Updated
2/17/2023

PROJECT ACTION AREA

Action area is defined by regulation to mean all areas to be affected directly or indirectly by the Federal action and not merely the immediate area involved in the action (50 CFR § 402.02).

> This analysis [determining the action area] is not limited to the "footprint" of the action nor is it limited by the Federal agency's authority. Rather, it is a biological determination of the reach of the proposed action on listed species. Subsequent analyses of the environmental baseline, effects of the action, and levels of incidental take are based upon the action area.
>
> The documentation used by a Federal action agency to initiate consultation should contain a description of the action area as defined in the [US Fish and Wildlife Service's] Services' regulations and explained in the Services' consultation handbook. If the Services determine that the action area as defined by the action agency is incorrect, the Services should discuss their rationale with the agency or applicant, as appropriate. Reaching agreement on the description of the action area is desirable but ultimately the Services can only consult when an action area is defined properly under the regulations. (USFWS 2016)

There is only one action area for the project (Figure 1). Development of the action area is an iterative process and is defined by the extent of the proposed project's effects as influenced by the topographic relief and vegetation structure of the surrounding area.

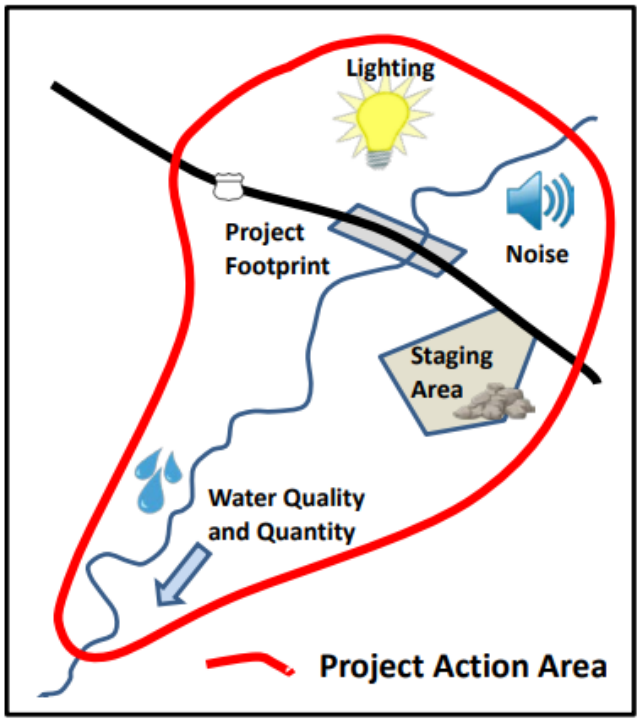

Figure 1. Visual depiction of the action area per the USFWS's regulation and programmatic consultation with FHWA on the Indiana and Northern Long-eared Bat (USFWS 2018).

I. Developing the Action Area

When determining the boundaries of the action area, use the activity checklist to identify all potential project impacts and the geographic extent of each of these impacts. This includes any detours associated with the project. Overlay all these varied impact areas on an aerial, for each impact type. The boundary of the action area would be the farthest geographic extent of these potential project impacts.

Potential factors/impacts influencing the farthest geographic extent can be grouped into four major categories:

- Noise
- Visual
- Waterway
- Lighting

The action area resulting from these impact types is dependent upon project activities and physical site conditions. When defining the action area, one should start with a broader area and then may be modified, in accordance with site conditions and project activities. In some instances, this may result in an increase or decrease in the action area. Based on a literature review, previously developed Nebraska Biological Evaluation Process (BE Process) documents, and discussions among BE Process Programmatic Agreement signatories, the following distances have been identified as a starting point for developing the action area:

- **Noise** 1.1 miles
- **Visual** 0.5 mile
- **Waterway** 300 feet upstream, 1,500 feet downstream
- **Lighting** 500 feet radius

As these starting distances show, construction noise will typically be the driving factor for the action area boundary. These estimates represent the greatest likely extent of effects for the action area and will be used on most projects. Detailed information on how the action area limits were identified is presented in the Rationale for Action Area Limits section at the end of this document. If the biologist completing the review finds a refinement of the action area is warranted for a project, the following section describes the process for refining the action area.

