Resource Report 6
Geological Resources

Resource Report No. 6

Geological Resources

Ventura to Farmington A-Line Abandonment and Capacity Replacement Project and Northern Lights 2027 Expansion Project

FERC Docket No. CP26-___-000

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RESOURCE REPORT NO. 6 – GEOLOGICAL RESOURCES SUMMARY OF FILING INFORMATION

MINIMUM REQUIREMENT	LOCATION ADDRESSED
Identify the location (by milepost) of mineral resources and any planned or active surface mines crossed by the proposed facilities. (§ 380.12(h)(1) & (2)) • Describe hazards to the facilities from mining activities, including subsidence, blasting, slumping or landsliding or other ground failure.	Sections 6.2 and 6.4
Identify any geologic hazards to the proposed facilities. (§ 380.12(h)(2)) • For offshore this information is needed on a mile-by-mile basis and will require completion of geophysical and other surveys before filing.	Section 6.4
Discuss the need for and locations where blasting may be necessary in order to construct the proposed facilities. (§ 380.12(h)(3))	Section 6.3
For LNG projects in seismic areas, the materials required by "Data Requirements for the Seismic Review of LNG Facilities," NBSIR84- 2833. (§ 380.12(h)(5))	Not applicable
For underground storage facilities, how drilling activity by others within or adjacent to the facilities would be monitored, and how old wells would be located and monitored within the facility boundaries. (§ 380.12(h)(6))	Not applicable
ADDITIONAL INFORMATION	
Identify any sensitive paleontological resource areas crossed by the proposed facilities. (Usually only if raised in scoping or if the project affects federal lands.)	Section 6.5
Briefly summarize the physiography and bedrock geology of the project.	Section 6.1
If proposed pipeline crosses active drilling areas, describe plan for coordinating with drillers to ensure early identification of other companies' planned new wells, gathering lines, and aboveground facilities.	Not applicable
If the application is for underground storage facilities: • Describe monitoring of potential effects of the operation of adjacent storage or production facilities on the proposed facility, and vice versa; • Describe measures taken to locate and determine the condition of old wells within the field and buffer zone and how the applicant would reduce risk from failure of known and undiscovered wells; and • Identify and discuss safety and environmental safeguards required by state and federal drilling regulations.	Not applicable

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Abbreviations and Acronyms

A-line	Northern Natural Gas' 16-inch-diameter M500 A Mainline
asl	above sea level
D-line	Northern Natural Gas' 30-inch-diameter M500 D line
E-line	Northern Natural Gas' 30-inch-diameter M500 E line
ETWS	extra temporary workspace
FEMA	Federal Emergency Management Agency
FERC	Federal Energy Regulatory Commission
HDD	horizontal directional drilling
IDNR	Iowa Department of Natural Resources
MDNR	Minnesota Department of Natural Resources
MP	milepost
MGS	Minnesota Geological Survey
NL27 Project	Northern Lights 2027 Expansion Project
Northern	Northern Natural Gas
PGA	peak ground acceleration
Plan	Upland Erosion Control, Revegetation, and Maintenance Plan
Projects	Ventura to Farmington A-Line Abandonment and Capacity Replacement Project and Northern Lights 2027 Expansion Project
ROW	right of way
SFHA	special flood hazard areas
TAR	temporary access road
USGS	U.S. Geological Survey
V2F Project	Ventura to Farmington A-Line Abandonment and Capacity Replacement Project

6.0 RESOURCE REPORT 6 – GEOLOGICAL RESOURCES

Northern's application is composed of two discrete projects, the V2F Project and the NL27 Project. The two Projects will be built concurrently, and Northern has combined the two Projects into a single Section 7 application due to their geographic overlap and interdependence. Since a majority of the geologic resources described in Resource Report 6 occur on a state-wide or regional level, the Projects are analyzed collectively, except where otherwise noted.

Resource Report 6 describes the physiography, geologic setting, mineral resources, geologic hazards, and paleontological resources associated with the proposed Projects' areas, and the measures that Northern will implement to minimize impacts on geologic resources during abandonment, construction and operation of the proposed disconnects, pipeline extensions and aboveground facilities.

Northern owns and operates a natural gas transmission pipeline system, including pipeline and associated aboveground facilities in Minnesota and Iowa. Northern is filing an application with FERC pursuant to section 7 of the Natural Gas Act. The V2F Project involves isolation and abandonment in-place of approximately 105.76 miles of 16-inch-diameter pipeline on Northern's M500 A and 25.35 miles of 16-inch-diameter M500 J pipeline systems (collectively referred to as the A-line) from Ventura, Iowa, to Farmington, Minnesota. To replace the capacity, Northern will construct three new pipeline extensions consisting of approximately 17.88 miles of 36-inch- and 30-inch-diameter pipelines and associated aboveground appurtenances in Freeborn, Steele and Dakota counties, Minnesota.

The NL27 Project consists of the installation of ten pipeline extensions totaling 28.43 miles, a compressor station uprate, and associated aboveground appurtenances in Minnesota for firm transportation requirements associated with Northern's customers. The NL27 Project is in Freeborn, Steele, Scott, Carver, Martin, Stearns, Jackson, Watonwan, Isanti, Morrison, and Washington counties, Minnesota.

Tables 6.0-1 and 6.0-2 provide a list of both Project components along with their associated Minnesota or Iowa counties.

Table 6.0-1 V2F Project Facilities and Location

Component	Project Facility	Facility Description	County, State
Lake Mills M500 E-line	8.29-mile pipeline	36-inch-diameter extension	Freeborn, MN
	Lake Mills compressor station	Temporary compression site	Worth, IA
Albert Lea M500 E-line	2.09-mile pipeline	36-inch-diameter extension	Steele, MN
	Owatonna compressor station	Temporary compression site	Steele, MN
Faribault M500 D-line	7.50-mile pipeline	30-inch-diameter extension	Dakota, MN
	Northfield #1	Temporary compression site	Dakota, MN

Component	Project Facility	Facility Description	County, State
A-line Abandonment	Ventura compressor station	Pipeline disconnect site	Hancock, IA
	Farmington compressor station	Pipeline disconnect site	Dakota, MN
	La Crosse BL MNB73201 launcher /ABA05	Temporary compression site	Freeborn, MN

Table 6.0-2 NL27 Project Facilities and Location

Component	Project Facility	Facility Description	County, State
Lake Mills M500 E-line	2.32-mile pipeline	36-inch-diameter extension	Freeborn, MN
Albert Lea M500 E-line	3.42-mile pipeline	36-inch-diameter extension	Steele, MN
Willmar 3rd Branch Line Upstream	1.78-mile pipeline	24-inch-diameter extension	Scott, MN
Willmar 3rd Branch Line Downstream	4.78-mile pipeline	24-inch-diameter extension	Carver, MN
Welcome 2nd Line	1.24-mile pipeline	16-inch-diameter extension	Martin, MN
Paynesville 2nd Branch Line	2.45-mile pipeline	4-inch-diameter extension	Stearns, MN
Worthington 2nd Branch Line	2.17-mile pipeline	8-inch-diameter extension	Jackson, MN
Springfield 2nd Branch Line	7.40-mile pipeline	8-inch-diameter extension	Watonwan, MN
Minnesota Interconnect 2nd Branch Line	1.59-mile pipeline	12-inch-diameter extension	Isanti, MN
Alexandria 2nd Branch Line	1.28-mile pipeline	8-inch-diameter extension	Morrison, MN
Aboveground Facilities			
Hugo Compressor Station Uprate	Hugo compressor station	Turbine switch for newer model with increase of 700 horsepower	Washington, MN

6.1 Geologic Setting

6.1.1 Physiography and Topography

Fenneman (1928) developed a three-tiered classification system (Division, Province, Section) to characterize the physiography of the U.S. based on terrain, rock type, geologic structure, and geologic history. The V2F Project and the NL27 Project occur within the Central Lowland Physiographic Province of the Interior Plains Division. The Interior Plains Division encompasses a vast region generally bounded by the Precambrian core of North America to the northeast, the Appalachian Mountains to the east, the Gulf of Mexico to the south, and the Rocky Mountains to the west. The Central Lowland Province generally occupies the area of the U.S. around the Great Lakes that was affected by the most recent period of continental glaciation during the Pleistocene, including portions of

Minnesota, Wisconsin, Michigan, Ohio, Illinois, and Pennsylvania, as well as parts of North Dakota, South Dakota, Nebraska, Iowa, and Missouri.

More specifically, the proposed V2F Project and the NL27 Project are within the Western Lakes Section of the Central Lowland Province, which is characterized by nearly flat to gently rolling glaciated till plains, with moraines and glacial lake plains in some areas. Based on USGS topographic maps (see Resource Report 1, Figure 1-2), the elevations of the V2F and NL27 Project components are shown in Table 6.1-1 and Table 6.1-2.

Table 6.1-1 V2F Project Component Elevations

Project Component	Project Facility	Min Elevation (feet asl)	Max Elevation (feet asl)
Lake Mills M500 E-line	8.29-mile pipeline	1,238	1,363
	Lake Mills compressor station	1,285	1,288
Albert Lea M500 E-line	2.09-mile pipeline	1,201	1,290
	Owatonna compressor station	1,158	1,182
Faribault M500 D-line	7.50-mile pipeline	946	1,076
	Northfield #1	1,010	1,010
A-line Abandonment	Ventura compressor station	1,232	1,253
	Farmington compressor station	900	912
	La Crosse BL MNB73201 launcher /ABA05	1,275	1,275

Table 6.1-2 NL27 Project Component Elevations

Project Component	Project Facility	Min Elevation (feet asl)	Max Elevation (feet asl)
Lake Mills M500 E-line	2.32-mile pipeline	1,269	1,331
Albert Lea M500 E-line	3.42-mile pipeline	1,194	1,274
Willmar 3rd Branch Line Upstream	1.78-mile pipeline	935	1,138
Willmar 3rd Branch Line Downstream	4.78-mile pipeline	955	1,020
Welcome 2nd Line	1.24-mile pipeline	1,264	1,327
Paynesville 2nd Branch Line	2.45-mile pipeline	1,090	1,162
Worthington 2nd Branch Line	2.17-mile pipeline	1,417	1,460
Springfield 2nd Branch Line	7.40-mile pipeline	1,016	1,065
Minnesota Interconnect 2nd Branch Line	1.59-mile pipeline	922	965
Alexandria 2nd Branch Line	1.28-mile pipeline	1,144	1,191
Hugo Compressor Station Uprate	Hugo compressor station	980	986

6.1.2 Surficial Geology

All Project facilities are located in the Central Lowland Province, which is a largely level region that rises to less than 1,000 feet asl in the east and less than 2,000 feet asl to the west. The province was subject to repeated Pleistocene glaciations and can be divided into regions based on glacial features, including the Great Lakes, Small Lakes, Driftless Area, Till Plains, Dissected Till Plains, and Osage Plains. Underlying glacial deposits are mostly horizontal Paleozoic sandstones, shales, limestones, conglomerates, and coals (National Park Service 2018).

V2F Project

According to the IDNR, surficial geology at the Ventura compressor station is identified as a complex glaciofluvial plain, also called the Noah Creek Formation. The Noah Creek Formation consists of 10 to 49 feet of stratified sand and gravel, overlying dense diamicton or Paleozoic limestone bedrock. The Noah Creek Formation is a low relief, broad flat plain with less than 10 feet of local relief (IDNR 1999). Surficial geology at the temporary compression site at the Lake Mills compressor station is identified as a Quaternary till ridge, also known as the Dows Formation. The Dows Formation contains 27 to 49 feet of calcareous, stratified loam to silt loam, stratified sand and gravel, to sandy loam diamicton. The Dows Formation is characterized by moderate to high relief hummocks, eskers and kame features, and ice-walled lake deposits (Iowa Geological and Water Survey 2012). Surficial geology is presented in Figure 6-1.

The surface geology for the V2F Project components in Freeborn and Steele counties, Minnesota, including the Lake Mills M500 E-line, Albert Lea M500 E-line, and temporary compression sites at the La Crosse BL73201 launcher/ABA 05 and at the Owatonna compressor station, is identified as a stagnation moraine also called the Heiberg Member of the New Ulm Formation. The Heiberg Member consists of 50 to 75 feet of loamy diamicton with sand, silt, and gravel of the Des Moines lobe provenance. The stagnation moraine unit is differentiated by its irregular, hummocky topography, the result of melt-out of Des Moines lobe ice. The stagnation features are typically ten to 20 feet tall (Lusardi, B.A., et al. 2019; MGS 2022). The surface geology for the V2F Project components in Dakota County, Minnesota, including the Faribault M500 D-line, the disconnect site at Farmington compressor station, and the temporary compression at Northfield MN #1, include diamictons from the New Ulm Formation, Pierce Formation of Winnipeg lobe provenance, and River Falls Formation of Superior lobe provenance, outwash from the New Ulm Formation, and alluvium (MGS 2023).

Northern completed geotechnical boreholes for the three pipeline extensions as follows.

- 17 geotechnical borings along the Lake Mills M500 E-line, which indicated the presence of sandy glacial till and sand and gravel outwash deposits to depths of at least 101.5 feet below ground surface.
- Four geotechnical borings were completed along the Albert Lea M500 E-line, which indicated the presence of silt, sand and clay glacial till soils to depths up to 121.5 feet.
- 21 geotechnical borings were completed along the Faribault M500 D-line, which indicated clay alluvium and sandy and clayey glacial till to depths up to 121 feet.

Four of the boreholes for the Faribault M500 D-line were completed on alternative routes (see Resource Report 10).

Additional discussion on the results of the geotechnical investigation is included in Section 6.7 and copies of the geotechnical reports are included in Appendix 6B.

NL27 Project

The surficial geology for the ten pipeline extensions and the Hugo compressor station identified as follows.

- Lake Mills M500 E-line is glacial till. The glacial till is comprised of sand, silt, and clay, with scattered gravel and boulders of Des Moines lobe provenance (MSU 1991).
- Albert Lea M500 E-line is hummocky glacial till. The unit is an unsorted loam interbedded with sand, silt, and gravel resulting from the stagnation and melting of the Des Moines lobe (Retzler et al. 2022).
- Willmar 3rd branch line upstream is glacial till and peat and bog sediment. The glacial till is a pebbly, unsorted loam with cobbles and boulders of Des Moines lobe provenance, mixed with inclusions of reddish-brown sediment of Superior provenance (Setterholm 2006).
- Willmar 3rd branch line downstream is glacial till and wetland and lake sediments. The glacial till consists of pebbly, unsorted loam to clay loam, with scattered cobbles and rare boulders of Des Moines lobe provenance (Bauer 2009).
- Welcome 2nd line is glacial till, characterized by sand, silt, and clay with scattered pebbles, cobbles, and some boulders of Des Moines lobe provenance (MSU 1991).
- Paynesville 2nd branch line is outwash deposits. The outwash is a sand, gravelly sand, and cobbly gravel of Des Moines lobe provenance (Meyer 1995).
- Worthington 2nd branch line is glacial till consisting of clay, silty clay, silt, sand, and gravel (MSU 1991).
- Springfield 2nd branch line is glacial outwash, glacial moraine sediment, and floodplain alluvium. The glacial outwash is a fine-grained sand with silt and clay layers of Des Moines lobe provenance; and the glacial moraine sediment is a pebbly, clayey diamicton associated with the Altamont moraine of the Des Moines lobe (MGS 2019).
- Minnesota Interconnect 2nd branch line is lacustrine sand and wetland sediments. The lacustrine sand is very fine to medium-grained and laminated, thinly bedded, or cross-bedded, and was deposited by the glacial Lake Grantsburg and subsequently by the glacial Lake Anoka (Chandler et al. 2017).
- Alexandria 2nd branch line is glacial till and wetland sediments. The glacial till is an unsorted sandy loam to loamy sand with pebbles and pockets of silt, sand, and gravel of Des Moines lobe provenance (Lusardi 2014).
- Hugo compressor station is glacial outwash sediment. The glacial outwash is sand and gravelly sand of Des Moines lobe provenance (Bauer 2016).

Northern completed geotechnical boreholes for the ten pipeline extensions as follows.

- Three geotechnical borings along the Lake Mills M500 E-line, which indicated the presence of sandy and clayey glacial till to depths of at least 40 feet below ground surface.
- Six geotechnical borings were completed along the Albert Lea M500 E-line, which indicated the presence of silt, sand, and clay glacial till to depths up to 101.5 feet.
- Nine geotechnical borings were completed along the Willmar 3rd branch line upstream, which indicated sandy, silty, and clayey post-glacial alluvium, sandy glacial outwash, silty glaciofluvial sediment, and sandy and clayey glacial till to depths up to 149.5 feet.
- Eleven geotechnical borings were completed along the Willmar 3rd branch line downstream, which indicated the presence of sandy glacial outwash and sandy and clayey glacial till to depths up to 101 feet.
- Two geotechnical borings were completed along the Welcome 2nd line, which indicated the presence of clayey alluvium, sandy glacial outwash, and clayey glacial till to depths up to 41 feet.
- Seven geotechnical borings were completed along the Paynesville 2nd branch line, which indicated the presence of sandy glacial outwash, silty and clayey glaciofluvial deposits, and clayey glacial till to depths between 29.5 feet and 59.5 feet.
- Four geotechnical borings were completed along the Worthington 2nd branch line, which indicated the presence of sandy, silty, and clayey glacial till to depths up to 61.5 feet.
- Fifteen geotechnical borings were completed along the Springfield 2nd branch line, which indicated sandy glacial outwash and sandy, silty, and clayey glacial till to depths up to 100 feet.
- Six geotechnical borings were completed along the Minnesota Interconnect 2nd branch line, which indicated sandy, silty, and lacustrine deposits, silty and sandy glaciofluvial deposits, silty, sandy, and clayey glacial till, and sandy outwash to depths up to 81 feet.
- Seven geotechnical borings were completed along the Alexandria 2nd branch line, which indicated the presence of sandy and gravely outwash and sandy, silty, and clayey glacial till to depths up to 141 feet.

Additional discussion on the results of the geotechnical investigation is included in Section 6.7 and copies of the geotechnical reports are included in Appendix 6C.

6.1.3 Bedrock Geology

V2F Project

The bedrock formation underlying the V2F Project is part of a sequence of Late Cambrian to Middle Devonian sedimentary rock consisting of sandstone, shale and carbonates. The bedrock was deposited under tectonically stable geologic conditions in a shallow marine water that flooded Iowa and southern Minnesota approximately 500 million years ago. Bedrock geology is presented in Figure 6-2.

- The Ventura compressor station is in the Middle Devonian Lime Creek and Sweetland Creek Formation and consists of shale and limestone with a maximum thickness of 200 feet (Iowa Geological and Water Survey 2010).
- The Lake Mills compressor station is in the Lithograph City Formation and consists of dolomite, limestone, and shale with a maximum thickness of 110 feet (Iowa Geological and Water Survey 2010).
- The Lake Mills M500 E-line and the temporary compression site for the A-line abandonment-La Crosse BL73201 launcher/ABA 05 consists of Middle Devonian sedimentary rock containing of dolomite, limestone, and shale. The lithology of the individual bedrock units is nearly uniform throughout Freeborn County, Minnesota, due to the continuous nature of the geologic processes that formed them. Limestone forms the bedrock surface and represents the youngest bedrock unit that is underlain by progressively older shales and sandstones (Mankato State University 1991; MGS 2011).
- The Albert Lea M500 E-line and the Owatonna compressor station, consists of Middle Devonian and Upper Ordovician sedimentary rocks consisting of dolomite and limestone (Retzler et al. 2022).
- The Faribault M500 D-line, the Farmington compressor station, and Northfield MN #1 consists of Upper Ordovician sedimentary rocks consisting of dolomite, sandstone, and shale (Steenberg et al. 2023).

Based on the site-specific geotechnical boring results, bedrock is not expected to be encountered during the construction of the V2F Project, except for the Faribault D-line. No bedrock was encountered at the maximum depths of the boreholes on the following components:

- 101.5 feet on the Lake Mills M500 E-line
- 121.5 feet on the Albert Lea M500 E-line.

Bedrock was encountered in six geotechnical borings on the Faribault M500 D-line at depths between 9.5 and 69.5 feet from ground surface. The bedrock was identified as sandstone consistent with the Ordovician St. Peter Sandstone. Additional information on impacts to bedrock is included in Section 6.7.

NL27 Project

The bedrock geology for the ten pipeline extensions and the Hugo compressor station are as follows:

- Lake Mills M500 E-line consists of Middle Ordovician limestone, dolomitic limestone, and shale (MSU 1991).
- Albert Lea M500 E-line consists of Upper Ordovician limestone, dolostone, and calcareous shale of the Galena Group (Retzler et al. 2022).
- Willmar 3rd branch line upstream consists of Lower and Middle Ordovician sedimentary rocks of the St. Peter Sandstone and the Prairie du Chien Group, which include sandstone, siltstone, dolostone, and shale (Setterholm 2006).

- Willmar 3rd branch line downstream consists of Late Cambrian, Early Ordovician and Late Cretaceous sedimentary rocks including sandstone and dolostone (Bauer 2009).
- Welcome 2nd line consists of Cretaceous shale, sand, and decomposed granite and gneiss (MSU 1991).
- Paynesville 2nd branch line consists of Cretaceous sedimentary rocks including carbonaceous sandstone, siltstone, shale, and marl, and Precambrian mafic intrusive formations (Meyer 1995).
- Worthington 2nd branch line consists of Cretaceous shale, sand, decomposed Sioux Quartzite, and decomposed granite and granitic gneiss (MSU 1991).
- Springfield 2nd branch line consists of Cretaceous claystone, sandstone, siltstone, mudstone, conglomerate, shale, marlstone, and minor lignite; and Middle and Late Cambrian sandstone, siltstone, and shale (MGS 2019).
- Minnesota Interconnect 2nd branch line consists of Mesoproterozoic sandstone (Chandler et al. 2017).
- Alexandria 2nd branch line consists of Paleoproterozoic metamorphic rocks, including strongly foliated schistose metagraywacke and argillite of the Little Falls Formation, and mafic intrusive formations (Lusardi 2014).
- Hugo compressor station consists of Lower Ordovician dolostone, sandy dolostone, sandstone, and shale (Bauer 2016).

Based on the site-specific geotechnical boring results, bedrock is not expected to be encountered during the construction of the NL27 Project. No bedrock was encountered at the maximum depths of the boreholes on the following components:

- 40 feet on the Lake Mills M500 E-line
- 101.5 feet on the Albert Lea M500 E-line
- 101 feet on the Willmar 3rd branch line downstream
- 41 feet on the Welcome 2nd line
- 61.5 feet on the Worthington 2nd branch line
- 81 feet from surface on the Minnesota Interconnect 2nd branch line
- 141 feet from surface on the Alexandria 2nd branch line.

Bedrock was encountered in one geotechnical boring on the Willmar 3rd branch line upstream and was identified as sandstone consistent with the Ordovician St. Peter Sandstone. Bedrock was encountered in seven geotechnical borings on the Paynesville 2nd branch line and was identified as gabbro consistent with the Precambrian mafic intrusions. Bedrock was encountered in six geotechnical borings on the Springfield 2nd branch line and was identified as shale consistent with mapped Cretaceous sedimentary formations. Additional information on impacts to bedrock is included in Section 6.7.

6.2 Mineral Resources

V2F Project

The mineral industry in Iowa consists of construction sand and gravel, crushed stone, industrial sand and gravel, lime, and Portland cement. Mineral production in Hancock and Worth counties is limited to crushed stone and sand and gravel (USGS 2019a). There are

no active mineral resource operations or coal mines within 0.5 mile of the proposed pipeline disconnect and temporary compression areas in Iowa (IDNR 2025; Iowa Department of Agriculture and Land Stewardship 2025). Iowa is not an oil-producing state and does not have any proven oil or natural gas reserves. Over 100 exploration wells have been drilled in the southeastern corner of the state, more than 100 miles from the V2F Project area and their combined production was less than 500 barrels. There are no current oil and gas production facilities in Iowa (U.S. Energy Information Administration 2025a).

The mineral industry in Minnesota consists of iron ore mining operations, which are limited to Itasca, Lake and St. Louis counties; peat production in northern Minnesota; and dimension stone, crushed stone, sand and gravel throughout the state. Iron ore mining and peat production do not occur in the vicinity of the V2F Project. Mineral production in Freeborn County is limited to sand and gravel, while mineral production in Steele and Dakota counties includes both sand and gravel and crushed stone (USGS 2019b). The MDNR website does not include mineral resource data for Freeborn or Steele counties. No evidence of surface mining was observed via desktop review for the proposed V2F Project in Freeborn, Steele, or Dakota counties. The MDNR Aggregate Mapper does not indicate any sand, gravel, or crushed stone operations within 0.25 mile of the V2F Project within Dakota County (MDNR 2025).

NL27 Project

The mineral industry in Minnesota consists of iron ore mining operations, which are limited to Itasca, Lake and St. Louis counties; peat production in northern Minnesota; and dimension stone, crushed stone, sand and gravel throughout the state. Iron ore mining and peat production do not occur in the vicinity of the NL27 Project. No evidence of surface mining was observed via desktop review for the proposed NL27 Project in Freeborn, Steele, Scott, Carver, Martin, Jackson, Isanti, Morrison, Washington, or Dakota counties. Minnesota does not have any crude oil or natural gas reserves or production or operating coal mines or reserves (U.S. Energy Information Administration 2025b).

The MDNR website does not include mineral resource data for Freeborn, Steele, Martin, Jackson, Watonwan, or Morrison counties. Only two of the NL27 pipeline extensions have surface mines within 0.25 mile and are listed in Table 6.2-1.

