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January 11, 2011

Mr. Jeremy Vink  
Planner  
Township of Woolwich  
24 Church Street West  
PO Box 158  
Elmira, Ontario  
N3B 2Z6



Dear Mr. Vink:

**PEER REVIEW - ACOUSTICAL STUDY  
HUNDER DEVELOPMENT - PROPOSED HUNSBERGER PIT**

Further to the peer review comments from Valcoustics Canada Ltd. dated October 14, 2010 please find enclosed herein IBI Group's response.

I trust that you will find the attached satisfactory. Should you have any questions, please do not hesitate to call.

Yours truly

**IBI GROUP**

David R. Sisco, BA, MCIP, RPP  
Associate, Principal – Planning

DRS/baw  
Encl.

cc: Bob Hunsberger, Hunder Development Ltd.  
John Emeljanow, Valcoustics Canada Ltd.



IBI Group  
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January 7, 2011

Mr. John Emeljanow  
Valcoustics Canada Ltd.  
30 Wertheim Court Unit 25  
Richmond Hill, Ontario  
L4B 1B9

Dear Mr. Emeljanow:

**PEER REVIEW OF ACOUSTICAL STUDY - ZONE CHANGE 8/2009 (HUNDER DEVELOPMENT LTD.)**

We are in receipt of your peer review comments dated October 14, 2010 and we provide the following response.

We have addressed your comments and prepared a revised noise study which has also been updated using new pit floor elevations.

In specific reference to your October 2010 comments, we offer the following. Please note that the point numbers refer to Valcoustics' comment numbers for ease of reference.

- 1) No comment
- 2) We maintain that the MOE Area classification is defined as written in NPC-205 and NPC-232. This classification is based on population and area characteristics. As the subject receivers are in the Community of Conestogo, and not in remote locations, the Class 2 definition for Conestogo Estates applies in our opinion.
- 3) The analysis is represented through Receiver B which examines all the sensitive receivers along River Run Place and the acoustical report identifies the worst case location. Note, we re-positioned the receiver location slightly on the plan.
- 4) The existing Hunsberger dwelling is proposed to be used as an office and as such is not a noise sensitive use. The existing Snyder dwelling is not proposed to be part of the pit operation and as such, the analysis has been revised to account for this receptor location.
- 5) On site truck movements were accounted for in the analysis. Idling trucks and refuelling equipment have a noise profile less than that of hauling trucks and we would deem them also to be included in the analysis. We have added a recommendation that truck idling be minimized by restricting the maximum duration a truck can idle to 5 minutes.
- 6) There are no specific MOE guidelines for off-site vehicles and noise. However, the MOE has prepared a draft document entitled "Noise Guidelines for Landfill Sites" from October 1998. We have added a section to the revised report in this regard.

Mr. John Emeljanow – January 7, 2011

- 7) Agreed, no comment.
- 8) Agreed, no comment.
- 9) The CadnaA reports are enclosed.

We trust that this information is satisfactory. Should you have any questions or concerns, please do not hesitate to contact the undersigned.

Yours truly

**IBI GROUP**

Handwritten signature of Trevor O'Brien, consisting of stylized initials 'TOB' with a horizontal line extending to the right.

Trevor O'Brien, B.Eng  
Engineer in Training

Handwritten signature of John Perks, consisting of stylized initials 'JP' with a horizontal line extending to the right.

John Perks, P.Eng, MBA  
Associate, Manager - Engineering

Hunder Development Ltd.

**HUNSBERGER PIT  
ACOUSTICAL STUDY**

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**FINAL**

**OCTOBER 2008  
REVISED DECEMBER 2010**



**DOCUMENT CONTROL**

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## 1. PREFACE

An initial report was completed by IBI (dated April 2009) and was part of the overall circulation completed for the planning process. As a result of the Township peer review completed by Valcoustics (dated February 22<sup>nd</sup>, 2010 and October 14, 2010) and modifications to some physical characteristics of the pit, this revised report has been prepared.

Generally, the more significant revisions include:

- Using multiple land area classifications (MOE) so as to recognize a small cluster of sensitive noise receivers (Conestogo residents) as Class 2 (urban). The balance of the receivers are Class 3 (rural).
- Considering cumulative impacts resulting from both the Jigs Hollow Pit and Hunsberger Pit operating concurrently.
- Pit operational adjustments, including extraction operation's proximity to the pit face.
- Pit floor elevation adjustments as a result of revised information provided by the hydrogeologist.
- Finally, modelling was updated utilizing the software CadnaA version 3.72, and octave band noise levels were used to more accurately model noise impacts.

## 2. INTRODUCTION

IBI Group was retained to conduct an acoustical study to examine the impacts of noise created by the excavation and processing of material within the limits of a proposed aggregate pit, and if necessary, recommend mitigation.

The proposed aggregate pit is referred to as the Hunsberger Pit and is located northeast of the Community of Conestogo. The pit is divided into two parts by Hunsberger Road. The northern portion of the pit is bounded by Regional Road 23 (Katherine Street) to the east, the Grand River to the northwest, Hunsberger Road to the south and existing residential to the north and west. The southern portion is bounded by Hunsberger Road to the north, and existing agricultural land to the east, west and south. Refer to the Noise Information Plan (Appendix A) for the location and pit layout.

The total property ownership is approximately 161.8 ha with a licensed area of 86.1 ha and a proposed area of extraction of approximately 59.8 ha. The Noise Information Plan also shows the surrounding lands and was used to locate sensitive receivers and establish existing and proposed elevations.

### 3. BACKGROUND AND NOISE CRITERIA

The MOE has developed a classification system for various acoustical environments. The following text is taken directly from the Class definitions from NPC-205 and NPC-232.

*"Class 1 Area" means an area with an acoustical environment typical of a major population centre, where the background noise is dominated by the urban hum.*

*"Class 2 Area" means an area with an acoustical environment that has qualities representative of both Class 1 and Class 3 Areas, and in which a low ambient sound level, normally occurring only between 23:00 and 07:00 hours in Class 1 Areas, will typically be realized as early as 19:00 hours.*

*Other characteristics which may indicate the presence of a Class 2 Area include:*

- *absence of urban hum between 19:00 and 23:00 hours;*
- *evening background sound level defined by natural environment and infrequent human activity; and*
- *no clearly audible sound from stationary sources other than from those under impact assessment.*

*"Class 3 Area" means a rural area with an acoustical environment that is dominated by natural sounds having little or no road traffic, such as the following:*

- *a small community with less than 1000 population;*
- *agricultural area;*
- *a rural recreational area such as a cottage or a resort area; or*
- *a wilderness area.*

Conestogo is primarily a residential community with a population of 1,235 (per the 2006 census). This type of community will realize daytime noise such as cars, lawn mowers, air conditioning and other human activity while the nighttime noise profile is more typical of a rural setting. Accordingly, a Class 2 category is appropriate for receivers in or near this community.

Those residential dwellings within proximity of the pit that are further removed from the settlement of Conestogo will be assumed to be in a "Class 3" area as defined by the Ministry of Environment (MOE).

The specific classifications for the various sensitive receivers are listed in Table 3 of this report.

The pit noise level criteria are to conform to NPC-205 "Sound Level Limits for Stationary Sources in Class 1 & 2 Areas (Urban)" and NPC-232 "Sound Level Limits for Stationary Sources in Class 3 Areas (Rural)" which are summarized in Table 1.

**Table 1 – MOE Noise Criteria**

Time of Day	Noise Level (dBA) Class 2	Noise Level (dBA) Class 3	Requirement
0700-1900	Less than or equal to 50	Less than or equal to 45	No control required
	Greater than 50	Greater than 45	Physical control required
1900-2300	Less than or equal to 45	Less than or equal to 40	No control required
	Greater than 45	Greater than 40	Physical control required
2300-0700	Less than or equal to 45	Less than or equal to 40	No control required
	Greater than 45	Greater than 40	Physical control required

There are three distinct stages in a pit's life which are described as follows:

**Stage 1: Initial Start-up Stage** – This stage is the first activity of a pit's life. It involves the stripping of topsoil and sub-soil (overburden) to expose the underlying aggregate. Typically this stripped material is used to construct visual and/or noise berms at the limits of the pit. Construction equipment involved in this stage would include but is not limited to scrapers, bulldozers and haul trucks. This stage is relatively short in duration in comparison to the life of a pit and can be considered the start-up "construction stage" of the pit.

