Northern Natural Gas Company
Data Response Form For Docket No. CP26-130-000
Ventura to Farmington A-line Abandonment and Capacity Replacement Project (V2F) and Northern Lights 2027 Expansion Project (NL27)

Requesting Party:	FERC
Reference No:	FERC-DR1-25
Requester's Name:	Allison King
Subject:	MN SHPO and Northern 2018 Agreement

Data Request 25 (Resource Report 4 – Cultural Resources):

All material filed with the Commission containing **location, character, and ownership** information about cultural resources must have the cover and any relevant pages therein clearly labeled in bold lettering: **"CUI//PRIV – DO NOT RELEASE."**

Resource Report 4 mentions a 2018 agreement between the Minnesota SHPO and Northern defining the visual APE to a 500-foot line-of-sight radius outward from the limits of new aboveground appurtenances and appurtenant facilities not exceeding 10 feet in height. Provide this agreement, the expiration date, and all updates/extensions obtained since its execution.

Response:
The 2018 agreement was not an official document/agreement but rather an informal understanding that was verbally discussed and confirmed with Minnesota State Historic Preservation Office (MN SHPO) staff in 2018 and has been standard practice since the combined Northern Lights 2019 Expansion Project and Rochester Project (Docket No. CP18-534-000). The MN SHPO has validated this informal understanding by concurring with Northern's cultural survey findings and indirect Area of Potential Effects (APE) conclusions for every subsequent Northern Lights Expansion Project after the Northern Lights 2019/Rochester Expansion Project.

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Requesting Party:	FERC
Reference No:	FERC-DR1-26
Requester's Name:	Allison King
Subject:	Site 21CR0025

Data Request 26 (Resource Report 4 – Cultural Resources):

All material filed with the Commission containing **location, character, and ownership** information about cultural resources must have the cover and any relevant pages therein clearly labeled in bold lettering: **"CUI//PRIV – DO NOT RELEASE."**

Confirm that Northern would avoid unevaluated or eligibility-contributing portions of site 21CR0025. Provide an avoidance plan for how the Project will avoid effecting portions of site 21CR0025 outside the area of potential effect to the FERC and Minnesota SHPO. Provide any SHPO comments on the plan.

Response:
Northern confirms that it will avoid all of site 21CR0025. The portion of the site that partially extends into the environmental survey boundary was recommended not eligible for listing in the National Register of Historic Places (NRHP). No portion of Site 21CR0025 is located in the APE. At its closest point, the site is 187 feet from the direct APE. An avoidance plan is not required because the site will not be impacted during construction.

Posted: 06/22/2026 Responsibility: Brian Garcia

Northern Natural Gas Company
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Ventura to Farmington A-line Abandonment and Capacity Replacement Project (V2F) and Northern Lights 2027 Expansion Project (NL27)

Requesting Party:	FERC
Reference No:	FERC-DR1-27
Requester's Name:	Allison King
Subject:	Paynesville Horizontal Directional Drill P4-1 Bedrock

Data Request 27 (Resource Report 6 – Geology):

Based on review of the plan and profile for HDD PAY-P4-1, as well as the boring log for the associated geotechnical boring (BH-05 Paynesville 2nd Line), while poor quality (decomposed) gabbro bedrock is present to an elevation of approximately 1,060 feet, the drill may encounter higher quality bedrock near the bottom tangent of the drill. Therefore, clarify the apparent discrepancy with Northern's statement in section 6.7 that, with regard to HDDs for the NL27 project, "none…will encounter bedrock therefore, Northern designed them to meet the parameters of the unconsolidated materials along the profiles;" as well as if the design of HDD PAY-P4-1 accounts for the potential to encounter gabbro bedrock, as applicable.

Response:

For PAY-P4-1, the horizontal directional drill (HDD) path will encounter decomposed, poor-quality gabbro at an approximate elevation of 1,071 feet (datum elevation); however, the bottom tangent of the PAY-P4-1 HDD designed to 1,055 feet.

While geotechnical borings BH-05 and BH-06 indicate decomposed gabbro to an elevation of 1,006 feet, the samples retrieved were classified as sandy silt and fat clay consistent with highly weathered rock that has decomposed into unconsolidated or soft material. Further, samples were noted to be moist, decomposed, and hand deformed.

The hollow stem auger borings utilized for BH-05 and BH-06 did not meet refusal and met their target elevations of 1,006 feet, further proving conditions crossed via HDD on PAY-P4-1 are not consistent with hard gabbro bedrock.

Northern designed the HDD to meet the soil conditions indicated by the geotechnical borings; therefore, Northern does not anticipate the HDD will encounter hard bedrock conditions during the drill.

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Ventura to Farmington A-line Abandonment and Capacity Replacement Project (V2F) and Northern Lights 2027 Expansion Project (NL27)

Requesting Party:	FERC
Reference No:	FERC-DR1-28a and b
Requester's Name:	Allison King
Subject:	Dust Control and Fugitive Dust Mitigation Plan

Data Request 28 (Resource Report 7 – Soils):

Section 7.4.3 references use of "other tackifiers" and section 9.1.5 references "commercially available dust control agents" for fugitive dust control. The site-specific residential construction plan for the NL27 project (dwg. no. CA-016) additionally references a Fugitive Dust Mitigation Plan which does not appear to be included in application material. Therefore:

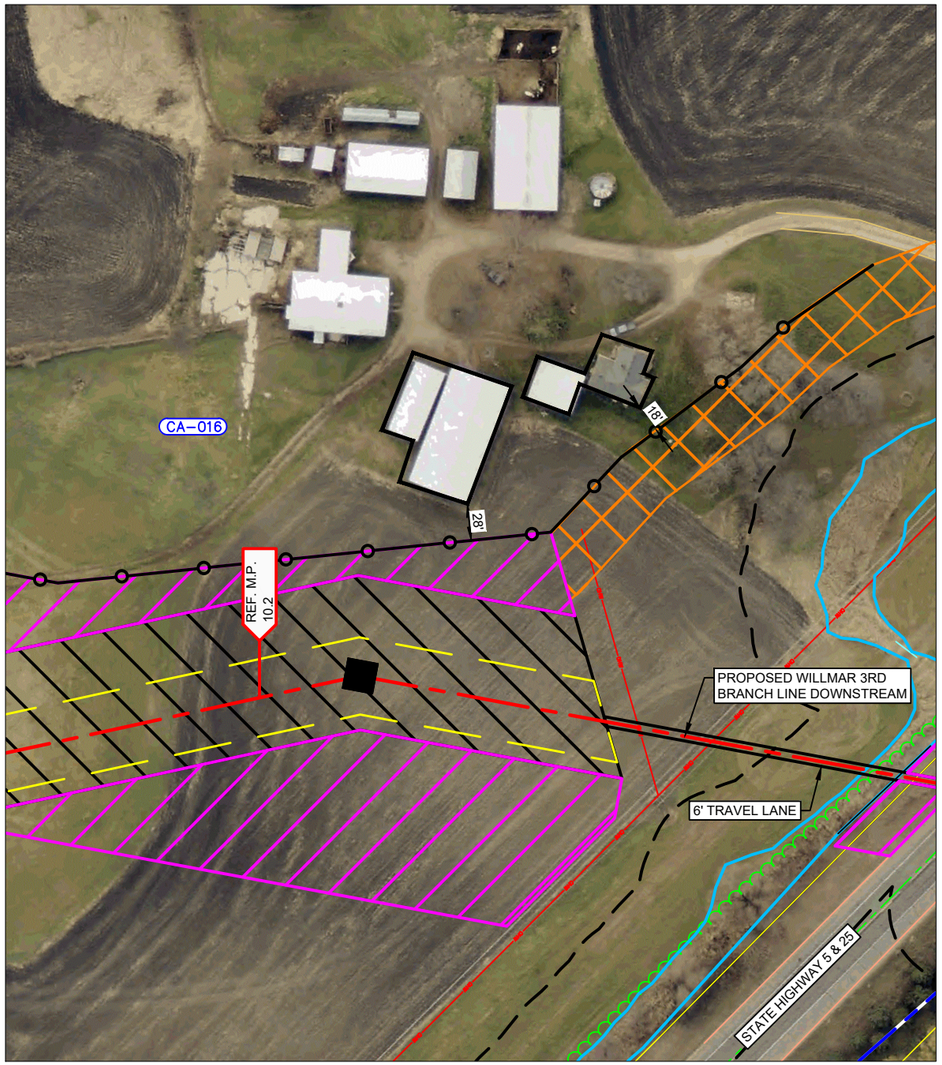
a. file the referenced Fugitive Dust Mitigation Plan; and
b. identify and provide safety data sheets for proposed dust suppressants and describe how their use and storage would not result in adverse environmental impacts, especially on agricultural land and in proximity to surface waters.

Response:
Northern will only utilize water for dust control. The water will be obtained from public water supplies and the totals are included in section 1.5.5.13 of Resource Report 1.

Northern's fugitive dust mitigation measures are addressed in section 7.4.3, the draft stormwater pollution prevention plans, and Northern's Engineering Standard 7507: Erosion and Sediment Control Technical Standards which are part of the draft stormwater pollution prevention plans. Northern has not prepared a separate Fugitive Dust Mitigation Plan. Northern has revised dwg. No. CA-016 (attached).

The tackifiers referenced in section 7.4.3 are associated with hydraulically applied erosion control products, or hydromulch, and the use of such products is limited to outside of a 100-foot buffer of any waterbody or wetland. Northern has not specified a list of acceptable hydromulch products but will not approve any containing malachite green dye or plastic fibers.

SITE-SPECIFIC RESIDENTIAL CONSTRUCTION PLAN - CA-016



PLAN
SCALE : 1"=50'

LEGEND

- PROPOSED WILLMAR 3RD BRANCH LINE DOWNSTREAM
- PROPERTY LINE
- OHW — OVERHEAD POWERLINE
- SAFETY FENCE
- WETLAND BUFFER
- WETLAND
- HOUSE
- TEMP. WORKSPACE
- EXTRA TEMP. WORKSPACE
- TEMP. ACCESS ROAD
- PROJECT PERMANENT ROW
- ENVIRONMENTAL SURVEY BOUNDARY
- HDD ENTRY/EXIT

NOTES:

1. NORTHERN WILL NOTIFY LANDOWNERS BY PHONE AND MAIL A MINIMUM OF 10 DAYS IN ADVANCE OF CONSTRUCTION.
2. THE EDGE OF THE CONSTRUCTION WORKSPACE WILL BE FENCED WITH SAFETY FENCING EXTENDING A MINIMUM OF 100 FEET EITHER SIDE OF THE RESIDENCE. FENCING WILL REMAIN IN PLACE UNTIL FINAL CLEANUP IS COMPLETE.
3. THE CONSTRUCTION WORKSPACE WILL BE REGULARLY WATERED TO CONTROL FUGITIVE DUST EMISSIONS.
4. RESIDENTIAL ACCESS WILL NOT BE IMPACTED AND WILL BE UNRESTRICTED THROUGHOUT CONSTRUCTION.
5. RESIDENTIAL UTILITIES WILL BE LOCATED PRIOR TO CONSTRUCTION AND ALL UTILITY SERVICES WILL BE MAINTAINED THROUGHOUT CONSTRUCTION.
6. TOPSOIL WILL BE SEGREGATED FROM AREAS TO BE EXCAVATED OR GRADED AND STOCKPILED FOR REDISTRIBUTION DURING RESTORATION.
7. NO MATURE TREES OR LANDSCAPING WILL BE REMOVED FROM WITHIN THE EDGE OF THE CONSTRUCTION WORKSPACE UNLESS NECESSARY FOR THE SAFE OPERATION OF CONSTRUCTION EQUIPMENT OR AS SPECIFIED IN LANDOWNER AGREEMENT.
8. ALL LAWN AND LANDSCAPE AREAS WILL BE RESTORED IN THE CONSTRUCTION WORKSPACE IMMEDIATELY AFTER CLEANUP OPERATIONS, OR AS SPECIFIED IN LANDOWNER AGREEMENTS, CONSISTENT WITH THE REQUIREMENTS OF THE PLAN.

FUGITIVE DUST CONTROL MEASURES

1. LIMIT VEHICLE AND EQUIPMENT SPEEDS TO 10 MILES PER HOUR.
2. ALL TRACK-OUT PADS AND CONSTRUCTION ENTRANCES/EXITS WILL BE CLEANED AT THE END OF EACH WORKDAY.
3. GRAVEL PADS WILL BE INSTALLED ADJACENT TO PAVED ROADWAYS TO LIMIT TRACK-OUT, AND CLEARLY ESTABLISHED AND ENFORCED TRAFFIC PATTERNS MAY BE USED TO ROUTE TRAFFIC OVER TRACK-OUT CONTROL DEVICES.
4. THE CONSTRUCTION WORKSPACE WILL BE REGULARLY WATERED TO CONTROL FUGITIVE DUST EMISSIONS.
5. IF WIND EROSION OR FUGITIVE DUST IS OBSERVED, NORTHERN WILL IMMEDIATELY REAPPLY OR IMPLEMENT ADDITIONAL WIND EROSION CONTROL BMPS FROM THE STORMWATER POLLUTION PREVENTION PLAN.

F1

50' 25' 0 50'-0" 100'-0"

SCALE: 1" = 50'-0"

Chan, Ginger 6/17/2026 8:16 AM M:\NNG 2027 NL\2_ALIGNMENT_RESIDENTIAL PLANNL27 WDC RESIDENTIAL PLAN.DWG

INTERNAL INFORMATION
DISTRIBUTION/COPIES LIMITED TO PROJECT NEEDS

FIGURE: 8-2

NO.	REVISION - DESCRIPTION	BY	DATE	CHK'D	APP'D
F1	RE-ISSUED FOR FERC	JM	6/8/26	ED	GC
F	ISSUED FOR FERC	JM	1/13/26	ED	GC

FILED WITH FERC
ANY CHANGES FROM WHAT IS SHOWN MUST BE IDENTIFIED AND REVIEWED BY REGULATORY BEFORE IMPLEMENTATION

STATUS	CHECKED BY	CHECKED DATE	APPROVED BY	APPROVED DATE
PRELIM				
BID				
CONST.				

