



# CIVITAS

CRESTONE PEAK RESOURCES OPERATING LLC

## NOISE MITIGATION PLAN

APPLICATION FOR:

**CHICO 4-65-26-25 NORTH**

CITY OF AURORA, COLORADO

Latitude 39.676179 Longitude -104.639045

← Please add DA-2395-00.

PREPARED BY:



MARCH 18, 2024

IN ACCORDANCE WITH  
COLORADO ENERGY AND CARBON MANAGEMENT COMMISSION  
SERIES 400 REGULATIONS  
ADOPTED JANUARY 15, 2021)

***PREPARED FOR THE COLORADO ENERGY AND CARBON MANAGEMENT COMMISSION***

## **INTRODUCTION**

Crestone Peak Resources Operating LLC (Crestone), a wholly owned subsidiary of Civitas Resources, Inc. and The Environmental and Natural Resources Group, Inc. (ENRG) have prepared a Noise Management Plan (NMP) for the Chico 4-65-26-25 North (Chico North) location. Per The Colorado Energy and Carbon Management Commission (ECMC) sound regulations, oil and gas operators drilling and hydraulically fracturing within the State of Colorado must submit a NMP detailing how sound regulations will be met. It is the intention of ENRG and Crestone to incorporate and satisfy all requirements under the governing ordinance set forth above as it pertains to this NMP as a supporting document for the application process for the Chico North location.

## **SITE DESCRIPTION**

The Chico North Pad is located at approximately Latitude 39.676179 Longitude -104.639045 (Figure 1). According to Google Earth maps and visual observation, the proposed pad site is located approximately 9,770 feet east of Watkins Road and approximately 1,945 feet south of E. Jewell Ave. in Arapahoe County, Colorado (Sec 26, T4S, R65W). Pursuant to the City of Aurora zoning, the Chico North is located within the city limits of Aurora, Colorado in a Medium Density Residential District (R-2) zoned area. The surrounding properties are primarily utilized for farming/ranching, oil and gas or residential development. Land or properties within ¼ mile the Chico North pad site consists of relatively undisturbed uplands. At the time of the NMP, the well pad had been constructed with associated oil and gas production equipment onsite. The well site is within ½ - ¾ mile of existing locations with ongoing production activities onsite.

The closest RBU is approximately 1,924 feet northeast from the edge of the working pad surface, as shown on Figure 1. The approximate elevation at the proposed location is 5,795 feet above sea level (Figure 2). The elevation within one (1) mile of the proposed drill site ranges from 5,743 – 5,840 feet (Figure 3). The average slope from north to south (A-A') is 3.7% and west to east (B-B') is 2.6% (Figure 4).

## **72-HOUR AMBIENT SOUND RESULTS**

For the 72-hour ambient sound study, ENRG utilized one (1) of our Noise Monitoring Terminals (NMTs) which are each equipped with a Type I Bruel & Kjaer (B&K) 2250 sound level meter. A graphical description of ENRG's continuous monitoring technology can be seen on Figure 5.

### **CHICO NORTH – NORTH AMBIENT SOUND LOCATION**

#### **72-Hour Ambient Sound Monitoring**

ENRG's Noise Monitoring Terminal (NMT), which is equipped with a Type I Bruel & Kjaer (B&K) 2250 sound level meter, was calibrated, programmed for dBA and dBC frequencies and installed at the Chico North - North ambient sound location by ENRG personnel before 0:00 on Saturday, March 9, 2024. Initial and final readings were verified with a calibration device to ensure accuracy during and

after the test. The objective was to measure and document the site’s ambient sound levels until 23:59 on Monday, March 11, 2024. The NMT was located approximately 1,925 feet northeast from the edge of disturbance of the proposed drilling location and approximately 300 feet south from the nearest residential building unit boundary (Figure 1). The NMT was placed where no obstructions were allowed to block the meter from measuring and recording accurate ambient sound levels. The results of the 72-hour ambient sound levels from the Chico North - North ambient sound location are summarized on Table A below. A copy of the ENRG ambient sound report is also attached as Exhibit A.

**TABLE A**

**CRESTONE PEAK RESOURCES OPERATING LLC  
CHICO NORTH - NORTH METER  
72-HOUR SOUND LEVEL SUMMARY - dBA & dBC**

<b>dBA</b>		72 HR AVG (dBA)	36 HR DAYTIME AVG	36 HR NIGHTTIME AVG	24 HR (dBA)	24 HR (dBA)	24 HR (dBA)
DAYS	DATE		(dBA) 7:00 AM - 7:00 PM	(dBA) 7:00 PM - 7:00 AM	DAY 1	DAY 2	DAY 3
SAT - SUN - MON	3/9/24 - 3/11/24	51.7	54.2	45.5	52.6	52.1	50.2

<b>dBC</b>		72 HR AVG (dBC)	36 HR DAYTIME AVG	36 HR NIGHTTIME AVG	24 HR (dBC)	24 HR (dBC)	24 HR (dBC)
DAYS	DATE		(dBC) 7:00 AM - 7:00 PM	(dBC) 7:00 PM - 7:00 AM	DAY 1	DAY 2	DAY 3
SAT - SUN - MON	3/9/24 - 3/11/24	64.4	65.7	62.6	63.3	64.5	65.3

**DRILLING AND COMPLETIONS SOUND ALLOWABLES**

**A - Scale Allowables – Chico North - North Ambient Location**

As shown on Table A above, ENRG and Crestone have measured and reported a 72-hour ambient sound level of 51.7 dBA, a 36-hour daytime ambient sound level of 54.2 dBA, and a 36-hour nighttime ambient sound level of 45.5 dBA at the Chico North - North location. Based on the ECMC 423.b.(2) regulation, the allowable for the Chico North - North location will be 65.0 dBA during the day and 60.0 dBA at night during operations as referenced in the regulation excerpt below and summarized on Table B below:

*(2) Unless otherwise required by Rule 423, drilling or completion operations, including Flowback:*

*A. In Residential/Rural or Commercial/Agricultural, maximum permissible noise levels will be 60 db(A) in the hours between 7:00 p.m. to 7:00 a.m. and 65 db(A) in the hours between 7:00 a.m. to 7:00 p.m.; and*

**TABLE B**  
**CRESTON PEAK RESOURCES OPERATING, LLC.**  
**CHICO NORTH - NORTH METER**  
**dBA ALLOWABLES**

DAYS	DATE	72 HR AVG (dBA)	36 HR DAYTIME AVG (dBA) 7:00 AM - 7:00 PM	ADJUSTED +5 DAYTIME (dBA) ALLOWABLE (IF > 65.0 dBA)	36 HR NIGHTTIME AVG (dBA) 7:00 PM - 7:00 AM	ADJUSTED +5 NIGHTTIME (dBA) ALLOWABLE (IF > 60.0 dBA)
SAT - SUN - MON	3/9/24 - 3/11/24	51.7	54.2	60.0	45.5	60.0

Based on the 72-hour ambient sound level results measured at the Chico North - North location from March 9 – 11, 2024, the ECMC daytime allowable of 65.0 dBA was met for 100% of the study, and the nighttime allowable of 60.0 dBA nighttime was met for 100% of the study. This is broken down and shown on the attached Exhibit A, after Figure 19.

**C - Scale Allowables – Chico North - North Ambient Location**

As part of the ECMC requirement regarding ambient sound studies, ENRG and Crestone have measured and reported a 72-hour ambient “C” scale sound level.

The ECMC regulation 423.b.(2)B. states the following in regard to “C” weighted data:

*B. In all zones maximum permissible noise levels will be 65 db(C) in the hours between 7:00 p.m. to 7:00 a.m. and 65 db(C) in the hours between 7:00 a.m. to 7:00 p.m.*

As shown on Table A above and on Table C below, ENRG and Crestone have measured and reported a 72-hour ambient sound level of 64.4 dBC, a 36-hour daytime ambient sound level of 65.7 dBC, and a 36-hour nighttime ambient sound level of 62.6 dBC at the Chico North - North location. Because the 36-hour daytime average was 65.7 dBC and exceeded the 65.0 dBC allowable, ENRG is proposing an adjustment during drilling, completions, and flowback to 72.7 dBC (65.7 + 7 = 72.7) for the daytime allowable at the Chico North - North ambient location as summarized on Table C below. Contrarily, and because the 36-hour nighttime allowable of 65.0 dBC was not exceeded at 62.6 dBC, ENRG is not proposing an increase to the drilling, completions, and flowback for the dBC nighttime allowable at the Chico North - North location and the allowable will remain 65.0 during nighttime hours as referenced in the regulation excerpt above and summarized on Table C below:

**TABLE C**  
**CRESTONE PEAK RESOURCES OPERATING, LLC.**  
**CHICO NORTH - NORTH METER**  
**dBC ALLOWABLES**

DAYS	DATE	72 HR AVG (dBC)	36 HR DAYTIME AVG (dBC) 7:00 AM - 7:00 PM	ADJUSTED +5 DAYTIME (dBC) ALLOWABLE (IF > 65.0 dBC)	36 HR NIGHTTIME AVG (dBC) 7:00 PM - 7:00 AM	ADJUSTED +5 NIGHTTIME (dBC) ALLOWABLE (IF > 65.0 dBC)
SAT - SUN - MON	3/9/24 - 3/11/24	64.4	65.7	70.7	62.6	65.0

Based on the 72-hour ambient sound level results measured at the Chico North - North location from March 9 – 11, 2024, The ECMC daytime proposed adjusted allowable of 72.7 dBC was exceeded for one (1) hour of the study, and the non-adjusted allowable of 65.0 dBC nighttime was exceeded for one (1) hour of the study and therefore the ambient was not compliant 100% of the time. This is broken down and shown on the attached Exhibit A, after Figure 19.

**Production Allowables – Chico North - North**

In accordance with the ECMC regulation and Table 423-1, allowables during production will be as follows:

<b>Table 423-1 – Maximum Permissible Noise Levels LAND USE DESIGNATION</b>	<b>7:00 am to next 7:00 pm</b>	<b>7:00 pm to next 7:00 am</b>
Residential/ Rural/State Parks & State Wildlife Areas	55 db(A)	50 db(A)
Commercial/Agricultural	60 db(A)	55 db(A)
Light Industrial	70 db(A)	65 db(A)
Industrial	80 db(A)	75 db(A)
All Zones	60 db(C)	60 db(C)

The allowables pursuant to the above regulation above are 55.0 dBA during the day and 50.0 dBA at night. Allowables for both daytime and nighttime are 60.0 dBC.

***A - Scale Allowables - Production***

During the ambient sound level survey at the Chico North - North location, the 36-hour daytime average was 54.2 dBA during the day, while the 36-hour nighttime average was 45.5 dBA. Because the daytime average of 54.2 dBA is not above the allowable of 55.0 dBA for production operations, the allowable will remain 55.0 dBA during daytime hours. Similarly, and because the nighttime average of 45.5 did not exceed the allowable of 50.0 dBA for nighttime hours, the allowable will remain 50.0 dBA for nighttime hours. It is important to note that three (3) hours exceeded the ECMC allowable of 55.0 dBA for daytime hours, and one (1) hour exceeded the ECMC allowable of 50.0 dBA for nighttime hours and therefore the ambient was not compliant 100% of the time. This is broken down and shown on the attached Exhibit A, after Figure 19.

***C - Scale Allowables - Production***

During the ambient sound level survey at the Chico North - North location, the 36-hour daytime average was 65.7 dBC during the day, while the 36-hour nighttime average was 62.6 dBC. Because the daytime average of 65.7 dBC is above the allowable of 60.0 dBC, ENRG is proposing an adjustment to 72.7 ( $65.7 + 7 = 72.7$ ) for daytime hours. Similarly, and because the 36-hour nighttime average was 62.6 dBC, ENRG is proposing an increase to the allowable at the Chico North - North location to 67.6 ( $62.6 + 5 = 67.6$ ) for nighttime hours. It is important to note that one (1) hour exceeded the adjusted daytime allowable of 72.7 dBC, while the nighttime adjusted allowable of 67.6

dBC was met 100% of the study and therefore the ambient was not compliant 100% of the time. This is broken down and shown on the attached Exhibit A, after Figure 19.

**CHICO NORTH – SOUTH AMBIENT SOUND LOCATION**

**72-Hour Ambient Sound Monitoring**

ENRG's Noise Monitoring Terminal (NMT), which is equipped with a Type I Bruel & Kjaer (B&K) 2250 sound level meter, was calibrated, programmed for dBA and dBC frequencies and installed at the Chico North - South ambient sound location by ENRG personnel before 0:00 on Saturday, March 9, 2024. Initial and final readings were verified with a calibration device to ensure accuracy during and after the test. The objective was to measure and document the site's ambient sound levels until 23:59 on Monday, March 11, 2024. The NMT was located approximately 2,165 feet south from the edge of disturbance of the proposed drilling location and approximately 300 feet northwest from the nearest residential building unit boundary (Figure 1). The NMT was placed where no obstructions were allowed to block the meter from measuring and recording accurate ambient sound levels. The results of the 72-hour ambient sound levels from the Chico North - South ambient sound location are summarized on Table D below. A copy of the ENRG ambient sound report is also attached as Exhibit A.

**TABLE D**  
**CRESTONE PEAK RESOURCES OPERATING LLC**  
**CHICO NORTH - SOUTH METER**  
**72-HOUR SOUND LEVEL SUMMARY - dBA & dBC**

<b>dBA</b>		72 HR AVG (dBA)	36 HR	36 HR	24 HR (dBA)	24 HR (dBA)	24 HR (dBA)
DAYS	DATE		DAYTIME AVG (dBA)	NIGHTTIME AVG (dBA)	DAY 1	DAY 2	DAY 3
SAT - SUN - MON	3/9/24 - 3/11/24	46.0	46.1	45.9	46.2	42.6	47.8

<b>dBC</b>		72 HR AVG (dBC)	36 HR	36 HR	24 HR (dBC)	24 HR (dBC)	24 HR (dBC)
DAYS	DATE		DAYTIME AVG (dBC)	NIGHTTIME AVG (dBC)	DAY 1	DAY 2	DAY 3
SAT - SUN - MON	3/9/24 - 3/11/24	62.6	63.7	61.2	60.6	62.2	64.3

**DRILLING AND COMPLETIONS SOUND ALLOWABLES**

**A - Scale Allowables – Chico North – South Ambient Location**

As shown on Table D above, ENRG and Crestone have measured and reported a 72-hour ambient sound level of 46.0 dBA, a 36-hour daytime ambient sound level of 46.1 dBA, and a 36-hour nighttime ambient sound level of 45.9 dBA at the Chico North - South location. Based on the ECMC 423.b.(2)A. regulation, the allowable for the Chico North - South location will be 65.0 dBA during the day and 60.0 dBA at night during operations as referenced in the regulation excerpt below and summarized on Table E below:

(2) Unless otherwise required by Rule 423, drilling or completion operations, including Flowback:

A. In Residential/Rural or Commercial/Agricultural, maximum permissible noise levels will be 60 db(A) in the hours between 7:00 p.m. to 7:00 a.m. and 65 db(A) in the hours between 7:00 a.m. to 7:00 p.m.; and

**TABLE E**  
**CRESTON PEAK RESOURCES OPERATING, LLC.**  
**CHICO NORTH - SOUTH METER**  
**dba ALLOWABLES**

DAYS	DATE	72 HR AVG (dba)	36 HR DAYTIME AVG (dba) 7:00 AM - 7:00 PM	ADJUSTED +5 DAYTIME (dba) ALLOWABLE (IF > 65.0 dba)	36 HR NIGHTTIME AVG (dba) 7:00 PM - 7:00 AM	ADJUSTED +5 NIGHTTIME (dba) ALLOWABLE (IF > 60.0 dba)
SAT - SUN - MON	3/9/24 - 3/11/24	46.0	46.1	60.0	45.9	60.0

Based on the 72-hour ambient sound level results measured at the Chico North - South location from March 9 – 11, 2024, the ECMC daytime allowable of 65.0 dBA was exceeded for zero (0) hours of the study, and the nighttime allowable of 60.0 dBA nighttime was exceeded for zero (0) hours of the study and therefore the ambient was compliant 100% of the time. This is broken down and shown on the attached Exhibit A, after Figure 19.

**C - Scale Allowables – Chico North - South Ambient Location**

As part of the ECMC requirement regarding ambient sound studies, ENRG and Crestone have measured and reported a 72-hour ambient “C” scale sound level.

The ECMC regulation states the following in regard to “C” weighted data:

B. In all zones maximum permissible noise levels will be 65 db(C) in the hours between 7:00 p.m. to 7:00 a.m. and 65 db(C) in the hours between 7:00 a.m. to 7:00 p.m.

As shown on Table D above and on Table F below, ENRG and Crestone have measured and reported a 72-hour ambient sound level of 62.6 dBC, a 36-hour daytime ambient sound level of 63.7 dBC, and a 36-hour nighttime ambient sound level of 61.2 dBC at the Chico North - South location. Because the 36-hour daytime allowable of 65.0 dBC was not exceeded at 63.7 dBC, ENRG is not proposing an increase to the drilling, completions or flowback for the dBC daytime allowable at the Chico North - South location and the allowable will remain 65.0 during daytime hours as referenced in the regulation excerpt above and summarized on Table F below. Similarly, and because the 36-hour

nighttime allowable of 65.0 dBC was not exceeded at 61.2 dBC, ENRG is not proposing an increase to the drilling, completions, or flowback for the dBC nighttime allowable at the Chico North - South location and the allowable will remain 65.0 during nighttime hours as referenced in the regulation excerpt above and summarized on Table F below:

**TABLE F**  
**CRESTONE PEAK RESOURCES OPERATING, LLC.**  
**CHICO NORTH - SOUTH METER**  
**dBC ALLOWABLES**

DAYS	DATE	72 HR AVG (dBC)	36 HR DAYTIME AVG (dBC) 7:00 AM - 7:00 PM	ADJUSTED +5 DAYTIME (dBC) ALLOWABLE (IF > 65.0 dBC)	36 HR NIGHTTIME AVG (dBC) 7:00 PM - 7:00 AM	ADJUSTED +5 NIGHTTIME (dBC) ALLOWABLE (IF > 65.0 dBC)
SAT - SUN - MON	3/9/24 - 3/11/24	62.6	63.7	65.0	61.2	65.0

Based on the 72-hour ambient sound level results measured at the Chico North - South location from March 9 – 11, 2024, The ECMC daytime allowable of 65.0 dBC was exceeded for six (6) hours of the study, and the allowable of 65.0 dBC nighttime was exceeded for one (1) hour of the study and therefore the ambient was not compliant 100% of the time. This is broken down and shown on the attached Exhibit A, after Figure 19.

