Appendix I

Additional Studies

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Land and Water Conservation Fund (LWCF) County Property List for Indiana (Last Updated April 2025)

ProjectNumber	SubProjectCode	County	Property
1800030	1800030	Allen	Franke Park
1800032	1800032	Allen	Kreager Park (Maumee Park)
1800067	1800067	Allen	Fox Island Co. Park & Nature Preserve
1800097	1800097	Allen	Jury Memorial Park and Pool
1800105	1800105	Allen	Franke Park
1800153	1800153	Allen	Moser Park
1800188	1800188	Allen	Franke Park
1800201	1800201	Allen	Foster Park & Golf Course
1800315	1800315	Allen	Fox Island Co. Park & Nature Preserve
1800369	1800369A	Allen	Fox Island Co. Park & Nature Preserve
1800369	1800369N	Allen	Franke Park
1800369	1800369K	Allen	Moser Park
1800371	1800371	Allen	Jehl Park
1800392	1800392	Allen	Havenhurst Park
1800396	1800396	Allen	St. Marys River Greenway
1800408	1800408	Allen	Cooks Landing Roadside Park
1800419	1800419	Allen	St. Marys River Greenway
1800465	1800465	Allen	St. Marys River Greenway
1800469	1800469	Allen	St. Marys River Greenway
1800500	1800500	Allen	Grabill Community Park
1800526	1800526	Allen	Buckner Farm Park
1800527	1800527	Allen	Matea Park
1800570	1800570	Allen	Kreager Park
1800577	1800577	Allen	Riverside Gardens Park
1800602	1800602	Allen	Shoaff Park
1800609	1800609	Allen	Monroeville Community Park
1800614	1800614	Allen	Archbold Wilson Memorial Park
1800619	1800619	Allen	Payton County Park
1800621	1800621	Allen	Jury Park
1800634	1800634	Allen	Buckner Park

*Park names may have changed. If acquisition of publically owned land or impacts to publically owned land is anticipated, coordination with Indiana State Parks, Community Grants & Trails Section, should occur.

Abbreviated Engineer's Assessment

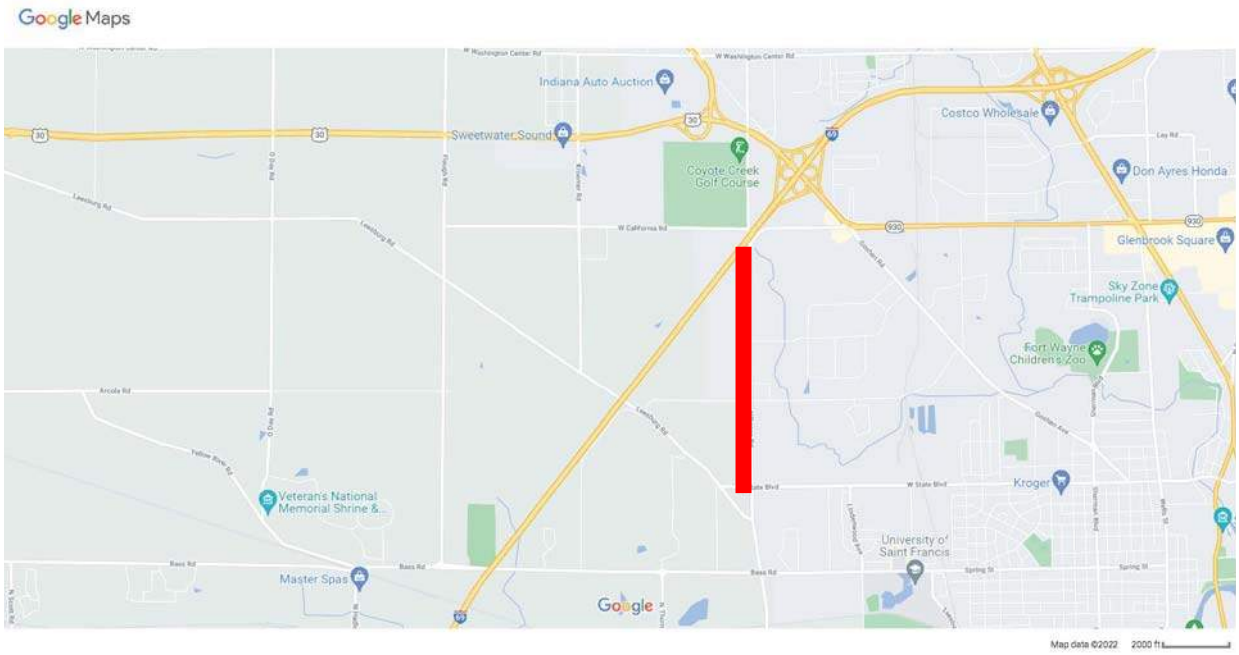
Designed By: **MJS** Date: **02/22/2022** Checked By: **JAS** Date: **02/28/2022**

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1. PROJECT LOCATION

The construction of this project will be from Coliseum Boulevard to approximately 150 south of State Boulevard in the City of Fort Wayne, Allen County.

Latitude		**Longitude**	
Start	41° 5'42.76"N	Start	85°11'31.27"W
Mid	41° 6'18.54"N	Mid	85°11'31.82"W
End	41° 6'57.97"N	End	85°11'32.73"W



2. PROJECT NEED AND PURPOSE

The purpose of this project intends to enhance traffic mobility, improve vehicular and pedestrian safety, and address increasing traffic.

The need of this project is to support the land use, economic development and growth objectives of metropolitan transportation plans established by Northeast Indiana Regional Coordinating Council (NIRCC) by adding travel lanes to Hillegas Road to improve safety and drainage. The existing segment of Hillegas Road is inadequate to support the current vehicular Average Daily traffic (19,958 vpd ADT) that uses this segment of the roadway. From 2018 to 2020, eighty-nine (89) vehicular accidents occurred in the project area. Over 11.2% of the total crashes were rear end collisions, two (2) were head on crashes, and twenty-nine (29) of the crashes included injuries. 2025 traffic volumes function at a Level of Service (LOS) E and ten-year traffic volumes (2035) function at LOS E.

Abbreviated Engineer's Assessment

Designed By: **MJS** Date: **02/22/2022** Checked By: **JAS** Date: **02/28/2022**

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3. EXISTING FACILITY

Hillegas Road in the City of Fort Wayne is classified as Urban Minor Arterial. Functional classification is classified by the Office of Roadway Inventory of the Indiana Department of Transportation. See map below.



The roadway consists of one lane in each direction approximate with of 11 feet. Left turn lanes have been added at State Boulevard, Butler Road, Independence Drive and Kraft Parkway. Paved shoulders are present ranging from 2 feet to 6 feet.

The existing roadway pavement is HMA with an average thickness of XX inches over aggregate with an average thickness of XX inches. (Will be completed after pavement cores are completed.) Record plans of the 2008 Butler Road intersection improvement project have a 12 inch asphalt pavement widening.

The pavement has numerous deficiencies ranging from longitudinal, transverse, and alligator cracking. The pavement has edge raveling. Various areas have been patched mostly likely due to potholes.

4. TRAFFIC DATA

Traffic count information was obtained from the Traffic Count Database System managed by the Indiana Department of Transportation from a count taken on August 17, 2021. No AADT was provided within the database. The seasonal adjustment factor from 2020 for minor arterials for the month of August was applied and a staggered growth rate was applied to the design year based on the direction from the Northeast Indiana Regional Coordinating Council.

Mike Siffer

From: Jeff Bradtmiller <Jeff.Bradtmiller@co.allen.in.us>
Sent: Thursday, January 13, 2022 2:45 PM
To: Mike Siffer
Subject: RE: Hillegas Road Des. No. 1901705 Growth Rate

EXERCISE CAUTION: This is an External Email Message!
"Think before clicking on links, opening attachments, or responding"

Mike,

Use an AGR of 1.2% out to 2027, then use 1.0% out to 2045 with no COVID factor.

Thanks;

Jeff Bradtmiller
Senior Transportation Planner
Northeastern Indiana Regional Coordinating Council
200 E. Berry Street - Suite 230
Fort Wayne, IN 46802
(260) 449-3605
Fax (260) 449-8652
www.nircc.com
Jeff.Bradtmiller@co.allen.in.us

The 2025 traffic is established as the 19,958 AADT.

The 2045 traffic is established as the 24,091 AADT.

The calculations are attached in this section.

5. IDENTIFICATION OF PROPOSAL

The City of Fort Wayne proposes to improve Hillegas Road from West State Boulevard to West Coliseum Boulevard with pavement widening and resurfacing to facilitate two (2) 11' foot through lanes northbound and southbound, with a two way left turn lane (TWLTL) and auxiliary lanes.

The project will include storm sewer and drainage improvements, sidewalks, curb and gutter, and added landscape medians where applicable.

Funds from the most current Federal Highway Transportation bill will be used for the construction and construction engineering phase. The project will be designed to meet the functional needs of the roadway and would be in accordance with INDOT's Design Criteria.

The project will be designed to meet Urban Minor Arterial functional classification in accordance with INDOT's Design Manual Figure 53-6 Geometric Design Criteria for Urban Arterial, 4 or More Lanes.

Functional Classification:	Urban Minor Arterial 16 (Intermediate)	
Road Design Standards:	Reconstruction (4R Standards)	
Project Length:	1.40 Miles	
Design Speed:	45 mph	Section 40-3.0
Posted Speed:	45 mph	
Access Control:	None	Section 40-5.0
Terrain:	Level	
Lane Width:	Des: 12 ft; Min: 11 ft.	Section 45-1.01
Curb Offset:	Right 2 ft. Left 1 ft (median)	Section 45-1.02
Shoulder:	Curb Right Des: 8 ft. Min. 2 ft. Left Des: 4 ft. Min. 2 ft. Uncurbed Right 8 ft; Left 2 ft.	Section 45-1.02
Cross Slope:	Travel Lane: 2% Shoulder: 2%	Section 45-1.02
TWLTL Width:	Des: 16 ft. Min: 14 ft.	Section 46-5.0
Median:	Des: 18 ft; Min: 4 ft.	Section 45-2.0
Sidewalks:	5 feet with 5 feet buffer	Section 45-1.06
Clear Zone:	Without Curb: 18 feet With Curb: 10 ft.	Figure 49-2A Section 49-2.03(03)
Side slopes:	Fore 6:1; Back 4:1; Ditch 4 ft	Section 45-3.0
Side Slopes (curbed)	12:1 for 12 ft, 3:1 max	Section 45-3.0
Stopping Sight Distance Horizontal	360 Feet	Figure 42-1A
Stopping Sight Distance Vertical	360 Feet min. 425 preferred	Section 42-1.0
Minimum Radius for e = 4%/6%	600 feet / 550 feet	Section 43-2.03
Minimum Radius normal crown	1039 feet	Figure 43-3D
Intersection Sight Distance	530 ft. P, 675 ft. SUT	Figure 46-10G
Vertical Curve K-Value	Crest: 61 Sag: 79	Section 44-3.0
Minimum Grade	0.5% des 0.3% curb 0.0% uncurbed	Section 44-1.03
<u>Drainage</u>		
Roadway Longitudinal Slope	0.5% des 0.3% curb 0.0% uncurbed	Section 36-6.02
Design Frequency and Spread	Two-Lane 10 years / 4 ft onto lane	Figure 36-7A

6. COST ESTIMATE

The total cost estimate as listed in the STIP is $20,203,500.00.

7. ENVIRONMENTAL ISSUES

A Red Flag investigation for the project was prepared in 2020.

A total of seven infrastructure items including, one (1) Religious Facilities, Smith Field Airport, Fort Wayne Elks Lodge and three (3) Planned/Proposed Trails will require coordination.

A total of one hundred twenty-nine (129) Water Resources are within a one half mile radius. Only fourteen (14) will be affected by the project.

- One (1) *NWI-Line* intersects the project approximately 0.08 miles north of Clearview Dr. A Waters of the US Report is recommended and coordination with the appropriate agency, if applicable, will occur.
- Three (3) *IDEM 303d Listed Streams and Lakes (Impaired)* intersect the project. A Waters of the US Report is recommended and coordination with the appropriate agency, if applicable, will occur.
- Six (6) *river/stream* features intersect the project area. A Waters of the US Report is recommended and coordination with the appropriate agency, if applicable, will occur.
- Two (2) *NWI – Wetlands* are located adjacent to the project area. A Waters of the US Report is recommended and coordination with the appropriate agency, if applicable, will occur.
- Two (2) *Floodplain – DFIRM* are located adjacent to or within the project area. A Waters of the US Report is recommended and coordination with the appropriate agency, if applicable, will occur.

A total of twenty-nine (29) Hazardous Materials within the half mile radius. Of the twenty-nine (29) items only nine (9) may be affected by the project. These include One (1) Resource Conservation and Recovery Act (RCRA) Generator/ TSD hazardous waste in treatment, storage, and disposal facility, Four (4) Underground Storage Tanks, One (1) Leaking Underground Storage (LUST) site and three (3) NPDES Facilities

Four (4) Properties identified in the SHAARD database for historic sites. All four sites have a County Survey Sites rating as "Contributing". No impacted is expected. There are thirty-two (32) Post-War Era (1940-1973) Residential Housing Sites that will require coordination with INDOT Cultural resources.

Coordination with the Indiana Department of Natural Resources (IDNR) and the U.S. Fish and Wildlife Service (USFWS) will be needed to determine the potential impact to any listed species and/or habitats may have on the project.

Three (3) locations have pedestrian and bus stop infrastructure that will require coordination. New facilities shall meet PROWAG requirements.

A list of the utility companies within the project area has been identified.

8. RIGHT OF WAY IMPACT

Right of way will be needed, most likely both temporary and permanent. It is anticipated that right of way will be 100 feet, but exact amounts is not known at this time.

9. TRAFFIC MAINTENANCE DURING CONSTRUCTION

Maintenance of traffic will be accomplished with a multi-phased construction to maintain two way traffic through the corridor.

Abbreviated Engineer's Assessment

Designed By: **MJS** Date: **02/22/2022** Checked By: **JAS** Date: **02/28/2022**

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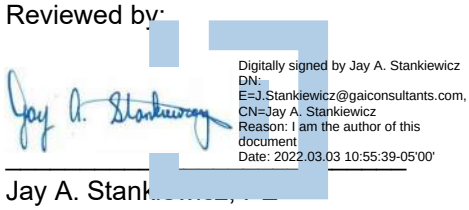
This document was prepared by:



Michael J. Siffer, P.E., PTOE
Transportation Technical Leader

Date: February 22, 2022

Reviewed by:



Jay A. Stankiewicz, P.E.
Engineering Manager

Date: February 28, 2022

Concurrence:

Phil LaBrash, PE
City Traffic Engineer

Date: 1/30/2025

Subject:	**AADT Traffic Projection**		
Project No.:	**Des. No. 1901705 GAI Project No. D191224.00**		
Project Name:	**Hillegas Road Added Travel Lanes - State Blvd. to Coliseum Blvd**		
Computed By:	**MJS**	Date:	**1/10/2022**
Checked By:	**BOA**	Date:	**1/17/2022**

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Traffic Count Source: TCDS Count Location L0202616
HILLEGAS RD BETWEEN BUTLER RD AND HUSTED ST

Functional Classification: Urban Minor Arterial

Count Year: 2021

Raw Count: 20,195 **NEG.** 10,501 **POS.** 9,694

Seasonal Adjustment Factor: 0.943 (attached)

AADT: 19,044

Growth Rate (r): 1.2% Use an AGR of 1.2% out to 2027, then use 1.0% out to 2045 with no COVID factor. Jeff Bradtmiller NIRCC

FV = PV * (1 + r * t)

Project Opening Year:	2025	2027	**Project Design Year:**	2045
PV =	19,044	19,044	**PV =**	20,416
t =	4	6	**t =**	18
r =	1.2%	1.2%	**r =**	1.0%
FV =	19,958	20,416	**FV =**	24,091

DHV percentage DHV-30 (TCDS L0202616 Peak Hour): 8.3% 2,002

8/17/2021	4:00 PM	1666	Max. Hourly Count
Day Total		20056	

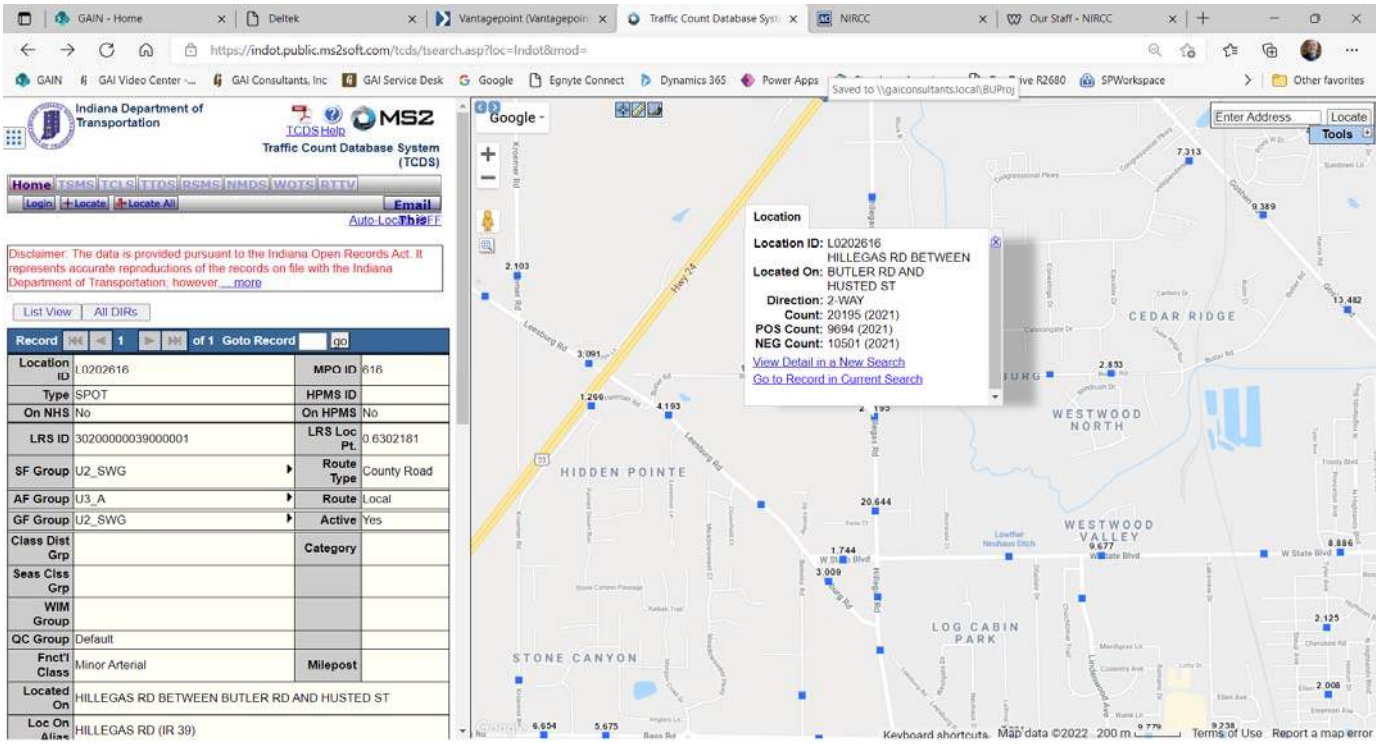
Directional Distribution: 52.0% **NEG.**