FAC. CODE: N/A		REL. W.O. N/A	
PL# N/A		CONST. YR 2027	
STA# N/A		PO# N/A	
	BY	DATE	
DESIGN	ED	9/30/25	
DRAWN	JM	9/30/25	
ASBUILT			
FILE NO.:			
SCALE: 1"=50'			

NORTHERN LIGHTS 2027 EXPANSION PROJECT
WILLMAR 3RD BRANCH LINE DOWNSTREAM
SITE-SPECIFIC RESIDENTIAL CONSTRUCTION PLAN - CA-016
SEC. 1, T115N. 26W
CARVER COUNTY, MINNESOTA

Northern Natural Gas.

PROJECT NO.

DWG. NO.
CA-016
F1

Northern Natural Gas Company
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Ventura to Farmington A-line Abandonment and Capacity Replacement Project (V2F) and Northern Lights 2027 Expansion Project (NL27)

Requesting Party:	FERC
Reference No:	FERC-DR1-29
Requester's Name:	Allison King
Subject:	V2F – Conservation Reserve Program

Data Request 29 (Resource Report 8 – Land Use and Aesthetics):

Provide additional information obtained regarding the Conservation Reserve Program located between mileposts 101.62 and 102.18 on the V2F Project.

Response:
Additional information regarding the Conservation Reserve Program (CRP) located between mileposts 101.62 and 102.18 on the V2F Project remains limited, as this data is not publicly available. Northern is aware that a CRP contract exists; however, the landowner has not provided additional details at this time.

Northern is scheduled to begin negotiations with the landowner in July 2026 and will work directly with them to ensure compliance with the terms of the CRP contract.

Northern Natural Gas Company
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Ventura to Farmington A-line Abandonment and Capacity Replacement Project (V2F) and Northern Lights 2027 Expansion Project (NL27)

Requesting Party:	FERC
Reference No:	FERC-DR1-30
Requester's Name:	Allison King
Subject:	Table 8.1-2

Data Request 30 (Resource Report 8 – Land Use and Aesthetics):

Confirm/clarify that construction and operation acreages for land use presented in table 8.1-2 reflect land affected by the Project. See related question RR3, Q1. As applicable, submit a revised table 8.1-2, without the wetland category. Wetlands under active cultivation should be included in the agricultural land use acreage.

Response:
Northern confirms the construction and operations acreages for the land use presented in Table 8.1-2 represents an accurate total of the land affected by the V2F Project.

Northern confirms the construction and operations acreages for the land use presented in Table 8.1-6 represents an accurate total of the land affected by the NL27 Project.

Tables 8.1-2 and 8.1-6 have been updated so wetlands under active cultivation are included in the agricultural land use, palustrine emergent and scrub-shrub wetlands are in open land, and forested wetlands are in forested/woodland. The tables are on the pages below due to table size.

Table 8.1-2 Acreage Affected by Construction and Operation of the V2F Project

Facility	Agricultural		Forest/Woodland		Industrial/ Commercial		Open Land		Open Water		Residential		Total	
	Const	Oper	Const	Oper	Const	Oper	Const	Oper	Const	Oper	Const	Oper	Const	Oper
Three Pipeline Extensions														
Lake Mills M500 E-line														
Pipeline ROW[1,2]	86.62	43.46	0.31	0.14	0.43	0.06	2.36	0.70	0.00	0.00	0.00	0.00	89.72	44.36
Within Existing Easement	*19.46*	*13.66*	*0.08*	*0.04*	*0.03*	*0.02*	*0.29*	*0.21*	*0.00*	*0.00*	*0.00*	*0.00*	*19.86*	*13.93*
Outside of Existing Easement	*67.16*	*29.80*	*0.23*	*0.10*	*0.40*	*0.04*	*2.07*	*0.49*	*0.00*	*0.00*	*0.00*	*0.00*	*69.86*	*30.43*
Extra Temporary Workspace (ETWS)	46.59	0.00	0.27	0.00	0.34	0.00	1.54	0.00	0.00	0.00	0.00	0.00	48.74	0.00
Within Existing Easement	*8.79*	*0.00*	*0.03*	*0.00*	*0.04*	*0.00*	*0.12*	*0.00*	*0.00*	*0.00*	*0.00*	*0.00*	*8.98*	*0.00*
Outside of Existing Easement	*37.80*	*0.00*	*0.24*	*0.00*	*0.30*	*0.00*	*1.42*	*0.00*	*0.00*	*0.00*	*0.00*	*0.00*	*39.76*	*0.00*
Staging Area	29.62	0.00	0.02	0.00	0.11	0.00	1.32	0.00	0.00	0.00	0.00	0.00	31.07	0.00
Within Existing Easement	*0.16*	*0.00*	*0.00*	*0.00*	*0.00*	*0.00*	*0.01*	*0.00*	*0.00*	*0.00*	*0.00*	*0.00*	*0.17*	*0.00*
Outside of Existing Easement	*29.46*	*0.00*	*0.02*	*0.00*	*0.11*	*0.00*	*1.31*	*0.00*	*0.00*	*0.00*	*0.00*	*0.00*	*30.90*	*0.00*
Temporary Access Roads	6.75	0.00	0.09	0.00	0.78	0.00	2.39	0.00	0.00	0.00	0.52	0.00	10.53	0.00
Within Existing Easement	*0.04*	*0.00*	*0.00*	*0.00*	*0.00*	*0.00*	*0.00*	*0.00*	*0.00*	*0.00*	*0.00*	*0.00*	*0.04*	0.00
Outside of Existing Easement	*6.71*	*0.00*	*0.09*	*0.00*	*0.78*	*0.00*	*2.39*	*0.00*	*0.00*	*0.00*	*0.52*	*0.00*	*10.49*	0.00
Existing Aboveground Appurtenance[4]	0.15	0.00	0.00	0.00	0.64	0.64	0.01	0.00	0.00	0.00	0.00	0.00	0.80	0.64
Within Existing Easement	*0.15*	*0.00*	*0.00*	*0.00*	*0.64*	*0.64*	*0.01*	*0.00*	*0.00*	*0.00*	*0.00*	*0.00*	*0.80*	*0.64*
Outside of Existing Easement	*0.00*	*0.00*	*0.00*	*0.00*	*0.00*	*0.00*	*0.00*	*0.00*	*0.00*	*0.00*	*0.00*	*0.00*	*0.00*	*0.00*
Subtotal	**169.73**	**43.46**	**0.69**	**0.14**	**2.30**	**0.70**	**7.62**	**0.70**	**0.00**	**0.00**	**0.52**	**0.00**	**180.86**	**45.00**
Albert Lea M500 E-line														
Pipeline ROW[1,2]	19.55	9.77	0.22	0.15	0.01	0.00	0.33	0.12	0.00	0.00	0.00	0.00	20.11	10.04
Within Existing Easement	*6.58*	*4.68*	*0.19*	*0.12*	*0.00*	*0.00*	*0.08*	*0.06*	*0.00*	*0.00*	*0.00*	*0.00*	*6.85*	*4.86*
Outside of Existing Easement	*12.97*	*5.09*	*0.03*	*0.03*	*0.01*	*0.00*	*0.25*	*0.06*	*0.00*	*0.00*	*0.00*	*0.00*	*13.26*	*5.18*
ETWS	5.65	0.00	0.00	0.00	0.00	0.00	0.15	0.00	0.00	0.00	0.00	0.00	5.80	0.00
Within Existing Easement	*1.03*	*0.00*	*0.00*	*0.00*	*0.00*	*0.00*	*0.02*	*0.00*	*0.00*	*0.00*	*0.00*	*0.00*	*1.05*	*0.00*

Facility	Agricultural		Forest/Woodland		Industrial/ Commercial		Open Land		Open Water		Residential		Total	
	Const	Oper	Const	Oper	Const	Oper	Const	Oper	Const	Oper	Const	Oper	Const	Oper
Outside of Existing Easement	*4.62*	*0.00*	*0.00*	*0.00*	*0.00*	*0.00*	*0.13*	*0.00*	*0.00*	*0.00*	*0.00*	*0.00*	*4.75*	*0.00*
Staging Area[3]	11.67	0.00	0.00	0.00	0.00	0.00	0.26	0.00	0.00	0.00	0.00	0.00	11.93	0.00
Outside of Existing Easement	*11.67*	*0.00*	*0.00*	*0.00*	*0.00*	*0.00*	*0.26*	*0.00*	*0.00*	*0.00*	*0.00*	*0.00*	*11.93*	*0.00*
Temporary Access Roads	5.34	0.00	0.00	0.00	0.20	0.00	0.11	0.00	0.00	0.00	0.00	0.00	5.65	0.00
Within Existing Easement	*0.04*	*0.00*	*0.00*	*0.00*	*0.01*	*0.00*	*0.02*	*0.00*	*0.00*	*0.00*	*0.00*	*0.00*	*0.07*	*0.00*
Outside of Existing Easement	*5.30*	*0.00*	*0.00*	*0.00*	*0.19*	*0.00*	*0.09*	*0.00*	*0.00*	*0.00*	*0.00*	*0.00*	*5.58*	*0.00*
Subtotal	**42.21**	**9.77**	**0.22**	**0.15**	**0.21**	**0.00**	**0.85**	**0.12**	**0.00**	**0.00**	**0.00**	**0.00**	**43.49**	**10.04**
Faribault M500 D-line														
Pipeline ROW[1,2]	64.13	31.98	1.56	0.62	0.47	0.05	8.74	4.30	0.00	0.00	0.00	0.00	74.90	36.95
Within Existing Easement	*16.17*	*11.60*	*0.31*	*0.24*	*0.02*	*0.01*	*1.68*	*1.14*	*0.00*	*0.00*	*0.00*	*0.00*	*18.18*	*12.99*
Outside of Existing Easement	*47.96*	*20.38*	*1.25*	*0.38*	*0.45*	*0.04*	*7.06*	*3.16*	*0.00*	*0.00*	*0.00*	*0.00*	*56.72*	*23.96*
ETWS	40.19	0.00	0.25	0.00	0.11	0.00	5.90	0.00	0.00	0.00	0.07	0.00	46.52	0.00
Within Existing Easement	*12.80*	*0.00*	*0.00*	*0.00*	*0.01*	*0.00*	*1.15*	*0.00*	*0.00*	*0.00*	*0.05*	*0.00*	*14.01*	*0.00*
Outside of Existing Easement	*27.39*	*0.00*	*0.25*	*0.00*	*0.10*	*0.00*	*4.75*	*0.00*	*0.00*	*0.00*	*0.02*	*0.00*	*32.51*	*0.00*
Staging Area	44.32	0.00	0.00	0.00	0.23	0.00	2.05	0.00	0.00	0.00	0.00	0.00	46.60	0.00
Within Existing Easement	*3.11*	0.00	*0.00*	*0.00*	*0.00*	*0.00*	*0.08*	*0.00*	*0.00*	*0.00*	*0.00*	*0.00*	*3.19*	*0.00*
Outside of Existing Easement	*41.21*	*0.00*	*0.00*	*0.00*	*0.23*	*0.00*	*1.97*	*0.00*	*0.00*	*0.00*	*0.00*	*0.00*	*43.41*	*0.00*
Temporary Access Roads	1.81	0.00	0.01	0.00	0.31	0.00	1.39	0.00	0.00	0.00	0.00	0.00	3.52	0.00
Within Existing Easement	*0.03*	0.00	*0.00*	*0.00*	*0.04*	*0.00*	*0.03*	*0.00*	*0.00*	*0.00*	*0.00*	*0.00*	*0.10*	*0.00*
Outside of Existing Easement	*1.78*	*0.00*	*0.01*	*0.00*	*0.27*	*0.00*	*1.36*	*0.00*	*0.00*	*0.00*	*0.00*	*0.00*	*3.42*	*0.00*
Existing Aboveground Appurtenances[4]	0.01	0.00	0.00	0.00	0.36	0.36	0.00	0.00	0.00	0.00	0.00	0.00	0.37	0.36
Within Existing Easement	*0.01*	*0.00*	*0.00*	*0.00*	*0.36*	*0.36*	*0.00*	*0.00*	*0.00*	*0.00*	*0.00*	*0.00*	*0.37*	*0.36*
Outside of Existing Easement	*0.00*	*0.00*	*0.00*	*0.00*	*0.00*	*0.00*	*0.00*	*0.00*	*0.00*	*0.00*	*0.00*	*0.00*	*0.00*	*0.00*
Subtotal	**150.46**	**31.98**	**1.82**	**0.62**	**1.48**	**0.41**	**18.08**	**4.30**	**0.00**	**0.00**	**0.07**	**0.00**	**171.91**	**37.31**
Two Disconnect Sites														
Ventura Compressor Station														

