CROTON POINT, CROTON-ON-HUDSON, NY

ENVIRONMENTAL NOISE STUDY AND FAÇADE GLAZING REQUIREMENTS

07.30.2024

PREPARED FOR:
John R. Bainlardi
WBP Development LLC,
480 Bedford Road Chappaqua,
New York 10514

Trinity Consultants | CERAMI | Longman Lindsey

We have visited the site of the future Croton Point project in Croton-On-Hudson, New York to perform an environmental noise study. The purpose of our survey was to measure the existing environmental noise levels throughout the site and establish site-specific spectra for use in our façade study. We also performed spot on the site to measure noise associated with activity in the adjacent MTA Metro-North trainyard and rail lines to the west and highway to the east. The following letter presents our recommendations and comments at this time.

1.0 Criteria

The proposed Croton Point development consists of a five (5) story residential building with a cellar level. Access to the site is provided by Croton Point Avenue from the south.

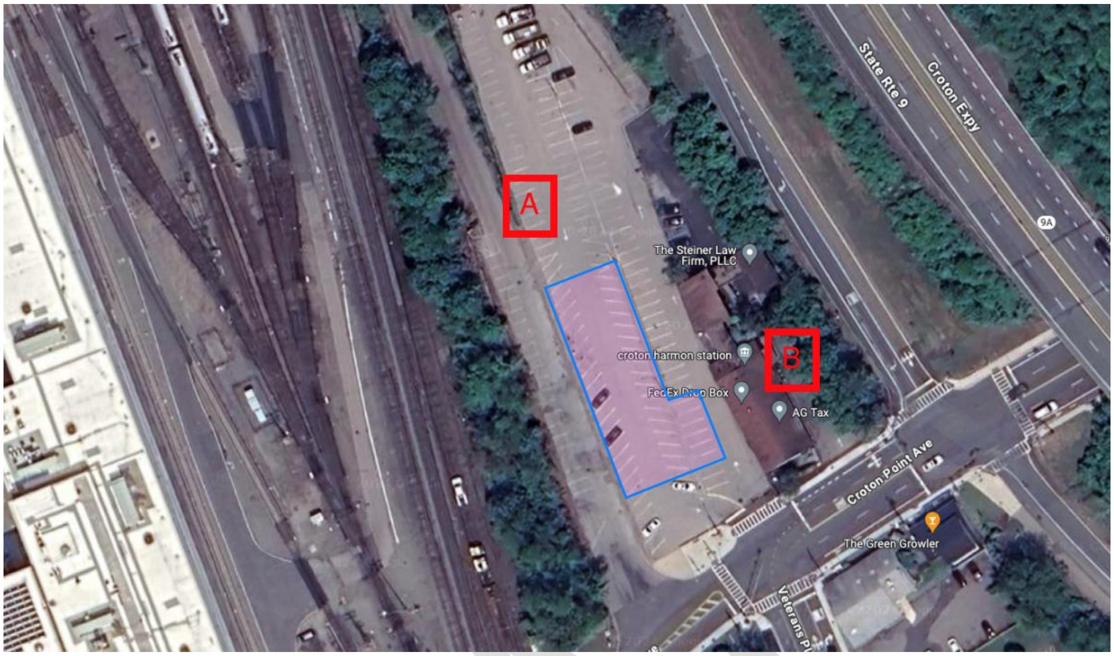
New York State has adopted the requirements of the International Building Code (IBC). IBC does not stipulate acceptable limits for noise levels from exterior noise. The Village of Croton on Hudson noise ordinance also contains no requirement for allowable levels of exterior noise from train or vehicular noise.

Absent any applicable code we have followed New York City's guideline for environmental noise impact upon residential buildings, which is outlined in the 2021 City Environmental Quality Review (CEQR) Technical Manual. CEQR requires residential buildings be designed to have a window-wall attenuation capable of achieving an interior noise level of 45 dBA in terms of a worst-case hourly L10 for vehicular noise and 40 dBA in terms of the Ldn for train noise. L10, which is the noise level exceeded 10% of the time of the measurement period. Ldn is the average noise level over a 24-hour period with a penalty applied to nighttime hours to acknowledge that people are more sensitive to noise at night when trying to sleep. As this proposed building will be impacted by train noise at all facades we have evaluated both criteria (L10 and Ldn) and used the worst case.

2.0 Site Inspection and Observations

Noise level data was collected using two sound level meters, one located at the west of the site overlooking the rail yard and the other located at the east of the site adjacent to State Route 9. See below Figure 1 for satellite view of the site and location of the two meters. The meters ran continuously from the morning of June 4th at 11:20 AM to the morning of June 7th at 9:40 AM. All measurements were performed using calibrated Type 1 NTI XL2 sound level meters with Type 1 M2230 microphones. Additional spot measurements were performed at the site on the mornings of June 4th and 7th. Traffic conditions and rail yard activity were observed and noted during these spot measurements.

Figure 1: Satellite image showing survey locations and future building outline shown in blue.



Regular north and southbound MTA Metro-North and Amtrak commuter train service was observed at the rail lines to the west of the site. We noted some trains passes were audibly different which is due to the combination of electro-diesel (Metro North) and diesel (Amtrak) trains. Northbound trains are louder as they are accelerating as they pull out of Croton-Harmon station with increased load on diesel engines and southbound trains quieter as trains are decelerating on their approach to the station. The northbound trains that we observed were also on the tracks closest to the site with southbound train on the tracks further away. We also observed movement of trains in the shop and trainyard areas which we understand operates twenty four hours a day. Upon review and analysis of noise data and audio recordings we noted what we believe to be idling of train engines and movement of trains within the repair shop and trainyard throughout the day and at night. Train horns, pneumatic brakes and some squealing of train wheels as they navigate track curves were also noted at day and night times. Trainyard noise and highway noise were the primary contributors for locations A and B respectively. However, we did note that the louder noise events such as train horns and vehicles with loud exhausts could be heard at both locations

The noise monitors logged levels continuously over the measurement period and were programmed to record broadband A-weighted sound levels in 1-second and 20 minute intervals for the maximum (Lmax), equivalent (energy average) (Leq) metrics, statistical percentile sound levels (Ln denoting the noise level exceeded n-percent of the time), as well as unweighted 1/3 octave band data.

3.0 Measurement Results and Required Façade Performance

The following Table summarizes our measurements at the west and east locations, measurements are presented in terms of the Day-Night Sound Level, Ldn. Ldn is the is the A-weighted equivalent sound level for a 24 hour period with an additional 10 dB imposed on the equivalent sound levels for night time hours of 10:00 PM to 7:00 AM. We choose the 24 hour time period spanning from 12PM June 5th to 12PM June 6th, as this was the loudest 24-hours period of the three days we collected for. This data set appeared to capture increased activity in the MTA trainyard and maintenance and repair shop

(Location A) when compared with other data from other days of our survey. Location B Ldn data remained consistent over the period of our survey spanning between 67 to 67.7 dBA, with the 67.7 dBA also occurring from 12PM June 5th to 12PM June 6th. The table below also shows the maximum 20-minute L10's measured throughout the course of our survey.

Table 1: Day-Night Sound Levels per survey locations

Location	Ldn (dBA)	L10 (dBA)
A	70.8	72
B	67.7	70

With the established goal of future residences having an interior sound level of 40 dBA Ldn or 45 dBA L10 the Ldn levels both represent worst case. Based on the loudest Ldn of 70.8 the façade of the building would need to provide 31 dBA of attenuation to result in an interior level of 40 dBA.

We have calculated the resultant interior sound levels with various glazing types to determine schematically what type of glazing is needed to satisfy the above level. Our projections are based on using glass-only data published by Viracon and incorporating a -5 dB correction to account for degradation associated with framing and operability. It will be important to ensure that the façade, and associated windows and doors do not degrade the glazing by more than 5 dB to ensure the design intent is met. We have included acoustic performance language, see Appendix A, that we recommend be included in the façade specification which outlines the intended performance and requires the window vendors to submit acoustic test data to substantiate they comply.

We find the following:

- In order to comply with an Ldn level of 40 dBA would require laminated insulated IGU with an OITC-35 rating, such as 1/4" glass – 1/2" air space – 1/2" laminated glass comprised of two layers 1/4" glass with a 0.03 PVB).
- The non-glazed portions of the façade would also need to be designed to have an equivalent or higher acoustic performance. Typically, this is easily achieved as opaque portions of the façade are backed with insulation and drywall. But please share information for our review as the design progresses.
- Scheme for HVAC design has not been shared for our review. We do not recommend PTAC / VTAC or other similar such systems that require penetrating through the façade as this will represent a weak link in the façade.

4.0 Variations in Noise

The established criteria is based on the Ldn, as explained above, this is an average sound levels throughout a 24-hour period with +10 dB correction factors added for nighttime hours to account for increased sensitivity of people sleeping. Individual noise events will be above 40 dBA at times. The following table represents some short term events we measured on site with their delta above the Ldn, a similar increase will occur inside:

Table 2: Short Term Events Relative to Ldn

Ldn	70.8 dBA
Train Passes (diesel), departing on track location and train direction	73 to 86 dBA +/-
Train Horn (depending on proximity of train to site)	70 to 84 dBA +/-
Wheel squeaks of electric trains moving through rail yard at low speed	70 dBA +/-

5.0 Low Frequency Noise

We understand other members of the community have complained of noise from the rail yard, specifically low-frequency noise from diesel engines. Based on our measurements diesel engines produce a series of peaks concentrated the low frequencies (20 Hz through 100 Hz) within the audible spectrum. Our measurements indicate diesel noise is at its highest amplitude at 80 and 100 Hz and diminishes as the frequency gets lower.

Please see attached Plots 1, 2 and 3 which plot 20 through 100 Hz. over the duration of our survey. The short duration peaks observed represent train passes with short duration of a couple of seconds. Elevated levels were observed at times, including nighttime due to activity within the train yard.

6.0 Summary

Noise associated with trains, train yard and diesel engine activities at the train yard are evident as would be expected for a project site within close proximity to these spaces. With appropriate façade construction an interior acoustic environment that complies with industry standard noise levels is achievable.

The above summarizes our findings and recommendations at this time. Upon review, please do not hesitate to contact us with any comments or questions.

Best regards,

Connor Whiriskey
Senior Associate

cc: Ken Shook / TCLL

Appendix A: Acoustic Performance Specification Language

Window Acoustical Specification

1.0 Summary

a. This specification defines acoustical requirements for the complete and entire window and terrace door assemblies to be supplied for the project.

b. The manufacturer shall have the responsibility to supply complete window and door assemblies, including, but not limited to: glass, framing, gaskets and including operable sections, as detailed within other specification sections and shown on architectural drawings.

c. The manufacturer(s) will be required to demonstrate compliance with the acoustical performance requirements with a laboratory test for an approved residential operable window and terrace door assemblies as defined herein.

