Sydney Metro City and Southwest – North Corridor Works

Summary Report – NCW Noise and Vibration Monitoring – May 2019 – October 2019

Project

Title	NCW Noise and Vibration Monitoring - Summary Report - May 2019 to October 2019
Client	Sydney Metro City and Southwest
Document Reference No.	LOR-NCW-Noise and Vibration Monitoring-May19-Oct19 Summary Report V0.3
Laing O'Rourke Project No.	K38

Document

Date	10 July 2020
Monitoring Period	May 2019 to October 2019
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Revisions

Date	Version	Description
08/11/2019	V0.1	LOR-NCW-Noise and Vibration Monitoring-May19-Oct19 Summary Report
06/12/2019	V0.2	Address LOR comments
10/07/2020	V0.3	Revised draft report for client review

1. Overview

Main North and North Shore Corridor Works Project (MNNSCW): Portion 7 - Northern Corridor Works (NCW) are being carried out by Laing O'Rourke Australia Construction Pty Ltd (LOR) on behalf of Sydney Metro. LOR has engaged Environmental Resources Management Australia Pty Ltd (ERM) to undertake environmental noise and vibration monitoring during select works.

The monitoring is being undertaken with due regard to, and in accordance with, the NCW – Construction Noise and Vibration Management Plan (CNVMP), last updated November 2018 and other relevant policy, guidelines and standards as listed in the reference section of this report.

This technical report has been prepared to summarise the results and findings of operator attended noise and vibration monitoring as well as unattended noise and vibration monitoring completed from May 2019 to October 2019 inclusive.

The noise and vibration monitoring was conducted throughout various track possession works as described in the approved Out-of-Hours Work (OOHW) application forms (OOHWAF), application numbers 28 to 30 prepared by LOR (i.e. OOHWAF028-030). LOR identified the potential for these works to generate noise and vibration impacts, and as such the monitoring was conducted by qualified and/or suitably experienced specialists to measure levels, evaluated compliance and provide recommendations for any new or modified mitigation.

The aim of this summary report is to provide an overview of recent monitoring activities, information on the outcomes, and any further recommendations to reduce noise and vibration-related impacts. The structure of this report is as follows:

- **Section 1 (this section)**: brief overview of the 2019 monitoring period and report objectives.
- **Section 2**: summary of the monitoring conducted and technical discussion.
- **Section 3**: summary of typical monitoring outcomes and recommendations.
- **Section 4**: conclusion.
- **Appendix A**: noise and vibration monitoring methodology.

This report is supported by the LOR-NCW-Noise and Vibration Monitoring (May19-Oct19) Addendum, which contains monitoring location maps, recorded data sets and supporting graphs of noise and vibration monitoring activities in chronological order.

2. Monitoring Summary (2019)

Table 2.1 presents a summary of the noise and vibration monitoring activities, both attended and unattended, for the period inclusive of May 2019 to October 2019.

As noted above, the full noise and vibration data sets are provided in the LOR-NCW-Noise and Vibration Monitoring (May19-Oct19) Addendum.

Table 2.1 – Noise and Vibration Monitoring Events Summary

Date (Report - Possession Ref.)	Approvals Documentation	Summary of Works	Complaints	Monitoring Type	Discussion
17.06.19 to 21.06.19 (RP32 – MW50, refer to Appendix A of the Addendum document)	OOHWAF-028	MW50 works included: • Overhead wire (OHW) adjustments on the Up Shore • Rail Relocation • Drainage Pit Investigations	**Two complaints** were received relating to noise associated with NCW activities being undertaken near residential receptors on Drake Street. Specifically, a complaint (reference 190618TOM) was received in regards to "Vehicles and plant accessing the corridor at night". Investigation result was Laing O'Rourke are undertaking approved OOH work during Sydney Trains possession periods'. No further action was required as resident did not want to call helpline or offer any contact details.	Attended and Unattended Noise	During **attended noise monitoring**, the existing noise environment (in the absence of site noise) at the majority of community locations near to the MW50 works was generally dominated by non-project related noise emissions, including those generated by residences near the measurement position, animals (birds and insects and domestic animals), wind-blown vegetation and aircraft passing overhead. Measured site noise level contributions (Leq, 15 minutes) were between 32 - 77 dBA over the monitoring period, depending on the type (and proximity) of construction activity and the duration of noise events that occurred within the sample period. On average site, noise level contributions for the MW50 works were 25 dBA **above the Noise Management Level** (NML). Comparison of site noise levels to the predicted values presented in OOHWAF-028 indicate that on average, actual emissions associated with MW50 works were 13 dBA **above the predicted values**. This however includes data where predictions were not provided in OOHWAF-028 and a precautionary analysis was undertaken by adopting either the most appropriate or the lowest predicted values (depending on the activity) for MW50. Exceedances in predicted values noted when several vehicles arrived and were poorly managed at the Drake Street site entrance. LOR was informed of the exceedance and the site manager co-ordinated site vehicle movements to prevent further exceedances. All relevant AMMs were in place during this activitiy (notification, noise monitoring and respite/alternative accommodation, where required). The exceedances did not result in the application of additional AMMs. During **unattended noise monitoring**, the existing noise environment (in the absence of site noise) at the majority of community locations near to the MW50 works was generally dominated by non-project related road traffic on public roads and other non-project emissions including: • those generated by residences near the measurement position • non-project related rail traffic (outside of track the possession hours) • animals (birds and insects, domestic animals) • wind-blown vegetation and aircraft passing overhead Noise at UNM02 and UNM03 was dominated by project noise emissions during times of documented activity at the site. Estimated site noise level contributions were **generally below the NML**'s at UNM02 and UNM03, with the exception of a few isolated events, which is expected for the type of activities being undertaken.

Date (Report - Possession Ref.)	Approvals Documentation	Summary of Works	Complaints	Monitoring Type	Discussion
22.06.19 to 23.06.19 (RP33a – WE51, refer to Appendix B of the Addendum document)	OOHWAF-028	WE51 works included: • Demolition 2 x Pits • Remove GST post and spoil removal • Ground investigations • Ballast Works • OHW Adjustment Works • Signals Construction Works • Demolition of Nelson St Pier 1 • Demolition stockpile management and removal • Pit 17 break down and lid placement • OSD Spillway Construction • Combined Services Routes works • Drainage ULX • Drainage Concrete Encasement	**Five complaints** were received during WE51 relating to noise associated with NCW activities. Responses to compliants are provided below: One complaint (Reference 190622TUAN) necessitated noise monitoring to occur at their property. The monitoring was conducted and identified noise levels 35 dBA above the background noise of the area. As a result, alternate accommodation was provided, and works were staggered as per the original plan, with plant relocated as required. No complaints were received regarding vibration during the WE51 monitoring period.	Attended and Unattended Noise	During **attended noise monitoring**, the existing noise environment (in the absence of site noise) at the majority of community locations near to the WE51 works was generally dominated by non-project related noise emissions, including those generated by residences near the measurement position, animals (birds and insects and domestic animals), wind-blown vegetation and aircraft passing overhead. Measured site noise level contributions (Leq, 15 minutes) were between 55 and 80 dBA over the monitoring period, depending on the type (and proximity) of construction activity and the duration of noise events that occurred within the sample period. On average site, noise level contributions for the WE51 works were 26 dBA **above the NML.** Comparison of site noise levels to the predicted values presented in OOHWAF-028 indicated that on average, actual emissions associated with WE51 works were ~9 dBA **above the predicted values**. All works were predicted in OOHWAF-028, however, the situation that created the exceedance in predictd values was two machines working too close to one another (and adjacent a resident's property) - due to unplanned overlapping of planned activities. During **unattended noise monitoring**, the existing noise environment (in the absence of site noise) at the majority of community locations near to the WE51 works was generally dominated by non-project related road traffic on public roads and other non-project emissions including: • those generated by residences near the measurement position • non-project related rail traffic (outside of track possession hours) • animals (birds and insects, domestic animals) • wind-blown vegetation and aircraft passing overhead Noise at UNM01, UNM02 and UNM03 was dominated by project noise emissions during times of documented activity at the site. Estimated site noise level contributions were **generally above the NML**'s at UNM01 and UNM02, which is expected for the type of activities being undertaken.

Date (Report - Possession Ref.)	Approvals Documentation	Summary of Works	Complaints	Monitoring Type	Discussion
22.06.19 to 23.06.19 (RP33b – WE51, refer to Appendix C of the Addendum document)	OOHWAF-028	WE51 works included: • Demolition 2 x Pits • Remove GST post and spoil removal • Ground investigations • Ballast Works • OHW Adjustment Works • Signals Construction Works • Demolition of Nelson St Pier 1 • Demolition stockpile management and removal • Pit 17 break down and lid placement • OSD Spillway Construction • Combined Services Routes works • Drainage ULX • Drainage Concrete Encasement	**No complaints** were received regarding vibration during the WE51 monitoring period.	Unattended Vibration	Vibration generated by WE51 works was at times perceptible at both UVM01 and UVM03. Vibration was not perceptible at UVM02 due to the minor nature of activities occurring within the rail corridor. When vibration-generating activities occurred the vibration generated by the works dominated the emissions perceived and detected at the receptor. General construction activities were occurring throughout WE51 however, vibration generated by the **majority of works was imperceptible**. Ambient vibration associated with the existing acoustics environment also remained imperceptible. Despite certain events being perceptible throughout WE51, the highest measured vibration levels (8.2 mm/s) and associated characteristic frequencies (43Hz) are **below and compliant with the applicable BS7385 vibration guideline values**, as identified in the CNVMP.

Date (Report - Possession Ref.)	Approvals Documentation	Summary of Works	Complaints	Monitoring Type	Discussion
24.06.19 to 28.06.19 (RP34 – MW51, refer to Appendix D of the Addendum document)	OOHWAF-028	MW51 works included: • OHW adjustments on the Up Shore • Rail Relocation. • Drainage Pit Investigations	**No complaints** were received regarding noise and/or vibration during the MW51 monitoring period.	Attended and Unattended Noise	During **attended noise monitoring**, the existing noise environment (in the absence of site noise) at the majority of community locations near to the MW51 works was generally dominated by non-project related noise emissions, including those generated by residences near the measurement position, animals (birds and insects and domestic animals), wind-blown vegetation and aircraft passing overhead. Measured site noise level contributions (Leq, 15 minutes) were between 33 - 60 dBA over the monitoring period, depending on the type of construction activity and the duration of noise events that occurred within the sample period. On average site, noise level contributions for the MW51 works were 11 dBA **above the NML**. Comparison of site noise levels to the predicted values presented in OOHWAF-028 indicated that on average, actual emissions associated with MW51 works were 2 dBA **above the predicted values in OOHWAF-028**. During **unattended noise monitoring**, the existing noise environment (in the absence of site noise) at the majority of community locations near to the MW51 works was generally dominated by non-project related road traffic on public roads and other non-project emissions including: • those generated by residences near the measurement position • non-project related rail traffic (outside of track the possession hours) • animals (birds and insects, domestic animals) • wind-blown vegetation and aircraft passing overhead Noise at UNM02 and UNM03 was dominated by project noise emissions during times of documented activity at the site. Estimated site noise level contributions were **generally below the NML**'s at UNM02 and UNM03, with the exception of a few isolated events, which is expected for the type of activities being undertaken.

Date (Report - Possession Ref.)	Approvals Documentation	Summary of Works	Complaints	Monitoring Type	Discussion
20.07.19 to 21.07.19 (RP35a – WE03, refer to Appendix E of the Addendum document)	OOHWAF-028	WE03 works included: • Free weld works • Ballast prep and track tamping works • OHW Adjustment Works • Locomotive tests • Signalling Commissioning Works • Excavation and footing construction	**No complaints** regarding noise were received during the WE03 monitoring period.	Attended and Unattended Noise	During **attended noise modelling**, the existing noise environment (in the absence of site noise) at the majority of community locations near to the WE03 works was generally dominated by non-project related noise emissions, including those generated by residences near the measurement position, animals (birds and insects and domestic animals), wind-blown vegetation and aircraft passing overhead. Measured site noise level contributions (Leq, 15 minutes) were between 53 - 71 dBA over the monitoring period, depending on the type (and proximity) of construction activity and the duration of noise events that occurred within the sample period. On average site, noise level contributions for the WE03 works were 15 dBA **above the NML.** Comparison of site noise levels to the predicted values presented in OOHWAF-028 indicated that on average, actual emissions associated with WE03 works were 2 dBA **below the predicted values**. During **unattended noise monitoring**, the existing noise environment (in the absence of site noise) at the majority of community locations near to the WE03 works was generally dominated by non-project related road traffic on public roads and other non-project emissions including: • those generated by residences near the measurement position • non-project related rail traffic (outside of track possession hours) • animals (birds and insects, domestic animals) • wind-blown vegetation and aircraft passing overhead Noise at UNM01, UNM02 and UNM03 was dominated by project noise emissions during times of documented activity at the site. Estimated site noise level contributions were **generally above the NML**'s at UNM01, UNM02 and UNM03, which is expected for the type of activities being undertaken.

Date (Report - Possession Ref.)	Approvals Documentation	Summary of Works	Complaints	Monitoring Type	Discussion
20.07.19 to 21.07.19 (RP35b – WE03, refer to Appendix F of the Addendum document)	OOHWAF-028	WE03 works included: • Free weld works • Ballast prep and track tamping works • OHW Adjustment Works • Locomotive tests • Signalling Commissioning Works • Excavation and footing construction	**No complaints** regarding vibration were received during the WE03 monitoring period.	Unattended Vibration	Vibration generated by WE03 works was at times perceptible at both UVM01 and UVM03. Vibration was not perceptible at UVM02 due to the minor nature of activities occurring within the rail corridor. When vibration-generating activities occurred the vibration generated by the works dominated the emissions perceived and detected at the receptor. General construction activities were occurring throughout WE03 however, vibration generated by the **majority of works was imperceptible**. Ambient vibration associated with the existing acoustics environment also remained imperceptible. Despite certain events being perceptible throughout WE03, the highest measured vibration levels (3.70 mm/s) and associated characteristic frequencies (11Hz) are **below and compliant with the applicable BS7385 vibration guideline values**, as identified in the CNVMP.

Date (Report - Possession Ref.)	Approvals Documentation	Summary of Works	Complaints	Monitoring Type	Discussion
29.07.19 to 02.08.19 (RP36 – MW04, refer to Appendix G of the Addendum document)	OOHWAF-029	MW04 works included: • Track Adjustments • Drainage preparation works and surveys • Material delivery	**No complaints** were received regarding noise and/or vibration during the MW04 monitoring period.	Attended and Unattended Noise	During **attended noise monitoring**, the existing noise environment (in the absence of site noise) at the majority of community locations near to the MW04 works was generally dominated by non-project related noise emissions, including those generated by residences near the measurement position, animals (birds and insects and domestic animals), wind-blown vegetation and aircraft passing overhead. Measured site noise level contributions (Leq, 15 minutes) were between 29 - 68 dBA over the monitoring period, depending on the type of construction activity and the duration of noise events that occurred within the sample period. On average site, noise level contributions for the MW04 works were 18 dBA **above the NML**. Comparison of site noise levels to the predicted values presented in OOHWAF-029 indicated that on average, actual emissions associated with MW04 works were 2 dBA **above the predicted values**. During **unattended noise monitoring**, the existing noise environment (in the absence of site noise) at the majority of community locations near to the MW04 works was generally dominated by non-project related road traffic on public roads and other non-project emissions including: • those generated by residences near the measurement position • non-project related rail traffic (outside of track the possession hours) • animals (birds and insects, domestic animals) • wind-blown vegetation and aircraft passing overhead Noise at UNM02 and UNM03 was dominated by project noise emissions during times of documented activity at the site. Estimated site noise level contributions were **above the NML's at UNM02** and **below the NML's at UNM03**, which is expected for the type of activities being undertaken.

Date (Report - Possession Ref.)	Approvals Documentation	Summary of Works	Complaints	Monitoring Type	Discussion
03.08.19 to 04.08.19 (RP37a – WE05, refer to Appendix H of the Addendum document)	OOHWAF-029	WE05 works included: (OOHWAF-029) • Signals Support & Construction Works • Demolition of Nelson St Pier 1 footing • Combined Services Routes works • Deep drainage works • HDPE Pipe Encasement works • Drainage Concrete Encasement • Over-head wiring adjustments	**Seven complaints** were received during the WE05 monitoring period relating to noise associated with NCW activities. One complaint triggered attended noise monitoring as an additional mitigation measure, which was conducted to evaluate site related noise levels at their property. Additionally, a project-specific respite offer was provided to the complainant prior to works being conducted, as outlined throughout the OOHWAF-029. Respite periods were observed during NCW WE05 works during attended noise monitoring.	Attended and Unattended Noise	During **attended noise monitoring**, the existing noise environment (in the absence of site noise) at the majority of community locations near to the WE05 works was generally dominated by non-project related noise emissions, including those generated by residences near the measurement position, animals (birds and insects and domestic animals), wind-blown vegetation and aircraft passing overhead. Measured site noise level contributions (Leq, 15 minutes) were between 51 - 68 dBA over the monitoring period, depending on the type (and proximity) of construction activity and the duration of noise events that occurred within the sample period. On average site, noise level contributions for the WE05 works were 15 **dBA above the NML**. Comparison of site noise levels to the predicted values presented in OOHWAF-029 indicated that on average, actual emissions associated with WE05 works were 2 dBA **above the predicted values**. During unattended noise monitoring, the existing noise environment (in the absence of site noise) at the majority of community locations near to the WE05 works was generally dominated by non-project related road traffic on public roads and other non-project emissions including: • those generated by residences near the measurement position • non-project related rail traffic (outside of track possession hours) • animals (birds and insects, domestic animals) • wind-blown vegetation and aircraft passing overhead Noise at UNM01, UNM02 and UNM03 was dominated by project noise emissions during times of documented activity at the site. Estimated site noise level contributions were **generally above the NML's at UNM01, UNM02 and UNM03**, which is expected for the type of activities being undertaken.

Date (Report - Possession Ref.)	Approvals Documentation	Summary of Works	Complaints	Monitoring Type	Discussion
03.08.19 to 04.08.19 (RP37b – WE05, refer to Appendix I of the Addendum document)	OOHWAF-029	WE05 works included: • Signals Support & Construction Works • Demolition of Nelson St Pier 1 footing • Combined Services Routes works • Deep drainage works • HDPE Pipe Encasement works • Drainage Concrete Encasement • Over-head wiring adjustments	**No complaints** were received regarding vibration during the WE05 monitoring period.	Unattended Vibration	Vibration generated by WE05 works was at times perceptible at UVM01, UVM02 and UVM03. When vibration-generating activities occurred the vibration generated by the works dominated the emissions perceived and detected at the receptor. General construction activities were occurring throughout WE05 however, vibration generated by **the majority of works was imperceptible**. Ambient vibration associated with the existing acoustics environment also remained imperceptible. Despite certain events being perceptible throughout WE05, the highest measured vibration levels (1.99 mm/s) and associated characteristic frequencies (>100Hz) are **below and compliant with the applicable BS7385 vibration guideline values**, as identified in the CNVMP.

Date (Report - Possession Ref.)	Approvals Documentation	Summary of Works	Complaints	Monitoring Type	Discussion
16.09.19 to 20.09.19 (RP38 – MW11, refer to Appendix J of the Addendum document)	OOHWAF-030	MW11 works included: • CSR/Drainage preparation and material movements for WE12 works • Sig & Comms Construction works	**Four complaints** were received during the MW11 monitoring period in relation to loud noises associated with approved OOHW, such as hammering and clanging, and movement of trucks. In order to manage complaints, the following measures were implemented: • Staff were briefed on not using truck reversing beepers at night at Drake Street (Complaint Reference 190917ANON) and to use Spotters as much as practicable. • Another noise complaint (Compliant Reference 190917LIU) came for the use of rail saw casing, which resulted in loud noise at 01:56am. Activity was curtailed to give adequate respite.	Attended and Unattended Noise	During **attended noise monitoring**, the existing noise environment (in the absence of site noise) at the majority of community locations near to the MW11 works was generally dominated by non-project related noise emissions, including those generated by residences near the measurement position, animals (birds and insects, and domestic animals), wind-blown vegetation and aircraft passing overhead. Measured site noise level contributions (Leq, 15 minutes) were between 36-68 dBA over the monitoring period, depending on the type of construction activity and the duration of noise events that occurred within the sample period. On average site, noise level contributions for the MW11 works were 14 dBA **above the NML**. Comparison of site noise levels to the predicted values presented in OOHWAF-030 indicated that on average, actual emissions associated with MW11 works were 4 dBA **above the predicted values**. The exceedance of the predicted values did trigger a requirement to consider additional mitigation measures - in this case, the activity was able to be curtailed to provide respite and remove / reduce the additional noise nuisance. During **unattended noise monitoring**, the existing noise environment (in the absence of site noise) at the majority of community locations near to the MW11 works was generally dominated by non-project related road traffic on public roads and other non-project emissions including: • those generated by residences near the measurement position • non-project related rail traffic (outside of track the possession hours) • animals (birds and insects, domestic animals) • wind-blown vegetation and aircraft passing overhead Noise at UNM01 and UNM02 was dominated by project noise emissions during times of documented activity at the site. Estimated site noise level contributions were **above the NML**'s at UNM01 and UNM02, which is expected for the type of activities being undertaken.

Date (Report - Possession Ref.)	Approvals Documentation	Summary of Works	Complaints	Monitoring Type	Discussion
21.09.19 to 22.09.19 (RP39a – WE12, refer to Appendix K of the Addendum document)	OOHWAF-030	WE12 works included: • Signal Support & Construction Works • Stockpile Management and Removal • Import of Material • Tamping • Guard Rail Installation • CSR ULX, Turning Unit routes, signal base install • Pit and pipe install for 250 and 750 drainage route	**No complaints** regarding noise were received during the WE12 monitoring period.	Attended and Unattended Noise	During **attended noise monitoring**, the existing noise environment (in the absence of site noise) at the majority of community locations near to the WE12 works was generally dominated by non-project related noise emissions, including those generated by residences near the measurement position, animals (birds and insects and domestic animals), wind-blown vegetation and aircraft passing overhead. Measured site noise level contributions (Leq, 15 minutes) were between 55-75 dBA over the monitoring period, depending on the type (and proximity) of construction activity and the duration of noise events that occurred within the sample period. On average, site noise level contributions for the WE12 works were 21 dBA **above the NML**. Comparison of site noise levels to the predicted values presented in OOHWAF-030 indicated that on average, actual emissions associated with WE12 works were 14 dBA **above the predicted values**. The increase in noise did not trigger the requirement to consider additional mitigation measure beyond the AMMs already offered / implemented, but more consultations and improved management of traffic and flow of trucks/plant off site (at Drake Street) assisting in minimising disturbance as much as practicable. During **unattended noise monitoring**, the existing noise environment (in the absence of site noise) at the majority of community locations near to the WE12 works was generally dominated by non-project related road traffic on public roads and other non-project emissions including: • those generated by residences near the measurement position • animals (birds and insects, domestic animals) • wind-blown vegetation and aircraft passing overhead Noise at UNM01, UNM02, UNM03, UNM04, and UNM05 was dominated by project noise emissions during times of documented activity at the site. Estimated site noise level contributions were **generally above the NML**'s at all unattended devices, which is expected for the type of activities being undertaken.

Date (Report - Possession Ref.)	Approvals Documentation	Summary of Works	Complaints	Monitoring Type	Discussion
21.09.19 to 22.09.19 (RP39b – WE12, refer to Appendix L of the Addendum document)	OOHWAF-030	WE12 works included: • Signal Support & Construction Works • Stockpile Management and Removal • Import of Material • Tamping • Guard Rail Installation • CSR ULX, Turning Unit routes, signal base install • Pit and pipe install for 250 and 750 drainage route	**No complaints** were received regarding vibration during the WE12 monitoring period.	Unattended Vibration	Vibration generated by WE12 works was at times perceptible at UVM02 and UVM03. When vibration-generating activities occurred the vibration generated by the works dominated the emissions perceived and detected at the receptor. General construction activities were occurring throughout WE12 however, vibration generated by **the majority of works was imperceptible**. Ambient vibration associated with the existing acoustics environment also remained imperceptible. Despite certain events being perceptible throughout WE12, the highest measured vibration levels (1.6 mm/s) and associated characteristic frequencies (32Hz) are **below and compliant with the applicable BS7385 vibration guideline values**, as identified in the CNVMP.

3. Outcomes and Recommendations

Technical reports were prepared for each monitoring period throughout May 2019 to October 2019 with specific recommendations provided throughout, based on the compliance evaluation and the magnitude and extent of impacts measured and/or observed. LOR (and their sub-contractors) were successful in implementing these recommendations where feasible, reasonable, practical and safe to do so.

Examples of the noise and vibration-reducing mitigation and management measures that have been implemented throughout May 2019 to October 2019 are provided below:

- **Respite management measures** i.e. providing one hour of respite between every three hours of noise-generating activities.
- Utilising the **existing rail corridor noise barriers** to reduce site emissions. Based on measurements conducted during 2018-2019, the current rail noise barrier is reducing site noise emissions by approximately 10 dBA or more.
  - This measure has been implemented for OOHW, particularly near the Hopetoun Avenue access/egress point (prior to its removal), and for any high noise-generating activities.
  - Additionally, temporary acoustic fencing was established along the fence line near the Drake Street site entrance, which was observed to reduce site noise emissions by approximately 5 dBA.
- Continued implementation of the **CNVMP** (established with due regard to the Construction Noise and Vibration Impact Statement (CNVIS)) during all NCW activities.
- Continued prediction of noise levels in support of the OOHWAF and ensuring that additional/all locations (e.g. where works could occur and monitoring may be required) are assessed. LOR currently assesses all receptors that may be impacted by a work activity to ensure additional mitigation measures are correctly applied, this information is then summarised in the OOHWAF.
- Implementation of the **Additional Mitigation Measures Matrix** (AMMM) as outlined in the CNVMP.
- **Noise (and/or vibration) monitoring** as per the requirements specified in the construction noise and vibration monitoring program established for NCW.
- Continued application the TfNSW **safe working distances for vibration intensive activities** to all works undertaken as part of the project, as far as practicable.
- Continued consideration of Peak Particle Velocity (PPV, mm/s) and Vibration Dose Values (VDV, $m/s^{1.75}$) to estimate potential for vibration generating activities to impact nearby sensitive receptors throughout future OOHWA, with reference to the Safe Working Distances of the CNVMP.
  - continuous vibration monitoring (attended or unattended) at the nearest sensitive receptors whenever vibration generating activities need to take place inside the TfNSW safe-working distances.
  - quantify the vibration levels associated with these construction activities and occur in the event of a complaint being received, as per the requirements specified in the construction noise and vibration monitoring program established for NCW.

Where measured noise levels were found to repeatedly exceed predicted noise levels for specific work activities, Additional Mitigation Measures were recommended as outlined in the CNVMP. Through consultation with ERM acoustics consultants, training was provided to LOR on how to predict more accurate noise levels for certain construction activities. Future OOHWAs contained more accurate predictions for work activities, which aligned more closely to measured values derived during attended noise monitoring. More accurate predictions in the OOHWA process allowed for a more appropriate level of mitigation to be applied during specific OOHW activities, to minimise impacts as much as practical during track possessions.

4. Conclusion

LOR continue to remain aware of the potential for nuisance, or an unacceptable level of amenity, to occur due to construction noise and vibration, and continue to plan for and then manage the construction works on the NCW project accordingly.

Construction noise and vibration levels have been reduced and impacts minimised with the successful implementation of the actions summarised in **Section 3** above.

Impacts may not always be reduced to negligible levels for all receptors during all construction activities; however, the summarised above have ensured that any residual impacts have been minimised as far as is practically achievable.

References

Laing O'Rourke - Sydney Metro City and Southwest - Northern Corridor Works - **Construction Noise and Vibration Impact Statement (CNVIS)**, prepared by ERM and last updated February 2018

Laing O'Rourke - Sydney Metro City and Southwest - Northern Corridor Works - **Construction Noise and Vibration Management Plan (CNVMP)**, prepared by ERM and dated October 2017

Laing O'Rourke - Sydney Metro City and Southwest - Northern Corridor Works - **Construction Noise and Vibration Monitoring Program**, prepared by ERM and dated October 2017

NSW Environment Protection Authority – NSW Environmental Noise Management – **Industrial Noise Policy (INP)**, January 2000 and relevant application notes

NSW Department of Environment and Climate Change – **NSW Interim Construction Noise Guideline (ICNG)**, July 2009

NSW Government – Sydney Metro **Construction Noise and Vibration Strategy (CNVS)**, August 2017

Standards Australia AS1055–1997™ (AS1055) – **Description and Measurement of Environmental Noise**, Parts 1, 2 and 3

Standards Australia AS IEC 61672.1–2004™ (AS61672) – Electro Acoustics - Sound Level Meters Specifications Monitoring or Standards Australia AS1259.2-1990™ (AS1259) – **Acoustics – Sound Level Meters – Integrating Averaging**

Standards Australia AS/IEC 60942:2004/IEC 60942:2003 (IEC60942) – Australian Standard™ – **Electroacoustics – Sound Calibrators**

Appendix A – Noise and Vibration Monitoring Methodology

Noise Monitoring

A summary of the noise monitoring methodology is provided below. The monitoring was conducted with due regard to and by the CNVMP and other relevant policy, guidelines and standards as listed in the reference section of this report; and as per the construction noise and vibration monitoring program established for NCW.

1. Overview

1.1 Attended noise monitoring

For all monitoring events, a qualified and suitably experienced operator visited community areas surrounding the NCW works and completed operator attended noise measurements. In all cases, the closest receptors were targeted for monitoring, with actual measurement locations selected based on the position of site works and the potentially most affected receptors.

Overall noise levels (L_{max}, L_{min}, L_{eq}, L_1, L_{10} and L_{90} in dBA) were measured at all locations. Based on the measured overall values and observations made during each operator attended noise measurement a site $L_{eq, 15minute}$ noise level contribution in dBA was determined in the absence of any influential source not associated with the project.

1.2 Unattended noise monitoring

Details of the unattended noise monitoring are summarised below:

- Unattended noise monitoring was conducted continuously at the location. Overall noise levels (L_{max}, L_{min}, L_{eq}, L_1, L_{10} and L_{90} in dBA) were measured in 15 minutes samples;
- The unattended noise monitoring devices do not directly measure the site contribution. To estimate potential site noise contributions (in the absence of any influential source not associated with the project), it has been assumed that any measured $L_{eq, 15\text{-}minute}$ noise level above 35 dBA at the noise monitoring devices are associated with the site, while works are known to be in progress. These threshold values were determined based on recent monitoring and observations completed near the site;

1.3 Monitoring Locations

Each monitoring location is individually described in the corresponding OOHW technical monitoring report.

2. Technical Requirements

All construction noise monitoring was undertaken in accordance with the "construction noise and vibration monitoring guideline" that is included in Appendix A of the Construction Noise and Vibration Strategy (CNVS) and outlines the minimum requirements for contractors undertaking monitoring on the Sydney Metro Project.

In accordance with the CNVIS, both attended and unattended measurements were the focus of all noise monitoring based on the scope of works for P7. Attended noise monitoring results fed back directly to the project team and actions taken without delay during the works.

In accordance with Condition of Approval (CoA) – C11 monitoring data was made available to the construction team, and LOR and this report can be provided to the Environmental Representative and/or Acoustics Advisor, the Department of Planning and Environment (DP&E) and the NSW Environment Protection Authority (EPA) if needed.

2.1 Noise Monitoring Equipment

All noise measurements were conducted by suitably experienced and qualified personnel with due regard to, and by, the relevant local and international standards for environmental monitoring.

The noise measurement instrumentation used to conduct the monitoring complied with the requirements of AS 61672.1 and AS/IEC 60942. Each noise device had the current National Association of Testing Authorities, Australia (NATA) calibration certificates, with certification at intervals not exceeding two years at the time of use.

Noise instrument calibration was checked prior to monitoring and again at the conclusion with no difference noted between the two measurements. A suitably experienced person has completed all data handling and analysis and subsequently reviewed by a qualified and experienced acoustician.

The equipment utilized during attended noise monitoring is provided below. The quantities of noise logging equipment varied to suit the requirements of each possession.

- ARL Ngara (Type 1) Environmental Noise Loggers
    - Serial 8781B2, last calibration 18/01/2019
    - Serial 878184, last calibration 15/01/2019
    - Serial 87801C, last calibration 30/11/2017
- Brüel & Kjær 2250 Investigator (Type 1) Sound Analyser (Serial No. 3009001, last calibration 21/12/2017 – valid for two years).
- NTi Audio XL2 Sound Level Meter (Serial No. A2A-06272-E0, last calibration 15/02/2019); and
- Brüel & Kjær 4231 (Type 1) Sound Level Calibrator (Serial No. 2605910, last calibration 15/01/2019).

2.2 Other requirements

All attended measurements were conducted by appropriately trained personnel in the analysis and assessment of construction noise and vibration. They are familiar with the requirements of the relevant standards and procedures.

The noise measurement procedures employed throughout the monitoring were established by the requirements of the Australian Standard (AS) 1055:1997 *Acoustics - Description and Measurement of Environmental Noise*.

Attended noise measurements were conducted by an operator using a handheld Type 1 'integrating-averaging' sound level meter. All analyses were completed with the sound level meter mounted to a tripod and with a windscreen fitted, at the height of 1.2 to 1.5 metres above the ground.

Instantaneous noise levels for all noted noise emission sources (extraneous or otherwise), meteorological conditions (average and maximum wind speeds, temperature, precipitation and cloud cover etc.) were recorded during all measurements. Relevant measurement parameters, i.e. L_{eq}, L_{min}, L_{max}, L_1, L_{10} and L_{90} were recorded in dBA. All noise samples were recorded using the "fast" time response of the sound level meter.

Noise monitoring was not completed within 3.5 metres of any reflective structure or wall, unless behind a barrier. A reduction of up to 2.5 dB was not applied to the measured ambient or site noise contribution ($L_{eq,\ 15\ minute}$ in dBA) as the barrier was reducing noise emissions from the site and in general, did not increase noise due to the reflective properties of the surface.

Noise monitoring was not completed during periods where wind speeds exceeded 5 m/s at the microphone. Noise monitoring was conducted during rain events however the rain was very light and had no effect on the measured data (if applicable).

The general setup of the sound level meter for attended noise measurements was as per Photo 4.1 of the Construction Noise and Vibration Monitoring Program established for NCW, as reproduced below as **Photo A2.1**.

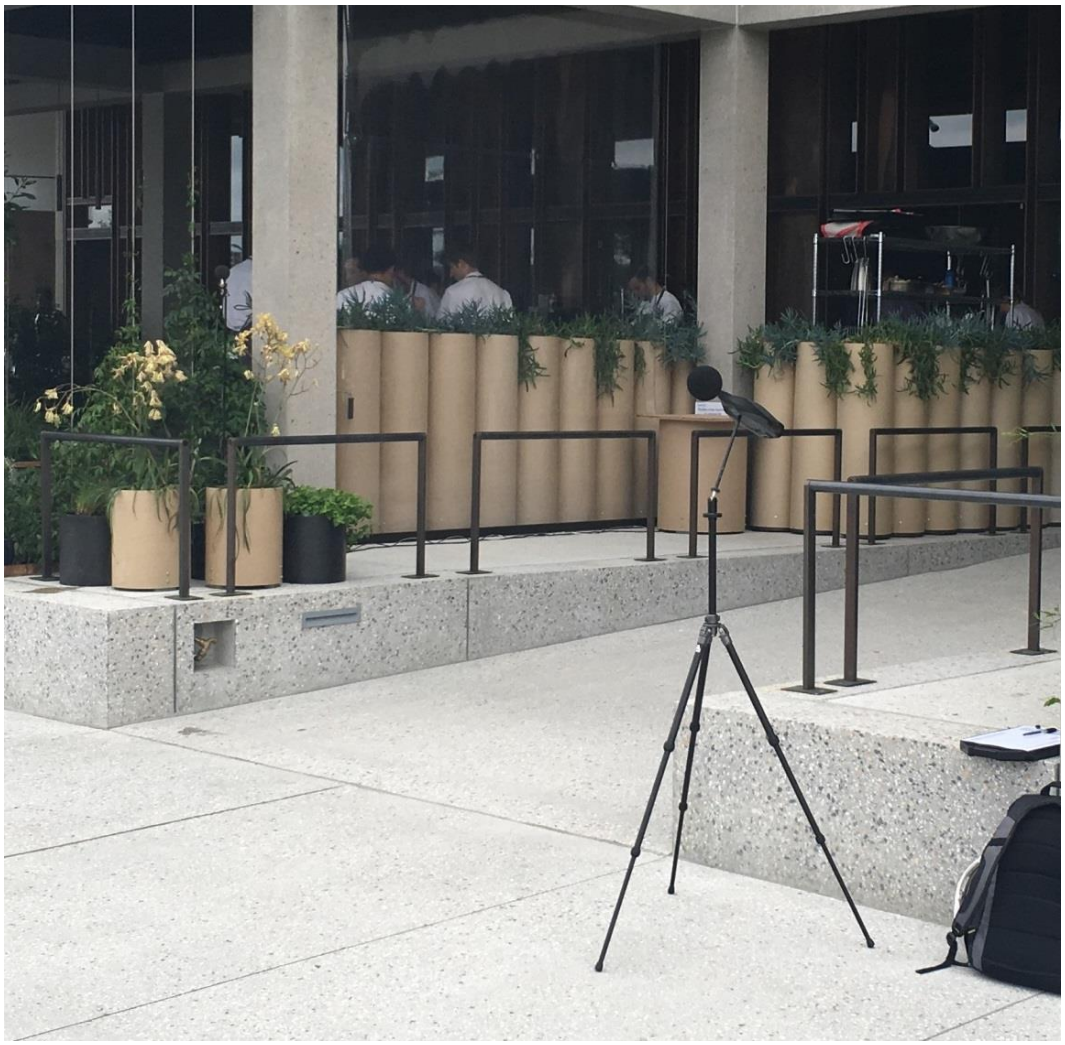

Photo A2.1: Example Attended Noise Monitoring Setup

Attended noise measurements were undertaken at the potentially most affected receptors identified in the LOR noise assessment (adapted for the phase of works) to confirm that the noise levels in the adjacent community were consistent with the predictions provided by LOR. Other potentially affected receptors were also considered as part of the monitoring regime. Monitoring occurred once works were underway but not at the commencement of activities. The duration of all community noise measurement samples was 15 minutes. The device's microphone was focused on the noise emission centre of the equipment being tested.

Vibration Monitoring Methodology

1. Monitoring Overview

1.1 Vibration Monitoring

Attended Vibration Monitoring

For all monitoring events, a qualified and suitably experienced operator visited the NCW P7 project site to conduct operator attended vibration measurements at the monitoring locations. The closest receptors were targeted for monitoring when outside of the rail corridor, with actual measurement locations selected based on the position of site works and the potentially most affected receptors. Vibration levels were measured to determine Peak Particle Velocity (PPV, mm/s and Frequency, Hz).

Unattended vibration monitoring

Unattended vibration monitoring was undertaken as requested by LOR during periods of extended, potentially vibration-generating works within the rail corridor.

1.2 Monitoring Locations

Each monitoring location is individually described in the corresponding OOHW technical monitoring report.

1.3 Vibration Monitoring Equipment

All vibration measurements were conducted by suitably experienced and qualified ERM personnel with due regard to, and in accordance with, the relevant local and international standards for environmental monitoring.

Vibration equipment was calibrated and checked to the manufacturer's specification, with certification at intervals not exceeding one year at the time of use.

A qualified and experienced acoustician has completed all data handling and analysis.

The equipment utilized during attended noise monitoring is provided below. The quantities of vibration logging equipment varied to suit the requirements of each possession.

- Saros Minimate Plus (Series III) Environmental Vibration Monitor.
    - Serial No. BE13734, last calibration 13/05/2019
    - Serial No. BE14130, last calibration 07/06/2019

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Sydney Metro City and Southwest – North Corridor Works

Addendum – NCW Noise and Vibration Monitoring – May 2019 – October 2019

Project

Title	NCW Noise and Vibration Monitoring - Addendum - May 2019 to October 2019
Client	Sydney Metro City and Southwest
Document Reference No.	LOR-NCW-Noise and Vibration Monitoring-May19-Oct19 Addendum.V03
Laing O'Rourke Project No.	K38

Document

Date	6 July 2020
Monitoring Period	May 2019 to October 2019
Prepared by:	Thomas Buchan
Reviewed by:	Steven De Luzuriaga

Revisions

Date	Version	Description
08/11/2019	V0.1	LOR-NCW-Noise and Vibration Monitoring-May19-Oct19 Addendum
06/12/2019	V0.2	Address LOR comments
06/07/2020	V0.3	Revised draft report for client review

1. Introduction

Main North and North Shore Corridor Works Project (MNNSCW): Portion 7 - Northern Corridor Works (NCW) are being carried out by Laing O'Rourke Australia Construction Pty Ltd (LOR) on behalf of Transport for New South Wales (TfNSW). LOR has engaged Environmental Resources Management Australia Pty Ltd (ERM) to undertake environmental noise and vibration monitoring during select works.

This addendum provides supporting information to LOR-NCW-Noise and Vibration Monitoring-May 2019 to October 2019 - Summary Report, which was prepared by ERM in November 2019. The addendum includes monitoring location maps, data tables and supporting graphs of noise and vibration monitoring activities in chronological order.

The structure of this addendum is as follows:

- **Appendix A - Monitoring Report (RP32):** Noise Monitoring – OOHW P7: **MW50** - 17 to 21 June 2019
- **Appendix B - Monitoring Report (RP33a):** Noise Monitoring – OOHW P7: **WE51** - 22 to 23 June 2019
- **Appendix C - Monitoring Report (RP33b):** Vibration Monitoring – OOHW P7: **WE51** - 22 to 23 June 2019
- **Appendix D - Monitoring Report (RP34):** Noise Monitoring – OOHW P7: **MW51** - 24 to 28 June 2019
- **Appendix E - Monitoring Report (RP35a):** Noise Monitoring – OOHW P7: **WE03** - 20 to 21 July 2019
- **Appendix F - Monitoring Report (RP35b):** Vibration Monitoring – OOHW P7: **WE03** - 20 to 21 July 2019
- **Appendix G - Monitoring Report (RP36):** Noise Monitoring – OOHW P7: **MW04** - 29 July to 2 August 2019
- **Appendix H - Monitoring Report (RP37a-):** Noise Monitoring – OOHW P7: **WE05** - 3 to 4 August 2019
- **Appendix I - Monitoring Report (RP37b):** Vibration Monitoring – OOHW P7: **WE05** - 3 to 4 August 2019
- **Appendix J - Monitoring Report (RP38):** Noise Monitoring – OOHW P7: **MW11** - 16 to 20 September 2019
- **Appendix K - Monitoring Report (RP39a):** Noise Monitoring – OOHW P7: **WE12** - 21 to 22 September 2019
- **Appendix L - Monitoring Report (RP39b):** Vibration Monitoring – OOHW P7: **WE12** - 21 to 22 September 2019

Appendix A – Monitoring Report (RP32)

Noise Monitoring – OOHW P7: MW50 - 17 to 21 June 2019

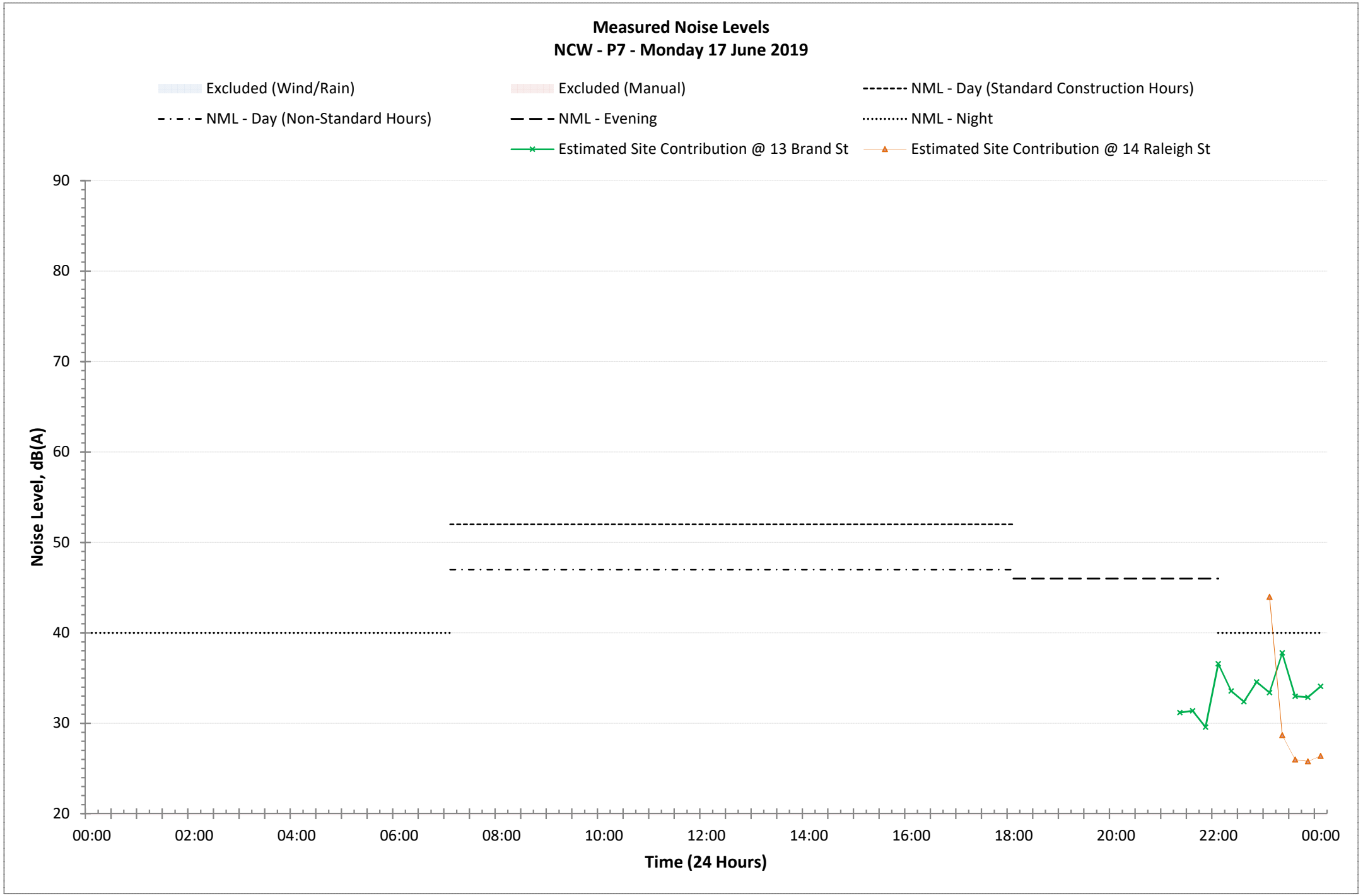
Figure A1.0 – OOHW MW50 – Attended and Unattended Noise Monitoring Locations

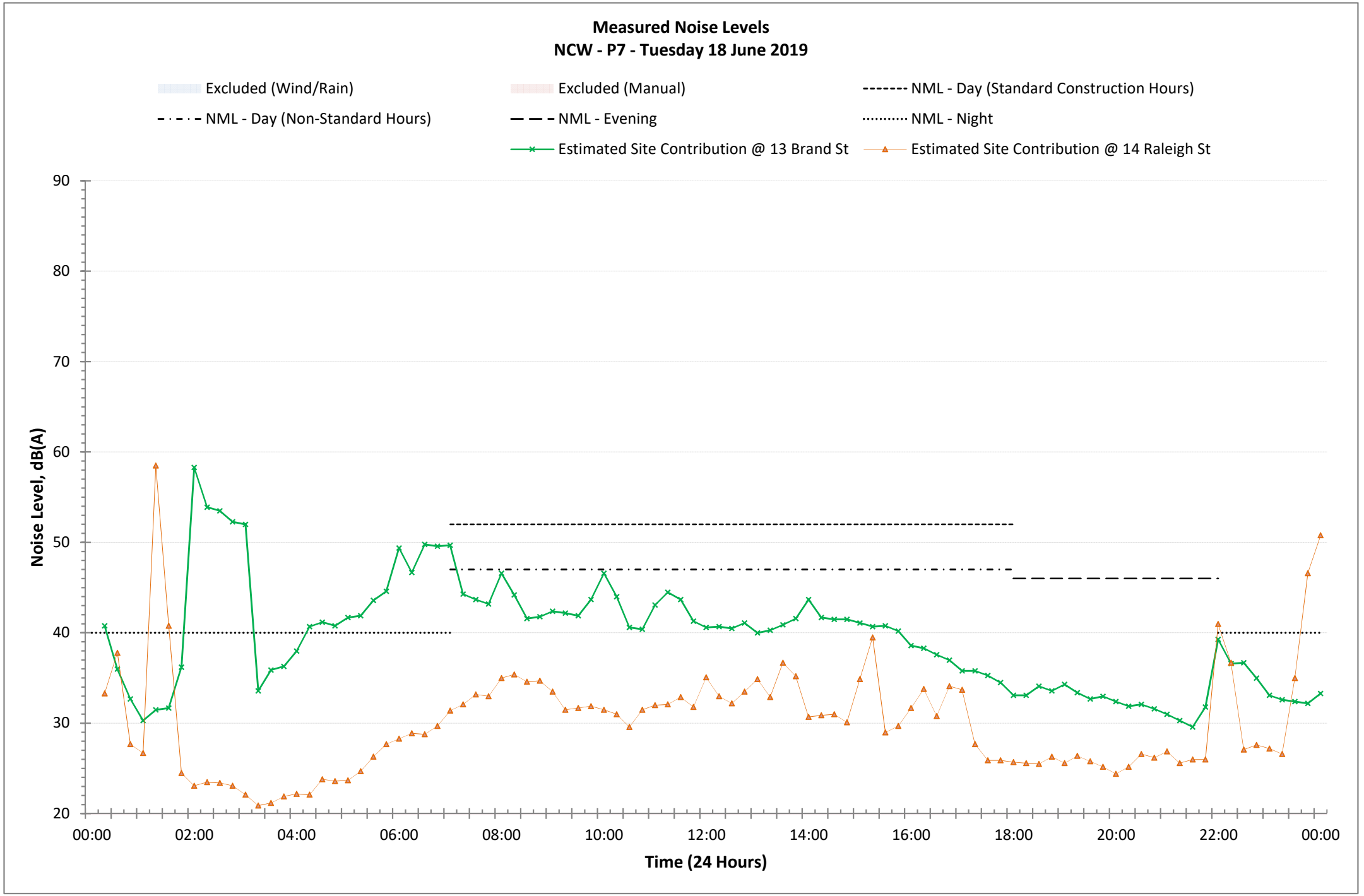
– NCW P7 (Monday, 17 June to Friday, 21 June 2019)

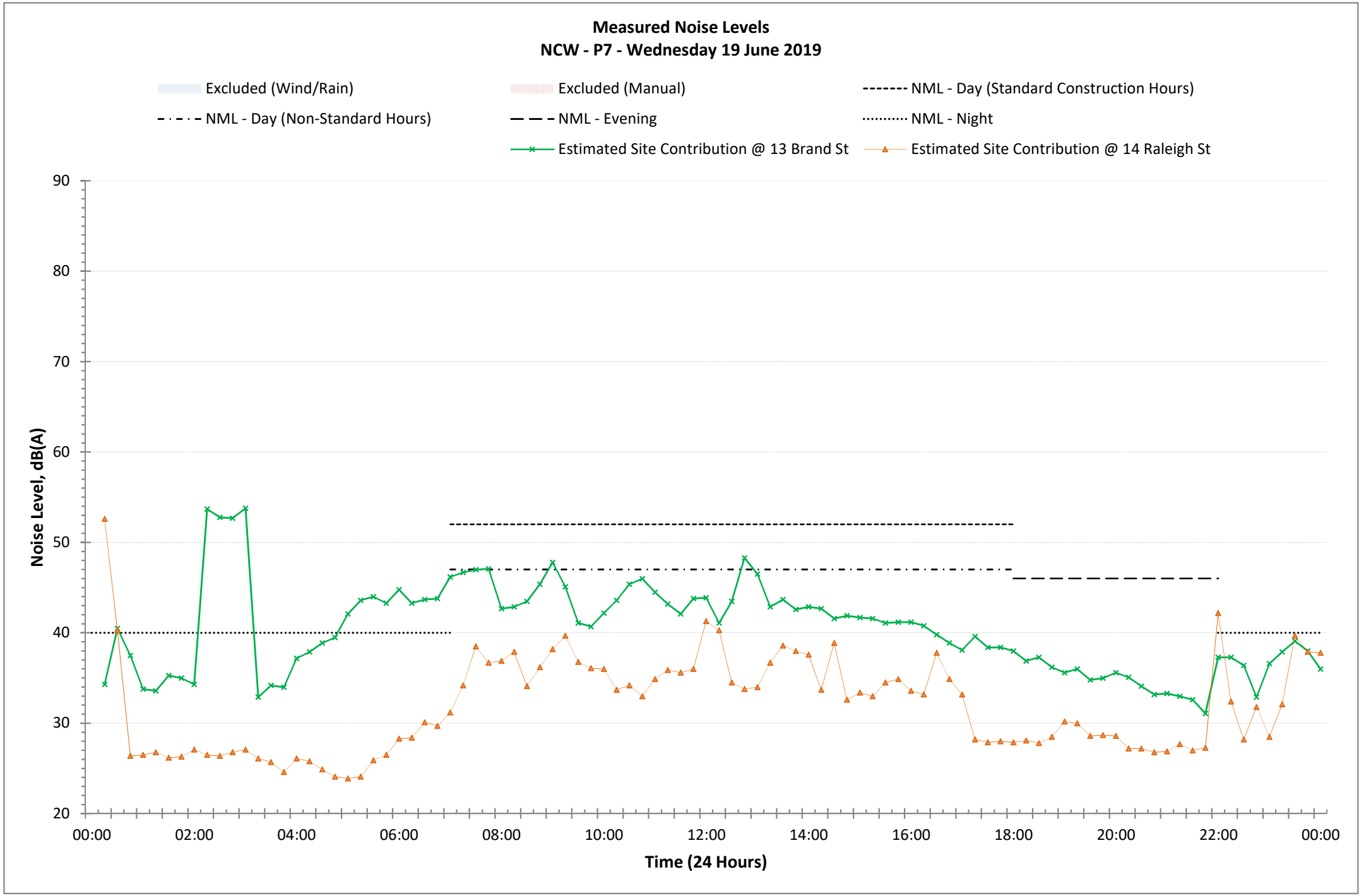
File Name	Date	Start Time	Elapsed Time	LAFmax	LAFmin	LAeq	LAF1.0	LAF10.0	LAF90.0	Percentage Site Contribution (%)	Measured Site Noise Level - LAeq, 15minute	Impulsive Modifying Factor?	Tonal Modifying Factor?	LF Modifying Factor?	Measured Site Noise Level - LAmax	NCA	Period	RBL - LA90, Period	NML - LAeq, 15 minute	Predicted Site Noise Level - LAeq, 15minute	Sleep Disturbance Screening Level - LAmax	Comparison to RBL - LAeq, Period	Comparison to NML - LAeq, 15 minute	Comparison to Predicted Site Noise Level - LAeq, 15minute	Comparison to Sleep Disturbance Screening Level - LAmax	Description
Project 001	17-Jun-19	23:46	00:14:03	73	37	43	50	44	38	100	47	4.5	0.0	0.0	50	NCA01	Night	35	40	52	50	12	7	-5	0	L01 - Project 001. Measurements undertaken at Drake Street. NCW involved a number of activities outlined within OOWHA-028 along with general construction activities, including use of hand tools and movement of vehicles and plant within the rail corridor. Site-related noises dominated the majority of measurements with approximately 100% contribution. Extraneous sources were also observed to include distant traffic, urban hum, insects and loud traffic.
Project 002	18-Jun-19	00:00	00:15:00	73	36	50	61	52	39	100	62	2.0	5.0	5.0	65	NCA01	Night	35	40	52	50	27	22	10	15	L01 - Project 002. Measurements undertaken at Drake Street. NCW involved a number of activities outlined within OOWHA-028 along with general construction activities, including use of hand tools and movement of vehicles and plant within the rail corridor. Site-related noises dominated the majority of measurements with approximately 20-100% contribution. Extraneous sources were also observed to include distant traffic, insects, urban hum, an aeroplane and loud traffic.
Project 003	18-Jun-19	00:15	00:15:00	72	37	54	67	58	39	100	62	3.1	0.0	5.0	65	NCA01	Night	35	40	52	50	27	22	10	15	L01 - Project 003. Measurements undertaken at Drake Street. NCW involved a number of activities outlined within OOWHA-028 along with general construction activities, including use of hand tools and movement of vehicles and plant within the rail corridor. Site-related noises dominated the majority of measurements with approximately 100% contribution. Extraneous sources were also observed to include distant traffic, insects and urban hum.
Project 004	18-Jun-19	01:00	00:15:00	63	40	44	50	46	42	50	51	4.8	0.0	5.0	56	NCA01	Night	35	40	52	50	16	11	-1	6	L02 - Project 004. Measurements undertaken at Raleigh Street. NCW involved a number of activities outlined within OOWHA-028 along with general construction activities, including use of hand tools and movement of vehicles and plant within the rail corridor. Site-related noises dominated the majority of measurements with approximately 10-100% contribution. Extraneous sources were also observed to include distant traffic, loud traffic, insects and urban hum.
Project 005	18-Jun-19	01:15	00:15:00	85	42	66	79	66	46	100	66	-	0.0	0.0	85	NCA01	Night	35	40	52	50	31	26	14	35	L02 - Project 005. Measurements undertaken at Raleigh Street. NCW involved a number of activities outlined within OOWHA-028 along with general construction activities, including use of hand tools and movement of vehicles and plant within the rail corridor. Site-related noises dominated the majority of measurements with approximately 100% contribution. Extraneous sources were also observed to include distant traffic and urban hum.
Project 006	18-Jun-19	01:31	00:15:00	77	39	54	63	56	41	100	59	-	0.0	5.0	75	NCA01	Night	35	40	52	50	24	19	7	25	L02 - Project 006. Measurements undertaken at Raleigh Street. NCW involved a number of activities outlined within OOWHA-028 along with general construction activities, including use of hand tools and movement of vehicles and plant within the rail corridor. Site-related noises dominated the majority of measurements with approximately 100% contribution. Extraneous sources were also observed to include distant traffic and urban hum.
Project 007	18-Jun-19	23:15	00:15:00	76	38	54	67	55	40	100	64	4.6	0.0	5.0	70	NCA01	Night	35	40	52	50	29	24	12	20	L01 - Project 007. Measurements undertaken at Drake Street. NCW involved a number of activities outlined within OOWHA-028 along with general construction activities, including use of hand tools and movement of vehicles and plant within the rail corridor. Site-related noises dominated the majority of measurements with approximately 5-100% contribution. Extraneous sources were also observed to include distant traffic, insects and loud traffic.
Project 008	18-Jun-19	23:30	00:15:00	55	38	42	49	43	39	50	47	3.2	0.0	5.0	48	NCA01	Night	35	40	52	50	12	7	-5	-2	L01 - Project 008. Measurements undertaken at Drake Street. NCW involved a number of activities outlined within OOWHA-028 along with general construction activities, including use of hand tools and movement of vehicles and plant within the rail corridor. Site-related noises dominated the majority of measurements with approximately 50-100% contribution. Extraneous sources were also observed to include distant traffic, insects and sirens.
Project 009	19-Jun-19	00:00	00:15:00	82	41	64	78	66	45	100	69	-	5.0	0.0	80	NCA01	Night	35	40	52	50	34	29	17	30	L02 - Project 009. Measurements undertaken at Raleigh Street. NCW involved a number of activities outlined within OOWHA-028 along with general construction activities, including use of hand tools and movement of vehicles and plant within the rail corridor. Site-related noises dominated the majority of measurements with approximately 100% contribution. Extraneous sources were also observed to include distant traffic, wildlife and insects.
Project 010	19-Jun-19	00:15	00:15:00	84	43	59	70	58	45	100	64	-	0.0	5.0	85	NCA01	Night	35	40	52	50	29	24	12	35	L02 - Project 010. Measurements undertaken at Raleigh Street. NCW involved a number of activities outlined within OOWHA-028 along with general construction activities, including use of hand tools and movement of vehicles and plant within the rail corridor. Site-related noises dominated the majority of measurements with approximately 100% contribution. Extraneous sources were also observed to include distant traffic and insects.
Project 011	19-Jun-19	00:30	00:15:00	75	42	51	60	53	44	100	59	3.8	0.0	5.0	65	NCA01	Night	35	40	52	50	24	19	7	15	L02 - Project 011. Measurements undertaken at Raleigh Street. NCW involved a number of activities outlined within OOWHA-028 along with general construction activities, including use of hand tools and movement of vehicles and plant within the rail corridor. Site-related noises dominated the majority of measurements with approximately 50-100% contribution. Extraneous sources were also observed to include distant traffic and insects.
Project 012	19-Jun-19	01:00	00:15:00	58	41	44	48	45	43	5	33	2.3	0.0	0.0	55	NCA01	Night	35	40	69	50	-2	-7	-36	5	L03 - Project 012. Measurements undertaken at Hopetoun Avenue. NCW involved a number of activities outlined within OOWHA-028 along with general construction activities, including use of hand tools and movement of vehicles and plant within the rail corridor. Site-related noises dominated the majority of measurements with approximately 5-100% contribution. Extraneous sources were also observed to include distant traffic, Chatswood dive site hum and loud traffic.
Project 013	19-Jun-19	01:15	00:15:00	58	42	45	49	46	43	5	35	3.0	0.0	0.0	52	NCA01	Night	35	40	69	50	0	-5	-34	2	L03 - Project 013. Measurements undertaken at Hopetoun Avenue. NCW involved a number of activities outlined within OOWHA-028 along with general construction activities, including use of hand tools and movement of vehicles and plant within the rail corridor. Site-related noises dominated the majority of measurements with approximately 5-100% contribution. Extraneous sources were also observed to include distant traffic, Chatswood dive site hum and loud traffic.
Project 014	19-Jun-19	01:30	00:15:00	63	42	46	52	49	43	50	49	5.2	0.0	0.0	60	NCA01	Night	35	40	69	50	14	9	-20	10	L03 - Project 014. Measurements undertaken at Hopetoun Avenue. NCW involved a number of activities outlined within OOWHA-028 along with general construction activities, including use of hand tools and movement of vehicles and plant within the rail corridor. Site-related noises dominated the majority of measurements with approximately 5-100% contribution. Extraneous sources were also observed to include distant traffic and Chatswood dive site hum.
Project 015	19-Jun-19	02:01	00:15:00	74	39	49	63	45	41	30	47	4.1	0.0	0.0	65	NCA01	Night	35	40	52	50	12	7	-5	15	L01 - Project 015. Measurements undertaken at Drake Street. NCW involved a number of activities outlined within OOWHA-028 along with general construction activities, including use of hand tools and movement of vehicles and plant within the rail corridor. Site-related noises dominated the majority of measurements with approximately 50-100% contribution. Extraneous sources were also observed to include distant traffic, loud traffic and wildlife.
Project 016	19-Jun-19	23:00	00:15:00	77	39	60	73	61	41	100	60	-	0.0	0.0	75	NCA01	Night	35	40	52	50	25	20	8	25	L01 - Project 016. Measurements undertaken at Drake Street. NCW involved a number of activities outlined within OOWHA-028 along with general construction activities, including use of hand tools and movement of vehicles and plant within the rail corridor. Site-related noises dominated the majority of measurements with approximately 50-100% contribution. Extraneous sources were also observed to include distant traffic, loud traffic and wildlife.
Project 017	19-Jun-19	23:30	00:15:00	84	38	63	74	68	40	50	65	-	0.0	5.0	78	NCA01	Night	35	40	52	50	30	25	13	28	L01 - Project 017. Measurements undertaken at Drake Street. NCW involved a number of activities outlined within OOWHA-028 along with general construction activities, including use of hand tools and movement of vehicles and plant within the rail corridor. Site-related noises dominated the majority of measurements with approximately 50-100% contribution. Extraneous sources were also observed to include distant traffic, loud cars and wildlife.
Project 018	20-Jun-19	00:00	00:15:00	64	42	52	58	55	44	100	57	-	0.0	5.0	80	NCA01	Night	35	40	52	50	22	17	5	30	L02 - Project 018. Measurements undertaken at Raleigh Street. NCW involved a number of activities outlined within OOWHA-028 along with general construction activities, including use of hand tools and movement of vehicles and plant within the rail corridor. Site-related noises dominated the majority of measurements with approximately 50-100% contribution. Extraneous sources were also observed to include distant traffic and sirens.
Project 019	20-Jun-19	00:15	00:15:00	59	42	48	53	51	44	100	57	4.7	0.0	5.0	85	NCA01	Night	35	40	52	50	22	17	5	35	L02 - Project 019. Measurements undertaken at Raleigh Street. NCW involved a number of activities outlined within OOWHA-028 along with general construction activities, including use of hand tools and movement of vehicles and plant within the rail corridor. Site-related noises dominated the majority of measurements with approximately 50-100% contribution. Extraneous sources were also observed to include distant traffic.
Project 020	20-Jun-19	01:00	00:15:00	59	47	49	53	50	48	5	46	4.7	0.0	5.0	55	NCA01	Night	35	40	52	50	11	6	-6	5	L04 - Project 020. Measurements undertaken at Berkeley Court. NCW involved a number of activities outlined within OOWHA-028 along with general construction activities, including use of hand tools and movement of vehicles and plant within the rail corridor. Site-related noises dominated the majority of measurements with approximately 5-100% contribution. Extraneous sources were also observed to include distant traffic, loud traffic and Chatswood dive site.
Project 021	20-Jun-19	01:15	00:15:00	60	47	49	54	50	48	5	36	-	0.0	0.0	52	NCA01	Night	35	40	52	50	1	-4	-16	2	L04 - Project 021. Measurements undertaken at Berkeley Court. NCW involved a number of activities outlined within OOWHA-028 along with general construction activities, including use of hand tools and movement of vehicles and plant within the rail corridor. Site-related noises dominated the majority of measurements with approximately 50-100% contribution. Extraneous sources were also observed to include distant traffic and Chatswood dive site.