**Production Allowables – Chico North - South**

In accordance with the ECMC regulation Table 423-1, allowables during production will be as follows:

<b>Table 423-1 – Maximum Permissible Noise Levels LAND USE DESIGNATION</b>	<b>7:00 am to next 7:00 pm</b>	<b>7:00 pm to next 7:00 am</b>
Residential/ Rural/State Parks & State Wildlife Areas	55 db(A)	50 db(A)
Commercial/Agricultural	60 db(A)	55 db(A)
Light Industrial	70 db(A)	65 db(A)
Industrial	80 db(A)	75 db(A)
All Zones	60 db(C)	60 db(C)

The allowables pursuant to the above regulation above are 55.0 dBA during the day and 50.0 dBA at night. Allowables for both daytime and nighttime are 60.0 dBC.

***A - Scale Allowables - Production***

During the ambient sound level survey at the Chico North – North location, the 36-hour daytime

average was 46.1 dBA during the day, while the 36-hour nighttime average was 45.9 dBA. Because the daytime average of 46.1 dBA is not above the allowable of 55.0 dBA for production operations, the allowable will remain 55.0 dBA during daytime hours. Similarly, and because the nighttime average of 45.9 did not exceed the allowable of 50.0 dBA for nighttime hours, the allowable will remain 50.0 dBA for nighttime hours. It is important to note that one (1) hour exceeded the ECMC allowable of 55.0 dBA for daytime hours, and one (1) hour exceeded ECMC allowable of 50.0 dBA for nighttime hours and therefore the ambient was not compliant 100% of the time. This is broken down and shown on the attached Exhibit A, after Figure 19.

### ***C - Scale Allowables - Production***

During the ambient sound level survey at the Chico North - South location, the 36-hour daytime average was 63.7 dBC during the day, while the 36-hour nighttime average was 61.2 dBC. Because the daytime average of 63.7 dBC is above the allowable of 60.0 dBC, ENRG is proposing an adjustment to 70.7 ( $63.7 + 7 = 70.7$ ) for daytime hours. Similarly, and because the 36-hour nighttime average was 61.2 dBC, ENRG is proposing an increase to the allowable at the Chico North - South location to 66.2 ( $61.2 + 5 = 66.2$ ) for nighttime hours. It is important to note that one (1) hour exceeded the adjusted daytime allowable of 70.7 dBC, while the nighttime adjusted allowable of 66.2 dBC was also exceeded for one (1) hour of the study and therefore the ambient was not compliant 100% of the time. This is broken down and shown on the attached Exhibit A, after Figure 19.

## **SOUND MITIGATION OPTIONS**

Sound mitigation requirements and Best Management Practices (BMPs) used to reduce the amount of sound emitted beyond the Crestone oil and gas operations lease boundary can be managed in numerous ways, both on behalf of the operator, as well as contractors performing work on-site. See Exhibit B (after Exhibit A) for a list of BMPs.

## **SOUND FROM DRILLING & COMPLETIONS OPERATIONS**

Figures 6, 7, and 8 show the layout of the drilling, completions, and production operations stages. Table 1.1 and Table 1.2 indicate typical sound levels generated during construction, oil and gas drilling, and completions operations.

## **ENGINE SOUND**

Some engines can operate at a constant number of revolutions per minute (RPM), which reduces the often annoying, fluctuating sound caused by engines that speed up and slow down. Mufflers, like those used for automobile engines, can be used to minimize engine sound.

## **SOUND MODELING**

By modeling with existing sound signatures emitted from equipment similar to that which will be utilized on a location, designs for sound wall placement can be recommended and tested for

efficiency. ENRG utilized the EMS Bruel and Kjaer V2023 Predictor - LimA software with sound signatures from the Patterson Rig 345 (Tier 2 Natural Gas with Battery) drilling rig and the Liberty Quiet Fleet for the models provided. ENRG has modeled the drilling, completions, and production phases of the Chico North pad with-out mitigation as indicated on Figures 9, 10, 11, 12, 13, and 14.

- Figure 9 presents anticipated un-mitigated dBA drilling sound levels
- Figure 10 presents anticipated un-mitigated dBA completions sound levels
- Figure 11 presents anticipated un-mitigated dBA production sound levels
- Figure 12 presents anticipated un-mitigated dBC drilling sound levels
- Figure 13 presents anticipated un-mitigated dBC completions sound levels
- Figure 14 presents anticipated un-mitigated dBC production sound levels

There are residential building units (RBU's) within 2,000 feet of the permanent equipment currently anticipated (i.e., wells, facilities) on the Chico North location. Figure 15 indicates the proposed sound wall and the design which was used to complete the mitigation portion of the modeling. ENRG has modeled the drilling and completions phase of the Chico North pad site with mitigation as indicated on Figures 16, 17, 18, and 19.

- Figure 15 presents the proposed sound wall for the Draco location
- Figure 16 presents anticipated mitigated dBA drilling levels
- Figure 17 presents anticipated mitigated dBA completions sound levels
- Figure 18 presents anticipated mitigated dBC drilling sound levels
- Figure 19 presents anticipated mitigated dBC completions sound levels

### **ECMC BEST MANAGEMENT PRACTICES (BMPs)**

- **Idling Equipment** – While idling engine/equipment, maintain at the lowest frequency possible, as well as, in a position/location that will prevent sound from carrying to nearby residents.
- **Unnecessary Sounds** – Unnecessary sounds such as honking the horn, revving vehicle engines, loud music, and unwarranted metal hammering/banging are all examples of sound that can create nuisance; failure to eliminate unnecessary sound from location will be subject to an internal compliance assessment if reported by a landowner.
- In accordance with ECMC regulations., continuous sound monitoring will be conducted, pending permissions, near the property line of the nearest occupied structure and in each direction of an RBU within 2000 ft.
- The construction phase is scheduled to last, at this time, approximately 7 weeks.
- Following the completion of construction, a sound barrier (minimum rating of STC-30) will be installed on all sides of the pad site. This sound barrier will be 32-feet tall and remain onsite through Completions operations.



- At the time of this NMP, Patterson 345 which is equipped with natural gas and batteries, is scheduled to be utilized for the drilling of the Chico North location. Rigs have been designed and equipped with sound mitigating equipment including devices to minimize squeaking from the draw works brakes. The drill phase is scheduled to last, at this time, for approximately 4 weeks.
- A quiet frac fleet will be used during the completion phase. The completions phase is scheduled, at this time, to last for approximately 8 weeks.
- Production is anticipated to last, at this time, approximately 30 years.
- At the commencement of production, if sound levels exceed the allowables set forth above, Crestone will mitigate production equipment, as necessary, to maintain compliance on the Chico North location.
- The Operator shall follow the most recent and most appropriate BMPs to reduce noise related to drilling and completion
- Unloading pipe. The Operator shall not unload pipe from delivery trucks between 8:00 p.m. and 7:00 a.m.
- ALLOWABLES

## **Chico North – North Ambient Location**

### **dBa -**

#### **Drilling and Completions –**

During the 72-hour sound study, the 36-hour daytime average was 54.2 dBA, while the 36-hour nighttime average was 45.5 dBA. Based on the results of the study, and ECMC regulations, ENRG is suggesting that the dBA allowable be 65.0 dBA during the day and 60.0 dBA during the night.

#### **Production -**

The allowable for the Chico North - North monitoring location will be 55.0 dBA during the day and 50.0 dBA at night for the production period.

### **dBc**

#### **Drilling and Completions –**

During the 72-hour sound study, the 36-hour daytime average was 65.7 dBc, while the 36-hour nighttime average was 62.6 dBc. Based on the results of the study ENRG is suggesting that the dBc allowable be 72.7 dBc during the day and 65.0 dBc during the night.

#### **Production -**

The allowable for the Chico North - North monitoring location will be 72.7 dBA during the day and 67.6 dBA at night for the production period.

**Chico North – South Ambient Location****dBA** –**Drilling and Completions -**

During the 72-hour sound study, the 36-hour daytime average was 46.1 dBA, while the 36-hour nighttime average was 45.9 dBA. Based on the results of the study ENRG is suggesting that the dBA allowable be 65.0 dBA during the day and 60.0 dBA during the night.

**Production -**

The allowable for the Chico North - South monitoring location will be 55.0 dBA during the day and 50.0 dBA at night for the production period.

**dB** –**Drilling and Completions**

During the 72-hour sound study, the 36-hour daytime average was 63.7 dB, while the 36-hour nighttime average was 61.2 dB. Based on the results of the study ENRG is suggesting that the dB allowable be 65.0 dB during the day and 65.0 dB during the night.

**Production -**

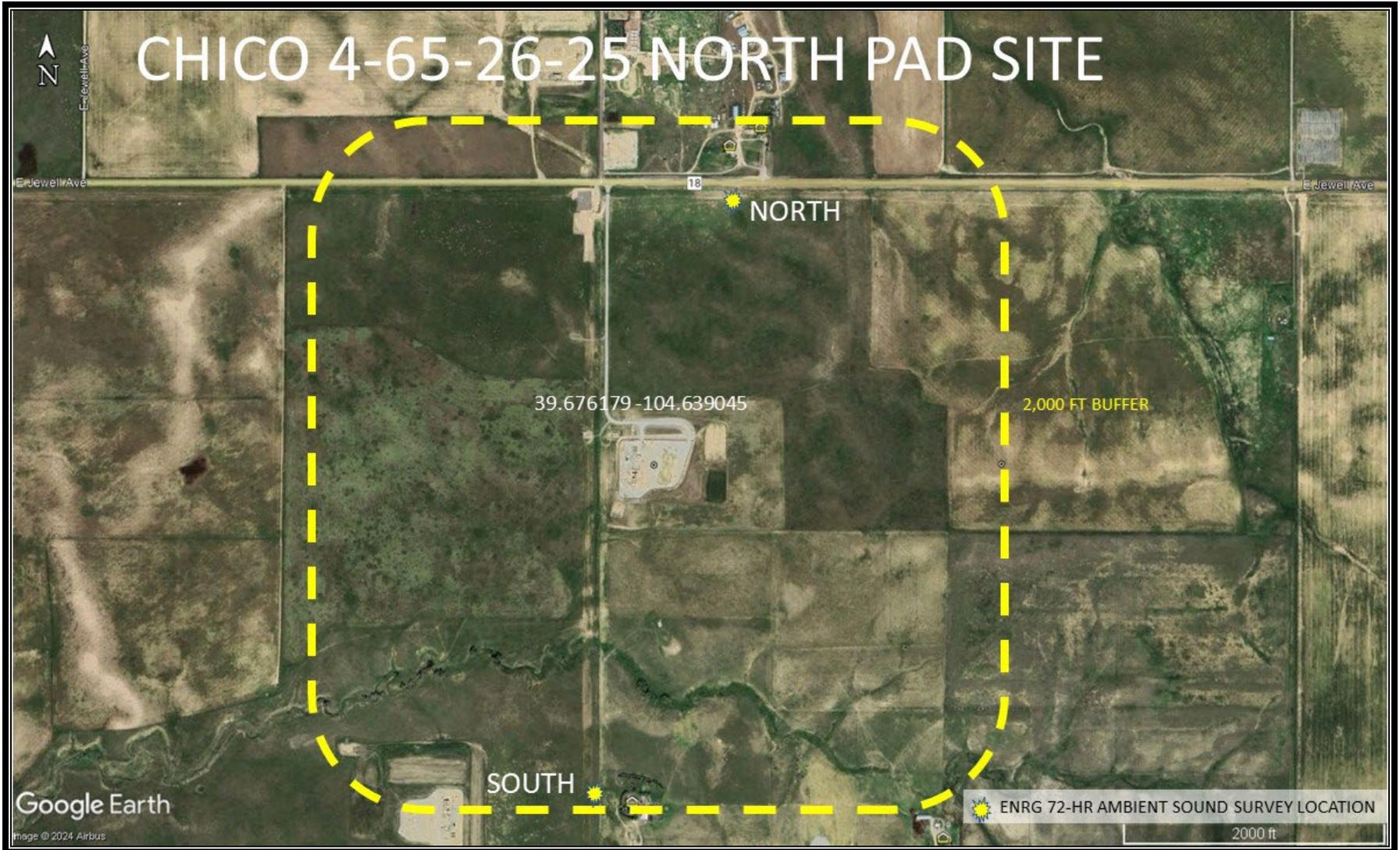
The allowable for the Chico North - South monitoring location will be 70.7 dB during the day and 66.2 dB at night for the production period.

ENRG will provide operational monitoring reports in the event of a complaint and at the request of ECMC. Results will be provided to the appropriate parties for review. For any questions regarding this NMP, please feel free to contact us.

Sincerely,

Chrystie Carter  
Operations Manager  
The Environmental & Natural Resources Group, Inc.

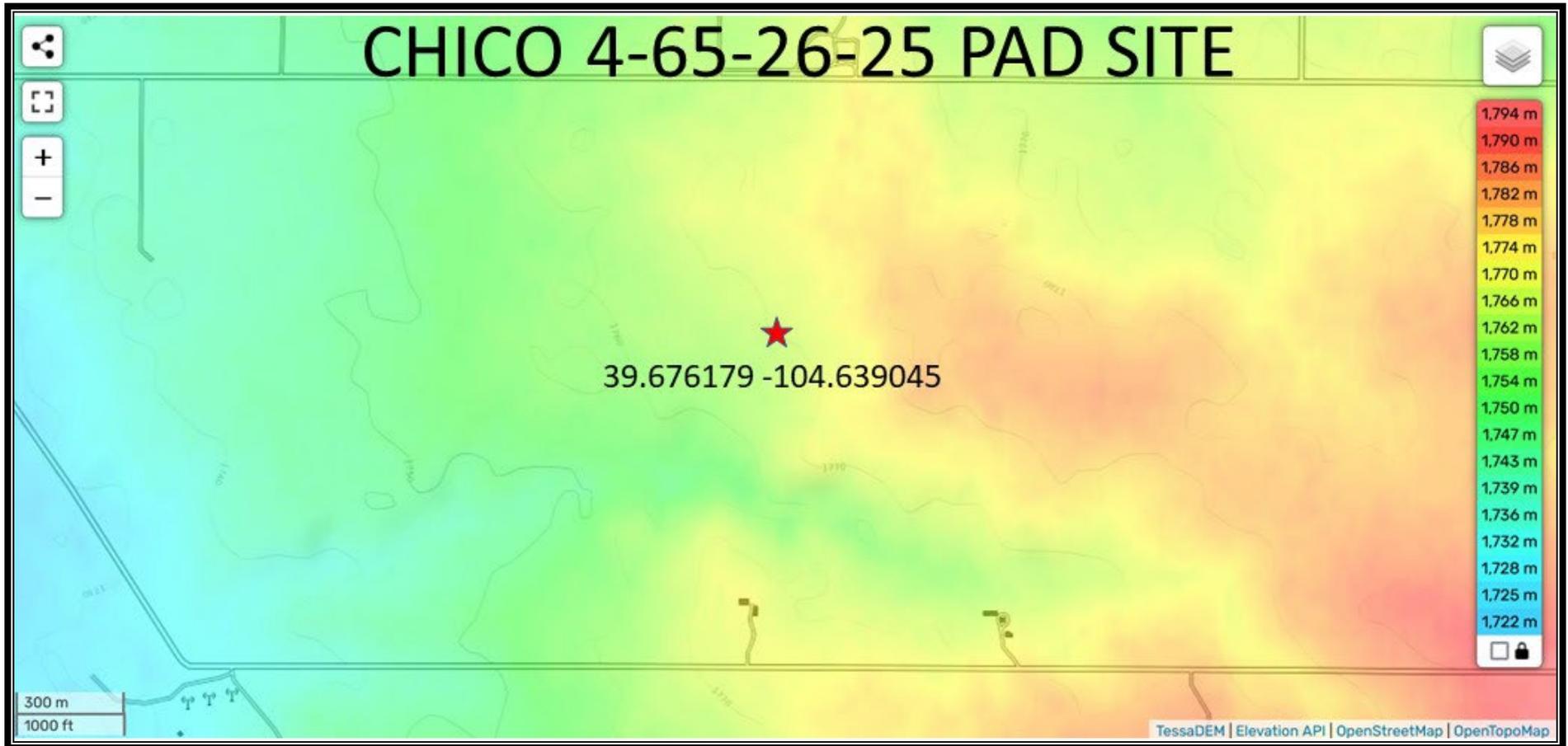
Attachments



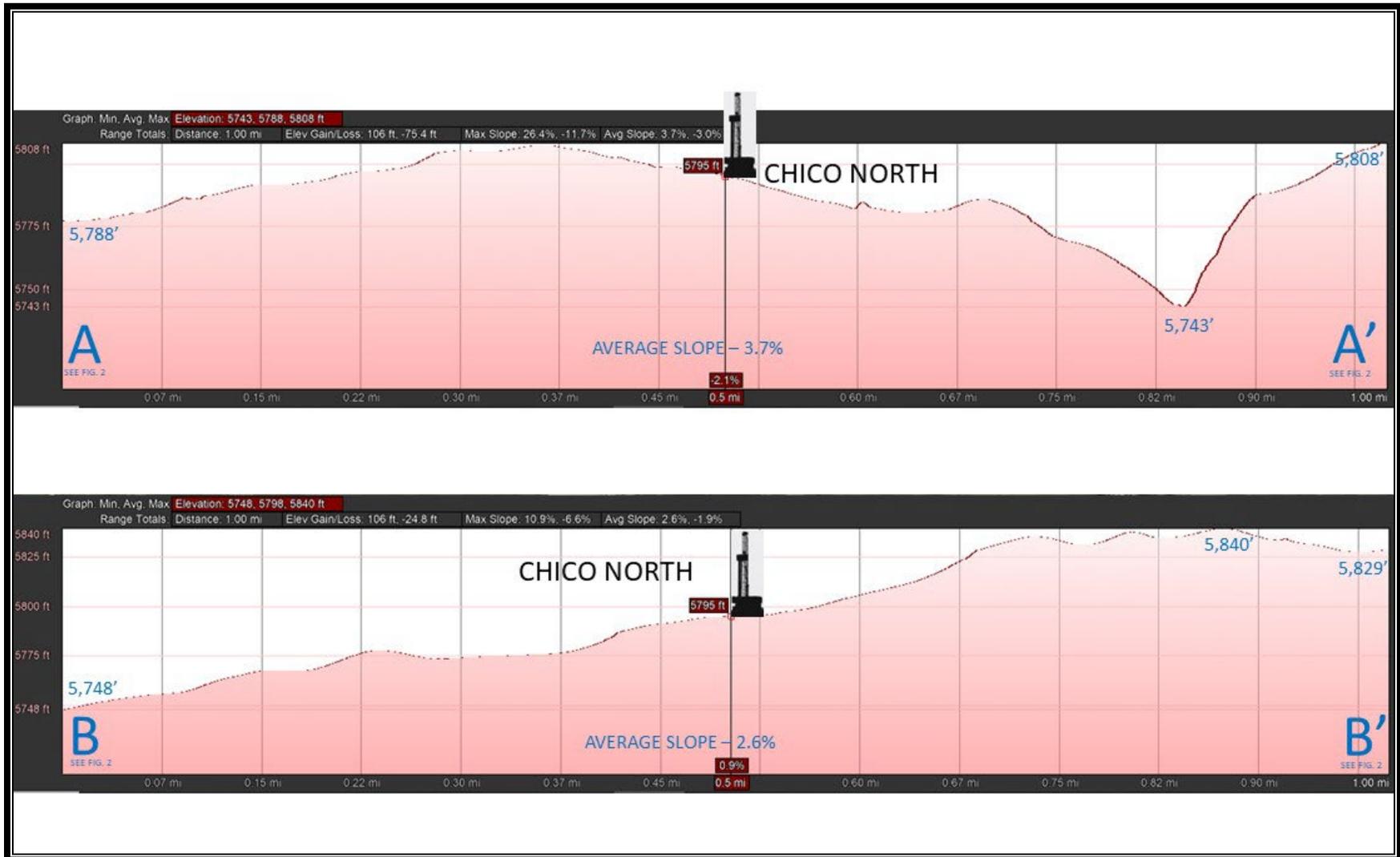
**FIGURE 1. CRESTONE PEAK RESOURCES OPERATING LLC – CHICO NORTH PAD SITE  
NOISE MITIGATION PLAN  
CHICO 4-65-26-25 NORTH - 72-HOUR AMBIENT SOUND LOCATIONS**



