Solar Krafte – Strathmore Solar Project
Noise Impact Assessment

Final

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Executive Summary

Solar Krafte Utilities Inc. (Solar Krafte) is proposing to construct a solar photovoltaic (PV) power facility (the "Project") within the limits of Strathmore, Alberta. The Project has a gross generation capacity of approximately 40.5 megawatts (MW) alternating current and includes PV modules, inverters, medium voltage transformers, and one switchgear and control transfer station.

The Project is located within the LSD 12-24-25 W4M, in the southeast limits of Strathmore. Six potentially "most impacted" noise sensitive receptors were selected within 1.5 km of the Project fenceline.

The Noise Impact Assessment (NIA) assessed the noise effect for the Baseline Case, Project Case, and Application Case at six noise sensitive receptors (i.e. receptors). An acoustic model was used to determine the noise effect at the six receptors. The Base Case represents noise effect from the ambient sound level and existing Alberta Utilities Commission (AUC) or Alberta Energy Regulator (AER) regulated facilities. The Project Case represents the Project only noise effect. The Application Case combines the Base Case and Project Case results to determine the cumulative sound level at the receptors.

Results indicate that the Baseline Case and Project Case sound levels are less than the permissible sound level (PSL). In the Application Case, the cumulative sound level includes the contribution from the Project, the ambient sound level, and noise effects from existing regulated facilities. The predicted cumulative sound levels are compared to the AUC Rule 012 PSL limits at the twenty-eight receptors to assess compliance. The key findings of the study are:

- The predicted cumulative sound levels at all six receptors are below the daytime and nighttime PSLs; and
- Low frequency noise (LFN) effects are not expected at all six receptors.

Therefore, this assessment concludes that the Project noise level meets the AUC Rule 012 requirements.

Abbreviations

AADT	Annual Average Daily Traffic Volume
AC	Alternating Current
AER	Alberta Energy Regulator
APEGA	Association of Professional Engineers and Geoscientists of Alberta
ASL	Ambient Sound Level
AUC	Alberta Utilities Commission
BSL	Basic Sound Level
°C	Degree Celsius
CAA	Canadian Acoustic Association
dB	Linear Decibel
dBA	A-Weighted Decibel
dBC	C-Weighted Decibel
DC	Direct Current
G	Ground Absorption Factor
Hz	Hertz
INCE	Institute of Noise Control Engineers of the USA
ISO	International Organization for Standardization
LFN	Low Frequency Noise
L_{eq}	Energy Equivalent Sound Level
LSD	Legal Subdivisions

km	kilometre
m	metre
MW	Megawatt
NIA	Noise Impact Assessment
PSL	Permissible Sound Level
PWL	Sound Power Level re 10^{-12} Watt
PV	Photovoltaic
Rule 012	AUC Rule 012, *Noise Control*
SPL	Sound Pressure Level re 20 µPa
UTM	Universal Transverse Mercator

Glossary

Ambient Noise	All noises that exist in an area and are not related to a facility. Ambient noise includes sound from other industrial noise not being measured, transportation sources, animals, and nature. Ambient noise is the same as background sound level
Ambient Sound Level (ASL)	The ASL consists of all noise in an area that is not related to regulated facilities. This noise includes sound from other non-regulated industrial facilities, transportation sources, animals and nature. The ASL does not include any energy-related industrial component and must be measured without it. The ASL can be measured when the sound level in an area is not felt to be represented by the BSLs. The ASL must be measured under representative conditions. As with comprehensive sound levels, representative conditions do not constitute absolute worst-case conditions (i.e., the quietest day in this case) but conditions that portray typical conditions for the area
Background Sound Level (i.e., Baseline)	It includes noise from all sources other than the sound of interest (i.e., sound from other industrial noise not being measured, transportation sources, animals, and nature)
Bands (octave, 1/3 octave)	A series of electronic filters separate sound into discrete frequency bands, making it possible to know how sound energy is distributed as a function of frequency. Each octave band has a centre frequency that is double the centre frequency of the octave band preceding it
Basic Sound Level (BSL)	The A-weighted Leq sound level commonly observed to occur in the designated land-use categories with industrial presence. The BSL is assumed to be 5 dBA above the ASL and is set out in Table 1 of AUC 2013
Category	A classification of a dwelling unit in relation to transportation routes used to arrive at a BSL

Class A Adjustment	Consists of the sum of adjustments that account for the seasonal nature of the noise source, absence of both tonal and impulse/impact components, and the actual ASL in an area. It cannot exceed +10 dBA. The Class A adjustment is added to the BSL, the daytime adjustment, and the Class B adjustment to arrive at a permissible sound level
Class B Adjustment	An adjustment based on the duration of a noisy activity that recognizes that additional noise can be tolerated if it is known that the duration will be limited. An adjustment of B1, B2, B3, or B4 may be selected as applicable
Comprehensive Sound Level (CSL)	The sound level that is a composite of different airborne sounds from many sources far away from and near the point of measurement. The CSL does include industrial components and must be measured with them, but it should exclude abnormal noise events
Daytime	The hours from 07:00 to 22:00
Daytime Adjustment	An adjustment that allows a 10 dBA increase because daytime sound levels are generally about 10 dBA higher than nighttime values
dB - Decibel	A logarithmic unit associated with sound pressure levels and sound power levels
dBA - Decibel, A-Weighted	A logarithmic unit where the recorded sound has been filtered using the A frequency weighting scale. A-weighting somewhat mimics the response of the human ear to sounds at different frequencies. A-weighted sound pressure levels are denoted by the suffix ‘A’ (i.e., dBA), and the term pressure is normally omitted from the description (i.e., sound level or noise level)
dBC - Decibel, C-Weighted	The logarithmic units associated with a sound pressure level, where the sound pressure signals has been filtered using a frequency weighting. The C-weighting approximates the sensitivity of human hearing at industrial noise levels (above about 85 dBA). C-weighted sound pressure levels are denoted by the suffix ‘C’ (i.e., dBC). C-weighted levels are often used in low-frequency noise analysis, as the filtering effect is nearly flat at lower frequencies

Decibel Addition	In acoustics, due to the logarithmic nature of the decibel scale, the addition of two or more sound pressure levels (denoted as SPL_1, SPL_2 … SPL_n) is done as follows: $SPL_1 + SPL_2 + \ldots SPL_n = 10 \log (10^{(SPL1/10)} + 10^{(SPL2/10)} + \ldots + 10^{(SPLn/10)})$ As an example: 50 dB + 50 dB = 53 dB
Dwelling Unit	Any permanently or seasonally occupied structure used for habitation for the purpose of human rest; including a nursing home or hospital with the exception of an employee or worker residence, dormitory, or construction camp located within an energy-related industrial plant boundary. Trailer parks and campgrounds may qualify as a dwelling if it can be demonstrated that they are in regular and consistent use. A permanent dwelling is a fixed residence occupied on a full-time basis. In the case of a condominium or apartment complex, each unit is considered a dwelling. A seasonally occupied dwelling is a fixed residence that, while not being occupied on a full-time basis, is occupied on a regular basis. A regular basis does not imply a scheduled occupancy but implies use of six weeks per year or more. The dwelling must not be mobile and should have some sort of foundation or features of permanence (e.g., electrical power, domestic water supply, septic system) associated with it. Summer cottages or manufactured homes are examples of seasonally-occupied dwellings, while a holiday trailer simply pulled onto a site is not.
Dwelling Unit (most affected)	The most impacted dwelling(s) are those subject to the highest average weighted sound level relative to the permissible sound level. The nearest dwelling unit may not necessarily be the one most adversely affected because of factors such as topography or man-made features. For example, the nearest dwelling unit to a facility may be located behind an intervening ridge, while a more distant dwelling unit may be in direct line of sight with the facility. Care must be taken in determining the most impacted dwelling unit.

