18 January 2019

Community Consultative Committee
Brandy Hill Quarry
c/o Lisa Andrews
Independent Chairperson

Dear Committee Members,

Thank you for your considered collection of questions. It is appreciated that technical documents of the nature of the Environmental Impact Statement and the Response to Submissions may include details that are not familiar or not clear to some lay-readers. Please be assured that this is not done deliberately to conceal elements of the Project, but is necessary. These documents are technical planning documents and need to be rigorous and comprehensive in order to meet the requirements the Department of Planning and Environment, other State government agencies and Port Stephens Council.

Hanson has asked that RWC review the questions and prepare a response that more clearly answers the technical questions. We note that some of the questions are deliberately divisive and while we have responded to these questions, we have done so in a straightforward manner. The offer to review and address the questions that the community had on the assessments for the Quarry was a genuine offer of engagement. It is hoped that in the future we can establish a much more cooperative approach. That was the impression we gained at the most recent meeting and wish to continue into the future.

PROCESSING PLANT

1. How many different 'Crushers' are proposed to be installed/operated?

There would be five fixed crushers (that is, built on concrete pads and footings) and a single mobile crusher (that is, capable of being moved) for the Project.

The Project would continue to use the same processing setup that is currently used at the Quarry for Stages 1, 2 and 3 but would include the additional mobile crusher for concrete recycling activities (approximately 20,000t/year). For Stage 4 and Stage 5, when the processing equipment is relocated, a new processing area would be constructed but would have a similar setup to that used for Stages 1, 2 and 3.

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2. When is it proposed to enclose these crushers?

All fixed crushers would be enclosed before the commencement of Stage 1. It is not proposed that the mobile crusher would be enclosed, however this equipment would not be in use as regularly as the fixed crushers.

3. How many other noise generating pieces of plant are proposed to be installed/operated?

All equipment and activities will generate noise however only some of the noise will be heard outside the Quarry. The equipment and activities that would generate the most noise include the following.

- Crushers.
- Screening equipment.
- Conveyors
- Impact noise from trucks when material is being loaded
- Haul trucks or road trucks within the Quarry
- Blasting, when it occurs
- Drilling activities to prepare for blasting, when it occurs.
- The noise assessment allowed for the use of a rock hammer to break up large rocks for transport to the processing area. This would only be used when required.

It is acknowledged that activities may be heard in the vicinity of the Quarry, however the predicted noise that would be generated has been assessed and is predicted to comply with the relevant guidelines. This assessment has also been reviewed by the EPA and was found to be satisfactory.

Hanson has proposed significant mitigation measures to reduce noise levels including enclosing fixed crushers and screening equipment, constructing an amenity barrier and monitoring noise regularly.

4. Is it proposed to enclose ALL of these other pieces of plant?

It is not feasible to enclose all noise generating equipment and activities.

5. Apart from enclosing the crushing plants what other measures will be taken to significantly reduce the emitted noise that carries well beyond the site boundary?

In addition to enclosing the fixed crushers and screening equipment, Hanson is proposing to construct an amenity barrier to the south of the Quarry site, a noise barrier along the access road and strategically locate stockpiles to provide a barrier to noise propagation.

6. What other types of sound attenuation measures are proposed for the processing plant?

Apart from the proposed enclosures, there is no other specific mitigation proposed for the processing plant. Enclosing the fixed processing equipment is an expensive measure and is considered a best practice approach to mitigating noise generation.

7. If any noise generating piece of plant is mobile, will it have noise attenuation measures fitted?

Mobile plant includes the front-end loaders, excavators and trucks used at the Quarry. This equipment is regularly maintained to reduce noise generated (such as might be experienced from an old vehicle) and have 'quacker' reversing alarms installed to replace reversing beepers that was a feature of older equipment.

The mobile crushers are designed to limit noise generation as much as practical within a compact and mobile piece of equipment. This includes internal design to house noisy parts in the body of the equipment and some covered components. This is not as effective as an enclosure but does provide some noise mitigation.

DUST AND NOISE EMISSION

8. Does Hanson:

a) admit that noise, vibrations and dust caused by its operations at the quarry leave the site and cause adverse effects to the health of persons and damage to property?

b) accept that approval of its expansion will continue the adverse impacts on others caused by the generation of noise, vibrations and dust from its operations at the quarry?

Hanson acknowledges that there is a potential for noise, vibrations and dust leaving any Quarry operation to cause adverse impacts. That is why the NSW State government regulates the approvals process and provides guidelines for the minimum standards that need to be satisfied for any proposal.

The technical assessments of the Project demonstrate that the ongoing operation would satisfy the standards set by the NSW government. The experience of adverse impacts is subjective, that is, impacts are experienced by different people in different ways. That is why the NSW State government sets minimum standards. These are the standards by which a Project is assessed and judged, with the ultimate decision based on a range of contributing factors.

Hanson has taken an approach to mitigate for noise, dust and vibration as much as is practical and has assessed the operation based on the worst-case scenario when production is maximised and adverse meteorological conditions are exacerbating impacts. The worst-case scenario does not represent average or regular operations. The assessments have demonstrated that during the worst-case scenario, the operation would satisfy the standards set by the NSW government.

9. What measures are proposed to prevent dust and noise leaving the site?

As mentioned above, noise and dust mitigations include enclosing fixed crushers and screening equipment and constructing an amenity barrier to the south of the Quarry operating areas. In addition to these design elements there are a range of operational controls that will limit dust and noise generation. Regularly spraying water on internal roads and disturbed areas or stockpiles is a common method used in the extractive industry to limit dust lift off from roads that have traffic over them on a regular basis. Additional controls include day-to-day checks on equipment, awareness of noise or dust generating actions and periodic training of personnel.

10. The residents are very concerned about the makeup of the dust that will be generated. Things like silicosis are of great concern.

a) Can you provide, for the current operation, a recent analysis of the dust generated on site, inclusive of the full particle size distribution, analysis of all minerals and chemicals contained in the dust, and the date, time and location of where the sample was collected?

b) Can you likewise provide an analysis of dust generated from the proposed development, including from the proposed concrete batching plant and recycled concrete crushing plant?

Testing of the products generated by the Quarry is currently being undertaken by a laboratory to examine the composition of the materials. To undertake the assessment, Hanson is testing a sample of fine material produced at the Quarry (the technical term for the material is "manufactured sand" due to its fine nature). As the Quarry crushes the material it is not possible to provide a full particle size distribution. However, it is expected that dust generated by the Quarry would include a range of particle sizes. For the purpose of assessment, particles of different fractions are considered. These include the following.

Deposited dust - all non-organic matter and therefore includes the much larger fractions of dust.

Total suspended particulates – particulate matter up to approximately 30 to 50 microns

PM_{10} – particulate matter that is 10 microns or less

$PM_{2.5}$ - particulate matter that is 2.5 microns or less

It is generally accepted that PM_{10} will make up approximately 40% of the total suspended particulates and has historically been the fraction used for assessment purposes. The larger fractions of matter are heavier and therefore do not travel as far from the site before coming to rest on the ground. As $PM_{2.5}$ is the smallest fraction assessed, it is likely to travel further but is generally a much smaller percentage of the particulate matter generated by the Quarry.

In addition, the concerns of the community regarding the quality of water collected in water tanks is also being assessed. Hanson has taken a sample of water from a water tank at the Quarry and from a residence on Giles Road. These tanks do not have a first flush system in place and will therefore be a worst-case example for the impact of dust on water quality. The sample taken at the Quarry was used because of its proximity to the source of the dust.

It should be noted that the assessment of potential air quality (predominantly dust) impacts for the Project determined that the Quarry operation would result in a minor incremental change to dust levels in the local area. Therefore, impacts from dust generated by the Quarry would not be significant. The revised mitigation and assessment requested by the EPA has resulted in further reductions to the predicted incremental dust contribution.

Hanson has been operating the Brandy Hill Quarry for over 20 years. The same material that has been extracted at the Quarry will be extracted for the ongoing operation. Dust particles within the boundary of the Quarry would be of a higher concentration than those leaving the Quarry and Hanson has not had any cases of silicosis or other respiratory disease amongst its personnel. Hanson takes workplace health and safety very seriously both from the perspective of care and responsibility for the health of its employees and at a senior management level from the risk such an event would have for the business. We are concerned that the community believes that Hanson

would put the lives of the personnel you have met at the CCC meetings at risk. This is an extreme view and hopefully not shared by all members of the CCC.

It is considered highly unlikely that a case of silicosis or other respiratory disease would result in the community surrounding the Quarry. We are aware of some research examples from New Zealand that we would be comfortable to share with you if it would help to allay fears. The fact that there are no regulatory requirements relating to silicosis for air quality assessment demonstrates that this is an unlikely outcome. Where there are regulations in place relating to silicosis[1], the regulations relate to work place risks, health and safety and do not concern indirect community impacts.

Dust generated from the proposed development would be the same as that currently being generated, except for the addition of concrete recycling activities that will generate dust from crushed concrete. However, the volume of concrete being crushed is so small that it would not significantly contribute to the total dust generated by the Quarry. Health risks associated with crushed concrete relate to potential silica generation and therefore management will be similar to general crushing activities.

11. Please issue an analysis for the proposed batching plant and concrete crushing plant that clearly demonstrates the increase in dust generation and specifically refer to any new chemicals that might be introduced to site as a result of the expansion.

The operation of the concrete batching plant and concrete recycling activities have been assessed in dust dispersion modelling for the Project. It should be noted that concrete recycling would be limited to 20,000 tonnes of material each year (compared to the crushing of 1.5Mt of hard rock).

Concrete batching involves mixing of aggregate, water and a cementitious binding material to produce concrete. Concrete batching operations can be considered a larger scale version of the concrete mixing that occurs in many back yards throughout Australia and has been a common element of home renovations for many years. The materials are readily available at nurseries and hardware stores (commonly 20kg bags). For the Quarry operations, the materials are generally added to a concrete agitator (concrete mixer) vehicle that combines the material by spinning and produces pre-mix concrete. There is very little exposure to air for the materials and therefore there is not expected to be significant dust generation.

It is not practical to exclude all other sources of dust from the dispersion model to look at these operations only. Given the small quantities that would be processed or produced the dust generated would be a small component of the total dust generated and this is already small compared to the assumed background levels applied for assessment.

[1] See the SafeWork NSW technical fact sheet (https://www.safework.nsw.gov.au/resource-library/hazardous-chemicals/crystalline-silica-technical-fact-sheet) or the QLD Government *Guideline for Management of Respirable Crystalline Silica in Queensland Mineral Mines and Quarries – May 2018*

12. The current operation generates noise and vibrations that are distressing to nearby residents in particular noise generated from the crushing plant and from blasting.

a) Can Hanson provide, for the current operation, a recent recording and analysis of noise, and vibration, inclusive of source and,

b) Can you likewise provide an analysis of noise and vibrations that will be generated from the proposed development?

Hanson commissioned noise monitoring on April 2018 and the resultant reporting is included with this letter. The report demonstrates that the Quarry contribution to noise levels in the local area remains within the assessment criteria and therefore levels set within the guidelines. Hanson appreciates that when blasting occurs, the noise may surprise some residents and that when residents hear the operations they may feel distressed. This is why Hanson has committed to a blast notification protocol, so that residents are given warning of blasting events and has committed to mitigating noise generated by the crushing equipment, principally by enclosing it.

An analysis of predicted noise generation and vibration that would be generated by the ongoing operations was prepared by Vipac Engineers and Scientists and presented with the RTS. The noise and vibration assessment has been reviewed by the EPA who have indicated that it is satisfied with the outcomes of the assessment. It should be noted that the assessment includes commitments to comprehensive mitigation, management and monitoring. If the community has specific questions regarding the outcomes of this assessment, they are welcome to be discussed at the next CCC meeting. A broad discussion of these outcomes here would simply be repeating Section 2.4 of the RTS.

13. Does Hanson admit that it must take all reasonable steps, at its cost, to abate the noise, vibrations and dust caused by its operations at the quarry that leave the site and can have actual physiological health impacts on members of the community in which they operate?

This is a leading question, however Hanson acknowledges that all mitigations required to ensure that the operations continue to satisfy NSW government requirements should be at Hanson's cost.

If community members are experiencing physiological health impacts from the Quarry it is important that these are raised with Hanson as soon as possible. However, given the results of the assessment undertaken, Hanson does not expect that Quarry operations will result in these impacts.

LAND USE

14. Is any part of the operation proposed to occur on land zoned E2 or E3?

The Quarry Site would be located within land that is zoned RU2. There would be no disturbance of land zoned E2 or E3.

15. If the operation is confined to the RU2 land, how do you justify bringing in material (such as old concrete) and processing it on the site of the quarry as this is clearly not an extractive industry?

Importing material for blending with the products extracted at the Quarry is entirely consistent with extractive industry practices and is relatively common. As long as the import of material is acknowledged in the application documents and Council and the EPA is aware of the process, Hanson is confident that it remains consistent with objectives for use of land zoned RU2.

16. How do you justify the proposed concrete batching plant as this is not an extractive industry?

The proposed concrete batching plant does not require extraction activities but is consistent with an approved use of land zoned RU2. If this use of the land contravened the objectives of RU2 zoned land it would have been raised by Port Stephens Council and/or DPE during assessment of the proposal.

It should also be noted that by locating the concrete batching plant within the Quarry Site, Hanson reduces the need for additional transport of the raw materials from the Quarry to an alternative location used for concrete production. In addition, the proposed location of the concrete production would isolate the potential impacts to one location and ensure that another 'greenfield' site does not need to be developed for the activities and therefore the potential impacts from this activity do not need to occur elsewhere. The requirements for clearing vegetation and generating noise would be consistent with the Quarry operation and therefore the potential cumulative impacts would be reduced.

17. Is it proposed to introduce other Industrial Activities such as coating products with bitumen as that activity is NOT an extractive industry?

The use of a pre-coat plant occurs for the existing operation and as noted in previous responses, this is consistent with the approved use of land zoned RU2. Pre-coat operations would continue under the ongoing operation.

18. Regarding brought-in components that can be mixed with material quarried on site:

a) What components has Hanson brought-in in the past, are currently bringing in, and intend to bring in under the proposed State Significant Development Application (SSDA)? E.g. Bitumen products for pre-coat, ingredients for the batching plant, and road base stabilisers.

b) What other non-extractive activities are proposed under this SSDA in addition to concrete batching, bitumen precoating and concrete recycling?

Currently Hanson imports materials required for operations including the following.

- Diesel hydrocarbons.
- Oils for maintenance of machinery.
- Bituminous materials for pre-coat operations.
- Potable (drinking) water.
- Other materials for use on site such as small quantities of weed spray (RoundUp).

Each of these materials would continue to be imported under the ongoing operations. Under the proposed operations, Hanson would also import concrete washout materials (for recycling) and cementitious binding material for use in the concrete batching plant.

OPERATING HOURS

19. Given Port Stephens Council's latest submission, do you believe you are currently operating within the terms of the current consent, particularly in terms of hours of operation?

As discussed in the recent CCC meeting, Hanson has received legal advice that confirms it is currently operating within the terms of the current consent.

20. You are aware that the residents oppose any part of the operation being 24/7. Do you still propose to have any part of the operation (including transport) running 24/7 and, if so, which parts of the operation?

As described in Section 3.12 of the RTS, Hanson has reduced the components of the operation that would be approved to occur 24/7 following a review of the proposed ongoing operation. Hanson is seeking approval for the following activities to occur 24/7 where needed to satisfy client demand.

- Secondary crushing and screening activities.
- Road truck loading and despatch.
- Maintenance

Hanson is confident that the operational noise generated by these activities would satisfy the requirements of the NSW government based on limiting intrusiveness and impacting amenity as well as sleep disturbance.

It should also be noted that approval to undertake activities 24/7 does not necessarily mean this would occur every day. The flexibility to meet client demand through preparatory crushing and screening (not using the primary crusher) or product transport is only expected to occur when Hanson experience peak demand from clients for large infrastructure or road maintenance jobs. Maintenance activities generally do not generate high noise levels and 24/7 maintenance is standard practice in the quarrying industry.

TRUCK MOVEMENTS AND ROAD SAFETY

21. When the volume of trucks going to and from the site was estimated, did it include the number of trucks that would be delivering materials and resources for other proposed activities that are not directly related to the extractive industry?

The proposed limits to Quarry product related despatch includes heavy vehicle movements associated with the import of concrete material and the operation of the proposed Concrete Batching Plant.

All other deliveries to the Quarry would be infrequent and have not been included in limits. This is standard practice in the quarrying industry. However, this does not mean that these changes to the road network are not considered in the assessment.

22. The quarry doesn't seem to have a potable water supply and it appears potable water is trucked in. If this is the case, have these truck movements been factored into the truck numbers?

Potable water would be delivered by a local drinking water supplier. Water is not required in such volumes that this requires significant truck levels. Deliveries of water and other consumables generally occurs outside of the peak despatch periods and therefore do not change the peak hourly traffic levels from the Quarry.

