Chapter 5
Physical and Environmental Analysis

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5 PHYSICAL AND ENVIRONMENTAL ANALYSIS

5.1 Introduction

Chapter 5 summarizes the physical and environmental characteristics and conditions in the West Lake Corridor Project (Project) Study Area. Potential impacts of the Project Alternatives are also described. The Study Area is defined for each topic area discussed. The information is presented for the No Build Alternative as a point of comparison with the impacts of the NEPA Preferred Alternative (Hammond Alternative Option 2) and the other Build Alternatives. The analyses contained herein comply with the National Environmental Policy Act (NEPA) (41 United States Code [USC] § 4321) and specific laws, regulations, and executive orders that apply to the evaluation of physical and environmental resources, noise and vibration, air quality, wetlands and water resources, threatened and endangered species, and hazardous materials. Any additional statutory or regulatory laws are provided within the regulatory context, as appropriate. The following were analyzed for potential physical and environmental impacts from the Project Alternatives:

- Noise
- Vibration
- Air Quality
- Energy
- Soils, Geologic Resources, and Farmlands
- Water Resources
- Biological Resources
- Hazardous Materials
- Utilities

5.2 Noise

This section describes the existing noise environment, identifies project-related noise levels that would result from the Project Alternatives, and describes proposed measures that would reduce project-related noise. More detail regarding the noise analysis findings is provided in **Appendix H** in the *West Lake Corridor Noise and Vibration Technical Report.*

Sensitive land uses are uses that are sensitive to noise and vibration such as parks, residences, hospitals, hotels/motels, schools, libraries, churches, natural areas/wildlife habitats, and historic properties.

5.2.1 Regulatory Setting

The noise analysis was conducted in accordance with guidelines specified in the Federal Transit Administration (FTA) guidance manual *Transit Noise and Vibration Impact Assessment* (United States Department of Transportation [USDOT] FTA 2006). The following section describes the methodology for assessing potential impacts from proposed transit projects. There are no local noise ordinances that apply to interstate rail operations or facilities from Hammond, Munster, or Dyer, Indiana. Local ordinances would regulate construction-generated noise.

5.2.2 Methodology

The methodology for assessing potential long-term noise impacts from transit operations includes:

- Identification of noise-sensitive land uses within the area of potential effect of the Project
- Measurement and characterization of existing noise conditions at sensitive receptors

- Projections of future noise levels from transit operations for Build Alternatives
- Assessment of potential long-term noise impact
- Recommendations for noise mitigation

The FTA guidance manual also includes the methodology for predicting and assessing potential short-term noise impact from construction activities. The approach for assessing potential impact from construction activities is more general than for transit operations since specific construction equipment and methods depend on the contractor's approach and are not typically defined at this stage of project development.

5.2.2.1 Noise Fundamentals and Descriptors

Two important aspects of sound that determine its potential impacts are loudness and frequency. The unit used to measure the loudness of noise is a decibel, linear or unweighted (dB). An adjusted dB scale, referred to as the A-weighted decibel scale, accounts for humans' ability to hear only a limited range of frequencies. Decibels in the A-weighted scale are designated as dBA. This analysis uses the dBA unit of measurement.

Noise levels at a given location tend to vary with time. To account for the variance in loudness over time, a common noise measurement is the equivalent sound pressure level (L_{eq}). It is measured in dBA for a specific time period (e.g., 1 minute). This analysis used L_{eq} to describe traffic and transit noise at schools, libraries, and other sensitive institutions. This analysis also gave more weight to noise that occurs at night (10:00 p.m. to 7:00 a.m.), consistent with federal regulations. Calculations that use this method produce the day-night equivalent sound level, which is abbreviated as L_{dn}.

5.2.2.2 Noise Impact Criteria

Operational Noise Criteria

The noise criteria that FTA uses to determine impacts vary based on land use, as shown in **Table 5.2-1**.

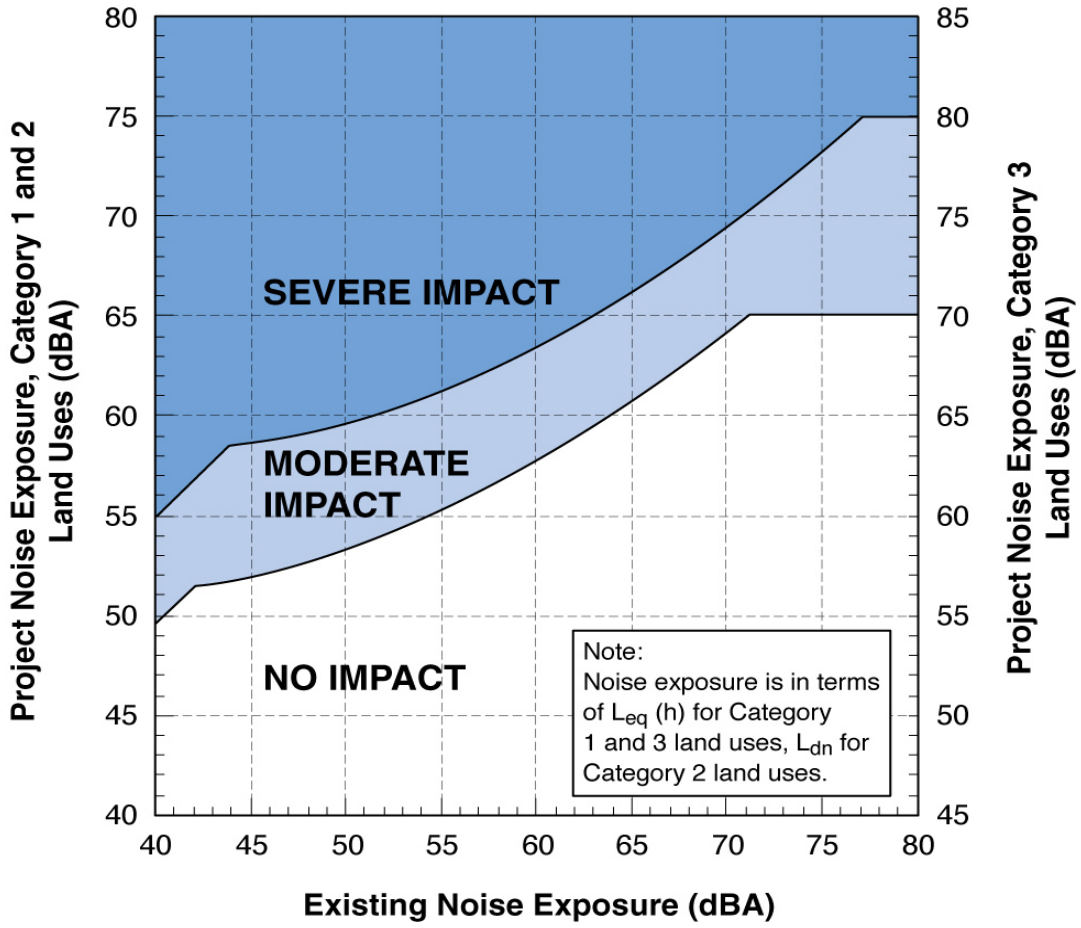
Table 5.2-1: FTA Land Use Categories and Noise Metrics

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.

SOURCE: USDOT FTA 2006.

FTA impact criteria compare existing outdoor noise levels with the noise generated solely by the rail noise source. The severity of noise impact is characterized by two curves (see **Figure 5.2-1**) that allow for higher project noise exposure where there are higher levels of existing background noise, up to a threshold level beyond which project noise exposure would result in an impact. The left vertical axis in the figure applies to FTA land use Categories 1 and 2, and the right vertical axis applies to Category 3. Noise levels above the top curve are considered to cause *severe* Impact since a substantial percentage of people living in the area would be highly annoyed by the new noise. Noise

levels in the range between the two curves are deemed to be *moderate* impacts, which are areas where the change in noise is noticeable, but may not be sufficient to cause a strong, adverse community reaction. Levels below the bottom curve represent *no impact*.



SOURCE: USDOT FTA 2006.

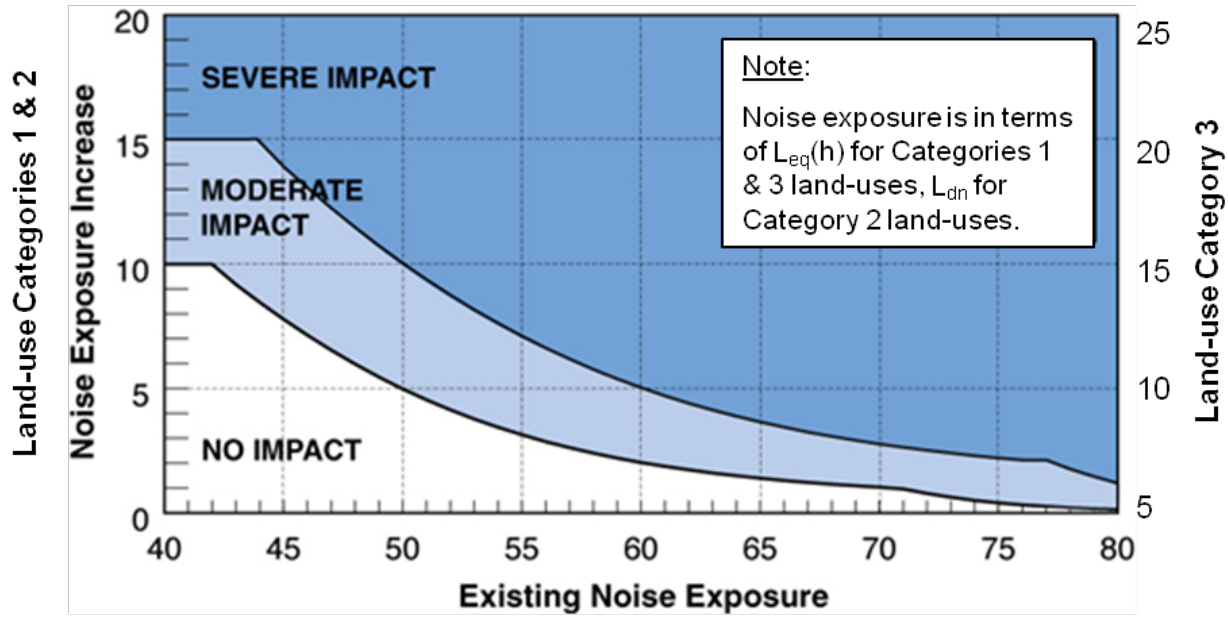
Figure 5.2-1: FTA Project Noise Impact Criteria

The level of impact at any specific site was established by comparing the predicted future Project noise level to the existing noise level at the site. As shown in **Table 5.2-1**, the average day-night noise level over a 24-hour period (or L_{dn}) is used to characterize noise exposure for residential areas (FTA Land Use Category 2). The L_{dn} descriptor 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 a.m. increased by 10 dB 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 facility's peak operating period.

In most cases when a new transit source is proposed (i.e., this Project), the level of impact at any specific site can be established by comparing the predicted future Project noise level at the site to the existing noise level at the site. However, along the existing Metra Electric District (MED)/South Shore Line (SSL) rail corridor, the existing noise sources (i.e., Metra and Northern Indiana Commuter Transportation District [NICTD] rail operations) would change as a result of the Project (i.e., NICTD operations would increase), so Project noise could be defined separately from existing noise. In this

case, the existing noise was determined and a new future noise was calculated, but accurately describing what constitutes the "Project noise" is not possible.

Along the existing MED/SSL corridor, the existing noise is dominated by a source that would change due to the Project, so adding the Project noise to the existing noise would be incorrect. For example, the existing noise exposure would change due to additional train operations. Consequently, the baseline noise levels used for comparison along the existing MED/SSL corridor were predicted using existing train schedules. Therefore, along the existing MED/SSL, the computed existing condition was compared with the calculated future noise for the Build Alternatives using the cumulative form of the noise criteria shown on **Figure 5.2-2**. However, noise impacts along the Study Area where new rail service would be built were evaluated using **Figure 5.2-1**.



SOURCE: USDOT FTA 2006.

Figure 5.2-2: FTA Increase in Cumulative Noise Levels Allowed by Criteria

Construction Noise Impact Criteria

Construction noise criteria are based on the guidelines provided in the FTA guidance manual (USDOT FTA 2006). These criteria, summarized in **Table 5.2-2**, are based on land use and time of day and are given in terms of noise exposure over an 8-hour work shift or 30-day period.

Table 5.2-2: FTA Construction Noise Assessment Criteria

Land Use	8-hour L_{eq} (dBA)		Noise Exposure (dBA)
	Day	Night	30-day Average
Residential	80	70	751
Commercial	85	85	802
Industrial	90	90	852

SOURCE: USDOT FTA 2006.

Notes: [1]In urban areas with very high ambient noise levels (L_{dn} > 65 dB), L_{dn} from construction operations should not exceed existing ambient +10 dB; [2]Twenty-four-hour L_{eq}, not L_{dn}.

5.2.2.3 Noise Impact Assessment Methodology

Screening Assessment

The FTA default screening distances of 375 feet for intervening buildings and 750 feet without intervening buildings were utilized to identify noise-sensitive receptors along the proposed Project alignments. Over 4,500 noise-sensitive receptors (such as residences, schools, and parks) were identified using this approach, which included about 2,900 receptors along the existing MED line and almost 1,600 receptors along the proposed alignments for the Project. Noise impacts were evaluated using FTA's "Detailed Assessment" guidelines to more accurately reflect the type of input data available. Noise impacts from stationary sources (such as the maintenance and storage facilities, stations and parking lots, and substations) were evaluated using FTA's "General Assessment" guidelines to reflect single large stationary sources (USDOT FTA 2006).

Noise is defined as unwanted sound from a source that travels along a path to a receiver.

Sound is measured in decibels (dB).

Amplitude is the loudness of a sound.

Frequency is the number of times the sound is observed.

A-weighted decibels (dBA) are used to measure sounds in the spectrum that the human ear is more sensitive to hearing.

Baseline Noise Monitoring

To determine the existing background noise levels at sensitive receptors near the Project, a baseline noise-monitoring program was conducted at 11 representative locations shown on **Figure 5.2-3**. Noise levels were measured from December 2 to December 5, 2014, during various periods of the day in accordance with FTA guidelines to determine the average ambient conditions on a typical weekday.

The noise measurements documented existing noise sources in the Study Area, including traffic along Calumet Avenue. The 24-hour day-night noise level (or L_{dn}) is used to describe existing noise at residences and other FTA Category 2 land uses. Similarly, peak-hour equivalent noise levels (L_{eq}) are reported for non-residential or institutional receptors such as schools, libraries, or churches. All noise levels are reported in A-weighted noise levels (or dBA) for comparison with FTA criteria.

Noise Modeling Assumptions

The various noise modeling assumptions, noise levels for each of the proposed noise sources (including train pass-bys, wheel squeal, etc.), and other operating characteristics (such as average duration times, source heights, etc.) are described in detail in **Appendix H** in the *West Lake Corridor Noise and Vibration Technical Report*. The noise modeling assumptions, noise levels for each of the proposed noise, and other operating characteristics data are based on default FTA data, as well as operational information provided by the Project team. The commuter rail operations data are summarized in Appendix B of the *West Lake Corridor Noise and Vibration Technical Report* (see **Appendix H**) for various peak and off-peak periods of the day. Proposed operating hours for the new service would generally be between 5:30 a.m. and 12 a.m. on weekdays and 6:00 a.m. to 1:00 a.m. on Saturdays and Sundays. The schedule was used to predict future noise levels under the Build Alternatives. The noise projections were carried out using the following methodological assumptions:

- All modeling projections are consistent with the methodology in the detailed assessment chapters of FTA's *Transit Noise and Vibration Impact Assessment* guidance manual (USDOT FTA 2006).
- Noise-sensitive land use in the Study Area was determined based on parcel data, aerial imagery, and windshield surveys in the field. Specific noise-sensitive uses include residential properties (single-family, multi-family), churches, parks, and schools.

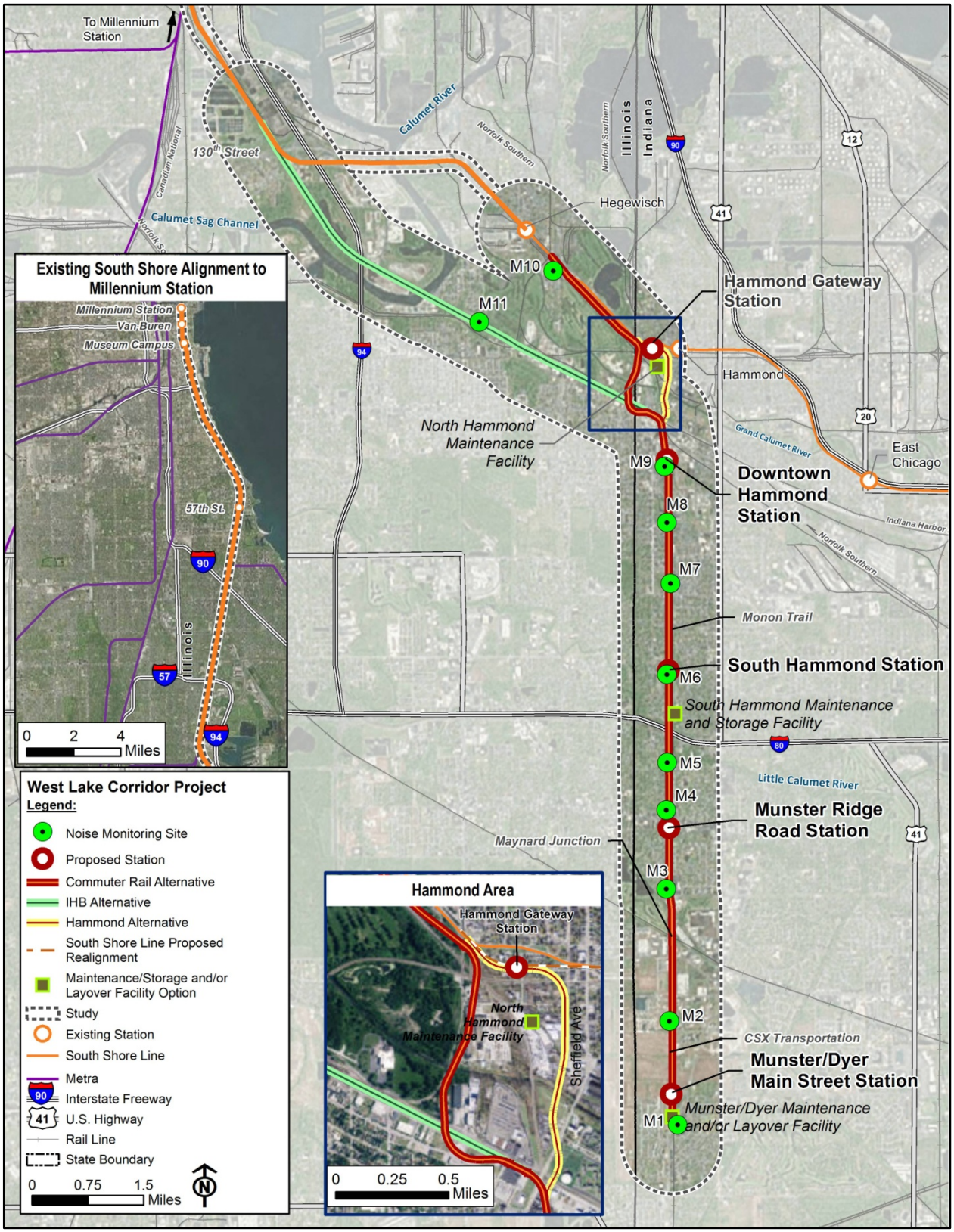


Figure 5.2-3: Noise-Monitoring Sites in Study Area

5.2.3 Affected Environment

The proposed Build Alternative alignments are located in suburban and urban areas in Northwest Indiana and Northeast Illinois. The Study Area south of the existing MED/SSL is characterized by a mix of rural suburban to dense urban communities that include major highways such as I-94 and arterials such as Ridge Road and Hohman Avenue. As summarized in **Table 5.2-3**, the measured day-night noise levels in the Study Area ranged from 54 dBA at Receptor M3 (a residence on Manor Avenue in Munster) to 76 dBA at Receptor M10 (a residence along South Chippewa Avenue in Burnham, Illinois). In general, the lower noise levels are representative of land uses along the Monon Trail, while the higher noise levels reflect heavy traffic along urban streets.

Table 5.2-3: Baseline Noise Monitoring Results (dBA)

Site ID	Receptor Location and Description	FTA Land Use Category	Day-Night Noise Level (L_{dn})	Peak Hour Noise Level (L_{eq})
M1	Maria Goretti Catholic Church, 500 Northgate Dr., Dyer	3	--	56
M2	Residence, 9901 Whitehall Gardens, Munster	2	60	55
M3	Residence, 8827 Manor Ave., Munster	2	54	52
M4	Vacant, Manor Ave. at Ridge Rd., Munster[1]	2	58	55
M5	Residence, 736 Sunnyside Ave., Munster	2	61	58
M6	Residence, 7136 Lyman Ave., Hammond	2	63	62
M7	Residence, 6411 Blaine Ave., Hammond	2	60	56
M8	Residence, 268 Waltham St., Hammond	2	61	61
M9	Residence, 255 Ogden St., Hammond	2	62	60
M10	Residence, 13918 S. Chippewa Ave., Burnham	2	76	69
M11	Residence, 14315 S. Manistee Ave., Burnham	2	61	54

SOURCE: USDOT FTA 2006; AECOM 2014.
Note: [1]The surrounding land uses at this site are residential.

Similarly, peak-hour noise levels measured along the Study Area ranged from 52 dBA at Receptor M3 (a residence along Manor Avenue in Munster) to 69 dBA at Receptor M10 (a residence along South Chippewa Avenue in Burnham). These levels represent large differences in existing ambient conditions ranging from rural to urban land uses. All noise levels are reported in dBA, which best approximates the sensitivity of human hearing.

5.2.4 Environmental Consequences

The potential noise impacts from the Project Alternatives are described in the following sections.

5.2.4.1 Long-Term Operating Effects

No Build Alternative

Projected noise levels under the No Build Alternative are anticipated to be similar to those under existing conditions. Irrespective of other projects planned and programmed in the region, ambient noise under the No Build Alternative is anticipated to be essentially the same as under existing conditions without the NEPA Preferred Alternative. For example, it takes a doubling of the traffic volumes for the noise levels to increase by 3 dBA, the threshold where most listeners detect the change. However, only marginal increases in traffic levels are predicted in the Study Area between now and 2040, resulting in slightly higher congestion and lower average travel speeds. Along the existing MED/SSL corridor, ambient noise levels at residences adjacent to the rail corridor would be

dominated by existing rail operations. The future noise under the No Build Alternative is expected to be similar to the existing conditions since operations are not expected to increase substantially.

NEPA Preferred Alternative

Predicted noise levels for all discrete receptors included in the baseline noise measurements are provided in **Table 5.2-4**. Maximum day-night Project noise levels under the NEPA Preferred Alternative are predicted to range from 32 dBA at Site M11 (a residence along South Manistee Avenue in Burnham) to 67 dBA at Site M3 (a residence along Manor Avenue in Munster). The elevated noise levels would primarily be due to Federal Railroad Administration (FRA)-required warning horn use within ¼ mile of all proposed grade crossings. Exceedances of the FTA *moderate* or *severe* impact criteria are anticipated for discrete receptors M3, M6, M7, M8, and M9 under all Build Alternatives.

Table 5.2-5 provides a summation of the Study Area-wide noise impacts anticipated for all Build Alternatives. Under the NEPA Preferred Alternative, exceedances of the FTA *severe* impact criteria are predicted at 145 residences (Category 2 land uses) and 3 institutional receptors (Category 3 land uses). Exceedances of the FTA *moderate* impact criteria are predicted at 290 residences and 20 institutional receptors. A total of 435 impacts are predicted at residences (FTA Category 2 receptor) and 23 impacts are predicted at institutions (FTA Category 3 receptor). No exceedances of the FTA impact criteria are predicted along the existing MED/SSL. These impact counts do not include vacant properties identified using aerial and street-view photography. The locations of all affected receptors are illustrated in Appendix A of the *West Lake Corridor Noise and Vibration Technical Report* (see **Appendix H**).

Table 5.2-4: Predicted Noise Levels at Select Receptors under the Project Alternatives (dBA)

Receptor		FTA Category	Noise Levels (dBA)[1]					FTA Criteria	
No.	Description		No Build	NEPA Preferred	Commuter Rail	IHB	Hammond 1 & 3	Mod-erate	Severe
M1	Maria Goretti Catholic Church, 500 Northgate Dr.	3	56	39	39	39	39	61	67
M2	Residence, 9901 Whitehall Gardens	2	60	52	52	52	52	58	63
M3	Residence, 8827 Manor Ave.	2	54	**67**	**67**	**67**	**67**	55	61
M4	Vacant, Manor Ave. at Ridge Rd.	--[2]	58	**59**	**60**	**59**	**59**	--	--
M5	Residence, 736 Sunnyside Ave.	2	61	48	48	48	48	58	64
M6	Residence, 7136 Lyman Ave.	2	63	**62**	**62**	**62**	**62**	60	65
M7	Residence, 6411 Blaine Ave.	2	60	**63**	**63**	**63**	**63**	58	63
M8	Residence, 268 Waltham St.	2	61	**66**	**66**	**66**	**66**	58	64
M9	Residence, 255 Ogden St.	2	62	**61**	**61**	**61**	**61**	59	65
M10	Residence, 13918 S. Chippewa Ave.	2	76	48	48	37	48	65	74

Table 5.2-4: Predicted Noise Levels at Select Receptors under the Project Alternatives (dBA) (cont.)

Receptor		FTA Category	Noise Levels (dBA)[1]					FTA Criteria	
No.	Description		No Build	NEPA Preferred	Commuter Rail	IHB	Hammond 1 & 3	Mod-erate	Severe
M11	Residence, 14315 S. Manistee Ave.	2	61	32	32	51	32	58	64

SOURCE: AECOM 2015.

Notes: [1]Exceedances of the FTA moderate impact criteria are **bolded**; exceedances of the FTA severe impact criteria are shaded gray and **bolded**. The Project noise levels are reported for each of the three primary Build Alternatives including the Commuter Rail Alternative, Hammond Alternative, and the IHB Alternative; [2]Site M4 is currently a vacant property and is, therefore, not included in the impact evaluation. However, the surrounding land uses at this site are residential. Measurements at this site are representative of the noise in this area.

Table 5.2-5: Predicted Study Area Wide Noise Impacts under the Build Alternatives

Project Alternative	Corridor Segment[1]	Moderate[2]			Severe[2]			Totals[2]		
		1	2	3	1	2	3	1	2	3
NEPA Preferred	MED/SSL	0	0	0	0	0	0	0	0	0
	Project	0	290	20	0	145	3	0	435	23
	Total	**0**	**290**	**20**	**0**	**145**	**3**	**0**	**435**	**23**
Commuter Rail Options	MED/SSL	0	0	0	0	0	0	0	0	0
	Project	0	288	20	0	147	3	0	435	23
	Total	**0**	**288**	**20**	**0**	**147**	**3**	**0**	**435**	**23**
IHB Options	MED/SSL	0	0	0	0	0	0	0	0	0
	Project	0	290	45	0	145	11	0	435	56
	Total	**0**	**290**	**45**	**0**	**145**	**11**	**0**	**435**	**56**
Hammond Options 1 and 3	MED/SSL	0	0	0	0	0	0	0	0	0
	Project	0	290	20	0	145	3	0	435	23
	Total	**0**	**290**	**20**	**0**	**145**	**3**	**0**	**435**	**23**

SOURCE: AECOM 2016.

Notes: [1]MED/SSL: The existing MED/SSL line; [2]The number of exceedances of the moderate and severe impact criteria categories are reported for each of the three FTA land-use categories: Category 1 is highly sensitive receptors; Category 2 is residences; and Category 3 is institutional properties.

Commuter Rail Alternative Options

The results of the noise analysis for the Commuter Rail Alternative options are summarized in **Table 5.2-5** and described below. The impacts expected under Commuter Rail Alternative Options 2, 3, and 4 are described qualitatively based on the findings for Commuter Rail Alternative Option 1. North of Douglas Street, the proposed Commuter Rail Alternative alignment is the same for all the options. However, south of Douglas Street, the Commuter Rail Alternative options include variations on the location of the proposed Munster/Dyer Main Street Station parking lot (i.e., east side versus west side of the CSX freight line), two locations for the maintenance facility and one option that places the proposed alignment on the west side of the existing CSX freight line. However, since none of these Project elements dominate the noise exposure and the predicted noise impacts that would be due to warning horns at grade crossings, no difference in the number of impacts is predicted among the options. For all Commuter Rail Alternative Options, no exceedances of the FTA impact criteria are predicted along the existing MED/SSL.

As shown in **Table 5.2-4**, maximum day-night project noise levels under the Commuter Rail Alternative Options are predicted to range from 32 dBA at Site M11 (a residence along South Manistee Avenue in Burnham) to 67 dBA at Site M3 (a residence along Manor Avenue in Munster). The elevated noise levels would primarily be due to FRA-required warning horn use within ¼ mile of all grade crossings. Therefore, exceedances of the FTA *moderate* or *severe* impact criteria are predicted at receptor Sites M3, M6, M7, M8, and M9. As shown in **Table 5.2-5**, exceedances of the FTA *severe* impact criteria are predicted at 147 residences (Category 2 land uses) and 3 institutional receptors (Category 3 land uses). Exceedances of the FTA *moderate* impact criteria are predicted at 288 residences and 20 institutional receptors. A total of 435 impacts are predicted at residences (FTA Category 2 receptor) and 23 FTA Category 3 receptor impacts are predicted. The locations of all potentially affected receptors are illustrated in Appendix A of the *West Lake Corridor Noise and Vibration Technical Report* (see **Appendix H**).

IHB Alternative Options

South of Douglas Street, the proposed IHB Alternative alignment for all Options would be the same as the Commuter Rail Alternative Options. However, north of Douglas Street, the IHB Alternative Options would follow the existing IHB freight line right-of-way (ROW) west through Calumet City and other points west and north. Therefore, with only minor exceptions, the noise impacts are predicted to be the same for each of the IHB Alternative options. No exceedances of the FTA impact criteria are predicted along the existing MED/SSL.

As shown in **Table 5.2-4**, maximum day-night project noise levels under the IHB Alternative Options are predicted to range from 37 dBA at Site M10 (a residence along South Chippewa Avenue in Burnham) to 67 dBA at Site M3 (a residence along Manor Avenue in Munster). The elevated noise levels would primarily be due to FRA-required warning horn use within ¼-mile of all grade crossings. Therefore, exceedances of the FTA *moderate* or *severe* impact criteria are predicted at receptor Sites M3, M6, M7, M8 and M9. Predicted noise impacts under the IHB Alternative Options are reported in **Table 5.2-5**. Exceedances of the FTA *severe* impact criteria are predicted at 145 residences (Category 2 land uses) and 11 institutional receptors (Category 3 land uses). Exceedances of the FTA *moderate* impact criteria are predicted at 290 residences and 45 institutional receptors. A total of 435 impacts are predicted at residences (FTA Category 2 receptor) and 56 FTA Category 3 receptor impacts are predicted. The locations of all impacted receptors are illustrated in Appendix A of the *West Lake Corridor Noise and Vibration Technical Report* (see **Appendix H**).

