



Noise Technical Report for the Colville Delta 8 Project, North Slope Borough, Alaska

OCTOBER 2026

PREPARED FOR

U.S. Army Corps of Engineers

PREPARED BY

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**NOISE TECHNICAL REPORT
FOR THE COLVILLE DELTA 8 PROJECT,
NORTH SLOPE BOROUGH, ALASKA**

Prepared for

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CONTENTS

1	Introduction	1
2	Project Location and Description	1
2.1	Project Location.....	1
2.2	Project Description	1
3	Sound Fundamentals.....	4
3.1	Definition of Acoustic Terms	4
3.1.1	Sound Levels of Representative Sounds and Noises	4
4	Environmental Setting	6
4.1	Existing Land Use and Site Conditions	6
4.2	Ambient Sound Levels	6
4.3	Noise-Sensitive Receptors	7
5	Noise Analysis Methodology	8
5.1	Propagation and Attenuation	8
5.2	Project Phases and Duration	8
5.3	Source Sound Levels	9
5.4	Regulatory Framework and Criteria	11
6	Project Noise Impacts	11
6.1	Construction Noise (Years 1–2)	11
6.2	Drilling Noise (Years 2–7)	14
6.3	Operational Noise (Years 2–30)	14
6.4	Aircraft Noise (All Years)	14
6.5	Combined Project Noise.....	15
6.6	Wind-Enhanced Noise Assessment	16
6.7	Alternatives C and D	19
6.8	Noise Mitigation Measures.....	20
7	Summary	20
8	Literature Cited	22

Figures

Figure 1. Project location map.	3
Figure 2. Wind rose for the Nuiqsut monitoring station, 2020–2024.	17

Tables

Table 1. Pile Installation Methods by Location	2
Table 2. Sound Levels of Representative Noise Sources.....	5
Table 3. Average Human Ability to Perceive Changes in Sound Levels	5
Table 4. Estimated Sound Levels at Nuiqsut During Willow Construction and Operation.....	7
Table 5. Project Noise Levels	13
Table 6. Wind-Enhanced Noise Levels at Nuiqsut for Alternative B.....	18

1 INTRODUCTION

ConocoPhillips Alaska, Inc. (CPAI), is proposing the Colville Delta (CD) 8 Project (Project) to develop a drillsite and associated infrastructure to support resource extraction from the Narwhal reservoir on Alaska's North Slope, near the community of Nuiqsut. This analysis evaluates potential noise impacts associated with the Project during three phases: construction, drilling, and operations. The analysis includes a review of the existing acoustic environment, identification of nearby noise-sensitive receptors, and evaluation of applicable noise guidelines to determine whether Project activities could result in adverse community noise impacts.

2 PROJECT LOCATION AND DESCRIPTION

2.1 Project Location

The Project would be located on Alaska's North Slope between the East Channel and Nigliq Channel of the Colville River. The CD8 drillsite would be approximately 7.5 miles south of the existing Alpine Central Facility (ACF) and CD1, 4.5 miles southeast of CD4, and approximately 2.1 miles east-northeast (ENE) of the community of Nuiqsut. CD8 would be part of CPAI's Western North Slope operating and development area (Figure 1).

Three action alternatives are under consideration for the CD8 drillsite location. Alternative B (Applicant's Preferred Alternative) would place the drillsite approximately 2.1 miles ENE of Nuiqsut. Alternative C (Northern Alternative) would place the drillsite approximately 3.1 miles northeast (NE) of Nuiqsut. Alternative D (Northwestern Alternative) would place the drillsite approximately 2.5 miles north-northeast (NNE) of Nuiqsut. All three alternatives would use the same general infrastructure configuration, including a gravel drillsite pad, access road, pipelines, and tie-in pad. Because Alternative B is the closest to Nuiqsut and the most aligned with the prevailing wind direction, it represents the worst case for potential community noise impacts and is the primary focus of this analysis. A comparative discussion of Alternatives C and D is provided in Section 6.7 (Alternatives C and D).

2.2 Project Description

The CD8 Project would include construction of a 15.3-acre gravel drillsite pad, a 0.5-acre tie-in pad near Colville Delta 4N (CD4N), approximately 6.1 miles of gravel access road, and associated pipeline infrastructure connecting the drillsite to the ACF. Pipelines would transport produced oil, injection water, and gas or miscible injectant between the drillsite and existing processing facilities.

The drillsite would support development of up to 40 wells for production and injection, as well as associated infrastructure required for drilling, well stimulation, and operational support. Existing Alpine facilities, including the ACF, CD1, and CD4, may receive minor upgrades or tie-in equipment needed to support CD8 operations. Water for injection would be supplied by pumps located at the ACF, not at the CD8 drillsite; therefore, water-injection pump noise is not a source at CD8. Pump jacks are not used on the North Slope and are not part of the CD8 facility design.

The CD8 Project duration would be approximately 30 years and would consist of three phases. Construction activities would occur during Years 1 and 2 and would include development of the drillsite, access road, pipelines, and associated infrastructure. Most construction activities, including pile installation along the pipeline alignment, would occur during winter from ice pads and roads. Drilling would begin in Year 2 and continue through Year 7, overlapping with initial production as wells are

completed. Operational activities would occur from Year 2 through Year 30 and would include long-term production and field operations.

Pile installation methods at CD8 are summarized in Table 1 below. The primary installation method for the CD8 pad, pipeline alignment, and bridge piers would be drill, set, and slurry (D/S/S), which is substantially quieter than vibratory installation. Vibratory pile installation is expected to be used as a secondary method on a limited basis, primarily within an approximately one- to two-week window on the CD8 pad where access constraints, hydrology, or soils may make D/S/S impractical. Vibratory installation would also be used for bridge sheet piles, for which D/S/S is not a feasible alternative. Because vibratory installation produces the highest construction-related source levels analyzed in this report (see Section 5.3 [Source Sound Levels] for associated sound levels), it is evaluated explicitly as a bounding scenario even though it is not the primary method (see Section 6.1 [Construction Noise Years 1–2]).

Table 1. Pile Installation Methods by Location

Project Area	Primary Pile Installation Method	Secondary Pile Installation Method	Additional Details
CD8 pad	Drill, set, slurry	Vibratory (limited)	Vibratory may be used as a secondary method for approximately 1–2 weeks where the work area is constrained or where hydrology or soils make D/S/S impractical.
Pipeline alignment	Drill, set, slurry	Vibratory (limited)	
Bridge piers	Drill, set, slurry	Vibratory (limited)	
Bridge sheet piles	Vibratory	Not applicable	Sheet piles cannot be installed using D/S/S.

The drill rig at CD8 would be an enclosed North Slope design, specifically a rig of the Doyon Drilling, Inc. (Doyon) 25 class (or equivalent), fitted with insulated metal acoustic panels rated sound transmission class (STC) 35 and with insulated air intake and exhaust systems. Rig power would be supplied predominantly by electricity generated at the ACF and delivered to CD8; on-site diesel generators would serve only as a backup during occasional temporary interruptions in ACF-supplied power. Fracking (well stimulation) operations would be conducted on a day-shift basis only and would consist of five to six arctic-configured pump trailers with enclosed fans, two of which are typically backup units not operating at the same time as the active trailers.

Access to the site during construction would rely on seasonal ice roads; once the CD8 gravel access road is constructed, primary access would be via the gravel road. Helicopter use would be limited during all Project phases, and most personnel and materials would be transported by ground vehicles or fixed-wing aircraft to the Alpine airstrip.

The gravel material site that would supply construction aggregate for the Project has already been permitted under a separate authorization and is not part of the scope of this analysis.

