



ENVIRONMENTAL NOISE SAFETY COMPLIANCE REPORT

September 7, 2021

Purpose of Report:

Soteria RF Safety Consultants has been contracted as an independent/third party consultant to provide an Environmental Noise Safety Compliance Report to determine if the proposed wireless site listed below complies with exterior noise limits for wireless communication facilities as per local/municipal/jurisdiction code(s). This report summarizes:

Front Page – Site Info / Compliance Statement	Section 3.0 – Calculation Methodology
Section 1.0 – Proposed Design	Section 4.0 – Results & Conclusions
Section 2.0 – Noise Standards & Guidelines	Section 5.0 – Recommended Mitigations

Wireless Site Info:

Carrier/Project: T-Mobile
Site ID: BA00209A/SF209 7655-7665
 REDWOOD B
Structure Type: ROOFTOP
Pole ID: n/a

Address: 7655 Redwood BLVD
 Novato, CA 94945

Latitude: 38.120059
Longitude: -122.568050

(Proposed Wireless Site – Photosim)

(Proposed Wireless Site Location – Google Maps)



Report Certification:

I have reviewed and approve of the following report and believe it to be true and accurate to the best of my knowledge.

Name: Wade M. Hojeij
Credential: Registered Professional Engineer
CA Registration No: E-16587
Expiration Date: 06/30/2022



COMPLIANCE STATEMENT

Based on location, proposed design, equipment type(s), and operational parameters given to Soteria RF Safety Consultants, along with accepted predictive acoustic modeling calculations and using worst-case scenario (operating 24x7x365/max power), the following wireless site:

BA00209A / SF209 7655-7665 REDWOOD B
WILL COMPLY

with the City of Novato Standards - Chapter 19.22.070.

No mitigation is required.

Section 1.0 – Proposed Design

The following proposed design equipment table is based upon construction drawings and radio frequency data sheet (RFDS) information received from the client.

Equipment Type	Manufacturer	Model Number	Qty	Reference Distance, Meters	Reference Distance, Feet	Equipment Noise Level (dBA)
Radio (equipment room cabinet)	Ericcson	RUS01 B2	3	n/a	n/a	0
Radio (roof)	Ericcson	4480	3	n/a	n/a	0
Antenna (roof)	RFS	APX16DWV-16DWV-S-W-A20	3	n/a	n/a	0
Antenna (roof)	RFS	APXVAALL24_43-U-NA20	3	n/a	n/a	0
Cabinet (equipment room)	RBS	6102 ODE	1	1	3.28	68

Section 2.0 – Noise Standards & Guidelines

Noise is measured in decibels (dB), which are units of sound energy intensity. Sound waves, traveling outward from a source, exert a sound pressure level measured in dB. The typical human ear is not equally sensitive to all frequencies of the audible sound spectrum. To account for this variation, the A-weighted scale is used. A-weighting is a method of frequency weighting to account for the variation in sensitivity of the human ear to the range of frequencies of the audible spectrum. A 3-dBA increase is the smallest change in noise level perceptible to the average person.

Many standards provide guidance on the measurement, prediction, and limits of the noise level. These standards are used by local jurisdictions (counties and cities) to create their own noise level limits for the general public exposure. The two most commonly referenced federal agencies that have applicable standards for occupational or general public settings are the National Institute for Occupational Safety and Health (NIOSH) and the Environmental Protection Agency (EPA), respectively. There are also other noise limit standards published by the American National Standards Institute (ANSI); International Organization for Standardization (ISO), and the Institute of Electrical and Electronics Engineers (IEEE). (For additional information, see Appendix B)

Section 2.1 – Local Jurisdiction Governing Standard:

Chapter 19.22.070 – Noise Standards.

- a. No person shall operate or cause to be operated any source of sound at any location within the city, or allow the creation of any noise on property owned, leased, occupied or otherwise controlled by such person which causes the noise level when measured on any receiving property to exceed the following noise level limits: **Residential 60 dBA from 6AM to 10PM and 45 dBA from 10PM-6AM.**

Section 3.0 – Calculation Methodology

The following calculation methodology was used to determine the day-night average sound level (DNL) which represents the average equivalent sound level over a 24-hour period, with a penalty added for noise during the night time 2000-0600 (10dB). During the night time period, 10dB penalty is added to reflect the impact of the noise. Equation (2) is used to calculate a known and/or measured noise level at various distances and Equation (3) is used to calculate a known and/or measured noise level from multiple sources.