Energy Equivalent Sound Level (L_{eq})	An energy-average sound level taken over a specified period of time. It represents the average sound pressure encountered for the period. The time period is often added as a suffix to the label (e.g., $L_{eq}(24)$ for the 24-hour equivalent sound level). Leq is usually A-weighted. A Leq value expressed in dBA is a good, single value descriptor of the annoyance of noise
Frequency	Number of cycles per unit of time. In acoustics frequency is expressed in hertz (Hz), i.e. cycles per second
Frequent Aircraft Flyovers	Used in the assessment of categories as part of a site specific analysis for dwellings that lie within a contour area with a noise exposure forecast (NEF) 25 or greater, as designated by Transport Canada. In the absence of any NEF contours for local airport, Transport Canada is to be contacted for current air traffic statistics. In this case, to qualify for the BSL adjustment, a dwelling must be within 5 km of an airport that has a minimum of nine aircraft takeoffs or landings over the nighttime period
Heavily Travelled Road	Generally, includes highways and any other road where the average traffic count is at least 10 vehicles per hour over the nighttime period. It is acknowledged that highways are sometimes lightly travelled during the nighttime period, which is usually the period of greatest concern
Hertz (Hz)	Unit of measurement of frequency, numerically equal to cycles per second
Low Frequency Noise (LFN)	Noise in the low frequency range (AUC definition), 20 Hz up to 250 Hz, where a clear tone is present below and including 250 HZ and the difference between the overall C-weighted sound level and the overall A-weighted sound level exceeds 20 dB
Nighttime	the hours from 22:00 to 07:00
Noise	Unwanted sound
Noise Exposure Forecast (NEF)	The NEF contours are site specific to each airport and take into account such factors as traffic levels, proximity to runways, flight paths, and aircraft type and size

Noise Impact Assessment (NIA)	An NIA identifies the expected sound level emanating from a facility as measured 15 m from the nearest or most impacted permanently or seasonally occupied dwelling. It also identifies what the permissible sound level is and how it was calculated
Noise Level	Same as Sound Level, except applied to unwanted sounds
Permanent Facility	Any existing or proposed facility that will be at a location longer than two months
Permanently Occupied Dwelling	A fixed dwelling occupied on a full-time basis
Permissible Sound Level (PSL)	The maximum sound level that a facility should not exceed at a point 15 m from the nearest or most impacted dwelling unit. The PSL is the sum of the BSL, daytime adjustment, Class A adjustment, and Class B adjustment
Seasonally Occupied Dwelling	A fixed dwelling that, while not being occupied on a full-time basis, is occupied on a regular basis. A regular basis does not imply a scheduled occupancy but implies use of six weeks per year or more. The dwelling must not be mobile and should have some sort of foundation or features of permanence (e.g., electrical power, domestic water supply, septic system) associated with it. Summer cottages or mobile homes are examples of seasonally occupied dwellings, while a holiday trailer simply pulled onto a site is not
Sound	A dynamic (fluctuating) pressure
Sound Pressure Level (SPL)	The logarithmic ratio of the root mean square sound pressure to the sound pressure at the threshold of hearing. The sound pressure level is defined by equation below where P is the RMS pressure due to a sound and P_0 is the reference pressure. P_0 is usually taken as 2.0×10^{-5} Pascals. $SPL\ (dB) = 20 \log(P_{RMS}/P_0)$
Sound Power Level (PWL)	The logarithmic ratio of the instantaneous sound power of a noise source to that of the reference power. The sound power level is defined by equation below where W is the sound power of the source in watts, and Wo is the reference power of 10^{-12} watts $PWL\ (dB) = 10 \log(W/W_0)$

Spectrum	The description of a sound wave's resolution into its components of frequency and amplitude
Tonal Components	Often industrial facilities exhibit tonal components. Examples of tonal components are transformer hum, sirens, and piping noise. The test for the presence of tonal components consists of two parts (as per tonality prescribed in AUC Rule 012). The first part must demonstrate that the sound pressure level of any one of the slow-response, A-weighted, 1/3-octave bands between 20 and 16 kHz is 10 dBA or more than the sound pressure level of at least one of the adjacent bands within two 1/3-octave bandwidths. In addition, there must be a minimum of a 5 dBA drop from the band containing the tone within 2 bandwidths on the opposite side. The second part is that the tonal component must be a pronounced peak clearly obvious within the spectrum

1.0 INTRODUCTION

Solar Krafte Utilities Inc. (Solar Krafte) retained Stantec Consulting Ltd. (Stantec) to conduct a Noise Impact Assessment (NIA) to support the regulatory application to the Alberta Utilities Commission (AUC) for a solar photovoltaic (PV) power facility (the Project) located within the limits of the town of Strathmore, Alberta. The Project has a gross generation capacity of approximately 40.5 megawatts (MW) alternating current. The Project requires the installation of solar panels as well as inverters, medium voltage transformers, and a switchgear and control transfer station.

The proposed Project is located within the LSD 12-24-25 W4M, in the southeast limits of Strathmore.

The objective of this NIA is to determine the Project noise effect and assess compliance with AUC Rule 012: Noise Control (AUC 2013). The methodologies used and results are described in this report. The prediction result has been generated from technical standards, manufacturer's information, and computer noise propagation modelling in accordance with AUC Rule 012 requirements.

2.0 STUDY AREA

The Project is located within the southeast limits of Strathmore, Alberta. The Project fence line is shown on Figure 1 and encompasses the facility infrastructure.

In accordance with Rule 012, the permissible sound level (PSL) must be met at the most impacted dwelling(s) within 1.5 km of a project boundary (AUC 1.5 km criteria boundary). The Noise Study Area is defined as a 3.0 km buffer around the Project fence line to include any potential cumulative noise effects from other third-party AUC or Alberta Energy Regulator (AER) regulated facilities. There are regulated facilities identified within 3 km of the Project fence line (Figure 1). The Project equipment layout is shown in Appendix A.

Dwellings are considered noise sensitive receptors (i.e., receptors). There are more than 100 receptors within the AUC 1.5 km criteria boundary. Six potentially "most impacted" receptors are selected within the 1.5 km AUC criteria boundary. These six receptors are closest to the Project boundary. Project noise level at receptors further from the Project boundary is less because noise effect decreases with distance from the source.

The receptor locations are presented in Table 1 and shown in Figure 1.

Table 1 Receptor Locations

Receptor Name	Universal Transverse Mercator (UTM) Coordinates [1] (m)		Approximate Distance to Project Fence line (m)	Direction from Project
	Easting	Northing		
R1	334990	5656289	552	Northeast
R2	334908	5656533	729	Northeast
R3	334691	5656560	658	North
R4	334897	5656737	864	Northeast
R5 [2]	334162	5656760	279	North
R6	333320	5656957	485	North

