



New Buffalo Bills Stadium

Noise Impact Study and Construction Noise Management Plan

19 October 2022

GHD

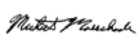

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1. Introduction

GHD Limited (GHD) was retained by Phillips Lytle LLP (PL) on behalf of Erie County to complete a Noise Impact Study (Study) and Construction Noise Management Plan (CNMP) for the proposed new Buffalo Bills Stadium to be located on the west side of Abbot Road in Orchard Park, New York (New Stadium).

The purpose of this Study was to evaluate the existing ambient background noise in the area at several sensitive locations around the New Stadium located to the west of the current Highmark Stadium in order to determine baseline conditions for comparison to the predicted noise impacts that may occur at the New Stadium during a Buffalo Bills NFL game or concert event due to:

1. Stadium speaker system speaker arrays for NFL games/events
2. Stadium Crowd/Fan Noise for NFL games/events
3. Stadium temporary sound system for concert events

These potential noise impacts were evaluated according to the guidance document issued by New York State Department of Environmental Conservation, Assessing and Mitigating Noise Impact, February 2, 2001 (“Noise Impact Criteria”) in which the proposed project is evaluated against the existing ambient acoustical conditions to determine if there is an adverse effect or if noise mitigation is required to minimize impacts.

To facilitate the noise evaluation, this Study has included one-week of long-term noise monitoring (LTM) to determine ambient background sound levels, and attended noise measurements during a Buffalo Bills game day event to determine gameday event sound levels.

GHD has also evaluated the noise impacts associated with a multi-phase construction of the New Stadium and provided a construction noise management plan (CNMP) for the various stages of this multi-year construction project to minimize noise impacts at the proximate sensitive institutional and residential areas around the New Stadium.

The components of the CNMP are the following:

1. Desktop construction noise impact assessment
2. Active construction noise monitoring set-up and recommended deployment locations (Reactive Program)
3. Noise compliant management procedure
4. Noise control options and best practices to mitigate construction noise impacts

2. Project Description

The New Stadium is located on the west side of Abbott Road, across from the Highmark Stadium. The project site is in the Town of Orchard Park, New York but is adjacent to the Town of Hamburg, New York to the west. The proposed New Stadium will be depressed approximately 35 feet below grade such that the main concourse is located at or near grade, with a capacity of approximately 60,000 - 63,000 patrons in a 360-degree configuration. The building façade at the main concourse level will be primarily brick, and the upper concourse is enclosed with a perforated metal screening. A 360-degree metal roof canopy is provided over the seating areas, approximately 190-210 ft. above grade.

Nearby sensitive receivers to the New Stadium include the residential area to the north of Southwestern Blvd. north of the project site (approximately 1,000 ft from the New Stadium), the State University of New York (“SUNY”) Erie Community College South (“ECC South”) campus directly to the west of the project site (approximately 1,080 ft from the New Stadium), the neighborhood south of US 20A between Abbott Road and Erie College Drive (approximately

1,475 ft from the New Stadium), and the neighborhood on the east side of Abbott Road between One Bills Drive and US 20A (approximately 525 ft from the New Stadium). The Site is located on land currently zoned Residential (R-1). The land directly to the south and east of the site is also zoned Residential (R-3 and R-4). Land immediately to the north is zoned Commercial (B-2). A Zoning Map is provided in Appendix A, Figure A.1.

CONCEPT SITE PLAN



Figure 2.1 Concept Site Plan for New Stadium Grounds

3. Methodology

GHD’s methodology and approach to evaluate each acoustical component of this project has been described below.

3.1 Point of Reception and Noise Monitoring Locations Summary

A "point-of-reception" (POR) is any point on the premises of a person where sound, originating from other than those premises, is received. The point-of-reception may be located on permanent or seasonal residences, nursing/retirement homes, rental residences, hospitals, campgrounds, schools, or places of worship.

The objective of this Study is to determine the existing equivalent sound level (L_{eq}) at the worst-case PORs around the Study area. The worst-case PORs are defined as the sensitive receptors with the greatest potential exposure to the New Stadium noise sources due to proximity and direct line-of-sight exposure.

The worst-case sensitive PORs are:

- POR1 – Nearest façade of a one-storey hotel at 3940 Southwestern Boulevard, approximately 1,000 feet north of the New Stadium (5 feet [ft] Above Grade [AG])
- POR2 – Nearest façade of a two-storey university building (Student Centre) on the “SUNY” Erie College South (“ECC South”) campus, approximately 1,080 feet west of the New Stadium (15 ft AG)

- POR3 – Nearest façade of a two-storey residence at 5122 Big Tree Road, approximately 1,475 feet south of the New Stadium (15 ft AG)
- POR4 – Nearest façade of a two-storey residence at 4129 Abbott Road, approximately 525 feet southeast of the New Stadium (15 ft AG)

These worst-case sensitive PORs are considered to be acoustically similar to the corresponding long-term noise monitoring (LTM) locations 1 to 4, which include:

- LTM1 – Parking Lot 4 along Southwestern Blvd. (5 ft AG)
- LTM2 – East Parking Lot at Erie College on Community College Dr. (5 ft AG)
- LTM3 – Off of Big Tree Rd at intersection of Erie College Dr. and Team Member Dr. (5 ft AG)
- LTM4 – On Bills Drive across from gate house (5ft AG)

Locations of the PORs, LTMs, and attended monitoring locations (A1-8) are provided in Figure 3.1 below:

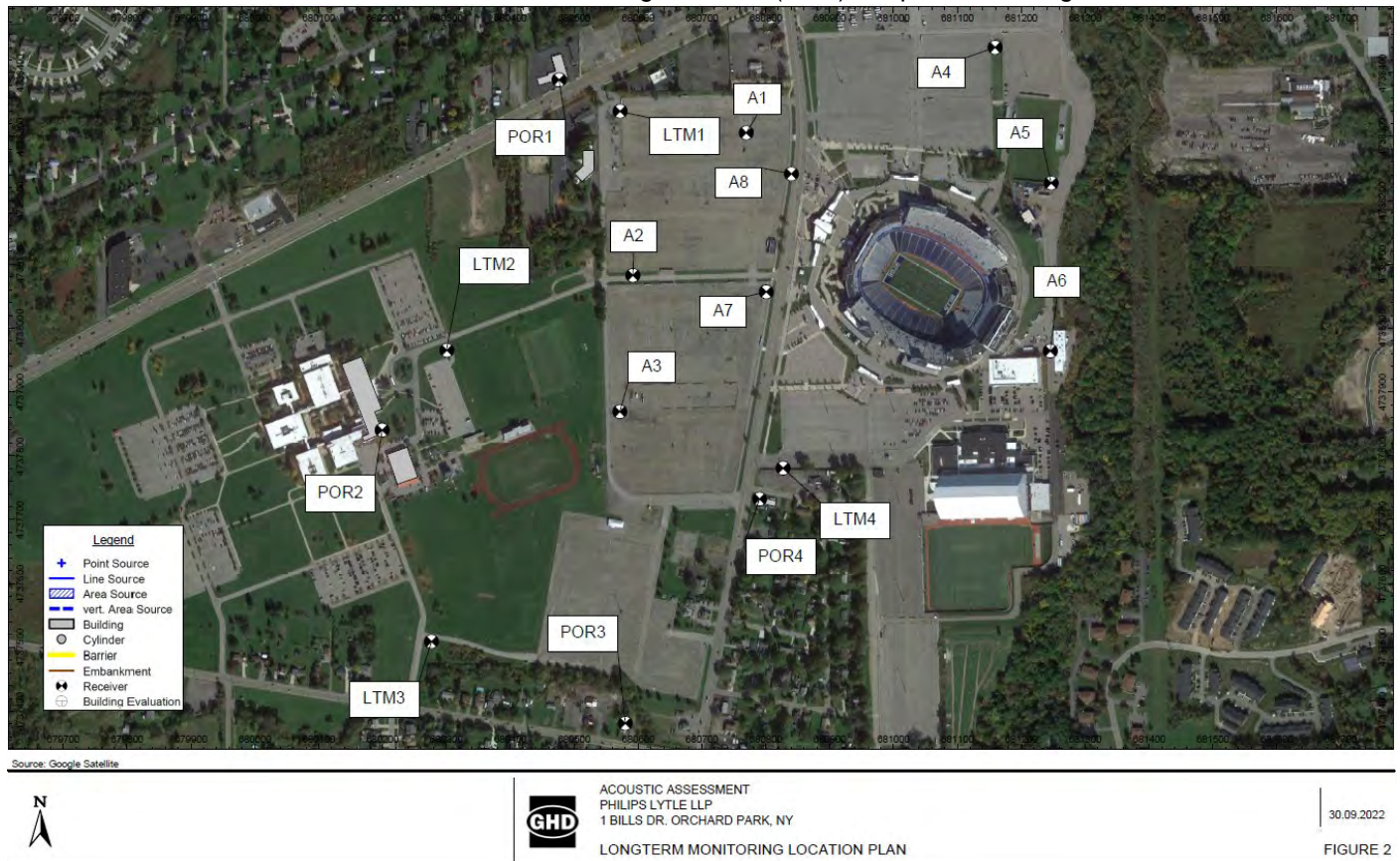


Figure 3.1 Locations of the PORs, Long Term Noise Monitoring, and Attended Monitoring Locations

3.2 Sound Level Measurements of Existing Conditions

3.2.1 Attended Noise Measurements During Game Day

Attended noise measurements were conducted by Mr. Patrick Chen and Mr. Sam East from GHD on Monday, September 19, 2022 from 5:00 p.m. to 11:00 p.m. during the course of the 2022 NFL regular season home opening game at Highmark Stadium. The purpose of these attended measurements was to capture the sound level of live events during an elevated noise event (i.e., a football game or concert) to attain detailed measurements and observations during the event of both the Highmark Stadium speaker system and the crowd/fan noise. The attended

noise measurements captured noise, before, during and after the Monday night Buffalo Bills football game. Attended noise measurements were supplemented with sound level measurements from the LTMs.

GHD took attended measurements at the following locations listed below and depicted above in Figure 3.1:

- All Four Long-term Monitoring Locations
- A1 – Lot 4, Northwest of Highmark Stadium
- A2 – Community College Drive between Lot 3 and 4, West of Highmark Stadium
- A3 – Lot 3, Southwest of Highmark Stadium
- A4 – Stadium Drive, North of Highmark Stadium
- A5 – Beside Bills Youth Football Stadium, Northeast of Highmark Stadium
- A6 – Stadium Drive, East of Highmark Stadium
- A7 – Abbot Road, West of Highmark Stadium
- A8 – Abbott Road, Northwest of Highmark Stadium

The sound level measurements were collected using a Type 1 Precision Sound Level Meter (SLM) which was calibrated and checked at 114 decibels (dBA) before and after the monitoring period.

Measurements were collected at a height of greater than three (3) feet above the ground and three (3) feet away from walls, barriers, obstructions, or other sound-reflective surfaces. A slow response setting was used and an A-weighted filter was used.

During the measurement period, detailed observations describing the type and nature of noise at each measurement location were documented and statistics of note were recorded: the Leq, Lmax, L5, L10 and L90 sound levels. Where possible GHD paused for nearby fan noise to get representative Highmark Stadium speaker only impacts.

Meteorological conditions consisted of low winds (<12 miles/hr), low humidity, and no precipitation during the measurement period.

3.2.2 Ambient Background Noise Monitoring

GHD selected the most appropriate locations to deploy the sound level meter system (SLMs) to capture the site-specific ambient sound level conditions in the areas adjacent to the sensitive residential PORs as shown on Figure 3.1.

The SLM equipment was set up on the four (4) LTM locations at a minimum height of 5 feet (ft). The sound level measurements were taken using 4 Larson Davis LxT Systems which includes a Type 1 Precision Sound Level Meter (SLM), Model LxT (Serial Numbers 0001181, 0004812, 0007094, 0007149); and a 1/2-inch free field condenser microphone. The SLM was calibrated and checked at 114 decibels (dBA) before and after each measurement period using a Larson Davis CAL200 Acoustic Calibrator.

The sound level measurements were collected for one-week from September 13 to September 20, 2022 to overlap with a Buffalo Bills Football Monday Night game on September 19, 2022. This ensures that the ambient background was captured with and without an elevated noise event.

Meteorological weather conditions during the noise monitoring period were obtained from the Weather Underground (Cheektowaga, NY Weather History | Weather Underground (wunderground.com)) which was collected by the Buffalo Niagara International Airport Weather Station in order to validate the data and to evaluate adverse weather conditions that could have affected the sound level measurements. Elevated sound levels that may have been influenced by high winds and/or rain were removed from the data set where appropriate.

During the measurement period, three quantities of note were recorded: the Leq, L5, and L90 sound levels, all over a one-hour time interval with minute-by-minute resolution with the detectors set to slow response. The Leq sound level is the energy equivalent sound level and represents the integrated sound exposure level of both steady and time varying sounds over the duration of the measurement. L5 represents the sound level which is exceeded 5 percent of

the time over the duration of the measurement; and L90 represents the sound level which is exceeded 90 percent of the time over the duration of the measurement, and is therefore useful in identifying the contribution of other steady source sound emissions in the area as detailed on Tables C.1-C.4 of Appendix C, Figure 6.1 and Figures C.1 to C.4 in Appendix C.

3.2.3 Acoustical Modelling of the Existing and Proposed Stadium Speaker Systems and Crowd Noise

3.2.3.1 Highmark Stadium Speaker and Crowd/Fan Noise Modelling

GHD took short-term attended measurements at several locations around the Highmark Stadium during the Buffalo Bills game on September 19, 2022 which provided the individual sound levels from each activity at interim measurement locations between Highmark Stadium and the points-of-reception. Due to the fact that these measurements were attended, qualitative observations on the type of discrete peaks observed to be either crowd or speaker noise at a closer location to Highmark Stadium can be used to then calculate the maximum sound level measured over a distance to the receiving point of the LTMs to assess impacts.

3.2.3.2 Proposed New Stadium Speaker Noise Modelling Completed by WJHW

Wrightson, Johnson, Haddon and Williams (WJHW) consulting firm prepared an Environmental Sound Study dated September 29, 2022 (“WJHW Study”), which provided an analysis of the proposed New Stadium’s speaker and concert systems.

According to the WJHW Study, their model included preliminary New Stadium geometry from Populous, sound system designs from WJHW and recent touring concert configurations. They note parking lots around the New Stadium, both existing and proposed, were included in the noise model. Also noted were the inclusion of buildings around the New Stadium, including the training center, SUNY ECC South campus, and the nearby residences that might otherwise provide noise buffering were excluded from the model to assess for worst-case noise propagation.

The WJHW Study made the following assumptions:

- The lower New Stadium façade is shown to be brick and glass; we have assumed this material is completely solid and any sound transmission through the glass would be negligible compared to the sound travelling around and over these walls.
- The upper New Stadium façade is shown to be perforated metal panels; we have assumed this material will allow all sound to pass through as a conservative estimate.
- The Highmark Stadium geometry was estimated from available aerial images of the site and public information on the Highmark Stadium construction; the playing field was modeled at 40 ft. below grade, and the top of the seating was modeled at 60 ft. above grade.
- The temporary concert sound system design (applicable for both the New Stadium and the Highmark Stadium) is assumed to consist of a stage in the south end zone with two large line arrays suspended from a temporary stage truss 50 ft. above the field, with music played at 112 dBA at the mix position 100 ft. from the front of the stage. The frequency spectrum for the music was taken from the noise limit riders of other large US concert venues.
- The New Stadium sound system design is assumed to consist of 12-box VLA line arrays suspended around the perimeter of the New Stadium canopy spaced every 75 ft., based on WJHW’s preliminary design of the sound system. Noise levels are assumed to be 105 dBA throughout the seating area and the content of the sound system was assumed to be pop music.

WJHW notes that the architectural design of the New Stadium, where the roof canopy, higher seating structures, and video board at the north end of the New Stadium, all help to contain the sound from both concert and football events within the New Stadium. Further, the sound system within the New Stadium is being designed as a distributed system with more speakers which can operate at lower power levels while maintaining the same sound level at the seating

areas because they are having to throw the sound a shorter distance to the fans. They also note that the patron capacity will be reduced by about 10% in the New Stadium.

GHD has used the WJHW provided modelled impacts and associated noise contour plots at each Study location to evaluate against the measured baseline ambient conditions where applicable.

4. Noise Assessment Criteria

4.1 SEQR Noise Assessment Criteria

Assessment criteria may be determined for a POR based on the SEQR's estimated exclusionary sound level limits, as described in Section V of the Noise Impact Criteria, in comparison to the background sound levels experienced in the area. The "background sound level" is defined as the sound level present in the environment that is produced by noise sources other than those from the New Stadium Project and would include traffic sound levels and sound from neighbouring industrial/commercial activity and sound from the Highmark Stadium.

4.1.1 SEQR Ambient Noise Levels by Area Type

For estimation purposes SEQR references the following ambient sound pressure levels (SPLs):

Table 4.1 SEQR Minimum Exclusionary Sound Level Limits for Steady Sound

Highly Industrial Area Sound Level Limits (dBA)	Urban Industrial Area Sound Level Limits (dBA)	Non-Industrial Sound Level Limits (dBA)	Rural Area Sound Level Limits (dBA)	Wilderness Area Sound Level Limits (dBA)
87	79	65-45	45	35

Based on the acoustic environment at the development, it is considered to be in a Non-Industrial Area, as shaded above. Baseline noise monitoring was completed to provide criteria at 4 LTM locations representative of the surrounding worst case receptors.

4.1.2 SEQR Thresholds for Significant Sound Pressure Level Increase

The goal for any permitted operation should be to minimize increases in sound pressure level above ambient levels at the chosen point of sound reception. Increases ranging from 0-3 dB should have no appreciable effect on receptors. Increases from 3-6 dB may have potential for adverse noise impact only in cases where the most sensitive of receptors are present. Sound pressure increases of more than 6 dB may require a closer analysis of impact potential depending on existing SPLs and the character of surrounding land use and receptors. SPL increases approaching 10 dB result in a perceived doubling of SPL.

The perceived doubling of the SPL results from the fact that SPLs are measured on a logarithmic scale. An increase of 10 dB(A) deserves consideration of avoidance and mitigation measures in most cases. The above thresholds as indicators of impact potential should be viewed as guidelines subject to adjustment as appropriate for the specific circumstances one encounters.

In non-industrial settings the SPL should probably not exceed ambient noise by more than 6 dB(A) at the receptor. An increase of 6 dB(A) may cause complaints. However, there may be occasions where an increase in SPLs of greater than 6 dB(A) might be acceptable.

To ensure that a significant sound level increase (more than 6 dBA) during elevated noise events, which include concerts and gameday events, long term measurements supplemented by attended measurements have been completed to generate a baseline for comparison during a Monday night game day event which is considered of a typical gameday at Highmark Stadium.

Long-term background noise monitoring was conducted by GHD from September 13 to September 20, 2022. The resulting background sound levels based on L5 should be utilized as the limits for this Study according to the SEQR process in which the New Stadium impacts will be evaluated against a +6 dBA increase from existing conditions. The n-percent exceeded level, Ln, is the sound pressure level exceeded for n percent of the time. In other words, for n percent of the time, the fluctuating sound pressure levels are higher than the Ln level. The most commonly used Ln values are the L5, L10, L50 and L90.

L5 is the level exceeded for 5% of the time. For 5% of the time, the sound or noise has a sound pressure level above remaining 95% of the measurement period. For the rest of the time, the sound or noise has a sound pressure level at or below L5. These higher sound pressure levels are probably due to sporadic or intermittent events. L5 is often used when assessing traffic noise and in planning applications as L5 is the level exceeded for 5% of the time and takes account of any annoying peaks in noise. GHD has used the L5 statistic (top 5 % of noise recorded during an hourly measurement) from the baseline monitoring data as the criteria to compare the SEQR evaluation against as it is representative of the amount of time that the New Stadium crowd or concert event peak noise would occur in a given hour during an event.

L5 noise data from the continuous one-hour baseline measurements of each time period were used for the SEQR evaluation as follows based on the following scenarios based on Gamedays occurring on a Sunday afternoon, Monday night or a typical concert event during the evening:

Table 4.2 Applicable Baseline Sound Levels for Comparison to Noise Impact Criteria During a Game Day or Concert Event

POR ID	POR Description	Baseline Sound Levels Limits (<+6 dBA)	
		Game Day Event (5pm – 11pm) (L5, dBA)	WJHW Modelled Existing Concert Night (7pm – 11pm) (dBA)
LTM1	Parking Lot 4 along Southwestern Blvd. (5 feet above grade [ft AG])	72 (78)	92 (98)
LTM2	Erie College – on Community College Dr. (5 ft AG)	65 (71)	76 (82)
LTM3	Off Of Big Tree Rd at intersection of Erie College Dr. and Team Member Dr. (5 ft AG)	62 (68)	69 (75)
LTM4	Bills Drive (5ft AG)	76 (82)	73 (79)

The event time periods have been predicted using typical game or concert periods with some time before and after to account for tailgating and crowds leaving a sporting or concert event. If an event were to be held earlier in the evening these results would be slightly lower. However, for the purpose of the Study, 11:00pm has been chosen as the end time which is the latest a typical sporting or concert event would operate.

4.1.3 Local Noise Ordinances

The Code of the Town of Orchard Park, Part II, General Legislation, Chapter 87 Noise, Section 87-3 states:

Subject to the provisions of this chapter, the creation of any unreasonably loud, disturbing and unnecessary noise is prohibited. Noise of such character, intensity and duration as to be detrimental to the life or health of any individual is prohibited.

The Code of the Town of Hamburg, Part II, General Legislation, Chapter 175 Noise, Article II states:

A. The creation of any unnecessary and unreasonably loud or disturbing noise is prohibited as a public nuisance.

B. Noise of such character, intensity and duration as to be detrimental to the life, health or welfare of the inhabitants of the Town of Hamburg is prohibited as a public nuisance.

C. In particular, without excluding other types of prohibited sounds by failure to enumerate them, all sleep-disturbing noises are prohibited. Sleep-disturbing noises shall mean any unnecessary and unreasonably loud or disturbing sounds occurring during the hours between 11:00 p.m. and 7:00 a.m. and unreasonably interfering with the sleep, comfort, health and repose of any individual within hearing thereof or in the vicinity.

These two municipal ordinances are “nuisance ordinances” and do not set a prescribed limit to the maximum sound levels. For this reason, the project has proposed a comparison to the Highmark Stadium conditions as a baseline for community noise impact, with the intent to limit the receptors where there is a significant increase in noise level during events. This is consistent with the guidelines published in the New York State Environmental Permits Guidance Document “Assessing and Mitigating Noise Impacts” which states:

The goal for any permitted operation should be to minimize increases in sound pressure level above ambient levels at the chosen point of sound reception. Increases ranging from 0-3 dB should have no appreciable effect on receptors. Increases from 3-6 dB may have potential for adverse noise impact only in cases where the most sensitive of receptors are presents. Sound pressure increases of more than 6 dB may require a closer analysis of impact potential depending on existing SPLs and the character of surrounding land use and receptors ... An increase of 10 dB(A) deserves consideration of avoidance and mitigation measures in most cases.

5. New Stadium Construction Noise Criteria

The United States Federal Transit Administration's (FTA) Transit Noise and Vibration Impact Assessment Manual (FTA, 2018) is widely used as a reference for construction noise and vibration impact assessment. The FTA guidance manual includes a residential daytime noise criterion of 80 dBA $L_{eq,8hr}$, or a 70 dBA $L_{eq,8hr}$ criterion for night-time work for detailed assessment purposes. Above these levels, noise control measures are recommended if practical.

Temporary construction noise impacts at all site locations are anticipated to be below the FTA guideline limit of 80 dBA $L_{eq,8hr}$ for daytime construction work at all POR locations. Noise levels are expected to be lower because the predictions are based on the assumed equipment operating together at the same conservative set-back distance, rather than distributed around the work site. However, noise will be controlled to ensure that the guideline limits are not exceeded, where possible.

The proposed CNMP will be conducted in accordance with the applicable noise regulations, guidelines, protocols and local ordinances. These include the following:

- Code of the Town of Orchard Park Part II, General Legislation Chapter 87, Noise
- Code of the Town of Hamburg Part II, General Legislation Chapter 175, Noise
- FTA, "Transit Noise and Vibration Impact Assessment Manual", September 2018

5.1 Construction Noise By-Law

The Code of the Town of Orchard Park Chapter 87-4 states the following time prohibitions:

The following acts, among others, are declared to be loud, disturbing and unnecessary noises in violation of this chapter, but the enumeration herein shall not be deemed to be exclusive:

The erection, including excavating, demolition, alteration or repair, of any building other than between 7:00 a.m. and 6:00 p.m. on weekdays, except in case of an urgent necessity in the interest of public safety and then only with a permit from the Building Inspector, which permit may be renewed for a period of three days or less while the emergency continues.

Construction noise monitoring is not required for by-law compliance.

The current proposed construction schedule indicates that project activities could occur on weekends and/or outside of the standard 7:00am – 6:00pm work hours. Although intermittent night and weekend work is proposed, it is anticipated that approximately 85 – 90% of the project work will be performed during standard work hours (Mon – Fri; 7:00 am – 6:00 pm). In compliance with applicable ordinances, any off-hours work must be properly requested in advance.

