Kempsey Shire Council

Frederickton Re-Zoning Study

Noise Impact Study

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Executive Summary

Acouras Consultancy has been commissioned, on behalf of Kempsey Shire Council to undertake an environmental noise study of the proposed re-zoning areas that may potentially be affected by the nearby Frederickton Abattoir and Frederickton Sewerage Treatment Plant (STP) and Pacific Highway. Rezoning proposals include:

- R1 General Residential land release north of Fredrickton Village along Great North Road;
- IN1 Industrial land release that is to the north of the abattoir on land currently over existing quarry lands; and
- R5 Rural Residential land north of Raymonds Lane.

The study of the proposed re-zoning has been carried out with regard to relevant acoustic standards and development policies including the Kempsey Shire Council's scope of works, DCP, Department of Planning (SEPP 102) and the NSW EPA INP as discussed in Section 2 .

As part of the assessment, Acouras personnel visited the study area and conducted an environmental noise survey of the surround area to establish the existing ambient and background noise levels. During the visit attended noise measurements were also undertaken at the abattoir, STP and dog pound and the results of various noise sources are given in Section 3.4 , Section 3.5 and Section 3.6 .

Unattended noise survey data was used to determine noise limiting criteria for industrial noise sources in accordance with the NSW EPA INP guidelines which are presented in Table 8.

The data collected from the attended noise survey have been used to develop a noise model which has been used to establish noise buffer zones. The noise modelling and buffer zones are presented in Figure 3.

Traffic noise from the Pacific Highway was also assessed. Using noise measurements (refer to Section 5.2) and published traffic flow data from the RMS, traffic noise for daytime a night modelled to determine the potential impact onto the re-zoned areas. Figure 4 and Figure 5 shows the contour line that allows for an "open window" scenario in accordance with the SEPP(I) clause 102.

Based on the investigation, the areas nominated for re-zoning are considered acoustically suitable for the proposed land uses and as long as development occurs outside the nominated buffer zones noise levels are expected to be within the nominated noise criteria.

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1 Introduction

The following report has been prepared by Acouras Consultancy on behalf of Kempsey Shire Council to undertake an environmental noise assessment associated with areas identified for re-zoning that are adjacent too, or "in the neighbourhood" of the existing Frederickton Abattoir (Everson abattoir and food processing plant) and Frederickton Sewerage Treatment Plant (STP).

1.1 Site Description and Zoning

The following Figure 1 outlines the study area including locations that have been nominated for rezoning. Rezoning proposals include:

- R1 General Residential land release north of Fredrickton Village along Great North Road;
- IN1 Industrial land release that is to the north of the abattoir on land currently over existing quarry lands; and
- R5 Rural Residential land north of Raymonds Lane.

Both of the future residential land (R1 and R5) uses have been identified as being potentially impacted by existing environmental noise from the abattoirs operations, Fredrickton STP and road traffic noise from the Pacific Highway (A1).

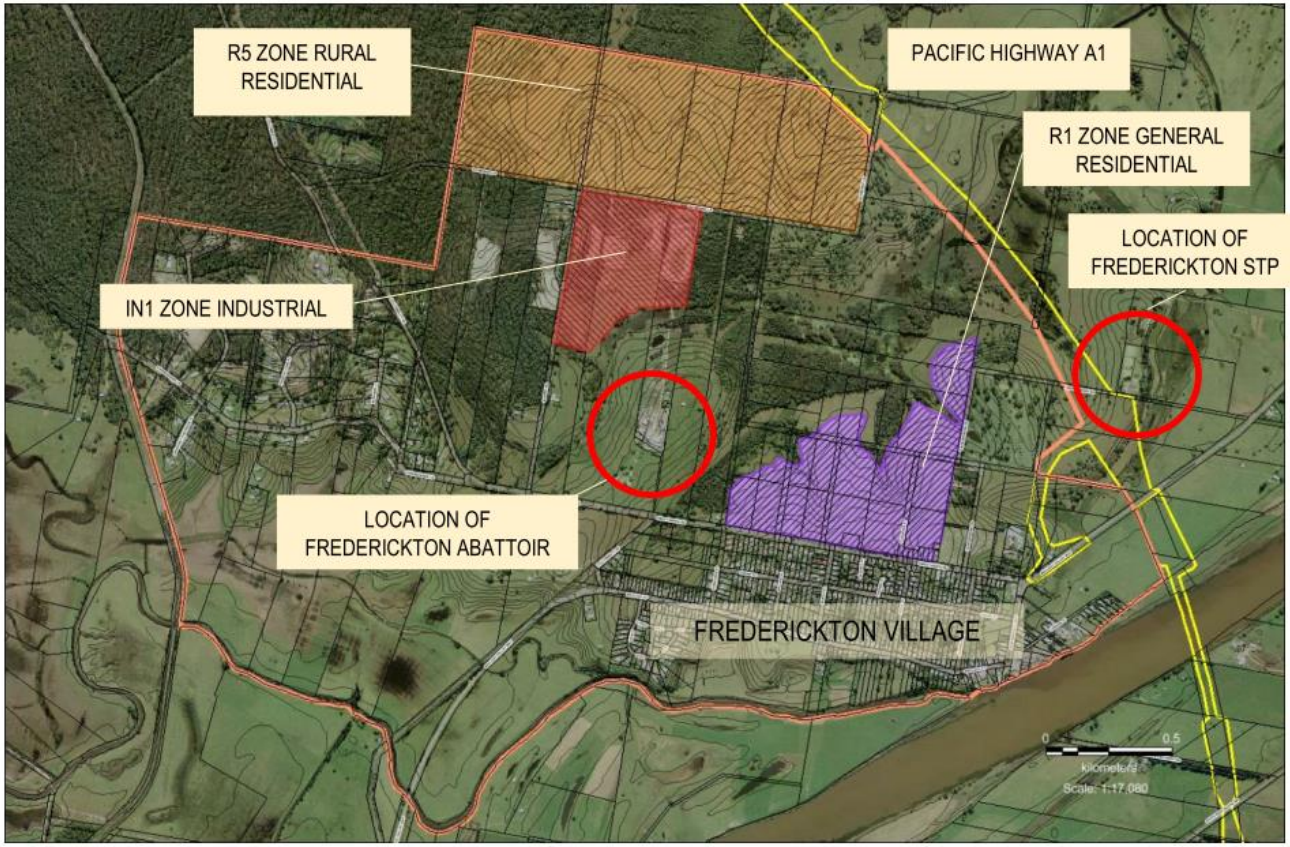


Figure 1 – Study Area Showing Proposed Re-Zonings in Context with Existing Abattoir and Sewerage Treatment Plant [1]

[1] Supplied by Kempsey Shire Council

1.2 Study Methodology and Overview

The purpose of this study is to assess the potential noise emissions from the operation of the existing Everson abattoir and food processing plant and the Frederickton Sewerage Treatment Plant and provide a buffer zone for any future residential developments. The following activities were conducted as part of this acoustic assessment:

- The re-zoning area was inspected and potential noise sources that may impact on rezoned areas were identified;
- Noise logger(s) were positioned to record long term background and ambient noise levels.
- Attended noise measurement were made of the primary sources of local noise, including:
  - Road traffic;
  - Frederickton Abattoir (this included a site visit to undertake near field noise measurements of plant and operational activities)
  - Frederickton Sewage Treatment Plant (STP).
- Noise measurements data was used to:
  - Provide a description and characterisation of the of the existing noise environment in the Frederickton area;
  - Develop an acoustic model of the study area and assess noise from the main sources (road, abbatoir and STP)
  - Establish site-specific external noise limits to comply with Kempsey Shire Council DCP/LEP, NSW EPA INP and other relevant criteria;
  - Assess noise against road traffic noise policies including the NSW Department of Planning guideline “Development Near Rail Corridors and Busy Roads” and other relevant guidelines including AS/NZS 2107 and AS3671.
  - Provide a discussion regarding acoustic suitability of the areas nominated for rezoning including provision of buffer zones to protect any future residential development from noise impact associated with the abattoir and STP.

2 Acoustic Standards, Guidelines and Development Control Polices

The following standards, guidelines and development policies are relevant to this project:

- Kempsey Development Control Plan 2013 and DCP 8 for Fredrickton;
- NSW Department of Planning "Development Near Rail Corridors and Busy Roads".
- NSW EPA "Road Noise Policy" (RNP) and Industrial Noise Policy (INP).
- WHO Guidelines for Community Noise.
- Australian standard AS/NZS 2107-2000: Acoustics – Recommended design sound levels and reverberation times for building interiors.
- AS 3671-1989: Acoustics - Road traffic noise intrusion - Building siting and construction.
- Australian standard AS 1055.1-1997: Acoustics – Description and measurement of environmental noise - General procedures.

2.1 Kempsey Shire Council DCP

Chapter C1 of the Kempsey Shire Council DCP provides a guideline for assessing the impact of industrial and commercial developments. In Section 5, the following provides a guide for new developments but can be applied to existing developments.