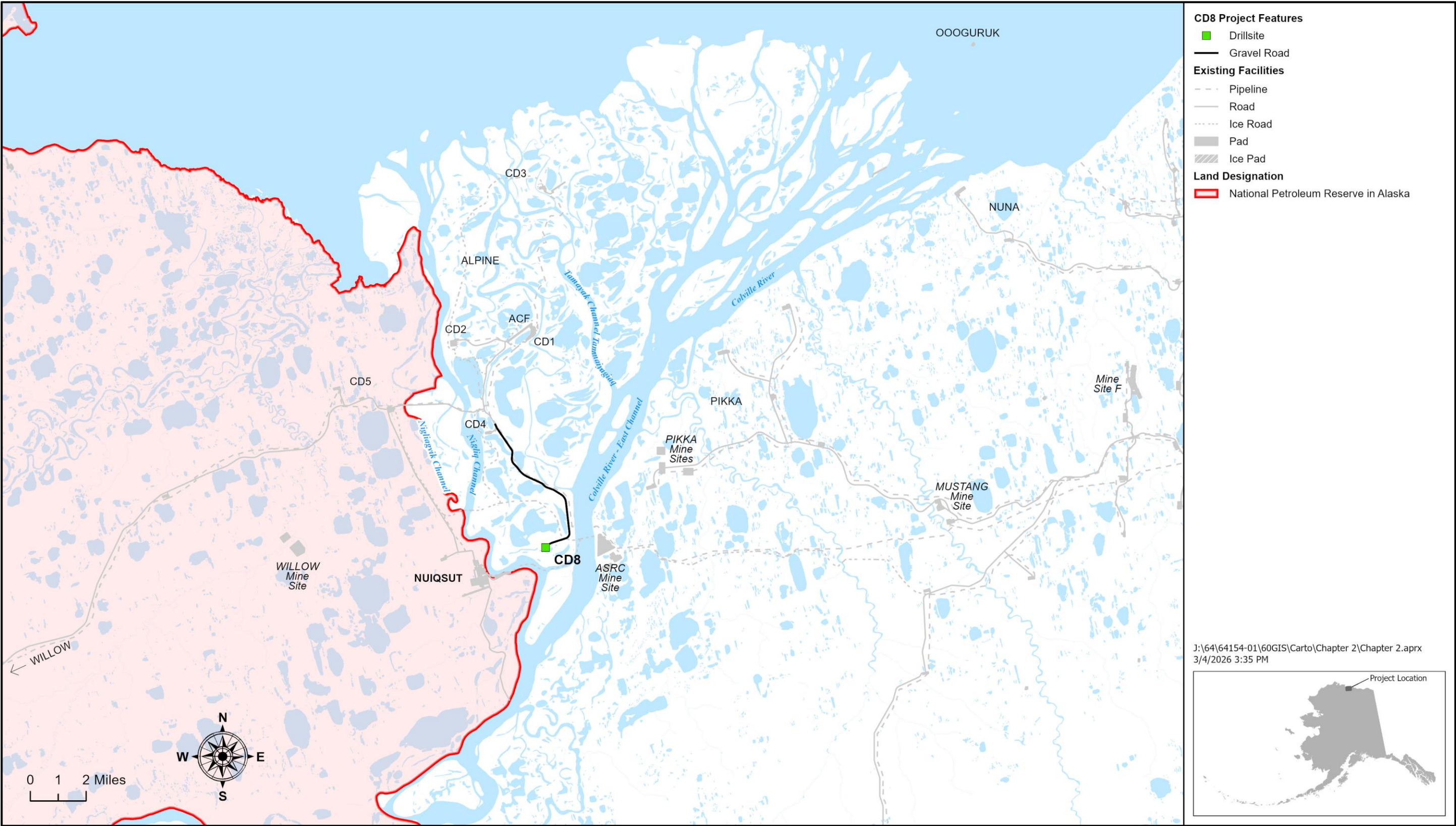


Figure 1. Project location map.

3 SOUND FUNDAMENTALS

This section summarizes basic acoustic concepts used to evaluate potential noise impacts associated with the Project.

3.1 Definition of Acoustic Terms

Sound levels are measured in decibels (dB), a logarithmic unit that describes sound pressure amplitude. Because the human ear is not equally sensitive to all frequencies, an A-weighted decibel (dBA) scale is used to approximate human perception; all sound levels in this report are expressed in dBA.

Because the dB scale is logarithmic, sound levels do not combine through simple arithmetic addition. When multiple noise sources occur simultaneously, their sound energies combine logarithmically, meaning that the resulting sound level increases more slowly than a direct sum of the individual levels.

The following descriptors are used throughout this analysis:

- Ambient sound level refers to the existing environmental sound at a given location resulting from the combined contribution of natural and human-made sources.
- Equivalent continuous sound level (L_{eq}) is the average sound level over a specified period, representing a constant sound level containing the same acoustic energy as the varying levels during that period. L_{eq} is the primary metric used in this analysis to describe predicted sound levels from individual sources. L_{eq} is used in this analysis to describe predicted sound levels from individual sources and to characterize short-duration or episodic noise events such as aircraft overflights.
- Day-night average sound level (L_{dn}) is the A-weighted equivalent sound level for a 24-hour period, with an additional 10-dB penalty applied to sound levels occurring during nighttime hours (10:00 p.m.–7:00 a.m.) to account for increased sensitivity to noise during sleep. L_{dn} is used to evaluate community noise exposure. For a source that operates continuously at a constant level, L_{dn} is approximately 6.4 dBA higher than the corresponding L_{eq} .
- Maximum sound level (L_{max}) is the highest sound level measured during a specific noise event or over a defined period. L_{max} is useful for describing short-duration or intermittent noise events, such as aircraft overflights or isolated construction activities.

3.1.1 Sound Levels of Representative Sounds and Noises

Sound levels in the environment vary widely depending on the surrounding setting and level of human activity. In quiet rural areas at night, ambient sound levels typically range from 32 to 35 dBA. In low-noise urban residential areas at night, levels generally range from 40 to 50 dBA. In busy urban environments, sound levels commonly reach 70 to 80 dBA throughout the day (U.S. Environmental Protection Agency [EPA] 1974).

Tables 2 and 3 present typical sound levels associated with common noise sources, general human responses to those sound levels, and typical human perception of changes in sound levels. These examples provide context for interpreting the predicted sound levels discussed later in this report.

Table 2. Sound Levels of Representative Noise Sources

Common Noise Sources	Sound Level (dBA)	Human Response
Rocket launching pad (no ear protection)	180	Irreversible hearing loss
Carrier deck jet operation Air raid siren	140	Painfully loud
Thunderclap	130	–
Jet takeoff (200 feet) Auto horn (3 feet)	120	Maximum vocal effort
Pile driver Rock concert	110	Extremely loud
Garbage truck Firecrackers	100	Very loud
Heavy truck (50 feet) City traffic	90	Very annoying Hearing damage (8 hours)
Alarm clock (2 feet) Hair dryer	80	Annoying
Noisy restaurant Freeway traffic Business office	70	Telephone use difficult
Air conditioning unit Conversational speech	60	Intrusive
Light auto traffic (100 feet)	50	Quiet
Living room Bedroom Quiet office	40	–
Library Soft whisper (15 feet)	30	Very quiet
Broadcasting studio	20	–
–	10	Just audible
–	0	Hearing begins

Source: Noise Pollution Clearinghouse (2019).

Table 3. Average Human Ability to Perceive Changes in Sound Levels

Increase in Sound Level (dBA)	Human Perception
2–3	Barely perceptible
5	Readily noticeable
10	Doubling of the sound
20	Dramatic change

Source: Bolt, Beranek and Newman, Inc. (1973).

4 ENVIRONMENTAL SETTING

This section describes the physical setting and existing acoustic environment surrounding the CD8 Project to establish baseline conditions for evaluating potential Project-related noise impacts. The discussion includes surrounding land uses, existing ambient sound conditions, and the location of nearby noise-sensitive receptors.

4.1 Existing Land Use and Site Conditions

The CD8 Project is in the Colville River Delta on the Arctic Coastal Plain, a landscape with low topographic relief characterized by permafrost, shallow lakes and ponds, tundra wetlands, and tidal river channels. The Project would be located near existing oil and gas infrastructure, including the ACF, CD1, and CD4; the Arctic Slope Regional Corporation (ASRC) Mine Site; and the community of Nuiqsut. The area is remote and is accessed by aircraft and seasonally by ice roads. Industry gravel roads occur near the Project.