**FIGURE 2. CRESTONE PEAK RESOURCES OPERATING LLC – CHICO NORTH PAD SITE  
NOISE MITIGATION PLAN  
HYBRID TOPOGRAPHIC MAP**



**FIGURE 3. CRESTONE PEAK RESOURCES OPERATING LLC – CHICO NORTH PAD SITE  
NOISE MITIGATION PLAN  
COLOR CODED RELIEF MAP**



**FIGURE 4. CRESTONE PEAK RESOURCES OPERATING LLC – CHICO NORTH PAD SITE  
NOISE MITIGATION PLAN  
CROSS – SECTIONAL ELEVATION PROFILE**



**ENRG**  
Consultants

In 2009 ENRG released its innovative solar-powered Noise Monitoring Terminal. The NMT transmits live, real-time drill site noise data via the Internet, providing operators with 24/7 access, instant alerts and daily reports via their PCs or smart phones.

**ENRG**  
Consultants

[www.enrgconsultants.com](http://www.enrgconsultants.com)

21323 I-76 Frontage Rd, Suite 401 Hudson, CO 80642

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**FIGURE 5. CRESTONE PEAK RESOURCES OPERATING LLC – CHICO NORTH PAD SITE  
NOISE MITIGATION PLAN  
ENRG NOISE MONITORING TERMINAL**

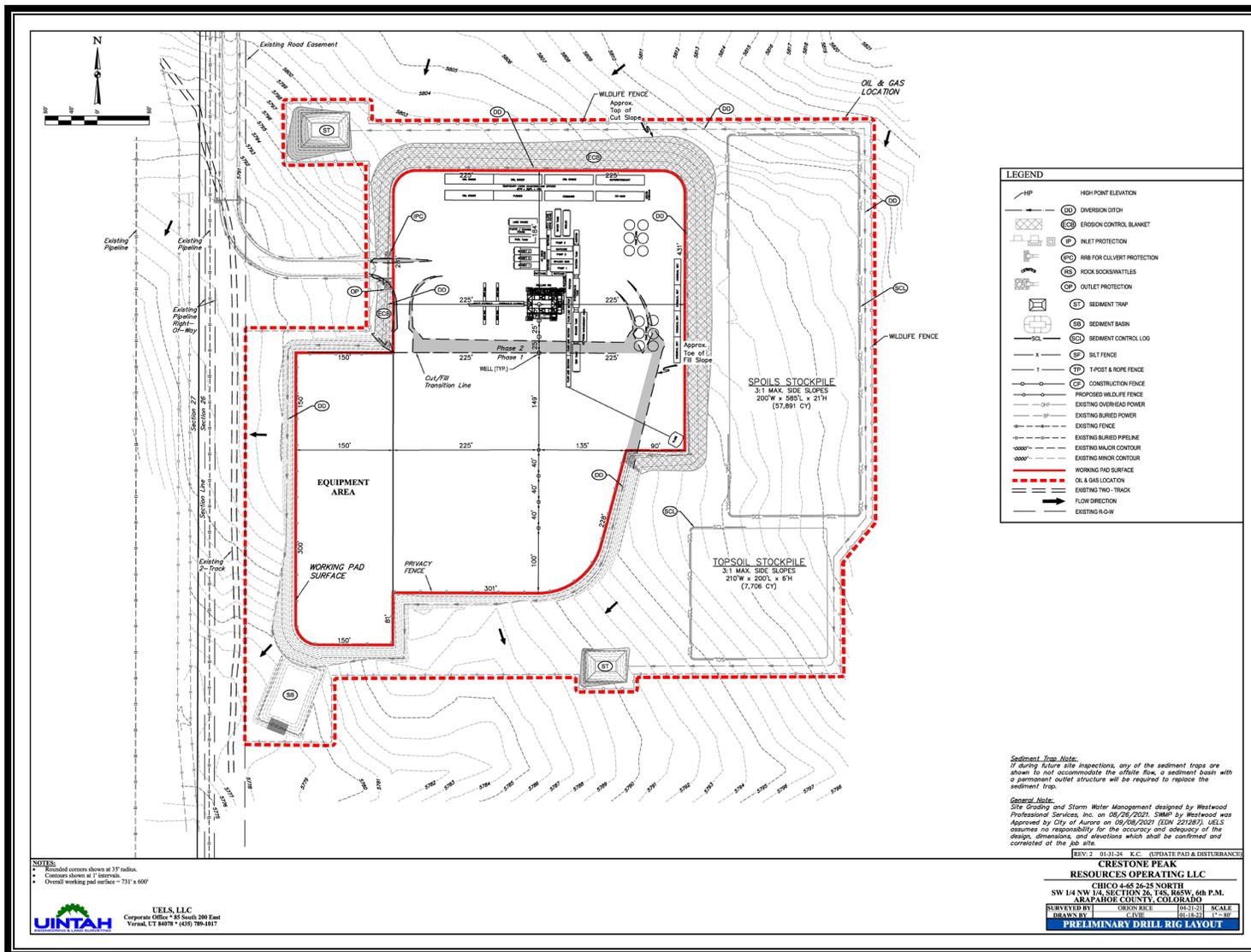


FIGURE 6. CRESTONE PEAK RESOURCES OPERATING LLC – CHICO NORTH PAD SITE  
NOISE MITIGATION PLAN  
DRILLING RIG LAYOUT

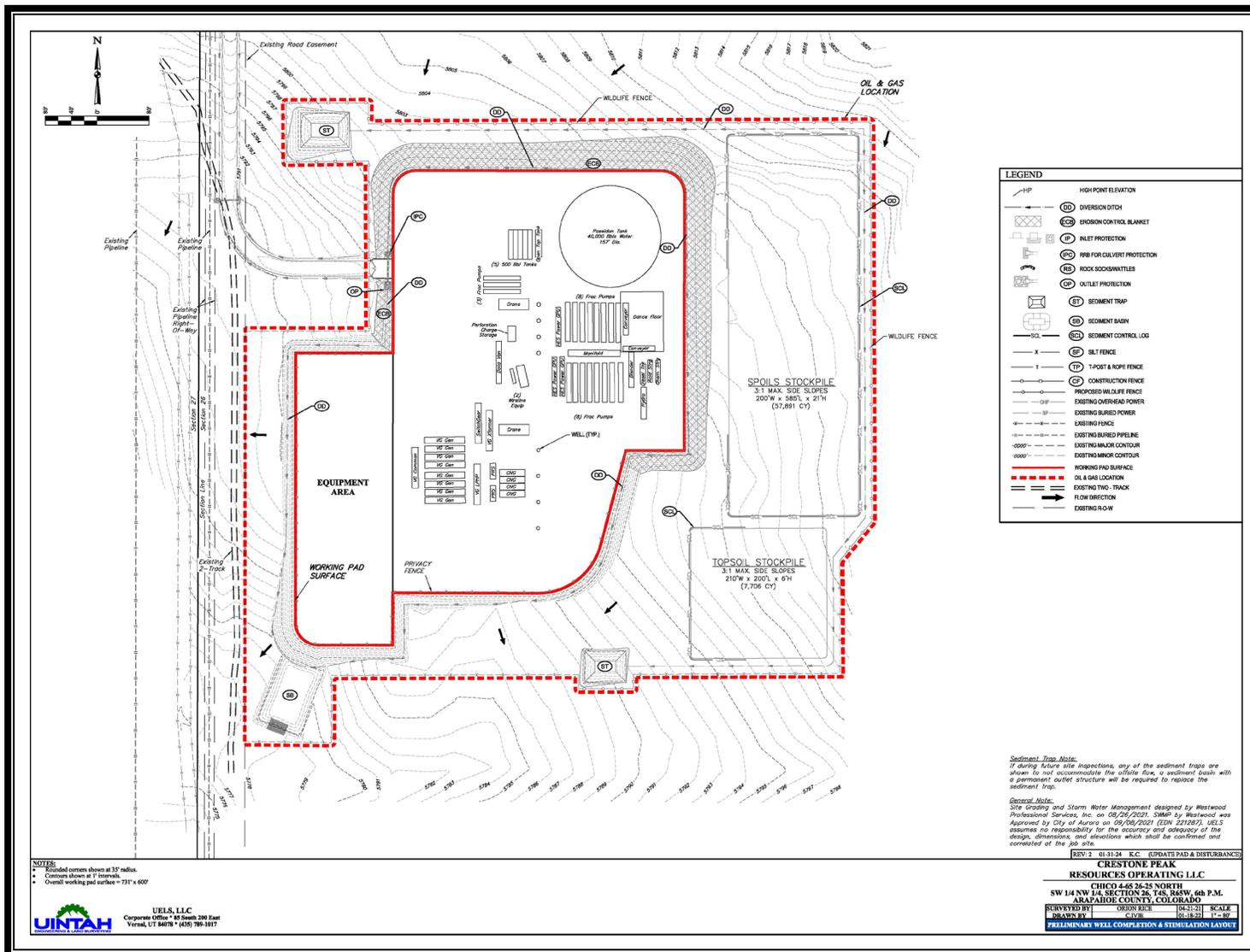


FIGURE 7. CRESTONE PEAK RESOURCES OPERATING LLC – CHICO NORTH PAD SITE  
NOISE MITIGATION PLAN  
WELL COMPLETIONS LAYOUT

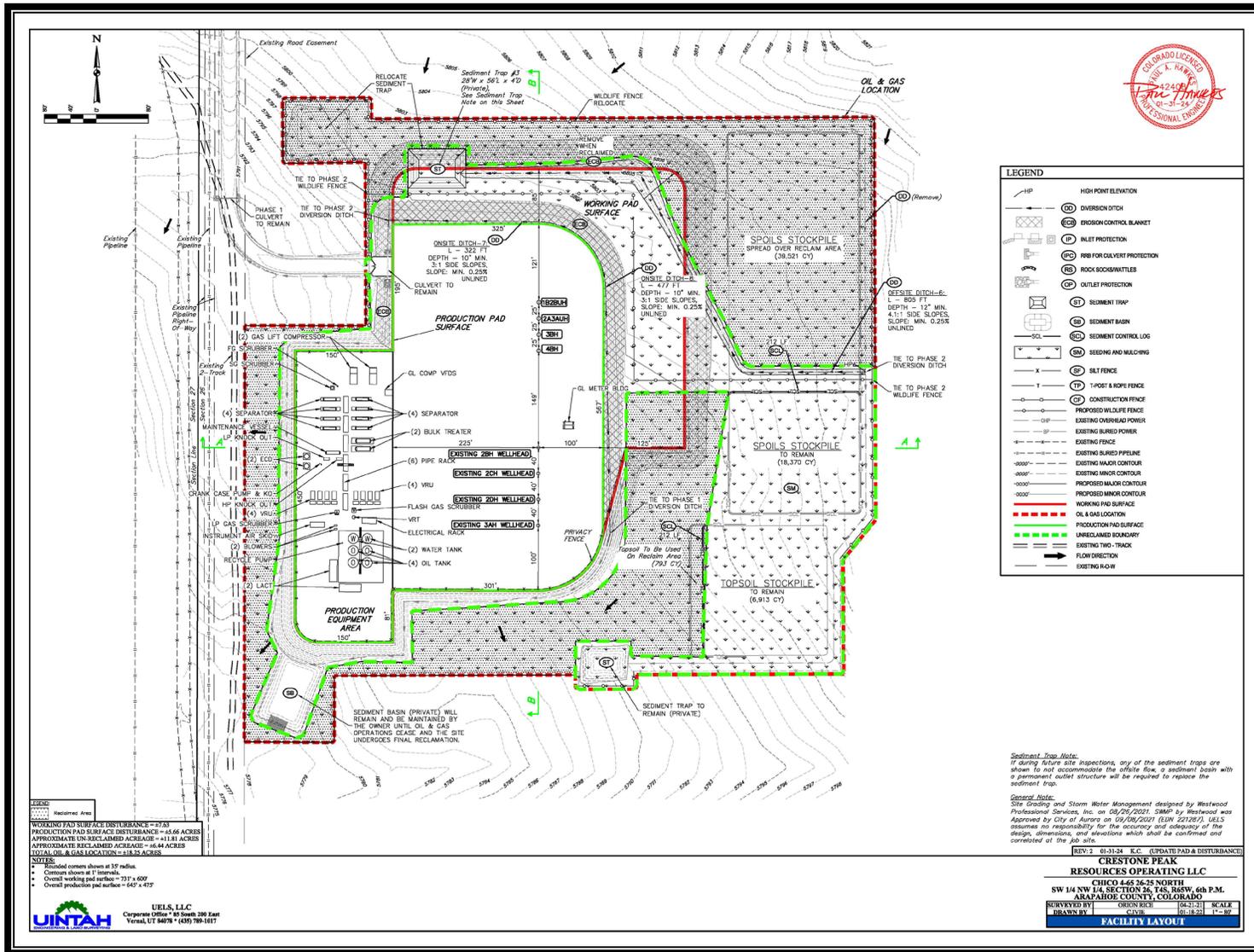


FIGURE 8. CRESTONE PEAK RESOURCES OPERATING LLC – CHICO NORTH PAD SITE  
NOISE MITIGATION PLAN  
PRODUCTION LAYOUT



Category	Distance [m]	Average [dBA]	Range [dBA]	Data type	Reference
General works	<15	–	70–90	measurement	BoLM, 2016 [3]
Access road construction	15	89	–	estimation	NYSDEC FSGEIS, 2015 [28]
	76	75			
	152	69			
	305	63			
	457	59			
	610	57			
Site preparation	191	58–69	–	measurement	McCawley, 2013 [23]
Well pad preparation	15	84	–	estimation	NYSDEC FSGEIS, 2015 [28]
	76	70			
	152	64			
	305	58			
	458	55			
	610	52			
Truck traffic	<152	–	65–85	estimation	Garfield County, Colorado, 2011 [8]
	191		56–73	measurement	McCawley, 2013 [23]
Horizontal drilling	15	76	–	estimation	NYSDEC FSGEIS, 2015 [28]
	76	62			
	152	56			
	305	50			
	457	47			
	610	44			
Vertical drilling	191	54	–	measurement	McCawley, 2013 [23]
Drilling (unspecified)	100	57.4–62		estimation	Ambrose and Florian, 2014 [1]
	300	52.5		measurement	
	1055	36.9			
	2300	30.4			
	191	75–80			

From Hayes et al (2017)

