



Camenisch 10-33HZ Well Pad and Facility

Site Mitigation and Best Management Practices: BMP cover sheet requested along with a BMP stating the adjusted ambient noise levels.

Based on the noise modeling analysis provided by Urban Solutions Group. Kerr-McGee Oil & Gas Onshore LP (KMOG) will implement the best management practices (BMPs) outlined in the Summary of BMP’s section. Table 3 Ambient Adjustable Allowable Daytime and Nighttime noise level limits for drilling, completions, and production operations KMOG will comply with at the Camenisch 10-33HZ location.

- The operator has conducted an ambient noise survey to document noise levels around the site.
- The operator will comply with maximum permissible noise levels adjusted based on the results of the ambient noise survey. The adjusted noise levels are outlined below:

Table 3: Adjusted Maximum Permissible Noise Levels for the Camenisch Pad

Operation	ZONE	Maximum Permissible Noise Levels	
		dBA	dBC
Drilling and Completions	Commercial/Agricultural	65 Day / 60 Night	65 Day / 65 Night
Production	Commercial/Agricultural	60 Day / 55 Night	72 Day / 66 Night

SUMMARY OF BMPS AND MITIGATION TO BE IMPLEMENTED

Best Management Practices (BMPs) are practices that are designed to prevent or reduce impacts caused by oil and gas operations on the environment and wildlife resources, and to minimize adverse impacts to public health, safety, and welfare.

The BMP’s that OXY plans to implement for the Camenisch site are as follows;

- OXY will comply with the maximum permissible levels specified in the COGCC Rule 423 as outlined in Table 3 of Section 2 of this document.

- Prior to commencement of any drilling and completion activities, approximately 720 linear feet of 32 foot tall, engineered sound wall rated at STC 32 will be installed as proposed in the NIA below on page 14. This will include approximately 500 linear feet on the South side of the location, and 220 linear feet on the East Side of the location.
- A Quiet Completions Fleet will be utilized for completions operations.
- At the Directors request, OXY agrees to acquire an additional ambient at the noise point of compliance 30 to 90 days prior to the commencement of operations. If the new ambient noise levels change any components of this Noise Mitigation Plan, a Form 4 sundry will be submitted to update the plan accordingly.
- Continuous monitoring will be employed for all drilling and completions and any operations that lasts longer than 24 continuous hours. Monitor locations will coincide with the noise point of compliance outlined in Figure 2 in Section 5 of this document.
- If the drilling rig or completions fleet is changed prior to commencement of operations, the mitigation measures will be equally or more protective. A Form 4 will be submitted per Rule 404.d to outline any changes.
- OXY will post contact information to receive and address noise complaints arising from pre-production operations around the clock, 24-hours, 7 days per week. Upon receipt of a complaint, either directly to OXY or from the COGCC, OXY will contact relative stakeholder within 24 hours of receipt



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Form 2A Noise Mitigation Plan

Camenisch 10-33HZ Pad
Weld County, Colorado

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REV 3



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1. EXECUTIVE SUMMARY

Urban Solution Group, LLC (Urban) was commissioned to prepare a Noise Mitigation Plan (NMP) for the Camenisch 10-33HZ Pad (Camenisch Pad) to be operated by **Kerr-McGee Oil and Gas Onshore, LP (KMOG)**. KMOG is proposing to develop oil and natural gas wells at the Camenisch Pad located near Johnstown, Colorado. The purpose of this plan is to assess predicted environmental noise impacts from the proposed operations on the surrounding environment caused by industrial operations as compared to the permissible noise level limits described in the Colorado Oil and Gas Conservation Commission (COGCC) Rule 423.

To facilitate this work, the following analyses were completed;

- Identification of one noise point of compliance per COGCC Rule 423 (the Regulation)
- Pre-operational ambient sound level survey per 423.b of the Regulation
- Completion of a full site-specific Noise Impact Assessment (NIA) with individual models for;
 - Drilling operations with the Precision Drilling Rig #461
 - Completions operations for the Halliburton Quiet Fleet
 - Production operations with the equipment and layout proposed by KMOG
- Specification of Best Management Practices (BMP's) that will be implemented at the Camenisch location such that all operations comply with the Regulation and minimize environmental impact on the surrounding area

The results of the analyses with full implementation of the BMPs for the Camenisch location are summarized as follows;

Analysis Type	Result
Noise points of compliance	<ul style="list-style-type: none"> • One identified in Figure 2 of Section 5
Pre-operational ambient noise survey	<ul style="list-style-type: none"> • Max. permissible levels per Table 423.b.1&2 in the Regulation • No ambient adjustments apply to the Monitoring Point
Drilling Operations NIA	<ul style="list-style-type: none"> • Compliant. Mitigation included for reference • Approximately 720 linear feet of 32-foot-tall , engineered sound wall rated at STC-32 will be installed on the south and east sides of the pad
Completions Operations NIA	<ul style="list-style-type: none"> • Compliant. Mitigation included for reference • Approximately 720 linear feet of 32-foot-tall , engineered sound wall rated at STC-32 will be installed on the south and east sides of the pad
Production Operations NIA	<ul style="list-style-type: none"> • Compliant. No further noise mitigation required

2. REGULATIONS AND NOISE STANDARDS SUMMARY

Noise for energy related facilities in the state of Colorado is regulated through the Colorado Oil and Gas Conservation Commission (COGCC) 423 series “Noise” regulations (the Regulation). The Regulation sets the maximum permissible noise level, which is the limit that the noise emanating from energy facilities in the study area may not exceed over a specified period, as measured at noise points of compliance (the receptors). These allowable limits are dependent on the land use zoning within the study area.

COGCC Rule 423 Noise Regulation – Brief Overview

Section 423.b (1) of COGCC Rule 423 (the Regulation) states that all Oil and Gas Operations will comply with the maximum permissible noise levels in Table 1 below unless otherwise required by Rule 423.

Table 1: Maximum Permissible Noise Levels (COGCC Table 423-1)

ZONE	Daytime (7:00 a.m. – 7:00 p.m.)	Nighttime (7:00 p.m. – 7:00 a.m.)
Residential/Rural/State Parks & 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)

Exceptions to these maximum permissible noise levels for Drilling, Completions and Flowback Operations are outlined in section 423.b (2) as follows;

- A. In Residential/Rural or Commercial/Agricultural, maximum permissible noise levels will be 60 dBA in the hours between 7:00 p.m. to 7:00 a.m. and 65 dBA in the hours between 7:00 a.m. to 7:00 p.m.; and
- B. In all zones maximum permissible noise levels will be 65 dBC in the hours between 7:00 p.m. to 7:00 a.m. and 65 dBC in the hours between 7:00 a.m. to 7:00 p.m.

These maximum allowable noise levels are applied at “noise points of compliance”. These points are chosen as outlined in section 423.a (5) of the Regulation;

(5) For proposed Oil and Gas Locations with a Working Pad Surface within 2,000 feet of one or more Residential Building Units (RBU’s), at least one, and no more than six noise points of compliance where monitors will be located. Operators will identify noise points of compliance using the following criteria:

- A. Provide one noise point of compliance in each direction in which an RBU is located within 2,000 feet of the proposed Working Pad Surface.

B. Noise points of compliance will be located at least 350 feet from the Working Pad Surface, and no less than 25 feet from the exterior wall of the RBU that is closest to the Working Pad Surface. If a Surface Owner or tenant refuses to provide the Operator with access to install a noise monitor, Camenisch the noise point of compliance will be located at either the next-closest RBU or an alternative location approximately the same distance and direction from the Working Pad Surface.

Demonstration of compliance with noise level limits during operation is outlined in section 423.c (2) as follows;

A. In response to a complaint or at the Director's request, Operators will measure sound levels at 25 feet from the complainant's occupied structure towards the noise source for low frequency (dBC) indicated issues. For high frequency (dBA) measurement will be at the nearest point of compliance. For equipment installed at Oil and Gas Locations subject to a Form 2A approved prior to January 15, 2021, after the Commencement of Production Operations, no single piece of equipment will exceed the maximum permissible noise levels listed in Table 423-1 as measured at a point 350 feet from the equipment generating the noise in the direction from which the complaint was received.

Finally, adjustments to the maximum permissible noise levels based on the measured pre-existing ambient noise levels is allowed. However, the new maximum allowable noise levels for permanent facilities such as Production Operations are capped and based on cumulative noise levels. Ambient adjustments and cumulative noise levels are outlined in section 423.d of the Regulation as follows;

d. Cumulative Noise. All noise measurements will be cumulative.

(1) Noise measurements taken at noise points of compliance designated pursuant to Rule 423.a.(5) will take into account ambient noise, rather than solely the incremental increase of noise from the facility targeted for measurement.

(2) At new or substantially modified Oil and Gas Locations where ambient noise levels at noise points of compliance designated pursuant to Rule 423.a.(5) already exceed the noise thresholds identified in Table 423-1, then Operators will be considered in compliance with Rule 423, unless at any time their individual noise contribution, measured pursuant to Rule 423.c, increases noise above ambient levels by greater than 5 dBC and 5 dBA between 7:00 p.m. and 7:00 a.m. or 7 dBC and 7 dBA between 7:00 a.m. and 7:00 p.m. This Rule 423.d.(2) does not allow Operators to increase noise above the maximum cumulative noise thresholds specified in Table 423-2 after the Commencement of Production Operations.

(3) After the Commencement of Production Operations, if ambient noise levels already exceed the maximum permissible noise thresholds identified in Table 423-1, under no

circumstances will new Oil and Gas Operations or a significant modification to an existing Oil and Gas Operations raise cumulative ambient noise above the following:

Table 2: Maximum Cumulative Noise Levels (COGCC Table 423-2)

ZONE	Daytime (7:00 a.m. – 7:00 p.m.)	Nighttime (7:00 p.m. – 7:00 a.m.)
Residential/Rural/State Parks & Wildlife Areas	65 dB(A)	60 dB(A)
Commercial/Agricultural	70 dB(A)	65 dB(A)
Light industrial	80 dB(A)	75 dB(A)
Industrial	90 dB(A)	85 dB(A)
All Zones	75 dB(C)	70 dB(C)

Maximum Permissible Levels (Adjusted) - Summary

The Ambient noise level survey for the Camenisch Pad is presented in Section 7 of this document. Based on the ambient noise levels in Table 5, there are no adjustments to the permissible levels during Drilling and Completions Operations. Since daytime and nighttime ambient noise levels are above 60 dBC, the daytime and nighttime C-weighted maximum permissible noise levels during the production phase are adjusted to be ambient plus 7 dBC during the daytime and 5 dBC during nighttime. Table 3 below is a summary of the adjusted maximum permissible noise levels for each operation at the Camenisch location according to COGCC Rule 423.

Table 3: Adjusted Maximum Permissible Noise Levels for the Camenisch Pad

Operation	ZONE	Maximum Permissible Noise Levels	
		dBA	dBC
Drilling and Completions	Commercial/Agricultural	65 Day / 60 Night	65 Day / 65 Night
Production	Commercial/Agricultural	60 Day / 55 Night	72 Day / 66 Night

3. SUMMARY OF BMPS AND MITIGATION TO BE IMPLEMENTED

Best Management Practices (BMPs) are practices that are designed to prevent or reduce impacts caused by oil and gas operations on the environment and wildlife resources, and to minimize adverse impacts to public health, safety, and welfare.

The BMP's that KMOG plans to implement for the Camenisch site are as follows;

- KMOG has conducted a Noise Impact Assessment for each phase of operations (drilling, completions, and production) to assess operational noise levels against the maximum allowable dBA and dBC noise levels stated in the Regulation.
- Prior to commencement of any drilling and completion activities, KMOG will install approximately 720 linear feet of 32-foot-tall, engineered sound wall rated at STC-32, as proposed in the NIA below on page 14. This will include approximately 500 linear feet on the South side of the location, and 220 linear feet on the East Side of the location.
- KMOG will utilize a Quiet Completions Fleet for completions operations.
- KMOG has implemented the following: The drilling rig will be a modified rig designed to reduce noise levels below compliance levels. This will include low noise level shale shakers and modifications to the generator house to reduce noise levels from the exhaust vents and radiator fans. Additional noise reduction modifications may also be implemented depending on the rig contractor utilized following a noise survey study.
- At the Directors request, KMOG agrees to acquire an additional ambient at the noise point of compliance 30 to 90 days prior to the commencement of operations. If the new ambient noise levels change any components of this Noise Mitigation Plan, a Form 4 sundry will be submitted to update the plan accordingly.
- KMOG will deploy continuous monitors for all drilling and completions and any operations that last longer than 24 continuous hours. Monitor locations will coincide with the noise point of compliance outlined in Figure 2 in Section 5 of this document.
- If the drilling rig or completions fleet is changed prior to commencement of operations, the mitigation measures will be equally or more protective. A Form 4 will be submitted per Rule 404.d to outline any changes.
- KMOG will post contact information to receive and address noise complaints arising from pre-production operations around the clock, 24-hours, 7 days per week. Upon receipt of a complaint, either directly to KMOG or from the COGCC, KMOG will contact relative stakeholder within 48 hours of receipt.