23. What changes, if any, are proposed for the intersection of Clarence Town Road and Brandy Hill Drive, where there is poor alignment of the intersection?

The assessment of this intersection indicates that the alignment and performance of this intersection would remain suitable for the ongoing operation. There are no changes proposed to this intersection, however Port Stephens Council may dedicate road maintenance funding contributed by Hanson to works at this intersection if deemed appropriate by Council.

24. Is there any proposal to lower the crest on Clarence Town Road where there is poor site distance along Clarence Town Road to the east?

As noted above, assessment of the road network indicated that this was not a constraint to the proposed ongoing operation. Therefore, there is no proposal to modify Clarence Town Road.

25. The Traffic Report prepared did not seem to adequately address a number of things including the roundabout at William Bailey Street and Newline Road. Did the traffic analysis consider the high number of garbage trucks that already use the roundabout at William Bailey Street and Newline Road? Newline Road is the site of the Recycling Plant and Land Fill for all of Port Stephens LGA and numerous garbage trucks use this roundabout from very early morning until about 10pm.

The Traffic Assessment considered the potential impact to traffic flow and intersection delay during a morning peak hour and an afternoon peak hour at key intersections. However, for the roundabout at William Bailey Street and Newline Road it was noted that the volume of traffic using this roundabout is already significant, including that which accesses the Recycling Plant and Land Fill developments. The change in Quarry traffic at this roundabout, compared to the total traffic using this intersection, would not significantly change the function of the roundabout. Hanson will monitor the operation of this roundabout internally as delays to Quarry deliveries are also a concern for the Company. However, any specific concerns regarding the function of the roundabout should be directed to Port Stephens Council.

26. The roundabout at Heatherbrae where Adelaide Street joins the Pacific Highway has recently been changed so that you can now only turn right from the right lane. What impact does that have on the conclusions drawn in the Traffic Report?

The majority of Quarry product-related traffic that use the roundabout at Heatherbrae will turn right towards Newcastle, the Central Coast or Sydney. It is assumed that this change has been made so that this roundabout is consistent with the relevant road design guidelines, with the ultimate aim to improve user safety. Hanson has not experienced significant delays at this roundabout as a result of the changes and would not expect this to significantly influence traffic flow for the ongoing operations. As noted for the roundabout at William Bailey Street and Newline Road, the Quarry-related traffic at this location would be a relatively small proportion of the total traffic using this intersection.

ECOLOGY AND ENVIRONMENT

27. Council is dissatisfied with the level of ecological work done and the conclusions drawn. This is also true of the residents and the EPA. What do you propose to do to satisfy this dissatisfaction?

Hanson has been consulting with Port Stephens Council and has clarified elements of the ecological assessment as it concerns hollow-bearing trees and has agreed to incorporate Koala management into the ongoing operation in consultation with Council. Hanson is not aware of concerns expressed by the EPA, however, notes that the OEH have indicated that it is satisfied with the assessment and conclusions.

This question is very broad in nature and we would be happy to discuss specific concerns at the next CCC meeting.

28. Does Hanson put profits over the environment and healthy lives for the community in which they operate?

This is a leading question and the answer is of course not.

COMMUNITY STAKEHOLDER ENGAGEMENT

29. Can you confirm that you are preparing a VPA and if so will it include contributions for any of the following:

- **The construction of a Footpath / Cycleway along Brandy Hill Drive**
- **Additional Bus bays**
- **Improvements to existing bus bays**
- **A levy paid to all affected Councils for the maintenance of the roads in the area**
- **Any improvements to bring haulage roads to AusRoads standards.**
- **Any measures to mitigate noise / traffic / dust to residents along probable haulage routes including Brandy Hill Drive, Seaham Road through Nelsons Plains, Raymond Terrace Road, Clarence Town Road, Paterson Road and Belmore Road as ALL properties along these roads will be negatively impacted.**

Hanson is in the process of negotiating a VPA with Port Stephens Council. The terms of the VPA will include provisions for infrastructure and for road maintenance, with a number of items specified for attention and funding.

Hanson has asked the community to provide indicative locations for bus bays that would suit the community and improve safety. However, Hanson is yet to receive a response on this.

Please note that Port Stephens Council is also party to the VPA and the terms need to be consistent with Council's requirements and the level of development that is appropriate for the local area. Once these terms are progressed, Hanson will be in a position to discuss these outcomes with the community.

30. The residents are gobsmacked by your 'Response to Submissions' in a number of areas but most notably the omnipresent theme that the resident's concerns are perceived rather than real. Of great concern is the statement that Sleep Deprivation is a perceived problem. Can you please explain how you arrived at that conclusion?

This concern was raised and discussed at the recent CCC meeting. As acknowledged at the meeting, Hanson and RWC did not intend to imply that resident's concerns were invalid or false. The intention of these statements was to clarify what appeared to be a misunderstanding of certain details regarding the proposed operations, which may have subsequently affected the community feedback provided in the submissions.

Where sleep disturbance was concerned, misunderstandings of the proposed truck levels may have influenced the community's conclusions relating to the potential for sleep disturbance. The RTS referred to the conclusions of the assessment that indicated that Hanson would satisfy NSW Government requirements in relation to sleep disturbance and that the expectations presented in some community submissions would most likely not match the reality of the development. However, there are light sleepers and there are heavy sleepers and therefore some individuals may be more sensitive to sleep disturbance than others.

We apologise if these comments seemed insensitive and presumptive and for any further distress caused. We reiterate that Hanson is not implying that the community's concerns are only perceived and not real. The comments were intended to better clarify information presented within the EIS and address misconceptions about the Project. Invariably the experience of impact is subjective including for matters of noise intrusion or sleep disturbance. The RTS discussed the local expectations of impact and highlighted that this may not be what is experienced in reality.

31. An integral part of determining a Development Application is about "Respecting and enhancing Local Character" See

https://www.planning.nsw.gov.au/~/media/Files/DPE/Circulars/local-character-planning-circular-2018-01-16.ashx

The residents contend that the level of expansion will completely change the character of the area in an unfavourable fashion.

How do you justify this expansion?

From the outset it should be noted that the Quarry has been a feature of the local area for over 20 years and that Brandy Hill Drive was constructed to provide access from the Quarry to the Pacific Highway. In addition, Clarence Town Road and Seaham Road are key arterial connections to regional areas and therefore carry a large number of heavy vehicles on a daily basis. Therefore, the proposed development would involve a Quarry operation in a location where there is an existing operation and transport activities in an environment that already features heavy vehicles.

The community concerns regarding significant changes to the local area are acknowledged. In response to these concerns, Hanson has proposed significant mitigation for potential noise and dust generation, has reviewed and amended proposed operating hours and comprehensively reviewed the proposed transport activities. With the implementation of the proposed mitigations, Hanson is confident that the proposed development would remain in keeping with the local character of the area.

In closing, Hanson is aware that there are elements of this proposal and the assessment undertaken that community members may not agree with and that will remain points of contention. Invariably, matters such as the experience of sleep disturbance are subjective matters where the impacts depend on the individual experiencing the impact. This does not deny that individuals may experience an impact. As discussed in the recent CCC meeting, now that we have reached the conclusion of technical assessment, the fine details relating to contributions can be resolved and we have comprehensive technical assessment results to assist with discussions. Hanson's objective is to find a balance between the needs of the operation, minimising environmental impacts and maintaining amenity for the local community.

Hanson welcomes further discussion at the next CCC meeting, however we hope to continue the productive engagement that was the outcome of the last meeting.

Yours sincerely

Nick Warren
Senior Environmental Consultant

Encls: Environmental Noise Monitoring – Brandy Hill Quarry, Seaham – Umwelt Australia Pty Ltd – May 2018

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Inspired people | Dedicated team
Quality outcomes

Hanson

ENVIRONMENTAL NOISE MONITORING

Brandy Hill Quarry, Seaham

FINAL

May 2018

ENVIRONMENTAL NOISE MONITORING

Brandy Hill Quarry, Seaham

FINAL

Prepared by
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This report was prepared using Umwelt's ISO 9001 certified Quality Management System.

Rev No.	Reviewer		Approved for Issue	
	Name	Date	Name	Date
Draft V0	Dave Davis	24/05/2018	Saul Martinez	24/05/2018
Final	Dave Davis	28/05/2018	Saul Martinez	28/05/2018

Table of Contents

Figures

Tables

Appendices

1.0 Introduction

Hanson Construction Materials Pty Ltd (Hanson) engaged Umwelt Australia Pty Limited (Umwelt) to undertake noise monitoring of noise emissions from the Brandy Hill Quarry (the site), located off Seaham Road, in Seaham NSW (refer to **Figure 1.1**).

This Noise Monitoring Report has been prepared by Umwelt on behalf of Hanson as part of the ongoing noise monitoring and reporting requirements under the Environment Protection Licence (EPL) for the site.

1.1 Scope

The noise monitoring and reporting requirements for the site are outlined in the EPL 1879.

This report presents the results of the April 2018 noise monitoring undertaken as part of the ongoing noise monitoring program for the site.

A glossary of terms and abbreviations used in this report is provided in **Appendix 1**.

Image Source: Nearmap (Feb 2018)

0 1.0 2.0 2.25km
1:50 000

FIGURE 1.1

Locality Plan

2.0 Assessment Criteria

2.1 Hanson Construction Materials Pty Ltd, Seaham

The noise impact assessment criteria for the Hanson Seaham Quarry, off Seaham Road, Seaham, are specified in EPL 1879. The noise impact assessment criteria (refer to **Table 2.1**) relate only to the noise contribution from the quarry.

The meteorological conditions under which the noise impact assessment criteria apply are specified in EPL 1879 are summarised in **Table 2.2.**

Table 2.1 Noise Impact Assessment Criteria from EPL 1879 for the Hanson Seaham Quarry, dB(A)

Location as described in EPL 1879	Day/Evening/Night[1] LAeq, 15 min	Night time[1] LA1, 1 min
R1 – 13B Giles Road, Seaham	36	45
R2 – 115 Brandy Hill Drive, Seaham	36	45
R3 – 13 Mooghin Road, Seaham	36	45
All other noise receiver locations	36	45

1 Day time period is defined as 7.00 am to 6.00 pm Monday to Saturday and 8.00 am to 6.00 pm Sundays and Public Holidays. Evening period is defined as 6.00 pm to 10.00 pm. Night time period is defined as 10.00 pm to 7.00 am Monday to Saturday and 10.00 pm to 8.00 am Sundays and Public Holidays.

Table 2.2 Meteorological Conditions under which the Noise Criteria apply

Parameter	EPL 1879
Rain	Not during rain or hail
Wind speed at microphone	≤ 5m/s
Wind speed at 10 m	≤ 3 m/s
Temperature inversion and/or atmospheric stability[1]	Stability category F and wind speed ≤ 2m/s at 10 m height Stability category G (no wind specified)
Meteorological Data	Data recorded by the Bureau of Meteorology (BoM) Tocal Automatic Weather Station

1 If atmospheric stability category G is measured at any time during the noise monitoring, then it is assumed that the temperature inversion is > 3°C/100m, else it is assumed that the temperature lapse rate is ≤ 3°C/100m for the entire monitoring period

3.0 Compliance Assessment Methodology

The compliance assessment process addresses compliance with the noise impact assessment criteria (**Table 2.1**) and is only undertaken for periods during which the meteorological conditions are consistent with those under which the criteria apply (refer to **Table 2.2**). Attended noise monitoring has been used to quantify and describe the acoustic environment around the quarry. The compliance assessment methodology involved the following activities:

- Attended noise monitoring surveys at each of the monitoring locations, R1 and R3, during the night-time period and where required the day period to measure the ambient noise levels in the surrounding region and to assess the site contributions (reported as $L_{Aeq,\ 15\ minute}$) to the measured noise levels.

- An unattended noise monitoring survey at monitoring location R2 during the night-time period and where required the day period to measure the ambient noise levels in the surrounding region and to assess the site contributions (reported as $L_{Aeq,\ 15\ minute}$) to the measured noise levels.

- Comparison of the attended noise monitoring results with the relevant noise impact assessment criteria to assess compliance of the site operations with the EPL criteria.

- Comparison of the $L_{A1,\ 1\ minute}$ night-time attended noise monitoring results with the night-time sleep disturbance criteria outlined in the EPL criterion.

4.0 Noise Monitoring

4.1 Noise Monitoring Program

The attended and unattended noise monitoring for the site is conducted in accordance with the NSW Environment Protection Authority (EPA) *Industrial Noise Policy* (INP) (2000) guidelines and the *Australian Standard AS1055-1997, Acoustics – Description and Measurement of Environmental Noise, Part 1 General Procedures*.

The purpose of the noise surveys is to quantify and describe the ambient noise environment in the region surrounding the site and to estimate the contribution of quarry-related activities to the ambient noise levels.

Attended noise monitoring was undertaken at locations R1 and R3, presented in **Table 4.1** and **Figure 4.1** and provides the following noise-related information:

- noise data that will assist in identifying noise contributions from the site
- noise data that is representative of noise levels at receivers within the localised area
- reference noise data that will assist in determining compliance at other receiver locations.

Unattended noise monitoring was also undertaken at location R2. The results of the attended monitoring at the other locations were used to assess the monitoring results at this location.

Table 4.1 Attended and unattended Noise Monitoring Locations

Monitoring Location	Monitoring type	Description
N1	Attended	R1 – 13B Giles Road, Seaham
N2	Unattended	R2 – 115 Brandy Hill Drive, Seaham
N3	Attended	R3 – 13 Mooghin Road, Seaham

During the attended monitoring sessions at N1, noise measurements are taken with a Larson Davis LD831 Precision Integrating Sound Level Meter (Serial Number 4379) which is calibrated on site using a Svantek SV 35A Class 1 Acoustic Calibrator (Serial Number 64069). The noise meter is run using three measurement profiles, Z Weighting (linear), C Weighting and A Weighting and records A-weighted 1/3 octave noise levels at 1 second intervals over a 15 minute measurement period.

During the attended monitoring sessions at N3, noise measurements are taken with a Svantek 959 noise and vibration analyser (Serial Number 12918) which is calibrated on site using a Brüel and Kjær Type 4231 Noise Meter Calibrator (Serial Number 2130702). The noise meter is run using three measurement profiles (Linear, C Weighting and A Weighting) and records A-weighted 1/3 octave noise levels at 1 second intervals over a 15 minute measurement period.

During the attended monitoring sessions the operator maintains a log of noise-related events that occur including various noise sources contributing to the ambient noise environment. Particular attention is paid to the contribution of the operations associated with the site.

Unattended noise monitoring was undertaken at location R2, presented in **Table 4.1** and **Figure 4.1** and provides the following noise-related information:

- noise data that will assist in identifying noise contributions from the site
- noise data that is representative of noise levels at receivers within the localised area

During the unattended monitoring session at N2, noise measurements are taken with an Acoustic Research Labs Pty Ltd (ARL), Type Ngara S-Pack Environmental Noise Logger (Serial Number 878021) which is calibrated on site using a Brüel and Kjær Type 4231 Noise Meter Calibrator (Serial Number 2130702). The noise meter is run using three measurement profiles (Z Weighting, C Weighting and A Weighting) and records A-weighted 1/3 octave noise levels at 1 second intervals over a 15 minute measurement period.

Meteorological data for the attended monitoring periods is collected from the Bureau of Meteorology's (BoM) Tocal Automatic Weather Station (Station IDN 60801) as required in EPL 1879, in order to confirm compliance with the requirements shown in **Table 2.2** (except for wind speed at the microphone location).

At location N1, Kestrel 4500 weather monitor (Serial Number 658027), positioned within 5 metres and at a corresponding height to the noise monitoring microphone (approximately 1.3 metres from the ground) was used to determine the wind speed at the microphone height, to confirm compliance with the requirements for wind speed at the microphone location at N2 shown in **Table 2.2.**

Image Source: Nearmap (Feb 2018)

0 0.5 1.0 1.25km
1:25 000

Legend

- Noise Monitoring Location

FIGURE 4.1

Noise Monitoring Locations

4.2 Attended Noise Monitoring Results for April 2018

Attended noise monitoring sessions, comprising of night and day time assessment periods, were conducted at locations N1 and N3 (refer to **Table 4.1** and **Figure 4.1**) during April 2018 assessment period.

The monitoring results at locations N1 and N3 are presented graphically in **Appendix 2** and **Appendix 4**, respectively and includes:

- the recorded A-weighted 1/3 octave noise levels at 1 second intervals over a 15 minute measurement period
- the results of a 1000 Hz low pass filter at 1 second intervals over the 15 minute measurement period
- an assessment of the maximum $L_{A1,1minute}$ noise level recorded over the 15 minute measurement period
- the $L_{Aeq,\ 15\ minute}$, $L_{A10,\ 15\ minute}$ and $L_{A90,\ 15\ minute}$ noise levels for the 15 minute measurement period
- operator comments regarding any extraneous noise sources contributing to the ambient noise levels.