6. New Stadium Noise Impact Assessment

6.1 Evaluation of Baseline Noise Monitoring Under Existing Conditions

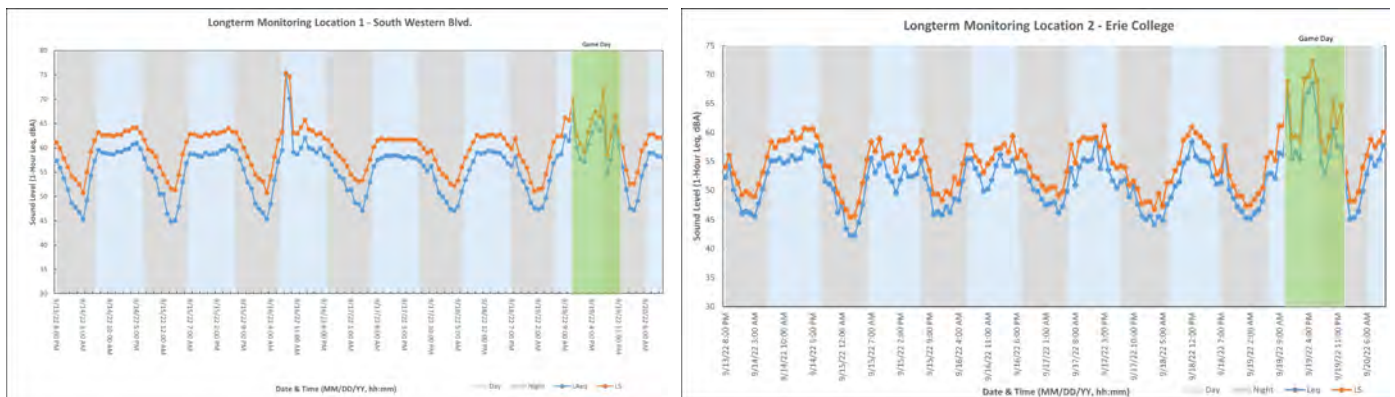
Overall, the baseline ambient noise levels follow typical diurnal patterns, with elevated sound levels during the day and lower sound levels during night. The sound levels in the monitoring area begin to elevate to normal day time sound levels at 5:00 a.m. and level out to typical daytime sound levels by 7:00 a.m. on weekdays and 9:00 a.m. on weekends. The monitoring areas begin to decrease from typical day time sound levels at 9:00 p.m. during the weekdays and 7:00 p.m. on weekends. The ambient minimum 1-hour Leq sound level limits during non-elevated noise events are as follows.

Table 6.1 Applicable Minimum Sound Level Limits or Site-Specific Limits for Steady State Sound

POR ID	POR Description	Lowest 1-hour Leq Sound Level Limits (dBA)		
		Day (7am – 7pm)	Evening (7pm – 11pm)	Night (11pm – 7am)
LTM1	Parking Lot 4 along Southwestern blvd. (5 feet above grade [ft AG])	53	53	45
LTM2	Erie College – on Community College Dr. (5 ft AG)	49	46	45
LTM3	Off Of Big Tree Rd at intersection of Erie College Dr. and Team Member Dr. (5 ft AG)	50	47	45
LTM4	Bills Drive (5ft AG)	59	51	45

GHD’s on site observations note that noise in the area is largely due to traffic on the nearby roadways and highways, when no elevated noise events are occurring at Highmark Stadium.

The lowest 1 hour Leq typically occurs at 3:00 a.m. or 4:00 a.m. Figure 6.1 below depicts the 1-hour Leq and L5 at each LTM during the monitoring periods, Tables C.1- C.4 and magnified versions of the Figure 6.1 can be found in Appendix C:



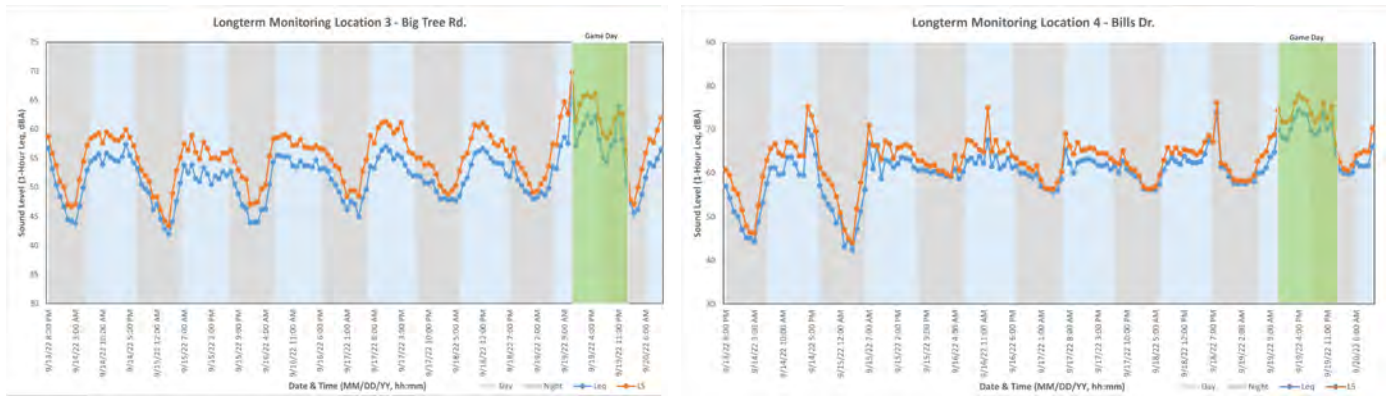


Figure 6.1 Baseline Noise Monitoring Figures

The baseline noise levels show a clear increase in sound levels during a Monday game day event. This increase in elevated noise levels will likely be comparable to game day events which could also generally occur on Thursday nights and Sundays at 1pm. All monitoring locations consistently showed similar nighttime low hourly Leq past 11 p.m. even with a nighttime football game event occurring.

Top left plot in Figure 6.1 shows that the daytime hourly Leq at LTM1(Located on the northwest corner of Parking Lot 4) of 59 dBA and drops to an hourly Leq of between 45 - 47 dBA during the night periods. There is one outlying 2-hour period on September 16th from 8:00 a.m. to 10:00 a.m. resulting in the Leq reaching a high of 75 dBA, the cause for this is however unknown and assumed to be an isolated event.

The top right plot in Figure 6.1 shows that the hourly Leq at LTM2(Located at the eastern parking lot of Erie College along Community College Dr.) was much more variable during the day ranging from 57 to 61 dBA some days and 53 to 59 dBA on others, this is likely due to the nature of colleges and their variable class schedules. During nighttime hours the hourly Leq generally was between 44 and 48 dBA, with one night (Wednesday) dropping to 42 dBA.

The bottom left plot in Figure 6.1 shows consistent daytime sound levels at LTM3(Located at the intersection of Team Member Dr. and Erie College Dr.), varying from 52 to 57 dBA on most days. During the nighttime however, the lowest hourly Leq was raised to a low of 48 dBA the two days leading up to the Monday gameday event, while typically most days varied between 42 and 45 dBA. This was likely due to increased traffic and use of the Team Member Parking lot.

The bottom right plot in Figure 6.1 shows the ambient sound levels at LTM 4, located on Bills Drive. It is apparent that this location was significantly affected by increased game day preparation in the week leading up to the game day with nighttime lowest hourly Leqs raising to 56 dBA. During the off-season it is likely to be expected that the sound levels during the night will be similar to the early mornings (1:00 a.m. to 4:00 a.m.) of Wednesday October 14th and Thursday October 15th with a nighttime low of 44 and 42 dBA respectively. Daytime sound levels at LTM4 are rather consistent (except for during gameday) ranging from 59 to 66 dBA with occasional spikes in sound levels due to unknown infrequent events.

Elevated sound levels at all LTMs was found during game day from 11:00 a.m. to 11:00 p.m. Tailgating events starting up during the daytime is the major cause of the elevated game day sound levels. Approximately 30 minutes before the game time the overall sound level decreases as tailgating events end and sound level begins to be dominated by

game events such as: Player introductions, touchdown celebrations, and finally fans leaving Highmark Stadium. Game day events are shown in the figure below from when GHD arrived on site at 5:00 p.m. and departed at 11:00p.m.

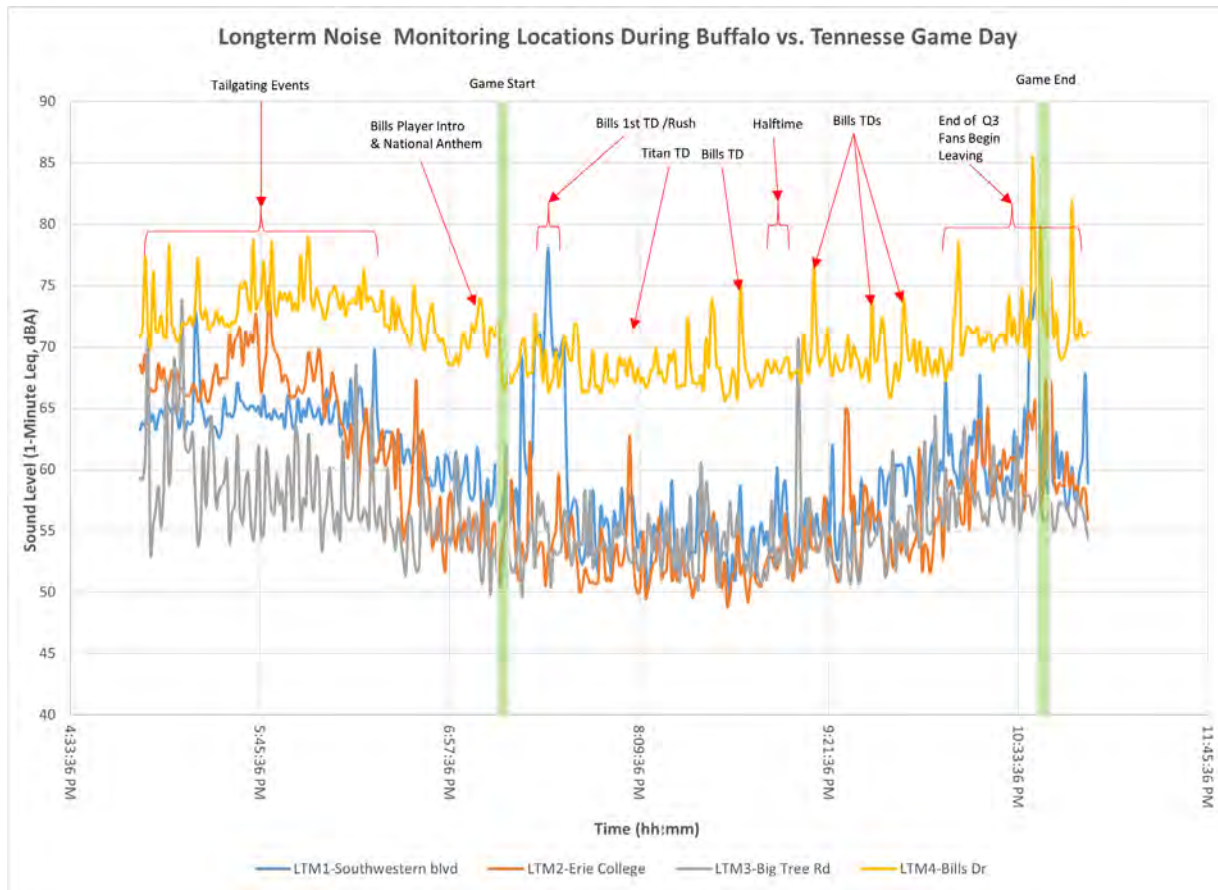


Figure 6.2 1-Minute Leq at Long Term Monitoring Locations during Gameday

6.2 Evaluation of Attended Noise Measurements During Game Day

During GHD’s attended noise measurements it is noted that the loudest game day events include the following:

- Tailgating Events
- Stadium Crowd noise
- Stadium Speaker noise
- Stadium Fireworks

The Tailgating events occurred mainly in the North Parking Lots (Lots 5-7), West parking Lots (Lots 3 and 4), and the SUNY Erie Community College West Parking Lots closest to Highmark Stadium. The sound levels during Tailgating events ranged from 65 dBA near LTM 2 to 76 dBA at the attended measurement A4 (depicted in Figure 3.1).

Attended measurements of Crowd noise were measured at A1 and LTM4, where a sound pressure level of ~71 dBA at 1,476 ft and 76 dBA at 436 ft respectively. The loudest crowd noise measured occurred at 7:31 p.m. after the opening touchdown play by the Buffalo Bills. During this period of time there was a long-sustained crowd cheer.

Attended measurements of Highmark Stadium speaker noise was measured at locations A2 and A5, where a sound pressure level of 59 dBA at 1214 ft and 63 dBA at 837 ft respectively. This was the loudest noise measured attributable to speaker noise which occurred at 8:09 p.m. during halftime where fans were not cheering.

Firework noise was the cause of many elevated instantaneous impulsive noise events. Fireworks occurred during game opening ceremonies, after a Buffalo Bills touchdown or scoring play, and at the end of the game. Sound levels of firework noise ranged from 73-75 dBA at A1. Fireworks typically conceded with crowd noise.

At the LTM locations the attended 1 minute Leq sound levels for these events were as follows:

Table 6.2 Summary of Attended Measurement for Game Day Events

LTM ID	LTM Description	1-Minutre Leq Sound Level of Event (dBA)			
		Average Tailgating	Crowd Noise	Stadium Speaker	Fireworks
LTM1	Parking Lot 4 along Southwestern Blvd. (5 ft AG)	64	65	55	71
LTM2	Erie College – on Community College Dr. (5 ft AG)	66	58	53	53
LTM3	Off Of Big Tree Rd at intersection of Erie College Dr. and Team Member Dr. (5 ft AG)	58	58	52	58
LTM4	Bills Drive (5ft AG)	73	72	66	70

6.3 New Stadium Noise Source Summary

The New Stadium will have 12-box VLA line arrays suspended around the New Stadium to be used during game days and 2 electro voice line arrays for concerts in addition to crowd/fan noise.

The sound levels are as follows:

- The temporary concert sound system for the New Stadium is assumed to consist of a stage in the south end zone with two large line arrays suspended from a temporary stage truss 50’ above the field with music played at 100 dBA at majority of seats.
- New Stadium sound system design is assumed to consist of 12-box VLA line arrays suspended around the perimeter of the New Stadium canopy spaced every 75 ft. with sound levels of 100 dBA at sidelines.
- GHD has measured the existing crowd/fan noise peak volume of ~ 71 dBA at 1,476 Feet (Total sound power level of ~133 dBA). Equivalent to a modelled sound level of 94 dBA at the sidelines.
- GHD has measured the gameday Highmark Stadium speaker noise peak volume of ~ 59 dBA at 1,214 Feet (Total sound power level of ~123 dBA). Equivalent to a modelled sound level of 83 dBA at the sidelines.

6.4 New Stadium Noise Modelling Results

GHD has referenced the WJHW Study for the New Stadium noise sound levels to compare to the following existing elevated noise event scenarios:

1. Stadium Concert Event
2. Stadium Game Day Event

As GHD was only able to take attended noise measurements during a game day event, WJHW’s Highmark Stadium concert modelled scenario will be compared to the WJHW New Stadium concert noise levels which GHD has summarized for context to the overall evaluation.

6.4.1 New Stadium Concert Event Sound System Results

As GHD was unable to measure a concert event at the existing Highmark Stadium, the calculated noise levels derived from a WJHW modelling of an existing concert event were used as representative of existing conditions.

The following excerpt Noise Contour Plot (Figure 5) from WJHW Study details impacts from Highmark Stadium during a concert:

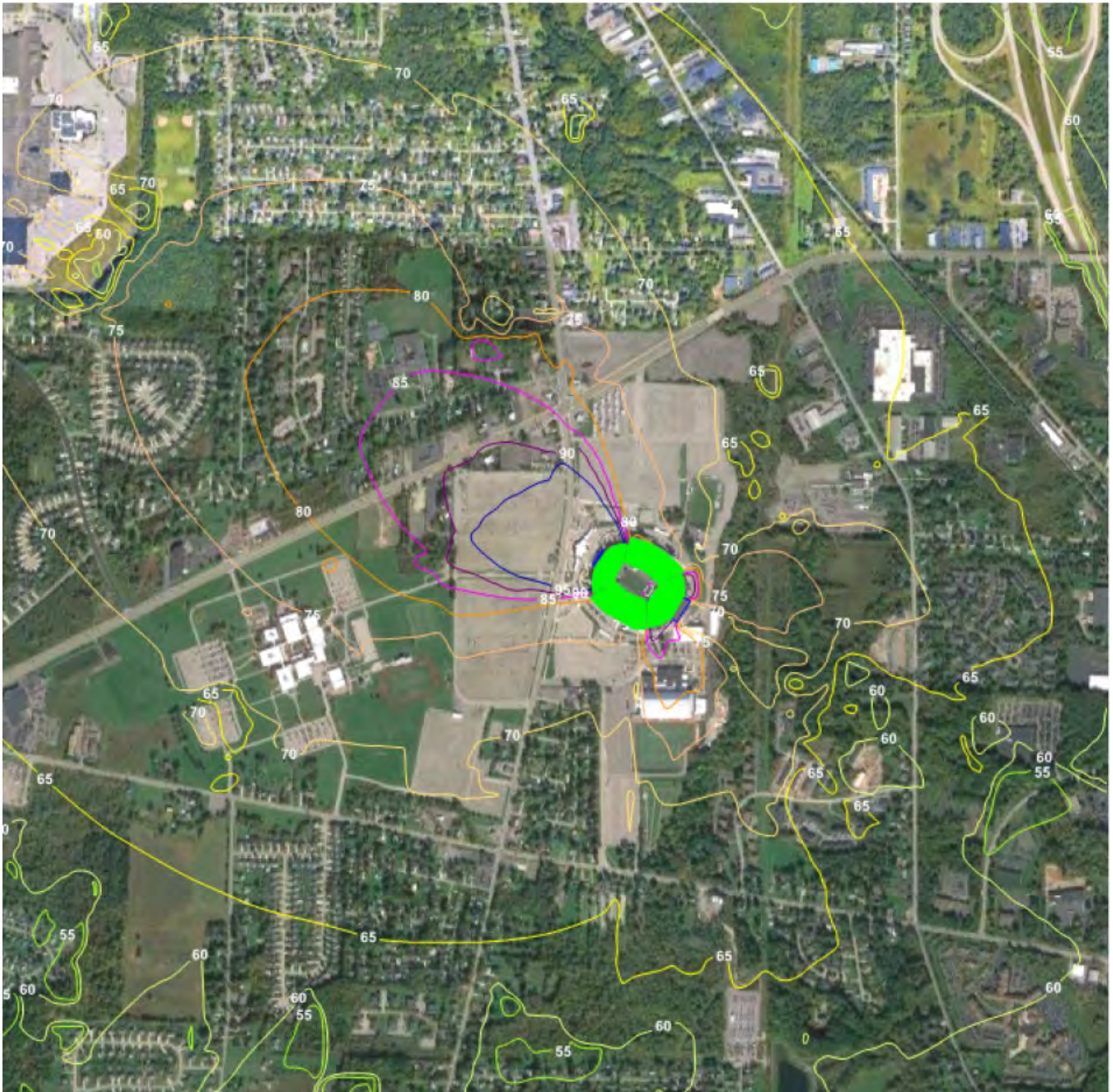


Figure 6.3 Existing Sound Levels from Highmark Stadium During Concert Event – Buffalo Bills New Stadium Concert in South End Zone

The following excerpt Noise Contour Plot (Figure 4) from WJHW Study details impacts from the New Stadium during a concert:

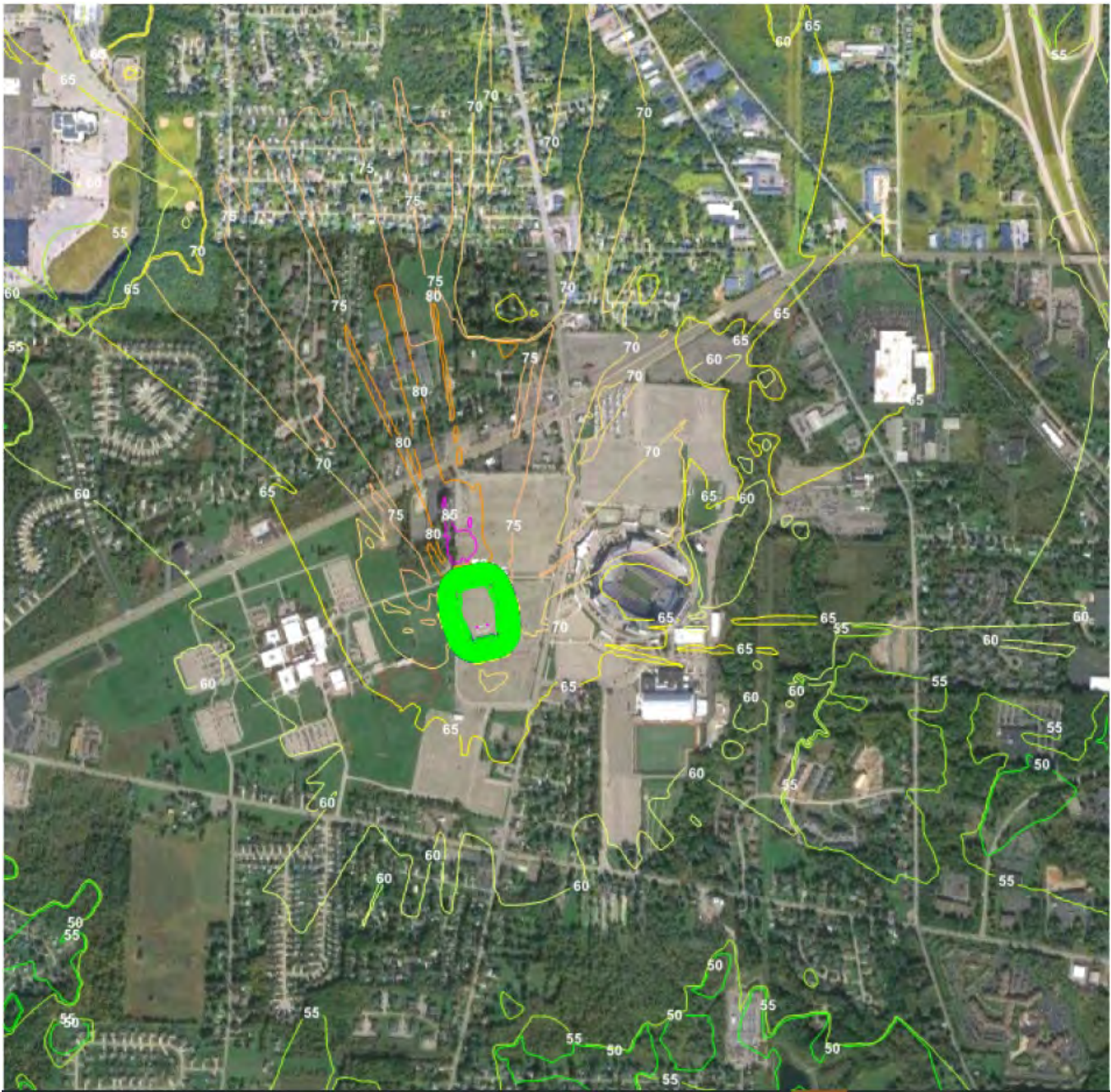


Figure 6.4 Anticipated Sound Levels from New Stadium During Concert Event – Buffalo Bills New Stadium Concert in South End Zone

Based on the WJHW Concert Sound Levels presented above GHD has summarized the impact relative to the noise level criteria below in Table 6.3:

Table 6.3 *New Stadium Sound System Sound Levels for Comparison to Noise Impact Criteria During a Concert Event*

POR ID	POR Description	WJHW Highmark Stadium Concert Speaker Sound Levels (dBA) Concert Night (7pm – 11pm)	WJHW New Stadium Concert Speaker Sound Levels (dBA) Concert Night (7pm – 11pm)	Delta between existing and proposed Sound Levels (+/- dBA)
LTM1	Parking Lot 4 along Southwestern Blvd. (5 ft AG)	92	79	-13
LTM2	Erie College – on Community College Dr. (5 ft AG)	76	68	-8
LTM3	Off of Big Tree Rd at intersection of Erie College Dr. and Team Member Dr. (5 ft AG)	69	60	-9
LTM4	Bills Drive (5ft AG)	73	65	-8

The proposed noise impacts for New Stadium concert events meets the Noise Impact Criteria of being less than 6 dBA above the existing noise levels at all locations. In fact, the New Stadium concert event results in a significantly lower community sound level impact reducing the overall sound level impact by 8 to 13 dBA. This is a significant reduction resulting in a perceived halving of the overall noise at locations closest to the New Stadium representing the nearest and worst-case sensitive receptors. GHD notes that within a 1-mile radius of the New Stadium, WJHW anticipates that a small area approximately 4,110 ft. from the New Stadium (at Lynwood Ave. and Brookview Terrace) could see an increase in concert sound level of approximately 3 dBA due to the orientation of the New Stadium. While not a significant increase, this predicted increase is likely overly conservative as this area will likely be shielded by intervening ground clutter (vegetation and buildings) which was not included in WJHW’s model.