File Name	Date	Start Time	Elapsed Time	LAFmax	LAFmin	LAeq	LAF1.0	LAF10.0	LAF90.0	Percentage Site Contribution (%)	Measured Site Noise Level - LAeq, 15minute	Impulsive Modifying Factor?	Tonal Modifying Factor?	LF Modifying Factor?	Measured Site Noise Level - LAmax	NCA	Period	RBL - LA90, Period	NML - LAeq, 15 minute	Predicted Site Noise Level - LAeq, 15minute	Sleep Disturbance Screening Level - LAmax	Comparison to RBL - LAeq, Period	Comparison to NML - LAeq, 15 minute	Comparison to Predicted Site Noise Level - LAeq, 15minute	Comparison to Sleep Disturbance Screening Level - LAmax	Description
Project 022	20-Jun-19	02:00	00:15:00	59	41	51	57	55	43	100	55	4.1	0.0	0.0	55	NCA01	Night	35	40	52	50	20	15	3	5	L02 - Project 022. Measurements undertaken at Raleigh Street. NCW involved a number of activities outlined within OOWHA-028 along with general construction activities, including use of hand tools and movement of vehicles and plant within the rail corridor. Site-related noises dominated the majority of measurements with approximately 100% contribution. Extraneous sources were also observed to include distant traffic, loud traffic and wildlife.
Project 023	20-Jun-19	02:15	00:15:00	60	42	48	54	52	43	100	51	2.5	0.0	0.0	58	NCA01	Night	35	40	52	50	16	11	-1	8	L01 - Project 023. Measurements undertaken at Drake Street. NCW involved a number of activities outlined within OOWHA-028 along with general construction activities, including use of hand tools and movement of vehicles and plant within the rail corridor. Site-related noises dominated the majority of measurements with approximately 100% contribution. Extraneous sources were also observed to include distant traffic and loud traffic.
Project 024	20-Jun-19	02:32	00:15:00	83	63	75	79	77	70	100	77	2.3	0.0	0.0	75	NCA01	Night	35	40	52	50	42	37	25	25	L01 - Project 024. Measurements undertaken at Drake Street. NCW involved a number of activities outlined within OOWHA-028 along with general construction activities, including use of hand tools and movement of vehicles and plant within the rail corridor. Site-related noises dominated the majority of measurements with approximately 50-100% contribution. Extraneous sources were inaudible.
Project 025	20-Jun-19	22:45	00:15:00	60	37	43	54	44	40	50	46	5.3	0.0	0.0	50	NCA01	Night	35	40	52	50	11	6	-6	0	L01 - Project 025. Measurements undertaken at Drake Street. NCW involved a number of activities outlined within OOWHA-028 along with general construction activities, including use of hand tools and movement of vehicles and plant within the rail corridor. Site-related noises dominated the majority of measurements with approximately 50-100% contribution. Extraneous sources were also observed to include distant traffic and insects.
Project 026	20-Jun-19	23:00	00:15:00	86	37	64	76	68	40	100	72	2.3	0.0	5.0	84	NCA01	Night	35	40	52	50	37	32	20	34	L01 - Project 026. Measurements undertaken at Drake Street. NCW involved a number of activities outlined within OOWHA-028 along with general construction activities, including use of hand tools and movement of vehicles and plant within the rail corridor. Site-related noises dominated the majority of measurements with approximately 100% contribution. Extraneous sources were also observed to include distant traffic and wildlife.
Project 027	20-Jun-19	23:15	00:15:00	85	42	61	73	60	44	100	68	2.4	0.0	5.0	80	NCA01	Night	35	40	52	50	33	28	16	30	L01 - Project 027. Measurements undertaken at Drake Street. NCW involved a number of activities outlined within OOWHA-028 along with general construction activities, including use of hand tools and movement of vehicles and plant within the rail corridor. Site-related noises dominated the majority of measurements with approximately 50-100% contribution. Extraneous sources were also observed to include distant traffic .
Project 028	20-Jun-19	23:45	00:15:00	61	42	49	56	53	44	100	56	2.0	0.0	5.0	55	NCA01	Night	35	40	52	50	21	16	4	5	L02 - Project 028. Measurements undertaken at Raleigh Street. NCW involved a number of activities outlined within OOWHA-028 along with general construction activities, including use of hand tools and movement of vehicles and plant within the rail corridor. Site-related noises dominated the majority of measurements with approximately 50-100% contribution. Extraneous sources were also observed to include distant traffic .
Project 029	21-Jun-19	00:00	00:15:00	63	40	49	57	52	43	100	54	-	0.0	5.0	55	NCA01	Night	35	40	52	50	19	14	2	5	L02 - Project 029. Measurements undertaken at Raleigh Street. NCW involved a number of activities outlined within OOWHA-028 along with general construction activities, including use of hand tools and movement of vehicles and plant within the rail corridor. Site-related noises dominated the majority of measurements with approximately 50-100% contribution. Extraneous sources were also observed to include distant traffic, loud traffic and road work.
Project 030	21-Jun-19	00:15	00:15:00	67	40	47	54	50	42	100	57	5.3	0.0	5.0	55	NCA01	Night	35	40	52	50	22	17	5	5	L02 - Project 031. Measurements undertaken at Raleigh Street. NCW involved a number of activities outlined within OOWHA-028 along with general construction activities, including use of hand tools and movement of vehicles and plant within the rail corridor. Site-related noises dominated the majority of measurements with approximately 50-100% contribution. Extraneous sources were also observed to include distant traffic and loud traffic.
Project 031	21-Jun-19	01:00	00:15:00	68	39	49	59	54	40	100	53	3.2	0.0	0.0	65	NCA01	Night	35	40	69	50	18	13	-16	15	L03 - Project 031. Measurements undertaken at Hopetoun Avenue. NCW involved a number of activities outlined within OOWHA-028 along with general construction activities, including use of hand tools and movement of vehicles and plant within the rail corridor. Site-related noises dominated the majority of measurements with approximately 100% contribution. Extraneous sources were also observed to include Chatswood dive site, distant traffic and urban hum.
Project 032	21-Jun-19	01:15	00:15:00	55	38	42	47	43	40	5	32	3.9	0.0	0.0	45	NCA01	Night	35	40	69	50	-3	-8	-37	-5	L03 - Project 032. Measurements undertaken at Hopetoun Avenue. NCW involved a number of activities outlined within OOWHA-028 along with general construction activities, including use of hand tools and movement of vehicles and plant within the rail corridor. Site-related noises dominated the majority of measurements with approximately 100% contribution. Extraneous sources were also observed to include Chatswood dive site, distant traffic, loud traffic and urban hum.

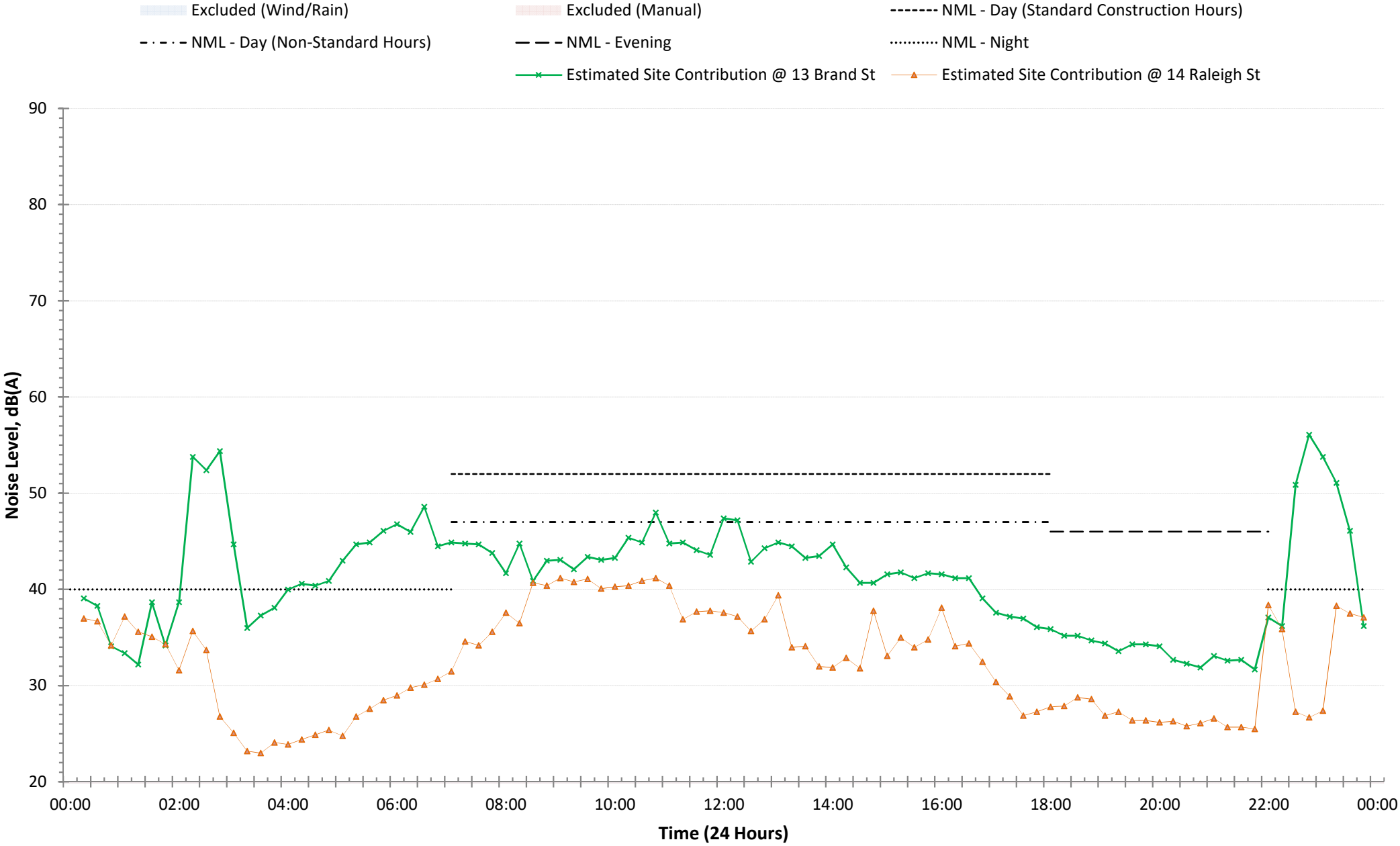
Weather 21 - 25 June 2019: Acceptable for the noise monitoring and generally calm.
Note: all predicted noise levels were reproduced from the LOR OOHWA Form for this track possession.
Note: Low frequency, tonality and impulsive noise tests were conducted in accordance with the INP. The measured Leq data was applied in all cases. Modifying factor (penalty) values were applied as applicable to the low frequency, tonal or impulsive components detectable or attributable to the sites noise emission. The site noise contribution reported here is inclusive of all modifying factors (if applicable).

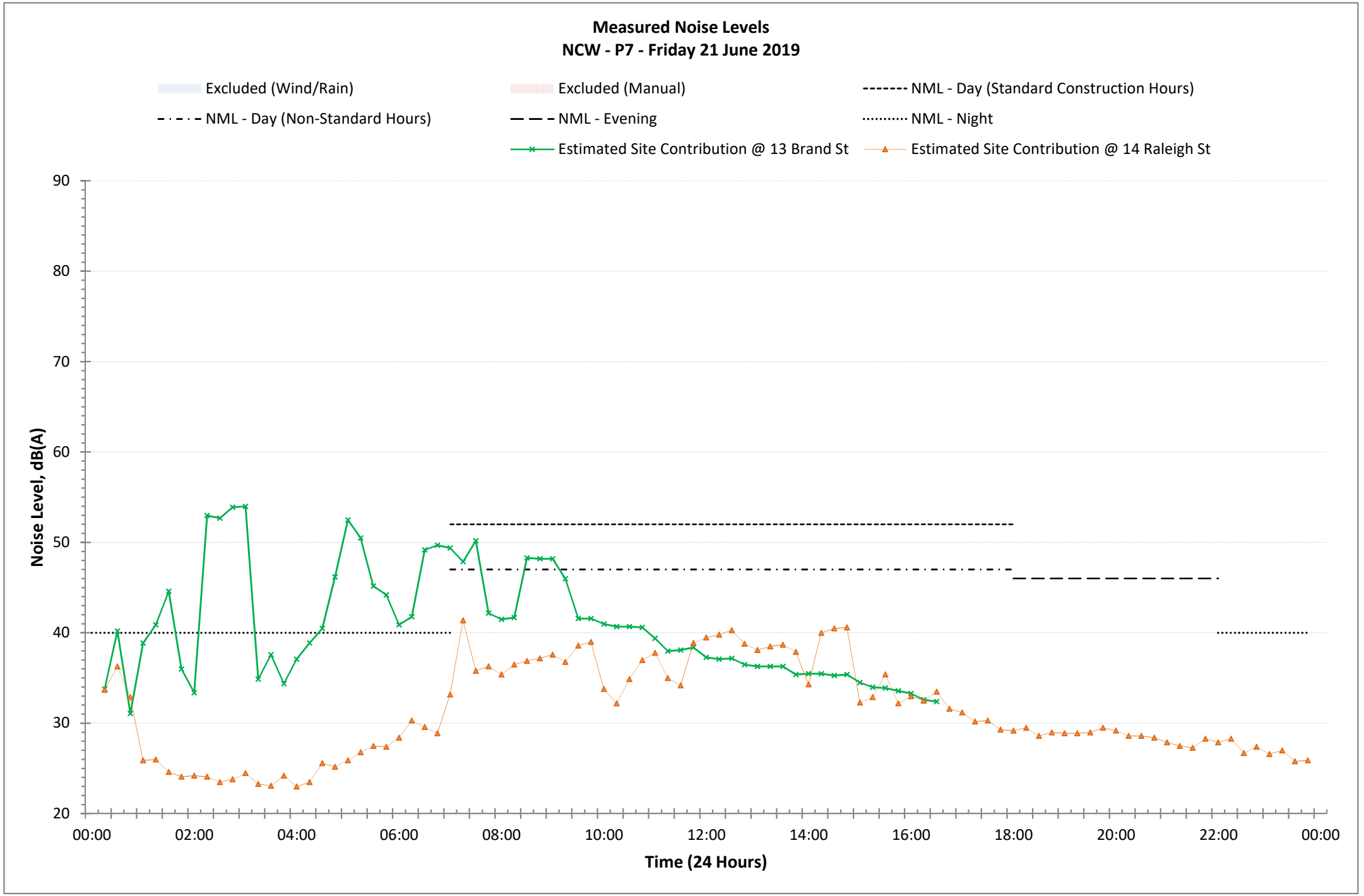

Measured Noise Levels
NCW - P7 - Monday 17 June 2019
Excluded (Wind/Rain)
Excluded (Manual)
NML - Day (Standard Construction Hours)
NML - Day (Non-Standard Hours)
NML - Evening
NML - Night
Estimated Site Contribution @ 13 Brand St
Estimated Site Contribution @ 14 Raleigh St
Noise Level, dB(A)
90
80
70
60
50
40
30
20
00:00
02:00
04:00
06:00
08:00
10:00
12:00
14:00
16:00
18:00
20:00
22:00
00:00
Time (24 Hours)


Measured Noise Levels
NCW - P7 - Tuesday 18 June 2019
Excluded (Wind/Rain)
Excluded (Manual)
NML - Day (Standard Construction Hours)
NML - Day (Non-Standard Hours)
NML - Evening
NML - Night
Estimated Site Contribution @ 13 Brand St
Estimated Site Contribution @ 14 Raleigh St
Noise Level, dB(A)
90
80
70
60
50
40
30
20
00:00
02:00
04:00
06:00
08:00
10:00
12:00
14:00
16:00
18:00
20:00
22:00
00:00
Time (24 Hours)


Measured Noise Levels
NCW - P7 - Wednesday 19 June 2019
Excluded (Wind/Rain)
Excluded (Manual)
NML - Day (Standard Construction Hours)
NML - Day (Non-Standard Hours)
NML - Evening
NML - Night
Estimated Site Contribution @ 13 Brand St
Estimated Site Contribution @ 14 Raleigh St
Noise Level, dB(A)
90
80
70
60
50
40
30
20
00:00
02:00
04:00
06:00
08:00
10:00
12:00
14:00
16:00
18:00
20:00
22:00
00:00
Time (24 Hours)

Measured Noise Levels
NCW - P7 - Thursday 20 June 2019




Measured Noise Levels
NCW - P7 - Friday 21 June 2019
Excluded (Wind/Rain)
Excluded (Manual)
NML - Day (Standard Construction Hours)
NML - Day (Non-Standard Hours)
NML - Evening
NML - Night
Estimated Site Contribution @ 13 Brand St
Estimated Site Contribution @ 14 Raleigh St
Noise Level, dB(A)
90
80
70
60
50
40
30
20
00:00
02:00
04:00
06:00
08:00
10:00
12:00
14:00
16:00
18:00
20:00
22:00
00:00
Time (24 Hours)

Appendix B – Monitoring Report (RP33a)

Noise Monitoring – OOHW P7: WE51 - 22 to 23 June 2019

Figure A1.0 – OOHW WE51 – Attended and Unattended Noise Monitoring Locations

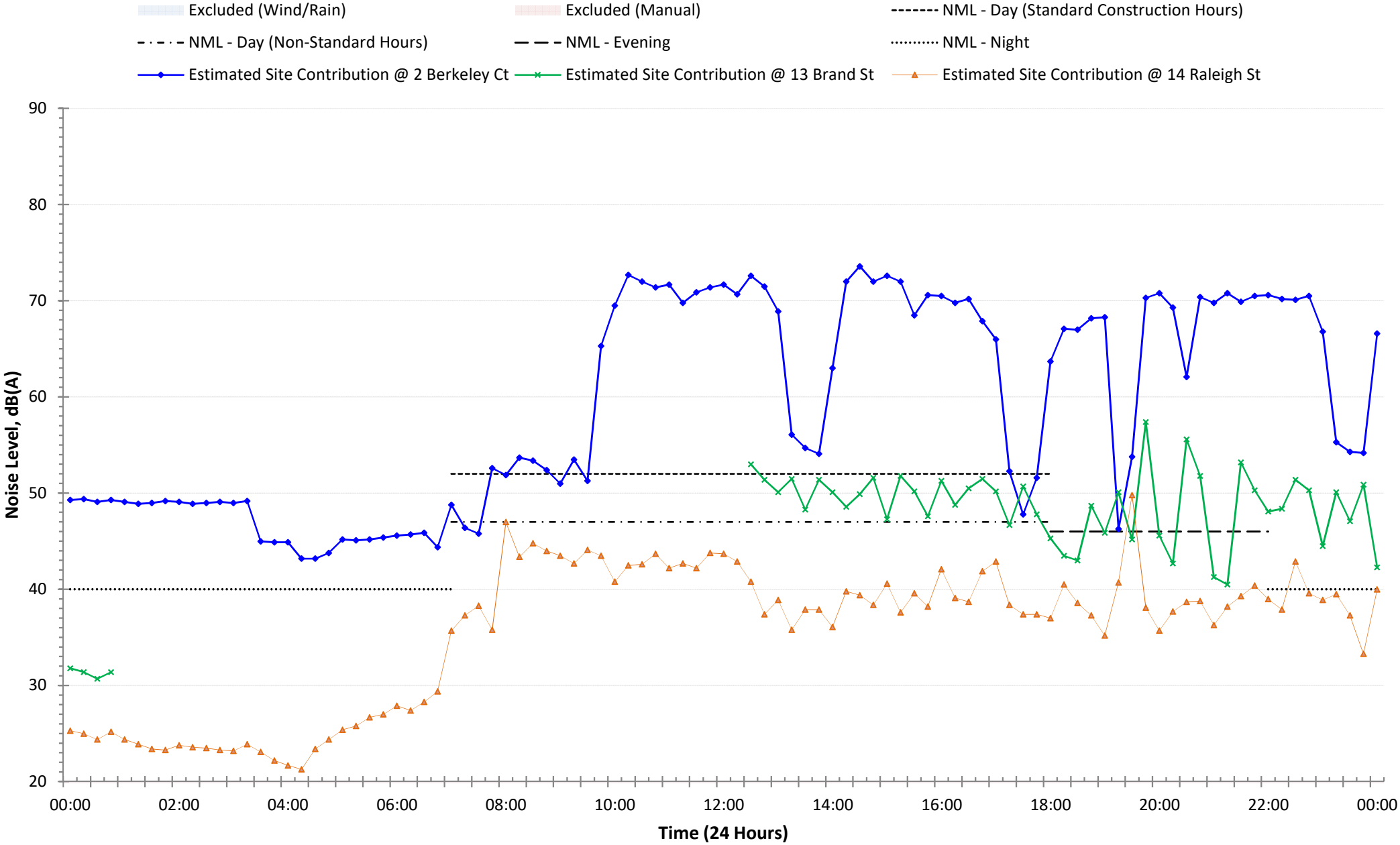
– NCW P7 (Saturday, 22 June and Sunday, 23 June 2019)

File Name	Date	Start Time	Elapsed Time	LAFmax	LAFmin	LAeq	LAF1.0	LAF10.0	LAF90.0	Percentage Site Contribution (%)	Measured Site Noise Level - LAeq, 15minute	Impulsive Modifying Factor?	Tonal Modifying Factor?	LF Modifying Factor?	Measured Site Noise Level - LAmax	NCA	Period	RBL - LA90, Period	NML - LAeq, 15 minute	Predicted Site Noise Level - LAeq, 15minute	Sleep Disturbance Screening Level - LAmax	Comparison to RBL - LA90, Period	Comparison to NML - LAeq, 15 minute	Comparison to Predicted Site Noise Level - LAeq, 15minute	Comparison to Sleep Disturbance Screening Level - LAmax	Description
Project 001	22-Jun-19	12:58	00:15:00	83	48	71	80	77	50	70	70	-	0.0	0.0	80	NCA01	Day	42	47	75	57	28	23	-5	23	A01 - Project 001. Measurements undertaken at Berkeley Court. NCW involved a number of activities outlined within OOWHA-028 along with general construction activities, including use of hand tools and movement of vehicles and plant within the rail corridor. Site-related noises dominated the majority of measurments with approximately 50-100% contribution. Extraneous sources were also observed to include distant traffic and leaking hydrant.
Project 002	22-Jun-19	13:15	00:15:00	73	50	56	64	58	52	90	58	2.6	0.0	0.0	70	NCA01	Day	42	47	75	57	16	11	-17	13	A01 - Project 002. Measurements undertaken at Berkeley Court. NCW involved a number of activities outlined within OOWHA-028 along with general construction activities, including use of hand tools and movement of vehicles and plant within the rail corridor. Site-related noises dominated the majority of measurments with approximately 80-100% contribution. Extraneous sources were also observed to include distant traffic, plane, passing car and leaking hydrant.
Project 003	22-Jun-19	13:32	00:15:00	70	49	55	62	57	51	100	55	-	0.0	0.0	70	NCA01	Day	42	47	75	57	13	8	-20	13	A01 - Project 003. Measurements undertaken at Berkeley Court. NCW involved a number of activities outlined within OOWHA-028 along with general construction activities, including use of hand tools and movement of vehicles and plant within the rail corridor. Site-related noises dominated the majority of measurments with approximately 80-100% contribution. Extraneous sources were also observed to include distant traffic, plane, passing car and leaking hydrant.
Project 004	22-Jun-19	13:57	00:15:00	98	59	76	79	78	67	100	79	3.4	0.0	0.0	90	NCA01	Day	42	47	69	57	37	32	10	33	A02 - Project 004. Measurements undertaken at Hopetoun Avenue. NCW involved a number of activities outlined within OOWHA-028 along with general construction activities, including use of hand tools and movement of vehicles and plant within the rail corridor. Site-related noises dominated the majority of measurments with approximately 100% contribution. Extraneous sources were inaudible.
Project 005	22-Jun-19	14:14	00:15:00	90	64	76	82	80	69	100	80	3.5	0.0	0.0	82	NCA01	Day	42	47	69	57	38	33	11	25	A02 - Project 005. Measurements undertaken at Hopetoun Avenue. NCW involved a number of activities outlined within OOWHA-028 along with general construction activities, including use of hand tools and movement of vehicles and plant within the rail corridor. Site-related noises dominated the majority of measurments with approximately 100% contribution. Extraneous sources were inaudible.
Project 006	22-Jun-19	14:30	00:15:00	93	68	74	76	75	73	100	78	3.1	0.0	0.0	88	NCA01	Day	42	47	69	57	36	31	9	31	A02 - Project 006. Measurements undertaken at Hopetoun Avenue. NCW involved a number of activities outlined within OOWHA-028 along with general construction activities, including use of hand tools and movement of vehicles and plant within the rail corridor. Site-related noises dominated the majority of measurments with approximately 100% contribution. Extraneous sources were inaudible.
Project 007	22-Jun-19	15:31	00:15:00	74	55	67	72	70	56	90	66	-	0.0	0.0	74	NCA01	Day	42	47	74	57	24	19	-8	17	A03 - Project 007. Measurements undertaken at Nelson St. NCW involved a number of activities outlined within OOWHA-028 along with general construction activities, including use of hand tools and movement of vehicles and plant within the rail corridor. Site-related noises dominated the majority of measurments with approximately 70-100% contribution. Extraneous sources were also observed to include wind blown vegetation, TSE works and birds.
Project 008	22-Jun-19	15:48	00:15:00	77	55	70	75	73	58	100	70	-	0.0	0.0	76	NCA01	Day	42	47	74	57	28	23	-4	19	A03 - Project 008. Measurements undertaken at Nelson St. NCW involved a number of activities outlined within OOWHA-028 along with general construction activities, including use of hand tools and movement of vehicles and plant within the rail corridor. Site-related noises dominated the majority of measurments with approximately 80-100% contribution. Extraneous sources were also observed to include TSE works.
Project 009	22-Jun-19	16:15	00:15:00	76	55	69	74	73	57	100	69	-	0.0	0.0	74	NCA01	Day	42	47	74	57	27	22	-5	17	A03 - Project 009. Measurements undertaken at Nelson St. NCW involved a number of activities outlined within OOWHA-028 along with general construction activities, including use of hand tools and movement of vehicles and plant within the rail corridor. Site-related noises dominated the majority of measurments with approximately 80-100% contribution. Extraneous sources were also observed to include TSE works.
Project 010	22-Jun-19	16:30	00:15:00	81	54	69	75	73	56	90	71	2.0	0.0	0.0	76	NCA01	Day	42	47	74	57	29	24	-3	19	A03 - Project 010. Measurements undertaken at Nelson St. NCW involved a number of activities outlined within OOWHA-028 along with general construction activities, including use of hand tools and movement of vehicles and plant within the rail corridor. Site-related noises dominated the majority of measurments with approximately 80-100% contribution. Extraneous sources were also observed to include TSE works and nearby pedestrians.
Project 011	22-Jun-19	18:16	00:15:00	78	47	68	75	72	50	100	70	2.5	0.0	0.0	78	NCA01	Evening	41	46	75	56	29	24	-5	22	A01 - Project 011. Measurements undertaken at Berkeley Court. NCW involved a number of activities outlined within OOWHA-028 along with general construction activities, including use of hand tools and movement of vehicles and plant within the rail corridor. Site-related noises dominated the majority of measurments with approximately 60-100% contribution. Extraneous sources were also observed to include distant traffic, car passing and leaking hydrant.
Project 012	22-Jun-19	18:32	00:15:00	78	49	68	76	73	53	100	72	4.3	0.0	0.0	77	NCA01	Evening	41	46	75	56	31	26	-3	21	A01 - Project 012. Measurements undertaken at Berkeley Court. NCW involved a number of activities outlined within OOWHA-028 along with general construction activities, including use of hand tools and movement of vehicles and plant within the rail corridor. Site-related noises dominated the majority of measurments with approximately 80-100% contribution. Extraneous sources were also observed to include distant traffic, local traffic and leaking hydrant.
Project 013	22-Jun-19	18:47	00:15:00	80	50	71	77	75	54	100	74	2.8	0.0	0.0	77	NCA01	Evening	41	46	75	56	33	28	-1	21	A01 - Project 013. Measurements undertaken at Berkeley Court. NCW involved a number of activities outlined within OOWHA-028 along with general construction activities, including use of hand tools and movement of vehicles and plant within the rail corridor. Site-related noises dominated the majority of measurments with approximately 80-100% contribution. Extraneous sources were also observed to include distant traffic, local traffic and leaking hydrant.
Project 014	22-Jun-19	19:04	00:15:00	82	48	69	79	74	49	60	69	2.3	0.0	0.0	80	NCA01	Evening	41	46	75	56	28	23	-6	24	A01 - Project 014. Measurements undertaken at Berkeley Court. NCW involved a number of activities outlined within OOWHA-028 along with general construction activities, including use of hand tools and movement of vehicles and plant within the rail corridor. Site-related noises dominated the majority of measurments with approximately 60-100% contribution. Extraneous sources were also observed to include distant traffic, car passing and leaking hydrant.
Project 015	22-Jun-19	19:45	00:15:00	62	50	53	59	54	51	80	62	5.0	0.0	5.0	60	NCA01	Evening	41	46	51	56	21	16	11	4	A04 - Project 015. Measurements undertaken at Drake St. NCW involved a number of activities outlined within OOWHA-028 along with general construction activities, including use of hand tools and movement of vehicles and plant within the rail corridor. Site-related noises dominated the majority of measurments with approximately 70-100% contribution. Extraneous sources were also observed to include distant traffic and plane.
Project 016	22-Jun-19	20:00	00:15:00	75	49	55	65	55	51	100	62	2.6	0.0	5.0	74	NCA01	Evening	41	46	51	56	21	16	11	18	A04 - Project 016. Measurements undertaken at Drake St. NCW involved a number of activities outlined within OOWHA-028 along with general construction activities, including use of hand tools and movement of vehicles and plant within the rail corridor. Site-related noises dominated the majority of measurments with approximately 80-100% contribution. Extraneous sources were also observed to include staff entering site and a work ute entering and leaving site.
Project 017	22-Jun-19	20:44	00:15:00	71	53	63	68	66	56	100	65	2.6	0.0	0.0	69	NCA01	Evening	41	46	51	56	24	19	14	13	A05 - Project 017. Measurements undertaken at Gillam St. NCW involved a number of activities outlined within OOWHA-028 along with general construction activities, including use of hand tools and movement of vehicles and plant within the rail corridor. Site-related noises dominated the majority of measurments with approximately 70-100% contribution. Extraneous sources were also observed to include distant traffic.
Project 018	22-Jun-19	21:00	00:15:00	72	53	62	67	65	56	64	64	3.2	0.0	0.0	67	NCA01	Evening	41	46	51	56	23	18	13	11	A05 - Project 018. Measurements undertaken at Gillam St. NCW involved a number of activities outlined within OOWHA-028 along with general construction activities, including use of hand tools and movement of vehicles and plant within the rail corridor. Site-related noises dominated the majority of measurments with approximately 80-100% contribution. Extraneous sources were also observed to include distant traffic and a car passing by.
Project 019	22-Jun-19	21:15	00:06:53	69	52	62	68	65	55	100	64	2.2	0.0	0.0	63	NCA01	Evening	41	46	51	56	23	18	13	7	A05 - Project 019. Measurements undertaken at Gillam St. NCW involved a number of activities outlined within OOWHA-028 along with general construction activities, including use of hand tools and movement of vehicles and plant within the rail corridor. Site-related noises dominated the majority of measurments with approximately 70-100% contribution. Extraneous sources were also observed to include distant traffic.
Project 020	22-Jun-19	22:11	00:15:00	84	55	71	77	74	58	100	74	3.8	0.0	0.0	76	NCA01	Night	35	40	74	50	39	34	0	26	A03 - Project 020. Measurements undertaken at Nelson St. NCW involved a number of activities outlined within OOWHA-028 along with general construction activities, including use of hand tools and movement of vehicles and plant within the rail corridor. Site-related noises dominated the majority of measurments with approximately 50-100% contribution. Extraneous sources were inaudible.
Project 021	22-Jun-19	22:34	00:15:00	68	47	60	66	64	51	100	60	-	0.0	0.0	66	NCA01	Night	35	40	51	50	25	20	9	16	A06 - Project 021. Measurements undertaken at Gordon Avenue. NCW involved a number of activities outlined within OOWHA-028 along with general construction activities, including use of hand tools and movement of vehicles and plant within the rail corridor. Site-related noises dominated the majority of measurments with approximately 100% contribution. Extraneous sources were inaudible.

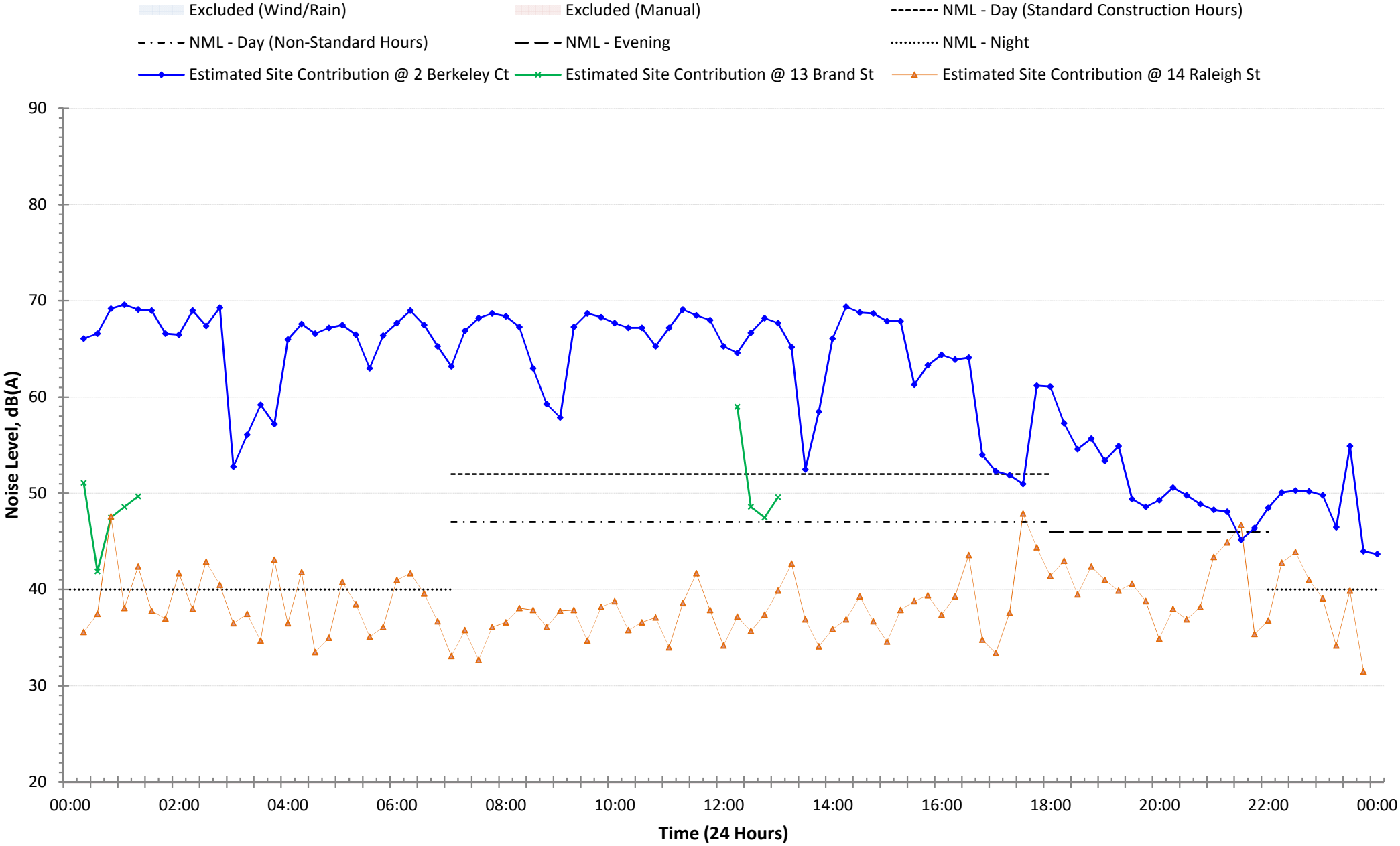
File Name	Date	Start Time	Elapsed Time	LAFmax	LAFmin	LAeq	LAF1.0	LAF10.0	LAF90.0	Percentage Site Contribution (%)	Measured Site Noise Level - LAeq, 15minute	Impulsive Modifying Factor?	Tonal Modifying Factor?	LF Modifying Factor?	Measured Site Noise Level - LAmax	NCA	Period	RBL - LA90, Period	NML - LAeq, 15 minute	Predicted Site Noise Level - LAeq, 15minute	Sleep Disturbance Screening Level - LAmax	Comparison to RBL - LA90, Period	Comparison to NML - LAeq, 15 minute	Comparison to Predicted Site Noise Level - LAeq, 15minute	Comparison to Sleep Disturbance Screening Level - LAmax	Description
Project 022	22-Jun-19	22:49	00:15:00	69	45	60	67	64	51	100	60	-	0.0	0.0	68	NCA01	Night	35	40	51	50	25	20	9	18	A06 - Project 022. Measurements undertaken at Gordon Avenue. NCW involved a number of activities outlined within OOWHA-028 along with general construction activities, including use of hand tools and movement of vehicles and plant within the rail corridor. Site-related noises dominated the majority of measurments with approximately 80-100% contribution. Extraneous sources were also observed to include a nearby motorbike.
Project 023	22-Jun-19	23:21	00:15:00	72	54	58	64	60	55	100	58	-	0.0	0.0	65	NCA01	Night	35	40	74	50	23	18	-16	15	A03 - Project 023. Measurements undertaken at Nelson St. NCW involved a number of activities outlined within OOWHA-028 along with general construction activities, including use of hand tools and movement of vehicles and plant within the rail corridor. Site-related noises dominated the majority of measurments with approximately 80-100% contribution. Extraneous sources were inaudible.
Project 024	23-Jun-19	12:44	00:15:00	80	54	72	77	75	62	100	75	3.0	0.0	0.0	76	NCA01	Day	42	47	75	57	33	28	0	19	A01 - Project 024. Measurements undertaken at Berkeley Court. NCW involved a number of activities outlined within OOWHA-028 along with general construction activities, including use of hand tools and movement of vehicles and plant within the rail corridor. Site-related noises dominated the majority of measurments with approximately 50-100% contribution. Extraneous sources were observed to include a nearby car.
Project 025	23-Jun-19	13:00	00:15:00	79	53	72	77	75	61	100	74	2.0	0.0	0.0	78	NCA01	Day	42	47	75	57	32	27	-1	21	A01 - Project 025. Measurements undertaken at Berkeley Court. NCW involved a number of activities outlined within OOWHA-028 along with general construction activities, including use of hand tools and movement of vehicles and plant within the rail corridor. Site-related noises dominated the majority of measurments with approximately 80-100% contribution. Extraneous sources were inaudible.
Project 026	23-Jun-19	13:15	00:15:00	79	48	67	76	73	51	70	68	2.2	0.0	0.0	78	NCA01	Day	42	47	75	57	26	21	-7	21	A01 - Project 026. Measurements undertaken at Berkeley Court. NCW involved a number of activities outlined within OOWHA-028 along with general construction activities, including use of hand tools and movement of vehicles and plant within the rail corridor. Site-related noises dominated the majority of measurments with approximately 40-100% contribution. Extraneous sources were observed to include distant traffic, a leaking hydrant, birds and a plane.
Project 027	23-Jun-19	14:29	00:15:00	77	47	59	65	62	52	100	62	3.6	0.0	0.0	65	NCA01	Day	42	47	51	57	20	15	11	8	A06 - Project 27. Measurements undertaken at Gordon Avenue. NCW involved a number of activities outlined within OOWHA-028 along with general construction activities, including use of hand tools and movement of vehicles and plant within the rail corridor. Site-related noises dominated the majority of measurments with approximately 60-100% contribution. Extraneous sources were observed to include loud distant traffic, local traffic, wind blown vegetation, birds and a plane.
Project 028	23-Jun-19	14:49	00:15:00	74	46	58	64	61	51	100	62	3.2	0.0	0.0	63	NCA01	Day	42	47	51	57	20	15	11	6	A06 - Project 28. Measurements undertaken at Gordon Avenue. NCW involved a number of activities outlined within OOWHA-028 along with general construction activities, including use of hand tools and movement of vehicles and plant within the rail corridor. Site-related noises dominated the majority of measurments with approximately 60-100% contribution. Extraneous sources were observed to include distant traffic, local traffic, wind blown vegetation, loud birds, a nearby dog barking and a plane.
Project 029	23-Jun-19	15:14	00:15:00	73	55	65	70	68	58	100	65	-	0.0	0.0	70	NCA01	Day	42	47	74	57	23	18	-9	13	A03 - Project 29. Measurements undertaken at Nelson Street. NCW involved a number of activities outlined within OOWHA-028 along with general construction activities, including use of hand tools and movement of vehicles and plant within the rail corridor. Site-related noises dominated the majority of measurments with approximately 80-100% contribution. Extraneous sources were inaudible.
Project 030	23-Jun-19	15:30	00:15:00	76	54	60	67	64	56	100	65	4.8	0.0	0.0	66	NCA01	Day	42	47	74	57	23	18	-9	9	A03 - Project 30. Measurements undertaken at Nelson Street. NCW involved a number of activities outlined within OOWHA-028 along with general construction activities, including use of hand tools and movement of vehicles and plant within the rail corridor. Site-related noises dominated the majority of measurments with approximately 100% contribution. Extraneous sources were observed to include a plan, birds and nearby residents.

Weather 22-23 June 2019: Generally overcast weather, with calm winds. Temperature ranged between 8-14 degrees Celsius over the monitoring periods.
Note: all predicted noise levels were reproduced from the LOR OOHWA Form for this track possession.
Note: Low frequency, tonality and impulsive noise tests were conducted in accordance with the INP. The measured Leq data was applied in all cases. Modifying factor (penalty) values were applied as applicable to the low frequency, tonal or impulsive components detectable or attributable to the sites noise emission. The site noise contribution reported here is inclusive of all modifying factors (if applicable).