4.3 Unattended noise monitoring results for April 2018

Unattended noise monitoring sessions, comprising of night and day time assessment periods, was conducted at location N2 (refer to **Table 4.1** and **Figure 4.1**) during April 2018 assessment period.

The monitoring results at location N2 are presented graphically in **Appendix 3** and includes:

- the recorded A-weighted 1/3 octave noise levels at 1 second intervals over a 15 minute measurement period
- an assessment of the maximum $L_{A1,1minute}$ noise level recorded over the 15 minute measurement period
- the $L_{Aeq,\ 15\ minute}$, $L_{A10,\ 15\ minute}$ and $L_{A90,\ 15\ minute}$ noise levels for the 15 minute measurement period
- operator comments regarding any extraneous noise sources contributing to the ambient noise levels.

4.4 Monitoring Results Summary

The results of the noise monitoring session, presented in **Appendices 2, 3** and **4** indicate that under the meteorological conditions at the time of monitoring:

- The site was compliant at all monitoring locations during April 2018 monitoring sessions with their respective night time $L_{Aeq,\ 15\ minute}$ noise assessment criteria.
- The site was compliant at all monitoring locations during the April 2018 monitoring sessions with the $L_{A1,\ 1\ minute}$ noise assessment criteria.

The noise impact assessment criteria for the sites are summarised in **Table 2.1**.

5.0 Statement of Compliance

5.1 Hanson Construction Materials Pty Ltd, Seaham

The results of the Hanson Seaham Quarry noise monitoring program for April 2018 have been assessed against the noise impact assessment criteria in the project related EPL 1879, for meteorological conditions identified in the relevant consents and licence.

Results of the attended noise monitoring program conducted during April 2018 showed that the site was complying with the relevant noise assessment criteria for each monitoring period, for the meteorological conditions experienced at the time of monitoring.

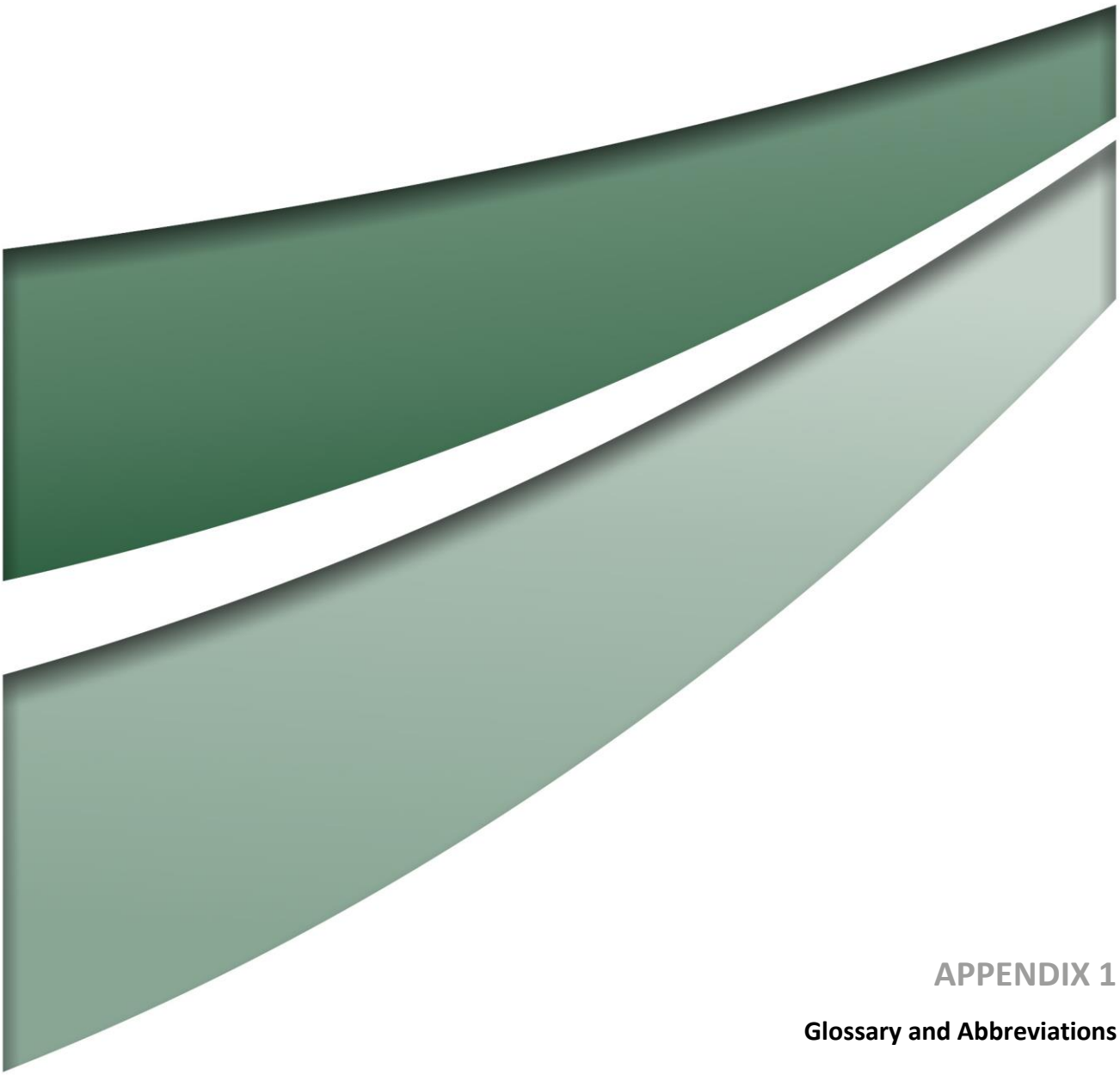
6.0 References

Environmental Protection Licence 1879, NSW EPA (Licence version date 25 May 2017)

Australian Standard AS1055-1997. *Acoustics – Description and Measurement of Environmental Noise, Part 1 General Procedures*.

NSW Environment Protection Authority, 2000. *New South Wales Industrial Noise Policy.*

NSW Environment Protection Authority, 2007. *Noise Policy for Industry*.

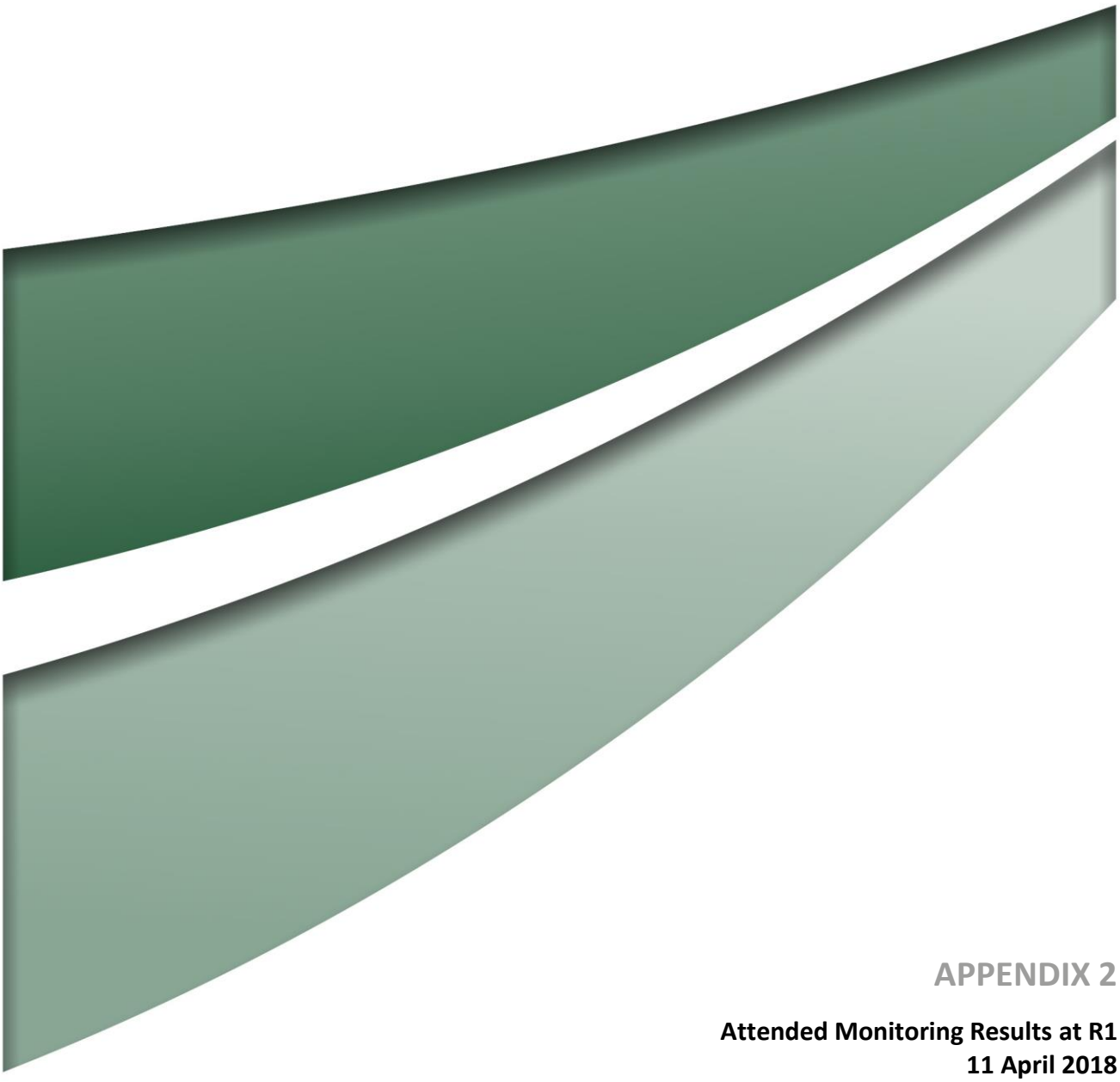


APPENDIX 1

Glossary and Abbreviations

Appendix 1 - Glossary and Abbreviations

Abbreviation	Description
1/3 Octave	Single octave bands divided into three parts.
Octave	A division of the frequency range into bands, the upper frequency limit of each band being twice the lower frequency limit.
ABL	Assessment background level – A single-figure background noise level representing each assessment period – day, evening and night (that is, three assessment background levels are determined for each 24 hour period of the monitoring period). It is determined by taking the lowest 10th percentile of the L90 level for each assessment period.
Ambient Noise	The noise associated with a given environment. Typically a composite of sounds from many sources located both near and far where no particular sound is dominant.
A-Weighting	A standard weighting of the audible frequencies designed to reflect the response of the human ear to noise.
dB(A), dBA	Decibels A-weighted.
dB(L), dB(Lin)	Decibels Linear or decibels Z-weighted.
Decibel (dB)	The units of sound level and noise exposure measurement where a step of 10 dB is a ten-fold increase in intensity or sound energy and actually sounds a little more than twice as loud.
Hertz (Hz)	The measure of frequency of sound wave oscillations per second – one oscillation per second equals 1 hertz.
LA10	The percentile sound pressure level exceeded for 10 per cent of the measurement period with 'A' frequency weighting calculated by statistical analysis. Typically used to assess the impact of an existing operation on a receiver area and is referred to as the cumulative noise levels at the receiver attributable to the noise source.
LA90	Background Noise Level. The percentile sound pressure level exceeded for 90 per cent of the measurement period with 'A' frequency weighting calculated by statistical analysis.
LAmax	The maximum of the sound pressure levels recorded over an interval of one second.
LA1,1minute	The measure of the short duration high-level noises that cause sleep arousal. The noise level is measured as the percentile sound pressure level that is exceeded one per cent of measurement period with 'A' frequency weighting calculated by statistical analysis during a measurement time interval of one minute.
LAeq,t	Equivalent continuous sound pressure level – The value of the sound pressure level of a continuous steady noise that, a measurement interval of time (t), has the same mean square sound pressure as the sound under consideration whose level varies with time. Usually measured in dB with 'A' weighting.
LAn	Percentile level – A measure of the fluctuation of the sound pressure level which is exceeded 'n' per cent of the observation time.
RBL	Rating background level – The overall single figure background level representing each assessment period over the whole monitoring period determined by taking the median of the ABLs found for each assessment period.
SPL (dBA)	Noise: Sound pressure level – The basic measure of noise loudness. The level of the root-mean-square sound pressure in decibels given by: $SPL = 10 \log_{10} (p/p_0)^2$ where p is the rms sound pressure in pascals and p_0 is the sound reference pressure at 20 µPa. decibels.
SWL	Sound power level – a measure of the energy emitted from a source as sound and is given by: $SWL = 10 \log_{10} (W/W_0)$ where W is the sound power in watts and W_0 is the sound reference power at 10^{-12} watts.



APPENDIX 2

Attended Monitoring Results at R1
11 April 2018

Appendix 2 – Attended Monitoring Results at R1

11 April 2018

The results of the attended noise monitoring session at R1 are presented graphically as run charts in **Figure A2.1** to **Figure A2.8**.

The results of the attended noise monitoring session are summarised in **Table A2.1**.

Night Period Compliance Assessment

During the night period attended noise monitoring, the results indicated that under the meteorological conditions at the time of monitoring, the quarry was complying with the respective $L_{Aeq,\ 15minute}$ and $L_{A1,\ 1minute}$ noise impact assessment criteria.

Day Period Compliance Assessment

During the night period attended noise monitoring, the results indicated that under the meteorological conditions at the time of monitoring, the quarry was complying with the $L_{Aeq,\ 15minute}$ noise impact assessment criterion.

Night Monitoring Results for R1, 13B Giles Road, Seaham

Date and Time: 11 April 2018, 05:26 to 05:41

Local Conditions: Calm conditions; clear sky, 15°C, 97% RH

Operator Comments:

The dominant noise sources contributing to the noise environment at the monitoring location were local road traffic noise, birds, road traffic noise on the surrounding area arterial road network (Clarence Town Road and Brandy Hill Road), insects and frogs. Other noise contributions included intermittent and barely audible broadband reverse alarms from the quarry and operator movement noise.

The $L_{Aeq,\ 15\ minute}$ noise contribution from the site was estimated to be less than 11 dB(A). The maximum $L_{A1,1minute}$ noise contribution from the site was estimated to be 32 dB(A).

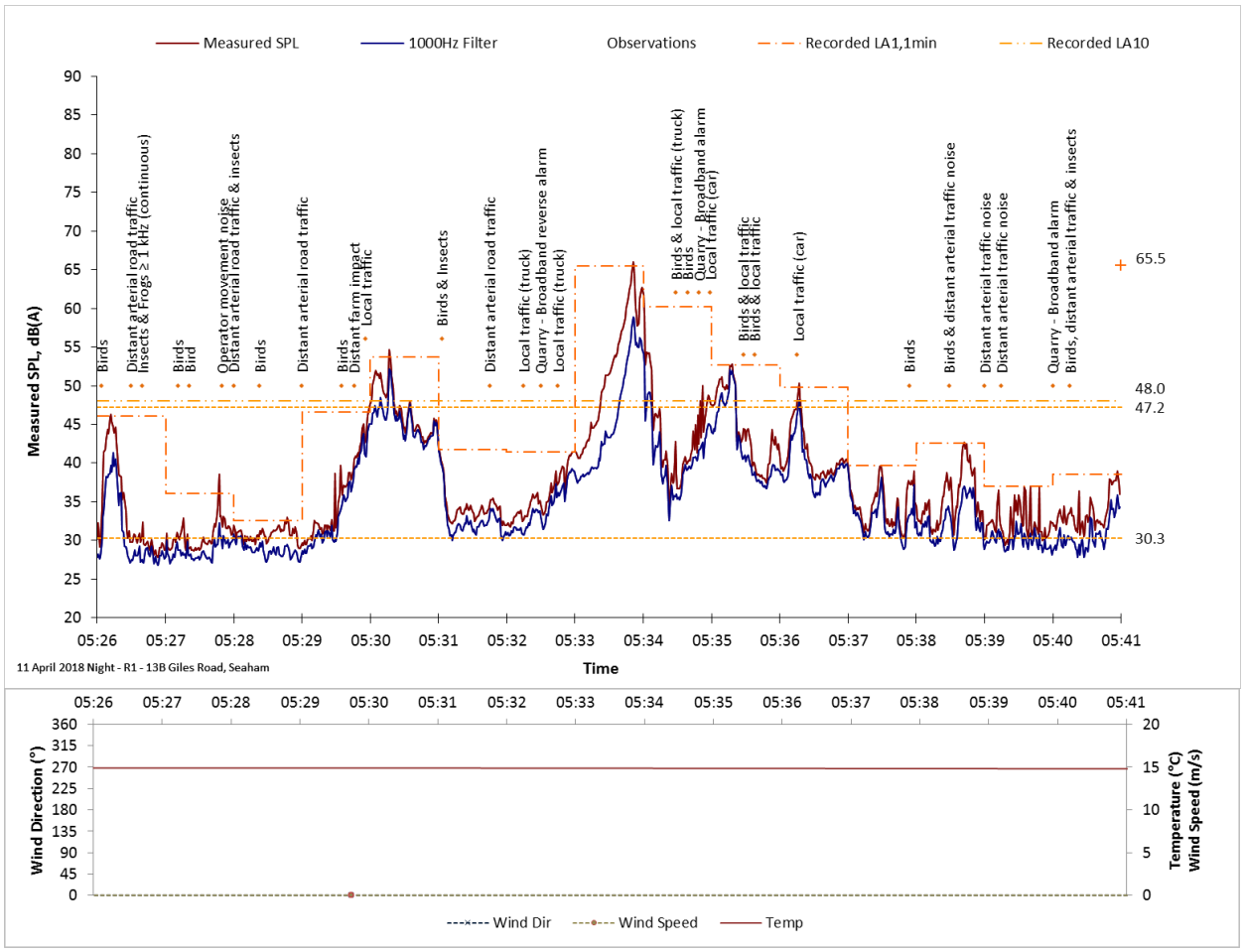


Figure A2.1

Night Monitoring Results at R1, 19 April 2018, 05:26 to 05:41

Night Monitoring Results for R1, 13B Giles Road, Seaham

Date and Time: 11 April 2018, 05:45 to 06:00

Local Conditions: Calm conditions; clear sky, 15°C, 97% RH

Operator Comments:

The dominant noise sources contributing to the noise environment at the monitoring location were birds, local and distant road traffic noise, insects and frogs. Other noise contributions resulted from broadband reverse alarms from the quarry mobile plant and a low-frequency impact.

