Section 4.11
Noise

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Acronyms and Abbreviations

BRT ..... Bus Rapid Transit
EIS ..... Environmental Impact Statement
FTA ..... Federal Transit Administration
LRT ..... Light Rail Transit
Metro ..... Niagara Frontier Transit Metro System, Inc.
Metro Rail ..... Metro Light Rail Transit Line
Project ..... Buffalo-Amherst-Tonawanda Corridor Transit Expansion
UB ..... University at Buffalo

4. Environmental Consequences

4.11 NOISE

This section presents the results of the operational noise analysis for the Project. The noise analysis considers noise from the LRT Build Alternative and the BRT Build Alternative, as well as vehicular traffic noise associated with access to the proposed stations and park & ride facilities. Section 4.17, "Construction Effects," describes measures to avoid, minimize, and mitigate potential noise impacts from construction. Section 4.12, "Vibration," addresses the assessment of potential vibration impacts associated with the Project.

Noise is "unwanted sound," generally measured in terms of loudness. The loudness, or magnitude, of noise determines its intensity and is measured in decibels (dB). The overall noise level from environmental sources is described in A-weighted decibels (dBA). The A-weighted decibel scale was developed to better approximate the sensitivity of human hearing. Because the decibel is based on a logarithmic scale, a 10-dB increase in noise level is generally perceived as a doubling of loudness, while a 3-dB increase in noise is just barely perceptible to the human ear (FHWA 2011). Table 4.11-1 summarizes the noise impact findings.

Table 4.11-1. Noise Impacts Summary

Alternative	Permanent Impacts
No Build Alternative	No adverse impacts
LRT Build Alternatives	Metro assumed the following mitigation to reduce Project noise impacts • A new fleet of rail vehicles to reduce noise resulting from steel train wheels making contact with the steel track configuration • Rail skirts on LRT vehicles • An investment, quarterly, in rail greasers on the track to reduce the friction between the rail vehicle wheels and the track • Signals to be used at the entrance or exit of tunnel portals that produce a level not greater than 83 dBA at a distance of 50 feet • Reduced speeds north of the proposed Ellicott Station and no warning bells at-grade crossings Inclusive of the mitigation measures described above, adverse noise impacts are anticipated for 16 residences within 172 feet of the surface tracks along John James Audubon Parkway between Dodge Road and the Amherst Police station. During final design of the LRT Build Alternative, horizontal alignment shifts will be considered to further reduce noise impacts to these residences.
BRT Build Alternative	No adverse impacts

For an overview of the regulatory context, methodology, and existing conditions see Appendix D7, "Noise and Vibration Technical Memorandum".

4.11.1 No Build Alternative

The No Build Alternative would consist of a future scenario without the Project and would be implemented in the context of several unrelated future residential and mixed-use development projects along the corridor, which are expected to be developed regardless of the selected Project alternative. Noise levels would be expected to be similar to or the same as the existing conditions.

4.11.2 LRT Build Alternative

Metro assessed the potential for noise impacts for the LRT Build Alternative using the FTA assessment methodology (see Appendix D7, "Noise and Vibration Technical Memorandum"). The LRT Build Alternative would introduce new noise sources into the environment, which could affect sensitive receptors. The LRT Build Alternative would extend the existing Metro Rail from the City of Buffalo into the towns of Amherst and Tonawanda and would consist of an underground (tunnel) section from the existing UB South Campus station to a tunnel portal on Niagara Falls Boulevard between Kenilworth and Princeton Avenues, followed by at-grade track along the remainder of the LRT Build Alternative, except for a grade separation at the intersection of Maple Road and Sweet Home Road. Potential sources of noise included in the LRT Build Alternative would be operation of rail on the surface track sections, audible signals at roadway crossings, audible signals on rail vehicles used at tunnel portal, substations, station parking lots, and the proposed light maintenance storage facility north of Interstate 990. The potential effects of these sources were examined in the noise analysis described below.

