King of Prussia RAIL

Connecting Community with Opportunity

FINAL ENVIRONMENTAL IMPACT STATEMENT
NOISE AND VIBRATION
TECHNICAL MEMORANDUM

Prepared for:

Southeastern Pennsylvania Transportation Authority (SEPTA)

SEPTA
Southeastern Pennsylvania Transportation Authority

Prepared by:

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1 Overview

A detailed noise and vibration study was conducted in accordance with the Federal Transit Administration's (FTA) *Transit Noise and Vibration Impact Assessment Manual* (Manual)[1] to assess the potential for impact to noise-sensitive receptors from various sources of the King of Prussia Rail Extension (Project). This technical report supports the *King of Prussia Rail Extension Combined Final Environmental Impact Statement/Record of Decision* (FEIS); this report describes the existing noise and vibration environment in the Project study area, identifies Project-related noise and vibration levels that will result from the Preferred Alternative, describes measures that have been incorporated into the design to reduce Project-related noise and vibration, and discusses commitments by SEPTA to address minimization and mitigation for noise and vibration impacts. The outline of this report follows the FTA Manual in Section 8.2.

The Project study area consists of two parts. In the King of Prussia area, the Project study area is the geographic area within 500 feet on either side of the centerline of the Preferred Alternative. In Upper Darby, the Project study area is the area of permanent impact of the Project at SEPTA's 69th Street Transportation Center. However, a noise evaluation was not conducted at the 69th Street Transportation Center because no noise-sensitive receptors are not present within that portion of the Project study area.

2 Inventory of Receptors

The FTA screening procedures were utilized to broadly identify receptor sites within the Project study area with the potential for noise and vibration impacts. Using FTA Table 4-7 for noise and Table 6-8 for vibration, the default screening distances were adjusted to reflect Project-specific operating conditions. This screening distance represents where the Project noise reaches approximately 50 dBA Ldn (day-night noise level) for residential receptors. Similarly, the default FTA screening distance to identify vibration-sensitive receptors along light rail transit alignments is 150 feet. Therefore, using the conservative screening distance of 500 feet for both noise and vibration and using graphical information system (GIS) software, aerial maps, and parcel data provided by Montgomery County, an inventory of 140 receptors were identified for the analysis (as shown in **Figures 2-1** to **2-4**).[2] The full inventory of 140 receptors was analyzed in this Technical Report. From this inventory of 140 receptors, 10 receptors were chosen as a representative subset for reporting purposes in Chapter 4 of the FEIS to demonstrate the range of future Project noise along the Project study area. This subset of representative receptors was selected based on their location and future exposure to new transit noise sources.

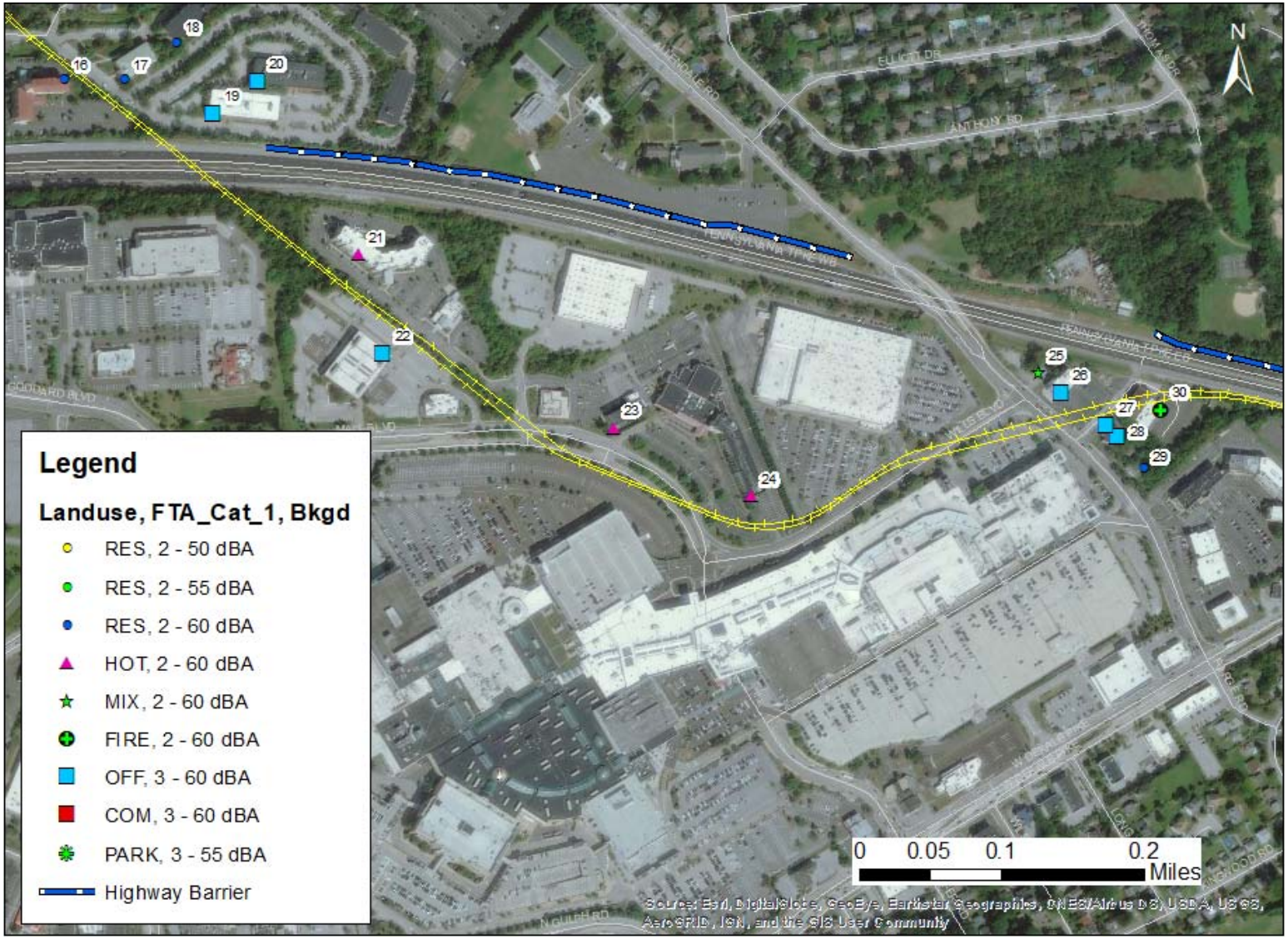
[1] Federal Transit Administration, Transit Noise and Vibration Impact Assessment Manual, FTA Report No. 0123, Washington, DC, September 2018
[2] Montgomery County Pennsylvania Geospatial Data Hub (https://data-montcopa.opendata.arcgis.com/)

Figure 2-1: Inventory of 140 Receptors and Background Noise Levels – Section 1

Notes: COM = commercial; FIRE = firehouse; HOT = hotel; MIX = mixed use; OFF = office; PARK = park; RES = residence

Source: AECOM, December 2020.

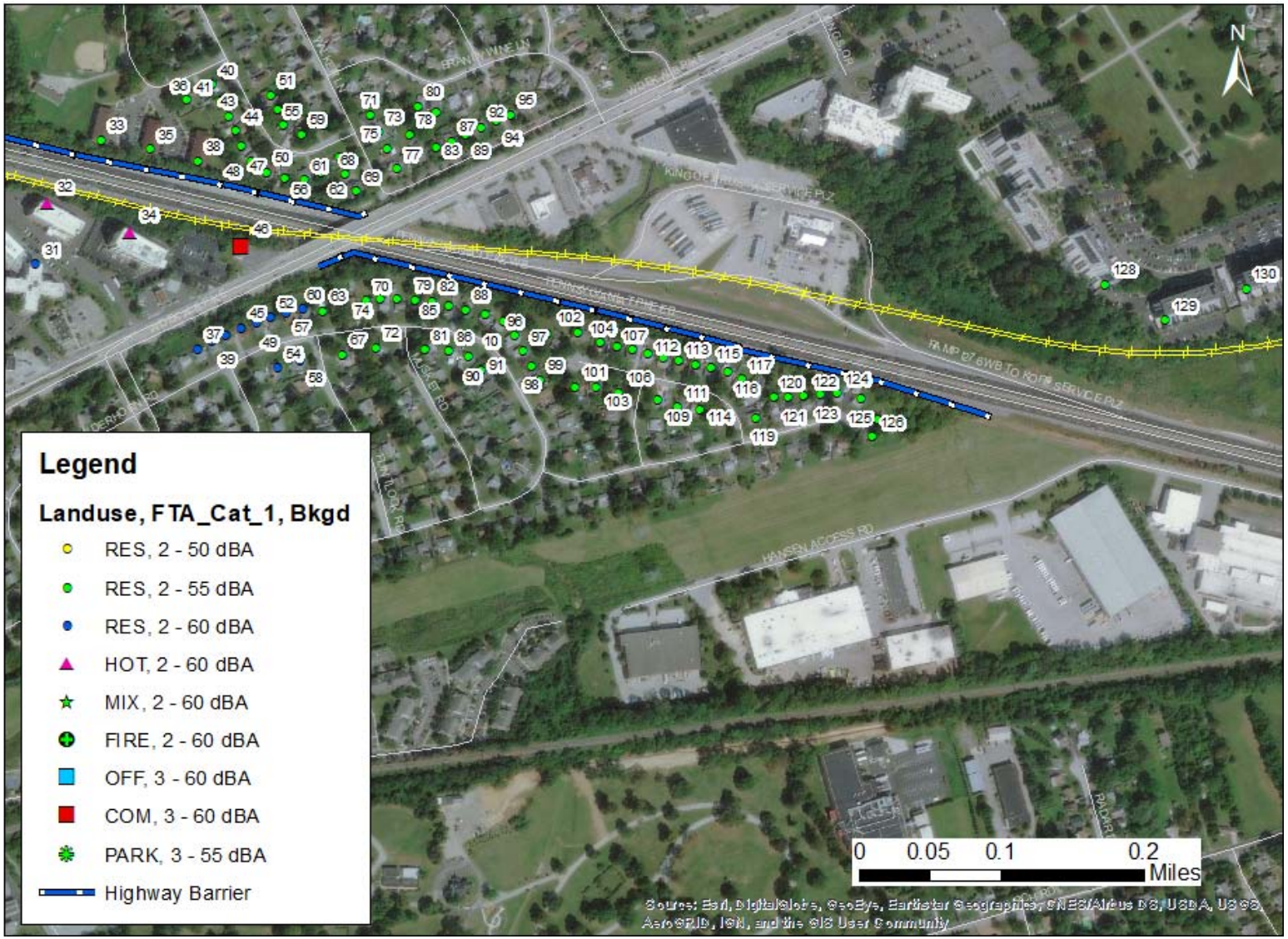
Figure 2-2: Inventory of 140 Receptors and Background Noise Levels – Section 2



Notes: COM = commercial; FIRE = firehouse; HOT = hotel; MIX = mixed use; OFF = office; PARK = park; RES = residence

Source: AECOM, December 2020.

Figure 2-3: Inventory of 140 Receptors and Background Noise Levels – Section 3



Notes: COM = commercial; FIRE = firehouse; HOT = hotel; MIX = mixed use; OFF = office; PARK = park; RES = residence

Source: AECOM, December 2020.

Figure 2-4: Inventory of 140 Receptors and Background Noise Levels – Section 4

Notes: COM = commercial; FIRE = firehouse; HOT = hotel; MIX = mixed use; OFF = office; PARK = park; RES = residence

Source: AECOM, December 2020.

3 Existing Conditions

3.1 Noise

In accordance with the detailed assessment guidelines, the existing noise conditions in the Project study area were estimated using Table 4-17 in the FTA Manual (Estimating Existing Noise Exposure for General Noise Assessment) rather than measured. Due to the current COVID-19 pandemic and interstate travel restrictions, traffic conditions are far from normal in the Project study area that is generally dominated by retail shopping. Additionally, local schools in the Upper Merion Area School District remain closed as all classes are conducted via distance learning at home. With schools not in session and many businesses still closed, normal traffic patterns (even compared to typical summertime periods) are significantly disrupted. Therefore, existing conditions were estimated because measurements would not accurately reflect current conditions due to disrupted traffic patterns.

Using several factors from FTA Table 4-17 and GIS mapping, including population density and proximity to interstate highways (including I-76), regional roadways (such as Dekalb Pike) and the Norristown High Speed Line (NHSL), baseline noise levels were estimated for each of the 140 selected receptors. FTA's assessment procedure translates these factors into baseline noise levels that range from 55 to 65 dBA within the study area. According to the FTA Table 4-17, the range of noise levels are applied equally to both institutional and residential receptors. An additional 5-decibel reduction was also applied to all residences located behind the existing highway noise barriers along the PA Turnpike to reflect the shielding benefits of the barrier. The noise levels estimated for the 140 receptors are shown graphically in **Figures 2-1 to 2-4** and listed in **Table 3.1-1**.

3.2 Vibration

Unlike noise, the existing ambient vibration is not required to assess vibration impact in most cases; but it is important to document general background vibration in the Project study area. Because the existing environmental vibration is usually below human perception, a limited vibration survey is sufficient even for a detailed vibration analysis. In lieu of existing vibration measurements, existing background vibration is estimated to range from 50 VdB or lower away from major roadways to 60 VdB near roadways. The background vibration velocity level of 50 VdB is well below the threshold of perception for humans of around 65 VdB. Within buildings, operation of mechanical equipment, movement of people, or slamming of doors causes the most perceptible indoor vibration. Typical outdoor sources of perceptible vibration in the Project study area are construction equipment and traffic on rough roads with potholes or expansion joints.

Table 3.1-1: Predicted Existing and Future Noise Levels at 140 Receptors under the Preferred Alternative

ID	Address	Land use	FTA Cat.	Metric	Existing Barrier	Existing	Milepost	Align Dist (ft)	Speed Track 1	Speed Track 2	Build	MOD	SEV	Impact
1	1100 First Ave Ste 100	OFF	3	Leq	no	60	358.50	69	5	5	63	63	68	moderate
2	935 First Ave	OFF	3	Leq	no	60	353.50	180	15	24	49	63	68	--
3	768 N Bethlehem Pike Ste 203	OFF	3	Leq	no	60	350.50	157	15	36	48	63	68	--
4	555 E Lancaster Ave Ste 100	OFF	3	Leq	no	60	347.50	390	15	48	45	63	68	--
5	555 E Lancaster Ave Ste 100	OFF	3	Leq	no	60	346.50	141	15	50	47	63	68	--
6	250 Haddonfield Berlin Rd	OFF	3	Leq	no	60	345.00	297	15	50	46	63	68	--
7	935 First Ave	COM	3	Leq	no	60	341.00	467	15	50	44	63	68	--
8	401 Plymouth Rd Ste 500	OFF	3	Leq	no	60	340.00	467	15	50	44	63	68	--
9	555 E Lancaster Ave Ste 100	OFF	3	Leq	no	60	338.50	182	15	49	47	63	68	--
10	456 Powderhorn Rd	RES	2	Ldn	yes	55	243.50	269	70	45	56	55	61	moderate
11	0	OFF	3	Leq	no	60	336.50	112	15	41	48	63	68	--
12	500 Office Center Dr Ste 210	OFF	3	Leq	no	60	333.00	160	15	27	48	63	68	--
13	725 Conshohocken State Rd	OFF	3	Leq	no	60	330.50	63	15	17	49	63	68	--
14	768 Bethlehem Pike Ste 203	OFF	3	Leq	no	60	326.00	50	11	10	62	63	68	--

ID	Address	Land use	FTA Cat.	Metric	Existing Barrier	Existing	Milepost	Align Dist (ft)	Speed Track 1	Speed Track 2	Build	MOD	SEV	Impact
15	11525 N Community House Rd	HOT	2	Ldn	no	60	326.50	333	9	8	47	58	63	--
16	44 Hersha Dr	RES	2	Ldn	no	60	313.00	53	30	50	52	58	63	--
17	0	RES	2	Ldn	no	60	311.50	90	30	50	55	58	63	--
18	0	RES	2	Ldn	no	60	311.00	316	30	50	54	58	63	--
19	550 American Ave Ste 1	OFF	3	Leq	no	60	308.00	190	40	50	56	63	68	--
20	0	OFF	3	Leq	no	60	307.50	387	40	50	53	63	68	--
21	8100 E 22nd St Bldg 500	HOT	2	Ldn	no	60	300.50	117	31	31	57	58	63	--
22	234 Mall Blvd	OFF	3	Leq	no	60	297.50	130	19	19	51	63	68	--
23	0	HOT	2	Ldn	no	60	288.50	159	26	26	55	58	63	--
24	120 S Warner Rd Ste 200	HOT	2	Ldn	no	60	282.50	101	30	30	57	58	63	--
25	275 Glenmoor Rd	MIX	2	Ldn	no	60	270.50	172	5	5	53	58	63	--
26	198 Allendale Rd	OFF	3	Leq	no	60	270.00	75	8	7	58	63	68	--
27	166 Allendale Rd	OFF	3	Leq	no	60	268.50	79	14	13	63	63	68	moderate
28	161 Pennsylvania Ave	OFF	3	Leq	no	60	268.00	131	16	15	59	63	68	--
29	158 Allendale Rd	RES	2	Ldn	no	60	267.50	263	18	17	55	58	63	--
30	170 Allendale Rd	FIRE	2	Ldn	no	60	266.50	67	22	21	58	58	63	moderate
31	150 Allendale Rd	RES	2	Ldn	no	60	260.50	301	46	45	58	58	63	moderate
32	1119 S College Ave	HOT	2	Ldn	no	60	260.50	74	46	45	60	58	63	moderate
33	0	RES	2	Ldn	yes	55	259.00	202	52	45	50	55	61	--
34	901 Main Ave	HOT	2	Ldn	no	60	257.00	106	60	45	57	58	63	--
35	519 William Rd Apt A-7	RES	2	Ldn	yes	55	257.00	212	60	45	50	55	61	--
36	511 William Rd	RES	2	Ldn	yes	55	256.50	421	62	45	49	55	61	--

ID	Address	Land use	FTA Cat.	Metric	Existing Barrier	Existing	Milepost	Align Dist (ft)	Speed Track 1	Speed Track 2	Build	MOD	SEV	Impact
37	528 Powderhorn Rd	RES	2	Ldn	no	60	254.00	476	70	45	55	58	63	--
38	0	RES	2	Ldn	yes	55	255.50	208	66	45	51	55	61	--
39	705 Hillview Dr	RES	2	Ldn	no	60	253.50	441	70	45	55	58	63	--
40	155 Nancys Ln	RES	2	Ldn	yes	55	255.50	499	66	45	49	55	61	--
41	149 Nancys Ln	RES	2	Ldn	yes	55	255.00	442	68	45	50	55	61	--
42	520 Powderhorn Rd	RES	2	Ldn	no	60	253.50	410	70	45	55	58	63	--
43	717 W Valley Forge Rd	RES	2	Ldn	yes	55	254.50	393	70	45	50	55	61	--
44	141 Nancys Ln	RES	2	Ldn	yes	55	254.00	343	70	45	51	55	61	--
45	516 Powderhorn Rd	RES	2	Ldn	no	60	253.00	379	70	45	55	58	63	--
46	Po Box 566	COM	3	Leq	no	60	253.00	77	70	45	55	63	68	--
47	636 Grand Regency Blvd	RES	2	Ldn	yes	55	253.50	293	70	45	51	55	61	--
48	201 Lochwood Ln	RES	2	Ldn	yes	55	253.00	240	70	45	51	55	61	--
49	512 Powderhorn Rd	RES	2	Ldn	no	60	252.50	350	70	45	55	58	63	--
50	133 Nancys Ln	RES	2	Ldn	yes	55	252.50	208	70	45	51	55	61	--
51	146 Nancys Ln	RES	2	Ldn	yes	55	253.00	494	70	45	49	55	61	--
52	508 Powderhorn Rd	RES	2	Ldn	no	60	252.00	326	70	45	55	58	63	--
53	142 Nancys Ln	RES	2	Ldn	yes	55	252.50	446	70	45	50	55	61	--
54	511 Powderhorn Rd	RES	2	Ldn	no	60	251.50	509	70	45	54	58	63	--
55	19 Pickering Bend	RES	2	Ldn	yes	55	252.00	389	70	45	50	55	61	--
56	152 Hillview Rd	RES	2	Ldn	yes	55	252.00	196	70	45	51	55	61	--

ID	Address	Land use	FTA Cat.	Metric	Existing Barrier	Existing	Milepost	Align Dist (ft)	Speed Track 1	Speed Track 2	Build	MOD	SEV	Impact
57	504 Powderhorn Rd	RES	2	Ldn	no	60	251.50	303	70	45	55	58	63	--
58	123 Flintlock Rd	RES	2	Ldn	no	60	250.50	476	70	45	54	58	63	--
59	132 Nancys Ln	RES	2	Ldn	yes	55	251.50	361	70	45	50	55	61	--
60	500 Powderhorn Rd	RES	2	Ldn	no	60	250.50	283	70	45	56	58	63	--
61	129 Nancys Ln	RES	2	Ldn	yes	55	251.00	194	70	45	51	55	61	--
62	127 Nancys Ln	RES	2	Ldn	yes	55	250.50	228	70	45	51	55	61	--
63	496 Powderhorn Rd	RES	2	Ldn	yes	55	250.00	287	70	45	52	55	61	--
64	123 Walker Ln	RES	2	Ldn	yes	55	250.50	406	70	45	50	55	61	--
65	121 Nancys Ln	RES	2	Ldn	yes	55	250.00	291	70	45	51	55	61	--
66	492 Powderhorn Rd	RES	2	Ldn	yes	55	249.50	237	70	45	52	55	61	--
67	493 Powderhorn Rd	RES	2	Ldn	yes	55	249.00	441	70	45	50	55	61	--
68	109 Walker Ln	RES	2	Ldn	yes	55	249.50	225	70	45	52	55	61	--
69	103 Walker Ln	RES	2	Ldn	yes	55	249.00	169	70	45	53	55	61	--
70	488 Powderhorn Rd	RES	2	Ldn	yes	55	248.50	233	70	45	52	55	61	--
71	140 Walker Ln	RES	2	Ldn	no	55	249.00	455	70	45	55	55	61	moderate
72	485 Powderhorn Rd	RES	2	Ldn	yes	55	248.00	403	70	45	51	55	61	--
73	136 Walker Ln	RES	2	Ldn	no	55	248.50	395	70	45	55	55	61	moderate
74	484 Powderhorn Rd	RES	2	Ldn	yes	55	248.00	225	70	45	52	55	61	--
75	132 Walker Ln	RES	2	Ldn	no	55	248.00	335	70	45	56	55	61	moderate

ID	Address	Land use	FTA Cat.	Metric	Existing Barrier	Existing	Milepost	Align Dist (ft)	Speed Track 1	Speed Track 2	Build	MOD	SEV	Impact
76	503 Valleywyck Dr	RES	2	Ldn	yes	55	247.50	219	70	45	51	55	61	--
77	450 W Dekalb Pike	RES	2	Ldn	no	55	247.50	264	70	45	55	55	61	moderate
78	444 Old Dekalb St	RES	2	Ldn	no	55	247.50	394	70	45	55	55	61	moderate
79	2432 Vista St	RES	2	Ldn	yes	55	246.50	216	70	45	51	55	61	--
80	419 Brandywine Ln	RES	2	Ldn	no	55	247.00	501	70	45	54	55	61	--
81	134 Musket Rd	RES	2	Ldn	yes	55	246.00	399	70	45	50	55	61	--
82	472 Powderhorn Rd	RES	2	Ldn	yes	55	246.00	216	70	45	51	55	61	--
83	440 W Dekalb Pike	RES	2	Ldn	no	55	246.50	354	70	45	55	55	61	moderate
84	417 Brandywine Ln	RES	2	Ldn	no	55	246.50	483	70	45	54	55	61	--
85	468 Powderhorn Rd	RES	2	Ldn	yes	55	245.50	230	70	45	51	55	61	--
86	465 Powderhorn Rd	RES	2	Ldn	yes	55	245.00	396	70	45	50	55	61	--
87	436 W Dekalb Pike	RES	2	Ldn	no	55	245.50	382	70	45	55	55	61	moderate
88	464 Powderhorn Rd	RES	2	Ldn	yes	55	244.50	236	70	45	57	55	61	moderate
89	432 W Dekalb Pike	RES	2	Ldn	no	55	245.00	411	70	45	55	55	61	moderate
90	1501 Butler Pike	RES	2	Ldn	yes	55	244.50	410	70	45	56	55	61	moderate
91	449 Powderhorn Rd	RES	2	Ldn	yes	55	244.00	459	70	45	55	55	61	moderate
92	428 W Dekalb Pike	RES	2	Ldn	no	55	244.50	442	70	45	60	55	61	moderate

ID	Address	Land use	FTA Cat.	Metric	Existing Barrier	Existing	Milepost	Align Dist (ft)	Speed Track 1	Speed Track 2	Build	MOD	SEV	Impact
93	473 Stacey Dr	RES	2	Ldn	yes	55	244.00	246	70	45	57	55	61	moderate
94	350 Anthony Rd	RES	2	Ldn	no	55	244.00	471	70	45	60	55	61	moderate
95	350 Anthony Rd	RES	2	Ldn	no	55	243.50	499	70	45	60	55	61	moderate
96	180 Godshall Rd	RES	2	Ldn	yes	55	243.00	319	70	45	56	55	61	moderate
97	448 Powderhorn Rd	RES	2	Ldn	yes	55	242.50	374	70	45	56	55	61	moderate
98	444 Powderhorn Rd	RES	2	Ldn	yes	55	242.00	425	70	45	55	55	61	moderate
99	440 Powderhorn Rd	RES	2	Ldn	yes	55	241.50	474	70	45	55	55	61	moderate
100	544 Elliott Dr	RES	2	Ldn	yes	55	241.50	303	70	45	57	55	61	moderate
101	609 Nantucket Cir	RES	2	Ldn	yes	55	240.50	489	70	45	55	55	61	moderate
102	424 Bluebuff Rd	RES	2	Ldn	yes	55	240.50	284	70	45	57	55	61	moderate
103	431 Bluebuff Rd	RES	2	Ldn	yes	55	239.50	483	70	45	55	55	61	moderate
104	422 Bluebuff Rd	RES	2	Ldn	yes	55	239.50	315	70	45	57	55	61	moderate
105	420 Bluebuff Rd	RES	2	Ldn	yes	55	239.00	320	70	45	57	55	61	moderate
106	183 Gunport Ln	RES	2	Ldn	yes	55	238.50	489	70	45	55	55	61	moderate
107	418 Bluebuff Rd	RES	2	Ldn	yes	55	238.00	327	70	45	57	55	61	moderate
108	416 Bluebuff Rd	RES	2	Ldn	yes	55	237.50	332	70	45	56	55	61	moderate
109	417 Bluebuff Rd	RES	2	Ldn	yes	55	237.00	494	70	45	55	55	61	moderate
110	414 Bluebuff Rd	RES	2	Ldn	yes	55	237.00	337	70	45	56	55	61	moderate

