FRA-161-15.80 (116322)
Noise Wall Preliminary Placement Plan (NWPPP)

Project Description

The FRA-161-15.80 (116322) project is located in Franklin County, Ohio near the city of New Albany. The project location and the study area are shown on Figure 1. The study area includes a section of interstate (I)-270 that extends from the I-270/State Route (SR) 3 interchange to the I-270 interchange at SR 161. From this interchange, the project continues east along SR 161 to a point approximately one mile east of the SR 161 interchange at United States (US) Route 62. The study area also includes the ramps to and from SR 161 at Sunbury Road, Hamilton Road, New Albany Road and Johnstown Road (US 62). Within the study area, SR 161 is a divided, controlled access highway and I-270 is a six-lane facility in the northbound direction. The proposed project involves the addition of one new through travel lane in the eastbound and westbound directions of SR 161. The travel lanes will be added within the existing SR 161 median. In some locations, minor widening (1-3 feet) will occur along the outside shoulder. The widening of northbound I-270, the addition of one travel lane will take place along the outside shoulder.

Noise Sensitive Areas (NSA)

The study area has been divided into one noise sensitive area, the Wilder School, located on the east side of I-270 just north of the I-270/SR 161 interchange. The rest of the study area is divided into 16 NSAs located along SR 161. All of the NSAs have been modeled for the Existing Year 2025 and Design Year 2045 using certified traffic data provided by ODOT. The NSAs for this project are described below and are shown in Figure 2.

Wilder School

Wilder School is located on the east side of I-270 about ½ mile north of the I-270/SR 161 interchange. Noise barrier walls line almost the entire length of I-270 on both the northbound and southbound sides between SR 3 to the north and the I-270/SR 161 interchange to the south. There is a gap of about 520 feet in the noise wall on the east side of I-270. Wilder School is located just east of this opening in the noise barrier wall and the school is not shielded from traffic noise on I-270. The analysis will evaluate closing this gap with new noise barrier and determine if Wilder School would be benefited by the new noise barrier

NSA 1

NSA 1 is located on the south side of SR 161 just east of the SR 161 loop ramp exiting traffic to Sunbury Road. To the east of NSA 1 is Big Walnut Creek at the north project limits. NSA 1 is comprised of the Reserve at Walnut Creek, an apartment community consisting of about 40 residential dwelling units. The entire apartment community is situated approximately 20 feet higher than SR 161 and most of the exit ramp to Sunbury Road. Receivers in NSA 1 are all Activity Category B having an FHWA noise abatement criterion (NCA) of 67 dBA.

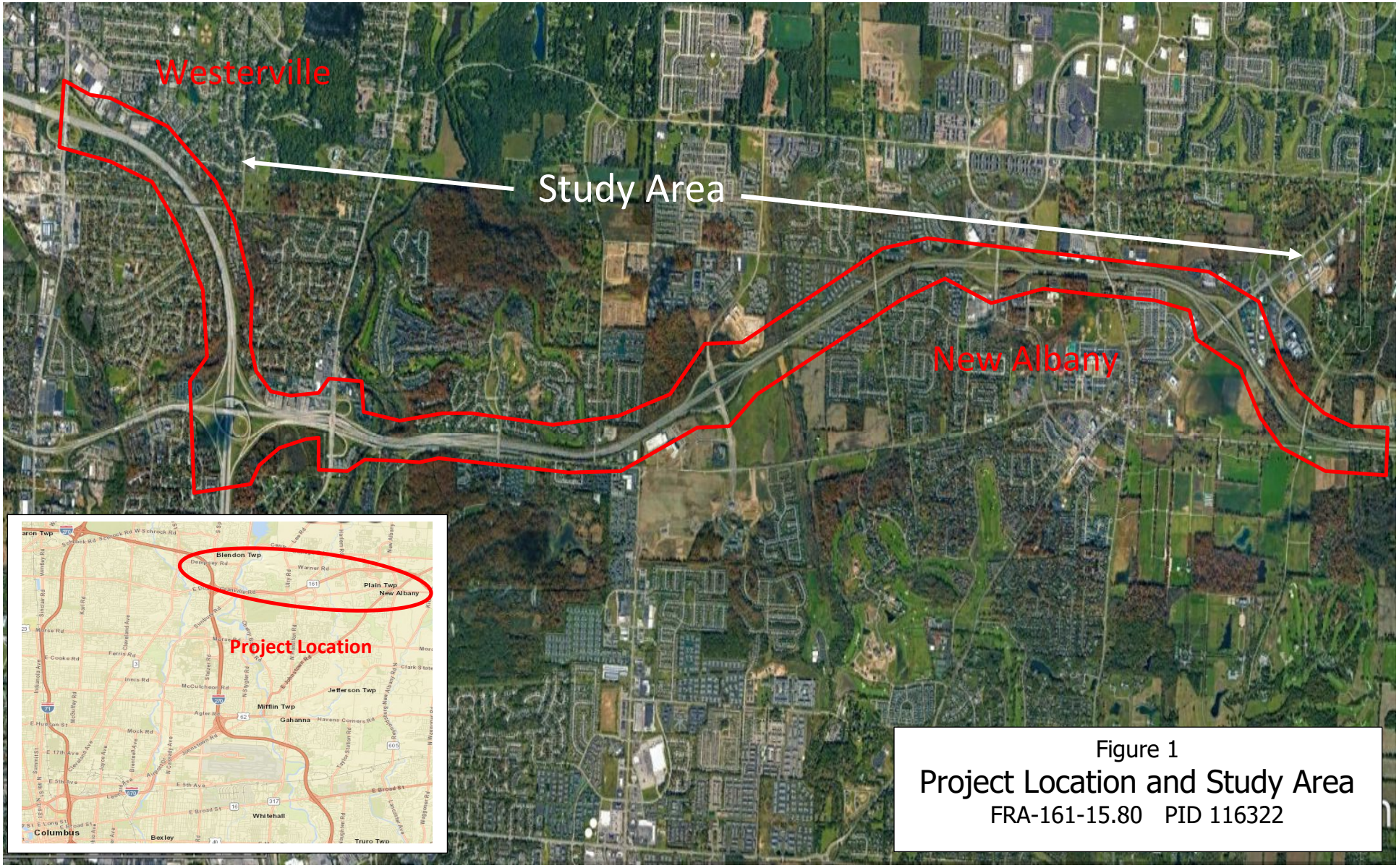

Figure 1
Project Location and Study Area
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NSA 2

NSA 2 is located on the north side of SR 161 just west of the Urly Road overpass of SR 161. NSA 2 is called the Fairway Lakes Apartments and is comprised of about 42 residential dwelling units situated within 500 feet of SR 161. The apartment buildings in NSA 2 are separated from traffic on SR 161 by a golfing fairway about 350 feet in width. The receivers in NSA 2 are situated at an elevation of 20 feet higher than SR 161. Receivers in NSA 2 are all Activity Category B having an FHWA noise abatement criterion (NCA) of 67 dBA.

NSA 3

NSA 3 is located on the north side of SR 161 to the east of Urly Road. NSA 3, known as Preston Commons, is comprised of about 28 single-family residential located within 500 feet of SR 161. Receivers in NSA 3 are all situated at a similar elevation as SR 161 and are all Activity Category B having an FHWA noise abatement criterion (NCA) of 67 dBA.

NSA 4

NSA 4 is located in the northeast quadrant of the SR 161/Hamilton Road interchange. NSA 4 is an apartment community called HQ Flats Apartments. Eight three-story apartment structures are located within 500 feet of US 161 having about 46 individual dwelling units on the ground floor. Receivers in NSA 4 are situated at a similar elevation to SR 161 and all are Activity Category B having an FHWA noise abatement criterion (NCA) of 67 dBA.

NSA 5

NSA 5 is located in the southeast quadrant of SR 161/Hamilton Road interchange. NSA 5 is comprised of the Ohio State Outpatient Care New Albany facility. The NSA was still under construction at the time of the analysis however a completed structure closest to SR 161 was analyzed for noise. The building in NSA 5 is considered an Activity Category D having an FHWA noise abatement criterion (NCA) of 52 dBA (interior).

NSA 6

NSA 6 is located on the north side of SR 161. NSA 6 is known as the Rocky Fork Condominiums. About eight of the condominium buildings lie within 500 feet of SR 161. Each building is comprised of four dwelling units. The 32 dwelling units are all Activity Category B having an FHWA noise abatement criterion (NCA) of 67 dBA.

NSA 7

NSA 7 is located on the north side of SR 161 just west of the Harlem Road overpass of SR 161. NSA 7 is called the Albany Commons Apartments. About 12 of the apartment buildings lie within 500 feet of SR 161. Each building is comprised of eight dwelling units. The 96 dwelling units are all Activity Category B having an FHWA noise abatement criterion (NCA) of 67 dBA.

NSA 8

NSA 8 is located on the south side of SR 161 just west of the Harlem Road overpass of SR 161. NSA 8 is called the Albany Woods Apartments. About 20 of the apartment buildings lie within 500 feet of SR 161. Each building is comprised of eight dwelling units. The 160 dwelling units are all Activity Category B having an FHWA noise abatement criterion (NCA) of 67 dBA.