TABLE 1.1. CRESTONE PEAK RESOURCES OPERATING LLC – CHICO NORTH PAD SITE NOISE MITIGATION PLAN

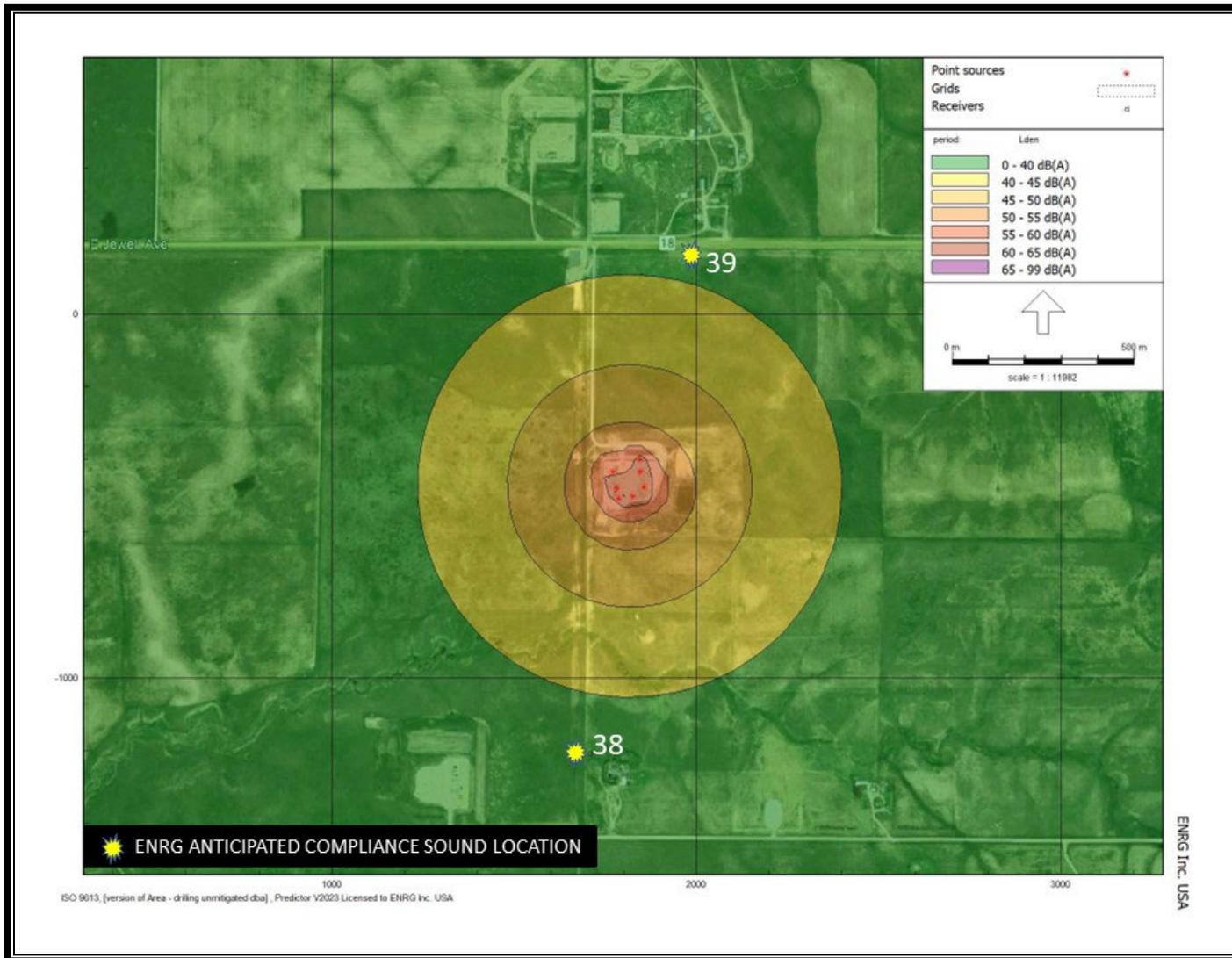
**TYPICAL DRILLING AND COMPLETIONS SOUND LEVELS**



Category	Distance [m]	Average [dBA]	Range [dBA]	Data type	Reference
Drilling (unspecified)	30	-	75-87	measurement	behrens and Associates, Inc., 2006 [2]
	61		71-79		
	91		65-74		
	122		60-71		
	152		56-68		
	183		54-59		
	213		51-55		
	244		51-54		
Hydraulic fracturing	15	99-104	-	estimation	NYSDEC FSGEIS, 2015 [28]
	76	85-90			
	152	79-84			
	305	73-78			
	457	69-74			
	610	67-72			
	191	52	47-60	measurement	McCawley, 2013 [23]
Hydraulic fracturing/ flowback	191	58	55-61	measurement	McCawley, 2013 [23]
Compressor station(s)	<305	63.15	35.3-94.8	measurement	MIFAEH, 2014 [22]
	305-610	55.48	35.3-77.6		
	610-762	54.09	35.3-80.3		
	>1067	51.50	35.3-74.1		
	On-site	69-86	-	measurement	BoFM, 2006 [3]
	1609	58-75			
	2012	54			
	100	53,8		estimation	Ambrose and Florian, 2014 [1]
	140	50,9		measurement	

From Hayes et al (2017)

**TABLE 1.2. CRESTONE PEAK RESOURCES OPERATING LLC – CHICO NORTH PAD SITE NOISE MITIGATION PLAN  
TYPICAL DRILLING AND COMPLETIONS SOUND LEVELS**



**FIGURE 9. CRESTONE PEAK RESOURCES OPERATING LLC – CHICO NORTH PAD SITE  
NOISE MITIGATION PLAN  
dBA UN-MITIGATED DRILLING SOUND LEVELS**

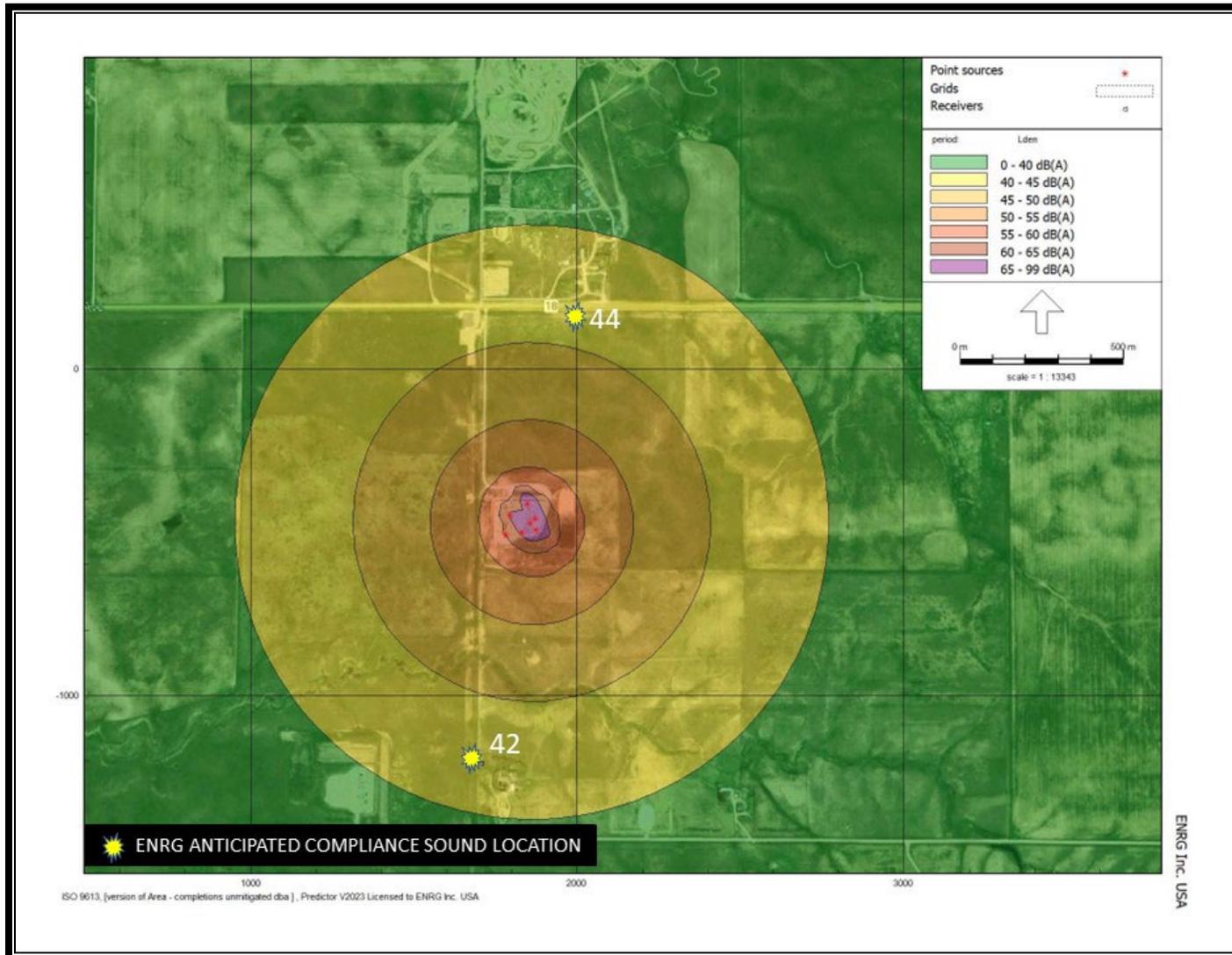


FIGURE 10. CRESTONE PEAK RESOURCES OPERATING LLC – CHICO NORTH PAD SITE  
NOISE MITIGATION PLAN  
**dB(A) UN-MITIGATED COMPLETIONS SOUND LEVELS**

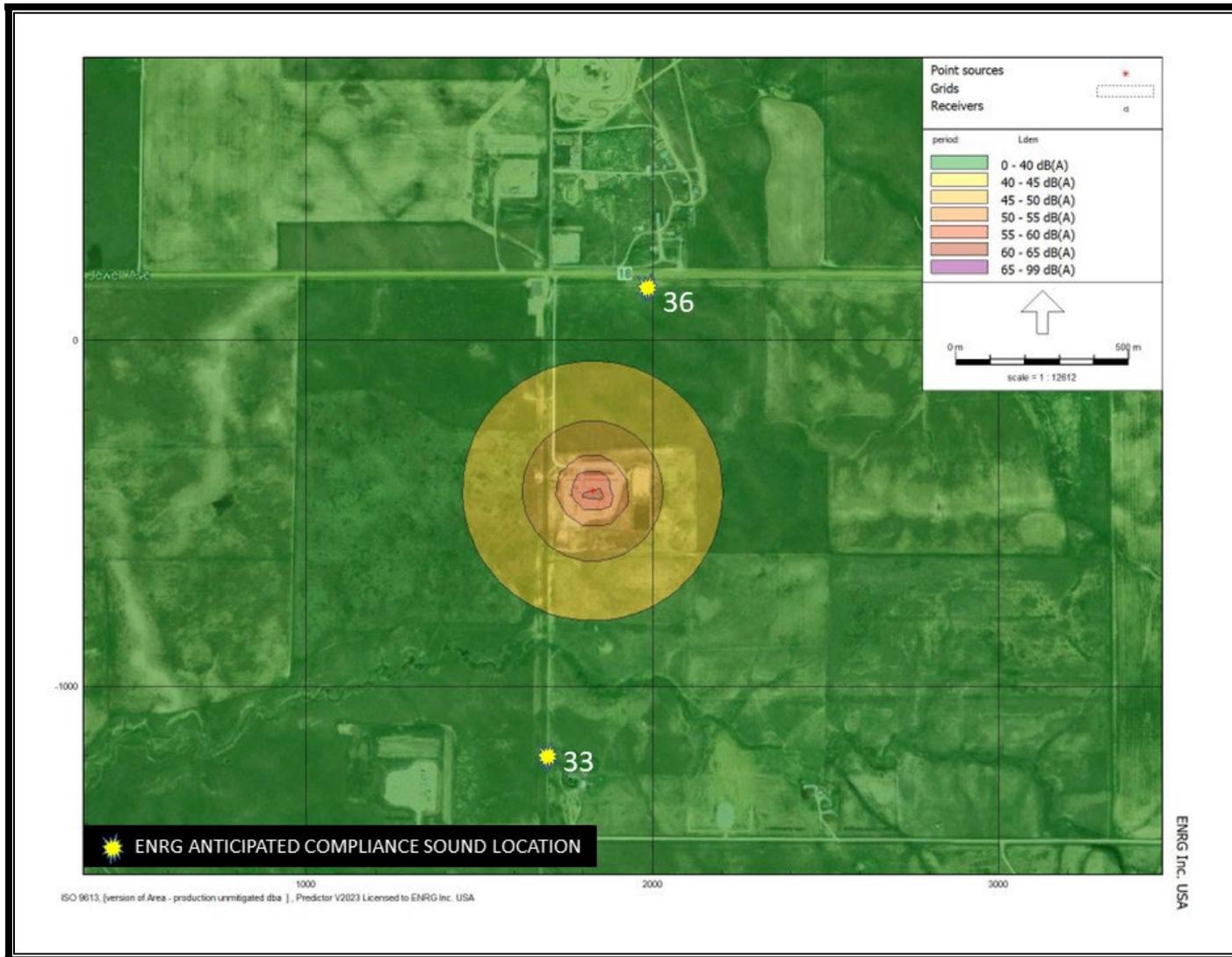


FIGURE 11. CRESTONE PEAK RESOURCES OPERATING LLC – CHICO NORTH PAD SITE  
NOISE MITIGATION PLAN  
**dB(A) UN-MITIGATED PRODUCTION SOUND LEVELS**

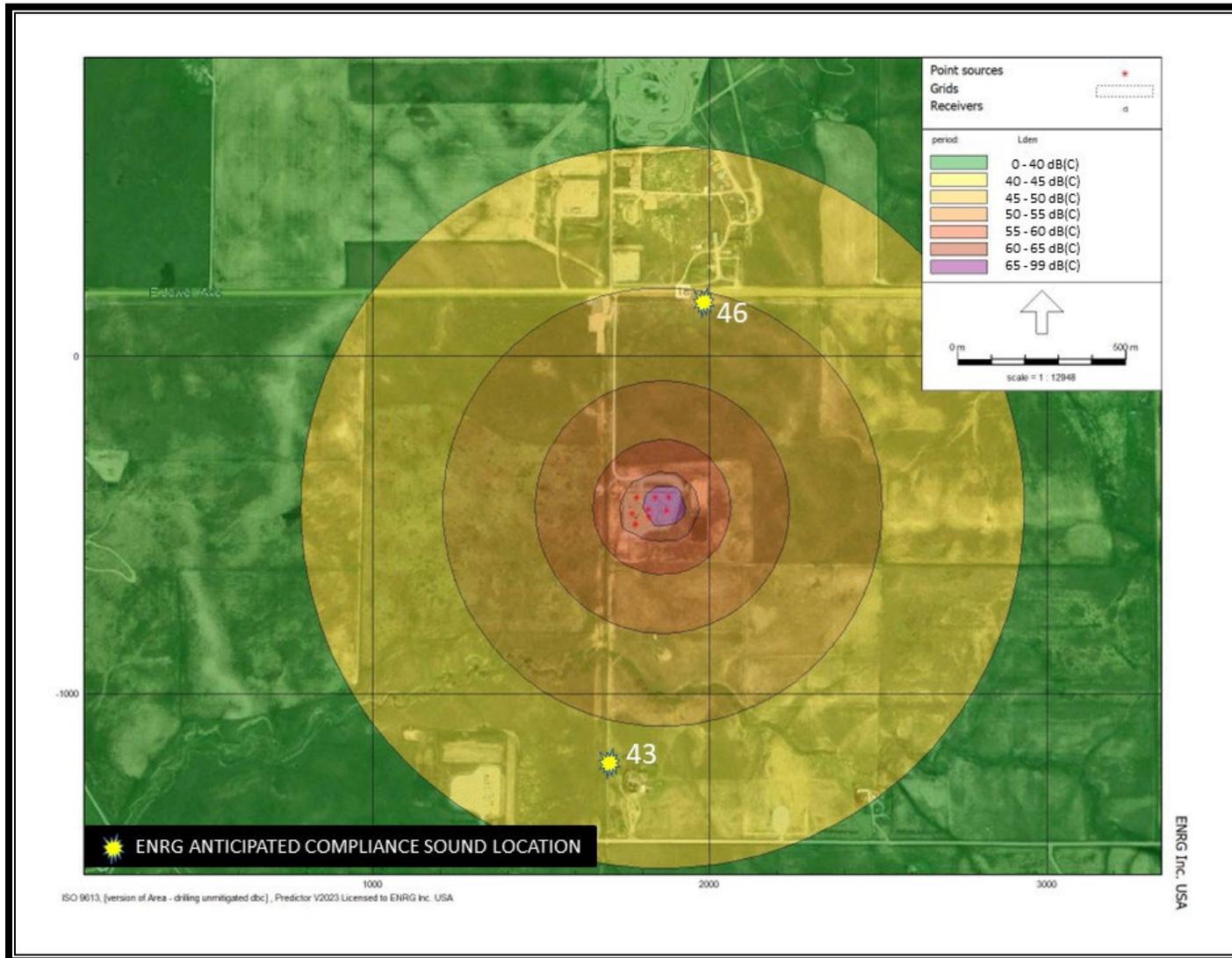


FIGURE 12. CRESTONE PEAK RESOURCES OPERATING LLC – CHICO NORTH PAD SITE  
NOISE MITIGATION PLAN  
**dB(C) UN-MITIGATED DRILLING SOUND LEVELS**