2.0 Submittals

a. Shop Drawings: Provide details of all window / door components together with acoustical performance calculations showing compliance with the requirements of this specification.

b. Laboratory Test: Submit an acoustical test report from an approved acoustical laboratory showing that the approved window, terrace door and storefront assemblies, when tested per ASTM E-90 Standard Test Method For laboratory Measurement Of Airborne Sound Transmission Loss of Building Partitions and Elements, comply with the requirements listed below in the Acoustic Performance Requirements Section.

3.0 Acoustical Performance Requirements

a. All complete window, terrace doors and storefront assemblies to be installed on this project shall attain a minimum acoustical performance as stated in the 'System' requirements in the table below, Table 3, based on their location in the building. This shall be as calculated in accordance with ASTM E-1332 (1990 or later). Note that the performance for both laboratory rated glass and complete system assembly are listed below.

b. In addition, the third-octave band minimum acoustical sound transmission loss performance shall meet or exceed the following in a fully tested assembly for each system described in the previous table:

Table 3: Acoustic Performance Requirements

	Third-Octave band Frequency, Hz																			
	80	100	125	160	200	250	315	400	500	630	800	1000	1250	1600	2000	2500	3150	4000	5000	OITC
Glass-only Performance	27	32	27	29	28	31	35	37	39	41	42	43	44	43	42	45	50	53	54	35
System Performance	22	27	22	24	23	26	30	32	34	36	37	38	39	38	37	40	45	48	49	30

*Data for glass-only is given as indicative of requirements to achieve complete assembly performance

4.0 Acoustical Test Requirements

a. Manufacturer shall submit for approval the specimens to be tested. Selected window and terrace doors must include an operable section where applicable and be representative of the majority of units being provided. If multiple glazing configurations are being used testing shall be conducted with each glass configuration. To satisfy this requirement, the following tests shall be conducted:

    1. Operable residential window (if multiple glazing or system types are being used a test must be done for each)
    2. Operable apartment terrace doors (if multiple glazing or system types are being used a test must be done for each)

b. Manufacturer shall conduct acoustical testing of the selected window / door units in a laboratory facility approved by the owner and acoustical consultant. Testing shall be undertaken in the presence of the project acoustical consultant and in accordance with ASTM E-90 Standard Test Method For laboratory Measurement Of Airborne Sound Transmission Loss of Building Partitions and Elements.

c. Should the acoustical test not comply with the specification requirements, it shall be the manufacturers responsibility to implement all necessary changes to facilitate achieving these requirements. Additional testing required to demonstrate compliance shall be the responsibility of the manufacturer including time and expenses for such additional testing and those of the project acoustical and other consultants.

1001 AVENUE OF THE AMERICAS
FOURTH FLOOR
NEW YORK NY 10018
T / 212.370.1776

1401 K STREET, NW
SUITE 1000
WASHINGTON DC 20005
T / 202.448.9975

2000 MARKET STREET
SUITE 770
PHILADELPHIA PA 19103
T / 215.310.9766

231 S. LASALLE STREET
SUITE 2100
CHICAGO IL 60604
T / 312.724.8776

1000 BRICKELL AVENUE
SUITE 1100
MIAMI FL 33131
T / 305.771.0211

200 WEST 41ST STREET
SUITE 1100
NEW YORK NY 10036
T / 212.315.6400

414 UNION STREET
SUITE 1900
NASHVILLE, TN 37219
T / 629.230.7925

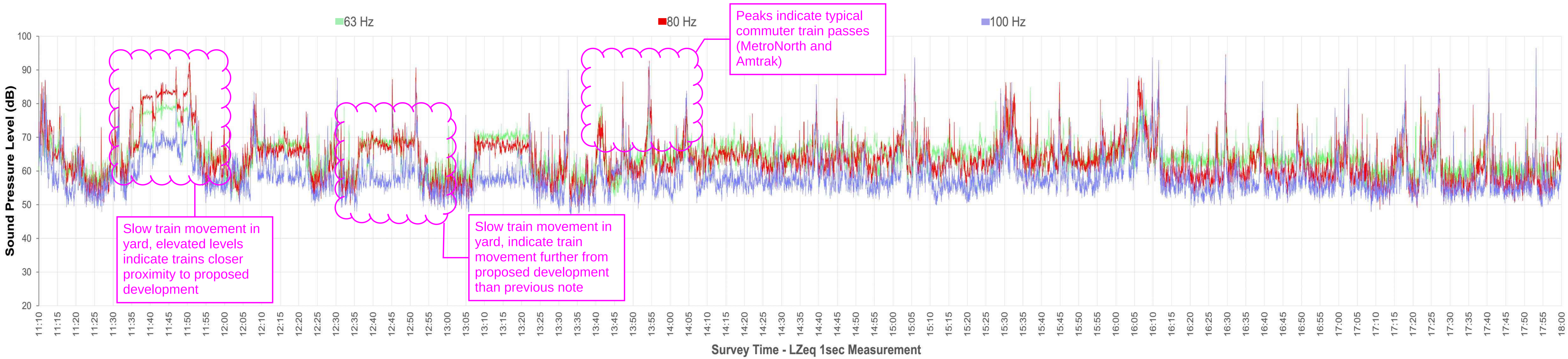
3415 S SEPULVEDA BLVD
SUITE 1131
LOS ANGELES, CA 90034

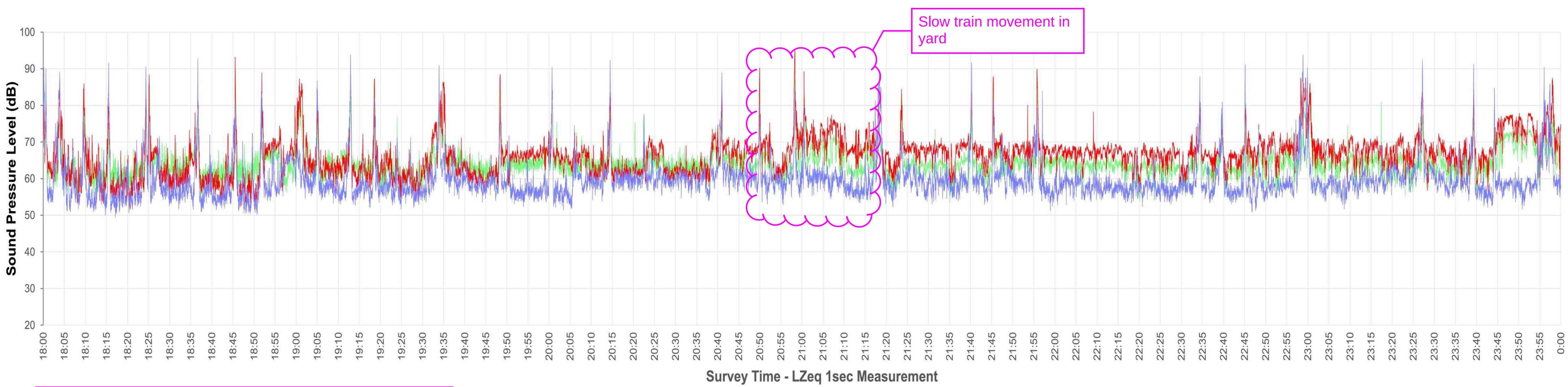
30 WERTHEIM COURT, UNIT 25
RICHMOND HILL ONTARIO
L4B 1B9 CANADA
T / 905.764.5223

Croton Point Development - Plot 1 [63, 80 & 100 Hz third octave band plots]

Tuesday 6/4/24 11:10 to Wednesday 6/5/24 0:00

Low Frequency (63-100 Hz) LZeq Time History Chart



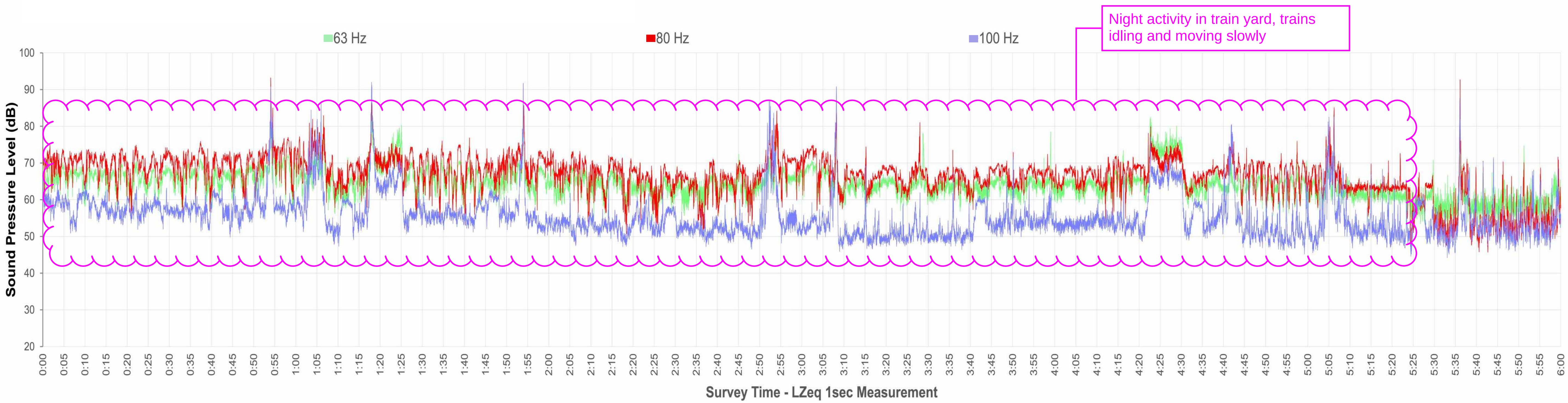


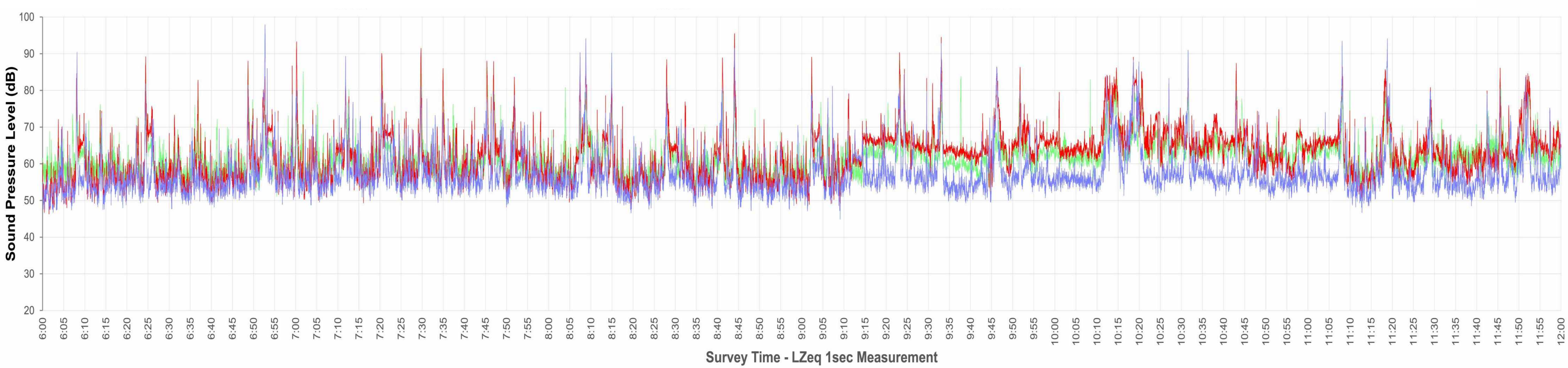
Please note thse annotations only highlight some typical activity relating to train noise and are not a comprehensive list of all time events iver the survey period