> *l) Where new business development (both new development and relevant alterations and extensions to existing development) adjoins existing/proposed residential uses:*
>
> > *(i) The design is to incorporate methods to reduce visual privacy and acoustic impacts on the adjoining residential use. This may be achieved by using landscaping, mounding and/or screening, suitable location of delivery areas, appropriate delivery hours and/or limiting after hours deliveries.*
> >
> > *(ii) All noise generating equipment such as mechanical plant or equipment, air conditioning units, fixed vacuum systems, mechanical ventilation from car parks, driveway entry shutters, garbage collection areas or similar, as well as delivery areas, must be designed to protect the acoustic privacy of neighbouring residential uses.*
> >
> > *(iii) All such noise generating equipment must be acoustically screened.*
> >
> > *(iv) Noise levels at the property/unit boundary of residential development must not exceed a $L_{Aeq,\ 15\ minute}$ of 5dB above background noise.*
> >
> > *(v) No development is to result in obtrusive lighting impact to residential uses.*

In reference to potential impact of traffic noise, Chapter D3 of the Kempsey Shire Council DCP (for South Kempsey Industrial precinct) Section 5.2.1 "Acoustic Buffer Setback" provides the following guidance that can be applied to this assessment:

> *a) No buildings are to be locate closer than:*
>
> > *(i) 65 metres to the nearest travelling lane of the upgraded Pacific Highway; and*
> >
> > *(ii) 35 metres to the remaining industrial area boundaries.*

(iii) Development, including building and subdivision, achieves the following acoustic mitigation requirements:

(i) Heavy industrial activities are avoided in the most eastern precincts of the industrial area to limit noise impacts the land within Zone E2 – Environmental Conservation;

(ii) Compliance with the NSW Industrial Noise Policy (NSW EPA, 2000); and

(iii) Compliance with the NSW Environmental Criteria for Road Traffic Noise (NSW EPA, 1999).

(iv) Allotments created by subdivision are to be sized to accommodate both:

(i) Sufficient land to accommodate projected development of the site; and

(ii) The acoustic buffer area as shown on Plan 4 Masterplan (refer to Appendix A).

2.2 Department of Planning (SEPP 102)

In the DoP guideline, Clause 102 (road) requires that if the development is for the purpose of a building for residential use, the consent authority must be satisfied that appropriate measures will be taken to ensure that the following L_{Aeq} levels are not exceeded.

Table 1— Development near Rail Corridors and Busy Roads – Interim Guideline

Residential Space	Internal Noise Criteria
in any bedroom in the building	35dB(A) at any time 10pm–7am
anywhere else in the building (other than a garage, kitchen, bathroom or hallway)	40dB(A) at any time

Mitigation measures are based on having windows and external doors closed. If internal noise levels with windows or doors open exceed the criteria by more than 10dBA, the design of the ventilation for these rooms should be such that occupants can leave windows closed, if they so desire, and also to meet the ventilation requirements of the Building Code of Australia.

2.3 Australian Standards for Internal Noise

The AS/NZS 2107–2000 outlines the acceptable internal noise levels such that a satisfactory acoustic environment within non-residential spaces in new and existing buildings can be achieved. Table 2 presents the recommended internal design noise levels.

Table 2— Recommended Internal Design Noise Levels (AS/NZS 2107)

Type of occupancy/activity	Recommended design sound level, L_{eq} in dB(A)	
	Satisfactory	Maximum
Houses near major roads		
Living areas	35	45
Sleeping areas	30	40
Work areas	35	45
Houses near minor roads		
Living areas	30	40
Sleeping areas	30	35
Work areas	35	40

2.4 Sleep Disturbance Noise Criteria

2.4.1 NSW EPA INP Guidelines

As requested, Council require additional assessment of the potential for sleep disturbance. The NSW INP does not specifically address sleep disturbance from high noise level events. The EPA, although not ideal continues to use the sleep criterion of an $L_{A1, (1\ minute)}$ not exceeding the $L_{A90, (15\ minute)}$ by more than 15 dB(A) as a guide to identify the likelihood of sleep disturbance.

The maximum noise level or $L_{A1, (1\ minute)}$, is the extent to which the maximum noise level exceeds the background level and the number of times this happens during the night-time period. Other factors that may be important in assessing the extent of impacts on sleep include:

- how often high noise events will occur.
- time of day (normally between 10pm and 7am).
- whether there are times of day when there is a clear change in the noise environment (such as during early morning shoulder periods).

2.4.2 WHO Guidelines for Community Noise

The World Health Organisation (WHO) guidelines provides an assessment is based on a combination of the both continuous nature and individual exposures. Therefore, the guidelines recommends the following criteria:

- 30 dB $L_{Aeq,8h}$, and
- 45 dB L_{Amax}..

3 Noise Survey

3.1 Unattended Noise Survey

An unattended noise survey was carried out at the site to measure the background and ambient noise levels. Nose monitoring was conducted between in Thursday 16th to Thursday the 23rd of June 2016. The monitor was positioned (as shown in Figure 2) at the following locations:

- Location 1 – 37-67 Raymonds Lane, Fredrickton.
- Location 2 – Fredrickton Sports Field.
- Traffic Noise Logger – Vacant open land approximately 200m from Pacific Highway.

Figure 2 shows the location of the noise loggers within the context of the study area, nearby industrial area of Abattoir and the STP.

Measurements were conducted using the following equipment:

- SVAN 977 Type 1 Real time Analyser/Noise Logger. Serial No. 34135.
- SVAN 958A Type 1 Real time Analyser/Noise Logger. Serial No. 36624.
- SVAN SV30A Type 1 Sound Level Calibrator. Serial No. 31830.

Noise monitoring was conducted in general accordance with Australian standard AS 1055.1-1997: Acoustics-Description and measurement of environmental noise-General procedures.

The noise analyser was calibrated immediately before and after measurements were taken with no discernible differences between these two recorded levels. The sound analyser is Type 1 and complies with Australian standard AS1259.2: 1990.

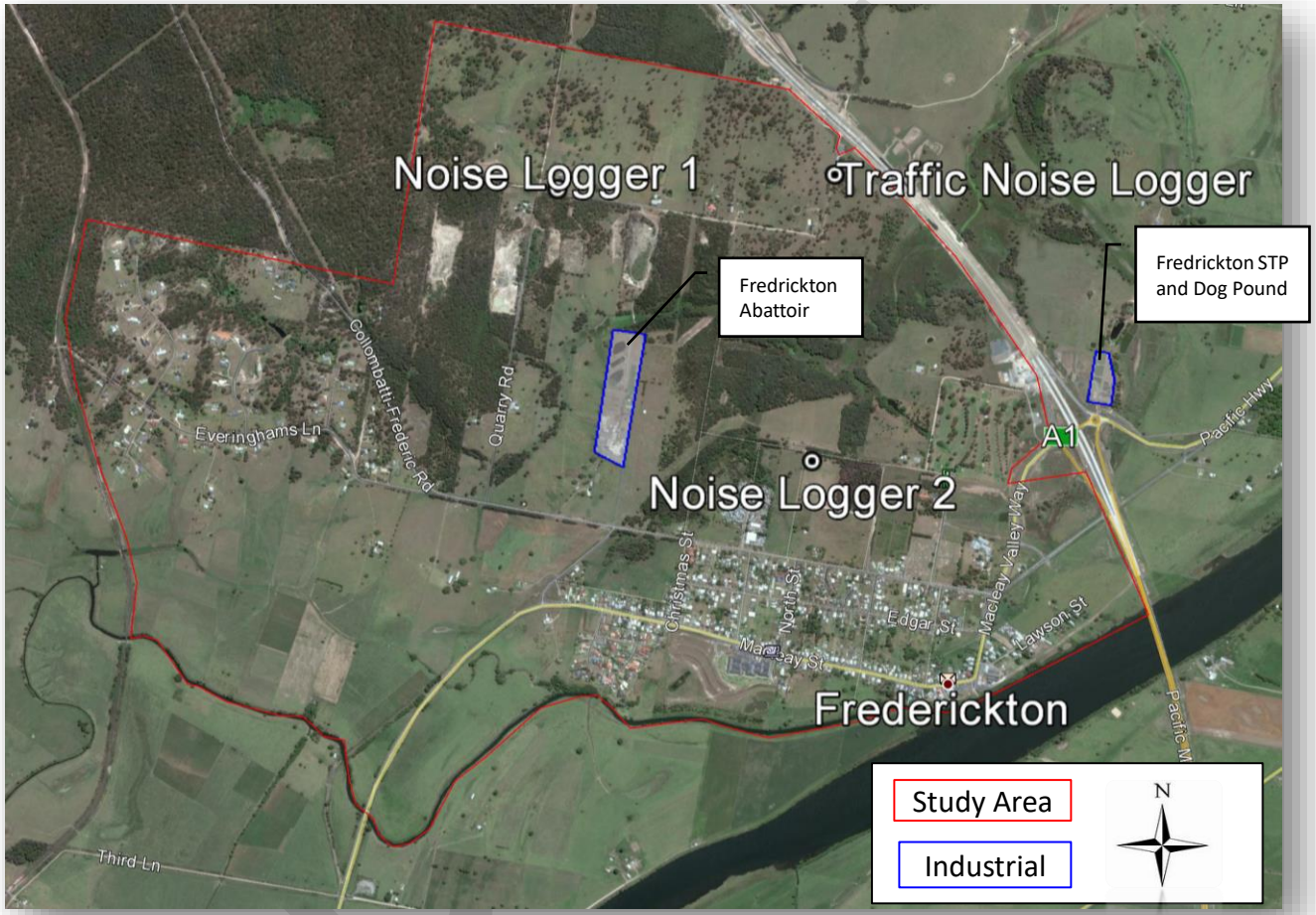


Figure 2 –Noise Logger Position

3.2 Ambient and Background Noise Levels

Table 3 presents a summary of the measured ambient and background noise level at each position.

