PROJECT CONNECT RAIL SPUR

Noise Analysis Report

May 16, 2023 | Terracon Project No. JN237170

Prepared for:

Thomas & Hutton

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May 16, 2022

Thomas & Hutton
1501 Main Street, Suite 760
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Attn: Corey Wise, PE, Project Manager
P: (803) 451-6783
E: wise.c&tandh.com

Re: Noise Analysis Report
Project Connect
Scout Motors EV Rail Spur/Yard
Blythewood, South Carolina
Terracon Project No. JN237170

Dear Mr. Wise:

We have completed the scope of Noise Analysis services for the above referenced project in general accordance with Terracon Proposal No. PJN237170. This report presents the findings of the noise analysis prepared using the conceptual site plans for Project Connect rail spur.

We appreciate the opportunity to be of service to you on this project. If you have any questions concerning this report or if we may be of further service, please contact us.

Sincerely,

Skelly and Loy/Terracon

Bill Kaufell
Acoustics Group Leader

Kevin Sohrabnia, P.E.
Senior Principal / Office Manager

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Report Summary

Topic	Overview Statement
Project Description	The development of the Scout Motors EV project development in Blythwood, S.C. involves the construction of a rail spur for shipping and receiving for the manufacturing operation. The site is currently undeveloped and adjacent to residential areas. The analysis includes baseline ambient sound level measurements and future conditions sound modeling at the above referenced site to address the facilities noise emissions for comparison to the FRA noise impact criteria.
Ambient Site Conditions	Existing sound levels in the project area are primarily influenced by environmental background related sources (birds, insects, residential activities) and vary depending on the time of day and activity. Air traffic is intermittent during the day as is local roadway sound depending on the distance from the traffic. Daily sound levels ranged from 42-46 dBA (Leq(24hr)).
Operational Noise	Sound modeling was used to assess the operational noise for comparison with the measured ambient site conditions, using FRA impact methodology. Sound level contributions associated solely with the project site activities ranged from 37 to 47 dBA, generally equivalent or less than the ambient measured conditions for the majority of the receptors. The results of the modeling indicate the rail operational sound emitted on the site dissipates with distance, topography and ground cover. Offsite noise at the sensitive receptor locations would be minimal and the project is not anticipated to have a significant impact on surrounding community sound levels or sensitive receptors based on FRA methodology and impact thresholds. While the project is not anticipated to have a significant impact on surrounding community sound levels, a 5' berm was included in the design to further reduce line of sight and offsite sound levels.

Introduction

This report presents the results of our Noise Analysis services performed for the proposed manufacturing facility located in Blythewood, South Carolina. The purpose of these services was to provide an estimate of the background and operational noise conditions related to the rail facilities proposed within the development, including:

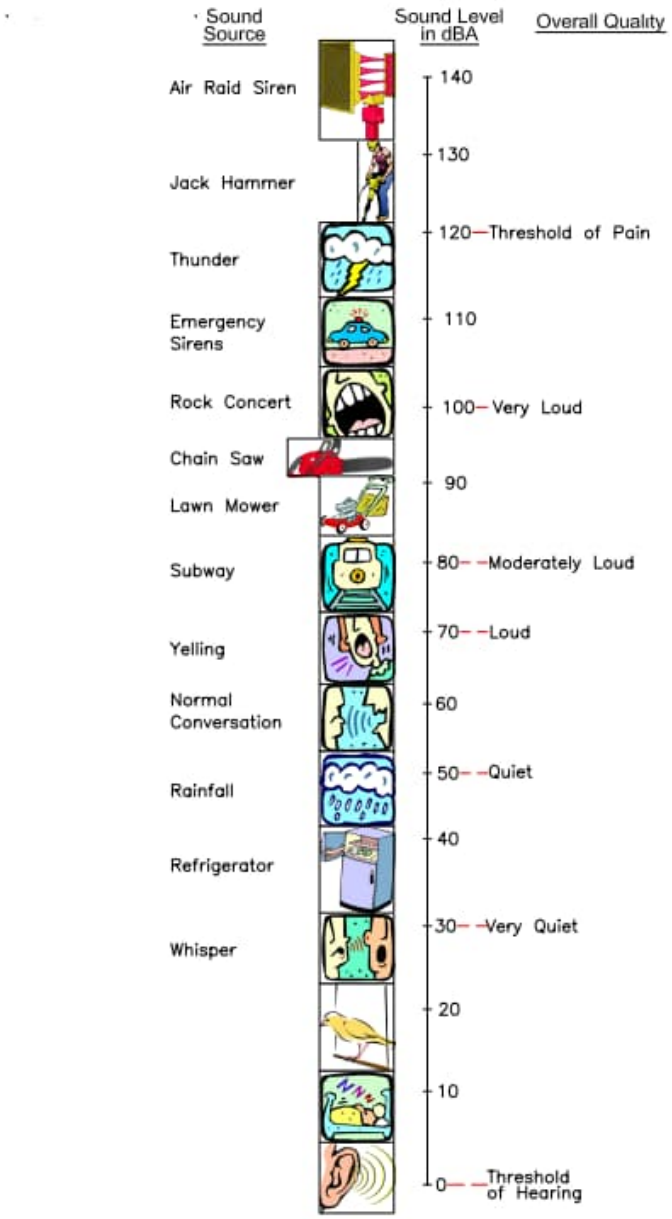
- Ambient background sound measurements
- Operational Noise Estimate

Project Description

Item	Description
Plans Provided	Illustrative Cross Section Exhibit PDF (April 2023) Thomas and Hutton. Project Connect – Facility Layout Model (April 19, 2023), Thomas and Hutton.
Project Description	The development of the Scout Motors EV project development in Blythwood, S.C. involves the construction of a rail spur for shipping and receiving for the manufacturing operation. The site is currently undeveloped and adjacent to residential areas. The analysis includes baseline ambient sound level measurements and future conditions sound modeling at the above referenced site to address the facilities noise emissions for comparison to the FRA noise impact criteria.

Fundamentals of Noise

Noise is defined as “unwanted sound.” Therefore, it can be considered a psychological phenomenon and not physical. The roar of racecars adds to the excitement of spectators and hence would be considered sound. This same roar may annoy nearby neighbors, thereby becoming noise. Similarly, the roar of a waterfall at 70 dBA may be pleasing to the ear and perceived as sound, while sound produced by traffic or industrial activities at that same intensity could justifiably be considered noise. Factors playing a role in the perception of sound include magnitude, amplitude, duration, frequency, source, and receiver. Nevertheless, researchers have established a fair correlation between the measurement of sound, the A-weighted decibel (dBA), and its associated perceived human response. The graphic below outlines common noise sources with associated sound levels in dBA.