NOTES:
[1] UTM Zone 12 NAD 83
[2] Closest to the Project fence line

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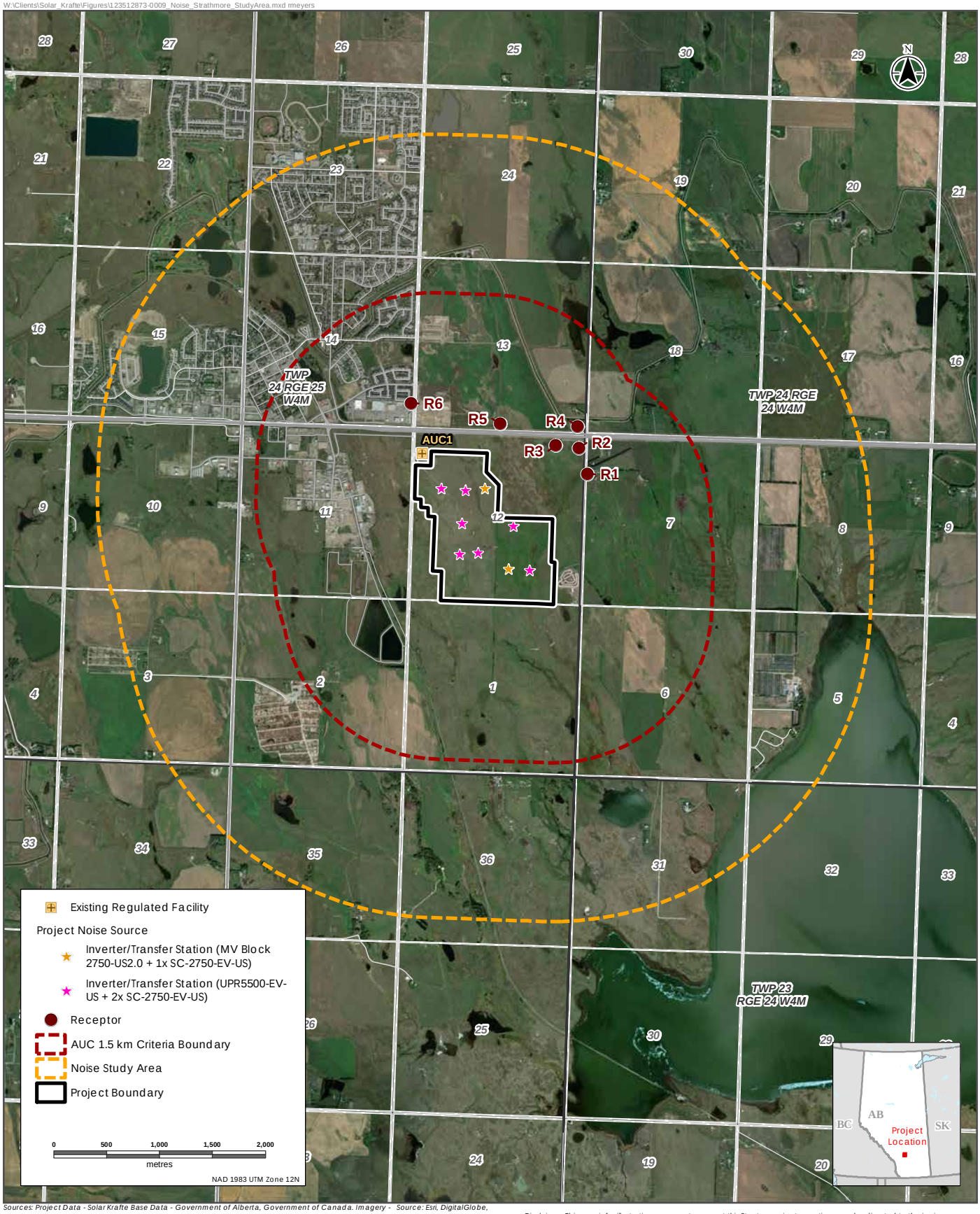

Sources: Project Data - Solar Krafte Base Data - Government of Alberta, Government of Canada. Imagery - Source: Esri, DigitalGlobe,

Disclaimer: This map is for illustrative purposes to support this Stantec project; questions can be directed to the issuing agency.

Noise Study Area

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Figure 1

3.0 REGULATORY FRAMEWORK

The AUC Rule 012: Noise Control (AUC 2013) provides regulatory limits for the noise effects associated with power generation facilities. In this application, assessment criteria are applied in accordance with Rule 012.

All new regulated facilities must meet a daytime (07:00 to 22:00) and nighttime (22:00 to 07:00) PSL at a distance of 1.5 km (AUC 1.5 km criteria boundary) from the Project fence line or at the most impacted dwelling(s). Only structures that are permanently or seasonally occupied for habitation for the purpose of human rest are defined as dwellings. Exceptions to this definition include any employee or worker residence, dormitory, or construction camp located within an industrial energy-related plant boundary. If there are no dwellings within the AUC 1.5 km criteria boundary, then the PSL is applicable along this criteria boundary.

PSL is the sum of Basic Sound Levels (BSLs), daytime adjustment, Class A adjustment, and Class B adjustment. Class A Adjustment is divided into A1 and A2 adjustments. A1 Seasonal Adjustment is based on the seasonal nature of the industrial activities. A2 Ambient Monitoring Adjustment is based on the actual ambient sound levels (A2). As the Project will operate throughout the year, there is no A1 adjustment for this location. The ambient monitoring adjustment is applicable only when the BSLs are thought not to be representative of the actual sound environment, and when ambient sound levels (ASLs) have been determined without the presence of other industrial facilities and associated activities. A2 Ambient Monitoring Adjustment is not applied in this assessment. Class B Adjustment is applicable to noise activities with durations less than 60 days. The PSL would be increased by 5 dB for noise activities longer than one week but less than or equal to 60 days. As the Project will operate throughout the year, there is no Class B adjustment.

The minimum BSL used to calculate the PSL is 40 dBA L_{eq} nighttime with adjustments made for proximity to transportation and population density. In a rural area without a heavy traffic road and low population density, the daytime and nighttime PSLs are 50 dBA and 40 dBA, respectively.

As part of the NIA requirements in AUC Rule 012, the potential for low frequency noise (LFN) effects from a project should be considered. The LFN effect is assessed at a receptor where a clear tone is present at or below 250 Hz and the difference between the overall C-weighted sound level and the overall A-weighted sound level exceeds 20 dB. The presence of both conditions at a receptor indicates the potential for LFN concerns.

4.0 METHODOLOGY

4.1 ENVIRONMENTAL NOISE DESCRIPTORS

Environmental noise typically varies over time. To account for this variation, a single number descriptor known as the energy equivalent sound level (L_{eq}) is used. It is defined as the steady, continuous sound level over that specified time that has the same acoustic energy as the actual varying sound levels over the same time. The unit for L_{eq} is dBA or dBC. dBA reflects the response of the human ear to different sound frequencies. For LFN analysis, the dBC unit is required. The regulatory definition for time periods used for L_{eq} measurements are daytime (07:00 to 22:00) and nighttime (22:00 to 07:00). The daytime L_{eq} is the 15-hour A-weighted energy equivalent sound level. Similarly, the nighttime L_{eq} is a 9-hour A-weighted energy equivalent sound level.

For a summary of acronyms and additional details on commonly used noise terminology, refer to the Glossary.

4.2 ASSESSMENT APPROACH

The approach used to assess the potential noise effects at the six receptors during normal operations of the Project is summarized as follows:

1. Determine ASLs and PSLs;
2. Quantify the Baseline Case sound level;
3. Predict Project Case noise levels from the Project operations;
4. Predict the cumulative sound levels; and
5. Assess compliance with the AUC Rule 012 requirements by comparing the cumulative sound levels to the PSL.

4.3 ACOUSTIC MODELLING

Noise prediction was conducted using Cadna/A acoustic modeling software (DataKustik 2017), based on the internationally accepted sound propagation algorithms (ISO 1993, 1996). The modelling parameters used in the assessment are summarized in Table 2.

Values of 10 °C (temperature) and 70% relative humidity are used in the model settings to represent summer nighttime conditions. The wind speed is based on ISO 9613-2 standard, which assumes 1 to 5 m/s downwind condition from the source to the receptor in the sound propagation calculation. Ground absorption factor (G) of 0.5 is used in the model to represent the Project surrounding area. G is an index with value ranges from 0 to 1 where 0 represents reflective ground and 1 represent absorptive ground condition. Terrain elevation is not incorporated in the noise model as the Project area is relatively flat. This is a conservative approach to the modeling. The reflection parameter of one represents the order of reflection when the sound emission incident ray hits a structure.

Table 2 Acoustic Modelling Parameters

Item	Model Parameters	Model Setting
1	Temperature	10 °C
2	Relative humidity	70 %
3	Wind speed	Downwind condition, as per ISO 9613-2 standard downwind setting (wind speed of 1 to 5 m/s)
4	Noise propagation software	Cadna/A (DataKustik 2017)
5	Noise propagation calculation standard	ISO 9613
6	Ground conditions and attenuation factor	ground absorption (G) of 0.5
7	Terrain Parameters (terrain resolution)	ground terrain data incorporated (50 m)
8	Reflection parameters	1 order of reflection

5.0 BASELINE CASE

The Baseline Case includes the noise effect from the ambient sound levels and other regulated (i.e., AUC or AER) existing or approved energy related facilities.

5.1 AMBIENT SOUND LEVEL AND PERMISSIBLE SOUND LEVEL

The ASL is defined in Rule 012 as the sound level that is a composite of different airborne sounds from many sources far away from and near the point of measurement. In the absence of actual measurements, Rule 012 recommends that the daytime and nighttime ASL be 5 dBA below the Basic Sound Level (BSL). The BSLs and ASLs for each receptor were determined in accordance with the AUC Rule 012. The population density, proximity to transportation classification, applicable adjustments, and ASL values for the receptors are summarized in Table 3.