POS. 9,694

NEG. 10,501

Raw Count: 20,195

Subject:	**Traffic Count Source**		
Project No.:	**Des. No. 1901705 GAI Project No. D191224.00**		
Project Name:	**Hillegas Road Added Travel Lanes - State Blvd. to Coliseum Blvd**		
Computed By:	**MJS**	Date:	**1/10/2022**
Checked By:	**BOA**	Date:	**1/17/2022**



[Traffic Count Database System (TCDS) (ms2soft.com)]

Subject:	**Traffic Count Seasonal Adjustment Factor Table**		
Project No.:	**Des. No. 1901705 GAI Project No. D191224.00**		
Project Name:	**Hillegas Road Added Travel Lanes - State Blvd. to Coliseum Blvd**		
Computed By:	**MJS**	Date:	**1/10/2022**
Checked By:	**BOA**	Date:	**1/17/2022**

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Insert Current year seasonal adjustment factor 0.943

https://www.in.gov/indot/about-indot/central-office/asset-data-collection/traffic-statistics/adjustment-factors/

SEASONAL ADJUSTMENT FACTORS BY FUNCTIONAL CLASSIFICATION 2016-2020*

U1_SWG — Urban - Interstate (1), Principal Arterial (Freeways and Expressways) (2)

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
2020	0.922	0.897	1.052	1.504	1.202	0.954	0.914	0.935	0.916	0.92	0.998	1.003
2019	1.153	1.091	1.016	0.987	0.973	0.982	0.970	0.939	0.966	0.949	1.003	1.035
2018	1.189	1.072	1.002	0.986	0.96	0.941	0.952	0.945	0.989	0.958	0.985	1.038
2017	1.151	1.033	1.000	1.012	0.970	0.932	0.969	0.941	0.979	0.984	0.999	1.071
2016	1.213	1.067	0.977	1.011	0.996	0.934	0.943	0.969	1.001	0.992	1.008	1.058
5 YR AVG	1.126	1.032	1.009	1.100	1.020	0.949	0.950	0.946	0.970	0.961	0.999	1.041

U2_SWG — Urban - Other Principal Arterials (3), Minor Arterials (4), Collectors (5 & 6), Locals (7)

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
2020	0.956	0.928	1.091	1.335	1.051	0.932	0.940	0.936	0.918	0.937	1.021	1.032
2019	1.188	1.058	1.032	0.973	0.951	0.954	0.951	0.936	0.965	0.966	1.032	1.064
2018	1.135	1.047	1.013	1.000	0.960	0.958	0.975	0.939	0.998	0.976	1.015	1.054
2017	1.105	1.000	1.008	0.997	0.969	0.948	1.009	0.943	0.970	0.986	1.013	1.054
2016	1.099	1.026	1.000	0.947	0.984	0.973	1.002	0.961	0.972	0.969	1.000	1.026
5 YR AVG	1.097	1.012	1.029	1.050	0.983	0.953	0.975	0.943	0.965	0.967	1.016	1.046

R1_SWGA — Rural - Interstate (1), Principal Arterial (Freeways and Expressways) (2)

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
2020	0.999	0.968	1.094	1.583	1.168	0.916	0.839	0.866	0.891	0.890	0.988	1.015
2019	1.256	1.142	1.040	1.008	0.948	0.911	0.896	0.899	0.983	0.973	1.019	1.049
2018	1.239	1.137	1.023	1.010	0.943	0.906	0.898	0.916	0.975	0.961	1.000	1.088
2017	1.224	1.125	1.029	0.991	0.956	0.892	0.911	0.928	0.967	0.974	0.997	1.084
2016	1.261	1.159	1.027	1.017	0.971	0.911	0.897	0.941	0.951	0.968	1.040	1.107
5 YR AVG	1.196	1.106	1.043	1.122	0.997	0.907	0.888	0.910	0.953	0.953	1.009	1.069

R2_SWGA — Rural - Principal Arterials (3), Minor Arterials (4)

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
2020	1.027	0.998	1.126	1.343	1.056	0.900	0.903	0.914	0.899	0.908	1.012	1.059
2019	1.168	1.055	1.043	0.996	0.946	0.944	0.963	0.940	0.953	0.973	1.029	1.066
2018	1.180	1.077	1.052	1.011	0.952	0.938	0.975	0.922	0.959	0.954	1.010	1.091
2017	1.136	1.027	1.025	1.014	0.959	0.927	0.981	0.944	0.955	0.979	1.025	1.071
2016	1.202	1.102	1.046	0.965	0.963	0.923	0.964	0.954	0.921	0.958	1.013	1.062
	1.143	1.052	1.058	1.066	0.975	0.926	0.957	0.935	0.937	0.954	1.018	1.070

R3_SWGA — Rural - Major Collectors (5), Minor Collectors (6), Locals (7)

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
2020	1.077	1.072	1.14	1.184	1.006	0.892	0.894	0.906	0.903	0.913	1.012	1.083
2019	1.197	1.085	1.055	0.959	0.928	0.942	0.952	0.941	0.961	0.954	1.034	1.097
2018	1.213	1.134	1.072	0.994	0.932	0.918	0.945	0.94	0.952	0.946	1.014	1.083
2017	1.186	1.064	1.053	0.981	0.936	0.896	0.933	0.934	0.952	0.978	1.034	1.130
2016	1.153	1.115	1.064	0.921	0.937	0.896	0.956	0.965	0.951	0.943	0.993	1.114
5 YR AVG	1.165	1.094	1.077	1.008	0.948	0.909	0.936	0.937	0.944	0.947	1.017	1.101

**The seasonal adjustment factors are used to expand average 24-hour volumes to estimated Annual Average Daily Traffic (AADT).*

Source: Indiana Department of Transportation
Division of Engineering and Asset Management, Asset Planning

June 2021

FHWA-Indiana Environmental Document

CATEGORICAL EXCLUSION LEVEL 1 FORM

GENERAL PROJECT INFORMATION

Road No./County:	Hillegas Road/ Allen County, Indiana
Designation Number(s):	1901705, 2201692, and 2201694
Project Description/Termini:	This document serves as a Map-21 Early Acquisition CE for Hillegas Road Added Travel Lanes from Coliseum Blvd. to State Blvd.,

[X] **CE Level 1 documentation for exempted projects**

[ ] **Additional Information to CE Level 1**

Approval: Drew Paramore May 19, 2023
INDOT DE/ESD Signature and Date

Release for Public Involvement: N/A
INDOT DE/ESD Initials and Date

Certification of Public involvement: N/A
INDOT Consultant Services Signature and Date

INDOT DE/ESD Reviewer: Cindy Mauro May 19, 2023
Signature and Date

CE Preparer: Kenneth McMullen, GAI Consultants
Name and Organization

Noise Analysis Report

Hillegas Road Added Travel Lanes, Des. No. 1901705

Allen County, IN

Prepared for:

GAI Consultants, City of Fort Wayne and Indiana Department of Transportation

Prepared by:

Hanson Professional Services Inc.
6510 Telecom Drive, Ste. 210
Indianapolis, IN 46278

Ali Whitehead, Civil Designer
Elizabeth Safranski, Traffic Modeler
September 28, 2022

ENGINEERING / PLANNING / ALLIED SERVICES

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Executive Summary

This traffic noise analysis report evaluates the traffic noise levels and potential impacts associated with the proposed roadway improvements of the Hillegas Road Added Travel Lanes project from West Coliseum Boulevard to East State Boulevard in Fort Wayne, Allen County, Indiana. This noise analysis was prepared in accordance with the Federal Highway Administration's (FHWA's) *Highway Traffic Noise: Analysis and Abatement Guidance* (December 2011) and the Indiana Department of Transportation (INDOT's) *Traffic Noise Analysis Procedure* (July 1, 2017).

The existing year (2022) noise levels and the design year (2045) noise levels were predicted using FHWA's Traffic Noise Model (TNM) Version 2.5. The traffic noise model was validated by taking ambient noise measurements at seven sites within the noise study area. All site locations were within the acceptable range of the modeled existing noise level results except for R4. The modeled noise level at R4 was 3.9 dB(A) under the measured noise level which is likely attributed to a child and adult conversing for a few minutes at the nearby playground during the measurement period.

A total of 8 CNEs were identified in the 500-foot buffer of the project area. These CNEs include activity categories B and C/D for residential areas and a church/medical facility. A total of 52 receptors were modeled for existing 2022 conditions, no build 2045 conditions, and build 2045 conditions.

It was found that of the 52 receptors, 10 receptors were identified as approaching/exceeding the NAC in 2045. Abatement measures were then considered for their feasibility and reasonableness. It was found that due to engineering feasibility, abatement would not be feasible. The impacted receptors are all located in residential areas that have many driveways and side access roads off of Hillegas Road. This would not allow the noise barrier to have an adequate length to properly block traffic noise and could cause sight distance issues for motorists. Due to the lack of feasibility, abatement measures were not considered for this project.

1.0 Introduction

This traffic noise study report was prepared in conjunction with the Categorical Exclusion document for the proposed Hillegas Road Added Travel Lanes project from West Coliseum Boulevard to East State Boulevard in Fort Wayne, Allen County, Indiana (Des. No. 1901705). This report documents the findings of noise analyses performed for the proposed roadway improvements. The following sections provide a description of the project and existing land use, a background of noise and applicable regulations, noise receptor selection and field monitoring, noise analysis methodology and modeling results, and analysis of abatement measures, construction noise, and coordination with local government officials for undeveloped lands.

1.1 Purpose of Analysis

The purpose of this noise analysis is to assess existing and future traffic noise levels associated with the Hillegas Road Added Travel Lanes project, identify impacted receptors within common noise environments (CNEs), and evaluate potential abatement measures for feasibility and reasonableness if impacted receptors are present. The analysis was performed in accordance with the current INDOT's *Traffic Noise Analysis Procedure* (July 1, 2017).

1.2 Project Description

This project involves adding travel Lanes from West Coliseum Boulevard to West State Boulevard, on the west side of the City of Fort Wayne, Allen County, Indiana (see Figure 1). This project is located in Sections 28, 29, 32 and 33 of Township 31 North, Range 12 East, on the Fort Wayne West U.S. Geological Survey 7.5-Minute Quadrangle. The purpose of the project is to enhance traffic mobility, improve vehicular and pedestrian safety, and address increasing traffic. The existing segment of Hillegas Road is inadequate to support current and future vehicular traffic. Vehicular safety has been a concern in recent years and future traffic volumes are predicted to worsen the road's function to a Level of Service (LOS) E (meaning unstable traffic flow causing low speeds and considerable delay). The project is also needed to support the land use, economic development and growth objectives of metropolitan transportation plans established by the Northeast Indiana Regional Coordinating Council (NIRCC).

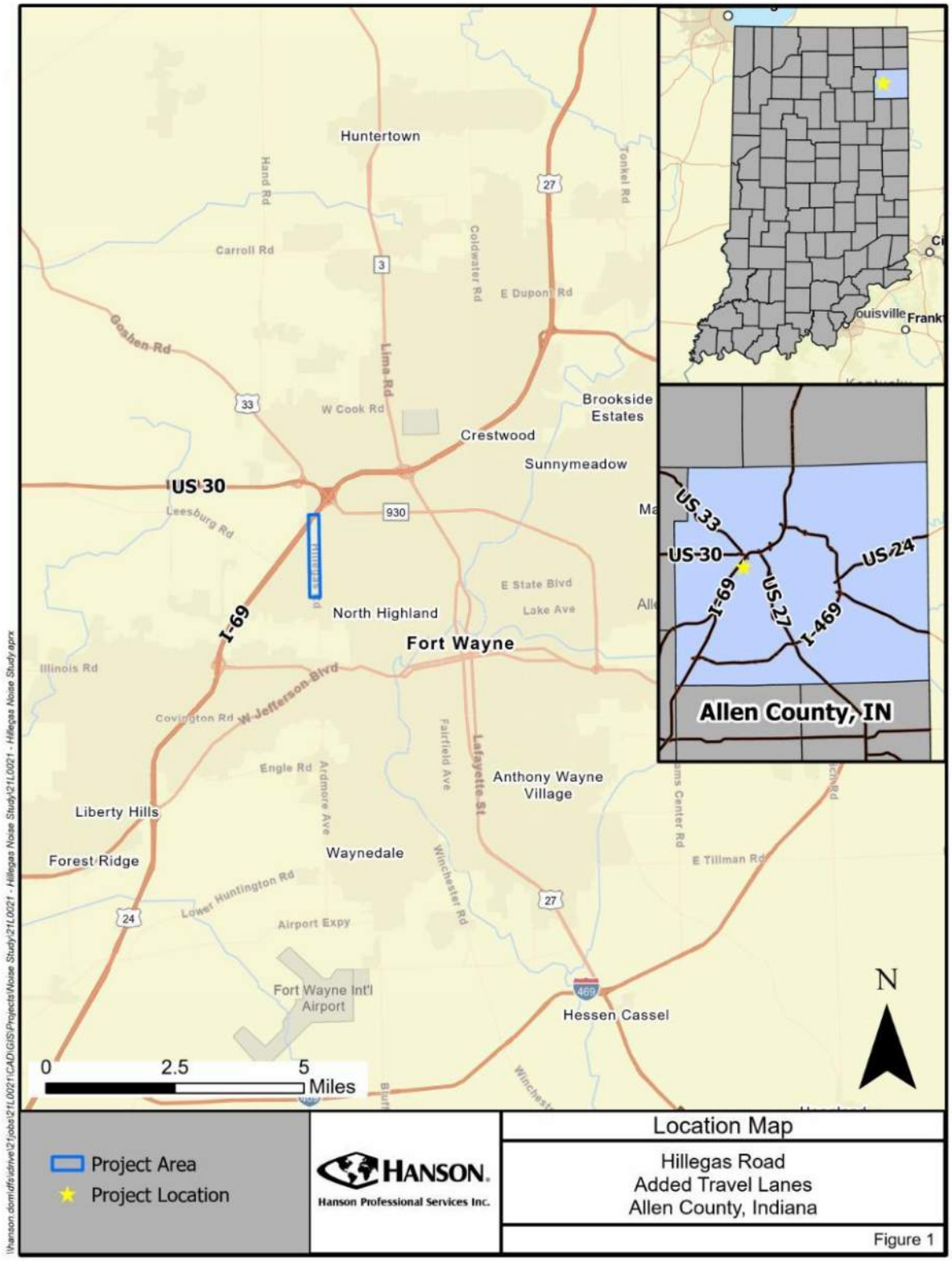
1.2.1 Existing Road Conditions

Hillegas Road is classified as Urban Minor Arterial. The roadway consists of one lane in each direction with an approximate width of 11 feet. Left turn lanes have been added at State Boulevard, Butler Road, Independence Drive and Kraft Parkway. Paved shoulders are present ranging from two feet to six feet.

1.2.2 Proposed Road Improvements

The proposed project includes widening the existing two lanes roadway to provide for a four-11-foot travel lane with a 12-foot center turn lane and raised center median where the center turn lane is not needed, along with curb and gutter on both sides of the road. The project also includes 10-foot multi-use trial on the east side and five-foot sidewalk on the west side with six-foot grass buffer, ADA curb ramps, new storm sewer system, large culvert pipe (small structure) rehabilitation, green infrastructure, street lights, traffic signal modernization, landscaping, new traffic signs and pavement markings. Federal and local funds will be used for the project improvements.

Figure 1 Project Location



2.0 Noise Background and Regulations

2.1 Noise Background

Sound intensity is measured in decibels (dB). Decibels are measured on a logarithmic scale. This means that, for a given 10 dB increase in the decibel level, the sound intensity increases by a factor of 10. The human ear generally perceives a 10 dB increase as a doubling of the sound level. The smallest increase or decrease in sound levels generally perceived by the human ear is considered to be about three dB.

A given noise produces sound in a number of different frequencies; many of these are outside the normal perception range of the human ear. The A-weighted scale of frequencies generally approximates the range of frequencies normally detected by the human ear.

All references to noise level values for this project are stated as an equivalent A-weighted sound level (L_{eq} dB(A)). The L_{eq} descriptor A-weighting is the generally accepted representation in decibels of the range of human hearing and its response to varying frequencies and loudness of traffic noise. The L_{eq} dB(A) is a single number indicator used to describe the mean energy or intensity level over a specified period of time during which the sound level fluctuated. Because the L_{eq} dB(A) is not influenced by the variability of the noise-time pattern, it is an effective way to compare or combine noises with differing time histories.

Highway noise generation is dependent on three main factors: traffic volume, traffic speed, and the number of trucks within the traffic. Each of these varies at any given moment. Highway noise is generated by a line of vehicles closely spaced. This gives a listener the perception of a linear noise source rather than a single, identifiable point of noise. As distance increases from the highway, noise is reduced or attenuated.

2.2 Federal Regulations

The Federal-aid Highway Act of 1970 required the Federal Highway Administration (FHWA) to develop noise standards and abatement requirements for highway traffic noise. These standards are contained in Part 772 of Title 23 of the Code of Federal Regulations (23 CFR 772). The federal regulations were developed to prescribe the methods that must be followed for the evaluation of highway traffic noise in federal-aid highway projects. FHWA will not approve a project unless a project has been satisfactorily evaluated for potential traffic noise impacts and has addressed feasible and reasonable noise abatement measures.