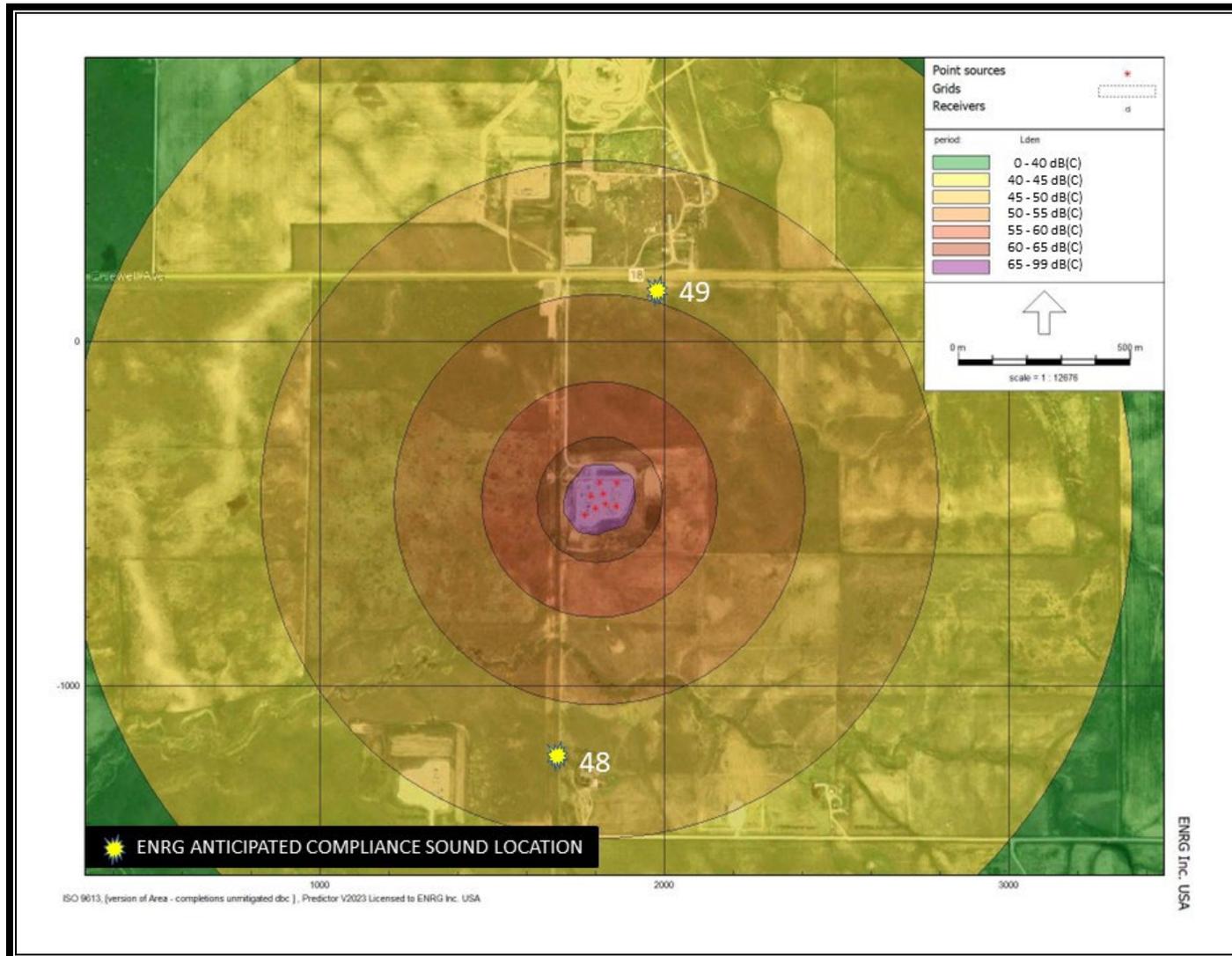
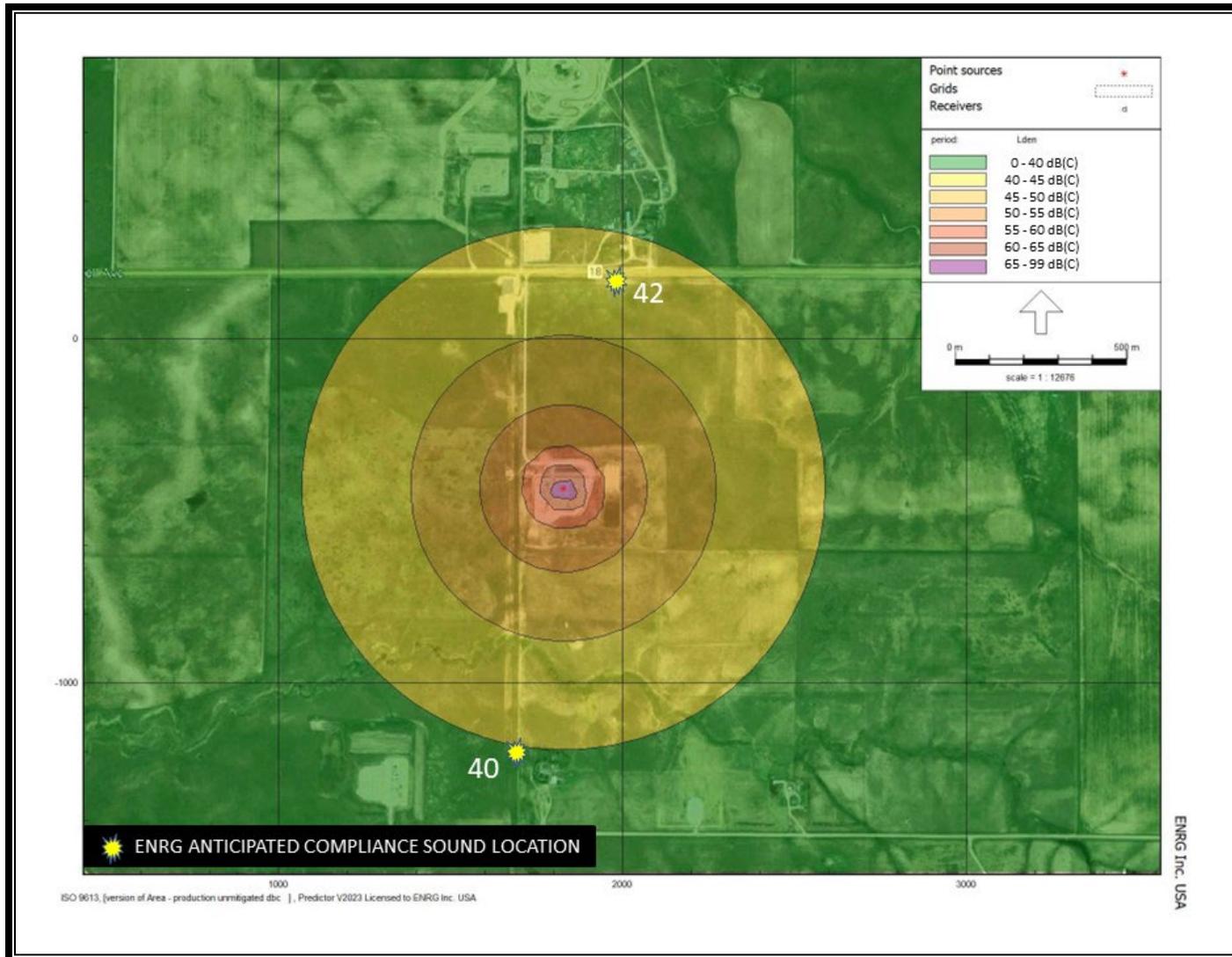


FIGURE 13. CRESTONE PEAK RESOURCES OPERATING LLC – CHICO NORTH PAD SITE  
NOISE MITIGATION PLAN  
**dBC UN-MITIGATED COMPLETIONS SOUND LEVELS**



**FIGURE 14. CRESTONE PEAK RESOURCES OPERATING LLC – CHICO NORTH PAD SITE  
NOISE MITIGATION PLAN  
dBC UN-MITIGATED PRODUCTION SOUND LEVELS**

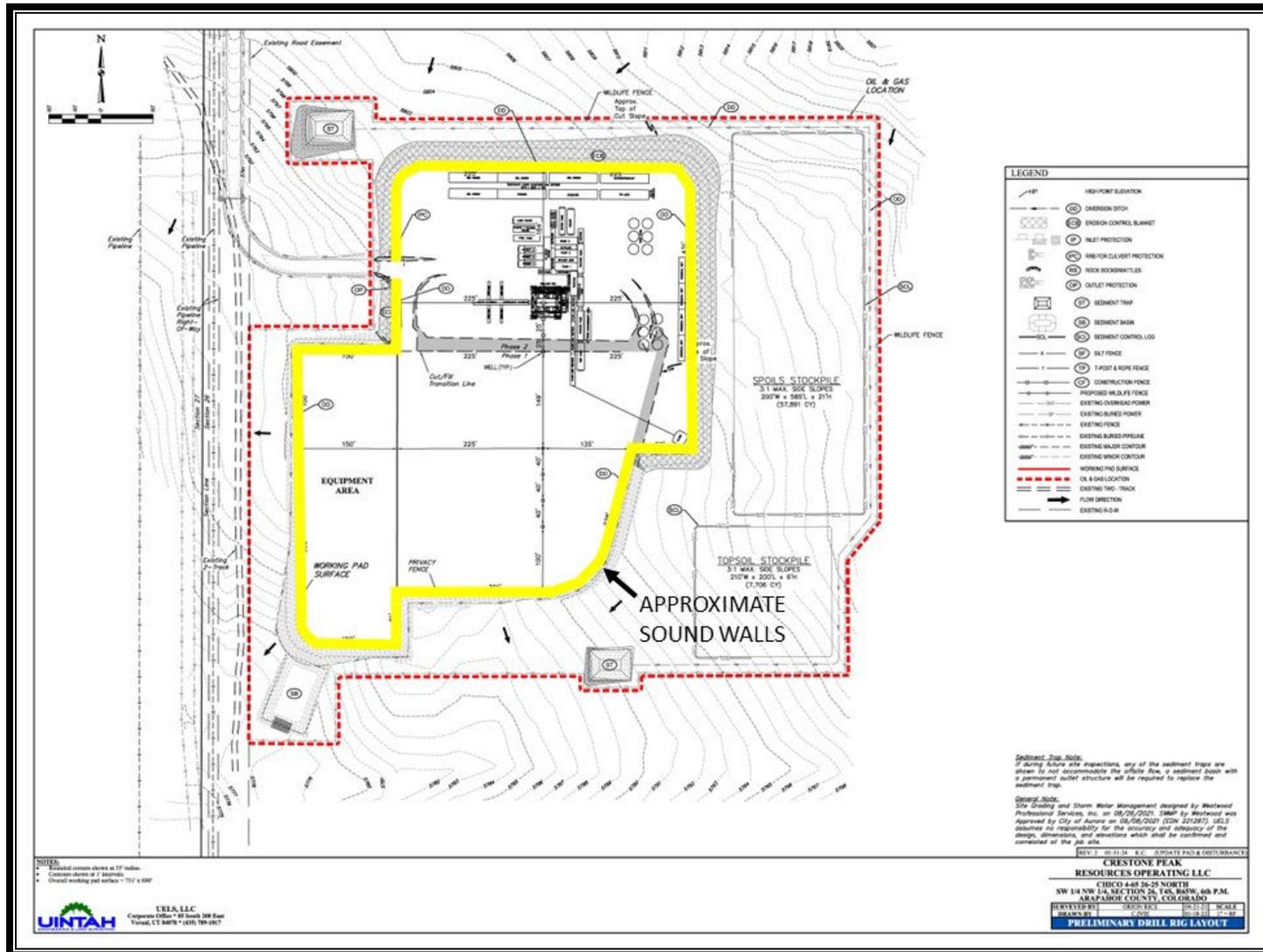
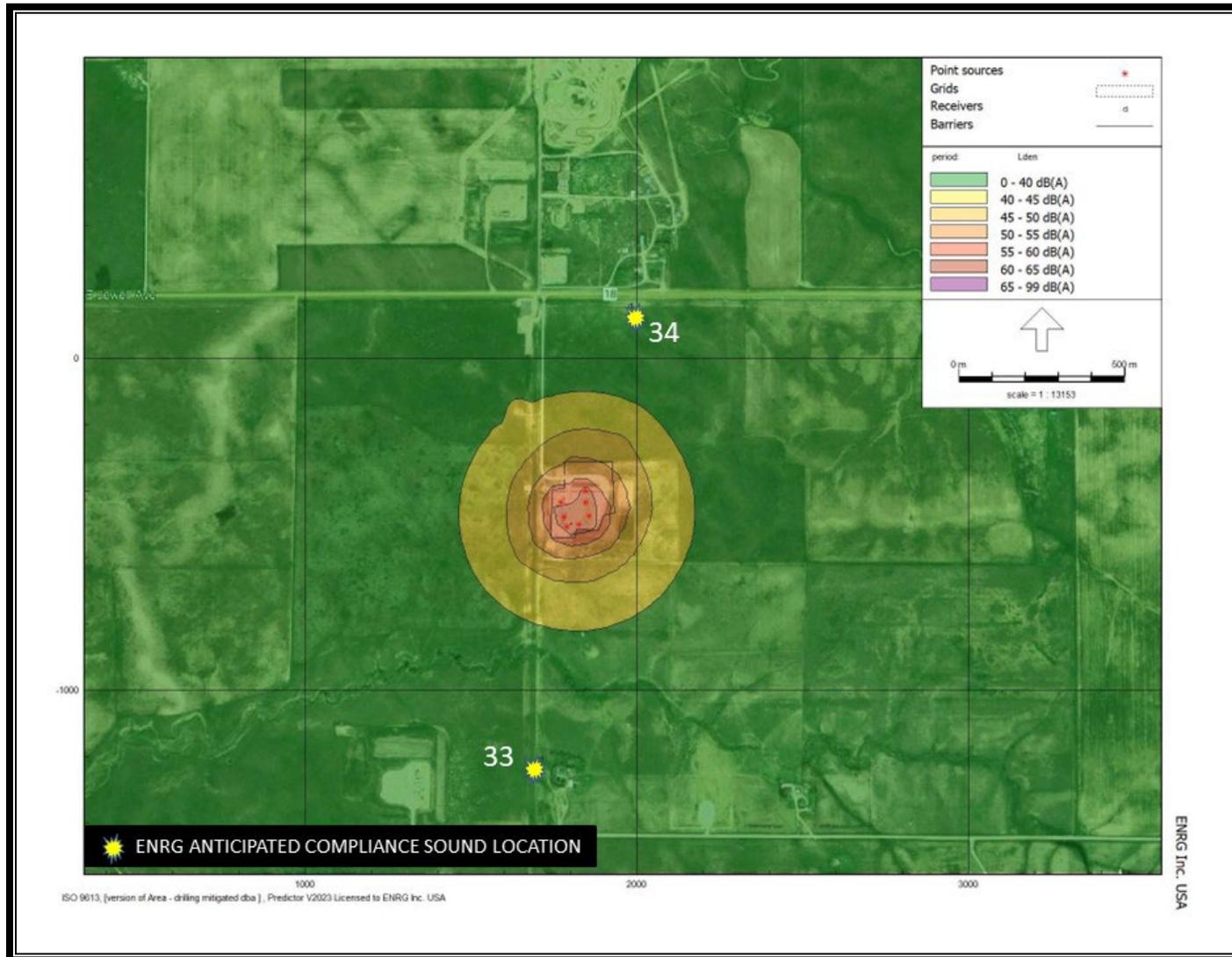
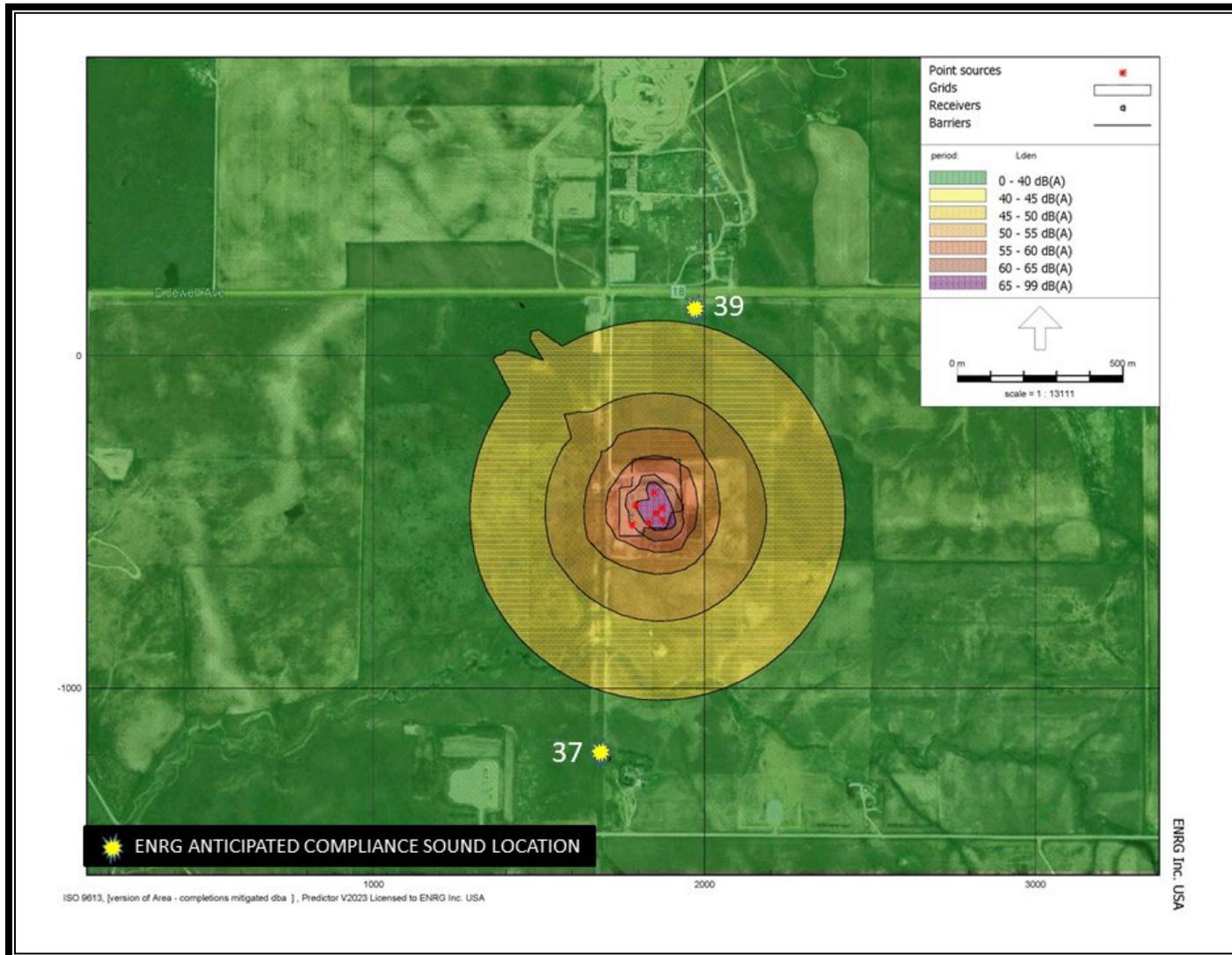


FIGURE 15. CRESTONE PEAK RESOURCES OPERATING LLC – CHICO NORTH PAD SITE  
NOISE MITIGATION PLAN  
ANTICIPATED SOUND WALL LOCATION



**FIGURE 16. CRESTONE PEAK RESOURCES OPERATING LLC – CHICO NORTH PAD SITE  
NOISE MITIGATION PLAN  
dBA MITIGATED DRILLING SOUND LEVELS**



**FIGURE 17. CRESTONE PEAK RESOURCES OPERATING LLC – CHICO NORTH PAD SITE  
NOISE MITIGATION PLAN  
dBA MITIGATED COMPLETIONS SOUND LEVELS**