Table 3—Ambient and Background Noise Survey Summary, dBA

Location	Time Period	$L_{eq\ (period)}$	RBL	$L_{90(period)}$
1	Day (07:00-18:00)	49	38	41
	Evening (18:00-22:00)	48	38	40
	Night (22:07:00)	44	35	37
2	Day (07:00-18:00)	45	36	39
	Evening (18:00-22:00)	46	37	39
	Night (22:07:00)	43	33	36

The noise loggers were located in open fields where noise from natural vegetation and wind dominate the area. Distant traffic noise from the Pacific Highway can be just audible above the ambient noise.

During the monitoring period any adverse weather condition have been excluded. The noise logger results are presented in Appendix B.

3.3 Traffic Noise Levels from the Pacific Highway

A short-term traffic noise measurement was conducted to quantify the existing traffic noise levels from the Pacific Highway (location shown in Figure 2). The noise logger was unattended between 6pm on Wednesday 15th until midday on Thursday 16th June 2016. Table 4 presents a summary of the measured ambient noise level and traffic noise impacting the development.

Table 4 – Measured Ambient and Traffic Noise and Levels, dBA

Location	Period	Highest L_{eq} 1hr
Pacific Highway	Day (07:00-22:00)	60
	Night (22:00-07:00)	57

3.4 Abattoir

The abattoir that is privately operated by Everson Food Process and operates Monday to Friday. The majority of the food process takes place between 5am and 10pm daily. As we understand, there is no intention in increase operation activities in the near future.

The mechanical equipment used in the food production operates 24hrs with some equipment such as the boiler, cyclone and heat exchanger stopping operation at 8pm. The site was visited and attended noise measurements made of various mechanical plant as summarised in table 5.

Table 5— Abattoir: Noise Level of Various Equipment, dBA

Item	Sound Pressure Level, L_{eq} dBA
Water Cooled Chillers	69 @ 15m
Boiler	75 @ 15m
Blower (from stack)	75 @ 5m
Cyclone + Heat Exchanger	74 @ 10m

3.5 Sewage Treatment Plant

Fredrickton Sewage Treatment Plant (STP) is owned by Kempsey Shire Council and operates on 24hrs basis. The following Table 6 presents the operating noise level of various equipment on the STP.

Table 6— STP: Noise Level of Various Equipment, dBA

Item	Sound Pressure Level, L_{eq} dBA
General water treatment noise	54 @ 5m
Water Pump	85 @ 2m
Sludge Pump	83 @ 2m
Aeration Pump	85 @ 2m

3.6 Council Dog Pound

On the same site as the STP, the council has the dog pound building. The building is constructed of masonry brick and has openings in the façade to allow natural ventilation. Table 7 below presents the measured noise level outside the building of dogs barking.

Table 7— Dog Pound Noise Level, dBA

Item	Sound Pressure Level, L_{max} dBA
Dogs barking	74-89 @ 5m (outside building)

4 Noise Criteria

The environmental noise survey data has been used to establish the emission noise limits for operational activities of the abattoir and STP. Noise goals have been calculated in general accordance with the NSW INP guideline and are summarised below for the affected land areas.

4.1 Project Specific Noise Limits (EPA INP)

Project specific Amenity and Intrusiveness noise goals are provided in Table 8.

Table 8—Noise Survey Summary and Project Limits, dBA

Location	Time Period	Existing Noise Levels		NSW Industrial Noise Policy		
		$L_{eq\ (period)}$	RBL	Amenity Criteria Recommended Noise Level (acceptable), L_{eq}	Intrusiveness Noise Level, L_{eq}	Project Specific Limit L_{eq}
1	Day	49	38	50	43	**42**
	Evening	48	38	45	43	**38**
	Night	44	35	40	40	**34**
2	Day	45	36	50	41	**41**
	Evening	46	37	45	42	**36**
	Night	43	33	40	38	**33**

4.2 Sleep Disturbance Criteria (EPA INP)

In accordance with the EPA INP guidelines, Table 9 presents the limits for sleep disturbance.. The $L_{A1, (1\ minute)}$ descriptor is meant to represent a maximum noise level measured under 'fast' time response. The EPA will accept analysis based on either $L_{A1, (1\ minute)}$ or $L_{A, (Max)}$.

Table 9 – Sleep Disturbance Limits, dBA

Location	Period	Minimum $L_{90(15min)}$	Sleep Disturbance Limits $L_{A1, (1min)}$
1	Night time (10pm-7am)	31	46
2	Night time (10pm-7am)	31	46

5 Noise Assessment

A noise model of the study are has been developed to understand the propagation of sound from the principal noise sources. These include:

- Industrial type noise associated with the Abattoir, Sewage Treatment Plant and Kempsey Shire Dog Pound;
- Road traffic noise from the Pacific Highway.

The acoustic model has been used to understand potential impacts from the above sources within the study area having regard to the proposed future land use. The model has also been used to determine noise buffer zones.

5.1 Industrial Noise

The following is an assessment of the current noise emissions from the abattoir and STP. All calculations have been conducted based on site noise measurements and the Concawe method for predicting noise propagation using CadnaA (version 4.5.149) noise modelling software. To consider the potential worst-case scenario, the following noise enhancing metrological parameters have been assessed in the model:

- A source to receiver maximum wind of 3m/s.
- Temperature inversion of 3°/100m.

Given that both facilities operate 24 hours a day, only the night time period has been considered as this is the most sensitive.

The following assessments predict extent of noise propagation up to the relevant noise criteria. Areas developed within the contour line would be expected to experience noise in excess of the noise criteria. Whereas areas outside of the contour would experience noise within the criteria.

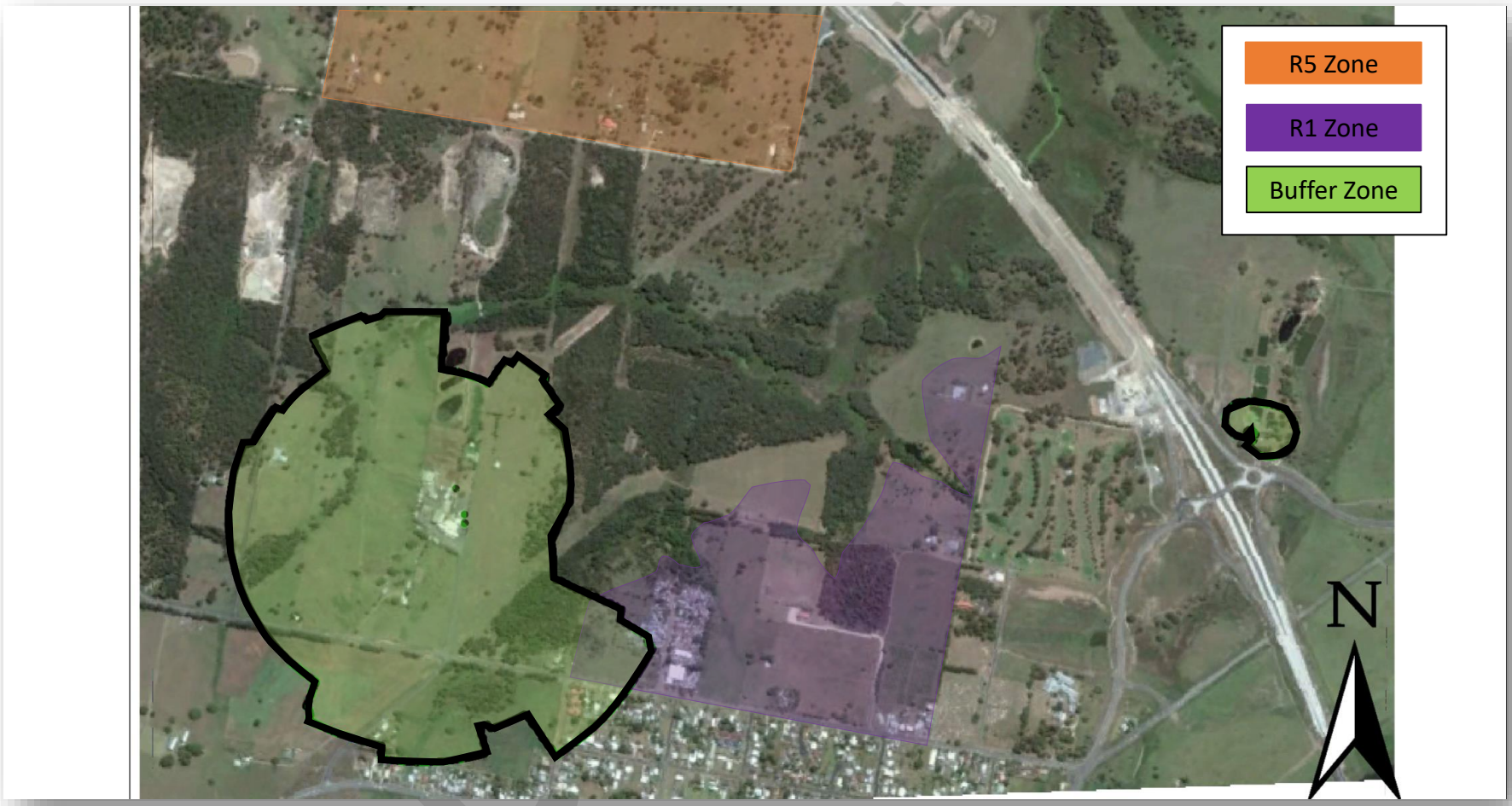


Figure 3 – Noise Buffer Zone for Abattoir and STP (Night-time)

5.2 Traffic Noise from Pacific Highway

This section details the traffic noise influence on the study area and the potential impact to residential development within the re-zoned areas. By analysing both the measured data and the AADT collected by RMS, the impact of the traffic noise along the Pacific Highway has been calculated by applying the CRTN method for predicting noise traffic noise using CadnaA (version 4.5.149) noise modelling software.

