September 15, 2020

JR Thulin
Senior Director, Development
Greystar
600 East Las Colinas Blvd. Suite 2100
Irvine, TX 75039
O 214.451.5698 ext. 1280
C 714.856.7104
jthulin@greystar.com

Re: Environmental Noise Survey
Elan Keller
Keller, Texas

DRAFT

TECHNICAL MEMORANDUM

This Technical Memorandum addresses the work performed to date by SLR International Corporation (SLR) for Greystar at the site of Elan Keller in Keller, Texas. The results of the environmental noise survey conducted at this site are presented in this Technical Memorandum along with an analysis of glazing acoustical performance requirements.

ENVIRONMENTAL NOISE STUDY

General

Sound level measurements were taken at the project site over a 48-hour period starting on August 30, 2020 by Jeffrey Bregar of SLR. The purpose of the measurements was to document train noise, traffic noise, and other ambient noise around the project site.

Rail Activity Near Site

The Elan Keller project site is located off North Main Street / Denton Highway, between Ridge Point Parkway and Mt. Gilead Road. A freight rail line runs parallel with North Main Street / Denton Highway and has crossing located on the North and South ends of the site where the rail line crosses Ridge Point Parkway and Mt. Gilead Road. Data collected by the Department of Transportation (DOT) and the Federal Railroad Administration (FRA) shows that both the Ridge Point Parkway (Keller Haslet Rd) and Mt. Gilead Road (Timberland Blvd) crossings average between 20 to 24 trains pass-by events within a 24-hour period with trains passing by the crossing at speeds between 25 and 60 mile per hour. The crossing inventor form for the Ridge Point Parkway (Keller Haslet Rd) crossing shows that the crossing is a 24-hour quiet zone while the Mt. Gilead Road (Timberland Blvd) crossings is not a quiet zone. U.S. DOT Crossing Inventory Forms for both crossings are attached.

Measurement Locations

Long-term sound level measurements were taken at three locations around the project site. The first monitor was placed on the North fence line of the property, roughly 40 feet South of Ridge Point Parkway and 190 feet East of North Main Street / Denton Highway and the rail line. The second and third monitors were placed along the West fence line of the property, roughly 730 and 1,350 feet South of Ridge Point Parkway and 10 and 50 feet East of North Main Street / Denton Highway and the rail line respectively. An aerial photo (**Figure 1**) showing the project site and the monitor locations is attached.

Measurement Instrumentation

Three Larson Davis Model 824 Type 1 sound level meters were used (serial numbers A0976, A3253, and A3269). The meters recorded 1/3-octave band and full-octave band sound levels as well as statistical parameters. The meters collected levels in terms of ten-second sound level averages and recorded statistical parameters on a fifteen-minute basis. The meters hold factory calibration certification traceable to NIST standards. The meters were field calibrated before and after the measurement period using a Brüel & Kjær Type 4230 94 dB 1000 Hz Sound Level calibrator (serial number 523033). Microphone windscreens were used for all measurements.

Weather

The temperature ranged from approximately 70 to 99°F during the measurement survey. The skies were partly cloudy with wind speed ranging from 7 to 18 mph from primarily the south and east. Relative humidity ranged from approximately 67 to 75% with dry ground conditions at the site.

MEASUREMENT RESULTS

Day-Night Equivalent Sound Level (L_{dn})

The ten-second sound level averages measured at each position were used to calculate the daytime average level (L_d), the nighttime average level (L_n), and the day-night equivalent sound level (L_{dn}) for each measurement location. The L_{dn} is an average of sound levels over a 24-hour period where for the hours between 10:00 p.m. and 7:00 a.m., ten decibels are added to the measured levels. The L_{dn} may be thought of as a 24-hour time average with a nighttime penalty of 10 dB(A) added to account for the increased sensitivity to noise of an average listener during the evening and night. Results from this survey are as follows:

Measurement Location	Description	Daytime Average (L_d)	Nighttime Average (L_n)	**Day-Night Equivalent Level (L_{dn})**
#1	40 feet South of Ridge Point Parkway and 190 feet East of North Main Street / Denton Highway and the rail line	61.5	59.4	**66.2**
#2	730 feet South of Ridge Point Parkway and 10 feet East of North Main Street / Denton Highway and the rail line	72.5	69.0	**76.1**
#3	1,350 feet South of Ridge Point Parkway and 50 feet East of North Main Street / Denton Highway and the rail line	68.7	65.7	**72.7**

The attached **Graphs 1 through 3** show the ten-second average A-weighted sound levels during the measurement period for the three monitor locations. All levels are A-weighted, or dB(A). The bottom portions of the graphs show the frequency information from the monitors which allows us to help determine noise sources. Levels recorded on all three monitors were primarily dominated by local traffic and train events.

Train Pass-By Events

A total of 38 train pass-by events occurred during the measurement period. Noises caused by passing trains are inconsistent and can differ in both frequency and overall sound level from one train to another due to numerous factors. To help determine the loudest sound levels experienced during a train pass-by event, the L_1 statistical noise level parameter was used. The L_1 describes the sound level that was exceeded 1% of the time and was recorded for every 15-minute interval during the measurement period. The L_1 sound levels for each 15-minute interval affected by train pass-by events were averaged together to determine the average loudest sound level experienced during a train pass-by event. Results from this analysis are as follows:

Measurement Location	Average Loudest Sound Level during Train Pass-by Event L_1 (dBA)
#1	74.6
#2	81.9
#3	81.0

EXTERIOR CONSTRUCTION PRELIMINARY RECOMMENDATIONS

Criteria

There are no known building code requirements or goals relating to maximum interior sound levels applicable to this development. The U.S. Department of Housing and Urban Development (HUD) guidelines[1] are based on a goal of a 45 dB(A) day-night average sound level (L_{dn}) inside the living unit and is an appropriate criterion level for this project.

However, due to the project site's location in proximity to the rail line, train pass-by events cause a temporary but significant increase to the noise level in the surrounding area. These noise levels are well above the measured L_{dn} and may be an annoyance to those living in units nearest the rail line.

To mitigate these disturbances, a criterion level of 55 dB(A) L_1 collected over a 15-minute period is recommended for inside the living units during train pass-by events.

Modeling Results

A computer based model was created to help determine the noise impact on the proposed apartment complex. Incorporating the architectural site plan, the model was developed using Cadna/A, version 2020 MR1 (32-bit) (build 177.5010), a commercial noise modeling package developed by DataKustik GmbH. The software takes into account spreading losses, ground and atmospheric effects, shielding from barriers and buildings, and reflections from surfaces. The software is based on published engineering standards. The ISO 9613[2] standard was used for air absorption and other noise propagation calculations. The model was "calibrated" utilizing the sound level measurements taken on the project site. Attached to this document are **Figures 2-9** which show the exterior sound levels on the building façades as calculated by the computer model. Elevation drawings for buildings 1 and 4 were not available at the time of this report. For clarity within the figures, façade images from buildings 2 and 3 were placed on buildings 1 and 4.

[1] 24 CFR Section 51.102 (HUD).
[2] ISO 9613, "Acoustics – Attenuation of sound during propagation outdoors," 1996.

The data from our measurement survey and analysis was used in calculating the expected interior noise levels within the proposed apartment complex. Typical living room and bedroom sizes, likely interior absorption characteristics, and areas of the façade elements were collected from the drawing set, dated August 7, 2020, and used in our calculations. Calculation results for differing window glazing are shown in **Table 1** below. Per client request, only two window glazing selections were chosen for modeling; A standard construction STC 28 / OITC 23 window and an upgraded STC 35 / OITC 30 window.

Table 1: Expected Interior L_1 with Scheduled Windows at Expected Exterior Sound Levels

Exterior Sound Level (dBA)	Expected L1 (dBA) inside Bedroom with STC 28 / OITC 23 Windows	Expected L1 (dBA) inside Bedroom with STC 35 / OITC 30 Windows
82	61.7	54.3
80	59.4	52.1
78	58.2	50.8
76	55.8	48.4
74	54.1	46.7
72	53.5	46.0
70	50.0	42.6

Recommendations

As shown in **Table 1**, the calculated interior L_1 in typical units within each building during train pass-by events will not meet the 55 dB(A) L_1 criterion with STC 28 / OITC 23 windows when the exterior sound level is greater than 74 dB(A). Therefore, it is recommended that:

1. Operable windows rated at STC/OITC 28/23, for example 1/8" annealed - 1/2" AS - 1/8" annealed, are recommended for:
   a. Living rooms and Bedrooms in all units on all façades which experience 74 dB(A) or less during a train pass-by event
   b. All patio doors in the living rooms of all units that fall under this category must also be rated at STC/OITC 28/23 or greater.
2. Operable windows rated at STC/OITC 35/30, for example 3/16" laminated annealed - 3/8" AS - 1/8" double strength, are recommended for:
   a. Living rooms and Bedrooms in all units on all façades which experience greater than 74 dB(A) during a train pass-by event
   b. All patio doors in the living rooms of all units that fall under this category must also be rated at STC/OITC 35/30 or greater.
3. Operable windows rated at STC/OITC 35/32, for example 1/4" laminated - 11/16" AS – 3/16", are recommended for all Unit Type C1 and C1A corner bedrooms.

Figures 10 through 13 attached show the locations of each window glazing recommendation necessary to meet the project criterion. SLR was requested to review the exterior façade construction of buildings 1 through 4 however, drawings for the exterior partition were not available at the time of this report. SLR will review the exterior façade construction once drawings become available.

CONCLUSION

Sound level measurements were taken over a 48-hour period at the site of Elan Keller in Keller, Texas. The day-night average sound levels were determined to be 66.2, 76.1, and 72.7 dB(A) L_{dn} at each respective measurement location. Using the L_1 statistical parameter, the average loudest sound levels during a train pass-by event were determined to be 74.6, 81.9, and 81.0 dB(A) at each respective measurement location. The train pass-by interior L_1 criterion is met in all units following the recommendations given herein. **Figures 10 through 13** attached show the location of the window glazing recommendations. SLR will review the exterior façade construction once drawings become available.

This concludes this Technical Memorandum. Please call if you have any questions or comments.