ID	Address	Land use	FTA Cat.	Metric	Existing Barrier	Existing	Milepost	Align Dist (ft)	Speed Track 1	Speed Track 2	Build	MOD	SEV	Impact
111	413 Bluebuff Rd	RES	2	Ldn	yes	55	236.00	512	70	45	55	55	61	moderate
112	412 Bluebuff Rd	RES	2	Ldn	yes	55	236.50	341	70	45	56	55	61	moderate
113	410 Bluebuff Rd	RES	2	Ldn	yes	55	235.50	345	70	45	56	55	61	moderate
114	407 Bluebuff Rd	RES	2	Ldn	yes	55	235.00	505	70	45	55	55	61	moderate
115	408 Bluebuff Rd	RES	2	Ldn	yes	55	235.00	347	70	45	56	55	61	moderate
116	406 Bluebuff Rd	RES	2	Ldn	yes	55	234.50	348	70	45	56	55	61	moderate
117	404 Bluebuff Rd	RES	2	Ldn	yes	55	234.00	364	70	45	56	55	61	moderate
118	402 Bluebuff Rd	RES	2	Ldn	yes	55	233.50	390	70	45	56	55	61	moderate
119	400 Bluebuff Rd	RES	2	Ldn	yes	55	233.00	493	70	45	55	55	61	moderate
120	390 Kingwood Rd	RES	2	Ldn	yes	55	232.50	408	70	45	56	55	61	moderate
121	386 Kingwood Rd	RES	2	Ldn	yes	55	232.00	396	70	45	56	55	61	moderate
122	382 Kingwood Rd	RES	2	Ldn	yes	55	231.50	381	70	45	56	55	61	moderate
123	378 Kingwood Rd	RES	2	Ldn	yes	55	231.00	364	70	45	56	55	61	moderate
124	979 Plymouth Rd	RES	2	Ldn	yes	55	230.00	345	70	45	56	55	61	moderate
125	1900 Market St Ste 800	RES	2	Ldn	yes	55	229.50	349	70	45	56	55	61	moderate
126	375 Kingwood Rd	RES	2	Ldn	yes	55	228.50	480	70	45	55	55	61	moderate
127	373 Kingwood Rd	RES	2	Ldn	yes	55	228.50	410	70	45	56	55	61	moderate
128	0	RES	2	Ldn	no	55	221.00	236	70	45	44	55	61	--
129	0	RES	2	Ldn	no	55	218.50	116	70	45	52	55	61	--
130	0	RES	2	Ldn	no	55	215.00	210	63	45	46	55	61	--

ID	Address	Land use	FTA Cat.	Metric	Existing Barrier	Existing	Milepost	Align Dist (ft)	Speed Track 1	Speed Track 2	Build	MOD	SEV	Impact
131	221 Tyler Rd	RES	2	Ldn	no	50	210.00	437	43	43	39	53	60	--
132	227 Tyler Rd	RES	2	Ldn	no	50	209.50	311	41	41	40	53	60	--
133	227 Garfield Rd	RES	2	Ldn	no	50	208.00	450	35	35	38	53	60	--
134	226 Tyler Rd	RES	2	Ldn	no	50	208.00	303	35	35	40	53	60	--
135	226 Garfield Rd	RES	2	Ldn	no	50	207.50	310	33	33	40	53	60	--
136	224 Garfield Rd	RES	2	Ldn	no	50	206.50	324	29	29	41	53	60	--
137	208 Tyler Rd	RES	2	Ldn	no	50	206.00	359	27	27	42	53	60	--
138	355 S Henderson Rd	RES	2	Ldn	no	60	208.00	397	35	35	39	58	63	--
139	208 Tyler Rd	RES	2	Ldn	no	50	203.50	452	17	17	50	53	60	--
140	Po Box 311	PARK	3	Leq	no	55	191.00	162	15	15	44	60	66	--
	Total Impacts		**1**									**--**	**--**	
			2									**51**	**0**	
			3									**2**	**0**	

Notes: -- = no impact; Align Dist. = alignment distance; Cat. = category; COM = commercial; Ldn = 24-hour day-night noise level; Leq = average peak hourly noise level; FIRE = firehouse; HOT = hotel; MOD = moderate; OFF = office; PARK = park; RES = residence; SEV = severe

Source: AECOM, November 2020.

4 Environmental Consequences

The Project will introduce new sources of operational noise and vibration in the Project study area. Project tracks will be in a dedicated guideway with no grade crossings or shared service with other rail operators, such as freight. With almost 80 percent of the Project tracks on an elevated guideway, including Project stations, most of the operational noise and vibration will be physically separated from the surrounding communities. In addition to rail operations, the Project will also include electrical substations to provide third-rail power and two parking garages at the Henderson Road Station and First Avenue Station.

4.1 Prediction Methodology

Noise levels from Project rail vehicle operations were predicted at each of the 140 receptor sites identified in the screening analysis using the Detailed Noise Analysis procedures, methodologies and algorithms included in Section 4.5 of FTA's *Manual*. Additionally, separate noise levels were also determined for stationary facilities including the passenger stations, electrical power substations, and the parking garages. The noise from the parking garages was predicted using the General Noise Assessment procedures, methodologies and algorithms included in Section 4.4 of FTA's *Manual*.

Detailed data used to determine rail vehicle operational noise is included in Section 10 of this Technical Report, including hourly operations, rail vehicle speeds by milepost, track elevations, and switch locations. For example, average daily rail vehicle operations for various periods of the day (ranging from 6:40-minute headways during the peak periods to 10-minute headways during the off-peak periods[3]) were used to calculate total daily noise exposure over a 24-hour period at residences and over a one-hour period for institutional receptors and noise-sensitive offices. Noise levels were adjusted to reflect each receptor's distance, changes in rail vehicle speeds, rail gaps at switches, ground attenuation and shielding effects due to the elevated track structure and the existing highway noise barriers. For example, rail vehicle noise levels at residences behind the existing highway barriers were adjusted lower by 5 decibels in accordance with Table 4-14 of the FTA *Manual*.

Other adjustments were applied for aerial slab track with direct fixation compared to tie and ballast track sections. Several track turnout switches are proposed along the Project alignment, including just east of First & Moore Station, west of Mall Blvd Station and at the Junction area east of Henderson Road Station. A 10-decibel adjustment was applied for rail vehicle passbys over switches to reflect the rail discontinuities associated with the switch points and frogs. Additionally, because there are no grade crossings with roadways along the Project alignment, crossing bells and rail vehicle warning horns at at-grade crossings will not occur.

[3] Gannett Fleming, *Draft Rail Operations Simulation Report – Norristown High Speed Line Extension*, August 25, 2020.

A comparative analysis of the change in future operational noise along the existing NHSL corridor was conducted using hourly rail vehicle 'counts' at the Hughes Park Station. As shown in Figure A5 in Appendix A, directional rail vehicle operations along the NHSL corridor are predicted to increase 167 percent between the existing condition and Project operations (from 202 to 539 rail vehicles per day) under the Preferred Alternative.[4] No changes in rail vehicle speeds or track location are proposed along the NHSL corridor except at the new wye junction for the King of Prussia Rail Extension.

Vibration levels from future rail vehicle operations were predicted using the General Vibration Assessment procedures, methodologies and algorithms included in Section 6.4 of the FTA's *Manual*. Unlike noise, however, vibration levels are determined for single events such as a rail vehicle passby rather than the cumulative exposure over a 24-hour period. Using the Ground-Surface Vibration Curves from Figure 6-4 in the FTA *Manual* for light rail vehicles, vibration levels were determined for rail vehicle passbys at each receptor site. The vibration levels from the FTA default data were adjusted to reflect each receptor's distance, changes in rail vehicle speeds, rail gaps at switches and type of track structure (i.e., elevated guideway vs. at-grade). Stationary Project facilities (such as passenger stations, traction power substations and parking garages) were not evaluated because they are not significant sources of vibration compared to rail vehicle operations.

4.2 Operational Noise Levels

As shown in **Table 3.1-1**, future day-night operational noise levels (or Ldn) are predicted to range from 38 dBA Leq at Receptor 133 (residence along Garfield Road) to 60 dBA at several receptors including residences along Anthony Road and Dekalb Pike and the Home2 Suites by Hilton hotel. Similarly, future peak-hour operational noise levels (or Leq) are predicted to range from 44 dBA to 63 dBA. Except for sites immediately adjacent to stations, operational Project noise at all of the other receptors in **Table 3.1-1** will be dominated by rail operations.

Along the existing NHSL corridor, the 167 percent increase in the number of rail vehicles per day will result in a 4.3 Ldn increase in day-night operational noise levels at all first-row residences that abut the existing NHSL corridor.

4.3 Operational Vibration Levels

Table 4.3-1 presents operational vibration levels at each of the 140 receptors studied. Operational vibration levels will range from 30 VdB at Receptors 7 and 8 (offices along First Avenue) to 69 VdB at Receptor 129 (a multifamily residential building at 251 Dekalb Pike). To minimize potential impacts from gaps in the switch mechanism, track turnout switches are proposed away from residences.

Along the NHSL corridor, the increase in daily rail vehicle operations will not change the vibration levels because vibration levels are 'event' based.

[4] Gannett Fleming, *Draft Rail Operations Simulation Report – Norristown High Speed Line Extension*, August 25, 2020.

Table 4.3-1: Predicted Future Vibration Levels at 140 Receptors under the Preferred Alternative

ID	Address	Land-use	FTA Cat.	Milepost	Align Dist (ft)	Track Type	Speed Track 1	Speed Track 2	Build	FTA Criteria	Impact
1	1100 First Ave Ste 100	OFF	3	358.50	69	VIA	5	5	41	75	--
2	935 First Ave	OFF	3	353.50	180	VIA	15	24	50	75	--
3	768 N Bethlehem Pike Ste 203	OFF	3	350.50	157	VIA	15	36	55	75	--
4	555 E Lancaster Ave Ste 100	OFF	3	347.50	390	VIA	15	48	40	75	--
5	555 E Lancaster Ave Ste 100	OFF	3	346.50	141	VIA	15	50	47	75	--
6	250 Haddonfield Berlin Rd	OFF	3	345.00	297	VIA	15	50	39	75	--
7	935 First Ave	COM	3	341.00	467	VIA	15	50	30	75	--
8	401 Plymouth Rd Ste 500	OFF	3	340.00	467	VIA	15	50	30	75	--
9	555 E Lancaster Ave Ste 100	OFF	3	338.50	182	VIA	15	49	42	75	--
10	456 Powderhorn Rd	RES	2	243.50	269	VIA	70	45	51	72	--
11	0	OFF	3	336.50	112	VIA	15	41	46	75	--
12	500 Office Center Dr Ste 210	OFF	3	333.00	160	VIA	15	27	43	75	--
13	725 Conshohocken State Rd	OFF	3	330.50	63	VIA	15	17	51	75	--
14	768 Bethlehem Pike Ste 203	OFF	3	326.00	50	VIA	11	10	50	75	--
15	11525 N Community House Rd Ste 100	HOT	2	326.50	333	VIA	9	8	31	72	--
16	44 Hersha Dr	RES	2	313.00	53	VIA	30	50	60	72	--
17	0	RES	2	311.50	90	VIA	30	50	54	72	--
18	0	RES	2	311.00	316	VIA	30	50	41	72	--
19	550 American Ave Ste 1	OFF	3	308.00	190	VIA	40	50	49	75	--
20	0	OFF	3	307.50	387	VIA	40	50	41	75	--
21	8100 E 22Nd St Bldg 500	HOT	2	300.50	117	VIA	31	31	56	72	--
22	234 Mall Blvd	OFF	3	297.50	130	VIA	19	19	49	75	--
23	0	HOT	2	288.50	159	VIA	26	26	47	72	--
24	120 S Warner Rd Ste 200	HOT	2	282.50	101	VIA	30	30	53	72	--
25	275 Glenmoor Rd	MIX	2	270.50	172	VIA	5	5	32	72	--
26	198 Allendale Rd	OFF	3	270.00	75	VIA	8	7	44	75	--
27	166 Allendale Rd	OFF	3	268.50	79	VIA	14	13	53	75	--
28	161 Pennsylvania Ave	OFF	3	268.00	131	VIA	16	15	48	75	--
29	158 Allendale Rd	RES	2	267.50	263	VIA	18	17	40	72	--
30	170 Allendale Rd	FIRE	2	266.50	67	VIA	22	21	58	72	--
31	150 Allendale Rd	RES	2	260.50	301	VIA	46	45	46	72	--
32	1119 S College Ave	HOT	2	260.50	74	VIA	46	45	61	72	--
33	0	RES	2	259.00	202	VIA	52	45	51	72	--
34	901 Main Ave	HOT	2	257.00	106	VIA	60	45	60	72	--

ID	Address	Land-use	FTA Cat.	Milepost	Align Dist (ft)	Track Type	Speed Track 1	Speed Track 2	Build	FTA Criteria	Impact
35	519 William Rd Apt A-7	RES	2	257.00	212	VIA	60	45	51	72	--
36	511 William Rd	RES	2	256.50	421	VIA	62	45	43	72	--
37	528 Powderhorn Rd	RES	2	254.00	476	VIA	70	45	43	72	--
38	0	RES	2	255.50	208	VIA	66	45	53	72	--
39	705 Hillview Dr	RES	2	253.50	441	VIA	70	45	44	72	--
40	155 Nancys Ln	RES	2	255.50	499	VIA	66	45	41	72	--
41	149 Nancys Ln	RES	2	255.00	442	VIA	68	45	43	72	--
42	520 Powderhorn Rd	RES	2	253.50	410	VIA	70	45	45	72	--
43	717 W Valley Forge Rd	RES	2	254.50	393	VIA	70	45	45	72	--
44	141 Nancys Ln	RES	2	254.00	343	VIA	70	45	47	72	--
45	516 Powderhorn Rd	RES	2	253.00	379	VIA	70	45	46	72	--
46	Po Box 566	COM	3	253.00	77	VIA	70	45	64	75	--
47	636 Grand Regency Blvd	RES	2	253.50	293	VIA	70	45	49	72	--
48	201 Lochwood Ln	RES	2	253.00	240	VIA	70	45	51	72	--
49	512 Powderhorn Rd	RES	2	252.50	350	VIA	70	45	47	72	--
50	133 Nancys Ln	RES	2	252.50	208	VIA	70	45	53	72	--
51	146 Nancys Ln	RES	2	253.00	494	VIA	70	45	42	72	--
52	508 Powderhorn Rd	RES	2	252.00	326	VIA	70	45	48	72	--
53	142 Nancys Ln	RES	2	252.50	446	VIA	70	45	44	72	--
54	511 Powderhorn Rd	RES	2	251.50	509	VIA	70	45	42	72	--
55	19 Pickering Bend	RES	2	252.00	389	VIA	70	45	45	72	--
56	152 Hillview Rd	RES	2	252.00	196	VIA	70	45	54	72	--
57	504 Powderhorn Rd	RES	2	251.50	303	VIA	70	45	49	72	--
58	123 Flintlock Rd	RES	2	250.50	476	VIA	70	45	43	72	--
59	132 Nancys Ln	RES	2	251.50	361	VIA	70	45	46	72	--
60	500 Powderhorn Rd	RES	2	250.50	283	VIA	70	45	50	72	--
61	129 Nancys Ln	RES	2	251.00	194	VIA	70	45	54	72	--
62	127 Nancys Ln	RES	2	250.50	228	VIA	70	45	52	72	--
63	496 Powderhorn Rd	RES	2	250.00	287	VIA	70	45	50	72	--
64	123 Walker Ln	RES	2	250.50	406	VIA	70	45	45	72	--
65	121 Nancys Ln	RES	2	250.00	291	VIA	70	45	49	72	--
66	492 Powderhorn Rd	RES	2	249.50	237	VIA	70	45	52	72	--
67	493 Powderhorn Rd	RES	2	249.00	441	VIA	70	45	44	72	--
68	109 Walker Ln	RES	2	249.50	225	VIA	70	45	52	72	--
69	103 Walker Ln	RES	2	249.00	169	VIA	70	45	55	72	--
70	488 Powderhorn Rd	RES	2	248.50	233	VIA	70	45	52	72	--
71	140 Walker Ln	RES	2	249.00	455	VIA	70	45	43	72	--

ID	Address	Land-use	FTA Cat.	Milepost	Align Dist (ft)	Track Type	Speed Track 1	Speed Track 2	Build	FTA Criteria	Impact
72	485 Powderhorn Rd	RES	2	248.00	403	VIA	70	45	45	72	--
73	136 Walker Ln	RES	2	248.50	395	VIA	70	45	45	72	--
74	484 Powderhorn Rd	RES	2	248.00	225	VIA	70	45	53	72	--
75	132 Walker Ln	RES	2	248.00	335	VIA	70	45	47	72	--
76	503 Valleywyck Dr	RES	2	247.50	219	VIA	70	45	53	72	--
77	450 W Dekalb Pike	RES	2	247.50	264	VIA	70	45	50	72	--
78	444 Old Dekalb St	RES	2	247.50	394	VIA	70	45	45	72	--
79	2432 Vista St	RES	2	246.50	216	VIA	70	45	53	72	--
80	419 Brandywine Ln	RES	2	247.00	501	VIA	70	45	42	72	--
81	134 Musket Rd	RES	2	246.00	399	VIA	70	45	45	72	--
82	472 Powderhorn Rd	RES	2	246.00	216	VIA	70	45	53	72	--
83	440 W Dekalb Pike	RES	2	246.50	354	VIA	70	45	47	72	--
84	417 Brandywine Ln	RES	2	246.50	483	VIA	70	45	42	72	--
85	468 Powderhorn Rd	RES	2	245.50	230	VIA	70	45	53	72	--
86	465 Powderhorn Rd	RES	2	245.00	396	VIA	70	45	46	72	--
87	436 W Dekalb Pike	RES	2	245.50	382	VIA	70	45	46	72	--
88	464 Powderhorn Rd	RES	2	244.50	236	VIA	70	45	52	72	--
89	432 W Dekalb Pike	RES	2	245.00	411	VIA	70	45	45	72	--
90	1501 Butler Pike	RES	2	244.50	410	VIA	70	45	45	72	--
91	449 Powderhorn Rd	RES	2	244.00	459	VIA	70	45	44	72	--
92	428 W Dekalb Pike	RES	2	244.50	442	VIA	70	45	44	72	--
93	473 Stacey Dr	RES	2	244.00	246	VIA	70	45	52	72	--
94	350 Anthony Rd	RES	2	244.00	471	VIA	70	45	43	72	--
95	350 Anthony Rd	RES	2	243.50	499	VIA	70	45	42	72	--
96	180 Godshall Rd	RES	2	243.00	319	VIA	70	45	48	72	--
97	448 Powderhorn Rd	RES	2	242.50	374	VIA	70	45	46	72	--
98	444 Powderhorn Rd	RES	2	242.00	425	VIA	70	45	45	72	--
99	440 Powderhorn Rd	RES	2	241.50	474	VIA	70	45	43	72	--
100	544 Elliott Dr	RES	2	241.50	303	VIA	70	45	49	72	--
101	609 Nantucket Cir	RES	2	240.50	489	VIA	70	45	43	72	--
102	424 Bluebuff Rd	RES	2	240.50	284	VIA	70	45	50	72	--
103	431 Bluebuff Rd	RES	2	239.50	483	VIA	70	45	43	72	--
104	422 Bluebuff Rd	RES	2	239.50	315	VIA	70	45	49	72	--
105	420 Bluebuff Rd	RES	2	239.00	320	VIA	70	45	48	72	--
106	183 Gunport Ln	RES	2	238.50	489	VIA	70	45	43	72	--
107	418 Bluebuff Rd	RES	2	238.00	327	VIA	70	45	48	72	--
108	416 Bluebuff Rd	RES	2	237.50	332	VIA	70	45	48	72	--

ID	Address	Land-use	FTA Cat.	Milepost	Align Dist (ft)	Track Type	Speed Track 1	Speed Track 2	Build	FTA Criteria	Impact
109	417 Bluebuff Rd	RES	2	237.00	494	VIA	70	45	42	72	--
110	414 Bluebuff Rd	RES	2	237.00	337	VIA	70	45	48	72	--
111	413 Bluebuff Rd	RES	2	236.00	512	VIA	70	45	42	72	--
112	412 Bluebuff Rd	RES	2	236.50	341	VIA	70	45	48	72	--
113	410 Bluebuff Rd	RES	2	235.50	345	VIA	70	45	47	72	--
114	407 Bluebuff Rd	RES	2	235.00	505	VIA	70	45	42	72	--
115	408 Bluebuff Rd	RES	2	235.00	347	VIA	70	45	47	72	--
116	406 Bluebuff Rd	RES	2	234.50	348	VIA	70	45	47	72	--
117	404 Bluebuff Rd	RES	2	234.00	364	VIA	70	45	47	72	--
118	402 Bluebuff Rd	RES	2	233.50	390	VIA	70	45	46	72	--
119	400 Bluebuff Rd	RES	2	233.00	493	VIA	70	45	42	72	--
120	390 Kingwood Rd	RES	2	232.50	408	VIA	70	45	45	72	--
121	386 Kingwood Rd	RES	2	232.00	396	VIA	70	45	46	72	--
122	382 Kingwood Rd	RES	2	231.50	381	VIA	70	45	46	72	--
123	378 Kingwood Rd	RES	2	231.00	364	VIA	70	45	47	72	--
124	979 Plymouth Rd	RES	2	230.00	345	VIA	70	45	47	72	--
125	1900 Market St Ste 800	RES	2	229.50	349	VIA	70	45	47	72	--
126	375 Kingwood Rd	RES	2	228.50	480	VIA	70	45	43	72	--
127	373 Kingwood Rd	RES	2	228.50	410	VIA	70	45	45	72	--
128	0	RES	2	221.00	236	CUT	70	45	62	72	--
129	0	RES	2	218.50	116	CUT	70	45	69	72	--
130	0	RES	2	215.00	210	CUT	63	45	62	72	--
131	221 Tyler Rd	RES	2	210.00	437	CUT	43	43	50	72	--
132	227 Tyler Rd	RES	2	209.50	311	CUT	41	41	54	72	--
133	227 Garfield Rd	RES	2	208.00	450	CUT	35	35	47	72	--
134	226 Tyler Rd	RES	2	208.00	303	CUT	35	35	53	72	--
135	226 Garfield Rd	RES	2	207.50	310	CUT	33	33	52	72	--
136	224 Garfield Rd	RES	2	206.50	324	CUT	29	29	50	72	--
137	208 Tyler Rd	RES	2	206.00	359	CUT	27	27	48	72	--
138	355 S Henderson Rd	RES	2	208.00	397	CUT	35	35	50	72	--
139	208 Tyler Rd	RES	2	203.50	452	CUT	17	17	41	72	--
140	Po Box 311	PARK	3	191.00	162	VIA	15	15	49	75	--

Notes: -- = no impact; Align Dist. = alignment distance; Cat. = category; COM = commercial; CUT = track alignment in a cut; VIA = track alignment on elevated guideway; FIRE = firehouse; HOT = hotel; OFF = office; PARK = park; RES = residence; SEV = severe
Source: AECOM, November 2020.

5 Operational Criteria

In accordance with the National Environmental Policy Act (NEPA) [42 U.S.C. § 4321 et seq.], the Council on Environmental Quality (CEQ) regulations [40 C.F.R. Parts 1500 -1508], and the FTA's *Transit Noise and Vibration Impact Assessment Manual* [FTA Report No. 0123, September 2018], noise and vibration impacts from the King of Prussia Rail Extension Project operations were assessed. The FTA's guidance *Manual*, particularly with respect to the assessment of impact and the annoyance criteria, are based the U.S. Environmental Protection Agency's (EPA) "Information on Levels of Environmental Noise Requisite to Protect Public Health and Welfare with an Adequate Margin of Safety" [Report No. 550/9-74-004, Washington DC, March 1974].

Community noise is also regulated by local and regional noise ordinances including the Upper Merion Township's *Chapter 107, Nuisances*. However, these local ordinances generally restrict nuisance noise and set limits on when construction can occur (such as no nighttime construction). They do not set any limits on the long-term operation of transit rail systems.

5.1 Noise

FTA's *Manual* Section 4.1 presents the basic concepts, methods, and procedures for evaluating the extent and severity of noise impacts from transit projects. Transit noise impacts are assessed based on land use categories and sensitivity to noise from transit sources under the FTA guidelines. The FTA land use categories and required noise metrics are described in **Table** .

Table 5.1-1: FTA Land Use Categories and Noise Metrics

Land Use Category	Noise Metric	Description
1	$L_{eq}(h)$	Tracts of land set aside for serenity and quiet, such as outdoor amphitheaters, concert pavilions and historic landmarks.
2	L_{dn}	Buildings used for sleeping such as residences, hospitals, hotels and other areas where nighttime sensitivity to noise is of utmost importance.
3	$L_{eq}(h)$	Institutional land uses with primarily daytime and evening uses including schools, libraries, churches, museums, cemeteries, historic sites and parks, and certain recreational facilities used for study or meditation.

