

APPENDIX 6

# TECHNICAL MEMORANDUM

**DATE:** May 7, 2025  
**TO:** Kaitlyn Dodson, Tom Dodson & Associates  
**FROM:** Bill Maddux, Urban Crossroads, Inc.  
**JOB NO:** 16467-03.docx

## **SUBJECT: COMMUNITY SERVICES DISTRICT (CSD) WELL NO. 18 NOISE ASSESSMENT**

Urban Crossroads, Inc. has completed the following Noise Assessment for the Community Services District (CSD) Well No. 18 (Project). The Well 18 site is located on APN 3100-561-14 along Beekley Road, south of Begonia Road and north of Highway 18. The Backup Well site is located on APN 3101-381-25 at the northeast corner of Barker Road and Camellia Road, east of Sheep Creek Road and North of Highway 18, in the community of Phelan within the County of San Bernardino.

### **PROJECT OVERVIEW**

The CSD seeks to install a new well at one of the two proposed locations as part of their Capital Improvement Plan (CIP), which would both aid the CSD in meeting current and future demand and minimize Chromium-6 concentrations in the CSD's water supply. The well installation at either of the two proposed 2.2-acre sites will include:

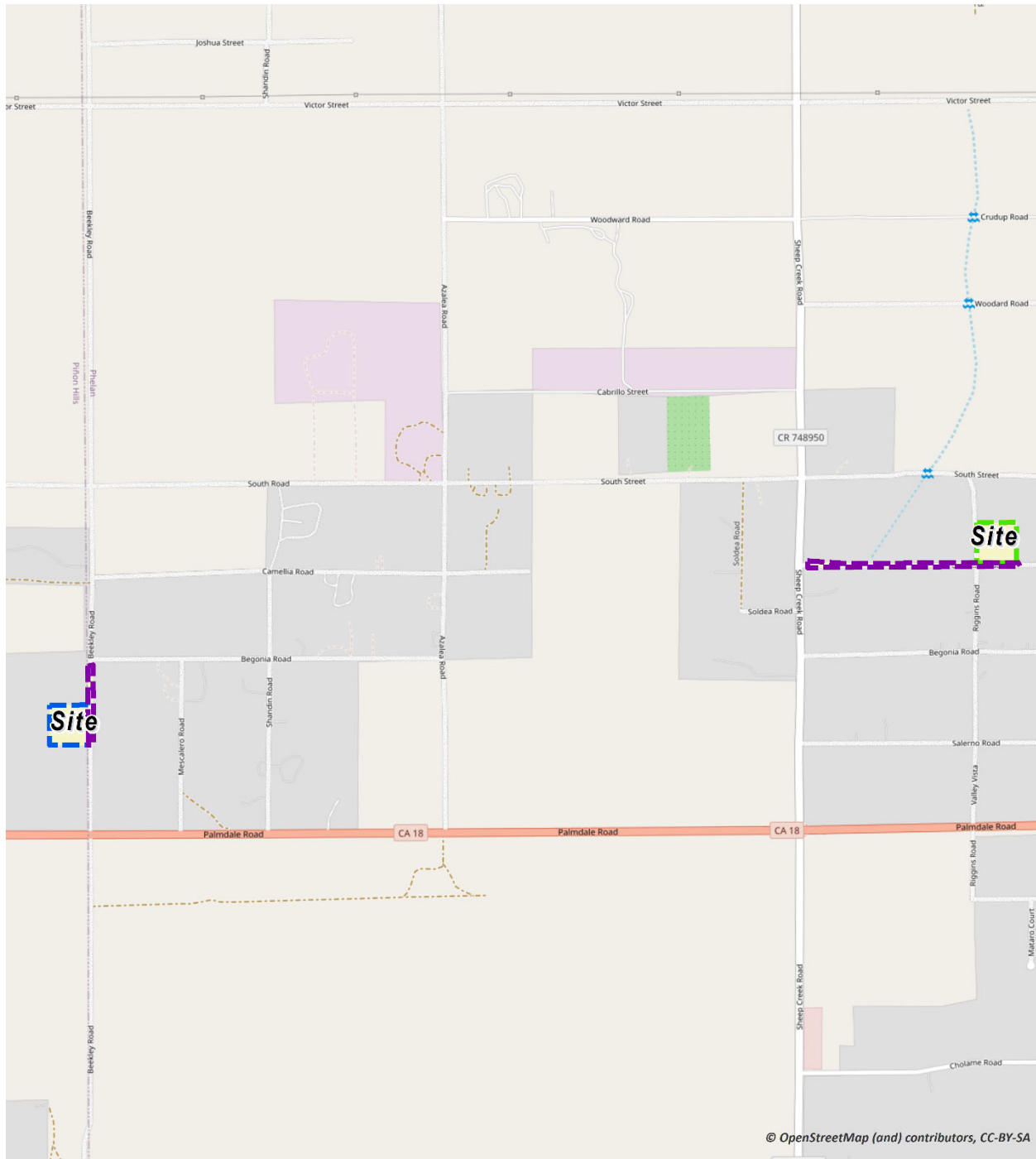
- A 6" drain line to the retention basin
- 10' x 10' chlorination building
- A 5" conduit, switch gear, and transformer
- A 20' X 10' building to house switchgear, electrical panels, and drives

The Well 18 site is proposed to install 600 lineal feet (LF) of water pipeline, while the Backup Well site is proposed to install 1,800 LF of water pipeline, as shown in Exhibit 1. The Project is anticipated to have an opening year of 2027.

### **SUMMARY OF FINDINGS**

The Noise Assessment shows that with the incorporation of a sound wall at the Backup Well site, the Project will not exceed the established County of San Bernardino operational or construction noise thresholds. Therefore, the Project operational and construction noise impacts are considered *less than significant* at the nearby noise-sensitive receiver locations.

### EXHIBIT 1: SITE PLAN



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**LEGEND:**

- Well18
- BackupWell
- Pipeline

## NOISE FUNDAMENTALS

Noise is simply defined as "unwanted sound." Sound becomes unwanted when it interferes with normal activities, when it causes actual physical harm or when it has adverse effects on health. Noise is measured on a logarithmic scale of sound pressure level known as a decibel (dB). A-weighted decibels (dBA) approximate the subjective response of the human ear to broad frequency noise source by discriminating against very low and very high frequencies of the audible spectrum. They are adjusted to reflect only those frequencies which are audible to the human ear. Exhibit 2 presents a summary of the typical noise levels and their subjective loudness and effects that are described in more detail below.

Since the range of intensities that the human ear can detect is so large, the scale frequently used to measure intensity is a scale based on multiples of 10, the logarithmic scale. The scale for measuring intensity is the decibel scale. Each interval of 10 decibels indicates a sound energy ten times greater than before, which is perceived by the human ear as being roughly twice as loud. (1) The most common sounds vary between 40 dBA (very quiet) to 100 dBA (very loud). Normal conversation at three feet is roughly at 60 dBA, while loud jet flyover noises equate to 110 dBA at approximately 1,000 feet, which can cause serious discomfort. (2) Another important aspect of noise is the duration of the sound and the way it is described and distributed in time.