Hammond Alternative Options 1 and 3

The potential noise impacts under Hammond Alternative Options 1 and 3 would be the same as those under the NEPA Preferred Alternative.

Maynard Junction Rail Profile Option

The Maynard Junction Rail Profile Option would include crossing the existing CSX freight line in an at-grade profile instead of an elevated profile. This change would include new rail discontinuities at the diamond crossing resulting in elevated noise levels. Since the Maynard Junction is located in a primarily industrial area with limited noise-sensitive receptors, no impacts are predicted in addition to those impacts described for the applicable alternative options (i.e., NEPA Preferred Alternative, Commuter Rail Alternative Options 1, 2, and 3, IHB Alternative Options 1, 2, and 3, and Hammond Alternative Option 1).

5.2.4.2 Short-Term Construction Effects

No construction-related noise impacts are anticipated as a result of the No Build Alternative. Potential impacts associated with other projects under the No Build Alternative would be evaluated separately as part of the planning for those projects.

Noise levels from construction activities associated with the Build Alternatives, although temporary, could be a nuisance at nearby sensitive receptors such as residences, hotels, and schools. Noise levels during construction would vary depending on the types of activity and equipment used for each stage of work. Heavy machinery, the major source of noise in construction, would be constantly moving and not usually at one location very long. For example, Project construction activities would include new track, rehabilitating bridges, relocating utilities, reconstructing street intersections, constructing passenger stations, and building structures associated with the maintenance facility and other ancillary facilities (e.g., overhead contact system [OCS] poles or traction power substations [TPSS]).

Table 5.2-6 shows typical construction equipment noise emission levels at 50 feet. The use of especially noisy equipment, such as a rail saw, jack hammer, scrapers, and pneumatic tools, would be common throughout the proposed alignment. Pile drivers, the noisiest type of equipment for rail projects, may be used in areas where the tracks are on elevated structures, or where other Project features would require a pile foundation.

Table 5.2-6: Typical Construction Equipment Noise Emission Levels at 50 Feet from Source

Equipment Type	Typical Noise Levels at 50 feet from Source
Pile Drivers (Impact)	101
Rail Saw	90
Scraper	89
Truck	88
Jack Hammer	88
Mobile Crane	88
Grader	85
Dozer	85
Tie Inserter	85
Pneumatic Tool	85
Impact Wrench	85

SOURCE: FTA 2016.

It is generally recognized that there would be temporary noise impacts during construction in some locations. In addition, activities associated with construction staging and/or material laydown areas could result in noise impacts if located in noise-sensitive areas, although noise-sensitive areas would be avoided to the maximum extent possible. Similarly, there would also be the potential for noise increases along detour routes and truck haul routes.

The bulk of the construction would normally occur during daylight hours when some residents are not at home, when residents who are at home are less sensitive to construction activities, and when other community noise sources contribute to higher ambient noise levels. However, some construction activities may also occur during the nighttime and on weekends to complete the Project sooner and reduce the overall duration of impact on the community. Most construction activities are expected to last less than 6 months at any one location, depending on the type of activity, and the overall Project construction period is expected to last approximately 2 years. During this timeframe, noise impacts

are expected along the proposed alignment, particularly at sensitive receptors adjacent to the proposed alignment and facilities.

At this early stage of Project development, the extent of the short-term construction impact is indeterminable as the construction plans, which would identify the specific equipment to be used and the locations where the equipment would be used, would not be completed until the Engineering phase of the Project. Additional analysis would be conducted during the Engineering phase to confirm construction noise impact locations.

5.2.5 Avoidance, Minimization, and/or Mitigation Measures

Noise impacts are predicted for the Build Alternatives during operation of the Project. Potential mitigation measures that could be incorporated into the design of the Project to reduce impacts are discussed in the following sections. With the incorporation of recommended mitigation measures, it is expected that all impacts would be reduced below the *severe* noise threshold. Similarly, noise control measures would also eliminate or minimize the predicted *moderate* noise impacts. A table of the reduction in noise at each receptor once the proposed mitigation is applied is provided in the *West Lake Corridor Noise and Vibration Technical Report* in **Appendix H**.

5.2.5.1 Long-Term Operating Effects

No mitigation measures are proposed for the No Build Alternative since no impacts are anticipated. Since operational noise impacts are predicted under the NEPA Preferred Alternative and other Build Alternatives, an evaluation of potential mitigation measures is required. Potential mitigation measures for impacts are discussed below.

- Noise impacts due to warning horns on rail vehicles within ¼ mile of grade crossings may be eliminated by installing stationary wayside horns at grade crossings. Wayside horns would limit the horn noise exposure to the area around the grade crossings by directing the acoustical “cone” along the road rather than into the community. With wayside horns, all of the *severe* and *moderate* noise impacts would be eliminated except for one multi-family building on Manor Avenue in Munster. The remaining noise level of 55 dBA after mitigation would be equal to the FTA *moderate* noise threshold of 55 dBA.
- The remaining noise impact due to train operations may be eliminated with a noise barrier adjacent to the west side of the track. Since the acoustical center of the trains is approximately 2 feet above top-of-rail, shorter knee-height barriers 3 feet tall located within 15 feet of the track centerline would eliminate any impacts due to wheel-rail noise and aerodynamic noise. A noise barrier on Manor Avenue in Munster would eliminate this remaining noise impact.
- Since track turnout switches would be strategically placed away from residences, no noise or vibration impacts are predicted due to switches.
- Potential nuisance noise due to parking facilities may be eliminated or reduced in severity by designing the layout such that the loudest activities (such as idling buses and passenger drop-off curbs) are located away from any nearby residences. Additionally, other “smart design” measures include landscaping elements that shield nearby residences from nuisance noise such as slamming doors, patrons’ voices, car starters, and other general activities associated with park-and-ride lots.
- Similarly, potential nuisance noise due to the proposed maintenance and service facilities may be eliminated or reduced in severity by utilizing “smart design” during the Engineering phase of the Project. For example, facility designs that place the loudest mechanical equipment indoors or that

locate buildings between the closest residences and the loudest activities would minimize the noise impacts in the community.

5.2.5.2 Short-Term Construction Effects

No mitigation measures are proposed for the No Build Alternative since no construction-related impacts are anticipated. For the Build Alternatives, NICTD's selected construction contractor would use noise control measures and best management practices (BMPs) to ensure construction-related noise levels do not exceed the local and state noise codes. Local noise ordinances (such as Lake County Code of Ordinances, Title IX, General Regulation, Chapter 93: Noise) prohibit construction noise between 8:00 p.m. and 7:00 a.m. FTA, however, recommends a noise limit of 80 dBA at any sensitive receptor during the daytime period from 7:00 a.m. to 10:00 p.m. to avoid impacts in the community.

Consistency with local ordinances and implementation of noise control measures and BMPs would ensure that noise levels associated with construction of the Project would not result in impacts to noise-sensitive land uses, as classified by FTA (e.g., residences, hospitals, hotels, and schools). Typical types of noise control measures and BMPs include the following:

- Develop noise and vibration control plans that demonstrate that each new phase of construction work would comply with the county or local noise criteria
- Place temporary noise barriers around the construction site
- Place localized barriers around specific items of equipment or smaller areas
- Use alternative backup alarms/warning procedures
- Use higher performance mufflers on equipment used during nighttime hours
- Use portable noise sheds for smaller, noisy equipment, such as air compressors, dewatering pumps, and generators

All noise control measures and BMPs would be confirmed during the Engineering phase when the details of the Project construction activities are developed and finalized as part of the construction bid contracts.

5.3 Vibration

The section focuses on the potential effects to resources sensitive to vibration. These resources are generally referred to as sensitive receptors for the purpose of this analysis. More detail regarding the vibration analysis findings is provided in the *West Lake Corridor Noise and Vibration Technical Report* in **Appendix H**.

Vibration is the transfer of energy resulting from the motion of a mechanical system.

VdB is the measurement of vibration decibels.

5.3.1 Regulatory Setting

The vibration analysis was performed in accordance with guidelines specified in FTA's guidance manual *Transit Noise and Vibration Impact Assessment* (USDOT FTA 2006). The following section describes the methodology for assessing potential impact from proposed transit projects such as the Project. There are no local vibration ordinances that apply to interstate rail operations or facilities from Hammond, Munster, or Dyer, Indiana.

5.3.2 Methodology

In lieu of a detailed vibration monitoring program to document existing soil properties, FTA's "General Assessment" guidelines (including the default ground-surface vibration curves) were utilized as a conservative or worst-case approach to evaluate the potential for impacts under the Build Alternatives. The methodology for assessing potential long-term vibration impact from transit operations includes:

- Identification of vibration-sensitive land uses within the area of potential effect of the Project
- Measurement and characterization of existing vibration conditions at these receptors
- Projections of future vibration levels from transit operations for Build Alternatives
- Assessment of potential long-term vibration impact
- Recommendations for vibration mitigation

The FTA default screening distances of 375 feet for intervening buildings and 750 feet without intervening buildings were utilized to identify vibration-sensitive receptors (such as residences, schools, and parks).

The guidance manual also includes the methodology for predicting and assessing potential short-term vibration impact from construction activities. The approach to assessing potential impact from construction activities is more general than for transit operations since specific construction equipment and methods depend on the contractor's approach and are not typically defined at this stage of the Project.

5.3.2.1 Vibration Fundamentals and Descriptors

According to FTA, ground-borne vibration associated with vehicle movements is usually the result of uneven interactions between wheels and the road or rail surfaces. Examples of such interactions (and subsequent vibrations) include train wheels over a jointed rail, an untrue rail car wheel with "flats," and a motor vehicle wheel hitting a pothole, a manhole cover, or any other uneven surface (USDOT FTA 2006).

Unlike noise, which travels in air, transit vibration typically travels along the surface of the ground. Depending on the geological properties of the surrounding terrain and the type of building structure exposed to transit vibration, vibration propagation can be more or less efficient. Buildings with a solid foundation set in bedrock are "coupled" more efficiently to the surrounding ground and experience relatively higher vibration levels than buildings located in sandier soil. Heavier buildings (such as masonry structures) are less susceptible to vibration than wood-frame buildings because they absorb more vibration energy (USDOT FTA 2006).

Vibration induced by passing vehicles can generally be discussed in terms of displacement, velocity, or acceleration. However, human responses and responses by monitoring instruments and other objects are most accurately described with velocity. Therefore, the vibration velocity level is used to assess vibration impacts from transit projects (USDOT FTA 2006).

To describe the human response to vibration, the average vibration amplitude (called the root mean square [RMS] amplitude) is used to assess impacts. The RMS velocity level is expressed in inches per second (is) or vibration velocity levels in decibels (dB). All dB vibration levels are referenced to one micro-inch per second (µips) (USDOT FTA 2006).

5.3.2.2 Operational Vibration Impact Criteria

The FTA vibration criteria for evaluating ground-borne vibration impacts from train pass-bys at nearby sensitive receptors are shown in **Table 5.3-1**. These vibration criteria are related to ground-borne vibration levels that are expected to result in human annoyance, and are based on RMS velocity levels expressed in dB referenced to 1 µips. FTA's experience with community response to ground-borne vibration indicates that, when there are only a few train events per day, it would take higher vibration levels to evoke the same community response that would be expected from more frequent events. This is taken into account in the FTA criteria by distinguishing between projects with frequent, occasional, and infrequent events, where the frequent events category is defined as more than 70 events per day. Similarly, the occasional events category is defined as between 30 and 70 events per day, while the infrequent events category is defined as less than 30 events per day. To be conservative, the FTA occasional criteria were used to assess ground-borne vibration impacts in the Study Area.

Table 5.3-1: Ground-Borne Vibration Impact Criteria

Category	Receptor Land Use Description	RMS Vibration Levels (dB)		
		Frequent Events	Occasional Events	Infrequent Events
1	Buildings where low vibration is essential for interior operations	65	65	65
2	Residences and buildings where people normally sleep	72	75	80
3	Daytime institutional and office use	75	78	83
Specific Buildings	TV/Recording Studios/Concert Halls	65	65	65
	Auditoriums	72	80	80
	Theaters	72	80	80

SOURCE: USDOT FTA 2006.

The vibration criteria levels shown in **Table 5.3-1** 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 dB.

Projected ground-borne vibration levels from commuter rail pass-bys were predicted using the default ground-surface vibration curves in FTA's guidance manual on *Transit Noise and Vibration Impact Assessment* (USDOT FTA 2006). The commuter rail trains would travel up to a maximum speed of 42 miles per hour (mph), greatly reducing the potential for vibration impacts to nearby receptors. Vibration impacts were evaluated along both the proposed alignment and the existing MED/SSL. As a conservative modeling assumption, the surface vibration curves were adjusted to reflect local conditions (receptor distances), changes in train speed, and special track work such as switches. For example, vibration levels due to rail discontinuities at turnout switches are typically 10 dB higher than for continuously-welded rail track. No adjustments were applied for corrugated rail, wheel flats, or other unmaintained rolling stock. NICTD maintains a rail-grinding and wheel-trueing program to maximize track life and to minimize adverse vibration in the community. Finally, no adjustments were applied for different receptor building construction types (i.e., masonry versus timber).

5.3.3 Affected Environment

Existing vibration along the proposed alignment (particularly along the southern segment) is currently affected by vehicular roadway traffic, particularly cars, trucks, and buses. Along the existing MED/SSL corridor, vibration is dominated by existing rail service from the SSL, Metra, Amtrak, and freight.

5.3.4 Environmental Consequences

This section includes a discussion of the potential operational impacts of the Project, as well as an assessment of temporary construction impacts from vibration. Additional information is provided in the *West Lake Corridor Noise and Vibration Technical Report* in **Appendix H**.

5.3.4.1 Long-Term Operating Effects

No Build Alternative

Projected vibration levels under the No Build Alternative are expected to be similar to existing conditions. Traffic, including heavy trucks and buses, rarely creates perceptible ground-borne vibration unless vehicles are operating very close to buildings or there are irregularities in the road, such as potholes or expansion joints. The pneumatic tires and suspension systems of automobiles, trucks, and buses eliminate most ground-borne vibration. Similarly, vibration levels from existing train service along the existing MED/SSL is expected to be the dominant source of vibration in the area, which is not expected to change from the existing condition. As a result, there would be no vibration impacts associated with the No Build Alternative since nothing would be built.

NEPA Preferred Alternative

Predicted ground-borne vibration levels for the same discrete receptors utilized in the noise assessment, described in **Section 5.2** of this DEIS, are provided in **Table 5.3-2**. Project vibration levels under the NEPA Preferred Alternative are predicted to range from 21 dB at Site M10 (a residence along South Chippewa Avenue in Burnham) to 66 dB at Site M8 (a residence along Waltham Street in Hammond). The elevated vibration levels would be primarily due to rail discontinuities at track turnout switches. Overall, no exceedances of the FTA *occasional* vibration impact criteria are predicted along the existing MED/SSL. However, one exceedance is predicted along the proposed alignment at a residence along Lyman Avenue next to a proposed track turnout switch. No other exceedances are predicted under the proposed alignment for the NEPA Preferred Alternative.

Commuter Rail Alternative Options

The results of the vibration analysis for the Commuter Rail Alternative Options are summarized in **Table 5.3-2** and described below. The Commuter Rail Alternative has four different options. North of Douglas Street, the proposed Commuter Rail Alternative alignment is the same for all four options; however, there are differences between the options south of Douglas Street. As discussed in greater detail in the *West Lake Corridor Noise and Vibration Technical Report* (see **Appendix H**), the differences between the four options would not affect the level and/or number of vibration impacts.

Project vibration levels under the Commuter Rail Alternative Options are predicted to range from 21 dB at Site M10 (a residence along South Chippewa Avenue in Burnham) to 66 dB at Site M8 (a residence along Waltham Street in Hammond), see **Table 5.3-2**. The elevated vibration levels would primarily be due to rail discontinuities at track turnout switches. Overall, no exceedances of the FTA occasional vibration impact criteria are predicted along the existing MED/SSL. However, one exceedance is predicted along the proposed Commuter Rail Alternative alignment at a residence along Lyman Avenue next to a proposed track turnout switch. No other exceedances are predicted under the Commuter Rail Alternative Options.

Table 5.3-2: Predicted Vibration Levels at Select Receptors under the Project Alternatives (dB)

No.	Receptor	FTA	Vibration Levels (dB)				FTA
	Description	Category	NEPA Preferred	Commuter Rail	IHB	Hammond 1 & 3	Criteria[1]
M1	Maria Goretti Catholic Church, 500 Northgate Dr.	3	41	41	41	41	78
M2	Residence, 9901 Whitehall Gardens	2	61	61	61	61	75
M3	Residence, 8827 Manor Ave.	2	62	62	62	62	75
M4	Vacant, Manor Ave. at Ridge Rd.	--[2]	57	57	57	57	--
M5	Residence, 736 Sunnyside Ave.	2	60	60	60	60	75
M6	Residence, 7136 Lyman Ave.[3]	2	60	60	60	60	75
M7	Residence, 6411 Blaine Ave.	2	61	61	61	61	75
M8	Residence, 268 Waltham St.	2	66	66	66	66	75
M9	Residence, 255 Ogden St.	2	59	59	59	59	75
M10	Residence, 13918 S. Chippewa Ave.	2	21	21	--[4]	21	75
M11	Residence, 14315 S. Manistee Ave.	2	--[4]	--[4]	67	--[4]	75

SOURCE: AECOM 2014.

Notes: [1]FTA vibration impact criteria used to assess impact reflects the "occasional" event activity level (i.e., 30-70 events per day).

[2]Site M4 is currently a vacant property and is, therefore, not included in the impact evaluation. However, the surrounding land uses at this site are residential. Measurements at this site are representative of the vibration level in this area.

[3]This site is closest to the residence where an exceedance to the vibration criteria is predicted.

[4]Receptors not located on Alternative.

IHB Alternative Options

South of Douglas Street, the proposed IHB Alternative alignment would be the same as the Commuter Rail Alternative Options. However, north of Douglas Street, the IHB Alternative Options would follow the existing IHB ROW west through Calumet City and other points west and north. The proposed alignment for the IHB Alternative Options would shift many of the vibration impacts north of Douglas Street west along the existing IHB freight line ROW. As shown in **Table 5.3-2**, project vibration levels under the IHB Alternative Options are predicted to range from 41 dB at Site M1 (Maria Goretti Church in Dyer) to 67 dB at Site M11 (a residence along South Manistee Avenue in Burnham). The elevated vibration levels would primarily be due to rail discontinuities at track turnout switches. Differing from the NEPA Preferred Alternative and the Commuter Rail Alternative Options, vibration levels at Site M11 would be 67 dB. Therefore, with only minor exceptions, the vibration impacts for the IHB Alternative Options are predicted to be the same as those predicted for the Commuter Rail Alternative Options. No exceedances of the FTA impact criteria are predicted along the existing MED/SSL. One exceedance is predicted along the proposed IHB Alternative alignment at a residence along Lyman Avenue next to a proposed track turnout

Hammond Alternative Options 1 and 3

Hammond Alternative Options 1 and 3 would have the same impacts as the NEPA Preferred Alternative. The differences between the NEPA Preferred Alternative and Hammond Alternative Options 1 and 3 would not affect the level and/or number of vibration impacts. Overall, no exceedances of the FTA *occasional* vibration impact criteria are predicted along the existing MED/SSL corridor. However, one exceedance is predicted along the proposed alignment at a residence along Lyman Avenue next to a proposed track turnout switch. No other exceedances are predicted under the proposed alignment for the Hammond Alternative Options 1 or 3.

Maynard Junction Rail Profile Option

The location of the Maynard Junction Rail Profile Option away from vibration-sensitive receptors would have a negligible effect on vibration because future vibration from the Project, including the new crossover, would be insignificant due to the large distances between the rail diamond crossing and the closest vibration-sensitive receptors. No additional exceedances of the FTA *occasional* vibration impact criteria resulting from the Maynard Junction Rail Profile Option are predicted for any of the applicable alternative options (i.e., NEPA Preferred Alternative, Commuter Rail Alternative Options 1, 2, and 3, IHB Alternative Options 1, 2, and 3, and Hammond Alternative Option 1).

5.3.4.2 Short-Term Construction Effects

There would be no construction impacts as a result of the No Build Alternative. Potential impacts associated with other projects under the No Build Alternative would be evaluated separately as part of the planning for those projects. For all Build Alternatives, Project construction activities would include laying new track, rehabilitating bridges, relocating utilities, reconstructing street intersections, constructing passenger stations, and building structures associated with the maintenance facility and other ancillary facilities (OCS poles, TPSS, etc.). It is generally recognized that there would be temporary vibration impacts during construction in some locations. This analysis makes conservative assumptions regarding construction vibration so that potential maximum impacts are analyzed and disclosed consistent with NEPA requirements.

The bulk of the construction would normally occur during daylight hours when some residents are not at home and when residents who are at home are less sensitive to construction activities. However, some construction activities may also occur during the nighttime and on weekends. During construction, vibration impacts are expected along the proposed alignment, particularly at sensitive receptors adjacent to the proposed alignment and facilities. NICTD is committed to minimizing impacts in the community by requiring its construction contractors to implement appropriate vibration control measures that would eliminate impacts and minimize extended disruption of normal activities.

5.3.5 Avoidance, Minimization, and/or Mitigation Measures

5.3.5.1 Long-Term Operating Effects

No mitigation measures are proposed for the No Build Alternative since no impacts are anticipated. For all Build Alternatives, one exceedance is predicted at a residence along Lyman Avenue next to a proposed track turnout switch. Mitigating this impact would include relocating the switch away from residences, installing ballast mats under the proposed switch, or utilizing pointless or spring frogs. Final determination of specific mitigation design measures for each location would occur in the Engineering phase of the Project.

5.3.5.2 Short-Term Construction Effects

No mitigation measures are proposed for the No Build Alternative since no construction-related impacts are anticipated. For the Build Alternatives, consistency with local ordinances and implementation of BMPs would prevent vibration levels associated with construction of the Project from impacting vibration-sensitive receptors. BMPs that could be implemented by the construction contractor to minimize vibration in the community include the following control measures:

- Use less vibration-intensive construction equipment or techniques near vibration-sensitive locations.
- Route heavily laden vehicles away from vibration-sensitive locations.

- Operate earthmoving equipment as far as possible from vibration-sensitive locations.
- Sequence construction activities that produce vibration, such as demolition, excavation, earthmoving, and ground impacting, so that the vibration sources do not operate simultaneously.
- Use construction devices with the least impact to accomplish necessary tasks. For example, instead of using impact pile drivers, using vibratory pile drivers or augers would be considered.

5.4 Air Quality

This section describes the current regulation pertaining to the control of air pollutants, the pollutants of concern within the Study Area, the region's attainment status, existing conditions, future traffic, and the potential future air quality effects of the Project Alternatives.

5.4.1 Regulatory Setting

5.4.1.1 Criteria Pollutants and National Ambient Air Quality Standards (NAAQS)

"**Air Pollution**" is a general term that refers to one or more chemical substances that degrade the quality of the atmosphere. Individual air pollutants degrade the atmosphere by reducing visibility, damaging property, reducing the productivity or vigor of crops or natural vegetation, or reducing human or animal health.

Regulations for air pollutant emissions exist to protect human health, welfare, and the environment. The United States Environmental Protection Agency (USEPA) develops and enforces the regulations that help govern air quality. In 1970, the Clean Air Act (CAA) (42 USC § 7401 et seq.) established National Ambient Air Quality Standards (NAAQS) for six criteria pollutants (see **Table 5.4-1**) to protect public health and welfare (40 Code of Federal Regulations [CFR] § 50). The NAAQS include primary and secondary standards. The primary standards were established at levels sufficient to protect public health with an adequate margin of safety. The secondary standards were established to protect public welfare from the adverse effects associated with pollutants in the ambient air.

Six criteria air pollutants identified by USEPA are considered as being of concern nationwide: carbon monoxide (CO), sulfur dioxide (SO_2), nitrogen oxides (NOx) nitrogen dioxide (NO_2), ozone (O_3), particulate matter with a diameter of 10 micrometers or less(PM_{10}), particulate matter with a diameter of 2.5 micrometers or less ($PM_{2.5}$), and lead (Pb) (USEPA 2015c). The sources of these pollutants, their effects on human health, and their concentrations in the atmosphere vary considerably (USEPA 2015c).

5.4.1.2 NAAQS Attainment Status

According to the CAA (42 USC § 7401 et seq.), areas where ambient concentrations of a criteria pollutant are below the corresponding NAAQS are designated as being in "attainment" for this pollutant. Areas where the criteria pollutant level exceeds the NAAQS are designated as being in "nonattainment." A maintenance area is one that has been redesignated from nonattainment status with an approved maintenance plan under Section 175 of the CAA to attainment (40 CFR § 150). Where insufficient data exist to determine an area's attainment status, the area is designated unclassifiable or in attainment. O_3 nonattainment areas are categorized as marginal, moderate, serious, severe, or extreme. CO and PM_{10} nonattainment areas are categorized as moderate or serious. The Project would take place in Lake County, Indiana, and Cook County, Illinois. Both counties are currently designated as:

- A marginal nonattainment area for O_3
- A maintenance area for $PM_{2.5}$ and PM_{10}

- An attainment area for other criteria pollutants

The CAA, as amended in 1990 (42 USC § 7401 et seq.), mandates that states with nonattainment areas must adopt State Implementation Plans (SIPs) that target the elimination or reduction of the severity as well as the number of violations of the NAAQS.

Table 5.4-1: National Ambient Air Quality Standards

Pollutant		Primary/ Secondary	Averaging Time	Level	Form
Carbon Monoxide (CO)		Primary	8-hour	9 ppm	Not to be exceeded more than once per year
			1-hour	35 ppm	
Lead (Pb)		Primary and Secondary	Rolling 3-month	0.15 µg/m^3(1)	Not to be exceeded
Nitrogen Dioxide (NO_2)		Primary	1-hour	100 ppb	98th percentile, averaged over 3 years
		Primary and Secondary	Annual	53 ppb(2)	Annual mean
Ozone (O_3)		Primary and Secondary	8-hour	0.075 ppm(3)	Annual fourth-highest daily maximum 8-hr concentration, averaged over 3 years
Particle Pollution	$PM_{2.5}$	Primary	Annual	12 µg/m(3)	Annual mean, averaged over 3 years
		Secondary	Annual	15 µg/m(3)	Annual mean, averaged over 3 years
		Primary and Secondary	24-hour	35 µg/m(3)	98th percentile, averaged over 3 years
	PM_{10}	Primary and Secondary	24-hour	150 µg/m(3)	Not to be exceeded more than once per year on average over 3 years
Sulfur Dioxide (SO_2)		Primary	1-hour	75 ppb(4)	99th percentile of 1-hour daily maximum concentrations, averaged over 3 years
		Secondary	3-hour	0.5 ppm	Not to be exceeded more than once per year

SOURCE: USEPA 2015 https://www.epa.gov/criteria-air-pollutants/naaqs-table.

Notes: [1]Final rule signed October 15, 2008. The 1978 lead standard (1.5 µg/m^3 as a quarterly average) remains in effect until one year after an area is designated for the 2008 standard, except that in areas designated nonattainment for the 1978 standards, the 1978 standard remains in effect until implementation plans to attain or maintain the 2008 standard are approved.

[2]The official level of the annual NO_2 standard is 0.053 ppm, equal to 53 ppb, which is shown here for the purpose of clearer comparison to the 1-hour standard.

[3]Final rule signed March 12, 2008. The 1997 ozone standard (0.08 ppm, annual fourth-highest daily maximum 8-hour concentration, averaged over 3 years) and related implementation rules remain in place. In 1997, EPA revoked the 1-hour ozone standard (0.12 ppm, not to be exceeded more than once per year) in all areas, although some areas have continued obligations under that standard ("anti-backsliding"). The 1-hour ozone standard is attained when the expected number of days per calendar year with maximum hourly average concentrations above 0.12 ppm is less than or equal to 1.

[4]Final rule signed June 2, 2010. The 1971 annual and 24-hour SO_2 standards were revoked in that same rulemaking. However, these standards remain in effect until one year after an area is designated for the 2010 standard, except in areas designated nonattainment for the 1971 standards, where the 1971 standards remain in effect until implementation plans to attain or maintain the 2010 standard are approved.

5.4.1.3 Transportation Conformity Rule

USEPA developed the CAA Transportation Conformity Rule (TCR) (40 CFR §§ 51.390 and 93). The TCR is applicable to transportation projects funded and approved by FTA and/or the Federal Highway Administration (FHWA) in nonattainment and/or maintenance areas and requires the analysis of project-related air emissions to show that the Project would not cause or contribute to any new violations of the NAAQS (40 CFR §§ 51.390 and 93). Since the Project is located in a nonattainment or maintenance area, TCR compliance is applicable. Because the proposed action would not affect the traffic network in Cook County, Illinois, the TCR compliance demonstration is only applicable to the Study Area within Lake County, Indiana.

The Northwestern Indiana Regional Planning Commission (NIRPC) is responsible for developing the SIP-conforming transportation improvement programs (TIP) to address mobile source emissions within the applicable region in Indiana. There are two levels of transportation conformity:

- **Regional Conformity**: The current applicable transportation plans and programs are known as the *2040 Comprehensive Regional Plan* (CRP) (NIRPC 2011) and the *FY 2016-2019 TIP*. The regional conformity determination must show that the total emissions from on-road mobile sources in the region's transportation system are within the Motor Vehicle Emissions Budget (MVEB) outlined in the SIP. The program must also be consistent with the goals for air quality found in the SIP. The regional emissions analysis as part of the SIP conformance demonstration must include all federally funded projects and non-federally funded and/or regionally significant projects that would affect vehicle travel in the region.
- **Project-Level Conformity**: For specific transportation projects, the conformity determination must show that the individual project is consistent with the SIP conformity determination. Potential localized emission impacts must be addressed and consistent with goals found in the SIP. State or local transportation agencies are responsible for the project-level conformity determination. The analysis described in this DEIS is to meet the project-level conformity requirement through a quantitative microscale hot-spot analysis.

5.4.1.4 Mobile Source Air Toxics (MSATs)

In addition to the criteria air pollutants discussed above, USEPA regulates air toxics. Most air toxics originate from human-made sources, including on-road mobile sources, non-road mobile sources (e.g., airplanes), and stationary sources (e.g., dry cleaners, factories, or refineries) (40 CFR §§ 59, 80, 85, and 86). FHWA performed an analysis using the *Motor Vehicles Emission Simulator* (MOVES) Version 2010b software to model national mobile source air toxics (MSATs) emission trends from 1999 to 2050. FHWA's results indicate that even if vehicle miles traveled (VMT) increased by 102 percent as assumed from 2010 to 2050, total annual emissions for the priority MSAT will have a combined reduction of 83 percent over that same time period (FHWA 2012b). As a result, USEPA concluded that no further motor vehicle emissions standards or fuel standards were necessary to further control MSATs. FHWA's interim guidance on MSAT analysis establishes a three-tiered approach to determine the level of MSAT analysis required by a project-level study (FHWA 2012). Project requirements are assessed in relation to the FHWA's interim guidance in **Section 5.4.2.3**.

