

Appendix J

Noise Data

Noise Calculations for the NextEra Energy Transmission West's (NEET West's) proposed Suncrest Dynamic Reactive Power Support Project

Construction Equipment 1 (rock drill)	98 dBA at 50 feet
Construction Equipment 2 (scraper)	89 dBA at 50 feet

Combined Noise at 50 feet (Ltotal at 50 feet) 98.5 dBA
 $L_{total} = 10 \log(10^{L1/10} + 10^{L2/10})$

San Diego County Noise Threshold Limits and Distances from Project Site to those Limits for Construction Equipment

Noise Threshold	Threshold Level - Leq (dBA)	Threshold Level - Lmax	Distance to Leq Threshold from Middle of Project Site (feet)	Distance to Lmax Threshold from Middle of Project Site (feet)
Construction Daytime Limit (7 am-7pm)	75	75	749.4	749.4
Nighttime Limit (7pm -7am)	45		23,698.4	
Impulsive Daytime Limit	85		237.0	

Source: San Diego County Noise Ordinance, County Code Chapter 4, Noise Abatement and Control.

Nearest Sensitive Receptors and Distances from Middle of Nearest Project Site (SVC site)

Sensitive Receptor	Distance (feet)
Residence southeast of project site	3279
Nearest property line from project site	458
Nearest occupied property line from project site	856

Vibration Source Levels for Construction Equipment (FTA 2006)

Equipment	Peak Particle Velocity (PPV) at 25 feet	Lv/VBA (units of dB) at 25 feet	Vrms (root mean square)	
Impact Hammer (Hoe Ram)	0.089	87	0.0224	Vrms was calculated using: $L_v = 20 \log_{10}(v/v_{ref})$. Where L_v is the velocity level in decibels (VdB), v = rms velocity amplitude, and v_{ref} = reference velocity amplitude. The equation was solved for $v = v_{ref} * 10^{(L_v/20)}$ to determine the rms velocity for the proposed construction equipment.
	<i>RMS calculations</i>	41.0	0.00011	

Vibration Calculations with Equations for Vibration-Causing Equipment (use of impact hammer/hoeram)

Threshold	Distance to Threshold from Middle of Project Site (feet)	Notes
$PPV = PPV_{ref} * (25/d)^{1.5}$	20.5	Building damage threshold
$L_{vd} = L_{vref} - 30 \log(D/25)$	42.8	residential, human perception threshold

San Diego County Guidelines (2009), Table 4 thresholds were used.

$PPV = PPV_{ref} * (25/d)^{1.5}$
 where PPV (equip) is the peak particle velocity in inches/second of the equipment adjusted for distance
 PPV (ref) is the reference vibration level in inches/second at 25 feet from FTA 2006 reference Table 12-2.
 D is the distance from the equipment to the receiver.

$L_{vd} = L_{vref} - 30 \log(D/25)$
 Lvd is the vibration level at 25 feet and D is the distance from the equipment to the receiver.

Distance (feet) from Middle of Project Site to Sensitive Receptors	Noise level dBA	Noise Level Equation: Leq = EL50-20*log(D/50)
50	98.5	
100	92.5	
200	86.5	
300	83.0	
400	80.5	
456	79.3	Nearest property line
500	78.5	
750	75.0	
856	73.8	Nearest occupied property line
1000	72.5	
1250	70.6	
1500	69.0	
2000	66.5	
2500	64.5	
3000	63.0	
3279	62.2	Nearest residence
3500	61.6	
4000	60.5	
5000	58.5	

Blasting Noise Calculations

Construction Blasting	94 dBA at 50 feet	(FHWA 2009)
-----------------------	-------------------	-------------

San Diego County Noise Threshold Limits and Distances from Project Site to those Limits from Blasting

Noise Threshold	Threshold Level - Leq (dBA)	Threshold Level - Lmax	Distance to Leq Threshold from Middle of Project Site (feet)	Distance to Lmax Threshold from Middle of Project Site (feet)
Construction Daytime Limit (7 am-7pm)	75	75	445.6	445.6
Nighttime Limit (7pm -7am)	45		14,091.9	
Impulsive Daytime Limit	85		140.9	

Source: San Diego County Noise Ordinance, County Code Chapter 4, Noise Abatement and Control.