Based on land use, seven separate activity categories are used by FHWA to assess potential noise impacts as defined by 23 CFR 772. Five of the seven activity categories have Noise Abatement Criteria (NAC) that establishes noise levels where noise abatement needs to be evaluated. The FHWA considered several approaches to define impact levels, but generally based the criteria on noise levels associated with the interference of speech communication. The NAC are therefore a balance of what is desirable and what is generally achievable.

The federal regulations were specifically written to allow flexibility in the development of state policies appropriate for the resources and other influences specific to the state. The FHWA guidance manual, *Highway Traffic Noise: Analysis and Abatement Guidance,* gives state transportation agencies guidance to develop their own state policies. FHWA has deferred to the state agencies to define the

noise level that “approaches” the NAC and to define a substantial increase in traffic noise levels. It should be noted that the NAC are not used as goals for noise attenuation design criteria or design targets. Instead, the NAC are noise impact thresholds for considering abatement when they are approached, met, or exceeded. Noise abatement measures are required to be considered as part of the project if impacts are identified.

2.3 INDOT Policy

INDOT’s most recent noise policy version, *INDOT Traffic Noise Analysis Procedure*, became effective July 1, 2017, and is based on INDOT’s application of the FHWA standards. This policy is applicable to all Type 1 Federal highway projects in the state of Indiana, which encompass the construction of a highway on a new location or the physical alteration of an existing highway that significantly changes either its horizontal or vertical alignment or increases the number of through traffic lanes. The INDOT noise policy outlines a traffic noise analysis with the following elements:

- Identification of Noise-Sensitive Areas and Receptors
- Measurement of Ambient Noise
- Determination of Existing (Current) and Future Noise Levels
- Identification of Traffic Noise Impacts
- Consideration of Noise Abatement Measures
    - Feasibility of Noise Abatement Measure
    - Reasonableness of Noise Abatement Measures
- Future Noise Level Information for Local Government Officials
- Construction Noise

3.0 Noise Analysis Methodology

3.1 Noise Receptor Selection

A receptor is a discrete or representative location of a common noise environment (CNE) for any of the activity categories listed in Table 1. INDOT defines a CNE as a group of receptors within the same Activity Category that are exposed to similar noise sources and levels; traffic volumes, traffic mix, and speed; and topographic features. A CNE generally occurs between two secondary noise sources, such as interchanges, intersections and crossroads. Primary consideration is given to exterior areas where frequent human use occurs for Activity Categories A, B, C and E. Consideration should be given to Activity Category D land uses for interior noise sensitive land uses. Land use along the proposed project corridor was reviewed and identified using the FHWA Activity Categories as shown in Table 1.

Land uses within the noise study limits consists of single-family residences (NAC Category B); a church and medical facility/playground (NAC Categories C and D); offices (NAC Category E); non-sensitive industrial, manufacturing, warehousing and commercial (NAC Category F); and vacant land (NAC Category G). The noise study limits are generally defined as the area 500 feet from the proposed edge of road pavement. Once sensitive land use areas were identified, the receptors were grouped into CNEs. A total of eight CNEs identified within the noise study limits and evaluate for noise impacts. See Table 2 and Appendix A for CNEs and receptor locations.

Table 1 FHWA Noise Abatement Criteria – Hourly A-Weighted Sound Level in Decibels (dB(A))

Activity Category	$L_{eq}(h)$	Evaluation Location	Description of Activity Category
A	57	Exterior	Lands on which serenity and quiet are of extraordinary significance and serve an important public need and where the preservation of those qualities is essential if the area is to continue to serve its intended purpose.
B(1)	67	Exterior	Residential.
C(1)	67	Exterior	Active sport areas, amphitheaters, auditoriums, campgrounds, cemeteries, day care centers, hospitals, libraries, medical facilities, parks, picnic areas, places of worship, playgrounds, public meeting rooms, public or nonprofit institutional structures, radio studios, recording studios, recreation areas, Section 4(f) sites, schools, television studios, trails and trail crossings.
D	52	Interior	Auditoriums, day care centers, hospitals, libraries, medical facilities, places of worship, public meeting rooms, public or nonprofit institutional structures, radio studios, recording studios, schools, and television studios.
E(1)	72	Exterior	Hotels, motels, offices, restaurants/bars, and other developed lands, properties or activities not included in A-D or F.
F	---	---	Agriculture, airports, bus yards, emergency services, industrial, logging, maintenance facilities, manufacturing, mining, rail yards, retail facilities, shipyards, utilities (water resources, water treatment, electrical), and warehousing.
G	---	---	Undeveloped lands that are not permitted.

(1) Includes undeveloped lands permitted for this activity category.
Source: FHWA, *23 CFR Part 772*.

Traffic noise is also evaluated on undeveloped permitted lands. To identify any potential development on undeveloped lands within the noise study limits, Hanson contacted the Fort Wayne Department of Planning Services. Based on their review of site permits on March 30, 2022, no current or future developments were identified. On May 4, 2022, the City of Fort Wayne reported a tire warehouse to be potentially developed on the east side of Hillegas Road between Independence Drive and Clearview Drive. However, upon review of the site plans, no common outside gathering was identified.

Fifty-one receptors are residential-sensitive land use areas (Activity Category B) within the noise study limits. The houses they represent were chosen because they are all residential dwellings and are subject to the same types of traffic noise within their respective CNE. One receptor represents a church and a medical facility (pediatric therapy and autism center), which includes an outdoor playground (Activity Categories C and D).

Table 2 Preliminary Noise Receptors and CNEs

CNE	Receptors	Description	Activity Category
R1	R1-1	1 Residence	B
R2	R2-1	1 Residence	B
R3	R3-1 to R3-4	4 Residences	B
R4	R4-1	1 Church and 1 Medical Facility	C/D
R5	R5-1 to R5-16	16 Residences	B
R6	R6-1 to R6-23	23 Residences	B
R7	R7-1 to R7-2	2 Residences	B
R8	R8-1 to R8-4	4 Residences	B

3.2 Common Noise Environments

The following provides a description of each CNE that was identified as having an area of frequent human outdoor use during land use review and grouping.

3.2.1 CNE 1

CNE 1 is located northwest of Interstate 69 (I-69) and west of Hillegas Road on the south side of California Road at the north end of the project. This CNE represents one single-family residence. The topography is generally flat. I-69, Hillegas Road and California Road are the major noise sources for this CNE.

3.2.2 CNE 2

CNE 2 is located on the west side of Hillegas Road south of Independence Drive. This CNE represents one single-family residence. The topography is generally flat. Hillegas Road is the main noise source for this CNE.

3.2.3 CNE 3

CNE 3 is located on the east side of Hillegas Road and north of Clearview Drive. This CNE represents four single-family residences. The topography is generally flat. Hillegas Road is the main noise source for this CNE.

3.2.4 CNE 4

CNE 4 is located on the west side of Hillegas Road and south of Butler Road. This CNE represents a church and a pediatric therapy and autism medical facility, which includes a playground at the rear of the building. The topography is flat to slightly sloping. Hillegas. Road is the main noise source for this CNE.

Under most situations, a single structure is considered a single receptor. Because the church and the medical facility do not contain dwelling units, an algorithm was used to translate usage data into an appropriate number of receptors, based on converting total usage to equivalent residential units. The standard INDOT algorithm for converting usage data into equivalent residential units is:

$$\frac{\text{Daily number of users}}{\text{2.52 people on average per household}} \times \text{Percentage of property within 500 feet} = \text{Number of receptors (rounded up)}$$

Three Rivers Wesleyan Church – Based on website information and the building size, the church has approximately 150 regular attendees on an average Sunday service. Based on the occupation of this building approximately six hours per day and two days per week for 12 months of the year, a usage factor of 0.07 is assumed for this facility. Multiplying the usage factor of 0.07 by 150 attendees equals 11 average daily users. The following algorithm was used to calculate the appropriate number of receptors per receiver:

> (11 users per day/2.52 average people per household) x (100% of the property within the noise study limits) = 5 receptors

Possibilities Northwest Pediatric Therapy and Autism Services - According to staff at the medical center, the facility has approximately 75 average users per day when open. Based on an occupation of this facility of eight hours per day and five days per week for 12 months of the year, a usage factor of 0.24 is assumed for this facility. Multiplying the usage factor of 0.24 by 75 users per day equals 18 average daily users. The following algorithm was used to calculate the appropriate number of receptors per receiver:

> (18 users per day/2.52 average people per household) x (100% of the property within the noise study limits) = 8 receptors

3.2.5 CNE 5

CNE 5 is located on the east side of Hillegas Road and north of State Boulevard. This CNE represents 23 single-family residences. The topography is generally flat to gently sloping to the south/southeast. Hillegas Road and State Boulevard are the main noise sources for this CNE.

3.2.6 CNE 6

CNE 6 is located on the west side of Hillegas Road and north of State Boulevard. This CNE represents 16 single-family residences. The topography is generally flat. Hillegas Road and State Boulevard are the main noise sources for this CNE.

3.2.7 CNE 7

CNE 7 is located on the east side of Hillegas Road and south of State Boulevard at the south end of the project. This CNE represents two single-family residences. The topography is gently sloping to the southeast. Hillegas Road and State Boulevard are the main noise sources for this CNE.

3.2.8 CNE 8

CNE 8 is located on the west side of Hillegas Road and south of State Boulevard at the south end of the project. This CNE represents four single-family residences. The topography is gently sloping to the south. Hillegas Road and State Boulevard are the main noise sources for this CNE.

4.0 Noise Modeling and Impact Identification

Seven representative locations were monitored on August 11, 2022, for the purpose of validating the TNM results and to generally determine existing noise levels. These field measurements were gathered for a 15-minute period at each of the seven sites using a Svantek sound level meter Svan 971. Traffic counts and vehicle classification were collected concurrently with the noise measurement. The field data sheets for each measurement site are included in Appendix B. The Certificate of Calibration for this sound level meter is included in Appendix C. Prior to use, the meter was calibrated using the appropriate calibrator for this model.

The noise monitoring results were compared to the modeled noise level results from TNM 2.5 utilizing the actual traffic counts and vehicle types recorded during field measurements (see Table 3). Measured noise levels ranged from 56.7 to 66.7 dB(A). All site locations were within the acceptable range of +/- 3 dB(A) of the modeled existing noise level results when utilizing the recorded traffic from the monitoring period except for R4. The modeled noise level at R4 was 3.9 dB(A) under the measured noise level. The higher noise level in the field is likely attributed to a child and adult conversing for a few minutes at the nearby playground during the 15-minute measurement period.

Table 3 Noise Monitoring Results

Receptor Number [(1)]	Measured Level dB(A)	Modeled Level dB(A) [(2)]	Difference
R2	63.9	66.9	3.0
R3	57.9	60.9	3.0
R4	56.7	52.8	-3.9
R5	60.8	61.6	0.8
R6	63.4	63.9	0.5
R7	61.2	63.2	2.0
R8	66.7	64.0	-2.7

(1) See Appendix A for receptor locations

(2) Existing model with field collected counts

TNM 2.5 was utilized to conduct the analysis of 2022 existing traffic noise levels and 2045 future build and no-build traffic scenarios. The model arrived at predicted noise levels through a series of adjustments to a reference sound level. The reference sound level, also called the “reference energy mean emission level,” was based on the sound levels of different classes of vehicles (cars, medium trucks, and heavy trucks). Adjustments were made for predicted traffic flow by the sampling point (design year traffic flow); sampling point distance from the alignment, including whether the intervening ground is hard (parking lot or a body of water) or soft (grass or soil); finite roadway length (the receptor is only exposed to a finite length of the roadway); and shielding (trees or rows of houses between the

receptor and the alignment). The existing conditions model was then adjusted for planned geometric changes and projected traffic volumes and speeds to examine projected future noise conditions.

The following TNM 2.5 model assumptions were incorporated into the analysis of this project:

- Traffic volumes and vehicle speeds were assigned to the appropriate TNM vehicle classifications. Traffic data can be found in Appendix E.
- Traffic volumes were not included along auxiliary roadways that have low traffic volumes and utilization as residential access. Traffic volumes were included for Butler Road and State Boulevard as these roadways had significant traffic volumes.
- The model includes noise barriers to represent an industrial office park located on Superior Ridge Drive.
- The default ground zone was lawn.

As defined by INDOT noise policy, a receptor is impacted if predicted noise levels either: 1) approach (within 1.0 dB(A)) or exceed the NAC (see Table 1); or 2) predicted noise levels will substantially exceed the existing noise levels (at least 15.0 dB(A) above the existing conditions).

NAC Activity Category C land uses that do not have an exterior area of frequent human use are categorized as Activity Category D land uses, which are evaluated for interior noise impacts. NAC Activity Category C land uses that also have an interior use were categorized as Activity Category C/D. For evaluating interior noise levels, the exterior level was modeled and a reduction factor applied (see Table 4). Noise impacts were not identified for Activity Category D receptors.

Table 4 Category D Noise Level Results

Receptor Number	Description	Exterior Noise Level dB(A)	Noise Reduction due to Structural Criteria dB(A)	Interior Noise dB(A)	Interior NAC dB(A)	Impact
R4-1	Medical Facility	55.0	25	30.0	51	No
R4-2	Church	61.8	25	36.8	51	No

Noise analysis was completed for 52 receptors located within the 500-foot offset from the edge of shoulder. Each receptor was analyzed for three scenarios: 2022 existing conditions, 2045 no-build, and 2045 build. The results of the predicted existing and future noise level analysis are shown in Table 5. Existing 2022 noise levels for the 52 receptors ranged from 50.0 to 67.4 dB(A). Predicted future design year 2045 no-build noise levels for the 52 receptors ranged from 50.8 to 68.3 dB(A). Predicted future design year 2045 build noise levels for the 52 receptors ranged from 52.6 to 70.4 dB(A).

Predicted future design year 2045 build noise levels would approach or exceed the NAC at 10 receptor locations from a total of 52 receptors analyzed. Therefore, impact abatement consideration is required. The predicted noise levels at these 10 receptors would range from 66.0 to 70.4 dB(A). Changes in predicted future noise levels from existing noise levels would range from a 7.7 dB(A) decrease to a 3.3 dB(A) increase. No receptors were identified as having predicted noise levels substantially exceeding the existing noise levels.

Table 5 Noise Analysis Results

Receptor Number	NAC Activity Category	Represents	NAC dB(A)	2022 Existing Noise Level dB(A)	Predicted Year			Impacted
					2045 Build Noise Level dB(A)	2045 No-Build Noise Level dB(A)	Build Increase over Existing dB(A)	
R1-1	B	Residence	66	61.4	62.6	62.4	0.2	No
R2-1	B	Residence	66	64.6	66.0	65.4	0.6	Yes-NAC
R3-1	B	Residence	66	61.6	64.1	62.4	1.7	No
R3-2	B	Residence	66	61.8	63.3	62.6	0.7	No
R3-3	B	Residence	66	56.1	59.2	57.0	2.2	No
R3-4	B	Residence	66	52.6	55.4	53.5	1.9	No
R4-1	C	Playground	66	52.8	55.0	53.7	1.3	No
R5-1	B	Residence	66	65.7	66.8	66.5	0.3	Yes-NAC
R5-2	B	Residence	66	64.4	65.7	65.2	0.5	No
R5-3	B	Residence	66	64.7	65.6	65.5	0.1	No
R5-4	B	Residence	66	65.0	65.8	65.8	0.0	No
R5-5	B	Residence	66	61.9	64.1	62.7	1.4	No
R5-6	B	Residence	66	52.3	55.2	53.2	2.0	No
R5-7	B	Residence	66	60.0	62.9	60.8	2.1	No
R5-8	B	Residence	66	52.5	55.6	53.4	2.2	No
R5-9	B	Residence	66	63.5	66.9	64.3	2.6	Yes-NAC
R5-10	B	Residence	66	52.4	55.5	53.3	2.2	No
R5-11	B	Residence	66	61.2	65.2	62.0	3.2	No
R5-12	B	Residence	66	52.9	55.9	53.7	2.2	No
R5-13	B	Residence	66	61.7	65.6	62.5	3.1	No
R5-14	B	Residence	66	52.6	54.3	53.5	0.8	No
R5-15	B	Residence	66	63.3	64.5	64.2	0.3	No
R5-16	B	Residence	66	58.1	59.1	59.2	-0.1	No
R6-1	B	Residence	66	67.4	70.4	68.3	2.1	Yes-NAC
R6-2	B	Residence	66	65.0	65.6	65.8	-0.2	No
R6-3	B	Residence	66	65.4	66.2	66.2	0.0	Yes-NAC
R6-4	B	Residence	66	65.5	66.2	66.3	-0.1	Yes-NAC
R6-5	B	Residence	66	65.4	65.3	66.2	-0.9	No
R6-6	B	Residence	66	65.6	66.6	66.4	0.2	Yes-NAC
R6-7	B	Residence	66	66.6	67.9	67.4	0.5	Yes-NAC
R6-8	B	Residence	66	61.3	64.3	62.1	2.2	No
R6-9	B	Residence	66	62.9	66.7	63.8	2.9	Yes-NAC
R6-10	B	Residence	66	61.1	65.2	61.9	3.3	No
R6-11	B	Residence	66	54.7	58.4	55.6	2.8	No

Receptor Number	NAC Activity Category	Represents	NAC dB(A)	2022 Existing Noise Level dB(A)	Predicted Year			Impacted
					2045 Build Noise Level dB(A)	2045 No-Build Noise Level dB(A)	Build Increase over Existing dB(A)	
R6-12	B	Residence	66	51.4	54.5	52.3	2.2	No
R6-13	B	Residence	66	50.1	53.0	50.9	2.1	No
R6-14	B	Residence	66	50.0	52.6	50.8	1.8	No
R6-15	B	Residence	66	51.9	55.1	52.8	2.3	No
R6-16	B	Residence	66	54.3	58.1	55.1	3.0	No
R6-17	B	Residence	66	62.0	66.1	62.8	3.3	Yes-NAC
R6-18	B	Residence	66	61.5	65.6	62.4	3.2	No
R6-19	B	Residence	66	63.1	65.3	63.9	1.4	No
R6-20	B	Residence	66	55.9	58.4	56.7	1.7	No
R6-21	B	Residence	66	53.2	54.9	54.0	0.9	No
R6-22	B	Residence	66	51.7	53.4	52.5	0.9	No
R6-23	B	Residence	66	54.6	57.6	55.4	2.2	No
R7-1	B	Residence	66	63.2	63.2	64.1	-0.9	No
R7-2	B	Residence	66	56.3	57.0	57.2	-0.2	No
R8-1	B	Residence	66	64.3	57.4	65.1	-7.7	No
R8-2	B	Residence	66	53.1	52.8	53.9	-1.1	No
R8-3	B	Residence	66	57.5	57.9	58.3	-0.4	No
R8-4	B	Residence	66	61.4	60.8	62.2	-1.4	No

5.0 Abatement Analysis

Traffic noise abatement evaluation is used to identify potential noise abatement measures when the existing or predicted future traffic noise levels approach, meet or exceed the NAC, or when the predicted future noise levels of the build alternative result in a substantial increase over existing noise levels. In addition to the direct benefits of noise abatement, the social, economic and environmental effects also must be considered. Any noise abatement measure must be determined both feasible and reasonable to be considered for implementation. The noise abatement measure also must be considered a prudent expenditure of public funds to be considered reasonable. The following section outlines noise abatement measures when traffic noise impacts have been determined.