5.4.1.5 Greenhouse Gas Emissions

Greenhouse gases (GHGs) are gas emissions that trap heat in the atmosphere. USEPA issued the Final *Mandatory Reporting of Greenhouse Gases Rule* on September 22, 2009. On a national scale, federal agencies are addressing emissions of GHGs through reductions mandated in federal laws and Executive Orders (EO). Most recently EO 13423 (*Strengthening Federal Environmental, Energy, and Transportation Management)* and EO 13514 (*Federal Leadership in Environmental, Energy, and Economic Performance)* were established to address GHGs, including GHG emissions inventory, reduction, and reporting. In an effort to reduce energy consumption, reduce GHGs, reduce dependence on petroleum, and increase the use of renewable energy resources in accordance with the goals set by EO 13423 and the Energy Policy Act of 2005, FTA has been promoting public transportation that can reduce GHG emissions by providing a low emissions alternative to driving, facilitating compact development and minimizing the carbon footprint of its operations.

5.4.2 Methodology

The air quality analysis for the Project was conducted in accordance with the requirements of federal and state conformity regulations and guidelines. Under the proposed condition, traffic patterns would remain the same in Cook County, Illinois, and therefore a project-level air quality analysis within Cook County is not warranted. However, in Lake County, Indiana, traffic patterns would change along the proposed alignment particularly around proposed stations. Therefore, the project-level air quality impact analysis was conducted for the Study Area within Lake County, Indiana for CO, PM, MSATs, Mesoscale emissions burden, and GHG emissions.

5.4.2.1 Carbon Monoxide (CO) Hot-Spot Analysis

A CO hot-spot analysis was conducted at select congested intersections along the proposed alignment. Motor vehicles emit CO at the highest rates when they are operating at low speeds or when idling (USEPA 1995). For this reason, the potential for adverse CO impact is greatest at intersections where traffic is most congested. An intersection screening method was first utilized to rank the worst-case locations for each Project Alternative based on the USEPA criteria established in the *Guidelines for Modeling Carbon Monoxide from Roadway Intersections* (USEPA 1992). A total of 25 intersections were screened. Based on the traffic forecasts, the top two intersections, as shown below, with the highest approaching traffic volume and the worst level of service (LOS) were selected for further CO hot-spot dispersion modeling analysis:

- 173rd Street and Harrison Avenue, Hammond, Indiana
- Sheffield Avenue and Main Street, Dyer, Indiana

If these “worst case” intersections do not show violation of the NAAQS, then all other intersections with better operational conditions in the Study Area are assumed to be in compliance with the NAAQS as well.

The CO hot-spot analysis was conducted by following the guidelines and procedures established by USEPA and the Indiana Department of Transportation (INDOT):

- *Procedural Manual for Preparing Environmental Documents* (INDOT 2008)
- *Guideline for Modeling Carbon Monoxide from Roadway Intersections* (USEPA1992)
- CAL3QHC User’s Guide (USEPA 1995)
- Motor Vehicle Emission Simulator (MOVES), User's Guide for MOVES2014 (USEPA 2014)
- *Using MOVES in Project-Level Carbon Monoxide Analyses* (USEPA 2010)

According to USEPA and INDOT guidelines, a project is defined as having a significant air quality impact if it causes a new violation of the NAAQS for CO of 35 parts per million (ppm) for the 1-hour average or 9 ppm for the 8-hour average at the selected intersections. USEPA’s MOVES2014 emission factor model and the CAL3QHC dispersion model were used to predict the worst-case CO levels at two selected intersections.

5.4.2.2 $PM_{2.5}$ and PM_{10} Impact Analysis

The $PM_{2.5}$ and PM_{10} impact analysis was performed based on the guidelines and procedures outlined by USEPA in the following documents for a hot-spot analysis:

- *Procedural Manual for Preparing Environmental Documents* (INDOT 2008)

- *Transportation Conformity Guidance for Quantitative Hot-spot Analyses in PM2.5 and PM10 Nonattainment and Maintenance Areas* (USEPA 2010)

To meet statutory requirements, the TCR requires PM hot-spot analyses to be performed for projects of air quality concern located in $PM_{2.5}$ or PM_{10} nonattainment or maintenance areas. Lake County is in a maintenance area for $PM_{2.5}$ and a partial maintenance area for PM_{10}. Consistent with the guidelines, forecasted traffic conditions in the Study Area were evaluated to determine whether the Project is an air quality concern that requires a hot-spot analysis for $PM_{2.5}$ and PM_{10}.

The Build Alternatives evaluated in this Draft Environmental Impact Statement (DEIS) would involve geometric modifications to intersections. However, the overall traffic mix and volume around these intersections would remain essentially the same. The number of diesel vehicles traveling through these intersections would not change because of the Project. While traffic conditions (volume and truck mix) may change between the present and horizon year 2040, these changes can be expected to be well below the thresholds defined above. Moreover the Project does not fall into any of the above project categories with potential of air quality concern. Therefore, it can be concluded that the Project would not cause or contribute to a $PM_{2.5}$ or PM_{10} violation that would worsen the current maintenance status of the area. Consequently, no further hot-spot analysis for $PM_{2.5}$ or PM_{10} is warranted.

5.4.2.3 Mobile Source Air Toxics (MSATs) Analysis

FHWA's Interim Guidance (the Guidance) establishes a three-tiered approach to determine the level of MSAT analysis required by a project-level study (FHWA 2012b). According to the Guidance, the category of exempt projects or projects with no meaningful potential MSAT effects includes:

- Projects qualifying as a categorical exclusion under 23 CFR § 771.118(c)
- Projects exempt under the CAA conformity rule 40 CFR § 93.126
- Other projects with no meaningful impacts on traffic volumes or vehicle mix

Additionally, the Guidance indicates that "for projects with negligible traffic impacts, regardless of the class of NEPA environmental document, no MSAT analysis is required." It is further noted in the Guidance that "the types of projects categorically excluded under 23 CFR § 771.118(d) or exempt from conformity rule under 40 CFR § 93.127 do not warrant an automatic exemption from an MSAT analysis, but they usually will have no meaningful impact." Projects in this category do not require either a qualitative or a quantitative analysis for MSAT, although documentation of the project category is required. Since the Project falls into the category of resulting in no meaningful impacts on traffic volumes or vehicle mix, there would be no air quality concerns and it does not warrant either a qualitative or a quantitative analysis for MSATs.

5.4.2.4 Mesoscale Emission Burden Analysis

For the NEPA disclosure and alternative comparison purposes and as part of FTA's New and Small Starts evaluation and rating process for major new transit capital investments, a quantitative emission burden analysis was conducted for the Project. A mesoscale emission burden analysis of a project determines a project's overall emissions burden at the mesoscale level and it was performed for the relevant NAAQS criteria pollutants. The analysis was based on the NIRPC-provided weekday on-road vehicle VMT data. USEPA's MOVES 2014 emission factor model was used to predict on-road vehicular emissions in association with the regional VMT levels. Because the Project would be powered with overhead catenary resulting in no mesoscale emission burden, no emission estimates were performed for the rail element. In addition to the criteria pollutants, mesoscale GHGs in terms of carbon dioxide equivalent (CO_2e) were predicted using the same methodology described above.

5.4.3 Affected Environment

The Indiana Department of Environmental Management (IDEM) and the Illinois Environmental Protection Agency (IEPA) are responsible for implementing and enforcing air quality regulations including ambient air monitoring for the respective states. The Study Area encompasses Lake County in Indiana and Cook County in Illinois. The monitored ambient air quality conditions in these counties at the stations that are closest to the Study Area are summarized in **Table 5.4-2** and **Table 5.4-3**. The monitored levels show no exceedances of the NAAQS with the exception of O_3 in Cook County since Cook County was designated as an O_3 nonattainment area.

Table 5.4-2: Monitored Pollutant Concentrations in Lake County, Indiana

Pollutant	Location	Units	Averaging Period	Concentration			NAAQS
				2012	2013	2014	
CO	901 East Chicago Ave/East Chicago Post Office, East Chicago, IN	ppm	8-hour	1.9	1.5	2.1	9
			1-hour	4.5	2.9	5.4	35
SO_2	1300 141st St Street, Hammond, IN	ppb	1-hour	28	24	20	75
			3-years	24			
			24-hour	8	8	11.4	140
PM_{10}	2400 Cardinal Dr.- Benjamin Franklin Elem School, East Chicago, IN	µg/m^3	24-hour	44*	44	52	150
			3-years	47			
$PM_{2.5}$	Purdue University, Calumet-Powers Building, 220 169th Street, Hammond, IN	µg/m^3	Annual	10.6	10.4	11.8	12
			3-years	11			
			24-hour	28	20	39	35
			3-years	29			
NO_2	201 Mississippi St., Bunker, Gary, IN	ppb	1-hour	48	49	55	100
			3-years	51			
Ozone	1300 141 Street, Hammond, IN	ppm	8-hour	0.077	0.063	0.067	0.07
			3-years	0.069			

SOURCE: EPA Air Data 2016, http://www.epa.gov/airdata/ad_rep_mon.html.

Notes: [1]Based on the NAAQS definitions,

a. CO concentrations are the first-highest for year 2012, 2013 and 2014.

b. SO_2 concentrations are the 99-percentile for 1-hour and 24-hour for year 2012, 2013, and 2014, averaged over 3 years.

c. $PM_{2.5}$ weighted annual mean concentrations for year 2012, 2013 and 2014, averaged over 3 years and the 24-hour concentration is the annual 98th percentiles in 2012, 2013, and 2014, averaged over 3 years.

d. PM_{10} concentrations are the first-highest for year 2012, 2013, and 2014, averaged over 3 years.

e. NO_2 1-hour concentration is the average of the annual 98th percentiles in 2012, 2013, and 2014, averaged over 3 years.

f. 8-hour average ozone concentrations are the average of the fourth highest-daily values from 2012, 2013, and 2014, averaged over 3 years.

*The PM_{10} concentration for year 2012 was collected at 1921 Davis Street, Robertsdale, Clark High School, Hammond, IN.

Table 5.4-3: Monitored Pollutant Concentrations in Cook County, Illinois

Pollutant	Location	Units	Averaging Period	Concentration			NAAQS
				2011	2012	2013	
CO	750 Dundee Road, Northbrook, IL	ppm	8-hour	1.2	0.7*	0.9	9
			1-hour	2.0	1.4*	1.5	35
SO_2	7801 Lawndale, Chicago, IL	ppb	1-hour	17	10	15	75
			3-years average	14			
PM_{10}	750 Dundee Road, Northbrook, IL	$\mu g/m^3$	24-hour	44	37	38	150
			3-years average	40			
$PM_{2.5}$	13th & Tudor, Saint Clair, IL	$\mu g/m^3$	Annual	-	-	12	12
			24-hour	-	-	25	35
NO_2	7801 Lawndale, Chicago, IL	ppb	1-hour	70	62	67	100
			3-years average	66			
Ozone	3300 E. Cheltenham Place, Chicago, IL	ppm	8-hour	0.093	0.082	0.067	0.07
			3-years average	0.08			

SOURCE: EPA Air Data 2016, http://www.epa.gov/airdata/ad_rep_mon.html.

Notes: [1]Based on the NAAQS definitions,

a. CO concentrations are the first-highest for year 2012, 2013 and 2014.

b. SO_2 concentrations are the 99-percenrile for 1-hour and 24-hour for year 2012, 2013, and 2014, averaged over 3 years.

c. $PM_{2.5}$ weighted annual mean concentrations and the 24-hour concentration is the annual 98th percentiles in 2014. No data available for Cook County for years 2012 and 2013.

d. PM_{10} concentrations are the first-highest for year 2012, 2013, and 2014, averaged over 3 years.

e. NO_2 1-hour concentration is the average of the annual 98th percentiles in 2012, 2013, and 2014, averaged over 3 years.

f. 8-hour average ozone concentrations are the average of the fourth highest-daily values from 2012, 2013, and 2014, averaged over 3 years.

*The CO concentration for year 2012 was collected at 321 South Franklin, Chicago, IL.

5.4.4 Environmental Consequences

5.4.4.1 Long-Term Operating Effects

No Build Alternative

The No Build Alternative would have negligible effects on existing air quality.

Microscale CO Impact: For the purpose of providing comparisons between the No Build Alternative and the NEPA Preferred Alternative for the microscale hot-spot CO levels, CO concentration levels under the No Build Alternative were predicted at the selected intersections. As shown in **Table 5.4-4**, both 1- and 8-hour CO concentrations are predicted to be well below the NAAQS.

Table 5.4-4: 2040 Worst-case Carbon Monoxide Concentrations (ppm)

Worst-case Intersection	No Build Alternative		NEPA Preferred Alternative	
	1-hour	8-hour	1-hour	8-hour
173rd Street and Harrison Avenue (Hammond)	5.6	2.2	5.5	2.2
Sheffield Avenue and Main Street (Dyer)	5.5	2.2	5.8	2.4

SOURCE: AECOM 2016.

Note: CO levels include background concentrations of 5.4 ppm (1-hour) and 2.1 ppm (8-hour).

Mesoscale Emission Burden: For the purpose of evaluating potential mesoscale emission burdens under the Build Alternatives compared to the No Build Alternative, the weekday daily VMTs within the regional traffic network (**Table 5.4-5**) predicted by NIRPC for each Build Alternative were used. As shown in **Table 5.4-5**, VMT is predicted to decrease under each of the Build Alternatives.

Table 5.4-5: Change in Vehicle Miles Traveled

Build Alternative	Daily VMT (mile)		Difference in VMT Between No Build and Build	% Change from No Build
	2040 No Build	2040 Build		
NEPA Preferred Alternative	26,404,841	26,286,489	(118,352)	-0.4%
Commuter Rail Alternative Options	26,404,841	26,291,789	(113,051)	-0.4%
IHB Alternative Options	26,404,841	26,283,352	(121,489)	-0.5%
Hammond Alternative Options 1 and 3	26,404,841	26,286,489	(118,352)	-0.4%

SOURCE: AECOM 2016.

NEPA Preferred Alternative

Microscale CO Impact: The predicted worst-case microscale CO levels under the NEPA Preferred Alternative are summarized in **Table 5.4-4.** Based on the hot-spot modeling analysis for the maximum peak traffic conditions, the predicted 1- and 8-hour CO concentrations are well below the NAAQS of 35 and 9 ppm, respectively. As a result, the NEPA Preferred Alternative would not cause or contribute to a violation of the NAAQS for CO.

Mesoscale Emission Burden: As shown in **Table 5.4-6**, the daily emissions for the NEPA Preferred Alternative are slightly lower than the No Build Alternative, indicating that the emission burdens would be improved under the NEPA Preferred Alternative within the mesoscale network. Therefore, the NEPA Preferred Alternative would be in compliance with the TCR requirements on a project level because it would result in positive air quality impacts. On a regional level, the NEPA Preferred Alternative would need to be included in the future conforming TIP during the FEIS stage to ensure its compliance to the SIP-established MVEB.

Table 5.4-6: Mesoscale Emissions Burden under the NEPA Preferred Alternative (tons)

Pollutants	On-Road Vehicle		Change from No Build
	No Build	NEPA Preferred Alternative	
VOC	2.8	2.8	0.0
NOx	16.4	16.3	-0.1
CO	68.8	68.5	-0.3
$PM_{2.5}$	17.9	17.8	-0.1
PM_{10}	20.8	20.7	-0.1
SO_2	9.8	9.7	-0.1
CO_2e	22,226.8	22,127.1	-99.6

SOURCE: AECOM 2016.

Conformity Determination: Since the Project is still in an early NEPA planning stage, it is not listed in the most recent 2016-2019 TIP. However, it is listed in the regional long-range transportation plan (2040 CRP [NIRPC 2011]). Therefore, prior to the completion of the FEIS/ROD, the NEPA Preferred Alternative would need to be included in the future TIP designed to ensure the implementation of the goals and objectives identified in the long-range transportation plan. Additionally, the Project's CO microscale evaluation indicates that CO levels would also be well below the 1- and 8-hour NAAQS. According to the USEPA guidance (USEPA 2010), the Project is not an air quality concern for $PM_{2.5}$ and PM_{10}. As such, the Project is not expected to create violations of $PM_{2.5}$ or PM_{10} NAAQS. Therefore, this Project would comply with the conformity requirements on both the regional and local level.

Greenhouse Gas Emissions: For NEPA disclosure purposes, the results of the GHG mesoscale analysis, reported in terms of CO_2e, are summarized in **Table 5.4-6**. The weekday daily mesoscale emission burden under the NEPA Preferred Alternative is predicted to decrease slightly compared to the No Build Alternative.

Commuter Rail Alternative Options

Microscale CO Impact: Given similar traffic patterns around the selected worst-case intersections, the CO microscale hot-spot concentration levels under all the Commuter Rail Alternative Options are expected to be comparable to both the No Build Alternative and the NEPA Preferred Alternative, as summarized in **Table 5.4-4**. It is anticipated that the CO levels would remain well below the 1-hour NAAQS for CO of 35 ppm and the 8-hour NAAQS of 9 ppm under all Commuter Rail Alternative Options, resulting in no significant microscale impacts for CO.

Mesoscale Emission Burden: **Table 5.4-7** presents the weekday daily mesoscale emission burden for criteria pollutants under the Commuter Rail Alternative Options compared to the No Build Alternative. The daily emissions for the Commuter Rail Alternative Options would be slightly lower than the No Build Alternative, indicating that the emission burdens would be improved under the Commuter Rail Alternative Options within the mesoscale network. Therefore, the Commuter Rail Alternative Options would be in compliance with the TCR requirements on a project level because it would result in positive air quality impacts.

Table 5.4-7: Mesoscale Emission Burden under the Commuter Rail Alternative Options (tons)

Pollutants	On-Road Vehicle		Change from No Build
	No Build Alternative	Commuter Rail Alternative Options	
VOC	2.8	2.8	0.0
NO_x	16.4	16.3	-0.1
CO	68.8	68.5	-0.3
$PM_{2.5}$	17.9	17.8	-0.1
PM_{10}	20.8	20.7	-0.1
SO_2	9.8	9.7	-0.1
CO_2e	22,226.8	22,131.6	-95.2

SOURCE: AECOM 2016.

Greenhouse Gas Emissions: For NEPA disclosure purposes, the results of the GHG mesoscale analysis, reported in terms of CO_2e, are summarized in **Table 5.4-7**. The weekday daily mesoscale emission burden under the Commuter Rail Alternative Options is predicted to decrease slightly compared to the No Build Alternative.

IHB Alternative Options

Microscale CO Impact: Given similar traffic patterns around the selected worst-case intersections, the CO microscale hot-spot concentration levels under the IHB Alternative Options are expected to be comparable to both the No Build Alternative and the NEPA Preferred Alternative as summarized in **Table 5.4-4**. It is anticipated that the CO levels would remain well below the 1-hour NAAQS for CO of 35 ppm and the 8-hour NAAQS of 9 ppm under the IHB Alternative Options, resulting in no significant microscale impacts for CO.

Mesoscale Emission Burden: As shown in **Table 5.4-8**, the daily emissions for the IHB Alternative Options would be slightly lower than the No Build Alternative, indicating that the emission burdens would be improved under the IHB Alternative Options within the mesoscale network. Therefore, all IHB Alternative Options would be in compliance with the TCR requirements on a Project level because it would result in positive air quality impacts.

Table 5.4-8: Mesoscale Emissions Burden under the IHB Alternative Options (tons)

Pollutants	On-Road Vehicle		Change from No Build Alternative
	No Build Alternative	IHB Alternative Options	
VOC	2.8	2.8	0.0
NO_x	16.4	16.3	-0.1
CO	68.8	68.4	-0.3
$PM_{2.5}$	17.9	17.8	-0.1
PM_{10}	20.8	20.7	-0.1
SO_2	9.8	9.7	-0.1
CO_2e	22,226.8	22,124.5	-102.3

SOURCE: AECOM 2016.

Greenhouse Gas Emissions: For NEPA disclosure purposes, the results of the GHG mesoscale analysis, reported in terms of CO_2e, are summarized in **Table 5.4-8**. The weekday daily mesoscale emission burden under the IHB Alternative Options is predicted to decrease slightly compared to the No Build Alternative.

Hammond Alternative Options 1 and 3

Microscale CO Impact, Mesoscale Emission Burden, Greenhouse Gas Emissions: The effects described for the NEPA Preferred Alternative would be the same for Hammond Alternative Options 1 and 3.

Maynard Junction Rail Profile Option

There would be no change to the air quality impacts as a result of the Maynard Junction Rail Profile Option for any of the impacts described for the applicable alternative options (i.e., NEPA Preferred Alternative, Commuter Rail Alternative Options 1, 2, and 3, IHB Alternative Options 1, 2, and 3, and Hammond Alternative Option 1).

5.4.4.2 Short-Term Construction Effects

No construction-related impacts are anticipated under the No Build Alternative. Potential impacts associated with other projects under the No Build Alternative would be evaluated separately as part of the planning for those projects. For all Build Alternatives, construction activities would result in pollutant emissions from various equipment types and vehicles and fugitive dust emissions from ground-disturbing activities. Such construction effects are unavoidable but are also temporary. Emission levels would vary and the highest levels would last for a much shorter time particularly during the initial ground breaking phase. In general, impacts during construction are not expected to be substantial.

5.4.5 Avoidance, Minimization, and/or Mitigation Measures

5.4.5.1 Long-Term Operating Effects

Since the Project would not result in any operational impacts on air quality under the No Build or Build Alternatives, no mitigation measures would be warranted.

5.4.5.2 Short-Term Construction Effects

No mitigation measures are proposed for the No Build Alternative since no construction-related impacts are anticipated. For any of the Build Alternatives, impacts from temporary construction activities would be minimized through the implementation of standard BMPs that are common to a transportation project. Dust generated during construction would be minimized through standard dust control measures, such as applying water to exposed soils and limiting the extent and duration of exposed soil conditions. After construction is complete, dust levels are anticipated to be minimal because soil surfaces exposed during construction would be permanently covered (i.e., paved or revegetated).

Measures to mitigate fugitive dust kicked up into the air from earthmoving and other ground disturbance and emissions from construction equipment would include the following:

- Watering areas of exposed soil
- Covering open body trucks transporting materials to and from construction sites
- Routing truck traffic away from schools and residential communities when possible
- Repaving and/or replanting exposed areas as soon as possible following construction
- Securing tarps, plastic, or other material over debris piles

- Prohibiting delivery trucks or other equipment from idling during periods of extended unloading or inactivity

5.5 Energy

This section describes the current trend in energy consumption and assesses the potential long-term operations, including maintenance and short-term construction effects, of the Project Alternatives on energy consumption.

5.5.1 Regulatory Setting

Under the regulations for implementing NEPA, the Council on Environmental Quality (CEQ) requires that the energy requirements for each alternative be analyzed and the energy conservation and mitigation measures be identified (40 CFR § 1502.16(e)).

5.5.2 Methodology

Energy consumption was calculated based on projected travel forecasts for Northwest Indiana found in **Chapter 3**. The Study Area for energy use is the Northwest Indiana region. Estimates of direct (during operations) and indirect (during construction) energy consumption for the No Build Alternative and the Build Alternatives were based on the consumption factors obtained from the following documents:

- *Final Interim Policy Guidance Federal Transit Administration Capital Investment Grant Program* (USDOT 2015)
- *Transportation Energy Data Book,* Edition 34 (U.S. Department of Energy [USDOE] 2015)
- *Comparison of Passenger Rail Energy Consumption with Competing Modes (*National Cooperative Rail Research Program [NCRRP] 2015)
- *Assessment of the Energy Impacts of Improving Highway-Infrastructure Materials* (Stammer and Stodolsky 1995)
- *Urban Transportation and Energy: The Potential Savings of Different Modes* (Congressional Budget Office 1977)

The energy analysis focused on the following:

- **Direct energy analysis** includes the potential energy consumption on a mesoscale level for the Study Area due to changes in traffic patterns as a result of the Project. The direct energy analysis calculates the potential weekday energy consumed by both highway and transit vehicles. It considers the regional weekday VMT for automobiles, diesel trucks, and bus transit throughout the region as well as the project-induced incremental commuter rail element in the Study Area. Estimates of VMT and VHT were provided by the revised NIRPC model, as described in **Chapter 3** in the No Build and Build Alternatives.

  The weekday commuter rail VMT increase from the Build Alternatives was estimated based on the train schedule for the Build Alternatives. On-road VMT data were distributed into three vehicle categories: cars (light duty vehicles), buses, and trucks (single unit and combination trucks) based on the vehicle distribution derived using the MOVES2014 VMT input data file provided by the Corrodino Group. Based on the predicted vehicle distribution, approximately 70 percent of the vehicles are light duty vehicles, 20 percent are buses, and 10 percent are trucks.

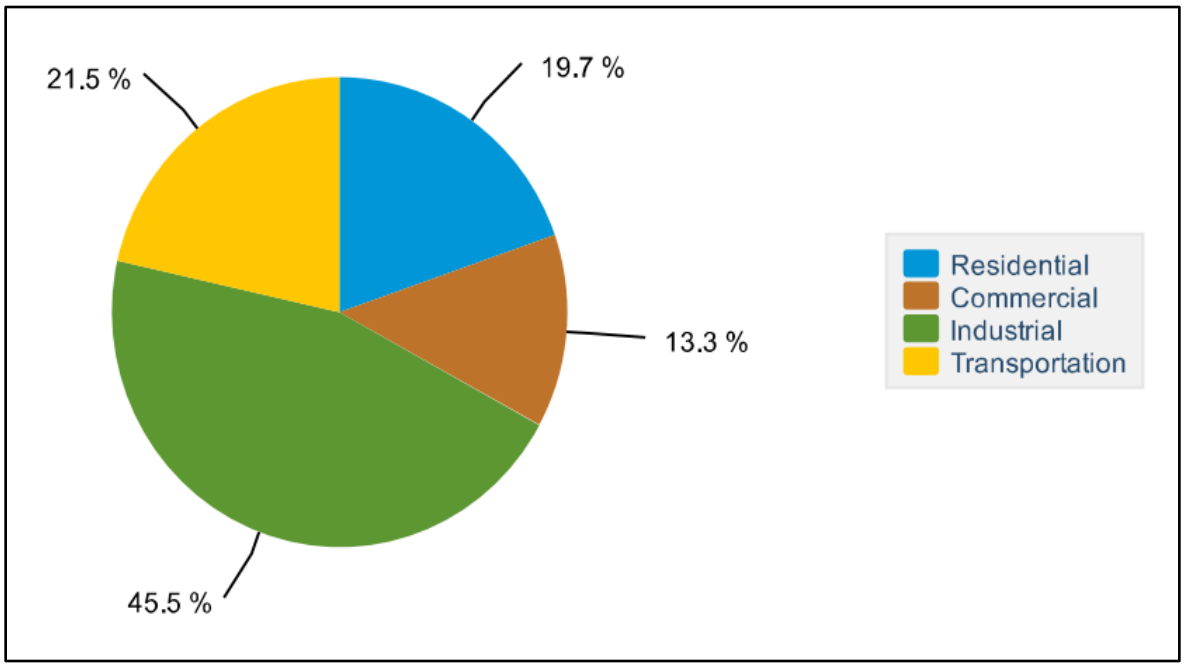
- **Indirect energy analysis** includes potential energy consumption related to the construction and maintenance of the Build Alternatives. Calculating indirect energy consumption during construction considered the number of proposed track miles. These figures were multiplied by a construction energy factor, which estimates the amount of energy necessary to extract raw materials, manufacture and fabricate construction materials, transport materials to the work site, and complete the construction.

Energy is commonly measured in terms of British thermal units (BTU), or the amount of heat required to raise the temperature of one pound of water by one degree Fahrenheit. By describing different types of energy use with a single unit of measure, it is feasible to compare the environmental and dollar cost of energy produced from different sources.

5.5.3 Affected Environment

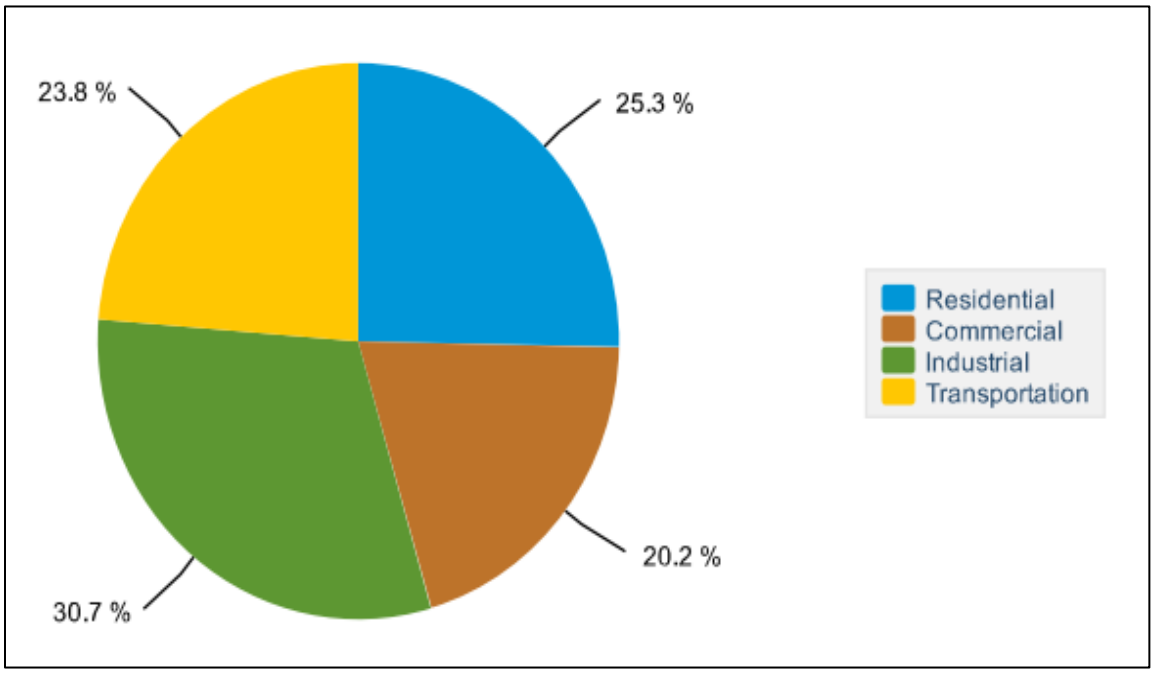
In the United States, the total energy consumption in 2015 was 97 quadrillion BTUs according to the U.S. Energy Information Administration (March 2016 Monthly Energy Review), with transportation accounting for 39 percent of total national energy use. Most of the energy consumed for transportation is from fossil fuels (95 percent).

In Indiana, the industrial sector is the largest consumer of energy. Based on the latest available information for 2013 shown on **Figure 5.5-1**, energy consumption for transportation in the state represents 22 percent of Indiana's total energy consumption compared to 24 percent of Illinois's total energy consumption (see **Figure 5.5-2**) and 39 percent of the nation's total energy consumption for transportation.



SOURCE: US Energy Information Administration. 2013.

Figure 5.5-1: Indiana Energy Consumption by Sector in 2013



SOURCE: US Energy Information Administration. 2013.

Figure 5.5-2: Illinois Energy Consumption by Sector in 2013

Throughout most of the Study Area, energy is provided by the Northern Indiana Public Service Company (NIPSCO) and Duke Energy. The Town of Munster, the City of Hammond, and the City of Chicago have adopted plans to reduce GHG emissions. These plans, listed below, propose achieving reductions, in part, through energy savings.