### EXHIBIT 2: TYPICAL NOISE LEVELS

<b>COMMON OUTDOOR ACTIVITIES</b>	<b>COMMON INDOOR ACTIVITIES</b>	<b>A - WEIGHTED SOUND LEVEL dBA</b>	<b>SUBJECTIVE LOUDNESS</b>	<b>EFFECTS OF NOISE</b>
THRESHOLD OF PAIN		140	<b>INTOLERABLE OR DEAFENING</b>	<b>HEARING LOSS</b>
NEAR JET ENGINE		130		
		120		
JET FLY-OVER AT 300m (1000 ft)	ROCK BAND	110	<b>VERY NOISY</b>	<b>SPEECH INTERFERENCE</b>
LOUD AUTO HORN		100		
GAS LAWN MOWER AT 1m (3 ft)		90	<b>LOUD</b>	<b>SPEECH INTERFERENCE</b>
DIESEL TRUCK AT 15m (50 ft), at 80 km/hr (50 mph)	FOOD BLENDER AT 1m (3 ft)	80		
NOISY URBAN AREA, DAYTIME	VACUUM CLEANER AT 3m (10 ft)	70		
HEAVY TRAFFIC AT 90m (300 ft)	NORMAL SPEECH AT 1m (3 ft)	60	<b>MODERATE</b>	<b>SLEEP DISTURBANCE</b>
QUIET URBAN DAYTIME	LARGE BUSINESS OFFICE	50		
QUIET URBAN NIGHTTIME	THEATER, LARGE CONFERENCE ROOM (BACKGROUND)	40	<b>FAINT</b>	<b>NO EFFECT</b>
QUIET SUBURBAN NIGHTTIME	LIBRARY	30		
QUIET RURAL NIGHTTIME	BEDROOM AT NIGHT, CONCERT HALL (BACKGROUND)	20		
	BROADCAST/RECORDING STUDIO	10	<b>VERY FAINT</b>	<b>NO EFFECT</b>
LOWEST THRESHOLD OF HUMAN HEARING	LOWEST THRESHOLD OF HUMAN HEARING	0		

## OFF-SITE TRAFFIC NOISE ANALYSIS

The Community Services District (CSD) Well No. 18 would typically generate a maximum of 4 trips per week for maintenance activities. Therefore, the Project would result in a less than 1 dBA change in traffic noise levels at land uses adjacent to the study area roadway segments, which would be *less than significant* noise level increase in traffic noise levels.

## RECEIVER LOCATIONS

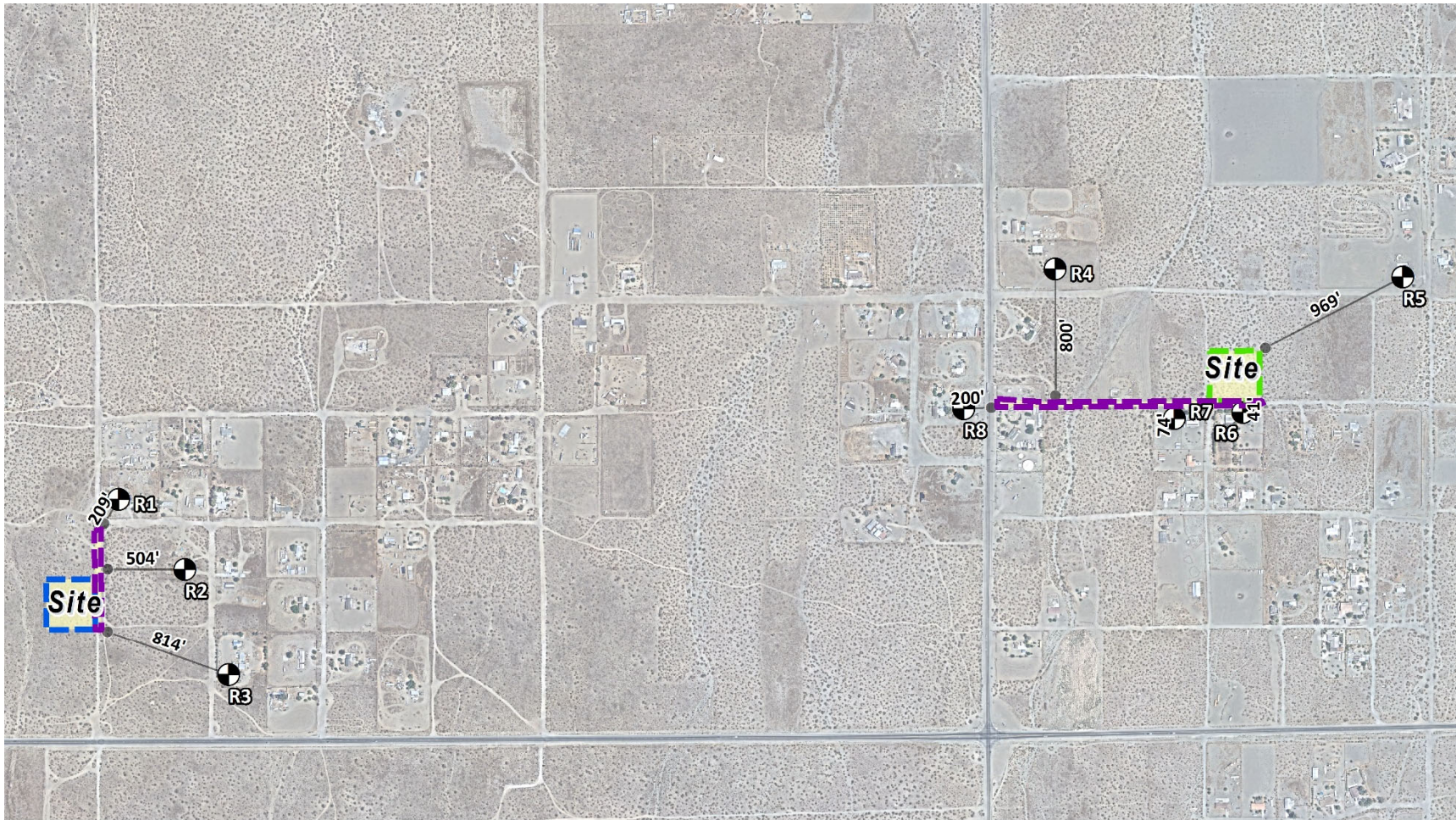
To assess the potential for noise impacts, the following receiver locations, as shown in Exhibit 3, were identified as representative locations for analysis. Sensitive uses or receivers are generally defined as locations where people reside or where the presence of unwanted sound could otherwise adversely affect the use of the land. To describe the potential off-site Project noise levels, eight receiver locations in the vicinity of the Project site were identified, including the location of the nearest existing noise-sensitive residential receiver (R6), located approximately 41 feet south of the pipeline and Backup Well site boundaries.

The selection of receiver locations is based on FHWA guidelines and is consistent with additional guidance provided by Caltrans and the FTA. Other sensitive land uses in the Project study area that are located at greater distances than those identified in this noise study will experience lower noise levels than those presented in this report due to the additional attenuation from distance and the shielding of intervening structures.

