Docket No. 7250
Exhibit DFLD-KK-5
Admitted: _______

RSG INC.
RESOURCE SYSTEMS GROUP, INC.

MEMORANDUM

To: Neil Habig, Deerfield Wind, LLC
From: Kenneth Kaliski, P.E., INCE Bd. Cert.
Subject: Deerfield Wind Project – Noise Report revisions
Date: 1 July 2008

I have revised the sound propagation modeling for the Deerfield Wind Project to account for the July 2008 turbine reconfiguration. Since the new modeling results are different from what was shown in RSG's November 2007 report (Exhibit Deerfield-KK-4), I have revised the modeling section of that report, pages 25 through 31. The replacement pages are attached. Note that changes from the November 2007 report are underlined.

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Finally, low frequency sound propagates better than higher frequency sound and tends to diffract more in the atmosphere under inversion conditions. Our modeling takes into account nighttime inversions and the differential atmospheric absorption of low and high frequency sound.

7. SOUND MODELING

7.1. MODELING SOFTWARE

Modeling was completed for the project using Cadna A acoustical modeling software. Made by Datakustik GmbH, Cadna A is an internationally accepted acoustical model, used by many other noise control professionals in the United States and abroad. The software has a high level of reliability and follows methods specified by the International Standards Organization in their ISO 9613-2 standard, "Acoustics – Attenuation of sound during propagation outdoors, Part 2: General Method of Calculation." The standard states,

> "This part of ISO 9613 specifies an engineering method for calculating the attenuation of sound during propagation outdoors in order to predict the levels of environmental noise at a distance from a variety of sources. The method predicts the equivalent continuous A-weighted sound pressure level … under meteorological conditions favorable to propagation from sources of known sound emissions. These conditions are for downwind propagation … propagation under a well-developed moderate ground-based temperature inversion, such as commonly occurs at night."

The model takes into account source sound power levels, surface reflection and absorption, atmospheric absorption, geometric divergence, meteorological conditions, walls, barriers, berms, and terrain.

A 25 meter by 25 meter grid of modeled receivers was set up covering 12,900 acres (20 square miles) around the site. A receiver is a point on the ground at which the computer model calculates a sound level. In addition, discrete receivers were placed at all residential homes using the Vermont Emergency 911 database. In an effort to be conservative, we excluded sound attenuation from forest cover. The model included the 11 existing turbines at a height of 40 meter, and <u>the Deerfield turbines at 78 meters above the ground.</u>

Details of the modeling input assumptions are shown in Appendix A.

7.2. MODELING RESULTS

We modeled several different scenarios to quantify sound levels from the project:

1) The proposed Deerfield wind turbines only, assuming all <u>15</u> are operating at their highest rated sound power.
2) The existing GMP wind turbines only, assuming all 11 are operating under the highest sound emissions derived from the recent monitoring data.

3) The proposed Deerfield and GMP wind turbines, all operating at the highest rated sound emission level.
4) The change in sound levels, comparing the existing condition, with the GMP turbines and background traffic, to the build condition.
5) The wind turbines operating under actual conditions monitored in the field.

7.2.1. Modeling under maximum rated sound power

As described above, we modeled the existing GMP and proposed Deerfield wind turbines using their maximum rated sound power level[3] under a moderate nighttime inversion with winds blowing from each wind turbine to each receiver.

Four scenarios were modeled using the ISO standard and are representative of the levels that would be expected with a moderate wind blowing from the source to the receiver under a moderate nighttime temperature inversion. In the first scenario, only the proposed turbines are included. The results of this modeling are shown in Figure 22. The figure shows several discrete modeled receivers as circles colored black and yellow. These receivers include the closest homes to the project, representative residences, and backcountry areas to the west and south of the project. The blue dots in the figure are the proposed wind turbines. The figure is color coded conforming to the modeled sound levels from the wind turbines, where red is the highest sound levels and light green is the lowest. As shown in sound level at the closest home due to the proposed Deerfield wind turbines is 40 dBA.

In the second scenario, only the existing turbines are included. The results of this modeling are shown in Figure 23. The sound level at the closest home due to the existing GMP Searsburg wind turbines is 42 dBA.

The third scenario includes both the existing and proposed turbines. As shown in Figure 24, the highest sound level modeled at a home is 43 dBA.

The modeling demonstrates that the project, even when combined with the sound from the existing GMP Searsburg turbines, can meet the noise standard of 45 dBA (night) at all nearby residences during times when windows would typically be open, and under the meteorological conditions specified in the ISO 9613-2 standard.

