LIGHTING PLAN

3 REVIEW CRITERIA FOR ALL APPLICATIONS (2.405)

In accordance with Section 2.405 of the El Paso County §1041 Regulations, the information in Table 13 describes how Pathway routing and site selection, construction, maintenance, and operation comply with the approval criteria for the Permit Authority approval of the portion of the transmission line subject to this Application. Each criterion for all applications from Section 2.405 is listed, followed by a description of how Pathway will comply.

Table 13: Pathway Compliance with Review Criteria for All Applications (Section 2.405 of the El Paso County §1041 Regulations)

Review Criteria Code Citation	Review Criteria	Pathway Compliance with Review Criteria
2.405.13	The Project will not cause a nuisance. The determination of nuisance effects of the Project may include but is not limited to the following considerations: increase in odors, dust, fumes, glare, heat, noise, vibration or artificial light.	Nuisance vibrations, odors, glare, artificial light, and heat are not anticipated during construction or operation of Pathway. Short-term effects are anticipated from a temporary increase in construction vehicles which may increase dust and fumes. These are not expected to cause a public nuisance. If a nuisance arises during construction, the nuisance will be mitigated in coordination with El Paso County. The Noise and EMF Study is provided as Attachment E. The projected noise levels from the Pathway transmission line were deemed reasonable by the CPUC and not subject to further review.

Pathway is not anticipated to generate any light; therefore, a Lighting Plan is not applicable to Pathway.

ATTACHMENT E: NOISE AND EMF STUDY

February 26, 2021

XCEL ENERGY

Colorado's Power Pathway

345 kV Line Audible Noise & Magnetic Field Report

Final

PROJECT NUMBER:
167902
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POWER ENGINEERS

345 KV LINE AUDIBLE NOISE & MAGNETIC FIELD REPORT

PREPARED FOR:
XCEL ENERGY

PREPARED BY:
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REVISION HISTORY						
REV.	ISSUE DATE	ISSUED FOR	PREP BY	CHKD BY	APPD BY	NOTES
0	2021-02-26	Impl	KAM	DTM	RES	Issued for Implementation

"Issued For" Definitions:
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EXECUTIVE SUMMARY

POWER Engineers, Inc. (POWER) was tasked with performing calculations and providing results for the investigation of audible noise (AN) and magnetic field related to Public Service Company of Colorado's (Public Service or the Company) proposed new double circuit 345 kV transmission line located in eastern Colorado to tie together seven existing and new substations: Fort St. Vrain, Canal Crossing, Pawnee, Goose Creek, May Valley, Tundra, and Harvest Mile. This report provides documentation of data, assumptions, analysis techniques, and results for audible noise and magnetic field of the 1272 ACSR Bittern conductor, as well as the alternative conductor selection of 556 twisted pair (T2) ACSR Dove, each on a double circuit structure.

The audible noise results [dB(A)] generated in this study were measured at 25 feet beyond the edge of the right-of-way (ROW) and the magnetic field results were measured at the edge of the ROW, consistent with Colorado Public Utilities Commission (PUC) Rule 3206(f) and (e), respectively. The purpose of these analyses is to support the Public Service's application for a CPCN for the transmission line and certain related substations. The results of these analyses, including this report, will be submitted to the PUC with the CPCN application.

At 25 feet beyond the edge of the ROW, the calculated AN results for both conductor types are below 50 dB(A), which is the most stringent noise level (for residential areas) deemed reasonable under PUC Rule 3206(f). The magnetic field results at the edge of the ROW for both conductor types are below the 150 milliGauss (mG) level deemed reasonable by PUC Rule 3206(e) at 25%, 50% and 100% of the conductor current carrying capacity. The results for 1272 ACSR Bittern conductor are provided in Table 1. The full results for the 1272 ACSR Bittern and the alternative 556 twisted pair (T2) ACSR Dove conductors are provided in Section 4.

Table 1: Results Summary

Case	Location	Deemed Reasonable Level (PUC Rule 3206)	Results
Audible Noise	25 Feet Outside Edge of ROW	50 dB(A) (Residential – most stringent level)	49.8 dB(A)
Magnetic Field	Edge of ROW	150 mG	54.7 mG

PROJECT NEED

In 2018, Public Service announced the Company's vision to reduce carbon emissions 80 percent by 2030 company-wide from 2005 levels and to provide 100 percent carbon-free electricity by 2050. In order to achieve an 80 percent reduction by 2030, extra high voltage transmission infrastructure will need to be constructed to assist bringing renewable generation from northeastern, eastern and/or southern parts of Colorado to the Denver Metro area and the Company's existing transmission system.

PROJECT DESCRIPTION

Colorado's Power Pathway project will consist of a double circuit 345 kV transmission line that will connect with seven existing and new stations: Fort St. Vrain, Canal Crossing, Pawnee, Goose Creek, May Valley, Tundra, and Harvest Mile. Figure 1 shows the larger project area with the double circuit 345 kV transmission line.

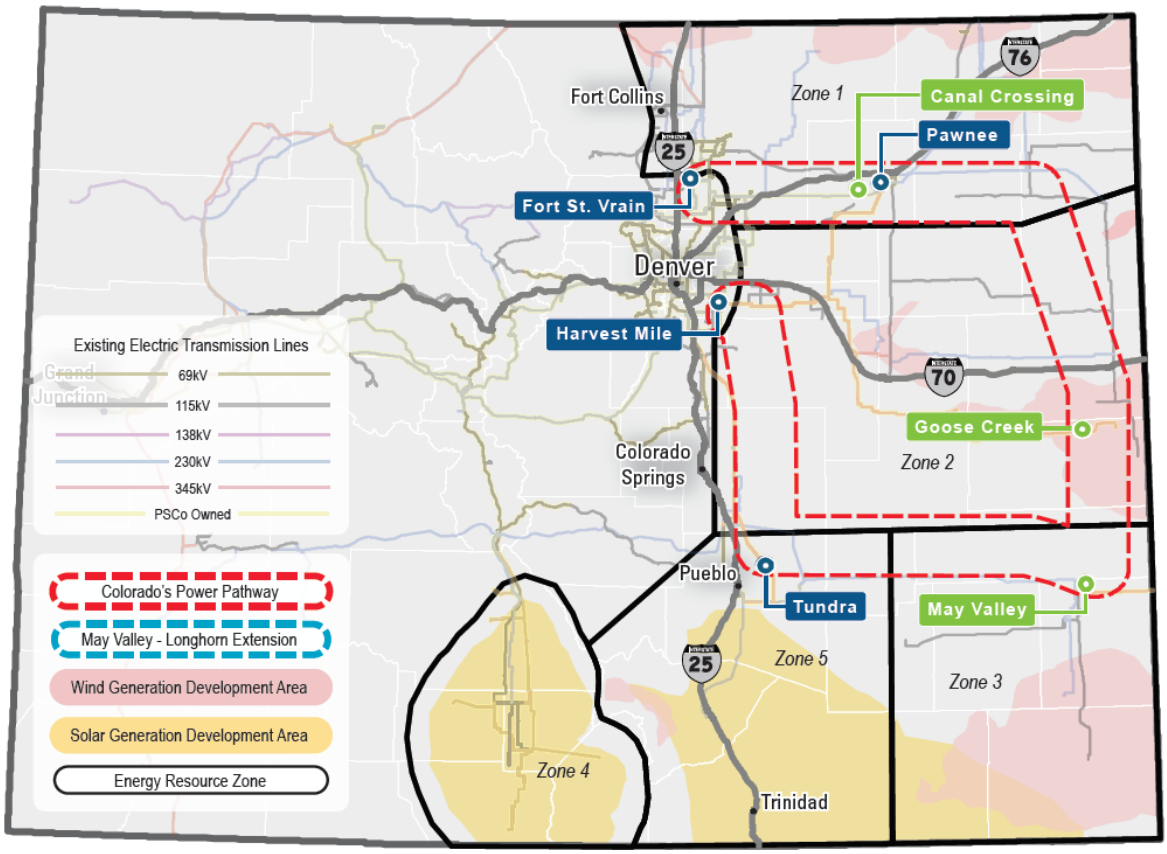


Figure 1: 345 kV Transmission Line General Area Overview

DATA

The two conductor types analyzed were 1272 ACSR Bittern and 556 twisted pair (T2) ACSR Dove. Table 2 provides the loading of each conductor (in percentage as a function of the conductor current carrying capacity) as provided by Public Service, to be used in this study and the equivalent conductor diameter. Both conductors are two-conductor bundle with a horizontal spacing of 18 inches.

Table 2: Conductor Loading and Sizes				
Conductor	Loading (amperes)			Diameter (inches)
	25%	50%	100%	
1272 ACSR Bittern	723	1,445	2,890	1.345
556 T2 Dove	786	1,571	3,142	1.517

The double circuit structure reviewed is provided in Appendix A. Dimensions shown for the double circuit structure in Appendix A were used in calculations to obtain audible noise and magnetic field results. Figure 2 shows the phasing for the double circuit structure.

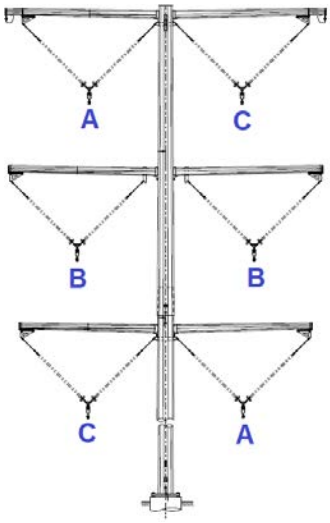


Figure 2: Double Circuit Phasing

Additional data used in the audible noise and magnetic field calculations are listed below.

- Average line altitude: 7,000 feet
- Right-of-Way (ROW) width: 150 feet
- Operating voltage: 345 kV
- Conductor minimum height: 30.5 feet
- Lower conductor average height: 51.5 feet
- Shield Wires: Two AFL DNO-10723 OPGW, 0.555-inch diameter

The shield wires were assumed to have 10-foot less sag than the phase conductors.

Any changes to the conductors, dimensions, or the phase arrangement could affect the results of the study.

PUC RULES AND STUDY METHODOLOGY

Applicable Rules for Magnetic Fields and Audible Noise

PUC Rule 3206 – Construction or Extension of Transmission Facilities (4 CCR 723-3-3206) requires new transmission facilities comply with Rule 3206 (f) for audible noise and 3206 (e) for magnetic fields.

Magnetic Field levels are detailed in section 3206(e), which states the following:

> The filing shall include the expected maximum level of magnetic fields that could be experienced under design conditions at the edge of the transmission line right of way or Station boundary, at a location of one meter above ground.

In addition, Rule 3206(e)(III) provides that "[p]roposed magnetic field levels of 150 mG (milliGauss) and below are deemed reasonable by rule and need not be mitigated to a lower level."

Audible Noise levels are detailed in section 3206(f), which states the following:

> The filing shall include the projected noise radiating beyond the property line or right-of-way (as applicable) at a distance of 25 feet.

Rule 3206(f)(II) provides that proposed levels of noise at or below the values listed below, by land use zoning designations, are deemed reasonable by rule and need not be mitigated to a lower level:

(A)	Residential	50 db(A)
(B)	Commercial	55 db(A)
(C)	Light industrial	65 db(A)
(D)	Industrial	75 db(A)

Rule 3206(f)(III) further provides that for land that has a zoning designation other than one of the four designation enumerated above, proposed noise levels will not be subject to further review if the proposed noise threshold is 50 dB(A) or below regardless of use of land.

Colorado's Power Pathway will generally be a greenfield construction project and will be approximately 560 miles in length. The transmission line will span several counties in Colorado and will likely cross through multiple different zoning districts with different zoning designations.

Transmission Line Magnetic Fields and Audible Noise Analysis Methodology and Assumptions

The audible noise and magnetic field analysis was performed using the Bonneville Power Administration's (BPA) Corona and Field Effects Program (CAFEP) software version 3, which is a utility standard program for noise and magnetic field modeling. CAFEP uses the electrical and

physical characteristics of the transmission line to calculate resulting fields and interference effects from the transmission lines.

The audible noise is primarily a function of the maximum operating voltage of conductors but is also impacted by the diameter of the conductors, distance of the conductors from each other, and elevation of the line above sea level. Audible noise was analyzed at the average conductor height along a span, as is standard in the industry.

Magnetic fields were primarily a function of the line current loading, which varies over time. The magnetic fields calculations were performed at 25%, 50% and 100% conductor current carrying capacity, as defined for each conductor in Table 2. For the analysis, magnetic fields were analyzed at a minimum conductor height (near mid-span, at maximum sag), as this location will produce the worst-case scenario (*i.e.* the highest magnetic field values).

Audible Noise (AN)

Audible noise is measured as an equivalent A-weighted sound-pressure level in decibels [dB(A)]. The L50 audible noise values represent the predicted average noise levels. The actual value is expected to be at or below this calculated L50 value 50% of the time, and above the value the other 50% of the time. Values are calculated at a height of five feet above the ground per IEEE Std 656-2018, using an estimated average conductor height of two-thirds the MOT (Maximum Operating Temperature) sag to approximate the average values along the entire line. In general, audible noise is highest during foul weather conditions (rain) as can be seen in the Results section for Audible Noise.

A single pole structure was modeled for audible noise. The new 345 kV lines are generally anticipated to be located in the center of a 150-foot-wide ROW.

Magnetic Fields

The reported magnetic field values are the magnetic flux density at a given point in space. Magnetic flux density is measured in gauss or milligauss (mG). Magnetic fields were analyzed at minimum conductor height above ground. Magnetic fields are analyzed at the edge of right-of-way for transmission lines and at a height of one meter (3.28 ft) above ground per IEEE Std 644-2019 and consistent with PUC Rule 3206(e).

A transmission line was modeled using a single pole structure. The new 345 kV lines are generally anticipated to be located in the center of a 150-foot-wide ROW.

RESULTS

Results for audible noise and magnetic field calculations are shown as to allow a comparison of results by conductor types.

Audible Noise (AN) Results

The calculated results of the audible noise (AN) for each specified conductor type are shown in Table 3. Audible Noise results are analyzed at the centerline, at the edge of right-of-way, and at 25 feet beyond the edge of right-of-way.

Table 3: Audible Noise Results

Conductor	Audible Noise [dB(A)] Per Location					
	Rain			Fair		
	25 Feet Beyond ROW	Edge of ROW	Centerline	25 Feet Beyond ROW	Edge of ROW	Centerline
Most stringent deemed reasonable level [Residential] (PUC Rule 3206)	*50*	*N/A*	*N/A*	*NA*	*N/A*	*N/A*
Bittern	49.8	50.7	52.9	24.8	25.7	27.9
T2 Dove	47.6	48.5	50.7	22.6	23.5	25.7

Figure 3 and Figure 4 show plots of the audible noise results for foul weather (rain) conditions and fair weather (dry) conditions, respectively, by conductor type.

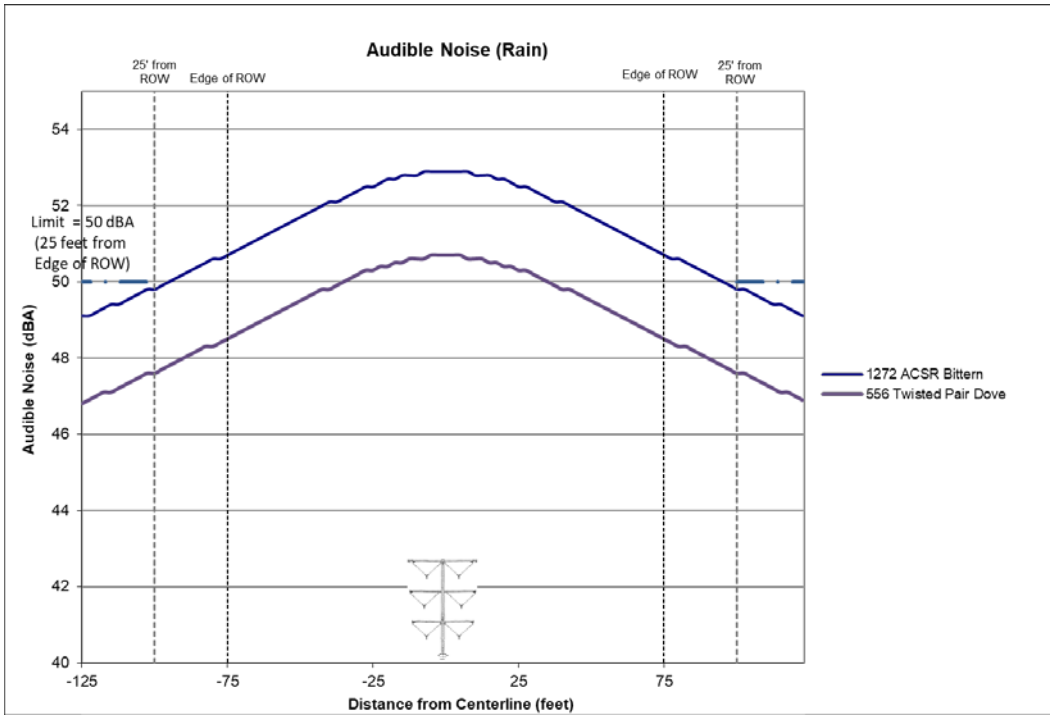


Figure 3: Audible Noise (AN) – Rain

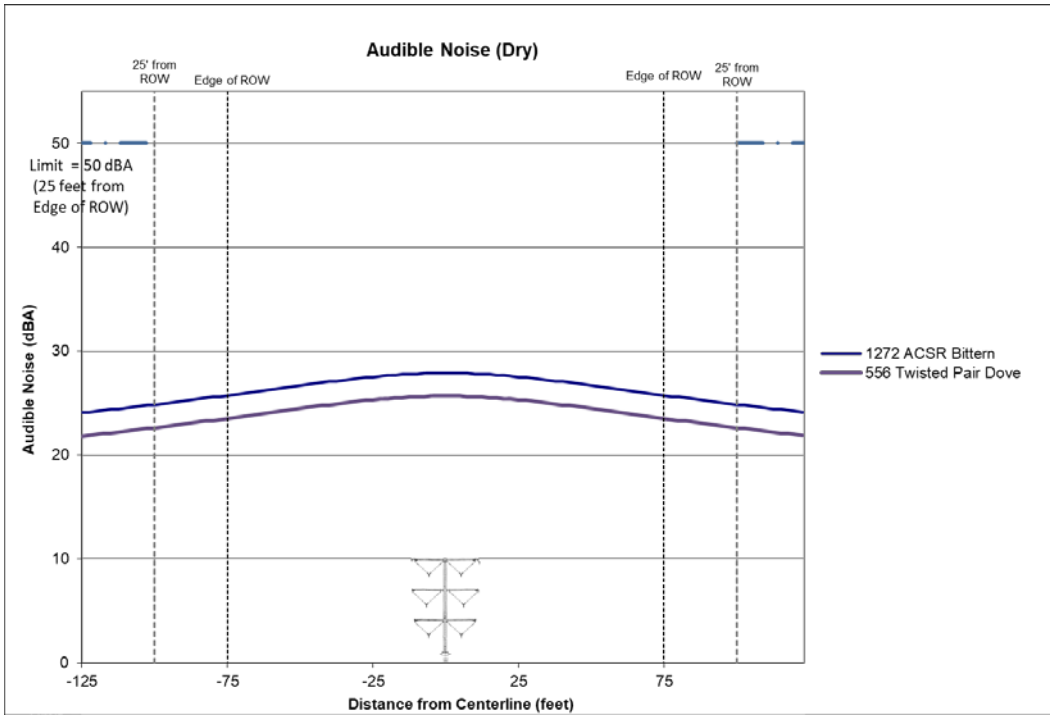


Figure 4: Audible Noise (AN) – Fair Weather (Dry)

The audible noise results for both foul weather (rain) conditions and fair conditions are below 50 dB(A) at 25 feet from both sides of the edge of the ROW. The audible noise levels are below all levels deemed reasonable by Commission rule, including the Commission's most stringent 50 dB(A) residential noise limit set forth in Rule 3206(f).

Magnetic Fields

The calculated magnetic field results are shown in Table 4. Magnetic field results are analyzed within the right-of-way for maximum value and at the edge of right-of-way for each 25%, 50%, and 100% of the conductor current carrying capacity.

