# 3.6 Noise and Vibration

This section describes the existing conditions and potential environmental consequences for noise and vibration under the Proposed Acquisition and the No-Action Alternative. As detailed in this section, the Proposed Acquisition would introduce additional train traffic and increase freight handled at rail yards and intermodal facilities, which would increase noise in nearby communities. The Proposed Acquisition would also cause temporary construction noise and vibration related to the 25 planned capital improvements, which could affect nearby communities.

## 3.6.1 Approach

This subsection describes the approach that OEA used to analyze noise and vibration under the Proposed Acquisition and the No-Action Alternative.

### 3.6.1.1 Noise and Vibration Study Area

The study area for noise and vibration includes rail line segments, rail yards, and intermodal facilities where the Proposed Acquisition would result in increased rail traffic, increased vehicular traffic, or increased activities that would exceed the thresholds set forth in the Board's regulations at 49 C.F.R. § 1105.7(e)(6). **Table 3.6-1** shows the thresholds for noise and vibration analysis for rail line segments, rail yards, and intermodal facilities.

***Table 3.6-1. Thresholds for Noise Analysis***

| Activity | Threshold |
|---|---|
| Rail Line Segment | An increase in rail traffic of at least 100 percent (measured in GTMs annually) or an increase of at least eight trains per day on any segment of rail line affected by the Proposed Acquisition. |
| Rail Yard | An increase in rail yard activity of at least 100 percent (measured by carload activity). |
| Intermodal Facility | An average increase in truck traffic of more than 10 percent of the average daily traffic or 50 vehicles a day on any affected road segment. |

Source: 49 C.F.R. § 1105.7(e)(6)

In addition to rail line segments, rail yards, and intermodal facilities where analysis thresholds would be met, the noise and vibration study area also includes the locations of 25 planned capital improvements. If the Board authorizes the Proposed Acquisition, the Applicants intend to add new sidings, extend existing sidings, add double track, and add facility working track at these locations to support the projected increase in rail traffic. As shown in **Figure 3.6-1** the noise and vibration study area extends along CP mainlines from Bensenville, Illinois to Kansas City, Missouri; along KCS mainlines from Kansas City to Port Arthur, Texas; and from Rosenberg, Texas to Laredo, Texas.

In response to public comments on the Draft EIS, OEA expanded the study area for noise and vibration to also include rail line segment U-BEAU-01, which extends from Beaumont, Texas to Rosenburg and passes through the Houston area. This rail line segment is part of

UP's Houston Subdivision and Glidden Subdivision. KCS currently operates trains on this segment under a trackage rights arrangement with UP, the segment's owner. If the Board authorizes the Proposed Acquisition, CPKC would continue to operate on this segment under a trackage rights arrangement. The Applicants project that the Proposed Acquisition would increase rail traffic on segment U-BEAU-01 by 7.57 trains per day, on average, which is less than the noise analysis threshold of eight trains per day.

For the purposes of its environmental analysis of the Proposed Acquisition, OEA assumed that all new freight trains would move on rail line segment U-BEAU-01. OEA understands that, because UP and BNSF own most of the rail lines in Houston, CPKC could not control the dispatching of trains on those rail lines. Based on information submitted to the Board by UP, BNSF, and others, OEA understands that trains through Houston are typically dispatched directionally, with westbound traffic using UP's Houston Subdivision and eastbound traffic using UP's Beaumont Subdivision. To the extent that some trains may be dispatched on rail line segments other than U-BEAU-01, then the increase in rail traffic on that segment resulting from the Proposed Acquisition is likely to be less than the 7.57 trains per day that the Applicants have projected. Therefore, the results reported in this section in the Final EIS may overstate the potential noise and vibration impacts of the Proposed Acquisition in the Houston area.

The noise and vibration study area also includes the areas surrounding the Bensenville, Schiller Park, Detroit Container Terminal, Wylie, Minneapolis, and International Freight Gateway intermodal facilities and the Schiller Park Rail Yard. At these locations, there would be an increase in rail yard activity of at least 100 percent (measured by carload activity) and/or an average increase in truck traffic of more than 10 percent of the average daily traffic or 50 vehicles per day on any affected road segment.

*Figure 3.6-1. Noise and Vibration Study Area*

### 3.6.1.2 Background Information

#### *Noise*

Noise is unwanted or undesirable sound. Sound is the result of small vibrations that cause air pressure to oscillate above and below the ambient atmospheric pressure, which humans perceive through their sense of hearing. This section describes noise impacts on humans, but noise may also affect wildlife, as described in *Section 3.11, Biological Resources*. The basic parameters of sound that affect how humans perceive it are:

- Sound level;
- Sound frequency; and
- Variation in sound over time.

Sound level is determined by how greatly the sound pressure fluctuates above and below the atmospheric pressure and is expressed on a compressed scale in units called decibels (dB). Values between 0 and 120 dB fall in the range of normally encountered sound.

The frequency of sound relates to its tone or pitch, which is determined by the rate of air pressure fluctuation and is expressed in terms of cycles per second or Hertz (Hz). The human ear can detect a wide range of frequencies, from about 20 Hz to 17,000 Hz. Because the sensitivity of human hearing varies with frequency, sound is measured for environmental noise commonly using a weighting system to provide a single-number descriptor that correlates with subjective human response. Sound levels measured using this weighting system are called "A-weighted" and are expressed in decibel notation as "dBA." Sound and noise experts widely accept the A-weighted sound level as a unit for describing environmental noise.

Because sound levels fluctuate from moment to moment, there are different ways to characterize the range of sound levels over a period of time. This is commonly done using the following sound level metrics:

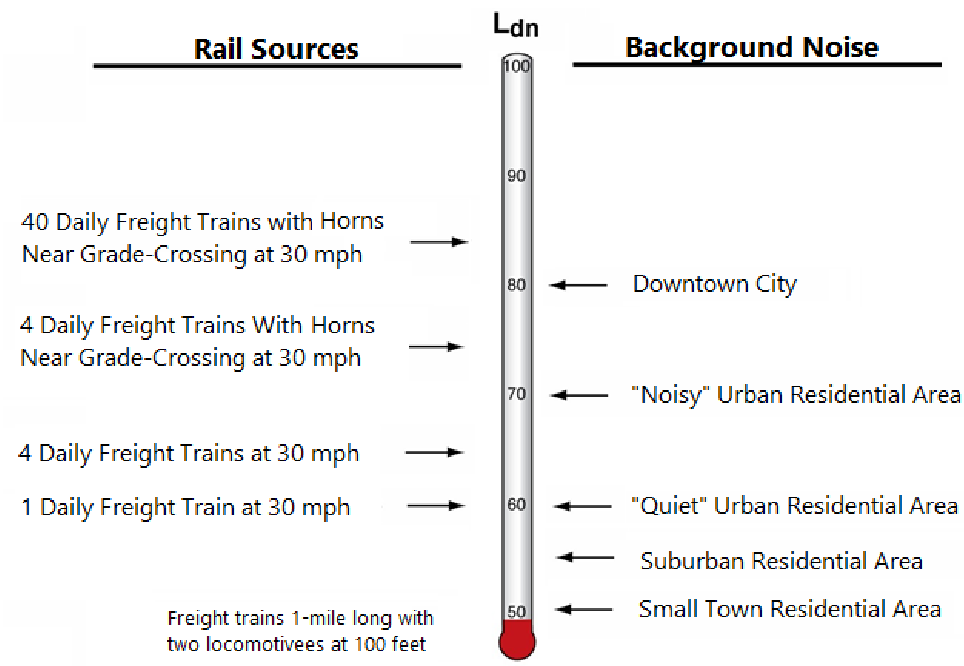
- **Lmax** is the maximum instantaneous A-weighted sound level. The Lmax represents the highest sound level generated by a source.
- **Leq** is the energy-average sound level. The Leq is a single value that is equivalent in sound energy to the fluctuating levels over a period. The Leq accounts for how loud noise events are, how long they last, and how many of them occur.
- **Ldn** is the day-night average sound level. The Ldn is a single value equivalent to the sound energy fluctuating over 24 hours with a 10-dB penalty applied to sound at night (10:00 p.m. to 7:00 a.m.). The Ldn accounts for how loud noise events are, how long they last, how many of them occur over a 24-hour period, and how many occur at night.
- **SEL** is the sound exposure level. The SEL is a single-value equivalent to the total sound energy from an event normalized to one second. The SEL is a fundamental measure of sound from a source used to determine Leq and Ldn levels.

Because sound levels are measured in decibels, adding sound levels is not linear. When two equal sources of sound are added together, the overall sound level increases by 3 dB. For example, 60 dB plus 60 dB equals 63 dB.  Research indicates the following relationships between A-weighted sound level and human perception:

- A 3-dB increase in sound level is a doubling of acoustic energy and is generally the threshold of perceptibility to the average person.  This means that if a constant source of sound increases by less than 3 dB, that difference is usually not perceptible to the average person.
- A 10-dB increase is a tenfold increase in acoustic energy and is perceived as a doubling in loudness.

**Figure 3.6-2** presents the typical range of background Ldn noise levels, based on setting and typical Ldn noise levels, generated by freight train activity, at a distance of 100 feet from the tracks.

***Figure 3.6-2. Typical Ldn Noise Levels***




Source: Federal Transit Administration (FTA) 2018

EPA, in consultation with the USDOT, regulates noise from railroad equipment and facilities pursuant to Section 17 of the Noise Control Act of 1972, 42 U.S.C. § 4916.  EPA regulates railroad noise by controlling the noise at the source—locomotives and rail cars. For example, EPA's regulations at 49 C.F.R. § 201.11(c) limit sound levels from stationary locomotives manufactured after December 31, 1979 to 87 dBA at a distance of 100 feet at any throttle setting except idle and to 70 dBA at idle throttle setting.  EPA's regulations at 49 C.F.R. § 201.12(c) limit sound levels from locomotives manufactured after December 31, 1979, while moving at any speed to 90 dBA at a distance of 100 feet.

