Acoustic Environment and Soundscape Resource Summary
Fort Scott National Historic Site

National Park Service
U.S. Department of the Interior

Natural Resource Stewardship and Science
Natural Sounds & Night Skies Division

The acoustic environment is a resource with intrinsic value. It is important as a natural resource, a cultural resource, or both. It is a critical component of wilderness character and plays an important role in wildlife communication, behavior, and other ecological processes. Results from multiple surveys indicate that hearing the sounds of nature is an important reason for visiting national parks. Therefore, the value of acoustic environments and soundscapes is related to an array of park resources and has broad implications for park management.

The quality of the acoustic environment is relevant in nearly every unit in the NPS System. When developing the foundation document, park staff should consider the acoustic environment as a resource with inherent value that may be recognized, when appropriate, in the Fundamental Resource and Value, Other Important Resource and Value, or other section of the document. The topics in Attachment 1 discuss the importance of the soundscape and the acoustic environment in relation to park resources and values. Sound levels in national parks can vary greatly, depending on location, topography, vegetation, biological activity, weather conditions and other factors. For example, the din of a typical suburban area fluctuates between 50 and 60 decibels (dBA), while the crater of Haleakala National Park is intensely quiet, with levels around 10 dBA. Below are some examples of sound pressure levels measured in national parks.

Decibel level (dBA)	Sound Source	Decibel level (dBA)	Sound Source
10	Volcano crater (Haleakala NP)	80	Snowcoach at 30 m (Yellowstone NP)
20	Leaves rustling (Canyonlands NP)	100	Thunder (Arches NP)
40	Crickets at 5 m (Zion NP)	120	Military jet, 100m above ground level (Yukon-Charley Rivers NP)
60	Conversational speech at 5 m (Whitman Mission NHS)	126	Cannon fire at 150m (Vicksburg NMP)

Quality of the Resource at Fort Scott NHS

A single parameter that is useful for assessing a park's acoustic environment is the impact of man-made sound sources in relation to natural acoustic conditions. The Natural Sounds and Night Skies Division (NSNSD) estimates the impacts using predictions from a geospatial sound model. The model predicts how much man-made noise raises natural ambient sound levels. Sound pressure levels for the continental United States were predicted using actual acoustical measurements combined with a multitude of explanatory variables such as location, climate, landcover, hydrology, wind speed, and proximity to noise sources (roads, railroads, and airports). The model predicts daytime impacts during midsummer. The impacts are determined by the difference between the modeled *natural* ambient sounds levels and the predicted *existing* sound levels.

To better express the variation of impact across parks, a park-specific impact map was generated from the geospatial sound model for each park. The park map for Fort Scott NHS is shown in Figure 1 below. The map was generated using 270 meter resolution, meaning that each pixel represents 270 square meters. At Fort Scott NHS, the mean impact is predicted to be 12.6 decibels (dBA). That is, the existing sounds level (with the influence of man-made sounds) is predicted to be 12.6 decibels above the natural ambient sounds level. One decibel change is not readily perceivable by the human hear, but any addition to this difference could begin to impact listening ability. An increase of 1.0 dBA would reduce listening area for wildlife and visitors by 21%. An increase of 12.6 dBA would reduce the listening area for wildlife and visitors by 95%. This is consistent with park units in or near population centers or with parks with a predomination of appropriate cultural sounds.

The park-specific map is a subset of Figure 2, L_{50} dBA impact sound pressure levels for the continental United States. An inset map is included in each park-specific map to provide a better sense of context, and major roads and highways are labeled for reference. For reference, Figures 3 and 4 show natural and existing sound pressure levels for Fort Scott NHS, respectively.