## OPERATIONAL NOISE ANALYSIS

The proposed extraction well pump station would be in an open structure with overhead protection. The proposed structure would not provide any noise reduction. The proposed extraction pumps are anticipated to generate up to 60 dBA at 32 feet. Assuming the extraction well is generally located near the center of the proposed well sites, the nearest receivers (R1) are approximately 700 feet from the Proposed Well 18 location, and (R6) 200 feet from the anticipated Backup Well location. Based on the anticipated attenuation due to distance, extraction pump noise levels would be approximately 33 to 44 dBA  $L_{eq}$  at the nearest off-site receivers. These noise levels would be below the County of San Bernardino daytime and nighttime noise level limits for residential land uses. Therefore, operational noise sources would be well controlled and are not anticipated to result in substantial noise level increases. Therefore, operational noise sources would be well controlled and are not anticipated to result in substantial noise level increases.

### EXHIBIT 3: RECEIVER LOCATIONS



## NOISE PREDICTION MODEL

To fully describe the exterior operational noise levels from the Project, Urban Crossroads, Inc. developed a noise prediction model using the CadnaA (Computer Aided Noise Abatement) computer program. CadnaA can analyze multiple types of noise sources using the spatially accurate Project site plan, georeferenced Nearmap aerial imagery, topography, buildings, and barriers in its calculations to predict outdoor noise levels. Using the ISO 9613-2 protocol, CadnaA will calculate the distance from each noise source to the noise receiver locations, using the ground absorption, distance, and barrier/building attenuation inputs to provide a summary of noise level at each receiver and the partial noise level contributions by noise source. The noise level calculations provided in this noise assessment account for the distance attenuation provided due to geometric spreading, when sound from a localized stationary source (i.e., a point source) propagates uniformly outward in a spherical pattern. A default ground attenuation factor of 0.5 was used in the CadnaA noise analysis to account for mixed ground representing a combination of hard and soft surfaces.

## CONSTRUCTION NOISE ANALYSIS

Section 83.01.080(g)(3) of the County of San Bernardino Development Code, provided in Appendix 3.1, indicates that construction activity is considered exempt from the noise level standards between the hours of 7:00 a.m. to 7:00 p.m. except on Sundays and Federal holidays. (3) However, neither the County of San Bernardino General Plan or County Code establish numeric maximum acceptable construction source noise levels at potentially affected receivers, which would allow for a quantified determination of what CEQA constitutes a *substantial temporary or periodic noise increase*. However, neither the General Plan nor the Municipal Code establish numeric maximum acceptable construction source noise levels at potentially affected receivers for CEQA analysis purposes. Therefore, a numerical construction threshold based on the Federal Transit Administration (FTA) Transit Noise and Vibration Impact Assessment Manual is used for the analysis of daytime and nighttime construction impacts. When conducting a detailed construction analysis, the FTA considers a daytime exterior construction noise level of 80 dBA  $L_{eq}$  and a nighttime exterior construction noise level of 70 dBA  $L_{eq}$  as a reasonable threshold for noise-sensitive residential land use. (4 p. 179)

## CONSTRUCTION NOISE SOURCES

Using reference construction equipment noise levels level measurements and the CadnaA noise prediction model, calculations of the Project construction noise level impacts at the nearest sensitive receiver locations were completed. To assess the worst-case construction noise levels, the Project construction noise analysis assumes the well drilling activities will operate continuously over a 24-hour period. The well construction locations, relative to the receivers, are shown in Exhibits 4 and 5.

Construction of the pipelines includes roadway excavation, pipeline installation, roadbed backfilling, and grading activities. Since the existing alignments are unpaved, no paving is anticipated. It is anticipated that pipelines will be constructed with multiple teams. However, pipeline construction would not physically overlap, rather, improvements would occur in multiple locations along the alignment and represent individual events at multiple locations. Construction along the unpaved roadways would extend 400-500 linear feet per day.

### EXHIBIT 4: WELL 18 CONSTRUCTION NOISE SOURCES AND RECEIVERS



### EXHIBIT 5: BACK-UP WELL CONSTRUCTION NOISE SOURCES AND RECEIVERS



Drill rigs have several substantial noise sources, each with its own characteristics. The main sources of noise are the generator sets, the compressors, the mud pumps, and the top drive.

Pumps/compressors and generator noise sources were placed five feet above ground level, and the drill rig top drive was placed fifteen feet above ground level. Drill rig and associated equipment noise levels were developed from a noise survey conducted by Behrens and Associates, Inc. of three different drill rig systems in 2006. Each of the drill rigs was rated at 1,000 horsepower and was capable of drilling depths ranging from 12,000 to 15,000 feet (5). The surveyed drill rigs are similar in capability to the drill rig proposed for the Project. Based on peak noise levels provided by the survey, reference noise levels with a uniform distance of 50 feet were calculated and are provided in Table 1.

**TABLE 1: CONSTRUCTION REFERENCE NOISE LEVELS**

Construction Stage	Reference Construction Equipment <sup>1</sup>	Reference Noise Level @ 50 Feet (dBA L <sub>eq</sub> )	Composite Reference Noise Level (dBA L <sub>eq</sub> ) <sup>2</sup>	Reference Power Level (dBA L <sub>w</sub> ) <sup>3</sup>
Grading/Site Preparation	Tractor	80	84.0	115.6
	Backhoe	74		
	Grader	81		
Pipeline Construction	Excavator	77	79.6	111.3
	Front End Loader	75		
	Welder/Torch	70		
Well Drilling	Drill Rig	85	87.6	119.2
	Generator	80		
	Compressor	82		

<sup>1</sup> FHWA Road Construction Noise Model.

<sup>2</sup> Represents the combined noise level for all equipment assuming they operate at the same time consistent with FTA Transit Noise and Vibration Impact Assessment guidance.

<sup>3</sup> Sound power level represents the total amount of acoustical energy (noise level) produced by a sound source independent of distance or surroundings.

## CONSTRUCTION NOISE LEVEL ANALYSIS

Using the reference construction equipment noise levels and the CadnaA noise prediction model, calculations of the Project construction noise levels with all equipment operating simultaneously during the daytime hours were completed. As shown in Table 2, the unabated daytime construction noise levels for activities for drilling and pipeline activities at well Site 18 are expected to range from 55.0 to 68.3 dBA L<sub>eq</sub> at the nearest residential uses. Appendix B includes the unabated typical construction CadnaA noise model calculations.

Using the reference construction equipment noise levels and the CadnaA noise prediction model, calculations of the Project drilling noise levels during the nighttime hours were completed. As shown in Table 3, the unabated nighttime construction noise levels for drilling activities are expected to range from 60.9 to 64.3 dBA L<sub>eq</sub> at the nearest residential uses.

Using the reference construction equipment noise levels and the CadnaA noise prediction model, calculations of the Project construction noise levels with all equipment operating simultaneously during daytime hours were completed. As shown in Table 4, the unabated construction noise levels for well drilling and pipeline activities at the Backup Well site are expected to range from 52.8 to 78.4 dBA L<sub>eq</sub> at the nearest residential uses.