The A-weighted scale refines the sound measurement unit of decibels to match the response of the human ear. It accounts for the fact that sounds of equal amplitude, but different frequencies are not necessarily perceived to be equally loud. While the human ear can detect sounds from about 20 Hz to 20,000 Hz, it is more sensitive to middle and high range frequencies (i.e., 2,000 Hz). To account for this occurrence, the A-weighted scale has been developed to place an emphasis on those frequencies that are more detectable to the human ear. The A-weighted scale, which has been in existence for over 40 years, is generally used in community and city noise ordinances and is expressed in units of dBA (decibels in the A-weighting).

Because sound is actually an energy level, it must be recorded on a logarithmic scale and expressed in logarithmic units called decibels (dB). Given this scale, a doubling of amplitude will result in a three-decibel increase in total level. Typically, a change in sound level between 2 and 3 dBA is barely perceptible, while a change of 5 dBA is readily noticeable by most people. A 10 dBA increase is usually perceived as a doubling of loudness; conversely, noise is perceived to be reduced by one-half when a sound level is reduced by 10 dBA.

Sound is also variable with the passage of time. When sound emission levels change (i.e., volume increased or decreased) or source/receptor relationships change (i.e., vehicle approaches and passes) over time, sound levels sensed at a given point can vary considerably. To account for this occurrence, several noise descriptors have been developed. Due to the fluctuations over time, environmental noise descriptors are generally based on averages, rather than instantaneous sound levels. The equivalent level or Leq is most commonly used in community noise studies. The Leq is the constant, steady-state sound level that, over a given period of time, would have the same acoustic energy as the actual varying level. In a sense, it is the average level, recognizing that the decibel is derived logarithmically. The Leq is reported for a given period of time, usually one hour, expressed Leq(h). In addition, Day-Night average sound level (Ldn) is used on community studies to describe the cumulative noise exposure during an average day. Ldn is often used by the US DOT in rail and air traffic noise studies.

As sound waves propagate from a source to a receiver, the level changes in magnitude and frequency content. Sound propagates outward spherically from a point source and decreases by 6 dB for each doubling of distance. When the propagation path is close to the ground, ground absorption affects the attenuation. Acoustically hard sites (pavement) would have minimal ground absorption while a soft site (grass) would further reduce the sound at a rate 1.5 dB per doubling of distance. Additional sound reductions occur as a result of atmospheric effects and shielding (barrier in path of source/receiver).

Regulatory Setting

The project is located within Richland County, South Carolina and Section 18-3 Noise ordinance was reviewed for applicability to the project. While the noise ordinance specifies noise impact thresholds (55 dBA night/62 dBA day), Section 18.3(b) indicates the ordinance "does not apply to industrial, commercial, or manufacturing noise; noise on construction sites; or noise generated from the lawful operation of farm equipment."

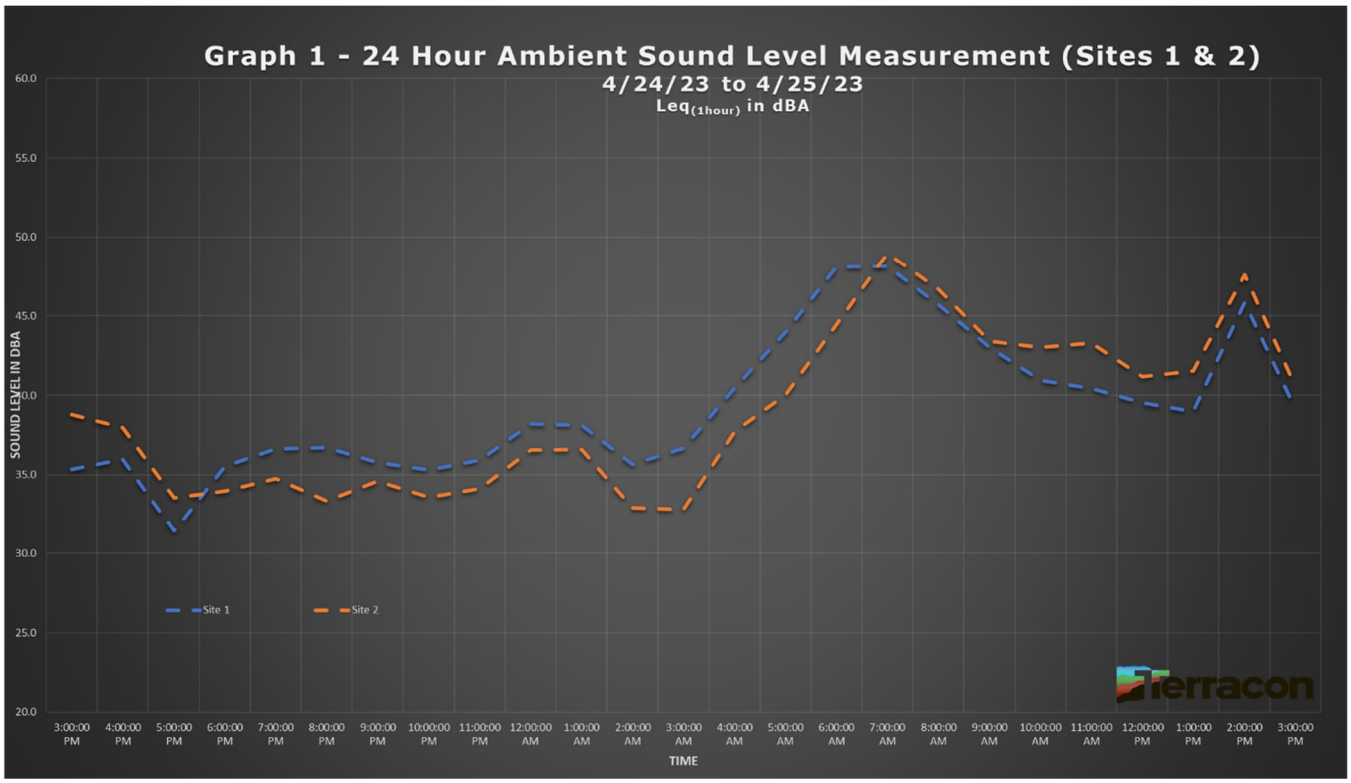
The US Department of Transportation Federal Railroad Administration (FRA) used the Federal Transit Administration (FTA) procedures for the determination of impacts related to rail