Sincerely,
SLR International Corporation

DRAFT

Omar C. Longoria, P.E.
Principal Engineer

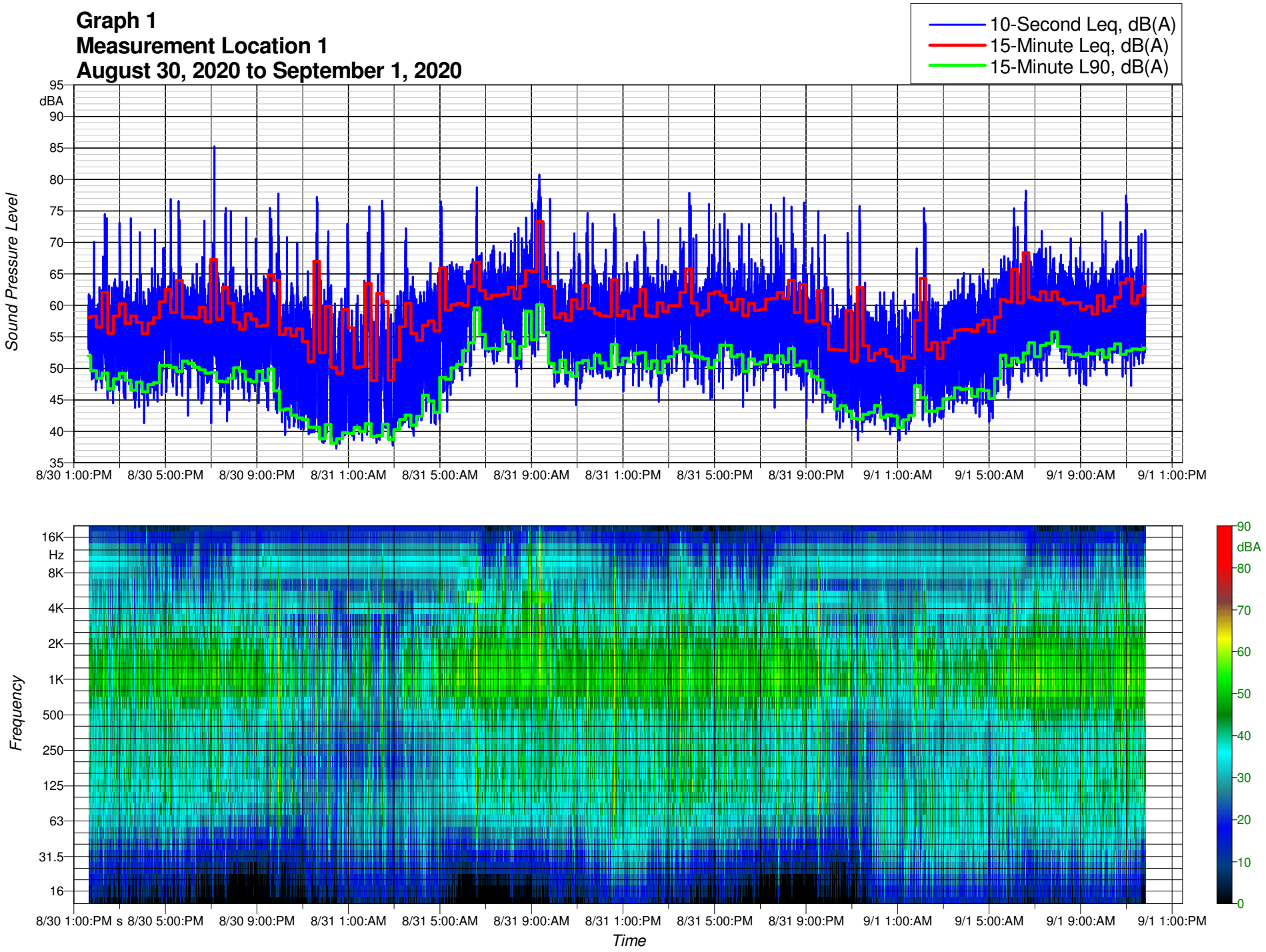
DRAFT

Jeffrey Bregar
Staff Consultant

OCL/jcb
SLR DRAFT Technical Memo - Greystar - Elan Keller - Environmental Noise Survey 09-15-2020.docx
Attachments: Figures 1-13, Graphs 1-3, Attachments 1-2

Figure 1: Measurement Locations

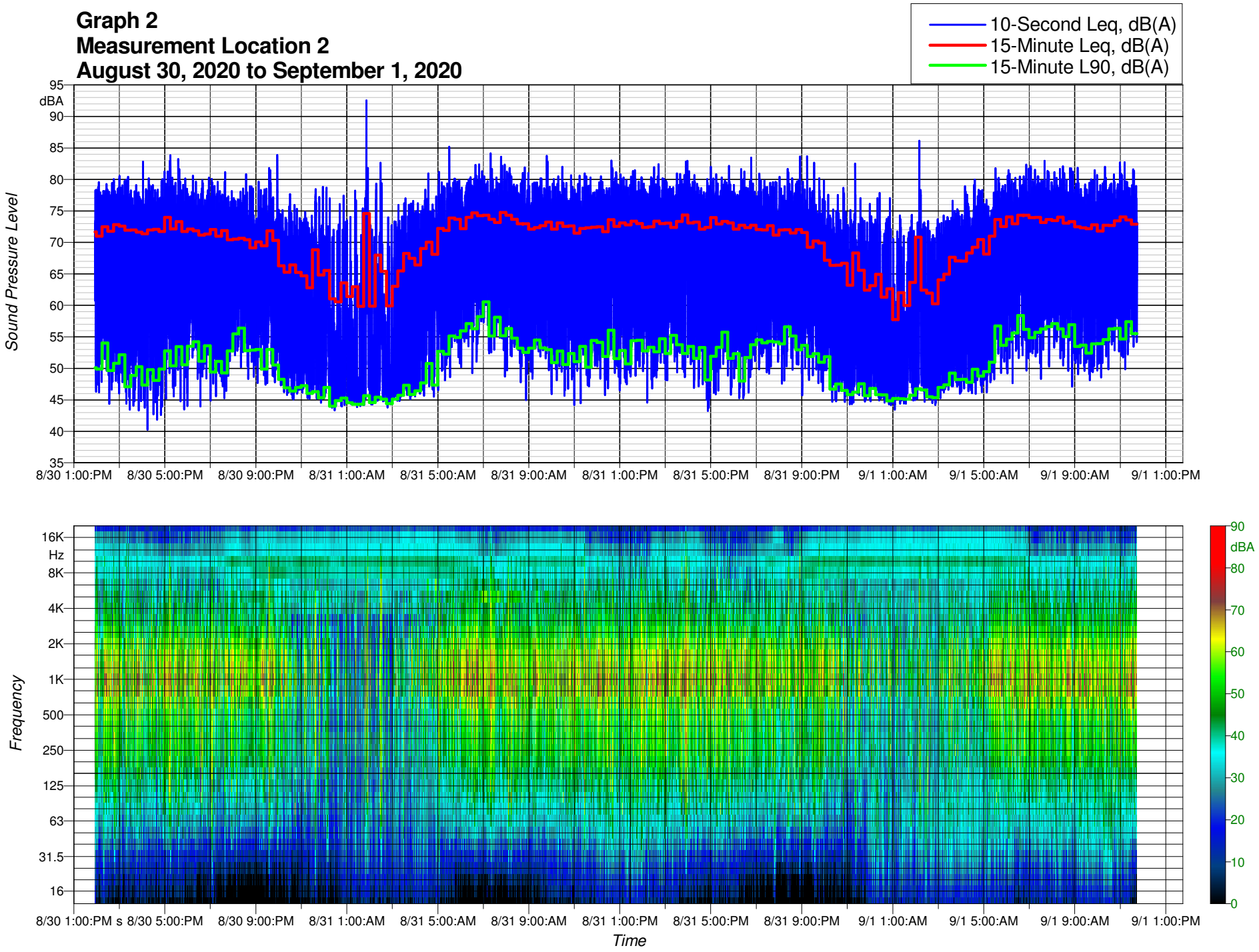
Graph 1
Measurement Location 1
August 30, 2020 to September 1, 2020



Greystar - Elan Keller

SLR

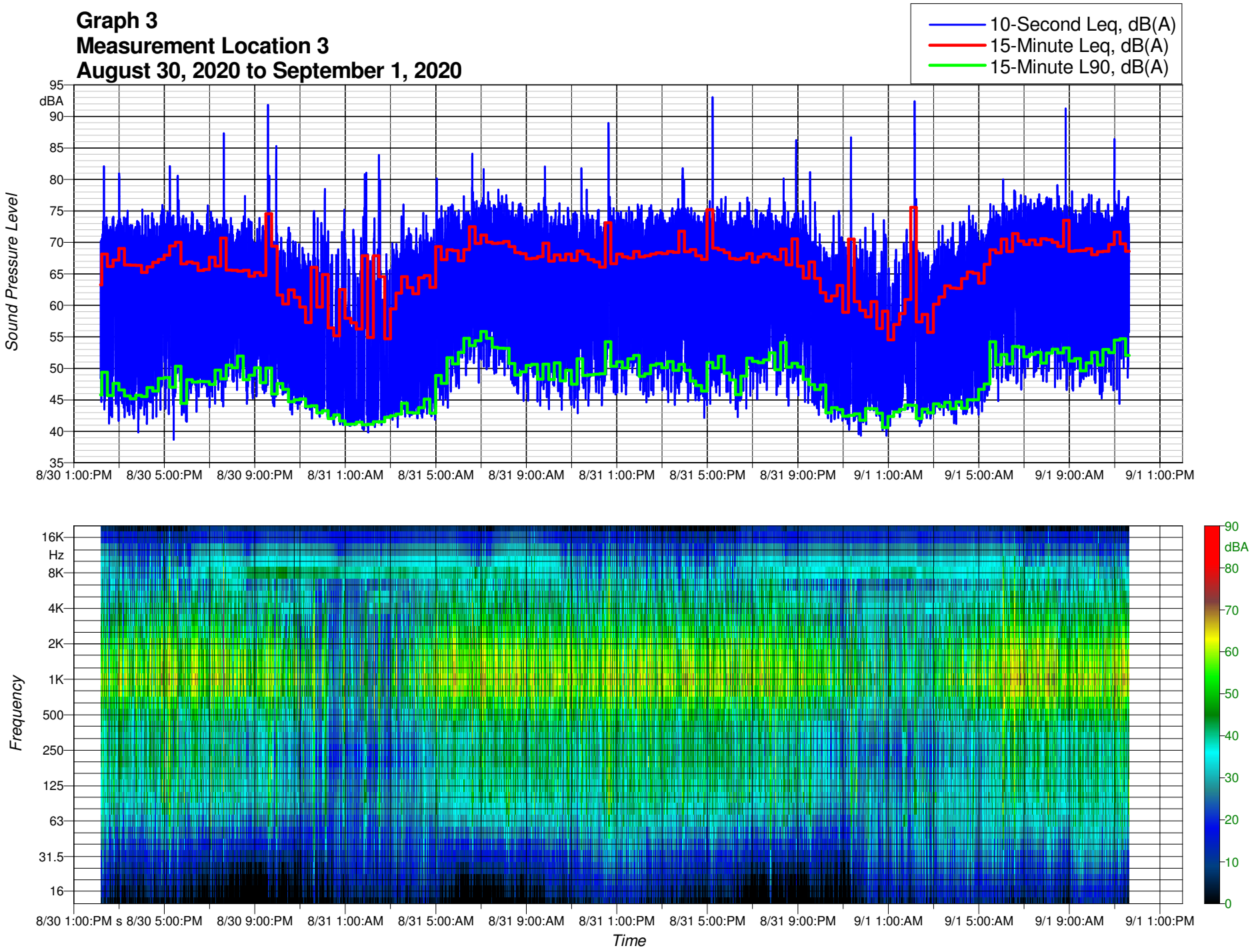
Graph 2
Measurement Location 2
August 30, 2020 to September 1, 2020