**TABLE 2: WELL 18 DAYTIME CONSTRUCTION NOISE LEVEL SUMMARY**

Receiver Location <sup>1</sup>	Construction Noise Levels (dBA L <sub>eq</sub> )			
	Grading/Site Preparation	Pipeline Construction	Well Drilling	Highest Levels <sup>2</sup>
R1	64.7	60.3	68.3	68.3
R2	63.2	58.8	66.8	66.8
R3	59.4	55.0	63.0	63.0

<sup>1</sup> Construction noise source and receiver locations are shown in Exhibit 4.

<sup>2</sup> Construction noise level calculations based on distance from the construction activity, which is measured from the Project site boundary to the nearest receiver locations. CadnaA construction noise model inputs are included in Appendix B.

**TABLE 3: WELL 18 NIGHTTIME CONSTRUCTION NOISE LEVEL SUMMARY**

Receiver Location <sup>1</sup>	Construction Noise Levels (dBA L <sub>eq</sub> )			
	Grading/Site Preparation	Pipeline Construction	Well Drilling	Highest Levels <sup>2</sup>
R1	0.0	0.0	64.3	64.3
R2	0.0	0.0	64.1	64.1
R3	0.0	0.0	60.9	60.9

<sup>1</sup> Construction noise source and receiver locations are shown in Exhibit 4.

<sup>2</sup> Construction noise level calculations based on distance from the construction activity, which is measured from the Project site boundary to the nearest receiver locations. CadnaA construction noise model inputs are included in Appendix B.

**TABLE 4: BACKUP WELL DAYTIME CONSTRUCTION NOISE LEVEL SUMMARY**

Receiver Location <sup>1</sup>	Construction Noise Levels (dBA L <sub>eq</sub> )			
	Grading/Site Preparation	Pipeline Construction	Well Drilling	Highest Levels <sup>2</sup>
R4	58.5	54.1	62.1	62.1
R5	57.2	52.8	60.8	60.8
R6	74.8	70.4	78.4	78.4
R7	70.1	65.7	73.7	73.7
R8	60.9	56.5	64.5	64.5

<sup>1</sup> Construction noise source and receiver locations are shown in Exhibit 5.

<sup>2</sup> Construction noise level calculations based on distance from the construction activity, which is measured from the Project site boundary to the nearest receiver locations. CadnaA construction noise model inputs are included in Appendix B.

Using the reference construction equipment noise levels and the CadnaA noise prediction model, calculations of the Project drilling activities were completed. As shown in Table 5, the unabated construction noise levels for activities are expected to range from 56.9 to 76.3 dBA  $L_{eq}$  at the nearest residential uses.

**TABLE 8: BACKUP WELL NIGHTTIME CONSTRUCTION NOISE LEVEL SUMMARY**

Receiver Location <sup>1</sup>	Construction Noise Levels (dBA $L_{eq}$ )			
	Grading/Site Preparation	Pipeline Construction	Well Drilling	Highest Levels <sup>2</sup>
R4	0.0	0.0	59.3	59.3
R5	0.0	0.0	59.9	59.9
R6	0.0	0.0	76.3	76.3
R7	0.0	0.0	68.6	68.6
R8	0.0	0.0	56.9	56.9

<sup>1</sup> Construction noise source and receiver locations are shown in Exhibit 5.

<sup>2</sup> Construction noise level calculations based on distance from the construction activity, which is measured from the Project site boundary to the nearest receiver locations. CadnaA construction noise model inputs are included in Appendix B.

### **CONSTRUCTION NOISE COMPLIANCE**

To evaluate whether the Project will generate potentially significant short-term noise levels at the nearest receiver locations, a construction-related noise level threshold of 80 dBA  $L_{eq}$  is used as a reasonable threshold to assess the daytime construction noise level impacts, and 70 dBA  $L_{eq}$  is used as a reasonable threshold to assess the nighttime construction noise level impacts. As shown in Table 6, construction noise levels at the nearest receiver locations will satisfy the reasonable daytime 80 dBA  $L_{eq}$  significance threshold during Project construction activities at either site. However, Table 6 shows that the well drilling activities at the Backup Well site would exceed the nighttime noise level threshold at R6. Therefore, it is recommended that if the Backup Well site is chosen, the Project should incorporate a 16-foot-high barrier along the sound boundary of the Backup Well site, as shown in Exhibit 6. As shown in Table 7, the recommended barrier would reduce drilling noise level below 70 dBA and would comply with the reasonable nighttime noise level threshold of 70 dBA  $L_{eq}$  at all receivers. Appendix B includes the detailed CadnaA construction noise model calculations.

### **ABATEMENT REQUIREMENTS**

To comply with the nighttime threshold, noise barriers with a minimum height of 16 feet should be erected along the southern boundary of the Backup Well site such that the drill rig and associated equipment are completely shielded from nearby residential areas. An effective barrier requires a weight of at least 2 pounds per square foot of face area with no decorative cutouts, perforations, or line-of-sight openings between shielded areas and the source. Examples of temporary barrier material include 5/8-inch plywood, 5/8-inch oriented-strand board, or sound blankets capable of providing a minimum sound transmission loss (STC) of 27 or a Noise Reduction Coefficient (NRC) of 0.85.



**TABLE 6: CONSTRUCTION NOISE LEVEL COMPLIANCE**

Receiver Location <sup>1</sup>	Construction Noise Levels (dBA Leq)					
	Highest Daytime Construction Noise Levels <sup>2</sup>	Daytime Threshold <sup>3</sup>	Threshold Daytime Exceeded? <sup>4</sup>	Highest Nighttime Construction Noise Levels <sup>2</sup>	Nighttime Threshold <sup>3</sup>	Threshold Daytime Exceeded? <sup>4</sup>
R1	68.3	80	No	64.3	70.0	No
R2	66.8	80	No	64.1	70.0	No
R3	63.0	80	No	60.9	70.0	No
R4	62.1	80	No	59.3	70.0	No
R5	60.8	80	No	59.9	70.0	No
R6	78.4	80	No	76.3	70.0	Yes
R7	73.7	80	No	68.6	70.0	No
R8	64.5	80	No	56.9	70.0	No

<sup>1</sup> Construction noise source and receiver locations are shown in Exhibits 4 and 5.

<sup>2</sup> Highest construction noise level calculations based on distance from the construction noise source activity to the nearest receiver locations, as shown in Tables 2 through 5.

<sup>3</sup> Construction noise level thresholds based on FTA 2018.

<sup>4</sup> Do the estimated Project construction noise levels exceed the construction noise level threshold?

**TABLE 7: CONSTRUCTION NOISE LEVEL COMPLIANCE WITH MITIGATION AT BACKUP WELL SITE**

Receiver Location <sup>1</sup>	Construction Noise Levels (dBA Leq)					
	Highest Daytime Construction Noise Levels <sup>2</sup>	Daytime Threshold <sup>3</sup>	Threshold Daytime Exceeded? <sup>4</sup>	Highest Nighttime Construction Noise Levels <sup>2</sup>	Nighttime Threshold <sup>3</sup>	Threshold Daytime Exceeded? <sup>4</sup>
R4	58.4	80	No	55.7	70.0	No
R5	56.9	80	No	56.3	70.0	No
R6	71.5	80	No	64.1	70.0	No
R7	69.8	80	No	63.9	70.0	No
R8	60.9	80	No	53.2	70.0	No

<sup>1</sup> Construction noise source and receiver locations are shown in Exhibits 4 and 5.