Table 4: Magnetic Field Results

Conductor	Edge of ROW Magnetic Field (mG)		
	25% Capacity	50% Capacity	100% Capacity
Deemed reasonable level (PUC Rule 3206)	*150*	*150*	*150*
Bittern	13.7	27.4	54.7
T2 Dove	14.9	29.7	59.5

Figure 5, Figure 6, and Figure 7 show plots of the magnetic field results at 25%, 50% and 100% capacity, respectively, by conductor type.

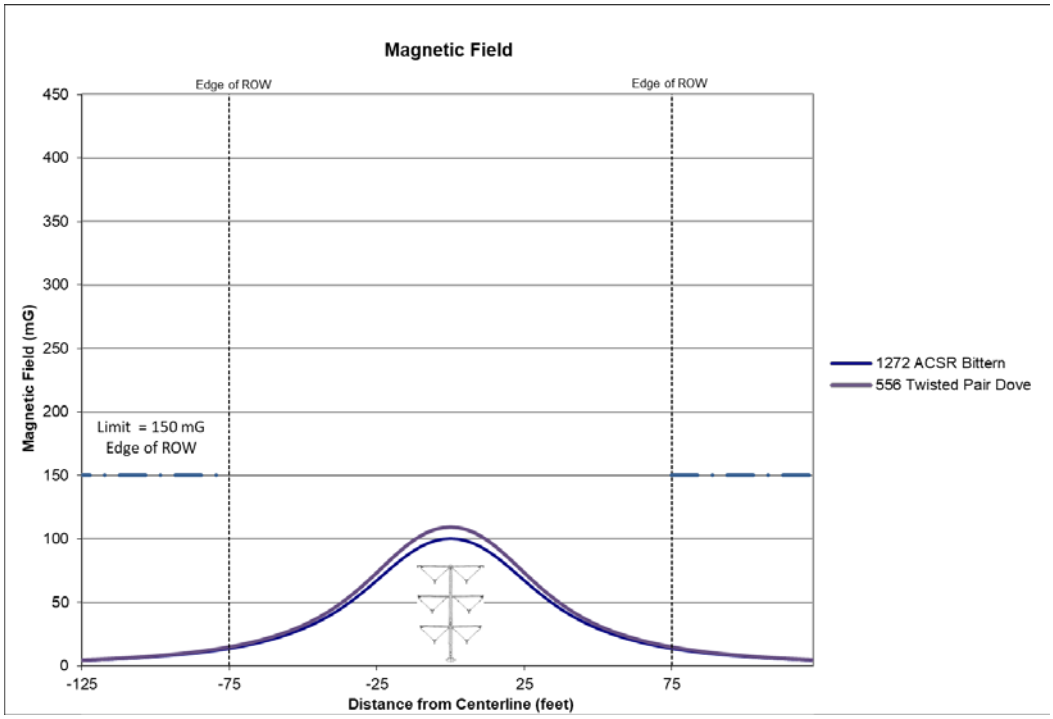


Figure 5: Magnetic Field (MF) – 25% Capacity

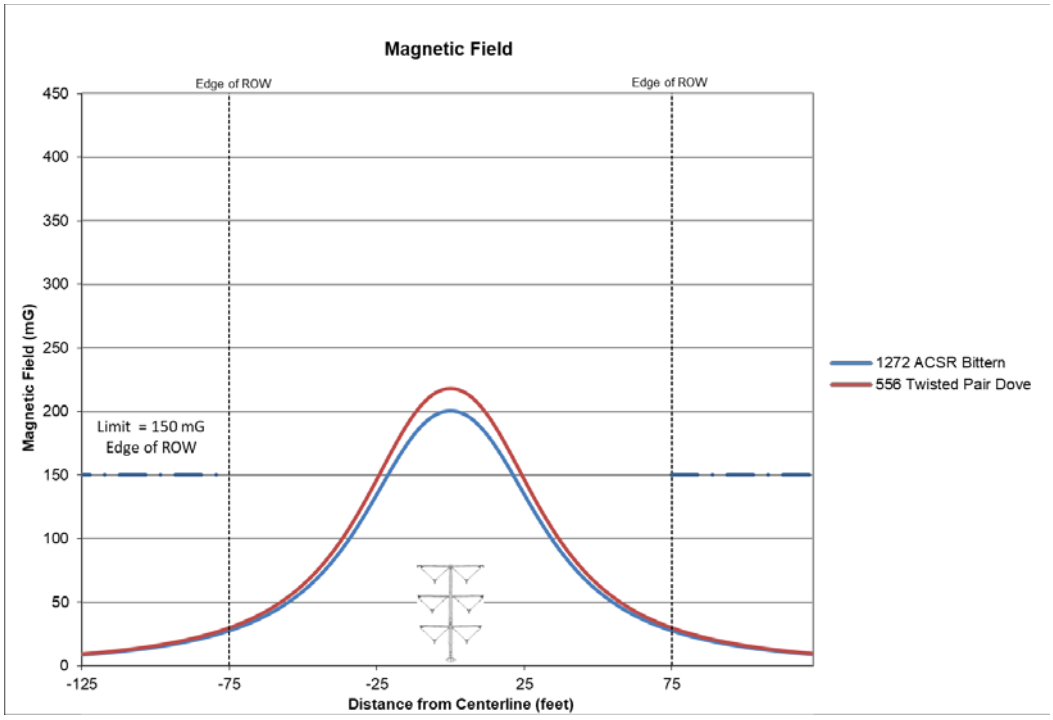


Figure 6: Magnetic Field (MF) – 50% Capacity

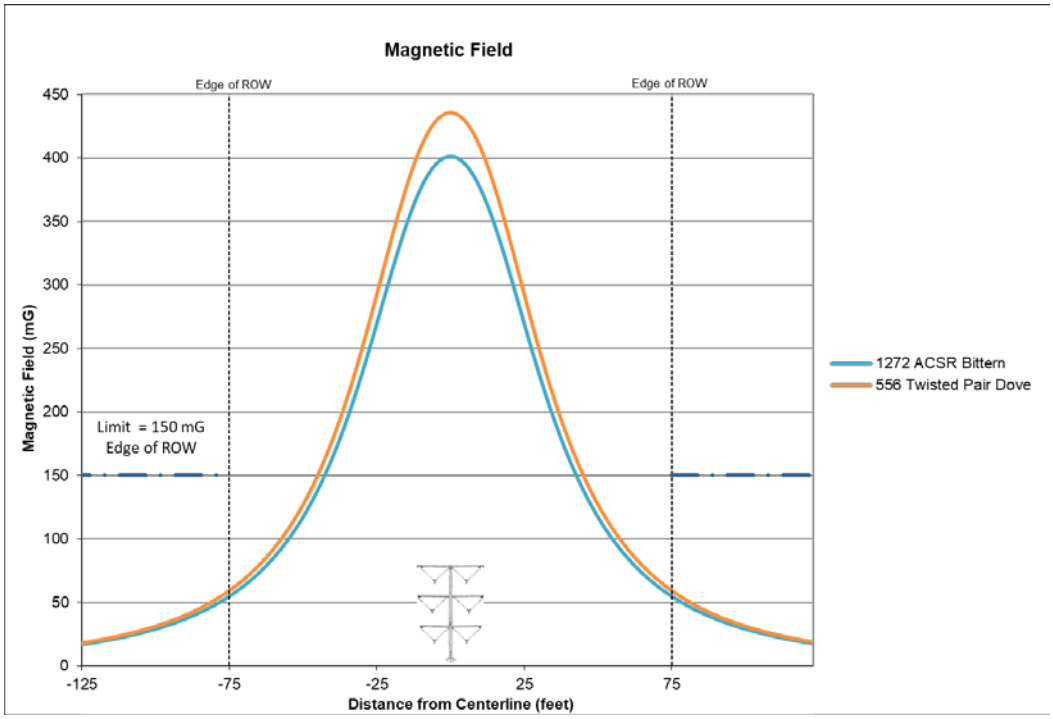


Figure 7: Magnetic Field (MF) – 100% Capacity

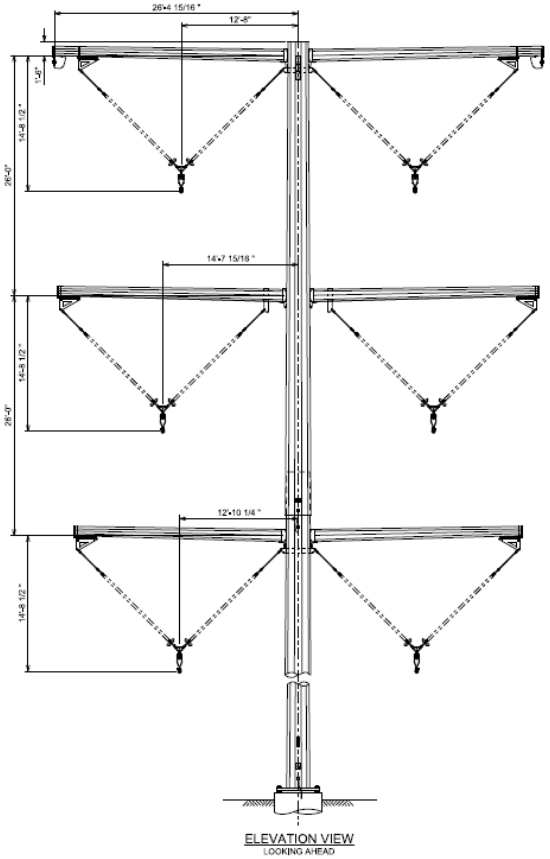
The magnetic field results for all conductor current carrying capacity are well below the 150 mG deemed reasonable at the edge of the ROW by PUC Rule 3206(e).

CONCLUSIONS

Audible noise levels [dB(A)] were analyzed at the centerline, at the edge of right-of-way, and at 25 feet beyond the edge of right-of-way. The results indicate that the noise levels in both fair and wet conditions from both potential conductor types reviewed (1272 ACSR Bittern and 556 twisted pair ACSR Dove) would fall below all audible noise levels deemed reasonable by the Rule 3206(f), including the most stringent residential level 50 dB(A) at 25 feet beyond the edge of the ROW.

Magnetic Fields were analyzed at the edge of the ROW and the magnetic fields from both potential conductor types are below the 150 mG magnetic field level that is deemed reasonable by Rule 3206(e).

APPENDIX A – STRUCTURE DRAWINGS AND REFERENCE DATA



ELEVATION VIEW
LOOKING AHEAD

REV	DATE	WBS 4	REVISION DESCRIPTION

I hereby certify that this plan, specification, or report was prepared by me or under my direct supervision and that I am a duly Licensed Professional Engineer under the laws of the state of Minnesota.

Signature: _____

Typed or Printed Name: _____

Date: _____

License Number: _____

ISSUED BY ENGINEERING DEPT FOR: CONSTRUCTION

CIRCUIT 345 kV
STRUCTURE DRAWING - TANGENT - STEEL - D,C, - SINGLE POLE
0-2 DEGREE, V-STRING, VERTICAL

Xcel Energy® | ERP_345-TAN-2CKT | SCALE NONE | REV. 0

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February 26, 2021

XCEL ENERGY

Colorado's Power Pathway Project

Substation Magnetic Field and Audible Noise Study

Final

PROJECT NUMBER:
167902

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POWER ENGINEERS

SUBSTATION MAGNETIC FIELD AND AUDIBLE NOISE STUDY

PREPARED FOR:

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REVISION HISTORY						
REV.	ISSUE DATE	ISSUED FOR	PREP BY	CHKD BY	APPD BY	NOTES
0	2021-02-26	Impl	SAS	WAA	RES	Issued for Implementation

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EXECUTIVE SUMMARY

Public Service Company of Colorado (Public Service or the Company) contracted POWER Engineers, Inc. (POWER) to investigate magnetic field and audible noise effects for the expansion or construction of seven substations (including single voltage switching stations) as part of Colorado's Power Pathway Project (Pathway Project), which includes 560 miles of new, double circuit 345 kV transmission infrastructure in eastern Colorado. The purpose of this report is to set forth the expected maximum level of magnetic fields that could be experienced at substation boundaries and the projected level of audible noise at 25 feet beyond substation property lines. This is consistent with Colorado Public Utilities Commission (PUC) Rule 3206 – Construction or Extension of Transmission Facilities (4 CCR 723-3-3206), in support of Public Service's application for a Certificate of Public Convenience and Necessity (CPCN) for these substation expansions, new substation construction, and the related transmission line. This report will be submitted to the PUC with the CPCN application. All analysis provided in this report is presented for the substation build-out to support the Pathway Project.

Table 1 shows the maximum magnetic field strengths calculated at substation boundaries and the maximum audible noise levels calculated at 25 feet from substation property lines. For magnetic field strengths, the maximum value at the fence line or property line of each substation is shown. As detailed in the report, the calculated magnetic field strengths at the fence line of all substations in the Pathway Project are expected to be below the 150 mG level deemed reasonable by PUC Rule 3206(e), with the exception of Pawnee and Harvest Mile Substations. For the substations where magnetic field levels were calculated above 150 mG at the fence line, magnetic field levels were also calculated at the substation property line. For Pawnee Substation, although the magnetic field strength at one fence line is projected to be above the level deemed reasonable by Rule 3206(e), Public Service owns the land adjacent to and surrounding the substation, and the magnetic field strength at the property line is below the level deemed reasonable by Rule 3206(e). Similarly, for Harvest Mile Substation, although the magnetic field strength at one fence line is projected to be above the level deemed reasonable by Rule 3206(e), the magnetic field strength at that property line is below the level deemed reasonable by Rule 3206(e).

For audible noise levels, the maximum value 25 feet from the property line is shown in accordance with PUC Rule 3206(f). As detailed in the report, the audible noise levels for Fort St. Vrain Substation, Pawnee Substation, and Canal Crossing Substation are expected to be below the applicable zoning-dependent level deemed reasonable by PUC Rule 3206(f). The other substations are not, or will not be, located on land for which there is a zoning-dependent noise level limit deemed reasonable by PUC Rule 3206(f).

TABLE 1 – MAGNETIC FIELD AND AUDIBLE NOISE RESULTS SUMMARY			
CASE	**LOCATION OF APPLICABLE MAXIMUM VALUE**	**DEEMED REASONABLE LEVEL (PUC RULE 3206)**	**RESULTS**
Magnetic Field	**Substation Boundary**	**150 mG**	**—**
Fort St. Vrain	Maximum at northern fence line	150 mG	112 mG
Canal Crossing	Maximum at southern fence line	150 mG	69 mG
Pawnee	Maximum at southern property line	150 mG	0.2 mG[a]
Goose Creek	Maximum at western fence line	150 mG	89 mG
May Valley	Maximum at western fence line	150 mG	82 mG
Tundra	Maximum at southwestern fence line	150 mG	105 mG
Harvest Mile	Maximum at southern property line	150 mG	32 mG[a]
Audible Noise	**25 feet from Substation Property Line**	**Deemed reasonable level (Zoning-dependent per Rule 3206)**	**—**
Fort St. Vrain	Maximum 25 feet from northern property line	75 dB(A) (Industrial)	62 dB(A)
Canal Crossing	Maximum 25 feet from northern property line	75 dB(A) (Industrial)	61 dB(A)
Pawnee	Maximum 25 feet from northern property line	75 dB(A) (Industrial)	62 dB(A)
Goose Creek	Maximum 25 feet from eastern property line	None established by Rule 3206(f)[b]	62dB(A)
May Valley	Maximum 25 feet from eastern property line	None established by Rule 3206(f)[b]	60 dB(A)
Tundra	Maximum 25 feet from northeastern property line	None established by Rule 3206(f)[b]	61 dB(A)
Harvest Mile	Maximum 25 feet from southern property line	None established by Rule 3206(f)[b]	57 dB(A)

(a) For Pawnee Substation, although the magnetic field strength results at one substation fence line are above the level deemed reasonable by Rule 3206(e), Public Service owns the land adjacent to and surrounding the substation, and the magnetic field strength at the property line is below the level deemed reasonable by PUC Rule 3206(e).

For Harvest Mile Substation, although the magnetic field strength results at one substation fence line are above the level deemed reasonable by Rule 3206(e), the magnetic field strength at the property line is below the level deemed reasonable by PUC Rule 3206(e).

(b) For some of the Power Pathway substations, the substation parcels and surrounding land are zoned agricultural and/or a mix of other zoning designations. Rule 3206(f) does not identify an audible noise level that is deemed reasonable for land zoned agricultural, and POWER does not draw any conclusions about the zoning-dependent audible noise levels that would be deemed reasonable by PUC Rule 3206(f). Additional information about zoning and land use can be found in the "Zoning Designations and Land Use" section below.

PROJECT NEED

In 2018, Public Service announced the Company's vision to reduce carbon dioxide emissions 80 percent company-wide from 2005 levels by 2030 and to provide 100 percent carbon-free electricity by 2050. In order to achieve an 80 percent reduction by 2030, extra high voltage transmission infrastructure will need to be constructed to assist bringing renewable generation from northeastern, eastern and/or southern parts of Colorado to the Denver Metro area and the Company's existing transmission system.

PROJECT DESCRIPTION

The Pathway Project will consist of a double circuit 345 kV transmission line that will connect with seven existing and new substations: Fort St. Vrain, Canal Crossing, Pawnee, Goose Creek, May Valley, Tundra, and Harvest Mile. Figure 1 shows the larger project area with the double circuit 345 kV transmission line.

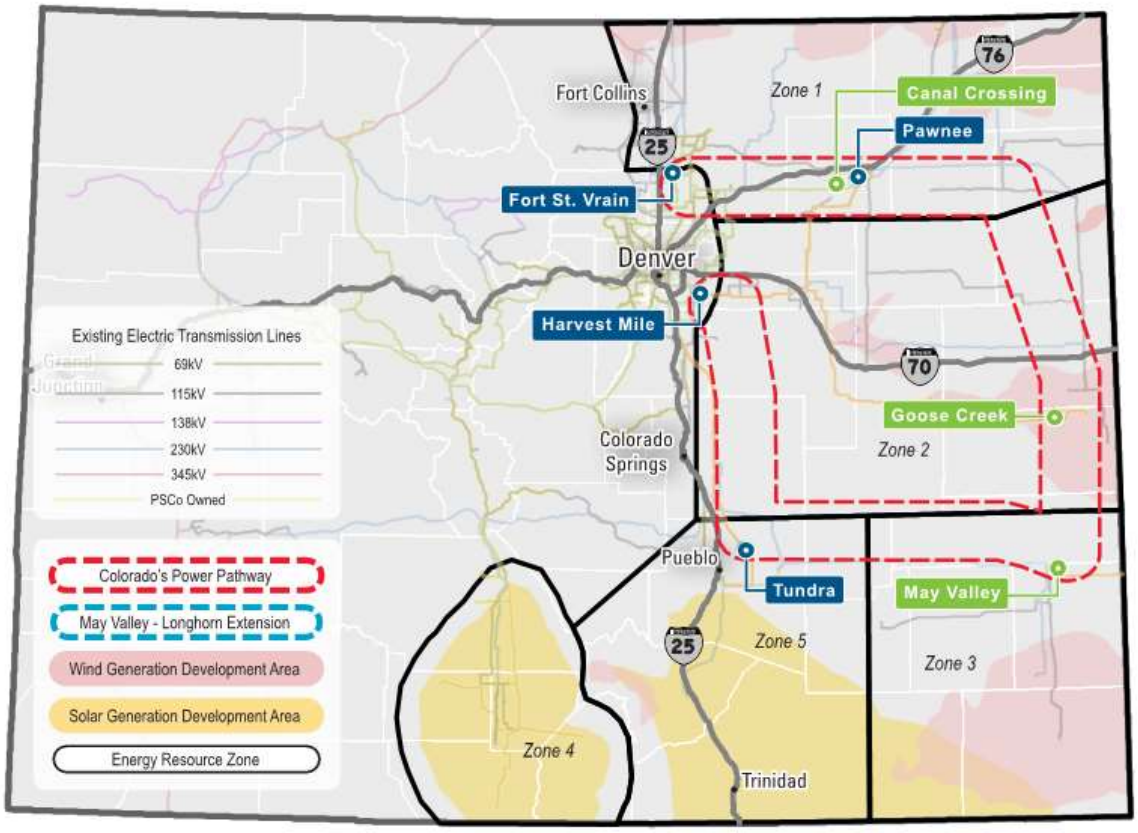

Figure 1: Pathway Project General Area Overview

PUC RULES AND STUDY METHODOLOGY

Applicable Rules for Magnetic Fields and Audible Noise

PUC Rule 3206 – Construction or Extension of Transmission Facilities (4 CCR 723-3-3206) requires new transmission facilities comply with Rule 3206(e) for magnetic field strengths and 3206(f) for audible noise.

