April 26, 2010

CONSULTING ENGINEERS & SCIENTISTS

Alexander Camps, A.I.A.
Project Manager/Senior Architect
PBS&J
2001 Northwest 107th Avenue
Miami, Florida 33172-2507

RWDI AIR Inc.
650 Woodlawn Road West
Guelph, ON
Canada N1K 1B8

A member of the RWDI Group of Companies

Re: Florida International University
Wall of Wind Facility
Noise Modeling for Wall of Wind Site – Preliminary Results
RWDI Job#: 1011235 **Email: ACamps@pbsj.com**

Dear Mr. Camps:

We have conducted a preliminary noise assessment of the Wall of Wind (WoW) Facility. This study focused on exterior noise emissions generated by the 12-fan Wall of Wind. As outlined in our proposal 1011235P, dated March 3, 2010, we have examined mitigation in the form of earth berms only.

As noted above, the assessment is preliminary and the results do not take into consideration any logistical and/or technical constraints of construction or impact on performance of the WoW. Following this preliminary study we recommend a meeting with Florida International University (FIU) to discuss any constraints which may arise from this study. In addition, we recommend an airflow study to address any potential impact the solution may have on the flow performance of the 12 fan WoW. Since the initial airflow study conducted by RWDI was based on a prototype design and noise wall, the conclusions of that study are not applicable to the current assessment.

NOISE MODELLING AND ASSUMPTIONS

Based on the limited amount of information available, we have made some conservative assumptions with respect to:

- proposed building layout,
- building height (32 ft),
- fan layout,
- building orientation,
- Norsonic noise data (distance from the measured fan),
- surrounding topography (flat),
- directivity of noise at the inlet and outlet,
- noise radiating through the building itself, and
- noise berm location and configuration (acceptable distance from building to the start of the berm was assumed to be 50 ft, the berm was modeled around the perimeter of the building, and slope 1:3 utilized).

Noise impact modelling was completed using Cadna/A, a commercially available software implementation of the ISO-9613 environmental noise propagation algorithms. The modelling took into account the following factors:

- source sound power level and directivity,
- distance attenuation,
- source-receptor geometry,
- barrier effects of the site features and surrounding topography,
- ground attenuation for the areas separating the noise sources from the noise sensitive receptors;
- air (atmospheric) attenuation, and
- meteorological affects on noise propagation.

A temperature of 32°C and 95% relative humidity were conservatively assumed in the modelling runs.

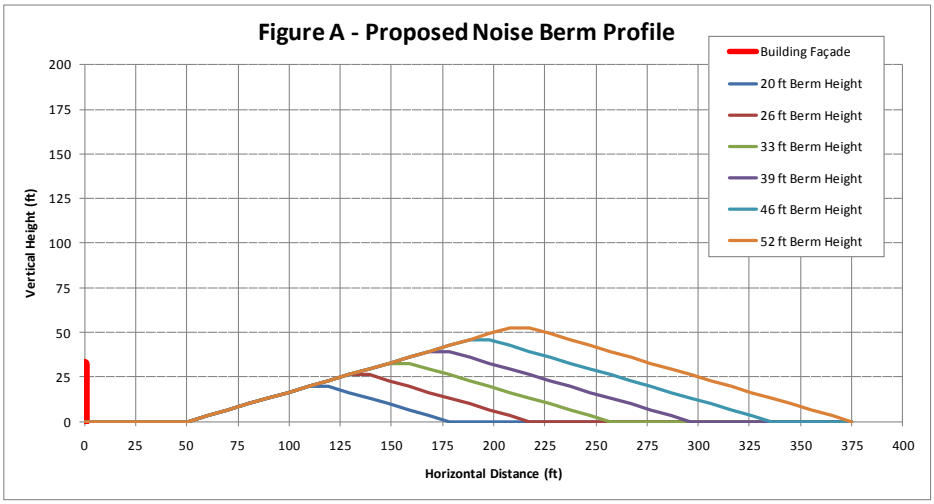
IMPACT ASSESSMENT

Noise modelling was conducted with and without a noise berm. Six berm heights were examined at 20ft, 26ft, 33ft, 39ft, 46ft, and 52ft above grade. Profiles are shown in Figure A below. It was assumed that the berm had a 1:3 slope, wrapped around the entire facility, and the acceptable distance from building to noise berm was approximately 50 ft. The study assumed all 12-fans were operating simultaneously at full capacity.

The approximate maximum areas of land required for the berms are as follows:

- 20 ft tall berm requires approximately 151,000 ft^2
- 26 ft tall berm requires approximately 225,000 ft^2
- 33 ft tall berm requires approximately 312,000 ft^2
- 39 ft tall berm requires approximately 411,000 ft^2
- 46 ft tall berm requires approximately 522,000 ft^2
- 52 ft tall berm requires approximately 646,000 ft^2

The land requirements are based on the assumption that the facility footprint is 80 ft x 100 ft, the distance from the building wall to the start of the noise berm is 50 ft, and the noise berm wraps around the entire perimeter of the facility.