Metro calculated the noise exposure associated with the LRT Build Alternative based on the contribution of each of the noise source elements described previously. The combined noise exposure at each receptor area within the screening distances from LRT Build Alternative elements was determined and compared to FTA's noise impact criteria based on land use category and existing noise level to identify potential impacts. Table 4.11-2 shows the noise levels and incremental change in noise levels for the LRT Build Alternative. Noise levels for the LRT Build Alternative shown in Table 4.11-2 are the sum of the rail noise components (*i.e.*, surface railway, crossing signals, train signals, substations, light maintenance and storage facility, and park and ride facilities), and the non-rail noise component (which is assumed to be the existing level) (see Appendix D7, "Noise and Vibration Technical Memorandum"). The noise exposure is the level of noise that would be produced by operation of the LRT Build Alternative and is compared to the impact criteria to determine whether the LRT Build Alternative could result in a noise impact.

Table 4.11-2 shows that the noise generated by the LRT Build Alternative at Receptors 3t, 3f, 3i, 5a, 5h, 6, 7a, 9a, 10, 11a, 12, 12a, 14, 14h, 14k, 15a, 16b, 18a, and 18f would not constitute a moderate or a severe impact according to FTA noise impact criteria. Incremental changes in noise levels between the LRT Build Alternative and existing conditions would be up to 4 dBA at these receptors, which would be imperceptible to less than readily noticeable. Consequently, the LRT Build Alternative would not result in any adverse noise impacts at these receptor sites.

Table 4.11-2 shows that the noise generated by the LRT Build Alternative at Receptors 3a, 4a, 8a, and 14a would be considered moderate impacts according to FTA noise impact criteria. However, the incremental change from existing noise levels that would occur at these receptors would be between 1 and 3 dBA. A change in noise level of 3 dBA is barely perceptible. Consequently, the LRT Build Alternative would not result in any adverse noise impacts and would not require mitigation at these receptor sites.

At Receptor 10c, which represents Lockwood Memorial Library on the UB North Campus, operation of the surface tracks would result in LRT Build Alternative generated noise that would exceed the FTA thresholds for moderate impacts but not the threshold for severe impacts (see Table 4.11-2). The incremental change from existing noise levels at Receptor 10c would be 6 dBA, which would be considered a readily noticeable difference. The LRT Build Alternative's total noise level of 62 dBA would be moderate and generally consistent with a noise-sensitive use.[1] Furthermore, the library building has insulated glass windows and a masonry façade that would provide at least 25 to 30 dBA window or wall attenuation of exterior noise sources, thereby reducing the rail-related noise at the interior of the library to approximately 32 to 37 dBA. As a result, the predicted noise levels at this receptor, while considered a moderate impact under FTA criteria, would not constitute an adverse impact.

At Receptor 13a, operation of the surface tracks would result in an LRT Build Alternative noise exposure (*i.e.*, LRT Build Alternative generated noise) that would exceed the FTA threshold for moderate impacts but not the threshold for severe impacts (see Table 4.11-2). This receptor represents residences along the east side of John James Audubon Parkway between Dodge Road and the Amherst Police station. Of these receptors, those within 172 feet of the surface tracks and embedded track at grade crossings would experience noise exposure in the moderate impact category and noise level increments (*i.e.*, the difference from existing noise levels) between 4 and 8 dBA. Such noise levels would be perceived as readily noticeable as compared to existing levels at these receptors. Consequently, the LRT Build Alternative would result in an adverse impact at approximately 16 residences within 172 feet of the surface tracks along John James Audubon Parkway between Dodge Road and the Amherst Police station. Figure 4.11-1 shows this area of expected impact.

[1] New York State Department of Environmental Conservation's "Assessing and Mitigating Noise Impacts" guidance manual suggests 65 dBA as an acceptable threshold for residential use, which would be comparably noise-sensitive to a library.