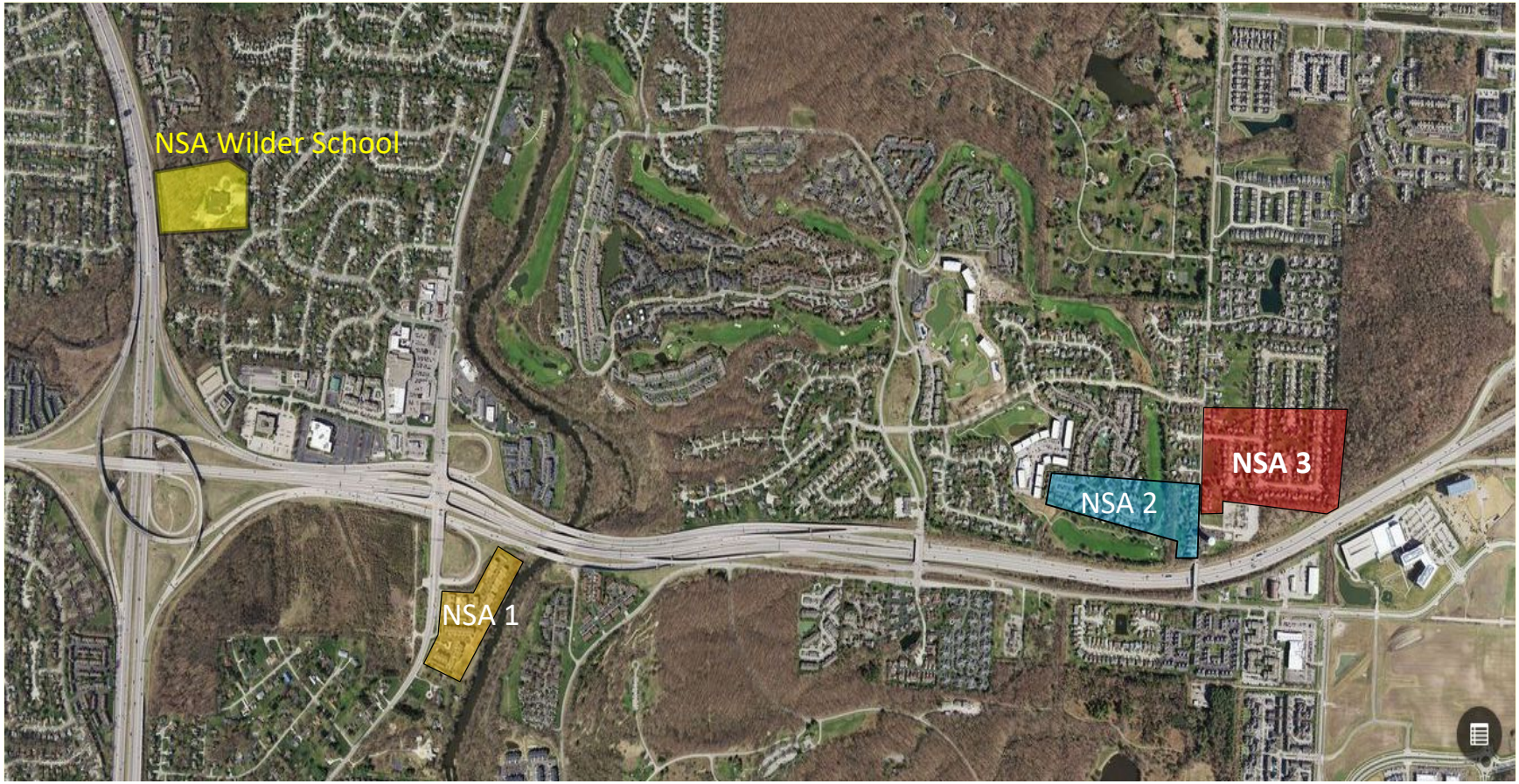

Figure 2a
Noise Sensitive Areas (NSA)
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Figure 2b
Noise Sensitive Areas (NSA)
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NSA 9

NSA 9 is located on the north side of SR 161 just east of the Harlem Road overpass of SR 161. NSA 9 is called the Rocky Ridge Condominiums. About 10 of the condominium buildings lie within 500 feet of SR 161. Each building is comprised of four dwelling units. The 40 condominium dwelling units and one single family residence on Harlem Road are all Activity Category B having an FHWA noise abatement criterion (NCA) of 67 dBA.

NSA 10

NSA 10 is located on the north side of SR 161 just east of the Rocky Ridge Condominiums. NSA 10 is comprised of both multi-family apartment buildings and single-family residential structures. Four of the apartment buildings having 36 individual dwelling units on the ground floor are located within 500 of SR 161. The single-family structures are in the Woods at Sugar Run condominium development and 12 of the buildings are located within 500 feet of SR 161. The 36 apartment dwelling units and the 12 single-family dwelling units are all Activity Category B having an FHWA noise abatement criterion (NCA) of 67 dBA.

NSA 11

NSA 11 is located on the south side of SR 161 just east of Harlem Road. NSA 11 is comprised of single-family residential structures located on the east side of Harlem Road and at the north end of Hanover Close, Settlement Drive and Connaught Drive. The 51 single-family dwelling units are all Activity Category B having an FHWA noise abatement criterion (NCA) of 67 dBA.

NSA 12

NSA 12 is located on the south side of SR 161 just west of the commercial development off of New Albany Road. NSA 12 is an apartment complex with buildings on Turnbridge Drive and Sulgrave Drive. Twelve of the apartment buildings, each having six dwelling units are located within 500 feet of SR 161. The 72 single-family dwelling units are all Activity Category B having an FHWA noise abatement criterion (NCA) of 67 dBA.

NSA 13

NSA 13 is located on the south side of SR 161 about 1,200 feet east of New Albany Road. NSA 13 is comprised of the Wexner Community Park and also includes the Plain Township Aquatic Center. NSA 13 falls under Activity Category C having an FHWA noise abatement criterion (NCA) of 67 dBA (exterior).

NSA 14

NSA 14 is located on the south side of SR 161 west of New Albany Condit Road. NSA 13 is comprised of the New Albany School Soccer field and also includes three single-family residential structures on the west side of New Albany Condit Road. The soccer field falls under Activity Category C having an FHWA noise abatement criterion (NCA) of 67 dBA (exterior) and the dwelling units are all Activity Category B having an FHWA noise abatement criterion (NCA) of 67 dBA.

NSA 15

NSA 15 is located on the south side of SR 161 just east of New Albany Condit Road. NSA 15 is comprised of single-family residential dwelling units south of Butterworth Green Drive. Sixty-three of the dwelling units are located within 500 feet of SR 161. The 63 single-family dwelling units are all Activity Category B having an FHWA noise abatement criterion (NCA) of 67 dBA.

NSA 16

NSA 16 is located on the south side of SR 161 just west of the SR 161 eastbound exit ramp to US 62 / Johnstown Road. NSA 16 is comprised of the Marburn Academy, an independent day school. The academy has soil berms created around the northern and eastern edges of the property that were likely constructed in an effort to reduce traffic noise levels. The academy is considered an Activity Category C having an outdoor FHWA noise abatement criterion (NCA) of 67 dBA.

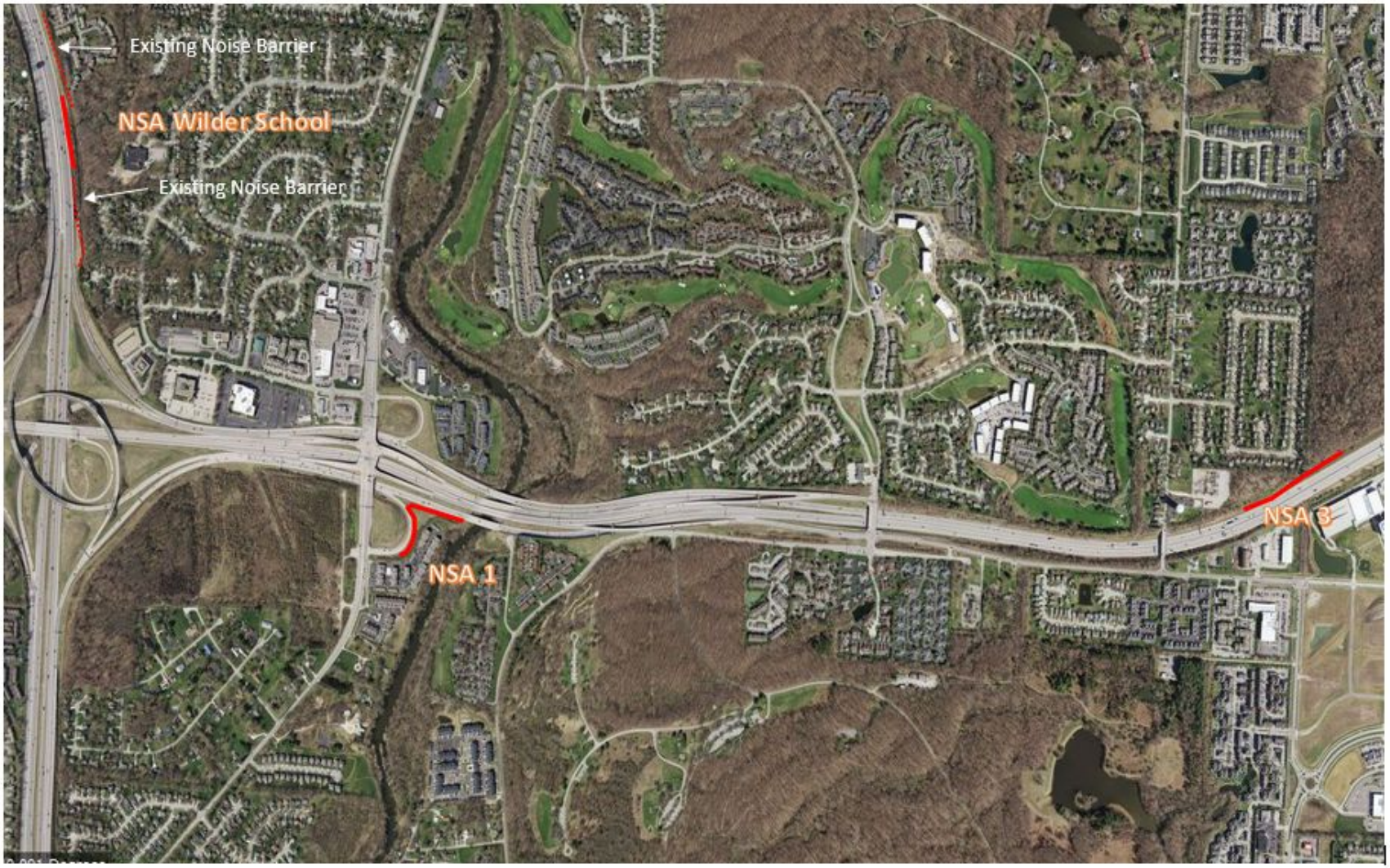
Evaluated Noise Barrier Wall Locations

Traffic noise impact was identified at almost all of the NSA locations. NSAs with no noise impact include NSA 2, NSA 5, NSA 13, NSA 14 and NSA 16. Receivers in NSA 2, the Fairway Lakes Apartments, are situated about 400 feet north of SR 161 with a wide grassy fairway separating the receivers from the roadway. Noise attenuates at a rate that no noise impact occurs. NSA 5 is the Ohio State Outpatient Care New Albany facility. There are no obvious areas for outdoor use in NSA 5 and the interior noise level does not exceed NAC interior level of 52 dBA. NSA 13 is the Wexner Community Park that is situated about 450 feet south of SR 161. The distance from SR 161, dense vegetation and elevation change helps attenuate noise at a rate that no impact occurs at NSA 13. NSA 14 is the New Albany Schools soccer field. The soccer field is shielded from traffic noise by dense vegetation to the west and by a soil berm between the field and SR 161. The features attenuate noise to where there is no impact at NSA 14. NSA 16 is the Marburn Academy. The academy has soil berms constructed along the north and the east property boundaries shielding the school from traffic noise on SR 161 and from the SR 161 exit ramp to Johnstown Road. Noise barrier walls were evaluated for noise abatement at all the other NSAs where noise impacts were predicted to occur in the design year.

As shown on Figure 3 on pages 8-9, 12 noise barrier wall locations were evaluated for potential noise abatement for receptors along SR 161. Individual noise barrier wall evaluations are described in the following sections.

NSA Wilder School – east side of I-270

Wilder School is located on the east side of I-270. An outdoor playground was modeled as an area of frequent outdoor use and is situated about 400 feet east of the edge of pavement and is about 10 feet higher in elevation than the roadway. There is a wooded ravine that drops off about 25 feet in elevation and is located between the roadway and the school playground. There are existing noise barrier walls located both north and south of the school with an opening between them of about 505 feet that exposes the school and playground to traffic noise. This analysis evaluated closing the gap between the existing barriers with a new barrier that would extend north from the existing south barrier along the edge of shoulder and seeing what affect that closure would have on the school's noise level. The analysis did not follow the typical reasonable and feasible determination of whether a noise barrier would be warranted for construction because a 500-foot-long barrier benefiting one receiver would not be cost reasonable. It was determined that without a noise barrier shielding the school, the noise level was predicted to be 71.5 dBA which is above the Activity Category C criterion of 67 dBA indicating the school playground is impacted by traffic noise. An 11-foot-high noise barrier of about 600 feet (closing the gap with some overlap of the north barrier wall) in length would reduce noise levels by 5.2 dB and the school playground would be benefited by the noise barrier but at a cost of $203,274. **No noise barrier wall is recommended for Wilder School.** See Figure 4 on page 10.