The results are presented as noise contours shown in the attached Figures 1 through 7. A 3-dimensional view of the facility and 33 ft noise berm from the noise model is shown in Figure 8. The noise contours are representative of a receiver height 5 ft above grade. A comparison of the unmitigated versus the mitigated case indicates that the noise berm does not provide effective noise reduction over distances greater than 1 mile. Sound levels within 1 mile are predicted to be approximately 10-20 dB lower. An overall sound level of 35 dBA from the WoW facility is predicted to be obtained at approximately 6 miles from the inlet and exhaust sides. Since the orientation of the building is unknown, a green circular ring has been incorporated into the figure to demonstrate the potential area of influence. The area of influence is where the facility sound levels are predicted to be greater than 35 dBA.

In general, the noise reduction performance from berms (or barriers) reduces rapidly the farther a receiver moves away from the berm. At extended distances, a berm is of little benefit. Berms are most effective when close to the source or receiver. At longer distances the noise mitigation performance is limited by diffraction of sound travelling over the top of the barrier or berm, and refraction of sound due to non-homogeneous states in the atmosphere (wind gradients, temperature gradients, etc.). In the case of the Wall of Wind facility the use of a barrier or berm can provide effective reduction in noise levels at distances up to 1 mile from the facility. For distances greater than 1 mile, berm performance, regardless of height and location, is negligible.

CONCLUSIONS/RECOMMENDATIONS

A berm next to the facility will provide reductions to noise sensitive receivers less than 1 mile. However for distances greater than 1 mile, a noise berm (or barrier) performance is negligible, regardless of height and location. A more effective means of reducing noise at distances greater than 1 mile is mitigation at the source (e.g., silencers, active noise control, etc.). Additional studies are recommended to examine feasibility of source mitigation.

It is important to reiterate that these results are preliminary and do not take into consideration any logistical and/or technical constraints. Following this preliminary study, if FIU were to proceed with a noise berm, we recommend a meeting to discuss any constraints which may arise from this study. In addition, we recommend an airflow study to address any potential impact the solution may have on the flow performance of the 12 fan WoW. Since the initial airflow study conducted by RWDI was based on a prototype design and noise wall, the conclusions of that study are not applicable to the current study.