5.1 Abatement Measures Considered

Noise barriers are typically the most practical noise abatement measures due to their cost effectiveness and ability to be implemented on right-of-way and along existing roadways. Noise barriers may include noise walls, earth berms or a combination of both. Noise barriers reduce noise levels by impeding transmission of noise, absorbing noise or reflecting it back toward the noise source. Other abatement measures such as traffic management/restrictions, alteration of alignment, or purchase of land for use as a buffer zone usually do not provide substantial noise reductions or are not found to be feasible and reasonable due to cost, right-of-way requirements or do not meet the purpose and need of the

proposed project. Based on these reasons, noise abatement measures other than noise barriers were not further considered for this project

5.2 Feasibility

Based on INDOT noise policy, noise abatement is feasible if the abatement measure meets the following conditions:

- Engineering Feasibility – INDOT requires noise abatement measures to be based on sound engineering practices and standards and requires that any measures be evaluated at the optimum location. Engineering feasibility also takes into account topography, drainage, safety, barrier height, utilities, and access/maintenance.

- Acoustic Feasibility – INDOT requires that noise barriers achieve a five dB(A) reduction at a majority (greater than 50 percent) of the impacted receptors.

The engineering feasibility of constructing noise barriers was evaluated for residential CNEs R2, R5 and R6. Each of these CNEs have first-row receptors requiring driveway access in addition to several side street access points on each side of Hillegas Road. Noise barriers need to extend uninterrupted the length of the area it is intended to shield. Additionally, the barrier length needs to extend at either end approximately four times the distance between the noise source and receptor to adequately deflect noise that spills around the end of the barrier. The barrier should also avoid interference with the line of sight at intersections, which could affect a driver's ability to see approaching traffic and create an unsafe condition to enter a roadway. Due to the inability to construct uninterrupted segments of noise barriers due to driveway and side road access and meet line of sight requirements, noise barriers for CNEs R2, R5 and R6 were determined to not be feasible.

5.3 Reasonableness

The reasonableness evaluation for noise abatement consists of three parts: the noise reduction design goal, cost effectiveness and the viewpoints of the benefited receptors.

- Design Goal – A majority (greater than 50 percent) of the first-row receptors achieve at least a seven dB(A) reduction in noise as a result of the noise abatement measure.

- Cost-Effectiveness – To determine cost effectiveness, the estimated cost of constructing a noise barrier will be divided by the number of benefited receptors (those who would receive a reduction of at least five dB(A)). A base material and design cost of $25,000 to $30,000 or less per benefited receiver is currently considered to be cost-effective. Development in which a majority (more than 50 percent) of the receptors was in place prior to the initial construction of the roadway in its current state (functional classification) will receive additional consideration for noise abatement. The cost-effectiveness criteria used for these cases will be 20 percent greater (currently $30,000 per benefited receptor).

- View of Residents and Property Owners – A survey will be mailed to each benefited receptor to consider the views of residents and property owners. The concerns and opinions of the property owners and residents will be balanced with other considerations in determining whether a barrier is appropriate for a given location.

Because noise barriers were determined to not be feasible based on engineering factors, a reasonableness evaluation was not conducted.

6.0 Construction Noise

Trucks and machinery used for construction produce noise that may affect some land uses and activities during the construction period. Residents along the alignment will at some time experience perceptible construction noise from implementation of the project. To minimize or eliminate the effect of construction noise on these receptors, the City of Fort Wayne and INDOT will consider mitigation measures to incorporate into the special provisions to the project's construction specifications as appropriate. These measures could include work-hour limits, equipment muffler requirements, location of haul roads, elimination of tailgate banging, reduction of backing up for equipment with alarms, and community complaint systems.

7.0 Coordination with Local Officials

The purpose of coordinating with local officials is to provide information and promote compatible land development and land use planning adjacent to proposed highway projects. Compatible land use planning is an important tool for preventing future noise impacts. This traffic noise study report will be provided to the City of Fort Wayne Community Planning & Policy and the Allen County Department of Planning Services following the completion of the environmental document. This information will allow the local planning agencies to prevent more sensitive land use types such as Activity Categories B and C from developing within the approximate 66 dBA contour limit through governmental ordinance or zoning. Figure 3 depicts where the NAC is approached (66 dBA contour) on undeveloped land in the noise study area following construction of the project.

8.0 Public Involvement

Noise barriers are not proposed for the project because they were determined not feasible. Therefore, consideration and obtaining of the views of residents and property owners regarding the potential for noise abatement is not warranted at this time. The City of Fort Wayne held a public meeting on April 21, 2022, to present the project purpose and need, preliminary plans and receive public questions and comments. Future public involvement activities for the project are a public hearing in fall 2022 and a final public meeting in summer 2023. The results of the approved traffic noise analysis will be presented at these upcoming public involvement events.

9.0 Statement of Likelihood

Based on the studies thus far accomplished, the State of Indiana has not identified locations where noise abatement is likely. Noise abatement measures that were studied at these locations were based upon preliminary design costs and design criteria. Noise abatement has not been found to be feasible based on the amount of side roads and driveways that would prevent uninterrupted segments of noise barriers necessary to achieve a 5 dB(A) reduction at a majority of the impacted receptors. In addition, noise barriers amongst these access points would cause sight distance safety issues for motorists. A re-evaluation of the noise analysis will occur during final design. If during final design it has been determined that conditions have changes such that noise abatement is feasible and reasonable, the abatement measures might be provided. The final decision on the installation of any abatement measure(s) will be made upon the completion of the project's final design and the public involvement processes.

The viewpoints of the benefited residents and property owners are a major consideration in determining the reasonableness of highway traffic noise abatement measures for proposed highway construction projects. These viewpoints have been determined and addressed during the environmental phase of project development. The will and desires of the public are an important factor in dealing with the overall problems of highway traffic noise. INDOT will incorporate highway traffic noise consideration in on-going activities for public involvement in the highway program, i.e., and will reexamine the resident's and property owners' views on the desirability and acceptability of abatement during project development.

10.0 Conclusion

Of the 52 receptors analyzed, 10 were found to be approaching/exceeding the NAC in the 2045 design year. Abatement measures were not found to be feasible due to engineering feasibility. The 10 impacted receptors are located in residential areas that have multiple side streets and driveway access points from HIllegas Road. The noise barrier would not be long enough to adequately block traffic noise and could cause sight-distance issues for motorists.

11.0 References

Indiana Department of Transportation, *Traffic Noise Analysis Procedure*, 2017.

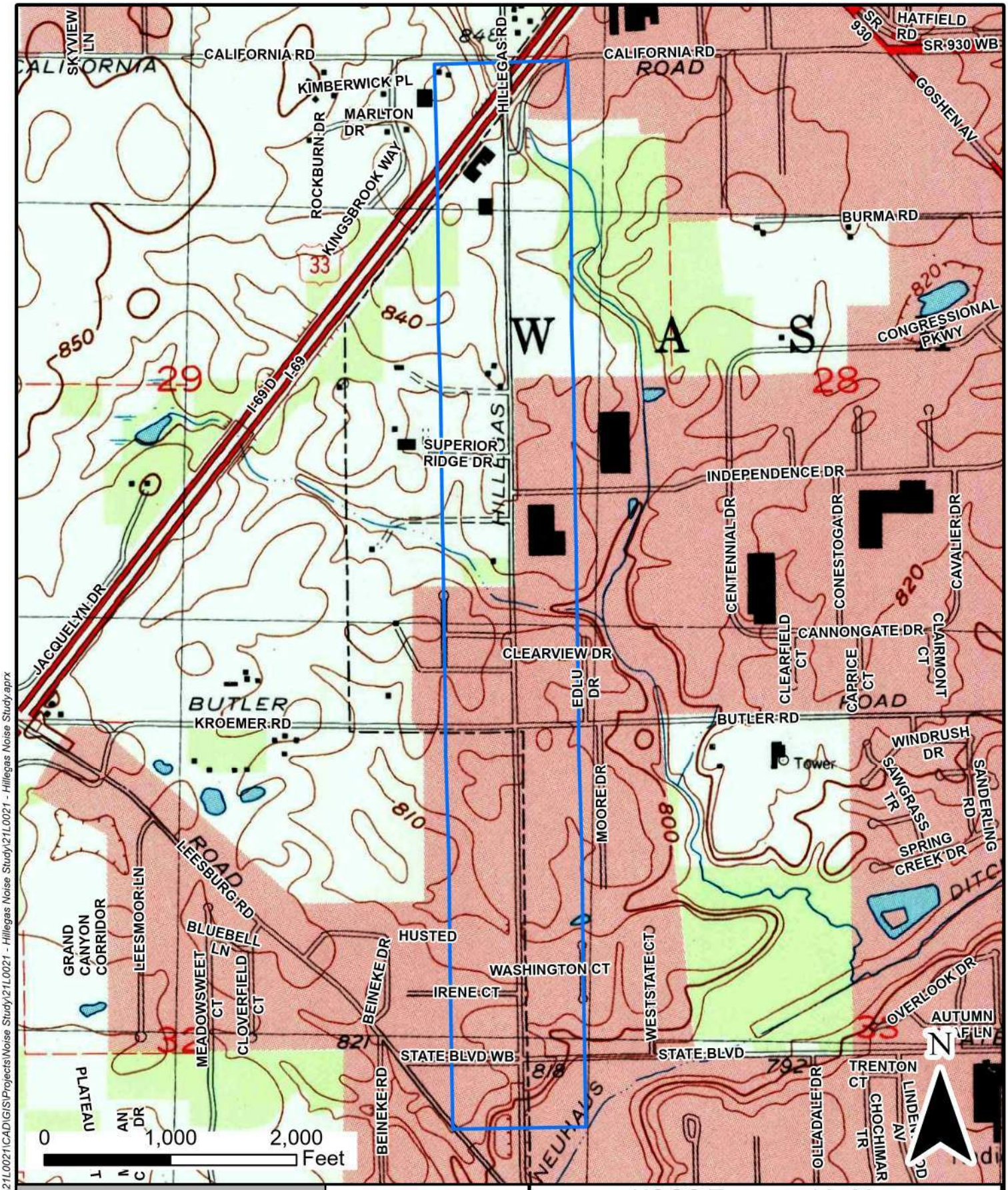
U.S. Department of Transportation (USDOT), Federal Highway Administration (FWHA), *Highway Traffic Noise: Analysis and Abatement Guidance (FHWA-HEP-10-025)*, December 2011.

23 CFR Part 772, *Procedures for Abatement of Highway Traffic Noise and Construction Noise*, 2010.

USDOT, FHWA, *Measurement of Highway-Related Noise* (FHWA-PD-96-046, DOT-VNTSCFHWA-96-5), May 1996.

USDOT, FHWA, *Noise Fundamentals Training Document - Highway Traffic Noise Sources*, September 1980.

Appendix A – Traffic Noise Analysis Figures



Noise Analysis Area

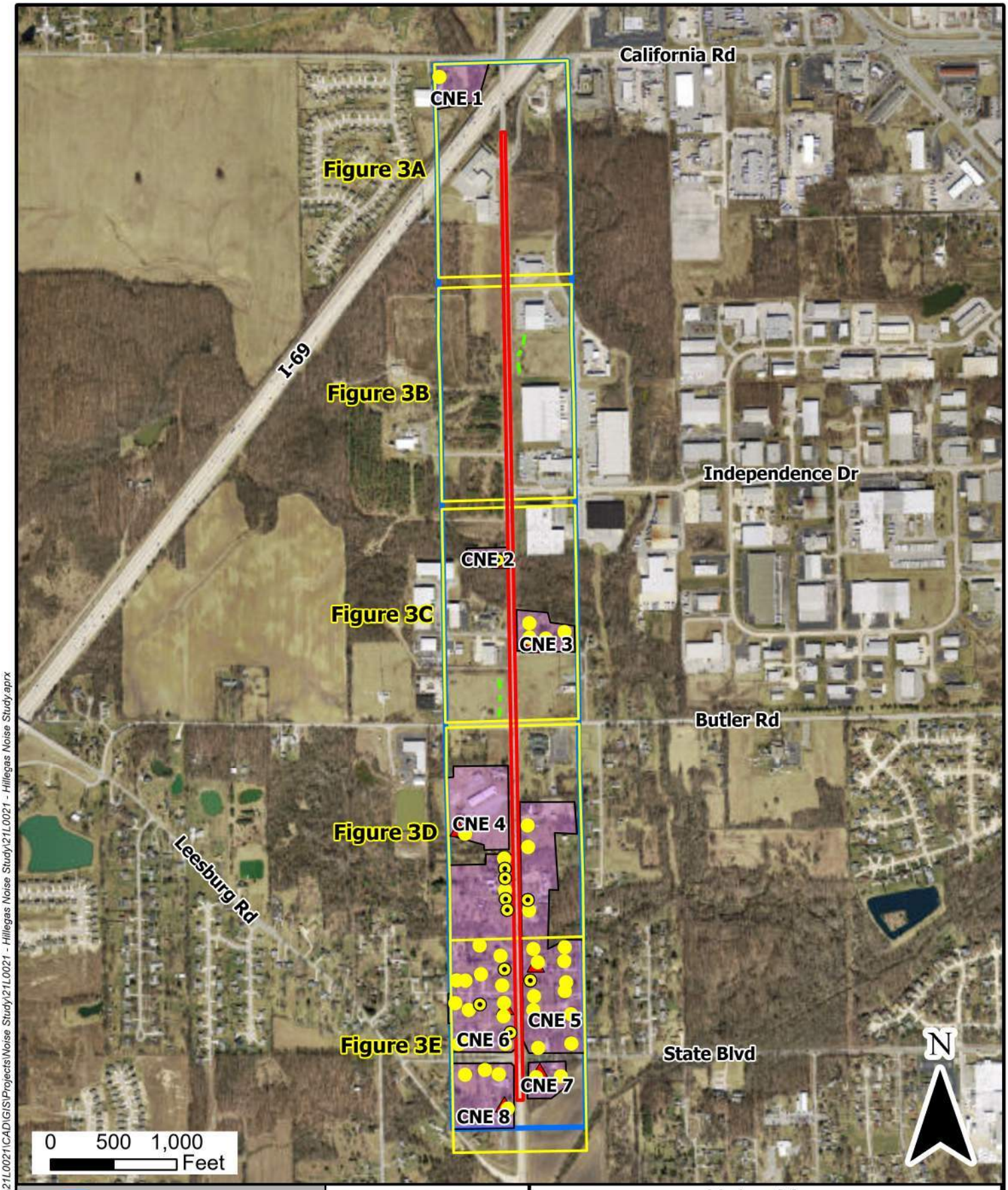
HANSON
Hanson Professional Services Inc.

USGS Topographic Map

Hillegas Road
Added Travel Lanes
Allen County, Indiana

Figure 2

\\hanson.dom\dfs\idrive\21\jobs\21L0021\CAD\GIS\Projects\Noise Study\21L0021 - Hillegas Noise Study\21L0021 - Hillegas Noise Study.aprx



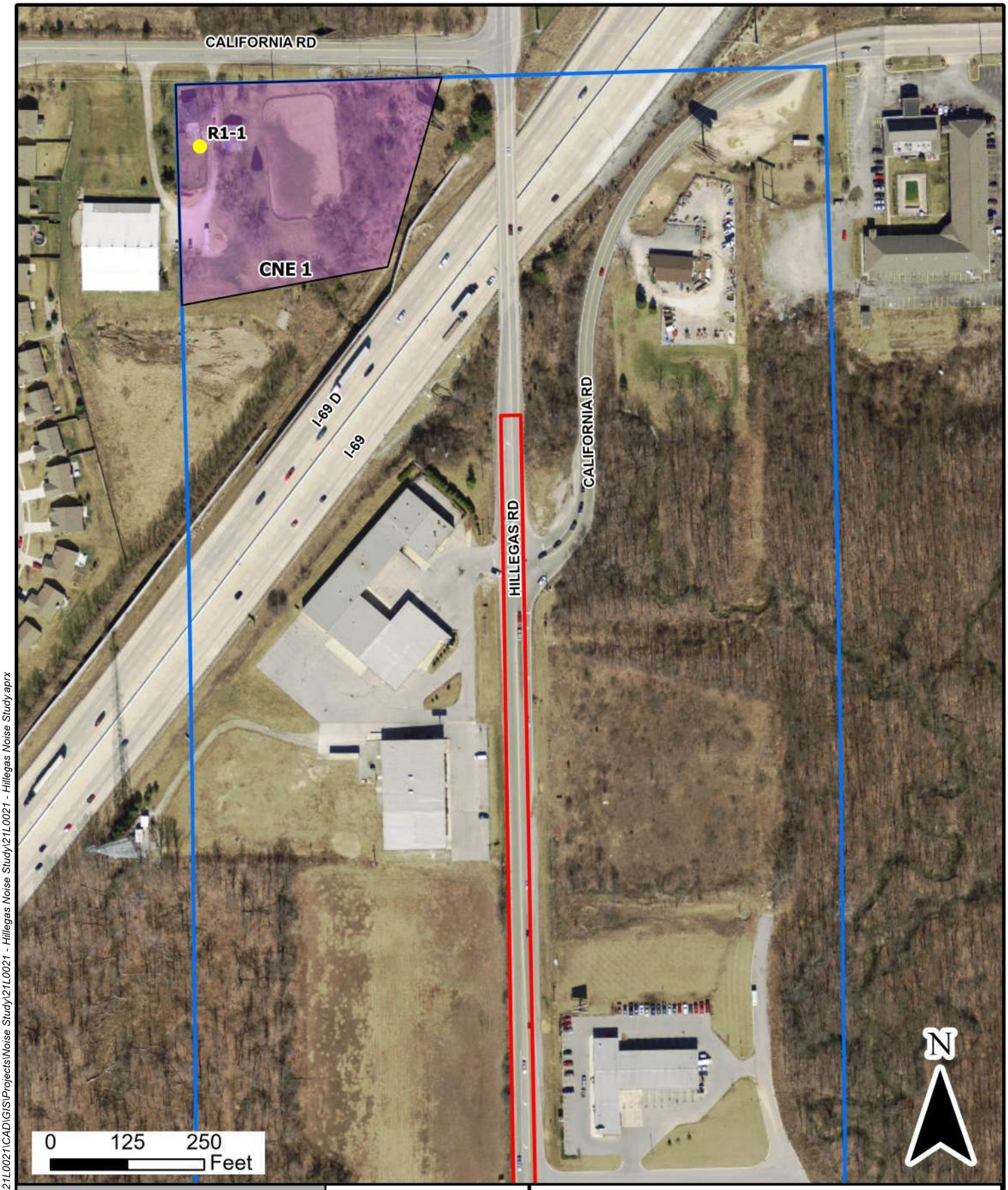
HANSON
Hanson Professional Services Inc.