To characterize noise impacts, OEA considers not only the source of noise, but also existing background noise levels, as well as sensitivity to noise.  Noise especially affects people in certain locations, such as schools, places of worship, libraries, hospitals, residences, retirement communities, and nursing homes, and these locations are therefore known as noise-sensitive receptors (hereafter, receptors). The Board's regulations at 49 C.F.R. 1105.7(e)(6) include two specific thresholds for noise analysis as follows:

- An increase in noise exposure as measured by a day-night average noise level, and
- 3 dBA or more.

If the thresholds are exceeded, OEA identifies the receptors in the project area and quantifies the noise increase for these receptors. An adverse noise impact occurs when the noise level at a receptor increases by 3 dBA or more and reaches or exceeds a Ldn of 65 dBA when combined with the existing background noise. Research indicates that both of these conditions must be met or exceeded to cause an adverse noise impact from rail operations (Surface Transportation Board 1998; Coate 1999).[1]

Unlike noise from rail operations, noise from construction activities are temporary in nature. The Federal Transit Administration (FTA) has developed general methods for assessing noise impacts from construction activities related to transportation, including noise impacts from construction equipment. **Table 3.6-2** shows FTA's criteria for construction noise, expressed in Leq. These criteria are based on the noise levels that FTA has found to cause annoyance in humans. They depend on the type of land use category and whether construction occurs during the day or night.

***Table 3.6-2. Construction Noise Criteria***

| Land Use Category | Construction Noise Criteria (Leq, dBA) | |
|---|---|---|
| | **Day** | **Night** |
| Residential | 80 | 70 |
| Commercial | 85 | 85 |
| Industrial | 90 | 90 |

Source: FTA 2018

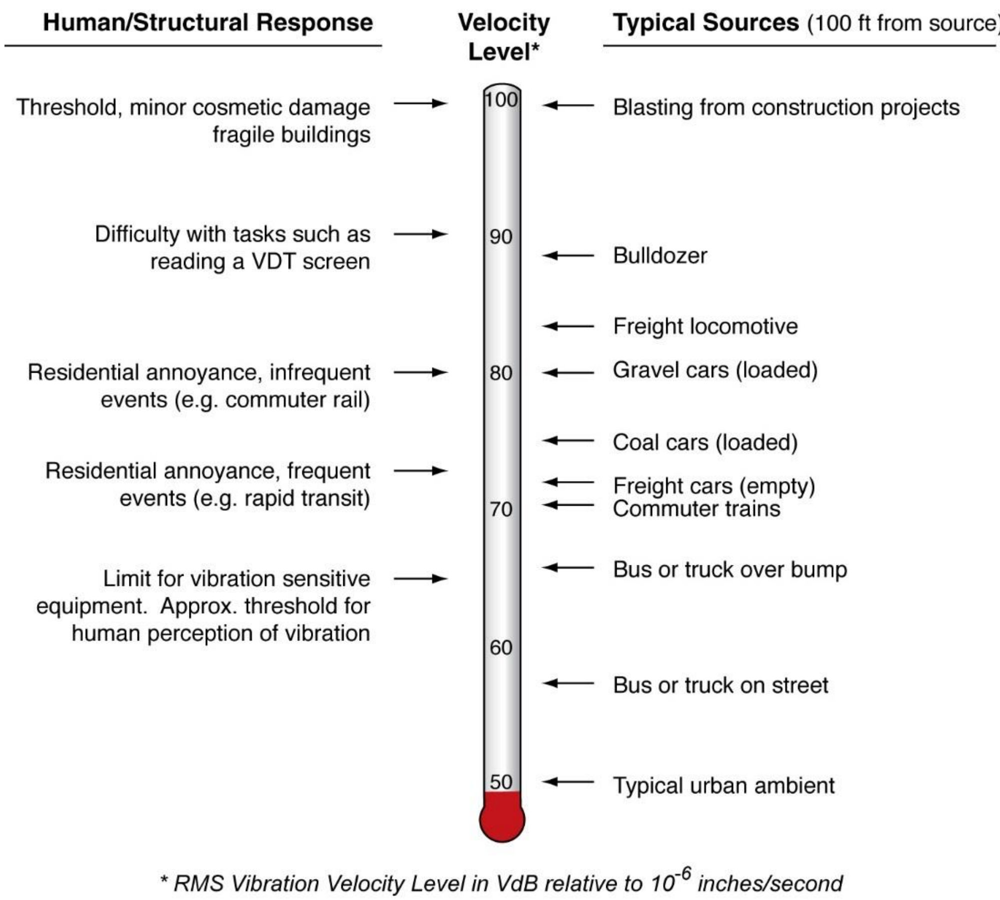
### *Vibration*

Ground-borne vibration is the oscillatory motion (moving back and forth) of the ground around an equilibrium position. Vibration can be a concern because it can annoy people and, if it is strong enough, damage buildings and other structures. When evaluating annoyance, vibration is measured in terms of decibels with "VdB" used in place of dB to avoid confusing vibration decibels with sound decibels. For annoyance impacts, receptors are generally the same as for noise because vibrations can annoy people inside buildings like schools, residences, libraries, nursing homes, hospitals, and places of worship. When evaluating potential damage to structures, vibration is measured in terms of the peak-particle velocity (PPV) in inches per second. Building damage thresholds are much higher than

[1] Although the Board's regulations at 49 C.F.R. § 1105.7(e)(6) indicate that either an increase of 3 dBA or an increase to an Ldn of 65 dBA would be an adverse impact, research indicates that both of these conditions must be met or exceeded for an adverse noise impact from rail operations to occur.

human annoyance thresholds. **Figure 3.6-3** illustrates a range of vibration levels using typical sources as examples. It also includes typical human responses to thresholds and levels generated by common sources.

***Figure 3.6-3. Typical Ground-Borne Vibration Levels***




Source: FTA 2018

Although federal regulations do not set thresholds for ground-borne vibration from train operations, FTA's *Transit Noise and Vibration Impact Assessment Manual* (FTA 2018) provides guidance on evaluating and assessing potential adverse vibration effects. **Table 3.6-3** shows FTA's criteria for construction-related vibration, based on the thresholds at which FTA determined that damage to different types of buildings could occur. As the table shows, most modern buildings without plaster have a vibration threshold of 0.5 inches per second, while some historic buildings that are particularly susceptible to vibration damage have a lower threshold of 0.12 inches per second. If vibration levels should exceed these thresholds, it does not necessarily mean that structural damage would occur but rather that there would be an increased potential for damage.

***Table 3.6-3. Construction Vibration Criteria***

| Building Category | Vibration Threshold peak particle velocity (PPV) (in/s) | Vibration Threshold (VdB) |
|---|---|---|
| I. Reinforced-concrete, steel, or timber (no plaster) | 0.5 | 102 |
| II. Engineered concrete and masonry (no plaster) | 0.3 | 98 |
| III. Non-engineered timber and masonry buildings | 0.2 | 94 |
| IV. Buildings extremely susceptible to vibration damage | 0.12 | 90 |

Source: FTA 2018

Vibrations caused by passing trains are generally not nearly strong enough to cause damage to even the most susceptible buildings. OEA has concluded in past cases that vibration from passing trains has the potential to exceed FTA's criteria for fragile buildings only within the rail ROW, where no such buildings are present. Outside of the rail ROW, vibration could cause annoyance, but not damage to structures (Surface Transportation Board 2015; Surface Transportation Board 2021). **Table 3.6-4** shows FTA's criteria for annoyance impacts from vibration. Because even events that cause lower levels of vibration can be annoying if they occur often throughout the day, FTA's criteria depend on the frequency of events, as well as the type of receptor.

***Table 3.6-4. Vibration Impact Criteria***

| Land Use Category | Vibration Level (VdB) | | |
|---|---|---|---|
| | Frequent Events[1] | Occasional Events[2] | Infrequent Events[3] |
| Special-use Buildings | 65 | 65 | 65 |
| Residential | 72 | 75 | 80 |
| Institutional | 75 | 78 | 83 |

Source: FTA 2018
[1] Frequent events correspond to more than 70 trains per day
[2] Occasional events correspond to 30 to 70 trains per day
[3] Infrequent events correspond to fewer than 30 trains per day

For most of the rail lines in the study area, the total projected rail traffic under the Proposed Acquisition would be fewer than 30 trains per day, so the criteria for infrequent events would apply. Along rail lines where there would be between 30 and 70 projected trains per day under the Proposed Acquisition, such as the segment between Shreveport, Louisiana and Frierson, Louisiana, the occasional events criteria would apply.

### 3.6.1.3 Noise and Vibration Measurements

To characterize the sound and vibration from trains in the study area, OEA conducted sound level measurements of freight train operations at 10 locations and vibration measurements at seven locations in the study area. OEA selected the measurement sites to include several locations spread throughout the study area near receptors where there were a relatively high number of existing daily train operations. OEA selected sites to capture both CP and KCS train operations along relatively straight track segments with typical train speeds. OEA conducted sound level measurements on wayside segments of track and near or at grade crossings to determine levels with and without the train horn. OEA collected these data to supplement the broader set of data available on sound and vibration emissions of freight trains and to evaluate actual measurements with the emissions that were previously used in other railroad mergers (Surface Transportation Board 1997; Surface Transportation Board 2015; Surface Transportation Board 2021). See **Appendix M** for further information on the measurement results.

OEA conducted noise measurements at locations near Davis Junction, Illinois; Stillman Valley, Illinois; Clinton, Iowa; Kansas City, Missouri; Grandview, Missouri; and Shreveport, Louisiana. OEA calculated the SEL, Leq, and frequency content of locomotives, railcars, and horns from these sound level measurements. The sound level results include:

- Locomotives generated sound levels from 85 to 100 dBA (SEL), with an average of 92 dBA (SEL), depending on train speed.
- Horns typically ranged from 106 to 116 dBA (SEL), with an average of 108 dBA (SEL) at locations between a quarter mile and an eighth mile from grade crossings and 111 dBA (SEL) at the grade crossing.
- Railcars generated 63 to 83 dBA (Leq), with an average of 75 dBA (Leq), depending on train speed.