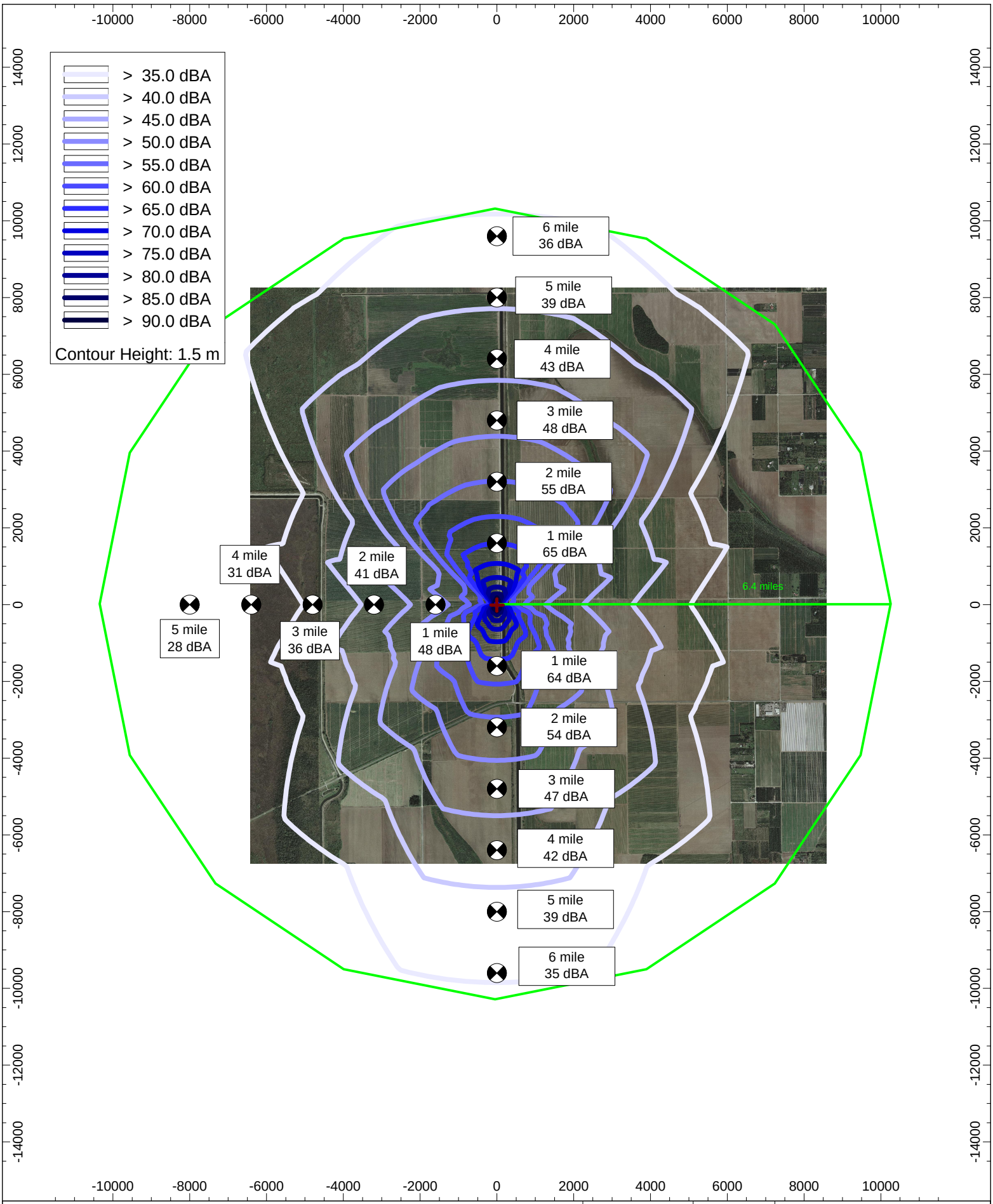
Yours very truly,

RWDI AIR Inc.

