APPENDIX G
NOISE METHODOLOGY

This appendix describes the methods and assumptions used to estimate the potential noise effects of the Proposed Action and the Modified Proposed Action. Discussion of effects can be found in Chapter 4, Section 4.5. Federal laws, regulations, and guidelines that specify requirements and provide guidance on noise analysis and impact assessment include the following:

- Surface Transportation Board environmental regulations at 49 Code of Federal Regulations (C.F.R.) § 1105.7
- Noise Control Act of 1972 (42 United States Code [U.S.C.] § 4910)
- Federal Railroad Administration (FRA) Guidelines (Report Number 293630-1, December 1998)
- U.S. Environmental Protection Agency (USEPA) Railroad Noise Emission Standards (40 C.F.R. § 201)
- FRA Railroad Noise Emission Compliance Regulations (49 C.F.R. § 210)
- FRA Final Rule on the Use of Locomotive Horns at Highway-Rail Grade Crossings (49 C.F.R., Parts 222 and 229)
- Federal Transit Administration (FTA) Transit Noise and Vibration Impact Assessment (FTA-VA-90-1003-06, May 2006)

In order to identify and quantify potential noise impacts within the corridor, SEA used FTA's Noise Impact Assessment Spreadsheet to predict wayside train noise levels from the proposed rail operations. Wayside noise collectively refers to noise generated by railcars and locomotives, such as wheel/rail noise, locomotive exhaust, and general engine noise, not including locomotive horn noise. The FTA model incorporates the procedures for a General Noise Assessment as described within Chapter 5 of the FTA's guidance manual, "Transit Noise and Vibration Impact Assessment." Input parameters, such as land use category, existing noise level, number of noise sources, type of source, speed of source, number of events, etc., were used to develop both severe and moderate noise impact contours for specific, distinctive segments within the proposed rail corridor. These segments within the proposed rail corridor were categorized based on two characteristics: proposed rail corridor through a town vs. outside of a town and the average existing noise level measured within that particular section of the corridor. With all other input parameters remaining constant, a train speed of 25 miles per hour (mph) was used for segments of the rail corridor outside of towns and a train speed of 10 mph was used for segments of the rail corridor passing through a town. Existing noise levels were measured at various locations throughout the study area, including rural and residential land uses that were acoustically representative for all areas encompassing the proposed rail corridor.

Input parameters for the FTA Noise Impact Assessment Spreadsheet that remain constant include the following:

- **Receiver Parameters: Land Use Category**: 2 - Residential (Note: See Table G-1 for descriptions of the three land use categories. Although eight Category 3 land uses were identified among the noise impacts identified within the study area, the majority of the

noise-impacted land uses were Category 2. The Category 3 land uses were evaluated individually.)

- **Noise Source Parameters: Number of Noise Sources:** 2 (Locomotive and Rail Car)
- **Noise Source 1: Source Type:** Fixed Guideway
- **Noise Source 1: Specific Source:** Diesel Electric Locomotive
- **Number of Locos/train:** 5 (Note: Initially, five locomotives were suggested to be operating per train, although it was later determined that a maximum of only two locomotives would need to be operating within the study area. The five-locomotive scenario that was used is a worst-case scenario.)
- **Number of Events/hr:** 0.13 (Note: This number is based on two trips occurring within the daytime hours, or 2/15.)
- **Noise Source 2: Source Type:** Fixed Guideway
- **Noise Source 2: Specific Source:** Rail Car
- **Number of Rail Cars/train:** 55
- **Number of Events/hr:** 0.13
- **Adjustments: Noise Barrier?** No
- **Adjustments: Jointed Track?** No (Note: The proposed rail will be continuous welded rail.)
- **Adjustments: Embedded Structure?** No (Note: The proposed rail will be ballast/tie.)
- **Adjustments: Aerial Structure?** No

TABLE G-1
LAND USE CATEGORIES FOR TRANSIT NOISE IMPACT ASSESSMENT

LAND USE CATEGORY	NOISE METRIC (dBA)	DESCRIPTION OF LAND USE CATEGORY
1	Outdoor L_{eq} (h)*	Tracts of land where quiet is an essential element in their intended purpose. This category includes lands set aside for serenity and quiet, and such land uses as outdoor amphitheaters and concert pavilions, as well as National Historic Landmarks with significant outdoor use. Also included are recording studios and concert halls.
2	Outdoor L_{dn}	Residences and buildings where people normally sleep. This category includes homes, hospitals, and hotels where a nighttime sensitivity to noise is assumed to be of utmost importance.
3	Outdoor L_{eq} (h)*	Institutional land uses with primarily daytime and evening use. This category includes schools, libraries, theaters, and churches where it is important to avoid interference with such activities as speech, meditation and concentration on reading material. Places for meditation or study associated with cemeteries, monuments, museums, campgrounds and recreational facilities can also be considered to be in this category. Certain historical sites and parks are also included.