On the Paynesville 2nd branch line, seven active pits are surface mines which are a source of sand and gravel. Northern also coordinated with the mine owners when selecting the proposed pipeline route to limit impacts to future operations. The active gravel pits located along the pipeline extension are separated by existing pipelines, driveways or public roads, which limit future expansion of any mining activities towards the Paynesville 2nd branch line.

One active sand and gravel mine was identified within 0.25 mile of the Springfield 2nd branch line. The active gravel pit is separated from the proposed extension by an existing pipeline, which limits future expansion of any mining activities towards the Springfield 2nd branch line.

Table 6.2-1 Mineral Resources within 0.25 mile of the NL27 Project

Project Component	Approximate MP	Mineral Resource[1]	Distance/Direction from Construction Work Area (feet)	Primary Method of Extraction	MDNR Status	MDNR Quarry Designation or Name[2]
Paynesville 2nd Branch Line	0.03	Sand and Gravel	202 NNW	N/A	Active	N/A
	0.06	Sand and Gravel	333 SSE	N/A	Active	N/A
	0.19	Sand and Gravel	90 NNW	N/A	Active	73031
	0.19	Sand and Gravel	90 NNW	N/A	Active	73163
	0.24	Sand and Gravel	90 SSE	N/A	Inactive	N/A
	0.83	Sand and Gravel	529 E	N/A	Inactive	N/A
	1.01	Sand and Gravel	76 SSE	N/A	Reclaimed	73081
	1.3	Sand and Gravel	76 SSE	N/A	Reclaimed	N/A
	1.37	Sand and Gravel	210 NNW	N/A	Active	N/A
	1.42	Sand and Gravel	230 SSE	N/A	Inactive	N/A
	1.69	Sand and Gravel	318 NNW	N/A	Reclaimed	73169
	1.73	Sand and Gravel	219 SSE	N/A	Active	N/A
	2.25	Sand and Gravel	1,064 SSE	N/A	Reclaimed	N/A
	2.44	Sand and Gravel	933 ESE	N/A	Inactive	73099
	2.44	Sand and Gravel	933 ESE	N/A	Active	73101
	2.44	Sand and Gravel	32 NNW	N/A	Reclaimed	73100
Springfield 2nd Branch Line	17.96	Sand and Gravel	262 NNE	N/A	Inactive/Reclaimed	N/A
	18.20	Sand and Gravel	42 NE	N/A	Active	N/A

[1] Data source: MDNR website and desktop analysis
[2] These pits were not confirmed with desktop verification or discussions with their operators.

Based on the above information, construction and operation of the V2F Project and NL27 Project are not expected to impact mineral resources in the area.

6.3 Blasting

Based on the soil mapping and site-specific geotechnical investigations, blasting is not expected to be necessary for construction of either of the Projects' pipeline extensions. The site-specific geotechnical investigations indicate that bedrock does not occur within trench excavation depths for the V2F or NL27 Project.

6.4 Geologic Hazards

Geologic hazards are conditions that present a risk to life and/or property if triggered. Certain geologic hazards such as landslides can be triggered by construction activities, whereas other geologic hazards including earthquakes and the expression of karst features on the land surface occur naturally and are primarily of concern to operating natural gas transmission facilities.

6.4.1 Karst Terrain

Karst terrain results from the dissolution of soluble bedrock such as limestone, dolomite, or gypsum through the circulation of slightly acidic groundwater. Karst features such as sinkholes can form suddenly, posing a threat to buildings, roadways, pipelines, and other surface improvements.

An assessment of the potential for karst terrain was conducted using data available from the MDNR and IDNR. The majority of the V2F Project and NL27 components are underlain by a thick layer of glacial drift, which significantly reduces the likelihood of the surface expression of karst bedrock features. The type and thickness of the unconsolidated material over carbonate bedrock is related to the frequency and type of sinkhole that can form. The USGS states that surface expression of sinkholes and other karst features is unlikely in areas where karst bedrock is covered by more than 50 feet of unconsolidated material (Weary and Doctor 2014). Figure 6-2 depicts both Project areas where carbonate bedrock is covered by glacial drift. With the exception of the 2.5 miles at the north end of the Faribault M500 D-line on the V2F Project, the USGS has identified no areas with carbonate bedrock that is underlain by less than 50 feet of unconsolidated material.

Based on the site-specific geotechnical boring results, bedrock is not expected to be encountered during the construction of the Lake Mills M500 E-line or Albert Lea M500 E-line for the V2F Project, or any of the NL27 Project components.

Bedrock may be encountered during the construction of the Faribault M500 D-line for the V2F Project. The geotechnical drilling encountered bedrock identified as sandstone as shallow as 9.5 feet from ground surface on the Faribault M500 D-line in an area identified with carbonate bedrock within 50 feet of the surface. The sandstone bedrock is consistent with the St. Peter Sandstone, which is known to contain karst features. Karst features within the St. Peter Sandstone are strongly associated with current and buried valleys. Due to the shallow nature of the bedrock units, the bedrock located on the Faribault M500 D-line is not associated with a bedrock valley (MGS 2023).

Based on Northern's experience operating and monitoring existing aboveground and pipeline facilities in Minnesota and Iowa, Northern does not expect karst terrain to present a danger to either of the proposed Project's facilities. Northern will be alert for surface expressions of potential subsurface features, and engineering controls, if needed, will be employed as appropriate.

6.4.2 Landslides

Landslides occur in various forms and timeframes, from slow creep to collapse, and have the potential to significantly damage buildings, roads, pipelines, and other structures.

Both the V2F and NL27 Project facilities are located on relatively level areas and not near any areas known for having the potential for landslides or slope instability (USGS 2025a).

V2F Project

Northern reviewed site-specific civil survey elevation data to identify steep slopes present for the V2F Project. Slopes between 5% and 15% are identified by beginning and ending MP in Appendix 6A-1; there are no slopes steeper than 15% on the V2F Project.

NL27 Project

Northern has reviewed site-specific civil survey elevation data to identify steep slopes present for the NL27 Project. Slopes between 5% and 15%, 15% and 30%, and greater than 30% are identified by beginning and ending MP in Appendix 6A-2. All slopes greater than 15% are within areas where the pipeline will be installed by HDD.

In accordance with the FERC Plan, Northern will install temporary trench plugs and temporary slope breakers during construction on slopes greater than 5% for both Projects. The temporary slope breakers will channel water off the ROW through a J-hook or other baffling device to limit water flow down long steep slopes. Temporary trench plugs will reduce the velocity of water flowing along the trench and volume of water that collects at the bottoms of slopes. In accordance with the FERC Plan, Northern will install permanent trench breakers and permanent slope breakers in areas of steep slopes on both Projects. Trench breakers are designed to prevent preferential water flow along the pipeline trench by diverting subsurface water flow to the land surface. Groundwater discharging to the land surface is then redirected off the ROW by slope breakers. Used in combination, these structures prevent subsurface piping of soils that can lead to slope instability and failure.

6.4.3 Seismicity

Seismicity refers to the frequency, intensity, and distribution of earthquakes in a given area. In general, the higher the magnitude of an earthquake the stronger the ground motion and the greater the resulting damage to structures and infrastructure. Earthquakes also can trigger related events including ground faults and soil liquefaction, a condition where granular, saturated soil temporarily loses its cohesive strength due to strong and prolonged shaking.

While Minnesota and Iowa are two of the least seismically active states in the U.S., there have been at least three earthquakes in Iowa since 1900 and at least 14 earthquakes in Minnesota since 1860 (USGS 2025b; USGS 2025c). According to the USGS, the closest earthquake to the V2F Project components in Iowa occurred June 30, 2021, and had a magnitude of 2.7. The earthquake was located near Rembrandt, Iowa, approximately 84 miles west-southwest of the disconnect site at the Ventura compressor station (USGS 2025c). The closest earthquake to the V2F and NL27 Project components in Minnesota occurred September 3, 1917, and had a magnitude of 4.3. The earthquake was located near Pillager, Minnesota, approximately 23 miles north of the Alexandria 2nd branch line on the NL27 Project (USGS 2025b).

An assessment of the potential for seismic ground motions within the V2F and NL27 Projects was conducted using data available from the USGS' 2023 Update to the U.S.

National Seismic Hazard Model (USGS 2024). USGS National Seismic Hazard Probability Mapping shows that for the Projects' area, within a 50-year period, there is a 2% probability of an earthquake with an effective PGA of 2 to 4% g, and a 10% probability of an earthquake with an effective PGA of less than 2% being exceeded (USGS 2024). For reference, PGA of 10% (0.1 g) is generally considered the minimum threshold for damage to older structures or structures not constructed to resist earthquakes. Thus, the risk that a damaging earthquake will occur during the operating life of the proposed pipeline extensions is very low. As a result, the potential for soil liquefaction and surface faulting also is very low. The USGS does not map any surface faults in Iowa or Minnesota that have been active in the Quaternary period (the last 1.6 million years) (USGS 2006).

6.4.4 Flooding and Scour

FEMA Risk Maps have been prepared for both the V2F and NL27 Project components. SFHA are defined as the area that will be inundated by the flood event having a 1% chance of being equaled or exceeded in any given year. The 1% annual chance flood also is referred to as the base flood or 100-year flood elevation.

V2F Project

A review of the FEMA Risk Maps indicates all components except the Faribault M500 D-line and the Owatonna compressor station are located outside of any identified SFHAs (Figure 6-3).

On the Faribault M500 D-line, Northern identified locations where two SFHAs will be crossed by the pipeline extension.

- The SFHA between MP 98.66 and MP 98.68 will be crossed by open-cut methods; portions of FAR SA-002, FAR ETWS-011 and FAR ETWS-013 are located within the SFHA
- The SFHA between MP 98.99 to 99.16 will be crossed primarily via HDD; the HDD point on the south side of Chub Creek is located outside the SFHA. The HDD point and a portion of FAR ETWS-014 and FAR ETWS-015 are located within the SFHA on the north side of Chub Creek.

For mitigation within the SFHA, Northern will stake down any construction mats, anchor or move any loose equipment outside of the SFHA, and limit fuel storage and refueling operations inside the SFHAs.

Additionally, a portion of the temporary access road at the temporary compression site at the Owatonna compressor station is within the SFHA; however, the access road has been built up below floodplain elevations so no additional mitigation will be required. A portion of FCS ETWS-002 at the disconnect site inside the Farmington compressor station is located within a SFHA. The area within the SFHA will be used for construction dewatering discharge purposes only (Figure 6-3). As described in Resource Report 1, the dewatering location has been required by MDNR staff on other Northern projects completed at this location. Northern will utilize tie-downs on any dewatering equipment that will remain in the SFHA for an extended period of time.

Northern will complete eight waterbody crossings during construction of the V2F Project; all waterbodies will be crossed via HDD.

- Five waterbody crossings on the Lake Mills M500 E-line: LMA-S01, LMA-S03, LMA-S04, LMA-S07 and LMA-S08 will be 26, 46, 53, 22 and 21 feet below the bed of the waterbody, respectively
- One waterbody (ALO-S01) crossing on the Albert Lea M500 E-line will be 51 feet below the bed of the waterbody
- Two waterbody crossings on the Faribault M500 D-line: FAR-S02 and FAR-S05 will be 52 and 29 feet below the bed of the waterbody, respectively

Due to the depths of the HDDs beneath the waterbodies, Northern does not anticipate scour will impact the crossing locations. There are no waterbodies located at the A-line disconnect sites nor at the temporary compression locations. Additional information on the waterbodies is included in Resource Report 2, Table 2.2-3.

NL27 Project

A review of these FEMA Risk Maps indicates that the Lake Mills M500 E-line, the Albert Lea M500 E-line, the Willmar 3rd branch line downstream, the Welcome 2nd line, the Worthington 2nd branch line, the Alexandria 2nd branch line, and the Hugo compressor station are located outside of any identified SFHAs (Figure 6-4). The remaining components cross SFHAs as follows.

- Willmar 3rd branch line upstream between MP 11.40 and MP 11.41; floodway will be crossed via HDD, with both HDD points located outside the SFHA.
- Paynesville 2nd branch line between MP 0.56 and MP 0.62. The SFHA will be crossed by HDD, with both HDD points located outside the SFHA. Additionally, a small portion of PAY-ETWS-010 is located within an SFHA at MP 0.82. If the portion of PAY-ETWS-010 cannot be avoided by construction activities, then Northern will utilize construction matting, as needed, in areas of the floodplain. Mats will be anchored to the ground.
- Springfield 2nd branch line
    - between MP 15.20 and MP 15.25 will be crossed via HDD with both HDD points located outside the SFHA
    - between MP 16.11 and MP 16.27 will be crossed via HDD, with both HDD points on the edge of the SFHA. ETWS for the HDD extends into the SFHA
    - between MP 17.35 and MP 18.21 will be crossed via HDD and open cut methods. The Watonwan River and 290th Street will be crossed via HDD while the remainder of the SFHA will be open cut. Several ETWSs including SPR-ETWS-023 to SPR-ETWS-032 will be located within the SFHA.
- Minnesota Interconnect 2nd branch line between MP 18.24 and MP 18.45. The SFHA will be crossed via HDD. The HDD point on the east side is located outside of the SFHA, while the HDD point on the west side is located at the edge of the SFHA. There also will be temporary and extra temporary workspaces located on the west side of the HDD.

For mitigation within the SFHA, Northern will stake down any construction mats, anchor or move any loose equipment outside of the SFHA, and limit fuel storage and refueling operations inside the SFHAs.

Northern will complete 14 waterbody crossings during construction of the NL27 Project; 11 waterbodies will be crossed via HDD and five will be crossed by open cut. All open cut crossings will be buried with at least 4.5 feet of cover with the exception of waterbodies WDC-S05 and WOR-S01, which will require a minimum depth of cover of ten feet since they are designated as public watercourses by the state.

- Two waterbodies will be crossed via HDD on the Albert Lea M500 E-line: ALO-S02 and ALO-S03 at 64 and 19 feet below the bed of the waterbody, respectively.
- Three waterbodies will be crossed via HDD on the Willmar 3rd branch line upstream: WIL-S08, WIL-OW02 and WIL-S09 at 34, 47, 32 feet below the bed of the waterbody, respectively.
- Two waterbodies will be crossed via open cut on the Willmar 3rd branch line downstream: WDC-S02 and WDC-S05.
- Three waterbodies will be crossed via HDD on the Paynesville 2nd branch line: PAY-S01, PAY-S02 and PAY-S03 at 40, 35 and 31 feet below the bed of the water body, respectively.
- One waterbody crossing on the Worthington 2nd branch line: WOR-S01 will be crossed by open cut.
- Four waterbodies will be crossed via HDD on the Springfield 2nd branch line: SPR-S01, SPR-S02, SPR-S03, and SPR-S04 at 43, 46, 46 and 43 feet below the bed of the waterbody, respectively.
- One waterbody will be crossed via HDD on the Minnesota Interconnect 2nd branch line: MIC-S01 at 32 feet below the bed of the waterbody.
- Two waterbodies on the Alexandria 2nd branch line: ALX-S01 and ALX-S02 will be crossed by open cut.

Due to the depths of the HDDs beneath the waterbodies, Northern does not anticipate scour will impact these crossing locations. Also, due to the depth and profiles of the waterbodies being open cut, Northern does not anticipate scour will impact the open-cut crossing locations. Additional information on the waterbodies is included in Resource Report 2, Table 2.2-4.

6.5 Paleontological Resources

All the V2F Project components located in Minnesota and five of the NL27 pipeline extensions (Lake Mills M500 E-line, Albert Lea M500 E-line, Willmar 3rd branch line upstream, Willmar 3rd branch line downstream, and the Minnesota Interconnect 2nd branch line) are located in areas of the Paleozoic era where warm, shallow seas covered the area. These waters were home to many marine organisms, and their fossils can be found in the rocks formed from sediments deposited on the ancient sea floor. Brachiopods, trilobites, cephalopods, corals, mollusks, and bryozoans are some of the fossils that can be found. Four of the NL27 pipeline extensions (Welcome 2nd line, Worthington 2nd branch line, Paynesville 2nd branch line, and Springfield 2nd branch line) are located in areas with Cretaceous sedimentary rocks, deposited in shallow marine and terrestrial environments.

Fossils that can be found in these areas include cephalopods, pteridophytes, bivalves, lycopods, brachiopods, ferns, liverworts, vascular plants, and insects (The Paleontology Portal 2025). The NL27 Alexandria 2nd branch line is located in a Paleoproterozoic metamorphic unit with igneous intrusions that do not contain fossils.

The V2F Project components located in Iowa (Lake Mills and Ventura compressor stations) are located where late Pleistocene vertebrates have been found (The Paleontology Portal 2025). The potential for V2F Project activities at the disconnect sites and temporary compression sites and for the NL27 Hugo compressor station uprate to encounter important paleontological resources is unlikely, due to the nature of previous excavation and disturbance from construction of existing facilities. The potential for encountering important paleontological resources while constructing the V2F and NL27 pipeline extensions is expected to be limited as the proposed pipelines generally parallel existing lines where ground disturbance has occurred.

6.6 Impacts and Mitigation

The overall impacts of both Projects on topography and geologic materials will be minor and limited to the temporary disturbance of slopes within the workspaces resulting from grading and trenching operations. The need to conduct blasting is not anticipated. Northern will further reduce impacts by implementing measures in FERC's Plan and Northern's Procedures to control water and minimize erosion during construction, returning contours, to preconstruction conditions to the extent practicable to avoid long-term impacts, and restoring vegetative cover over disturbed areas.

The risk of excavation and grading activities initiating a localized slope failure is low, as the proposed pipeline extensions cross areas with little slope and slope failures are not common in the areas. The risk of initiating a slope failure will be further reduced by controlling water, minimizing erosion, restoring surface contours, and restoring vegetative cover in the disturbed areas as noted above. Northern does not expect karst terrain to impact the V2F or NL27 Project facilities and the areas do not experience significant earthquakes. Therefore, both Projects should not initiate or be affected by karst features or seismic activity. In addition, the pipeline extensions have been designed and will be constructed, installed, and maintained in accordance with applicable regulations that are designed to ensure the integrity of the facilities, further reducing the potential for damage from geologic hazards.

Hydro-fracture assessments were conducted on all 19 HDDs for the V2F Project and all 31 HDDs for the NL27 Project. The assessments were based on comparing the modelled maximum formation limiting pressure with the minimum required drilling fluid annular pressure anticipated to maintain circulation of cuttings to surface using the boring logs and what are considered to be conservative parameters for the soils properties. The results indicate the risk of an inadvertent release is low for all HDDs and will be continuously monitored and managed throughout the HDD installations. Northern will implement its Project-specific HDD Monitoring, Inadvertent Return Response, and Contingency Plans, see Resource Report 1, Appendix 1A1 for the V2F Project and Appendix 1A2 for the NL27 Project, to minimize potential impacts associated with installation of the pipeline using the

HDD method. The complete HDD feasibility studies including mitigation recommendations are included in the individual project-specific HDD Plans.

The Projects will not impact mineral resources and pose only a low risk to paleontological resources. Northern's environmental inspector and other construction staff will be advised to watch for paleontological resources. In the unlikely event that fossils are encountered during construction, Northern will temporarily cease excavation in the area and will notify the state geological survey or natural history museum, as well as FERC, so that all finds may be properly documented.

6.7 Geotechnical Investigations

V2F Project

Northern conducted a geotechnical investigation along the Lake Mills M500 E-line to obtain information used in the design of the ten HDDs. The soil profile encountered at all 17 locations generally consisted of sandy glacial till consisting of clayey sand, sandy lean clay, or sandy silt, often interbedded with sand and gravel glacial outwash described as poorly graded sand. Groundwater was encountered within 13 of 17 borings. Water levels observed in the soil layers were between 8 and 53 feet and were generally found within sand or clayey sand units.

Northern conducted a geotechnical investigation along the Albert Lea M500 E-line to obtain information used in the design of two HDDs. The soil profile encountered at all four locations generally consisted of silt, sand, and clayey glacial till consisting of sandy lean clay, clayey sand, or sandy silt. Groundwater was encountered in all four borings. Water levels observed in the soil layers were between 21 and 26 feet and were generally found within sandy lean clay and clayey sand units.

Northern conducted a geotechnical investigation along the Faribault M500 D-line to obtain information used in the design of seven HDDs. The soil profile encountered at 17 locations generally consisted of glacial till consisting of clayey sand, sandy lean clay, sand, silty sand, or sandy silt, occasionally interbedded or overlain with sand and gravel glacial outwash. Sandstone was encountered in six geotechnical borings on the Faribault M500 D-line at depths between 9.5 and 69.5 feet. Alluvial deposits consisting of lean clay, sandy lean clay, clayey sand, silty sand, or sandy silt were found at three locations (BH-08A, BH-12 and BH-13). Groundwater was encountered within 14 of 17 boreholes. Water levels observed in the soil layers were between 4.5 and 85 feet and were generally found within sand, silty sand, sandstone, or sand stringers within sandy lean clay units.

A complete geotechnical report for the three pipeline extensions is included in Appendix 6B. A table of geotechnical testing results for the V2F Project is included as Table 6.7-1. Geotechnical investigation was not required at the disconnect or temporary compression sites.

Table 6.7-1 Geotechnical Testing Results for the V2F Project

Pipeline Facility	Crossing Number/ Ref. Drawing	Begin MP	End MP	Arc Drill Length (feet)	Maximum Depth HDD (feet)	Related Geotechnical Borings	Approximate Depth to Bedrock (feet)
Lake Mills M500 E-line	LMA-P4-1	34.36	34.57	1,071	33	BH-00	No bedrock
	LMA-P4-2	35.95	35.99	219	17	BH-02	No bedrock
	LMA-P4-3	37.76	38.08	1,745	59	BH-05, BH-06, BH-07	No bedrock
	LMA-P4-4	39.15	39.20	249	25	BH-08	No bedrock
	LMA-P4-5	39.45	39.61	880	40	BH-09, BH-10	No bedrock
	LMA-P4-6	40.63	40.76	661	27	BH-11, BH-12	No bedrock
	LMA-P4-7	41.08	41.24	834	33	BH-13	No bedrock
	LMA-P4-8	41.81	41.99	975	34	BH-14, BH-15	No bedrock
	LMA-P4-9	42.06	42.17	609	32	BH-15, BH-16	No bedrock
	LMA-P4-10	42.44	42.48	168	24	BH-17	No bedrock
Albert Lea M500 E-line	ALO-P4-1	2.08	2.49	2,209	55	BH-01, BH-02, BH-03	No bedrock
	ALO-P4-2	3.58	3.64	301	16	BH-04	No bedrock
Faribault M500D-line	FAR-P4-1	98.90	99.14	1,265	58	BH-02, BH-03	45
	FAR-P4-2	99.83	100.07	1,287	52	BH-04, BH-05, BH-06	No bedrock
	FAR-P4-3	100.50	100.88	2,035	89	BH-07A, BH-08A	No bedrock
	FAR-P4-5	102.04	102.20	855	52	BH-10A, BH-11A, BH-12, BH-12A	9.5 (auger refusal at 50)
	FAR-P4-6	103.02	103.17	791	32	BH-13, BH-14	No bedrock
	FAR-P4-7	103.59	104.02	2,270	81	BH-16, BH-17, BH-18	No bedrock
	FAR-P4-8	104.49	104.53	201	18	BH-19	No bedrock

Northern utilized the results of the geotechnical borings to finalize the HDD designs, specifically optimizing the angle of entry and adjusting the entry and exit pit locations. The current HDD design indicates that only two of the HDDs may encounter bedrock. Northern adjusted its drilling profile on those two drills to meet the design parameters for bedrock;

The remaining HDDs for the V2F Project will not encounter bedrock; therefore, Northern designed them to meet the parameters of the unconsolidated materials along the profiles. Northern has provided additional information on the feasibility of the HDDs along with safety factors and design considerations and recommendations in Resource Report 1, Appendix 1A.

NL27 Project

Northern conducted a geotechnical investigation along the Lake Mills M500 E-line to obtain information used in the design of the two HDDs. The soil profile encountered at all three locations generally consisted of sandy and clayey glacial till consisting of silty sand, clayey sand, sandy lean clay, silt, clayey sand with gravel, or silty sand with gravel. Groundwater was encountered in all three borings. Water levels observed in the soil layers were between two and nine feet and were generally found within silty sand or clayey sand with gravel units.

Northern conducted a geotechnical investigation along the Albert Lea M500 E-line to obtain information used in the design of five HDDs. The soil profile encountered at all six locations generally consisted of silt, sand, and clayey glacial till consisting of silt, silty sand, sandy lean clay, clayey or sand, occasionally interbedded or underlain with sand and gravel glacial outwash or silty organic deposits. Groundwater was encountered in three of the borings. Water levels observed in the soil layers were between 23 and 46 feet and were generally found within sandy lean clay, silty sand, and clayey sand units.

Northern conducted a geotechnical investigation along the Willmar 3rd branch line upstream to obtain information used in the design of three HDDs. The soil profile encountered at nine locations generally consisted of glacial till consisting of lean clay, clayey sand, sandy lean clay, silty sand, silty clay, or silt, occasionally interbedded or overlain with sand and gravel glacial outwash, or interbedded with silty glaciofluvial sediment. Alluvial deposits consisting of lean clay, silty clay, silty sand, sandy lean clay, clayey sand, or silty sand, were found at three locations (BH-7, BH-8 and BH-10). Groundwater was encountered within seven of nine boreholes. Water levels observed in the soil layers were between 6 to 38 feet and were generally found within sand, silty sand, silt, and sandy lean clay units. Sandstone bedrock was encountered at one location (BH-7) at a depth of 99.5 feet below ground surface.