The NSW RMS (Roads & Maritime Services) database for the AADT traffic volume figures for Pacific Highway (Station ID. 6196 and 6197) is given Table 10. The posted speed limit on the road is currently limited to 110 km/h.

Table 10 – NSW RMS AADT Traffic Volume for Pacific Highway (A1)

Road	Year	North Bound	South Bound	Combined
Pacific Hwy	2015	4,370	4,245	8,615
	2016	4,419	4,269	8,688

The following Figure 4 and Figure 5 shows the predicted impact of traffic noise from the Pacific Highway during the daytime and night time periods respectively.

The contour line indicates the acceptable limit for to accommodate open windows in the living and bedrooms of residential developments near the Pacific Highway. Residential developments within the limits can achieve internal noise with the windows closed (if desired) and provided there is alternate ventilation that meets the requirements if the Building Code of Australia.

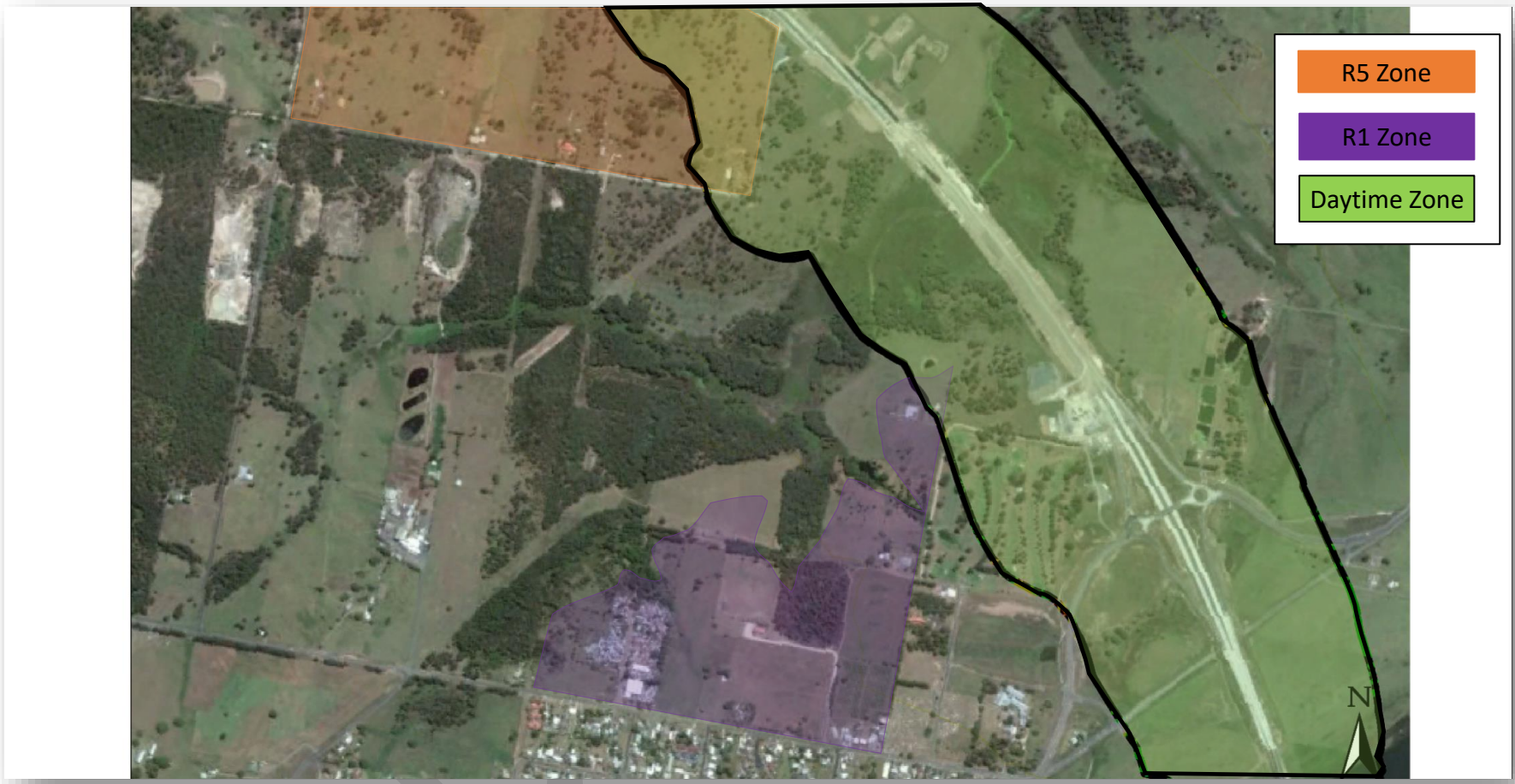


Figure 4 – Pacific Highway Traffic Noise Contour (Day-time)

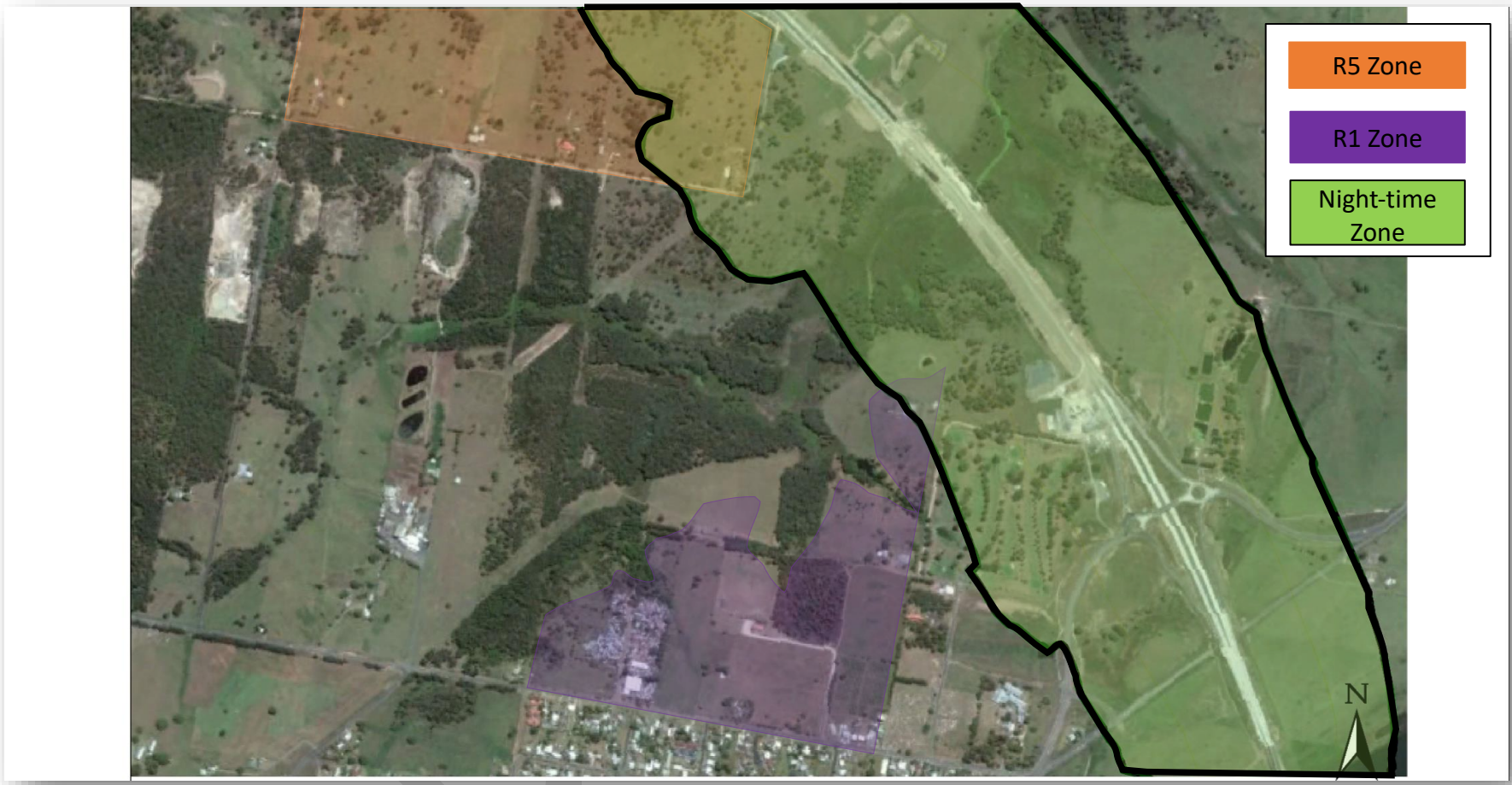


Figure 5 – Pacific Highway Traffic Noise Contour (Night-time)

5.3 Sleep Disturbance Discussion

Potentially, the most likely sources of the sleep disturbance would be either from dog barking at the Council pound or from the movement of vehicles (semi-trailers in particular) at the abattoir.