The $L_{Aeq,\ 15\ minute}$ noise contribution from the quarry was estimated to be less than 20 dB(A). The maximum $L_{A1,1minute}$ noise contribution from the quarry was 44 dB(A) resulting from a low-frequency impact.

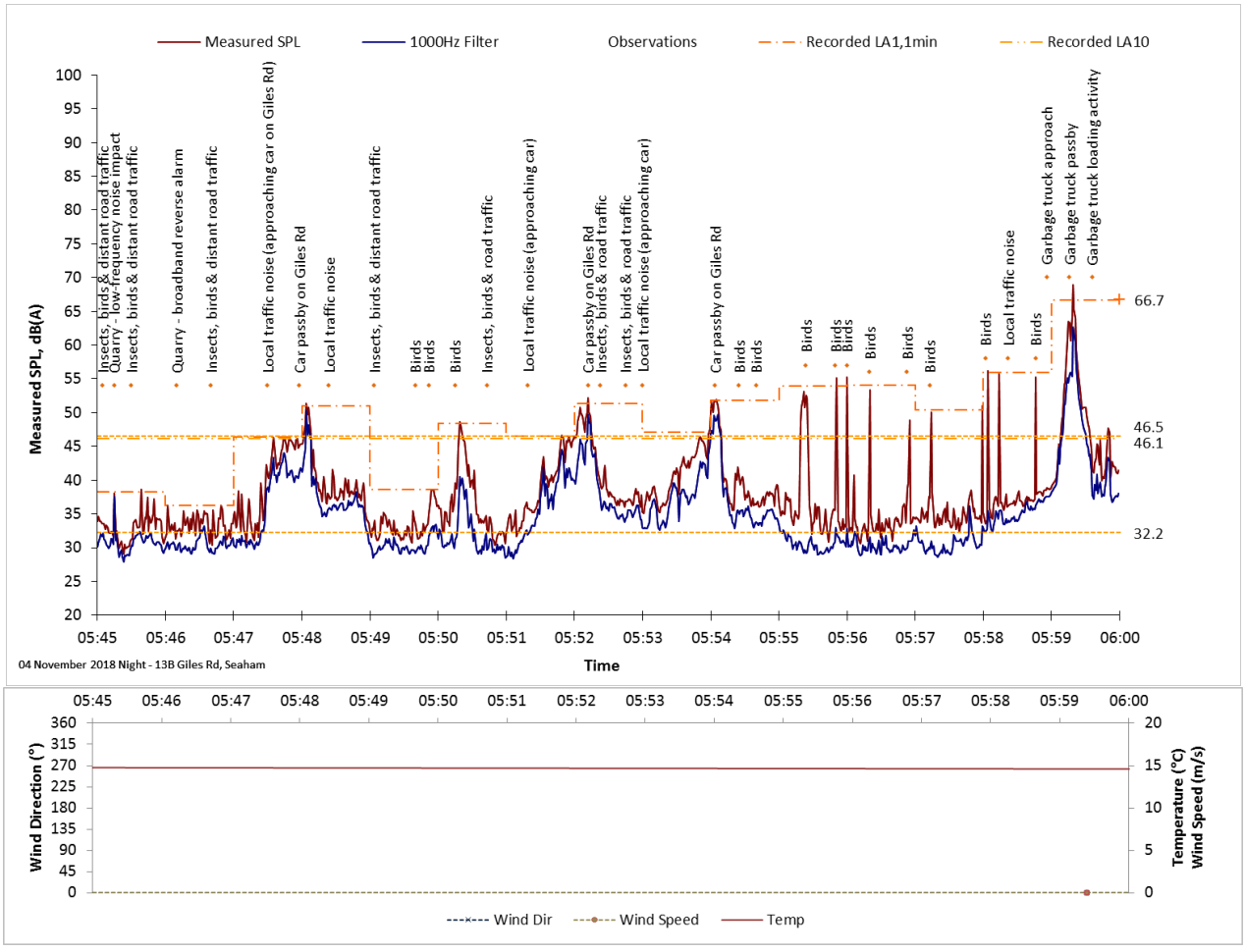


Figure A2.2

Night Monitoring Results at R1, 19 April 2018, 05:45 to 06:00

Night Monitoring Results for R1, 13B Giles Road, Seaham

Date and Time: 11 April 2018, 06:04 to 06:19

Local Conditions: Calm conditions; Clear sky, 15°C, 99% RH

Operator Comments:

The dominant noise sources contributing to the noise environment at the monitoring location were local road traffic noise, birds, distant road traffic noise, insects and frogs. Other noise contributions resulted from low-frequency quarry noise.

The $L_{Aeq,\ 15\ minute}$ noise contribution from the quarry was estimated to be less than 15 dB(A). The $L_{A1,1minute}$ noise contribution from the quarry was 32 dB(A) resulting from mobile plant activity.

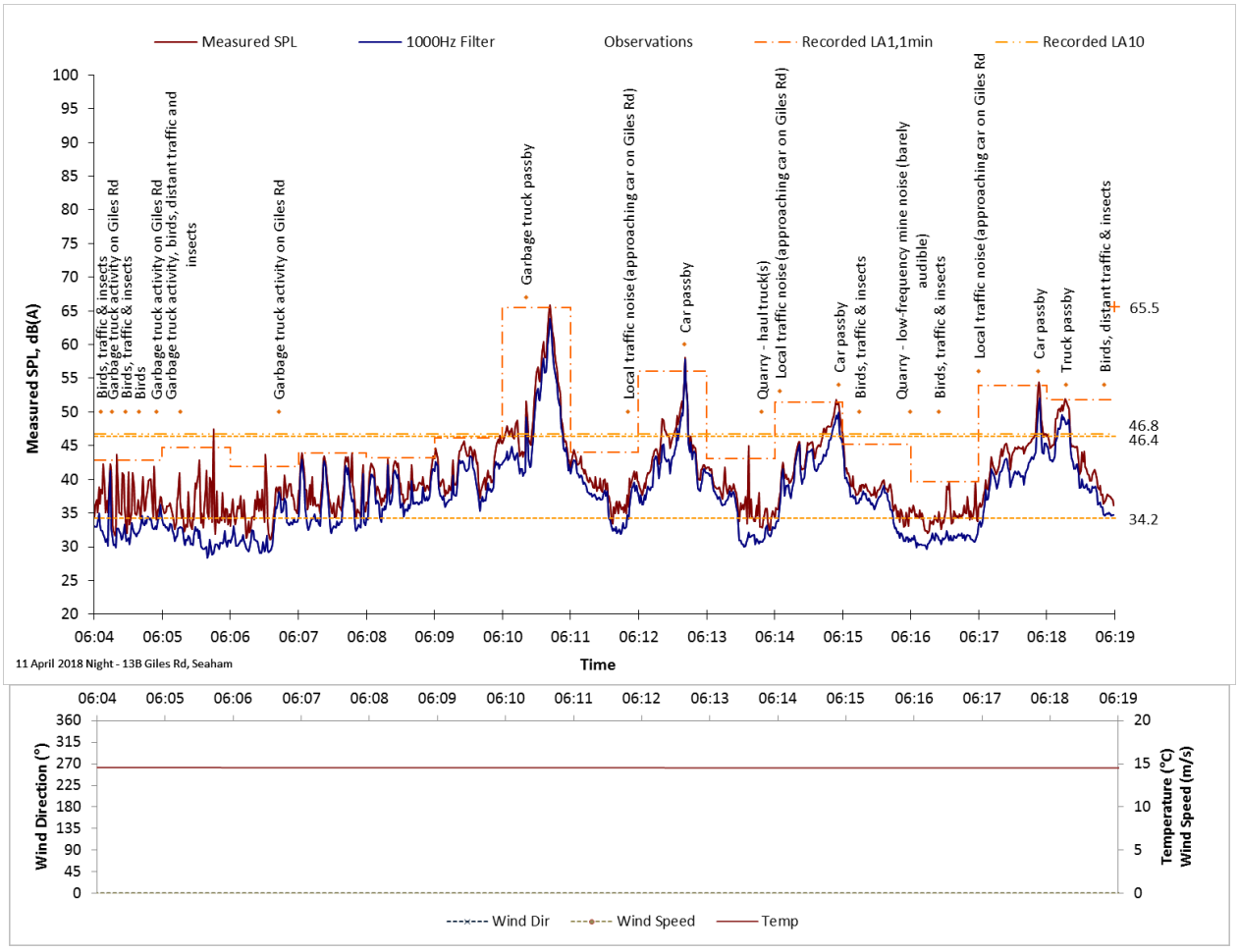


Figure A2.3

Night Monitoring Results at R1, 19 April 2018, 06:04 to 06:19

Night Monitoring Results for R1, 13B Giles Road, Seaham

Date and Time: 11 April 2018, 06:20 to 06:35

Local Conditions: Calm conditions; Clear sky, 15°C, 99% RH

Operator Comments:

The dominant noise sources contributing to the noise environment at the monitoring location were birds, local and distant road traffic noise, insects and frogs. Other noise contributions resulted from both fixed and mobile quarry mobile mechanical plant

The $L_{Aeq,\ 15\ minute}$ noise contribution from the quarry was estimated to be less than 25 dB(A). The $L_{A1,1minute}$ noise contribution from the quarry was less than 44 dB(A) resulting from mechanical plant noise.

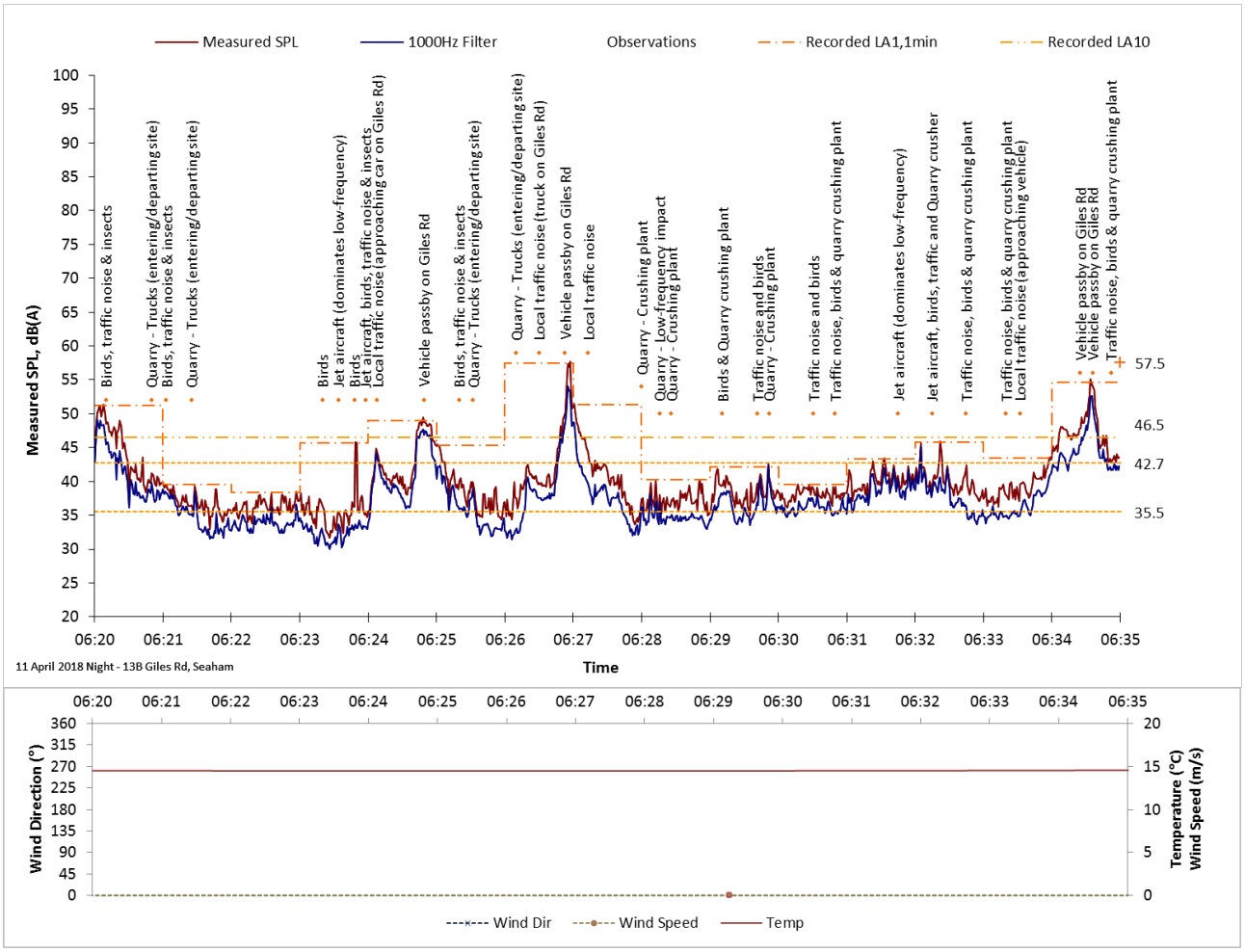


Figure A2.4

Night Monitoring Results at R1, 19 April 2018, 06:20 to 06:35

Night Monitoring Results for R1, 13B Giles Road, Seaham

Date and Time: 11 April 2018, 06:41 to 06:56

Local Conditions: Calm conditions; Clear sky, 15°C, 99% RH

Operator Comments:

The dominant noise sources contributing to the noise environment at the monitoring location were birds, local and distant road traffic noise, low-frequency quarry noise, insects and frogs. Other noise contributions resulted from jet aircraft activity at Williamtown airport

The $L_{Aeq,\ 15\ minute}$ noise contribution from the quarry was estimated to be less than 26 dB(A). The $L_{A1,1minute}$ noise contribution from the quarry was less than 40 dB(A) resulting from low-frequency mechanical plant noise.

