METRO
CONSULTING GROUP, LLC

CR 455 PROJECT DEVELOPMENT AND ENVIRONMENT (PD&E) STUDY

CR 455 EXTENSION PD&E STUDY
LAKE COUNTY, FLORIDA

LAKE
COUNTY, FL
REAL FLORIDA · REAL CLOSE

Noise Study Technical Memorandum

February 2021

TABLE OF CONTENTS

TABLE OF FIGURES

LIST OF TABLES

1.0 Introduction

Lake County is conducting a Project Development and Environment (PD&E) Study to evaluate the proposed CR 455 Extension on new alignment from Hartwood Marsh Road to Schofield Road, a length of approximately 5.5 miles. The CR 455 Extension PD&E Study Area is in the southeast portion of Lake County bound by US Highway 27 to the west, SR 50 to the north, the Lake/Orange County Line to the east and the approved Central Florida Expressway (CFX) Authority's Lake/Orange County Connector to the south. The PD&E Study Area is located in unincorporated Lake County adjacent to the City of Clermont and is primarily made up of a sand mine, rural residential, and vacant property. The County is currently developing plans to widen the existing portions of CR 455 to a four-lane divided roadway and extend it south to Hartwood Marsh Road. The goal of the PD&E Study is to develop and analyze alternatives within the area defined by this boundary to determine the alternative that best addresses the identified needs. This Noise Study Technical Memorandum was prepared as part of the PD&E Study for the Preferred Alternative.

The CR 455 Extension is anticipated to serve as a major north-south connector. The primary purpose of the proposed roadway project is to provide the transportation connections and capacity needed to relieve congestion on area roads and support the provision of goods and services to future developments consistent with local and regional planning efforts.

If future design-year noise levels at noise-sensitive receivers approach, meet, or exceed the Noise Abatement Criteria (NAC) established by The Federal Highway Administration (FHWA) in 23 CFR 772 or increase 15 dB(A) over existing noise levels as a direct result of the transportation improvement project, noise abatement must be considered. The FHWA Traffic Noise Modeling (TNM) Version 2.5 computer program was used to determine if noise impacts are predicted once the roadway is constructed in the proposed Design Year 2045.

2.0 Project Description

The Study Area was defined as a ±2,098-acre, ±5.5-mile-long corridor in Sections 2, 11, 13-14, and 23-26 of Township 23 South, Range 26 East, Lake County, Florida. The proposed improvements will include the construction of a new roadway that connects to Schofield Road in the south and to the southern terminus of the planned extension of CR 455 at Hartwood Marsh Road in the north (**Figure 1**). This will include the realignment of Hartwood Marsh Road from Foxhole Road to the intersection of the northern extension of CR 455 (from SR 50 to Hartwood Marsh Road). The Study Area encompasses and helps to guide the development of alignment alternatives for the proposed roadway improvements. The corridor is oriented north to south and consists of mostly undeveloped land used for water reclamation [Water Conserv II (WC II)] with a sand mine at the north end and several rural homesteads within its northern third. The intent of the PD&E Study is to analyze five alignment alternatives and identify and recommend a preferred alignment for an extension of CR 455 from Hartwood Marsh Road to Schofield Road.

