

Submittal Document II.F. Noise Impact Investigation of Mining Operation, prepared by Kolano and Saha, dated November 15, 2015 (“Noise Study”)





November 10, 2015  
2015-125

Mr. Patrick Lennon  
Honigman Miller Schwartz and Cohn LLP  
350 E. Michigan Avenue, Suite 300  
Kalamazoo, MI 49007

**Re: Noise Impact Investigation of Mining Operations**  
D-bar-A Project  
Metamora Township, MI

Dear Mr. Lennon:

This letter report provides our assessment of noise due to the mining operations for the proposed D-bar-A Project. Noises from the mining operations of this project are expected to be nearly identical to those of mining operations at other American Aggregates of Michigan (AAOM) facilities. In particular, the Highland Plant was used as the basis for our evaluation of noise for the proposed project. Through detailed measurements and standardized methods of noise prediction, we constructed a multi part acoustic model of the proposed project that follows the phased plan of the mining progress. With this model we have evaluated the expected worst case scenarios for each phase of work and, as needed, have made modifications to berm elements to keep noise within the local ordinance noise limits at potential noise receiving properties. The details of this work are provided below.

### **Proposed Mining Site**

The proposed mining site is to be located in Metamora Township and includes land that would be leased from the Boy Scouts of America (BSA) D-bar-A Ranch and a property referred to as the Guy Parcel. A general layout of this proposed mining site and phases of work are shown in **Exhibit 1**. Also included in this exhibit is the surrounding community to which this noise evaluation is being made. The details used to construct our acoustic model of this proposed mining plan were provided to us by the Edw. C. Levy, Co. (the parent company of AAOM), which included site plans, topographic data, and reclamation plan.

### **Noise Criteria**

Noise from the mining operations would be subject to the noise criteria of Metamora Township, which regulates the amount of noise that emanates from the proposed land use, as sound levels measured at the shared property line.

The Township of Metamora has provisions to limit noise in Zoning Ordinance No. 23, Section 1517 - *Performance Standards*, subsection F – *Noise*. It reads as follows:

*No operation or activity shall cause or created noise that has any annoying or disruptive effect on adjoining properties, that becomes a nuisance to adjacent uses and/or that exceeds the sound levels prescribed below, using an A-weighted decibel scale dB(A), when measured at the lot line of any adjoining use, based upon the following maximum allowable levels for each use district:*

Zoning of Adjoining Land Use	Maximum Allowable Noise Level measured in dB(A)	
	6 am to 9 pm	9 pm to 6 am
<b>A-1, A-2, R-1, R-2, RM, MN, RC</b>	<b>60</b>	<b>45</b>
<i>O-1, B-1, B-2</i>	70	60
<i>M-1</i>	85	75

The zoning districts adjacent to the Project Site include A-1 and R-2, so the noise limits of 60 dB(A) daytime and 45 dB(A) nighttime, as outlined above, are relevant to the proposed mining operation.

### **Acoustic Modeling**

Sound is a physical phenomenon that can be readily predicted with reasonable accuracy. In order to evaluate the community noise impact of sounds generated from the proposed mining operations, we have used an advanced three dimensional software package to develop a computer model of the proposed mining site. The software package, Cadna A<sup>1</sup>, follows international standards (such as ISO 9613) to properly calculate and predict outdoor sound levels. The computer program relies on user inputs of terrain, structures, foliage, obstacles, sound reflective and absorptive surfaces, receiver positions, as well as sources of sound from point sources, line sources, area sources as well as vehicular traffic on roadways. By using this predictive tool we have constructed a virtual acoustic model of the proposed mining site and adjacent community such that we can evaluate the sound levels expected from its operation.

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<sup>1</sup> DataKustik GmbH, Munich, Germany [www.datakustik.de](http://www.datakustik.de)

### **Noise Sources**

The proposed D-bar-A Project includes a sand and gravel mining operation that would produce a washed product. The noise producing equipment associated with the mining operations are expected to include:

- Excavator (such as the John Deere 600)
- Dozers (such as the Caterpillar D8K)
- Scrapers [AKA Pan] (such as the Caterpillar 631G)
- Articulated Dump Trucks (such as the Caterpillar 745C)
- Front End Wheel Loader (such as the Caterpillar 988F)
- Raw Product Sorting and Washing Plant
- Rock Sorting and Washing Plants
- Rock Crushing Equipment
- Sand Sorting and Washing Plant

These sources were measured at the American Aggregate Highland Plant, an AAOM mining operation that utilizes mining and extraction equipment very similar to the proposed operation in Metamora Township. We visited the site with precision sound measuring instrumentation and captured the sound level and spectrum of the various pieces of equipment at defined distances under working conditions. The results of these measurements were used as input for the noise sources of the acoustic model.

### **Model Construction**

The model was constructed using the D-bar-A Project site plan with topographical data. Satellite imagery was also used to help reference the locations of existing structures and other features of the site and surrounding community. The base model construction, from which the phases of mining were additionally modeled, is shown in **Exhibit 1**. For each of the models described below, noise producing equipment has been positioned to produce the highest sound levels for adjoining properties. Additionally, more equipment has been included in the model than might normally be used in the modeled operations. This is considered as a conservative, worst-case condition that demonstrates noise impact for a wide variety of potential equipment operating locations.

### **Construction of Berms and Stripping Operations**

For the purposes of modeling the worst case condition, the proposed equipment was placed in the model at the current, pre-mining grade elevations of the site. Equipment utilized in the stripping of topsoil, topsoil stockpiling, and berm creation (including dozers, pan scrapers and dump trucks) will operate at these grade elevations for a limited number of days during the year. According to AAOM, the typical topsoil stripping and related activities occurs annually, preparing the land for the next year or two of mining activity. As such, the stripping equipment will be active on a small parcel of land each year, ranging from 10 to 15 acres, and for a limited duration, typically two to four weeks. Once topsoil stripping and site preparation is completed, the extraction of the sand and gravel occurs from the base of the mining floor, well below the existing grade and utilizing the mining face and constructed berms as a barrier for transmitting noise impacts toward neighboring properties.

The noise assessment model and the recommendations below assume two scenarios: a berm construction/stripping phase that the earthmoving equipment will operate at the existing grade directly adjacent to the mining setback and extraction operations at the mining floor. Clearly the berm construction/stripping phase is a worst case scenario, and one in which is necessary in order to construct the recommendations of noise mitigation berms for compliance with the township ordinances. The actual berm heights may vary somewhat based on mining activities, variation in grade and proximity to adjacent residential properties.

The modeling results for the berm construction/stripping operations for each mining phase are provided in **Exhibits 2-6**. The sound levels shown in these modeling results represent maximum equipment sound levels that occur for brief periods of time during the represented operations. Additionally, as part of the worst case scenario, either an excavator with articulating dump trucks or a pan scraper with dozer would be used for the stripping operations, but not both. Both are included in the model to show the potential noise impact for each of these equipment options. While these construction operations are expected to be greater than the 60 dB(A) daytime residential noise limit, the sound levels may range from 60 to 70 dB(A) for limited periods of time as described above. The level and general character of this sound is comparable to a semi-truck and trailer passing at 45MPH at a distance of 200 feet.

Noise from this equipment is expected to be below the 60 dB(A) daytime residential noise limit when it is 600 to 800 feet from the property line depending on foliage and topography between the equipment and the property line.

### **PHASE I**

The results of the proposed Phase I mining activity are provided in **Exhibit 7**. This model shows the Phase I mining area, on the east side of the BSA lease parcel, including the aggregate sorting and washing plants. With 10' to 12' high earth berms along the property line to the south and east, mining operations in the Phase I area are expected to comply with the township noise ordinance at residential properties. The property directly south of the proposed plant is used for aggregate mining. The slight excess of projected sound on the north end of this site is not expected to create meaningful impact. However, if further noise control is needed to reduce the

level below 60 dB(A) the berm may be increased up to 16 feet in this limited area.