Vibration Source Levels for Blasting (FTA 2006)

Equipment	PPV at 50 feet	VBA at 50 feet	Vrms (root mean square)
Blasting	NA	100	
	<i>RMS calculations</i>	63.0	0.0014

Source: Blasting VBA at 50 feet is taken from the FTA (2006) manual's Figure 7-3.

Vibration Calculations with Equations for Vibration from blasting

Threshold	Distance to Threshold from Middle of Project Site (feet)	Notes
$PPV = PPV_{ref} * (50/d)^{1.5}$	NA	Building damage threshold
$L_{vd} = L_{vref} - 30 \log(D/50)$	232.1	residential, human perception threshold

Source: FTA (2006), 80 VdB threshold was used for Lvd.

Distance (feet) from Middle of Project Site to Sensitive Receptors	Noise level dBA	Noise Level Equation: Leq = EL50-20*log(D/50)
50	94.0	
100	88.0	
200	82.0	
250	80.0	
300	78.4	
400	75.9	
456	74.8	Nearest property line
500	74.0	
600	72.4	
750	70.5	
856	69.3	Nearest occupied property line
1500	64.5	
2000	62.0	
2500	60.0	
3000	58.4	
3279	57.7	Nearest residence
4000	55.9	

Operational Noise Calculations		
Operational Equipment 1 (HVAC)	87	dBa at 1 meter (3.28 feet)
Operational Equipment 2 (Transformer)	87	dBa at 1 meter (3.28 feet)

Combined Noise at 1 meter (Ltotal at 1 meter (3.28 feet)) 90.0 dBA
 $L_{total} = 10 \log(10^{L1/10} + 10^{L2/10})$

San Diego County Noise Threshold Limits and Distances from Project Site to those Limits for Operational Equipment

Noise Threshold	Threshold Level - Leq (dBA)	Threshold Level - Lmax	Distance to Leq Threshold from Middle of Project Site (feet)	Distance to Lmax Threshold from Middle of Project Site (feet)
Daytime Limit for Agricultural Areas (7 am-10pm)	50	75	328.4	18.5
Nighttime Limit (10pm -7am)	45		584.0	

Source: San Diego County Noise Ordinance, County Code Chapter 4, Noise Abatement and Control.

For CNEL calculations, the project's operational Leq of 30.0 dB at the nearest residence was combined with the existing ambient Leq of 49.8 dB, which resulted in an unchanged ambient Leq of 49.8 dB. Thus, assuming the equipment was operated continuously over a 24-hour period, the CNEL would be approximately 56 dB, as shown in the attachments.

Operational Noise		
Distance (feet) from Middle of Project Site to Sensitive Receptors	Noise level dBA	Noise Level Equation: Leq = EL3.28- 20*log(D/3.28)
50	66.3	
100	60.3	
200	54.3	
250	52.4	
300	50.8	
400	48.3	
456	47.1	Nearest property line
500	46.3	
600	44.8	
750	42.8	
856	41.7	Nearest occupied property line
1500	36.8	
2000	34.3	
2500	32.4	
3000	30.8	
3279	30.0	Nearest residence
4000	28.3	

NoiseMeters Inc.

[Home](#)
[Search](#)
[Contact](#)
[Applications](#)
[Products](#)
[Rental](#)
[Calibration](#)
[News](#)
[Resources](#)
[Help](#)
[Cart](#)


Tel. 888-206-4377

info@noisemeters.com
[Home](#) > [Applications](#) > Ldn Calculator

Ldn, Lden, CNEL - Community Noise Calculators

Ldn and Lden Calculator		
Start Time	Hourly Leq	Calculate
00:00	49.8 dB	Leq
01:00	49.8 dB	
02:00	49.8 dB	
03:00	49.8 dB	59.4 dB
04:00	49.8 dB	
05:00	49.8 dB	
06:00	49.8 dB	Ldn
07:00	49.8 dB	
08:00	49.8 dB	
09:00	62.2 dB	Lden
10:00	62.2 dB	
11:00	62.2 dB	
12:00	62.2 dB	60.8 dB
13:00	62.2 dB	
14:00	62.2 dB	
15:00	62.2 dB	60.9 dB
16:00	62.2 dB	
17:00	62.2 dB	
18:00	62.2 dB	
19:00	49.8 dB	
20:00	49.8 dB	
21:00	49.8 dB	
22:00	49.8 dB	
23:00	49.8 dB	

Rock Drill CNEL at Residence

Ldn and Lden Calculator

Calculation of the Ldn (day, night) and the Lden (day, evening, night) based on 1-hour Leq


[Calculators](#)

measurements.