Northern conducted a geotechnical investigation along the Willmar 3rd branch line downstream to obtain information used in the design of seven HDDs. The soil profile encountered at 11 locations generally consisted of glacial till consisting of clayey sand and sandy lean clay, occasionally interbedded with silty sand and sandy silt glacial outwash. Groundwater was encountered within 2 of 11 boreholes. Water levels observed in the soil layers were between 27 and 31 feet and were generally found within clayey sand and sandy lean clay units.

Northern conducted a geotechnical investigation along the Welcome 2nd line; however, no HDDs are proposed. The soil profile encountered at two locations generally consisted of glacial till consisting of sandy lean clay. In one boring, the till is overlain by sandy outwash and lean clay alluvium. Groundwater was not encountered in either borehole.

Northern conducted a geotechnical investigation along the Paynesville 2nd branch line to obtain information used in the design of three HDDs. The soil profile encountered at seven locations generally consisted of sandy outwash consisting of sand, sand with gravel, and sand with silt, often underlain by clayey glacial till and silty or clayey glaciofluvial deposits. Gabbro bedrock was encountered in all seven locations. Groundwater was encountered within five of seven boreholes. Water levels observed in the soil layers were between 8 and 33 feet and were generally found within sand with silt, sandy silt, sand, or lean clay units.

Northern conducted a geotechnical investigation along the Worthington 2nd branch line to obtain information used in the design of one HDD. The soil profile encountered at four locations generally consisted of sandy, silty, and glacial till consisting of sandy lean clay, sandy silt, clayey sand, lean clay, and sand. Groundwater was encountered within one of four boreholes. Water level was observed at 25 feet within a sandy silt unit.

Northern conducted a geotechnical investigation along the Springfield 2nd branch line to obtain information used in the design of five HDDs. The soil profile encountered at 15 locations generally consisted of sandy, silty, and clayey glacial till consisting of sandy lean clay, clayey sand, silty clay, sandy silt, silty sand, often overlain or interbedded with sandy outwash. Alluvial deposits consisting of lean clay, fat clay, clayey sand, silty sand, and sand, were found at five locations (BH-8, BH-9, BH-10, BH-12, and BH-15). Shale bedrock was encountered in seven boreholes. Groundwater was encountered in all 15 boreholes. Water levels observed in the soil layers were between 4 and 35 feet and were generally found within sandy lean clay, sand, clayey sand, and silty sand units.

Northern conducted a geotechnical investigation along the Minnesota Interconnect 2nd branch line to obtain information used in the design of three HDDs. The soil profile encountered at six locations generally consisted of sandy lacustrine sediments consisting of sand and silty sand, often underlain by clayey till, silty and sandy glaciofluvial sediments, and sandy outwash. Groundwater was encountered in all six boreholes. Water levels observed in the soil layers were between 12 and 25 feet and were generally found in sand and silty sand units.

Northern conducted a geotechnical investigation along the Alexandria 2nd branch line to obtain information used in the design of two HDDs. The soil profile encountered at seven locations generally consisted of sandy, silty and clayey glacial till consisting of lean clay, sandy lean clay, clayey sand, sandy silt, silty sand, and silt, often interbedded with sandy glacial outwash. Groundwater was encountered in six of seven boreholes. Water levels observed in the soil layers were between 16 and 33 feet and were generally found in sandy silt, sand, and sandy lean clay units.

A complete geotechnical report for the ten pipeline extensions is included in Appendix 6C. A table of geotechnical testing results for the NL27 Project is included as Table 6.7-2. Geotechnical investigation was not required at the Hugo compressor station uprate.

Table 6.7-2 Geotechnical Testing Results for the NL27 Project

Pipeline Facility	Crossing Number/ Ref. Drawing	Begin MP	End MP	Arc Drill Length (feet)	Maximum Depth HDD (feet)	Related Geotechnical Borings	Approximate Depth to Bedrock (feet)
Lake Mills M500 E-line	LMA-P4-1	43.72	43.75	183	15	BH-10	>40
	LMA-P4-2	44.16	44.20	228	18	BH-09	>40
Albert Lea M500 E-line	ALO-P4-1	4.04	4.06	115	15	None	N/A
	ALO-P4-2	4.69	4.84	791	31	BH-01	>51.5
	ALO-P4-3	5.18	5.50	1,685	68	BH-02, BH-03	>101.5, >101.5
	ALO-P4-4	5.88	5.91	166	15	BH-04	>40
	ALO-P4-5	7.01	7.03	128	14	BH-07A	>41.5
Willmar 3rd Branch Line Upstream	WIL-P4-1	3.36	3.40	214	16	BH-10	>41
	WIL-P4-2	4.28	4.63	1,870	75	BH-04, BH-05	>91, >91
	WIL-P4-3	4.79	5.00	1,117	57	BH-02, BH-03	>91, >91
Willmar 3rd Branch Line Downstream	WDC-P4-1	6.38	6.42	233	16	BH-01	>41
	WDC-P4-2	7.08	7.11	184	17	BH-02	>41
	WDC-P4-3	7.60	7.65	251	23	BH-03	>41
	WDC-P4-5	9.83	9.91	425	16	BH-06	>41
	WDC-P4-6	10.21	10.42	1,083	37	BH-07A, BH-07C	>41, >81
	WDC-P4-7	10.64	10.72	397	18	BH-07B	>41
	WDC-P4-8	10.85	10.95	524	19	BH-07D, BH-07E	>81, >81
Welcome 2nd Line	No Crossings						
Paynesville 2nd Branch Line	PAY-P4-1	0.53	0.64	580	33	BH-05	>26
	PAY-P4-2	0.83	0.91	436	29	BH-04	34.5
	PAY-P4-3	1.88	2.38	2,657	45	BH-01, BH-02	49.5, 59.5
Worthington 2nd Branch Line	WOR-P4-1	19.52	19.65	668	44	BH-04	>61.5

Pipeline Facility	Crossing Number/ Ref. Drawing	Begin MP	End MP	Arc Drill Length (feet)	Maximum Depth HDD (feet)	Related Geotechnical Borings	Approximate Depth to Bedrock (feet)
Springfield 2nd Branch Line	SPR-P4-1	15.16	15.31	824	47	BH-13, BH-14	79.5, 89.5
	SPR-P4-2	16.12	16.28	832	51	BH-11, BH-12	>91, >91
	SPR-P4-3	17.34	17.58	1,295	50	BH-07, BH-08	>100, 59.5
	SPR-P4-4	17.72	17.86	764	50	BH-05, BH-06, BH-07	69.5, 99.5, >100
	SPR-P4-5	21.15	21.21	326	22	BH-01	>41
Minnesota Interconnect 2nd Branch Line	MIC-P4-1	17.73	17.87	744	44	BH-30	>61
	MIC-P4-2	18.15	18.43	1,525	46	BH-28A, BH-29	>61, >61
	MIC-P4-3	18.59	18.84	1,360	58	BH-26, BH-27, BH-28	>81, >81, >61
Alexandria 2nd Branch Line	ALX-P4-1	17.45	17.67	1,179	57	BH-03A, BH-04A	>91, >101
	ALX-P4-2	17.81	17.96	817	46	BH-01A, BH-02A	>71, >71

Northern utilized the results of the geotechnical borings to finalize the HDD designs, specifically optimizing the angle of entry and adjusting the entry and exit pit locations. The current HDD design indicates that none of the HDDs will encounter bedrock; therefore, Northern designed them to meet the parameters of the unconsolidated materials along the profiles. Northern has provided additional information on the feasibility of the HDDs along with safety factors and design considerations and recommendations in Resource Report 1, Appendix 1A.

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Resource Report 6
Figures

Figure 6-1
Surficial Geology

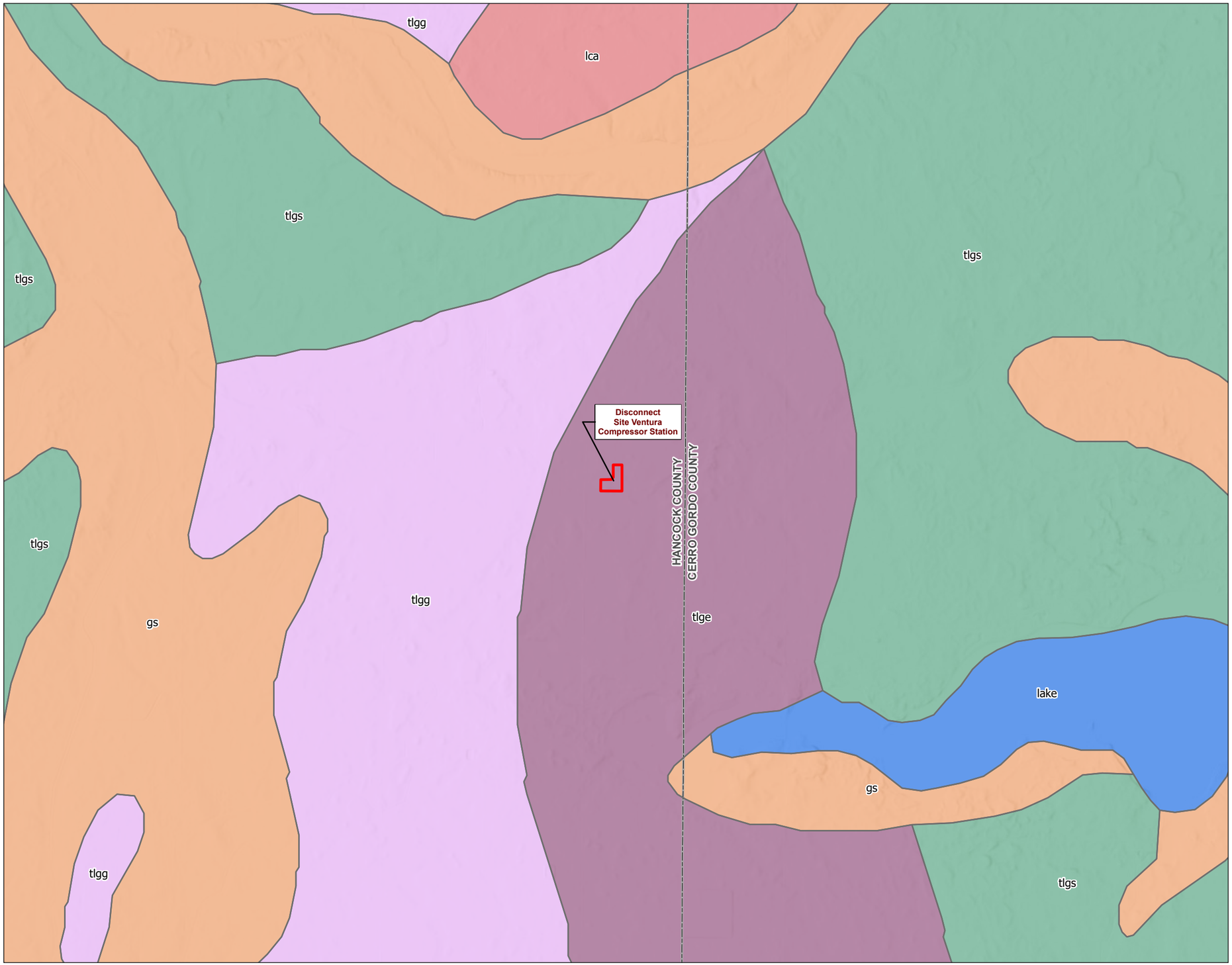


Figure No.

6-1

Title

Surficial Geology
V2F - Disconnect Site Ventura Compressor Station

Client/Project 172608813

Northern Natural Gas
Northern Lights 2027 Expansion Project / Ventura to Farmington A-Line Abandonment & Capacity Replacement Project

Project Location
Hancock County, Iowa

Prepared by JM on 2025-10-06
TR by SF on 2025-10-06
IR by SK on 2026-01-28

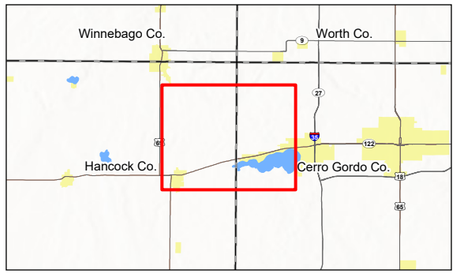
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Legend

- Environmental Survey Boundary (V2F)
- Lake Silt And Clay (lca)
- Loamy Till--end Moraine (tlge)
- Loamy Till--ground Moraine (tlgg)
- Loamy Till--stagnation Moraine (tlgs)
- Outwash Sand (gs)
- River/Lake



Notes
1. Coordinate System: NAD 1983 UTM Zone 15N
2. Data Sources: Stantec, NNG, Esri, USCB, USGS
3. Background: Esri World Hillshade

Stantec

Northern Natural Gas

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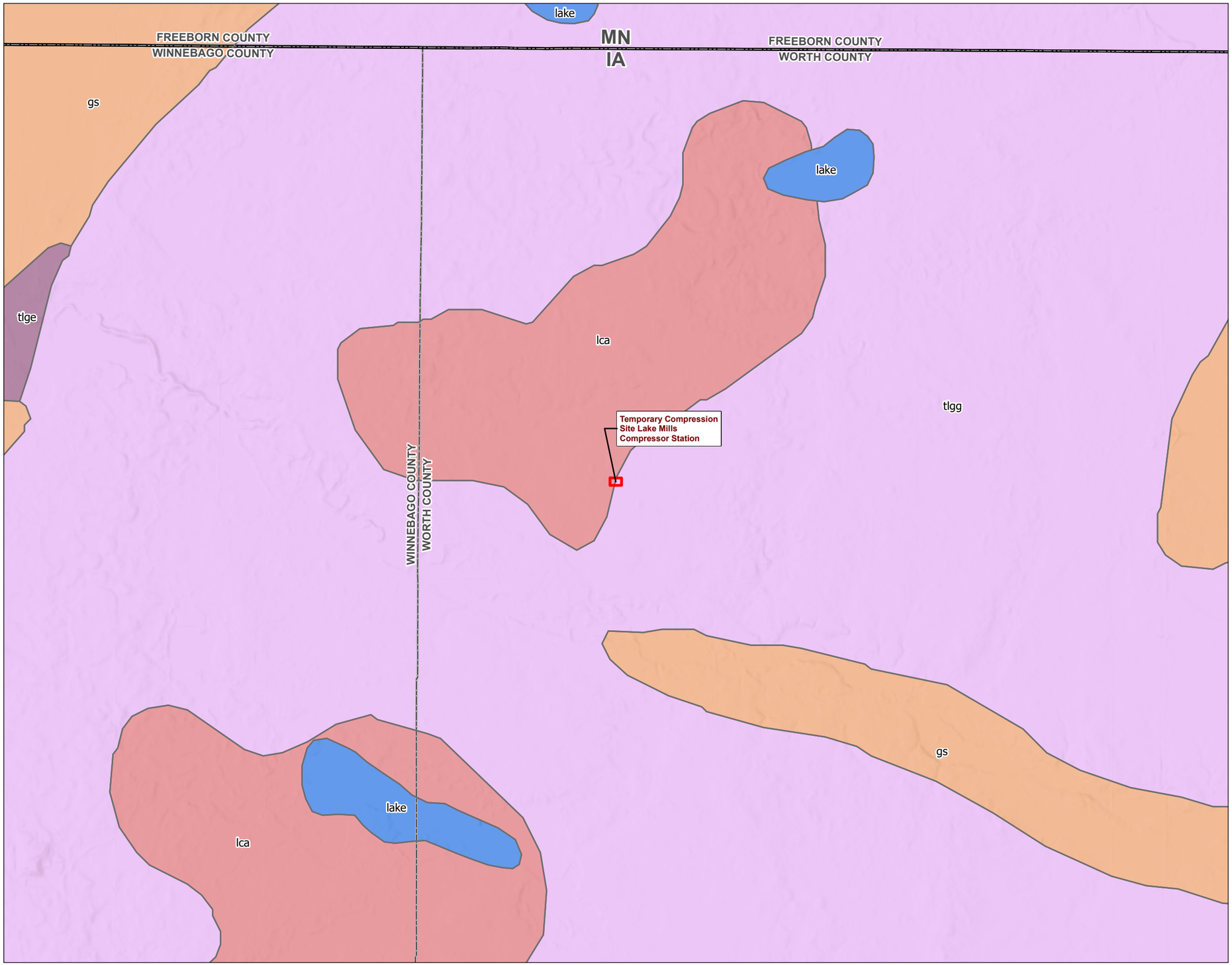


Figure No.

6-1

Title

Surficial Geology
V2F - Temporary Compression Site Lake Mills Compressor Station

Client/Project 172608813

Northern Natural Gas
Northern Lights 2027 Expansion Project / Ventura to Farmington A-Line Abandonment & Capacity Replacement Project

Project Location
Worth County, Iowa

Prepared by JM on 2025-10-06
TR by SF on 2025-10-06
IR by SK on 2026-01-28

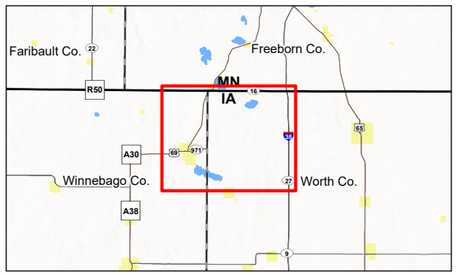
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Legend

- Environmental Survey Boundary (V2F)
- Lake Silt And Clay (lca)
- Loamy Till--end Moraine (tlge)
- Loamy Till--ground Moraine (tlgg)
- Outwash Sand (gs)
- River/Lake



Notes
1. Coordinate System: NAD 1983 UTM Zone 15N
2. Data Sources: Stantec, NNG, Esri, USCB, USGS
3. Background: Esri World Hillshade

Stantec

Northern Natural Gas

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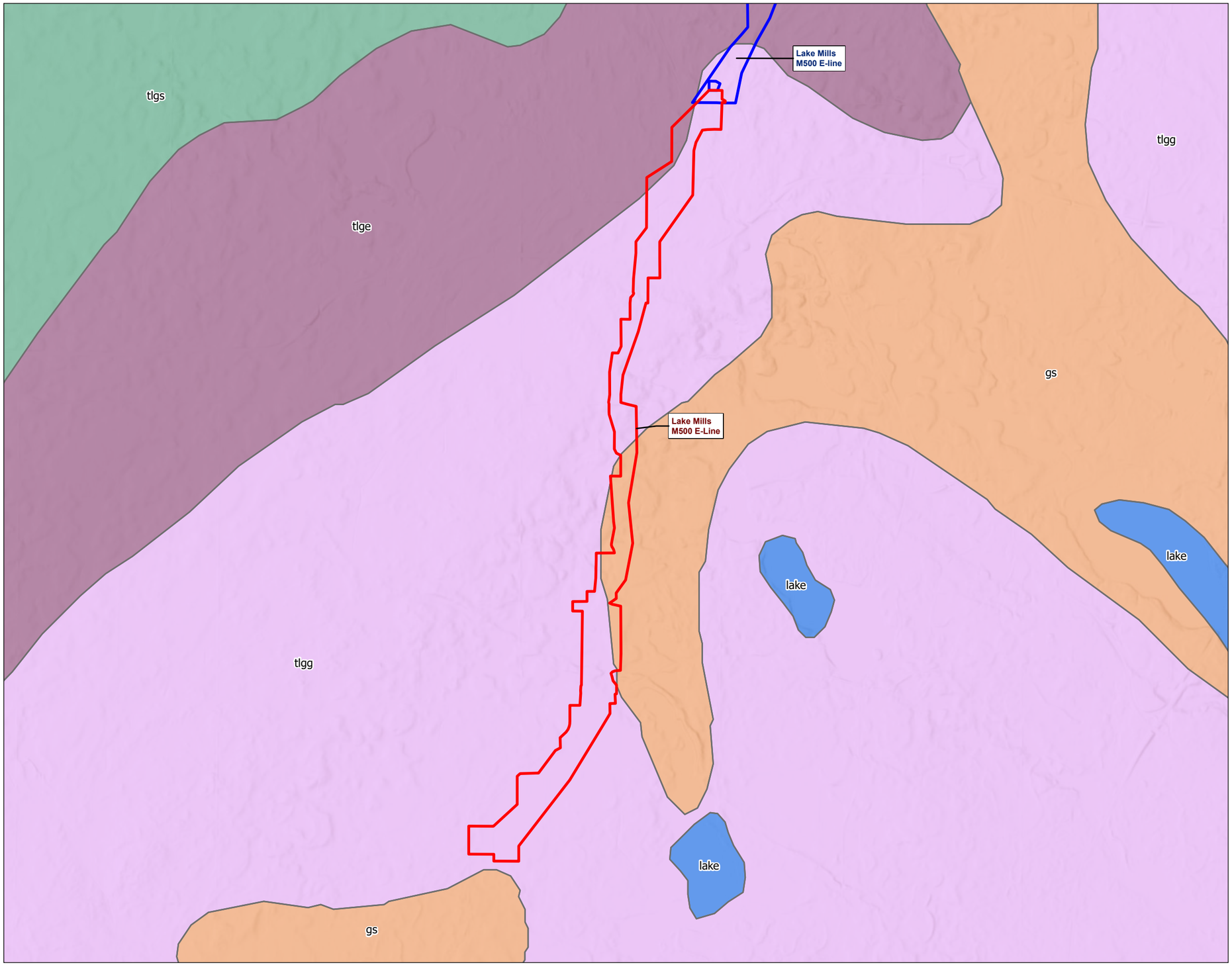


Figure No.

6-1

Title

Surficial Geology
V2F - Lake Mills M500 E-Line

Client/Project 172608813

Northern Natural Gas
Northern Lights 2027 Expansion Project / Ventura to Farmington A-Line Abandonment & Capacity Replacement Project

Project Location
Freeborn County, Minnesota

Prepared by JM on 2025-10-06
TR by SF on 2025-10-06
IR by SK on 2026-01-28

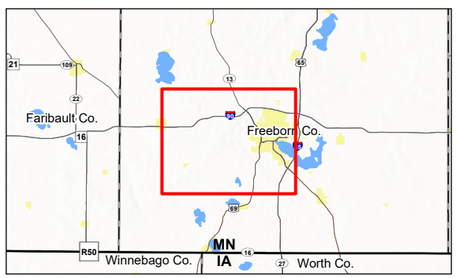
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Legend

- Environmental Survey Boundary (V2F)
- Environmental Survey Boundary (NL27)
- Loamy Till--end Moraine (tlge)
- Loamy Till--ground Moraine (tlgg)
- Loamy Till--stagnation Moraine (tlgs)
- Outwash Sand (gs)
- River/Lake



Notes
1. Coordinate System: NAD 1983 UTM Zone 15N
2. Data Sources: Stantec, NNG, Esri, USCB, USGS
3. Background: Esri World Hillshade

Stantec

Northern Natural Gas

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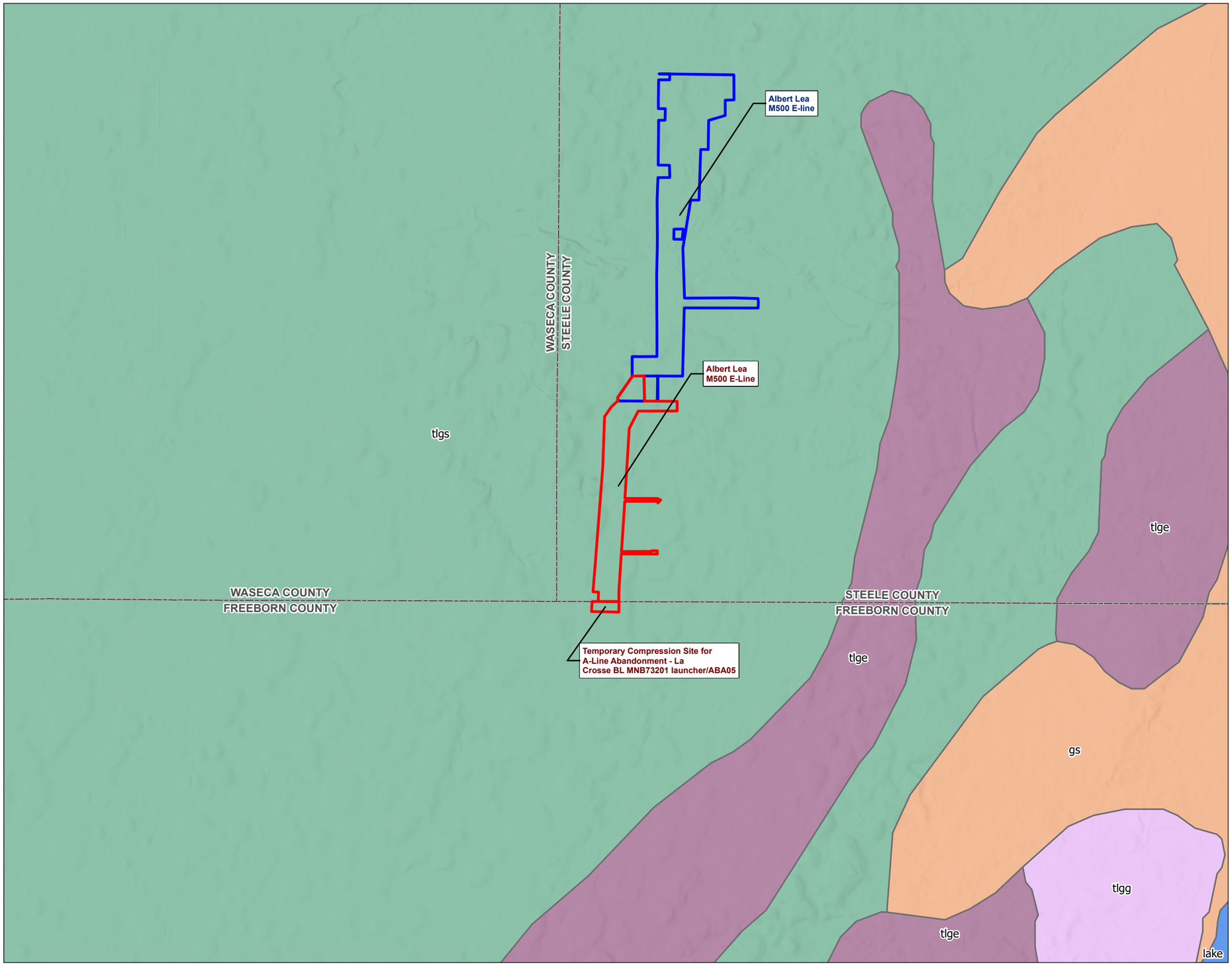


Figure No.