## **PHASES II, III, IV**

The results of proposed mining Phases II, III and IV are provided in **Exhibits 8, 9 & 10**. These modeling results show mining operations along the west side of the BSA lease parcel. Most mining operations will occur at an elevation that is significantly lower than adjacent residents to the west. This significant elevation difference will shield most of the noise of the mining operations produced by loaders and vehicles traveling in these lower elevations. Berms along the west and south property lines with a height of 12 to 16 feet are recommended to control residual noise from mining operations and overburden clearing operations. Under these conditions, mining operations for the Phases II, III, & IV areas are expected to comply with the township noise ordinance.

## **PHASE V**

The results of the proposed Phase V mining are provided in **Exhibit 11**. These modeling results show the Phase V mining area that is located on the Guy Parcel. With 12 to 16 foot high berms along the property line to the south and east, mining operations for the Phase V area are expected to comply with the township noise ordinance.

## **Trucks on Site**

Trucks coming to the D-bar-A Project are expected to enter a drive from Dryden Road that is roughly centered on the south property line of the Guy Parcel. The drive is planned to extend toward the east adjacent to the south property line before turning north along the east property line. Trucks traveling and standing along this drive are expected to contribute some noise along this area of the project site. The 12 foot high berms along the property lines adjacent to this drive, as recommended for mining operations, are expected to provide significant shielding for noise from these trucks. **Exhibits 12 & 13** show the modeling results of trucks moving and idling along this drive. In both situations, truck noise is significantly reduced by the berms and is expected to have sound levels less than 45 dB(A) at adjacent residential properties, well below the ordinance limit.

**Impact Summary**

The proposed mining operation will generate additional noise in the vicinity of the project through the use of earthmoving equipment for the installation of berms and topsoil stripping, processing equipment to prepare the raw sand and gravel for sale, and pit equipment used for extracting the sand and gravel from the ground. Metamora Township has enacted a noise performance standard through which sound levels are measured and enforced by the township. This noise assessment was prepared to evaluate the proposed mining operations and recommend mitigation measures through which the noise generated by the mining operations can be managed to be within the standards established by Metamora Township.

Based on this assessment and the proposed mitigation measures, the mining operation can be conducted within township standards. The construction of noise reducing berms and initial stripping in a given phase may result temporary noise levels above township standards, but this impact is limited in scope and duration, and is necessary for the construction of the noise controlling berms which reduce potential long term impacts.

Mr. Lennon, we hope the information contained in this report is helpful in the development of the D-bar-A Project. If there is any additional assistance we can provide you, don't hesitate to contact us.

Sincerely,  
KOLANO AND SAHA ENGINEERS, INC.

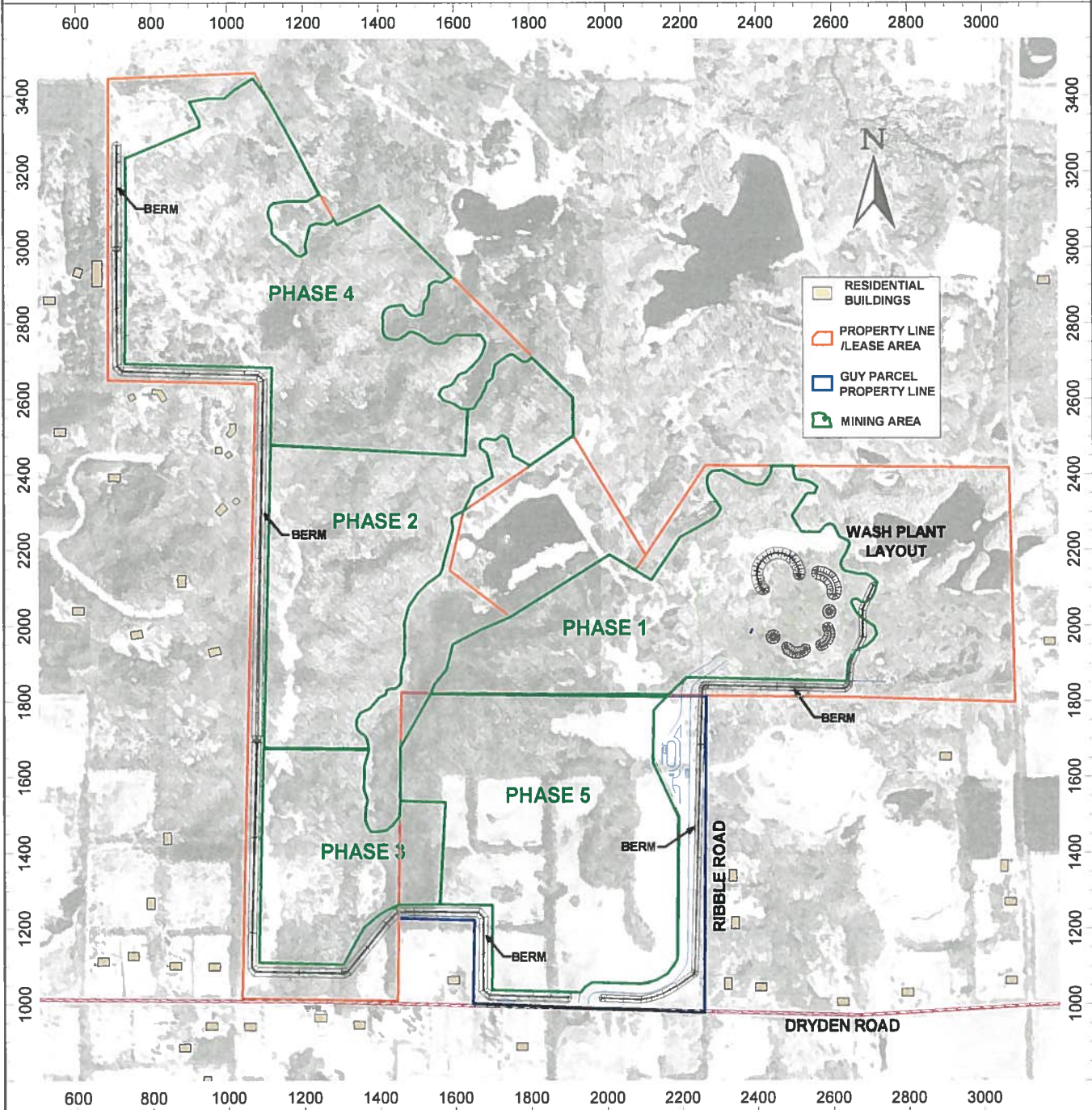


Darren Brown, P.E.  
INCE Board Certified  
Consultant



## EXHIBIT 1

### D-bar-A Project Site Layout with Phases of Mining on the Boy Scouts of America Lease Area and Guy Parcel with Adjacent Residential Properties and Homes