Site conditions strongly influence how noise is generated and transmitted across the landscape. The flat, open terrain of the Project area provides little topographic relief to block or absorb sound. During winter, when most construction activities would occur, frozen ground and snow cover create hard, acoustically reflective surfaces that can enhance long-range sound propagation. During summer, the soft, saturated surface of the tundra and its vegetation layer can provide meaningful ground absorption that partially offsets long-range propagation, particularly at mid and high frequencies (Piercy et al. 1977). The base attenuation calculations in this report do not take into account ground absorption; this is a conservative simplification, and actual summer sound levels are likely lower than predicted. The Project's proximity to Nuiqsut and its location within an area heavily used for subsistence activities, where natural ambient sound levels are typically low, heighten sensitivity to noise.

4.2 Ambient Sound Levels

Ambient sound levels around Nuiqsut and the lower Colville River, including the area around CD8 facilities, were documented by Stinchcomb (2017) from June through August 2016 during a period of peak subsistence use. Stinchcomb deployed acoustic monitoring stations at multiple locations in and around the Colville River Delta to quantify both natural ambient sound and aircraft sound levels. Natural ambient sound levels ranged from 25 to 47 dBA, with a median level of 35 dBA (Stinchcomb 2017). The median sound exposure level of aircraft ranged from 55 to 69 dBA (Stinchcomb 2017). These measurements are the only long-duration ambient soundscape data collected near the CD8 Project area. Short-duration measurements of blasting overpressure and ground vibration were subsequently collected in Nuiqsut between February and April 2024 (SLR International Corporation 2024); those data characterize impulsive blasting events associated with the Willow mine site rather than ambient conditions.

The loudest human-created sources of ambient noise in the area include activities associated with existing oil and gas infrastructure, particularly the Alpine facilities (ACF, CD1, and CD4) and the ASRC Mine Site, as well as aircraft operating in the region. Subsistence hunting and use of all-terrain vehicles and snowmachines also contribute to the ambient soundscape, particularly during summer months. Wind is the primary natural noise source in Nuiqsut, though occasional wildlife calls and water or ice movement in river channels also contribute to the ambient sound level. These natural sources are generally at or below the lower end of the measured ambient range.

Stinchcomb’s (2017) measured ambient sound levels were verified against American National Standards Institute standards for predicting ambient sound levels based on land use categories (American National Standards Institute 2013), which confirmed that the Stinchcomb measurements are consistent with expected sound levels for a remote area with limited industrial activity. Additional oil and gas development has occurred in the area since Stinchcomb’s 2016 monitoring period. Most notably, the Willow project, which is currently under construction approximately 25 miles west of Nuiqsut, and the Willow mine site (6.8 miles west of Nuiqsut) are contributing to the regional noise environment. To assess whether the 2016 measurements remain representative of current conditions, sound level estimates from the *Willow Master Development Plan Supplemental Environmental Impact Statement* (Willow EIS) (Bureau of Land Management [BLM] 2023) are presented in Table 4 for comparison.

Table 4. Estimated Sound Levels at Nuiqsut During Willow Construction and Operation

Noise Source	Estimated Sound Level at Nuiqsut (dBA)
During Willow Construction and Drilling (present–2029)*	
General construction	31
Gravel mining (until spring 2027)	31
Gravel mine blasting (until spring 2027)	59
Impact pile driving (until spring 2027)	42
Drill rig	Up to 23
Aircraft	Up to 39
Truck traffic	Up to 24
During Willow Operation (post-2029)	
Aircraft	Up to 39
Truck traffic	Up to 24
Flaring at Willow processing facility	29
Willow processing facility	9

Source: BLM (2023).

* Production scheduled to begin in 2029.

Table 4 shows that the highest predicted sound levels near Nuiqsut are up to 59 dBA during Willow construction and up to 39 dBA during Willow operations. The loudest construction sources during Willow are short-duration sources (gravel mine blasting and impact pile driving in winter). Mining at the Willow mine site is expected to be complete by spring of 2027 and would not overlap construction of CD8. By the time construction of CD8 begins, all remaining Willow construction activity would occur at Willow (25 miles west of Nuiqsut), and the activities with the loudest sources of noise would be complete. The more constant noise sources associated with Willow construction and operations (general construction, drilling, and the Willow processing facility) are considerably below the measured ambient sound level of 35 dBA and would not notably affect ambient conditions at Nuiqsut. Therefore, the measured ambient sound level of 35 dBA from Stinchcomb (2017) remains a valid benchmark for evaluating potential noise impacts from the CD8 Project.

4.3 Noise-Sensitive Receptors

The noise-sensitive receptors near the Project are the community of Nuiqsut and subsistence harvesters. For purposes of this analysis, impacts are evaluated at Nuiqsut, which is 2.1 miles from the perimeter of

the Project drillsite. Distances from individual sources may be slightly greater depending on site layout; using this distance provides a conservative (worst-case) evaluation.

5 NOISE ANALYSIS METHODOLOGY

This section describes the methods, data sources, and evaluation criteria used to assess potential noise impacts from the CD8 Project at Nuiqsut. No refined three-dimensional noise modeling was performed; sound levels were estimated using standard attenuation calculations based on published source levels, consistent with the screening-level approach appropriate for a National Environmental Policy Act (NEPA) technical report.

5.1 Propagation and Attenuation

Sound attenuation with distance was estimated using spherical spreading, which assumes sound energy radiates uniformly outward from a point source. Under this model, sound levels decrease by approximately 6 dB for each doubling of distance from the source. For this analysis, predicted sound levels were calculated at a receptor distance of 2.1 miles, corresponding to the distance between the Alternative B drillsite boundary and Nuiqsut, the nearest community. This calculation considers only geometric spreading and does not take into account ground absorption, atmospheric absorption, topographic shielding, or vegetation. Because the base calculation omits these attenuation mechanisms, predicted sound levels under neutral atmospheric conditions represent a conservative upper bound on actual noise conditions at Nuiqsut.

Ground absorption over soft, saturated tundra surfaces in the summer can provide additional attenuation of an estimated 1 to 3 dB over 2-mile distances, depending on frequency and on source and receiver height (Piercy et al. 1977). The analysis does not take into account this effect; actual summer sound levels at Nuiqsut are therefore likely somewhat lower than the values reported here. In winter, when frozen ground and snow cover form an acoustically hard surface, ground absorption is minimal and spherical spreading is a reasonable approximation for long-range propagation.

In addition to geometric spreading, meteorological conditions can influence sound propagation over long distances. Wind-induced refraction occurs when vertical gradients in wind speed cause sound waves to bend downward in the downwind direction, enhancing received noise levels at the ground. Under favorable downwind propagation conditions, this effect can increase noise levels by approximately 2 to 5 dB relative to neutral atmospheric conditions (Piercy et al. 1977). Conversely, ambient wind noise recorded at a community receptor can mask construction noise perceived by the listener, particularly during high-wind events. Field acoustic measurements on the North Slope have routinely shown wind noise to be the dominant ambient sound during windy conditions. While this masking does not change the physical sound levels of Project sources, it affects perceived audibility and is a relevant consideration for community noise assessment. A screening-level wind enhancement analysis was conducted for the CD8 Project using site-specific meteorological data; results are presented in Section 6.6 (Wind-Enhanced Noise Assessment).

5.2 Project Phases and Duration

Noise impacts are evaluated by Project phase because each phase has distinct acoustic characteristics, activity patterns, and durations. For the CD8 Project, noise was evaluated for three primary phases: construction, drilling, and operations.

Construction activities would occur during Years 1 to 2 and would include gravel pad construction, road development, pipeline installation, and associated infrastructure work. Most construction activities, including pipeline pile installation from ice pads, would occur during winter. Construction activities typically involve heavy equipment operation and material transport and generate intermittent but relatively high short-duration noise. Worker transport via ground vehicles and fixed-wing aircraft would also occur during this phase.

Drilling activities would occur during Years 2 to 7 and would include operation of the drill rig, mud pumps, and supporting equipment. Drill rig power would be predominantly supplied from the ACF, with on-site diesel generators used only for temporary backup during occasional ACF power interruptions. Drilling operates continuously and therefore represents the period with the greatest potential for sustained Project noise. Worker transit and periodic aircraft activity would continue throughout the drilling phase. Well-stimulation (fracking) operations, when they occur, would be conducted on a day-shift basis only and would consist of a small number of arctic-enclosed pump trailers; these would not be a sustained continuous noise source.