6-1

Title

Surficial Geology
V2F - Albert Lea M500 E-Line

Client/Project 172608813

Northern Natural Gas
Northern Lights 2027 Expansion Project / Ventura to Farmington A-Line Abandonment & Capacity Replacement Project

Project Location
Steele County, Minnesota

Prepared by JM on 2025-10-06
TR by SF on 2025-10-06
IR by SK on 2026-01-28

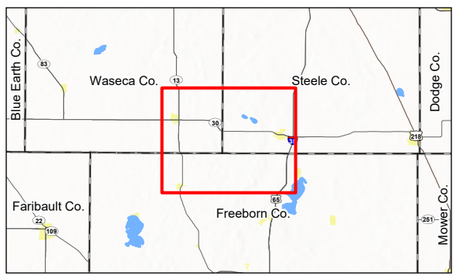
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Legend

- Environmental Survey Boundary (V2F)
- Environmental Survey Boundary (NL27)
- Loamy Till--end Moraine (tlge)
- Loamy Till--ground Moraine (tlgg)
- Loamy Till--stagnation Moraine (tlgs)
- Outwash Sand (gs)
- River/Lake



Notes
1. Coordinate System: NAD 1983 UTM Zone 15N
2. Data Sources: Stantec, NNG, Esri, USCB, USGS
3. Background: Esri World Hillshade

Stantec

Northern Natural Gas

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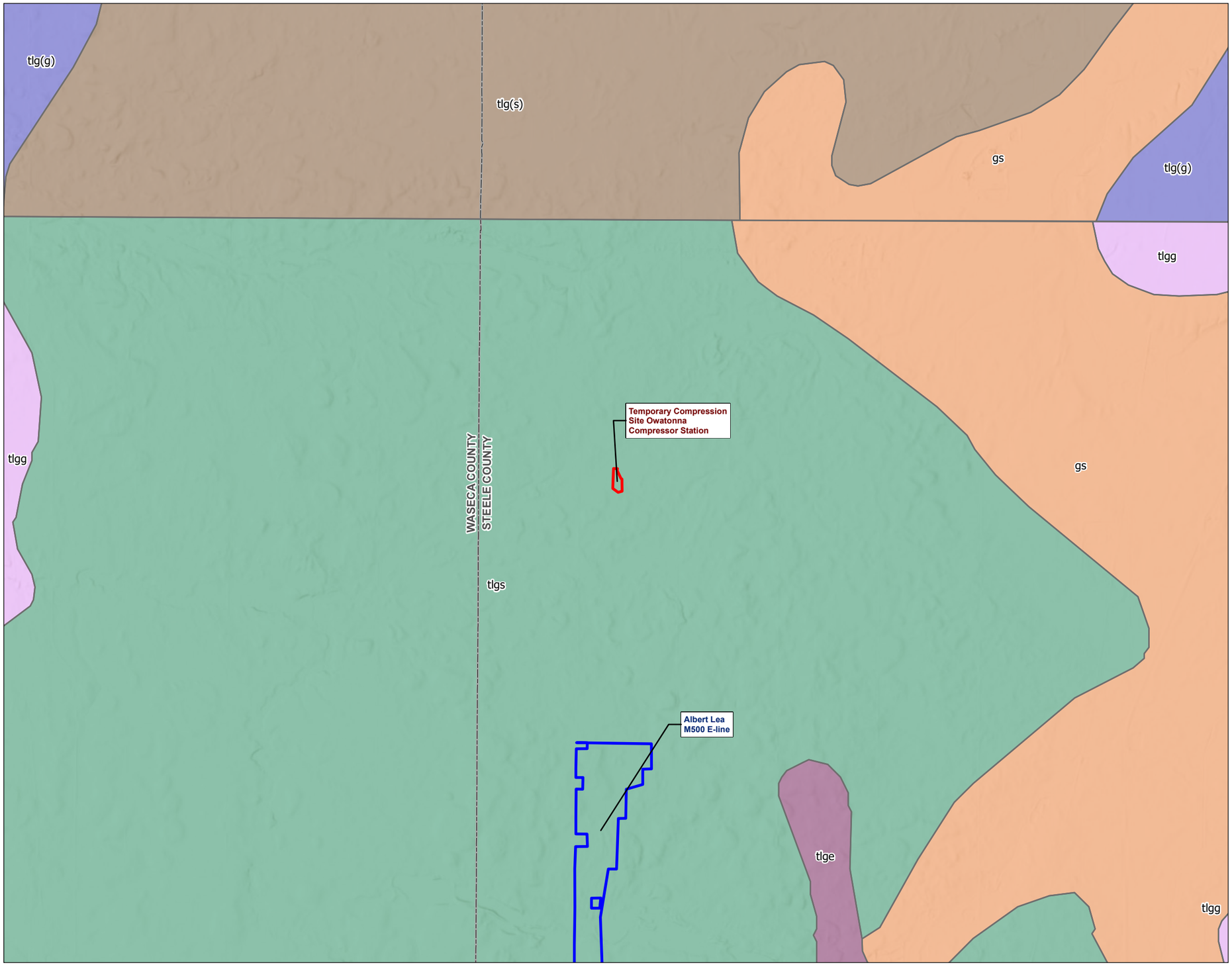


Figure No.

6-1

Title

Surficial Geology
V2F - Temporary Compression Site Owatonna Compressor Station

Client/Project 172608813

Northern Natural Gas
Northern Lights 2027 Expansion Project / Ventura to Farmington A-Line Abandonment & Capacity Replacement Project

Project Location
Steele County, Minnesota

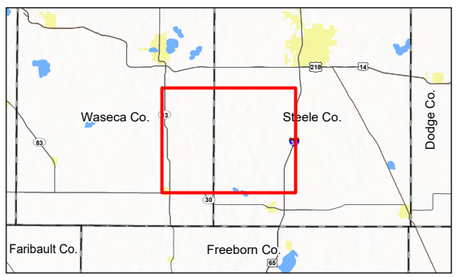
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TR by SF on 2025-10-06
IR by SK on 2026-01-28

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Legend

- Environmental Survey Boundary (V2F)
- Environmental Survey Boundary (NL27)
- Loamy Till--end Moraine (tlge)
- Loamy Till--ground Moraine (tlg(g))
- Loamy Till--ground Moraine (tlgg)
- Loamy Till--stagnation Moraine (tlg(s))
- Loamy Till--stagnation Moraine (tlgs)
- Outwash Sand (gs)



Notes
1. Coordinate System: NAD 1983 UTM Zone 15N
2. Data Sources: Stantec, NNG, Esri, USCB, USGS
3. Background: Esri World Hillshade

Stantec

Northern Natural Gas

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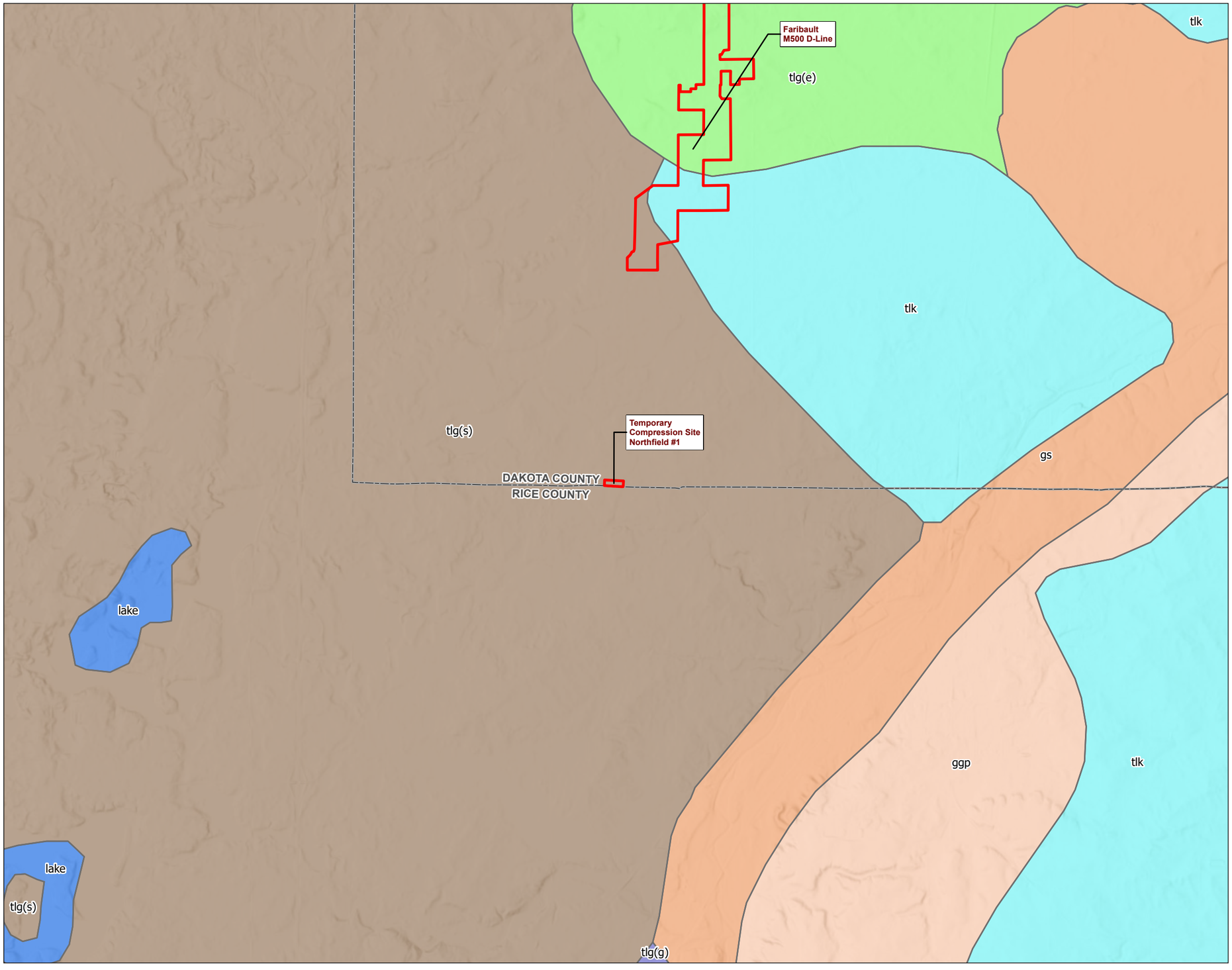


Figure No.

6-1

Title

Surficial Geology
V2F - Temporary Compression Site Northfield #1

Client/Project 172608813

Northern Natural Gas
Northern Lights 2027 Expansion Project / Ventura to Farmington A-Line Abandonment & Capacity Replacement Project

Project Location
Dakota County, Minnesota

Prepared by JM on 2025-10-06
TR by SF on 2025-10-06
IR by SK on 2026-01-28

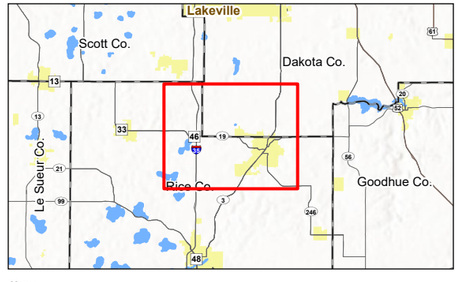
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Legend

- Environmental Survey Boundary (V2F)
- Loamy Till (tlk)
- Loamy Till--end Moraine (tlg(e))
- Loamy Till--ground Moraine (tlg(g))
- Loamy Till--stagnation Moraine (tlg(s))
- Outwash Sand (gs)
- Outwash Sand And Gravel (ggp)
- River/Lake



Notes
1. Coordinate System: NAD 1983 UTM Zone 15N
2. Data Sources: Stantec, NNG, Esri, USCB, USGS
3. Background: Esri World Hillshade

Stantec

Northern Natural Gas

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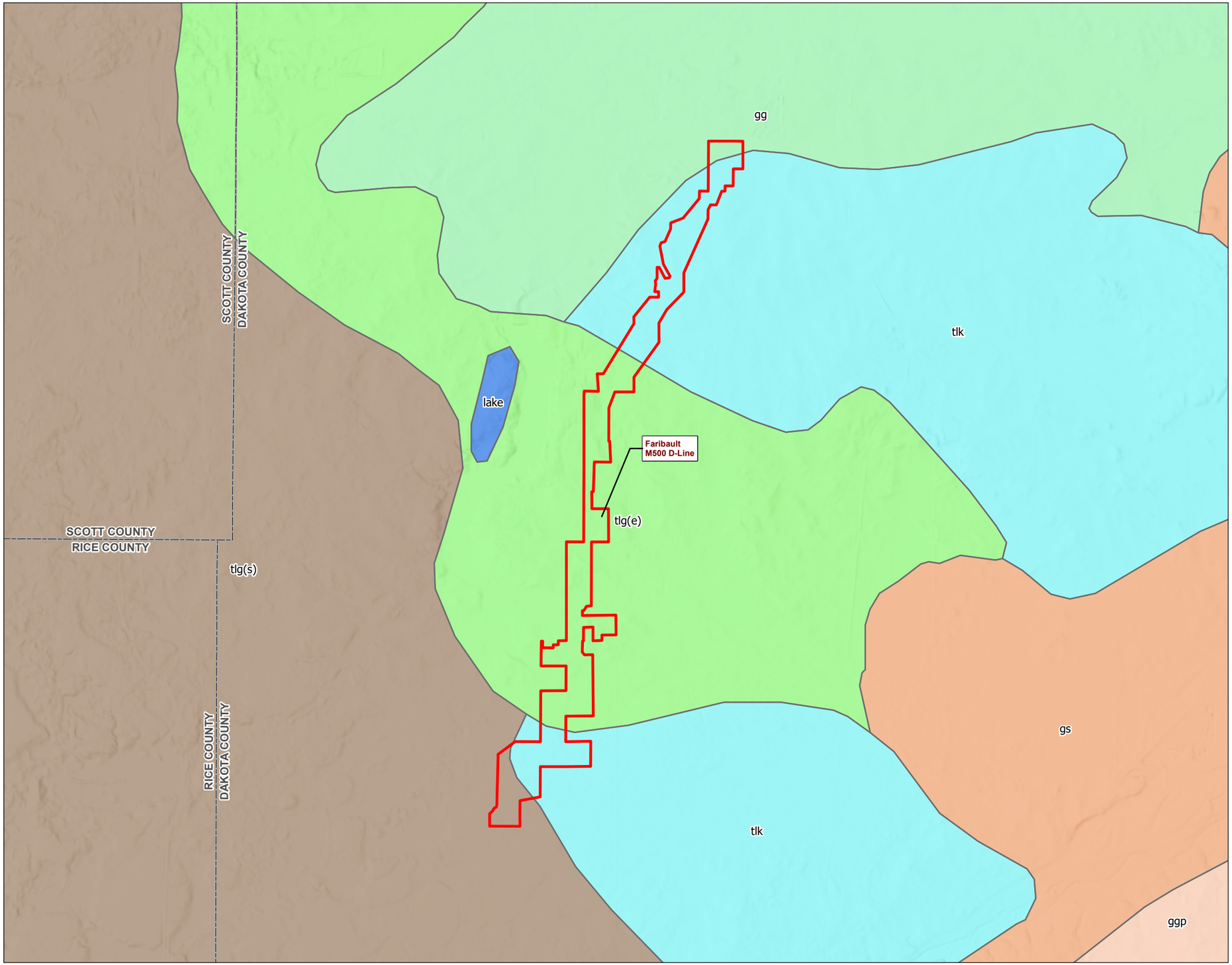


Figure No.
6-1

Title
Surficial Geology
V2F - Faribault M500 D-Line

Client/Project 172608813
Northern Natural Gas
Northern Lights 2027 Expansion Project / Ventura to Farmington A-Line Abandonment & Capacity Replacement Project

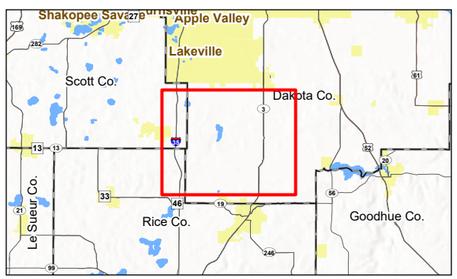
Project Location
Dakota County, Minnesota

Prepared by JM on 2025-10-06
TR by SF on 2025-10-06
IR by SK on 2026-01-28

N

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(At original document size of 11x17)
1:63,360

Legend
- Environmental Survey Boundary (V2F)
- Loamy Till (tlk)
- Loamy Till--end Moraine (tlg(e))
- Loamy Till--stagnation Moraine (tlg(s))
- Outwash Sand (gs)
- Outwash Sand And Gravel (gg)
- Outwash Sand And Gravel (ggp)
- River/Lake



Notes
1. Coordinate System: NAD 1983 UTM Zone 15N
2. Data Sources: Stantec, NNG, Esri, USCB, USGS
3. Background: Esri World Hillshade

Stantec

Northern Natural Gas

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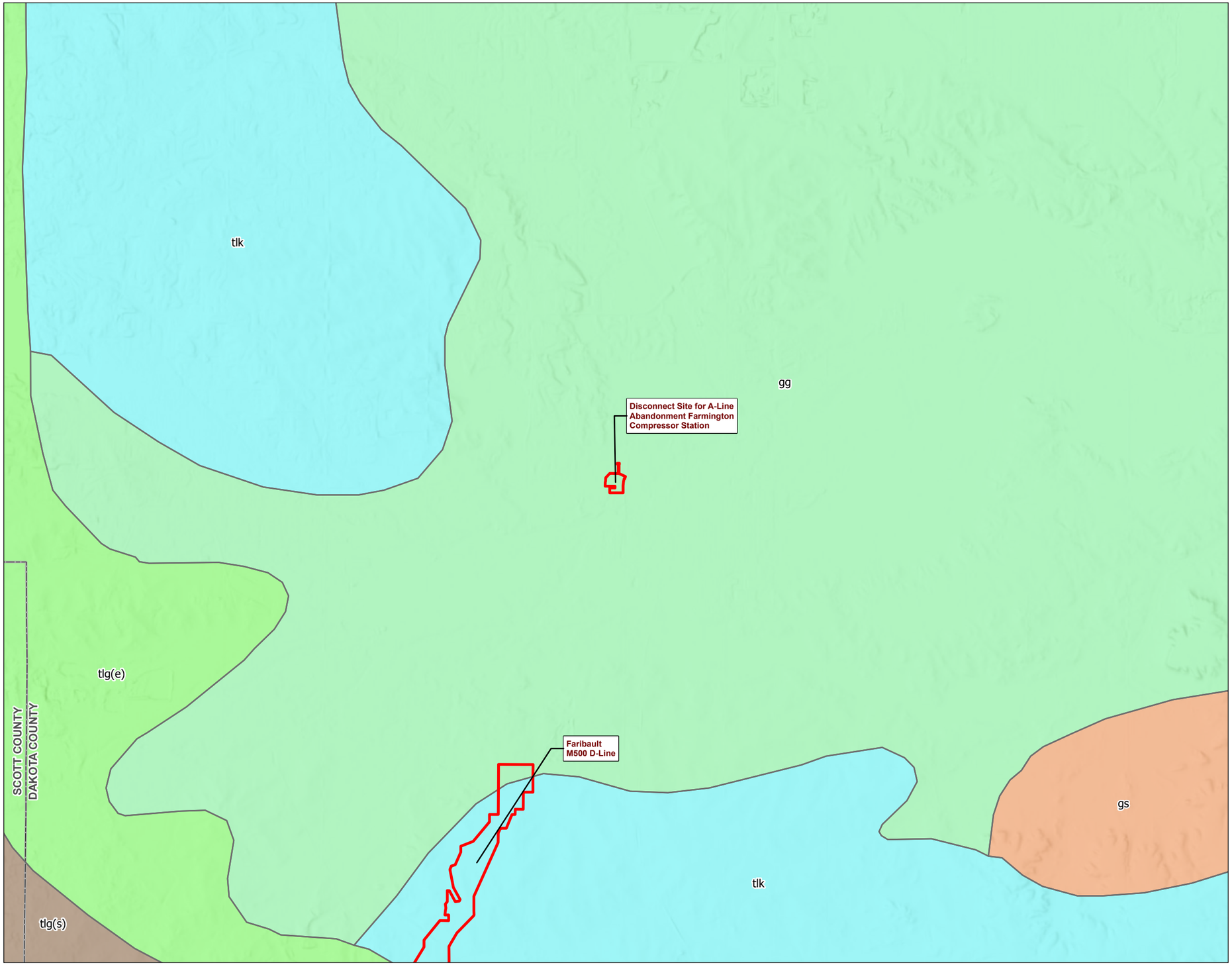


Figure No.

6-1

Title

Surficial Geology
V2F - Disconnect Site for A-Line Abandonment
Farmington Compressor Station

Client/Project 172608813

Northern Natural Gas
Northern Lights 2027 Expansion Project / Ventura to Farmington A-Line Abandonment & Capacity Replacement Project

Project Location
Dakota County, Minnesota

Prepared by JM on 2025-10-06
TR by SF on 2025-10-06
IR by SK on 2026-01-28

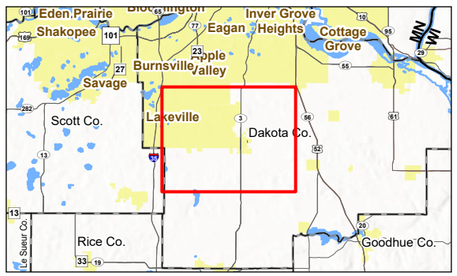
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(At original document size of 11x17)
1:63,360

Legend

- Environmental Survey Boundary (V2F)
- Loamy Till (tlk)
- Loamy Till--end Moraine (tlg(e))
- Loamy Till--stagnation Moraine (tlg(s))
- Outwash Sand (gs)
- Outwash Sand And Gravel (gg)



Notes
1. Coordinate System: NAD 1983 UTM Zone 15N
2. Data Sources: Stantec, NNG, Esri, USCB, USGS
3. Background: Esri World Hillshade

Stantec

Northern Natural Gas

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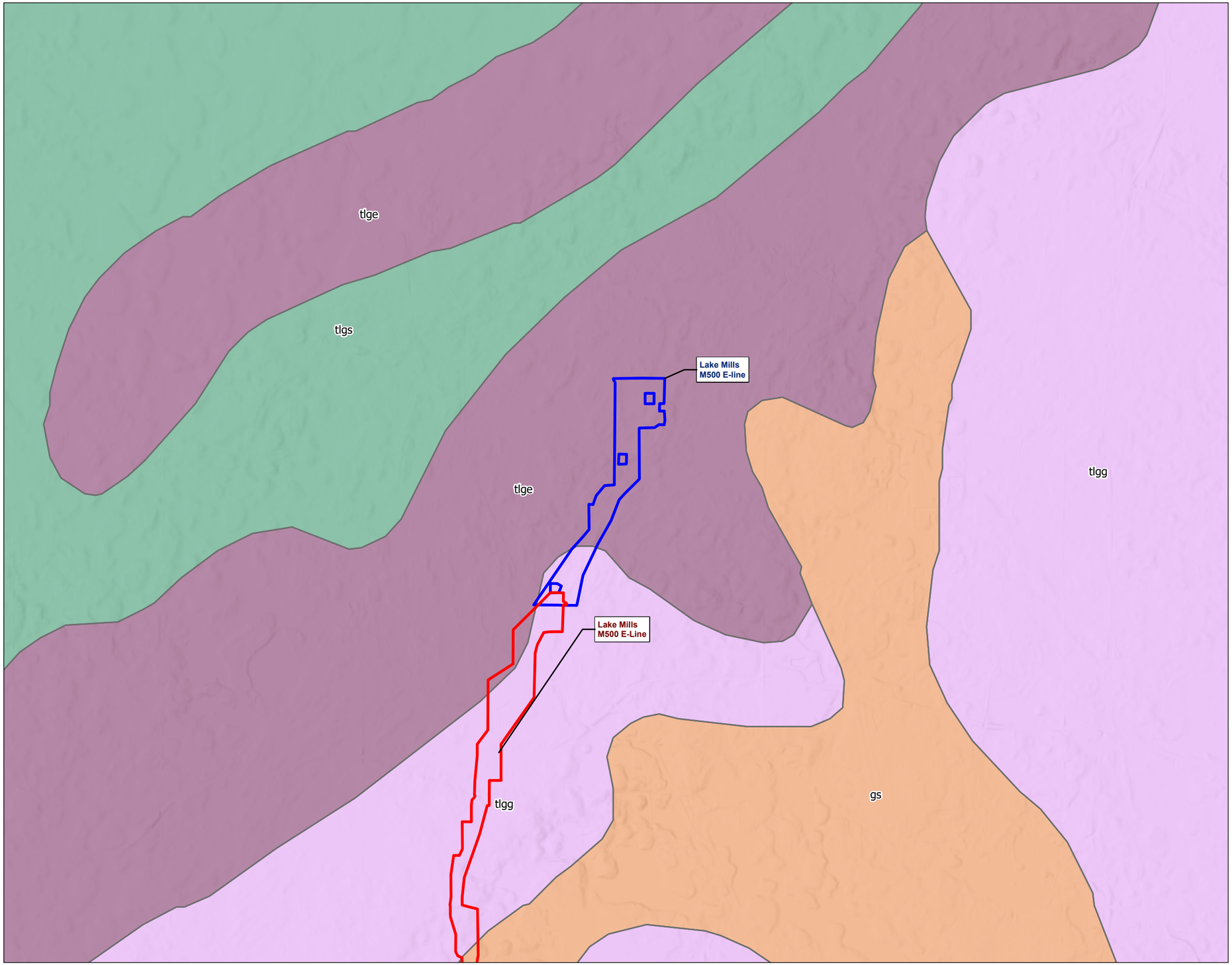