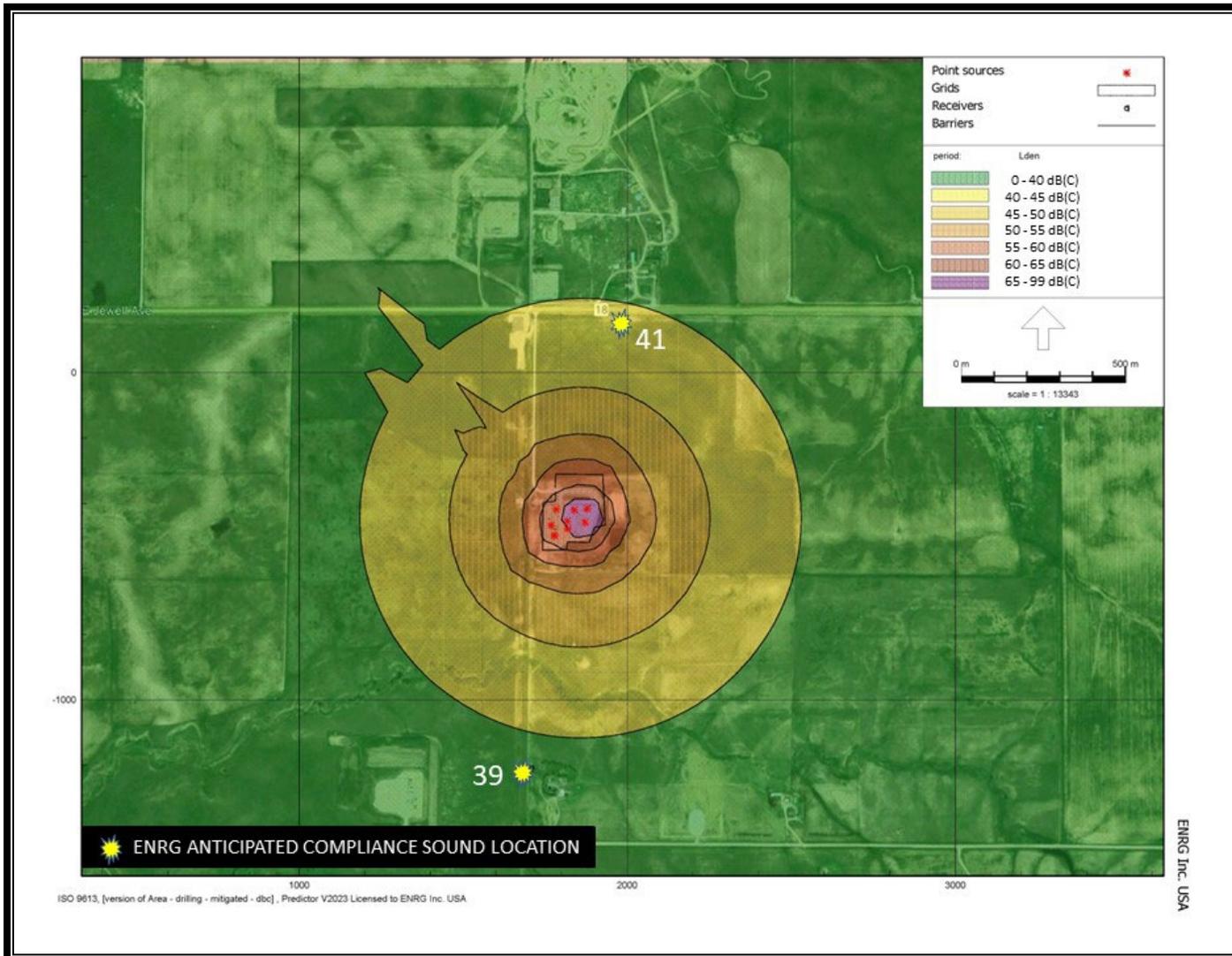


FIGURE 18. CRESTONE PEAK RESOURCES OPERATING LLC – CHICO NORTH PAD SITE  
NOISE MITIGATION PLAN  
**dB(C) MITIGATED DRILLING SOUND LEVELS**

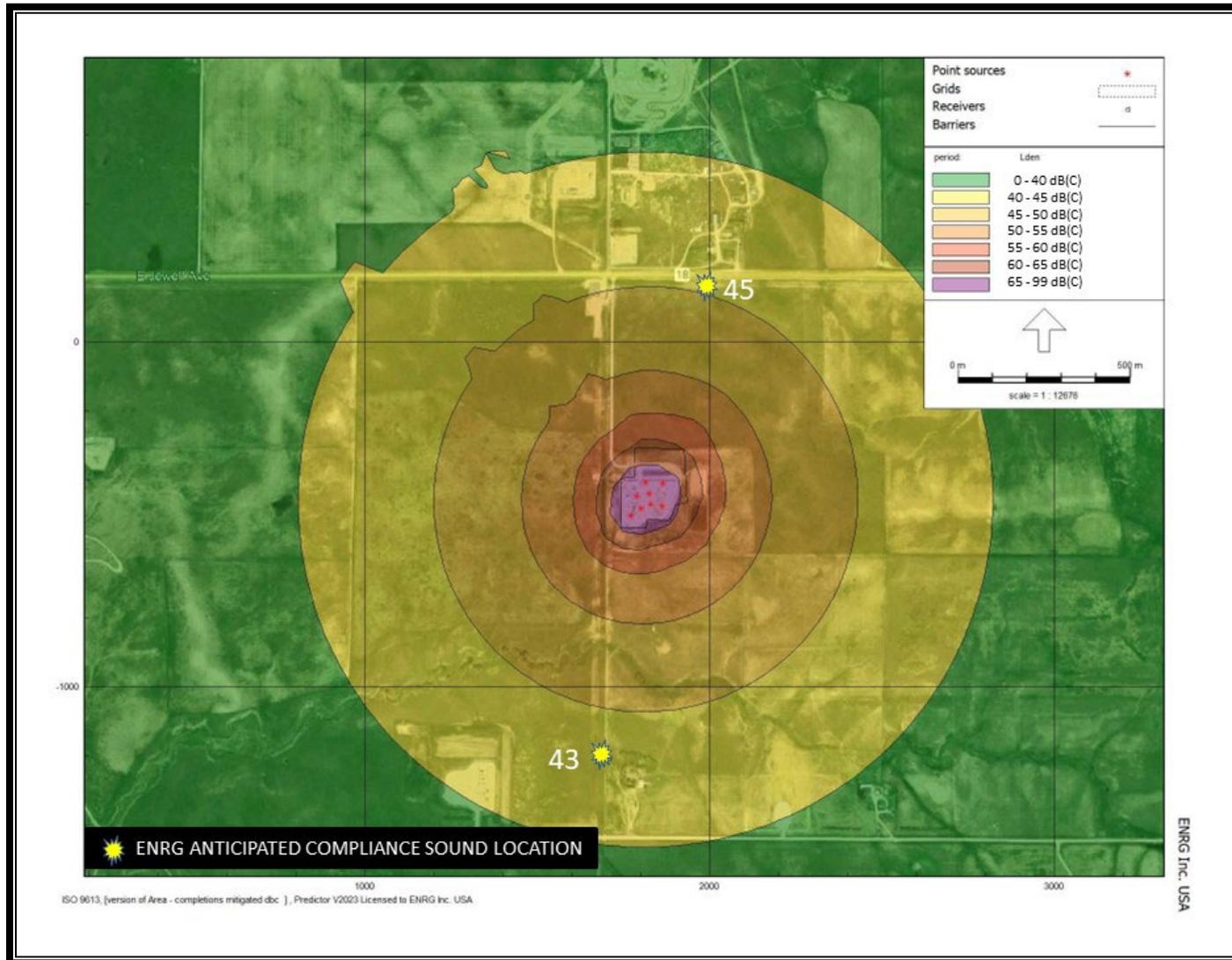


FIGURE 19. CRESTONE PEAK RESOURCES OPERATING LLC – CHICO NORTH PAD SITE  
NOISE MITIGATION PLAN  
**dB(C) MITIGATED COMPLETIONS SOUND LEVELS**



**CIVITAS**

CRESTONE PEAK RESOURCES OPERATING LLC

**EXHIBIT A**

**72-HOUR AMBIENT SOUND REPORTS:**

**CHICO NORTH PAD SITE**

*CHICO NORTH - NORTH METER*

*CHICO NORTH - SOUTH METER*

**CITY OF AURORA, COLORADO**

**Latitude 39.676179 Longitude -104.639045**

PREPARED BY:



MARCH 18, 2024



**CIVITAS**

CRESTONE PEAK RESOURCES OPERATING LLC

**72-HOUR AMBIENT SOUND LEVEL REPORT:  
CHICO 4-65-26-25 NORTH PAD SITE**

*CHICO NORTH - NORTH METER*

CITY OF AURORA, COLORADO

39.676179 -104.639045

PREPARED BY:



MARCH 18, 2024

***PREPARED FOR COLORADO ENERGY AND CARBON MANAGEMENT COMMISSION***

PREPARED FOR THE COLORADO ENERGY AND CARBON MANAGEMENT COMMISSION

March 18, 2024

Crestone Peak Resources Operating LLC  
Attn: Mr. Scott Farkas  
Lead, Well & Location Permitting  
555 17<sup>th</sup> Street #3500  
Denver, Colorado 80202

**RE: CRESTONE PEAK RESOURCES OPERATING LLC  
CHICO 4-65-26-25 NORTH PAD SITE  
72-HOUR AMBIENT SOUND LEVEL SURVEY  
CHICO NORTH - NORTH AMBIENT LOCATION**

Dear Mr. Farkas:

**Introduction**

Per your request, the Environmental and Natural Resources Group Inc. (ENRG) performed a 72-hour ambient sound level survey for Crestone Peak Resources Operating LLC (Crestone) in the vicinity of the Chico 4-65-26-25 North (Chico North) drilling location from March 9 – 11, 2024. Figure 1 shows the location where the ambient sound level survey was conducted, referred to as Chico North. This sound level survey was performed to conform to the Colorado Energy and Carbon Management Commission (ECMC) Operations and Reporting 400 series regulations regarding sound adopted January 15, 2021.

**Site Description**

The Chico North pad site is located at approximately Latitude 39.676179 Longitude -104.639045 (Figure 1). According to Google Earth maps and visual observation, the proposed pad site is located approximately 9,770 feet east of Watkins Road and approximately 1,945 feet south of E. Jewell Ave. in Arapahoe County, Colorado (Sec 26, T4S, R65W). Pursuant to the City of Aurora zoning, the Chico North is located within the city limits of Aurora, Colorado in a Medium Density Residential District (R-2) zoned area. The surrounding properties are primarily utilized for farming/ranching, oil and gas or residential development. Land or properties within ¼ mile the Chico North pad site consists of relatively undisturbed uplands.

At the time of deployment of ambient sound level survey equipment, ENRG personnel observed that the Chico North well pad had been constructed with associated oil and gas production equipment onsite. The well site is within ½ - ¾ mile of existing locations with ongoing production activities onsite.

**72-Hour Ambient Sound Monitoring**

ENRG's Noise Monitoring Terminal (NMT), which is equipped with a Type I Bruel & Kjaer (B&K)

2250 sound level meter, was calibrated, programmed for dBA and dBC frequencies and installed at the Chico North - North ambient sound location by ENRG personnel before 0:00 on Saturday, March 9, 2024. Initial and final readings were verified with a calibration device to ensure accuracy during and after the test. The objective was to measure and document the site’s ambient sound levels until 23:59 on Monday, March 11, 2024. The NMT was located approximately 1,925 feet northeast from the edge of disturbance of the proposed drilling location and approximately 300 feet south from the nearest residential building unit boundary (Figure 1). The NMT was placed where no obstructions were allowed to block the meter from measuring and recording accurate ambient sound levels (Figure 2). The results of the 72-hour ambient sound levels from the Chico North - North ambient sound location are summarized on Table A and on Table 1 below.

**Summary**

The results of the 72-hour ambient sound levels are attached as Table 1 and Figure 3. A summary of the 72-hour sound level averages is shown on Table 1. Figure 3 indicates the 72-hour dBA and dBC average sound levels, average hourly wind speeds and allowable wind speeds.

**TABLE A**  
**CRESTONE PEAK RESOURCES OPERATING LLC**  
**CHICO NORTH - NORTH METER**  
**72-HOUR SOUND LEVEL SUMMARY - dBA & dBC**

<b>dBA</b>		72 HR AVG (dBA)	36 HR	36 HR	24 HR (dBA) DAY 1	24 HR (dBA) DAY 2	24 HR (dBA) DAY 3
DAYS	DATE		DAYTIME AVG (dBA)	NIGHTTIME AVG (dBA)			
SAT - SUN - MON	3/9/24 - 3/11/24	51.7	54.2 7:00 AM - 7:00 PM	45.5 7:00 PM - 7:00 AM	52.6	52.1	50.2

<b>dBC</b>		72 HR AVG (dBC)	36 HR	36 HR	24 HR (dBC) DAY 1	24 HR (dBC) DAY 2	24 HR (dBC) DAY 3
DAYS	DATE		DAYTIME AVG (dBC)	NIGHTTIME AVG (dBC)			
SAT - SUN - MON	3/9/24 - 3/11/24	64.4	65.7 7:00 AM - 7:00 PM	62.6 7:00 PM - 7:00 AM	63.3	64.5	65.3

Please keep in mind that the study takes into account any potential location sound, as well as, any sound from sources surrounding the location including air traffic, highway traffic, and wildlife to name a few. As a reminder, Crestone was not performing any onsite construction, drilling or completion activities during the time of the study.

Please call or email us at the information below if you have any questions or comments.

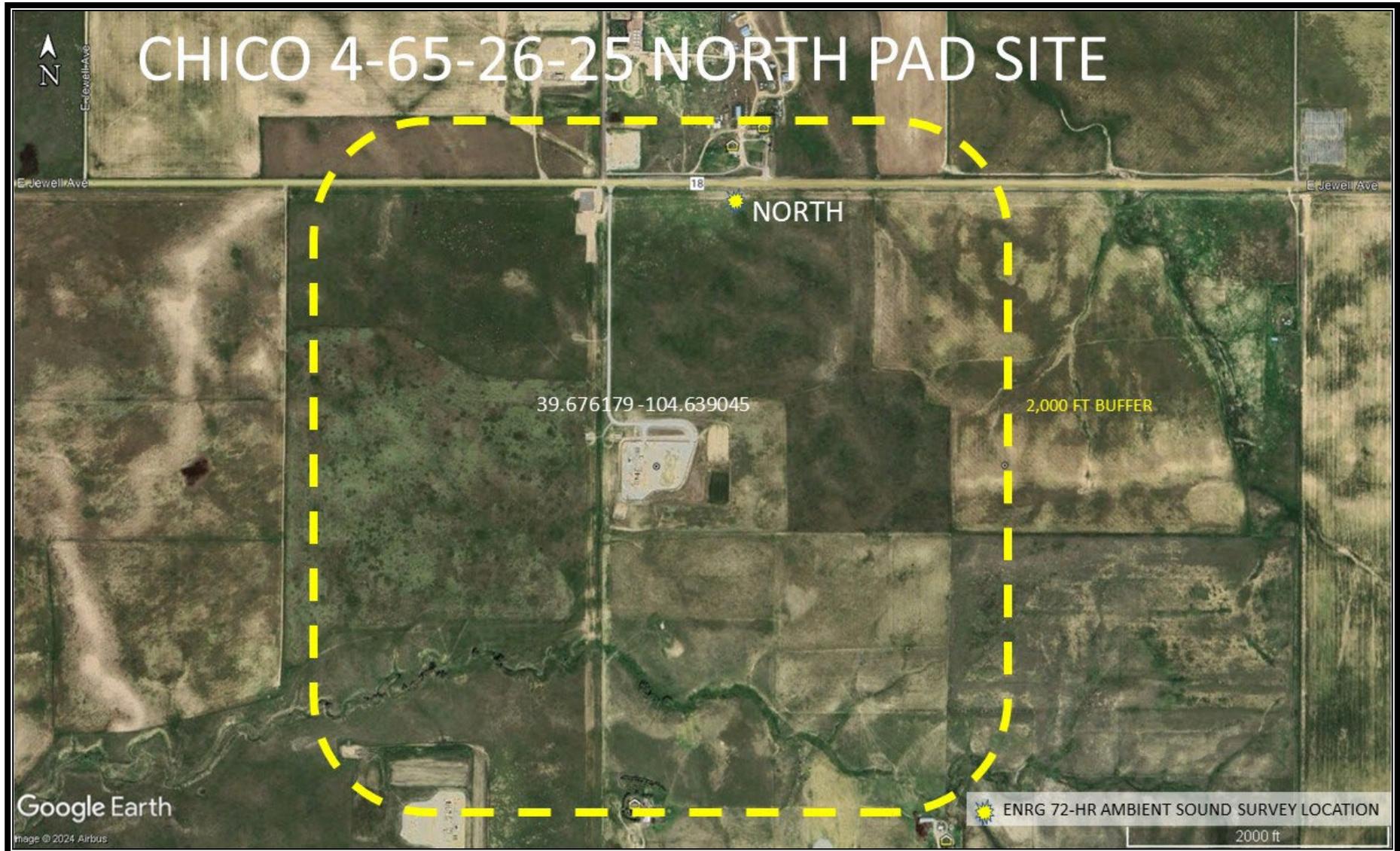
Sincerely,



Chrystie Carter  
 chrystie@enrgconsultants.com  
 214-435-6799 cell



Todd H. Boring  
 todd@enrgconsultants.com  
 214-674-3762 cell.