Equation (1) – Day-Night Average Sound Level (DNL):

The following equation calculates the equivalent noise level for a 24-hour period.

$$\mathbf{DNL = 10 \log ((H_d(10^{L_d/10})/24 + H_n(10^{(L_n+10)/10})/24)}$$

Where: DNL is day-night average sound level

L_d is day noise level

L_n is night noise level

H_d is the hours of day

H_n is the hours of night

Equation (2) – Prediction of noise level based on a given or measured noise level

The following equation calculates the noise level at various distances based on a known and/or measured noise level.

$$\mathbf{L_c = L_g + 20 \log (D_g/D_n)}$$

Where: L_c is the calculated noise level based on measured or known

L_g is the measured or known noise level

D_n is the distance used to calculate new noise level

D_g is the measured or known distance for a known noise level

Equation (3) – Noise levels from multiple sources

The following equation calculates the noise level from multiple sources

$$\mathbf{L_T = 10 \log (10^{(L_1/10)} + 10^{(L_2/10)} + 10^{(L_3/10)} + \dots)}$$

Where: L_T is the total noise level

$L_1, L_2, L_3,$ are the individual noise levels from different sources

Section 4.0 – Results & Conclusion

- **Results** – Table 1 - Calculated Noise Level Limits and Applicable Limits represents the day-night average sound level (DNL) from the proposed equipment operating under “worst-case” scenario (max facility/operational utilization) and is derived by using the calculation methodology, described in Section 3.0, and incorporates other parameters such as the City’s noise regulations and equipment manufacturer specifications.

Table 1 – Calculated Noise Level Limits and Applicable Limits

Calculated Noise Level	Distance from the Source (feet)	Noise Level Limit in dBA using DNL formula	Compliant with City’s Noise Regulations
Proposed Design / Section 1.0. Roof equipment, i.e. radios and antennas	10	0 DNL	Yes
Proposed Design / Section 1.0. Equipment in the first floor room, with building wall noise attenuation of 25 dB applied. Noise calculated for someone standing outside equipment room	10	39.34 DNL	Yes
City’s Noise Level Limit	58.88 DNL		

- **Conclusion** – Based on the results provided in Table 1 the calculated noise levels for **Site ID: BA00209A, WILL COMPLY**, with the City of Novato Noise Standards – Chapter 19.22.070.

Section 5.0 – Recommended Mitigations

None Recommended.

Appendix B – Technical References:

- ANSI (American National Standards Institute). American National Standard: Acoustical Performance Criteria, Design Requirements, and Guidelines for Schools. ANSI/ASA S12.60-2002 (R2009). New York: ANSI.
- ANSI. 2005. American National Standard: Quantities and Procedures for Description and Measurement of Environmental Sound—Part 4: Noise Assessment and Prediction of Long-Term Community Response. ANSI S12.9-2005/Part 4. New York: ANSI.
- ANSI. 2007. American National Standard for the Computation of Loudness and Steady Sounds. ANSI S3.4-2007. New York: ANSI.
- ANSI. 2008. Methods for the Estimation of Awakenings Associated with Outdoor Noise Events Heard in Homes. American National Acoustical Society of America Standard S12.19-2008, Part 6. Melville, NY: Acoustical Society of America.
- EPA (U.S. Environmental Protection Agency). 1974. Information on Levels of Environmental Noise Requisite to Protect Health and Welfare with an Adequate Margin of Safety . Document 550/9-74-004.
- ISO (International Organization for Standardization). Acoustics—Methods for Calculating Loudness Level. ISO-532 Standard.
- ISO. 2003. Acoustics—Description, Measurement, and Assessment of Environmental Noise—Part 1: Basic Quantities and Assessment Procedures.
- U.S. DEPARTMENT OF HEALTH AND HUMAN SERVICES, Public Health Service Centers for Disease Control and Prevention National Institute for Occupational Safety and Health. June 1998