Figure No.
6-1

Title
Surficial Geology
NL27 - Lake Mills M500 E-line

Client/Project 172608813
Northern Natural Gas
Northern Lights 2027 Expansion Project / Ventura to Farmington A-Line Abandonment & Capacity Replacement Project

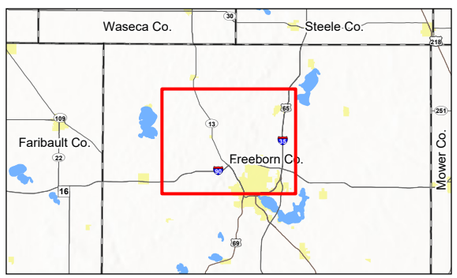
Project Location
Freeborn County, Minnesota

Prepared by JM on 2025-10-06
TR by SF on 2025-10-06
IR by SK on 2026-01-28

N

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(At original document size of 11x17)
1:63,360

Legend
- Environmental Survey Boundary (V2F)
- Environmental Survey Boundary (NL27)
- Loamy Till--end Moraine (tlge)
- Loamy Till--ground Moraine (tlgg)
- Loamy Till--stagnation Moraine (tlgs)
- Outwash Sand (gs)



Notes
1. Coordinate System: NAD 1983 UTM Zone 15N
2. Data Sources: Stantec, NNG, Esri, USCB, USGS
3. Background: Esri World Hillshade

Stantec

Northern Natural Gas

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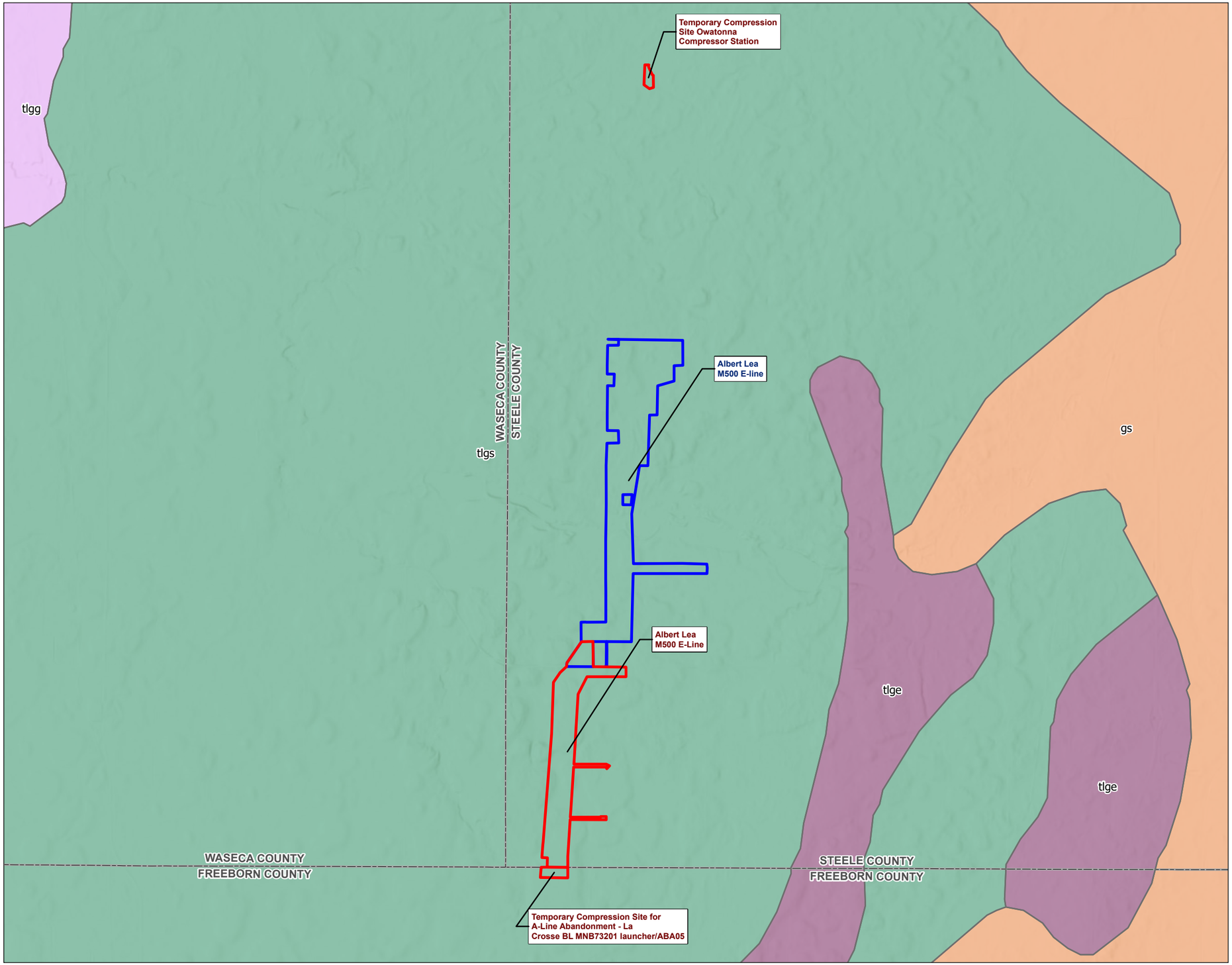


Figure No.

6-1

Title

Surficial Geology
NL27 - Albert Lea M500 E-line

Client/Project 172608813

Northern Natural Gas
Northern Lights 2027 Expansion Project / Ventura to Farmington A-Line Abandonment & Capacity Replacement Project

Project Location
Steele County, Minnesota

Prepared by JM on 2025-10-06
TR by SF on 2025-10-06
IR by SK on 2026-01-28

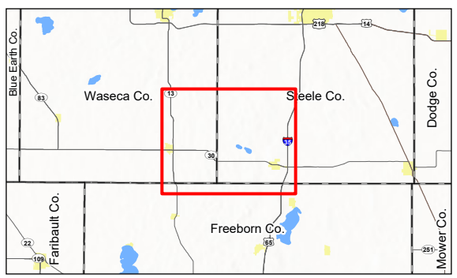
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(At original document size of 11x17)
1:63,360

Legend

- Environmental Survey Boundary (V2F)
- Environmental Survey Boundary (NL27)
- Loamy Till--end Moraine (tlge)
- Loamy Till--ground Moraine (tlgg)
- Loamy Till--stagnation Moraine (tlgs)
- Outwash Sand (gs)



Notes
1. Coordinate System: NAD 1983 UTM Zone 15N
2. Data Sources: Stantec, NNG, Esri, USCB, USGS
3. Background: Esri World Hillshade

Stantec

Northern Natural Gas

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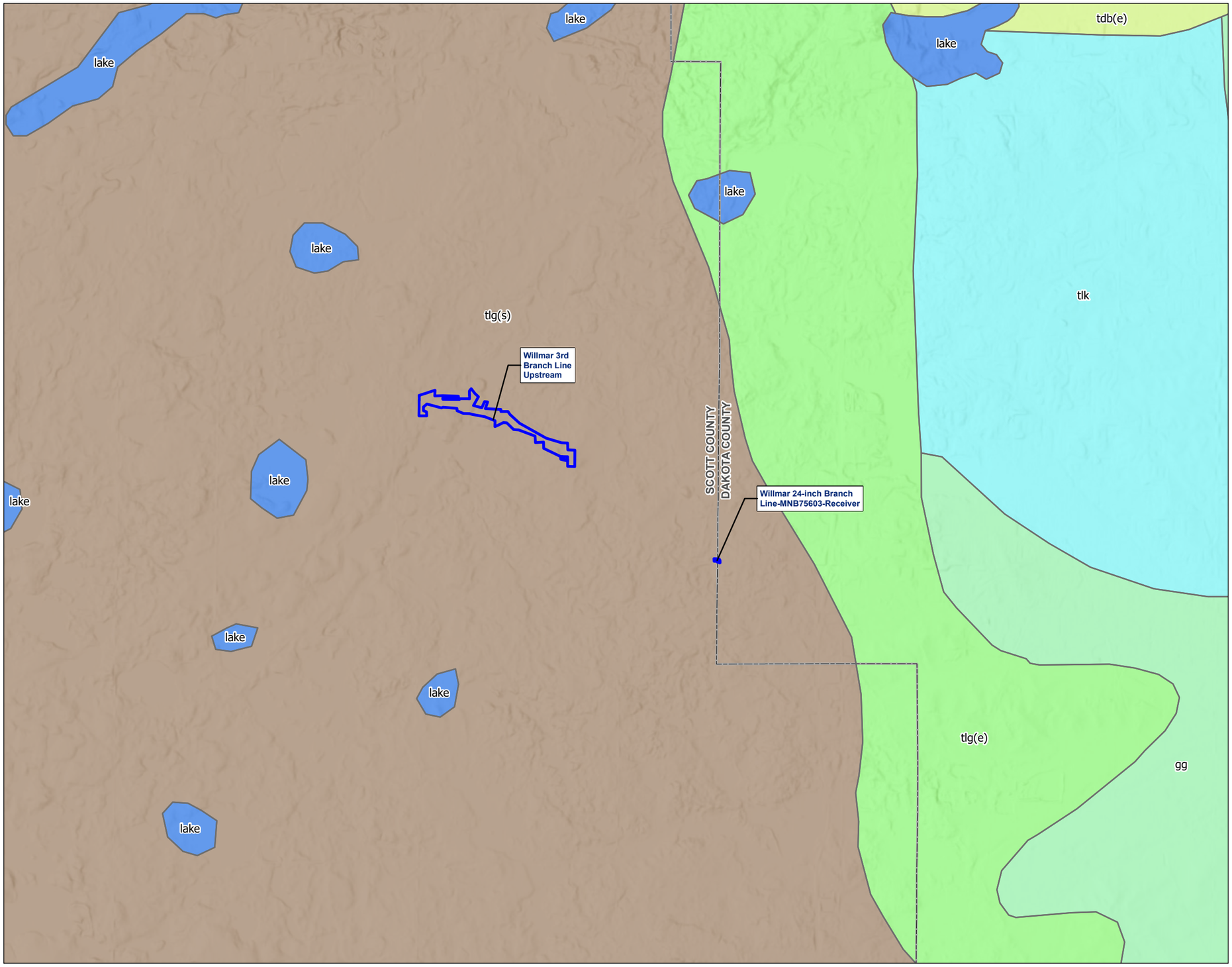


Figure No.
6-1

Title
Surficial Geology
NL27 - Willmar 3rd Branch Line Upstream

Client/Project 172608813
Northern Natural Gas
Northern Lights 2027 Expansion Project / Ventura to Farmington A-Line Abandonment & Capacity Replacement Project

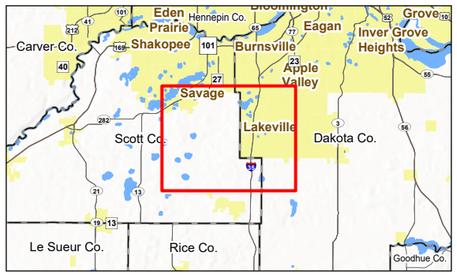
Project Location
Scott County, Minnesota

Prepared by JM on 2025-10-06
TR by SF on 2025-10-06
IR by SK on 2026-01-28

N

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(At original document size of 11x17)
1:63,360

Legend
- Environmental Survey Boundary (NL27)
- Loamy Till (tlk)
- Loamy Till--end Moraine (tlg(e))
- Loamy Till--stagnation Moraine (tlg(s))
- Outwash Sand And Gravel (gg)
- River/Lake
- Sandy Loamy Till--end Moraine (tdb(e))



Notes
1. Coordinate System: NAD 1983 UTM Zone 15N
2. Data Sources: Stantec, NNG, Esri, USCB, USGS
3. Background: Esri World Hillshade

Stantec
Northern Natural Gas

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Figure No.

6-1

Title

Surficial Geology
NL27 - Willmar 3rd Branch Line Downstream

Client/Project 172608813

Northern Natural Gas
Northern Lights 2027 Expansion Project / Ventura to Farmington A-Line Abandonment & Capacity Replacement Project

Project Location
Carver County, Minnesota

Prepared by JM on 2025-10-06
TR by SF on 2025-10-06
IR by SK on 2026-01-28

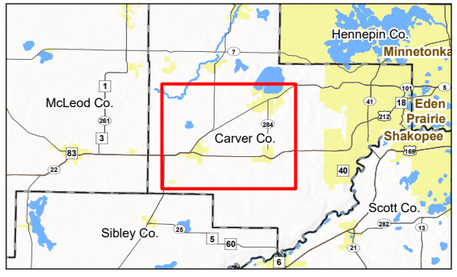
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(At original document size of 11x17)
1:63,360

Legend

- Environmental Survey Boundary (NL27)
- Loamy Till--ground Moraine (tlg(g))
- Loamy Till--stagnation Moraine (tlg(s))
- Outwash Sand (gs)
- Outwash Sand And Gravel (gg)
- River/Lake



Notes
1. Coordinate System: NAD 1983 UTM Zone 15N
2. Data Sources: Stantec, NNG, Esri, USCB, USGS
3. Background: Esri World Hillshade

Stantec

Northern Natural Gas

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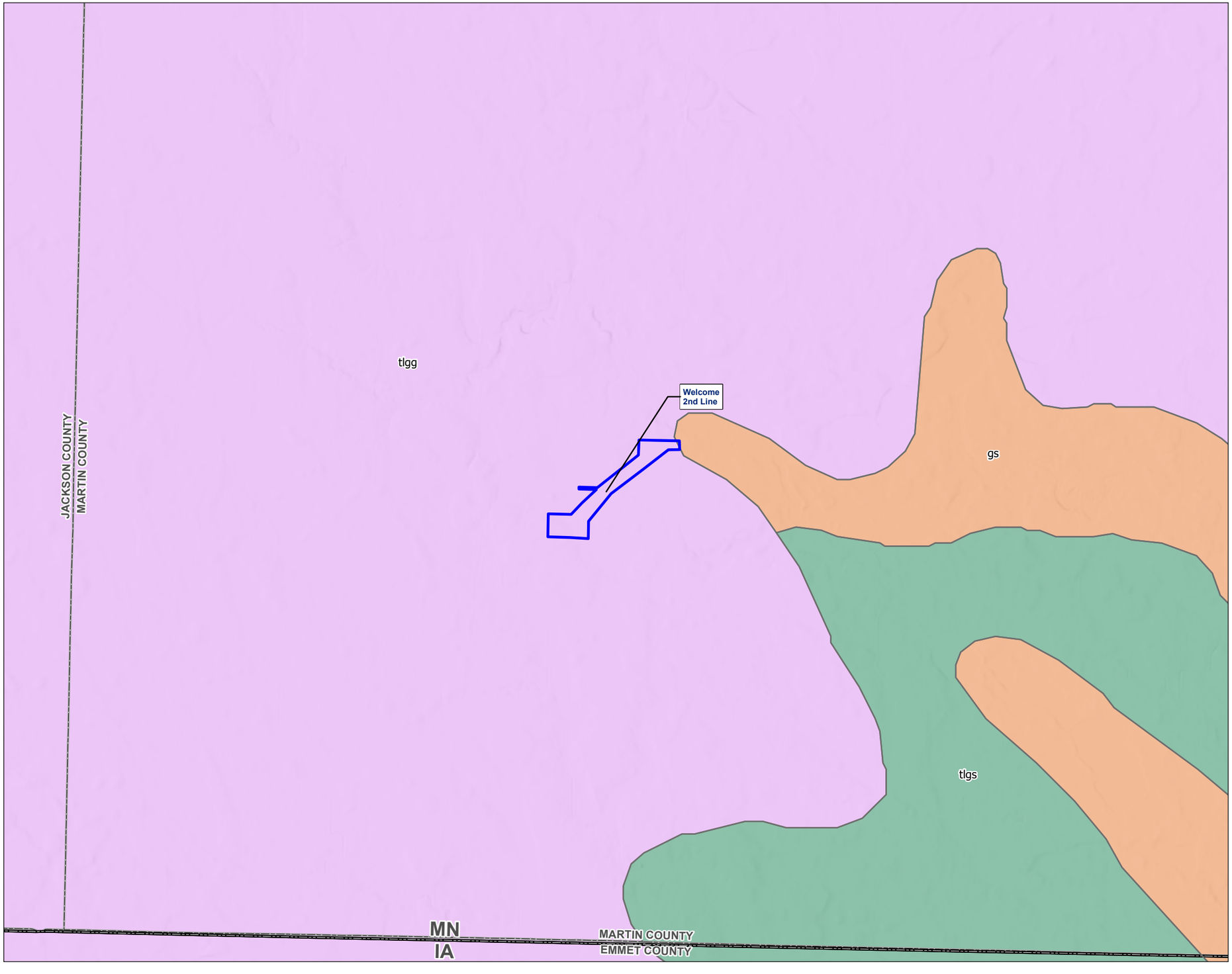


Figure No.

6-1

Title

Surficial Geology
NL27 - Welcome 2nd line

Client/Project 172608813

Northern Natural Gas
Northern Lights 2027 Expansion Project / Ventura to Farmington A-Line Abandonment & Capacity Replacement Project

Project Location
Martin County, Minnesota

Prepared by JM on 2025-10-06
TR by SF on 2025-10-06
IR by SK on 2026-01-28

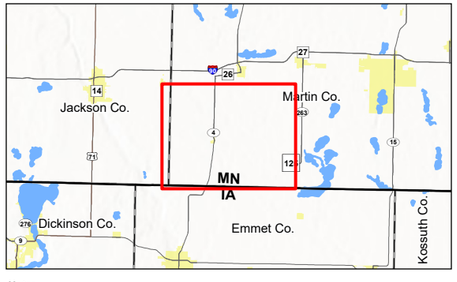
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(At original document size of 11x17)
1:63,360

Legend

- Environmental Survey Boundary (NL27)
- Loamy Till--ground Moraine (tlgg)
- Loamy Till--stagnation Moraine (tlgs)
- Outwash Sand (gs)



Notes
1. Coordinate System: NAD 1983 UTM Zone 15N
2. Data Sources: Stantec, NNG, Esri, USCB, USGS
3. Background: Esri World Hillshade

Stantec

Northern Natural Gas

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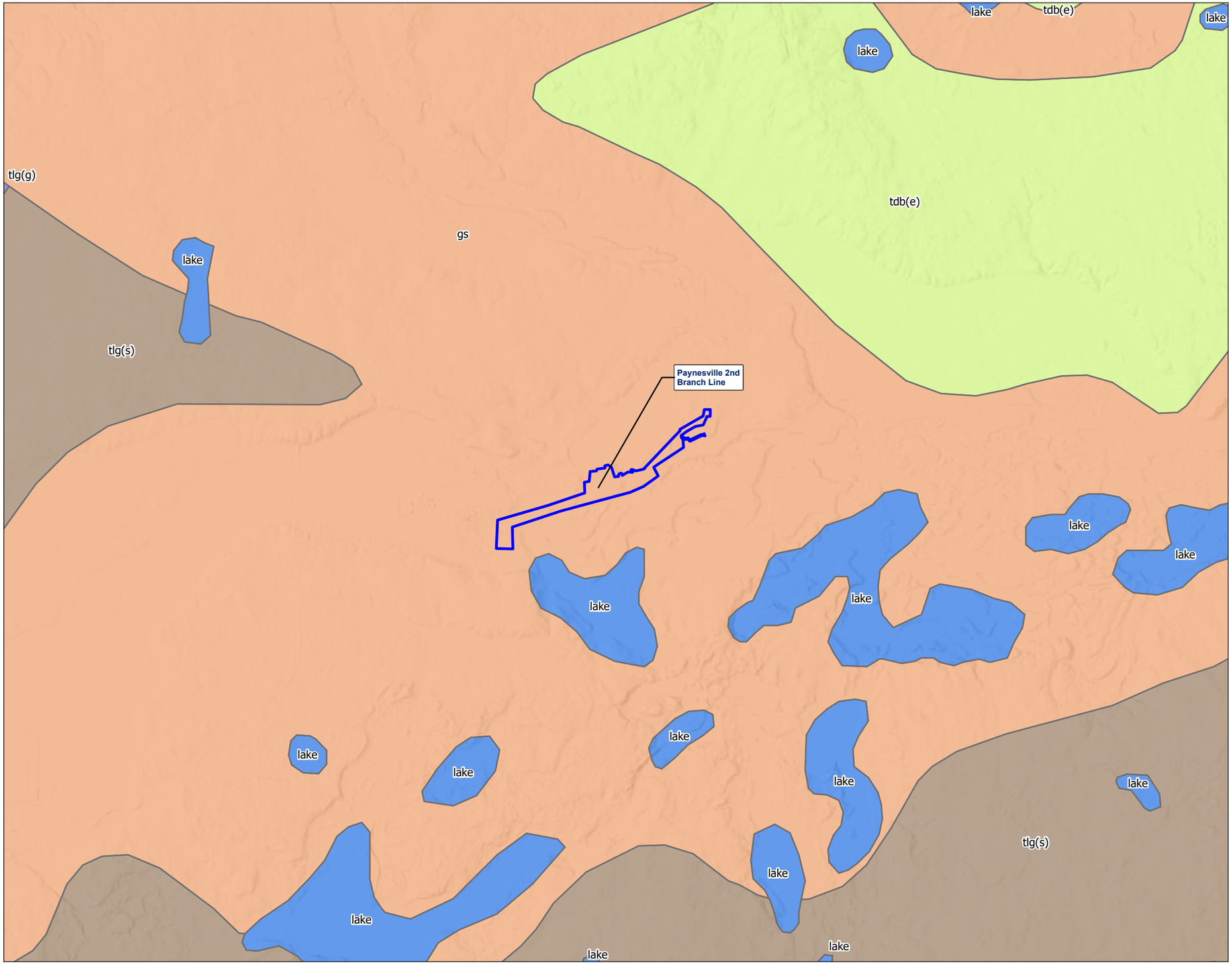


Figure No.
6-1

Title
Surficial Geology
NL27 - Paynesville 2nd branch line

Client/Project 172608813
Northern Natural Gas
Northern Lights 2027 Expansion Project / Ventura to Farmington A-Line Abandonment & Capacity Replacement Project

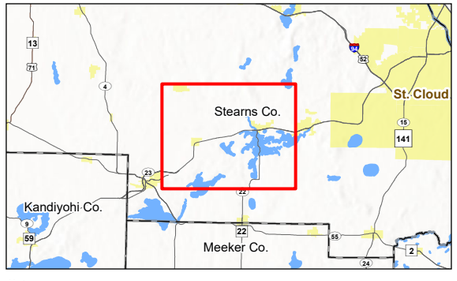
Project Location
Stearns County, Minnesota

Prepared by JM on 2025-10-06
TR by SF on 2025-10-06
IR by SK on 2026-01-28

N

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(At original document size of 11x17)
1:63,360

Legend
- Environmental Survey Boundary (NL27)
- Loamy Till--ground Moraine (tlg(g))
- Loamy Till--stagnation Moraine (tlg(s))
- Outwash Sand (gs)
- River/Lake
- Sandy Loamy Till--end Moraine (tdb(e))



Notes
1. Coordinate System: NAD 1983 UTM Zone 15N
2. Data Sources: Stantec, NNG, Esri, USCB, USGS
3. Background: Esri World Hillshade

Stantec

Northern Natural Gas

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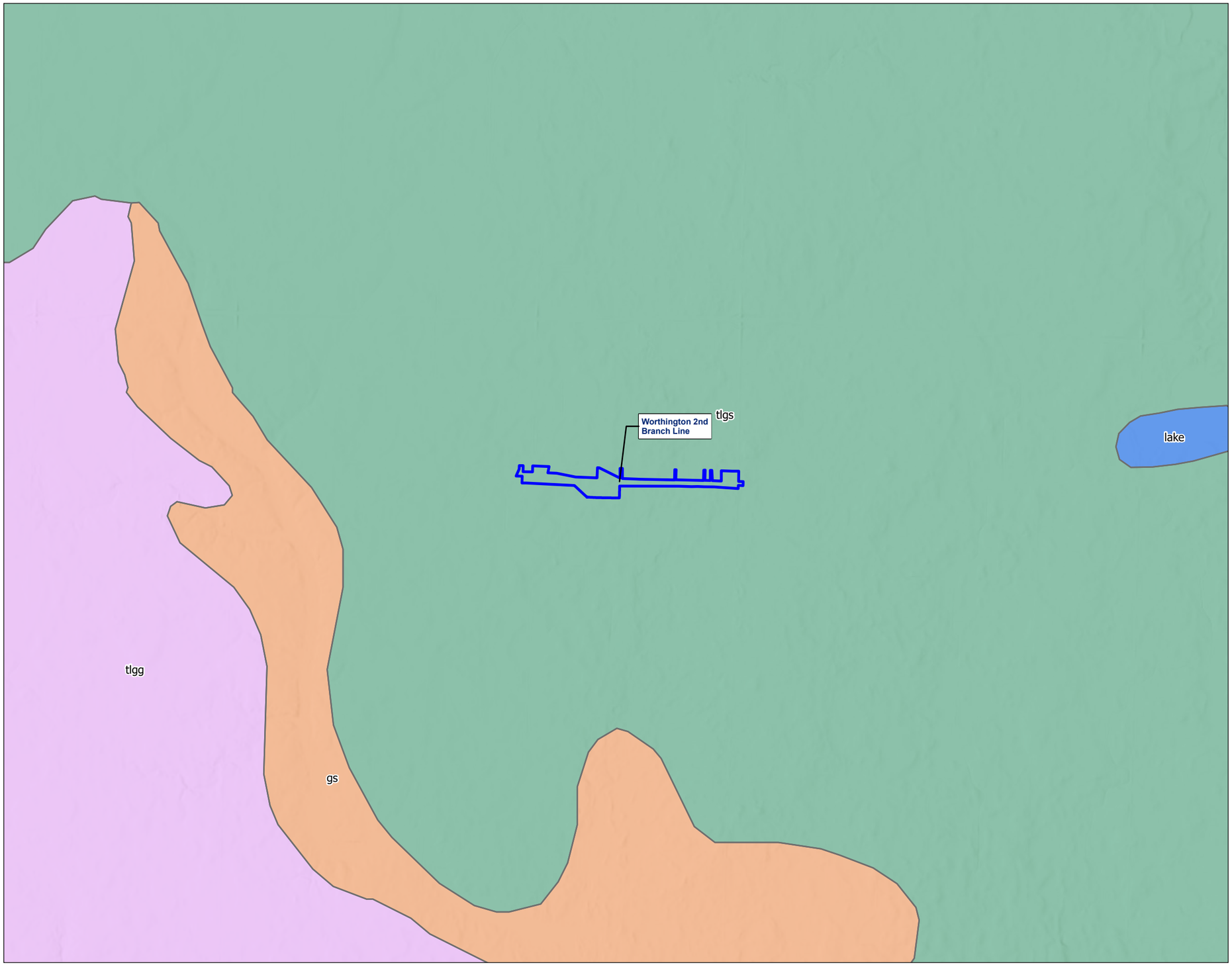


Figure No.