These sound measurements are relatively consistent with prior OEA environmental reviews, including the Conrail merger (Surface Transportation Board 1997), and the Tongue River Railroad (Surface Transportation Board 2015), and Uinta Basin Railway (Surface Transportation Board 2021) construction cases. Therefore, OEA used the same reference noise levels as those prior projects to model potential noise increases that could result from the Proposed Acquisition. *Section 3.6.3, Environmental Consequences*, presents the results of OEA's model.

OEA conducted vibration measurements from passing trains at locations near Davis Junction; Stillman Valley, Illinois; Clinton, Iowa; Kansas City, Missouri; and Shreveport, Louisiana. The intensity of the vibrations that OEA measured varied between sites due to different soil conditions and rail conditions (see **Appendix M**). Train speed and distance from the tracks also affected the vibration measurements. Overall, OEA's vibration measurements were generally consistent with FTA's general ground-borne vibration curves (see **Appendix M**). Therefore, OEA used FTA's vibration curves as the basis for modeling predicted vibration resulting from the Proposed Acquisition.

#### 3.6.1.4 Noise Modeling Methods

##### *Freight Train Noise*

OEA used a sound prediction software program to predict noise from freight rail operations throughout the study area. The noise modeling software, Cadna-A, implements the International Standards Organization Standard 9613-2:1996, "Acoustics—Attenuation of

Sound During Propagation Outdoors— Part 2: General Method of Calculation." Cadna-A is a three-dimensional model that accounts for the sound emissions of sources in octave-bands, terrain, intervening objects such as buildings, ground cover, and atmospheric conditions. OEA modeled noise levels from locomotives, railcars, and horns in octave-bands from 31.5 to 8,000 Hz.

OEA calculated noise levels (Ldn) at a reference distance of 100 feet for each track segment using equations based on the daily train volumes, number of locomotives, train length, and speed, assuming flat, acoustically soft ground conditions (see **Appendix M** for details). These track segments included:

- Wayside track (without horns);
- The first half of horn-sounding segments (within one quarter to one eighth mile from the grade crossing);
- The second half of horn-sounding segments (within one eighth mile to the grade crossing); and
- Noise at planned track siding locations, where locomotives would idle.

Based on freight train emissions used in prior cases, OEA predicted that the sound emissions would be:

- 95 dBA (SEL) at 100 feet from a single locomotive moving at 40 mph;
- 82 dBA (Leq) at 100 feet from railcars moving at 40 mph;
- 110 dBA (SEL) within one eighth mile from a crossing for train horns;
- 107 dBA (SEL) between one fourth mile and one eighth mile from a crossing for train horns; and
- 70 dBA (Leq) at 100 feet from idling locomotives are 70 dBA.

To predict train noise beyond 100 feet, OEA used Cadna-A to account for terrain, intervening objects, ground cover, and atmospheric conditions using a combination of digital elevation models with one-third arc-second (approximately 10-meter) resolution from the United States Geological Survey for terrain and the Microsoft National Building Footprints dataset to identify receptors. OEA categorized buildings as residences, schools, libraries, museums, places of worship, and nursing homes based on a review of aerial photography, state and/or municipal zoning maps, and limited field observations. OEA conducted the Cadna-A calculations in a grid with 30-foot spacing at a height of 5 feet above ground across a half-mile area from either side of the tracks.

### *Passenger Train Noise*

Because receptors in the study area are already located near an operation rail line, those receptors already experience noise from passing trains and would continue to do so whether or not the Board authorizes the Proposed Acquisition. In some portions of the study area, the vast majority of passing trains are passenger trains, such as Metra trains in the Chicago area. To account for noise from passenger trains, which would continue whether or not CP were to acquire KCS, OEA used a similar approach as for modeling noise from freight trains. OEA calculated predicted noise levels (Ldn) at a distance of 100 feet of each track segment based on daytime and nighttime train volumes, number of locomotives, train length, speed, and assuming flat, acoustically soft ground conditions. To predict train noise beyond 100 feet, the use of Cadna-A accounted for terrain, intervening objects, ground cover, and atmospheric conditions. Reference noise levels at 100 feet with and without train horn noise were calculated using FTA's Noise Impact Assessment Spreadsheet (dated October 1, 2018) for Metra. The passenger train volumes were based on the Metra train schedule (dated July 12, 2021).

#### *Rail Yards and Intermodal Facilities*

As discussed in *Chapter 2, Proposed Action and Alternatives*, OEA identified six rail yards and intermodal facilities where the Proposed Acquisition would cause the number of railcars processed per day or the volume of truck traffic per day to exceed the thresholds for environmental analysis (see **Table 3.6-1** above). Those six rail yards and intermodal facilities are the Bensenville yard, the Schiller Park yard, the Detroit Container Terminal, the Wylie yard, the Minneapolis IMS facility, and International Freight Gateway facility. In general, noise from intermodal facilities includes noise from cranes that are used for lifting freight containers and noise from trucks. Noise from rail yards includes the noise produced by the movement of the switching engines that process railcars from the departure yard to the receiving yard and noise from railcars coupling as new trains are put together. The rail yards at issue here do not include wheel retarders, which generate noise when braking railcars.

OEA modeled noise from rail yards and intermodal facilities based on methods used in previous environmental reviews (Surface Transportation Board 1997; EPA 1979; FRA 1982). See **Appendix M** for details on the equations that OEA used to predict noise from rail yards and intermodal facilities. OEA's noise modeling accounted for the number of lifts performed each day, the volume of trucking operations, the number of rail cars processed, and the hours of operations of the rail yards and intermodal facilities.

### 3.6.1.5 Vibration Modeling Methods

Trains generate vibration from the force of locomotives and railcars on the track. Vibration propagates through the track structure, the ground, and into nearby buildings, creating the potential to cause human annoyance. Locomotives typically generate higher vibration levels compared to railcars due to their greater weight. FTA has established general ground-borne vibration curves for freight locomotives and railcars, basing the outdoor vibration level on the distance from the track. OEA used these FTA general ground-borne vibration curves to predict vibration levels throughout the noise and vibration study area for the Proposed Acquisition, adjusting the levels for train speed and for the fact that vibration tends to be reduced as it passes from outside to inside of buildings.

Train speed affects vibration levels such that higher speeds generally correspond to higher vibration levels. According to FTA guidelines, a doubling in speed typically corresponds to a 6 VdB difference in vibration level. For most wood-framed buildings, interior vibration levels are 5 VdB lower than outdoor levels. Larger buildings or heavier masonry buildings generally provide additional vibration attenuation to the interior of the building. For all buildings in this analysis, OEA has assumed an outdoor-to-indoor building vibration attenuation of 5 VdB.

Based on the applicable FTA impact criterion, the speed and number of trains, the general vibration curves, and outdoor-to-indoor vibration attenuation, OEA calculated the distance from the track at which receptors would experience vibration effects. OEA calculated the distances to potential vibration impacts for the Proposed Acquisition and the No-Action Alternative and compared these to existing conditions.

**Table 3.6-5** shows the distance from the track centerline at which the vibration from a standard freight locomotive would exceed 75 VdB or 80 VdB for train speeds of 10 to 60 mph. As discussed above, 80 VdB is the criterion for annoyance impacts from vibration for infrequent events (such as fewer than 30 trains per day), while 75 VdB is the criterion for annoyance impacts from vibration for occasional events (e.g., between 30 and 70 trains per day). The distances to vibration annoyance (75 and 80 VdB) account for 5 VdB of outdoor-to-indoor vibration attenuation. The distance to potential structural damage for buildings extremely susceptible to vibration damage (0.12 inches per second) is evaluated at the exterior of the building and does not include outdoor-to-indoor vibration attenuation. As the table shows, the distance from the track at which vibration becomes annoying ranges from 8 feet for rail lines with few slow-moving trains to 94 feet for rail lines with many fast-moving trains. The distance to potential structural damage for buildings extremely susceptible to vibration damage is 4 feet from the track for slow-moving trains to 28 feet for fast-moving trains.

***Table 3.6-5. Train Vibration Levels***

| Train Speed (mph) | Distance from Track Centerline to 75 VdB (feet) | Distance from Track Centerline to 80 VdB (feet) | Distance from Track Centerline to 90 VdB (0.12 in/s) (feet) |
|---|---|---|---|
| 10 | 14 | 8 | 4 |
| 20 | 29 | 16 | 9 |
| 30 | 45 | 24 | 13 |
| 40 | 61 | 33 | 18 |
| 50 | 77 | 42 | 23 |
| 60 | 94 | 51 | 28 |

Based on these modeled distances, OEA created vibration contours for each rail line segment in the study area. The contours represent the area in which vibration levels would reach the annoyance criterion threshold under the Proposed Acquisition and the No-Action Alternative. OEA then identified all receptors located within the vibration contours, as discussed in *Section 3.6.3, Environmental Consequences*. **Appendix M** presents maps of the vibration contours.

## 3.6.2 Affected Environment

### 3.6.2.1 Existing Noise and Vibration Sources

Sources of existing noise and vibration in the study area include freight trains; passenger trains, including the Metra Milwaukee District West Line from Bensenville to Elgin, Illinois and the Heartland Flyer Amtrak line from Metro to Alliance, Texas; Chicago O'Hare International Airport; Fort Worth Alliance Airport; vehicular traffic, trucking activity, and stationary equipment at intermodal facilities; and natural sources such as wind blowing through trees and ground cover, insects, and birds. Throughout most of the study area, the predominant source of existing noise is the existing freight train activity, except near O'Hare International Airport and locations near interstate highways, where aviation and roadway sources also contribute to the existing noise environment.