Figure 1: Location Map of CR 455 PD&E Study Area

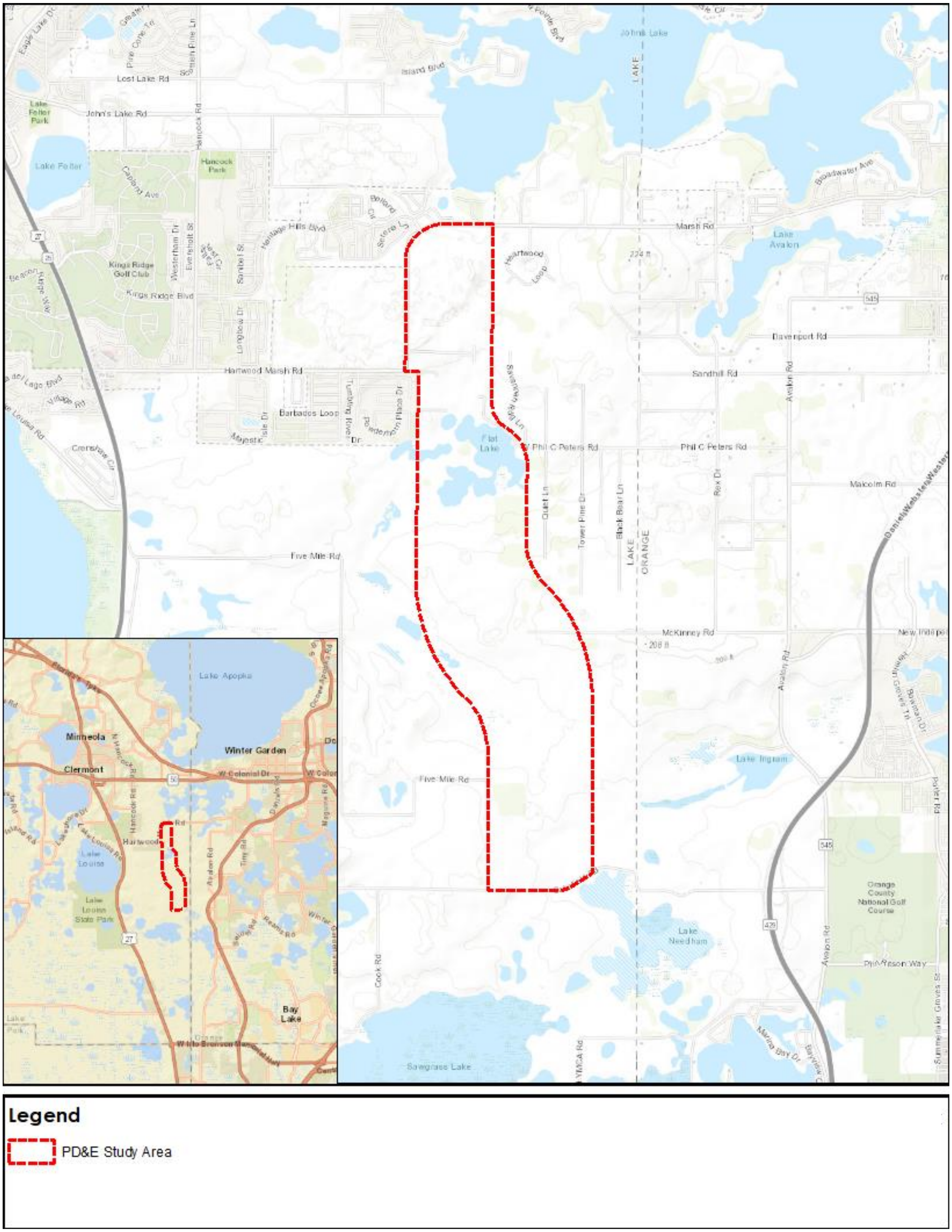


Figure 2 shows the preferred alignment that is the focus of this Noise Study. This alignment will require the acquisition of new right-of-way along its entire length and the construction of a new, four-lane divided roadway. The proposed 120-foot-wide typical section consists of four through lanes separated by a grass median with bicycle lanes and a buffered sidewalk or shared use path on each side of the roadway (**Figure 3**). The alignment includes the following study intersections: 1) CR 455 at Hartwood Marsh Road and 2) CR 455 at Foxhole Road. Both will be designed as roundabouts.

3.0 Purpose and Need

The area surrounding the proposed CR 455 Extension project is largely undeveloped with large tracts of agricultural lands, formerly in citrus production. **Figure 4** depicts a recent aerial photograph of the Study Area. The use of these lands for citrus production has declined due to the recent south migrating frost line and a disease called Citrus Greening. The closest community to the Study Area is the City of Clermont which during the last two decades has grown rapidly, partially due to its proximity to Orlando and tourist attractions like SeaWorld and Disney World. Continued population and employment growth in Clermont have generated a steady increase in travel demand for the area.

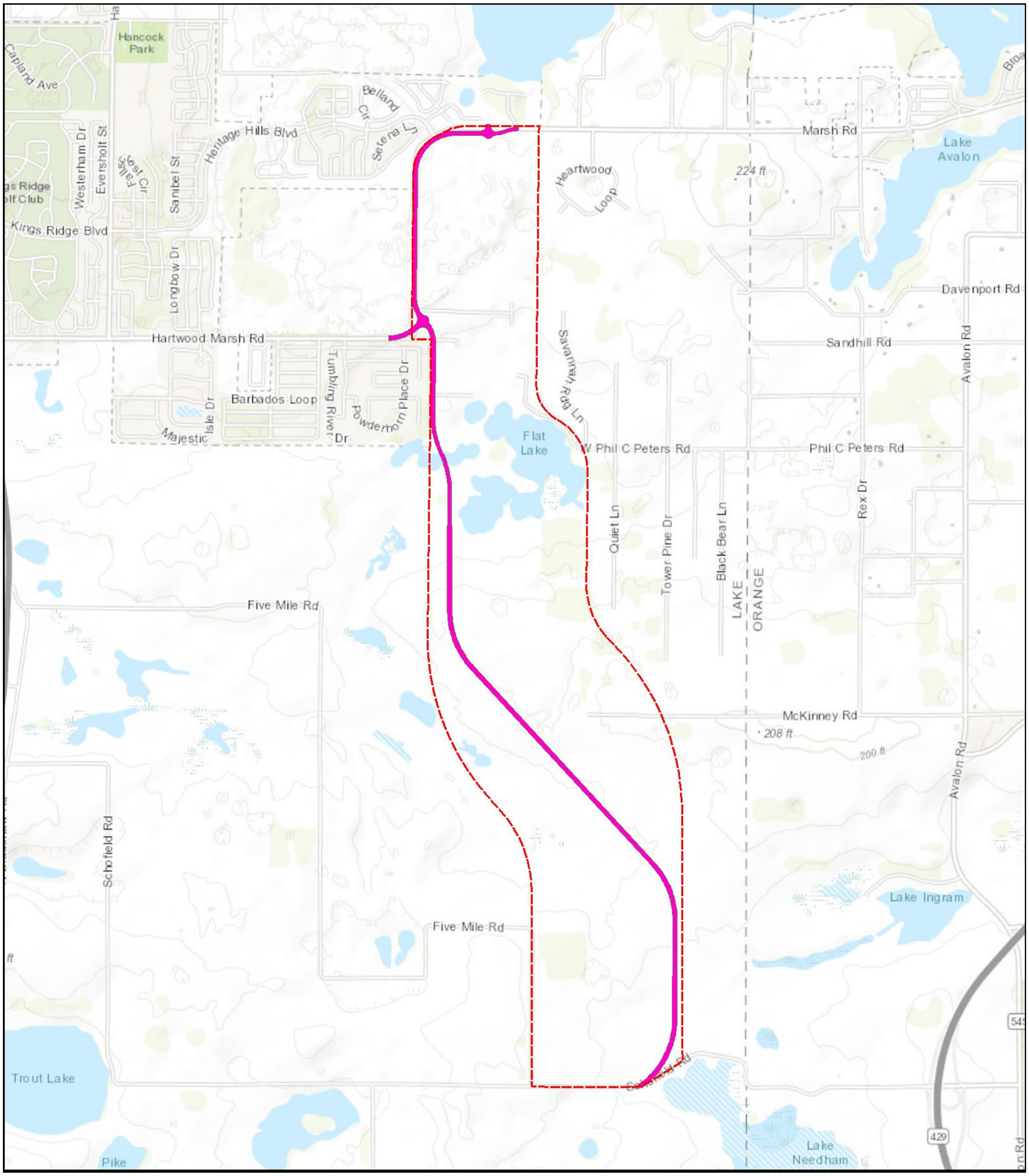
The study corridor is in an area of Lake County that is experiencing and is anticipated to continue experiencing substantial growth in the future. Economic, land development, and transportation projects of significance in this region include the following:

- Lake County's Wellness Way Area Plan (WWAP) – a development plan for 15,471-acres that will enable Lake County to diversify its economy, protect natural resources and strengthen its connectivity with other economic hubs in the region with planned land uses including a mix of residential, office, retail, light industrial and institutional facilities.
- Central Florida Expressway (CFX) Authority's Lake/Orange County Connector – an approved proposed expressway connecting US 27 in Lake County to SR 429 in Orange County, south of the CR 455 Extension Study Area.

The purpose of CR 455 Extension is to 1) enhance economic development in southeast Lake County through provision of a north-south connector; 2) improve mobility within the regional transportation network by providing a new connection to existing and future transportation routes consistent with the 2035 Long Range Transportation Plan (LRTP), the Wellness Way Area Plan (WWAP) and the 2030 Lake County Comprehensive Plan; 3) improve emergency services and hurricane evacuation for residents of Lake County by providing an additional route.

According to Florida 2070 (Florida Department of Agriculture, et al. 2017), a joint project from the University of Florida GeoPlan Center, the Florida Department of Agriculture and Consumer Services, and the nonprofit group 1000 Friends of Florida that examined the state's development trends and possible effects decades from now, this area is anticipated to experience significant human development over the next 50 years, with some almost doubling in population.

Figure 2: Preferred Alternative Alignment for CR 455 Extension PD&E Study



Legend

PD&E Study Area

Preferred Alignment

Figure 3: Typical Section for CR 455 Extension PD&E Study

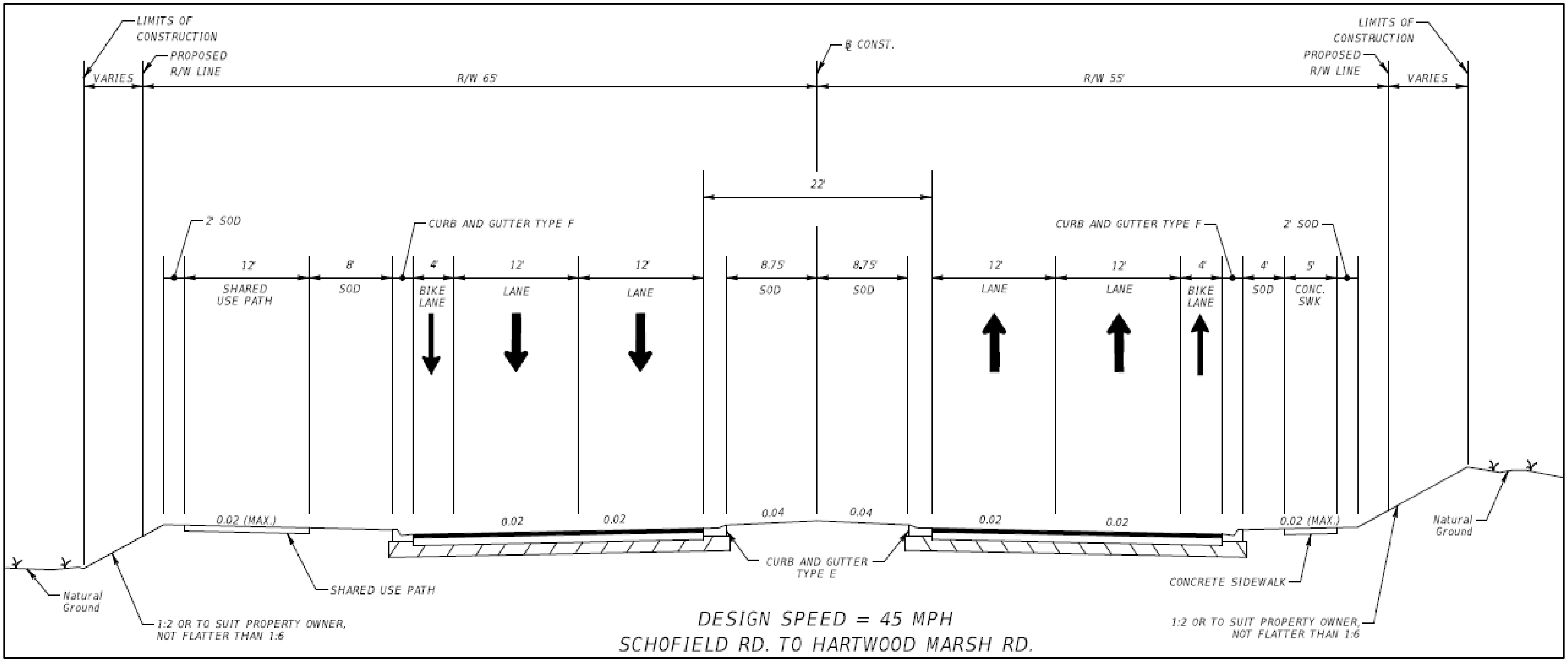
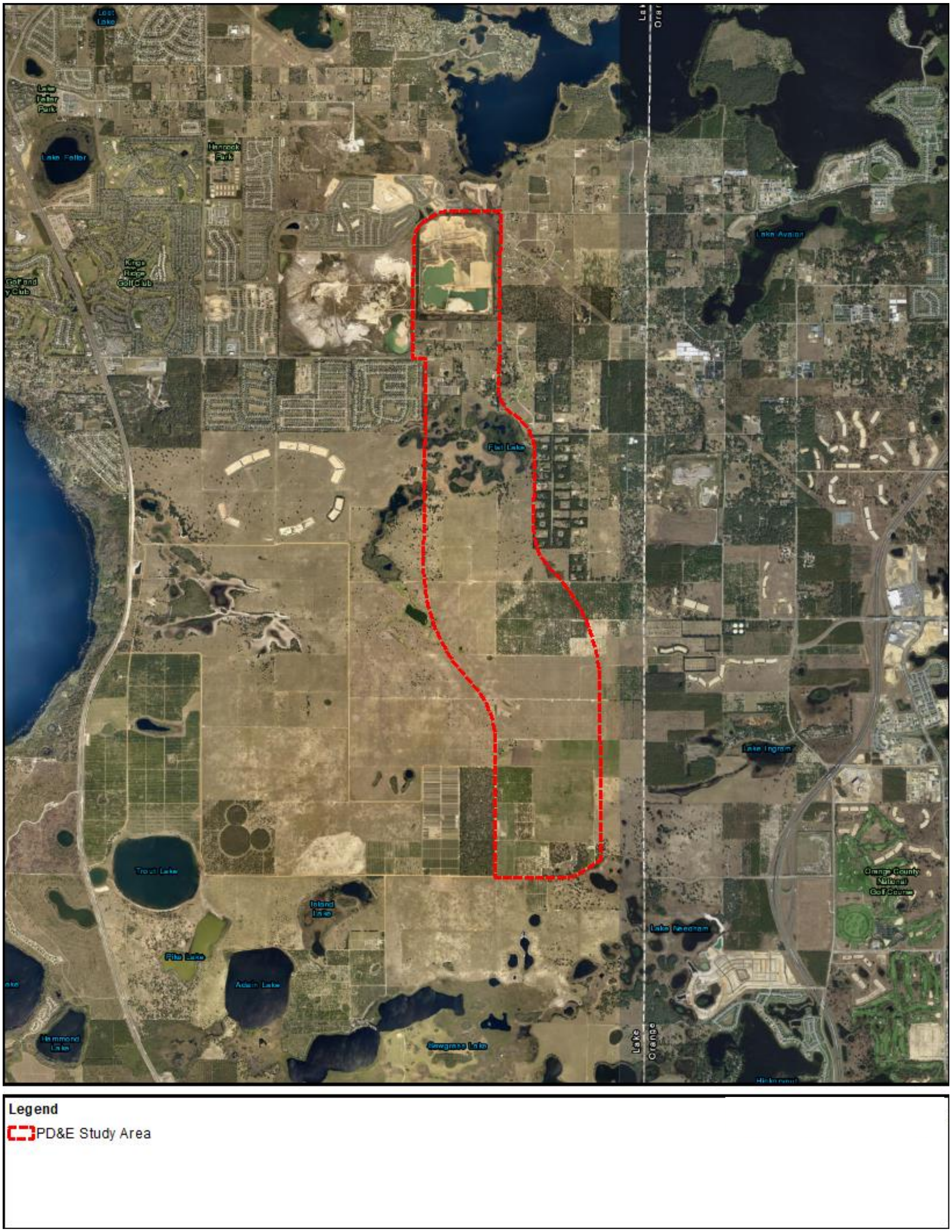


Figure 4: Aerial Photograph of CR 455 PD&E Study Area



4.0 Methodology

If future design year noise levels at noise-sensitive receivers approach [within 1 dB(A)], meet, or exceed the NAC established by the FHWA in 23 CFR 772 or increase 15 dB(A) over Existing noise levels as a direct result of the transportation improvement project, noise abatement must be considered. The FHWA's TNM Version 2.5 computer program was used to determine if noise impacts are predicted. If impacts are predicted to occur, a noise abatement evaluation is justified, and is conducted to determine if abatement is considered reasonable and feasible for any noise-sensitive sites. The format and content of this report are based on the procedures and policy established in Part 2, Chapter 18 "Noise", of the FDOT PD&E Manual (January 2019) and on the regulatory material found in 23 Code of Federal Regulations (CFR), Part 772, and entitled "Procedures for Abatement of Highway Traffic Noise and Construction Noise", which are available from the FHWA and FDOT.