4. SITE INFORMATION

The Camenisch Pad is located in Weld County. It is situated approximately 3,050 feet northwest of the intersection of Weld County Roads 38 and 19. The closest major road is Interstate 25 and is located approximately 4.5 miles west of the pad.

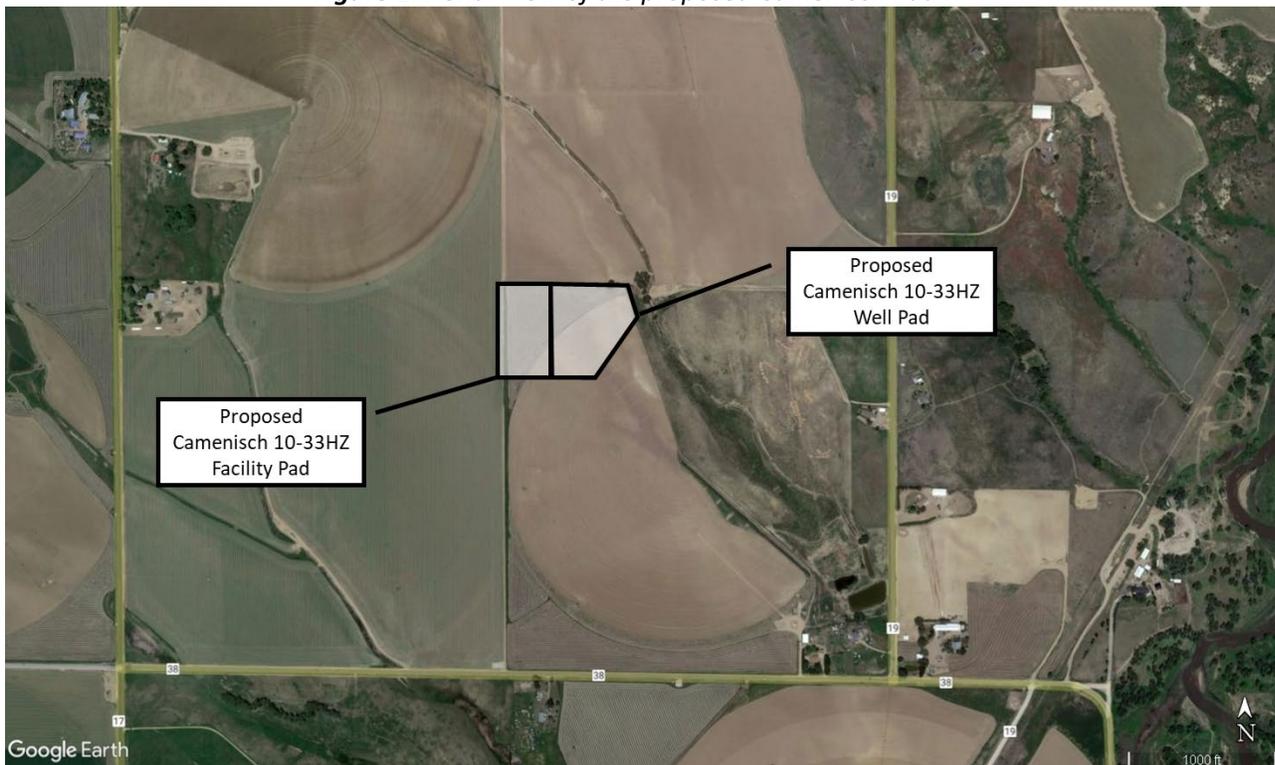
The location is zoned with an Agricultural land use designation, based on information from the Weld County Zoning Department.

The Camenisch location is slated for Drilling, Completions and Production operations. Drilling is planned with Precision Drilling Rig #461 and Completions will be carried out with a Quiet Completions Fleet. Information on planned production equipment is provided in Figure 19 of Appendix 2, with the only significant noise sources limited to 6 separators, 1 fully enclosed instrument air compressor, piping noise, 1 VOC combustor, and 1 LACT unit.

Detailed location information is presented below, and an aerial view of the location is shown in Figure 1.

Location: NW 1/4 SE 1/4 SEC. 33, T4N, R67W, 6TH P.M.
Drilling Rig: Precision Drilling Rig #461
Completions Rig: Halliburton Quiet Fleet
Production Equipment: Details provided in Figure 19 of Appendix 2
Pad Location Coordinates: 40°16'08.1"N, 104°53'39.3"W
Regulation Noise Target: COGCC Rule 423

Figure 1: Aerial View of the proposed Camenisch Pad

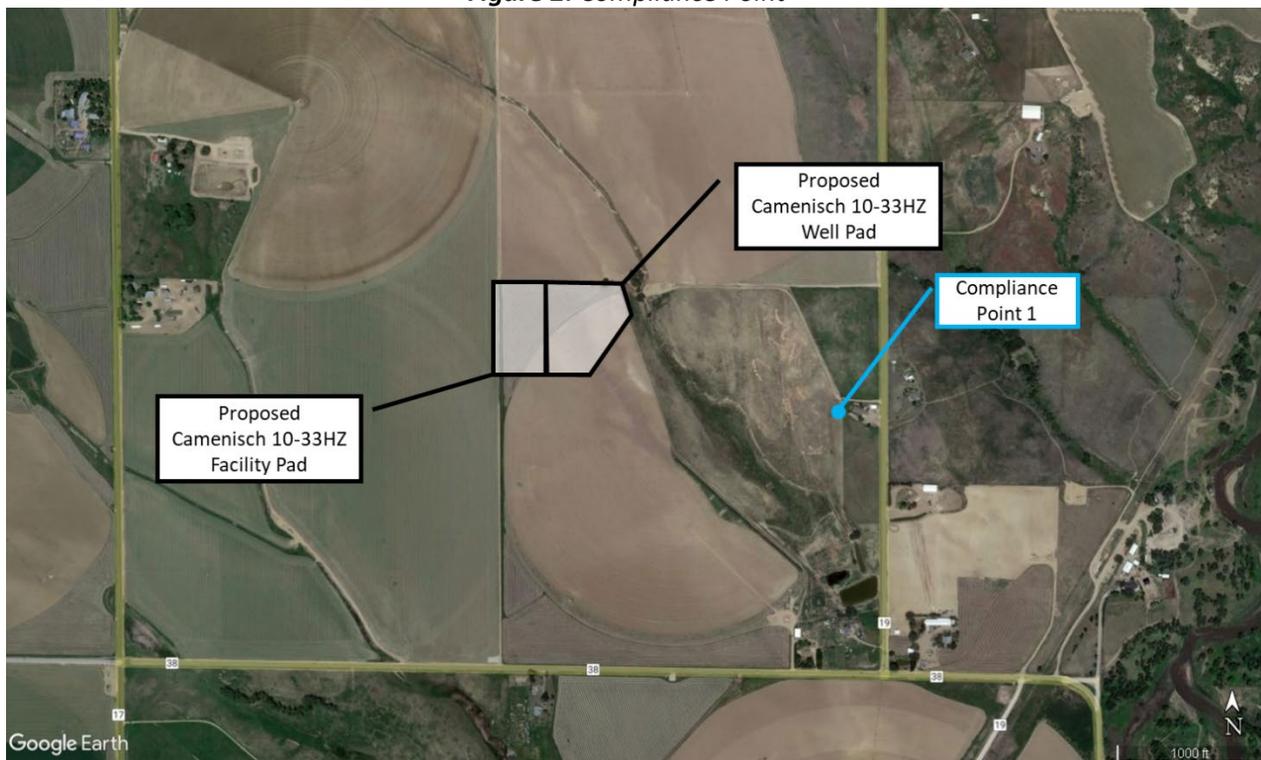


5. COMPLIANCE POINTS

The maximum allowable noise levels for all operations are applied at “noise points of compliance”. These points are chosen as outlined in section 423.a (5) of the Regulation (as summarized previously in Section 2 on page 2 above). At least one, and no more than six noise points of compliance are chosen for occupied RBU’s within 2,000 feet. These points must be situated anywhere between 350 feet from the Working Pad Surface, and no less than 25 feet from the exterior wall of the RBU that is closest to the Working Pad Surface (in the direction of an RBU).

Figure 2 shows an aerial view of the noise compliance point for the Camenisch location. Compliance points proposed indicate the sensitive stakeholder receptors closest to the location in each direction within 2,000 feet and have been chosen to be consistent with the rules defined by the COGCC 423.a.(5) series noise regulations.

Figure 2: Compliance Point



6. ESTIMATED OPERATIONS & DURATION SCHEDULE

The following reflects KMOG’s planned operations schedule for the Camenisch Pad at the time of this NMP. The schedule in Table 4 includes estimated duration of each stage of operation, including drilling, completion, flowback, and production.

Table 4: KMOG’s Planned Operations Schedule

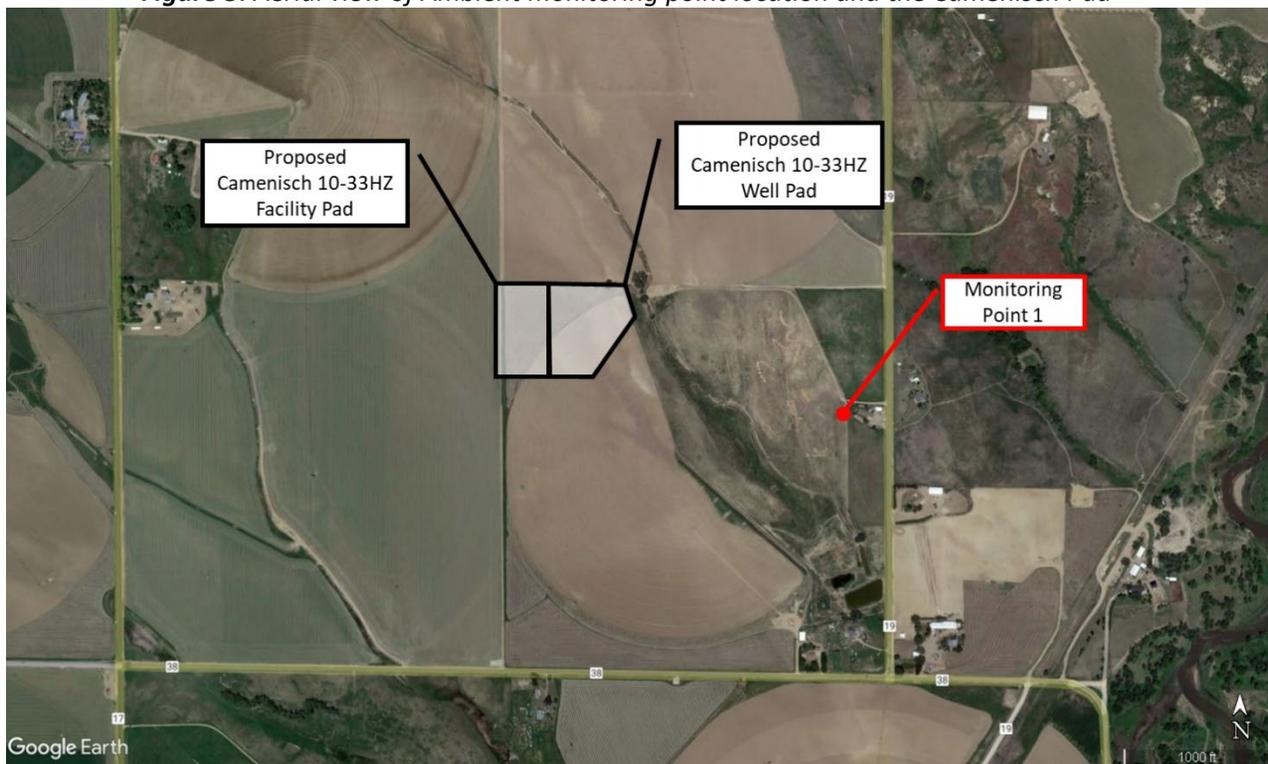
PHASE	DURATION (Days)	ESTIMATED START DATE
Construction	45	Q3 2023
Drilling	40	Q3 2023
Completion	35	Q4 2023
Flowback	30	Q4 2023
Production	10,950 (30 years)	Q1 2024

7. AMBIENT SOUND LEVEL SURVEY

Section 423.b of the Regulation requires that the Operator conduct a background ambient noise survey to establish baseline conditions for both A-scale and C-scale noise levels near the site. Urban conducted a 72-hour ambient sound monitoring study to monitor and document pre-operational ambient sound levels using a Type 1 hand-held sound level meter. The sound level meter collects measurements of both A and C-weighted decibel levels and is calibrated before and after the measurement period. The average values are calculated by averaging 1-minute Leq noise levels when the wind is below 5 miles per hour, per guidance from the COGCC.

