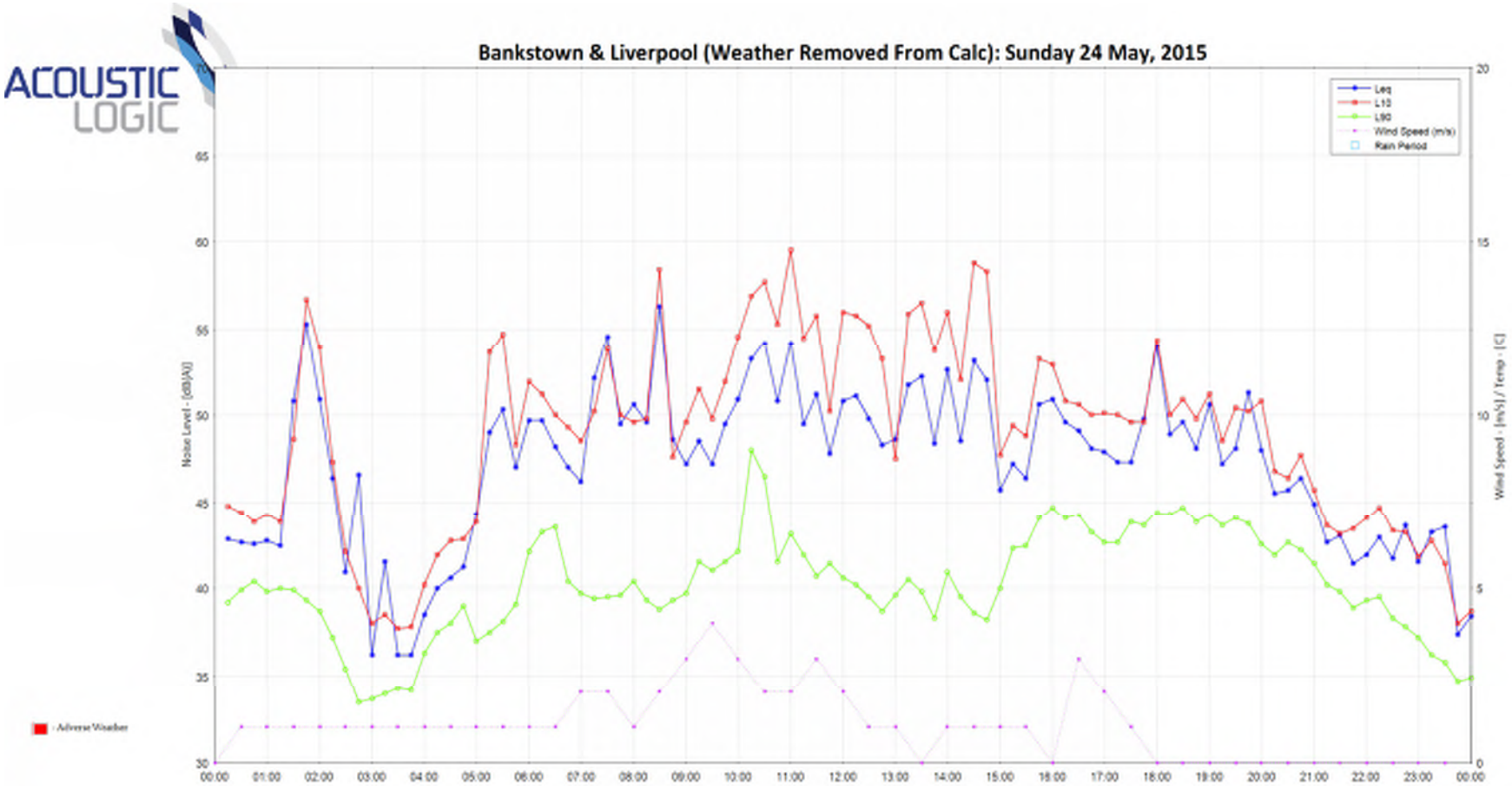
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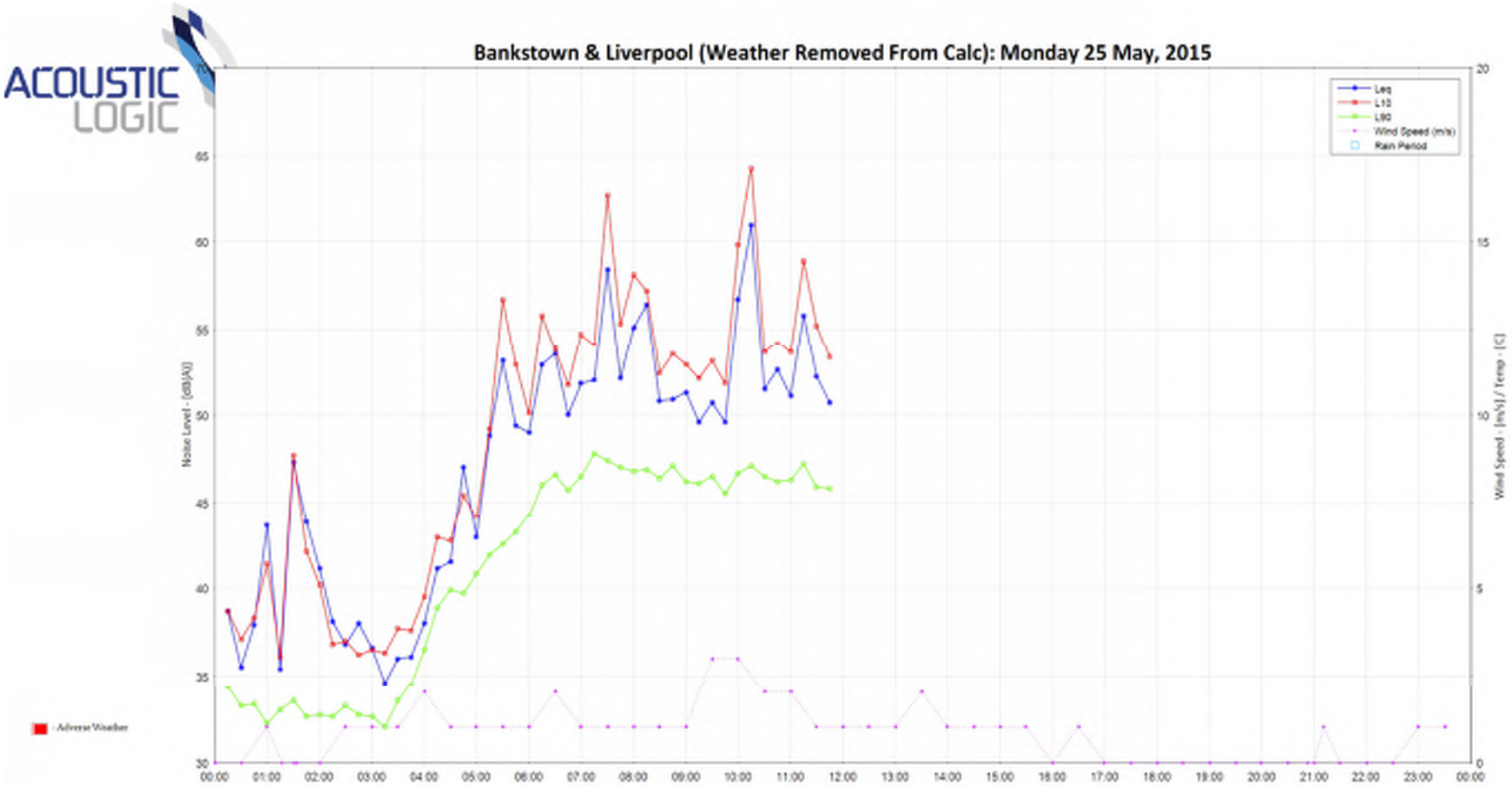
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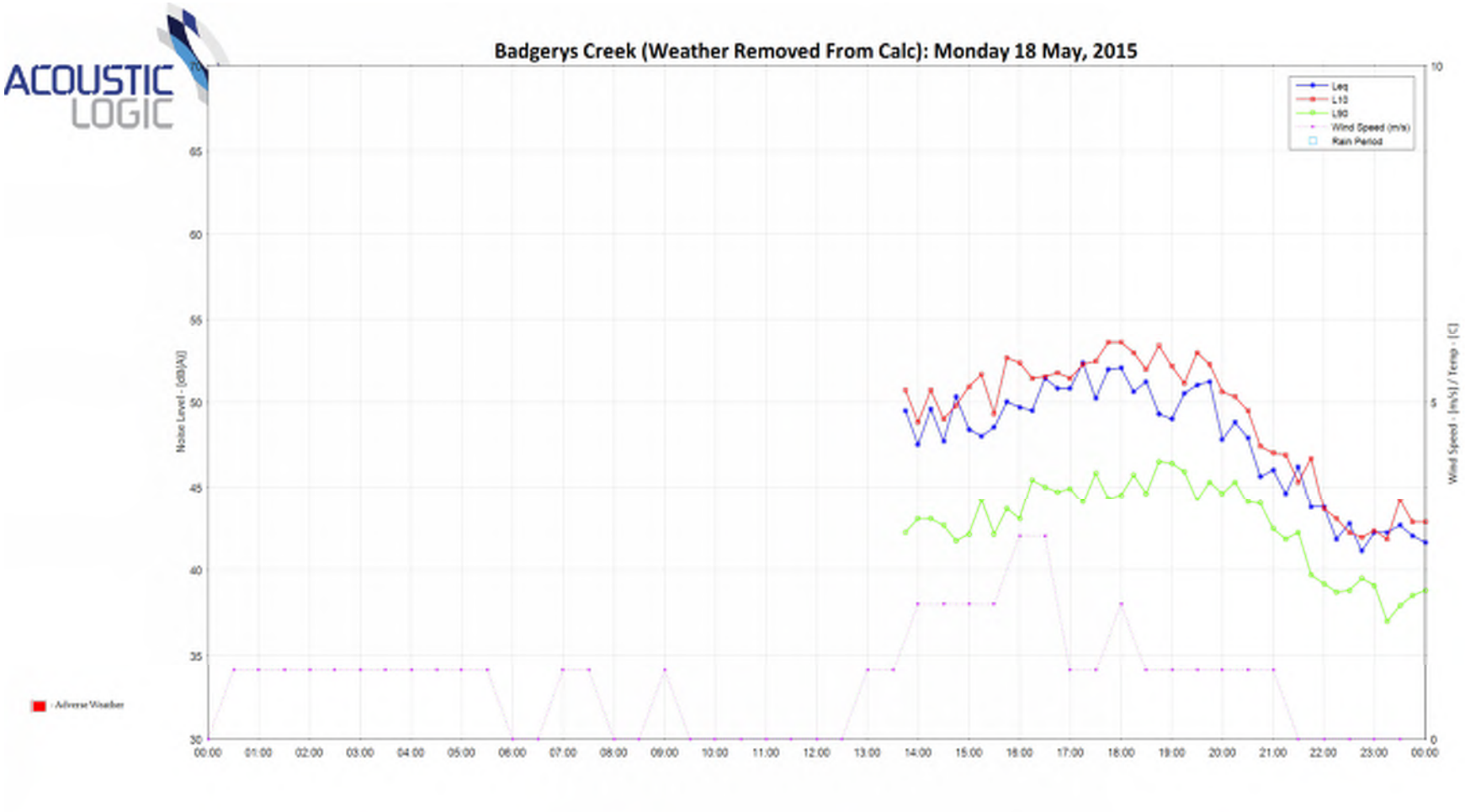