4.1 Noise Metrics

The noise levels documented in this report are based upon the hourly equivalent sound level [Leq(h)]. The Leq(h) represents the steady-state sound level, which contains the same amount of acoustic energy as the actual time-varying sound level over a one-hour period. Sound levels are measured and calculated in decibels (dB(A)), which is a unit of measure used to determine sound intensities. Leq(h) is measured on an A-weighted decibel scale (dB(A)), which is the scale that most closely approximates the response characteristics of the human ear to typical traffic noise levels.

4.2 Traffic Noise Modeling

The FHWA's TNM Version 2.5 computer program was used to determine if noise impacts are predicted. If impacts are predicted to occur, a noise abatement evaluation is justified, and is conducted to determine if abatement is considered reasonable and feasible for any noise-sensitive sites. This model is the latest version of TNM and was used as required by 23 CFR 772.

The model estimates the acoustic intensity at noise receiver sites based upon the roadway design and is influenced by vehicle speed and type. TNM 2.5 predicted noise levels are reported in dB(A) Leq(h). Noise receiver sites were identified throughout the project corridor. Information that was loaded into TNM 2.5 to predict Existing and Build noise levels includes: roadway geometry; vehicle types, volumes, and speeds; existing barrier and buffer information, propagation path; and climatic conditions. The results of the validation are shown in **Section 5.1**.

Noise levels were modeled for the proposed project within the Noise Sensitive Areas (NSAs, **Section 5.2**) for the future Design Year 2045 conditions. Predicted TNM results are contained in **Section 6.0**. Chapter 18 of the FDOT PD&E Manual states that "a traffic noise impact occurs when the modeled future highway traffic noise levels approach or exceed the NAC. A traffic noise impact also occurs when modeled future highway traffic noise levels substantially exceed the existing highway traffic noise level, even though the modeled levels may not exceed the NAC. FDOT has determined that the NAC is approached when it is within 1 dB(A) of the appropriate NAC and that a substantial increase occurs when the increase over existing conditions (measured or predicted) is 15dB(A) or greater." For the NSAs involved in this study, if traffic noise levels exceed or approach the NAC for Category B of 66 dB(A), impacts are said to occur.

4.3 Traffic Data

To predict traffic noise levels and assess impacts, the traffic characteristics that would yield the highest traffic noise impacts is used. The highest traffic volumes and highest traffic speeds will (typically) create the noisiest conditions. Level of Service (LOS) C volumes representing the peak hourly traffic volumes are used, unless traffic analysis demonstrates that this condition will not be reached [LOS C volumes were obtained from the generalized tables of FDOT's Level of Service Handbook (December 2012)]. If this is the case, then demand peak hour volumes are to be used. Based upon the design traffic forecasted for the design year of 2045 from the CR 455 Extension *Design Traffic Technical Memorandum* prepared for this project, the roadway is expected to reach LOS C volumes, so the Demand Peak Hour Volumes were used to model the Design Year 2045 volumes for noise projections. Traffic speeds used were the proposed speed limits for the 2045 design. See **Section 6.1** for more information about the traffic data.

4.4 Noise Abatement Criteria

The FHWA has established seven land use categories that are used to assess the impact of noise on these activities, of which five of these have NAC to consider (**Table 1**). If predicted noise levels approach or exceed the NAC levels, or a substantial noise increase is predicted, noise abatement must be considered. A substantial noise increase occurs when the Existing noise level is predicted to be exceeded by 15 dB(A) or more by the project. FDOT defines 'approach' as within 1.0 dB(A) of the FHWA criteria.

Table 1: Noise Abatement Criteria – Hourly A-Weighted Sound Level-decibels [dB(A)]

Activity Category	Activity Leq(h)1		Evaluation Location	Description
	FHWA	FDOT		
A	57	56	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[2]	67	66	Exterior	Residential
C[2]	67	66	Exterior	Active sports 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, recreational areas, Section 4(f) sites, schools, television studios, trails, and trail crossings.
D	52	51	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.

Part 2, Chapter 17 of PD&E Manual (5/24/2011) (Based on Table 1 of 23 CFR Part 772)

1. The Leq(h) Activity Criteria values are for impact determination only and are not design standards for noise abatement measures.
2. Includes undeveloped lands permitted for this activity category.

Noise sensitive receiver sites include areas where frequent exterior human use occurs. Included are lands which require quiet (Activity Category A), residential areas (Activity Category B), a variety of non-residential land uses such as parks, schools, places of worship, and medical facilities (Activity Category C), and commercial properties with areas of exterior use such as restaurants, hotels, and other places of business (Activity Category E). Activity Category D includes noise sensitive sites that have interior uses but no exterior activities such as hospitals, libraries, recording studios, television studios, and public meeting rooms. Activity Category F includes developed lands that are not sensitive to highway traffic noise such as agriculture, airports, and industrial and retail facilities. Agriculture facilities were noted within the Study Area as Activity Category F land uses, and do not require a noise analysis as stipulated in 23 CFR 772. Undeveloped vacant lands (Activity Category G) were also noted in the project corridor. There is not a NAC level for this category either, though FDOT must document highway traffic noise levels for all NAC categories and provide it to local officials. **Table 2** shows the relationship between typical noise levels and common indoor/outdoor activities.