Measured Noise Levels
NCW - P7 - Saturday 22 June 2019



Measured Noise Levels
NCW - P7 - Sunday 23 June 2019



Appendix C – Monitoring Report (RP33b)

Vibration Monitoring – OOHW P7: WE51 - 22 to 23 June 2019

Figure A1.0 – OOHW WE51 – Unattended Vibration Monitoring Locations

– NCW P7 (Saturday, 22 June to Sunday, 23 June 2019)

Quick report

NCW WE51

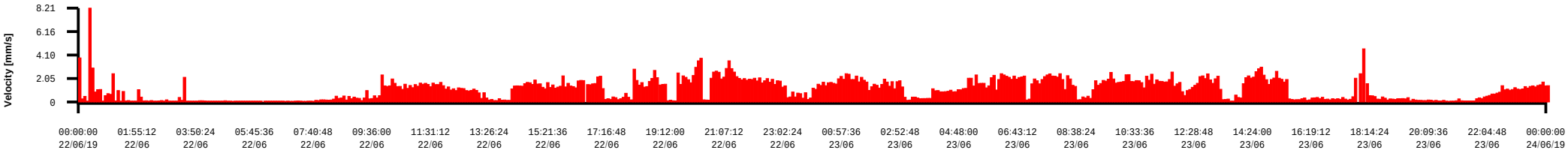
Start	22/06/2019
End	24/06/2019
Monitoring Location	UVM01

Monitoring Results

PPV max	8.21 mm/s
PPV max (99.9 %)	5.65 mm/s
PPV max (99.8 %)	5.06 mm/s
PPV max (99.5 %)	3.89 mm/s
PPV max (99.0 %)	3.57 mm/s

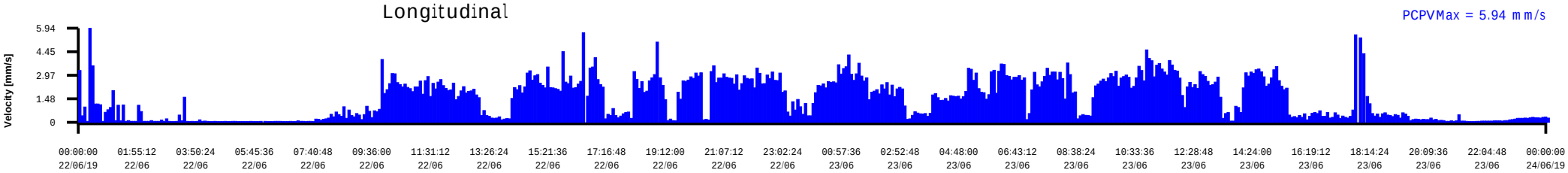
Vertical

PCPVMax = 8.21 mm/s



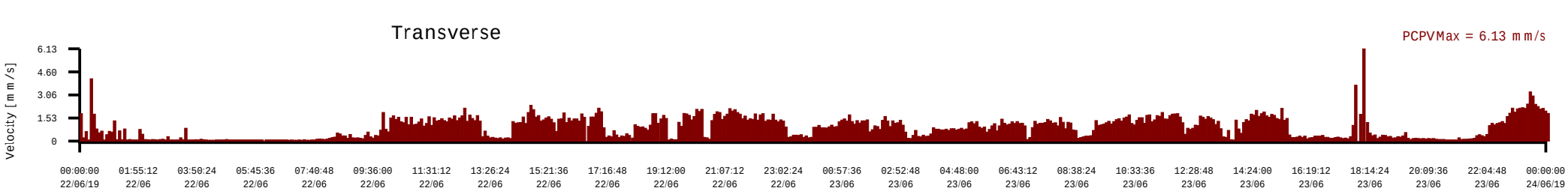
Longitudinal

PCPVMax = 5.94 mm/s



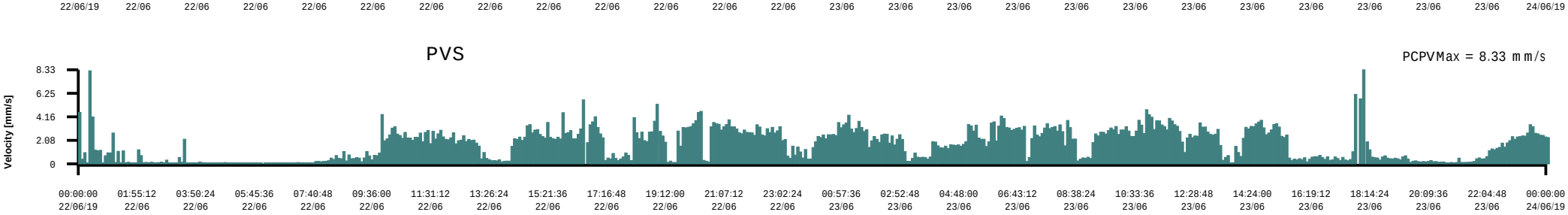
Transverse

PCPVMax = 6.13 mm/s



PVS

PCPVMax = 8.33 mm/s



Printed : 04/07/2019 10:54:11

Quick report

NCW WE51

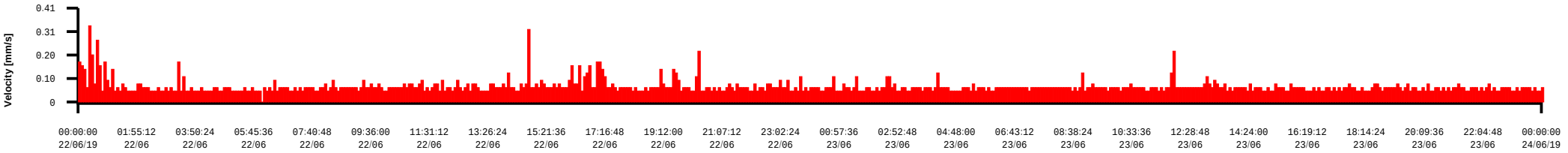
Start	22/06/2019
End	24/06/2019
Monitoring Location	UVM02

Monitoring Results

PPV max	0.36 mm/s
PPV max (99.9 %)	0.32 mm/s
PPV max (99.8 %)	0.30 mm/s
PPV max (99.5 %)	0.27 mm/s
PPV max (99.0 %)	0.24 mm/s

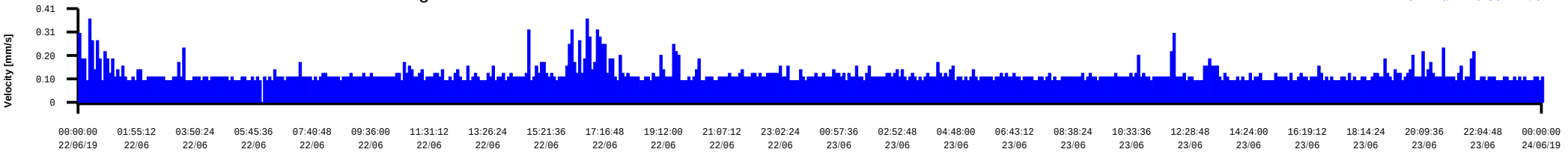
Vertical

PCPVMax = 0.33 mm/s



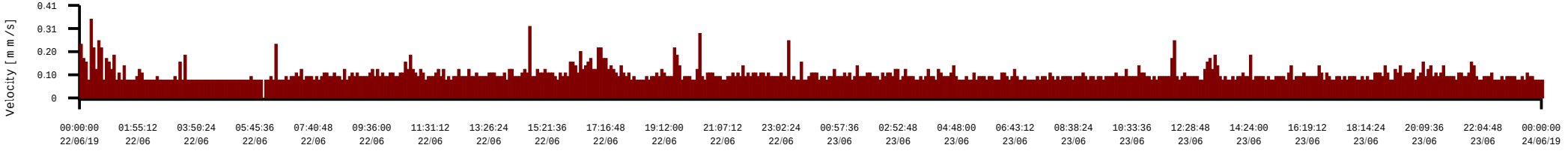
Longitudinal

PCPVMax = 0.36 mm/s



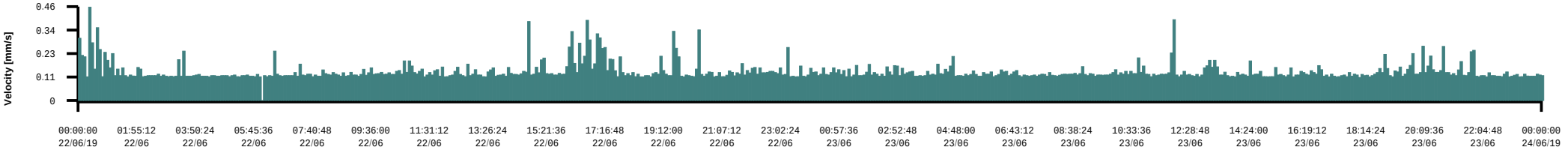
Transverse

PCPVMax = 0.35 mm/s



PVS

PCPVMax = 0.46 mm/s



Printed : 04/07/2019 10:54:12

UVM03 - Event Report

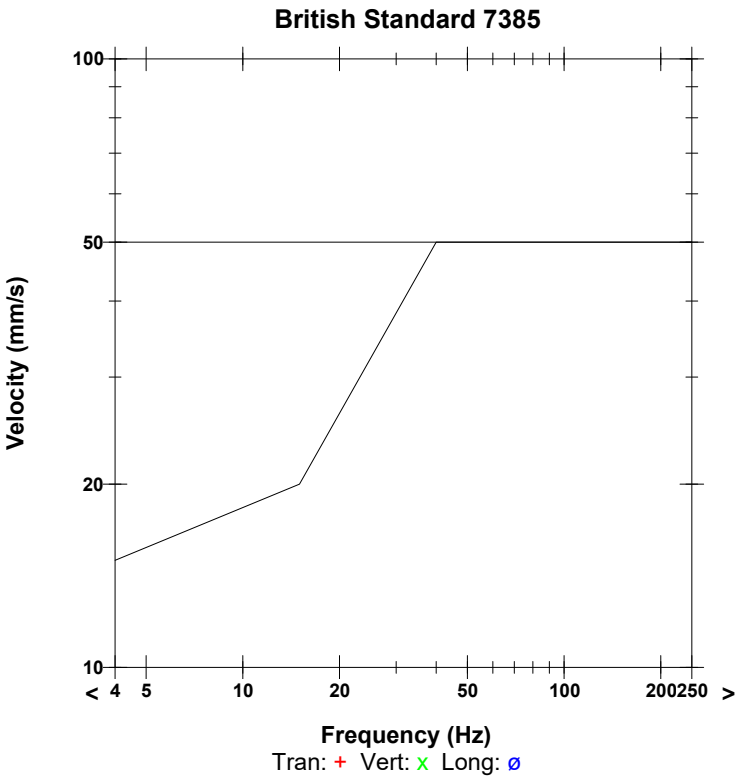
Histogram Start Time	00:00:07 June 22, 2019
Histogram Finish Time	05:59:59 June 22, 2019
Number of Intervals	1439.48 at 15 seconds
Range	Geo:254.0 mm/s
Sample Rate	1024sps
Operator/Setup:	Operator/ERM.mmb

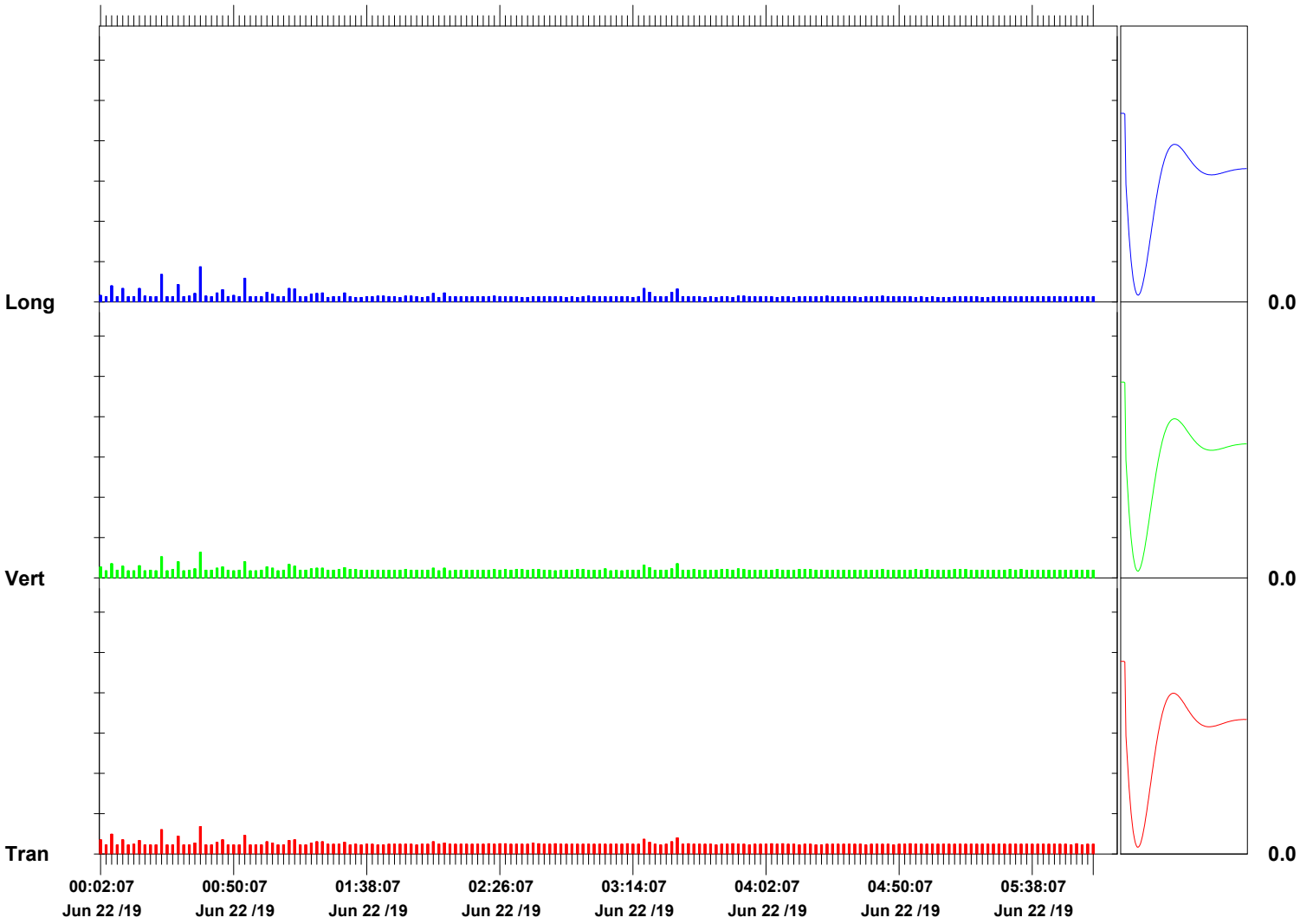
Serial Number	UM14423 V 10-89 Micromate ISEE
Battery Level	3.8 Volts
Unit Calibration	December 7, 2018 by Instantel
File Name	UM14423_20190622000007.IDFH

Notes

	Tran	Vert	Long	
PPV	0.339	0.315	0.434	mm/s
ZC Freq	51	28	85	Hz
Date	Jun 22 /19	Jun 22 /19	Jun 22 /19	
Time	00:37:52	00:37:52	00:37:52	
Sensor Check	Passed	Passed	Passed	
Frequency	7.5	7.3	7.3	Hz
Overswing Ratio	4.5	4.7	5.0	

Peak Vector Sum 0.491 mm/s on June 22, 2019 at 00:37:52





Time Scale: 2 minutes /div **Amplitude Scale:** Geo: 0.500 mm/s/div Sensor Check

UVM03 - Event Report

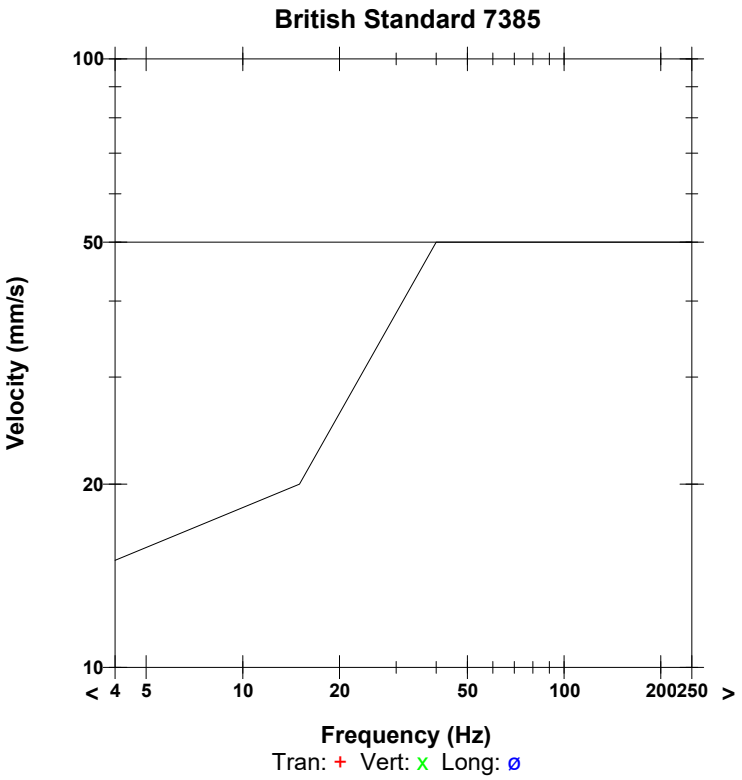
Histogram Start Time	06:03:39 June 22, 2019
Histogram Finish Time	17:59:59 June 22, 2019
Number of Intervals	2865.33 at 15 seconds
Range	Geo:254.0 mm/s
Sample Rate	1024sps
Operator/Setup:	Operator/ERM.mmb

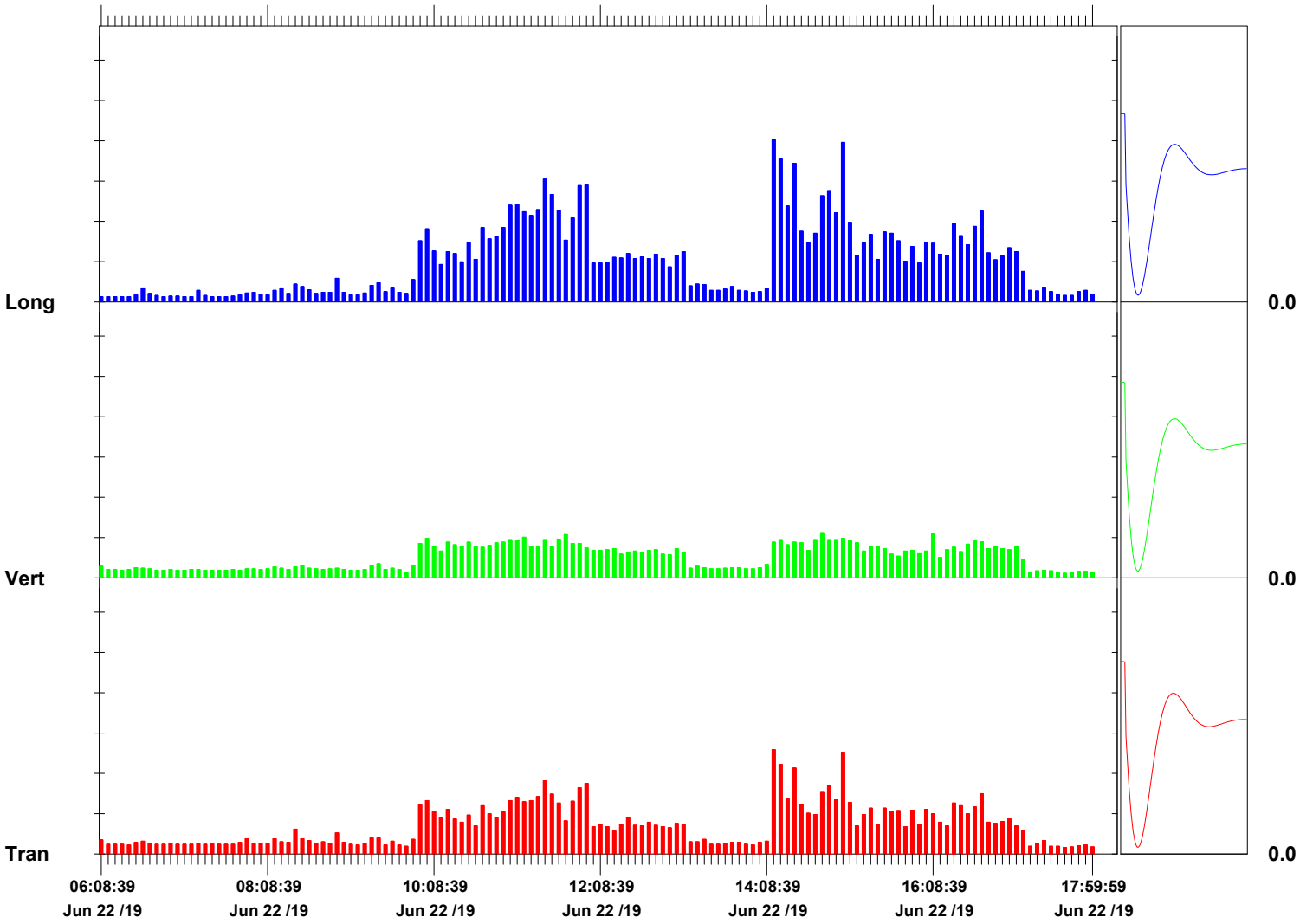
Serial Number	UM14423 V 10-89 Micromate ISEE
Battery Level	3.8 Volts
Unit Calibration	December 7, 2018 by Instantel
File Name	UM14423_20190622060339.IDFH

Notes

	Tran	Vert	Long	
PPV	1.293	0.560	2.010	mm/s
ZC Freq	>100	34	>100	Hz
Date	Jun 22 /19	Jun 22 /19	Jun 22 /19	
Time	14:13:39	14:47:54	14:13:39	
Sensor Check	Passed	Passed	Passed	
Frequency	7.5	7.3	7.3	Hz
Overswing Ratio	4.5	4.8	5.0	

Peak Vector Sum 2.344 mm/s on June 22, 2019 at 14:13:39





Time Scale: 5 minutes /div **Amplitude Scale:** Geo: 0.500 mm/s/div Sensor Check

UVM03 - Event Report

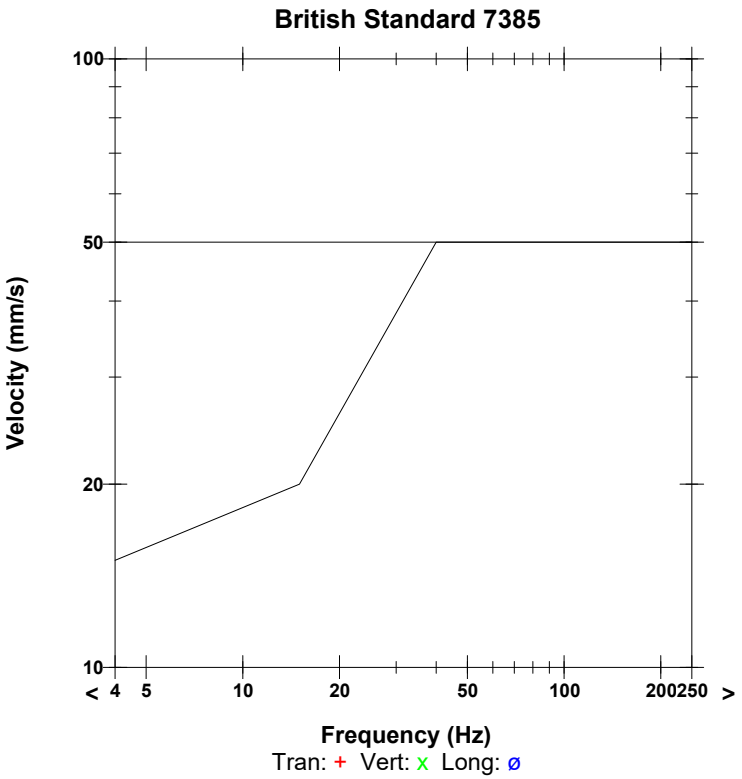
Histogram Start Time	18:03:39 June 22, 2019
Histogram Finish Time	23:59:59 June 22, 2019
Number of Intervals	1425.33 at 15 seconds
Range	Geo:254.0 mm/s
Sample Rate	1024sps
Operator/Setup:	Operator/ERM.mmb

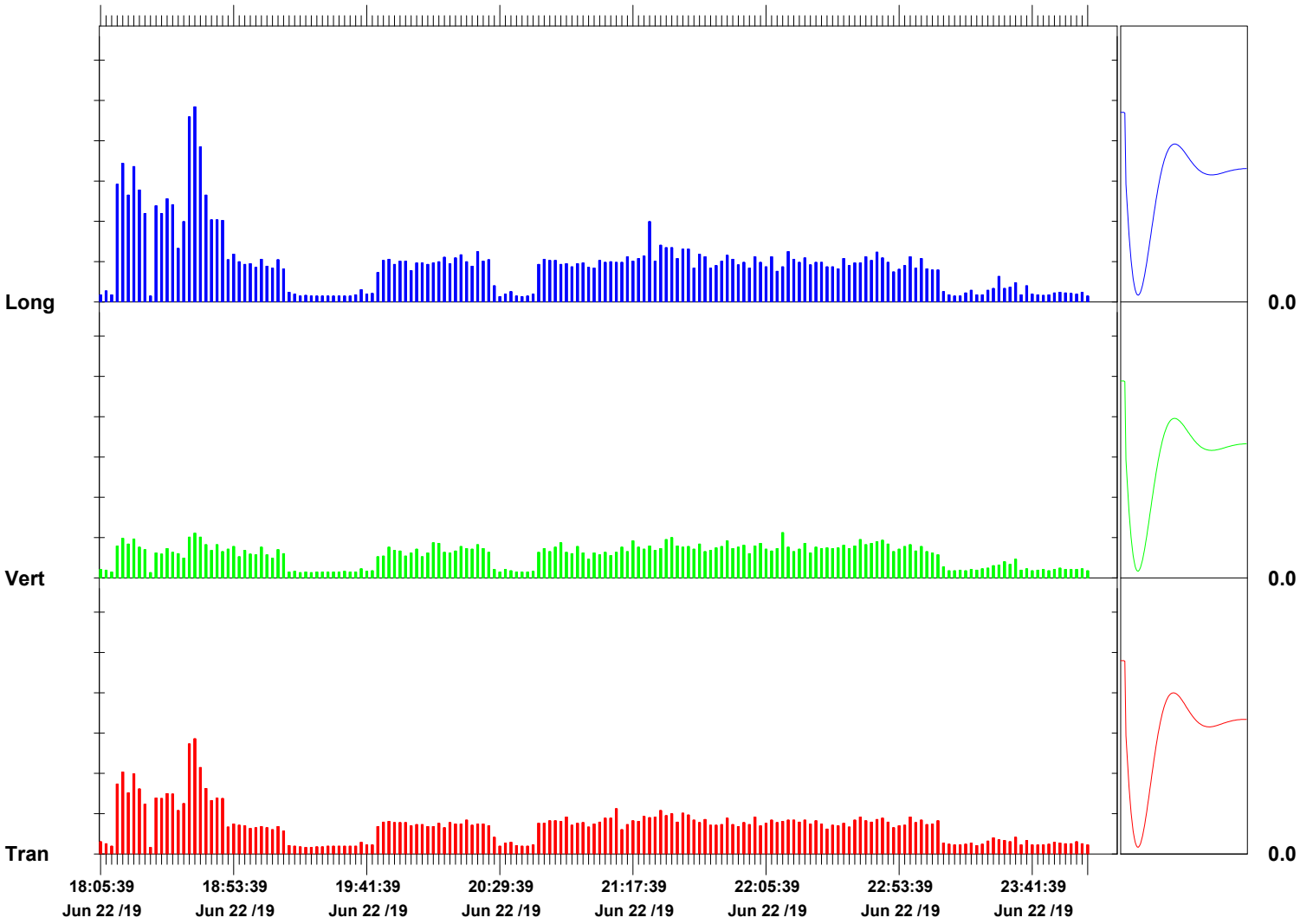
Serial Number	UM14423 V 10-89 Micromate ISEE
Battery Level	3.8 Volts
Unit Calibration	December 7, 2018 by Instantel
File Name	UM14423_20190622180339.IDFH

Notes

	Tran	Vert	Long	
PPV	1.427	0.560	2.420	mm/s
ZC Freq	>100	34	>100	Hz
Date	Jun 22 /19	Jun 22 /19	Jun 22 /19	
Time	18:37:54	22:10:39	18:38:09	
Sensor Check	Passed	Passed	Passed	
Frequency	7.5	7.3	7.3	Hz
Overswing Ratio	4.4	4.7	5.0	

Peak Vector Sum 2.789 mm/s on June 22, 2019 at 18:37:54





Time Scale: 2 minutes /div **Amplitude Scale:** Geo: 0.500 mm/s/div Sensor Check

UVM03 - Event Report

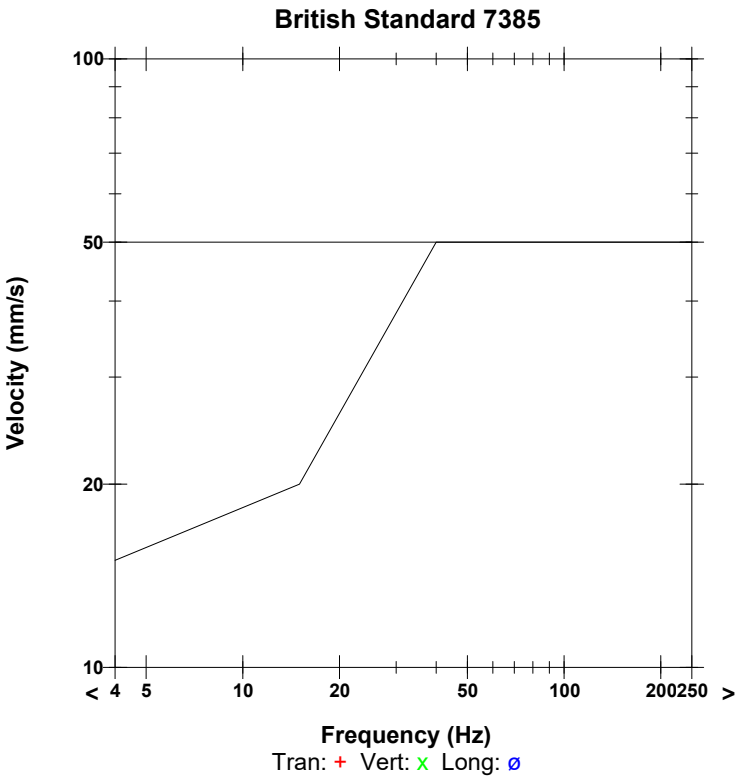
Histogram Start Time	00:00:07 June 23, 2019
Histogram Finish Time	05:59:59 June 23, 2019
Number of Intervals	1439.48 at 15 seconds
Range	Geo:254.0 mm/s
Sample Rate	1024sps
Operator/Setup:	Operator/ERM.mmb

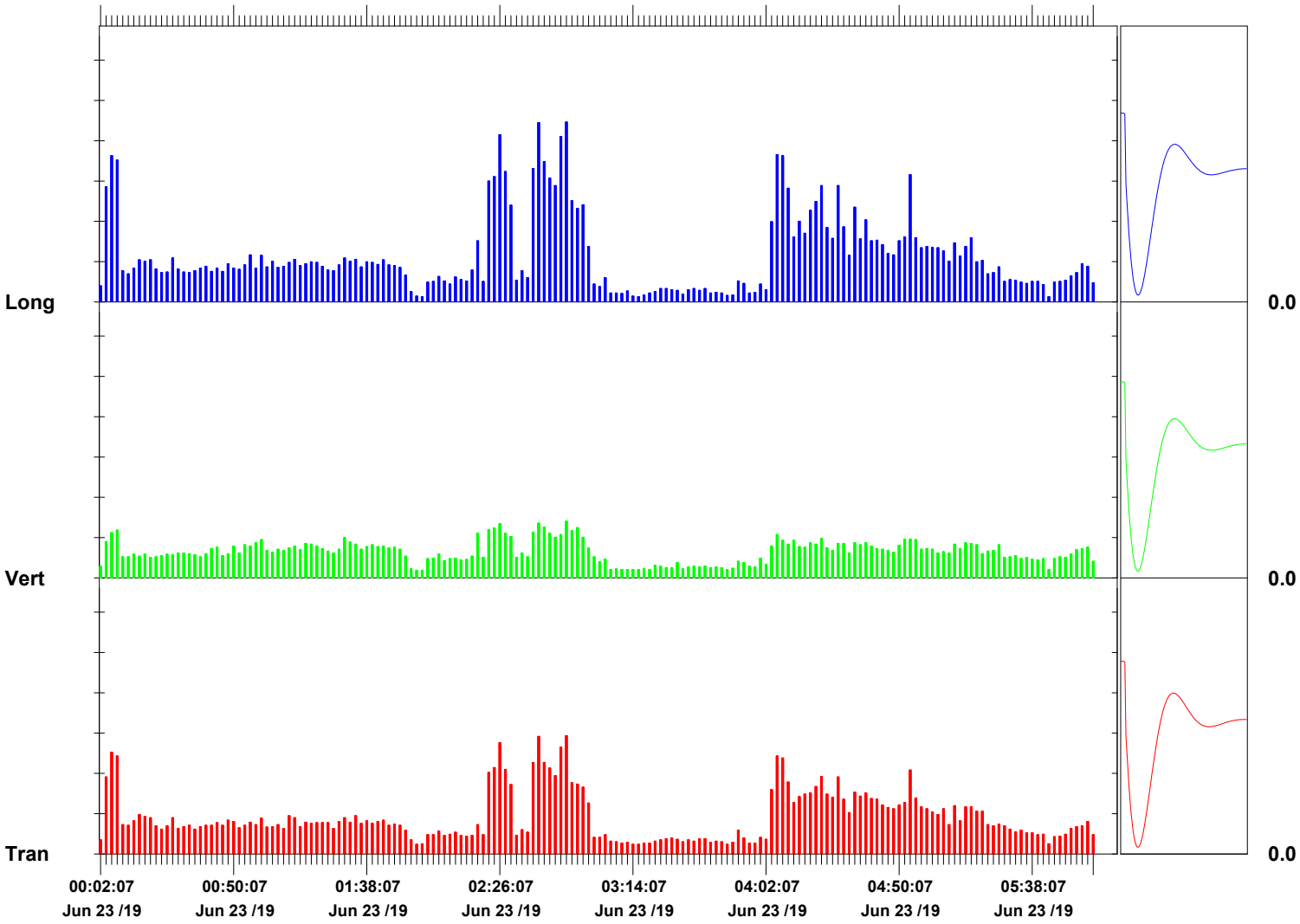
Serial Number	UM14423 V 10-89 Micromate ISEE
Battery Level	3.8 Volts
Unit Calibration	December 7, 2018 by Instantel
File Name	UM14423_20190623000007.IDFH

Notes

	Tran	Vert	Long	
PPV	1.466	0.701	2.231	mm/s
ZC Freq	>100	73	>100	Hz
Date	Jun 23 /19	Jun 23 /19	Jun 23 /19	
Time	02:48:37	02:48:37	02:48:37	
Sensor Check	Passed	Passed	Passed	
Frequency	7.5	7.3	7.3	Hz
Overswing Ratio	4.4	4.7	5.0	

Peak Vector Sum 2.654 mm/s on June 23, 2019 at 02:48:37





Time Scale: 2 minutes /div **Amplitude Scale:** Geo: 0.500 mm/s/div Sensor Check

UVM03 - Event Report

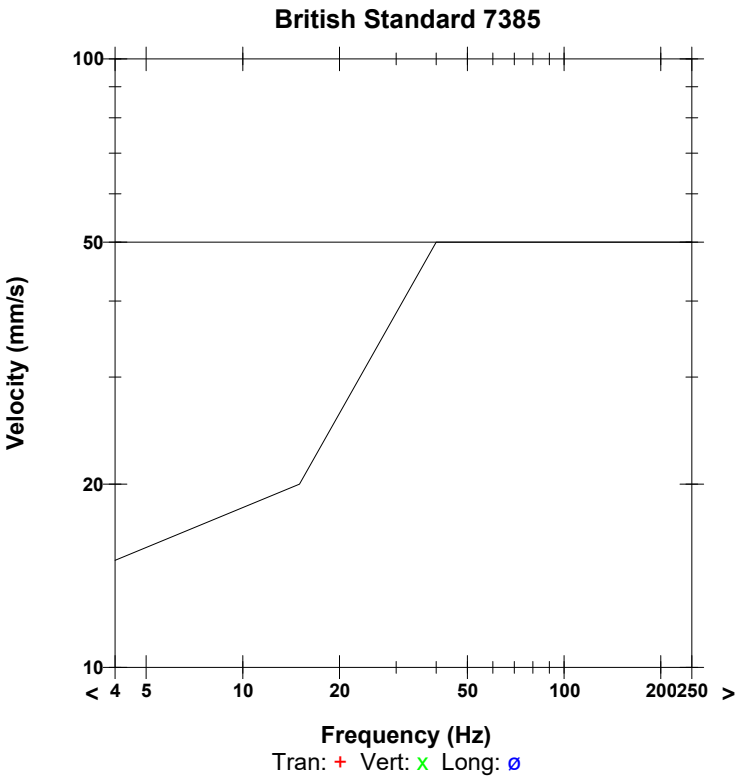
Histogram Start Time	06:03:39 June 23, 2019
Histogram Finish Time	17:59:59 June 23, 2019
Number of Intervals	2865.33 at 15 seconds
Range	Geo:254.0 mm/s
Sample Rate	1024sps
Operator/Setup:	Operator/ERM.mmb

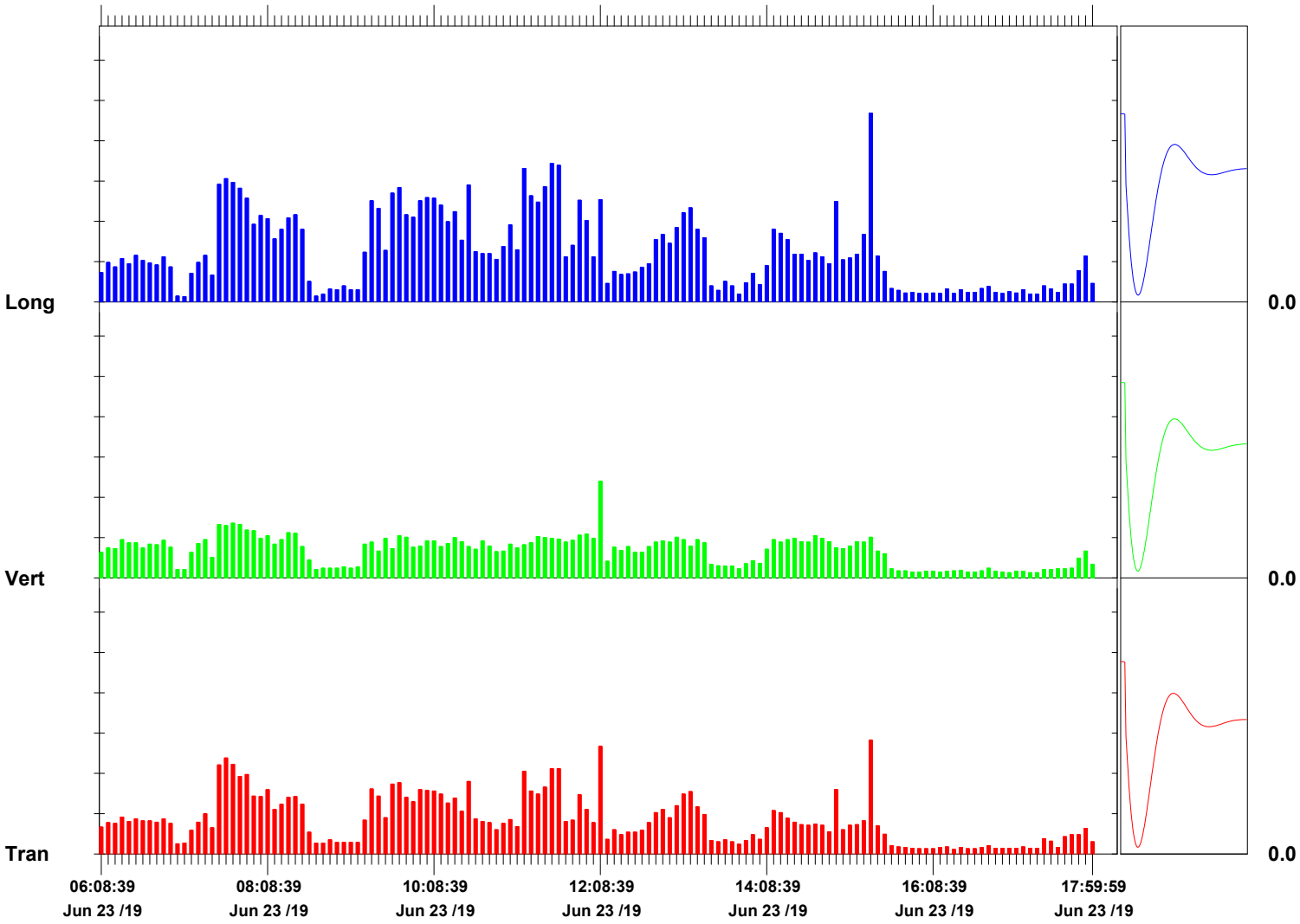
Serial Number	UM14423 V 10-89 Micromate ISEE
Battery Level	3.8 Volts
Unit Calibration	December 7, 2018 by Instantel
File Name	UM14423_20190623060339.IDFH

Notes

	Tran	Vert	Long	
PPV	1.411	1.198	2.341	mm/s
ZC Freq	>100	>100	>100	Hz
Date	Jun 23 /19	Jun 23 /19	Jun 23 /19	
Time	15:22:24	12:06:09	15:22:24	
Sensor Check	Passed	Passed	Passed	
Frequency	7.5	7.3	7.3	Hz
Overswing Ratio	4.5	4.8	5.1	

Peak Vector Sum 2.706 mm/s on June 23, 2019 at 15:22:24





Time Scale: 5 minutes /div **Amplitude Scale:** Geo: 0.500 mm/s/div Sensor Check

UVM03 - Event Report

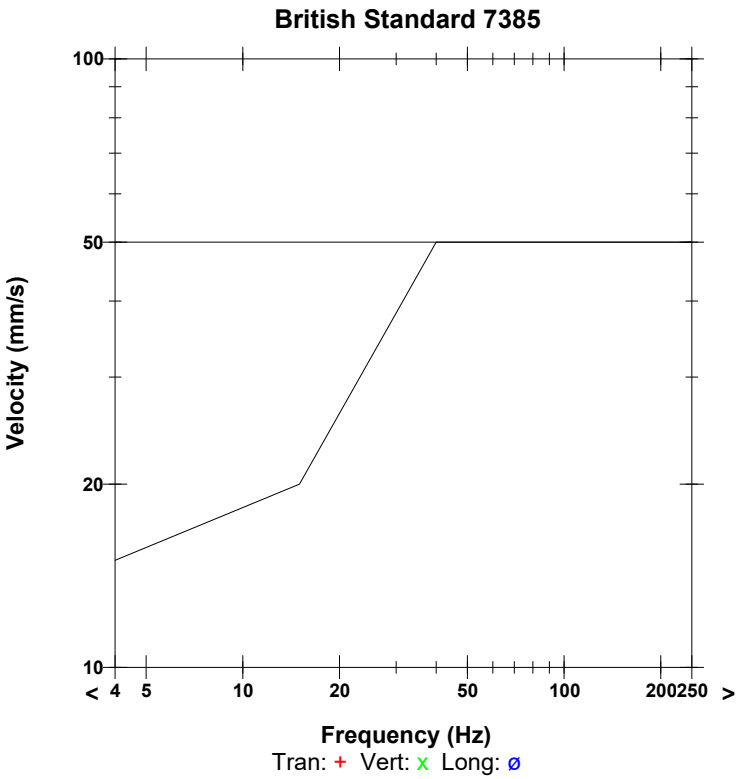
Histogram Start Time	18:03:39 June 23, 2019
Histogram Finish Time	23:59:59 June 23, 2019
Number of Intervals	1425.33 at 15 seconds
Range	Geo:254.0 mm/s
Sample Rate	1024sps
Operator/Setup:	Operator/ERM.mmb

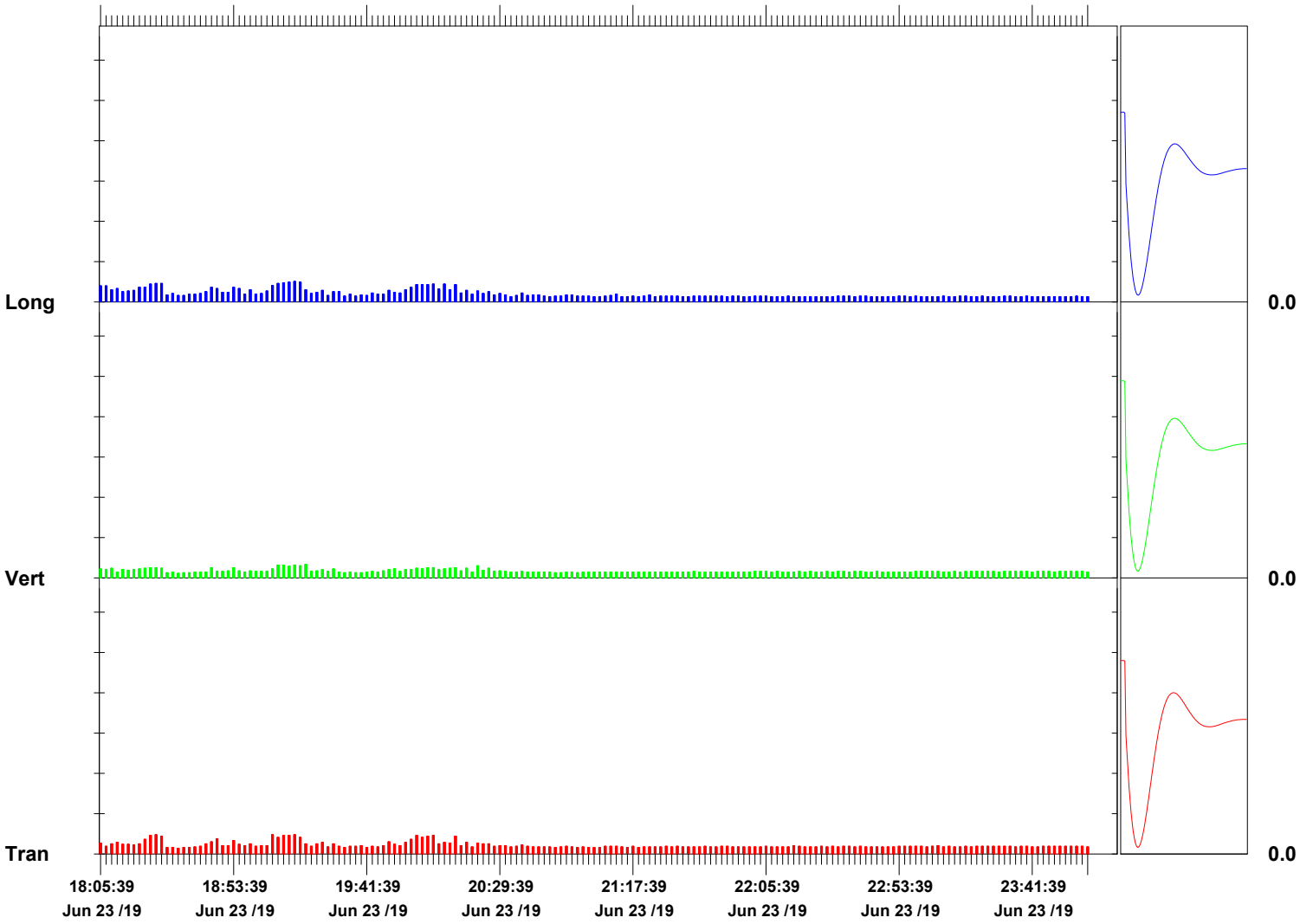
Serial Number	UM14423 V 10-89 Micromate ISEE
Battery Level	3.8 Volts
Unit Calibration	December 7, 2018 by Instantel
File Name	UM14423_20190623180339.IDFH

Notes

	Tran	Vert	Long	
PPV	0.236	0.166	0.252	mm/s
ZC Freq	64	32	>100	Hz
Date	Jun 23 /19	Jun 23 /19	Jun 23 /19	
Time	18:25:24	19:18:39	19:13:54	
Sensor Check	Passed	Passed	Passed	
Frequency	7.5	7.3	7.3	Hz
Overswing Ratio	4.4	4.7	4.9	

Peak Vector Sum 0.329 mm/s on June 23, 2019 at 19:11:39





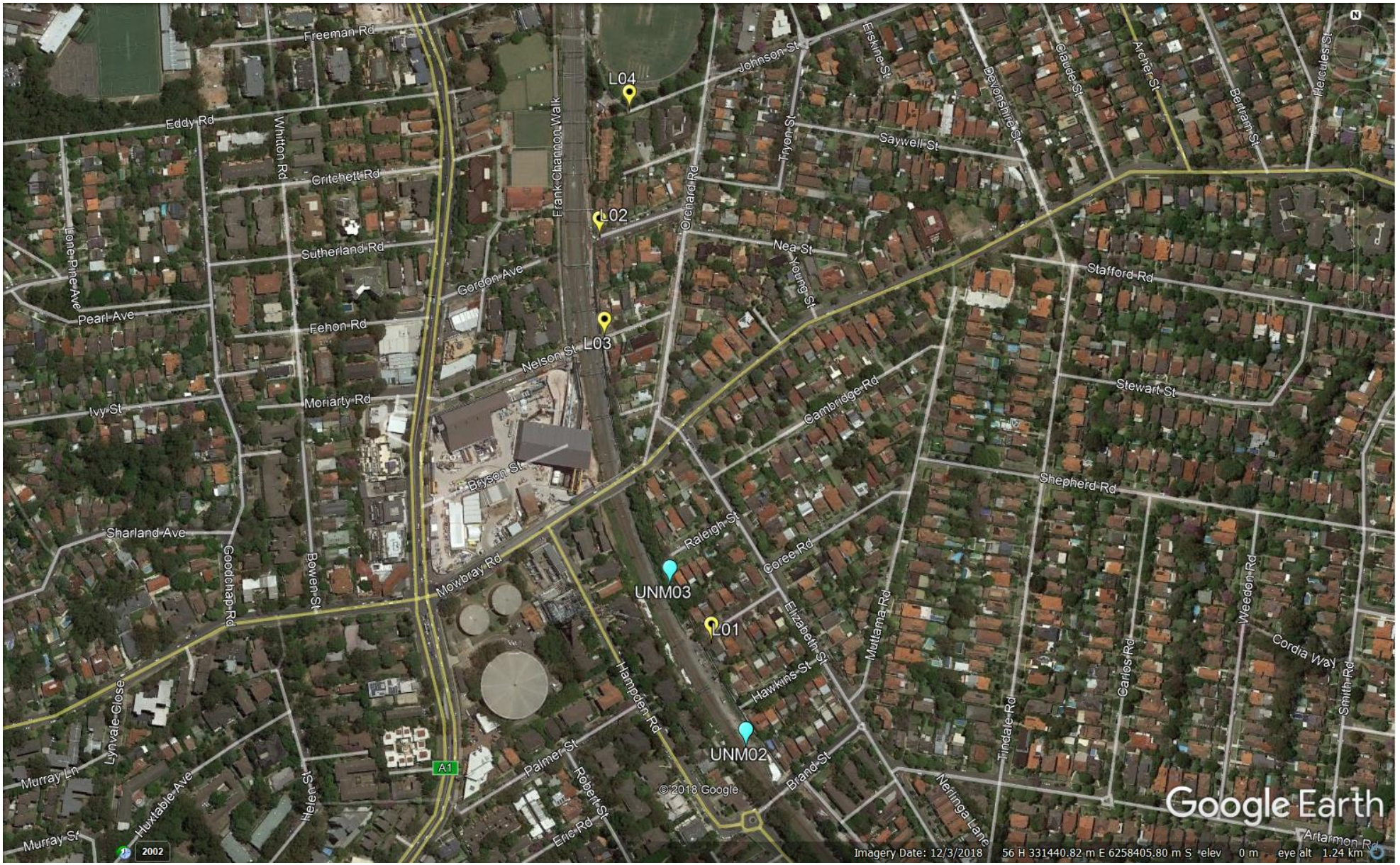
Time Scale: 2 minutes /div **Amplitude Scale:** Geo: 0.500 mm/s/div Sensor Check

Appendix D – Monitoring Report (RP34)

Noise Monitoring – OOHW P7: MW51 - 24 to 28 June 2019

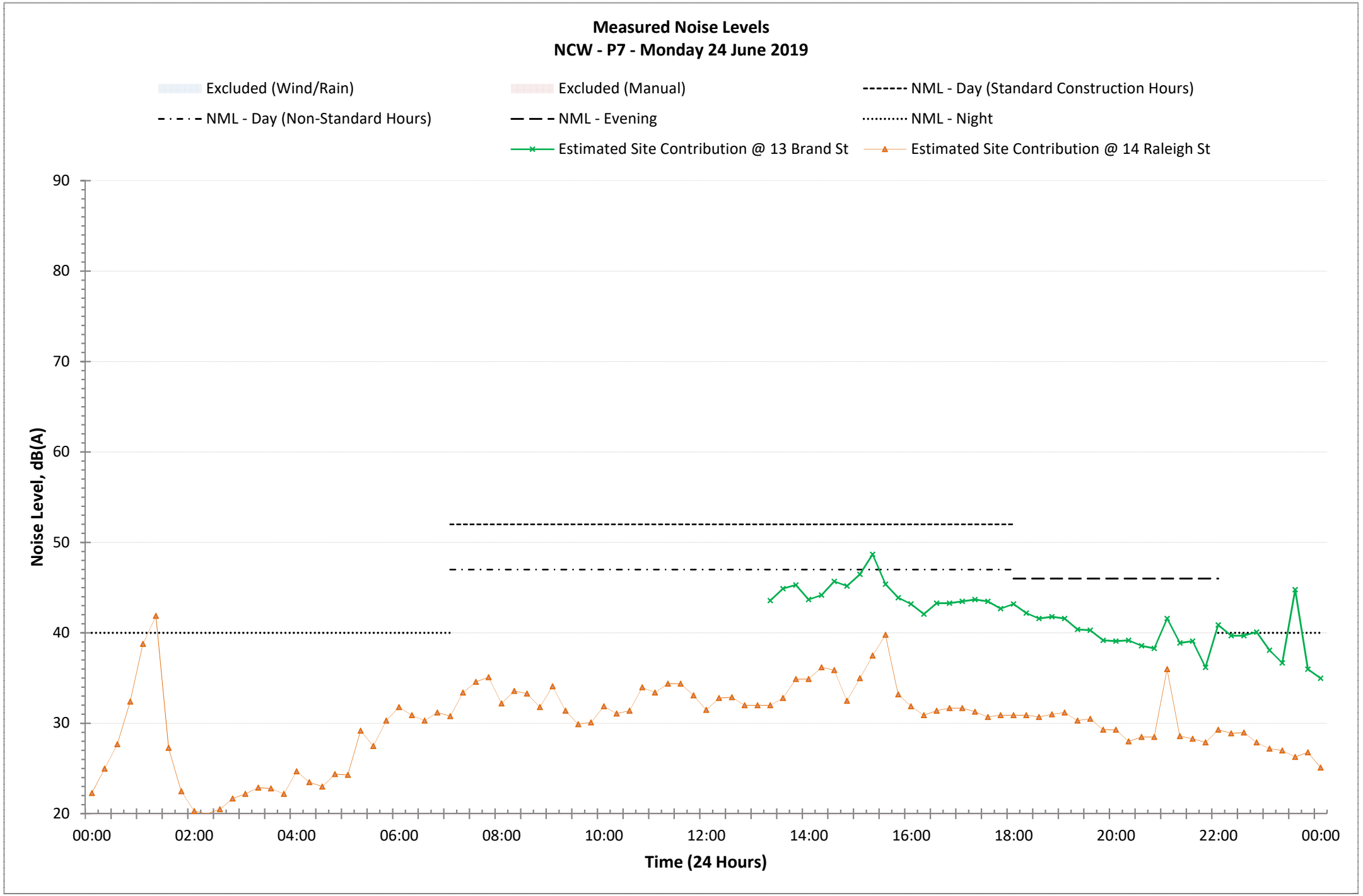
Figure A1.0 – OOHW MW51 – Attended and Unattended Noise Monitoring Locations

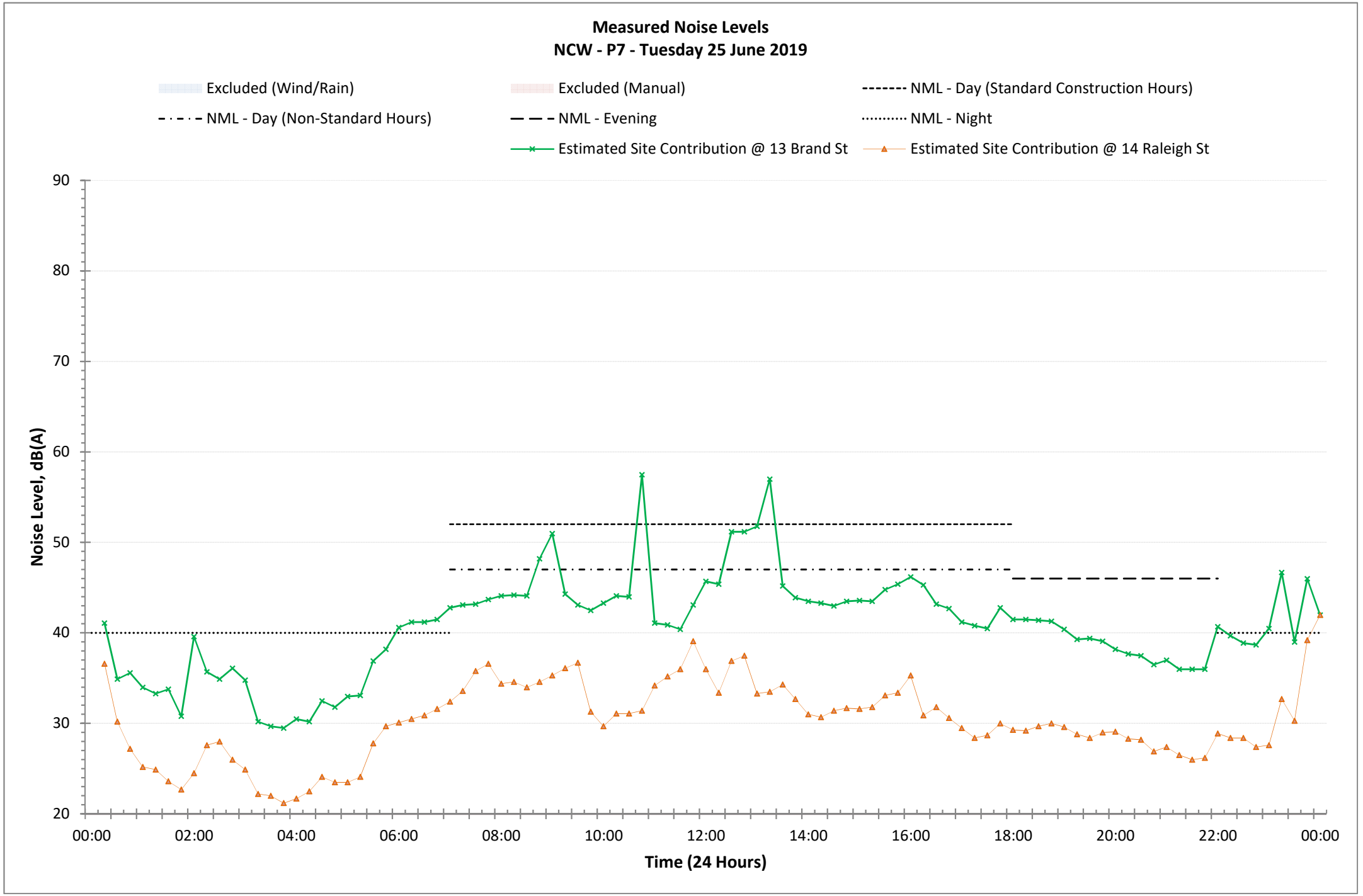
– NCW P7 (Monday, 24 June to Friday, 28 June 2019)