Five receptors are in population densities between 1 to 8 dwellings per quarter section of land. The exception is R6, where the population density is higher than 160 dwellings per quarter section of land. R6 represents the residential community located in the southeastern corner of Strathmore.

All six receptors are classified as Category 2 because they are located more than 30 m but less than 500 m from Highway 1. Highway 36 is considered as heavily travelled roads because Annual Average Daily Traffic Volume of (AADT) 10580 vehicles (Appendix B). The nighttime time traffic is assumed to be 10% of the AADT. The value of 1058 vehicles during nighttime is considered to be a heavy travelled road.

The PSL is the sum of BSL, daytime adjustment, Class A adjustment, and Class B adjustment. There are no Class A or Class B adjustments for all receptors. The PSLs established for all receptors are presented in Table 3.

Table 3 Calculated Daytime and Nighttime Ambient Sound Levels and Permissible Sound Level

Receptor ID	Dwelling Unit Density per Quarter Section [1] of Land	Proximity to Transportation Category [2]	Nighttime Basic Sound Level (dBA)	Nighttime Ambient Sound Level [3] (dBA)	Daytime Adjustments (dB)	Daytime Ambient Sound Level (dBA)	PSL Daytime (dBA)	PSL Nighttime (dBA)
R1	1 to 8 Dwellings	Category 2	45	40	10	55	55	45
R2		Category 2	45	40	10	55	55	45
R3		Category 2	45	40	10	55	55	45
R4		Category 2	45	40	10	55	55	45
R5		Category 2	45	40	10	55	55	45
R6	More than 160 Dwellings	Category 2	51	46	10	56	61	51

NOTES:

[1] Refers to a quarter section or a 451 m radius, with the most likely affected dwelling at the centre (AUC 2013). For quarter sections with various land uses or with mixed densities, the density chosen should be factored for the area under consideration. Quarter section is an area of one-fourth of a square mile.

[2] Definition of transportation proximity category as follows:
Category 1—dwelling units more than 500 m from heavily travelled roads and rail lines and not subject to frequent aircraft flyovers.
Category 2—dwelling units more than 30 m but less than 500 m from heavily travelled roads and rail lines and not subject to frequent aircraft flyovers.
Category 3—dwelling units less than 30 m from heavily travelled roads and rail lines and/or subject to frequent aircraft flyovers.

[3] ASL is 5 dB below the BSL as prescribed in AUC Rule 012

5.2 EXISTING REGULATED FACILITIES

Information on the existing regulated facilities with noise emission are based on information from AltaLink, AER database (AER 2019), and a field program conducted within the study area. There is one existing regulated facility located within the study area. The facility is the AltaLink Strathmore substation (AUC1). There are two 138/25 kV 25 MVA transformer units (T1 and T2) within the substation. The substation is adjacent to the Project boundary (Figure 1). The facilities location, descriptions, and sound power levels are presented in Table 4. The substation transformer sound power levels are based on noise prediction method. Noise measurement data from the field program was not used because the transformer was not audible at the substation fence line.

Table 4 Sound Power Level of Third Party Regulated Facilities

ID	LSD	Description	Sound Power level (dBA)
AUC1	NW 12-24-25 W4M	AltaLink Strathmore Substation	92.3

5.3 BASELINE CASE SOUND LEVELS

The Baseline Case sound level is the combined noise effect from the ASL and existing regulated facilities. An acoustic model was used to determine the noise effects from AltaLink Strathmore Substation at the six receptors. The acoustic model was based on the sound power level summarized in Table 4.

Table 5 summarizes the ASL and the predicted noise levels from the third-party facility at the receptors. Figure 2 presents the noise contour results from the third-party facility only. The results show that Baseline Case sound levels at all six receptors are below the PSLs.

Table 5 Baseline Case Sound Levels

Receptor ID	Ambient Sound Level		Noise Effect from Third-Party Facilities		Baseline Case Sound Level [1]	
	Daytime (dBA)	Nighttime (dBA)	Daytime (dBA)	Nighttime (dBA)	Daytime (dBA)	Nighttime (dBA)
R1	50	40	9.6	9.6	50.0	40.0
R2	50	40	10.3	10.3	50.0	40.0
R3	50	40	12.2	12.2	50.0	40.0
R4	50	40	10.3	10.3	50.0	40.0
R5	50	40	17.4	17.4	50.0	40.0
R6	56	46	26.5	26.5	56.0	46.0

NOTE:
[1] Baseline Case sound level is the logarithmic sum of noise effect from ASL and Third-Party Facilities sound level

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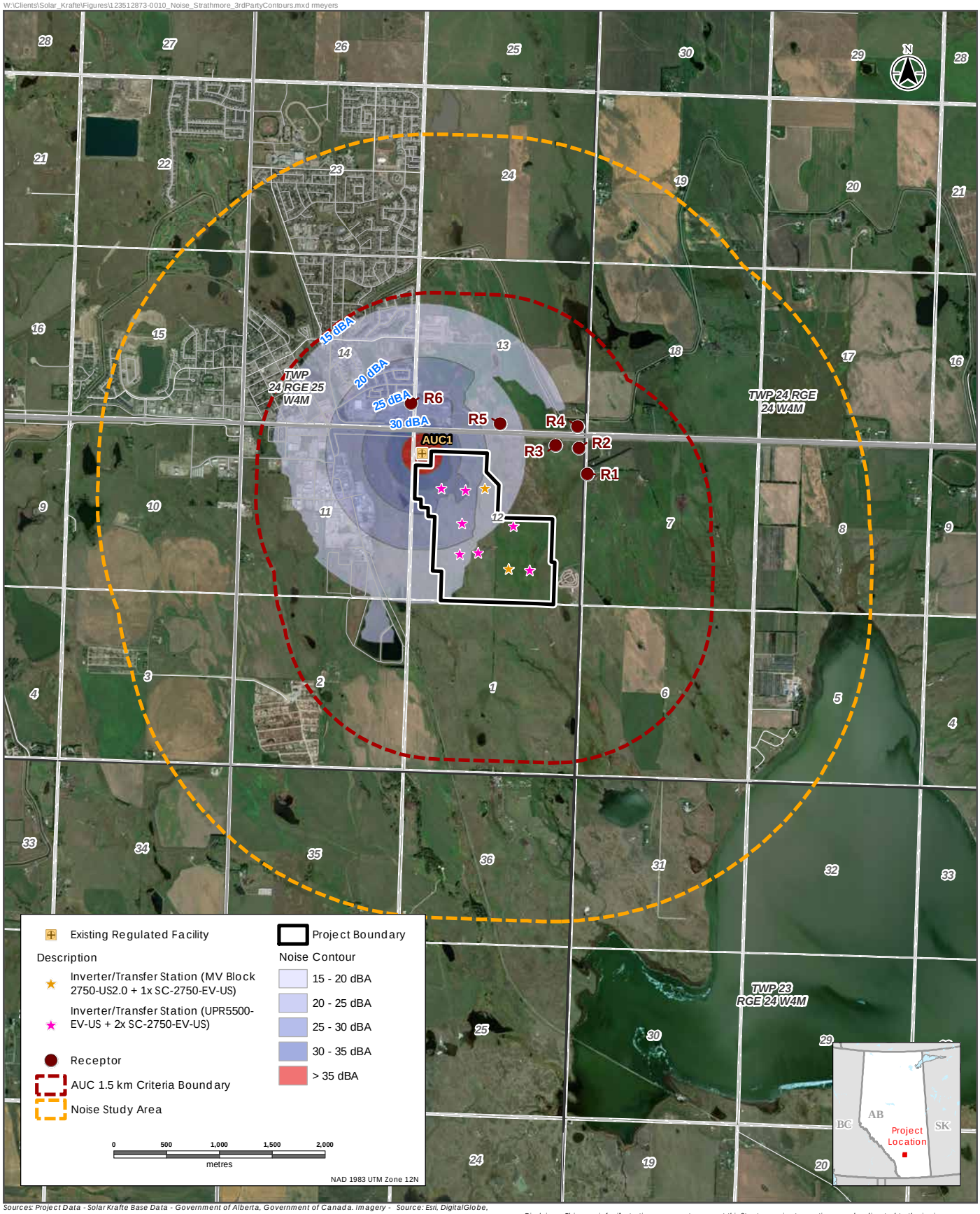

Sources: Project Data - Solar Krafte Base Data - Government of Alberta, Government of Canada. Imagery - Source: Esri, DigitalGlobe,

Disclaimer: This map is for illustrative purposes to support this Stantec project; questions can be directed to the issuing agency.