Greystar - Elan Keller

SLR

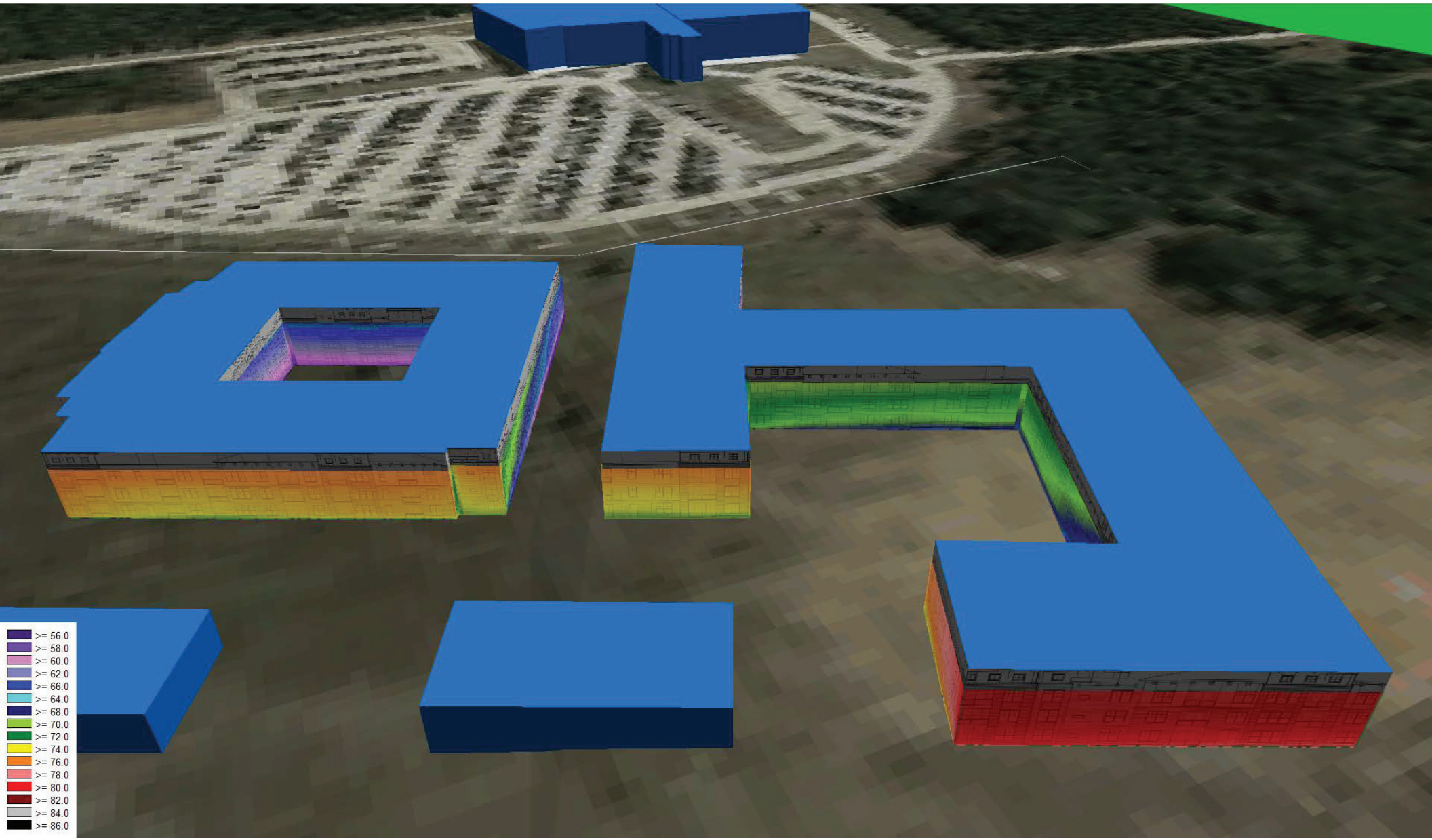
Graph 3
Measurement Location 3
August 30, 2020 to September 1, 2020



Greystar - Elan Keller

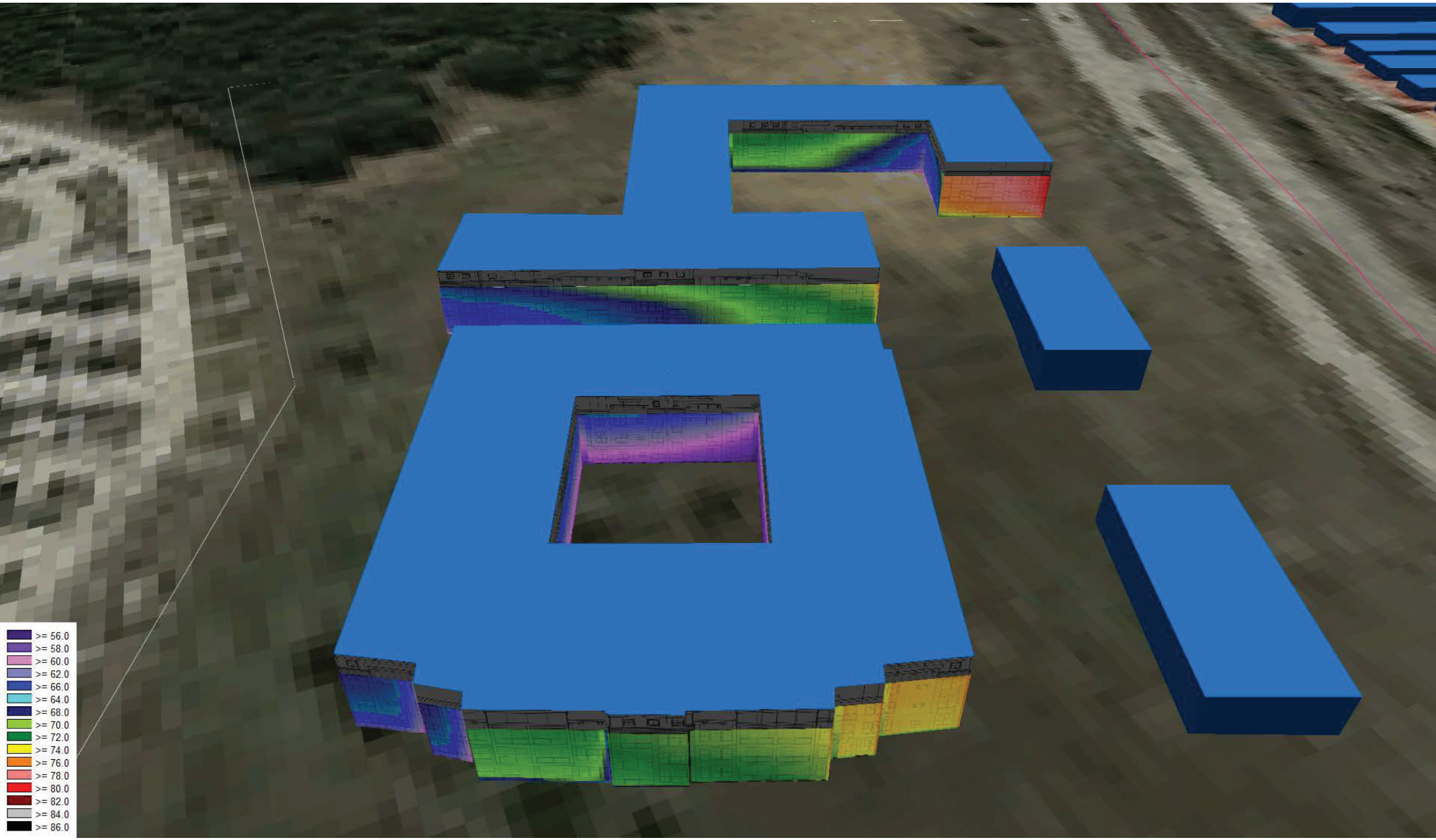
SLR

Figure 2: Computer Generated Noise Map - Plan North Façade Buildings 1 and 2 - Train Pass-by Event



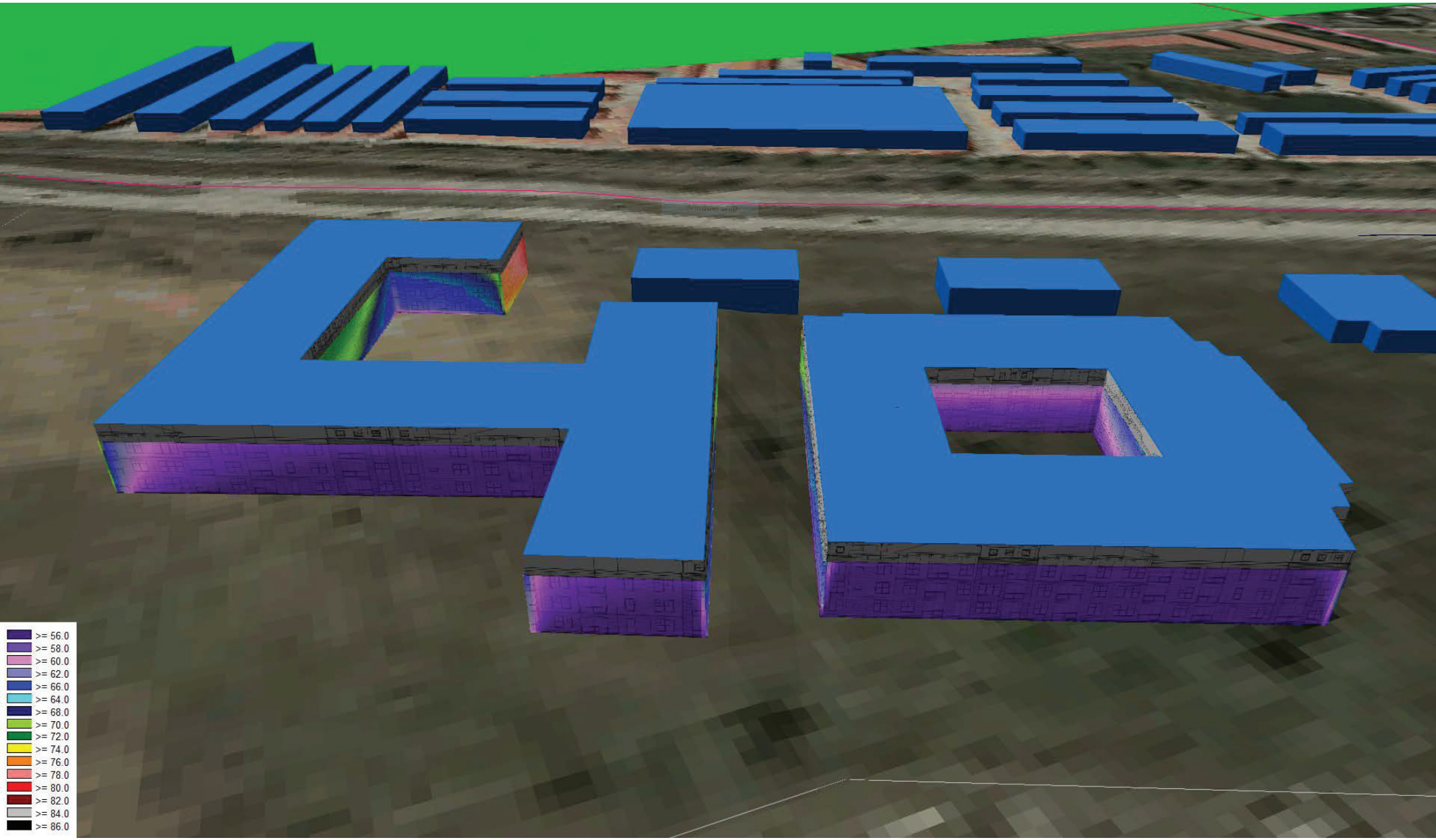
Greystar - Elan Keller

Figure 3: Computer Generated Noise Map - Plan East Façade Buildings 1 and 2 - Train Pass-by Event