Table 4.11-2. Noise Levels with the LRT Build Alternative (in dBA)

Receptor Site #	Receptor Site	FTA Land Use Category	Existing Noise Level	FTA Impact Thresholds[1]		LRT Build Alternative Noise Exposure	LRT Build Alternative Total Noise Level	LRT Build Alternative Noise Increment over Existing	Impact?[2]
				Moderate	Severe				
15a	89 Grandview Avenue	2	61	58	64	56	62	1	No Impact
3a	339 Niagara Falls Boulevard	2	70	64	69	66	71	1	Moderate
3t	297 Niagara Falls Boulevard	2	70	64	69	61	70	0	No Impact
3f	249 Niagara Falls Boulevard	2	70	64	69	64[4]	71	1	No Impact
3i	Trinity United Methodist Church	3	70	69	74	61	70	0	No Impact
4a	315 Curtis Parkway	2	58	57	62	58	61	3	Moderate
5a	51 Wrexham Court North	2	59	57	63	56	61	2	No Impact
5h	1343 Brighton Road	2	59	57	63	48	59	0	No Impact
6	Sweet Home Middle School	3	62	64	69	57	63	1	No Impact
18a	324 Homecrest Drive	2	62[3]	59	64	56	63	1	No Impact
18f	344 Homecrest Drive	2	62[3]	59	64	57	63	1	No Impact
16b	1185 Sweet Home Road	2	69	63	69	63	70	1	No Impact
7a	100 Villas Drive	2	60	58	63	56	61	1	No Impact
8a	Hadley Village 112	2	60	58	64	58	62	2	Moderate
9a	Park Hall, UB North Campus	3	56	61	67	57	59	3	No Impact
10	Davis Hall, UB North Campus	3	56	61	67	54	58	2	No Impact
10c	Lockwood Memorial Library, UB North Campus	3	56	61	67	61	62	6	Moderate
11a	Greiner Hall, UB North Campus	2	56	56	62	52	58	2	No Impact
12	Audubon Branch Amherst Public Library	3	54	60	66	55	58	4	No Impact
12a	Skinnersville Cemetery, Frontier Road	3	54	60	66	56	58	4	No Impact
13a	2 Partridge Run	2	52	54	60	59	60	8	Moderate
14	Amherst Chapel and Funeral Home	3	60	63	69	47	61	1	No Impact
14a	300 Dodge Road	2	60	58	63	58	62	2	Moderate
14h	Muir Woods Future Residential Development	3	60	58	63	51	61	1	No Impact
14k	Muir Woods Future Residential Development	3	60	58	63	58	62	2	No Impact

Notes:

1 Impact criterion is based on the existing noise level, as shown in per Appendix D7, "Noise and Vibration Technical Memorandum".