Predicted Noise Contour Map - Third Party Facilities

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Figure 2

6.0 PROJECT CASE

The Project Case includes noise effects from the Project only.

6.1 NOISE EMISSION SOURCES

Inverters and medium voltage transformers are noise emission sources associated with the Project. The site layout is presented in Appendix A.

The Project includes 16 inverters and 9 medium voltage transformers. The specifications are summarized as follows:

- Inverter: SMA Sunny Central 2750-EV-US (SC 2750-EV-US)
- Medium Voltage Transformer: SMA Utility Power Rack 5500-EV-US (UPR5500-EV-US)
- Medium Voltage Transformer: SMA Medium Voltage Block 2750-US-2.0 (MV 2750-US-2.0)

The inverter converts the direct current (DC) power to AC power. There are total of 9 inverter block locations within the Project fence line. At seven inverter block locations, the configuration includes two inverters (SC 2750-EV-US) and one medium voltage transformer (UPR 5500-EV-US). At two inverter block locations, the configuration includes one inverter (SC 2750-EV-US) and one medium voltage transformer (MV 2750-US-2.0).

The medium voltage transformer is a three-phase pad-mounted compartmental type transformer. The transformer is insulated in fluid (i.e. electrical-grade mineral oil or bio-based natural ester dielectric coolant). It uses natural convection cooling method such that a cooler fan is not required. The inverter blocks are assumed to operate continuously during the daytime and nighttime period for this NIA.

The sound power level for the inverter were established using manufacturer data (Appendix C). The sound power level for the medium voltage transformer were based on theoretical prediction methods (Crocker 2007). Table 6 summarizes the sound power levels for the inverters and medium voltage transformers.

Table 6 Inverter and Medium Voltage Transformer Sound Power Levels

Noise Source	Quantity	Sound Power Level (dBA) in Octave Band Center Frequency (Hz) per Unit									Overall dBA
		31.5	63	125	250	500	1000	2000	4000	8000	
Inverter (SC 2750-EV-US)	16	93.0	96.0	93.1	93.7	88.9	85.3	85.1	77.5	70.5	92.0 [1]
Medium Voltage Transformer (UPR 5500-EV-US)	7	76.3	82.3	84.3	79.3	79.3	73.3	68.3	63.3	56.3	79.7 [2]
Medium Voltage Transformer (MV 2750-US-2.0)	2	72.0	78.0	80.0	75.0	75.0	69.0	64.0	59.0	52.0	75.3 [2]

NOTES:
[1] Based on the manufacture data, see Appendix C.
[2] Based on the theoretical prediction method in Crocker 2007.

6.2 MODELLING RESULTS

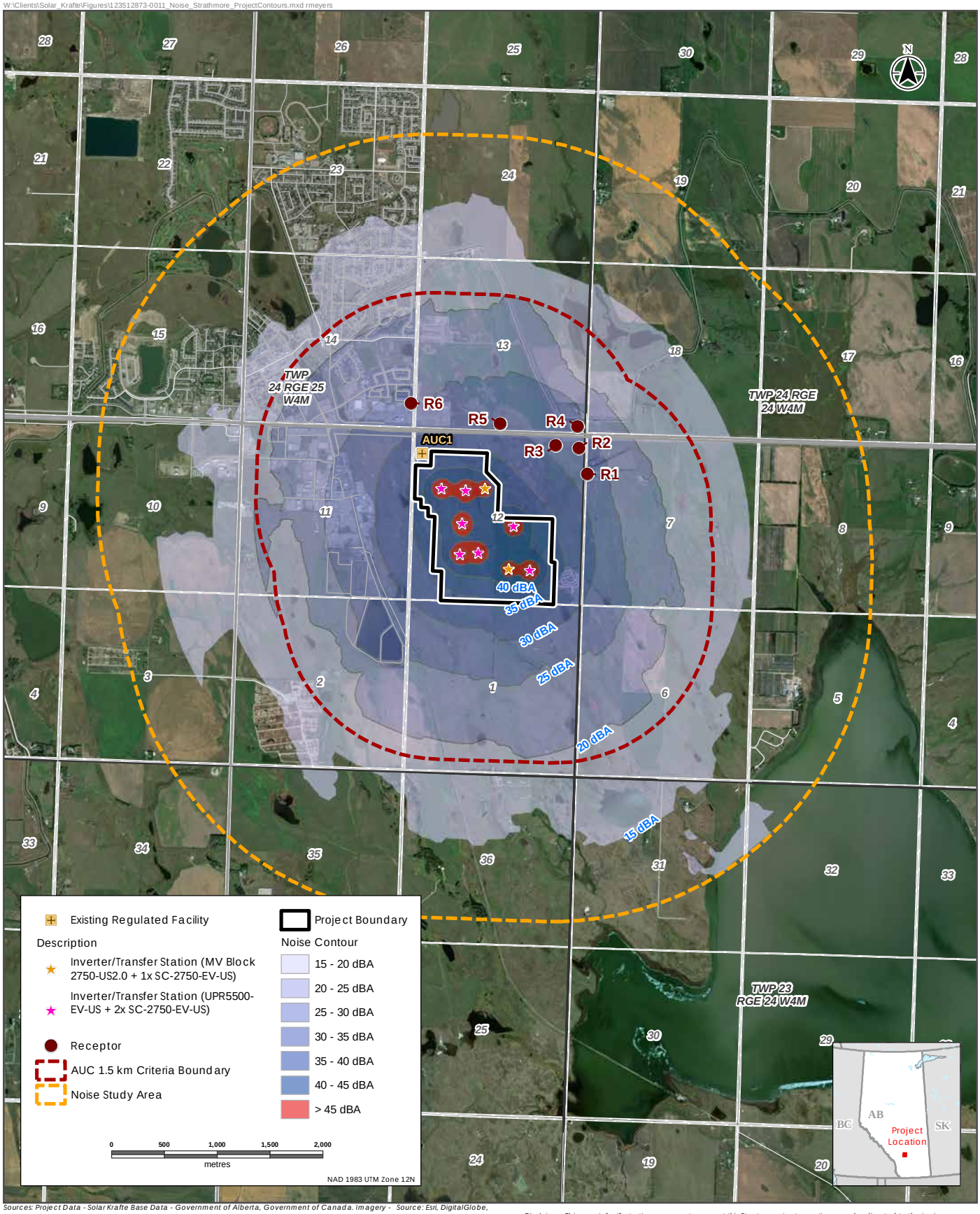
Table 7 summarizes the predicted Project only noise effect at the six receptor locations within the AUC 1.5 km criteria boundary. Figure 3 presents the daytime or nighttime Project only noise contour results within the Noise Study Area. The results indicate that the Project noise effect is below the ASL as well as the PSL at all receptors. Receptor R5 is the “most impacted” receptor with the highest predicted noise level.

Table 7 Project Only Noise Effect

Receptor ID	Project Only Noise Effect (dBA)	
	Daytime	Nighttime
R1	28.3	28.3
R2	27.5	27.5
R3	28.9	28.9
R4	26.3	26.3
R5 [1]	29.3	29.3
R6	25.9	25.9

NOTE:
[1] Receptor with the highest Project Only Noise Effect (i.e. 29.3 dBA).

W:\Clients\Solar_Krafte\Figures\123512873-0011_Noise_Strathmore_ProjectContours.mxd rmeyers



Sources: Project Data - Solar Krafte Base Data - Government of Alberta, Government of Canada. Imagery - Source: Esri, DigitalGlobe,

Disclaimer: This map is for illustrative purposes to support this Stantec project; questions can be directed to the issuing agency.