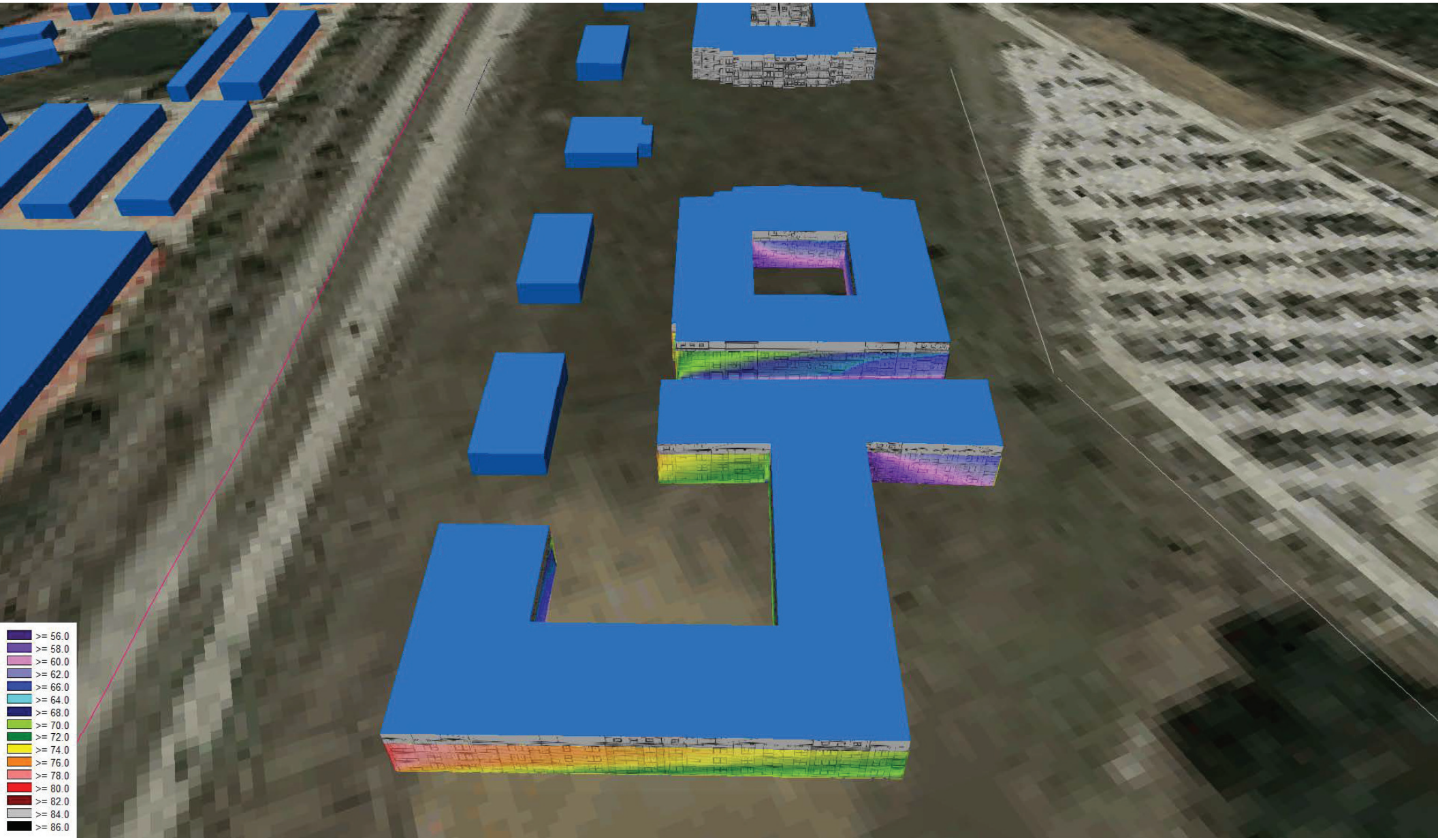
Greystar - Elan Keller

Figure 4: Computer Generated Noise Map - Plan South Façade Buildings 1 and 2 - Train Pass-by Event



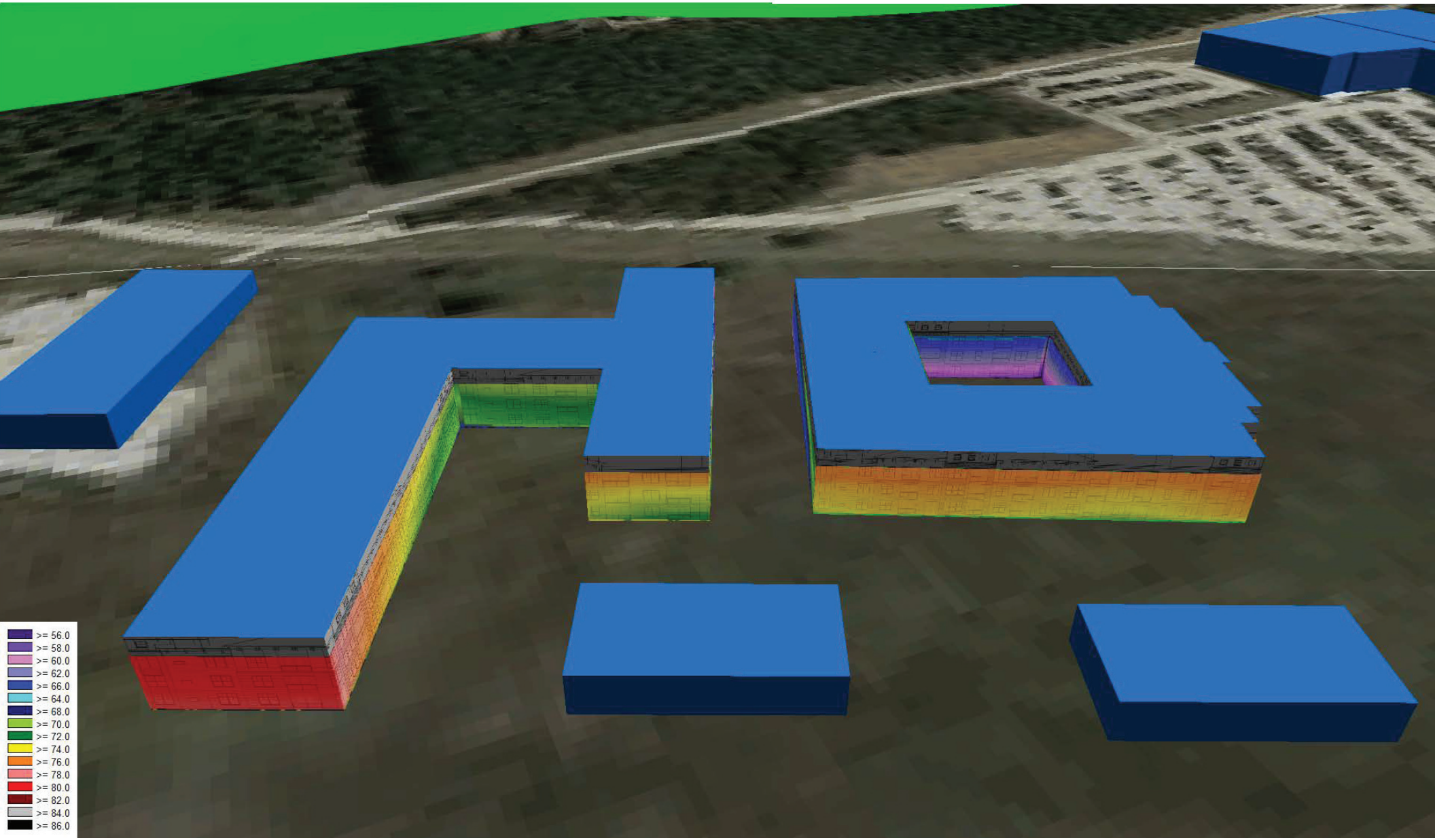
Greystar - Elan Keller

Figure 5: Computer Generated Noise Map - Plan West Façade Buildings 1 and 2 - Train Pass-by Event



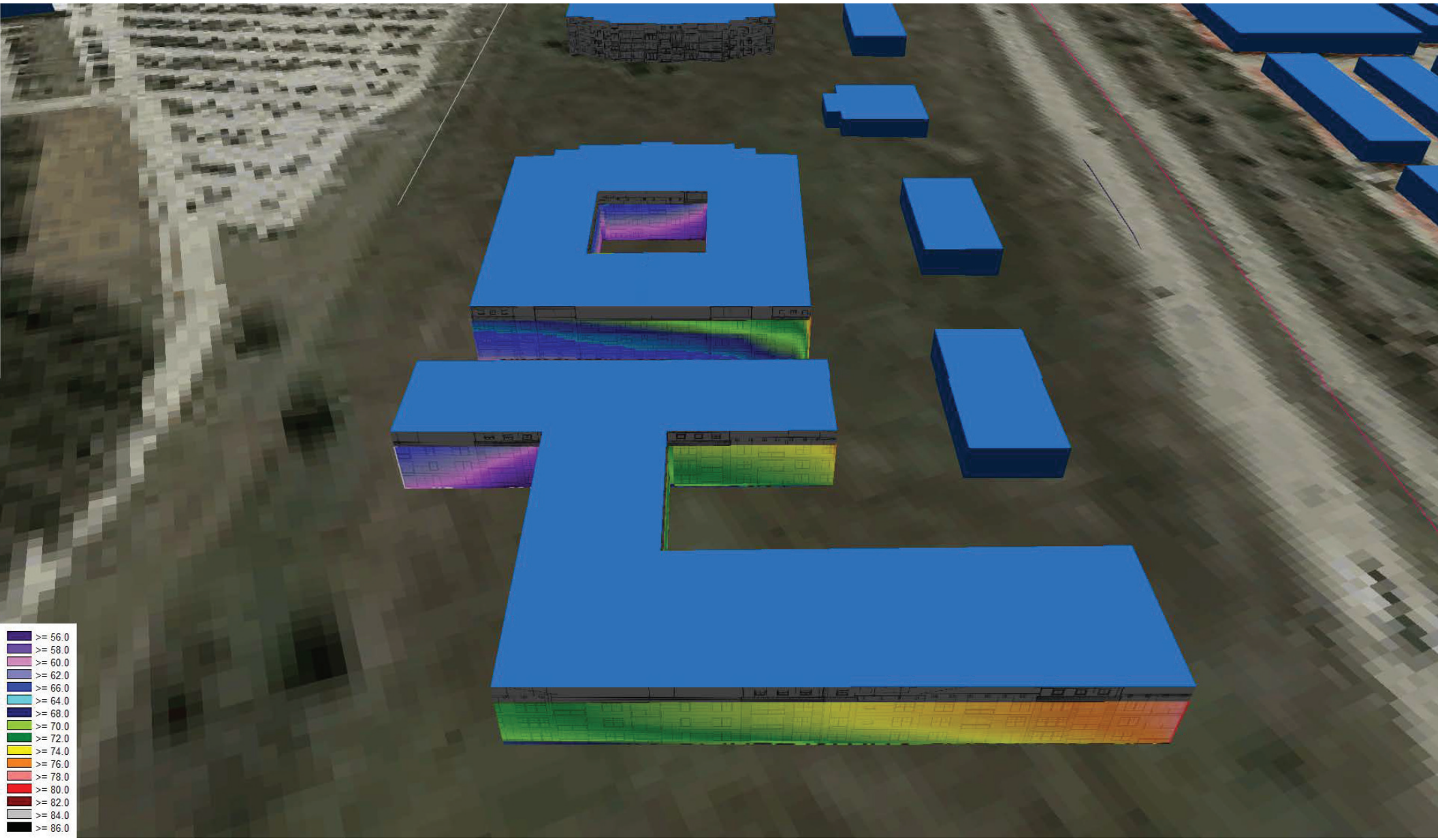
Greystar - Elan Keller

Figure 6: Computer Generated Noise Map - Plan North Façade Buildings 3 and 4 - Train Pass-by Event