Facility	Agricultural		Forest/Woodland		Industrial/ Commercial		Open Land		Open Water		Residential		Total	
	Const	**Oper**	**Const**	**Oper**	**Const**	**Oper**	**Const**	**Oper**	**Const**	**Oper**	**Const**	**Oper**	**Const**	**Oper**
Disconnect Workspace[3] (ETWS/TAR)	0.76	0.00	0.00	0.00	3.94	0.00	0.03	0.00	0.00	0.00	0.00	0.00	4.73	0.00
Farmington Compressor Station														
Disconnect Workspace[3] (ETWS/TAR)	0.00	0.00	0.62	0.00	3.97	0.00	0.87	0.00	0.01	0.00	0.00	0.00	5.47	0.00
Subtotal	**0.76**	**0.00**	**0.62**	**0.00**	**7.91**	**0.00**	**0.90**	**0.00**	**0.01**	**0.00**	**0.00**	**0.00**	**10.20**	**0.00**
Temporary Compression Sites														
La Crosse BL MNB73201 Launcher/ABA 05														
Temporary Compression Workspace[3] (ETWS)	1.37	0.00	0.00	0.00	0.38	0.00	0.44	0.00	0.00	0.00	0.00	0.00	2.19	0.00
Lake Mills Compressor Station														
Temporary Compression Workspace[3] (ETWS)	0.00	0.00	0.00	0.00	4.97	0.00	0.32	0.00	0.00	0.00	0.00	0.00	5.29	0.00
Owatonna Compressor Station														
Temporary Compression Workspace[3] (ETWS/TAR)	0.00	0.00	0.00	0.00	4.33	0.00	0.00	0.00	0.00	0.00	0.00	0.00	4.33	0.00
Northfield MN #1														
Temporary Compression Workspace[3] (ETWS/TAR)	2.30	0.00	0.00	0.00	0.18	0.00	0.45	0.00	0.00	0.00	0.00	0.00	2.93	0.00
Subtotal	**3.67**	**0.00**	**0.00**	**0.00**	**9.86**	**0.00**	**1.21**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**14.74**	**0.00**
Project Within Existing Easement	*70.91*	*29.94*	*1.23*	*0.40*	*14.49*	*1.03*	*4.26*	*1.41*	*0.01*	*0.00*	*0.05*	*0.00*	*90.95*	*32.78*
Project Outside of Existing Easement	*295.92*	*55.27*	*2.12*	*0.51*	*7.27*	*0.08*	*24.40*	*3.71*	*0.00*	*0.00*	*0.54*	*0.00*	*330.25*	*59.57*
V2F PROJECT TOTAL	**366.83**	**85.21**	**3.35**	**0.91**	**21.76**	**1.11**	**28.66**	**5.12**	**0.01**	**0.00**	**0.59**	**0.00**	**421.20**	**92.35**

[1] Construction ROW is based on a 60- to 100-foot-wide temporary ROW in uplands and wetlands. Operational ROW is based on 50-foot-wide corridor in uplands and 10-foot-wide corridor in wetlands. Differing ROW widths are shown on the construction alignment sheets.
[2] Northern also included impacts for a single 6-foot-wide or two 3-foot-wide parallel travel lanes between HDD entry and exit points in the pipeline ROW calculations.
[3] Outside existing easement
[4] The existing aboveground appurtenance(s) will be removed.

Table 8.1-6 Acreage Affected by Construction and Operation of the NL27 Project

Facility	Agricultural		Forested/Woodland		Industrial/ Commercial		Open Land		Open Water		Residential		Total	
	Const	**Oper**	**Const**	**Oper**	**Const**	**Oper**	**Const**	**Oper**	**Const**	**Oper**	**Const**	**Oper**	**Const**	**Oper**
Lake Mills M500 E-line														
Pipeline ROW[1,2]	22.25	11.19	0.40	0.24	0.27	0.12	4.99	2.44	0.00	0.00	0.00	0.00	27.91	13.99
Within Existing Easement	*5.58*	*3.72*	*0.11*	*0.08*	*0.04*	*0.02*	*1.40*	*0.94*	*0.00*	*0.00*	*0.00*	*0.00*	*7.13*	*4.76*
Outside of Existing Easement	*16.67*	*7.47*	*0.29*	*0.16*	*0.23*	*0.10*	*3.59*	*1.50*	*0.00*	*0.00*	*0.00*	*0.00*	*20.78*	*9.23*
Extra Temporary Workspace (ETWS)	6.06	0.00	0.00	0.00	0.18	0.00	2.69	0.00	0.00	0.00	0.00	0.00	8.93	0.00
Within Existing Easement	*0.99*	*0.00*	*0.00*	*0.00*	*0.02*	*0.00*	*0.54*	*0.00*	*0.00*	*0.00*	*0.00*	*0.00*	*1.55*	*0.00*
Outside of Existing Easement	*5.07*	*0.00*	*0.00*	*0.00*	*0.16*	*0.00*	*2.15*	*0.00*	*0.00*	*0.00*	*0.00*	*0.00*	*7.38*	*0.00*
Staging Area	6.40	0.00	0.00	0.00	0.02	0.00	0.08	0.00	0.00	0.00	0.00	0.00	6.50	0.00
Within Existing Easement	*0.49*	*0.00*	*0.00*	*0.00*	*0.00*	*0.00*	*0.01*	*0.00*	*0.00*	*0.00*	*0.00*	*0.00*	*0.50*	*0.00*
Outside of Existing Easement	*5.91*	*0.00*	*0.00*	*0.00*	*0.02*	*0.00*	*0.07*	*0.00*	*0.00*	*0.00*	*0.00*	*0.00*	*6.00*	*0.00*
Permanent Access Roads	0.08	0.08	0.00	0.00	0.00	0.00	1.21	1.21	0.00	0.00	0.27	0.27	1.56	1.56
Within Existing Easement	*0.00*	*0.00*	*0.00*	*0.00*	*0.00*	*0.00*	*0.02*	*0.02*	*0.00*	*0.00*	*0.00*	*0.00*	*0.02*	*0.02*
Outside of Existing Easement	*0.08*	*0.08*	*0.00*	*0.00*	*0.00*	*0.00*	*1.19*	*1.19*	*0.00*	*0.00*	*0.27*	*0.27*	*1.54*	*1.54*
Temporary Access Roads	1.96	0.00	0.00	0.00	0.06	0.00	0.35	0.00	0.00	0.00	0.00	0.00	2.37	0.00
Within Existing Easement	*0.05*	*0.00*	*0.00*	*0.00*	*0.01*	*0.00*	*0.10*	*0.00*	*0.00*	*0.00*	*0.00*	*0.00*	*0.16*	*0.00*
Outside of Existing Easement	*1.91*	*0.00*	*0.00*	*0.00*	*0.05*	*0.00*	*0.25*	*0.00*	*0.00*	*0.00*	*0.00*	*0.00*	*2.21*	*0.00*
Existing Aboveground Appurtenances4	0.00	0.00	0.00	0.00	0.25	0.25	0.00	0.00	0.00	0.00	0.00	0.00	0.25	0.25
Within Existing Easement	*0.00*	*0.00*	*0.00*	*0.00*	*0.25*	*0.25*	*0.00*	*0.00*	*0.00*	*0.00*	*0.00*	*0.00*	*0.25*	*0.25*
Proposed Aboveground Appurtenance[4]	0.00	0.00	0.00	0.00	0.00	0.00	0.06	0.06	0.00	0.00	0.00	0.00	0.06	0.06
Within Existing Easement	*0.00*	*0.00*	*0.00*	*0.00*	*0.00*	*0.00*	*0.05*	*0.05*	*0.00*	*0.00*	*0.00*	*0.00*	*0.05*	*0.05*
Outside of Existing Easement	*0.00*	*0.00*	*0.00*	*0.00*	*0.00*	*0.00*	*0.01*	*0.01*	*0.00*	*0.00*	*0.00*	*0.00*	*0.01*	*0.01*
Subtotal	**36.75**	**11.27**	**0.40**	**0.24**	**0.78**	**0.37**	**9.38**	**3.71**	**0.00**	**0.00**	**0.27**	**0.27**	**47.58**	**15.86**

Facility	Agricultural		Forested/Woodland		Industrial/ Commercial		Open Land		Open Water		Residential		Total	
	Const	Oper	Const	Oper	Const	Oper	Const	Oper	Const	Oper	Const	Oper	Const	Oper
Albert Lea M500 E-line														
Pipeline ROW[1,2]	34.09	17.15	0.20	0.09	0.12	0.02	3.45	1.58	0.00	0.00	0.00	0.00	37.86	18.84
Within Existing Easement	*8.88*	*5.64*	*0.00*	*0.00*	*0.00*	*0.00*	*0.11*	*0.06*	*0.00*	*0.00*	*0.00*	*0.00*	*8.99*	*5.70*
Outside of Existing Easement	*25.21*	*11.51*	*0.20*	*0.09*	*0.12*	*0.02*	*3.34*	*1.52*	*0.00*	*0.00*	*0.00*	*0.00*	*28.87*	*13.14*
ETWS	12.95	0.00	0.04	0.00	0.02	0.00	2.31	0.00	0.00	0.00	0.00	0.00	15.32	0.00
Within Existing Easement	*1.61*	*0.00*	*0.00*	*0.00*	*0.00*	*0.00*	*0.00*	*0.00*	*0.00*	*0.00*	*0.00*	*0.00*	*1.61*	*0.00*
Outside of Existing Easement	*11.34*	*0.00*	*0.04*	*0.00*	*0.02*	*0.00*	*2.31*	*0.00*	*0.00*	*0.00*	*0.00*	*0.00*	*13.71*	*0.00*
Staging Area[3]	7.15	0.00	0.00	0.00	0.01	0.00	4.83	0.00	0.00	0.00	0.00	0.00	11.99	0.00
Outside of Existing Easement	*7.15*	*0.00*	*0.00*	*0.00*	*0.01*	*0.00*	*4.83*	*0.00*	*0.00*	*0.00*	*0.00*	*0.00*	*11.99*	*0.00*
Permanent Access Roads	0.00	0.00	0.00	0.00	0.00	0.00	0.02	0.02	0.00	0.00	0.00	0.00	0.02	0.02
Outside of Existing Easement	*0.00*	*0.00*	*0.00*	*0.00*	*0.00*	*0.00*	*0.02*	*0.02*	*0.00*	*0.00*	*0.00*	*0.00*	*0.02*	*0.02*
Temporary Access Roads	4.65	0.00	0.00	0.00	2.02	0.00	0.59	0.00	0.00	0.00	0.02	0.00	7.28	0.00
Within Existing Easement	*0.02*	*0.00*	*0.00*	*0.00*	*0.03*	*0.00*	*0.01*	*0.00*	*0.00*	*0.00*	*0.00*	*0.00*	*0.06*	*0.00*
Outside of Existing Easement	*4.63*	*0.00*	*0.00*	*0.00*	*1.99*	*0.00*	*0.58*	*0.00*	*0.00*	*0.00*	*0.02*	*0.00*	*7.22*	*0.00*
Proposed Aboveground Appurtenance[4]	0.00	0.00	0.00	0.00	0.00	0.00	0.16	0.16	0.00	0.00	0.00	0.00	0.16	0.16
Outside of Existing Easement	*0.00*	*0.00*	*0.00*	*0.00*	*0.00*	*0.00*	*0.16*	*0.16*	*0.00*	*0.00*	*0.00*	*0.00*	*0.16*	*0.16*
Subtotal	**58.84**	**17.15**	**0.24**	**0.09**	**2.17**	**0.02**	**11.36**	**1.76**	**0.00**	**0.00**	**0.02**	**0.00**	**72.63**	**19.02**
Willmar 3rd Branch Line Upstream														
Pipeline ROW[1,2]	2.57	1.25	2.06	1.17	0.11	0.00	6.46	3.11	0.02	0.00	3.94	1.87	15.16	7.40
Within Existing Easement	*0.88*	*0.64*	*0.36*	*0.26*	*0.00*	*0.00*	*2.00*	*1.28*	*0.00*	*0.00*	*0.99*	*0.49*	*4.23*	*2.67*
Outside of Existing Easement	*1.69*	*0.61*	*1.70*	*0.91*	*0.11*	*0.00*	*4.46*	*1.83*	*0.02*	*0.00*	*2.95*	*1.38*	*10.93*	*4.73*
ETWS	1.53	0.00	0.42	0.00	0.09	0.00	3.93	0.00	0.00	0.00	2.38	0.00	8.35	0.00
Within Existing Easement	*0.63*	*0.00*	*0.03*	*0.00*	*0.01*	*0.00*	*0.63*	*0.00*	*0.00*	*0.00*	*1.10*	*0.00*	*2.40*	*0.00*
Outside of Existing Easement	*0.90*	*0.00*	*0.39*	*0.00*	*0.08*	*0.00*	*3.30*	*0.00*	*0.00*	*0.00*	*1.28*	*0.00*	*5.95*	*0.00*
Staging Area	1.56	0.00	0.00	0.00	0.00	0.00	2.51	0.00	0.00	0.00	0.29	0.00	4.36	0.00