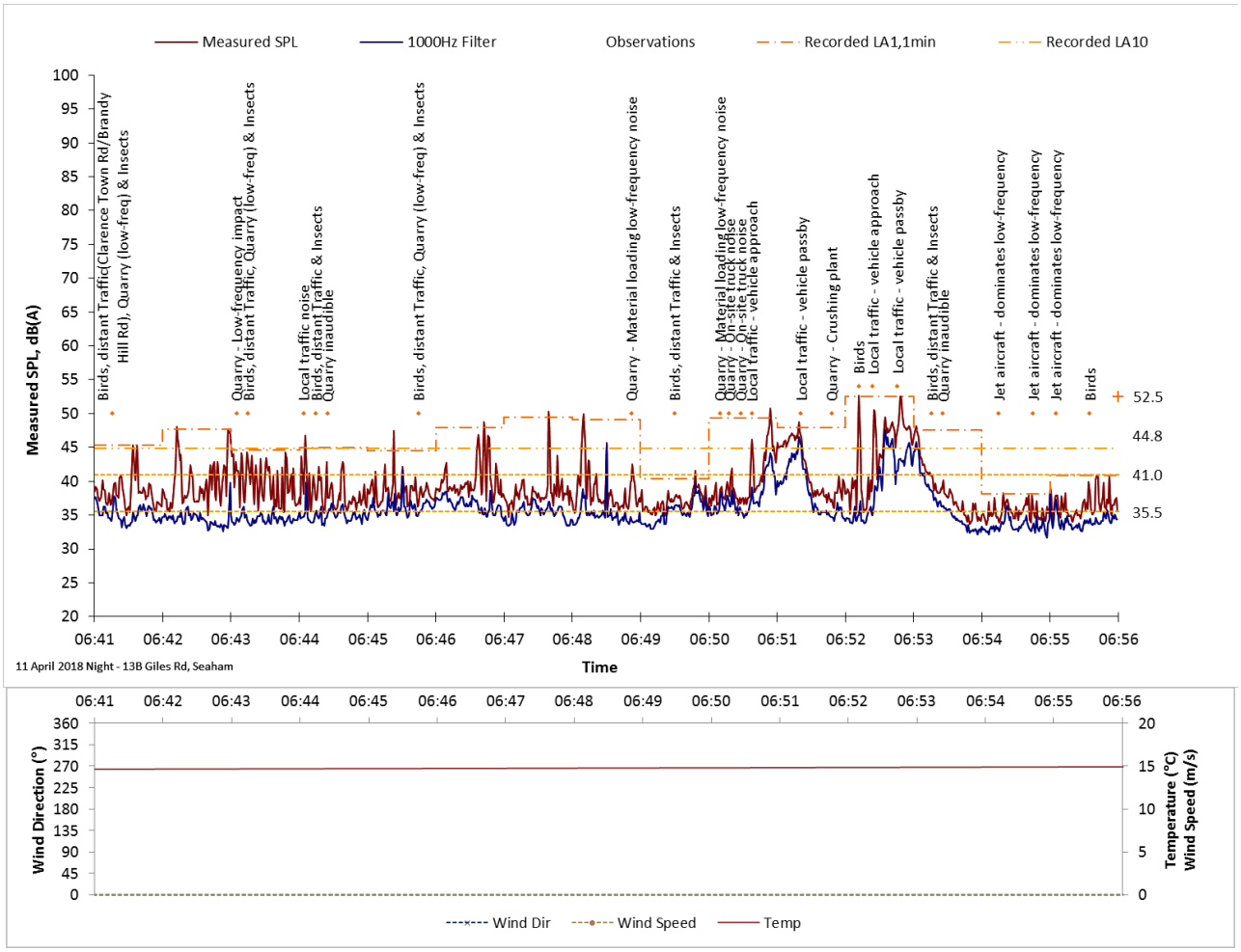


Figure A2.5

Night Monitoring Results at R1, 19 April 2018, 06:41 to 06:56

Day Monitoring Results for R1, 13B Giles Road, Seaham

Date and Time: 11 April 2018, 07:00 to 07:15

Local Conditions: Calm conditions; Clear sky, 16°C, 94% RH

Operator Comments:

The dominant noise sources contributing to the noise environment at the monitoring location were birds, low-frequency quarry noise, aircraft noise, local and distant road traffic noise and insects.

The $L_{Aeq,\ 15\ minute}$ noise contribution from the quarry was estimated to be less than 28 dB(A).

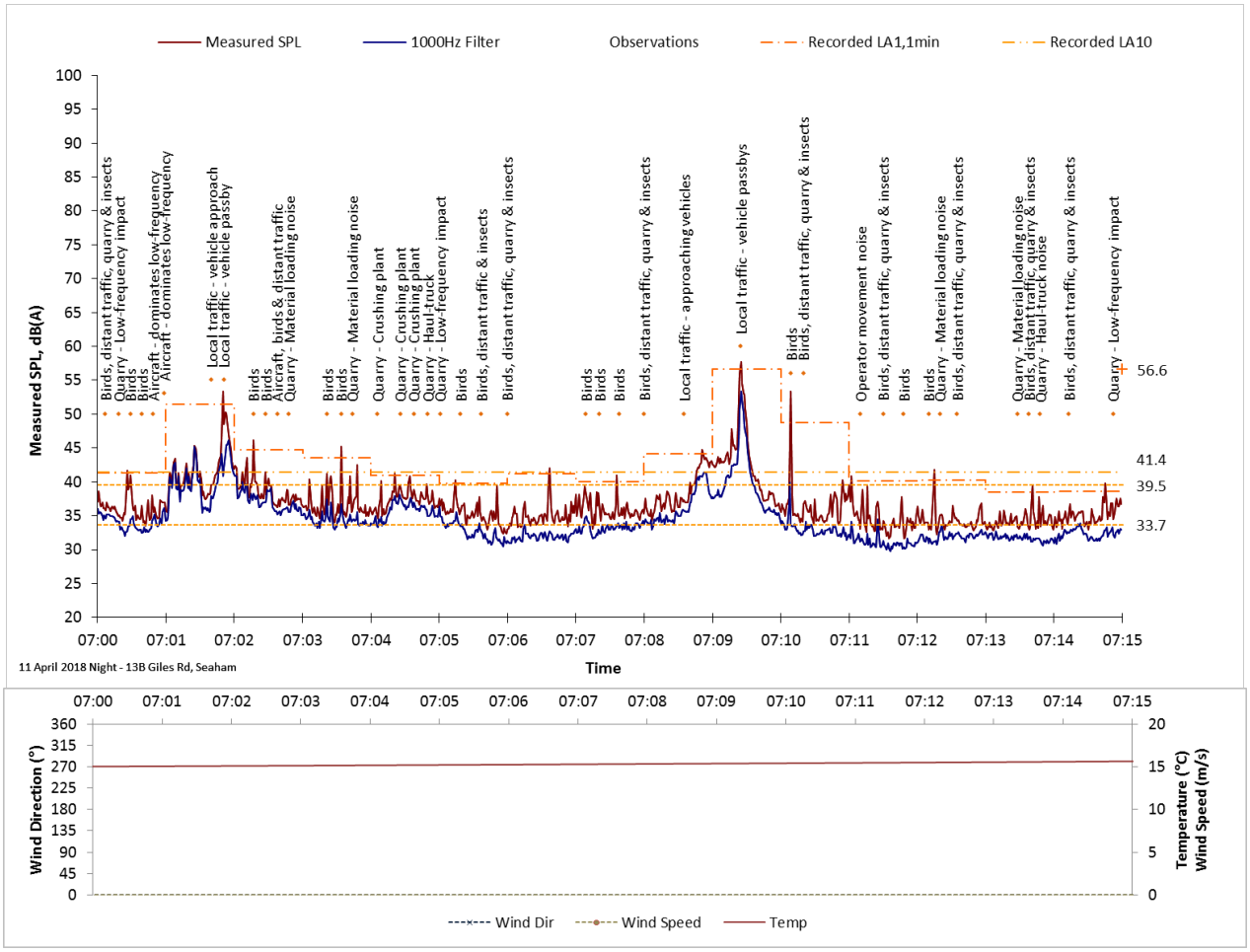


Figure A2.6

Day Monitoring Results at R1, 19 April 2018, 07:00 to 07:15

Day Monitoring Results for R1, 13B Giles Road, Seaham

Date and Time: 11 April 2018, 07:23 to 07:38

Local Conditions: Wind NE at 0 to 0.2 m/s, gusting to 0.5 m/s; Cloudless sky, 17°C, 93% RH

Operator Comments:

The dominant noise sources contributing to the noise environment at the monitoring location were birds, aircraft noise, low-frequency quarry noise, local and distant road traffic noise and insects. Other noise sources included operator movement noise.

The $L_{Aeq,\ 15\ minute}$ noise contribution from the quarry was estimated to be less than 26 dB(A).

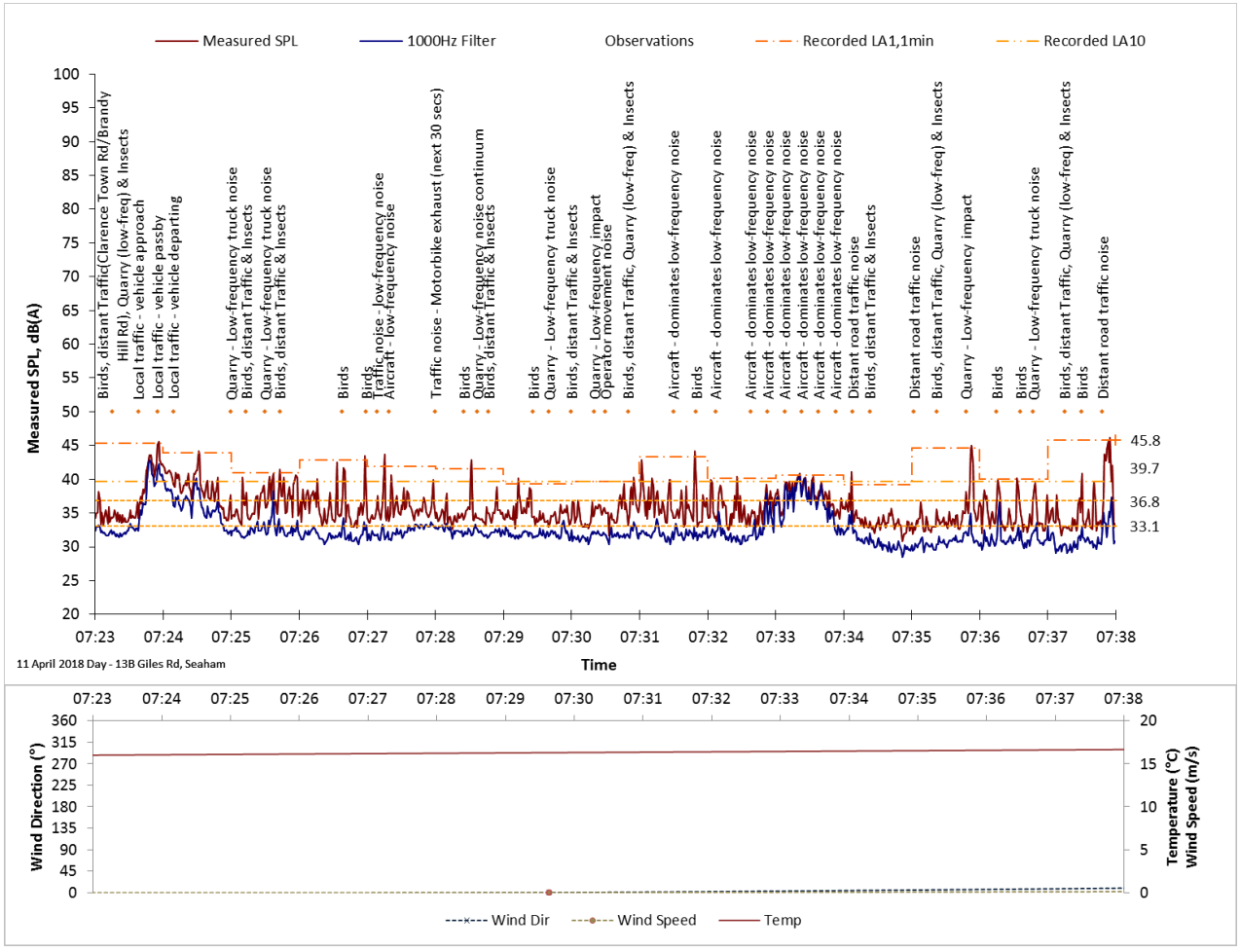


Figure A2. 7

Day Monitoring Results at R1, 19 April 2018, 07:23 to 07:38

Day Monitoring Results for R1, 13B Giles Road, Seaham

Date and Time: 11 April 2018, 07:42 to 07:57

Local Conditions: Wind NE at 0.2 to 0.4 m/s, gusting to 0.5 m/s; Cloudless sky, 17°C, 93% RH

Operator Comments:

The dominant noise sources contributing to the noise environment at the monitoring location were birds, low-frequency mechanical plant from the SW, local and distant road traffic noise, low-frequency quarry noise and insects.

The $L_{Aeq,\ 15\ minute}$ noise contribution from the quarry was estimated to be less than 25 dB(A).

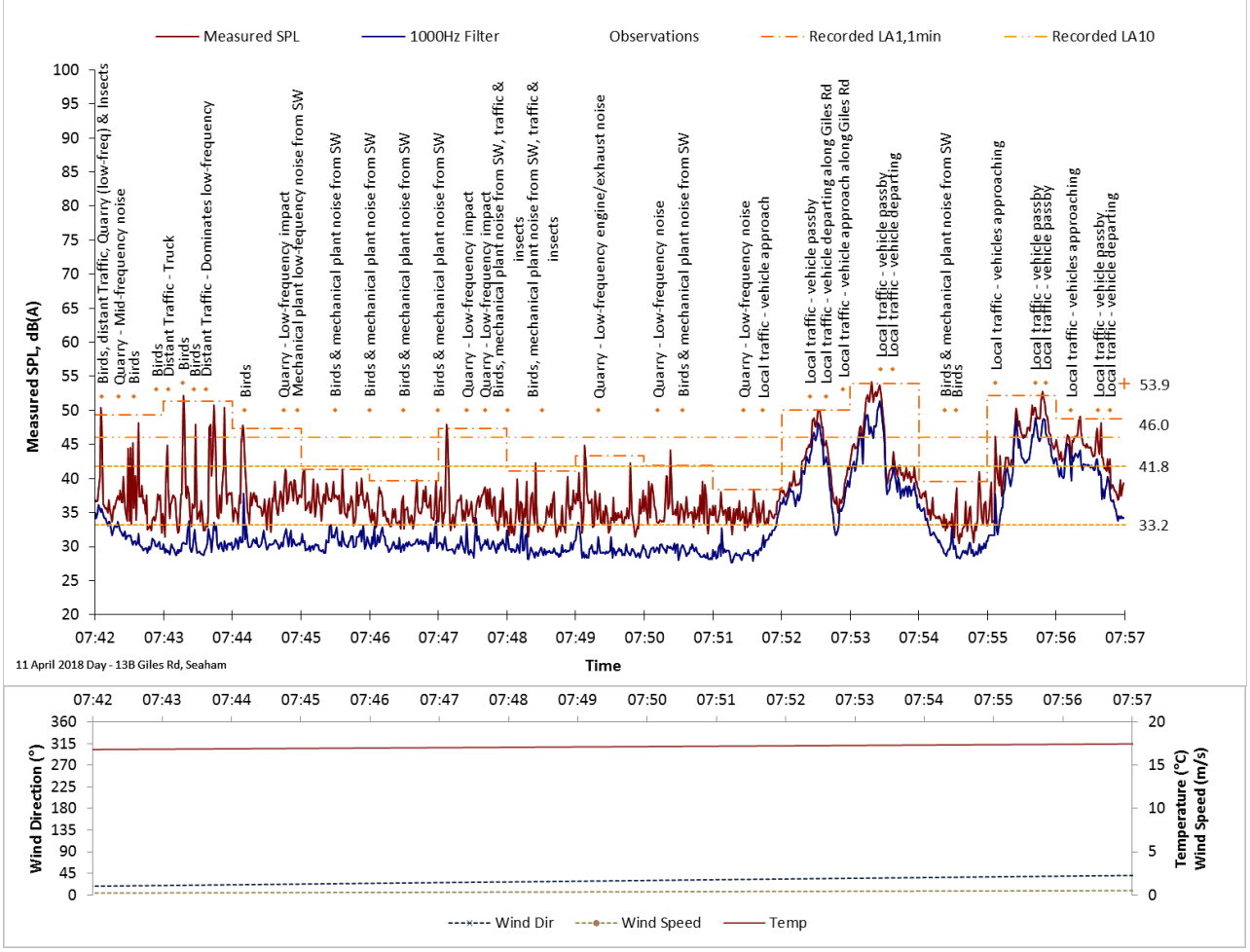


Figure A2.8

Day Monitoring Results at R1, 19 April 2018, 07:42 to 07:57

Table A2.1 – Summary of Attended Noise Monitoring at R1, 13B Giles Road, Seaham – 11 April 2018, dB(A)

Location	Start Time	Measured Noise Levels			Estimated[1] Site Contribution			
	15 min period	LA90, 15min	LAeq, 15min	LA1, 1 min	LAeq, 15min	LA1, 1 min	Met. Exclusion[2,3] (Y/N) [Reason]	Compliant with EPL and PA (Y/N)
Night Period – 19 April 2018								
R1	05:26	30.3	47.2	65.5	<14	32	N	Y
	05:45	32.2	46.5	66.7	<20	44	N	Y
	06:04	34.2	46.4	65.5	<15	32	N	Y
	06:20	35.5	42.7	57.5	<25	44	N	Y
	06:41	35.5	41.0	52.5	<26	40	N	Y
Day Period – 19 April 2018								
R1	07:00	33.7	39.5	56.5	<28	N/A	N	Y
	07:23	33.1	36.8	45.8	<26	N/A	N	Y
	07:42	33.2	41.8	53.9	<25	N/A	N	Y