Magnetic field levels are detailed in section 3206(e), which states the following:

> The filing shall include the expected maximum level of magnetic fields that could be experienced under design conditions at the edge of the transmission line right-of-way or substation boundary, at a location of one meter above ground.

In addition, Rule 3206(e)(III) provides that "[p]roposed magnetic field levels of 150 mG (milliGauss) and below are deemed reasonable by rule and need not be mitigated to a lower level."

Audible noise levels are detailed in section 3206(f), which states the following:

> The filing shall include the projected level of noise radiating beyond the property line or right-of-way (as applicable) at a distance of 25 feet.

Rule 3206(f)(II) provides that proposed levels of noise at or below the values listed in Figure 2, by land use zoning designation, are deemed reasonable by rule and need not be mitigated to a lower level:

(A)	Residential	50 db(A)
(B)	Commercial	55 db(A)
(C)	Light industrial	65 db(A)
(D)	Industrial	75 db(A)

Figure 2: Audible Noise Levels Deemed Reasonable by Rule 3206(f) by Zoning Designation

Rule 3206(f)(III) further provides that for land that has a zoning designation other than one of the four designations enumerated above, proposed noise levels will not be subject to further review if the proposed noise threshold is 50 dB(A) or below regardless of use of land.

Zoning Designations and Land Use

Table 2 summarizes the zoning designations of the Pathway Project substation parcels and details zoning and uses of the surrounding land.

TABLE 2 – SUBSTATION ZONING AND SURROUNDING LAND USES			
SUBSTATION	**SUBSTATION ZONING[a]**	**ZONING OF SURROUNDING LAND**	**SURROUNDING LAND USES**
Fort St. Vrain	Heavy Industrial (I-3)	• Agricultural (A)	• Agriculture and livestock operations • Oil and gas infrastructure • Power plant • South Platte River and associated floodplains
Pawnee and Canal Crossing	Heavy Industrial (HI)	• Split Zoning (SZ) • Agriculture Production Zone (A)	• Agriculture • Oil and gas infrastructure • Power plants and substations • State wildlife area • Water reservoirs and evaporation ponds
Goose Creek	Agricultural (A)	• Agricultural (A)	• Agriculture • Existing wind facility
May Valley	Non-irrigated Agriculture (A-2)	• Non-irrigated Agriculture (A-2)	• Agriculture • Oil and gas infrastructure
Tundra	Agricultural (A-1)	• Agricultural (A-1), except Pueblo Chemical Depot	• Grassland • Pueblo Chemical Depot • Pueblo Memorial Airport
Harvest Mile	Agricultural (A-1)	• Agricultural (A-1) • Mixed Use (MU) • Residential (R-2)	• Agriculture • Mixed use (Arapahoe County Fairgrounds Event Center) • Residential

(a) Zoning information in this table was provided by Public Service.

Substation Magnetic Field and Audible Noise Analysis Methodology and Assumptions

Magnetic Fields

The magnetic field effects were modeled using SES (Safe Engineering Services and technologies ltd.) CDEGS (Current Distribution, Electromagnetic fields, Grounding and Soil structure analysis) software, version 16.2. The CDEGS software allows for modeling of the bus work (typically horizontal conductors and vertical conductors) in three dimensions, which allows the physical system to be accurately represented within the model and field effects to be analyzed.

The analysis was performed by energizing the buses to the maximum rating. To this end, vertical and horizontal buses were energized to carry the maximum steady state current rating of 3,000 amperes in

the same directions. It is worth mentioning that this energization scheme may not be physically feasible given that currents will split at bus nodes. Therefore, this energization represents the worst-case magnetic field strengths (i.e. the highest EMF values) that can be produced outside of the bus zone if all the bus conductors carry their maximum current rating. Consistent with PUC Rule 3206(e), the magnetic field is analyzed and reported at a height of one meter above the ground.

The values of these effects were calculated at the substation fence line. In certain instances, the magnetic field levels were calculated for reference at the property line and beyond. Results include, for reference, plots of the values for the entire substation.

Audible Noise

The audible noise effects were analyzed through acoustic modeling of the substation using the DataKustik GmbH, CadnaA (Computer Aided Noise Abatement) software package (version 4.5.151 or version 2021 MR 1), which is a utility standard program. Noise propagation characteristics in this software package are based upon *ISO 9613 "Acoustics – Attenuation of sound during propagation outdoors –Part 1: Calculation of the absorption of sound by the atmosphere and Part 2: General method of calculation."*

The audible noise effects for this project are driven by the maximum sound pressure of the transformers and reactors. The values of these effects were calculated at points 25 feet from the substation property line. The receptor height placement is modeled at 1.5 meters (4.9 feet) to approximate the height of an individual's ear. Results include, for reference, plots of the values for the entire substation and at least 25 feet beyond the substation property line.

STUDY DETAILS

Magnetic field and audible noise performance are based on the electrical and physical characteristics of the substation. Specifically, these factors are driven by the voltage and current loading of the bus, the heights of the conductors and buses from the ground, and transformer and reactor ratings. As a result, there are a number of variable factors that will affect results. The data listed in Table 3 was used for the analysis. Should any of this data change, the results will also change.

TABLE 3 – SUMMARY OF INPUT DATA

MEASUREMENT CATEGORY	DATA
345 kV Bus Rating[a]	3,000 A
230 kV Bus Rating[a]	3,000 A
15 kV Bus Current Maximum[b]	1,540 A
345 kV Low Bus Height[c]	19.0 feet
345 kV High Bus Height[c]	33.5 feet
230 kV Low Bus Height[c]	17 feet
230 kV High Bus Height[c]	28 feet
15 kV Low Bus Height[c]	12 feet
15 kV High Bus Height[c]	19 feet
60 MVAR Reactor Maximum Sound Pressure Level[d]	83 dB(A)
40 MVAR Reactor Maximum Sound Pressure Level[d]	65 dB(A)
345 kV/230 kV 560 MVA Transformer Maximum Sound Pressure Level[e]	77 dB(A)

(a) Bus ratings are per Public Service design standards.

(b) Bus current maximum assumed using 15 kV and ideal 40 MVAR reactor.

(c) Bus heights listed in Table 3 are per Public Service design standards. For Harvest Mile and Goose Creek, the following bus heights were used in place of the design standards: 18 feet/28 feet for low/high bus at 230 kV, and 21 feet/37 feet for low/high bus at 345 kV, respectively.

(d) Measurement locations per IEEE Std C57.21-2008. 40 MVAR reactor level per NEMA.

(e) Measurement locations per IEEE Std C57.12.90-2010.

Appendix A includes substation general arrangement drawings from which dimensions were obtained. Note that for all new and expanding substations, buses shown horizontally on the drawings were assumed to be low buses, and buses shown vertically were assumed to be high buses. For the existing 230 kV sections at Fort St. Vrain, the buses shown horizontally were assumed to be high buses, and buses shown vertically were assumed to be low buses.

RESULTS

Magnetic Field

The reported magnetic field strength values are the magnetic flux densities at given points in space. Magnetic flux density is calculated in gauss or milligauss (mG). For these studies, magnetic field strengths were calculated with the maximum ampacity flowing in the substation based upon the bus rating.

Fort St. Vrain

Table 4 shows a summary of the magnetic field strength values at the fence line, within the existing property line, for the expanded Fort St. Vrain Substation. Values are calculated at a height of one meter above the ground per IEEE Std 644-2019 and consistent with PUC Rule 3206(e). The magnetic field strength levels at each of the proposed fence lines for the expansion portion of the substation are below the 150 mG magnetic field level deemed reasonable by PUC Rule 3206(e).

TABLE 4 – FORT ST. VRAIN MAGNETIC FIELD STRENGTH

STATION FENCE LINE LOCATION	MAGNETIC FIELD AT EDGE OF FENCE LINE [mG]
Magnetic Field Deemed Reasonable Level (PUC Rule 3206)	*150*
Maximum Northern Fence Line	112
Maximum Eastern Fence Line	57
Maximum Southern Fence Line	57
Maximum Western Fence Line	57

Figure 3 shows magnetic field strengths along the entire substation fence line, while Figure 4 shows magnetic field strength values throughout the substation that exceed 150 mG. Figure 3 shows magnetic field strength values higher than the 150 mG deemed reasonable at certain points along the edge of the existing 230 kV yard, within the Public Service property line. The highest magnetic field levels are at the north end of the existing substation immediately adjacent to the Fort St. Vrain generating station. Access to this area is restricted, and the public is not permitted entry. Public Service also owns additional property adjacent to the identified parcel, extending north of the substation more than half a mile and to the west by 350 feet.

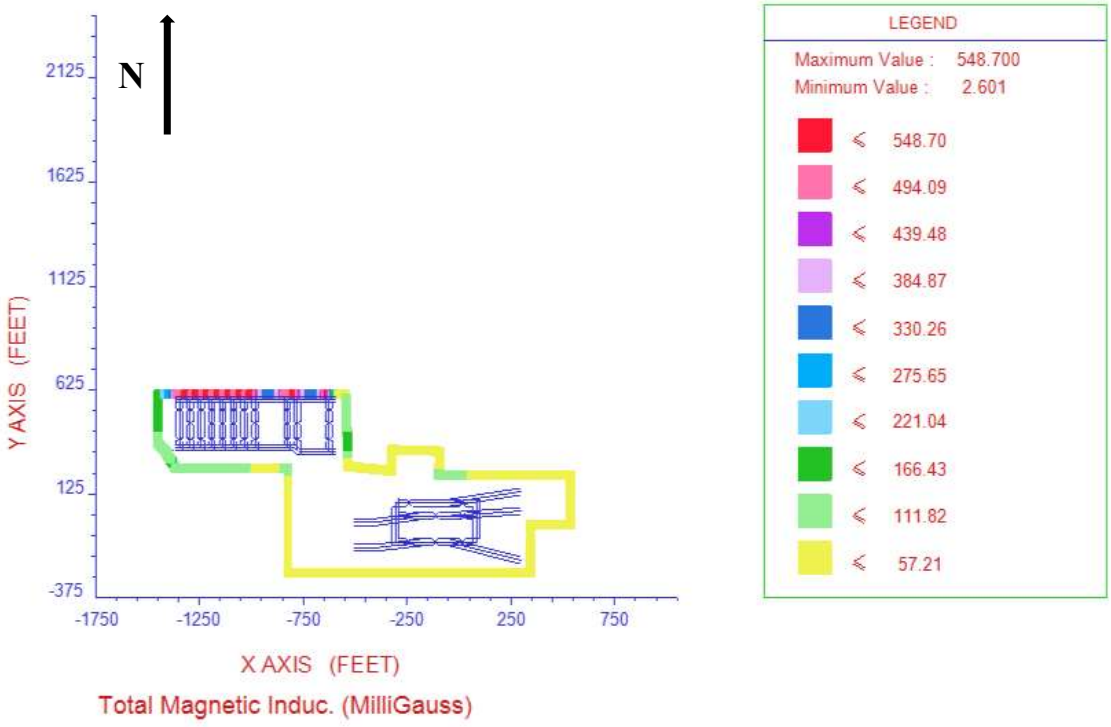

Figure 3: Fort St. Vrain Magnetic Field Strength Values at the Fence Line

Figure 4: Fort St. Vrain Magnetic Field Strength Values Exceeding 150 mG

Canal Crossing

Table 5 shows a summary of the magnetic field strength values at the proposed fence line for the new Canal Crossing Substation based on a conceptual substation general arrangement provided by the Company. Values are calculated at a height of one meter above the ground per IEEE Std 644-2019 and consistent with PUC Rule 3206(e). The magnetic field strength levels at each of the proposed fence lines for the new substation are below the 150 mG magnetic field strength levels deemed reasonable by PUC Rule 3206(e).

TABLE 5 – CANAL CROSSING MAGNETIC FIELD STRENGTH

SUBSTATION FENCE LINE LOCATION	MAGNETIC FIELD AT EDGE OF FENCE LINE [mG]
Magnetic Field Deemed Reasonable Level (PUC Rule 3206)	*150*
Maximum Northern Fence Line	36
Maximum Eastern Fence Line	7
Maximum Southern Fence Line	69
Maximum Western Fence Line	38

Figure 5 shows magnetic field strengths along the fence line. Figure 6 shows magnetic field strength values throughout the substation that exceed 150 mG.

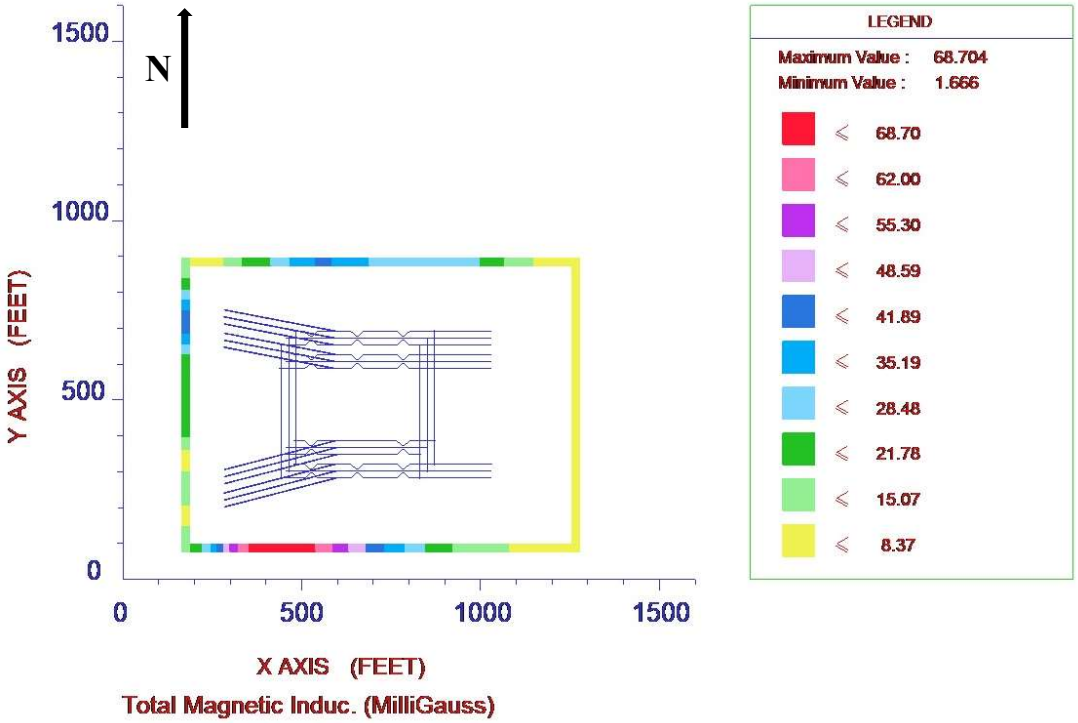

Figure 5: Canal Crossing Magnetic Field Strength Values at the Fence Line

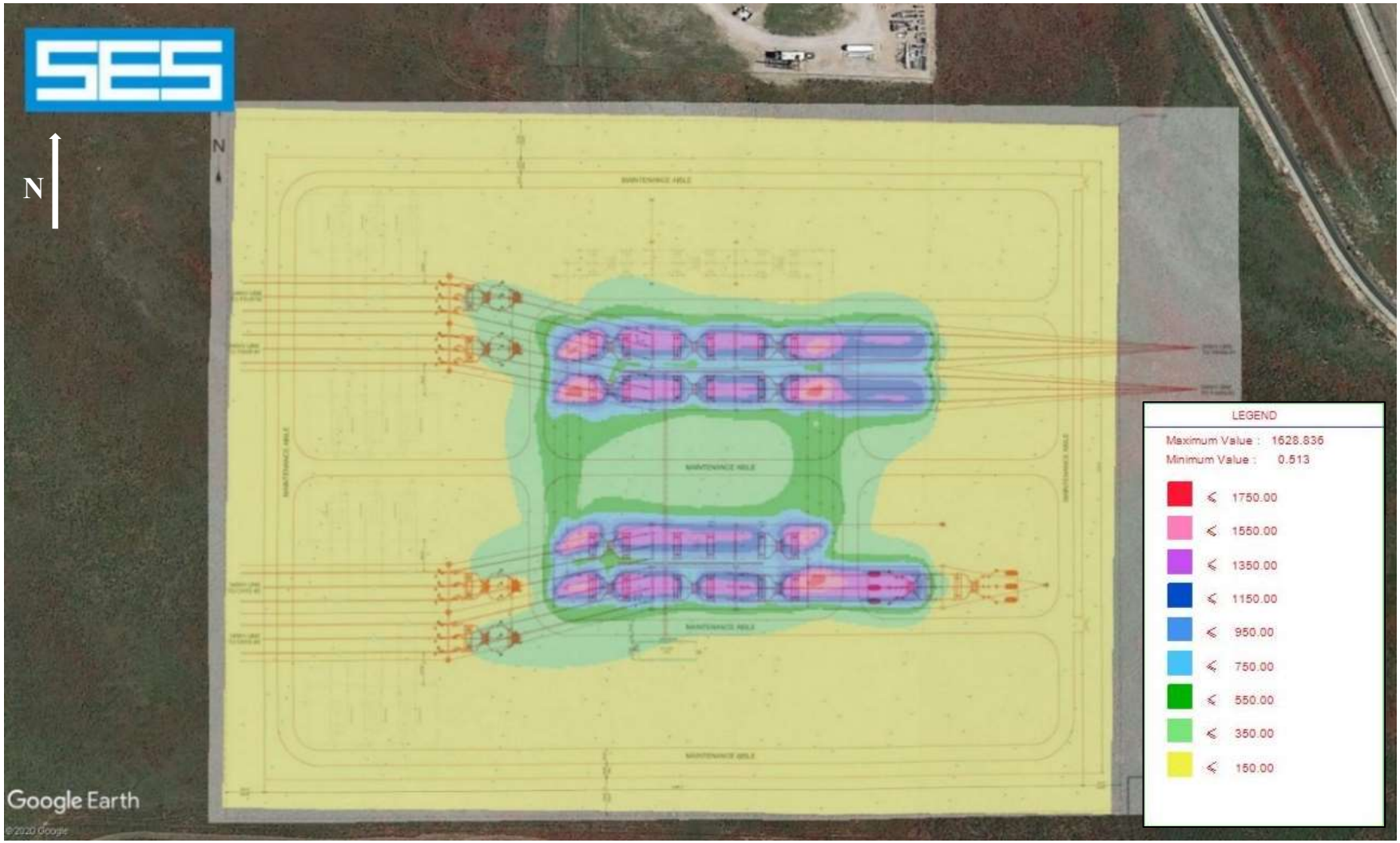

Figure 6: Canal Crossing Magnetic Field Strength Values Exceeding 150 mG

Pawnee

Table 6 shows a summary of the magnetic field strength values at the fence line and property line for the expanded Pawnee Substation. Values are calculated at a height of one meter above the ground per IEEE Std 644-2019 and consistent with PUC Rule 3206(e). Because the magnetic field strength level along one of the substation fence lines is above the 150 mG magnetic field level deemed reasonable by rule, magnetic field strength was calculated at the edge of the property line. The property line analyzed encompasses parcels owned by Public Service that are adjacent to the substation parcel. The magnetic field strength levels along the entire property line are below the 150 mG magnetic field level deemed reasonable by PUC Rule 3206(e).

TABLE 6 – PAWNEE MAGNETIC FIELD STRENGTH

SUBSTATION FENCE LINE LOCATION	MAGNETIC FIELD AT EDGE OF FENCE LINE [mG]	MAGNETIC FIELD AT EDGE OF PROPERTY LINE [mG]
Magnetic Field Deemed Reasonable Level (PUC Rule 3206)	*150*	*150*
Maximum Northern Fence Line	142	0.0
Maximum Eastern Fence Line	39	0.2
Maximum Southern Fence Line	348	0.0
Maximum Western Fence Line	210	0.1

Figure 7 and Figure 8 show plots of the magnetic field strength values along the fence line and property line, respectively. Figure 9 shows magnetic field strengths that exceed 150 mG. The plots at the fence line show values higher than the 150 mG deemed reasonable at certain points along the edge of the southern edge of the substation fence line, well within the existing Public Service property line. Public Service owns the land surrounding the Pawnee Substation (including all the land shown on Figure 8), including for several thousand feet to the south of the substation's southern fence line. Moreover, members of the public are not invited or expected at the substation site. Figure 8 shows that magnetic field strengths fall below 150 mG level deemed reasonable by PUC Rule 3206(e) within the Public Service property line.