The abattoir operates generally between 5am and 10pm Monday to Friday. Employee vehicles would enter the facility in the morning at the start the shift. We assume that there could be a delivery prior to 7am, but our understanding is that most deliveries are done in the afternoon. There is no intention to increase operation activity.

Table 3 below provide sound pressure levels of typical vehicle noise that have been used for the calculations.

Table 11 – Typical Noise Level of Vehicles, L_{max} dBA

Type	Sound Pressure Level Range @ 0.5m, L_{max} dBA[2]
Semi-trailer (Western Star or Kenworth)	80-101
General passenger vehicle	67-88

The nearest existing (near Christie Street) and future residential zones are located at least 280m from the facilities entrance. We would predict that any intermittent noise ($L_{1(1min)}$) from vehicles entering or existing the facilities entrance would be less than the $L_{1(1min)}$ 45dBA outside the window and less than L_{max} 35dBA inside. This would comply with the recommended INP and WHO sleep disturbance criteria.

Noise from dog barking at the Council Compound would be inaudible at the future resident zones located more than 600m west of the facility.

[2] Based on ADR83/00 external noise test.

6 Conclusion

An environmental noise assessment has been undertaken to determine acoustic environment associated with the re-zoning areas that may potentially be affected by the nearby Frederickton Abattoir and Frederickton Sewerage Treatment Plant (STP) and Pacific Highway.

The study of the proposed re-zoning has been carried out with regard to relevant acoustic standards and development policies including the Kempsey Shire Council's scope of works, DCP, Department of Planning (SEPP 102) and the NSW EPA INP as discussed in Section 2 .

As part of the assessment, Acouras personnel visited the study area and conducted an environmental noise survey of the surround area to establish the existing ambient and background noise levels. During the visit attended noise measurements were also undertaken at the abattoir, STP and dog pound and the results of various noise sources are given in Section 3.4 , Section 3.5 and Section 3.6 .

Unattended noise survey data was used to determine noise limiting criteria for industrial noise sources in accordance with the NSW EPA INP guidelines which are presented in Table 8.

The data collected from the attended noise survey have been used to develop a noise model which has been used to establish noise buffer zones. The noise modelling and buffer zones are presented in Figure 3. Also based on our predictions, it is unlikely that there would be potential for sleep disturbance from dog barking noise or vehicle movements at the future residential zones.

Traffic noise from the Pacific Highway was also assessed. Using noise measurements (refer to Section 5.2) and published traffic flow data from the RMS, traffic noise for daytime a night modelled to determine the potential impact onto the re-zoned areas. Figure 4 and Figure 5 shows the contour line that allows for an "open window" scenario in accordance with the SEPP(I) clause 102.

Based on the investigation, the areas nominated for re-zoning are considered acoustically suitable for the proposed land uses and as long as development occurs outside the nominated buffer zones noise levels are expected to be within the nominated noise criteria.

Appendix A – Acoustic Terminology

Decibel, dB: A dimensionless unit which denotes the ratio between two quantities that are proportional to power, energy or intensity. One of these quantities is a designated reference by which all other quantities of identical units are divided. The sound pressure level in decibels is equal to 10 times the logarithm (to the base 10) of the ratio between the pressure squared divided by the reference pressure squared. The reference pressure used in acoustics is 20 micro Pascals.

A-WEIGHTING: A measure of sound pressure level designed to reflect the response of the human ear, which does not respond equally to all frequencies. To describe sound in a manner representative of the human ear's response it is necessary to reduce the effects of the low and high frequencies with respect to medium frequencies. The resultant sound level is said to be A-weighted, and the units are in decibels (dBA). The A-weighted sound level is also called the noise level.

Sound Pressure Level, L p (dB), of a sound: 20 times the logarithm to the base 10 of the ratio of the r.m.s. sound pressure to the reference sound pressure of 20 micro Pascals. Sound pressure level is measured using a microphone and a sound level meter, and varies with distance from the source and the environment.

Ambient Noise/Sound: All noise level present in a given environment, usually being a composite of sounds from many sources far and near. Traffic, HVAC, masking sound or even low-level background music can contribute to ambient level of noise or sound.

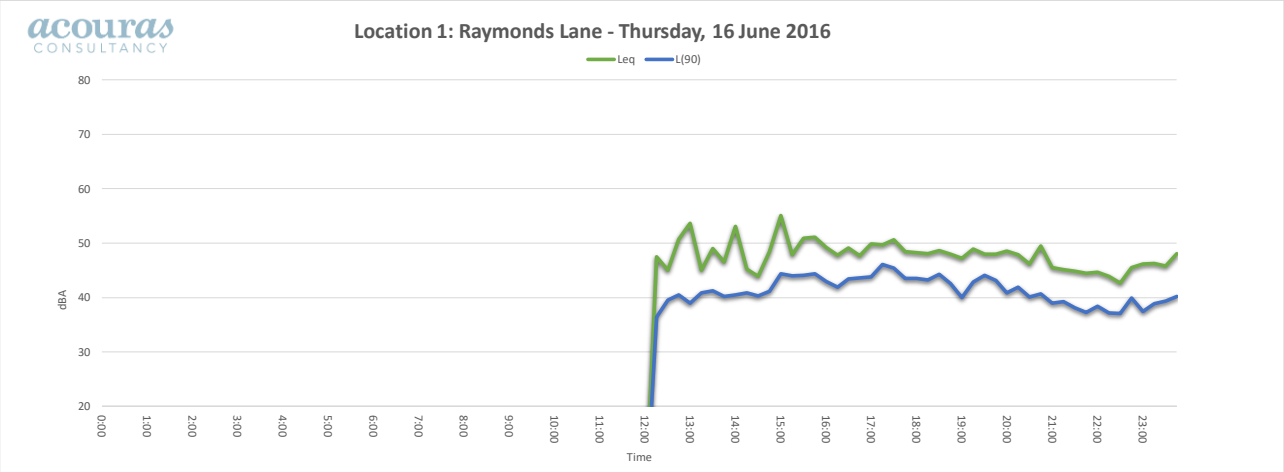
Percentile Level - L 90 , L 10 , etc: A statistical measurement giving the sound pressure level which is exceeded for the given percentile of an observation period, e.g. L 90 is the level which is exceeded for 90% of a measurement period. L 90 is commonly referred to as the "background" sound level.

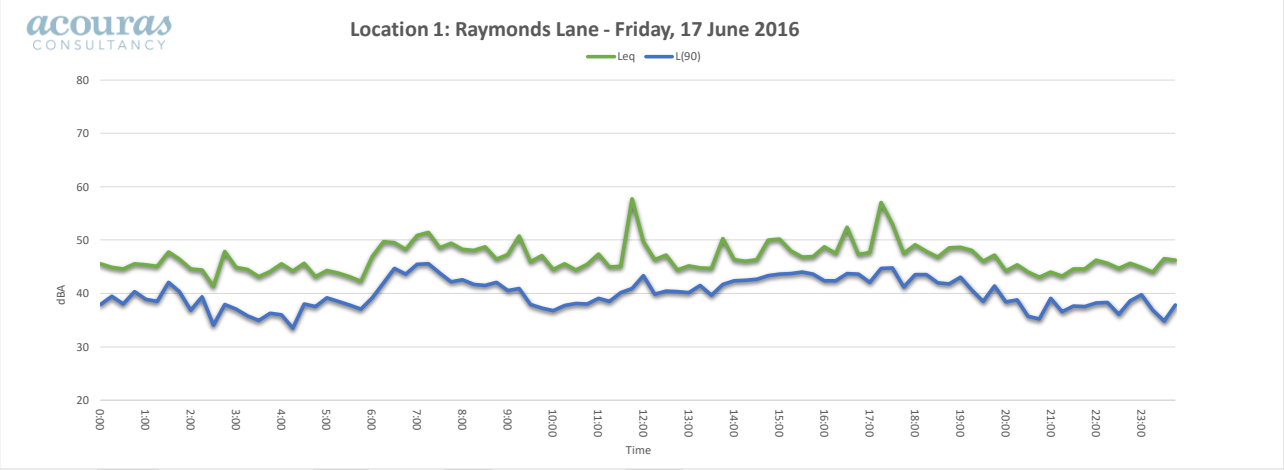
Background Noise (L 90): The sum total of all unwanted residual noise generated from all direct and reflected sound sources in a space that can represent an interface to, or interfere with good listening and speech intelligibility.

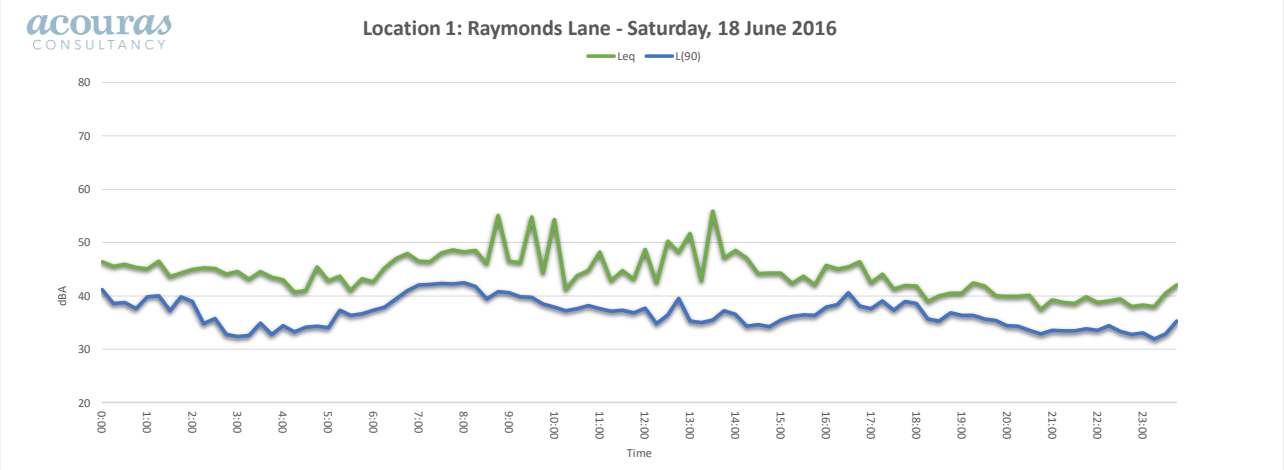
Rating Background Level – RBL: Method for determining the existing background noise level which involves calculating the tenth percentile from the L A90 measurements. This value gives the Assessment Background Noise Level (ABL). Rating Background Level is the median of the overall ABL.