WJHW notes that the overall lack of a significant increase in sound level is because while the New Stadium is still open air and is closer to US-20 and the residences located to the north, the higher seating structures, and video board on the north side of the New Stadium help to contain the sound within the venue.

6.4.2 New Stadium Game Event Results

Based on GHD’s attended noise measurements and observations, the sound levels from WJHW are considered the worst-case scenario, in that the sound level is not expected to be consistently at the worst-case sound level for an entire game. GHD’s observations prove this expectation is correct as the sound level varied between 18 dBA and 28 dBA between the minimum and maximum sound levels during a game as the speakers and crowd noise are only elevated for short bursts of time. Therefore, the maximum L5 (the upper 5% of sound received) sound level is considered to be a good comparison to WJHW’s modelled results.

The following excerpt Noise Contour Plot (Figure 6) from WJHW Study detailing impacts from the New Stadium during a gameday event:

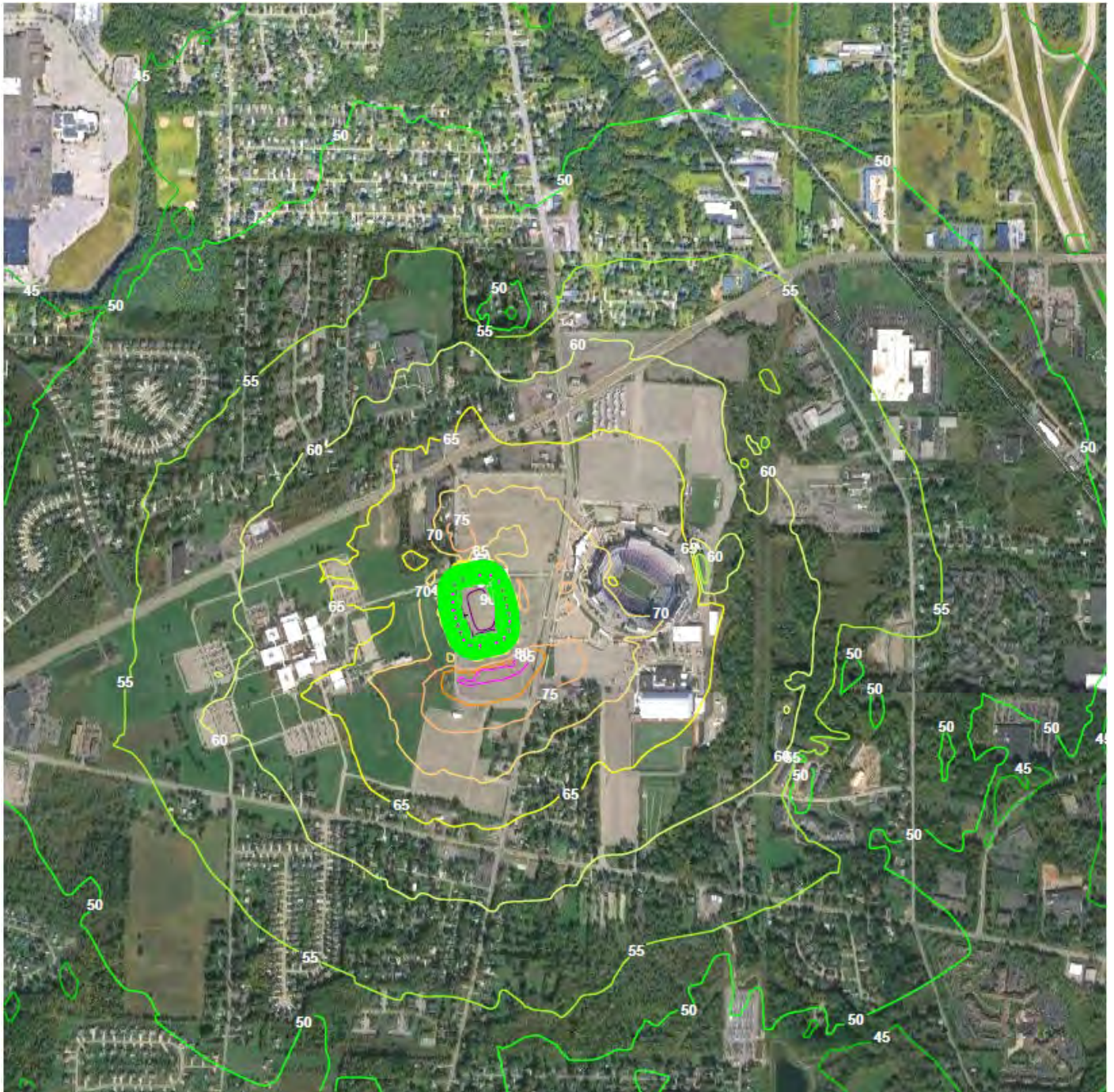


Figure 6.5 Anticipated Sound Levels from New Stadium on Gameday – Buffalo Bills New Stadium – Music on Gameday

Based on the WJHW Gameday Sound Levels presented above GHD has summarized the impact relative to the noise level criteria below in Table 6.4:

Table 6.4 *New Stadium Speaker Sound Levels for Comparison to Noise Impact Criteria During a Game Day Event*

POR ID	POR Description	Existing Highmark Stadium Game Sound Levels (L5%) (dBA)	New Stadium Game Speaker/ Crowd 10 min Leq Sound Levels (dBA)	Delta between existing and Predicted Sound Levels (dBA)
LTM1	Parking Lot 4 along Southwestern Blvd. (5 ft AG)	72	69-72	-3 - 0
LTM2	Erie College – on Community College Dr. (5 ft AG)	65	64-67	-1 - +2
LTM3	Off Of Big Tree Rd at intersection of Erie College Dr. and Team Member Dr. (5 ft AG)	62	64-66	+2 - +4
LTM4	Bills Drive (5ft AG)	76	76-78	+0 - +2

GHD has compared WJHW’s predicted 10-minute maximum Leq with the 1-hour L5 sound level of the loudest game day hour. This is a good comparison due the consistent rises and falls of the crowd and speaker noise throughout a game. Based on these predicted noise impacts from the New Stadium Game Speaker system/crowd meet the Noise Impact Criteria of being less than 6 dBA above the existing noise levels at all LTMs.

GHD measured the existing game day noise impacts from the crowd/fans, tailgating and fireworks with attended 1-minute Leq sound levels at each of the noise monitoring stations. Crowd noise and firework sound levels will increase overall at all LTM locations due to the Stadium being moved closer to the LTM locations, however overall sound power level (how loud the crowd and fireworks are) will likely remain the same overall. The sound levels at LTM 1, 2 and 3 will likely increase due to the shorter distance to the surrounding sensitive areas from the new stadium compared to the existing stadium. Based on this change in 1-minute firework sound levels there will be an insignificant increase (>6 dBA) at locations LTM 1, 3 and 4, while location LTM2 (ECC) is estimated to increase more than 6 dBA. The 1-minute crowd sound level locations are predicted to increase more than 6 dBA overall. However, when compared to the overall 1-hour L5 baseline sound levels there is no significant increase and meets the Noise Criteria.

LTM2 is located at ECC where the closest structures/sensitive receptors are offices and classrooms which are typically daytime use only, while the noise impacts associated with game day crowd noise and fireworks which only occur during evening/nighttime hours (7:00p.m. – 11:00 p.m.) or weekends during game times, this increase at the ECC ground is therefore not significant. Additionally, GHD compared the baseline gametime 1-hour L5 sound level at LTM2 (65 dBA) to the conservative 1-minute Leq sound levels from crowd noise or fireworks at the new stadium location scenario and confirm they are less than a 6 dBA increase meeting the noise criteria.

Based on GHD’s observations and attended noise measurements at LTM3 (Big Tree Road/Erie College Drive) there may be an increase in tailgating sound levels due to the new stadium parking areas being moved closer. However, as there are more areas for tailgating the crowds will be dispersed over a larger area covering several lots and the bulk of the tailgating will remain in the northern lots and move to western lots. Therefore, sound levels are not expected to increase more than 6 dBA at LTM3 over the short period of time before a game. Tailgating events already occur next to the LTM1, LTM2 and LTM4 areas, and therefore a significant increase of sound levels is not expected at these locations.

7. Construction Noise Impact Assessment

This Construction Noise Impact Assessment and Construction Noise Management Plan (CNMP) details the following:

- Identifies and maps construction related noise sources, sensitive receptors, and monitoring locations
- Detail's sound level instrumentation and deployment set-up
- Defines noise criteria and associated trigger levels
- Outlines the optional active construction noise monitoring programs
- Responsibilities of stakeholders and project deliverables
- Schedule for report submissions
- Noise engineer/technician roles and responsibilities
- Complaint management procedure
- Record keeping procedure
- Specifies Noise Control options

The construction of the New Stadium is split up into 3 main phases. Phase 1 is divided into subphases to allow for modelling of the change in topography caused by excavation, and Phase 3 is divided into subphases by what equipment will be operating on site:

1. Phase 1A – Demolition and Initial Excavation (March 2023 – February 2024)
2. Phase 1B – Demolition, Utilities Relocation, Excavation, Foundation Work (March 2023 – February 2024)
3. Phase 2 – Foundation Work, New Utilities, Concrete, Start of Structural Steel (February 2024 – Jan/Feb 2025)
4. Phase 3A – Completion of Structural Steel, Complete Utilities, MEP (Mechanical, Electrical, Plumbing) (Jan/Feb 2025 – Spring 2025)
5. Phase 3B – Completion of Structural Steel, Complete Utilities, MEP (Mechanical, Electrical, Plumbing) (Spring 2025 – April 2026)

Construction is slated to run 7 days a week, from 6 am – 11 pm on weekdays, 7 am – 6 pm on Saturdays and 8 am – 5 pm on Sundays. However, it is anticipated that 85 – 90% of project work will occur within standard 7 am – 6 pm weekday work hours. The equipment are classified as “stationary sources” of sound.

7.1 Construction Noise Source Summary

Equipment and activities associated with Phases 1 to 3 for the construction of the New Stadium (Project) have the potential to produce noise emissions in the vicinity of the Project above the documented baseline limits. Changes to ambient noise levels and vibrations have the potential to impact existing sensitive receptors. The construction phase of any project is typically considered temporary or short-term relative to the entire life cycle of a project and mostly limited to daytime construction hours. It is anticipated that any construction or operational noise will be at or below the FTA noise limits at the worst-case receptor locations. Should levels above the FTA noise limits occur noise mitigating controls such as, controlling noise with attenuation (the distance between a noise source and a receptor), vertical separation/blocked line of sight, best practices for construction/demolition and equipment design where feasible.

The following section details an updated analysis, parameters or assumptions used in the noise evaluation of the CNMP.

Noise Source Operating Parameters/Assumptions

In order to predict the future worst-case noise impacts from the Project activities, representative octave band noise data was used or measured from construction/processing equipment similar to what is noted to be required for the Project. This data was obtained from the United Kingdom's Department of Environment Food and Rural Affairs (DEFRA) Update of Noise Database for Prediction of Noise on Construction and Open Sites, 2005 and 2006 (common

source used globally). The United States Department of Transportation, Federal Highway Administration (FHWA) document FHWA Roadway Construction Noise Model User's Guide, 2006 as well as the New York State Department of Environmental Conservation's "Assessing and Mitigating Noise Impacts" and GHD's noise source library were used as supplemental documents to obtain sound level data for equipment not listed by DEFRA.

Most noise-generating activities were weighted with the acoustical usage factors provided in the FHWA database, which adjust the sound levels to account for the percentage of time per hour they would be operational and emitting significant noise. If an acoustical usage factor was not available, the equipment or activity was assumed to operate for the full hour (100% load) which is considered conservative unless otherwise specified.

The environmentally significant noise sources or activities occurring on Site is separated into 5 separate stages/substages. The equipment to be used during each phase of construction is listed in the tables below, along with their sound power levels and acoustical usage factors.

Table 7.1 *Estimated Equipment List for Phase 1A (Demolition and Initial Excavation) and Phase 1B (Demolition, Utilities Relocation, Excavation and Foundation Work), March 2023 – Feb. 2024*

Equipment	Sound Power Level (dBA)	Acoustical Usage Factor	Phase 1A	Phase 1B	Phase 2	Phase 3A	Phase 3B
Auger Drill Rig	117	20%	2	2	-	-	-
Backhoe	112	40%	6	6	6	6	6
Bulldozer	117	40%	4	4	1	1	1
Chainsaw	117	20%	2	2	2	1	1
Compactor	112	20%	2	2	2	2	2
Concrete Batch Plant	115	15%	-	1	1	1	1
Concrete Mixer Truck	117	40%	-	10	10	10	6
Concrete Pump Truck	114	20%	-	2	2	2	2
Crawler Crane	115	16%	2	2	2	10	8
Drill Rig Truck	116	20%	-	1	1	-	-
Drum Mixer	112	50%	-	2	2	1	1
Dump Truck	116	40%	10	10	5	5	5
Excavator	117	40%	6	6	6	6	4
Front End Loader	112	40%	4	4	4	4	4
Generator	114	50%	6	6	6	6	6
Gradall	117	40%	2	2	2	1	1
Grader	117	40%	2	2	-	-	1
Hoe Ram	122	20%	4	4	-	-	-
Impact Pile Driver	127	20%	-	2	-	-	-
Jackhammer	117	20%	2	2	1	1	1
Loader	112	-	4	4	2	2	2
Pavement Scarifier	117	20%	-	-	-	-	1
Paver	117	50%	-	-	-	-	1
Pneumatic Tool	117	50%	-	10	10	-	10
Rivet Buster	117	20%	5	5	5	2	2

Equipment	Sound Power Level (dBA)	Acoustical Usage Factor	Phase 1A	Phase 1B	Phase 2	Phase 3A	Phase 3B
Rock Drill	117	20%	5	5	2	-	9
Roller	105	20%	-	-	-	-	1
Scraper	117	40%	2	2	-	-	1
Vibrating Hopper	117	50%	-	2	2	1	1
Vibratory Concrete Mixer	112	20%	-	4	4	4	2
Vibratory Pile Driver	127	20%	-	2	1	-	-
Wheel Wash Station	103	-	5	5	5	5	5
Welder	105	40%	-	6	6	6	6

There are no other significant noise generating activities or equipment.

Figures D1A, D1B, D2, D3A D3B have been created to show the noise source locations with associated noise contour plots and the main haul truck routes during each phase of construction. These figures can be found in Appendix D.

8. Construction Noise Impact Assessment

The worst-case assessment of steady-state noise sources at the selected points-of-reception was based on measured sound pressure levels. CadnaA Acoustical Modelling Software (CadnaA), version 2022, was used to model the potential impacts of the significant noise sources. Cadna A calculates sound level emissions based on the ISO 9613-2 standard “Acoustics – Attenuation of Sound during Propagation Outdoors”.

The magnitude of noise impacts associated with construction will be dependent upon a number of factors including:

- The intensity of construction activities
- The location of construction activities
- The type of equipment used
- Existing local noise sources
- Intervening terrain
- The prevailing weather conditions

The construction is separated into 5 phases and resulting noise levels at the PORs are shown below:

Table 8.1 Resulting Noise Levels for Each Phase of Construction at Each POR

Worst-case POR	Phase of Construction				
	Phase 1A (dBA)	Phase 1B (dBA)	Phase 2 (dBA)	Phase 3A (dBA)	Phase 3B (dBA)
POR1 – 2-Storey Hotel on Southwestern Blvd. (15 ft AG)	68	69	65	65	63
POR2 – 2-Storey Office Building at ECC (15 ft AG)	70	69	65	66	63
POR3 – 2-Storey Residence on Big Tree Rd. (15 ft AG)	68	66	63	64	63
POR4 – 2-Storey Residence on Fay St. (15 ft AG)	77	75	72	72	71

The modelled noise impacts associated with each stage of construction meet the FTA construction noise criteria of 80 dBA $L_{eq,8hr}$ daytime and, in fact, in many instances will be much lower than that. It is noted that POR2 is located at the ECC campus which represents office space. Standard windows typically provide an approximate 10-15 dBA sound

reduction. As a result, the indoor sound level in the office would be approximately 55-60 dBA during the loudest phase of construction (Phase 1A) and 48-53 dBA during the quietest phase (Phase 3B), these levels are inline with typical busy office conversational sound levels, and is not considered adverse. Other buildings on the east side of ECC (closest to the construction site) are not noise sensitive spaces.

Current construction plans are to complete construction during daytime hours only. However, should construction need to be conducted during nighttime hours best practices as defined in Section 10 and additional noise mitigation will be required, as the predicted sound levels at POR4 are currently above the 70 dBA $L_{eq,8hr}$ nighttime noise criteria based on the conservative assessment of activities.

Estimated Noise Contours for each construction phase can be found on Figures D1A, D1B, D2, D3A D3B in Appendix D.

9. Reactive Construction Noise Monitoring Program

GHD has proposed an optional active construction Noise Monitoring Program to be initiated on a reactive basis should complaints arise due to construction. Active construction monitoring may be done throughout construction period on a as needed basis. Should optional noise monitoring be required due to a complaint, a Construction Monitoring phase trigger will be programmed in sound level meters at agreed upon the minimum exclusionary sound level limit based on Baseline Monitoring data or the criteria associated with limits defined by the FTA of 80 dBA daytime and 70 dBA nighttime sound level limits.

Noise Engineer/Technician (Technician) will deploy monitoring locations as defined in Figure 2 when notified by the Contractor that construction is set to start. They will ensure monitoring set up is calibrated, recording all information needed and secured properly. During monitoring the Technician will record exceedances during construction along with a post-construction report. Ongoing exceedances will be recorded by the Technician. During weekly data collection, Technician will ensure that all data has been collected, downloaded securely, and processed. After data collection, Technician will note down time and return set up to secure position. Should at any time there be an outage Technician will inform Contractor and County within 1 day and replace promptly. The construction noise report will be submitted within 10 business days after week of monitoring.

Erie County (County) will be responsible for providing and ensuring access to monitoring locations. They will also be responsible to report all complaints to Technician and set up noise controls should they be needed during construction.

Construction Contractor (Contractor) will take note of activities performed on construction site daily and communicate these at the end of the month so as to aid the Technician to properly explain exceedances that occur due to construction activities.

9.1 Instrumentation

All noise monitoring measurements should be collected using calibrated Type 1 precision sound level meters and data logging systems conforming to standard ANSI S1.4-1983 (R2006) "Specification for Sound Level Meters". The SLM will calibrated and checked at 114 decibels (dBA) before and after each measurement period using a Calibrator.

The equipment will be field calibrated before and after each data collection period. The long-term monitoring equipment will collect continuous 1-hour L_{eq} sound levels, as well as, other useful acoustic statistics such as L_{min} , L_{max} , L10 (noise level exceeded 10 percent of the time), and L_{90} (noise level exceeded 90 percent of the time) data, L_{10} , L_{50} , L_{90} and a 24 hour total measurement period L_{eq} . Measurements will be continuous over a period of not less than 24 hours to define the equivalent sound levels (Leqs) including the 24-hour, 12-hour daytime L_d (7 a.m. to 7 p.m.),

4-hour evening L_{en} (7 p.m. to 11 p.m.), 8-hour nighttime L_{night} (11 p.m. to 7 a.m.), peak morning and evening, and maximum 1-hour L_{eqs} experienced by residents in an average week. Equipment will record a 10 second audio recording once triggers are triggered.

Equipment will be securely locked to avoid tampering and placed in a secure location chained to a bolted down object in a secure case.

9.1.1 Construction Noise Monitoring Deliverable

The report will report the following:

- Number of hours recorded (hours)
- Number of inclement Weather conditions hours
- Number of hours not recorded due to regular maintenance and download operations
- Number of hours not recorded due to equipment failure
- Number of hours not recorded due to power failure
- Downtime, and power and equipment failures will be followed up and corrective action plan will be defined and implemented

Monitoring records will include the following:

- The hourly equivalent sound level, $L_{eq,t}$
- Hourly 10% exceedance noise level, L_{10}
- Average Hourly Air temperature, air humidity, wind speed, precipitation and presence of Inclement Weather conditions

Weather data for the monthly active monitoring reports will be collected from the Weather Company's Weather Underground online historical weather data from the Buffalo Niagara International Airport Station.

Data reporting will be done monthly and Contractor will complete a monthly review of the datasets to be sent to the client and Contract Administrator to review the daily and monthly average measurements and any issues. Monthly measurement reports will be logged for the purposes of maintaining historical records.

In terms of response actions, data obtained on site will be reviewed on a monthly basis and the Technician will notify the Contractor if recorded measurements exceed review levels. It is proposed that the review and alert levels shall be based on the FTA's minimum exclusionary sound level limits as specified or based on the optional baseline monitoring results.

The monthly data review will determine if the Technician needs to alert the Contractor by e-mail when a threshold is exceeded. This will allow the Contractor to determine the source of the exceedances and the appropriate abatement measure as outlined in the Control Plan. This proactive control method will ensure that the residents within the project area are not disturbed by ongoing construction noise and related activities.

Should exceedances occur during the course of the monitoring program these exceedances will be highlighted and brought to the Contractor's attention. It is the responsibility of the Contractor to implement any control/compliant protocol. Should noise complaints warrant an acoustical engineer to review site conditions and make mitigation recommendations this will be addressed with additional site visits on a time and materials basis if required.

Any complaints are expected to be logged by the County and provided to the Technician for inclusion in the final Noise Monitoring Report. The complaints will allow the Technician to confirm whether the proposed noise abatement measures were implemented, if they are performing as expected, and if alternative control measures are required during the monitoring program.

9.2 Noise Complaint Management Procedure

When a Noise Complaint is made to the County the following will occur:

1. The County will record the noise complaint including the cause of noise, whether noise is constant or not, and the date and time the noise occurred.
2. The County will inform the Contractor of noise complaints and provide the necessary information.
3. The County will communicate with the Technician about the noise complaint.
4. The Technician will review possible causes for complaints within 1 week of the reception of the complaint and provide initial suggestions on how to mitigate noise. If required, there will be a site visit where the Technician takes short-term sound level measurements. After the site visit, the Technician will provide suggestions on mitigation within 1 week.
5. Once suggestions are made the Contractor will arrange for mitigation if deemed reasonable. The Technician shall provide support in arrangement if needed.
6. Once mitigation is in place the Technician will take further measurements on-site to ensure that mitigation is effective and properly installed.
7. The Technician will provide summary memo of mitigation results within a week of mitigation measurements.

10. Noise Control Options and Best Practices

10.1 Best Practices for Construction Noise Impacts

As construction noise could impact receptors in the vicinity of the Project, the following recommendations will be implemented by the contractor to minimize noise impacts due to the Project's construction equipment and activities are provided below:

- All construction equipment should be properly maintained according to manufacturer's recommendations and fitted with efficient muffling devices.
- Construction equipment and/or activities typically known to be of annoyance (e.g., piling) should consider the following options:
 - Limit operating time within the daytime period when ambient noise levels are expected to be higher. If construction needs to be undertaken outside of the normal daytime hours, local residents shall be informed beforehand of the type of construction planned and the expected duration.
 - Avoid unnecessary revving of engines and switch off equipment when not required (do not idle).
 - Minimize drop heights of materials. Administrative controls are required to eliminate uncontrolled tailgate banging and the use of experienced equipment operators.
 - Route haulage/dump trucks on main roads where possible, rather than quieter residential roads.
 - Maintain an acceptable setback distance from the identified NSAs, where practical.
 - Carry out additional noise studies or monitoring program to verify and document noise levels.
 - Use of high-capacity compressed air storage to limit compressor usage.
 - Investigate other alternative construction equipment or processes to complete the task.

During construction work adjacent to residential areas and in proximity to the grade separation work sites if it is determined that there is a need to further reduce noise effects (e.g., if persistent complaints arise), the following additional mitigation measures may be considered and implemented, where appropriate:

- Offset usage of active heavy equipment (schedule non-concurrent use).
- Implement noise compliance checks to ensure equipment levels are in compliance with recommend best practice equipment noise limits.
- Reroute construction and truck traffic, where possible.
- Coordinate ‘noisy’ operations such that they will not occur simultaneously, where possible.
- Where possible, investigate and implement the use of alternative construction equipment or methods to reduce noise emissions from construction. Utilize alternative equipment that generates lower noise levels, such as using an electric rather than internal combustion engine, or optimize silencer/muffler/enclosure performance.
- Use rubber linings in chutes and dumpers to reduce impact noise.
- Install acoustic enclosures, noise shrouds or noise curtains around noisy equipment.
- Install temporary noise barriers/solid construction hoarding on site boundary to screen affected locations. Sound attenuating hoarding should be constructed. Hoarding means a wall or similar structure, used as a noise control measure, and high enough to break the line-of-sight between the source and the receptor. The minimum surface density (face weight) is 20 kg/m². Any combination of material can be used (e.g., wood 1 to 1/2 inch thick) to construct the hoarding as long as it meets the appropriate surface density requirement and does not have any gaps, holes or other penetrations.
- Where noise levels are above 80 dBA, ensure that operators and workers in the direct surrounding areas are equipped with proper noise protection ear plugs.