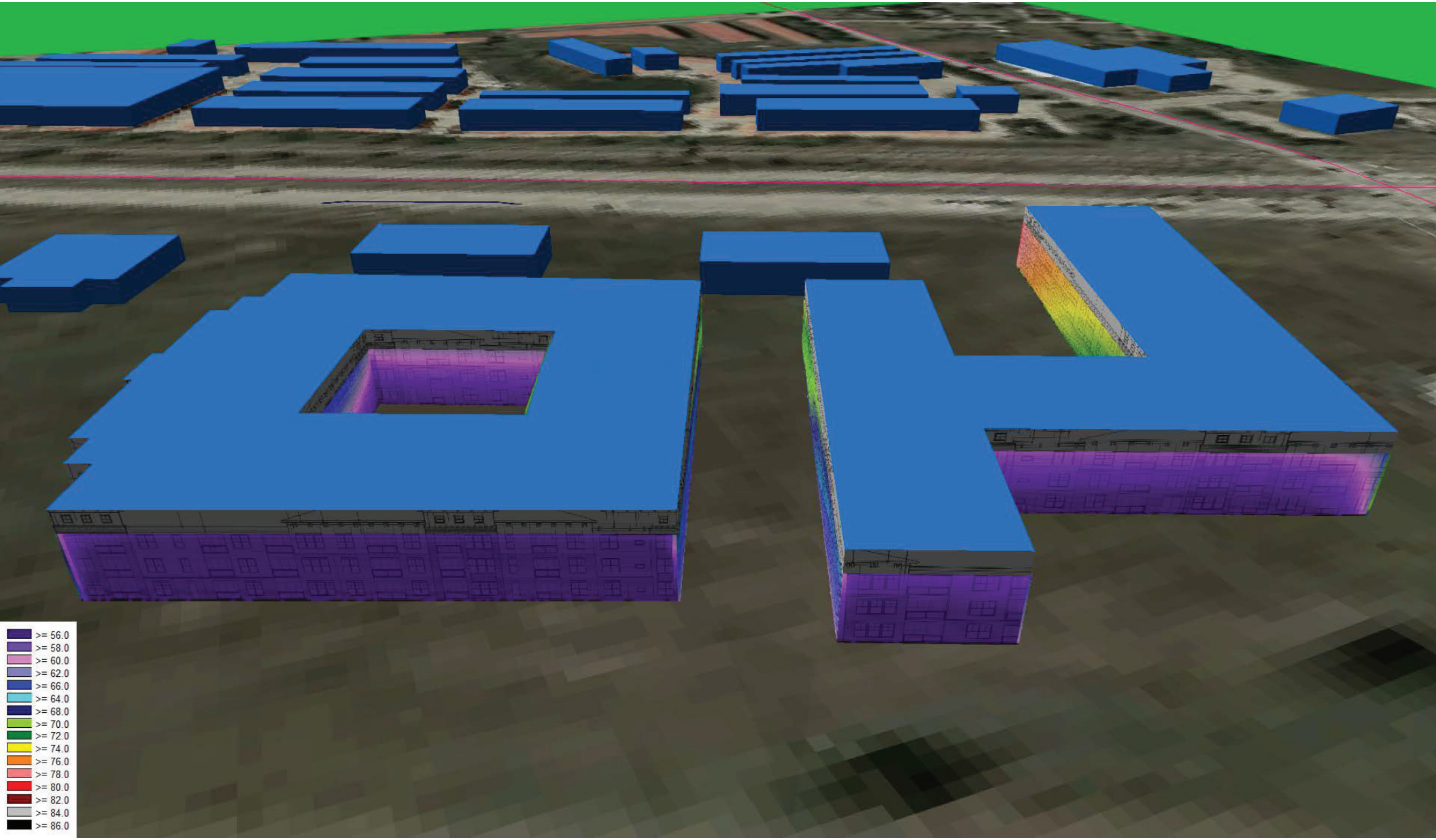
Greystar - Elan Keller

Figure 7: Computer Generated Noise Map - Plan East Façade Buildings 3 and 4 - Train Pass-by Event



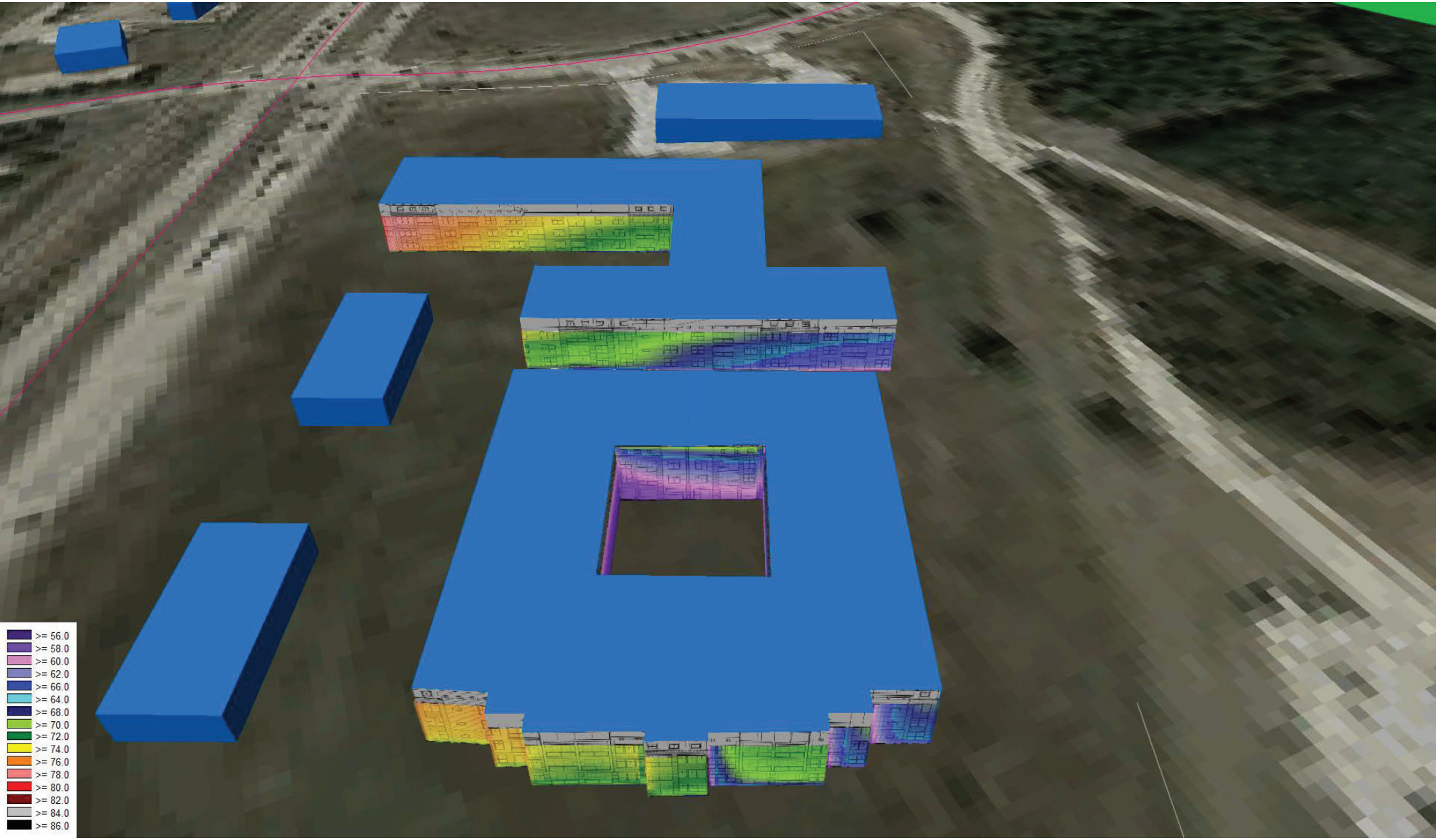
Greystar - Elan Keller

Figure 8: Computer Generated Noise Map - Plan South Façade Buildings 3 and 4 - Train Pass-by Event



Greystar - Elan Keller

Figure 9: Computer Generated Noise Map - Plan West Façade Buildings 3 and 4 - Train Pass-by Event