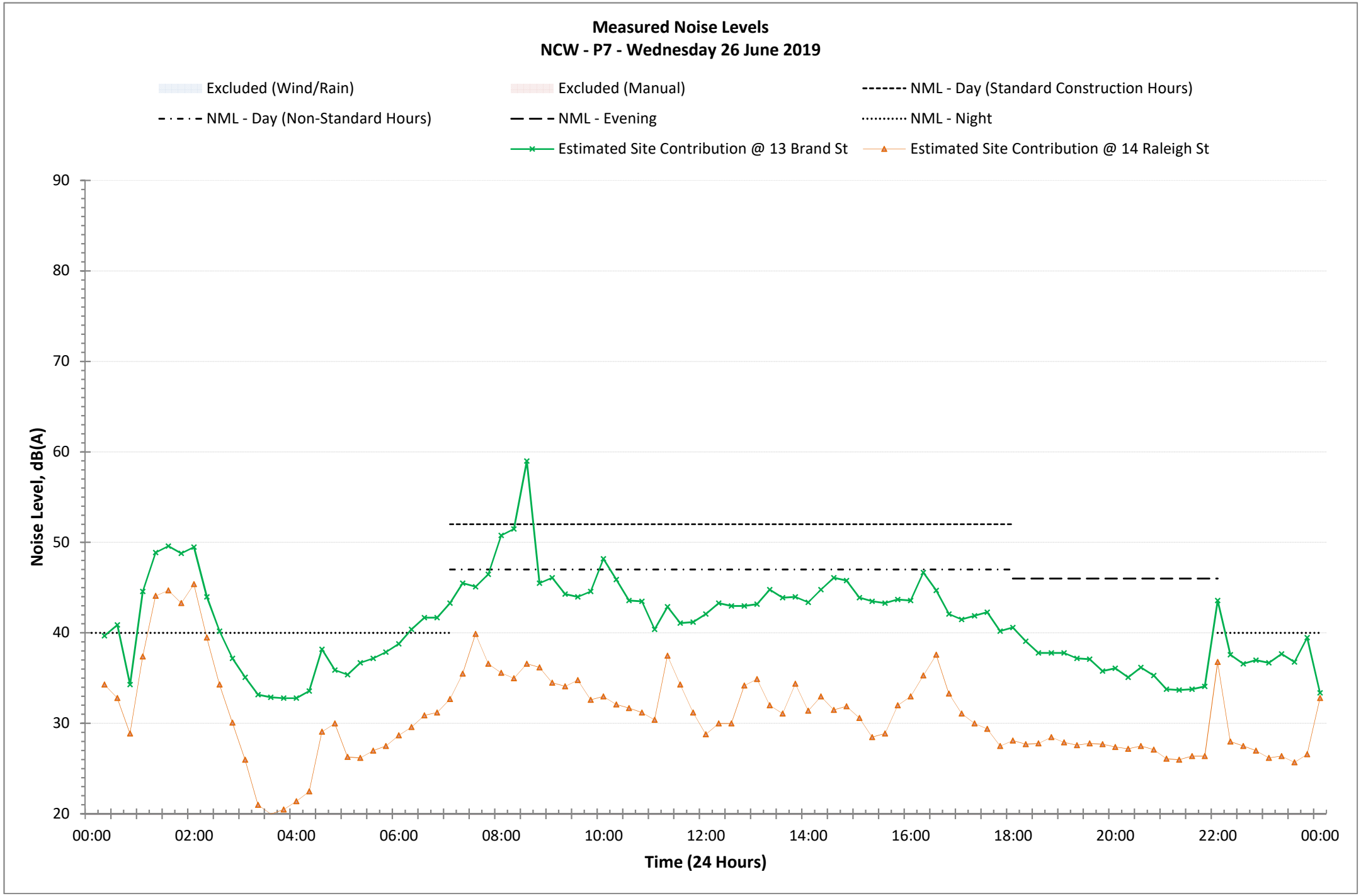


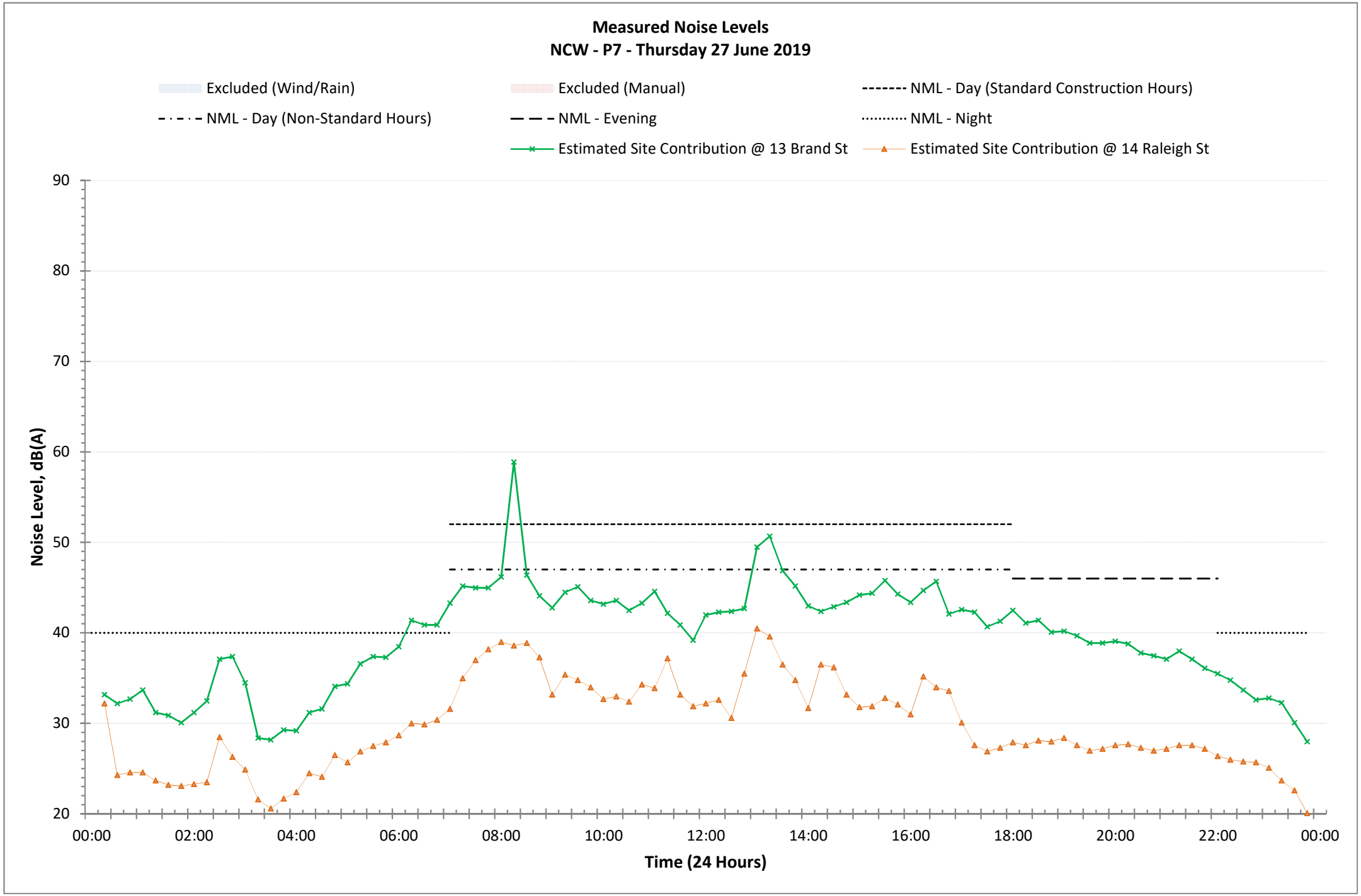
File Name	Date	Start Time	Elapsed Time	LAFmax	LAFmin	LAeq	LAF1.0	LAF10.0	LAF90.0	Percentage Site Contribution (%)	Measured Site Noise Level - LAeq, 15minute	Impulsive Modifying Factor?	Tonal Modifying Factor?	LF Modifying Factor?	Measured Site Noise Level - LAmax	NCA	Period	RBL - LA90, Period	NML - LAeq, 15 minute	Predicted Site Noise Level - LAeq, 15minute	Sleep Disturbance Screening Level - LAmax	Comparison to RBL - LAeq, Period	Comparison to NML - LAeq, 15 minute	Comparison to Predicted Site Noise Level - LAeq, 15minute	Comparison to Sleep Disturbance Screening Level - LAmax	Description
Project 002 *(no Project 001)*	24-Jun-19	23:15	00:15:00	68	38	42	48	44	40	20	35	0.0	0.0	0.0	45	NCA01	Night	47	52	48	62	-12	-17	-13	-17	L01 - Project 002. Measurements undertaken at Drake Street. NCW involved a number of activities outlined within OOWHA-028 along with general construction activities, including use of hand tools and movement of vehicles and plant within the rail corridor. Site-related noises dominated the majority of measurements with approximately 100% contribution. Extraneous sources were also observed to include distant traffic, siren, very light drizzle and loud traffic.
Project 003	25-Jun-19	00:15	00:04:19	81	42	52	62	50	43	20	45	0.0	0.0	0.0	45	NCA01	Night	47	52	69	62	-2	-7	-24	-17	L02 - Project 003. Measurements undertaken at Hopetoun Avenue. NCW involved a number of activities outlined within OOWHA-028 along with general construction activities, including use of hand tools and movement of vehicles and plant within the rail corridor. Site-related noises dominated the majority of measurements with approximately 30% contribution. Extraneous sources were also observed to include Chatswood dive site, rain (drizzle and heavy), and Chatswood train station.
Project 004	25-Jun-19	00:45	00:04:10	75	42	48	54	48	43	20	41	0.0	0.0	0.0	46	NCA01	Night	47	52	69	62	-6	-11	-28	-16	L02 - Project 004. Measurements undertaken at Hopetoun Avenue. NCW involved a number of activities outlined within OOWHA-028 along with general construction activities, including use of hand tools and movement of vehicles and plant within the rail corridor. Site-related noises dominated the majority of measurements with approximately 100% contribution. Extraneous sources were also observed to include Chatswood dive site, rain , heavy rain, and loud traffic.
Project 005	25-Jun-19	01:00	00:15:00	61	49	51	55	52	51	20	44	0.0	0.0	0.0	52	NCA01	Night	47	52	75	62	-3	-8	-31	-10	L03 - Project 005. Measurements undertaken at Berkeley Court (Nelson Street). NCW involved a number of activities outlined within OOWHA-028 along with general construction activities, including use of hand tools and movement of vehicles and plant within the rail corridor. Site-related noises dominated the majority of measurements with approximately 30-40% contribution. Extraneous sources were also observed to include Chatswood dive site, light rain, and loud traffic.
Project 006	25-Jun-19	01:15	00:15:00	61	49	52	55	52	51	80	55	4.5	0.0	0.0	55	NCA01	Night	47	52	75	62	8	3	-20	-7	L03 - Project 006. Measurements undertaken at Berkeley Court (Nelson Street). NCW involved a number of activities outlined within OOWHA-028 along with general construction activities, including use of hand tools and movement of vehicles and plant within the rail corridor. Site-related noises dominated the majority of measurements with approximately 60-100% contribution. Extraneous sources were also observed to include Chatswood dive site, light rain, and loud traffic.
Project 007	25-Jun-19	01:45	00:11:10	68	41	45	50	47	43	50	50	2.6	0.0	5.0	50	NCA01	Night	47	52	69	62	3	-2	-19	-12	L02 - Project 007. Measurements undertaken at Hopetoun Avenue. NCW involved a number of activities outlined within OOWHA-028 along with general construction activities, including use of hand tools and movement of vehicles and plant within the rail corridor. Site-related noises dominated the majority of measurements with approximately 60-100% contribution. Extraneous sources were also observed to include Chatswood dive site, light rain, heavy rain, insect/animal and loud traffic.
Project 009 *(no Project 008)*	25-Jun-19	23:15	00:07:20	90	39	55	50	46	41	100	46	5.4	0.0	0.0	49	NCA01	Night	35	40	48	50	11	6	-2	-1	L01 - Project 009. Measurements undertaken at Drake Street. NCW involved a number of activities outlined within OOWHA-028 along with general construction activities, including use of hand tools and movement of vehicles and plant within the rail corridor. Site-related noises dominated the majority of measurements with approximately 50-100% contribution. Extraneous sources were also observed to include rain residue from trees, distant traffic, loud traffic and heavy rain.
Project 010	25-Jun-19	23:45	00:15:01	70	39	53	58	55	43	100	58	5.4	0.0	0.0	58	NCA01	Night	35	40	48	50	23	18	10	8	L01 - Project 010. Measurements undertaken at Drake Street. NCW involved a number of activities outlined within OOWHA-028 along with general construction activities, including use of hand tools and movement of vehicles and plant within the rail corridor. Site-related noises dominated the majority of measurements with approximately 50-100% contribution. Extraneous sources were also observed to include rain residue from trees, distant traffic, loud traffic and heavy rain.
Project 011	26-Jun-19	00:00	00:15:00	89	39	54	58	56	41	100	60	5.3	0.0	0.0	60	NCA01	Night	35	40	48	50	25	20	12	10	L01 - Project 011. Measurements undertaken at Drake Street. NCW involved a number of activities outlined within OOWHA-028 along with general construction activities, including use of hand tools and movement of vehicles and plant within the rail corridor. Site-related noises dominated the majority of measurements with approximately 30-100% contribution. Extraneous sources were also observed to include slight drizzle, distant traffic and loud traffic.
Project 012	26-Jun-19	00:45	00:15:00	98	47	64	57	50	49	20	47	5.4	0.0	0.0	49	NCA01	Night	35	40	75	50	12	7	-28	-1	L03 - Project 012. Measurements undertaken at Berkeley Court. NCW involved a number of activities outlined within OOWHA-028 along with general construction activities, including use of hand tools and movement of vehicles and plant within the rail corridor. Site-related noises dominated the majority of measurements with approximately 20-40% contribution. Extraneous sources were also observed to include slight drizzle, heavy rain, Chatswood dive site, a plane and loud traffic.
Project 014 *(no Project 13)*	27-Jun-19	00:00	00:15:00	69	36	43	51	44	38	100	46	3.8	0.0	0.0	53	NCA01	Night	35	40	48	50	11	6	-2	3	L01 - Project 014. Measurements undertaken at Drake Street. NCW involved a number of activities outlined within OOWHA-028 along with general construction activities, including use of hand tools and movement of vehicles and plant within the rail corridor. Site-related noises dominated the majority of measurements with approximately 70-100% contribution. Extraneous sources were also observed to include distant traffic, loud traffic and insects/animals.
Project 015	27-Jun-19	00:30	00:15:00	65	38	47	55	51	40	100	50	3.7	0.0	0.0	58	NCA01	Night	35	40	69	50	15	10	-19	8	L02 - Project 015. Measurements undertaken at Hopetoun Avenue. NCW involved a number of activities outlined within OOWHA-028 along with general construction activities, including use of hand tools and movement of vehicles and plant within the rail corridor. Site-related noises dominated the majority of measurements with approximately 70-100% contribution. Extraneous sources were also observed to include loud traffic, Chatswood dive site, Train (Chatswood station) and distant traffic.
Project 016	27-Jun-19	00:45	00:15:00	53	38	41	47	42	39	5	33	4.7	0.0	0.0	39	NCA01	Night	35	40	69	50	-2	-7	-36	-11	L02 - Project 016. Measurements undertaken at Hopetoun Avenue. NCW involved a number of activities outlined within OOWHA-028 along with general construction activities, including use of hand tools and movement of vehicles and plant within the rail corridor. Site-related noises dominated the majority of measurements with approximately 10% contribution. Extraneous sources were also observed to include Chatswood dive site, distant traffic and loud traffic.
Project 017	27-Jun-19	01:45	00:15:00	63	41	47	53	49	43	100	52	5.2	0.0	0.0	53	NCA01	Night	35	40	69	50	17	12	-17	3	L04 - Project 017. Measurements undertaken at Chapman Avenue. NCW involved a number of activities outlined within OOWHA-028 along with general construction activities, including use of hand tools and movement of vehicles and plant within the rail corridor. Site-related noises dominated the majority of measurements with approximately 60-100% contribution. Extraneous sources were also observed to include urban hum, Chatswood train station and loud traffic.
Project 018	27-Jun-19	02:00	00:15:00	69	42	45	48	45	43	70	48	5.3	0.0	0.0	49	NCA01	Night	35	40	69	50	13	8	-21	-1	L04 - Project 018. Measurements undertaken at Chapman Avenue. NCW involved a number of activities outlined within OOWHA-028 along with general construction activities, including use of hand tools and movement of vehicles and plant within the rail corridor. Site-related noises dominated the majority of measurements with approximately 30-100% contribution. Extraneous sources were also observed to include urban hum, leaves falling and distant traffic.

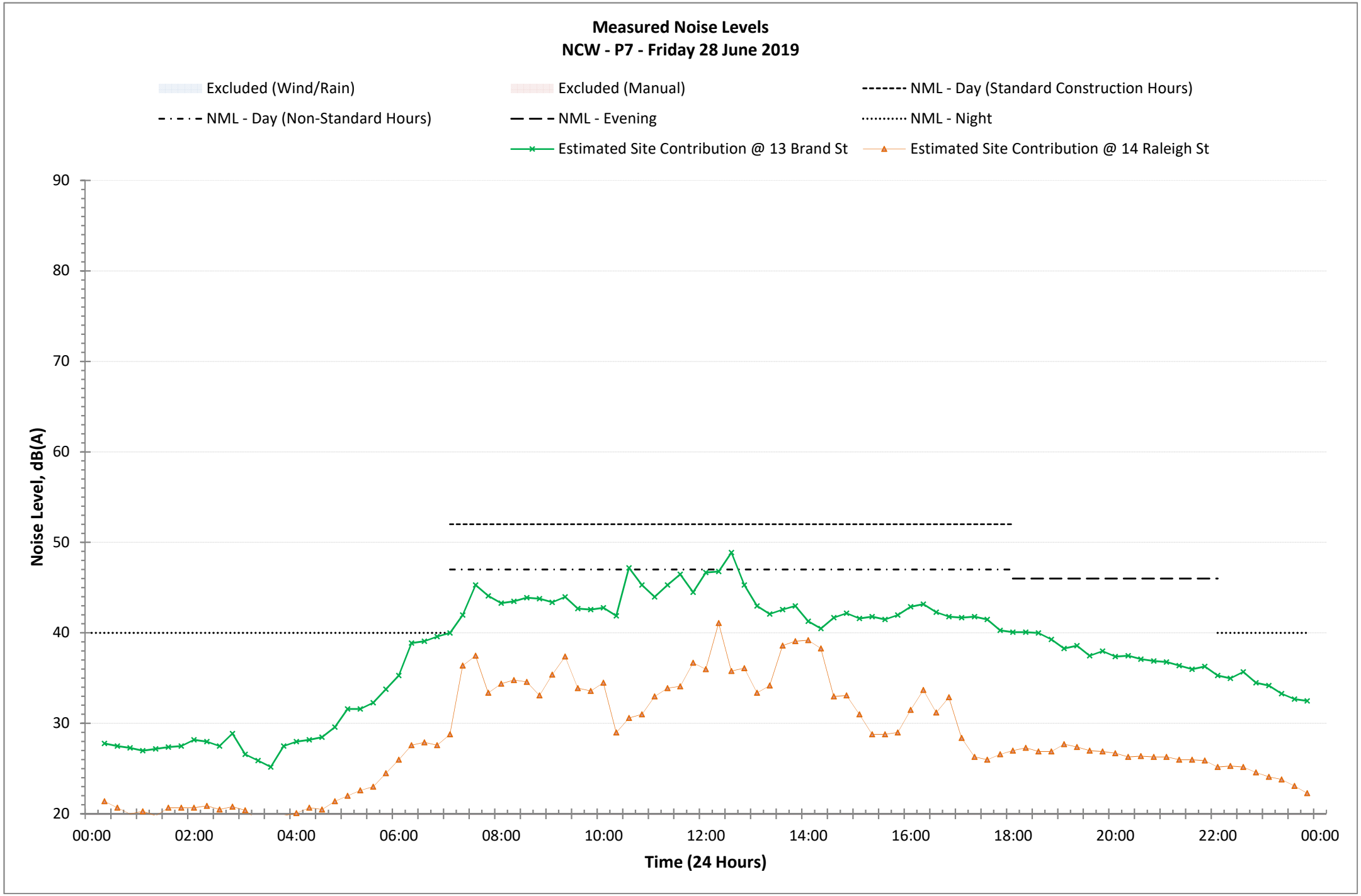
Weather 24-28 June 2019: Generally overcast weather, some extended periods of rain, with calm winds.
Note: all predicted noise levels were reproduced from the LOR OOHWA Form for this track possession.
Note: Low frequency, tonality and impulsive noise tests were conducted in accordance with the INP. The measured Leq data was applied in all cases. Modifying factor (penalty) values were applied as applicable to the low frequency, tonal or impulsive components detectable or attributable to the sites noise emission. The site noise contribution reported here is inclusive of all modifying factors (if applicable).


Measured Noise Levels
NCW - P7 - Monday 24 June 2019
Excluded (Wind/Rain)
Excluded (Manual)
NML - Day (Standard Construction Hours)
NML - Day (Non-Standard Hours)
NML - Evening
NML - Night
Estimated Site Contribution @ 13 Brand St
Estimated Site Contribution @ 14 Raleigh St
Noise Level, dB(A)
90
80
70
60
50
40
30
20
00:00
02:00
04:00
06:00
08:00
10:00
12:00
14:00
16:00
18:00
20:00
22:00
00:00
Time (24 Hours)


Measured Noise Levels
NCW - P7 - Tuesday 25 June 2019
Excluded (Wind/Rain)
Excluded (Manual)
NML - Day (Standard Construction Hours)
NML - Day (Non-Standard Hours)
NML - Evening
NML - Night
Estimated Site Contribution @ 13 Brand St
Estimated Site Contribution @ 14 Raleigh St
Noise Level, dB(A)
90
80
70
60
50
40
30
20
00:00
02:00
04:00
06:00
08:00
10:00
12:00
14:00
16:00
18:00
20:00
22:00
00:00
Time (24 Hours)


Measured Noise Levels
NCW - P7 - Wednesday 26 June 2019
Excluded (Wind/Rain)
Excluded (Manual)
NML - Day (Standard Construction Hours)
NML - Day (Non-Standard Hours)
NML - Evening
NML - Night
Estimated Site Contribution @ 13 Brand St
Estimated Site Contribution @ 14 Raleigh St
Noise Level, dB(A)
90
80
70
60
50
40
30
20
00:00
02:00
04:00
06:00
08:00
10:00
12:00
14:00
16:00
18:00
20:00
22:00
00:00
Time (24 Hours)


Measured Noise Levels
NCW - P7 - Thursday 27 June 2019
Excluded (Wind/Rain)
Excluded (Manual)
NML - Day (Standard Construction Hours)
NML - Day (Non-Standard Hours)
NML - Evening
NML - Night
Estimated Site Contribution @ 13 Brand St
Estimated Site Contribution @ 14 Raleigh St
Noise Level, dB(A)
90
80
70
60
50
40
30
20
00:00
02:00
04:00
06:00
08:00
10:00
12:00
14:00
16:00
18:00
20:00
22:00
00:00
Time (24 Hours)


Measured Noise Levels
NCW - P7 - Friday 28 June 2019
Excluded (Wind/Rain)
Excluded (Manual)
NML - Day (Standard Construction Hours)
NML - Day (Non-Standard Hours)
NML - Evening
NML - Night
Estimated Site Contribution @ 13 Brand St
Estimated Site Contribution @ 14 Raleigh St
Noise Level, dB(A)
90
80
70
60
50
40
30
20
00:00
02:00
04:00
06:00
08:00
10:00
12:00
14:00
16:00
18:00
20:00
22:00
00:00
Time (24 Hours)

Appendix E – Monitoring Report (RP35a)

Noise Monitoring – OOHW P7: WE03 - 20 to 21 July 2019

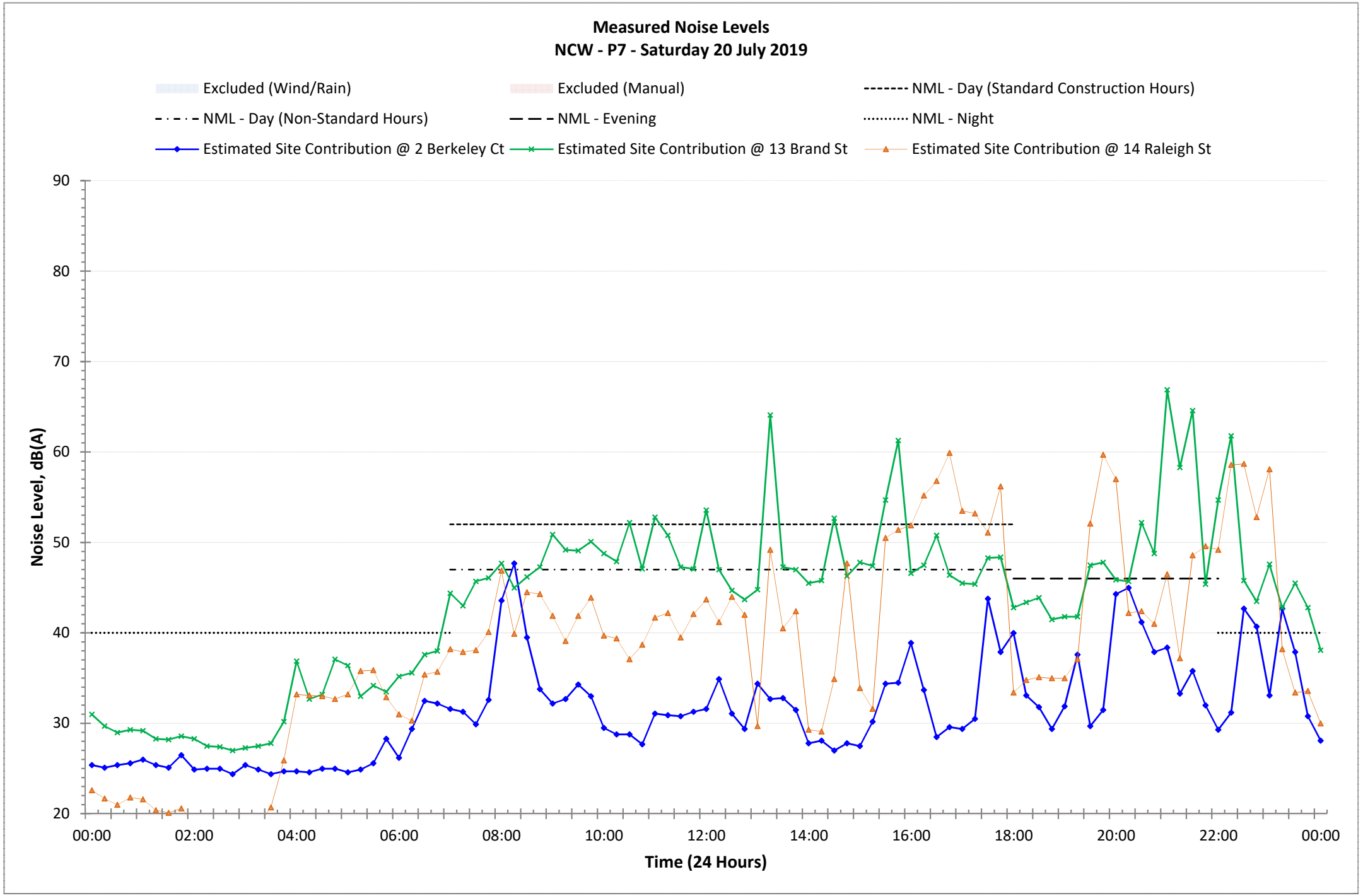
Figure A1.0 – OOHW WE03 – Attended and Unattended Noise Monitoring Locations

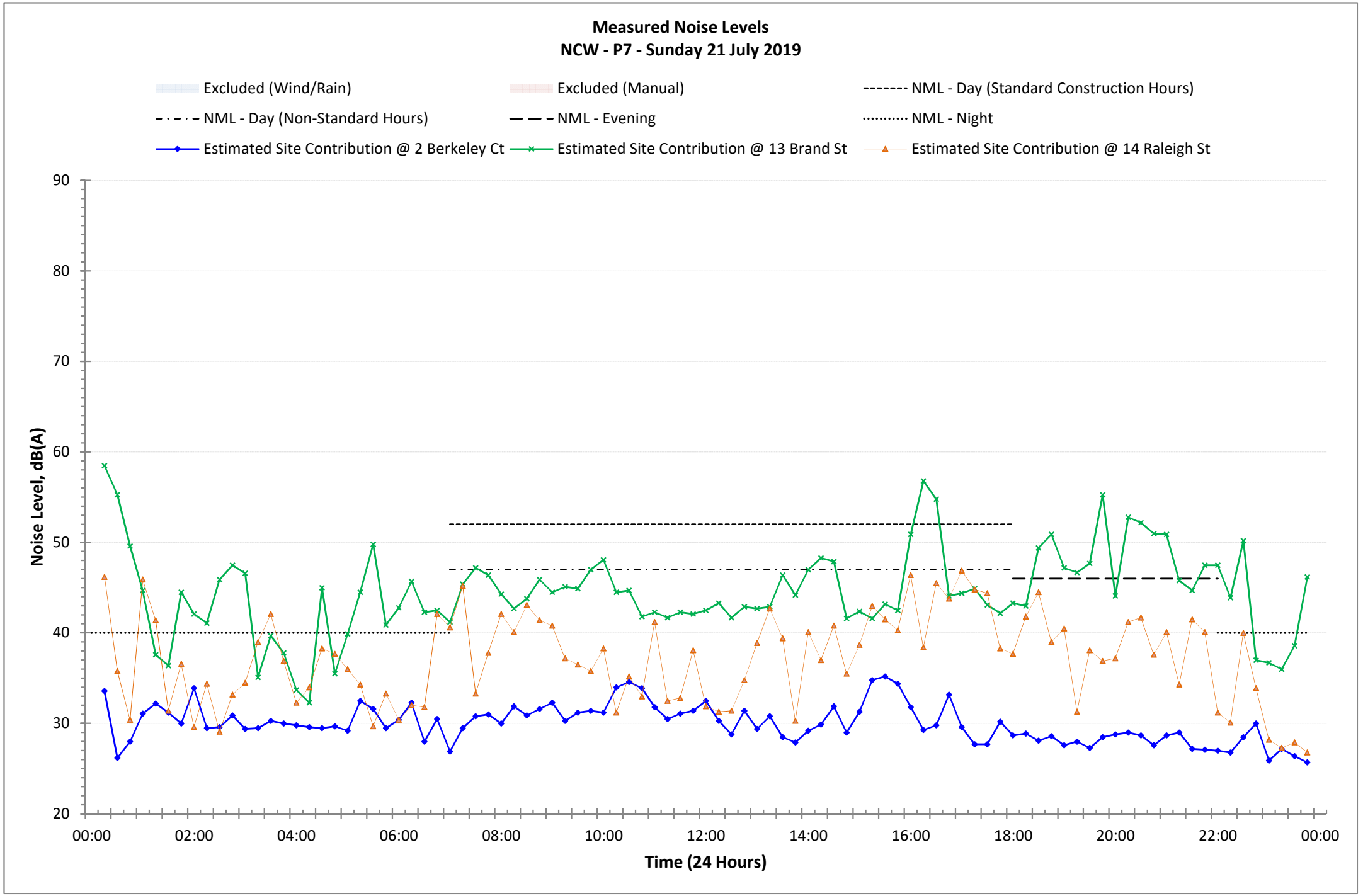
– NCW P7 (Saturday, 20 July and Sunday, 21 July 2019)

File Name	Date	Start Time	Elapsed Time	LAFmax	LAFmin	LAeq	LAF1.0	LAF10.0	LAF90.0	Percentage Site Contribution (%)	Measured Site Noise Level - LAeq, 15minute	Impulsive Modifying Factor?	Tonal Modifying Factor?	LF Modifying Factor?	Measured Site Noise Level - LAmax	NCA	Period	RBL - LA90, Period	NML - LAeq, 15 minute	Predicted Site Noise Level - LAeq, 15minute	Sleep Disturbance Screening Level - LAmax	Comparison to RBL - LA90, Period	Comparison to NML - LAeq, 15 minute	Comparison to Predicted Site Noise Level - LAeq, 15minute	Comparison to Sleep Disturbance Screening Level - LAmax	Description
Project 000	20-Jul-19	19:00	00:15:00	66	47	53	59	55	49	30	47	-	-	-	54	NCA01	Day	42	47	48	57	5	0	-1	-3	A01 - Project 000. Measurement undertaken at Berkeley Court. NCW involved a number of activities outlined within OOWHA-028 along with general construction activities, including use of hand tools and movement of vehicles and plant within the rail corridor. Site-related noises dominated the majority of measurement with approximately 30% contribution. Extraneous sources were also observed to include distant traffic, non-site related construction activities and wind-blown vegetation.
Project 001	20-Jul-19	19:15	00:15:00	74	46	54	62	58	48	100	54	-	-	-	70	NCA01	Day	42	47	53	57	12	7	1	13	A01 - Project 001. Measurement undertaken at Berkeley Court. NCW involved a number of activities outlined within OOWHA-028 along with general construction activities, including use of hand tools and movement of vehicles and plant within the rail corridor. Site-related noises dominated the majority of measurement with approximately 100% contribution. Extraneous sources were also observed to include distant traffic and nearby wildlife.
Project 002	20-Jul-19	19:44	00:15:00	91	62	66	72	68	63	100	71	-	5.0	-	91	NCA01	Day	42	47	71	57	29	24	0	34	A02 - Project 002. Measurement undertaken at Drake Street. NCW involved a number of activities outlined within OOWHA-028 along with general construction activities, including use of hand tools and movement of vehicles and plant within the rail corridor. Site-related noises dominated the majority of measurement with approximately 80-100% contribution. Extraneous sources were also observed to include distant traffic, plane, passing car and leaking hydrant.
Project 003	20-Jul-19	20:00	00:15:00	85	48	63	75	68	50	100	68	-	5.0	-	76	NCA01	Day	42	47	71	57	26	21	-3	19	A02 - Project 003. Measurement undertaken at Drake Street. NCW involved a number of activities outlined within OOWHA-028 along with general construction activities, including use of hand tools and movement of vehicles and plant within the rail corridor. Site-related noises dominated the majority of measurement with approximately 100% contribution. Extraneous sources were also observed to include nearby wildlife and distant traffic.
Project 004	20-Jul-19	20:30	00:15:00	67	47	55	62	59	49	100	55	-	-	-	64	NCA01	Day	42	47	71	57	13	8	-16	7	A03 - Project 004. Measurement undertaken at Raleigh Street. NCW involved a number of activities outlined within OOWHA-028 along with general construction activities, including use of hand tools and movement of vehicles and plant within the rail corridor. Site-related noises dominated the majority of measurement with approximately 100% contribution. Extraneous sources were also observed to include nearby wildlife and wind-blown vegetation.
Project 005	20-Jul-19	20:45	00:15:00	70	47	55	64	59	49	100	55	-	-	-	69	NCA01	Day	42	47	71	57	13	8	-16	12	A03 - Project 005. Measurement undertaken at Hopetoun Avenue. NCW involved a number of activities outlined within OOWHA-028 along with general construction activities, including use of hand tools and movement of vehicles and plant within the rail corridor. Site-related noises dominated the majority of measurement with approximately 100% contribution. Extraneous sources were also observed to include nearby wildlife and wind-blown vegetation.
Project 006	20-Jul-19	22:00	00:15:00	70	46	51	59	53	47	100	56	-	5.0	-	69	NCA01	Day	42	47	58	57	14	9	-3	12	A04 - Project 006. Measurement undertaken at Hopetoun Avenue. NCW involved a number of activities outlined within OOWHA-028 along with general construction activities, including use of hand tools and movement of vehicles and plant within the rail corridor. Site-related noises dominated the majority of measurement with approximately 100% contribution. Extraneous sources were also observed to include distant traffic and nearby wildlife.
Project 007	20-Jul-19	22:15	00:15:00	69	45	53	64	55	47	100	53	-		-	69	NCA01	Day	42	47	58	57	11	6	-5	12	A04 - Project 007. Measurement undertaken at Hopetoun Avenue. NCW involved a number of activities outlined within OOWHA-028 along with general construction activities, including use of hand tools and movement of vehicles and plant within the rail corridor. Site-related noises dominated the majority of measurement with approximately 100% contribution. Extraneous sources were also observed to include distant traffic and nearby wildlife.
Project 008	20-Jul-19	22:45	00:15:00	80	50	67	75	72	51	100	72	-	5.0	-	80	NCA01	Day	42	47	71	57	30	25	1	23	A02 - Project 008. Measurement undertaken at Drake Street. NCW involved a number of activities outlined within OOWHA-028 along with general construction activities, including use of hand tools and movement of vehicles and plant within the rail corridor. Site-related noises dominated the majority of measurement with approximately 100% contribution. Extraneous sources were also observed to include distant traffic.
Project 009	20-Jul-19	23:00	00:15:00	82	54	68	76	74	58	90	67	-	-	-	78	NCA01	Day	42	47	71	57	25	20	-4	21	A02 - Project 009. Measurement undertaken at Drake Street. NCW involved a number of activities outlined within OOWHA-028 along with general construction activities, including use of hand tools and movement of vehicles and plant within the rail corridor. Site-related noises dominated the majority of measurement with approximately 100% contribution. Extraneous sources were also observed to include distant traffic.
Project 010	20-Jul-19	23:45	00:15:00	74	47	63	73	69	49	100	63	-	-	-	73	NCA01	Evening	41	46	69	56	22	17	-6	17	A04 - Project 010. Measurement undertaken at Hopetoun Avenue. NCW involved a number of activities outlined within OOWHA-028 along with general construction activities, including use of hand tools and movement of vehicles and plant within the rail corridor. Site-related noises dominated the majority of measurement with approximately 100% contribution. Extraneous sources were also observed to include distant traffic and nearby wildlife.
Project 011	21-Jul-19	00:01	00:15:00	67	46	50	56	51	47	100	55	-	5.0	-	67	NCA01	Evening	41	46	69	56	14	9	-14	11	A04 - Project 011. Measurement undertaken at Hopetoun Avenue. NCW involved a number of activities outlined within OOWHA-028 along with general construction activities, including use of hand tools and movement of vehicles and plant within the rail corridor. Site-related noises dominated the majority of measurement with approximately 100% contribution. Extraneous sources were also observed to include distant traffic and nearby wildlife.
Project 012	21-Jul-19	00:30	00:15:00	59	43	46	52	47	45	5	33	-	-	-	47	NCA01	Evening	41	46	53	56	-8	-13	-20	-9	A01 - Project 012. Measurement undertaken at Berkeley Court. NCW involved a number of activities outlined within OOWHA-028 along with general construction activities, including use of hand tools and movement of vehicles and plant within the rail corridor. Site-related noises were minimal and contributed to approximately 5% of the measured LAeq. Extraneous noise sources dominated the measurement and included Chatswood dive site works, distant traffic and wildlife.
Project 013	21-Jul-19	00:45	00:15:00	62	44	47	53	50	45	30	42	-	-	-	61	NCA01	Evening	41	46	53	56	1	-4	-11	5	A01 - Project 013. Measurement undertaken at Berkeley Court. NCW involved a number of activities outlined within OOWHA-028 along with general construction activities, including use of hand tools and movement of vehicles and plant within the rail corridor. Site-related noises were minimal and contributed to approximately 30% of the measured LAeq. Extraneous noise sources dominated the measurement and included Chatswood dive site works and distant traffic.
Project 014	21-Jul-19	01:00	00:15:00	62	44	47	53	49	46	50	44	-	-	-	52	NCA01	Evening	41	46	53	56	3	-2	-9	-4	A01 - Project 014. Measurement undertaken at Berkeley Court. NCW involved a number of activities outlined within OOWHA-028 along with general construction activities, including use of hand tools and movement of vehicles and plant within the rail corridor. Site-related noises contributed to approximately 50% of the measured LAeq. Extraneous noise sources were observed, and included Chatswood dive site works, nearby wildlife and distant traffic.
Project 015	21-Jul-19	01:30	00:15:00	66	46	50	58	52	47	100	50	-	-	-	61	NCA01	Evening	41	46	58	56	9	4	-8	5	A04 - Project 015. Measurement undertaken at Hopetoun Avenue. NCW involved a number of activities outlined within OOWHA-028 along with general construction activities, including use of hand tools and movement of vehicles and plant within the rail corridor. Site-related noises dominated the majority of measurement with approximately 100% contribution. Extraneous sources were also observed to include distant traffic and wildlife.
Project 016	21-Jul-19	01:45	00:15:00	63	44	48	56	50	46	100	48	-	-	-	58	NCA01	Evening	41	46	58	56	7	2	-10	2	A04 - Project 016. Measurement undertaken at Hopetoun Avenue. NCW involved a number of activities outlined within OOWHA-028 along with general construction activities, including use of hand tools and movement of vehicles and plant within the rail corridor. Site-related noises dominated the majority of measurement with approximately 100% contribution. Extraneous sources were also observed to include distant traffic.
Project 017	21-Jul-19	02:01	00:15:00	72	45	52	58	54	47	100	52	-	-	-	71	NCA01	Evening	41	46	58	56	11	6	-7	15	A04 - Project 017. Measurement undertaken at Hopetoun Avenue. NCW involved a number of activities outlined within OOWHA-028 along with general construction activities, including use of hand tools and movement of vehicles and plant within the rail corridor. Site-related noises dominated the majority of measurement with approximately 100% contribution. Extraneous sources were also observed to include distant traffic and wildlife.
Project 018	21-Jul-19	03:00	00:06:53	63	44	48	56	49	46	70	46	-	-	-	49	NCA01	Evening	41	46	58	56	5	0	-12	-7	A04 - Project 018. Measurement undertaken at Hopetoun Avenue. NCW involved a number of activities outlined within OOWHA-028 along with general construction activities, including use of hand tools and movement of vehicles and plant within the rail corridor. Site-related noises dominated the majority of measurement with approximately 100% contribution. Extraneous sources were also observed to include nearby wildlife.

File Name	Date	Start Time	Elapsed Time	LAFmax	LAFmin	LAeq	LAF1.0	LAF10.0	LAF90.0	Percentage Site Contribution (%)	Measured Site Noise Level - LAeq, 15minute	Impulsive Modifying Factor?	Tonal Modifying Factor?	LF Modifying Factor?	Measured Site Noise Level - LAmax	NCA	Period	RBL - LA90, Period	NML - LAeq, 15 minute	Predicted Site Noise Level - LAeq, 15minute	Sleep Disturbance Screening Level - LAmax	Comparison to RBL - LA90, Period	Comparison to NML - LAeq, 15 minute	Comparison to Predicted Site Noise Level - LAeq, 15minute	Comparison to Sleep Disturbance Screening Level - LAmax	Description
Project 019	21-Jul-19	03:29	00:15:00	73	47	52	59	53	48	100	52	-	-	-	72	NCA01	Night	35	40	53	50	17	12	-1	22	A01 - Project 019. Measurement undertaken at Berkeley. NCW involved a number of activities outlined within OOWHA-028 along with general construction activities, including use of hand tools and movement of vehicles and plant within the rail corridor. Site-related noises dominated the majority of measurement with approximately 700% contribution. Extraneous sources were observed to include Chatswood dive site works, distant traffic and nearby wildlife/windblown vegetation.
Project 020	21-Jul-19	03:45	00:15:00	74	47	54	65	54	48	100	54	-	-	-	73	NCA01	Night	35	40	58	50	19	14	-4	23	A04 - Project 020. Measurement undertaken at Hopetoun Avenue. NCW involved a number of activities outlined within OOWHA-028 along with general construction activities, including use of hand tools and movement of vehicles and plant within the rail corridor. Site-related noises dominated the majority of measurement with approximately 100% contribution. Extraneous sources were also observed to include nearby wildlife and distant traffic.
Project 021	21-Jul-19	16:00	00:15:00	79	45	51	58	52	47	30	46	-	-	-	53	NCA01	Night	35	40	51	50	11	6	-5	3	A05 - Project 021. Measurement undertaken at Chapman Avenue. NCW involved a number of activities outlined within OOWHA-028 along with general construction activities, including use of hand tools and movement of vehicles and plant within the rail corridor. Site-related noises contributed to approximately 30% of the overall LAeq. Extraneous sources were dominant and included nearby people in Chatswood Oval, wildlife and distant traffic.
Project 022	21-Jul-19	16:15	00:15:00	71	46	55	64	57	49	50	51	-	-	-	63	NCA01	Night	35	40	51	50	16	11	0	13	A05 - Project 022. Measurement undertaken at Chapman Avenue. NCW involved a number of activities outlined within OOWHA-028 along with general construction activities, including use of hand tools and movement of vehicles and plant within the rail corridor. Site-related noises contributed to approximately 50% of the overall LAeq. Extraneous sources were observed and included nearby people in Chatswood Oval, wildlife and distant traffic.
Project 023	21-Jul-19	16:30	00:15:00	72	47	55	65	56	50	40	51	-	-	-	59	NCA01	Day	42	47	51	57	9	4	0	2	A05 - Project 023. Measurement undertaken at Chapman Avenue. NCW involved a number of activities outlined within OOWHA-028 along with general construction activities, including use of hand tools and movement of vehicles and plant within the rail corridor. Site-related noises contributed to approximately 40% of the overall LAeq. Extraneous sources were dominant and included nearby people in Chatswood Oval, wildlife and distant traffic.
Project 024	21-Jul-19	17:00	00:15:00	71	45	51	58	54	48	30	46	-	-	-	57	NCA01	Day	42	47	53	57	4	-1	-7	0	A01 - Project 024. Measurement undertaken at Berkeley Court. NCW involved a number of activities outlined within OOWHA-028 along with general construction activities, including use of hand tools and movement of vehicles and plant within the rail corridor. Site-related noises contributed to approximately 30% of the overall measured LAeq. Extraneous sources dominated the measurement and included Chatswood dive site works, distant traffic, nearby wildlife and wind-blown vegetation.
Project 025	21-Jul-19	17:15	00:15:00	63	44	50	56	53	47	10	40	-	-	-	54	NCA01	Day	42	47	53	57	-2	-7	-13	-3	A01 - Project 025. Measurement undertaken at Berkeley Court. NCW involved a number of activities outlined within OOWHA-028 along with general construction activities, including use of hand tools and movement of vehicles and plant within the rail corridor. Site-related noises contributed to approximately 10% of the overall measured LAeq. Extraneous sources dominated the measurement and included Chatswood dive site works, distant traffic and aeroplane movement, nearby wildlife and wind-blown vegetation.
Project 026	21-Jul-19	17:45	00:15:00	73	46	53	61	56	48	100	53	-	-	-	72	NCA01	Day	42	47	53	57	11	6	0	15	A06 - Project 026. Measurement undertaken at Gordon Avenue. NCW involved a number of activities outlined within OOWHA-028 along with general construction activities, including use of hand tools and movement of vehicles and plant within the rail corridor. Site-related noises dominated the majority of measurement with approximately 60-100% contribution. Extraneous sources were observed to include loud distant traffic, local traffic, wind blown vegetation, birds and a plane.
Project 027	21-Jul-19	18:00	00:15:00	69	46	55	63	58	49	100	55	-	-	-	68	NCA01	Day	42	47	53	57	13	8	2	11	A03 - Project 027. Measurement undertaken at Raleigh Street. NCW involved a number of activities outlined within OOWHA-028 along with general construction activities, including use of hand tools and movement of vehicles and plant within the rail corridor. Site-related noises dominated the majority of measurement with approximately 100% contribution. Extraneous sources were observed to include distant traffic and nearby wildlife.
Project 028	21-Jul-19	18:15	00:15:00	74	46	54	62	57	49	100	59	-	5.0	-	73	NCA01	Day	42	47	53	57	17	12	6	16	A03 - Project 028. Measurement undertaken at Raleigh Street. NCW involved a number of activities outlined within OOWHA-028 along with general construction activities, including use of hand tools and movement of vehicles and plant within the rail corridor. Site-related noises dominated the majority of measurement with approximately 100% contribution. Extraneous sources were observed to include distant traffic, wind-blown vegetation and nearby wildlife.
Project 029	21-Jul-19	18:45	00:15:00	82	48	56	62	58	51	100	56	-	-	-	82	NCA01	Day	42	47	61	57	14	9	-5	25	A03 - Project 029. Measurement undertaken at Raleigh Street. NCW involved a number of activities outlined within OOWHA-028 along with general construction activities, including use of hand tools and movement of vehicles and plant within the rail corridor. Site-related noises dominated the majority of measurement with approximately 100% contribution. Extraneous sources were observed to include distant traffic and aeroplane movements, wind-blown vegetation and nearby wildlife.
Project 030	21-Jul-19	19:00	00:15:00	85	49	58	68	60	51	100	58	-	-	-	84	NCA01	Day	42	47	61	57	16	11	-3	27	A02 - Project 030. Measurement undertaken at Drake Street. NCW involved a number of activities outlined within OOWHA-028 along with general construction activities, including use of hand tools and movement of vehicles and plant within the rail corridor. Site-related noises dominated the majority of measurement with approximately 100% contribution. Extraneous sources were also observed to include distant traffic and nearby wildlife.
Project 031	21-Jul-19	19:16	00:15:00	71	48	54	64	57	49	100	59	-	5.0	-	69	NCA01	Day	42	47	61	57	17	12	-2	12	A02 - Project 031. Measurement undertaken at Drake Street. NCW involved a number of activities outlined within OOWHA-028 along with general construction activities, including use of hand tools and movement of vehicles and plant within the rail corridor. Site-related noises dominated the majority of measurement with approximately 100% contribution. Extraneous sources were also observed to include distant traffic and nearby wildlife.
Project 032	21-Jul-19	19:32	00:15:00	81	49	58	69	59	50	100	58	-	-	-	80	NCA01	Day	42	47	61	57	16	11	-4	23	A02 - Project 032. Measurement undertaken at Drake Street. NCW involved a number of activities outlined within OOWHA-028 along with general construction activities, including use of hand tools and movement of vehicles and plant within the rail corridor. Site-related noises dominated the majority of measurement with approximately 100% contribution. Extraneous sources were also observed to include distant traffic and aeroplane movements, and nearby wildlife.
Project 033	21-Jul-19	20:00	00:15:00	63	43	50	58	53	46	100	50	-	-	-	62	NCA01	Day	42	47	52	57	8	3	-2	5	A02 - Project 033. Measurement undertaken at Drake Street. NCW involved a number of activities outlined within OOWHA-028 along with general construction activities, including use of hand tools and movement of vehicles and plant within the rail corridor. Site-related noises dominated the majority of measurement with approximately 100% contribution. Extraneous sources were also observed to include distant traffic, nearby people and nearby wildlife.
Project 034	21-Jul-19	20:15	00:15:00	65	44	52	58	54	48	100	52	-	-	-	65	NCA01	Day	42	47	52	57	10	5	0	8	A03 - Project 034. Measurement undertaken at Raleigh Street. NCW involved a number of activities outlined within OOWHA-028 along with general construction activities, including use of hand tools and movement of vehicles and plant within the rail corridor. Site-related noises dominated the majority of measurement with approximately 100% contribution. Extraneous sources were observed to include distant traffic and aeroplane movements, and nearby wildlife.
Project 035	21-Jul-19	20:45	00:15:00	71	51	55	62	58	53	100	60	-	5.0	-	71	NCA01	Day	42	47	61	57	18	13	-1	14	A03 - Project 035. Measurement undertaken at Raleigh Street. NCW involved a number of activities outlined within OOWHA-028 along with general construction activities, including use of hand tools and movement of vehicles and plant within the rail corridor. Site-related noises dominated the majority of measurement with approximately 100% contribution. Extraneous sources were observed to include distant traffic and aeroplane movements, and nearby wildlife.

Weather 20-21 July 2019: Generally fine weather, low cloud coverage with calm winds. Temperature ranged between 9-21 degrees Celsius over the monitoring periods.
Note: all predicted noise levels were reproduced from the LDR OOHWA Form for this track possession.
Note: Low frequency, tonality and impulsive noise tests were conducted in accordance with the INP. The measured Leq data was applied in all cases. Modifying factor (penalty) values were applied as applicable to the low frequency, tonal or impulsive components detectable or attributable to the sites noise emission. The site noise contribution reported here is inclusive of all modifying factors (if applicable).


Measured Noise Levels
NCW - P7 - Saturday 20 July 2019
Excluded (Wind/Rain)
Excluded (Manual)
NML - Day (Standard Construction Hours)
NML - Day (Non-Standard Hours)
NML - Evening
NML - Night
Estimated Site Contribution @ 2 Berkeley Ct
Estimated Site Contribution @ 13 Brand St
Estimated Site Contribution @ 14 Raleigh St
Noise Level, dB(A)
90
80
70
60
50
40
30
20
00:00
02:00
04:00
06:00
08:00
10:00
12:00
14:00
16:00
18:00
20:00
22:00
00:00
Time (24 Hours)


Measured Noise Levels
NCW - P7 - Sunday 21 July 2019
Excluded (Wind/Rain)
Excluded (Manual)
NML - Day (Standard Construction Hours)
NML - Day (Non-Standard Hours)
NML - Evening
NML - Night
Estimated Site Contribution @ 2 Berkeley Ct
Estimated Site Contribution @ 13 Brand St
Estimated Site Contribution @ 14 Raleigh St
Noise Level, dB(A)
90
80
70
60
50
40
30
20
00:00
02:00
04:00
06:00
08:00
10:00
12:00
14:00
16:00
18:00
20:00
22:00
00:00
Time (24 Hours)

Appendix F – Monitoring Report (RP35b)

Vibration Monitoring – OOHW P7: WE03 - 20 to 21 July 2019

Figure A1.0 – OOHW WE03 – Unattended Vibration Monitoring Locations

– NCW P7 (Saturday, 20 July to Sunday, 21 July 2019)

Quick report

NCW WE03

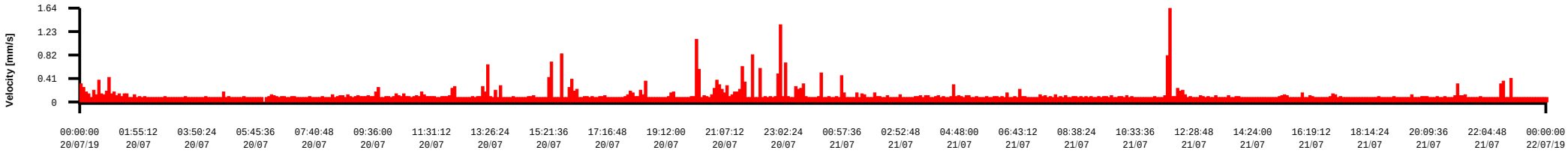
Start	20/07/2019
End	22/07/2019
Monitoring Location	UVM01

Monitoring Results

PPV max	3.70 mm/s
PPV max (99.9 %)	1.35 mm/s
PPV max (99.8 %)	1.00 mm/s
PPV max (99.5 %)	0.60 mm/s
PPV max (99.0 %)	0.43 mm/s

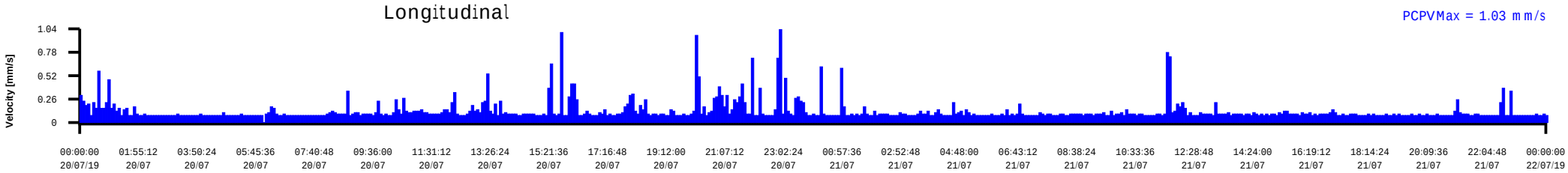
Vertical

PCPVMax = 1.64 mm/s



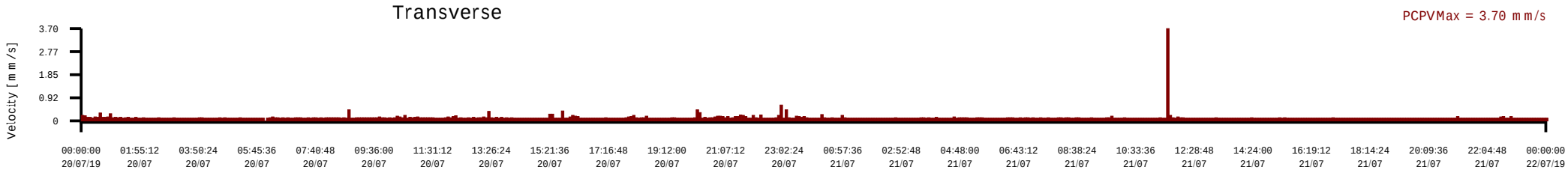
Longitudinal

PCPVMax = 1.03 mm/s



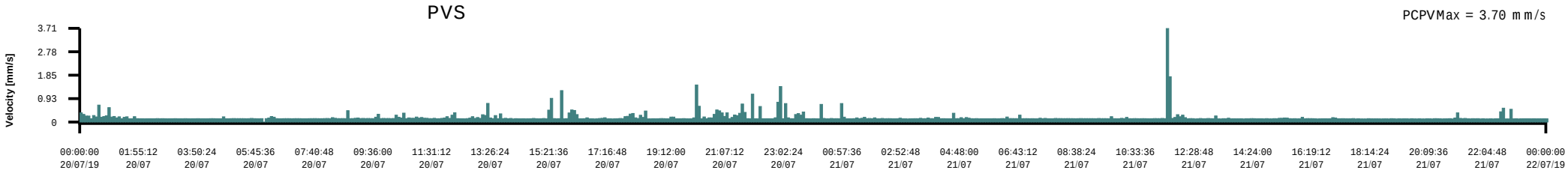
Transverse

PCPVMax = 3.70 mm/s



PVS

PCPVMax = 3.70 mm/s



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Quick report

NCW WE03

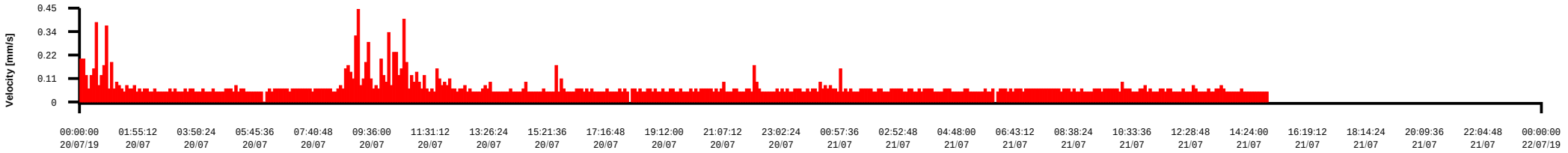
Start	20/07/2019
End	22/07/2019
Monitoring Location	UVM02

Monitoring Results

PPV max	0.44 mm/s
PPV max (99.9 %)	0.40 mm/s
PPV max (99.8 %)	0.33 mm/s
PPV max (99.5 %)	0.24 mm/s
PPV max (99.0 %)	0.19 mm/s

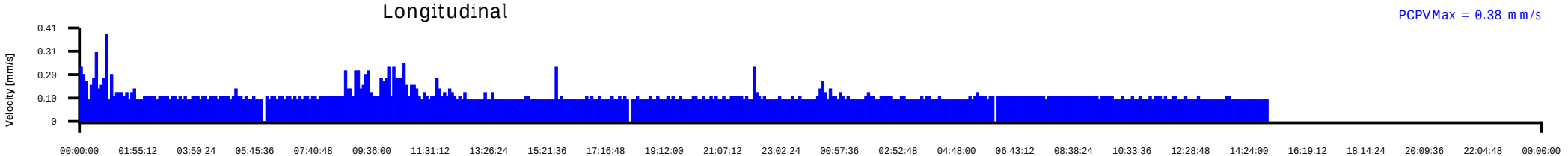
Vertical

PCPVMax = 0.44 mm/s



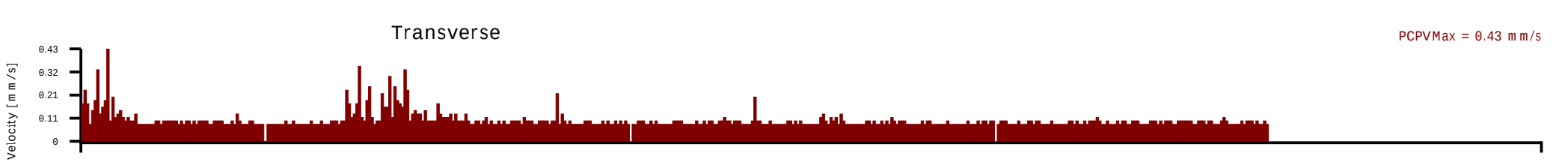
Longitudinal

PCPVMax = 0.38 mm/s



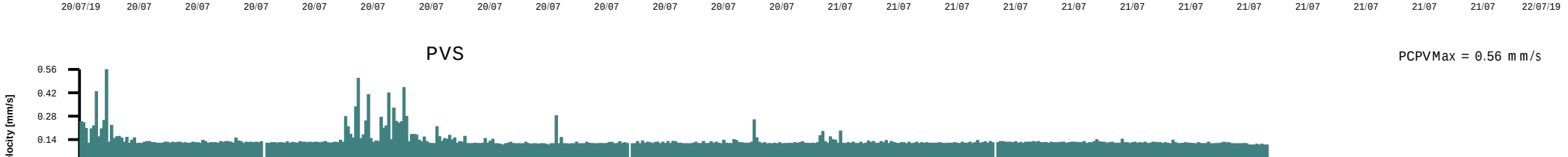
Transverse

PCPVMax = 0.43 mm/s



PVS

PCPVMax = 0.56 mm/s



Printed : 24/07/2019 13:01:31

Event Report

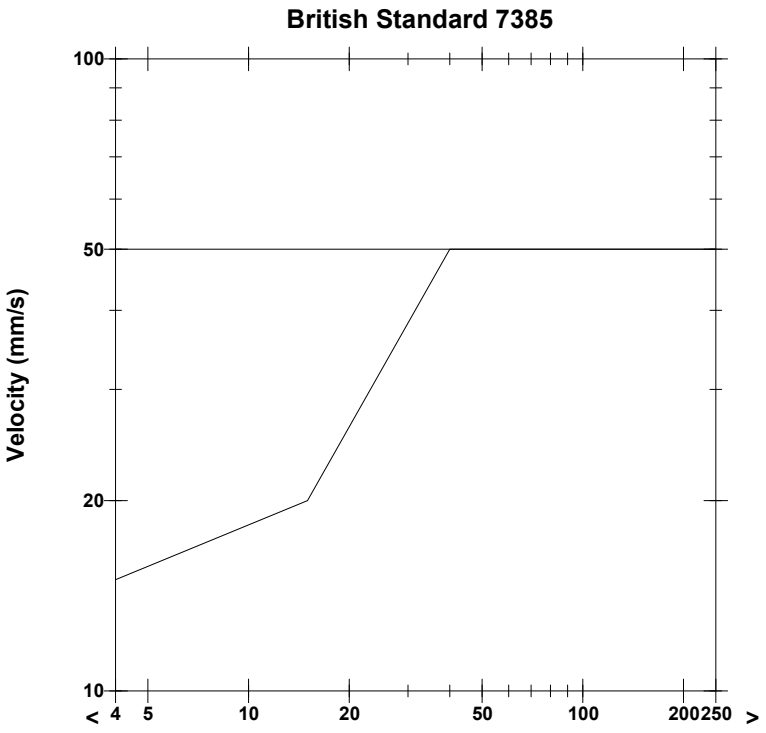
Histogram Start Time	14:23:58 July 18, 2019
Histogram Finish Time	12:47:39 July 23, 2019
Number of Intervals	7103.68 at 1 minute
Range	Geo:254.0 mm/s
Sample Rate	1024sps
Operator/Setup:	Operator/NCW.MMB