Appendix 2

Noise Logging Data
(marked up with Badgerys Creek weather data)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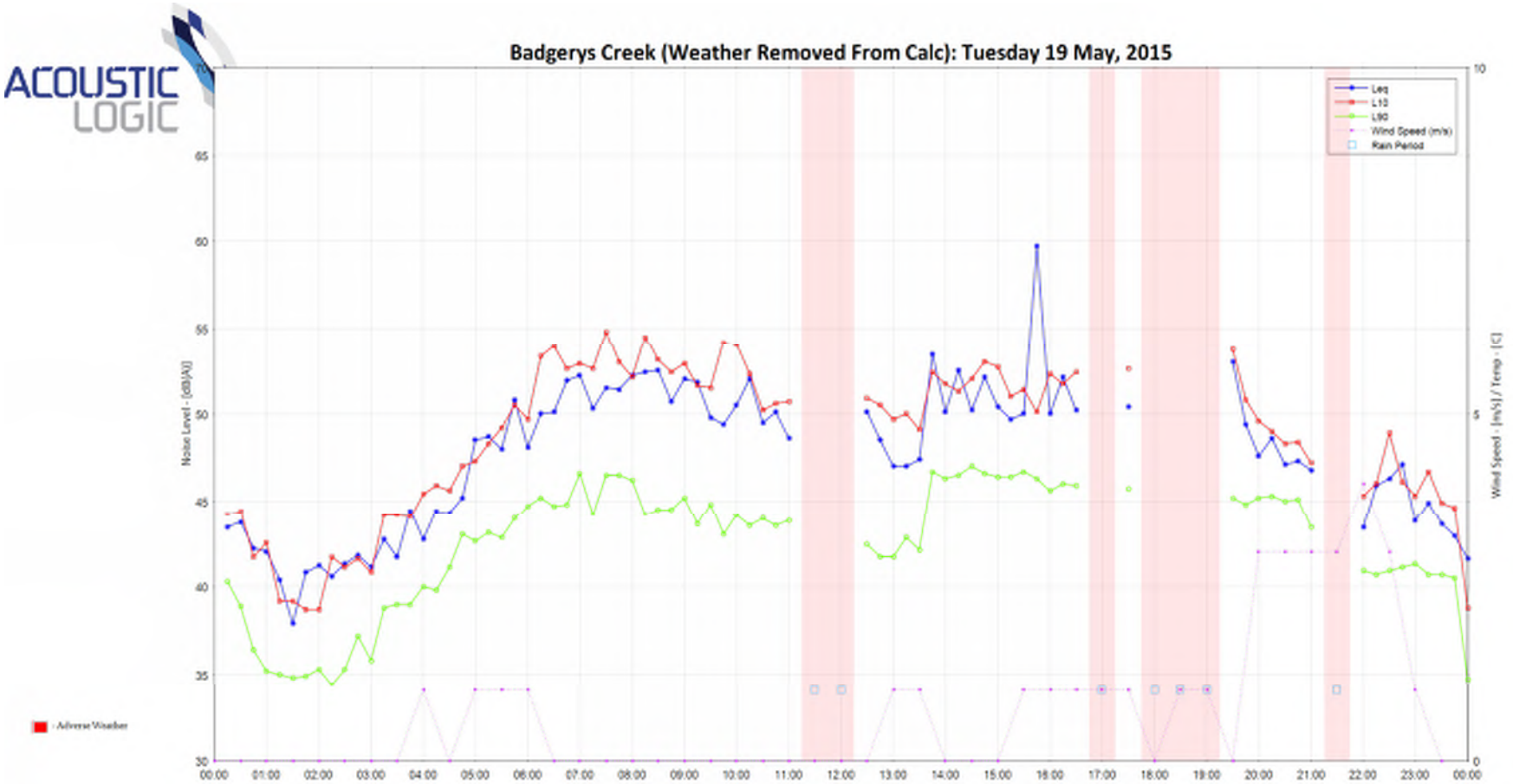
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