Facility	Agricultural		Forested/Woodland		Industrial/ Commercial		Open Land		Open Water		Residential		Total	
	Const	Oper	Const	Oper	Const	Oper	Const	Oper	Const	Oper	Const	Oper	Const	Oper
Outside of Existing Easement	*1.56*	*0.00*	*0.00*	*0.00*	*0.00*	*0.00*	*2.51*	*0.00*	*0.00*	*0.00*	*0.29*	*0.00*	*4.36*	*0.00*
Temporary Access Roads	0.00	0.00	0.23	0.00	1.27	0.00	1.91	0.00	0.00	0.00	0.11	0.00	3.52	0.00
Within Existing Easement	*0.00*	*0.00*	*0.00*	*0.00*	*0.00*	*0.00*	*0.03*	*0.00*	*0.00*	*0.00*	*0.00*	*0.00*	*0.03*	*0.00*
Outside of Existing Easement	*0.00*	*0.00*	*0.23*	*0.00*	*1.27*	*0.00*	*1.88*	*0.00*	*0.00*	*0.00*	*0.11*	*0.00*	*3.49*	*0.00*
Existing Aboveground Appurtenances[4]	0.00	0.00	0.00	0.00	1.61	0.98	0.00	0.00	0.00	0.00	0.00	0.00	1.61	0.98
Within Existing Easement	*0.00*	*0.00*	*0.00*	*0.00*	*1.61*	*0.98*	*0.00*	*0.00*	*0.00*	*0.00*	*0.00*	*0.00*	*1.61*	*0.98*
Subtotal	**5.66**	**1.25**	**2.71**	**1.17**	**3.08**	**0.98**	**14.81**	**3.11**	**0.02**	**0.00**	**6.72**	**1.87**	**33.00**	**8.38**
Willmar 3rd Branch Line Downstream														
Pipeline ROW[1,2]	42.22	21.26	0.75	0.33	0.18	0.01	9.54	4.67	0.00	0.00	0.03	0.00	52.72	26.27
Within Existing Easement	*10.60*	*7.53*	*0.07*	*0.05*	*0.01*	*0.01*	*1.12*	*0.77*	*0.00*	*0.00*	*0.00*	*0.00*	*11.80*	*8.36*
Outside of Existing Easement	*31.62*	*13.73*	*0.68*	*0.28*	*0.17*	*0.00*	*8.42*	*3.90*	*0.00*	*0.00*	*0.03*	*0.00*	*40.92*	*17.91*
ETWS	26.13	0.00	0.19	0.00	0.07	0.00	4.17	0.00	0.00	0.00	0.05	0.00	30.61	0.00
Within Existing Easement	*2.11*	*0.00*	*0.00*	*0.00*	*0.00*	*0.00*	*0.56*	*0.00*	*0.00*	*0.00*	*0.00*	*0.00*	*2.67*	*0.00*
Outside of Existing Easement	*24.02*	*0.00*	*0.19*	*0.00*	*0.07*	*0.00*	*3.61*	*0.00*	*0.00*	*0.00*	*0.05*	*0.00*	*27.94*	*0.00*
Staging Area	16.21	0.00	0.00	0.00	0.00	0.00	2.42	0.00	0.00	0.00	0.00	0.00	18.63	0.00
Within Existing Easement	*0.32*	*0.00*	*0.00*	*0.00*	*0.00*	*0.00*	*0.00*	*0.00*	*0.00*	*0.00*	*0.00*	*0.00*	*0.32*	*0.00*
Outside of Existing Easement	*15.89*	*0.00*	*0.00*	*0.00*	*0.00*	*0.00*	*2.42*	*0.00*	*0.00*	*0.00*	*0.00*	*0.00*	*18.31*	*0.00*
Permanent Access Roads	0.23	0.23	0.00	0.00	0.00	0.00	0.06	0.06	0.00	0.00	0.00	0.00	0.29	0.29
Within Existing Easement	*0.01*	*0.01*	*0.00*	*0.00*	*0.00*	*0.00*	*0.03*	*0.03*	*0.00*	*0.00*	*0.00*	*0.00*	*0.04*	*0.04*
Outside of Existing Easement	*0.22*	*0.22*	*0.00*	*0.00*	*0.00*	*0.00*	*0.03*	*0.03*	*0.00*	*0.00*	*0.00*	*0.00*	*0.25*	*0.25*
Temporary Access Roads	4.94	0.00	0.00	0.00	0.08	0.00	1.60	0.00	0.00	0.00	0.86	0.00	7.48	0.00
Within Existing Easement	*0.06*	*0.00*	*0.00*	*0.00*	*0.00*	*0.00*	*0.00*	*0.00*	*0.00*	*0.00*	*0.00*	*0.00*	*0.06*	*0.00*
Outside of Existing Easement	*4.88*	*0.00*	*0.00*	*0.00*	*0.08*	*0.00*	*1.60*	*0.00*	*0.00*	*0.00*	*0.86*	*0.00*	*7.42*	*0.00*
Existing Aboveground Appurtenances[4]	0.00	0.00	0.00	0.00	0.30	0.30	0.00	0.00	0.00	0.00	0.00	0.00	0.30	0.30
Within Existing Easement	*0.00*	*0.00*	*0.00*	*0.00*	*0.30*	*0.30*	*0.00*	*0.00*	*0.00*	*0.00*	*0.00*	*0.00*	*0.30*	*0.30*

Facility	Agricultural		Forested/Woodland		Industrial/ Commercial		Open Land		Open Water		Residential		Total	
	Const	**Oper**	**Const**	**Oper**	**Const**	**Oper**	**Const**	**Oper**	**Const**	**Oper**	**Const**	**Oper**	**Const**	**Oper**
Proposed Aboveground Appurtenance[4]	0.15	0.15	0.00	0.00	0.00	0.00	0.01	0.01	0.00	0.00	0.00	0.00	0.16	0.16
Within Existing Easement	*0.00*	*0.00*	*0.00*	*0.00*	*0.00*	*0.00*	*0.01*	*0.01*	*0.00*	*0.00*	*0.00*	*0.00*	*0.01*	*0.01*
Outside of Existing Easement	*0.15*	*0.15*	*0.00*	*0.00*	*0.00*	*0.00*	*0.00*	*0.00*	*0.00*	*0.00*	*0.00*	*0.00*	*0.15*	*0.15*
Subtotal	**89.88**	**21.64**	**0.94**	**0.33**	**0.63**	**0.31**	**17.80**	**4.74**	**0.00**	**0.00**	**0.94**	**0.00**	**110.19**	**27.02**
Welcome 2nd Line														
Pipeline ROW[1,2]	13.28	7.31	0.00	0.00	0.07	0.04	0.17	0.10	0.00	0.00	0.00	0.00	13.52	7.45
Within Existing Easement	*4.43*	*3.66*	*0.00*	*0.00*	*0.02*	*0.02*	*0.05*	*0.05*	*0.00*	*0.00*	*0.00*	*0.00*	*4.50*	*3.73*
Outside of Existing Easement	*8.85*	*3.65*	*0.00*	*0.00*	*0.05*	*0.02*	*0.12*	*0.05*	*0.00*	*0.00*	*0.00*	*0.00*	*9.02*	*3.72*
ETWS	0.82	0.00	0.00	0.00	0.03	0.00	0.18	0.00	0.00	0.00	0.00	0.00	1.03	0.00
Within Existing Easement	*0.11*	*0.00*	*0.00*	*0.00*	*0.00*	*0.00*	*0.01*	*0.00*	*0.00*	*0.00*	*0.00*	*0.00*	*0.12*	*0.00*
Outside of Existing Easement	*0.71*	*0.00*	*0.00*	*0.00*	*0.03*	*0.00*	*0.17*	*0.00*	*0.00*	*0.00*	*0.00*	*0.00*	*0.91*	*0.00*
Staging Area	11.45	0.00	0.00	0.00	0.00	0.00	0.32	0.00	0.00	0.00	0.00	0.00	11.77	0.00
Within Existing Easement	*0.58*	*0.00*	*0.00*	*0.00*	*0.00*	*0.00*	*0.01*	*0.00*	*0.00*	*0.00*	*0.00*	*0.00*	*0.59*	*0.00*
Outside of Existing Easement	*10.87*	*0.00*	*0.00*	*0.00*	*0.00*	*0.00*	*0.31*	*0.00*	*0.00*	*0.00*	*0.00*	*0.00*	*11.18*	*0.00*
Permanent Access Roads	0.09	0.09	0.00	0.00	0.00	0.00	0.02	0.02	0.00	0.00	0.00	0.00	0.11	0.11
Within Existing Easement	*0.02*	*0.02*	*0.00*	*0.00*	*0.00*	*0.00*	*0.02*	*0.02*	*0.00*	*0.00*	*0.00*	*0.00*	*0.04*	*0.04*
Outside of Existing Easement	*0.07*	*0.07*	*0.00*	*0.00*	*0.00*	*0.00*	*0.00*	*0.00*	*0.00*	*0.00*	*0.00*	*0.00*	*0.07*	*0.07*
Temporary Access Roads	1.72	0.00	0.00	0.00	0.01	0.00	0.03	0.00	0.00	0.00	0.00	0.00	1.76	0.00
Outside of Existing Easement	*1.72*	*0.00*	*0.00*	*0.00*	*0.01*	*0.00*	*0.03*	*0.00*	*0.00*	*0.00*	*0.00*	*0.00*	*1.76*	*0.00*
Existing Aboveground Appurtenances[4]	0.00	0.00	0.00	0.00	0.77	0.77	0.00	0.00	0.00	0.00	0.00	0.00	0.77	0.77
Within Existing Easement	*0.00*	*0.00*	*0.00*	*0.00*	*0.77*	*0.77*	*0.00*	*0.00*	*0.00*	*0.00*	*0.00*	*0.00*	*0.77*	*0.77*
Proposed Aboveground Appurtenance[4]	0.01	0.01	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.01	0.01
Within Existing Easement	*0.01*	*0.01*	*0.00*	*0.00*	*0.00*	*0.00*	*0.00*	*0.00*	*0.00*	*0.00*	*0.00*	*0.00*	*0.01*	*0.01*
Subtotal	**27.37**	**7.41**	**0.00**	**0.00**	**0.88**	**0.81**	**0.72**	**0.12**	**0.00**	**0.00**	**0.00**	**0.00**	**28.97**	**8.34**

Facility	Agricultural		Forested/Woodland		Industrial/ Commercial		Open Land		Open Water		Residential		Total	
	Const	Oper	Const	Oper	Const	Oper	Const	Oper	Const	Oper	Const	Oper	Const	Oper
Paynesville 2nd Branch Line														
Pipeline ROW[1,2]	6.46	4.42	2.19	1.47	0.34	0.28	8.01	5.10	0.00	0.00	0.26	0.21	17.26	11.48
Within Existing Easement	*0.87*	*0.86*	*0.60*	*0.60*	*0.04*	*0.03*	*2.53*	*2.30*	*0.00*	*0.00*	*0.00*	*0.00*	*4.04*	3.79
Outside of Existing Easement	*5.59*	*3.56*	*1.59*	*0.87*	*0.30*	*0.25*	*5.48*	*2.80*	*0.00*	*0.00*	*0.26*	*0.21*	*13.22*	7.69
ETWS	2.72	0.00	1.23	0.00	0.53	0.00	8.33	0.00	0.00	0.00	0.18	0.00	12.99	0.00
Within Existing Easement	*0.12*	*0.00*	*0.07*	*0.00*	*0.05*	*0.00*	*1.80*	*0.00*	*0.00*	*0.00*	*0.11*	*0.00*	*2.15*	*0.00*
Outside of Existing Easement	*2.60*	*0.00*	*1.16*	*0.00*	*0.48*	*0.00*	*6.53*	*0.00*	*0.00*	*0.00*	*0.07*	*0.00*	*10.84*	*0.00*
Staging Area	9.93	0.00	0.00	0.00	3.15	0.00	1.17	0.00	0.00	0.00	0.00	0.00	14.25	0.00
Outside of Existing Easement	*9.93*	*0.00*	*0.00*	*0.00*	*3.15*	*0.00*	*1.17*	*0.00*	*0.00*	*0.00*	*0.00*	*0.00*	*14.25*	0.00
Permanent Access Roads	0.00	0.00	0.00	0.00	0.07	0.07	0.06	0.06	0.00	0.00	0.00	0.00	0.13	0.13
Within Existing Easement	*0.00*	*0.00*	*0.00*	*0.00*	*0.04*	*0.04*	*0.02*	*0.02*	*0.00*	*0.00*	*0.00*	*0.00*	*0.06*	*0.06*
Outside of Existing Easement	*0.00*	*0.00*	*0.00*	*0.00*	*0.03*	*0.03*	*0.04*	*0.04*	*0.00*	*0.00*	*0.00*	*0.00*	*0.07*	*0.07*
Temporary Access Roads	0.73	0.00	0.01	0.00	2.65	0.00	0.99	0.00	0.00	0.00	0.00	0.00	4.38	0.00
Within Existing Easement	*0.00*	*0.00*	*0.00*	*0.00*	*0.08*	*0.00*	*0.00*	*0.00*	*0.00*	*0.00*	*0.00*	*0.00*	*0.08*	0.00
Outside of Existing Easement	*0.73*	*0.00*	*0.01*	*0.00*	*2.57*	*0.00*	*0.99*	*0.00*	*0.00*	*0.00*	*0.00*	*0.00*	*4.30*	0.00
Existing Aboveground Appurtenances[4]	0.00	0.00	0.00	0.00	0.29	0.29	0.00	0.00	0.00	0.00	0.00	0.00	0.29	0.29
Within Existing Easement	*0.00*	*0.00*	*0.00*	*0.00*	*0.23*	*0.23*	*0.00*	*0.00*	*0.00*	*0.00*	*0.00*	*0.00*	*0.23*	*0.23*
Outside Existing Easement	*0.00*	*0.00*	*0.00*	*0.00*	*0.06*	*0.06*	*0.00*	*0.00*	*0.00*	*0.00*	*0.00*	*0.00*	*0.06*	*0.06*
Proposed Aboveground Appurtenance[4]	0.00	0.00	0.00	0.00	0.00	0.00	0.01	0.01	0.00	0.00	0.00	0.00	0.01	0.01
Within Existing Easement	*0.00*	*0.00*	*0.00*	*0.00*	*0.00*	*0.00*	*0.01*	*0.01*	*0.00*	*0.00*	*0.00*	*0.00*	*0.01*	0.01
Subtotal	**19.84**	**4.42**	**3.43**	**1.47**	**7.03**	**0.64**	**18.57**	**5.17**	**0.00**	**0.00**	**0.44**	**0.21**	**49.31**	**11.91**
Worthington 2nd Branch Line														
Pipeline ROW[1,2]	17.63	11.75	0.00	0.00	0.06	0.02	1.25	0.84	0.00	0.00	0.00	0.00	18.94	12.61
Within Existing Easement	*4.86*	*4.85*	*0.00*	*0.00*	*0.01*	*0.01*	*0.39*	*0.39*	*0.00*	*0.00*	*0.00*	*0.00*	*5.26*	*5.25*
Outside of Existing Easement	*12.77*	*6.90*	*0.00*	*0.00*	*0.05*	*0.01*	*0.86*	*0.45*	*0.00*	*0.00*	*0.00*	*0.00*	*13.68*	*7.36*