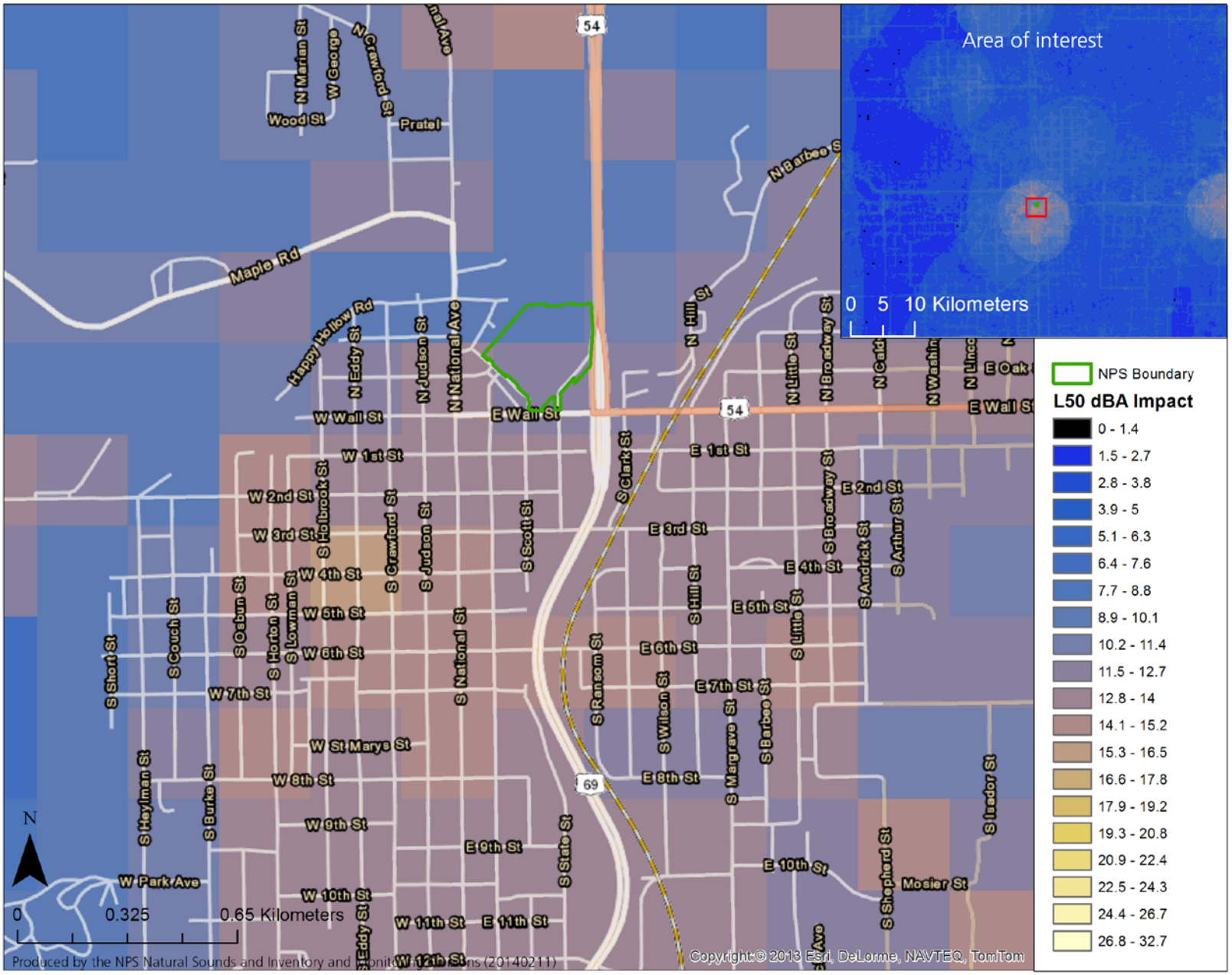

Figure 1. Park-specific impact map for Fort Scott NHS. (note: each figure has different scale values)