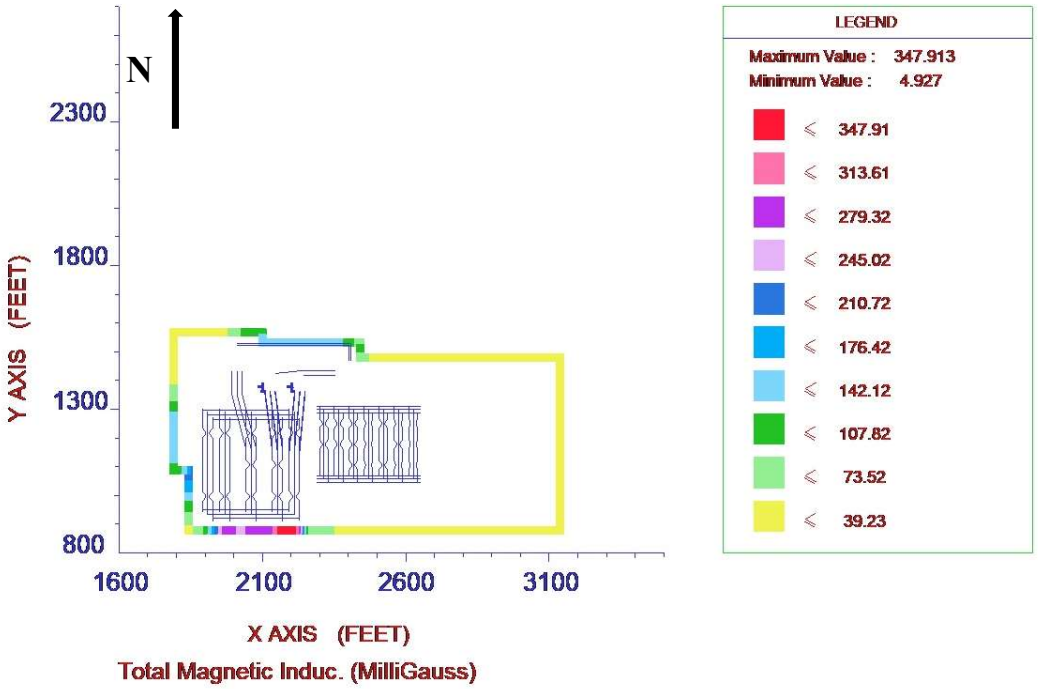

Figure 7: Pawnee Magnetic Field Strength Values at the Fence Line

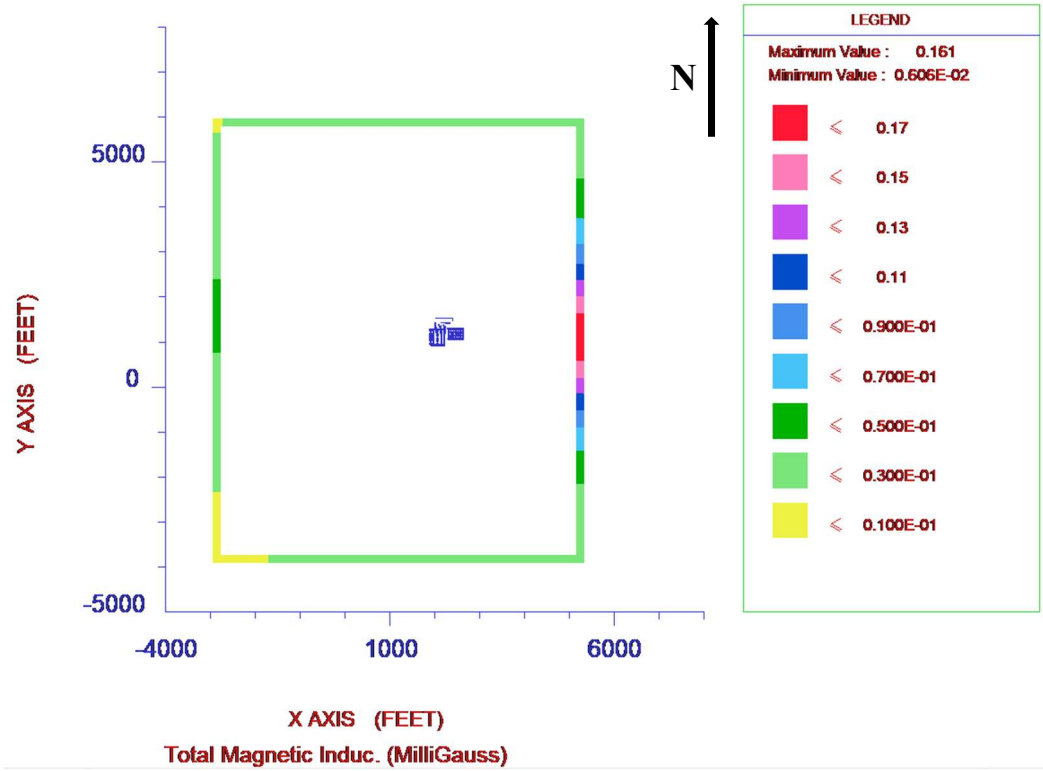

Figure 8: Pawnee Magnetic Field Strength Values at the Property Line

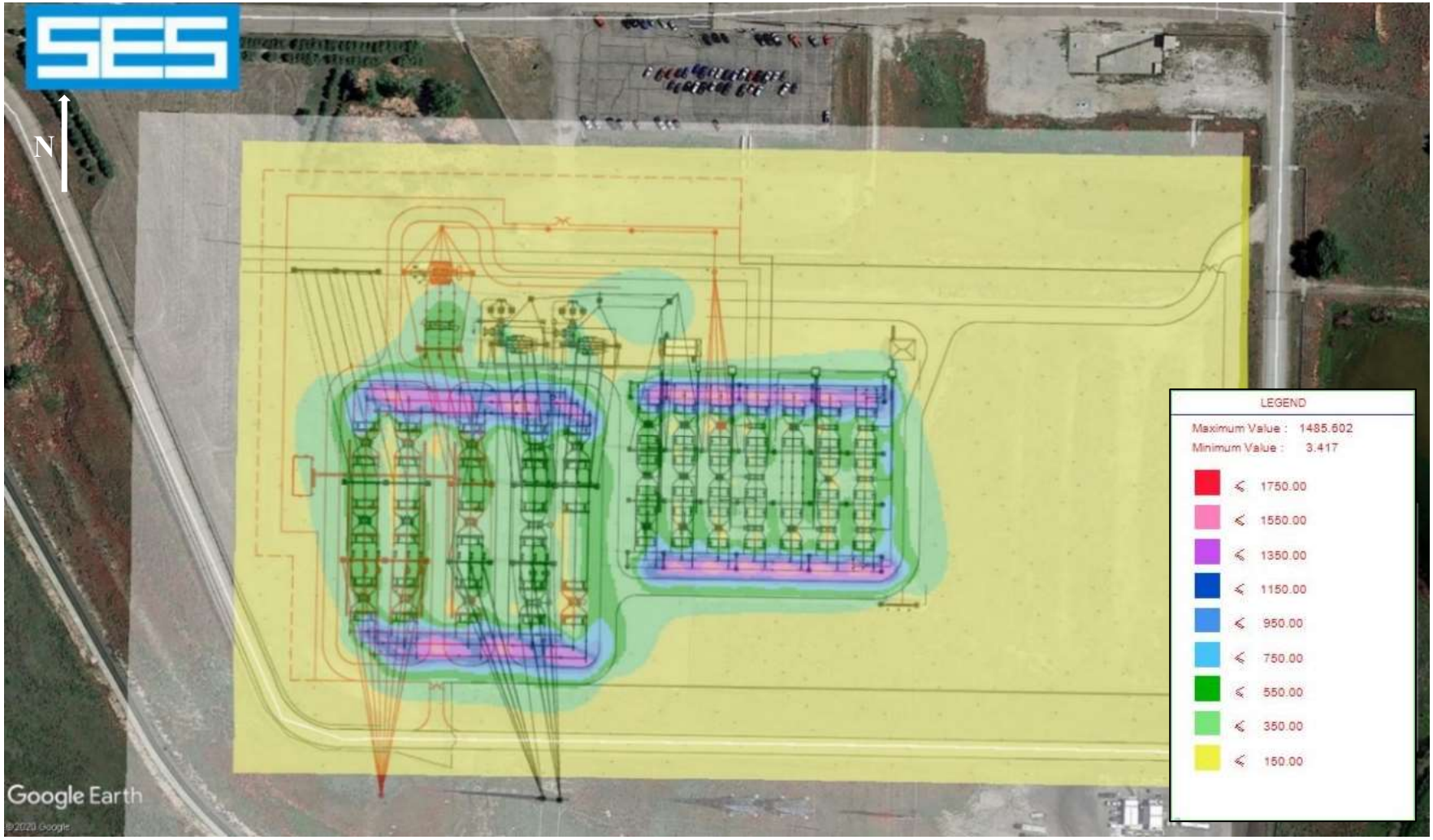

Figure 9: Pawnee Magnetic Field Strength Values Exceeding 150 mG

Goose Creek

Table 7 shows a summary of the magnetic field strength values at a hypothetical fence line for the new Goose Creek Substation based on a conceptual substation general arrangement provided by the Company and the assumed land acquisition for the substation. Values are calculated at a height of one meter above the ground per IEEE Std 644-2019 and consistent with PUC Rule 3206(e). The magnetic field strength levels at each of the hypothetical fence lines for the substation are below the 150 mG magnetic field strength levels deemed reasonable by PUC Rule 3206(e).

TABLE 7 – GOOSE CREEK MAGNETIC FIELD STRENGTH

SUBSTATION FENCE LINE LOCATION	MAGNETIC FIELD AT EDGE OF FENCE LINE [mG]
Magnetic Field Deemed Reasonable Level (PUC Rule 3206)	*150*
Maximum Northern Fence Line	30
Maximum Eastern Fence Line	72
Maximum Southern Fence Line	13
Maximum Western Fence Line	89

Figure 10 shows magnetic field strengths along the fence line. Figure 11 shows magnetic field strength values throughout the substation that exceed 150 mG.

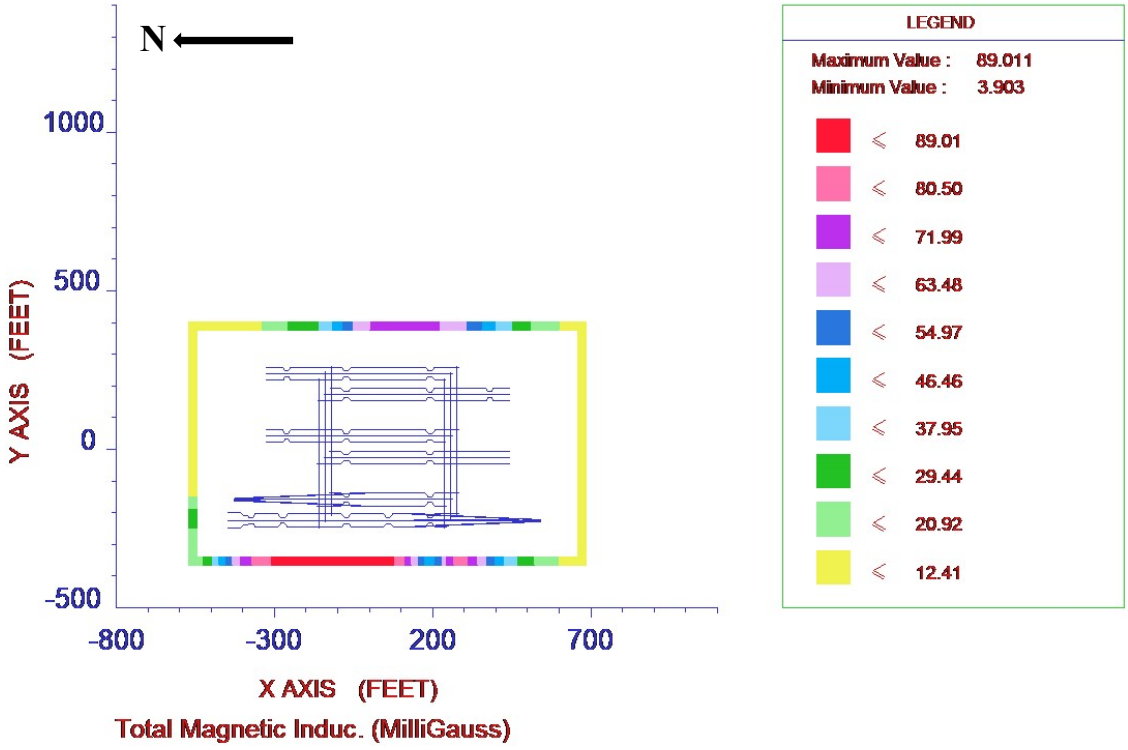

Figure 10: Goose Creek Magnetic Field Strength Values at the Fence Line

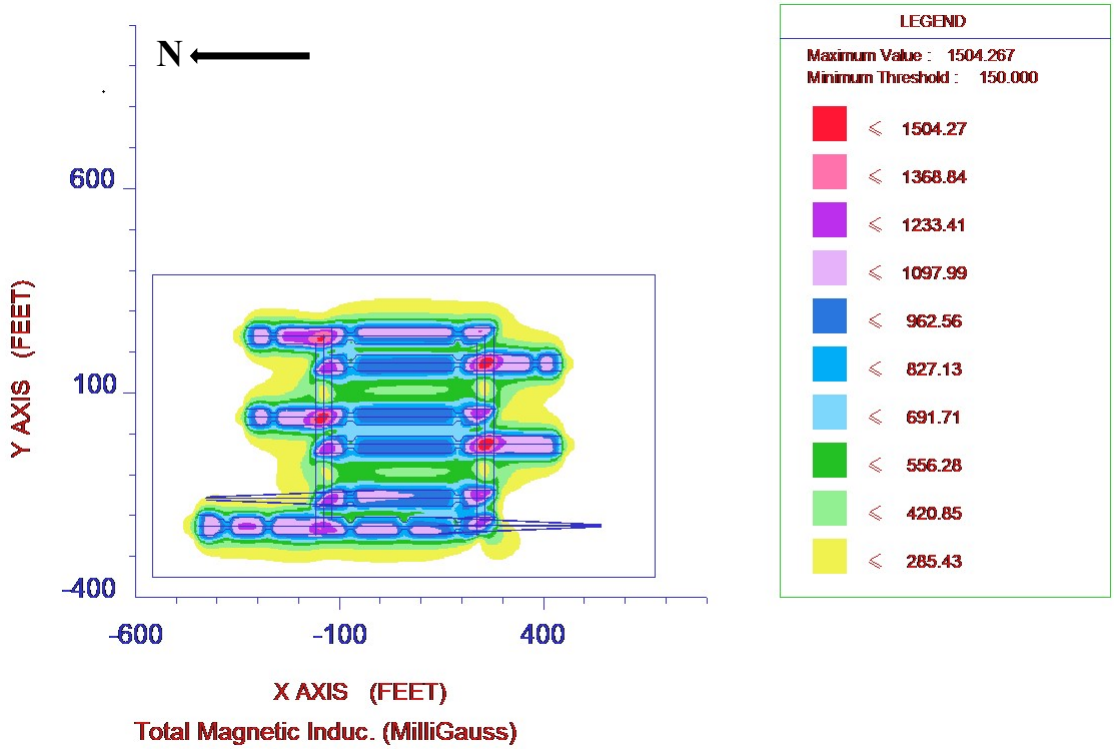

Figure 11: Goose Creek Magnetic Field Strength Values Exceeding 150 mG

May Valley

Table 8 shows a summary of the magnetic field strength values at a hypothetical fence line for the new May Valley Substation based on a conceptual substation general arrangement provided by the Company and the assumed land acquisition for the substation. Values are calculated at a height of one meter above the ground per IEEE Std 644-2019 and consistent with PUC Rule 3206(e). The magnetic field strength levels at each of the hypothetical fence lines for the new substation are below the 150 mG magnetic field strength levels deemed reasonable by PUC Rule 3206(e).

TABLE 8 – MAY VALLEY MAGNETIC FIELD STRENGTH

SUBSTATION FENCE LINE LOCATION	MAGNETIC FIELD AT EDGE OF FENCE LINE [mG]
Magnetic Field Deemed Reasonable Level (PUC Rule 3206)	*150*
Maximum Northern Fence Line	45
Maximum Eastern Fence Line	39
Maximum Southern Fence Line	70
Maximum Western Fence Line	82

Figure 12 shows magnetic field strengths along the fence line. Figure 13 shows magnetic field strength values throughout the substation that exceed 150 mG.

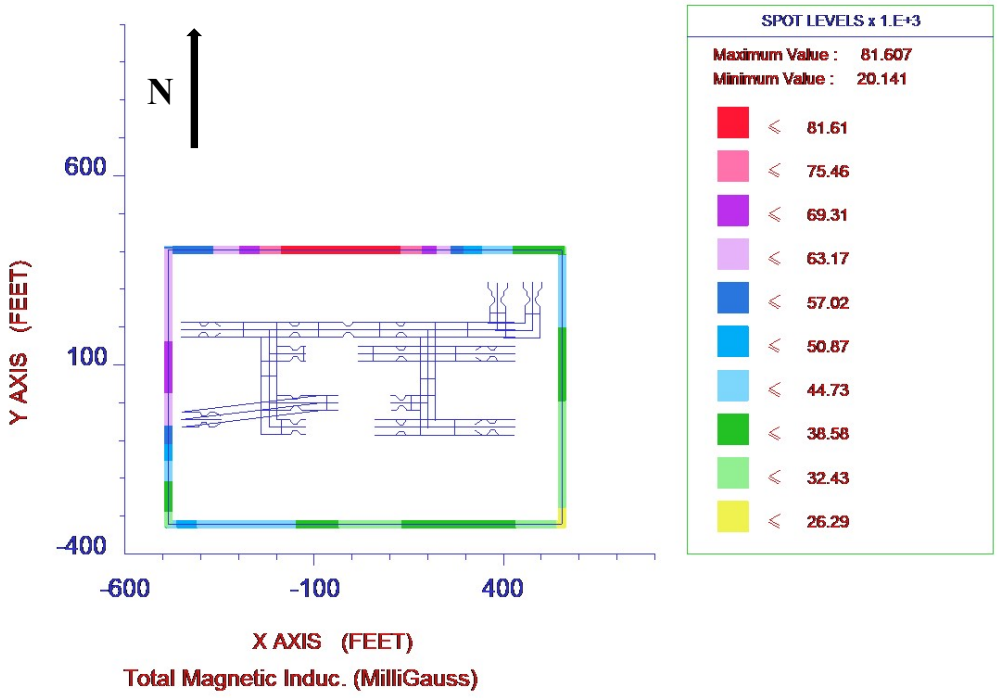

Figure 12: May Valley Magnetic Field Strength Values at the Fence Line

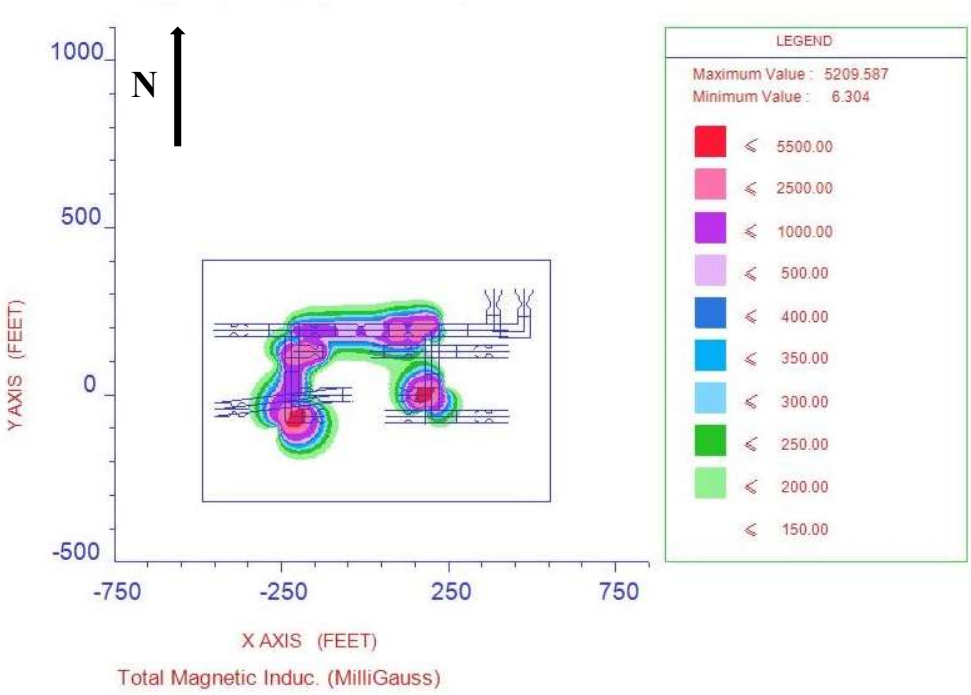

Figure 13: May Valley Magnetic Field Strength Values Exceeding 150 mG

Tundra

Table 9 shows a summary of the magnetic field strength values at the proposed fence line for the expanded Tundra Substation based on a conceptual substation general arrangement provided by the Company. Values are calculated at a height of one meter above the ground per IEEE Std 644-2019 and consistent with PUC Rule 3206(e). The magnetic field strength levels at each of the proposed fence lines for the substation are below the 150 mG magnetic field strength levels deemed reasonable by PUC Rule 3206(e).

