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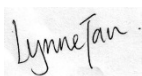
Port of Newcastle Operations Pty Ltd

Dyke Point Shed Storage

Noise Impact Assessment

20E-16-0160-TRP-456512-0

29 Sep 2016

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EXECUTIVE SUMMARY

Vipac Engineers and Scientists Ltd (Vipac) was engaged by Port of Newcastle Operations Pty Ltd (PoN) to carry out the Noise Impact Assessment of the proposed freight storage facility at Lot 93 DP 1193181, Dyke Road, Carrington, 2294, NSW.

The purpose of this assessment is to determine the potential noise impacts associated with the operational phases of the proposed freight storage facility, on noise sensitive receivers located in the surrounding area. Noise impacts have been assessed in accordance with the Environment Protection Authority (EPA) Office of Environment and Heritage (OEH) Industrial Noise Policy (INP), and the Department of Environment, Climate Change and Water (DECCW) (NSW) Road Noise Policy.

The findings show that the predicted noise impact associated with the proposed Dyke Point Shed Storage operations on the noise sensitive receivers range between 30 to 44dB(A) L_{eq} . This range is within the applicable Project Specific Noise Level criteria during all periods (i.e. daytime, evening and night-time) at all of the nearest noise sensitive receptors.

The predicted noise impact during the night-time period associated with Dyke Point Shed Storage operations on the noise sensitive receivers range between 40 to 58dB(A) L_1 , which is within the sleep disturbance noise criteria at all of the nearest noise sensitive receptors.

It is noteworthy that the truck movements operations within the internal roads of the Port of Newcastle land operate 24 hours a day, 7 days a week and therefore, the noise impact from the truck movements associated with the Dyke Point Shed Storage operations should not be an issue as the proposed Dyke Point Shed storage operations is not intended to generate additional truck movements within the internal roads, on top of the existing truck movements within the port. Notwithstanding the above, Vipac has taken into account the noise impact from the truck movements in the noise modelling and the noise prediction shows compliance at all of the nearest noise sensitive receptors.

The purpose of this facility is to provide a covered storage area for short term leasing or licencing of all / part of the building to various tenants for various lengths of time and this type of operations (loading/ unloading activities) would likely occur twice a year. In terms of cargo being disseminated from the facility, the cargo would typically be transported to its destination via Darling Street heavy vehicle route onto Industrial Drive heading in a northerly or westerly direction.

It is anticipated that the number of truck movements generated by the proposed development on public road systems would be very minimal and which could be easily accommodated with the existing truck movements generated by the port activities. Vipac has also reviewed the traffic volume data from Road & Maritime Services counter on Hannell Street (Station ID 05209), approximately 1.2km south of Industrial Drive, the annual daily traffic volume on year 2016 is approximately 31,353 vehicles. With approximately 31,353 vehicles per day on Industrial Drive, the traffic noise impact generated by the proposed Dyke Point Shed operations will be negligible, assuming the truck movements generated by the proposed facility is less than 10% of the total truck movements on the Industrial Drive.

The traffic noise impact along Darling Street and Elizabeth Street would not be an issue as the receivers along both Darling Street and Elizabeth Street are commercial/industrial receivers. Notwithstanding that, the slight increase in truck movements comparing to existing truck movements along both roads would not significantly increase the noise levels at the receivers.

Predicted noise levels associated with all other activities on-site at Dyke Point Shed Storage facility comply with the applicable noise criteria during the day, evening and night periods. It is therefore Vipac's professional opinion that the proposed development is acceptable from an acoustic point of view.

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1 INTRODUCTION

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The purpose of this assessment is to determine the potential noise impacts associated with the operational phases of the proposed freight storage facility, on noise sensitive receivers located in the surrounding area. Noise impacts have been assessed in accordance with the Environment Protection Authority (EPA) Office of Environment and Heritage (OEH) Industrial Noise Policy (INP), and the Department of Environment, Climate Change and Water (DECCW) (NSW) Road Noise Policy.

2 PROJECT DESCRIPTION

2.1 SITE LOCATION

The Dyke Point Shed is located within Carrington precinct of Port of Newcastle land. According to the Newcastle City Council's Local Environmental Plan (LEP), the subject site is found within SP1 Special Activities under SEPP (Three Ports) and the nearest sensitive receivers are located to the south (Honeysuckle) and north east (Stockton) of the Dyke Point Shed. The nearest noise sensitive receivers to the south of the proposed freight storage facility are found within a mixed use zone, consisting of multi-storey residential and mixed use development and the receivers to the north east of the proposed freight storage facility are found within a low density residential zone with single and double storey dwellings.

The location of the Dyke Point Shed and the noise sensitive receivers in the surrounding area are illustrated in **Figure 2-1**.

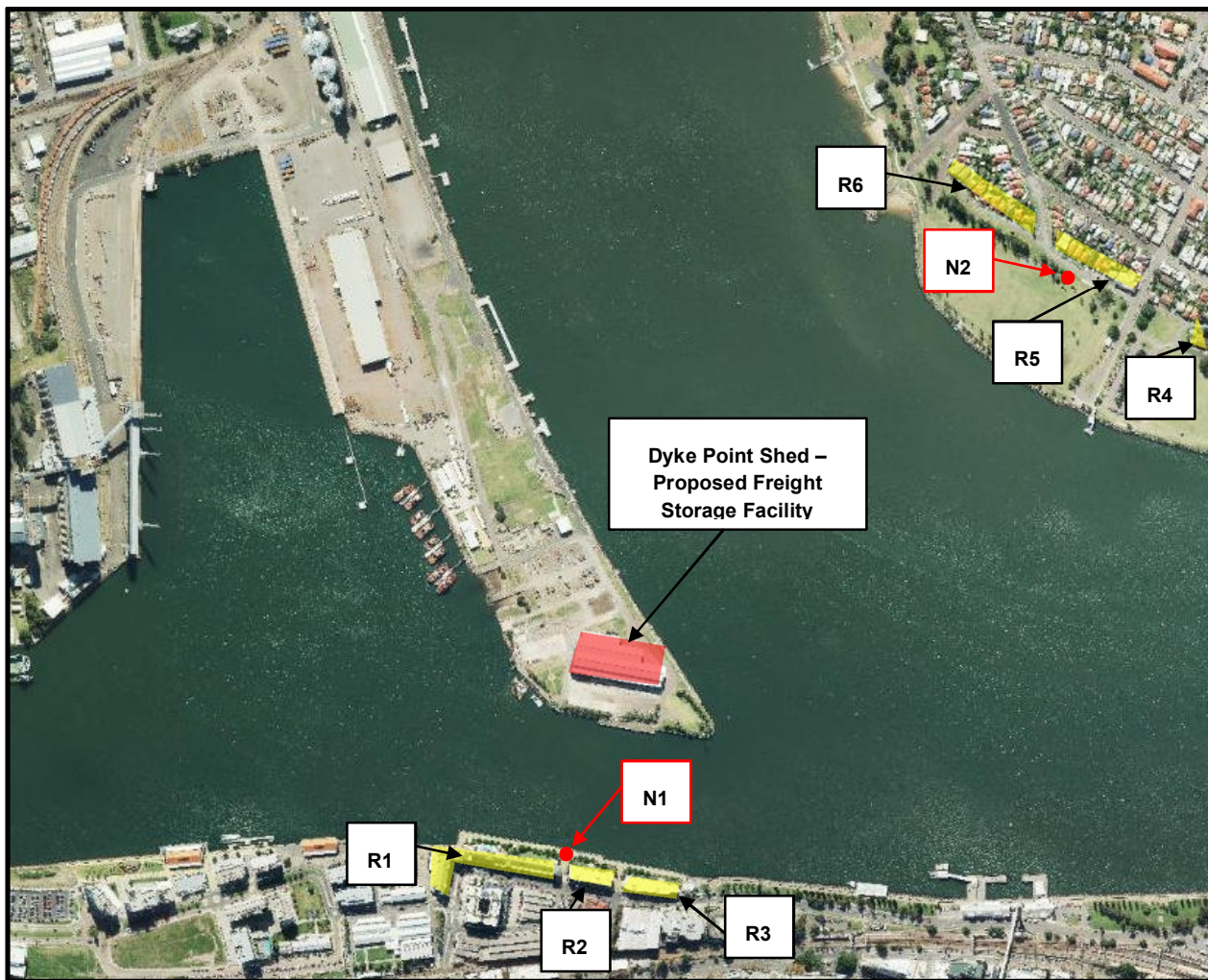


Figure 2-1: Dyke Point Shed and Nearest Noise Sensitive Receivers

2.2 PROPOSED DYKE POINT SHED STORAGE FACILITY

The facility would provide for the storage of a range of freight including (but not limited to) project cargo such as wind turbine components, tunnel boring machine components, large industrial components, luxury boats, electrical transformers and machinery, general cargo such as farm machinery, excavators, and construction machinery, and breakbulk such as steel or timber. Freight or cargo that is hazardous, loose bulk or a waste product would not be stored or handled at the facility.

This would provide an approved covered storage facility for the purposes of short term leasing or licencing of all / part of the building to various tenants for various lengths of time. This type of operation would have minimal environmental impacts and would not require extensive mitigation measures to be applied to the existing building. No manufacturing, processing or industrial uses are anticipated.

Freight would be unloaded via ships gear onto trucks at berths within Carrington Precinct i.e. West Basin 4 or other berths within the Port, and transported to the facility for unloading and storage. Distribution of cargo would be via truck to its destination. Cargo may also be trucked from its point of origin, to the storage facility for storage and consolidation, and then trucked to a Carrington Precinct berths or another berth within the Port for export and the Facility would operate 24 hours a day.

2.3 NOISE SENSITIVE RECEIVERS

A list of the nearest potentially affected noise sensitive receivers to the proposed freight storage site is provided in **Table 2-1** below. It should be noted that noise sensitive receivers with similar distance and noise exposure to the proposed freight storage activities will be categorised into one group.

Table 2-1: Noise Sensitive Receivers

ID	Property	Usage (INP Categories)
R1	350 Wharf Road, Newcastle Crowne Hotel (5 storeys building)	Urban
R2	304 Wharf Road, Newcastle Residential Apartment 1 (5 storeys building)	Urban
R3	304 Wharf Road, Newcastle Residential Apartment 2 (5 storeys building)	Urban
R4	16, 18 , 20 Wharf Crescent, Stockton 1, 1A Newcastle Street, Stockton	Sub-Urban
R5	22,24,26,28,30,32,34,36 Hunter Street, Stockton 1, 12 Mitchell Street Stockton	Sub-Urban
R6	40,42,44,46,48,50,52,54,56,58 Hunter Street, Stockton	Sub-Urban

3 EXISTING NOISE ENVIRONMENT

3.1 UNATTENDED NOISE MEASUREMENTS

Vipac installed noise logging equipment at two locations for a period of ten (10) days on the 15th September 2016 to 26th September 2016 to measure baseline environmental noise levels at representative noise sensitive receptor locations in the vicinity of the proposed development site. The monitoring points listed in **Table 3-1** were chosen, as they are representative of the closest noise sensitive receptors located in the vicinity of Dyke Point Shed. The locations of the monitoring points are also shown in **Figure 2-1**.

The primary aim of the noise logging survey was to determine the existing environmental noise levels of the potentially affected area and to enable an assessment of the potential noise impacts on the receiving environment during the construction and operational phases.

Table 3-1: Monitoring Locations

Loc.	Noise Survey Dates	Location / Address	Instrument	Serial No.
N1	15/09/2016 – 24/09/2016	Honeysuckle Broadwalk, between Crowne Hotel and Residential Apartment	Duo dB	10304
N2	15/09/2016 – 24/09/2016	Passive Recreation Area, Opposite 34 Hunter Street, Stockton	LD 870	1466

The instruments were programmed to accumulate noise data continuously over sampling periods of 15-minutes for the entire monitoring period. Internal software then calculates and stores the Ln percentile noise levels for each sampling period, which can later be retrieved for detailed analysis.

The instruments were calibrated using a Rion NC-73 calibrator immediately before and after monitoring and showed a maximum error of 0.5 dB.

Meteorological data during the noise logging survey was obtained from the Bureau of Meteorology (BoM) Weather Station at Newcastle Nobby (061055). Where adverse meteorological conditions such as wind exceeding 5m/s and/or rain were observed in any 15-minute period, this data has been excluded.

A summary of current noise levels at the noise monitoring locations is presented in **Table 3-2** and graphically illustrated in **Appendix B**.

Table 3-2: Summary of current ambient noise levels - dB(A)

Loc.	Period	L _{Aeq}	L _{A90}	RBL ¹
N1	Day	56	48	46
	Evening	54	47	46
	Night	51	45	43
N2	Day	55	44	42
	Evening	49	43	39
	Night	49	43	39

3.2 ATTENDED NOISE MEASUREMENTS

Vipac also conducted short period 15-minute attended noise measurements at the two baseline monitoring locations (N1 and N2) on the 26th September 2016 to quantify noise sources that dominate the overall ambient noise levels in the area. **Table 3-3** provides the results of the attended measurements.

Table 3-3: Attended Measurement Results

Loc.	Time	L _{Aeq}	L _{A90}	Description
N1	11:51	52	47	Overall noise environment at this monitoring location was dominated by traffic noise from Wharf Road and pedestrian noise walking on the Boardwalk. Birds chirping were audible occasionally. Two boats/ferries passing the harbour were observed during the measurement period. However, the noise from the boat/ferries was not dominating the overall environment. Noise associated with the Port of Newcastle operations was not audible at the monitoring location during the measurement period.

¹ RBL is the median of the overall assessment background noise level calculated using OEH Industrial Noise Policy methodology as defined in the glossary of acoustic terms.