Croton Point Development

Wednesday 6/5/24 0:00 to Wednesday 6/5/24 12:00

Low Frequency (63-100 Hz) LZeq Time History Chart

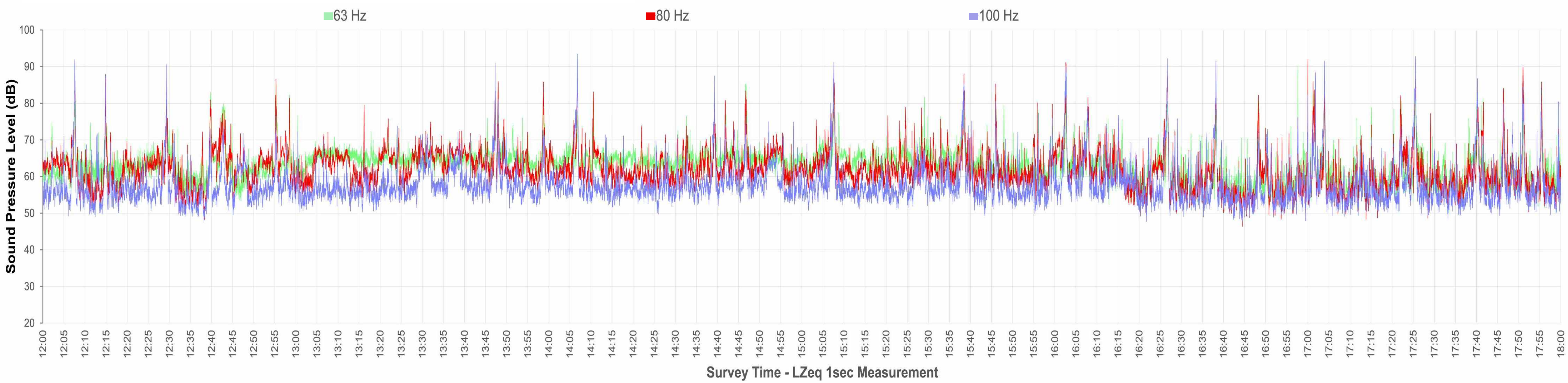


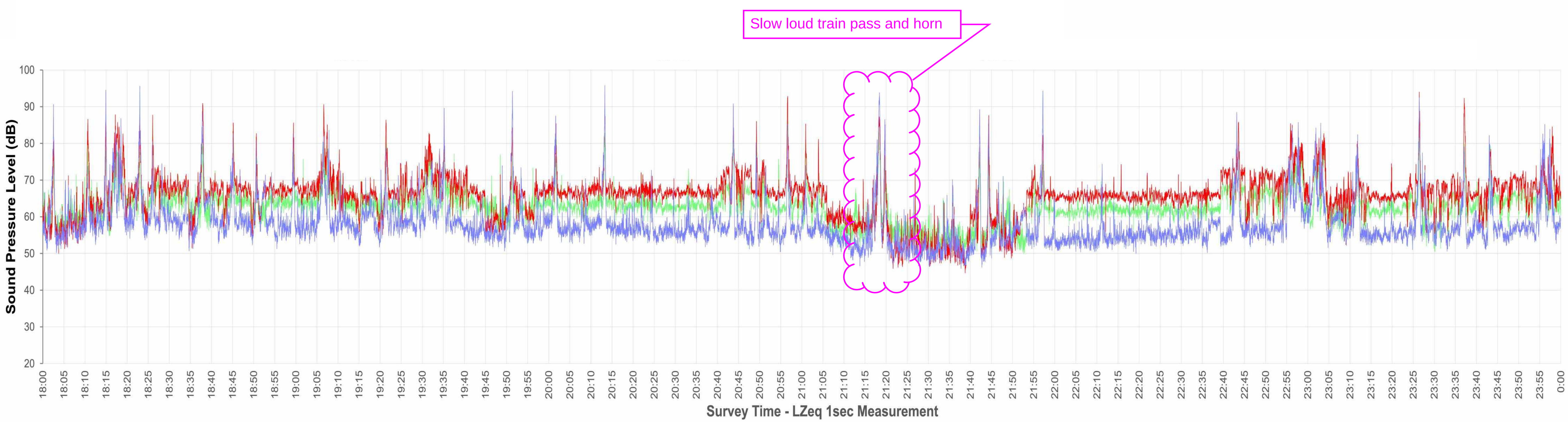


Croton Point Development

Wednesday 6/5/24 12:00 to Thursday 6/6/24 0:00

Low Frequency (63-100 Hz) LZeq Time History Chart





Croton Point Development

Thursday 6/6/24 0:00 to Thursday 6/6/24 12:00

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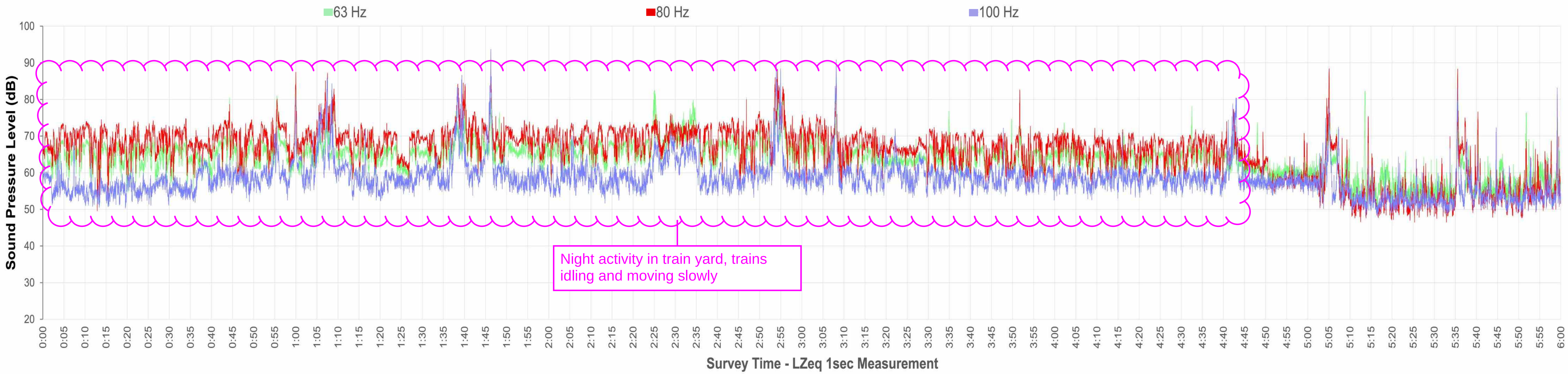
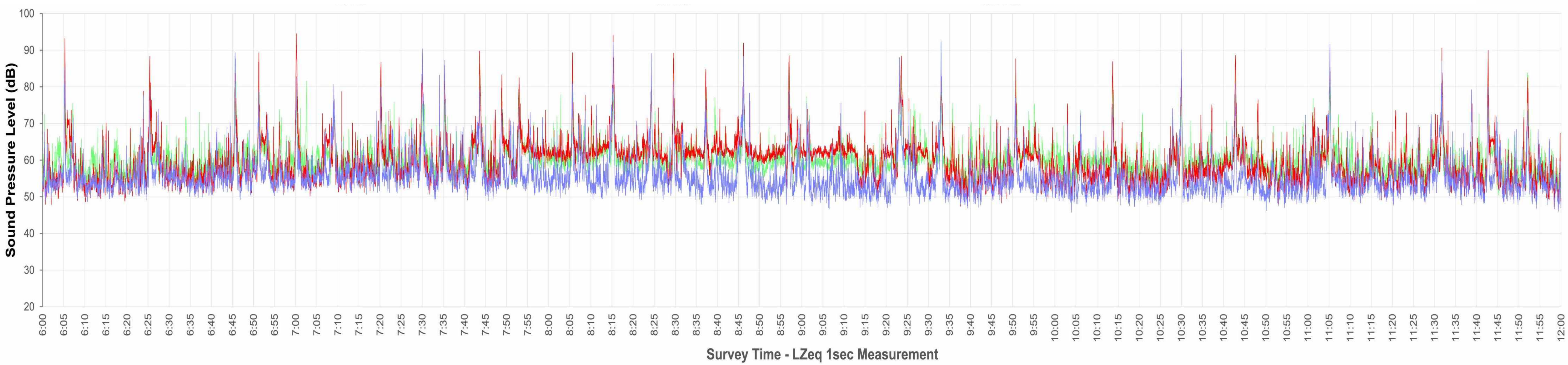
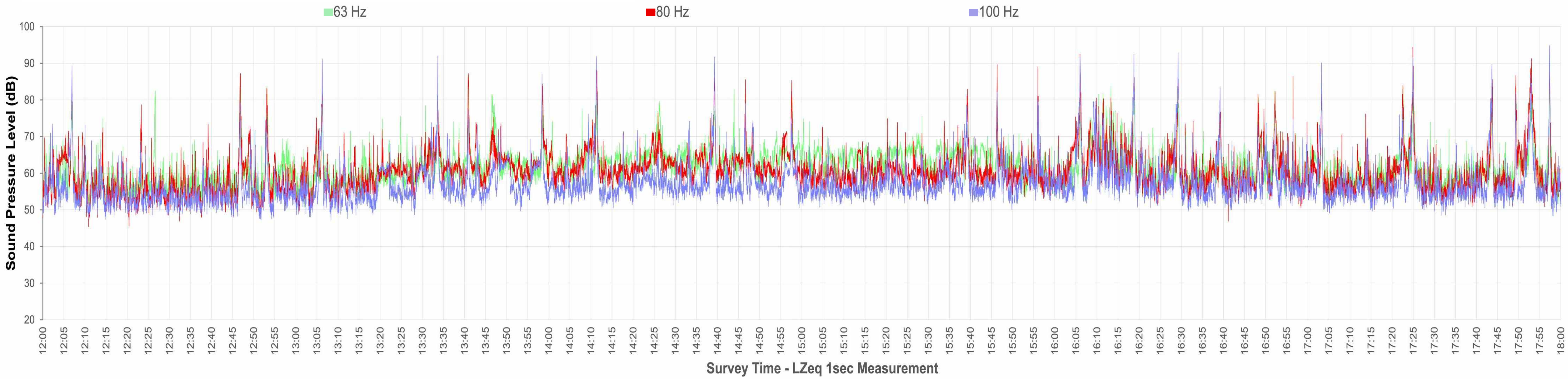