II. Refining the Action Area

Noise

Once the project activities are better known, the action area can be refined based upon the distance to return to ambient noise levels from the various types of equipment to be used for construction. To refine the action area, the following information is needed: existing ambient noise level; project activities and equipment to be used; and noise distance attenuation calculator. For Type I noise projects (projects that are adding through lanes, capacity, substantial vertical or horizontal alignment changes, etc.,), future build condition noise levels are also needed to analyze potential long-term noise effects on species.

Step 1: Determine Ambient Noise Level

Ambient outdoor levels can vary substantially from “20-30 dB estimated for a quiet wilderness area to the region of 80-90 dB in the noisiest urban areas” (EPA 1974). If noise measurements are available, those measurements should be used as the ambient noise levels. In most cases noise measurements will not be available and ambient noise levels should be estimated based upon the US Department of Transportation (USDOT) Bureau of Transportation Statistics’ National Transportation Noise Map (https://maps.dot.gov/BTS/NationalTransportationNoiseMap/). Select the view that shows noise levels with all modes of transportation included in the upper right corner of the map (

yellow selection) and zoom to your project location. Figure 2 shows an example of the map. The three roadways shown have different ambient noise levels. To determine the ambient noise level to use in action area calculations, use the highest noise level shown. For example, West Dodge Road and N 204th Street have noise levels identified ranging from 45.0-49.9 dBA up to 70.00-79.9 dBA. Use 79.9 dBA as the ambient noise level. Using this approach, the ambient noise for 192nd Street is 59.9 dBA and the ambient noise level for Blondo Street between 180th Street and 192nd Street is 49.9 dBA.