**FIGURE 1. CRESTONE PEAK RESOURCES OPERATING LLC – CHICO NORTH 4-65-26-25 PAD SITE  
NOISE MONITORING TERMINAL (NMT) LOCATION  
CHICO NORTH - NORTH METER**



**FIGURE 2. CRESTONE PEAK RESOURCES OPERATING LLC – CHICO NORTH 4-65-26-25 PAD SITE  
NOISE MONITORING TERMINAL (NMT) LOCATION  
CHICO NORTH - NORTH METER (View to the North)**

**TABLE 1**  
**CRESTONE PEAK RESOURCES OPERATING LLC**  
**CHICO NORTH 4-65-26-25 PAD SITE**  
**CHICO NORTH - NORTH METER**  
**72-HOUR AMBIENT SOUND LEVEL AVERAGES**  
**MARCH 9, 2024**

Time	Average dBA/Hr (Leq)	Minimum dBA/Hr (LAFmin)	Maximum dBA/Hr (LAFmax)	Average dBC/Hr (Leq)	
0:00-0:59	48.4	38.2	69.9	63.7	Nighttime Range
1:00-1:59	41.8	36.8	62.8	61.3	
2:00-2:59	37.9	36.0	49.5	60.3	
3:00-3:59	38.6	36.6	51.2	60.7	
4:00-4:59	40.8	36.8	68.3	61.0	
5:00-5:59	44.2	36.8	70.2	61.7	
6:00-6:59	47.3	35.7	72.8	61.1	
7:00-7:59	63.8	36.4	92.8	67.0	Daytime Range
8:00-8:59	51.2	37.5	73.3	64.5	
9:00-9:59	48.1	35.4	69.4	62.4	
10:00-10:59	52.5	31.6	75.9	64.6	
11:00-11:59	53.2	29.8	79.2	63.9	
12:00-12:59	50.7	29.9	72.9	63.0	
13:00-13:59	53.8	29.5	81.4	64.2	
14:00-14:59	51.8	29.1	78.3	63.5	
15:00-15:59	51.1	28.6	77.0	65.0	
16:00-16:59	51.7	29.1	74.3	65.0	
17:00-17:59	48.0	29.6	71.0	61.5	
18:00-18:59	46.8	31.3	70.0	61.2	
19:00-19:59	48.8	34.1	70.9	63.6	Nighttime Range
20:00-20:59	47.3	35.3	73.8	64.5	
21:00-21:59	47.2	35.7	68.6	62.2	
22:00-22:59	46.4	35.8	67.8	62.8	
23:00-23:59	44.8	37.1	68.7	62.6	

<b>24-Hr LAeq</b>	<b>52.6</b>
<b>12-Hr Daytime LAeq</b>	<b>55.1</b>
<b>12-Hr Nighttime LAeq</b>	<b>45.7</b>

<b>24-Hr LCeq</b>	<b>63.3</b>
<b>12-Hr Daytime LCeq</b>	<b>64.1</b>
<b>12-Hr Nighttime LCeq</b>	<b>62.3</b>

TABLE 1 - Pg. 1 OF 3

**TABLE 1**  
**CRESTONE PEAK RESOURCES OPERATING LLC**  
**CHICO NORTH 4-65-26-25 PAD SITE**  
**CHICO NORTH - NORTH METER**  
**72-HOUR AMBIENT SOUND LEVEL AVERAGES**  
**MARCH 10, 2024**

Time	Average dBA/Hr (Leq)	Minimum dBA/Hr (LAFmin)	Maximum dBA/Hr (LAFmax)	Average dBC/Hr (Leq)	
0:00-0:59	44.9	36.4	75.4	62.6	Nighttime Range
1:00-1:59	40.1	37.3	48.4	61.9	
2:00-2:59	41.9	37.4	66.9	62.1	
3:00-3:59	41.9	37.4	66.9	62.1	
4:00-4:59	44.1	37.1	74.3	63.6	
5:00-5:59	42.4	36.7	71.5	62.8	
6:00-6:59	44.1	36.4	71.7	63.1	Daytime Range
7:00-7:59	46.9	36.5	72.9	63.5	
8:00-8:59	49.0	33.9	75.1	63.9	
9:00-9:59	44.6	32.9	69.3	63.2	
10:00-10:59	47.7	31.1	69.7	66.6	
11:00-11:59	49.6	30.7	77.1	67.9	
12:00-12:59	49.0	29.6	73.5	65.8	
13:00-13:59	53.6	31.2	80.6	65.4	
14:00-14:59	63.0	31.6	99.8	67.5	
15:00-15:59	52.7	31.0	83.2	63.6	
16:00-16:59	53.8	28.6	79.5	66.2	
17:00-17:59	55.4	29.3	85.0	64.6	
18:00-18:59	50.6	30.6	74.1	63.5	Nighttime Range
19:00-19:59	50.3	31.9	77.2	67.1	
20:00-20:59	47.7	31.4	69.5	62.3	
21:00-21:59	46.9	34.1	68.7	62.9	
22:00-22:59	46.5	32.9	75.7	63.1	
23:00-23:59	43.2	37.5	67.6	62.7	

<b>24-Hr LAeq</b>	<b>52.1</b>
<b>12-Hr Daytime LAeq</b>	<b>54.6</b>
<b>12-Hr Nighttime LAeq</b>	<b>45.5</b>

<b>24-Hr LCeq</b>	<b>64.5</b>
<b>12-Hr Daytime LCeq</b>	<b>65.4</b>
<b>12-Hr Nighttime LCeq</b>	<b>63.3</b>

TABLE 1 - Pg. 2 OF 3

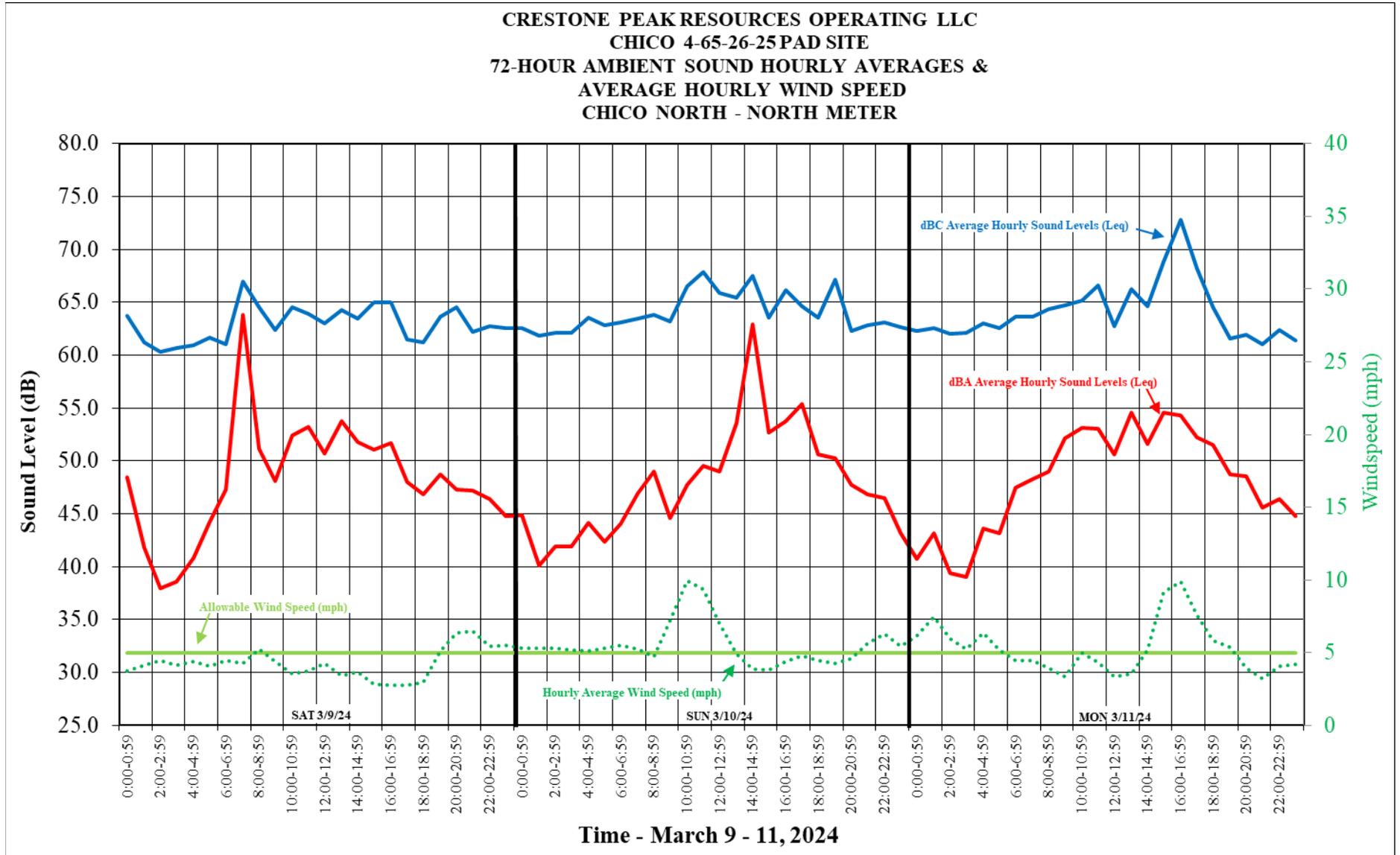
**TABLE 1**  
**CRESTONE PEAK RESOURCES OPERATING LLC**  
**CHICO NORTH 4-65-26-25 PAD SITE**  
**CHICO NORTH - NORTH METER**  
**72-HOUR AMBIENT SOUND LEVEL AVERAGES**  
**MARCH 11, 2024**

Time	Average dBA/Hr (Leq)	Minimum dBA/Hr (LAFmin)	Maximum dBA/Hr (LAFmax)	Average dBC/Hr (Leq)	
0:00-0:59	40.8	37.6	58.1	62.3	Nighttime Range
1:00-1:59	43.2	36.3	65.7	62.6	
2:00-2:59	39.4	36.7	56.5	62.0	
3:00-3:59	39.1	35.7	63.3	62.2	
4:00-4:59	43.6	34.5	76.7	63.0	
5:00-5:59	43.1	36.8	67.1	62.6	
6:00-6:59	47.5	37.2	75.7	63.6	Daytime Range
7:00-7:59	48.3	36.7	71.0	63.6	
8:00-8:59	49.0	37.1	73.3	64.4	
9:00-9:59	52.1	35.0	77.0	64.7	
10:00-10:59	53.1	29.4	78.9	65.2	
11:00-11:59	53.0	31.1	74.4	66.6	
12:00-12:59	50.6	30.1	78.8	62.8	
13:00-13:59	54.5	30.0	84.3	66.3	
14:00-14:59	51.6	29.8	81.1	64.6	
15:00-15:59	54.5	29.5	81.1	68.8	
16:00-16:59	54.3	31.1	80.3	72.8	
17:00-17:59	52.2	30.2	76.3	68.2	
18:00-18:59	51.5	30.3	77.9	64.5	Nighttime Range
19:00-19:59	48.8	31.2	71.3	61.6	
20:00-20:59	48.5	31.3	72.6	62.0	
21:00-21:59	45.6	32.7	68.4	61.0	
22:00-22:59	46.4	35.3	67.4	62.4	
23:00-23:59	44.8	35.4	65.6	61.4	

<b>24-Hr LAeq</b>	<b>50.2</b>
<b>12-Hr Daytime LAeq</b>	<b>52.5</b>
<b>12-Hr Nighttime LAeq</b>	<b>45.3</b>
<b>72-Hour LAeq Average</b>	<b>51.7</b>
<b>36-Hour LAeq Daytime</b>	<b>54.2</b>
<b>36-Hour LAeq Nighttime</b>	<b>45.5</b>

<b>24-Hr LCeq</b>	<b>65.3</b>
<b>12-Hr Daytime LCeq</b>	<b>67.0</b>
<b>12-Hr Nighttime LCeq</b>	<b>62.3</b>
<b>72-Hour dBC Average (Leq)</b>	<b>64.4</b>
<b>36-Hour LCeq Daytime</b>	<b>65.7</b>
<b>36-Hour LCeq Nighttime</b>	<b>62.6</b>

TABLE 1 - Pg. 3 OF 3



**FIGURE 3. CRESTONE PEAK RESOURCES OPERATING LLC – CHICO NORTH 4-65-26-25 PAD SITE  
72-HOUR SOUND LEVEL SURVEY – CHICO NORTH - NORTH METER  
dBA & dBC HOURLY AVERAGE (Leq) & AVERAGE HOURLY WIND SPEED**



**CIVITAS**

CRESTONE PEAK RESOURCES OPERATING LLC

**72-HOUR AMBIENT SOUND LEVEL REPORT:  
CHICO 4-65-26-25 NORTH PAD SITE**

*CHICO NORTH - SOUTH METER*

CITY OF AURORA, COLORADO

39.676179 -104.639045

PREPARED BY:



MARCH 18, 2024

***PREPARED FOR THE COLORADO ENERGY AND CARBON MANAGEMENT COMMISSION***

PREPARED FOR THE COLORADO ENERGY AND CARBON MANAGEMENT COMMISSION

March 18, 2024

Crestone Peak Resources Operating LLC  
Attn: Mr. Scott Farkas  
Lead, Well & Location Permitting  
555 17<sup>th</sup> Street #3500  
Denver, Colorado 80202

**RE: CRESTONE PEAK RESOURCES OPERATING LLC  
CHICO 4-65-26-25 NORTH PAD SITE  
72-HOUR AMBIENT SOUND LEVEL SURVEY  
CHICO NORTH - SOUTH AMBIENT LOCATION**

Dear Mr. Farkas:

**Introduction**

Per your request, the Environmental and Natural Resources Group Inc. (ENRG) performed a 72-hour ambient sound level survey for Crestone Peak Resources Operating LLC (Crestone) in the vicinity of the Chico 4-65-26-25 North (Chico North) drilling location from March 9 – 11, 2024. Figure 1 shows the location where the ambient sound level survey was conducted, referred to as Chico South. This ambient sound level survey was performed to conform to the Colorado Energy and Carbon Management Commission (ECMC) Operations and Reporting 400 series regulations regarding sound adopted January 15, 2021.

**Site Description**

The Chico North pad site is located at approximately Latitude 39.676179 Longitude -104.639045 (Figure 1). According to Google Earth maps and visual observation, the proposed pad site is located approximately 9,770 feet east of Watkins Road and approximately 1,945 feet south of E. Jewell Ave. in Arapahoe County, Colorado (Sec 26, T4S, R65W). Pursuant to the City of Aurora zoning, the Chico North is located within the city limits of Aurora, Colorado in a Medium Density Residential District (R-2) zoned area. The surrounding properties are primarily utilized for farming/ranching, oil and gas or residential development. Land or properties within ¼ mile the Chico North pad site consists of relatively undisturbed uplands.

At the time of deployment of ambient sound level survey equipment, ENRG personnel observed that the Chico North well pad had been constructed with associated oil and gas production equipment onsite. The well site is within ½ - ¾ mile of existing locations with ongoing production activities onsite.

**72-Hour Ambient Sound Monitoring**

ENRG's Noise Monitoring Terminal (NMT), which is equipped with a Type I Bruel & Kjaer (B&K)

2250 sound level meter, was calibrated, programmed for dBA and dBC frequencies and installed at the Chico North - South ambient sound location by ENRG personnel before 0:00 on Saturday, March 9, 2024. Initial and final readings were verified with a calibration device to ensure accuracy during and after the test. The objective was to measure and document the site’s ambient sound levels until 23:59 on Monday, March 11, 2024. The NMT was located approximately 2,165 feet south from the edge of disturbance of the proposed drilling location and approximately 300 feet northwest from the nearest residential building unit boundary (Figure 1). The NMT was placed where no obstructions were allowed to block the meter from measuring and recording accurate ambient sound levels (Figure 2). The results of the 72-hour ambient sound levels from the Chico North - South ambient sound location are summarized on Table A and on Table 1 below.

**Summary**

The results of the 72-hour ambient sound levels are attached as Table 1 and Figure 3. A summary of the 72-hour sound level averages is shown on Table 1. Figure 3 indicates the 72-hour dBA and dBC average sound levels, average hourly wind speeds and allowable wind speeds.

**TABLE A**  
**CRESTONE PEAK RESOURCES OPERATING LLC**  
**CHICO NORTH - SOUTH METER**  
**72-HOUR SOUND LEVEL SUMMARY - dBA & dBC**

<b>dBA</b>		72 HR AVG (dBA)	36 HR	36 HR	24 HR (dBA) DAY 1	24 HR (dBA) DAY 2	24 HR (dBA) DAY 3
DAYS	DATE		DAYTIME AVG (dBA)	NIGHTTIME AVG (dBA)			
SAT - SUN - MON	3/9/24 - 3/11/24	46.0	46.1 7:00 AM - 7:00 PM	45.9 7:00 PM - 7:00 AM	46.2	42.6	47.8

<b>dBC</b>		72 HR AVG (dBC)	36 HR	36 HR	24 HR (dBC) DAY 1	24 HR (dBC) DAY 2	24 HR (dBC) DAY 3
DAYS	DATE		DAYTIME AVG (dBC)	NIGHTTIME AVG (dBC)			
SAT - SUN - MON	3/9/24 - 3/11/24	62.6	63.7 7:00 AM - 7:00 PM	61.2 7:00 PM - 7:00 AM	60.6	62.2	64.3

Please keep in mind that the study takes into account any potential location sound, as well as, any sound from sources surrounding the location including air traffic, highway traffic, and wildlife to name a few. As a reminder, Crestone was not performing any onsite construction, drilling or completion activities during the time of the study.

Please call or email us at the information below if you have any questions or comments.

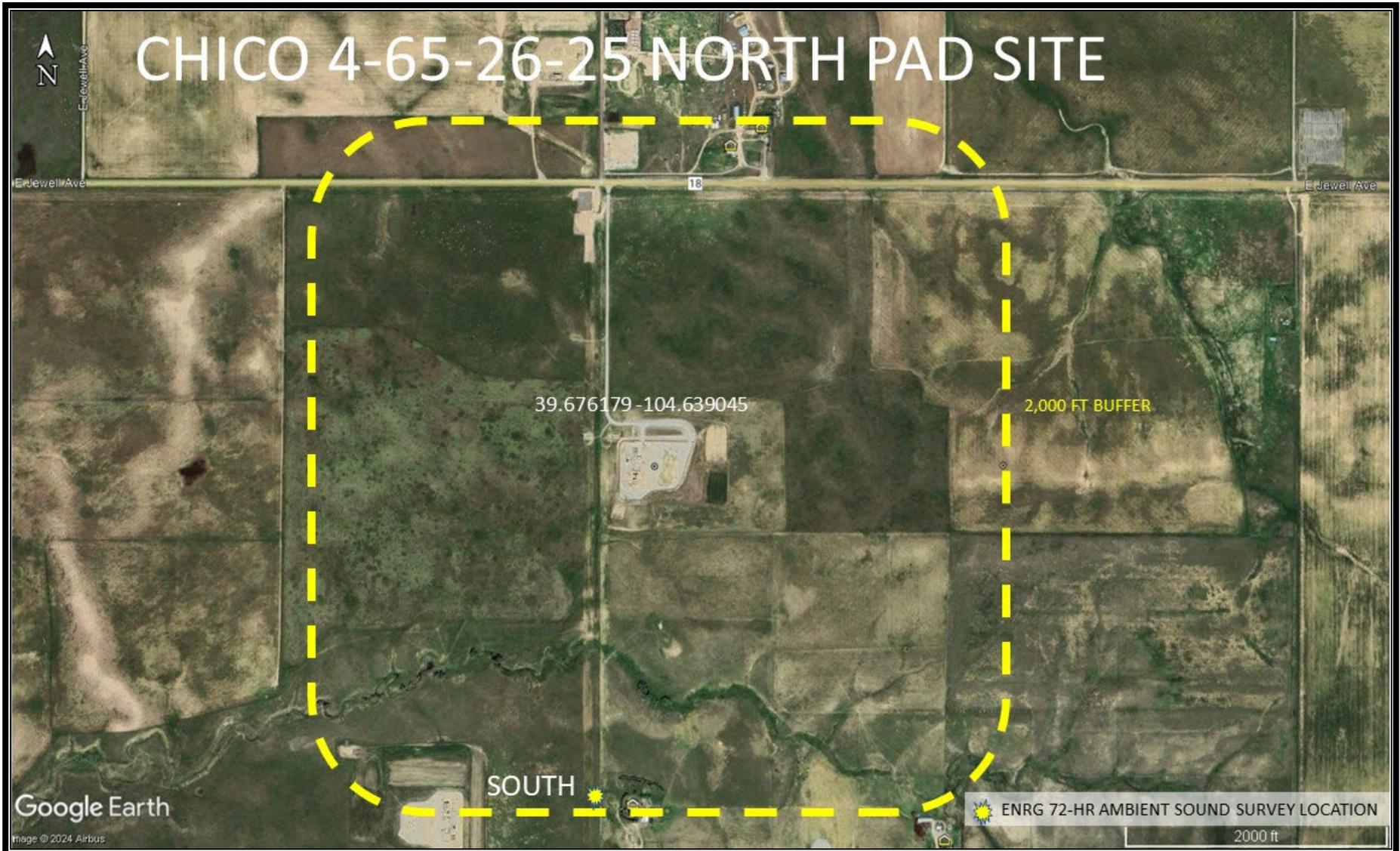
Sincerely,



Chrystie Carter  
 chrystie@enrgconsultants.com  
 214-435-6799 cell



Todd H. Boring  
 todd@enrgconsultants.com  
 214-674-3762 cell.