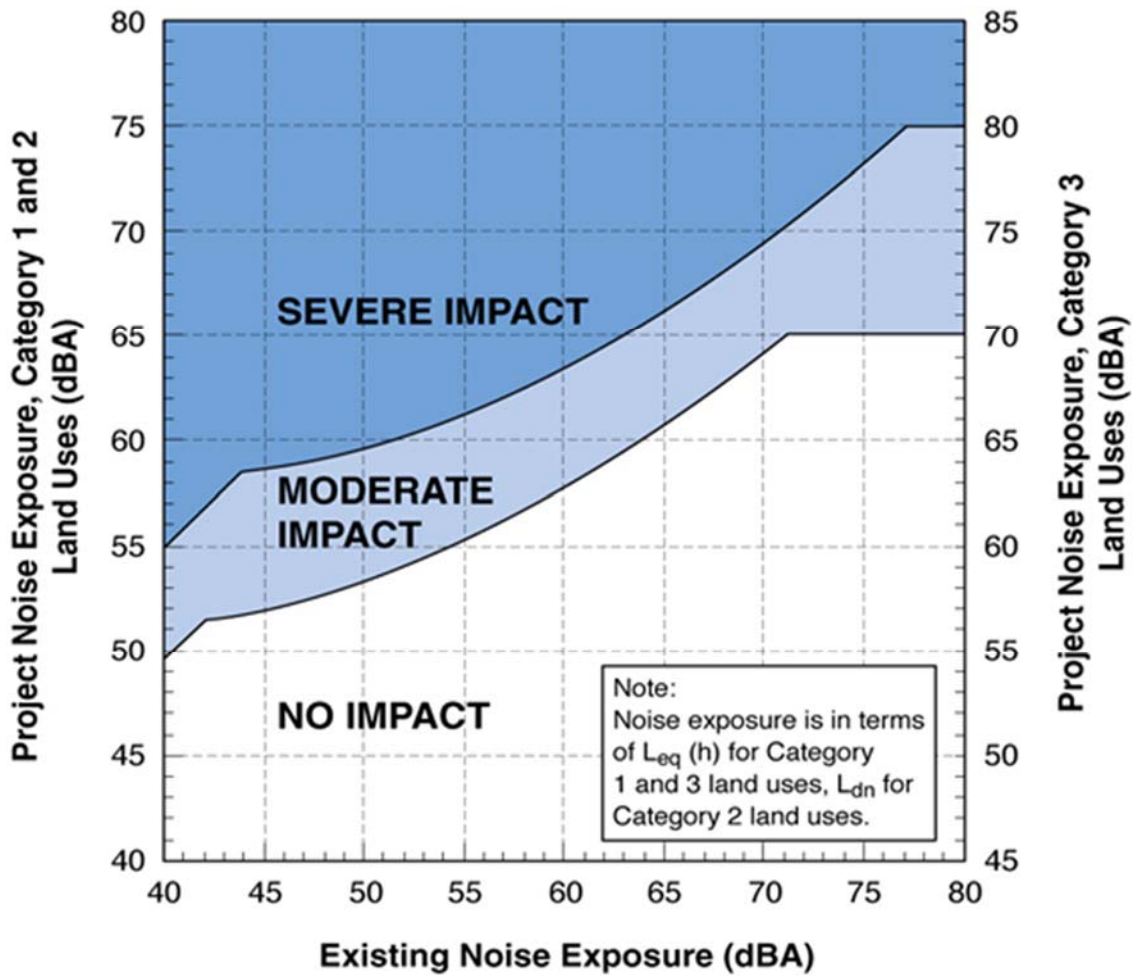
Notes: L_{dn} describes a receiver's cumulative noise exposure from all events over a full 24 hours, with events between 10:00 p.m. and 7:00 am increased by 10 decibels to account for greater nighttime sensitivity to noise. For other noise sensitive land uses, such as schools and libraries (FTA Land Use Category 3) and outdoor amphitheaters (FTA Land Use Category 1), the average hourly equivalent noise level (or $L_{eq}(h)$) is used to represent the peak operating period.

Source: FTA *Manual*.

As shown in **Figure 5.1-1**, the FTA noise impact criteria are defined by two curves that allow increasing Project noise levels as existing noise increases up to a point, beyond which impact is determined based on Project noise alone. The FTA noise criteria are delineated into two categories: *moderate* and *severe* impact. The *moderate* impact threshold defines areas where the change in noise is noticeable but may not be sufficient to cause a strong, adverse community reaction. The *severe* impact threshold defines the noise limits above which a

substantial percentage of the population would be highly annoyed by new noise. The level of impact at any specific site can be determined by comparing the predicted Project noise level to the allowable noise exposure based on the existing noise level at the site.

Figure 5.1-1: FTA Noise Impact Criteria for Transit Projects



Source: FTA *Manual*.

5.2 Vibration

FTA's *Manual* Section 6.2 presents the basic concepts, methods, and procedures for evaluating the extent of vibration impacts from transit project operations. The FTA vibration criteria for evaluating ground-borne vibration impacts from rail vehicle operations at nearby sensitive receptors are shown in **Table 5.2-1**. These vibration criteria are related to ground-borne vibration levels that are expected to result in human annoyance and are based on root mean square (RMS) velocity levels expressed in VdB referenced to one micro inch per second. FTA's experience with community response to ground-borne vibration indicates that when there are only a few rail vehicle events per day, higher vibration levels are necessary to evoke the same community response that would be expected from more frequent events.

Table 5.2-1: Indoor Ground-Borne Vibration and Ground-Borne Noise Impact Criteria for General Vibration Assessment and Special Buildings

Land Use Category	Ground-borne Vibration			Ground-borne Noise		
	Frequent[1]	Occasional	Infrequent	Frequent	Occasional	Infrequent
Category 1: Buildings where Vibration would interfere with interior operations.	65 VdB[2]	65 VdB	65 VdB	N/A[3]	N/A	N/A
Category 2: Residences and buildings where people normally sleep.	72 VdB	75 VdB	80 VdB	35 dBA	38 dBA	43 dBA
Category 3: Institutional land uses with primarily daytime use.	75 VdB	78 VdB	83 VdB	40 dBA	43 dBA	48 dBA
Concert Halls	65 VdB	65 VdB	65 VdB	25 dBA	25 dBA	25 dBA
TV Studios	65 VdB	65 VdB	65 VdB	25 dBA	25 dBA	25 dBA
Recording Studios	65 VdB	65 VdB	65 VdB	25 dBA	25 dBA	25 dBA
Auditoriums	72 VdB	80 VdB	80 VdB	30 dBA	38 dBA	38 dBA
Theaters	72 VdB	80 VdB	80 VdB	35 dBA	43 dBA	43 dBA

1. Frequent events is defined as more than 70 vibration events of the same kind per day; Occasional events is 30-70 events per day, and; Infrequent events is fewer than 30 events per day.
2. This criterion limit is based on levels that are acceptable for most moderately sensitive equipment such as optical microscopes. Vibration-sensitive manufacturing or research will require detailed evaluation to define the acceptable vibration levels. Ensuring lower vibration levels in a building often requires special design of the HVAC systems and stiffened floors.
3. Vibration-sensitive equipment is not sensitive to ground-borne noise.
Source: FTA *Manual*, Table 6-3 and Table 6-4.

This experience is taken into account in the FTA criteria by distinguishing between projects with *frequent*, *occasional*, or *infrequent* events. The *frequent* events category is defined as more than 70 events per day, the *occasional* events category is defined as between 30 and 70 events per day, and the *infrequent* events category is defined as less than 30 events per day. To be conservative, the FTA *frequent* criteria were used to assess ground-borne vibration impacts in the Project study area.

The vibration criteria levels shown in **Table 5.2-1** are defined in terms of human annoyance for different land use categories such as high sensitivity (Category 1), residential (Category 2), and institutional (Category 3). In general, the vibration threshold of human perceptibility is approximately 65 VdB. No Category 1 receptors were identified in the Project study area.

Ground-borne noise is rarely a concern for above-grade or elevated rail systems because airborne noise typically dominates. Therefore, ground-borne noise (low-frequency rumble indoors) was not evaluated because no Project impacts are expected.

6 Operational Impact Assessment

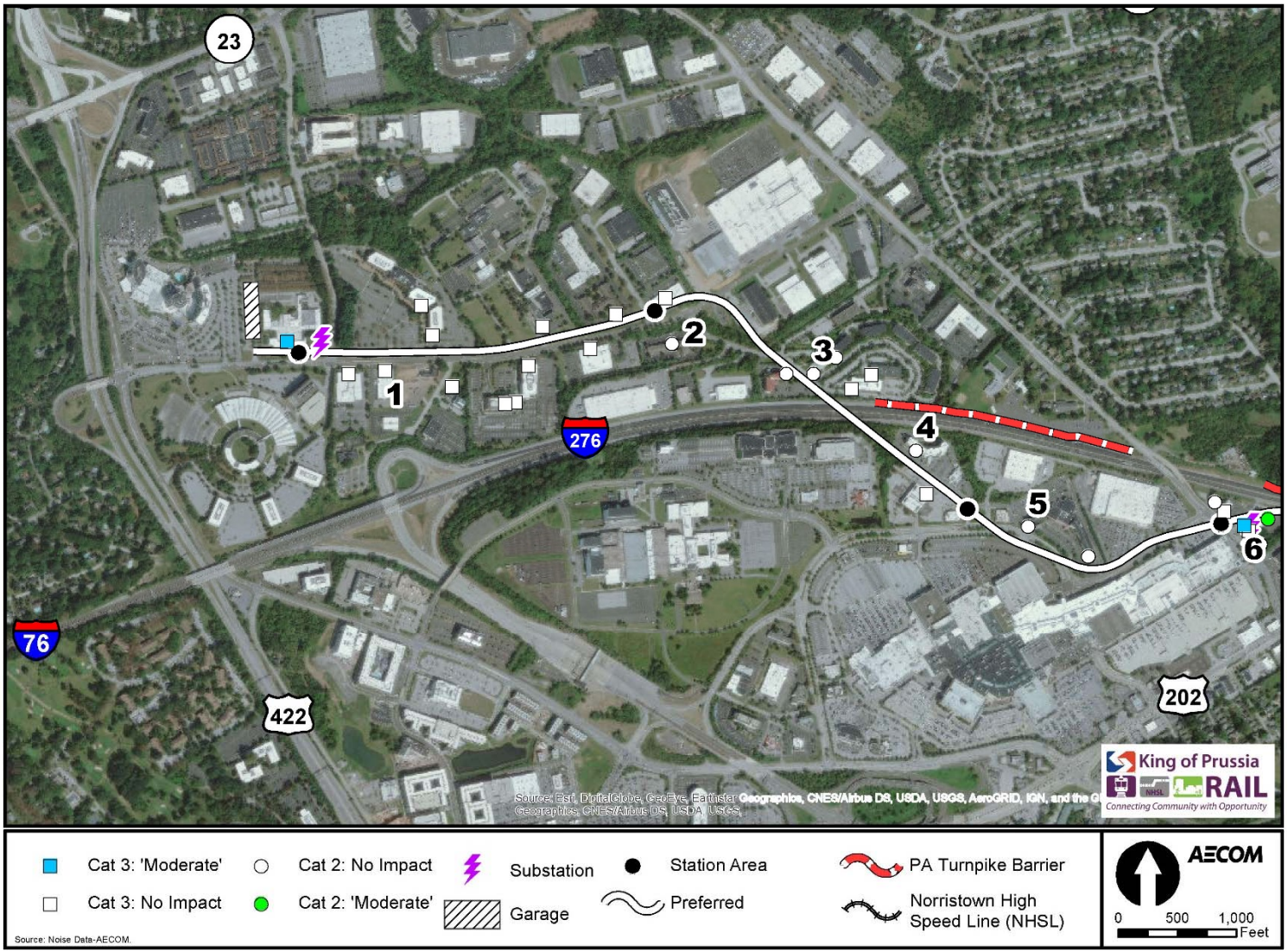
6.1 Noise

As shown in **Table 3.1-1**, maximum operational noise levels at the 140 receptors will range from 60 dBA Ldn at residences to 63 dBA Leq at offices. These are the maximum Project operational noise levels that will occur in the Project study area as well at the 140 receptors. As a result, operational noise impacts (defined as future Project noise levels that are equal to or greater than the FTA criteria) are predicted at several receptors. As summarized in **Table 3.1-1** and shown graphically in **Figure** and **Figure** , *moderate* noise impacts are predicted at 50 residences, 1 hotel (Home2 Suites by Hilton) and 2 office buildings (adjacent to the First & Moore and Allendale Road Stations). No *severe* noise impacts are predicted anywhere.

As shown in **Figure** , the low level of operational noise impact is due to the 2-foot raised edge of the guideway (or solid side walls of elevated track structure) that will shield the wheel-rail noise from receptors at lower elevations. Additionally, the existing highway noise barriers along I-76 will provide additional shielding from future rail vehicle operations for residences in the Valley Forge Homes and Brandywine Village neighborhoods. Valley Forge Homes includes residences along Powderhorn Road south of I-76 and Brandywine Village includes residences along Nancy and Walker Lanes north of I-76. The combined effects of the elevated track structure and the existing highway barriers result in a limited number of *moderate* noise impacts and no *severe* impacts under the Preferred Alternative.

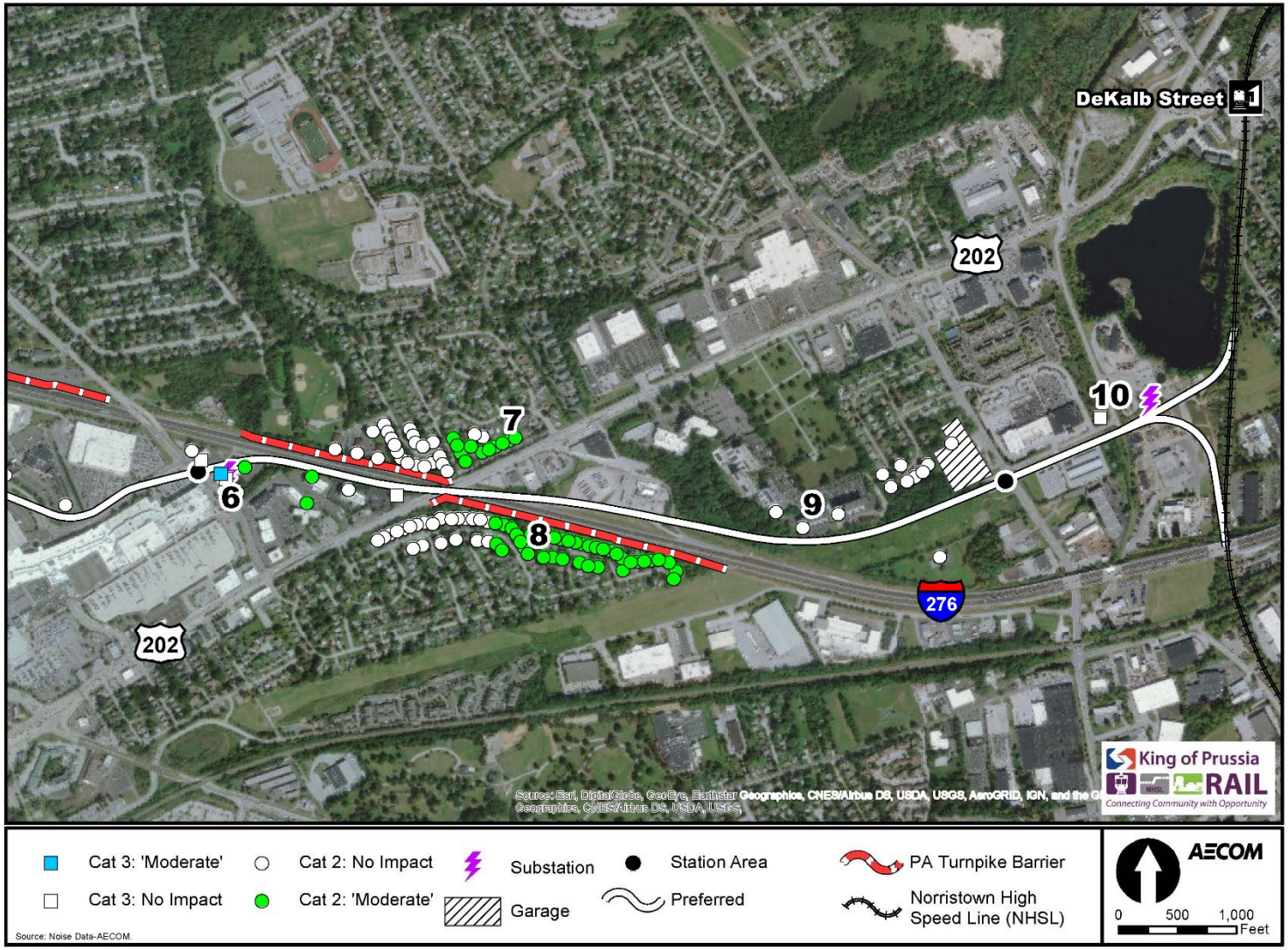
Along the existing NHSL corridor, noise levels from existing rail service at the closest residences in the Hughes Park neighborhood, for example, are estimated at 57 dBA Ldn. In accordance with the FTA's allowable increase in cumulative noise by the criteria, future Project operational noise above 59.6 dBA will result in a *moderate* impact. In other words, a *moderate* operational noise impact will occur if the existing noise level increases by 2.6 dBA. Based on SEPTA's future operating plan along the NHSL corridor, the number of rail vehicles is expected to increase 167 percent between the existing condition and the Preferred Alternative (from 202 to 539 rail vehicles per day). This net increase in operations (with no change in the track alignment or operating speeds) will contribute to a cumulative increase of 4.3 dBA. Therefore, because the cumulative increase in operations exceeds the allowable increase criterion of 3 dBA, *moderate* noise impacts are predicted at first-row residences along the existing NHSL corridor between 69th Street Transportation Center and Norristown Transportation Center under the Preferred Alternative.

Figure 6.1-1: Noise Impacts under the Preferred Alternative (Western Section)



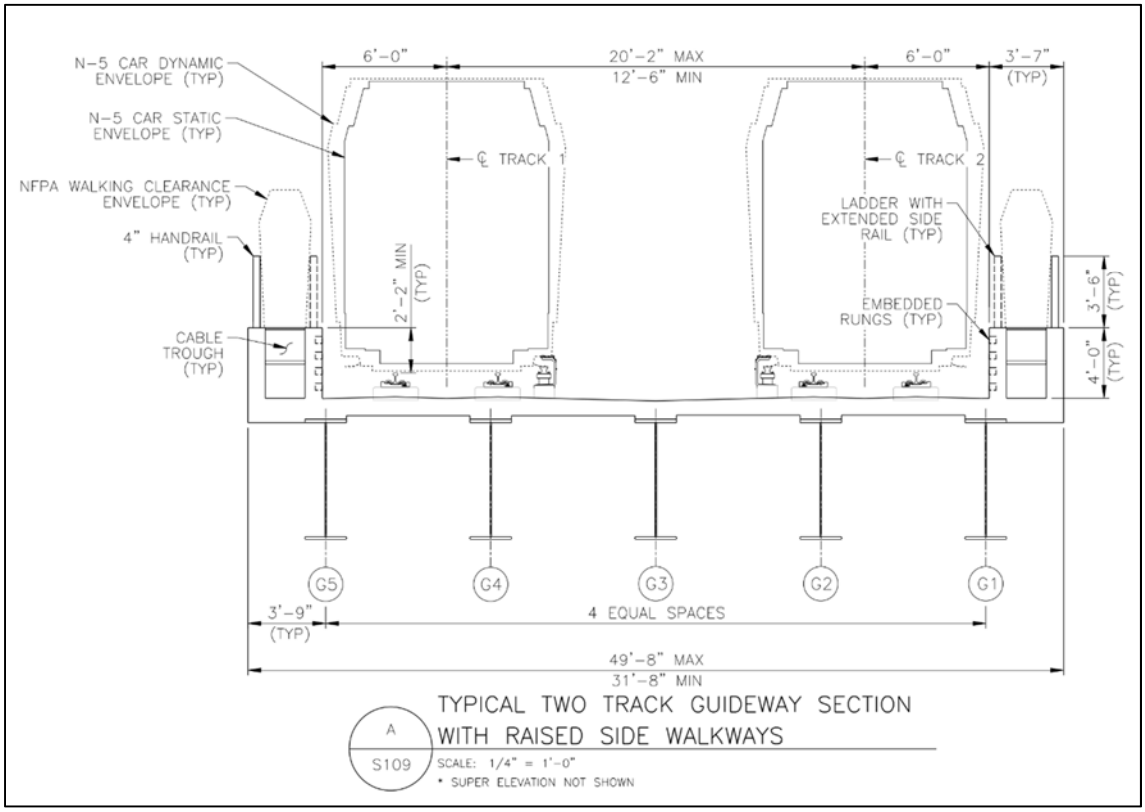
Note: Numbers indicate representative receptors reported in the FEIS; symbols indicate the inventory of 140 receptors.
Source: AECOM, November 2020.

Figure 6.1-2: Noise Impacts under the Preferred Alternative (Eastern Section)



Note: Numbers indicate representative receptors reported in the FEIS; symbols indicate the inventory of 140 receptors.
Source: AECOM, November 2020.

Figure 6.1-3: Proposed Viaduct Guideway Profile Showing Edge of Structure



Source: "NHSL-King of Prussia Rail Extension, 15% Design Submission, AECOM, May 20, 2020. [KOP Rail_15_PLAN_FINAL.pdf]

6.2 Vibration

As shown in **Table 4.**, operational vibration levels at the 140 receptors range from 30 VdB to 69 VdB. None of the future operational vibration levels from the proposed rail vehicle operations are predicted to exceed the FTA *frequent* impact criteria of 72 VdB at residential receptors or 75 VdB at non-residential receptors. The lack of operational vibration impacts is due to the use of an elevated guideway for 78 percent of the proposed track alignment. In general, the heavier the structure, the lower the vibration levels. Therefore, operational vibration levels along the Project guideway (which is significantly heavier than typical at-grade track) will be well below the FTA impact criteria. Additionally, track switches (which typically contribute to elevated vibration levels due to the gap in the rail) are proposed away from residences to further minimize the potential for adverse impacts.

Along the existing NHSL, the potential for operational vibration impacts was assessed qualitatively. Because vibration is assessed based on single events and the same type of rail vehicles is proposed for the Preferred Alternative, no change in the future vibration is expected to occur along the existing NHSL. Therefore, no operational vibration impacts are expected along the existing NHSL as a result of the Preferred Alternative.

7 Operational Mitigation

The FTA Manual specifies that 'severe' noise impacts require mitigation. Because no 'severe' impacts are predicted to occur as a result of the Project, mitigation measures have not been identified in this FEIS. However, as described in this section, SEPTA has made the following commitments as part of the Project regarding noise effects. During subsequent design, SEPTA will continue to assess the potential for noise impacts as a result of further design of the Project, and will evaluate the need for and design of mitigation for noise impacts. SEPTA will report the results of the evaluation on the Project website.

- **Parapet Walls on Guideway** - Solid parapets in lieu of open safety railings would eliminate noise impacts from train operations along the guideway. Increasing the height of the proposed edge of the guideway from 2.2 feet above top of rail to 6 feet above top of rail at the following locations would eliminate all predicted moderate noise impacts:

    - Valley Forge Homes
        - Station No. 227+00 to 247+00 (south side)
        - 37 residential impacts
    - Brandywine Village
        - Station No. 243+00 to 250+00 (north side)
        - 11 residential impacts
    - Allendale Road Station
        - Station No. 259+00 to 269+00 (south side)
        - 3 residential impacts
        - 1 office impact

    Because the Valley Forge Homes and Brandywine Village neighborhoods currently benefit from a highway noise barrier, the effectiveness of parapet walls on the guideway will need to be investigated in more detail during subsequent design by SEPTA.

- **Station-specific Noise Control** – At Allendale Road Station, several station-specific noise minimization and mitigation measures are available (such as clear noise panels to block noise and a distributed speaker system to maximize speech intelligibility) for consideration during subsequent design.

Because no Project operational vibration impacts are predicted, no control measures are required regarding vibration.

8 Construction Analysis

Due to the size of the Project and the facilities proposed for construction, temporary noise impacts are expected to occur. To maintain a balance between constructing the Project and quality of life for nearby communities, SEPTA and its contractors are bound by federal, State and local guidelines to use construction techniques and incorporate minimization and mitigation

measures to eliminate or minimize construction noise and vibration impacts. Since specifics on the types of equipment proposed will not be identified by SEPTA until subsequent design when construction plans are developed, the analysis of construction effects is a preliminary estimation of the types of noise and vibration effects that could be expected during the construction phase of the Project. The preliminary estimation of construction noise and vibration effects will be refined during subsequent Project design when details of the Project elements, construction locations, equipment types, equipment usage, and schedules are developed.

8.1 Construction Analysis Criteria

8.1.1 Noise

FTA's *Manual* Section 7.1 presents the basic concepts, methods, criteria and procedures for evaluating the extent and severity of temporary construction noise impacts from transit projects. As shown in **Table 8.1-1**, criteria based on the one-hour average noise level or Leq(h) were used to assess preliminary construction noise impacts at residences and commercial land-uses at the same 140 receptors selected for the long-term operational analysis. These criteria are intended for a general noise assessment when details of the construction activities are not yet known and will not be developed until the subsequent design phase.

Table 8.1-1: FTA General Assessment Construction Noise Criteria

Land Use	1-Hour Leq (dBA)	
	Day	Night
Residential	90	80
Commercial	100	100
Industrial	100	100

Source: FTA Manual, Table 7-2.

8.1.2 Vibration

FTA's *Manual* Section 7.2 presents the basic concepts, methods, criteria and procedures for evaluating the extent and severity of temporary construction vibration impacts from transit projects. The concern regarding vibration from construction activities (such as pile driving and other heavy impact equipment) is the potential for cosmetic damage to nearby buildings. The peak particle velocity vibration level (PPV), which is typically expressed in inches per second, was used to assess the potential for damage at residences and other sensitive receptors using the criteria shown in **Table 8.1-2**. The PPV vibration level represents the maximum peak level and is, therefore, typically used to assess stresses on buildings that could cause damage.