**Stage 2: Extraction and Processing** – This stage involves the aggregate extraction and processing. The extraction of the aggregate is typically done using front-end loader(s) working at the pit face. The loader(s) deposit the aggregate into trucks either for transport to market or for transport to the processing area if the aggregate is to be processed. Depending on the setup of the pit, a conveyor may be used in place of the truck to transport the aggregate to the processing area and/or stockpiles.

Depending on the type of aggregate, processing of the aggregate may be needed. A screener may be used at the pit face to pre-process the aggregate before transport. The screener would move with the extraction operation. As well, if the aggregate needs further processing, a crusher can be used to process the aggregate into different products (e.g., Granular A, etc.).

**Stage 3: Rehabilitation Stage** – Once all the aggregate has been extracted from a particular extraction phase, the worked-out phase is rehabilitated. This would involve the spreading of the previously stripped sub-soil and topsoil onto the floor of the pit from the surrounding berms as specified in the rehabilitation portions of the pit application. Equipment involved in this stage typically includes but are not limited to scrapers, bulldozers and haul trucks. This stage can be considered the ending "construction stage" of the pit.

Noise levels from the first (Start-up Construction Stage) and last (Rehabilitation or Ending Construction Stage) stages are governed by the MOE Guideline NPC-115. This Guideline stipulates certain requirements for construction equipment.

The middle stage of the pit is the "Extraction and Processing" stage and is the longest of the three stages as this stage involves the majority of the pit activity. The pit is proposed to be divided into nine (9) phases for extraction. Each phase is to be completed sequentially. Within each phase of

the proposed aggregate pit the typical equipment to be in operation includes three (3) front end loaders, a screener, and haul trucks.

There are several aspects to the extraction stage that create acoustical impacts and each of these must be accounted for in the calculations of the total noise levels produced by extraction, processing and haulage within the pit. The initial aspect of extraction is the process of excavation, or mining, where two (2) front end loaders excavate material at the pit face and load aggregate into a screener that sorts the aggregate into various stockpiles by the size of the aggregate. A third front end loader transfers material from the stockpiles into trucks for haulage to the market and/or to the processing/shipping area for further processing.

The processing/shipping aspect consists of a front end loader loading aggregate into a crusher/screener to be processed to a specified size and placed in stockpiles.

The last aspect required for acoustical assessment is the transportation of processed material via haul trucks from the pit to market.

## 4. NOISE PREDICTION METHODS

The various pit operations are assumed to be stationary acoustical sources as per MOE guidelines. As specified within the MOE publication NPC-205 "Sound Level Limits for Stationary Sources in Class 1 & 2 Areas (Urban)" and NPC-232 "Sound Level Limits for Stationary Sources in Class 3 Areas (Rural)", acoustical impacts are to be determined at all existing sensitive receiver locations for times when the pit is in full operation and the ambient acoustical environment is at its minimum.

The noise level profiles produced by typical aggregate pit equipment operating within the pit have been established in previous studies and verified through ongoing monitoring. The noise levels are shown in Table 2.

**Table 2 – Reference Noise Levels**

Equipment	Sound Pressure Level (dB) by Octave Band Frequency (Hz)								
	32 Hz	64 Hz	125 Hz	250 Hz	500 Hz	1000 Hz	2000 Hz	4000 Hz	8000 Hz
Front End Loader	110.4	117.9	109.3	109.8	100.8	96.13	97.26	91.47	82.19
Screeners	99.03	112.2	109.5	105.6	99.81	101.2	105.1	97.47	93.56
Crusher	115.9	125.1	127.1	123.7	120.2	118.7	117.4	113.3	106.7
Idling Truck	104.8	106.2	99.0	95.4	94.5	96.9	92.2	86.4	76.9

Within 450m of the proposed Hunsberger pit there is another proposed aggregate pit known as the Kuntz Topsoil, Sand & Gravel - Jigs Hollow Pit. While the MOE does not require cumulative impacts from separate industries to be considered, the Township does. The noise levels and assumptions for the Jigs Hollow Pit may be found in the report entitled "Jigs Hollow Pit – Acoustical Study" prepared by IBI Group, dated May 2010.

CadnaA noise modeling software (version 3.72) was used to analyze the unabated acoustical impacts from the proposed operations within the aggregate pit at the various sensitive receiver locations for that receiver's worst case phase of operation. Once unabated acoustical impacts were established, locations of issue were identified and appropriate mitigation measures determined to reduce impacts to meet the criteria specified by the MOE.

There are a number of existing residential properties in close proximity to the proposed pit. Eight (8) receiver locations were identified to represent the surrounding existing residential development based on elevation and distance separation. Table 3 defines the receiver locations, and the Noise Information Plan (Appendix A) locates these receivers.

**Table 3 – Receiver Locations**

Receiver	MOE Class	Location
Receiver A	3	East of pit, south of Hunsberger Road (Lot 1040)
Receiver B	2	Southwest of pit (Lot 63)
Receiver C	2	West of pit, south of Hunsberger Road (Lot 1280)
Receiver D	2	West of pit, north of Hunsberger Road (Lot 209)
Receiver E	3	Northwest of pit (Lot 100)
Receiver F	3	North of pit (Lot 19)
Receiver G	3	East of pit (Lot 271)
Receiver H	3	Snyder Farm, north of pit (Lot 128)

## 5. RESULTS

### 5.1 Construction Stage

Although initial construction noise will have an impact on the surrounding receiver locations, it is neither practical nor feasible to provide external noise attenuation (i.e., noise barrier). The only practical methods are to ensure that noise emissions from the individual pieces of equipment are kept to a minimum and to limit the times of operation of this equipment.

The following outlines recommended methods for reducing noise levels from the construction activities to as great an extent as practical:

1. All construction equipment shall conform to MOE noise guidelines as set out in NPC-115.
2. The construction of the perimeter noise berms must be the first activity completed when preparing the pit.
3. Construction activities must be limited to the hours of 0700 to 1900. No construction should take place on Saturdays, Sundays or statutory holidays.
4. Construction of the berms and all additional pre-excavation preparation should if possible take place in the months of October to April, to as great an extent as possible, as windows of residents will be closed and residents would tend to be indoors to a greater extent thereby not being impacted by the construction noise.

## 5.2 Extraction and Processing Stage

All calculated acoustical levels are based on the worst case operations within the pit when it is loudest and operations are generally closest to receiver locations. Given this, it is assumed:

- Three (3) loaders working at the pit face along with a screener (refer to Section 2.0).
- Aggregate will be extracted in one lift.
- The pit floor will be approximately 3.0m to 8.0m below existing grade depending on the location in the pit.

Based on the projected haulage of the pit, there will be an estimated six trucks entering and leaving the site per hour (i.e. 12 trips per hour) which is an average and can change as the demand for aggregate increases or decreases. For a worst case, 10 trucks were modeled entering and 10 trucks were modeled exiting the pit for a total of 20 trucks movements per hour. The assessment distance used for the on-site haul trucks to each receiver location is the shortest distance between the path of the truck and the receiver.

Finally, a processing area will exist on site consisting of a crusher, screener and a front end loader.

Table 4 summarizes the predicted unattenuated noise levels that would be experienced at the receiver locations from the various independent pit operations as calculated using CadnaA. As discussed previously, the neighbouring Jigs Hollows Pit worst case noise levels are included to produce accumulated total noise levels.