As presented in *Chapter 2, Proposed Action and Alternatives*, **Table 2-1**, existing KCS and CP freight train operations in the noise and vibration study area range from approximately three to over 20 daily trains. Each train typically has two to three locomotives and ranges from 4,200 to 7,100 feet in length. The types of railcars include hopper cars, tank cars, boxcars, automotive cars, intermodal container cars, and flat cars. Because the primary source of noise is from the wheel/rail interaction, most railcars generate similar noise and vibration. The trains have diesel-electric locomotives such as the EMD SD40-2, EMD GP20C-ECO, GE AC4400CW, and SD40, which have approximately 3,000 to 4,400 horsepower. The trains typically operate at speeds between 20 and 60 mph throughout the study area.

OEA's observations of existing trains in the field showed that the vast majority of train wheelsets are in good running condition, with limited wheel flats[2] that can increase noise or vibration conditions. The existing tracks are primarily continuous-welded rail, which provides a smooth-running surface to minimize increases in noise and vibration such as what may occur with jointed tracks.

In accordance with 49 C.F.R. Parts 222 and 229, Use of Locomotive Horns at Highway-Rail Grade Crossings; Final Rule, FRA requires locomotive engineers to sound their train horns at public at roadway/rail at-grade crossings. FRA regulations require train engineers to sound their horn for 15 to 20 seconds (not to exceed 25 seconds), using a long-long-short-long sounding pattern. Engineers may not sound the horn farther than a quarter of a mile from the crossing and must continue until the first locomotive has passed through the crossing. The horns must generate a sound level between 96 and 110 dBA (Lmax) at a distance of 100 feet in front of the locomotive. Although train horns are sounded for a relatively short time compared to the time it takes for an entire freight train to pass by—often two minutes or more—horns are substantially louder than the locomotive and railcars and, consequently, Ldn noise levels are higher at grade crossings than at wayside locations.

[2] Wheel flats are a flat section on a steel wheel of a rail vehicle that is a result of skidding on steel rails and affect the wheel radius (FTA 2018).

There are approximately 1,200 grade crossings throughout the noise and vibration study area. A few municipalities are designated quiet zones by FRA; in these zones, locomotive engineers do not routinely sound their horn through the crossings except during emergency conditions. There are existing quiet zones in portions of Bartlett, Illinois; Schaumberg, Illinois; Bensenville, Illinois; Itasca, Illinois; Muscatine, Iowa; Neosho, Missouri; Beaumont, Texas; Victoria, Texas; Wharton, Texas; El Campo, Texas; Louise, Texas; Edna, Texas; and north of Texarkana, Texas.

Based on the noise and vibration approach described in *Section 3.6.1.4* and *Section 3.6.1.5*, OEA determined existing noise and vibration conditions throughout the study area from Bensenville, Illinois to Laredo, Texas. **Appendix M** presents the existing noise contours. **Table 3.6-6** presents the noise levels at a distance of 100 feet from the track centerline for trains at 40 mph on wayside track segments (with no train horn noise) and segments within one eighth mile of at-grade crossings. These noise levels vary based on the number of trains, number of locomotives per train, and length of trains. OEA assumed train operations occur equally throughout all hours of the day. OEA reported noise levels in this table based on a train speed of 40 mph, since this is a typical operating speed throughout the study area. As described in *Section 3.6.1.4, Noise Modeling Methods*, the noise contour calculations using Cadna-A are based on actual train speeds throughout the study area.

**Table 3.6-6** also presents the number of receptors within the existing 65 dBA (Ldn) noise contour and within the existing vibration impact threshold. This table shows that there are a total of 16,043~~2,385~~ receptors currently within the 65 dBA (Ldn) noise contour and 278~~44~~ receptors currently within the annoyance threshold for vibration (75 or 80 VdB depending on the number of trains per day).

***Table 3.6-6. Existing Noise and Vibration Conditions (2019)***

| Track Segment | Length (miles) | Noise Level at 100 feet and 40 mph (Ldn, dBA) | | Receptors within 65 dBA (Ldn) | Receptors within Vibration Annoyance Threshold |
|---|---|---|---|---|---|
| | | Wayside | Grade-Crossing (within 1/8-mile) | | |
| Bensenville, IL to Elgin, IL[1] | 23.0 | 67.0 | 77.7 | 189 | 1 |
| Elgin, IL to Davis Junction, IL | 38.7 | 65.5 | 72.6 | 227 | 0 |
| Davis Junction, IL to Sabula, IA | 61.4 | 68.9 | 76.0 | 235 | 0 |
| Sabula, IA | 0.7 | 68.6 | 75.7 | 1 | 0 |
| Sabula, IA to Clinton, IA | 17.5 | 70.6 | 77.9 | 173 | 0 |
| Clinton, IA to Water Works, IA | 33.2 | 69.6 | 76.9 | 643 | 25 |
| Water Works, IA to Nahant, IA | 4.5 | 69.6 | 76.9 | 4 | 0 |
| Nahant, IA to Muscatine, IA | 24.6 | 69.3 | 75.9 | 183 | 0 |
| Muscatine, IA to Ottumwa, IA | 82.5 | 67.8 | 74.4 | 325 | 0 |
| Ottumwa, IA to MO/IA State Border | 61.2 | 66.2 | 73.0 | 105 | 2 |
| MO/IA State Border, to Laredo, MO | 41.1 | 66.2 | 73.0 | 15 | 0 |
| Laredo, MO to Polo, MO | 51.6 | 66.9 | 73.7 | 64 | 0 |

*Table 3.6-6. Existing Noise and Vibration Conditions (2019)*

| Track Segment | Length (miles) | Noise Level at 100 feet and 40 mph (Ldn, dBA) | | Receptors within 65 dBA (Ldn) | Receptors within Vibration Annoyance Threshold |
|---|---|---|---|---|---|
| | | Wayside | Grade-Crossing (within 1/8-mile) | | |
| Polo, MO to Kansas City, MO | 42.1 | 66.7 | 73.6 | 191 | 3 |
| Kansas City, MO to Pittsburg, KS | 124.5 | 71.4 | 79.5 | 661 | 0 |
| Pittsburg, KS to Watts, OK | 107.8 | 72.0 | 79.4 | 1,565 | 0 |
| Watts, OK to Poteau, OK | 90.4 | 71.4 | 78.8 | 806 | 0 |
| Poteau, OK to Heavener, OK | 11.6 | 71.6 | 79.0 | 203 | 0 |
| Heavener, OK to De Queen, AR | 94.6 | 70.7 | 78.6 | 486 | 0 |
| De Queen, AR to Ashdown, AR | 37.1 | 71.6 | 79.4 | 189 | 0 |
| Ashdown, AR to Shreveport, LA | 83.2 | 70.7 | 78.6 | 734 | 1 |
| Shreveport, LA to Frierson, LA | 21.8 | 74.4 | 81.7 | 509 | 0 |
| Frierson, LA to Leesville, LA | 91.4 | 70.3 | 77.9 | 621 | 0 |
| Leesville, LA to De Quincy, LA | 50.6 | 70.5 | 78.0 | 508 | 1 |
| De Quincy, LA to Beaumont, TX | 47.0 | 69.7 | 77.2 | 425 | 0 |
| Beaumont, TX to Port Arthur, TX | 20.1 | 67.5 | 75.0 | 333 | 0 |
| Beaumont, TX to Rosenberg, TX | 120.0 | 74.9 | 82.4 | 3,658 | 234 |
| Rosenberg, TX to Kendleton, TX | 12.2 | 69.8 | 77.1 | 133 | 0 |
| Kendleton, TX to Victoria, TX | 74.8 | 69.9 | 77.3 | 478 | 5 |
| Victoria, TX to Placedo, TX (UP) | 12.8 | 71.4 | 77.3 | 250 | 0 |
| Placedo, TX (UP) to Robstown, TX | 82.8 | 71.4 | 77.3 | 610 | 0 |
| Robstown, TX to Laredo, TX | 144.0 | 71.8 | 79.2 | 1,519 | 6 |
| | | | **Total** | **16,043** ~~**2,385**~~ | **278** ~~**44**~~ |

[1] Noise levels include METRA Milwaukee District West Line train operations

## 3.6.3 Environmental Consequences

The following subsections discuss the environmental consequences of the Proposed Acquisition and the No-Action Alternative.

### 3.6.3.1 Proposed Acquisition

#### *Noise Impacts from Increased Rail Traffic*

Under the Proposed Acquisition, rail traffic would increase on certain rail line segments throughout the combined network. There would be an increase of eight or more trains per day in the noise and vibration study area, which runs from Bensenville, Illinois to Port Arthur, Texas and from Rosenberg, Texas to Laredo, Texas, as shown in **Figure 3.6-1**. The

Applicants plan to make 25 capital improvements within the existing rail ROW to support the projected increase in rail traffic. These capital improvements include new passing sidings, which are low-speed sections of track alongside the main rail line often used as passing lanes. Under the Proposed Acquisition, there would be increased noise due to idling locomotives at these siding locations. As described in *Section 3.2, Grade Crossing Safety and Section 3.3, Grade Crossing Delay*, the Proposed Acquisition would result in the removal of quiet zone designations for four grade crossings in Bartlett, Illinois. These grade crossings include Prospect Avenue, South Oak Avenue, South Western Avenue, and Naperville Road. Therefore, OEA has conservatively assumed that locomotive engineers would sound horns at these crossings.

The Proposed Acquisition would not increase the number of daily trains from Renner, Texas to Alliance, Texas and would minimally increase carload tonnage of CP and KCS trains—from approximately 1.29 to 1.97 million gross tons per mile (mGT) under the No-Action Alternative to 3.33 to 4.22 mGT under the Proposed Acquisition. OEA did not conduct further noise and vibration analysis, since four to 26 trains currently operate on these segments and the small increase in carload tonnage would not result in a doubling of overall carload activity and not result in a 3 dBA or greater increase in noise.