**FIGURE 1. CRESTONE PEAK RESOURCES OPERATING LLC – CHICO NORTH 4-65-26-25 PAD SITE  
NOISE MONITORING TERMINAL (NMT) LOCATION  
CHICO NORTH - SOUTH METER**



**FIGURE 2. CRESTONE PEAK RESOURCES OPERATING LLC – CHICO NORTH 4-65-26-25 PAD SITE  
NOISE MONITORING TERMINAL (NMT) LOCATION  
CHICO NORTH - SOUTH METER (View to the East)**

**TABLE 1**  
**CRESTONE PEAK RESOURCES OPERATING LLC**  
**CHICO NORTH 4-65-26-25 PAD SITE**  
**CHICO NORTH - SOUTH METER**  
**72-HOUR AMBIENT SOUND LEVEL AVERAGES**  
**MARCH 9, 2024**

Time	Average dBA/Hr (Leq)	Minimum dBA/Hr (LAFmin)	Maximum dBA/Hr (LAFmax)	Average dBC/Hr (Leq)	
0:00-0:59	47.8	37.9	68.2	61.5	Nighttime Range
1:00-1:59	41.9	31.8	62.9	58.7	
2:00-2:59	37.9	30.5	57.1	56.8	
3:00-3:59	35.7	29.8	52.2	55.4	
4:00-4:59	32.5	29.6	47.5	54.8	
5:00-5:59	42.3	30.2	63.2	57.6	
6:00-6:59	49.7	36.1	71.4	59.7	Daytime Range
7:00-7:59	49.3	35.2	71.9	60.3	
8:00-8:59	50.9	36.2	71.4	62.9	
9:00-9:59	48.5	33.7	71.2	62.1	
10:00-10:59	49.4	30.0	68.8	62.6	
11:00-11:59	47.0	28.2	70.4	60.7	
12:00-12:59	45.8	27.0	69.8	60.2	
13:00-13:59	44.2	27.7	68.5	59.3	
14:00-14:59	46.4	26.0	73.6	60.7	
15:00-15:59	42.4	28.0	68.8	57.8	
16:00-16:59	48.3	28.9	68.0	61.5	
17:00-17:59	42.2	29.1	64.2	58.7	
18:00-18:59	34.5	28.9	55.1	57.4	Nighttime Range
19:00-19:59	45.2	31.8	66.3	61.9	
20:00-20:59	45.4	35.6	70.6	63.0	
21:00-21:59	46.5	35.7	66.8	63.6	
22:00-22:59	45.5	34.8	64.1	62.5	
23:00-23:59	43.0	35.5	67.3	61.3	

<b>24-Hr LAeq</b>	<b>46.2</b>
<b>12-Hr Daytime LAeq</b>	<b>47.2</b>
<b>12-Hr Nighttime LAeq</b>	<b>44.8</b>

<b>24-Hr LCeq</b>	<b>60.6</b>
<b>12-Hr Daytime LCeq</b>	<b>60.7</b>
<b>12-Hr Nighttime LCeq</b>	<b>60.6</b>

TABLE 1 - Pg. 1 OF 3

**TABLE 1**  
**CRESTONE PEAK RESOURCES OPERATING LLC**  
**CHICO NORTH 4-65-26-25 PAD SITE**  
**CHICO NORTH - SOUTH METER**  
**72-HOUR AMBIENT SOUND LEVEL AVERAGES**  
**MARCH 10, 2024**

Time	Average dBA/Hr (Leq)	Minimum dBA/Hr (LAFmin)	Maximum dBA/Hr (LAFmax)	Average dBC/Hr (Leq)	
0:00-0:59	38.2	33.9	54.8	60.7	Nighttime Range
1:00-1:59	37.8	34.6	44.9	60.6	
2:00-2:59	37.8	34.6	44.9	60.6	
3:00-3:59	37.8	33.7	44.5	59.9	
4:00-4:59	37.4	33.4	49.2	60.1	
5:00-5:59	41.7	34.2	70.8	60.3	
6:00-6:59	42.3	35.2	60.4	60.9	Daytime Range
7:00-7:59	45.9	34.2	73.3	60.7	
8:00-8:59	46.0	30.7	64.1	61.7	
9:00-9:59	44.4	31.1	67.9	61.8	
10:00-10:59	42.4	32.7	69.0	67.4	
11:00-11:59	44.0	28.5	64.4	68.3	
12:00-12:59	43.7	27.6	63.0	65.2	
13:00-13:59	40.7	26.5	68.1	62.4	
14:00-14:59	41.0	27.5	64.4	59.2	
15:00-15:59	41.7	26.7	65.0	60.0	
16:00-16:59	40.8	27.3	64.9	60.1	
17:00-17:59	41.4	27.3	65.2	58.7	
18:00-18:59	40.7	27.7	59.4	58.8	Nighttime Range
19:00-19:59	43.2	29.1	63.1	59.7	
20:00-20:59	42.3	28.9	66.6	60.0	
21:00-21:59	46.0	31.6	66.1	62.1	
22:00-22:59	43.7	32.7	63.8	62.5	
23:00-23:59	43.4	34.1	64.5	61.2	

<b>24-Hr LAeq</b>	<b>42.6</b>
<b>12-Hr Daytime LAeq</b>	<b>43.2</b>
<b>12-Hr Nighttime LAeq</b>	<b>41.9</b>

<b>24-Hr LCeq</b>	<b>62.2</b>
<b>12-Hr Daytime LCeq</b>	<b>63.3</b>
<b>12-Hr Nighttime LCeq</b>	<b>60.8</b>

TABLE 1 - Pg. 2 OF 3

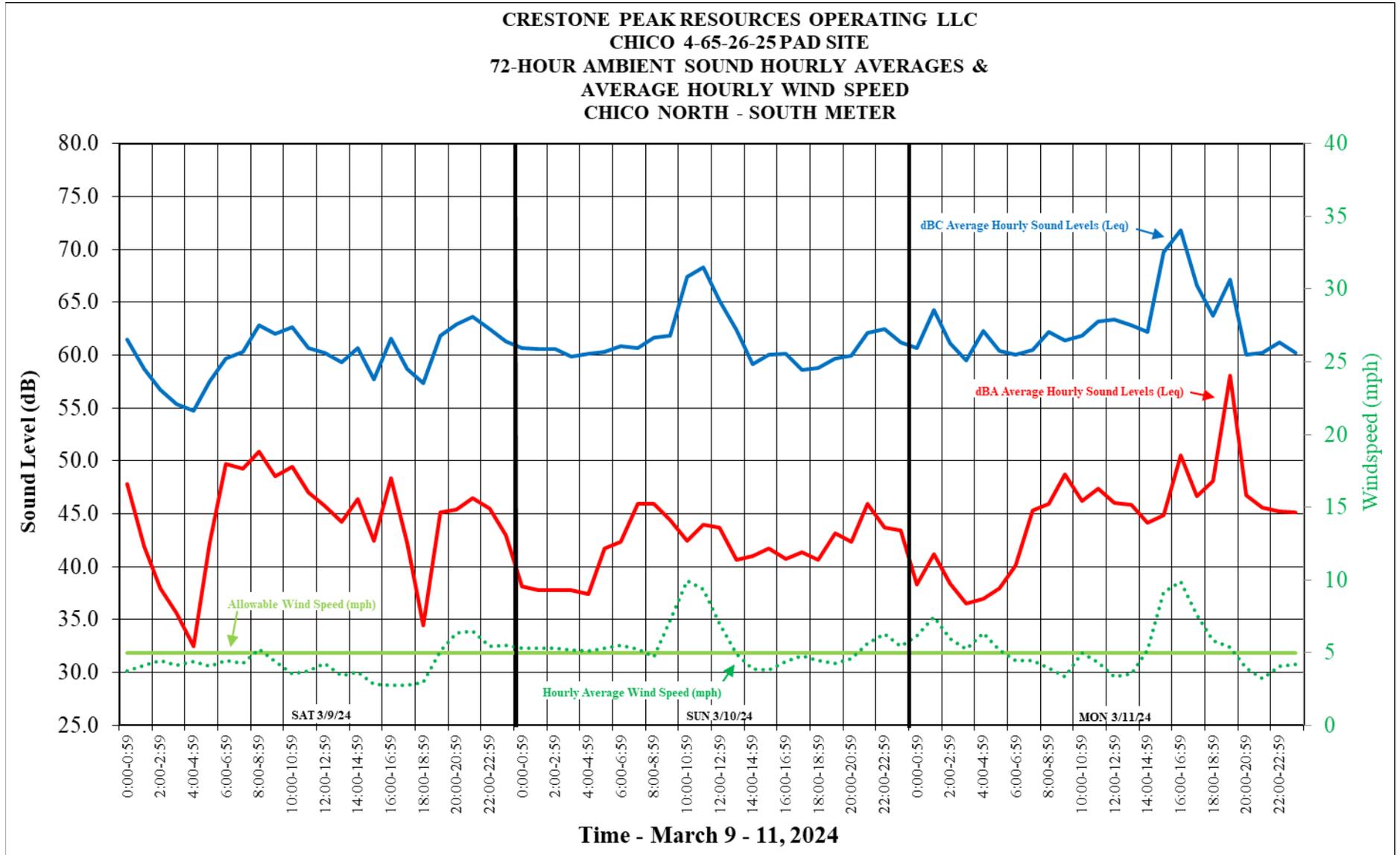
**TABLE 1**  
**CRESTONE PEAK RESOURCES OPERATING LLC**  
**CHICO NORTH 4-65-26-25 PAD SITE**  
**CHICO NORTH - SOUTH METER**  
**72-HOUR AMBIENT SOUND LEVEL AVERAGES**  
**MARCH 11, 2024**

Time	Average dBA/Hr (Leq)	Minimum dBA/Hr (LAFmin)	Maximum dBA/Hr (LAFmax)	Average dBC/Hr (Leq)	
0:00-0:59	38.4	34.2	45.8	60.7	Nighttime Range
1:00-1:59	41.2	35.2	61.0	64.2	
2:00-2:59	38.4	33.8	48.3	61.1	
3:00-3:59	36.5	32.5	43.7	59.5	
4:00-4:59	36.9	32.8	45.6	62.3	
5:00-5:59	37.9	32.9	54.2	60.4	
6:00-6:59	40.1	32.9	59.7	60.0	Daytime Range
7:00-7:59	45.4	34.0	67.9	60.5	
8:00-8:59	45.9	34.4	64.5	62.2	
9:00-9:59	48.7	33.3	75.5	61.4	
10:00-10:59	46.2	30.4	64.0	61.8	
11:00-11:59	47.4	28.2	67.2	63.2	
12:00-12:59	46.0	26.3	64.9	63.4	
13:00-13:59	45.9	28.6	64.4	62.8	
14:00-14:59	44.2	30.0	72.8	62.2	
15:00-15:59	44.9	30.8	65.7	69.7	
16:00-16:59	50.6	32.9	71.4	71.8	
17:00-17:59	46.7	30.2	72.4	66.6	
18:00-18:59	48.1	29.6	73.2	63.7	Nighttime Range
19:00-19:59	58.1	31.7	87.5	67.1	
20:00-20:59	46.8	30.4	67.8	60.0	
21:00-21:59	45.6	33.1	69.4	60.2	
22:00-22:59	45.2	34.1	66.6	61.2	
23:00-23:59	45.2	35.8	63.5	60.3	

<b>24-Hr LAeq</b>	<b>47.8</b>
<b>12-Hr Daytime LAeq</b>	<b>47.0</b>
<b>12-Hr Nighttime LAeq</b>	<b>48.5</b>
<b>72-Hour LAeq Average</b>	<b>46.0</b>
<b>36-Hour LAeq Daytime</b>	<b>46.1</b>
<b>36-Hour LAeq Nighttime</b>	<b>45.9</b>

<b>24-Hr LCeq</b>	<b>64.3</b>
<b>12-Hr Daytime LCeq</b>	<b>65.7</b>
<b>12-Hr Nighttime LCeq</b>	<b>62.1</b>
<b>72-Hour dBC Average (Leq)</b>	<b>62.6</b>
<b>36-Hour LCeq Daytime</b>	<b>63.7</b>
<b>36-Hour LCeq Nighttime</b>	<b>61.2</b>

TABLE 1 - Pg. 3 OF 3



**FIGURE 3. CRESTONE PEAK RESOURCES OPERATING LLC – CHICO NORTH 4-65-26-25 PAD SITE  
72-HOUR SOUND LEVEL SURVEY – CHICO NORTH - SOUTH METER  
dBA & dBC HOURLY AVERAGE (Leq) & AVERAGE HOURLY WIND SPEED**



**CIVITAS**

CRESTONE PEAK RESOURCES OPERATING LLC

**EXHIBIT B**

**BEST MANAGEMENT PRACTICES:**

**CHICO NORTH PAD SITE**

**CITY OF AURORA, COLORADO**

**Latitude 39.676179 Longitude -104.639045**

PREPARED BY:



MARCH 18, 2024



# CIVITAS

CRESTONE PEAK RESOURCES OPERATING LLC

## Best Management Practices (BMPs)

### ECMC BEST MANAGEMENT PRACTICES (BMPs)

- Idling Equipment – While idling engine/equipment, maintain at the lowest frequency possible, as well as, in a position/location that will prevent sound from carrying to nearby residents.
- Unnecessary Sounds – Unnecessary sounds such as honking the horn, revving vehicle engines, loud music, and unwarranted metal hammering/banging are all examples of sound that can create nuisance; failure to eliminate unnecessary sound from location will be subject to an internal compliance assessment if reported by a landowner.
- In accordance with ECMC regulations., continuous sound monitoring will be conducted, pending permissions, near the property line of the nearest occupied structure and in each direction of an RBU within 2000 ft.
- The construction phase is scheduled to last, at this time, approximately 7 weeks.
- Following the completion of construction, a sound barrier (minimum rating of STC-30) will be installed on all sides of the pad site. This sound barrier will be 32-feet tall and remain onsite through Completions operations.
- At the time of this NMP, Patterson 345 which is equipped with natural gas and batteries, is scheduled to be utilized for the drilling of the Chico North location. Rigs have been designed and equipped with sound mitigating equipment including devices to minimize squeaking from the draw works brakes. The drill phase is scheduled to last, at this time, for approximately 4 weeks.
- A quiet frac fleet will be used during the completion phase. The completions phase is scheduled, at this time, to last for approximately 8 weeks.
- Production is anticipated to last, at this time, approximately 30 years.
- At the commencement of production, if sound levels exceed the allowables set forth above, Crestone will mitigate production equipment, as necessary, to maintain compliance on the Chico North location.

- The Operator shall follow the most recent and most appropriate BMPs to reduce noise related to drilling and completion
- Unloading pipe. The Operator shall not unload pipe from delivery trucks between 8:00 p.m. and 7:00 a.m.
- **ALLOWABLES**

### **Chico North – North Ambient Location**

#### **dBa -**

##### **Drilling and Completions –**

During the 72-hour sound study, the 36-hour daytime average was 54.2 dBA, while the 36-hour nighttime average was 45.5 dBA. Based on the results of the study, and ECMC regulations, ENRG is suggesting that the dBA allowable be 65.0 dBA during the day and 60.0 dBA during the night.

##### **Production -**

The allowable for the Chico North - North monitoring location will be 55.0 dBA during the day and 50.0 dBA at night for the production period.

#### **dBc**

##### **Drilling and Completions –**

During the 72-hour sound study, the 36-hour daytime average was 65.7 dBc, while the 36-hour nighttime average was 62.6 dBc. Based on the results of the study ENRG is suggesting that the dBc allowable be 72.7 dBc during the day and 65.0 dBc during the night.

##### **Production -**

The allowable for the Chico North - North monitoring location will be 72.7 dBA during the day and 67.6 dBA at night for the production period.

### **Chico North – South Ambient Location**

#### **dBa –**

##### **Drilling and Completions -**

During the 72-hour sound study, the 36-hour daytime average was 46.1 dBA, while the 36-hour nighttime average was 45.9 dBA. Based on the results of the study ENRG is suggesting that the dBA allowable be 65.0 dBA during the day and 60.0 dBA during the night.

##### **Production -**

The allowable for the Chico North - South monitoring location will be 55.0 dBA during the day and 50.0 dBA at night for the production period.

**dBC** –**Drilling and Completions**

During the 72-hour sound study, the 36-hour daytime average was 63.7 dBC, while the 36-hour nighttime average was 61.2 dBC. Based on the results of the study ENRG is suggesting that the dBC allowable be 65.0 dBC during the day and 65.0 dBC during the night.

**Production -**

The allowable for the Chico North - South monitoring location will be 70.7 dBC during the day and 66.2 dBC at night for the production period.