Jason Tsang, B.Sc.Eng., P.Eng.
Project Manager / Senior Engineer

JTT/klm

FIGURES



Modelled Noise Impact Contours
Excluding Mitigation

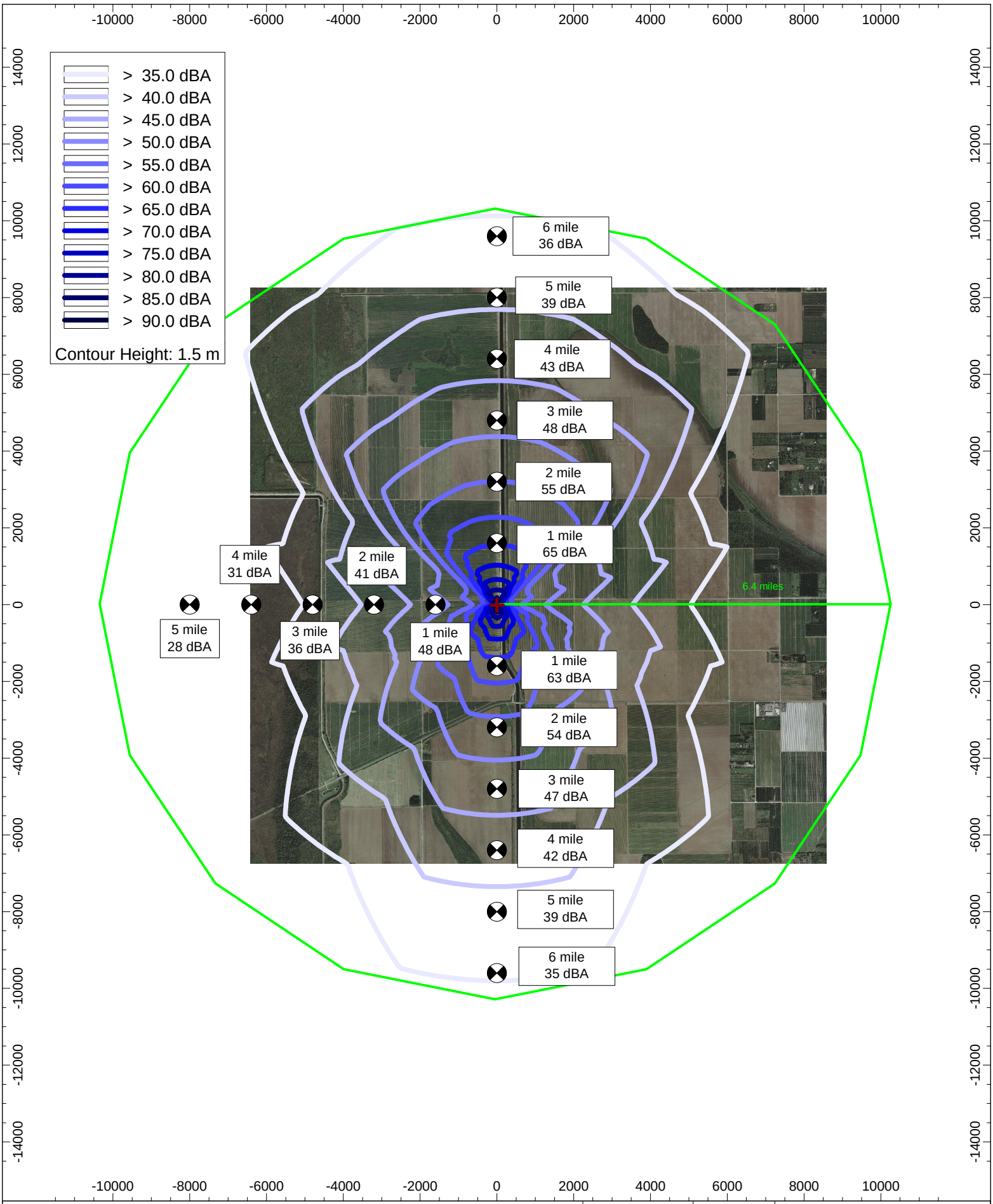
Wall of Wind FLU - Florida, USA

True North

Project #1011235

Drawn by: MTL	Figure: **1**
Scale:	1:125000
Date:	April 26, 2010

RWDI®



Modelled Noise Impact Contours Including 20' Berm