Kolano and Saha Engineers, Inc. - 3559 Sashabaw Road, Waterford, MI 48329

Project No.  
2015-125

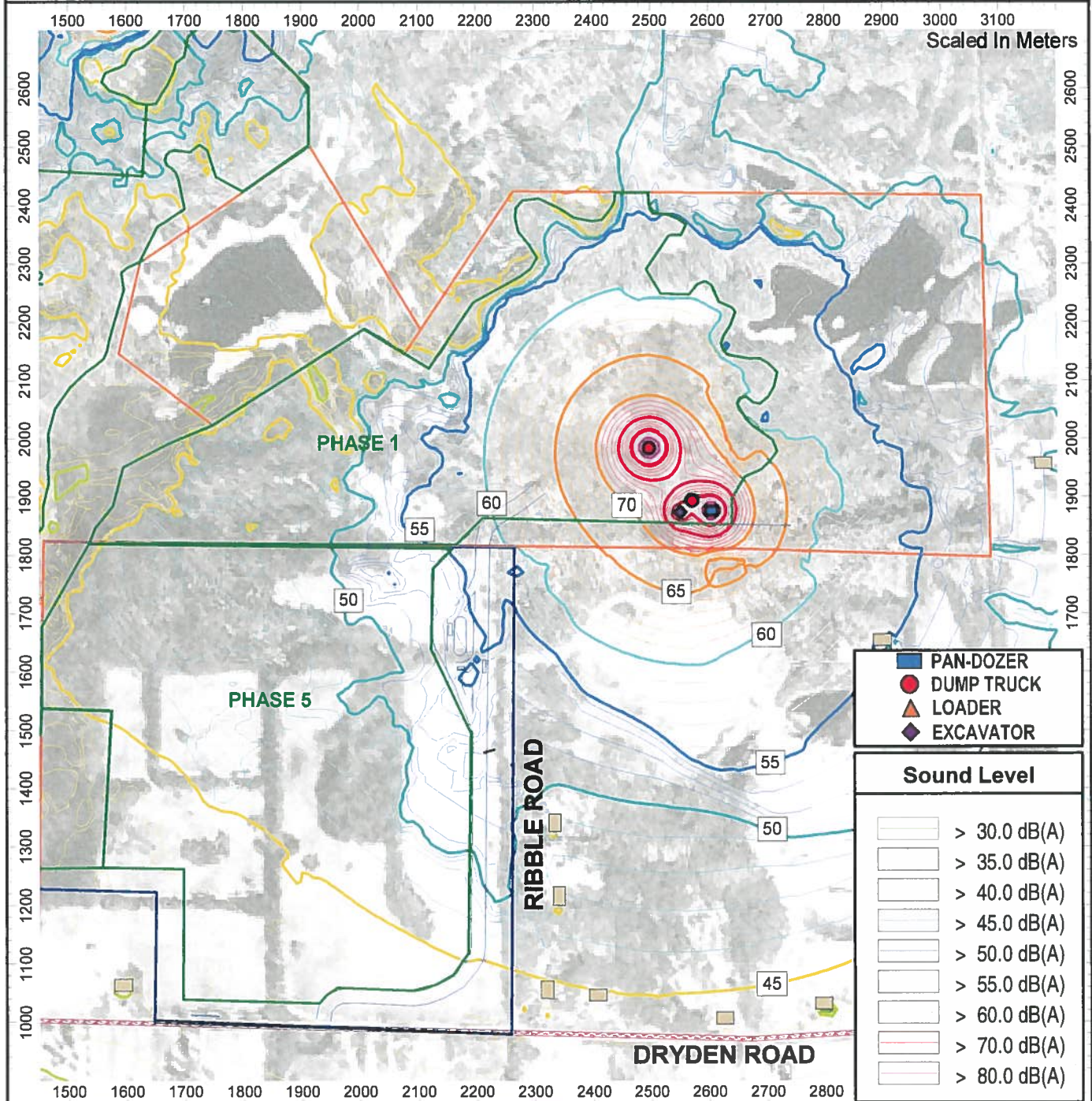
D-bar-A Project  
Conducted for: American Aggregates of Michigan

Sound Level Evaluation Modeling Conducted on - Oct. 5, 2015



## EXHIBIT 2

### SOUND LEVEL EVALUATION OF PHASE I of the D-bar-A Project Berm Construction and Stripping Operations



Kolano and Saha Engineers, Inc. - 3559 Sashabaw Road, Waterford, MI 48329

Project No.  
2015-125

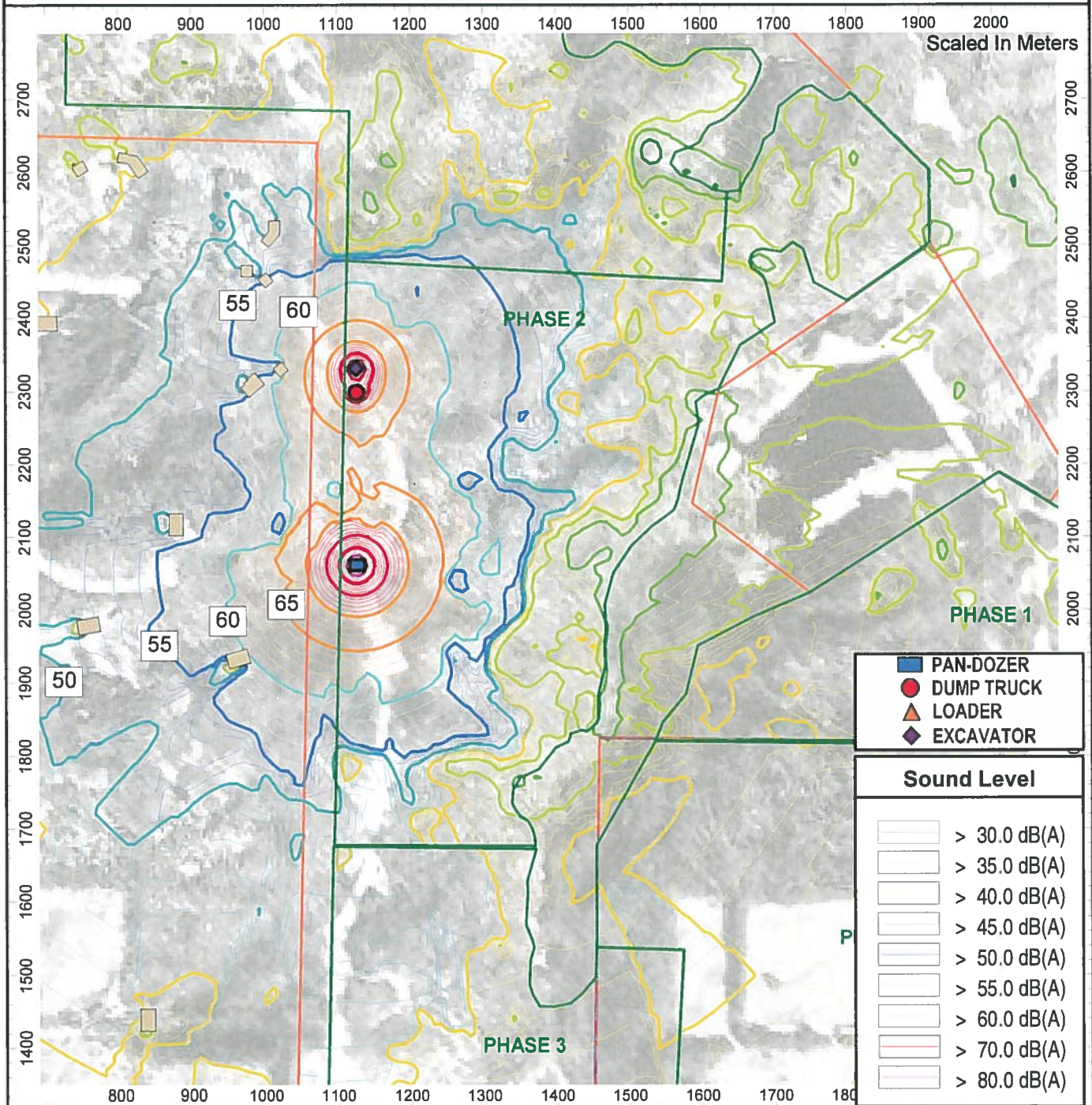
D-bar-A Project  
Conducted for: American Aggregates of Michigan