6-1

Title

Surficial Geology
NL27 - Worthington 2nd branch line

Client/Project 172608813

Northern Natural Gas
Northern Lights 2027 Expansion Project / Ventura to Farmington A-Line Abandonment & Capacity Replacement Project

Project Location
Jackson County, Minnesota

Prepared by JM on 2025-10-06
TR by SF on 2025-10-06
IR by SK on 2026-01-28

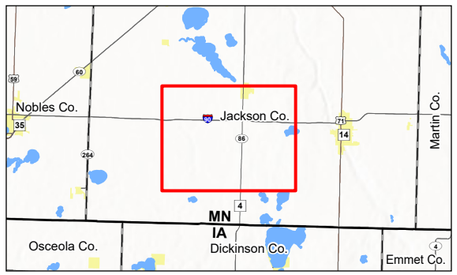
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(At original document size of 11x17)
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Legend

- Environmental Survey Boundary (NL27)
- Loamy Till--ground Moraine (tlgg)
- Loamy Till--stagnation Moraine (tlgs)
- Outwash Sand (gs)
- River/Lake



Notes
1. Coordinate System: NAD 1983 UTM Zone 15N
2. Data Sources: Stantec, NNG, Esri, USCB, USGS
3. Background: Esri World Hillshade

Stantec

Northern Natural Gas

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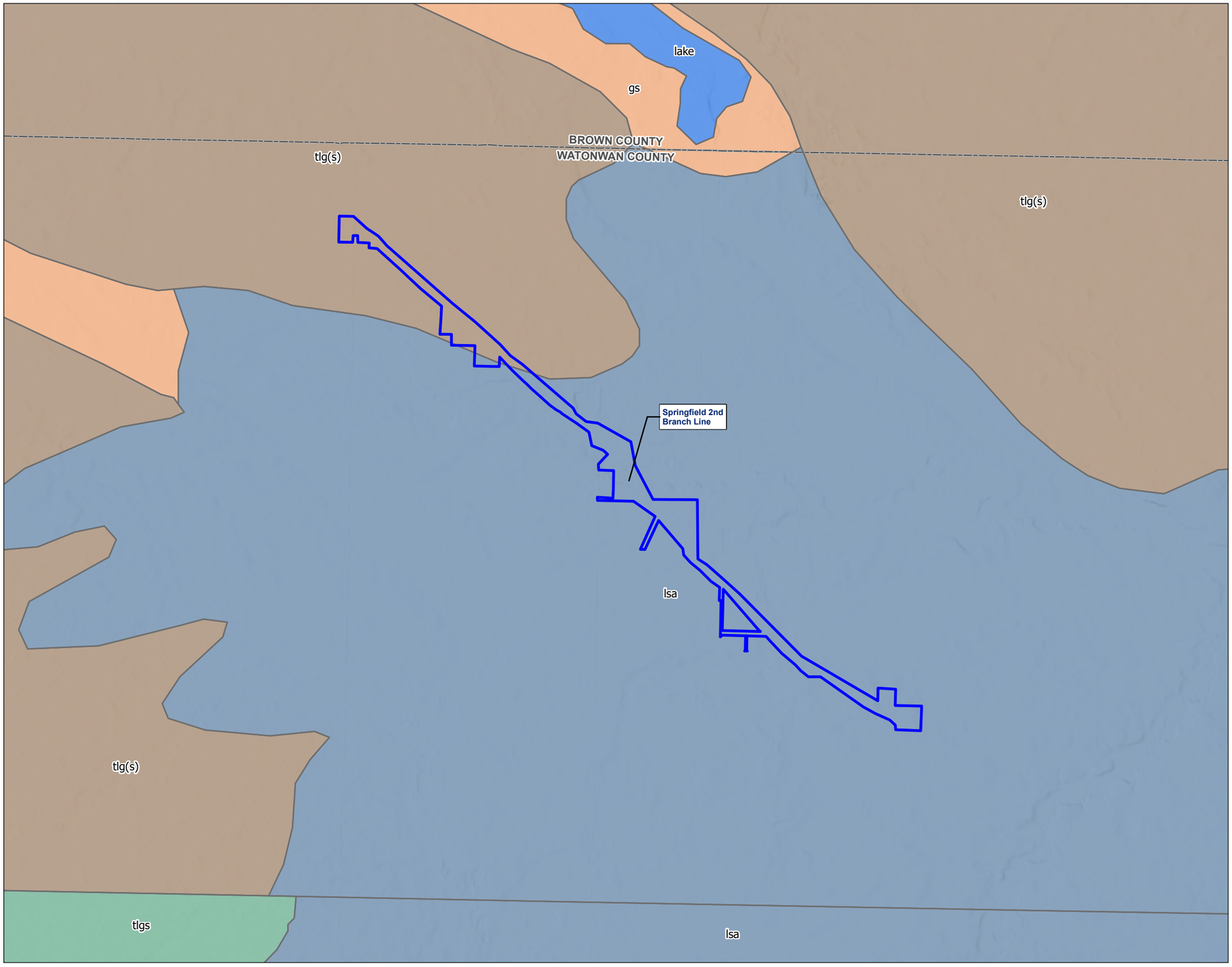


Figure No.
6-1

Title
Surficial Geology
NL27 - Springfield 2nd branch line

Client/Project 172608813
Northern Natural Gas
Northern Lights 2027 Expansion Project / Ventura to Farmington A-Line Abandonment & Capacity Replacement Project

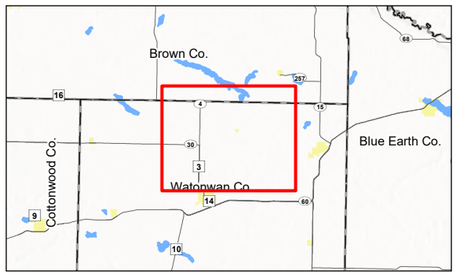
Project Location
Watonwan County, Minnesota

Prepared by JM on 2025-10-06
TR by SF on 2025-10-06
IR by SK on 2026-01-28

N

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(At original document size of 11x17)
1:63,360

Legend
- Environmental Survey Boundary (NL27)
- Lake Sand (lsa)
- Loamy Till--stagnation Moraine (tlg(s))
- Loamy Till--stagnation Moraine (tlgs)
- Outwash Sand (gs)
- River/Lake



Notes
1. Coordinate System: NAD 1983 UTM Zone 15N
2. Data Sources: Stantec, NNG, Esri, USCB, USGS
3. Background: Esri World Hillshade

Stantec
Northern Natural Gas

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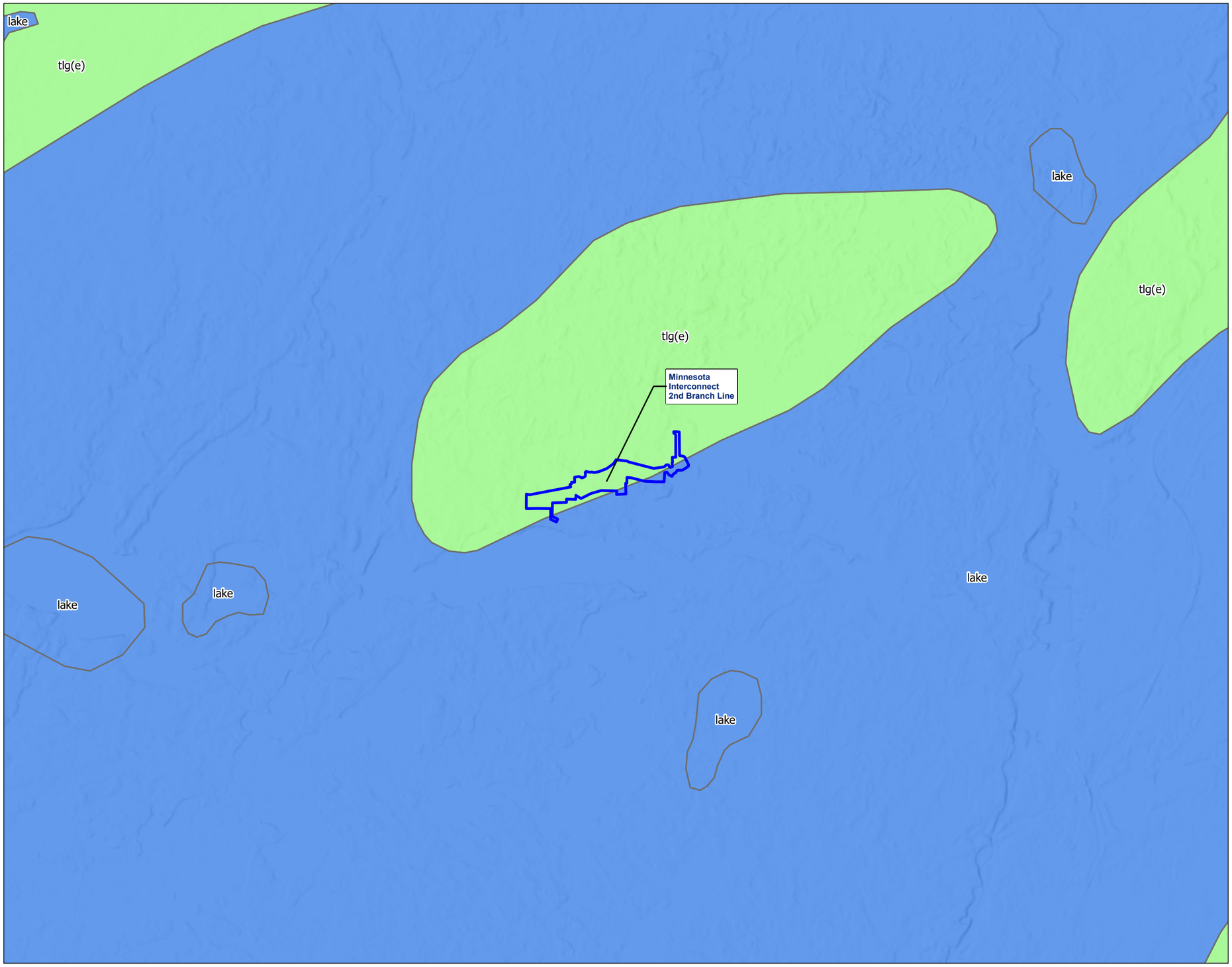


Figure No.

6-1

Title

Surficial Geology
NL27 - Minnesota Interconnect 2nd branch line

Client/Project 172608813

Northern Natural Gas
Northern Lights 2027 Expansion Project / Ventura to Farmington A-Line Abandonment & Capacity Replacement Project

Project Location
Isanti County, Minnesota

Prepared by JM on 2025-10-06
TR by SF on 2025-10-06
IR by SK on 2026-01-28

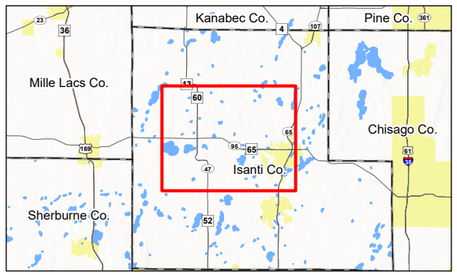
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(At original document size of 11x17)
1:63,360

Legend

- Environmental Survey Boundary (NL27)
- Loamy Till--end Moraine (tlg(e))
- River/Lake



Notes
1. Coordinate System: NAD 1983 UTM Zone 15N
2. Data Sources: Stantec, NNG, Esri, USCB, USGS
3. Background: Esri World Hillshade

Stantec

Northern Natural Gas

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Figure No.
6-1

Title
Surficial Geology
NL27 - Alexandria 2nd branch line

Client/Project 172608813
Northern Natural Gas
Northern Lights 2027 Expansion Project / Ventura to Farmington A-Line Abandonment & Capacity Replacement Project

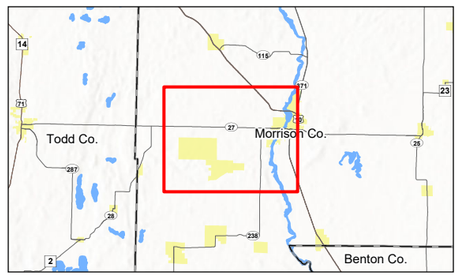
Project Location
Morrison County, Minnesota

Prepared by JM on 2025-10-06
TR by SF on 2025-10-06
IR by SK on 2026-01-28

N

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(At original document size of 11x17)
1:63,360

Legend
- Environmental Survey Boundary (NL27)
- Alluvium (al)
- Outwash Sand And Gravel (gg)
- River/Lake
- Sandy Loamy Till--end Moraine (tdb(e))
- Sandy Loamy Till--ground Moraine (tdb(g))



Notes
1. Coordinate System: NAD 1983 UTM Zone 15N
2. Data Sources: Stantec, NNG, Esri, USCB, USGS
3. Background: Esri World Hillshade

Stantec
Northern Natural Gas

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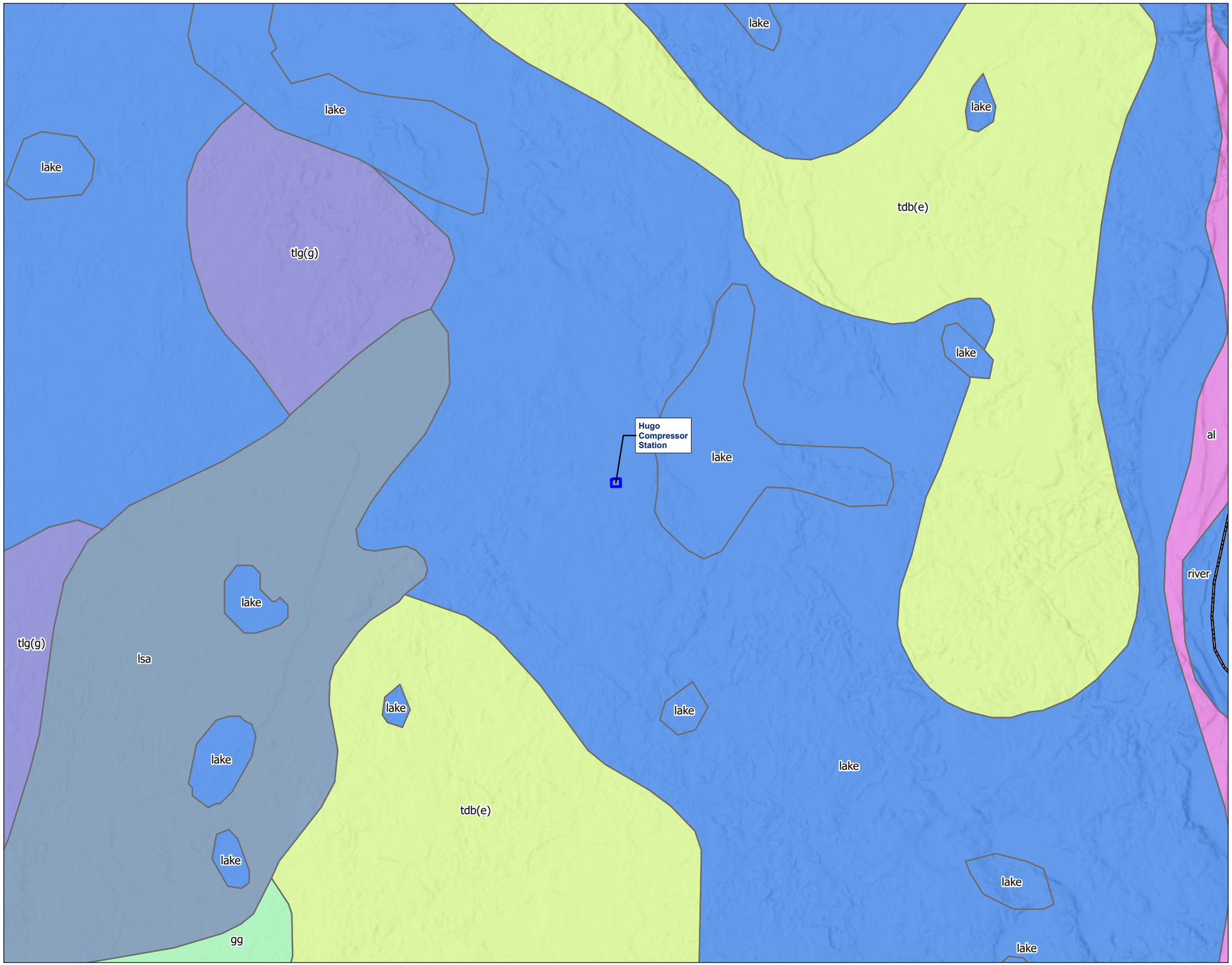


Figure No.
6-1

Title
Surficial Geology
NL27 - Hugo Compressor Station

Client/Project 172608813
Northern Natural Gas
Northern Lights 2027 Expansion Project / Ventura to Farmington A-Line Abandonment & Capacity Replacement Project

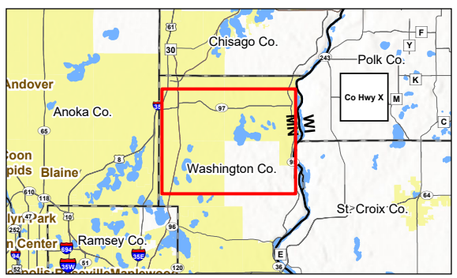
Project Location
Washington County, Minnesota

Prepared by JM on 2025-10-06
TR by SF on 2025-10-06
IR by SK on 2026-01-28

N

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(At original document size of 11x17)
1:63,360

Legend
- Environmental Survey Boundary (NL27)
- Alluvium (al)
- Lake Sand (lsa)
- Loamy Till--ground Moraine (tlg(g))
- Outwash Sand And Gravel (gg)
- River/Lake
- Sandy Loamy Till--end Moraine (tdb(e))



Notes
1. Coordinate System: NAD 1983 UTM Zone 15N
2. Data Sources: Stantec, NNG, Esri, USCB, USGS
3. Background: Esri World Hillshade

Stantec
Northern Natural Gas

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Figure 6-2
Bedrock Geology

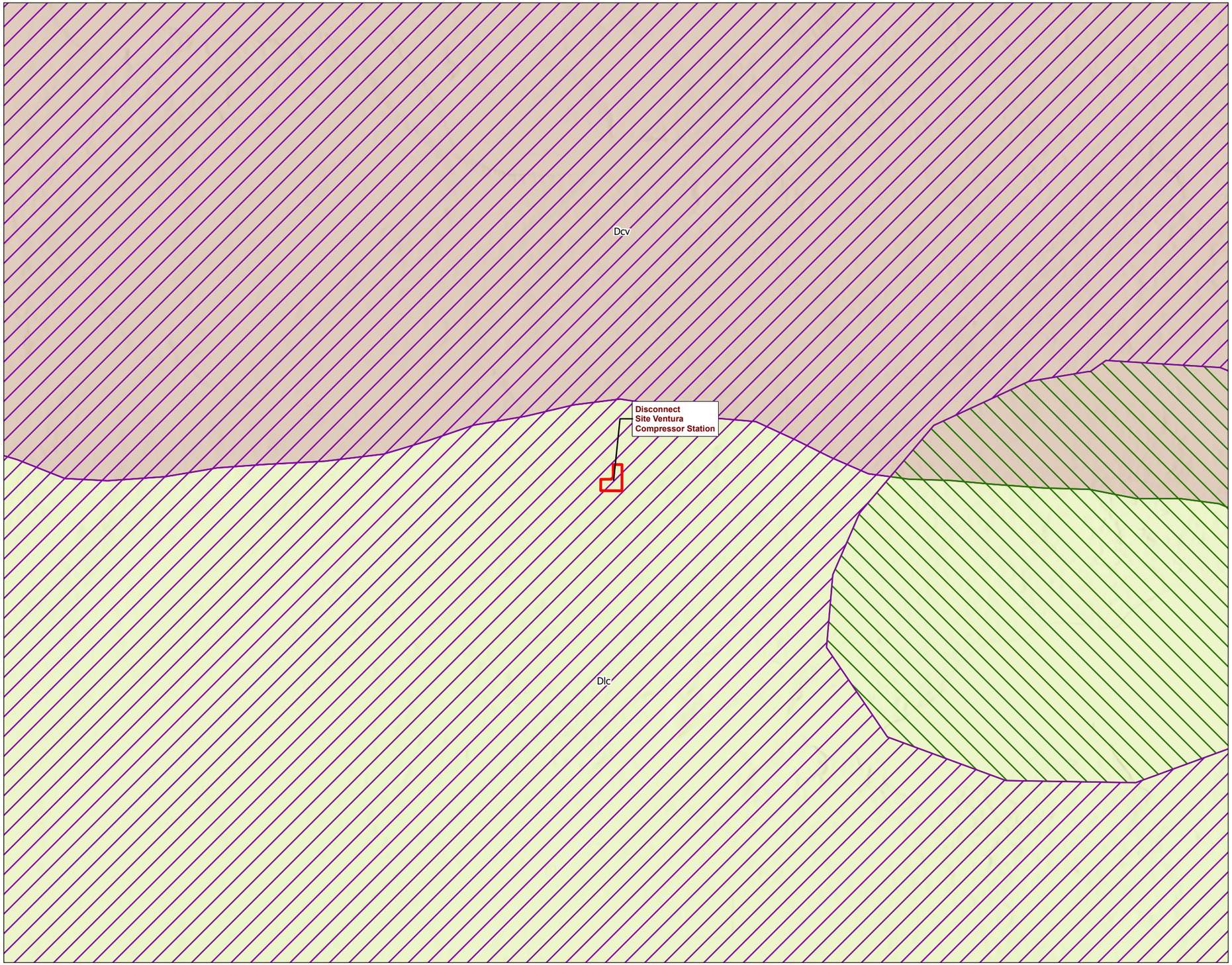


Figure No.