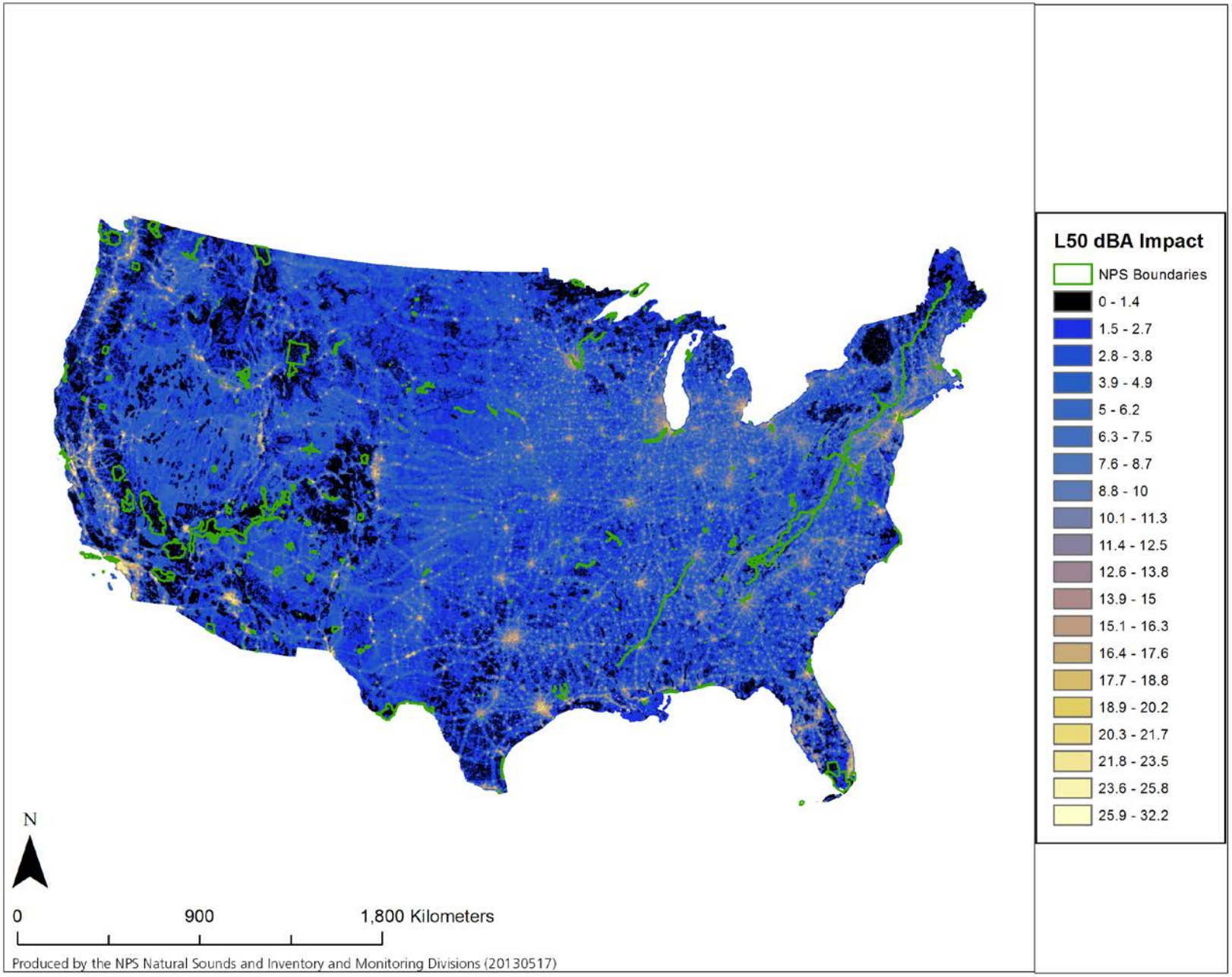

Figure 2. L_{50} dBA impact sound pressure levels for the continental United States. (note: each figure has different scale values)