Operational activities would occur during Years 2 to 30 and would include routine production, maintenance activities, and periodic vehicle and aircraft traffic. Operational noise would generally be lower in intensity and more consistent than construction or drilling noise; helicopter and vehicle traffic during operations would decrease relative to earlier phases. The pumps that would inject produced water for reservoir pressure support would be located at CD1; water-injection pump noise, therefore, is not a CD8 source.

5.3 Source Sound Levels

Source sound levels used in this analysis were compiled from established and publicly available datasets that characterize typical noise emissions from construction equipment, oil and gas infrastructure, and aircraft operations.

Construction equipment sound levels (including general equipment, haul trucks, and vibratory pile driving) were obtained from the Federal Highway Administration (FHWA) Roadway Construction Noise Model (RCNM) database (FHWA 2006, 2011). For the primary D/S/S pile installation method used at CD8, the FHWA RCNM auger drill rig is used as a representative analog, yielding a source level of 84 dBA L_{max} at 50 feet (FHWA 2011). Applying the RCNM default acoustical usage factor of 20% for auger drilling yields an equivalent continuous source level of approximately 77 dBA L_{eq} at 50 feet. This value is consistent with published data for drilled displacement pile installation rigs, which have reported maximum sound levels as low as 70 dBA at 100 feet (approximately 76 dBA at 50 feet) on equipment equipped with modern sound-suppression technology (Morris-Shea Bridge Company 2024). The 77 dBA L_{eq} at 50 feet value is therefore used as the upper bound for D/S/S at CD8 in the absence of D/S/S monitoring data.

Sound levels for oil and gas drilling and production equipment were referenced from measurements reported in a BLM environmental analysis for oil and gas development in Sierra and Otero Counties, New Mexico (BLM 2003), and from published empirical measurements of land-based drilling rigs (BLM 2003; Radtke 2016; SLR Consulting 2011).

The drill rig source level is derived from measured source levels for conventional land drilling rigs, adjusted for the two features that distinguish the CD8 configuration from those rigs. Measurements of unmitigated land rigs agree closely, as follows:

- 83 dBA at 50 feet for well drilling (BLM 2003)

- 83 dBA at 50 feet equivalent from a measured overall sound power level of 118 dBA (SLR 2011)
- 82 dBA at 50 feet equivalent from 65 dBA L_{eq} at 117 yards (Radtke 2016, published in peer-reviewed form as Radtke et al. 2017)
- 80 dBA measured directly at 50 feet from an operating rig (Fort Worth, Texas, study summarized in Radtke 2016).

A baseline of 83 dBA at 50 feet was adopted for the CD8 Project analysis. From this baseline, 11 dB is deducted for the acoustic enclosure and 5 dB is deducted for ACF-supplied electrical power, yielding the 67 dBA at 50 feet applied in this analysis.

Both deductions use measured field data rather than the STC rating of the metal acoustic panels. STC is a laboratory single-number rating derived from the 125- to 4,000-hertz range and is not a reliable predictor of performance at the low frequencies that dominate drilling rig noise; SLR (2011) shows the 125-hertz octave band at 121 dBA, which is above the 118-dBA overall level. Measured field insertion losses for rig screening range from approximately 6 dB for perimeter sound walls (Radtke 2016) to approximately 10 dB for a 16-foot STC-25 acoustical blanket wall installed on one side of a rig (Fort Worth, Texas, study summarized in Radtke 2016). The 11-dB deduction applied here reflects the fully enclosing, higher-rated STC-35 treatment at CD8 (Wrobel 2026). The 5-dB power deduction rests on the identification of engine generators as the dominant noise source on diesel-powered rigs (Ibrahimi GavamAbadi et al. 2015; Radtke 2016). For comparison, the Fort Worth study measured 62 dBA at 120 feet outside a one-sided barrier, equivalent to approximately 70 dBA at 50 feet for a diesel-powered rig, and concluded that 71 and 63 dBA at 50 feet are achievable day and night with proper mitigation. The 67-dBA value falls within that range.

The Doyon 25 class rig planned for CD8 would be enclosed in insulated metal acoustic panels rated STC-35, with insulated air-intake and exhaust systems and a predominantly electric power supply (Wrobel 2026). This configuration is expected to be substantially quieter than conventional unenclosed diesel drilling rigs, for which typical overall source levels are in the order of 83 dBA at 50 feet (BLM 2003), consistent with values used in other drilling environmental analyses. The value of 67 dBA at 50 feet adopted in this report therefore corresponds specifically to the enclosed, predominantly electric rig configuration planned for the CD8 Project.

The BLM (2003) environmental analysis was conducted for oil and gas operations in Sierra and Otero Counties, New Mexico, and provides measured source levels for generic production equipment types (e.g., well drilling at 83 dBA at 50 feet, produced-water injection at 71 dBA at 50 feet) that are not specific to Arctic operating conditions. In this 2003 analysis, the BLM values serve two limited purposes:

1. As a baseline reference for conventional, unenclosed diesel drilling operations against which the CD8 enclosed-rig configuration can be compared
2. As the source level for produced-water injection equipment, which is a generic mechanical pump installation whose noise emission characteristics do not vary materially by geographic region

The produced-water injection source would be located at the ACF (7.8 miles from Nuiqsut), and its predicted contribution at Nuiqsut is negligible (approximately 19 dBA L_{dn}); even a substantial adjustment to this source level would not change the analysis conclusions. For the drill rig itself, the BLM (2003) unenclosed value of 83 dBA at 50 feet is not used as an input to the noise predictions; instead, the analysis adopts the enclosed-rig source level of 67 dBA at 50 feet derived earlier in this section from measured source levels for conventional land rigs (BLM 2003; Radtke 2016; SLR 2011). Accordingly, the modeling basis has been refined from the generic BLM (2003) reference to a source level

representative of the specific enclosure and power-supply configuration proposed for the Project, derived earlier in this section.

A secondary case was developed to estimate drill-rig noise during occasional periods when the ACF power supply is temporarily unavailable and on-site diesel generators supply rig power. In the absence of Project-specific measurements for this contingency condition, a conservative increase of 3 dB over the primary enclosed-rig source level was applied to represent the additional diesel generator noise, yielding 70 dBA at 50 feet. The backup unit is a single generator set rated at approximately 635 kilowatt, an order of magnitude smaller than the roughly 4.8 megawatts of diesel prime mover capacity installed on a conventionally powered rig of this class (Doyon 2024); a 3-dB increase is therefore conservative for this configuration. Backup generators themselves would be fully enclosed or acoustically packaged in accordance with the mitigation measure described in Section 6.8 (Noise Mitigation Measures) and would not appreciably increase the overall drillsite source level beyond the conservative 3 dB contingency applied here.

5.4 Regulatory Framework and Criteria

There are no Federal, State, or local noise ordinances that directly regulate environmental noise associated with construction or operation of the CD8 Project. In the absence of enforceable standards, this analysis uses the EPA's recommended outdoor noise guideline of 55 dBA L_{dn} as the benchmark for evaluating potential community noise impacts (EPA 1974). This threshold corresponds to approximately 48.6 dBA L_{eq} for a noise source operating continuously over a 24-hour period. At or below this level, adverse effects such as sleep disturbance, speech interference, and general annoyance are unlikely.

Because some Project activities, including drilling, may operate continuously during both daytime and nighttime hours, L_{dn} provides an appropriate metric for evaluating sustained community noise exposure. For intermittent or daytime-only sources, such as construction equipment and aircraft, L_{eq} values are also reported to better represent the actual acoustic conditions during those activities. Both metrics are presented in the impact analysis (Section 6 [Project Noise Impacts]) to facilitate comparison with the EPA guideline of 55 dBA L_{dn} and the measured ambient sound level of 35 dBA.

6 PROJECT NOISE IMPACTS

This section evaluates potential noise impacts associated with construction, drilling, and operational activities for the CD8 Project. Because each phase involves different equipment types, activity patterns, and durations, the resulting noise characteristics vary over the life of the Project. The following subsections describe predicted sound levels at Nuiqsut for each phase and compare them to the ambient sound level of 35 dBA and the EPA guideline of 55 dBA L_{dn} . Table 5 summarizes all predicted sound levels without considering wind effects; Table 6 provides estimates considering wind-enhanced noise propagation.