Noise Map

Hillegas Road
Added Travel Lanes
Allen County, Indiana

Figure 3

\\hanson.dom\dfs\drive\21\jobs\21L0021\CAD\GIS\Projects\Noise Study\21L0021 - Hillegas Noise Study\21L0021 - Hillegas Noise Study.aprx



Noise Analysis Area
Project Area
Common Noise Environment (CNE)
Impacted Receptor
Not Impacted Receptor
Field Measurement Site
66dBA Contour

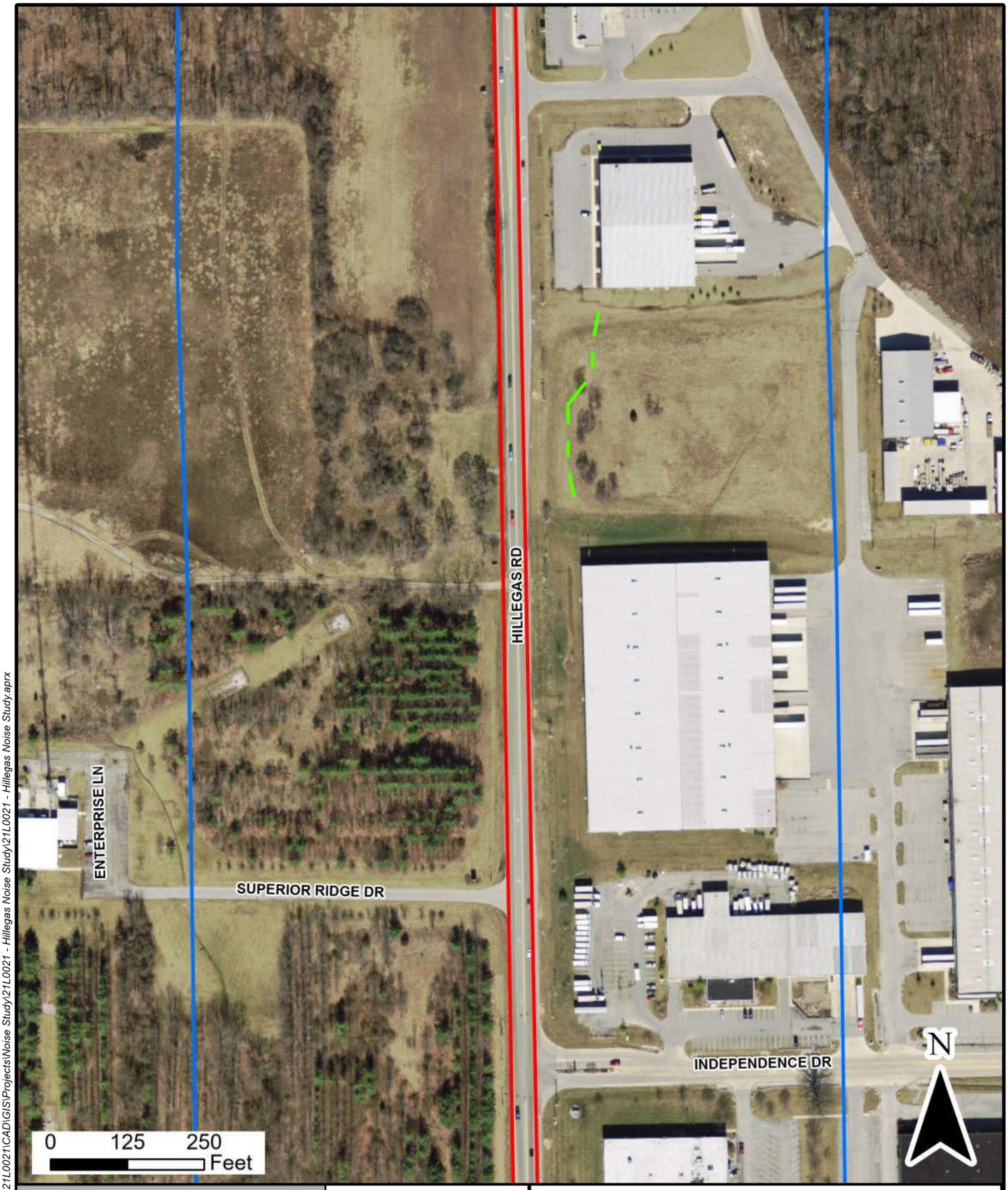
HANSON
Hanson Professional Services Inc.

Noise Map

Hillegas Road
Added Travel Lanes
Allen County, Indiana

Figure 3A

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Noise Analysis Area
Project Area
Common Noise Environment (CNE)
Impacted Receptor
Not Impacted Receptor
Field Measurement Site
66dBA Contour

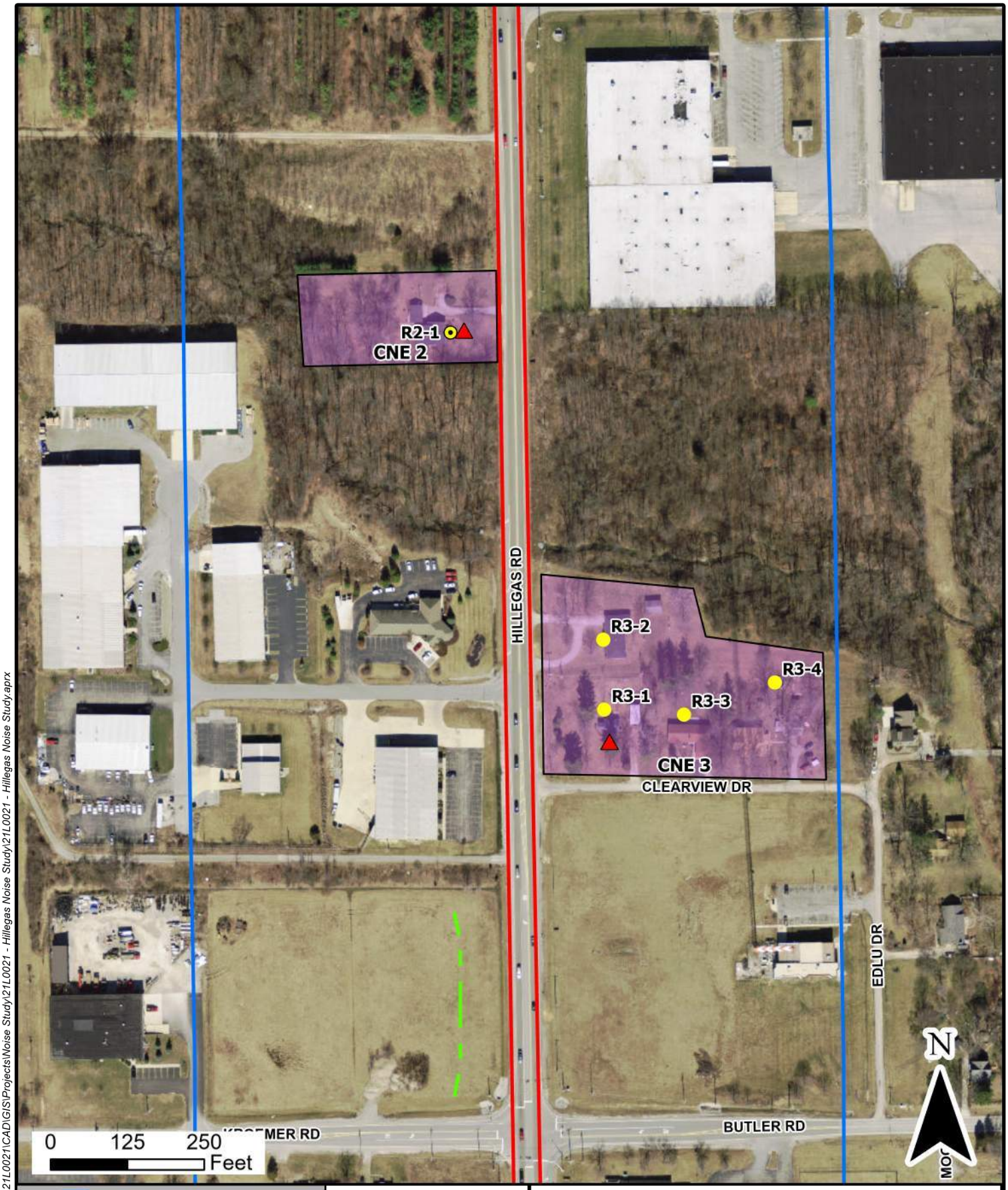
HANSON
Hanson Professional Services Inc.

Noise Map

Hillegas Road
Added Travel Lanes
Allen County, Indiana

Figure 3B

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Noise Analysis Area
Project Area
Common Noise Environment (CNE)
Impacted Receptor
Not Impacted Receptor
Field Measurement Site
66dBA Contour

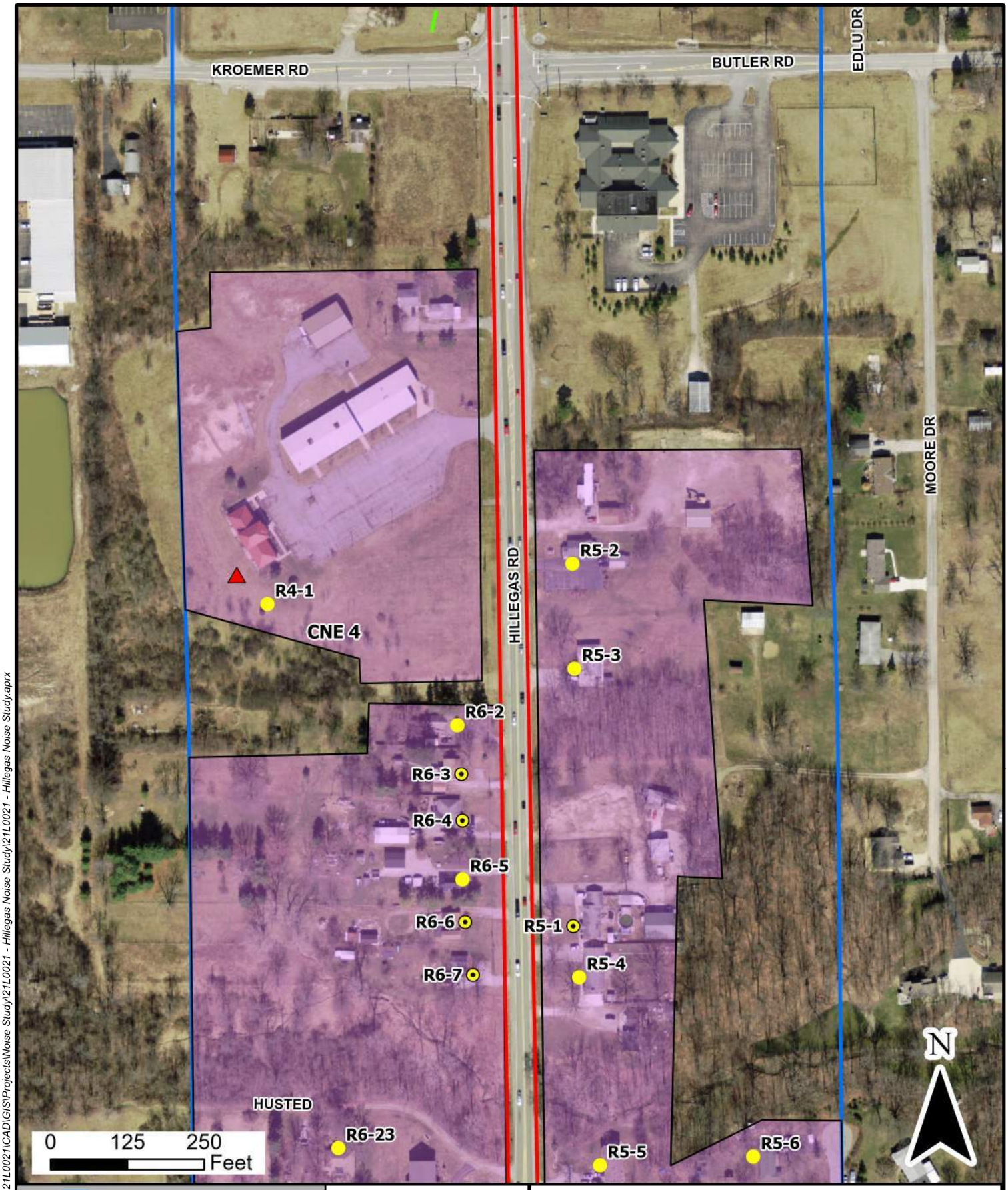
HANSON
Hanson Professional Services Inc.

Noise Map

Hillegas Road
Added Travel Lanes
Allen County, Indiana

Figure 3C

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Noise Analysis Area
Project Area
Common Noise Environment (CNE)
Impacted Receptor
Not Impacted Receptor
Field Measurement Site
66dBA Contour

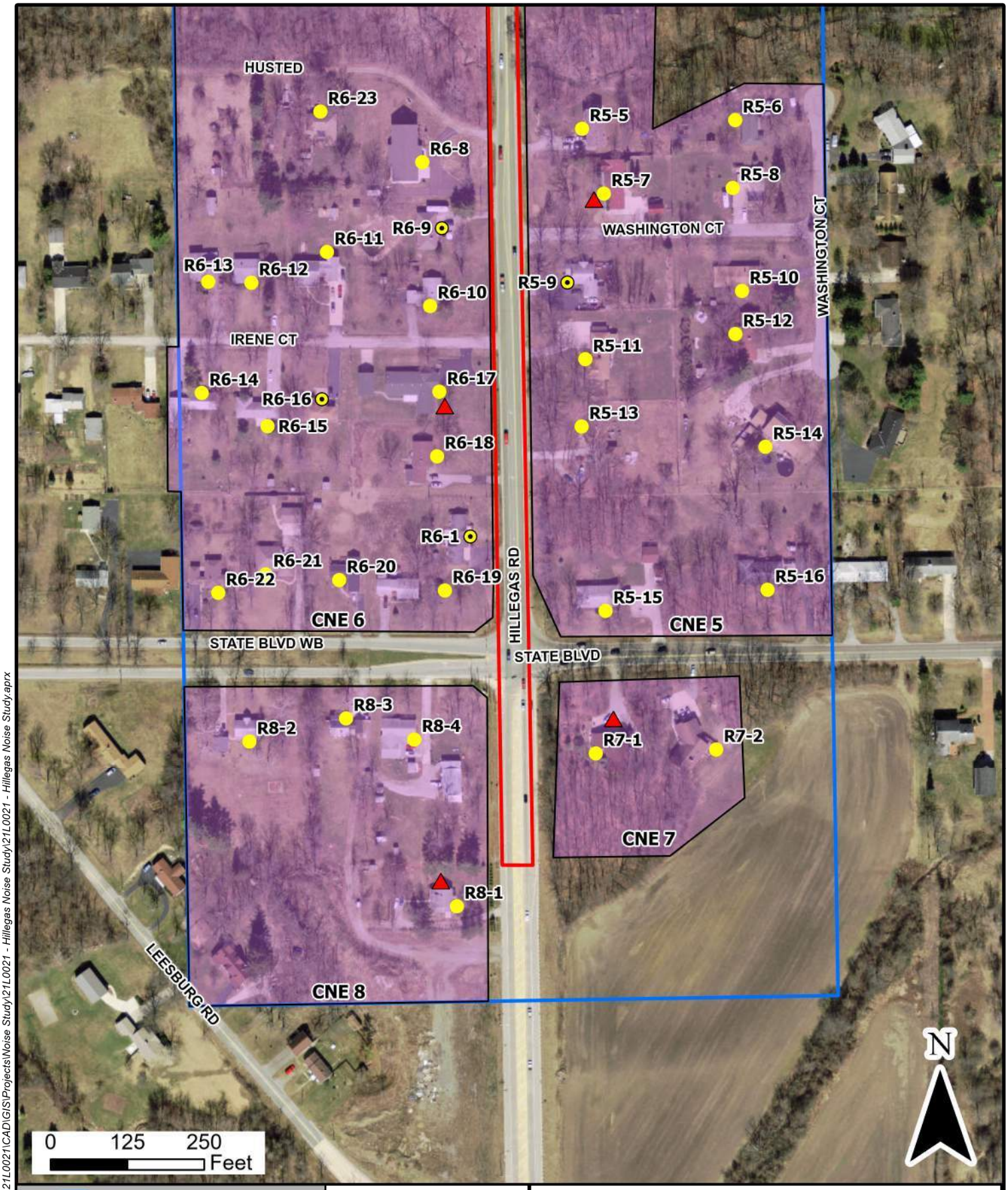
HANSON
Hanson Professional Services Inc.