The ambient monitoring location in relation to the Camenisch Pad is shown in Figure 3 below. A-weighted and C-weighted sound levels were collected at the location from Saturday November 13, 2021, at 12:00 a.m., to Tuesday November 16, 2021, at 12:00 a.m.

Figure 3: Aerial view of Ambient monitoring point location and the Camenisch Pad



In addition to the ambient noise levels acquired, the sound level meter (SLM) was set to record audio files when the levels exceed 60 dBA in the daytime (7:00 a.m. – 7:00 p.m.) and 55 dBA in the nighttime (7:00 p.m. – 7:00 a.m.). Based on the recordings, the most common sounds for the monitoring locations include traffic, insects, and aircraft traffic.

Table 5 below shows the overall A and C-weighted averages (Leq) for the 72-hour monitoring period for the SLM. Averages below show the overall sound levels when wind was below five (5) miles per hour. Data was filtered to remove values with wind speeds that exceed five (5) miles per hour, per COGCC guidance.

Table 5: Overall Leq Background Ambient Noise Levels (Filtered for Wind Speed)

Location	Daytime Averages (Leq)		Nighttime Averages (Leq)		Overall Averages (Leq)	
	dBA	dBc	dBA	dBc	dBA	dBc
Monitoring Point 1	46	65	44	61	45	64

Figure 18 in Appendix 1 contains a chart with the unfiltered hourly averages and wind speeds for the monitoring point.

Ambient Adjustments

Section 423.d of the Regulation allows for adjustments to the maximum permissible noise levels if the pre-existing background ambient noise levels exceed the maximum permissible levels outlined in the Regulation. The adjusted permissible noise level(s) are applied to the compliance points in the direction of the monitoring points. For Drilling and Completions Operations, the ambient noise levels in Table 5 show the ambient noise levels are below the maximum permissible levels for the daytime and nighttime periods. For Production Operations, the Monitoring Point daytime and nighttime ambient noise levels exceed the permissible noise levels of 60 dBc. The Compliance Point allowable levels are adjusted, and the maximum levels are the ambient noise level plus 7 dBc (daytime) and 5 dBc (nighttime) during Production Operations. Ambient adjustments and the maximum permissible levels are summarized in Table 3 of Section 2 above.

8. NOISE IMPACT ASSESSMENT

A Noise Impact Assessment (NIA) was conducted for the Camenisch Pad using a three-dimensional computer noise modeling software. This is a predictive model to aid in ascertaining the environmental impact of the facility during all planned operations on the surrounding environment. The results of this assessment will compare the predicted levels of the Camenisch Pad operations to the permissible noise level limits described in COGCC Rule 423.

A brief explanation of the methodology is presented first, followed by noise model results for drilling, completions, and production.

Methodology

All computer models and predicted noise levels generated for the assessment are developed with Predictor V2022, a commercial noise modeling software. The ISO 9613-1 and 2 international standards are utilized in this software as they are widely accepted both internationally as well as in North America. The algorithms used in the commercial software package are based on methods and theory that are widely accepted in the environmental acoustics community. Both detailed equipment technical information and location specific topography, are used to generate comprehensive noise predictions that take into account environmental conditions, buildings, ground cover and barriers (natural, topographical and otherwise). Note that actual field measurements may differ from modeled noise levels on any given day due to ever changing environmental factors and other noise sources in the study area that may not be in the computer model.

Table 6 below lists the conditions used in the model.

Table 6. Conditions Used in Predictor V2022 Software

Parameter	Modeled Input and Description
Temperature	55°F – Represents typical summer nighttime temperature
Topography	3.3 ft Resolution
Wind Velocity	2.2 - 11.2 mph – ISO 9613 uses a slight downwind condition from each noise source to each receiver.
Wind Direction	From the noise source to the reception points
Relative Humidity	40% - Typical summer nighttime relative humidity
Ground Absorption	0.0 for water bodies and roads 0.6 for everywhere else

It is assumed that facility operating conditions do not change significantly between the daytime and nighttime period. The resulting predicted noise levels are compared to the maximum permissible noise levels described by The Regulation to determine if the subject facility is in compliance.

The noise levels generated in this predictive model are strictly from oil and gas operations at the facility. Pre-existing sound sources such as those from animals, weather, road traffic, and all other ambient sounds are not included in the noise models.

Receptor points in this assessment are shown in Figure 4 below and were modelled at a distance of 25 feet from the occupied structure towards the facility for both dBA and dBC predictions. The closest receptor, Receptor 1, is located approximately 1,670 feet southeast of the edge of Camenisch Pad.

Figure 4: Receptor Point



Equipment Information and Site Layouts

Drilling Operations at the Camenisch Pad are carried out using the Precision Drilling Rig #461. The sound power levels used in this NIA are taken from the E21068 Precision Drilling Rig #461 Sound Signature Report (August 2021). The model assumes the backyard equipment is positioned

southwest of the well row with the V-door facing northeast. The rig orientation and placement was oriented to minimize noise impact.

Completions Operations at the Camenisch Pad are carried out using the Halliburton Oilfield Services (HAL) Quiet Fleet. The sound power levels used for the HAL Quiet Fleet in this NIA are taken from the E21055 HAL Quiet Fleet Sound Signature Report (September 2021). The model assumes the pump trucks are positioned south of the well row. The completions equipment orientation and placement were oriented to minimize noise impact.

Production Operations at the Camenisch Pad are implemented per the equipment layouts supplied by KMOG. The sound power levels used for the production equipment used in this NIA are taken from the E21069 Production Equipment Sound Signature Report (October 2021). The production equipment layout for the Camenisch Pad is shown in Figure 19 of Appendix 2.

Drilling Noise Model Results

Results for both unmitigated and mitigated drilling operations are presented in Table 7 below. The receptor location in the table corresponds to the location identified in Figure 4.

The results demonstrate that unmitigated drilling operational noise levels are below the maximum permissible levels of 60 dBA and 65 dBC and is thus compliant without mitigation. However, the mitigated results presented here a for informational purposes, as the same mitigation layout is required for county compliance. The sound wall layout is shown in blue in Figure 5 and consists of approximately 720 linear feet of 32-foot-tall , engineered, sound wall rated at STC-32.

The predicted levels only include sound levels from drilling operations and do not include ambient noise or noise contribution from other sources outside of the planned operations.

Noise contour maps are provided for the area surrounding the Camenisch Pad. The contours are provided in 5 dB increments with the color scale indicating the sound level of each contour. Unmitigated Drilling Operations noise contour maps are presented in Figure 6 and Figure 7, whereas mitigated contours are shown in Figure 8 and Figure 9.

Table 7. Drilling Operations Noise Model Results

Receptor	Approximate Distance & Direction from the Working Pad Surface (feet)	Maximum Permissible Noise Level		Drilling Unmitigated		Drilling Mitigated	
		dBA	dBC	dBA	dBC	dBA	dBC
1	1,670 SE	60	65	52	62	46	59

Figure 5. Drilling Mitigation Layout

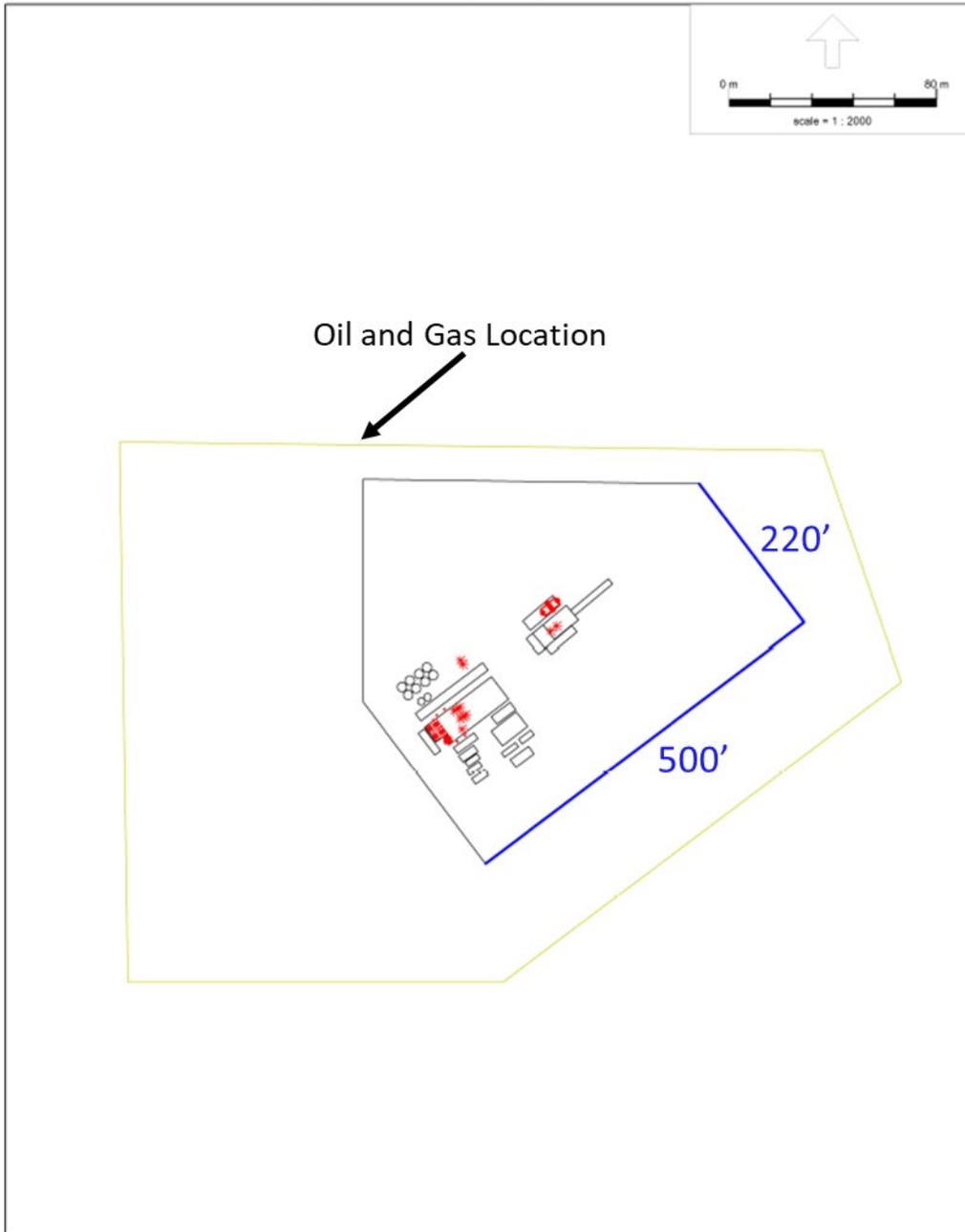


Figure 6. Unmitigated Drilling Noise Contour Map (dBA)

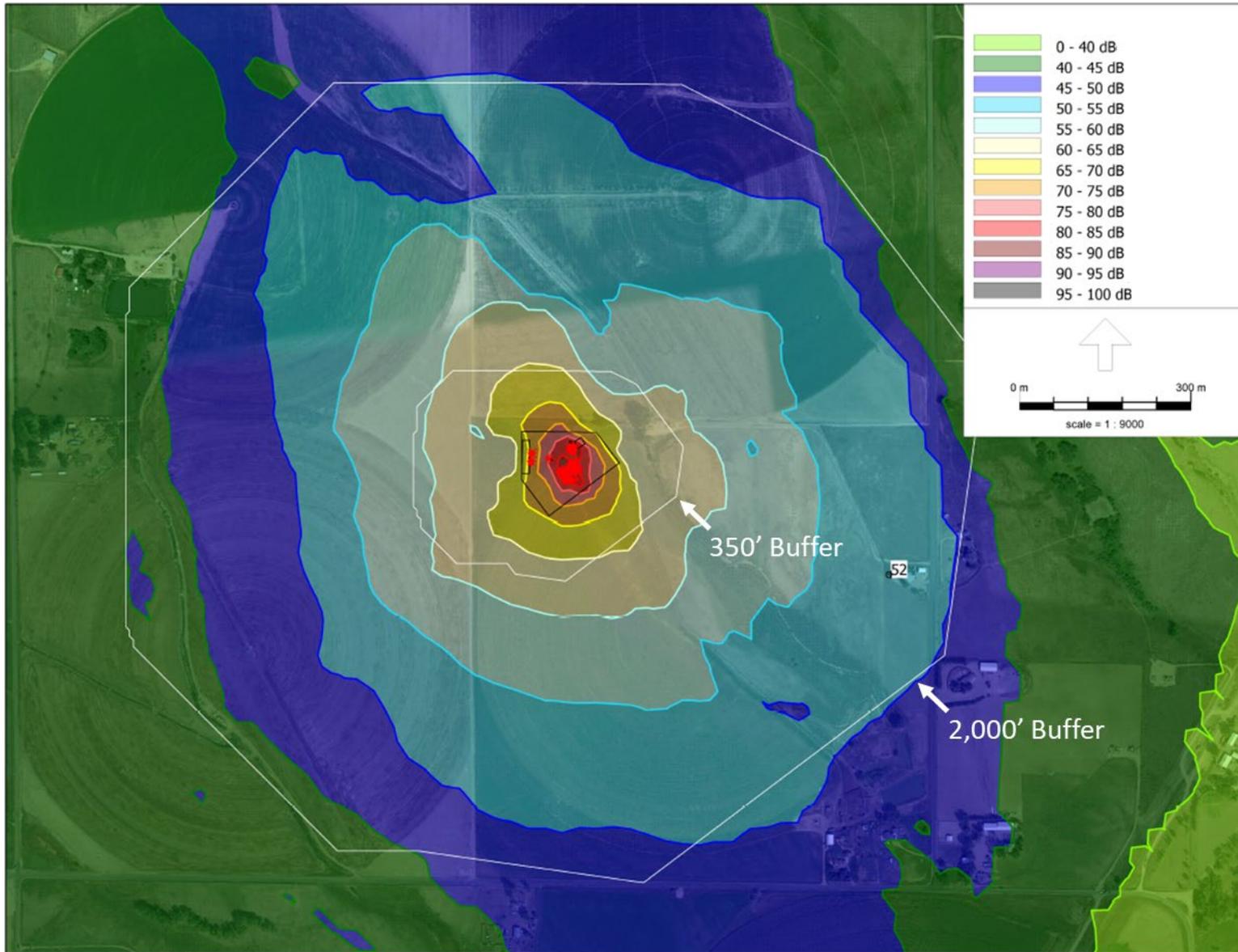


Figure 7. Unmitigated Drilling Noise Contour Map (dBC)