* L_{eq} for the noisiest hour of transit-related activity during hours of noise sensitivity.
Source: FTA Transit Noise and Vibration Impact Assessment, May 2006, FTA-VA-90-1003-06

The variable input parameters for the FTA Noise Impact Assessment Spreadsheet are dependent on the specific location of the proposed rail corridor within the project area. Table G-2 presents the variable input parameters of Existing Noise Level (L_{dn}) and Speed (mph) as they pertain to the Proposed Action and Modified Proposed Action. The corresponding distances for moderate and severe noise impact contours are also presented in Columns 5 and 6.

TABLE G-2
VARIABLE INPUTS FOR FTA NOISE IMPACT ASSESSMENT SPREADSHEET

	Segment	Existing Noise Level (L_{dn})	Speed (mph)	Distance to Impact Contour (ft)	
				Moderate	Severe
Western Segment: Wallaceton to Munson Route	Wallaceton	57	10	83	34
	Wallaceton to Morrisdale	51	25	72	28
	Morrisdale/Allport	59	10	71	30
	Allport to Munson	51	25	72	28
	Munson	51	10	122	48
Western Segment: Alternate Route from Philipsburg to Munson	Phillipsburg	58	10	77	32
	Troy	53	10	109	43
	Hawk Run	56	10	89	37
	Hawk Run to Munson	53	25	64	25
	Munson	51	10	122	48
Eastern Segment	Munson to Gorton	51	25	72	28

Upon determination of the moderate and severe wayside noise impact contour distances, a horn noise assessment was performed to determine the additional moderate and severe horn noise contributions at several at-grade public road crossings. Tables G-3 and G-4 present the locations of all public road crossings associated with the Proposed Action and Modified Proposed Action.

TABLE G-3
PROPOSED ACTION
WESTERN SEGMENT (WALLACETON TO MUNSON ROUTE)
PUBLIC ROAD CROSSINGS

ID #	MUNICIPALITY	MILEPOST	ROAD NAME	FUNCTIONAL CLASSIFICATION	ADT
1	Wallaceton	75.18	Pine Street	Local Road	N/A
2	Wallaceton	75.02	Reed Street (S.R. 2034)	Minor Collector	N/A
3	Wallaceton	74.94	Baughman Street	Local Road	N/A
4	Wallaceton	74.85	Hilltop Road	Local Road	N/A
5	Wallaceton	74.70	Wallaceton Road (S.R. 2034)	Minor Collector	350
6	Wallaceton	74.66	Unnamed Gravel Road	Local Road	N/A
7	Boggs	73.87	Wallaceton Road (S.R. 2034)	Minor Collector	350
8	Morris	72.22	Wallaceton Road (S.R. 2034)	Minor Collector	350
9	Morris	71.80	Myers Road (T-682)	Local Road	N/A
10	Morris	70.93	Deer Creek Road (S.R. 1009)	Minor Collector	60
11	Morris	70.52	Jones Lane	Local Road	N/A
12	Morris	70.41	Jones Lane	Local Road	N/A
13	Morris	69.35	S.R. 0053	Minor Arterial	478
14	Morris	69.18	Old Turnpike Road (S.R. 2032)	Minor Collector	46
15	Morris	67.92	Main Street (S.R. 2035)	Minor Collector	59
16	Morris	67.43	Colorado Road (T-704)	Local Road	N/A
17	Morris	67.29	Casanova Road (T-958)	Local Road	N/A
18	Cooper	65.65	Sawmill Road (T-707)	Local Road	N/A
19	Cooper	65.38	Winburne Road (S.R. 2037)	Local Road	N/A

Grade-Separated Crossing (Highway over Rail)

TABLE G-4
MODIFIED PROPOSED ACTION
WESTERN SEGMENT (ALTERNATE ROUTE FROM PHILIPSBURG TO MUNSON)
PUBLIC ROAD CROSSINGS

ID #	MUNICIPALITY	MILEPOST	ROAD NAME	FUNCTIONAL CLASSIFICATION	ADT
1A	Morris	N/A	S.R. 0053	Minor Arterial	6,973
2A	Morris	5.84	Ninth Street (S.R. 2043)	Local Road	7,120
3A	Morris	0.2	Casanova Road (T-958)	Local Road	N/A
18	Cooper	65.65	Sawmill Road (T-707)	Local Road	N/A
19	Cooper	65.38	Winburne Road (S.R. 2037)	Local Road	N/A
Grade-Separated Crossing (Rail over Highway)					

To determine the horn noise contributions at the at-grade public road crossings, SEA used the FRA's train horn assessment model to calculate severe and moderate impact zones for each crossing. Similar to the FTA wayside noise model, the FRA horn noise model incorporates several constant input parameters but only one variable input parameter (existing noise level). Based on the locations of the at-grade public road crossings, it is assumed that the train will be moving at approximately 10 mph upon sounding its horn.