Noise Map

Hillegas Road
Added Travel Lanes
Allen County, Indiana

Figure 3D

\\hanson.dom\dfs\dfrive\21jobs\21L0021\CAD\GIS\Projects\Noise Study\21L0021 - Hillegas Noise Study\21L0021 - Hillegas Noise Study.aprx



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Appendix B – Noise Measurement Data Sheets

SITE INFORMATION

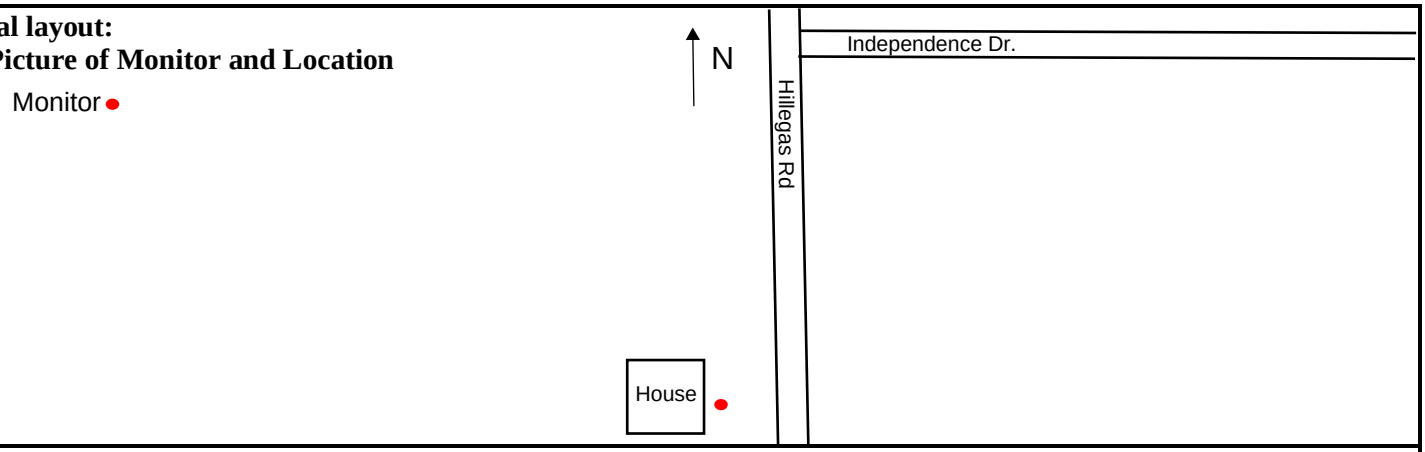
Site:	**R2**	**Investigator(s):** Ali Whitehead, Lane Page	**Weather Conditions**
			Temp (°F) 78°
			Wind (mph) N 8 mph
Meter ID:	971		**RH (%)** 49%
Meter Serial No.	40342		**Description:** partly cloudy
Data File(s): 40			

Start of Data Logging		End of Data Logging		Start of Data Logging		End of Data Logging	
Date:	8/11/22	**Date:**	8/11/22	**Date:**		**Date:**	
Time:	3:52pm	**Time:**	4:09pm	**Time:**		**Time:**	
		Duration:	16 min, 18s			**Duration:**	

DESCRIPTION OF SURROUNDINGS

Physical layout:

[X] **Picture of Monitor and Location**



Major sound generator: Hillegas Road

ADDITIONAL NOTES

Date	Time	Comment

TRAFFIC DATA

Roadway	Hillegas Road Northbound	Hillegas Road Southbound		
Cars	219	210		
Medium Truck	7	1		
Heavy Truck	4	11		
Buses				
Motorcycles				

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Engineering | Planning | Allied Services

SOUND MONITORING DATA FORM
Hillegas Road Added Travel Lanes
Allen County, IN

SITE INFORMATION

Site:	**R3**	**Investigator(s):** Ali Whitehead, Lane Page	**Weather Conditions**
			Temp (°F) 78°
			Wind (mph) N 9 mph
Meter ID:	971		**RH (%)** 48%
Meter Serial No.	40342		**Description:** partly cloudy
Data File(s): 41			

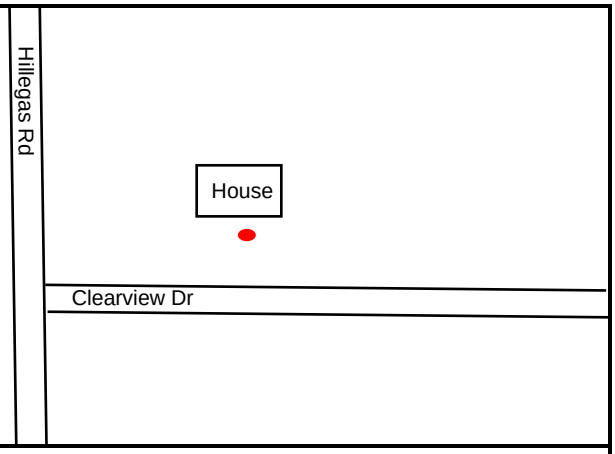
Start of Data Logging		End of Data Logging		Start of Data Logging		End of Data Logging	
Date:	8/11/22	**Date:**	8/11/22	**Date:**		**Date:**	
Time:	4:19pm	**Time:**	4:35pm	**Time:**		**Time:**	
		Duration:	16 min, 8s			**Duration:**	

DESCRIPTION OF SURROUNDINGS

Physical layout:

[X] **Picture of Monitor and Location**

● Monitor



Major sound generator: Hillegas Road

ADDITIONAL NOTES

Date	Time	Comment

TRAFFIC DATA

Roadway	Hillegas Road Northbound	Hillegas Road Southbound		
Cars	190	202		
Medium Truck	12	-		
Heavy Truck	4	1		
Buses				
Motorcycles				

HANSON Engineering | Planning | Allied Services	SOUND MONITORING DATA FORM Hillegas Road Added Travel Lanes Allen County, IN

SITE INFORMATION

Site: **R4**		**Investigator(s):** Ali Whitehead, Lane Page	**Weather Conditions**
			Temp (°F) 77°
			Wind (mph) NNE 7 mph
Meter ID: 971			**RH (%)** 50%
Meter Serial No.	40342		**Description:** partly cloudy
Data File(s): 39			

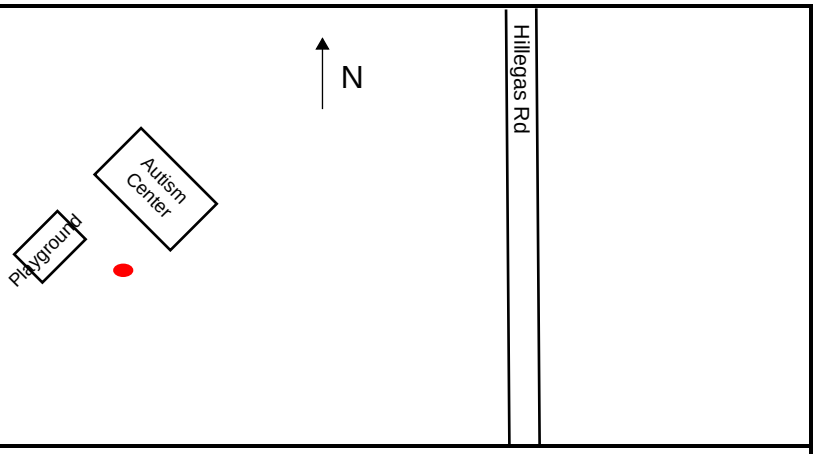
Start of Data Logging		**End of Data Logging**		**Start of Data Logging**		**End of Data Logging**	
Date:	8/11/22	**Date:**	8/11/22	**Date:**		**Date:**	
Time:	3:22pm	**Time:**	3:40pm	**Time:**		**Time:**	
		Duration:	17 min, 28s			**Duration:**	

DESCRIPTION OF SURROUNDINGS

Physical layout:

[X] **Picture of Monitor and Location**

● Monitor



Major sound generator: Hillegas Road

ADDITIONAL NOTES

Date	Time	Comment

TRAFFIC DATA

Roadway	Hillegas Road Northbound	Hillegas Road Southbound		
Cars	179	211		
Medium Truck	12	7		
Heavy Truck	7	5		
Buses				
Motorcycles				

HANSON Engineering | Planning | Allied Services	SOUND MONITORING DATA FORM Hillegas Road Added Travel Lanes Allen County, IN

SITE INFORMATION

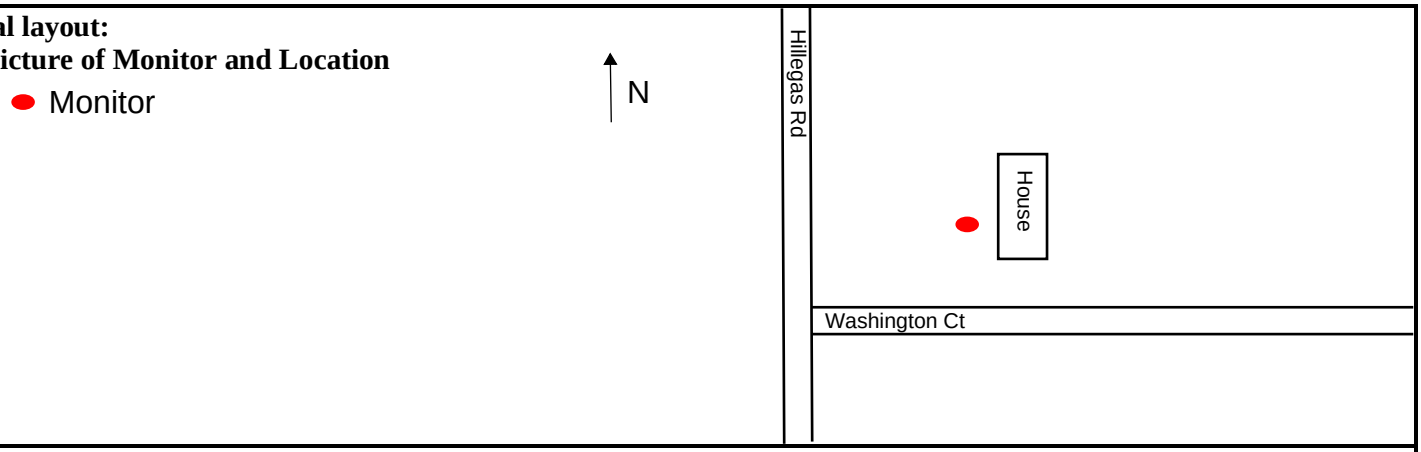
Site:	**R5**	**Investigator(s):** Ali Whitehead, Lane Page	**Weather Conditions**
			Temp (°F) 77°
			Wind (mph) NE 6 mph
Meter ID:	971		**RH (%)** 52%
Meter Serial No.	40342		**Description:** partly cloudy
Data File(s): 38			

Start of Data Logging		End of Data Logging		Start of Data Logging		End of Data Logging	
Date:	8/11/22	**Date:**	8/11/22	**Date:**		**Date:**	
Time:	2:55pm	**Time:**	3:11pm	**Time:**		**Time:**	
		Duration:	16 min, 26s			**Duration:**	

DESCRIPTION OF SURROUNDINGS

Physical layout:

[X] **Picture of Monitor and Location**



Major sound generator: Hillegas Road

ADDITIONAL NOTES

Date	Time	Comment

TRAFFIC DATA

Roadway	Hillegas Road Northbound	Hillegas Road Southbound	Washington Ct Eastbound	Washington Ct Westbound
Cars	183	181	1	-
Medium Truck	10	2	-	-
Heavy Truck	4	12	-	1
Buses				
Motorcycles				

HANSON Engineering | Planning | Allied Services	SOUND MONITORING DATA FORM Hillegas Road Added Travel Lanes Allen County, IN

SITE INFORMATION

Site:	**R6**	**Investigator(s):** Ali Whitehead, Lane Page	**Weather Conditions**
			Temp (°F) 76°
			Wind (mph) NNE 7 mph
Meter ID:	971		**RH (%)** 66%
Meter Serial No.	40342		**Description:** partly cloudy
Data File(s): 37			

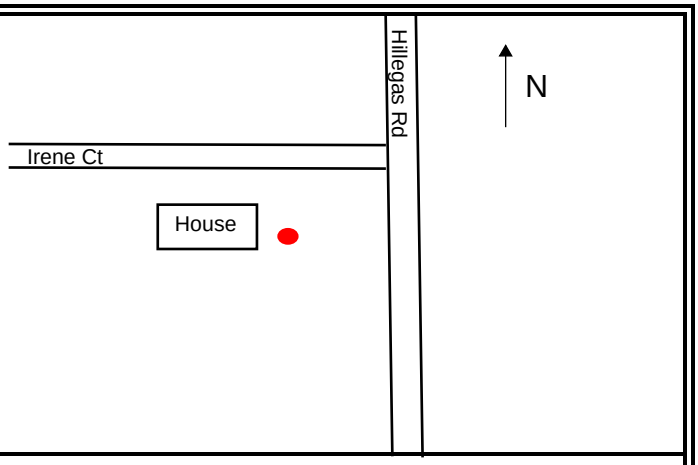
Start of Data Logging		End of Data Logging		Start of Data Logging		End of Data Logging	
Date:	8/11/22	**Date:**	8/11/22	**Date:**		**Date:**	
Time:	2:28pm	**Time:**	2:44pm	**Time:**		**Time:**	
		Duration:	16 min, 1 s			**Duration:**	

DESCRIPTION OF SURROUNDINGS

Physical layout:

[X] **Picture of Monitor and Location**

● Monitor



Major sound generator: Hillegas Road

ADDITIONAL NOTES

Date	Time	Comment

TRAFFIC DATA

Roadway	Hillegas Road Northbound	Hillegas Road Southbound	Irene Ct Eastbound	Irene Ct Westbound
Cars	159	186	-	2
Medium Truck	14	7	-	-
Heavy Truck	6	12	-	-
Buses				
Motorcycles				

HANSON
Engineering | Planning | Allied Services

SOUND MONITORING DATA FORM
Hillegas Road Added Travel Lanes
Allen County, IN

SITE INFORMATION

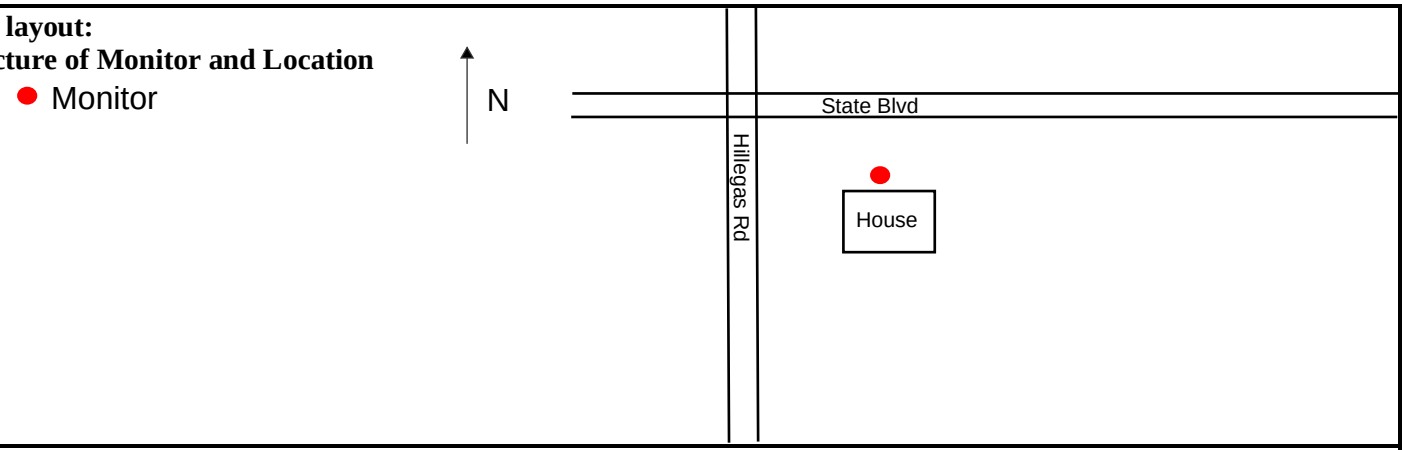
Site: **R7**		**Investigator(s):** Ali Whitehead, Lane Page	**Weather Conditions**
			Temp (°F) 74°
			Wind (mph) NNE 7 mph
Meter ID: 971			**RH (%)** 64%
Meter Serial No.	40342		**Description:** partly cloudy
Data File(s): 34			

Start of Data Logging		**End of Data Logging**		**Start of Data Logging**		**End of Data Logging**	
Date:	8/11/22	**Date:**	8/11/22	**Date:**		**Date:**	
Time:	1:11pm	**Time:**	1:29pm	**Time:**		**Time:**	
		Duration:	17 min, 28s			**Duration:**	

DESCRIPTION OF SURROUNDINGS

Physical layout:

[X] **Picture of Monitor and Location**



Major sound generator: Hillegas Road

ADDITIONAL NOTES

Date	Time	Comment

TRAFFIC DATA

Roadway	Hillegas Road Northbound	Hillegas Road Southbound	State Blvd Eastbound	State Blvd Westbound
Cars	157	163	63	67
Medium Truck	5	-	2	1
Heavy Truck	17	12	2	5
Buses				
Motorcycles				

HANSON Engineering | Planning | Allied Services	SOUND MONITORING DATA FORM Hillegas Road Added Travel Lanes Allen County, IN

SITE INFORMATION

Site: **R8**		**Investigator(s):** Ali Whitehead, Lane Page	**Weather Conditions**
			Temp (°F) 77°
			Wind (mph) NE 8 mph
Meter ID: 971			**RH (%)** 56%
Meter Serial No.	40342		**Description:** partly cloudy
Data File(s): 35			