Table 2: Typical Noise Levels

Common Outdoor Activities	Noise Level dB(A)	Common Indoor Activities
	110	Rock Concert
Jet Engine		
	100	
Gas Lawn Mower at 3 feet		
	90	
Diesel Truck at 50 feet, at 50mph		Food Blender at 3 feet.
	80	Garbage Disposal at 3 feet
Noisy Urban Area Daytime		
Gas Lawn Mower at 100 feet	70	Vacuum Cleaner at 10 feet
Commercial Area		Normal Speech at 3 feet
Heavy Traffic at 300 feet	60	
		Large Business Office
Quiet Urban Area Daytime	50	Dishwasher Next Room
Quiet Urban Area Nighttime	40	Theater, Large Conference Room (background)
Quiet Suburban Area Nighttime		
	30	Library
Quiet Rural Area Nighttime		Bedroom at Night
Diesel Truck at 50 feet, at 50mph	20	
Source: California Dept. of Transportation Technical Noise Supplement, Oct. 1998, Page 18.		

4.5 Noise Abatement Measures

The FHWA requires that noise abatement measures be considered for a proposed project when the predicted noise levels approach, equal, or exceed NAC, or will increase substantially over existing levels. The most common and effective noise abatement measure is the construction of a noise barrier. As noted in 23 CFR 772.13(c)(1), the FHWA requires that, at a minimum, FDOT shall consider noise abatement in the form of a noise barrier. FHWA also considers the following activities as acceptable noise abatement measures.

4.5.1 Alignment Selection

Alignment selection involves the orientation of the project location in such a way as to minimize impacts and costs. For noise abatement, alignment selection is primarily a matter of a) positioning the roadway at a sufficient distance from the noise-sensitive sites, and b) positioning the roadway at a location where other noise abatement techniques, such as a noise abatement wall, could be implemented.

4.5.2 Property Acquisition

Property acquisition for buffer zones alone is considered to be costly. Buffer zones can provide relief from noise impacts by creating added distance between the noise generator and the noise receiver. Methods of applying land use controls to maintain and establish buffered areas through zoning may be established by local jurisdiction.

4.5.3 Land Use Controls

One of the most effective noise abatement measures is the proper implementation of land use controls to minimize future noise impacts. Local jurisdictions with zoning control can implement policies to limit the growth on noise-sensitive land uses adjacent to the roadway.

4.5.4 Traffic Management

Traffic management measures that limit vehicle type, speed, volume, and time of operations can be effective noise abatement measures.

4.5.5 Noise Barriers

Noise barriers reduce noise levels by blocking the sound path between a roadway and noise-sensitive sites. To be effective, barriers must be continuous, sufficiently long, tall, shield a reasonably sized impacted area or several people, and provide appreciable noise level reduction. Noise barriers are to be modeled at locations where noise increases exceeded abatement criteria during the design year and evaluated for feasibility and reasonableness. A wide range of factors are used to evaluate noise abatement measures as reasonable and feasible. Feasibility deals with engineering considerations such as the ability to construct a barrier using standard construction techniques and methods to provide a reduction of at least 5 dB(A) to an impacted receiver site. Additionally, in order for a noise barrier to be considered acoustically feasible, at least two impacted receiver sites must achieve a 5 dB(A) reduction or greater.

As noted in 23 CFR 772.13(c)(1), the FHWA requires that, at a minimum, consider noise abatement in the form of a noise barrier. When a noise abatement measure such as a sound barrier is determined to be feasible, the reasonableness is then evaluated. Three reasonableness factors must be collectively achieved in order for the noise abatement measure to be deemed reasonable: the achievement of the noise reduction design goal (7 dB(A) for at least one receiver per FDOT criteria), the cost effectiveness of the noise abatement measure, and the consideration of the viewpoints of the benefited property owners and residents.

To effectively reduce the noise coming around its ends, a barrier should be at least as long as eight times the distance from the home or receiver to the barrier, with the receiver located at the mid-point of the barrier. Openings in noise barriers for driveway connections or intersecting streets destroy their effectiveness. When examining the cost reasonableness of a modeled noise barrier design for a residential area, the upper limit of $42,000 per benefited receiver has been set by FDOT using the standard construction cost of $30.00 per square foot. A benefited receiver is defined as a noise sensitive site that will obtain a minimum of 5 dB(A) of noise reduction as a result of a specific noise abatement measure whether or not they are predicted as having a noise impact. Only benefited receiver sites can be included in the calculation of a barrier being cost reasonable.

5.0 Traffic Noise Analysis

5.1 Noise Model Validation

The purpose of field measuring existing traffic noise levels is to: 1) ensure that traffic noise is the main source of noise, and to validate the TNM input values and verify that the model accurately predicts the existing traffic noise based upon the current conditions, and 2) to estimate existing ambient noise levels along the new alignment section of the project for use in determining impacts when compared to predicted future levels. In order to collect data required, field monitoring was conducted by two noise monitoring specialists in accordance with the FHWA's guidance document "Measurement of Highway-Related Noise" on September 19, 2018.

A Larson Davis SoundTrack LxT Noise Logging Dosimeter was used to collect existing sound levels at the location. The average sound level over a one-hour period is considered the Level Equivalent Hourly [Leq(h)] and is used in the noise modeling process. The dosimeter was calibrated on site just prior to the onset of each sampling event to ensure accuracy and mounted on a tripod at a height of approximately five feet which is standard and equivalent to the average height of the human ear.