Sound Level Evaluation Modeling Conducted on - Oct. 5, 2015



# EXHIBIT 3

## SOUND LEVEL EVALUATION OF PHASE II of the D-bar-A Project Berm Construction and Stripping Operations



Kolano and Saha Engineers, Inc. - 3559 Sashabaw Road, Waterford, MI 48329

Project No.  
2015-125

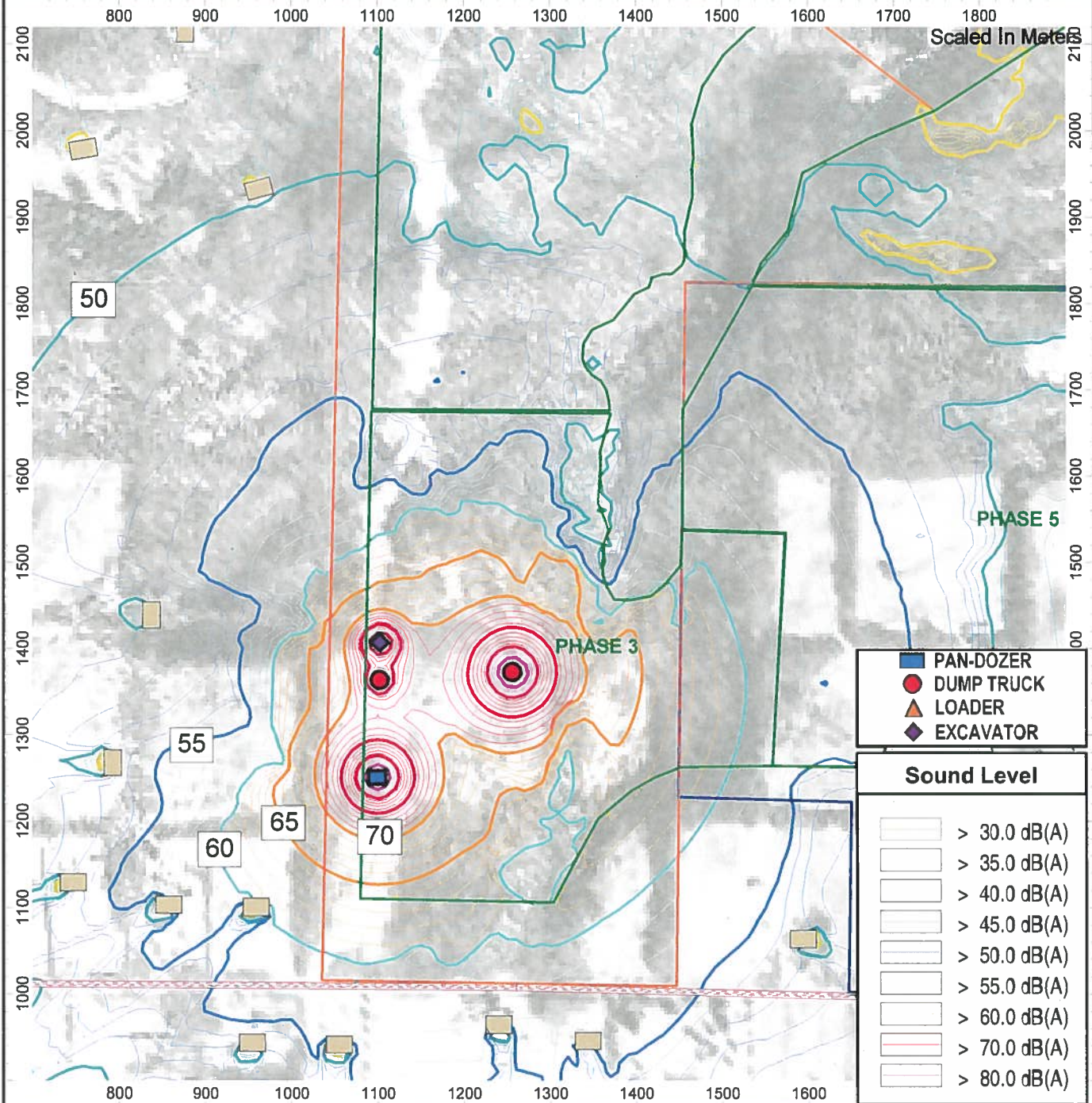
D-bar-A Project  
Conducted for: American Aggregates of Michigan

Sound Level Evaluation Modeling Conducted on - Oct. 5, 2015



# EXHIBIT 4

## SOUND LEVEL EVALUATION OF PHASE III of the D-bar-A Project Berm Construction and Stripping Operations



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Project No.  
2015-125

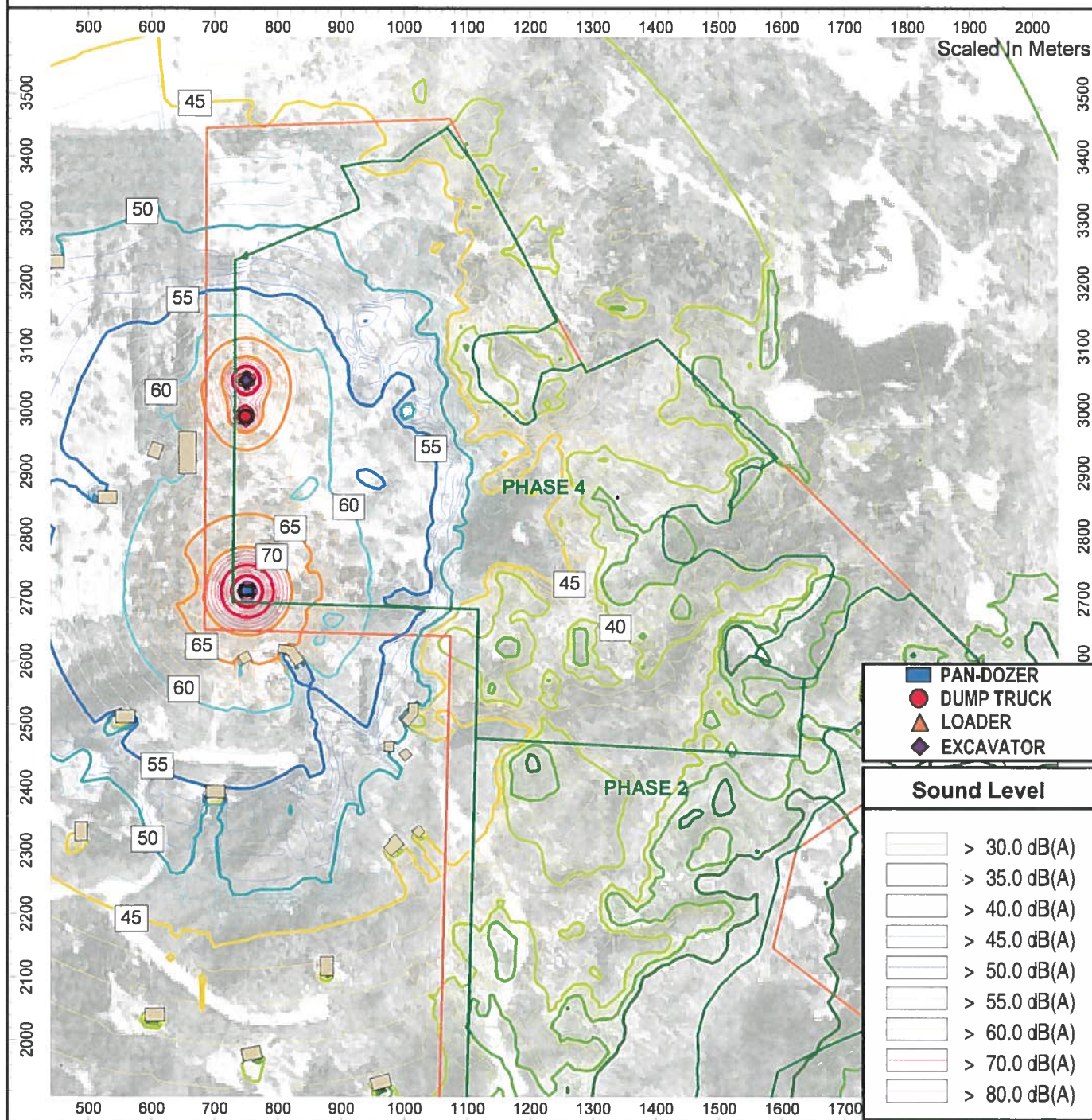
D-bar-A Project  
Conducted for: American Aggregates of Michigan