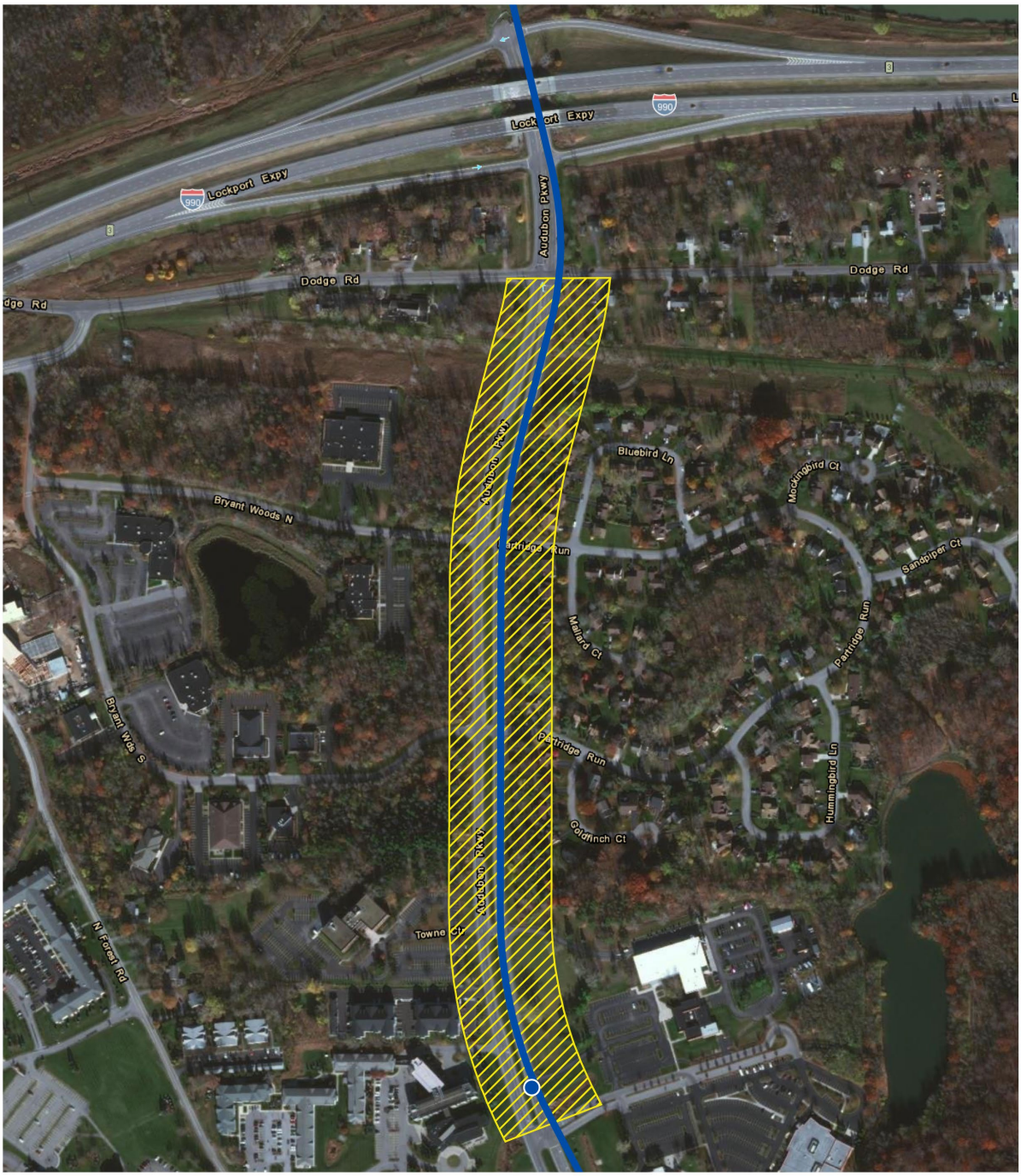
2 The noise exposure for the LRT Build Alternative is compared to the FTA moderate impact and severe impact thresholds to determine whether a moderate impact or severe impact are predicted to occur; severe impacts are considered adverse impacts and moderate impacts could be considered adverse impacts, depending on-site-specific context.

3 Existing noise level revised based on updated 2021 noise monitoring effort.

4 Actual total noise exposure is 63.5 dBA (rounded in the above table to 64 dBA), which is below the moderate impact threshold of 64 dBA

Key: dBA = A-weighted decibels

Figure 4.11-1. LRT Build Alternative Operational Noise Impact Zone for Residential Receptors (172 feet)



Source: ESRI World Imagery, 2019

As described in Chapter 3, "Transportation," in the LRT Build Alternative, Metro Rail vehicles would operate along the Project alignment using both ballast and unballasted (embedded) track. At key locations, specifically at signalized intersections, along the Project alignment, unballasted (embedded) track investments would be made to allow vehicular traffic to easily cross the track alignment. Vehicular traffic would be permitted to cross the tracks at signalized intersections, with left-turn movements being permitted during protected signal phases to avoid unsafe left-turn or through movements in conflict with the Metro Rail.

In the ballast portions of the Project alignment, vehicular traffic would not be permitted or physically able to cross portions the ballasted track, resulting in potential traffic diversions. Vehicular traffic can affect noise levels at a noise receptor if it is diverted such that the total volume of vehicular traffic passing that receptor would significantly increase. The volume of traffic that would be expected to be diverted by the LRT Build Alternative (e.g., as a result of disallowed turns off of roadways along the railway) would be lower than would warrant quantitative traffic analysis. The diversions are expected to be less than approximately 100 vehicles per day on any roadway segment. This is less than 25 percent of the total traffic volumes on the Project alignment roadways, and would not have the potential to result in any appreciable change in noise levels. Therefore, diverted traffic associated with the LRT Build Alternative would not have the potential to result in any adverse noise impacts.