The largest increase in rail traffic under the Proposed Acquisition would occur on the CP mainline between Sabula, Iowa, and Kansas City, Missouri, where OEA estimates that rail traffic would increase by approximately 14.4 additional trains per day, on average. **Table 3.6-7** presents the number of receptors within the 65 dBA (Ldn) noise contours and the vibration thresholds for the Proposed Acquisition and the No-Action Alternative. This table shows that there would be a total of 29,853~~3,742~~ receptors within the 65 dBA (Ldn) and 439~~60~~ receptors within the vibration thresholds under the Proposed Acquisition.

As the table shows, the Proposed Acquisition would cause the vibration annoyance threshold to be exceeded at 439 receptors in the study area, including 379 receptors along rail line segment U-BEAU-01 in UP's Houston Subdivision. This result is due to the fact that average rail traffic on portions of segment U-BEAU-01 would be under 30 trains per day under the No-Action Alternative but would be over 30 trains per day under the Proposed Acquisition. Therefore, under the No-Action Alternative, FTA's "infrequent events" threshold for vibration annoyance would apply, while the lower "occasional events" threshold for vibration annoyance would apply under the Proposed Acquisition. Although OEA does not expect that the Proposed Acquisition would cause vibration levels from passing trains to increase, people living along the affected rail lines would experience the vibration more frequently than they do currently and thus vibration would affect more receptors due to the lower vibration threshold.

As noted above, OEA assumed for the purposes of its environmental review that all new freight trains would move on rail line segment U-BEAU-01. OEA understands that, because UP and BNSF own most of the rail lines in Houston, CPKC could not control the dispatching of trains on those rail lines. Based on information submitted to the Board by UP, BNSF, and others, OEA understands that trains through Houston are typically dispatched directionally, with westbound traffic using UP's Houston Subdivision and eastbound traffic using UP's Beaumont Subdivision. To the extent that some trains may be dispatched on rail line segments other than U-BEAU-01, then the increase in rail traffic on that segment resulting from the Proposed Acquisition is likely to be less than the 7.57 trains per day that the Applicants have projected. Therefore, the results reported in this section in the Final EIS may overstate the potential impacts of the Proposed Acquisition in the Houston area, including vibration annoyance impacts.

***Table 3.6-7. Receptors Within Noise and Vibration Contours Under the Proposed Acquisition and No-Action Alternative***

| | Receptors within 65 dBA (Ldn) Noise Contour | | Receptors within Vibration Annoyance Threshold | |
|---|---|---|---|---|
| **Track Segment** | **Proposed Acquisition** | **No-Action** | **Proposed Acquisition** | **No-Action** |
| Bensenville, IL to Elgin, IL[1] | 561[2] | 237 | 1 | 1 |
| Elgin, IL to Davis Junction, IL | 622 | 281 | 0 | 0 |
| Davis Junction, IL to Sabula, IA | 480 | 274 | 0 | 0 |
| Sabula, IA | 4 | 1 | 0 | 0 |
| Sabula, IA to Clinton, IA | 313 | 188 | 0 | 0 |
| Clinton, IA to Water Works, IA | 1,246 | 747 | 25 | 25 |
| Water Works, IA to Nahant, IA | 18 | 4 | 0 | 0 |
| Nahant, IA to Muscatine, IA | 399 | 210 | 0 | 0 |
| Muscatine, IA to Ottumwa, IA | 1,020 | 373 | 0 | 0 |
| Ottumwa, IA to MO/IA State Border | 395 | 120 | 2 | 2 |
| MO/IA State Border, MO to Laredo, MO | 79 | 18 | 0 | 0 |
| Laredo, MO to Polo, MO | 242 | 78 | 0 | 0 |
| Polo, MO to Kansas City, MO | 684 | 283 | 3 | 3 |
| Kansas City, MO to Pittsburg, KS | 1,253 | 932 | 6 | 0 |
| Pittsburg, KS to Watts, OK | 2,775 | 1,858 | 7 | 0 |
| Watts, OK to Poteau, OK | 1,454 | 983 | 0 | 0 |
| Poteau, OK to Heavener, OK | 380 | 246 | 0 | 0 |
| Heavener, OK to De Queen, AR | 943 | 610 | 0 | 0 |
| De Queen, AR to Ashdown, AR | 322 | 224 | 0 | 0 |
| Ashdown, AR to Shreveport, LA | 1,434 | 981 | 1 | 1 |
| Shreveport, LA to Frierson, LA | 865 | 644 | 3 | 0 |
| Frierson, LA to Leesville, LA | 1,102 | 731 | 0 | 0 |
| Leesville, LA to De Quincy, LA | 930 | 622 | 1 | 1 |
| De Quincy, LA to Beaumont, TX | 847 | 507 | 0 | 0 |
| Beaumont, TX to Port Arthur, TX | 551 | 397 | 0 | 0 |
| Beaumont, TX to Rosenberg, TX | 6,111 | 4,832 | 379 | 234 |
| Rosenberg, TX to Kendleton, TX | 217 | 170 | 0 | 0 |
| Kendleton, TX to Victoria, TX | 855 | 624 | 5 | 5 |
| Victoria, TX to Placedo, TX (UP) | 409 | 270 | 0 | 0 |

*Table 3.6-7. Receptors Within Noise and Vibration Contours Under the Proposed Acquisition and No-Action Alternative*

| Track Segment | Receptors within 65 dBA (Ldn) Noise Contour | | Receptors within Vibration Annoyance Threshold | |
|---|---|---|---|---|
| | Proposed Acquisition | No-Action | Proposed Acquisition | No-Action |
| Placedo, TX (UP) to Robstown, TX | 969 | 662 | 0 | 0 |
| Robstown, TX to Laredo, TX | 2,373 | 1,922 | 6 | 6 |
| Total | 29,853 ~~3,742~~ | 20,029 ~~15,197~~ | 439 ~~60~~ | 278 ~~44~~ |

1 Noise levels include METRA Milwaukee District West Line train operations
2 Grade crossings at Prospect Avenue, South Oak Avenue, South Western Avenue, and Naperville Road would exceed the risk threshold for a quiet zone with Proposed Acquisition. OEA has assumed horns would be sounded with Proposed Acquisition prior to mitigation.

Applying the Board's thresholds, the Proposed Acquisition would result in an adverse noise impact for receptors where noise levels from rail operations meet or exceed 65 Ldn and increase by at least 3 dBA Ldn, compared to the No-Action Alternative. The increase in noise would vary from track segment to track segment based on train volumes as well as train consists (the lengths of the trains including all locomotives and railcars). OEA assumed that the Proposed Acquisition would not affect train speeds. The train consists are an important factor in determining Ldn noise levels at wayside locations, where there is no train horn noise. At grade crossings, where the train horn is the predominant source of noise, train consists do not affect Ldn noise levels as much, since longer or shorter trains sound their horn equally. Therefore, noise levels would increase with the Proposed Acquisition slightly differently at wayside and grade crossing locations.

**Table 3.6-8** presents the noise levels at a speed of 40 mph and a distance of 100 feet from the track centerline for each rail line segment in the study area under the Proposed Acquisition and the No-Action Alternative. The table reports the modeled noise levels based on an assumed train speed of 40 mph, since this is a typical operating speed throughout the study area. The increase in noise would be consistent at all train speeds. The increase in noise is applicable to all receptors within the study area since they are close enough to the tracks and other non-train noise sources (such as airplanes, traffic, and natural sources) do not contribute substantially to the overall noise levels. As shown in the table, there would be a 3 dBA or greater increase in noise (see bolded values) along the rail line segments between Bensenville, Illinois and Davis Junction, Illinois and Clinton, Iowa and Kansas City, Missouri. There would be a 3 dBA or greater increase in noise at the four existing grade crossings that would no longer qualify as quiet zones in Bartlett, Illinois. There would also be a 3 dBA or greater increase in noise near grade crossings between Elgin, Illinois and Kansas City, Missouri and De Quincy, Louisiana and Beaumont, Texas. Noise levels would not increase by 3 dBA or more at other track segments, generally because these segments already have a relatively high number of daily train operations.