Greystar - Elan Keller

Figure 10: Recommended Window Glazing Locations Building #1

Legend

Standard Window STC 28 / OITC 23

Upgraded Window STC 35 / OITC 30

Upgraded Window STC 35 / OITC 32

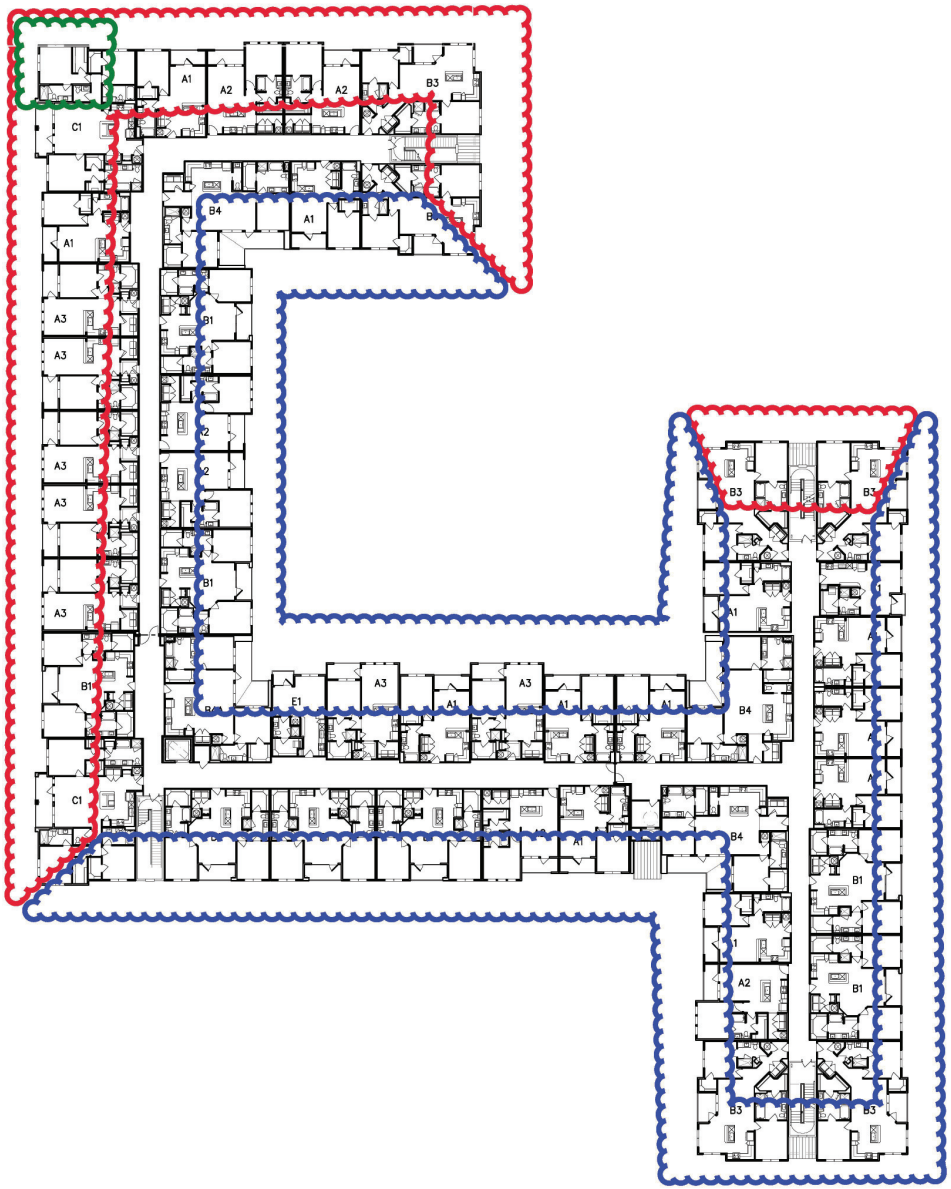


Figure 11: Recommended Window Glazing Locations
Building #2

Legend

Standard Window STC 28 / OITC 23

Upgraded Window STC 35 / OITC 30

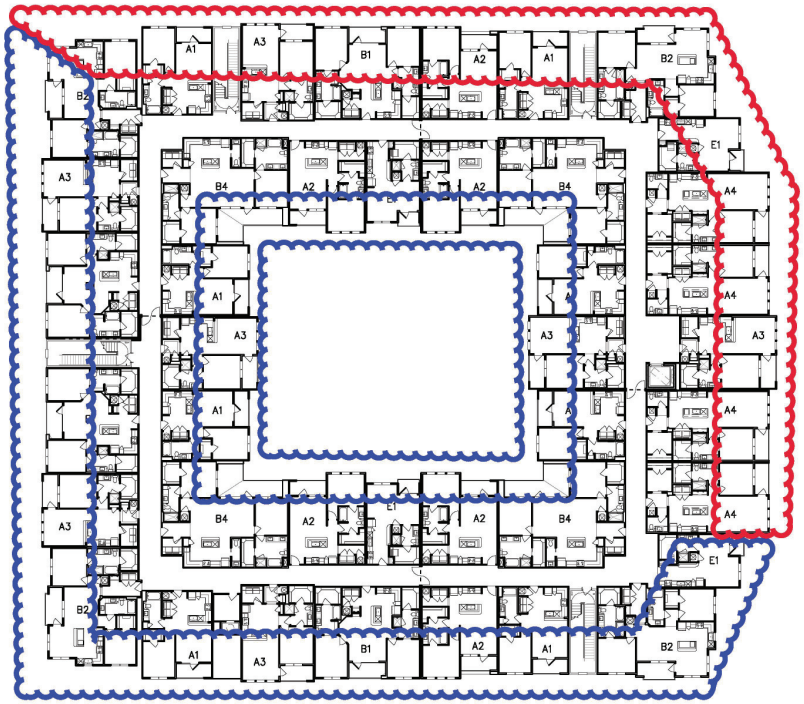


Figure 12: Recommended Window Glazing Locations
Building #3

Legend

Standard Window STC 28 / OITC 23

Upgraded Window STC 35 / OITC 30

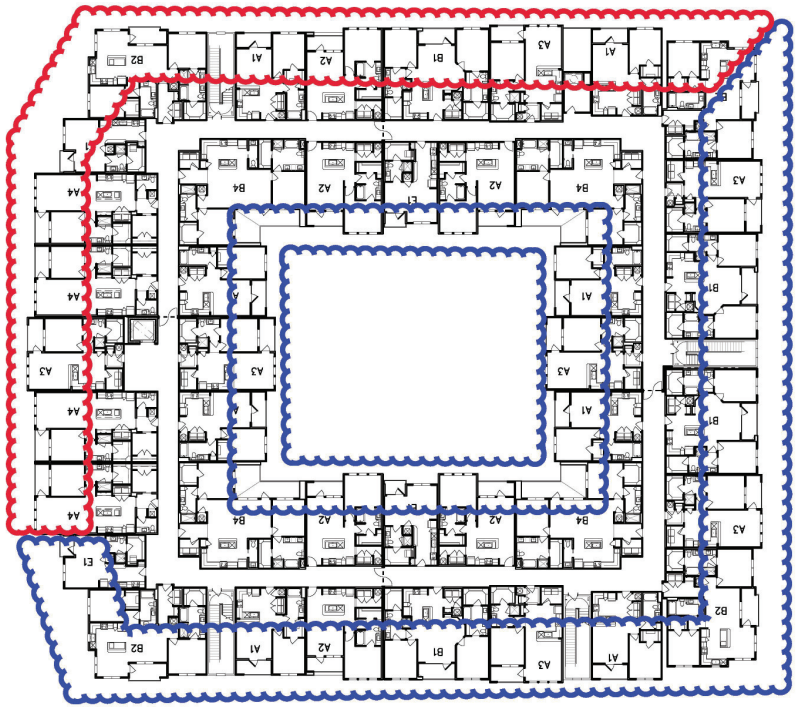
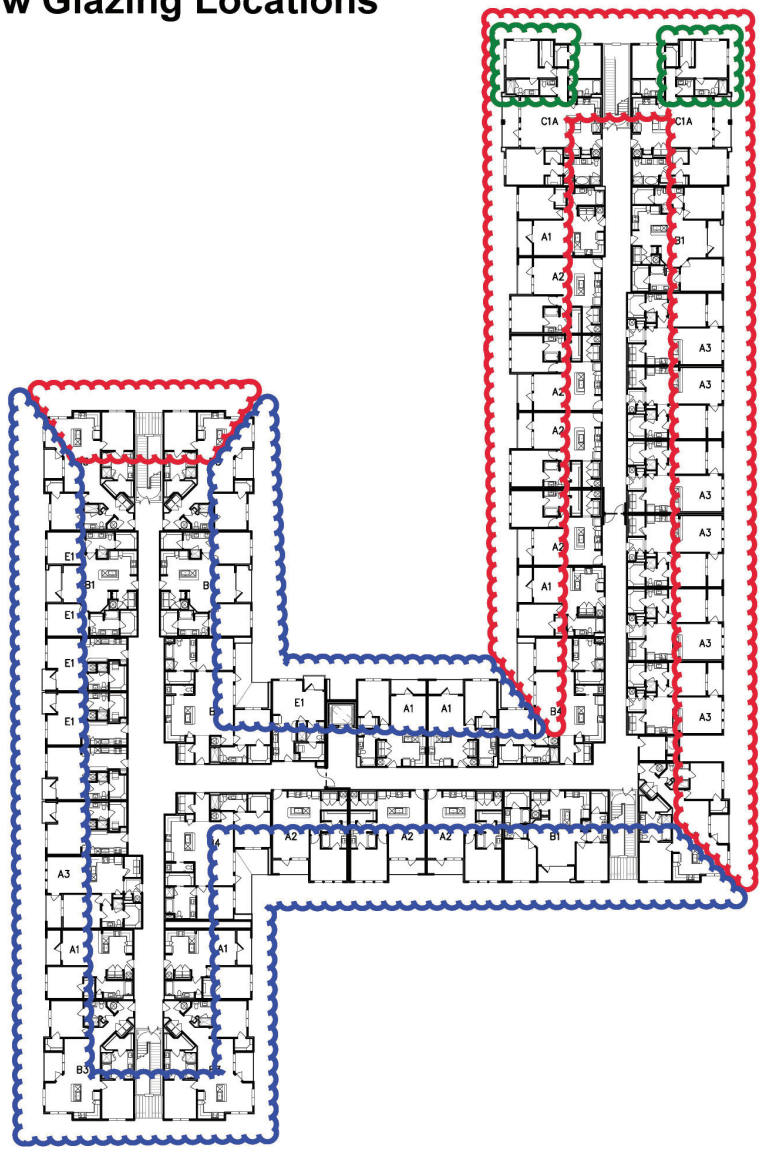


Figure 13: Recommended Window Glazing Locations Building #4

Legend

Standard Window STC 28 / OITC 23
Upgraded Window STC 35 / OITC 30
Upgraded Window STC 35 / OITC 32



U. S. DOT CROSSING INVENTORY FORM

DEPARTMENT OF TRANSPORTATION
FEDERAL RAILROAD ADMINISTRATION

OMB No. 2130-0017

Instructions for the initial reporting of the following types of new or previously unreported crossings: For public highway-rail grade crossings, complete the entire inventory Form. For private highway-rail grade crossings, complete the Header, Parts I and II, and the Submission Information section. For public pathway grade crossings (including pedestrian station grade crossings), complete the Header, Parts I and II, and the Submission Information section. For Private pathway grade crossings, complete the Header, Parts I and II, and the Submission Information section. For grade-separated highway-rail or pathway crossings (including pedestrian station crossings), complete the Header, Part I, and the Submission Information section. For changes to existing data, complete the Header, Part I Items 1-3, and the Submission Information section, in addition to the updated data fields. Note: For private crossings only, Part I Item 20 and Part III Item 2.K. are required unless otherwise noted. An asterisk * denotes an optional field.

A. Revision Date (MM/DD/YYYY)	B. Reporting Agency	C. Reason for Update (Select only one)	D. DOT Crossing Inventory Number
06 / 16 / 2020	☒ Railroad ☐ Transit ☐ State ☐ Other	☐ Change in Data ☐ New Crossing ☐ Closed ☐ No Train Traffic ☐ Quiet Zone Update ☐ Re-Open ☒ Date Change Only ☐ Change in Primary Operating RR ☐ Admin. Correction	795349T

Part I: Location and Classification Information

1. Primary Operating Railroad	2. State	3. County
Union Pacific Railroad Company [UP]	TEXAS	TARRANT

4. City / Municipality	5. Street/Road Name & Block Number	6. Highway Type & No.
☐ In ☒ Near FORT WORTH	Keller Haslet Road (Street/Road Name) | * (Block Number)	CR 4042

7. Do Other Railroads Operate a Separate Track at Crossing?	8. Do Other Railroads Operate Over Your Track at Crossing?
☐ Yes ☒ No If Yes, Specify RR	☒ Yes ☐ No If Yes, Specify RR: BNSF

9. Railroad Division or Region	10. Railroad Subdivision or District	11. Branch or Line Name	12. RR Milepost
☐ None Texoma	☐ None Choctaw Sub	☒ None	(prefix) | 0738.100 (nnnn.nnn) | (suffix)

13. Line Segment *	14. Nearest RR Timetable Station *	15. Parent RR (if applicable)	16. Crossing Owner (if applicable)
		☒ N/A	☐ N/A UP

17. Crossing Type	18. Crossing Purpose	19. Crossing Position	20. Public Access (if Private Crossing)	21. Type of Train	22. Average Passenger Train Count Per Day
☒ Public ☐ Private	☒ Highway ☐ Pathway, Ped. ☐ Station, Ped.	☒ At Grade ☐ RR Under ☐ RR Over	☐ Yes ☐ No	☒ Freight ☐ Intercity Passenger ☐ Commuter ☐ Transit ☐ Shared Use Transit ☐ Tourist/Other	☐ Less Than One Per Day ☐ Number Per Day 0

23. Type of Land Use
☒ Open Space ☐ Farm ☐ Residential ☐ Commercial ☐ Industrial ☐ Institutional ☐ Recreational ☐ RR Yard

24. Is there an Adjacent Crossing with a Separate Number?	25. Quiet Zone (FRA provided)
☐ Yes ☒ No If Yes, Provide Crossing Number	☐ No ☒ 24 Hr ☐ Partial ☐ Chicago Excused Date Established 5/21/2015 12:00:0