1 Meteorological conditions under which the noise exceedance criteria do not apply are defined in in EPL 1879.

2 See Table A2.2 below for specific meteorological data during the monitoring period.

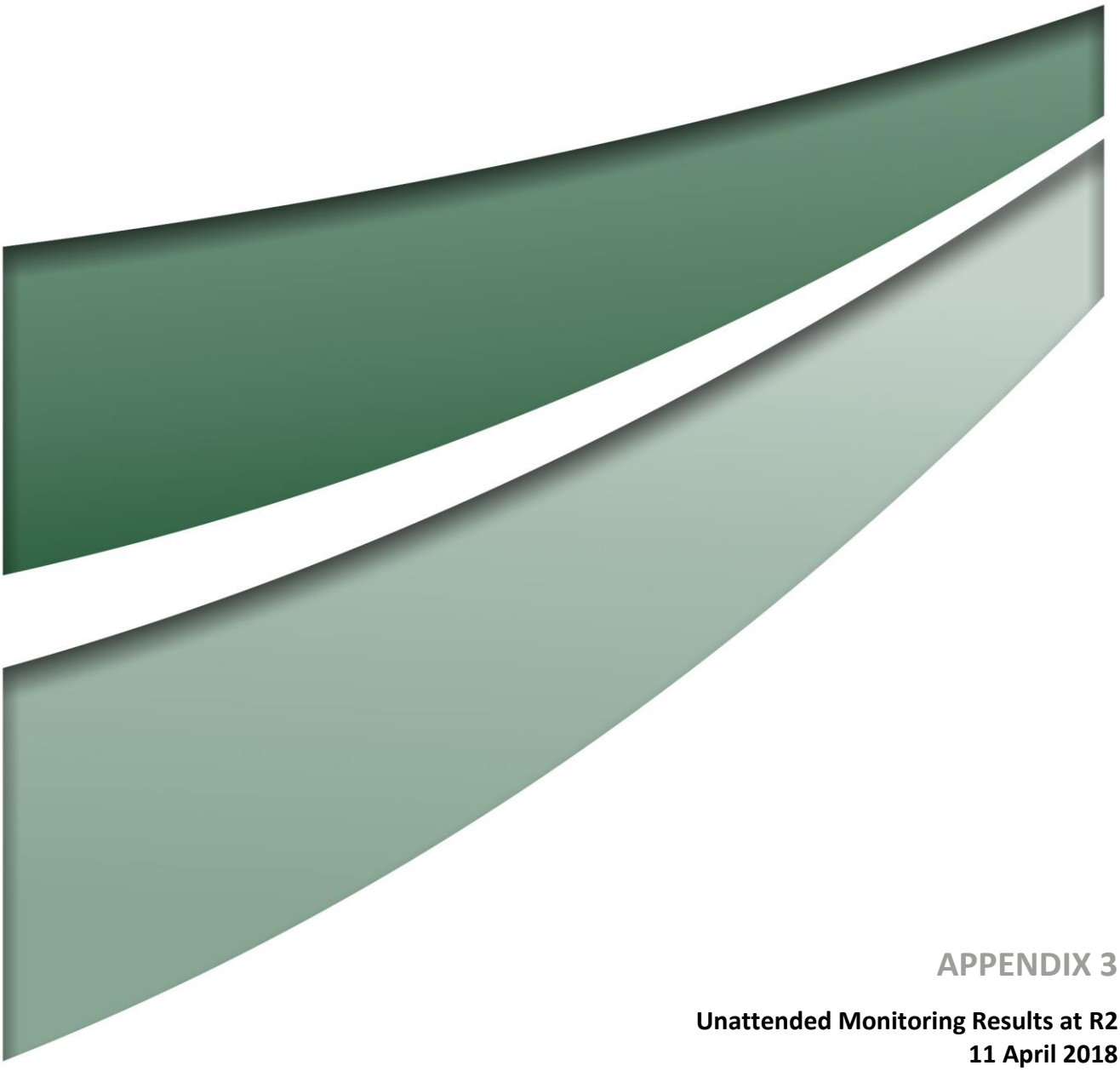
Table A2.2 – Meteorological Conditions During the Monitoring Period – 11 April 2018, dB(A)

Location	Start Time	Date	Meteorological Assessment During Monitoring Period[1]			
			Rain / Hail (mm)	Avg. Wind Speed @ Mic.[2] (m/s)	Avg. Wind Speed @ 10m (m/s)	Atmospheric Stability Category[3] (ASC)
Night Period – 11 April 2018						
R1	05:26	11/04/18	0	<5	Calm	F
	05:45	11/04/18	0	<5	Calm	F
	06:04	11/04/18	0	<5	Calm	F
	06:20	11/04/18	0	<5	Calm	F
	06:41	11/04/18	0	<5	Calm	F
Day Period – 11 April 2018						
R1	07:00	11/04/18	0	<5	Calm	D/F
	07:23	11/04/18	0	<5	0.0 – 0.2 (calm)	D/F
	07:42	11/04/18	0	<5	0.2 – 0.4 (calm)	D/F

1 Meteorological conditions were sourced from the Bureau of Meteorology's (BoM) Tocal Automatic Weather Station (Station IDN 60801) as required in EPL 1879.

2 Wind speed at microphone height was measured using a weather monitor (Kestrel 4500, serial number 658027) positioned within five metres and at a corresponding height of the noise monitoring microphone (except where otherwise noted)

3 Atmospheric stability category derived during the 15 minute interval of the monitoring period



APPENDIX 3

Unattended Monitoring Results at R2
11 April 2018

Appendix 3 – Unattended Monitoring Results

11 April 2018

The results of the unattended noise monitoring session are summarised in **Table A3.1**. The meteorological conditions during the period of unattended noise monitoring are summarised in **Table A3.2**.

The ambient noise environment at the monitoring location was dominated by road traffic noise from the adjacent arterial road, Brandy Hill Road, as well as road traffic noise from the surrounding arterial road network including Clarence Town Road. Other noise sources contributions included local rural noise sources such as including insects, frogs, birds, dogs and cattle. The noise contribution from the quarry was not measurable at the monitoring location.

Night Period Compliance Assessment

During the night period unattended noise monitoring, the results indicated that under the meteorological conditions at the time of monitoring, the quarry was complying with the respective $L_{Aeq,\ 15minute}$ and $L_{A1,\ 1minute}$ noise impact assessment criteria at the monitoring.

Day Period Compliance Assessment

During the day period unattended noise monitoring, the results indicated that under the meteorological conditions at the time of monitoring, the quarry was complying with the respective $L_{Aeq,\ 15minute}$ noise impact assessment criterion at the monitoring location.

Table A3.1 – Summary of the Unattended Noise Monitoring at R2, 115 Brandy Hill Road, Brandy Hill – 11 April 2018, dB(A)

Location	Start Time	Measured Noise Levels			Estimated[1] Site Contribution			
	15 min period	LA90, 15min	LAeq, 15min	LA1, 1 min	LAeq, 15min	LA1, 1 min	Met. Exclusion[2,3] (Y/N) [Reason]	Compliant with EPL and PA (Y/N)
Night Period – 19 April 2018								
R1	05:26	36	62	79	<30	Not measurable	N	Y
	05:45	38	65	80	<30	Not measurable	N	Y
	06:04	40	65	82	<30	Not measurable	N	Y
	06:20	42	65	82	<30	Not measurable	N	Y
	06:41	44	65	82	<30	Not measurable	N	Y
Day Period – 19 April 2018								
R1	07:00	44	66	83	<30	N/A	N	Y
	07:23	42	65	83	<30	N/A	N	Y
	07:42	38	66	81	<30	N/A	N	Y

1 Meteorological conditions under which the noise exceedance criteria do not apply are defined in in EPL 1879.

2 See Table A3.2 below for specific meteorological data during the monitoring period.

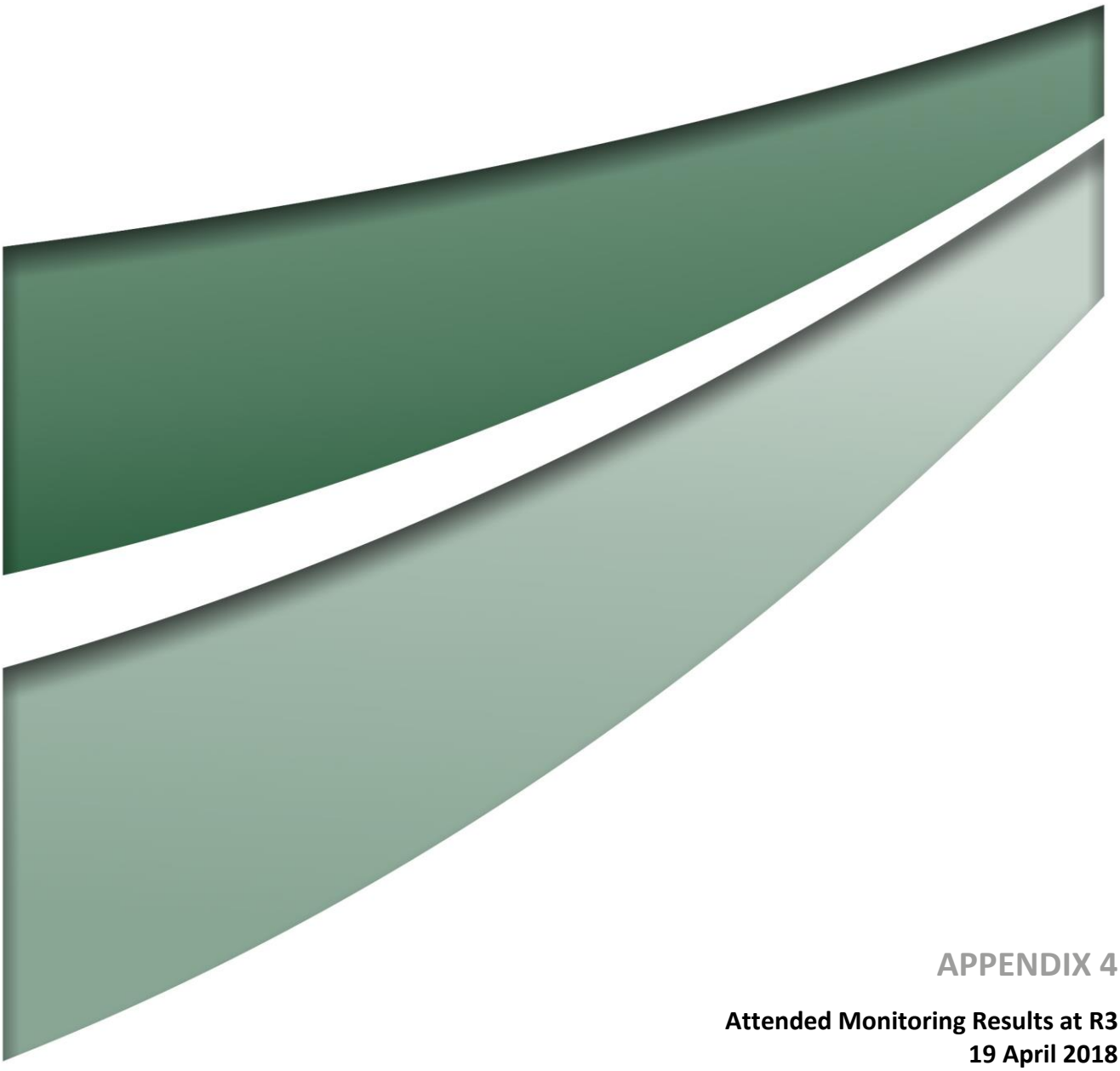
Table A3.2 – Meteorological Conditions During the Monitoring Period – 11 April 2018, dB(A)

Location	Start Time	Date	Meteorological Assessment During Monitoring Period[1]			
			Rain / Hail (mm)	Avg. Wind Speed @ Mic.[2] (m/s)	Avg. Wind Speed @ 10m (m/s)	Atmospheric Stability Category[3] (ASC)
Night Period – 11 April 2018						
R1	05:26	11/04/18	0	<5	Calm	F
	05:45	11/04/18	0	<5	Calm	F
	06:04	11/04/18	0	<5	Calm	F
	06:20	11/04/18	0	<5	Calm	F
	06:41	11/04/18	0	<5	Calm	F
Day Period – 11 April 2018						
R1	07:00	11/04/18	0	<5	Calm	D/F
	07:23	11/04/18	0	<5	0.0 – 0.2 (calm)	D/F
	07:42	11/04/18	0	<5	0.2 – 0.4 (calm)	D/F

1 Meteorological conditions were sourced from the Bureau of Meteorology's (BoM) Tocal Automatic Weather Station (Station IDN 60801) as required in EPL 1879.

2 Wind speed at microphone height was measured using a weather monitor (Kestrel 4500, serial number 658027) positioned within five metres and at a corresponding height of the noise monitoring microphone (except where otherwise noted)

3 Atmospheric stability category derived during the 15 minute interval of the monitoring period



APPENDIX 4

Attended Monitoring Results at R3
19 April 2018

Appendix 4 – Attended Monitoring Results at R3

19 April 2018

The results of the attended noise monitoring session are presented graphically as run charts in **Figure A4.1** to **Figure A4.8**.

The results of the attended noise monitoring session are summarised in **Table A4.1**.

Night Period Compliance Assessment

During the night period attended noise monitoring, the results indicated that under the meteorological conditions at the time of monitoring the quarry was complying with the respective $L_{Aeq,\ 15minute}$ and $L_{A1,\ 1minute}$ noise impact assessment criteria.

Day Period Compliance Assessment

During the night period attended noise monitoring, the results indicated that under the meteorological conditions at the time of monitoring, the quarry was complying with the $L_{Aeq,\ 15minute}$ noise impact assessment criterion.

Night Monitoring Results for R3, 13 Mooghin Road, Seaham

Date and Time: 19 April 2018, 05:18 to 05:33

Local Conditions: Wind WNW to NW at 1.6 to 1.9 m/s, gusting to 1.9 m/s; Clear sky, 12°C, 97% RH

Operator Comments:

The ambient noise environment at the monitoring location was dominated by local rural noise sources including insects and frogs as well as distant arterial road traffic noise from Clarence Town Road. Other noise sources included intermittent birds, cattle and operator movement noise.

Noise from the quarry was not audible during the attended monitoring period.

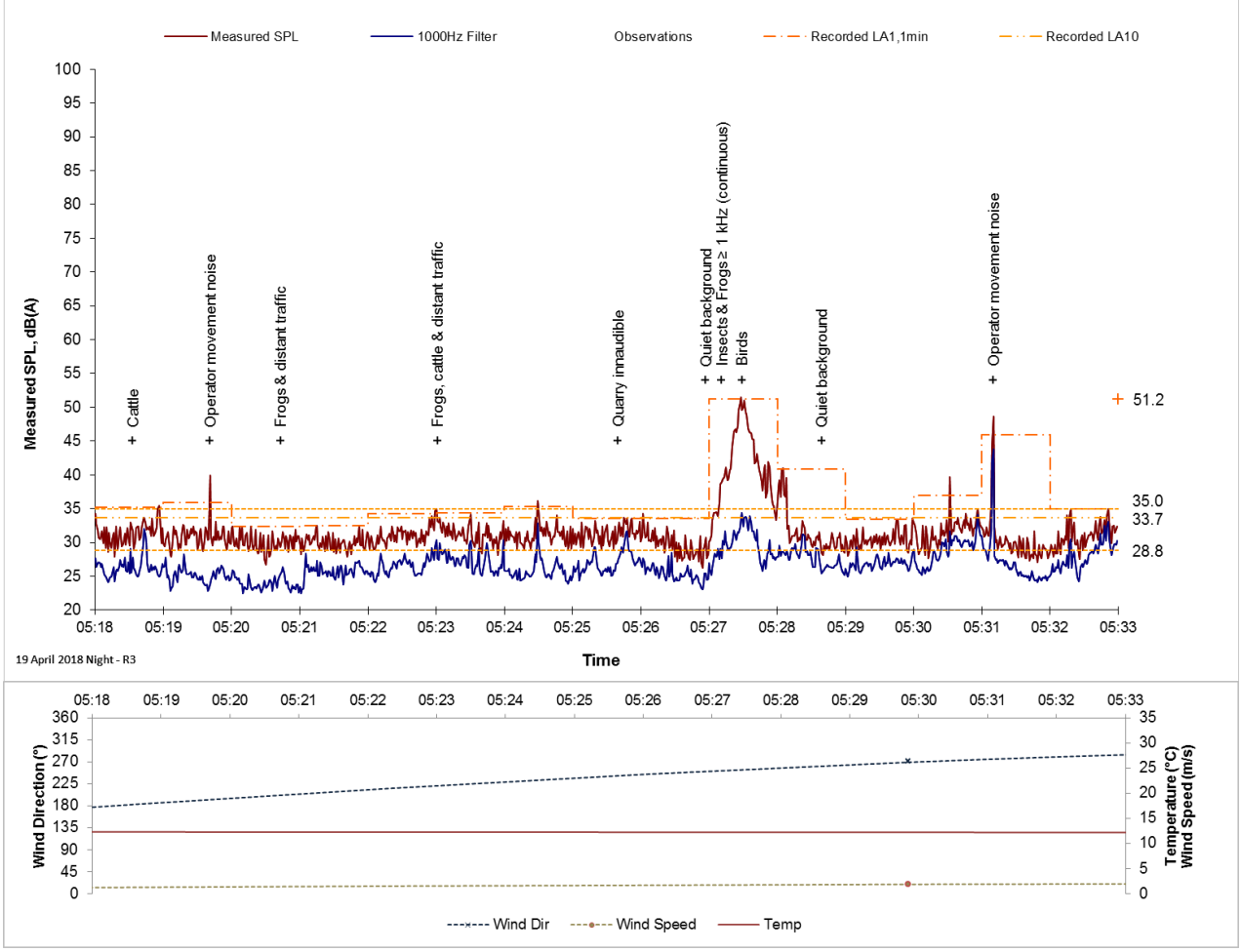


Figure A4.1

Night Monitoring Results at R3, 19 April 2018, 05:18 to 05:33

Night Monitoring Results for R3, 13 Mooghin Road, Seaham

Date and Time: 19 April 2018, 05:40 to 05:55

Local Conditions: Wind WNW to NW at 1.6 to 1.9 m/s, gusting to 1.9 m/s; Clear sky, 12°C, 97% RH

Operator Comments:

The ambient noise environment at the monitoring location was dominated by local rural noise sources including insects and frogs, as well as birds. Other intermittent noise sources included distant arterial road traffic noise and cattle.