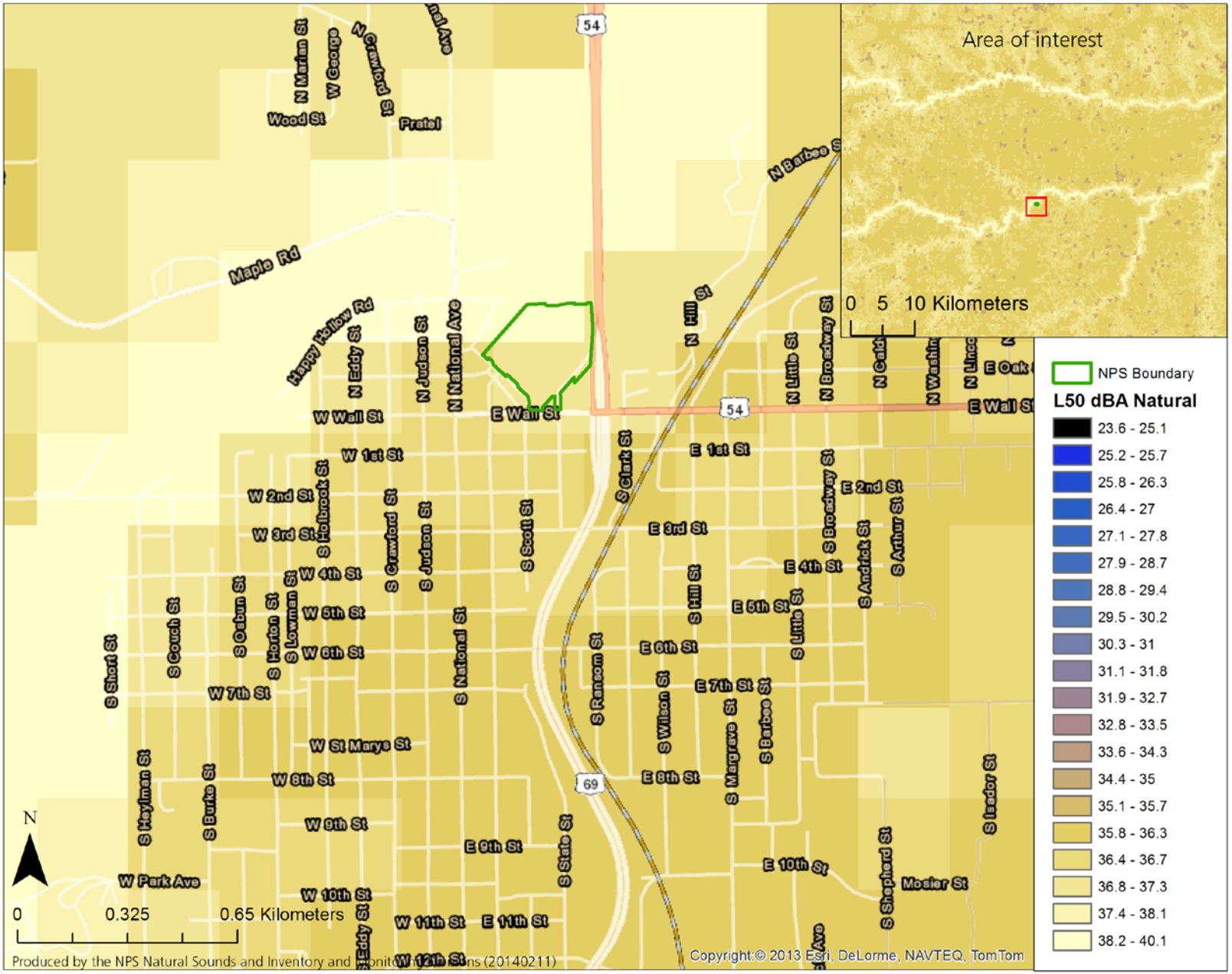

Figure 3. L_{50} dBA natural sound pressure levels for Fort Scott NHS. (note: each figure has different scale values)