Loc.	Time	L _{Aeq}	L _{A90}	Description
N2	12:24	56	44	The noise environment was dominated by traffic noise from Hunter Street and birds chirping. The noise from a local event was also audible at background level however; the music from the event was getting louder towards the end of the measurement. Occasionally, noise associated with the Port of Newcastle operations at Carrington precinct was faintly audible.

4 CRITERIA

4.1 NSW EPA INDUSTRIAL NOISE POLICY (INP)

The EPA (OEH) INP set limits on the noise that may be generated by the Dyke Point Shed operations during the operational stage. These limits are dependent upon the existing noise levels at the site and are designed to ensure changes to the existing noise environment are minimised and deal with the intrusiveness of the noise and the amenity of the environment. The most stringent of the limits is taken as the limiting criterion for the noise source.

The intrusiveness noise criterion requires that the L_{Aeq,15minutes} of the noise source, measured at the most sensitive receiver under worst-case conditions, should not exceed the Rated Background Level (RBL) by more than 5dB, represented as follows:

- $L_{Aeq,15minutes} \leq RBL + 5dB$

Noise levels at nearby noise sensitive receptors (located in the surrounding area) associated with Dyke Point Shed Operations should not exceed the Project Specific Noise Levels detailed in **Table 4-1**.

Table 4-1: Project Specific Noise Levels at Noise Sensitive Receptors dB(A) - Residential

Loc.	Period	RBL	Intrusiveness Criteria Level	Recommended ¹ Acceptable L _{Aeq}	Project Specific Noise Level
R1 to R3 (N1)	Day	46	51	60	51
	Evening	46	51	50	51
	Night	43	48	45	45
R4 to R6 (N2)	Day	42	47	55	47
	Evening	39	44	45	44
	Night	39	44	40	40

4.2 SLEEP DISTURBANCE CRITERIA

Guidance indicating the potential for sleep disturbance is set out in the NSW Environmental Criteria for Road and Traffic Noise (EPA 1999), and is summarised as follows:

¹ Recommended Acceptable L_{Aeq} noise level for residence in rural area from Table 2.1 in OEH Industrial Noise Policy.

“OEH reviewed research on sleep disturbance in the NSW Environmental Criteria for Road Traffic Noise (ECRTN) (EPA, 1999). This review concluded that the range of results is sufficiently diverse that it was not reasonable to issue new noise criteria for sleep disturbance.

From the research, OEH recognised that current sleep disturbance criterion of an $L_{A1, (1 \text{ minute})}$ not exceeding the $L_{A90, (15 \text{ minute})}$ by more than 15 dB(A) is not ideal. Nevertheless, as there is insufficient evidence to determine what should replace it, OEH will continue to use it as a guide to identify the likelihood of sleep disturbance.

This means that where the criterion is met, sleep disturbance is not likely, but where it is not met, a more detailed analysis is required.

The detailed analysis should cover the maximum noise level or $L_{A1, (1 \text{ minute})}$, that 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. Some guidance on possible impact is contained in the review of research results in the appendices to the ECRTN. 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).

The $L_{A1, (1 \text{ minute})}$ descriptor is meant to represent a maximum noise level measured under ‘fast’ time response. OEH will accept analysis based on either $L_{A1, (1 \text{ minute})}$ or $L_{A(Max)}$.

It should be noted that the OEH refers to the Office of Environment and Heritage, and DECCW refers to the Department of Environment, Climate Change and Water. DECC refers to the Department of Environment & Climate Change.

Table 4-2 details the criteria for sleep disturbance for each individual noise receivers.

Table 4-2: Sleep Disturbance Criteria – dB(A)

Location	Period	Rated Background Noise level (RBL)	Criteria (RBL +15)
R1 to R3 (N1)	Night	43	58
R4 to R6 (N2)	Night	39	54

4.3 NSW ROAD NOISE POLICY (RNP)

The requirements of the NSW Road Noise Policy (RNP) published by the Department of Environment, Climate Change and Water (DECCW) are also applicable to this assessment. **Table 4-3** summarises the road category to establish the noise assessment criteria based on the type of road and the land use developments. The proposed development has the potential to generate additional traffic on the arterial/local roads that can potentially impact on the nearby noise sensitive receivers.

Table 4-3: Road Traffic Noise Assessment Criteria for Residential Land Uses

Road Category	Type of project / land use	Assessment Criteria/ Target Noise Level, dB(A)	
		Day (7am-10pm)	Night (10pm-7am)
Freeway/arterial/sub-arterial Road (Industrial Drive)	3. Existing residences affected by additional traffic on existing freeways/arterial/sub-arterial roads generated by land use developments.	L _{Aeq} , (15hour). 60 (external)	L _{Aeq} , (9 hour) 55 (external)

Note: These criteria are for assessment against façade- corrected noise levels when measured in front of a building façade. Hence, a correction factor of 2.5 dB is added to the predicted noise levels

As stated in Section 3.4 of the Road Noise Policy, with regard to existing residences and other sensitive land uses affected by additional traffic on existing roads generated by land use development, if the assessment criteria is already exceeded then any increase in total traffic noise level should be limited to 2dB above that of the corresponding 'no build option'.

5 NOISE MODELLING

Noise modelling has been performed using the SoundPLAN[®] computational noise modelling software package. The use of the SoundPLAN[®] software and referenced modelling methodology is accepted for use in the state of NSW by the Office of Environment and Heritage (OEH) for environmental noise modelling purposes. Vipac have undertaken numerous noise modelling and impact assessments previously for a range of projects, including mining and industrial projects using SoundPLAN[®].

5.1 NOISE SOURCES

Vipac has been advised by PoN that the main noise contributor associated with the proposed Dyke Point Shed Facility will comprise of semi-trailers, forklifts, reach stackers.

Noise levels of the equipment associated with the proposed development is detailed in **Table 5-1**.

Table 5-1: Noise Levels of each Item of Equipment

Activities	63	125	250	500	1000	2000	4000	dBA	Source
Reach Stacker Movements - L _{Aeq}	101	99	98	102	101	99	90	105	Sound Power Level
Forklift Movements including reversing beacon - L _{Aeq}	109	108	106	102	98	97	93	105	Sound Power Level
Truck Movements at slow speed @ 7m - L _{Aeq}	64	59	58	59	59	57	52	63	Sound Pressure Level
Truck Movements at slow speed @ 7m - L _{A1}	76	72	71	78	74	71	66	79	Sound Pressure Level
Container Landing - L _{A1}	118	121	116	114	110	104	99	115	Sound Power Level

5.2 WEATHER CONDITIONS

Four acoustic modelling scenarios were assessed for the operational phase of the proposed Dyke Point Shed Facility within the SoundPLAN program using CONCAWE algorithms under both neutral and worst case weather conditions for the day and night periods. It should be noted that sound will propagate further through the atmosphere under certain weather conditions dependent on air pressure variations, wind speed and

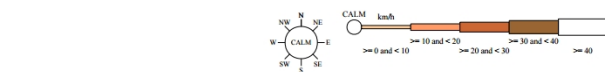
direction variations, temperature inversions etc. The 'worst-case' weather conditions chosen were those highly conducive to the propagation of sound.

Table 5-2 presents the weather parameters used in the CONCAWE calculations based on annual data from the Bureau of Meteorology (BoM) Weather Station at Newcastle Nobby NSW (061055).

Table 5-2: Sound Plan Weather Parameters

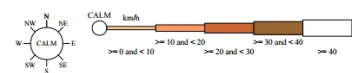
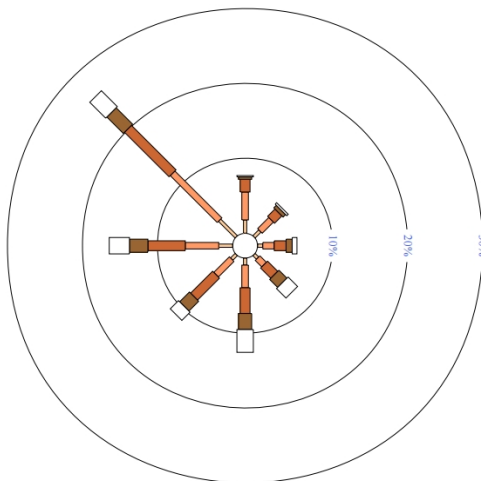
Parameter	Day		Evening/Night	
	Neutral	Worst-Case	Neutral	Worst-Case
Pasquill Stability Category	B	D	D	F
Wind Speed (m/s)	0	3	0	3
Humidity (%)	60	60	70	70
Temperature (deg Celsius)	16	16	11	11
Met Category	3	5	4	6

Copies of wind roses for the BoM Weather Station at Newcastle Nobby (061055) are provided below, illustrating the Annual 9.00am and 3.00pm Wind Roses in the area. The prevailing wind direction in the area is from a north westerly, southerly, easterly direction with notable winds from south easterly direction to a lesser extent. This is noteworthy given the fact that the nearest noise sensitive receivers are located to the south and north east of the proposed Dyke Point Facility. Therefore, the predominant winds in the area are not expected to be blowing from the proposed Facility in the direction of the nearby sensitive receivers for the majority of the time.



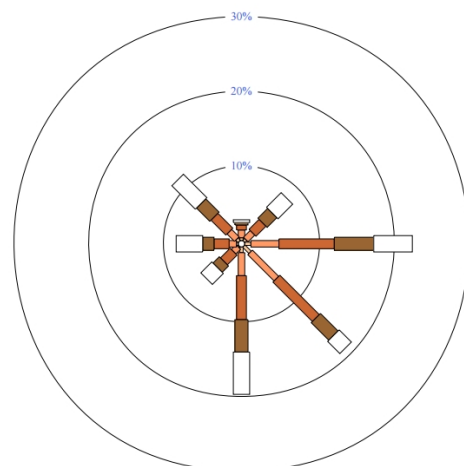
9 am
19175 Total Observations

Calm 8%



3 pm
19149 Total Observations

Calm 2%



5.3 NOISE MODELLING SCENARIO

Vipac understands that the project cargo will be unloaded from a self-gearred vessel at a berth (West Basin 4 or East Basin 1 & 2) within the Carrington Precinct to a semi-trailer and trucked on internal port roads to the proposed facility at Dyke Point. The number of truck movements per operation would be approximately two movements per hour for a 24 hour period. Then the truck will access the building through a roller shuttle door on the eastern façade. The unloading and loading operations will be undertaken by a forklift and a reach stacker within the building. It is likely that the project cargo will be stored for a period of 6 months before the cargo is disseminated. Therefore, the loading and unloading operations of the proposed facility are likely to occur twice a year. The cargo being disseminated from the proposed facility will typically leave the Carrington Port Precinct via Darling Street heavy vehicle route on to Industrial Drive heading in a northerly or westerly direction.

Vipac assumed the following in the noise model:

- Truck driving at 25km/h. two movements per hour, which equivalent to 10 minutes of driving for two movements per hour (operating for 17% of the 24 hour period);
- One forklift and one reach stacker operating within the shed with door closed (operating for 80% of the 24 hour period);
- The truck route to the Dyke Point Facility is illustrated in **Appendix C**

5.4 MODELLING ASSUMPTIONS

The following assumptions were made in developing the acoustic model of the proposed Facility:

- Based on Vipac's observation on site, the ground terrain between the proposed Facility and noise sensitive receivers were relatively flat and therefore, it is assumed to be flat terrain in the noise model;
- The ground absorption in the proposed site and the harbour were assumed to be fully reflective and the ground absorption in the noise receiver surrounding to be absorptive;
- Acoustic modelling has been conducted based on all the roller doors being fully closed during the unloading and loading operations;
- The influence of traffic noise or noise from other nearby source is not included in the noise model;
- The wall cladding and roof for the Dyke Point Shed was constructed with 0.42 corrugated metal sheet;

6 RESULTS

6.1 MODELLED NOISE – OPERATIONAL PHASE (L_{AEQ})

Noise prediction modelling has been carried out to assess the potential impact associated with the proposed facility on the existing noise environment at the nearest noise sensitive receptors located in proximity to the site. The predicted noise levels representative of the operational phase for both neutral conditions and worst-case conditions during day and evening/night-time are presented in **Table 6-1**.

Table 6-1: Operational Phase – Predicted Noise Impact (L_{Aeq})

Receiver	Floor Level	Day			Evening/Night		
		Neutral	Worst-Case	Criteria	Neutral	Worst Case	Criteria
R1	Ground Floor	39	43	51	40	43	51,45
	First Floor	39	43	51	40	43	51,45
	Second Floor	40	43	51	41	43	51,45
	Third Floor	40	43	51	41	43	51,45
	Fourth Floor	40	43	51	41	43	51,45
R2	Ground Floor	38	43	51	40	43	51,45
	First Floor	39	43	51	40	43	51,45
	Second Floor	40	43	51	40	43	51,45
	Third Floor	40	43	51	41	43	51,45
	Fourth Floor	40	43	51	41	43	51,45
R3	Ground Floor	39	43	51	40	43	51,45
	First Floor	40	43	51	41	43	51,45
	Second Floor	40	43	51	41	43	51,45
	Third Floor	40	43	51	41	44	51,45
	Fourth Floor	41	44	51	41	44	51,45
R4	Ground Floor	30	37	47	33	37	44,40
R5	Ground Floor	30	37	47	33	38	44,40
R6	Ground Floor	31	39	47	34	39	44,40

The predicted noise impact associated with the proposed Dyke Point Shed Storage operations on the noise sensitive receivers range between 30 to 44dB(A), which is within the applicable Project Specific Noise Level criteria during all periods (i.e. daytime, evening and night-time) at all of the nearest noise sensitive receptors.

Appendix D provides the noise contour maps associated with the noise modelling scenarios in respect of the operational phase of the proposed Dyke Point Shed Storage

6.2 SLEEP DISTURBANCE – OPERATIONAL PHASE

Noise prediction modelling has also been carried out to assess the potential impact on sleep disturbance associated with the Dyke Point Shed Storage operations at the nearest noise sensitive receptors located in proximity to the site. Two scenarios were modelled in this noise assessment to take into account the truck movement to/from the Facility and the unloading operations within the building. The predicted noise levels (L_{Amax}) representative of the operational phase for both neutral conditions and worst-case conditions during night-time for both scenarios are presented in **Table 6-2**.