The last scenario shows the difference between the no-build and build sound levels. As opposed to the latter three scenarios, this includes background equivalent average daily sound levels from traffic on VT Routes 8 and 9. The results are shown in Figure 25. The modeling shows that there is very little change in average sound levels due to the proposed project at residences along VT 8 and VT 9.

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[3] Note that there are some circumstances in the winter where ice can form on the wind turbine blades, creating higher levels of turbulence noise. These events are expected to occur only a few times during a typical winter and are of short duration.

Figure 22: Sound Levels from the Proposed Deerfield Wind Project

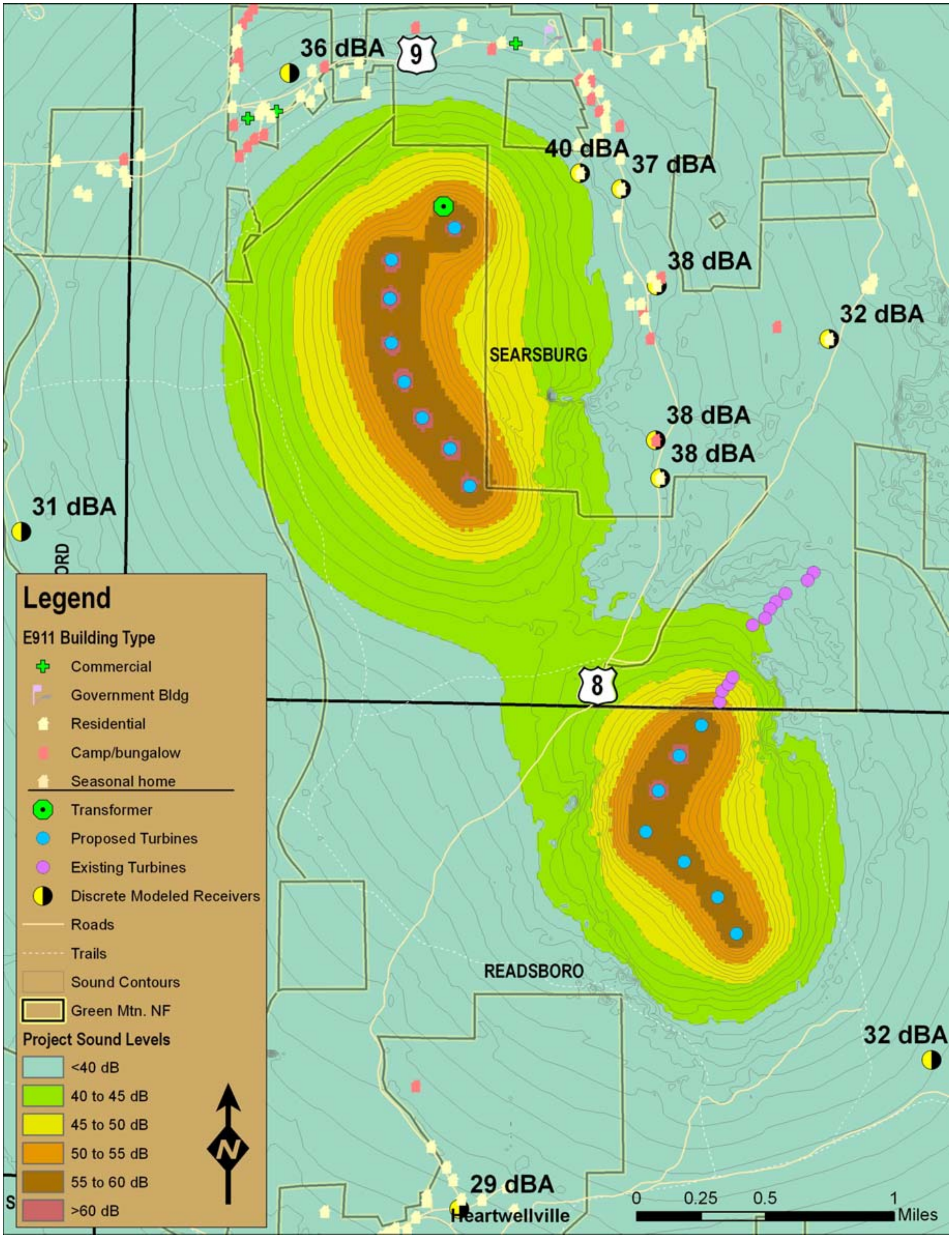


Figure 23: Sound Levels from Existing GMP Searsburg Turbines Only

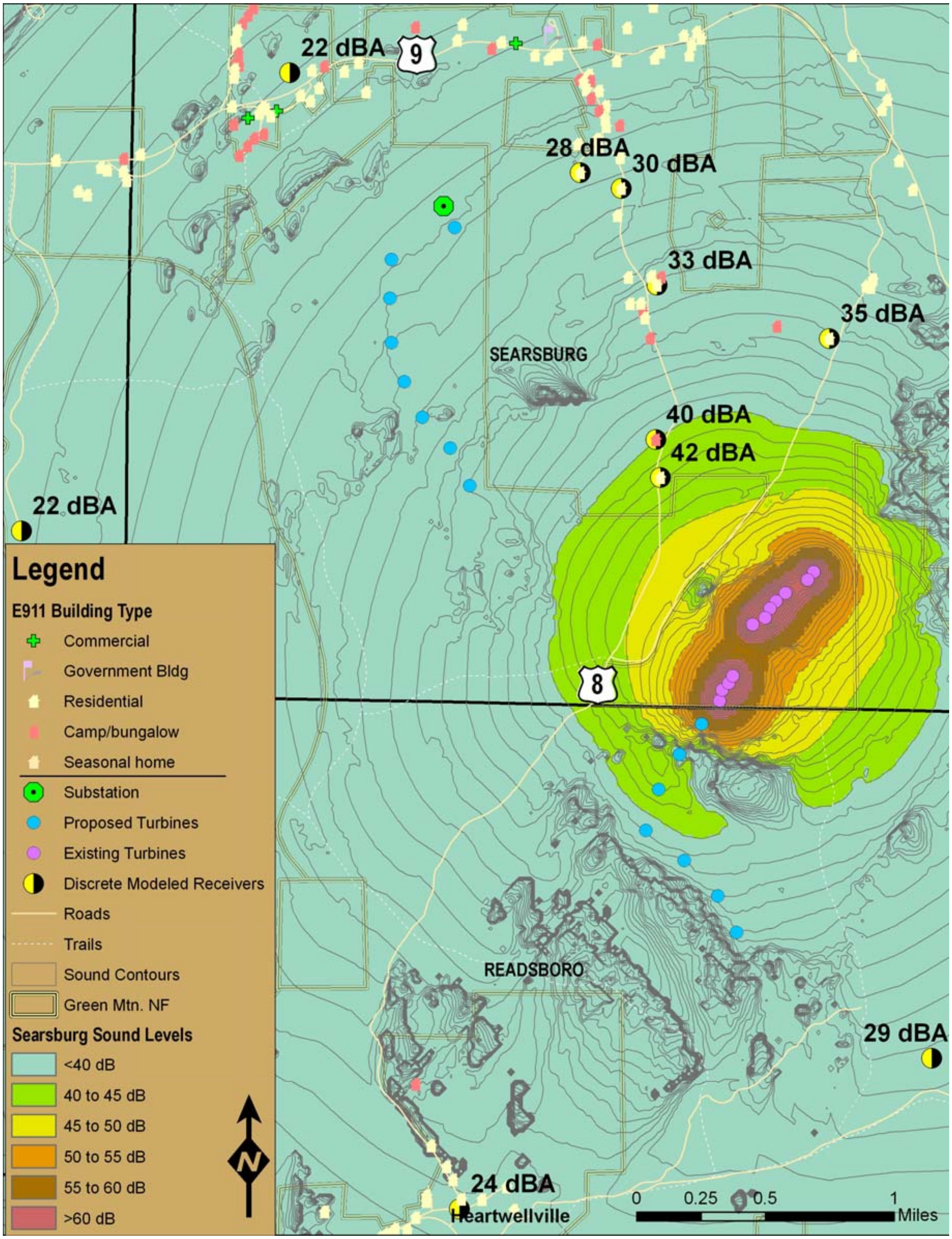


Figure 24: Deerfield Wind Project and GMP Searsburg Facility Cumulative Sound Level