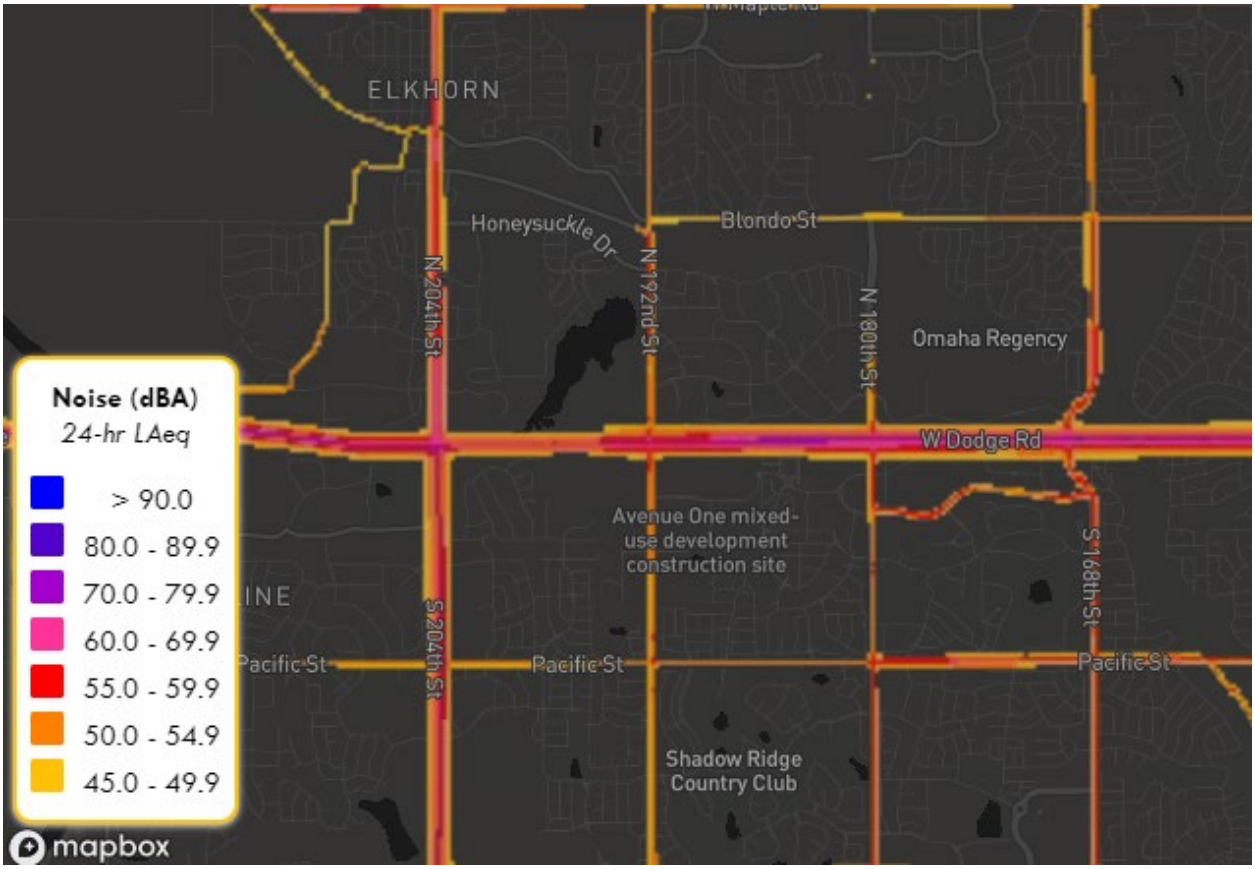

Figure 2. Example Location from National Transportation Noise Map (Office of Spatial Analysis and Visualization at the Bureau of Transportation Statistics, U.S. Department of Transportation, no date.)

Step 2: Identify Loudest Construction Equipment

To refine the action area for construction noise impacts, it is necessary to identify the loudest construction noise equipment. To determine what construction equipment would be used, see the project-specific Activity Checklist, and refer to the Activity Definitions BE document for typical equipment used for that activity. Then, identify the loudest piece of equipment to be used on the project using FHWA Construction Noise Handbook Table 9.1 in the Actual Measured L_{max} @ 50 feet column to determine the loudest sound generated by the project construction (https://www.fhwa.dot.gov/environment/noise/construction_noise/handbook/handbook09.cfm). Finally, use that noise level to calculate the distance to return to ambient noise levels. The loudest noise level may vary along the project length based on where certain equipment types are used. For example, if the loudest piece of equipment to be used on a 10-mile-long project is an impact pile driver, but the impact pile driver is only used at the bridge location that noise level should only be used at the bridge location. If the next loudest piece of equipment for the same project is a pavement scarifier, and it will be used along the length of the project, the pavement scarifier noise level should be used along the remainder the project.

The loudest construction equipment used on a project can then be used to determine the distance to return to ambient noise levels, as described in Step 3 below.

Step 3: Calculate Distance(s) using a Distance Attenuation Calculator

Using noise levels of construction equipment of identified in Step 2 and the ambient noise levels identified in Step 1, enter the data into an online distance attenuation calculator (such as Szyk 2019; https://www.omnicalculator.com/physics/distance-attenuation) to obtain the distance at which the construction noise will dissipate and return to ambient noise levels. Figure 3 shows an example calculation where the loudest equipment is a pavement scarifier (90 dBA for Actual Measured L_{max} @ 50 feet) and the estimated ambient noise level is 59.9 dBA for (using 280th Street in the Step 2 example). The distance from the source for Point 1 will always be 50 feet because that is the distance from the equipment source at which the noise levels in FHWA Construction Noise Handbook Table 9.1 were measured. Blue arrows represent data entered by user. The red arrow points to the activity-specific noise impact action area limit. Round up to the nearest 10 feet (1,600 feet in the example).