Table 6-2: Predicted Noise Impact - L_{Amax} , dB(A)

Receiver	Floor Level	Truck Movements		Unloading Operations		Criteria
		Neutral	Worst	Neutral	Worst	
R1	Ground Floor	54	58	47	49	58
	First Floor	54	58	48	49	58
	Second Floor	54	58	48	50	58
	Third Floor	54	58	48	50	58
	Fourth Floor	54	58	48	50	58
R2	Ground Floor	54	58	47	49	58
	First Floor	54	58	47	49	58
	Second Floor	54	58	48	49	58
	Third Floor	54	58	48	50	58
	Fourth Floor	54	58	48	50	58
R3	Ground Floor	54	58	47	49	58
	First Floor	54	58	48	50	58
	Second Floor	54	58	48	50	58
	Third Floor	54	58	48	50	58
	Fourth Floor	54	58	48	50	58
R4	Ground Floor	44	49	40	44	54
R5	Ground Floor	45	50	40	44	54
R6	Ground Floor	47	52	41	45	54

The predicted noise impact during the night-time period associated with Dyke Point Shed Storage operations on the noise sensitive receivers range between 40 to 58dB(A), which is within the sleep disturbance noise criteria at all of the nearest noise sensitive receptors.

It is noteworthy that the truck movement operations within the internal roads of the Port of Newcastle land operate 24 hours a day, 7 days a week and therefore, the noise impact from the truck movements associated with the Dyke Point Shed Storage operations should not be an issue as the proposed Dyke Point Shed storage operations is not intended to generate additional truck movements within the internal roads, on top of the existing truck movements within the port. Notwithstanding the above, Vipac has taken into account the noise impact from the truck movements in the noise modelling and the noise prediction shows compliance at all of the nearest noise sensitive receptors.

Appendix E provides the noise contour maps associated with the noise modelling scenarios in respect of the operational phase of the proposed Dyke Point Shed Storage.

6.3 TRAFFIC IMPACT ASSESSMENT

The purpose of this facility is to provide a covered storage area for short term leasing or licencing of all / part of the building to various tenants for various lengths of time and this type of operations (loading/ unloading activities) would likely to occur twice a year. In terms of cargo being disseminated from the facility, the cargo would typically truck to its destination via Darling Street heavy vehicle route onto Industrial Drive heading in a northerly or westerly direction.

It is anticipated that the number of truck movements generated by the proposed development on public road systems would be very minimal and which could be easily accommodated with the existing truck movements generated by the port activities. Vipac has also reviewed the traffic volume data from Road & Maritime Services counter on Hannell Street (Station ID 05209), approximately 1.2km south of Industrial Drive, the annual daily traffic volume on year 2016 is approximately 31,353 vehicles. With approximately 31,353 vehicles per day on Industrial Drive, the traffic noise impact generated by the proposed Dyke Point Shed operations will be negligible, assuming the truck movements generated by the proposed facility is less than 10% of the total truck movements on the Industrial Drive.

The traffic noise impact along Darling Street and Elizabeth Street would not be an issue as the receivers along both Darling Street and Elizabeth Street are commercial/industrial receivers. Notwithstanding that, the slight increase in truck movements comparing to existing truck movements along both roads would not significantly increase the noise levels at the receivers.

7 NOISE MANAGEMENT PLAN

During the operation of the proposed Facility, we recommend the following noise management plan to be implemented to ensure the noise amenity of the surrounding receivers. This includes:

- Doors should be closed during the unloading activities
- Reduce throttle setting and turn off when not being used
- Avoid unnecessary revving of engines
- Mobile plants should not be idling on site
- Ensure there is no unnecessary shouting or loud stereos/radios on-site.
- No door slamming
- Install where feasible and reasonable less annoying alternatives to typical 'beeper' alarms such as broadband quackers, than emit noise over a wide range of frequencies

8 CONCLUSION

A noise impact assessment has been undertaken to determine the potential noise impact of the proposed Dyke Point Shed storage operations on noise sensitive receptors in the surrounding area of the proposed development

The predicted noise impact associated with the proposed Dyke Point Shed Storage operations on the noise sensitive receivers range between 30 to 44dB(A), which is within the applicable Project Specific Noise Level criteria during all periods (i.e. daytime, evening and night-time) at all of the nearest noise sensitive receptors.

The predicted noise impact during the night-time period associated with Dyke Point Shed Storage operations on the noise sensitive receivers range between 40 to 58dB(A), which is within the sleep disturbance noise criteria at all of the nearest noise sensitive receptors.

It is noteworthy that the truck movements operations within the internal roads of the Port of Newcastle land operate 24hours, 7 days a week and therefore, the noise impact from the truck movements associated with

the Dyke Point Shed Storage operations should not be an issue as the proposed Dyke Point Shed storage operations is not intended to generate additional truck movements within the internal roads, on top of the existing truck movements within the port. Notwithstanding the above, Vipac has taken into account the noise impact from the truck movements in the noise modelling and the noise prediction shows compliance at all of the nearest noise sensitive receptors.

The purpose of this facility is to provide a covered storage area for short term leasing or licencing of all / part of the building to various tenants for various lengths of time and this type of operations (loading/ unloading activities) would likely to occur twice a year. In terms of cargo being disseminated from the facility, the cargo would typically truck to its destination via Darling Street heavy vehicle route onto Industrial Drive heading in a northerly or westerly direction.

It is anticipated that the number of truck movements generated by the proposed development on public road systems would be very minimal and which could be easily accommodated with the existing truck movements generated by the port activities. Vipac has also reviewed the traffic volume data from Road & Maritime Services counter on Hannell Street (Station ID 05209), approximately 1.2km south of Industrial Drive, the annual daily traffic volume on year 2016 is approximately 31,353 vehicles. With approximately 31,353 vehicles per day on Industrial Drive, the traffic noise impact generated by the proposed Dyke Point Shed operations will be negligible, assuming the truck movements generated by the proposed facility is less than 10% of the total truck movements on the Industrial Drive.

The traffic noise impact along Darling Street and Elizabeth Street would not be an issue as the receivers along both Darling Street and Elizabeth Street are commercial/industrial receivers. Notwithstanding that, the slight increase in truck movements comparing to existing truck movements along both roads would not significantly increase the noise levels at the receivers.

Predicted noise levels associated with all other activities on-site at Dyke Point Shed Storage facility comply with the applicable noise criteria during the day, evening and night periods. It is therefore Vipac's professional opinion that the proposed development is acceptable from an acoustic point of view.

Appendix A : GLOSSARY OF TERMS

A list of commonly used acoustical terms (and their definition) used in this report is provided below, as an aid to readers of the report.

Term	Definition
$L_{eq,1hr}$	Equivalent Continuous Noise Level - which, lasting for as long as a given noise event has the same amount of acoustic energy as the given event for the period of an hour.
$L_{A10,1 hr}$	The noise level, which is equalled or exceeded for 10% of the measurement period of one hour.
$L_{A90,T}$	The noise level, which is equalled or exceeded for 90% of a given measurement period, T. $L_{A90,T}$ is used in Australia as the descriptor for background noise.
$L_{Aeq,T}$	The equivalent continuous A-weighted sound pressure level that has the same mean square pressure level as a sound that varies over time, for a given time period. It can be considered as the average sound pressure level over the measurement period and is commonly used as a descriptor for ambient noise.
L_n	The Sound Pressure levels that is equalled or exceeded for n% of the interval time period. Commonly used noise intervals are L_1 , L_{10} , L_{90} and $L_{99\%}$
$L_{A10,18hrs}$	The L_{10} noise level for the time period extending from 6am to midnight.