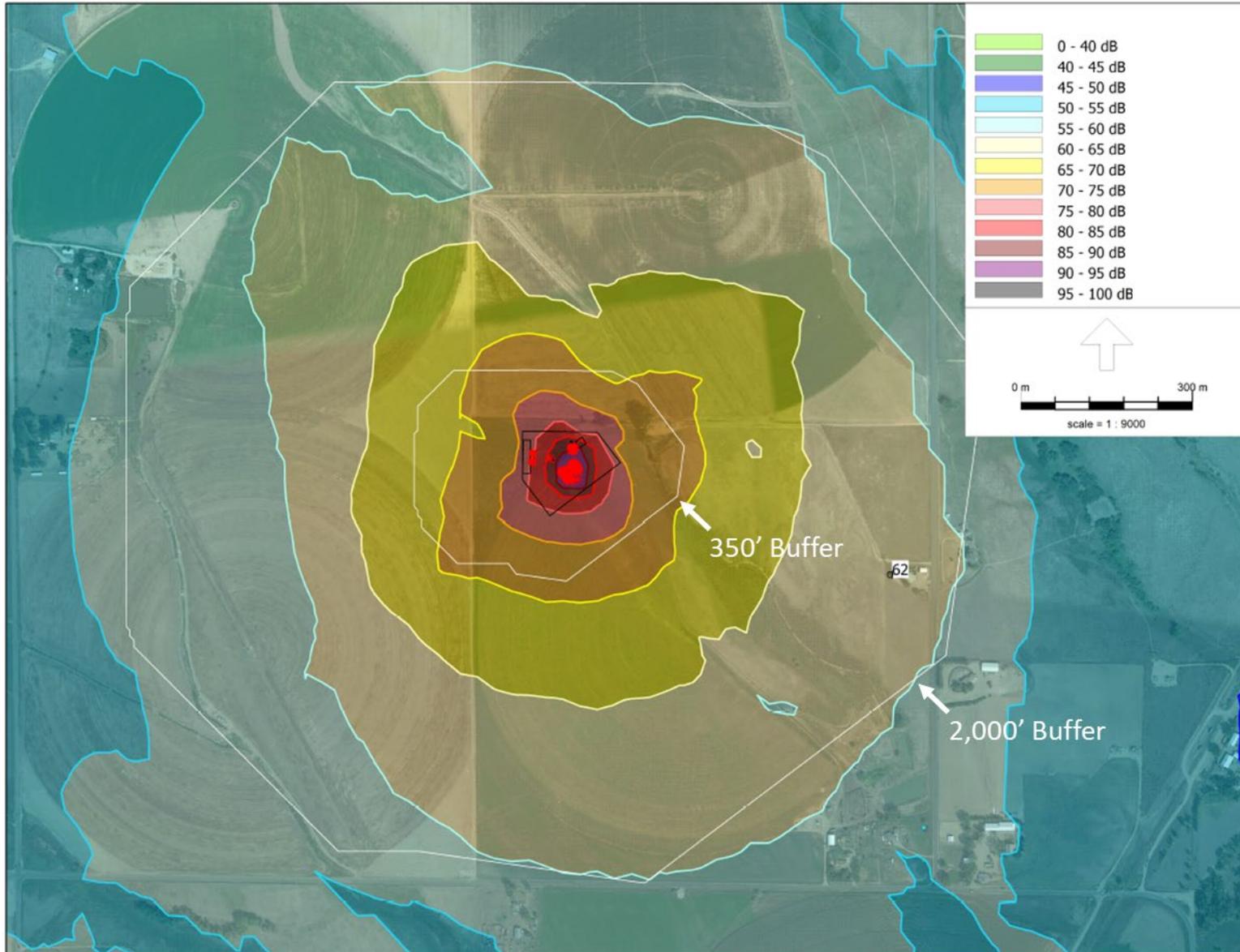


Figure 8. Mitigated Drilling Noise Contour Map (dBA)

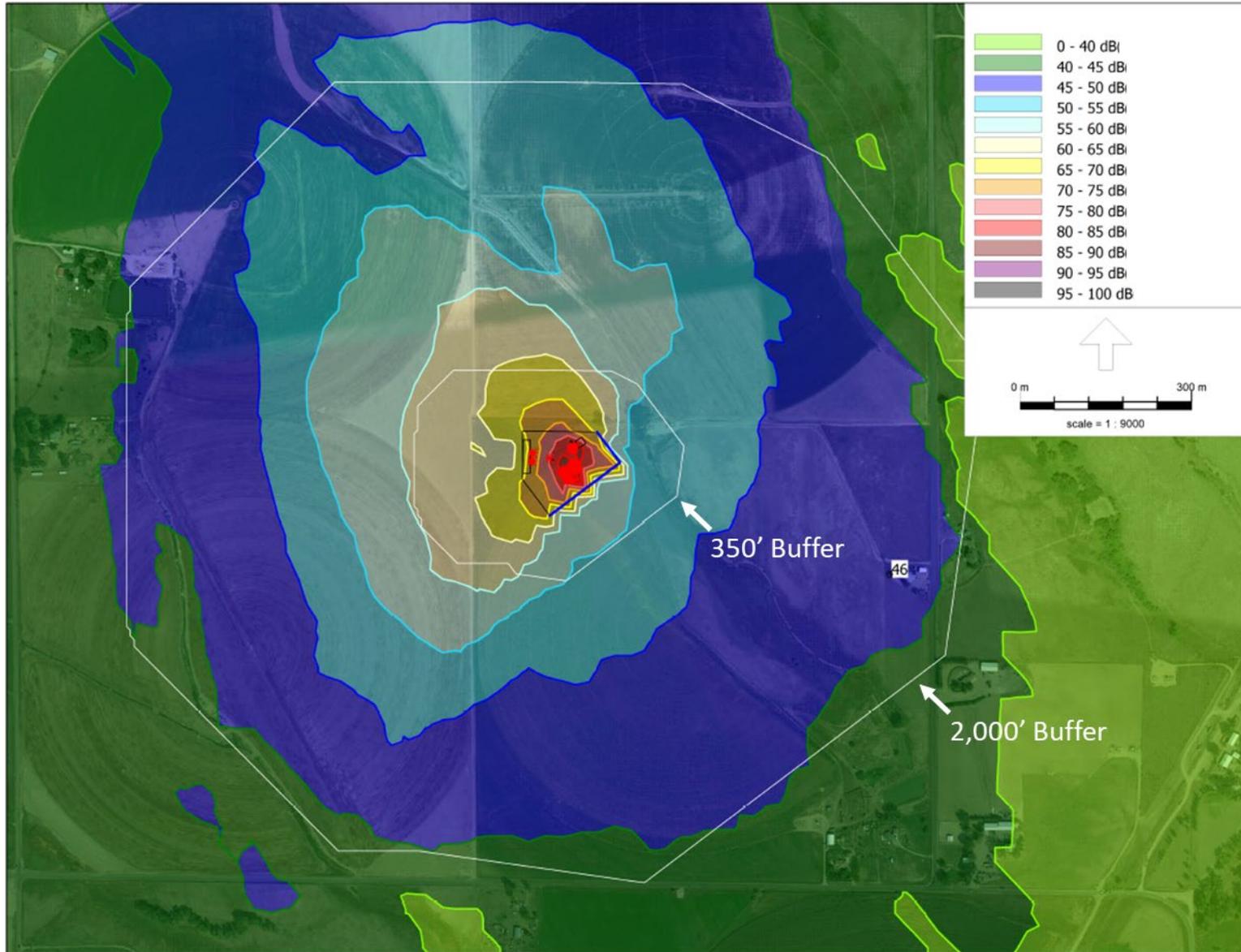
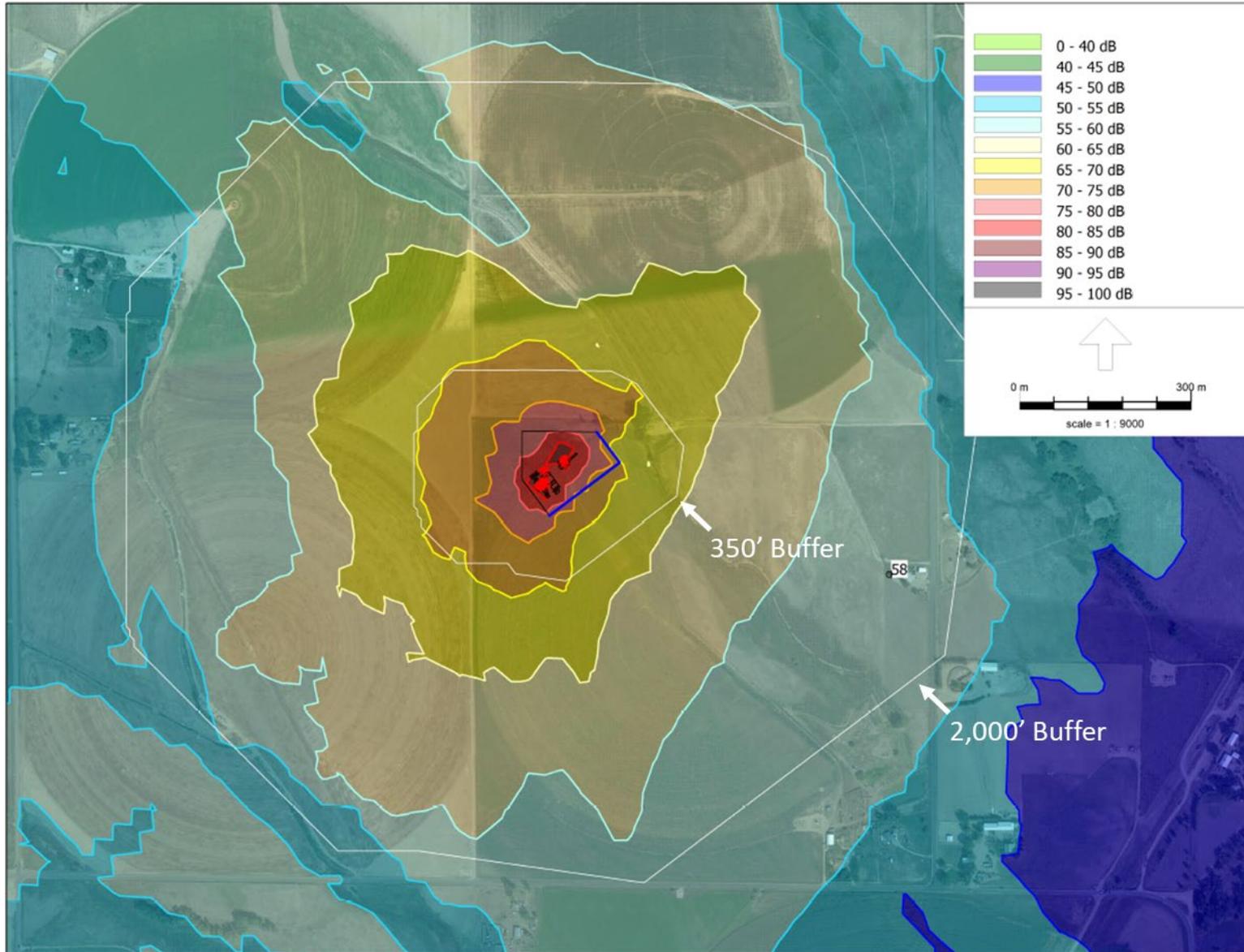


Figure 9. Mitigated Drilling Noise Contour Map (dBC)



Completions Noise Model Results

Results for both unmitigated and mitigated completions operations are presented in Table 8 below. The receptor locations in the table correspond to the locations identified in Figure 4.