**Table 4 – Unattenuated Noise Levels**

Receiver Location	Worst Case Phase	Hunsberger (dBA)	Jigs Hollows (dBA)	Combined Total (dBA)	MOE Criteria (dBA)
Receiver A	6	60.3	32.9	60.3	45
	2	49.4	32.9	49.5	45
Receiver B	3	57.9	33.8	57.9	50
Receiver C	3 & 7	56.0	35.1	56.0	50
Receiver D	7 & 8	55.2	41.2	55.4	50
Receiver E	5	53.2	35.5	53.3	45
Receiver F	4 & 5	47.4	36.3	47.7	45
Receiver G	5 & 6	54.4	32.2	54.4	45
Receiver H	4 & 5	58.6	38.7	58.6	45

As shown in Table 4, the noise levels produced by the extraction stage exceed the required noise criteria at the surrounding receivers, both with and without Jigs Hollow Pit noise, and as such, mitigation is required. To attenuate noise levels to within criteria, physical mitigation (i.e. earthen berms) as well as operational restrictions are required.

It is proposed to construct earth berms in the locations and/or to retain in situ material barriers to the minimum elevations as shown on Appendix A's Noise Information Plan. The proposed berms will be placed as close to the limit of extraction as possible in order to provide maximum noise attenuation at the surrounding receivers. The perimeter berms are to be vegetated to provide as much ground absorption of noise as possible as well as provide an aesthetically pleasing screen for the public and to prevent erosion. The construction of these berms will take place during the initial

start-up stage of each phase, which will ensure the berms are in place before extraction operations commence. The berms will be removed once extraction is complete and the pit rehabilitated.

In addition, the crusher will be enclosed by a berm to reduce the acoustical impact from the processing equipment. Other screening and stacking equipment can be operated outside of this area. This berm is to be 8.0m above the final pit floor. It will have an inner diameter of 40 metres to allow equipment adequate room to operate. The processing area must be located in the north western area of Phase 1 as shown on the Noise Information Plan.

Table 5 shows the resulting noise levels with the above mitigation in place. As shown, the proposed attenuation methods and features adequately reduce noise level emissions from the Hunsberger Pit operations for all receiver locations.

**Table 5 – Attenuated Noise Levels**

Receiver Location	Worst Case Phase	Hunsberger (dBA)	Jipe Hollow (dBA)	Total (dBA)	Criteria (dBA)
Receiver A	6	44.6	32.9	44.9	45
	2	44.9	32.9	44.9	45
Receiver B	3	46.4	33.8	46.6	50
Receiver C	3 & 7	46.4	35.1	47.0	50
Receiver D	7 & 8	45.7	41.2	46.9	50
Receiver E	5	42.5	35.5	43.0	45
Receiver F	4 & 5	40.0	36.3	41.6	45
Receiver G	5 & 6	42.8	32.2	43.1	45
Receiver H	4 & 5	45.0	38.7	45.7	45

Note, Receiver H is a building owned by the pit and thus the minor exceedance is acceptable and further mitigation is not warranted.

### 5.3 Aggregate Transportation

While on site transportation of aggregate was included in the previous section, off site transportation was not. Off site transportation is via municipal roads whose purpose is transportation. Thus off site truck noise is considered beyond the responsibility of the pit. However, to be conservative, an analysis of the impact of the increased truck traffic from the pit on noise levels along Katherine Street was conducted and found the increase in noise levels was 2 dBA. This increase is acoustically insignificant as a 3 dBA increase is the lowest discernible difference the human ear can detect.

There are no specific MOE guidelines for off-site vehicles and noise. However, the MOE has prepared a draft document entitled "Noise Guidelines for Landfill Sites" from October 1998, which states:

*"Section 6 – Off-site vehicles*

*An access route for off-site vehicles shall be selected which will result in a minimum noise impact. The selection process shall be based on a detailed qualitative assessment of noise impact on individual receptors and the number of affected receptors along the alternative routes. The municipality and the affected residents must be clearly informed of any potential noise impact."*

In preparation of the Aggregate Pit Plan the following review of the alternative routes was considered:

- Hunsberger Road – This is a gravel road with access to either Golf Course Road or Katherine Street. Golf Course Road is a residential street and thus not an appropriate route.
- Katherine Street – Northbound: This road is traveling away from the main market for the sand and gravel and through the Community of Winterbourne and as such is not practical.
- Katherine Street – Southbound: This is a paved road and is the shortest distance to get haul trucks to the major regional road network (i.e. Sawmill Road), and is the direction of travel to the main market area.

Thus, Katherine Street southbound is preferred and is the proposed route.

## 6. RECOMMENDATIONS

This study has demonstrated that without mitigation measures in place, certain receiver locations would experience noise levels in excess of the MOE Noise Criteria as a result of the proposed aggregate pit operations. In order to ensure that the MOE's criteria noise levels are met, the following is recommended:

1. That all construction equipment meet noise emission standards of MOE's NPC 115, and that construction activities take place in the months of October to April to as great an extent as possible (i.e. when residential windows are typically closed).
2. That topsoil, subsoil and/or overburden from the pit will be utilized to create sound attenuation earthen berms as shown in the Noise Information Plan (Appendix A). Where berms are required, they must be placed as close to the limit of extraction as possible in order to maximize noise attenuation. The berms must be vegetated with a ground cover in order to provide maximum ground absorption of noise and stabilize the berms to prevent erosion.
3. Earthen berms are to be constructed as shown in the Noise Information Plan and described as follows:
  - a. Along the northern extraction limit with a height of 2.0m. The elevation along the top of the berm shall be approximately 336.5m. This berm is required while the extraction operation is in Phase 4.
  - b. Along the east extraction limit (north of Hunsberger Road, south of the haul route) with a height of 5.0m. The elevation along the top of the berm shall be approximately 342.5m. This berm is required throughout the life of the pit.
  - c. Along the east extraction limit (south of Hunsberger Road) with a height of 2.5m. The elevation along the top of the berm shall be approximately 329.5m. This berm is required while the extraction operation is in Phase 2.
  - d. Along the west extraction limit (south of Hunsberger Road) with a height of 2.5m. The elevation along the top of the berm shall be approximately 330.0m. This berm is required while the extraction operation is in Phase 3.
  - e. Along the west extraction limit (north of Hunsberger Road) with a height of 1.5m. The elevation along the top of the berm shall be approximately 337.0m. This berm is required throughout the life of the pit.
  - f. Along the north-western extraction limit with a height of 1.0m. The elevation along the top of the berm shall be approximately 337.5m. This berm is required throughout the life of the pit.
  - g. Along the north extraction limit in Phase 5 with a height of 4.0m. The elevation along the top of the berm shall be approximately 340.0m. This berm is required while the extraction operation is in Phase 5.
  - h. Along the south extraction limit of Phase 3 with a height of 2.5m. The elevation along the top of the berm shall be approximately 330.0m. This berm is required while the extraction operation is in Phase 3.
  - i. Surrounding the processing equipment with a height of 8.0m. The elevation along the top of the berm shall be approximately 335.0m. This berm is required throughout the life of the pit.
  - j. Along the south east extraction limit of Phase 1 with a height of 2.0m. The elevation along the top of the berm shall be approximately 337.0m. This berm is required throughout the life of the pit.

4. That extraction and processing activity within the pit, including initial start-up and ongoing operations, take place between the hours of 0700 and 1900 Monday to Friday. No extraction should take place on Saturdays, Sundays or statutory holidays.
5. That all extraction operations within each phase shall generally move toward the nearest receiver location to maximize the effectiveness of the pit's face for noise attenuation.
6. That the extraction lifts be maximized in height to best utilize the pit face for noise attenuation.
7. That the loading of aggregate from stockpiles should be completed as much as possible on the side farthest from the closest sensitive receiver location so as to best utilize the stockpiles for noise attenuation.
8. That twice annually the pit operator must monitor the noise levels at all receiver locations to ensure noise levels are kept within the established criteria. All monitoring must be done by a qualified acoustical engineer and shall follow the guidelines and specification outlined in NPC 233 "Information to be Submitted for Approval of Stationary Sources of Sound". An annual report must be issued to the Ministry of the Environment (MOE) and Ministry of Natural Resources (MNR).
9. Alternative warning technologies, [back-up beepers] such as the use of broad band alarms shall be used by on-site extraction equipment where possible. These technologies must be
  - i) Approved by MOL;
  - ii) Found to be feasible to reduce off-site noise impacts;
  - iii) Maintain the safety function.
10. That trucks within the aggregate pit limit their idle time to 5 minutes.