*Table 3.6-8. Noise Level Increase by Track Segment for Proposed Acquisition*

| Track Segment | Noise Level at 100 feet and 40 mph (Ldn, dBA) | | | | | |
|---|---|---|---|---|---|---|
| | Wayside | | | Grade-Crossing | | |
| | Proposed Acquisition | No-Action | Increase | Proposed Acquisition | No-Action | Increase |
| Bensenville, IL to Elgin, IL[1] | 71.8 | 68.0 | **3.8** | 80.4[2] | 77.8 | 2.6 |
| Elgin, IL to Davis Junction, IL | 71.5 | 67.3 | **4.2** | 78.4 | 73.3 | **5.1** |
| Davis Junction, IL to Sabula, IA | 72.6 | 70.5 | 2.1 | 79.6 | 76.5 | **3.1** |
| Sabula, IA | 72.5 | 70.2 | 2.3 | 79.5 | 76.2 | **3.3** |
| Sabula, IA to Clinton, IA | 75.9 | 73.0 | 2.9 | 82.2 | 78.7 | **3.5** |
| Clinton, IA to Water Works, IA | 75.4 | 71.8 | **3.6** | 81.7 | 77.5 | **4.2** |
| Water Works, IA to Nahant, IA | 75.4 | 71.8 | **3.6** | 81.7 | 77.5 | **4.2** |
| Nahant, IA to Muscatine, IA | 74.3 | 70.4 | **3.9** | 81.2 | 76.3 | **4.9** |
| Muscatine, IA to Ottumwa, IA | 73.9 | 69.2 | **4.7** | 80.8 | 75.1 | **5.7** |
| Ottumwa, IA to MO/IA State Border | 73.7 | 68.8 | **4.9** | 80.5 | 73.9 | **6.6** |
| MO/IA State Border to Laredo, MO | 73.7 | 68.8 | **4.9** | 80.5 | 73.9 | **6.6** |
| Laredo, MO to Polo, MO | 74.0 | 69.8 | **4.2** | 80.7 | 74.7 | **6.0** |
| Polo, MO to Kansas City, MO | 74.0 | 69.7 | **4.3** | 80.7 | 74.5 | **6.2** |
| Kansas City, MO to Pittsburg, KS | 76.5 | 74.6 | 1.9 | 83.0 | 80.7 | 2.3 |
| Pittsburg, KS to Watts, OK | 75.9 | 74.1 | 1.8 | 82.6 | 80.3 | 2.3 |
| Watts, OK to Poteau, OK | 75.6 | 73.5 | 2.1 | 82.3 | 79.7 | 2.6 |
| Poteau, OK to Heavener, OK | 75.7 | 73.6 | 2.1 | 82.4 | 79.8 | 2.6 |
| Heavener, OK to De Queen, AR | 76.0 | 74.0 | 2.0 | 82.3 | 79.7 | 2.6 |
| De Queen, AR to Ashdown, AR | 76.4 | 74.7 | 1.7 | 82.7 | 80.5 | 2.2 |
| Ashdown, AR to Shreveport, LA | 75.9 | 73.9 | 2.0 | 82.3 | 79.6 | 2.7 |
| Shreveport, LA to Frierson, LA | 78.0 | 76.7 | 1.3 | 83.9 | 82.4 | 1.5 |
| Frierson, LA to Leesville, LA | 75.2 | 72.6 | 2.6 | 81.5 | 78.6 | 2.9 |
| Leesville, LA to De Quincy, LA | 75.2 | 72.7 | 2.5 | 81.5 | 78.7 | 2.8 |
| De Quincy, LA to Beaumont, TX | 74.9 | 72.0 | 2.9 | 81.2 | 78.0 | **3.2** |
| Beaumont, TX to Port Arthur, TX | 71.3 | 69.5 | 1.8 | 77.6 | 75.4 | 2.2 |
| Beaumont, TX to Rosenberg, TX (UP)[3] | 78.7 | 77.1 | 1.6 | 84.3 | 83.2 | 1.1 |
| Rosenberg, TX to Kendleton, TX | 74.0 | 72.2 | 1.8 | 80.5 | 78.0 | 2.5 |
| Kendleton, TX to Victoria, TX | 74.1 | 72.5 | 1.6 | 80.6 | 78.2 | 2.4 |
| Victoria, TX to Placedo, TX (UP) | 74.1 | 72.4 | 1.7 | 80.5 | 77.9 | 2.6 |
| Placedo, TX (UP) to Robstown, TX | 74.1 | 72.4 | 1.7 | 80.5 | 77.9 | 2.6 |
| Robstown, TX to Laredo, TX | 76.1 | 75.4 | 0.7 | 81.9 | 80.4 | 1.5 |

[1] Noise levels include METRA Milwaukee District West Line train operations

[2] Grade crossings at Prospect Avenue, South Oak Avenue, South Western Avenue, and Naperville Road would exceed the risk threshold for a quiet zone with Proposed Acquisition. Therefore, OEA conservatively assumed that trains would sound their horns at these locations.

[3] The projected increase in rail traffic for this segment is 7.57 trains per day. Although this projected increase is below the threshold for noise analysis, OEA modeled train noise for this segment in response to public comments on the Draft EIS.

OEA assessed noise impacts throughout the study area to determine the number of receptors in each county that would exceed 65 dBA (Ldn) with a 3 dBA increase under the Proposed Acquisition. **Table 3.6-9** and **Figure 3.6-4** present the number of receptors by county where noise levels would exceed 65 dBA (Ldn) in the existing, No-Action Alternative and Proposed Acquisition, and where there would be noise impact. See **Appendix M** for additional information on the number of receptors within the 65 dBA (Ldn) and noise impacts by cities and towns throughout the study area.

OEA's analysis found that the Proposed Acquisition would result in adverse noise impacts at a total of 6,307 receptors. Many of those receptors are near at-grade crossings where there are higher noise levels and a generally higher density of receptors. The counties with the greatest number of adversely affected receptors include Clinton County, Iowa; Scott County, Iowa; Muscatine County, Iowa; and Orange County, Texas.

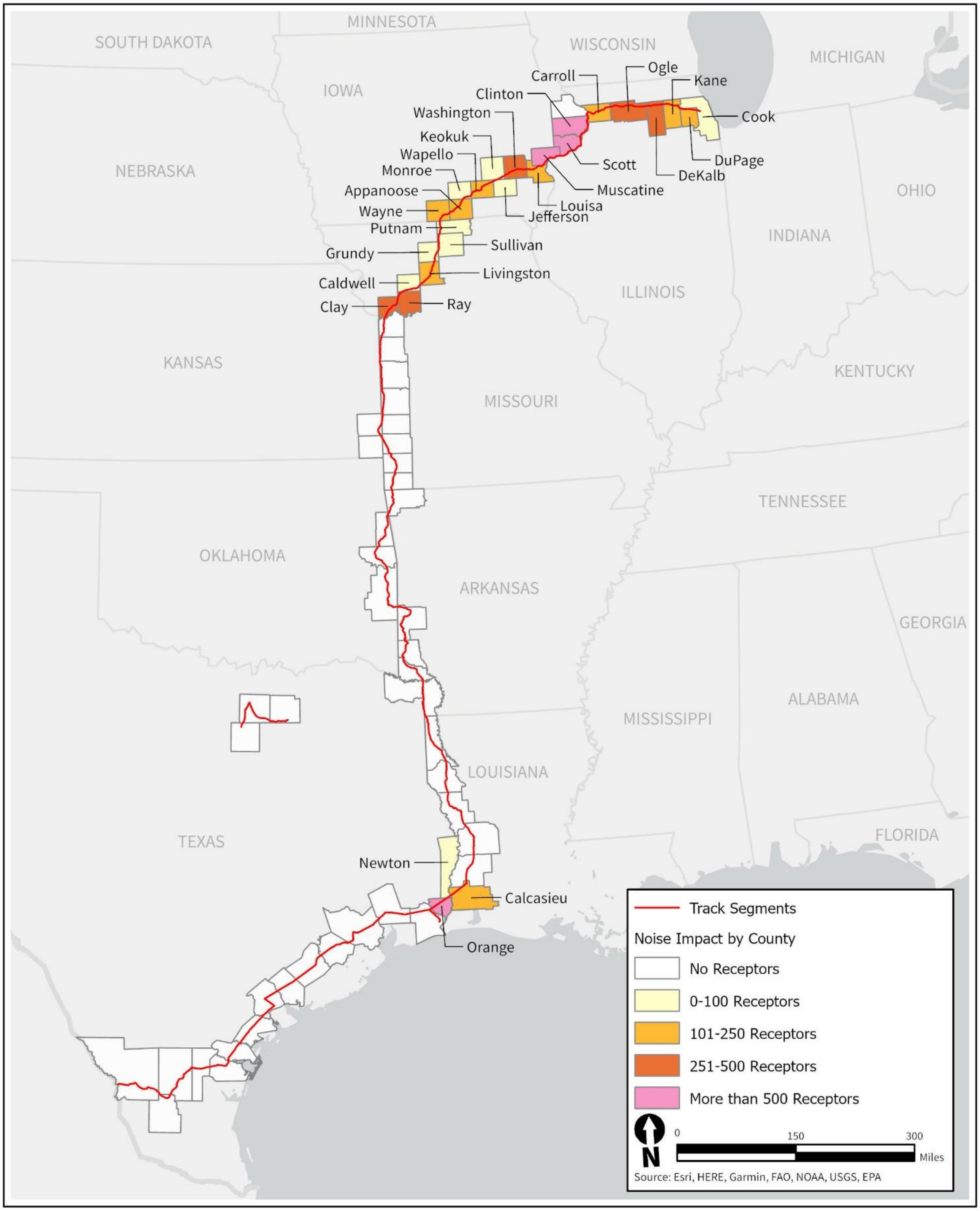
***Table 3.6-9. Noise Results by County***

| County | Receptors within 65 dBA (Ldn) | | | Receptors with Adverse Noise Impacts (65 dBA Ldn and 3 dBA increase) |
|---|---|---|---|---|
| | Existing | Proposed Acquisition | No-Action | |
| DuPage County, IL | 116 | 289 | 140 | 127 |
| Cook County, IL | 26 | 147 | 38 | 8 |
| Kane County, IL | 85 | 263 | 116 | 146 |
| DeKalb County, IL | 99 | 299 | 128 | 299 |
| Ogle County, IL | 266 | 515 | 297 | 472 |
| Carroll County, IL | 59 | 150 | 73 | 135 |
| Jackson County, IA | 13 | 18 | 14 | 0 |
| Clinton County, IA | 345 | 616 | 373 | 590 |
| Scott County, IA | 499 | 1016 | 593 | 1,016 |
| Muscatine County, IA | 260 | 675 | 294 | 675 |
| Louisa County, IA | 60 | 180 | 73 | 180 |
| Washington County, IA | 94 | 333 | 107 | 333 |
| Keokuk County, IA | 0 | 2 | 0 | 2 |
| Jefferson County, IA | 3 | 12 | 4 | 12 |
| Wapello County, IA | 71 | 233 | 86 | 233 |
| Monroe County, IA | 1 | 8 | 1 | 8 |
| Appanoose County, IA | 33 | 127 | 39 | 127 |
| Wayne County, IA | 55 | 175 | 59 | 175 |
| Putnam County, MO | 7 | 28 | 9 | 28 |
| Sullivan County, MO | 6 | 39 | 6 | 39 |
| Grundy County, MO | 2 | 12 | 3 | 12 |
| Livingston County, MO | 48 | 182 | 60 | 182 |
| Caldwell County, MO | 19 | 71 | 24 | 71 |
| Ray County, MO | 90 | 261 | 118 | 261 |
| Clay County, MO | 98 | 412 | 159 | 412 |
| Jackson County, MO | 169 | 371 | 278 | 0 |
| Cass County, MO | 144 | 293 | 213 | 0 |
| Miami County, KS | 3 | 6 | 5 | 0 |
| Bates County, MO | 151 | 258 | 193 | 0 |
| Vernon County, MO | 52 | 67 | 58 | 0 |
| Barton County, MO | 43 | 47 | 46 | 0 |
| Crawford County, KS | 405 | 767 | 510 | 0 |
| Cherokee County, KS | 1 | 2 | 2 | 0 |
| Jasper County, MO | 342 | 590 | 408 | 0 |
| Newton County, MO | 169 | 272 | 201 | 0 |