LEGEND
Evaluated Noise Barrier Wall Location
Existing Noise Barrier Wall

Figure 3
Evaluated Noise Barrier Walls
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LEGEND
Evaluated Noise Barrier Wall Location

Figure 3
Evaluated Noise Barrier Walls
FRA-161-15.80 PID116322

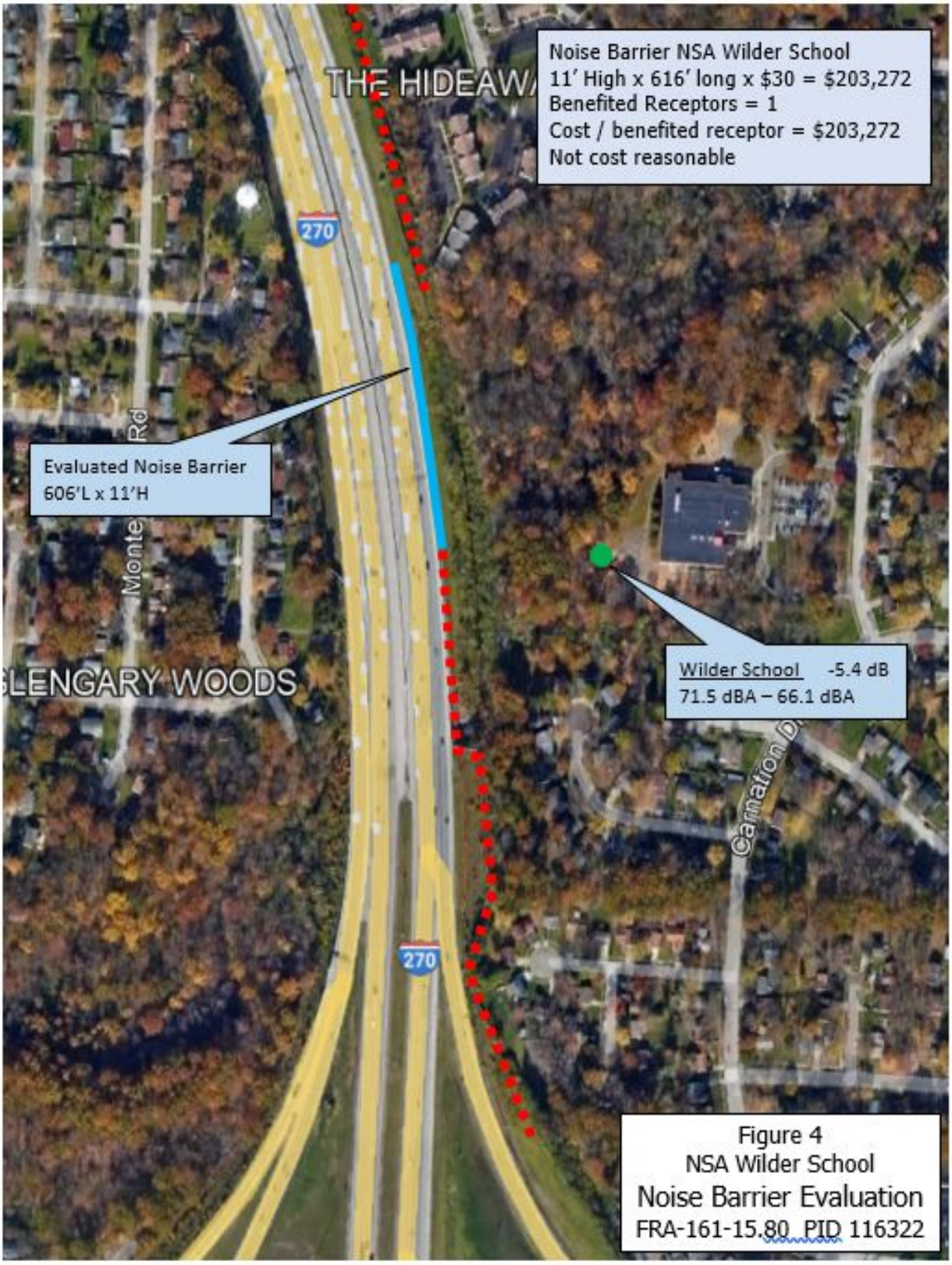

Figure 4
NSA Wilder School
Noise Barrier Evaluation
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NSA 1 – Reserve at Walnut Creek

NSA 1 is located on the south side of SR 161 just east of the SR 161 loop exit ramp to Sunbury Road. NSA 1 is located on a hill at an elevation of 20 feet higher than SR 161. All of the residential dwelling units were modeled as Activity Category B having a NAC of 67 dBA. Of the 38 dwelling units located in NSA 1, 10 were predicted to experience noise levels above the Activity Category B NAC in the Design Year 2045. The noise barrier for NSA 1 was evaluated along the EOS of SR 161, which is slightly higher than the ROW and along the EOS of the loop exit ramp. As shown on Figure 5, page 12, the noise barrier NSA1 evaluates the effectiveness of a noise barrier along the EOS at various lengths and is compared at various heights as shown in Table 1.

Table 1. Noise Barrier Height Comparison
NSA 1 – Noise Barrier Modeled along EOS of SR 161 and EOS of loop ramp

Scenario	Barrier Length	Barrier Height	Cost of Barrier	Impacted receptors	Benefited Receptors	Cost per Benefited Receptor	Maximum Insertion Loss (dB)	Recommended Height
NSA 1	657′	16	$315,406	10	0	- - -	2.9	Noise Barrier Not Recommended
	657′	18	$354,832	10	0	- - -	3.1	
	657′	20	$394,257	10	0	- - -	3.3	
	1,232′	16	$591,560	10	6	$98,593	5.1	
	1,232′	18	$665,505	10	6	$110,917	6.1	
	1,232′	20	$739,450	10	6	$123,461	6.9	

A noise barrier running along the SR 161 EOS at a length of 657 feet was evaluated at various heights as shown in Table 1 above. At the maximum height of 20 feet, a noise barrier along the EOS could not reduce noise levels to benefit any of the receivers. A second noise barrier alignment utilized the noise barrier along the SR 161 EOS and extending over to also run along the SR 161 loop exit ramp at a length of 1,232 feet. In this configuration, the noise barrier could benefit one receiver (representing six dwelling units). However, the noise barrier would not be a feasible and reasonable noise abatement measure even at a maximum height of 20 feet. **No noise barrier wall is recommended for NSA 1.**

NSA 2 – Fairway Lakes Apartments

No noise impacts were identified in NSA 2 under the design year 2045 build condition. The receivers are located a far enough distance from SR 161 that traffic noise can attenuate to an acceptable level before reaching the receivers.

NSA 3 – Preston Commons

NSA 3 is located on the north side of SR 161 just east of Urly Road. NSA 3 is comprised of 28 residential dwelling units located within 500 feet of SR 161. All of the residential dwelling units were modeled as Activity Category B having a NAC of 67 dBA. Of the 28 dwelling units located in NSA 3, 19 were predicted to experience noise levels above the Activity Category B NAC in the Design Year 2045. A noise barrier for NSA 3 was evaluated along the roadway clear zone which is located 30 north of the of SR 161 outside lane. The noise barrier transitions toward the EOS below the overhead power lines to increase the distance between the noise barrier and the power lines. The noise barrier was evaluated at a cost of $30 per square foot. As shown on Figure 6, page 14, the noise barrier NSA3 evaluates the effectiveness of a noise barrier along the EOS at various lengths and is compared at various heights as shown in Table 2.


Noise Barrier NSA 1
16′ High x 1,232′ Long x $30 ft²=$591,560
Benefited Receptors= 6
Cost / Benefited Receptor = $98,593
Not Cost Reasonable
Barrier Not Recommended
Evaluated Noise Barrier
1,232'L x 16' H
LEGEND
Impacted and Benefited
Impacted and Not Benefited
Not Impacted but Benefited
Not Impacted and Not Benefited
Evaluated Noise Barrier
Figure 5
NSA 1 Noise Barrier Evaluation
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Table 2. Noise Barrier Height Comparison NSA 3 – Noise Barrier Modeled along EOS								
Scenario	Barrier Length	Barrier Height	Cost of Barrier	Impacted receptors	Benefited Receptors	Cost per Benefited Receptor	Maximum Insertion Loss (dB)	Recommended Height
NSA3	1,304′	10′	$391,200	19	11	$35,563	6.0	
	1,304′	11′	$430,320	19	13	$33,101	7.1	
	1,304′	12′	$469,182	19	14	$33,513	8.1	
	1,304′	13′	$508,560	19	18	$28,253	9.2	
	1,304′	14′	$547,680	19	21	$26,080	9.3	14′
	1,304′	15′	$586,478	19	21	$27,927	9.8	
	1,304′	16′	$625,400	19	21	$29,782	10.2	

As shown in the table above noise barrier NSA3 would be reasonable and feasible at many heights. Noise barrier NSA 3 at a height of 14 feet benefits the most receivers at the lowest cost per benefited receiver. The noise barrier is located on a 10-foot offset from the ROW line due to the presence of overhead power lines located along the ROW. Offsetting the noise barrier this distance should not conflict with the power lines during construction. **Noise barrier wall NSA3 at a height of 14 feet is recommended as a noise abatement measure for NSA 3.**

NSA 4 – HQ Flats Apartments

NSA 4 is located on the north side of SR 161 just east of Hamilton Road. NSA 4 is the HQ Flats Apartment community and is comprised of 46 residential dwelling units located within 500 feet of SR 161. All of the residential dwelling units were modeled as Activity Category B having a NAC of 67 dBA. Of the 46 dwelling units located in NSA 4, 34 were predicted to experience noise levels above the Activity Category B NAC in the Design Year 2045. A noise barrier for NSA 4 was evaluated along the EOS of SR 161 and following along the exit ramp from SR 161 westbound to Hamilton Road. The EOS is slightly higher in elevation than the ROW. The noise barrier was evaluated at a cost of $30 per square foot. As shown on Figure 7, page 15, the noise barrier NSA3 evaluates the effectiveness of a noise barrier along the EOS at various lengths and is compared at various heights as shown in Table 3.