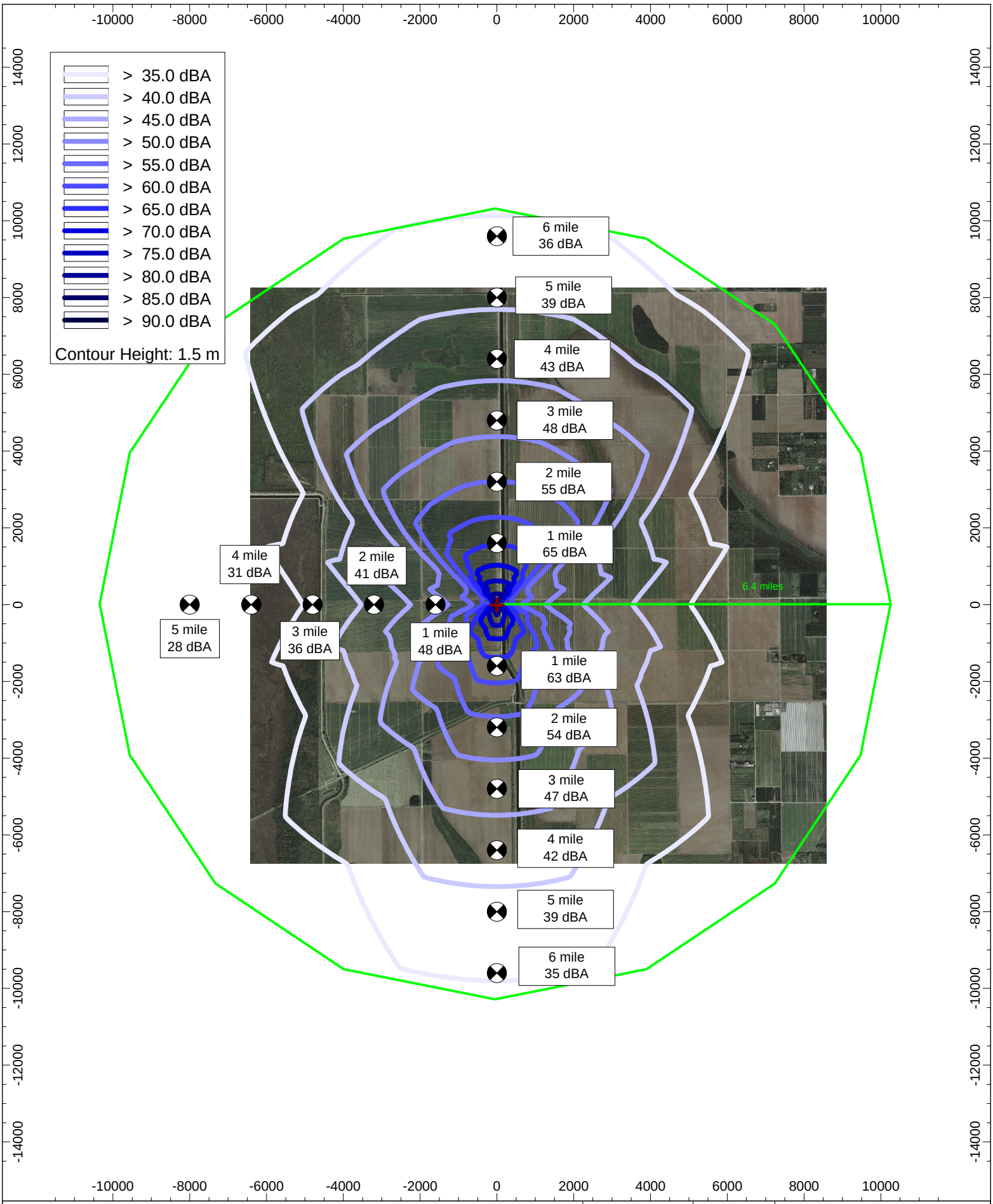
True North

Drawn by: MTL	Figure: **2**
Scale:	1:125000
Date:	April 26, 2010

Wall of Wind FLU - Florida, USA

Project #1011235

RWDI®



Modelled Noise Impact Contours Including 26' Berm

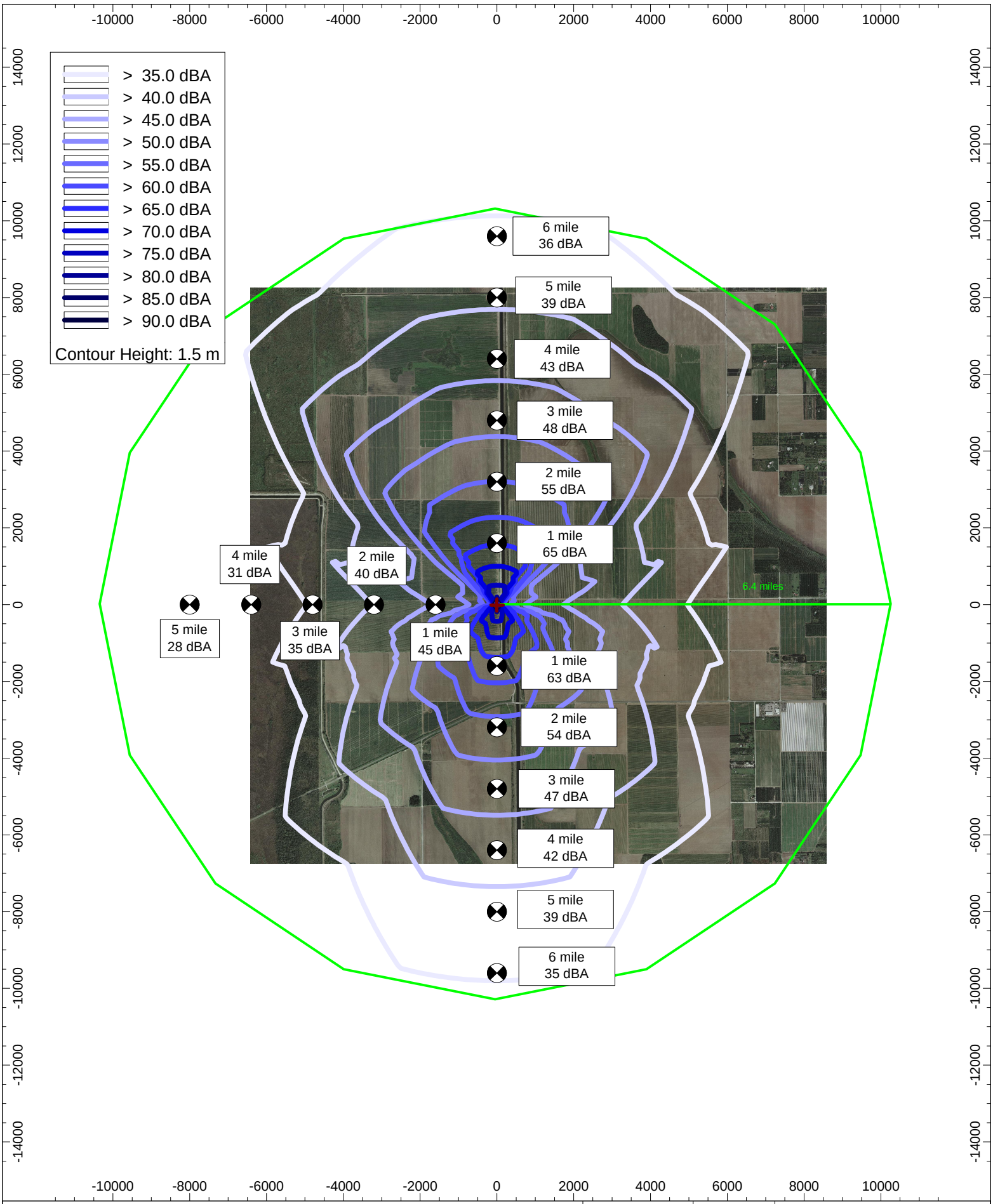
Wall of Wind FLU - Florida, USA

True North

Project #1011235