- *A Vision for the 21st Century: 2010 Comprehensive Plan* (Munster 2010)
- *City of Hammond Comprehensive/Land Use Pla*n (City of Hammond 1992)
- Chicago Climate Action Plan, Our City Our Future (http://www.chicagoclimateaction.org/)

5.5.4 Environmental Consequences

The Build Alternatives would essentially result in a decrease in energy consumption within the region compared to the No Build Alternative due to the future reduction in VMT. This reduction in VMT is presumably due to the diversion of drivers from passenger vehicles to riders of the Project service.

5.5.4.1 Long-Term Operating Effects

No Build Alternative

Energy consumption under the No Build Alternative is summarized in **Table 5.5-1**, **Table 5.5-3**, and **Table 5.5-4**. The energy consumption under the No Build Alternative ranges from 56,693 one million British thermal units (MMBTU) for trucks to 183,455 MMBTU for buses. The energy consumption predicted for the No Build Alternative was used as a basis for comparison to the proposed Build Alternatives.

NEPA Preferred Alternative

Table 5.5-1 summarizes the direct energy consumption for the NEPA Preferred Alternative compared with the No Build Alternative. Although energy consumption would be allocated for the trains, the overall energy consumption for the NEPA Preferred Alternative is predicted to be slightly lower than the No Build Alternative due to VMT reductions for all roadway vehicles. The reduction in energy consumption indicates that the NEPA Preferred Alternative would not cause adverse impacts on the environment.

Table 5.5-1: Summary of Direct Energy Consumption under the NEPA Preferred Alternative

Vehicle	BTU per Vehicle-Mile	Weekday Vehicle Miles Traveled (Miles)		Energy Consumption (MMBTU)	
		No Build Alternative	NEPA Preferred Alternative	No Build Alternative	NEPA Preferred Alternative
Car[4]	5,633[1]	18,373,601	18,288,457	103,498	103,019
Bus[5]	33,978[1]	5,399,240	5,374,220	183,455	182,605
Truck[6]	21,540[2]	2,631,999	2,619,802	56,693	56,431
Trains	1,883[3]	-	450	-	1
Total Energy Consumption				343,646	342,056
Percent Change from No Build Alternative					-0.46%

SOURCE: AECOM 2016.

Notes: [1]FTA *Final Interim Policy Guidance Federal Transit Administration Capital Investment Grant Program*, August 2015.

[2]Oak Ridge National Laboratory's *Transportation Energy Data Book*, Edition 34, Table 2.17.

[3]NCRRP Report 3, Comparison of Passenger Rail Energy Consumption with Competing Modes, 2015, Table 7-9 and 7-10.

[4]Car VMT includes VMT for passenger cars, passenger truck and light commercial trucks.

[5]Bus VMT includes VMT for intercity bus, transit bus and school bus.

[6]Truck VMT includes VMT for single unit truck and combination trucks.

Energy would also be consumed for station and vehicle maintenance. Rail track maintenance includes track geometry maintenance and track segment replacement, including possible welding and torch cutting activities, ballast maintenance, etc. According to the Congressional Budget Office (1977), rail station and vehicle maintenance combined required approximately 7,000 BTUs per VMT. Predicted annual commuter rail VMT was used to estimate annual maintenance energy for the Project. **Table 5.5-2** summarizes the indirect energy consumption related to maintenance activities for the Project.

Table 5.5-2: Summary of Maintenance Energy Consumption

Alternative	Weekday Commuter Rail VMT	Station and Maintenance Energy[1]	Indirect Energy Consumption
	Miles	BTU/Vehicle Mile	MMBTU
NEPA Preferred Alternative	450	7,000	3.2
Commuter Rail Alternative Options	374	7,000	2.6
IHB Alternative Options	367	7,000	2.6
Hammond Alternative Options 1 and 3	450	7,000	3.2

SOURCE: AECOM 2016.

Note: [1]*Urban Transportation and Energy: The Potential Savings of Different Modes*, December 1977, Table 7.

Commuter Rail Alternative Options

Table 5.5-3 summarizes the direct energy consumption for all Commuter Rail Alternative Options compared with the No Build Alternative. Although energy consumption would be allocated for the

trains, the overall energy consumption for the Commuter Rail Alternative Options is predicted to be slightly lower than the No Build Alternative due to VMT reductions for all roadway vehicles. The reduction in energy consumption indicates that the Commuter Rail Alternative Options would not cause adverse impacts on the environment.

Table 5.5-3: Summary of Direct Energy Consumption under the Commuter Rail Alternative Options

Vehicle	BTU per Vehicle-Mile	Weekday Vehicle Miles Traveled (Miles)		Energy Consumption (MMBTU)	
		No Build Alternative	Commuter Rail Alternative Options	No Build Alternative	Commuter Rail Alternative Options
Car[4]	5,633[1]	18,373,601	18,294,935	103,498	103,055
Bus[5]	33,978[1]	5,399,240	5,376,124	183,455	182,670
Truck[6]	21,540[2]	2,631,999	2,620,730	56,693	56,451
Trains	1,883[3]	-	374	-	1
Total Energy Consumption				343,646	342,177
Percent Change from No Build Alternative					-0.43%

SOURCE: AECOM 2016.

Notes: [1]FTA *Final Interim Policy Guidance Federal Transit Administration Capital Investment Grant Program*, August 2015.
[2]Oak Ridge National Laboratory's *Transportation Energy Data Book*, Edition 34, Table 2.17.
[3]NCRRP Report 3, Comparison of Passenger Rail Energy Consumption with Competing Modes, 2015, Tables 7-9 and 7-10.
[4]Car VMT includes VMT for passenger cars, passenger truck and light commercial trucks.
[5]Bus VMT includes VMT for intercity bus, transit bus and school bus.
[6]Truck VMT includes VMT for single unit truck and combination trucks.

IHB Alternative Options

Table 5.5-4 summarizes the direct energy consumption for the IHB Alternative Options compared with the No Build Alternative. Although energy consumption would be allocated for the trains, the overall energy consumption for the IHB Alternative Options is predicted to be slightly lower than the No Build Alternative due to VMT reductions for all roadway vehicles. The reduction in energy consumption indicates that the IHB Alternative Options would not cause adverse impacts on the environment.

Table 5.5-4: Summary of Direct Energy Consumption under the IHB Alternative Options

Vehicle	BTU per Vehicle-Mile	Weekday Vehicle Miles Traveled (Miles)		Energy Consumption (MMBTU)	
		No Build Alternative	IHB Alternative Options	No Build Alternative	IHB Alternative Options
Car[4]	5,633[1]	18,373,601	18,289,064	103,498	103,022
Bus[5]	33,978[1]	5,399,240	5,374,398	183,455	182,611
Truck[6]	21,540[2]	2,631,999	2,619,889	56,693	56,432
Trains	1,883	-	367	-	1
Total Energy Consumption				343,647	342,066
Percent Change from No Build Alternative					-0.46%

SOURCE: AECOM 2016.

Note: [1]FTA *Final Interim Policy Guidance Federal Transit Administration Capital Investment Grant Program*, August 2015.
[2]Oak Ridge National Laboratory's *Transportation Energy Data Book*, Edition 34, Table 2.17.
[3]NCRRP Report 3, Comparison of Passenger Rail Energy Consumption with Competing Modes, 2015, Tables 7-9 and 7-10.
[4]Car VMT includes VMT for passenger cars, passenger truck and light commercial trucks.
[5]Bus VMT includes VMT for intercity bus, transit bus and school bus.
[6]Truck VMT includes VMT for single unit truck and combination trucks.

Hammond Alternative Options 1 and 3

The effects described for the NEPA Preferred Alternative would be the same for Hammond Alternative Options 1 and 3.

Maynard Junction Rail Profile Option

There would be no change to the energy impacts as a result of the Maynard Junction Rail Profile Option for any of the applicable alternative options (i.e., NEPA Preferred Alternative, Commuter Rail Alternative Options 1, 2, and 3, IHB Alternative Options 1, 2, and 3, and Hammond Alternative Option 1).

5.5.4.2 Short-Term Construction Effects

No construction-related impacts are anticipated for the No Build Alternative. Potential impacts associated with other projects under the No Build Alternative would be evaluated separately as part of the planning for those projects. For the Build Alternatives, it is assumed that no major roadway construction is anticipated; therefore, this section focuses on construction energy related to commuter rail tracks only. Total track miles were used in estimating the construction energy related to the commuter rail. **Table 5.5-5** summarizes the track-miles used in the analysis as well as indirect energy consumption related to construction activities. The following construction categories associated with the Project were used in estimating the new track construction energy consumption: track laying and excavation and grading activities.

Table 5.5-5: Summary of Construction Energy Consumption

Alternative	New Track Miles	Construction Energy Consumed per Track-Mile[1]		Construction Energy Consumption
		New Construction[2]	Excavation and Grading[3]	
	Mile	10^9 BTU/Mile	10^9 BTU/Mile	MMBTU
NEPA Preferred Alternative	8.6	12.7	0.75	115,670
Commuter Rail Alternative Options	9.5	12.7	0.75	127,775
IHB Alternative Options	12.3	12.7	0.75	165,435
Hammond Alternative Options 1 and 3	8.6	12.7	0.75	115,670

SOURCE: AECOM 2016.

Note: [1] *Assessment of the Energy Impacts of Improving Highway-Infrastructure Material*, Stammer and Stodolsky, April 1995, Table 3.3.

[2] Assumed energy consumption for new track to be similar to roadway new construction.

[3] Assumed energy consumption for excavation and grading for track to be similar to roadway resurfacing.

5.5.5 Avoidance, Minimization, and/or Mitigation Measures

5.5.5.1 Long-Term Operating Effects

No mitigation measures are proposed for the No Build Alternative since no impacts are anticipated. All Build Alternatives are intended to provide an alternative mode of transportation. The Project would facilitate reduced use of personal vehicles by shifting drivers from cars to transit and the direct energy usage and consumption during operations is predicted to decrease between the No Build Alternative and the Build Alternatives; therefore, no mitigation measures are proposed.

5.5.5.2 Short-Term Construction Effects

No mitigation measures are proposed for the No Build Alternative since no construction-related impacts are anticipated. For the Build Alternatives, measures to mitigate indirect energy usage during construction typically include limiting idling of machinery and optimizing construction methods in order to lower fuel usage.

5.6 Soils, Geologic Resources, and Farmlands

This section presents an inventory of soils, geologic resources, and farmlands in the Study Area and identifies the extent of impacts that would result from implementation of the Project Alternatives.

5.6.1 Regulatory Setting

5.6.1.1 Soils and Geologic Resources

Federal, state, and local governments may impose special restrictions on land use or land treatment based on soil properties. The following regulations/agencies may require permits to protect soil and geological resources during construction and/or operation.

Federal:

- River Basin Activities (NRCS General Manual Title 150, Part 405)
- Clean Water Act, Section 404 Permit
- Endangered Species Act of 1973 (NRCS General Manual Title 190, Part 410)
- EO 11988, Floodplain Management (3 CFR § 117 [1978])
- NEPA (NRCS General Manual Title 190, Part 410)
- Watershed Protection and Flood Prevention Act (Public Law 566) National Watershed Manual

State:

- IDEM and Indiana Department of Natural Resources (INDNR)
- IDEM, Department of Agriculture, Soil and Water Conservation Districts, Conservation Reserve Enhancement Program
- IEPA, Bureau of Land

5.6.1.2 Farmlands

Farmlands are protected under the Farmland Protection Policy Act (FPPA), which is contained within the Agriculture and Food Act of 1981 (Public Law 97-98). The FPPA is applicable to federal programs and includes protection of prime farmland, unique farmland, and land of statewide or local importance. The agency that manages this resource is the United States Natural Resources Conservation Service (NRCS). Additional regulations and agencies that may be applicable include the Farm Security and Rural Investment Act of 2002 (Farm Bill), the United States Department of Agriculture (USDA) Farm Service Agency (FSA), NRCS (The 2014 Farm Bill), and Local Farm Service Agencies.

5.6.2 Methodology

The Study Area considered for this analysis is the limit of disturbance (LOD) for the Project. The LOD is the boundary within which construction, materials storage, grading, landscaping, and related activities would occur.

5.6.2.1 Soils and Geologic Resources

Soil characteristics and geological features and resources were assessed using published soil survey books, surficial geology maps, and online mapping services provided by the USDA NRCS; however, on-site soil and geotechnical investigations would be conducted as part of the Engineering phase of the selected alternative, since differences in published mapping and current conditions may exist. Physical soil characteristics within the Study Area were evaluated to determine which soil types required consideration in **Section 5.6.4**. Soils that can be seasonally wet, are poorly drained, make up steep slopes, or are more prone to erosion and flooding were considered since these areas can become unstable as foundations for transportation infrastructure. Using the NRCS Web Soil Survey, Suitabilities and Limitations for Use were determined for all soil units within the Study Area, resulting in ratings of "not limited," "somewhat limited," or "very limited" for suitability of shallow excavations as explained below (USDA NRCS 2015). In addition, United States Geological Survey (USGS) topographic maps were reviewed to evaluate the topography of the Study Area.

- **Not Limited**: The soil has features that are very favorable for the specified use. Good performance and very low maintenance can be expected.
- **Somewhat Limited:** The soil has features that are moderately favorable for the specified use. The limitations can be overcome or minimized by special planning, design, or installation. Fair performance and moderate maintenance can be expected.
- **Very Limited:** The soil has one or more features that are unfavorable for the specified use. The limitations generally cannot be overcome without major soil reclamation, special design, or expensive installation procedures. Poor performance and high maintenance can be expected.

Geological hazards and geological resources were considered, including fault zones and mineral resources. Soil and geological features were compared to plan view and typical section drawings and published documents to determine the areas that may have potential issues with erosion or sedimentation during construction or operations, especially near waterways.

5.6.2.2 Farmlands

Impacts to farmland were determined based on the examination of aerial photography and a site visit. Farmland that has the potential to be converted to non-farm use due to any proposed federally-funded action must be evaluated by NRCS to determine an impact rating score. NRCS evaluates the impacts and determines the score based on a land evaluation and site assessment (LESA) system. The score is determined with the use of Form AD-1006, the Farmland Conversion Impact Rating, which evaluates the amount of prime, unique, or important farmland that would be converted.

Prime farmland is defined by USDA as "land that has the best combination of physical and chemical characteristics for producing food, feed, forage, fiber, and oilseed crops… but is not urban or built-up land or water areas." Unique and important farmlands are subsets of prime farmland. Coordination with NRCS and submission of the AD-1006 form were deemed unnecessary after identifying prime farmland parcels within the Study Area, as described further in **Section 5.6.3.2**.

5.6.3 Affected Environment

5.6.3.1 Soils and Geologic Resources

In the Study Area, the ground elevation ranges from approximately 620 feet above mean sea level (MSL) at the southernmost point to approximately 585 feet above MSL at the northernmost point. Soils within the Study Area include 31 soil units in Lake County, Indiana, and 30 soil units in Cook County, Illinois (USDA NRCS 2015). The most-prevalent soil types within the Study Area in Lake County are Urban Land (10.6 percent of Study Area in Indiana) and Bono silty clay (17.4 percent of Study Area in Indiana). The most-prevalent soil types within the Study Area in Cook County include Urban Land (8.5 percent of total Study Area in Illinois) and 14 various types of Orthents soil (approximately 13 percent of Study Area in Illinois). Although there would be no new construction within this area, the soils in the area north of Kensington to Millennium Station were investigated, as there would be additional train service in this area. This area has approximately 15 different types of soil units with the most prevalent soil types being various types of Urban Land soils.

Within the Study Area, 20 out of the 31 total soil units in Lake County were determined to have characteristics and physical properties that make the soil suitability “very limited” for shallow excavations. Very limited suitability for shallow excavations means that these soils, when disturbed during construction, would result in poor performance and high maintenance. Within the Study Area, 16 out of the 30 total soil unit types in Cook County were determined to have characteristics and physical properties that make the soil suitability “very limited” for shallow excavations. These soil units are listed in **Table 5.6-1**.

A layer of silty material, or loess, was deposited over the Study Area after the glacial period ended. The primary locations of loess are the floodplains along major rivers. Loess covers till, outwash, and lacustrine material in portions of Lake County and Cook County. It is less than 40 inches thick throughout most of the Study Area. Standing water left in depressions made by the receding glaciers caused those areas to become very wet during soil formation and decaying plant material accumulated more quickly than it could decompose, resulting in organic soils.

The bedrock geology within the Study Area is primarily of the Niagaran and Cayugan Series, Silurian System, Wabash formations, which include limestone, dolomite, and argillaceous dolomite rock types. The regional mineral resources in the Study Area include dolomite, limestone, sand, gravel, clay, shale, coal, and both surface and groundwater.

The Silurian dolomitic limestone underlies unconsolidated glacial deposits in Lake County and Cook County. Till makes up a large portion of the glacial deposits covering the Study Area and various beach ridges mark the former lake stages. The tills consist of unsorted ice-deposited sediment composed of a matrix of silt, clay, and sand in which pebbles, cobbles, and boulders are embedded. Beneath the glacial deposits in the Study Area lie about 5,000 feet of Paleozoic bedrock formations in a gently sloping arch called the Kankakee arch, which parallels the southern curve of Lake Michigan and overlies the Precambrian rock surface composed of granite.

5.6.3.2 Farmlands

The Study Area is primarily urban in nature. A small agricultural field is located in the southern portion of the Study Area in Indiana near the proposed Munster/Dyer Main Street Station. A second smaller parcel is located just north of this site. Both parcels are located within municipal boundaries and are slated for development. Although there are soils that are identified as being suitable for prime farmland use under the USDA definition, the actual existing uses and locations of these parcels disqualify them from being designated as prime farmland.

Table 5.6-1: NRCS Web Soil Survey Results of "Very Limited" Suitability for Shallow Excavations

Soil Unit Symbol	Soil Unit Name	Acreage of Soil Unit within Study Area
Lake County		
49A	Watseka loamy fine sand, 0 to 2 percent slopes	371.8
54B	Plainfield loamy sand, 1 to 6 percent slopes	48.2
69A	Milford silty clay loam, 0 to 2 percent slopes	245.4
125A	Selma loam, 0 to 2 percent slopes	38.6
141A	Wesley fine sandy loam, 0 to 2 percent slopes	8.6
153A	Pella silty clay loam, 0 to 2 percent slopes	40.8
189A	Martinton silt loam, 0 to 2 percent slopes	12.7
201A	Gilford fine sandy loam, 0 to 2 percent slopes	404.4
522F	Orthents, clayey, refuse substratum, steep	72.9
741B	Oakville fine sand, 1 to 6 percent slopes	121.2
849A	Milford-Martinton complex, 0 to 2 percent slopes	84.9
903A	Muskego and Houghton mucks, 0 to 2 percent slopes	64.0
1409A	Aquents, clayey, undrained, nearly level	14.0
3107A	Sawmill silty clay loam, 0 to 2 percent slopes, frequently flooded	101.5
Cook County		
BlA	Blount silt loam, Lake Michigan Lobe, 0 to 2 percent slopes	302.3
Bn	Bono silty clay	2,231.4
Ca	Houghton muck, drained, 0 to 1 percent slopes	3.8
De	Del Rey silt loam	2.6
El	Elliott silt loam, 0 to 2 percent slopes	76.4
Gd	Gilford fine sandy loam	1.6
Gm	Gilford loam	21.9
Mm	Maumee loamy fine sand	411.2
Mo	Milford silt loam, overwash	252.5
Mr	Milford silty clay loam, 0 to 2 percent slopes	112.1
MuD2	Morley silt loam, 12 to 18 percent slopes, eroded	52.6
MuE	Morley silt loam, 18 to 25 percent slopes	1.9
MvB3	Morley silty clay loam, 2 to 6 percent slopes, severely eroded	1.9
MvC3	Morley silty clay loam, 6 to 12 percent slopes, severely eroded	316.9
Pc	Pewamo silty clay loam	235.1
PlB	Plainfield fine sand, 0 to 6 percent slopes	343.2
PlC	Plainfield fine sand, 6 to 12 percent slopes	18.3
Rs	Rensselaer loam, calcareous subsoil variant	312.6
SpB	Sparta fine sand, 0 to 4 percent slopes	101.3
Wa	Wallkill silt loam	57.2
Wk	Watseka loamy fine sand	635.6
Wo	Wauseon fine sandy loam	9.9

SOURCE: USDA NRCS 2015.

5.6.4 Environmental Consequences

5.6.4.1 Long-Term Operating Effects

No Build Alternative

The No Build Alternative would not impact soils, geologic resources, or farmlands as there would be no change in existing conditions and, therefore, no operational impacts.

NEPA Preferred Alternative

Soils and Geologic Resources

There would be no long-term impacts to soils and the underlying geology would not be affected. Short term affects to soils with geotechnical limitations during construction and mitigation measures to minimize impacts are discussed in **Section 5.6.5**.

Farmlands

Implementation of the NEPA Preferred Alternative would not impact farmlands as there are no parcels that could be potentially designated as prime farmland in the Study Area, as described in **Section 5.6.3.2.** The two agricultural properties that were identified within the boundary of the Study Area are located within municipal boundaries. Although the soil properties match those of prime farmlands, neither parcel is zoned for agricultural use: one parcel is a small agricultural field, located in the southern portion of the Study Area in Indiana near the proposed Munster/Dyer Main Street Station. A second smaller parcel is located just north of this site. Both parcels are located within municipal boundaries and are slated for development.

Commuter Rail Alternative Options

Impacts from implementation of the Commuter Rail Alternative Options to soils and geologic resources and farmlands would be the same as those described for the NEPA Preferred Alternative.

IHB Alternative Options

Impacts from implementation of the IHB Alternative Options to soils and geologic resources and farmlands would be the same as those described for the NEPA Preferred Alternative.

Hammond Alternative Options 1 and 3

Impacts from Hammond Alternative Options 1 and 3 to soils and geologic resources and farmlands would be the same as those described for the NEPA Preferred Alternative.

Maynard Junction Rail Profile Option

No change to the impacts to soils and geologic resources and farmlands as described for the applicable alternative options (i.e., NEPA Preferred Alternative, Commuter Rail Alternative Options 1, 2, and 3, IHB Alternative Options 1, 2, and 3, and Hammond Alternative Option 1) would occur from the Maynard Junction Rail Profile Option.

5.6.4.2 Short-Term Construction Effects

Soils and Geologic Resources

No construction-related impacts are anticipated under the No Build Alternative. For all Build Alternatives, impacts during construction may result from the following: soil disturbance due to clearing, grading, and excavations; compaction due to heavy machinery traffic; potential reduction of soil quality due to mixing of rock with topsoil; and loss of soil due to water and wind erosion.

Farmlands

The No Build Alternative, NEPA Preferred Alternative, and the other Build Alternatives would not impact farmlands.

5.6.5 Avoidance, Minimization, and/or Mitigation Measures

Long-Term Operating Effects

Soils and Geologic Resources

No mitigation measures are proposed for soils and geologic resources as no impacts are anticipated for any of the Project Alternatives.

Farmlands

The No Build Alternative, NEPA Preferred Alternative, and Build Alternatives would not affect farmlands; therefore, no mitigation measures are proposed.

Short-Term Construction Effects

Soils and Geologic Resources

No mitigation measures are proposed for the No Build Alternative since no construction-related impacts are anticipated. For the Build Alternatives, impacts to soils during construction would be temporary in nature and minimized through the implementation of BMPs and erosion and sediment control plans. Areas would be revegetated using appropriate seed mixes native to Northern Indiana and Northern Illinois. In addition, the Project would comply with applicable permit conditions. In addition, in order to avoid and minimize negative impacts associated with the construction phase of the Project, the following INDNR recommendations would be followed where appropriate:

- Revegetate all bare and disturbed areas with a mixture of grasses (excluding tall fescue), legumes, and native shrub and hardwood trees upon completion
- Minimize in-channel disturbances and clearing of trees and brush
- Obtain appropriate permits prior to work
- Consider soft armoring and bioengineering techniques for streambank stabilization and revegetation prior to use of riprap
- Use minimum average 6-inch grade riprap placed in accordance with applicable regulations
- Stabilize exposed soils with temporary vegetation between November 1 and April 1 if they are to be left idle for longer than 7 days
- Do not allow debris or materials to fall into or enter the waterway
- Minimize suspended solids in the waterway
- Utilize erosion controls on steep slopes and streambanks
- Apply appropriate seed mixes on disturbed areas at the time of restoration

On-site soil and geotechnical investigations to be completed during the design phase of the Project would identify soils within the Project footprint showing limitations for suitability. Soils with limited suitability would require additional engineering and special design in order to minimize poor performance and high maintenance.

Farmlands

The No Build Alternative, NEPA Preferred Alternative, and Build Alternatives would not affect farmlands; therefore, no mitigation measures are proposed.

5.7 Water Resources

This section summarizes current regulations regarding surface waters, which include waters of the United States (US) and wetlands, floodplains, groundwater, and coastal zones. It defines the existing conditions of these resources within the Study Area and describes the effects of the Project Alternatives on these resources. It also discusses mitigation measures NICTD would undertake to offset adverse effects. Further details are included in the *West Lake Corridor Natural Resources Technical Report* and the *West Lake Corridor Wetland Delineation Technical Report* in **Appendix H.**

5.7.1 Regulatory Setting

5.7.1.1 Surface Waters and Wetlands

Water resources include the features listed below:

- **Surface waters**: waters such as ponds, lakes, rivers, and streams
- **Waters of the US:** all waters that are currently used, were used in the past, or may be susceptible to use in interstate or foreign commerce
- **Wetlands**: waters that have saturated or inundated land
- **Floodplains**: areas that are prone to flooding
- **Groundwater**: waters contained in underground aquifers
- **Stormwater:** water generated from rain and snowmelt events that flows over land or impervious surfaces, such as paved streets, parking lots, and building rooftops, and does not soak into the ground
- **Coastal Zone:** a line that forms the boundary between the land and the ocean or a lake

Wetlands and waters of the US are regulated under Sections 401 (33 USC § 1341) and 404 (33 USC § 1344) of the Clean Water Act (CWA). The placement of fill materials in wetlands or waters of the US requires a permit from the United States Army Corps of Engineers (USACE) under Section 404 (33 USC § 1344) of the CWA. As part of the permitting process, it must be demonstrated that impacts to waters of the US were avoided to the maximum extent possible, minimized where avoidance is not possible, and mitigation provided for unavoidable impacts. USEPA develops and interprets policy, reviews and comments on individual permit applications, and enforces Section 404 (33 USC § 1344) provisions.

Section 401 of the CWA requires any applicant for a Section 404 permit to obtain a Water Quality Certification for any activity that may result in the discharge of a pollutant into waters of the US. The Section 401 Water Quality Certification is administered by the state; in Indiana it is administered by IDEM and in Illinois it is administered by IEPA.

Surface waters are determined to be waters of the US if there are hydrologic connections to interstate waters or if there is a significant nexus to waters of the US. Surface waters that are isolated from waters of the US are regulated under state laws.

5.7.1.2 Floodplains

Regulatory floodways are identified by the Federal Emergency Management Agency (FEMA) as part of the Flood Insurance Rate Map (FIRM) program. Federal and state regulations that are applicable to floodplains or floodways include:

- EO 13690, *Establishing a Federal Flood Risk Management Standard and a Process for Further Soliciting and Considering Stakeholder Input*

- EO 11988, *Floodplain Management*
- USDOT Order 5650.2, *Floodplain Management and Protection*

Both Indiana and Illinois have floodplain and floodway regulations, which are listed below. In Indiana, construction activities require a permit from INDNR; in Illinois, permits are required from the Illinois Department of Natural Resources (IDNR). In both Indiana and Illinois, compensatory storage is required to fill in the floodway.

- Indiana Flood Control Act (Indiana Code [IC] 14-28-1)
- Indiana Floodplain Management Act (IC 14-28-3)
- Floodway Construction in Northeastern Illinois (Illinois Administrative Code [IAC] Title 17, Part 3708)
- Constructions in Floodways of Rivers, Lakes, and Streams (IAC Title 17, Part 3700)

5.7.1.3 Groundwater and Water Supply

Groundwater is protected by federal and state regulations. The Federal Safe Drinking Water Act (42 USC §§ 300f-300j-26) establishes wellhead protection areas. In Indiana, public water supplies are protected through the 1989 Groundwater Protection Act (IC 13-18-17-6). The Illinois Groundwater Protection Act (415 Illinois Compiled Statutes [ILCS] 55) provides regulations regarding protective setbacks to groundwater wells in Illinois.

5.7.1.4 Stormwater

Lake County Stormwater Management and Clean Water Regulations (Ordinance No. 1365C) and the *Cook County Stormwater Management Plan* (2014) regulate stormwater drainage improvements related to development of lands in Lake County and Cook County, respectively.

5.7.1.5 Coastal Zones

The Coastal Zone Management Act of 1972 (CZMA) (16 USC §§ 1451-1464) provides the basis for protecting the nation's coastal resources and the Great Lakes. The National Coastal Zone Management Program is authorized through the CZMA and is overseen by a partnership of the National Oceanic and Atmospheric Administration and local or state agencies. As such, projects that are located within a CZMA boundary must be reviewed to ensure that the project is consistent with the CZMA. In both Indiana and Illinois, the CZMA is administered by the respective DNR. IDNR manages this resource through the Illinois Coastal Management Program (ICMP) and INDNR manages their coastal management program through the Lake Michigan Coastal Program (LMCP), with assistance from the NRCS. Portions of the Project are located within the coastal zone management boundaries in Indiana and Illinois. In both states, a federal consistency review would be required.

5.7.2 Methodology

The Study Area for the water resources analyses is defined as ½ mile from the proposed alignment. The analysis methodologies are described below.

5.7.2.1 Surface Waters and Wetlands

Information on the location of surface waters, including ponds, lakes, rivers, and streams, was obtained from the USGS National Hydrography Dataset (USGS 2008). Information on impaired waters was obtained from the USEPA Office of Water Programs (USEPA 2015b). Field reconnaissance

included inspections of the identified water bodies. No water or sediment samples were taken and no data were obtained except for what was readily visible during the reconnaissance.

A determination of the jurisdictional status of surface waters, whether they are under federal jurisdiction and the CWA, or state jurisdiction due to their isolation from interstate hydrologic connections, is made by the regulatory agencies (USACE, IDEM, or IEPA). The jurisdictional status of individual surface waters will be made when design plans are developed and submitted as part of the CWA Section 401/404 permitting process. For the purposes of this DEIS, most surface waters that were identified using Geographic Information System (GIS) information are considered jurisdictional under the CWA and subject to the authority of USACE except for those noted. Among the delineated wetlands, the USACE provided a preliminary determination that 29 are considered jurisdictional according to a letter dated July 29, 2016 (see **Appendix F**).

For the purposes of this discussion, surface waters are discussed as either meeting water quality standards or as impaired. Under Section 303(d) of the CWA, states are required to determine which waters do not meet water quality standards and report these to USEPA (33 USC § 303(d)). Reasons for these impairments are also required. Information related to impairments was obtained from the IEPA Section 303(d) CWA Impaired Waters internet site and the IDEM Section 303(d) CWA Impaired Waters internet site (IEPA 2014, IDEM 2014).

In the fall of 2015, wetland investigations and delineations were performed in the Study Area between Dyer and Hammond and near the IHB freight line ROW. The purpose of the investigation was to determine the location and extent of any wetlands and waters of the US within the Study Area.