Table 8.1-2: FTA Construction Vibration Damage Criteria

Building Category	PPV (in/sec)	RMS (VdB)
I. Reinforced-concrete, steel or timber (no plaster)	0.5	102
II. Engineered concrete and masonry (no plaster)	0.3	98
III. Non-engineered timber and masonry buildings	0.2	94

Building Category	PPV (in/sec)	RMS (VdB)
IV. Buildings extremely susceptible to vibration damage	0.12	90

Notes: PPV = peak particle velocity; RMS = root mean square; VdB = vibration decibels
Source: FTA *Manual*, Table 7-5.

Additionally, the RMS vibration criteria shown in **Table 5.2-1** were also used to assess the potential for annoyance and interference with vibration-sensitive activities because PPV is not a good indicator of human response.

8.2 Prediction Methodology

A Quantitative Construction Noise and Vibration Assessment was conducted because the Project construction is expected to last approximately four years. An FTA General Assessment of construction noise and vibration was conducted for the Project because it is in an early assessment stage when the equipment roster and schedule are undefined and only a rough estimate of construction noise levels is practical. Based on the long-term noise assessment, a construction assessment was conducted for the fabrication of the elevated track structure, passenger stations, traction power substations, and the two parking garages.

8.2.1 Noise

As part of the General Assessment, the two noisiest pieces of equipment expected to be used in each phase of construction were selected and their cumulative noise levels added together. As a conservative assumption, each piece of equipment is assumed to operate continuously for one hour with no ground attenuation effects. Using FTA Equation 7-1, the construction equipment noise levels were adjusted for each receptor's distance only. The selected equipment types and reference noise levels are summarized in **Table 8.2-1**.

Table 8.2-1: FTA Construction Equipment Noise Emission Levels

	Reference	Estimated Equipment Selection			
Equipment	SPL	Viaduct	Stations	Substation	Garage
Crane, Derrick	88	1	1	--	1
Generator	82	--	--	1	--
Pile Driver (Impact)	101	1	1	--	1
Truck	84	--	--	1	--

Notes: SPL = sound power level at 50 feet
Source: FTA *Manual*.

8.2.2 Vibration

As part of the General Assessment, the potential for damage and annoyance from each individual piece of equipment was evaluated. As part of the preliminary assessment, two pieces of equipment were selected to represent the types of activity that could occur for each construction type. Ground vibration from construction equipment spread through the ground and diminish in strength with distance. The ground and distance attenuation factors for peak particle

velocity (PPV) and root mean square (RMS) vibration levels included in FTA's *Manual* were applied to each equipment type. Using FTA Equations 7-2 and 7-3, the construction equipment vibration levels were adjusted for each receptor's distance only for damage (PPV) and annoyance (RMS), respectively. No other adjustments were applied. The selected equipment types and reference noise levels are summarized in **Table 2**.

Table 2.2-2: FTA Vibration Source Levels for Construction Equipment

	Reference		Estimated Equipment Selection			
Equipment	PPV	RMS	Viaduct	Stations	Substation	Garage
Pile driver (vibratory), Upper	0.734	105	1	1	--	1
Large bulldozer	0.089	87	--	--	1	--
Caisson drilling	0.089	87	1	1	1	1

Notes: PPV = peak particle velocity; RMS = root mean square

Source: FTA *Manual*.

8.3 Construction Analysis Results

8.3.1 Noise

As shown in **Table 8.3-1**, maximum one-hour noise levels from Project construction activities are predicted to range from 81 dBA at Receptor 40 (a residence on Nancys Lane at Station No. 255+50) to 104 dBA at Receptor 30 (firehouse on Allendale Road at Station No. 266+50). The loudest noise levels will be due to the impact pile driver being less than 50 feet from Receptor 30 during guideway construction. Overall, Project construction activities are predicted to exceed the FTA 'daytime' noise impact criteria at 13 residences and 2 non-residential receptors. For nighttime construction, Project noise levels are predicted to exceed the FTA 'nighttime' criteria at 119 residences. No nighttime impacts will occur at offices. Construction noise impacts are shown graphically in **Figure 8.3-1** and **Figure 8.3-**.

8.3.2 Vibration

As shown in **Table 8.3-1**, PPV vibration levels (to assess damage) during Project construction are predicted to range from 0.008 in/sec at several residences 500 feet from the guideway to 2.076 in/sec at Receptor 1 (offices at 1100 First Avenue). Similarly, RMS vibration levels (to assess annoyance) are predicted to range from 66 VdB at several residences 500 feet from the guideway to 114 VdB at Receptor 1 (offices at 1100 First Avenue). The highest vibration levels are due to the impact pile driver being less than 50 feet from Receptor 1. Overall, construction vibration levels are predicted to exceed the Project damage criteria for Category I structures at two offices less than 30 feet from the guideway. Similarly, construction vibration levels are also predicted to exceed the FTA annoyance criteria at 57 residences and 17 non-residential receptors. Construction vibration impacts are shown graphically in **Figure 8.3-3** and **Figure** 8.3-
.

8.4 Construction Mitigation

During subsequent design, SEPTA will continue to evaluate the potential for temporary construction noise and vibration impacts, and identify measures to minimize or mitigate construction impacts as warranted. SEPTA will also continue the Project public outreach program during construction to inform the public about the schedule of activities and provide for public input. SEPTA will include control measures in their procurement specifications and construction plans, and report the results of the evaluation on the Project website. During Project construction, SEPTA will implement the control measures according to the Project construction plan.

The following noise and vibration mitigation and minimization measures will be assessed by SEPTA to determine their feasibility and reasonableness:

- At staging and laydown areas, consider installing acoustical curtains or other temporary noise shields to perimeter fencing to act as a temporary noise barrier.
- Strategic placement of containers or other barriers along the perimeter of staging areas would shield nearby residences from construction activities within the laydown area.
- Substituting impulsive equipment such as pile drivers and hoe rams with augers and vibratory pile drivers whenever possible.
- In general, utilize equipment enclosures or shrouds for all exposed stationary equipment while other solutions (such as portable acoustical curtains hung from cranes) may be more practical for mobile sources.
- All equipment should include properly tuned exhaust mufflers or attenuators that comply with the local and municipal noise ordinances.
- Additionally, utilize regional roadways rather than local streets for excavation of spoils and new deliveries to further minimize the construction impacts (i.e., noise, vibration, air quality, visual, traffic, etc.) on the nearby community.

Table 8.3-1: Predicted Construction Noise and Vibration Levels at 140 Receptors under the Preferred Alternative

ID	Address	Land use	FTA Cat.	Milepost	Noise dBA	Criteria Day/Night	Impact Day/Night	Vibration PPV	Criteria Cat I	Impact	Vibration RMS	Criteria Frequent	Impact
1	1100 First Ave Ste 100	OFF	3	358.50	99	100	--	2.076	0.5	yes	114	75	yes
2	935 First Ave	OFF	3	353.50	91	100	--	0.734	0.5	yes	105	75	yes
3	768 N Bethlehem Pike Ste 203	OFF	3	350.50	92	100	--	0.260	0.5	--	96	75	yes
4	555 E Lancaster Ave Ste 100	OFF	3	347.50	84	100	--	0.092	0.5	--	87	75	yes
5	555 E Lancaster Ave Ste 100	OFF	3	346.50	92	100	--	0.048	0.5	--	81	75	yes
6	250 Haddonfield Berlin Rd	OFF	3	345.00	86	100	--	0.019	0.5	--	73	75	--
7	935 First Ave	COM	3	341.00	82	100	--	0.009	0.5	--	67	75	--
8	401 Plymouth Rd Ste 500	OFF	3	340.00	82	100	--	0.010	0.5	--	67	75	--
9	555 E Lancaster Ave Ste 100	OFF	3	338.50	91	100	--	0.042	0.5	--	80	75	yes
10	456 Powderhorn Rd	RES	2	243.50	87	90 / 80	night	0.022	0.5	--	75	72	yes
11	0	OFF	3	336.50	94	100	--	0.078	0.5	--	85	75	yes
12	500 Office Center Dr Ste 210	OFF	3	333.00	92	100	--	0.051	0.5	--	82	75	yes
13	725 Conshohocken State Rd	OFF	3	330.50	99	100	--	0.185	0.5	--	93	75	yes
14	768 Bethlehem Pike Ste 203	OFF	3	326.00	101	100	day	0.262	0.5	--	96	75	yes

ID	Address	Land use	FTA Cat.	Milepost	Noise dBA	Criteria Day/Night	Impact Day/Night	Vibration PPV	Criteria Cat I	Impact	Vibration RMS	Criteria Frequent	Impact
15	11525 N Community House Rd	HOT	2	326.50	86	90 / 80	night	0.018	0.5	--	73	72	yes
16	44 Hersha Dr	RES	2	313.00	103	90 / 80	day & night	0.359	0.5	--	99	72	yes
17	0	RES	2	311.50	96	90 / 80	day & night	0.108	0.5	--	88	72	yes
18	0	RES	2	311.00	85	90 / 80	night	0.016	0.5	--	72	72	yes
19	550 American Ave Ste 1	OFF	3	308.00	89	100	--	0.035	0.5	--	79	75	yes
20	0	OFF	3	307.50	83	100	--	0.012	0.5	--	69	75	--
21	8100 E 22Nd St Bldg 500	HOT	2	300.50	94	90 / 80	day & night	0.073	0.5	--	85	72	yes
22	234 Mall Blvd	OFF	3	297.50	95	100	--	0.089	0.5	--	87	75	yes
23	0	HOT	2	288.50	91	90 / 80	day & night	0.046	0.5	--	81	72	yes
24	120 S Warner Rd Ste 200	HOT	2	282.50	95	90 / 80	day & night	0.090	0.5	--	87	72	yes
25	275 Glenmoor Rd	MIX	2	270.50	90	90 / 80	day & night	0.041	0.5	--	80	72	yes
26	198 Allendale Rd	OFF	3	270.00	98	100	--	0.140	0.5	--	91	75	yes
27	166 Allendale Rd	OFF	3	268.50	102	100	day	0.305	0.5	--	97	75	yes
28	161 Pennsylvania Ave	OFF	3	268.00	96	100	--	0.097	0.5	--	87	75	yes
29	158 Allendale Rd	RES	2	267.50	88	90 / 80	night	0.026	0.5	--	76	72	yes
30	170 Allendale Rd	FIRE	2	266.50	104	90 / 80	day & night	0.424	0.5	--	100	72	yes
31	150 Allendale Rd	RES	2	260.50	86	90 / 80	night	0.019	0.5	--	73	72	yes
32	1119 S College Ave	HOT	2	260.50	99	90 / 80	day & night	0.193	0.5	--	93	72	yes
33	0	RES	2	259.00	89	90 / 80	night	0.032	0.5	--	78	72	yes

ID	Address	Land use	FTA Cat.	Milepost	Noise dBA	Criteria Day/Night	Impact Day/Night	Vibration PPV	Criteria Cat I	Impact	Vibration RMS	Criteria Frequent	Impact
34	901 Main Ave	HOT	2	257.00	96	90 / 80	day & night	0.101	0.5	--	88	72	yes
35	519 William Rd Apt A-7	RES	2	257.00	89	90 / 80	night	0.030	0.5	--	77	72	Yes
36	511 William Rd	RES	2	256.50	83	90 / 80	night	0.011	0.5	--	68	72	--
37	528 Powderhorn Rd	RES	2	254.00	82	90 / 80	night	0.009	0.5	--	67	72	--
38	0	RES	2	255.50	89	90 / 80	night	0.031	0.5	--	77	72	Yes
39	705 Hillview Dr	RES	2	253.50	82	90 / 80	night	0.010	0.5	--	68	72	--
40	155 Nancys Ln	RES	2	255.50	81	90 / 80	night	0.008	0.5	--	66	72	--
41	149 Nancys Ln	RES	2	255.00	82	90 / 80	night	0.010	0.5	--	68	72	--
42	520 Powderhorn Rd	RES	2	253.50	83	90 / 80	night	0.012	0.5	--	69	72	--
43	717 W Valley Forge Rd	RES	2	254.50	83	90 / 80	night	0.012	0.5	--	69	72	--
44	141 Nancys Ln	RES	2	254.00	84	90 / 80	night	0.014	0.5	--	71	72	--
45	516 Powderhorn Rd	RES	2	253.00	84	90 / 80	night	0.013	0.5	--	70	72	--
46	Po Box 566	COM	3	253.00	99	100	--	0.179	0.5	--	93	75	Yes
47	636 Grand Regency Blvd	RES	2	253.50	86	90 / 80	night	0.018	0.5	--	73	72	Yes
48	201 Lochwood Ln	RES	2	253.00	87	90 / 80	night	0.025	0.5	--	76	72	Yes
49	512 Powderhorn Rd	RES	2	252.50	85	90 / 80	night	0.015	0.5	--	71	72	--
50	133 Nancys Ln	RES	2	252.50	89	90 / 80	night	0.031	0.5	--	77	72	Yes

ID	Address	Land use	FTA Cat.	Milepost	Noise dBA	Criteria Day/Night	Impact Day/Night	Vibration PPV	Criteria Cat I	Impact	Vibration RMS	Criteria Frequent	Impact
51	146 Nancys Ln	RES	2	253.00	81	90 / 80	night	0.008	0.5	--	66	72	--
52	508 Powderhorn Rd	RES	2	252.00	85	90 / 80	night	0.017	0.5	--	72	72	Yes
53	142 Nancys Ln	RES	2	252.50	82	90 / 80	night	0.010	0.5	--	67	72	--
54	511 Powderhorn Rd	RES	2	251.50	81	90 / 80	night	0.008	0.5	--	66	72	--
55	19 Pickering Bend	RES	2	252.00	83	90 / 80	night	0.012	0.5	--	69	72	--
56	152 Hillview Rd	RES	2	252.00	89	90 / 80	night	0.033	0.5	--	78	72	Yes
57	504 Powderhorn Rd	RES	2	251.50	86	90 / 80	night	0.018	0.5	--	73	72	Yes
58	123 Flintlock Rd	RES	2	250.50	82	90 / 80	night	0.009	0.5	--	67	72	--
59	132 Nancys Ln	RES	2	251.50	84	90 / 80	night	0.013	0.5	--	70	72	--
60	500 Powderhorn Rd	RES	2	250.50	86	90 / 80	night	0.021	0.5	--	74	72	Yes
61	129 Nancys Ln	RES	2	251.00	89	90 / 80	night	0.034	0.5	--	78	72	Yes
62	127 Nancys Ln	RES	2	250.50	88	90 / 80	night	0.027	0.5	--	76	72	Yes
63	496 Powderhorn Rd	RES	2	250.00	86	90 / 80	night	0.020	0.5	--	74	72	Yes
64	123 Walker Ln	RES	2	250.50	83	90 / 80	night	0.011	0.5	--	69	72	--
65	121 Nancys Ln	RES	2	250.00	86	90 / 80	night	0.018	0.5	--	73	72	Yes
66	492 Powderhorn Rd	RES	2	249.50	88	90 / 80	night	0.027	0.5	--	76	72	Yes

ID	Address	Land use	FTA Cat.	Milepost	Noise dBA	Criteria Day/Night	Impact Day/Night	Vibration PPV	Criteria Cat I	Impact	Vibration RMS	Criteria Frequent	Impact
67	493 Powderhorn Rd	RES	2	249.00	82	90 / 80	night	0.010	0.5	--	68	72	--
68	109 Walker Ln	RES	2	249.50	88	90 / 80	night	0.027	0.5	--	76	72	Yes
69	103 Walker Ln	RES	2	249.00	90	90 / 80	day & night	0.042	0.5	--	80	72	Yes
70	488 Powderhorn Rd	RES	2	248.50	88	90 / 80	night	0.028	0.5	--	77	72	Yes
71	140 Walker Ln	RES	2	249.00	82	90 / 80	night	0.009	0.5	--	67	72	--
72	485 Powderhorn Rd	RES	2	248.00	83	90 / 80	night	0.012	0.5	--	69	72	--
73	136 Walker Ln	RES	2	248.50	83	90 / 80	night	0.012	0.5	--	69	72	--
74	484 Powderhorn Rd	RES	2	248.00	88	90 / 80	night	0.030	0.5	--	77	72	Yes
75	132 Walker Ln	RES	2	248.00	85	90 / 80	night	0.015	0.5	--	71	72	--
76	503 Valleywyck Dr	RES	2	247.50	89	90 / 80	night	0.031	0.5	--	77	72	Yes
77	450 W Dekalb Pike	RES	2	247.50	87	90 / 80	night	0.021	0.5	--	74	72	Yes
78	444 Old Dekalb St	RES	2	247.50	83	90 / 80	night	0.012	0.5	--	69	72	--
79	2432 Vista St	RES	2	246.50	89	90 / 80	night	0.032	0.5	--	78	72	Yes
80	419 Brandywine Ln	RES	2	247.00	81	90 / 80	night	0.008	0.5	--	66	72	--
81	134 Musket Rd	RES	2	246.00	83	90 / 80	night	0.012	0.5	--	69	72	--
82	472 Powderhorn Rd	RES	2	246.00	89	90 / 80	night	0.032	0.5	--	78	72	Yes
83	440 W Dekalb Pike	RES	2	246.50	84	90 / 80	night	0.014	0.5	--	70	72	--

ID	Address	Land use	FTA Cat.	Milepost	Noise dBA	Criteria Day/Night	Impact Day/Night	Vibration PPV	Criteria Cat I	Impact	Vibration RMS	Criteria Frequent	Impact
84	417 Brandywine Ln	RES	2	246.50	81	90 / 80	night	0.009	0.5	--	66	72	--
85	468 Powderhorn Rd	RES	2	245.50	88	90 / 80	night	0.029	0.5	--	77	72	Yes
86	465 Powderhorn Rd	RES	2	245.00	83	90 / 80	night	0.012	0.5	--	69	72	--
87	436 W Dekalb Pike	RES	2	245.50	83	90 / 80	night	0.012	0.5	--	69	72	--
88	464 Powderhorn Rd	RES	2	244.50	88	90 / 80	night	0.027	0.5	--	76	72	Yes
89	432 W Dekalb Pike	RES	2	245.00	83	90 / 80	night	0.011	0.5	--	69	72	--
90	1501 Butler Pike	RES	2	244.50	83	90 / 80	night	0.012	0.5	--	69	72	--
91	449 Powderhorn Rd	RES	2	244.00	82	90 / 80	night	0.010	0.5	--	67	72	--
92	428 W Dekalb Pike	RES	2	244.50	82	90 / 80	night	0.010	0.5	--	68	72	--
93	473 Stacey Dr	RES	2	244.00	88	90 / 80	night	0.026	0.5	--	76	72	Yes
94	350 Anthony Rd	RES	2	244.00	82	90 / 80	night	0.009	0.5	--	67	72	--
95	350 Anthony Rd	RES	2	243.50	81	90 / 80	night	0.008	0.5	--	66	72	--
96	180 Godshall Rd	RES	2	243.00	85	90 / 80	night	0.017	0.5	--	72	72	Yes
97	448 Powderhorn Rd	RES	2	242.50	84	90 / 80	night	0.013	0.5	--	70	72	--
98	444 Powderhorn Rd	RES	2	242.00	83	90 / 80	night	0.011	0.5	--	68	72	--

ID	Address	Land use	FTA Cat.	Milepost	Noise dBA	Criteria Day/Night	Impact Day/Night	Vibration PPV	Criteria Cat I	Impact	Vibration RMS	Criteria Frequent	Impact
99	440 Powderhorn Rd	RES	2	241.50	82	90 / 80	night	0.009	0.5	--	67	72	--
100	544 Elliott Dr	RES	2	241.50	86	90 / 80	night	0.019	0.5	--	73	72	Yes
101	609 Nantucket Cir	RES	2	240.50	82	90 / 80	night	0.009	0.5	--	67	72	--
102	424 Bluebuff Rd	RES	2	240.50	86	90 / 80	night	0.021	0.5	--	74	72	Yes
103	431 Bluebuff Rd	RES	2	239.50	82	90 / 80	night	0.009	0.5	--	67	72	--
104	422 Bluebuff Rd	RES	2	239.50	85	90 / 80	night	0.017	0.5	--	73	72	Yes
105	420 Bluebuff Rd	RES	2	239.00	85	90 / 80	night	0.017	0.5	--	72	72	Yes
106	183 Gunport Ln	RES	2	238.50	82	90 / 80	night	0.009	0.5	--	67	72	--
107	418 Bluebuff Rd	RES	2	238.00	85	90 / 80	night	0.017	0.5	--	72	72	Yes
108	416 Bluebuff Rd	RES	2	237.50	85	90 / 80	night	0.016	0.5	--	72	72	Yes
109	417 Bluebuff Rd	RES	2	237.00	81	90 / 80	night	0.009	0.5	--	66	72	--
110	414 Bluebuff Rd	RES	2	237.00	85	90 / 80	night	0.016	0.5	--	72	72	Yes
111	413 Bluebuff Rd	RES	2	236.00	81	90 / 80	night	0.008	0.5	--	66	72	--
112	412 Bluebuff Rd	RES	2	236.50	85	90 / 80	night	0.015	0.5	--	71	72	--
113	410 Bluebuff Rd	RES	2	235.50	85	90 / 80	night	0.015	0.5	--	71	72	--
114	407 Bluebuff Rd	RES	2	235.00	81	90 / 80	night	0.008	0.5	--	66	72	--
115	408 Bluebuff Rd	RES	2	235.00	85	90 / 80	night	0.015	0.5	--	71	72	--
116	406 Bluebuff Rd	RES	2	234.50	85	90 / 80	night	0.015	0.5	--	71	72	--

ID	Address	Land use	FTA Cat.	Milepost	Noise dBA	Criteria Day/Night	Impact Day/Night	Vibration PPV	Criteria Cat I	Impact	Vibration RMS	Criteria Frequent	Impact
117	404 Bluebuff Rd	RES	2	234.00	84	90 / 80	night	0.014	0.5	--	71	72	--
118	402 Bluebuff Rd	RES	2	233.50	84	90 / 80	night	0.013	0.5	--	70	72	--
119	400 Bluebuff Rd	RES	2	233.00	82	90 / 80	night	0.009	0.5	--	66	72	--
120	390 Kingwood Rd	RES	2	232.50	83	90 / 80	night	0.012	0.5	--	69	72	--
121	386 Kingwood Rd	RES	2	232.00	83	90 / 80	night	0.012	0.5	--	69	72	--
122	382 Kingwood Rd	RES	2	231.50	84	90 / 80	night	0.013	0.5	--	70	72	--
123	378 Kingwood Rd	RES	2	231.00	84	90 / 80	night	0.014	0.5	--	71	72	--
124	979 Plymouth Rd	RES	2	230.00	85	90 / 80	night	0.015	0.5	--	71	72	--
125	1900 Market St Ste 800	RES	2	229.50	85	90 / 80	night	0.015	0.5	--	71	72	--
126	375 Kingwood Rd	RES	2	228.50	82	90 / 80	night	0.009	0.5	--	67	72	--
127	373 Kingwood Rd	RES	2	228.50	83	90 / 80	night	0.012	0.5	--	69	72	--
128	0	RES	2	221.00	88	90 / 80	night	0.025	0.5	--	76	72	Yes
129	0	RES	2	218.50	94	90 / 80	day & night	0.074	0.5	--	85	72	Yes
130	0	RES	2	215.00	89	90 / 80	night	0.030	0.5	--	77	72	Yes
131	221 Tyler Rd	RES	2	210.00	84	90 / 80	night	0.010	0.5	--	68	72	--
132	227 Tyler Rd	RES	2	209.50	86	90 / 80	night	0.017	0.5	--	72	72	Yes
133	227 Garfield Rd	RES	2	208.00	86	90 / 80	night	0.012	0.5	--	69	72	--
134	226 Tyler Rd	RES	2	208.00	87	90 / 80	night	0.017	0.5	--	72	72	Yes
135	226 Garfield Rd	RES	2	207.50	88	90 / 80	night	0.017	0.5	--	72	72	Yes
136	224 Garfield Rd	RES	2	206.50	89	90 / 80	night	0.025	0.5	--	76	72	Yes
137	208 Tyler Rd	RES	2	206.00	91	90 / 80	day & night	0.043	0.5	--	80	72	Yes

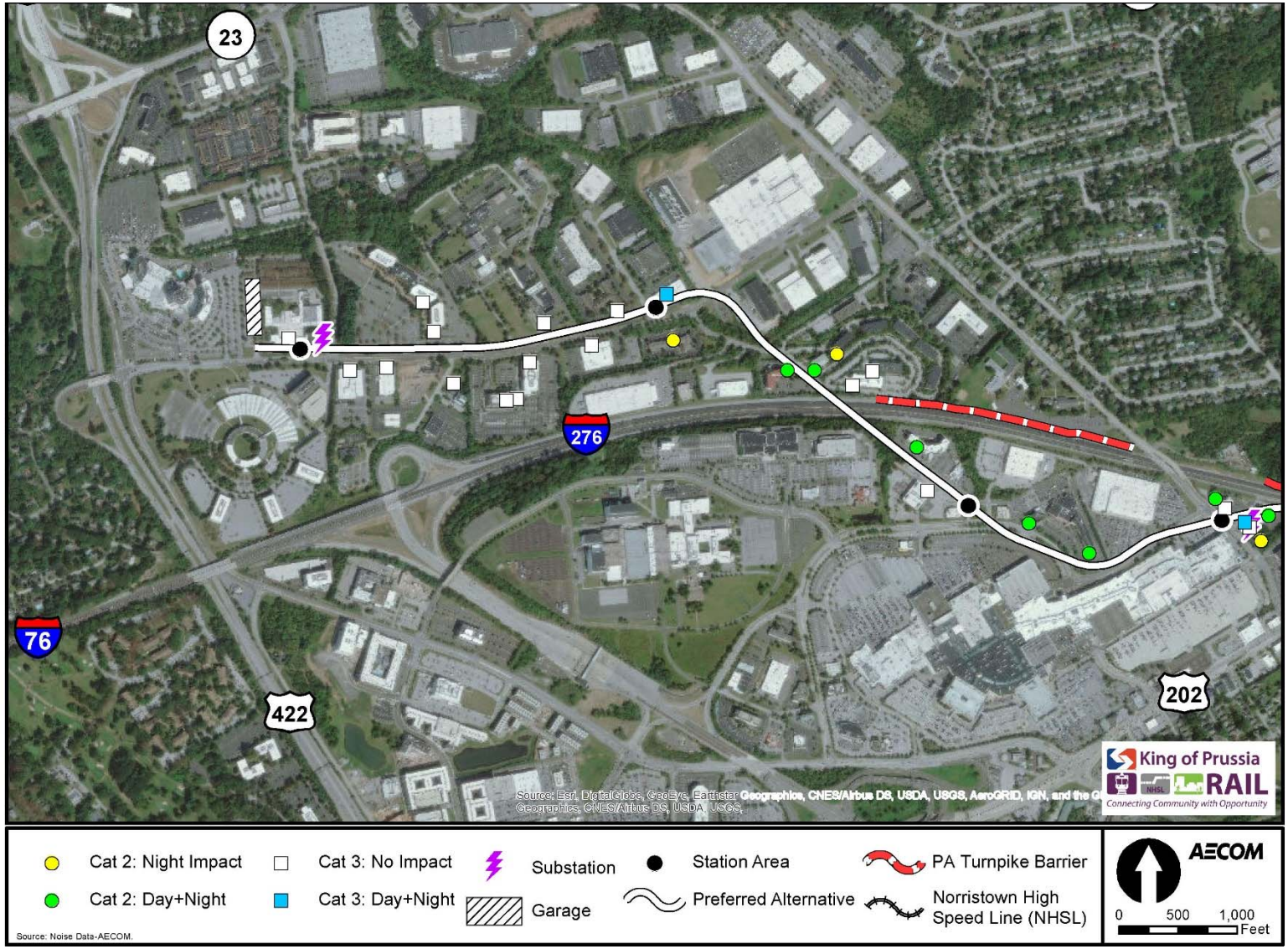
ID	Address	Land use	FTA Cat.	Milepost	Noise dBA	Criteria Day/Night	Impact Day/Night	Vibration PPV	Criteria Cat I	Impact	Vibration RMS	Criteria Frequent	Impact
138	355 S Henderson Rd	RES	2	208.00	85	90 / 80	night	0.013	0.5	--	70	72	--
139	208 Tyler Rd	RES	2	203.50	100	90 / 80	day & night	0.217	0.5	--	94	72	Yes
140	Po Box 311	PARK	3	191.00	91	100	--	0.045	0.5	--	81	75	Yes
	Total Impacts		**1**				**- / -[1]**			**--**			**--**
			2				**13 / 119**			**--**			**57**
			3				**2 / -**			**2**			**17**

[1]No Category 1 land-uses were identified in the Project study area.