Drawn by: MTL	Figure: **3**
Scale:	1:125000
Date:	April 26, 2010

RWDI®



Modelled Noise Impact Contours
Including 33' Berm

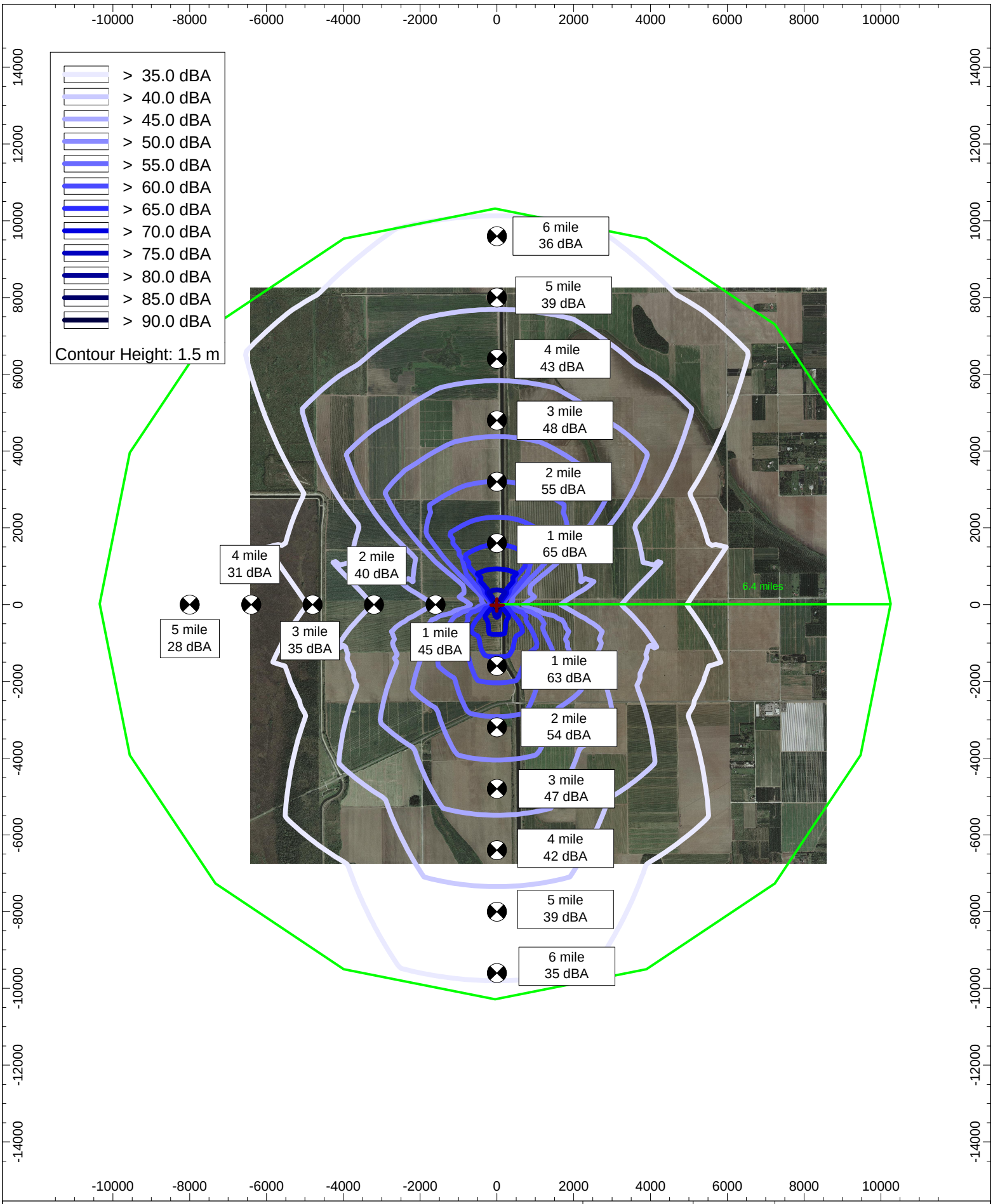
Wall of Wind FLU - Florida, USA

True North

Project #1011235

Drawn by: MTL	Figure: **4**
Scale:	1:125000
Date:	April 26, 2010

RWDI®



Modelled Noise Impact Contours Including 39' Berm