Table 3. Noise Barrier Height Comparison NSA 4– Noise Barrier Modeled along EOS								
Scenario	Barrier Length	Barrier Height	Cost of Barrier	Impacted receptors	Benefited Receptors	Cost per Benefited Receptor	Maximum Insertion Loss (dB)	Recommended Height
NSA4	1,078′	11′	$355634	34	22	$16,165	6.2	
	1,078′	12′	$387,965	34	28	$13,855	6.6	
	1,078′	13′	$428,295	34	28	$15,296	6.9	
	1,078′	14′	$452,625	34	28	$16,165	7.1	14′
	1,078′	15′	$484,956	34	28	$17,319	7.4	

As shown in the table above barrier NSA4 becomes reasonable and feasible at a height of 12′. **Noise barrier wall NSA4 at a height of 14 feet is recommended as a noise abatement measure for NSA 4.**

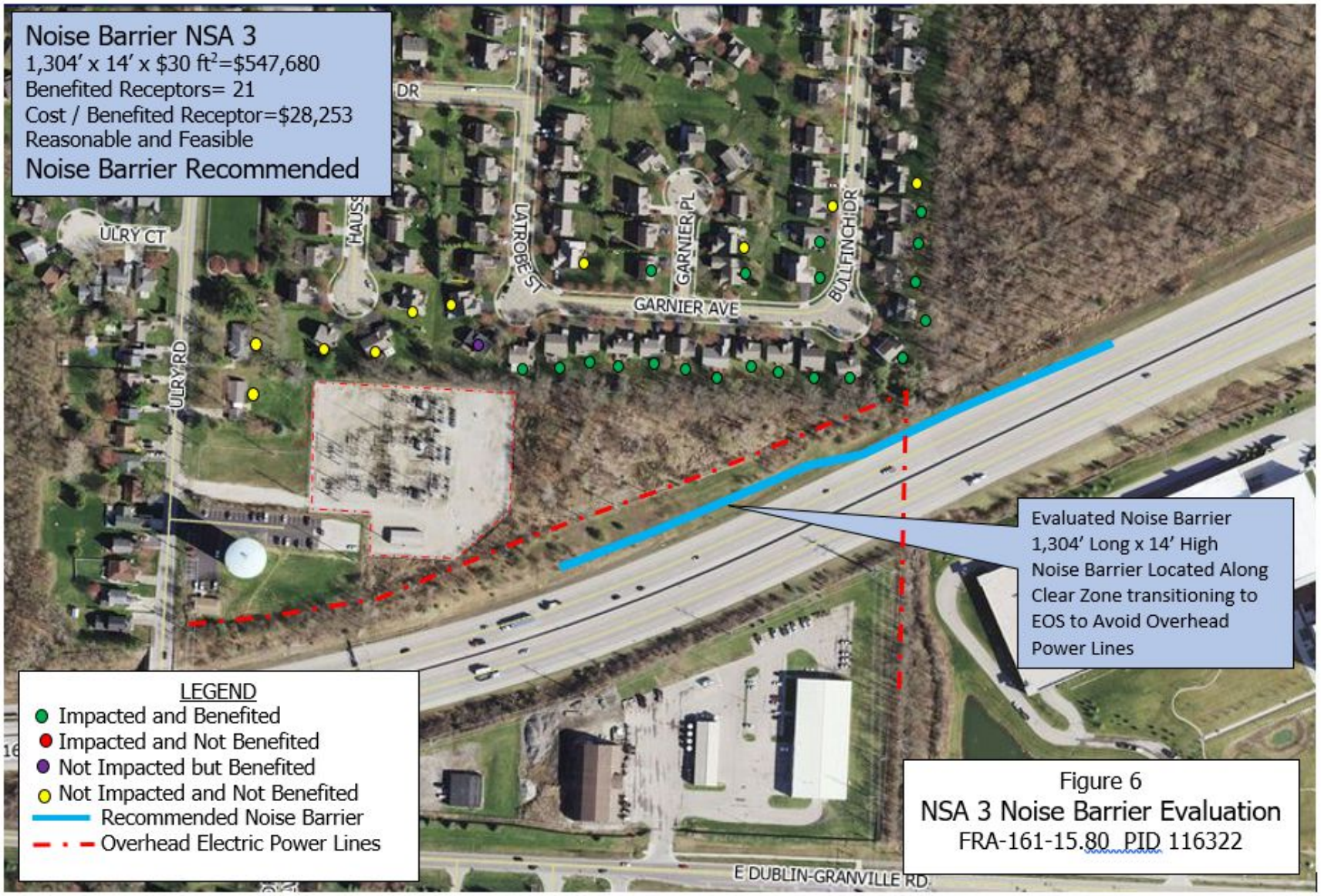

Figure 6
NSA 3 Noise Barrier Evaluation
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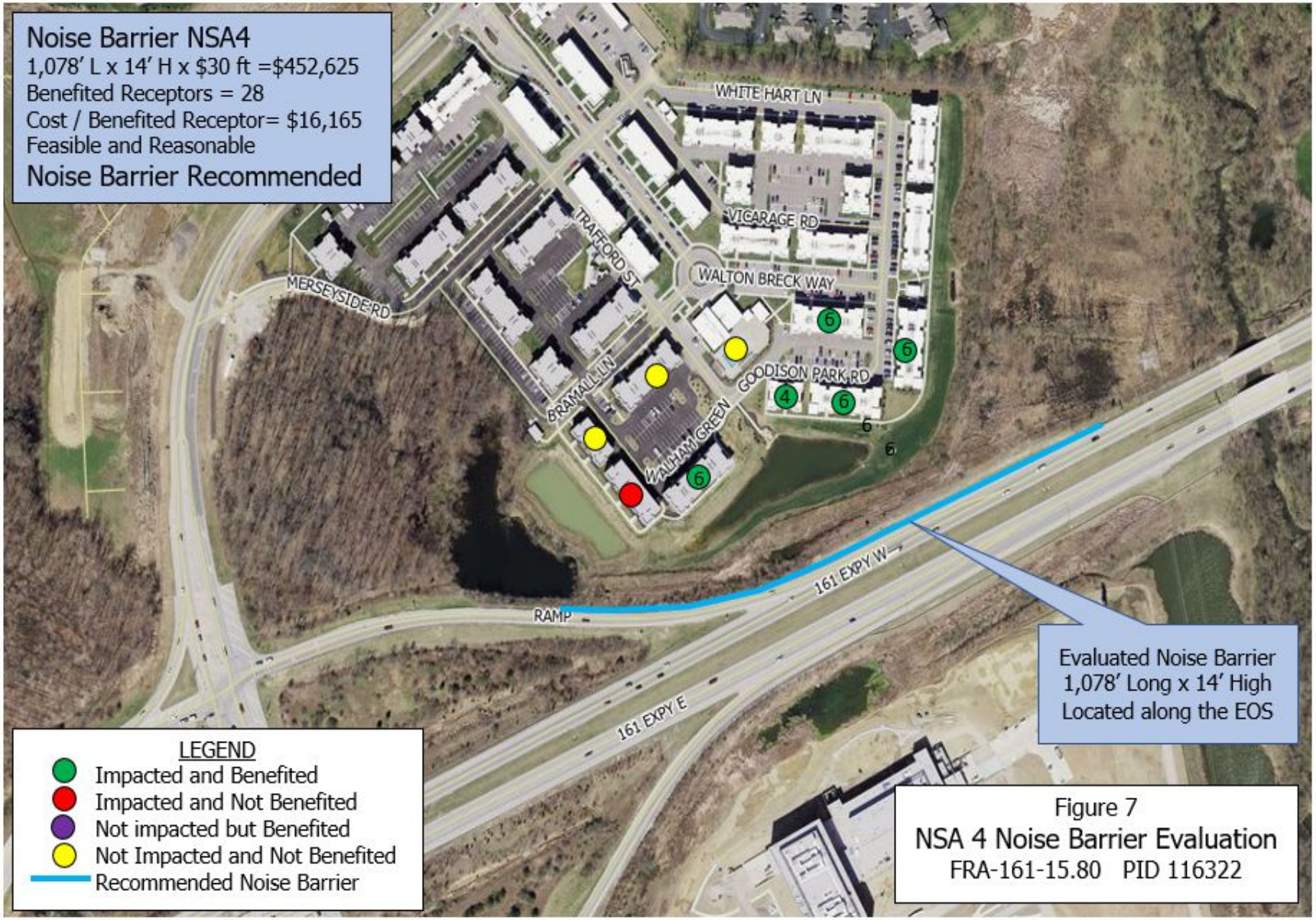

Figure 7
NSA 4 Noise Barrier Evaluation
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NSA 5 – Ohio State Outpatient Care New Albany

No noise impacts were identified in NSA 5 under the design year 2045 build condition. NSA 5 is the Ohio State Outpatient Care New Albany. The care facility is currently under construction and it was determined that the prediction of an interior noise level to determine potential noise impact was most appropriate for the facility at this time. The facility is considered an Activity Category D having an FHWA noise abatement criterion (NAC) of 52 dBA (interior). A design year noise level of 64.1 dBA was predicted for the facility. According to the FHWA Building Noise Reduction Factors, a masonry building with closed windows would provide a minimum interior noise reduction of 25 dB. A 64.1 dB exterior noise level would be reduced to 39.1 dB interior. There would be no exceedance of the NAC and consideration of noise abatement is not necessary for NSA 5.

NSA 6 – Pepper Mill Apartments

NSA 6 is located on the north side of SR 161 just east of Hamilton Road. NSA 6 is the Rocky Fork Condominium community and is comprised of 28 residential dwelling units located within 500 feet of SR 161. All of the residential dwelling units were modeled as Activity Category B having a NAC of 67 dBA. Of the 28 dwelling units located in NSA 6, 12 were predicted to experience noise levels above the Activity Category B NAC in the Design Year 2045. A noise barrier for NSA 6 was evaluated along the existing white fence line. The noise barrier was evaluated at a cost of $30 per square foot. Noise barrier NSA 6 is shown on Figure 8 and is evaluated and compared at various heights as shown in Table 4.

Table 4. Noise Barrier Height Comparison
NSA 6– Noise Barrier Modeled along EOS

Scenario	Barrier Length	Barrier Height	Cost of Barrier	Impacted Receptors	Benefited Receptors	Cost per Benefited Receptor	Maximum Insertion Loss (dB)	Recommended Height
NSA6	1,049′	10′	$314,700	12	4	$78,675	4.8	
	1,049′	11′	$346,170	12	4	$86,542	5.8	
	1,049′	12′	$377,640	12	8	$47,205	6.0	
	1,049′	13′	$409,043	12	12	$34,086	6.2	
	1,049′	14′	$440,507	12	12	$36,708	6.4	14′
	1,049′	15′	$472,050	12	12	$39,337	6.7	

As shown in the table above barrier NSA4 becomes reasonable and feasible at a height of 13′. **Noise barrier NSA6 at a height of 14 feet is recommended as a noise abatement measure for NSA 6.**

NSA 7 – Albany Commons

No noise impacts were identified in NSA 7 under the design year 2045 build condition. Even though the receivers are located just over 200 feet from the edge of the nearest travel lane, the local topography and the construction of soil berms along the Albany Commons south property line shields the receivers from much of the traffic noise. Additional noise studies were conducted for the receivers in NSA 7 to further quantify that exiting year and design year noise levels do not exceed the federal criteria or the state noise policy.

Noise Sensitive Area (NSA) 7 is located on the north side of SR 161 just west of the Harlem Road overpass of SR 161. NSA 7 is comprised of the New Albany Commons apartment community.

The Albany Commons apartment complex has 20 buildings with each building comprised of eight individual dwelling units. All, or part of 13 buildings are located within 500 feet of the proposed design year driving lanes of SR 161 and were evaluated for potential noise impact as a result of the proposed improvements. There is an existing soil berm located along the apartment complexes' south property line and is situated between the apartment buildings and SR 161. It is assumed that the soil berm was built along with the apartment buildings during original construction with the purpose of partially screening the buildings from SR 161 and to provide a substantial level of noise reduction for the residents.

As part of this noise analysis, it was determined through noise modeling that the soil berm does provide a substantial level of noise reduction for the apartment community. The largest increase in noise level from the existing year 2025 to the design year 2045 was predicted to be 1.5 decibels (dB) and the highest predicted design year noise level was 63.5 dBA. In the design year, none of the receivers in NSA 7 would experience either a substantial increase (≥10dB increase) in noise level or exceed the FHWA Category B Noise Abatement Criteria (residential) noise level of 66 dBA. With no identified noise impact, the consideration of noise abatement for NSA 7 is not warranted. However, additional noise evaluation was conducted to ensure that dwelling units at New Albany Commons would, indeed, not be impacted by design year noise levels.