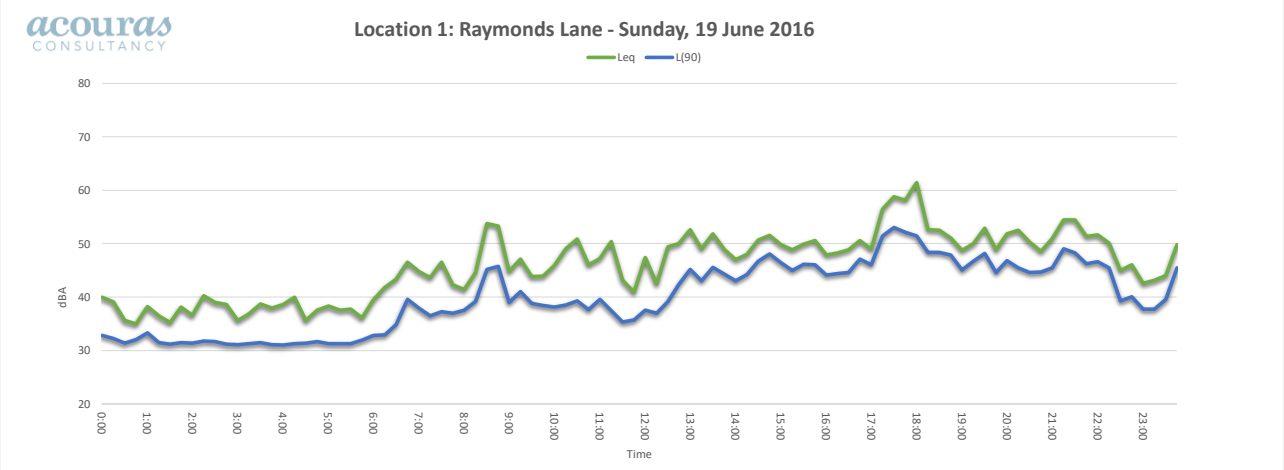
L AEQ,T : Equivalent continuous A-weighted sound pressure level. The value of the A-weighted sound pressure level of a continuous steady sound that, within a measurement time interval T, has the same A-weighted sound energy as the actual time-varying sound.