<sup>2</sup> Highest construction noise level calculations based on distance from the construction noise source activity to the nearest receiver locations, as shown in Tables 2 through 5.

<sup>3</sup> Construction noise level thresholds based on FTA 2018.

<sup>4</sup> Do the estimated Project construction noise levels exceed the construction noise level threshold?

**EXHIBIT 6: RECOMMENDED BARRIER LOCATION FOR BACKUP WELL SITE**



**LEGEND:**

- Backup Well
- Pipeline
- Temporary Noise Barrier

## REFERENCES

1. **California Department of Transportation Environmental Program.** *Technical Noise Supplement - A Technical Supplement to the Traffic Noise Analysis Protocol.* Sacramento, CA: s.n., September 2013.
2. **Environmental Protection Agency Office of Noise Abatement and Control.** *Information on Levels of Environmental Noise Requisite to Protect Public Health and Welfare with an Adequate Margin of Safety.* March 1974. EPA/ONAC 550/9/74-004.
3. **County of San Bernardino.** *Code of Ordinances, Title 8 Development Code, Chapter 83.01 General Performance Standards.*
4. **U.S. Department of Transportation, Federal Transit Administration.** *Transit Noise and Vibration Impact Assessment Manual, FTA Report No. 0123.* September 2018.
5. **Behrens and Associates, Inc.** *Gas Well Drilling Noise Impact and Mitigation Study.* April 2006.
6. **U.S. Department of Transportation, Federal Highway Administration, Office of Environment and Planning.** *FHWA Roadway Construction Noise Model.* January, 2006.



**APPENDIX A:**

**COUNTY OF SAN BERNARDINO DEVELOPMENT CODE**

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**§ 83.01.080 Noise.**

This Section establishes standards concerning acceptable noise levels for both noise-sensitive land uses and for noise-generating land uses.

(a) *Noise Measurement.* Noise shall be measured:

(1) At the property line of the nearest site that is occupied by, and/or zoned or designated to allow the development of noise-sensitive land uses;

(2) With a sound level meter that meets the standards of the American National Standards Institute (ANSI § SI4 1979, Type 1 or Type 2);

(3) Using the “A” weighted sound pressure level scale in decibels (ref. pressure = 20 micronewtons per meter squared). The unit of measure shall be designated as dB(A).

(b) *Noise Impacted Areas.* Areas within the County shall be designated as “noise-impacted” if exposed to existing or projected future exterior noise levels from mobile or stationary sources exceeding the standards listed in Subdivision (d) (Noise Standards for Stationary Noise Sources) and Subdivision (e) (Noise Standards for Adjacent Mobile Noise Sources), below. New development of residential or other noise-sensitive land uses shall not be allowed in noise-impacted areas unless effective mitigation measures are incorporated into the project design to reduce noise levels to these standards. Noise-sensitive land uses shall include residential uses, schools, hospitals, nursing homes, religious institutions, libraries, and similar uses.

(c) *Noise Standards for Stationary Noise Sources.*

(1) *Noise Standards.* Table 83-2 (Noise Standards for Stationary Noise Sources) describes the noise standard for emanations from a stationary noise source, as it affects adjacent properties:

<b>Table 83-2</b>		
<b>Noise Standards for Stationary Noise Sources</b>		
<b>Affected Land Uses (Receiving Noise)</b>	<b>7:00 a.m. - 10:00 p.m. Leq</b>	<b>10:00 p.m. - 7:00 a.m. Leq</b>
<b>Table 83-2</b>		
<b>Noise Standards for Stationary Noise Sources</b>		
<b>Affected Land Uses (Receiving Noise)</b>	<b>7:00 a.m. - 10:00 p.m. Leq</b>	<b>10:00 p.m. - 7:00 a.m. Leq</b>
Residential	55 dB(A)	45 dB(A)
Professional Services	55 dB(A)	55 dB(A)
Other Commercial	60 dB(A)	60 dB(A)
Industrial	70 dB(A)	70 dB(A)
Leq = (Equivalent Energy Level). The sound level corresponding to a steady-state sound level containing the same total energy as a time-varying signal over a given sample period, typically one, eight or 24 hours.		
dB(A) = (A-weighted Sound Pressure Level). The sound pressure level, in decibels, as measured on a sound level meter using the A-weighting filter network. The A-weighting filter de-emphasizes the very low and very high frequency components of the sound, placing greater emphasis on those frequencies within the sensitivity range of the human ear.		
Ldn = (Day-Night Noise Level). The average equivalent A-weighted sound level during a 24-hour day obtained by adding 10 decibels to the hourly noise levels measured during the night (from 10:00 p.m. to 7:00 a.m.). In this way Ldn takes into account the lower tolerance of people for noise during nighttime periods.		

(2) *Noise Limit Categories.* No person shall operate or cause to be operated a source of sound at a location or allow the creation of noise on property owned, leased, occupied, or otherwise controlled by the person, which causes the noise level, when measured on another property, either incorporated or unincorporated, to exceed any one of the following:

(A) The noise standard for the receiving land use as specified in Subdivision (b) (Noise-Impacted Areas), above, for a cumulative period of more than 30 minutes in any hour.

(B) The noise standard plus five dB(A) for a cumulative period of more than 15 minutes in any hour.

(C) The noise standard plus ten dB(A) for a cumulative period of more than five minutes in any hour.

(D) The noise standard plus 15 dB(A) for a cumulative period of more than one minute in any hour.

(E) The noise standard plus 20 dB(A) for any period of time.

(d) *Noise Standards for Adjacent Mobile Noise Sources.* Noise from mobile sources may affect adjacent properties adversely. When it does, the noise shall be mitigated for any new development to a level that shall not exceed the standards described in the following Table 83-3 (Noise Standards for Adjacent Mobile Noise Sources).

<b>Table 83-3</b>			
<b>Noise Standards for Adjacent Mobile Noise Sources</b>			
<b>Land Use</b>		<b>Ldn (or CNEL) dB(A)</b>	
<b>Categories</b>	<b>Uses</b>	<b>Interior<sup>(1)</sup></b>	<b>Exterior<sup>(2)</sup></b>
<b>Table 83-3</b>			
<b>Noise Standards for Adjacent Mobile Noise Sources</b>			
<b>Land Use</b>		<b>Ldn (or CNEL) dB(A)</b>	
<b>Categories</b>	<b>Uses</b>	<b>Interior<sup>(1)</sup></b>	<b>Exterior<sup>(2)</sup></b>
Residential	Single and multi-family, duplex, mobile homes	45	60 <sup>(3)</sup>
Commercial	Hotel, motel, transient housing	45	60 <sup>(3)</sup>
	Commercial retail, bank, restaurant	50	N/A
	Office building, research and development, professional offices	45	65
	Amphitheater, concert hall, auditorium, movie theater	45	N/A
Institutional/Public	Hospital, nursing home, school classroom, religious institution, library	45	65
Open Space	Park	N/A	65
<b>Notes:</b>			
(1) The indoor environment shall exclude bathrooms, kitchens, toilets, closets and corridors.			
(2) The outdoor environment shall be limited to: <ul style="list-style-type: none"> <li>· Hospital/office building patios</li> <li>· Hotel and motel recreation areas</li> <li>· Mobile home parks</li> <li>· Multi-family private patios or balconies</li> <li>· Park picnic areas</li> <li>· Private yard of single-family dwellings</li> <li>· School playgrounds</li> </ul>			
(3) An exterior noise level of up to 65 dB(A) (or CNEL) shall be allowed provided exterior noise levels have been substantially mitigated through a reasonable application of the best available noise reduction technology, and interior noise exposure does not exceed 45 dB(A) (or CNEL) with windows and doors closed. Requiring that windows and doors remain closed to achieve an acceptable interior noise level shall necessitate the use of air conditioning or mechanical ventilation.			
CNEL = (Community Noise Equivalent Level). The average equivalent A-weighted sound level during a 24-hour day, obtained after addition of approximately five decibels to sound levels in the evening from 7:00 p.m. to 10:00 p.m. and ten decibels to sound levels in the night from 10:00 p.m. to 7:00 a.m.			