Sound Level Evaluation Modeling Conducted on - Oct. 5, 2015



# EXHIBIT 5

## SOUND LEVEL EVALUATION OF PHASE IV of the D-bar-A Project Berm Construction and Stripping Operations



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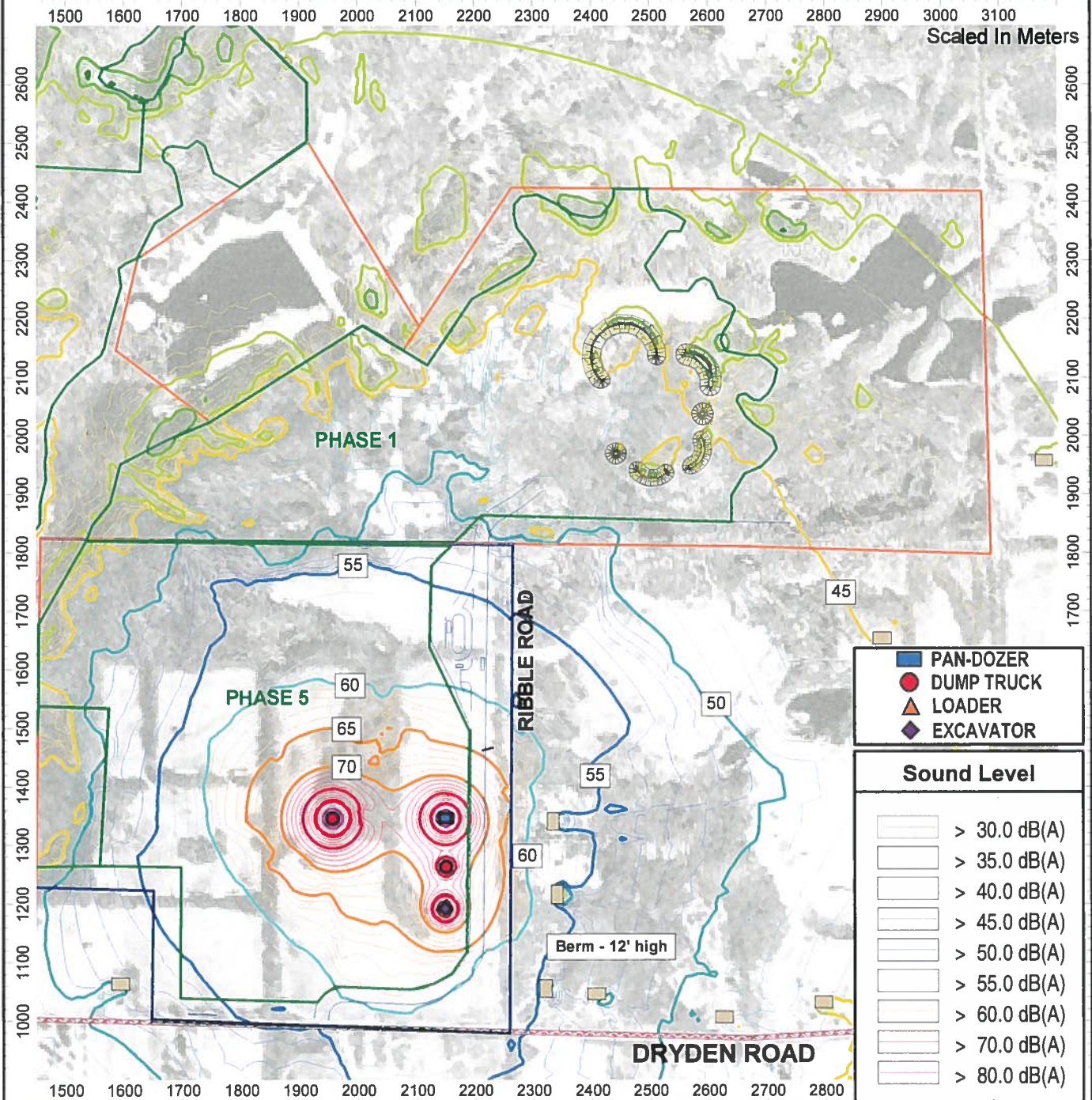
D-bar-A Project  
Conducted for: American Aggregates of Michigan

Sound Level Evaluation Modeling Conducted on - Oct. 5, 2015



# EXHIBIT 6

## SOUND LEVEL EVALUATION OF PHASE V of the D-bar-A Project Berm Construction and Stripping Operations



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2015-125

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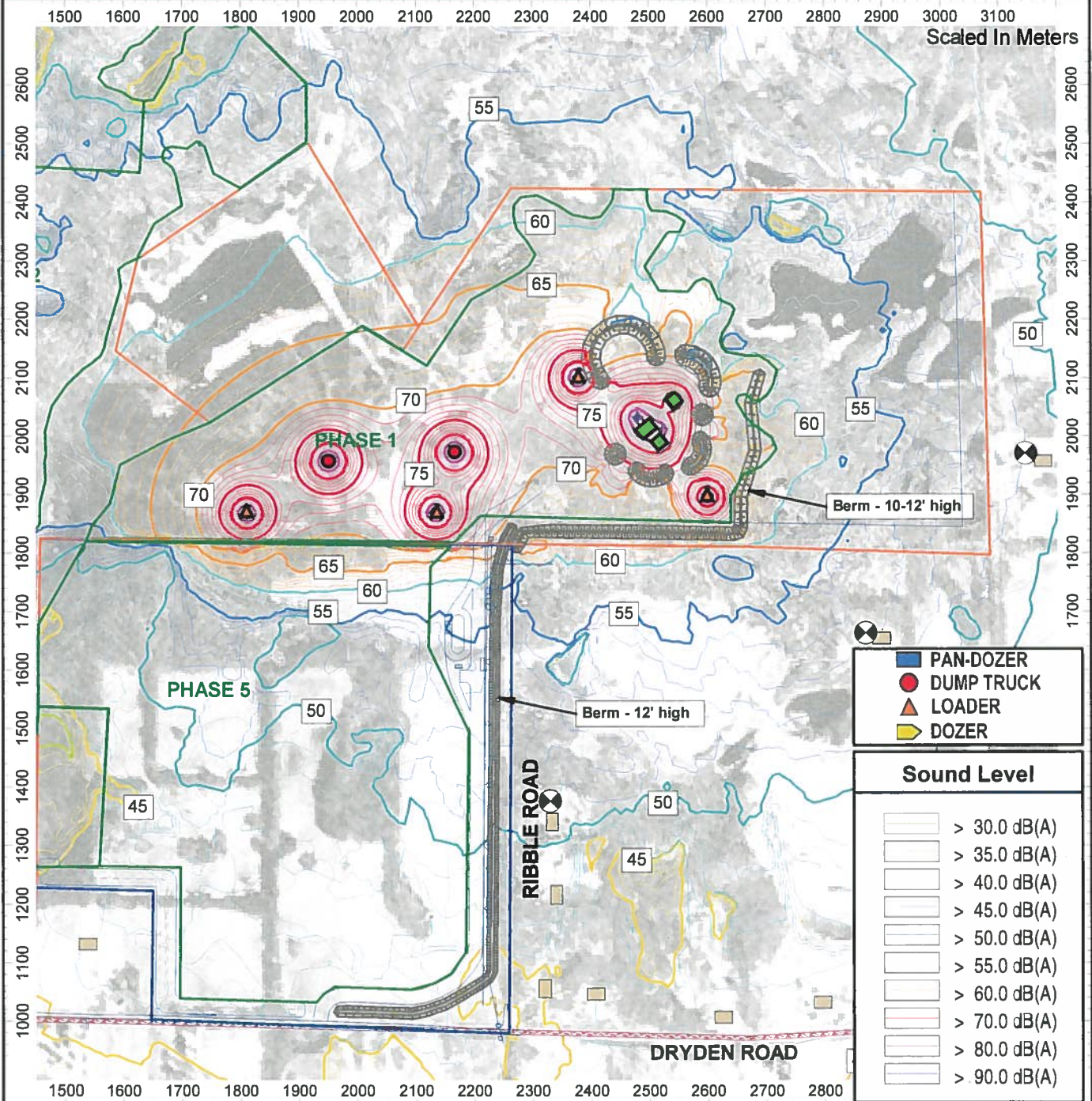
Sound Level Evaluation Modeling Conducted on - Oct. 5, 2015