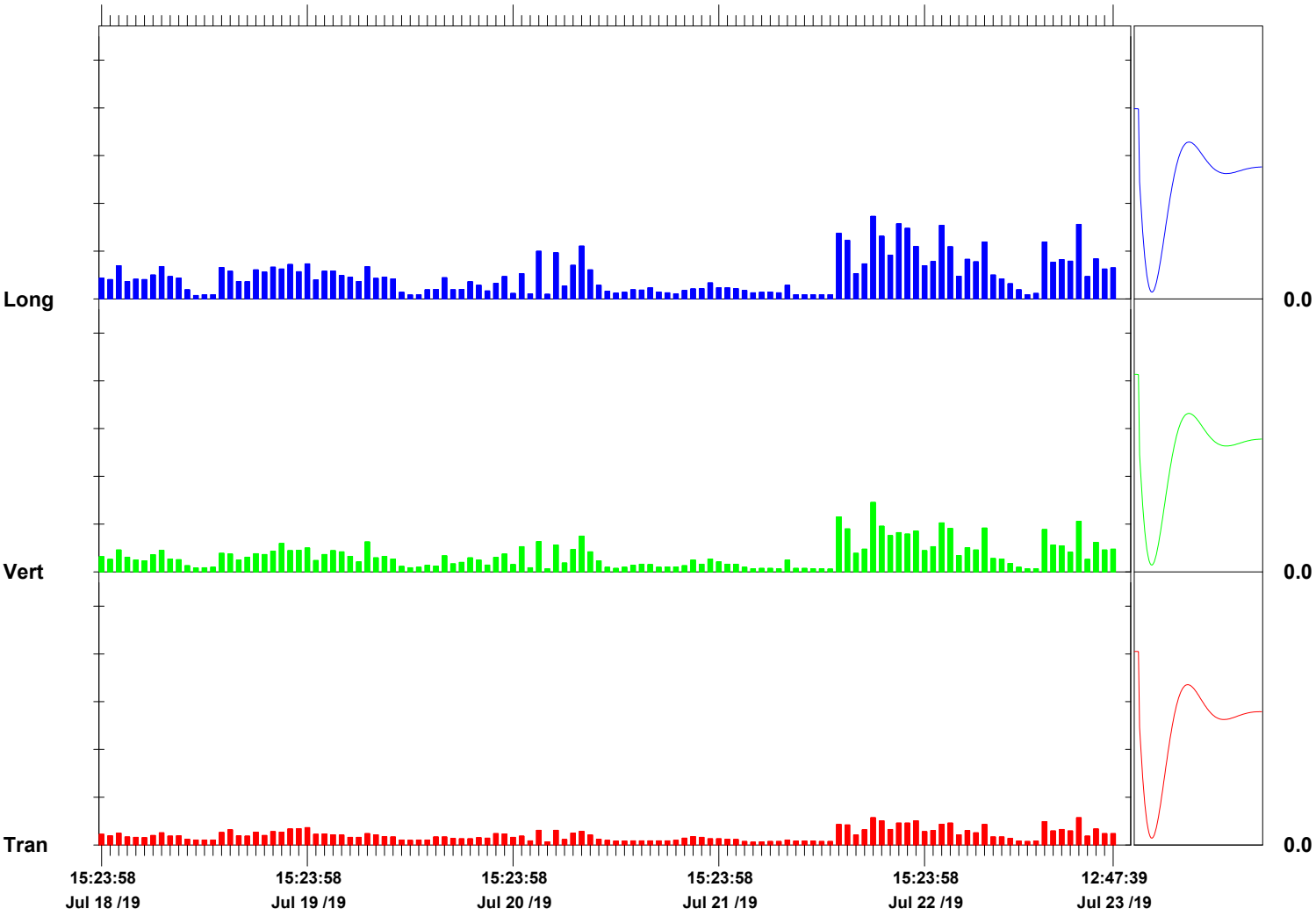
Serial Number	UM14423 V 10-89 Micromate ISEE
Battery Level	3.8 Volts
Unit Calibration	December 7, 2018 by Instantel
File Name	UM14423_20190718142358.IDFH

Notes

	Tran	Vert	Long	
PPV	0.567	1.450	1.726	mm/s
ZC Freq	51	47	47	Hz
Date	Jul 22 /19	Jul 22 /19	Jul 22 /19	
Time	08:35:58	08:35:58	08:35:58	
Sensor Check	Passed	Passed	Passed	
Frequency	7.5	7.3	7.3	Hz
Overswing Ratio	4.2	4.5	4.8	

Peak Vector Sum 2.194 mm/s on July 22, 2019 at 08:35:58





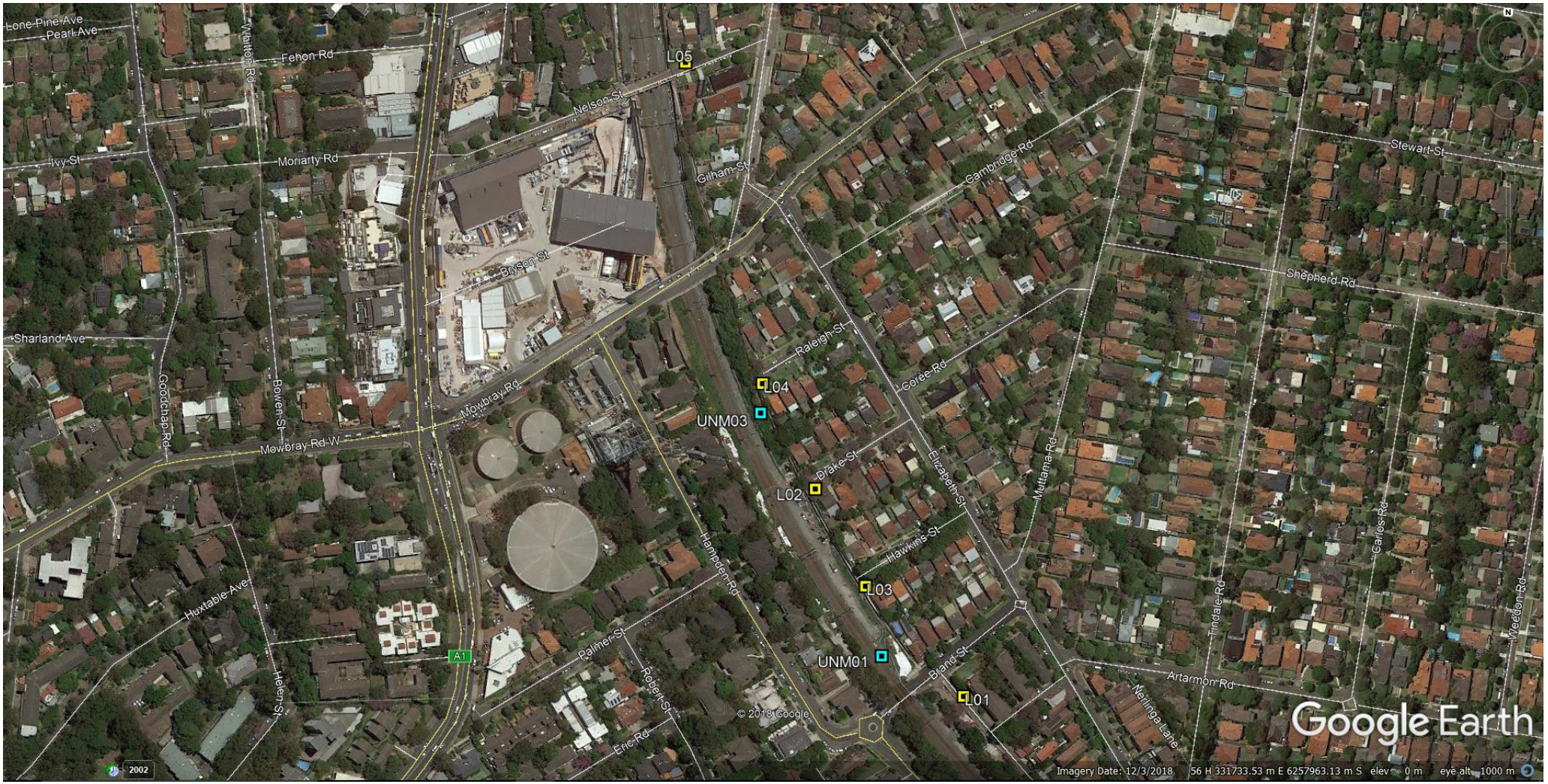
Time Scale: 1 hour /div **Amplitude Scale:** Geo: 1.000 mm/s/div Sensor Check

Appendix G – Monitoring Report (RP36)

Noise Monitoring – OOHW P7: MW04 - 29 July to 2 August 2019

Figure A1.0 – OOHW MW04 – Attended and Unattended Noise Monitoring Locations

– NCW P7 (Monday, 29 July to Friday, 2 August 2019)

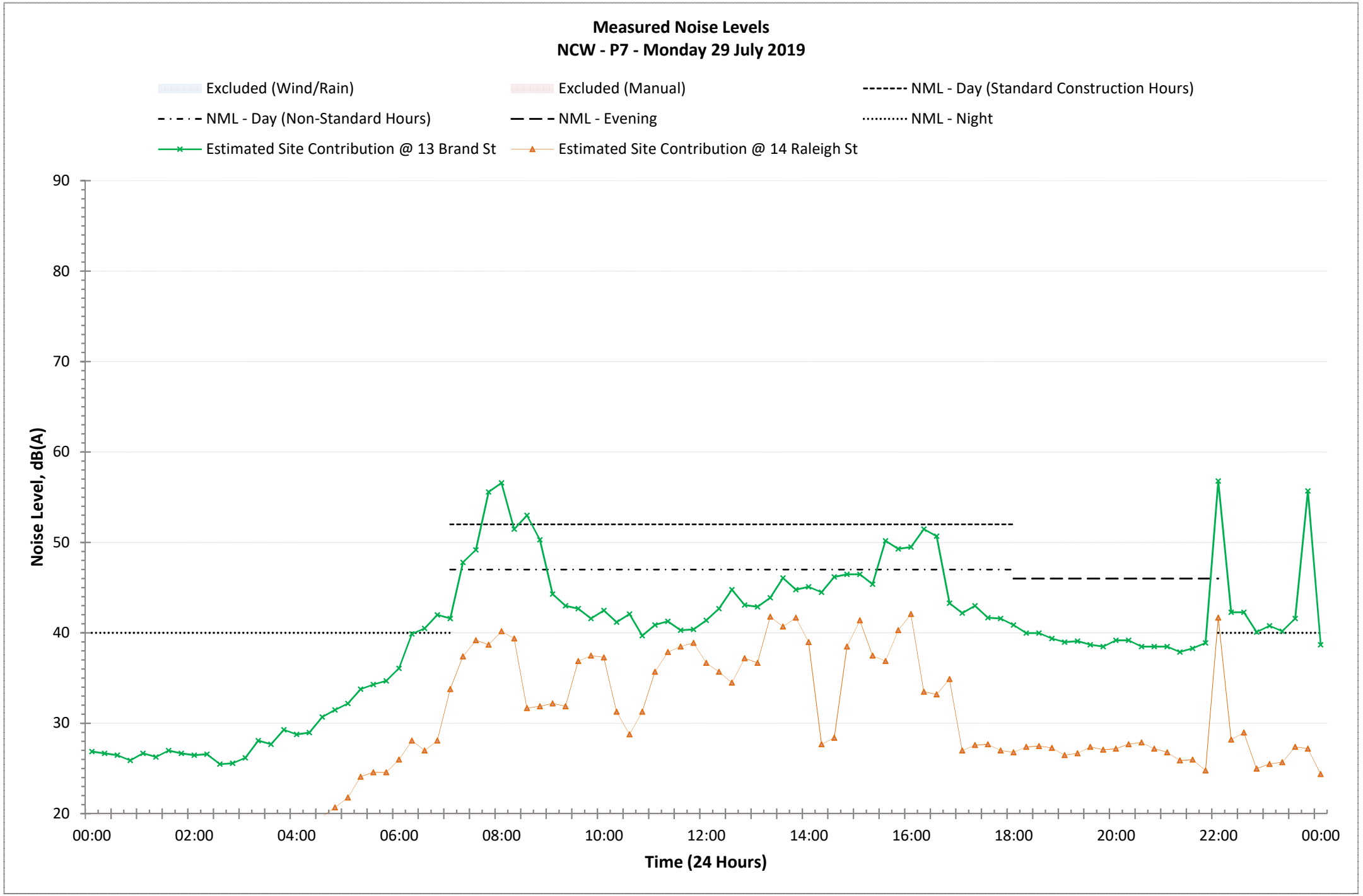


File Name	Date	Start Time	Elapsed Time	LAFmax	LAFmin	LAeq	LAF1.0	LAF10.0	LAF90.0	Percentage Site Contribution (%)	Measured Site Noise Level - LAeq, 15minute	Impulsive Modifying Factor?	Tonal Modifying Factor?	LF Modifying Factor?	Measured Site Noise Level - LAmax	NCA	Location	Period	RBL - LA90, Period	NML - LAeq, 15 minute	Predicted Site Noise Level - LAeq, 15minute	Sleep Disturbance Screening Level - LAmax	Compliance to RBL - LA90, Period	Compliance to NML - LAeq, 15minute	Compliance to Predicted Site Noise Level - LAeq, 15minute	Compliance to Sleep Disturbance Screening Level - LAmax	Description
Project 001	29-Jul-19	22:45	00:15:00	82	38	55	62	56	49	50	52	0.0	0.0	0.0	79	NCA01	L01	Night	47	52	57	62	5	0	-5	17	L01 - Project 001-002. Measurements undertaken outside 10 Brand Street apartments along Valetta Lane. NCW involved a number of activities outlined within OOHWA-029 along with general construction activities, including use of hand tools and movement of vehicles and plant within the rail corridor. Site-related noises contributed to approximately 50% of the overall Leq. Extraneous sources were observed to include distant and nearby traffic, and light rain.
Project 002	29-Jul-19	23:00	00:15:00	71	38	51	60	55	41	50	48	0.0	0.0	0.0	70	NCA01		Night	47	52	57	62	1	-4	-9	8	
Project 003	29-Jul-19	23:30	00:15:00	79	36	59	70	64	39	50	56	0.0	0.0	0.0	70	NCA01	L02	Night	47	52	52	62	9	4	4	8	L02 - Project 003-004. Measurements undertaken at 12 Drake Street. NCW involved a number of activities outlined within OOHWA-029 along with general construction activities, including use of hand tools and movement of vehicles and plant within the rail corridor. Site-related noises contributed to approximately 50% of the measured Leq over the measurements. Extraneous sources were observed to include light rain, and distant and local traffic.
Project 004	29-Jul-19	23:45	00:15:00	62	35	44	54	48	37	50	41	0.0	0.0	0.0	55	NCA01		Night	47	52	52	62	-6	-11	-11	-7	
Project 005	30-Jul-19	00:15	00:15:00	76	44	54	70	49	45	12	45	0.0	0.0	0.0	57	NCA01	L03	Night	47	52	48	62	-2	-7	-3	-5	L03 - Project 005. Measurement undertaken at 14 Hawkins Street. NCW involved a number of activities outlined within OOHWA-029 along with general construction activities, including use of hand tools and movement of vehicles and plant within the rail corridor. Site-related noises were barely audible and contributed to approximately 12% of the overall Leq. Extraneous sources dominated the measurement and included distant and local traffic, passing aeroplanes and nearby wildlife.
Project 006	30-Jul-19	00:45	00:15:00	68	37	42	48	44	39	30	37	0.0	0.0	0.0	45	NCA01	L04	Night	47	52	47	62	-10	-15	-10	-17	L04 - Project 006-007. Measurements undertaken at 14 Raleigh Street. NCW involved a number of activities outlined within OOHWA-029 along with general construction activities, including use of hand tools and movement of vehicles and plant within the rail corridor. Site-related noises contributed approximately 30-50% of the overall Leq. Extraneous sources generally dominated the measurements and included distant and local traffic.
Project 007	30-Jul-19	01:00	00:15:00	69	38	42	47	44	40	50	32	0.0	0.0	0.0	50	NCA01		Night	35	40	47	50	-3	-8	-15	0	
Project 008	30-Jul-19	02:00	00:15:00	60	50	52	54	53	51	10	42	0.0	0.0	0.0	52	NCA01	L05	Night	35	40	55	50	7	2	-13	2	L05 - Project 008. Measurement undertaken at the western end of Berkeley Court. NCW involved a number of activities outlined within OOHWA-029 along with general construction activities, including use of hand tools and movement of vehicles and plant within the rail corridor. Site-related noises were barely audible and contributed to approximately 10% of the overall Leq. Extraneous sources dominated the measurement and included distant and local traffic and Chatswood Dive Site works.
Project 009	30-Jul-19	02:30	00:15:00	75	36	58	71	61	38	100	58	0.0	0.0	0.0	72	NCA01	L02	Night	35	40	52	50	23	18	6	22	L02 - Project 009-012. Measurements undertaken at Drake Street. NCW involved a number of activities outlined within OOHWA-029 along with general construction activities, including use of hand tools and movement of vehicles and plant within the rail corridor. Site-related noises contributed approximately 10-100% of the overall Leq over the measurements. Extraneous sources were also observed to include light rain, distant and local traffic, and nearby wildlife.
Project 010	30-Jul-19	02:45	00:15:00	69	35	39	44	40	36	10	29	0.0	0.0	0.0	40	NCA01		Night	35	40	52	50	-6	-11	-23	-10	
Project 011	30-Jul-19	22:30	00:15:00	73	39	51	62	55	41	50	48	0.0	0.0	0.0	68	NCA01		Night	35	40	52	50	13	8	-4	18	
Project 012	30-Jul-19	22:45	00:15:00	73	37	60	68	65	40	30	55	0.0	0.0	0.0	65	NCA01		Night	35	40	52	50	20	15	3	15	
Project 013	31-Jul-19	00:30	00:15:00	67	40	55	64	60	43	10	45	0.0	0.0	0.0	48	NCA01	L04	Night	35	40	47	50	10	5	-2	-2	L04 - Project 013-016. Measurements undertaken at 14 Raleigh Street. NCW involved a number of activities outlined within OOHWA-029 along with general construction activities, including use of hand tools and movement of vehicles and plant within the rail corridor. Site-related noises contributed approximately 10-50% of the overall Leq over the measurements. Extraneous sources were generally dominant and included distant and local traffic, light rain and heavy rain.
Project 014	31-Jul-19	00:45	00:15:00	69	42	51	59	54	44	20	44	0.0	0.0	0.0	50	NCA01		Night	35	40	47	50	9	4	-3	0	
Project 015	31-Jul-19	01:45	00:15:00	64	38	43	50	45	40	50	40	0.0	0.0	0.0	50	NCA01		Night	35	40	47	50	5	0	-7	0	
Project 016	31-Jul-19	02:00	00:15:00	62	38	43	52	46	39	50	40	0.0	0.0	0.0	48	NCA01		Night	35	40	47	50	5	0	-7	-2	
Project 017	31-Jul-19	02:30	00:15:00	68	35	46	61	42	36	50	43	0.0	0.0	0.0	60	NCA01	L02	Night	35	40	52	50	8	3	-9	10	L02 - Project 017-018. Measurements undertaken at Drake Street. NCW involved a number of activities outlined within OOHWA-029 along with general construction activities, including use of hand tools and movement of vehicles and plant within the rail corridor. Site-related noises contributed approximately 50% of the overall Leq over the measurements. Extraneous sources were also observed to include light rain, distant and local traffic, and nearby wildlife.
Project 018	31-Jul-19	02:45	00:14:47	78	34	53	64	56	36	50	49	0.0	0.0	0.0	65	NCA01		Night	35	40	52	50	14	9	-3	15	

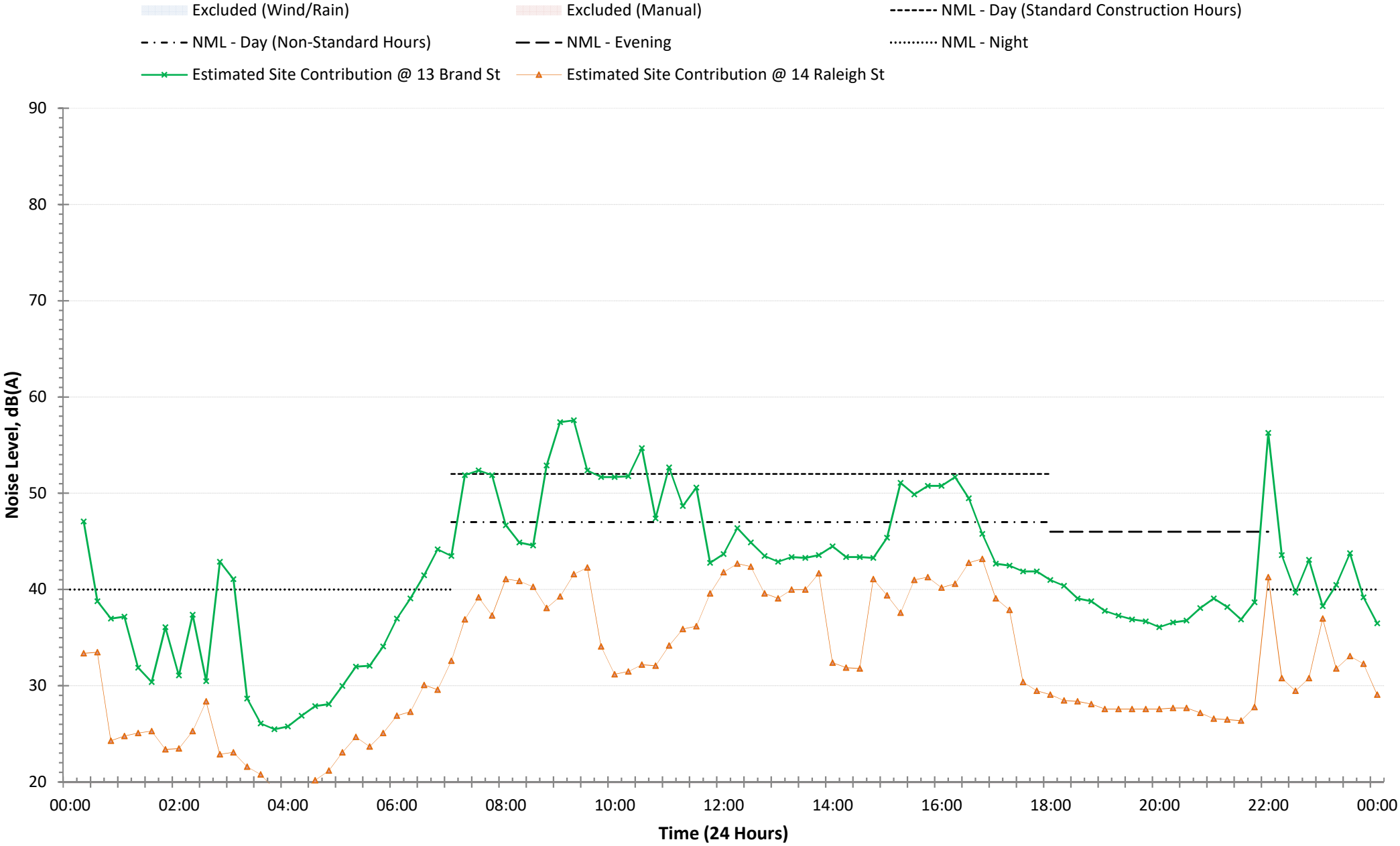
File Name	Date	Start Time	Elapsed Time	LAFmax	LAFmin	LAeq	LAF1.0	LAF10.0	LAF90.0	Percentage Site Contribution (%)	Measured Site Noise Level - LAeq, 15minute	Impulsive Modifying Factor?	Tonal Modifying Factor?	LF Modifying Factor?	Measured Site Noise Level - LAmax	NCA	Location	Period	RBL - LA90, Period	NML - LAeq, 15 minute	Predicted Site Noise Level - LAeq, 15minute	Sleep Disturbance Screening Level - LAmax	Compliance to RBL - LA90, Period	Compliance to NML - LAeq, 15minute	Compliance to Predicted Site Noise Level - LAeq, 15minute	Compliance to Sleep Disturbance Screening Level - LAmax	Description
Project 019	31-Jul-19	22:15	00:15:00	78	55	65	74	67	57	100	65	0.0	0.0	0.0	75	NCA01		Night	35	40	57	50	30	25	8	25	
Project 020	31-Jul-19	22:30	00:15:00	77	54	65	75	69	57	100	65	0.0	0.0	0.0	75	NCA01	L01	Night	35	40	57	50	30	25	8	25	L01 - Project 019-021. Measurements undertaken outside 10 Brand Street apartments along Valetta Lane. NCW involved a number of activities outlined within OOHWA-029 along with general construction activities, including use of hand tools and movement of vehicles and plant within the rail corridor. Site-related noises dominated the measurements at 100% contribution. Extraneous sources were observed to include distant and nearby traffic.
Project 021	31-Jul-19	22:45	00:15:00	76	53	63	72	65	55	100	63	0.0	0.0	0.0	73	NCA01		Night	35	40	57	50	28	23	6	23	
Project 022	31-Jul-19	23:15	00:15:00	73	37	55	69	55	40	100	55	0.0	0.0	0.0	72	NCA01		Night	35	40	52	50	20	15	3	22	
Project 023	31-Jul-19	23:30	00:15:00	66	38	48	61	48	39	50	45	0.0	0.0	0.0	65	NCA01	L02	Night	35	40	52	50	10	5	-7	15	L02 - Project 022-023. Measurements undertaken at Drake Street. NCW involved a number of activities outlined within OOHWA-029 along with general construction activities, including use of hand tools and movement of vehicles and plant within the rail corridor. Site-related noises contributed approximately 50-100% of the overall Leq over the measurements. Extraneous sources were also observed to include distant traffic and road works on Mowbray Road.
Project 024	01-Aug-19	00:15	00:15:00	59	38	44	49	46	40	10	34	0.0	0.0	0.0	45	NCA01		Night	35	40	47	50	-1	-6	-13	-5	
Project 025	01-Aug-19	00:30	00:15:00	67	40	45	49	47	42	10	35	0.0	0.0	0.0	45	NCA01	L04	Night	35	40	47	50	0	-5	-12	-5	L04 - Project 024-025. Measurements undertaken at 14 Raleigh Street. NCW involved a number of activities outlined within OOHWA-029 along with general construction activities, including use of hand tools and movement of vehicles and plant within the rail corridor. Site-related noises were generally inaudible and contributed to approximately 10% of the overall Leq over the measurements. Extraneous sources were generally dominant and included distant and loud traffic, and nearby road works on Mowbray Road.
Project 026	01-Aug-19	01:00	00:15:00	65	45	51	54	53	47	50	48	0.0	0.0	0.0	52	NCA01		Night	35	40	55	50	13	8	-7	2	
Project 027	01-Aug-19	01:15	00:15:00	69	45	49	57	50	46	50	46	0.0	0.0	0.0	59	NCA01		Night	35	40	55	50	11	6	-9	9	
Project 028	01-Aug-19	01:45	00:15:00	70	50	53	57	54	52	80	52	0.0	0.0	0.0	55	NCA01	L05	Night	35	40	55	50	17	12	-3	5	L05 - Project 026-029. Measurements undertaken at the western end of Berkeley Court. NCW involved a number of activities outlined within OOHWA-029 along with general construction activities, including use of hand tools and movement of vehicles and plant within the rail corridor. Site-related noises contributed to approximately 50% of the overall Leq. Extraneous sources were observed to include distant and local traffic, and Chatswood Dive Site works.
Project 029	01-Aug-19	02:00	00:15:00	70	50	53	60	54	52	50	50	0.0	0.0	0.0	55	NCA01		Night	35	40	55	50	15	10	-5	5	
Project 030	01-Aug-19	02:30	00:15:00	65	38	45	52	47	41	100	45	0.0	0.0	0.0	57	NCA01	L04	Night	35	40	47	50	10	5	-2	7	L04 - Project 030. Measurement undertaken at 14 Raleigh Street. NCW involved a number of activities outlined within OOHWA-029 along with general construction activities, including use of hand tools and movement of vehicles and plant within the rail corridor. Site-related noises dominated the measurement at 100% contribution. Extraneous sources were observed to include distant traffic, light rain and nearby wildlife.
Project 031	01-Aug-19	22:00	00:15:00	76	52	66	74	69	57	100	66	0.0	0.0	0.0	75	NCA01		Night	35	40	57	50	31	26	9	25	
Project 032	01-Aug-19	22:15	00:15:00	87	55	68	78	73	57	100	68	0.0	0.0	0.0	78	NCA01	L01	Night	35	40	57	50	33	28	11	28	L01 - Project 031-032. Measurements undertaken outside 10 Brand Street apartments along Valetta Lane. NCW involved a number of activities outlined within OOHWA-029 along with general construction activities, including use of hand tools and movement of vehicles and plant within the rail corridor. Site-related noises dominated the measurements at 100% contribution. Extraneous sources were observed to include distant traffic and passing trains.
Project 033	01-Aug-19	22:45	00:15:00	85	46	62	73	60	50	100	62	0.0	0.0	0.0	85	NCA01		Night	35	40	55	50	27	22	7	35	
Project 034	01-Aug-19	23:00	00:15:00	81	47	64	77	68	50	100	64	0.0	0.0	0.0	80	NCA01		Night	35	40	55	50	29	24	9	30	
Project 035	01-Aug-19	23:15	00:15:00	76	49	57	67	59	51	100	57	0.0	0.0	0.0	65	NCA01	L02	Night	35	40	55	50	22	17	2	15	L02 - Project 033-037. Measurements undertaken at Drake Street. NCW involved a number of activities outlined within OOHWA-029 along with general construction activities, including use of hand tools and movement of vehicles and plant within the rail corridor. Site-related noises dominated the measurements at 100% contribution. Extraneous sources were also observed to include distant, passing trains and nearby Sydney Trains works.
Project 036	01-Aug-19	23:30	00:15:00	66	39	53	62	58	42	100	53	0.0	0.0	0.0	60	NCA01		Night	35	40	55	50	18	13	-2	10	
Project 037	01-Aug-19	23:45	00:15:00	78	42	60	72	63	44	100	60	0.0	0.0	0.0	75	NCA01		Night	35	40	55	50	25	20	5	25	

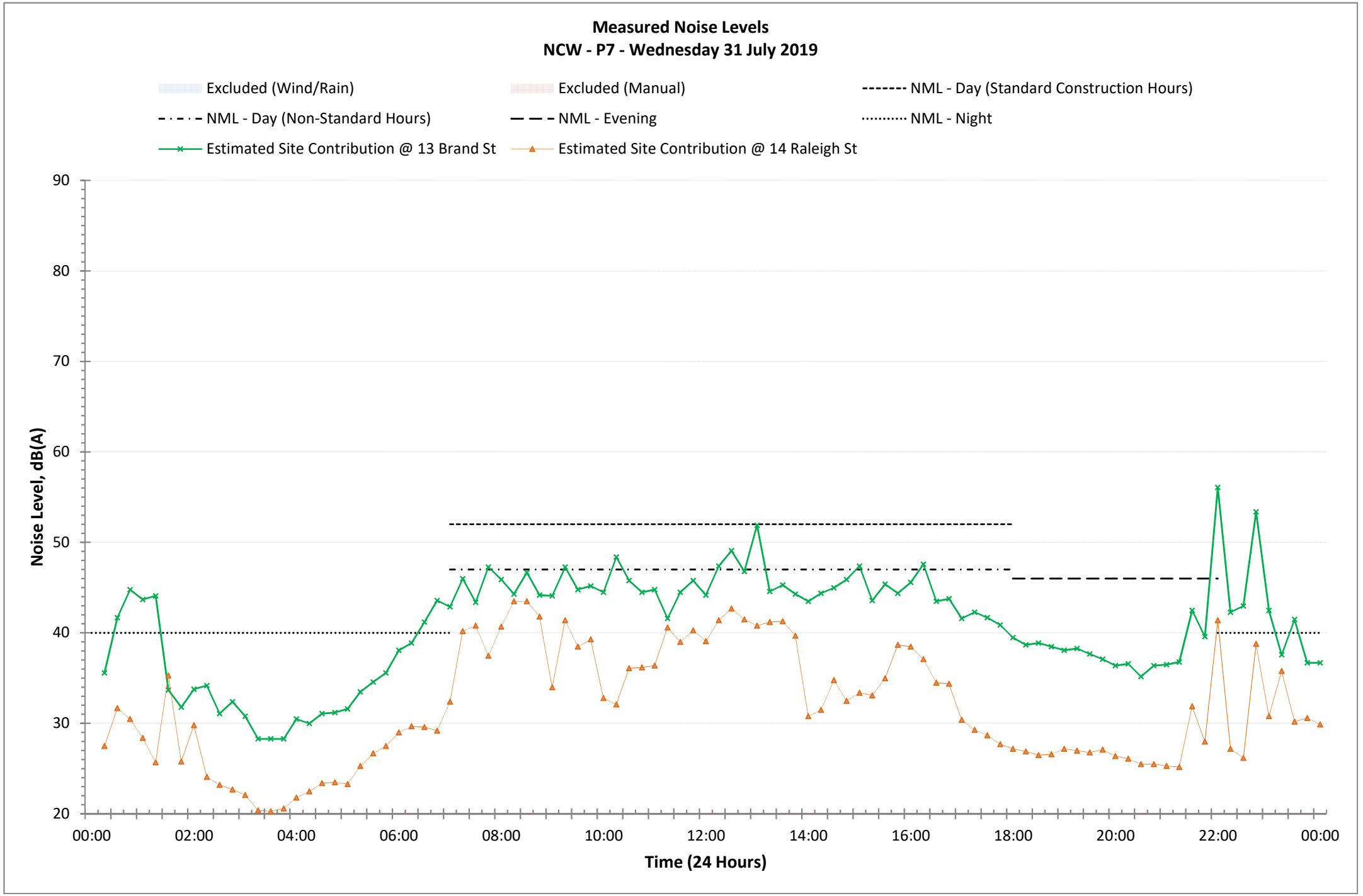
File Name	Date	Start Time	Elapsed Time	LAFmax	LAFmin	LAeq	LAF1.0	LAF10.0	LAF90.0	Percentage Site Contribution (%)	Measured Site Noise Level - LAeq, 15minute	Impulsive Modifying Factor?	Tonal Modifying Factor?	LF Modifying Factor?	Measured Site Noise Level - LAmax	NCA	Location	Period	RBL - LA90, Period	NML - LAeq, 15 minute	Predicted Site Noise Level - LAeq, 15minute	Sleep Disturbance Screening Level - LAmax	Compaison to RBL - LA90, Period	Compaison to NML - LAeq, 15minute	Compaison to Predicted Site Noise Level - LAeq, 15minute	Compaison to Sleep Disturbance Screening Level - LAmax	Description
Project 038	02-Aug-19	00:30	00:15:00	61	44	49	53	51	45	1	29	0.0	0.0	0.0	0	NCA01	L04	Night	35	40	47	50	-6	-11	-18	-50	L04 - Project 038-039. Measurements undertaken at 14 Raleigh Street. NCW involved a number of activities outlined within OOHWA-029 along with general construction activities, including use of hand tools and movement of vehicles and plant within the rail corridor. Site-related noises were inaudible throughout the measurements. Extraneous sources dominated the measurements and included distant, and nearby road works and wildlife.
Project 039	02-Aug-19	00:45	00:15:00	65	43	47	56	48	45	1	27	0.0	0.0	0.0	0	NCA01		Night	35	40	47	50	-8	-13	-20	-50	
Project 040	02-Aug-19	01:30	00:15:00	59	50	52	55	53	52	10	42	0.0	0.0	0.0	53	NCA01	L05	Night	35	40	55	50	7	2	-13	3	L05 - Project 040-042. Measurements undertaken at the western end of Berkeley Court. NCW involved a number of activities outlined within OOHWA-029 along with general construction activities, including use of hand tools and movement of vehicles and plant within the rail corridor. Site-related noises were generally inaudible and contributed to approximately 10% of the overall Leq. Extraneous sources were generally dominant and included nearby road works and Chatswood Dive Site works.
Project 041	02-Aug-19	01:45	00:15:00	60	50	52	55	53	51	10	42	0.0	0.0	0.0	55	NCA01		Night	35	40	55	50	7	2	-13	5	
Project 042	02-Aug-19	02:00	00:15:00	56	50	52	53	52	51	10	42	0.0	0.0	0.0	53	NCA01		Night	35	40	55	50	7	2	-13	3	
Project 043	02-Aug-19	02:30	00:15:00	67	41	44	51	45	42	50	41	0.0	0.0	0.0	58	NCA01	L02	Night	35	40	52	50	6	1	-11	8	L02 - Project 043-044. Measurements undertaken at Drake Street. NCW involved a number of activities outlined within OOHWA-029 along with general construction activities, including use of hand tools and movement of vehicles and plant within the rail corridor. Site-related noises contributed to approximately 50-100% of the overall Leq over the measurements. Extraneous sources were also observed to include nearby Sydney Trains works and wildlife.
Project 044	02-Aug-19	02:45	00:15:00	82	36	58	71	55	38	100	58	0.0	0.0	0.0	75	NCA01		Night	35	40	52	50	23	18	6	25	

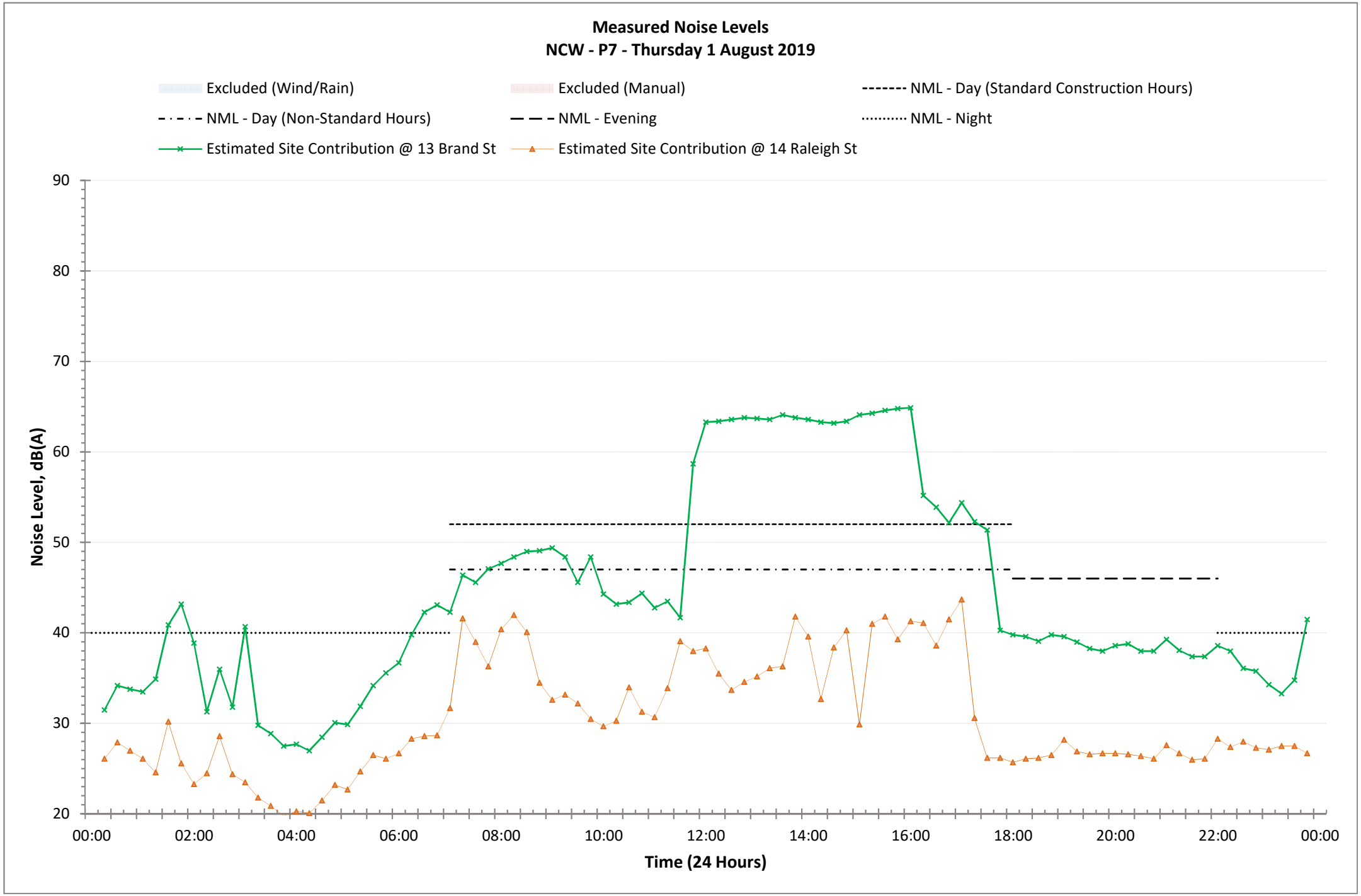
Weather 29 July - 02 August 2019: Generally overcast weather, some extended periods of rain, with calm winds. Temperatures ranged between 9 - 13 degrees Celsius over the monitoring period.
Note: all predicted noise levels were reproduced from the LOR OOHWA Form for this track possession.
Note: Low frequency, tonality and impulsive noise tests were conducted in accordance with the INP. The measured Leq data was applied in all cases. Modifying factor (penalty) values were applied as applicable to the low frequency, tonal or impulsive components detectable or attributable to the sites noise emission. The site noise contribution reported here is inclusive of all modifying factors (if applicable).

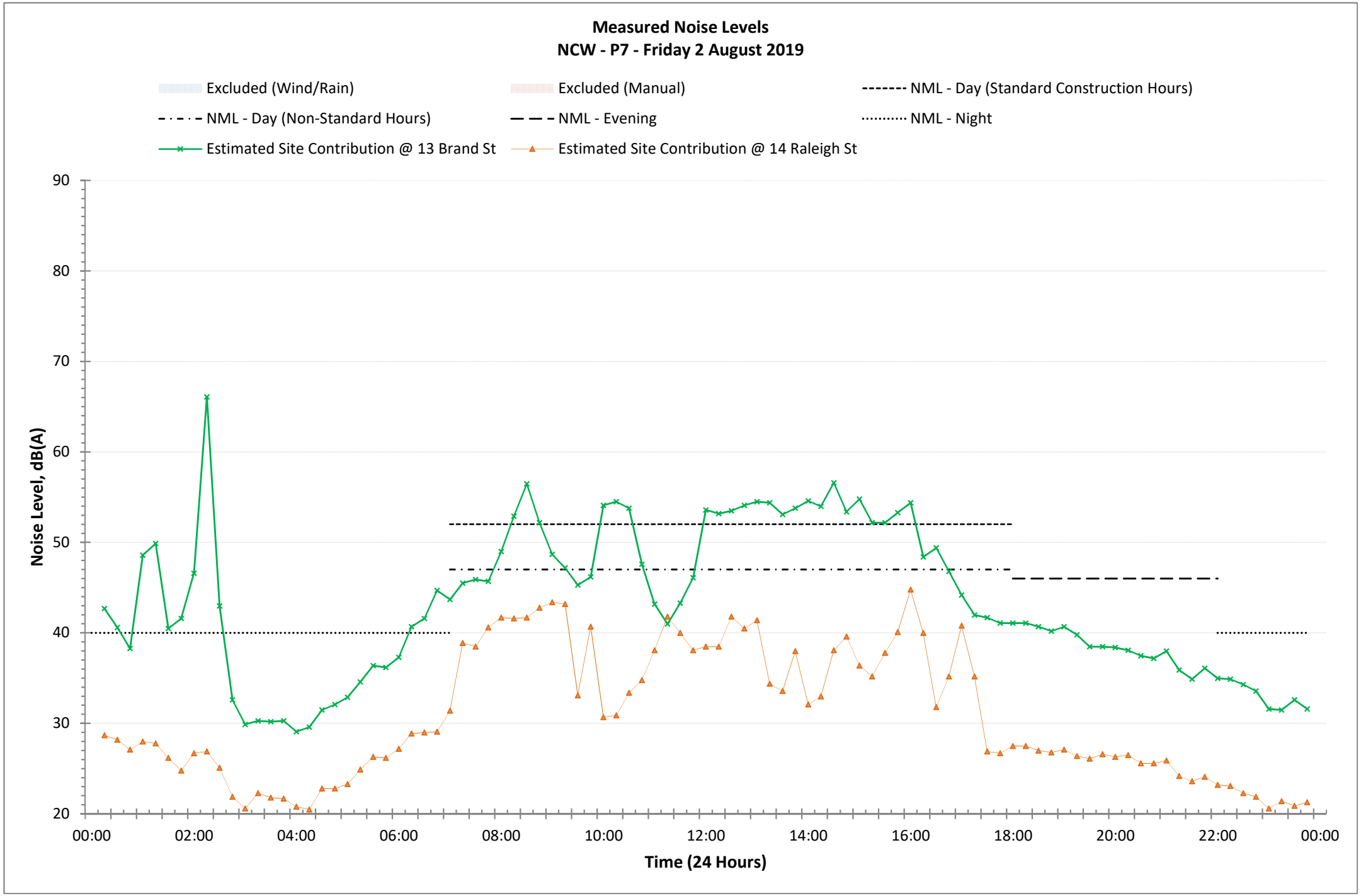

Measured Noise Levels
NCW - P7 - Monday 29 July 2019
Excluded (Wind/Rain)
Excluded (Manual)
NML - Day (Standard Construction Hours)
NML - Day (Non-Standard Hours)
NML - Evening
NML - Night
Estimated Site Contribution @ 13 Brand St
Estimated Site Contribution @ 14 Raleigh St
Noise Level, dB(A)
90
80
70
60
50
40
30
20
00:00
02:00
04:00
06:00
08:00
10:00
12:00
14:00
16:00
18:00
20:00
22:00
00:00
Time (24 Hours)

Measured Noise Levels
NCW - P7 - Tuesday 30 July 2019




Measured Noise Levels
NCW - P7 - Wednesday 31 July 2019
Excluded (Wind/Rain)
Excluded (Manual)
NML - Day (Standard Construction Hours)
NML - Day (Non-Standard Hours)
NML - Evening
NML - Night
Estimated Site Contribution @ 13 Brand St
Estimated Site Contribution @ 14 Raleigh St
Noise Level, dB(A)
90
80
70
60
50
40
30
20
00:00
02:00
04:00
06:00
08:00
10:00
12:00
14:00
16:00
18:00
20:00
22:00
00:00
Time (24 Hours)


Measured Noise Levels
NCW - P7 - Thursday 1 August 2019
Excluded (Wind/Rain)
Excluded (Manual)
NML - Day (Standard Construction Hours)
NML - Day (Non-Standard Hours)
NML - Evening
NML - Night
Estimated Site Contribution @ 13 Brand St
Estimated Site Contribution @ 14 Raleigh St
Noise Level, dB(A)
90
80
70
60
50
40
30
20
00:00
02:00
04:00
06:00
08:00
10:00
12:00
14:00
16:00
18:00
20:00
22:00
00:00
Time (24 Hours)

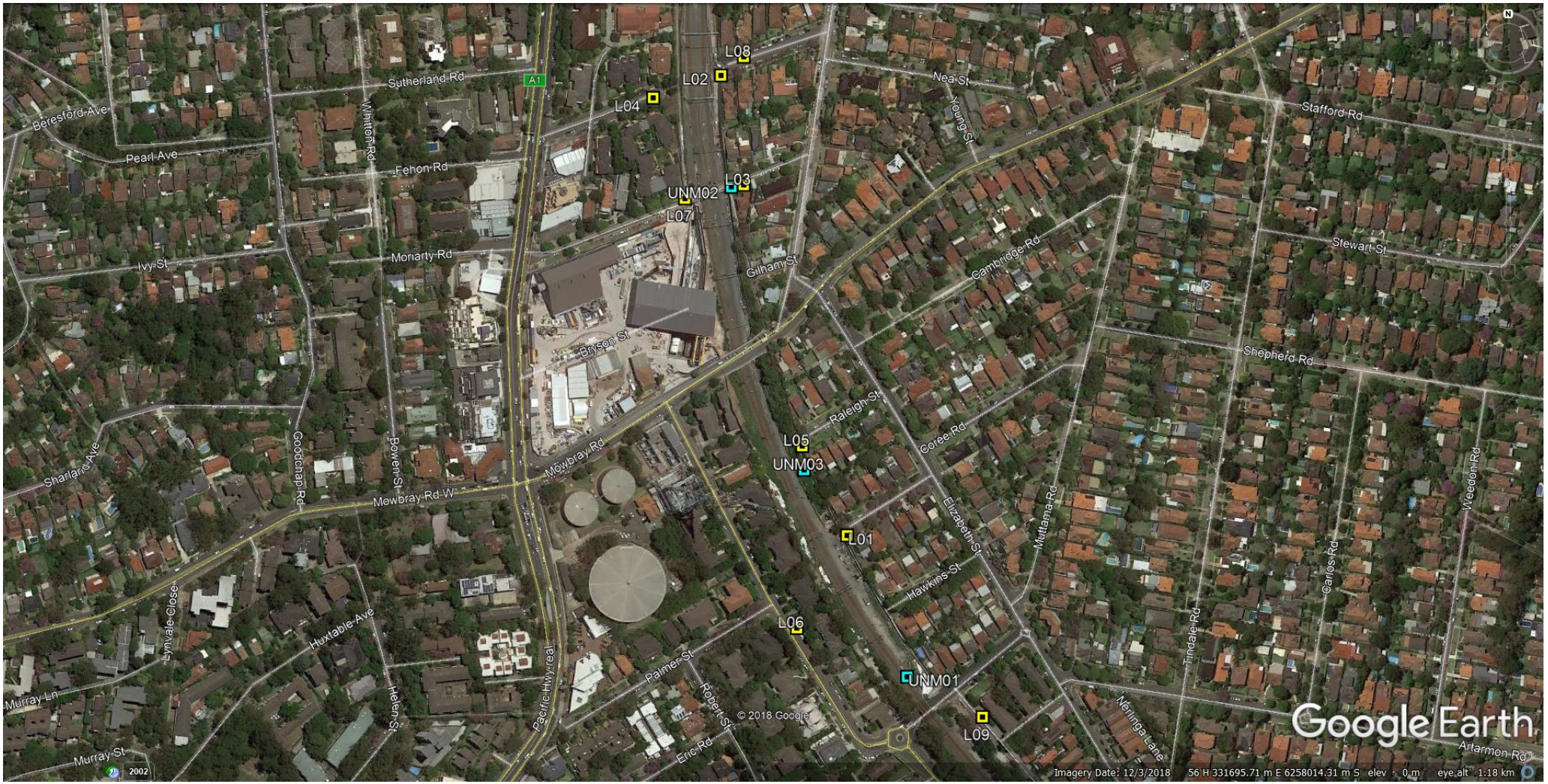

Measured Noise Levels
NCW - P7 - Friday 2 August 2019
Excluded (Wind/Rain)
Excluded (Manual)
NML - Day (Standard Construction Hours)
NML - Day (Non-Standard Hours)
NML - Evening
NML - Night
Estimated Site Contribution @ 13 Brand St
Estimated Site Contribution @ 14 Raleigh St
Noise Level, dB(A)
90
80
70
60
50
40
30
20
00:00
02:00
04:00
06:00
08:00
10:00
12:00
14:00
16:00
18:00
20:00
22:00
00:00
Time (24 Hours)

Appendix H – Monitoring Report (RP37a)

Noise Monitoring – OOHW P7: WE05 - 3 to 4 August 2019

Figure A1.0 – OOHW WE05 – Attended and Unattended Noise Monitoring Locations (Artarmon to Chatswood)

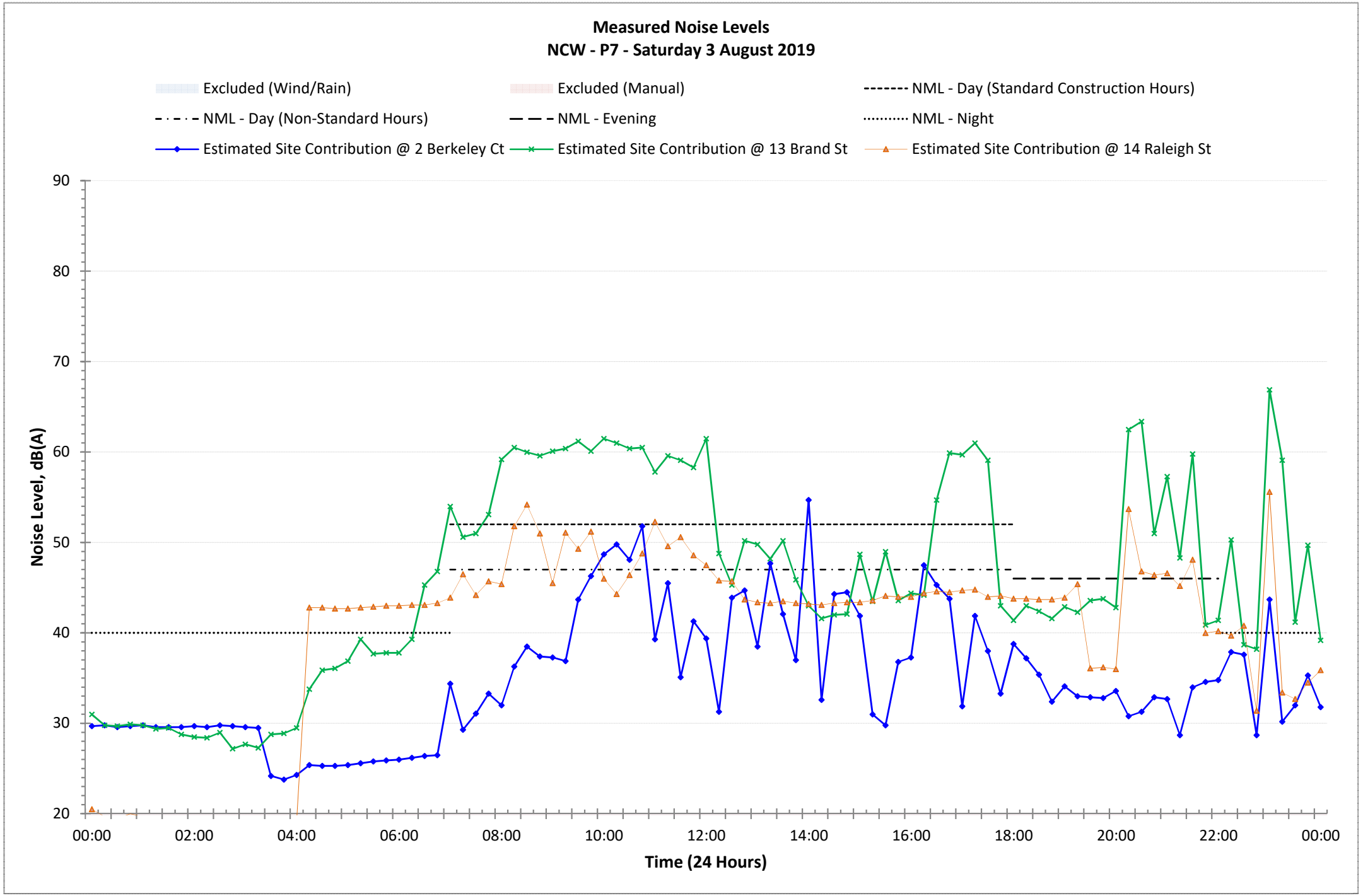
– NCW P7 (Saturday, 3 August and Sunday, 4 August 2019)