6.1 Construction Noise (Years 1–2)

Construction would generate temporary and intermittent noise from pile installation, heavy equipment (bulldozers, graders, scrapers, loaders), haul trucks, and pipeline installation equipment. Pile installation is the most acoustically significant construction activity. Because CD8 would use D/S/S as the primary pile installation method for the pad, pipeline alignment, and bridge piers, and vibratory installation only as a secondary method in limited situations (see Section 2.2 [Project Description] and Table 1), noise levels are evaluated for two construction scenarios:

- Primary construction scenario: D/S/S pile installation combined with general construction equipment and haul trucks. This represents the typical, day-to-day construction conditions that would prevail during most of the pile installation schedule.
- Secondary (bounding) scenario: vibratory pile installation combined with general construction equipment and haul trucks. Because vibratory installation is the loudest construction source analyzed, this scenario conservatively bounds the maximum noise condition during the limited periods when vibratory installation is in use.

At the 2.1-mile distance to Nuiqsut, D/S/S pile installation (primary method) is predicted to generate approximately 30.1 dBA L_{eq} (36.5 dBA L_{dn}), based on a source level of 77 dBA L_{eq} at 50 feet. This level would be below the measured ambient level of 35 dBA and well below the EPA guideline of 55 dBA L_{dn} . Vibratory pile installation (secondary method) is predicted to generate approximately 47.5 dBA L_{eq} (53.9 dBA L_{dn}), based on a source level of 94.5 dBA L_{eq} at 50 feet. This would exceed the ambient level of 35 dBA by approximately 12.5 dBA, a change that would be perceived as more than a doubling of loudness but remains below the EPA guideline of 55 dBA L_{dn} . General construction equipment would generate approximately 46.4 dBA L_{dn} , and haul trucks would generate approximately 36.1 dBA L_{dn} .

When construction sources are combined logarithmically to represent periods when multiple activities could occur simultaneously, the combined construction sound level would be approximately 47.2 dBA L_{dn} under the primary scenario (D/S/S), substantially below the EPA guideline of 55 dBA L_{dn} . Under the secondary (bounding) scenario, where vibratory installation replaces D/S/S, the combined construction level would be approximately 54.7 dBA L_{dn} , still below but approaching the EPA guideline. This bounding combined estimate conservatively assumes all construction sources operate simultaneously and continuously over a 24-hour period, which overstates actual conditions since pile installation occurs only during discrete work windows and would not run concurrently with all other equipment at all times.

D/S/S noise would attenuate to ambient levels (35 dBA) at approximately 1.2 miles from the source; vibratory pile driving would attenuate to ambient at approximately 8.9 miles; general equipment noise would reach ambient at approximately 3.7 miles. Construction noise during the limited periods when vibratory installation would be in use would be perceptible well beyond the immediate work area, though sound levels at Nuiqsut would remain below levels associated with adverse community noise impacts. Construction noise would be limited to Years 1 and 2, would occur only during active work periods (predominantly during winter), and would diminish once pile installation and heavy equipment operations cease.

Table 5. Project Noise Levels

Project Phase	Noise Source	Duration	Distance to Nuiqsut (miles)	Source Level* (dBA)	Predicted L_{eq} (dBA) at Nuiqsut	Estimated L_{dn} (dBA) [†] at Nuiqsut	Distance at Which Noise Attenuates to 35 dBA (miles) [‡]
Construction	D/S/S pile installation (primary)	Years 1–2, winter only	2.1	77 L_{eq} at 50 feet [§]	30.1	36.5	1.2
Construction	Vibratory pile installation (secondary; limited use)	Years 1–2, winter only	2.1	94.5 L_{eq} at 50 feet [§]	47.5	53.9	8.9
Construction	General equipment	Years 1–2	2.1	87 L_{eq} at 50 feet [§]	40.0	46.4	3.7
Construction	Haul trucks	Years 1–2	2.1	76 L_{max} at 50 feet [§]	29.7	36.1	1.0
Construction	Combined (primary: D/S/S + general equipment + trucks) [¶]	Years 1–2	2.1	–	40.8	47.2	4.3
Construction	Combined (secondary: vibratory + gen eq + trucks) [¶]	Years 1–2 (limited)	2.1	–	48.3	54.7	9.7
Drilling	Drill rig, ACF-powered (primary)	Years 2–7	2.1	67 at 50 feet [#]	20.1	26.5	0.4
Drilling	Drill rig, on-site backup power (secondary)	Years 2–7 (occasional)	2.1	70 at 50 feet [#]	23.1	29.5	0.5
Operations	All steady-state equipment (combined) ^{††}	Years 2–30	2.1	–	29.8	36.1	1.0
All	Truck traffic	All years	2.1	77 L_{max} at 50 feet [§]	29.7	36.1	1.0
Construction	Fixed-wing aircraft	Years 1–2	8.0	69–81 at 1,000 feet ^{§§}	Up to 39	– ^{¶¶}	– ^{¶¶}
All	Helicopter	All years	2.1	70–80 at 1,000 feet ^{§§}	Up to 59	– ^{¶¶}	33.7

* All predicted levels are calculated using spherical spreading attenuation (6 dB per doubling of distance) from the source level at the reference distance. Calculations do not account for ground absorption, atmospheric attenuation, topographic shielding, or barriers; predictions are therefore conservative (worst-case) estimates.

[†] L_{dn} values for continuous sources are calculated as $L_{eq} + 6.4$ dBA, reflecting the 10-dB nighttime penalty applied over a 24-hour period for sources assumed to operate continuously.

[‡] Ambient sound level of 35 dBA is based on median measured L_{eq} levels near Nuiqsut (Stinchcomb 2017). Attenuation distances in this column are calculated using this L_{eq} -based ambient level and are not directly comparable to the L_{dn} values in the preceding column, which include a 6.4 dB adjustment for the 24-hour day-night averaging period.

[§] Data from FHWA's RCNM database (FHWA 2011). Construction equipment source levels represent typical L_{eq} values from RCNM; haul truck values represent L_{max} .

[¶] Combined construction levels calculated by logarithmic addition. The primary scenario uses D/S/S (77 dBA L_{eq} at 50 feet) for pile installation; the secondary scenario uses vibratory (94.5 dBA L_{eq} at 50 feet). Combined values conservatively assume all sources operate simultaneously and continuously; in practice, pile installation would occur only during discrete work windows.

[#] Drill rig source level (primary) derived in Section 5.3 (Source Sound Levels) from measured source levels for conventional land drilling rigs (BLM 2003; Radtke 2016; SLR 2011) minus 11 dB for the field insertion loss of the STC-35 acoustic enclosure and minus 5 dB for ACF-supplied electrical power in place of on-site diesel prime movers. Secondary value for on-site backup power is based on a +3-dB adjustment for supplementary on-site diesel generation.

^{††} Combined operational level calculated by logarithmic addition of individual steady-state sources (truck traffic and tie-in pad equipment). Does not include intermittent sources (aircraft). Produced-water injection noise is excluded because the pumps are located at the ACF and are part of the existing facility infrastructure, not a new CD8 source.

^{§§} Fixed-wing aircraft noise at Nuiqsut is based on the Willow EIS (BLM 2023:Table 3.6.3), which reports up to 39 dBA for comparable aircraft types with flight paths approximately 8 miles from the community. The 69–81 dBA values represent noise levels directly beneath the flight path at 1,000 feet altitude, not a horizontal reference distance. Helicopter noise is estimated at the CD8 drillsite (2.1 miles from Nuiqsut) using spherical spreading from the 1,000-foot overhead level; this is conservative because atmospheric absorption is not included.

^{¶¶} L_{dn} is not reported for aircraft because these sources are intermittent and short-duration events. L_{dn} represents a 24-hour average and is not a meaningful descriptor for infrequent noise events. The L_{eq} values shown represent the predicted peak sound level during an individual event, not a sustained condition.

6.2 Drilling Noise (Years 2–7)

Drilling would generate continuous, 24-hour noise from the drill rig, mud pumps, and associated support equipment. Because drilling occurs around the clock, this phase represents the highest sustained noise contribution from the Project. The drill rig planned for CD8 is a modern enclosed North Slope rig of the Doyon 25 class (or equivalent), which uses STC-35 insulated metal acoustic panels and insulated intake and exhaust systems (Wrobel 2026). Drill rig power would be supplied predominantly from the ACF.