If you have a project where a particular activity results in the loudest equipment type being only used at a spot location (ex. vibratory pile driver at 101 dBA at bridge locations) while the loudest equipment on the remainder of the project is a different piece of equipment (ex. concrete saw at 90 dBA)), multiple calculations will need to be completed for use in Step 4.

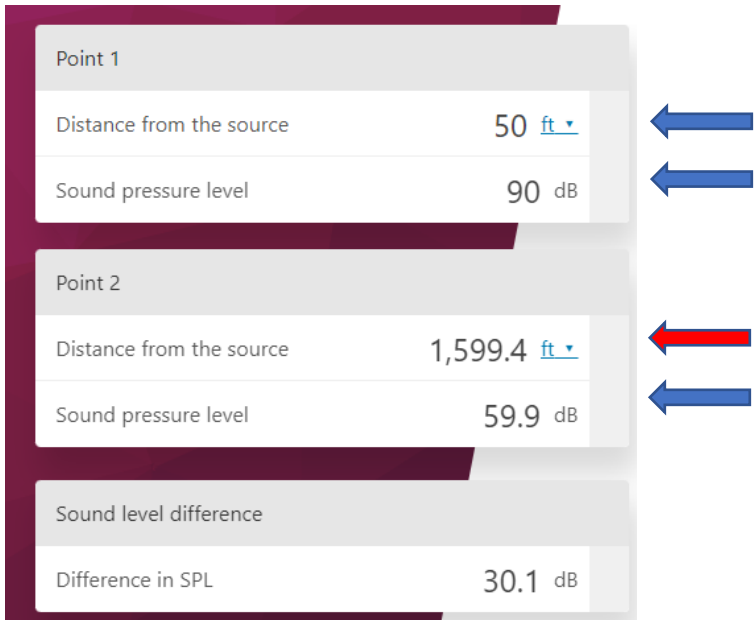

Figure 3. Distance attenuation calculation example using Szyk 2019.

Step 4: Revise Action Area

Adjust the action area using the distances calculated in Step 3. The calculated distances are the radius of the action area. Where the radii for more than one type of activity/equipment overlap, the furthest distance should be used as the action area boundary. In the example at the end of Step 3, the action area would be larger in the portion of the project with vibratory pile driving than the portion of the project where the loudest equipment used is a concrete saw. Figure 4 shows the revised action area for noise for the example project described in steps 1 through 3 with a scarifier used along the length of the project and a pile driver only at the bridge location.

Figure 4. Example revised action area (not a real project).

Waterway

Waterway action areas apply when there is any potential for direct or indirect effects to waterways.

Refinement of the action area for waterway impacts is more qualitative and will be documented within the SEP form. Include details about the use of Best Management Practices (BMPs) during construction. Describe how the action area maybe modified in response to site and project specific details, such as soil substrate type, the type of construction activity types within a waterway (ex, corrugated metal pipe installation, coffer dams, pier installation), and the volume and velocity of waters within the waterway.

Visual and Lighting

For lighting, the action area can be refined once the lighting structure height is known by multiplying the structure height by 2.75 to determine the radius of lighting impacts. Further refinement of the of the action area for visual and lighting impacts is more qualitative and will be documented within the SEP form. Include details about the presence of any features that provide shielding effects (the presence of some type of natural or man-made barrier blocking the effects of sound and visual impacts), such as trees, topographic relief, and waterways present along the project and describe how their presence affects the boundary of the action area.

For example, the roadway project is located at the base of a hill to the west which limits what is visible and the distance and/or direction noise and light can travel away from the roadway. As a result, the action area west of the roadway extends only to the hill crest.

Detour

Background: When there is a road or access closure, the designation of detours is required for federal-aid projects. Furthermore, these designated detours must use a functionally equivalent route.