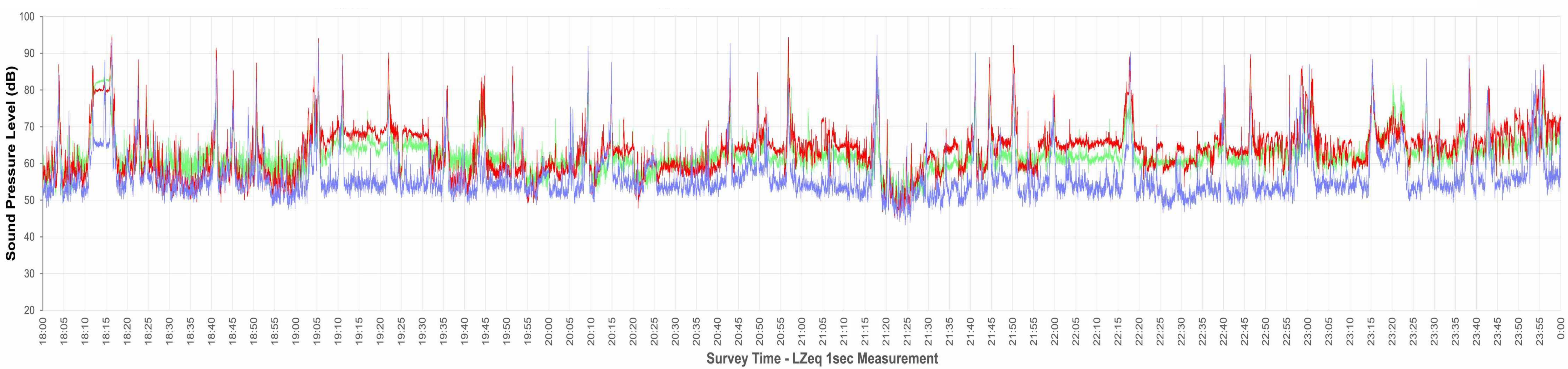


Croton Point Development

Thursday 6/6/24 12:00 to Friday 6/7/24 0:00

Low Frequency (63-100 Hz) LZeq Time History Chart

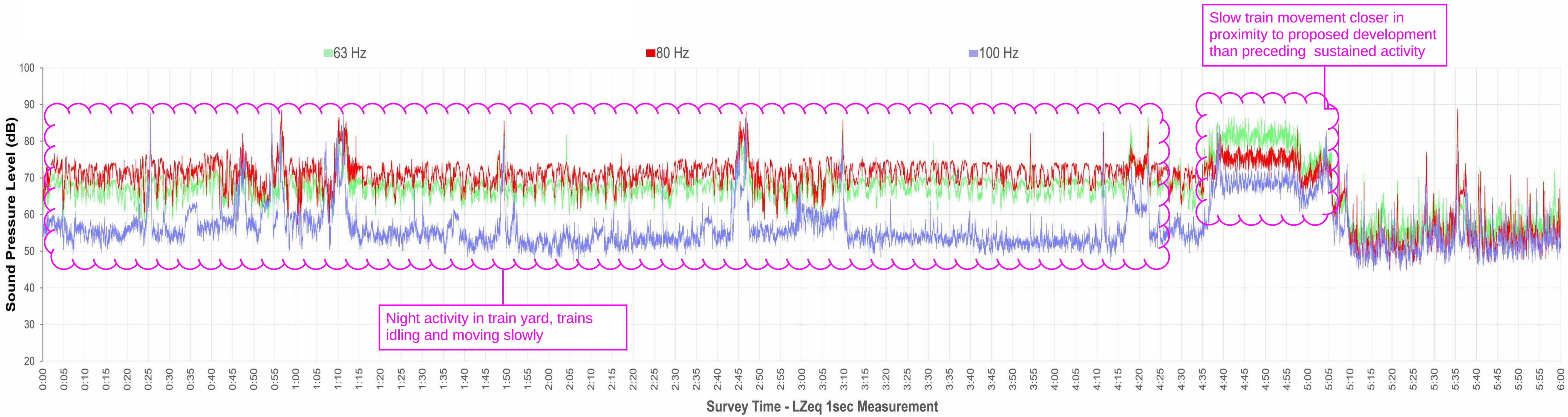


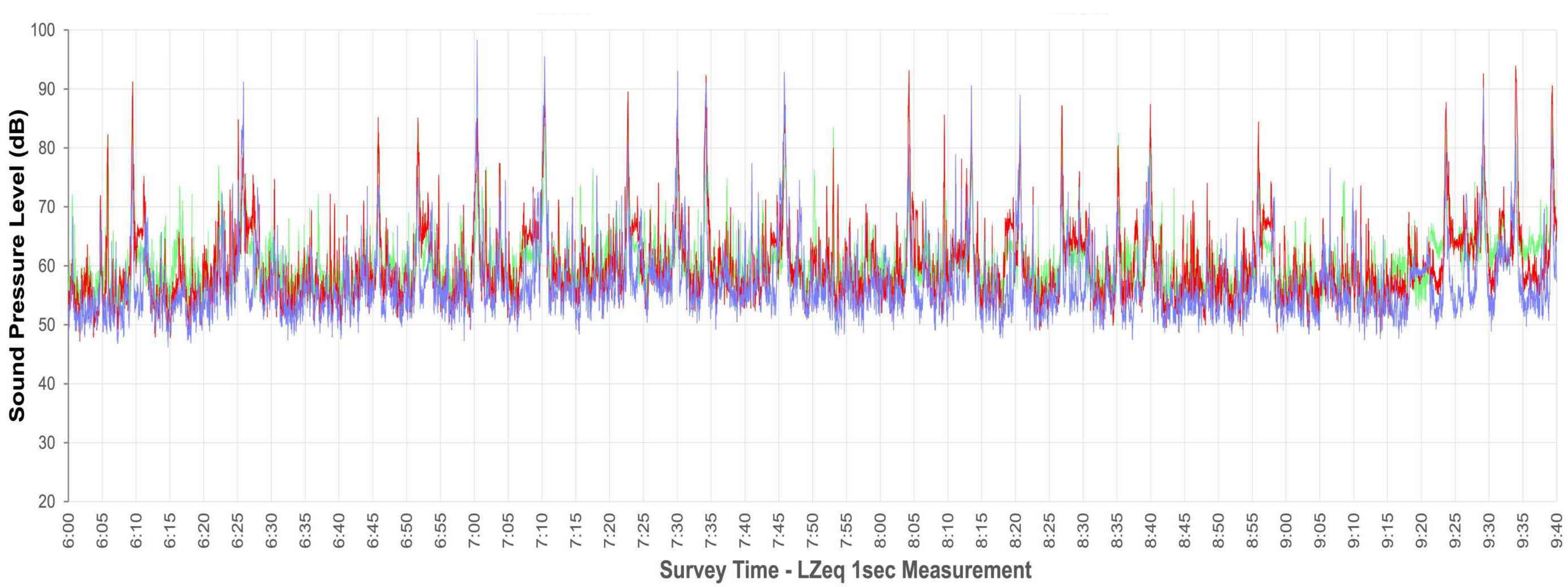


Croton Point Development

Friday 6/7/24 0:00 to Friday 6/7/24 9:40

Low Frequency (63-100 Hz) LZeq Time History Chart

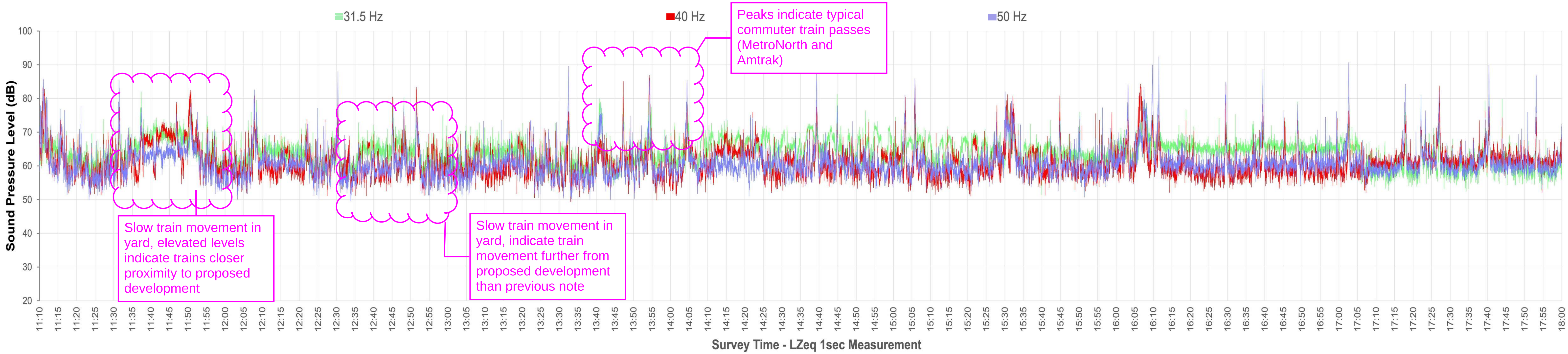


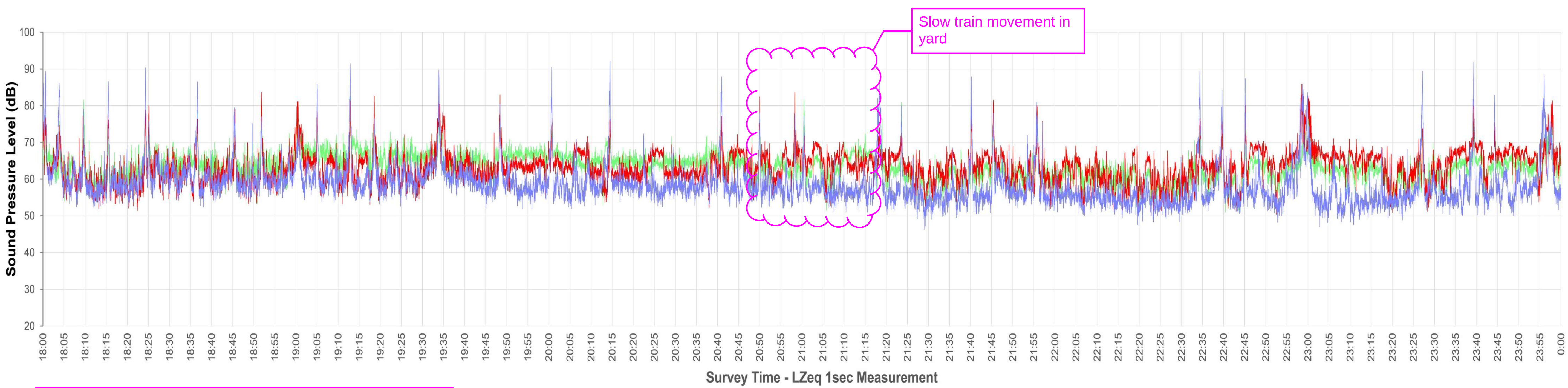


Croton Point Development - Plot 2 [31.5, 40 & 50 Hz third octave band plots]