Ldn - Day Night Average Sound Level

The Ldn is the average equivalent sound level over a 24 hour period, with a penalty added for noise during the nighttime hours of 22:00 to 07:00. During the nighttime period 10 dB is added to reflect the impact of the noise.

Ldn measurements are useful for assessing the impact that road, rail, air and general industry has on the local population.

The NoiseMeters Ldn calculator accepts hourly Leq measurements and calculates the Ldn accordingly.

Lden or CNEL

The Lden (Day Evening Night Sound Level) or CNEL (Community Noise Equivalent Level) is the average sound level over a 24 hour period, with a penalty of 5 dB added for the evening hours or 19:00 to 22:00, and a penalty of 10 dB added for the nighttime hours of 22:00 to 07:00.

It is very similar in nature (and in results) to the Ldn, but with the added penalty for the evening period.

Our Lden or CNEL calculator takes the hourly Leq measurements and calculates the Lden (which is the same as the CNEL).

[< Noise Applications](#)

[Home](#) - [Contact](#) - [Applications](#) - [Products](#) - [Rental](#) - [News](#) - [Resources](#) - [Search](#) - [Help](#)
[Sound Level Meters](#) - [Dosimeters](#) - [Noise Signs](#) - [Microphones & Calibrators](#)

Telephone 888-206-4377
info@noisemeters.com

NoiseMeters Inc.

- Home
- Contact
- Applications
- Products
- Rental
- Calibration
- News
- Resources
- Help
- Cart

Tel. 888-206-4377
info@noisemeters.com

[Home](#) > [Applications](#) > Ldn Calculator

Ldn, Lden, CNEL - Community Noise Calculators

Ldn and Lden Calculator

Start Time	Hourly Leq	<input type="button" value="Calculate"/>
00:00	49.8 dB ✔	Leq 55.3 dB
01:00	49.8 dB ✔	
02:00	49.8 dB ✔	
03:00	49.8 dB ✔	Ldn 58.2 dB
04:00	49.8 dB ✔	
05:00	49.8 dB ✔	
06:00	49.8 dB ✔	Lden 58.4 dB
07:00	57.7 dB ✔	
08:00	57.7 dB ✔	
09:00	57.7 dB ✔	
10:00	57.7 dB ✔	
11:00	57.7 dB ✔	
12:00	57.7 dB ✔	
13:00	57.7 dB ✔	
14:00	57.7 dB ✔	Lden 58.4 dB
15:00	57.7 dB ✔	
16:00	57.7 dB ✔	
17:00	57.7 dB ✔	
18:00	57.7 dB ✔	
19:00	49.8 dB ✔	
20:00	49.8 dB ✔	
21:00	49.8 dB ✔	
22:00	49.8 dB ✔	Lden 58.4 dB
23:00	49.8 dB ✔	

Blasting-related Noise at Residence

Ldn and Lden Calculator

Calculation of the Ldn (day, night) and the Lden (day, evening, night) based on 1-hour Leq



Calculators

measurements.

Ldn - Day Night Average Sound Level

The Ldn is the average equivalent sound level over a 24 hour period, with a penalty added for noise during the nighttime hours of 22:00 to 07:00. During the nighttime period 10 dB is added to reflect the impact of the noise.

Ldn measurements are useful for assessing the impact that road, rail, air and general industry has on the local population.

The NoiseMeters Ldn calculator accepts hourly Leq measurements and calculates the Ldn accordingly.