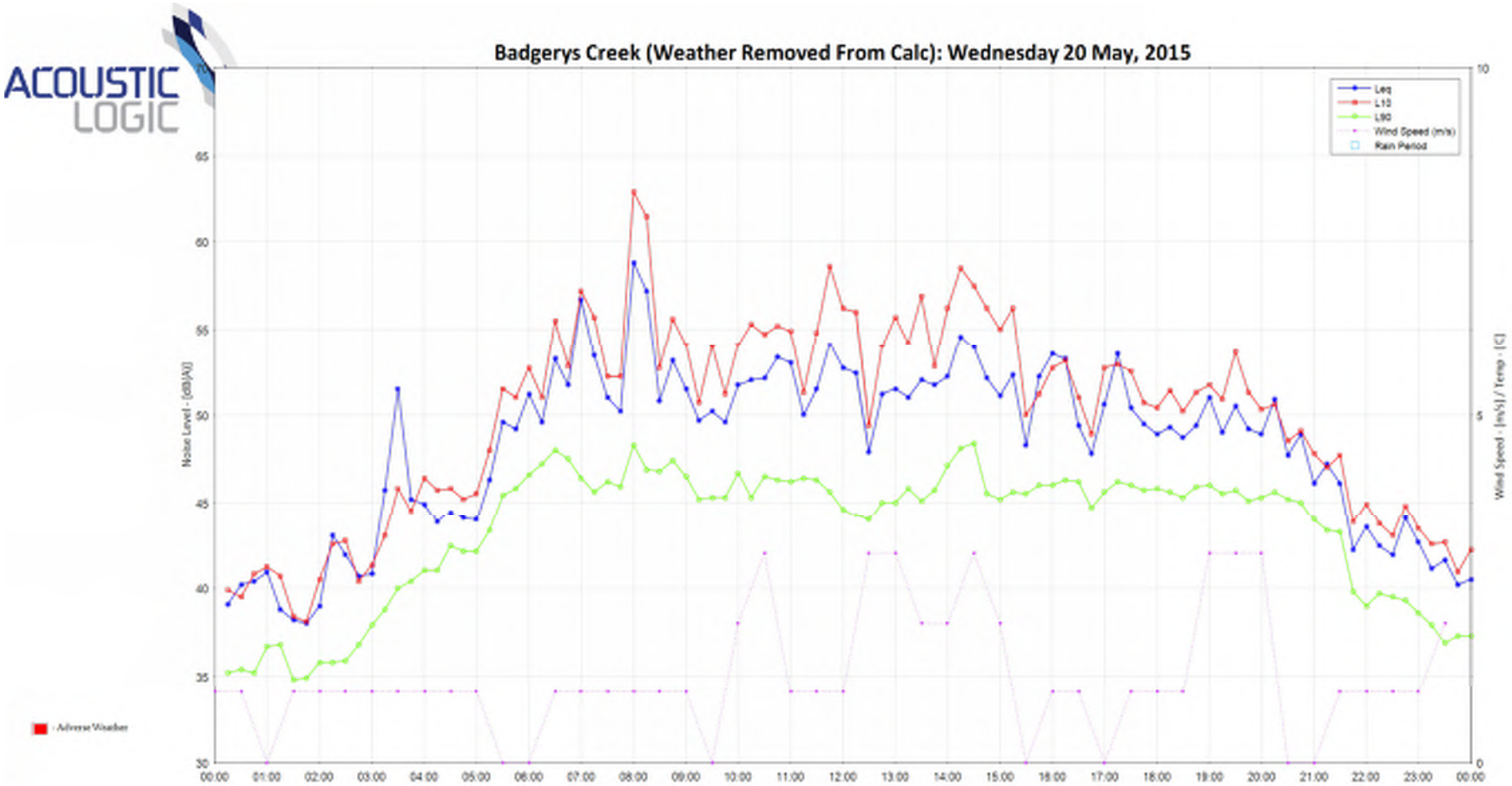
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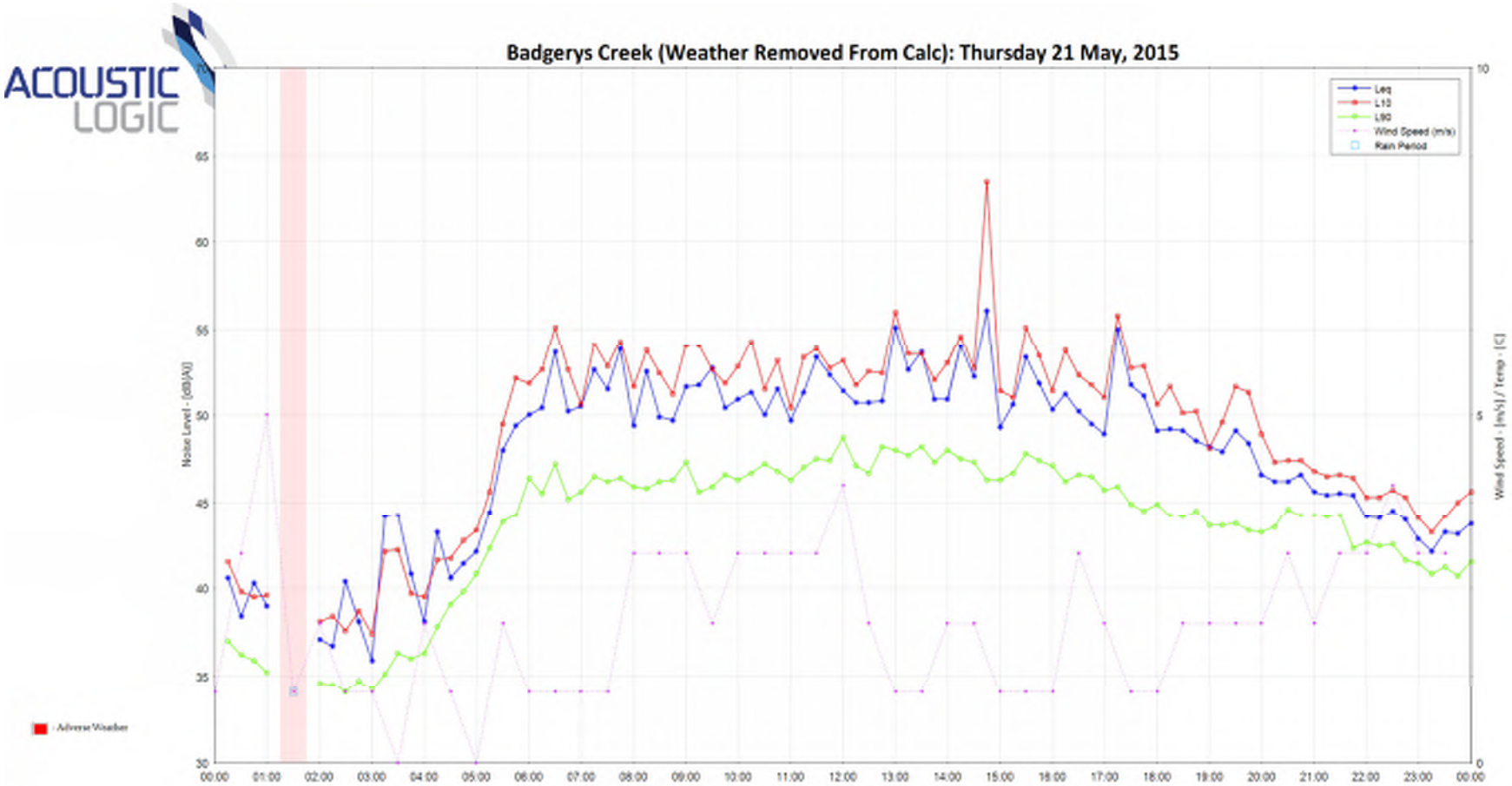
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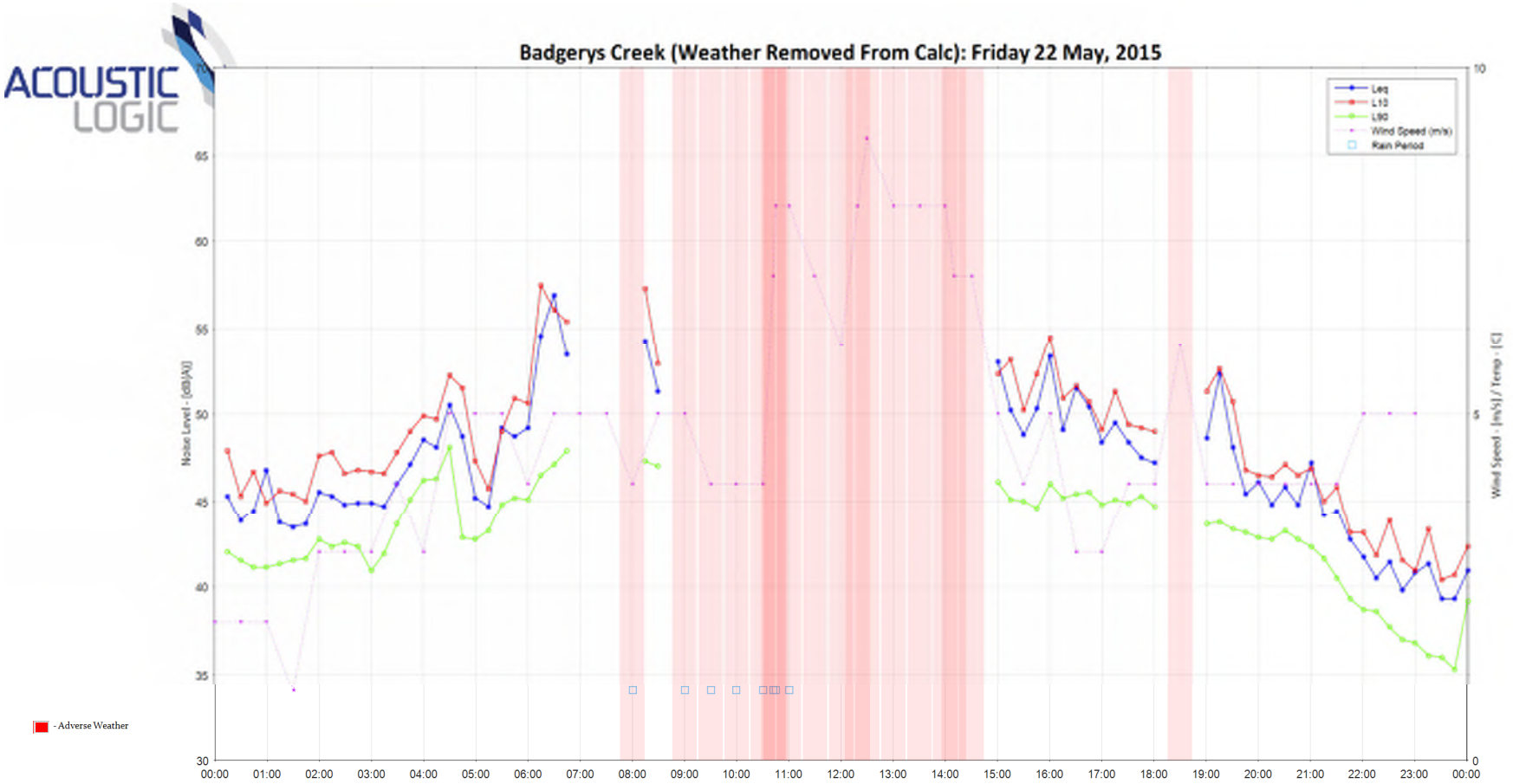