Notes: -- = no impact; Cat. = category; COM = commercial; dBA = decibel; FIRE = firehouse; HOT = hotel; OFF = office; PARK = park; PPV = peak particle velocity; RES = residence; RMS = root mean squared

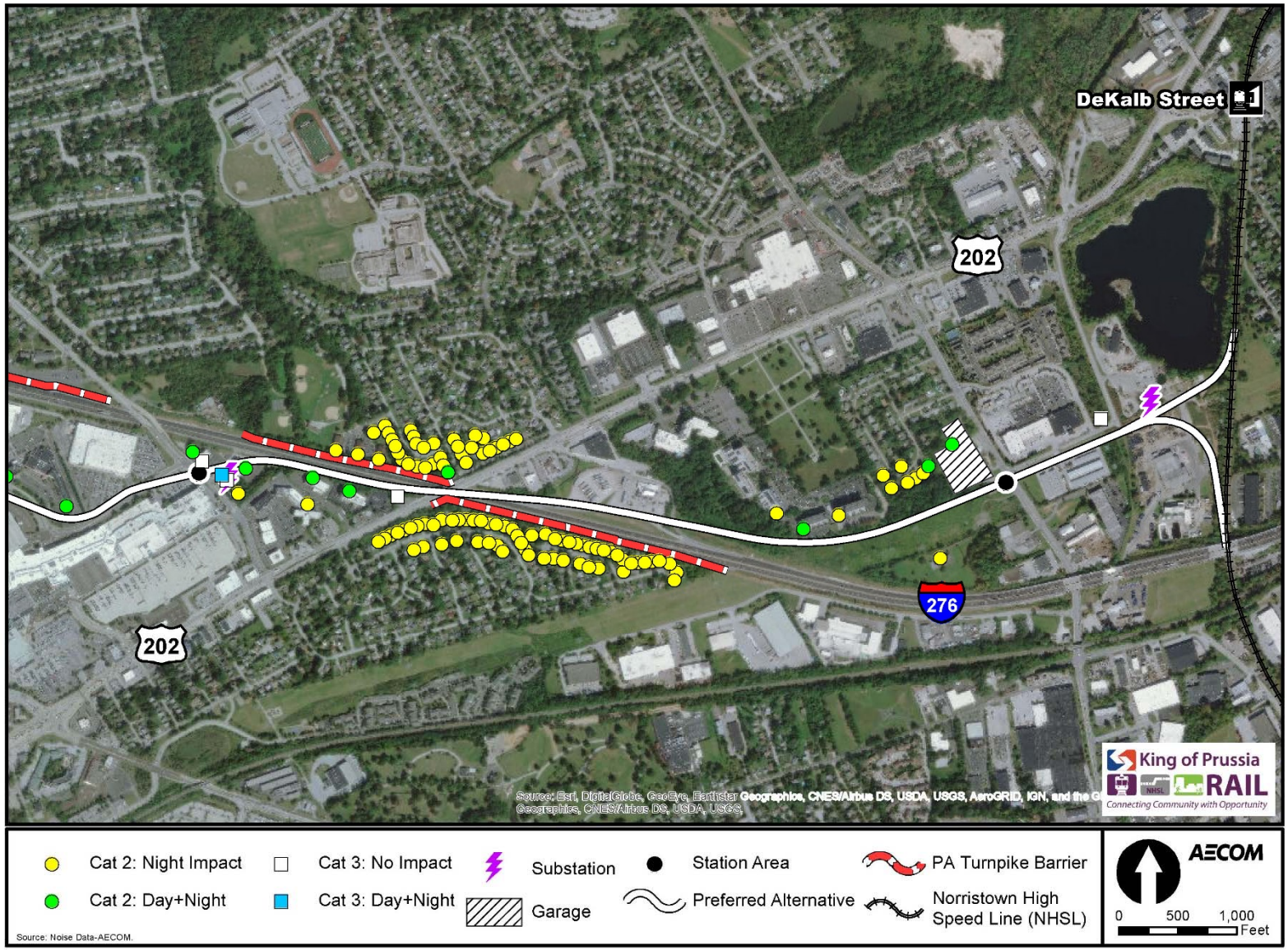
Source: AECOM, November 2020.

Figure 8.3-1: Preliminary Construction Noise Impacts under the Preferred Alternative (Western Section)



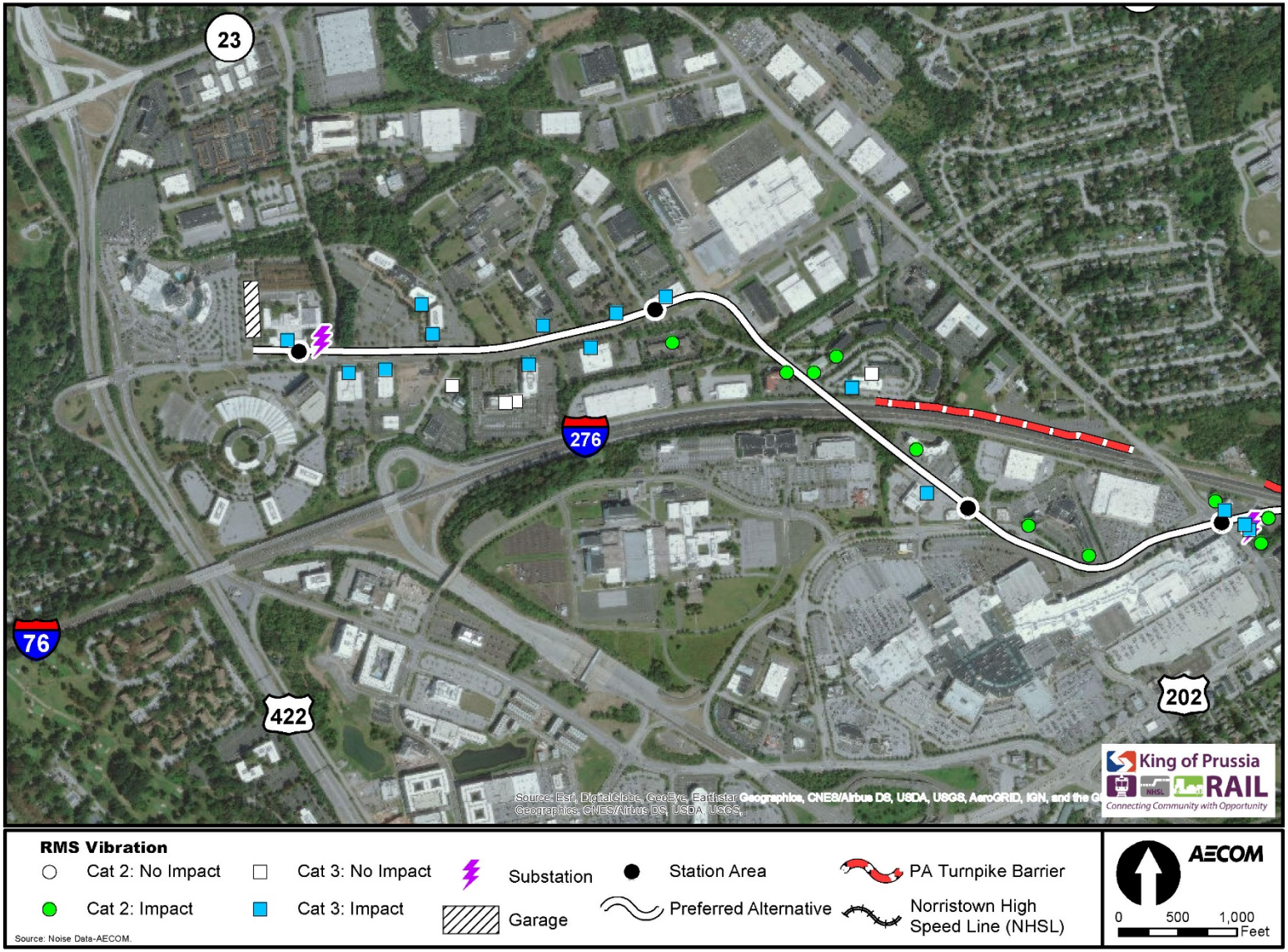
Source: AECOM, November 2020.

Figure 8.3-2: Preliminary Construction Noise Impacts under the Preferred Alternative (Eastern Section)



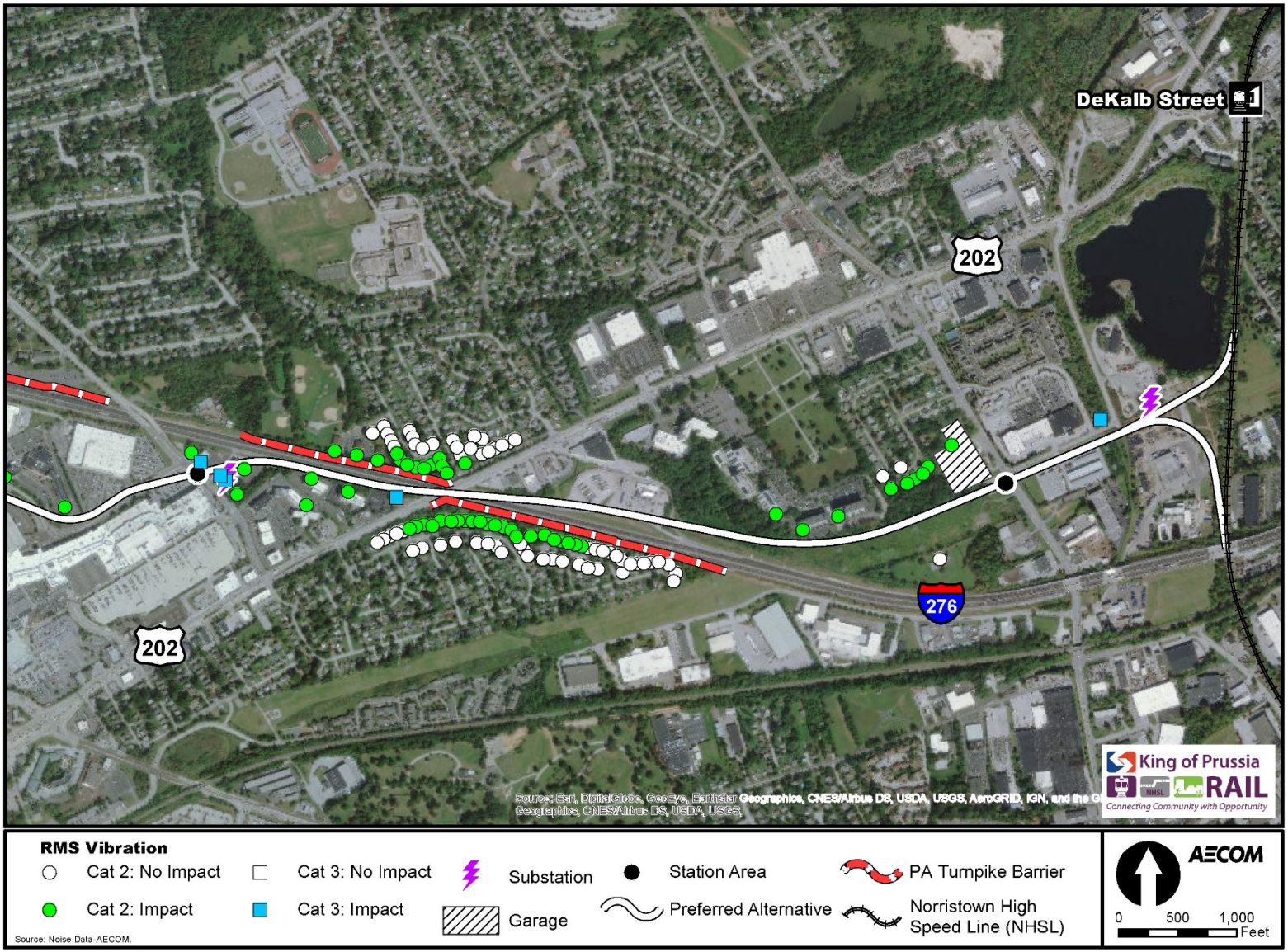
Source: AECOM, November 2020.

Figure 8.3-3: Preliminary Construction Vibration Impacts under the Preferred Alternative (Western Section)



Source: AECOM, November 2020.

Figure 8.3-4: Preliminary Construction Vibration Impacts under the Preferred Alternative (Eastern Section)



Source: AECOM, November 2020.

9 References

National Environmental Policy Act (NEPA), 42 U.S.C. § 4321 et seq.

Council on Environmental Quality (CEQ) regulations, 40 C.F.R. Parts 1500 -1508.

Federal Transit Administration, Transit Noise and Vibration Impact Assessment Manual, FTA Report No. 0123, September 2018.

U.S. Environmental Protection Agency, "Information on Levels of Environmental Noise Requisite to Protect Public Health and Welfare with an Adequate Margin of Safety", Report No. 550/9-74-004, Washington DC, March 1974.

Upper Merion Township, Code of Ordinances, Chapter 107, Nuisances.

10 Appendix

List of Appendix Figures

Figure A1: Future Rail Vehicle Schedules with Origin-Destination King of Prussia – Norristown to KOP

			0:02	0:01	0:04	0:02	0:02	0:02	0:05	0:18										
	Consist	NTC	Bridgeport	DeKalb St.	Henderson Rd	Allendale Rd	Mall Blvd	1st & American	KOP	NT-KOP			Next Departure	Comment	Route Type	Headway to the Following Train	Number of Cars		Next Train	
B-4 NT-KOP	B-4	8:22	8:24	8:25	8:29	8:31	8:33	8:35	8:40	0:18			8:58		NT-KOP	4:20	1	1	B-4 KOP-NT	1
C-10 NT-KOP	C-10	12:42	12:44	12:45	12:49	12:51	12:53	12:55	13:00	0:18			13:18		NT-KOP	1:00	1	1	C-10 KOP-NT	1
C-11 NT-KOP	C-11	13:42	13:44	13:45	13:49	13:51	13:53	13:55	14:00	0:18			14:18		NT-KOP	1:00	1	1	C-11 KOP-NT	1
C-12 NT-KOP	C-12	14:42	14:44	14:45	14:49	14:51	14:53	14:55	15:00	0:18			15:18		NT-KOP	1:00	1	1	C-12 KOP-NT	1
C-13 NT-KOP	C-13	15:42	15:44	15:45	15:49	15:51	15:53	15:55	16:00	0:18			16:18		NT-KOP	1:00	1	1	C-13 KOP-NT	1
C-14 NT-KOP	C-14	16:42	16:44	16:45	16:49	16:51	16:53	16:55	17:00	0:18			17:18		NT-KOP	1:00	1	1	C-14 KOP-NT	1
C-15 NT-KOP	C-15	17:42	17:44	17:45	17:49	17:51	17:53	17:55	18:00	0:18			18:18		NT-KOP	1:00	1	1	C-15 KOP-NT	1
C-16 NT-KOP	C-16	18:42	18:44	18:45	18:49	18:51	18:53	18:55	19:00	0:18			19:18		NT-KOP	1:00	1	1	C-16 KOP-NT	1
C-17 NT-KOP	C-17	19:42	19:44	19:45	19:49	19:51	19:53	19:55	20:00	0:18			20:18		NT-KOP	1:00	1	1	C-17 KOP-NT	1
C-18 NT-KOP	C-18	20:42	20:44	20:45	20:49	20:51	20:53	20:55	21:00	0:18			21:18		NT-KOP	1:00	1	1	C-18 KOP-NT	1
C-19 NT-KOP	C-19	21:42	21:44	21:45	21:49	21:51	21:53	21:55	22:00	0:18			22:18		NT-KOP	##############	1	1	C-19 KOP-NT	1
C-21 NT-KOP	C-21	23:42	23:44	23:45	23:49	23:51	23:53	23:55	0:00	0:18			0:18		NT-KOP	1:00	1	1	C-21 KOP-NT	1
C-22 NT-KOP	C-22	0:42	0:44	0:45	0:49	0:51	0:53	0:55	1:00	0:18			1:18		NT-KOP	22:00	1	1	C-22 KOP-NT	0
C-2O NT-KOP	C-2O	22:42	22:44	22:45	22:49	22:51	22:53	22:55	23:00	0:18			23:18		NT-KOP	##############	1	1	C-2O KOP-NT	1
C-3 NT-KOP	C-3	5:42	5:44	5:45	5:49	5:51	5:53	5:55	6:00	0:18			6:18		NT-KOP	1:00	1	1	C-3 KOP-NT	1
C-4 NT-KOP	C-4	6:42	6:44	6:45	6:49	6:51	6:53	6:55	7:00	0:18			7:18		NT-KOP	1:00	1	1	C-4 KOP-NT	1
C-5 NT-KOP	C-5	7:42	7:44	7:45	7:49	7:51	7:53	7:55	8:00	0:18			8:18		NT-KOP	1:00	1	1	C-5 KOP-NT	1
C-6 NT-KOP	C-6	8:42	8:44	8:45	8:49	8:51	8:53	8:55	9:00	0:18			9:18		NT-KOP	1:00	1	1	C-6 KOP-NT	1
C-7 NT-KOP	C-7	9:42	9:44	9:45	9:49	9:51	9:53	9:55	10:00	0:18			10:18		NT-KOP	1:00	1	1	C-7 KOP-NT	1
C-8 NT-KOP	C-8	10:42	10:44	10:45	10:49	10:51	10:53	10:55	11:00	0:18			11:18		NT-KOP	1:00	1	1	C-8 KOP-NT	1
C-9 NT-KOP	C-9	11:42	11:44	11:45	11:49	11:51	11:53	11:55	12:00	0:18			12:18		NT-KOP	7:40	1	1	C-9 KOP-NT	1
D-11 NT-KOP	D-11	19:22	19:24	19:25	19:29	19:31	19:33	19:35	19:40	0:18			19:58		NT-KOP	1:00	1	1	D-11 KOP-NT	2
D-12 NT-KOP	D-12	20:22	20:24	20:25	20:29	20:31	20:33	20:35	20:40	0:18			20:58		NT-KOP	1:00	1	1	D-12 KOP-NT	2
D-13 NT-KOP	D-13	21:22	21:24	21:25	21:29	21:31	21:33	21:35	21:40	0:18			21:58		NT-KOP	1:00	1	1	D-13 KOP-NT	2
D-14 NT-KOP	D-14	22:22	22:24	22:25	22:29	22:31	22:33	22:35	22:40	0:18			22:58		NT-KOP	1:00	1	1	D-14 KOP-NT	2
D-15 NT-KOP	D-15	23:22	23:24	23:25	23:29	23:31	23:33	23:35	23:40	0:18			23:58		NT-KOP	0:20	1	1	D-15 KOP-NT	2
D-16 NT-KOP	D-16	0:22	0:24	0:25	0:29	0:31	0:33	0:35	0:40	0:18			0:58		NT-KOP	16:00	1	1	D-16 KOP-NT	2
D-9 NT-KOP	D-9	16:22	16:24	16:25	16:29	16:31	16:33	16:35	16:40	0:18			16:58		NT-KOP	##############	1	1	D-9 KOP-NT	1
G-10 NT-KOP	G-10	13.02	13.04	13.05	13.09	13.11	13.13	13.15	13.20	0.18			13.38		NT-KOP	1:00	1	1	G-10 KOP-NT	1
G-11 NT-KOP	G-11	14:02	14:04	14:05	14:09	14:11	14:13	14:15	14:20	0:18			14:38		NT-KOP	1:00	1	1	G-11 KOP-NT	1
G-12 NT-KOP	G-12	15:02	15:04	15:05	15:09	15:11	15:13	15:15	15:20	0:18			15:38		NT-KOP	1:00	1	1	G-12 KOP-NT	1
G-13 NT-KOP	G-13	16:02	16:04	16:05	16:09	16:11	16:13	16:15	16:20	0:18			16:38		NT-KOP	1:00	1	1	G-13 KOP-NT	1
G-14 NT-KOP	G-14	17:02	17:04	17:05	17:09	17:11	17:13	17:15	17:20	0:18			17:38		NT-KOP	1:00	1	1	G-14 KOP-NT	1
G-15 NT-KOP	G-15	18:02	18:04	18:05	18:09	18:11	18:13	18:15	18:20	0:18			18:38		NT-KOP	1:00	1	1	G-15 KOP-NT	1
G-16 NT-KOP	G-16	19:02	19:04	19:05	19:09	19:11	19:13	19:15	19:20	0:18			19:38		NT-KOP	1:00	1	1	G-16 KOP-NT	0
G-17 NT-KOP	G-17	20:02	20:04	20:05	20:09	20:11	20:13	20:15	20:20	0:18			20:38		NT-KOP	1:00	1	1	G-17 KOP-NT	0
G-18 NT-KOP	G-18	21:02	21:04	21:05	21:09	21:11	21:13	21:15	21:20	0:18			21:38		NT-KOP	1:00	1	1	G-18 KOP-NT	0
G-19 NT-KOP	G-19	22:02	22:04	22:05	22:09	22:11	22:13	22:15	22:20	0:18			22:38		NT-KOP	##############	1	1	G-19 KOP-NT	0
G-21 NT-KOP	G-21	0:02	0:04	0:05	0:09	0:11	0:13	0:15	0:20	0:18			0:38		NT-KOP	23:00	1	1	G-21 KOP-NT	0
G-2O NT-KOP	G-2O	23:02	23:04	23:05	23:09	23:11	23:13	23:15	23:20	0:18			23:38		NT-KOP	##############	1	1	G-2O KOP-NT	0
G-3 NT-KOP	G-3	6:02	6:04	6:05	6:09	6:11	6:13	6:15	6:20	0:18			6:38		NT-KOP	1:00	1	1	G-3 KOP-NT	1
G-4 NT-KOP	G-4	7:02	7:04	7:05	7:09	7:11	7:13	7:15	7:20	0:18			7:38		NT-KOP	1:00	1	1	G-4 KOP-NT	1
G-5 NT-KOP	G-5	8:02	8:04	8:05	8:09	8:11	8:13	8:15	8:20	0:18			8:38		NT-KOP	1:00	1	1	G-5 KOP-NT	1
G-6 NT-KOP	G-6	9:02	9:04	9:05	9:09	9:11	9:13	9:15	9:20	0:18			9:38		NT-KOP	1:00	1	1	G-6 KOP-NT	1
G-7 NT-KOP	G-7	10:02	10:04	10:05	10:09	10:11	10:13	10:15	10:20	0:18			10:38		NT-KOP	1:00	1	1	G-7 KOP-NT	1
G-8 NT-KOP	G-8	11:02	11:04	11:05	11:09	11:11	11:13	11:15	11:20	0:18			11:38		NT-KOP	1:00	1	1	G-8 KOP-NT	1
G-9 NT-KOP	G-9	12:02	12:04	12:05	12:09	12:11	12:13	12:15	12:20	0:18			12:38		NT-KOP	##############	1	1	G-9 KOP-NT	1
J-3 NT-KOP	J-3	7:22	7:24	7:25	7:29	7:31	7:33	7:35	7:40	0:18			7:58		NT-KOP	##############	1	1	J-3 KOP-NT	1

Source: Gannett Fleming, *Draft Rail Operations Simulation Report – Norristown High Speed Line Extension*, August 25, 2020.