Lden or CNEL

The Lden (Day Evening Night Sound Level) or CNEL (Community Noise Equivalent Level) is the average sound level over a 24 hour period, with a penalty of 5 dB added for the evening hours or 19:00 to 22:00, and a penalty of 10 dB added for the nighttime hours of 22:00 to 07:00.

It is very similar in nature (and in results) to the Ldn, but with the added penalty for the evening period.

Our Lden or CNEL calculator takes the hourly Leq measurements and calculates the Lden (which is the same as the CNEL).

[< Noise Applications](#)

[Home](#) - [Contact](#) - [Applications](#) - [Products](#) - [Rental](#) - [News](#) - [Resources](#) - [Search](#) - [Help](#)
[Sound Level Meters](#) - [Dosimeters](#) - [Noise Signs](#) - [Microphones & Calibrators](#)

Telephone 888-206-4377
info@noisemeters.com

Ldn, Lden, CNEL - Community Noise Calculators

Ldn and Lden Calculator

Start Time	Hourly Leq	Calculate
00:00	49.8 dB <input checked="" type="checkbox"/>	Leq 49.8 dB Ldn 56.2 dB Lden 56.5 dB
01:00	49.8 dB <input checked="" type="checkbox"/>	
02:00	49.8 dB <input checked="" type="checkbox"/>	
03:00	49.8 dB <input checked="" type="checkbox"/>	
04:00	49.8 dB <input checked="" type="checkbox"/>	
05:00	49.8 dB <input checked="" type="checkbox"/>	
06:00	49.8 dB <input checked="" type="checkbox"/>	
07:00	49.8 dB <input checked="" type="checkbox"/>	
08:00	49.8 dB <input checked="" type="checkbox"/>	
09:00	49.8 dB <input checked="" type="checkbox"/>	
10:00	49.8 dB <input checked="" type="checkbox"/>	
11:00	49.8 dB <input checked="" type="checkbox"/>	
12:00	49.8 dB <input checked="" type="checkbox"/>	
13:00	49.8 dB <input checked="" type="checkbox"/>	
14:00	49.8 dB <input checked="" type="checkbox"/>	
15:00	49.8 dB <input checked="" type="checkbox"/>	
16:00	49.8 dB <input checked="" type="checkbox"/>	
17:00	49.8 dB <input checked="" type="checkbox"/>	
18:00	49.8 dB <input checked="" type="checkbox"/>	
19:00	49.8 dB <input checked="" type="checkbox"/>	
20:00	49.8 dB <input checked="" type="checkbox"/>	
21:00	49.8 dB <input checked="" type="checkbox"/>	
22:00	49.8 dB <input checked="" type="checkbox"/>	
23:00	49.8 dB <input checked="" type="checkbox"/>	

Operation-related Noise at Residence

Ldn and Lden Calculator

Calculation of the Ldn (day, night) and the Lden (day, evening, night) based on 1-hour Leq measurements.



Calculators

Ldn - Day Night Average Sound Level

The Ldn is the average equivalent sound level over a 24 hour period, with a penalty added for noise during the nighttime hours of 22:00 to 07:00. During the nighttime period 10 dB is added to reflect the impact of the noise.

Ldn measurements are useful for assessing the impact that road, rail, air and general industry has on the local population.

The NoiseMeters Ldn calculator accepts hourly Leq measurements and calculates the Ldn accordingly.

Lden or CNEL

The Lden (Day Evening Night Sound Level) or CNEL (Community Noise Equivalent Level) is the average sound level over a 24 hour period, with a penalty of 5 dB added for the evening hours or 19:00 to 22:00, and a penalty of 10 dB added for the nighttime hours of 22:00 to 07:00.

It is very similar in nature (and in results) to the Ldn, but with the added penalty for the evening period.

Our Lden or CNEL calculator takes the hourly Leq measurements and calculates the Lden (which is the same as the CNEL).

< Noise Applications

[Home](#) - [Contact](#) - [Applications](#) - [Products](#) - [Rental](#) - [News](#) - [Resources](#) - [Search](#) - [Help](#)
[Sound Level Meters](#) - [Dosimeters](#) - [Noise Signs](#) - [Microphones & Calibrators](#)

Telephone 888-206-4377
info@noisemeters.com