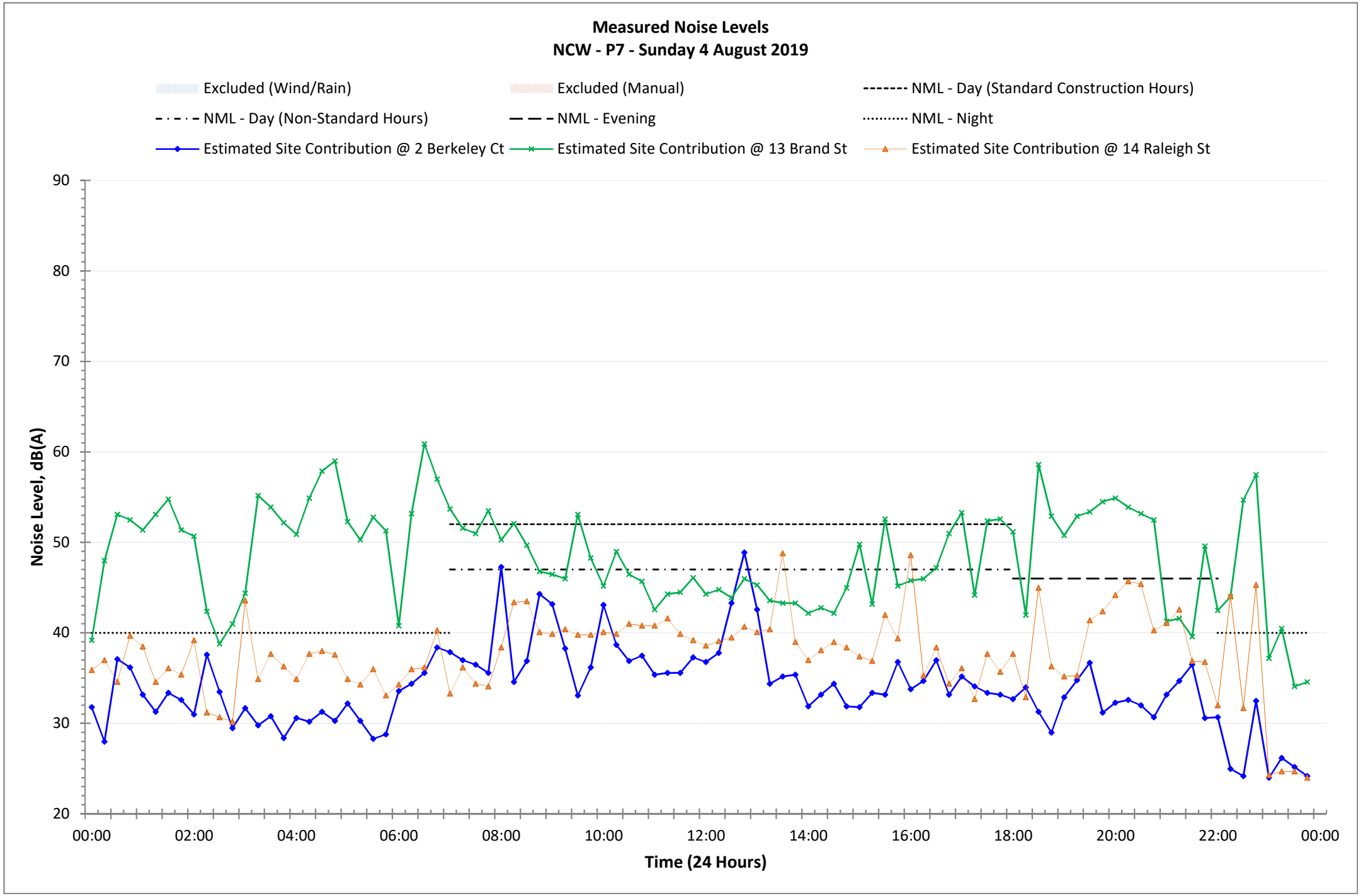


File Name	Date	Start Time	Elapsed Time	LAFmax	LAFmin	LAeq	LAF1.0	LAF10.0	LAF90.0	Percentage Site Contribution (%)	Measured Site Noise Level - LAeq, 15minute	Impulsive Modifying Factor?	Tonal Modifying Factor?	LF Modifying Factor?	Measured Site Noise Level - LAmax	NCA	Location	Period	RBL - LA90, Period	NML - LAeq, 15 minute	Predicted Site Noise Level - LAeq, 15minute	Sleep Disturbance Screening Level - LAmax	Compliance to RBL - LA90, Period	Compliance to NML - LAeq, 15minute	Compliance to Predicted Site Noise Level - LAeq, 15minute	Compliance to Sleep Disturbance Screening Level - LAmax	Description
Project 001	03-Aug-19	16:00	00:15:00	71	51	53	55	54	52	100	55	0.0	2.0	0.0	55	NCA01	L01	Day	42	47	47	57	13	8	8	-2	L01 - Project 001-002. Measurements undertaken at 12 Drake Street. NCW involved a number of activities outlined within OOHWA-029 along with general construction activities, including use of hand tools and movement of vehicles and plant within the rail corridor. Site-related noises dominated the majority of measurements with approximately 100% contribution. Extraneous sources were also observed to include distant traffic and wildlife.
Project 002	03-Aug-19	16:15	00:15:00	79	51	56	65	57	53	100	56	0.0	0.0	0.0	70	NCA01		Day	42	47	47	57	14	9	9	13	
Project 003	03-Aug-19	16:43	00:15:00	72	52	56	64	57	53	100	56	0.0	0.0	0.0	64	NCA01	L02	Day	42	47	65	57	14	9	-9	7	L02 - Project 003-005. Measurements undertaken at 12 Hopetoun Avenue. NCW involved a number of activities outlined within OOHWA-029 along with general construction activities, including use of hand tools and movement of vehicles and plant within the rail corridor. Site-related noises dominated the majority of measurements with approximately 100% contribution. Extraneous sources were also observed to include distant air and road traffic, and wildlife.
Project 004	03-Aug-19	17:00	00:15:00	72	51	59	68	64	52	100	59	0.0	0.0	0.0	70	NCA01		Day	42	47	65	57	17	12	-6	13	
Project 005	03-Aug-19	17:35	00:15:00	66	52	54	59	55	53	100	61	0.0	7.0	0.0	64	NCA01		Day	42	47	65	57	19	14	-4	7	
Project 006	03-Aug-19	18:55	00:15:00	69	49	53	59	54	51	100	58	0.0	5.0	0.0	68	NCA01	L03	Evening	42	47	63	57	16	11	-5	11	L03 - Project 004-007. Measurements undertaken outside 2 Berkeley Court. NCW involved a number of activities outlined within OOHWA-029 along with general construction activities, including use of hand tools and movement of vehicles and plant within the rail corridor. Site-related noises dominated the majority of measurements with approximately 100% contribution. Extraneous sources were also observed to include distant road and air traffic, nearby wildfire and water leaking from a nearby hydrant.
Project 007	03-Aug-19	19:15	00:15:00	75	49	53	59	54	51	100	58	0.0	5.0	0.0	71	NCA01		Evening	42	47	63	57	16	11	-5	14	
Project 008	03-Aug-19	19:51	00:15:00	67	51	56	62	58	53	100	61	0.0	5.0	0.0	58	NCA01	L04	Evening	42	47	63	57	19	14	-2	1	L04 - Project 008. Measurement undertaken at the eastern end of Gordon Avenue. NCW involved a number of activities outlined within OOHWA-029 along with general construction activities, including use of hand tools and movement of vehicles and plant within the rail corridor. Site-related noises dominated the majority of measurement with approximately 100% contribution. Extraneous sources were also observed to include distant traffic.
Project 009	03-Aug-19	20:30	00:15:00	66	55	58	61	59	57	100	58	0.0	0.0	0.0	63	NCA01	L05	Evening	42	47	52	57	16	11	6	6	L05 - Project 009. Measurement undertaken at 14 Raleigh Street. NCW involved a number of activities outlined within OOHWA-029 along with general construction activities, including use of hand tools and movement of vehicles and plant within the rail corridor. Site-related noises dominated the measurement with approximately 100% contribution. Extraneous sources were not observed throughout the measurement.
Project 010	03-Aug-19	21:00	00:15:00	78	44	61	72	64	46	70	59	0.0	0.0	0.0	68	NCA01	L06	Evening	42	47	63	57	17	12	-4	11	L06 - Project 010-011. Measurement undertaken at 91 Hampden Street, Artarmon. NCW involved a number of activities outlined within OOHWA-029 along with general construction activities, including use of hand tools and movement of vehicles and plant within the rail corridor. Site-related noises dominated the majority of measurements with approximately 70% contribution. Extraneous sources were observed to include distant traffic, nearby pedestrians and irrigation.
Project 011	03-Aug-19	21:17	00:15:00	88	43	63	75	65	46	70	61	0.0	0.0	0.0	64	NCA01		Evening	41	46	63	56	20	15	-2	8	
Project 012	03-Aug-19	22:09	00:15:00	75	56	63	72	64	58	100	68	0.0	5.0	0.0	74	NCA01	L05	Night	41	46	63	56	27	22	5	18	L05 - Project 012. Measurement undertaken at 14 Raleigh Street. NCW involved a number of activities outlined within OOHWA-029 along with general construction activities, including use of hand tools and movement of vehicles and plant within the rail corridor. Site-related noises dominated the measurement with approximately 100% contribution. Extraneous sources were observed throughout the measurement to include passing ambulances.
Project 013	03-Aug-19	22:39	00:15:00	71	47	54	66	54	48	100	54	0.0	0.0	0.0	70	NCA01	L03	Night	41	46	63	56	13	8	-9	14	L03 - Project 013. Measurement undertaken outside 2 Berkeley Court. NCW involved a number of activities outlined within OOHWA-029 along with general construction activities, including use of hand tools and movement of vehicles and plant within the rail corridor. Site-related noises dominated the majority of measurement with approximately 100% contribution. Extraneous sources were not observed throughout the measurement.
Project 014	03-Aug-19	23:05	00:15:00	88	45	67	83	60	47	100	67	0.0	0.0	0.0	86	NCA01	L02	Night	41	46	63	56	26	21	4	30	L02 - Project 014-015. Measurements undertaken at 12 Hopetoun Avenue. NCW involved a number of activities outlined within OOHWA-029 along with general construction activities, including use of hand tools and movement of vehicles and plant within the rail corridor. Site-related noises dominated the majority of measurements with approximately 100% contribution. Extraneous sources were also observed to include distant traffic.
Project 015	03-Aug-19	23:24	00:15:00	73	45	52	61	53	48	100	57	0.0	5.0	0.0	68	NCA01		Night	41	46	63	56	16	11	-6	12	
Project 016	03-Aug-19	23:54	00:15:00	71	44	49	57	50	46	100	54	0.0	5.0	0.0	55	NCA01	L04	Night	41	46	55	56	13	8	-1	-1	L04 - Project 016. Measurement undertaken at the eastern end of Gordon Avenue. NCW involved a number of activities outlined within OOHWA-029 along with general construction activities, including use of hand tools and movement of vehicles and plant within the rail corridor. Site-related noises dominated the majority of measurement with approximately 100% contribution. Extraneous sources were also observed to include distant traffic.
Project 017	04-Aug-19	00:16	00:15:00	62	53	54	55	55	54	100	54	0.0	0.0	0.0	55	NCA01	L07	Night	41	46	55	56	13	8	-1	-1	L07 - Project 017-018. Measurements undertaken at the eastern end of Nelson Street, outside of the TSE Site Compound. NCW involved a number of activities outlined within OOHWA-029 along with general construction activities, including use of hand tools and movement of vehicles and plant within the rail corridor. Site-related noises dominated the majority of measurements with approximately 100% contribution. Extraneous sources were not observed throughout the measurements.
Project 018	04-Aug-19	00:35	00:15:00	70	54	59	62	61	55	100	59	0.0	0.0	0.0	67	NCA01		Night	41	46	63	56	18	13	-4	11	
Project 019	04-Aug-19	01:03	00:15:00	65	42	53	62	58	44	100	53	0.0	0.0	0.0	63	NCA01	L04	Night	41	46	55	56	12	7	-2	7	L04 - Project 019. Measurement undertaken at the eastern end of Gordon Avenue. NCW involved a number of activities outlined within OOHWA-029 along with general construction activities, including use of hand tools and movement of vehicles and plant within the rail corridor. Site-related noises dominated the majority of measurement with approximately 100% contribution. Extraneous sources were also observed to include distant traffic.

File Name	Date	Start Time	Elapsed Time	LAFmax	LAFmin	LAeq	LAF1.0	LAF10.0	LAF90.0	Percentage Site Contribution (%)	Measured Site Noise Level - LAeq, 15minute	Impulsive Modifying Factor?	Tonal Modifying Factor?	LF Modifying Factor?	Measured Site Noise Level - LAmax	NCA	Location	Period	RBL - LA90, Period	NML - LAeq, 15 minute	Predicted Site Noise Level - LAeq, 15minute	Sleep Disturbance Screening Level - LAmax	Compliance to RBL - LA90, Period	Compliance to NML - LAeq, 15minute	Compliance to Predicted Site Noise Level - LAeq, 15minute	Compliance to Sleep Disturbance Screening Level - LAmax	Description
Project 020	04-Aug-19	01:27	00:15:00	68	43	57	64	61	44	100	57	0.0	0.0	0.0	63	NCA01	L08	Night	35	40	55	50	22	17	2	13	L08 - Project 020-021. Measurements undertaken at 9 Hopetoun Avenue. NCW involved a number of activities outlined within OOHWA-029 along with general construction activities, including use of hand tools and movement of vehicles and plant within the rail corridor. Site-related noises dominated the majority of measurements with approximately 100% contribution. Extraneous sources were not observed throughout the measurements.
Project 021	04-Aug-19	01:45	00:15:00	63	42	55	61	60	44	100	55	0.0	0.0	0.0	62	NCA01		Night	35	40	55	50	20	15	0	12	
Project 022	04-Aug-19	02:15	00:15:00	76	48	63	73	70	49	100	63	0.0	0.0	0.0	73	NCA01	L02	Night	35	40	63	50	28	23	0	23	L02 - Project 022. Measurement undertaken at 12 Hopetoun Avenue. NCW involved a number of activities outlined within OOHWA-029 along with general construction activities, including use of hand tools and movement of vehicles and plant within the rail corridor. Site-related noises dominated the majority of measurement with approximately 100% contribution. Extraneous sources were not observed throghout the measurement.
Project 023	04-Aug-19	15:39	00:15:00	76	45	56	64	59	48	40	52	0.0	0.0	0.0	67	NCA01	L03	Night	35	40	55	50	17	12	-3	17	L03 - Project 023-024. Measurements undertaken outside 2 Berkeley Court. NCW involved a number of activities outlined within OOHWA-029 along with general construction activities, including use of hand tools and movement of vehicles and plant within the rail corridor. Site-related noises contributed to approximately 40-50% of the overall Leq. Extraneous sources were also observed to include distant traffic and nearby wildlife.
Project 024	04-Aug-19	15:56	00:15:00	67	47	52	58	54	49	50	51	0.0	2.0	0.0	54	NCA01		Day	42	47	55	57	9	4	-4	-3	
Project 025	04-Aug-19	16:19	00:15:00	75	50	59	68	61	55	100	59	0.0	0.0	0.0	65	NCA01	L02	Day	42	47	65	57	17	12	-6	8	L02 - Project 025-026. Measurements undertaken at 12 Hopetoun Avenue. NCW involved a number of activities outlined within OOHWA-029 along with general construction activities, including use of hand tools and movement of vehicles and plant within the rail corridor. Site-related noises dominated the majority of measurements with approximately 100% contribution. Extraneous sources were also observed to include nearby pedestrians and wildlife, and apssing aeroplanes.
Project 026	04-Aug-19	16:35	00:15:00	71	46	57	67	60	48	100	57	0.0	0.0	0.0	69	NCA01		Day	42	47	65	57	15	10	-8	12	
Project 027	04-Aug-19	17:16	00:15:00	75	48	56	63	59	53	100	58	0.0	2.0	0.0	66	NCA01	L04	Day	42	47	63	57	16	11	-5	9	L04 - Project 027-028. Measurements undertaken at the eastern end of Gordon Avenue. NCW involved a number of activities outlined within OOHWA-029 along with general construction activities, including use of hand tools and movement of vehicles and plant within the rail corridor. Site-related noises dominated the majority of measurements with approximately 100% contribution. Extraneous sources were also observed to include neaby wildlife, passing aeroplanes and music.
Project 028	04-Aug-19	17:32	00:15:00	75	48	53	61	55	50	100	55	0.0	2.0	0.0	74	NCA01		Day	42	47	63	57	13	8	-8	17	
Project 029	04-Aug-19	17:58	00:15:00	68	54	56	61	57	55	100	61	0.0	5.0	0.0	63	NCA01	L07	Day	42	47	63	57	19	14	-2	6	L07 - Project 029. Measurement undertaken at the eastern end of Nelson Street, outside of the TSE Site Compound. NCW involved a number of activities outlined within OOHWA-029 along with general construction activities, including use of hand tools and movement of vehicles and plant within the rail corridor. Site-related noises dominated the majority of measurement with approximately 100% contribution. Extraneous sources were observed to include passing aeroplanes.
Project 030	04-Aug-19	18:26	00:15:00	79	56	62	72	64	57	100	67	0.0	5.0	0.0	76	NCA01	L09	Evening	42	47	57	57	25	20	10	19	L09 - Project 030-031. Measurements undertaken at outside 10 Brand Street appartments on Valetta Lane. NCW involved a number of activities outlined within OOHWA-029 along with general construction activities, including use of hand tools and movement of vehicles and plant within the rail corridor. Site-related noises dominated the majority of measurements with approximately 100% contribution. Extraneous sources were observed to include distant traffic and aeroplane movements.
Project 031	04-Aug-19	18:43	00:15:00	80	56	64	73	67	59	100	64	0.0	0.0	0.0	80	NCA01		Evening	42	47	57	57	22	17	7	23	

Weather 3-4 August 2019: Generally fine weather, low cloud coverage with calm winds. Temperature ranged between 9-18 degrees Celsius over the monitoring periods.
Note: all predicted noise levels were reproduced from the LOR OOHWA Form for this track possession.
Note: Low frequency, tonality and impulsive noise tests were conducted in accordance with the INP. The measured Leq data was as applied in all cases. Modifying factor (penalty) values were applied as applicable to the low frequency, tonal or impulsive components detectable or attributable to the sites noise emission. The site noise contribution reported here is inclusive of all modifying factors (if applicable).


Measured Noise Levels
NCW - P7 - Saturday 3 August 2019
Excluded (Wind/Rain)
Excluded (Manual)
NML - Day (Standard Construction Hours)
NML - Day (Non-Standard Hours)
NML - Evening
NML - Night
Estimated Site Contribution @ 2 Berkeley Ct
Estimated Site Contribution @ 13 Brand St
Estimated Site Contribution @ 14 Raleigh St
Noise Level, dB(A)
90
80
70
60
50
40
30
20
00:00
02:00
04:00
06:00
08:00
10:00
12:00
14:00
16:00
18:00
20:00
22:00
00:00
Time (24 Hours)

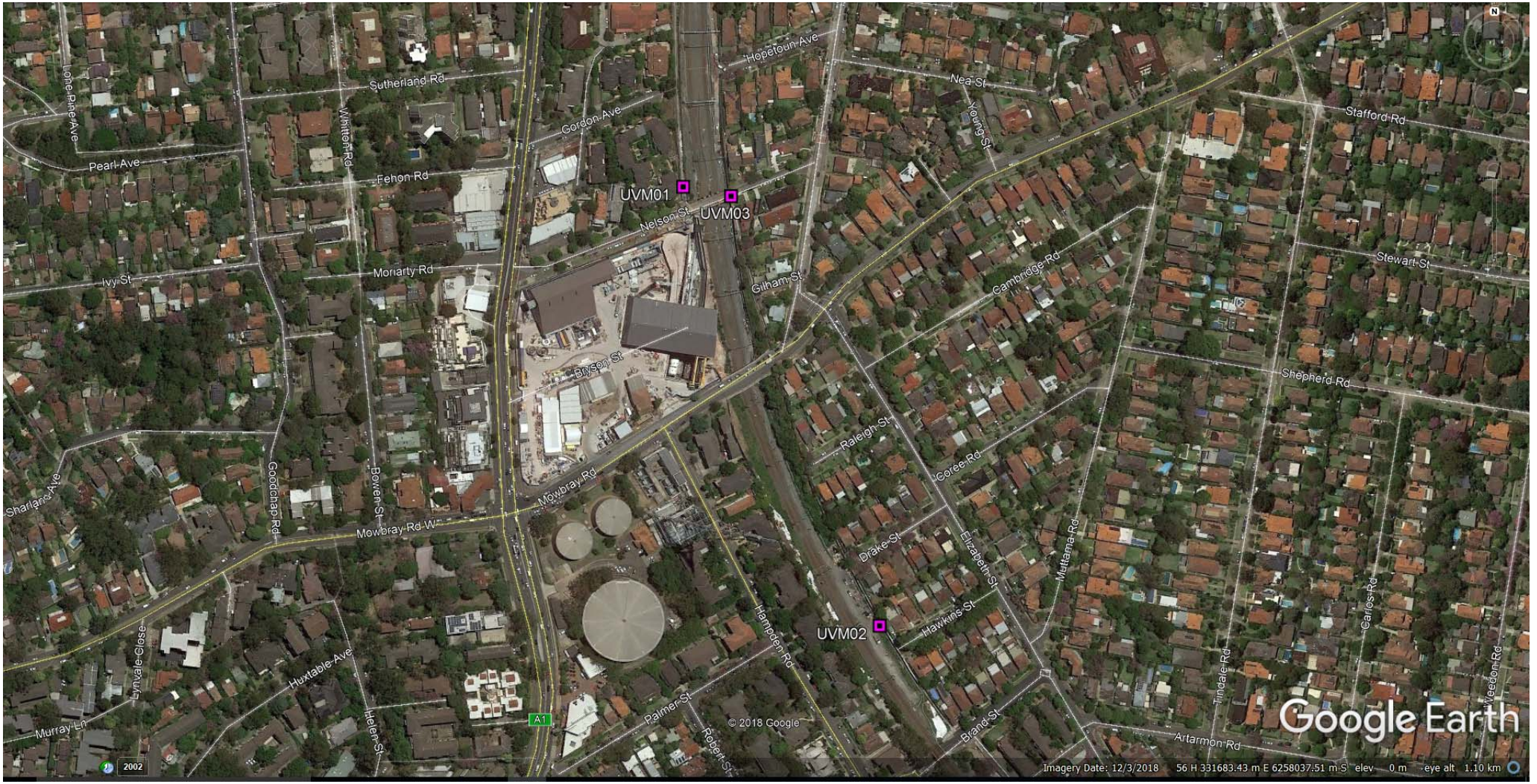

Measured Noise Levels
NCW - P7 - Sunday 4 August 2019
Excluded (Wind/Rain)
Excluded (Manual)
NML - Day (Standard Construction Hours)
NML - Day (Non-Standard Hours)
NML - Evening
NML - Night
Estimated Site Contribution @ 2 Berkeley Ct
Estimated Site Contribution @ 13 Brand St
Estimated Site Contribution @ 14 Raleigh St
Noise Level, dB(A)
90
80
70
60
50
40
30
20
00:00
02:00
04:00
06:00
08:00
10:00
12:00
14:00
16:00
18:00
20:00
22:00
00:00
Time (24 Hours)

Appendix I – Monitoring Report (RP37b)

Vibration Monitoring – OOHW P7: WE05 - 3 to 4 August 2019

Figure A1.0 – OOHW WE05 – Unattended Vibration Monitoring Locations

– NCW P7 (Saturday, 3 August to Sunday, 4 July 2019)



Vibration Report (UVM01)

Rail Corridor - Nelson Street

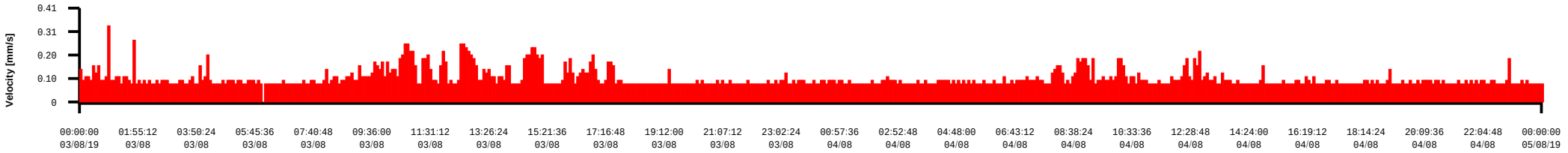
Start	3/08/2019
End	5/08/2019
Monitoring Location	UVM01

Monitoring Results

PPVmax	1.00 mm/s
PPVmax (99.9%)	0.67 mm/s
PPVmax (99.8%)	0.62 mm/s
PPVmax (99.5%)	0.59 mm/s
PPVmax (99.0%)	0.51 mm/s

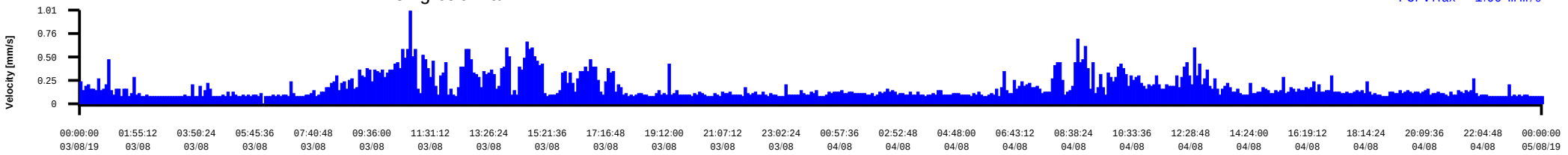
Vertical

PCPVMax = 0.33 mm/s



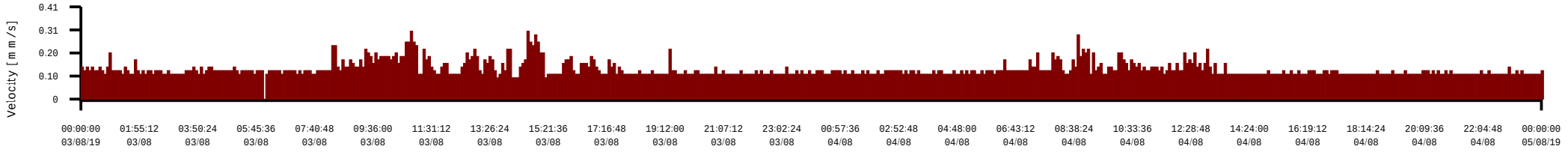
Longitudinal

PCPVMax = 1.00 mm/s



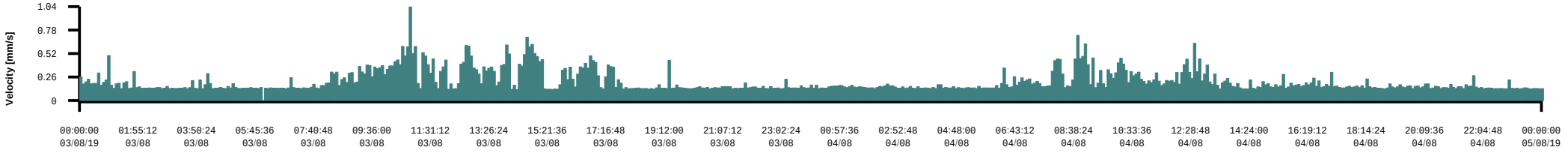
Transverse

PCPVMax = 0.30 mm/s



PVS

PCPVMax = 1.04 mm/s



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Vibration Report (UVM02)

Rail Corridor - Hawkins Street

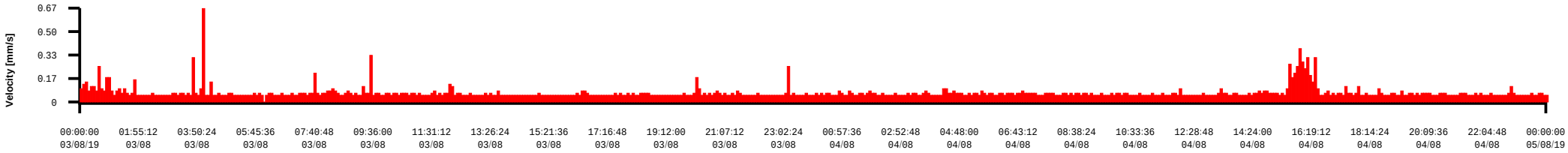
Start	3/08/2019
End	5/08/2019
Monitoring Location	UVM02

Monitoring Results

PPVmax	0.82 mm/s
PPVmax (99.9%)	0.54 mm/s
PPVmax (99.8%)	0.46 mm/s
PPVmax (99.5%)	0.36 mm/s
PPVmax (99.0%)	0.25 mm/s

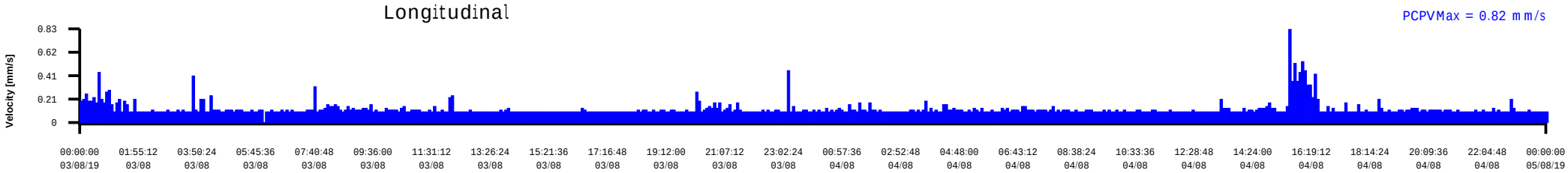
Vertical

PCPVMax = 0.67 mm/s



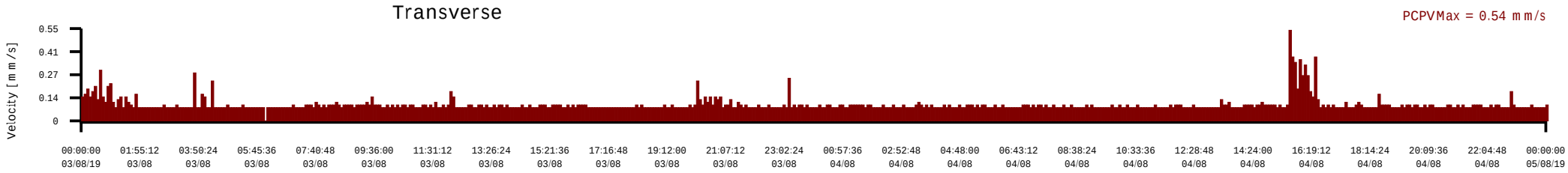
Longitudinal

PCPVMax = 0.82 mm/s



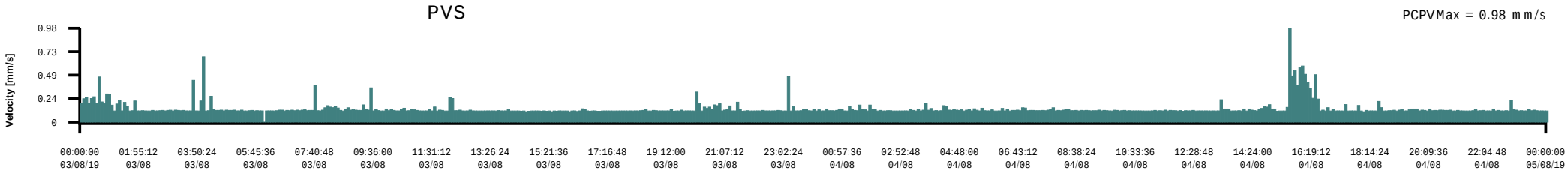
Transverse

PCPVMax = 0.54 mm/s



PVS

PCPVMax = 0.98 mm/s



Printed : 05/08/2019 13:29:57

Event Report - NCW WE05

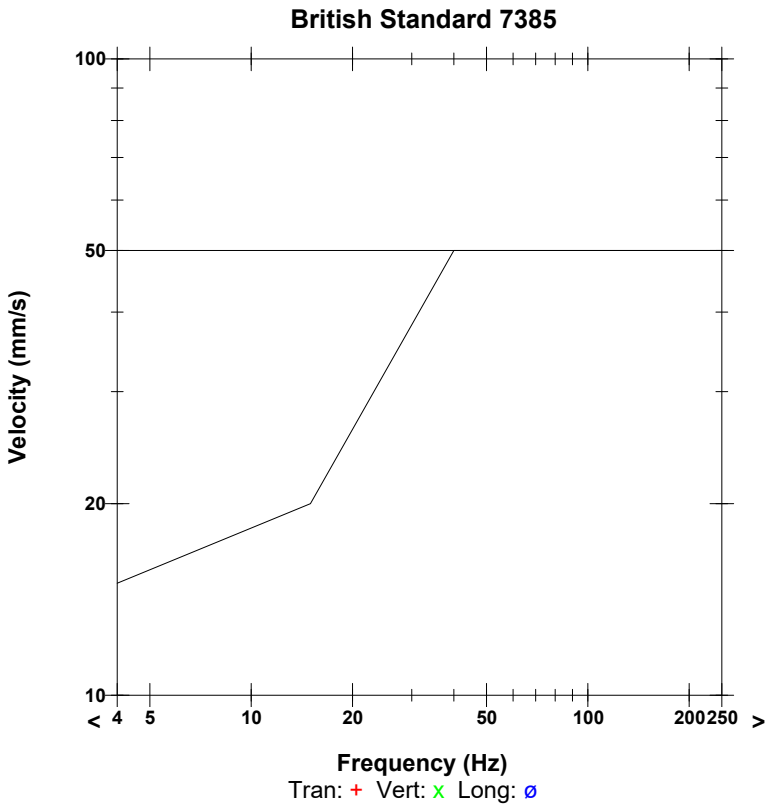
Histogram Start Time	13:44:37 August 1, 2019
Histogram Finish Time	09:40:23 August 7, 2019
Number of Intervals	8395.78 at 1 minute
Range	Geo:254.0 mm/s
Sample Rate	1024sps
Operator/Setup:	Operator/NCW.MMB

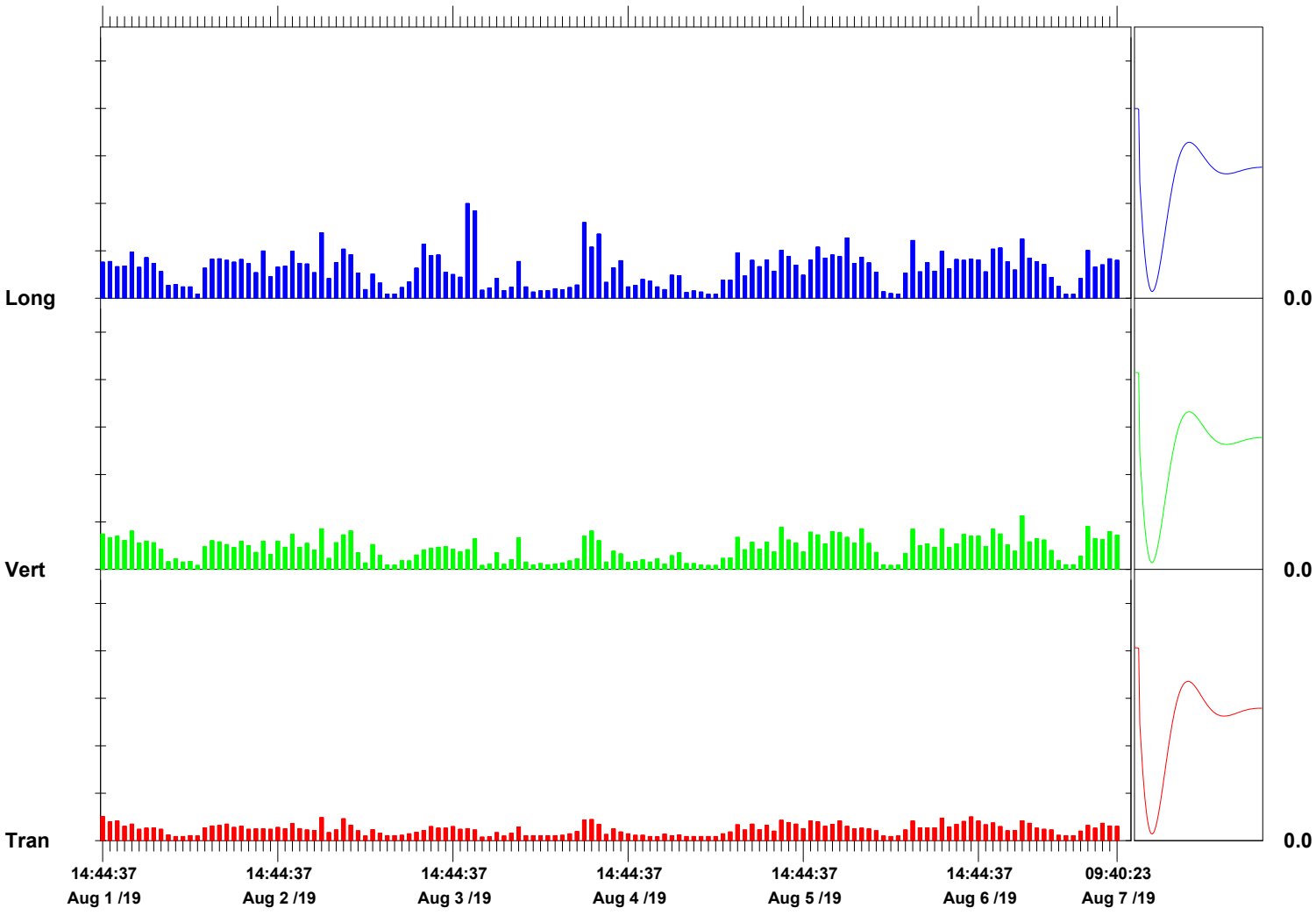
Serial Number	UM14423 V 10-89 Micromate ISEE
Battery Level	3.8 Volts
Unit Calibration	December 7, 2018 by Instantel
File Name	UM14423_20190801134437.IDFH

Notes

	Tran	Vert	Long	
PPV	0.504	1.127	1.994	mm/s
ZC Freq	51	51	>100	Hz
Date	Aug 1 /19	Aug 6 /19	Aug 3 /19	
Time	14:05:37	19:48:37	16:43:37	
Sensor Check	Passed	Passed	Passed	
Frequency	7.5	7.3	7.3	Hz
Overswing Ratio	4.2	4.5	4.8	

Peak Vector Sum 2.001 mm/s on August 3, 2019 at 16:43:37





Time Scale: 1 hour /div **Amplitude Scale:** Geo: 1.000 mm/s/div Sensor Check

Appendix J – Monitoring Report (RP38)

Noise Monitoring – OOHW P7: MW11 - 16 to 20 September 2019

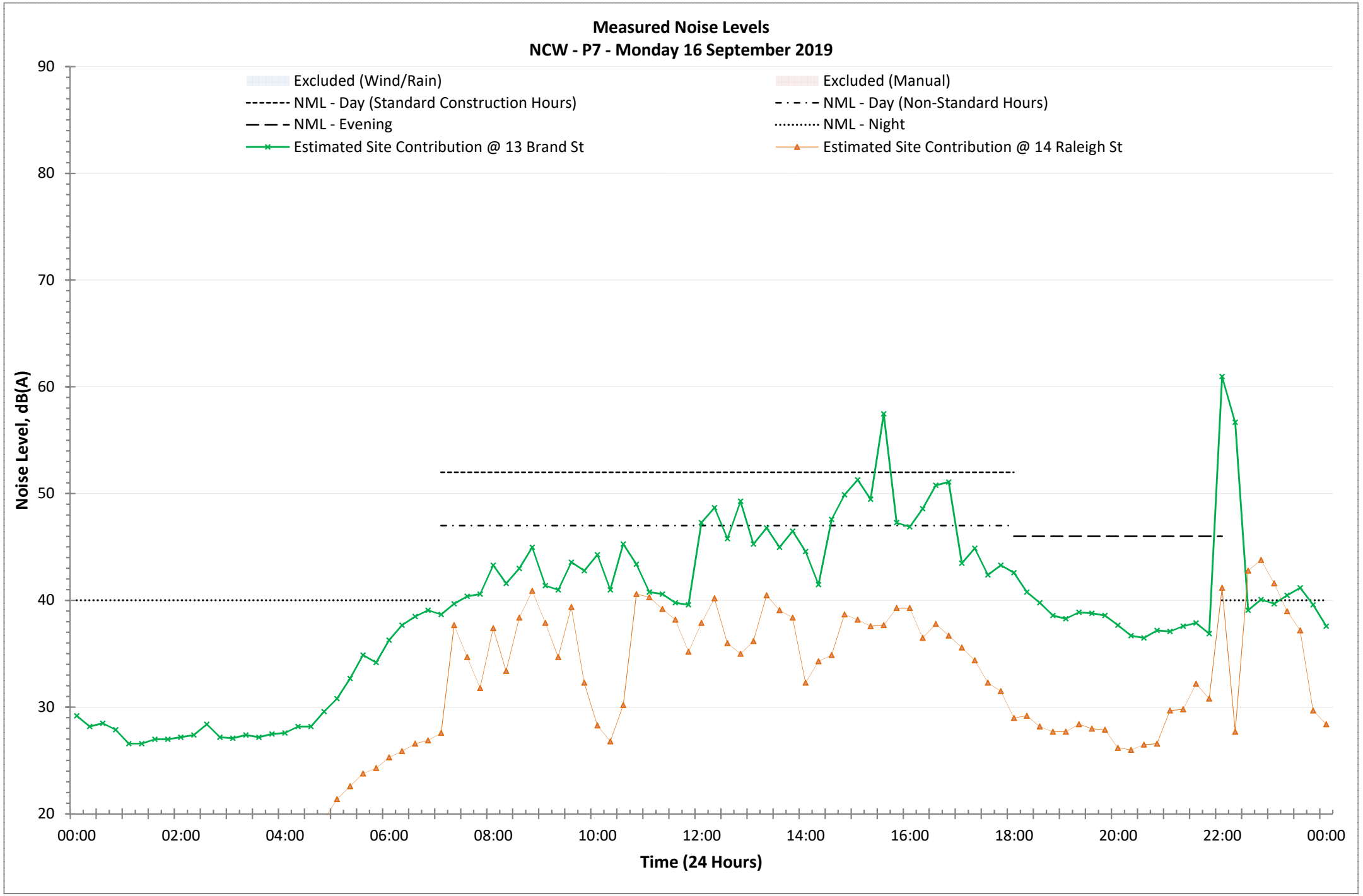
Figure A1.0 – OOHW MW11 – Attended and Unattended Noise Monitoring Locations

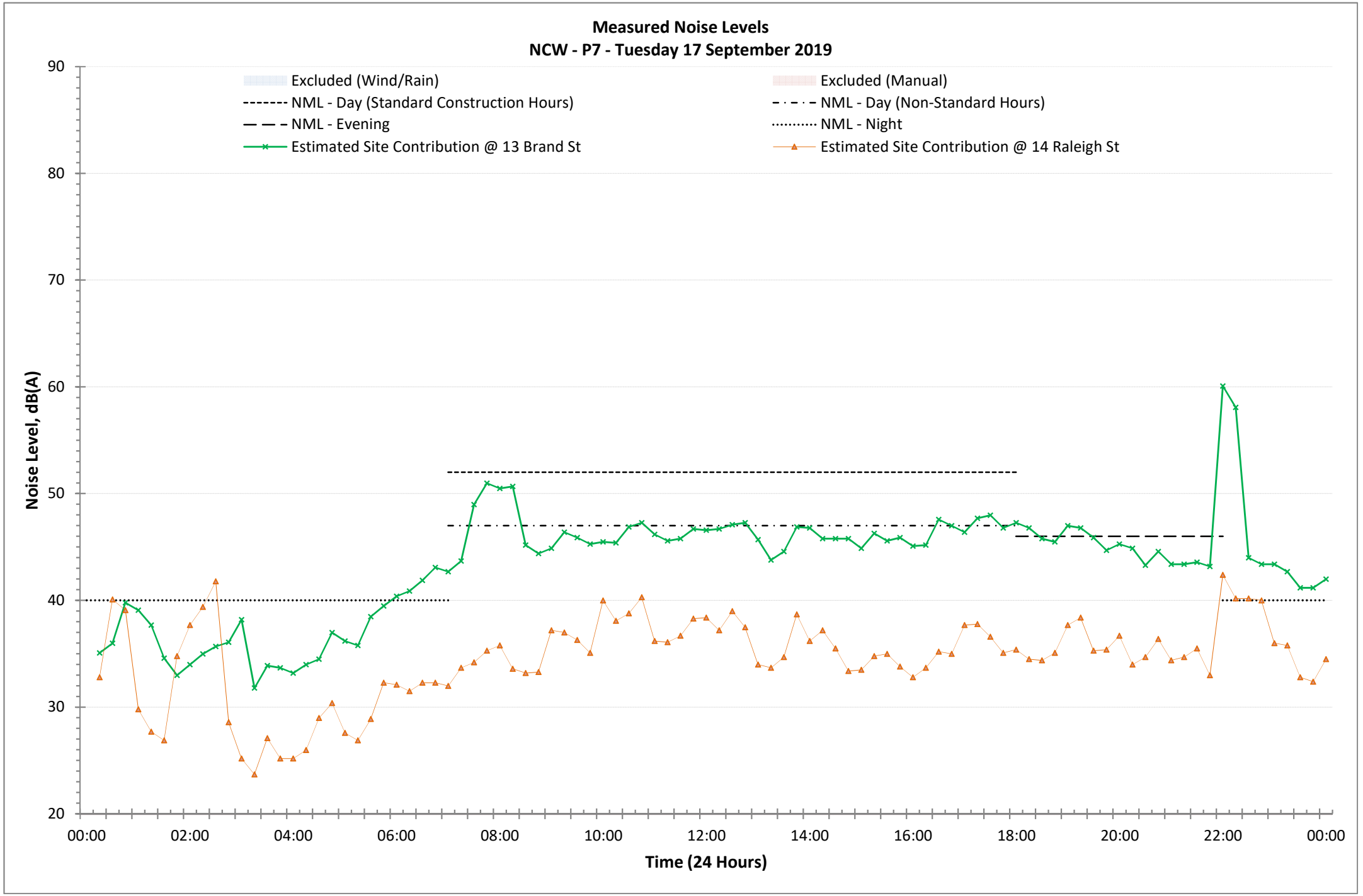
– NCW P7 (Monday, 16 September to Friday, 20 September 2019)

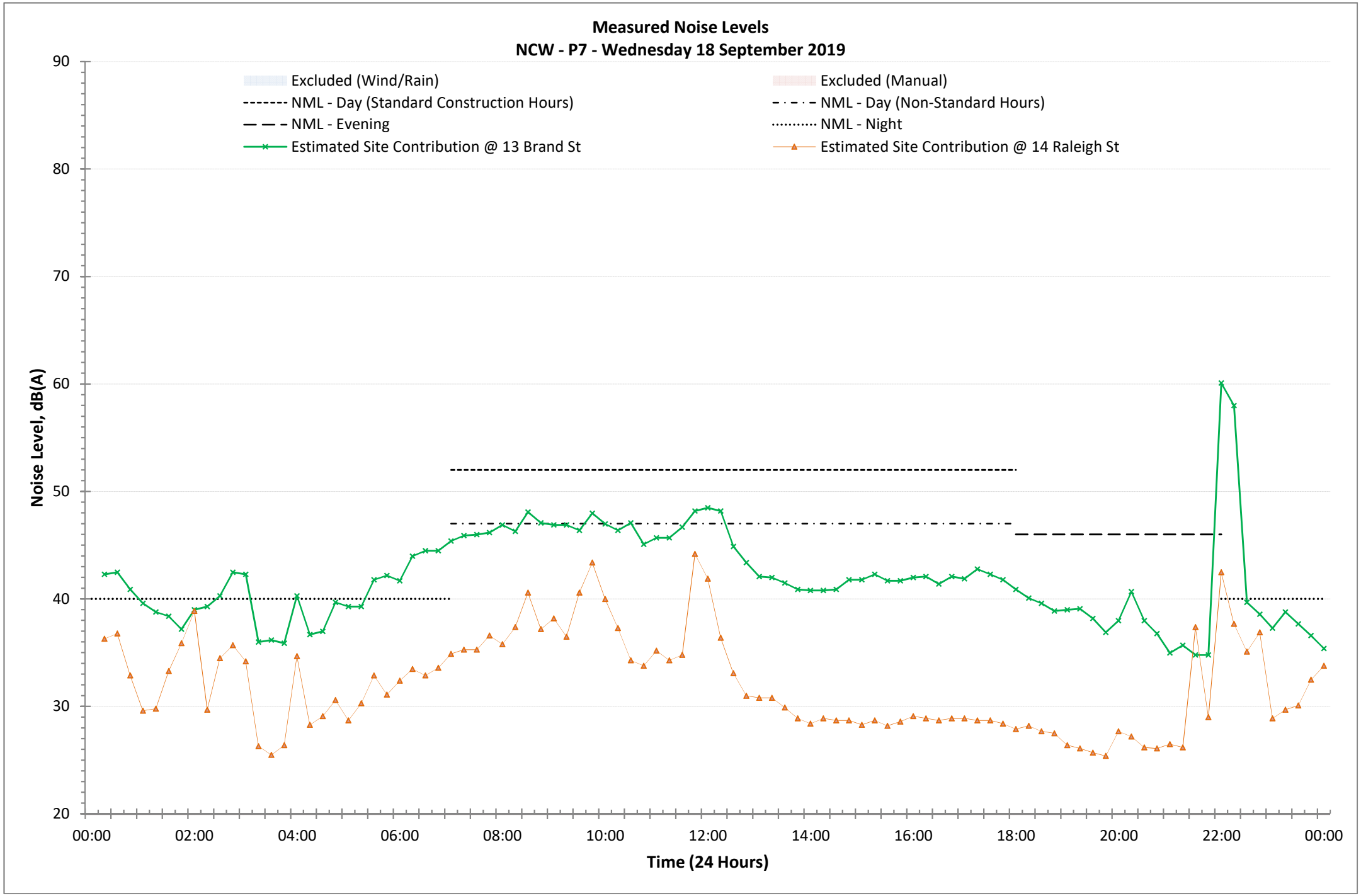
File Name	Date	Start Time	Elapsed Time	LAFmax	LAFmin	LAeq	LAF1.0	LAF10.0	LAF90.0	Percentage Site Contribution (%)	Measured Site Noise Level - LAeq,15minute	Impulsive Modifying Factor?	Tonal Modifying Factor?	LF Modifying Factor?	Measured Site Noise Level - LAmax	NCA	Period	Location	RBL - LA90,Period	NML - LAeq, 15minute	Predicted Site Noise Level - LAeq,15minute	Sleep Disturbance Screening Level - LAmax	Comparison to RBL - LA90,Period	Comparison to NML - LAeq, 15minute	Comparison to Predicted Site Noise Level - LAeq, 15minute	Comparison to Sleep Disturbance Screening Level - LAmax	Description
Project 001	16-Sep-19	23:48	00:15:00	63.3	44.3	47.4	52.3	48.6	45.8	50	49	0.0	5.0	0.0	61	NCA01	Night	L01	35	40	52	50	14	9	-3	11	L01 - Project 001-002. Measurements taken at Drake Street. Site noise contributions resulted from plant engines, voices on site, and clangs and bangs. Site-related noises contributed to approximately 50% of the overall. Extraneous sources were observed to include distant and nearby traffic, light rain, and windblown vegetation.
Project 002	17-Sep-19	00:04	00:15:00	63.3	44	46.5	53.9	46.8	45.1	50	43	0.0	0.0	0.0	62	NCA01	Night	L01	35	40	52	50	8	3	-9	12	
Project 003	17-Sep-19	01:02	00:15:00	62.1	44.5	49.1	55.7	50.7	46.7	60	47	0.0	0.0	0.0	62	NCA01	Night	L02	35	40	52	50	12	7	-5	12	L02 - Project 003-004. Measurements taken at Raleigh Street. Site-related noises included plant engines, clangs and bangs, and reverse alarms. Site noise contributed to approximately 50% of the measured Leq over the measurements. Extraneous sources were observed to include light rain, distant and local traffic, and wind blown vegetation.
Project 004	17-Sep-19	01:18	00:15:00	64	43.9	46.4	50.9	47.5	45	70	50	0.0	5.0	0.0	49	NCA01	Night	L02	35	40	52	50	15	10	-2	-1	
Project 005	17-Sep-19	01:47	00:15:00	54.6	48.4	51.4	53.5	52.4	50.3	5	38	0.0	0.0	0.0	54	NCA01	Night	L03	35	40	54	50	3	-2	-16	4	L03 - Project 005. Measurement undertaken at Hopetoun Avenue. Site-related noises consisted of clangs and bangs, contributing to 5% of the overall Leq. Extraneous sources dominated the measurement and included distant and local traffic, windblown vegetation, and noise generated at the Chatswood Divesite.
Project 006	17-Sep-19	23:30	00:04:00	58.6	45	48	53.3	50.1	45.9	0	36	0.0	0.0	0.0	36	NCA01	Night	L03	35	40	54	50	1	-4	-18	-14	L03 - Project 006. Measurement undertaken at Hopetoun Avenue. Measurement was ceased at 4mins duration due to inclement weather. In the 4min measured, no site-related contributions were noted. Extraneous noise sources included distant traffic, rain, and windblown vegetation.
Project 007	18-Sep-19	00:46	00:15:00	64.8	43.5	48.7	56	50.5	45.3	30	49	0.0	0.0	0.0	58	NCA01	Night	L03	35	40	54	50	14	9	-5	8	L03 - Project 007. Measurement taken at Hopetoun Avenue. Site-related noise originated from movement of high-rails/telehandlers, idling plant engines, clangs and bangs, and site staff talking. Site noise contributed to 30% of the total measurement. Extraneous noise dominated the measurement, consisting of passing traffic, water flowing into stormwater drains and wind.
Project 008	18-Sep-19	01:01	00:15:00	75.8	45.2	52.7	62.9	52.8	46.8	100	58	0.0	5.0	0.0	75	NCA01	Night	L03	35	40	55	50	23	18	3	25	L03 - Project 008. Measurement undertaken at Hopetoun Avenue. Site activities generated approximately 100% of the overall contribution. Site related noise was generated by plant engines, movement of plant and machinery, clangs and bangs, plant horns and talking. Extraneous noise contributions were minimal, consisting of largely of wind and rain.
Project 009	18-Sep-19	01:17	00:15:00	99	44.5	64.8	61.8	51.7	46.2	60	68	0.0	5.0	0.0	68	NCA01	Night	L03	35	40	52	50	33	28	16	18	L03 - Project 009 and 010. Measurement undertaken at Hopetoun Avenue. Site related noise originated from reverse buzzers, plant engines, clangs and bangs, and voices from site. These site noise contributions accounted for approximately 60% of the overall measured noise. Strong winds and rain contributed to extraneous noise and resulted in the measurement ending early at 8 minutes.
Project 010	18-Sep-19	01:30	00:15:00	61.9	42.3	47.7	57.4	49	44	30	42	0.0	0.0	0.0	61	NCA01	Night	L03	35	40	52	50	7	2	-10	11	
Project 011	18-Sep-19	22:31	00:15:00	74.3	43.7	65.3	70.2	68.9	45.5	100	65	0.0	0.0	0.0	74	NCA01	Night	L01	35	40	52	50	30	25	13	24	L01 - Project 011 and Project 012. Measurements undertaken at Drake Street. Site noise resulting from plant engines, staff conversations, clangs and bangs and movement of site vehicles and plant. Site noise contributed to approximately 100% of the overall measurement.
Project 012	18-Sep-19	22:46	00:15:00	66.1	41.6	49.8	57.2	54	43	100	50	0.0	0.0	0.0	66	NCA01	Night	L01	35	40	52	50	15	10	-2	16	
Project 013	18-Sep-19	23:30	00:15:00	64	46	48.6	54	49.1	47.4	30	43	0.0	0.0	0.0	63	NCA01	Night	L04	35	40	59	50	8	3	-16	13	L04 - Projects 013, 014 and 015. Measurements undertaken at Berkeley Street. Site noise contributed to approximately 30-50% of the overall noise measured, resulting from reverse buzzers, movement of plant and materials, and clangs and bangs. Distant traffic, works at the Chatswood dive site, barking dogs and emergency vehicle sirens were the sources of extraneous noise observed.
Project 014	18-Sep-19	23:45	00:15:00	60.3	46.3	48.7	54.5	49.1	47.4	50	46	0.0	0.0	0.0	54	NCA01	Night	L04	35	40	59	50	11	6	-13	4	
Project 015	19-Sep-19	00:01	00:15:00	58.2	46.5	49.2	53	50.7	47.9	50	46	0.0	0.0	0.0	58	NCA01	Night	L04	35	40	59	50	11	6	-13	8	
Project 016	19-Sep-19	01:00	00:15:00	56.9	38.9	41.9	47.3	43.6	40	100	42	0.0	0.0	0.0	55	NCA01	Night	L03	35	40	54	50	7	2	-12	5	L03 - Project 016. Measurement undertaken at Hopetoun Avenue. Site-related noise was generated by clangs and bangs, movement of plant and vehicles, and idling machinery. Site noise was responsible for approximately
Project 017	19-Sep-19	01:15	00:15:00	54	37.6	40.9	45.4	42	39.2	80	40	0.0	0.0	0.0	48	NCA01	Night	L03	35	40	54	50	5	0	-14	-2	L03 - Projects 017 and 018. Measurement undertaken at Hopetoun Avenue. Site-related noise was generated by clangs and bangs, movement of plant and vehicles, and idling machinery. Site noise was responsible for approximately 80-100% of the measurement. Extraneous noise sources were noted, including distant traffic, insects, a metro train, and work at the Chatswood Dive site.
Project 018	19-Sep-19	01:31	00:14:47	54.2	37.9	41.1	45.7	42.5	39.2	100	41	0.0	0.0	0.0	52	NCA01	Night	L03	35	40	54	50	6	1	-13	2	