# EXHIBIT 7

## SOUND LEVEL EVALUATION OF

### PHASE I of the D-bar-A Project



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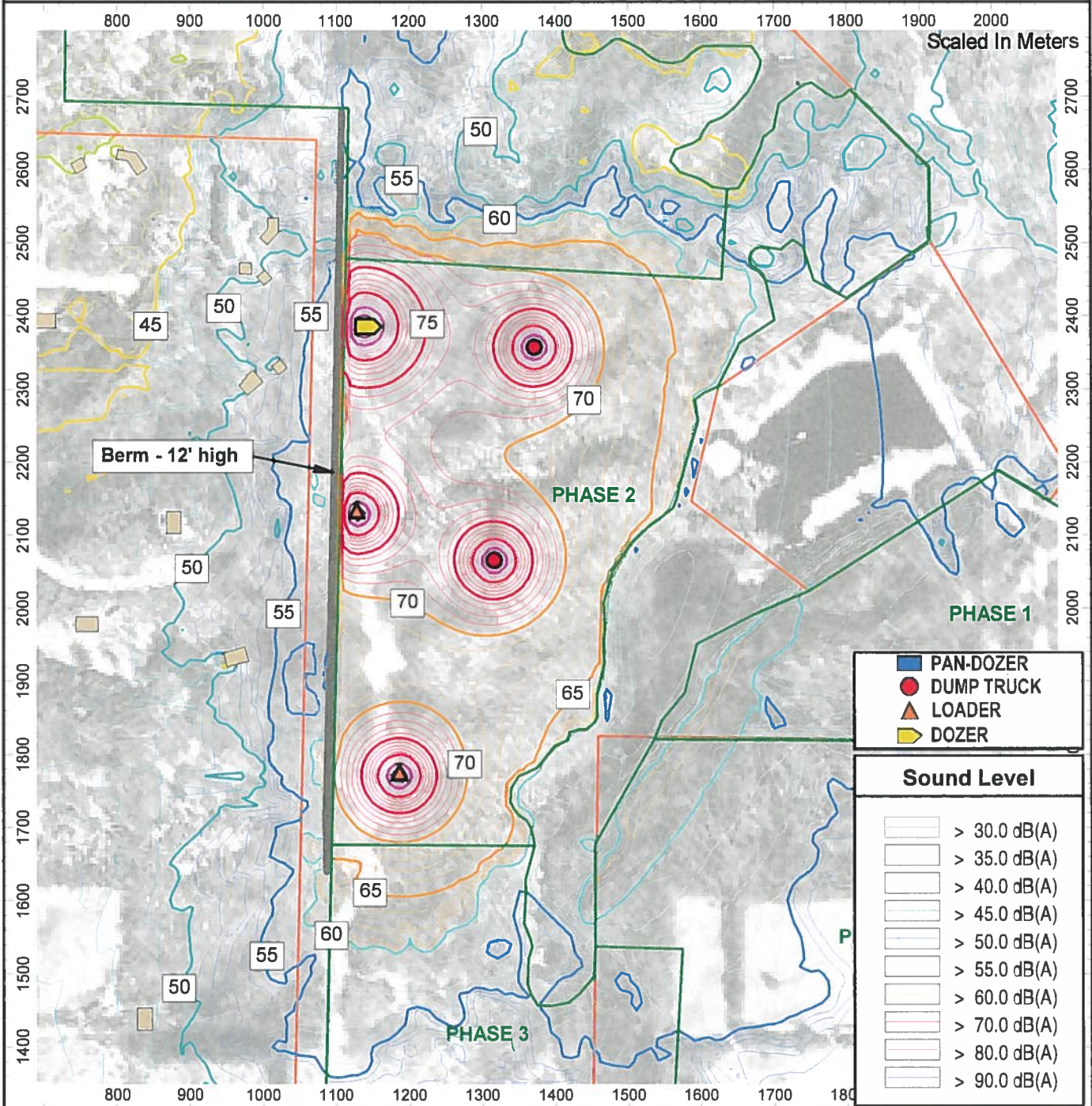
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# EXHIBIT 8 SOUND LEVEL EVALUATION OF PHASE II of the D-bar-A Project



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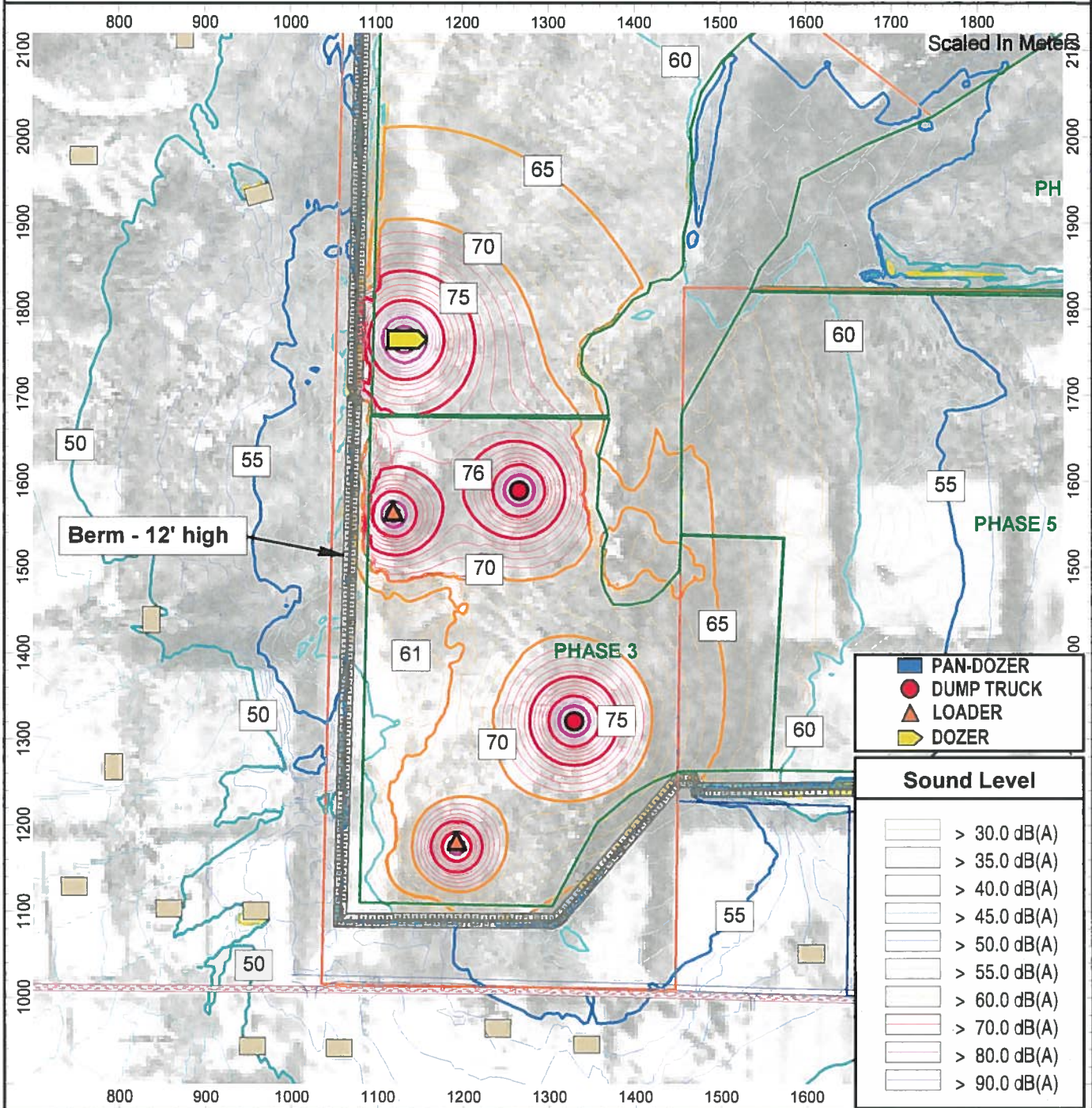
Project No.  
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# EXHIBIT 9 SOUND LEVEL EVALUATION OF PHASE III of the D-bar-A Project