Appendix B : NOISE LOGGING RESULTS



Figure 8-1: Noise Logger N1

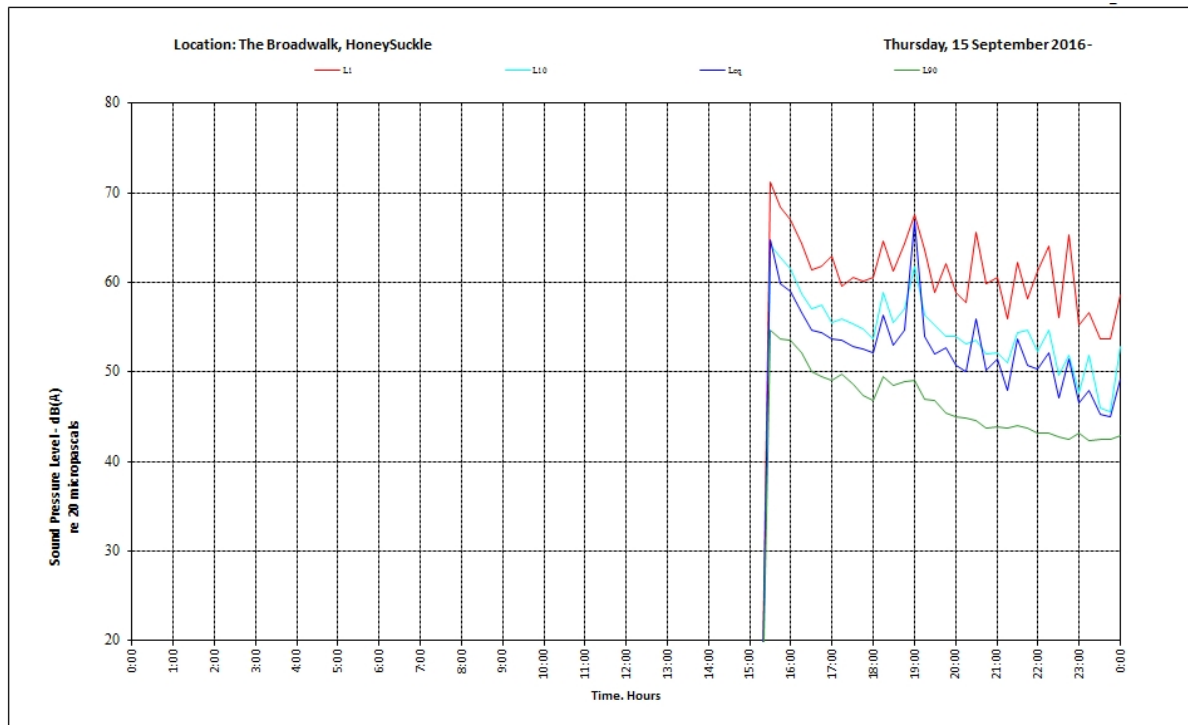


Figure 8-2: Noise Logging Results , N1 – Day 1

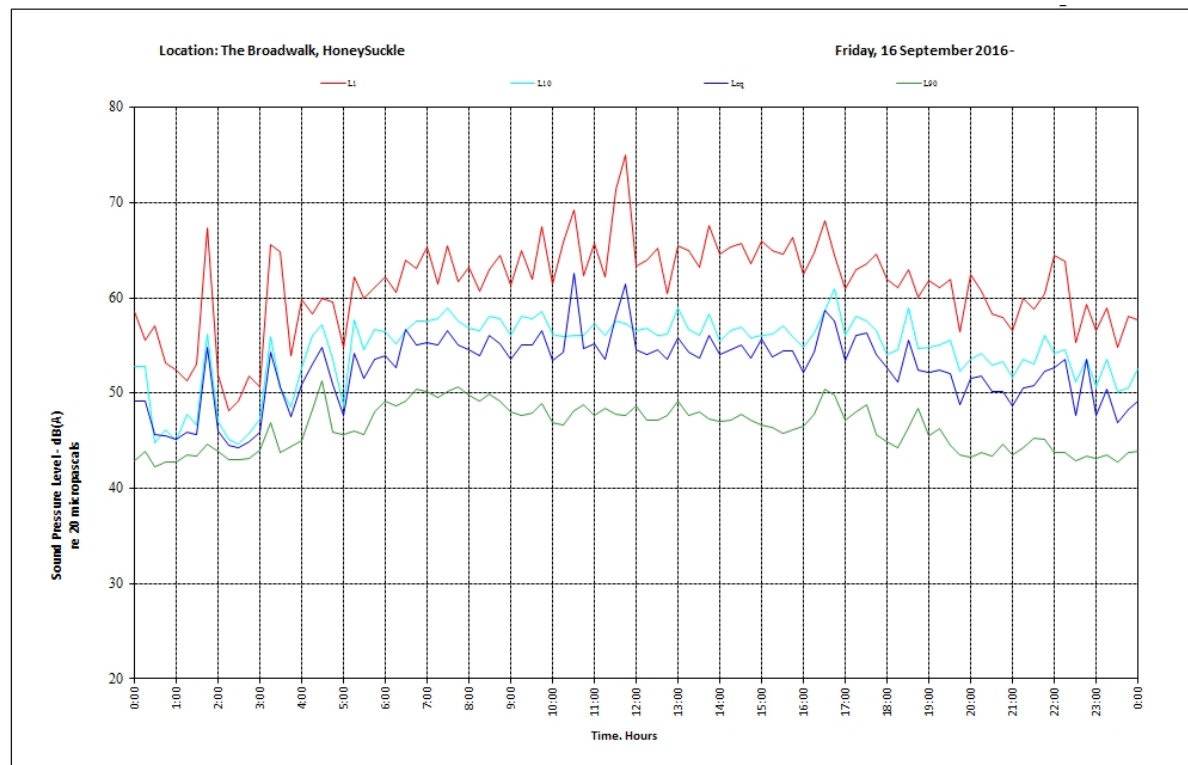


Figure 8-3: Noise Logging Results, N1 – Day 2

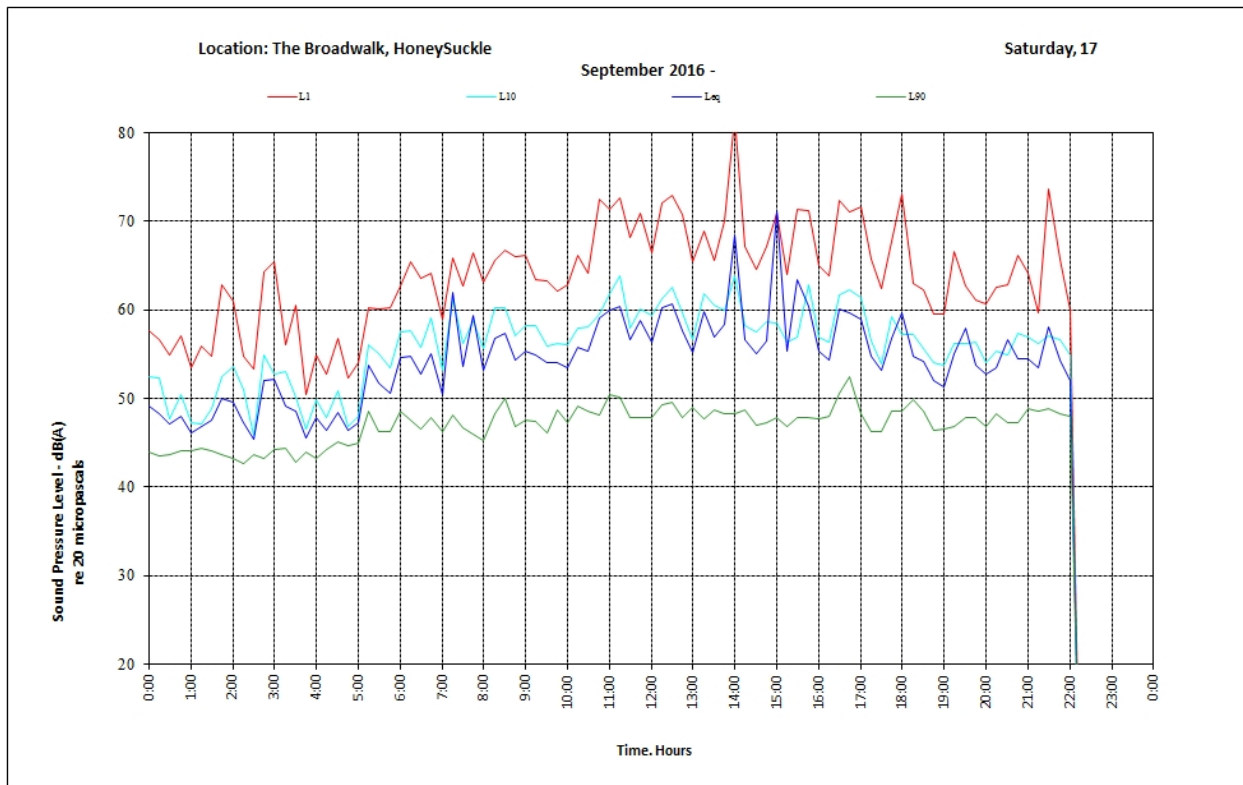


Figure 8-4: Noise Logging Results , N1 – Day 3

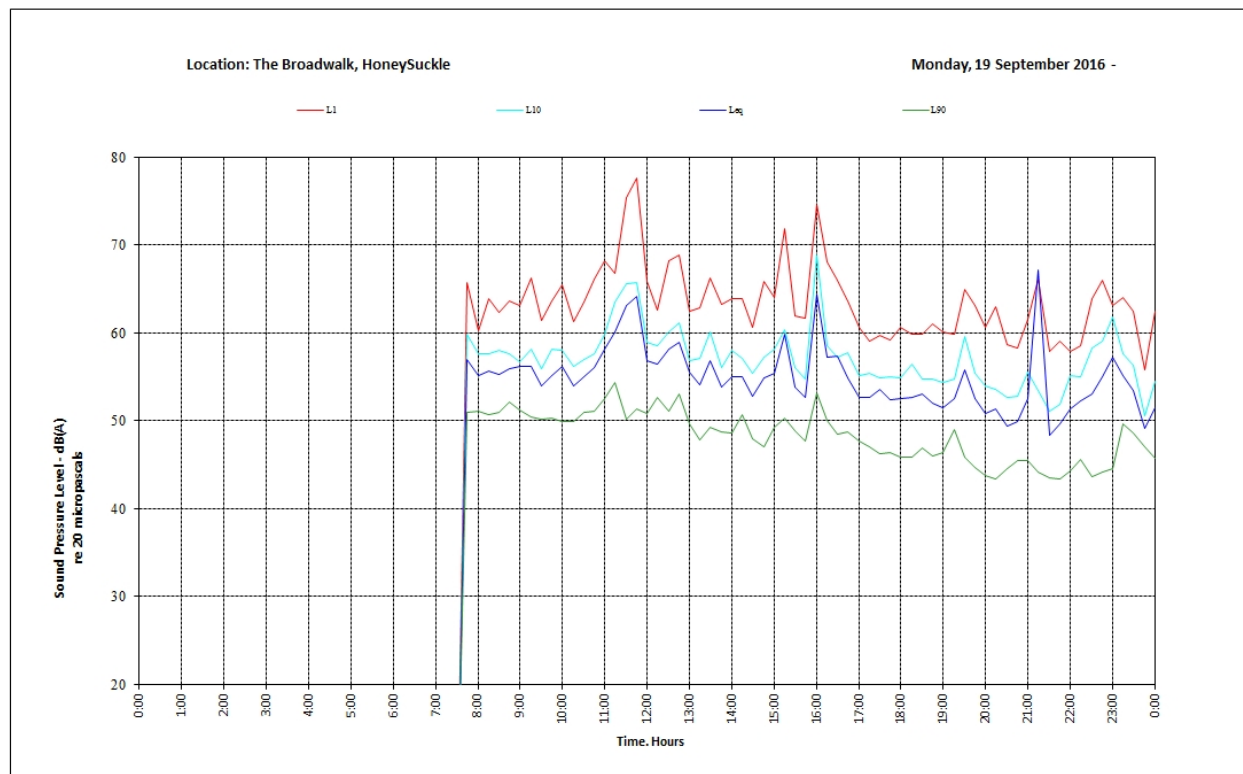


Figure 8-5: Noise Logging Results , N1 – Day 5

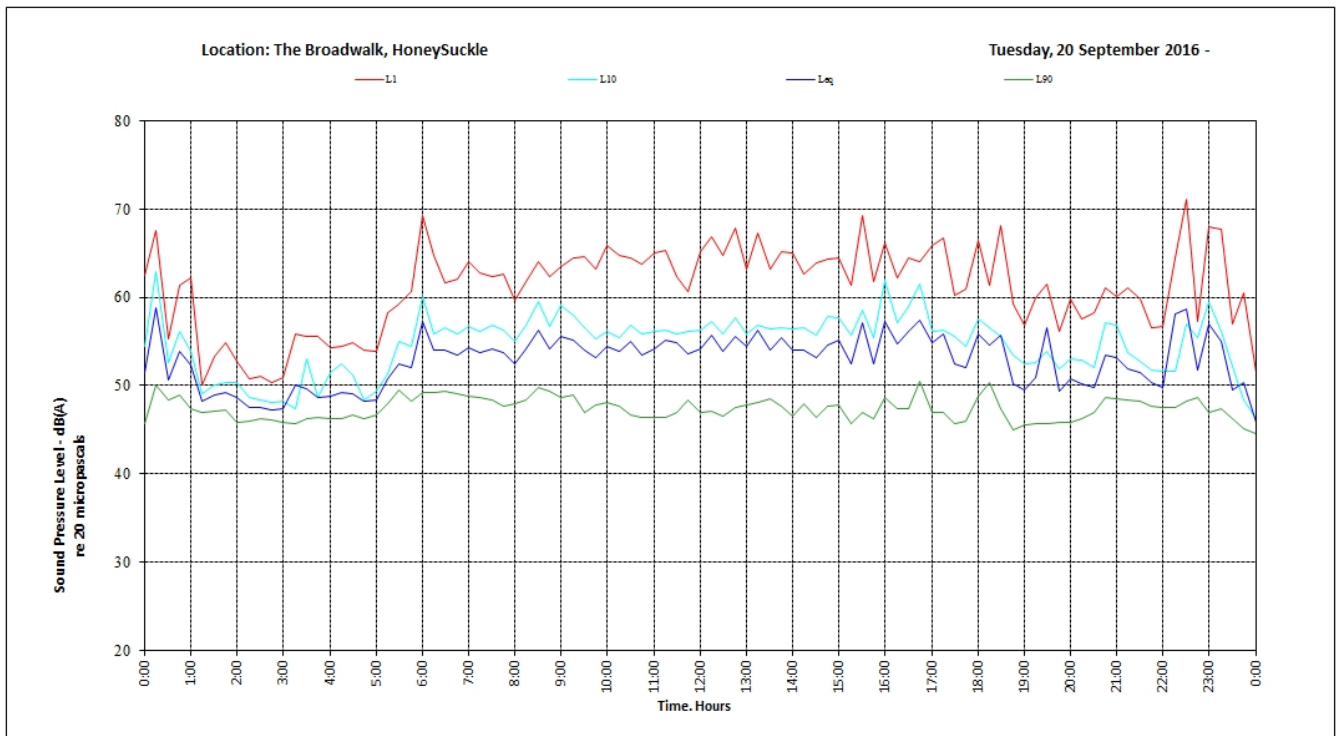