4.11.3 BRT Build Alternative

Metro assessed the potential for noise impacts for the BRT Build Alternative using the FTA assessment methodology. The BRT Build Alternative would involve a fleet of electric rubber-tired vehicles traversing along the same alignment as the LRT Build Alternative (except at-grade where the LRT Build Alternative segments would be below-grade). Potential sources of noise included in the BRT Build Alternative would be operation of buses on the road surfaces and at stations as well as a park & ride facility at the proposed Boulevard Mall Station and a park & ride facility and storage light maintenance facility at the northern terminus of the Project alignment. The potential effects of these sources are described below.

Metro calculated the noise exposure associated with the BRT Build Alternative based on the contribution of each of the noise sources. To identify potential impacts, the combined noise exposure at each receptor area within the screening distances was determined and compared to FTA's noise impact criteria based on land use category and existing noise level. Table 4.11-3 shows the noise levels and incremental change in noise levels for the BRT Build Alternative. Noise levels for the BRT Build Alternative shown in Table 4.11-3 are the sum of the noise components (*i.e.*, operation of electric vehicles, park & ride facilities, and storage light maintenance facility) and the non-bus noise component (which is assumed to be the existing level). The noise exposure is the level of noise that would be produced by operation of the BRT Build Alternative and is compared to the impact criteria to determine whether the BRT Build Alternative could result in noise impacts.

Table 4.11-3. Noise Levels with the BRT Build Alternative (in dBA)

Receptor Site #	Receptor Site	FTA Land Use Category	Existing Noise Level	FTA Impact Thresholds[1]		BRT Build Alternative Noise Exposure	BRT Build Alternative Total Noise Level	BRT Build Alternative Noise Increment over Existing	Impact[2]?
				Moderate	Severe				
1	UB Foster Hall	3	56	61	67	41	56	0	No Impact
19a	3442 Route 5 (University Court Apartments)	2	60	58	63	57	62	2	No Impact
2a	135 Kenmore Ave	2	61	58	64	55	62	1	No Impact
2b	171 Niagara Falls Boulevard	2	61	58	64	60	64	3	Moderate
15a	89 Grandview Avenue	2	61	58	64	46	61	0	No Impact
3a	339 Niagara Falls Boulevard	2	70	64	69	57	70	0	No Impact
3f	249 Niagara Falls Boulevard	2	70	64	69	56	70	0	No Impact
3i	Trinity United Methodist Church	3	70	69	74	54	70	0	No Impact
3t	297 Niagara Falls Boulevard	2	70	64	69	55	70	0	No Impact
16b	1185 Sweet Home Road	2	69	63	69	51	69	0	No Impact
7a	100 Villas Drive	2	60	58	63	44	60	0	No Impact
8a	Hadley Village 112	2	60	58	64	46	60	0	No Impact
9a	Park Hall, UB North Campus	3	56	61	67	45	56	0	No Impact
10c	Lockwood Memorial Library, UB North Campus	3	56	61	67	51	57	1	No Impact
11a	Greiner Hall, UB North Campus	2	56	56	62	45	57	1	No Impact
12	Audubon Branch Amherst Public Library	3	54	60	66	47	55	1	No Impact
12a	Skinnersville Cemetery, Frontier Road	3	54	60	66	52	56	2	No Impact
13a	2 Partridge Run	2	52	54	60	53	56	4	No Impact
14	Amherst Chapel and Funeral Home	3	60	63	69	40	60	0	No Impact
14a	300 Dodge Road	2	60	58	63	51	61	1	No Impact
14h	Muir Woods Future Residential Development	3	60	58	63	57	62	2	No Impact

Notes:

[1] Impact criterion is based on the existing noise level, as shown in Appendix D7, "Noise and Vibration Technical Memorandum".

