

North Plains Connector LLC
North Plains Connector Transmission Project
Docket No. PU-26-82

Late-Filed Exhibit 18 – EMF Information

At the September 1, 2026 technical hearing, the North Dakota Public Service Commission (“PSC”) requested that North Plains Connector LLC (“North Plains”) provide information regarding the electromagnetic field studies conducted for the North Dakota portion of the North Plains Connector Transmission Project (“Project”). To ensure the EMF information reflects the most up-to-date Project design specifications, North Plains had the attached memorandum prepared summarizing the results of the EMF analyses conducted for the Project, which is marked as **Late-Filed Exhibit 18-1**.



Memo

DATE:	September 23, 2026		
TO:	Kat Bridwell North Plains Connector LLC (NPC)		
ORIGINATOR:	Rob Schaerer, P.E. (WSP)	PROJECT NUMBER:	US0056106.9022.03.09
cc:	Kristine Lombardi (NPC), Matt Freudenrich (NPC), Curtis Symank (WSP), Heather Dell (WSP), Walter Ayala (WSP)		
SUBJECT:	Review of Potential Electric and Magnetic Fields for the North Plains Connector Project HVDC and HVAC Transmission Lines in North Dakota		

This memo is intended to provide a high-level summary of calculated electric and magnetic fields (EMF) for North Plains Connector LLC (North Plains) regarding the North Dakota portion of the North Plains Connector Project (Project). The ±525 kilovolt (kV) High-Voltage Direct Current (HVDC) Transmission Line extends from the Montana-North Dakota state line into Morton County, North Dakota where a converter station will convert the DC power to AC power at 345 kV. Two double-circuit alternating current 345 kV transmission lines will extend from the converter stations to their respective 345 kV substations. One transmission line is located in Morton County (referred to as the Morton Transmission Line) and the other transmission line extends from Morton County into Oliver County (referred to as the Oliver Transmission Line).

EMF Basics

All transmission lines produce electric fields when energized with voltage and magnetic fields when current or power is flowing on the line. As part of transmission line design, electric and magnetic fields have been considered when selecting conductor sizes and structure design for the Project. North Dakota does not have any regulatory limits for these factors. As a result, expected maximum values for each aspect have been calculated using industry standard methodologies, and results compared to applicable international or industry guidelines or limits, as discussed below.

HVDC Transmission Line Results

Common industry practice is to design electric fields from HVDC lines to be under 25 kV/m based on guidance from Electric Power Research Institute (EPRI) and National Radiological Protection Board (NRPB). Some references including EPRI and Alstom also suggest a limit of 10 kV/m outside the transmission line right-of-way (ROW).

The International Commission on Non-Ionizing Radiation Protection (ICNIRP) recommends magnetic field values below 400 mT (4 million mG) for HVDC transmission lines.



Memo

Table 1 below summarizes the results of the effects, applicable location, calculated maximum value, corresponding limit, and the source of the limit (as described above) for the HVDC Transmission Line. Reported results are the “worst-case” results which account for the lowest conductor heights and both normal and contingency line operation (one HVDC pole out-of-service), even though these scenarios occur only for short periods. Values referencing the edge-of-ROW utilize the typical 200-foot ROW width with the structure centered within the ROW. All results meet the applicable recommended limits.

Table 1 HVDC Transmission Line EMF Summary – Worst Case Results

Effect	Location	Maximum Value	Recommended Limit	Source of Recommended Limit
Electric Field	Anywhere	24.8 kV/m	25 kV/m	EPRI and others
Electric Field	Edge of ROW	2.3 kV/m	10 kV/m	EPRI and others
Magnetic Field	Anywhere	838 mG	4 Million mG	ICNIRP

Morton and Oliver Transmission Line Results

IEEE Std C95.1-2019 (“IEEE Standard for Safety Levels with Respect to Human Exposure to Electric, Magnetic, and Electromagnetic Fields, 0 Hz to 300 GHz”) provides exposure reference level (ERL) limits for exposure to AC electric fields. For the general public, the limits at 60 Hz (US power system frequency) are 5 kV/m outside the transmission line ROW and 10 kV/m within the ROW.

The ICNIRP recommends magnetic field values below 2000 mG for 60 Hz AC transmission lines. IEEE Std C95.1 also provides an ERL of 9,040 mG for 60 Hz AC transmission lines, but the more stringent ICNIRP limit was applied.

Table 2 below summarizes the results of the effects, applicable location, calculated maximum value, corresponding limit, and the source of the limit (as described above) for the Morton and Oliver Transmission Lines. Reported results are the “worst-case” results which account for the lowest conductor heights and both normal and contingency line operation (one circuit out-of-service), even though these scenarios occur only for short periods. Magnetic fields are presented based on the maximum expected line load current. Values referencing the edge-of-ROW utilize the typical 200-foot ROW width with the structure centered within the ROW. All results are below the applicable limits.

Memo

Table 2 Morton and Oliver Transmission Lines EMF Summary – Worst Case Results

Effect	Location	Maximum Value	Recommended Limit	Source of Recommended Limit
Electric Field	Anywhere	7.4 kV/m	10 kV/m	IEEE
Electric Field	Edge of ROW	0.5 kV/m	5 kV/m	IEEE
Magnetic Field	Anywhere	253 mG	2000 mG	ICNIRP

Conclusions

Based on the designs of the HVDC Transmission Line and Morton and Oliver Transmission Lines, all EMF levels will be below the industry guidelines or recommended limits in North Dakota.



Rob Schaerer, P.E.