Based on the preceding, we conclude that with the implementation of the above recommendations that the proposed Hunsberger Pit will operate within the MOE criteria.

Prepared by:

**IBI GROUP**



Trever O'Brien, B.Eng  
Engineer in Training



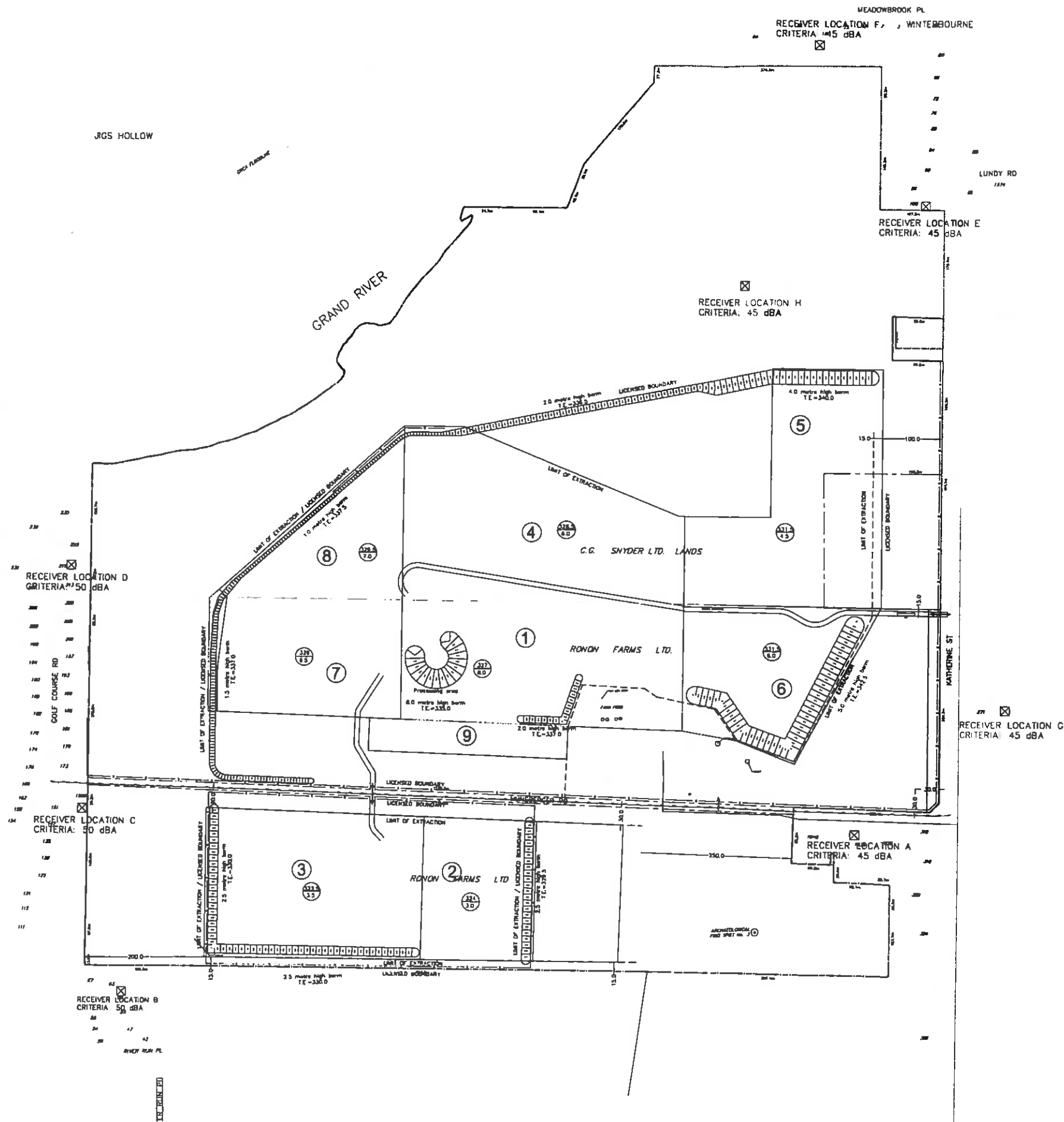
John Perks, MBA, P.Eng  
Associate

TO/JP

## APPENDIX A

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### NOISE INFORMATION PLAN



**LEGEND**

- ⊗ RECEIVER LOCATION
- ⊖ BERM LOCATION
- ⊖  
327  
8.0 FINAL GRADE ELEVATION  
EXCAVATION DEPTH
- ④ PHASE NUMBER

RECEIVER	DISTANCE FROM EXTRACTION LIMIT
A	154.3 m
A2	529.3 m
B	150.1 m
C	209.4 m
D	244.8 m
E	387.5 m
F	843.2 m
G	270.3 m
H	145.3 m

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SCALE 1:7500  
 DATE JANUARY 7, 2010  
 PROJECT No. 19672 (KE-2053)

TOWNSHIP OF WOOLWICH  
 REGION OF WATERLOO

HUNSBERGER PIT

NOISE INFORMATION  
 PLAN

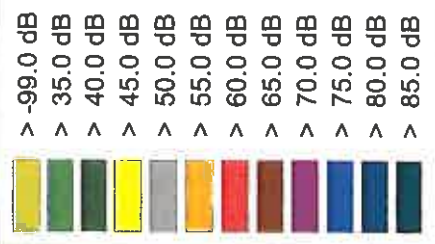
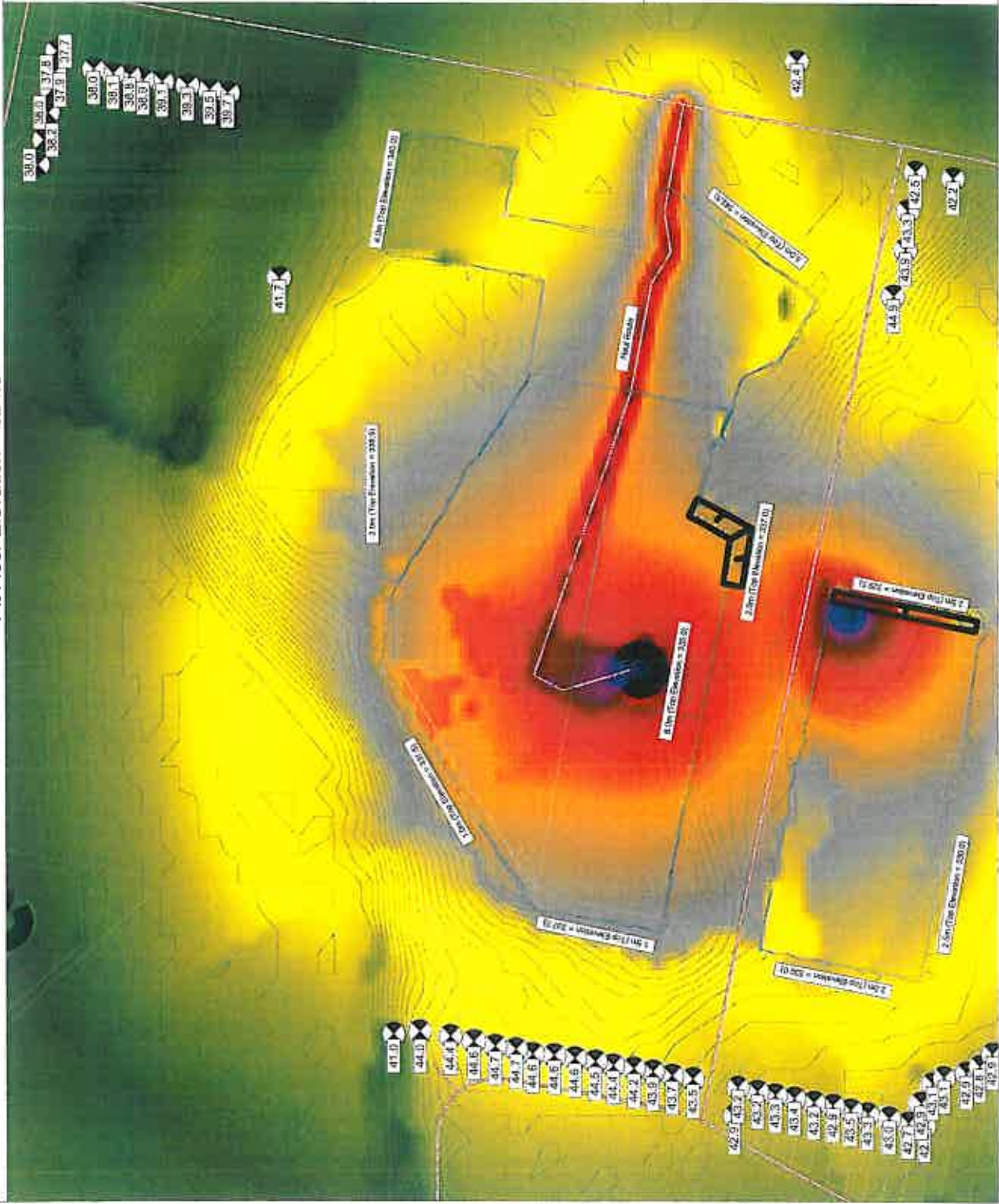
FIGURE 4