The horn noise model inputs that are constant for all scenarios are:

- **Noise Situation:** 2 (Horns in Future Only)
- **Horn Lmax (dBA at 100 feet):** 110 (Note: FRA Regulation 229.129 requires all lead locomotives to have an audible warning device that produces a minimum sound level of 96 dBA at a distance 100 feet in front of the locomotive. Maximum sound levels are typically 105 to 110 dBA at 100 feet in front of the train. As a worst-case scenario, 110 dBA was used, well above the 96 dBA value required by the FRA.
- **Horn Location on Locomotive:** 1 (National Average, 50% front, 50% middle)
- **Shielding:** 5 (Rural)
- **Length of Impact Area:** 2 (20 seconds)
- **Future Train Speed:** 10 mph
- **Number of Future Trains in one Direction:** 1
- **Future Number of Day Trains (7:00 A.M. to 10:00 P.M.):** 2
- **Future Number of Night Trains (10:00 P.M. to 7:00 A.M.):** 0
- **Future Average Number of Cars:** 55
- **Future Average Number of Locomotives:** 5

The variable input parameter for the FRA horn noise model is dependent upon the specific location of the at-grade public crossing within the project area. Several crossings used the same model to determine severe and moderate impact zones, as their variable input parameter (the existing noise level) was the same for several crossings. Table G-5 presents the crossings and the existing noise levels used along with the FRA Horn Noise Model Impact Zone Numeric Output.

TABLE G-5
VARIABLE INPUT AND IMPACT ZONE OUTPUT FOR FRA HORN NOISE MODEL

	PUBLIC ROAD CROSSING ID #	USER-DEFINED EXISTING NOISE LEVEL L_{dn} (dBA)	IMPACT ZONES NUMERIC OUTPUT (IN FEET)					
			MODERATE IMPACT DISTANCE AT CROSSING	SEVERE IMPACT DISTANCE AT CROSSING	ZONE LENGTH	1/2 ZONE LENGTH	MODERATE IMPACT DISTANCE AT 1/2 ZONE LENGTH	SEVERE IMPACT DISTANCE AT 1/2 ZONE LENGTH
Western Segment: Wallaceton to Munson Route	1 through 6	57	520	295	200	100	401	220
	10, 11, 12, 13, 14	59	472	268	200	100	362	199
	8, 15, 16, 17, 18, 19	51	654	366	200	100	510	277
Western Segment: Alternate Route from Philipsburg to Munson	1A, 2A	58	496	281	200	100	382	209
	18, 19	51	654	366	200	100	510	277

The moderate and severe noise impact contours generated by the FTA wayside noise model were applied in CADD to develop a visual representation over aerial mapping of the study area. The moderate and severe impact zones for each of the respective public road crossings were then incorporated into these noise impact contours. These severe and moderate noise impact contours are shown on the Environmental Features Mapping in Volume 2.

Noise-sensitive land uses located within these impact contours were evaluated to determine the total number of moderate and severe noise impacts respective to the different Build Alternatives. Table G-6 lists the total number of moderate and severe impacts associated with the Proposed Action and Modified Proposed Action.

TABLE G-6
PROPOSED ACTION/MODIFIED PROPOSED ACTION
NOISE-IMPACTED SENSITIVE LAND USES

RAIL SEGMENT	NOISE-IMPACTED SENSITIVE LAND USES		
	MODERATE	SEVERE	TOTAL
Western Segment (Wallaceton to Munson Route)	71	107	178
Western Segment (Alternate Route from Philipsburg to Munson)	23	9	32
Eastern Segment	0	0	0

Of the 178 total noise impacts to sensitive land uses associated with the Proposed Action's Wallaceton to Munson Route, 6 were identified as Category 3 land uses while the other 172 were identified as Category 2 (i.e., residential) land uses. These potentially noise-impacted Category 3 land uses include the Wallaceton United Methodist Church, Wallaceton Church of God, Clearfield County Alternative

Education Building, St. Agnes Church in Morrisdale, Winburne Cemetery, and Winburne Fireman's Park. All of these potential noise impacts would be due to train horn noise and the buildings' proximity to a public road grade crossing. Although these Category 3 land uses have been identified as being noise-impacted, SEA has concluded that the impacts from horn noise would not be significant for the churches, as the rail line is not anticipated to be in operation on Sunday.

Of the 32 total noise impacts to sensitive land uses associated with the Modified Proposed Action's Alternate Route from Philipsburg to Munson, 2 were identified as Category 3 land uses while the other 30 were identified as Category 2 (i.e., residential) land uses. These potentially noise-impacted Category 3 land uses include Winburne Cemetery and Winburne Fireman's Park. Both of these potential Category 3 land use noise impacts would be due to train horn noise associated with the two public road grade crossings in the Winburne area (i.e., Sawmill Road and Winburne Road).