In Indiana, all wetlands located within 50 feet of proposed ROW were identified or delineated. In Illinois, all wetlands located within 100 feet of the proposed ROW were identified or delineated (100-foot buffers are required per the Cook County Watershed Management Ordinance). Wetlands near the LOD were investigated using one of three methods, based on right of entry and physical access issues. For areas with approved and safe right of entry, the investigation was performed in accordance with the Section 404 guidelines of the USACE Chicago District, the 1987 *Corps of Engineers Wetlands Delineation Manual* (USACE 1987), and the *Interim Regional Supplement to the Corps of Engineers Wetland Manual: Midwest Region* (2010 Supplement) (USACE 2010). Wetland boundaries were flagged where property ownership allowed. For those portions of the wetland that extended outside of the 50-foot or 100-foot buffer, wetland boundaries were estimated and drawn on aerial photography.

Wetlands located between Hammond and Metra's Millennium Station in downtown Chicago, or the IHB freight line ROW and Metra's Millennium Station, were identified using National Wetland Inventory (NWI) maps only. No new infrastructure is proposed in this portion of the Study Area; as such, full on-site wetland delineations were not conducted where the Project would operate on the existing MED/SSL tracks. Since there would be no impacts in this area, the greater degree of accuracy was deemed unnecessary.

5.7.2.2 Floodplains

Floodplain geospatial data were acquired from the Indiana Geological Survey (INGS) and the Illinois State Geospatial Survey (ISGS) to determine where the Build Alternatives would cross floodplains. Since detailed survey information is not available at this conceptual stage of the Project, fill in the floodplain/floodway volumes could not be computed for the existing channel crossing of the bridge/culvert structures. The actual fill in the floodplain volumes will be calculated during the Engineering phase with compensatory storage potentially provided along the stream crossing channel overbanks. Even though the fill volume could not be computed, the impacted floodway/floodplain

footprint area for the proposed track work was determined.

For the crossing of the Little Calumet River in Hammond by the Build Alternatives, the preliminary floodplain results were used (instead of the effective floodplain limits) from the FEMA website. The preliminary results take into consideration recent flood control work performed at this location as part of a Letter of Map Revision (LOMR) submitted to FEMA by INDNR.

5.7.2.3 Groundwater and Water Supply

The analysis of potential groundwater impacts included an assessment of the existing groundwater conditions in the Project footprint, or LOD, as well as the effects on groundwater resources from potential impacts to existing water wells. The LOD is the boundary within which construction, materials storage, grading, landscaping, and related activities would occur. This assessment was based on available geospatial groundwater (aquifer) data and well location information. The data were obtained from the ISGS, IDEM, and INGS and utilized to analyze the proposed alignment impacts on groundwater (unconsolidated and bedrock aquifers), as well as the distance of the proposed alignment to existing water wells.

5.7.2.4 Stormwater

Impervious surfaces are areas covered by material that impedes the infiltration of water into the soil. Examples of impervious surfaces are buildings, pavement, concrete, and severely compacted soils. Impervious surfaces can have an effect on local streams, both in water quality and streamflow, and flooding characteristics.

For the stormwater analysis, proposed rail, station and parking lot, and maintenance and storage layouts were established in the Project conceptual design plan set (see **Appendix G**) to determine the amount of added impervious area. The detention policy requirements were determined per the county and state regulations applicable where the proposed work would occur. Some assumptions were made with respect to the storage volume and footprint of proposed detention facilities based on the proposed disturbed areas. To be conservative, no credit was given for existing impervious area being replaced with proposed tracks or a new parking lot facility. The current project improvement plan would also need to be modified to include additional ROW to construct the proposed detention facilities adjacent to the parking lots, rail stations, and maintenance facilities.

5.7.2.5 Coastal Zones

Information on the location of coastal zone management boundaries was obtained from INDNR and IDNR for the respective Coastal Management Programs.

5.7.3 Affected Environment

5.7.3.1 Surface Waters and Wetlands

Fifty-two wetlands, of varying sizes and quality, were identified in the Study Area. The wetlands include ditch wetlands, retention and detention basins, forested, riparian, floodplain forest, sedge meadow, wet meadow, scrub/shrub, prairie marsh, and emergent wetland communities (see **Table 5.7-1**). Most wetlands are of low quality indicative of disturbance, except for wetlands located in the Flatfoot Lake/Beaubien Woods Forest Preserve and the Burnham Prairie Nature Preserve, which are high quality aquatic resources. On July 29, 2016 the USACE provided a preliminary jurisdictional determination for “waters of the United States” in the Indiana portion of the Study Area. The wetlands referenced as 1, 2, 3, 4, 5, 6, 7, 8, 9, 10, 11, 30, 31, 32, 33, 34, 35, 36, 37, 38, 39, 40, 41, 42 and 44 were determined as adjacent to the Little Calumet River, a navigable water. The wetlands referenced as 49, 50, 51, and 52 were determined as adjacent to the Grand Calumet River, also a navigable water. Therefore these wetlands are determined to be jurisdictional and impacts to these areas will

require a permit from the USACE. Wetlands referenced as 12, 17, 18, 19, 20, 21, and 43 were created as stormwater detention facilities and are therefore not jurisdictional. A final jurisdictional determination request of individual surface waters will be made during the Engineering phase. Further details and mapping are included in the *West Lake Corridor Wetland Delineation Technical Report* in **Appendix H.**

Table 5.7-1: Summary of Wetlands in the Study Area

Map ID[1]	Wetland Type	Location	Mapped Soil	Dominant Vegetation
1	Emergent, Riparian	Immediately south of river at Monon Trail bridge	Bono silty clay loam	*Persicaria lapathifolium, Phalaris arundinacea, Ipomoea hederacea*
2	Wet meadow; wooded wetland	South of River at Monon Trail bridge	Bono silty clay loam	*Phalaris arundinacea, Parthenocissus quinquefolia, Vitis riparia, Fraxinus pennsylvanica subintegerrima, Acer negundo, Quercus macrocarpa, Ulmus rubra*
3	Emergent, Riparian	Immediately north of river at Monon Trail bridge	Bono silty clay loam	*Persicaria lapathifolia, Helianthus tuberosus, Phalaris arundinacea, Symphyotrichum pilosum, Eupatorium serotinum, Sambucus nigra*
4	Floodplain forest	Eastern side of Monon Trail, north of river, south of Interstate	N/A	*Lysimachia nummularia, Phragmites australis, Acer negundo, Fraxinus pennsylvanica*
5	Sedge meadow	Immediately north of Interstate at Monon Trail	Watseka silt loam	*Phragmites australis, Fraxinus pennsylvanica subintegerrima, Acer negundo, Populus deltoides*
6	Eastern forested wetland	Immediately north of Interstate at Monon Trail	Watseka silty clay loam	*Impatience capensis, Crataegus mollis, Ulmus americana, Fraxinus pennsylvanica subintegerrima*
7	Sedge meadow with forested wetland edge	East of Monon Trail at 174th St.	Watseka loamy fine sand	*Lythrum salicaria, Salix interior, Populus deltoides, Fraxinus pennsylvanica subintegerrima, Phragmites australis*
8	Sedge meadow edges with forested wetland center	North of 173rd St. and East of Lyman Ave.	Watseka loamy fine sand	*Lythrum salicaria, Fraxinus pennsylvanica subintegerrima, Populus deltoides*
9	Wet prairie with shrubs	West of Sheffield Ave and South of Main St. at rail crossing	Bono silty clay loam	*Sambucus nigra, Frangula alnus, Lythrum salicaria*
10	Sedge meadow with forested wetland edge	North of 173rd St. and East of Lyman Ave.	Watseka loamy fine sand	*Lythrum salicaria, Fraxinus pennsylvanica subintegerrima, Populus deltoides*
11	Ditch wetland	East of rail near at edge of subdivision south of Otis Bowen Dr.	Bono silty clay	*Phragmites australis*
12	Bioretention basin	East of rail, south of Superior Ave.	Bono silty clay	*Phragmites australis*
13	Sedge meadow swale and shrub wetland	North of E. 130 St. near Calumet Water Reclamation Plant, west of rail	Orthents clayey	*Phragmites australis, Salix spp, Morus alba, Populus deltoides*

Table 5.7-1: Summary of Wetlands in the Study Area (cont.)

Map ID[1]	Wetland Type	Location	Mapped Soil	Dominant Vegetation
14	Sedge meadow and shrub wetland	South of 130th St., east of rail	Orthents clayey	*Typha angustifolia, Hawthorn spp.*
15	Sedge meadow swale	West of rail near 132nd St.	Orthents, Ashkum, Aquents	*Eleocharis palustris*
16	Sedge meadow and shrub wetland ditch	Adjacent to rail on west side in Cook County Forest Preserve District	Orthents clayey	*Phragmites australis, Lythrum salicaria, Sambucus nigra, Salix exigua, Equisetum arvense, Helianthus tuberosus, Eleocharis palustris, Ulmus americana*
17	Retention basin wetland	East of rail, south of 45th St. near Town of Munster	Rensselaer loam, calcareous subsoil variant, Bono silty clay	*Phragmites australis, Lythrum salicaria*
18	Detention basin	East of rail in subdivision near Columbia Ave.	Bono silty clay	*Phragmites australis, Typha angustifolia*
19	Disturbed Wet prairie	East of rail in subdivision near Columbia Ave.	Bono silty clay	*Populus deltoides, Salix interior, Phragmites australis, Eleocharis palustris*
20	Detention basin	East of rail in subdivision near Columbia Ave.	Bono silty clay	*Lythrum salicaria, Eleocharis palustris, Salix interior*
21	Detention basin	East of rail in subdivision near Columbia Ave.	Bono silty clay	*Salix interior, Eleocharis palustris*
22	Ditch sedge meadow	North side of rail near Waste Management landfill	Landfill	*Phragmites australis, Bidens cernua*
23	Ditch sedge meadow and forested wetland	South side of rail near Waste Management landfill	Landfill	*Phragmites australis*
24	Forested riparian wetland	North side of rail near Waste Management landfill, at river edge	Landfill	*Phragmites australis, Acer negundo*
25	Forested riparian ditch wetland	North side of rail near Waste Management landfill	Landfill	*Phragmites australis, Rhamnus frangula, Acer negundo*
26	Large prairie marsh and forested wetland	Adjacent to rail on east side in Cook County Forest Preserve District	Watseka silty clay loam, Plainfield loamy sand, Gilford fine sandy loam	*Populus deltoides, Bidens cernua, Carex stricta, Typha latifolia, Alisma subcordatum*
27	Wet prairie and sedge meadow	North of rail near 143rd St. and Hammond Ave.	Gilford loamy sand, Watseka loamy fine sand	*Phalaris arundinacea, Populus tremuloides, Populus deltoides, Solidago rugosa, Vitis riparia*
28	Prairie marsh	Adjacent to rail on east side in Cook County Forest Preserve District	Orthents (aquic), Watseka loamy fine sand, Gilford fine sandy loam	*Phragmites australis, Lythrum salicaria, Salix interior, Populus deltoides*
29	Forested riparian wetland	Adjacent to rail on west side in Cook County Forest Preserve District	Pella silty clay loam	*Phragmites australis, Populus deltoides*
30	Disturbed sedge meadow	East of rail, south of Fisher St.	Maumee loamy fine sand	*Phragmites australis*
31	Sedge meadow	East of rail, south of Fisher St.	Rensselaer loam, calcareous subsoil variant	*Populus deltoides, Phragmites australis*
32	Sedge meadow and forested wetland ditch	East of rail, south of Fisher St.	Rensselaer loam, calcareous subsoil variant	*Populus deltoides, Rhamnus frangula, Salix interior, Phragmites australis*
33	Sedge meadow ditch	East of rail, south of Fisher St.	Maumee loamy fine sand,	*Phragmites australis, Populus deltoides*
34	Sedge meadow	West of rail, south of Fisher St.	Maumee loamy fine sand	*Phragmites australis, Lythrum salicaria, Cornus stolonifera, Frangula alnus, Geum laciniatum trichocarpum*

Table 5.7-1: Summary of Wetlands in the Study Area (cont.)

Map ID[1]	Wetland Type	Location	Mapped Soil	Dominant Vegetation
35	Sedge meadow	East of rail, north of 45th St.	Rensselaer loam, calcareous subsoil variant	*Salix interior, Populus deltoids, Cornus stolonifera, Fraxinus pennsylvanica subintegerrima, Typha angustifolia, Vitis riparia*
36	Sedge meadow	East of rail, north of 45th St.	Rensselaer loam, calcareous subsoil variant	*Populus deltoides, Typha angustifolia, Phragmites australis*
37	Sedge meadow	West of rail, north of 45th St.	Rensselaer loam, calcareous subsoil variant	*Salix interior, Cornus stolonifera, Typha angustifolia, Vitis riparia*
38	Ditch forested wetland and sedge meadow ditch	West of rail near Sheffield Ave. crossing	Bono silty clay	*Phragmites australis, Salix interior, Cornus stolonifera, Equisetum arvense, Acer saccharinum, Prunus serotina, Populus deltoides, Rubus occidentalis*
39	Forested wetland ditch	West of rail, north of Seminary Dr.	Bono silty clay	*Phragmites australis, Salix interior, Salix fragilis*
40	Wet prairie	West of rail, north of Seminary Dr	Bono silty clay	*Lythrum salicaria, Salix interior*
41	Forested wetland	West of rail, north of 45th St.	Rensselaer loam, calcareous subsoil variant	*Phragmites australis, Populus deltoides*
42	Ditch sedge meadow	West of rail near Glastonbury St., south of 45th St.	Bono silty clay	*Lythrum salicaria, Andropogon gerardii, Cornus stolonifera*
43	Detention basin	West of rail near Glastonbury St., south of 45th St.	Bono silty clay	*Open water with rip-rap. No vegetation.*
44	Sedge meadow swale	West of rail near Glastonbury St., south of 45th St.	Bono silty clay	*Lythrum salicaria, Typha angustifolia*
45	Riparian forested wetland	East of Interstate near river and Waste Management	Landfills	*Not visible*
46	Sedge meadow	East of rail, north of 130th St.	Orthents, clayey	*Not visible*
47	Ditch sedge meadow	Between rail, north of 130th St.	Orthents, loamy	*Not visible*
48	Ditch sedge meadow	West of rail, north of 130th St.	Orthents, loamy	*Not visible*
49	Riparian wetland	On northern bank of Calumet River near Chicago St. and State Line Rd.	Urban land	*Not visible*
50	Riparian wetland	On southern bank of Calumet River near Chicago St. and State Line Rd.	Orthents, loamy-skeletal	*Not visible*
51	Riparian wetland	On southern bank of Calumet River near Wilcox St. and Hohman Ave.	Urban land	*Not visible*
52	Riparian wetland	On northern bank of Calumet River near Wilcox St. and Hohman Ave.	Urban land	*Not visible*

SOURCE: AECOM 2016.

Note: [1]See mapping in the *West Lake Corridor Wetland Delineation Technical Report* in **Appendix H**.

The following is a discussion of the surface waters, including rivers, streams, named ditches, lakes, and ponds. These water bodies are discussed from south to north. Additional information and mapping are provided in the *West Lake Corridor Natural Resources Technical Report* in **Appendix H.**

North Creek: The Study Area approaches North Creek at the southern end of the Study Area, but North Creek is west of the Study Area boundary. Per the Illinois 2016 303(d) List of Impaired Waters, North Creek is impaired due to dissolved oxygen, hexachlorobenzene, and sedimentation/siltation.

Unnamed Tributary to North Creek: The Study Area approaches an unnamed tributary to North Creek at the Lansing Country Club, but the tributary is located west of the Study Area. Water quality information for the unnamed tributary to North Creek is the same as North Creek, discussed above.

Dyer Ditch: Dyer Ditch is in the southern-most portion of the Study Area. Not listed in the Indiana 2014 303(d) List of Impaired Waters, it is assumed that Dyer Ditch meets water quality standards.

Plum Creek: Plum Creek is in the southern-most portion of the Study Area. USEPA considers this Hart Ditch. Not listed in the Indiana 303(d) List of Impaired Waters, it is assumed that Plum Creek meets water quality standards.

Little Calumet River: The Study Area crosses the Little Calumet River twice. All of the Build Alternatives cross the Little Calumet River at the same location in Indiana, south of I-80. Per the Indiana 2014 303(d) List of Impaired Waters, the River is impaired at this location due to chloride, dissolved oxygen, impaired biotic communities, polychlorinated biphenyls (PCBs), free cyanide, and nutrients.

The Little Calumet River is crossed another time in the Illinois portion of the Study Area. It is not impaired where the proposed alignments of the NEPA Preferred Alternative, Commuter Rail Alternative Options and Hammond Alternative Options cross the river near 130th Street; however, it is impaired where it is crossed by the IHB Alternative Options near 141st Street. Per the Illinois 2016 303(d) List of Impaired Waters, causes of impairment near 141st Street include aldrin, mercury, low dissolved oxygen, total phosphorus, PCBs, and silver. No total maximum daily loads (TMDLs) have been developed for this portion of the watershed.

Powderhorn Lake: The Commuter Rail Alternative Options and the Hammond Alternative Options are south of and adjacent to Powderhorn Lake, approximately 0.03 mile at its closest point. A request for determination as to whether this lake is jurisdictional under the CWA will be made during the Engineering phase. Not listed in the Illinois 2016 303(d) List of Impaired Waters, it is assumed that Powderhorn Lake meets water quality standards.

Grand Calumet River: The proposed alignments of the NEPA Preferred Alternative, Commuter Rail Alternative Options and the Hammond Alternative Options cross the Grand Calumet River approximately 0.2 mile north of Plummer Avenue/Willow Court. The Grand Calumet River is considered a traditional navigable river by USACE/USEPA. The proposed alignment for the NEPA Preferred Alternative and the Hammond Alternative Options crosses the river on the Indiana side. The proposed alignment for the Commuter Rail Alternative Options crosses the river on the Illinois side. Per the Indiana 2014 303(d) List of Impaired Waters, the Grand Calumet River has impaired biotic communities and is impaired due to ammonia, low dissolved oxygen, *E. coli*, nutrients, and PCBs. Per the Illinois 2016 303(d) List of Impaired Waters, the Grand Calumet River is impaired for indigenous aquatic life due to ammonia, arsenic, barium, cadmium, chromium, copper, dichlorodiphenyltrichloroethane (DDT), iron, lead, nickel, low dissolved oxygen, total phosphorus, PCBs, sedimentation/siltation, silver, and zinc.

A letter from INDNR dated November 10, 2014 (see **Appendix F**) advised that the Grand Calumet River is one of the most contaminated rivers in the country due to a long history of chemical dumping and discharges prior to environmental regulations. The River had contaminated sediments averaging 8 feet to 10 feet in depth. Due to a collaborative effort by government agencies, industry, municipalities, nonprofits, and community residents, remediation of the River through the installation of a 2 foot cap is nearing completion. In addition, large-scale ecological restoration of adjacent wetland and riparian communities is underway.

Flatfoot Lake: The IHB Alternative Options run south and east of Flatfoot Lake in the Beaubien Woods Forest Preserve. A request determination as to whether this lake is jurisdictional under the CWA will need to be made during the Engineering phase. Per the Illinois 2016 303(d) List of Impaired Waters, Flatfoot Lake is impaired for fish consumption due to mercury.

Metropolitan Water Reclamation District of Greater Chicago's (MWRDGC) Calumet Water Reclamation Plant Ponds: All proposed alignments run adjacent to the Calumet Water Reclamation Plant north of 130th Street. There is an assemblage of open water ponds and sludge drying beds within this site. These ponds are part of the operations of the plant and are not anticipated to be jurisdictional under the CWA, but a request for jurisdictional determination will be made during the Engineering Phase. These ponds may be considered waters of the state.

Lake Calumet: All proposed alignments are in the vicinity of Lake Calumet, with the NEPA Preferred Alternative, Commuter Rail Alternative Options and Hammond Alternative Options 1 and 3 closest when on the existing SSL tracks. At its closest point, the Study Area is approximately ½-mile west of the lake. Lake Calumet is considered a traditional navigable river by USACE/USEPA. Per the Illinois 2016 303(d) List of Impaired Waters, Lake Calumet is impaired for fish consumption due to mercury and PCBs.

5.7.3.2 Floodplains

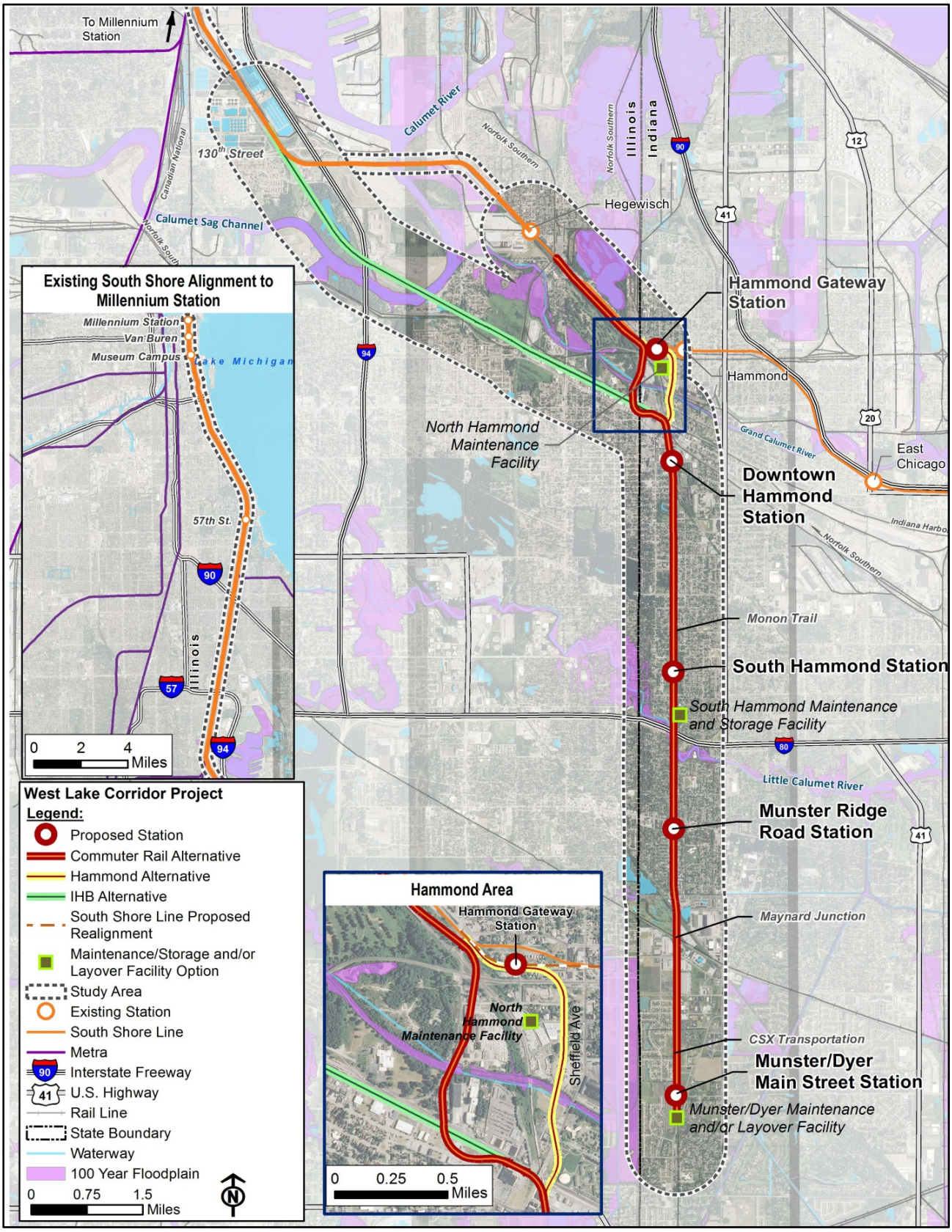
According to the FIRMs for Lake and Cook counties, the Study Area is within the FEMA 100-year floodplain in multiple areas along the Study Area. Existing floodways/floodplains in the Study Area are shown on **Figure 5.7-1**.

5.7.3.3 Groundwater and Water Supply

There are 43 water wells located within ½ mile of the proposed alignments for the NEPA Preferred Alternative (37 in Indiana and 6 in Illinois), Commuter Rail Alternative Options (36 in Indiana and 7 in Illinois), and Hammond Alternative Options 1 and 3 (37 in Indiana and 6 in Illinois). For the IHB Alternative Options, there are 48 water wells within ½ mile of the proposed alignment (36 in Indiana and 12 in Illinois). Water wells are located within the Study Area in both Indiana and Illinois as shown on **Figure 5.7-2**. Most of the aquifers are located deep underground; however, several existing shallower groundwater wells could potentially be affected by proposed runoff from the new facilities.

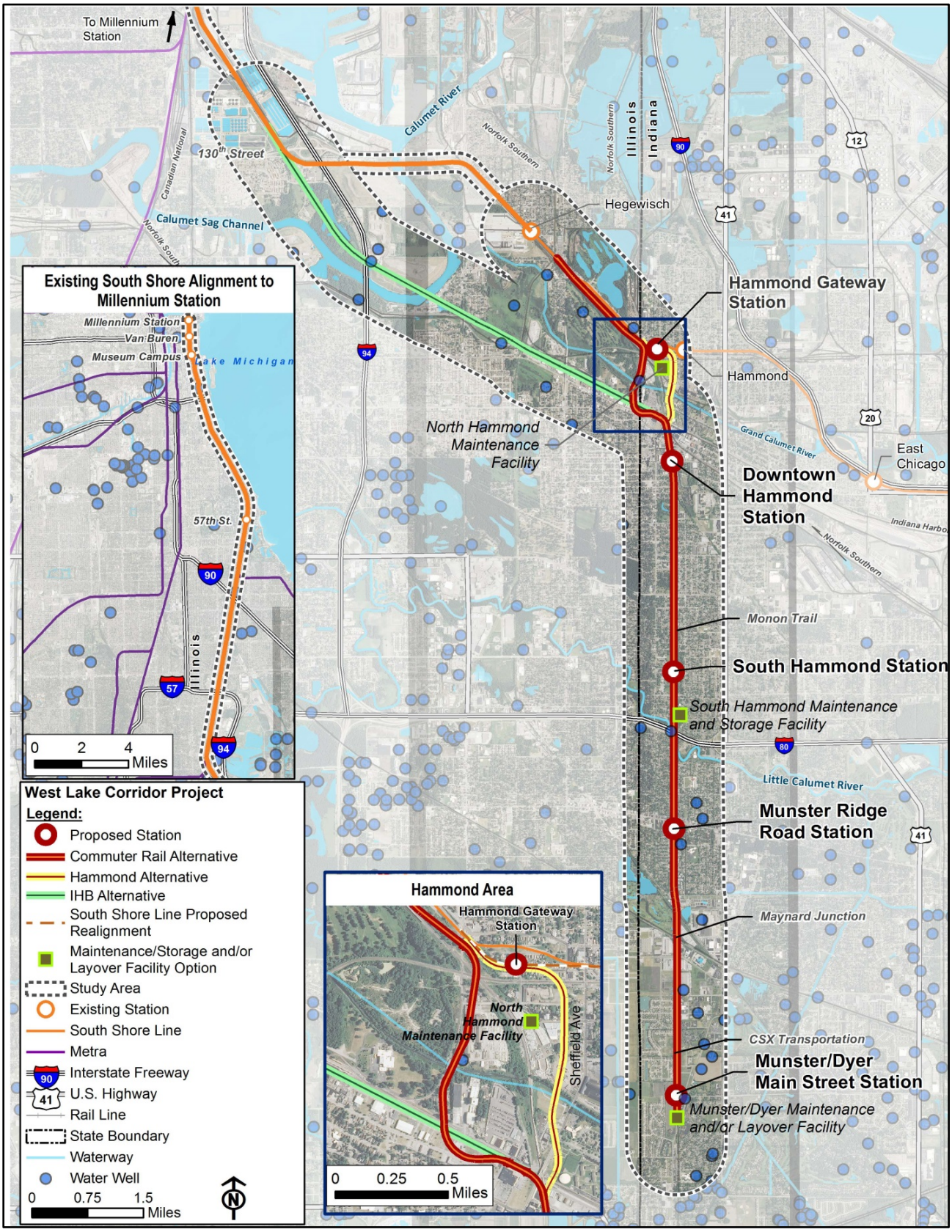
5.7.3.4 Stormwater

Currently much of the Study Area has no formal stormwater treatment to meet current water quality regulatory requirements. Stormwater within the Study Area typically flows directly into surrounding vegetated ditches that provide water quality benefits such as sediment stabilization and waterborne sediments filtration. Water then flows through existing wetlands (see **Section 5.7.3.1**), and then outlets to the major waterways within each watershed. There are some locations where runoff is drained to storm drain grates located along the curb of the road, which connect into the storm sewer system.



SOURCE: FEMA 2008; FEMA 2012.

Figure 5.7-1: Floodplains in the Study Area



SOURCE: INDNR n.d.; Illinois State Geologic Survey 2015.

Figure 5.7-2: Water Wells in the Study Area

5.7.3.5 Coastal Zones

Within the State of Illinois, the coastal zone management area is associated with Lake Michigan in the northern portion of the Study Area and Lake Calumet in the central portion of the Study Area. In the northern portion, north of 56th Street in Chicago, the MED tracks form the boundary of the coastal zone management area. In the southern portion of the Study Area, the coastal zone management area includes Lake Calumet, including land south to 134th Street from I-90 to the Indiana-Illinois state line. Within Indiana, the entire Study Area is located within the coastal zone management area.

5.7.4 Environmental Consequences

This section presents the potential impacts of the Project Alternatives on water resources. For more information on the potential impacts, see the *West Lake Commuter Rail Project Natural Resources Technical Report* in **Appendix H**.

5.7.4.1 Long-Term Operating Effects

No Build Alternative

Under the No Build Alternative, there would be no Project-related impacts to water resources.

NEPA Preferred Alternative

Surface Waters and Wetlands

The NEPA Preferred Alternative would affect 8.18 acres of low to moderate quality wetlands. All wetland impacts would be in Indiana. It would also affect the following surface waters:

Grand Calumet River: There would be no direct impacts on the Grand Calumet River. The NEPA Preferred Alternative would cross the Grand Calumet River in Indiana where it is impaired due to a variety of contaminants. Of the listed impairments, a commuter rail line has the potential to release additional heavy metals, oil and grease (lubricants used in undercarriage of railcars or track switches), or sediments (generalized dust kicked up from air currents created by train traffic); however, indirect impacts would be minimal due to the low number of trains (24 trains per day), which would be electrically-powered rather than diesel-powered.

Little Calumet River: There would be no direct impacts to the Little Calumet River. The NEPA Preferred Alternative would cross the Little Calumet River on a new through-girder bridge, and may use the remaining original Monon Railroad support structures, which include two abutments and three piers. Four of the original piers have been removed. The northernmost existing pier is located at the edge of the River and the other two piers are within the levee protection system. Due to the removal of the adjacent piers, the existing piers would need to be strengthened. The work for the northernmost pier would be in-water. A decision to encapsulate or replace the remaining existing support structures would be made in the Project's Engineering phase. The bridge would be designed to clear span the river. Any modifications to the existing abutments would be conducted outside of the ordinary high water mark. Indirect impacts to the Little Calumet River would be negligible as only minor amounts of contaminants would occur due to 24 trains per day. In addition, the existing Monon Trail bridge would be relocated to the west using new support structures that would also fully clear span the River. As a result, no abutments, piers, or sheet pile walls would be constructed in the water for the Monon Trail bridge.