Figure A1: Future Rail Vehicle Schedules with Origin-Destination King of Prussia – Norristown to KOP (continued)

K-3 NT-KOP	K-3	6:22	6:24	6:25	6:29	6:31	6:33	6:35	6:40	0:18			6:58		NT-KOP	11:00	1	1	K-3 KOP-NT	1
L-6 NT-KOP	L-6	17:22	17:24	17:25	17:29	17:31	17:33	17:35	17:40	0:18			17:58		NT-KOP	##############	1	1	L-6 KOP-NT	1
R1-10 NT-KOP	R1-10	15:22	15:24	15:25	15:29	15:31	15:33	15:35	15:40	0:18			15:58		NT-KOP	3:00	1	1	R1-10 KOP-NT	1
R1-12 NT-KOP	R1-12	18:22	18:24	18:25	18:29	18:31	18:33	18:35	18:40	0:18			18:58		NT-KOP	##############	1	1	R1-12 KOP-NT	1
R1-4 NT-KOP	R1-4	9:22	9:24	9:25	9:29	9:31	9:33	9:35	9:40	0:18			9:58		NT-KOP	1:00	1	1	R1-4 KOP-NT	1
R1-5 NT-KOP	R1-5	10:22	10:24	10:25	10:29	10:31	10:33	10:35	10:40	0:18			10:58		NT-KOP	1:00	1	1	R1-5 KOP-NT	1
R1-6 NT-KOP	R1-6	11:22	11:24	11:25	11:29	11:31	11:33	11:35	11:40	0:18			11:58		NT-KOP	1:00	1	1	R1-6 KOP-NT	1
R1-7 NT-KOP	R1-7	12:22	12:24	12:25	12:29	12:31	12:33	12:35	12:40	0:18			12:58		NT-KOP	1:00	1	1	R1-7 KOP-NT	1
R1-8 NT-KOP	R1-8	13:22	13:24	13:25	13:29	13:31	13:33	13:35	13:40	0:18			13:58		NT-KOP	1:00	1	1	R1-8 KOP-NT	1
R1-9 NT-KOP	R1-9	14:22	14:24	14:25	14:29	14:31	14:33	14:35	14:40	0:18			14:58		NT-KOP	##############	1	1	R1-9 KOP-NT	1

Source: Gannett Fleming, *Draft Rail Operations Simulation Report – Norristown High Speed Line Extension*, August 25, 2020.

Figure A2: Future Rail Vehicle Schedules with Origin-Destination King of Prussia – KOP to Norristown

			0:02	0:02	0:02	0:03	0:03	0:01	0:02	0:15									
	Consist	KOP	1st & American	Mall Blvd	Allendale Rd	Henderson Rd	DeKalb St.	Bridgeport	NTC	KOP-NT				NT Track	Next Departure	Comment	Route Type	Headway to the Following Train	Number of Cars
B-4 KOP-NT	B-4	8:58	9:00	9:02	9:04	9:07	9:10	9:11	9:16	0:18				2A	9:26		KOP-NT	4:20	1
C-10 KOP-NT	C-10	13:18	13:20	13:22	13:24	13:27	13:30	13:31	13:36	0:18				2A	13:42		KOP-NT	1:00	1
C-11 KOP-NT	C-11	14:18	14:20	14:22	14:24	14:27	14:30	14:31	14:36	0:18				2A	14:42		KOP-NT	1:00	1
C-12 KOP-NT	C-12	15:18	15:20	15:22	15:24	15:27	15:30	15:31	15:36	0:18				2A	15:42		KOP-NT	1:00	1
C-13 KOP-NT	C-13	16:18	16:20	16:22	16:24	16:27	16:30	16:31	16:36	0:18				2A	16:42		KOP-NT	1:00	1
C-14 KOP-NT	C-14	17:18	17:20	17:22	17:24	17:27	17:30	17:31	17:36	0:18				2A	17:42		KOP-NT	1:00	1
C-15 KOP-NT	C-15	18:18	18:20	18:22	18:24	18:27	18:30	18:31	18:36	0:18				2A	18:42		KOP-NT	1:00	1
C-16 KOP-NT	C-16	19:18	19:20	19:22	19:24	19:27	19:30	19:31	19:36	0:18				2A	19:42		KOP-NT	1:00	1
C-17 KOP-NT	C-17	20:18	20:20	20:22	20:24	20:27	20:30	20:31	20:36	0:18				2A	20:42		KOP-NT	1:00	1
C-18 KOP-NT	C-18	21:18	21:20	21:22	21:24	21:27	21:30	21:31	21:36	0:18				2A	21:42		KOP-NT	1:00	1
C-19 KOP-NT	C-19	22:18	22:20	22:22	22:24	22:27	22:30	22:31	22:36	0:18				2A	22:42		KOP-NT	##############	1
C-2 KOP-NT	C-2	5:18	5:20	5:22	5:24	5:27	5:30	5:31	5:36	0:18				2A	5:42		KOP-NT	##############	1
C-21 KOP-NT	C-21	0:18	0:20	0:22	0:24	0:27	0:30	0:31	0:36	0:18				2A	0:42		KOP-NT	1:00	1
C-22 KOP-NT	C-22	1:18	1:20	1:22	1:24	1:27	1:30	1:31	1:36	0:18				1A	1:42		KOP-NT	22:00	1
C-2O KOP-NT	C-2O	23:18	23:20	23:22	23:24	23:27	23:30	23:31	23:36	0:18				2A	23:42		KOP-NT	##############	1
C-3 KOP-NT	C-3	6:18	6:20	6:22	6:24	6:27	6:30	6:31	6:36	0:18				2A	6:42		KOP-NT	1:00	1
C-4 KOP-NT	C-4	7:18	7:20	7:22	7:24	7:27	7:30	7:31	7:36	0:18				2A	7:42		KOP-NT	1:00	1
C-5 KOP-NT	C-5	8:18	8:20	8:22	8:24	8:27	8:30	8:31	8:36	0:18				2A	8:42		KOP-NT	1:00	1
C-6 KOP-NT	C-6	9:18	9:20	9:22	9:24	9:27	9:30	9:31	9:36	0:18				2A	9:42		KOP-NT	1:00	1
C-7 KOP-NT	C-7	10:18	10:20	10:22	10:24	10:27	10:30	10:31	10:36	0:18				2A	10:42		KOP-NT	1:00	1
C-8 KOP-NT	C-8	11:18	11:20	11:22	11:24	11:27	11:30	11:31	11:36	0:18				2A	11:42		KOP-NT	1:00	1
C-9 KOP-NT	C-9	12:18	12:20	12:22	12:24	12:27	12:30	12:31	12:36	0:18				2A	12:42		KOP-NT	7:40	1
D-11 KOP-NT	D-11	19:58	20:00	20:02	20:04	20:07	20:10	20:11	20:16	0:18				2A	20:22		KOP-NT	1:00	1
D-12 KOP-NT	D-12	20:58	21:00	21:02	21:04	21:07	21:10	21:11	21:16	0:18				2A	21:22		KOP-NT	1:00	1
D-13 KOP-NT	D-13	21:58	22:00	22:02	22:04	22:07	22:10	22:11	22:16	0:18				2A	22:22		KOP-NT	1:00	1
D-14 KOP-NT	D-14	22:58	23:00	23:02	23:04	23:07	23:10	23:11	23:16	0:18				2A	23:22		KOP-NT	1:00	1
D-15 KOP-NT	D-15	23:58	0:00	0:02	0:04	0:07	0:10	0:11	0:16	0:18				2A	0:22		KOP-NT	##############	1
D-16 KOP-NT	D-16	0:58	1:00	1:02	1:04	1:07	1:10	1:11	1:16	0:18				1A	1:22		KOP-NT	16:00	1
D-9 KOP-NT	D-9	16:58	17:00	17:02	17:04	17:07	17:10	17:11	17:16	0:18				2A	17:26		KOP-NT	##############	1
G-10 KOP-NT	G-10	13:38	13:40	13:42	13:44	13:47	13:50	13:51	13:56	0:18				2A	14:02		KOP-NT	1:00	1
G-11 KOP-NT	G-11	14:38	14:40	14:42	14:44	14:47	14:50	14:51	14:56	0:18				2A	15:02		KOP-NT	1:00	1
G-12 KOP-NT	G-12	15:38	15:40	15:42	15:44	15:47	15:50	15:51	15:56	0:18				2A	16:02		KOP-NT	1:00	1
G-13 KOP-NT	G-13	16:38	16:40	16:42	16:44	16:47	16:50	16:51	16:56	0:18				2A	17:02		KOP-NT	1:00	1
G-14 KOP-NT	G-14	17:38	17:40	17:42	17:44	17:47	17:50	17:51	17:56	0:18				2A	18:02		KOP-NT	1:00	1
G-15 KOP-NT	G-15	18:38	18:40	18:42	18:44	18:47	18:50	18:51	18:56	0:18				2A	19:02		KOP-NT	1:00	1
G-16 KOP-NT	G-16	19:38	19:40	19:42	19:44	19:47	19:50	19:51	19:56	0:18				2A	20:02		KOP-NT	1:00	1
G-17 KOP-NT	G-17	20:38	20:40	20:42	20:44	20:47	20:50	20:51	20:56	0:18				2A	21:02		KOP-NT	1:00	1
G-18 KOP-NT	G-18	21:38	21:40	21:42	21:44	21:47	21:50	21:51	21:56	0:18				2A	22:02		KOP-NT	1:00	1
G-19 KOP-NT	G-19	22:38	22:40	22:42	22:44	22:47	22:50	22:51	22:56	0:18				2A	23:02		KOP-NT	##############	1
G-2 KOP-NT	G-2	5:38	5:40	5:42	5:44	5:47	5:50	5:51	5:56	0:18				2A	6:02		KOP-NT	##############	1
G-21 KOP-NT	G-21	0:38	0:40	0:42	0:44	0:47	0:50	0:51	0:56	0:18				1A	1:02		KOP-NT	23:00	1
G-2O KOP-NT	G-2O	23:38	23:40	23:42	23:44	23:47	23:50	23:51	23:56	0:18				2A	0:02		KOP-NT	0:20	1

Source: Gannett Fleming, *Draft Rail Operations Simulation Report – Norristown High Speed Line Extension*, August 25, 2020.

Figure A2: Future Rail Vehicle Schedules with Origin-Destination King of Prussia – KOP to Norristown (continued)

G-3 KOP-NT	G-3	6:38	6:40	6:42	6:44	6:47	6:50	6:51	6:56	0:18				2A	7:02		KOP-NT	1:00	1
G-4 KOP-NT	G-4	7:38	7:40	7:42	7:44	7:47	7:50	7:51	7:56	0:18				2A	8:02		KOP-NT	1:00	1
G-5 KOP-NT	G-5	8:38	8:40	8:42	8:44	8:47	8:50	8:51	8:56	0:18				2A	9:02		KOP-NT	1:00	1
G-6 KOP-NT	G-6	9:38	9:40	9:42	9:44	9:47	9:50	9:51	9:56	0:18				2A	10:02		KOP-NT	1:00	1
G-7 KOP-NT	G-7	10:38	10:40	10:42	10:44	10:47	10:50	10:51	10:56	0:18				2A	11:02		KOP-NT	1:00	1
G-8 KOP-NT	G-8	11:38	11:40	11:42	11:44	11:47	11:50	11:51	11:56	0:18				2A	12:02		KOP-NT	1:00	1
G-9 KOP-NT	G-9	12:38	12:40	12:42	12:44	12:47	12:50	12:51	12:56	0:18				2A	13:02		KOP-NT	##############	1
J-3 KOP-NT	J-3	7:58	8:00	8:02	8:04	8:07	8:10	8:11	8:16	0:18				2A	8:26		KOP-NT	##############	1
K-2 KOP-NT	K-2	5:58	6:00	6:02	6:04	6:07	6:10	6:11	6:16	0:18				2A	6:22		KOP-NT	1:00	1
K-3 KOP-NT	K-3	6:58	7:00	7:02	7:04	7:07	7:10	7:11	7:16	0:18				2A	7:26		KOP-NT	11:00	1
L-6 KOP-NT	L-6	17:58	18:00	18:02	18:04	18:07	18:10	18:11	18:16	0:18				2A	18:26		KOP-NT	##############	1
R1-10 KOP-NT	R1-10	15:58	16:00	16:02	16:04	16:07	16:10	16:11	16:16	0:18				2A	16:26		KOP-NT	3:00	1
R1-12 KOP-NT	R1-12	18:58	19:00	19:02	19:04	19:07	19:10	19:11	19:16	0:18				2A	19:26		KOP-NT	##############	1
R1-4 KOP-NT	R1-4	9:58	10:00	10:02	10:04	10:07	10:10	10:11	10:16	0:18				2A	10:22		KOP-NT	1:00	1
R1-5 KOP-NT	R1-5	10:58	11:00	11:02	11:04	11:07	11:10	11:11	11:16	0:18				2A	11:22		KOP-NT	1:00	1
R1-6 KOP-NT	R1-6	11:58	12:00	12:02	12:04	12:07	12:10	12:11	12:16	0:18				2A	12:22		KOP-NT	1:00	1
R1-7 KOP-NT	R1-7	12:58	13:00	13:02	13:04	13:07	13:10	13:11	13:16	0:18				2A	13:22		KOP-NT	1:00	1
R1-8 KOP-NT	R1-8	13:58	14:00	14:02	14:04	14:07	14:10	14:11	14:16	0:18				2A	14:22		KOP-NT	1:00	1
R1-9 KOP-NT	R1-9	14:58	15:00	15:02	15:04	15:07	15:10	15:11	15:16	0:18				2A	15:22		KOP-NT	##############	1

Source: Gannett Fleming, *Draft Rail Operations Simulation Report – Norristown High Speed Line Extension,* August 25, 2020.

Figure A3: Future Rail Vehicle Schedules with Origin-Destination King of Prussia – 69th Street to KOP

Local				0:02	0:01	0:01	0:01	0:01	0:01	0:01	0:01	0:02	0:01	0:01	0:01	0:02	0:02	0:01	0:01	0:02	0:02	0:03	0:02	0:02	0:02	0:03		0:25								
Exp						0:03		0:03				0:03																								
		Consist	69th St	Parkview	Township Line	Pennfield	Beechwood	Wynnewood Rd	Ardmore Jct	Ardmore Ave	Haverford	Bryn Mawr	Roberts Rd	Garrett Hill	Stadium	Villanova	Radnor	County Line	Matsonford	Gulph Mills	Hughes Park	Henderson Rd	Allendale Rd	Mall Blvd	1st & American	KOP		Bryn Mawr to KOP	Next train	NTC	Next Departure	Comment	Route Type	Headway to the Following Train	Number of Cars
Lcl	B-1 69-KO	B-1	4:29									4:40								0:02	0:04	0:07	0:09	0:11	0:13	5:08		0:28	B-2 69-KO		5:20		69-KOP	0:04	1
Lcl	C-1 69-KO	C-1	4:33									4:44								0:02	0:04	0:07	0:09	0:11	0:13	5:12		0:28	C-2 KOP-N		5:18		69-KOP	0:06	1
Lcl	D-1 69-KO	D-1	4:39									4:50								0:02	0:04	0:07	0:09	0:11	0:13	5:18		0:28	D-2 69-KO		5:30		69-KOP	0:10	1
Lcl	F-1 69-KO	F-1	4:49									5:00								0:02	0:04	0:07	0:09	0:11	0:13	5:28		0:28	F-2 KOP-6		5:40		69-KOP	0:04	1
Lcl	G-1 69-KO	G-1	4:53									5:04								0:02	0:04	0:07	0:09	0:11	0:13	5:32		0:28	G-2 KOP-N		5:38		69-KOP	0:06	1
Lcl	H2-1 69-K	H2-1	4:59									5:10								0:02	0:04	0:07	0:09	0:11	0:13	5:38		0:28	H1-2 KOP-6		5:50		69-KOP	0:10	2
Lcl	J-1 69-KO	J-1	5:09									5:20								0:02	0:04	0:07	0:09	0:11	0:13	5:48		0:28	J-2 KOP-6		6:00		69-KOP	0:04	1
Lcl	K-1 69-KO	K-1	5:13									5:24								0:02	0:04	0:07	0:09	0:11	0:13	5:52		0:28	K-2 KOP-N		5:58		69-KOP	0:06	1
Lcl	L-1 69-KO	L-1	5:19									5:30								0:02	0:04	0:07	0:09	0:11	0:13	5:58		0:28	L-2 69-KO		6:10		69-KOP	0:10	1
Lcl	N2-1 69-K	N2-1	5:29									5:40								0:02	0:04	0:07	0:09	0:11	0:13	6:08		0:28	N2-2 KOP-6		6:20		69-KOP	0:10	2
Lcl	O-1 69-KO	O-1	5:39									5:50								0:02	0:04	0:07	0:09	0:11	0:13	6:18		0:28	O-2 69-KO		6:30		69-KOP	0:10	1
Lcl	P-1 69-KO	P-1	5:49									6:00								0:02	0:04	0:07	0:09	0:11	0:13	6:28		0:28	P-2 KOP-6		6:40		69-KOP	0:10	1
Lcl	Q2-1 69-K	Q2-1	5:59									6:10								0:02	0:04	0:07	0:09	0:11	0:13	6:38		0:28	Q1-2 KOP-6		6:50		69-KOP	0:10	2
Lcl	B-2 69-KO	B-2	6:09									6:20								0:02	0:04	0:07	0:09	0:11	0:13	6:48		0:28	B-3 KOP-6		7:00		69-KOP	0:10	1
Exp	E-2 69-KO	E-2	6:20									6:29								0:02	0:04	0:07	0:09	0:11	0:13	6:58		0:29	E-3 69-KO		7:10		69-KOP	0:10	1
Exp	D-2 69-KO	D-2	6:30									6:39								0:02	0:04	0:07	0:09	0:11	0:13	7:08		0:29	D-3 69-KO		7:20		69-KOP	0:10	1
Exp	M-2 69-K	M-2	6:40									6:49								0:02	0:04	0:07	0:09	0:11	0:13	7:18		0:29	M-3 69-KO		7:30		69-KOP	0:10	1
Exp	A-3 69-KO	A-3	6:50									6:59								0:02	0:04	0:07	0:09	0:11	0:13	7:28		0:29	A-4 KOP-6		7:40		69-KOP	0:10	1
Exp	L-2 69-KO	L-2	7:00									7:09								0:02	0:04	0:07	0:09	0:11	0:13	7:38		0:29	L-3 KOP-6		7:50		69-KOP	0:10	1
Exp	R2-2 69-K	R2-2	7:10									7:19								0:02	0:04	0:07	0:09	0:11	0:13	7:48		0:29	R2-3 KOP-6		8:00		69-KOP	0:10	2
Exp	T-1 69-KO	T-1	7:20									7:29								0:02	0:04	0:07	0:09	0:11	0:13	7:58		0:29	T-2 69-KO		8:10		69-KOP	0:10	1
Exp	O-2 69-KO	O-2	7:30									7:39								0:02	0:04	0:07	0:09	0:11	0:13	8:08		0:29	O-3 KOP-6		8:20		69-KOP	0:10	1
Exp	F-3 69-KO	F-3	7:40									7:49								0:02	0:04	0:07	0:09	0:11	0:13	8:18		0:29	F-4 KOP-6		8:30		69-KOP	0:10	1
Exp	H2-3 69-K	H2-3	7:50									7:59								0:02	0:04	0:07	0:09	0:11	0:13	8:28		0:29	H2-4 KOP-6		8:40		69-KOP	0:10	2
Exp	E-3 69-KO	E-3	8:00									8:09								0:02	0:04	0:07	0:09	0:11	0:13	8:38		0:29	E-4 KOP-6		8:50		69-KOP	0:10	1
Exp	S-3 69-KO	S-3	8:10									8:19								0:02	0:04	0:07	0:09	0:11	0:13	8:48		0:29	S-4 69-KO		9:00		69-KOP	0:10	1
Exp	D-3 69-KO	D-3	8:20									8:29								0:02	0:04	0:07	0:09	0:11	0:13	8:58		0:29	D-4 KOP-6		9:10		69-KOP	0:10	1
Exp	M-3 69-K	M-3	8:30									8:39								0:02	0:04	0:07	0:09	0:11	0:13	9:08		0:29	M-4 69-KO		9:20		69-KOP	0:10	1
Exp	P-3 69-KO	P-3	8:40									8:49								0:02	0:04	0:07	0:09	0:11	0:13	9:18		0:29	P-4 69-KO		15:50	P Done	69-KOP	0:11	1
Local	Q1-3 69-K	Q1-3	8:50									9:01								0:02	0:04	0:07	0:09	0:11	0:13	9:29		0:28	Q1-4 69-KO		9:40		69-KOP	0:19	1
Local	T-2 69-KO	T-2	9:09									9:20								0:02	0:04	0:07	0:09	0:11	0:13	9:48		0:28	T-3 69-KO		10:00		69-KOP	0:20	1
Local	H1-4 69-K	H1-4	9:29									9:40								0:02	0:04	0:07	0:09	0:11	0:13	10:08		0:28	H1-5 69-KO		10:20		69-KOP	0:20	1
Local	S-4 69-KO	S-4	9:49									10:00								0:02	0:04	0:07	0:09	0:11	0:13	10:28		0:28	S-5 69-KO		10:40		69-KOP	0:20	1
Local	M-4 69-K	M-4	10:09									10:20								0:02	0:04	0:07	0:09	0:11	0:13	10:48		0:28	M-5 69-KO		11:00		69-KOP	0:20	1
Local	Q1-4 69-K	Q1-4	10:29									10:40								0:02	0:04	0:07	0:09	0:11	0:13	11:08		0:28	Q1-5 69-KO		11:20		69-KOP	0:20	1
Local	T-3 69-KO	T-3	10:49									11:00								0:02	0:04	0:07	0:09	0:11	0:13	11:28		0:28	T-4 69-KO		11:40		69-KOP	0:20	1
Local	H1-5 69-K	H1-5	11:09									11:20								0:02	0:04	0:07	0:09	0:11	0:13	11:48		0:28	H1-6 69-KO		12:00		69-KOP	0:20	1
Local	S-5 69-KO	S-5	11:29									11:40								0:02	0:04	0:07	0:09	0:11	0:13	12:08		0:28	S-6 69-KO		12:20		69-KOP	0:20	1
Local	M-5 69-K	M-5	11:49									12:00								0:02	0:04	0:07	0:09	0:11	0:13	12:28		0:28	M-6 69-KO		12:40		69-KOP	0:20	1
Local	Q1-5 69-K	Q1-5	12:09									12:20								0:02	0:04	0:07	0:09	0:11	0:13	12:48		0:28	Q1-6 69-KO		13:00		69-KOP	0:20	1
Local	T-4 69-KO	T-4	12:29									12:40								0:02	0:04	0:07	0:09	0:11	0:13	13:08		0:28	T-5 69-KO		13:20		69-KOP	0:20	1
Local	H1-6 69-K	H1-6	12:49									13:00								0:02	0:04	0:07	0:09	0:11	0:13	13:28		0:28	H1-7 KOP-6		13:40		69-KOP	0:20	1
Local	S-6 69-KO	S-6	13:09									13:20								0:02	0:04	0:07	0:09	0:11	0:13	13:48		0:28	S-7 69-KO		14:00		69-KOP	0:20	1
Local	M-6 69-K	M-6	13:29									13:40								0:02	0:04	0:07	0:09	0:11	0:13	14:08		0:28	M-7 69-KO		14:20		69-KOP	0:20	1
Local	Q1-6 69-K	Q1-6	13:49									14:00								0:02	0:04	0:07	0:09	0:11	0:13	14:28		0:28	Q1-7 KOP-6		14:40		69-KOP	0:20	1
Local	T-5 69-KO	T-5	14:09									14:20								0:02	0:04	0:07	0:09	0:11	0:13	14:48		0:28	T-6 69-KO		15:00		69-KOP	0:20	1
Local	V2-3 69-K	V2-3	14:29									14:40								0:02	0:04	0:07	0:09	0:11	0:13	15:08		0:28	V2-4 KOP-6		15:20		69-KOP	0:20	2
Exp	S-7 69-KO	S-7	14:50									14:59								0:02	0:04	0:07	0:09	0:11	0:13	15:28		0:29	S-8 KOP-6		15:40		69-KOP	0:20	1
Local	N2-4 69-K	N2-4	15:09									15:20								0:02	0:04	0:07	0:09	0:11	0:13	15:48		0:28	N2-5 KOP-6		16:00		69-KOP	0:10	2
Local	M-7 69-K	M-7	15:19									15:30								0:02	0:04	0:07	0:09	0:11	0:13	15:58		0:28	M-8 69-KO		16:10		69-KOP	0:10	1
Exp	U-4 69-KO	U-4	15:30									15:39								0:02	0:04	0:07	0:09	0:11	0:13	16:08		0:29	U-5 KOP-6		16:20		69-KOP	0:07	2
Local	O-8 69-KO	O-8	15:36									15:47								0:02	0:04	0:07	0:09	0:11	0:13	16:15		0:28	O-9 69-KO		16:30		69-KOP	0:13	1
Exp	T-6 69-KO	T-6	15:50									15:59								0:02	0:04	0:07	0:09	0:11	0:13	16:28		0:29	T-7 KOP-6		16:40		69-KOP	0:10	1
Exp	F-9 69-KO	F-9	16:00									16:09								0:02	0:04	0:07	0:09	0:11	0:13	16:38		0:29	F-10 69-KO		16:50		69-KOP	0:10	1
Exp	Q2-5 69-K	Q2-5	16:10									16:19								0:02	0:04	0:07	0:09	0:11	0:13	16:48		0:29	Q2-6 KOP-6		17:00		69-KOP	0:10	2
Exp	B-6 69-KO	B-6	16:20									16:29								0:02	0:04	0:07	0:09	0:11	0:13	16:58		0:29	B-7 69-KO		17:10		69-KOP	0:10	1
Exp	J-6 69-KO	J-6	16:30									16:39								0:02	0:04	0:07	0:09	0:11	0:13	17:08		0:29	J-7 KOP-6		17:20		69-KOP	0:07	2
Exp	P-4 69-KO	P-4	16:37									16:46								0:02	0:04	0:07	0:09	0:11	0:13	17:15		0:29	P-5 69-KO		17:30		69-KOP	0:13	1
Exp	A-7 69-KO	A-7	16:50									16:59								0:02	0:04	0:07	0:09	0:11	0:13	17:28		0:29	A-8 KOP-6		17:40		69-KOP	0:10	1
Exp	M-8 69-K	M-8	17:00									17:09								0:02	0:04	0:07	0:09	0:11	0:13	17:38		0:29	M-9 KOP-6		17:50		69-KOP	0:10	1
Exp	V2-5 69-K	V2-5	17:10									17:19								0:02	0:04	0:07	0:09	0:11	0:13	17:48		0:29	V2-6 KOP-6		18:00		69-KOP	0:10	2
Exp	O-9 69-KO	O-9	17:20									17:29								0:02	0:04	0:07	0:09	0:11	0:13	17:58		0:29	O-10 KOP-6		18:10		69-KOP	0:10	1
Exp	S-9 69-KO	S-9	17:30									17:39								0:02	0:04	0:07	0:09	0:11	0:13	18:08		0:29	S-10 69-KO		18:20		69-KOP	0:07	1

Source: Gannett Fleming, *Draft Rail Operations Simulation Report – Norristown High Speed Line Extension*, August 25, 2020.