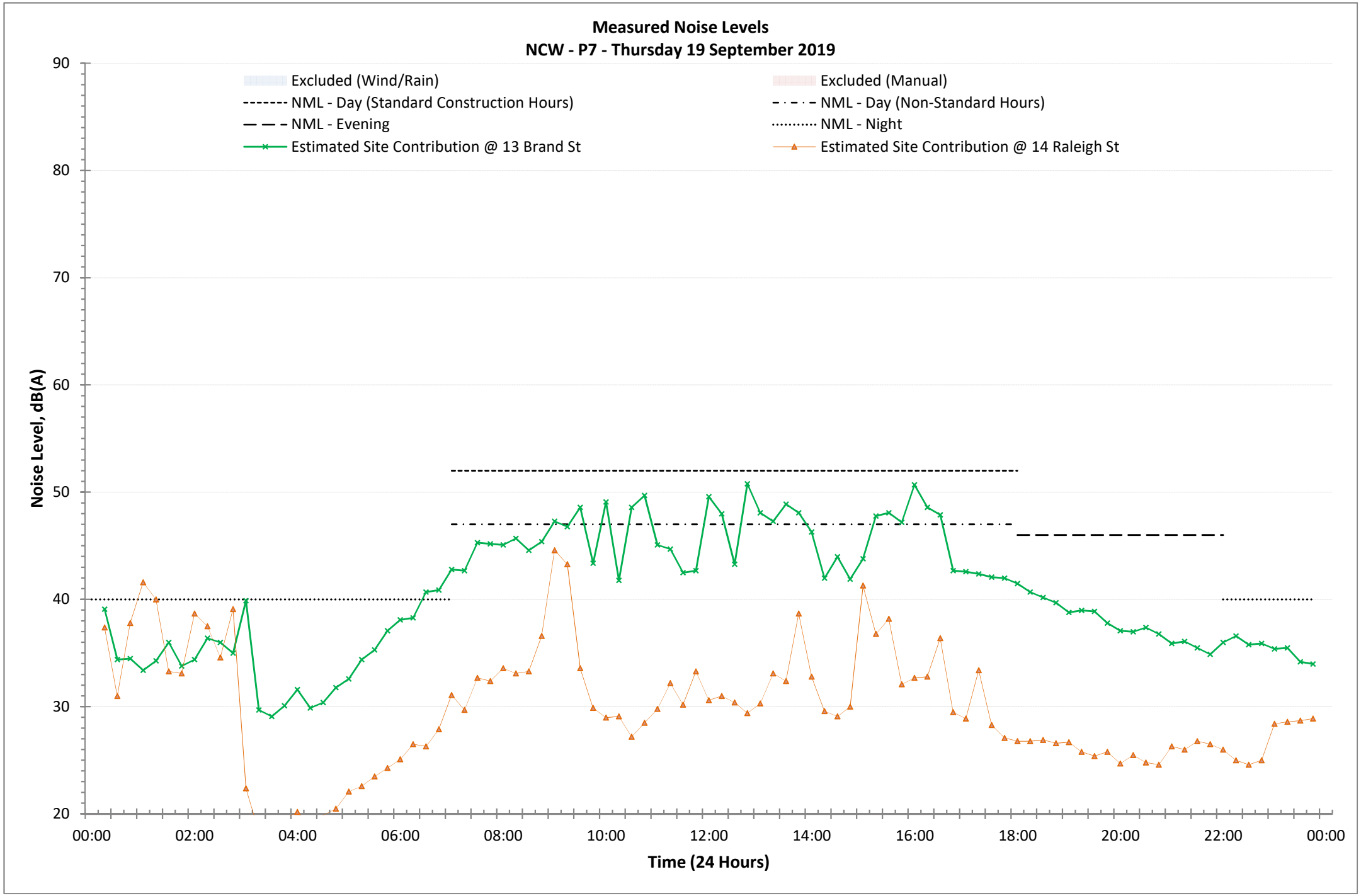
File Name	Date	Start Time	Elapsed Time	LAFmax	LAFmin	LAeq	LAF1.0	LAF10.0	LAF90.0	Percentage Site Contribution (%)	Measured Site Noise Level - LAeq, 15minute	Impulsive Modifying Factor?	Tonal Modifying Factor?	LF Modifying Factor?	Measured Site Noise Level - LAmax	NCA	Period	Location	RBL - LA90, Period	NML - LAeq, 15 minute	Predicted Site Noise Level - LAeq, 15minute	Sleep Disturbance Screening Level - LAmax	Comparison to RBL - LA90, Period	Comparison to NML - LAeq, 15 minute	Comparison to Predicted Site Noise Level - LAeq, 15minute	Comparison to Sleep Disturbance Screening Level - LAmax	Description
Project 019	19-Sep-19	01:47	00:15:00	55.2	37.4	40.5	47	41.3	38.7	50	37	0.0	0.0	0.0	52	NCA01	Night	L03	35	40	54	50	2	-3	-17	2	L03 - Project 019. Measurement undertaken at Hopetoun Avenue. Site-related noise accounted for approximately 50% of the overall contribution. Site noise was generated by clangs and bangs, movement of plant and materials, reverse buzzers and screeching. Extraneous noise was observed from passing traffic, metro trains, and rainwind.
Project 020	19-Sep-19	22:30	00:15:00	64.9	40.1	44.8	55.5	44.3	41.6	30	40	0.0	0.0	0.0	64	NCA01	Night	L01	35	40	52	50	5	0	-12	14	L01 - Projects 020 and 021. Measurement taken at Drake Street. Site noise contributions resulting from generator/engine idling, voices from site, use of hand tools, and clangs and bangs. Site noise contributed to approximately 30-50% of the overall measurement. Extraneous noise resulted from windblown vegetation, dogs barking, passing traffic and aircraft, and insects.
Project 021	19-Sep-19	22:45	00:15:00	60	41.1	45.2	49.2	45.9	42.9	50	42	0.0	0.0	0.0	60	NCA01	Night	L01	35	40	52	50	7	2	-10	10	
Project 022	19-Sep-19	23:30	00:15:00	57.8	40.7	44.4	48.4	46.1	42.3	30	44	0.0	5.0	0.0	57	NCA01	Night	L02	35	40	52	50	9	4	-8	7	L02 - Projects 022 and 023. Measurements taken at Raleigh Street. Site noise contributions resulting from clangs and bangs, movement of plant and materials, reverse buzzers, horn blasts and idling plant/generators. Site noise was responsible for approximately 30-60% of overall recorded measurements. Extraneous noise sources included distant traffic, emergency vehicle sirens, animals, passing aircraft and insects.
Project 023	19-Sep-19	23:45	00:15:00	66.5	40.2	48.5	60.7	48.9	42.1	60	46	0.0	0.0	0.0	66	NCA01	Night	L02	35	40	52	50	11	6	-6	16	
Project 024	20-Sep-19	00:01	00:15:00	60.8	42.5	48.1	56.5	50.3	43.7	100	53	0.0	5.0	0.0	58	NCA01	Night	L02	35	40	52	50	18	13	1	8	L02 - Project 024. Measurement taken at Raleigh Street. Site noise originating from idling plant, movement of plant and materials, site staff talking, horn blasts, and reverse buzzers resulted in approximately 100% of the measured noise. Extraneous noise from distant traffic and windblown vegetation was considered to have minimal contribution to observed levels.
Project 025	20-Sep-19	00:30	00:15:00	57.5	44.5	47.9	53.2	50.3	45.7	70	46	0.0	0.0	0.0	54	NCA01	Night	L04	35	40	59	50	11	6	-13	4	L04 - Project 025 and 026. Measurements undertaken at Berkeley Court. Site-related noise originated from movement of plant, reverse buzzers, clangs and bangs, and site staff talking. Overall site noise contributed to 70-80% of observed levels. Extraneous noise sources included insect noises, passing traffic, and metro trains.
Project 026	20-Sep-19	00:45	00:15:00	63.6	43.6	47.1	53.3	48.1	45.1	80	46	0.0	0.0	0.0	63	NCA01	Night	L04	35	40	59	50	11	6	-13	13	
Project 027	20-Sep-19	01:15	00:15:00	67.2	37.7	42.7	50.8	44.4	38.9	80	47	0.0	5.0	0.0	47	NCA01	Night	L03	35	40	54	50	12	7	-7	-3	L03 - Projects 027 and 028. Measurement taken at Hopetoun Avenue. Site-related noise accounted for approximately 80-100% of observed levels, resulting from reverse buzzers, site staff talking, idling engines, movement of plant, horn blasts, and clangs and bangs. Extraneous noise sources included insects, distant traffic, and metro trains.
Project 028	20-Sep-19	01:30	00:15:00	60.8	36.2	45.4	56.2	48.1	37.6	100	50	0.0	5.0	0.0	60	NCA01	Night	L03	35	40	54	50	15	10	-4	10	
Project 029	20-Sep-19	02:15	00:15:00	65.8	43	46.5	51.1	47.2	44.2	60	44	0.0	0.0	0.0	65	NCA01	Night	L04	35	40	59	50	9	4	-15	15	L04 - Project 029. Measurements undertaken at Berkeley Court. Site related noise sources included reverse buzzers, clangs and bangs, use of hand tools, loud clangs and bangs, and movement of plant. Site related noise was responsible for approximately 60% of the recorded measurements. Extraneous noise sources included insect and metro trains.

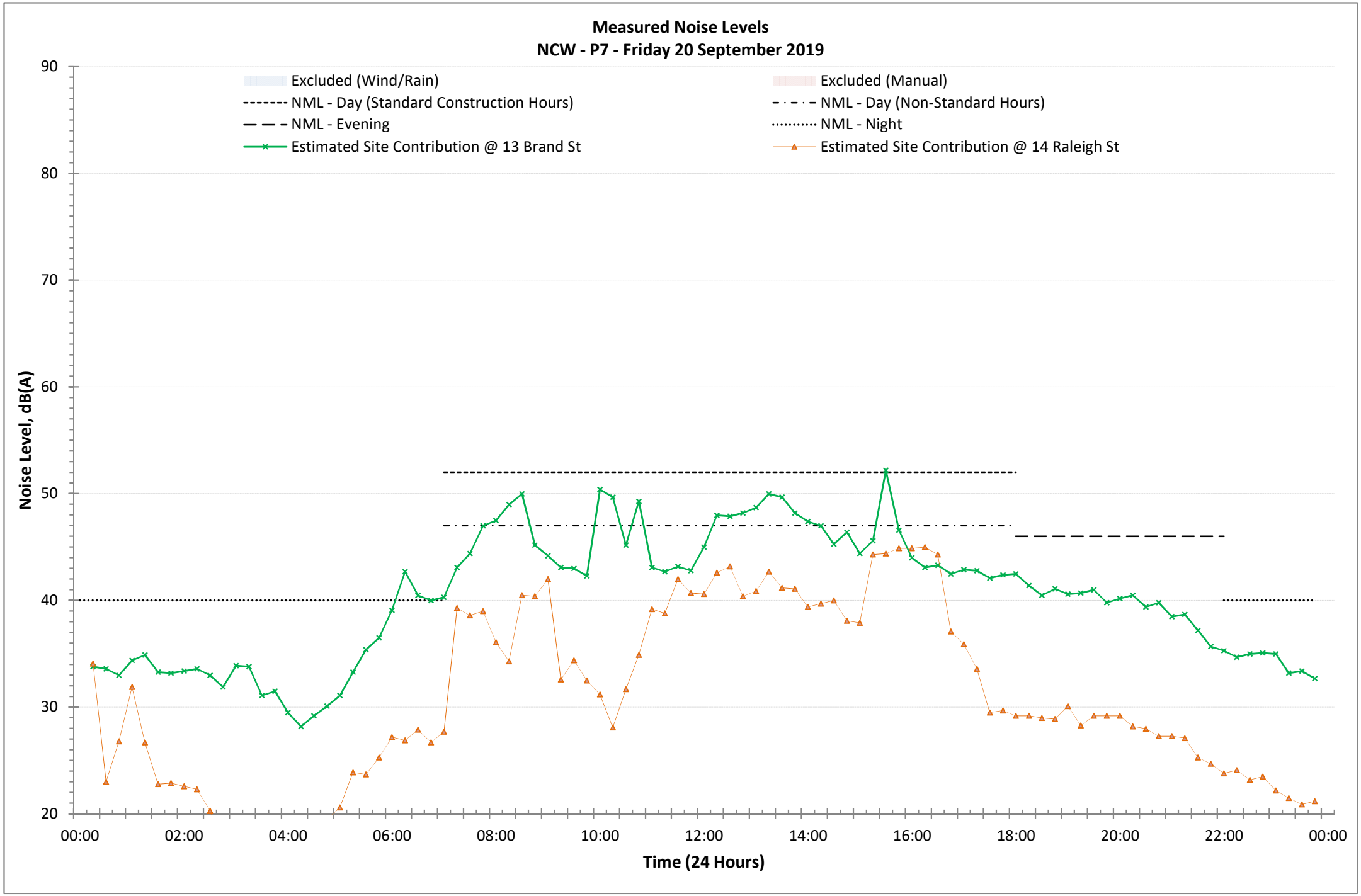
Weather 16-20 September: Generally overcast weather, some extended periods of rain, with heavy winds. Temperatures ranged between 9 - 17 degrees Celsius over the monitoring period.
Note: all predicted noise levels were reproduced from the LCR CCHNIA.Form for this track possession.
Note: Low frequency, tonality and impulsive noise tests were conducted in accordance with the INP. The measured Leq data was applied in all cases. Modifying factor (penalty) values were applied as applicable to the low frequency, tonal or impulsive components detectable or attributable to the sites noise emission. The site noise contribution reported here is inclusive of all modifying factors (if applicable).


Measured Noise Levels
NCW - P7 - Monday 16 September 2019
Excluded (Wind/Rain)
Excluded (Manual)
NML - Day (Standard Construction Hours)
NML - Day (Non-Standard Hours)
NML - Evening
NML - Night
Estimated Site Contribution @ 13 Brand St
Estimated Site Contribution @ 14 Raleigh St
Noise Level, dB(A)
90
80
70
60
50
40
30
20
00:00
02:00
04:00
06:00
08:00
10:00
12:00
14:00
16:00
18:00
20:00
22:00
00:00
Time (24 Hours)


Measured Noise Levels
NCW - P7 - Tuesday 17 September 2019
Excluded (Wind/Rain)
Excluded (Manual)
NML - Day (Standard Construction Hours)
NML - Day (Non-Standard Hours)
NML - Evening
NML - Night
Estimated Site Contribution @ 13 Brand St
Estimated Site Contribution @ 14 Raleigh St
Noise Level, dB(A)
90
80
70
60
50
40
30
20
00:00
02:00
04:00
06:00
08:00
10:00
12:00
14:00
16:00
18:00
20:00
22:00
00:00
Time (24 Hours)


Measured Noise Levels
NCW - P7 - Wednesday 18 September 2019
Excluded (Wind/Rain)
Excluded (Manual)
NML - Day (Standard Construction Hours)
NML - Day (Non-Standard Hours)
NML - Evening
NML - Night
Estimated Site Contribution @ 13 Brand St
Estimated Site Contribution @ 14 Raleigh St
Noise Level, dB(A)
90
80
70
60
50
40
30
20
00:00
02:00
04:00
06:00
08:00
10:00
12:00
14:00
16:00
18:00
20:00
22:00
00:00
Time (24 Hours)


Measured Noise Levels
NCW - P7 - Thursday 19 September 2019
Excluded (Wind/Rain)
Excluded (Manual)
NML - Day (Standard Construction Hours)
NML - Day (Non-Standard Hours)
NML - Evening
NML - Night
Estimated Site Contribution @ 13 Brand St
Estimated Site Contribution @ 14 Raleigh St
Noise Level, dB(A)
90
80
70
60
50
40
30
20
00:00
02:00
04:00
06:00
08:00
10:00
12:00
14:00
16:00
18:00
20:00
22:00
00:00
Time (24 Hours)


Measured Noise Levels
NCW - P7 - Friday 20 September 2019
Excluded (Wind/Rain)
Excluded (Manual)
NML - Day (Standard Construction Hours)
NML - Day (Non-Standard Hours)
NML - Evening
NML - Night
Estimated Site Contribution @ 13 Brand St
Estimated Site Contribution @ 14 Raleigh St
Noise Level, dB(A)
90
80
70
60
50
40
30
20
00:00
02:00
04:00
06:00
08:00
10:00
12:00
14:00
16:00
18:00
20:00
22:00
00:00
Time (24 Hours)

Appendix K – Monitoring Report (RP39a)

Noise Monitoring – OOHW P7: WE12 - 21 to 22 September 2019

Figure A1.0 – OOHW WE12 – Unattended Noise Monitoring Location – St Leonards – NCW P7 (Saturday, 21 September and Sunday, 22 September 2019)

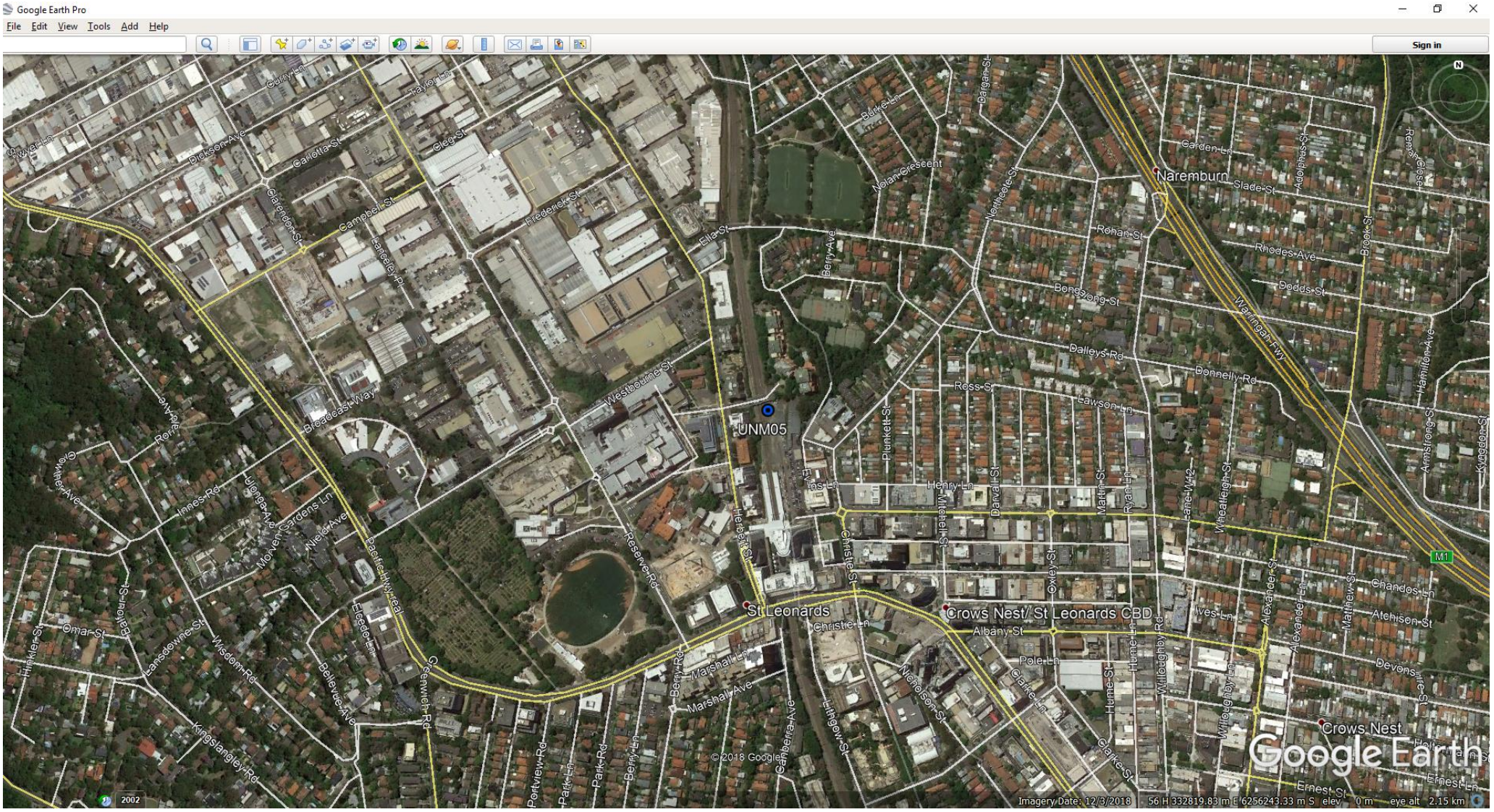
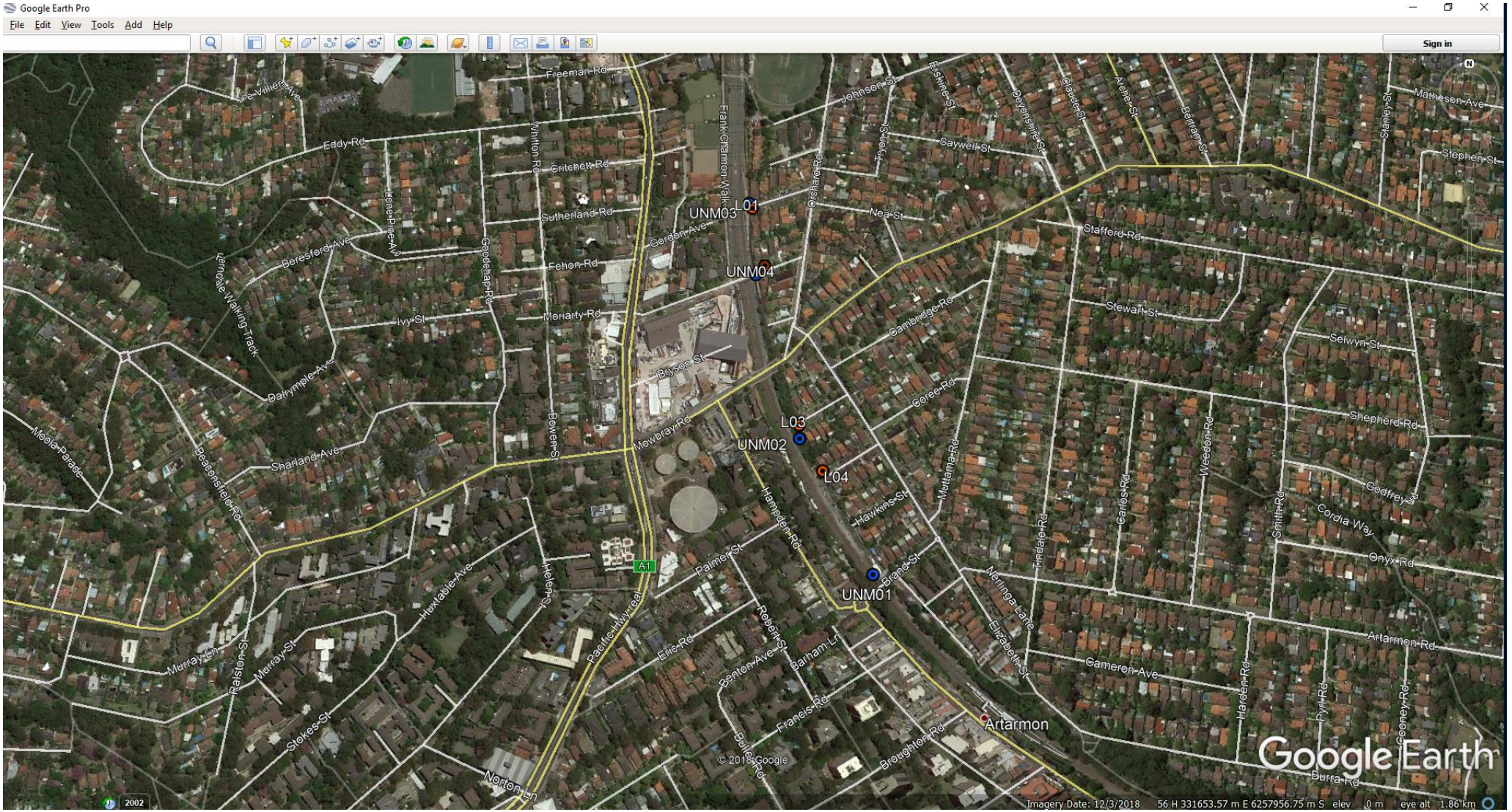


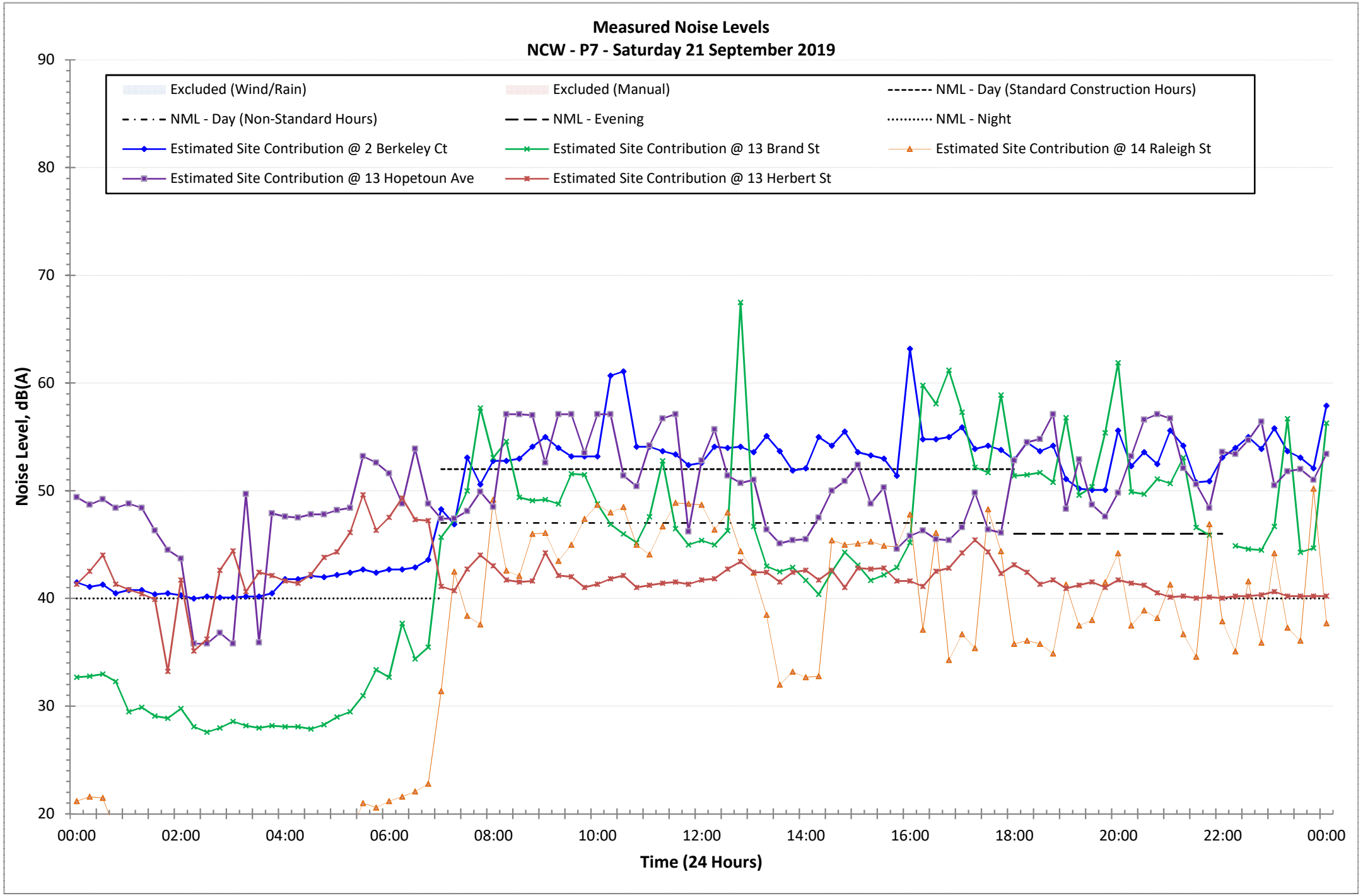
Figure A1.1 – OOHW WE12 – Attended and Unattended Noise Monitoring Locations - Artarmon – NCW P7 (Saturday, 21 September and Sunday, 22 September 2019)

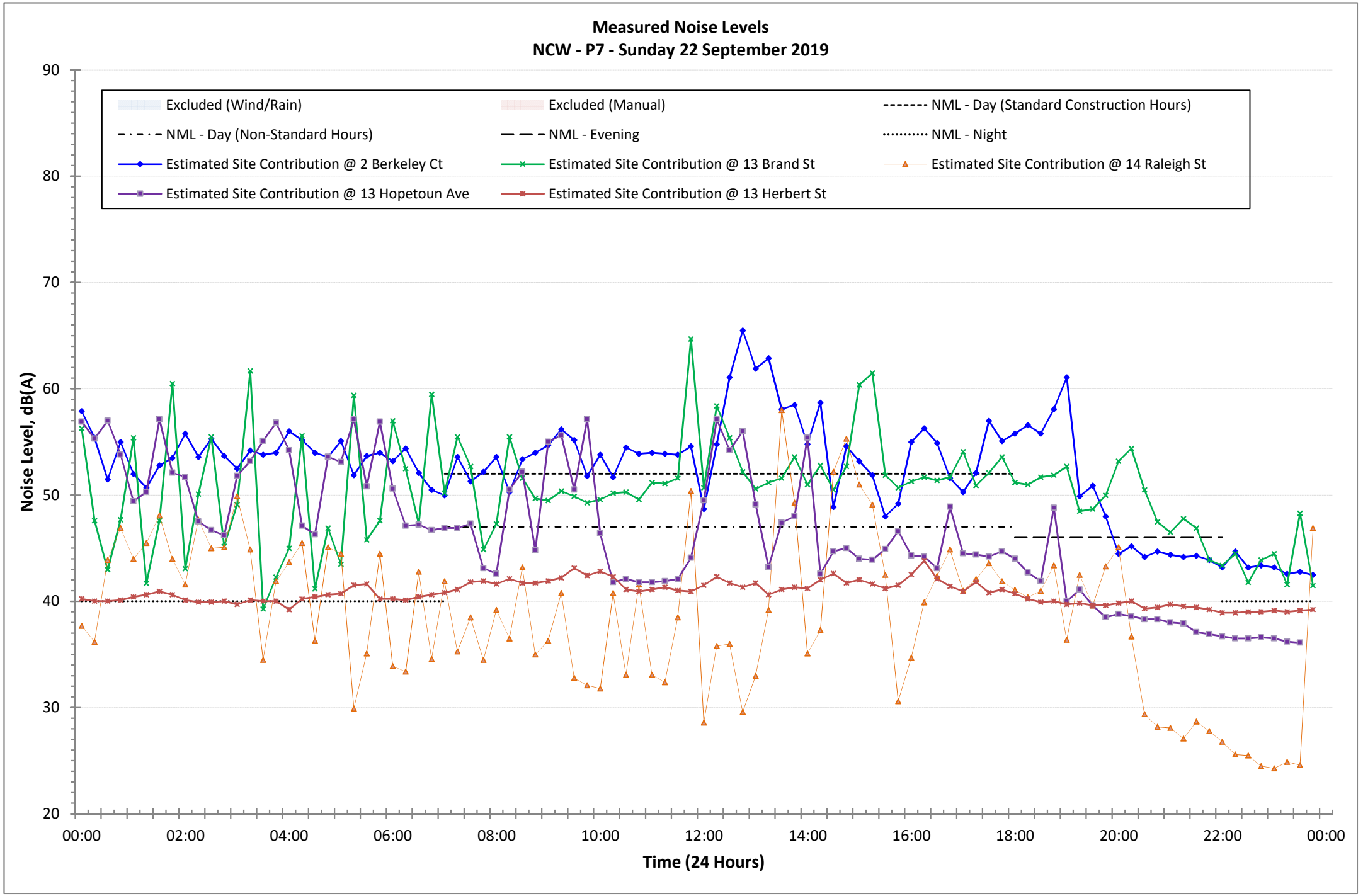


File Name	Date	Start Time	Elapsed Time	LAFmax	LAFmin	LAeq	LAF01.0	LAF10.0	LAF90.0	Percentage Site Contribution (%)	Measured Site Noise Level - LAeq, 15minute	Impulsive Modifying Factor?	Tonal Modifying Factor?	LF Modifying Factor?	Measured Site Noise Level - LAmax	NCA		Period	RBL - LA90, Period	NML - LAeq, 15minute	Predicted Site Noise Level - LAeq, 15minute	Sleep Disturbance Screening Level - LAmax	Comparison to RBL - LA90, Period	Comparison to NML - LAeq, 15minute	Comparison to Predicted Site Noise Level - LAeq, 15minute	Comparison to Sleep Disturbance Screening Level - LAmax	Description
Project 001	21/09/2019	17:30	0:15:00	85	46.8	58.2	65.2	56.7	49.1	90	58	0.0	0.0	0.0	55	NCA01	L01	Day	42	47	71	57	16	11	-13	-2	L01 - Project 001-002. Measurements taken at the end of Hopetoun Avenue. Site-related noise resulted from movement of plant and trains, train horns, and unloading of ballast. Site-related noises dominated the majority of measurements with approximately 80-100% contribution. Extraneous sources were also observed to include distant traffic and wildlife.
Project 002	21/09/2019	18:00	0:15:00	81.4	53.3	61.1	67	62.6	56.4	100	61	0.0	0.0	0.0	70	NCA01	L01	Evening	41	46	71	56	20	15	-10	14	
Project 003	21/09/2019	18:30	0:15:00	81.3	49.9	54.9	61.1	54.7	51.6	90	59	0.0	5.0	0.0	64	NCA01	L02	Evening	41	46	68	56	18	13	-9	8	L02 - Project 003. Measurement taken outside 5 Berkeley Court. Site noise contributions included clangs and bangs, generator/plant idling and train horns. Site-related noises dominated the majority of measurements with approximately 80% contribution. Extraneous sources were also observed to include distant traffic, wildlife, and insects.
Project 004	21/09/2019	20:00	0:15:00	84.3	53.4	61.2	69.1	62.2	55.3	80	60	0.0	0.0	0.0	70	NCA01	L01	Evening	41	46	71	56	19	14	-11	14	
Project 005	21/09/2019	20:30	0:15:00	83.5	55.5	62	68.6	62.9	59	95	62	0.0	0.0	0.0	64	NCA01	L01	Night	35	40	62	50	27	22	0	14	L01 - Projects 004, 005 and 006. Measurements taken at the end of Hopetoun Avenue. Site-related noise resulted from movement of plant and trains, train horns, and unloading of ballast. Site-related noises dominated the majority of measurements with approximately 95-100% contribution. Extraneous sources were also observed to include local traffic and emergency vehicles.
Project 006	21/09/2019	21:15	0:15:00	67.3	49.7	55.4	59	57.3	52.5	100	55	0.0	0.0	0.0	68	NCA01	L01	Night	35	40	71	50	20	15	-16	18	
Project 007	21/09/2019	21:45	0:15:00	73	47.9	53.4	58.9	54.8	50.4	95	58	0.0	5.0	0.0	71	NCA01	L02	Night	35	40	68	50	23	18	-10	21	L02 - Project 007. Measurement taken outside 5 Berkeley Court. Site noise contributions included plant engines idling, plant movement, unloading of ballast and train horns. Site-related noises dominated the majority of measurements with approximately 95% contribution. Extraneous sources were also observed to include passing air traffic.
Project 008	21/09/2019	22:45	0:15:00	82.5	52.9	59	64.4	61.1	54.8	95	64	0.0	5.0	0.0	58	NCA01	L01	Night	35	40	71	50	29	24	-7	8	
Project 009	21/09/2019	23:15	0:15:00	74.2	52.5	60.8	66.8	63.7	55.8	90	60	0.0	0.0	0.0	63	NCA01	L01	Night	35	40	71	50	25	20	-11	13	L01 - Projects 008 009, 010 and 011. Measurement take at the western end of Hopetoun Avenue. Construction activities inside the rail corridor included train and plant movement, horn blasts, unloading of ballast and materials, and operation of machinery. Site-related noises dominated the majority of measurement with approximately 90-100% contribution. Extraneous sources were also observed to include distant traffic, and operator generated sources.
Project 010	22/09/2019	00:00	0:15:00	78.3	55.7	62.4	68.7	64.5	59.3	95	62	0.0	0.0	0.0	68	NCA01	L01	Night	35	40	71	50	27	22	-9	18	
Project 011	22/09/2019	00:30	0:15:00	79.6	52.1	63.5	68.3	66	59.4	100	64	0.0	0.0	0.0	64	NCA01	L01	Night	35	40	71	50	29	24	-8	14	
Project 012	22/09/2019	01:00	0:15:00	69.9	51.9	55.5	59.6	56.5	53.9	100	56	0.0	0.0	0.0	59	NCA01	L02	Night	35	40	68	50	21	16	-13	9	L02 - Project 012. Measurement taken outside 5 Berkeley Court. Site noise contributions included plant operation, reverse buzzers, and idling plant. Site-related noises dominated the majority of measurements with approximately 100% contribution. No extraneous source observed.
Project 013	22/09/2019	15:45	0:15:00	71.2	50.9	58.1	64.4	61	54.3	80	57	0.0	0.0	0.0	70	NCA01	L01	Day	42	47	71	57	15	10	-14	13	L01 - Project 013. Measurement taken at the western end of Hopetoun Avenue. Site noise contributions included idling plant, reverse buzzers, movement of plant and machinery and clangs and bangs. Site noise resulted in approximately 80% of the overall measurement. Extraneous noise sources included distant traffic.
Project 014	22/09/2019	16:15	0:15:00	75	51.2	57.1	64.5	58.2	53.7	75	61	0.0	5.0	0.0	86	NCA01	L02	Day	42	47	68	57	19	14	-7	29	L02 - Project 014. Measurement taken outside 5 Berkeley Court. Site noise contributions included plant operation, reverse buzzers, ballast loading and idling plant. Site-related noises dominated the majority of measurements with approximately 75% contribution. Extraneous noise sources included distant traffic, a passing motorbike, and a nearby resident playing basketball.
Project 015	22/09/2019	16:45	0:15:00	70.8	51.6	58.3	66.1	61	54.5	75	57	0.0	0.0	0.0	68	NCA01	L03	Day	42	47	61	57	15	10	-4	11	
Project 016	22/09/2019	17:15	0:15:00	76.1	49.7	62	71.6	66.4	54	100	62	0.0	0.0	0.0	73	NCA01	L03	Day	42	47	61	57	20	15	1	16	L03 - Projects 015 and 016. Measurement undertaken outside 14 Raleigh Street. NCW site noise resulting from plant movement and operation, along with horn blasts and general clangs and bangs. Site noise contributed to approximately 75-100% of the overall measurement. Extraneous sources included birds and children playing.
Project 017	22/09/2019	17:45	0:15:00	99.9	51.7	75.3	82.9	76.9	64.8	100	75	0.0	0.0	0.0	80	NCA01	L04	Day	42	47	51	57	33	28	24	23	L04 - Project 017. Measurement taken outside 13 Drake Street. Site noise occurring as a result of truck movement and loading and use of hand tools. Site noise contributed to 100% of the overall measurement, with no extraneous sources noted.
Project 018	22/09/2019	18:30	0:15:00	68.8	49.5	54.7	59.3	56.6	52	50	57	0.0	5.0	0.0	67	NCA01	L01	Evening	41	46	71	56	16	11	-14	11	L01 - Project 018. Measurement at Hopetoun Avenue. Site noise relating to plant movement was noted, contributing to 50% of the overall measurement. Local traffic and passing aircraft were noted as extraneous sources.
Project 019	22/09/2019	19:00	0:15:00	64.3	52.4	56.4	61.7	58.2	54.3	90	56	0.0	0.0	0.0	63	NCA01	L02	Evening	41	46	68	56	15	10	-12	7	L02 - Project 019. Measurement undertaken at Berkeley Court. Site noise resulting from plant movement and engine idling, clangs and bangs, and plant operation. Distant traffic also noted. Site-related noise accounted for approximately 90% of the overall contribution.

File Name	Date	Start Time	Elapsed Time	LAFmax	LAFmin	LAeq	LAF1.0	LAF10.0	LAF90.0	Percentage Site Contribution (%)	Measured Site Noise Level - LAeq, 15minute	Impulsive Modifying Factor?	Tonal Modifying Factor?	LF Modifying Factor?	Measured Site Noise Level - LAmax	NCA		Period	RBL - LA90, Period	NML - LAeq, 15 minute	Predicted Site Noise Level - LAeq, 15minute	Sleep Disturbance Screening Level - LAmax	Comparison to RBL - LA90, Period	Comparison to NML - LAeq, 15 minute	Comparison to Predicted Site Noise Level - LAeq, 15minute	Comparison to Sleep Disturbance Screening Level - LAmax	Description
Project 020	22/09/2019	19:30	0:15:00	80.2	50.3	57.9	66.1	60.5	52.4	100	63	0.0	5.0	0.0	63	NCA01	L04	Evening	41	46	52	56	22	17	11	7	L04 - Projects 020, 021 and 022. Measurements undertaken at 13 Drake Street. Site related noise contributed to 100% of all measurements, created by voices on site, loading of plant onto trucks, generators running, and movement of plant and vehicles. No extraneous sources noted.
Project 021	22/09/2019	19:45	0:15:00	87.4	52	70.5	81.1	74.6	54.3	100	71	0.0	0.0	0.0	83	NCA01	L04	Evening	41	46	52	56	30	25	19	27	
Project 022	22/09/2019	20:10	0:15:00	98.9	50.5	74.9	82.6	77.3	70.9	100	75	0.0	0.0	0.0	93	NCA01	L04	Evening	41	46	52	56	34	29	23	37	

Weather 21-22 September 2019: Generally fine weather, low cloud coverage with calm winds. Some patchy rain in the evenings. Temperature ranged between 18-21 degrees Celsius over the monitoring periods.
Note: all predicted noise levels were reproduced from the LOR OOHWA Form for this track possession.
Note: Low frequency, tonality and impulsive noise tests were conducted in accordance with the INP. The measured Leq data was applied in all cases. Modifying factor (penalty) values were applied as applicable to the low frequency, tonal or impulsive components detectable or attributable to the sites noise emission. The site noise contribution reported here is inclusive of all modifying factors (if applicable).


Measured Noise Levels
NCW - P7 - Saturday 21 September 2019
Excluded (Wind/Rain)
Excluded (Manual)
NML - Day (Standard Construction Hours)
NML - Day (Non-Standard Hours)
NML - Evening
NML - Night
Estimated Site Contribution @ 2 Berkeley Ct
Estimated Site Contribution @ 13 Brand St
Estimated Site Contribution @ 14 Raleigh St
Estimated Site Contribution @ 13 Hopetoun Ave
Estimated Site Contribution @ 13 Herbert St
Noise Level, dB(A)
90
80
70
60
50
40
30
20
00:00
02:00
04:00
06:00
08:00
10:00
12:00
14:00
16:00
18:00
20:00
22:00
00:00
Time (24 Hours)

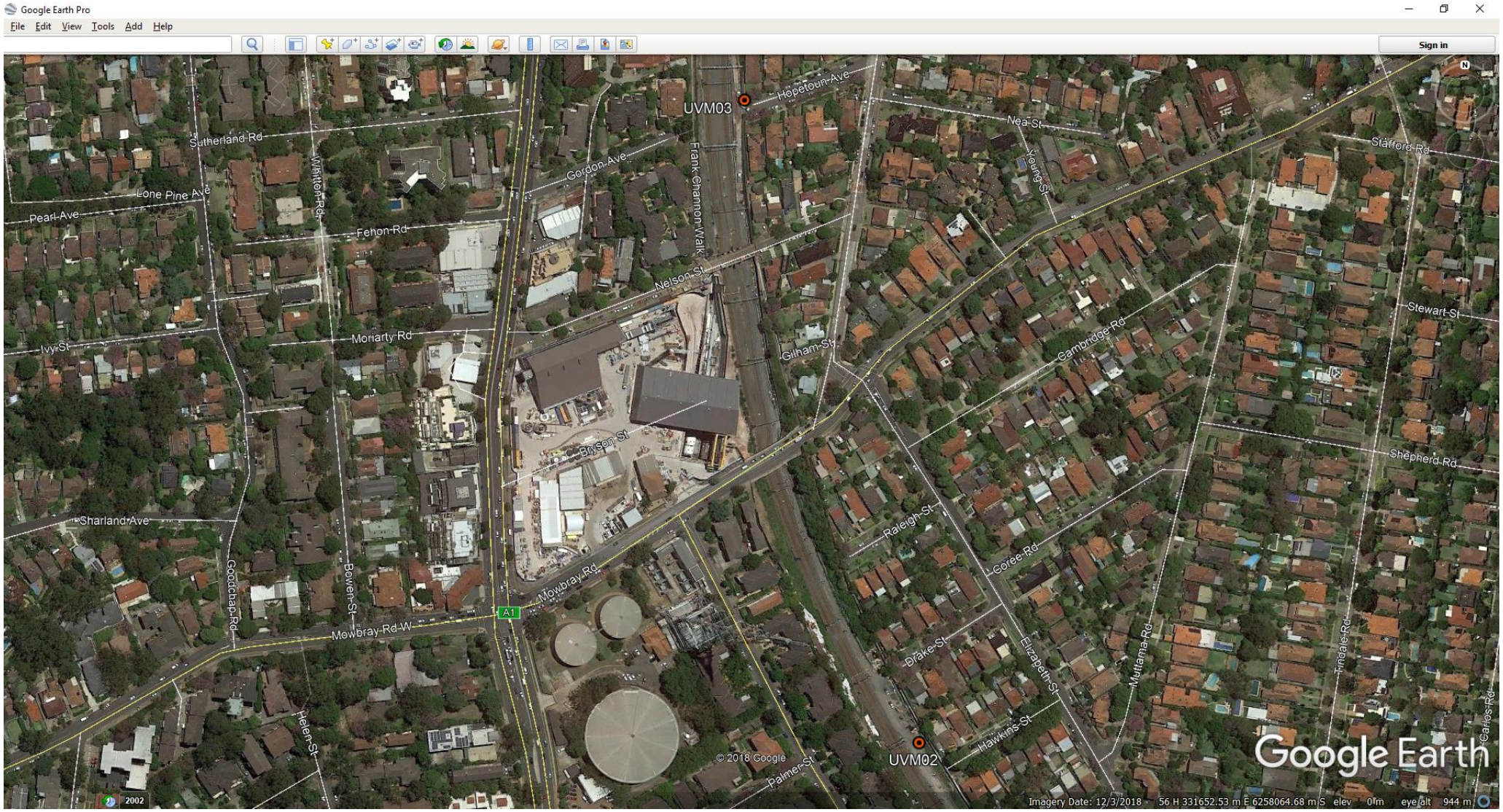

Measured Noise Levels
NCW - P7 - Sunday 22 September 2019
Excluded (Wind/Rain)
Excluded (Manual)
NML - Day (Standard Construction Hours)
NML - Day (Non-Standard Hours)
NML - Evening
NML - Night
Estimated Site Contribution @ 2 Berkeley Ct
Estimated Site Contribution @ 13 Brand St
Estimated Site Contribution @ 14 Raleigh St
Estimated Site Contribution @ 13 Hopetoun Ave
Estimated Site Contribution @ 13 Herbert St
Noise Level, dB(A)
90
80
70
60
50
40
30
20
00:00
02:00
04:00
06:00
08:00
10:00
12:00
14:00
16:00
18:00
20:00
22:00
00:00
Time (24 Hours)

Appendix L – Monitoring Report (RP39b)

Vibration Monitoring – OOHW P7: WE12 - 21 to 22 September 2019

Figure A1.0 – OOHW WE12 – Unattended Vibration Monitoring Locations

– NCW P7 (Saturday, 21 September to Sunday, 22 September 2019)



Event Report - NCW WE12 UVM02

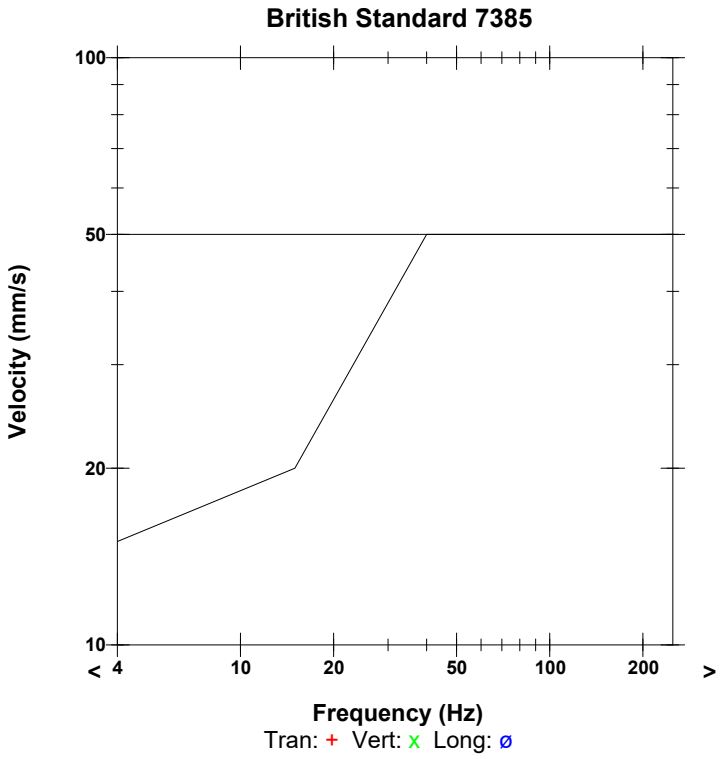
Histogram Start Time	18:06:48 September 20, 2019	**Serial Number**	BE13734 V 10.72-8.17 MiniMate Plus
Histogram Finish Time	06:00:01 September 21, 2019	**Battery Level**	6.8 Volts
Number of Intervals	714.00 at 1 minute	**Unit Calibration**	May 13, 2019 by Saros Int.
Range	Geo:31.75 mm/s	**File Name**	O734I4AV.NC0
Sample Rate	1024sps		

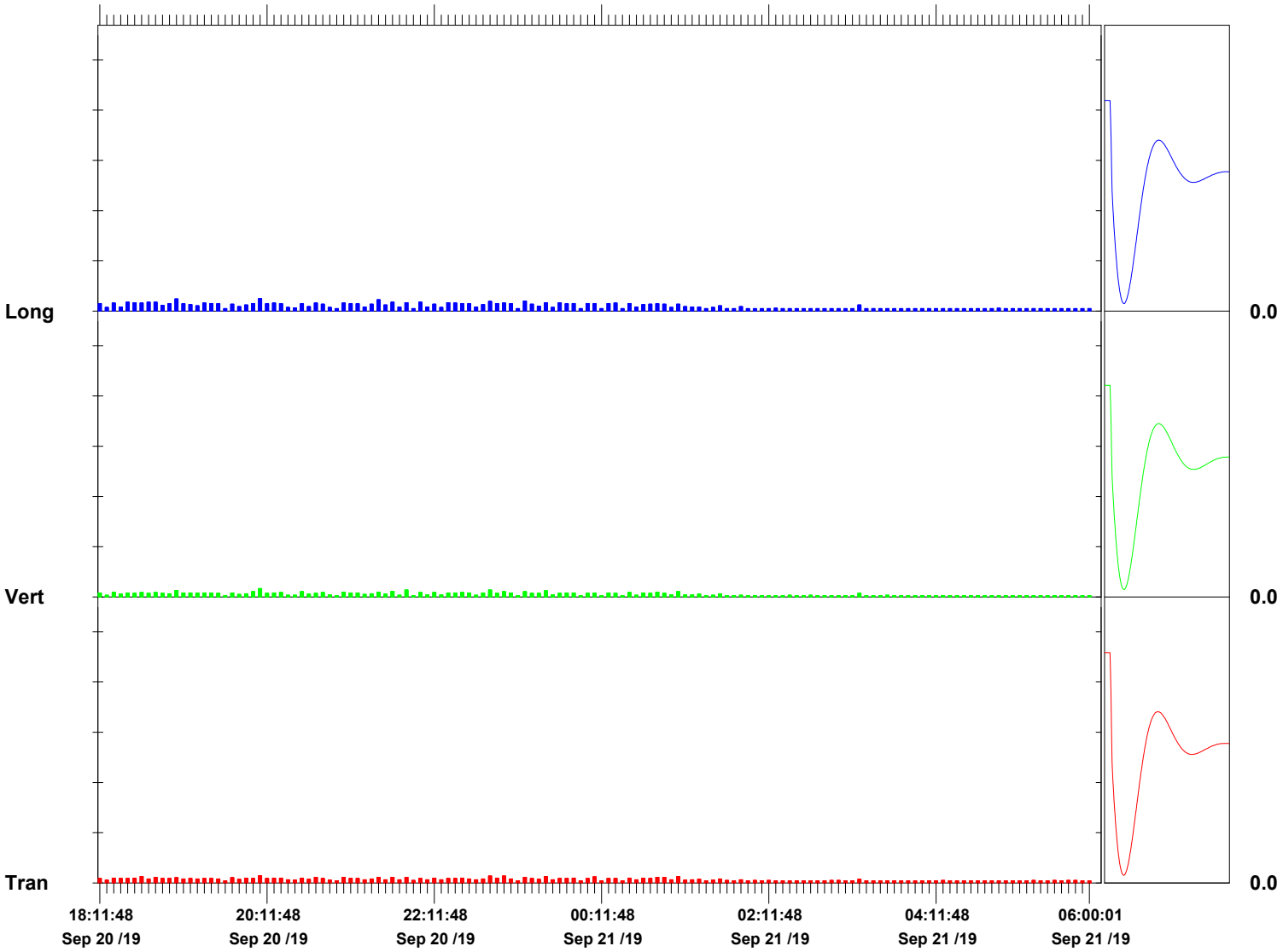
Notes
Location:
Client:
User Name:
General:

Extended Notes

	Tran	Vert	Long	
PPV	0.286	0.333	0.492	mm/s
ZC Freq	28	51	43	Hz
Date	Sep 20 /19	Sep 20 /19	Sep 20 /19	
Time	20:04:48	20:04:48	20:04:48	
Sensor Check	Passed	Passed	Passed	
Frequency	7.5	7.5	7.4	Hz
Overswing Ratio	3.9	3.7	3.9	

Peak Vector Sum 0.502 mm/s on September 20, 2019 at 20:04:48





Time Scale: 5 minutes /div **Amplitude Scale:** Geo: 2.000 mm/s/div Sensor Check

Event Report - NCW WE12 UVM02

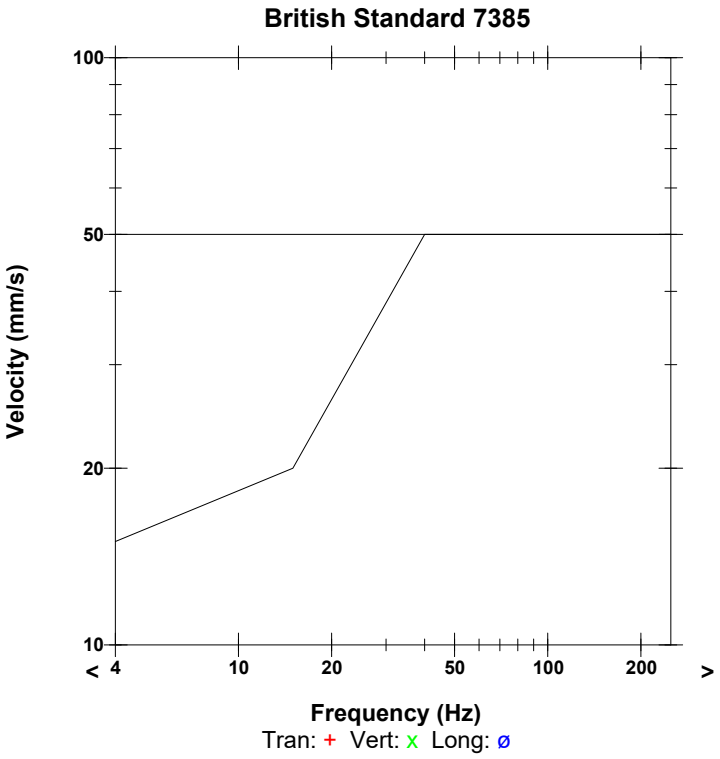
Histogram Start Time	06:06:49 September 21, 2019	**Serial Number**	BE13734 V 10.72-8.17 MiniMate Plus
Histogram Finish Time	16:45:31 September 21, 2019	**Battery Level**	6.7 Volts
Number of Intervals	638.00 at 1 minute	**Unit Calibration**	May 13, 2019 by Saros Int.
Range	Geo:31.75 mm/s	**File Name**	O734I4BS.ZD0
Sample Rate	1024sps		