Figure 8-6: Noise Logging Results , N1 – Day 6

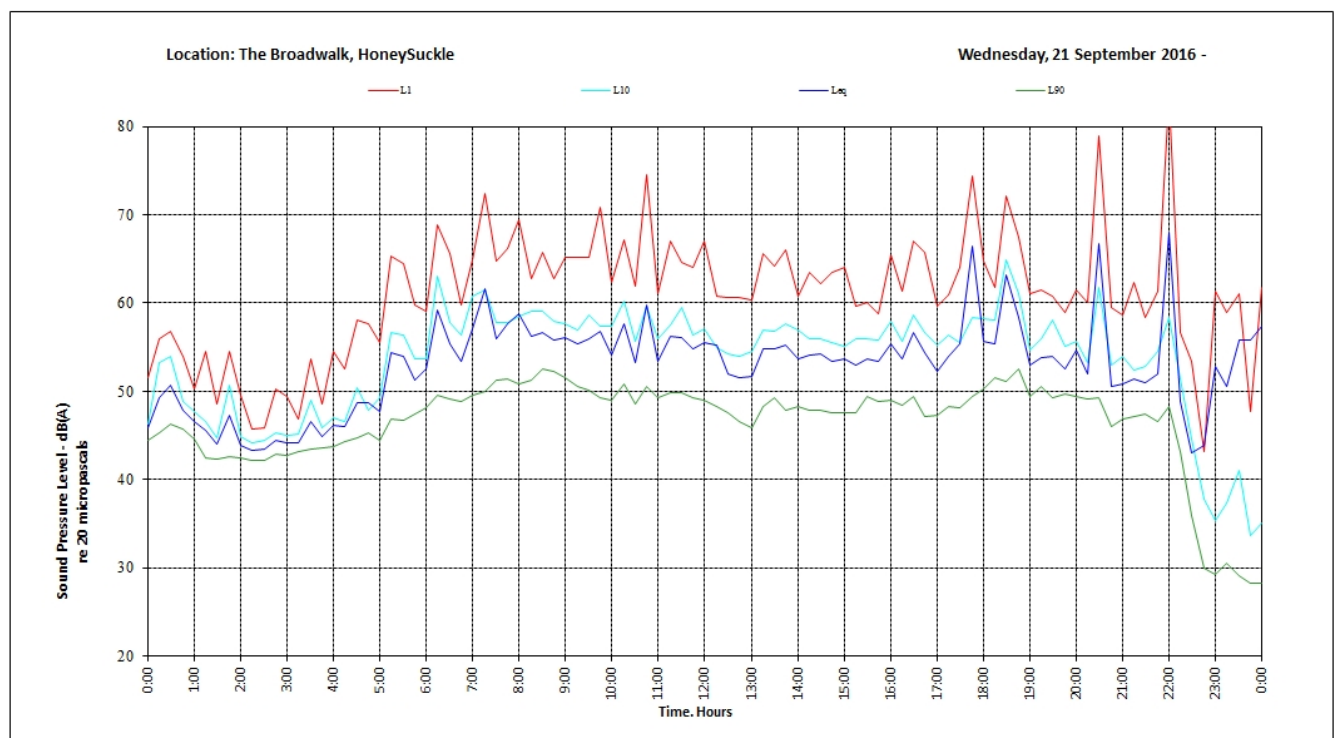


Figure 8-7; Noise Logging Results , N1 – Day 7

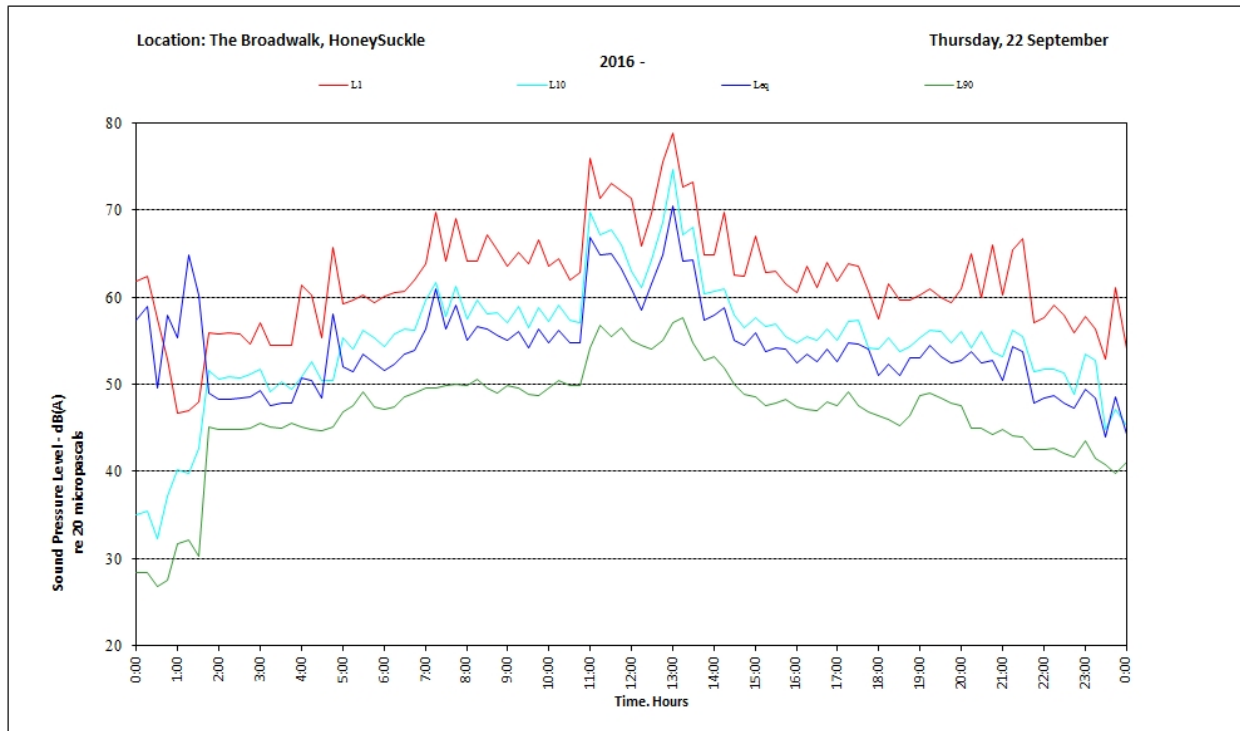


Figure 8-8: Noise Logging Results , N1 – Day 8

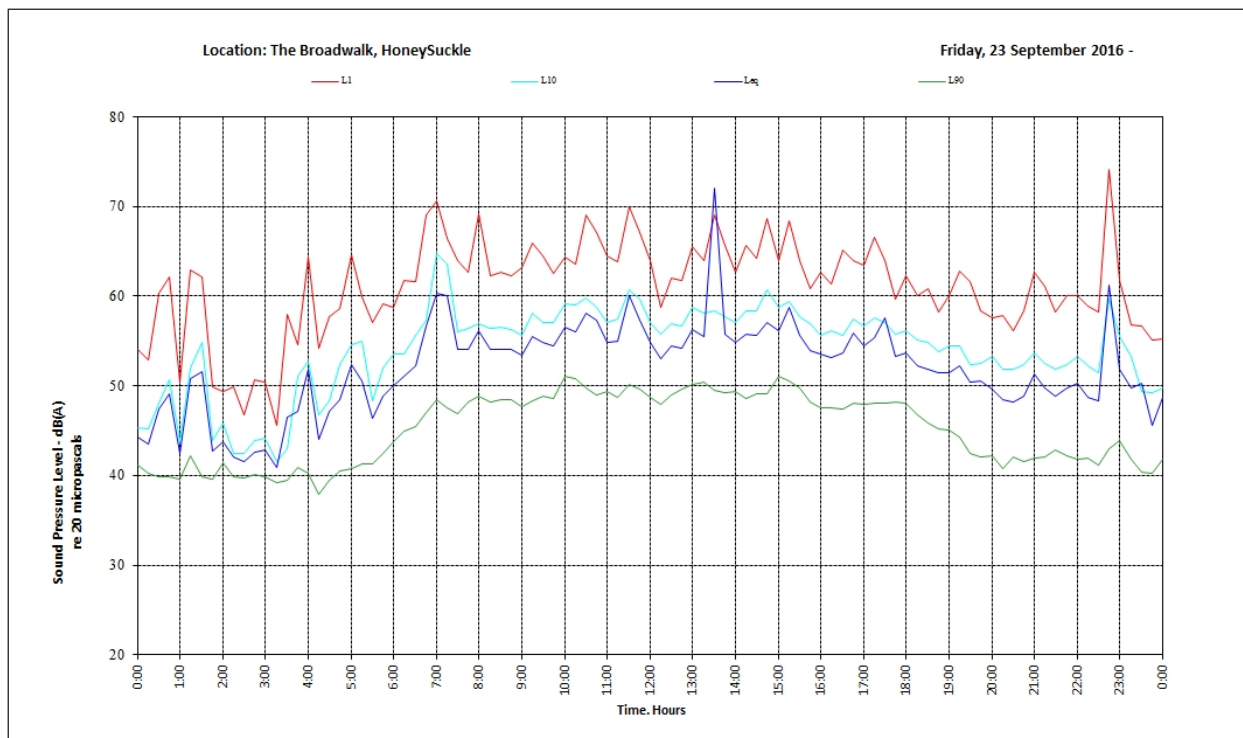


Figure 8-9: Noise Logging Results , N1 – Day 9

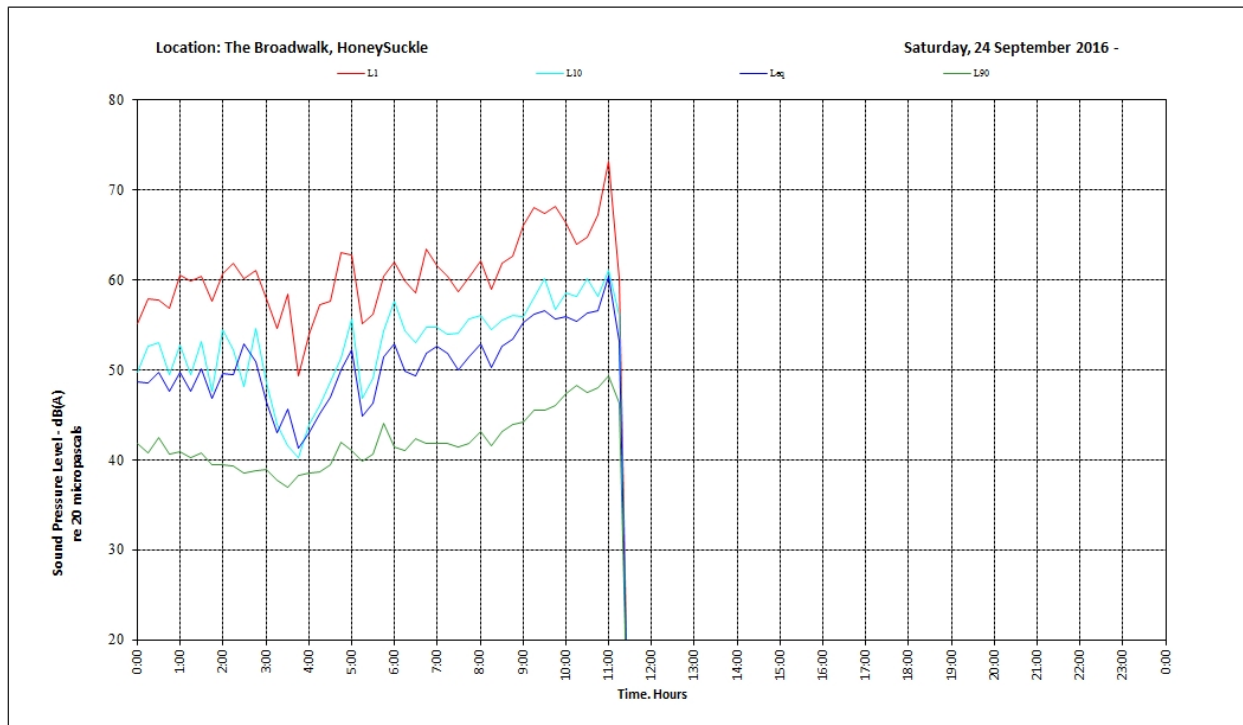


Figure 8-10: Noise Logging Results , N1 – Day 10



Figure 8-11: Noise Logger, N2