Under the primary power configuration (ACF-supplied electrical power) and based on the derived source level of 67 dBA at 50 feet for the enclosed, predominantly electric Doyon 25 class rig (see Section 5.3 [Source Sound Levels]), drill rig noise would attenuate to approximately 20.1 dBA L_{eq} at Nuiqsut. The corresponding L_{dn} is approximately 26.5 dBA, reflecting the 10-dB nighttime penalty applied to this continuous source. This would be below the EPA guideline of 55 dBA L_{dn} and the ambient level of 35 dBA L_{eq} . Drilling noise under the primary configuration would attenuate to the ambient level at approximately 0.4 mile from the source. This attenuation distance is sensitive to the derived source level; if no credit were taken for the acoustic enclosure or the ACF power supply, drilling noise would remain above the 35-dBA ambient level to approximately 2.4 miles and would be faintly audible at Nuiqsut, although it would remain well below the EPA guideline (see Section 5.3 [Source Sound Levels]).

During occasional temporary interruptions in ACF-supplied power, on-site diesel generators would supply rig power. Under this backup configuration, drill rig noise at Nuiqsut is predicted to increase to approximately 23.1 dBA L_{eq} (29.5 dBA L_{dn}). This would be below the EPA guideline of 55 dBA L_{dn} and the ambient level of 35 dBA L_{eq} . Backup power periods would be limited in duration and frequency. Drilling would continue for approximately 5 years (Years 2–7), overlapping early production operations. Once drilling is complete, this noise source would cease entirely.

6.3 Operational Noise (Years 2–30)

Operational noise sources at CD8 would include minor tie-in pad equipment (small pumps, metering units), routine vehicle traffic, and pipeline infrastructure. Produced-water injection pumps are located at the ACF (approximately 7.8 miles from Nuiqsut) and are not a CD8 noise source; water-injection pumping noise at Nuiqsut attributable to CD8 operations is therefore negligible. Pump jacks are not used on the North Slope and are not part of the CD8 facility design.

Tie-in pad equipment at CD4N would produce levels far below those that would influence community sound conditions at Nuiqsut. Pipeline systems produce negligible operational noise. Routine truck traffic would attenuate to approximately 36.1 dBA L_{dn} at Nuiqsut.

When combined logarithmically, all steady-state operational sources attributable to CD8 would produce an aggregate level of approximately 36.1 dBA L_{dn} in Nuiqsut, which is essentially at existing ambient conditions and well below the EPA threshold. Operational noise would persist for the life of the Project but at levels substantially lower than drilling noise and unlikely to be distinguishable from the existing sound environment.

6.4 Aircraft Noise (All Years)

Fixed-wing aircraft supporting Project construction would use the Alpine airstrip, which is approximately 8 miles from Nuiqsut. These aircraft produce noise levels of 69 to 81 dBA directly beneath the flight path at an altitude of 1,000 feet (BLM 2023:Table 3.6.3 footnote d). Typical flight paths between Alpine and the Project area would pass approximately 8 miles from Nuiqsut. The Willow EIS (BLM 2023) predicts

that aircraft noise at Nuiqsut from flights at this distance would be up to 39 dBA. This value is adopted here as the best available estimate of fixed-wing aircraft noise at Nuiqsut, since the same airstrip, aircraft types, and flight paths would serve the CD8 Project. At 39 dBA, fixed-wing aircraft noise during individual events would be near the ambient level of 35 dBA and well below the EPA guideline.

Helicopter operations at the CD8 drillsite (2.1 miles from Nuiqsut) could generate up to 59 dBA during individual events, based on a maximum overflight level of 70 to 80 dBA directly beneath the aircraft at 1,000 feet altitude (BLM 2023) and spherical spreading attenuation to the 2.1-mile distance. This estimate does not account for atmospheric absorption, which would further reduce the received level, and represents the instantaneous peak during an individual event rather than a sustained condition. Helicopter use would be limited to emergency response and periodic monitoring. Flights would not occur over the community.

Aircraft events are intermittent and short in duration. L_{dn} is not a meaningful metric for infrequent noise events because a single brief overflight has a negligible effect on a 24-hour average. The sound levels reported here represent the peak predicted level during an individual event, not a sustained condition. Fixed-wing aircraft events at Nuiqsut would be near ambient levels. Individual helicopter events may briefly exceed the ambient level, but these events would be infrequent and would not contribute to sustained community noise exposure. Aircraft noise would not meaningfully alter the long-term acoustic environment at Nuiqsut.

6.5 Combined Project Noise

The CD8 Project phases are not isolated in time. Construction (Years 1–2), drilling (Years 2–7), and operations (Years 2–30) overlap during certain periods, meaning multiple noise sources could contribute to the acoustic environment simultaneously. However, not all construction sources would operate concurrently with drilling. In particular, gravel pad construction, including heavy haul truck traffic and compaction equipment, would be completed and the pad surface seasoned before the drill rig is mobilized to the pad.

Consequently, the general construction equipment and haul truck sources evaluated in Section 6.1 (Construction Noise [Years 1–2]) and Table 5 would not temporally overlap drill rig operations. The only construction activity that could potentially coincide with early drilling is pile installation along the pipeline alignment or at bridge locations, where work may continue after the rig is mobilized to the completed pad. Three combined-overlap scenarios are therefore evaluated to bracket the range of possible conditions during Year 2; Scenarios A and B include only pile installation noise (not general equipment or haul trucks) combined with the drill rig, reflecting the actual sequencing of construction activities:

- Scenario A: less likely, but higher-impact overlap (bounding): assumes vibratory pile installation (secondary method) coincides in time with continuous drilling. General construction equipment and haul trucks are excluded because gravel pad construction would be complete before rig mobilization. This represents an upper-bound condition evaluated to provide defensible disclosure of maximum potential noise, even though Project scheduling is expected to avoid this overlap.
- Scenario B: assumes D/S/S pile installation (primary method) coincides in time with continuous drilling. As with Scenario A, general construction equipment and haul trucks are excluded because pad construction would be complete before rig mobilization. This scenario represents the most likely overlap condition if pipeline pile installation is still under way when drilling begins.
- Scenario C: sequenced construction and drilling (expected schedule): all pile installation on the pad and along the pipeline is completed before drilling begins, and pad construction (gravel

hauling, compaction) is completed and the pad seasoned before rig mobilization. Under this schedule, no construction sources overlap with drilling, and combined noise is dominated by drilling plus steady-state operations.

Under Scenario A, logarithmic addition of vibratory pile installation (53.9 dBA L_{dn}) and the ACF-powered drill rig (26.5 dBA L_{dn}) yields approximately 53.9 dBA L_{dn} , which complies with the EPA guideline of 55 dBA L_{dn} . This estimate conservatively assumes vibratory pile driving operates continuously over a 24-hour period, which is unlikely because pile driving occurs only during discrete work windows rather than around the clock. In practice, actual sound levels during any such overlap would be lower than predicted because pile driving would be intermittent. This potential overlap condition would be temporary and restricted to 1 to 2 weeks on the CD8 pad when vibratory installation could be used.

Under Scenario B, the logarithmic addition of D/S/S pile installation (36.5 dBA L_{dn}) and the ACF-powered drill rig (26.5 dBA L_{dn}) would result in approximately 36.9 dBA L_{dn} , which would comply with the EPA guideline of 55 dBA L_{dn} . This estimate conservatively assumes D/S/S pile driving operates continuously over a 24-hour period, which is unlikely because pile driving occurs only during discrete work windows rather than around the clock. In practice, actual sound levels during any such overlap would be lower than predicted because pile driving would be intermittent.

Under Scenario C, the logarithmic addition of the ACF-powered drill rig with aggregate CD8 steady-state operational equipment would result in a combined sound level of approximately 36.5 dBA L_{dn} at Nuiqsut. This combined level would be below the EPA threshold of 55 dBA L_{dn} . Under the drill rig backup power secondary scenario, the combined drilling plus operations level would be approximately 37.0 dBA L_{dn} , remaining below the EPA guideline.