Predicted Noise Contour Map - Project Only

Stantec

STRATHMORE SOLAR PROJECT

Figure 3

6.3 LOW FREQUENCY NOISE ANALYSIS

As part of the NIA requirements in AUC Rule 012, the potential LFN effects from a project should be considered. The LFN effect is assessed at a receptor where a clear tone is present at or below 250 Hz and when the difference between the overall C-weighted sound level and the overall A-weighted sound level exceeds 20 dB. The presence of both conditions at a receptor indicates the potential for LFN concerns. The first LFN condition (i.e., clear tone is present at or below 250 Hz) can only be assessed by a post-construction noise measurement study, therefore only the second condition is included in this NIA.

Table 8 presents the prediction results in A-weighted (dBA) and C-weighted (dBC) sound levels for all the receptors within the AUC 1.5 km criteria boundary. The dBC minus dBA values are below 20 dB at six receptors. LFN effects due to the Project are not predicted.

Table 8 Low Frequency Noise Analysis Summary

Receptor ID	Project Only Daytime or Nighttime Noise Contribution		
	dBA	dBC	dBC minus dBA
R01	28.3	42.5	14.2
R02	27.5	42.0	14.5
R03	28.9	42.9	14.0
R04	26.3	41.1	14.8
R05	29.3	42.5	13.2
R06	25.9	39.7	13.8

7.0 APPLICATION CASE

The Application Case assesses the cumulative noise effects including the contribution from the Baseline Case (see Table 5) and the Project Case (see Table 7). Table 9 summarizes the cumulative sound level at the six receptors. The cumulative sound level results are compared to the daytime and nighttime PSLs to verify if the Project is in compliance with AUC Rule 012 requirements.

The cumulative sound levels at all receptors are below the daytime and nighttime PSLs and, as such, the Project is in compliance with Rule 012.

Table 9 Cumulative Sound Levels Results

Receptor ID	Baseline Case Sound Level		Project Only Noise Effect		Cumulative Sound Level		PSL		Compliance with Rule 012
	Daytime (dBA)	Nighttime (dBA)	Daytime (dBA)	Nighttime (dBA)	Daytime (dBA)	Nighttime (dBA)	Daytime (dBA)	Nighttime (dBA)	
R01	50.0	40.0	28.3	28.3	50.0	40.3	55	45	Yes
R02	50.0	40.0	27.5	27.5	50.0	40.2	55	45	Yes
R03	50.0	40.0	28.9	28.9	50.0	40.3	55	45	Yes
R04	50.0	40.0	26.3	26.3	50.0	40.2	55	45	Yes
R05	50.0	40.0	29.3	29.3	50.0	40.4	55	45	Yes
R06	56.0	46.0	25.9	25.9	56.0	46.1	61	51	Yes

8.0 CONCLUSIONS

Project noise effects have been predicted at six noise sensitive receptors within 1.5 km of the Project fence line. The most impacted receptor is R5, situated approximately 279 m north of the Project fence line. This assessment concludes that the Project noise level meets the AUC Rule 012 requirements due to the following results:

- The predicted cumulative sound levels at all receptors are below the daytime and nighttime PSLs; and
- LFN effects are not expected at all receptors.

9.0 ACOUSTIC PRACTITIONER'S INFORMATION

Table 10 describes Stantec's noise practitioners' roles, training, and experience.

Table 10 Noise Practitioners' Summary

Name	**Jonathan Chui, P.Eng, INCE**	**Lina Wang, B.Sc.,**
Title	Senior Noise Specialist	Noise Specialist
Role	• Discipline Lead • NIA report author	• Quality Reviewer
Training and experience	• Over 15 years of experience in acoustic consulting. • Member of the Association of Professional Engineers and Geoscientists of Alberta (APEGA) and a member of the Institute of Noise Control Engineers of the USA (INCE).	• Over 14 years of experience in acoustic consulting. • Member of Canadian Acoustic Association (CAA)

10.0 REFERENCES

AER (Alberta Energy Regulator). 2019. Alberta Energy Regulator Database. Website link: http://www.aer.ca/data-and-publications/statistical-reports/st102

AUC (Alberta Utilities Commission). 2013. Rule 012, Noise Control, version April 1, 2013 – present. Alberta, Canada.

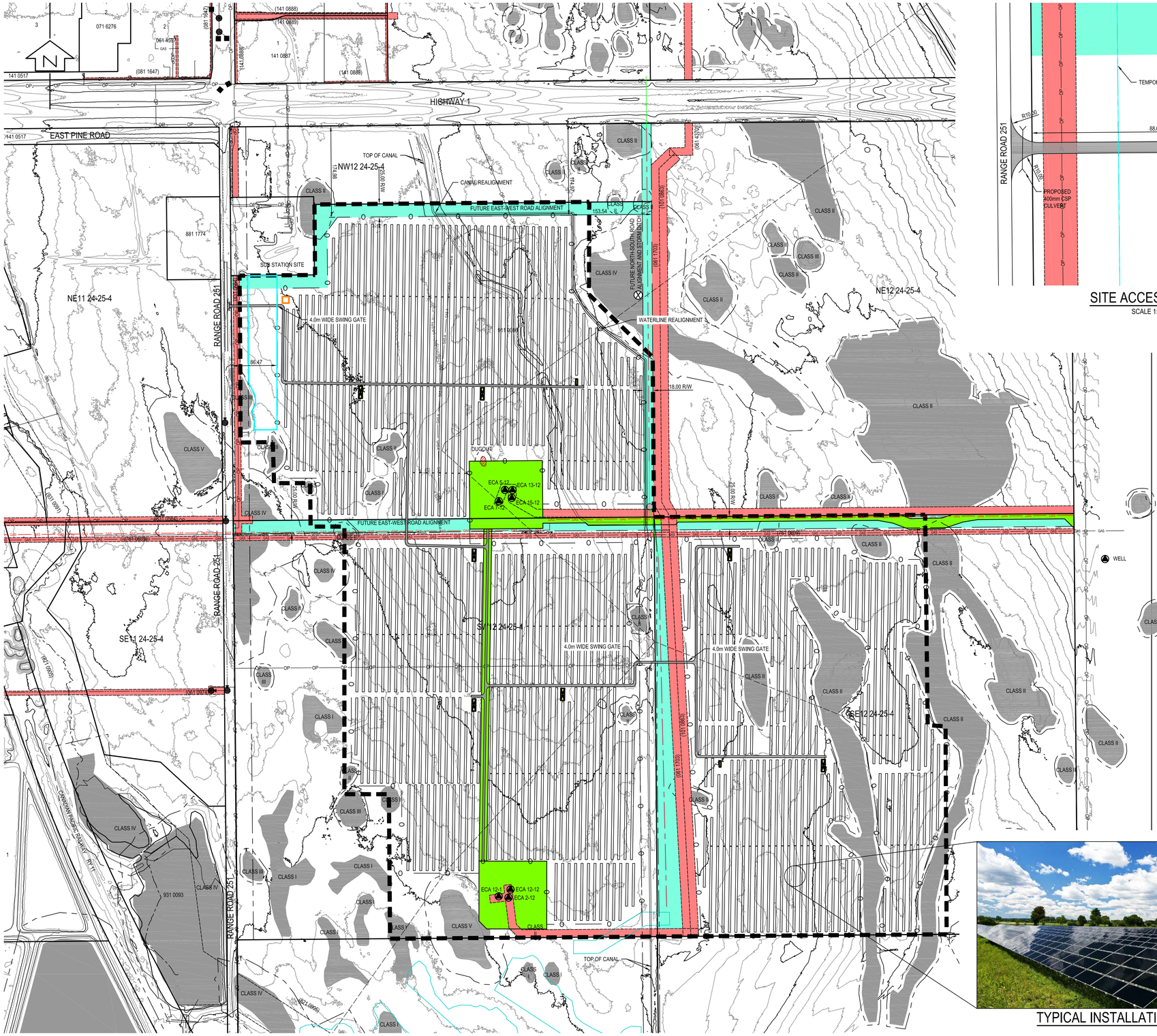
Crocker. M.J. 2007. Handbook of Noise and Vibration. John Wiley & Sons, Inc.