Appendix B – Noise Logger Results





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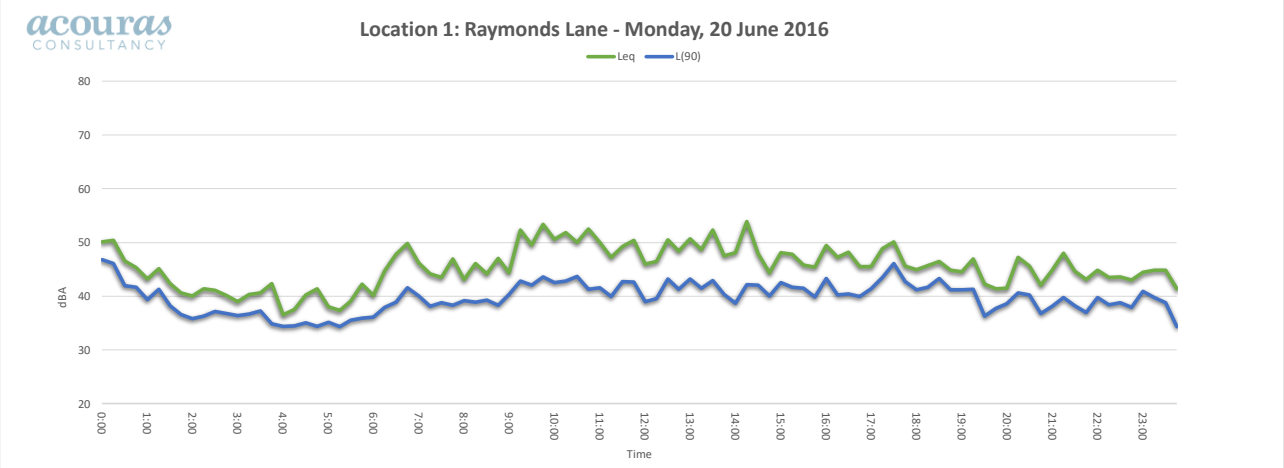
Leq
L(90)
dBA
Time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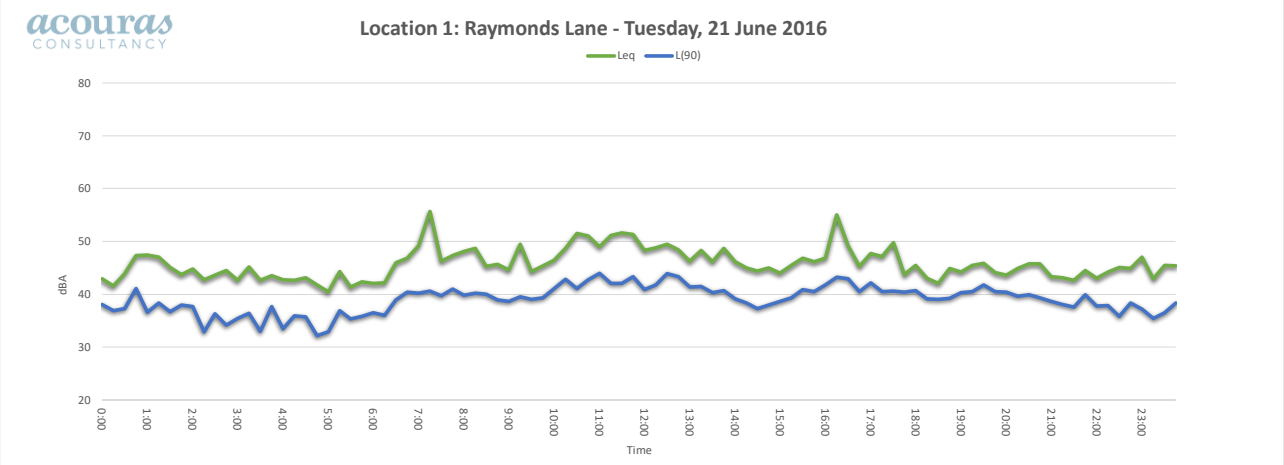
Leq
L(90)
dBA
Time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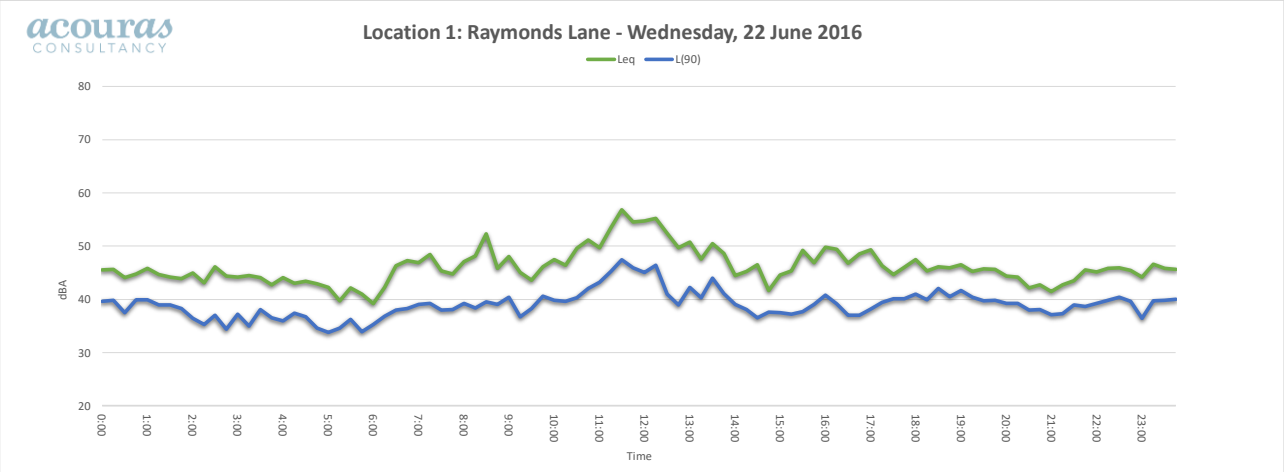
Leq
L(90)
dBA
Time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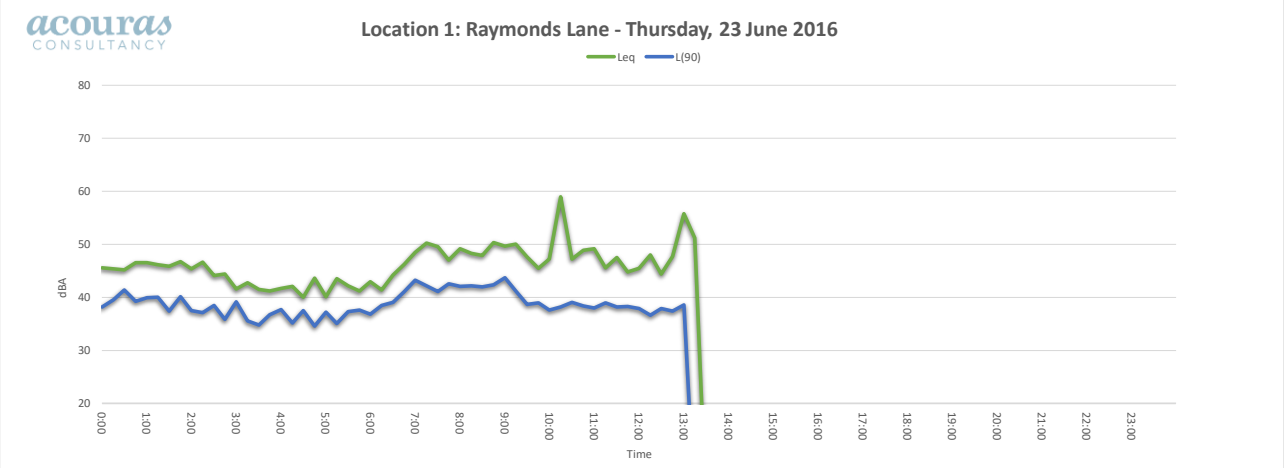
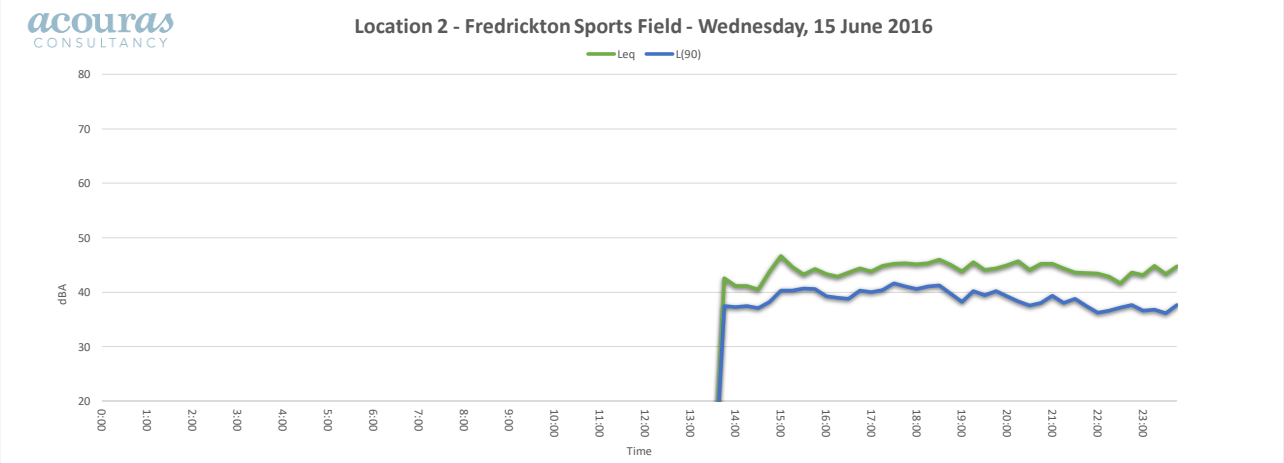
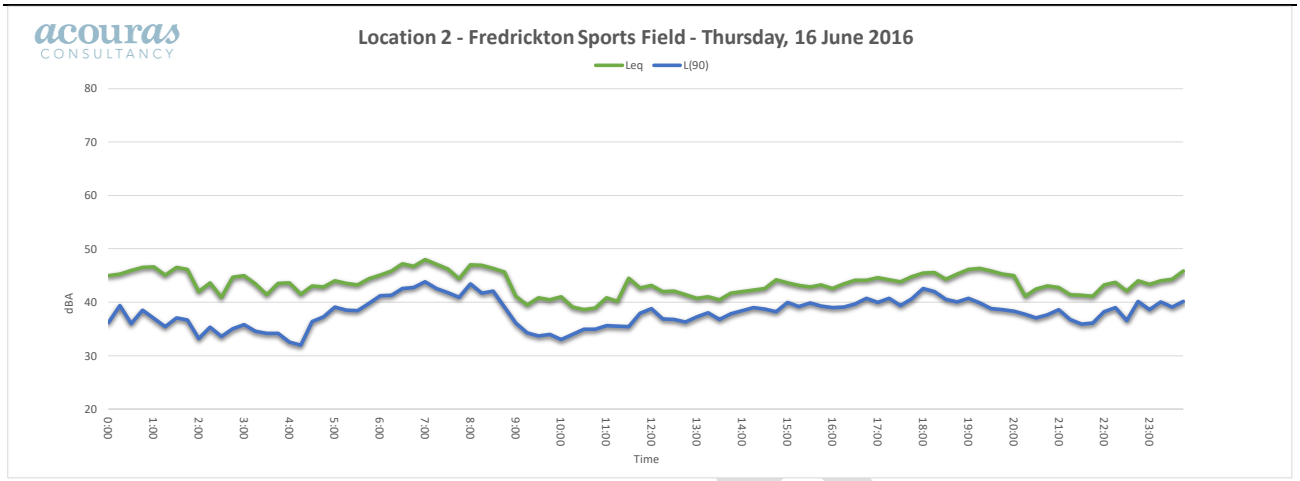
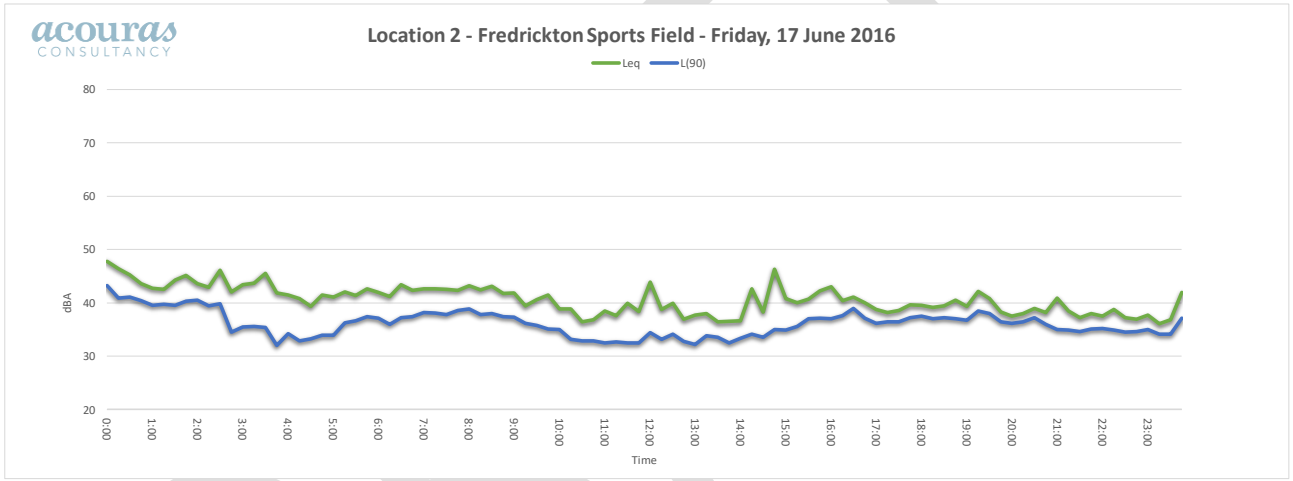
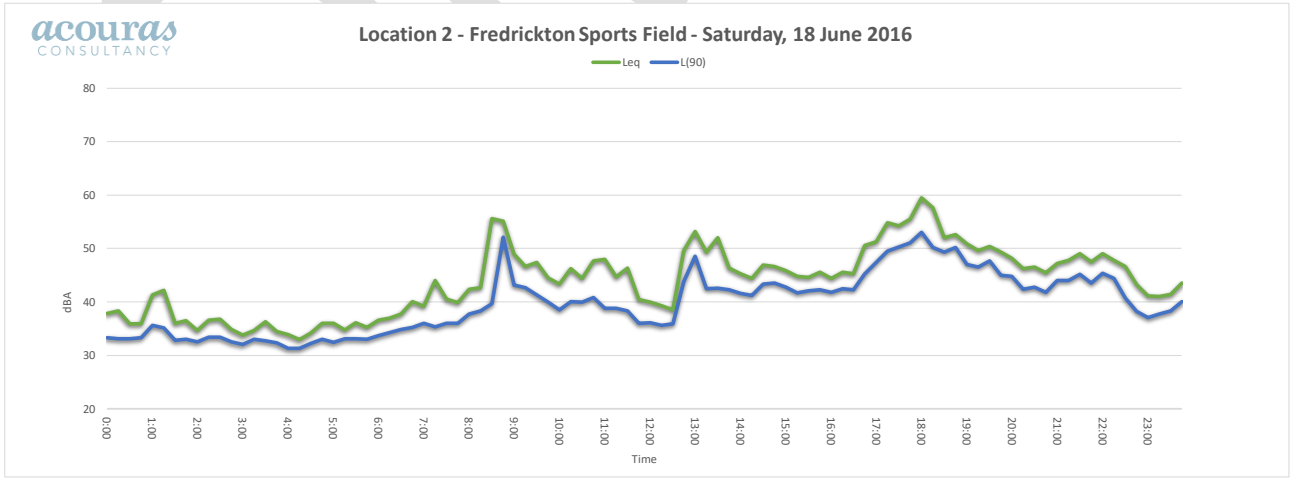
Leq
L(90)
dBA
Time