26. HSR Corridor ID	27. Latitude in decimal degrees	28. Longitude in decimal degrees	29. Lat/Long Source
☒ N/A	(WGS84 std: nn.nnnnnnn) 32.9635003	(WGS84 std: -nnn.nnnnnnn) -97.2506514	☒ Actual ☐ Estimated

30.A. Railroad Use *	31.A. State Use *
30.B. Railroad Use *	31.B. State Use *
30.C. Railroad Use *	31.C. State Use * State Phone# updated - date updated: 2018-08-16
30.D. Railroad Use *	31.D. State Use *
32.A. Narrative (Railroad Use) *	32.B. Narrative (State Use) *

33. Emergency Notification Telephone No. (posted)	34. Railroad Contact (Telephone No.)	35. State Contact (Telephone No.)
800-848-8715	402-544-3721	512-416-2635

Part II: Railroad Information

1. Estimated Number of Daily Train Movements

1.A. Total Day Thru Trains (6 AM to 6 PM)	1.B. Total Night Thru Trains (6 PM to 6 AM)	1.C. Total Switching Trains	1.D. Total Transit Trains	1.E. Check if Less Than One Movement Per Day ☐ How many trains per week?
10	10	0	0	

2. Year of Train Count Data (YYYY)	3. Speed of Train at Crossing
2016	3.A. Maximum Timetable Speed (mph) 60 3.B. Typical Speed Range Over Crossing (mph) From 30 to 60

4. Type and Count of Tracks
Main 1 Siding 0 Yard 0 Transit 0 Industry 0

5. Train Detection (Main Track only)
☒ Constant Warning Time ☐ Motion Detection ☐AFO ☐ PTC ☐ DC ☐ Other ☐ None

6. Is Track Signaled?	7.A. Event Recorder	7.B. Remote Health Monitoring
☒ Yes ☐ No	☐ Yes ☒ No	☐ Yes ☒ No

U. S. DOT CROSSING INVENTORY FORM

A. Revision Date *(MM/DD/YYYY)*	PAGE 2	D. Crossing Inventory Number *(7 char.)*
06/16/2020		795349T

Part III: Highway or Pathway Traffic Control Device Information

1. Are there Signs or Signals? ☒ Yes ☐ No

2. Types of Passive Traffic Control Devices associated with the Crossing

2.A. Crossbuck Assemblies *(count)*	2.B. STOP Signs *(R1-1) (count)*	2.C. YIELD Signs *(R1-2) (count)*	2.D. Advance Warning Signs *(Check all that apply; include count)* ☐ None
0	0	0	☒ W10-1 2 ☐ W10-3 ☐ W10-11 ☒ W10-2 2 ☐ W10-4 ☐ W10-12

2.E. Low Ground Clearance Sign *(W10-5)*	2.F. Pavement Markings	2.G. Channelization Devices/Medians	2.H. EXEMPT Sign *(R15-3)*	2.I. ENS Sign *(I-13)* Displayed
☐ Yes *(count 0)* ☒ No	☒ Stop Lines ☐ Dynamic Envelope ☒ RR Xing Symbols ☐ None	☒ All Approaches ☒ Median ☐ One Approach ☐ None	☐ Yes ☒ No	☒ Yes ☐ No

2.J. Other MUTCD Signs ☒ Yes ☐ No	2.K. Private Crossing Signs *(if private)*	2.L. LED Enhanced Signs *(List types)*
Specify Type R8-8 Count 1 Specify Type W10-9P Count 4 Specify Type ____ Count ____	☐ Yes ☐ No	

3. Types of Train Activated Warning Devices at the Grade Crossing *(specify count of each device for all that apply)*

3.A. Gate Arms *(count)*	3.B. Gate Configuration	3.C. Cantilevered *(or Bridged)* Flashing Light Structures *(count)*	3.D. Mast Mounted Flashing Lights *(count of masts)* 2	3.E. Total Count of Flashing Light Pairs
Roadway 2 Pedestrian 0	☒ 2 Quad ☐ Full *(Barrier)* Resistance ☐ 3 Quad ☐ 4 Quad ☐ Median Gates	Over Traffic Lane 0 ☐ Incandescent Not Over Traffic Lane 0 ☐ LED	☐ Incandescent ☒ LED ☒ Back Lights Included ☒ Side Lights Included	5

3.F. Installation Date of Current Active Warning Devices: *(MM/YYYY)*	3.G. Wayside Horn	3.H. Highway Traffic Signals Controlling Crossing	3.I. Bells *(count)*
____/____ ☒ Not Required	☐ Yes Installed on *(MM/YYYY)* ____/____ ☒ No	☐ Yes ☒ No	2

3.J. Non-Train Active Warning	3.K. Other Flashing Lights or Warning Devices
☐ Flagging/Flagman ☐ Manually Operated Signals ☐ Watchman ☐ Floodlighting ☐ None	Count 0 Specify type ____

4.A. Does nearby Hwy Intersection have Traffic Signals?	4.B. Hwy Traffic Signal Interconnection	4.C. Hwy Traffic Signal Preemption	5. Highway Traffic Pre-Signals	6. Highway Monitoring Devices *(Check all that apply)*
☐ Yes ☐ No	☐ Not Interconnected ☐ For Traffic Signals ☐ For Warning Signs	☐ Simultaneous ☐ Advance	☐ Yes ☒ No Storage Distance * ____ Stop Line Distance * ____	☐ Yes - Photo/Video Recording ☐ Yes – Vehicle Presence Detection ☐ None

Part IV: Physical Characteristics

1. Traffic Lanes Crossing Railroad	2. Is Roadway/Pathway Paved?	3. Does Track Run Down a Street?	4. Is Crossing Illuminated? *(Street lights within approx. 50 feet from nearest rail)*
☐ One-way Traffic ☒ Two-way Traffic ☐ Divided Traffic Number of Lanes 2	☒ Yes ☐ No	☐ Yes ☒ No	☐ Yes ☒ No

5. Crossing Surface *(on Main Track, multiple types allowed)* Installation Date * *(MM/YYYY)* ____/____ Width * ____ Length * 32

☐ 1 Timber ☐ 2 Asphalt ☐ 3 Asphalt and Timber ☒ 4 Concrete ☐ 5 Concrete and Rubber ☐ 6 Rubber ☐ 7 Metal
☐ 8 Unconsolidated ☐ 9 Composite ☐ 10 Other *(specify)* ____

6. Intersecting Roadway within 500 feet?	7. Smallest Crossing Angle	8. Is Commercial Power Available? *
☒ Yes ☐ No If Yes, Approximate Distance *(feet)* 70	☐ 0° – 29° ☐ 30° – 59° ☒ 60° - 90°	☒ Yes ☐ No

Part V: Public Highway Information

1. Highway System	2. Functional Classification of Road at Crossing	3. Is Crossing on State Highway System?	4. Highway Speed Limit
☐ (01) Interstate Highway System ☐ (02) Other Nat Hwy System (NHS) ☐ (03) Federal AID, Not NHS ☒ (08) Non-Federal Aid	☐ (0) Rural ☒ (1) Urban ☐ (1) Interstate ☐ (5) Major Collector ☐ (2) Other Freeways and Expressways ☐ (3) Other Principal Arterial ☐ (6) Minor Collector ☐ (4) Minor Arterial ☒ (7) Local	☐ Yes ☒ No	30 MPH ☐ Posted ☒ Statutory

5. Linear Referencing System *(LRS Route ID)* *

6. LRS Milepost *

7. Annual Average Daily Traffic *(AADT)*	8. Estimated Percent Trucks	9. Regularly Used by School Buses?	10. Emergency Services Route
Year 2016 AADT 7865	03 %	☐ Yes ☒ No Average Number per Day 0	☒ Yes ☐ No

Submission Information - *This information is used for administrative purposes and is not available on the public website.*

Submitted by ____ Organization ____ Phone ____ Date ____

U. S. DOT CROSSING INVENTORY FORM

DEPARTMENT OF TRANSPORTATION
FEDERAL RAILROAD ADMINISTRATION

OMB No. 2130-0017

Instructions for the initial reporting of the following types of new or previously unreported crossings: For public highway-rail grade crossings, complete the entire inventory Form. For private highway-rail grade crossings, complete the Header, Parts I and II, and the Submission Information section. For public pathway grade crossings (including pedestrian station grade crossings), complete the Header, Parts I and II, and the Submission Information section. For Private pathway grade crossings, complete the Header, Parts I and II, and the Submission Information section. For grade-separated highway-rail or pathway crossings (including pedestrian station crossings), complete the Header, Part I, and the Submission Information section. For changes to existing data, complete the Header, Part I Items 1-3, and the Submission Information section, in addition to the updated data fields. Note: For private crossings only, Part I Item 20 and Part III Item 2.K. are required unless otherwise noted. An asterisk * denotes an optional field.

A. Revision Date *(MM/DD/YYYY)*	B. Reporting Agency	C. Reason for Update *(Select only one)*	D. DOT Crossing Inventory Number
04 / 22 / 2020	☒ Railroad ☐ Transit ☐ State ☐ Other	☒ Change in Data ☐ New Crossing ☐ Closed ☐ No Train Traffic ☐ Quiet Zone Update ☐ Re-Open ☐ Date Change Only ☐ Change in Primary Operating RR ☐ Admin. Correction	795350M

Part I: Location and Classification Information

1. Primary Operating Railroad	2. State	3. County
Union Pacific Railroad Company [UP]	TEXAS	TARRANT

4. City / Municipality	5. Street/Road Name & Block Number	6. Highway Type & No.
☐ In ☒ Near FORT WORTH	TIMBERLAND BOULEVARD *(Street/Road Name)* | * *(Block Number)*	ST 0000

7. Do Other Railroads Operate a Separate Track at Crossing?	8. Do Other Railroads Operate Over Your Track at Crossing?
☐ Yes ☒ No If Yes, Specify RR	☒ Yes ☐ No If Yes, Specify RR BNSF

9. Railroad Division or Region	10. Railroad Subdivision or District	11. Branch or Line Name	12. RR Milepost
☐ None TEXOMA	☐ None Choctaw Sub	☒ None	*(prefix)* | 0738.630 | *(suffix)* *(nnnn.nnn)*

13. Line Segment *	14. Nearest RR Timetable Station *	15. Parent RR *(if applicable)*	16. Crossing Owner *(if applicable)*
		☒ N/A	☐ N/A UP

17. Crossing Type	18. Crossing Purpose	19. Crossing Position	20. Public Access *(if Private Crossing)*	21. Type of Train	22. Average Passenger Train Count Per Day
☒ Public ☐ Private	☒ Highway ☐ Pathway, Ped. ☐ Station, Ped.	☒ At Grade ☐ RR Under ☐ RR Over	☐ Yes ☐ No	☒ Freight ☐ Intercity Passenger ☐ Commuter ☐ Transit ☐ Shared Use Transit ☐ Tourist/Other	☐ Less Than One Per Day ☐ Number Per Day 0

23. Type of Land Use
☐ Open Space ☐ Farm ☒ Residential ☐ Commercial ☐ Industrial ☐ Institutional ☐ Recreational ☐ RR Yard

24. Is there an Adjacent Crossing with a Separate Number?	25. Quiet Zone *(FRA provided)*
☐ Yes ☒ No If Yes, Provide Crossing Number	☒ No ☐ 24 Hr ☐ Partial ☐ Chicago Excused Date Established

26. HSR Corridor ID	27. Latitude in decimal degrees	28. Longitude in decimal degrees	29. Lat/Long Source
☒ N/A	*(WGS84 std: nn.nnnnnnn)* 32.9565300	*(WGS84 std: -nnn.nnnnnnn)* -97.2545180	☒ Actual ☐ Estimated