The results demonstrate that unmitigated completions operational noise levels are below the maximum permissible noise levels of 60 dBA and 65 dBC and is thus compliant without mitigation. However, the mitigated results presented here assume a partial perimeter sound wall for informational purposes, as the same mitigation layout is required for county compliance. The sound wall layout is shown in blue in Figure 10 and consists of approximately 720 linear feet of 32-foot-tall , engineered, sound wall rated at STC-32.

The predicted levels only include sound levels from Completions Operations and do not include ambient noise or noise contribution from other sources outside of the planned operations.

Noise contour maps are provided for the area surrounding the Camenisch Pad. The contours are provided in 5 dB increments with the color scale indicating the sound level of each contour. Unmitigated Completions Operations noise contour maps are presented in Figure 11 and Figure 12, whereas mitigated contours are shown in Figure 13 and Figure 14.

Table 8: Completions Operations Noise Model Results

Receptor	Approximate Distance & Direction from the Working Pad Surface (feet)	Maximum Permissible Noise Level		Completions Unmitigated		Completions Mitigated	
		dBA	dBC	dBA	dBC	dBA	dBC
1	1,670 SE	60	65	52	62	46	59

Figure 10. Completions Mitigation Layout

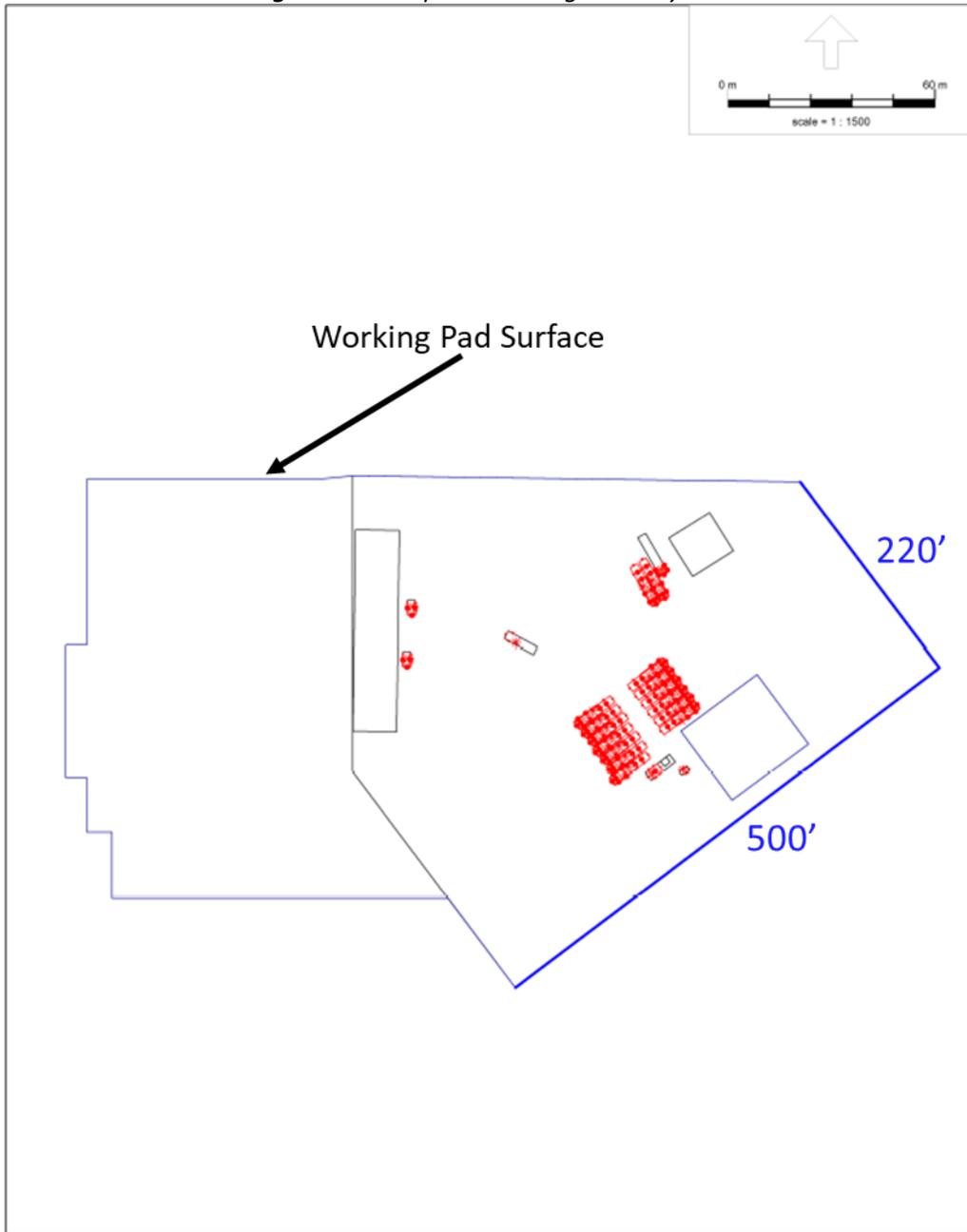


Figure 11. Unmitigated Completions Noise Contour Map (dBA)

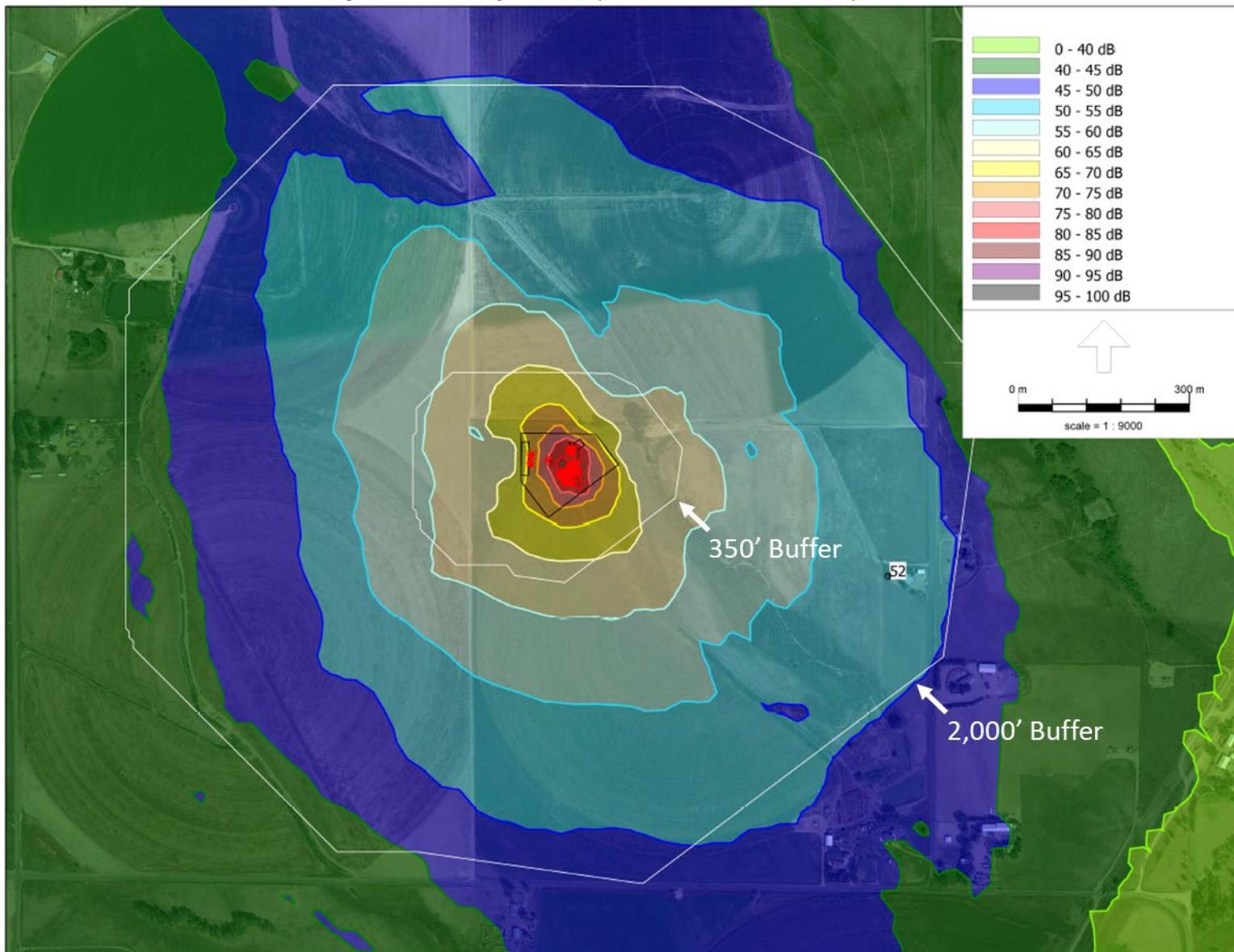


Figure 12. Unmitigated Completions Noise Contour Map (dBC)

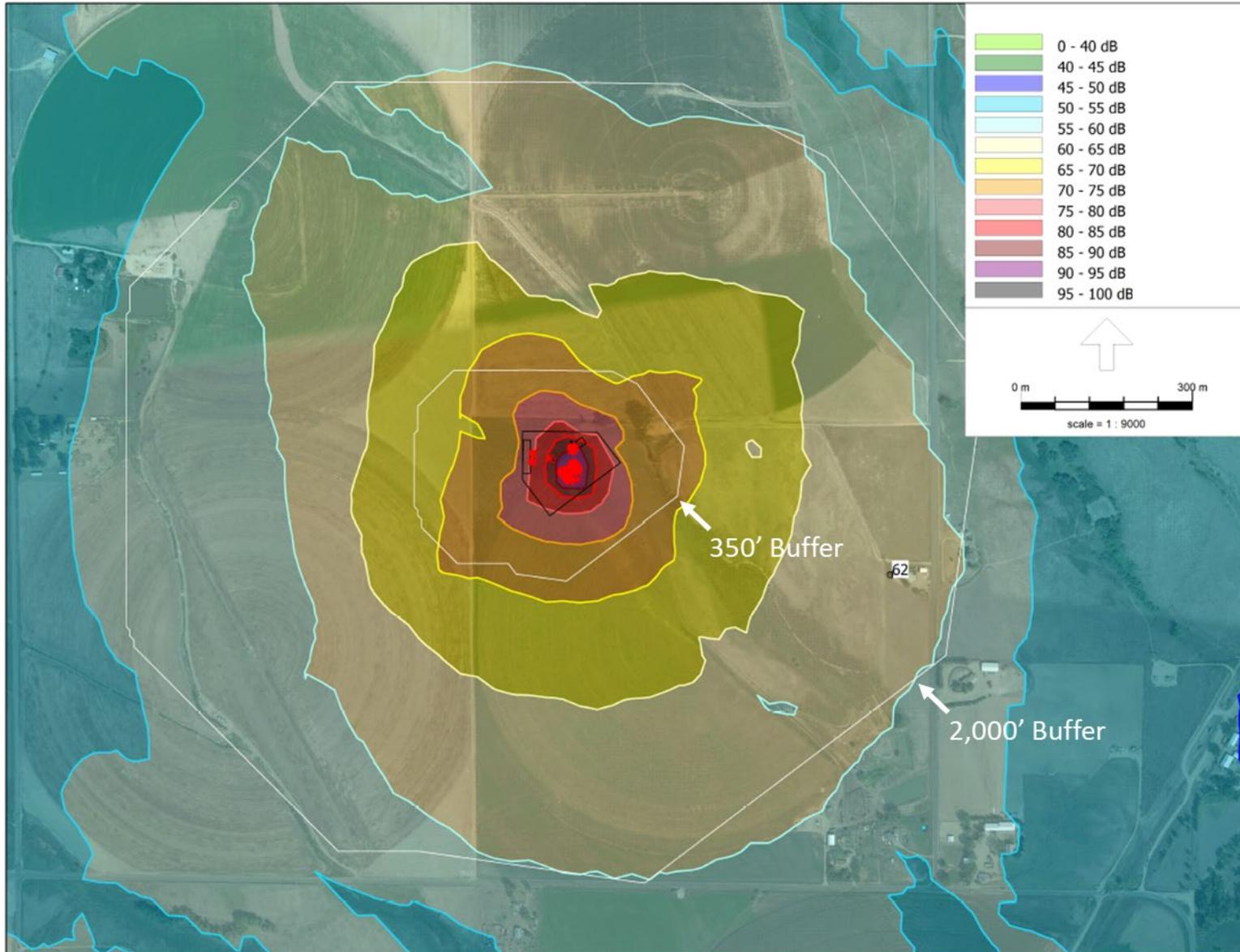


Figure 13. Mitigated Completions Noise Contour Map (dBA)