*Table 3.6-9. Noise Results by County*

| County | Receptors within 65 dBA (Ldn) | | | Receptors with Adverse Noise Impacts (65 dBA Ldn and 3 dBA increase) |
|---|---|---|---|---|
| | **Existing** | **Proposed Acquisition** | **No-Action** | |
| McDonald County, MO | 355 | 597 | 411 | 0 |
| Benton County, AR | 375 | 718 | 444 | 0 |
| Adair County, OK | 277 | 475 | 323 | 0 |
| Sequoyah County, OK | 256 | 455 | 306 | 0 |
| Le Flore County, OK | 585 | 1,123 | 731 | 0 |
| Polk County, AR | 331 | 647 | 421 | 0 |
| Sevier County, AR | 72 | 133 | 92 | 0 |
| Little River County, AR | 278 | 491 | 338 | 0 |
| Miller County, AR | 12 | 14 | 12 | 0 |
| Bowie County, TX | 185 | 376 | 245 | 0 |
| Cass County, TX | 59 | 112 | 77 | 0 |
| Caddo Parish, LA | 835 | 1,548 | 1,108 | 0 |
| De Soto Parish, LA | 332 | 545 | 381 | 0 |
| Sabine Parish, LA | 203 | 366 | 240 | 0 |
| Vernon Parish, LA | 419 | 756 | 500 | 0 |
| Beauregard Parish, LA | 164 | 295 | 203 | 0 |
| Calcasieu Parish, LA | 165 | 335 | 203 | 198 |
| Newton County, TX | 34 | 64 | 41 | 56 |
| Orange County, TX | 291 | 582 | 348 | 510 |
| Jefferson County, TX | 463 ~~333~~ | 774 ~~551~~ | 561 ~~397~~ | 0 |
| Liberty County, TX | 397 | 673 | 486 | 0 |
| Harris County, TX | 2,347 | 3,895 | 3,151 | 0 |
| Fort Bend County, TX | 974 ~~190~~ | 1,628 ~~308~~ | 1,266 ~~235~~ | 0 |
| Wharton County, TX | 181 | 329 | 240 | 0 |
| Jackson County, TX | 148 | 257 | 195 | 0 |
| Victoria County, TX | 491 | 815 | 554 | 0 |
| Refugio County, TX | 173 | 261 | 187 | 0 |
| San Patricio County, TX | 216 | 347 | 231 | 0 |
| Nueces County, TX | 426 | 652 | 503 | 0 |
| Jim Wells County, TX | 268 | 508 | 388 | 0 |
| Duval County, TX | 387 | 564 | 471 | 0 |
| Jim Hogg County, TX | 133 | 237 | 170 | 0 |
| Webb County, TX | 377 | 545 | 474 | 0 |
| **Total** | **16~~2~~,043 ~~385~~** | **~~23,742~~29,853** | **~~15,197~~20,029** | **6,307** |

*Figure 3.6-4. Receptors with Adverse Noise Impact by County*



### *Intermodal Facilities and Rail Yards*

The Proposed Acquisition would result in changes in activities associated with increased truck traffic, lifting equipment such as cranes and gantries, switching engine movements, and car coupling when processing cars and building trains at the six intermodal facilities and rail yards in the study area. These changes would result in an increase in the average noise levels that nearby receptors would experience. The average noise levels near each rail yard and intermodal facility would depend on the number of lifts (moving containers between trucks and railcars) conducted each day, the daily volume of truck traffic, and the total number of railcars processed each day. **Table 3.6-10** summarizes these factors and the estimated average noise levels at the closest receptors under the Proposed Acquisition and the No-Action Alternative (see **Appendix M** for maps showing the locations of the closest receptors).

As the table shows, OEA estimates that average noise levels under the No-Action Alternative would range from 42.5 to 65.0 dBA (Ldn) at the closest receptor locations. Under the Proposed Acquisition, OEA estimates that the average noise levels would range from 43.2 to 66.5 dBA at the closest receptors. The largest difference in average noise levels between the Proposed Acquisition and the No-Action Alternative would be approximately 2.9 dBA, which would occur near the Schiller Park yard, where OEA estimates that average noise levels would be approximately 60.2 dBA under the Proposed Acquisition. The only receptors where OEA expects that average noise levels would exceed 65 dBA (Ldn) under the Proposed Acquisition are the residences on Colby Lane near the Wylie yard. Noise levels at these residences would only increase by up to 1.6 dBA under the Proposed Acquisition. As discussed above, a receptor experiences an adverse noise impact when the average noise level increases by 3 dBA or more and exceeds 65 dBA (Ldn). OEA did not identify any receptors that would experience an adverse noise impact as a result of increased activities at intermodal facilities and rail yards caused by the Proposed Acquisition.

*Table 3.6-10. Intermodal Facilities and Rail Yards Noise Impact Assessment Results*

| Intermodal Facility/ Rail Yard | Distance to Receptors (feet) | Proposed Acquisition (Daily) | | | No-Action (Daily) | | | Noise Level (Ldn) | | |
|---|---|---|---|---|---|---|---|---|---|---|
| | | Lifts | Trucks | Railcars | Lifts | Trucks | Railcars | Proposed Acquisition | No-Action | Increase |
| Minneapolis IMS[1] | 1,444 - 5,584 | 543 | 332 | 131.7 | 457 | 279 | 103 | 55.9 - 60.4 | 55.1 - 59.6 | 0.8 |
| Detroit Container Terminal | 1,451 - 2,352 | 248 | 228 | 57 | 156 | 141 | 33 | 51.4 - 55.7 | 49.1 - 53.5 | 2.2 - 2.3 |
| Bensenville[2] | 1,099 - 5,344 | 955 | 698 | 1796 | 534 | 383 | 1428 | 53.7 - 57.4 | 52.5 - 55.3 | 1.2 - 2.0 |
| Schiller Park[3] | 650 - 1,849 | 356 | 324 | 151 | 190 | 190 | 74 | 51.9 - 60.2 | 49.0 - 57.3 | 2.8 - 2.9 |
| International Freight Gateway | 5,555 - 7,757 | 204 | 104 | 143 | 103 | 51 | 124 | 43.2 - 46.8 | 42.5 - 46.1 | 0.7 |
| Wylie | 1,052 - 4,560 | 994 | 474 | 460 | 702 | 326 | 323 | 51.1 - 66.5 | 49.6 - 65.0 | 1.5 - 1.6 |

[1] Shoreham rail yard has been included with the Minneapolis IMS intermodal facility.
[2] Intervening buildings between the receptors and rail yard/intermodal facilities provide a minimum of 10 dBA noise reduction.
[3] Schiller Park includes a noise barrier along eastern boundary assumed to provide a minimum of 5 dBA noise reduction.

### *Noise and Vibration from Capital Improvements*

As described in *Chapter 2*, the Applicants plan to make 25 capital improvements within the existing ROW. The siding track construction would include excavating, grading, constructing the sub-ballast and ballast layers, placing ties, laying track, welding track sections, and spiking the track on the ties. OEA anticipates that construction activities would generally occur over a short period of time (typically, approximately two weeks) at each location, and since construction occurs linearly along the track, it would not occur in front of any particular receptor for a prolonged period of time. Nevertheless, noise and vibration during construction of the capital improvements has the potential to cause annoyance to nearby receptors.

**Table 3.6-11** presents the utilization factor (percent of time the equipment is used) and maximum noise level at 50 feet from construction equipment typically used for track construction related to the planned capital improvements. The table presents the energy-average noise level (Leq) at 50 feet from each piece of equipment and the cumulative noise level of all equipment. Cumulatively, track construction would generate 86 dBA (Leq) at a distance of 50 feet.

***Table 3.6-11. Construction Noise Levels***

| Equipment | Maximum Noise Level at 50 feet (Lmax, dBA) | Utilization Factor (%) | Energy-Average Noise Level at 50 feet (Leq, dBA) |
|---|---|---|---|
| Compactor | 82 | 20% | 75 |
| Crane | 83 | 16% | 75 |
| Dump Trucks | 76 | 40% | 72 |
| Front End Loaders | 80 | 40% | 76 |
| Road Grader | 85 | 40% | 81 |
| Rail Tamper | 83 | 40% | 79 |
| Rail Tensor/Stressor | 82 | 50% | 79 |
| Thermite Welder | 74 | 40% | 70 |
| Cumulative Construction Noise Level at 50 feet (Leq, dBA) | | | 86 |

OEA calculated the distances to construction noise levels under the 25 planned capital improvements that exceed the FTA construction noise criteria based on a 7.5 decibel reduction per distance doubling. The distances to construction noise impact are as follows:

- Construction noise would exceed the residential day threshold of 80 dBA (Leq) within 88 feet.
- Construction noise would exceed the commercial threshold of 85 dBA (Leq) within 56 feet.
- Construction noise would exceed the industrial threshold of 90 dBA (Leq) within 35 feet.

Construction noise levels would exceed FRA construction noise guidelines at three noise sensitive receptors (such as residences) within 88 feet of the proposed Heavener siding in

LeFlore County, Oklahoma and two commercial and two industrial facilities within 56 and 35 feet from the proposed Blue Valley siding in Jackson County, Missouri.

Generally speaking, ground-borne vibration from some construction equipment, such as earth-moving equipment, loaded trucks, and vibratory rollers may have the potential to cause some damage to nearby buildings only if those buildings are located very close to the construction activities. **Table 3.6-12** presents the vibration level of construction equipment typically used during track construction. This table shows that vibration levels from this equipment would approach the thresholds for potential structural damage within 14 feet of Category I buildings and within 34 feet of Category IV buildings which are particularly susceptible to vibration damage. Since these distances to construction vibration impacts would not extend beyond the railroad ROW, there are no structures within these screening distances and therefore no potential for structural damage.