Noise measurements at Albany Commons

As part of all noise analyses, field noise measurements are taken at every NSA at a location that would be representative of the entire NSA. During the field measurements, traffic volume and vehicle mix are recorded. A noise model is then run using the field collected traffic volumes and a receiver point at the field measured location. The field measured level is then compared to modeled level to ensure that model has been set to correctly predict noise levels based on actual field conditions. A field noise measurement was taken on May 9, 2022 and the 15-minute equivalent noise level was 62.4 dBA. The modeled noise level was 62.8 dBA. When compared, the results are almost identical and shows that the noise model is accurately predicting actual site conditions. Noise measurements performed by ODOT OES found that the soil berm is reducing noise by 7 to 9 dB between top of berm and behind the berm at the toe of slope. During their site visit, ODOT identified two potentially noise sensitive receivers (a dog park and a community garden space) in an area not shielded by the soil berm and asked for a noise barrier analysis for this area at the eastern edge of the NSA. An analysis using a noise barrier 300-feet-long by 14-feet-high was completed. In this configuration the noise barrier could not provide a level of noise reduction (-5 dB) that would benefit either receiver height and was not recommended.

Noise level reduction provided by the existing soil berm

A noise analysis using the design year traffic volume was run to estimate the levels of noise reduction the existing soil berm is currently providing the receivers. In the first run of the analysis, the existing soil berm was removed from the noise model. The model was then run to predict noise levels that would occur **without** the existing soil berm. **Without** the existing soil berm, eight noise receivers (NSA7-1 through NSA7-8) would be impacted by traffic noise as shown in the second column of Table 5. In the second run of the analysis, the existing soil berm was inserted back into the noise model, and the model was run to predict the noise levels that would occur in the design year with the existing soil berm in place. The last column in Table 5 shows the noise reduction that the soil berm provides the dwelling units. The soil berm is shown to

provide the level of noise reduction that benefits eleven of the receivers (all receivers except NSA7-7 and NSA7-12). The existing noise barrier is providing a high level of noise reduction for all the receivers.

Table 5. NSA 7
Noise Reduction provided by the Existing Soil Berm

Receiver	Design Year Noise levels **without** the soil berm (dBA) **(Baseline)**	Design Year Noise levels **with** the soil berm (dBA)	Noise Reduction provided by the existing soil berm (dB)
NSA7-1	72.0	63.5	8.5
NSA7-2	68.4	61.5	6.9
NSA7-3	67.9	61.8	6.1
NSA7-4	69.1	62.3	6.8
NSA7-5	66.7	61.7	5.0
NSA7-6	65.5	61.0	4.5
NSA7-7	66.7	62.6	4.1
NSA7-8	67.2	62.4	4.8
NSA7-9	65.1	60.2	4.9
NSA7-10	64.2	59.3	4.9
NSA7-11	63.4	58.9	4.5
NSA7-12	62.7	58.6	4.1
NSA7-13	64.8	59.8	5.0

Receivers impacted **without** the existing soil berm

Receivers benefited **with** the existing soil berm

Noise level reduction provided by a 14-foot-high noise barrier in addition to the soil berm

A noise analysis was conducted to determine what the level of noise reduction could be with the addition of a 14' high noise barrier to the existing soil berm as shown in Table 2. A noise analysis was prepared using the design year traffic volume and a noise barrier wall at a height of 14 feet and a length of 1,500 feet running along the existing white fence. At a cost of \$30 $ft^{2,}$ a noise barrier of this configuration would have an approximate cost of \$631,200. The levels of noise reduction this noise barrier would provide would range from 0.8 dB to 2.5 dB and are shown in the last column of the following table. The average person cannot perceive a change in noise level of less than 3.0 db. Constructing a noise barrier would not be feasible in reducing noise by a perceptible level and a cost of \$631,200 is not a reasonable expenditure in return for such low levels of noise reduction.

Table 6. NSA 7
The existing soil berm with the addition of a 14' high noise barrier

Receiver	Design Year noise levels **with** the soil berm (dBA)	Design Year noise levels **with** the soil berm **and** a 14'-high noise barrier (dBA)	Additional noise reduction provided by a 14' - high noise barrier (dB)
NSA7-1	63.5	62.4	-0.9
NSA7-2	61.5	60.3	-0.8
NSA7-3	61.8	60.0	-1.8
NSA7-4	62.3	61.0	-1.3
NSA7-5	61.7	60.0	-1.7

Table 6. NSA 7 The existing soil berm with the addition of a 14' high noise barrier			
Receiver	Design Year noise levels **with** the soil berm (dBA)	Design Year noise levels **with** the soil berm **and** a 14'-high noise barrier (dBA)	Additional noise reduction provided by a 14' - high noise barrier (dB)
NSA7-6	61.0	59.5	-1.5
NSA7-7	62.6	60.8	-1.8
NSA7-8	62.4	59.7	-2.7
NSA7-9	60.2	57.8	-2.4
NSA7-10	59.3	56.8	-2.5
NSA7-11	58.9	56.5	-2.4
NSA7-12	58.6	56.7	-1.9
NSA7-13	59.8	57.9	-1.9

Noise level reduction provided by a 14-foot-high noise barrier without the soil berm

A noise analysis was also conducted to estimate the levels of noise reduction a 14-foot-high noise barrier could provide the dwelling units if the soil berm was not constructed is shown in Table 3. In this analysis, there is no soil berm. **Without** the soil berm, eight noise receivers (NSA7-1 through NSA7-8) would be impacted by traffic noise, as shown in the second column. A noise barrier wall at a height of 14 feet and a length of 1,500 feet running along the existing white fence line was inserted into the noise model. With the 14-foot-high noise barrier, none of the receivers in NSA 7 would be impacted by traffic noise as shown in the third column. The last column of the table shows the levels of noise reduction the noise barrier would provide would ranging from 4.4 dB to 8.9 dB and would benefit all but one (NSA7-12) of the receivers in NSA 7.

Table 7. NSA 7 Evaluating a 14' High Noise Barrier in lieu of the Existing Soil Berm			
Receiver	Design Year Noise levels **without** the soil berm (dBA) **(Baseline)**	Design Year Noise levels **with a 14' high noise barrier** (dBA)	Noise Reduction provided by a noise barrier (dB)
NSA7-1	72.0	63.1	8.9
NSA7-2	68.4	61.4	7.0
NSA7-3	67.9	61.2	6.7
NSA7-4	69.1	61.9	7.2
NSA7-5	66.7	61.1	5.6
NSA7-6	65.5	60.5	5.0
NSA7-7	66.7	61.6	5.1
NSA7-8	67.2	60.9	6.3
NSA7-9	65.1	59.7	5.4
NSA7-10	64.2	59.2	5.0
NSA7-11	63.4	58.7	4.7
NSA7-12	62.7	58.3	4.4
NSA7-13	64.8	58.8	5.9

Receiver impacted **without** the existing soil berm

Receiver benefited **with** a noise barrier wall

Comparison of the noise level reduction provided by the existing soil berm compared to a 14-foot-high noise barrier

As a final comparison, Table 4 shows the levels of noise reduction the existing soil berm currently provides the noise receivers as compared to the levels of noise reduction a 14' high noise barrier could provide if there were not a soil berm in place. The levels of noise reduction with a berm and with a noise barrier are very comparable. As shown in Table 4, a noise barrier wall could provide a slightly higher level of noise reduction than the soil berm, but the difference on average is only about 0.5 dB, an imperceptible noise level.

Table 8. NSA 7
Levels of noise reduction provided by the soil berm versus a noise barrier wall

Receiver	Levels of noise reduction provided by the existing soil berm	Levels of noise reduction that could be provided by a 14' high noise barrier	The difference in noise level reduction noise barrier over soil berm(dB)
NSA7-1	8.5	8.9	0.4
NSA7-2	6.9	7.0	0.1
NSA7-3	6.1	6.7	0.6
NSA7-4	6.8	7.2	0.4
NSA7-5	5.0	5.6	0.6
NSA7-6	4.5	5.0	0.5
NSA7-7	4.1	5.1	1.0
NSA7-8	4.8	6.3	1.5
NSA7-9	4.9	5.4	0.5
NSA7-10	4.9	5.0	0.1
NSA7-11	4.5	4.7	0.2
NSA7-12	4.1	4.4	0.3
NSA7-13	5.0	5.9	0.9

The analyses show that the existing soil berm is providing a comparable level of noise reduction that a 14' high noise barrier wall could provide. The modeling of NSA 7 appears to confirm that the existing soil berm does and will continue to provide a substantial level of noise abatement even with the additional traffic of the proposed project. Additional noise abatement is not warranted at NSA 7.

NSA 8 – Albany Woods

NSA 8 is located on the south side of SR 161 just west of Harlem Road. NSA 8 is the Albany Woods Apartments community and is comprised of 146 residential dwelling units located within 500 feet of SR 161. All of the residential dwelling units were modeled as Activity Category B having a NAC of 67 dBA. Of the 146 dwelling units located in NSA 8, 124 were predicted to experience noise levels above the Activity Category B NAC in the Design Year 2045. A noise barrier for NSA 8 was evaluated along the existing white fence line that follows the ROW line of SR 161. The EOS is about the same elevation as the ROW. The noise barrier was evaluated at a cost of $30 per square foot. Noise barrier NSA 8 is shown on Figure 9 and is evaluated and compared at various heights as shown in Table 9.

Table 9. Noise Barrier Height Comparison
NSA 8– Noise Barrier Modeled along EOS

Scenario	Barrier Length	Barrier Height	Cost of Barrier	Impacted Receptors	Benefited Receptors	Cost per Benefited Receptor	Maximum Insertion Loss (dB)	Recommended Height
NSA8	2,510′	11′	$828,220	124	94	$8,810	11.3	
	2,510′	12′	$903,513	124	110	$8,213	12.0	
	2,510′	13′	$978,806	124	116	$8,433	12.5	
	2,510′	14′	$1,054,098	124	132	$7,985	13.1	14′
	2,510′	15′	$1,129,391	124	140	$8,067	13.6	

As shown in the table above barrier NSA8 is reasonable and feasible at many heights. **Noise barrier NSA8 at a height of 14 feet is recommended as a noise abatement measure for NSA 8.**