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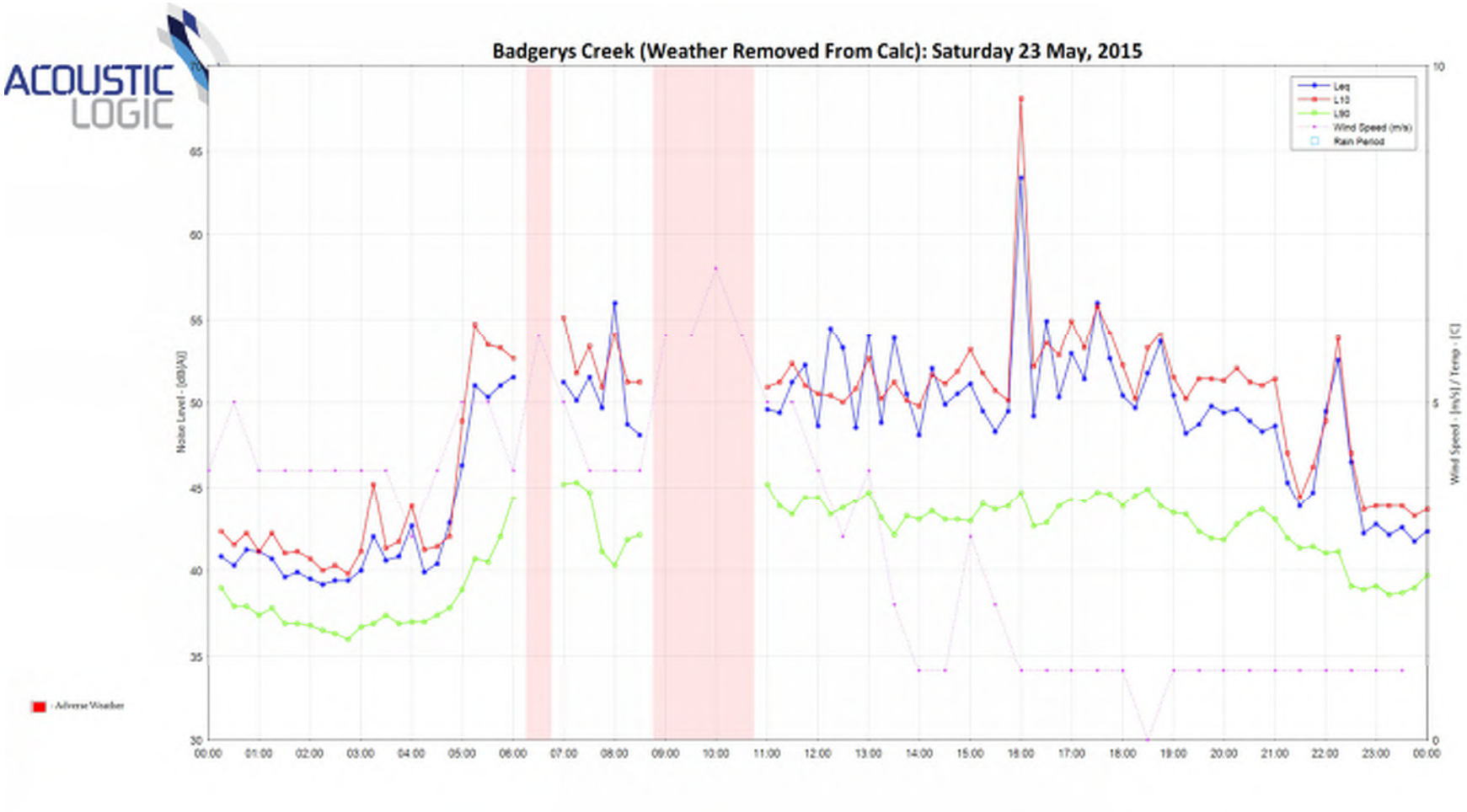
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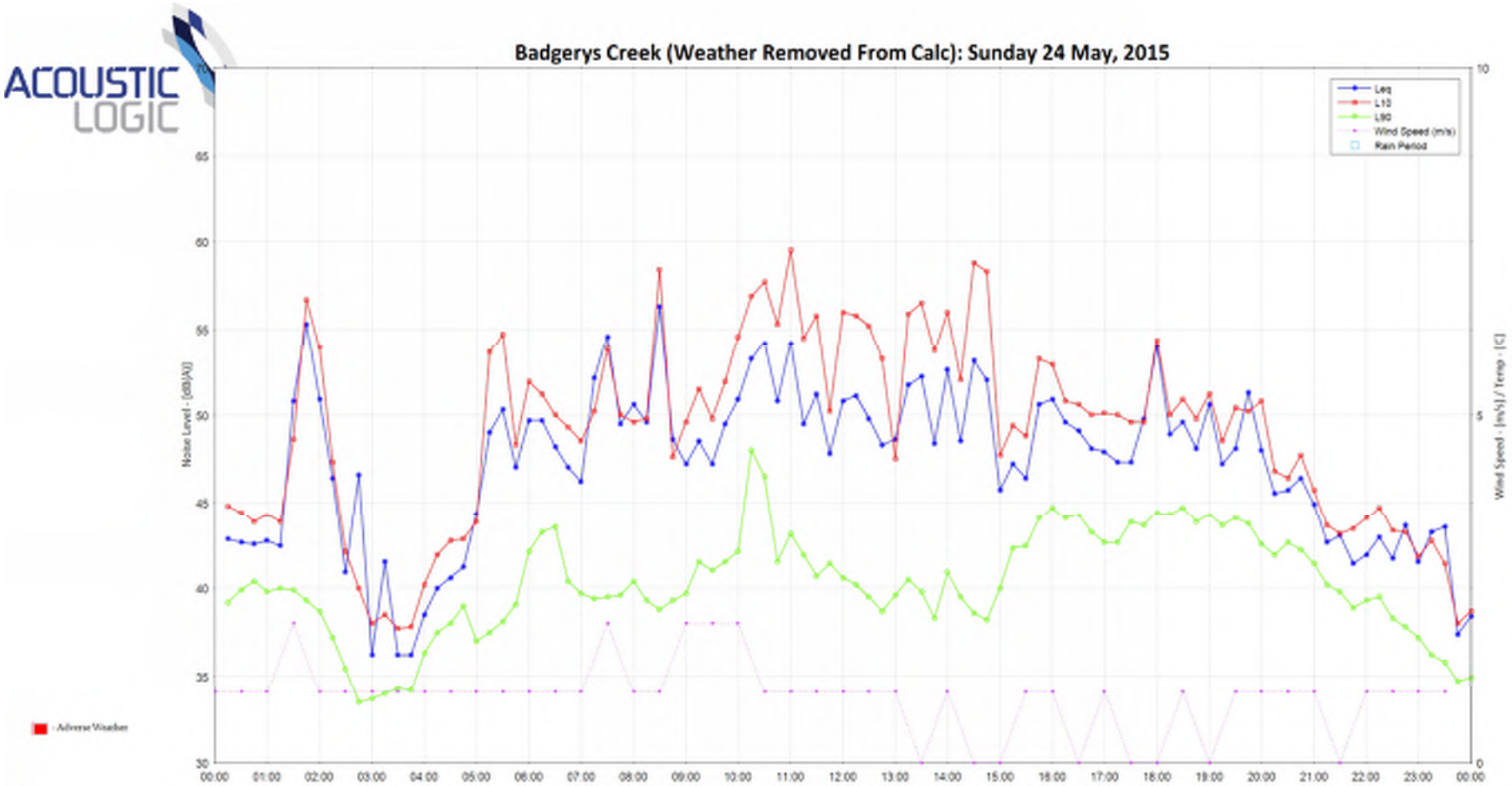