The action area for detours will be refined to focus on possible impacts from the use of the detour, which may be different in nature than impacts associated with the actual construction activities. If a detour route itself requires improvements to accommodate the project, either before, during or after the project, follow the same action area refinement process as for the actual construction area (as described under A-C, above). If the detour route will not include improvements and will detour traffic onto a like facility (i.e., same functionally classified route), then the action area can be modified based on a more qualitative basis and will be documented within the SEP form. In this instance, the action area for the detour route should focus on the risk of direct roadkill mortality due to higher temporary traffic volumes only, as species inhabiting the area would already be habituated to existing visual and noise impacts associated with traffic. If the detour will use a road(s) with a lower functional classification, consider direct mortality, visual, and noise for the detour route.

III. Action Area Description on SEP Form

In the SEP form, provide a written description of the action area, how it was refined and why for each of the four impact types: noise, visual, waterway, and lighting. Include the noise calculation as well as text description of and justification for any modifications to the action area. See Attachment A for an example Action Area Description.

IV. Rationale for Action Area Limits

The action area needs to take into consideration the potential types of impacts from road and bridge construction. The action area will vary based on construction activities and site conditions. When the action area is developed to obtain the official species list, details of the project may not be known, so the action area should include the largest area potentially impacted. This action area can then be refined as project details become available and site conditions are assessed. Figure 5 shows the often-cited Foreman et al. 1997 figure showing impact distances from a roadway.