6-2

Title

Bedrock Geology
V2F - Disconnect Site Ventura Compressor Station

Client/Project 172608813

Northern Natural Gas
Northern Lights 2027 Expansion Project / Ventura to Farmington A-Line Abandonment & Capacity Replacement Project

Project Location
Hancock County, Iowa

Prepared by JM on 2025-10-06
TR by SF on 2025-10-06
IR by SK on 2026-01-28

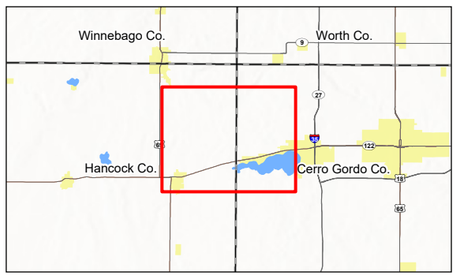
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(At original document size of 11x17)
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Legend

- Environmental Survey Boundary (V2F)
- Carbonate rocks buried under =50 ft of glacially derived insoluble sediments in a humid climate
- Carbonate rocks buried under >50 ft of glacially derived insoluble sediments in a humid climate
- Late Dovonian - limestone, dolostone (dolomite) (Dlc)
- Middle Dovonian - limestone, dolostone (dolomite) (Dcv)



Notes
1. Coordinate System: NAD 1983 UTM Zone 15N
2. Data Sources: Stantec, NNG, Esri, USCB, USGS
3. Background: Esri World Hillshade

Stantec

Northern Natural Gas

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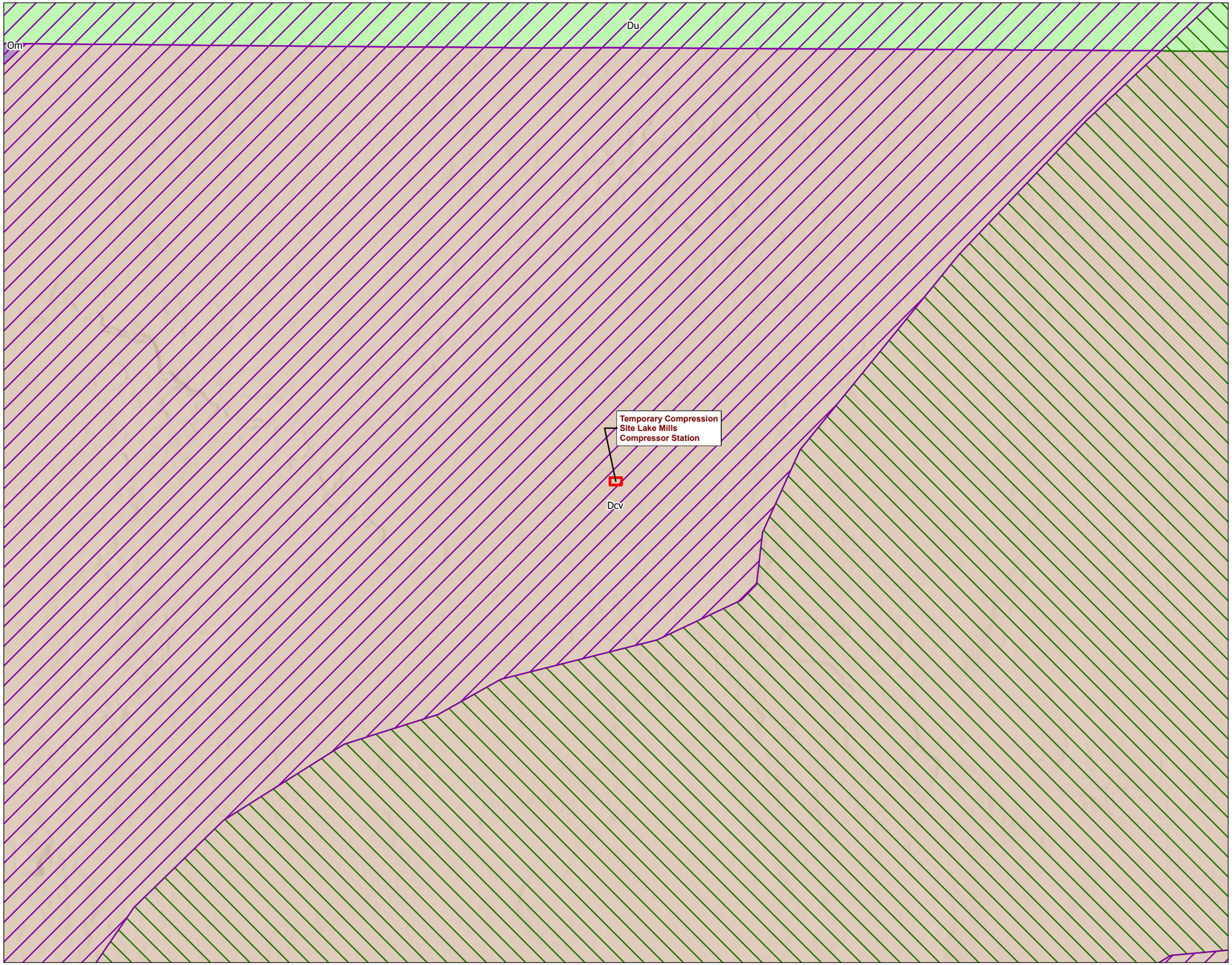


Figure No.

6-2

Title

Bedrock Geology
V2F - Temporary Compression Site Lake Mills Compressor Station

Client/Project 172608813

Northern Natural Gas
Northern Lights 2027 Expansion Project / Ventura to Farmington A-Line Abandonment & Capacity Replacement Project

Project Location
Worth County, Iowa

Prepared by JM on 2025-10-06
TR by SF on 2025-10-06
IR by SK on 2026-01-28

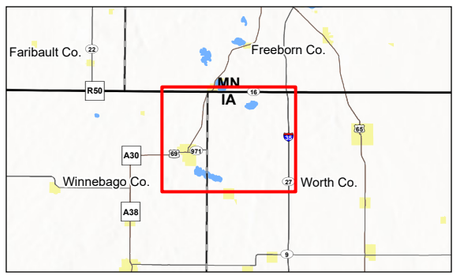
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(At original document size of 11x17)
1:63,360

Legend

- Environmental Survey Boundary (V2F)
- Carbonate rocks buried under =50 ft of glacially derived insoluble sediments in a humid climate
- Carbonate rocks buried under >50 ft of glacially derived insoluble sediments in a humid climate
- Devonian - limestone, dolostone (dolomite) (Du)
- Late Ordovician-Cincinnatian series - shale, dolostone (dolomite) (Om)
- Middle Dovonian - limestone, dolostone (dolomite) (Dcv)



Notes
1. Coordinate System: NAD 1983 UTM Zone 15N
2. Data Sources: Stantec, NNG, Esri, USCB, USGS
3. Background: Esri World Hillshade

Stantec

Northern Natural Gas

Revised: 2026-02-17 By: jmarty
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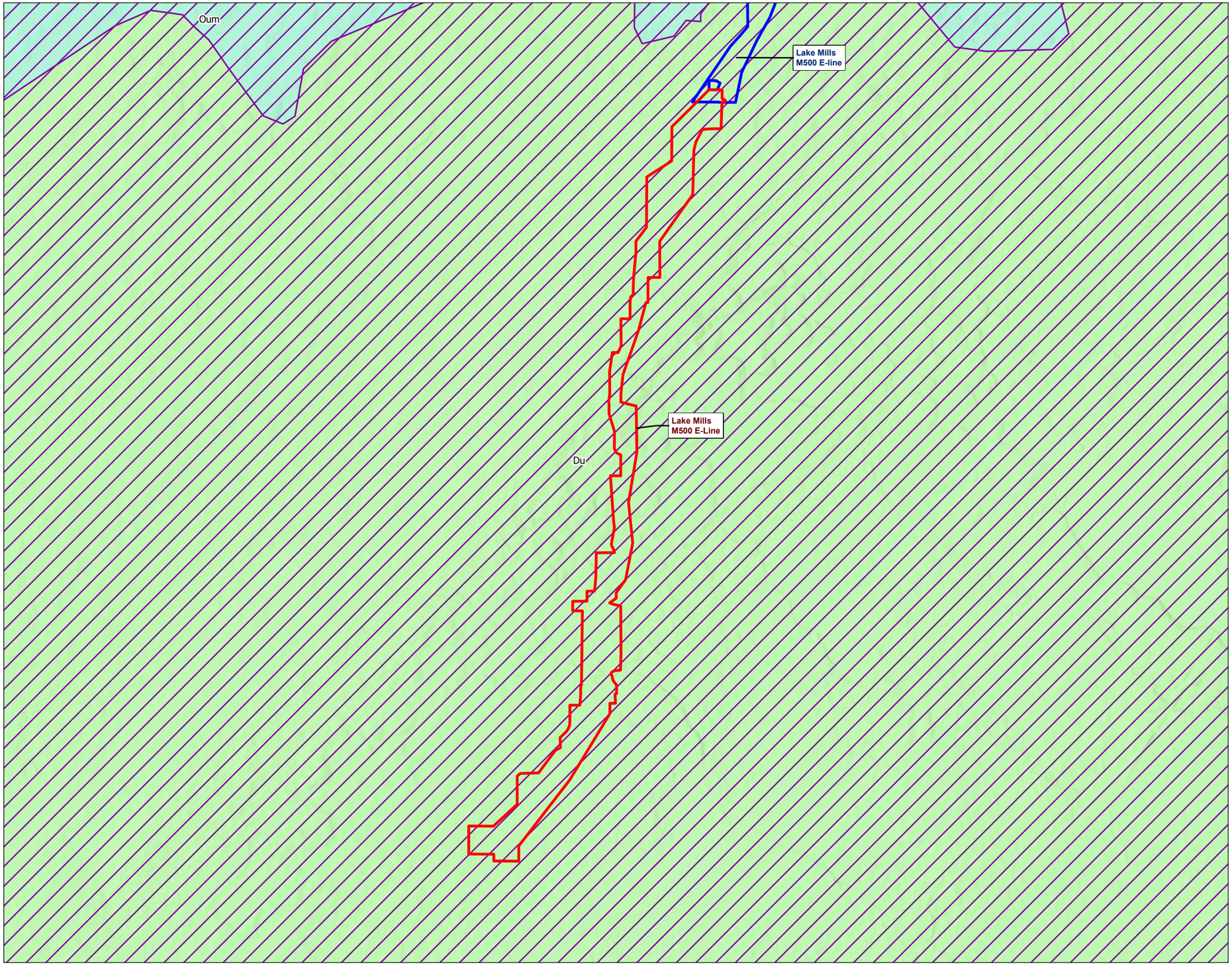


Figure No.

6-2

Title

Bedrock Geology
V2F - Lake Mills M500 E-Line

Client/Project 172608813

Northern Natural Gas
Northern Lights 2027 Expansion Project / Ventura to Farmington A-Line Abandonment & Capacity Replacement Project

Project Location
Freeborn County, Minnesota

Prepared by JM on 2025-10-06
TR by SF on 2025-10-06
IR by SK on 2026-01-28

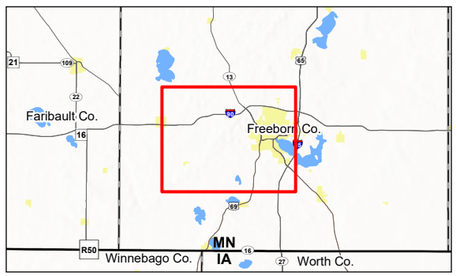
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(At original document size of 11x17)
1:63,360

Legend

- Environmental Survey Boundary (V2F)
- Environmental Survey Boundary (NL27)
- Carbonate rocks buried under >50 ft of glacially derived insoluble sediments in a humid climate
- Devonian - limestone, dolostone (dolomite) (Du)
- Late and Middle Ordovician - limestone, dolostone (dolomite) (Oum)



Notes
1. Coordinate System: NAD 1983 UTM Zone 15N
2. Data Sources: Stantec, NNG, Esri, USCB, USGS
3. Background: Esri World Hillshade

Stantec

Northern Natural Gas

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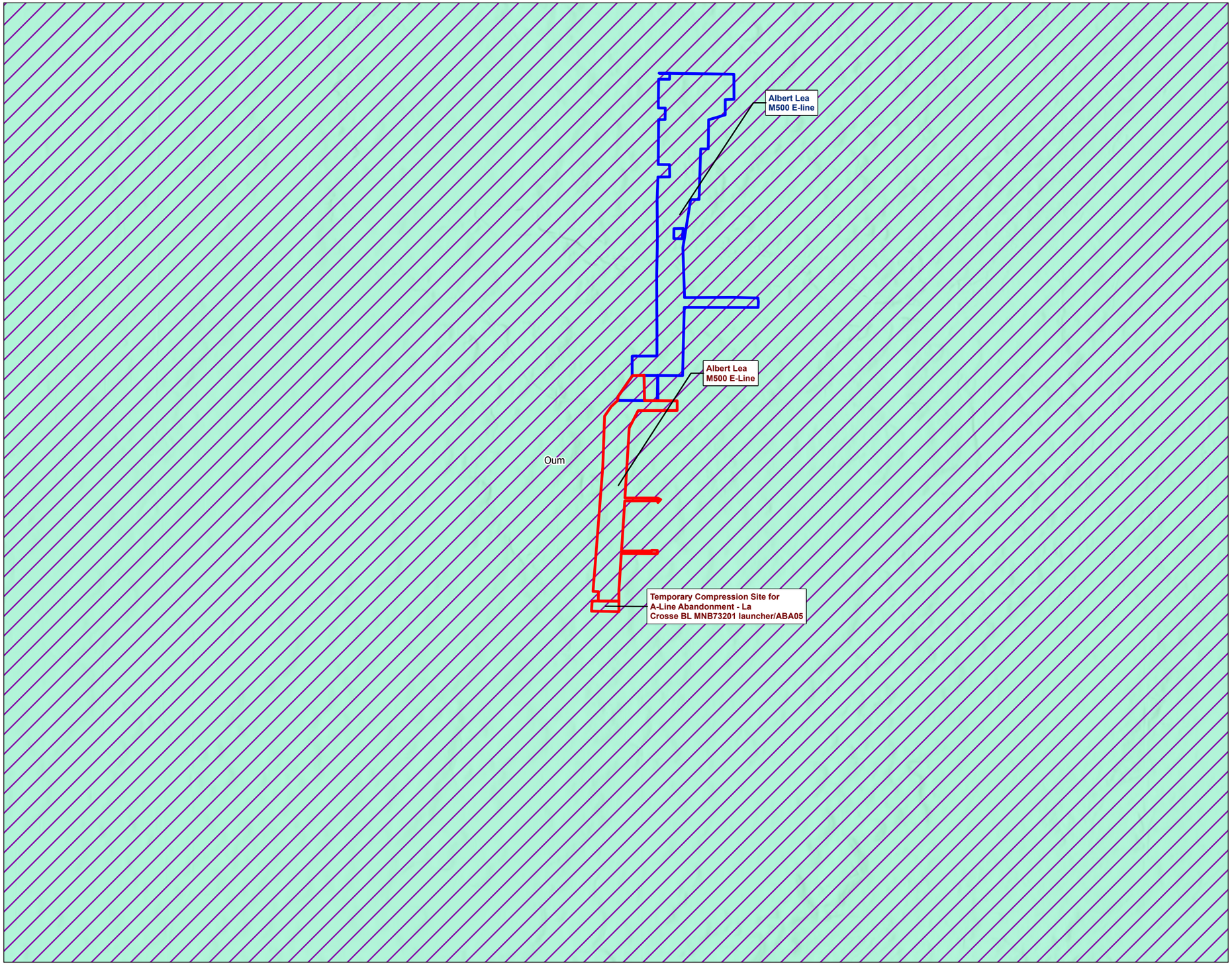


Figure No.

6-2

Title

Bedrock Geology
V2F - Albert Lea M500 E-Line

Client/Project 172608813

Northern Natural Gas
Northern Lights 2027 Expansion Project / Ventura to Farmington A-Line Abandonment & Capacity Replacement Project

Project Location
Steele County, Minnesota

Prepared by JM on 2025-10-06
TR by SF on 2025-10-06
IR by SK on 2026-01-28

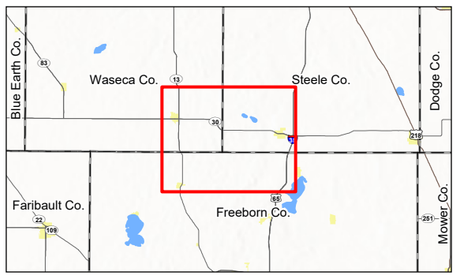
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(At original document size of 11x17)
1:63,360

Legend

- Environmental Survey Boundary (V2F)
- Environmental Survey Boundary (NL27)
- Carbonate rocks buried under >50 ft of glacially derived insoluble sediments in a humid climate
- Late and Middle Ordovician - limestone, dolostone (dolomite) (Oum)



Notes
1. Coordinate System: NAD 1983 UTM Zone 15N
2. Data Sources: Stantec, NNG, Esri, USCB, USGS
3. Background: Esri World Hillshade

Stantec

Northern Natural Gas

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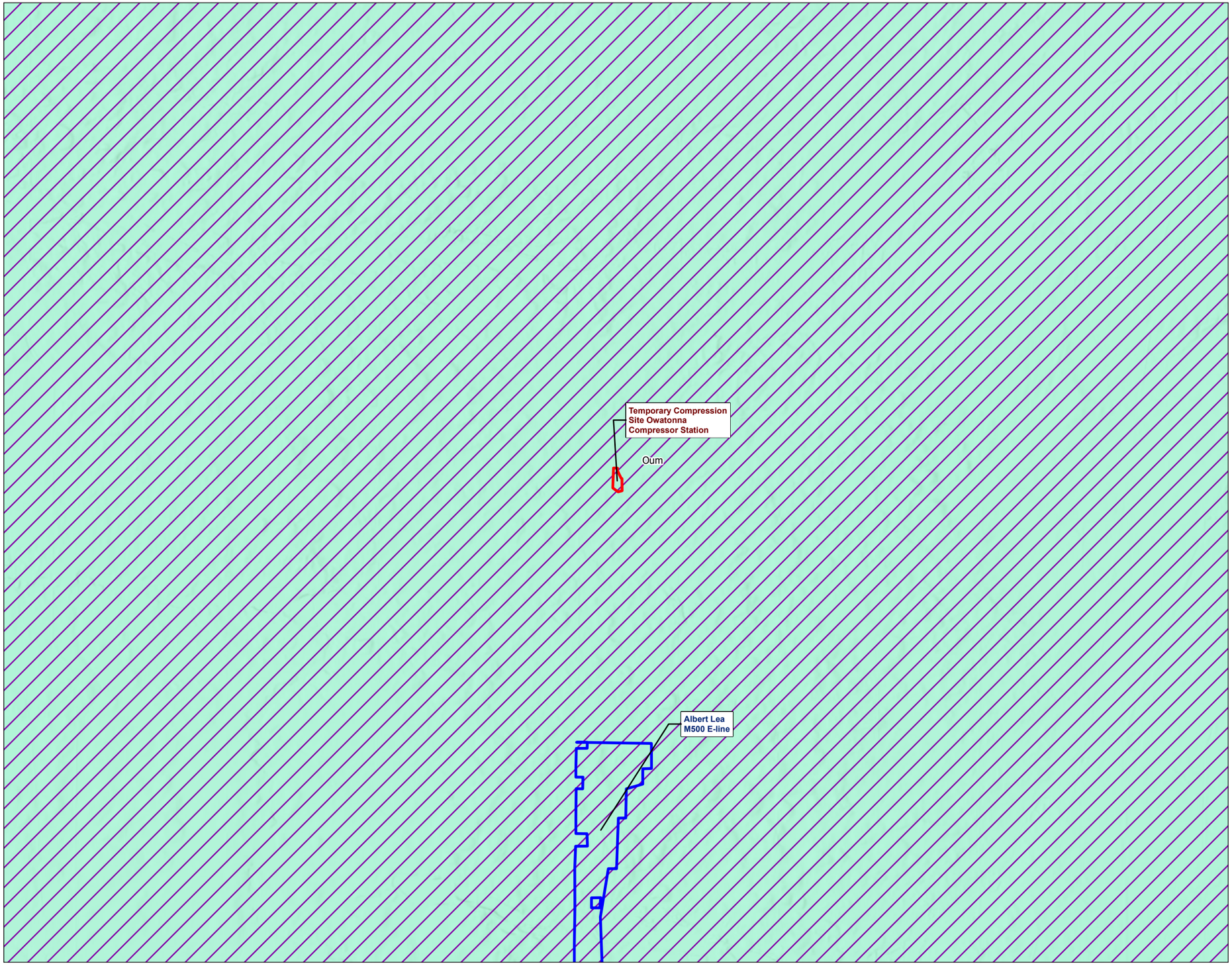


Figure No.

6-2

Title

Bedrock Geology
V2F - Temporary Compression Site Owatonna Compressor Station

Client/Project 172608813

Northern Natural Gas
Northern Lights 2027 Expansion Project / Ventura to Farmington A-Line Abandonment & Capacity Replacement Project

Project Location
Steele County, Minnesota

Prepared by JM on 2025-10-06
TR by SF on 2025-10-06
IR by SK on 2026-01-28

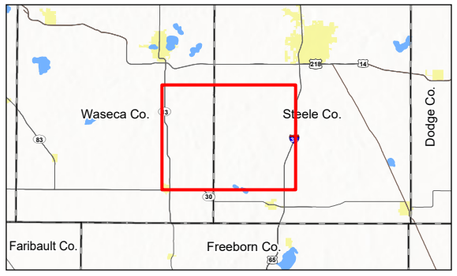
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(At original document size of 11x17)
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Legend

- Environmental Survey Boundary (V2F)
- Environmental Survey Boundary (NL27)
- Carbonate rocks buried under >50 ft of glacially derived insoluble sediments in a humid climate
- Late and Middle Ordovician - limestone, dolostone (dolomite) (Oum)



Notes
1. Coordinate System: NAD 1983 UTM Zone 15N
2. Data Sources: Stantec, NNG, Esri, USCB, USGS
3. Background: Esri World Hillshade

Stantec

Northern Natural Gas

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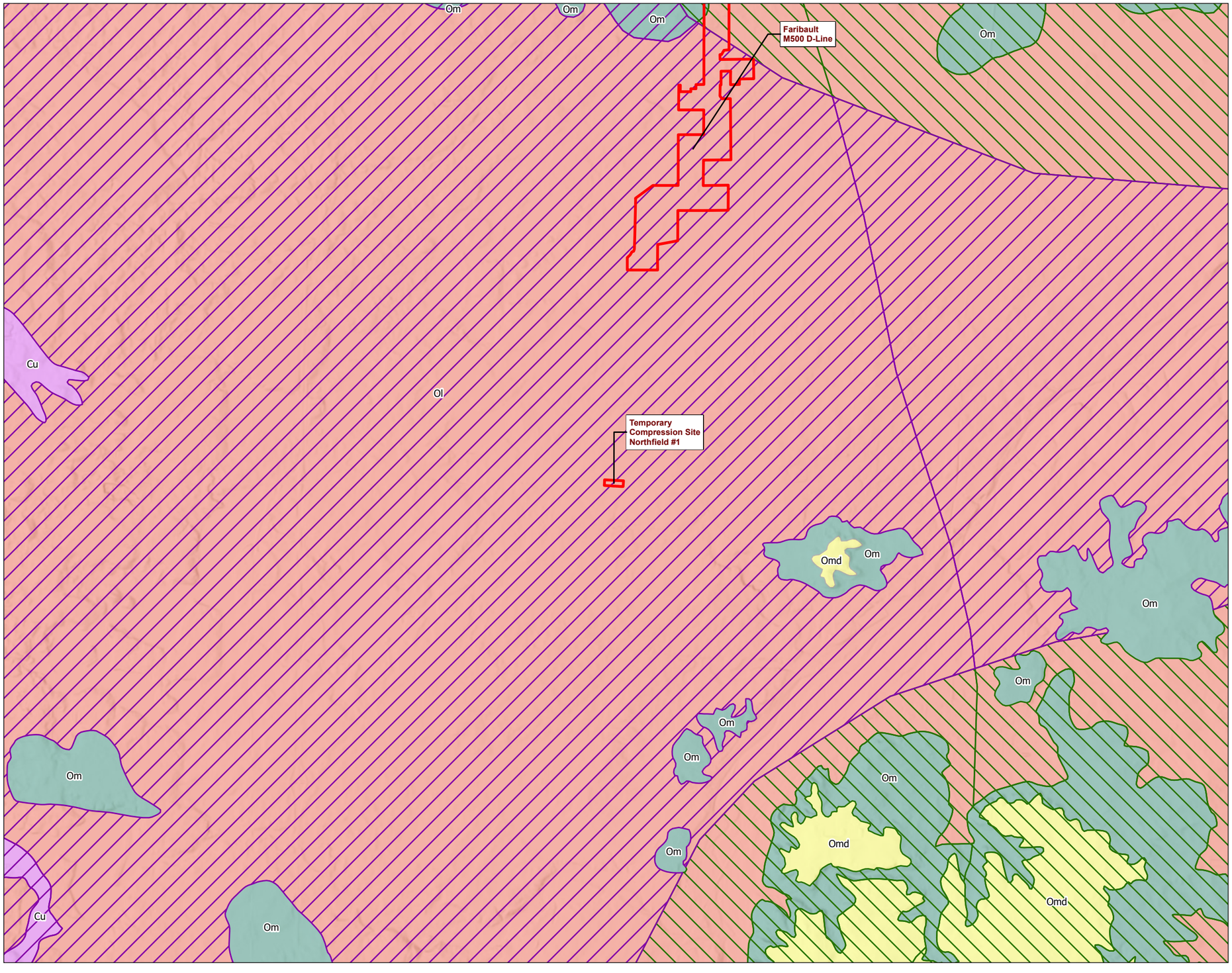


Figure No.