During the field validation event, noise readings were taken three separate times at 15-minute intervals during both the morning (10:00 AM – 11:30 AM) and afternoon (1:00 PM – 2:30 PM), periods of non-peak traffic activity. Two locations were used for the collection of noise levels for the purpose of model validation: 1) Site 1 was on Hartwood Marsh Road just east of the entrance to the Heritage Hills subdivision, beyond the lane to turn into the subdivision, and 2) Site 2 was further south on Hartwood Marsh Road where it makes a 90-degree westward bend, just outside of the Hartwood Reserve subdivision. The meter at Site 1 was placed 50 feet from the middle of the oncoming traffic lane, in a grassy area of the right-of-way. The meter at Site 2 was located 20 feet from the edge of pavement of the oncoming travel lane. Both locations provided clear sight lines to observe traffic in both directions of the roadway. Additional data recorded included all input parameters necessary to run the computer model such as distance to the edge of the nearest travel lane, roadway width, paved shoulder widths, and local terrain. A hand-drawn sketch of the surrounding features was also created.

In order to gauge traffic volumes during the monitoring periods, traffic counts of the number and type of vehicles traveling in each direction at the monitoring station were recorded. Traffic counts were taken simultaneously during each of the three noise recording events. Vehicles were categorized as either (1) passenger cars or light trucks, (2) medium trucks (box or panel trucks with one double-axle), (3) buses, (4) heavy trucks (two or more double-axles), and (5) motorcycles. Field notes were collected to record general weather and environmental conditions, and all unusual or otherwise noteworthy sound events.

Traffic speeds for passing vehicles were determined by using the posted speed limit along that section of roadway. The speeds used in the TNM modeling program for the model validation were 45 mph for all vehicles.

Design files were used to establish the input parameters for modeling the roadway, including vertical and horizontal geometry and ground elevations. Because there was no terrain data available, the model runs were conducted with all features kept at ground level.

The TNM model was validated at the field sampling location along Hartwood Marsh Road in two locations as described previously. Field recorded noise levels varied slightly from TNM predictions. As seen in **Table 3**, both field receivers were within 3 dB of the predicted value and therefore validate the model.

Table 3: Traffic Noise Model Validation Results dB(A)

Field Station	Run Info	Field Value	TNM Predicted	D	FHWA/FDOT Limit	Validated?
Site 1	AM Run	64.3	65.1	0.8	3	YES
	PM Run	62.6	65.1	2.5	3	YES
Site 2	AM Run	65.8	67.1	1.3	3	YES
	PM Run	65.0	67.1	2.1	3	YES

5.2 Noise Sensitive Sites

A noise-sensitive receiver is defined as “any property (owner occupied, rented, or leased) where frequent exterior human use occurs.” The project was broken up into geographic Noise Sensitive Areas (NSAs) to facilitate the analysis of traffic related noise impacts. Three NSAs that have the potential to be impacted by the project were identified and are shown on the Noise Sensitive Areas Map (**Figure 5**). The potentially impacted noise-sensitive sites identified for the Study Area consisted only of single-family residences. The NSAs within the Study Area present a single type of site to model within TNM: single family residences that were modeled using a point to represent each site. Following is a description of each NSA.

Noise Sensitive Area 1

This area contains 26 residences that were modeled for potential noise impacts (**Figure 6**). The residences were located within the first row of homes adjacent to the westbound travel lane of Hartwood Marsh Road (and the Preferred Alternative) within the Heritage Hills subdivision.

Noise Sensitive Area 2

This area contains 41 residences that were modeled for potential noise impacts (**Figure 7**). The residences were located along the eastbound lane of Hartwood Marsh Road adjacent to the Hartwood Reserve subdivision. This area also contained residences along the southbound lanes of the Preferred Alternative, south of the proposed southern roundabout.

Noise Sensitive Area 3

This area contains six residences that were modeled for potential noise impacts (**Figure 7**). The residences were located in the rural residential area near Foxhole Road and Flat Lake Road, along the northbound lanes of the Preferred Alternative, and adjacent to and south of the proposed southern roundabout.

Figure 5: Noise Sensitive Areas for CR 455 Extension PD&E Study

Legend

Predicted Receivers

Preferred Alternative ROW

Figure 6: Noise Sensitive Area 1

Figure 7: Noise Sensitive Areas 2 and 3

Legend

- Noise_Meter
- Predicted_Receivers

5.1 Existing Noise Levels

For projects on a new alignment, noise measurements are taken to determine the Existing noise levels since existing traffic noise cannot be modeled using TNM. As with the measurements taken for the noise model validation, these measurements were taken in accordance with both FHWA and FDOT Noise Policy. Measurements were collected along the proposed new portion of the corridor. The land use along the proposed new alignment consists of the residences in NSAs 1 and 2, rural homesteads along Foxhole Road and Flat Lake Road, a sand mine, and undeveloped land (both of which do not have a NAC Activity Leq(h)). Field measurements determined that the Existing noise level in this area was 40.1 dB(A).

6.0 Predicted Noise Levels

The three NSAs consist of receivers that fall under NAC Activity Category B (residential) exclusively.

6.1 Noise Impact Analysis

Based upon the results of the TNM modeling for Existing conditions, there were no receivers that approached or exceeded the NAC for this Activity Category of 66 dB(A).

Future Noise levels were also predicted for the Design Year 2045 conditions. The future noise levels were predicted to approach or exceed the NAC of 66 dB(A) at NSA 2. Traffic volumes used for the analysis were demand peak hour numbers calculated by the project's Traffic Engineer (**Table 4**). Speeds were defined as 45 mph throughout the project except for the roundabouts where the speed was dropped to 30 mph. **Figure 8** shows 15 impacted receivers in NSA 2 and one impacted receiver in NSA 3, in relation to the preferred alignment.