The following is a summary of the items of good practice to be considered relating to construction noise according to applicable noise guidelines.

10.2 Best Practice Construction Equipment Noise Limits

Best Practice Construction Equipment requirements are detailed as follows:

	Excavation Equipment, Dozers, Loaders, Backhoes	Pneumatic Pavement Breakers – Residential / Quiet Zone	Compressors – Residential / Quiet Zone	Tracked Drills– Residential / Quiet Zone
Power Rating < 75 kW	83 dBA	85 dBA	76 dBA/70dBA	100 dBA
Power Rating > 75 kW	85 dBA			
Note: The equipment requirement is based on a January 1, 1981, date of manufacturer or later. A power rating is not applicable for pavement breakers, compressors, or tracked drills.				

Measurements are conducted at a 50’ reference distance and at the rated maximum RPM in accordance with SAE J88a procedures. Stationary or pass-by tests are appropriate following the procedure below:

3.3.6 – For stationary tests, record the sound level obtained at a distance of 15 m (50 ft.) normal to the centers of the four major surfaces of the equipment at the microphone height. Generally, four major surfaces refer to front, rear, and sides of an imaginary box that would just fit over the machine but does not include attachment items such as buckets, dozers, and booms. In the case of a crane or an excavator, the upper (revolving superstructure) fore-and-aft centerline should be in line with the lower fore-and-aft centerline.

3.3.7 – For moving tests, take measurements at a distance of 15 m (50ft) measured in a direction normal to a major side surface which is parallel to the machine path.

3.3.8 – *The final reported sound level per this SAE Recommended Practice shall be the highest of the reported values obtained in paragraphs 3.3.6 and 3.3.7; the test report shall include the test mode, the machine operating conditions during the reported test mode, the stabilized maximum governed engine speed, the location of the microphone in relation to the construction machine, the surface description over which the machine operated, and the sound level measurements were made.*

The major concerns of this report are human annoyances due to excessive noise and vibration levels, therefore, the applicable legislative documents that were followed relate to residential impacts and not to impacts on construction workers, which is the responsibility of contractors performing the construction operations.

11. Conclusions and Recommendations

11.1 Construction Noise Summary

The noise levels during each phase of construction at the PORs are predicted to be within the FTA construction noise guideline limit of 80 dBA $L_{eq,8hr}$ during the day. Active construction monitoring may be done throughout construction period on a as needed basis. Should complaints arise due to construction noise, the optional reactive noise monitoring plan may be implemented, in addition to any noise mitigation measures, if required.

Current construction plans are to perform construction during daytime hours only. However, should construction need to be completed during nighttime hours best practices as defined in Section 10 and additional noise mitigation will be required, as the predicted sound levels at POR4 are currently above the 70 dBA $L_{eq,8hr}$ nighttime noise criteria.

11.2 Stadium Noise Impact Summary

The ambient noise levels around Highmark Stadium on typical days have been found to range at night from a hourly lowest L_{eq} of 42 to 45 dBA at all LTMs, except for days leading up to gameday events where the sound levels at LTM3 and LTM4 increase to lows of 48 dBA and 56 dBA respectively. Daytime lowest L_{eq} s largely remained the same during non-elevated noise event days.

New Stadium concert noise impacts are predicted to decrease overall by 8-13 dBA based on WJHW's models. This decrease is mainly due to higher seating structures and video board of the New Stadium.

Gameday sound levels are dominated by tailgating activities (58-73 dBA), crowd noise (58-72 dBA), Highmark Stadium speaker noise (52-66 dBA) and the occasional fireworks (53-71 dBA) at the 4 LTM locations. On non-event nights, night-time sound levels reach typical night-time low L_{eq} sound levels.

The WJHW predicted noise impacts from the New Stadium Game Speaker/Crowd meet the Noise Impact Criteria of being less than 6 dBA above the existing noise levels at all LTM locations.

Based on GHD's observations and attended noise measurements at LTM3 (Big Tree Road/Erie College Drive) there may be an increase in tailgating sound levels due to the new stadium parking areas being moved closer. However, as there are more areas for tailgating, the crowds will be dispersed over a larger area covering several lots and the bulk of the tailgating will likely remain in the northern lots and move to western lots. Therefore, the sound levels are not expected to increase more than 6 dBA at LTM3 over the short period of time before a game. Tailgating events already occur next to the LTM1, LTM2 and LTM4 areas, and therefore a significant increase of sound levels is not expected at these locations.

Future stadium crowd noise and firework sound levels will increase overall at all LTM locations due to the Stadium being moved closer to the LTM locations, however overall sound power level (how loud the crowd and fireworks are)

will likely remain the same overall. The 1-minute crowd and firework sound level locations are predicted to increase more than 6 dBA overall. However, compared to the 1-hour L5 sound level during a game the 1-minute Leqs do not result in a significant increase and meets the Noise Impact Criteria.

Overall, the predicted noise impacts from the New Stadium Game Speaker system/crowd meet the Noise Impact Criteria of being less than 6 dBA above the existing noise levels at all PORs. Furthermore, based on GHD's 1-minute attended measurements of gameday events such as crowd noise and firework noise there are significant changes, however when compared with the 1-hour L5 sound level the Noise Impact Criteria is met.

12. Definitions

Decibel: Logarithmic unit associated with Sound Pressure Level, sound power level, or acceleration level. Symbol: dB.

Decibel, A-Weighted: Logarithmic unit associated with Sound Pressure Level, where Sound Pressure signal has been filtered using frequency weighting that mimics response of human ear to quiet sound levels. Resultant Sound Pressure Level is representative of subjective loudness response of human ear.

A-weighted Sound Pressure Levels are denoted by suffix 'A' (for example dBA), and the term pressure is normally omitted from description (for example, sound level or noise level).

Symbol: dBA.

Sound Level Meter (SLM): Instrument comprised of microphone, amplifier, output meter, and frequency-weighting networks used for measurement of sound levels.

Measurement Time Interval: Time interval over which squared Instantaneous Sound Pressure is integrated to compute time averaged Sound Pressure or sound exposure (i.e., time interval data actually measured).

Sound Pressure: At a point in space, root mean square determined over specified time interval of Instantaneous Sound Pressure. Unit: Pascal (Pa). Symbol: p.

The term Sound Pressure is also used generically to mean fluctuating pressure that is superimposed on atmospheric static pressure due to presence of sound wave. For purpose of this Section, it has the restricted meaning, noted above.

Instantaneous Sound Pressure: Sound Pressure (for example, difference between total pressure and atmospheric static pressure) that exists at a given point in space, at a particular instant in time, in a stated frequency band. Unit: Pascal (Pa). Symbol: $p(t)$.

Peak Sound Pressure: At a point in space, highest absolute value of Instantaneous Sound Pressure occurring during specified time interval. Unit: Pascal (Pa). Symbol: P_{pk} .

Peak Sound Pressure may be frequency-weighted by standardized frequency-weighting characteristic (e.g., A, B or C; in accordance with ANSI/ASA S1.4 and ANSI/ASA S1.4A).

Example: A-weighted Peak Sound Pressure; symbol: p_{Apk} .

Sound Pressure Level: Ten times the common logarithm of the square of the ratio of the Sound Pressure to the reference Sound Pressure of 20 micropascals. Unit: Decibel (dB). Symbol: L_p .

Equivalent Sound Level: Ten times the logarithm (base 10) of the time integral over a stated time, T hours, of the squared A-weighted Sound Pressure relative to 20 μ Pa, divided by that time. The Equivalent Sound Level is identical to the sound level of a constant sound of the same total A-weighted acoustical energy as the actual varying sound of interest over the same time period. Unit: decibel (dB). Symbol: $L_{eq,T}$.

Peak Sound Pressure Level: Ten times the common logarithm of square of ratio of Peak Sound Pressure to the reference sound pressure of 20 micropascals. Unit: Decibel (dB). Symbol: L_{pk} .

Exceedance Noise Level: The noise level exceeded N% of the time. It is a statistical measure of the noise level.

For highly varying sounds, L90 represents background noise level, L50 represents median or typical noise level, and L10 represents short term peak noise levels.

Unit: Decibel (dB). Symbol: L_N .

Daytime: 7:00 a.m. to 7:00 p.m.

Evening: 7:00 p.m. to 11:00 p.m.

Night-time: 11:00 p.m. to 7:00 a.m.

Noise Baseline Reading: Initial readings taken prior to construction to provide baseline for reference to review and alert levels.

Noise Review Level: Assess the necessity of altering method, rate or sequence of construction to reduce noise levels for value of instrumentation readings.

Valid Monitoring Data: Monitoring data recorded and downloaded complying with the following conditions:

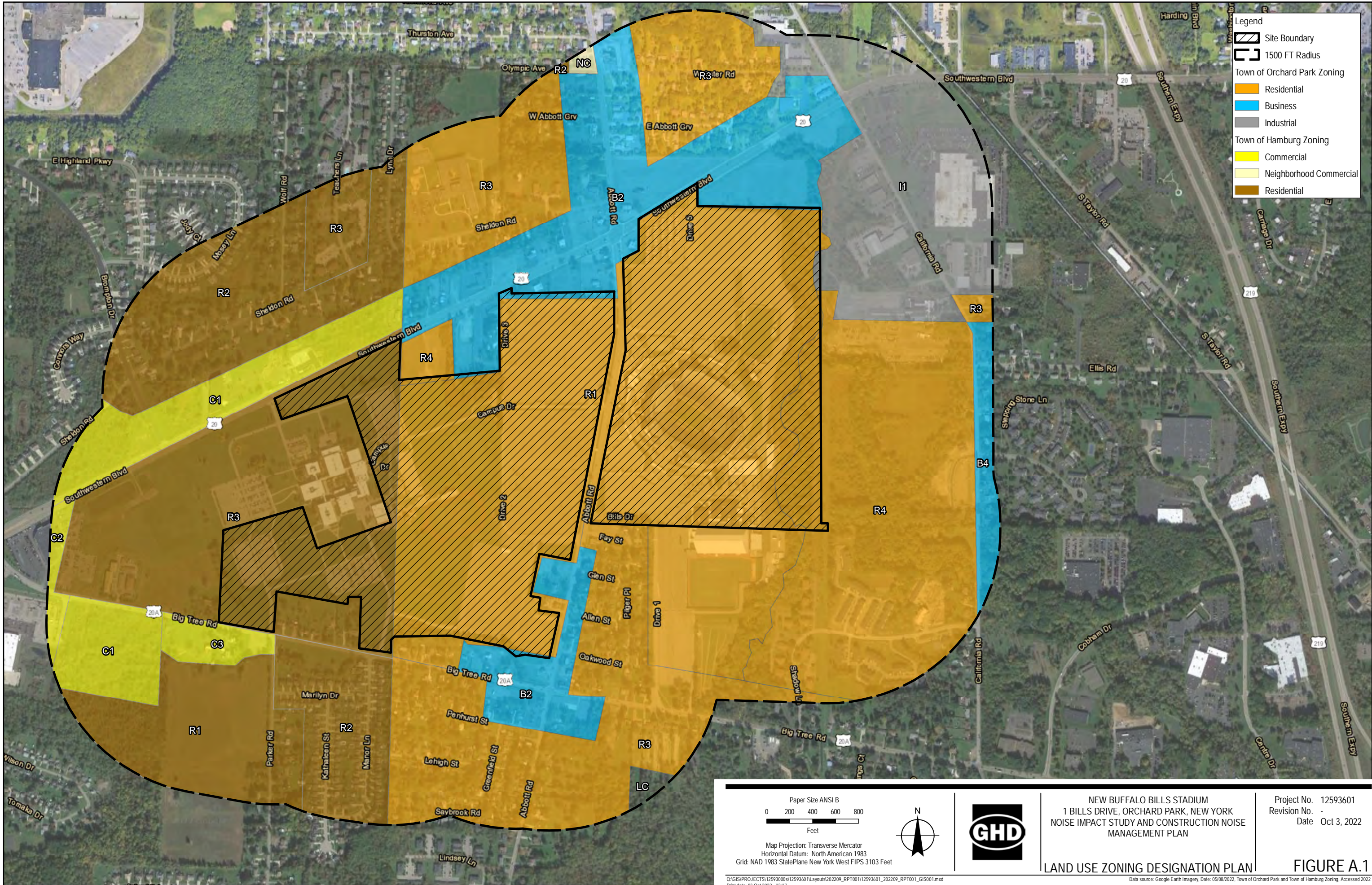
- 60 minutes integration time of the recording
- Data does not fall within a period where Inclement Weather Conditions recorded

Inclement Weather Conditions: Hourly period atmospheric weather conditions on Site. Outside of the limits of operation of Sound Level Meter.

Appendices

Appendix A

Land Use Zoning Plan Map



Legend

- Site Boundary
- 1500 FT Radius
- Town of Orchard Park Zoning**
- Residential
- Business
- Industrial
- Town of Hamburg Zoning**
- Commercial
- Neighborhood Commercial
- Residential

<p>Paper Size ANSI B</p> <p>0 200 400 600 800</p> <p>Feet</p> <p>Map Projection: Transverse Mercator Horizontal Datum: North American 1983 Grid: NAD 1983 StatePlane New York West FIPS 3103 Feet</p>			<p>NEW BUFFALO BILLS STADIUM 1 BILLS DRIVE, ORCHARD PARK, NEW YORK NOISE IMPACT STUDY AND CONSTRUCTION NOISE MANAGEMENT PLAN</p> <p>Project No. 12593601 Revision No. - Date Oct 3, 2022</p>
<p>LAND USE ZONING DESIGNATION PLAN</p>			<p>FIGURE A.1</p>

Q:\GIS\PROJECTS\12593000s\12593601\Layouts\202209_RPT001\12593601_202209_RPT001_GIS001.mxd
Print date: 03 Oct 2022 - 12:17
Data source: Google Earth Imagery, Date: 05/08/2022, Town of Orchard Park and Town of Hamburg Zoning, Accessed 2022

Appendix B

**Town of Orchard Park and Hamburg
Noise By-Law**

Chapter 87

NOISE

[HISTORY: Adopted by the Town Board of the Town of Orchard Park as Secs. 10-16 through 10-20 of the 1970 Code. Amendments noted where applicable.]

GENERAL REFERENCES

Dogs — See Ch. 58.

Peace and good order See Ch. 99.

§ 87-1. Declaration of policy.

It is hereby declared to be the policy of the Town Board to prevent any unreasonably loud, disturbing and unnecessary noises. Noises of such character, intensity and duration as to be detrimental to the life and health of any individual or contrary to the public welfare are prohibited.

§ 87-2. Exemptions.

This chapter shall not apply to the operation or use of any organ, radio, bell, chimes or other instrument, apparatus or device by any church, synagogue or school.

§ 87-3. Loud and unnecessary noises prohibited.

Subject to the provisions of this chapter, the creation of any unreasonably loud, disturbing and unnecessary noise is prohibited. Noise of such character, intensity and duration as to be detrimental to the life or health of any individual is prohibited.

§ 87-4. Enumeration of prohibited noises.

The following acts, among others, are declared to be loud, disturbing and unnecessary noises in violation of this chapter, but the enumeration herein shall not be deemed to be exclusive:

- A. Horns, signaling devices. The sounding of any horn or signal device on any automobile, motorcycle, bus or other vehicle while stationary, except as a danger signal when an approaching vehicle is apparently out of control or, if in motion, only as a danger signal after or as brakes are being applied and deceleration of the vehicle is intended; the creation by means of any such signal device of any unreasonably loud or harsh sound or the sounding of any such device for an unnecessary period of time.
- B. Noisy vehicles. The use of an automobile, motorcycle or other vehicle so out of repair, so loaded or in such a manner as to create loud, unnecessary grating, grinding, rattling or other noise.
- C. Discharge of exhaust. The discharge into the open air of the exhaust of any steam engine, stationary internal-combustion engine, motor vehicle or boat engine or

motor except through a muffler or other device which will effectively prevent loud or explosive noises therefrom.

- D. Construction, demolition, excavation. The erection, including excavating, demolition, alteration or repair, of any building other than between 7:00 a.m. and 6:00 p.m. on weekdays, except in case of an urgent necessity in the interest of public safety and then only with a permit from the Building Inspector, which permit may be renewed for a period of three days or less while the emergency continues.
- E. Noise near schools, other institutions. The creation of any excessive noise on any street adjacent to any school, institution of learning or court while the same is in session, or adjacent to any hospital, which unreasonably interferes with the workings of such institutions, provided conspicuous signs are displayed in such streets indicating that the same is a school, hospital or court street.
- F. Loading, unloading. The creation of a loud and excessive noise in connection with loading or unloading any vehicle or the opening and destruction of bales, boxes, crates and containers.
- G. Hawking, peddling. The shouting and crying of peddlers, hawkers and vendors which disturbs the peace and quiet of the neighborhood.
- H. Drums, loudspeakers, similar devices. The use of a drum, loudspeaker or any other sound-producing instrument or device for the purpose of attracting attention to any performance, show or sale or display of merchandise by the creation of noise, except where authorized by special permit to be issued by the Commissioner of Public Safety, who shall make reasonable rules and regulations therefor.
- I. Noise in conduct of business. The creation of any unnecessary noise in the operation, conduct and/or maintenance of any business, factory, plant, yard or manufacturing establishment, including excavating, blasting (where permitted), grinding, breaking, crushing or processing of any substance or materials.

§ 87-5. Posting of provisions.

Notice of the provisions of this chapter shall be posted at places and locations in the town deemed necessary by the Town Board.

Chapter 175

NOISE

[HISTORY: Adopted by the Town Board of the Town of Hamburg 9-3-1963; effective 9-21-1963. Amendments noted where applicable.]

ARTICLE I
Legislative Intent

§ 175-1. Legislative intent.

By adoption of this chapter, the Town Board of the Town of Hamburg declares its intent to prohibit and/or regulate in a manner consistent with the health, welfare and safety of the citizens of this town breaches of the peace, improper assembly, unreasonably loud and disturbing noises, profane, vulgar and/or obscene language or conduct. Therefore, the Town Board, in the exercise of its police power vested in it under § 130 of the Town Law of the State of New York, does hereby enact the following ordinance:

ARTICLE II
Loud Noises Prohibited

§ 175-2. Prohibitions. [Amended 6-14-1982 by L.L. No. 2-1982]

- A. The creation of any unnecessary and unreasonably loud or disturbing noise is prohibited as a public nuisance.
- B. Noise of such character, intensity and duration as to be detrimental to the life, health or welfare of the inhabitants of the Town of Hamburg is prohibited as a public nuisance.
- C. In particular, without excluding other types of prohibited sounds by failure to enumerate them, all sleep-disturbing noises are prohibited. Sleep-disturbing noises shall mean any unnecessary and unreasonably loud or disturbing sounds occurring during the hours between 11:00 p.m. and 7:00 a.m. and unreasonably interfering with the sleep, comfort, health and repose of any individual within hearing thereof or in the vicinity.

ARTICLE III
Profane, Vulgar, Obscene Language

§ 175-3. Acts to provoke breach of peace prohibited.

No person shall, with intent to provoke a breach of the peace or whereby a breach of the peace may be caused, commit any of the following acts:

- A. Use of offensive, disorderly, threatening, obscene or insulting language, conduct or behavior.
- B. Act in such manner to annoy, disturb, interfere with, obstruct or be offensive to others.
- C. Cause a crowd to collect by his actions, except when lawfully addressing such crowds.
- D. Interfere with any person or persons by jostling, crowding or placing one's hand in or near a person's pocket, pocketbook or handbag.
- E. Station himself on any public street or sidewalk for the purpose of soliciting alms unlawfully or insulting passersby.
- F. Frequent or loiter about any public place for the purpose of soliciting or committing a crime against nature, prostitution or other immoral acts.

ARTICLE IV
Loitering or Riotous Actions Prohibited

§ 175-4. Crowds.

No person shall take part in, join, aid or abet any riotous or tumultuous crowds or assemblies on the public streets, walks or property adjacent thereto.

§ 175-5. Loitering.

No person shall loiter about the public streets, walks or doorways of businesses, restaurants or taverns catering to the public.

ARTICLE V
Penalties

§ 175-6. Penalties for offenses. [Amended 6-14-1982 by L.L. No. 2-1982]

- A. Any violation of this chapter may be declared an offense and, upon conviction of a first offense hereunder, a person shall be subject to a criminal fine of not less than \$50 or more than \$250 or imprisonment for not more than 10 days, or both. Upon a second conviction hereunder, the penalty shall be a criminal fine of not less than \$100 or more than \$250 or imprisonment for not more than 10 days, or both.
- B. Each day (a twenty-four-hour period) shall constitute a separate offense.

ARTICLE VI
Saving Clause

§ 175-7. Severability.

If any clause, sentence, paragraph, section or part of this chapter shall be adjudged invalid by any court of competent jurisdiction, such judgment shall not affect, impair or invalidate the remainder.

ARTICLE VII
Effective Date

§ 175-8. Effective date.

This chapter has been duly adopted by the Town Board of the Town of Hamburg at its regular meeting September 3, 1963, and shall take effect 10 days after publication and posting or immediately upon personal service as provided by § 133 of the Town Law of the State of New York.

Appendix C

**Long-Term Monitoring and Attended
Measurement Data**

Figure C.1 - Longterm Monitoring Location 1 - South Western Blvd.

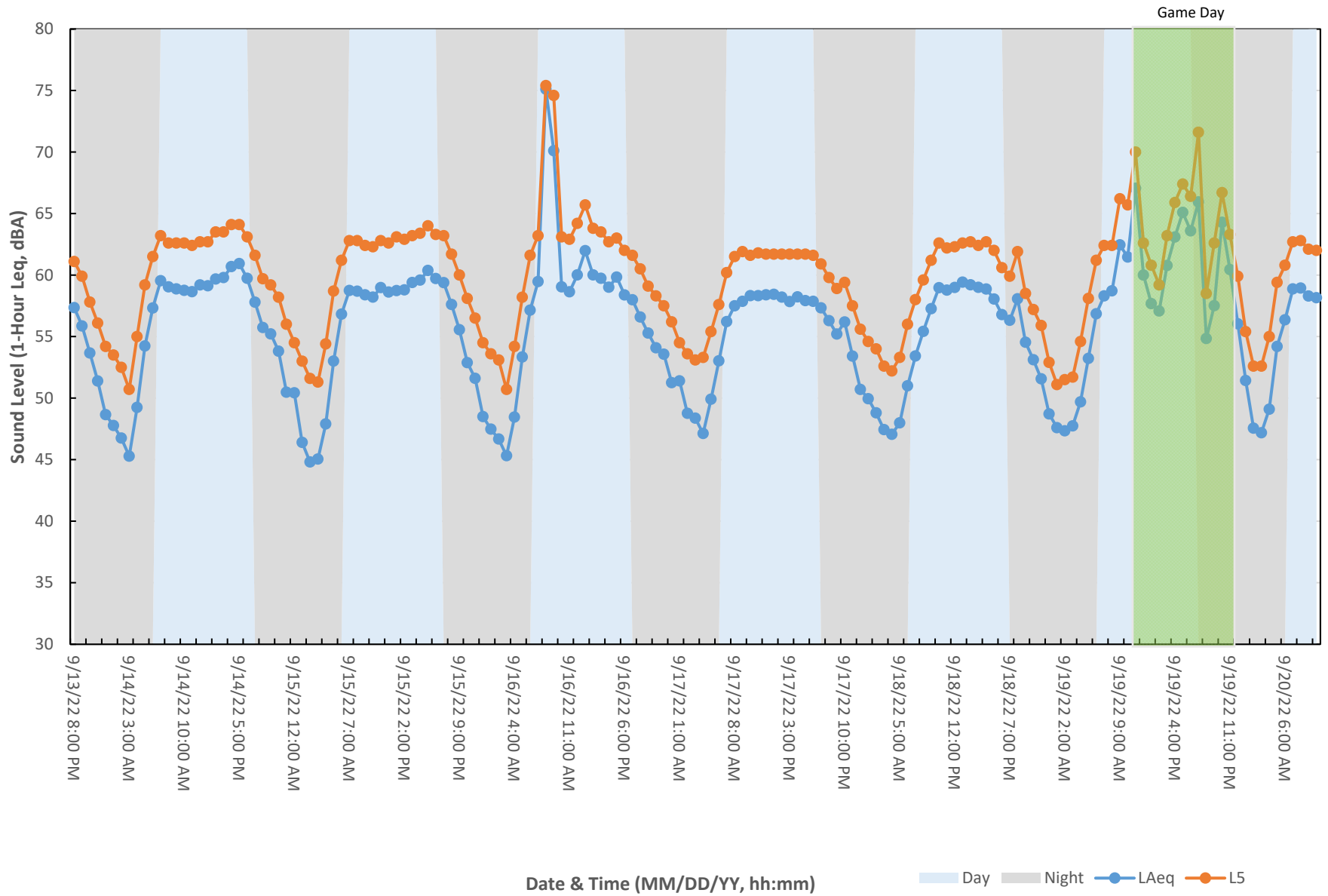


Figure C.2 - Longterm Monitoring Location 2 - Erie College

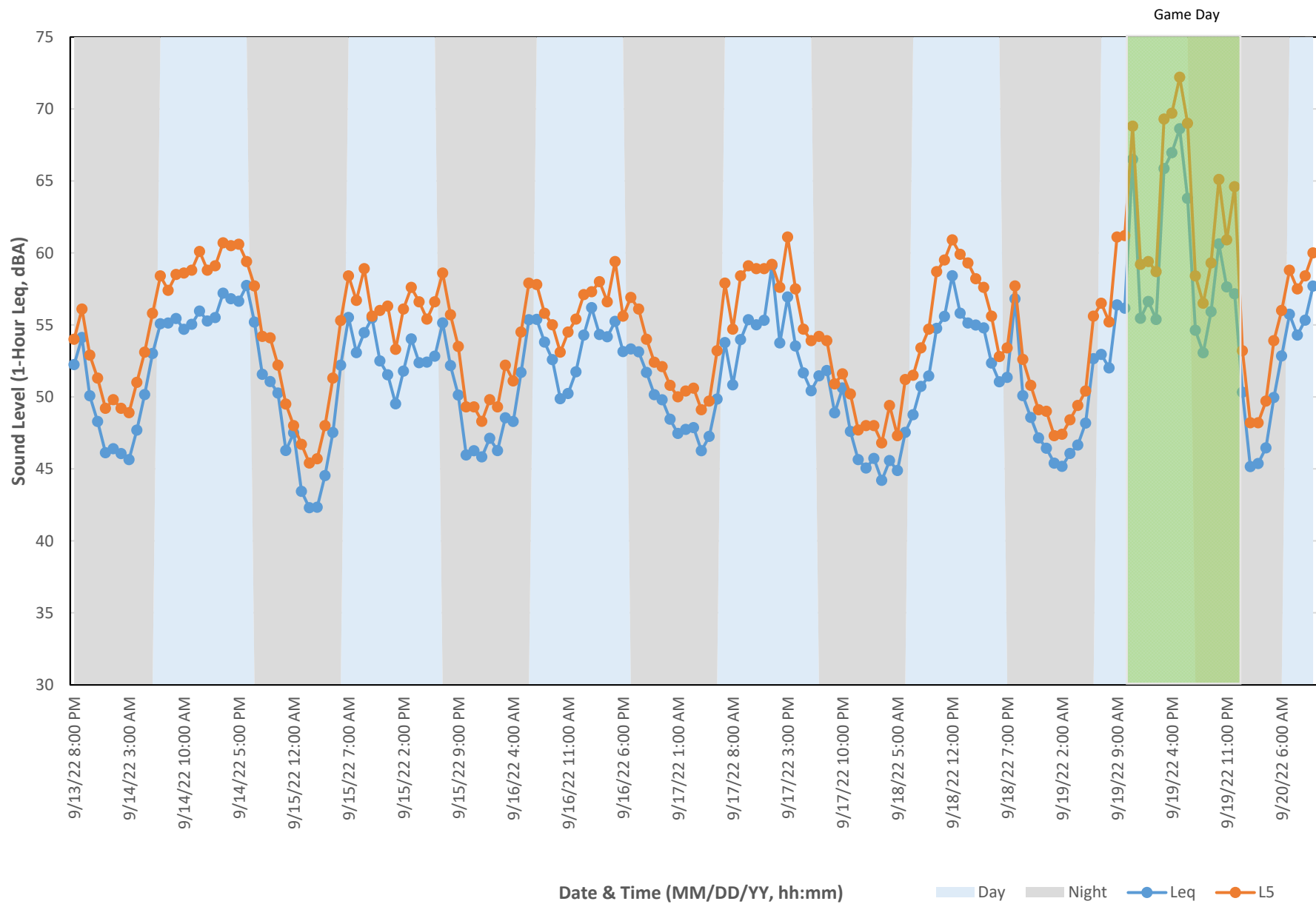


Figure C.3 - Longterm Monitoring Location 3 - Big Tree Rd.