TABLE 9 – TUNDRA MAGNETIC FIELD STRENGTH

SUBSTATION FENCE LINE LOCATION	MAGNETIC FIELD AT EDGE OF FENCE LINE [mG]
Magnetic Field Deemed Reasonable Level (PUC Rule 3206)	*150*
Maximum Northeastern Fence Line	104
Maximum Northwestern Fence Line	64
Maximum Southeastern Fence Line	103
Maximum Southwestern Fence Line	105

Figure 14 shows magnetic field strengths along the fence line. Figure 15 shows magnetic field strength values throughout the substation that exceed 150 mG.

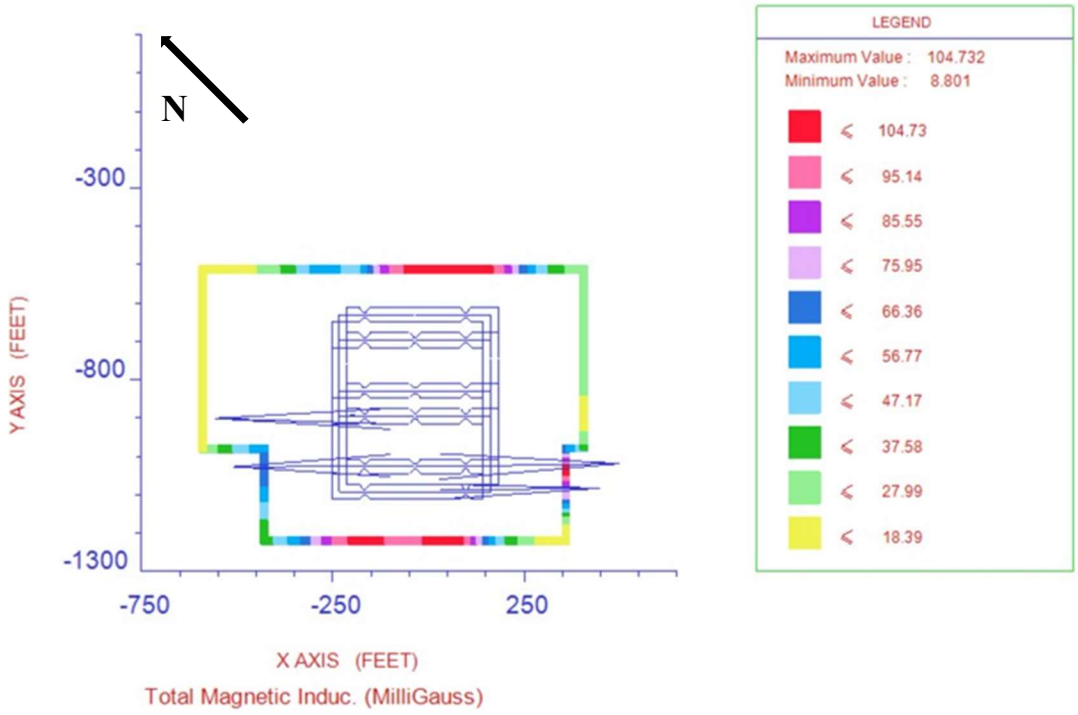

Figure 14: Tundra Magnetic Field Strength Values at the Fence Line

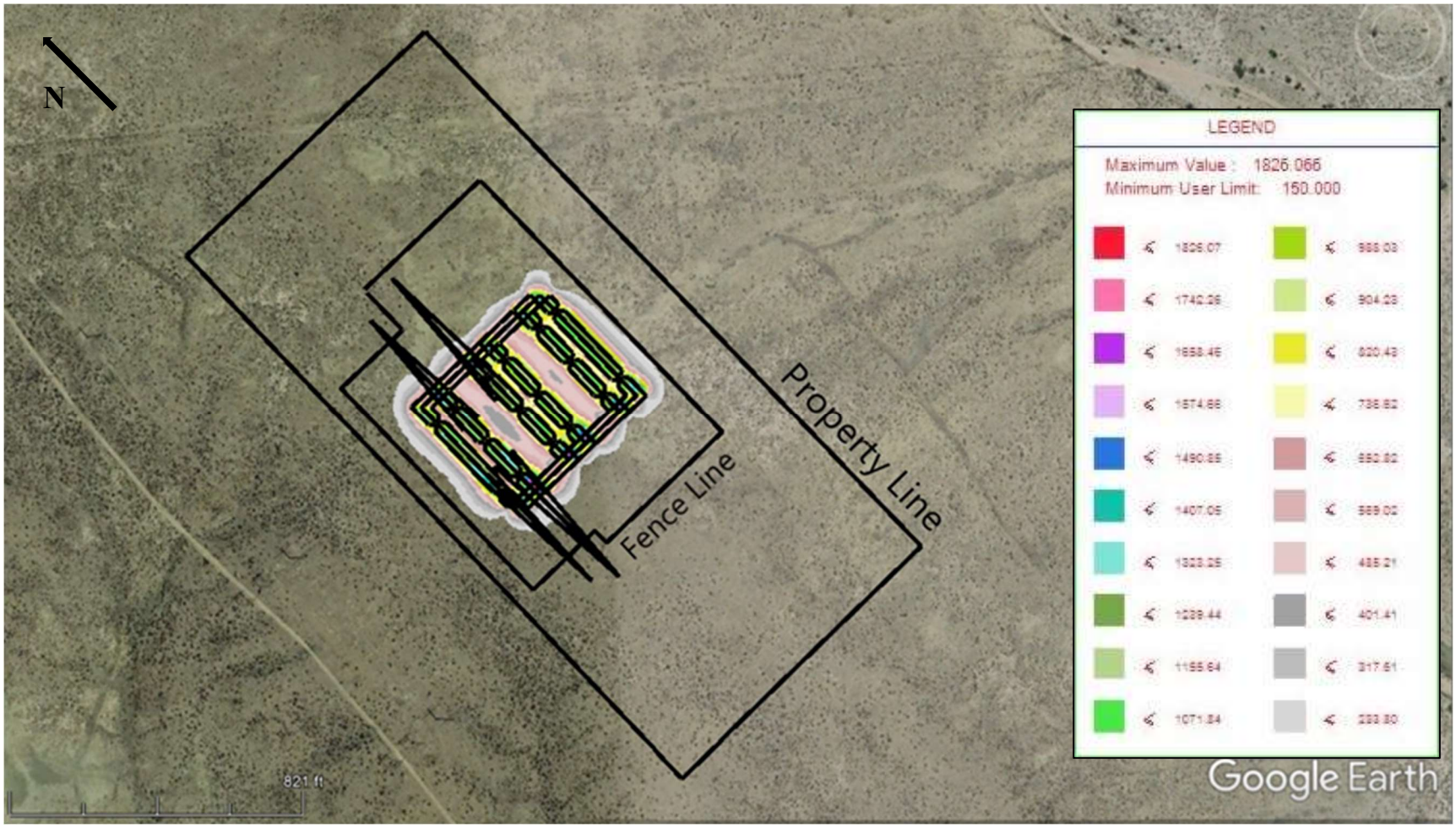

Figure 15: Tundra Magnetic Field Strength Values Exceeding 150 mG

Harvest Mile

Table 10 shows a summary of the magnetic field strength values at the fence line and property line for the expanded Harvest Mile Substation. Values are calculated at a height of one meter above the ground per IEEE Std 644-2019 and consistent with PUC Rule 3206(e). Because the magnetic field strength level along one of the substation fence lines is above the 150 mG magnetic field level deemed reasonable by rule, magnetic field strength was calculated at the edge of the property line. The magnetic field strength levels along the entire property line of the substation are below the 150 mG magnetic field level deemed reasonable by PUC Rule 3206(e).

TABLE 10 – HARVEST MILE MAGNETIC FIELD STRENGTH

SUBSTATION FENCE LINE LOCATION	MAGNETIC FIELD AT EDGE OF FENCE LINE [mG]	MAGNETIC FIELD AT EDGE OF PROPERTY LINE [mG]
Magnetic Field Deemed Reasonable Level (PUC Rule 3206)	*150*	*150*
Maximum Northern Fence Line	69	10
Maximum Eastern Fence Line	36	2
Maximum Southern Fence Line	224	32
Maximum Western Fence Line	121	3

Figure 16 and Figure 17 show plots of the magnetic field strengths along the fence line and property line, respectively. Figure 18 shows magnetic field strengths that exceed 150 mG.

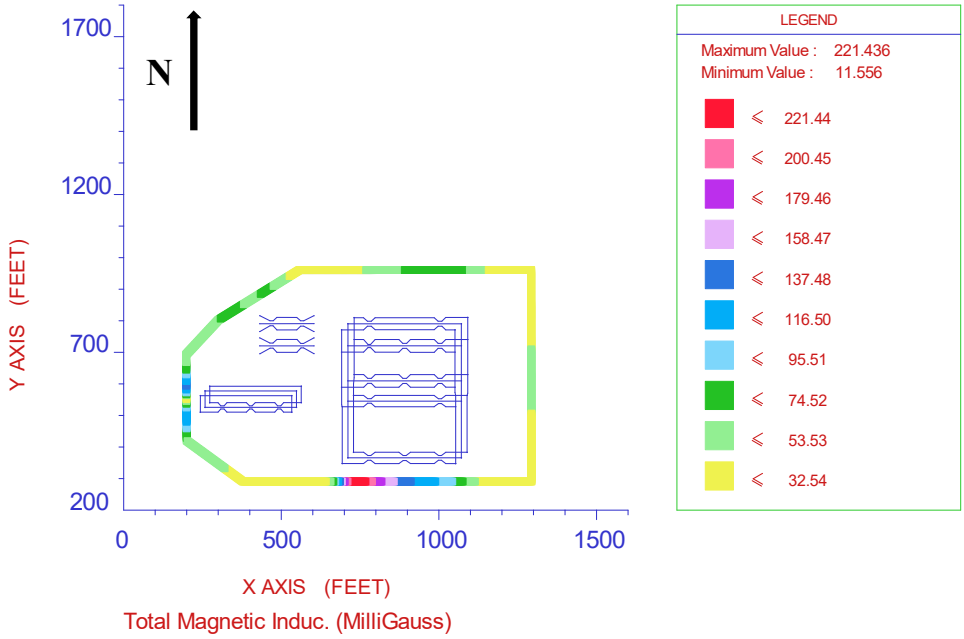

Figure 16: Harvest Mile Magnetic Field Strength Values at the Fence Line

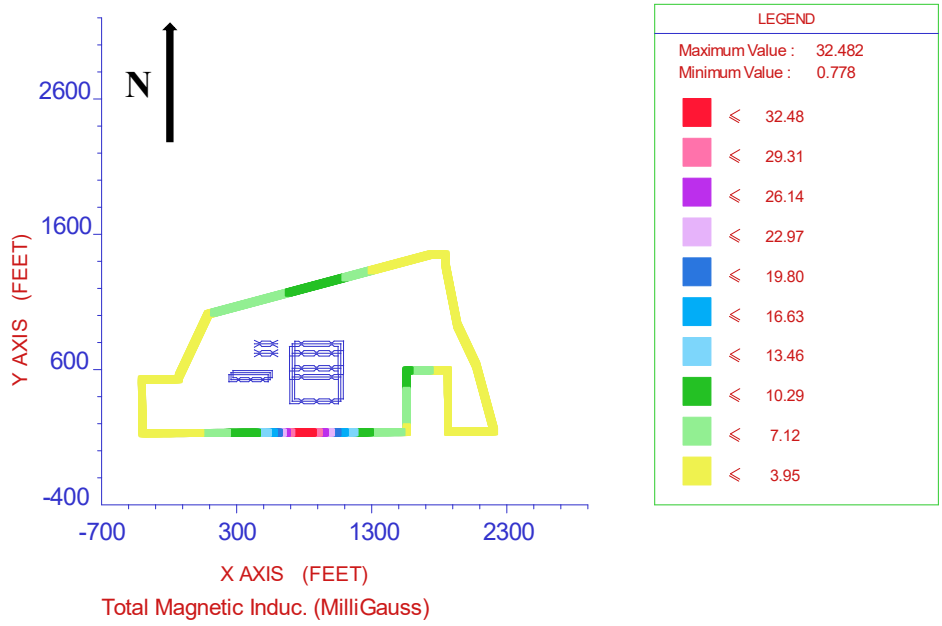

Figure 17: Harvest Mile Magnetic Field Strength Values at the Property Line

Figure 18: Harvest Mile Magnetic Field Strength Values Exceeding 150 mG

Audible Noise

Within the scope of the Pathway Project, the new and expanded substations will contain reactors and transformers that are considered as continuous noise generating equipment. Each noise source was modeled as a point source. Additionally, the models included walls or barriers that might block sound, such as control houses, for their impact at mitigating noise outside the substations.

Audible noise is measured and calculated as an equivalent A-weighted sound pressure level in decibels (dB(A)). Values are calculated at a height of 1.5 meters (~4.9 feet) to approximate the height of an individual's ear.

This preliminary study assumes a flat surface at the site and does not account for possible elevation changes. Additionally, the analysis does not consider possible attenuation due to the properties of ground surfaces. No structures outside of substation fence lines, including buildings that would be expected to absorb, reflect, or shield audible noise, were modeled for these studies.

Fort St. Vrain

The expanded Fort St. Vrain Substation will contain two transformers (rating of 560 MVA) and two reactors (assumed rating of 60 MVAR) that are considered as continuous noise generating equipment on the site. Figure 19 shows the color-shaded plot of the sound pressure levels produced by the reactors and transformers around the substation.

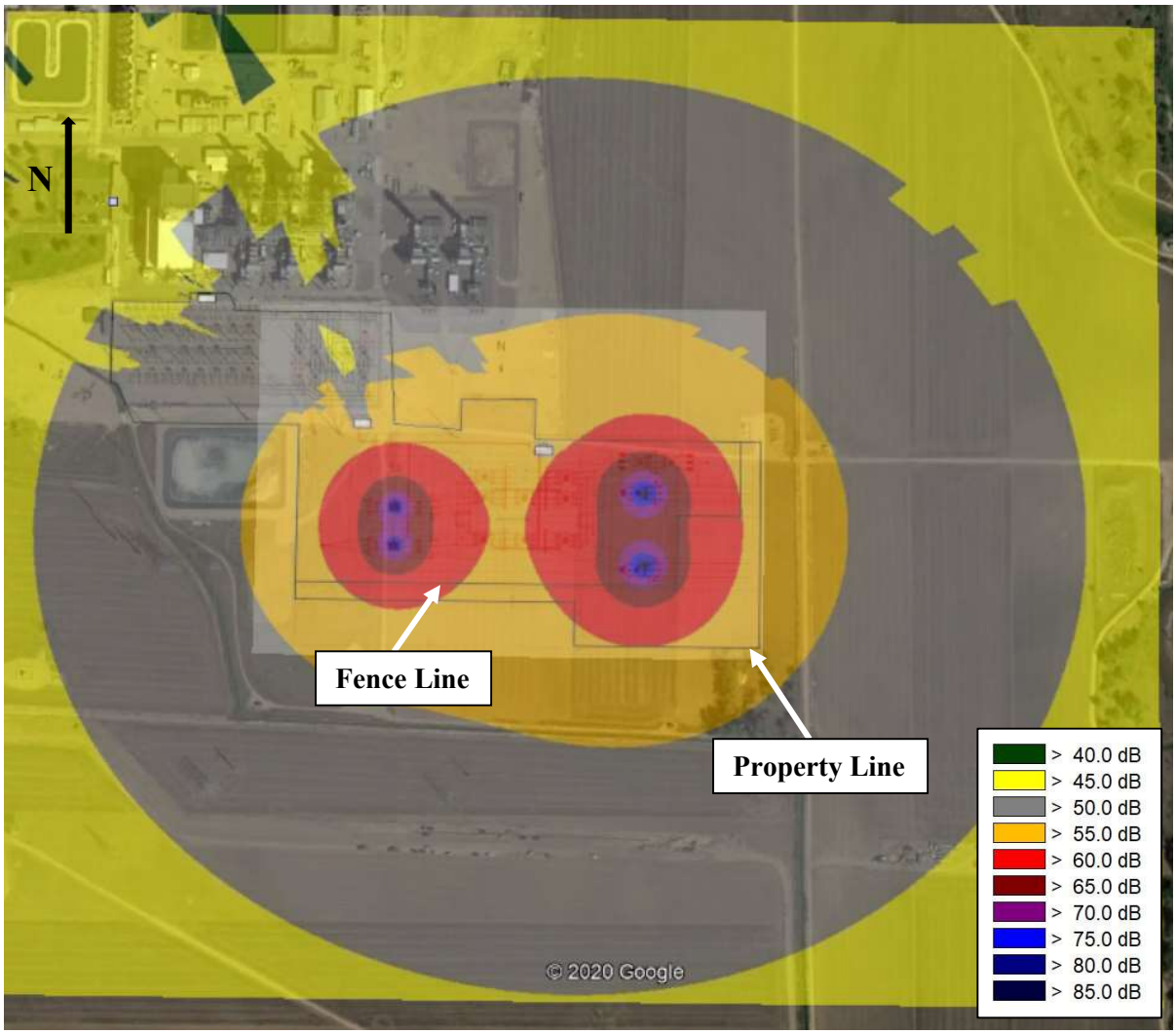

Figure 19: Fort St. Vrain Audible Noise Levels

Table 11 shows the projected audible noise levels 25 feet from the substation's property lines. The audible noise produced by the substation is expected to be 62 dB(A) or less at a distance of 25 feet from the property lines. This is below the noise level deemed reasonable by PUC Rule 3206(f) for property zoned as Industrial (75 dB(A)). Public Service also owns additional property adjacent to the identified parcel, and audible noise levels at those boundaries would be expected to be lower.

TABLE 11 – FORT ST. VRAIN AUDIBLE NOISE VALUES	
SUBSTATION PROPERTY LINE LOCATION	**AUDIBLE NOISE 25 FEET FROM PROPERTY LINE [DB(A)]**
Audible Noise Deemed Reasonable Level (PUC Rule 3206)	*75 dB(A) (Industrial)*
25 feet from Northern Property Line	62
25 feet from Eastern Property Line	58
25 feet from Southern Property Line	60
25 feet from Western Property Line	58

Canal Crossing

The new Canal Crossing Substation will contain four reactors (assumed rating of 60 MVAR) that are considered as continuous noise generating equipment on the site. Figure 20 shows the color-shaded plot of the sound pressure levels produced by the reactors around the substation.