Facility	Agricultural		Forested/Woodland		Industrial/ Commercial		Open Land		Open Water		Residential		Total	
	Const	**Oper**	**Const**	**Oper**	**Const**	**Oper**	**Const**	**Oper**	**Const**	**Oper**	**Const**	**Oper**	**Const**	**Oper**
ETWS	7.26	0.00	0.00	0.00	0.03	0.00	0.15	0.00	0.00	0.00	0.00	0.00	7.44	0.00
Within Existing Easement	*1.46*	*0.00*	*0.00*	*0.00*	*0.00*	*0.00*	*0.06*	*0.00*	*0.00*	*0.00*	*0.00*	*0.00*	*1.52*	*0.00*
Outside of Existing Easement	*5.80*	*0.00*	*0.00*	*0.00*	*0.03*	*0.00*	*0.09*	*0.00*	*0.00*	*0.00*	*0.00*	*0.00*	*5.92*	*0.00*
Staging Area	5.89	0.00	0.00	0.00	0.07	0.00	0.47	0.00	0.00	0.00	0.00	0.00	6.43	0.00
Within Existing Easement	*0.27*	*0.00*	*0.00*	*0.00*	*0.00*	*0.00*	*0.00*	*0.00*	*0.00*	*0.00*	*0.00*	*0.00*	*0.27*	*0.00*
Outside of Existing Easement	*5.62*	*0.00*	*0.00*	*0.00*	*0.07*	*0.00*	*0.47*	*0.00*	*0.00*	*0.00*	*0.00*	*0.00*	*6.16*	*0.00*
Permanent Access Roads	0.06	0.06	0.00	0.00	0.03	0.03	0.08	0.08	0.00	0.00	0.00	0.00	0.17	0.17
Outside of Existing Easement	*0.06*	*0.06*	*0.00*	*0.00*	*0.03*	*0.03*	*0.08*	*0.08*	*0.00*	*0.00*	*0.00*	*0.00*	*0.17*	*0.17*
Temporary Access Roads	1.71	0.00	0.08	0.00	0.04	0.00	0.91	0.00	0.00	0.00	0.00	0.00	2.74	0.00
Within Existing Easement	*0.00*	*0.00*	*0.00*	*0.00*	*0.00*	*0.00*	*0.02*	*0.00*	*0.00*	*0.00*	*0.00*	*0.00*	*0.02*	*0.00*
Outside of Existing Easement	*1.71*	*0.00*	*0.08*	*0.00*	*0.04*	*0.00*	*0.89*	*0.00*	*0.00*	*0.00*	*0.00*	*0.00*	*2.72*	*0.00*
Existing Aboveground Appurtenances[4]	0.00	0.00	0.00	0.00	0.19	0.19	0.00	0.00	0.00	0.00	0.00	0.00	0.19	0.19
Within Existing Easement	*0.00*	*0.00*	*0.00*	*0.00*	*0.19*	*0.19*	*0.00*	*0.00*	*0.00*	*0.00*	*0.00*	*0.00*	*0.19*	*0.19*
Proposed Aboveground Appurtenance[4]	0.23	0.23	0.00	0.00	0.00	0.00	0.01	0.01	0.00	0.00	0.00	0.00	0.24	0.24
Outside of Existing Easement	*0.23*	*0.23*	*0.00*	*0.00*	*0.00*	*0.00*	*0.01*	*0.01*	*0.00*	*0.00*	*0.00*	*0.00*	*0.24*	*0.24*
Subtotal	**32.78**	**12.04**	**0.08**	**0.00**	**0.42**	**0.24**	**2.87**	**0.93**	**0.00**	**0.00**	**0.00**	**0.00**	**36.15**	**13.21**
Springfield 2nd Branch Line														
Pipeline ROW[1,2]	55.27	36.65	0.55	0.24	0.41	0.02	6.75	4.08	0.00	0.00	0.01	0.00	62.99	40.99
Within Existing Easement	*15.15*	*15.15*	*0.12*	*0.12*	*0.00*	*0.00*	*1.40*	*1.40*	*0.00*	*0.00*	*0.00*	*0.00*	*16.67*	*16.67*
Outside of Existing Easement	*40.12*	*21.50*	*0.43*	*0.12*	*0.41*	*0.02*	*5.35*	*2.68*	*0.00*	*0.00*	*0.01*	*0.00*	*46.32*	*24.32*
ETWS	24.01	0.00	0.26	0.00	0.44	0.00	3.58	0.00	0.00	0.00	0.08	0.00	28.37	0.00
Within Existing Easement	*3.84*	*0.00*	*0.00*	*0.00*	*0.00*	*0.00*	*0.35*	*0.00*	*0.00*	*0.00*	*0.00*	*0.00*	*4.19*	*0.00*
Outside of Existing Easement	*20.17*	*0.00*	*0.26*	*0.00*	*0.44*	*0.00*	*3.23*	*0.00*	*0.00*	*0.00*	*0.08*	*0.00*	*24.18*	*0.00*
Staging Area	15.88	0.00	0.03	0.00	0.00	0.00	0.33	0.00	0.00	0.00	0.00	0.00	16.24	0.00
Within Existing Easement	*0.10*	*0.00*	*0.01*	*0.00*	*0.00*	*0.00*	*0.00*	*0.00*	*0.00*	*0.00*	*0.00*	*0.00*	*0.11*	*0.00*

Facility	Agricultural		Forested/Woodland		Industrial/ Commercial		Open Land		Open Water		Residential		Total	
	Const	Oper	Const	Oper	Const	Oper	Const	Oper	Const	Oper	Const	Oper	Const	Oper
Outside of Existing Easement	*15.78*	*0.00*	*0.02*	*0.00*	*0.00*	*0.00*	*0.33*	*0.00*	*0.00*	*0.00*	*0.00*	*0.00*	*16.13*	*0.00*
Permanent Access Roads	0.00	0.00	0.00	0.00	0.00	0.00	0.06	0.06	0.00	0.00	0.00	0.00	0.06	0.06
Within Existing Easement	*0.00*	*0.00*	*0.00*	*0.00*	*0.00*	*0.00*	*0.04*	*0.04*	*0.00*	*0.00*	*0.00*	*0.00*	*0.04*	*0.04*
Outside of Existing Easement	*0.00*	*0.00*	*0.00*	*0.00*	*0.00*	*0.00*	*0.02*	*0.02*	*0.00*	*0.00*	*0.00*	*0.00*	*0.02*	*0.02*
Temporary Access Roads	11.50	0.00	0.00	0.00	0.31	0.00	0.18	0.00	0.00	0.00	0.00	0.00	11.99	0.00
Outside of Existing Easement	*11.50*	*0.00*	*0.00*	*0.00*	*0.31*	*0.00*	*0.18*	*0.00*	*0.00*	*0.00*	*0.00*	*0.00*	*11.99*	*0.00*
Existing Aboveground Appurtenances[4]	0.00	0.00	0.00	0.00	0.01	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.01	0.00
Within Existing Easement	*0.00*	*0.00*	*0.00*	*0.00*	*0.01*	*0.00*	*0.00*	*0.00*	*0.00*	*0.00*	*0.00*	*0.00*	*0.01*	*0.00*
Outside of Existing Easement	*0.00*	*0.00*	*0.00*	*0.00*	*0.00*	*0.00*	*0.00*	*0.00*	*0.00*	*0.00*	*0.00*	*0.00*	*0.00*	*0.00*
Proposed Aboveground Appurtenance[4]	0.22	0.22	0.00	0.00	0.00	0.00	0.01	0.01	0.00	0.00	0.00	0.00	0.23	0.23
Within Existing Easement	*0.05*	*0.05*	*0.00*	*0.00*	*0.00*	*0.00*	*0.01*	*0.01*	*0.00*	*0.00*	*0.00*	*0.00*	*0.06*	0.06
Outside of Existing Easement	*0.17*	*0.17*	*0.00*	*0.00*	*0.00*	*0.00*	*0.00*	*0.00*	*0.00*	*0.00*	*0.00*	*0.00*	*0.17*	*0.17*
Subtotal	**106.88**	**36.87**	**0.84**	**0.24**	**1.17**	**0.02**	**10.91**	**4.15**	**0.00**	**0.00**	**0.09**	**0.00**	**119.89**	**41.28**
Minnesota Interconnect 2nd Branch Line														
Pipeline ROW[1,2]	7.78	5.16	0.18	0.00	0.03	0.00	2.00	1.20	0.00	0.00	0.00	0.00	9.99	6.36
Within Existing Easement	*1.32*	*1.32*	*0.00*	*0.00*	*0.00*	*0.00*	*0.60*	*0.60*	*0.00*	*0.00*	*0.00*	*0.00*	*1.92*	*1.92*
Outside of Existing Easement	*6.46*	*3.84*	*0.18*	*0.00*	*0.03*	*0.00*	*1.40*	*0.60*	*0.00*	*0.00*	*0.00*	*0.00*	*8.07*	*4.44*
ETWS	9.84	0.00	0.03	0.00	0.03	0.00	2.91	0.00	0.00	0.00	0.02	0.00	12.83	0.00
Within Existing Easement	*1.33*	*0.00*	*0.00*	*0.00*	*0.00*	*0.00*	*0.70*	*0.00*	*0.00*	*0.00*	*0.00*	*0.00*	*2.03*	*0.00*
Outside of Existing Easement	*8.51*	*0.00*	*0.03*	*0.00*	*0.03*	*0.00*	*2.21*	*0.00*	*0.00*	*0.00*	*0.02*	*0.00*	*10.80*	*0.00*
Staging Area	7.36	0.00	0.00	0.00	0.00	0.00	2.49	0.00	0.00	0.00	0.00	0.00	9.85	0.00
Within Existing Easement	*0.00*	*0.00*	*0.00*	*0.00*	*0.00*	*0.00*	*0.23*	*0.00*	*0.00*	*0.00*	*0.00*	*0.00*	*0.23*	*0.00*
Outside of Existing Easement	*7.36*	*0.00*	*0.00*	*0.00*	*0.00*	*0.00*	*2.26*	*0.00*	*0.00*	*0.00*	*0.00*	*0.00*	*9.62*	*0.00*
Permanent Access Roads	0.00	0.00	0.00	0.00	0.00	0.00	0.07	0.07	0.00	0.00	0.00	0.00	0.07	0.07
Outside of Existing Easement	*0.00*	*0.00*	*0.00*	*0.00*	*0.00*	*0.00*	*0.07*	*0.07*	*0.00*	*0.00*	*0.00*	*0.00*	*0.07*	*0.07*

Facility	Agricultural		Forested/Woodland		Industrial/ Commercial		Open Land		Open Water		Residential		Total	
	Const	**Oper**	**Const**	**Oper**	**Const**	**Oper**	**Const**	**Oper**	**Const**	**Oper**	**Const**	**Oper**	**Const**	**Oper**
Temporary Access Roads	1.88	0.00	2.75	0.00	0.96	0.00	1.64	0.00	0.00	0.00	0.00	0.00	7.23	0.00
Outside of Existing Easement	*1.88*	*0.00*	*2.75*	*0.00*	*0.96*	*0.00*	*1.64*	*0.00*	*0.00*	*0.00*	*0.00*	*0.00*	*7.23*	0.00
Existing Aboveground Appurtenances[4]	0.00	0.00	0.00	0.00	0.01	0.01	0.00	0.00	0.00	0.00	0.00	0.00	0.01	0.01
Within Existing Easement	*0.00*	*0.00*	*0.00*	*0.00*	*0.01*	*0.01*	*0.00*	*0.00*	*0.00*	*0.00*	*0.00*	*0.00*	*0.01*	*0.01*
Proposed Aboveground Appurtenance[4]	0.05	0.05	0.00	0.00	0.00	0.00	0.04	0.04	0.00	0.00	0.00	0.00	0.09	0.09
Within Existing Easement	*0.01*	*0.01*	*0.00*	*0.00*	*0.00*	*0.00*	*0.01*	*0.01*	*0.00*	*0.00*	*0.00*	*0.00*	*0.02*	*0.02*
Outside of Existing Easement	*0.04*	*0.04*	*0.00*	*0.00*	*0.00*	*0.00*	*0.03*	*0.03*	*0.00*	*0.00*	*0.00*	*0.00*	*0.07*	*0.07*
Subtotal	**26.91**	**5.21**	**2.96**	**0.00**	**1.03**	**0.01**	**9.15**	**1.31**	**0.00**	**0.00**	**0.02**	**0.00**	**40.07**	**6.53**
Alexandria 2nd Branch Line														
Pipeline ROW[1,2]	3.69	2.45	0.68	0.29	0.07	0.00	3.36	2.17	0.00	0.00	1.17	0.76	8.97	5.67
Within Existing Easement	*1.22*	*1.22*	*0.12*	*0.12*	*0.00*	*0.00*	*0.92*	*0.90*	*0.00*	*0.00*	*0.38*	*0.38*	*2.64*	*2.62*
Outside of Existing Easement	*2.47*	*1.23*	*0.56*	*0.17*	*0.07*	*0.00*	*2.44*	*1.27*	*0.00*	*0.00*	*0.79*	*0.38*	*6.33*	*3.05*
ETWS	2.69	0.00	0.18	0.00	0.02	0.00	5.92	0.00	0.00	0.00	0.00	0.00	7.95	0.00
Within Existing Easement	*0.59*	*0.00*	*0.04*	*0.00*	*0.01*	*0.00*	*0.84*	*0.00*	*0.00*	*0.00*	*0.00*	*0.00*	*1.48*	*0.00*
Outside of Existing Easement	*2.10*	*0.00*	*0.14*	*0.00*	*0.01*	*0.00*	*4.22*	*0.00*	*0.00*	*0.00*	*0.00*	*0.00*	*6.47*	*0.00*
Staging Area	2.37	0.00	0.14	0.00	0.00	0.00	1.66	0.00	0.00	0.00	0.00	0.00	4.17	0.00
Outside of Existing Easement	*2.37*	*0.00*	*0.14*	*0.00*	*0.00*	*0.00*	*1.66*	*0.00*	*0.00*	*0.00*	*0.00*	*0.00*	*4.17*	*0.00*
Permanent Access Roads	0.18	0.18	0.00	0.00	0.05	0.05	0.02	0.02	0.00	0.00	0.00	0.00	0.25	0.25
Within Existing Easement	*0.02*	*0.02*	*0.00*	*0.00*	*0.00*	*0.00*	*0.00*	*0.00*	*0.00*	*0.00*	*0.00*	*0.00*	*0.02*	*0.02*
Outside of Existing Easement	*0.16*	*0.16*	*0.00*	*0.00*	*0.05*	*0.05*	*0.02*	*0.02*	*0.00*	*0.00*	*0.00*	*0.00*	*0.23*	*0.23*
Temporary Access Roads	2.88	0.00	0.08	0.00	0.24	0.00	0.18	0.00	0.00	0.00	0.27	0.00	3.65	0.00
Within Existing Easement	*0.08*	*0.00*	*0.00*	*0.00*	*0.00*	*0.00*	*0.00*	*0.00*	*0.00*	*0.00*	*0.00*	*0.00*	*0.08*	*0.00*
Outside of Existing Easement	*2.80*	*0.00*	*0.08*	*0.00*	*0.24*	*0.00*	*0.18*	*0.00*	*0.00*	*0.00*	*0.27*	*0.00*	*3.57*	*0.00*
Existing Aboveground Appurtenances[4]	0.00	0.00	0.00	0.00	0.04	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.04	0.00
Within Existing Easement	*0.00*	*0.00*	*0.00*	*0.00*	*0.04*	*0.00*	*0.00*	*0.00*	*0.00*	*0.00*	*0.00*	*0.00*	*0.04*	*0.00*