## APPENDIX B

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### CADNAA OUTPUT

Phase 2 - Hunsberger  
Pit Floor Elevation = 324.0

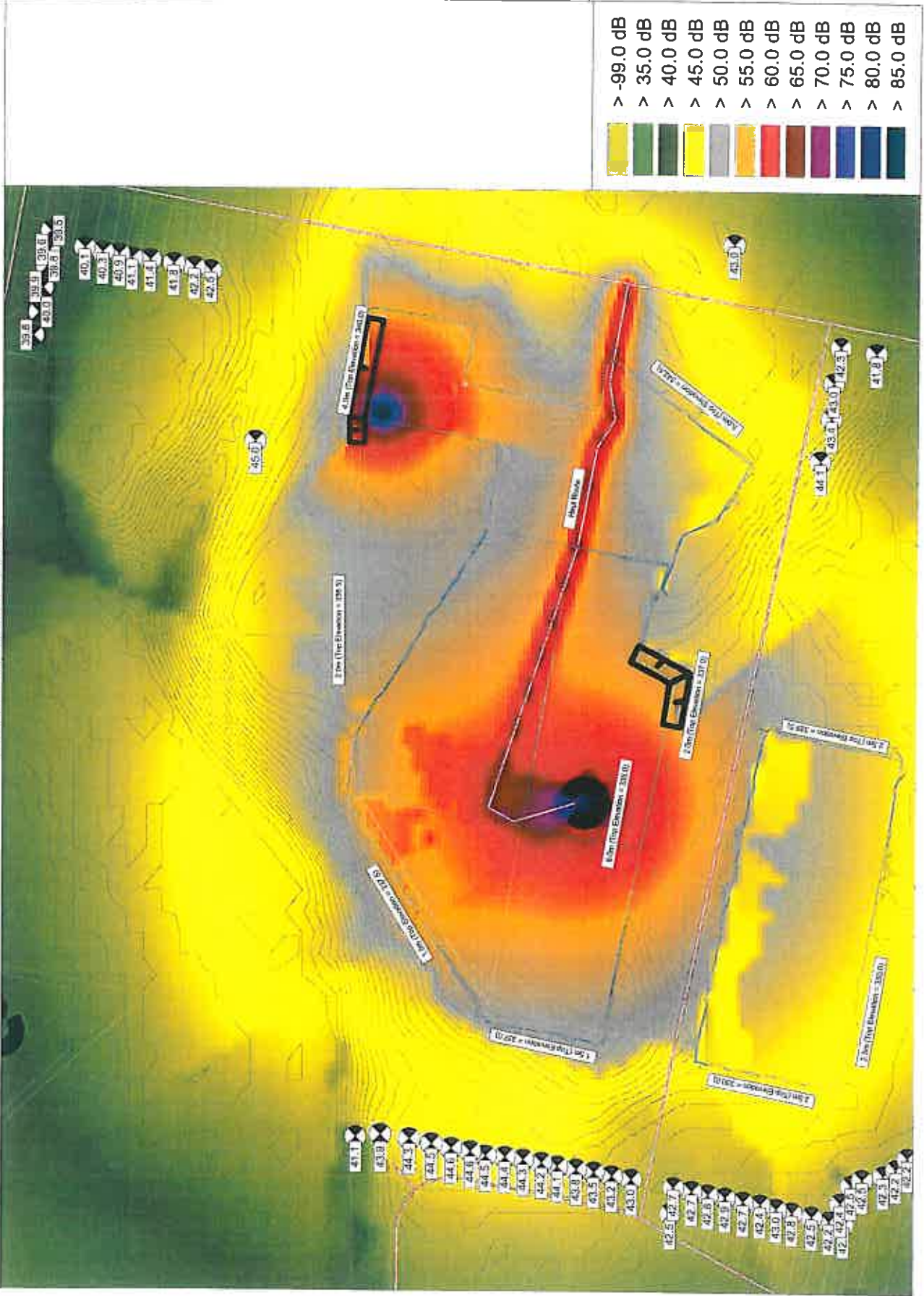






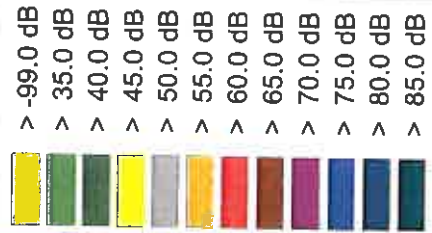


Phase 5 - Hunsberger  
 Pit Floor Elevation = 331.5

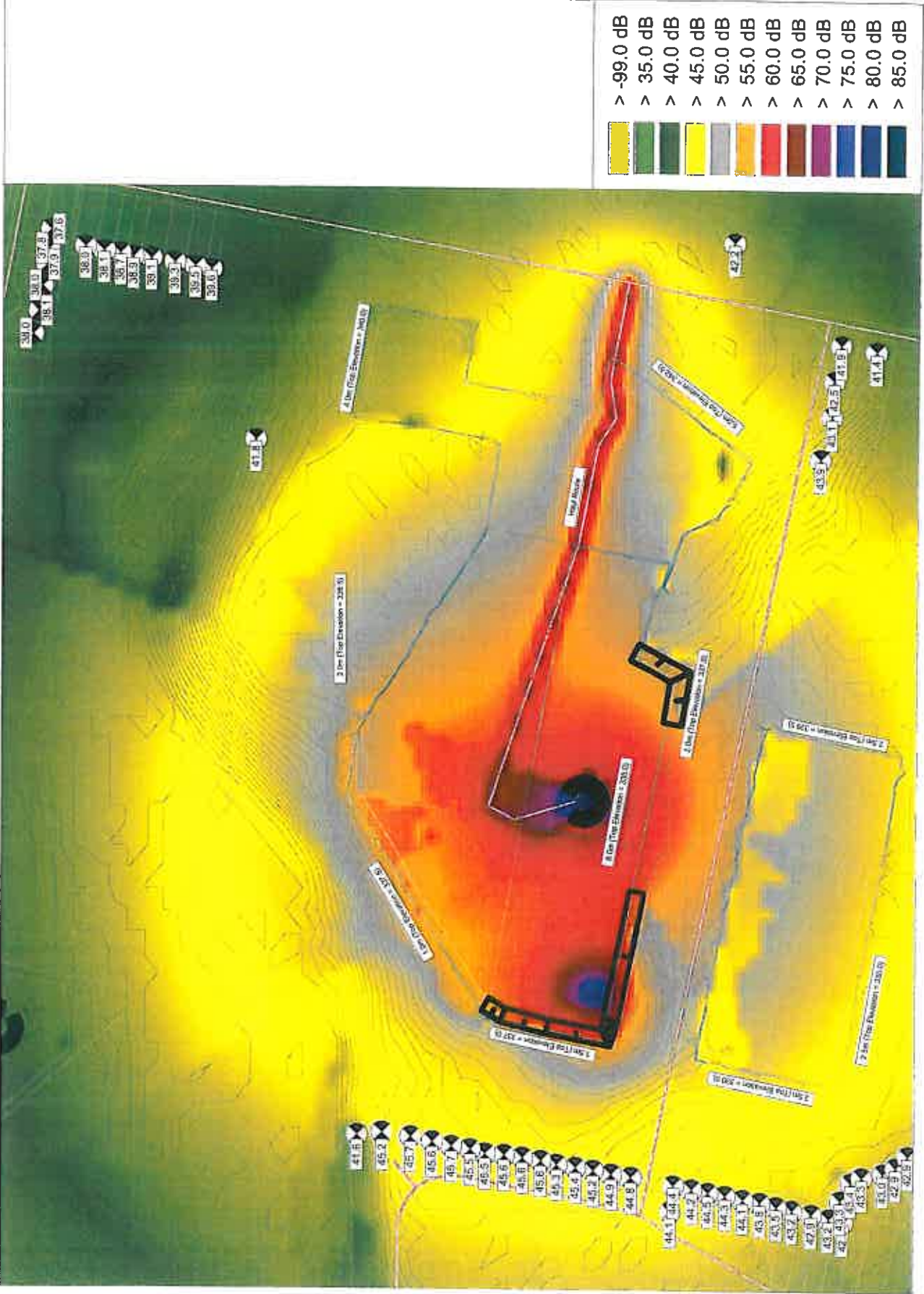


> -99.0 dB	[Lightest Green]