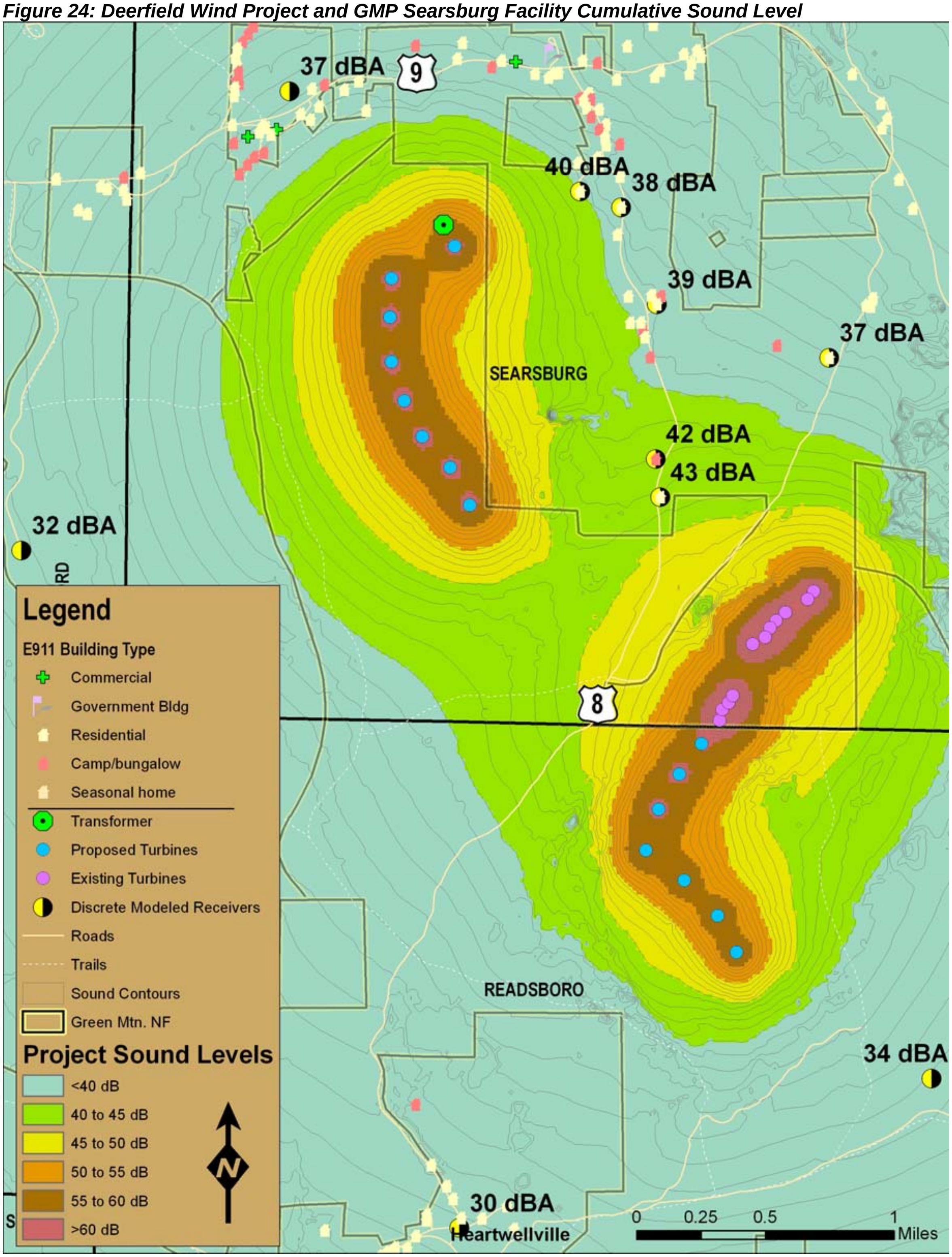
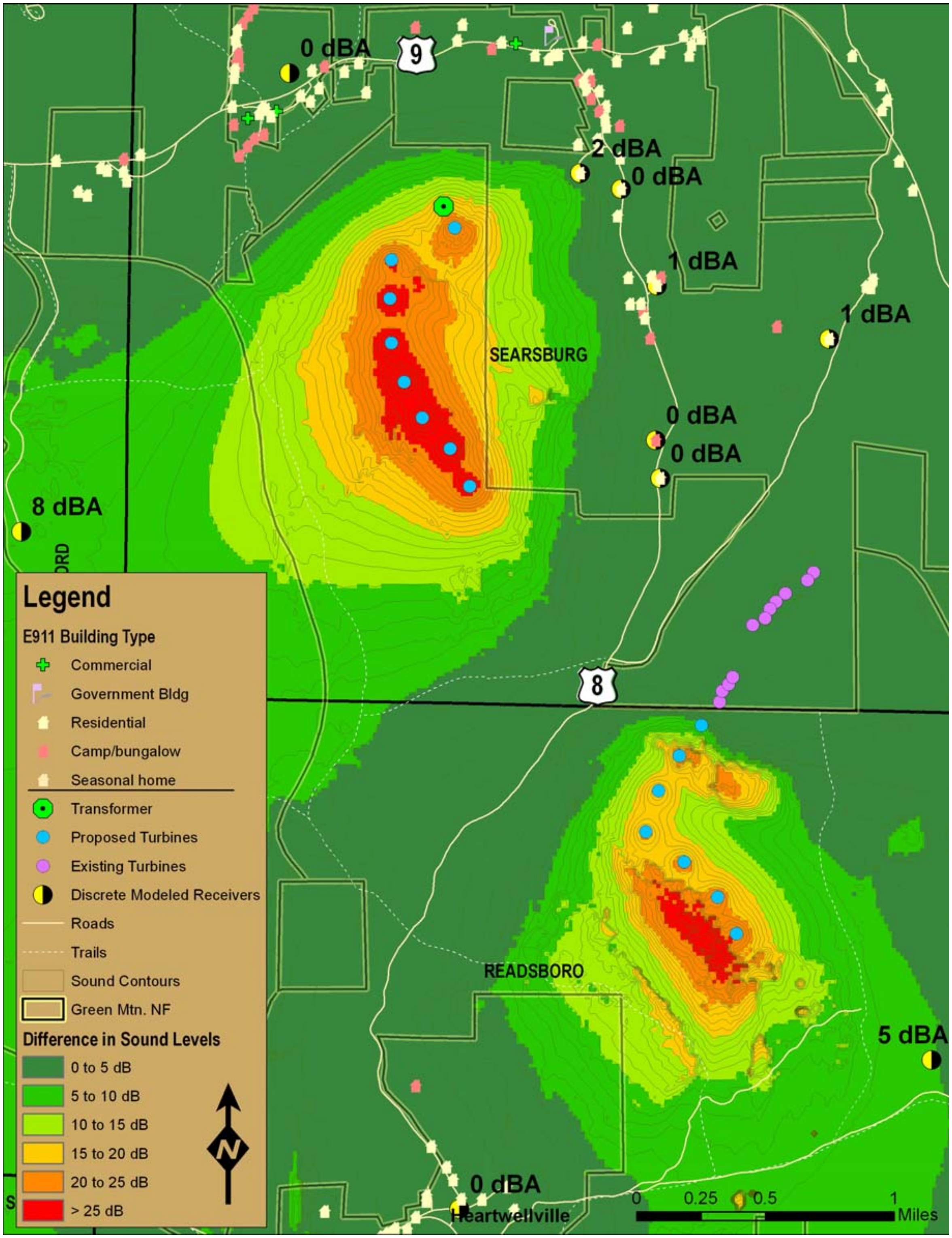