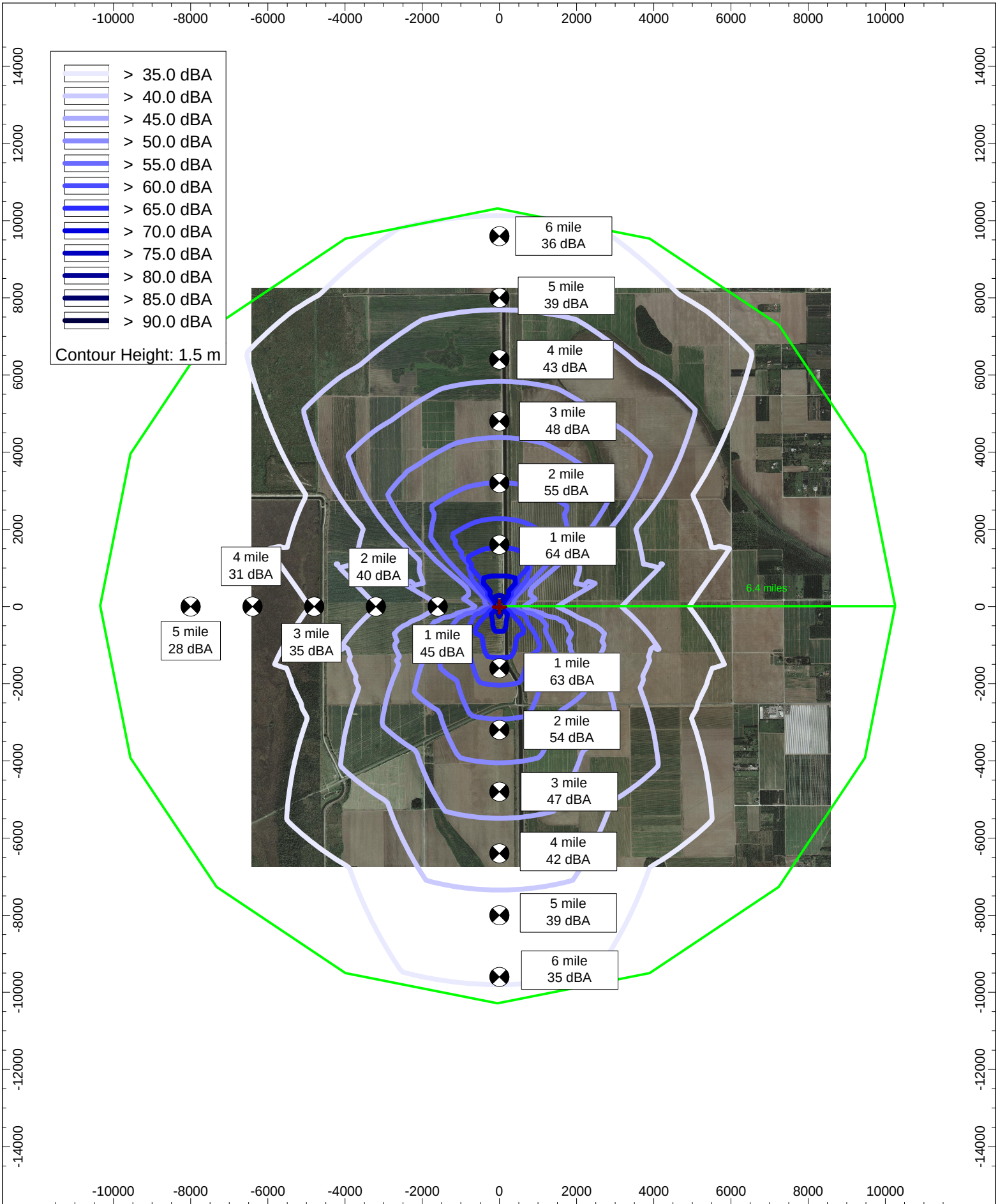
Wall of Wind FLU - Florida, USA

True North

Project #1011235

Drawn by: MTL	Figure: **5**
Scale:	1:125000
Date:	April 26, 2010

RWDI®



Modelled Noise Impact Contours Including 46' Berm

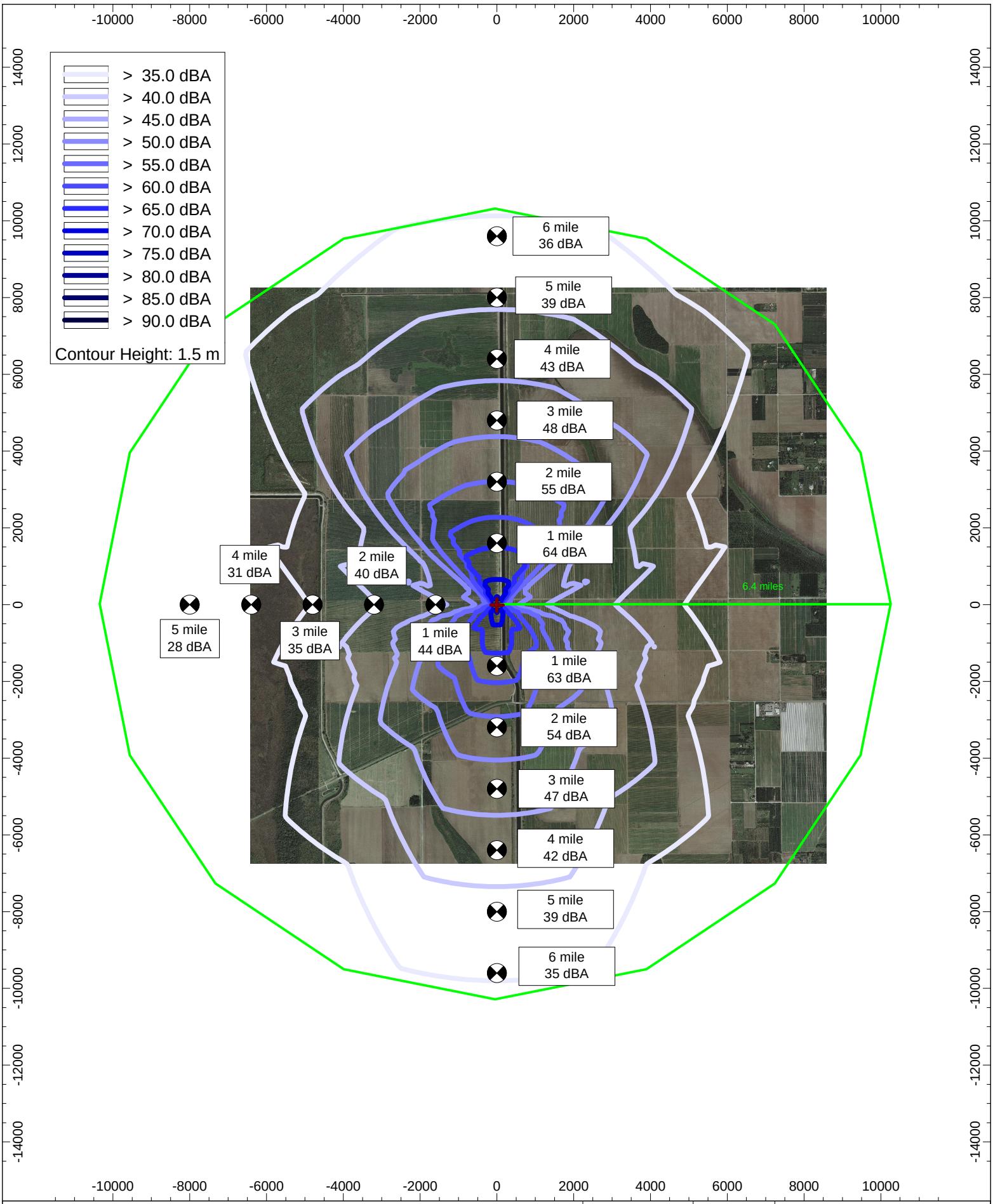
Wall of Wind FLU - Florida, USA

Project #1011235

True North

Drawn by: MTL	Figure: **6**