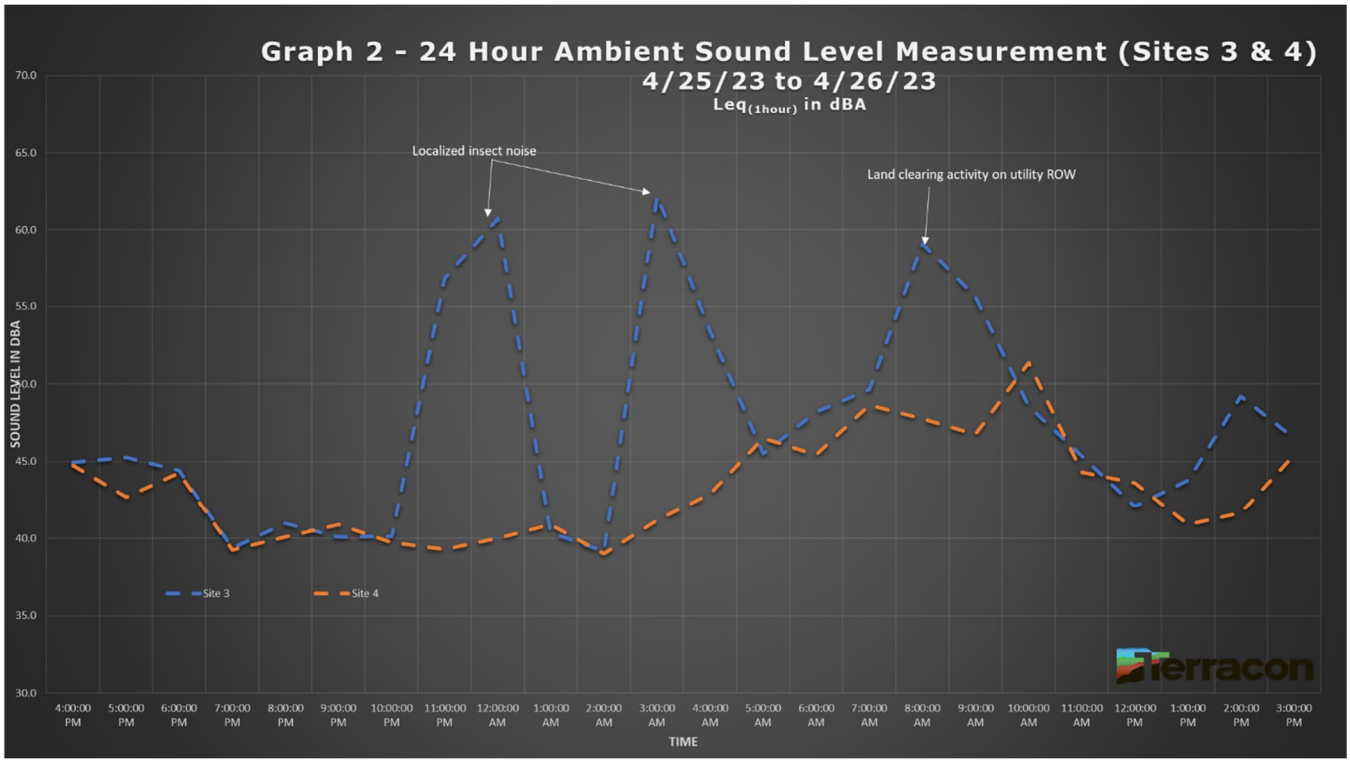
projects. Generally speaking, impacts are determined by comparing the ambient noise conditions to the projects noise exposure. Moderate impacts are defined as an increase in 10-15 dBA over ambient conditions, while severe impacts are identified when there is a 15 dBA increase over ambient conditions. The measured ambient sound levels were used to establish impact thresholds for this project.

Existing Site Conditions

The project is located on an undeveloped parcel of property west of I-77 and south of Blythewood Road in Richland County, South Carolina. Residential land uses are present to the south and west of the property and are comprised of single-family units in the Holly Bluffs and Ashley Oaks Development.

Ambient sound monitoring was completed on the site to document the existing ambient sound levels at several locations. Two (2) Rion NL52 Type 1 Sound Level Analyzers were used to document the background sound levels over a 24-hour duration at four locations on April 24 through April 26, 2023. The locations of the measurements are outlined on the monitoring site index below and a summary of the results are presented in Graph 1 (Sites 1 and 2) and Graph 2 (Sites 3 and 4) below. Additional monitoring data is in the attachment entitled Noise Measurement Data.


Graph 1 - 24 Hour Ambient Sound Level Measurement (Sites 1 & 2)
4/24/23 to 4/25/23
Leq(1hour) in dBA
SOUND LEVEL IN DBA
60.0
55.0
50.0
45.0
40.0
35.0
30.0
25.0
20.0
Site 1
Site 2
3:00:00 PM
4:00:00 PM
5:00:00 PM
6:00:00 PM
7:00:00 PM
8:00:00 PM
9:00:00 PM
10:00:00 PM
11:00:00 PM
12:00:00 AM
1:00:00 AM
2:00:00 AM
3:00:00 AM
4:00:00 AM
5:00:00 AM
6:00:00 AM
7:00:00 AM
8:00:00 AM
9:00:00 AM
10:00:00 AM
11:00:00 AM
12:00:00 PM
1:00:00 PM
2:00:00 PM
3:00:00 PM
TIME


Graph 2 - 24 Hour Ambient Sound Level Measurement (Sites 3 & 4)
4/25/23 to 4/26/23
Leq(1hour) in dBA
Localized insect noise
Land clearing activity on utility ROW
SOUND LEVEL IN DBA
70.0
65.0
60.0
55.0
50.0
45.0
40.0
35.0
30.0
Site 3
Site 4
4:00:00 PM
5:00:00 PM
6:00:00 PM
7:00:00 PM
8:00:00 PM
9:00:00 PM
10:00:00 PM
11:00:00 PM
12:00:00 AM
1:00:00 AM
2:00:00 AM
3:00:00 AM
4:00:00 AM
5:00:00 AM
6:00:00 AM
7:00:00 AM
8:00:00 AM
9:00:00 AM
10:00:00 AM
11:00:00 AM
12:00:00 PM
1:00:00 PM
2:00:00 PM
3:00:00 PM
TIME

Existing sound levels in the project area are primarily influenced by environmental background related sources (birds, insects, residential activities) and vary depending on the time of day and activity. Air traffic is intermittent during the day as is local roadway traffic depending on the distance from the local roads. Increases in sound level in the morning are primarily a result of bird activity and residential activity. In addition to the time history graphs provided, the overall measurement summaries are provided below in tabular format

Measurements completed at Sites 1 and 2 from April 24 to April 25, 2023 (Graph 1) varied from 31 to 49 dBA (1-hour Leq) over the 24-hour duration. Daytime (7am to 10pm) sound levels at Site 1 and 2 averaged 42-43 dBA while nighttime (10pm to 7am) averaged 38-42 dBA. These two locations are relatively remote from background noise sources and hourly sound levels during the evening and nighttime hours were 31-35 dBA from 5pm through 4am.

Measurements completed at Sites 3 and 4 from April 25 to April 26, 2023 (Graph 2) varied from 39 to 62 dBA (1-hour Leq) over the 24-hour duration. There were several intermittent spikes measured at Site 3 due to nighttime insect activity and land clearing activities during the morning of April 26 (removed from 24hour calculations). Daytime (7am to 10pm) sound levels at Sites 3 and 4 averaged 45-46 dBA while nighttime (10pm to 7am) averaged 42-43 dBA.