Tuesday 6/4/24 11:10 to Wednesday 6/5/24 0:00

Low Frequency (31.5-50 Hz) LZeq Time History Chart





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Croton Point Development

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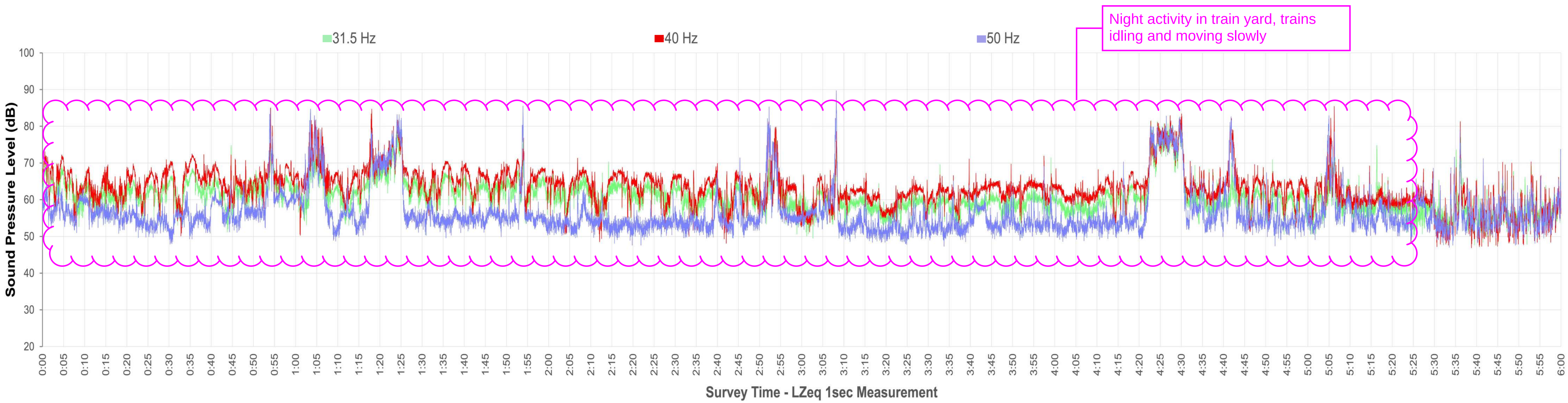
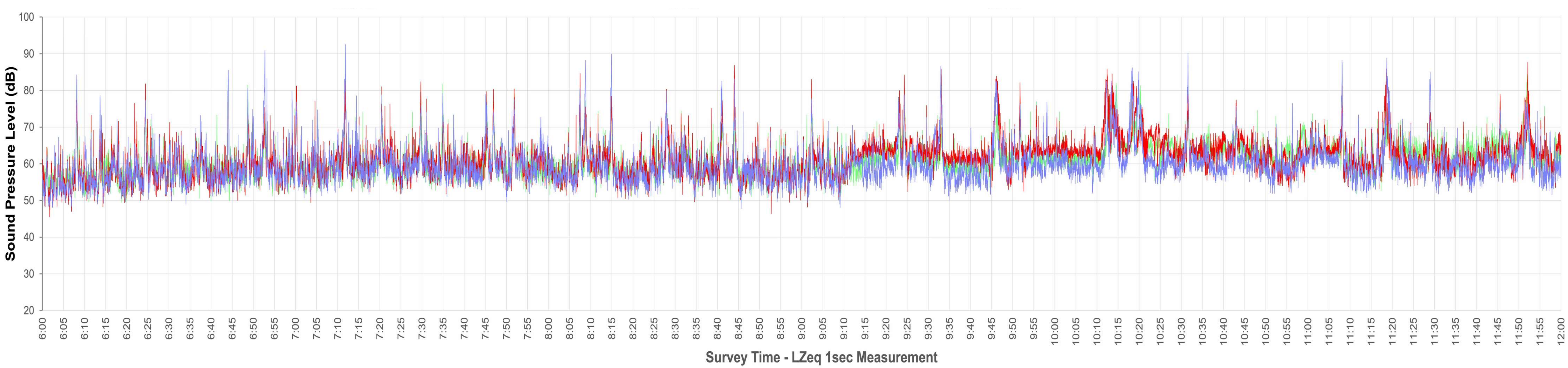
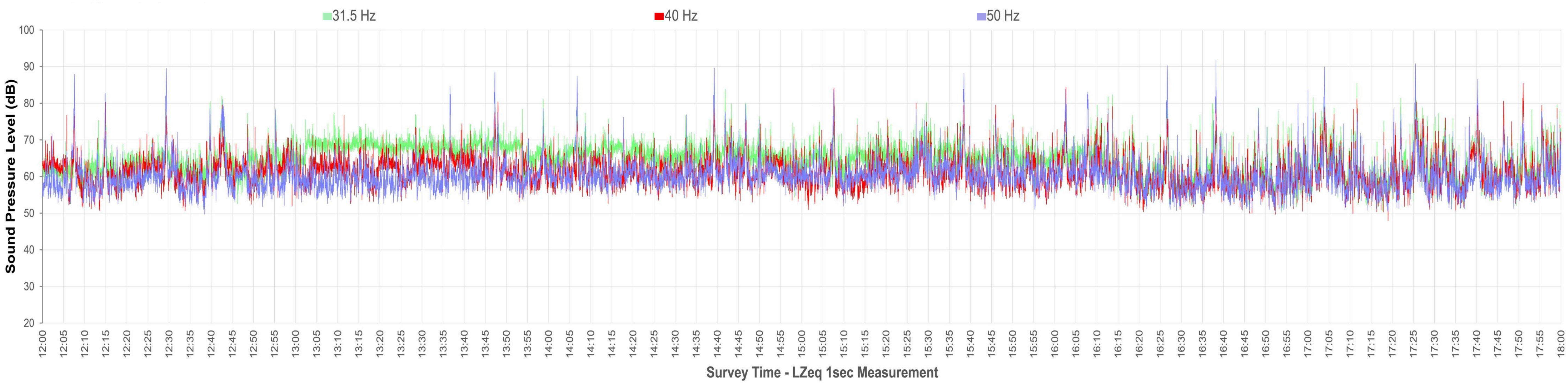