Figure A3: Future Rail Vehicle Schedules with Origin-Destination King of Prussia – 69th Street to KOP (continued)

Exp	F-10 69-K	F-10	17:37									17:46								0:02	0:04	0:07	0:09	0:11	0:13	18:15		0:29	-11 KOP-6		18:30		69-KOP	0:13	1
Exp	N2-6 69-K	N2-6	17:50									17:59								0:02	0:04	0:07	0:09	0:11	0:13	18:28		0:29	2-7 KOP-6		18:40		69-KOP	0:10	2
Exp	B-7 69-KO	B-7	18:00									18:09								0:02	0:04	0:07	0:09	0:11	0:13	18:38		0:29	5-8 KOP-6		18:50		69-KOP	0:10	1
Exp	U-6 69-KO	U-6	18:10									18:19								0:02	0:04	0:07	0:09	0:11	0:13	18:48		0:29	-7 KOP-6		19:00		69-KOP	0:10	2
Exp	P-5 69-KO	P-5	18:20									18:29								0:02	0:04	0:07	0:09	0:11	0:13	18:58		0:29	-6 KOP-6		19:12		69-KOP	0:10	1
Exp	T-8 69-KO	T-8	18:30									18:39								0:02	0:04	0:07	0:09	0:11	0:13	19:08		0:29	-9 69-KO		19:20		69-KOP	0:20	1
Exp	Q2-7 69-K	Q2-7	18:50									18:59								0:02	0:04	0:07	0:09	0:11	0:13	19:28		0:29	2-8 KOP-6		19:40		69-KOP	0:20	2
Lcl	S-10 69-K	S-10	19:09									19:20								0:02	0:04	0:07	0:09	0:11	0:13	19:48		0:28	-11 69-KO		20:00		69-KOP	0:20	1
Lcl	N1-8 69-K	N1-8	19:29									19:40								0:02	0:04	0:07	0:09	0:11	0:13	20:08		0:28	1-9 69-KO		20:20		69-KOP	0:20	1
Lcl	R2-7 69-K	R2-7	19:49									20:00								0:02	0:04	0:07	0:09	0:11	0:13	20:28		0:28	2-8 69-KO		20:40		69-KOP	0:20	1
Lcl	T-9 69-KO	T-9	20:09									20:20								0:02	0:04	0:07	0:09	0:11	0:13	20:48		0:28	-10 69-KO		21:00		69-KOP	0:20	1
Lcl	H2-9 69-K	H2-9	20:29									20:40								0:02	0:04	0:07	0:09	0:11	0:13	21:08		0:28	2-10 69-K		21:20		69-KOP	0:20	1
Lcl	S-11 69-K	S-11	20:49									21:00								0:02	0:04	0:07	0:09	0:11	0:13	21:28		0:28	-12 69-KO		21:40		69-KOP	0:20	1
Lcl	N1-9 69-K	N1-9	21:09									21:20								0:02	0:04	0:07	0:09	0:11	0:13	21:48		0:28	1-10 69-K		22:00		69-KOP	0:20	1
Lcl	R2-8 69-K	R2-8	21:29									21:40								0:02	0:04	0:07	0:09	0:11	0:13	22:08		0:28	2-9 69-KO		22:20		69-KOP	0:20	1
Lcl	T-10 69-K	T-10	21:49									22:00								0:02	0:04	0:07	0:09	0:11	0:13	22:28		0:28	-11 69-KO		22:40		69-KOP	0:20	1
Lcl	H2-10 69	H2-10	22:09									22:20								0:02	0:04	0:07	0:09	0:11	0:13	22:48		0:28	2-11 69-K		23:00		69-KOP	0:20	1
Lcl	S-12 69-K	S-12	22:29									22:40								0:02	0:04	0:07	0:09	0:11	0:13	23:08		0:28	-13 KOP-6		23:20		69-KOP	0:20	1
Lcl	N1-10 69	N1-10	22:49									23:00								0:02	0:04	0:07	0:09	0:11	0:13	23:28		0:28	1-11 KOP-		23:40		69-KOP	0:20	1
Lcl	R2-9 69-K	R2-9	23:09									23:20								0:02	0:04	0:07	0:09	0:11	0:13	23:48		0:28	2-10 KOP-		0:00		69-KOP	0:20	1
Lcl	T-11 69-K	T-11	23:29									23:40								0:02	0:04	0:07	0:09	0:11	0:13	0:08		0:28	-12 KOP-6		0:20		69-KOP	0:20	1
Lcl	H2-11 69	H2-11	23:49									0:00								0:02	0:04	0:07	0:09	0:11	0:13	0:28		0:28	2-12 KOP-		0:40		69-KOP	#######	1

Source: Gannett Fleming, *Draft Rail Operations Simulation Report – Norristown High Speed Line Extension*, August 25, 2020.

Figure A4: Future Rail Vehicle Schedules with Origin-Destination King of Prussia – KOP to 69th Street

			0:02	0:02	0:02	0:03	0:03	0:01	0:02	0:01	0:01	0:02	0:01	0:01	0:01	0:01	0:01	0:01	0:01	0:02	0:01	0:01	0:01	0:01	0:05						
Exp	69th St	KOP	1st & American	Mall Blvd	Allendale Rd	Henderson Rd	Hughes Park	Gulph Mills	Matsonford	County Line	Radnor	Villanova	Stadium	Garrett Hill	Roberts Rd	Bryn Mawr	Haverford	Ardmore Ave	Ardmore Jct	Wynnewood Rd	Beechwood	Pennfield	Township Line	Parkview	69th St		Next Departure	Comment	Route Type	Headway to the Following Train	Number of Cars
Local	0:39	0:00	0:02	0:04	0:06	0:09	0:12	0:13	0:15	0:16	0:17	0:19	0:20	0:21	0:22	0:25	0:26	0:27	0:28	0:30	0:31	0:32	0:33	0:34	0:39			R2 Done	KOP-69	0:20	1
Local	0:59	0:20	0:22	0:24	0:26	0:29	0:32	0:33	0:35	0:36	0:37	0:39	0:40	0:41	0:42	0:45	0:46	0:47	0:48	0:50	0:51	0:52	0:53	0:54	0:59			TDone	KOP-69	0:20	1
Local	1:19	0:40	0:42	0:44	0:46	0:49	0:52	0:53	0:55	0:56	0:57	0:59	1:00	1:01	1:02	1:05	1:06	1:07	1:08	1:10	1:11	1:12	1:13	1:14	1:19			H2 Done	KOP-69	4:40	1
Exp	5:59	5:20	5:22	5:24	5:26	5:29	5:32	5:33	5:35	5:36	5:37	5:39	5:40	5:41	5:42	5:46	5:47	5:48	5:49	5:51	5:52	5:53	5:54	5:55	5:59		6:09		KOP-69	0:10	1
Exp	6:09	5:30	5:32	5:34	5:36	5:39	5:42	5:43	5:45	5:46	5:47	5:49	5:50	5:51	5:52	5:56	5:57	5:58	5:59	6:01	6:02	6:03	6:04	6:05	6:09		6:30		KOP-69	0:10	1
Exp	6:19	5:40	5:42	5:44	5:46	5:49	5:52	5:53	5:55	5:56	5:57	5:59	6:00	6:01	6:02	6:06	6:07	6:08	6:09	6:11	6:12	6:13	6:14	6:15	6:19		6:29		KOP-69	0:10	1
Ltd	6:29	5:50	5:52	5:54	5:56	5:59	6:02	6:03	6:05	6:06	6:07	6:09	6:10	6:11	6:12	6:15	6:16	6:17	6:18	6:20	6:21	6:22	6:23	6:24	6:29		6:49		KOP-69	0:10	2
Exp	6:39	6:00	6:02	6:04	6:06	6:09	6:12	6:13	6:15	6:16	6:17	6:19	6:20	6:21	6:22	6:26	6:27	6:28	6:29	6:31	6:32	6:33	6:34	6:35	6:39		6:45		KOP-69	0:10	1
Ltd	6:49	6:10	6:12	6:14	6:16	6:19	6:22	6:23	6:25	6:26	6:27	6:29	6:30	6:31	6:32	6:35	6:36	6:37	6:38	6:40	6:41	6:42	6:43	6:44	6:49		7:00		KOP-69	0:10	1
Exp	6:59	6:20	6:22	6:24	6:26	6:29	6:32	6:33	6:35	6:36	6:37	6:39	6:40	6:41	6:42	6:46	6:47	6:48	6:49	6:51	6:52	6:53	6:54	6:55	6:59		7:09		KOP-69	0:10	2
Exp	7:09	6:30	6:32	6:34	6:36	6:39	6:42	6:43	6:45	6:46	6:47	6:49	6:50	6:51	6:52	6:56	6:57	6:58	6:59	7:01	7:02	7:03	7:04	7:05	7:09		7:30		KOP-69	0:10	1
Exp	7:19	6:40	6:42	6:44	6:46	6:49	6:52	6:53	6:55	6:56	6:57	6:59	7:00	7:01	7:02	7:06	7:07	7:08	7:09	7:11	7:12	7:13	7:14	7:15	7:19		7:29		KOP-69	0:10	1
Exp	7:29	6:50	6:52	6:54	6:56	6:59	7:02	7:03	7:05	7:06	7:07	7:09	7:10	7:11	7:12	7:16	7:17	7:18	7:19	7:21	7:22	7:23	7:24	7:25	7:29		7:49		KOP-69	0:10	2
Exp	7:39	7:00	7:02	7:04	7:06	7:09	7:12	7:13	7:15	7:16	7:17	7:19	7:20	7:21	7:22	7:26	7:27	7:28	7:29	7:31	7:32	7:33	7:34	7:35	7:39		7:45		KOP-69	0:10	1
Exp	7:49	7:10	7:12	7:14	7:16	7:19	7:22	7:23	7:25	7:26	7:27	7:29	7:30	7:31	7:32	7:36	7:37	7:38	7:39	7:41	7:42	7:43	7:44	7:45	7:49		8:00		KOP-69	0:10	1
Exp	7:59	7:20	7:22	7:24	7:26	7:29	7:32	7:33	7:35	7:36	7:37	7:39	7:40	7:41	7:42	7:46	7:47	7:48	7:49	7:51	7:52	7:53	7:54	7:55	7:59		8:20		KOP-69	0:10	1
Exp	8:09	7:30	7:32	7:34	7:36	7:39	7:42	7:43	7:45	7:46	7:47	7:49	7:50	7:51	7:52	7:56	7:57	7:58	7:59	8:01	8:02	8:03	8:04	8:05	8:09		8:30		KOP-69	0:10	1
Exp	8:19	7:40	7:42	7:44	7:46	7:49	7:52	7:53	7:55	7:56	7:57	7:59	8:00	8:01	8:02	8:06	8:07	8:08	8:09	8:11	8:12	8:13	8:14	8:15	8:19		8:29		KOP-69	0:10	1
Exp	8:29	7:50	7:52	7:54	7:56	7:59	8:02	8:03	8:05	8:06	8:07	8:09	8:10	8:11	8:12	8:16	8:17	8:18	8:19	8:21	8:22	8:23	8:24	8:25	8:29		8:49		KOP-69	0:10	1
Exp	8:39	8:00	8:02	8:04	8:06	8:09	8:12	8:13	8:15	8:16	8:17	8:19	8:20	8:21	8:22	8:26	8:27	8:28	8:29	8:31	8:32	8:33	8:34	8:35	8:39		8:45		KOP-69	0:10	2
Exp	8:49	8:10	8:12	8:14	8:16	8:19	8:22	8:23	8:25	8:26	8:27	8:29	8:30	8:31	8:32	8:36	8:37	8:38	8:39	8:41	8:42	8:43	8:44	8:45	8:49		9:09		KOP-69	0:10	1
Exp	8:59	8:20	8:22	8:24	8:26	8:29	8:32	8:33	8:35	8:36	8:37	8:39	8:40	8:41	8:42	8:46	8:47	8:48	8:49	8:51	8:52	8:53	8:54	8:55	8:59		9:04		KOP-69	0:10	1
Exp	9:09	8:30	8:32	8:34	8:36	8:39	8:42	8:43	8:45	8:46	8:47	8:49	8:50	8:51	8:52	8:56	8:57	8:58	8:59	9:01	9:02	9:03	9:04	9:05	9:09		9:24		KOP-69	0:10	1
Exp	9:19	8:40	8:42	8:44	8:46	8:49	8:52	8:53	8:55	8:56	8:57	8:59	9:00	9:01	9:02	9:06	9:07	9:08	9:09	9:11	9:12	9:13	9:14	9:15	9:19		9:29		KOP-69	0:10	2
Ltd	9:29	8:50	8:52	8:54	8:56	8:59	9:02	9:03	9:05	9:06	9:07	9:09	9:10	9:11	9:12	9:15	9:16	9:17	9:18	9:20	9:21	9:22	9:23	9:24	9:29		9:44		KOP-69	0:10	1
Exp	9:39	9:00	9:02	9:04	9:06	9:09	9:12	9:13	9:15	9:16	9:17	9:19	9:20	9:21	9:22	9:26	9:27	9:28	9:29	9:31	9:32	9:33	9:34	9:35	9:39		9:49		KOP-69	0:10	1
Ltd	9:49	9:10	9:12	9:14	9:16	9:19	9:22	9:23	9:25	9:26	9:27	9:29	9:30	9:31	9:32	9:35	9:36	9:37	9:38	9:40	9:41	9:42	9:43	9:44	9:49		10:04		KOP-69	0:10	1
Ltd	9:59	9:20	9:22	9:24	9:26	9:29	9:32	9:33	9:35	9:36	9:37	9:39	9:40	9:41	9:42	9:45	9:46	9:47	9:48	9:50	9:51	9:52	9:53	9:54	9:59		10:09		KOP-69	0:20	1
Ltd	10:19	9:40	9:42	9:44	9:46	9:49	9:52	9:53	9:55	9:56	9:57	9:59	10:00	10:01	10:02	10:05	10:06	10:07	10:08	10:10	10:11	10:12	10:13	10:14	10:19		10:29		KOP-69	0:20	1
Ltd	10:39	10:00	10:02	10:04	10:06	10:09	10:12	10:13	10:15	10:16	10:17	10:19	10:20	10:21	10:22	10:25	10:26	10:27	10:28	10:30	10:31	10:32	10:33	10:34	10:39		10:49		KOP-69	0:20	1
Ltd	10:59	10:20	10:22	10:24	10:26	10:29	10:32	10:33	10:35	10:36	10:37	10:39	10:40	10:41	10:42	10:45	10:46	10:47	10:48	10:50	10:51	10:52	10:53	10:54	10:59		11:09		KOP-69	0:20	1
Ltd	11:19	10:40	10:42	10:44	10:46	10:49	10:52	10:53	10:55	10:56	10:57	10:59	11:00	11:01	11:02	11:05	11:06	11:07	11:08	11:10	11:11	11:12	11:13	11:14	11:19		11:29		KOP-69	0:20	1
Ltd	11:39	11:00	11:02	11:04	11:06	11:09	11:12	11:13	11:15	11:16	11:17	11:19	11:20	11:21	11:22	11:25	11:26	11:27	11:28	11:30	11:31	11:32	11:33	11:34	11:39		11:49		KOP-69	0:20	1
Ltd	11:59	11:20	11:22	11:24	11:26	11:29	11:32	11:33	11:35	11:36	11:37	11:39	11:40	11:41	11:42	11:45	11:46	11:47	11:48	11:50	11:51	11:52	11:53	11:54	11:59		12:09		KOP-69	0:20	1
Ltd	12:19	11:40	11:42	11:44	11:46	11:49	11:52	11:53	11:55	11:56	11:57	11:59	12:00	12:01	12:02	12:05	12:06	12:07	12:08	12:10	12:11	12:12	12:13	12:14	12:19		12:29		KOP-69	0:20	1
Ltd	12:39	12:00	12:02	12:04	12:06	12:09	12:12	12:13	12:15	12:16	12:17	12:19	12:20	12:21	12:22	12:25	12:26	12:27	12:28	12:30	12:31	12:32	12:33	12:34	12:39		12:49		KOP-69	0:20	1
Ltd	12:59	12:20	12:22	12:24	12:26	12:29	12:32	12:33	12:35	12:36	12:37	12:39	12:40	12:41	12:42	12:45	12:46	12:47	12:48	12:50	12:51	12:52	12:53	12:54	12:59		13:09		KOP-69	0:20	1
Ltd	13:19	12:40	12:42	12:44	12:46	12:49	12:52	12:53	12:55	12:56	12:57	12:59	13:00	13:01	13:02	13:05	13:06	13:07	13:08	13:10	13:11	13:12	13:13	13:14	13:19		13:29		KOP-69	0:20	1
Ltd	13:39	13:00	13:02	13:04	13:06	13:09	13:12	13:13	13:15	13:16	13:17	13:19	13:20	13:21	13:22	13:25	13:26	13:27	13:28	13:30	13:31	13:32	13:33	13:34	13:39		13:49		KOP-69	0:20	1
Ltd	13:59	13:20	13:22	13:24	13:26	13:29	13:32	13:33	13:35	13:36	13:37	13:39	13:40	13:41	13:42	13:45	13:46	13:47	13:48	13:50	13:51	13:52	13:53	13:54	13:59		14:09		KOP-69	0:20	1
Ltd	14:19	13:40	13:42	13:44	13:46	13:49	13:52	13:53	13:55	13:56	13:57	13:59	14:00	14:01	14:02	14:05	14:06	14:07	14:08	14:10	14:11	14:12	14:13	14:14	14:19		14:51		KOP-69	0:20	1
Ltd	14:39	14:00	14:02	14:04	14:06	14:09	14:12	14:13	14:15	14:16	14:17	14:19	14:20	14:21	14:22	14:25	14:26	14:27	14:28	14:30	14:31	14:32	14:33	14:34	14:39		14:50		KOP-69	0:20	1
Ltd	14:59	14:20	14:22	14:24	14:26	14:29	14:32	14:33	14:35	14:36	14:37	14:39	14:40	14:41	14:42	14:45	14:46	14:47	14:48	14:50	14:51	14:52	14:53	14:54	14:59		15:19		KOP-69	0:20	1
Ltd	15:19	14:40	14:42	14:44	14:46	14:49	14:52	14:53	14:55	14:56	14:57	14:59	15:00	15:01	15:02	15:05	15:06	15:07	15:08	15:10	15:11	15:12	15:13	15:14	15:19		15:51		KOP-69	0:20	1
Ltd	15:39	15:00	15:02	15:04	15:06	15:09	15:12	15:13	15:15	15:16	15:17	15:19	15:20	15:21	15:22	15:25	15:26	15:27	15:28	15:30	15:31	15:32	15:33	15:34	15:39		15:50		KOP-69	0:20	1
Exp	15:59	15:20	15:22	15:24	15:26	15:29	15:32	15:33	15:35	15:36	15:37	15:39	15:40	15:41	15:42	15:46	15:47	15:48	15:49	15:51	15:52	15:53	15:54	15:55	15:59		16:06		KOP-69	0:20	2
Exp	16:19	15:40	15:42	15:44	15:46	15:49	15:52	15:53	15:55	15:56	15:57	15:59	16:00	16:01	16:02	16:06	16:07	16:08	16:09	16:11	16:12	16:13	16:14	16:15	16:19		16:26		KOP-69	0:10	1
Exp	16:29	15:50	15:52	15:54	15:56	15:59	16:02	16:03	16:05	16:06	16:07	16:09	16:10	16:11	16:12	16:16	16:17	16:18	16:19	16:21	16:22	16:23	16:24	16:25	16:29		16:37		KOP-69	0:10	1
Exp	16:39	16:00	16:02	16:04	16:06	16:09	16:12	16:13	16:15	16:16	16:17	16:19	16:20	16:21	16:22	16:26	16:27	16:28	16:29	16:31	16:32	16:33	16:34	16:35	16:39		16:46		KOP-69	0:10	2
Exp	16:49	16:10	16:12	16:14	16:16	16:19	16:22	16:23	16:25	16:26	16:27	16:29	16:30	16:31	16:32	16:36	16:37	16:38	16:39	16:41	16:42	16:43	16:44	16:45	16:49		17:00		KOP-69	0:10	1
Exp	16:59	16:20	16:22	16:24	16:26	16:29	16:32	16:33	16:35	16:36	16:37	16:39	16:40	16:41	16:42	16:46	16:47	16:48	16:49	16:51	16:52	16:53	16:54	16:55	16:59		17:06		KOP-69	0:10	2
Exp	17:09	16:30	16:32	16:34	16:36	16:39	16:42	16:43	16:45	16:46	16:47	16:49	16:50	16:51	16:52	16:56	16:57	16:58	16:59	17:01	17:02	17:03	17:04	17:05	17:09		17:20		KOP-69	0:10	1
Exp	17:19	16:40	16:42	16:44	16:46	16:49	16:52	16:53	16:55	16:56	16:57	16:59	17:00	17:01	17:02	17:06	17:07	17:08	17:09	17:11	17:12	17:13	17:14	17:15	17:19		17:26		KOP-69	0:10	1
Exp	17:29	16:50	16:52	16:54	16:56	16:59	17:02	17:03	17:05	17:06	17:07	17:09	17:10	17:11	17:12	17:16	17:17	17:18	17:19	17:21	17:22	17:23	17:24	17:25	17:29		17:37		KOP-69	0:10	1
Exp	17:39	17:00	17:02	17:04	17:06	17:09	17:12	17:13	17:15	17:16	17:17	17:19	17:20	17:21	17:22	17:26	17:27	17:28	17:29	17:31	17:32	17:33	17:34	17:35	17:39		17:46		KOP-69	0:10	2
Exp	17:49	17:10	17:12	17:14	17:16	17:19	17:22	17:23	17:25	17:26	17:27	17:29	17:30	17:31	17:32	17:36	17:37	17:38	17:39	17:41	17:42	17:43	17:44	17:45	17:49		18:00		KOP-69	0:10	1
Exp	17:59	17:20	17:22	17:24	17:26	17:29	17:32	17:33	17:35	17:36	17:37	17:39	17:40	17:41	17:42	17:46	17:47	17:48	17:49	17:51	17:52	17:53	17:54	17:55	17:59		18:06		KOP-69	0:10	2
Exp	18:09	17:30	17:32	17:34	17:36	17:39	17:42	17:43	17:45	17:46	17:47	17:49	17:50	17:51	17:52	17:56	17:57	17:58	17:59	18:01	18:02	18:03	18:04	18:05	18:09		18:20		KOP-69	0:10	1
Exp	18:19	17:40	17:42	17:44	17:46	17:49	17:52	17:53	17:55	17:56	17:57	17:59	18:00	18:01	18:02	18:06	18:07	18:08	18:09	18:11	18:12	18:13	18:14	18:15	18:19		18:26		KOP-69	0:10	1
Exp	18:29	17:50	17:52	17:54	17:56	17:59	18:02	18:03	18:05	18:06	18:07	18:09	18:10	18:11	18:12	18:16	18:17	18:18	18:19	18:21	18:22	18:23	18:24	18:25	18:29			M Done	KOP-69	0:10	1
Exp	18:39	18:00	18:02	18:04	18:06	18:09	18:12	18:13	18:15	18:16	18:17	18:19	18:20	18:21	18:22	18:26	18:27	18:28	18:29	18:31	18:32	18:33	18:34	18:35	18:39		18:46		KOP-69	0:10	2
Exp	18:49	18:10	18:12	18:14	18:16	18:19	18:22	18:23	18:25	18:26	18:27	18:29	18:30	18:31	18:32	18:36	18:37	18:38	18:39	18:41	18:42	18:43	18:44	18:45	18:49			O Done	KOP-69	0:10	1
Exp	18:59	18:20	18:22	18:24	18:26	18:29	18:32	18:33	18:35	18:36	18:37	18:39	18:40	18:41	18:42	18:46	18:47	18:48	18:49	18:51	18:52	18:53	18:54	18:55	18:59		19:09		KOP-69	0:10	1
Exp	19:09	18:30	18:32	18:34	18:36	18:39	18:42	18:43	18:45	18:46	18:47	18:49	18:50	18:51	18:52	18:56	18:57	18:58	18:59	19:01	19:02	19:03	19:04	19:05	19:09		19:24		KOP-69	0:10	1
Exp	19:19	18:40	18:42	18:44	18:46	18:49	18:52	18:53	18:55	18:56	18:57	18:59	19:00	19:01	19:02	19:06	19:07	19:08	19:09	19:11	19:12	19:13	19:14	19:15	19:19		19:29		KOP-69	0:10	2
Exp	19:29	18:50	18:52	18:54	18:56	18:59	19:02	19:03	19:05	19:06	19:07	19:09	19:10	19:11	19:12	19:16	19:17	19:18	19:19	19:21	19:22	19:23	19:24	19:25	19:29		19:44		KOP-69	0:10	1
Exp	19:39	19:00	19:02	19:04	19:06	19:09	19:12	19:13	19:15	19:16	19:17	19:19	19:20	19:21	19:22	19:26	19:27	19:28	19:29	19:31	19:32	19:33	19:34	19:35	19:39		19:49		KOP-69	0:12	2
Exp	19:51	19:12	19:14	19:16	19:18	19:21	19:24	19:25	19:27	19:28	19:29	19:31	19:32	19:33	19:34	19:38	19:39	19:40	19:41	19:43	19:44	19:45	19:46	19:47	19:51			P Done	KOP-69	0:08	1
Ltd	19:59	19:20	19:22	19:24	19:26	19:29	19:32	19:33	19:35	19:36	19:37	19:39	19:40	19:41	19:42	19:45	19:46	19:47	19:48	19:50	19:51	19:52	19:53	19:54	19:59		20:09		KOP-69	0:20	1
Ltd	20:19	19:40	19:42	19:44	19:46	19:49	19:52	19:53	19:55	19:56	19:57	19:59	20:00	20:01	20:02	20:05	20:06	20:07	20:08	20:10	20:11	20:12	20:13	20:14	20:19		20:29		KOP-69	0:20	2
Ltd	20:39	20:00	20:02	20:04	20:06	20:09	20:12	20:13	20:15	20:16	20:17	20:19	20:20	20:21	20:22	20:25	20:26	20:27	20:28	20:30	20:31	20:32	20:33	20:34	20:39		20:49		KOP-69	0:20	1

Source: Gannett Fleming, *Draft Rail Operations Simulation Report – Norristown High Speed Line Extension*, August 25, 2020.