Table 4: Peak Demand Hour Traffic Volumes for the Design Year (2045)

Peak Hour Design Year Volumes Both Directions		
Roadway	**Segments**	**Vehicles/Day**
CR 455 Extension	Northern Roundabout to Southern Roundabout	2,700
Hartwood Marsh Rd	Hancock Rd to CR 455 Extension / Southern Roundabout	2,100
CR 455 Extension	Hartwood Marsh Road / Southern Roundabout to Wellness Way	2,800

<u>Noise Sensitive Area 1</u>
This area represents Activity Category B and has no sites predicted to be impacted in the Existing Year Model or the Build (Design Year 2045) Model. The predicted Existing noise levels for this NSA range from 54.3 dB(A) to 64.6 dB(A). The predicted Build noise levels for this NSA range from 59.4 dB(A) to 65.1 dB(A). One receiver is predicted to approach the NAC of 66 dB(A) with a level of 65.1 dB(A), but none meet or exceed the threshold, or achieve a Significant Increase [>15 dB(A)] over Existing levels.

<u>Noise Sensitive Area 2</u>
This area represents Activity Category B and has no sites predicted to be impacted in the Existing Year Model but has 15 receivers that will be impacted in the Build (Design Year 2045) Model. The predicted Existing noise levels for this NSA range from 33.7 dB(A) to 62.7 dB(A). The predicted Build noise levels for this NSA range from 57.9 dB(A) to 70.0 dB(A). 15 receivers are predicted to approach or exceed the NAC of 66 dB(A) or achieve a Significant Increase [>15 dB(A)] over Existing levels.

Noise Sensitive Area 3

This area represents Activity Category B and has no sites predicted to be impacted in the Existing Year Model, and only one receiver that will be impacted in the Build (Design Year 2045) Model. The predicted Existing noise levels for this NSA range from 33.7 dB(A) to 54.7 dB(A). The predicted Build (Design Year 2045) noise levels for this NSA range from 58.0 dB(A) to 67.7 dB(A). One receiver is predicted to approach or exceed the NAC of 66 dB(A) or achieve a Significant Increase ([>15 dB(A)] over Existing levels.

Figure 8: Impacted Noise Receivers for CR 455 Extension PD&E Study

6.2 Noise Abatement Analysis

A six-foot noise barrier configuration did not meet the design goal of two or more receivers receiving at least 5 dB(A) of benefit with at least one receiver receiving greater than 7 dB(A) of benefit. A noise wall would have to be a minimum of eight feet tall to meet the design goal (**Figure 9**). The eight-foot configuration was calculated to cost just above the cost feasible threshold (within $42,000 per benefited receiver). One impacted receiver in NSA 2 was left as an outlier. The receiver at the southwest quadrant of the roundabout was omitted from the final noise barrier analysis because it would cause the barrier for the remaining impacted receivers to exceed the cost threshold.

Table 5: Noise Barrier Analysis for NSA 2

Barrier Type	Height (ft)	Length (ft)	Impacted Receivers	Impacted and Benefitted Receivers	Non-Impacted Benefitted Receivers	Total # Benefitted Receivers	Avg. Noise Reduction dB(A)	Cost ($30 ft^2)	Avg Cost ($) per Benefitted Receiver	Comment
Wall	6	2,660	15	15	0	15	5.93	$478,800	$31,920	No receiver with >7dB(A) benefit
Wall	8	2,660	15	15	0	15	7.27	$638,400	$42,560	Preferred
Wall	10	2,660	15	15	0	15		$798,000	$53,200	Exceeds cost threshold

<u>NSA 3 Barrier</u>

Because two receivers that essentially serve as individual receivers were predicted to be impacted within this NSA, a noise abatement analysis was not conducted because it did not meet the FHWA and FDOT criteria for being acoustically feasible and would also be exceed the cost threshold per impacted receiver.

7.0 Conclusion

NSA 2 is the only area predicted to have noise impacts in the Design Year (2045). It is predicted to have 15 receivers with a greater than 66 dB(A) Leq(h) as a result of the proposed project. An eight-foot noise wall was determined to benefit all 15 receivers and meet the design goal of having at least two benefited receivers with a 5 dB(A) insertion loss, at least one receiver with a greater than 7 dB(A) insertion loss, and a cost within $42,000 per benefited receiver. Although the average cost per benefited receiver ($42,559) is slightly above the threshold ($42,000), it is considered viable for these planning purposes. The final cost will be determined during the roadway construction's design and engineering phase.

Figure 9: NSA 2 Noise Barrier for CR 455 PD&E

8.0 Construction Noise and Vibration

Construction activities for the proposed improvements will have temporary noise impacts for those residents and visitors within the immediate vicinity of the project. Noise and vibration impacts will be caused by heavy equipment movement and construction activities such as earth moving and vibratory compaction. Noise control measures should be implemented according to the FDOT's Standard Specifications for Road and Bridge Construction to minimize or eliminate some potential construction noise and vibration impacts. Section 335, F.S., exempts FDOT from compliance with local ordinances. FDOT policy is to follow the requirement of local ordinances to the extent that is reasonable. However, should unanticipated noise or vibration issues arise during construction, the Project Engineer will investigate additional methods of controlling these impacts. No construction vibration sensitive sites were identified during the noise study.