Noise from the quarry was not audible during the attended monitoring period.

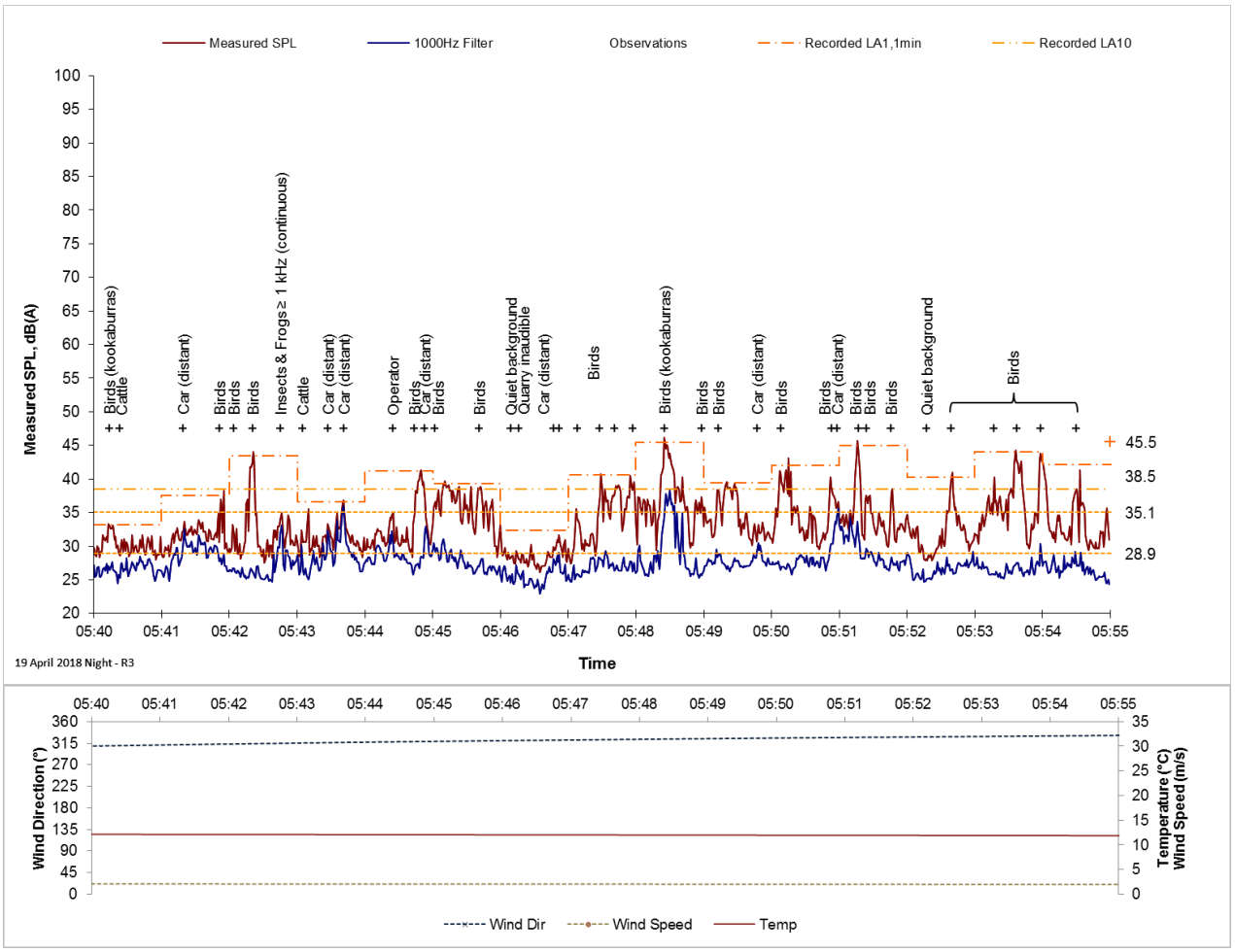


Figure A4.2

Night Monitoring Results at R3, 19 April 2018, 05:40 to 05:55

Night Monitoring Results for R3, 13 Mooghin Road, Seaham

Date and Time: 19 April 2018, 06:03 to 06:18

Local Conditions: Wind NNW at 0.8 to 1.4 m/s, gusting to 1.8 m/s; Clear sky, 12°C, 98% RH

Operator Comments:

The ambient noise environment at the monitoring location was dominated by local rural noise sources including insects, frogs and birds, as well as distant arterial road traffic noise from Clarence Town Road. Other noise sources included aircraft noise and a domestic impact from the North.

Noise from the quarry was not audible during the attended monitoring period.

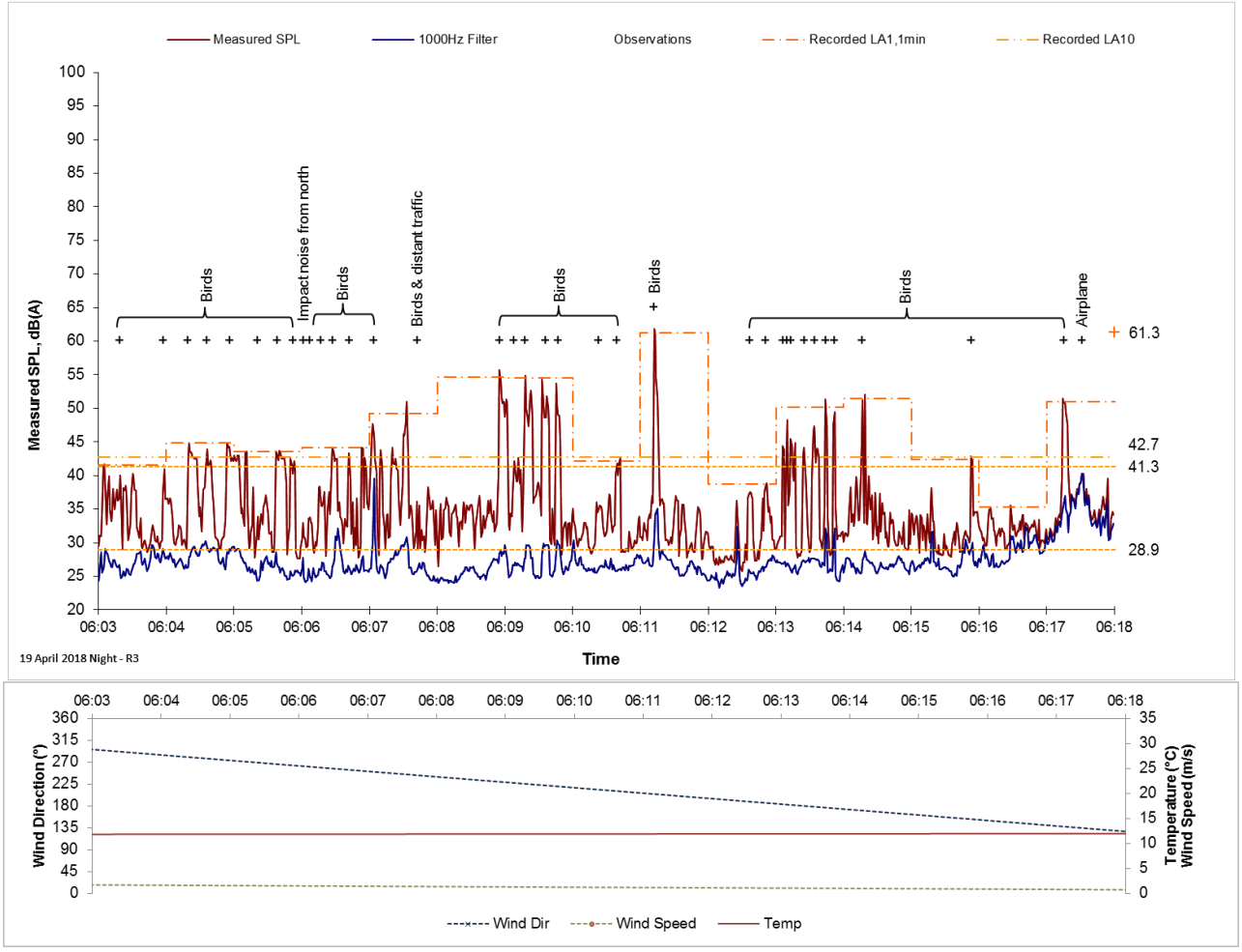


Figure A4.3

Night Monitoring Results at R3, 19 April 2018, 06:03 to 06:18

Night Monitoring Results for R3, 13 Mooghin Road, Seaham

Date and Time: 19 April 2018, 06:26 to 06:41

Local Conditions: Wind NNW at 0 to 0.8 m/s, gusting to 1.7 m/s; Clear sky, 12°C, 98% RH

Operator Comments:

The ambient noise environment at the monitoring location was dominated by local rural noise sources including insects, frogs and birds, as well as distant road traffic noise from the surrounding arterial road network. Other noise sources included aircraft noise and intermittent noise from the quarry.

The $L_{Aeq,\ 15\ minute}$ noise contribution from the quarry site was estimated to be less than 10 dB(A). The maximum $L_{A1,\ 1\ minute}$ noise contribution from the quarry site was estimated to be 30 dB(A) resulting from low-frequency site noise below 315 Hz.

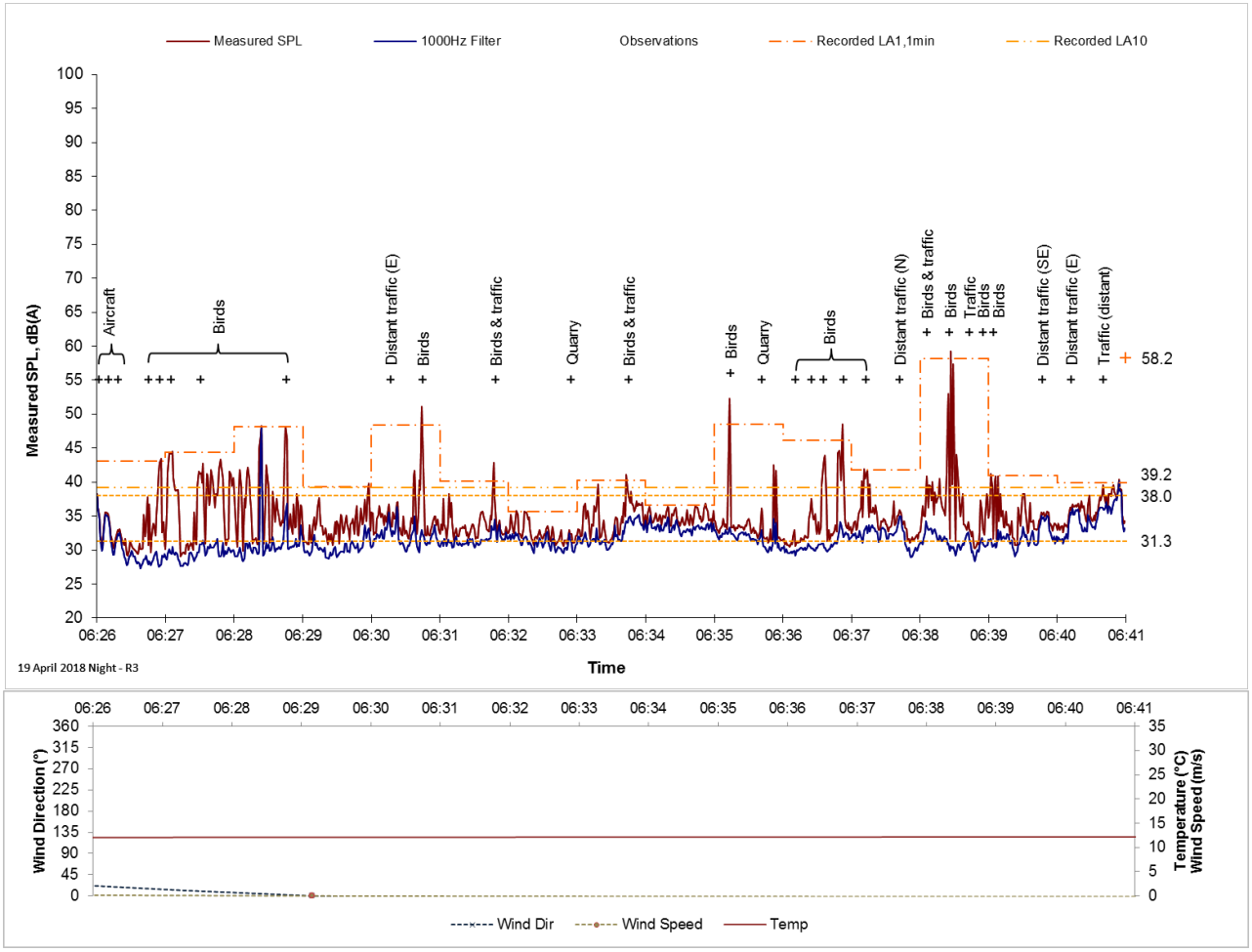


Figure A4.4

Night Monitoring Results at R3, 19 April 2018, 06:26 to 06:41

Night Monitoring Results for R3, 13 Mooghin Road, Seaham

Date and Time: 19 April 2018, 06:46 to 07:01

Local Conditions: Wind N at 0 to 0.2 m/s, gusting to 0.5 m/s; Clear sky, 13°C, 95% RH

Operator Comments:

The ambient noise environment at the monitoring location was dominated by local rural noise sources including insects, frogs and birds, as well as distant road traffic noise from the surrounding arterial road network. Other noise sources included operator noise and intermittent noise from the quarry.

The $L_{Aeq,\ 15\ minute}$ noise contribution from the quarry site was estimated to be less than 10 dB(A). The maximum $L_{A1,\ 1\ minute}$ noise contribution from the quarry site was estimated to be 30 dB(A) resulting from low-frequency site noise below 315 Hz.

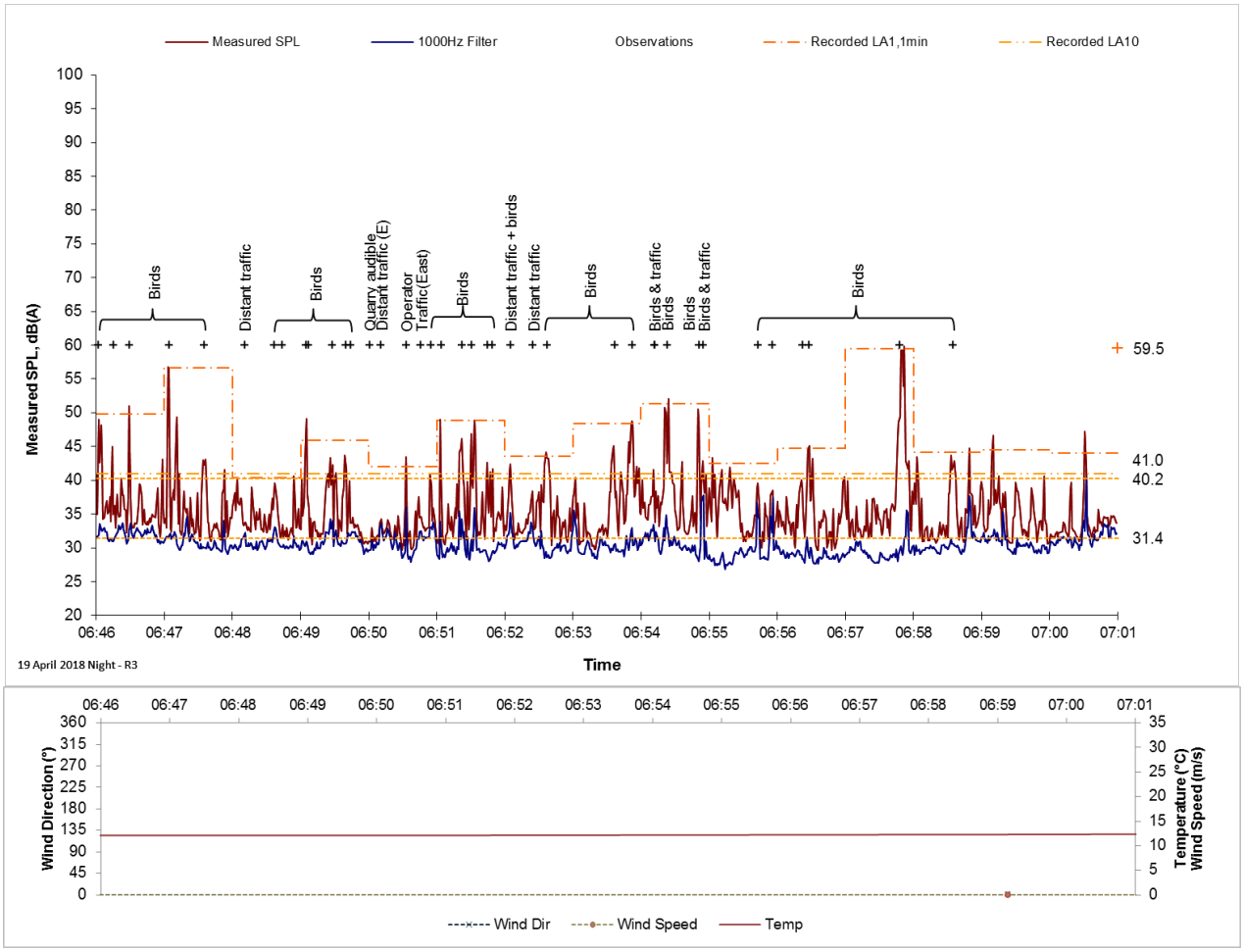


Figure A4.5

Night Monitoring Results at R3, 19 April 2018, 06:46 to 07:01

Night Monitoring Results for R3, 13 Mooghin Road, Seaham

Date and Time: 19 April 2018, 07:12 to 07:27

Local Conditions: Wind N at 0 to 0.2 m/s, gusting to 0.5 m/s; Clear sky, 14°C, 92% RH

Operator Comments:

The ambient noise environment at the monitoring location was dominated by local rural noise sources including insects, frogs and birds, as well as distant road traffic noise from the surrounding arterial road network. Other noise sources included local traffic (farm access track) and barely audible intermittent noise from the quarry.