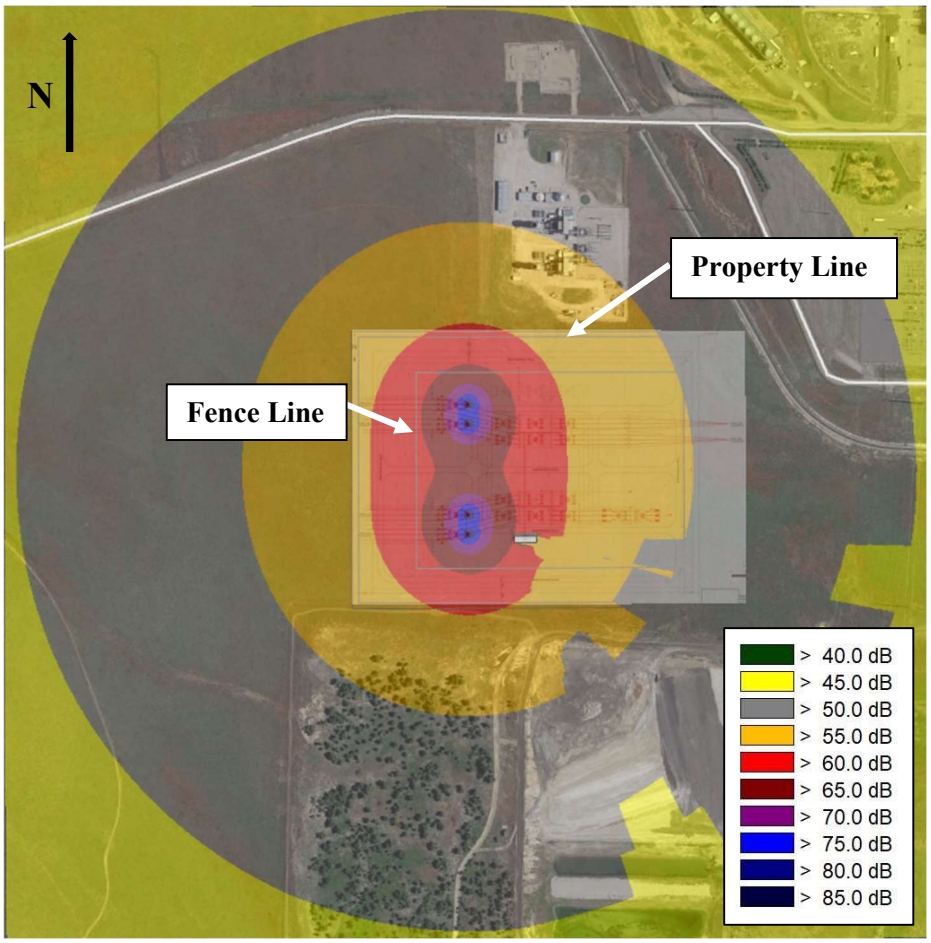

Figure 20: Canal Crossing Audible Noise Levels

Table 12 shows the projected audible noise levels 25 feet from the substation's property lines. The audible noise produced by the substation is expected to be 61 dB(A) or less at a distance of 25 feet from the property lines. This is below the noise level deemed reasonable by PUC Rule 3206(f) for property zoned as Industrial (75 dB(A)). Public Service also owns additional property adjacent to the identified parcel, and audible noise levels at those boundaries would be expected to be lower.

TABLE 12 – CANAL CROSSING AUDIBLE NOISE VALUES	
SUBSTATION PROPERTY LINE LOCATION	**AUDIBLE NOISE 25 FEET FROM PROPERTY LINE [DB(A)]**
Audible Noise Deemed Reasonable Level (PUC Rule 3206)	*75 dB(A) (Industrial)*
25 feet from Northern Property Line	61
25 feet from Eastern Property Line	55
25 feet from Southern Property Line	61
25 feet from Western Property Line	59

Pawnee

The expanded Pawnee Substation will contain two 15 kV air core reactors (assumed rating of 40 MVAR) and three transformers (rating of 560 MVA) that are considered as continuous noise generating equipment on the site. Figure 21 shows the color-shaded plot of the sound pressure levels produced by the reactors and transformers around the substation.

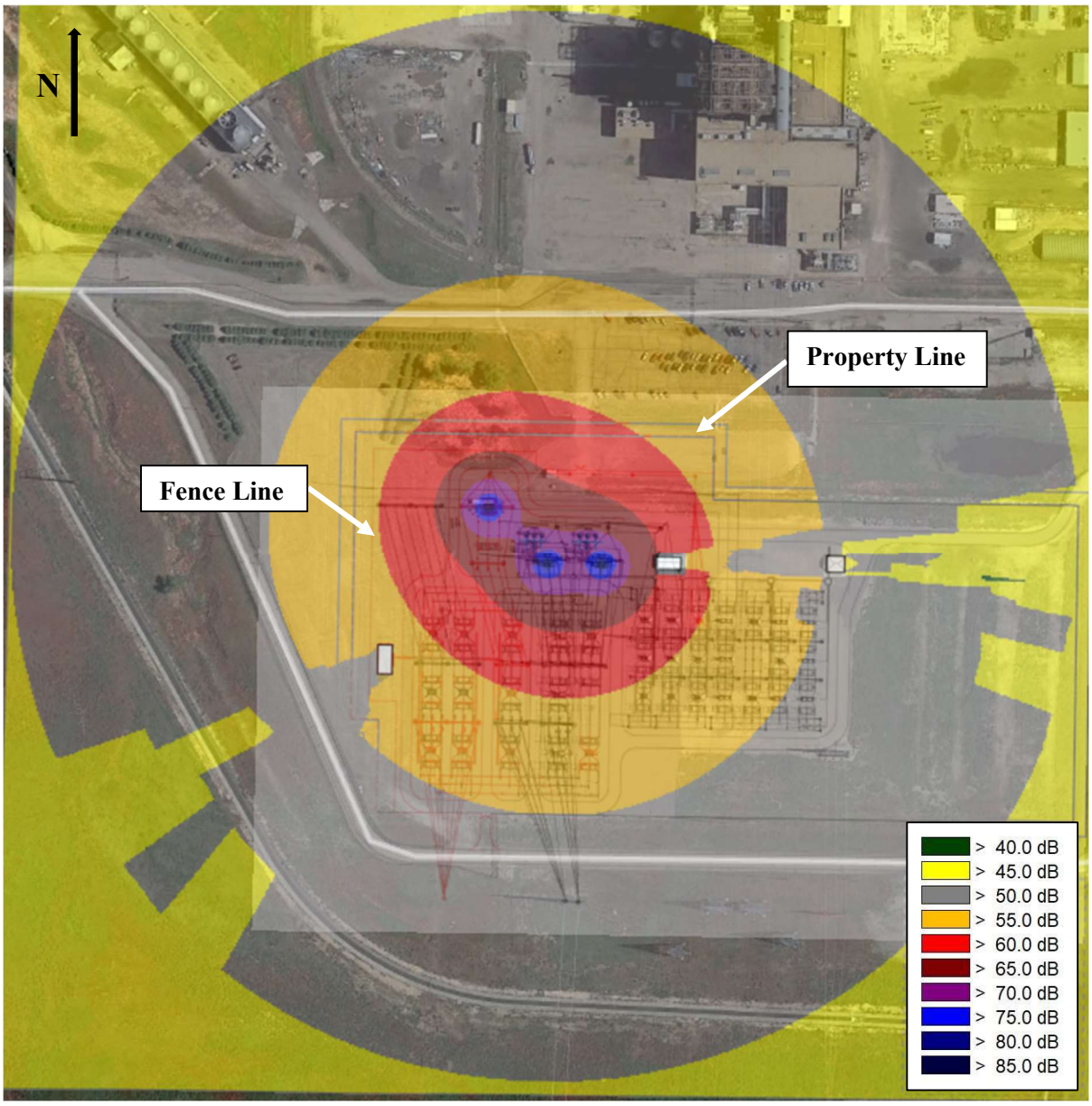

Figure 21: Pawnee Audible Noise Levels

Table 13 shows the projected audible noise levels 25 feet from the substation's property lines. The audible noise produced by the substation is expected to be 62 dB(A) or less at a distance of 25 feet

from the property lines. This is below the noise level deemed reasonable by PUC Rule 3206(f) for property zoned as Industrial (75 dB(A)). Public Service also owns additional property adjacent to the identified parcel, and audible noise levels at those boundaries would be expected to be lower.

TABLE 13 – PAWNEE AUDIBLE NOISE VALUES

SUBSTATION PROPERTY LINE LOCATION	AUDIBLE NOISE 25 FEET FROM PROPERTY LINE [DB(A)]
Audible Noise Deemed Reasonable Level (PUC Rule 3206)	*75 dB(A) (Industrial)*
25 feet from Northern Property Line	62
25 feet from Eastern Property Line	50
25 feet from Southern Property Line	55
25 feet from Western Property Line	58

Goose Creek

The new Goose Creek Substation will contain four reactors (assumed rating of 60 MVAR) that are considered as continuous noise generating equipment on the site. Figure 22 shows the color-shaded plot of the sound pressure levels produced by the reactors around the substation.

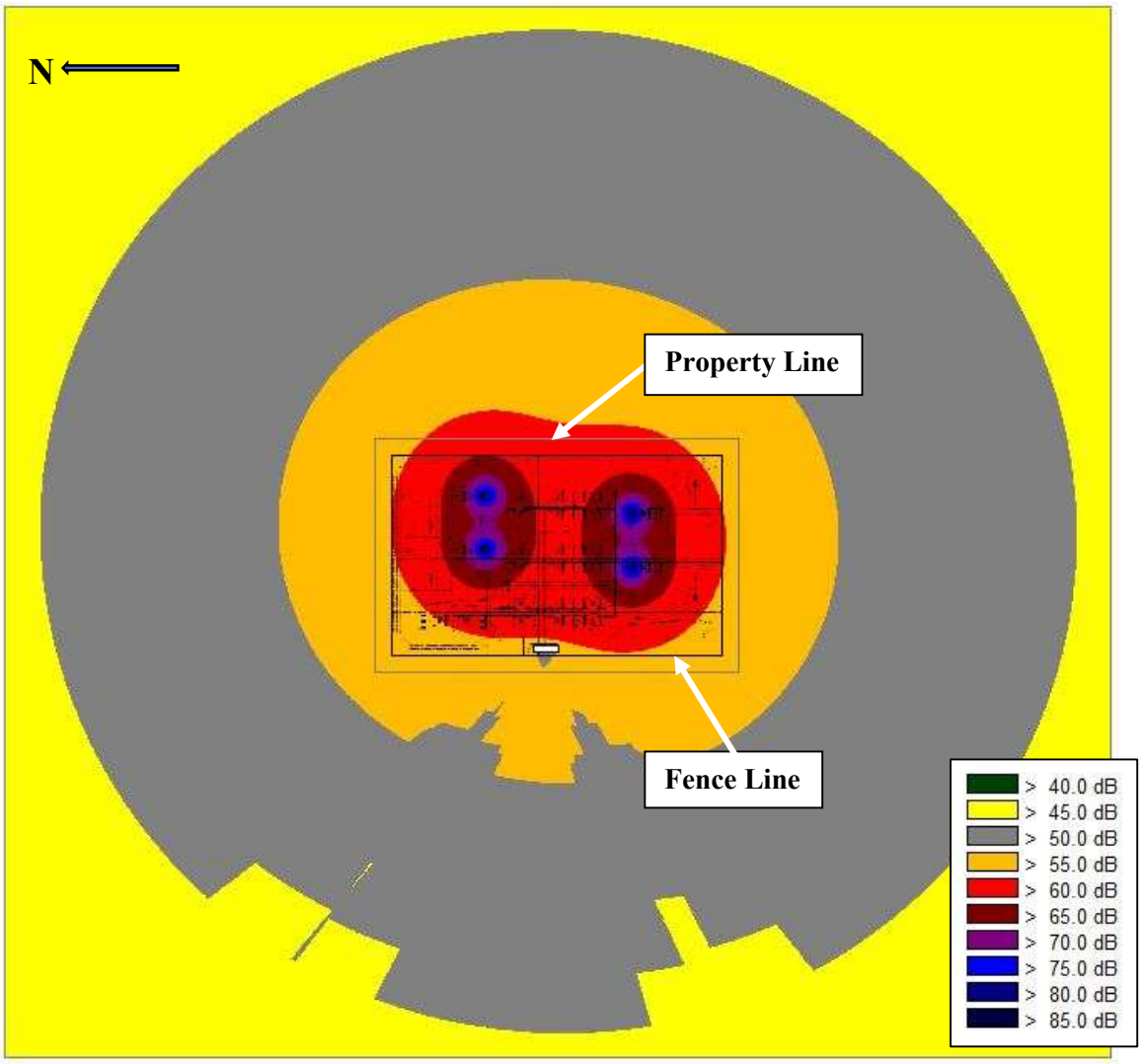

Figure 22: Goose Creek Audible Noise Levels

Table 14 shows the projected audible noise levels 25 feet from hypothetical substation property lines based on a conceptual substation general arrangement provided by the Company and the assumed land acquisition for the substation. A location for the substation has not been finalized at this point, so the actual property lines are unknown. The audible noise produced by the substation is expected to be 62 dB(A) or less at a distance of 25 feet from the property lines.

TABLE 14 – GOOSE CREEK AUDIBLE NOISE VALUES	
SUBSTATION PROPERTY LINE LOCATION	**AUDIBLE NOISE 25 FEET FROM PROPERTY LINE [DB(A)]**
Audible Noise Deemed Reasonable Level (PUC Rule 3206)	*No 3206(f) defined ruling limit*[a]
25 feet from Northern Fence Line	59
25 feet from Eastern Fence Line	62
25 feet from Southern Fence Line	59
25 feet from Western Fence Line	58

(a) For some of the Power Pathway substations, the substation parcels and surrounding land are zoned agricultural and/or a mix of other zoning designations. Rule 3206(f) does not identify an audible noise level that is deemed reasonable for land zoned agricultural, and POWER does not draw any conclusions about the zoning-dependent audible noise levels that would be deemed reasonable by PUC Rule 3206(f). Additional information about zoning and land use can be found in the "Zoning Designations and Land Use" section.

May Valley

The new May Valley Substation will contain four reactors (assumed rating of 60 MVAR) that are considered as continuous noise generating equipment on the site. Figure 23 shows the color-shaded plot of the sound pressure levels produced by the reactors around the substation.

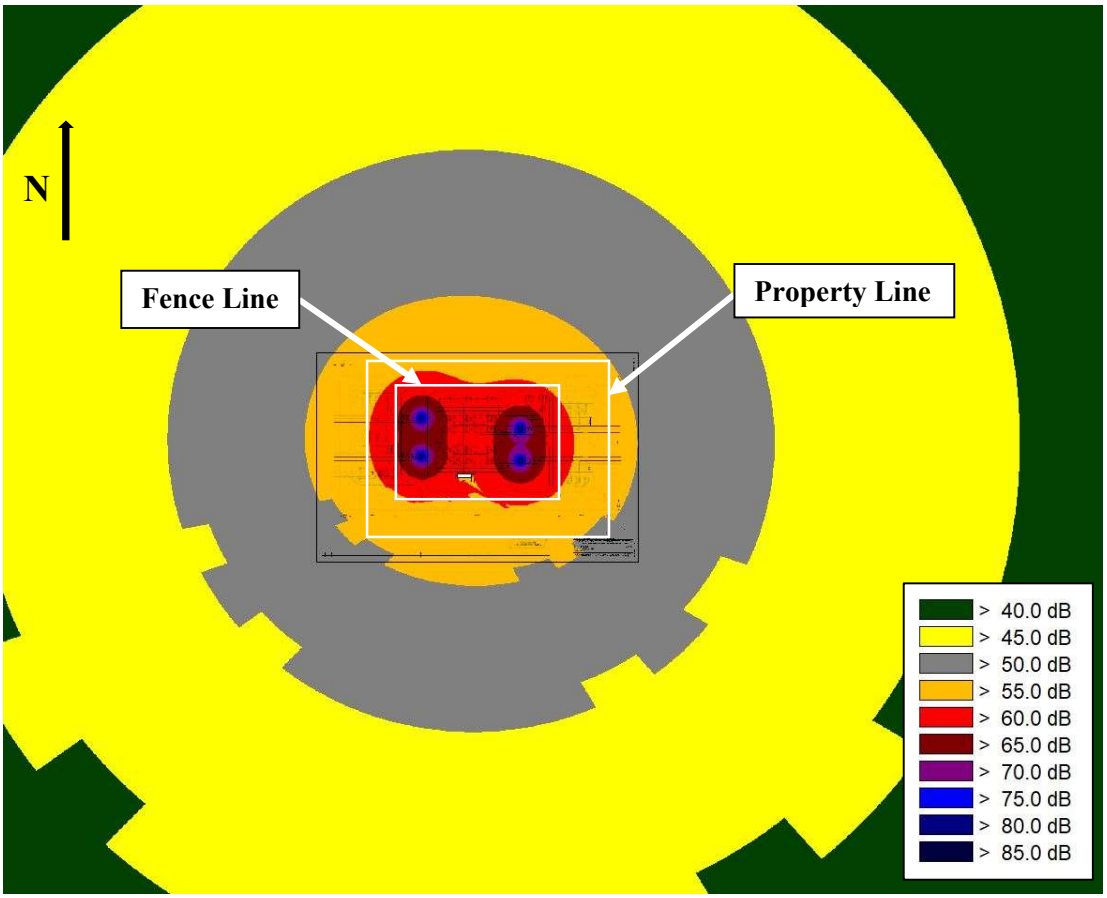

Figure 23: May Valley Audible Noise Levels

Table 15 shows the projected audible noise levels 25 feet from hypothetical substation property lines based on a conceptual substation general arrangement provided by the Company and the assumed land acquisition for the substation. A location for the substation has not been finalized at this point, so the actual property lines are unknown. The audible noise produced by the substation is expected to be 60 dB(A) or less at a distance of 25 feet from the property lines.

TABLE 15 – MAY VALLEY AUDIBLE NOISE VALUES	
SUBSTATION PROPERTY LINE LOCATION	**AUDIBLE NOISE 25 FEET FROM PROPERTY LINE [DB(A)]**
Audible Noise Deemed Reasonable Level (PUC Rule 3206)	*No 3206(f) defined ruling limit*[a]
25 feet from Northern Property Line	56
25 feet from Eastern Property Line	60
25 feet from Southern Property Line	57
25 feet from Western Property Line	60

(a) For some of the Power Pathway substations, the substation parcels and surrounding land are zoned agricultural and/or a mix of other zoning designations. Rule 3206(f) does not identify an audible noise level that is deemed reasonable for land zoned agricultural, and POWER does not draw any conclusions about the zoning-dependent audible noise levels that would be deemed reasonable by PUC Rule 3206(f). Additional information about zoning and land use can be found in the "Zoning Designations and Land Use" section.

Tundra

The expanded Tundra Substation will contain four reactors (assumed rating of 60 MVAR) that are considered as continuous noise generating equipment on the site. Figure 24 shows the color-shaded plot of the sound pressure levels produced by the reactors around the substation.