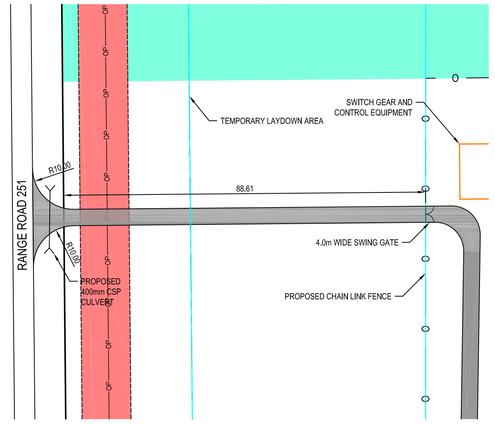
DataKustik. 2017. Cadna/A Computer Aided Noise Abatement Model, Version 4.5.151. Munich, Germany.

ISO (International Organization for Standardization). 1993. International Standard ISO 9613-1, Acoustics – Attenuation of Sound During Propagation Outdoors. Part 1: Calculation of Absorption of Sound by the Atmosphere. Geneva, Switzerland.

ISO. 1996. International Standard ISO 9613-2, Acoustics – Attenuation of Sound During Propagation Outdoors. Part 2: General Method of Calculation. Geneva, Switzerland.

APPENDIX A
SITE LAYOUT


HIGHWAY 1
EAST PINE ROAD
RANGE ROAD 251
NW12 24-25-4
NE11 24-25-4
NE12 24-25-4
SW12 24-25-4
SE11 24-25-4
SE12 24-25-4
TOP OF CANAL
CANAL REALIGNMENT
FUTURE EAST-WEST ROAD ALIGNMENT
FUTURE NORTH-SOUTH ROAD ALIGNMENT AND STORM DITCH
WATERLINE REALIGNMENT
SUB STATION SITE
4.0m WIDE SWING GATE
DUGOUT
ECA 5-12
ECA 13-12
ECA 7-12
ECA 15-12
ECA 12-1
ECA 12-12
ECA 2-12
CANADIAN PACIFIC RAILWAY
TOP OF CANAL
WELL



SITE ACCESS DETAIL
SCALE 1:750m

LEGEND

- SITE BOUNDARY
- EXISTING CONTOURS (1.0m INTERVAL)
- SITE SETBACKS
- PROPOSED BARBED WIRE FENCE
- PROPOSED CHAIN LINK FENCE
- EXISTING FENCE
- PROPOSED GAS LINE
- EXISTING GAS LINE
- EXISTING SOUR GAS LINE
- ABANDONED GAS LINE
- EXISTING OIL LINE
- ABANDONED OIL LINE
- EXISTING SALT WATER LINE
- ABANDONED SALT WATER LINE
- EXISTING TELUS LINE
- EXISTING UNDERGROUND POWER
- EXISTING OVERHEAD POWERLINE
- EXISTING WATERLINE
- TEMPORARY LAYDOWN AREA
- SWITCHGEAR AND CONTROL EQUIPMENT
- SITE ACCESS ROAD
- EXISTING WELL ACCESS ROAD
- PIPELINE RIGHT OF WAY
- EXISTING DUGOUT
- PROPOSED ROAD RIGHT OF WAY
- CONFIRMED EXISTING WELL
- ABANDONED WELL
- CONFIRMED BORE HOLE
- EXISTING IRRIGATION PIVOT
- EXISTING POWER POLE
- EXISTING TELUS BOX
- EXISTING POWER BOX
- EXISTING WATER PUMP
- SOLAR TRACKER
- INVERTER/TRANSFER STATION (UPR5500-EV-US+2xSC-2750-EV-US)
- INVERTER/TRANSFER STATION (MV BLOCK 2750 US-2.0+1xSC-2750-EV-US)

TYPICAL INSTALLATION

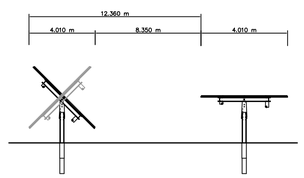
Project Data

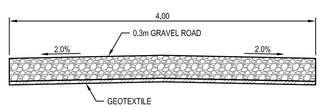
Fenced Area Total	-	98.0 ha
Fence Length Total	-	8943 m
Number of Structures 6T (6 x 54)	-	226
Number of Structures 5T (5 x 54)	-	105
Number of Structures 4T (4 x 54)	-	80
Number of Structures 3T (3 x 54)	-	44
Number of Structures 2T (2 x 54)	-	46
Number of Modules	-	130950
Type of Module / Power	-	CS3U-380MS / 380 W-DC
Inverter / Stands	-	7 x (UPR5500-EV-US) 2 x (MV Block 2750 US-2.0 + SC2750-EV-US)
Plant System Rating	-	**49.76100 MWp-DC**

Construction and Parameter

Construction Series	-	Ideematec-Tracker, 2 Modules vertical
Connection	-	26 / String
System Rotation	-	no
GCR	-	0.32

Sketch Construction Series





SITE ACCESS ROAD
SCALE 1:40

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2	2019-04-25	ISSUED FOR REGULATORY APPROVAL	MA	--	TP
1	2019-01-16	ISSUED FOR REGULATORY APPROVAL	MA	--	TP
0	2018-08-02	ISSUED FOR CONSULTATION	MA	--	TP

SEAL:

CLIENT: solarkrafte

CLIENT REF. NO:

3509 6th AVENUE NORTH
LETHBRIDGE, ALBERTA T1J 5C1
TEL: 403-327-7746 | FAX: 403-380-2825 | WWW.WSPGROUP.COM

PROJECT: **STRATHMORE SOLAR FARM**

PROJECT NO: 181-11286-00
ORIGINAL SCALE: 1:4000
DATE: 2019-04-25
DESIGNED BY: MA
DRAWN BY: JW
DISCIPLINE: **CIVIL**

TITLE: **STRATHMORE SITE PLAN**

DRAWING NO: **C-009**
SHEET NO: OF
ISSUE: **ISSUED FOR REGULATORY APPROVAL**
ISS/REV: **2**
2019-04-25

2019/04/25 10:47AM

No A1 - I:\PROJECTS\Active Work\181-11286\00 - Strathmore\2.2 Dwg\02-Eng\Dgn\Current Work\fig-Set181-11286-00C-009

APPENDIX B
TRAFFIC INFORMATION

ALBERTA HIGHWAYS 1 TO 986
TRAFFIC VOLUME HISTORY 2008 - 2017

Alberta Transportation
Modeling and Analysis

Produced: 16-Feb-2018 By CornerStone Solutions Inc.