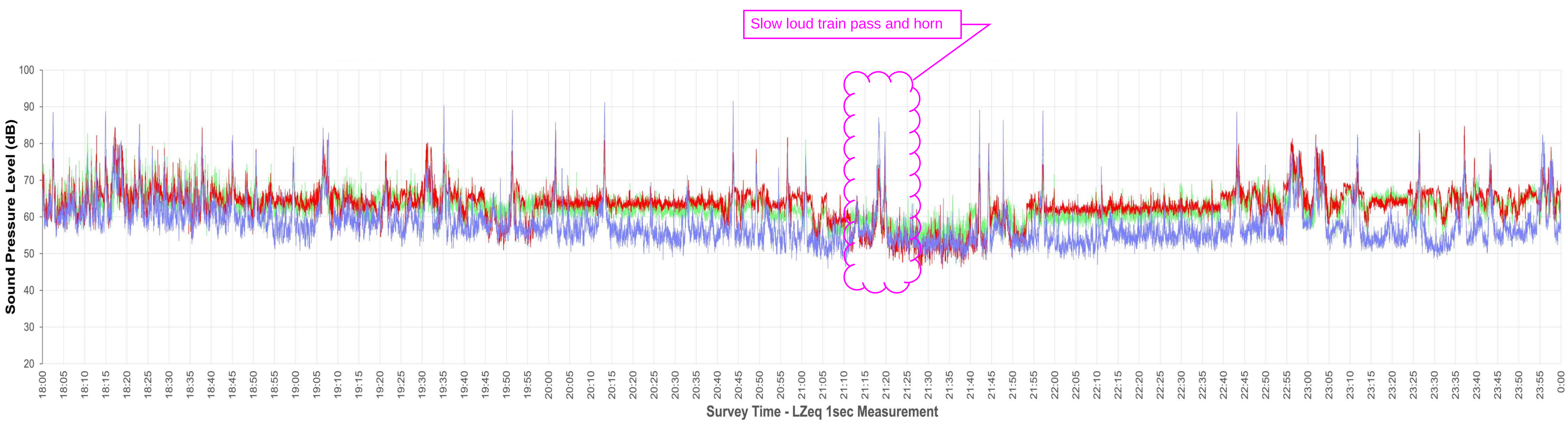


Croton Point Development

Wednesday 6/5/24 12:00 to Thursday 6/6/24 0:00

Low Frequency (31.5-50 Hz) LZeq Time History Chart

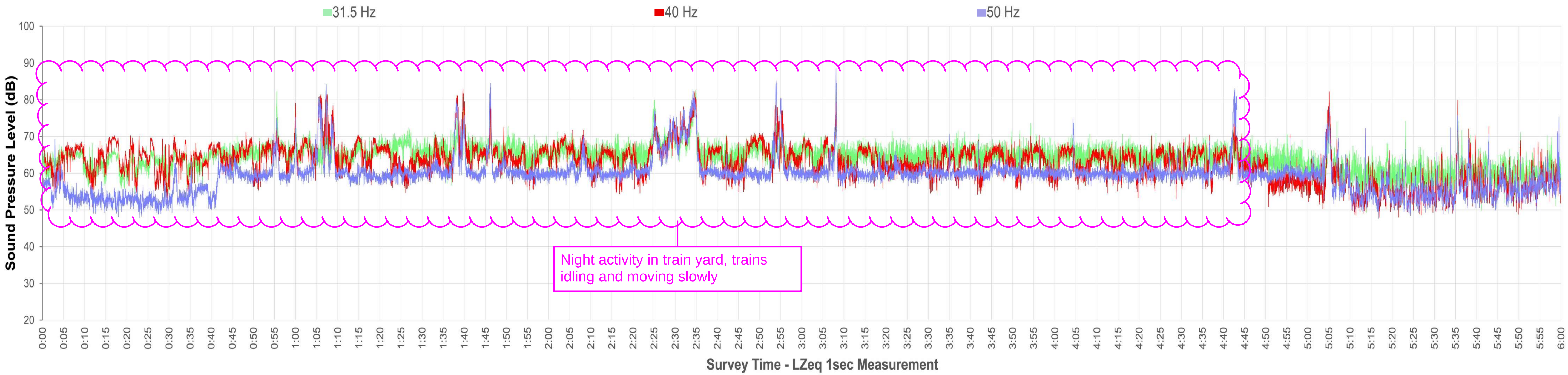


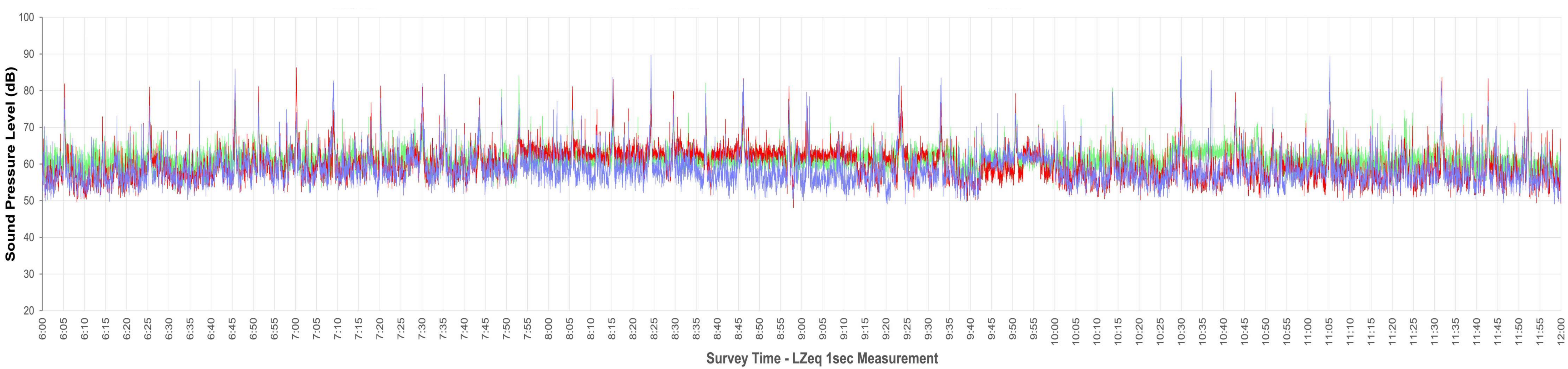


Croton Point Development

Thursday 6/6/24 0:00 to Thursday 6/6/24 12:00

Low Frequency (31.5-50 Hz) LZeq Time History Chart





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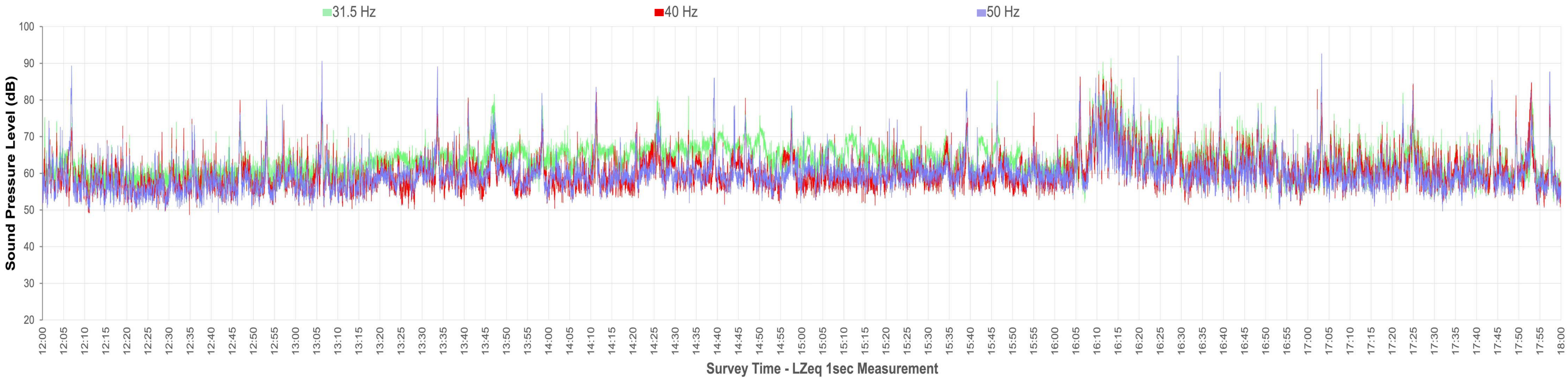
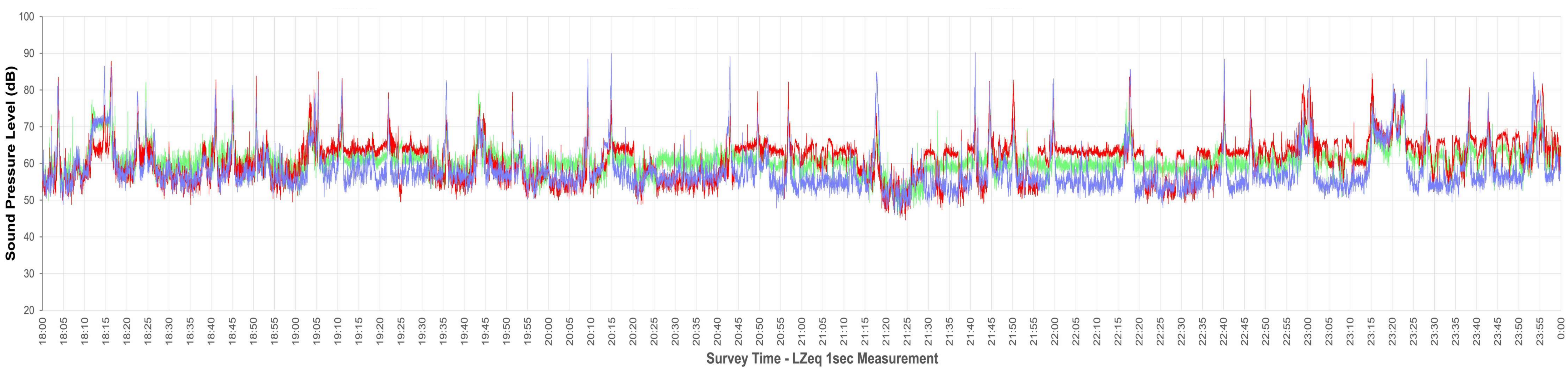
Croton Point Development