Facility	Agricultural		Forested/Woodland		Industrial/ Commercial		Open Land		Open Water		Residential		Total	
	Const	**Oper**	**Const**	**Oper**	**Const**	**Oper**	**Const**	**Oper**	**Const**	**Oper**	**Const**	**Oper**	**Const**	**Oper**
Proposed Aboveground Appurtenance[4]	0.01	0.01	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.01	0.01
Within Existing Easement	*0.00*	*0.00*	*0.00*	*0.00*	*0.00*	*0.00*	*0.00*	*0.00*	*0.00*	*0.00*	*0.00*	*0.00*	*0.00*	*0.00*
Outside of Existing Easement	*0.01*	*0.01*	*0.00*	*0.00*	*0.00*	*0.00*	*0.00*	*0.00*	*0.00*	*0.00*	*0.00*	*0.00*	*0.01*	*0.01*
Subtotal	**11.82**	**2.64**	**1.08**	**0.29**	**0.42**	**0.05**	**10.28**	**2.19**	**0.00**	**0.00**	**1.44**	**0.76**	**25.04**	**5.93**
Aboveground Facility														
Hugo Compressor Station Uprate														
Project Within Existing Easement	*0.00*	*0.00*	*0.00*	*0.00*	*4.53*	*4.53*	*0.00*	*0.00*	*0.00*	*0.00*	*0.00*	*0.00*	*4.53*	*4.53*
Subtotal	**0.00**	**0.00**	**0.00**	**0.00**	**4.53**	**4.53**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**4.53**	**4.53**
Projects Within Existing Easement	*68.67*	*44.71*	*1.53*	*1.23*	*8.31*	*7.39*	*16.64*	*8.91*	*0.00*	*0.00*	*2.58*	*0.87*	*97.73*	*63.11*
Project Outside of Existing Easement	*348.06*	*75.19*	*11.15*	*2.60*	*13.83*	*0.59*	*89.21*	*18.28*	*0.02*	*0.00*	*7.36*	*2.24*	*469.63*	*98.90*
NL27 PROJECT TOTAL	**416.73**	**119.90**	**12.68**	**3.83**	**22.14**	**7.98**	**105.85**	**27.19**	**0.02**	**0.00**	**9.94**	**3.11**	**567.36**	**162.01**

[1] Construction ROW is based on a 60- to 100-foot-wide temporary ROW in uplands and wetlands. Operational ROW is based on 50-foot-wide corridor in uplands and 10-foot-wide corridor in wetlands. Differing widths are shown on the construction alignment sheets.
[2] Northern also included impacts for a single 6-foot-wide or two 3-foot-wide parallel travel lanes between HDD entry and exit points in the pipeline ROW calculations.
[3] Outside existing easement
[4] The existing aboveground appurtenance(s) will be removed.

Northern Natural Gas Company
Data Response Form For Docket No. CP26-130-000
Ventura to Farmington A-line Abandonment and Capacity Replacement Project (V2F) and Northern Lights 2027 Expansion Project (NL27)

Requesting Party:	FERC
Reference No:	FERC-DR1-31
Requester's Name:	Allison King
Subject:	Mitigate Exhaust Emissions From Construction Equipment

Data Request 31 (Resource Report 9 – Air Quality and Noise):

Indicate any equipment, procedures, or measures that Northern would commit to implement to mitigate exhaust emissions from construction equipment. These may include idling restrictions, use of low-sulfur fuel, commitment to use newest tier IV equipment, use of natural gas or electric powered equipment/vehicles, installation of controls on temporary stationary equipment, etc.

Response:

Large construction equipment, such as graders or front-end loaders, are generally powered by diesel engines. For diesel engines, the emission standards have been phased in over the past two decades in four steps, referred to as Tier 1 to Tier 4. The engine must comply with the emission standards in place based on the size of the engine for the year the engine was built and must comply with the appropriate standard throughout its useful life. The engine manufacturers must certify the engine emissions to the EPA. In 2010, the EPA required the sulfur concentration in diesel fuels be lowered from a historical concentration of 500 ppm to 15 ppm (ultra-low sulfur diesel fuel), which allows diesel engines to meet current Tier 4 emission requirements. Proper maintenance of construction equipment and use of low and ultra-low-sulfur diesel fuel will minimize engine emissions during Project construction.

Northern has reviewed the US EPA Construction Emission Control Checklist and has adopted the following controls and best practices, including the following for mobile and stationary-source diesel controls.

- For on-highway vehicles, Northern verified that its primary construction contractors have programs in place to replace their on-highway vehicles within 10 years of purchase. The primary contractors do not generally own or maintain vehicles from 2010 or older.
- For non-road vehicles and equipment, Northern's general contractors have indicated most of the construction equipment, excluding specialty equipment (e.g., side booms), operated by the companies are less than 10 years old and equipped to comply with Tier 4 exhaust emissions standards.
- The remaining stationary-source vehicles (locomotives and marine vessels) noted by the EPA are not applicable to the Project.

Regarding the best practices applied through the construction contracting or oversight process, Northern verified with its contractors that many have already adopted the following best management practices (BMPs):

- Limiting construction equipment idling time to 15 to 30 minutes between usages, dependent on the construction task.
- Encouraging the use of electric starting aids, such as block heaters, where applicable.

- Maintaining diesel engines per the manufacturer's recommended maintenance schedule and procedures.

Additionally, Northern will encourage contractors to retrofit older-tier or Tier 0 non-road engines with exhaust filtration devices before they enter the construction site. Northern's contractors have indicated most of their equipment is not older-tier or Tier 0 and already meets a higher level of exhaust emissions standards.

Northern verified that its primary construction contractors have already implemented fleet replacement programs. The primary contractors generally do not own or maintain vehicles from 2010 or older. Given the current alternative energy vehicle technology and the remote locations of several of the project components, use of hybrid or battery-electric vehicles is not feasible.

Posted: 06/22/2026 Responsibility: Brian Garcia

Northern Natural Gas Company
Data Response Form For Docket No. CP26-130-000
Ventura to Farmington A-line Abandonment and Capacity Replacement Project (V2F) and Northern Lights 2027 Expansion Project (NL27)

Requesting Party:	FERC
Reference No:	FERC-DR1-32
Requester's Name:	Allison King
Subject:	Hugo Compressor Station Blowdowns

Data Request 32 (Resource Report 9 – Air Quality and Noise):

For the Hugo compressor station, describe the expected types of blowdown facilities (e.g., individual unit, full station, etc.), estimate the average number of yearly blowdowns by type, the amount of gas released per event type for methane and greenhouse gas in tons of CO2e, and the estimated annual amount. Indicate whether the blowdown(s) would be installed with a silencer and the technical specifications, and estimate the noise impact at the nearest noise sensitive areas.

Response:
The Hugo compressor station currently employs a unit blowdown and station blowdown system.

The unit blowdown system includes a unit blowdown silencer and the silencer will remain after the Project. During normal operation of the compressor station, a unit shutdown event is estimated to occur about 40 times per year. For this evaluation, Northern estimates two thousand standard cubic feet (Mscf) of natural gas will be vented per compressor unit blowdown event at the Hugo compressor station.

The station blowdown system is typically used for emergency shutdown (ESD) testing. ESD testing occurs annually, not to exceed 15 months, according to NNG operating procedures and federal regulation set forth by the Pipeline and Hazardous Material Safety Administration (PHMSA) Code of Federal Regulation (CFR) 192.167(a). Northern minimizes venting of natural gas by closing vent sources to atmosphere in order to test ESD equipment without venting when possible.

Northern estimates a full station blowdown event would release 198 Mscf of natural gas. For the emission calculations, Northern has assumed that a full blowdown event occurs once per year, a conservative assumption.

The total estimated blowdown emissions for Hugo compressor station of volatile organic compounds (VOC) and greenhouse gas emissions are summarized in Table 32-1 below. The greenhouse gas emissions are reported in tons of CO2e.

Table 32-1 Blowdown Emissions Summary for Hugo Compressor Station

Description	Average Annual Emissions (tons per year)	
	Volatile Organic Compounds (VOC)	CO_{2e}
Unit Blowdown	0.01	40.73
Full System Event	0.03	101.82
Annual Total	0.04	142.55

Unit blowdowns at the Hugo compressor station already utilize a unit blowdown silencer and this Project will not modify the blowdown equipment or silencer. Unit blowdowns are not a continuous noise source and typically last three to four minutes.

A 2022 ambient noise study completed at the Hugo compressor station confirmed continuous noise sources do not exceed 55 Ldn dBA at the nearest noise-sensitive area (NSA) and is provided in Table 35-2 of Data Response DR1-35. All blowdown events are intermittent and not included in the ambient noise study.

The dynamic insertion loss, which characterizes the noise reduction performance of the unit blowdown silencer, is provided in Table 32-2 below.

Table 32-2 Unit Blowdown Silencer Technical Specifications

Dynamic Insertion Loss (dB) at Octave Band Center Frequency (Hz)							
63	**125**	**250**	**500**	**1000**	**2000**	**4000**	**8000**
13	17	26	48	56	58	58	56

Northern Natural Gas Company
Data Response Form For Docket No. CP26-130-000
Ventura to Farmington A-line Abandonment and Capacity Replacement Project (V2F) and Northern Lights 2027 Expansion Project (NL27)

Requesting Party:	FERC
Reference No:	FERC-DR1-33
Requester's Name:	Allison King
Subject:	Fugitive Methane Emissions

Data Request 33 (Resource Report 9 – Air Quality and Noise):

Indicate if Northern would install specific equipment or implement operational changes to reduce fugitive methane emissions such as those identified in EPA's Natural Gas STAR program, by state agencies, or in peer-reviewed studies. Additionally, discuss how Northern would identify leaking valves, seals, or other equipment on the pipeline, compressor, and other aboveground facilities, and the criteria for repair/replacement.

Response:
For all Project components, Northern continues to implement the best management practices adopted under the EPA's Natural Gas STAR and Methane Challenge programs to reduce methane emissions. Northern employs a combination of ground and aerial leak detection surveys for all pipelines and facilities and performs maintenance and repairs in accordance with the requirements of 49 CFR Part 192.

Northern is committed to complying with existing and emerging regulatory requirements intended to facilitate a reduction in greenhouse gases during construction and operation of its facilities.

Specific to the Hugo compressor station, Northern will maintain compliance with requirements for notifications, reporting, and recordkeeping as specified in National Society of Professional Surveyors (NSPS) Subpart OOOOb. The monthly leak detection and repair required by NSPS Subpart OOOOb will help reduce and minimize fugitive emissions at the Hugo compressor station. Further, the proposed new centrifugal compressor will be equipped with dry seals to limit fugitive emissions. Northern will repair dry seals should the seals not maintain volumetric flow rate at or below 10 standard cubic feet per minute per compressor seal.

The Hugo compressor station will result in an increase in horsepower; therefore, the Hugo compressor station is an affected facility for the collection of fugitive emission components and must comply with the requirements of 40 CFR §60.5397b(a) through (j) which requires the following:

- Develop an emission monitoring plan that covers the collection of fugitive emission components at the compressor station within each company-defined area;
- Initial fugitive emission surveys;
- Monthly monitoring of all fugitive emission components using AVO or any other detection method;
- Quarterly monitoring of all fugitive emission components using either optical gas imaging (OGI) or an instrument reading 500 ppm or greater using Method 21; and
- If required, complete repairs of fugitive emissions within 30 days of detection

Northern Natural Gas Company
Data Response Form For Docket No. CP26-130-000
Ventura to Farmington A-line Abandonment and Capacity Replacement Project (V2F) and Northern Lights 2027 Expansion Project (NL27)

Requesting Party:	FERC
Reference No:	FERC-DR1-34a, b, c and d
Requester's Name:	Allison King
Subject:	Hugo Compressor Station Air Dispersion Modeling Analysis

Data Request 34 (Resource Report 9 – Air Quality and Noise):

Provide an air dispersion modeling analysis (screening using AERSCREEN or refined analysis using AERMOD or EPA-approved alternative) of the Hugo compressor station disclosing the incremental increase in air quality impacts from criteria pollutants emitted from the entire facility in comparison of the National Ambient Air Quality Standards (NAAQS); and state ambient air quality standards, if different. Northern should:

a. identify existing modeled emission rates of criteria pollutants from the station, and provide modeling results to identify existing local impact levels of criteria pollutants;

b. identify proposed modeled emission rates of criteria pollutants from the station, provide modeling results to identify the local impacts of the new equipment in addition to the existing equipment at the compressor station;

c. Provide a summary table indicating the significance analysis of the proposed facility at maximum impact level (1st highest high) for each NAAQS averaging period, the largest Radius of Impact (ROI) for any pollutant above the Significant Impact Levels; and

d. Provide a summary table indicating the NAAQS analysis for each averaging period that includes both ambient background, and total facility impact.