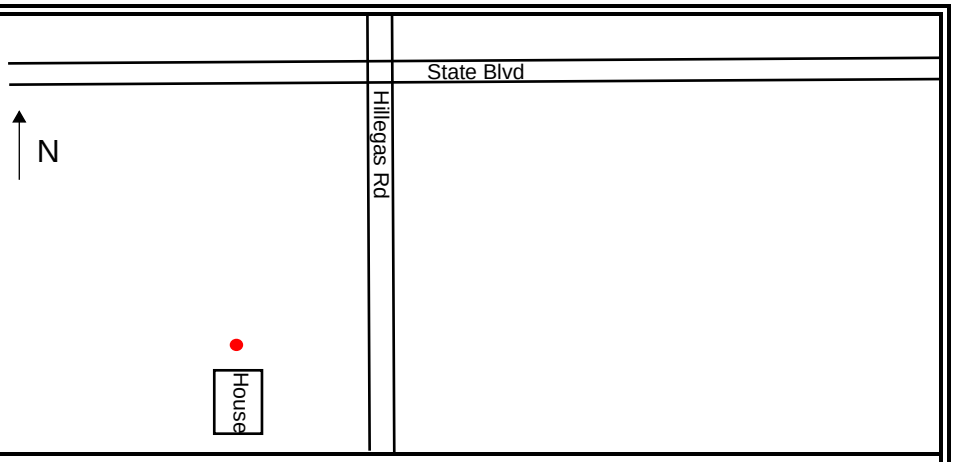
Start of Data Logging		**End of Data Logging**		**Start of Data Logging**		**End of Data Logging**	
Date:	8/11/22	**Date:**	8/11/22	**Date:**		**Date:**	
Time:	1:44pm	**Time:**	2:01pm	**Time:**		**Time:**	
		Duration:	16 min, 33s			**Duration:**	

DESCRIPTION OF SURROUNDINGS

Physical layout:

[X] **Picture of Monitor and Location**

• Monitor



Major sound generator: Hillegas Road

ADDITIONAL NOTES

Date	Time	Comment

TRAFFIC DATA

Roadway	Hillegas Road Northbound	Hillegas Road Southbound		
Cars	144	147		
Medium Truck	16	3		
Heavy Truck	3	13		
Buses				
Motorcycles				

HANSON Engineering | Planning | Allied Services	SOUND MONITORING DATA FORM Hillegas Road Added Travel Lanes Allen County, IN

Appendix C – Sound Level Meter Calibration Certificates

e-mail: service@sensidyne.com Tel.: +727-530-3602 ext. 781 www.sensidyne.com

SENSIDYNE®
Industrial Health & Safety Instrumentation
Calibration Laboratory

1000 112th Circle North Suite 100
Saint Petersburg, FL 33716
USA

ACCREDITED
Certificate No. 3943.01

CALIBRATION CERTIFICATE

Date of issue: September 2, 2021 **Certificate No:** 020921-2 **Page:** 1/2

OBJECT OF CALIBRATION	Sound calibrator type SV 34, serial number 48777, manufacturer Svantek.
APPLICANT	U.S. Environmental Rental 781 Industrial Drive Elmhurst, IL 60126
CALIBRATION METHOD	Method described in instruction W10101 "Calibration of Acoustic Calibrators", ", rev -, dated 09/03/15, written on the basis of international standard EN IEC 60942:2005 Electroacoustics – Sound calibrators.
ENVIRONMENTAL CONDITIONS	Temperature: (24.0 ÷ 24.3) °C Ambient pressure: (101.34 ÷ 101.36) kPa Relative humidity: (53.0 ÷ 52.5) %
DATE OF CALIBRATION	2021-09-02
TRACEABILITY	This certificate is issued under the agreement EA MLA in the field of calibration and provides traceability of measurement results to the standards maintained in the Central Office of Measures.
CALIBRATION RESULTS	The results are presented on page 2 of this certificate including measurement uncertainty.
UNCERTAINTY OF MEASUREMENTS	Uncertainty of measurement has been evaluated in compliance with EA-4/02:2013 and listed on page 2. The expanded uncertainty assigned corresponds to a coverage probability of 95 % and the coverage factor $k = 2$.
CONFORMITY WITH REQUIREMENTS	On the basis of the calibration results, it has been found that sound calibrator meets metrological requirements specified in the standard EN 60942 Electroacoustics – Sound calibrators, for class 1.

The certificate may be presented or copied as a whole document only.

CALIBRATION RESULTS Calibration results are the following:

For nominal level 94 dB

1. Sound pressure level generated by the sound calibrator in the reference conditions of 101,325 kPa for static pressure, 23 °C for temperature and 50 % for relative humidity results:

(0.00 ± 0,15) dB

2. Frequency of sound pressure results:

(0.00 ± 0,1) Hz

3. Total harmonic distortion of sound pressure results:

(0.00 ± 0,12) %

For nominal level 114 dB

1. Sound pressure level generated by the sound calibrator in the reference conditions of 101,325 kPa for static pressure, 23 °C for temperature and 50 % for relative humidity results:

(114.01 ± 0,15) dB

2. Frequency of sound pressure results:

(999.96 ± 0,1) Hz

3. Total harmonic distortion of sound pressure results:

(0.20 ± 0,12) %

Authorized by: Michael Sexton

e-mail: service@sensidyne.com Tel.: +727-530-3602 ext. 781 www.sensidyne.com

SENSIDYNE®
Industrial Health & Safety Instrumentation
Calibration Laboratory

1000 112th Circle North Suite 100
Saint Petersburg, FL 33716
USA

ACCREDITED
Certificate No. 3943.01

CALIBRATION CERTIFICATE

Date of issue: September 13, 2021 **Certificate No:** 130921-1 **Page:** 1/6

OBJECT OF CALIBRATION	Sound level meter type SVAN 971, number 40342, manufacturer SVANTEK with preamplifier type SV18, number 33312, manufacturer SVANTEK and microphone type 7052E, number 73409, manufacturer ACO.
APPLICANT	U.S. Environmental Rental 781 Industrial Dr. Elmhurst, IL 60126
CALIBRATION METHOD	Method described in instruction WI0102 "Calibration of Sound Level Meters", rev -, dated 09/03/15, written on the basis of international standard EN IEC 61672-3:2006 Electroacoustics. Part 3: Periodic tests.
ENVIRONMENTAL CONDITIONS	Temperature: (23.5 ÷ 23.7) °C Ambient pressure: (101.8 ÷ 101.9) kPa Relative humidity: (43 ÷ 49) %
DATE OF CALIBRATION	13-09-2021
TRACEABILITY	Calibration results were referred to primary standard of sound pressure maintained in the Central Office of Measures with the application of the working standard – sound calibrator type SV 30A, No 48714, manufactured by SVANTEK.
CALIBRATION RESULTS	The results are presented on pages 2 ÷ 6 of this certificate including measurement uncertainty.
UNCERTAINTY OF MEASUREMENTS	Uncertainty of measurement has been evaluated in compliance with EA-4/02:2013. The expanded uncertainty assigned corresponds to a coverage probability of 95 % and the coverage factor $k = 2$.
CONFORMITY WITH REQUIREMENTS	On the basis of the calibration results, it has been found that sound level meter meets metrological requirements specified in the standard IEC 61672-1:2002 Electroacoustics – Sound level meters. Part 1: Specifications, for class 1.

The certificate may be presented or copied as a whole document only.

CALIBRATION RESULTS Calibration results are the following:

1. **Indication at the calibration check frequency**

The sound level meter was calibrated in compliance with the instruction manual. During this process, the indication of this SLM was adjusted to the sound pressure level of the sound level calibrator type SV 30A, No 48714, from SVANTEK. The sound pressure level was corrected by the free-field factor.

Deviation of the acoustic pressure measurement of the A-weighted sound level using the sound calibrator type SV 30A, No 48714, from SVANTEK, was made according to the standard reference conditions: for static pressure 101,325 kPa, for temperature 23 °C and for relative humidity 50 %, results:

(0.0 ± 0.2) dB

The deviation was determined as a difference between the measured sound level and the sound level corrected by the free-field factor appropriate to mentioned sound calibrator.

2. **Self-generated noise with microphone installed**

Frequency weighting	A
The highest level of self-generated noise stated in the instruction manual [dB]	15,0
Indication [dB]	11.1

3. **Self-generated noise with microphone replaced by the electrical input signal device**

Frequency weighting	A	C	Z
The highest expected level of self-generated noise stated in the instruction manual [dB]	12.0	12.0	17.0
Level of self-generated noise [dB]	5.6	5.7	13.6

4. **Acoustical signal tests of a frequency weighting C**

Frequency [Hz]	The deviation of frequency weighting [dB]	Extended uncertainty [dB]	Tolerance limits [dB]
125,0	-0.1	0,3	±1,5
1000,0	0.0	0,3	±1,1
4000,0	0.7	0,4	±1,6
8000,0	1.2	0,4	-3,1; +2,5

Authorized by: Michael Sexton

5. Electrical signal tests of frequency weightings

Frequency [Hz]	The deviation of frequency weighting [dB]			Extended uncertainty [dB]	Tolerance limits [dB]
	A	C	Z		
63,0	0.0	-0.1	0.0	0,3	±1,5
125,0	0.0	0.0	0.0	0,3	±1,5
250,0	-0.2	-0.1	-0.1	0,3	±1,4
500,0	-0.1	0.0	0.0	0,3	±1,4
1000,0	0.1	0.1	0.1	0,3	±1,1
2000,0	0.5	0.5	0.5	0,3	±1,6
4000,0	0.7	0.7	0.7	0,3	±1,6
8000,0	1.0	1.0	0.9	0,4	-3,1; +2,5
16000,0	-0.3	-0.4	-0.1	0,6	-17,0; +3,5

6. Frequency and time weightings at 1 kHz

	Sound level				Time-averaged sound level
Frequency weighting	A	A	C	Z	A
Time weighting	Fast	Slow	Fast	Fast	-
Indication [dB]	114.0	114.0	114.0	114.0	114.0
The deviation of indication from the indication of A-weighted sound level with Fast time weighting [dB]		0.0	0.0	0.0	0.0
Extended uncertainty [dB]		0.1			
Tolerance limits [dB]		±0,3	±0,4	±0,4	±0,3

Authorized by: Michael Sexton

7. Level linearity on the reference level range

Range: HIGH

Expected sound level [dB]	Level linearity error [dB]	Extended uncertainty [dB]	Tolerance limits [dB]
122.0	0.0		
121.0	0.0		
120.0	0.0		
119.0	0.0		
118.0	0.0		
117.0	0.0		
116.0	0.0		
115.0	0.0		
114.0	0.0		
109.0	0.0		
104.0	0.0		
99.0	0.0		
94.0	0.0		
89.0	0.0		
84.0	0.0	0,2	
79.0	0.0		
74.0	0.0		±1,1
69.0	0.0		
64.0	0.0		
59.0	0.0		
54.0	0.0		
49.0	0.0		
44.0	0.0		
39.0	0.0		
34.0	0.0		
33.0	0.0		
32.0	0.0		
31.0	0.0		
30.0	0.0		
29.0	0.0		
28.0	0.0		
27.0	0.0	0,3	
26.0	0.0		
25.0	0.1		

Authorized by: Michael Sexton

8. Level linearity including the level range control

Level range	HIGH	LOW
Indication for the reference sound pressure level [dB]	114.0	114.0
The deviation of indication [dB]		0.0
Anticipated level that is 5 dB less than the upper limit specified in the instruction manual for level range at 1 kHz [dB]	118.0	132.0
Indication [dB]	118.0	132.0
The deviation of indication [dB]	0.0	0.0
Extended uncertainty [dB]	0.2	
Tolerance limits [dB]	±1,1	

9. Toneburst response

Measurement quantity	Time weighting	Toneburst duration [ms]	The indications in response to toneburst relative to the steady sound level [dB]	Reference toneburst response relative to the steady sound level [dB]	The deviations of the measured toneburst in responses from the corresponding reference toneburst [dB]	Extended uncertainty [dB]	Tolerance limits [dB]
Time-weighted sound level	Fast	200	-1.0	-1,0	0.0	0.2	±0,8
		2	-18.0	-18,0	0.0		-1,8; +1,3
		0,25	-27.1	-27,0	-0.1		-3,3; +1,3
Time-weighted sound level	Slow	200	-7.5	-7,4	-0.1		±0,8
		2	-27.1	-27,0	-0.1		-1,8; +1,3
Sound exposure level	-	200	-7.0	-7,0	0.0		±0,8
		2	-27.0	-27,0	0.0		-1,8; +1,3
		0,25	-36.1	-36,0	-0.1		-3,3; +1,3

10. Peak C sound level

Numbers of cycles in test signal	Frequency of test signal [Hz]	The deviation of indication [dB]	Extended uncertainty [dB]	Tolerance limits [dB]
One	8000	-0.5	0,2	±2,4
Positive half-cycle	500	0.0		±1,4
Negative half-cycle	500	0.0		

11. Overload indication

Frequency weighting A

The difference between the levels of the positive and negative one-half-cycles input signals that first cause the displays of overload indication [dB]	Extended uncertainty [dB]	Maximum value of the difference [dB]
0.2	0,3	1,8

Authorized by: Michael Sexton

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Appendix D – Predicted Noise Levels

Hanson Professional Services
Ali Whitehead
29 September 2022
TNM 2.5
Calculated with TNM 2.5

RESULTS: SOUND LEVELS
PROJECT/CONTRACT: Hillegas Road
RUN: Calibration
BARRIER DESIGN: INPUT HEIGHTS
ATMOSPHERICS: 77 deg F, 55% RH

Average pavement type shall be used unless a State highway agency substantiates the use of a different type with approval of FHWA.

Receiver Name	No.	#DUs	Existing LAeq1h	No Barrier LAeq1h Calculated	Crit'n	Increase over existing Calculated	Crit'n Sub'l Inc	Type Impact	With Barrier Calculated LAeq1h	Noise Reduction Calculated	Goal	Calculated minus Goal
			dBA	dBA	dBA	dB	dB		dBA	dB	dB	dB
R2	9	1	0.0	66.9	66	66.9	10	Snd Lvl	66.9	0.0	8	-8.0
R3	10	1	0.0	60.9	66	60.9	10	----	60.9	0.0	8	-8.0
R4	11	1	0.0	52.8	66	52.8	10	----	52.8	0.0	8	-8.0
R5	12	1	0.0	61.6	66	61.6	10	----	61.6	0.0	8	-8.0
R6	13	1	0.0	63.9	66	63.9	10	----	63.9	0.0	8	-8.0
R7	14	1	0.0	63.2	66	63.2	10	----	63.2	0.0	8	-8.0
R8	15	1	0.0	64.0	66	64.0	10	----	64.0	0.0	8	-8.0

Dwelling Units	# DUs	Noise Reduction Min	Avg	Max
		dB	dB	dB
All Selected	7	0.0	0.0	0.0
All Impacted	1	0.0	0.0	0.0
All that meet NR Goal	0	0.0	0.0	0.0

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Hanson Professional Services
Ali Whitehead

29 September 2022
TNM 2.5
Calculated with TNM 2.5

RESULTS: SOUND LEVELS
PROJECT/CONTRACT: Hillegas Road
RUN: Existing
BARRIER DESIGN: INPUT HEIGHTS
ATMOSPHERICS: 77 deg F, 55% RH

Average pavement type shall be used unless a State highway agency substantiates the use of a different type with approval of FHWA.

Receiver Name	No.	#DUs	Existing LAeq1h	No Barrier LAeq1h Calculated	Crit'n	Increase over existing Calculated	Crit'n Sub'l Inc	Type Impact	With Barrier Calculated LAeq1h	Noise Reduction Calculated	Goal	Calculated minus Goal
			dBA	dBA	dBA	dB	dB		dBA	dB	dB	dB
R1-1	9	1	0.0	61.4	66	61.4	10	----	61.4	0.0	8	-8.0
R2-1	10	1	0.0	64.6	66	64.6	10	----	64.6	0.0	8	-8.0
R3-1	11	1	0.0	61.6	66	61.6	10	----	61.6	0.0	8	-8.0
R4-1	12	1	0.0	52.8	66	52.8	10	----	52.8	0.0	8	-8.0
R5-1	13	1	0.0	65.7	66	65.7	10	----	65.7	0.0	8	-8.0
R6-1	14	1	0.0	67.4	66	67.4	10	Snd Lvl	67.4	0.0	8	-8.0
R7-1	15	1	0.0	63.2	66	63.2	10	----	63.2	0.0	8	-8.0
R8-1	17	1	0.0	64.3	66	64.3	10	----	64.3	0.0	8	-8.0
R3-4	18	1	0.0	52.6	66	52.6	10	----	52.6	0.0	8	-8.0
R3-2	19	1	0.0	61.8	66	61.8	10	----	61.8	0.0	8	-8.0
R3-3	20	1	0.0	56.1	66	56.1	10	----	56.1	0.0	8	-8.0
R5-2	21	1	0.0	64.4	66	64.4	10	----	64.4	0.0	8	-8.0
R5-3	22	1	0.0	64.7	66	64.7	10	----	64.7	0.0	8	-8.0
R5-4	23	1	0.0	65.0	66	65.0	10	----	65.0	0.0	8	-8.0
R5-5	24	1	0.0	61.9	66	61.9	10	----	61.9	0.0	8	-8.0
R5-7	25	1	0.0	60.0	66	60.0	10	----	60.0	0.0	8	-8.0
R5-8	26	1	0.0	52.5	66	52.5	10	----	52.5	0.0	8	-8.0
R5-6	27	1	0.0	52.3	66	52.3	10	----	52.3	0.0	8	-8.0
R6-2	28	1	0.0	65.0	66	65.0	10	----	65.0	0.0	8	-8.0
R6-3	29	1	0.0	65.4	66	65.4	10	----	65.4	0.0	8	-8.0