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Project No.  
2015-125

D-bar-A Project  
Conducted for: American Aggregates of Michigan

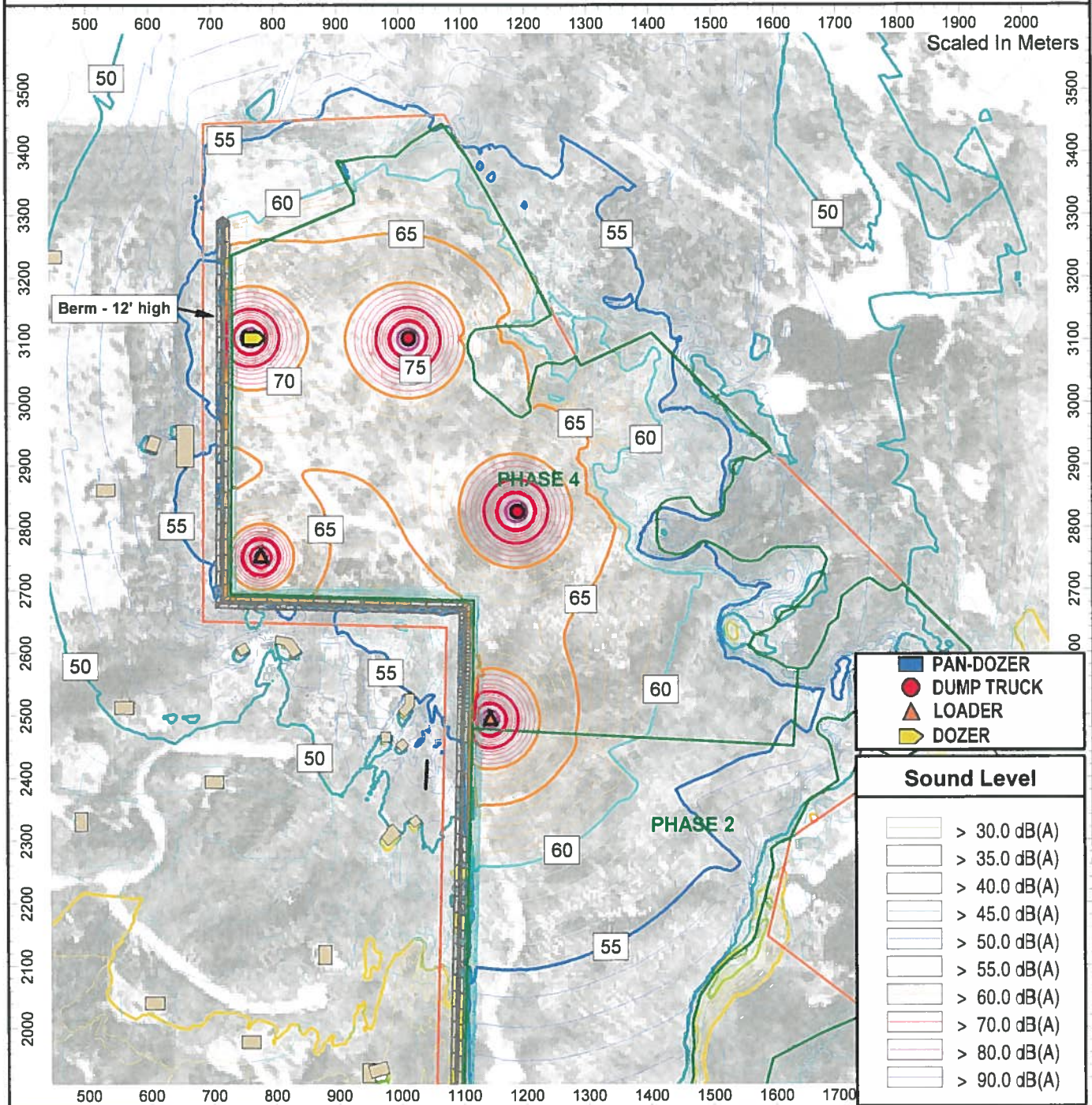
Sound Level Evaluation Modeling Conducted on - Oct. 5, 2015



# EXHIBIT 10

## SOUND LEVEL EVALUATION OF

### PHASE IV of the D-bar-A Project



Kolano and Saha Engineers, Inc. - 3559 Sashabaw Road, Waterford, MI 48329

Project No.  
2015-125

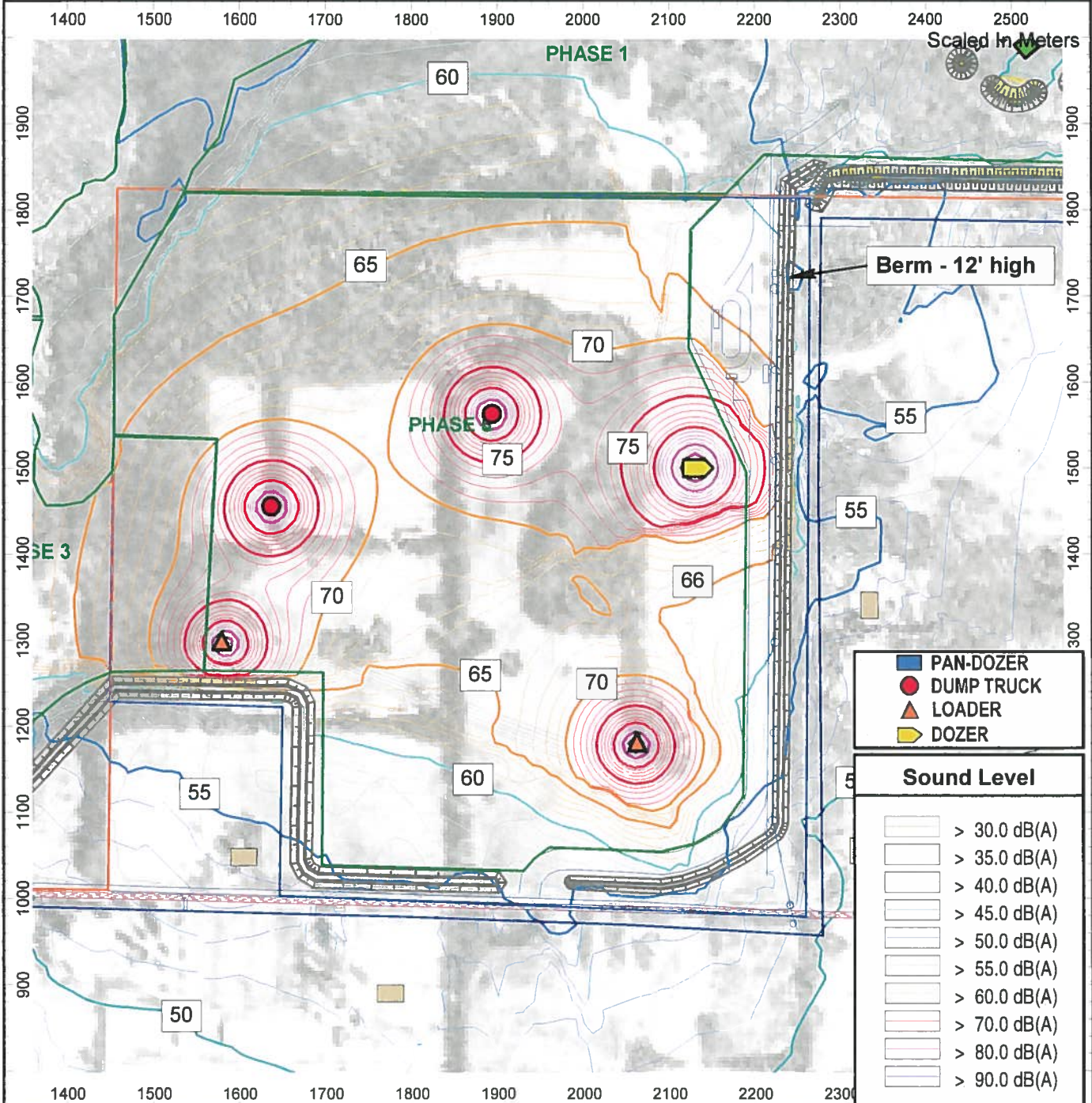
D-bar-A Project  
Conducted for: American Aggregates of Michigan