Thursday 6/6/24 12:00 to Friday 6/7/24 0:00

Low Frequency (31.5-50 Hz) LZeq Time History Chart

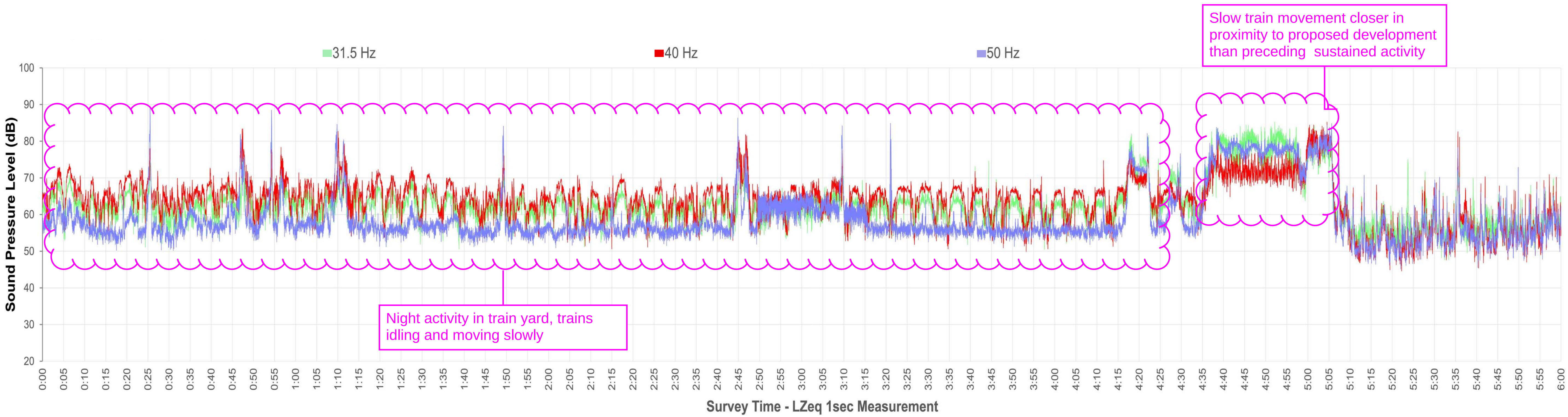


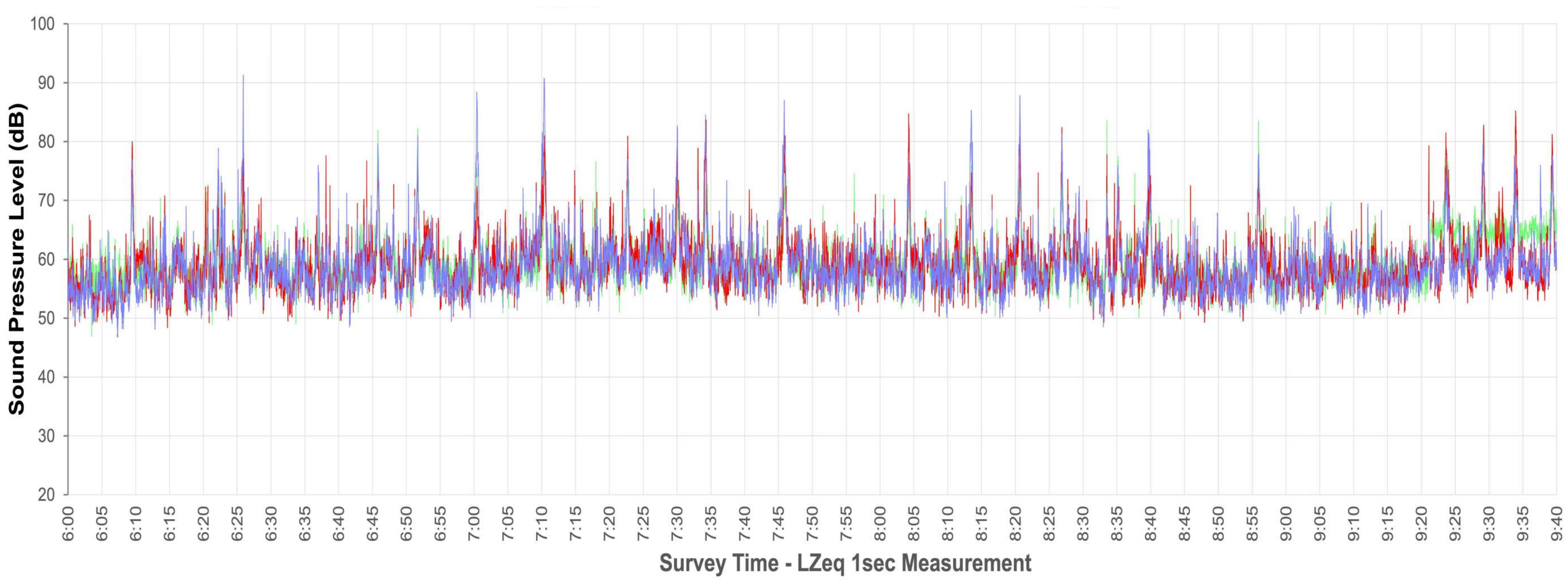


Croton Point Development

Friday 6/7/24 0:00 to Friday 6/7/24 9:40

Low Frequency (31.5-50 Hz) LZeq Time History Chart





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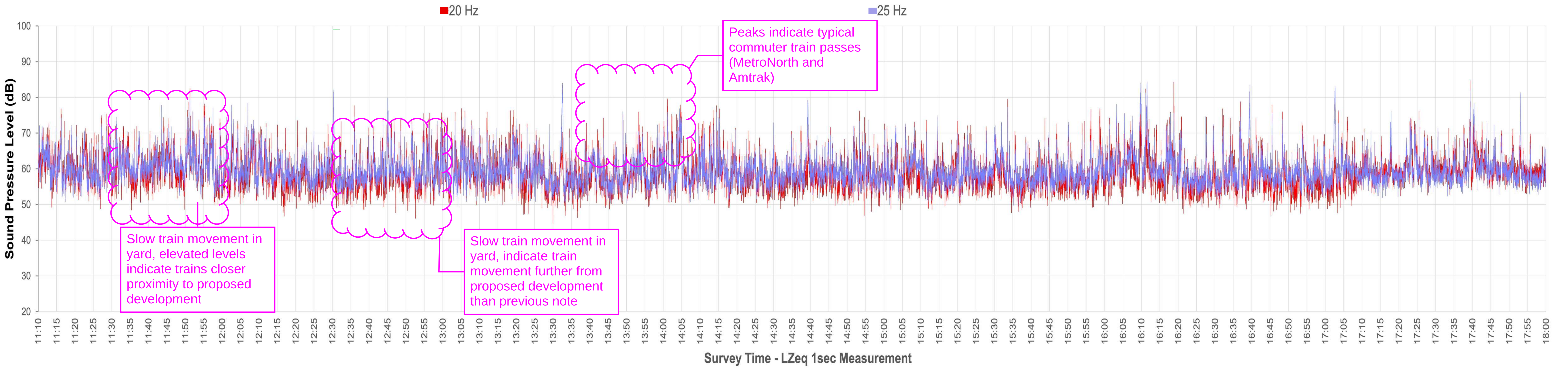
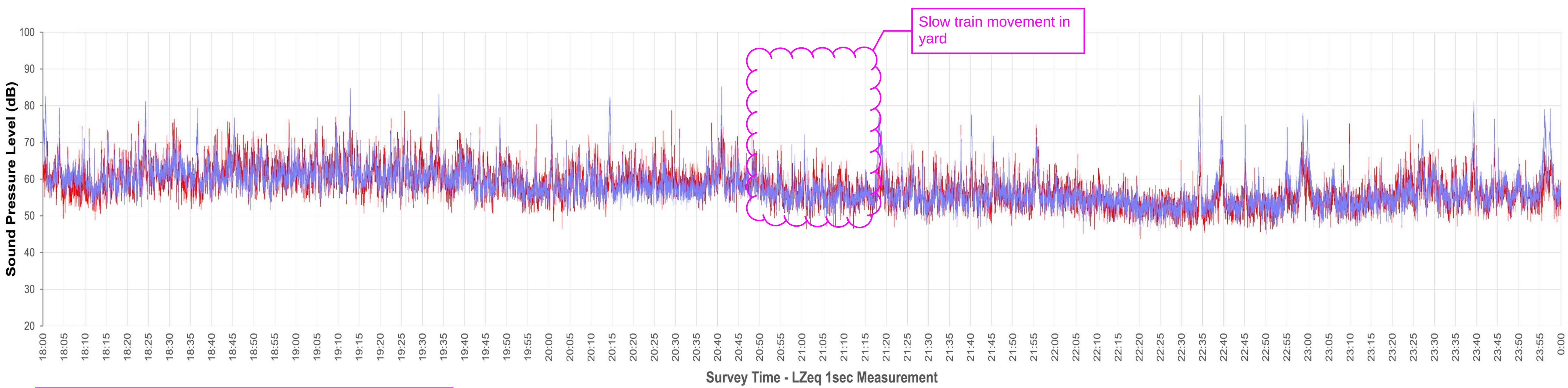
Croton Point Development - Plot 3 [20 & 25 Hz third octave band plots]

Tuesday 6/4/24 11:10 to Wednesday 6/5/24 0:00

Low Frequency (20-25 Hz) LZeq Time History Chart





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Croton Point Development

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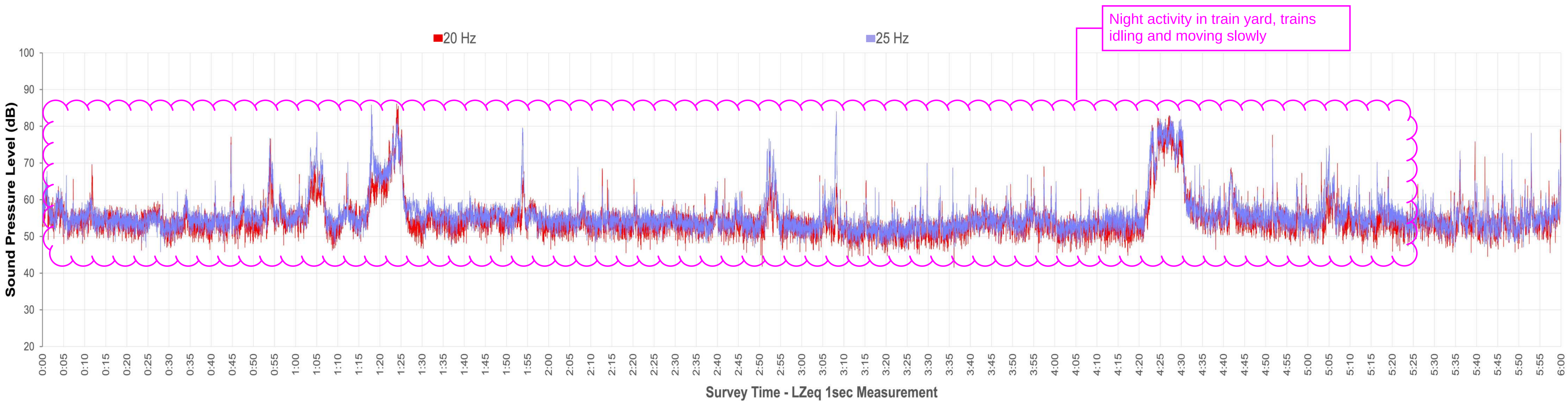
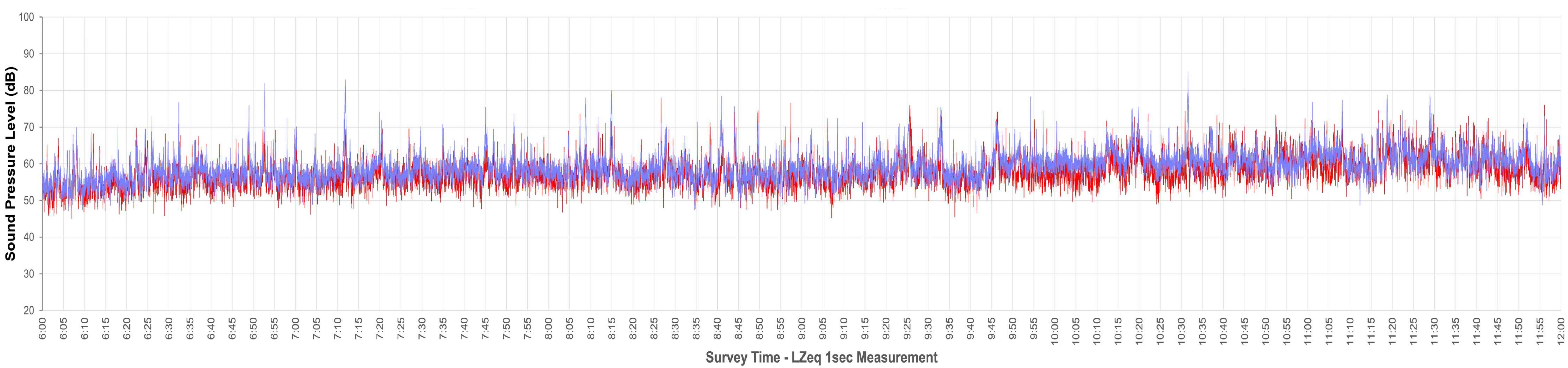
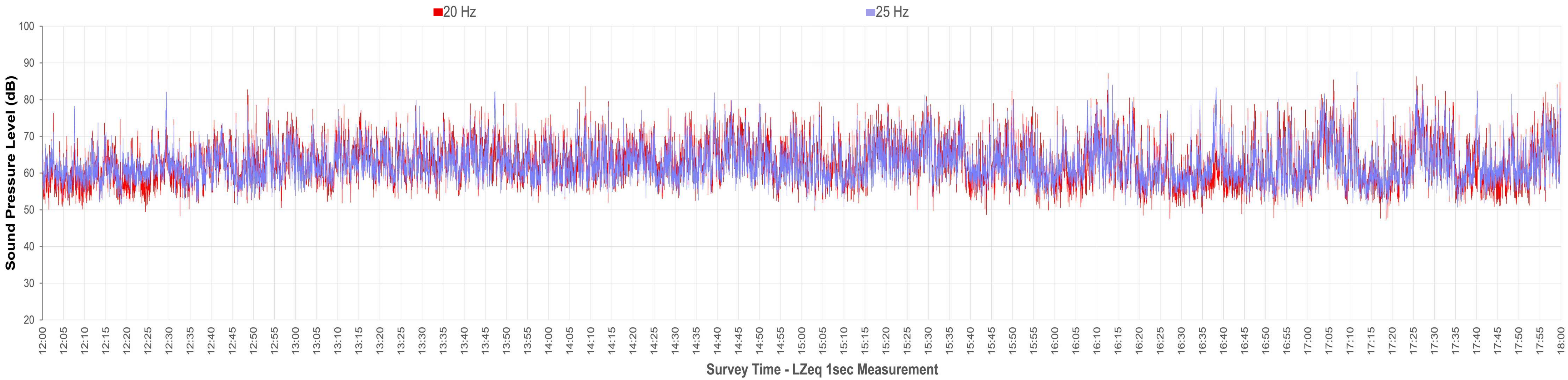