(e) *Increases in Allowable Noise Levels.* If the measured ambient level exceeds any of the first four noise limit categories in Subdivision (d)(2), above, the allowable noise exposure standard shall be increased to reflect the ambient noise level. If the ambient noise level exceeds the fifth noise limit category in Subdivision (d)(2), above, the maximum allowable noise level under this category shall be increased to reflect the maximum ambient noise level.

(f) *Reductions in Allowable Noise Levels.* If the alleged offense consists entirely of impact noise or simple tone noise, each of the noise levels in Table 83-2 (Noise Standards for Stationary Noise Sources) shall be reduced by five dB(A).

(g) *Exempt Noise.* The following sources of noise shall be exempt from the regulations of this Section:

- (1) Motor vehicles not under the control of the commercial or industrial use.
- (2) Emergency equipment, vehicles, and devices.
- (3) Temporary construction, maintenance, repair, or demolition activities between 7:00 a.m. and 7:00 p.m., except Sundays and Federal holidays.
- (h) *Noise Standards for Other Structures.* All other structures shall be sound attenuated against the combined input of all present and projected exterior noise to not exceed the criteria.

<b>Table 83-4</b>	
<b>Noise Standards for Other Structures</b>	
<b>Typical Uses</b>	<b>12-Hour Equivalent Sound Level (Interior) in dBA Ldn</b>
Educational, institutions, libraries, meeting facilities, etc.	45
General office, reception, etc.	50
Retail stores, restaurants, etc.	55
Other areas for manufacturing, assembly, testing, warehousing, etc.	65

In addition, the average of the maximum levels on the loudest of intrusive sounds occurring during a 24-hour period shall not exceed 65 dBA interior.

(Ord. 4011, passed - -2007; Am. Ord. 4245, passed - -2014)

**§ 83.01.090 Vibration.**

(a) *Vibration Standard.* No ground vibration shall be allowed that can be felt without the aid of instruments at or beyond the lot line, nor shall any vibration be allowed which produces a particle velocity greater than or equal to two-tenths inches per second measured at or beyond the lot line.

(b) *Vibration Measurement.* Vibration velocity shall be measured with a seismograph or other instrument capable of measuring and recording displacement and frequency, particle velocity, or acceleration. Readings shall be made at points of maximum vibration along any lot line next to a parcel within a residential, commercial and industrial land use zoning district.

(c) *Exempt Vibrations.* The following sources of vibration shall be exempt from the regulations of this Section.

- (1) Motor vehicles not under the control of the subject use.
- (2) Temporary construction, maintenance, repair, or demolition activities between 7:00 a.m. and 7:00 p.m., except Sundays and Federal holidays.

(Ord. 4011, passed - -2007)

**APPENDIX B:**  
**CADNAA CONSTRUCTION NOISE CALCULATIONS**

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## WELL SITE 18

# 16467 - CSD Well No. 18

CadnaA Noise Prediction Model: 16467-02\_Well 18 Construction.cna

Date: 08.04.25

Analyst: B. Maddux

## Calculation Configuration

Configuration	
Parameter	Value
<b>General</b>	
Max. Error (dB)	0.00
Max. Search Radius (ft)	6561.70
Min. Dist Src to Rcvr	0.00
<b>Partition</b>	
Raster Factor	0.50
Max. Length of Section (ft)	3280.80
Min. Length of Section (ft)	3.30
Min. Length of Section (%)	0.00
Proj. Line Sources	On
Proj. Area Sources	On
<b>Ref. Time</b>	
Daytime Penalty (dB)	0.00
Recr. Time Penalty (dB)	5.00
Night-time Penalty (dB)	10.00
<b>DTM</b>	
Standard Height (m)	0.00
Model of Terrain	Triangulation
<b>Reflection</b>	
max. Order of Reflection	2
Search Radius Src	328.08
Search Radius Rcvr	328.08
Max. Distance Source - Rcvr	3280.84 3280.84
Min. Distance Rcvr - Reflector	3.28 3.28
Min. Distance Source - Reflector	0.33
<b>Industrial (ISO 9613 (1996))</b>	
Lateral Diffraction	some Obj
Obst. within Area Src do not shield	On
<b>Screening</b>	
	Incl. Ground Att. over Barrier
	Dz with limit (20/25)
Barrier Coefficients C1,2,3	3.0 20.0 0.0
Temperature (°F)	50
rel. Humidity (%)	70
Ground Absorption G	0.50
Wind Speed for Dir. (mph)	6.7
<b>Roads (TNM)</b>	
<b>Railways (FTA/FRA)</b>	
<b>Aircraft (???)</b>	
Strictly acc. to AzB	

## Receiver Noise Levels

Name	M.	ID	Level Lr			Limit. Value			Land Use			Height (ft)	Coordinates			
			Day (dBA)	Night (dBA)	CNEL (dBA)	Day (dBA)	Night (dBA)	CNEL (dBA)	Type	Auto	Noise Type		X (ft)	Y (ft)	Z (ft)	
R1		R1	64.7	60.7	68.0	80.0	70.0	65.0				5.00	r	6685120.40	2008331.41	5.00
R2		R2	63.2	60.5	67.5	80.0	70.0	65.0				5.00	r	6685518.84	2007909.53	5.00
R3		R3	59.4	57.3	64.3	80.0	70.0	65.0				5.00	r	6685783.16	2007272.81	5.00

## Point Source(s)

Name	M.	ID	Result. PWL			Lw / Li		Operating Time			Height (ft)	Coordinates				
			Day (dBA)	Evening (dBA)	Night (dBA)	Type	Value norm.	Day (min)	Special (min)	Night (min)		X (ft)	Y (ft)	Z (ft)		

## Line Source(s)

Name	M.	ID	Result. PWL			Result. PWL'			Lw / Li			Operating Time			Moving Pt. Src			Height (ft)	
			Day (dBA)	Evening (dBA)	Night (dBA)	Day (dBA)	Evening (dBA)	Night (dBA)	Type	Value norm.	Day dB(A)	Special (min)	Night (min)	Day	Evening	Night	Number		Speed

Name	ID	Height		Coordinates			
		Begin (ft)	End (ft)	x (ft)	y (ft)	z (ft)	Ground (ft)