Measurement Summary

Sound Measurement Site	Day Sound Level Leq in dBA [1]	Night Sound Level Leq in dBA [2]	24 Hour Sound Level Leq in dBA [3]
M1	42	42	42
M2	43	38	42
M3	45	42	46
M4	46	43	45

[1] Day = 6AM to 10 PM
[2] Night = 10 PM to 6 AM
[3] 24 Hour = 12PM to 12 PM

Hourly Measurement Summary

Time	Hourly Sound Level [$L_{eq(1\ hr)}$(dbA)] 4/24/23 to 4/25/23		Hourly Sound Level [$L_{eq(1\ hr)}$(dbA)] 4/25/23 to 4/26/23	
	Site 1	Site 2	Site 3	Site 4
4:00 PM	36	38	45	45
5:00 PM	31	34	45	43
6:00 PM	36	34	44	44
7:00 PM	37	35	39	39
8:00 PM	37	33	41	40
9:00 PM	36	35	40	41
10:00 PM	35	34	40	40
11:00 PM	36	34	57	39
12:00 AM	38	37	61	40
1:00 AM	38	37	40	41
2:00 AM	36	33	39	39
3:00 AM	37	33	62	41
4:00 AM	40	38	53	43
5:00 AM	44	40	46	47
6:00 AM	48	44	48	45
7:00 AM	48	49	50	49
8:00 AM	46	47	59	48
9:00 AM	43	43	56	47
10:00 AM	41	43	49	51
11:00 AM	40	43	45	44
12:00 PM	40	41	42	44
1:00 PM	39	42	44	41
2:00 PM	46	48	49	42
3:00 PM	39	41	47	45
24hour Leq	42	42	46	45
Day-Night Level (Ldn)	48	46	49	50

Operational Noise

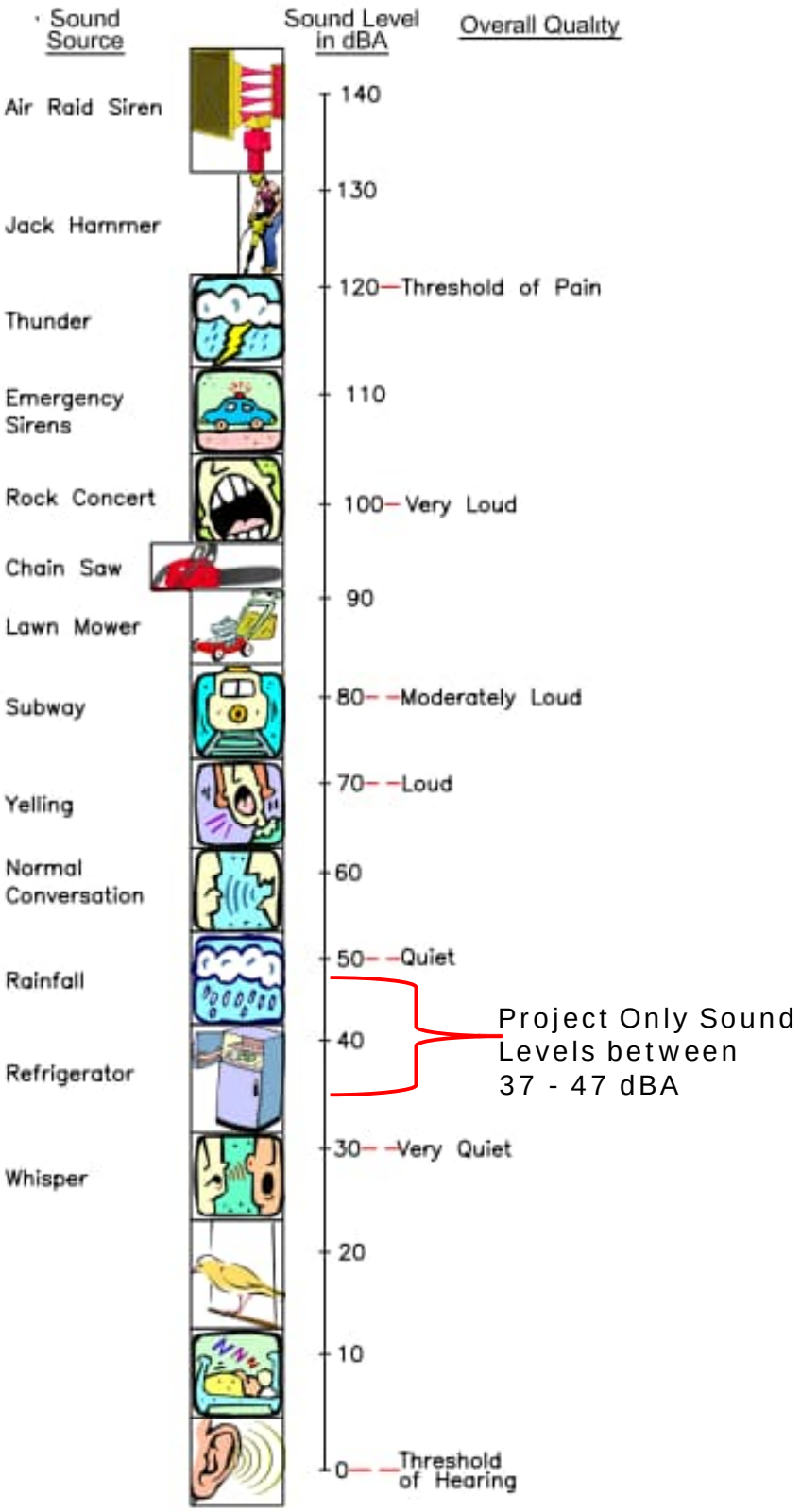
The conceptual development of Project Connect is outlined on Figure 1 with cross sections. The future operating acoustical environment for the proposed conceptual layout was simulated using the SoundPLAN v.5.1 software. SoundPLAN implements International Organization for Standardization (ISO) ISO-9613-2 1996 (Attenuation of sound during propagation outdoors – Part 2: General method of calculation), which is an international standard method for calculating sound during propagation outdoors in order to predict the levels of environmental noise at a distance from a variety of sources. A three-dimensional topographical model was created to assess the sound propagation of the proposed facility. A digital terrain model was created using existing ground elevations and contours obtained from topographic mapping derived from USGS mapping at 1-meter intervals. SoundPLAN uses the FRA train noise emissions for freight and rail car sound predictions. FRA has a regulation governing compliance of noise emissions from interstate railroads. The FRA's Railroad Noise Emission Compliance Regulation (49 CFR Part 210) prescribes compliance requirements for enforcing railroad noise emission standards adopted by EPA (40 CFR Part 201) and sets maximum sound levels from railroad equipment.