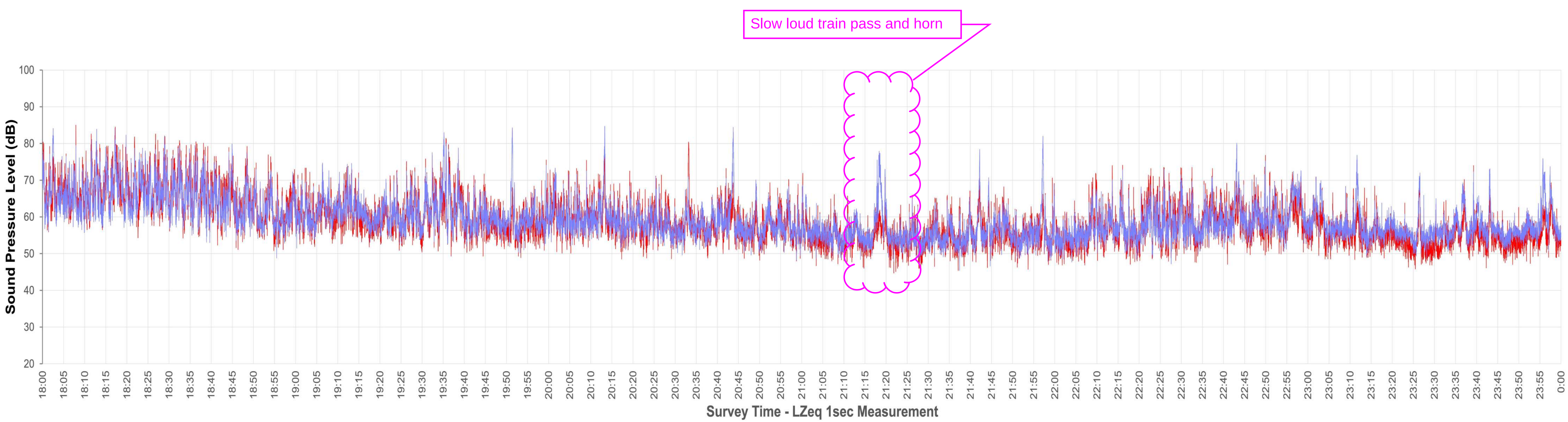


Croton Point Development

Wednesday 6/5/24 12:00 to Thursday 6/6/24 0:00

Low Frequency (20-25 Hz) LZeq Time History Chart

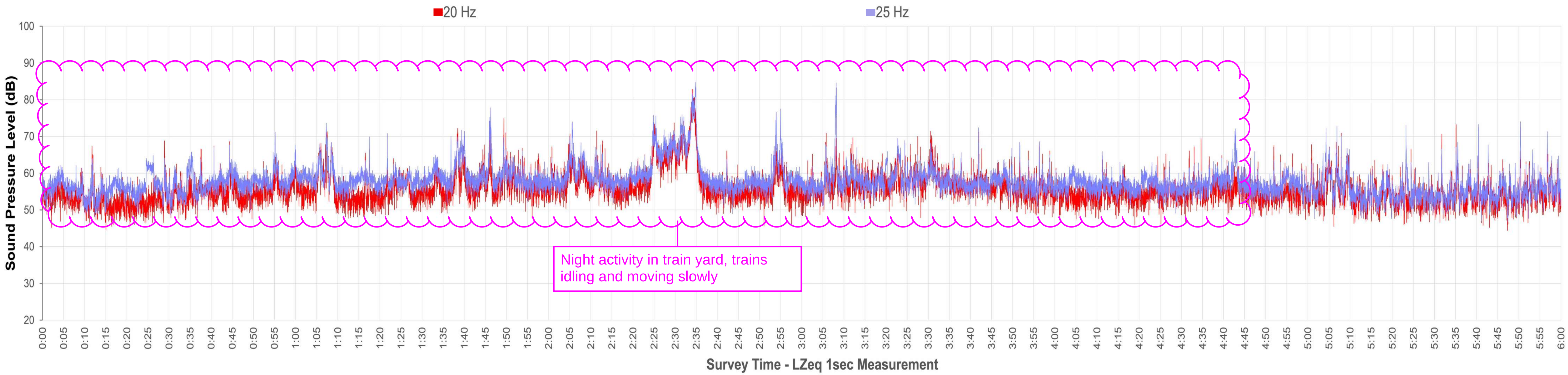


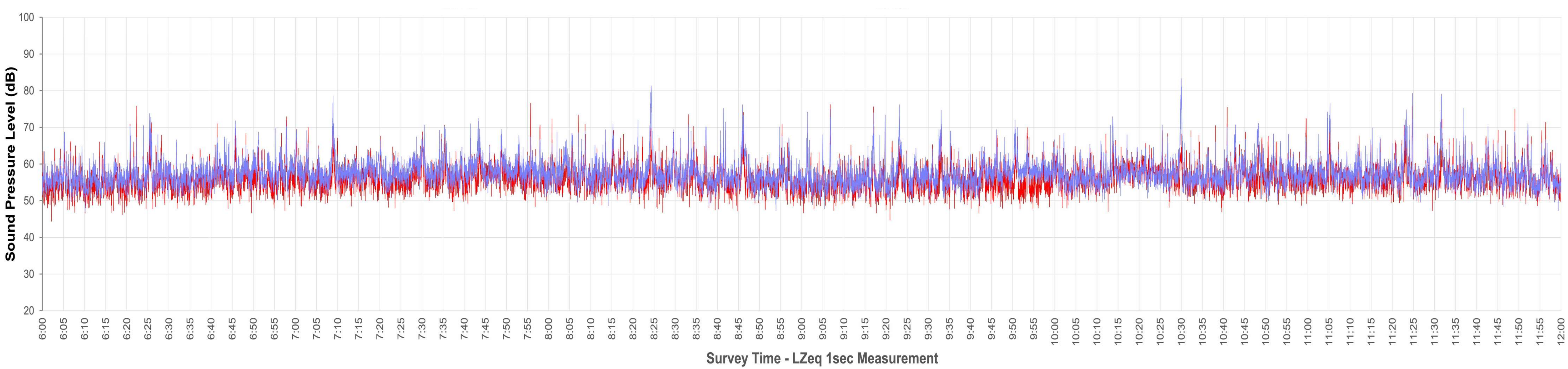


Croton Point Development

Thursday 6/6/24 0:00 to Thursday 6/6/24 12:00

Low Frequency (20-25 Hz) LZeq Time History Chart

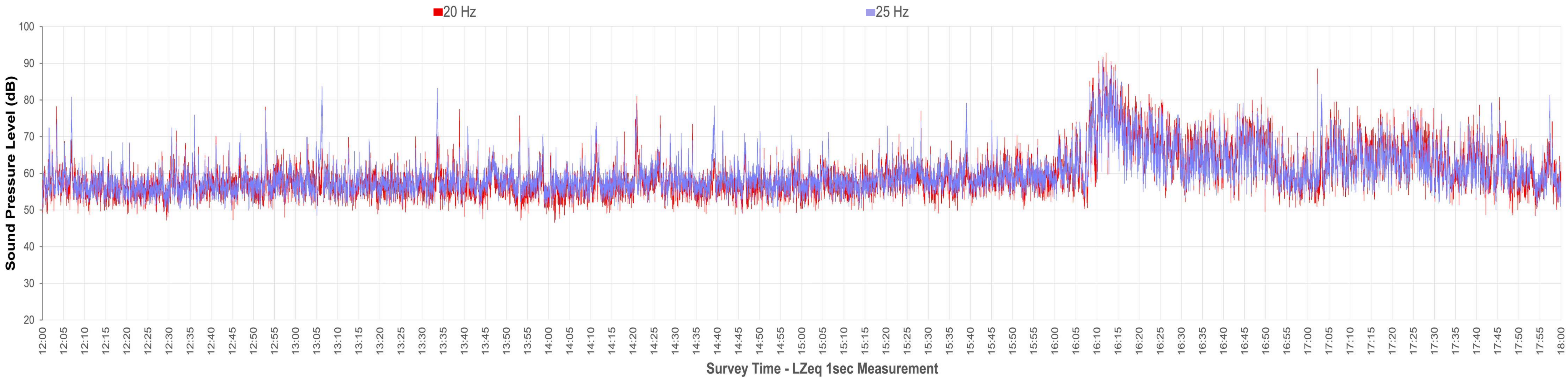


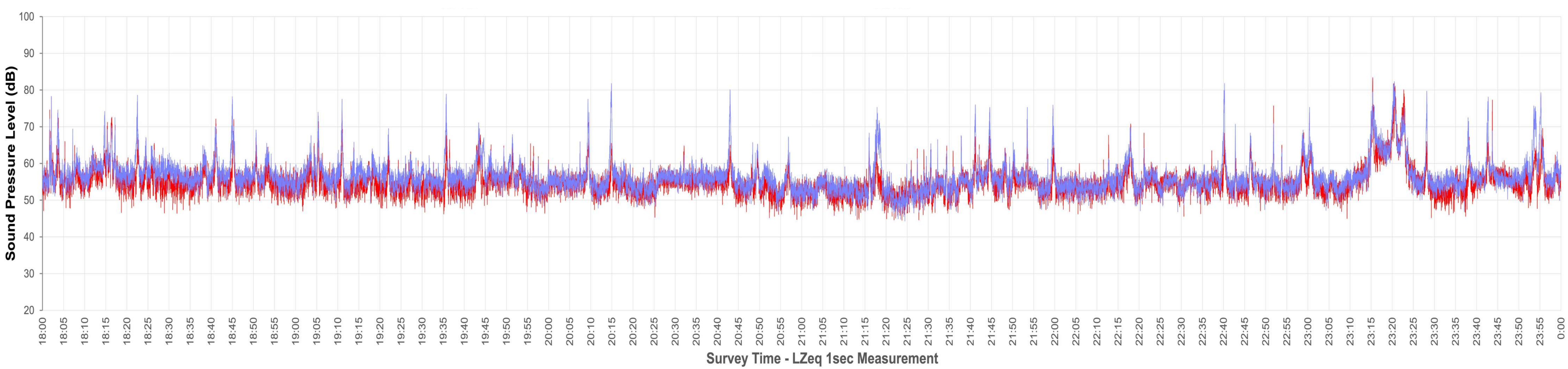


Croton Point Development

Thursday 6/6/24 12:00 to Friday 6/7/24 0:00

Low Frequency (20-25 Hz) LZeq Time History Chart





Croton Point Development

Friday 6/7/24 0:00 to Friday 6/7/24 9:40

Low Frequency (20-25 Hz) LZeq Time History Chart