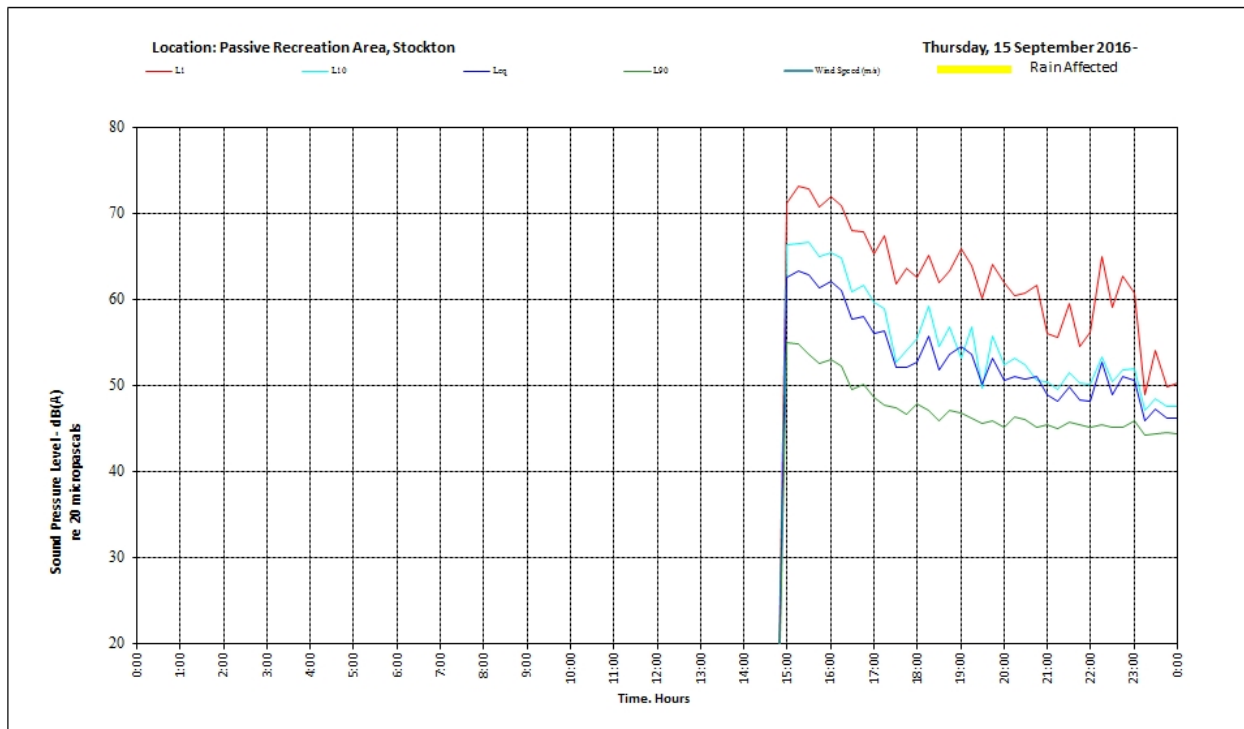


Figure 8-12: Noise Logging Results, N2- Day 1

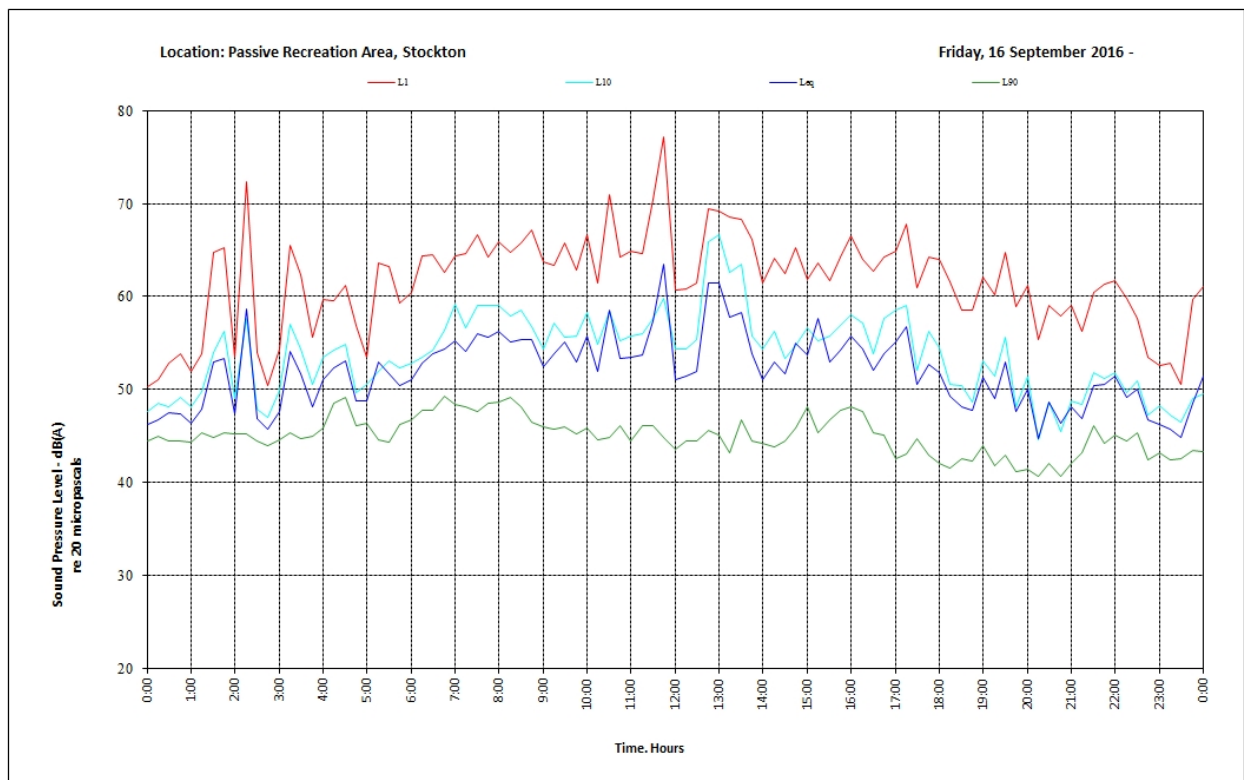


Figure 8-13: Figure 8-14: Noise Logging Results, N2- Day 2

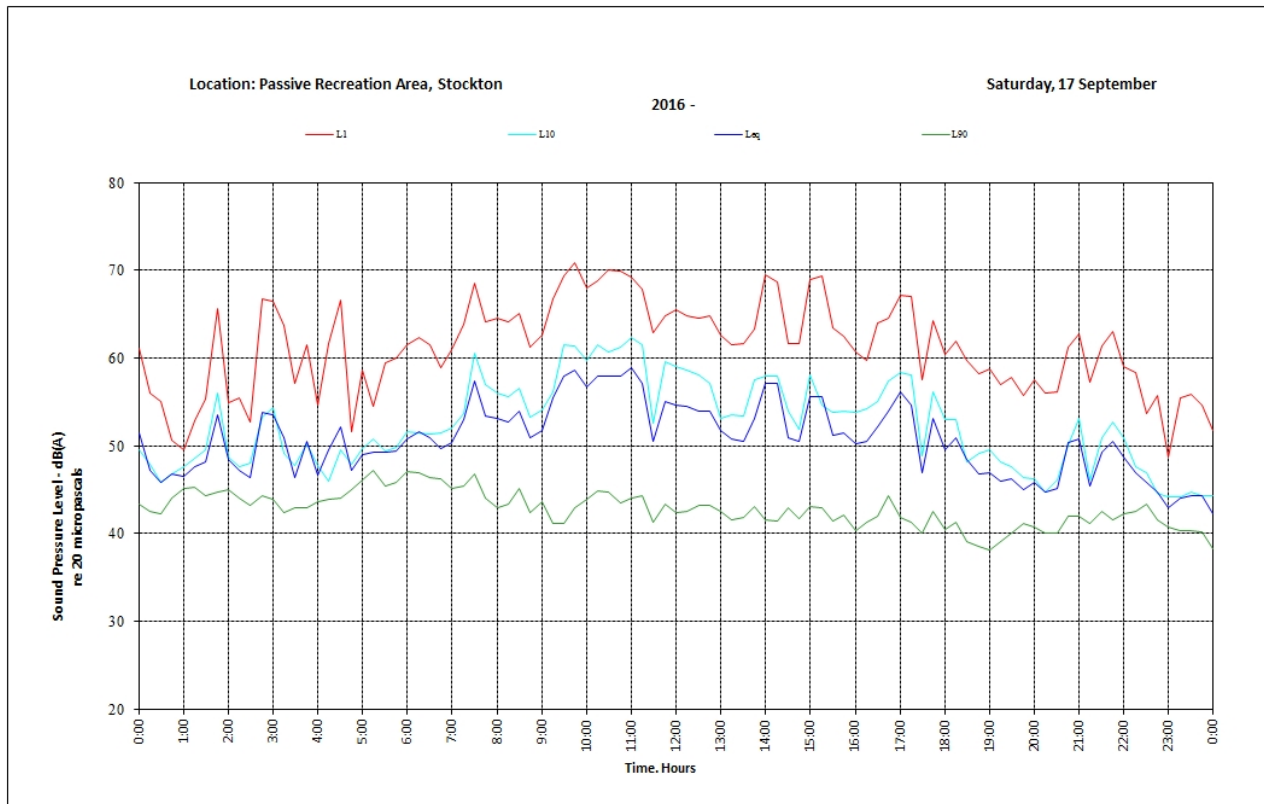


Figure 8-15: Noise Logging Results, N2- Day 3

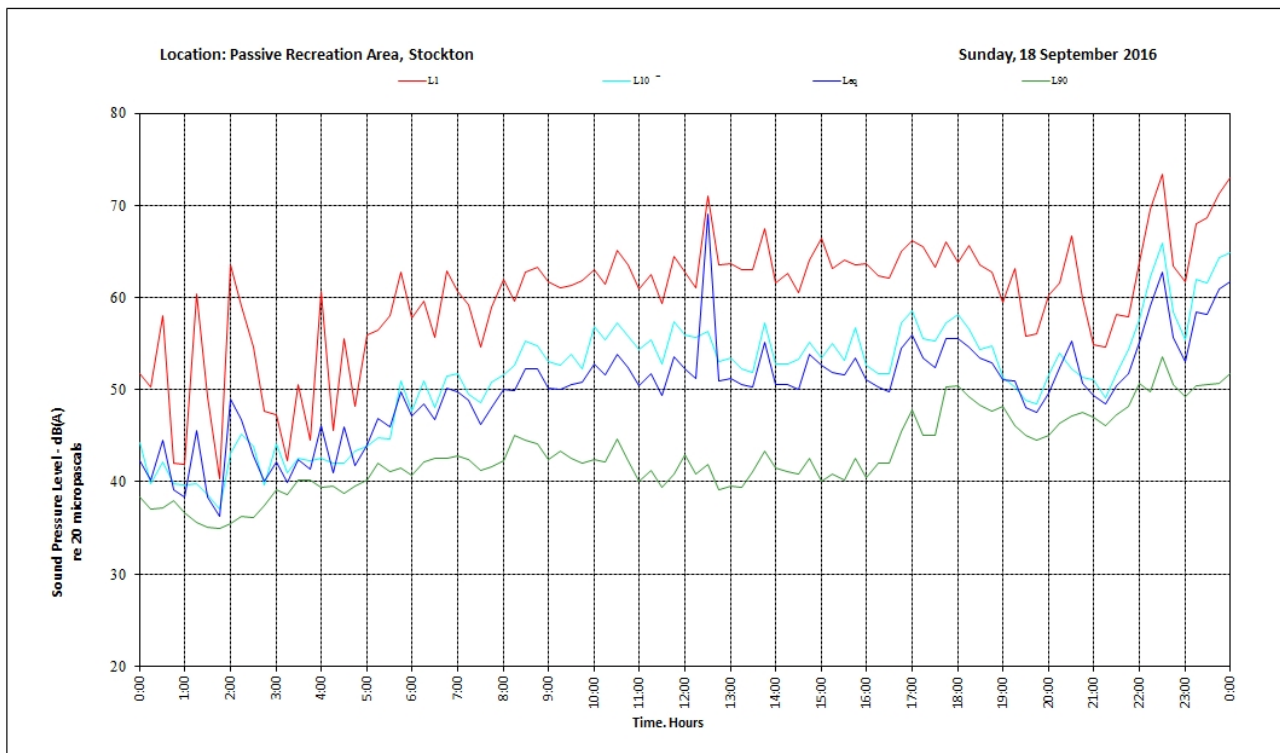


Figure 8-16: Noise Logging Results, N2- Day 4

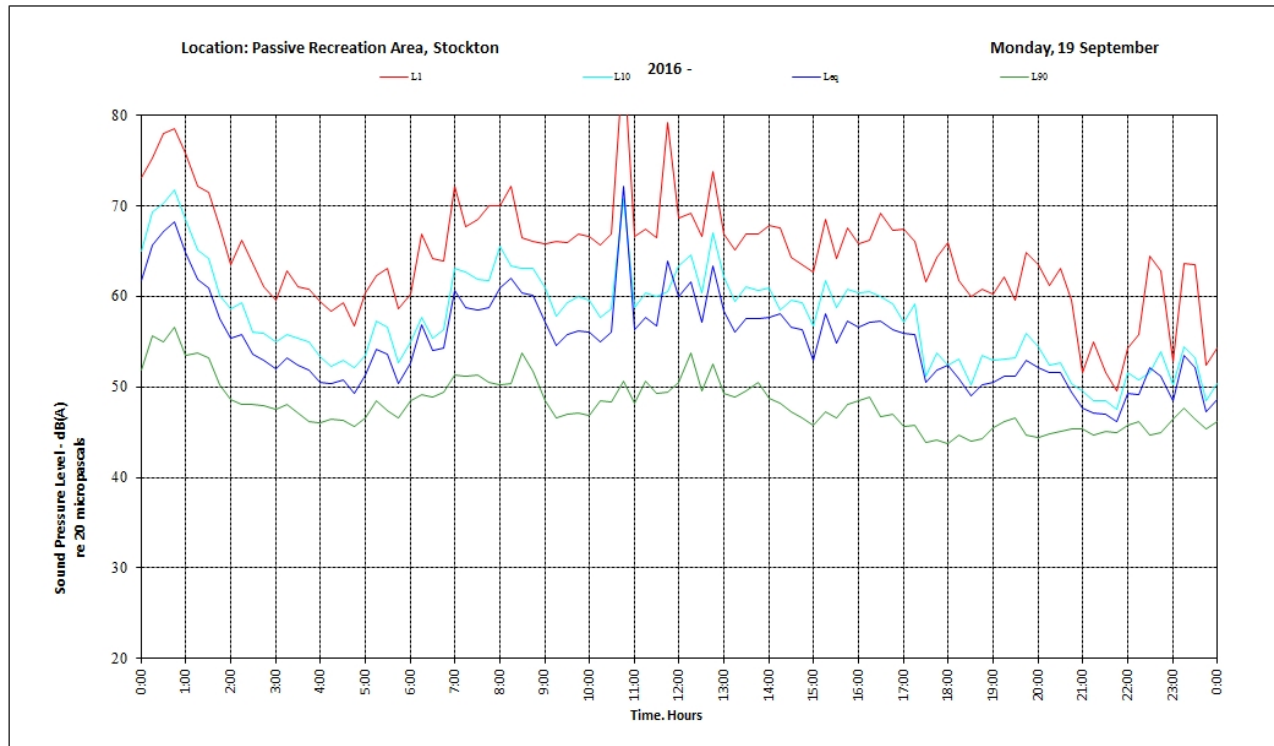


Figure 8-17: Noise Logging Results, N2- Day 5

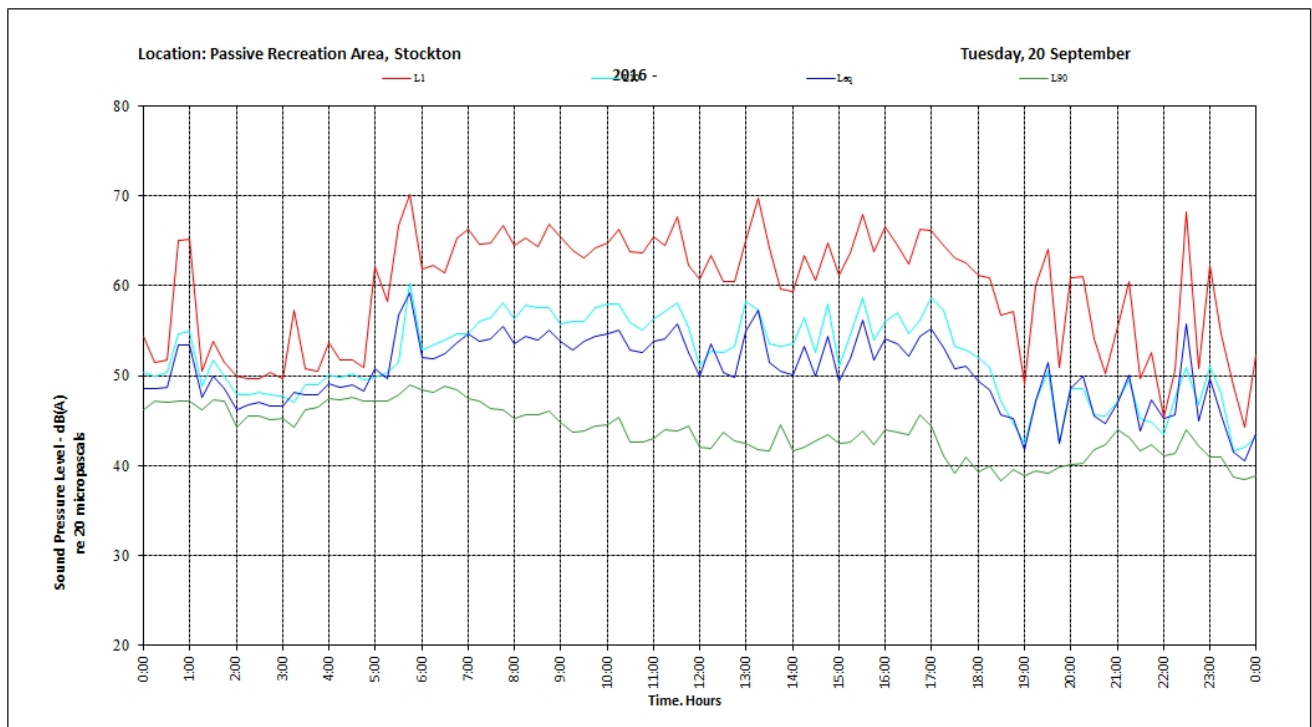