Sound Level Evaluation Modeling Conducted on - Oct. 5, 2015



# EXHIBIT 11

## SOUND LEVEL EVALUATION OF PHASE V of the D-bar-A Project



Kolano and Saha Engineers, Inc. - 3559 Sashabaw Road, Waterford, MI 48329

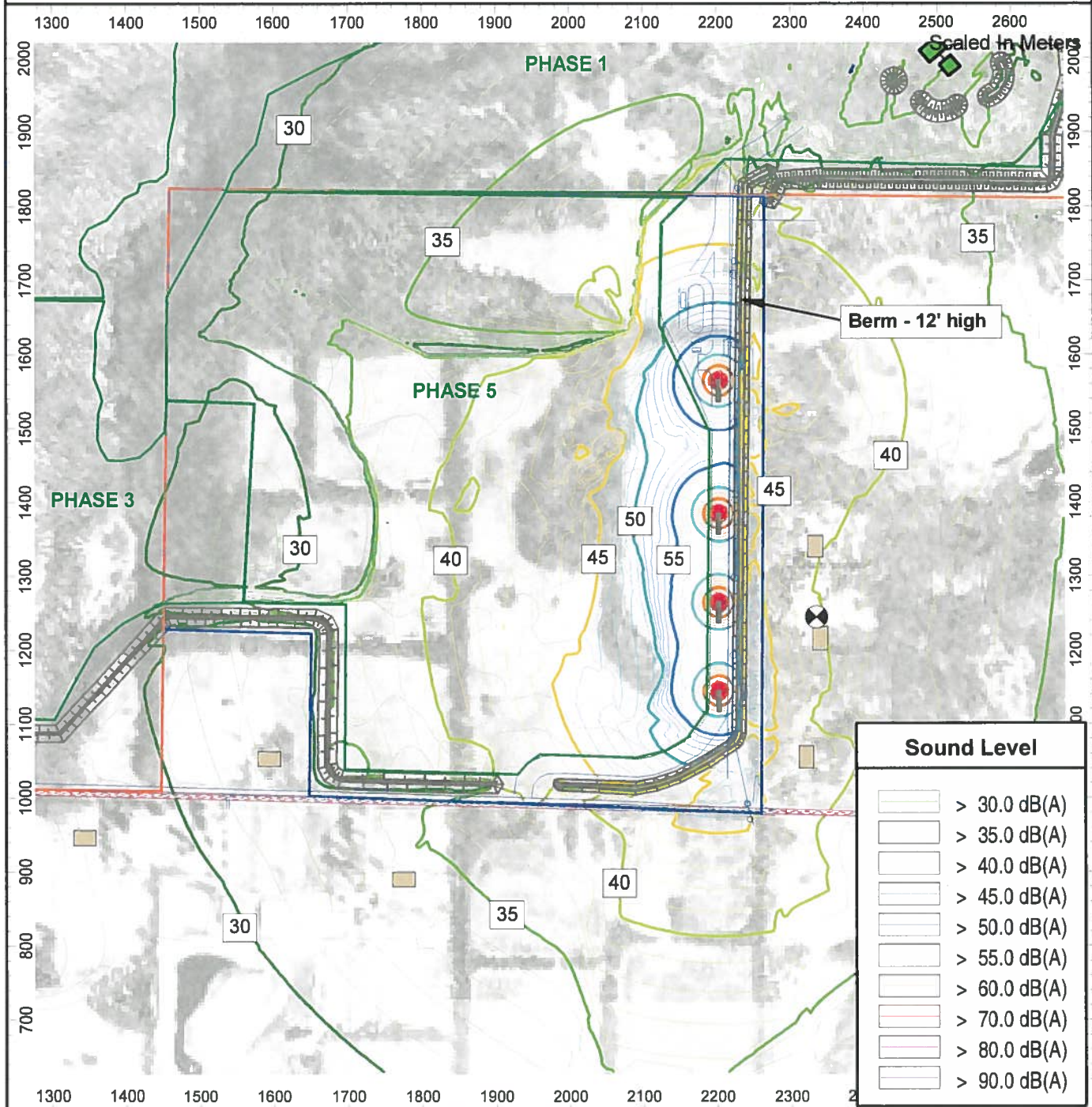
Project No.  
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D-bar-A Project  
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Sound Level Evaluation Modeling Conducted on - Oct. 5, 2015



**EXHIBIT 12**  
**SOUND LEVEL EVALUATION OF**  
**Trucks Moving on the Drive of the D-bar-A Project**



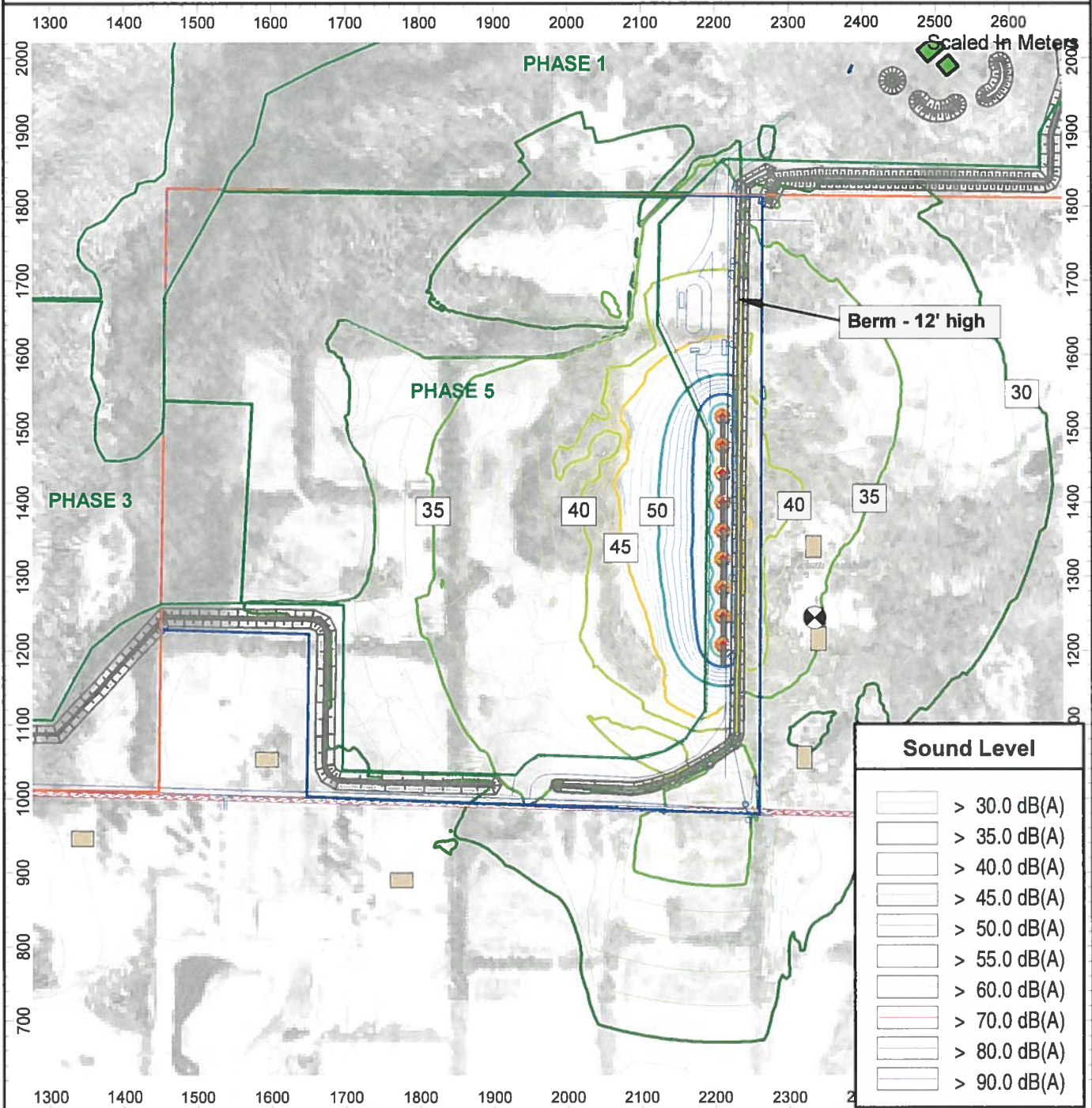
**Kolano and Saha Engineers, Inc. - 3559 Sashabaw Road, Waterford, MI 48329**

Project No.  
2015-125

D-bar-A Project  
Conducted for: American Aggregates of Michigan

Sound Level Evaluation Modeling Conducted on - Oct. 5, 2015

**EXHIBIT 13**  
**SOUND LEVEL EVALUATION OF**  
**Trucks Idling on the Drive of the D-bar-A Project**



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Project No.  
2015-125

D-bar-A Project  
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