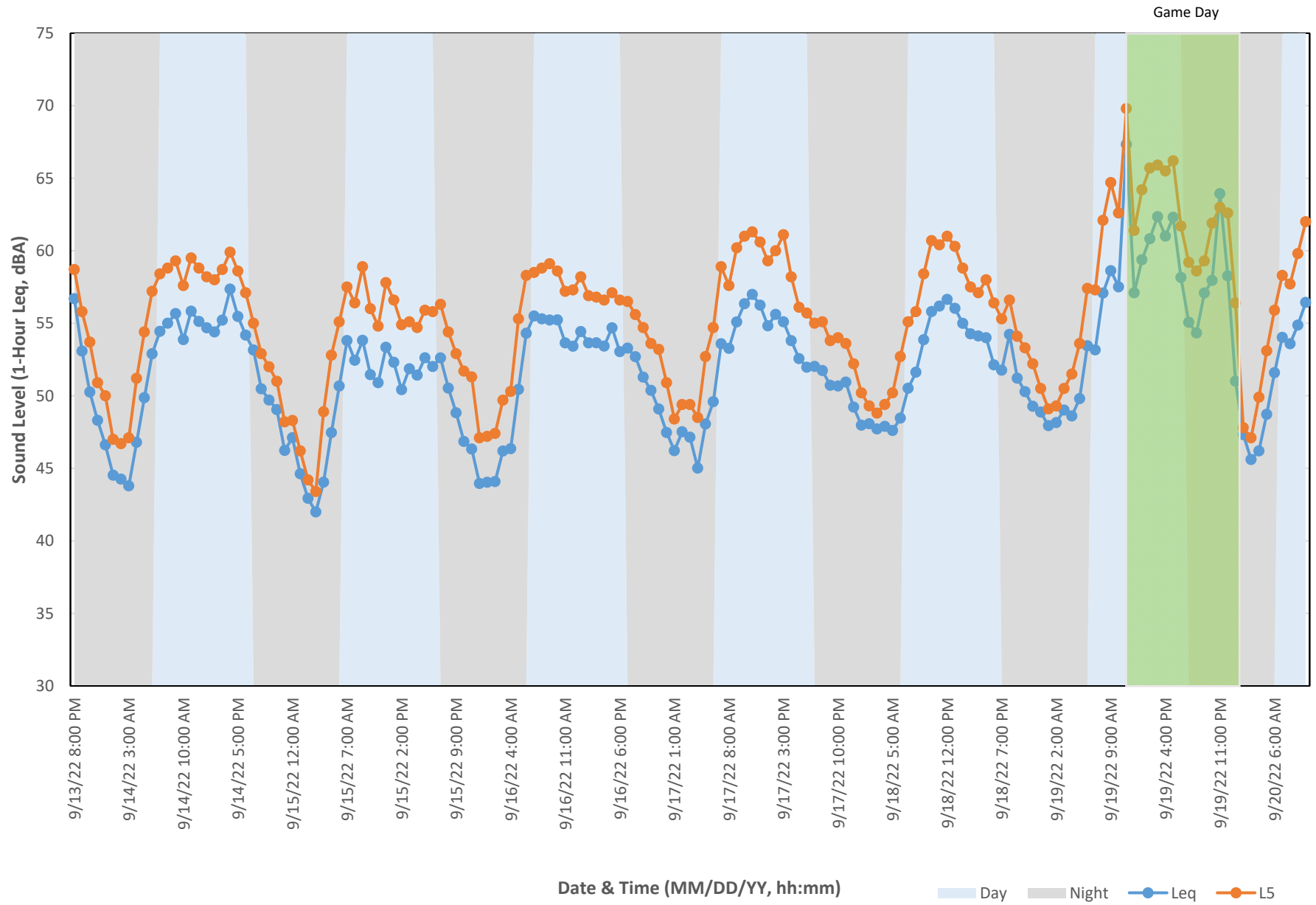


Figure C.4 - Longterm Monitoring Location 4 - Bills Dr.

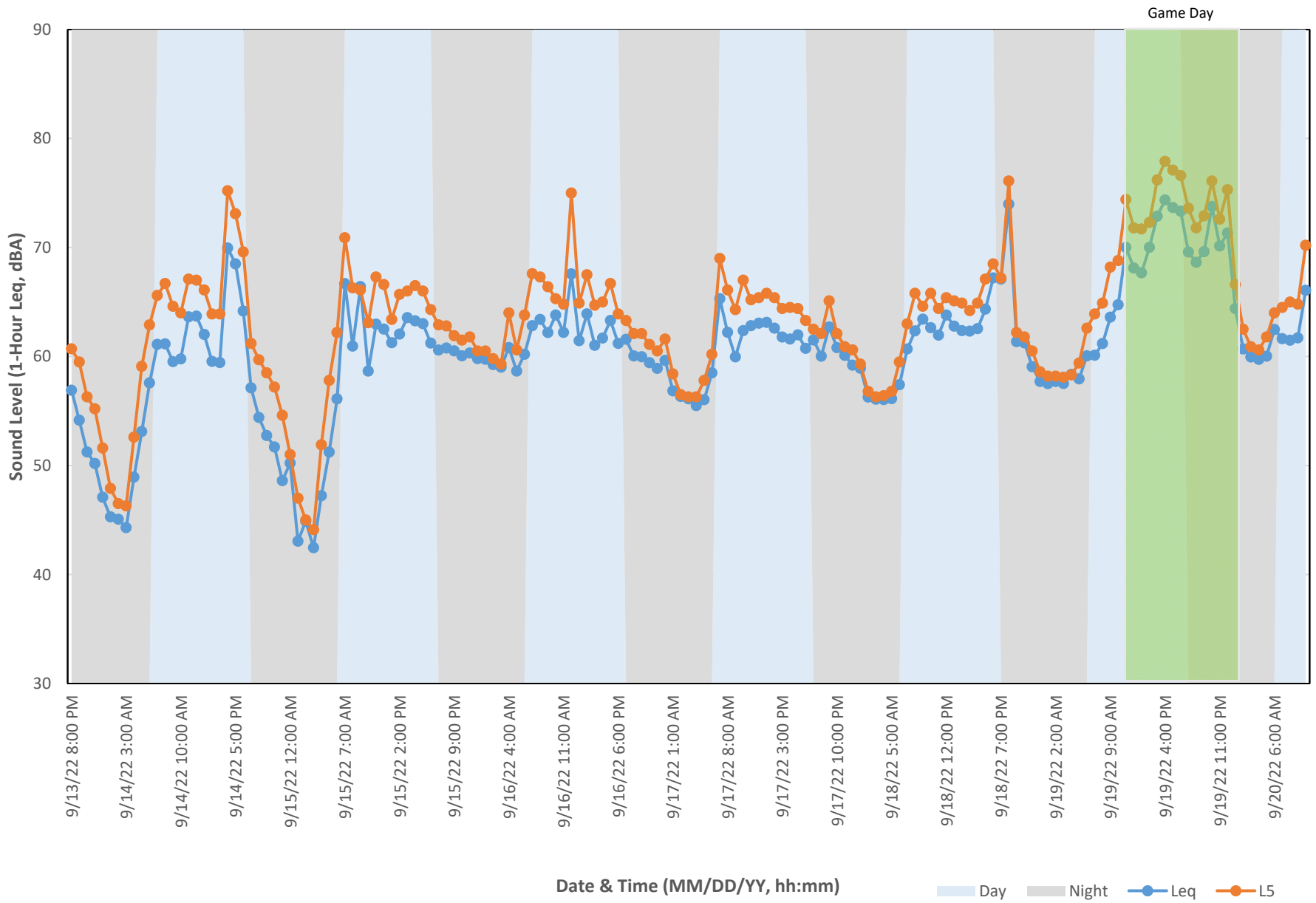


Table C.1

Environmental Sound Level Measurements, LEQ - Validated Background Measurements, LTM1
Buffalo Bills Stadium
Orchard Park, NY

Date	Time	Leq ^{(2), (3)}	L90	L5	Wind Spd (mph) ⁽¹⁾	Temperature (°F)	Weather
2022-09-13	20:00:00	57	53	61	6	62	
2022-09-13	21:00:00	56	50	60	8	63	
2022-09-13	22:00:00	54	48	58	8	62	
2022-09-13	23:00:00	51	46	56	5	61	
2022-09-14	00:00:00	49	43	54	6	59	
2022-09-14	01:00:00	48	40	54	6	60	
2022-09-14	02:00:00	47	40	53	7	59	
2022-09-14	03:00:00	45	40	51	7	58	
2022-09-14	04:00:00	49	41	55	6	58	
2022-09-14	05:00:00	54	46	59	6	58	
2022-09-14	06:00:00	57	52	62	7	58	
2022-09-14	07:00:00	60	54	63	5	58	
2022-09-14	08:00:00	59	54	63	8	62	
2022-09-14	09:00:00	59	53	63	10	66	
2022-09-14	10:00:00	59	52	63	10	68	
2022-09-14	11:00:00	59	53	62	12	70	Wind Speed >= 12 mph
2022-09-14	12:00:00	59	54	63	14	73	Wind Speed >= 12 mph
2022-09-14	13:00:00	59	54	63	14	73	Wind Speed >= 12 mph
2022-09-14	14:00:00	60	54	64	14	71	Wind Speed >= 12 mph
2022-09-14	15:00:00	60	53	64	14	71	Wind Speed >= 12 mph
2022-09-14	16:00:00	61	57	64	10	72	
2022-09-14	17:00:00	61	56	64	10	73	
2022-09-14	18:00:00	60	54	63	9	73	
2022-09-14	19:00:00	58	51	62	14	68	Wind Speed >= 12 mph
2022-09-14	20:00:00	56	49	60	8	65	
2022-09-14	21:00:00	55	49	59	10	62	
2022-09-14	22:00:00	54	47	58	10	62	
2022-09-14	23:00:00	50	44	56	9	62	
2022-09-15	00:00:00	50	41	55	7	61	
2022-09-15	01:00:00	46	39	53	8	60	
2022-09-15	02:00:00	45	38	52	9	59	
2022-09-15	03:00:00	45	38	51	10	57	
2022-09-15	04:00:00	48	39	54	6	56	
2022-09-15	05:00:00	53	43	59	5	54	
2022-09-15	06:00:00	57	49	61	3	52	
2022-09-15	07:00:00	59	51	63	5	50	
2022-09-15	08:00:00	59	51	63	0	53	
2022-09-15	09:00:00	58	51	62	5	56	
2022-09-15	10:00:00	58	52	62	10	59	
2022-09-15	11:00:00	59	51	63	9	61	
2022-09-15	12:00:00	59	52	63	5	62	
2022-09-15	13:00:00	59	50	63	3	63	
2022-09-15	14:00:00	59	51	63	3	64	
2022-09-15	15:00:00	59	52	63	6	66	
2022-09-15	16:00:00	60	52	63	0	65	
2022-09-15	17:00:00	60	54	64	6	66	
2022-09-15	18:00:00	60	54	63	6	65	
2022-09-15	19:00:00	59	52	63	7	62	
2022-09-15	20:00:00	58	50	62	3	58	
2022-09-15	21:00:00	56	48	60	5	57	
2022-09-15	22:00:00	53	45	58	6	56	
2022-09-15	23:00:00	52	45	57	6	55	
2022-09-16	00:00:00	49	42	55	5	53	
2022-09-16	01:00:00	47	42	54	3	52	
2022-09-16	02:00:00	47	40	53	3	52	
2022-09-16	03:00:00	45	41	51	5	50	
2022-09-16	04:00:00	48	42	54	5	50	
2022-09-16	05:00:00	53	46	58	6	50	
2022-09-16	06:00:00	57	51	62	5	49	
2022-09-16	07:00:00	59	55	63	6	49	
2022-09-16	08:00:00	75	56	75	5	51	
2022-09-16	09:00:00	70	55	75	6	56	
2022-09-16	10:00:00	59	52	63	8	62	
2022-09-16	11:00:00	59	52	63	9	66	
2022-09-16	12:00:00	60	54	64	10	68	
2022-09-16	13:00:00	62	55	66	13	71	Wind Speed >= 12 mph
2022-09-16	14:00:00	60	55	64	13	71	Wind Speed >= 12 mph
2022-09-16	15:00:00	60	53	64	10	73	
2022-09-16	16:00:00	59	53	63	10	73	
2022-09-16	17:00:00	60	53	63	12	73	Wind Speed >= 12 mph
2022-09-16	18:00:00	58	52	62	8	73	
2022-09-16	19:00:00	58	53	62	5	71	
2022-09-16	20:00:00	57	52	61	0	70	
2022-09-16	21:00:00	55	51	59	6	66	
2022-09-16	22:00:00	54	49	58	0	63	
2022-09-16	23:00:00	54	48	58	3	63	
2022-09-17	00:00:00	51	46	56	5	61	
2022-09-17	01:00:00	51	45	55	5	61	
2022-09-17	02:00:00	49	44	54	0	61	
2022-09-17	03:00:00	48	43	53	5	60	
2022-09-17	04:00:00	47	41	53	0	60	
2022-09-17	05:00:00	50	43	55	3	59	
2022-09-17	06:00:00	53	47	58	3	59	
2022-09-17	07:00:00	56	50	60	5	60	
2022-09-17	08:00:00	58	51	62	3	59	
2022-09-17	09:00:00	58	51	62	0	63	
2022-09-17	10:00:00	58	53	62	7	68	
2022-09-17	11:00:00	58	53	62	5	72	
2022-09-17	12:00:00	58	54	62	9	75	
2022-09-17	13:00:00	58	53	62	9	77	
2022-09-17	14:00:00	58	53	62	14	78	Wind Speed >= 12 mph
2022-09-17	15:00:00	58	52	62	9	78	
2022-09-17	16:00:00	58	53	62	8	78	

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2022-09-17	18:00:00	58	51	62	7	76	
2022-09-17	19:00:00	57	51	61	6	74	
2022-09-17	20:00:00	56	51	60	6	71	
2022-09-17	21:00:00	55	51	59	6	69	
2022-09-17	22:00:00	56	50	59	6	68	
2022-09-17	23:00:00	53	49	58	6	66	
2022-09-18	00:00:00	51	46	56	6	65	
2022-09-18	01:00:00	50	45	55	6	65	
2022-09-18	02:00:00	49	44	54	7	66	
2022-09-18	03:00:00	47	44	53	8	67	
2022-09-18	04:00:00	47	43	52	8	67	
2022-09-18	05:00:00	48	44	53	7	66	
2022-09-18	06:00:00	51	46	56	10	69	
2022-09-18	07:00:00	53	47	58	8	69	
2022-09-18	08:00:00	55	49	60	7	70	
2022-09-18	09:00:00	57	51	61	14	72	Wind Speed >= 12 mph
2022-09-18	10:00:00	59	55	63	18	74	Wind Speed >= 12 mph
2022-09-18	11:00:00	59	55	62	15	75	Wind Speed >= 12 mph
2022-09-18	12:00:00	59	55	62	22	76	Wind Speed >= 12 mph
2022-09-18	13:00:00	59	55	63	17	75	Wind Speed >= 12 mph
2022-09-18	14:00:00	59	54	63	21	76	Wind Speed >= 12 mph
2022-09-18	15:00:00	59	54	62	21	77	Wind Speed >= 12 mph
2022-09-18	16:00:00	59	53	63	20	76	Wind Speed >= 12 mph
2022-09-18	17:00:00	58	52	62	15	73	Wind Speed >= 12 mph
2022-09-18	18:00:00	57	52	61	10	69	Light Rain
2022-09-18	19:00:00	56	52	60	8	69	
2022-09-18	20:00:00	58	52	62	7	69	
2022-09-18	21:00:00	55	50	59	7	68	
2022-09-18	22:00:00	53	49	57	7	67	
2022-09-18	23:00:00	52	47	56	12	72	Wind Speed >= 12 mph
2022-09-19	00:00:00	49	46	53	10	71	
2022-09-19	01:00:00	48	46	51	13	71	Wind Speed >= 12 mph
2022-09-19	02:00:00	47	45	52	13	71	Wind Speed >= 12 mph
2022-09-19	03:00:00	48	45	52	9	70	
2022-09-19	04:00:00	50	46	55	9	71	
2022-09-19	05:00:00	53	47	58	9	71	
2022-09-19	06:00:00	57	51	61	8	70	
2022-09-19	07:00:00	58	53	62	10	71	
2022-09-19	08:00:00	59	53	62	10	70	
2022-09-19	09:00:00	62	56	66	10	72	Thunderstorm
2022-09-19	10:00:00	61	56	66	12	69	Wind Speed >= 12 mph
2022-09-19	11:00:00	67	58	70	8	68	Light Rain with Thunder
2022-09-19	12:00:00	60	56	63	13	65	Wind Speed >= 12 mph
2022-09-19	13:00:00	58	54	61	15	67	Wind Speed >= 12 mph
2022-09-19	14:00:00	57	55	59	15	71	Wind Speed >= 12 mph
2022-09-19	15:00:00	61	58	63	20	71	Wind Speed >= 12 mph
2022-09-19	16:00:00	63	61	66	16	72	Wind Speed >= 12 mph
2022-09-19	17:00:00	65	63	67	15	73	Wind Speed >= 12 mph
2022-09-19	18:00:00	64	59	66	13	74	Wind Speed >= 12 mph
2022-09-19	19:00:00	66	53	72	8	70	Light Rain with Thunder, Game Start
2022-09-19	20:00:00	55	50	59	8	68	
2022-09-19	21:00:00	58	51	63	12	68	Wind Speed >= 12 mph
2022-09-19	22:00:00	64	56	67	8	66	
2022-09-19	23:00:00	60	56	63	8	64	Game End
2022-09-20	00:00:00	56	50	60	7	62	
2022-09-20	01:00:00	51	44	55	7	61	
2022-09-20	02:00:00	48	42	53	8	60	
2022-09-20	03:00:00	47	41	53	8	60	
2022-09-20	04:00:00	49	42	55	9	60	
2022-09-20	05:00:00	54	44	59	12	61	Wind Speed >= 12 mph
2022-09-20	06:00:00	56	50	61	10	60	
2022-09-20	07:00:00	59	52	63	10	60	
2022-09-20	08:00:00	59	52	63	8	61	
2022-09-20	09:00:00	58	52	62	7	64	
2022-09-20	10:00:00	58	51	62	9	67	

	Min. 1-hr Leq	Min. 1-hr L90	Max. 1-hr L5
Daytime (07:00 - 19:00)	53 dBA	47 dBA	75 dBA
Evening (19:00 - 23:00)	53 dBA	45 dBA	72 dBA
Nighttime (23:00-07:00)	45 dBA	38 dBA	63 dBA

Notes:

- (1) Weather data provided by the US National Weather Service's Niagara Falls International Airport Weather Station.
- (2) Measurements recorded during inclement weather (winds speeds greater than 12 mph and/or rain) were disregarded.
- (3) Bolded data represents the lowest or highest measured Leq during the respective monitoring time period.