> 35.0 dB	[Light Green]
> 40.0 dB	[Medium Green]
> 45.0 dB	[Yellow-Green]
> 50.0 dB	[Yellow]
> 55.0 dB	[Orange]
> 60.0 dB	[Red-Orange]
> 65.0 dB	[Red]
> 70.0 dB	[Purple-Red]
> 75.0 dB	[Purple]
> 80.0 dB	[Dark Blue]
> 85.0 dB	[Darkest Blue]

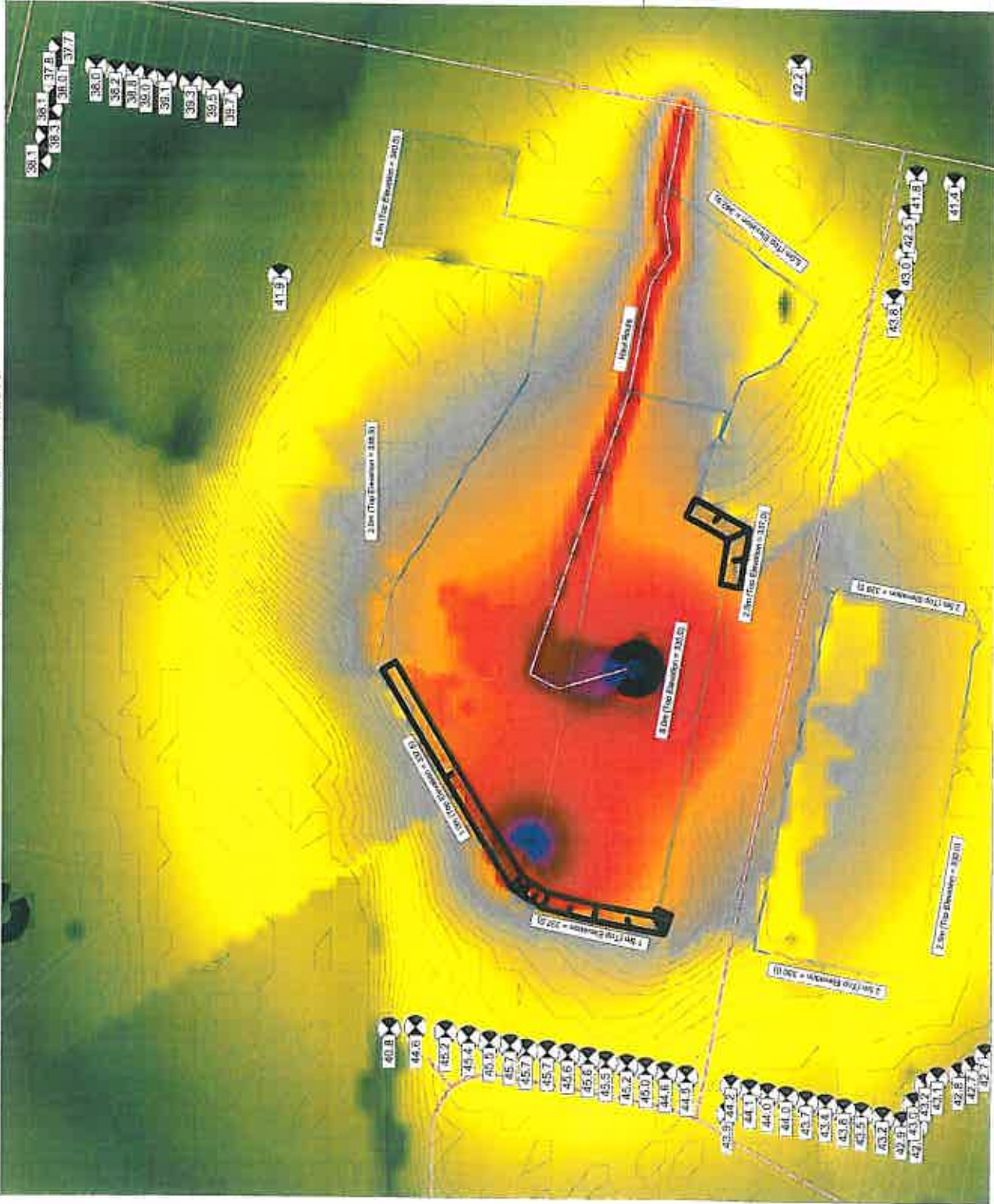
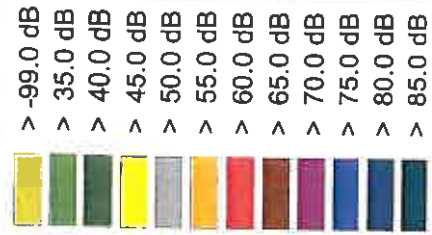
Phase 6 - Hunsberger  
Pit Floor Elevation = 331.5