Figure 8-18: Noise Logging Results, N2- Day 6

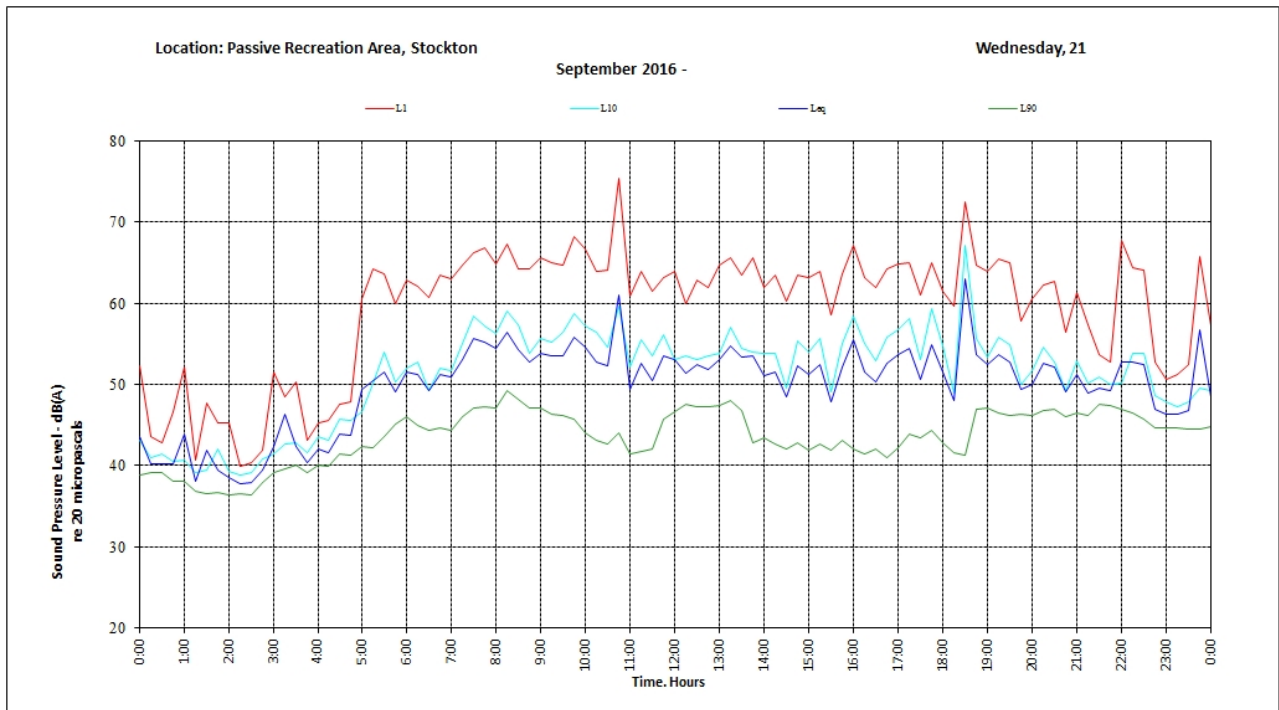


Figure 8-19: Noise Logging Results, N2- Day 7

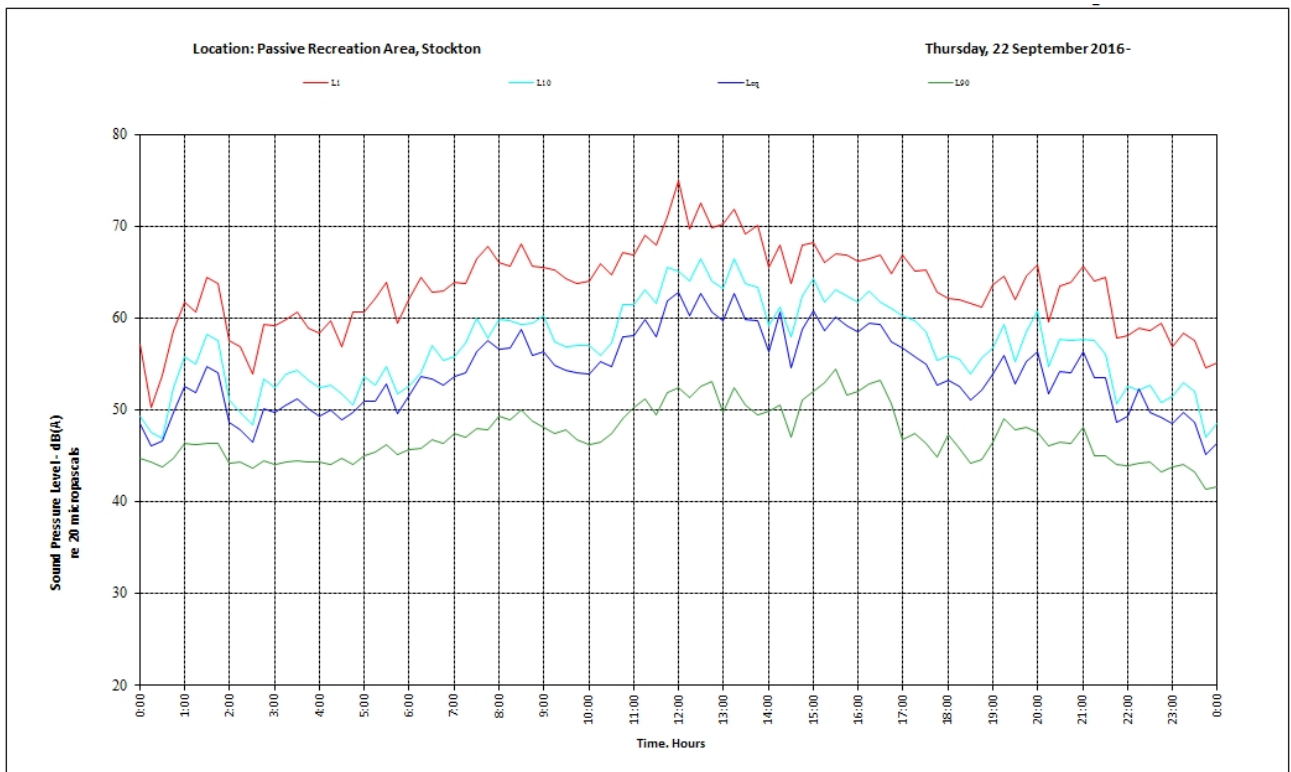


Figure 8-20: Noise Logging Results, N2- Day 8

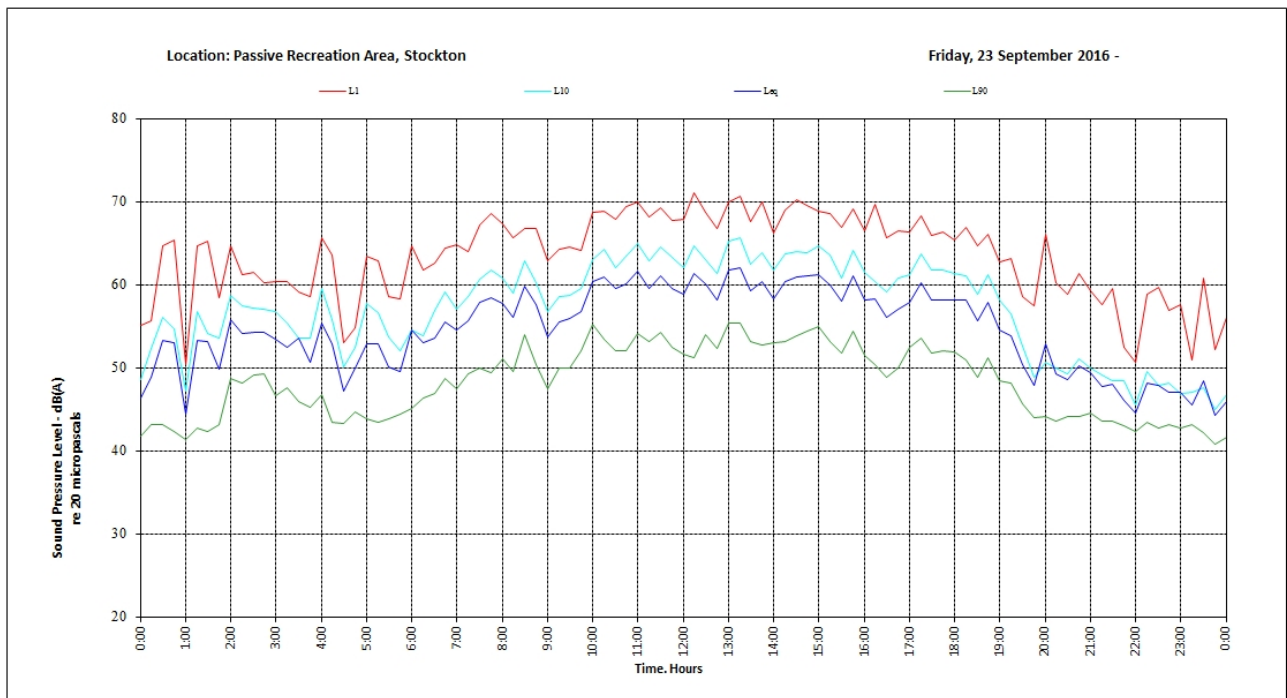


Figure 8-21: Noise Logging Results, N2- Day 9

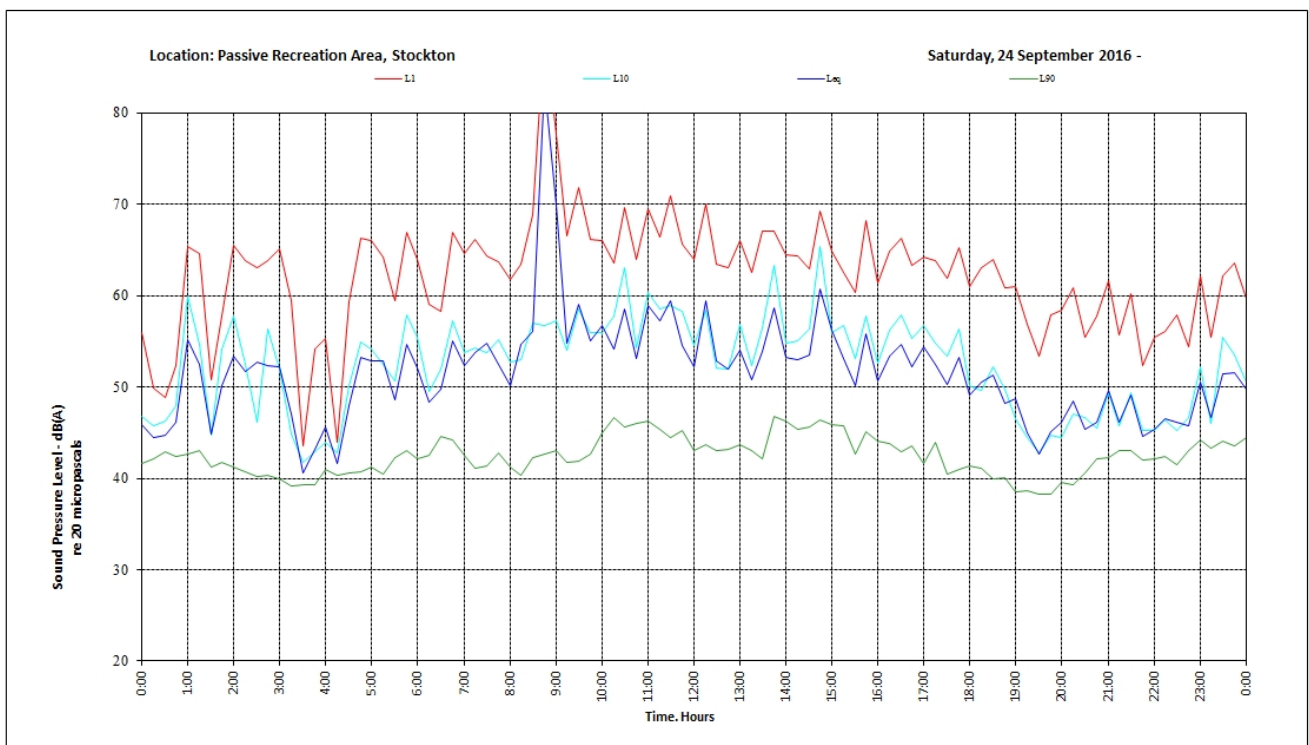


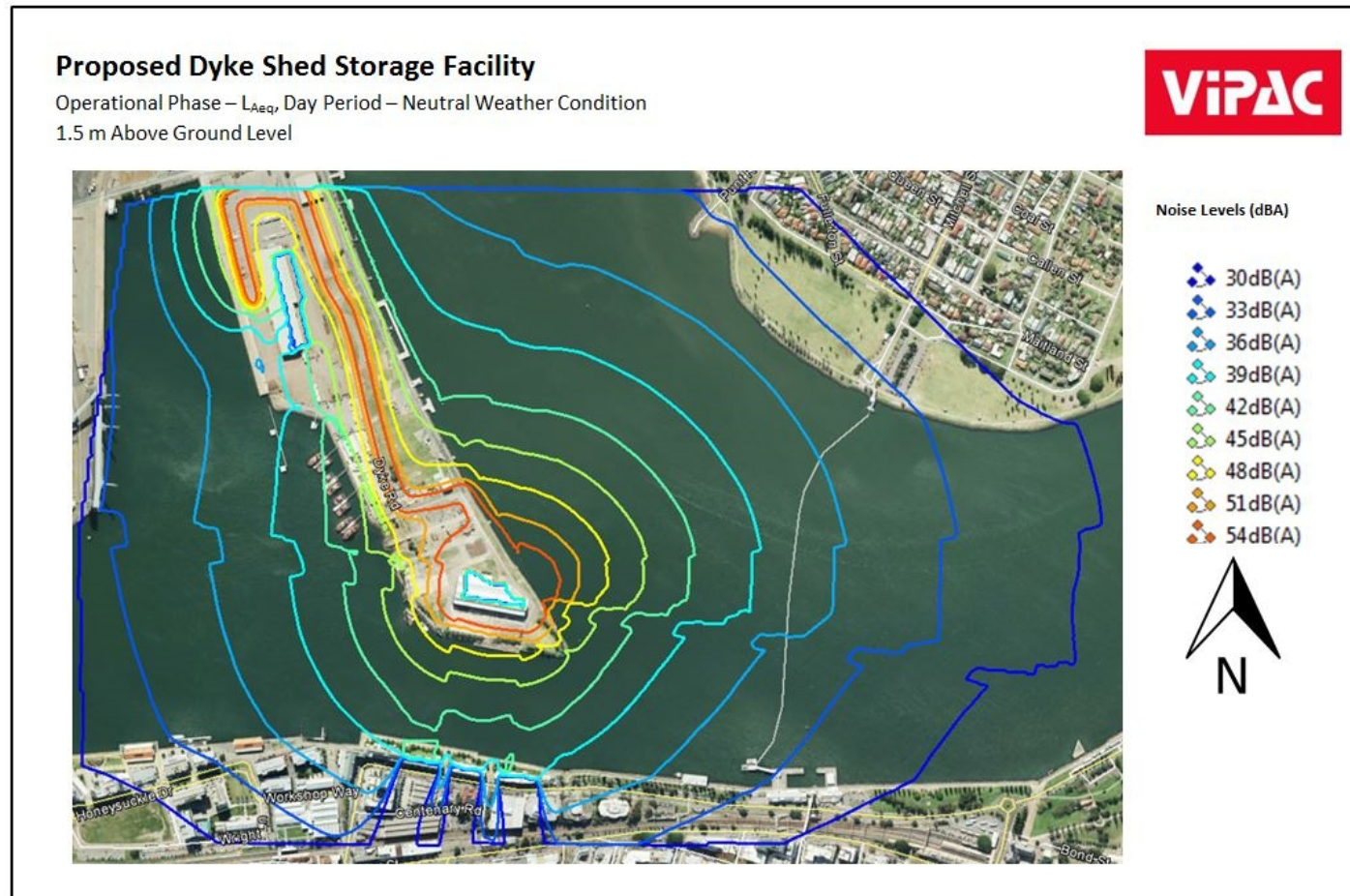
Figure 8-22: Noise Logging Results, N2- Day 10