## Area Source(s)

Name	M.	ID	Result. PWL			Result. PWL''			Lw / Li			Operating Time			Height (ft)	
			Day (dBA)	Evening (dBA)	Night (dBA)	Day (dBA)	Evening (dBA)	Night (dBA)	Type	Value norm.	Day dB(A)	Special (min)	Night (min)			
Pipline1		P1	115.6	115.6	115.6	82.2	82.2	82.2	Lw	115.6		900.00	0.00	0.00	8	r

Name	M.	ID	Result. PWL			Result. PWL''			Lw / Li			Operating Time			Height (ft)	
			Day (dBA)	Evening (dBA)	Night (dBA)	Day (dBA)	Evening (dBA)	Night (dBA)	Type	Value	norm.	Day (min)	Special (min)	Night (min)		
Well18		W18	119.2	119.2	119.2	80.1	80.1	80.1	Lw	119.2					14	r

Name	ID	Height		Coordinates					
		Begin (ft)	End (ft)	x (ft)	y (ft)	z (ft)	Ground (ft)		
Pipline1	P1	8.00	r			6684974.40	2008144.69	8.00	0.00
						6685014.18	2008151.67	8.00	0.00
						6685016.65	2007545.64	8.00	0.00
						6684979.29	2007546.80	8.00	0.00
						6684975.68	2007850.01	8.00	0.00
Well18	W18	14.00	r			6684685.24	2007848.63	14.00	0.00
						6684975.68	2007850.01	14.00	0.00
						6684979.29	2007546.80	14.00	0.00
						6684686.18	2007546.06	14.00	0.00

### Barrier(s)

Name	Sel.	M.	ID	Absorption		Z-Ext.		Cantilever		Height		Coordinates			
				left	right	horz.	vert.	Begin (ft)	End (ft)	x (ft)	y (ft)	z (ft)	Ground (ft)		

### Building(s)

Name	Sel.	M.	ID	RB	Residents	Absorption	Height (ft)	Coordinates			
								x (ft)	y (ft)	z (ft)	Ground (ft)

### Ground Absorption(s)

Name	Sel.	M.	ID	G	Coordinates	
					x (ft)	y (ft)

### Contour(s)

Name	Sel.	M.	ID	OnlyPts	Height		Coordinates		
					Begin (ft)	End (ft)	x (ft)	y (ft)	z (ft)

### Vertical Area Source(s)

Name	ID	Height		Coordinates			
		Begin (ft)	End (ft)	x (ft)	y (ft)	z (ft)	Ground (ft)

### Rail

Name	Sel.	M.	ID	Lw'		Train Class	Correct.	Vmax
				Day (dBA)	Night (dBA)			

### Sound Level Spectra

Name	ID	Type	Oktave Spectrum (dB)										Source	
			Weight.	31.5	63	125	250	500	1000	2000	4000	8000	A	lin

### Roads

Name	Sel.	M.	ID	Lme			Count Data		exact Count Data						Speed Limit		SCS	Surface		Gradient	Mult. Reflection		
				Day (dBA)	Evening (dBA)	Night (dBA)	DTV	Str.class.	M			p (%)			Auto	Truck	Dist.	Dstro	Type	(%)	Drefl	Hbuild	Dist.

### RoadsGeo

Name	Height		Coordinates				Dist (ft)	LSlope (%)
	Begin (ft)	End (ft)	x (ft)	y (ft)	z (ft)	Ground (ft)		



## **BACKUP WELL SITE**

# 16467 - CSD Well No. 18

CadnaA Noise Prediction Model: 16467-02\_BU\_Well\_Construction.cna

Date: 08.04.25

Analyst: B. Maddux

## Calculation Configuration

Configuration	
Parameter	Value
<b>General</b>	
Max. Error (dB)	0.00
Max. Search Radius (ft)	6561.70
Min. Dist Src to Rcvr	0.00
<b>Partition</b>	
Raster Factor	0.50
Max. Length of Section (ft)	3280.80
Min. Length of Section (ft)	3.30
Min. Length of Section (%)	0.00
Proj. Line Sources	On
Proj. Area Sources	On
<b>Ref. Time</b>	
Daytime Penalty (dB)	0.00
Recr. Time Penalty (dB)	5.00
Night-time Penalty (dB)	10.00
<b>DTM</b>	
Standard Height (m)	0.00
Model of Terrain	Triangulation
<b>Reflection</b>	
max. Order of Reflection	2
Search Radius Src	328.08
Search Radius Rcvr	328.08
Max. Distance Source - Rcvr	3280.84 3280.84
Min. Distance Rcvr - Reflector	3.28 3.28
Min. Distance Source - Reflector	0.33
<b>Industrial (ISO 9613 (1996))</b>	
Lateral Diffraction	some Obj
Obst. within Area Src do not shield	On
<b>Screening</b>	
	Incl. Ground Att. over Barrier
	Dz with limit (20/25)
Barrier Coefficients C1,2,3	3.0 20.0 0.0
Temperature (°F)	50
rel. Humidity (%)	70
Ground Absorption G	0.50
Wind Speed for Dir. (mph)	6.7
<b>Roads (TNM)</b>	
<b>Railways (FTA/FRA)</b>	
<b>Aircraft (???)</b>	
Strictly acc. to AzB	

## Receiver Noise Levels

Name	M.	ID	Level Lr			Limit. Value			Land Use			Height (ft)	Coordinates			
			Day (dBA)	Night (dBA)	CNEL (dBA)	Day (dBA)	Night (dBA)	CNEL (dBA)	Type	Auto	Noise Type		X (ft)	Y (ft)	Z (ft)	
R4		R4	58.5	55.7	62.8	80.0	70.0	65.0				5.00	r	6690752.04	2009716.87	5.00
R5		R5	57.2	56.3	63.1	80.0	70.0	65.0				5.00	r	6692842.97	2009669.13	5.00
R6		R6	74.8	72.7	79.7	80.0	70.0	65.0				5.00	r	6691881.60	2008853.15	5.00
R7		R7	70.1	65.0	72.6	80.0	70.0	65.0				5.00	r	6691469.27	2008817.35	5.00
R8		R8	60.9	53.3	61.8	80.0	70.0	65.0				5.00	r	6690203.43	2008875.51	5.00

## Point Source(s)

Name	M.	ID	Result. PWL			Lw / Li			Operating Time			Height (ft)	Coordinates			
			Day (dBA)	Evening (dBA)	Night (dBA)	Type	Value (dB(A))	norm.	Day (min)	Special (min)	Night (min)		X (ft)	Y (ft)	Z (ft)	

## Line Source(s)

Name	M.	ID	Result. PWL			Result. PWL'			Lw / Li			Operating Time			Moving Pt. Src			Height (ft)	
			Day (dBA)	Evening (dBA)	Night (dBA)	Day (dBA)	Evening (dBA)	Night (dBA)	Type	Value (dB(A))	norm.	Day (min)	Special (min)	Night (min)	Day	Evening	Night		Number

Name	ID	Height		Coordinates			
		Begin (ft)	End (ft)	x (ft)	y (ft)	z (ft)	Ground (ft)