Provide all source input parameters (emission rate, stack height, stack temperature, exit velocity, etc.), and justify the bases for any assumptions. Provide a description on how the modeling was performed (for example, identify the specific model number, meteorological data source, terrain data, source parameters, building information, receptor grids, NO_2/NO_x conversion, post-processing assumptions, etc.). Provide the background monitors used and justify their use. Provide input data, as well as output data showing maximum impacts outside the fenceline (the EPA-defined ambient air boundary), and at sensitive receptors in the area (schools, hospitals, nursing homes, etc). Provide the input and output files as outlined in the attached document titled *Guidance for Filers: How to Transmit Files that cannot be eFiled to FERC* or contact FERC staff for directions on how to submit the modeling files.

Provide a narrative of the air dispersion modeling required for the Minnesota Pollution Control Agency air permitting process for the Storage Facility modification. If air dispersion modeling is not required per the states' permitting process, explain the information, criteria, or methodology that Minnesota Pollution Control Agency will require of Northern to demonstrate compliance with the Clean Air Act.

Response:

a. Northern identified the modeled emission rates from the existing station and provided the modeling results below. The modeled emission rates are included in zip file, which has been downloaded to a CD and sent to the Secretary via overnight mail and dispersion modeling results for the existing station are summarized in Table 34-1 below.
b. Northern identified the modeled emission rates from the new equipment and provided the modeling results below in Table 34-2. The Project includes replacement of the existing turbine and emergency generator. The existing turbine and emergency generator will be removed prior to operation of the proposed equipment. There will be no overlap in emissions; therefore, modeling was not completed for a combined analysis of the existing and proposed equipment as they will not be operating at the same time. The modeled emission rates for the new equipment (i.e., post-construction) are included in the provided zip file and dispersion modeling results are summarized in Table 34-2 below.
c. Northern completed a significant analysis of the proposed facility at maximum impact level for each NAAQS averaging period and calculated the ROI for the pollutants above the Significant Impact Levels (SIL). The dispersion modeling results are provided below in Table 34-3.
d. Northern completed a summary table of the NAAQS analysis. The results of the post-construction NAAQS analysis are provided in Table 34-2 below.

FERC Request: *Provide all source input parameters (emission rate, stack height, stack temperature, exit velocity, etc.), and justify the bases for any assumptions. Provide a description on how the modeling was performed (for example, identify the specific model number, meteorological data source, terrain data, source parameters, building information, receptor grids, NO_2/NO_x conversion, post-processing assumptions, etc.). Provide the background monitors used and justify their use. Provide input data, as well as output data showing maximum impacts outside the fenceline (the EPA-defined ambient air boundary), and at sensitive receptors in the area (schools, hospitals, nursing homes, etc). Provide the input and output files as outlined in the attached document titled Guidance for Filers: How to Transmit Files that cannot be eFiled to FERC or contact FERC staff for directions on how to submit the modeling files.*

Response: Northern has provided all source input parameters for the existing and new equipment in the attached Hugo CS Modeling Data file. Northern has included a description of the modeling process below including the specific modeling number, meteorological data source, terrain data, source parameters, building information, receptor grids, NO2/NOx conversion, and post-processing assumptions. Information regarding the background monitors is provided below. Input and output files are provided in a zip file, which has been downloaded to a CD and sent to the Secretary via overnight mail.

FERC Request: *Provide a narrative of the air dispersion modeling required for the Minnesota Pollution Control Agency air permitting process for the Storage Facility modification. If air dispersion modeling is not required per the states' permitting process, explain the information, criteria, or methodology that Minnesota Pollution Control Agency will require of Northern to demonstrate compliance with the Clean Air Act.*

Response: The Minnesota Pollution Control Agency (MPCA) has a procedure for addressing modeling requirements for projects with hourly emission increases. Emission changes before and after the project are compared to modeling thresholds outlined in MPCA Form CH-19. If hourly emissions increases are below the specified thresholds in MPCA Form CH-19, dispersion modeling is not required for a permit application. Northern completed this analysis and determined that modeling is not required for the Project; therefore, Northern also determined that the project will not affect ambient air quality.

As described above, air dispersion modeling was performed for the proposed Hugo compressor station using version 24142 of AERMOD, the most advanced sequential Gaussian plume model sanctioned by the environmental protection agency. The meteorological data was processed through the AERMOD meteorological preprocessor (AERMET), whose purpose is to compute boundary layer parameters used to estimate profiles of wind, turbulence, and temperature. AERMINUTE, a program within AERMET that is used to process 1-minute Automated Surface Observing Systems wind data available from the NCDC to generate hourly-averaged wind speed and wind direction observations or values to supplement the standard hourly observations, was used to process the meteorological data used with AERMOD.

Background modeling information is provided below and in an attached document included with the zip file. Surface meteorological data for the five-year period of 2020 through 2024 was taken from the St. Cloud Regional Airport, which is approximately 99 km west-northwest of the Hugo compressor station. The upper air meteorological data for the five-year period of 2020 through 2024 was taken from the Chanhassen National Weather Service station, which is approximately 68 km southwest of the Hugo compressor station.

A source impact analysis is a modeling analysis designed to show the allowable emissions from a project will not result in a violation of the NAAQS. The Significant Impact Levels (SILs) are used to determine if the ambient impact of a project is significant enough to warrant further review. If a project is below the SIL for a pollutant and averaging period, further analysis is not required.

Northern completed a modeling analysis to compare the results of the existing facility and post-Project Hugo compressor station emissions to the SILs and determine compliance with NAAQS. The air dispersion modeling results for the existing sources are summarized in Table 34-1 for all required pollutants and averaging periods. The air dispersion modeling results for the post-Project sources are summarized in Table 34-2 for all required pollutants and averaging periods. The Project includes replacement of turbine and emergency generator. The existing turbine and emergency generator will be removed prior to operation of the proposed equipment; there will be no overlap in emissions.

The results of the modeling analysis demonstrate that neither the operation of the existing or proposed new equipment at the Hugo compressor station will cause or contribute to an exceedance of the NAAQS as the results for all pollutants and averaging periods are below the SIL or NAAQS.

Table 34-1 Hugo Compressor Existing Station AERMOD Results

Pollutant	Averaging Period	Project Impact ($\mu g/m^3$)	Class II Significant Impact Level ($\mu g/m^3$)	Percent of SIL	Background [a] ($\mu g/m^3$)	NAAQS Total ($\mu g/m^3$)	NAAQS ($\mu g/m^3$)	Percent of NAAQS
NO2 [b]	1-hour	7.64	7.5	102%	71.44	74.52	188	40%
	Annual	0.45	1	45%	NA	NA	100	NA
CO	1-hour	415.70	500	21%	NA	NA	40,000	NA
	8-hour	285.01	2,000	57%	NA	NA	10,000	NA
PM10	24-hour	4.04	5	81%	NA	NA	150	NA
PM2.5	24-hour	2.93	1.2	244%	22	23.64	35	68%
	Annual	0.02	0.3	6%	NA	NA	12	NA
SO2	1-hour	0.64	7.8	8%	NA	NA	196	NA
	3-hour	0.65	25	3%	NA	NA	1300	NA

[a] Background concentrations are from the MPCA website (Air quality modeling | Minnesota Pollution Control Agency)
[b] The modeled NO2 impact represents the EPA Tier 2 method, assuming an 80% NO2/NOX ratio.
Note: µg/m^3 = micrograms per cubic meter, NAAQS = National Ambient Air Quality Standards, NO2 = nitrogen dioxide, CO = carbon monoxide, PM10 = PM with an aerodynamic diameter of 10 microns or less, PM2.5 = PM with an aerodynamic diameter of 2.5 microns or less, and SO2 = sulfur dioxide.

Table 34-2 Hugo Compressor Station Post-Project AERMOD Results

Pollutant	Averaging Period	Project Impact (µg/m^3)	Class II Significant Impact Level (µg/m^3)	Percent of SIL	Background [a] (µg/m^3)	NAAQS Total (µg/m^3)	NAAQS (µg/m^3)	Percent of NAAQS
NO2 [b]	1-hour	11.19	7.5	149%	71.44	81.14	188	43%
	Annual	0.53	1	53%	NA	NA	100	NA
CO	1-hour	190.38	500	10%	NA	NA	40,000	NA
	8-hour	172.00	2,000	34%	NA	NA	10,000	NA
PM10	24-hour	2.63	5	53%	NA	NA	150	NA
PM2.5	24-hour	2.01	1.2	168%	22	22.98	35	66%
	Annual	0.04	0.3	14%	NA	NA	12	NA
SO2	1-hour	0.16	7.8	2%	NA	NA	196	NA
	3-hour	0.16	25	1%	NA	NA	1300	NA

[a] Background concentrations are from the MPCA website (Air quality modeling | Minnesota Pollution Control Agency)
[b] The modeled NO2 impact represents the EPA Tier 2 method, assuming an 80% NO2/NOX ratio.
Note: µg/m^3 = micrograms per cubic meter, NAAQS = National Ambient Air Quality Standards, NO2 = nitrogen dioxide, CO = carbon monoxide, PM10 = PM with an aerodynamic diameter of 10 microns or less, PM2.5 = PM with an aerodynamic diameter of 2.5 microns or less, and SO2 = sulfur dioxide.

Northern also completed a radius of impact (ROI) analysis for the new equipment (post-Project equipment) for the pollutants and averaging periods with ambient impacts over the SIL. This analysis was completed for the 1-hour and annual NO2 and 24-hour PM2.5. Table 34-3 below shows the results from the analysis.

Table 34-3 Hugo Compressor Station Significant Impact Level Analysis

Pollutant	Averaging Period	Project Impact (µg/m^3)	Class II Significant Impact Level (µg/m^3)	Percent of Significant Impact Level	Radius of Impact (km)
NO2	1-hour	11.19	7.5	149%	0.11
PM2.5	24-hour	2.01	1.2	168%	0.08

As requested, Northern also completed an analysis to evaluate the incremental increase in modeled concentration between the existing station and post project station equipment. The incremental increase or decrease is summarized in Table 34-4 below. The results are compared to the SILs. As shown in Table 34-4, there is only an incremental increase in results for the 1-hour and annual NO2 and annual PM2.5 averaging periods. The incremental increase for these pollutants and averaging periods is less than the SIL.

Therefore, the increase is not significant and will not cause an exceedance of ambient air quality standards. The remaining pollutants will decrease with the installation of the new equipment.

Table 34.4 Hugo Compressor Station Project Comparison AERMOD Results

Pollutant	Averaging Period	Modeled Project Change (µg/m^3)	Class II Significant Impact Level (µg/m^3)	Percent of Significant Impact Level
NO2	1-hour	3.55	7.5	47%
	Annual	0.09	1	9%
CO	1-hour	-225.32	500	-11%
	8-hour	-113.01	2,000	-23%
PM10	24-hour	-1.41	5	-28%
PM2.5	24-hour	-0.92	1.2	-77%
	Annual	0.02	0.3	8%
SO2	1-hour	-0.48	7.8	-6%
	3-hour	-0.49	25	-2%

Hugo Modeling Appendix Report

Stantec performed air dispersion modeling for the Hugo Compressor Station using version 24142 of AERMOD, the most advanced sequential Gaussian plume model sanctioned by the EPA. Surface air meteorological data for the five-year period of 2020 through 2024 was taken from the St. Cloud Regional Airport (STC). St. Cloud Regional Airport is approximately 99 km west-northwest of the Hugo Compressor Station. Upper air meteorological data for the five-year period was taken from the Chanhassen National Weather Station (MPX). The Chanhassen National Weather Service Station is approximately 68 km southwest of the Hugo Compressor Station.

Receptor elevations were determined using the AERMOD terrain processor (AERMAP), version 24142, which incorporates user-provided receptor locations and electronic terrain files. These GeoTIFF terrain files are publicly available in 1/3 arc-second resolution and were obtained from the USGS in National Elevation Dataset format. The AERMAP domain covers the entire extent of the maps, following the default settings.

A nested Cartesian receptor grid with four tiers centered on the approximate center point of the Hugo Compressor Station was created to evaluate the impacts at the site. The four tiers were structured as follows:

- Tier 1 spacing of 50 meters out to 1 km;
- Tier 2 spacing of 100 meters out to 2 km;
- Tier 3 spacing of 250 meters out to 5 km; and
- Tier 4 spacing of 500 meters out to 10 km.

Receptors were also placed at 10-meter intervals around the environmental boundary of the Hugo Compressor Station.

The Building Profile Input Program with Plume Rise Model Enhancements (BPIP-PRIME) version 04274 was used to calculate building downwash parameters for the model analysis. Structures can influence modeling results because of building-induced downwash, which can increase predicted concentrations at receptors in close proximity to stacks. Locations for stacks and buildings were input into BPIP-PRIME using the BPIP input file created from the site plan provided by Northern.