MWRDGC's Calumet Water Reclamation Plant Ponds: Indirect impacts would be negligible as existing, active tracks would be used and only incremental increases in contaminants would occur due to the increase in train traffic of approximately 24 trains per day.

Floodplains

The proposed stations, parking lots, or maintenance and storage facility would affect floodway/ floodplain crossings. All impacts to the floodplain would be in Indiana. **Table 5.7-2** indicates the added total fill in the floodway and floodplain in terms of total disturbed area for the NEPA Preferred Alternative.

Table 5.7-2: Total Fill in Floodplain/Floodway - NEPA Preferred Alternative

State	Total Fill Area (acres)	
	Floodway	Floodplain
Indiana	1.10	1.33
Illinois	0.07	0.14
Total	**1.17**	**1.47**

SOURCE: AECOM 2016.

There is one major stream crossing with a designated floodplain along the proposed alignment that would require compensatory storage for any fill in the floodplain (i.e., the Grand Calumet River). This stream crosses the proposed alignment approximately 1,600 feet north of Willow Court (just south of the IHB freight line), in Hammond.

Groundwater and Water Supply

Water wells could be affected by possible contaminated runoff from proposed operating conditions. These impacts would be minimal due to the presence of organic or clay soils, which minimize the potential for contaminants to move through the soil. Sandy soils are found in the northern portion of the Study Area; however, there are only a few wells located in this area. None of the proposed stations have existing water wells located within their proposed footprints. The proposed Munster/Dyer Main Street Station has an existing water well on private property (520 Sheffield Avenue, Dyer, IN 46311) that is located about 70 feet south of the proposed Main Street construction. Should this property be acquired for station construction, the water well could be affected.

Stormwater

Table 5.7-3 indicates the added impervious area that would result from the NEPA Preferred Alternative. Per the Cook County and Lake County Stormwater Management Plans, the proposed work would include design to reduce the proposed peak runoff volume and rate to meet the predevelopment stormwater runoff volume and rate.

Table 5.7-3: Total Impervious Area Created by the NEPA Preferred Alternative

State	Total Impervious Area (acres)			
	Stations / Parking	Maintenance Facility	Layover Facility	Track
Indiana	38.3	3.0	2.8	26.2
Illinois	0.0	0.0	0.0	0.0
Total	**38.3**	**3.0**	**2.8**	**26.2**

SOURCE: AECOM 2016.

The current Project design drawings for the improvements in the proposed station areas do not include any designated sites for detention storage purposes. These locations would need to be re-evaluated during the Engineering phase to determine whether some of the proposed landscape area adjacent to the parking lots and stations can be converted into detention storage or if additional land acquisition is required to construct these basins. The footprint for the proposed detention facilities can also be decreased slightly by providing some pavement storage along the parking lot surface or within underground storage pipes. In addition, engineers will evaluate more innovative stormwater management techniques, including, for example, tree infiltration cells, curb cuts, and permeable materials for parking surfaces.

Coastal Zones

It is not anticipated that the NEPA Preferred Alternative would have any impacts on coastal zone management areas in the Study Area.

Commuter Rail Alternative Options

Surface Waters and Wetlands

Impacts from the Commuter Rail Alternative Options would be the same as those described for the NEPA Preferred Alternative, except for wetland impacts. **Table 5.7-3** indicates the added impervious area that would result from the NEPA Preferred Alternative. **Table 5.7-4** shows the number of acres of impacts to wetlands that would occur under the Commuter Rail Alternative Options. All of the wetlands that would be affected are of low to moderate quality.

Table 5.7-4: Potential Wetland Impacts of the Commuter Rail Alternative

Option	State	Acres of Impact
Option 1	Indiana	8.64
	Illinois	0.19
	Total	**8.83**
Option 2	Indiana	9.06
	Illinois	0.19
	Total	**9.25**
Option 3	Indiana	9.06
	Illinois	0.19
	Total	**9.25**
Option 4	Indiana	5.23
	Illinois	0.19
	Total	**5.42**

SOURCE: AECOM 2016.

Floodplains

Potential impacts from the Commuter Rail Alternative Options would be similar to those described for the NEPA Preferred Alternative except that impact numbers for the crossing of the Grand Calumet River would be different as the Commuter Rail Alternative Options would cross the Grand Calumet River about 1,900 feet west near the Indiana-Illinois state line. **Table 5.7-5** indicates the added total fill in the floodway and floodplain in terms of total disturbed area for the Commuter Rail Alternative Options. The proposed stations, parking lots, or maintenance facilities would not affect floodway or floodplain crossings.

Table 5.7-5: Total Fill in Floodplain/Floodway for Commuter Rail Alternative Options

State	Total Fill Area (acres)	
	Floodway	Floodplain
Indiana	1.10	1.33
Illinois	0.10	0.14
Total	**1.20**	**1.47**

SOURCE: AECOM 2016.

There are two major stream crossings with designated floodplains along the proposed alignment that would require compensatory storage for any fill in the floodplain, the Little Calumet River and the Grand Calumet River. The Little Calumet River crosses the proposed alignment for all options approximately 400 feet south of I-80/94, at the Hammond/Munster border; while the proposed alignment for all options crosses the Grand Calumet River approximately 1,200 feet north of Plummer Avenue/Willow Court (just south of the existing IHB freight line), in Calumet City, Illinois.

Groundwater and Water Quality

Impacts from the Commuter Rail Alternative Options would be the same as those described for the NEPA Preferred Alternative.

Stormwater

Table 5.7-6 indicates the added impervious area that would result from Commuter Rail Alternative Options.

Table 5.7-6: Total Impervious Area from Commuter Rail Alternative Options

Option	State	Total Impervious Area (acres)		
		Stations / Parking	Maintenance & Storage Facility	Track
Option 1	Indiana	33.6	13.0	21.8
	Illinois	0.0	0.0	4.4
	Total	**33.6**	**13.0**	**26.2**
Option 2	Indiana	37.1	13.0	21.8
	Illinois	0.0	0.0	4.4
	Total	**37.1**	**13.0**	**26.2**
Option 3	Indiana	33.4	15.7	21.8
	Illinois	0.0	0.0	4.4
	Total	**33.4**	**15.7**	**26.2**
Option 4	Indiana	36.1	13.0	21.8
	Illinois	0.0	0.0	4.4
	Total	**36.1**	**13.0**	**26.2**

SOURCE: AECOM 2016.

Coastal Zones

Similar to the NEPA Preferred Alternative, it is not anticipated that the Commuter Rail Alternative Options would have any impacts on coastal zone management areas in the Study Area.

IHB Alternative Options

Surface Waters and Wetlands

The difference between the IHB Alternative Options and the NEPA Preferred Alternative is that the IHB Alternative Options would not impact the Grand Calumet River; however, the IHB Alternative Options would impact Flatfoot Lake and wetland impacts would be different. Potential impacts to wetlands as a result of the IHB Alternative Options are shown in **Table 5.7-7**. Potential impacts to Flatfoot Lake are discussed below.

Table 5.7-7: Potential Wetland Impacts of the IHB Alternative Options

Option	State	Acres of Impact
Option 1	Indiana	8.69
	Illinois	11.73
	Total	**20.42**
Option 2	Indiana	9.06
	Illinois	11.73
	Total	**20.79**
Option 3	Indiana	7.58
	Illinois	11.73
	Total	**19.31**
Option 4	Indiana	7.58
	Illinois	11.73
	Total	**19.31**

SOURCE: AECOM 2016.

All IHB Alternative Options would affect three high quality aquatic resource wetlands, totaling 4.42 acres. The remaining wetland impacts under all IHB Alternative Options would occur to wetlands of low to moderate quality. There would be no direct impacts to Flatfoot Lake. Although new tracks would be constructed at this location, they would be constructed within the existing ROW. Flatfoot Lake is impaired at this location due to mercury. A commuter rail line has the potential to release heavy metals, including mercury. Indirect impacts to Flatfoot Lake would be negligible due to contaminant uptake/adsorption of vegetation and soils located between the railroad tracks and Flatfoot Lake.

Floodplains

Table 5.7-8 indicates the added total fill in the floodway and floodplain in terms of total disturbed area for the IHB Alternative Options. All options would affect the same acreage. The proposed stations, parking lots, or maintenance facilities would not affect floodway or floodplain crossings.

Table 5.7-8: Total Fill in Floodplain/Floodway for the IHB Alternative Options

State	Total Fill Area (acres)	
	Floodway	Floodplain
Indiana	1.10	1.33
Illinois	0.10	0.14
Total	**1.20**	**1.47**

SOURCE: AECOM 2016.

The IHB Alternative Options would have one additional major stream crossing that is within a designated floodplain, the Little Calumet River. This stream crosses under the proposed alignment approximately 1,200 feet north of East 142nd Street in Burnham, Illinois. The crossing is located within a designated floodway, which would be impacted by the construction of a second bridge to the west of the existing structure that would serve the new track that would be built for exclusive freight use. The current single track bridge would be rehabilitated, and would be used exclusively for Project trains.

Groundwater and Water Supply

Impacts from the IHB Alternative Options would be the same as those described for the NEPA Preferred Alternative.

Stormwater

Table 5.7-9 indicates the added impervious area that would result from the IHB Alternative Options.

Table 5.7-9: Total Impervious Area from the IHB Alternative Options

Option	State	Total Impervious Area (acres)		
		Station/Parking	Maintenance & Storage Facility	Track
Option 1	Indiana	33.6	13.0	21.6
	Illinois	0.0	0.0	13.4
	Total	**33.6**	**13.0**	**35.0**
Option 2	Indiana	37.1	13.0	21.6
	Illinois	0.0	0.0	13.4
	Total	**37.1**	**13.0**	**35.0**
Option 3	Indiana	33.4	15.7	21.6
	Illinois	0.0	0.0	13.4
	Total	**33.4**	**15.7**	**35.0**
Option 4	Indiana	36.1	13.0	21.6
	Illinois	0.0	0.0	13.4
	Total	**36.1**	**13.0**	**35.0**

SOURCE: AECOM 2016.

Coastal Zones

Similar to the NEPA Preferred Alternative, it is not anticipated that the IHB Alternative Options would have any impacts on coastal zone management areas in the Study Area.

Hammond Alternative Options 1 and 3

Surface Waters and Wetlands

Impacts from Hammond Alternative Options 1 and 3 would be the same as those described for the NEPA Preferred Alternative, except for the wetland impacts shown in **Table 5.7-10**. All wetlands that would be affected are of low to moderate quality and are located in Indiana.

Table 5.7-10: Potential Wetland Impacts of Hammond Alternative Options 1 and 3

Option	Acres of Impact
Option 1	8.10
Option 3	4.50

SOURCE: AECOM 2016.

Floodplains

Table 5.7-11 indicates the added total fill in the floodway and floodplain in terms of total disturbed area from Hammond Alternative Options 1 and 3. None of the floodway/floodplain crossings would be affected by the proposed stations, parking lots, or maintenance facilities.

Table 5.7-11: Total Fill in Floodplain/Floodway from Hammond Alternative Options 1 and 3

State	Total Fill Area (acres)	
	Floodway	Floodplain
Indiana	1.10	1.33
Illinois	0.07	0.14
Total	**1.17**	**1.47**

SOURCE: AECOM 2016.

There is one major stream crossing with a designated floodplain along the proposed track that would require compensatory storage for any fill in the floodplain, the Grand Calumet River. This stream crosses the proposed alignment approximately 1,600 feet north of Willow Court (just south of the existing IHB freight line), in Hammond.

Groundwater and Water Supply

Impacts from Hammond Alternative Options 1 and 3 would be the same as those described for the NEPA Preferred Alternative.

Stormwater

Table 5.7-12 indicates the added impervious area that would result from Hammond Alternative Options 1 to 3. All impacts would occur in Indiana.

Table 5.7-12: Total Impervious Area from Hammond Alternative Options 1 and 3

Option	Total Impervious Area (acres)			
	Station	Maintenance Facility	Layover Facility	Rail
Option 1	34.8	3.0	2.8	26.2
Option 3	37.3	5.7	3.0	26.2

SOURCE: AECOM 2016.

Coastal Zones

Similar to the NEPA Preferred Alternative, it is not anticipated that Hammond Alternative Options 1 and 3 would have any impacts on coastal zone management areas in the Study Area.

Maynard Junction Rail Profile Option

There would be no change to impacts to surface waters or wetlands, floodplains, groundwater and water supply, and stowrmwater as described for the applicable alternative options (i.e., NEPA Preferred Alternative, Commuter Rail Alternative Options 1, 2, and 3, IHB Alternative Options 1, 2, and 3, and Hammond Alternative Option 1) resulting from the Maynard Junction Rail Profile Option.

5.7.4.2 Short-Term Construction Effects

There would be no construction related impacts associated with the No Build Alternative; therefore, there would be no impacts to surface waters, floodplains, groundwater, or coastal zones. Potential impacts associated with other projects under the No Build Alternative would be evaluated separately as part of the planning for those projects. The potential construction impacts would be the same for all Build Alternatives. Construction impacts that would result under any of the Build Alternatives are described below.

Surface Waters and Wetlands

During construction of Build Alternatives, there may be erosion and sedimentation, which could be released to surface waters or wetlands.

Floodplains

For all Build Alternatives, impacts to floodplains as a result of construction would be temporary, and would consist primarily of erosion and sediment control impacts.

Groundwater and Water Supply

For all Build Alternatives, water wells located within the construction limits of the proposed rail, existing rail to be restored, and the site development of the station and maintenance facility options may be directly affected by construction, which has the potential to pollute groundwater. Wells near construction limits may be impacted via construction surface runoff activities or via traffic. Impacts to the majority of these wells would be minimal due to distance and the presence of organic or clay soils, which minimize the potential for contaminants to move through the soil. Impacts may occur, but would be minimal to wells located within the northern portion of the Study Area, where sandy soils are present because there are few wells in this portion of the Study Area.

Stormwater

Construction activities for all Build Alternatives would disturb soils and could cause runoff that could potentially erode slopes and drainage ways, form gullies, and deposit sediment in adjacent water bodies. For those sections in the Study Area served by municipal storm sewer systems, construction activities could disturb soils and affect water quality by carrying sediment in runoff and discharging to storm drains.

Coastal Zones

For all Build Alternatives, there would be no impacts to coastal zone management area as a result of construction.

5.7.5 Avoidance, Minimization, and/or Mitigation Measures

5.7.5.1 Long-Term Operation Effects

Since no impacts to water resources are anticipated under the No Build Alternative, no mitigation measures are proposed.

Surface Waters and Wetlands

USEPA has provided guidelines related to the CWA, which include choosing the least environmental damaging practicable alternative (minimizing impacts), prohibitions on causing or contributing to significant degradation of waters, and minimizing and mitigating unavoidable impacts to waters of the US and wetlands. The Project would not impact the integrity of the cap that is located in the West Branch of the Grand Calumet River in Hammond (as discussed in **Section 5.7.3.1**). Any bridge in this section of the river would span the river, with no piers or abutments within the river channel.

Per INDNR (ER-17897), the Project would utilize existing structures for stream crossing where possible, thereby minimizing impacts to surface waters and wetlands (see **Appendix F**). Where the existing structure for the Little Calumet River would be used, the northernmost existing pier is located at the edge of the River and the other two piers are within the levee protection system. The existing piers would need to be strengthened and the work for the northernmost pier would occur in-water. If the use of an existing structure is not possible, spans without piers would be used at the Little Calumet River; bridges would be used preferentially over culverts; and bottomless culverts would be used instead of pipe culverts in order to promote passage of aquatic organisms. If box or pipe culverts are used, they would be buried a minimum of 6 inches; crossings would span the entire channel width; the natural stream substrate would be maintained within any structures; and stream depths and velocities during low flow conditions would be similar to those in the natural stream. By complying with these guidelines, impacts to surface waters due to scouring and impacts to aquatic organisms would be minimized.

A determination of impacts to waters of the US and wetlands would be finalized during the Engineering phase. The amount and type of wetland and waters of the US mitigation would be determined as part of the CWA permit process, in compliance with USACE/USEPA requirements. For impacts to wetlands determined not to be jurisdictional under the CWA, mitigation would be provided per applicable state requirements. Riparian mitigation would be required under Indiana's Construction in a Floodway regulations. Impacts specific to riparian habitat would be determined as part of the CWA Sections 401/404 permitting process.

Floodplains

Any proposed permanent fill within the existing floodways/floodplains would require compensatory storage and a hydraulically sized structure to ensure that water surface levels are not raised within the stream channel or along adjacent properties. These crossings would also need to be designed to allow for fish passage and to meet any regulatory and water quality requirements from regulatory agencies. If compensatory storage cannot be provided at the stream crossing of the proposed track work, additional coordination would be required with the county and local community to mitigate the required compensatory storage volume farther upstream or downstream of the proposed crossing in a certain designated area. There is a possibility that additional ROW may be required to widen ditches or construct a new compensatory storage site adjacent to the floodplain.

Groundwater and Water Supply

All wells that are located within the LOD and would be impacted by the Project would be properly capped and abandoned. If the dwelling associated with an affected well is to remain after construction is complete, the water well would be replaced or other suitable alternative would be provided. Any replacement wells would be constructed such that susceptibility to surficial contamination is minimized (i.e., constructing the well in a deeper aquifer).

Stormwater

Stormwater facilities, discharges, and other BMPs/water quality measures would be monitored and managed following construction in accordance with the requirements of the Indiana 327 15-5, Rule 5 (2012c) and the General National Pollutant Discharge Elimination System (NPDES) Illinois permit number ILR10.

Coastal Zones

There would be no impacts to coastal management zones in both Indiana and Illinois. No mitigation is proposed.

5.7.5.2 Short-Term Construction Effects

Since no construction-related impacts are anticipated under the No Build Alternative, no mitigation measures are proposed.

Surface Waters and Wetlands

Impacts to surface waters and wetlands would be minimized through the implementation of BMPs and erosion and sediment control plans, which would be required as part of the CWA Sections 401/404 permits.

Floodplains

While there would be temporary construction impacts to the existing floodplains, no mitigation measures are proposed since the impacts do not constitute permanent regrading and fill within the existing floodplain limits, which in this scenario would require compensatory storage. Erosion and sediment control plans would be required with the contract drawings to prevent or reduce the displacement of soil and other sediments via stormwater runoff within land development area.

Groundwater and Water Supply

Mitigation measures would be completed through the implementation of BMPs (such as bioswales, which is a type of landscaping designed to remove silt and pollution from water runoff) that treat and filter stormwater runoff prior to it infiltrating and becoming groundwater. These BMPs would also be implemented to minimize the volume of stormwater runoff discharge. Installation of BMPs would result in physical, chemical, or biological pollutant load reduction; increased infiltration; and evapotranspiration (plant respiration). Proper soil erosion and sediment control measures would also be used to minimize erosion and sedimentation from the project.

Stormwater

Stormwater facilities and discharges would be monitored and managed during construction in accordance with the requirements of the Indiana 327 15-5, Rule 5 (2012c) and the General NPDES

Illinois permit number ILR10. Other stormwater control practices may be implemented to mitigate water quality impacts. In addition to detention facilities, other practices such as vegetated basins/buffers, infiltration basins, and bioswales would be evaluated to minimize transport of sediment, heavy metals, and other pollutants. Regional stormwater detention storage may be necessary per watershed basis to ensure that the overall watershed release rate to the designate waterway crossings is not increased. It may not be feasible to provide stormwater detention storage at each outlet.

Coastal Zones

There would be no impacts to CZMAs in both Indiana and Illinois. No mitigation is proposed.

5.8 Biological Resources (Wildlife and Habitat, and Threatened and Endangered Species)

This section discusses the natural resources located within the Study Area, including wildlife and habitats. It also documents federal and state-listed threatened and endangered species and identifies the potential effects to natural resources that would result from implementation of the alternatives under study in this DEIS. Information included within this section is based on the information provided in the *West Lake Corridor Natural Resources Technical Report* (see **Appendix H**).

5.8.1 Regulatory Setting

5.8.1.1 Threatened and Endangered Species

The following statutes and regulations apply to rare, threatened, and endangered species:

- Section 7 of the Endangered Species Act of 1973 (16 USC §§ 1531-1544)
- Illinois Endangered Species Protection Act (520 ILCS 10)
- Indiana Nongame and Endangered Species Conservation Act (IC 14-22-34)

5.8.1.2 Wildlife and Habitat

The following statutes and regulations apply to wildlife and habitat:

- Migratory Bird Treaty Act of 1918 (16 USC §§ 703-712)
- Bald Eagle and Golden Eagle Protection Act of 1940 (16 USC §§ 668-668d, 54 Stat. 250)
- Section 404/401 of the Clean Water Act
- Illinois Natural Areas Preservation Act (525 ILCS 30)

5.8.2 Methodology

The Study Area for the biological resources analyses is defined as an area ½ mile around each of the proposed alignments and associated facilities (maintenance and storage facilities, layover facilities, stations, and park-and-ride lots). This distance captures the habitat that is directly adjacent to the Project and the wildlife that could potentially be affected by it. The analysis included all natural areas and federal- and state-listed species potentially located within the Study Area.

5.8.2.1 Threatened and Endangered Species

A list of federally-protected species for both Indiana and Illinois was obtained from the United States Fish and Wildlife Service (USFWS) Endangered Species Program website and correspondence with USFWS (see the *West Lake Corridor Natural Resources Technical Report* in **Appendix H**). Information on the potential presence of Indiana-protected species was obtained from INDNR. Information on the potential presence of Illinois-protected species within the Study Area was obtained from IDNR Ecological Compliance Assessment Tool (EcoCAT) database, from coordination with the Forest Preserve District of Cook County (FPDCC), and from breeding bird summaries. Habitat and lifecycle of federal- and state-protected species identified were determined and a site reconnaissance and review of aerial photography was conducted to determine the presence of required habitat types in the Study Area. No species surveys were conducted; the potential for a particular species presence was based on the presence/absence of appropriate habitat, published material, or from coordination with FPDCC.

5.8.2.2 Wildlife and Habitat

Information on the potential presence of natural areas or wildlife habitat was obtained from aerial photography of the Study Area. Site reconnaissance was conducted on October 22, and November 3, 2014, for the purpose of evaluating areas identified by the aerial photography as having the potential for floristic quality sufficient to be considered a natural area or possess wildlife habitat. No formal floristic quality assessments or species surveys were conducted.

Information on the potential presence of natural habitat areas in Indiana was obtained through coordination with INDNR. Information on the potential presence of natural habitat areas in Illinois was obtained from the IDNR EcoCAT. This website provided information on the Illinois Natural Area Inventory (INAI) sites in the Study Area, as well as potential protected species that may occur within the Illinois portion of the Study Area.

5.8.3 Affected Environment

5.8.3.1 Threatened and Endangered Species

Federally Protected Species

The USFWS Endangered Species Program website listed five federally-protected species in Lake County, Indiana, and eight federally-threatened and endangered species, two candidate species, and one area designated as critical habitat within Cook County, Illinois. In a letter dated November 4, 2014, USFWS states that Lake County, Indiana, is within the range of the Indiana bat (*Myotis sodalis*), Karner blue butterfly (*Lycaeides melissa samuelis*), northern long-eared bat (*Myotis septentrionalis*), Pitcher's thistle (*Cirsium pitcheri*), and Mead's milkweed (*Asclepias meadii*). Cook County, Illinois, is within the range of the piping plover (*Charadrius melodus*), Hine's emerald dragonfly (*Somatochlora hineana*), leafy-prairie clover (*Dalea foliosa*), prairie bush clover (*Lespedeza leptostachya*), eastern prairie fringed orchid (*Platanthera leucophaea*), Mead's milkweed (*Asclepias meadii*), the eastern massasauga rattlesnake (*Sistrurus catenatus*), and the rattlesnake-master borer moth (*Papaipema eryngii*). Cook County also contains designated Critical Habitat for the Hine's emerald dragonfly (*Somatochlora hineana*). Although habitat may be present, correspondence received from USFWS indicated that none of the federally listed species are known to occur within the Study Area.

State Protected Species

INDNR advised that no plant or animal species listed as state or federally threatened, endangered, or rare have been reported to occur within the Study Area. A historical record of northern leopard frog (*Lithobates pipiens*), a State species of special concern, has been documented near the Study Area, between the CN (former Elgin, Joliet and Eastern Railway [EJE]) and Norfolk Southern freight lines in Dyer, Indiana. The IDNR's EcoCAT website and FPDCC identified 23 Illinois-protected species and an important bird species that may potentially be within the Study Area (see **Table 5.8-1**). Habitats where these species are known to occur are described in **Section 5.8.3.2**.

Table 5.8-1: Illinois Protected Species in the Study Area[1]

Species	Status	Nesting/Present	Known Location
yellow-crowned night heron (*Nyctanassa violacea*)	State endangered	Breeding and present	**Powderhorn Preserve**, within the marshes; Calumet Water Reclamation Plant; **Lake Calumet INAI site**
yellow-crowned night heron (*Nyctanassa violacea*)	State endangered	Present	**Burnham Prairie Nature Preserve; Beaubien Woods/Flatfoot Lake**; Calumet Water Reclamation Plant
black-crowned night heron (*Nycticorax nycticorax*)	State endangered	Present	**Lake Calumet INAI site**
American bittern (*Botaurus lentiginosus*)	State endangered	Potentially present	Lake Calumet INAI site
king rail (*Rallus elegans*)	State endangered	Present	**Powderhorn Preserve**, within the marshes; **Lake Calumet INAI site**
common gallinule (*Gallinula galeata*)	State endangered	Breeding and present	**Powderhorn Preserve**, within the marshes; **Burnham Prairie Nature Preserve**
little blue heron (*Egretta caerulea*)	State endangered	Present	**Powderhorn Preserve**, within the marshes; **Lake Calumet INAI site; Burnham Prairie Nature Preserve**
northern harrier (*Circus cyaneus*)	State endangered	Potentially present	Lake Calumet INAI site
common moorhen (*Gallinula chloropus*)	State endangered	Potentially present within marshes and ponds with tall emergent vegetation	Hegewisch Marsh; **Lake Calumet INAI site**
yellow-headed blackbird (*Xanthocephalus xanthocephalus*)	State endangered	Potentially present within prairie wetlands, shallow areas of marshes, ponds, and rivers	Hegewisch Marsh; **Lake Calumet INAI site; Burnham Prairie Nature Preserve**
snowy egret (*Egretta thula*)	State endangered	Prairie wetlands, shallow areas of marshes, ponds, and rivers	**Lake Calumet INAI site**
black tern (*Chlidonias niger*)	State endangered	Ponds and rivers	**Lake Calumet INAI site**
Wilson's phalarope (*Phalaropus tricolor*)	State endangered	Wetlands, shallow areas of marshes, ponds, and rivers	**Lake Calumet INAI site**
osprey (*Pandion haliaetus*)	State threatened	Breeding	**Powderhorn Lake**
least bittern (*Ixobrychus exilis*)	State threatened	Breeding and present	**Powderhorn Preserve,** within the marshes; **Lake Calumet INAI site; Burnham Prairie Nature Preserve**
peregrine falcon (*Falco peregrinus*)	State threatened	Present	Calumet Water Reclamation Plant; Calumet River at Torrence Avenue

Table 5.8 1: Illinois Protected Species in the Study Area[1] (cont.)

Species	Status	Nesting/Present	Known Location
black-billed cuckoo (*Coccyzus erythropthalmus*)	State threatened	Present	**Powderhorn Preserve**, within the prairie; **Burnham Prairie Nature Preserve; Beaubien Woods/Flatfoot Lake**
pied billed grebe *(Podilymbus podiceps)*	State threatened	Present	**Hegewisch Marsh**
willow flycatcher (*Empidonax traillii*)	Important bird area species	Present, potentially breeding	**Powderhorn Preserve**, within the prairie; Calumet Water Reclamation Plant; **Burnham Prairie Nature Preserve; Beaubien Woods/Flatfoot Lake**
Blanding's turtle (*Emydoidea blandingii)*	State endangered	Breeding and present	**Powderhorn Lake** and within the marshes; Calumet City Prairie; Burnham Prairie Nature Preserve; Beaubien Woods/Flatfoot Lake
banded killfish (*Fundulus diaphanus*)	State threatened	Breeding and present	**Powderhorn Lake**
marsh speedwell (*Veronica scutellata*)	State threatened	Potentially present within marshes, wet meadows, low areas along springs, low muddy areas along ponds, and swamps	No known location
Franklin's ground squirrel (*Spermophilus franklinii*)	State threatened	Present	Calumet City Prairie; Burnham Prairie Nature Preserve; Beaubien Woods/Flatfoot Lake
grass pink orchid (*Calopogon tuberosus)*	State endangered	Present	Calumet City Prairie; Burnham Prairie Nature Preserve; Beaubien Woods/Flatfoot Lake
Richardson's rush (*Juncus alpinus*)	State endangered	Present	Calumet City Prairie; Burnham Prairie Nature Preserve; Beaubien Woods/Flatfoot Lake
marsh speedwell (*Veronica scutellata*)	State threatened	Present	Calumet City Prairie; Burnham Prairie Nature Preserve; Beaubien Woods/Flatfoot Lake

SOURCE: Illinois EcoCAT 2014.

Notes: [1]Species/locations noted in bold are confirmed present within the Study Area. Underlined species are known to occur within the Study Area, but locations are not disclosed due to property owners' request for confidentiality.

5.8.3.2 Wildlife and Habitat

The Study Area north of the 115th Street/Kensington Metra Station and south of Douglas Street is highly urbanized with small pockets of open space primarily consisting of mowed lawn and landscaped trees, particularly within urban parks. Any wildlife or birds associated with these landscaped areas and parks are urban tolerant. There are also small parcels scattered throughout the Study Area that are currently undeveloped and dominated by early successional or invasive species. There are larger parcels of high quality resources periodically located within these portions of the Study Area. These larger parcels of natural habitat are described below.

The central portion of the Study Area traverses the Calumet region. This region contains remnant dune and swale habitat, as well as other sensitive habitats. The Calumet Open Space Reserve includes marshes, prairies, and woodlands. The Reserve provides habitat for over 200 species of

birds and rare mammals, amphibians, and reptiles. Forty percent of all Illinois threatened or endangered species can be found within the Reserve, which is also an important stopover for migratory birds. The natural areas within the Study Area are shown on **Figure 5.8-1**. The natural areas within the Study Area are described below from south to north.