Hwy	CS	TCS	Muni	From	2008 AADT	2009 AADT	2010 AADT	2011 AADT	2012 AADT	2013 AADT	2014 AADT	2015 AADT	2016 AADT	2017 AADT	2017 ASDT
1	10	8	CofC	E OF 201 24-24-29-405900000			19110	23470	24770	28970	28180	30530	30750	30880	33800
1	10	8	Rkyv	W OF GARDEN RD E OF CALGARY 19-24-28-400000000	19040	22070	23100	23770	24770	28970	28180	30530	30750	30880	33800
1	10	8	Rkyv	E OF GARDEN RD E OF CALGARY 19-24-28-400000000	18360	20210	21150	21780	22700	24310	23930	25920	26120	26230	28710
1	10	8	Rkyv	W OF CONRICH RD 20-24-28-400000000	18360	20210	21150	21780	22700	24310	23930	25920	26120	26230	28710
1	10	8	Rkyv	E OF CONRICH RD 20-24-28-400000000	17810	19070	19950	20940	21820	23260	23090	25000	24720	24830	27170
1	10	8	Rkyv	W OF RAINBOW RD E OF CALGARY 21-24-28-400000000	17810	19070	19950	20940	21820	23260	23090	25000	24720	24830	27170
1	10	8	Rkyv	E OF RAINBOW RD E OF CALGARY 21-24-28-400000000	17540	18780	19620	20490	21330	23030	22860	24730	24430	24540	26860
1	10	8	Rkyv	W OF PARADISE RD / INVERLAKE RD 22-24-28-408050000								24730	24430	24540	26860
1	10	8	Rkyv	E OF PARADISE RD / INVERLAKE RD 22-24-28-408050000								23040	22760	22860	25020
1	10	8	Rkyv	N OF 1A E OF CALGARY	17250	17630	18430	19090	20780	21610	21690	23040	22760	22860	25020
1	10	12	Rkyv	S OF 1A E OF CALGARY	16670	16120	16960	17560	20410	21030	21370	22010	20620	20500	22440
1	10	12	Rkyv	3 KM E OF 1 & 1A CHESTERMERE	16180	15740	16690	17220	17830	18340	18960	19230	18830	18760	20520
1	10	12	Rkyv	W OF 791 S OF DELACOUR	16290	15730	16570	17150	17840	18390	18720	19280	18860	18750	20520
1	10	16	Rkyv	E OF 791 S OF DELACOUR	14920	14400	15180	16180	16810	17340	17670	18150	17370	17280	18910
1	10	16	Rkyv	W OF 9 & 797 N OF LANGDON	13960	13460	14900	15510	16210	16880	17170	17490	17050	17010	18620
1	12	4	Rkyv	E OF 9 & 797 N OF LANGDON	14400	14060	14320	14800	15540	16130	16380	16640	16320	16340	17920
1	12	4	WhtL	W OF 24 W OF STRATHMORE	14130	13790	14220	14820	15610	16210	16340	16490	16160	16180	17740
1	12	8	WhtL	E OF 24 W OF STRATHMORE	14150	13810	14240	14720	15000	15520	16280	16420	16090	16110	17670
1	12	8	WhtL	2.8 KM E OF 1 & 24 STRATHMORE	14110	13850	14420	14780	15030	15550	16280	16200	15910	15950	17490
1	12	8	WhtL	W OF 817 IN STRATHMORE	14170	13840	13620	14180	14450	14880	15410	14940	14630	14650	16070
1	12	12	WhtL	E OF 817 IN STRATHMORE	11730	11450	11000	11720	11950	12240	12670	13400	13130	13150	14420
1	12	12	WhtL	W OF LAKESIDE BLVD IN STRATHMORE 11-24-25-408050000	11330	11060	10890	11640	11860	12100	12530	13540	13270	13290	14570
1	12	12	WhtL	E OF LAKESIDE BLVD IN STRATHMORE 11-24-25-408050000	11280	11010	11280	12610	12850	13110	13570	13730	13460	13480	14780
1	12	12	WhtL	W OF GEOGRE FREEMAN TR, STRATHMORE 11-24-25-400000000	11280	11010	11280	12610	12850	13110	13570	13730	13460	13480	14780
1	12	12	WhtL	E OF GEOGRE FREEMAN TR, STRATHMORE 11-24-25-400000000	9900	9670	9950	10180	10380	10600	10910	10770	10560	10580	11600
1	12	12	WhtL	W OF NAMAKA RD 9-24-24-400000000	9170	9340	9640	9690	9890	10110	10260	10300	9960	9980	11220
1	12	12	WhtL	E OF NAMAKA RD 9-24-24-400000000	8610	8580	8840	8690	8850	9030	9470	9510	9170	9190	10330
1	12	12	WhtL	W OF 21 E OF STRATHMORE	8610	8580	8840	8690	8850	9030	9470	9510	9170	9190	10330
1	14	4	WhtL	E OF 21 E OF STRATHMORE	7700	7580	7830	7770	7910	8060	8230	8330	8410	8410	9450
1	14	4	WhtL	7.3 KM E OF 1 & 21 STRATHMORE	7300	7200	7490	7530	7650	7780	7990	8010	7980	7890	8900
1	14	4	WhtL	W OF 561 E OF STRATHMORE	7120	7000	7220	7320	7500	7630	7730	7850	7680	7600	8540
1	14	8	WhtL	E OF 561 E OF STRATHMORE	6000	5900	6080	6160	6220	6330	6410	6500	6300	6240	7010
1	14	8	WhtL	W OF 547 N OF GLEICHEN	5800	5700	5790	6020	6160	6280	6380	6040	6010	6010	6750
1	14	12	WhtL	E OF 547 N OF GLEICHEN	5120	5040	5030	5260	5380	5480	5560	5480	5450	5450	6120
1	14	12	WhtL	W OF 901 E OF GLEICHEN	5230	5130	5150	5420	5430	5510	5590	5520	5520	5530	6210
1	14	12	WhtL	E OF 901 E OF GLEICHEN	7560	7420	7440	7480	7490	7570	7690	7460	7820	7870	9170
1	14	12	WhtL	W OF 842 N OF CLUNY	7470	7320	7340	7460	7470	7530	7650	7590	7990	8030	9360
1	14	16	WhtL	E OF 842 N OF CLUNY	6770	6640	6660	6770	6880	6940	7060	7140	7180	7220	8420
1	14	16	WhtL	1 KM W OF 1 & 56 BASSANO	6610	6490	6550	6670	6780	6820	7040	7110	7070	7130	8300
1	14	16	WhtL	W OF 56 N OF CROWFOOT	6640	6500	6520	6650	6790	6850	6980	7120	7080	7120	8300
1	14	20	WhtL	E OF 56 N OF CROWFOOT	7080	6880	6900	7030	7200	7260	7390	7530	7400	7440	8670

APPENDIX C
MANUFACTURER INFORMATION

White Paper BU-U-019: Sunny Central

Sound Power Measurements on SC xxxx (-US) central inverters

Performed by:
SMA Solar Technology AG - Sonnenallee 1 - 34266 Niestetal, Germany - EMC Environment Laboratory (EMV- und Umweltlabor)

Summing up of the Situation

Measurements were taken for one central inverter each of the models SC 2200 and SC 2500-EV. The sound power measurements were performed in accordance with the DIN EN ISO 9614-2:12/1996 standard, "Determination of sound power levels of noise sources using sound intensity".

The measurements were taken under nominal operating conditions for the inverters, with all inverter fans operating at maximum speed.

Inspection Reference According to EN ISO 3744:2011-02

EN ISO 3744 is used as the basis for determining the noise emissions of the unit under test according to EN ISO 12001:05-2007.
As part of the acoustics, it includes the determination of the sound level of noise sources using the enveloping surface method of accuracy class 2 for essentially free field conditions over a reflective plane. Measurements must be carried out in compliance with IEC 551 and DIN EN 45645-1 according to DIN EN ISO 3744. To position the measurement instruments, the enclosure of the unit under test is considered a main radiation area.

Inspection Reference According to EN ISO 9614-2:2010-11

The sound level is determined according to DIN EN ISO 9614-2 "Determination of sound power levels of noise sources using sound intensity", Part 2: "Measurement by scanning".
This measurement procedure keeps interference on the measurement result caused by noises from the environment to a minimum.

Type of Test / Thresholds and Requirements:

Type of Test / Thresholds and Requirements:	Sound level measurement according to DIN EN ISO 3744:2011-02 and DIN EN ISO 9614-2:2010-11 of sinusoidal, irregularly shaped, transient signals. Classification of ambient conditions in compliance with the German Noise Control Guidelines (TA Lärm). (according to Section 2)
Result:	**The requirements were fulfilled.**

Result of Measurements

The following rating levels can be determined from the sound power measurements performed:

Inverter type	Sound power level mean value L_{WA}
SC 1850-US	94
SC 2200 & SC 2200-US	94
SC 2500-EV, SC 2500-EV-US SC 2750-EV, SC 2750-EV-US	92

The following tables show the selected distances from the inverter and their corresponding sound pressure levels L_{pA} in dB(A) at nominal AC power.

Distance	SC 1850-US	SC 2200 (-US)	SC 2500-EV (-US)	SC 2750-EV (-US)
1 m	79	79	77	77
10 m	66	66	64	64
20 m	60	60	58	58
30 m	56	56	55	55
40 m	54	54	52	52
50 m	52	52	50	50
60 m	50	50	49	49
70 m	49	49	47	47
80 m	48	48	46	46
90 m	47	47	45	45
100 m	46	46	44	44

Information:

The detailed test report may be requested from SMA Solar Technology AG if necessary.