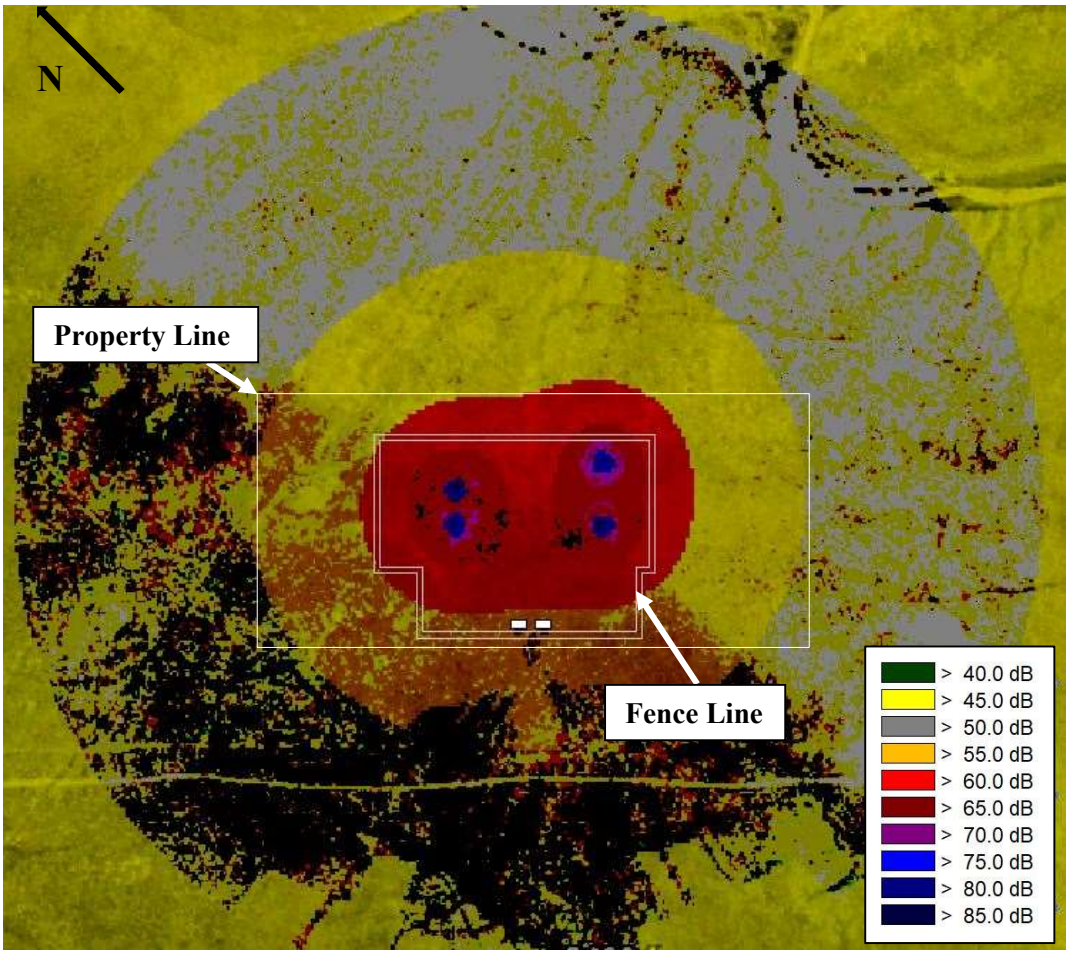

Figure 24: Tundra Audible Noise Levels

Table 16 shows the projected audible noise levels 25 feet from the substation's property lines. The audible noise produced by the substation is expected to be 61 dB(A) or less at a distance of 25 feet from the property lines.

TABLE 16 – TUNDRA AUDIBLE NOISE VALUES	
SUBSTATION PROPERTY LINE LOCATION	**AUDIBLE NOISE 25 FEET FROM PROPERTY LINE [DB(A)]**
Audible Noise Deemed Reasonable Level (PUC Rule 3206)	*No 3206(f) defined ruling limit*[a]
25 feet from Northeastern Property Line	61
25 feet from Northwestern Property Line	55
25 feet from Southeastern Property Line	55
25 feet from Southwestern Property Line	58

(a) For some of the Power Pathway substations, the substation parcels and surrounding land are zoned agricultural and/or a mix of other zoning designations. Rule 3206(f) does not identify an audible noise level that is deemed reasonable for land zoned agricultural, and POWER does not draw any conclusions about the zoning-dependent audible noise levels that would be deemed reasonable by PUC Rule 3206(f). Additional information about zoning and land use can be found in the "Zoning Designations and Land Use" section.

Harvest Mile

The expanded Harvest Mile Substation will contain two transformers (rating of 560 MVA) and two reactors (assumed rating of 60 MVAR) that are considered as continuous noise generating equipment on the site. Figure 25 shows the color-shaded plot of the sound pressure levels produced by the reactors and transformers around the substation.

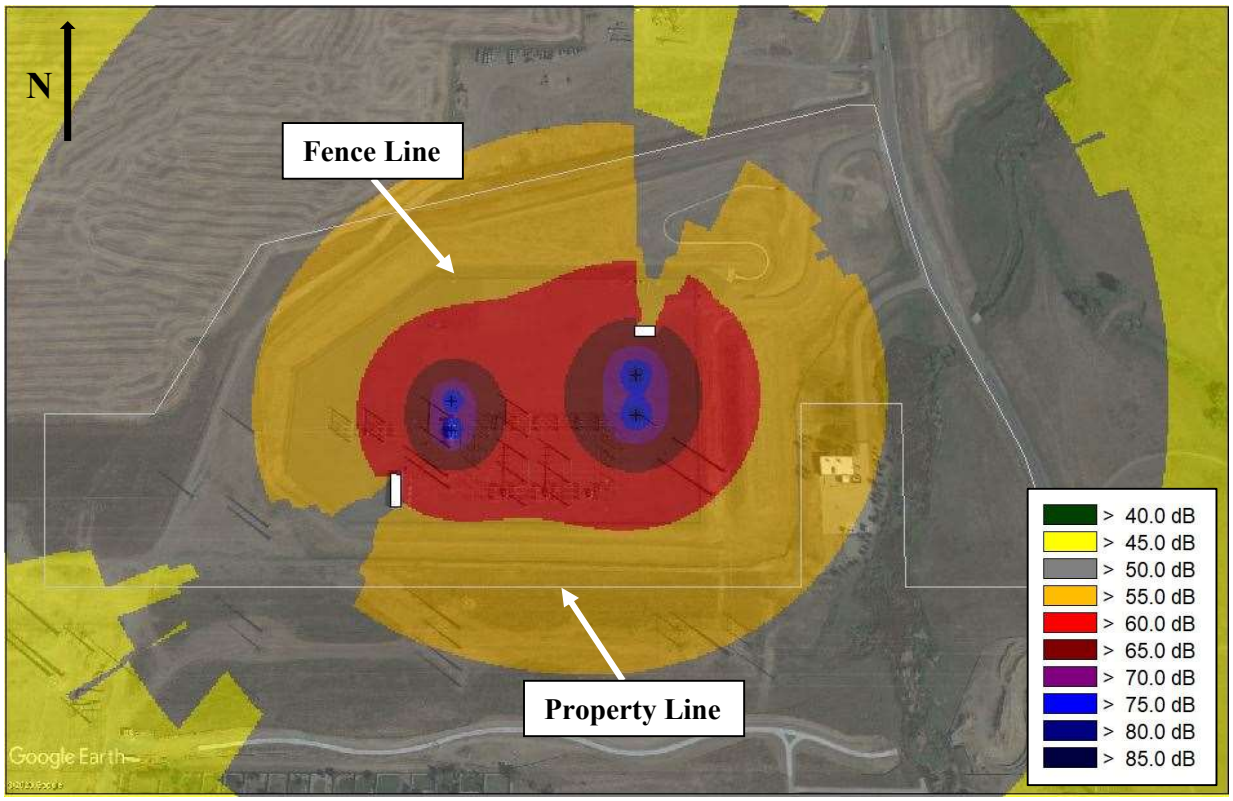

Figure 25: Harvest Mile Audible Noise Levels

Table 17 shows the projected audible noise levels 25 feet from the substation's property lines. The audible noise produced by the substation is expected to be 57 dB(A) or less at a distance of 25 feet from the property lines.

TABLE 17 – HARVEST MILE AUDIBLE NOISE VALUES	
SUBSTATION PROPERTY LINE LOCATION	**AUDIBLE NOISE 25 FEET FROM PROPERTY LINE [DB(A)]**
Audible Noise Deemed Reasonable Level (PUC Rule 3206)	*No 3206(f) defined ruling limit*[a]
25 feet from Northern Property Line	56
25 feet from Eastern Property Line	54
25 feet from Southern Property Line	57
25 feet from Western Property Line	54

(a) For some of the Power Pathway substations, the substation parcels and surrounding land are zoned agricultural and/or a mix of other zoning designations. Rule 3206(f) does not identify an audible noise level that is deemed reasonable for land zoned agricultural, and POWER does not draw any conclusions about the zoning-dependent audible noise levels that would be deemed reasonable by PUC Rule 3206(f). Additional information about zoning and land use can be found in the "Zoning Designations and Land Use" section.

CONCLUSION

Public Service contracted POWER to investigate magnetic field and audible noise effects for the expansion or construction of seven substations (including single voltage switching stations) as part of the Pathway Project for the purpose of determining the expected maximum level of magnetic fields that could be experienced at substation boundaries and the projected level of audible noise at 25 feet beyond substation property lines, consistent with PUC Rule 3206 – Construction or Extension of Transmission Facilities (4 CCR 723-3-3206) requirements.

For magnetic field strengths, the maximum value at the fence line was provided if the calculated maximum was below the 150 mG level deemed reasonable by PUC Rule 3206(e). POWER calculated magnetic field strengths at the substation fence lines. If the maximum magnetic field strength at the substation fence line was not below 150 mG, the maximum field strength value was calculated at the property line. As detailed in the report, the calculated magnetic field strengths for the substations in the Pathway Project are expected to be below the 150 mG level deemed reasonable by PUC Rule 3206(e), with the exception of Pawnee and Harvest Mile Substations. For Pawnee Substation, although magnetic field strength at one fence line is projected to be above the level deemed reasonable by Rule 3206(e), Public Service owns the land adjacent to and surrounding the substation, and the magnetic field strength at the property line is below the level deemed reasonable by Rule 3206(e). Similarly, for Harvest Mile Substation, although the magnetic field strength at one fence line is projected to be above the level deemed reasonable by Rule 3206(e), the magnetic field strength at that property line is below the level deemed reasonable by Rule 3206(e).

For audible noise levels, the maximum value 25 feet from the property line was calculated in accordance with PUC Rule 3206(f). As detailed in the report, the audible noise levels for Fort St. Vrain Substation, Pawnee Substation, and Canal Crossing Substation are expected to be below the applicable zoning-dependent level deemed reasonable by PUC Rule 3206(f). The other substations are not, or will not be, located on land for which there is a zoning-dependent noise level limit deemed reasonable by PUC Rule 3206(f).