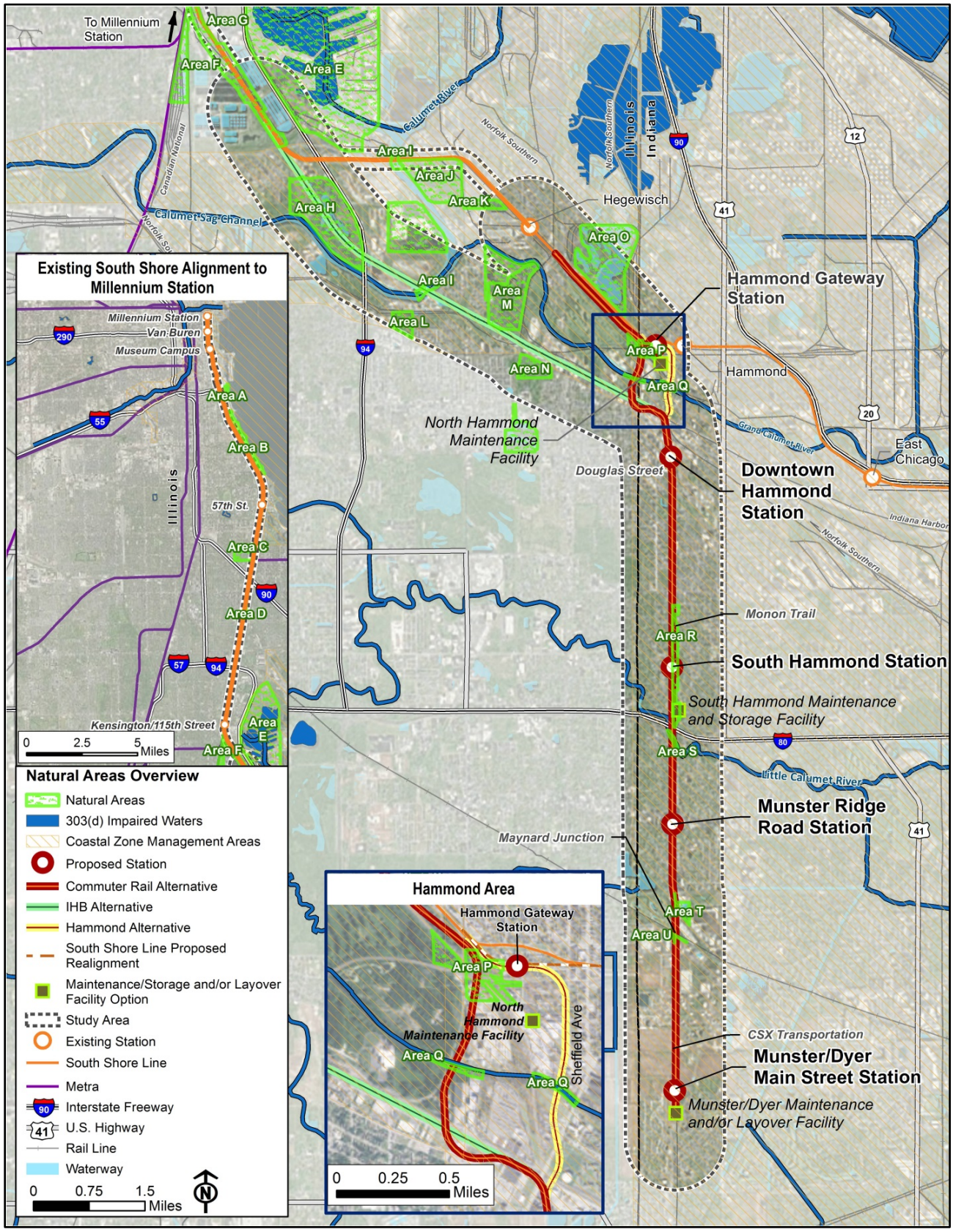
Area U: North of 45th Street: There is a natural area containing limited wildlife habitat just north of 45th Street in Munster. This habitat is contained within portions of developed parcels associated with commercial and industrial development, adjacent to the railroad tracks. These undeveloped portions contain a mixture of mowed lawn and invasive, weedy shrub and tree species. Wildlife habitat associated with this parcel is very minimal due to its small size and its association with development. The area provides some habitat for urban tolerant wildlife, such as eastern gray squirrels (*Sciurus carolinensis*), opossums (*Didelphis virginiana*), eastern cottontail (*Sylvilagus floridanus*), and songbirds (*Passeriformes* sp.).

Area T: South of Fisher Street, east of Pennsy Greenway: There is a natural area containing limited wildlife habitat in an undeveloped parcel south of Fisher Street in Munster. This undeveloped parcel is primarily wetland, but dominated by invasive species [primarily common reed (*Phragmites australis*)]. There are some cottonwoods (*Populus deltoides*) and willows (*Salix* sp.) present, but they are scattered and intermittent. Wildlife habitat associated with this parcel is minimal due to its small size and the surrounding development. The area provides some habitat for urban tolerant wildlife, such as squirrels (*Sciurus sp.*), opossums (*Didelphis virginiana*), rabbits (*Sylvilagus floridanus*), and songbirds (*Passeriformes* sp.).

Area S: Little Calumet River, Hammond: This crossing of the Little Calumet River occurs just south of I-80/94 at the Munster/Hammond border. The Little Calumet River passes through residential development in this portion of the watershed. Habitat associated with the River at this location is highly disturbed and dominated by invasive species [reed canary grass (*Phalaris arundinacea*)]. Wildlife habitat associated with the River is minimal due to the surrounding residential development. The area provides some habitat for urban tolerant wildlife, such as squirrels (*Sciurus sp.*), opossums (*Didelphis virginiana*), rabbits (*Sylvilagus floridanus*), and songbirds (*Passeriformes* sp.).

Area R: Vine Street to I-80/94, Hammond: There is a natural area containing wildlife habitat in South Hammond, adjacent to the east side of the proposed alignment, between I-80 and Vine Street. This habitat, which is associated with the Monon Trail, contains a strip of mowed lawn immediately adjacent to the Monon Trail, and then opens to a strip of prairie and woodland. This area contains moderate quality prairie and woods, although it is limited in the amount of habitat it provides because it is a narrow strip. The area most likely provides habitat for urban tolerant wildlife, such as squirrels (*Sciurus sp.*), opossums (*Didelphis virginiana*), rabbits (*Sylvilagus floridanus*), and songbirds (*Passeriformes* sp.).

Area Q: Grand Calumet River: Two crossings of the Grand Calumet River were studied; the Commuter Rail Alternative Options would cross near the Indiana-Illinois state line, while the NEPA Preferred Alternative and Hammond Alternative Options 1 and 3 would cross west of Hohman Avenue in Hammond. Habitat at both crossing locations is similar. The habitat is highly disturbed and dominated by invasive species (reed canary grass and common reed). The Grand Calumet River most likely does not provide habitat opportunities because it is a narrow strip and contains no vegetative diversity, but it may act as a corridor for waterfowl.



SOURCE: AECOM 2015; USEPA 2015b; IDNR 2014c; INDNR 2014d

Figure 5.8-1: Natural Areas in the Study Area

Area P: Wabash Avenue and Brunswick Street, Hammond: A small prairie is located adjacent to the tracks between Wabash Avenue and Brunswick Street in the northern portion of the Study Area. This small prairie possesses moderate floristic quality with scattered trees. The area most likely provides habitat for urban tolerant wildlife, such as squirrels (*Sciurus sp.*), opossums (*Didelphis virginiana*), rabbits (*Sylvilagus floridanus*), and songbirds (*Passeriformes* sp.).

Area O: Powderhorn Lake and Powderhorn Prairie and Marsh Nature Preserve: Powderhorn Lake and the associated Prairie and Marsh Nature Preserve is an INAI site and is part of the Calumet Open Space Reserve. The property, owned by FPDCC, is located at the far northern end of the Study Area, on the north side of Brainard Avenue. Powderhorn Lake is located within both the City of Chicago and the Village of Burnham, in Illinois. The 192-acre preserve, of which 130 acres have been dedicated as the Powderhorn Prairie and Marsh Nature Preserve, contains Powderhorn Lake and remnant dune and swale habitat. The 83-acre lake is maintained as a community amenity and provides opportunities for picnicking and fishing. The property provides 59 acres of prairie/savannah and 50 acres of marsh habitat. The preserve contains approximately 250 plant species, including black oak (*Quercus velutina*), white oak (*Quercus alba*), pin oak (*Quercus palustris*), sassafras (*Sassafras albidum*), hazelnut (*Corylus* sp.), elderberry (*Sambucus nigra*), buttonbush (*Cephalanthus occidentalis*), prickly pear cactus (*Opuntia engelmannii*), nodding wild onion (*Allium cernuum*), Indian hemp (*Apocynum cannabinum*), partridge pea (*Chamaecrista fasciculate*), purple love grass (*Eragrostis spectabilis*), cinnamon willow-herb (*Epilobium coloratum*), rough blazing star (*Liatris aspera*), Turk's cap lily (*Lilium superbum*), and slender false foxglove (*Agalinis tenuifolia*). The marshes contained within the preserve also contain habitat for state-protected species, particularly birds (Sparks 2014; USACE 2014c).

Area N: Calumet City Prairie and Marsh Nature Preserve: The Calumet City Prairie and Marsh Nature Preserve is an INAI site and part of the Calumet Open Space Reserve. Located south of State Street and between Burnham Avenue and Burnham Greenway, the 40-acre Calumet City Prairie is owned by FPDCC. It possesses dune and swale topography with high quality prairie and marsh, and supports three Illinois-protected plant species.

SOURCE: AECOM 2015.

Burnham Prairie Nature Preserve

Area M: Burnham Prairie Nature Preserve: The Burnham Prairie Nature Preserve is a 93-acre remnant ridge and swale complex located immediately adjacent to the north side of the Study Area, west of Burnham Avenue in Burnham, Illinois. This prairie is owned by FPDCC and contains restored marsh, sedge meadow, savanna, and wet prairie. IDNR received a grant in 2010 from USFWS to restore an additional 98 acres of adjacent land; the restoration of this Burnham Prairie Annex will result in the prairie encompassing 191 acres of high quality habitat. The preserve is an INAI site and part of the Calumet Open Space Reserve. Commonly found species include small mammals, such as squirrels (*Sciurus sp.*), opossums (*Didelphis virginiana*), rabbits (*Sylvilagus floridanus*), and songbirds (*Passeriformes sp.*), raccoons (*Procyon lotor*), white-tailed deer (*Odocoileus virginianus*), and coyotes (*Canis latrans*). Double-crested cormorants (*Phalacrocorax auritus*), least bitterns (*Ixobrychus exilis*), snowy egrets (*Egretta thula*), little blue herons (*E. caerulea*), yellow-crowned night herons (*Nyctanassa violacea*), glossy ibis (*Plegadis falcinellus*), and common moorhen (*Gallinula chloropus*) are known to frequent the marsh. Burnham Prairie Nature Preserve is an important migratory bird stop over location and provides breeding habitat for several state threatened birds (USACE 2014a; Illinois Birding by County 2015).

Area L: Dolton Avenue Prairie: The Dolton Area Prairie in Illinois is a 24-acre INAI site that is part of the Calumet Open Space Reserve. Owned by FPDCC, it is located between State Street and 142nd Street, east of Paxton Avenue. The Dolton Avenue Prairie contains remnant wet prairie habitat.

Area K: West of Brainard Avenue, south of 134th Street: Between Torrence Avenue and Brainard Avenue is a small, undeveloped parcel located adjacent to the railroad tracks between a railroad yard and industrial facility. Although small in size, the parcel is a wooded lot with mature cottonwood trees and forms a corridor to Hegewisch Marsh. The parcel most likely supports urban tolerant birds and wildlife.

Area J: Hegewisch Marsh: Hegewisch Marsh is an approximately 126-acre site adjacent to the Little Calumet River, managed by the Chicago Park District. The railroad tracks form the northern boundary of this property. Hegewisch Marsh is a hemi-marsh, which is a mix of open water and vegetation, and the largest wetland within the City of Chicago. It contains a diversity of habitats, including woodland, marsh, and meadows and is part of the Calumet Open Space Reserve. It provides habitat for wildlife and migratory birds, such as the yellow headed blackbirds [*Xanthocephalus xanthocephalus* (Illinois state endangered)], pied-billed grebes [*Podilymbus podiceps* (Illinois state threatened)], and common gallinule [*Gallinula galeata* (Illinois state endangered)], which are known to utilize this marsh for nesting. It is currently undergoing geomorphic and hydrologic restoration by USACE and IDNR. Located within an urban environment, Hegewisch Marsh provides habitat for wildlife and migratory birds. Hegewisch Marsh is located 0.10 mile north of Thomas O'Brien Lock Marsh/Park No. 576, which contains Whitford Pond. In 2012, Whitford Pond, although outside the Study Area, was the location of the first bald eagle (*Haliaeetus leucocephalus*) nest in Chicago since the 1880s.

Area I: Little Calumet River, Calumet City: The Little Calumet River is located near the state line and is crossed by Project Alternatives. The Little Calumet River consists of an oxbow in this location, with the NEPA Preferred Alternative, Commuter Rail Alternative Options and the Hammond Alternative Options 1 and 3 crossing the River at the northeastern leg of the oxbow just south of 130th Street, and the IHB Alternative Options crossing the river at the southwestern leg of the oxbow near 141st Street. At the northeastern crossing of the river, the Little Calumet River is associated with Hegewisch Marsh on the eastern river bank, described above. There is no natural habitat associated with the western bank in this location. At the southwestern crossing of the river, no natural habitat is associated with either bank; a landfill is located on the northern bank while a boat marina is located on the southern bank. The Little Calumet River may act as a wildlife corridor for waterfowl. The Little Calumet River is again crossed by the Study Area in the southern-most portion of the Project Alternative south of I-80/94 (see Area S). A peregrine falcon (*Falco peregrinus*) is known to nest on the Ford Memorial Bridge over the Little Calumet River at Torrence Avenue. This bridge is outside of the Study Area, approximately 1.9 miles northeast of the proposed alignment. Peregrine falcons (*Falco peregrinus*) have nested on this bridge in 2008, 2010, and 2011.

Area H: Flatfoot Lake/Beaubien Woods Forest Preserve: Flatfoot Lake, and the surrounding Beaubien Woods Forest Preserve, is part of the Calumet Open Space Reserve. Beaubien Woods is located east of I-94, south of 130th Street. This 279-acre property is owned by FPDCC. It contains prairie, woodland, and wetland habitats; the 19-acre Flatfoot Lake is located within the center of the property. Flatfoot Lake is stocked with catfish and bluegill-sunfish hybrids. The preserve provides habitat for small mammals, such as squirrels (*Sciurus sp.*), opossums (*Didelphis virginiana*), rabbits (*Sylvilagus floridanus*),

SOURCE: AECOM 2014.

Flatfoot Lake

raccoons (*Procyon lotor*), and deer (*Odocoileus virginianus*); and songbirds (*Passeriformes* sp.), including catbirds, warblers, orioles (*Oriolus* spp.), and indigo buntings (*Passerina cyanea*). Occasional coyotes (*Canis latrans*) and bald eagles (*Haliaeetus leucocephalus*) have been identified at the preserve. Roosting habitat for bats is likely present. Three state protected species are known to occur at this preserve (FPDCC 2015).

Area G: MWRDGC Calumet Water Reclamation Plant: The MWRDGC Calumet Water Reclamation Plant is located north of 130th Street. MWRDGC constructed the marsh in conjunction with a USACE mitigation project. The east bioswales drying site and southern lagoons appear to contain habitat based on aerial photography. The site reconnaissance determined that there is a narrow strip of habitat that exists in association with the existing railroad tracks and MWRDGC. This property was never developed because of the surrounding industrial uses. It contains mixed forest and scrub/shrub habitat and provides a corridor to Kensington Marsh, located west of the Study Area. Three Illinois protected species of birds are known to inhabit the property. At the location adjacent to the railroad tracks, the vegetation is dominated by common reed and is extremely degraded. Due to the dominance of invasive species in the vicinity of the tracks, this part of the Reclamation Plant is not expected to support state protected species.

Area F: Kensington Marsh: Kensington Marsh is located northwest of the MWRDGC Calumet Water Reclamation Plant. This 15-acre marsh consists of open water, wetlands, and upland habitat. This marsh provides wildlife habitat, particularly for birds. Its habitat value is declining, however, due to the increased invasion of common reed.

Area E: Lake Calumet INAI Site: Lake Calumet is a 3,050-acre INAI site contained within the Calumet Open Space Reserve. It is located east of I-94 and north of 127th Street. Lake Calumet is listed as an INAI site due to the presence of exceptional bird habitat, including habitat for state protected species. It has 11 known State endangered or threatened bird species nesting here and over 200 species of birds occur here, many of which do not nest anywhere else in northeastern Illinois. One of Illinois's largest populations of the state endangered black-crowned night heron (*Nycticorax nycticorax*) inhabits the marshes located on the east side of Lake Calumet. Additionally, bald eagles (*Haliaeetus leucocephalus*) are known to nest in the northern portion of this site. However, only a very small sliver of the Lake Calumet INAI site extends within the ½-mile buffer of the Study Area. The portion of the Lake Calumet INAI site located closest to the Study Area is dominated by invasive species, primarily common reed.

Area D: East Side of MED Tracks, between 83rd Street and 86th Street: A fairly large wooded parcel exists between 83rd Street and 86th Street, sandwiched between the railroad tracks and Avalon Park. This parcel provides habitat for urban tolerant wildlife, such as squirrels (*Sciurus sp.*), opossums (*Didelphis virginiana*), rabbits (*Sylvilagus floridanus*), and songbirds (*Passeriformes* sp.). Its association with Avalon Park increases its habitat potential.

Area C: Oak Woods Cemetery: The Oak Woods Cemetery is located on the west side of the MED tracks between 67th Street and 71st Street. This large cemetery, located adjacent to the railroad tracks, was established in 1853 and has large, mature trees amidst mowed lawn. Due to its size and the presence of mature trees, this cemetery provides habitat for urban tolerant wildlife, such as squirrels (*Sciurus sp.*), opossums (*Didelphis virginiana*), rabbits (*Sylvilagus floridanus*), and songbirds (*Passeriformes* sp.).

Area B: Burnham Park Wildlife Corridor: Burnham Park Wildlife Corridor is a 103-acre parcel located between the MED tracks and Lake Shore Drive, as well as between Lake Shore Drive and Lake Michigan, from 31st Street to 47th Street. The property is in the process of being naturalized with native plant species, including oak woodlands, savanna, and prairie. It is designed to be a stopover

for the approximately 300 species of migratory birds that utilize the lakefront. Additionally, the Burnham Park Wildlife Corridor is a continuation of and connected to the McCormick Bird Sanctuary.

Area A: McCormick Bird Sanctuary: McCormick Bird Sanctuary is a natural habitat constructed on top of a McCormick Place underground parking garage. Native habitats that have been installed include shortgrass prairie, shrubs, and a pond. The site has been designed to provide habitat for migrating birds that utilize the lakefront. An increase in native birds utilizing this habitat has been noted by the City of Chicago (Chicago Planning and Development 2015).

5.8.4 Environmental Consequences

5.8.4.1 Long-Term Operating Effects

Table 5.8-2 provides a summary of the potential impacts of each Project Alternative. The potential impacts are described below. For more detailed information on potential impacts, see the *West Lake Corridor Natural Resources Technical Report* in **Appendix H**.

Table 5.8-2: Summary of Potential Impacts to Threatened and Endangered Species and Wildlife and Natural Areas/Habitat from Project Alternatives

Alternative	Threatened and Endangered Species	Wildlife	Natural Areas/ Habitat (acres)
No Build Alternative	N/A	N/A	0.00
NEPA Preferred Alternative	Negligible	Minimal	20.78
Commuter Rail Alternative Option 1	Negligible	Minimal	31.64
Commuter Rail Alternative Option 2	Negligible	Minimal	31.64
Commuter Rail Alternative Option 3	Negligible	Minimal	20.81
Commuter Rail Alternative Option 4	Negligible	Minimal	31.58
IHB Alternative Option 1	Negligible	Avoidance and behavior impacts due to noise/ activity, interference with vocalization, animal/train collisions, barriers to movement	43.97
IHB Alternative Option 2	Negligible	Same as IHB Alternative Option 1	43.97
IHB Alternative Option 3	Negligible	Same as IHB Alternative Option 1	33.14
IHB Alternative Option 4	Negligible	Same as IHB Alternative Option 1	43.91
Hammond Alternative Option 1	Negligible	Minimal	21.51
Hammond Alternative Option 3	Negligible	Minimal	21.48
Maynard Junction Rail Profile Option	None	None	None

SOURCE: AECOM 2016.

No Build Alternative

The No Build Alternative would not affect federally- or state-protected species as there would be no change in existing conditions and no operational impacts.

NEPA Preferred Alternative

Threatened and Endangered Species: Federally-protected species are not located within the Study Area. In the majority of the areas where state-protected species may be located, the Project would

use existing tracks. Due to the degraded nature of most of these areas, state-protected species are unlikely to utilize the habitat in the vicinity of the tracks. Higher quality areas, discussed in **Section 5.8.3.2**, are sufficiently far enough from the alignment that state-protected species would not be affected. Therefore, there would be no direct impacts and only negligible indirect impacts on state-protected species.

Wildlife and Habitat: The NEPA Preferred Alternative would affect 20.78 acres of natural habitat. The physical loss of natural habitat would occur wherever new components or ROW would be needed, including new tracks, stations, parking, and support facilities. Any resident animals, birds, or migratory birds utilizing habitat that would be required for the new components or ROW for the NEPA Preferred Alternative would be displaced. These displacements would primarily affect urban tolerant wildlife, and impacts to populations as a whole are not anticipated. In locations where direct impacts would not occur, wildlife would not be affected because in those instances the existing habitat would serve as a buffer from the proposed alignment, the species present are urban tolerant, the species present are acclimated to train traffic and noise, or more sensitive species are already avoiding the area due to existing train traffic.

Commuter Rail Alternative Options

Threatened and Endangered Species: Impacts from the Commuter Rail Alternative Options would be the same as those described for the NEPA Preferred Alternative. There would be no direct impacts and only negligible indirect impacts on state-protected species, bald eagles, and/or migratory birds.

Wildlife and Habitat: The Commuter Rail Alternative Options would affect natural habitat as listed in **Table 5.8-3**. Potential impacts to wildlife would be the same as described for the NEPA Preferred Alternative.

Table 5.8-3: Impacts to Natural Habitats from the Commuter Rail Alternative Options

Commuter Rail Alternative Option	Acres of Natural Habitat Affected
Option 1	31.64
Option 2	31.64
Option 3	20.81
Option 4	31.58

SOURCE: AECOM 2016.

IHB Alternative Options

Threatened and Endangered Species: Federally-protected species are not known to be located within the Study Area for the IHB Alternative Options. No impacts to federally-protected species are anticipated.

State-protected species are located in the Study Area. In most locations where new tracks would be installed within the existing ROW; the areas adjacent to the tracks are degraded or do not contain habitat for state-protected species. The proposed alignment of the IHB Alternative Options would cross Beaubien Woods and come in close proximity to Flatfoot Lake, as well as adjacent to the Burnham Prairie Nature Preserve. New tracks would need to be constructed at both of these locations. Three state-protected species are known to occur at Beaubien Woods/Flatfoot Lake and seven state-protected species are known to occur at Burnham Prairie Nature Preserve. Additionally, Beaubien Woods provides roosting habitat for bats, which may include the northern long-eared bat. There would be no direct impacts to state-protected species at Beaubien Woods or Burnham Prairie Nature Preserve. New tracks in this location would utilize the existing ROW and no habitat would be lost. The habitat immediately adjacent to the existing ROW is degraded and does not contain any

state-protected plant species and required habitats for protected bird or animal species are not found adjacent to the tracks. Animal/train collisions are unlikely as animals/birds would be alerted to the presence of trains by the noise of the train's approach.

Wildlife and Habitat: The IHB Alternative Options would affect natural habitat as listed in **Table 5.8-4**. Additional impacts to wildlife would include barriers to movement, avoidance of trains, avoidance of habitat adjacent to the tracks due to noise, interference with bird vocalizations, and animal/train collisions. These impacts would occur at Beaubien Woods Forest Preserve and Burnham Prairie Nature Preserve. Barriers to movement are expected to be minimal because barriers are already in place due to the existing tracks, and large mammals do not avoid railroads. Adjacent areas are already experiencing train traffic, animals inhabiting this area are somewhat habituated to train traffic, and the degree of avoidance would be less than experienced adjacent to roadways due to the short term, intermittent nature of the disturbance. Noise impacts on birds would be short term and intermittent in nature; and animal/train collisions would be minimized by the animals being alerted to the presence of trains by the noise of the train approach.

Table 5.8-4: Impacts to Natural Habitats from the IHB Alternative Options

IHB Alternative Option	Acres of Natural Habitat Affected
Option 1	43.97
Option 2	43.97
Option 3	33.14
Option 4	43.91

SOURCE: AECOM 2016.

Hammond Alternative Options 1 and 3

Threatened and Endangered Species: Impacts from Hammond Alternative Options 1 and 3 would be the same as those described for the NEPA Preferred Alternative. There would be no direct impacts and only negligible indirect impacts on state-protected species, bald eagles, and/or migratory birds.

Wildlife and Habitat: Hammond Alternative Options 1 and 3 would affect 21.51 and 21.48 acres of natural habitat, respectively. Potential impacts to wildlife would be the same as described for the NEPA Preferred Alternative.

Maynard Junction Rail Profile Option

There would be no changes to the impacts to natural areas or wildlife habitat described for the applicable alternative options (i.e., NEPA Preferred Alternative, Commuter Rail Alternative Options 1, 2, and 3, IHB Alternative Options 1, 2, and 3, and Hammond Alternative Option 1) as a result of the Maynard Junction Rail Profile Option.

5.8.4.2 Short-Term Construction Effects

The NEPA Preferred Alternative and Build Alternatives would have similar construction consequences. Under the No Build Alternative, no construction impacts would result from the development of the Project. Potential impacts associated with other projects under the No Build Alternative would be evaluated separately as part of the planning for those projects.

NEPA Preferred Alternative and Build Alternatives

Construction has the potential to impact natural areas and state-protected species due to increases in noise, construction traffic, the presence of workers, and erosion and sedimentation associated with

clearing activities. Construction-related impacts are temporary in nature and limited to the areas adjacent to the tracks and are therefore expected to be minimal.

5.8.5 Avoidance, Minimization, and/or Mitigation Measures

The following measures would be implemented to minimize impacts to federally- and state- protected species.

5.8.5.1 Long-Term Operating Effects

Threatened and Endangered Species

Per INDNR (ER-17897), in order to minimize the Project's impacts to the Indiana bat, no trees that are suitable for Indiana bat roosting (greater than 3 inches in diameter at breast height), living or dead, would be cut from April 1 through September 30. Per the Final 4(d) Rule for the northern long-eared bat, no trees would be removed within 150-foot radius of a known maternity roost tree between June 1 and July 31. While no impacts to the Indiana bat and northern long-eared bat are anticipated, removal of trees would be in compliance with the applicable requirements.

Wildlife and Habitat

Per correspondence received from USFWS dated November 4, 2014, EO 13186 and the Migratory Bird Treaty Act require federal agencies to avoid or minimize impacts on migratory bird populations. Any impacts to migratory bird species would be mitigated as required by USFWS consultation and USACE permit requirements.

INDNR (ER-17897) also provided recommendations for stream crossings that would minimize impacts to fish, wildlife, and botanical resources. Recommendations included erosion and sediment control requirements for exposed soil. Additionally, INDNR advised that riparian habitat mitigation would be required if riparian impacts occur, and impacts must be avoided to any mitigation plantings that were installed as a result of the sediment remediation of the West Branch Grand Calumet River between Hohman Avenue and the state line. Erosion and sedimentation impacts would be minimized through the implementation of erosion and sediment control plans. See **Appendix F** for a copy of the correspondence.

Impacts to wildlife and habitat are expected to be minimal, as discussed above. Additional mitigation beyond what is described above is not proposed.

5.8.5.2 Short- Term Construction Effects

Per INDNR (ER-17897), techniques to minimize the Project's impacts to wildlife must include the following:

- No work will be allowed in waterways from April 1 through June 30 without prior written approval from the Division of Fish and Wildlife.
- Riprap that is a minimum 6 inches in grade will be used below the normal water level in order to provide habitat for aquatic organisms in the voids.
- Impacts due to erosion and sedimentation during construction would be minimized through the use of proper erosion and sediment control measures, which would be required as part of the CWA Sections 401/404 permits. In addition, impacts to wetland or waters of the US would be mitigated for based on applicable regulations. Mitigation ratios will be determined as part of the

CWA Sections 401/404 permitting processes, and wetland types and mitigation amounts would be determined at that time.

5.9 Hazardous Materials

The presence of potentially contaminated properties is a concern in the development of transit projects for the following reasons:

- Potential liabilities associated with ownership of such properties
- Migration of contaminated materials off the properties
- Potential cleanup costs
- Potential impact on public health
- Safety concerns associated with construction personnel encountering unsuspected wastes or contaminated soil or groundwater

This section describes the procedures used to search for hazardous and contaminated materials within the Study Area. In addition, this section presents the results of a corridor-level field review and a search of local, state, and federal databases of known hazardous, contaminated, or regulated materials sites, which may be impacted by the Project. Mitigation measures to minimize impacts are also described. More information on the hazardous materials analysis can be found in the *West Lake Corridor Hazardous Materials Technical Report* in **Appendix H**.

5.9.1 Regulatory Setting

Numerous federal and state laws and regulations govern the handling, treatment, storage, and transportation of hazardous and contaminated materials. Key regulations directing the investigation pertinent to hazardous, contaminated, and regulated materials relevant to the Project include:

- The Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA) (42 USC § 9601 et seq.)
- Superfund Amendments and Reauthorization Act (SARA) (Public Law 99-499)
- Resource Conservation and Recovery Act of 1976 (RCRA) (42 USC § 6901 et seq.)
- Federal Occupational Safety and Health Act (OSHA) (29 USC § 651 et seq.)
- Toxic Substances Control Act (TSCA) (15 USC § 2601 et seq.)
- Indiana Title 329 Solid Waste Management Division (329 IAC 3.1-1-2)
- Illinois Solid Waste Management Act (45 ILCS 20)

5.9.2 Methodology

The limited-scope Phase I Environmental Site Assessment (ESA) was performed in general conformance with applicable portions of the American Society for Testing and Materials International (ASTM) Standard Practice Designation E 1527-13 for ESAs. Per the ASTM standard, findings could include Recognized Environment Conditions (RECs), including historical RECs (HRECs), controlled RECs (CRECs), and *de minimis* conditions.

This limited-scope Phase I ESA included a site visit, regulatory research, historical review, and environmental database analysis of the Project. The Study Area is defined as 1 mile from the proposed alignments. In conducting the limited-scope Phase I ESA, the Study Area was assessed for visible signs of possible contamination, historical records for the Study Area were reviewed to identify historical uses that could be indicative of hazardous materials use or release, and environmental database records were analyzed for the Study Area and surrounding sites.

By definition, each REC and CREC identified has the potential to impact the Study Area. For the purpose of this analysis, each REC and CREC is classified as a Low, Medium, or High Risk site. These risk classifications are defined as follows:

A **REC** is defined as the presence or likely presence of any hazardous substances or petroleum products on a property under conditions that indicate an existing release, a past release, or a material threat of a release of any hazardous substances or petroleum products into structures on the property or into the ground, ground water, or surface water of the property.

An **HREC** is a past release of any hazardous substances or petroleum products that has occurred in connection with the property and has been addressed to the satisfaction of the applicable regulatory authority, without subjecting the property to any required controls.

A **CREC** is a recognized environmental condition resulting from a past release of hazardous substances or petroleum products that has been addressed, with hazardous substances or petroleum products allowed to remain in place subject to the implementation of required controls

A ***de minimis*** condition is a situation that does not present a material risk of harm to public health or the environment and generally would not be subject to enforcement action if brought to the attention of the regulating authority.
- ASTM Standard 2005

- **Low Risk**: Properties identified as CRECs.
- **Medium Risk**: Properties identified as RECs that have closed leaking underground storage tank (LUST) or other spill incidents, above-ground storage tank/underground storage tank (AST/UST) sites with no spill-related listings, vehicle repair sites, junk yards, or sites without long-term historical industrial use.
- **High Risk**: Properties identified as RECs that have active/open LUST or other spill incidents, historical dry cleaners, historical auto stations (i.e., gas stations), active LUST sites, or sites with identified long-term historical industrial use.