Legend

Day Time Hours	
Evening Time Hours	
Night Time Hours	

Table C.2

Environmental Sound Level Measurements, LEQ - Validated Background Measurements, LTM2
Buffalo Bills Stadium
Orchard Park, NY

Date	Time	Leq ^{(2), (3)}	L90	L5	Wind Spd (mph) ⁽¹⁾	Temperature (°F)	Weather
2022-09-13	20:00:00	52	50	54	6	62	
2022-09-13	21:00:00	54	51	56	8	63	
2022-09-13	22:00:00	50	47	53	8	62	
2022-09-13	23:00:00	48	46	51	5	61	
2022-09-14	00:00:00	46	43	49	6	59	
2022-09-14	01:00:00	46	43	50	6	60	
2022-09-14	02:00:00	46	43	49	7	59	
2022-09-14	03:00:00	46	43	49	7	58	
2022-09-14	04:00:00	48	44	51	6	58	
2022-09-14	05:00:00	50	47	53	6	58	
2022-09-14	06:00:00	53	50	56	7	58	
2022-09-14	07:00:00	55	52	58	5	58	
2022-09-14	08:00:00	55	53	57	8	62	
2022-09-14	09:00:00	55	51	59	10	66	
2022-09-14	10:00:00	55	50	59	10	68	
2022-09-14	11:00:00	55	50	59	12	70	Wind Speed >= 12 mph
2022-09-14	12:00:00	56	51	60	14	73	Wind Speed >= 12 mph
2022-09-14	13:00:00	55	52	59	14	73	Wind Speed >= 12 mph
2022-09-14	14:00:00	56	51	59	14	71	Wind Speed >= 12 mph
2022-09-14	15:00:00	57	51	61	14	71	Wind Speed >= 12 mph
2022-09-14	16:00:00	57	53	61	10	72	
2022-09-14	17:00:00	57	52	61	10	73	
2022-09-14	18:00:00	58	51	59	9	73	
2022-09-14	19:00:00	55	50	58	14	68	Wind Speed >= 12 mph
2022-09-14	20:00:00	52	48	54	8	65	
2022-09-14	21:00:00	51	47	54	10	62	
2022-09-14	22:00:00	50	45	52	10	62	
2022-09-14	23:00:00	46	43	50	9	62	
2022-09-15	00:00:00	47	42	48	7	61	
2022-09-15	01:00:00	43	41	47	8	60	
2022-09-15	02:00:00	42	40	45	9	59	
2022-09-15	03:00:00	42	40	46	10	57	
2022-09-15	04:00:00	45	40	48	6	56	
2022-09-15	05:00:00	48	43	51	5	54	
2022-09-15	06:00:00	52	48	55	3	52	
2022-09-15	07:00:00	56	52	58	5	50	
2022-09-15	08:00:00	53	48	57	0	53	
2022-09-15	09:00:00	54	48	59	5	56	
2022-09-15	10:00:00	55	47	56	10	59	
2022-09-15	11:00:00	52	48	56	9	61	
2022-09-15	12:00:00	52	46	56	5	62	
2022-09-15	13:00:00	50	45	53	3	63	
2022-09-15	14:00:00	52	46	56	3	64	
2022-09-15	15:00:00	54	46	58	6	66	
2022-09-15	16:00:00	52	48	57	0	65	
2022-09-15	17:00:00	52	48	55	6	66	
2022-09-15	18:00:00	53	48	57	6	65	
2022-09-15	19:00:00	55	49	59	7	62	
2022-09-15	20:00:00	52	48	56	3	58	
2022-09-15	21:00:00	50	46	54	5	57	
2022-09-15	22:00:00	46	43	49	6	56	
2022-09-15	23:00:00	46	44	49	6	55	
2022-09-16	00:00:00	46	43	48	5	53	
2022-09-16	01:00:00	47	44	50	3	52	
2022-09-16	02:00:00	46	43	49	3	52	
2022-09-16	03:00:00	49	45	52	5	50	
2022-09-16	04:00:00	48	46	51	5	50	
2022-09-16	05:00:00	52	48	55	6	50	
2022-09-16	06:00:00	55	53	58	5	49	
2022-09-16	07:00:00	55	53	58	6	49	
2022-09-16	08:00:00	54	52	56	5	51	
2022-09-16	09:00:00	53	50	55	6	56	
2022-09-16	10:00:00	50	47	53	8	62	
2022-09-16	11:00:00	50	46	55	9	66	
2022-09-16	12:00:00	52	47	55	10	68	
2022-09-16	13:00:00	54	49	57	13	71	Wind Speed >= 12 mph
2022-09-16	14:00:00	56	49	57	13	71	Wind Speed >= 12 mph
2022-09-16	15:00:00	54	50	58	10	73	
2022-09-16	16:00:00	54	48	57	10	73	
2022-09-16	17:00:00	55	49	59	12	73	Wind Speed >= 12 mph
2022-09-16	18:00:00	53	47	56	8	73	
2022-09-16	19:00:00	53	50	57	5	71	
2022-09-16	20:00:00	53	51	56	0	70	
2022-09-16	21:00:00	52	50	54	6	66	
2022-09-16	22:00:00	50	48	52	0	63	
2022-09-16	23:00:00	50	47	52	3	63	
2022-09-17	00:00:00	48	46	51	5	61	
2022-09-17	01:00:00	47	45	50	5	61	
2022-09-17	02:00:00	48	44	50	0	61	
2022-09-17	03:00:00	48	44	51	5	60	
2022-09-17	04:00:00	46	43	49	0	60	
2022-09-17	05:00:00	47	44	50	3	59	
2022-09-17	06:00:00	50	46	53	3	59	
2022-09-17	07:00:00	54	49	58	5	60	
2022-09-17	08:00:00	51	48	55	3	59	
2022-09-17	09:00:00	54	46	58	0	63	
2022-09-17	10:00:00	55	48	59	7	68	
2022-09-17	11:00:00	55	50	59	5	72	
2022-09-17	12:00:00	55	48	59	9	75	
2022-09-17	13:00:00	59	49	59	9	77	
2022-09-17	14:00:00	54	49	58	14	78	Wind Speed >= 12 mph
2022-09-17	15:00:00	57	50	61	9	78	
2022-09-17	16:00:00	54	48	58	8	78	

Table C.2

Environmental Sound Level Measurements, LEQ - Validated Background Measurements, LTM2
Buffalo Bills Stadium
Orchard Park, NY

Date	Time	Leq ^{(2), (3)}	L90	L5	Wind Spd (mph) ⁽¹⁾	Temperature (°F)	Weather
2022-09-17	17:00:00	52	47	55	10	78	
2022-09-17	18:00:00	50	47	54	7	76	
2022-09-17	19:00:00	51	46	54	6	74	
2022-09-17	20:00:00	52	49	54	6	71	
2022-09-17	21:00:00	49	47	51	6	69	
2022-09-17	22:00:00	51	48	52	6	68	
2022-09-17	23:00:00	48	45	50	6	66	
2022-09-18	00:00:00	46	43	48	6	65	
2022-09-18	01:00:00	45	43	48	6	65	
2022-09-18	02:00:00	46	43	48	7	66	
2022-09-18	03:00:00	44	42	47	8	67	
2022-09-18	04:00:00	46	42	49	8	67	
2022-09-18	05:00:00	45	42	47	7	66	
2022-09-18	06:00:00	48	44	51	10	69	
2022-09-18	07:00:00	49	46	52	8	69	
2022-09-18	08:00:00	51	48	53	7	70	
2022-09-18	09:00:00	51	49	55	14	72	Wind Speed >= 12 mph
2022-09-18	10:00:00	55	50	59	18	74	Wind Speed >= 12 mph
2022-09-18	11:00:00	56	51	60	15	75	Wind Speed >= 12 mph
2022-09-18	12:00:00	58	52	61	22	76	Wind Speed >= 12 mph
2022-09-18	13:00:00	56	51	60	17	75	Wind Speed >= 12 mph
2022-09-18	14:00:00	55	50	59	21	76	Wind Speed >= 12 mph
2022-09-18	15:00:00	55	51	58	21	77	Wind Speed >= 12 mph
2022-09-18	16:00:00	55	50	58	20	76	Wind Speed >= 12 mph
2022-09-18	17:00:00	52	49	56	15	73	Wind Speed >= 12 mph
2022-09-18	18:00:00	51	49	53	10	69	Light Rain
2022-09-18	19:00:00	51	49	53	8	69	
2022-09-18	20:00:00	57	49	58	7	69	
2022-09-18	21:00:00	50	48	53	7	68	
2022-09-18	22:00:00	49	47	51	7	67	
2022-09-18	23:00:00	47	45	49	12	72	Wind Speed >= 12 mph
2022-09-19	00:00:00	46	44	49	10	71	
2022-09-19	01:00:00	45	44	47	13	71	Wind Speed >= 12 mph
2022-09-19	02:00:00	45	43	47	13	71	Wind Speed >= 12 mph
2022-09-19	03:00:00	46	44	48	9	70	
2022-09-19	04:00:00	47	44	49	9	71	
2022-09-19	05:00:00	48	46	50	9	71	
2022-09-19	06:00:00	53	49	56	8	70	
2022-09-19	07:00:00	53	50	57	10	71	
2022-09-19	08:00:00	52	50	55	10	70	
2022-09-19	09:00:00	56	51	61	10	72	Thunderstorm
2022-09-19	10:00:00	56	51	61	12	69	Wind Speed >= 12 mph
2022-09-19	11:00:00	66	53	69	8	68	Light Rain with Thunder
2022-09-19	12:00:00	55	51	59	13	65	Wind Speed >= 12 mph
2022-09-19	13:00:00	57	49	59	15	67	Wind Speed >= 12 mph
2022-09-19	14:00:00	55	52	59	15	71	Wind Speed >= 12 mph
2022-09-19	15:00:00	66	62	69	20	71	Wind Speed >= 12 mph
2022-09-19	16:00:00	67	64	70	16	72	Wind Speed >= 12 mph
2022-09-19	17:00:00	69	65	72	15	73	Wind Speed >= 12 mph
2022-09-19	18:00:00	64	54	69	13	74	Wind Speed >= 12 mph
2022-09-19	19:00:00	55	50	58	8	70	Light Rain with Thunder, Game Start
2022-09-19	20:00:00	53	49	57	8	68	
2022-09-19	21:00:00	56	50	59	12	68	Wind Speed >= 12 mph
2022-09-19	22:00:00	61	54	65	8	66	
2022-09-19	23:00:00	58	53	61	8	64	Game End
2022-09-20	00:00:00	57	47	65	7	62	
2022-09-20	01:00:00	50	44	53	7	61	
2022-09-20	02:00:00	45	43	48	8	60	
2022-09-20	03:00:00	45	43	48	8	60	
2022-09-20	04:00:00	46	43	50	9	60	
2022-09-20	05:00:00	50	45	54	12	61	Wind Speed >= 12 mph
2022-09-20	06:00:00	53	49	56	10	60	
2022-09-20	07:00:00	56	51	59	10	60	
2022-09-20	08:00:00	54	51	58	8	61	
2022-09-20	09:00:00	55	51	58	7	64	
2022-09-20	10:00:00	58	50	60	9	67	

	Min. 1-hr Leq	Min. 1-hr L90	Max. 1-hr L5
Daytime (07:00 - 19:00)	49 dBA	45 dBA	72 dBA
Evening (19:00 - 23:00)	46 dBA	43 dBA	65 dBA
Nighttime (23:00-07:00)	42 dBA	40 dBA	65 dBA

Notes:

- (1) Weather data provided by the US National Weather Service's Niagara Falls International Airport Weather Station.
- (2) Measurements recorded during inclement weather (winds speeds greater than 12 mph and/or rain) were disregarded.
- (3) Bolded data represents the lowest or highest measured Leq during the respective monitoring time period.

Legend

Day Time Hours	
Evening Time Hours	
Night Time Hours	

Table C.3

Environmental Sound Level Measurements, LEQ - Validated Background Measurements, LTM3
Buffalo Bills Stadium
Orchard Park, NY

Date	Time	Leq ^{(2), (3)}	L90	L5	Wind Spd (mph) ⁽¹⁾	Temperature (°F)	Weather
2022-09-13	20:00:00	57	49	59	6	62	
2022-09-13	21:00:00	53	49	56	8	63	
2022-09-13	22:00:00	50	47	54	8	62	
2022-09-13	23:00:00	48	46	51	5	61	
2022-09-14	00:00:00	47	44	50	6	59	
2022-09-14	01:00:00	45	42	47	6	60	
2022-09-14	02:00:00	44	42	47	7	59	
2022-09-14	03:00:00	44	41	47	7	58	
2022-09-14	04:00:00	47	42	51	6	58	
2022-09-14	05:00:00	50	45	54	6	58	
2022-09-14	06:00:00	53	48	57	7	58	
2022-09-14	07:00:00	54	50	58	5	58	
2022-09-14	08:00:00	55	51	59	8	62	
2022-09-14	09:00:00	56	51	59	10	66	
2022-09-14	10:00:00	54	49	58	10	68	
2022-09-14	11:00:00	56	51	60	12	70	Wind Speed >= 12 mph
2022-09-14	12:00:00	55	51	59	14	73	Wind Speed >= 12 mph
2022-09-14	13:00:00	55	51	58	14	73	Wind Speed >= 12 mph
2022-09-14	14:00:00	54	50	58	14	71	Wind Speed >= 12 mph
2022-09-14	15:00:00	55	51	59	14	71	Wind Speed >= 12 mph
2022-09-14	16:00:00	57	53	60	10	72	
2022-09-14	17:00:00	55	52	59	10	73	
2022-09-14	18:00:00	54	51	57	9	73	
2022-09-14	19:00:00	53	48	55	14	68	Wind Speed >= 12 mph
2022-09-14	20:00:00	50	49	53	8	65	
2022-09-14	21:00:00	50	47	52	10	62	
2022-09-14	22:00:00	49	46	51	10	62	
2022-09-14	23:00:00	46	45	48	9	62	
2022-09-15	00:00:00	47	45	48	7	61	
2022-09-15	01:00:00	45	43	46	8	60	
2022-09-15	02:00:00	43	41	44	9	59	
2022-09-15	03:00:00	42	40	43	10	57	
2022-09-15	04:00:00	44	40	49	6	56	
2022-09-15	05:00:00	47	41	53	5	54	
2022-09-15	06:00:00	51	45	55	3	52	
2022-09-15	07:00:00	54	48	58	5	50	
2022-09-15	08:00:00	52	48	56	0	53	
2022-09-15	09:00:00	54	46	59	5	56	
2022-09-15	10:00:00	51	46	56	10	59	
2022-09-15	11:00:00	51	47	55	9	61	
2022-09-15	12:00:00	53	46	58	5	62	
2022-09-15	13:00:00	52	45	57	3	63	
2022-09-15	14:00:00	50	45	55	3	64	
2022-09-15	15:00:00	52	47	55	6	66	
2022-09-15	16:00:00	51	47	55	0	65	
2022-09-15	17:00:00	53	48	56	6	66	
2022-09-15	18:00:00	52	47	56	6	65	
2022-09-15	19:00:00	53	48	56	7	62	
2022-09-15	20:00:00	51	47	54	3	58	
2022-09-15	21:00:00	49	45	53	5	57	
2022-09-15	22:00:00	47	43	52	6	56	
2022-09-15	23:00:00	46	42	51	6	55	
2022-09-16	00:00:00	44	41	47	5	53	
2022-09-16	01:00:00	44	41	47	3	52	
2022-09-16	02:00:00	44	41	47	3	52	
2022-09-16	03:00:00	46	42	50	5	50	
2022-09-16	04:00:00	46	42	50	5	50	
2022-09-16	05:00:00	50	45	55	6	50	
2022-09-16	06:00:00	54	50	58	5	49	
2022-09-16	07:00:00	55	52	59	6	49	
2022-09-16	08:00:00	55	51	59	5	51	
2022-09-16	09:00:00	55	50	59	6	56	
2022-09-16	10:00:00	55	52	59	8	62	
2022-09-16	11:00:00	54	49	57	9	66	
2022-09-16	12:00:00	53	48	57	10	68	
2022-09-16	13:00:00	54	50	58	13	71	Wind Speed >= 12 mph
2022-09-16	14:00:00	54	50	57	13	71	Wind Speed >= 12 mph
2022-09-16	15:00:00	54	50	57	10	73	
2022-09-16	16:00:00	53	49	57	10	73	
2022-09-16	17:00:00	55	48	57	12	73	Wind Speed >= 12 mph
2022-09-16	18:00:00	53	47	57	8	73	
2022-09-16	19:00:00	53	49	57	5	71	
2022-09-16	20:00:00	53	50	56	0	70	
2022-09-16	21:00:00	51	48	55	6	66	
2022-09-16	22:00:00	50	48	54	0	63	
2022-09-16	23:00:00	49	46	53	3	63	
2022-09-17	00:00:00	47	45	51	5	61	
2022-09-17	01:00:00	46	45	48	5	61	
2022-09-17	02:00:00	48	44	49	0	61	
2022-09-17	03:00:00	47	43	49	5	60	
2022-09-17	04:00:00	45	42	49	0	60	
2022-09-17	05:00:00	48	42	53	3	59	
2022-09-17	06:00:00	50	44	55	3	59	
2022-09-17	07:00:00	54	47	59	5	60	
2022-09-17	08:00:00	53	48	58	3	59	
2022-09-17	09:00:00	55	49	60	0	63	
2022-09-17	10:00:00	56	50	61	7	68	
2022-09-17	11:00:00	57	51	61	5	72	
2022-09-17	12:00:00	56	51	61	9	75	
2022-09-17	13:00:00	55	50	59	9	77	
2022-09-17	14:00:00	56	50	60	14	78	Wind Speed >= 12 mph
2022-09-17	15:00:00	55	49	61	9	78	
2022-09-17	16:00:00	54	49	58	8	78	

Table C.3

Environmental Sound Level Measurements, LEQ - Validated Background Measurements, LTM3
Buffalo Bills Stadium
Orchard Park, NY

Date	Time	Leq ^{(2), (3)}	L90	L5	Wind Spd (mph) ⁽¹⁾	Temperature (°F)	Weather
2022-09-17	17:00:00	53	48	56	10	78	
2022-09-17	18:00:00	52	47	56	7	76	
2022-09-17	19:00:00	52	46	55	6	74	
2022-09-17	20:00:00	52	49	55	6	71	
2022-09-17	21:00:00	51	48	54	6	69	
2022-09-17	22:00:00	51	48	54	6	68	
2022-09-17	23:00:00	51	48	54	6	66	
2022-09-18	00:00:00	49	48	52	6	65	
2022-09-18	01:00:00	48	47	50	6	65	
2022-09-18	02:00:00	48	47	49	7	66	
2022-09-18	03:00:00	48	47	49	8	67	
2022-09-18	04:00:00	48	47	49	8	67	
2022-09-18	05:00:00	48	46	50	7	66	
2022-09-18	06:00:00	48	46	53	10	69	
2022-09-18	07:00:00	51	46	55	8	69	
2022-09-18	08:00:00	52	47	56	7	70	
2022-09-18	09:00:00	54	49	58	14	72	Wind Speed >= 12 mph
2022-09-18	10:00:00	56	50	61	18	74	Wind Speed >= 12 mph
2022-09-18	11:00:00	56	52	60	15	75	Wind Speed >= 12 mph
2022-09-18	12:00:00	57	52	61	22	76	Wind Speed >= 12 mph
2022-09-18	13:00:00	56	52	60	17	75	Wind Speed >= 12 mph
2022-09-18	14:00:00	55	50	59	21	76	Wind Speed >= 12 mph
2022-09-18	15:00:00	54	50	58	21	77	Wind Speed >= 12 mph
2022-09-18	16:00:00	54	50	57	20	76	Wind Speed >= 12 mph
2022-09-18	17:00:00	54	48	58	15	73	Wind Speed >= 12 mph
2022-09-18	18:00:00	52	47	56	10	69	Light Rain
2022-09-18	19:00:00	52	48	55	8	69	
2022-09-18	20:00:00	54	50	57	7	69	
2022-09-18	21:00:00	51	49	54	7	68	
2022-09-18	22:00:00	50	49	53	7	67	
2022-09-18	23:00:00	49	48	52	12	72	Wind Speed >= 12 mph
2022-09-19	00:00:00	49	48	51	10	71	
2022-09-19	01:00:00	48	47	49	13	71	Wind Speed >= 12 mph
2022-09-19	02:00:00	48	47	49	13	71	Wind Speed >= 12 mph
2022-09-19	03:00:00	49	48	51	9	70	
2022-09-19	04:00:00	49	47	52	9	71	
2022-09-19	05:00:00	50	47	54	9	71	
2022-09-19	06:00:00	53	48	57	8	70	
2022-09-19	07:00:00	53	49	57	10	71	
2022-09-19	08:00:00	57	49	62	10	70	
2022-09-19	09:00:00	59	50	65	10	72	Thunderstorm
2022-09-19	10:00:00	58	51	63	12	69	Wind Speed >= 12 mph
2022-09-19	11:00:00	67	53	70	8	68	Light Rain with Thunder
2022-09-19	12:00:00	57	51	61	13	65	Wind Speed >= 12 mph
2022-09-19	13:00:00	59	51	64	15	67	Wind Speed >= 12 mph
2022-09-19	14:00:00	61	52	66	15	71	Wind Speed >= 12 mph
2022-09-19	15:00:00	62	53	66	20	71	Wind Speed >= 12 mph
2022-09-19	16:00:00	61	53	66	16	72	Wind Speed >= 12 mph
2022-09-19	17:00:00	62	53	66	15	73	Wind Speed >= 12 mph
2022-09-19	18:00:00	58	52	62	13	74	Wind Speed >= 12 mph
2022-09-19	19:00:00	55	50	59	8	70	Light Rain with Thunder, Game Start
2022-09-19	20:00:00	54	50	59	8	68	
2022-09-19	21:00:00	57	50	59	12	68	Wind Speed >= 12 mph
2022-09-19	22:00:00	58	54	62	8	66	
2022-09-19	23:00:00	64	54	63	8	64	Game End
2022-09-20	00:00:00	58	49	63	7	62	
2022-09-20	01:00:00	51	46	56	7	61	
2022-09-20	02:00:00	47	45	48	8	60	
2022-09-20	03:00:00	46	44	47	8	60	
2022-09-20	04:00:00	46	44	50	9	60	
2022-09-20	05:00:00	49	44	53	12	61	Wind Speed >= 12 mph
2022-09-20	06:00:00	52	47	56	10	60	
2022-09-20	07:00:00	54	49	58	10	60	
2022-09-20	08:00:00	54	49	58	8	61	
2022-09-20	09:00:00	55	50	60	7	64	
2022-09-20	10:00:00	56	50	62	9	67	

	Min. 1-hr Leq	Min. 1-hr L90	Max. 1-hr L5
Daytime (07:00 - 19:00)	50 dBA	45 dBA	70 dBA
Evening (19:00 - 23:00)	47 dBA	43 dBA	62 dBA
Nighttime (23:00-07:00)	42 dBA	40 dBA	63 dBA

Notes:

- (1) Weather data provided by the US National Weather Service's Niagara Falls International Airport Weather Station.
- (2) Measurements recorded during inclement weather (winds speeds greater than 12 mph and/or rain) were disregarded.
- (3) Bolded data represents the lowest or highest measured Leq during the respective monitoring time period.

Table C.4

Environmental Sound Level Measurements, LEQ - Validated Background Measurements, LTM4
Buffalo Bills Stadium
Orchard Park, NY

Date	Time	Leq ^{(2), (3)}	L90	L5	Wind Spd (mph) ⁽¹⁾	Temperature (°F)	Weather
2022-09-13	20:00:00	57	51	61	6	62	
2022-09-13	21:00:00	54	48	60	8	63	
2022-09-13	22:00:00	51	47	56	8	62	
2022-09-13	23:00:00	50	44	55	5	61	
2022-09-14	00:00:00	47	43	52	6	59	
2022-09-14	01:00:00	45	42	48	6	60	
2022-09-14	02:00:00	45	42	47	7	59	
2022-09-14	03:00:00	44	42	46	7	58	
2022-09-14	04:00:00	49	42	53	6	58	
2022-09-14	05:00:00	53	46	59	6	58	
2022-09-14	06:00:00	58	50	63	7	58	
2022-09-14	07:00:00	61	53	66	5	58	
2022-09-14	08:00:00	61	52	67	8	62	
2022-09-14	09:00:00	60	52	65	10	66	
2022-09-14	10:00:00	60	51	64	10	68	
2022-09-14	11:00:00	64	53	67	12	70	Wind Speed >= 12 mph
2022-09-14	12:00:00	64	55	67	14	73	Wind Speed >= 12 mph
2022-09-14	13:00:00	62	53	66	14	73	Wind Speed >= 12 mph
2022-09-14	14:00:00	60	52	64	14	71	Wind Speed >= 12 mph
2022-09-14	15:00:00	59	52	64	14	71	Wind Speed >= 12 mph
2022-09-14	16:00:00	70	59	75	10	72	
2022-09-14	17:00:00	69	64	73	10	73	
2022-09-14	18:00:00	64	53	70	9	73	
2022-09-14	19:00:00	57	49	61	14	68	Wind Speed >= 12 mph
2022-09-14	20:00:00	54	47	60	8	65	
2022-09-14	21:00:00	53	46	59	10	62	
2022-09-14	22:00:00	52	43	57	10	62	
2022-09-14	23:00:00	49	43	55	9	62	
2022-09-15	00:00:00	50	41	51	7	61	
2022-09-15	01:00:00	43	39	47	8	60	
2022-09-15	02:00:00	45	38	45	9	59	
2022-09-15	03:00:00	42	39	44	10	57	
2022-09-15	04:00:00	47	40	52	6	56	
2022-09-15	05:00:00	51	42	58	5	54	
2022-09-15	06:00:00	56	47	62	3	52	
2022-09-15	07:00:00	67	54	71	5	50	
2022-09-15	08:00:00	61	51	66	0	53	
2022-09-15	09:00:00	66	49	66	5	56	
2022-09-15	10:00:00	59	49	63	10	59	
2022-09-15	11:00:00	63	49	67	9	61	
2022-09-15	12:00:00	63	57	67	5	62	
2022-09-15	13:00:00	61	58	63	3	63	
2022-09-15	14:00:00	62	58	66	3	64	
2022-09-15	15:00:00	64	58	66	6	66	
2022-09-15	16:00:00	63	59	67	0	65	
2022-09-15	17:00:00	63	59	66	6	66	
2022-09-15	18:00:00	61	59	64	6	65	
2022-09-15	19:00:00	61	59	63	7	62	
2022-09-15	20:00:00	61	59	63	3	58	
2022-09-15	21:00:00	61	60	62	5	57	
2022-09-15	22:00:00	60	59	62	6	56	
2022-09-15	23:00:00	60	59	62	6	55	
2022-09-16	00:00:00	60	59	61	5	53	
2022-09-16	01:00:00	60	59	61	3	52	
2022-09-16	02:00:00	59	59	60	3	52	
2022-09-16	03:00:00	59	59	59	5	50	
2022-09-16	04:00:00	61	58	64	5	50	
2022-09-16	05:00:00	59	58	61	6	50	
2022-09-16	06:00:00	60	58	64	5	49	
2022-09-16	07:00:00	63	59	68	6	49	
2022-09-16	08:00:00	63	59	67	5	51	
2022-09-16	09:00:00	62	58	66	6	56	
2022-09-16	10:00:00	64	57	65	8	62	
2022-09-16	11:00:00	62	57	65	9	66	
2022-09-16	12:00:00	68	57	75	10	68	
2022-09-16	13:00:00	61	56	65	13	71	Wind Speed >= 12 mph
2022-09-16	14:00:00	64	56	68	13	71	Wind Speed >= 12 mph
2022-09-16	15:00:00	61	56	65	10	73	
2022-09-16	16:00:00	62	57	65	10	73	
2022-09-16	17:00:00	63	60	67	12	73	Wind Speed >= 12 mph
2022-09-16	18:00:00	61	58	64	8	73	
2022-09-16	19:00:00	62	59	63	5	71	
2022-09-16	20:00:00	60	59	62	0	70	
2022-09-16	21:00:00	60	59	62	6	66	
2022-09-16	22:00:00	59	58	61	0	63	
2022-09-16	23:00:00	59	58	61	3	63	
2022-09-17	00:00:00	60	58	62	5	61	
2022-09-17	01:00:00	57	54	58	5	61	
2022-09-17	02:00:00	56	54	57	0	61	
2022-09-17	03:00:00	56	54	56	5	60	
2022-09-17	04:00:00	55	54	56	0	60	
2022-09-17	05:00:00	56	54	58	3	59	
2022-09-17	06:00:00	58	55	60	3	59	
2022-09-17	07:00:00	65	56	69	5	60	
2022-09-17	08:00:00	62	56	66	3	59	
2022-09-17	09:00:00	60	56	64	0	63	
2022-09-17	10:00:00	62	56	67	7	68	
2022-09-17	11:00:00	63	61	65	5	72	
2022-09-17	12:00:00	63	61	65	9	75	
2022-09-17	13:00:00	63	61	66	9	77	
2022-09-17	14:00:00	63	60	65	14	78	Wind Speed >= 12 mph
2022-09-17	15:00:00	62	59	64	9	78	
2022-09-17	16:00:00	62	59	65	8	78	