The model for Project Connect included all proposed buildings, rail car unloading/loading areas, proposed rail spur and rail yard. Worst case operational assumptions were made based on potential build out for the site including the daily rail car requirements anticipated at the site (rail cars needed for shipping/receiving at full buildout) and associated train usage. Approximately 214 rail cars are estimated per day when the facility is at full build out (average annual rail cars per year estimated at 51,977). Typical train configuration of 2 freight locomotives and 32 rail cars were used for the modeling and worst-case assumptions (10 mph) were used throughout the modeling inputs.

SoundPLAN is capable of either predicting A-weighted sound levels at discrete receptors (single locations) or calculating sound contours given the three-dimensional terrain. Sound level projections were calculated at representative sensitive receptor locations (19 receptors) within close proximity of the project boundaries to the southern and west of the property. In addition, sound contour modeling was used for the proposed site to graphically display the future acoustical environment and illustrate the influence of the facility on adjoining properties as well as outline noise mitigation effectiveness. The day-night sound levels (LDN) were calculated for comparison to the FRA noise impact threshold.

Noise Modeling Results

The sensitive receptor modeling locations, tree zones, source locations and calculation area are located on Figure 2. The combined operational sound level projections for each of the sensitive receptors outlined on Figure 2 are found in the table below entitled Sound Modeling Summary. Sound level contributions at the sensitive receptor locations associated solely with the project site activities (no berm) ranged from 37 to 47 dBA, generally equivalent or less than the ambient measured conditions for the majority of the receptors. The graphic on the following page outlines where the project sound levels fall in regard to the common sound sources and overall loudness.


Sound Source
Sound Level in dBA
Overall Quality
Air Raid Siren
Jack Hammer
Thunder
Emergency Sirens
Rock Concert
Chain Saw
Lawn Mower
Subway
Yelling
Normal Conversation
Rainfall
Refrigerator
Whisper
140
130
120—Threshold of Pain
110
100—Very Loud
90
80—Moderately Loud
70—Loud
60
50—Quiet
40
30—Very Quiet
20
10
0—Threshold of Hearing
Project Only Sound Levels between 37 - 47 dBA

Sound Modeling Summary[1]

Receptor ID	24 Hr Ambient Sound Level[1]	FRA Threshold for Moderate Impact (10 dBA increase)	Project Only Sound Level w/o Berm LDN in dB(A)	Impact?	Project Only Sound Level w/ 5' Berm		Increase over Existing Sound
					LDN in dBA	Insertion Loss	
1	45	55	41	No	41	0	-4
2	45	55	41	No	41	0	-4
3	45	55	43	No	43	0	-2
4	45	55	43	No	43	0	-2
5	45	55	44	No	44	0	-1
6	46	56	46	No	46	0	0
7	46	56	46	No	45	1	-1
8	46	56	45	No	44	1	-2
9	46	56	40	No	40	0	-6
10	42	52	47	No	45	2	3
11	42	52	45	No	43	2	1
12	42	52	45	No	43	2	1
13	42	52	45	No	43	2	1
14	42	52	44	No	42	2	0
15	42	52	37	No	37	0	-5
16	42	52	40	No	40	0	-2
17	42	52	46	No	45	1	3
18	42	52	44	No	43	1	1
19	42	52	41	No	40	1	-2

Project sound influence is less than ambient measured values.

Negligible increase

Barely perceptible increase (3 dBA)

1 All project sound levels are Day-Night (Ldn) sound levels in dBA.
2 Estimated using the ambient monitoring sound data for closest measurement site to the modeling location

The visual results (isopleth) of the sound dispersion model for the worst-case operating condition scenario is depicted on Figure 3. Based on the results of the ambient measurement compared to the SoundPLAN analysis, the adjacent communities are not impacted based the FRA impact thresholds. While the project is not anticipated to have a significant impact on the adjacent community sound levels or sensitive receptors and is not impacted per FRA methodologies, a 5' berm is included in the design. Figure 4 outlines the sound dispersion with the berm. This berm would reduce the wheel-rail interface sound emissions and provides sound reduction at several receptors (insertion loss).

The results of the modeling indicate the majority of the rail operational sound emitted on the site dissipates with distance, topography and ground cover. Offsite noise at the sensitive receptor locations would be minimal and the project is not anticipated to have a significant impact on surrounding community noise levels or sensitive receptors based on FRA methodology and impact thresholds. A 3 dBA increase over existing sound level was noted at Receptors 10 and 17 (with berm). A 3 dBA increase in sound is barely perceptible and none of the project sound levels would exceed the FRA moderate impact threshold (10 dBA increase over existing).

Figures

Contents:

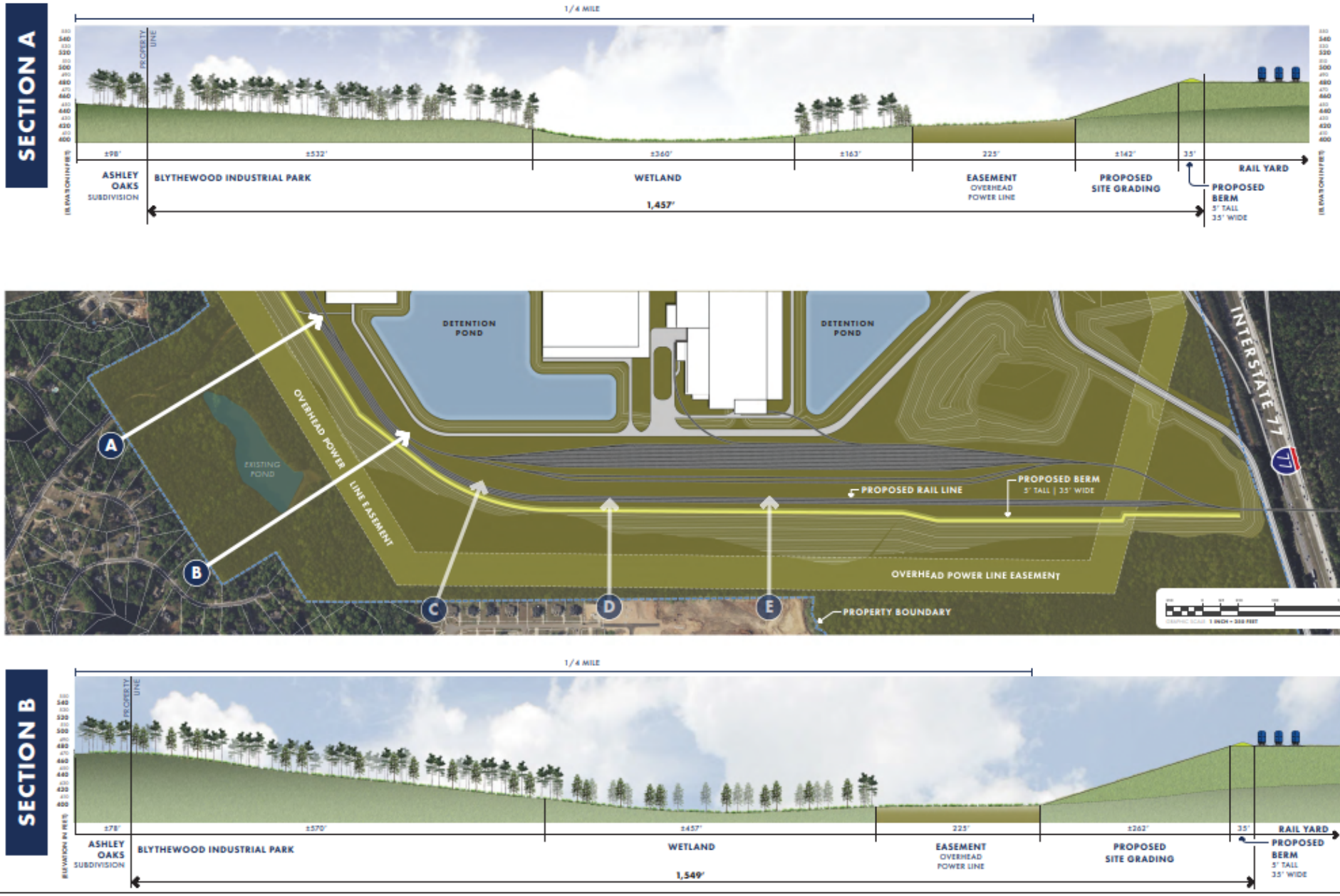


FIGURE 1 - ILLUSTRATIVE CROSS SECTION EXHIBIT

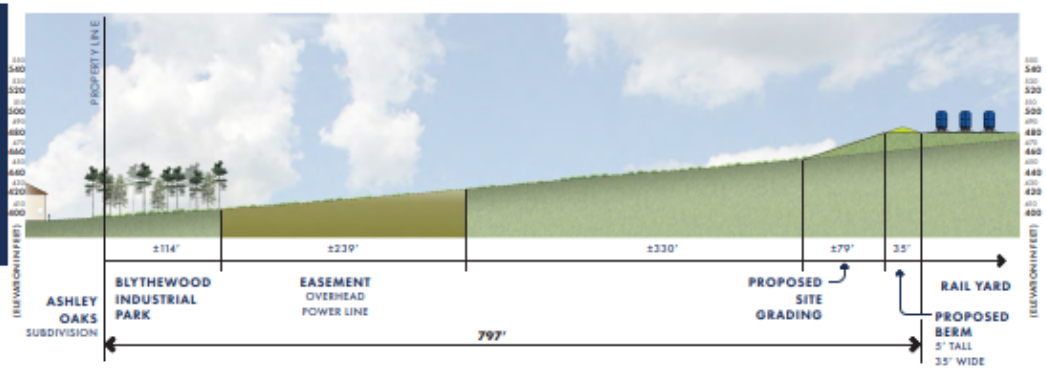
PROJECT CONNECT

BLYTHEWOOD INDUSTRIAL PARK | RICHLAND COUNTY | SOUTH CAROLINA

APRIL 2023

RICHLAND COUNTY Economic Development | South Carolina Department of Commerce | THOMAS & HUTTON

SECTION C



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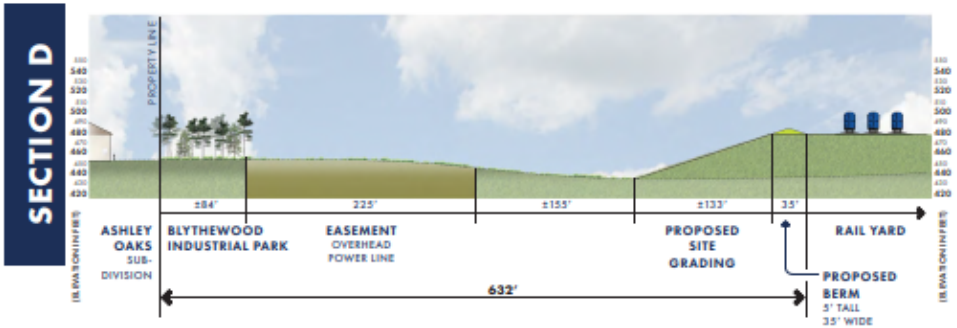
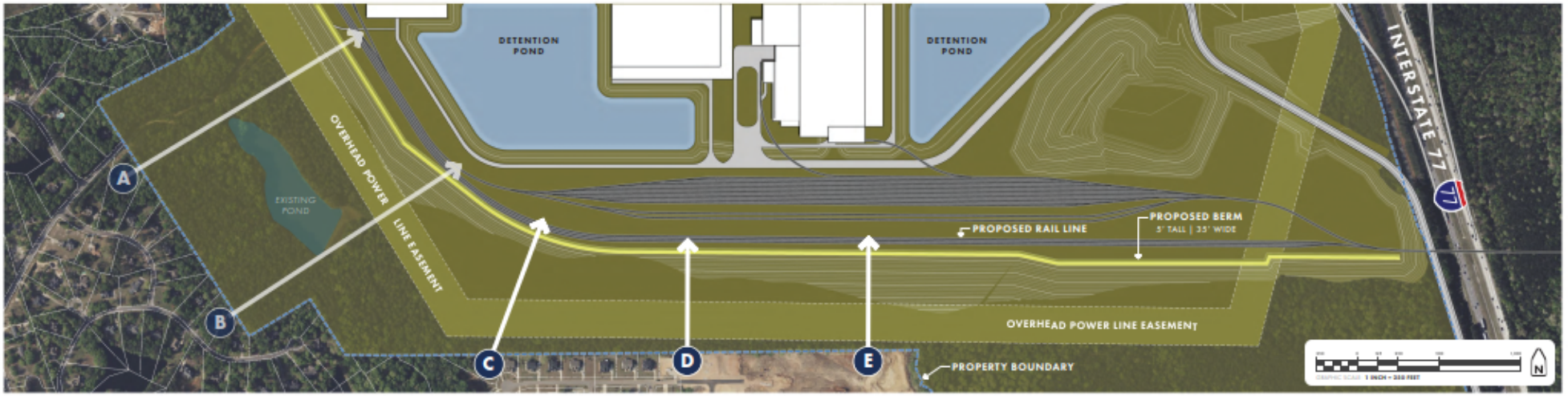
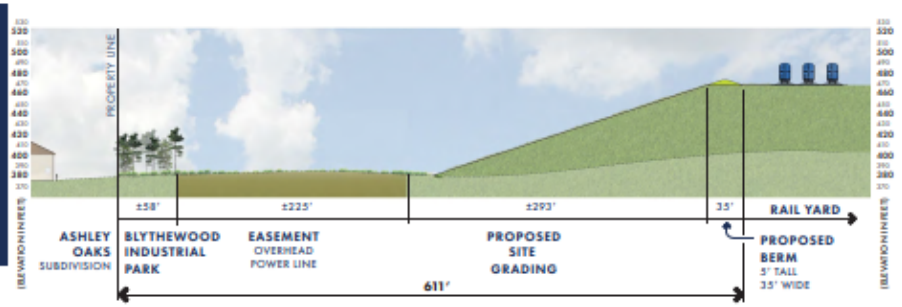




SECTION E



NOTES:

- Views (line of sight) assumed from a 6' tall person.
- Trees shown are assumed to be ±50' - 60' tall.