Scale:	1:125000
Date:	April 26, 2010

RWDI®



Modelled Noise Impact Contours
Including 52' Berm

Wall of Wind FLU - Florida, USA

True North

Project #1011235

Drawn by: MTL	Figure: **7**
Scale:	1:125000
Date:	April 26, 2010

RWDI®

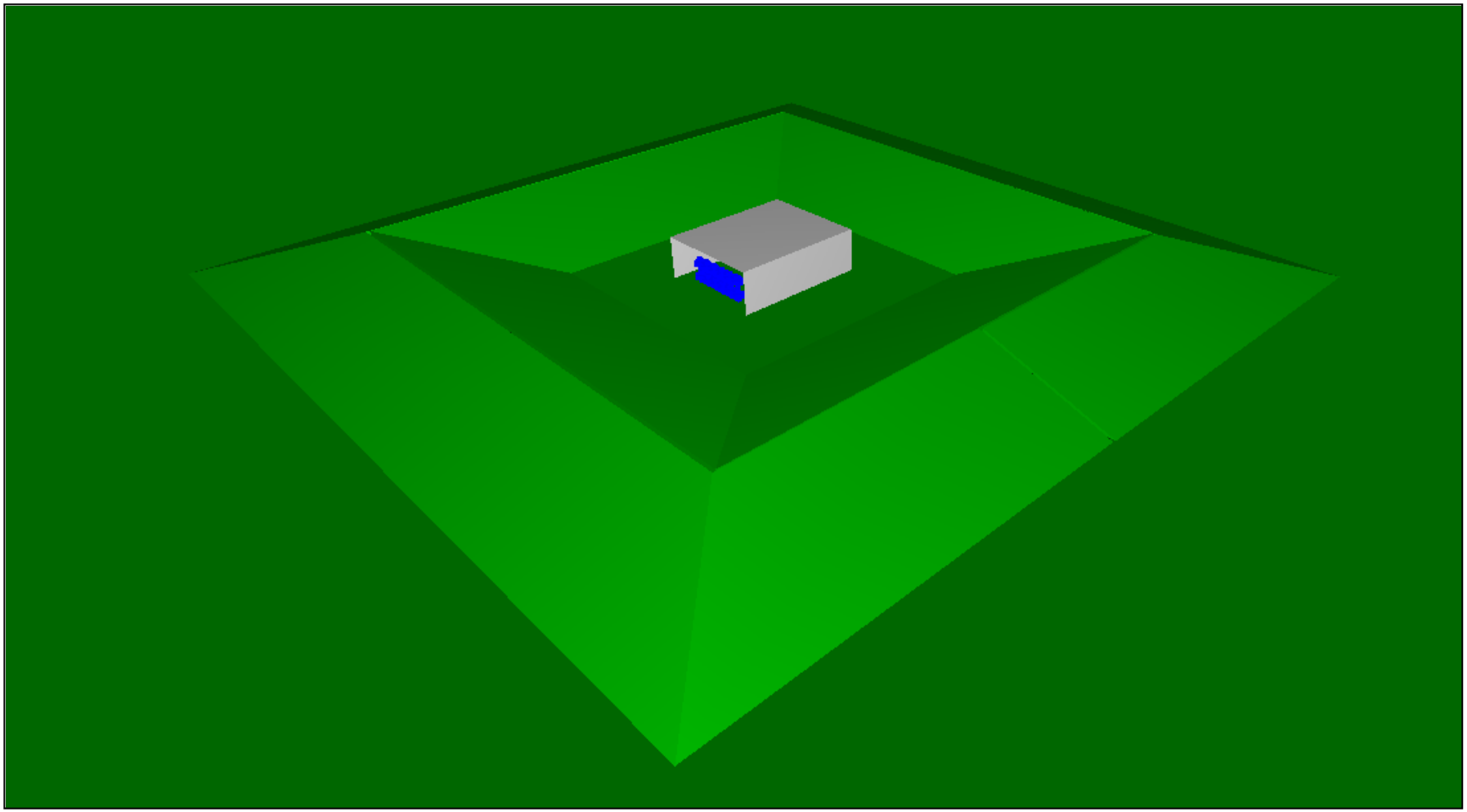


Figure 8: 3-Dimensional View of Modelled Facility and 33 ft Earth Noise Berm