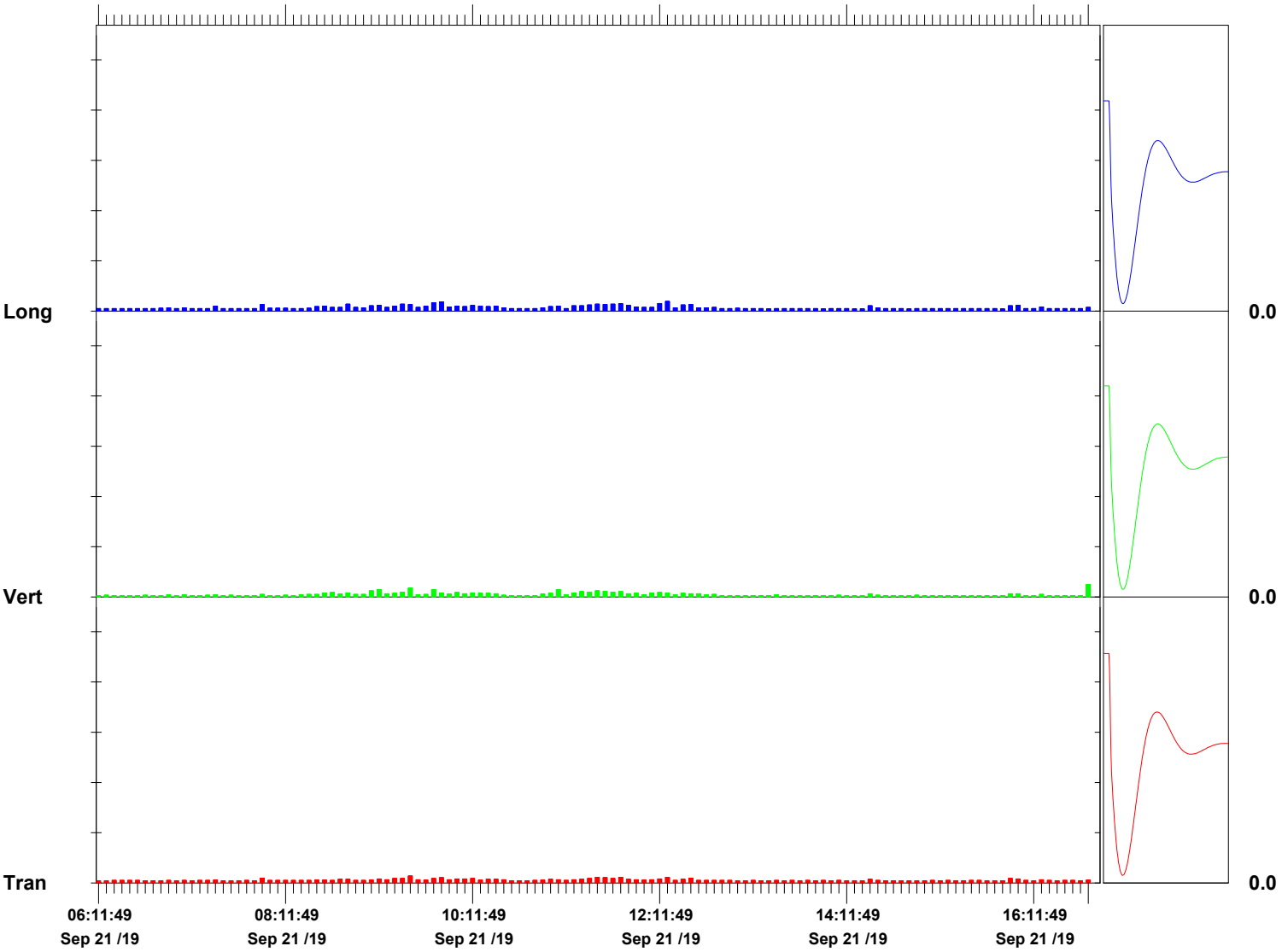
Notes
Location:
Client:
User Name:
General:

Extended Notes

	Tran	Vert	Long	
PPV	0.270	0.492	0.381	mm/s
ZC Freq	20	5.1	20	Hz
Date	Sep 21 /19	Sep 21 /19	Sep 21 /19	
Time	09:27:49	16:43:49	12:12:49	
Sensor Check	Passed	Passed	Passed	
Frequency	7.5	7.5	7.4	Hz
Overswing Ratio	3.9	3.7	4.0	

Peak Vector Sum 0.496 mm/s on September 21, 2019 at 16:43:49





Time Scale: 5 minutes /div **Amplitude Scale:** Geo: 2.000 mm/s/div Sensor Check

Event Report - NCW WE12 UVM02

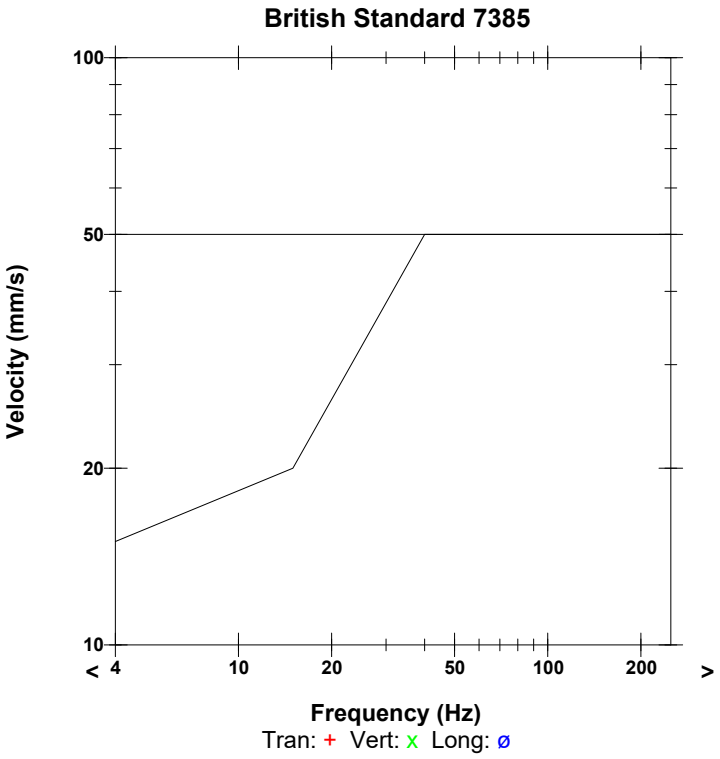
Histogram Start Time	16:50:59 September 21, 2019	**Serial Number**	BE13734 V 10.72-8.17 MiniMate Plus
Histogram Finish Time	18:00:00 September 21, 2019	**Battery Level**	6.8 Volts
Number of Intervals	70.00 at 1 minute	**Unit Calibration**	May 13, 2019 by Saros Int.
Range	Geo:31.75 mm/s	**File Name**	O734I4CM.SZ0
Sample Rate	1024sps		

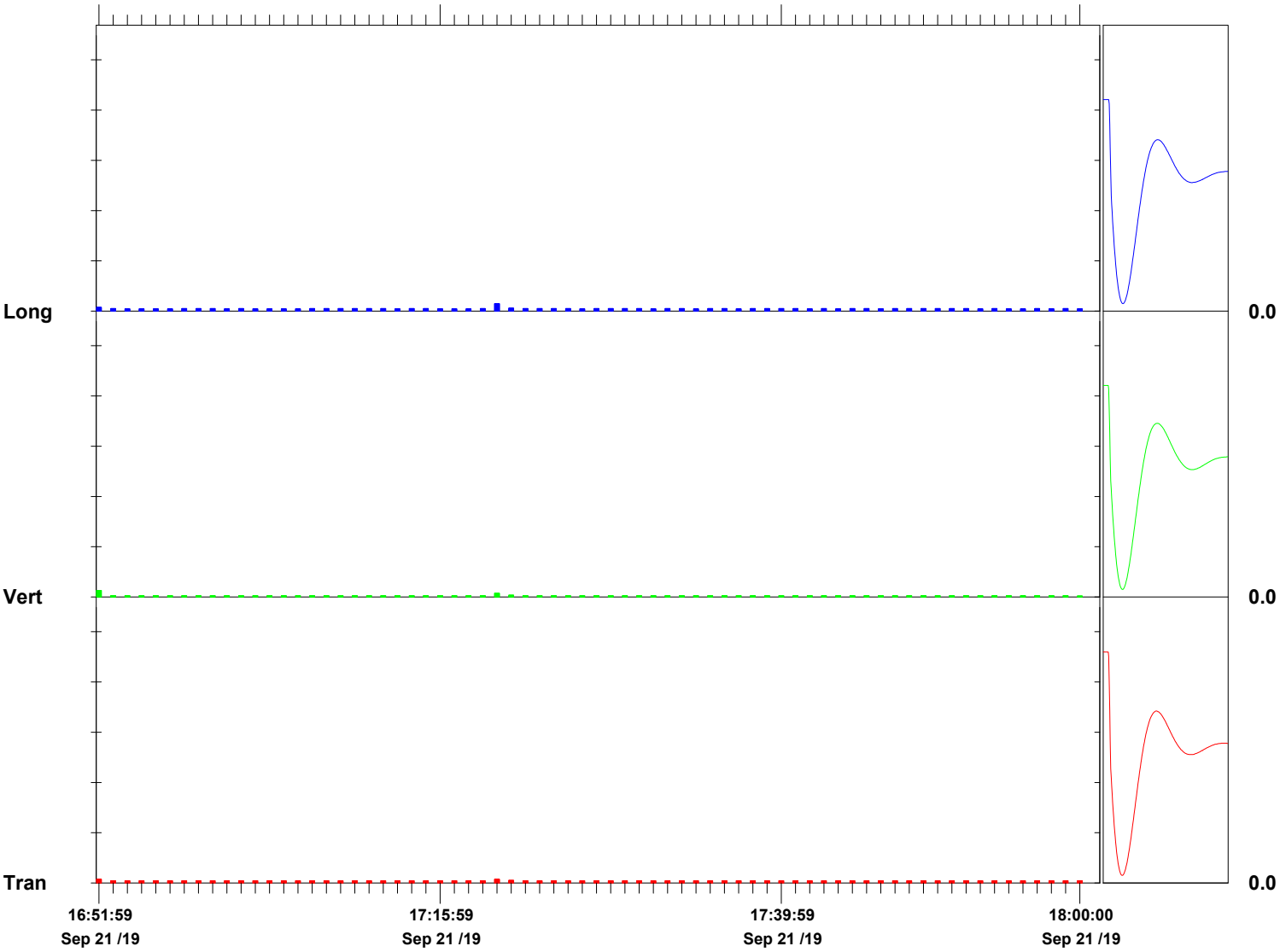
Notes
Location:
Client:
User Name:
General:

Extended Notes

	Tran	Vert	Long	
PPV	0.143	0.254	0.286	mm/s
ZC Freq	21	30	30	Hz
Date	Sep 21 /19	Sep 21 /19	Sep 21 /19	
Time	16:51:59	16:51:59	17:19:59	
Sensor Check	Passed	Passed	Passed	
Frequency	7.6	7.5	7.4	Hz
Overswing Ratio	3.8	3.6	3.9	

Peak Vector Sum 0.290 mm/s on September 21, 2019 at 17:19:59





Time Scale: 1 minute /div **Amplitude Scale:** Geo: 2.000 mm/s/div Sensor Check

Event Report - NCW WE12 UVM02

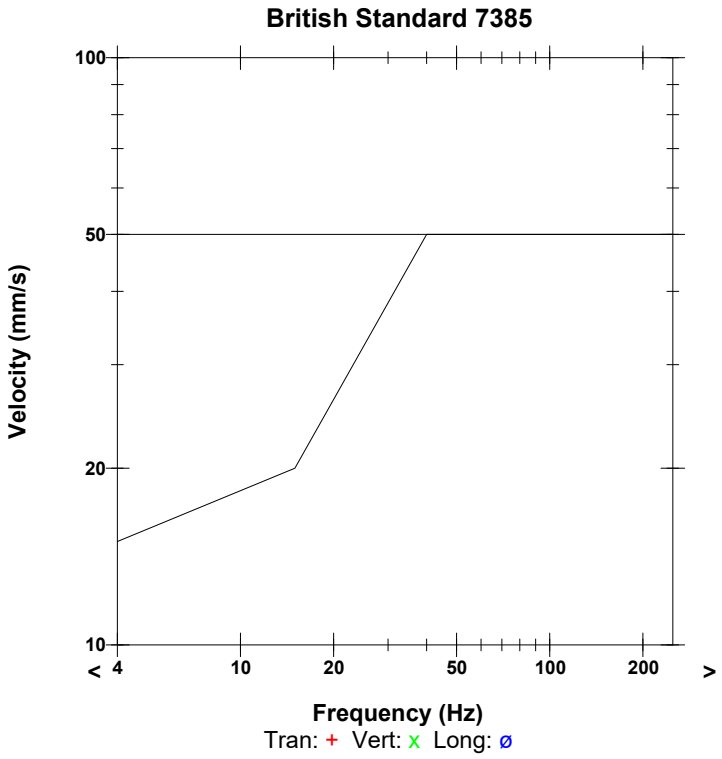
Histogram Start Time	18:06:48 September 21, 2019	**Serial Number**	BE13734 V 10.72-8.17 MiniMate Plus
Histogram Finish Time	06:00:01 September 22, 2019	**Battery Level**	6.3 Volts
Number of Intervals	714.00 at 1 minute	**Unit Calibration**	May 13, 2019 by Saros Int.
Range	Geo:31.75 mm/s	**File Name**	O734I4CQ.BC0
Sample Rate	1024sps		

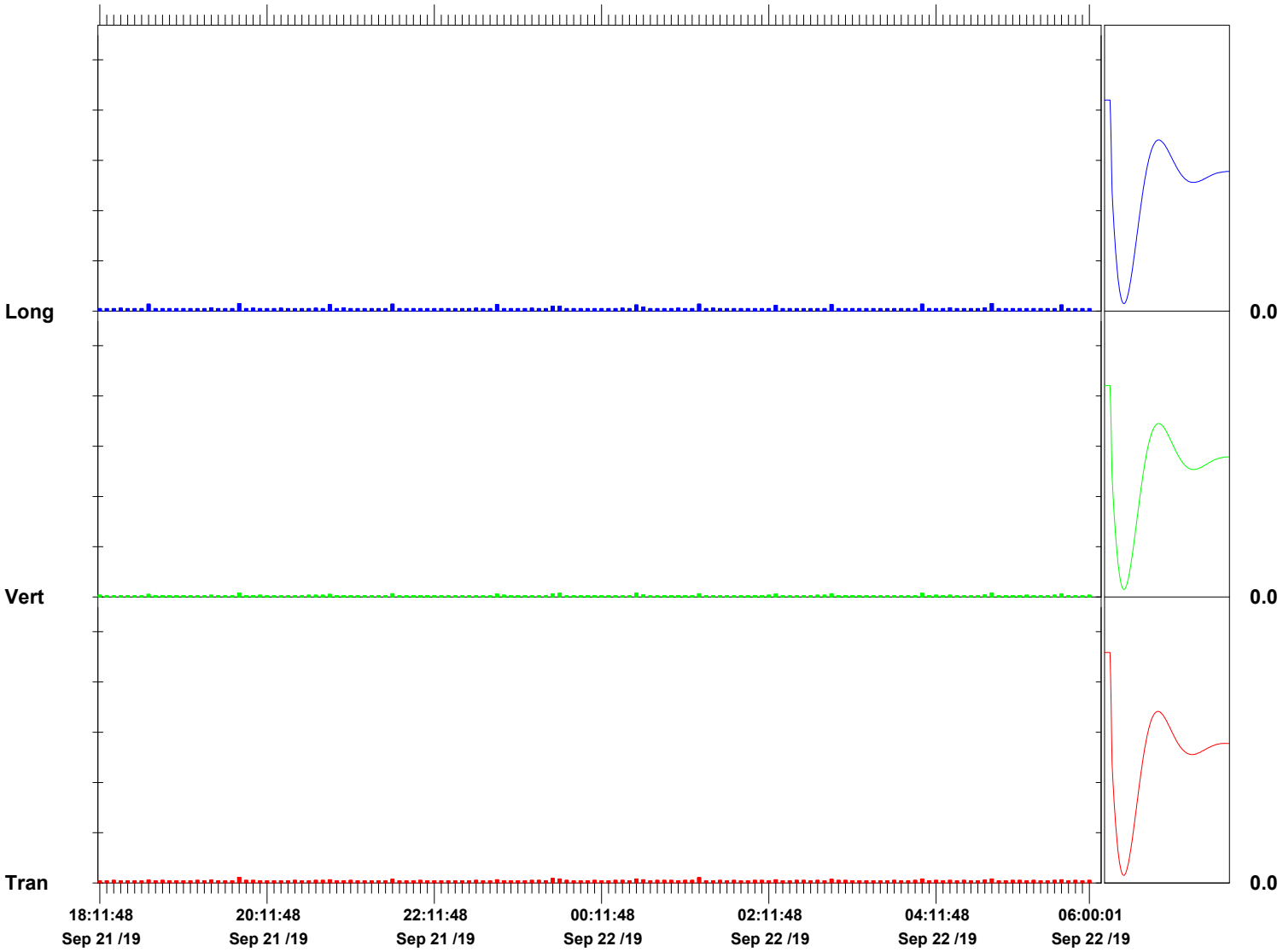
Notes
Location:
Client:
User Name:
General:

Extended Notes

	Tran	Vert	Long	
PPV	0.222	0.159	0.302	mm/s
ZC Freq	34	57	16	Hz
Date	Sep 21 /19	Sep 21 /19	Sep 21 /19	
Time	19:48:48	19:48:48	19:48:48	
Sensor Check	Passed	Passed	Passed	
Frequency	7.5	7.5	7.4	Hz
Overswing Ratio	3.9	3.7	3.9	

Peak Vector Sum 0.310 mm/s on September 21, 2019 at 19:48:48





Time Scale: 5 minutes /div **Amplitude Scale:** Geo: 2.000 mm/s/div Sensor Check

Event Report - NCW WE12 UVM02

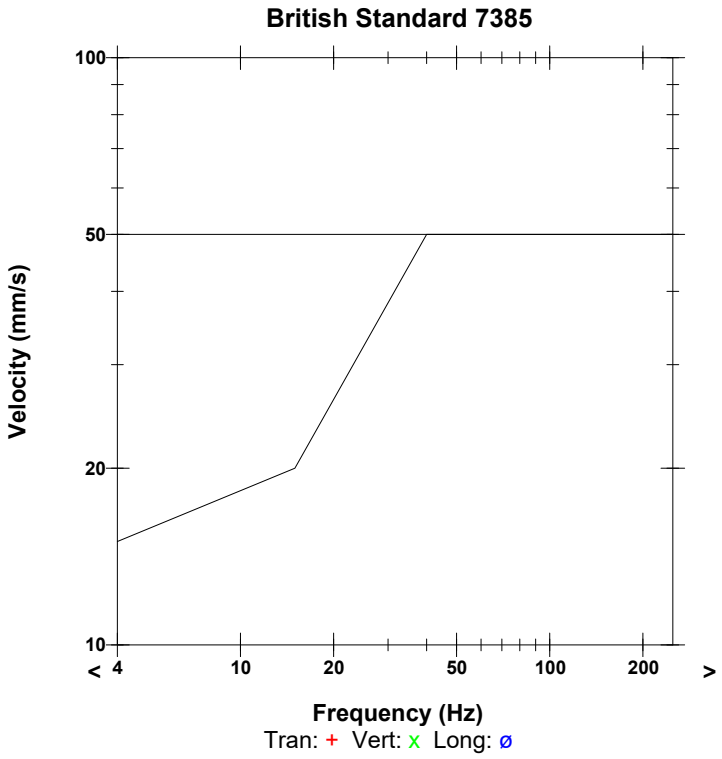
Histogram Start Time	06:06:49 September 22, 2019	**Serial Number**	BE13734 V 10.72-8.17 MiniMate Plus
Histogram Finish Time	18:00:00 September 22, 2019	**Battery Level**	6.4 Volts
Number of Intervals	714.00 at 1 minute	**Unit Calibration**	May 13, 2019 by Saros Int.
Range	Geo:31.75 mm/s	**File Name**	O734I4DN.ND0
Sample Rate	1024sps		

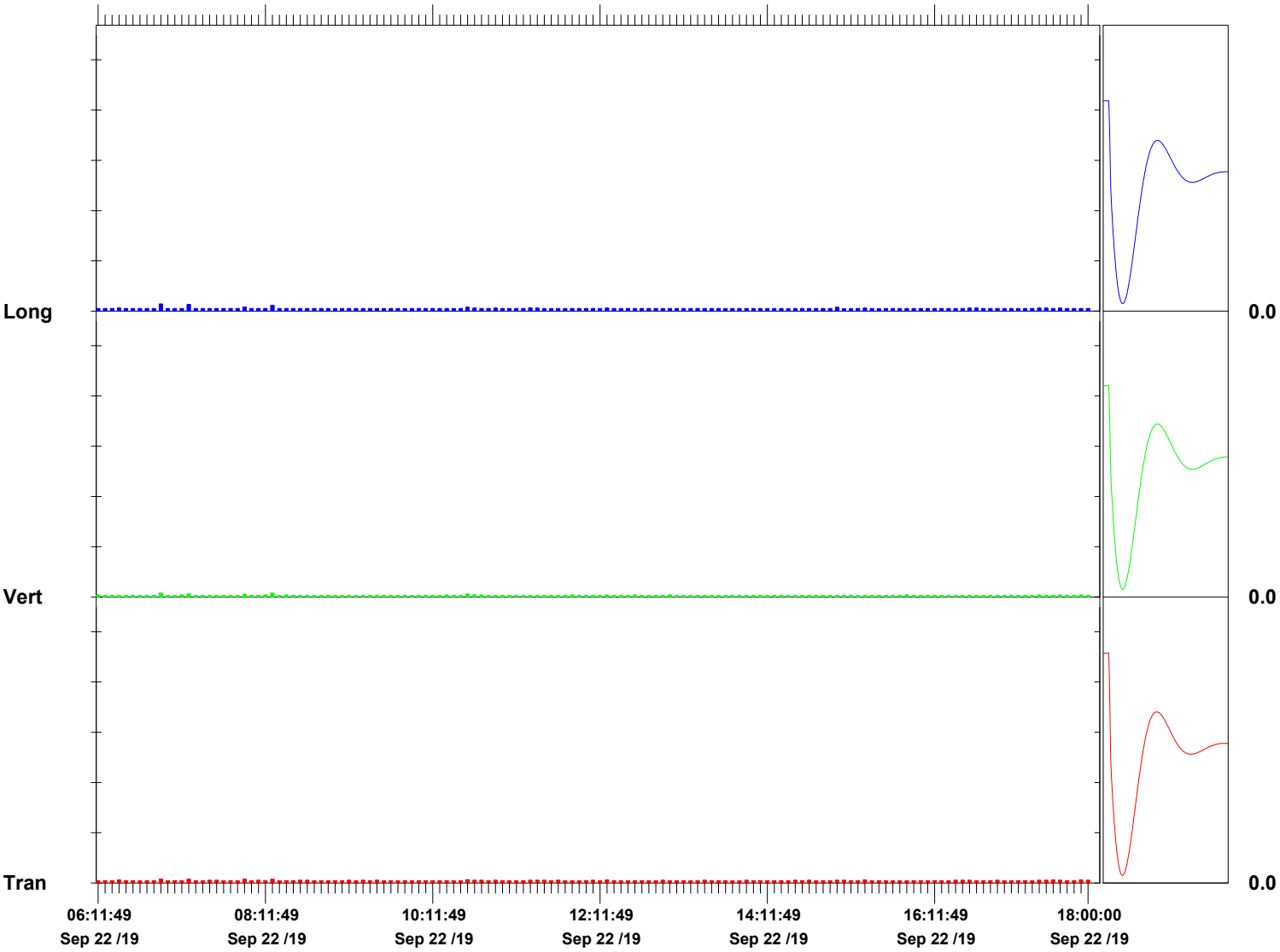
Notes
Location:
Client:
User Name:
General:

Extended Notes

	Tran	Vert	Long	
PPV	0.159	0.143	0.270	mm/s
ZC Freq	32	43	37	Hz
Date	Sep 22 /19	Sep 22 /19	Sep 22 /19	
Time	06:53:49	06:53:49	06:53:49	
Sensor Check	Passed	Passed	Passed	
Frequency	7.5	7.5	7.4	Hz
Overswing Ratio	3.9	3.7	4.0	

Peak Vector Sum 0.283 mm/s on September 22, 2019 at 06:53:49





Time Scale: 5 minutes /div **Amplitude Scale:** Geo: 2.000 mm/s/div Sensor Check

Event Report - NCW WE12 UVM02

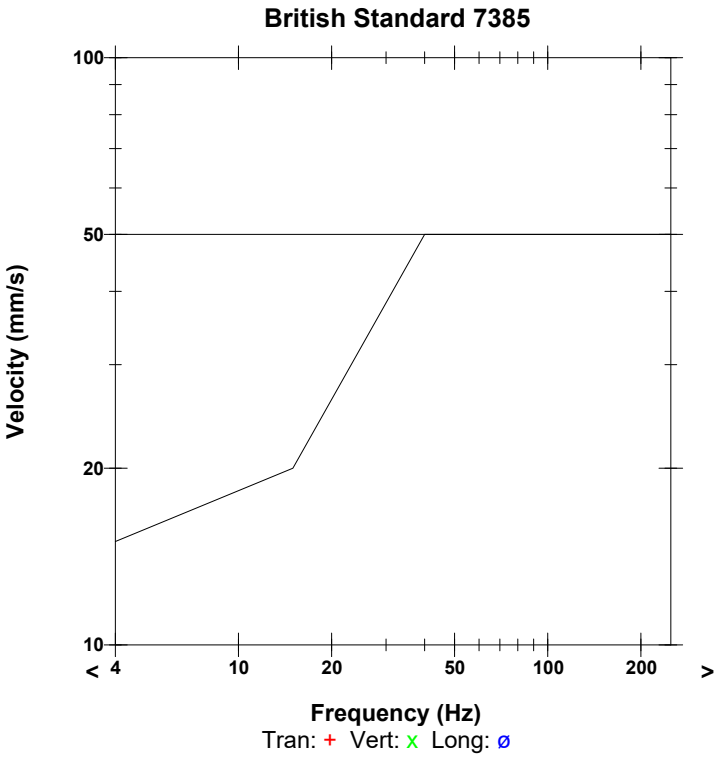
Histogram Start Time	18:06:48 September 22, 2019	**Serial Number**	BE13734 V 10.72-8.17 MiniMate Plus
Histogram Finish Time	06:00:01 September 23, 2019	**Battery Level**	6.2 Volts
Number of Intervals	714.00 at 1 minute	**Unit Calibration**	May 13, 2019 by Saros Int.
Range	Geo:31.75 mm/s	**File Name**	O734I4EK.ZC0
Sample Rate	1024sps		

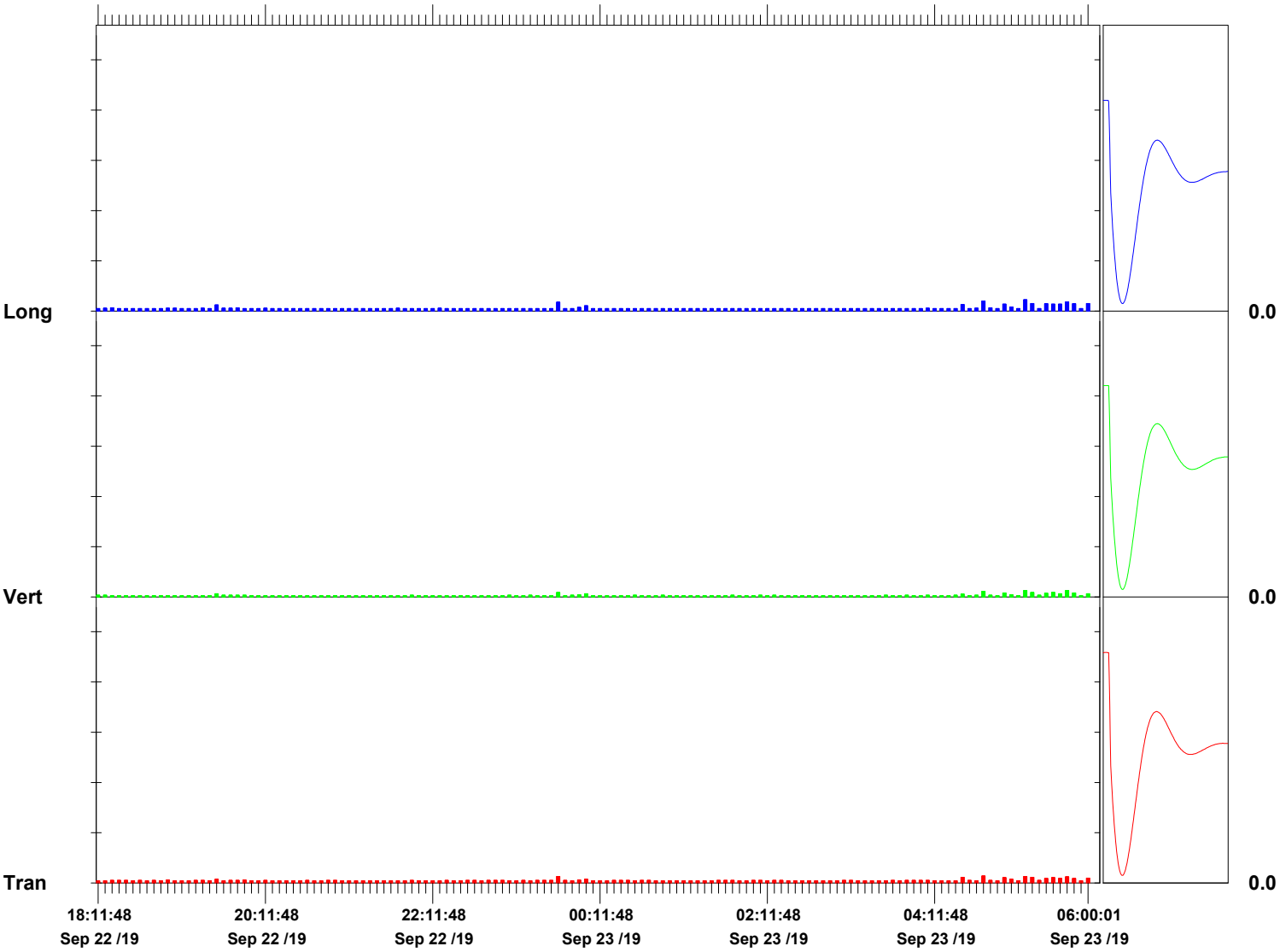
Notes
Location:
Client:
User Name:
General:

Extended Notes

	Tran	Vert	Long	
PPV	0.270	0.254	0.444	mm/s
ZC Freq	27	43	26	Hz
Date	Sep 23 /19	Sep 23 /19	Sep 23 /19	
Time	04:44:48	05:13:48	05:13:48	
Sensor Check	Passed	Passed	Passed	
Frequency	7.6	7.5	7.4	Hz
Overswing Ratio	3.9	3.7	3.9	

Peak Vector Sum 0.470 mm/s on September 23, 2019 at 05:13:48





Time Scale: 5 minutes /div **Amplitude Scale:** Geo: 2.000 mm/s/div Sensor Check

Event Report - NCW WE12 UVM03

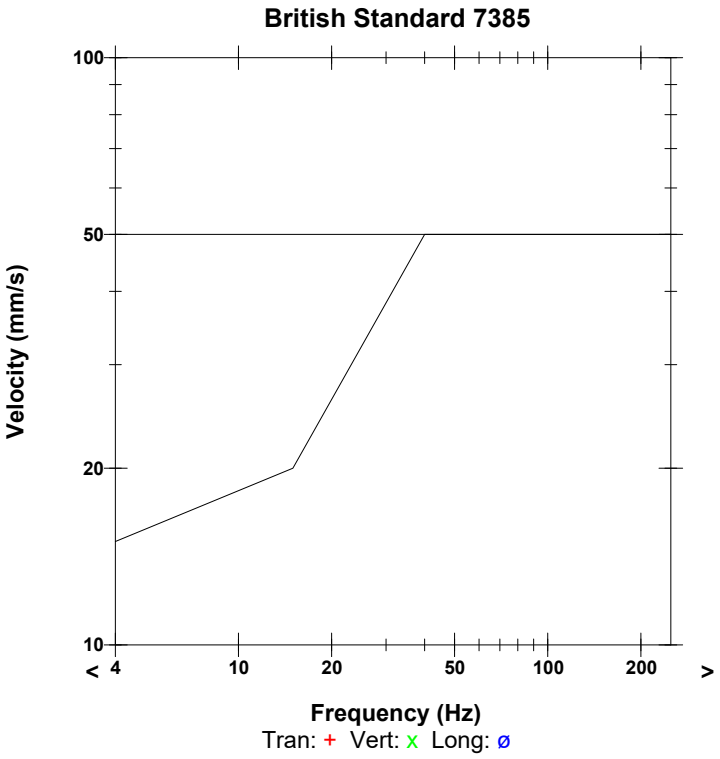
Histogram Start Time	06:03:59 September 21, 2019	**Serial Number**	BE12733 V 10.72-8.17 MiniMate Plus
Histogram Finish Time	18:00:00 September 21, 2019	**Battery Level**	6.7 Volts
Number of Intervals	717.00 at 1 minute	**Unit Calibration**	May 13, 2019 by Saros Int.
Range	Geo:31.75 mm/s	**File Name**	N733I4BS.UN0H
Sample Rate	1024sps		

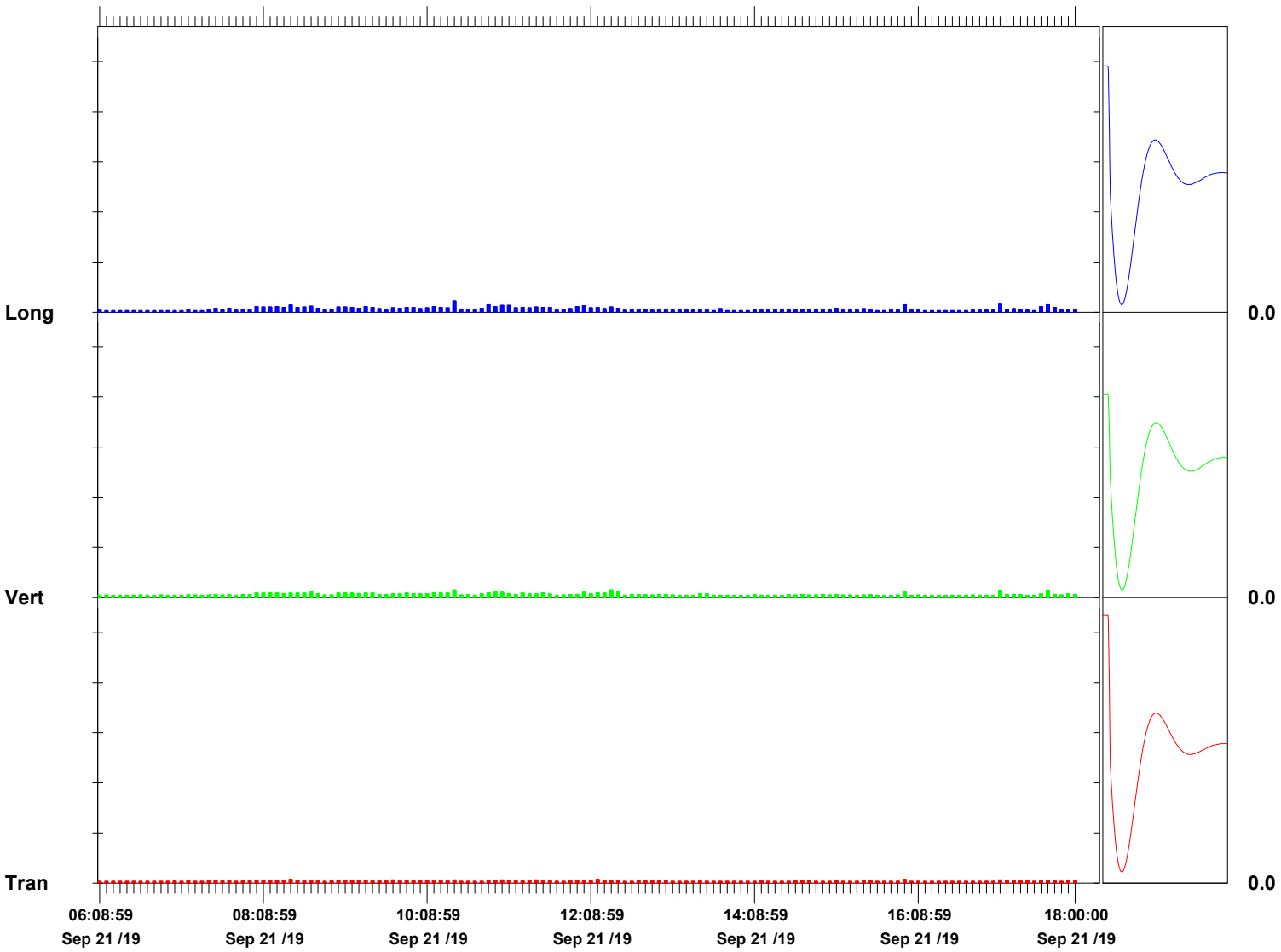
Notes
Location:
Client:
User Name:
General:

Extended Notes

	Tran	Vert	Long	
PPV	0.143	0.302	0.444	mm/s
ZC Freq	21	32	24	Hz
Date	Sep 21 /19	Sep 21 /19	Sep 21 /19	
Time	08:24:59	10:26:59	10:26:59	
Sensor Check	Passed	Passed	Passed	
Frequency	7.6	7.6	7.7	Hz
Overswing Ratio	3.9	3.5	3.8	

Peak Vector Sum 0.533 mm/s on September 21, 2019 at 10:26:59





Time Scale: 5 minutes /div **Amplitude Scale:** Geo: 2.000 mm/s/div Sensor Check

Event Report - NCW WE12 UVM03

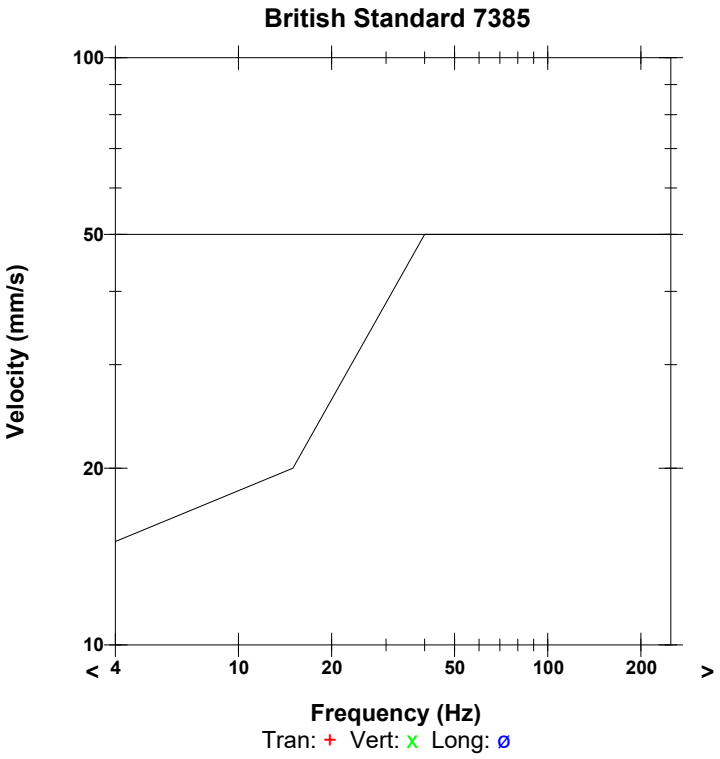
Histogram Start Time	18:04:01 September 21, 2019	**Serial Number**	BE12733 V 10.72-8.17 MiniMate Plus
Histogram Finish Time	06:00:01 September 22, 2019	**Battery Level**	6.8 Volts
Number of Intervals	716.00 at 1 minute	**Unit Calibration**	May 13, 2019 by Saros Int.
Range	Geo:31.75 mm/s	**File Name**	N733I4CQ.6P0H
Sample Rate	1024sps		

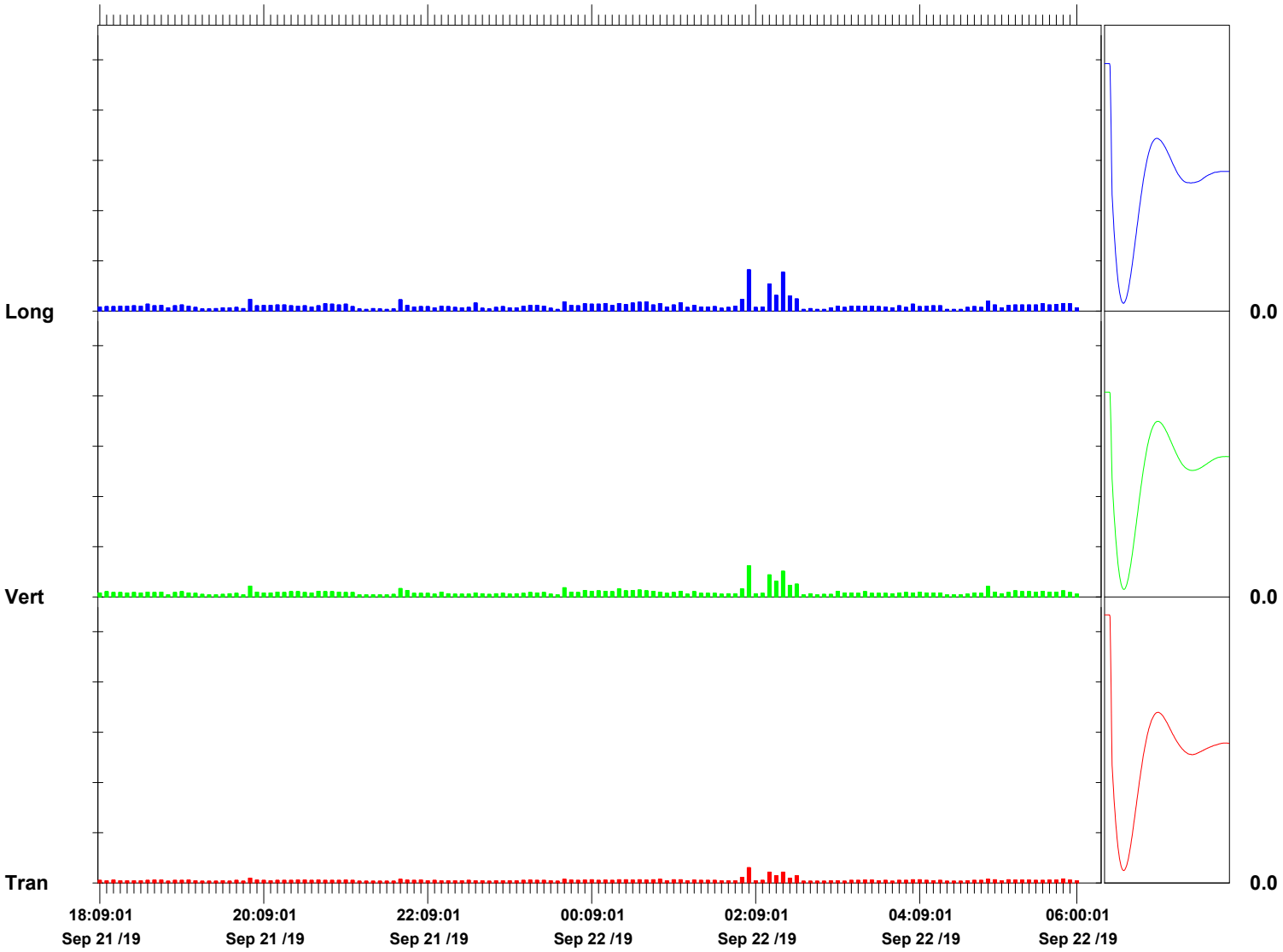
Notes
Location:
Client:
User Name:
General:

Extended Notes

	Tran	Vert	Long	
PPV	0.603	1.238	1.635	mm/s
ZC Freq	28	28	32	Hz
Date	Sep 22 /19	Sep 22 /19	Sep 22 /19	
Time	02:02:01	02:01:01	02:01:01	
Sensor Check	Passed	Passed	Passed	
Frequency	7.6	7.6	7.7	Hz
Overswing Ratio	3.8	3.5	3.8	

Peak Vector Sum 1.931 mm/s on September 22, 2019 at 02:01:01





Time Scale: 5 minutes /div **Amplitude Scale:** Geo: 2.000 mm/s/div Sensor Check

Event Report - NCW WE12 - UVM03

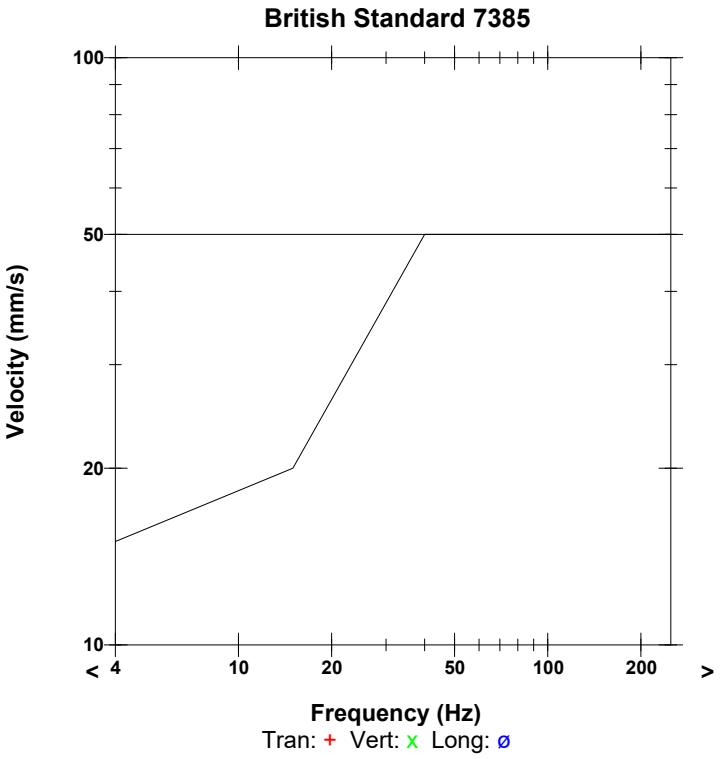
Histogram Start Time	06:04:00 September 22, 2019	**Serial Number**	BE12733 V 10.72-8.17 MiniMate Plus
Histogram Finish Time	18:00:00 September 22, 2019	**Battery Level**	6.7 Volts
Number of Intervals	716.00 at 1 minute	**Unit Calibration**	May 13, 2019 by Saros Int.
Range	Geo:31.75 mm/s	**File Name**	N733I4DN.IO0H
Sample Rate	1024sps		

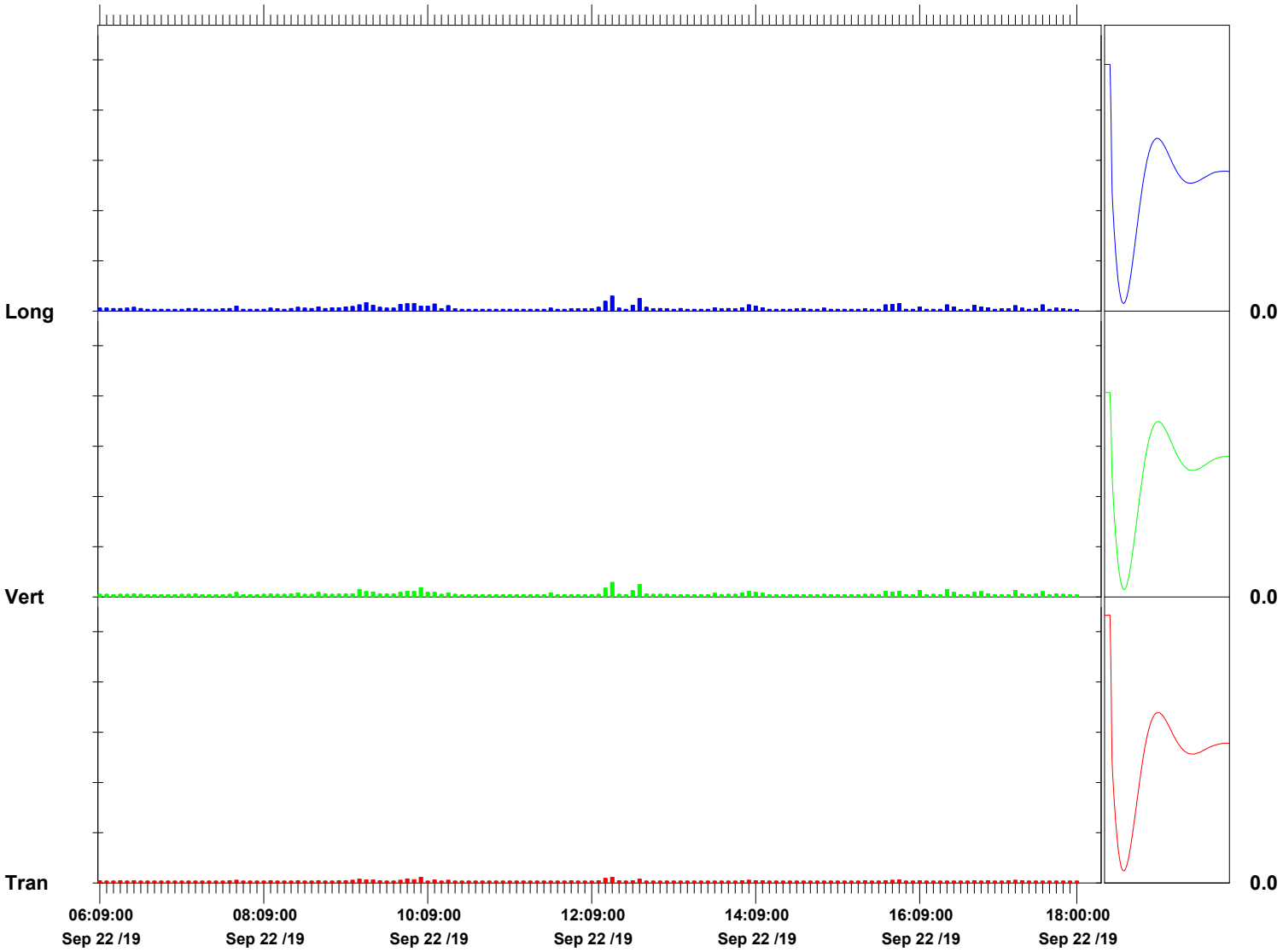
Notes
Location:
Client:
User Name:
General:

Extended Notes

	Tran	Vert	Long	
PPV	0.222	0.571	0.587	mm/s
ZC Freq	21	39	30	Hz
Date	Sep 22 /19	Sep 22 /19	Sep 22 /19	
Time	10:02:00	12:20:00	12:21:00	
Sensor Check	Passed	Passed	Passed	
Frequency	7.5	7.6	7.7	Hz
Overswing Ratio	3.9	3.5	3.8	

Peak Vector Sum 0.697 mm/s on September 22, 2019 at 12:20:00





Time Scale: 5 minutes /div **Amplitude Scale:** Geo: 2.000 mm/s/div Sensor Check

Event Report - NCW WE12 - UVM03

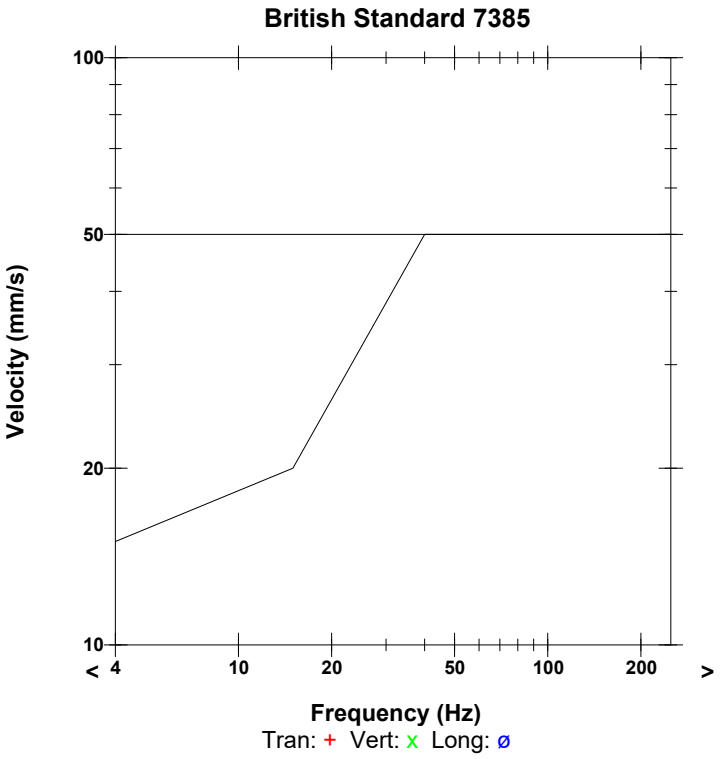
Histogram Start Time	18:03:53 September 22, 2019	**Serial Number**	BE12733 V 10.72-8.17 MiniMate Plus
Histogram Finish Time	06:00:01 September 23, 2019	**Battery Level**	6.8 Volts
Number of Intervals	717.00 at 1 minute	**Unit Calibration**	May 13, 2019 by Saros Int.
Range	Geo:31.75 mm/s	**File Name**	N733I4EK.UH0H
Sample Rate	1024sps		

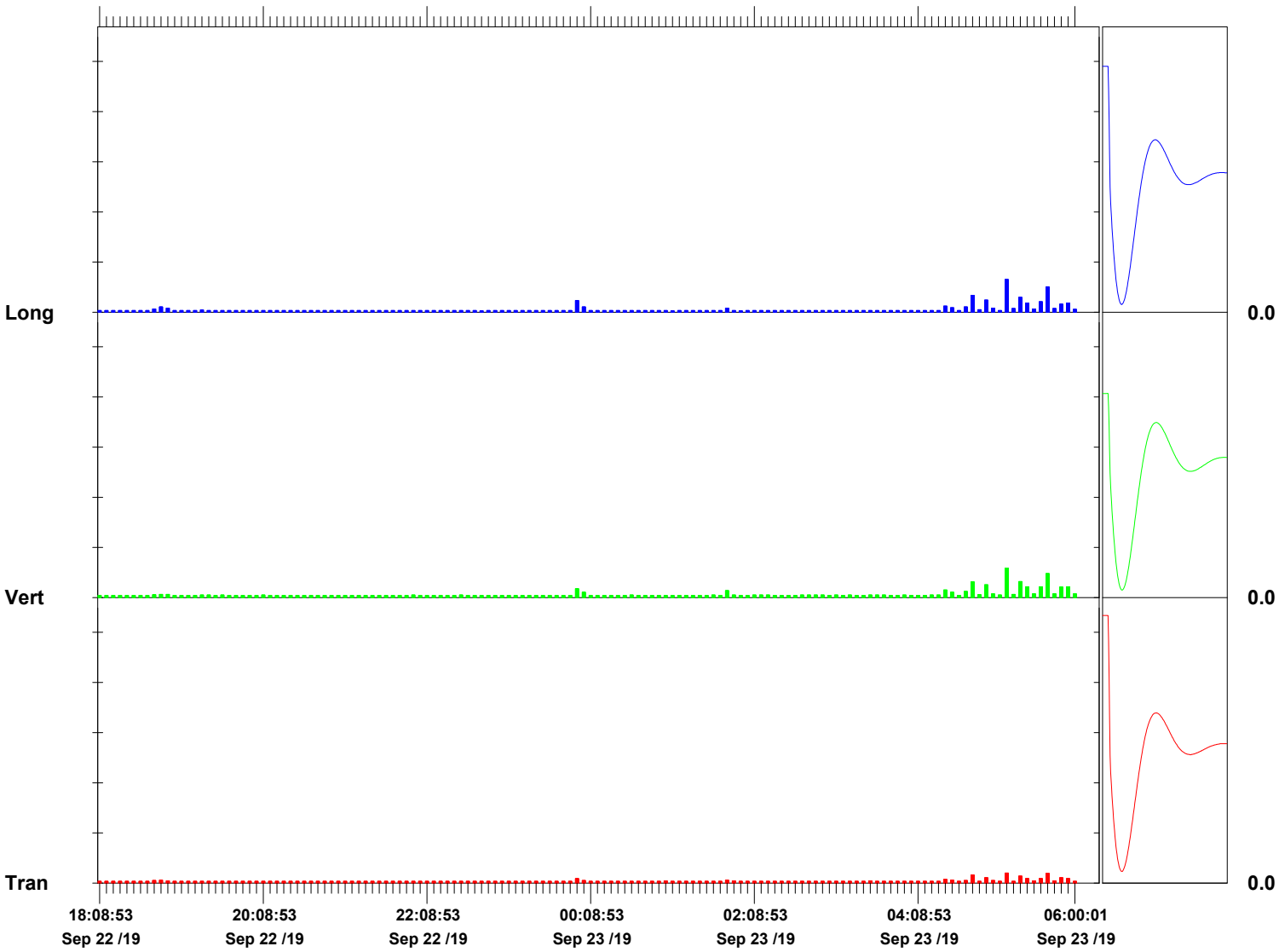
Notes
Location:
Client:
User Name:
General:

Extended Notes

	Tran	Vert	Long	
PPV	0.397	1.175	1.302	mm/s
ZC Freq	51	47	47	Hz
Date	Sep 23 /19	Sep 23 /19	Sep 23 /19	
Time	05:13:53	05:13:53	05:13:53	
Sensor Check	Passed	Passed	Passed	
Frequency	7.5	7.6	7.7	Hz
Overswing Ratio	3.9	3.5	3.7	

Peak Vector Sum 1.645 mm/s on September 23, 2019 at 05:13:53





Time Scale: 5 minutes /div **Amplitude Scale:** Geo: 2.000 mm/s/div Sensor Check

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ENDORSEMENT

CITY & SOUTHWEST ACOUSTIC ADVISOR

Review of	**Laing O'Rourke North Corridor Works Noise and Vibration Monitoring Report May 2019 – October 2019**	**Document reference:**	LOR-NCW-Noise and Vibration Monitoring-May19-Oct19 Summary Report V0.3 Dated 10 July 2020
Prepared by:	Larry Clark, Alternate Acoustic Advisor		
Date of issue:	11 August 2020		

As approved Alternate Acoustics Advisor for the Sydney Metro City & Southwest project, I have reviewed and provided comment on the Noise and Vibration Monitoring Report May 2019 – October 2019 for the North Corridor Works (NCW), as required under A27 (d) of the project approval conditions.

I previously reviewed and commented on Version 2 of the Report. Version 3 has been updated to satisfactorily address my comments.

The NCW Noise and Vibration Monitoring Report is to be submitted to the Department of Planning and Environment in accordance with Condition of Approval C16 and the LOR Construction Noise and Vibration Monitoring Plan (CNVMP).

I have reviewed the monitoring report and am satisfied that it meets the requirements for construction noise and vibration monitoring for NCW, as outlined in the NCW CNVMP. I endorse the report.

Larry Clark, City & Southwest Alternate Acoustics Advisor