Figure 25: Difference between No Build and Build Modeled Levels – Includes 24-hour Traffic



7.2.2. Frequency analysis using one year of meteorological data

Wind turbines operate at all types of wind speeds and wind directions, not just those assumed in the ISO 9613-2 standard. The ISO standard is valid for moderate nighttime inversions, with winds blowing from the source to the receiver, and wind speeds of 1 to 4 m/s as measured up to 11 meters above the ground. The turbines will operate outside this range. That is, there will be times with the wind turbines operate during the daytime, when winds are blowing away from receivers, under higher wind speeds, and under more severe inversions. Some of these factors will increase perceived noise from the wind turbines and some will decrease it.

To evaluate the likelihood of sound levels exceeding a nighttime sleep disturbance level of 45 dBA $Leq_{8)}$, we obtained one year of hourly wind speed and wind direction data from the ridgetop meteorological towers in Searsburg. We then used this data to calculate stability class for each hour and ran the Cadna A model at the receiver that has the greatest impact for stability classes, wind speeds, and wind directions that were not covered by the ISO standard, but estimated using the Concawe algorithm.[4] We then adjusted the sound output from the wind turbine based on the actual wind speed and assuming the manufacturer confidence interval about the rated sound power level. Finally, we estimated the sound level at this worst-case home for each hour of the year.

Assuming these conditions, our results show with the combined operation of the existing GMP and proposed Deerfield turbines, there would be no period during which the average 8-hour nighttime sound level would exceed 43 dBA. In addition, the Deerfield turbines alone do not create any 8-hour nighttime periods exceeding 39 dBA. This analysis confirms that there is a very high probability that the 45 dBA $Leq_{(8)}$ standard will not be exceeded. While there is a small but finite chance nighttime hourly sound levels may exceed 45 dBA, this would not occur during warm weather months when windows are more likely to be open.

7.3. LOW FREQUENCY SOUND

At the residence with the highest overall sound levels from all turbines, the highest sound level at a frequency of 31.5 Hz is approximately 59 dB and at a frequency of 63 Hz it is approximately 52 dB. (These are unweighted sound pressure levels.) These are below the *interior* sound levels of 65 to 70 dB, respectively, that are likely to create moderately perceptible building vibrations at these frequencies.

[4] "The Propagation of Noise from Petroleum and Petrochemical Complexes to Neighbouring Communities," CONCOWE Report no 4/81, May, 1981.