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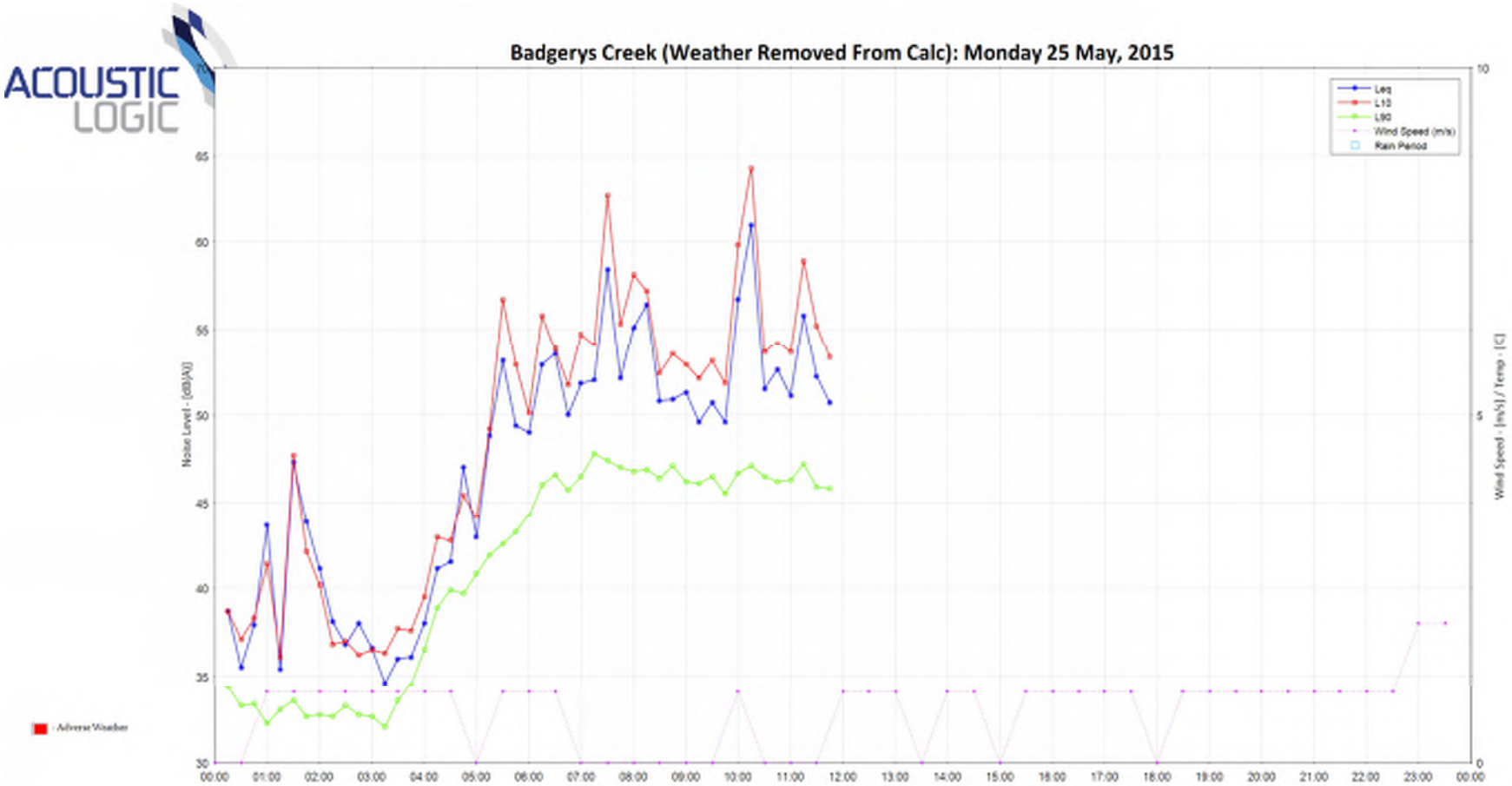
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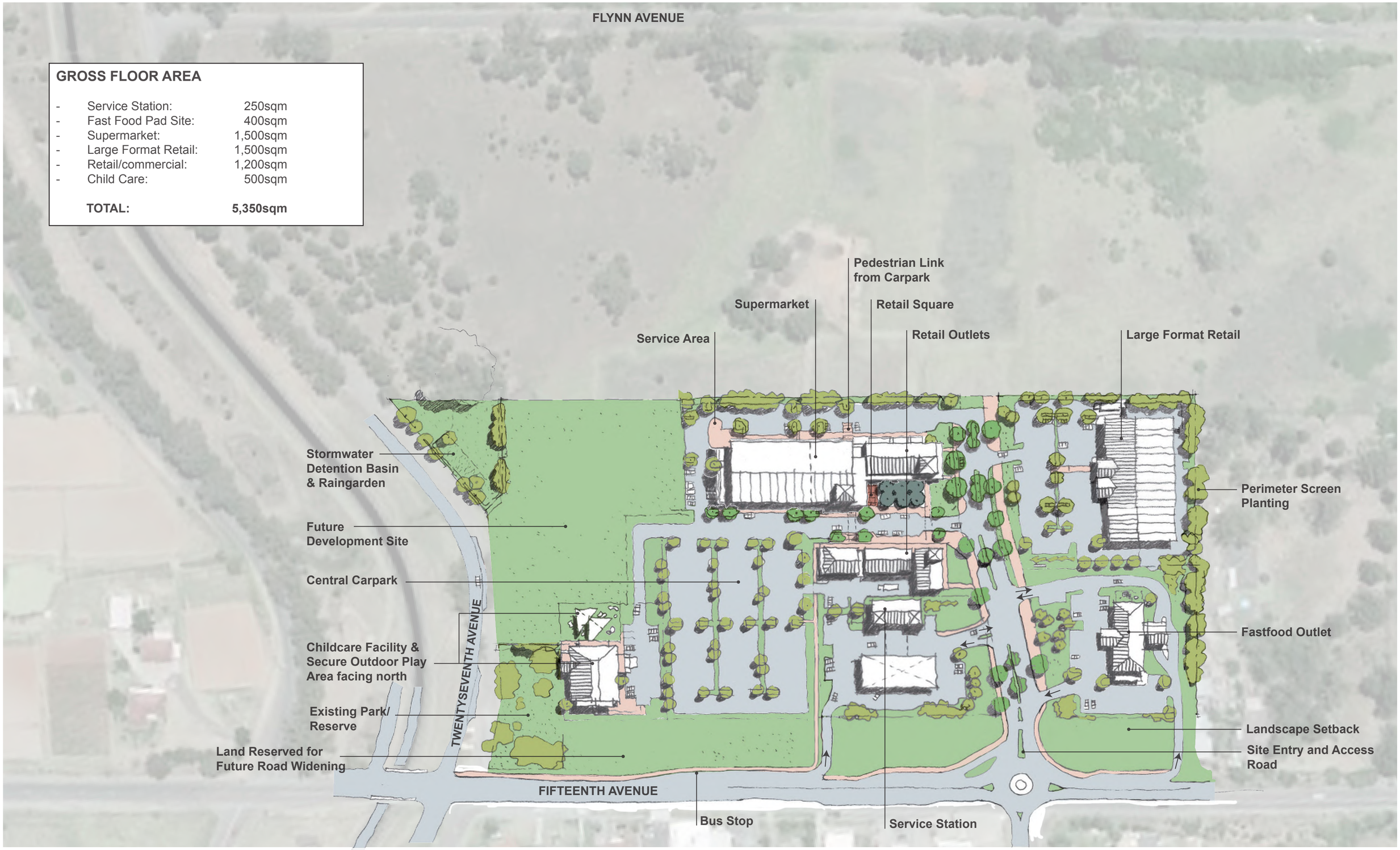
Appendix 3

Site Plan

GROSS FLOOR AREA

-	Service Station:	250sqm
-	Fast Food Pad Site:	400sqm
-	Supermarket:	1,500sqm
-	Large Format Retail:	1,500sqm
-	Retail/commercial:	1,200sqm
-	Child Care:	500sqm
	TOTAL:	**5,350sqm**



LFA (PACIFIC) PTY LIMITED

MASTERPLANNING
URBAN DESIGN
ARCHITECTURE
LANDSCAPE ARCHITECTURE
INTERIORS

SUITE 4, EDGECLIFF COURT, 2 NEW McLEAN ST, EDGECLIFF NSW 2027
M PO BOX 259, EDGECLIFF NSW 2027 T 02 9327 6822 F 02 9327 5554
E lfa@lfa.com.au W www.lfa.com.au ABN 92 850 134 905 QM ISO 9001:2008

NOMINATED ARCHITECTS ALEJ LESTER NO 3134 STEPHEN ANDERS NO 6364

Illustrative Site Plan

2014-4330 -u/c
22 June 2015

0 10 20 50 100m

Fifteenth Avenue Commercial Precinct