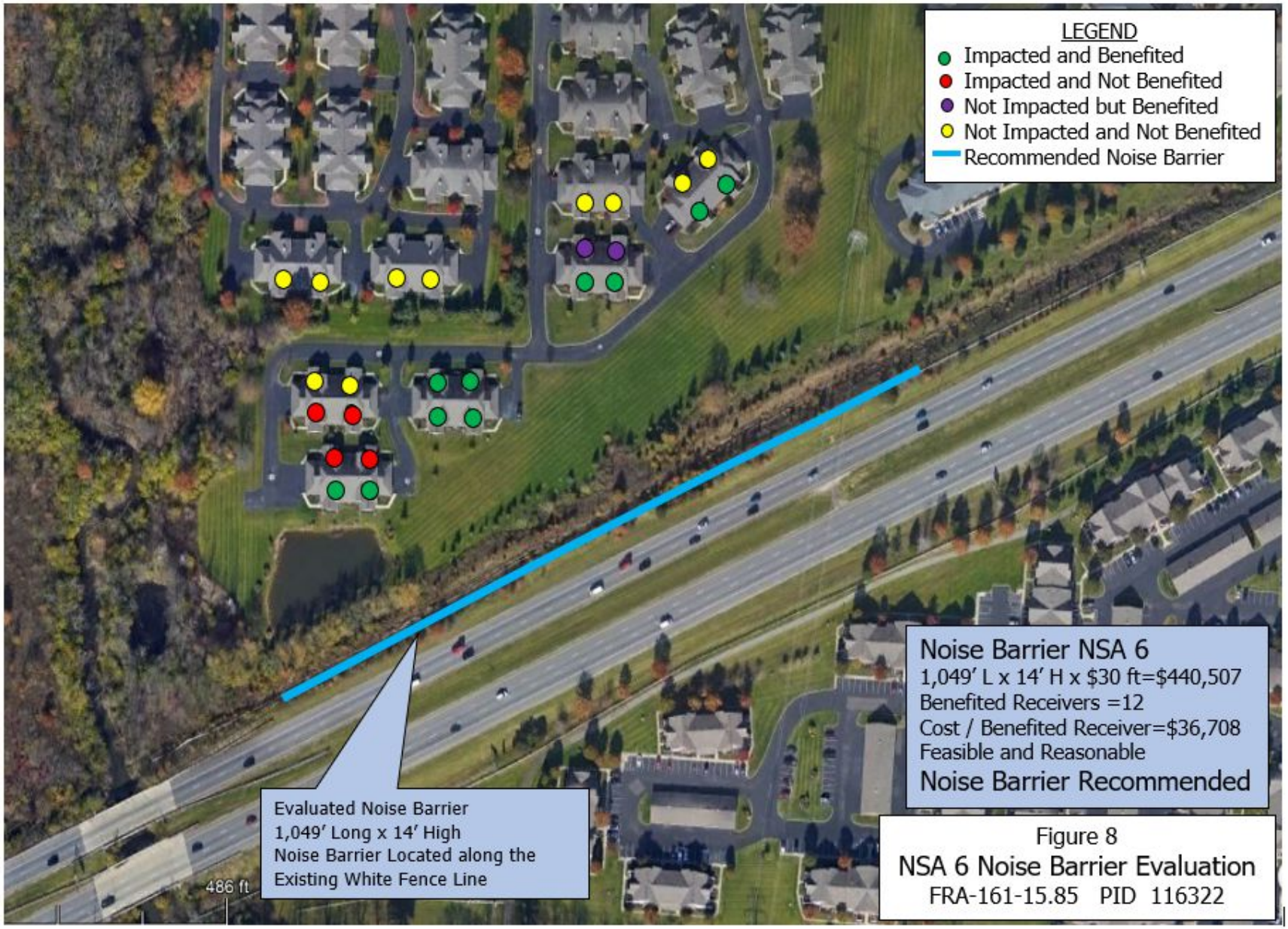


Figure 8
NSA 6 Noise Barrier Evaluation
FRA-161-15.85 PID 116322

Figure 9
NSA 8 Noise Barrier Evaluation
FRA-161-15.85 PID 116322

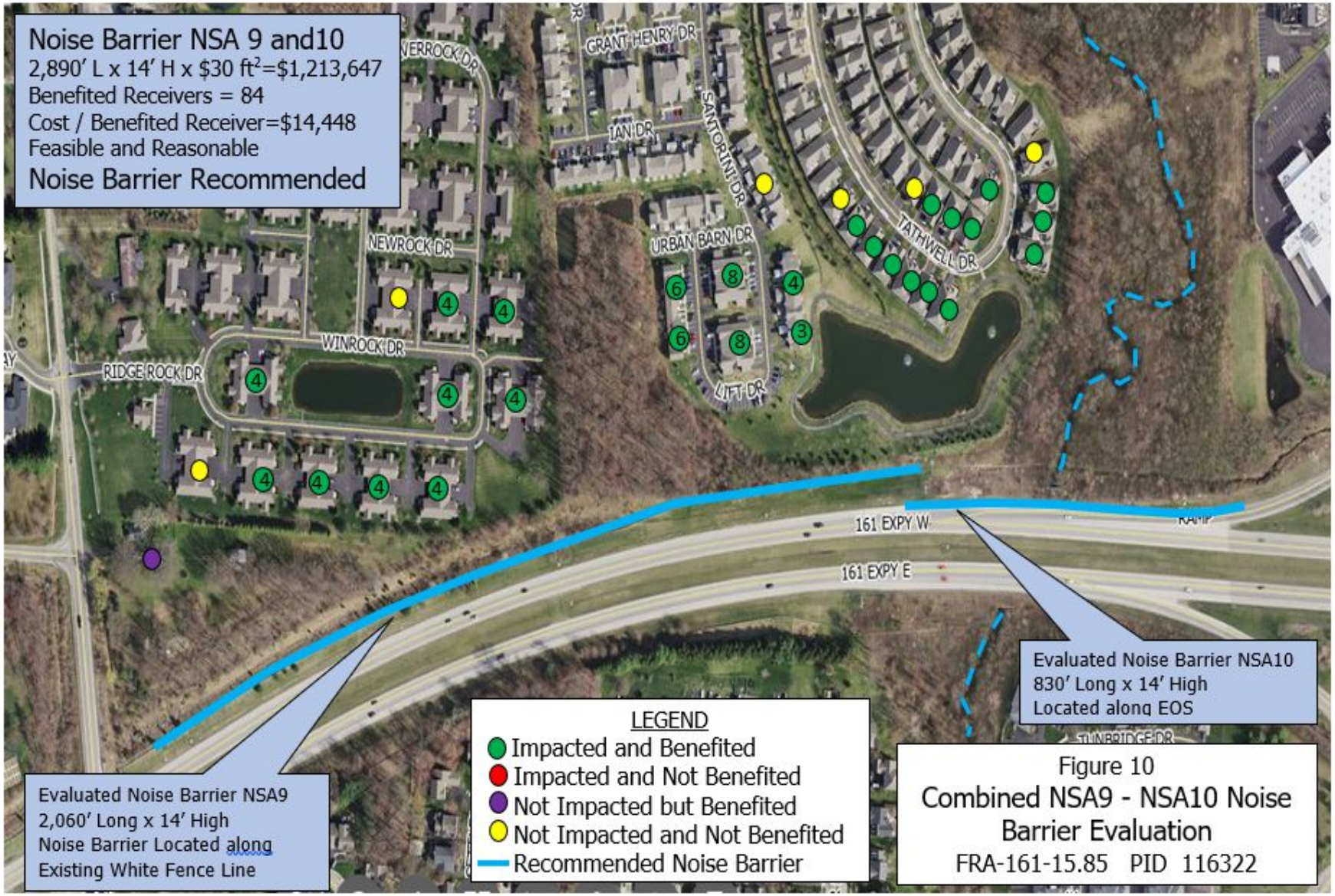
NSA 9 – Ridge Rock Drive and NSA 10 – Tathwell Drive

NSA 9 is located on the north side of SR 161 just east of Harlem Road. NSA 9 is called the Rocky Ridge Condominiums community and is comprised of 41 residential dwelling units located within 500 feet of SR 161. There is also a single-family residential structure in the NSA having access via Harlem Road. NSA 10 is located on the north side of SR 161 just west of the New Albany Road westbound entrance ramp to SR 161. NSA 10 is comprised of apartment buildings and single-family stand-alone condominiums. The apartment community is called Grammercy at New Albany and is comprised of 35 residential dwelling units located within 500 feet of SR 161. The single-family residential development is called the Woods at Sugar Run condominiums. The condominium community has 11 dwelling units located within 500 feet of SR 161. All of the residential dwelling units were modeled as Activity Category B having a NAC of 67 dBA. Of the 41 dwelling units located in NSA 9, 28 were predicted to experience noise levels above the Activity Category B NAC in the Design Year 2045. A noise barrier for NSA 9 was evaluated along the existing white fence line on the north side of SR 161. Of the 47 dwelling units located in NSA 10, 28 were predicted to experience noise levels above the Activity Category B NAC in the Design Year 2045. A noise barrier for NSA 10 was evaluated along the EOS of SR 161. Both noise barriers were evaluated at a cost of $30 per square foot. Noise barriers NSA9 and NSA10 is shown on Figure 10 and is evaluated and compared at various heights as shown in Table 10.

Table 10. Noise Barrier Height Comparison
NSA 9 and NSA 10– Noise Barrier Modeled along ROW and EOS

Scenario	Barrier Length	Barrier Height	Cost of Barrier	Impacted Receptors	Benefited Receptors	Cost per Benefited Receptor	Maximum Insertion Loss (dB)	Recommended Height
NSA 9 NSA 10	2,510′	11′	$828,502	52	20	$41,425	7.6	
	2,510′	12′	$903,821	52	32	$28,244	8.4	
	2,890′	13′	$1,184,384	52	70	$16,919	9.1	
	2,890′	14′	$1,213,647	52	84	$14,448	9.6	14′
	2,890′	15′	$1,300,336	52	88	$14,776	10.1	

As shown on table 8, the noise barriers when evaluated together are shown to be a reasonable and feasible noise abatement measure at many heights. **Noise barriers NSA9 and NSA10, both at heights 14 feet are recommended as a noise abatement measure for NSA 9 and NSA 10.**


Noise Barrier NSA 9 and10
2,890' L x 14' H x $30 ft²=$1,213,647
Benefited Receivers = 84
Cost / Benefited Receiver=$14,448
Feasible and Reasonable
Noise Barrier Recommended
GRANT HENRY DR
IAN DR
SANTORINI DR
URBAN BARN DR
TATHWELL DR
LIFT DR
NEWROCK DR
WINROCK DR
RIDGE ROCK DR
161 EXPY W
161 EXPY E
Evaluated Noise Barrier NSA10
830' Long x 14' High
Located along EOS
Evaluated Noise Barrier NSA9
2,060' Long x 14' High
Noise Barrier Located along
Existing White Fence Line
LEGEND
Impacted and Benefited
Impacted and Not Benefited
Not Impacted but Benefited
Not Impacted and Not Benefited
Recommended Noise Barrier
Figure 10
Combined NSA9 - NSA10 Noise Barrier Evaluation
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NSA 11 – Settlement Drive and NSA 12 – Berkeley Park

NSAs 11 and 12 are located on the south side of SR 161 and run along the entire length of SR 161 from Harlem Road to the east bound exit ramp from SR 161 to New Albany Road. It wasn't until after naming the NSAs that it was noticed that a drainageway is located between the two NSAs and separating them with elevation change. At the west end of NSA 11, the elevation is about 10 feet higher along the ROW than the EOS. It was discovered that not all the first-row receptors could be shielded with a noise barrier along the ROW moving east as elevations drop near the drainageway. A noise barrier along the EOS will overlap the noise barrier along the ROW and will continue east to the exit ramp. NSA 11 is comprised of closely spaced single-family homes in a development called Hampsted Village. There is a total of 51 residential dwelling units located within 500 feet of SR 161. NSA 12 an apartment community called Berkley Park at New Albany and is comprised of 72 residential dwelling units located within 500 feet of SR 161. All of the residential dwelling units were modeled as Activity Category B having a NAC of 67 dBA. Of the 123 dwelling units located in NSAs 11 and 12, 114 were predicted to experience noise levels above the Activity Category B NAC in the Design Year 2045.