30.A. Railroad Use *	31.A. State Use *
30.B. Railroad Use *	31.B. State Use *
30.C. Railroad Use *	31.C. State Use * State Phone# updated - date updated: 2018-08-16
30.D. Railroad Use *	31.D. State Use *
32.A. Narrative *(Railroad Use)* *	32.B. Narrative *(State Use)* *

33. Emergency Notification Telephone No. *(posted)*	34. Railroad Contact *(Telephone No.)*	35. State Contact *(Telephone No.)*
800-848-8715	402-544-3721	512-416-2635

Part II: Railroad Information

1. Estimated Number of Daily Train Movements

1.A. Total Day Thru Trains *(6 AM to 6 PM)*	1.B. Total Night Thru Trains *(6 PM to 6 AM)*	1.C. Total Switching Trains	1.D. Total Transit Trains	1.E. Check if Less Than One Movement Per Day ☐ How many trains per week?
12	12	0	0	

2. Year of Train Count Data *(YYYY)*	3. Speed of Train at Crossing
2016	3.A. Maximum Timetable Speed *(mph)* 50 3.B. Typical Speed Range Over Crossing *(mph)* From 25 to 50

4. Type and Count of Tracks
Main 1 Siding 0 Yard 0 Transit 0 Industry 0

5. Train Detection *(Main Track only)*
☒ Constant Warning Time ☐ Motion Detection ☐AFO ☐ PTC ☐ DC ☐ Other ☐ None

6. Is Track Signaled?	7.A. Event Recorder	7.B. Remote Health Monitoring
☒ Yes ☐ No	☐ Yes ☒ No	☐ Yes ☒ No

U. S. DOT CROSSING INVENTORY FORM

A. Revision Date *(MM/DD/YYYY)*	PAGE 2	D. Crossing Inventory Number *(7 char.)*
04/22/2020		795350M

Part III: Highway or Pathway Traffic Control Device Information

1. Are there Signs or Signals? ☒ Yes ☐ No

2. Types of Passive Traffic Control Devices associated with the Crossing

2.A. Crossbuck Assemblies *(count)*	2.B. STOP Signs *(R1-1) (count)*	2.C. YIELD Signs *(R1-2) (count)*	2.D. Advance Warning Signs *(Check all that apply; include count)* ☐ None
0	0		☒ W10-1 2 ☐ W10-3 1 ☐ W10-11 ☐ W10-2 ☐ W10-4 ☐ W10-12

2.E. Low Ground Clearance Sign *(W10-5)*	2.F. Pavement Markings	2.G. Channelization Devices/Medians	2.H. EXEMPT Sign *(R15-3)*	2.I. ENS Sign *(I-13)* Displayed
☐ Yes *(count* 0 *)* ☒ No	☒ Stop Lines ☐ Dynamic Envelope ☒ RR Xing Symbols ☐ None	☒ All Approaches ☒ Median ☐ One Approach ☐ None	☐ Yes ☒ No	☒ Yes ☐ No

2.J. Other MUTCD Signs ☒ Yes ☐ No	2.K. Private Crossing Signs *(if private)*	2.L. LED Enhanced Signs *(List types)*
Specify Type R8-8 Count 4 Specify Type W10-9P Count 2 Specify Type W10-11b Count 2	☐ Yes ☐ No	

3. Types of Train Activated Warning Devices at the Grade Crossing *(specify count of each device for all that apply)*

3.A. Gate Arms *(count)*	3.B. Gate Configuration	3.C. Cantilevered *(or Bridged)* Flashing Light Structures *(count)*	3.D. Mast Mounted Flashing Lights *(count of masts)* 4	3.E. Total Count of Flashing Light Pairs
Roadway 4 Pedestrian 0	☒ 2 Quad ☐ Full *(Barrier)* Resistance ☐ 3 Quad ☐ 4 Quad ☐ Median Gates	Over Traffic Lane 1 ☐ Incandescent Not Over Traffic Lane 0 ☒ LED	☐ Incandescent ☒ LED ☒ Back Lights Included ☐ Side Lights Included	10

3.F. Installation Date of Current Active Warning Devices: *(MM/YYYY)*	3.G. Wayside Horn	3.H. Highway Traffic Signals Controlling Crossing	3.I. Bells *(count)*
_____/_____ ☒ Not Required	☐ Yes Installed on *(MM/YYYY)* _____/_____ ☒ No	☐ Yes ☒ No	2

3.J. Non-Train Active Warning	3.K. Other Flashing Lights or Warning Devices
☐ Flagging/Flagman ☐ Manually Operated Signals ☐ Watchman ☐ Floodlighting ☐ None	Count 0 Specify type _____

4.A. Does nearby Hwy Intersection have Traffic Signals?	4.B. Hwy Traffic Signal Interconnection	4.C. Hwy Traffic Signal Preemption	5. Highway Traffic Pre-Signals	6. Highway Monitoring Devices *(Check all that apply)*
☒ Yes ☐ No	☐ Not Interconnected ☒ For Traffic Signals ☐ For Warning Signs	☐ Simultaneous ☒ Advance	☐ Yes ☒ No Storage Distance * _____ Stop Line Distance * _____	☐ Yes - Photo/Video Recording ☐ Yes – Vehicle Presence Detection ☐ None

Part IV: Physical Characteristics

1. Traffic Lanes Crossing Railroad	2. Is Roadway/Pathway Paved?	3. Does Track Run Down a Street?	4. Is Crossing Illuminated? *(Street lights within approx. 50 feet from nearest rail)*
☐ One-way Traffic ☒ Two-way Traffic ☐ Divided Traffic Number of Lanes 6	☒ Yes ☐ No	☐ Yes ☒ No	☐ Yes ☒ No

5. Crossing Surface *(on Main Track, multiple types allowed)* Installation Date * *(MM/YYYY)* _____/_____ Width * _____ Length * 112

☐ 1 Timber ☐ 2 Asphalt ☐ 3 Asphalt and Timber ☒ 4 Concrete ☐ 5 Concrete and Rubber ☐ 6 Rubber ☐ 7 Metal
☐ 8 Unconsolidated ☐ 9 Composite ☐ 10 Other *(specify)* _____

6. Intersecting Roadway within 500 feet?	7. Smallest Crossing Angle	8. Is Commercial Power Available? *
☒ Yes ☐ No If Yes, Approximate Distance *(feet)* 75	☐ 0° – 29° ☐ 30° – 59° ☒ 60° - 90°	☒ Yes ☐ No

Part V: Public Highway Information

1. Highway System	2. Functional Classification of Road at Crossing	3. Is Crossing on State Highway System?	4. Highway Speed Limit
☐ (01) Interstate Highway System ☐ (02) Other Nat Hwy System (NHS) ☐ (03) Federal AID, Not NHS ☒ (08) Non-Federal Aid	☐ (0) Rural ☒ (1) Urban ☐ (1) Interstate ☒ (5) Major Collector ☐ (2) Other Freeways and Expressways ☐ (3) Other Principal Arterial ☐ (6) Minor Collector ☐ (4) Minor Arterial ☐ (7) Local	☐ Yes ☒ No	_____ MPH ☐ Posted ☐ Statutory

5. Linear Referencing System *(LRS Route ID)* *

6. LRS Milepost *

7. Annual Average Daily Traffic *(AADT)*	8. Estimated Percent Trucks	9. Regularly Used by School Buses?	10. Emergency Services Route
Year 2009 AADT 2620	03 %	☐ Yes ☒ No Average Number per Day 0	☐ Yes ☐ No

Submission Information - *This information is used for administrative purposes and is not available on the public website.*

Submitted by _____ Organization _____ Phone _____ Date _____

Jerald Ducay

From:	Leslie Sagar
Sent:	Monday, November 16, 2020 4:02 PM
To:	Jerald Ducay
Cc:	Gary Ponder
Subject:	Re: CenterStage - Realty Capital

JP,

I have reviewed the DRAFT Environmental Noise Survey Technical Memorandum prepared by SLR International Corporation dated September 15, 2020 for Elan Keller, (which I assume is a new name for the CenterStage - Realty Capital project) and have the following comments:

1. The DRAFT Technical Memorandum does not use the Federal Railroad Administration (FRA) noise model for assessing the noise and vibration impacts of the Union Pacific freight line adjacent to the project site.

2. The FRA model requires the input of the existing and future number of daily freight train operations, the number of existing and future locomotive engines pulling/pushing the trains, and the number of night time operations, whether a train horn is used at the at-grade intersections, and the type of horn. This information needs to be obtained from Union Pacific and provided in the Technical Memorandum.

3. At a minimum, the FRA Horn Noise MS Excel spreadsheet model needs to be used using the information in Comment 2 above to assess the noise impacts at the two nearby at-grade crossings of Hwy 377 at Mt. Gilead Rd., and Hwy 377 and Keller-Haslet Rd. The output of this model provides the 65DNL contour distance from the rail line, and this 65DNL contour needs to be overlaid onto a project site plan in relation to the proposed buildings and other project features.

4. Although SLR International Corporation used commercial noise modeling software, this is no substitute for the FRA noise model to assess freight train noise and vibration. Federal noise guidelines are quite clear that noise sensitive receptors such as residential (single and multi-family), churches, schools, daycare, and outdoor amphitheater facilities are incompatible land uses within the 65DNL contour.

5. Mitigation measures can be accomplished for noise levels between the 65DNL and 75DNL contours; however, it is important to know where these contours are in relation to the project site. The site plan may need to be modified so that incompatible land uses do not occur within the 65 DNL contour. Noise level reduction measures to reduce interior sound levels to a maximum 45db are appropriate, but the measures proposed in the Technical Memorandum do not mitigate the exterior noise levels of the proposed sidewalk cafes, outdoor music venue and other outdoor public areas that were presented by the applicant as part of the development.

Thank you for the opportunity to provide comment on the DRAFT Environmental Noise Survey.

Leslie V. Sagar | Planning and Zoning Commissioner
City of Keller, Texas
Website: www.cityofkeller.com

November 18, 2020

To: JR Thulin
Senior Director, Development
Greystar
600 East Las Colinas Blvd. Suite 2100
Irvine, TX 75039

O 214.451.5698 ext. 1280
C 714.856.7104
jthulin@greystar.com

Re: Response to Email from Leslie Sagar re: FRA Noise Model
Greystar - Elan Keller Project
Keller, Texas

RESPONSE REGARDING FRA NOISE MODEL

The Federal Railroad Administration (FRA) noise model is a predictive model that provides a DNL noise contour which is used to assess land use compatibility. SLR's analysis used 48-hours of site-specific empirical data to characterize the environmental sound levels at the site, including rail noise. As such, it is unnecessary to use the FRA model to theoretically predict the rail noise levels at these locations since we have measurements of the actual levels. Predictive modeling would be appropriate if there was reason to believe that rail traffic may increase in the future, but that is not the case with this project. And, although freight traffic may vary somewhat from day to day, the data we collected were very consistent with the FRA data for these crossings which indicate an average of 20 to 24 trains per 24 hour period. Therefore, using a predictive model such as the FRA model will not improve on the quality of data that we have already obtained and incorporated into our analysis and recommended noise mitigation treatments for the project.

Sincerely,
SLR INTERNATIONAL CORPORATION

Omar C. Longoria, P.E.
Principal

OCL/ocl SLR Acoustics ltr - Greystar Elan Keller - FRA response - 11-18-2020.docx