APPENDIX A – REFERENCE DRAWINGS

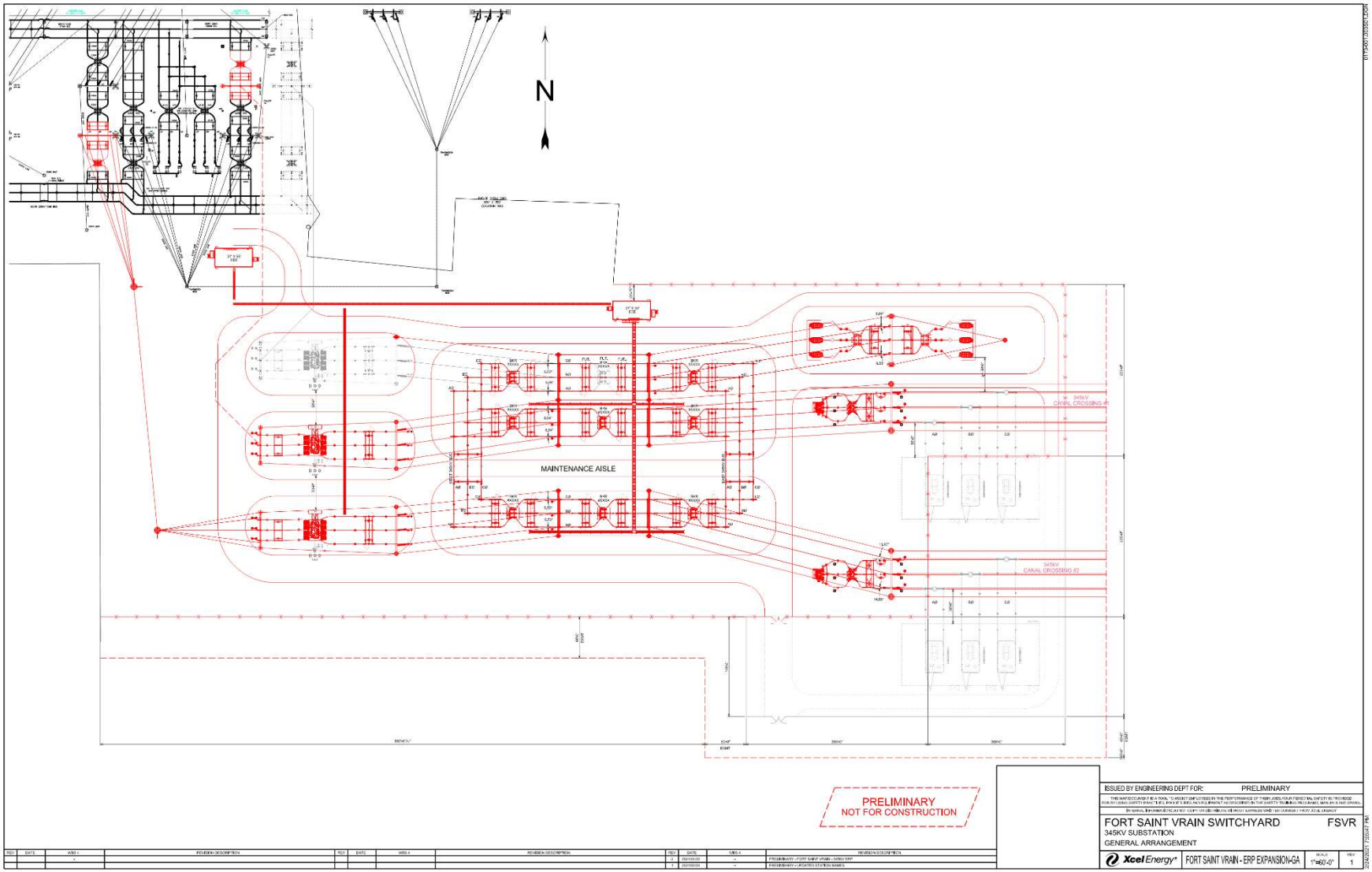

Figure 26: Fort St. Vrain General Arrangement Drawing

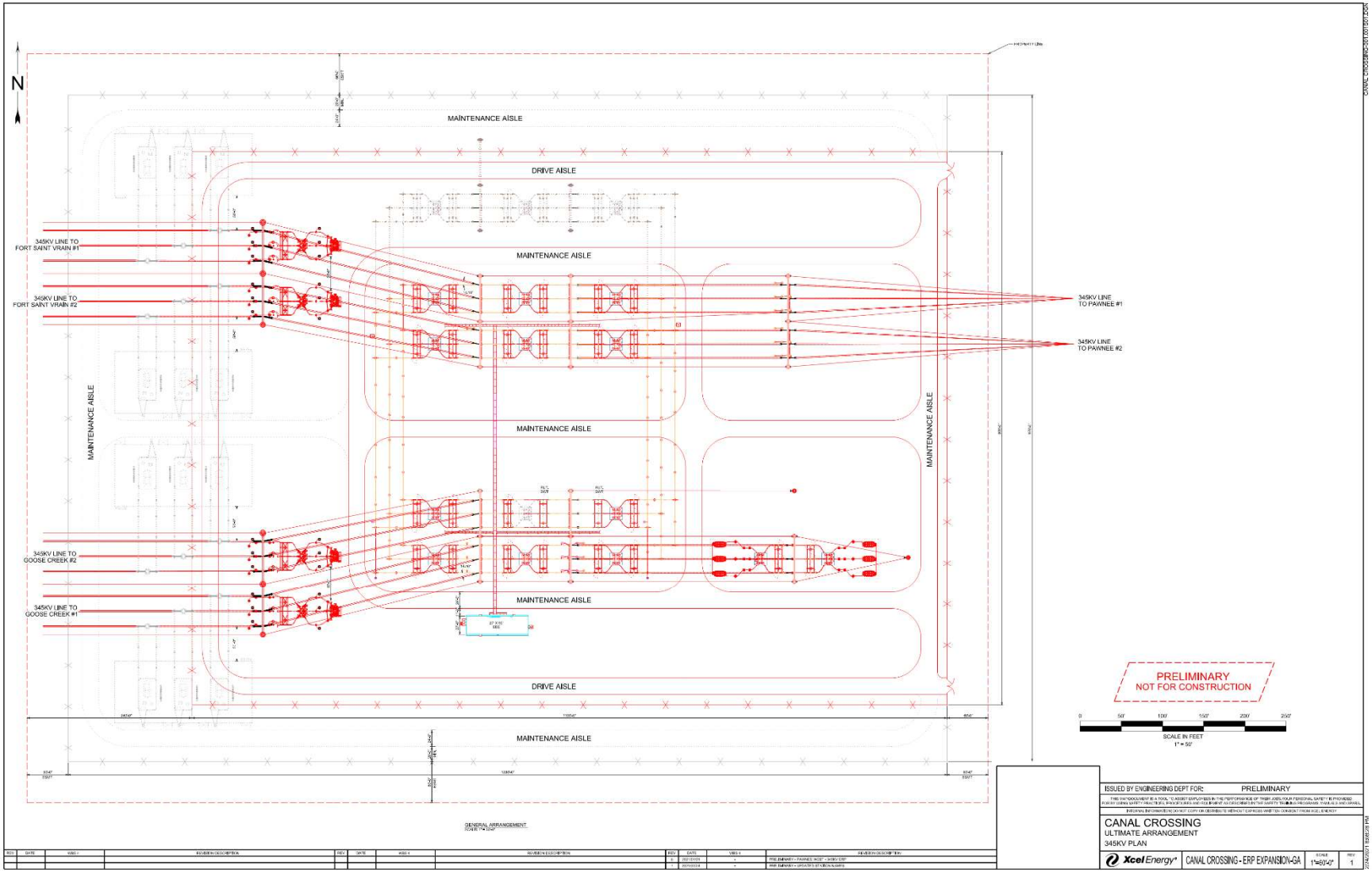

Figure 27: Canal Crossing General Arrangement Drawing

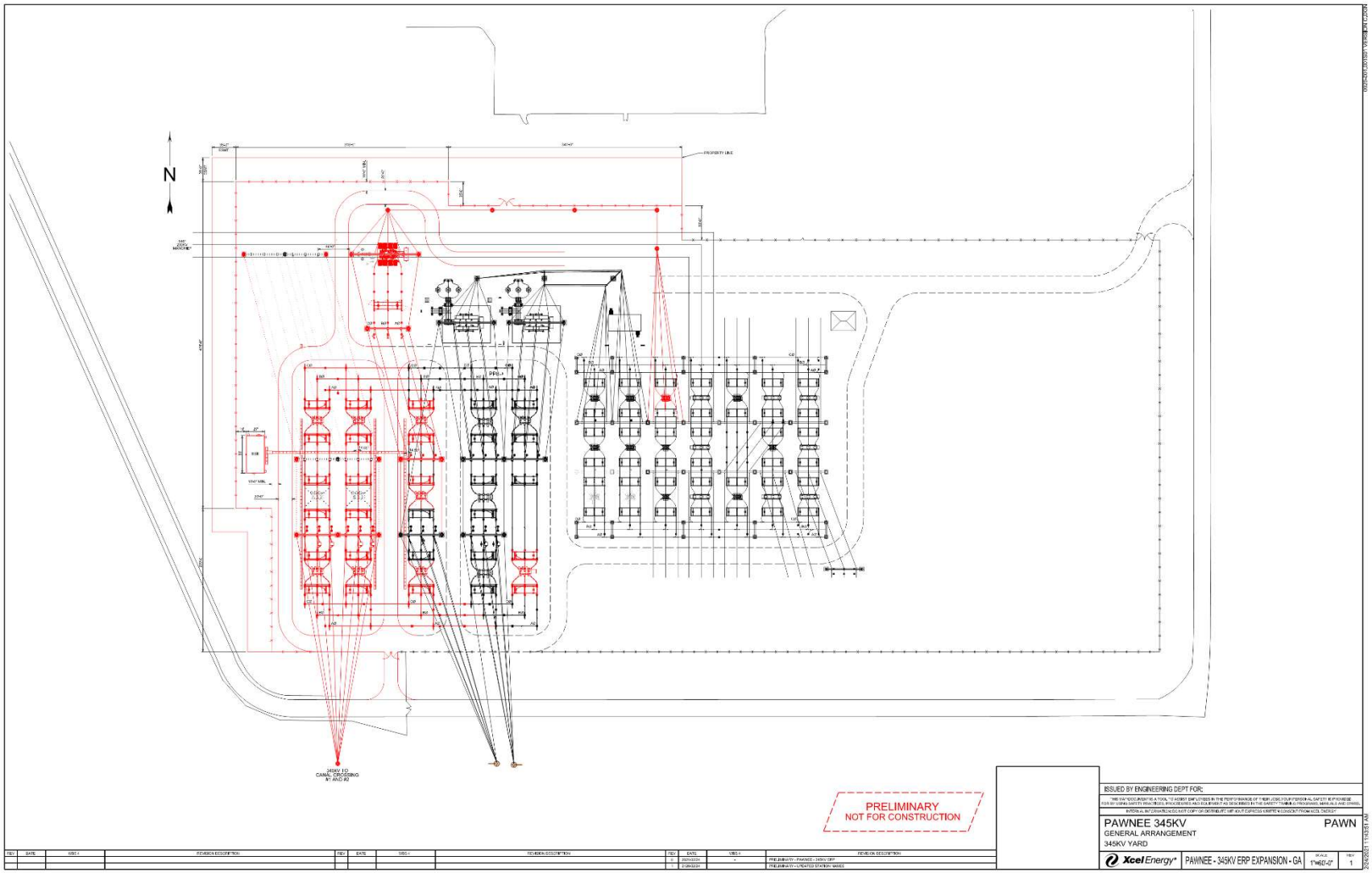

Figure 28: Pawnee General Arrangement Drawing

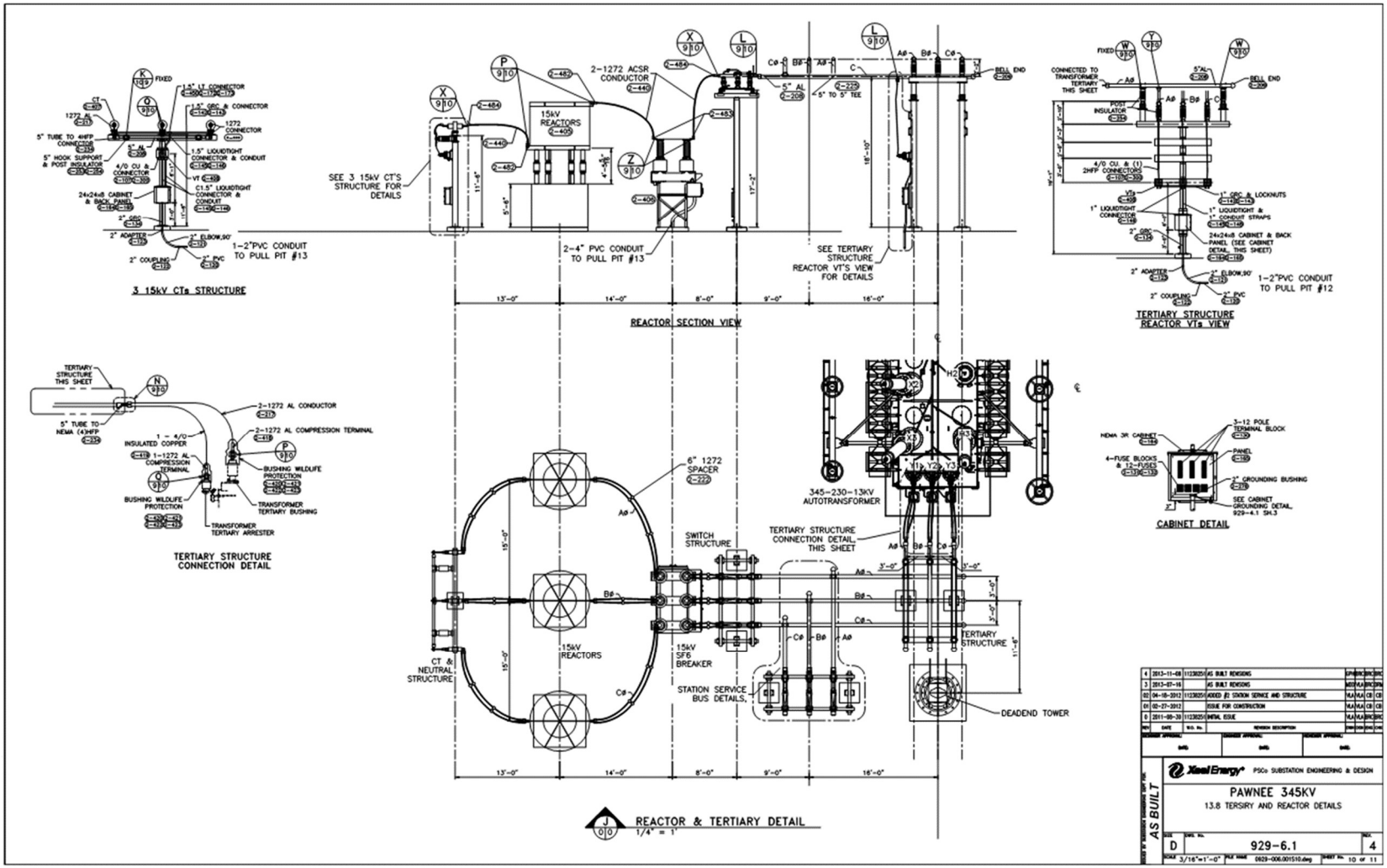

Figure 29: Pawnee Reactor Details

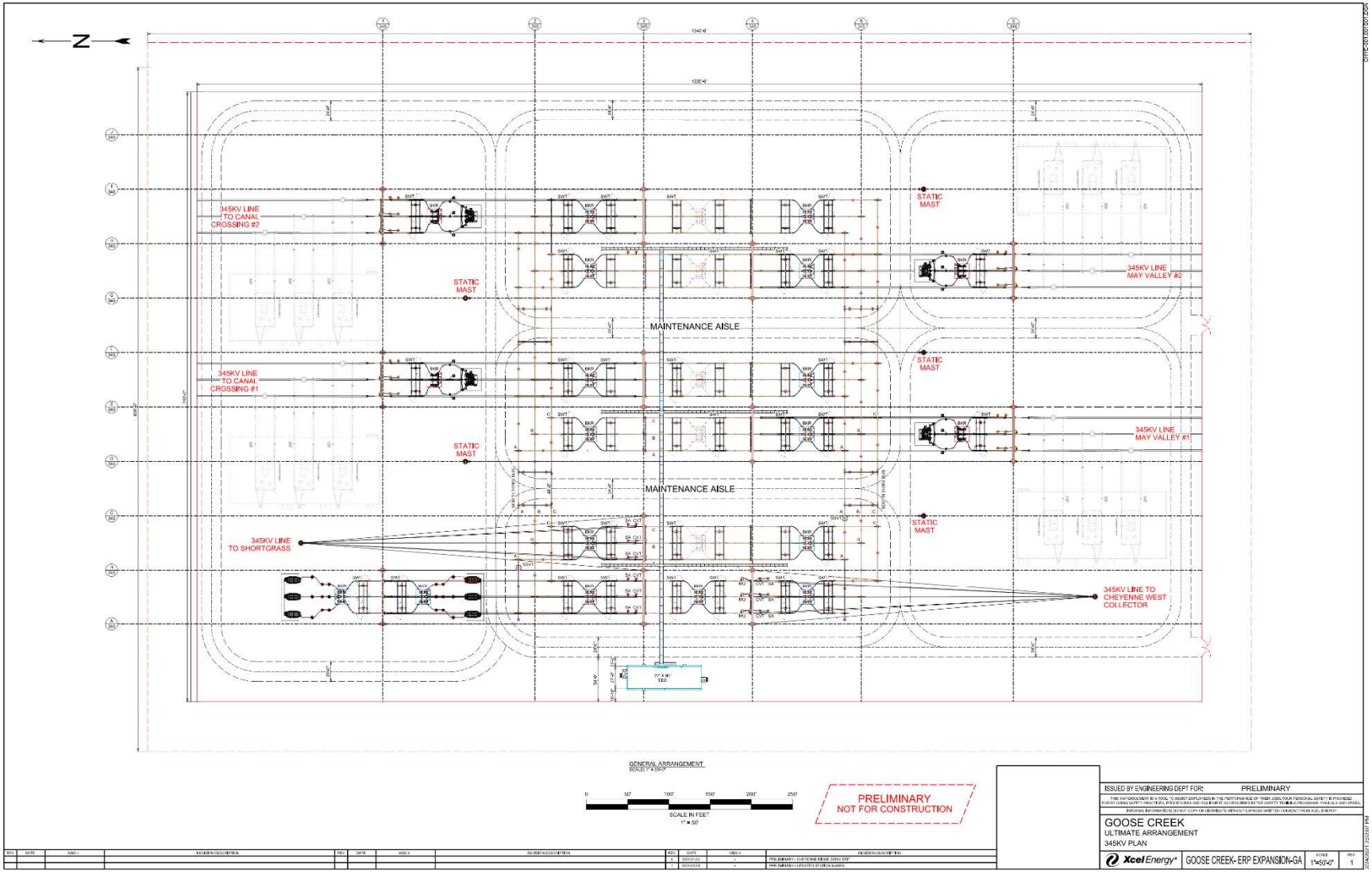

Figure 30: Goose Creek General Arrangement Drawing

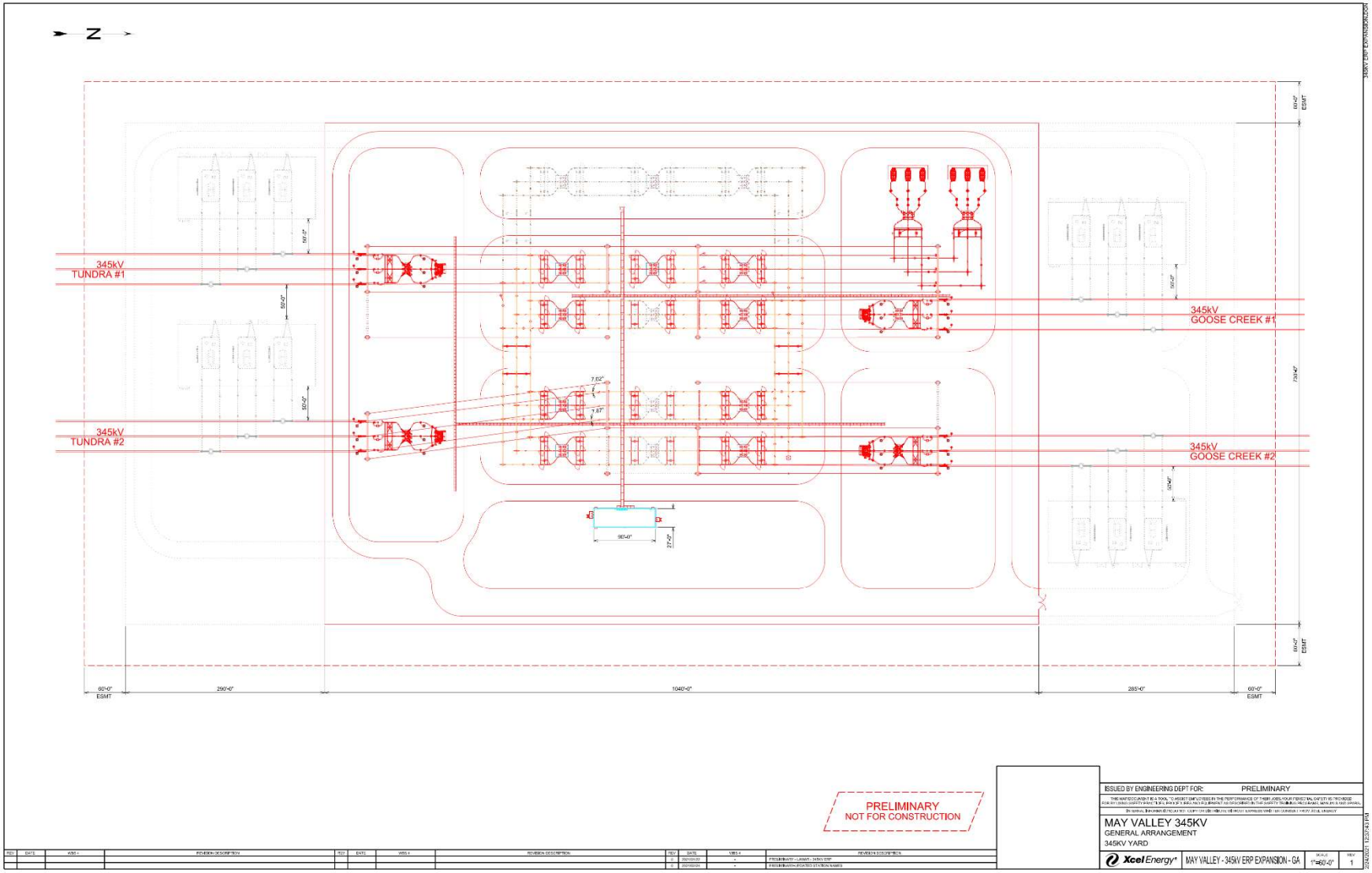

Figure 31: May Valley General Arrangement Drawing

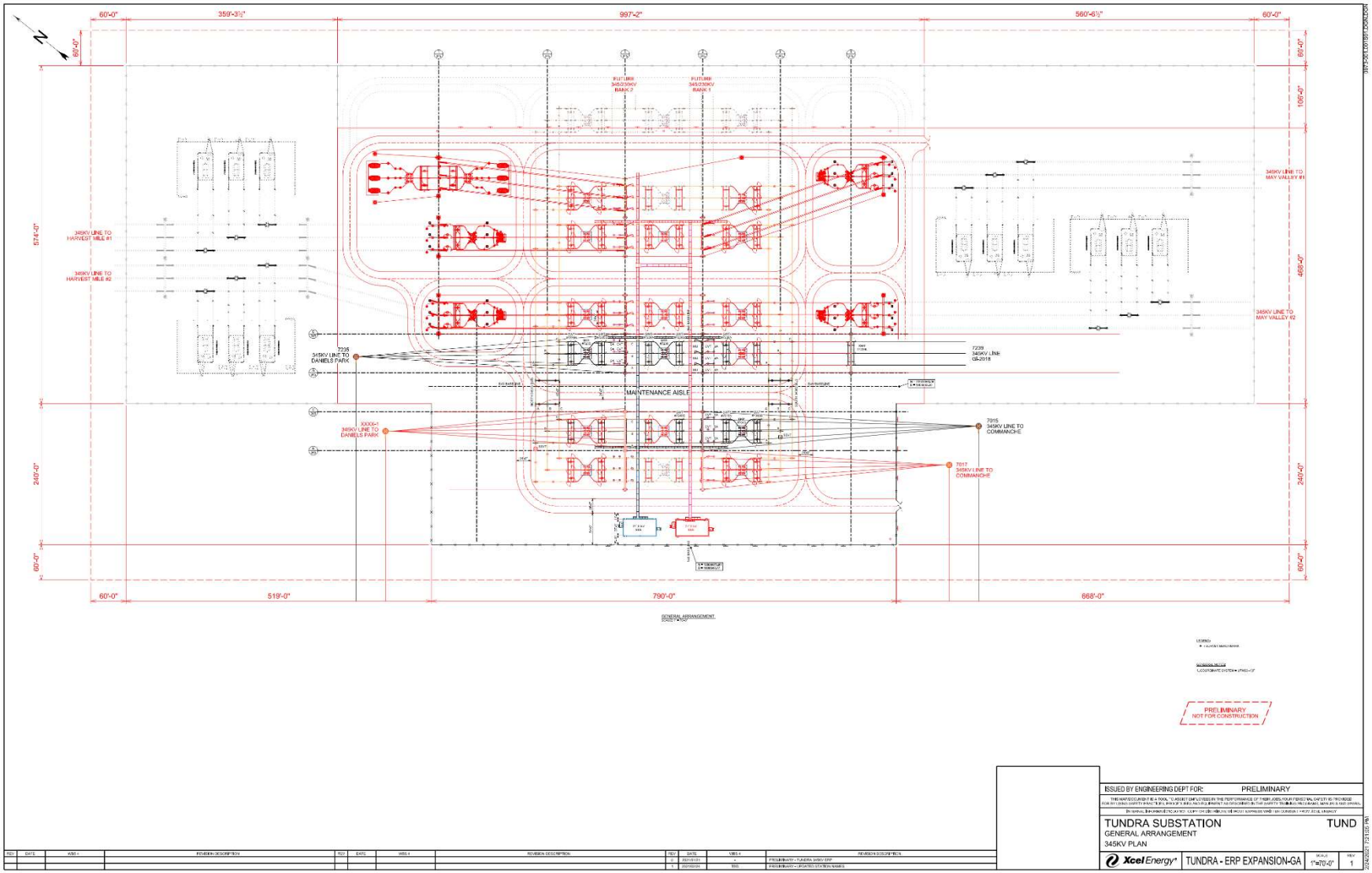

Figure 32: Tundra General Arrangement Drawing

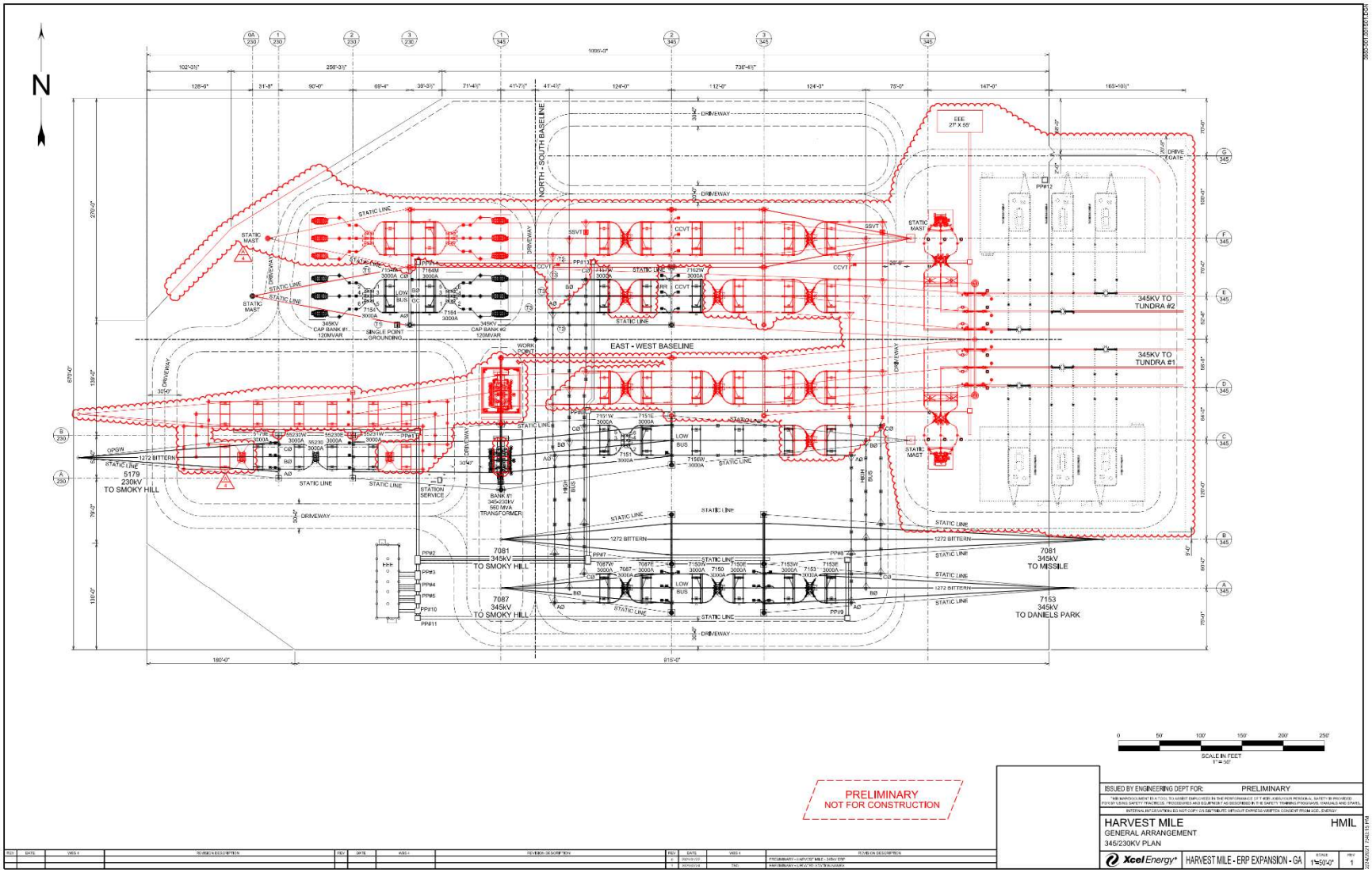

Figure 33: Harvest Mile General Arrangement Drawing