Table C.4
Environmental Sound Level Measurements, LEQ - Validated Background Measurements, LTM4
Buffalo Bills Stadium
Orchard Park, NY

Date	Time	Leq ^{(2), (3)}	L90	L5	Wind Spd (mph) ⁽¹⁾	Temperature (°F)	Weather
2022-09-17	17:00:00	62	59	64	10	78	
2022-09-17	18:00:00	61	59	63	7	76	
2022-09-17	19:00:00	62	59	63	6	74	
2022-09-17	20:00:00	60	59	62	6	71	
2022-09-17	21:00:00	63	59	65	6	69	
2022-09-17	22:00:00	61	59	62	6	68	
2022-09-17	23:00:00	60	58	61	6	66	
2022-09-18	00:00:00	59	58	61	6	65	
2022-09-18	01:00:00	59	56	59	6	65	
2022-09-18	02:00:00	56	56	57	7	66	
2022-09-18	03:00:00	56	56	56	8	67	
2022-09-18	04:00:00	56	56	56	8	67	
2022-09-18	05:00:00	56	56	57	7	66	
2022-09-18	06:00:00	57	56	60	10	69	
2022-09-18	07:00:00	61	57	63	8	69	
2022-09-18	08:00:00	62	57	66	7	70	
2022-09-18	09:00:00	63	58	65	14	72	Wind Speed >= 12 mph
2022-09-18	10:00:00	63	58	66	18	74	Wind Speed >= 12 mph
2022-09-18	11:00:00	62	59	64	15	75	Wind Speed >= 12 mph
2022-09-18	12:00:00	64	60	65	22	76	Wind Speed >= 12 mph
2022-09-18	13:00:00	63	61	65	17	75	Wind Speed >= 12 mph
2022-09-18	14:00:00	62	60	65	21	76	Wind Speed >= 12 mph
2022-09-18	15:00:00	62	60	64	21	77	Wind Speed >= 12 mph
2022-09-18	16:00:00	63	61	65	20	76	Wind Speed >= 12 mph
2022-09-18	17:00:00	64	61	67	15	73	Wind Speed >= 12 mph
2022-09-18	18:00:00	67	62	69	10	69	Light Rain
2022-09-18	19:00:00	67	61	67	8	69	
2022-09-18	20:00:00	74	62	76	7	69	
2022-09-18	21:00:00	61	60	62	7	68	
2022-09-18	22:00:00	61	60	62	7	67	
2022-09-18	23:00:00	59	57	61	12	72	Wind Speed >= 12 mph
2022-09-19	00:00:00	58	57	59	10	71	
2022-09-19	01:00:00	58	57	58	13	71	Wind Speed >= 12 mph
2022-09-19	02:00:00	58	57	58	13	71	Wind Speed >= 12 mph
2022-09-19	03:00:00	58	57	58	9	70	
2022-09-19	04:00:00	58	57	58	9	71	
2022-09-19	05:00:00	58	57	59	9	71	
2022-09-19	06:00:00	60	57	63	8	70	
2022-09-19	07:00:00	60	57	64	10	71	
2022-09-19	08:00:00	61	57	65	10	70	
2022-09-19	09:00:00	64	58	68	10	72	Thunderstorm
2022-09-19	10:00:00	65	60	69	12	69	Wind Speed >= 12 mph
2022-09-19	11:00:00	70	63	74	8	68	Light Rain with Thunder
2022-09-19	12:00:00	68	63	72	13	65	Wind Speed >= 12 mph
2022-09-19	13:00:00	68	64	72	15	67	Wind Speed >= 12 mph
2022-09-19	14:00:00	70	67	72	15	71	Wind Speed >= 12 mph
2022-09-19	15:00:00	73	69	76	20	71	Wind Speed >= 12 mph
2022-09-19	16:00:00	74	71	78	16	72	Wind Speed >= 12 mph
2022-09-19	17:00:00	74	70	77	15	73	Wind Speed >= 12 mph
2022-09-19	18:00:00	73	70	77	13	74	Wind Speed >= 12 mph
2022-09-19	19:00:00	70	66	74	8	70	Light Rain with Thunder, Game Start
2022-09-19	20:00:00	69	66	72	8	68	
2022-09-19	21:00:00	70	67	73	12	68	Wind Speed >= 12 mph
2022-09-19	22:00:00	74	68	76	8	66	
2022-09-19	23:00:00	70	68	73	8	64	Game End
2022-09-20	00:00:00	71	67	75	7	62	
2022-09-20	01:00:00	64	61	67	7	61	
2022-09-20	02:00:00	61	59	63	8	60	
2022-09-20	03:00:00	60	59	61	8	60	
2022-09-20	04:00:00	60	59	61	9	60	
2022-09-20	05:00:00	60	59	62	12	61	Wind Speed >= 12 mph
2022-09-20	06:00:00	62	59	64	10	60	
2022-09-20	07:00:00	62	59	65	10	60	
2022-09-20	08:00:00	61	58	65	8	61	
2022-09-20	09:00:00	62	58	65	7	64	
2022-09-20	10:00:00	66	58	70	9	67	

	Min. 1-hr Leq	Min. 1-hr L90	Max. 1-hr L5
Daytime (07:00 - 19:00)	59 dBA	49 dBA	78 dBA
Evening (19:00 - 23:00)	51 dBA	43 dBA	76 dBA
Nighttime (23:00-07:00)	42 dBA	38 dBA	75 dBA

Notes:

- (1) Weather data provided by the US National Weather Service's Niagara Falls International Airport Weather Station.
- (2) Measurements recorded during inclement weather (winds speeds greater than 12 mph and/or rain) were disregarded.
- (3) Bolded data represents the lowest or highest measured Leq during the respective monitoring time period.

Table C.5
Environmental Sound Level Measurements, LEQ - Game Day, LTM1
Buffalo Bills Stadium
Orchard Park, NY

Date	Time	LTM1 Leq ^{(2), (3)}	LTM2 Leq ^{(2), (3)}	LTM3 Leq ^{(2), (3)}	LTM4 Leq ^{(2), (3)}	Play-By-Play
2022-09-19	17:00:00	63	69	59	71	GHD Arrived to Site
2022-09-19	17:01:00	64	68	59	72	Tail Gating Events
2022-09-19	17:02:00	64	69	61	77	
2022-09-19	17:03:00	66	66	71	71	
2022-09-19	17:04:00	64	67	53	70	
2022-09-19	17:05:00	64	66	55	76	
2022-09-19	17:06:00	63	66	57	71	
2022-09-19	17:07:00	64	69	59	71	
2022-09-19	17:08:00	65	67	55	73	
2022-09-19	17:09:00	64	68	59	71	
2022-09-19	17:10:00	65	66	67	71	
2022-09-19	17:11:00	65	67	59	78	
2022-09-19	17:12:00	65	68	62	72	
2022-09-19	17:13:00	65	68	69	71	
2022-09-19	17:14:00	64	68	64	70	
2022-09-19	17:15:00	63	67	66	71	
2022-09-19	17:16:00	65	67	74	72	
2022-09-19	17:17:00	63	66	62	72	
2022-09-19	17:18:00	64	66	61	72	
2022-09-19	17:19:00	64	66	62	72	
2022-09-19	17:20:00	64	67	63	72	
2022-09-19	17:21:00	72	67	58	73	
2022-09-19	17:22:00	70	66	54	77	
2022-09-19	17:23:00	66	66	55	73	
2022-09-19	17:24:00	65	67	62	72	
2022-09-19	17:25:00	64	66	57	73	
2022-09-19	17:26:00	64	65	61	71	
2022-09-19	17:27:00	63	66	64	72	
2022-09-19	17:28:00	63	68	61	72	
2022-09-19	17:29:00	63	69	57	73	
2022-09-19	17:30:00	63	67	58	72	
2022-09-19	17:31:00	63	67	59	73	
2022-09-19	17:32:00	66	67	59	72	
2022-09-19	17:33:00	64	67	61	72	
2022-09-19	17:34:00	65	71	54	72	
2022-09-19	17:35:00	64	69	57	72	
2022-09-19	17:36:00	65	71	57	72	
2022-09-19	17:37:00	67	71	63	73	
2022-09-19	17:38:00	66	72	56	75	
2022-09-19	17:39:00	65	69	56	75	
2022-09-19	17:40:00	65	71	59	75	
2022-09-19	17:41:00	65	70	60	74	
2022-09-19	17:42:00	65	71	56	73	
2022-09-19	17:43:00	65	70	54	79	
2022-09-19	17:44:00	65	73	57	73	
2022-09-19	17:45:00	65	70	62	74	
2022-09-19	17:46:00	64	66	54	74	
2022-09-19	17:47:00	66	68	55	77	
2022-09-19	17:48:00	64	70	62	73	
2022-09-19	17:49:00	65	75	59	73	
2022-09-19	17:50:00	64	71	57	79	
2022-09-19	17:51:00	65	70	56	74	
2022-09-19	17:52:00	64	69	60	73	
2022-09-19	17:53:00	64	69	57	74	
2022-09-19	17:54:00	65	67	58	74	
2022-09-19	17:55:00	63	68	55	74	
2022-09-19	17:56:00	66	67	61	74	
2022-09-19	17:57:00	65	66	59	74	
2022-09-19	17:58:00	63	66	56	73	
2022-09-19	17:59:00	64	66	63	74	
2022-09-19	18:00:00	66	67	62	73	
2022-09-19	18:01:00	64	66	55	77	
2022-09-19	18:02:00	65	66	58	74	
2022-09-19	18:03:00	64	67	57	76	
2022-09-19	18:04:00	66	70	63	79	
2022-09-19	18:05:00	65	69	58	74	
2022-09-19	18:06:00	64	67	57	73	
2022-09-19	18:07:00	64	68	61	75	
2022-09-19	18:08:00	65	70	59	74	
2022-09-19	18:09:00	64	68	53	73	

Table C.5
Environmental Sound Level Measurements, LEQ - Game Day, LTM1
Buffalo Bills Stadium
Orchard Park, NY

Date	Time	LTM1 Leq ^{(2), (3)}	LTM2 Leq ^{(2), (3)}	LTM3 Leq ^{(2), (3)}	LTM4 Leq ^{(2), (3)}	Play-By-Play
2022-09-19	18:10:00	65	64	56	72	
2022-09-19	18:11:00	67	66	57	73	
2022-09-19	18:12:00	64	66	60	74	
2022-09-19	18:13:00	64	68	57	74	
2022-09-19	18:14:00	65	67	55	75	
2022-09-19	18:15:00	66	66	57	74	
2022-09-19	18:16:00	63	64	54	73	
2022-09-19	18:17:00	63	64	62	74	
2022-09-19	18:18:00	66	63	57	72	
2022-09-19	18:19:00	63	61	56	73	
2022-09-19	18:20:00	67	64	56	74	
2022-09-19	18:21:00	63	61	58	74	
2022-09-19	18:22:00	64	63	69	74	
2022-09-19	18:23:00	67	59	56	75	
2022-09-19	18:24:00	67	62	56	73	
2022-09-19	18:25:00	64	63	57	76	
2022-09-19	18:26:00	64	65	56	74	
2022-09-19	18:27:00	63	61	55	74	
2022-09-19	18:28:00	62	59	65	74	
2022-09-19	18:29:00	70	61	57	73	
2022-09-19	18:30:00	65	61	55	73	
2022-09-19	18:31:00	62	62	57	73	
2022-09-19	18:32:00	62	63	55	75	
2022-09-19	18:33:00	63	60	54	72	
2022-09-19	18:34:00	63	61	60	72	
2022-09-19	18:35:00	63	62	56	71	
2022-09-19	18:36:00	63	63	55	74	
2022-09-19	18:37:00	62	58	53	71	
2022-09-19	18:38:00	61	63	56	73	
2022-09-19	18:39:00	63	58	54	72	
2022-09-19	18:40:00	61	54	53	72	
2022-09-19	18:41:00	61	55	52	71	
2022-09-19	18:42:00	62	56	56	70	
2022-09-19	18:43:00	61	58	56	70	Approximate End of Majority of Tailgating
2022-09-19	18:44:00	61	62	53	75	
2022-09-19	18:45:00	62	67	52	73	
2022-09-19	18:46:00	63	57	52	73	
2022-09-19	18:47:00	62	63	59	71	
2022-09-19	18:48:00	60	62	57	70	
2022-09-19	18:49:00	59	59	55	71	
2022-09-19	18:50:00	59	58	57	73	
2022-09-19	18:51:00	59	54	54	73	
2022-09-19	18:52:00	59	55	54	71	
2022-09-19	18:53:00	61	54	57	71	
2022-09-19	18:54:00	59	58	55	70	
2022-09-19	18:55:00	58	53	54	71	
2022-09-19	18:56:00	61	52	55	70	
2022-09-19	18:57:00	61	57	55	69	
2022-09-19	18:58:00	59	58	54	69	
2022-09-19	18:59:00	59	55	56	69	First Big Roar from Crowd
2022-09-19	19:00:00	61	54	61	69	
2022-09-19	19:01:00	57	56	60	69	
2022-09-19	19:02:00	59	54	53	70	
2022-09-19	19:03:00	60	56	55	71	
2022-09-19	19:04:00	61	55	55	70	
2022-09-19	19:05:00	58	53	57	70	
2022-09-19	19:06:00	57	55	53	72	Bills Introduction Start
2022-09-19	19:07:00	58	56	55	71	
2022-09-19	19:08:00	62	55	56	72	Diggs Introduction
2022-09-19	19:09:00	60	53	53	74	Allen Introduction
2022-09-19	19:10:00	56	58	51	73	National Anthem
2022-09-19	19:11:00	57	54	54	70	
2022-09-19	19:12:00	59	54	58	69	End of Anthem Fireworks
2022-09-19	19:13:00	57	52	50	72	
2022-09-19	19:14:00	58	55	53	71	
2022-09-19	19:15:00	60	56	53	71	Crowd pump up Leading to Kickoff
2022-09-19	19:16:00	56	51	51	72	Game Kickoff
2022-09-19	19:17:00	56	53	50	69	
2022-09-19	19:18:00	58	54	53	67	
2022-09-19	19:19:00	58	56	62	67	
2022-09-19	19:20:00	56	55	53	68	
2022-09-19	19:21:00	56	59	52	67	Big 17 yard gain - Buffalo
2022-09-19	19:22:00	57	56	52	68	
2022-09-19	19:23:00	58	52	53	68	
2022-09-19	19:24:00	56	51	55	69	Big Crowd Roar
2022-09-19	19:25:00	69	54	50	70	1st Down Buffalo

Table C.5

**Environmental Sound Level Measurements, LEQ - Game Day, LTM1
Buffalo Bills Stadium
Orchard Park, NY**

Date	Time	LTM1 Leq ^{(2), (3)}	LTM2 Leq ^{(2), (3)}	LTM3 Leq ^{(2), (3)}	LTM4 Leq ^{(2), (3)}	Play-By-Play
2022-09-19	19:26:00	62	52	53	71	
2022-09-19	19:27:00	60	53	53	68	
2022-09-19	19:28:00	61	62	55	68	
2022-09-19	19:29:00	61	56	56	68	
2022-09-19	19:30:00	72	53	52	73	Touchdown - Buffalo
2022-09-19	19:31:00	71	53	58	70	Touchdown Celebration - Buffalo
2022-09-19	19:32:00	71	54	56	71	Firework + Celebration (Lmax)
2022-09-19	19:33:00	69	54	57	67	Touchdown Celebration - Buffalo
2022-09-19	19:34:00	73	51	55	70	
2022-09-19	19:35:00	78	53	56	66	
2022-09-19	19:36:00	73	53	50	67	
2022-09-19	19:37:00	69	54	53	68	Start of Tennessee Possession
2022-09-19	19:38:00	70	55	53	70	
2022-09-19	19:39:00	69	60	53	67	Tennessee Possession
2022-09-19	19:40:00	70	55	53	68	
2022-09-19	19:41:00	71	56	57	71	Big Defensive Hold - Buffalo
2022-09-19	19:42:00	61	53	56	70	
2022-09-19	19:43:00	55	55	54	69	
2022-09-19	19:44:00	57	56	52	69	
2022-09-19	19:45:00	58	54	54	72	
2022-09-19	19:46:00	57	52	54	72	Touchdown - Tennessee
2022-09-19	19:47:00	53	50	54	68	
2022-09-19	19:48:00	52	50	54	66	
2022-09-19	19:49:00	53	52	58	66	
2022-09-19	19:50:00	56	51	53	66	
2022-09-19	19:51:00	53	51	58	67	
2022-09-19	19:52:00	58	51	52	70	
2022-09-19	19:53:00	54	51	54	67	
2022-09-19	19:54:00	52	51	53	67	
2022-09-19	19:55:00	57	55	53	66	
2022-09-19	19:56:00	55	54	54	67	
2022-09-19	19:57:00	56	51	54	69	
2022-09-19	19:58:00	55	51	52	67	
2022-09-19	19:59:00	51	51	53	67	
2022-09-19	20:00:00	56	53	55	67	End of Quarter 1
2022-09-19	20:01:00	55	54	54	67	
2022-09-19	20:02:00	55	52	56	69	
2022-09-19	20:03:00	58	52	55	69	
2022-09-19	20:04:00	55	53	55	69	
2022-09-19	20:05:00	57	56	53	68	
2022-09-19	20:06:00	58	63	52	69	
2022-09-19	20:07:00	58	55	52	68	
2022-09-19	20:08:00	56	51	54	67	
2022-09-19	20:09:00	54	50	52	68	
2022-09-19	20:10:00	55	50	52	67	
2022-09-19	20:11:00	54	55	53	68	
2022-09-19	20:12:00	53	50	52	67	
2022-09-19	20:13:00	50	50	56	67	
2022-09-19	20:14:00	52	51	54	68	
2022-09-19	20:15:00	55	52	53	68	
2022-09-19	20:16:00	55	53	55	70	Field Goal - Buffalo
2022-09-19	20:17:00	54	56	54	68	
2022-09-19	20:18:00	57	51	52	68	
2022-09-19	20:19:00	54	52	54	67	
2022-09-19	20:20:00	55	52	57	68	
2022-09-19	20:21:00	55	55	54	69	
2022-09-19	20:22:00	59	51	53	69	
2022-09-19	20:23:00	54	52	52	70	
2022-09-19	20:24:00	52	51	55	67	
2022-09-19	20:25:00	52	52	51	67	
2022-09-19	20:26:00	53	53	55	67	
2022-09-19	20:27:00	53	51	52	67	
2022-09-19	20:28:00	56	52	52	72	
2022-09-19	20:29:00	53	51	58	69	
2022-09-19	20:30:00	53	50	51	67	
2022-09-19	20:31:00	53	51	51	67	
2022-09-19	20:32:00	58	51	50	67	
2022-09-19	20:33:00	55	51	60	68	
2022-09-19	20:34:00	54	51	55	67	Touchdown - Buffalo
2022-09-19	20:35:00	53	55	59	71	
2022-09-19	20:36:00	56	54	57	68	
2022-09-19	20:37:00	54	55	53	74	
2022-09-19	20:38:00	54	56	56	73	
2022-09-19	20:39:00	56	51	53	68	
2022-09-19	20:40:00	52	52	50	68	
2022-09-19	20:41:00	53	50	54	67	
2022-09-19	20:42:00	53	52	55	66	
2022-09-19	20:43:00	53	49	53	66	
2022-09-19	20:44:00	50	50	57	66	
2022-09-19	20:45:00	53	51	55	68	
2022-09-19	20:46:00	51	52	55	67	
2022-09-19	20:47:00	55	55	56	66	
2022-09-19	20:48:00	59	51	55	75	

Table C.5
Environmental Sound Level Measurements, LEQ - Game Day, LTM1
Buffalo Bills Stadium
Orchard Park, NY

Date	Time	LTM1 Leq ^{(2), (3)}	LTM2 Leq ^{(2), (3)}	LTM3 Leq ^{(2), (3)}	LTM4 Leq ^{(2), (3)}	Play-By-Play
2022-09-19	20:49:00	54	52	53	71	
2022-09-19	20:50:00	53	51	52	68	
2022-09-19	20:51:00	53	49	53	68	
2022-09-19	20:52:00	55	51	51	67	
2022-09-19	20:53:00	55	52	55	67	
2022-09-19	20:54:00	51	51	53	67	
2022-09-19	20:55:00	54	51	51	68	
2022-09-19	20:56:00	56	50	51	67	
2022-09-19	20:57:00	54	52	52	68	
2022-09-19	20:58:00	55	53	51	69	
2022-09-19	20:59:00	53	53	53	68	
2022-09-19	21:00:00	53	53	58	68	
2022-09-19	21:01:00	55	52	52	69	
2022-09-19	21:02:00	60	52	54	68	
2022-09-19	21:03:00	54	54	52	68	
2022-09-19	21:04:00	58	53	55	68	
2022-09-19	21:05:00	59	56	54	69	
2022-09-19	21:06:00	56	52	51	69	
2022-09-19	21:07:00	54	52	53	67	
2022-09-19	21:08:00	53	51	52	68	
2022-09-19	21:09:00	53	52	56	68	
2022-09-19	21:10:00	53	54	71	68	
2022-09-19	21:11:00	57	52	58	67	
2022-09-19	21:12:00	55	55	52	71	
2022-09-19	21:13:00	58	53	52	69	Touchdown - Buffalo
2022-09-19	21:14:00	54	57	58	68	
2022-09-19	21:15:00	56	54	56	70	
2022-09-19	21:16:00	55	53	56	77	
2022-09-19	21:17:00	56	54	53	71	
2022-09-19	21:18:00	55	53	53	69	
2022-09-19	21:19:00	55	55	55	69	
2022-09-19	21:20:00	56	58	56	70	
2022-09-19	21:21:00	58	53	52	71	
2022-09-19	21:22:00	55	55	54	69	
2022-09-19	21:23:00	62	53	52	68	
2022-09-19	21:24:00	54	52	52	69	
2022-09-19	21:25:00	53	51	52	69	
2022-09-19	21:26:00	56	51	51	68	
2022-09-19	21:27:00	55	56	56	68	
2022-09-19	21:28:00	55	65	55	69	
2022-09-19	21:29:00	53	65	52	71	
2022-09-19	21:30:00	53	57	51	68	Field Goal - Buffalo
2022-09-19	21:31:00	58	58	55	70	
2022-09-19	21:32:00	56	52	53	69	
2022-09-19	21:33:00	56	51	51	69	
2022-09-19	21:34:00	59	54	52	67	
2022-09-19	21:35:00	55	59	55	68	
2022-09-19	21:36:00	57	58	56	69	Interception - Buffalo
2022-09-19	21:37:00	56	55	54	67	
2022-09-19	21:38:00	58	57	54	74	
2022-09-19	21:39:00	55	56	54	69	Touchdown - Buffalo
2022-09-19	21:40:00	55	56	55	69	
2022-09-19	21:41:00	60	57	56	71	
2022-09-19	21:42:00	60	54	55	72	
2022-09-19	21:43:00	57	53	51	70	
2022-09-19	21:44:00	59	52	52	67	
2022-09-19	21:45:00	60	54	57	66	
2022-09-19	21:46:00	56	52	61	67	
2022-09-19	21:47:00	60	54	52	69	
2022-09-19	21:48:00	60	56	56	67	
2022-09-19	21:49:00	60	53	54	69	Interception to Touchdown - Buffalo
2022-09-19	21:50:00	60	55	55	74	
2022-09-19	21:51:00	58	55	53	71	
2022-09-19	21:52:00	61	53	57	69	
2022-09-19	21:53:00	60	53	57	69	
2022-09-19	21:54:00	59	54	55	71	
2022-09-19	21:55:00	56	55	56	68	
2022-09-19	21:56:00	61	62	54	70	
2022-09-19	21:57:00	61	52	54	69	
2022-09-19	21:58:00	59	54	62	68	
2022-09-19	21:59:00	57	53	55	70	
2022-09-19	22:00:00	60	52	55	68	Fans Start to Leave Stadium
2022-09-19	22:01:00	62	53	55	68	Fans Cheering as they leave Stadium
2022-09-19	22:02:00	59	56	64	69	
2022-09-19	22:03:00	59	56	57	68	
2022-09-19	22:04:00	61	58	57	70	
2022-09-19	22:05:00	60	53	55	69	
2022-09-19	22:06:00	67	58	60	67	
2022-09-19	22:07:00	61	59	55	69	
2022-09-19	22:08:00	63	59	58	68	
2022-09-19	22:09:00	60	58	59	72	
2022-09-19	22:10:00	60	57	55	74	
2022-09-19	22:11:00	59	57	58	78	