## Area Source(s)

Name	M.	ID	Result. PWL			Result. PWL"			Lw / Li			Operating Time			Height	
			Day (dBA)	Evening (dBA)	Night (dBA)	Day (dBA)	Evening (dBA)	Night (dBA)	Type	Value dB(A)	norm.	Day (min)	Special (min)	Night (min)	(ft)	r
Pipeline2		P2	115.6	115.6	115.6	79.0	79.0	79.0	Lw	115.6		900.00	0.00	0.00	8	r
Backup_Well		BUW	119.2	119.2	119.2	79.9	79.9	79.9	Lw	119.2					14	r

Name	ID	Height		Coordinates			
		Begin (ft)	End (ft)	x (ft)	y (ft)	z (ft)	Ground (ft)
Pipeline2	P2	8.00	r	6690403.46	2008935.75	8.00	0.00
				6690684.08	2008916.32	8.00	0.00
				6691017.14	2008918.15	8.00	0.00
				6691348.28	2008919.97	8.00	0.00
				6691680.04	2008922.53	8.00	0.00
				6691993.09	2008921.85	8.00	0.00
				6692007.69	2008895.01	8.00	0.00
				6691348.28	2008890.97	8.00	0.00
				6690403.08	2008884.94	8.00	0.00
Backup_Well	BUW	14.00	r	6691681.23	2009223.99	14.00	0.00
				6691981.92	2009225.47	14.00	0.00
				6691980.67	2008944.70	14.00	0.00
				6691993.09	2008921.85	14.00	0.00
				6691680.04	2008922.53	14.00	0.00

### Barrier(s)

Name	Sel.	M.	ID	Absorption		Z-Ext.		Cantilever		Height		Coordinates				
				left	right	horz.	vert.	Begin (ft)	End (ft)	x (ft)	y (ft)	z (ft)	Ground (ft)			
						(ft)	(ft)	(ft)	(ft)	(ft)	(ft)	(ft)	(ft)	(ft)	(ft)	(ft)

### Building(s)

Name	Sel.	M.	ID	RB	Residents	Absorption	Height	Coordinates						
								Begin (ft)	x (ft)	y (ft)	z (ft)	Ground (ft)		

### Ground Absorption(s)

Name	Sel.	M.	ID	G	Coordinates	
					x (ft)	y (ft)

### Contour(s)

Name	Sel.	M.	ID	OnlyPts	Height		Coordinates		
					Begin (ft)	End (ft)	x (ft)	y (ft)	z (ft)

### Vertical Area Source(s)

Name	ID	Height		Coordinates			
		Begin (ft)	End (ft)	x (ft)	y (ft)	z (ft)	Ground (ft)

### Rail

Name	Sel.	M.	ID	Lw'		Train Class	Correct.	Vmax
				Day (dBA)	Night (dBA)			

### Sound Level Spectra

Name	ID	Type	Oktave Spectrum (dB)										Source			
			Weight.	31.5	63	125	250	500	1000	2000	4000	8000		A	lin	

### Roads

Name	Sel.	M.	ID	Lme			Count Data		exact Count Data						Speed Limit		SCS	Surface		Gradient	Mult. Reflection			
				Day (dBA)	Evening (dBA)	Night (dBA)	DTV	Str.class.	M			p (%)			Auto	Truck	Dist.	Dstro	Type	(%)	Drefl	Hbuild	Dist.	

### RoadsGeo

Name	Height		Coordinates				Dist (ft)	LSlope (%)
	Begin (ft)	End (ft)	x (ft)	y (ft)	z (ft)	Ground (ft)		



## **BACKUP WELL SITE MITIGATION**

# 16467 - CSD Well No. 18

CadnaA Noise Prediction Model: 16467-02\_BU\_Well\_ConstructionMit.cna

Date: 08.04.25

Analyst: B. Maddux

## Calculation Configuration

Configuration	
Parameter	Value
<b>General</b>	
Max. Error (dB)	0.00
Max. Search Radius (ft)	6561.70
Min. Dist Src to Rcvr	0.00
<b>Partition</b>	
Raster Factor	0.50
Max. Length of Section (ft)	3280.80
Min. Length of Section (ft)	3.30
Min. Length of Section (%)	0.00
Proj. Line Sources	On
Proj. Area Sources	On
<b>Ref. Time</b>	
Daytime Penalty (dB)	0.00
Recr. Time Penalty (dB)	5.00
Night-time Penalty (dB)	10.00
<b>DTM</b>	
Standard Height (m)	0.00
Model of Terrain	Triangulation
<b>Reflection</b>	
max. Order of Reflection	2
Search Radius Src	328.08
Search Radius Rcvr	328.08
Max. Distance Source - Rcvr	3280.84 3280.84
Min. Distance Rcvr - Reflector	3.28 3.28
Min. Distance Source - Reflector	0.33
<b>Industrial (ISO 9613 (1996))</b>	
Lateral Diffraction	some Obj
Obst. within Area Src do not shield	On
<b>Screening</b>	
	Incl. Ground Att. over Barrier
	Dz with limit (20/25)
Barrier Coefficients C1,2,3	3.0 20.0 0.0
Temperature (°F)	50
rel. Humidity (%)	70
Ground Absorption G	0.50
Wind Speed for Dir. (mph)	6.7
<b>Roads (TNM)</b>	
<b>Railways (FTA/FRA)</b>	
<b>Aircraft (???)</b>	
Strictly acc. to AzB	

## Receiver Noise Levels

Name	M.	ID	Level Lr			Limit. Value			Land Use			Height (ft)	Coordinates			
			Day (dBA)	Night (dBA)	CNEL (dBA)	Day (dBA)	Night (dBA)	CNEL (dBA)	Type	Auto	Noise Type		X (ft)	Y (ft)	Z (ft)	
R4		R4	58.5	55.7	62.8	80.0	70.0	65.0				5.00	r	6690752.04	2009716.87	5.00
R5		R5	57.2	56.3	63.1	80.0	70.0	65.0				5.00	r	6692842.97	2009669.13	5.00
R6		R6	74.8	72.7	79.7	80.0	70.0	65.0				5.00	r	6691881.60	2008853.15	5.00
R7		R7	70.1	65.0	72.6	80.0	70.0	65.0				5.00	r	6691469.27	2008817.35	5.00
R8		R8	60.9	53.3	61.8	80.0	70.0	65.0				5.00	r	6690203.43	2008875.51	5.00

## Point Source(s)

Name	M.	ID	Result. PWL			Lw / Li			Operating Time			Height (ft)	Coordinates			
			Day (dBA)	Evening (dBA)	Night (dBA)	Type	Value (dB(A))	norm.	Day (min)	Special (min)	Night (min)		X (ft)	Y (ft)	Z (ft)	

## Line Source(s)

Name	M.	ID	Result. PWL			Result. PWL'			Lw / Li			Operating Time			Moving Pt. Src			Height (ft)	
			Day (dBA)	Evening (dBA)	Night (dBA)	Day (dBA)	Evening (dBA)	Night (dBA)	Type	Value (dB(A))	norm.	Day (min)	Special (min)	Night (min)	Day	Evening	Night		Number

Name	ID	Height		Coordinates			
		Begin (ft)	End (ft)	x (ft)	y (ft)	z (ft)	Ground (ft)

## Area Source(s)