The $L_{Aeq,\ 15\ minute}$ noise contribution from the quarry site was estimated to be less than 10 dB(A). The maximum $L_{A1,\ 1\ minute}$ noise contribution from the quarry site was estimated to be 28 dB(A) resulting from low-frequency site noise below 315 Hz.

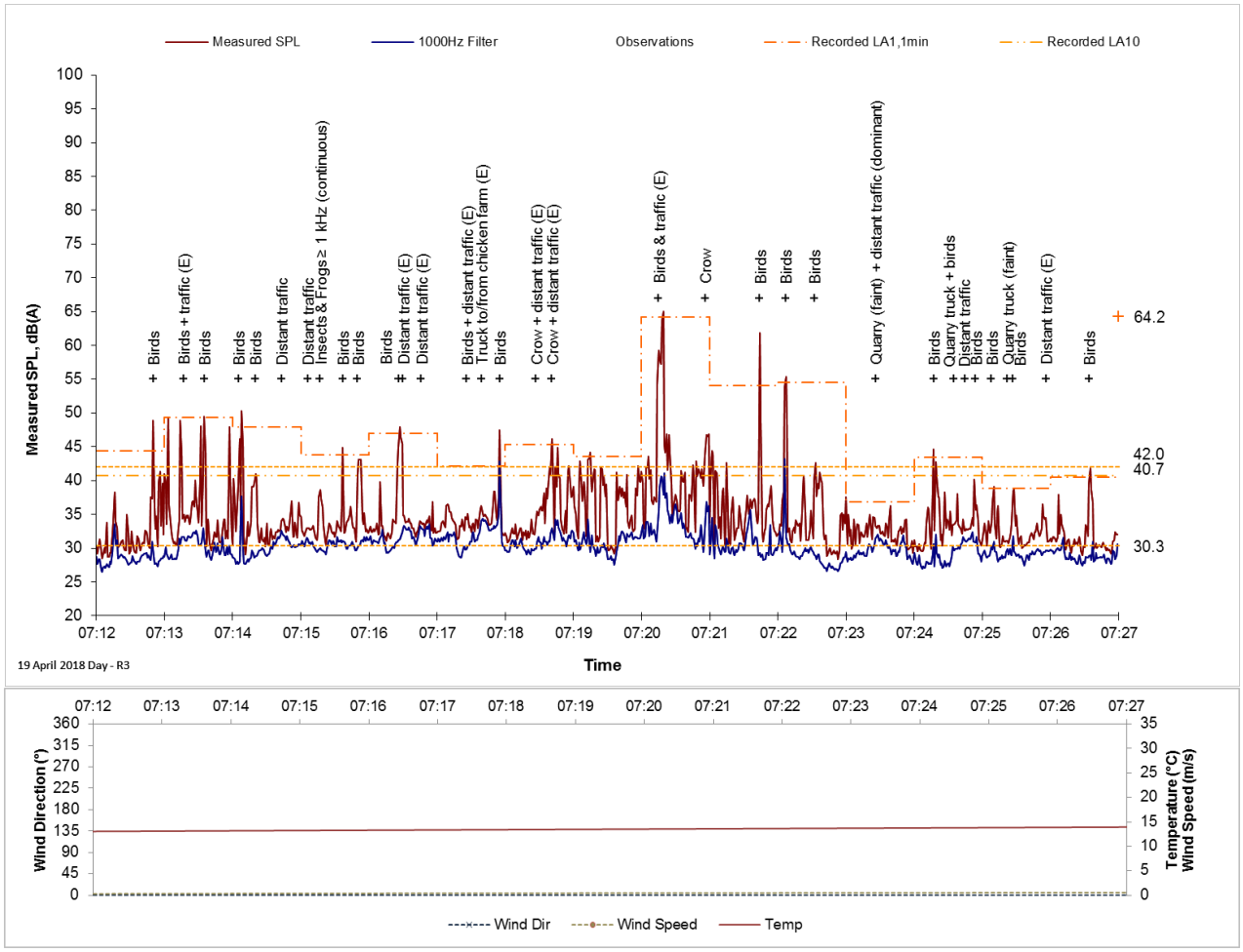


Figure A4.6

Day Monitoring Results at R3, 19 April 2018, 07:12 to 07:27

Night Monitoring Results for R3, 13 Mooghin Road, Seaham

Date and Time: 19 April 2018, 07:36 to 07:51

Local Conditions: Wind N at 0.2 to 0.4 m/s, gusting to 0.5 m/s; Clear sky, 15°C, 91% RH

Operator Comments:

The ambient noise environment at the monitoring location was dominated by local rural noise sources including insects, frogs and birds, as well as distant road traffic noise from the surrounding arterial road network. Other noise sources included intermittent noise from the quarry.

The $L_{Aeq,\ 15\ minute}$ noise contribution from the quarry site was estimated to be less than 13 dB(A). The maximum $L_{A1,\ 1\ minute}$ noise contribution from the quarry site was estimated to be 28 dB(A) resulting from low-frequency site noise below 500 Hz.

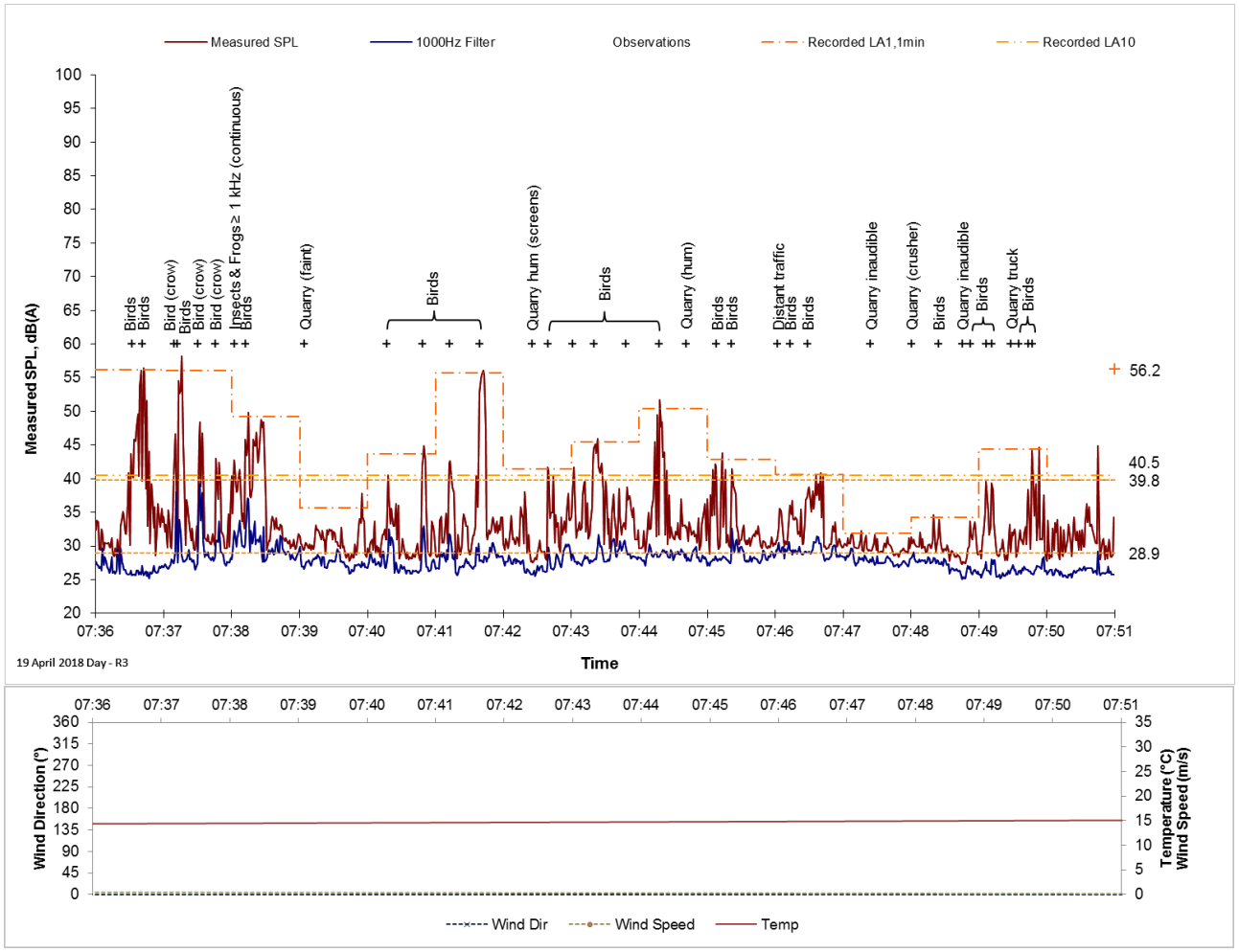


Figure A4.7

Day Monitoring Results at R3, 19 April 2018, 07:36 to 07:51

Table A4.1 – Summary of Attended Noise Monitoring at R3, 19 April 2018, dB(A)

Location	Start Time	Measured Noise Levels			Estimated[1] site contribution			
	15 min period	LA90, 15min	LAeq, 15min	LA1, 1 min	LAeq, 15min	LA1, 1 min	Met. Exclusion[2,3] (Y/N) [Reason]	Compliant with EPL and PA (Y/N)
R3	05:18	28.8	35	51.2	Not Audible	Not Audible	N	Y
	05:40	28.9	35.1	45.5	Not Audible	Not Audible	N	Y
	06:03	28.9	41.3	61.3	Not Audible	Not Audible	N	Y
	06:26	31.3	38	58.2	< 10	30	N	Y
	06:46	31.4	40.2	59.5	< 10	30	N	Y
Day Period – 19 April 2018								
R3	07:12	30.3	42	64.2	< 10	N/A	N	Y
	07:36	28.9	39.8	56.2	< 13	N/A	N	Y

1 Meteorological conditions under which the noise exceedance criteria do not apply are defined in in EPL 1879.

2 See Table A4.2 below for specific meteorological data during the monitoring period.

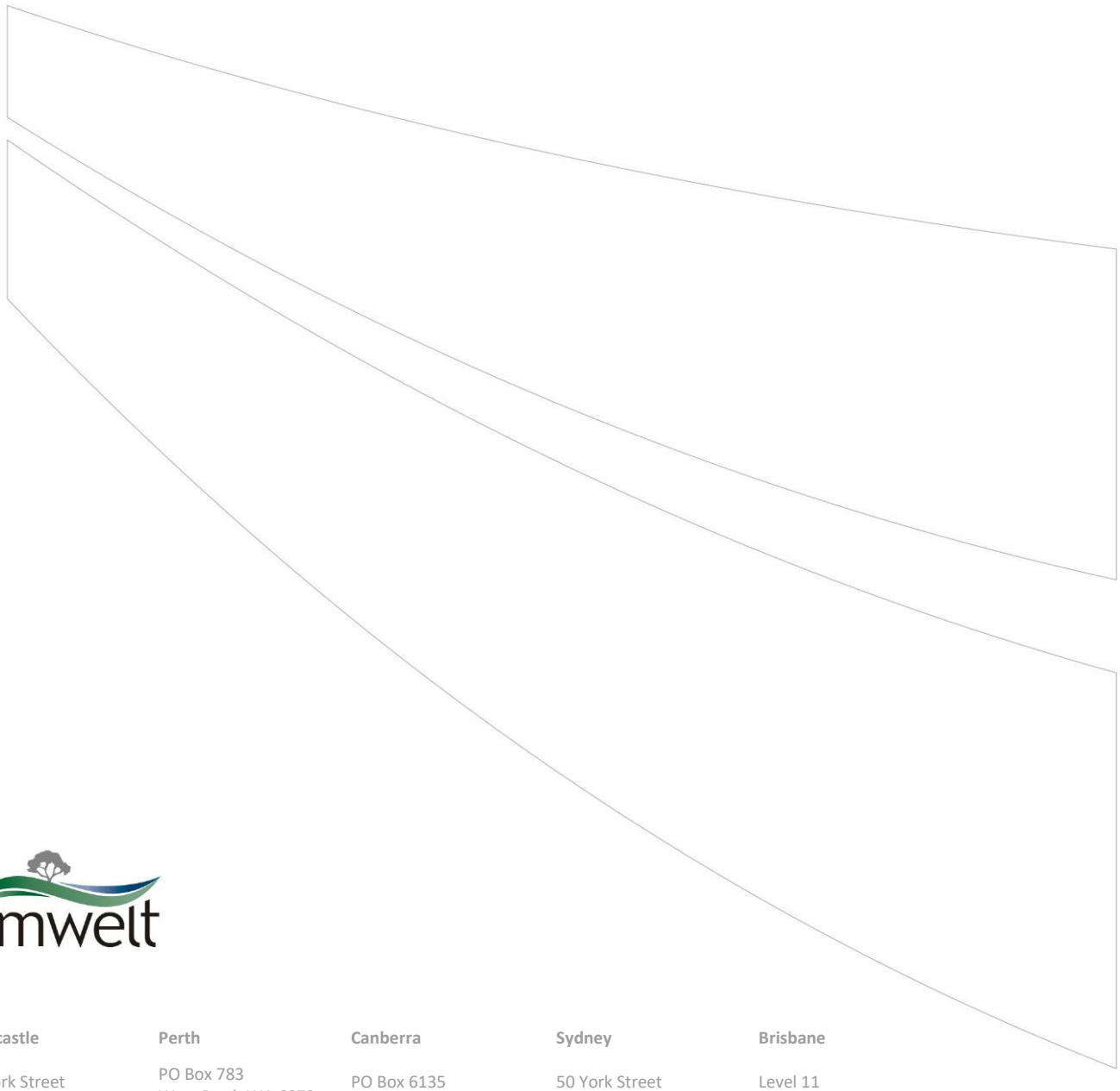
Table A4.2 – Meteorological Conditions During the Monitoring Period at R3, 19 April 2018, dB(A)

Location	Start Time	Date	Meteorological Assessment During Monitoring Period[1]			
			Rain / Hail (mm)	Avg. Wind Speed @ Mic.[2] (m/s)	Avg. Wind Speed @ 10m (m/s)	Atmospheric Stability Category[3] (ASC)
Night Period – 19 April 2018						
R3	05:18	19/04/18	0	<5	1.6 – 1.9	F
	05:40	19/04/18	0	<5	1.6 – 1.9	F
	06:03	19/04/18	0	<5	0.8 – 1.4	F
	06:26	19/04/18	0	<5	0.0 – 0.8	F
	06:46	19/04/18	0	<5	0.0 – 0.2 (calm)	F/D
Night Period – 19 April 2018						
R3	07:12	19/04/18	0	<5	0.0 – 0.2 (calm)	D
	07:36	19/04/18	0	<5	0.2 – 0.4 (calm)	D

1 Meteorological conditions were sourced from the Bureau of Meteorology's (BoM) Tocal Automatic Weather Station (Station IDN 60801) as required in EPL 1879.

2 Wind speed at microphone height was measured using a weather monitor (Kestrel 4500, serial number 658027) positioned within five metres and at a corresponding height of the noise monitoring microphone (except where otherwise noted)

3 Atmospheric stability category derived during the 15 minute interval of the monitoring period



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