Additional noise sources may occur during each Project phase, including support equipment, ancillary vehicle use, and intermittent maintenance activities. These sources are not individually modeled but would be relatively minor compared to the dominant contributors evaluated and would be unlikely to produce noticeable additive impacts beyond the levels already described.

6.6 Wind-Enhanced Noise Assessment

The noise predictions in Sections 6.1 (Construction Noise [Years 1–2]) through 6.5 (Combined Project Noise) assume neutral atmospheric conditions and do not account for the effect of wind on sound propagation. Wind can either enhance or reduce noise levels at a distant receiver depending on direction and atmospheric stability. When wind blows from the source toward the receiver (downwind propagation), vertical wind speed gradients refract sound waves downward, increasing received noise levels by approximately 2 to 5 dB relative to neutral conditions (Piercy et al. 1977). On the flat, open terrain of the North Slope, where topographic shielding is absent and frozen ground surfaces are acoustically reflective for much of the year, this downwind enhancement can be particularly pronounced. Conversely, wind noise at the receiver can mask industrial noise during high-wind events, reducing perceived audibility even when physical sound levels are elevated. While this masking effect is not quantified in this analysis, it is a relevant consideration for community noise assessment.

To evaluate the potential magnitude of wind-related enhancement, the CONCAWE noise propagation methodology (Manning 1981) was applied to hourly meteorological data collected at the Nuiqsut monitoring station from 2020 through 2024 (CPAI 2026). The dataset includes approximately 39,600 valid hourly observations of wind speed and direction. Wind data confirm that the prevailing wind direction is from the ENE (Figure 2), with the ENE sector accounting for approximately 19% of all non-calm hours and adjacent east (E) and northeast (NE) sectors contributing an additional 12% and 10%,

respectively. Mean wind speed is approximately 4.7 meters per second, and calm conditions occur less than 2% of the time. The Alternative B drillsite bearing of approximately 66° closely aligns with this dominant wind direction, meaning downwind propagation from the drillsite toward Nuiqsut occurs frequently.

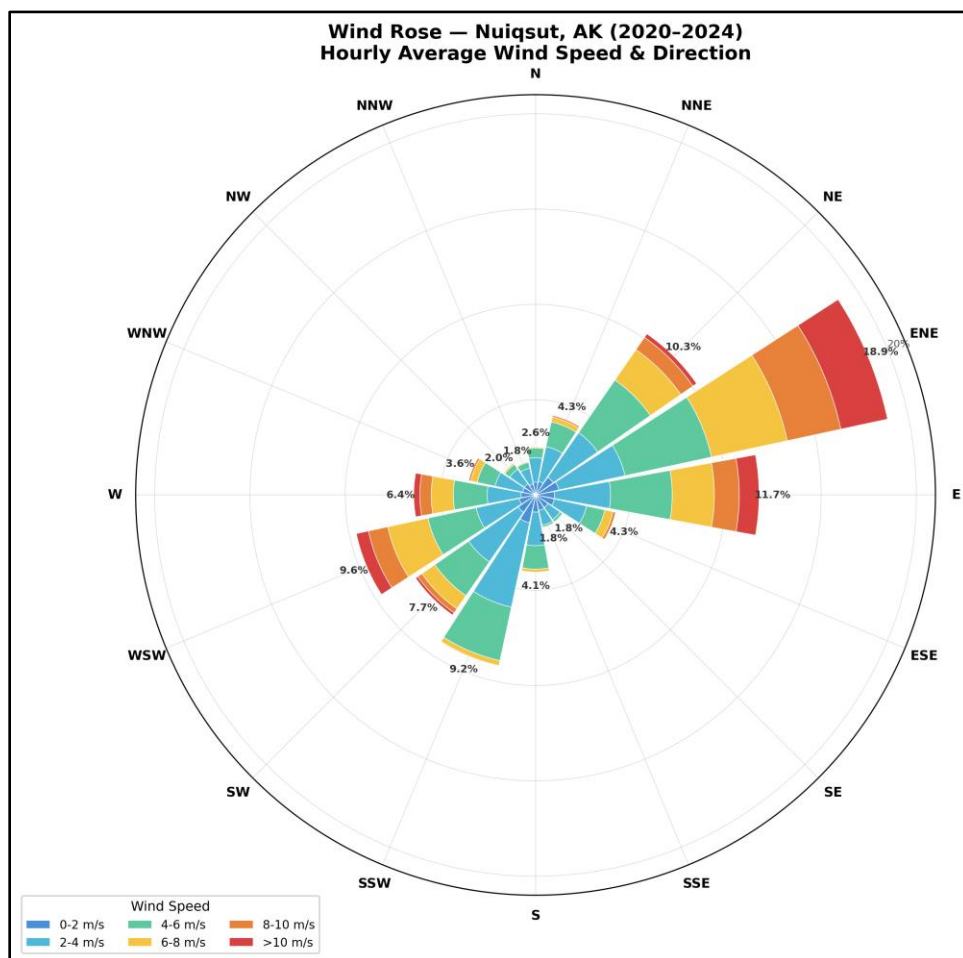


Figure 2. Wind rose for the Nuiqsut monitoring station, 2020–2024.

The CONCAWE model classifies each hourly observation into one of six meteorological categories based on Pasquill atmospheric stability class and the vector wind speed along the source-to-receiver bearing. Categories 1 through 3 reduce noise levels (upwind or unstable conditions), Category 4 is neutral, and Categories 5 and 6 enhance noise levels (downwind and/or stable conditions), with broadband corrections of approximately +2 dB and +3 dB, respectively. Pasquill stability classes were assigned using solar radiation data (daytime) and the measured temperature gradient between 2 and 10 meters (nighttime).

For the Alternative B bearing, enhanced propagation conditions (Categories 5 and 6) occur approximately 52% of the time, driven primarily by the combination of neutral atmospheric stability and strong downwind winds along the ENE bearing. Neutral conditions (Category 4) occur approximately 9% of the time, and attenuating conditions (Categories 1 through 3) account for approximately 39%. Enhanced conditions are most frequent during summer (approximately 63% of hours), coinciding with peak subsistence use, and somewhat less frequent during winter (approximately 46%), when most construction activities would occur.

Two summary metrics were computed from the hourly classifications. An energy-weighted long-term average across all meteorological conditions yields a net enhancement of approximately +1 dB. An energy-weighted average for the 52% of hours classified as Categories 5 and 6 (downwind conditions) yields an enhancement of approximately +2.8 dB. Table 6 applies these corrections to the neutral-condition predictions from Table 5. Values exceeding the EPA guideline of 55 dBA L_{dn} are shown in bold.

Table 6. Wind-Enhanced Noise Levels at Nuiqsut for Alternative B

Project Phase	Noise Source	Neutral L_{dn} (dBA)	Long-Term Avg L_{dn} (dBA)*	Downwind L_{dn} (dBA)†
Construction	D/S/S pile installation (primary)	36.5	37.5	39.3
Construction	Vibratory pile installation (secondary)	53.9	54.9	56.7
Construction	General equipment	46.4	47.4	49.2
Construction	Haul trucks	36.1	37.1	38.9
Construction	Combined - primary scenario (D/S/S)	47.2	48.2	50.0
Construction	Combined - secondary scenario (vibratory)	54.7	55.7	57.5
Drilling	Drill rig - ACF power (primary)	26.5	27.5	29.3
Drilling	Drill rig - on-site backup power (secondary)	29.5	30.5	32.3
Operations	Combined steady-state equipment	36.1	37.1	38.9
Construction + Drilling	Scenario A: Drilling + vibratory construction (less likely, higher-impact overlap)	53.9	54.9	56.7
Construction + Drilling	Scenario B: Drilling + D/S/S pile installation (primary overlap)	36.9	37.9	39.7
Drilling + Operations	Scenario C: Drilling + operations (expected sequenced schedule)	36.5	37.5	39.3

Note: Bold values exceed the EPA guideline of 55 dBA L_{dn} .

* Energy-weighted average across all CONCAWE meteorological categories (1–6) over the 5-year period of record (2020–2024). Represents the net meteorological effect including both enhanced (downwind) and attenuated (upwind) conditions.

† Energy-weighted average for CONCAWE Categories 5 and 6 (downwind propagation conditions), which occur approximately 52% of the time at the Alternative B bearing.