Figure A4: Future Rail Vehicle Schedules with Origin-Destination King of Prussia – KOP to 69th Street (continued)

Ld	20:59	20:20	20:22	20:24	20:26	20:29	20:32	20:33	20:35	20:36	20:37	20:39	20:40	20:41	20:42	20:45	20:46	20:47	20:48	20:50	20:51	20:52	20:53	20:54	20:59			21:09		KOP-69	0:20	1
Ld	21:19	20:40	20:42	20:44	20:46	20:49	20:52	20:53	20:55	20:56	20:57	20:59	21:00	21:01	21:02	21:05	21:06	21:07	21:08	21:10	21:11	21:12	21:13	21:14	21:19			21:29		KOP-69	0:20	1
Ld	21:39	21:00	21:02	21:04	21:06	21:09	21:12	21:13	21:15	21:16	21:17	21:19	21:20	21:21	21:22	21:25	21:26	21:27	21:28	21:30	21:31	21:32	21:33	21:34	21:39			21:49		KOP-69	0:20	1
Ld	21:59	21:20	21:22	21:24	21:26	21:29	21:32	21:33	21:35	21:36	21:37	21:39	21:40	21:41	21:42	21:45	21:46	21:47	21:48	21:50	21:51	21:52	21:53	21:54	21:59			22:09		KOP-69	0:20	1
Ld	22:19	21:40	21:42	21:44	21:46	21:49	21:52	21:53	21:55	21:56	21:57	21:59	22:00	22:01	22:02	22:05	22:06	22:07	22:08	22:10	22:11	22:12	22:13	22:14	22:19			22:29		KOP-69	0:20	1
Ld	22:39	22:00	22:02	22:04	22:06	22:09	22:12	22:13	22:15	22:16	22:17	22:19	22:20	22:21	22:22	22:25	22:26	22:27	22:28	22:30	22:31	22:32	22:33	22:34	22:39			22:49		KOP-69	0:20	1
Ld	22:59	22:20	22:22	22:24	22:26	22:29	22:32	22:33	22:35	22:36	22:37	22:39	22:40	22:41	22:42	22:45	22:46	22:47	22:48	22:50	22:51	22:52	22:53	22:54	22:59			23:09		KOP-69	0:20	1
Ld	23:19	22:40	22:42	22:44	22:46	22:49	22:52	22:53	22:55	22:56	22:57	22:59	23:00	23:01	23:02	23:05	23:06	23:07	23:08	23:10	23:11	23:12	23:13	23:14	23:19			23:29		KOP-69	0:20	1
Ld	23:39	23:00	23:02	23:04	23:06	23:09	23:12	23:13	23:15	23:16	23:17	23:19	23:20	23:21	23:22	23:25	23:26	23:27	23:28	23:30	23:31	23:32	23:33	23:34	23:39			23:49		KOP-69	0:20	1
Ld	23:59	23:20	23:22	23:24	23:26	23:29	23:32	23:33	23:35	23:36	23:37	23:39	23:40	23:41	23:42	23:45	23:46	23:47	23:48	23:50	23:51	23:52	23:53	23:54	23:59			0:09	S Done	KOP-69	0:20	1
Ld	0:19	23:40	23:42	23:44	23:46	23:49	23:52	23:53	23:55	23:56	23:57	23:59	0:00	0:01	0:02	0:05	0:06	0:07	0:08	0:10	0:11	0:12	0:13	0:14	0:19				N1 Done	KOP-69	0:20	1

Source: Gannett Fleming, *Draft Rail Operations Simulation Report – Norristown High Speed Line Extension*, August 25, 2020.

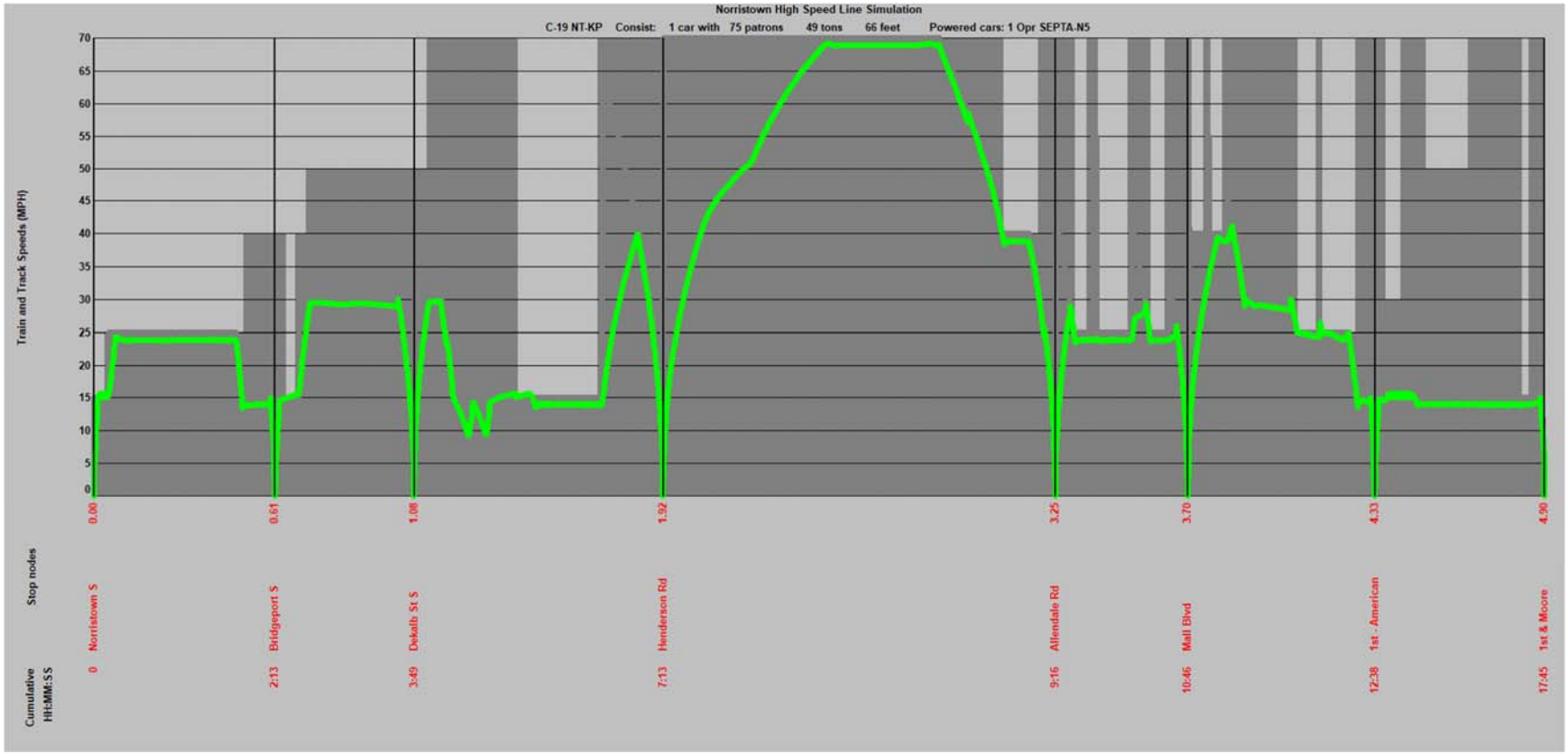
Figure A5: Existing and Future Operations along the NHSL Corridor

Existing NHSL at Hughes Park			
Time Interval		Northbound	Southbound
4:00	5:00	2	1
5:00	6:00	3	3
6:00	7:00	5	5
7:00	8:00	6	6
8:00	9:00	6	6
9:00	10:00	3	3
10:00	11:00	2	2
11:00	12:00	2	2
12:00	13:00	2	2
13:00	14:00	2	2
14:00	15:00	2	2
15:00	16:00	6	6
16:00	17:00	6	6
17:00	18:00	6	6
18:00	19:00	6	5
19:00	20:00	4	4
20:00	21:00	3	4
21:00	22:00	3	3
22:00	23:00	2	3
23:00	0:00	2	2
0:00	1:00	2	2
1:00	2:00	1	1
2:00	3:00	1	1
3:00	4:00	0	0
	Totals	77	77

Future NHSL at Hughes Park			
Time Interval		Northbound	Southbound
4:00	5:00	3	0
5:00	6:00	11	6
6:00	7:00	9	9
7:00	8:00	10	10
8:00	9:00	10	10
9:00	10:00	8	9
10:00	11:00	6	6
11:00	12:00	6	6
12:00	13:00	6	6
13:00	14:00	6	6
14:00	15:00	6	6
15:00	16:00	8	6
16:00	17:00	10	10
17:00	18:00	10	10
18:00	19:00	9	10
19:00	20:00	7	9
20:00	21:00	6	6
21:00	22:00	6	6
22:00	23:00	6	6
23:00	0:00	6	6
0:00	1:00	3	6
1:00	2:00	0	3
2:00	3:00	0	0
3:00	4:00	0	0
	Totals	152	152

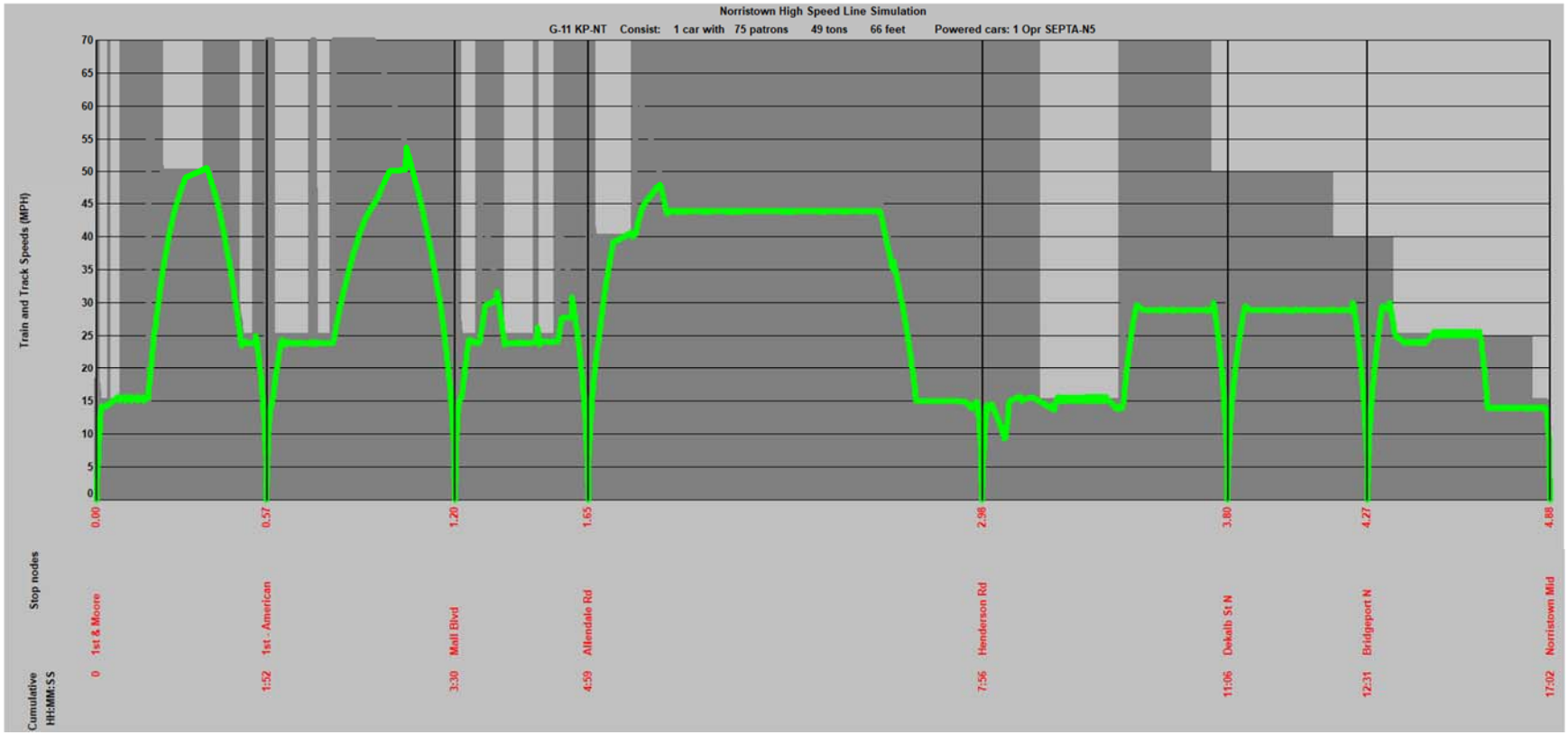
Source: Gannett Fleming, email Greg May, November 3, 2020 and October 29, 2020 for the existing and future rail Vehicle operations, respectively.

Figure A6: Future Rail Vehicle Speeds – Norristown to KOP



Source: Gannett Fleming, *Draft Rail Operations Simulation Report – Norristown High Speed Line Extension*, August 25, 2020.

Figure A7: Future Rail Vehicle Speeds – KOP to Norristown

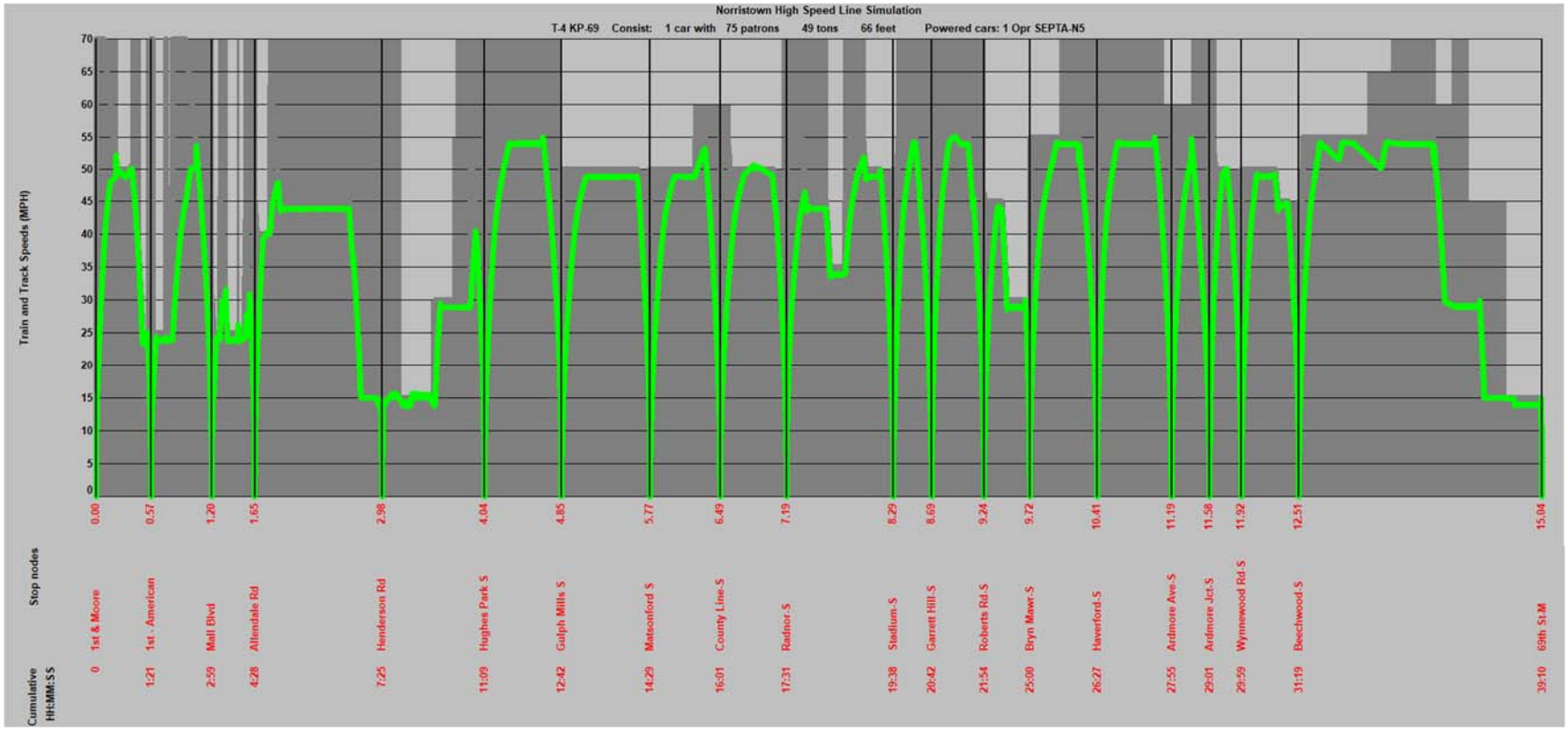


Source: Gannett Fleming, *Draft Rail Operations Simulation Report – Norristown High Speed Line Extension*, August 25, 2020.

Figure A8: Future Rail Vehicle Speeds – 69th Street to KOP Local

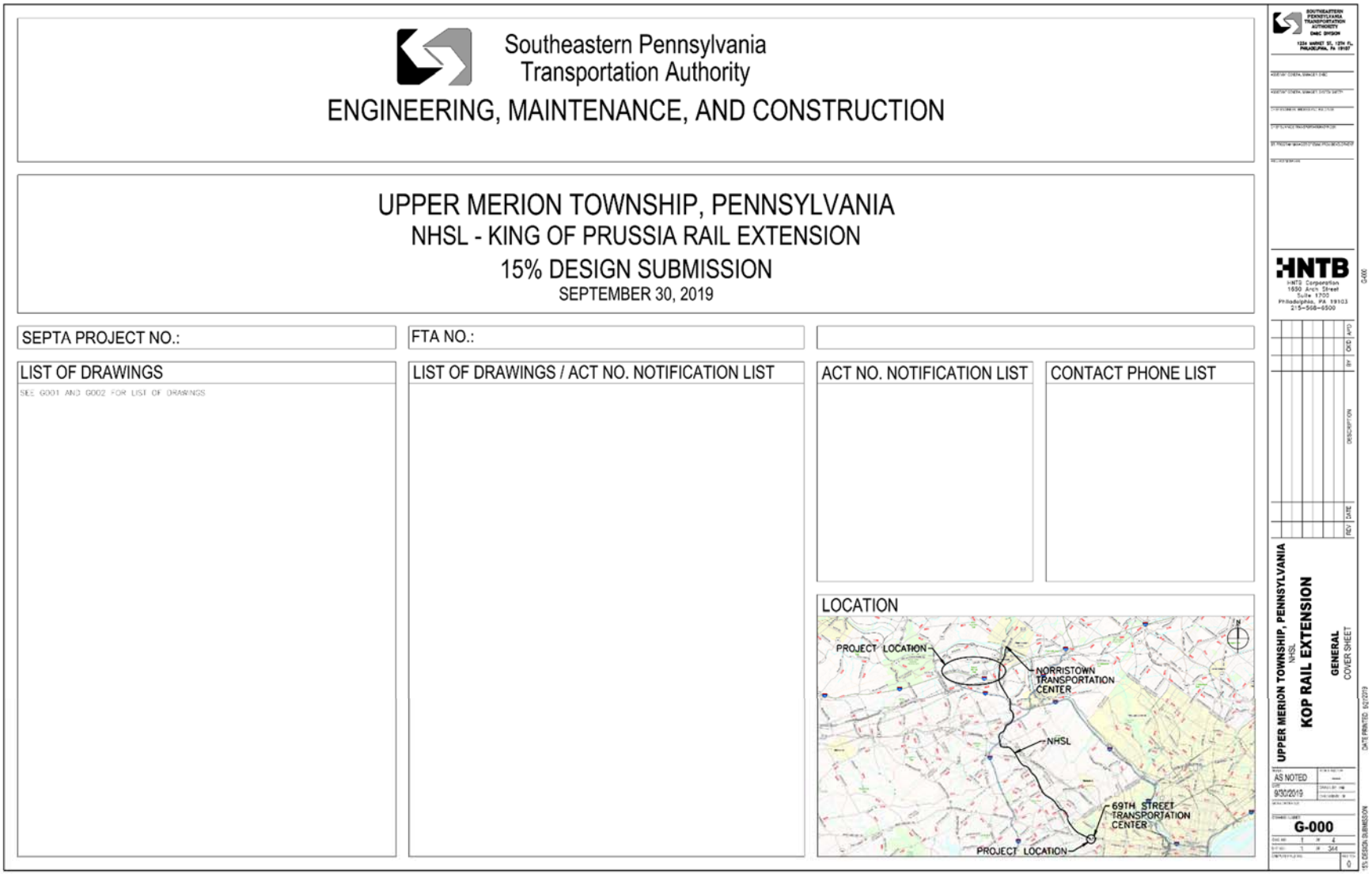
Source: Gannett Fleming, *Draft Rail Operations Simulation Report – Norristown High Speed Line Extension*, August 25, 2020.

Figure A9: Future Rail Vehicle Speeds – KOP to 69th Street Local



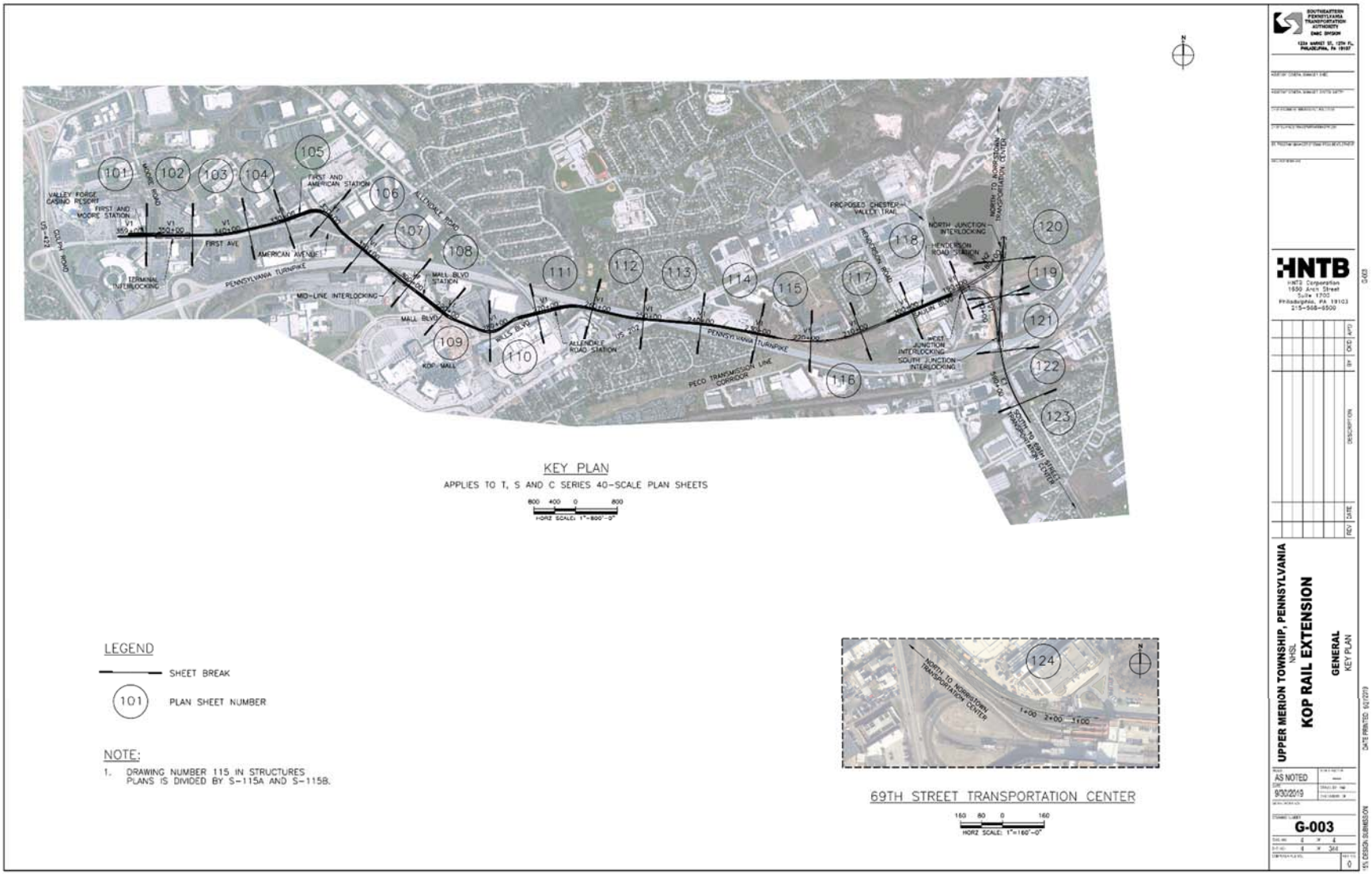
Source: Gannett Fleming, *Draft Rail Operations Simulation Report – Norristown High Speed Line Extension*, August 25, 2020.

Figure A10: Track Elevations – "15% Design Submission"



Source: "NHSL-King of Prussia Rail Extension, 15% Design Submission, AECOM, May 20, 2020. [KOP Rail_15_PLAN_FINAL.pdf]

Figure A10: Track Elevations – "15% Design Submission" (continued)



Source: "NHSL-King of Prussia Rail Extension, 15% Design Submission, AECOM, May 20, 2020. [KOP Rail_15_PLAN_FINAL.pdf]