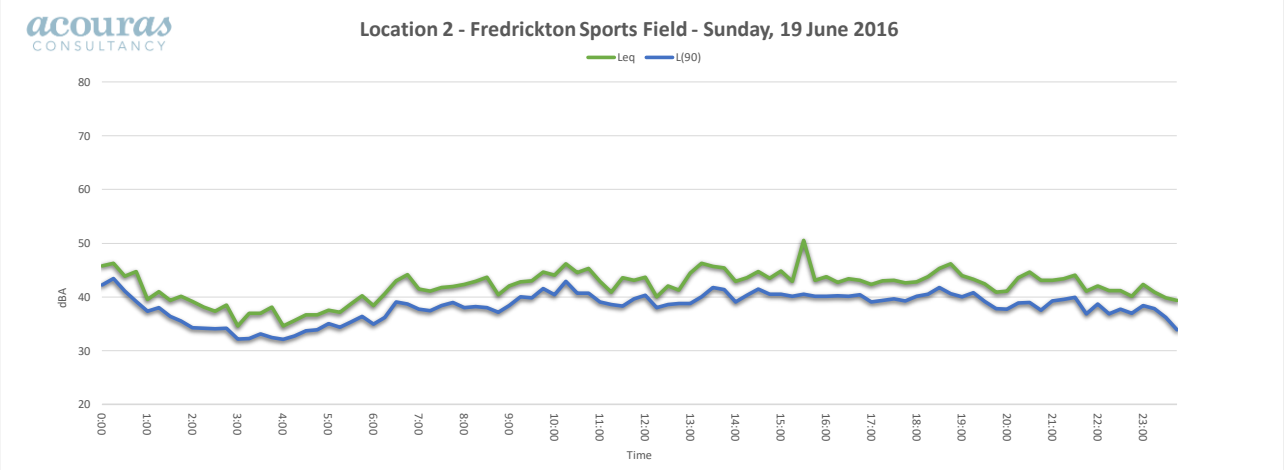

Location 1: Raymonds Lane - Thursday, 23 June 2016
Leq
L(90)
dBA
Time

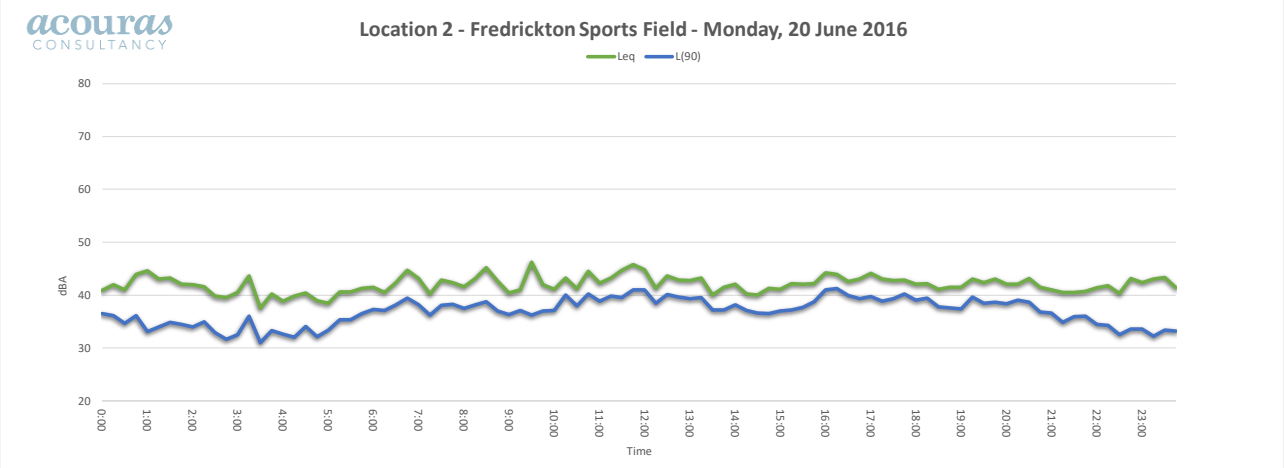

Location 2 - Fredrickton Sports Field - Wednesday, 15 June 2016
Leq
L(90)
dBA
Time

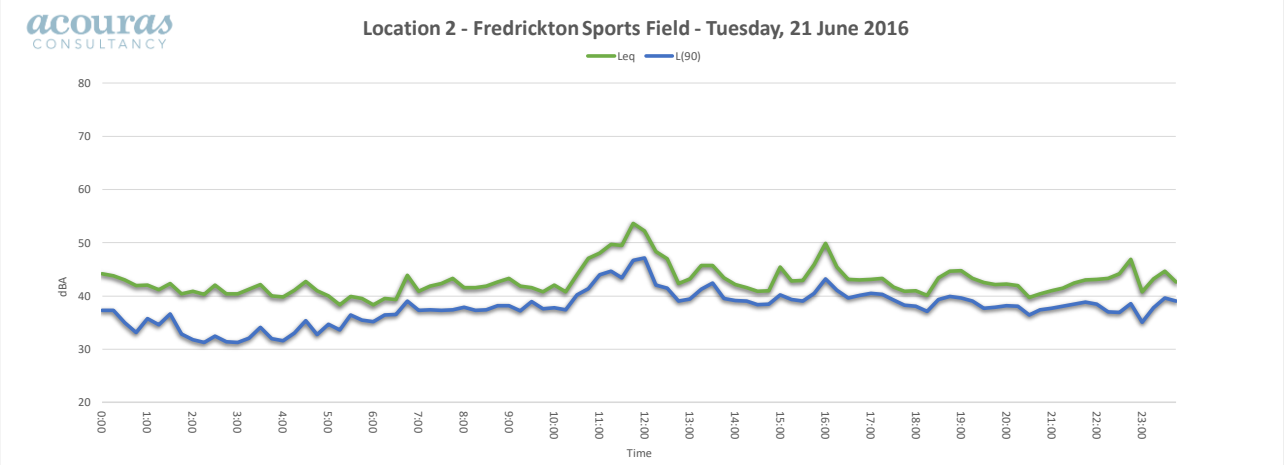

Location 2 - Fredrickton Sports Field - Thursday, 16 June 2016
Leq
L(90)
dBA
Time

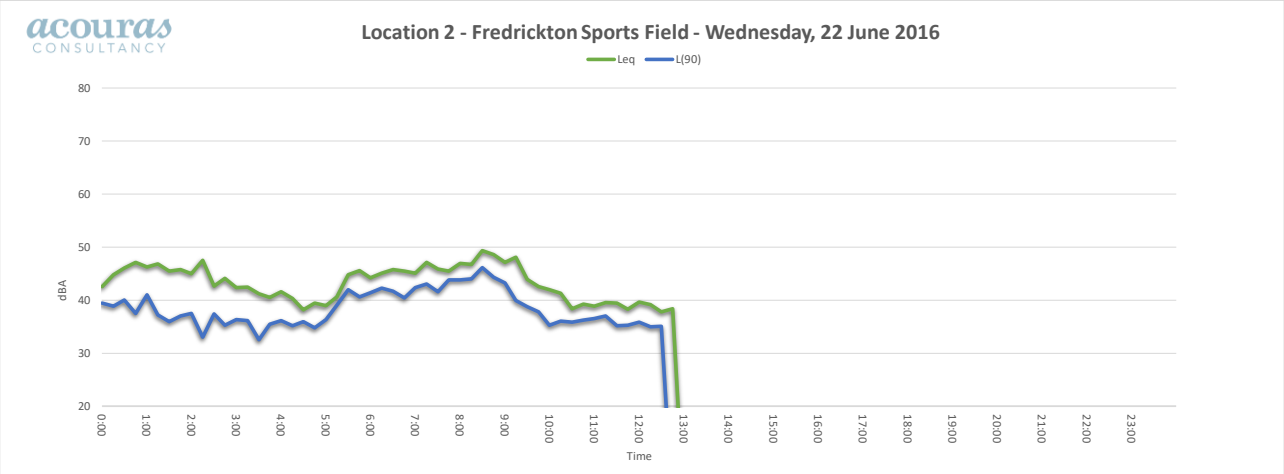

Location 2 - Fredrickton Sports Field - Friday, 17 June 2016
Leq
L(90)
dBA
Time


Location 2 - Fredrickton Sports Field - Saturday, 18 June 2016
Leq
L(90)
dBA
Time


Location 2 - Fredrickton Sports Field - Sunday, 19 June 2016
Leq
L(90)
dBA
Time


Location 2 - Fredrickton Sports Field - Monday, 20 June 2016
Leq
L(90)
dBA
Time


Location 2 - Fredrickton Sports Field - Tuesday, 21 June 2016
Leq
L(90)
dBA
Time


Location 2 - Fredrickton Sports Field - Wednesday, 22 June 2016
Leq
L(90)
dBA
80
70
60
50
40
30
20
0:00
1:00
2:00
3:00
4:00
5:00
6:00
7:00
8:00
9:00
10:00
11:00
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20:00
21:00
22:00
23:00
Time