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R6-4	30	1	0.0	65.5	66	65.5	10	----	65.5	0.0	8	-8.0
R6-5	31	1	0.0	65.4	66	65.4	10	----	65.4	0.0	8	-8.0
R6-6	32	1	0.0	65.6	66	65.6	10	----	65.6	0.0	8	-8.0
R6-7	33	1	0.0	66.6	66	66.6	10	Snd Lvl	66.6	0.0	8	-8.0
R6-8	34	1	0.0	61.3	66	61.3	10	----	61.3	0.0	8	-8.0
R6-9	35	1	0.0	62.9	66	62.9	10	----	62.9	0.0	8	-8.0
R6-10	36	1	0.0	61.1	66	61.1	10	----	61.1	0.0	8	-8.0
R6-11	37	1	0.0	54.7	66	54.7	10	----	54.7	0.0	8	-8.0
R6-12	38	1	0.0	51.4	66	51.4	10	----	51.4	0.0	8	-8.0
R6-13	39	1	0.0	50.1	66	50.1	10	----	50.1	0.0	8	-8.0
R6-17	40	1	0.0	62.0	66	62.0	10	----	62.0	0.0	8	-8.0
R6-16	41	1	0.0	54.3	66	54.3	10	----	54.3	0.0	8	-8.0
R6-15	42	1	0.0	51.9	66	51.9	10	----	51.9	0.0	8	-8.0
R6-14	43	1	0.0	50.0	66	50.0	10	----	50.0	0.0	8	-8.0
R6-18	44	1	0.0	61.5	66	61.5	10	----	61.5	0.0	8	-8.0
R6-19	45	1	0.0	63.1	66	63.1	10	----	63.1	0.0	8	-8.0
R6-20	46	1	0.0	55.9	66	55.9	10	----	55.9	0.0	8	-8.0
R6-21	47	1	0.0	53.2	66	53.2	10	----	53.2	0.0	8	-8.0
R6-22	48	1	0.0	51.7	66	51.7	10	----	51.7	0.0	8	-8.0
R8-2	49	1	0.0	53.1	66	53.1	10	----	53.1	0.0	8	-8.0
R8-3	50	1	0.0	57.5	66	57.5	10	----	57.5	0.0	8	-8.0
R8-4	52	1	0.0	61.4	66	61.4	10	----	61.4	0.0	8	-8.0
R5-9	53	1	0.0	63.5	66	63.5	10	----	63.5	0.0	8	-8.0
R5-11	54	1	0.0	61.2	66	61.2	10	----	61.2	0.0	8	-8.0
R5-13	55	1	0.0	61.7	66	61.7	10	----	61.7	0.0	8	-8.0
R5-15	56	1	0.0	63.3	66	63.3	10	----	63.3	0.0	8	-8.0
R5-16	57	1	0.0	58.1	66	58.1	10	----	58.1	0.0	8	-8.0
R5-10	58	1	0.0	52.4	66	52.4	10	----	52.4	0.0	8	-8.0
R5-12	59	1	0.0	52.9	66	52.9	10	----	52.9	0.0	8	-8.0
R5-14	60	1	0.0	52.6	66	52.6	10	----	52.6	0.0	8	-8.0
R7-2	61	1	0.0	56.3	66	56.3	10	----	56.3	0.0	8	-8.0
R6-23	62	1	0.0	54.6	66	54.6	10	----	54.6	0.0	8	-8.0

Dwelling Units	**# DUs**	**Noise Reduction**		
		Min	**Avg**	**Max**
		dB	**dB**	**dB**
All Selected	52	0.0	0.0	0.0
All Impacted	2	0.0	0.0	0.0

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All that meet NR Goal		0	0.0	0.0	0.0							

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Hanson Professional Services
Ali Whitehead

29 September 2022
TNM 2.5
Calculated with TNM 2.5

RESULTS: SOUND LEVELS
PROJECT/CONTRACT: Hillegas Road
RUN: Future No Build
BARRIER DESIGN: INPUT HEIGHTS
ATMOSPHERICS: 77 deg F, 55% RH

Average pavement type shall be used unless a State highway agency substantiates the use of a different type with approval of FHWA.

Receiver Name	No.	#DUs	Existing LAeq1h	No Barrier LAeq1h Calculated	Crit'n	Increase over existing Calculated	Crit'n Sub'l Inc	Type Impact	With Barrier Calculated LAeq1h	Noise Reduction Calculated	Goal	Calculated minus Goal
			dBA	dBA	dBA	dB	dB		dBA	dB	dB	dB
R1-1	9	1	0.0	62.4	66	62.4	10	----	62.4	0.0	8	-8.0
R2-1	10	1	0.0	65.4	66	65.4	10	----	65.4	0.0	8	-8.0
R3-1	11	1	0.0	62.4	66	62.4	10	----	62.4	0.0	8	-8.0
R4-1	12	1	0.0	53.7	66	53.7	10	----	53.7	0.0	8	-8.0
R5-1	13	1	0.0	66.5	66	66.5	10	Snd Lvl	66.5	0.0	8	-8.0
R6-1	14	1	0.0	68.3	66	68.3	10	Snd Lvl	68.3	0.0	8	-8.0
R7-1	15	1	0.0	64.1	66	64.1	10	----	64.1	0.0	8	-8.0
R8-1	17	1	0.0	65.1	66	65.1	10	----	65.1	0.0	8	-8.0
R3-4	18	1	0.0	53.5	66	53.5	10	----	53.5	0.0	8	-8.0
R3-2	19	1	0.0	62.6	66	62.6	10	----	62.6	0.0	8	-8.0
R3-3	20	1	0.0	57.0	66	57.0	10	----	57.0	0.0	8	-8.0
R5-2	21	1	0.0	65.2	66	65.2	10	----	65.2	0.0	8	-8.0
R5-3	22	1	0.0	65.5	66	65.5	10	----	65.5	0.0	8	-8.0
R5-4	23	1	0.0	65.8	66	65.8	10	----	65.8	0.0	8	-8.0
R5-5	24	1	0.0	62.7	66	62.7	10	----	62.7	0.0	8	-8.0
R5-7	25	1	0.0	60.8	66	60.8	10	----	60.8	0.0	8	-8.0
R5-8	26	1	0.0	53.4	66	53.4	10	----	53.4	0.0	8	-8.0
R5-6	27	1	0.0	53.2	66	53.2	10	----	53.2	0.0	8	-8.0
R6-2	28	1	0.0	65.8	66	65.8	10	----	65.8	0.0	8	-8.0
R6-3	29	1	0.0	66.2	66	66.2	10	Snd Lvl	66.2	0.0	8	-8.0

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R6-4	30	1	0.0	66.3	66	66.3	10	Snd Lvl	66.3	0.0	8	-8.0
R6-5	31	1	0.0	66.2	66	66.2	10	Snd Lvl	66.2	0.0	8	-8.0
R6-6	32	1	0.0	66.4	66	66.4	10	Snd Lvl	66.4	0.0	8	-8.0
R6-7	33	1	0.0	67.4	66	67.4	10	Snd Lvl	67.4	0.0	8	-8.0
R6-8	34	1	0.0	62.1	66	62.1	10	----	62.1	0.0	8	-8.0
R6-9	35	1	0.0	63.8	66	63.8	10	----	63.8	0.0	8	-8.0
R6-10	36	1	0.0	61.9	66	61.9	10	----	61.9	0.0	8	-8.0
R6-11	37	1	0.0	55.6	66	55.6	10	----	55.6	0.0	8	-8.0
R6-12	38	1	0.0	52.3	66	52.3	10	----	52.3	0.0	8	-8.0
R6-13	39	1	0.0	50.9	66	50.9	10	----	50.9	0.0	8	-8.0
R6-17	40	1	0.0	62.8	66	62.8	10	----	62.8	0.0	8	-8.0
R6-16	41	1	0.0	55.1	66	55.1	10	----	55.1	0.0	8	-8.0
R6-15	42	1	0.0	52.8	66	52.8	10	----	52.8	0.0	8	-8.0
R6-14	43	1	0.0	50.8	66	50.8	10	----	50.8	0.0	8	-8.0
R6-18	44	1	0.0	62.4	66	62.4	10	----	62.4	0.0	8	-8.0
R6-19	45	1	0.0	63.9	66	63.9	10	----	63.9	0.0	8	-8.0
R6-20	46	1	0.0	56.7	66	56.7	10	----	56.7	0.0	8	-8.0
R6-21	47	1	0.0	54.0	66	54.0	10	----	54.0	0.0	8	-8.0
R6-22	48	1	0.0	52.5	66	52.5	10	----	52.5	0.0	8	-8.0
R8-2	49	1	0.0	53.9	66	53.9	10	----	53.9	0.0	8	-8.0
R8-3	50	1	0.0	58.3	66	58.3	10	----	58.3	0.0	8	-8.0
R8-4	51	1	0.0	62.2	66	62.2	10	----	62.2	0.0	8	-8.0
R5-9	52	1	0.0	64.3	66	64.3	10	----	64.3	0.0	8	-8.0
R5-11	53	1	0.0	62.0	66	62.0	10	----	62.0	0.0	8	-8.0
R5-13	54	1	0.0	62.5	66	62.5	10	----	62.5	0.0	8	-8.0
R5-15	55	1	0.0	64.2	66	64.2	10	----	64.2	0.0	8	-8.0
R5-16	56	1	0.0	59.2	66	59.2	10	----	59.2	0.0	8	-8.0
R5-10	57	1	0.0	53.3	66	53.3	10	----	53.3	0.0	8	-8.0
R5-12	58	1	0.0	53.7	66	53.7	10	----	53.7	0.0	8	-8.0
R5-14	59	1	0.0	53.5	66	53.5	10	----	53.5	0.0	8	-8.0
R7-2	60	1	0.0	57.2	66	57.2	10	----	57.2	0.0	8	-8.0
R6-23	61	1	0.0	55.4	66	55.4	10	----	55.4	0.0	8	-8.0

Dwelling Units	**# DUs**	**Noise Reduction**		
		Min	**Avg**	**Max**
		dB	**dB**	**dB**
All Selected	52	0.0	0.0	0.0
All Impacted	7	0.0	0.0	0.0

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All that meet NR Goal		0	0.0	0.0	0.0							

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Hanson Professional Services, Inc.
29 September 2022
EMS
TNM 2.5
Calculated with TNM 2.5

RESULTS: SOUND LEVELS
PROJECT/CONTRACT: 21L0021 - Hillegas Road Added Lanes
RUN: 2045 Proposed
BARRIER DESIGN: INPUT HEIGHTS
Average pavement type shall be used unless a State highway agency substantiates the use of a different type with approval of FHWA.
ATMOSPHERICS: 68 deg F, 50% RH

Receiver Name	No.	#DUs	Existing LAeq1h	No Barrier LAeq1h Calculated	Crit'n	Increase over existing Calculated	Crit'n Sub'l Inc	Type Impact	With Barrier Calculated LAeq1h	Noise Reduction Calculated	Goal	Calculated minus Goal
			dBA	dBA	dBA	dB	dB		dBA	dB	dB	dB
R1-1	9	1	0.0	62.6	66	62.6	10	----	62.6	0.0	8	-8.0
R2-1	10	1	0.0	66.0	66	66.0	10	Snd Lvl	66.0	0.0	8	-8.0
R3-1	11	1	0.0	64.1	66	64.1	10	----	64.1	0.0	8	-8.0
R4-1	12	1	0.0	55.0	66	55.0	10	----	55.0	0.0	8	-8.0
R5-1	13	1	0.0	66.8	66	66.8	10	Snd Lvl	66.8	0.0	8	-8.0
R6-1	14	1	0.0	70.4	66	70.4	10	Snd Lvl	70.4	0.0	8	-8.0
R7-1	15	1	0.0	63.2	66	63.2	10	----	63.2	0.0	8	-8.0
R8-1	17	1	0.0	57.4	66	57.4	10	----	57.4	0.0	8	-8.0
R3-4	18	1	0.0	55.4	66	55.4	10	----	55.4	0.0	8	-8.0
R3-2	19	1	0.0	63.3	66	63.3	10	----	63.3	0.0	8	-8.0
R3-3	20	1	0.0	59.2	66	59.2	10	----	59.2	0.0	8	-8.0
R5-2	21	1	0.0	65.7	66	65.7	10	----	65.7	0.0	8	-8.0
R5-3	22	1	0.0	65.6	66	65.6	10	----	65.6	0.0	8	-8.0
R5-4	23	1	0.0	65.8	66	65.8	10	----	65.8	0.0	8	-8.0
R5-5	24	1	0.0	64.1	66	64.1	10	----	64.1	0.0	8	-8.0
R5-7	25	1	0.0	62.9	66	62.9	10	----	62.9	0.0	8	-8.0
R5-8	26	1	0.0	55.6	66	55.6	10	----	55.6	0.0	8	-8.0
R5-6	27	1	0.0	55.2	66	55.2	10	----	55.2	0.0	8	-8.0
R6-2	28	1	0.0	65.6	66	65.6	10	----	65.6	0.0	8	-8.0
R6-3	29	1	0.0	66.2	66	66.2	10	Snd Lvl	66.2	0.0	8	-8.0

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R6-4	30	1	0.0	66.2	66	66.2	10	Snd Lvl	66.2	0.0	8	-8.0
R6-5	31	1	0.0	65.3	66	65.3	10	----	65.3	0.0	8	-8.0
R6-6	32	1	0.0	66.6	66	66.6	10	Snd Lvl	66.6	0.0	8	-8.0
R6-7	33	1	0.0	67.9	66	67.9	10	Snd Lvl	67.9	0.0	8	-8.0
R6-8	34	1	0.0	64.3	66	64.3	10	----	64.3	0.0	8	-8.0
R6-9	35	1	0.0	66.7	66	66.7	10	Snd Lvl	66.7	0.0	8	-8.0
R6-10	36	1	0.0	65.2	66	65.2	10	----	65.2	0.0	8	-8.0
R6-11	37	1	0.0	58.4	66	58.4	10	----	58.4	0.0	8	-8.0
R6-12	38	1	0.0	54.5	66	54.5	10	----	54.5	0.0	8	-8.0
R6-13	39	1	0.0	53.0	66	53.0	10	----	53.0	0.0	8	-8.0
R6-17	40	1	0.0	66.1	66	66.1	10	Snd Lvl	66.1	0.0	8	-8.0
R6-16	41	1	0.0	58.1	66	58.1	10	----	58.1	0.0	8	-8.0
R6-15	42	1	0.0	55.1	66	55.1	10	----	55.1	0.0	8	-8.0
R6-14	43	1	0.0	52.6	66	52.6	10	----	52.6	0.0	8	-8.0
R6-18	44	1	0.0	65.6	66	65.6	10	----	65.6	0.0	8	-8.0
R6-19	45	1	0.0	65.3	66	65.3	10	----	65.3	0.0	8	-8.0
R6-20	46	1	0.0	58.4	66	58.4	10	----	58.4	0.0	8	-8.0
R6-21	47	1	0.0	54.9	66	54.9	10	----	54.9	0.0	8	-8.0
R6-22	48	1	0.0	53.4	66	53.4	10	----	53.4	0.0	8	-8.0
R8-2	49	1	0.0	52.8	66	52.8	10	----	52.8	0.0	8	-8.0
R8-3	50	1	0.0	57.9	66	57.9	10	----	57.9	0.0	8	-8.0
R8-4	51	1	0.0	60.8	66	60.8	10	----	60.8	0.0	8	-8.0
R5-9	52	1	0.0	66.9	66	66.9	10	Snd Lvl	66.9	0.0	8	-8.0
R5-11	53	1	0.0	65.2	66	65.2	10	----	65.2	0.0	8	-8.0
R5-13	54	1	0.0	65.6	66	65.6	10	----	65.6	0.0	8	-8.0
R5-15	55	1	0.0	64.5	66	64.5	10	----	64.5	0.0	8	-8.0
R5-16	56	1	0.0	59.1	66	59.1	10	----	59.1	0.0	8	-8.0
R5-10	57	1	0.0	55.5	66	55.5	10	----	55.5	0.0	8	-8.0
R5-12	58	1	0.0	55.9	66	55.9	10	----	55.9	0.0	8	-8.0
R5-14	59	1	0.0	54.3	66	54.3	10	----	54.3	0.0	8	-8.0
R7-2	60	1	0.0	57.0	66	57.0	10	----	57.0	0.0	8	-8.0
R6-23	61	1	0.0	57.6	66	57.6	10	----	57.6	0.0	8	-8.0

Dwelling Units	**# DUs**	**Noise Reduction**		
		Min	**Avg**	**Max**
		dB	**dB**	**dB**
All Selected	52	0.0	0.0	0.0
All Impacted	10	0.0	0.0	0.0

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All that meet NR Goal		0	0.0	0.0	0.0							

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Appendix E – Traffic Data

Hillegas		
2021 AADT	19,958	VPD
2045 AADT	24,091	VPD
2021 DHV	2,417	VPH
2045 DHV	2,918	VPH
Directional Distribution	52	%
Speed Limit	45	MPH
Trucks	1.3	%

I-69		
2021 AADT	70,784	VPD
2045 AADT	88,720	VPD
2021 DHV	7,078	VPH
2045 DHV	8,872	VPH
Directional Distribution	62	%
Speed Limit	65	MPH
Trucks	5	%

State Blvd.		
2021 AADT	8,612	VPD
2045 AADT	10,693	VPD
2021 DHV	861	VPH
2045 DHV	1,069	VPH
Directional Distribution	50	%
Speed Limit	30	MPH
Trucks	3	%

Butler Road		
2021 AADT	3,004	VPD
2045 AADT	3,730	VPD
2021 DHV	300	VPH
2045 DHV	373	VPH
Directional Distribution	50	%
Speed Limit	35	MPH
Trucks	3	%

Jay A. Stankiewicz

From: Bales, Ronald <rbales@indot.IN.gov>
Sent: Tuesday, November 1, 2022 8:15 AM
To: Jeff Bushur
Cc: Jay A. Stankiewicz; Jason Rowley; Ali Whitehead; Elizabeth Safranski; Mike Siffer; Passmore, Andrew D; Foheybreting, Nicole K; DPerry1
Subject: 21L0021, Des. 1901705, Hillegas Road Added Travel Lanes, Fort Wayne, Allen County, IN - Traffic Noise Analysis Report

EXERCISE CAUTION: This is an External Email Message!

Think before clicking on links, opening attachments, or responding

INDOT has reviewed the noise analysis for the above-referenced project and found it to be technically sufficient. As you are aware, INDOT no longer comments on recommendations provided in noise studies for local agency projects. However, it is our assessment that the study has been completed in accordance with federal guidelines and state policy. Thank you.

Ron Bales
INDOT-Greenfield District
Office: (317) 515-7908
Email: rbales@indot.in.gov