Under the primary construction scenario (D/S/S), combined construction noise would remain below the EPA guideline under all meteorological conditions, reaching at most 50.0 dBA L_{dn} under downwind conditions. Under the secondary (vibratory) scenario, combined construction noise would exceed the guideline under both downwind (57.5 dBA L_{dn}) and long-term average (55.7 dBA L_{dn}) conditions, and vibratory installation alone would reach 56.7 dBA L_{dn} under downwind conditions. Because vibratory installation is limited to approximately 1 to 2 weeks on the CD8 pad, these exceedances would be brief.

Drill rig noise under all meteorological conditions would remain well below the EPA guideline, reaching approximately 29.3 dBA L_{dn} (ACF power, downwind) or 32.3 dBA L_{dn} (backup power, downwind). Combined operational noise under downwind conditions would be approximately 38.9 dBA L_{dn} .

For the three combined scenarios under downwind conditions: Scenario A (vibratory plus drilling) would reach 56.7 dBA L_{dn} , exceeding the guideline; Scenario B (D/S/S plus drilling) would reach 39.7 dBA L_{dn} ; and Scenario C (expected sequenced schedule) would reach 39.3 dBA L_{dn} . During the remaining 48% of hours when winds are crosswind, upwind, or calm, noise levels would be at or below the neutral-condition predictions in Table 5.

Although downwind enhancement is most frequent during summer (63% of hours, coinciding with peak subsistence use), the vibratory construction activities that drive the only predicted exceedances would occur primarily during winter, when downwind conditions are less frequent (46%) and wind-generated ambient noise tends to mask industrial sound at the receiver. The analysis does not account for more complex atmospheric phenomena such as surface-based inversions or ducting, which may occur intermittently in Arctic environments.

6.7 Alternatives C and D

The noise impact analysis presented in the preceding sections evaluates Alternative B (Applicant's Preferred Alternative), which would be the closest drillsite to Nuiqsut and the most closely aligned with the dominant wind direction. Alternatives C and D would locate the drillsite at greater distances from Nuiqsut and along bearings that diverge more substantially from the prevailing ENE wind. Both factors would result in lower predicted noise levels at Nuiqsut compared with Alternative B.

Alternative C (Northern Alternative) would place the drillsite approximately 3.1 miles NE of Nuiqsut (bearing approximately 37 degrees from the north [N]), roughly 1 mile farther from the community than Alternative B. At this increased distance, geometric spreading alone would reduce predicted sound levels by approximately 3.4 dB relative to the Alternative B predictions at 2.1 miles. The NE bearing also diverges from the core of the dominant ENE wind regime.

Analysis of the meteorological record indicates that the Alternative C drillsite is within the downwind arc approximately 38% of the time, compared to 52% for Alternative B. Alternative C would therefore produce lower noise levels at Nuiqsut under both neutral and wind-enhanced conditions, and would be less likely to approach the EPA guideline of 55 dBA L_{dn} .

Alternative D (Northwestern Alternative) would place the drillsite approximately 2.5 miles NNE of Nuiqsut (bearing approximately 17 degrees from the N). At this increased distance, geometric spreading alone would reduce predicted sound levels by approximately 1.5 dB relative to the Alternative B predictions at 2.1 miles. The NNE bearing diverges substantially from the dominant ENE wind direction. Meteorological analysis shows that the Alternative D drillsite is within the downwind arc approximately 23% of the time, the lowest of the three alternatives and roughly half the frequency of Alternative B. Although Alternative D is only 0.4 mile farther from Nuiqsut than Alternative B, the substantially reduced downwind frequency indicates that wind-enhanced noise propagation would be far less frequent under this alternative. Noise levels at Nuiqsut under Alternative D would be lower than those predicted for Alternative B during all Project phases.

In summary, Alternative B would produce the loudest noise levels at Nuiqsut due to its proximity (2.1 miles) and close alignment with the prevailing ENE wind direction. Alternatives C and D are both farther from Nuiqsut and substantially less aligned with the dominant wind path, and would therefore produce lower noise levels at the community under all meteorological conditions. The noise impact predictions for Alternative B, including the wind-enhanced estimates, represent a conservative upper bound for all action alternatives.

6.8 Noise Mitigation Measures

The CD8 Project incorporates several design features that are integral to the proposed facility configuration and are reflected in the noise source levels used throughout this analysis. These are not mitigation measures applied after the fact; they are committed elements of the Project design that define the acoustic baseline evaluated in this report:

- Enclosed drill rig. The rig planned for CD8 is a modern enclosed North Slope rig (Doyon 25 class) with STC-35 insulated metal acoustic panels and insulated intake and exhaust systems (Doyon Drilling, Inc. 2024). This enclosure substantially reduces source-area noise compared with conventional unenclosed rigs.
- Electric power from ACF. Drill rig power would be supplied predominantly from the ACF, with on-site diesel generation used only for temporary backup. This reduces the duration and frequency of on-site generator operation and keeps drill rig source noise at its lower primary value.
- D/S/S as primary pile installation method. Using drill, set, and slurry as the primary pile installation method for the pad, pipeline alignment, and bridge piers avoids the highest construction source level (vibratory installation) during most of the pile installation schedule.

In addition to these design features, the following mitigation measures could be applied to further reduce noise impacts, consistent with measures identified in Willow EIS Appendix I (BLM 2023):

- Use of totally enclosed or acoustically packaged backup generator sets. Any permanent backup electric power generator sets at the CD8 drillsite could be totally enclosed or acoustically packaged to abate noise. Because the main drill rig power source is the ACF, this measure would apply to the on-site backup generation configuration.
- Minimize helicopter traffic during caribou calving (May 20 to June 20). Helicopter use at the CD8 drillsite could be minimized during the May 20 to June 20 caribou calving period. This measure would address wildlife noise disturbance and also would reduce short-duration community noise events during the subsistence season.

7 SUMMARY

Under the expected Project schedule and equipment configuration, the CD8 Project would not produce sustained noise levels at Nuiqsut that exceed the EPA guideline of 55 dBA L_{dn} during any Project phase. The only predicted exceedances would occur under the secondary (vibratory) construction scenario during wind-enhanced conditions, when noise levels could reach approximately 57.5 dBA L_{dn} (combined) and 56.7 dBA L_{dn} (vibratory alone) under downwind propagation, and could reach 55.7 dBA L_{dn} under the long-term average. These exceedances would be limited to the approximately 1 to 2 weeks when vibratory pile installation is active on the CD8 pad and would not represent sustained community noise exposure. All drilling and operational sources remain well below the EPA guideline under all meteorological conditions.

During construction (Years 1–2), D/S/S pile installation (the primary method) would generate approximately 36.5 dBA L_{dn} at Nuiqsut, near ambient levels. Combined construction noise under the primary scenario would be approximately 47.2 dBA L_{dn} . Under the secondary vibratory scenario, combined construction noise would reach 54.7 dBA L_{dn} under neutral conditions, below the guideline, but would exceed it under wind-enhanced conditions as noted above. Construction noise would be temporary, intermittent, and limited to daytime work periods during Years 1 and 2.

During drilling (Years 2–7), the enclosed Doyon 25 class rig under ACF-supplied power would produce approximately 26.5 dBA L_{dn} at Nuiqsut, below the 35 dBA ambient level. Under backup power, drill rig noise would reach at most 32.3 dBA L_{dn} (downwind), still well below the guideline.

During operations (Years 2–30), combined steady-state equipment noise would be approximately 36.1 dBA L_{dn} , essentially at ambient conditions. Aircraft noise would be intermittent and brief, with fixed-wing events producing up to 39 dBA and helicopter events up to 59 dBA during individual overflights.

Three combined scenarios confirm that the expected construction-to-drilling sequence avoids significant noise overlap. Only Scenario A (vibratory plus drilling under downwind conditions) would approach the guideline at 56.7 dBA L_{dn} ; Scenarios B and C remain below 40 dBA L_{dn} under all conditions.

Alternatives C and D, would be located farther from Nuiqsut and would be less aligned with the prevailing ENE wind, thus would produce lower noise levels at Nuiqsut under all conditions. The predictions for Alternative B represent a conservative upper bound for all action alternatives.

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