Table C.5
Environmental Sound Level Measurements, LEQ - Game Day, LTM1
Buffalo Bills Stadium
Orchard Park, NY

Date	Time	LTM1 Leq ^{(2), (3)}	LTM2 Leq ^{(2), (3)}	LTM3 Leq ^{(2), (3)}	LTM4 Leq ^{(2), (3)}	Play-By-Play
2022-09-19	22:12:00	62	56	58	69	
2022-09-19	22:13:00	59	56	63	70	
2022-09-19	22:14:00	60	60	59	72	
2022-09-19	22:15:00	63	55	59	72	
2022-09-19	22:16:00	62	61	58	71	
2022-09-19	22:17:00	64	58	57	71	
2022-09-19	22:18:00	61	64	58	72	
2022-09-19	22:19:00	68	64	57	70	
2022-09-19	22:20:00	61	60	56	71	
2022-09-19	22:21:00	60	60	56	70	
2022-09-19	22:22:00	58	65	56	71	
2022-09-19	22:23:00	61	59	58	71	
2022-09-19	22:24:00	58	58	62	70	
2022-09-19	22:25:00	59	60	59	71	
2022-09-19	22:26:00	60	60	57	71	
2022-09-19	22:27:00	61	59	56	71	
2022-09-19	22:28:00	58	62	56	71	
2022-09-19	22:29:00	59	60	58	70	
2022-09-19	22:30:00	59	61	57	74	
2022-09-19	22:31:00	58	61	58	71	
2022-09-19	22:32:00	63	61	56	72	
2022-09-19	22:33:00	59	61	63	70	
2022-09-19	22:34:00	62	59	55	71	
2022-09-19	22:35:00	61	60	57	75	
2022-09-19	22:36:00	65	57	58	70	
2022-09-19	22:37:00	62	64	58	72	
2022-09-19	22:38:00	74	65	58	69	
2022-09-19	22:39:00	72	63	56	85	
2022-09-19	22:40:00	74	66	58	78	
2022-09-19	22:41:00	72	61	59	72	
2022-09-19	22:42:00	58	57	57	80	
2022-09-19	22:43:00	63	58	56	72	<i>End of Game</i>
2022-09-19	22:44:00	59	67	56	73	<i>Traffic Leaving Stadium</i>
2022-09-19	22:45:00	58	60	56	71	
2022-09-19	22:46:00	62	67	57	76	
2022-09-19	22:47:00	59	60	55	71	
2022-09-19	22:48:00	63	58	56	73	
2022-09-19	22:49:00	59	59	57	69	
2022-09-19	22:50:00	61	59	57	69	
2022-09-19	22:51:00	59	59	57	69	
2022-09-19	22:52:00	57	61	57	70	
2022-09-19	22:53:00	58	59	56	72	
2022-09-19	22:54:00	60	60	56	82	
2022-09-19	22:55:00	58	58	55	71	
2022-09-19	22:56:00	58	59	58	71	
2022-09-19	22:57:00	60	57	57	72	
2022-09-19	22:58:00	61	58	57	71	
2022-09-19	22:59:00	68	58	56	71	
2022-09-19	23:00:00	59	56	54	71	

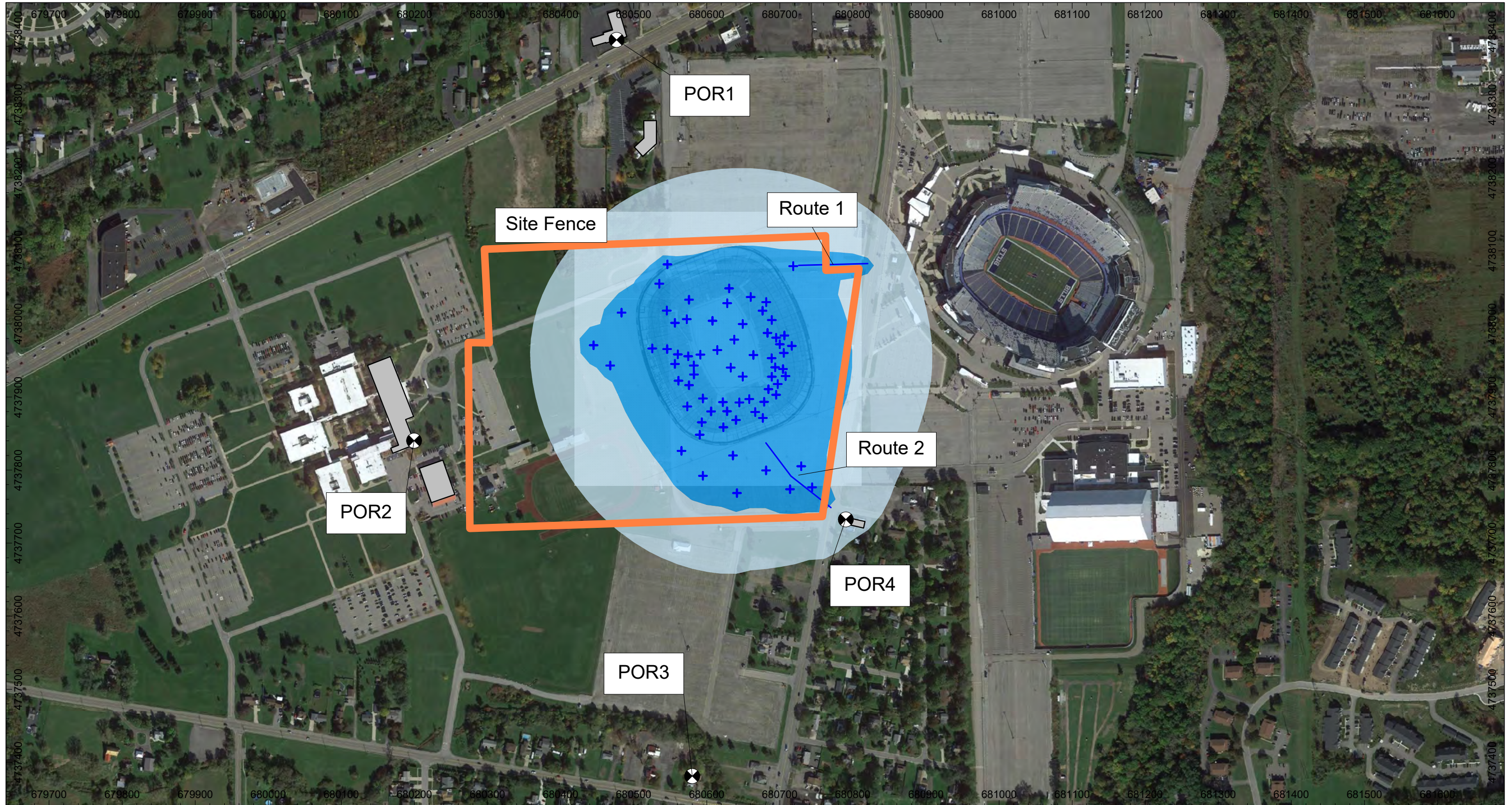
	LTM1 Leq ⁽¹⁾	LTM2 Leq ⁽¹⁾	LTM3 Leq ⁽¹⁾	LTM4 Leq ⁽¹⁾
Minimum 1-hr Leq	50 dBA	49 dBA	50 dBA	66 dBA
Maximum 1-hr Leq	78 dBA	67 dBA	71 dBA	85 dBA

Note:

(1) Bolded data represents the highest or lowest measured Leq during the respective monitoring time period.

Appendix D

Construction Noise Contours



Source: Google Satellite



Legend

- > 75 dBA
- > 80 dBA

Notes:
 Noise level contours presented above represent A-weighted 1-hour equivalent sound levels calculated at a grid height of 4.5 metres above grade.

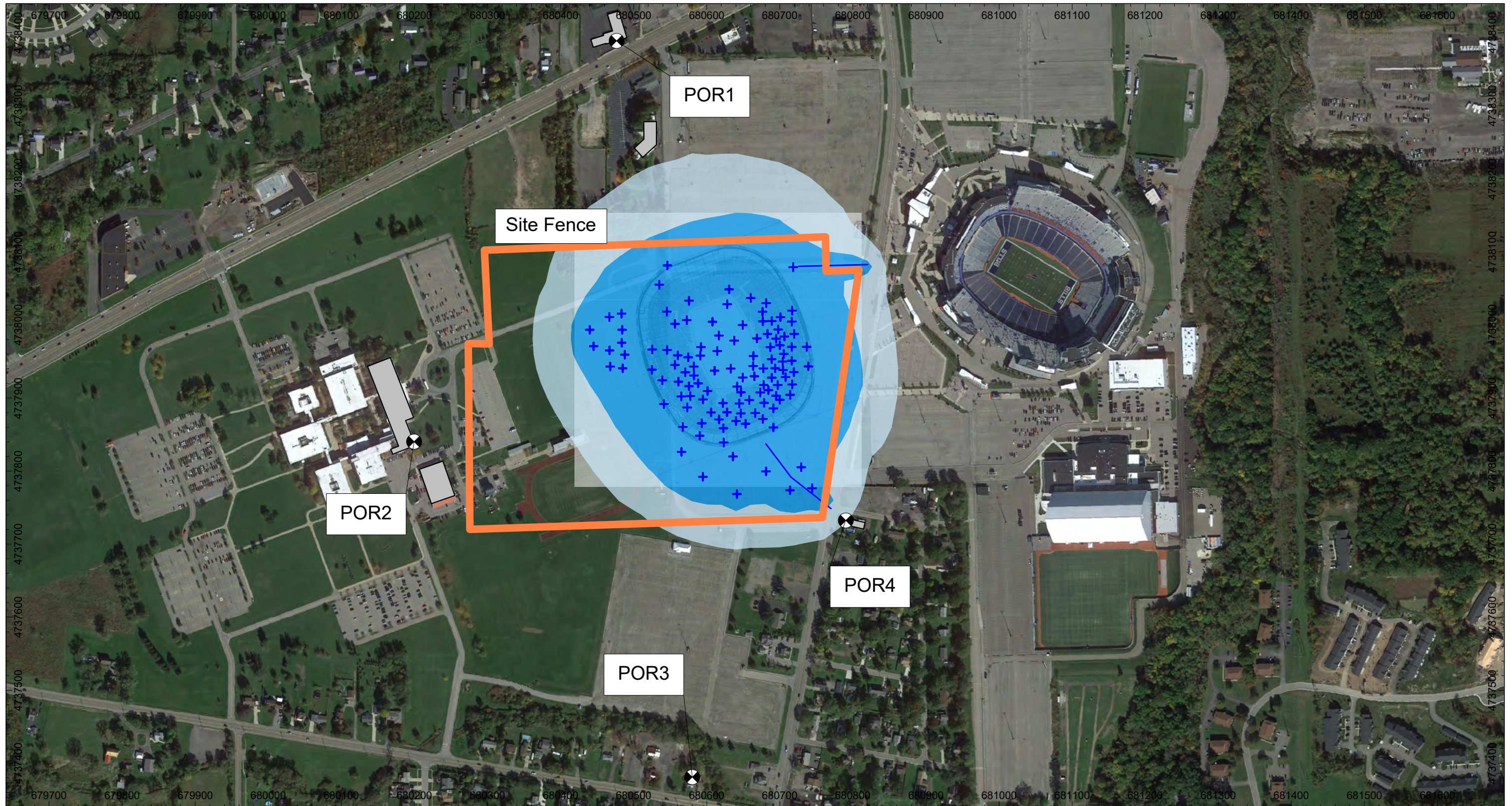


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NOISE CONTOUR PLOT - CONSTRUCTION PHASE 1A

30.09.2022

FIGURE D1A



Source: Google Satellite



Legend

- > 75 dBA
- > 80 dBA

Notes:
 Noise level contours presented above represent A-weighted 1-hour equivalent sound levels calculated at a grid height of 4.5 metres above grade.

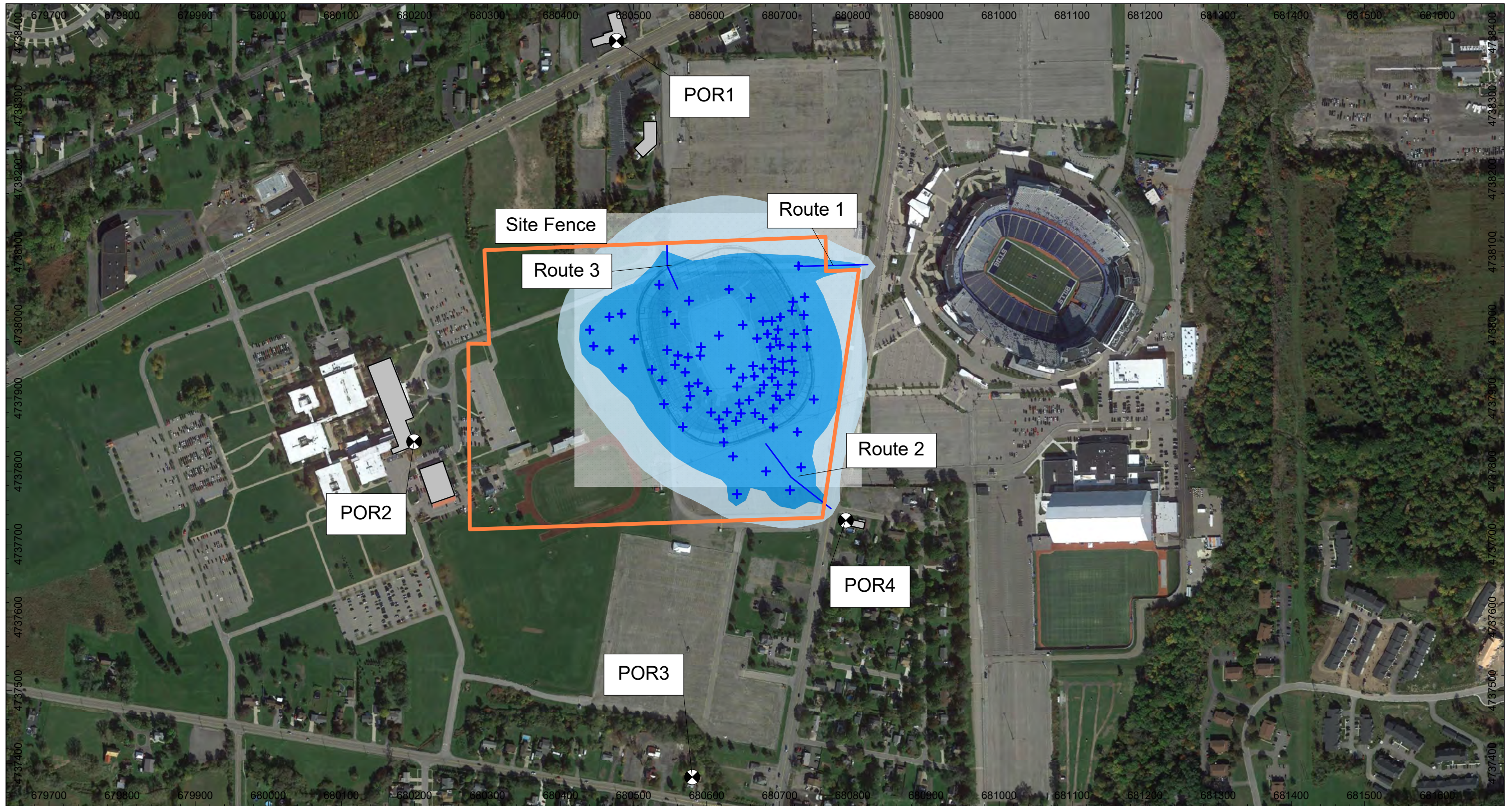


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NOISE CONTOUR PLOT - CONSTRUCTION PHASE 1B

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FIGURE D1B



Source: Google Satellite



Legend

- > 75 dBA
- > 80 dBA

Notes:
 Noise level contours presented above represent A-weighted 1-hour equivalent sound levels calculated at a grid height of 4.5 metres above grade.

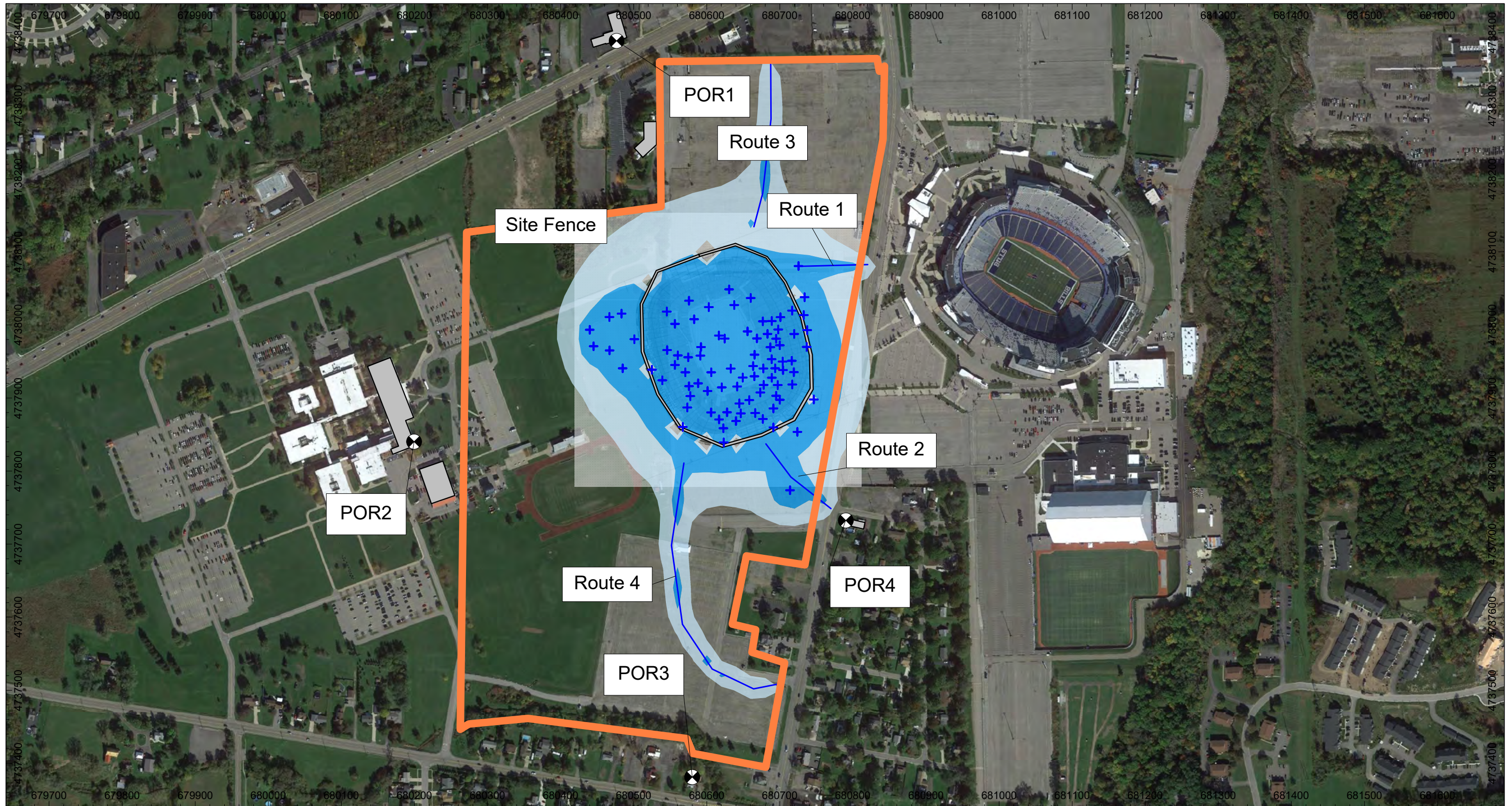


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NOISE CONTOUR PLOT - CONSTRUCTION PHASE 2

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FIGURE D2



Source: Google Satellite



Legend

- > 75 dBA
- > 80 dBA

Notes:
 Noise level contours presented above represent A-weighted 1-hour equivalent sound levels calculated at a grid height of 4.5 metres above grade.

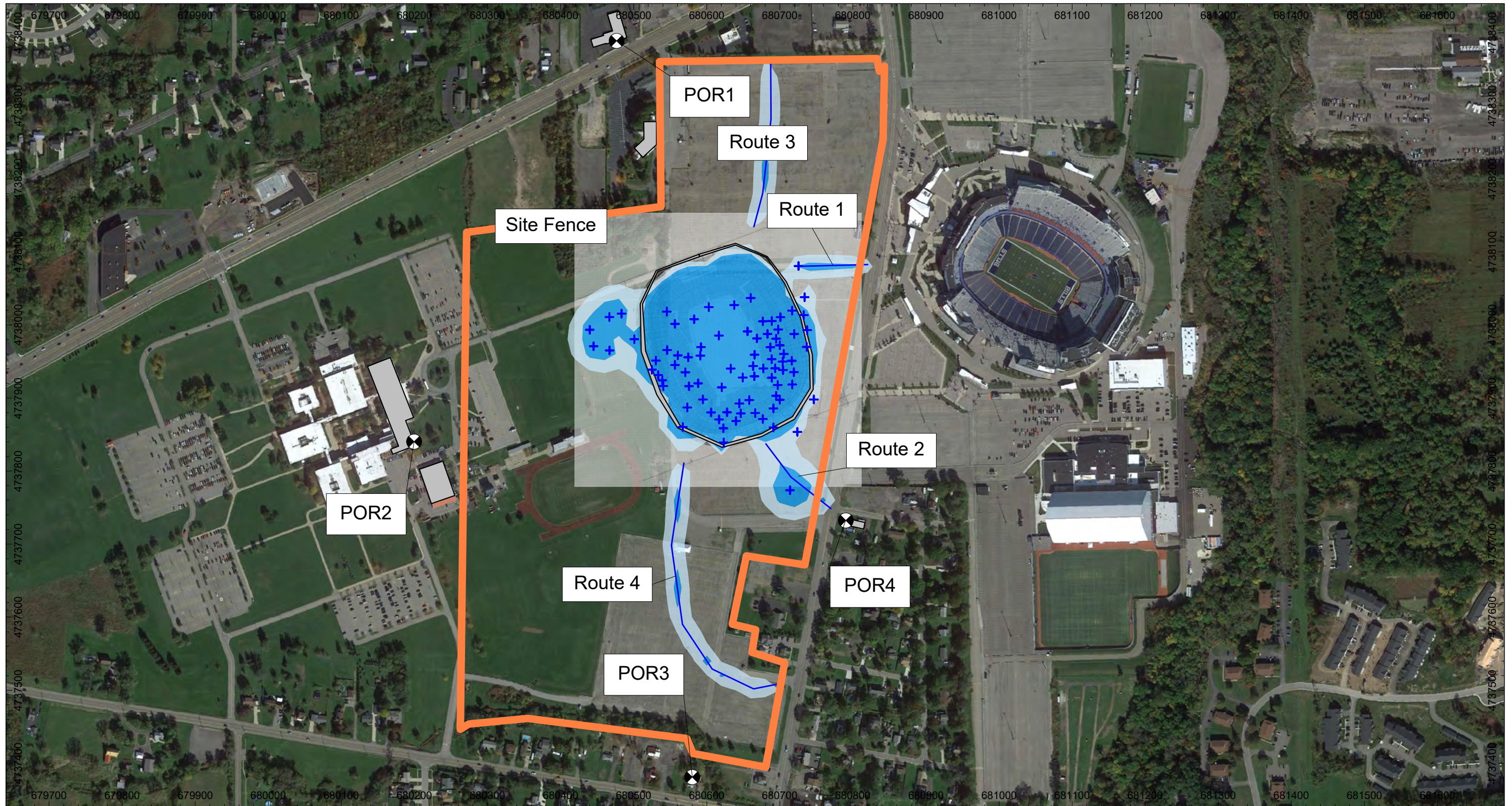


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NOISE CONTOUR PLOT - CONSTRUCTION PHASE 3A

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FIGURE D3A



Source: Google Satellite



Legend

- > 75 dBA
- > 80 dBA

Notes:
 Noise level contours presented above represent A-weighted 1-hour equivalent sound levels calculated at a grid height of 4.5 metres above grade.



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NOISE CONTOUR PLOT - CONSTRUCTION PHASE 3B

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FIGURE D3B