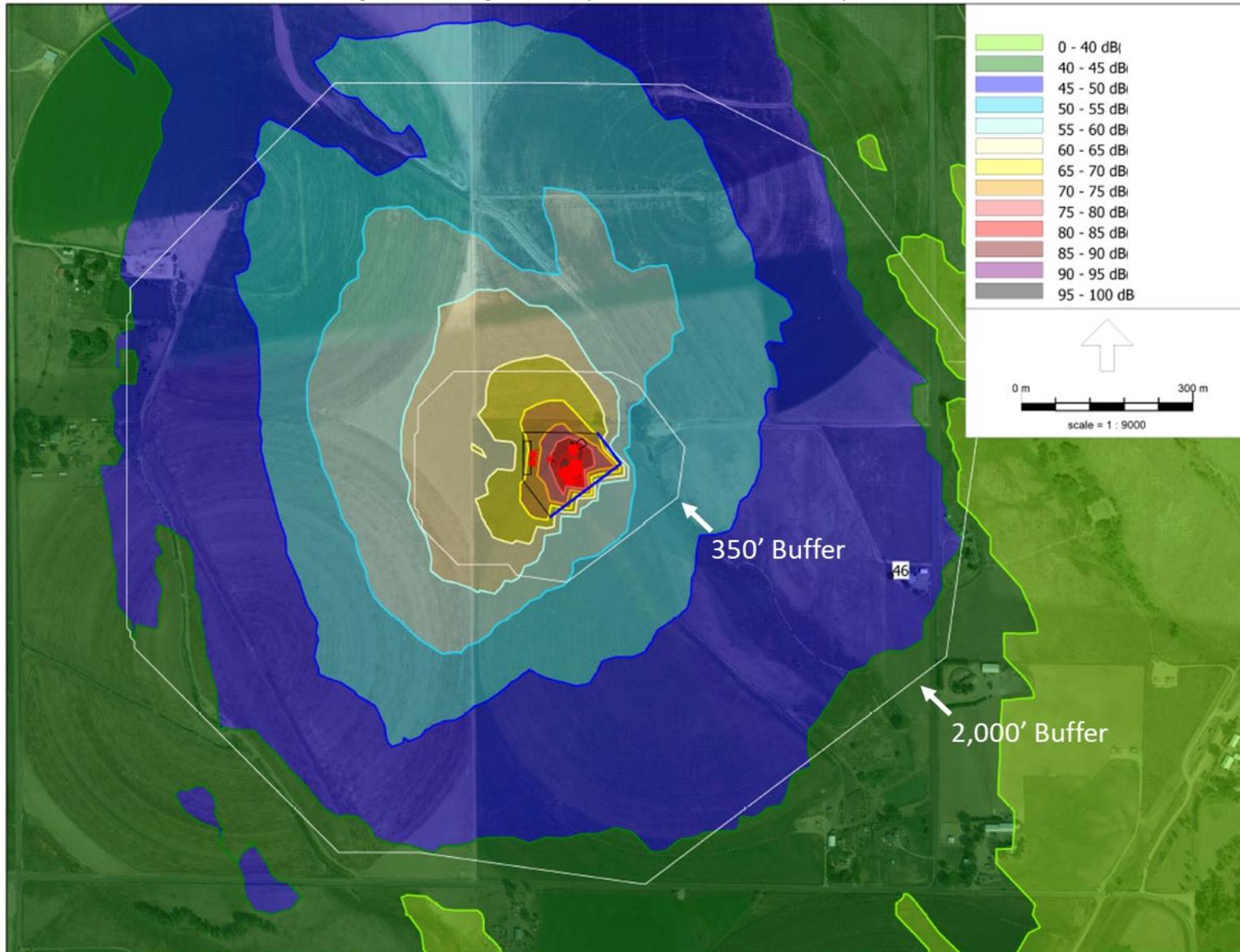
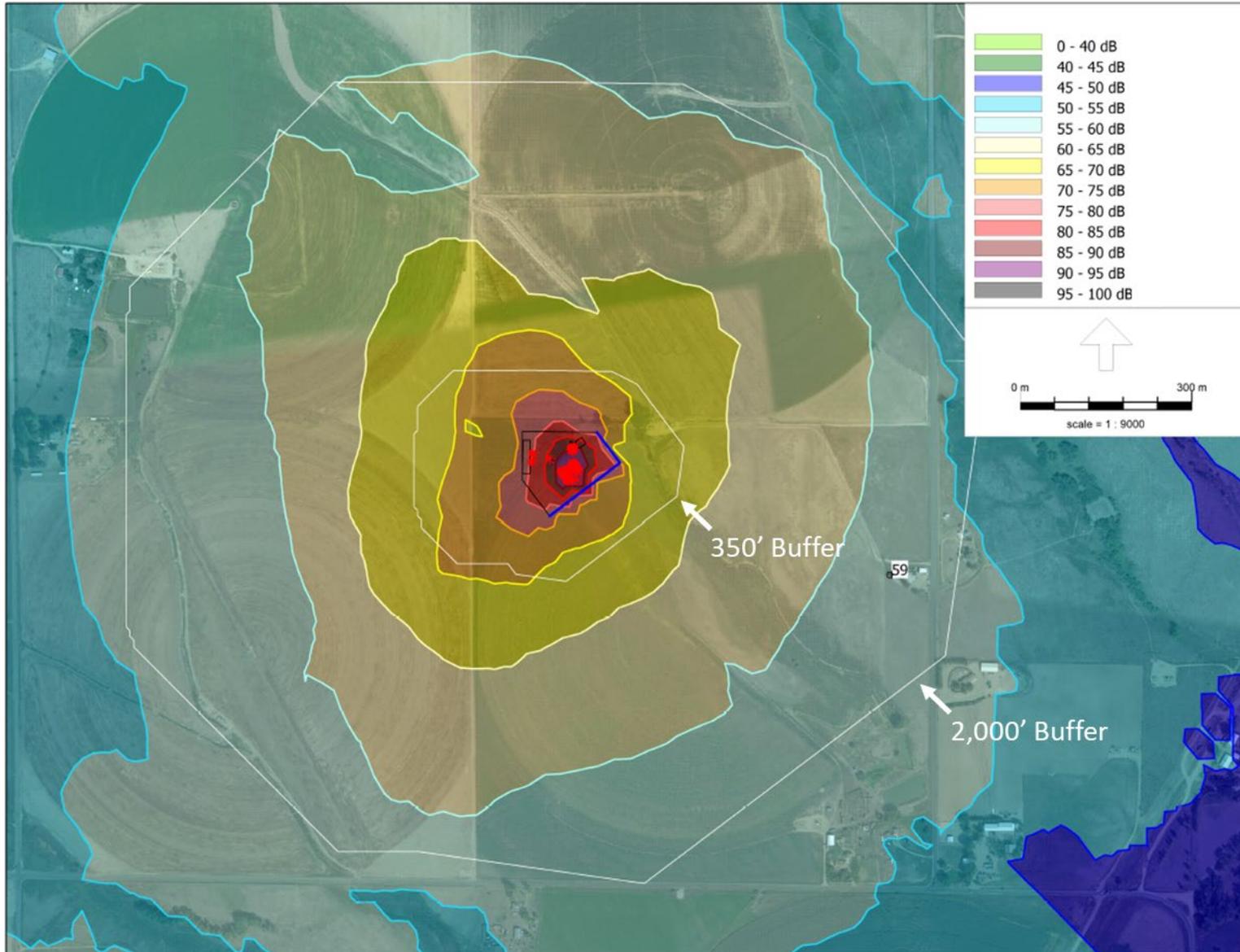


Figure 14. Mitigated Completions Noise Contour Map (dBC)



Production Noise Model Results

Model results for unmitigated Production Operations are presented in Table 9 below. The receptor locations in the table correspond to the locations identified in Figure 4.

Unmitigated Production Operational noise levels are below the COGCC Rule 423 adjusted limits of 55 dBA and 66 dBC and are therefore compliant. Therefore, no further noise mitigation is required. The predicted levels only include sound levels from Production Operations and do not include ambient noise or noise contribution from other sources outside of the planned operations.

Noise contour maps are provided for the area surrounding the Camenisch Pad. The contours are provided in 5 dB increments with the color scale indicating the sound level of each contour. Unmitigated Production Operations noise contour maps are presented in Figure 15 and Figure 16.

Table 9: Production Operations Noise Model Results

Receptor	Approximate Distance & Direction from the Working Pad Surface (feet)	Maximum Permissible Noise Level		Production Unmitigated	
		dBA	dBC	dBA	dBC
1	1,670 SE	55	66	36	49

Figure 15. Unmitigated Production Noise Contour Map (dBA)

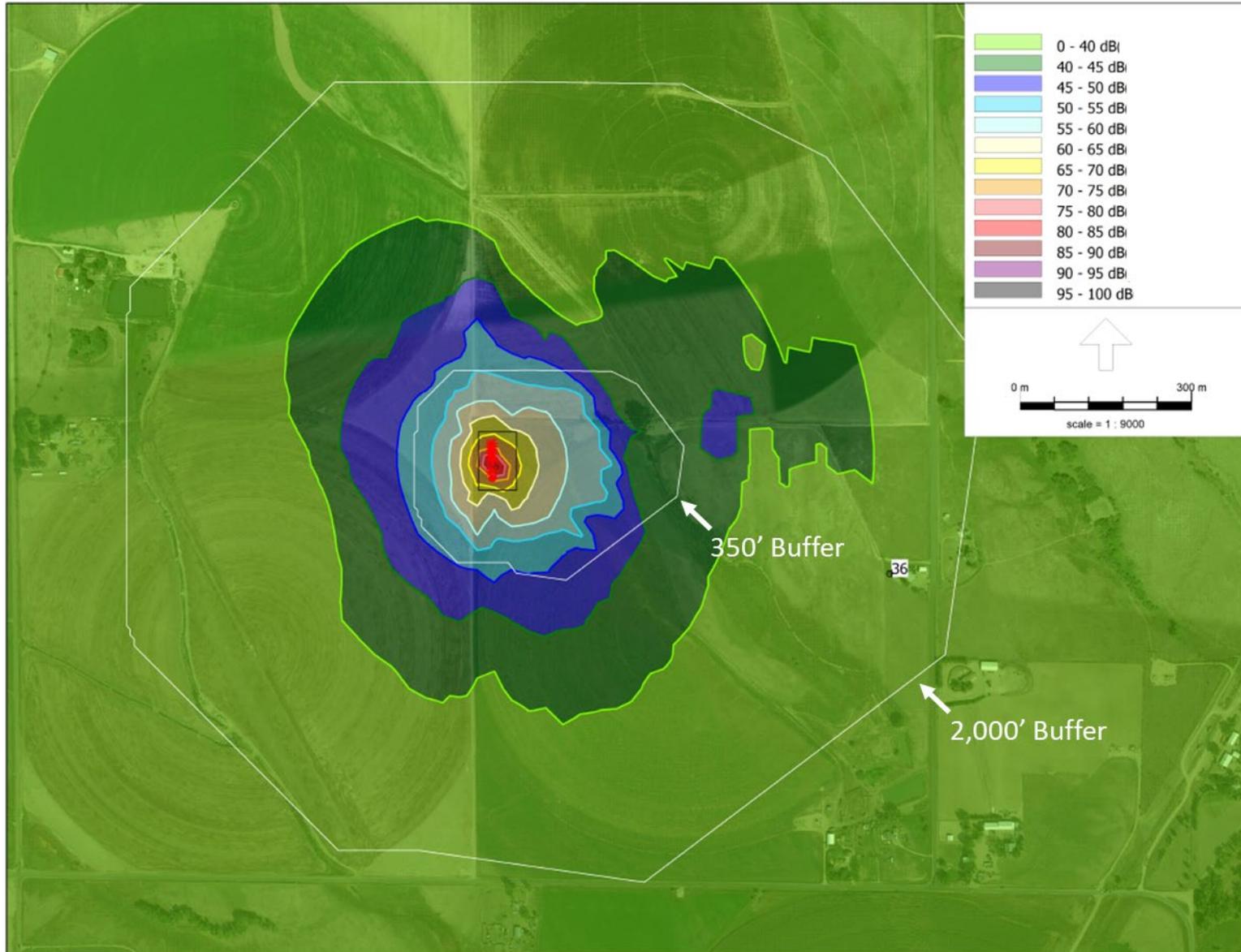
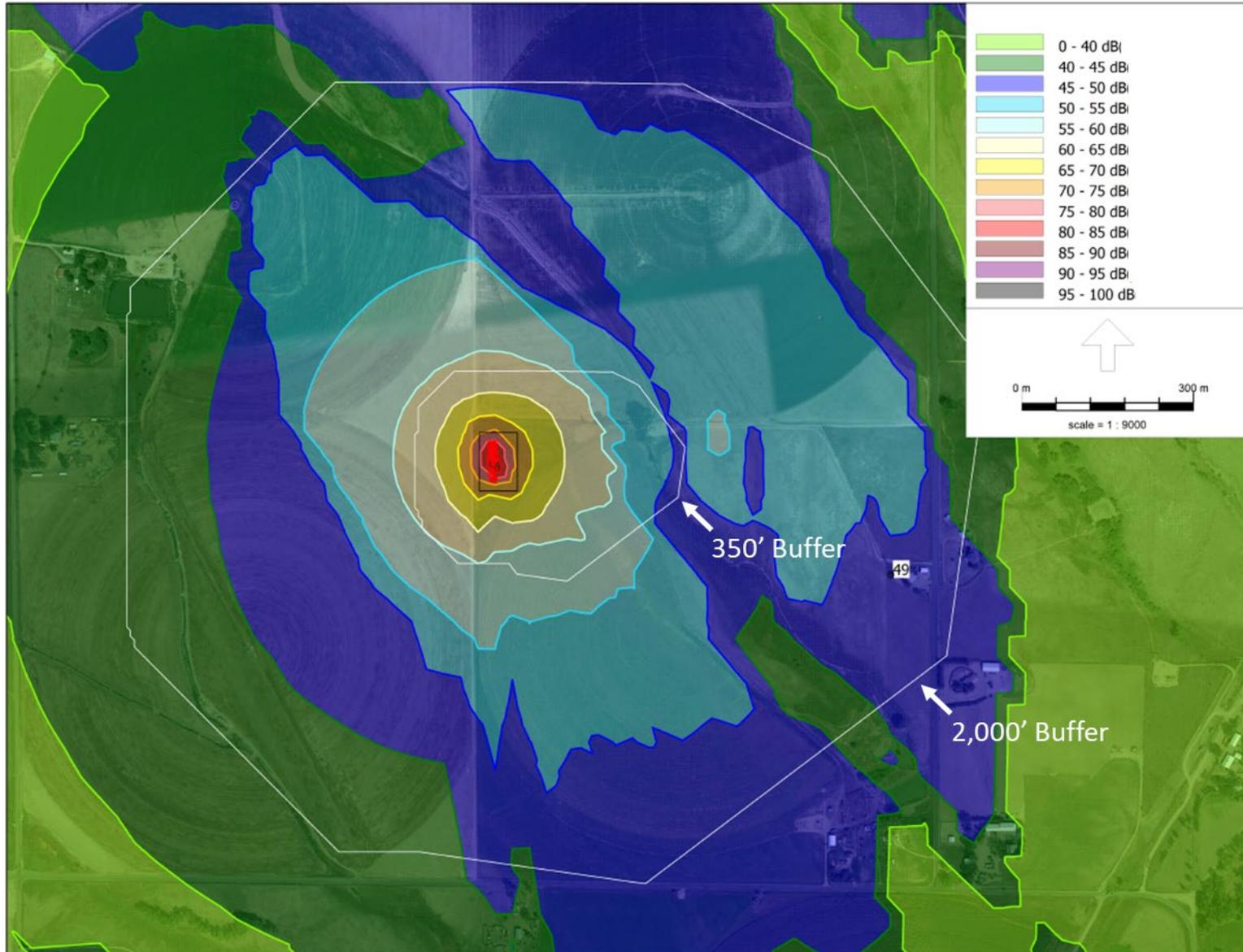