FIGURE 1 - ILLUSTRATIVE CROSS SECTION EXHIBIT

PROJECT CONNECT

BLYTHEWOOD INDUSTRIAL PARK | RICHLAND COUNTY | SOUTH CAROLINA

APRIL 2023

RICHLAND COUNTY Economic Development | South Carolina Department of Commerce | THOMAS & HUTTON

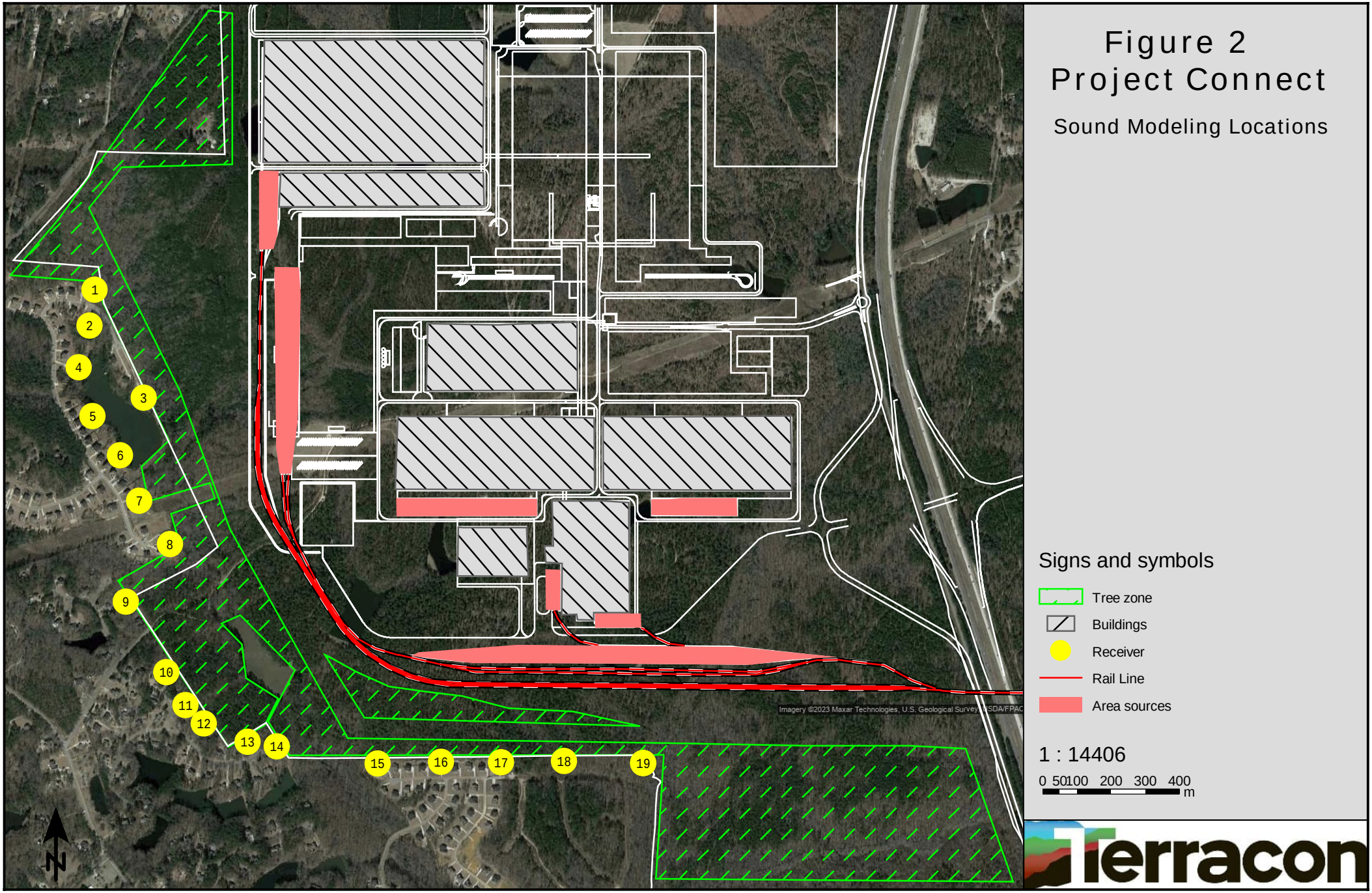


Figure 2
Project Connect

Sound Modeling Locations

Signs and symbols

- Tree zone
- Buildings
- Receiver
- Rail Line
- Area sources

1 : 14406

0 50100 200 300 400 m

Terracon

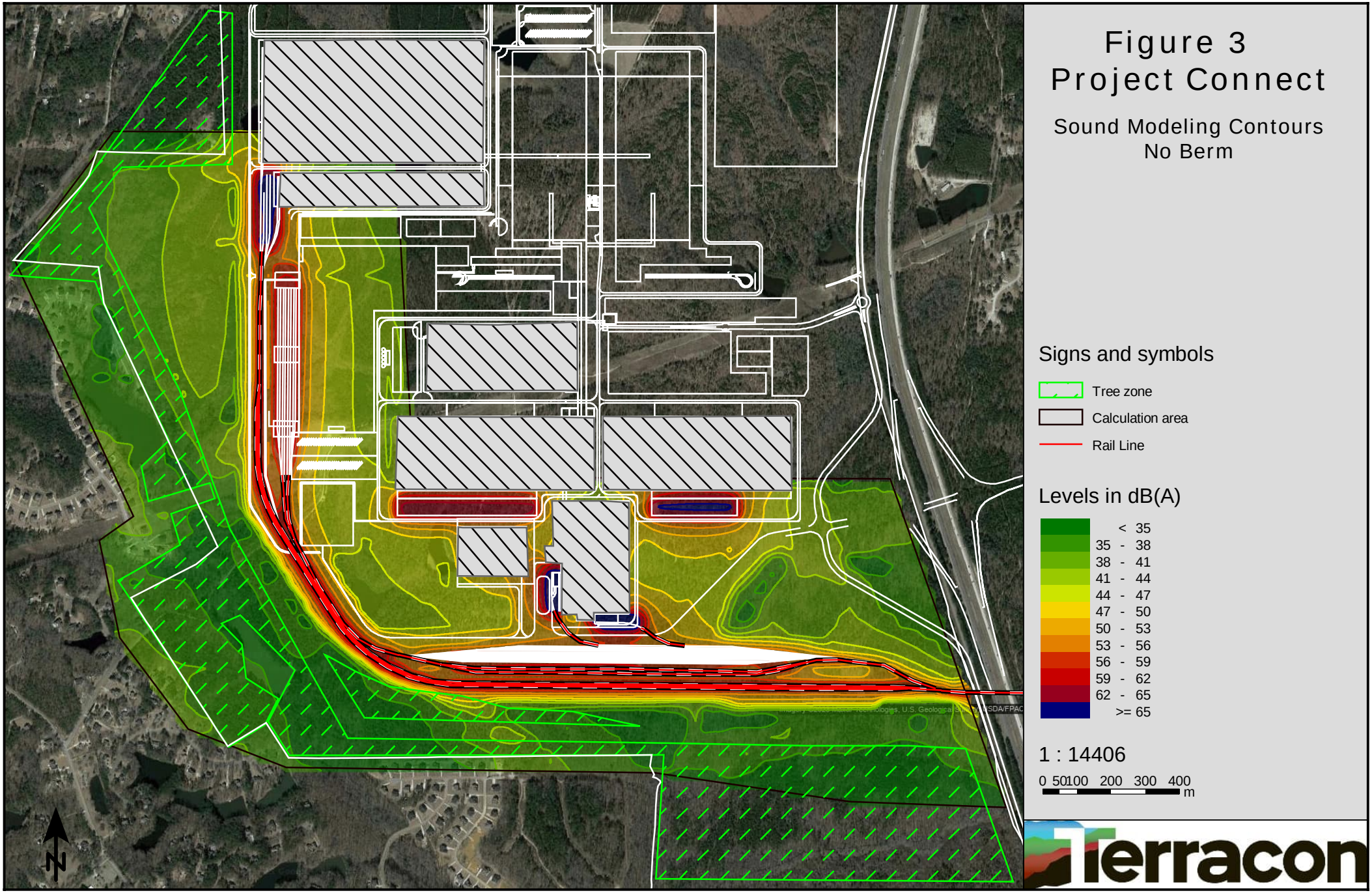


Figure 3
Project Connect
Sound Modeling Contours
No Berm