5.9.3 Affected Environment

According to the environmental database report, numerous sites were identified within the appropriate search distance of the Study Area, defined in **Section 5.9.2** as 1-mile from the proposed alignments (Environmental Data Resources, Inc. 2014 and 2016). Based on the review of these database listings, a majority of these sites are not expected to present a REC, or a hazardous materials threat, to the Project based on their distance to the proposed alignments, regulatory status (i.e., closed, no violations found), media impacted (i.e., soil only), and/or topographical position from the alignments (i.e., down-gradient or cross-gradient). Based on the review of databases, historical data, and

observations from the site visit, 68 RECs, 2 CRECs, and 3 HRECs were identified within the Study Area. See the *West Lake Corridor Hazardous Materials Technical Report* in **Appendix H** for more information.

5.9.4 Environmental Consequences

This section addresses both the potential for environmental consequences of the Project in regard to hazardous materials and/or petroleum products, as well as the potential for the Project to encounter such materials during construction activities.

5.9.4.1 Long-Term Operating Effects

No Build Alternative

Under the No Build Alternative, there would be no impacts related to hazardous materials due to the Project. Potential impacts associated with other projects under the No Build Alternative would be evaluated separately as part of the planning for those projects.

NEPA Preferred Alternative

The proposed North Hammond Maintenance Facility would be used to maintain commuter rail vehicles. This facility would generate regulated materials associated with maintenance activities. These materials would include oils, greases, solvents, and other waste materials. Similar activities would occur at the proposed Munster/Dyer Layover Facility. NICTD would operate the Project under a health and safety program that includes provisions for the safe handling, storing, and disposing of regulated materials. In doing so, operational impacts regarding regulated materials are unlikely to occur.

Commuter Rail Alternative Options

Commuter Rail Alternative Options 1, 2, and 4: The findings for the NEPA Preferred Alternative apply to the proposed South Hammond Maintenance and Storage Facility.

Commuter Rail Alternative Option 3: The findings for the NEPA Preferred Alternative apply to the proposed Munster/Dyer Maintenance and Storage Facility.

IHB Alternative Options

IHB Alternative Options 1, 2, and 4: The potential effects of IHB Alternative Options 1, 2, and 4 would be the same as described for Commuter Rail Alternative Options 1, 2, and 4.

IHB Alternative Option 3: The potential effects of IHB Alternative Option 3 would be the same as described for Commuter Rail Alternative Option 3.

Hammond Alternative Options 1 and 3

The potential effects of Hammond Alternative Options 1 and 3 would be the same as described for the NEPA Preferred Alternative.

Maynard Junction Rail Profile Option

There are no RECs specifically associated with the Maynard Junction Rail Profile Option. Therefore, there would be no changes to the hazardous materials impacts presented for the applicable

alternative options (i.e., NEPA Preferred Alternative, Commuter Rail Alternative Options 1, 2, and 3, IHB Alternative Options 1, 2, and 3, and Hammond Alternative Option 1).

5.9.4.2 Short-Term Construction Effects

Under the No Build Alternative, there would be no impacts related to hazardous materials due to the Project. Potential impacts associated with other projects under the No Build Alternative would be evaluated separately as part of the planning for those projects.

Construction activities for all Project Alternatives have the potential to disturb hazardous materials associated with the identified RECs and CRECs that may be present within the soil and/or groundwater in the vicinity of the Project. Additional investigation would be necessary prior to construction in order to verify whether hazardous materials are present in the Study Area. The following subsections describe the potential construction-related impacts associated with the Build Alternatives. **Table 5.9-1** summarizes the findings by alternative.

Table 5.9-1: Summary of Potential Hazardous Materials Impacts during Construction by Alternative

Alternative	Total Number of Hazardous Materials Impacts		
	High Risk RECs	Medium Risk RECs	Low Risk CRECs
No Build	N/A	N/A	N/A
NEPA Preferred Alternative	32	21	2
Commuter Rail Alternative Options	23	22	2
IHB Alternative All Options	25	18	2
Hammond Alternative Options 1 and 3	32	21	2
Maynard Junction Rail Profile Option	0	0	0

SOURCE: AECOM 2016.

High Risk RECs have a higher risk of affecting the Project than Medium or Low Risk RECs; however, all RECs have the potential to impact the Project. The impacts by Build Alternative are discussed further in the following subsections.

The NEPA Preferred Alternative and other Build Alternatives would require ground disturbance in areas where new tracks would be laid or where stations and other infrastructure would be constructed. The RECs that could be encountered represent areas where the potential for soil and/or groundwater located within the footprint of the Project have been polluted by contaminants from off-site or on-site sources. Thus, construction of the Project has the potential to disturb hazardous materials contamination that may be present within the Project footprint.

5.9.5 Avoidance, Minimization, and/or Mitigation Measures

5.9.5.1 Long-Term Operating Effects

Since no impacts are anticipated under the No Build Alternative, no mitigation measures are proposed. Operational impacts associated with each Build Alternative are expected to be minimal because of the safety plan NICTD would employ to control regulated materials it uses as part of Project operation. NICTD's plan would establish procedures and staff training for proper use, storage, and maintenance of equipment and disposal of regulated materials. All regulated materials generated as part of maintenance would be disposed of in accordance with state and local guidelines.

5.9.5.2 Short-Term Construction Effects

No mitigation measures are proposed for the No Build Alternative since no construction-related impacts are anticipated. For the Build Alternatives, a Phase II ESA in accordance with applicable ASTM guidance would be conducted prior to ROW acquisition or start of construction for properties located in the vicinity of the identified High Risk RECs. For Medium Risk RECs, their closure status or current site status would be reviewed again prior to the start of construction activities to ensure that no new activities have occurred that may elevate the risk level and that the current activities are still indicative of minimal potential for contamination from hazardous material use and/or activities. If a site's risk level changes, then a Phase II ESA may be warranted for sites currently identified as Medium Risk.

A **Phase II ESA** is an assessment that is performed to confirm the presence of hazardous materials on a property. Previous site uses that normally create the need for a Phase II ESA may include service stations, dry cleaners, automotive and machine shops, manufacturing, hazardous waste storage, etc. A Phase II ESA can include chemical analysis of soil, groundwater, surface water, and sediments within the limits of disturbance of the Project to evaluate potential impacts from a REC. Geophysical studies, including soil borings, installation of monitoring wells, and digging of test pits may be required.

If hazardous materials were to be encountered during construction, the appropriate precautions would be taken to prevent worker exposure and to minimize the spread of contaminants into the environment. NICTD would prepare and implement a safety plan during construction that includes provisions for action if previously unidentified regulated materials are encountered during construction. The plan would include awareness training and a response plan for engineering and construction crews if signs of apparent contamination are discovered during excavations or pre-construction borings, even if the Phase I assessment indicates low probability of contamination at a given location. Engineering and construction crews would be required to immediately report apparent contamination to their supervisor who would take immediate and appropriate action to protect worker and public safety.

If inactive water wells, USTs, or hazardous materials/wastes are encountered during Project planning or construction, they would be properly closed and removed in accordance with state and local requirements. Inactive water wells would be closed so as to not provide a conduit for possible groundwater contamination. If a decommissioned UST is encountered, it would be removed in accordance with applicable regulatory requirements and confirmation soil sampling would be conducted to determine whether there has been a petroleum release. If hazardous materials/wastes are encountered within soils or groundwater during construction, the state appropriate environmental regulatory agency (IEPA or IDEM) would be contacted. If site buildings are to be demolished or renovated, asbestos and lead-based paint surveys would be conducted by a qualified contractor.

5.10 Utilities

This section describes the existing utilities, both public and private, located within the Study Area, identifies the utility owners, and identifies potential effects to utilities that would result from the Project Alternatives. It also discusses the strategies to avoid, minimize, or mitigate these impacts. This section also documents coordination activities that would be undertaken during future phases of the Project.

5.10.1 Regulatory Setting

A utility is defined by 23 CFR § 645 as a privately, publicly, or cooperatively owned line, facility or system for producing, transmitting, or distributing communications, cable television, power, electricity,

light, heat, gas, oil, crude products, water, steam, waste, storm water not connected with highway drainage, or any other similar commodity, including any fire or police signal system or street lighting system, which directly or indirectly serves the public. The following is a summary of the laws, regulations, and guidelines that are associated with utility relocation and accommodation.

5.10.1.1 Federal

As a federal transit project, the Project would require integration with existing utility infrastructure that would be subject to the FTA *Project and Construction Management Guidelines* (FTA 2011). Laws dealing with utility relocation and accommodation are contained in 23 USC §§ 109(l)(1) and 123. Regulations dealing with utility relocation and accommodation matters are contained in 23 CFR §§ 645.101-119 and § 645.201-.215.

5.10.1.2 State

The following are state policies regarding utilities:

- 105 IAC 13, *Utility Facility Relocations on Construction Contracts*
- 92 IAC 530, *Accommodation of Utilities on Right-of-Way*

5.10.1.3 Railroad

The following are railroad policies regarding utilities:

- CSX permitting policy for utility permits and CSX's Design and Construction Standard Specifications
- NS wireline and pipeline licenses procedure
- Conrail application process for pipe/wire occupations

5.10.2 Methodology

Information on utilities within the Study Area was identified through coordination with municipalities, utility companies, and field visits. The major utilities, such as transmission lines, water lines, and pipelines, have been included for analysis. Electric, telephone, cable, and gas distribution lines were not considered in this document as they are typically smaller in size, easily relocated, and located within the public ROW. Impacts were evaluated within the Project footprint at locations where:

- Underground utilities are potentially located within the ROW of the Build Alternatives
- Aerial utilities would be crossed by a portion of the alignment of the Build Alternatives
- Utility site facilities would be crossed by a portion of the alignment of the Build Alternatives

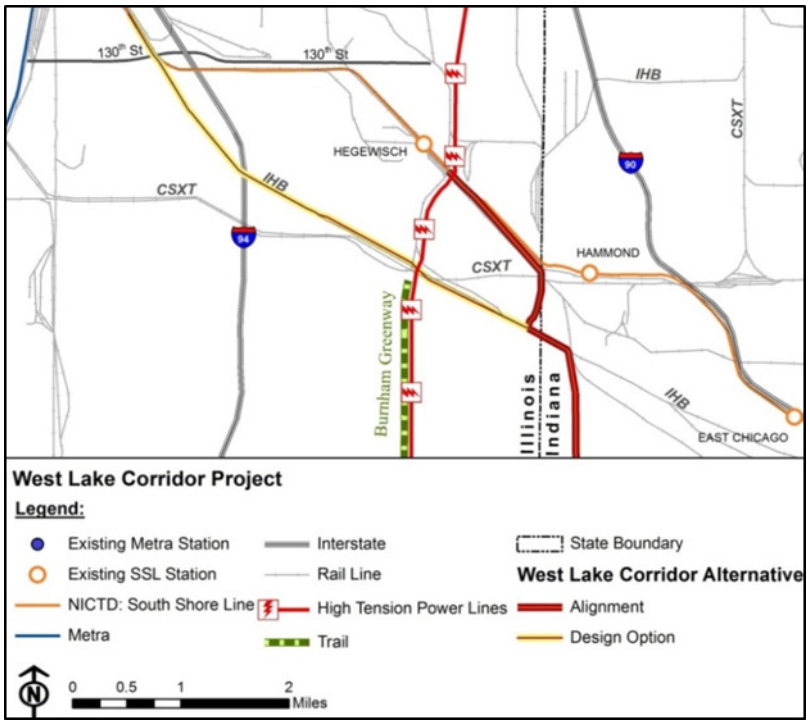
5.10.3 Affected Environment

The majority of the Project footprint is located within Indiana with the northern portions of the footprint in Illinois. Municipalities are responsible for utilities such as water, sewer, and sanitary infrastructure. The private utilities likely to exist within the footprint include natural gas, electric, telecommunications, and underground pipelines. Field verification of the utility information would occur during the Engineering phase.

In addition to these private utility companies, local municipalities are generally responsible for sanitary sewer, storm sewer, water mains, and street lighting. The municipal utilities are generally located within street ROW; however, some utilities cross the Study Area outside of the street ROW.

5.10.3.1 Aerial Utilities

ComEd high tension wires cross the IHB railroad and CSX freight line north-south; west of Burnham Avenue in Burnham, Illinois. The approximate locations of the ComEd high tension wires are shown on **Figure 5.10-1**.



SOURCE: AECOM 2016.

Figure 5.10-1: ComEd High Tension Power Lines

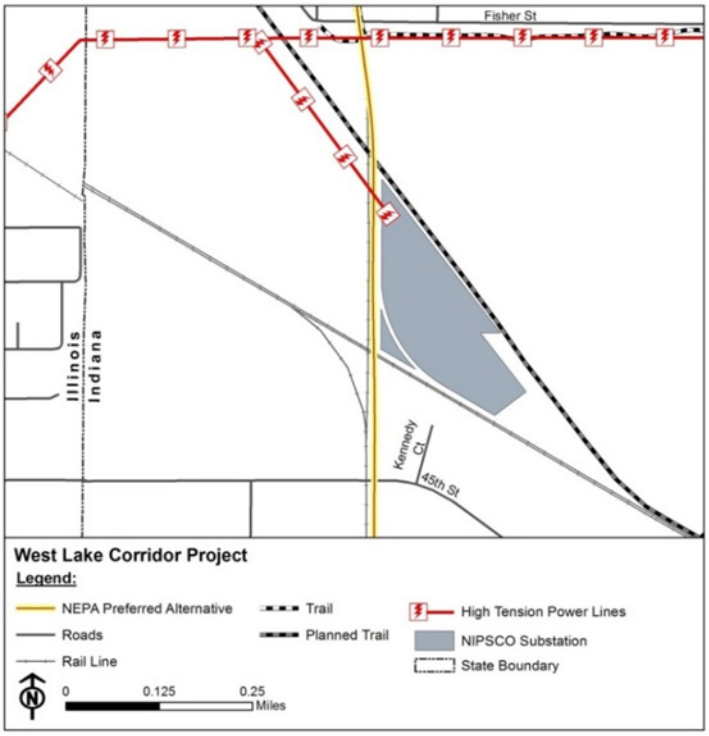
Northern Indiana Public Service Company (NIPSCO) is a provider of natural gas and electricity within northern Indiana. They have a substation at the southwest corner of Willow Court and Morton Court in Hammond and own property adjacent to the west side of Hohman Avenue and south of the Grand Calumet River.

SOURCE: Quandel 2014; Google Streetview 2013.

ComEd High Tension Wires (looking north)

NIPSCO Substation (looking southwest)

NIPSCO's high voltage overhead transmission lines run from a facility near Maynard Junction to Fisher Street. The approximate location of the NIPSCO facility and lines is shown on **Figure 5.10-2**. In addition to the high tension power lines, utility poles are located throughout the Study Area, which are used to support such utilities as overhead power lines, telephone, cable, or fiber optic wires. These are typically located parallel to existing streets and within public ROW.

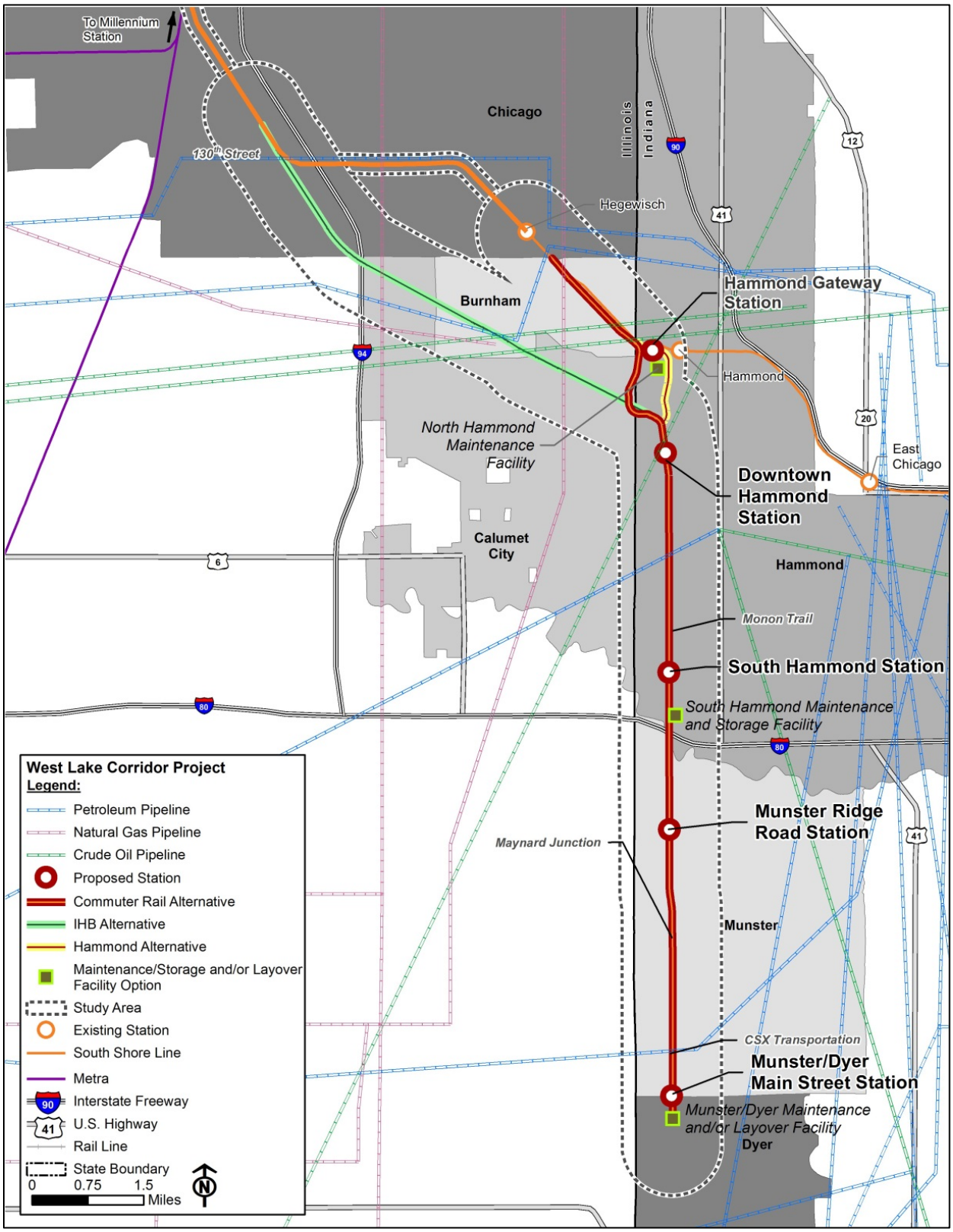


SOURCE: AECOM 2016.

Figure 5.10-2: NIPSCO Facility and Overhead Transmission Lines

5.10.3.2 Pipelines

Oil and natural gas pipelines exist within the Study Area; however, given the sensitive nature of this infrastructure, only general location information is available at this time. The pipelines that cross the Project footprint include petroleum product pipelines, crude oil pipelines, and natural gas pipelines. The publicly available information on these pipelines from the United States Energy Information Administration is presented on **Figure 5.10-3**. The potential conflict locations are identified in **Table 5.10-1** for the Build Alternatives.



SOURCE: US Energy Information Administration 2012 and 2013.

Figure 5.10-3: Pipelines within the Study Area

Table 5.10-1: Pipeline Locations in the Study Area

Pipeline Type	General Location	Build Alternatives
Petroleum Product Pipeline	South of 45th Street (Dyer, IN)	All
Petroleum Product Pipeline	Near Waltham Street and Monon Corridor crossing (Hammond, IN)	All
Crude Oil Pipeline	Near Fayette Street and Monon Corridor crossing (Hammond, IN)	All
Crude Oil Pipeline	Near Burnham Avenue crossing of the state line (Burnham, IL/Hammond, IN)	NEPA Preferred Alternative Commuter Rail Alternative Options Hammond Alternative Options 1 and 3
Crude Oil Pipeline	Northwest of Burnham Avenue crossing of the state line (Burnham, IL/Hammond, IN)	Commuter Rail Alternative Options
Crude Oil Pipeline	Near Burnham Prairie Nature Preserve (Burnham, IL)	IHB Alternative Options
Crude Oil Pipeline	Near Burnham Prairie Nature Preserve (Burnham, IL)	IHB Alternative Options
Petroleum Product Pipeline	Northwest of Burnham Avenue crossing of the state line (Burnham, IL/Hammond, IN)	Commuter Rail Alternative Options
Petroleum Product Pipeline	Near Burnham Prairie Nature Preserve (Burnham, IL)	IHB Alternative Options
Petroleum Product Pipeline	South of 130th Street (Burnham, IL)	IHB Alternative Options

SOURCE: AECOM 2016.

5.10.3.3 Existing Water Service

Existing water service within the Study Area is provided, maintained, and owned by the following entities: City of Hammond, Town of Munster, and Town of Dyer.

- The Dyer water mains are all located outside of the Project footprint.
- Munster water mains primarily traverse the Project footprint in an east-west direction and are located within the public ROW of the following streets: Broadmoor Avenue, Ridge Road, Fisher Street, 45th Street, and Superior Avenue. There is also a north-south oriented water main on the east side of Manor Avenue (parallel to the Monon Corridor). Water mains not located within existing street ROW include an east-west line extending under the existing CSX freight line near the southern limit of the municipal boundary, an east-west oriented line south of Ridge Road, and a north-south oriented water main parallel to the Monon Corridor between Fisher Street and 45th Street. These water mains range in size between 6 and 16inches.
- The Hammond Water Works Department is responsible for over 400 miles of water mains, some of which are located within the Project footprint. Water mains located within or near the Project footprint are located within existing roadway ROW and follow parallel to the road. The water mains range in size between 4 and 54 inches. In addition, water storage tanks are within the Study Area, including an underground tank near Hohman Avenue and Michigan Street and an elevated tank near 173rd Street and Harrison Avenue.

5.10.3.4 Existing Sanitary and Stormwater Sewer

- Sanitary and storm sewer services are owned and maintained by the public works divisions of the municipality in which they are located, including City of Hammond, Town of Munster, and Town of Dyer.
- In Dyer, an 8-inch sanitary line is located on the west side of Sheffield Avenue; adjacent to the Project footprint. A stormwater line runs along Sheffield Avenue with pipes connecting to the west side of the street. Information on the size of these pipes is not readily available.
- In Munster, a 90-inch stormwater pipe crosses the project footprint south of I-80 (near the intersection of Manor Avenue and Fairbanks Place) and connects to a pump station east of the Project footprint, before outletting to the Little Calumet River. Other stormwater pipes are located within the street ROW along Broadmoor Avenue, Ridge Road, Fisher Street, and Superior Avenue. Near the southern end of the municipal boundary, two stormwater pipes under the CSX freight line connect the residential developments on either side. These pipes range between 10 and 48 inches.
- Sanitary sewers connect to the residential and commercial developments within Munster and are generally located within the public ROW and parallel to streets. There is a sanitary line on the east side of the Project footprint between Fisher Street and 45th Street. The sanitary sewers range in size between 8 and 12 inches. Near the southern end of the municipal boundary, a pressurized sewer main under the CSX freight line connects the residential developments on either side.
- Most of the Project footprint within Hammond is located within the existing former Monon rail corridor ROW. There are no sanitary or stormwater pipes located within or crossing the Project footprint from north of I-80/I-94 to south of Douglas Street. North and south of I-80/I-94 are two sanitary sewers that cross the Project footprint.
- From Douglas Street to the northern limit of Hammond, each street crossed by the Project footprint includes combined sanitary and stormwater sewer infrastructure. These pipes range in diameter between 15 inches and 18 inches. There is also a 60-inch stormwater pipe along Hohman Avenue. A 72-inch combined sewer overflow pipe is located along Douglas Street.

5.10.3.5 Telecommunications

There is a Sprint communications facility, including a building and property, located just south of the SSL east of the Indiana-Illinois state line. The building is within a tall fenced area, and is assumed to serve an integral element of their communication network. SBC also provides telecommunication service within the Study Area.

Where the proposed alignment is adjacent to active railroads, the probability of encountering utilities may be higher, including, for example, underground fiber optic, cabling, pipelines, conduits, ducts, etc., as well various utilities overhead on poles. Discovering the presence of these possible facilities, and deciding how their presence would be mitigated, would be addressed in more detail during the Engineering phase of the Project.

5.10.4 Environmental Consequences

5.10.4.1 Long-Term Operation Effects

Effects of the Project on utilities were evaluated based on the presence of utilities known to exist within the Project footprint. Coordination with local and state agencies may be required to relocate specific utilities outside of the Project Study Area. Utilities to go on, over, or under property owned by a freight rail company would need to acquire the necessary permits and follow the utility process for that organization. Private and public utilities that run parallel to or cross within the Project footprint would be located during the Engineering phase to determine whether they are in conflict with the Project and would require adjustments or relocation.

No Build Alternative

The No Build Alternative would have no impact on the existing utilities.

NEPA Preferred Alternative

The proposed alignment of the NEPA Preferred Alternative would result in the adjustment or relocation of utilities that cross or are adjacent to the proposed alignment. Underground and aerial utilities within Hammond, Munster, and Dyer that would be impacted by the NEPA Preferred Alternative are detailed below. The Sprint facility site near the state line would likely conflict with the NEPA Preferred Alternative and may need to be acquired as part of the Project; therefore, coordination with Sprint would occur to relocate this facility if necessary.

The footprint of the NEPA Preferred Alternative would cross two crude oil pipelines and two petroleum product pipelines. The pipelines may not be directly impacted; however, depending on the vertical proximity to the improvements, the pipelines may need to be relocated and/or encased as required to allow maintenance, access and protection. The proposed elevation of the Project to flyover the Maynard Junction rail crossing would conflict with NIPSCO high tension wires south of Fisher Street in Munster. Several options to resolve this conflict have been identified, and costs have been included in the overall estimate for the Project based on the conceptual review conducted thus far. The identification of a design solution that would be acceptable to NIPSCO would be addressed during the Engineering phase of the Project.

Commuter Rail Alternative Options

All four options of the Commuter Rail Alternative would have a similar impact on utilities as the NEPA Preferred Alternative except for the potential impact to pipelines. The Commuter Rail Alternative Options would potentially affect three crude oil pipelines and two petroleum product pipelines. The pipelines may not be directly impacted; however, depending on the vertical proximity to the improvements. The pipelines may need to be relocated and/or encased as required to allow maintenance, access and protection.

IHB Alternative Options

All four options of the IHB Alternative south of Sibley Street would have the same effects as the Commuter Rail Alternative Options. North of Sibley Street, the following effects would occur:

- Along the northern section of the IHB Alternative Options, the proposed alignment would be raised to span the IHB and CSX freight lines, landing on the north side of these railroads. The proposed structure would impact the existing ComEd high voltage transmission lines, which are oriented north-south.

- The IHB Alternative Options would cross two natural gas pipelines and four petroleum product pipelines. The pipelines may not be directly impacted; however, depending on the vertical proximity to the improvements. The pipelines may need to be relocated and/or encased as required to allow maintenance, access and protection.

Hammond Alternative Options 1 and 3

Hammond Alternative Options 1 and 3 would have the same effects on utilities as the NEPA Preferred Alternative.

Maynard Junction Rail Profile Option

The option to cross the Maynard Junction at-grade would avoid the potential conflict with NIPCSO high tension wires south of Fisher Street that is described for the applicable alternative options (i.e., NEPA Preferred Alternative, Commuter Rail Alternative Options 1, 2, and 3, IHB Alternative Options 1, 2, and 3, and Hammond Alternative Option 1).

5.10.4.2 Short-Term Construction Effects

No construction-related impacts are anticipated under the No Build Alternative. Potential impacts associated with other projects under the No Build Alternative would be evaluated separately as part of the planning for those projects.

The NEPA Preferred Alternative, Commuter Rail Alternative Options, IHB Alternative Options, and Hammond Alternative Options 1 and 3, as well as the maintenance and storage facility and station alternatives, would have similar construction impacts, as described below.

Construction of the NEPA Preferred Alternative and other Build Alternatives could result in intermittent impacts to utility service during construction or in advance of other construction activities such as excavation and grading activities, placement of structural foundations, and work that requires large-scale equipment, which could impact subsurface and overhead utilities. Utility service disruptions could occur throughout construction to facilitate utility relocations. It is anticipated that these disruptions would be minimal, with temporary connections provided to customers prior to permanent relocation activities. Utility owners would ultimately decide when and if disruptions to service would be allowed.

Utility locations that are uncertain or misidentified can be unintentionally damaged during construction. The large number of utilities present within the Study Area increases the likelihood of encountering previously unidentified utilities. Coordination with utility providers would be conducted during the Engineering and Construction phases to determine accurate locations of utilities within the ROW for construction.

5.10.5 Avoidance, Minimization, and/or Mitigation Measures

5.10.5.1 Long-Term Operating Effects

Since no impacts are anticipated under the No Build Alternative, no mitigation measures are proposed. For the Build Alternatives, NICTD would continue to coordinate with public and private utility owners to identify utility facilities that would potentially be affected by the Project and to develop conceptual plans and cost estimates for the anticipated relocation, replacement, or protection of those utilities. Where the project would conflict with high tension power lines, the power lines would need to be raised to ensure vertical clearance from the track.

Ongoing coordination would continue as the Engineering phase progresses to identify additional impacts and minimize service disruptions, in coordination with respective utility owners and appropriate local agencies. Existing utilities would be surveyed during the Engineering phase and efforts would be made to avoid or limit impacts to existing utilities when practical. Where the Project may conflict with existing utilities, the utilities would be protected in place, relocated, replaced, or abandoned (if possible) in consultation with the utility owner.

Where relocation would be required, efforts would be made to consolidate existing utilities where practical to reduce the number of lines (e.g., replace two water mains with a single line) or combine facilities (e.g., use of a joint duct bank for underground telecommunication lines) as permitted by the utility owners.

Measures would be taken to minimize utility service outages and to schedule them with the utility owner and the customer such that they would present the least inconvenience. Special measures may be incorporated to ensure continuous service to life safety functions such as hospitals, fire protection, emergency response, and other facilities providing critical support such as private medical offices/care facilities.

5.10.5.2 Short-Term Construction Effects

No mitigation measures are proposed for the No Build Alternative since no construction-related impacts are anticipated. For the Build Alternatives, continued coordination with utility companies would occur throughout the Project duration to minimize temporary effects during construction. Interruptions of service may occur during construction of improvements or relocation of utility infrastructure. Any service interruptions would be limited in duration and geographic coverage area. Advance notification would be provided to adjacent property owners that would be affected by temporary service interruptions. Efforts to schedule service interruptions during non-peak service time periods would help to avoid impacts during any critical service periods.
NICTD would develop a project construction, education, and outreach plan during the Engineering phase of the Project. This plan would identify how NICTD would educate the public and stakeholders about ongoing and upcoming construction and construction impacts (i.e., detours, service interruptions). It would be expected to include both broad-based approaches to educate the public (i.e., media, web site, newsletters, public meetings) and targeted outreach to those who may be more directly affected by construction activities (direct mail, small group meetings, in-person communication). Construction impacts would be minimized through selection and implementation of BMPs. The procurement documents would specify these methods along with restrictions on work hours, as appropriate.

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