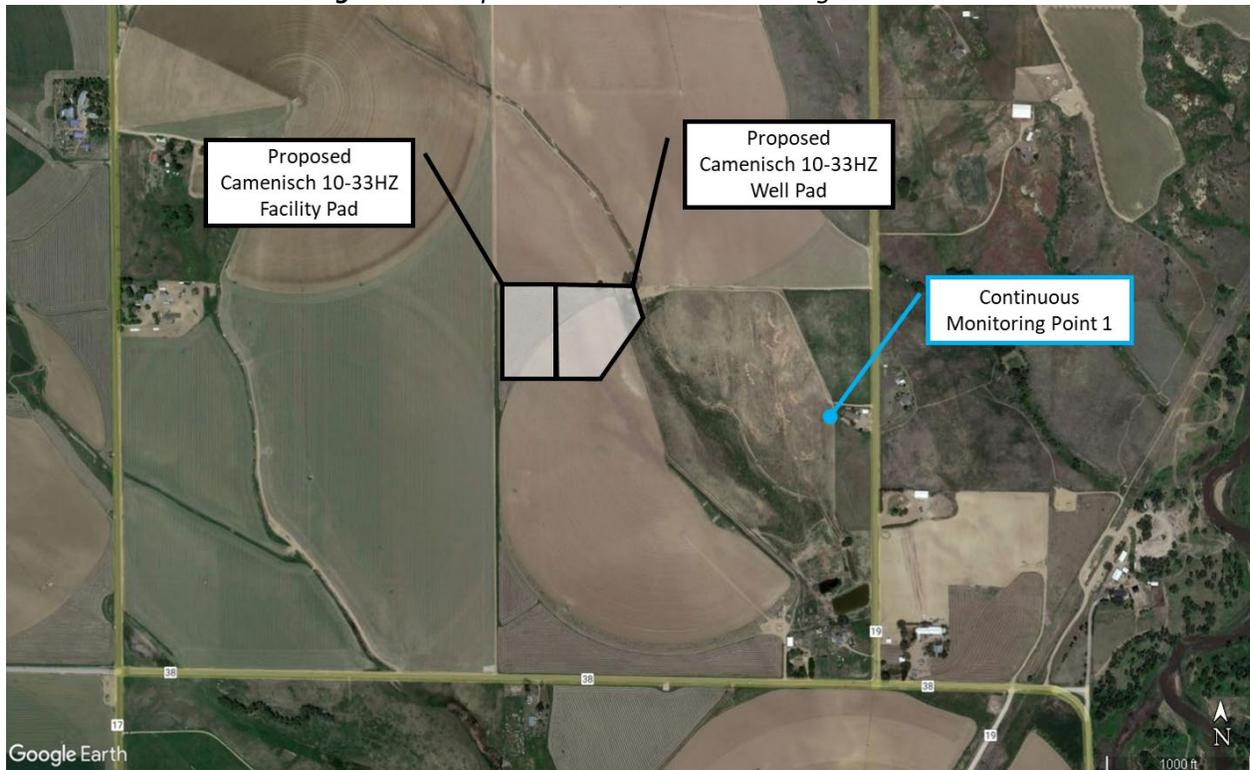
Figure 16. Unmitigated Production Noise Contour Map (dBC)



9. CONTINUOUS MONITORING / COMPLAINT RESOLUTION

Throughout the duration of drilling and completion operations, KMOG will conduct Continuous Noise Monitoring at noise point of compliance outlined in Figure 17. Continuous monitoring services are deployed to provide continuous noise level documentation and compliance verification throughout operations for both dBA and dBC scales. The noise point of compliance is located on private land. The measurement location can be adjusted if access is not granted. If a noise complaint is made to either KMOG directly, or to the COGCC, or the Local Government Designee and the Operator is notified of the complaint, KMOG is able to reference continuous monitoring data and identify the source of any sound level 'spike(s)' throughout the monitoring period.

Figure 17. Proposed Continuous Monitoring Location



The sound level meter collects measurements of A and C-weighted decibel (dB) levels by continuously sampling sound levels, logging the specified data every minute. Monthly calibration is conducted to ensure accuracy of the meter. The hourly Leq values shown in Continuous Noise Monitoring reporting are calculated by averaging 1-minute Leq noise levels when the wind is below 5 miles per hour, per guidance from the COGCC.

10. CONCLUSION

The results of the proactive planning, noise modelling, and implementation of Best Management Practices as discussed in this NMP indicate that noise levels generated by KMOG's proposed oil and gas operations at the Camenisch Pad are expected to comply with permissible noise levels required by the COGCC Rule 423 for all operations (drilling, completion, and production).

11. NOTATIONS

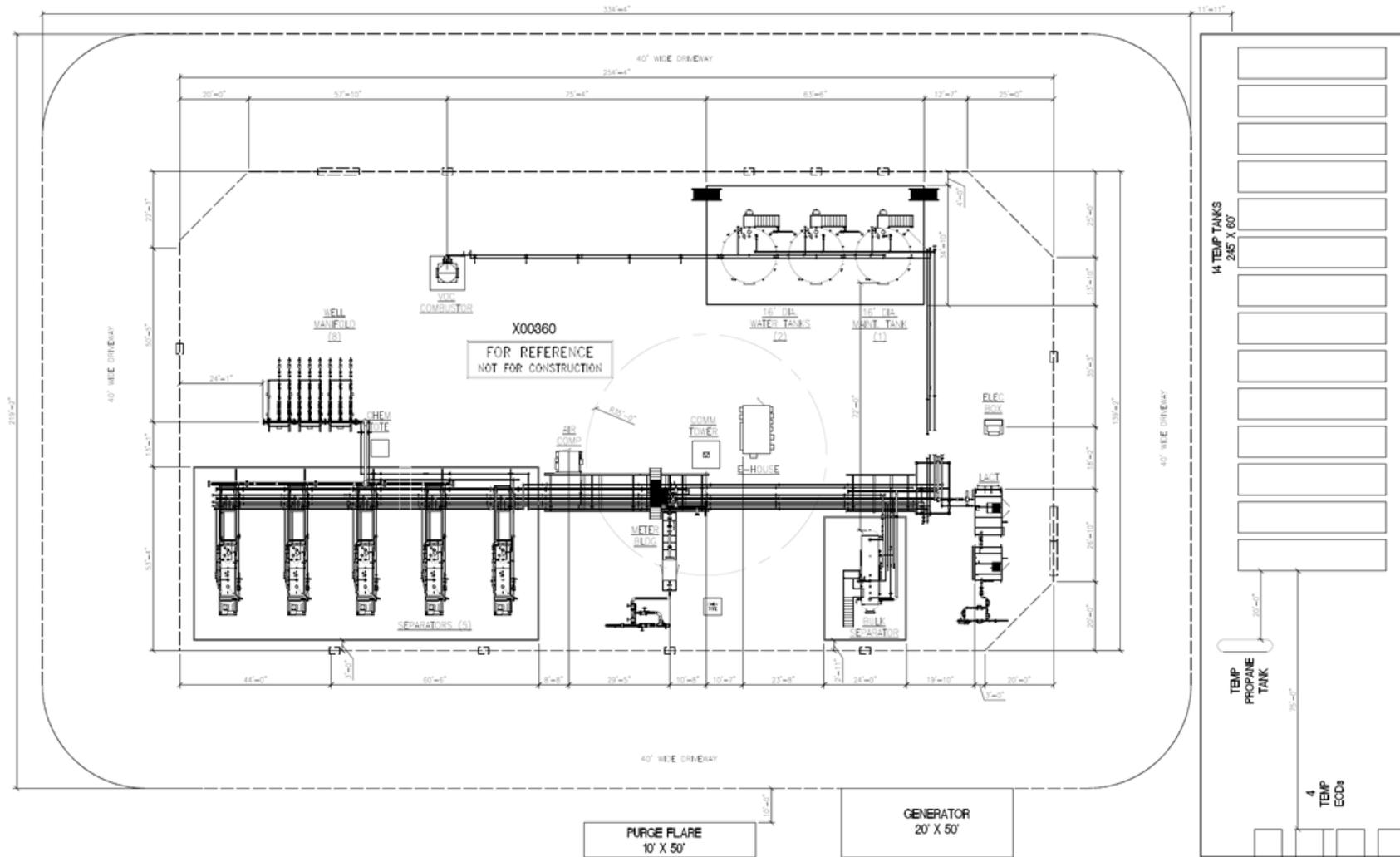
The services provided for this project were performed in accordance with generally accepted professional consulting services. No warranty, expressed or implied, is made or intended by rendition for these consulting services or by furnishing oral or written reports of the findings made. Urban Solution Group generated this report for the exclusive use by Kerr-McGee Oil and Gas Onshore, LP.