Signs and symbols
Tree zone
Calculation area
Rail Line
Levels in dB(A)
< 35
35 - 38
38 - 41
41 - 44
44 - 47
47 - 50
50 - 53
53 - 56
56 - 59
59 - 62
62 - 65
>= 65
1 : 14406
0 50100 200 300 400 m
N
Terracon

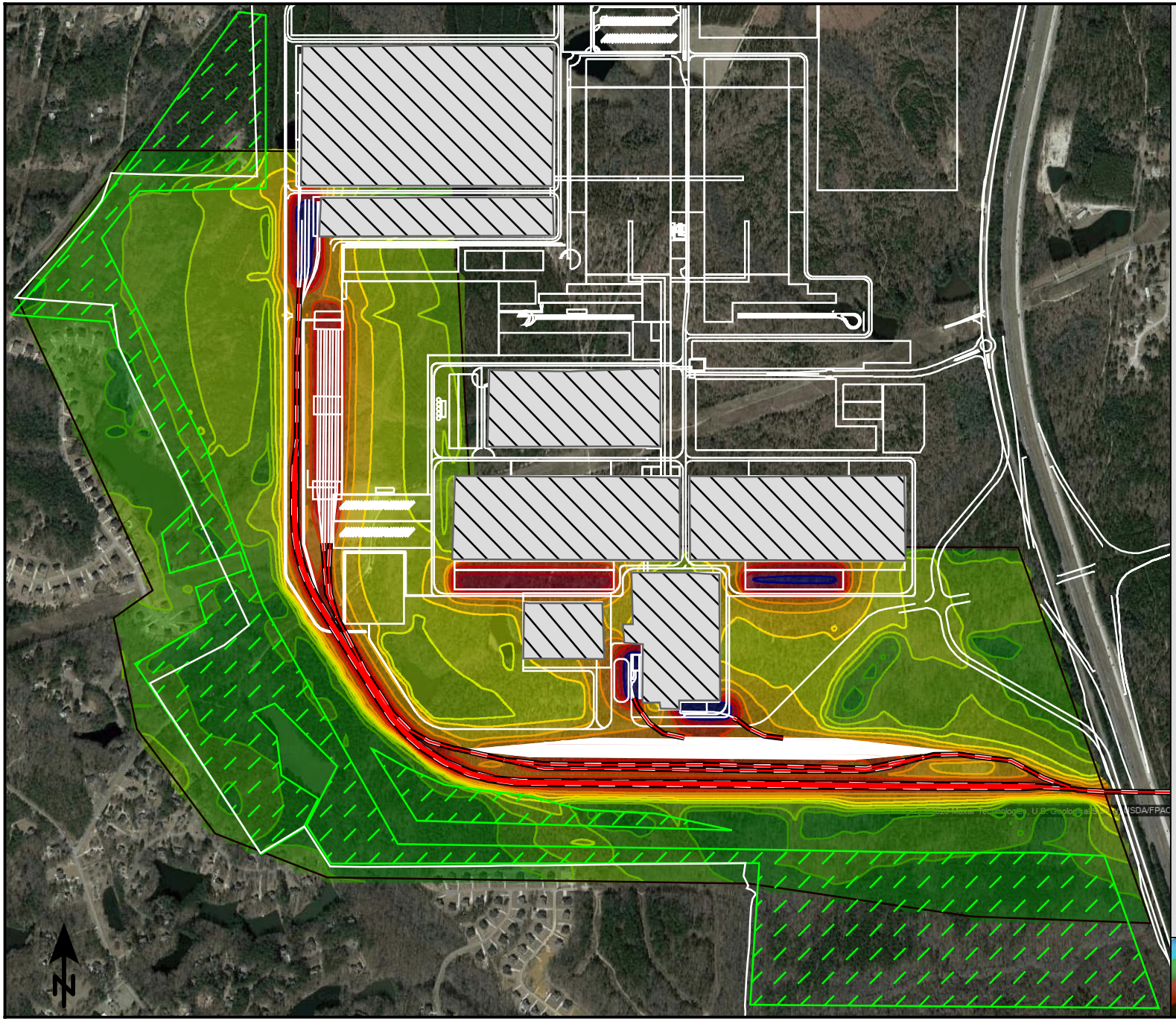


Figure 4
Project Connect

Sound Modeling Contours
5' Berm

Signs and symbols

- Tree zone
- Calculation area
- Rail Line

Levels in dB(A)

< 35
35 - 38
38 - 41
41 - 44
44 - 47
47 - 50
50 - 53
53 - 56
56 - 59
59 - 62
62 - 65
>= 65

1 : 14406

0 50100 200 300 400 m

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