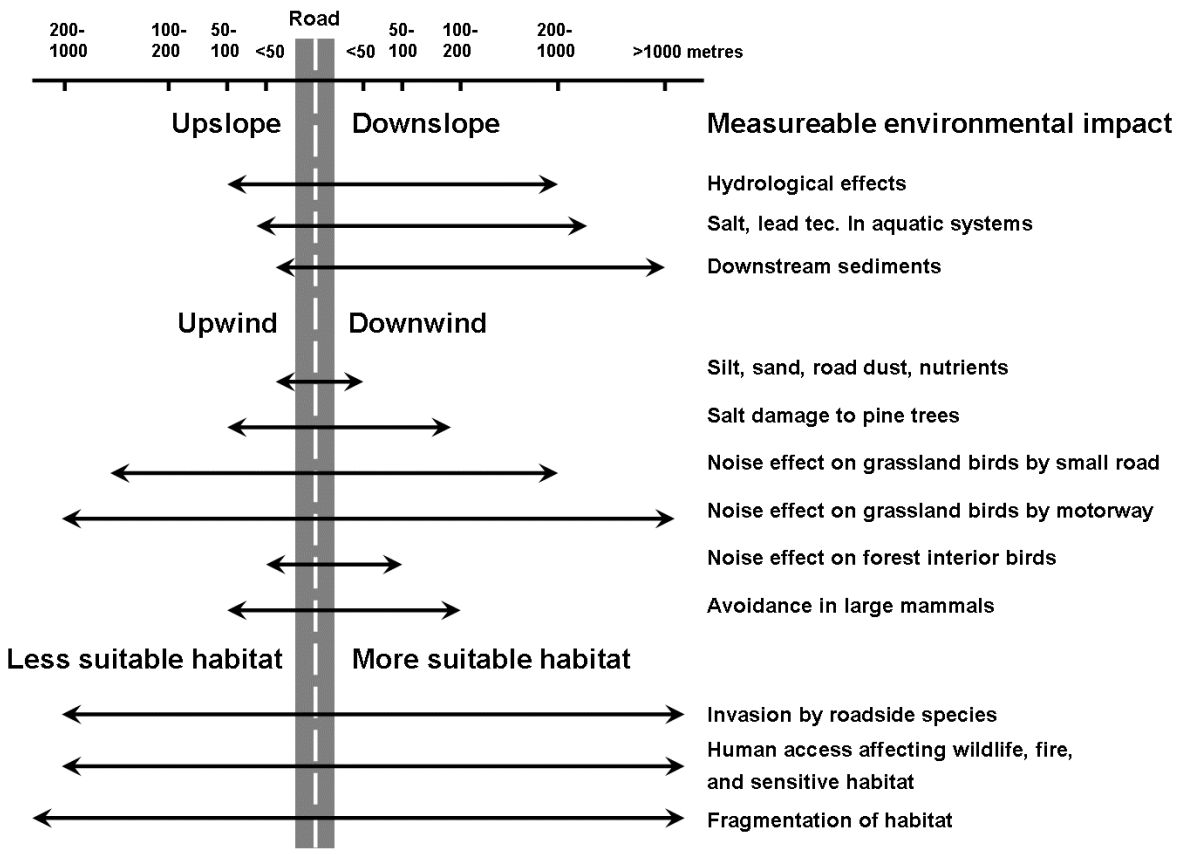

Figure 5. Disturbance effects spreading from a road to the surrounding landscape. (Forman et al 1997 as cited in Seiler, Andreas. 2003).

The following sections present the rationale for the action area by impact category.

Noise

Ambient outdoor levels can vary substantially from “20-30 dB estimated for a quiet wilderness area to the region of 80-90 dB in the noisiest urban areas” (EPA, 1974). If noise measurements are available, those measurements should be used as the ambient noise levels. In most cases noise measurements will not be available and ambient noise levels should be estimated based upon site conditions using the USDOT Bureau of Transportation Statistics’ National Transportation Noise Map (https://maps.dot.gov/BTS/NationalTransportationNoiseMap/). Figure 2 shows an example. The three roadways shown have different ambient noise levels. Based on review of the National Transportation Noise Map, most highways in NE that are included on this map are in the range of 50-59 dBA. Therefore, an ambient noise level of 59.9 is used to develop the initial action area distance for noise.

To determine the estimated maximum distance road and bridge construction noise could have an impact, the FHWA Construction Noise Handbook was reviewed. To determine where the sound dissipates from the source one must determine where the noise would return to ambient levels. The sound attenuation formula is used to calculate sound pressure level changes vs. distance from the noise source in a free field without obstructions (Engineering ToolBox 2005). The incorporation of obstructions to noise travel crosses into the scope of a full noise analysis.

Using the calculation without obstructions provides the maximum dissipation distance for construction noise impacts, thus representing a more conservative approach.

There are numerous calculators available on the internet that use the sound attenuation formula for calculating noise levels at a distance from the source such as https://www.omnicalculator.com/physics/distance-attenuation. Using the USDOT Bureau of Transportation Statistics' National Transportation Noise Map, construction equipment noise levels from the FHWA Construction Noise Handbook Table 9.1 (https://www.fhwa.dot.gov/environment/noise/construction_noise/handbook/handbook09.cfm) and a distance attenuation calculator, an action area was developed. Table 9.1 identifies impact pile drivers and vibratory pile drivers as the loudest construction equipment at 95 dBA at Spec. 721.560 L_{max} @ 50 feet and 101 dBA for Actual Measured L_{max} @ 50 feet (FHWA 2006). Using an ambient noise level of 59.9 dBA, Actual Measured L_{max} @ 50 feet sound level for impact pile drivers and vibratory pile drivers of 101 dBA, and the inverse square law, the noise levels would dissipate to ambient noise levels in a free field without obstructions at a distance of 5,675 feet (1.1 miles). Therefore, to encompass the largest distance for noise to return to ambient levels, the impact area distance for noise should be 1.1 miles.

Visual

Established BE Process conservation conditions for wildlife species listed in Nebraska include impact distances for interior least tern (0.25 mile), mountain plover (150 feet), northern long-eared bat (0.25 mile), piping plover (0.25 mile), southern flying squirrel (750 feet), swift fox (750 feet), and whooping crane (0.5 mile). The FHWA, USFWS, NGPC, and NDOT agreed to an action area of 0.5 mile based upon the largest conservation condition distance of 0.5 mile for whooping crane.