A noise barrier for NSA 11 was evaluated along the existing white fence line on the south side of SR 161. In general, the fence line is about five to ten feet higher than the elevation along the EOS along this section of SR 161. A noise barrier for NSA 12 was evaluated along the EOS of mainline SR 161 and continues along the EOS of the exit ramp. Elevations along the EOS are about 10 to 15 feet higher than along the ROW where the drainageway passes under SR 161. The noise barrier was evaluated at a cost of $30 per square foot. Noise barriers NSA 11 and 12 are shown on Figure 11 and are evaluated as one barrier system at various heights as shown in Table 11.

Table 11. Noise Barrier Height Comparison
NSA 11 and NSA 12 Combined– Noise Barrier Modeled along ROW and EOS

Scenario	Barrier Length	Barrier Height	Cost of Barrier	Impacted Receptors	Benefited Receptors	Cost per Benefited Receptor	Maximum Insertion Loss (dB)	Recommended Height
NSA 11 NSA 12	3,176′	12′	$1,143,039	107	113	$10,115	11.2	
	3,176′	13′	$1,238,292	107	115	$10,767	11.9	
	3,176′	14′	$1,333,545	107	116	$11,460	12.8	14′
	3,176′	15′	$1,428,798	107	116	$12,317	12.9	
	3,176′	16′	$1,524,052	107	116	$13,138	13.3	

As shown in the table above, noise barriers NSA 11 and NSA 12 are both reasonable and feasible at several heights. At a height of 14 feet, the noise barriers provide a noise benefit for the most receptors. **Noise barrier NSA11 and noise barrier NSA12, both at heights of 14 feet are recommended as a noise abatement measure for NSAs 11 and 12.**

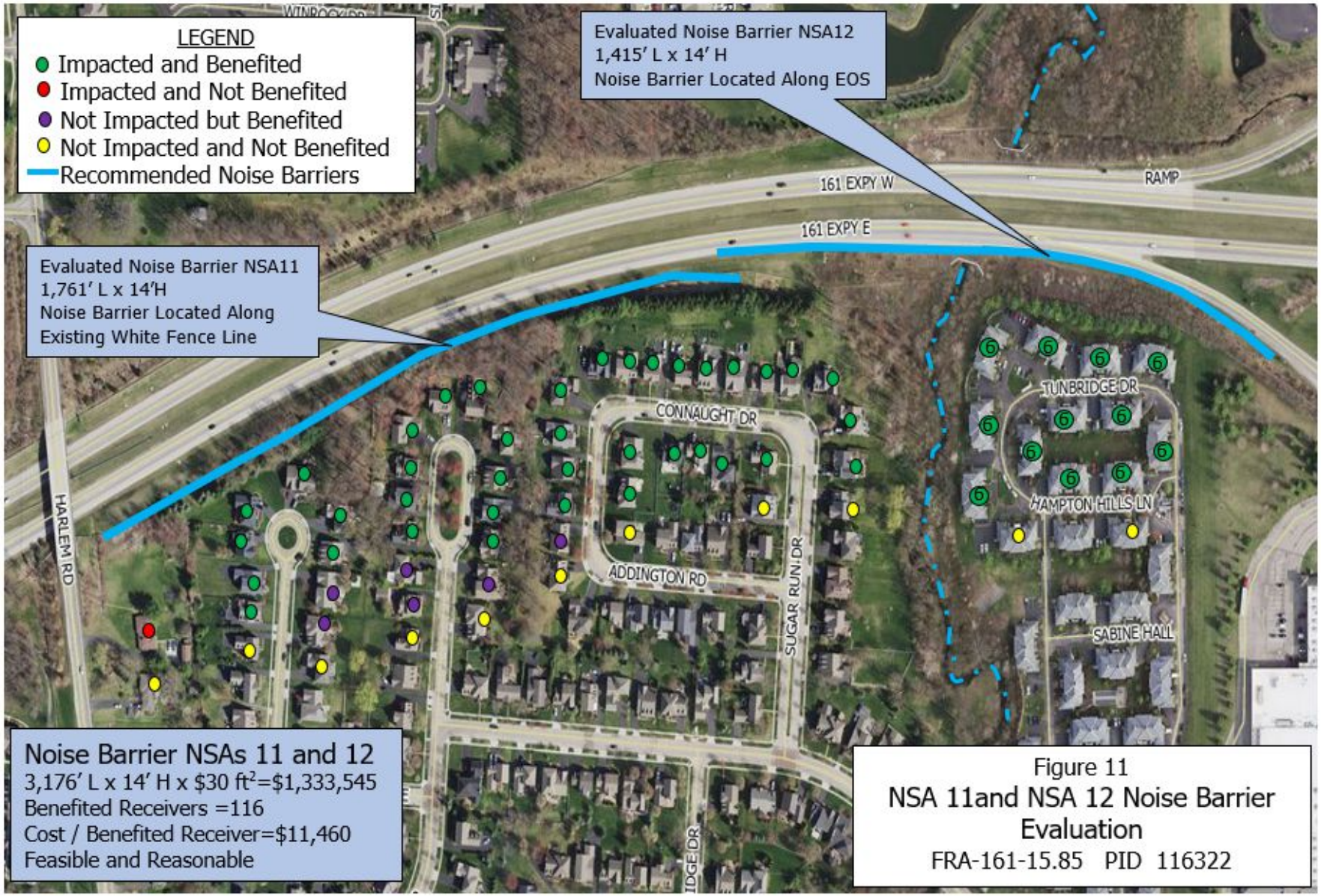

Figure 11
NSA 11and NSA 12 Noise Barrier Evaluation
FRA-161-15.85 PID 116322

NSA 13 – Wexner Community Park

NSA 13 is the Wexner Community Park located on the south side of SR 161. The NSA also includes the Plain Township Aquatic Center. The outdoor areas of frequent use are located around 400 feet south of SR 161. Due to the distance separation, **no noise impacts were identified** in NSA 13 under the design year 2045 build condition.

NSA 14 – New Albany School Soccer Field

NSA 14 is located on the south side of SR 161 west of New Albany Condit Road. The NSA is currently used as a soccer field by New Albany Schools. The northernmost area of the NSA that could be utilized as part of the soccer field is located 270 feet south of SR 161. There is also a landscaped soil berm located between the soccer field and SR 161. The berm rises to a height of 18 feet above the roadway and about 10 feet higher than the soccer field. The soil berm, combined with the distance of the soccer field from SR 161, reduce traffic noise levels to the point where **no noise impacts were identified** in NSA 14 under the design year 2045 build condition.

NSA 15 Butterworth Green Drive Neighborhood

NSA 15 is located on the south side of SR 161 east of New Albany Condit Road. The NSA is comprised of three single family dwelling units with driveway access to New Albany Condit Road and a large, single-family residential development known as Windsor New Albany having 59 dwelling units located within 500 feet of SR 161. There is property, owned by the Windsor Homeowners Association Inc, located between Butterworth Green Drive and SR 161. This property is a landscaped soil berm that is about 10 feet higher in elevation than SR 161 and ranges from six to eight feet higher in elevation than the homes in Windsor New Albany along Butterworth Green Drive. This berm helps to shield the homes in Windsor from traffic noise on SR 161. With the shielding effects provided by the soil berm, of the 62 receivers in NSA 15, only seven are impacted by traffic noise from SR 161. A noise barrier wall was evaluated along the ROW of SR 161. Elevations along the ROW range from two to ten feet higher than the EOS.

A noise barrier along the ROW was evaluated at a cost of $30 per square foot. Noise barrier NSA 15 is shown on Figure 12 and is evaluated and compared at various heights as shown in Table 12.

Table 12. Noise Barrier Height Comparison
NSA 15– Noise Barrier Modeled along ROW

Scenario	Barrier Length	Barrier Height	Cost of Barrier	Impacted Receptors	Benefited Receptors	Cost per Benefited Receptor	Maximum Insertion Loss (dB)	Recommended Height
NSA 15	1,996′	13′	$778,513	13	17	$45,794	11.1	
	1,900	14′	$799,370	13	20	$39,968	11.6	14′
	1,900′	15′	$856,467	13	26	$32,941	12.0	
	1,996′	16′	$958,170	13	28	$34,220	12.4	
	1,996′	17′	$1,017,960	13	32	$31,811	12.4	

As shown in the table above, noise barrier NSA15 is reasonable and feasible at several heights. **Noise barrier NSA15 at a height of 14 feet is recommended as a noise abatement measure for NSA 15.**


Evaluated Noise Barrier
150' Long x 14' High
Noise Barrier Located Along ROW
Evaluated Noise Barrier
1,940' Long x 14' High
Noise Barrier Located Along ROW
Noise Barrier NSA 15 ROW
2,090' L x 14' H x $30 ft=$877,800
Benefited Receivers = 21
Cost / Benefited Receiver=$ 41,800
Feasible and Reasonable
Noise Barrier Recommended
LEGEND
Impacted and Benefited
Impacted and Not Benefited
Not Impacted but Benefited
Not Impacted and Not Benefited
Noise Barrier Recommended
Figure 12
NSA 15 Noise Barrier
Evaluation along ROW
FRA-161-15.85 PID 116322

NSA 16 – Marburn Academy

No noise impacts were identified in NSA 16 under the design year 2045 build condition. NSA 16 is the Marburn Academy private day school. The Academy has fairly high soil berms located on the north side of the property shielding the academy from traffic noise on SR 161 and also has a soil berm on the east side of the property shielding the academy grounds from traffic noise on the SR 161 exit ramp to US 62. The soil berms provide a substantial level of noise reduction from traffic noise and no traffic noise impacts were identified. There is no exceedance of the FHWA Category C NAC of 67 dBA and consideration of noise abatement is not necessary for NSA 16.

Summary

A noise barrier evaluation summary of all of the NSA scenarios is presented in Table 12 on the following page. Noise barrier walls that were determined to be both feasible and reasonable are highlighted in green.

Table 14, on page 31, summarizes the recommended noise barrier walls for the project. Figure 13, on pages 32 and 33 show the recommended noise barrier wall locations for the project.