Phase 7 - Hunsberger  
Pit Floor Elevation = 329.0



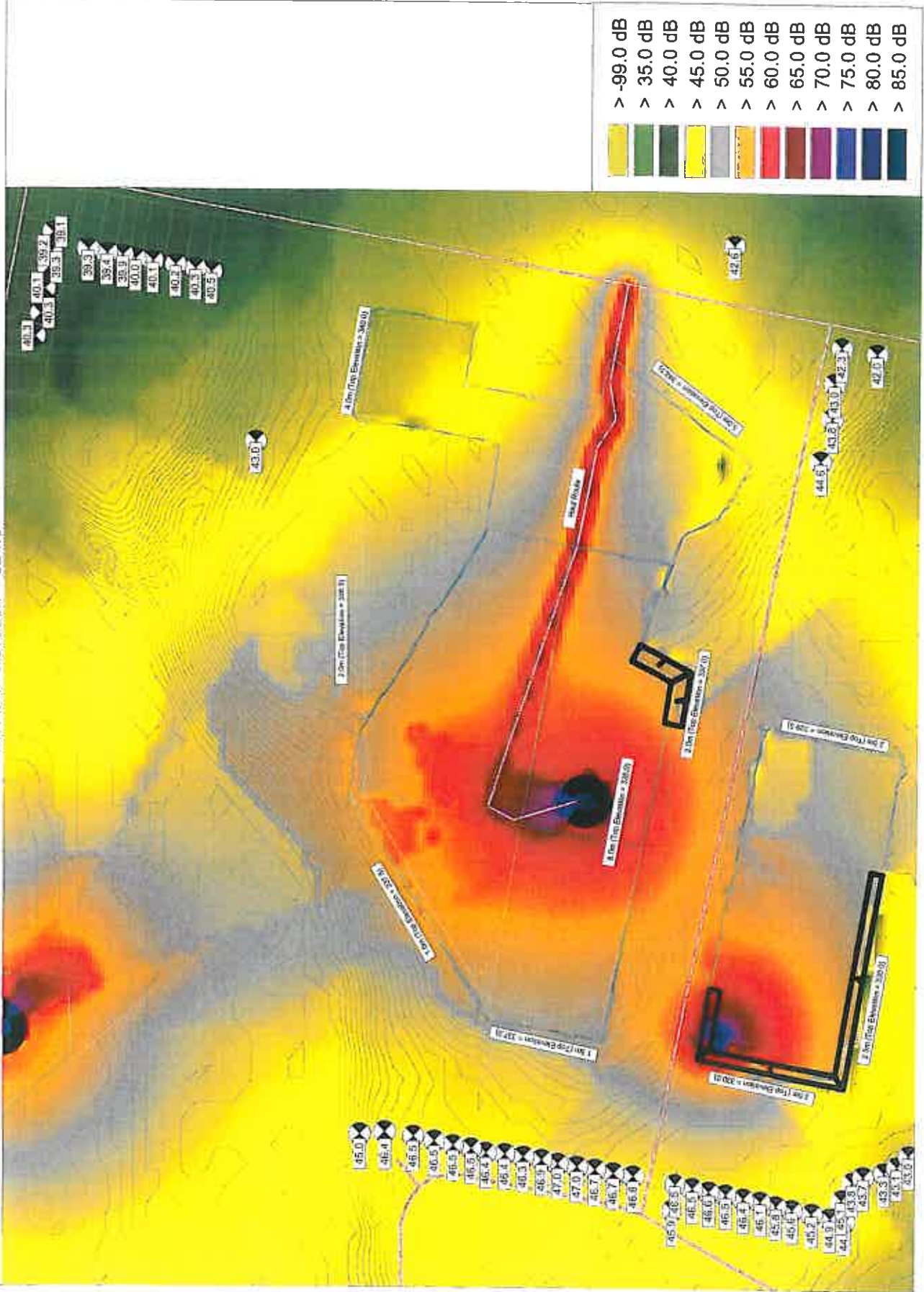
Phase 8 - Hunsberger  
Pit Floor Elevation = 329.5