Northern Natural Gas
Hugo Compressor Station

Stack Locations for Modeling Project Impacts

Unit ID	AERMOD ID	Description	Location		Base Elev. (m)	Basis
			x (m E)	y (m N)		
EQUI1	EXSTRU1	Compressor Turbine	508693.31	5006260.80	300.1	Aerial Photo, Site Map
EQUI4	NWSTRU1	Compressor Turbine	508693.31	5006260.80	300.1	Aerial Photo, Site Map
EQUI3	STRU3	Emergency Generator	508695.33	5006292.09	300.5	Client information
EQUI5	STRU4	Emergency Generator	508715.08	5006304.95	300.4	Site Map
IA	FGHEAT	Fuel Gas Heater	508708.77	5006252.23	300.15	Site Map
IA	EXSPHEAT	Space Heaters	508703.49	5006263.04	300.19	Building footprint

Northern Natural Gas
Hugo Compressor Station

Stack Parameters

Unit ID	AERMOD ID	Description	Release Height (ft)	Release Height (m)	Stack Temp. (F)	Stack Temp. (K)	Stack Dia. (ft)	Stack Dia. (m)	Stack Exit Vel. (ft/s)	Stack Exit Vel. (m/s)	Air flow (SCFM)	Basis
IA	FGHEAT	Fuel Gas Heater	20.000	6.098	750.0	672.039	0.7188	0.219	9.30	2.835	226	Manufacturer, based on similar sources
EQUI1	EXSTRU1	Compressor Turbine	50.000	15.244	841.0	722.594	3.0000	0.915	238.45	72.698	101,156	Existing stack parameters
EQUI4	NWSTRU1	Compressor Turbine	50.000	15.244	905.0	758.150	3.0000	0.915	255.34	77.847	108,321	Stack height and diameter are existing, temp and velocity are based on vendor information
EQUI3	STRU3	Emergency Generator	6.580	2.006	1250.0	949.817	0.2500	0.076	324.17	98.831	955	Existing stack parameters
EQUI5	STRU4	Emergency Generator	26.200	7.988	971.0	794.817	0.8300	0.253	214.31	65.337	6,959	Manufacturer, based on similar sources

Unit ID	AERMOD ID	Description	Release Height (ft)	Release Height (m)	Lateral Dimension SigmaY (m)	Vertical Dimension SigmaZ (m)	Length_X (m)
IA	EXSPHEAT	Space Heaters	30.670	9.348	2.830	4.348	12.170

Northern Natural Gas
Hugo Compressor Station

Emission Rates for Modeling Project Impacts

Unit ID	AERMOD ID	CO (g/s) Short-Term		NOx (g/s) Short-Term		PM10 (g/s)		PM2.5 (g/s)		SO2 (g/s)			Basis
		Short-Term (0°F)	Long-Term (0°F)	Short-Term (0°F)	Long-Term (0°F)	Short-Term (0°F)	Long-Term (0°F)	Short-Term (0°F)	Long-Term (0°F)	1-hr (0°F)	3-hr, 24-hr (0°F)	Annual (0°F)	
IA	FGHEAT	3.11E-03	3.11E-03	3.71E-03	3.71E-03	2.82E-04	NA	2.82E-04	2.82E-04	2.22E-05	2.22E-05	2.22E-05	
EQUI1	EXSTRU1	2.13E+00	2.13E+00	7.29E-01	7.29E-01	4.81E-02	NA	4.81E-02	4.81E-02	5.48E-02	5.48E-02	5.48E-02	Existing, to be removed
EQUI4	NWSTRU1	5.69E-01	5.69E-01	5.59E-01	5.59E-01	6.83E-02	NA	6.83E-02	6.83E-02	1.46E-02	1.46E-02	1.46E-02	
EQUI3	STRU3	2.68E-01	2.68E-01	NA	7.64E-03	4.52E-03	NA	4.52E-03	2.58E-04	NA	1.37E-04	7.82E-06	Existing, to be removed
EQUI5	STRU4	8.56E-01	8.56E-01	NA	2.44E-02	1.58E-02	NA	1.58E-02	9.01E-04	NA	4.78E-04	2.73E-05	
IA	EXSPHEAT	4.95E-04	4.95E-04	5.89E-04	5.89E-04	4.48E-05	NA	4.48E-05	4.48E-05	3.53E-06	3.53E-06	3.53E-06	Existing, remain at site
IA	NWSPHEAT	1.56E-03	1.56E-03	1.85E-03	1.85E-03	1.41E-04	NA	1.41E-04	1.41E-04	1.11E-05	1.11E-05	1.11E-05	

Unit ID	AERMOD ID	CO (lb/hr) Short-Term		NOx (lb/hr) Short-Term		PM10 (lb/hr)		PM2.5 (lb/hr)		SO2 (lb/hr)			Basis
		Short-Term (0°F)	Long-Term (0°F)	Short-Term (0°F)	Long-Term (0°F)	Short-Term (0°F)	Long-Term (0°F)	Short-Term (0°F)	Long-Term (0°F)	1-hr (0°F)	3-hr, 24-hr (0°F)	Annual (0°F)	
IA	FGHEAT	0.02	0.02	0.03	0.03	2.24E-03	NA	2.24E-03	2.24E-03	1.76E-04	1.76E-04	1.76E-04	
EQUI1	EXSTRU1	16.89	16.89	5.78	5.78	3.82E-01	NA	3.82E-01	3.82E-01	4.35E-01	4.35E-01	4.35E-01	Existing, to be removed
EQUI4	NWSTRU1	4.51	4.51	4.44	4.44	0.54	NA	0.54	0.54	0.12	0.12	0.12	
EQUI3	STRU3	2.13	2.13	NA	0.06	0.04	NA	0.04	2.05E-03	NA	1.09E-03	6.21E-05	Existing, to be removed
EQUI5	STRU4	6.79	6.79	NA	0.19	0.13	NA	0.13	0.01	NA	3.80E-03	2.17E-04	
IA	EXSPHEAT	3.93E-03	3.93E-03	4.67E-03	4.67E-03	3.55E-04	NA	3.55E-04	3.55E-04	2.80E-05	2.80E-05	2.80E-05	Existing, remain at site
IA	NWSPHEAT	1.24E-02	1.24E-02	1.47E-02	1.47E-02	1.12E-03	NA	1.12E-03	1.12E-03	8.82E-05	8.82E-05	8.82E-05	

Northern Natural Gas Company
Data Response Form For Docket No. CP26-130-000
Ventura to Farmington A-line Abandonment and Capacity Replacement Project (V2F) and Northern Lights 2027 Expansion Project (NL27)

Requesting Party:	FERC
Reference No:	FERC-DR1-35
Requester's Name:	Allison King
Subject:	Hugo Compressor Station Existing Noise Environment

Data Request 35 (Resource Report 9 – Air Quality and Noise):

Quantify the existing noise environment at the existing Hugo compressor and the nearby noise-sensitive areas (NSA). Include a large scale (1:3,600 or greater) plot plan identifying the noise measurement locations. Provide a description of the ambient noise survey that includes, but is not limited to: documentation of dominant noise sources at the measurement sites; wind speed and direction at the measurement sites, duration of measurement, time and date of measurements, description of noise meter used, and any filtering, or post-measurement processing used. The operational status of the facility during the noise survey should be indicated. Existing sound levels should be reported as the time averaged A-weighted sound level (Leq dBA) for both day and night, and day-night averaged A-weighted sound level (Ldn dBA).

Response:

Sound measurements were completed in the vicinity of the Hugo compressor station May 16, 2022. Sound levels were measured at eight locations using a Larson Davis Model LxT sound level meter, which meets IEC 61672 Class 1 requirements. The compressor station operated at 70% to 80% load during the measurements, which is the representative of the typical operating range of the station. The duration of each sound measurement ranged from 5 to 16 minutes. Measurements were completed during the late evening/nighttime period to reduce the influence of non-compressor station sound sources on the measurement results. Because the Hugo compressor station operation does not vary between day and night periods, daytime sound levels generated by the compressor station would be the same as during nighttime. Audible sound sources observed at the measurement locations included the compressor station, frogs, and insects. Wind speed was below 10 miles per hour (mph) during the measurement.

Results and further details from the sound measurements are provided in Table 35-1 below. Post-processing of sound measurement data involved excluding sound levels during a truck pass-by event at one measurement location and recalculating the Leq sound level. Ldn sound levels at the measurement locations were calculated based on the measured Leq sound levels. Ldn sound levels were then estimated at the nearest noise sensitive areas (NSAs) using the Ldn sound level at the most representative measurement location, based on the direction of the NSA from the compressor station, and adjusting for the NSA distance from the compressor station. Spherical spreading of sound from the compressor station was assumed which results in a decrease in sound levels at a rate of 6 decibels per doubling of distance from the sound source. Additional sound attenuation associated with sound interacting with the ground surface was not accounted for in the calculation, which is a conservative assumption. The results in Table 35-2 below show that the estimated existing Ldn sound levels with

the compressor station operating are 55 dBA or lower at the nearby NSAs. The octave band sounds measurement results collected at the measurement locations are shown in Table 35-3 below.

Table 35-1 Existing Sound Measurement Results

Measurement Location	Distance from CS, ft	Leq, dBA	Ldn, dBA	Date	Time
ML1	160	62	68	5/16/22	9:00 PM
ML2	265	58	64	5/16/22	9:18 PM
ML3	185	62	69	5/16/22	9:36 PM
ML4	100	60	66	5/16/22	10:00 PM
ML5	455	44	51	5/16/22	11:09 PM
ML6	575	52	59	5/16/22	11:20 PM
ML7	460	51	57	5/16/22	10:46 PM
ML8B	910	47	54	5/16/22	11:34 PM

Table 35-2 Estimated Sound Levels at NSAs

NSA	Distance from CS, ft	Representative Measurement			Estimated Ldn at NSA, dBA
		Location	Distance from CS, ft	Ldn, dBA	
NSA08	1015	ML8B	910	54	53
NSA14	840	ML1	160	68	54
NSA04	705	ML2	265	64	55
NSA01	1095	ML3	185	69	53
NSA03	1325	ML6	575	59	52

Table 35-3 Octave Band Sound Measurement Results

Measurement Location	Leq Sound Level (dB) at Octave Band Center Frequency (Hz)								
	31.5	63.0	125	250	500	1000	2000	4000	8000
ML1	62	54	56	47	47	50	60	49	40
ML2	62	57	54	44	47	49	55	44	41
ML3	69	65	64	57	64	48	48	47	43
ML4	74	71	66	56	53	54	54	48	42
ML5	59	51	46	32	40	37	36	36	38
ML6	59	54	47	34	36	40	41	50	40
ML7	60	53	49	37	39	41	46	45	40
ML8B	54	47	41	37	35	33	36	44	39

Figure No.

1

Title

Sound Measurement Locations and NSAs
NL27 - Hugo Compressor Station

Client/Project 172609138

Northern Natural Gas
Northern Lights 2027 Expansion Project

Project Location
Washington County, Minnesota

Prepared by SF on 2026-01-09
TR by JM on 2026-01-09
IR by JP on 2026-06-16

N

0 150 300 Feet
(At original document size of 11x17)
1:3,600

Legend
- Environmental Survey Boundary
- Existing Facility
- Noise Sensitive Area (NSA)
- Noise Monitoring Location
- Existing Pipeline

National Hydrography Dataset
- Perennial Stream*
- Intermittent Stream*
- Canal/Ditch*
- Waterbody

Notes
1. Coordinate System: NAD 1983 UTM Zone 15N
2. Data Sources: Stantec, Northern Natural Gas, Esri, USCB, USGS
3. Background: 2023 NAIP

Stantec

Northern Natural Gas

Northern Natural Gas Company
Data Response Form For Docket No. CP26-130-000
Ventura to Farmington A-line Abandonment and Capacity Replacement Project (V2F) and Northern Lights 2027 Expansion Project (NL27)

Requesting Party:	FERC
Reference No:	FERC-DR1-36
Requester's Name:	Allison King
Subject:	Acoustical Noise Analysis of Modified Hugo Compressor Station

Data Request 36 (Resource Report 9 – Air Quality and Noise):

Provide an acoustical analysis of the modified Hugo Compressor Station to quantify the magnitude and frequency spectrum (1/3 or whole octave bands) of principal noise sources associated with the proposed operation of the station. Noise sources should include all noise-producing equipment at the facility including: engine, turbine, electric motors, compressors, boilers, gas coolers, oil coolers, vent fans, intake and exhaust noise, and all appurtenant equipment. Identify and quantify mitigation measures, including specific noise control equipment and propagate the resultant A-weighted noise (Leq and Ldn) at the nearest NSAs. The data should represent the maximum load/noise of the proposed equipment, identify the major source engine manufacturer and model, and specify noise control measures. Include a narrative discussing data sources and basis for any calculations or noise models used to generate noise estimates.

Response:

The Hugo compressor station modification will include replacing a Solar Taurus 60 model 7002 turbine with a Solar Taurus 60 model 7802 turbine. These are the principal noise sources that are being modified as part of the modification. The octave band sound levels of the two natural gas turbines are compared in Table 36-1 below. Comparing the overall A-weighted sound levels indicates that the new equipment (Taurus 60 7802) is expected to generate equal or less noise than the existing equipment (Taurus 60 7002).

Table 36-1 Equipment Sound Pressure Level at 15 meters (50 feet), Full Load

Component	Unit	Octave Band Center Frequency (Hz)									Overall Sound Power Level, dBA
		31.5	63	125	250	500	1000	2000	4000	8000	
Combustion Inlet	Taurus 60 7002	76	82	88	89	90	92	95	120	112	121
	Taurus 60 7802	69	78	87	87	84	85	89	114	111	116
Combustion Exhaust	Taurus 60 7002	88	91	88	91	95	87	80	72	64	94
	Taurus 60 7802	88	91	88	91	95	87	80	72	64	94
Unenclosed Package*	Taurus 60 7002	81	81	84	86	86	81	79	78	79	88
	Taurus 60 7802	81	81	84	86	86	81	79	78	79	88

* Turbine package is located within the compressor station building.

Noise control measures currently installed at the Hugo compressor station will remain in place after the turbine upgrade is completed. These noise control measures include acoustic baffles on ventilation fans, exhaust silencer for turbine, intake air silencer for turbine, insulated piping, insulated scrubber, noise wall for control valve on north side of station, and a unit blowdown silencer. Noise mitigation is not quantified per noise control equipment.

Modifications to the Hugo compressor station are not expected to result in an increase in sound levels at the nearest noise-sensitive areas (NSAs) because noise from the new turbine will be lower than the existing turbine. Existing condition sound measurement results are provided in Table 35-1 in data response DR1-35.

Since the Hugo compressor station is an operating facility, Northern cannot isolate and measure noise from individual equipment. All equipment must operate simultaneously; therefore, the ability to collect independent sound measurements is not feasible. Table 35-3 in data response DR1-35 provides measured octave band sound levels that were collected May 2022 with all principal noise sources at the compressor station running.