Table 13. Noise Barrier Evaluation Summary

Barrier	Barrier Length (feet)	Barrier Height (feet)	Square Footage of Barrier	Maximum Insertion Loss[a] (dB)	Impacted Receptors	Benefitted Receptors [b]	Barrier Cost [c]	Cost per benefited receptor	Effectiveness		Barrier Location [f]	Barrier Recommended [g]
									Feasible [d]	Reasonable [e]		
Wilder School	606	11	6,666	5.4	1	1	$203,273	$203,273	No	No	EOS	No
NSA 1	1,232	16	19,712	5.1	10	6	$591,560	$98,593	No	No	EOS	No
NSA 2	No Noise Impact											
NSA 3	1.304	14	18,256	9.3	19	21	$547,680	$26,080	Yes	Yes	Clear zone and EOS	Yes
NSA 4	1,078	14	15,092	7.1	34	28	$452,625	$16,165	Yes	Yes	EOS	Yes
NSA 5	No Noise Impact											
NSA 6	1,049	14	14,686	6.4	12	12	$440,507	$36,708	Yes	Yes	White Fence Line	Yes
NSA 7	No Noise Impact											
NSA 8	2,510	14	35,140	13.1	124	132	$1,054,098	$7,985	Yes	Yes	White Fence Line / ROW	Yes
NSA 9 and NSA 10	2,890	14	40,460	9.6	52	84	$1,213,647	$14,448	Yes	Yes	White Fence Line and EOS	Yes
NSA 11 and NSA 12	3,176	14	44,464	12.8	107	116	$1,333,545	$11,460	Yes	Yes	White Fence Line and EOS	Yes
NSA 13	No Noise Impact											
NSA 14	No Noise Impact											
NSA 15	2,090	14	29,260	11.6	13	21	$877,800	$41,800	Yes	Yes	ROW	Yes

[a] Insertion Loss (IL) is the maximum noise reduction provided by the noise barrier.
[b] A receptor is considered benefited by the noise barrier if the IL is 5dB or greater.
[c] Cost is based on $30 per square foot of noise barrier constructed on ground and $100 per square foot constructed on bridge structure or on retaining wall.
[d] A noise barrier is considered feasible if it can provide a substantial noise reduction of at least 7dB at one receptor location.
[e] A noise barrier is considered cost reasonable if the cost per benefited receptor is less than $42,000.
[f] The location of the noise barrier wall: ROW=noise barrier is located along the right of way line; EOS=noise barrier is located along the edge of shoulder.
[g] Noise barrier recommendation is based on the number of benefited receptors and the relative cost per benefited receptor.

Table 14. Recommended Noise Barrier Walls

Barrier	Barrier Length (feet)	Barrier Height (feet)	Square Footage of Barrier	Maximum Insertion Loss[a] (dB)	Impacted Receptors	Benefitted Receptors [b]	Barrier Cost [c]	Cost per benefited receptor	Effectiveness		Barrier Location [f]	Barrier Recommended [g]
									Feasible [d]	Reasonable [e]		
NSA 3	1.304	14	18,256	9.3	19	21	$547,680	$26,080	Yes	Yes	Clear zone and EOS	Yes
NSA 4	1,078	14	15,092	7.1	34	28	$452,625	$16,165	Yes	Yes	EOS	Yes
NSA 6	1,049	14	14,686	6.4	12	12	$440,507	$36,708	Yes	Yes	White Fence Line	Yes
NSA 8	2,510	14	35,140	13.1	124	132	$1,054,098	$7,985	Yes	Yes	White Fence Line / ROW	Yes
NSA 9 and NSA 10	2,890	14	40,460	9.6	52	84	$1,213,647	$14,448	Yes	Yes	White Fence Line and EOS	Yes
NSA 11 and NSA 12	3,176	14	44,464	12.8	107	116	$1,333,545	$11,460	Yes	Yes	White Fence Line and EOS	Yes
NSA 15	2,090	14	29,260	11.6	13	21	$877,800	$41,800	Yes	Yes	ROW	Yes

[a] Insertion Loss (IL) is the maximum noise reduction provided by the noise barrier.
[b] A receptor is considered benefited by the noise barrier if the IL is 5dB or greater.
[c] Cost is based on $30 per square foot of noise barrier constructed on ground and $100 per square foot constructed on bridge structure or on retaining wall.
[d] A noise barrier is considered feasible if it can provide a substantial noise reduction of at least 7dB at one receptor location.
[e] A noise barrier is considered cost reasonable if the cost per benefited receptor is less than $42,000.
[f] The location of the noise barrier wall: ROW=noise barrier is located along the right of way line; EOS=noise barrier is located along the edge of shoulder.
[g] Noise barrier recommendation is based on the number of benefited receptors and the relative cost per benefited receptor.

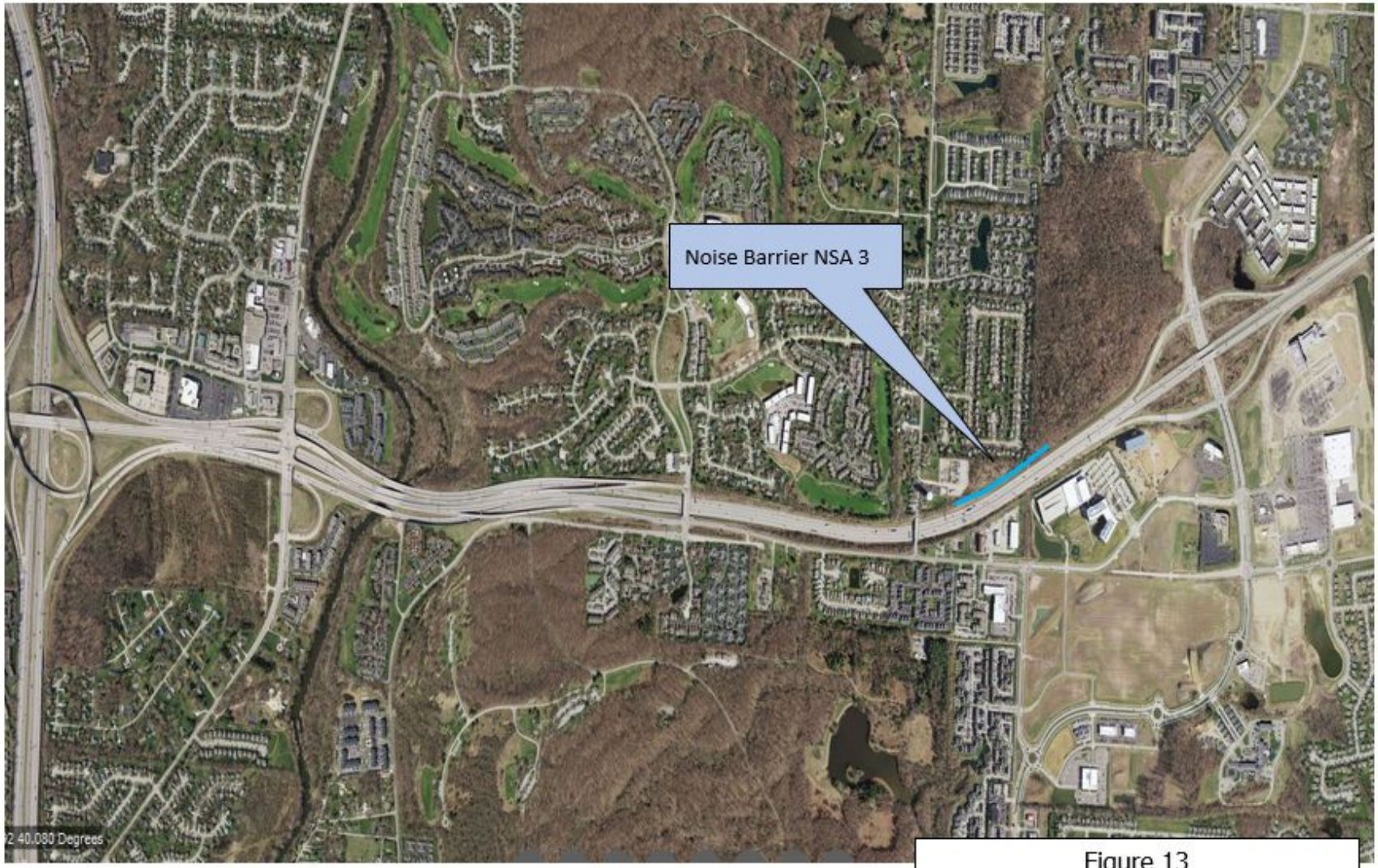

Figure 13
Recommended Noise Barrier Wall Locations
FRA-161-15.85 PID 116322

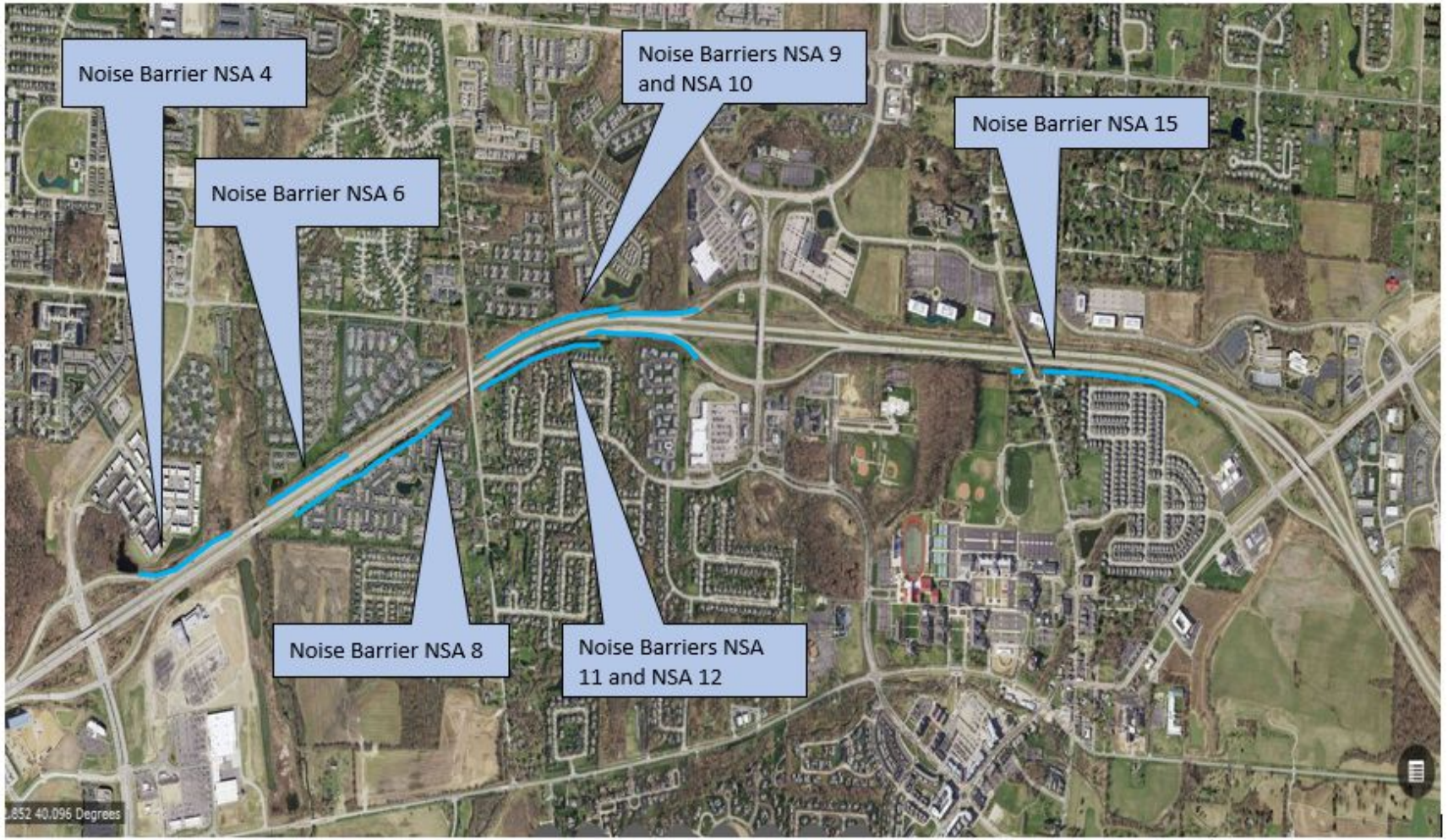

Figure 13
Recommended Noise Barrier Wall Locations
FRA-161-15.85 PID 116322