Waterways

This category includes all potential effects on waterways, including stormwater pollutants and sediment, and changes to hydrology and erosion/deposition patterns from hard surfaces placed within or along/adjacent to waterways. Figure 5 provides a widely used estimation of waterway effects resulting from a roadway, with waterway effects extending 100 meters (328 feet) upstream and more than 1,000 meters (3,281 feet) downstream. However, NGPC found in its experience that in Nebraska, downstream effects extend approximately 1,500 feet downstream. Based on Figure 5, NGPC experience in Nebraska, and established BE Process documents, the action area for waterways is 300 ft upstream and 1,500 feet downstream of the waterway crossing.

Lighting

With NDOT's requirements for downward facing lighting and down-shielding lighting during construction, and the down-shielded design of LED lights, the potential impact area is reduced. Today, NDOT-installed lighting along Interstate 80 is approximately 80 feet tall. Older lighting structures along the interstate in Nebraska may be up to 150 feet tall. Intersection lights installed by NDOT on highways are usually 40 feet tall. These lights have a maximum of 70,000 lumens and 30,000 lumens, respectively (Cunningham 2020 and NDOT 2020). LED lighting for roadways is divided among four types based upon the type of distribution. Type 2 lights (narrow forward emitting lights) are typically used on side streets while Type 3 lights (forward facing but wider light distribution than Type 2) are common on roadsides (Sitler's LED Supplies 2018). Type 5 lights (cast light in a full circle) may be used in interchanges (Sitler's LED Supplies 2018). Type 2 lights have the broadest distribution of light from the light source with light distributed 2.75 times wider than the structure height (Sitler's LED Supplies 2018). Using this

light distribution, interstate lighting would have a radius of 220 feet on new structures up to 412.5 feet on the tallest old structures. Lighting on highways would reach a radius of 110 feet. To capture the potential action area for lighting in open environments on listed species, the FHWA, USFWS, NGPC, and NDOT extended the action area to a radius of 500 feet from the roadway lighting.

V. References

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Attachment A:

Example Action Area Description for SEP Form

The following action area example is based on the fictional project in north of Waterloo in Douglas County, Nebraska on West Maple Road as shown in Figure 4.1. The loudest equipment on the project are a pavement scarifier and a pile driver. The pile driver will only be used in the one location shown in Figure 4.1. The project does not include lighting or nighttime work with lights.

Standard Action Area Write-up

The action area for this project extends 1.1 miles from the centerline of the roadway. This distance represents the greatest likely extent of effects on species and critical habitat.

Example Refined Action Area Write-up

The initial action area for this project was established using the 1.1-mile buffer to encompass potential noise impacts. Upon review of the project location, project activities, and species in range the action area has been revised. The project is in Douglas County on the northern edge of Waterloo. The following sections describe how the revised action area, shown in Figure 1, was developed.

Noise

The loudest equipment used for the project would be a pile driver. Throughout the rest of the project, a pavement scarified is the loudest equipment that would be used. The ambient noise level for West Maple Road is 59.9 dBA. FHWA Table 9.1 identifies impact pile drivers and vibratory pile drivers as the loudest construction equipment at 95 dBA at Spec. 721.560 L_{max} @ 50 feet and 101 dBA for Actual Measured L_{max} @ 50 feet (FHWA 2006). Using an ambient noise level of 59.9 dBA, Actual Measured L_{max} @ 50 feet sound level for impact pile drivers and vibratory pile drivers of 101 dBA, and the inverse square law, the noise levels would dissipate to ambient noise levels in a free field without obstructions at 5,675 feet (1.1 miles). Pile driving would only occur in one location on the west bank of the Elkhorn River north of the bridge and a 1.1-mile buffer was applied from the pile driving location. For the remainder of the project, the loudest equipment is a pavement scarifier (90 dBA for Actual Measured L_{max} @ 50 feet) resulting in a dissipation distance of 1,600 feet and that buffer was applied to the remainder of the project.

Waterway

Due to the size of the action area resulting from potential noise impacts extending 1 mile from the bank of the Elkhorn River, no action area modifications were made for waterways as they would remain within the limit for noise.