Appendix 1 – Ambient Level Charts

Appendix 2 – Equipment Layouts



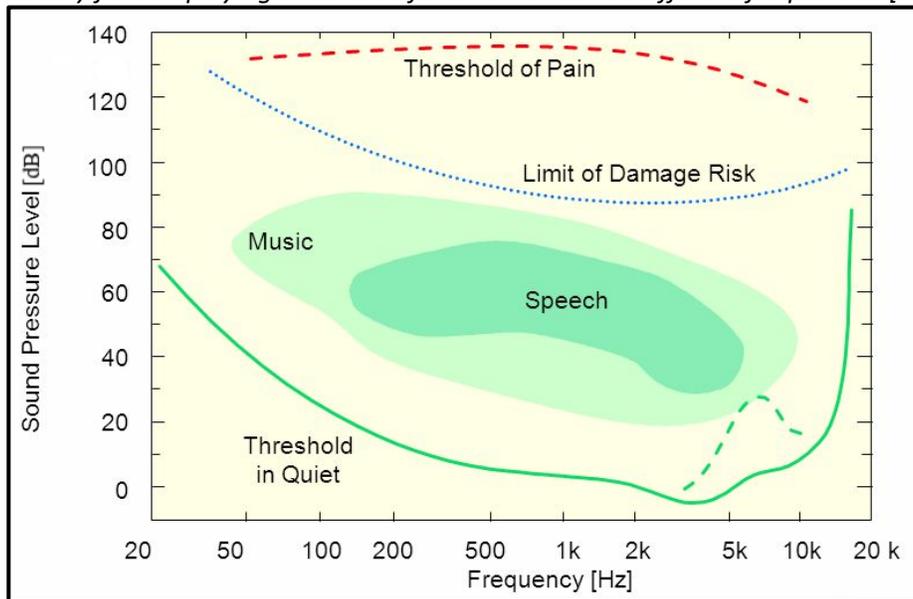
Figure 19: Production Equipment and Layout



Appendix 3 – Sound Fundamentals

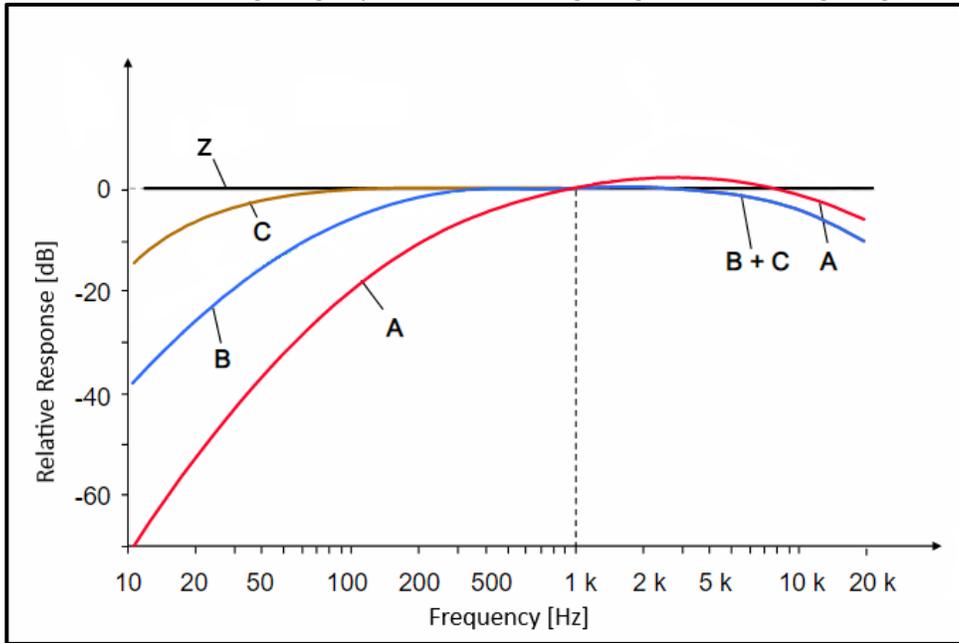
Sound is a series of vibrations transmitted through the air, or other medium, and can be heard when they are processed by the human ear. There are two important properties that describe sound; frequency and amplitude. Frequency is determined by the rate of movement and is measured in cycles per second, which is known as Hertz (Hz). A healthy human ear can hear 20 Hz – 20,000 Hz (Figure 20). The sensation associated with frequency is commonly referred to as the pitch of a sound. High frequencies produce a higher pitch and vice versa. The amplitude of a sound is determined by the maximum displacement of air molecules produced by the vibrations. These displacements lead to pressure fluctuations in air, which are expressed in decibels (dB). Decibels are a logarithmic ratio of sound pressure over the standard threshold of hearing. The more energy a sound has, the larger the pressure fluctuations, resulting in a louder sound.

Figure 20: Auditory field displaying thresholds for a human ear at different frequencies [Bruel and Kjaer]



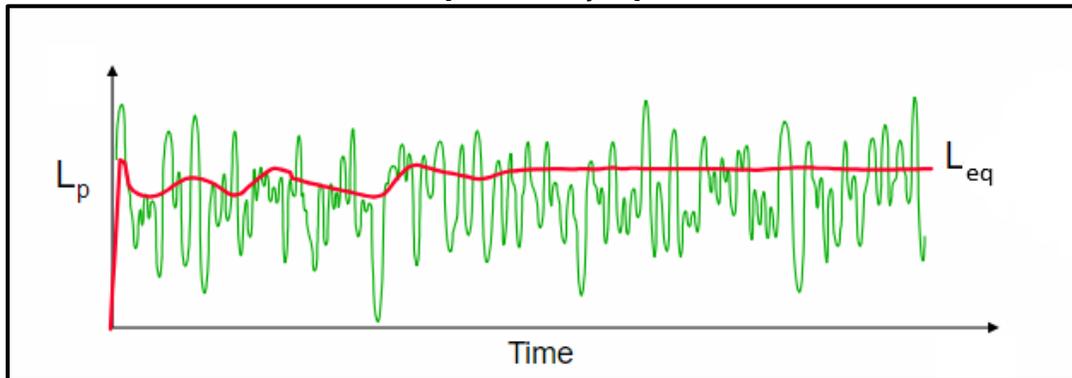
Frequency weightings are applied to measurements to provide a better match between measured results and human perception. Each weighting, in relation to their frequency components, allows for a consistent measurement of the different type of noise sources. A-weighted decibel sound pressure levels (dBA) are measurements recorded from a sound level meter measuring sounds similar to the response of the ear (Figure 21). While C-weighted (dBC) measurements are for low-frequency components.

Figure 21: Common sound weightings up to 20 kHz, Z-weighting means no weighting [Bruel and Kjaer]



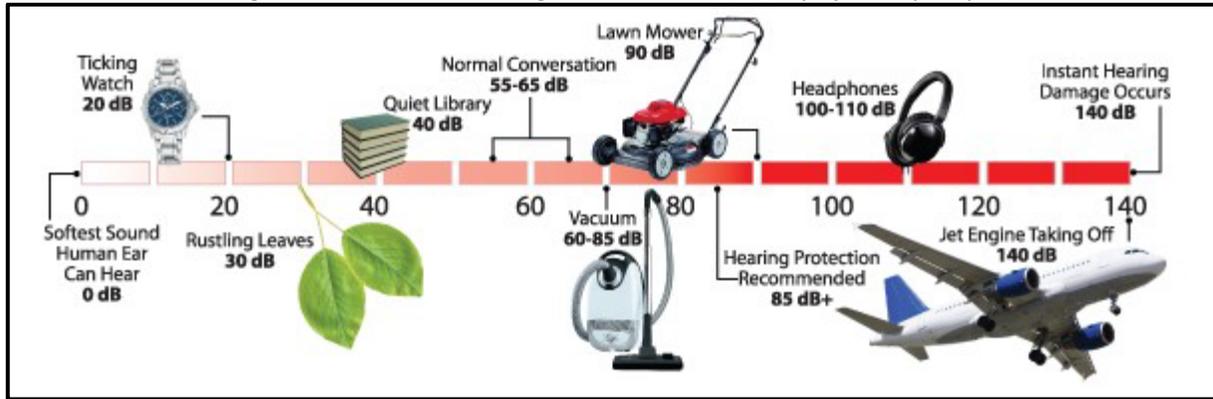
Each measurement has an exponential time factor. Slow time weighting is the most common for environmental noise measurements and will be used for these measurements. For recording over long periods of time, the sound level meter records each weighted decibel reading with an equivalent, or average, continuous sound level reading (L_{eq}). L_{eq} represents the same energy as the actual time varying sound signal (Figure 22). L_{Aeq} refers to the equivalent continuous sound level for an A-weighted measurement.

Figure 22: Sound level recording displaying L_{eq} , a steady-state sound level, over a noise measurement [Bruel and Kjaer]



Environmental noise is a combination of various noise sources. These sources may include; vehicle traffic, aircraft flyovers, wind, weather disturbances, commercial or industrial activities, and other short-term events. These sources create “background noise”. Background noise varies throughout the day, generally following the cycle of human activity. Figure 23 below presents typical A-weighted (dBA) sound levels for common sources of sound.

Figure 23: Common A-weighted sound levels [City of Albuquerque]



Appendix 4 – Glossary

Ambient Noise

All noises that exist in an area and are not related to facility. Ambient noise includes sound from other industrial noise not subject to this directive, transportation sources, animals and nature.

Average Sound Level

See Energy Equivalent Sound Level.

A-weighted sound level

The sound level as measured on a sound level meter using a setting that emphasizes the middle frequency components similar to the frequency response of the human ear.

Calibration

A procedure used for the adjustment of a sound level meter using a reference source of a known sound pressure level and frequency. Calibration must take place before and after the sound level measurements.

C-weighted Sound Level

The C-weighting approximates the sensitivity of human hearing at the industrial noise levels (above 85 dBA). The C-weighted sound level is more sensitive to the sounds used to assess the low- frequencies than the A-weighted sound level. It is sometimes used to assess the low-frequency content of complex sound environments.

Day Night Sound Level (Ldn)

Is the average noise level over a 24-hour period. The noise between the hours of 22:00 and 07:00 is artificially increased by 10 dB. The nighttime noise is weighted to consider the decrease in community background noise.

Daytime Average Sound Level

The time-averaged A-weighted sound level measured between the daytime hours, which are usually 7:00 am to 7:00 pm (7:00 am to 9:00 pm for COUNTY Code).

Decibel (dB)

A unit of measure of sound pressure that compresses a large range of numbers into a more meaningful scale. The basic unit of measurement for sound levels.

dBA

The decibel (dB) sound pressure level filtered through the A filtering network to approximate human hearing response. See dB and A-weighted Sound Level.

dBC

The decibel (dB) sound pressure level filtered through the C filtering network. See dB and C-weighted Sound Level.

Energy Equivalent Sound Level (L_{eq})

The L_{eq} is a single-number average, sound level that represents cumulative acoustical energy as measured over a specified time interval.

Facility

Any operation used in exploration, processing, development and transportation of energy resources.

Frequency

The number of oscillations per second for a sound wave.

Impulse Noise

Unwanted, instantaneous sharp sounds that create sudden impulses of pressure similar to gunfire and explosions.

Noise Reduction

The difference in sound pressure level between two points

L_{dn}

See Day night sound level.

 L_{eq}

See Energy Equivalent Sound Level.

Mitigated

The sound levels from the purposed equipment and noise control items that Urban added.

Noise

Generally understood as unwanted sound.

Noise Mitigation Plan (NMP)

Identifies the expected sound level emanating from operations and receptor points are placed in locations related to compliance. It also identifies what the permissible sound level is and how it was calculated.

Noise Reduction Coefficient (NRC)

A single number rating of the sound absorption properties for a material. An NRC value of zero indicates the material is purely reflective. An NRC value of one indicates perfect absorption.



Octave

A series of electronic filters separate sound into discrete frequency bands, making it possible to know how sound energy is distributed as a function of frequency. The octave band has a center frequency that is double the center frequency of the octave band preceding it.

Point Source

A source that radiates sound from a single point. Generally used to model equipment when looking at the sound impact over a large area.

Receiver

A person or piece of equipment that is affected by noise.

Sound

A series of vibrations transmitted through the air, or other medium, and can be heard when they are processed by the human ear.

Sound Level Meter (SLM)

An instrument that contains a microphone and filter used to measure sound levels, using standard frequency-weightings and exponentially weighted time averaging.

Sound Power Level

A physical measurement of the amount of power a sound source radiates into the surrounding air. It is the rate at which sound energy is emitted, or received, per unit time.

Sound Transmission Class (STC)

An integer rating that measures how well a barrier or building partition attenuates sound. Indicates how well a barrier is at stopping sound from transmitting through it.

Unmitigated

The sound levels from the equipment only, meaning no additional noise control was added to the expected noise levels. The equipment may already have noise control installed, but can still qualify as unmitigated as Urban has not added any mitigation.

1/3 Octave

The 1/3 octave band analysis provides a finer breakdown of sound distribution as a function of frequency.

RECORD OF REVISIONS

Rev#	Date	By	Summary of Revisions
0	2021/12/31	EJJ	Initial Release
1	2022/1/18	EJJ	Added additional BMP's detailing results from the Noise Impact Assessment and updated the company reference to Kerr-McGee
2	2022/1/20	EJJ	Edited BMP's and distinguished facility pad in images
3	2022/3/7	EJJ	Revised sections of the report based on comments sent from KMOG