***Table 3.6-12. Construction Vibration***

| Equipment | Vibration Level at 25 feet (in/s) | Distance (feet) to Building Category I Threshold (0.5 in/s) | Distance (feet) to Building Category II Threshold (0.3 in/s) | Distance (feet) to Building Category III Threshold (0.2 in/s) | Distance (feet) to Building Category IV Threshold (0.12 in/s) |
|---|---|---|---|---|---|
| Compactor/Vibratory Roller | 0.210 | 14 | 18 | 25 | 34 |
| Dump Trucks | 0.076 | 7 | 10 | 14 | 18 |
| Front End Loaders | 0.089 | 8 | 11 | 15 | 20 |

Source: FTA 2018; VHB 2022

### 3.6.3.2 No-Action Alternative

Under the No-Action Alternative, CP would not acquire KCS and rail traffic on rail lines and activities at rail yards and intermodals facilities would not increase as a result of the Proposed Acquisition. However, rail traffic could increase on CP and KCS lines as a result of changing market conditions, such as general economic growth, and activities at rail yards at intermodal facilities could also increase. These changes would not involve authorization from the Board or environmental review by OEA under NEPA. As discussed above and in *Chapter 2, Proposed Action and Alternatives*, OEA anticipates that, even in the absence of the Proposed Acquisition, rail traffic due to general economic growth would result in higher average noise levels than currently exist along those rail lines today. As shown in **Table 3.6-7**, OEA estimates that a total of 20,029~~15,197~~ receptors in the study area would experience an average noise level of 65 dBA (Ldn) or above under the No-Action Alternative. This is more than the estimated number of receptors in the study area that currently experience a noise level of 65 dBA or above (16,043~~2,385~~), but less than the number of estimated receptors that would experience that noise level under the Proposed Acquisition (29,853~~3,742~~). OEA does not expect that the number of receptors currently affected by vibration from passing trains (278~~44~~) would change under the No-Action Alternative.

**Table 3.6-13** presents the noise levels at a speed of 40 mph and a distance of 100 feet from the track centerline for each rail line segment in the study area under the Existing and No-Action Alternative. The table reports the modeled noise levels based on an assumed train speed of 40 mph since this is a typical operating speed throughout the study area. The increase in noise that would occur with the No-Action Alternative would be up to 3.6 dBA at wayside locations and up to 1.2 dBA at grade crossing locations.

***Table 3.6-13. Noise Level Increase by Track Segment for No-Action Alternative***

| | Noise Level at 100 feet and 40 mph ($L_{dn}$, dBA) | | | | | |
|---|---|---|---|---|---|---|
| | Wayside | | | Grade-Crossing | | |
| Track Segment | Existing | No-Action | No-Action minus Existing | Existing | No-Action | No-Action minus Existing |
| Bensenville, IL to Elgin, IL[1] | 67.0 | 68.0 | 1.0 | 77.7 | 77.8 | 0.1 |
| Elgin, IL to Davis Junction, IL | 65.5 | 67.3 | 1.8 | 72.6 | 73.3 | 0.7 |
| Davis Junction, IL to Sabula, IA | 68.9 | 70.5 | 1.6 | 76.0 | 76.5 | 0.5 |
| Sabula, IA | 68.6 | 70.2 | 1.6 | 75.7 | 76.2 | 0.5 |
| Sabula, IA to Clinton, IA | 70.6 | 73.0 | 2.4 | 77.9 | 78.7 | 0.8 |
| Clinton, IA to Water Works, IA | 69.6 | 71.8 | 2.2 | 76.9 | 77.5 | 0.6 |
| Water Works, IA to Nahant, IA | 69.6 | 71.8 | 2.2 | 76.9 | 77.5 | 0.6 |
| Nahant, IA to Muscatine, IA | 69.3 | 70.4 | 1.1 | 75.9 | 76.3 | 0.4 |
| Muscatine, IA to Ottumwa, IA | 67.8 | 69.2 | 1.4 | 74.4 | 75.1 | 0.7 |
| Ottumwa, IA to MO/IA State Border | 66.2 | 68.8 | 2.6 | 73.0 | 73.9 | 0.9 |
| MO/IA State Border to Laredo, MO | 66.2 | 68.8 | 2.6 | 73.0 | 73.9 | 0.9 |
| Laredo, MO to Polo, MO | 66.9 | 69.8 | 2.9 | 73.7 | 74.7 | 1.0 |
| Polo, MO to Kansas City, MO | 66.7 | 69.7 | 3.0 | 73.6 | 74.5 | 0.9 |
| Kansas City, MO to Pittsburg, KS | 71.4 | 74.6 | 3.2 | 79.5 | 80.7 | 1.2 |
| Pittsburg, KS to Watts, OK | 72.0 | 74.1 | 2.1 | 79.4 | 80.3 | 0.9 |
| Watts, OK to Poteau, OK | 71.4 | 73.5 | 2.1 | 78.8 | 79.7 | 0.9 |
| Poteau, OK to Heavener, OK | 71.6 | 73.6 | 2.0 | 79.0 | 79.8 | 0.8 |
| Heavener, OK to De Queen, AR | 70.7 | 74.0 | 3.3 | 78.6 | 79.7 | 1.1 |
| De Queen, AR to Ashdown, AR | 71.6 | 74.7 | 3.1 | 79.4 | 80.5 | 1.1 |
| Ashdown, AR to Shreveport, LA | 70.7 | 73.9 | 3.2 | 78.6 | 79.6 | 1.0 |
| Shreveport, LA to Frierson, LA | 74.4 | 76.7 | 2.3 | 81.7 | 82.4 | 0.7 |
| Frierson, LA to Leesville, LA | 70.3 | 72.6 | 2.3 | 77.9 | 78.6 | 0.7 |
| Leesville, LA to De Quincy, LA | 70.5 | 72.7 | 2.2 | 78.0 | 78.7 | 0.7 |
| De Quincy, LA to Beaumont, TX | 69.7 | 72.0 | 2.3 | 77.2 | 78.0 | 0.8 |
| Beaumont, TX to Port Arthur, TX | 67.5 | 69.5 | 2.0 | 75.0 | 75.4 | 0.4 |
| Beaumont, TX to Rosenberg, TX | 74.9 | 77.1 | 2.2 | 82.4 | 83.2 | 0.8 |
| Rosenberg, TX to Kendleton, TX | 69.8 | 72.2 | 2.4 | 77.1 | 78.0 | 0.9 |
| Kendleton, TX to Victoria, TX | 69.9 | 72.5 | 2.6 | 77.3 | 78.2 | 0.9 |
| Victoria, TX to Placedo, TX (UP) | 71.4 | 72.4 | 1.0 | 77.3 | 77.9 | 0.6 |

*Table 3.6-13. Noise Level Increase by Track Segment for No-Action Alternative*

| Track Segment | Noise Level at 100 feet and 40 mph ($L_{dn}$, dBA) | | | | | |
|---|---|---|---|---|---|---|
| | Wayside | | | Grade-Crossing | | |
| | Existing | No-Action | No-Action minus Existing | Existing | No-Action | No-Action minus Existing |
| Placedo, TX (UP) to Robstown, TX | 71.4 | 72.4 | 1.0 | 77.3 | 77.9 | 0.6 |
| Robstown, TX to Laredo, TX | 71.8 | 75.4 | 3.6 | 79.2 | 80.4 | 1.2 |

[1] Noise levels include METRA Milwaukee District West Line train operations

## 3.6.4 Conclusion

The Proposed Acquisition would result in adverse noise and vibration impacts due to the projected increase in rail traffic. The Proposed Acquisition would cause noise levels to increase by at least 3 dBA and to exceed 65 dBA (Ldn) at 6,307 receptors in the study area. Those receptors include residences, hospitals, school, libraries, nursing homes, and places of worship. OEA does not expect that the Proposed Acquisition would cause individual trains to become substantially louder or to become audible in places where they are not currently. However, the projected increase in rail traffic from the Proposed Acquisition would make rail-related noise more frequent, which would result in a higher day-night average noise level (Ldn) at many receptors. Noise from construction activities associated with the 25 planned capital improvements would be temporary, and there would be no adverse vibration impacts from construction activities. Although vibration from passing trains would not be strong enough to cause damage to any buildings, the projected increase in rail traffic would exceed the annoyance threshold for vibration at some receptors in the study area.

The Applicants have proposed voluntary mitigation measures to minimize noise and vibration impacts. These measures include a commitment to minimize construction-related noise between 9:00 p.m. and 7:00 a.m. local time during construction of the 25 planned capital improvements (see *Chapter 4, Mitigation*, Voluntary Mitigation [VM]-Noise-02) and a commitment to use continuously welded rail at the planned capital improvements to reduce wheel-rail wayside noise, to the extent practicable (VM-Noise-03). The Applicants have also committed to fund the improvements necessary to allow any potentially affected community with an existing quiet zone to maintain that designation should the increase in merger related train traffic cause that community to fall out of compliance with FRA regulations (VM-Noise-01).

OEA is also recommending additional mitigation measures to ensure that noise impacts would be minimized. These measures would require the Applicants to maintain rail and rail beds according to American Railway Engineering and Maintenance-of-Way Association standards (MM-Noise-01), to comply with FRA regulations establishing decibel limits for train operations (MM-Noise-02), to consider lubricating curves where doing so would be a safe and effective means of reducing noise (MM-Noise-03), to employ other safe and efficient operating procedures that would reduce noise (MM-Noise-04), and to promptly respond to community inquiries concerning the establishment of quiet zones and assist communities in identifying measures, methods, or technologies that may enable those communities to establish quiet zones (MM-Noise-05). Even if the Board imposes these mitigation measures, however, OEA expects that the Proposed Acquisition would result in unavoidable adverse noise impacts.