Visual and Lighting

There is no permanent lighting or nighttime work with lights included in this project, so the action area was not revised for potential lighting impacts. For visual impacts, the project area is within the range of piping plover, interior least tern, and northern long-eared bat. All of these species have the potential to be disturbed within 0.25 mile of activity. The previously discussed action area revision for noise results in an action area over 0.25 mile from project activities.
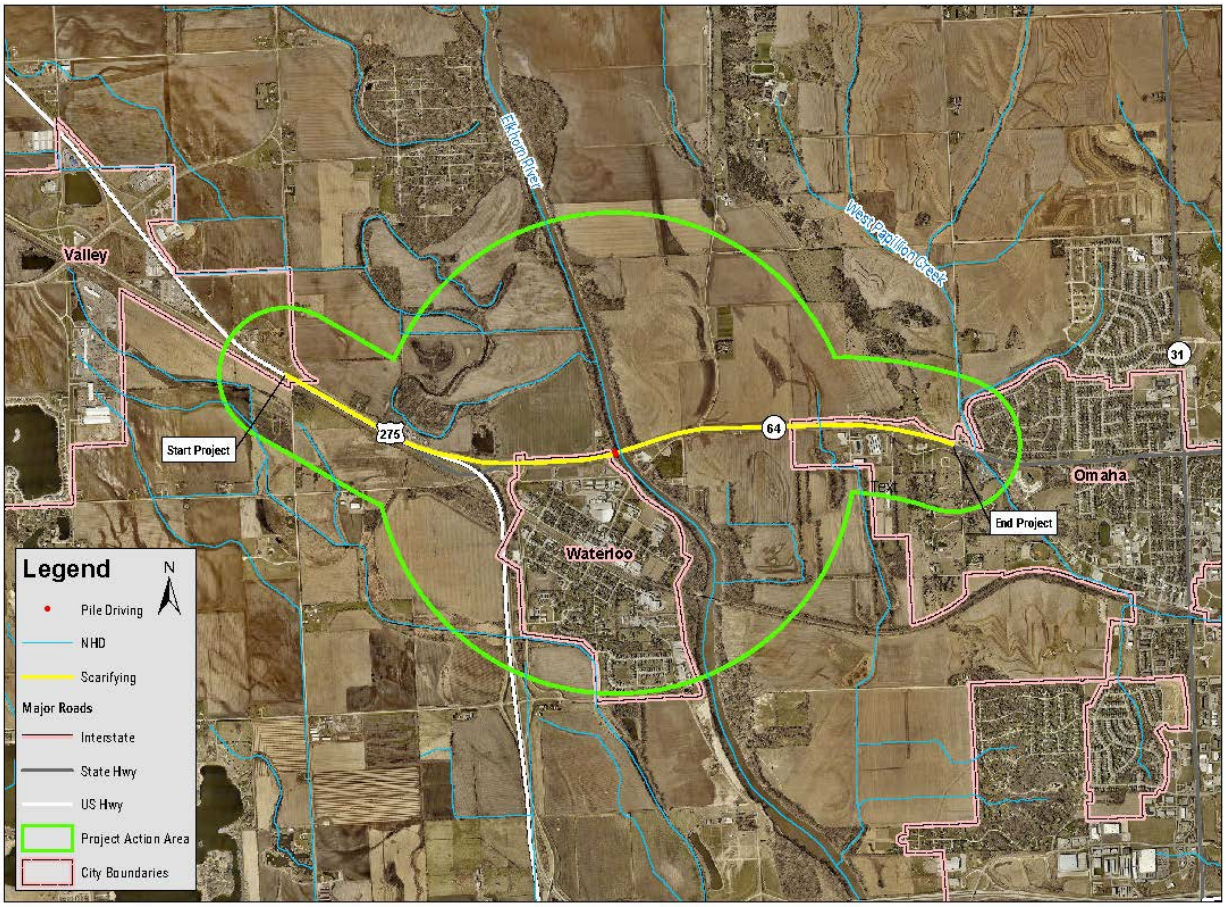
Figure 1. Project Action Area