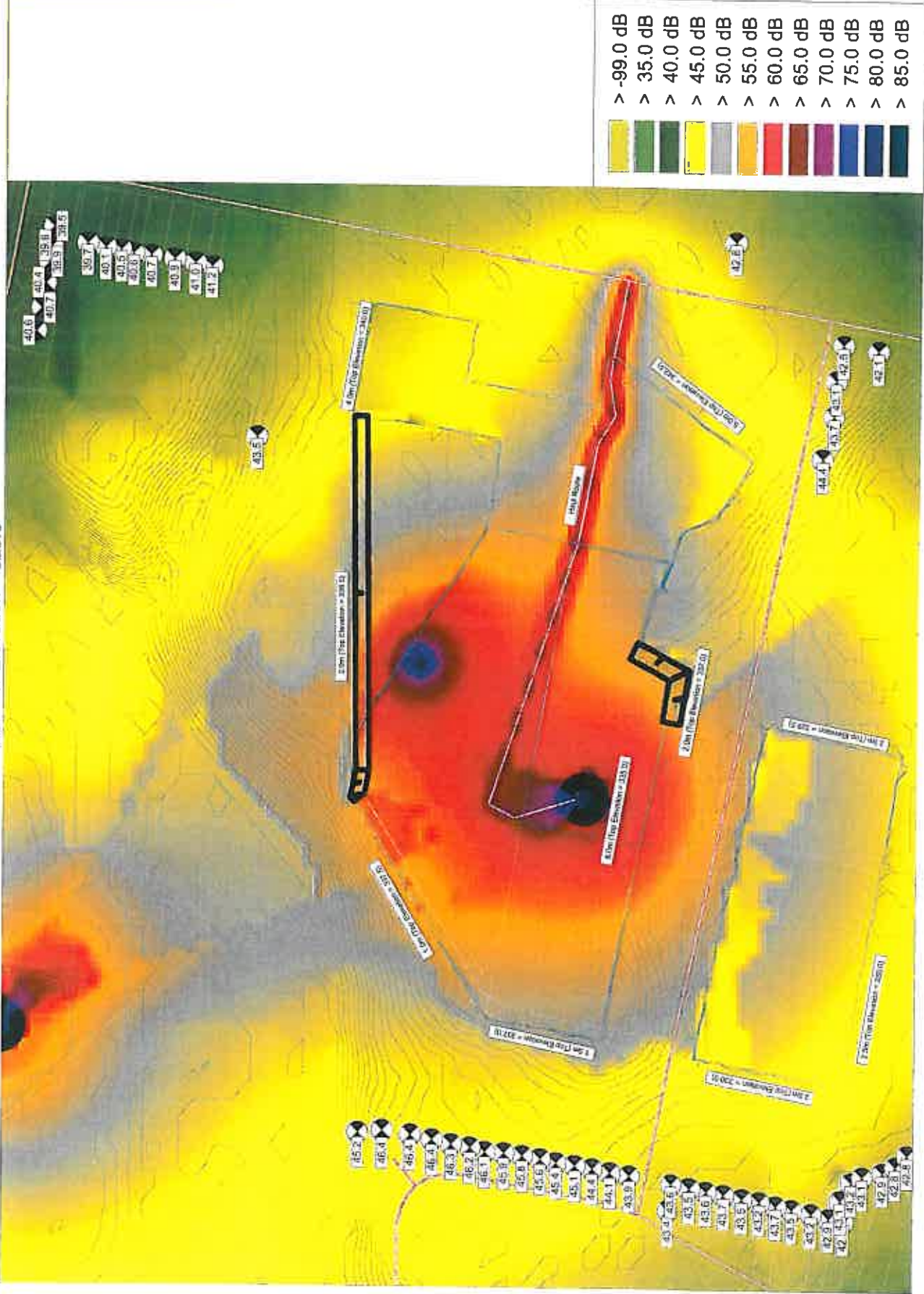


Phase 3 - Cumulative Impact  
Pit Floor Elevation = 324.0



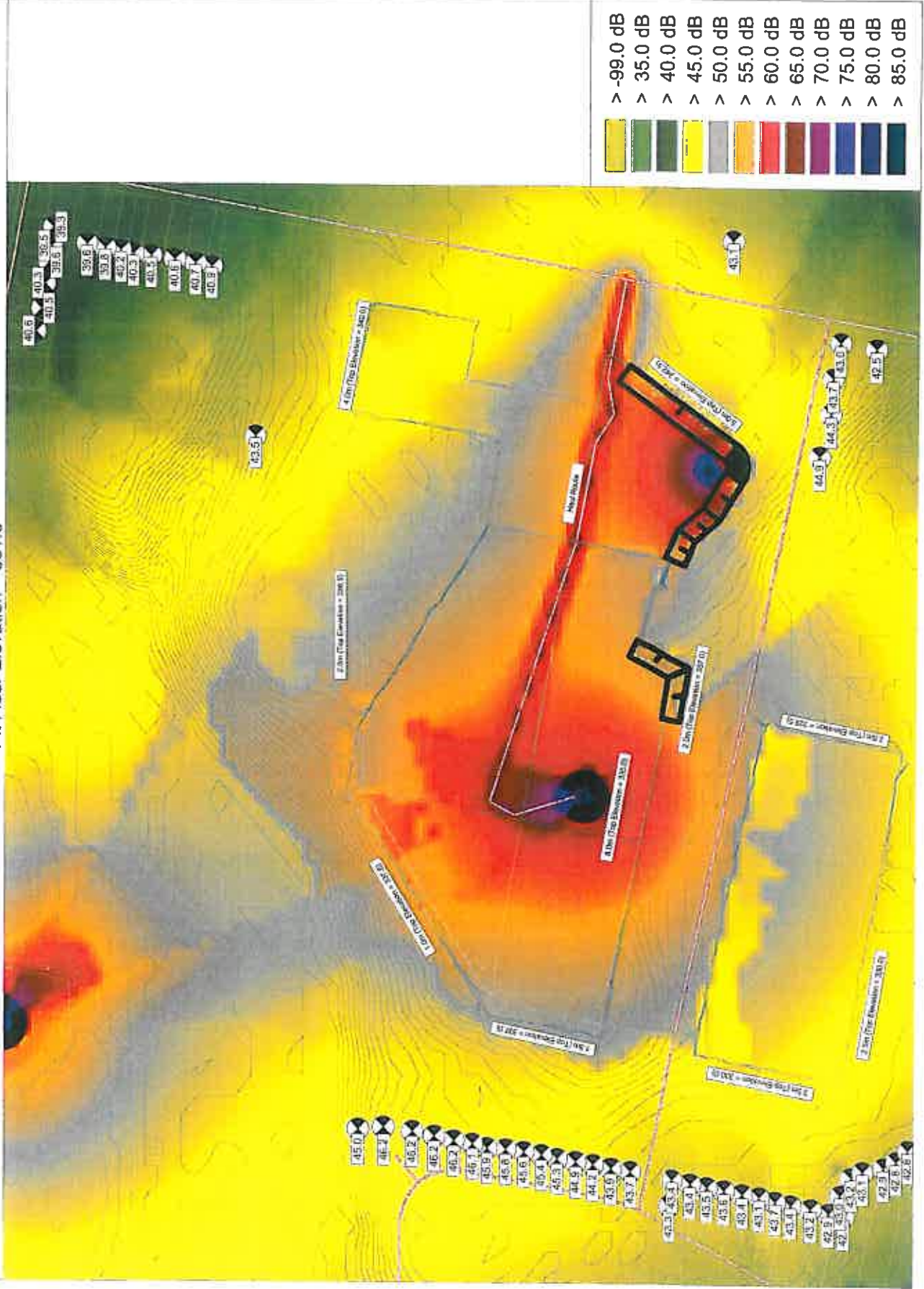
> -99.0 dB	[Yellow]
> 35.0 dB	[Light Green]
> 40.0 dB	[Green]
> 45.0 dB	[Yellow-Green]
> 50.0 dB	[Light Yellow]
> 55.0 dB	[Yellow-Orange]
> 60.0 dB	[Orange]
> 65.0 dB	[Red-Orange]
> 70.0 dB	[Red]
> 75.0 dB	[Dark Red]
> 80.0 dB	[Purple]
> 85.0 dB	[Dark Blue]

Phase 4 - Cumulative Impact  
 Pit Floor Elevation = 328.5

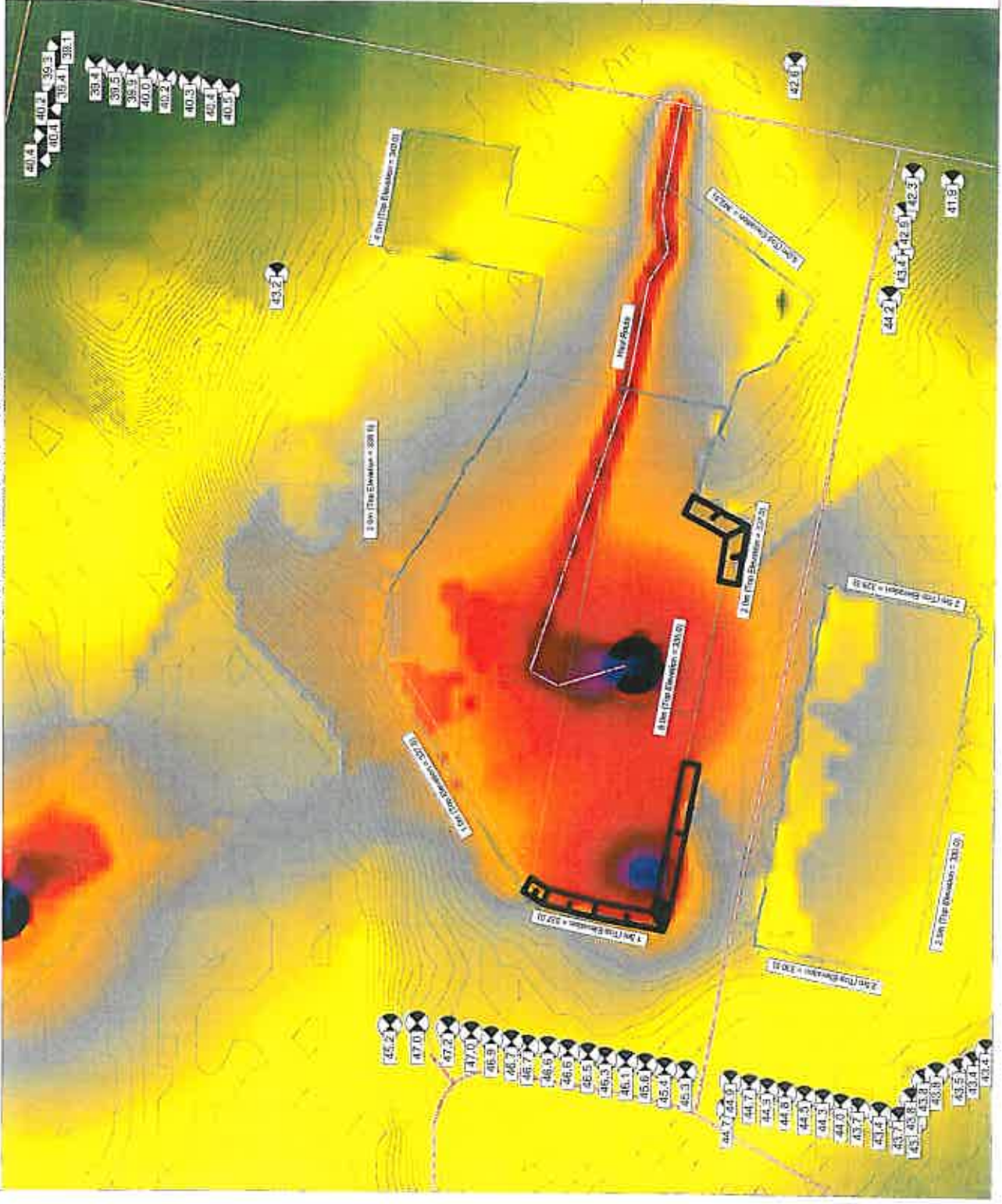
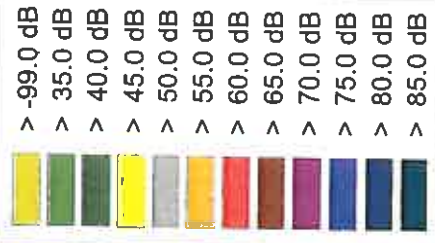




Phase 6 - Cumulative Impact  
Pit Floor Elevation = 331.5



Phase 7 - Cumulative Impact  
Pit Floor Elevation = 329.0





## APPENDIX C

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### 2006 CONESTOGO CENSUS