Appendix C : TRUCK ROUTE



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Appendix D : NOISE CONTOURS MAPS - OPERATIONAL PHASE - LAEQ



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Proposed Dyke Shed Storage Facility

Operational Phase – L_{Aeq} Day Period – Worst Case Weather Condition
1.5 m Above Ground Level



Noise Levels (dBA)

- 30dB(A)
- 33dB(A)
- 36dB(A)
- 39dB(A)
- 42dB(A)
- 45dB(A)
- 48dB(A)
- 51dB(A)
- 54dB(A)



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Proposed Dyke Shed Storage Facility

Operational Phase – L_{Aeq} , Evening/Night Period – Neutral Weather Condition

1.5 m Above Ground Level



Noise Levels (dBA)

- 30dB(A)
- 33dB(A)
- 36dB(A)
- 39dB(A)
- 42dB(A)
- 45dB(A)
- 48dB(A)
- 51dB(A)
- 54dB(A)



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Proposed Dyke Shed Storage Facility

Operational Phase – L_{Aeq} Evening/Night Period – Worst case Weather Condition

1.5 m Above Ground Level



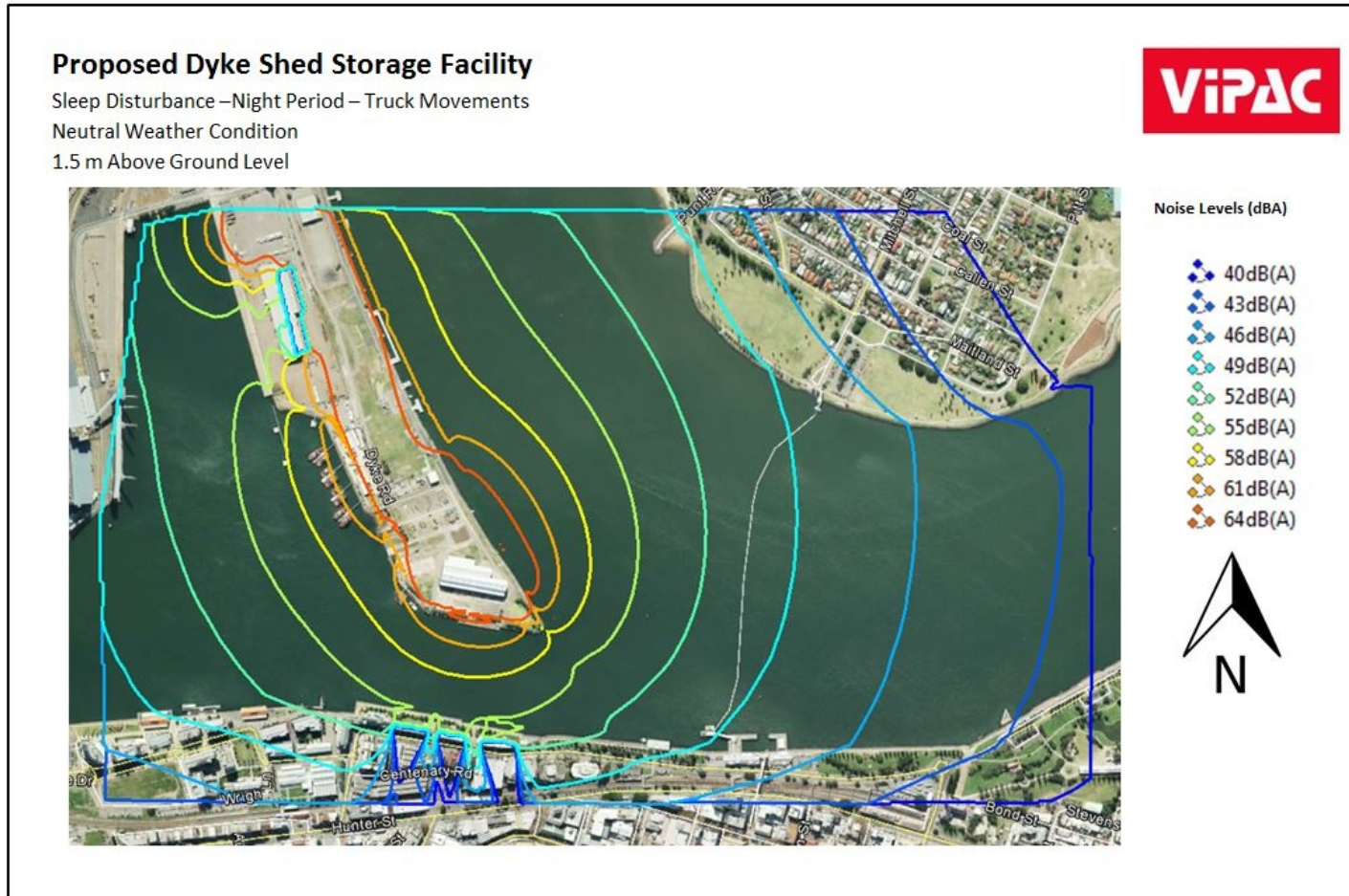

Noise Levels (dBA)

- 30dB(A)
- 33dB(A)
- 36dB(A)
- 39dB(A)
- 42dB(A)
- 45dB(A)
- 48dB(A)
- 51dB(A)
- 54dB(A)



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Appendix E : NOISE CONTOURS MAPS – SLEEP DISTURBANCE



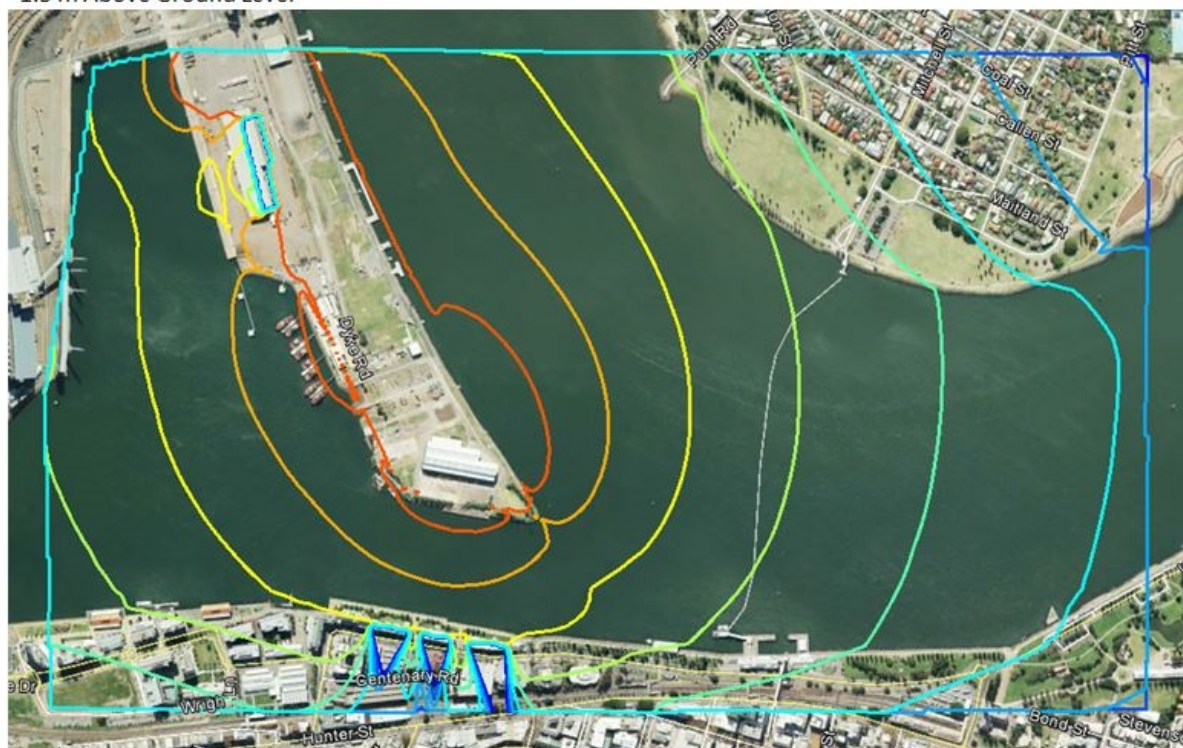
29 Sep 2016

Proposed Dyke Shed Storage Facility

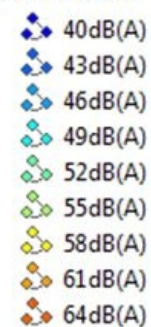
Sleep Disturbance – Night Period – Truck Movements

Worst Case Weather Condition

1.5 m Above Ground Level



Noise Levels (dBA)



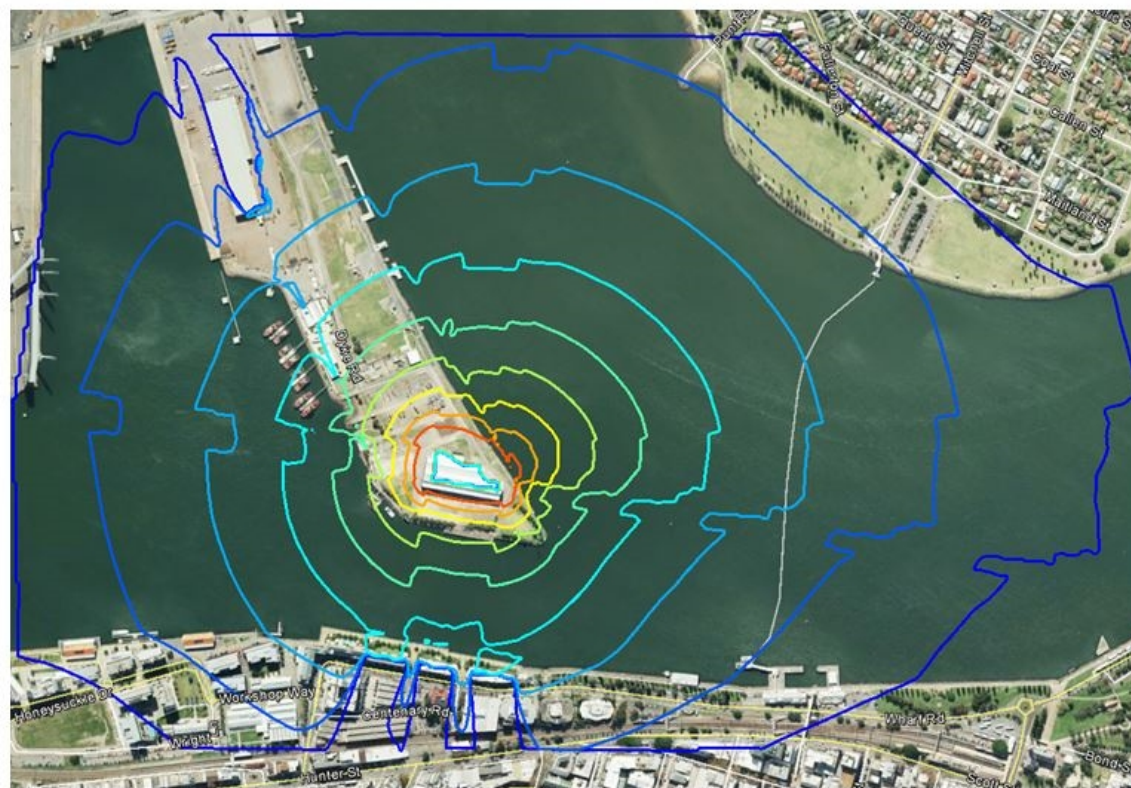
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Proposed Dyke Shed Storage Facility

Sleep Disturbance – Night Period – Unloading Activities within the Building

Neutral Weather Condition

1.5 m Above Ground Level



Noise Levels (dBA)

- 40dB(A)
- 43dB(A)
- 46dB(A)
- 49dB(A)
- 52dB(A)
- 55dB(A)
- 58dB(A)
- 61dB(A)
- 64dB(A)



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Proposed Dyke Shed Storage Facility

Sleep Disturbance - Night Period – Unloading Activities within the Building

Worst Case Weather Condition

1.5 m Above Ground Level



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