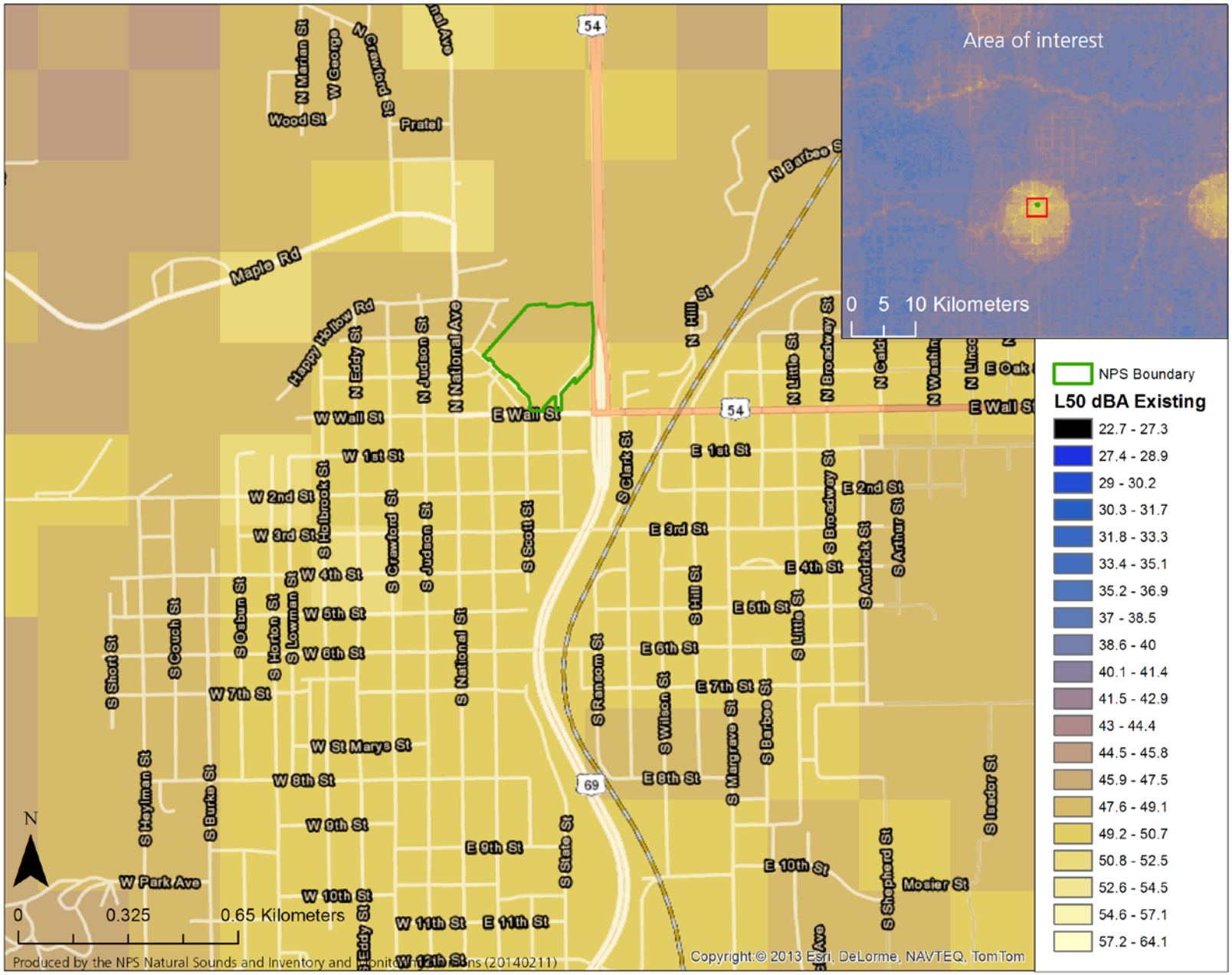

Figure 4. L_{50} dBA existing sound pressure levels for Fort Scott NHS. (note: each figure has different scale values)