[2] The noise exposure for the BRT Build Alternative is compared to the FTA moderate impact and severe impact thresholds to determine whether a moderate impact or severe impact are predicted to occur; severe impacts are considered adverse impacts and moderate impacts could be considered adverse impacts, depending on-site-specific context.

Key: dBA = A-weighted decibels

Table 4.11-3 shows that the noise generated by the BRT Build Alternative at all receptors except 2b would not constitute moderate or severe impacts according to FTA noise impact criteria. In addition, incremental changes in noise levels between the BRT Build Alternative and existing conditions would be no greater than 4 dBA at these receptors, which would be imperceptible to less than barely noticeable. Consequently, the BRT Build Alternative would not result in any adverse noise impacts at these receptor sites.

Table 4.11-3 shows that the noise generated by the BRT Build Alternative at Receptor 2b would be considered a moderate impact according to FTA noise impact criteria. However, the incremental change from existing noise levels that would occur at this receptor would be 3 dBA. A change in noise level of 3 dBA would be considered barely perceptible. Consequently, the BRT Build Alternative would not result in any adverse noise impacts and would not require mitigation at this receptor site.

4.11.4 Proposed Mitigation Strategies

To reduce the adverse noise impacts resulting from the LRT Build Alternative, Metro will implement, as practical, various mitigation strategies. These mitigation strategies were incorporated into the conceptual design and operational assumptions and the noise analysis presented above. The proposed mitigation strategies and measures to be included in the construction and operation of the LRT Build Alternative, as practical, are listed below:

- The LRT Build Alternative would include the deployment of a new fleet of rail vehicles to operate along the newly introduced rail line extension as well as the existing light-rail line. This investment in a new fleet of rail vehicles will reduce noise resulting from the operations of the LRT Build Alternative and its steel train wheels making contact with the steel track configuration. The newer or better these rail vehicles steels wheels are maintained, the less noise created.
- These vehicles would include rail skirts that break the line of sight between the wheel-rail contact point and adjacent noise receptors (*e.g.*, residences), resulting in a reduction of 5 dBA.
- LRT Build Alternative would include an investment, as practical, in rail greasers on the track to reduce the friction between the rail vehicle wheels and the track.
- New rail vehicles would also include signals to be used at the entrance or exit of tunnel portals that produce a level not greater than 83 dBA at a distance of 50 feet.
- To reduce noise in the residential areas along the LRT Build Alternative north of the proposed Ellicott Station, speed would be limited to 28 miles per hour, and warning bells would not be used at at-grade crossings; however, warning systems (e.g., gates and flashing signals) would be located at each at-grade crossing to improve the safety of the crossing.
- During final design of the LRT Build Alternative, horizontal alignment shifts will be considered and included in the Project, as practical, to further reduce noise impacts.

Specifically, along John James Audubon Parkway, an alignment shift west (closer to the travel lanes) will be considered.

ADDITIONAL MITIGATION AND OTHER CONSIDERATIONS

Metro considered the following additional noise reduction measures for the LRT Build Alternative, but were determined to either be not feasible or not provide additional benefit beyond the measures described above:

- Wayside noise barriers, which were determined to be less effective than train skirts because of the gaps in the barrier that would be necessary to allow for crossings and the height required to provide effective noise reductions.
- Removal of at-grade crossings, which where feasible, provided less reduction in noise than speed restrictions and elimination of crossing bells.
- Alternate alignment utilizing the southbound lanes of the John James Audubon Parkway, which were considered and determined to be less effective as there would be two additional at-grade crossings north of the proposed Ellicott Station to tie into both the southern alignment (at Ellicott Station) and the I-990 Station and proposed light maintenance storage facility, each located on the eastern side of John James Audubon Parkway.

In addition, Metro will also consider landscaping along John James Audubon Parkway. This potential investment does not have a quantifiable impact on Project noise (per FTA Guidelines); therefore, it is not considered a proposed mitigation strategy.

4.11.4.1 BRT Build Alternative

The noise analysis found that noise resulting from operation of the BRT Build Alternative would not rise to the level of an adverse impact and therefore mitigation would not be required.