6-2

Title

Bedrock Geology
V2F - Temporary Compression Site Northfield #1

Client/Project 172608813

Northern Natural Gas
Northern Lights 2027 Expansion Project / Ventura to Farmington A-Line Abandonment & Capacity Replacement Project

Project Location
Dakota County, Minnesota

Prepared by JM on 2025-10-06
TR by SF on 2025-10-06
IR by SK on 2026-01-28

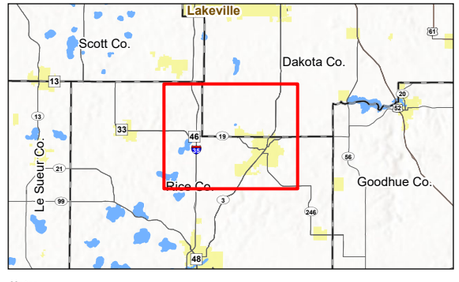
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0 0.5 1 Miles

(At original document size of 11x17)
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Legend

- Environmental Survey Boundary (V2F)
- Carbonate rocks buried under =50 ft of glacially derived insoluble sediments in a humid climate
- Carbonate rocks buried under >50 ft of glacially derived insoluble sediments in a humid climate
- Late Cambrian - dolostone (dolomite), sandstone (Cu)
- Lower Ordovician - dolostone (dolomite), limestone (Ol)
- Middle Ordovician - sandstone, limestone (Om)
- Middle Ordovician - shale, limestone (Omd)



Notes
1. Coordinate System: NAD 1983 UTM Zone 15N
2. Data Sources: Stantec, NNG, Esri, USCB, USGS
3. Background: Esri World Hillshade

Stantec

Northern Natural Gas

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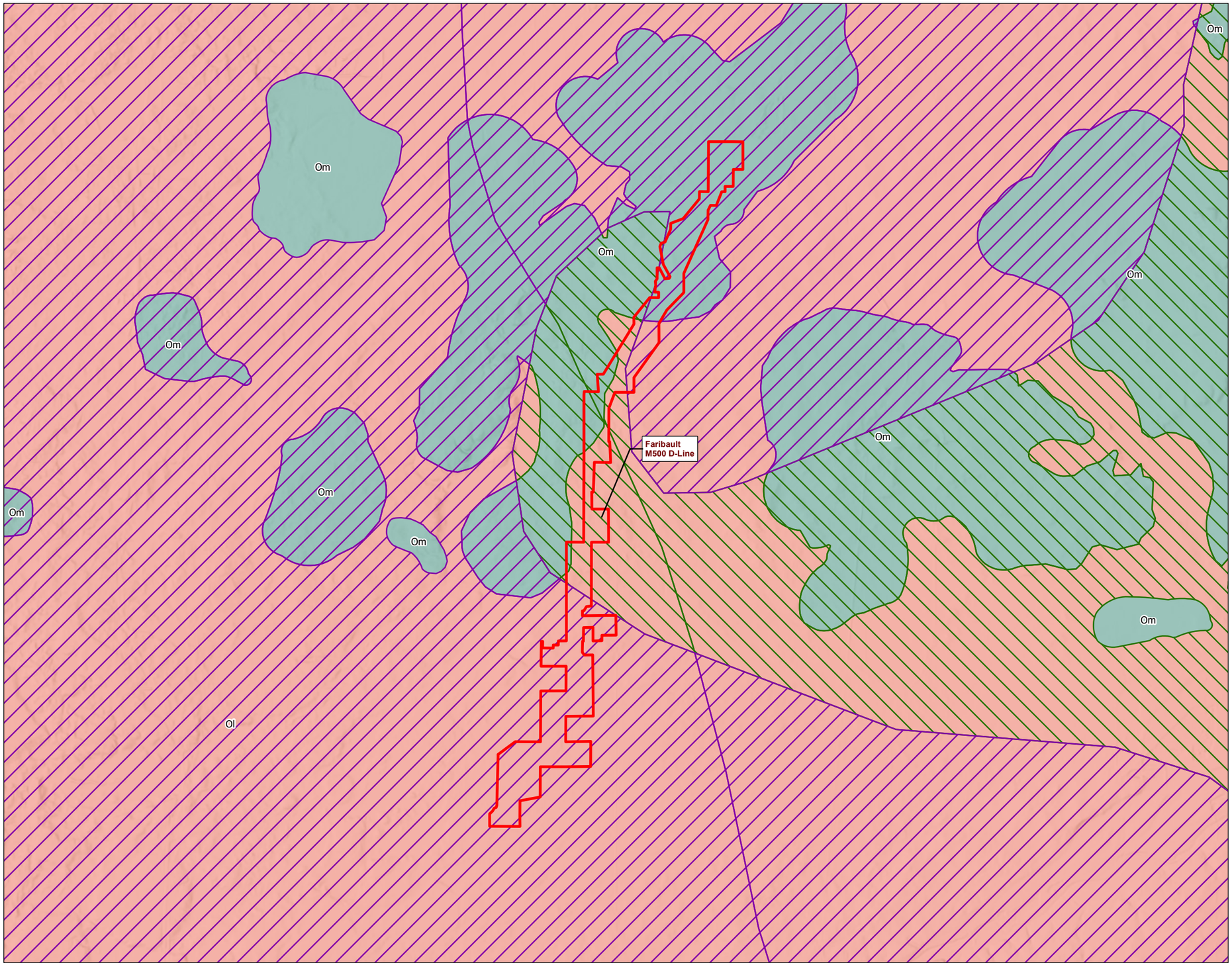


Figure No.
6-2

Title
Bedrock Geology
V2F - Faribault M500 D-Line

Client/Project 172608813
Northern Natural Gas
Northern Lights 2027 Expansion Project / Ventura to Farmington A-Line Abandonment & Capacity Replacement Project

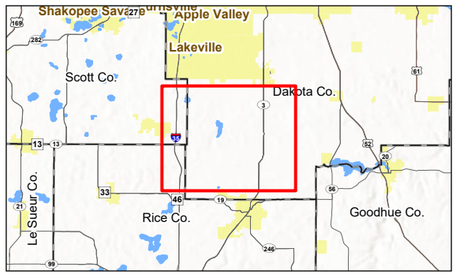
Project Location
Dakota County, Minnesota

Prepared by JM on 2025-10-06
TR by SF on 2025-10-06
IR by SK on 2026-01-28

N

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(At original document size of 11x17)
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Legend
- Environmental Survey Boundary (V2F)
- Carbonate rocks buried under =50 ft of glacially derived insoluble sediments in a humid climate
- Carbonate rocks buried under >50 ft of glacially derived insoluble sediments in a humid climate
- Lower Ordovician - dolostone (dolomite), limestone (Ol)
- Middle Ordovician - sandstone, limestone (Om)



Notes
1. Coordinate System: NAD 1983 UTM Zone 15N
2. Data Sources: Stantec, NNG, Esri, USCB, USGS
3. Background: Esri World Hillshade

Stantec

Northern Natural Gas

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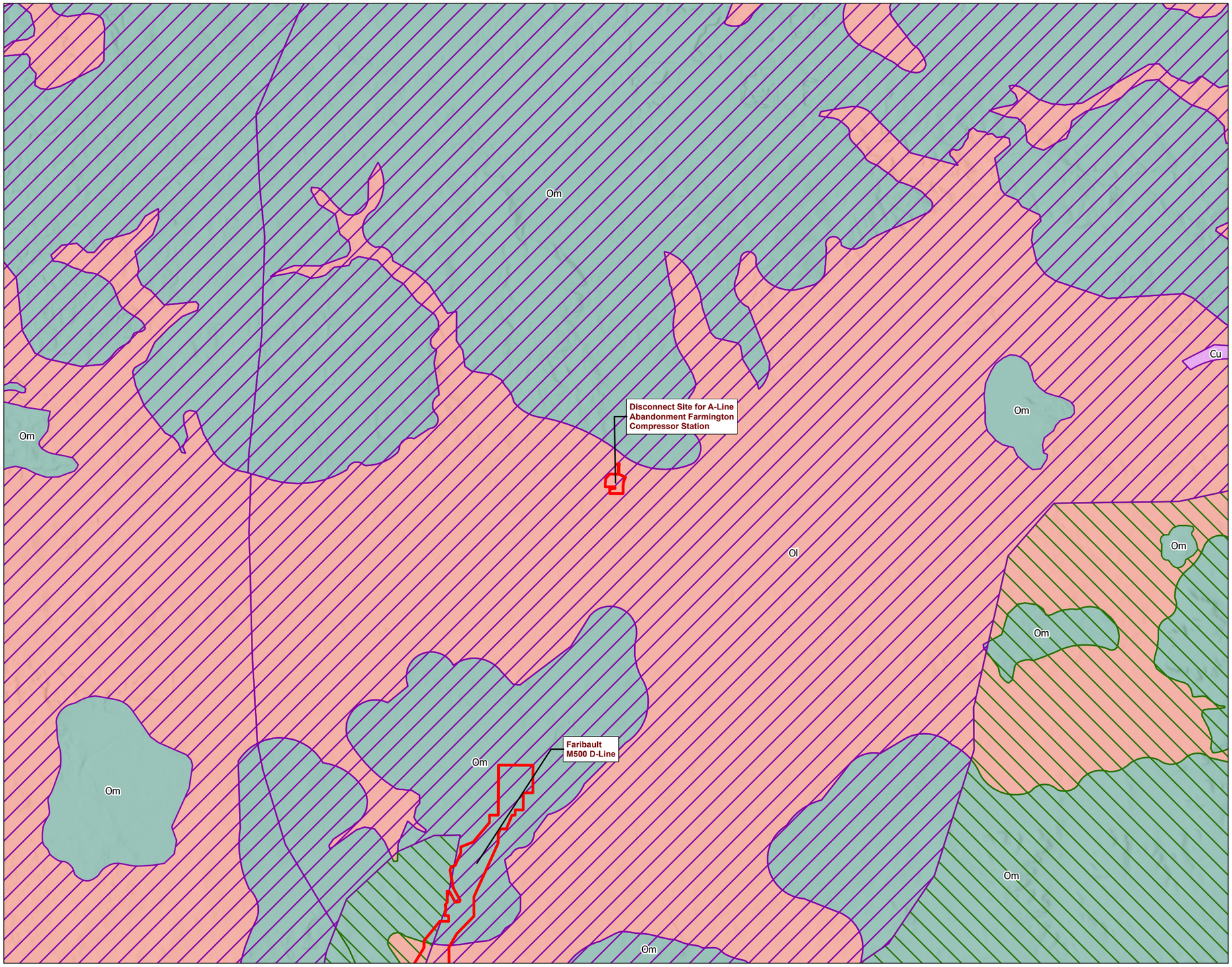


Figure No.

6-2

Title

Bedrock Geology
V2F - Disconnect Site for A-Line Abandonment
Farmington Compressor Station

Client/Project 172608813

Northern Natural Gas
Northern Lights 2027 Expansion Project / Ventura to Farmington A-Line Abandonment & Capacity Replacement Project

Project Location
Dakota County, Minnesota

Prepared by JM on 2025-10-06
TR by SF on 2025-10-06
IR by SK on 2026-01-28

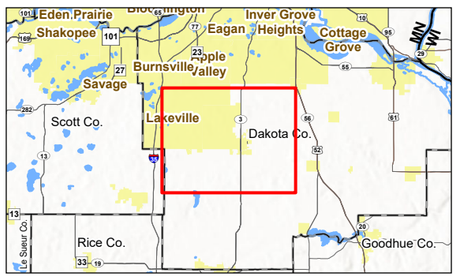
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(At original document size of 11x17)
1:63,360

Legend

- Environmental Survey Boundary (V2F)
- Carbonate rocks buried under =50 ft of glacially derived insoluble sediments in a humid climate
- Carbonate rocks buried under >50 ft of glacially derived insoluble sediments in a humid climate
- Late Cambrian - dolostone (dolomite), sandstone (Cu)
- Lower Ordovician - dolostone (dolomite), limestone (Ol)
- Middle Ordovician - sandstone, limestone (Om)



Notes

1. Coordinate System: NAD 1983 UTM Zone 15N
2. Data Sources: Stantec, NNG, Esri, USCB, USGS
3. Background: Esri World Hillshade

Stantec

Northern Natural Gas

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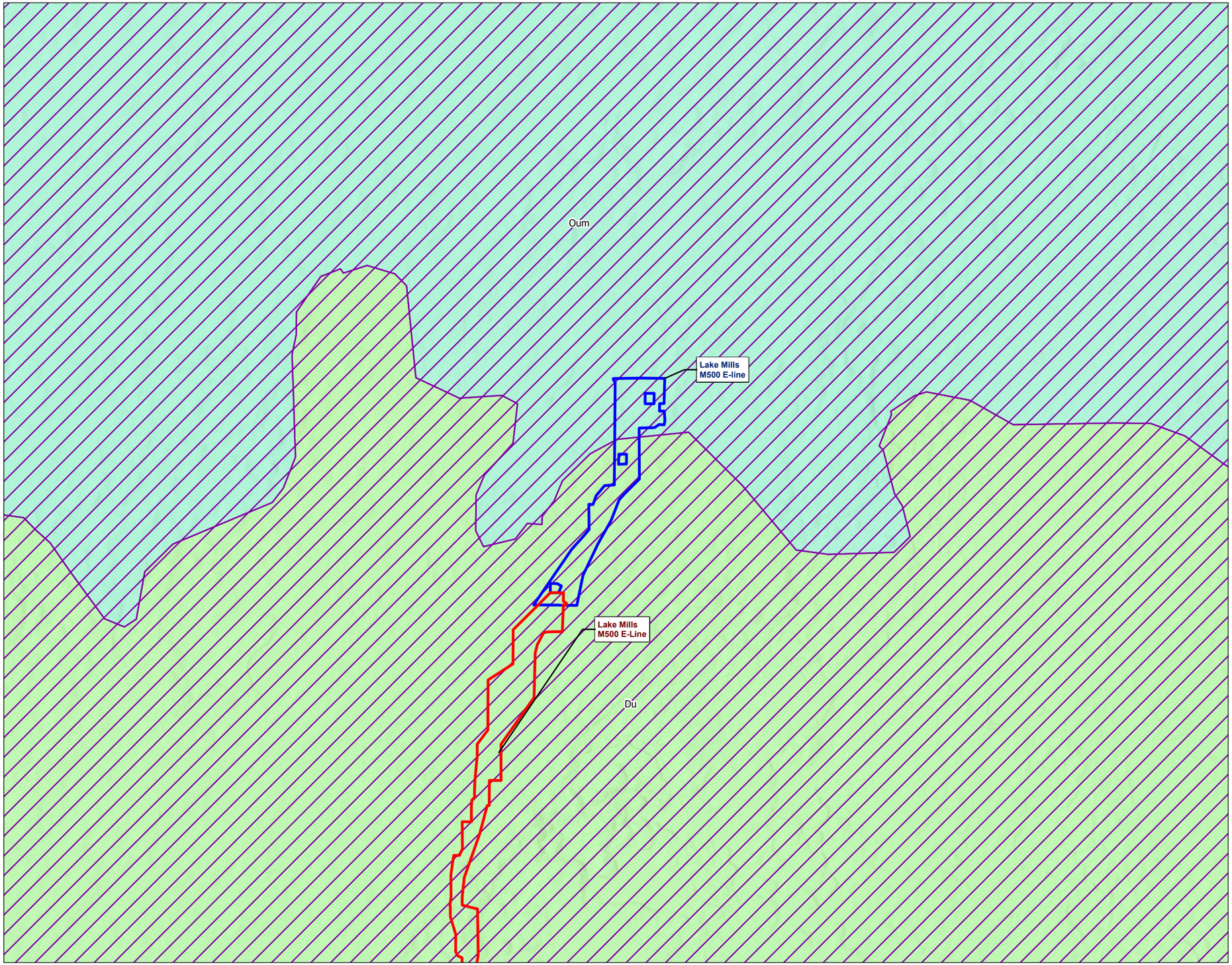


Figure No.

6-2

Title

Bedrock Geology
NL27 - Lake Mills M500 E-line

Client/Project 172608813

Northern Natural Gas
Northern Lights 2027 Expansion Project / Ventura to Farmington A-Line Abandonment & Capacity Replacement Project

Project Location
Freeborn County, Minnesota

Prepared by JM on 2025-10-06
TR by SF on 2025-10-06
IR by SK on 2026-01-28

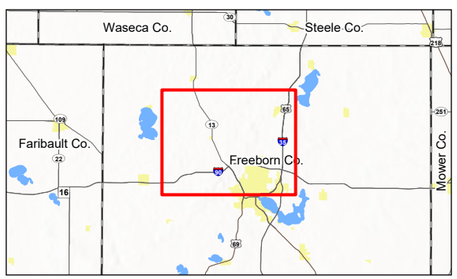
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(At original document size of 11x17)
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Legend

- Environmental Survey Boundary (V2F)
- Environmental Survey Boundary (NL27)
- Carbonate rocks buried under >50 ft of glacially derived insoluble sediments in a humid climate
- Devonian - limestone, dolostone (dolomite) (Du)
- Late and Middle Ordovician - limestone, dolostone (dolomite) (Oum)



Notes
1. Coordinate System: NAD 1983 UTM Zone 15N
2. Data Sources: Stantec, NNG, Esri, USCB, USGS
3. Background: Esri World Hillshade

Stantec

Northern Natural Gas

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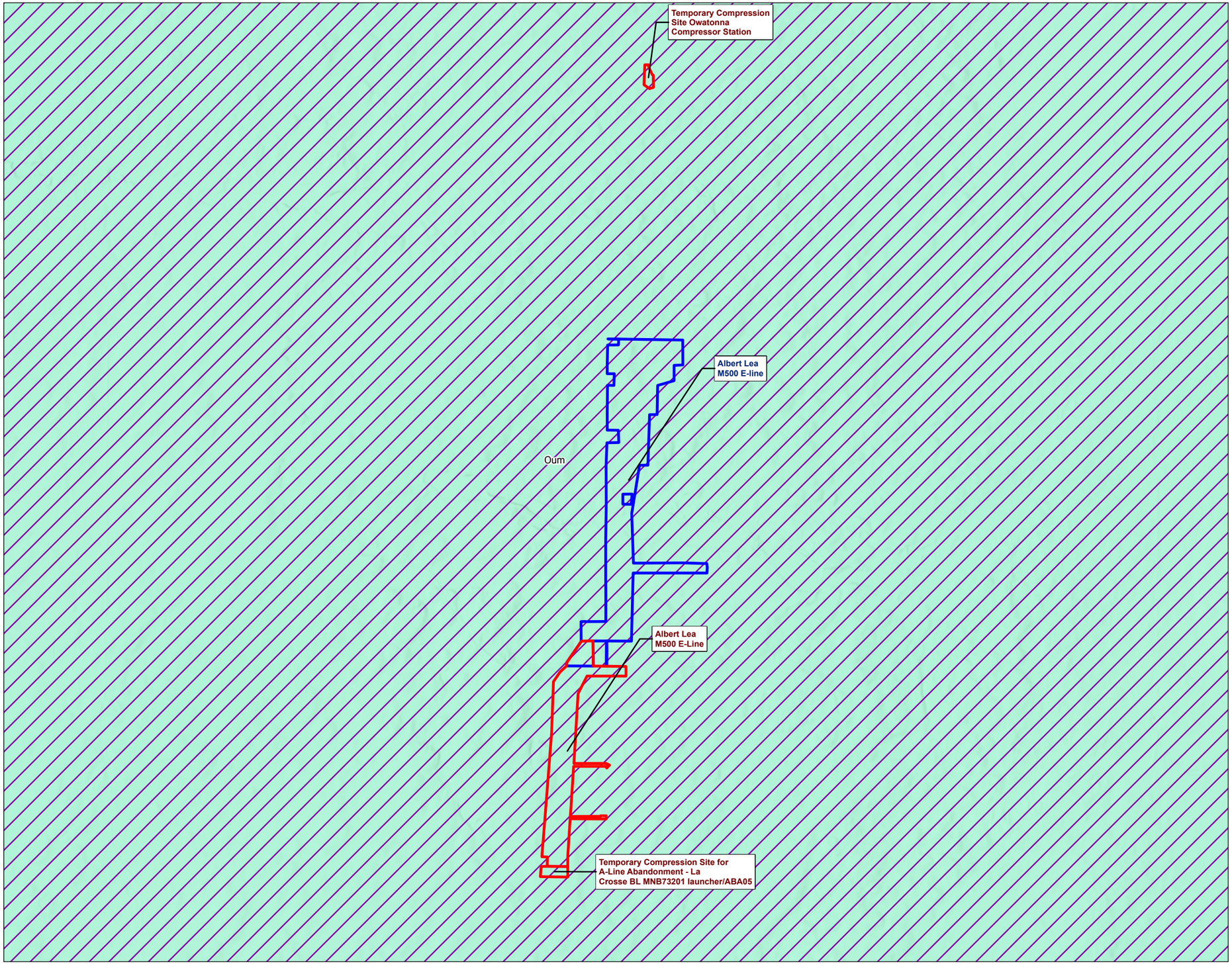


Figure No.

6-2

Title

Bedrock Geology
NL27 - Albert Lea M500 E-line

Client/Project 172608813

Northern Natural Gas
Northern Lights 2027 Expansion Project / Ventura to Farmington A-Line Abandonment & Capacity Replacement Project

Project Location
Steele County, Minnesota

Prepared by JM on 2025-10-06
TR by SF on 2025-10-06
IR by SK on 2026-01-28

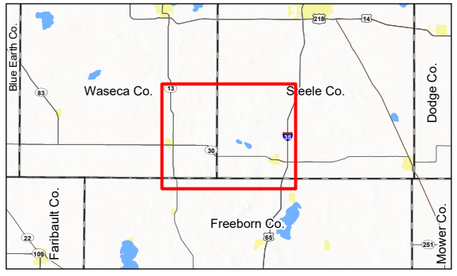
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Legend

- Environmental Survey Boundary (V2F)
- Environmental Survey Boundary (NL27)
- Carbonate rocks buried under >50 ft of glacially derived insoluble sediments in a humid climate
- Late and Middle Ordovician - limestone, dolostone (dolomite) (Oum)



Notes
1. Coordinate System: NAD 1983 UTM Zone 15N
2. Data Sources: Stantec, NNG, Esri, USCB, USGS
3. Background: Esri World Hillshade

Stantec

Northern Natural Gas

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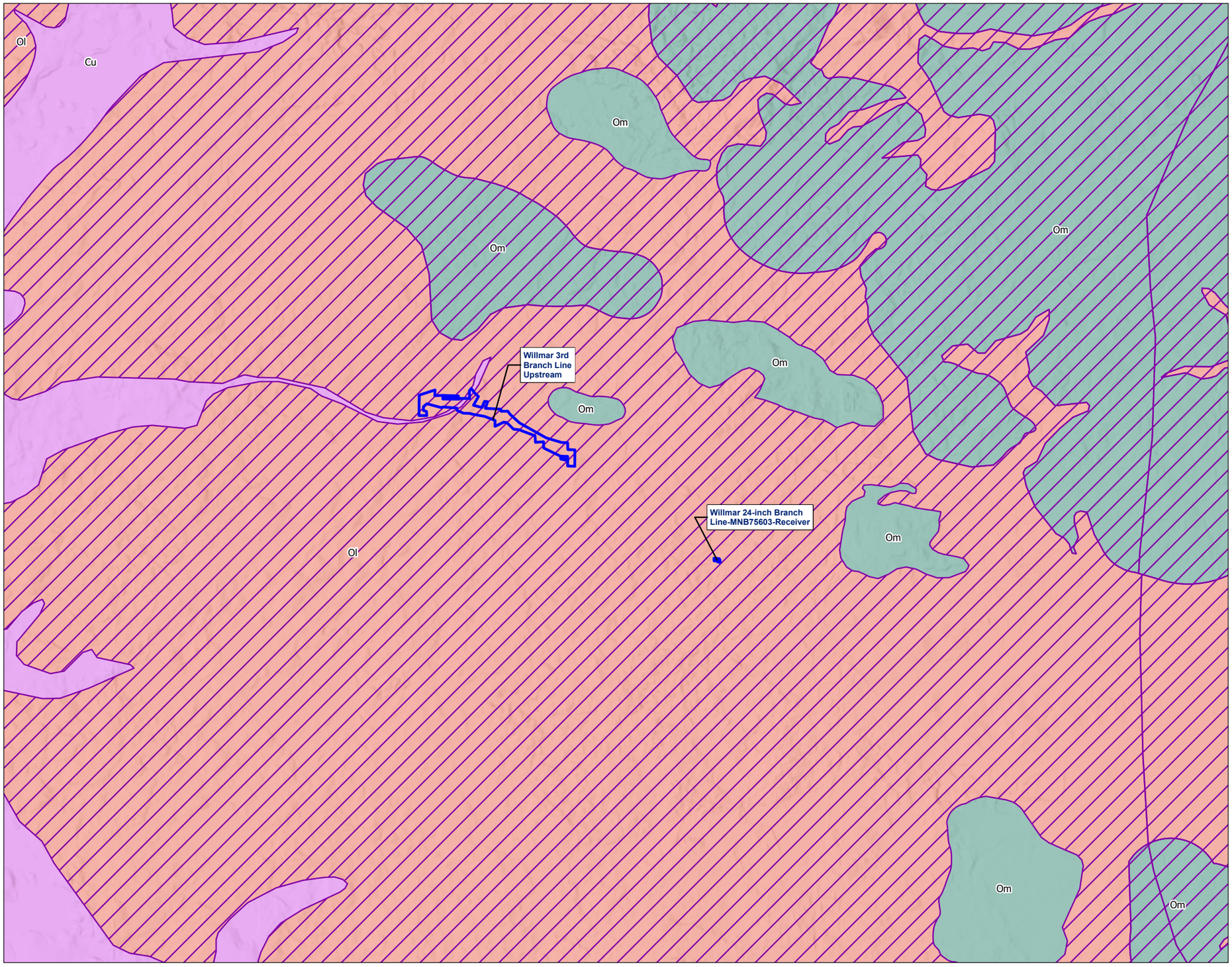


Figure No.

6-2

Title

Bedrock Geology
NL27 - Willmar 3rd Branch Line Upstream

Client/Project 172608813

Northern Natural Gas
Northern Lights 2027 Expansion Project / Ventura to Farmington A-Line Abandonment & Capacity Replacement Project

Project Location
Scott County, Minnesota

Prepared by JM on 2025-10-06
TR by SF on 2025-10-06
IR by SK on 2026-01-28

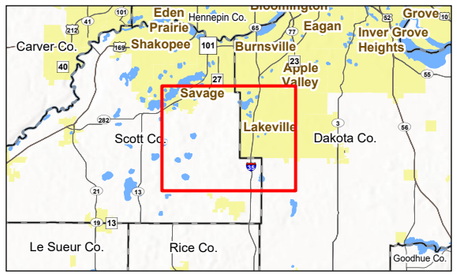
N

0 0.5 1 Miles

(At original document size of 11x17)
1:63,360

Legend

- Environmental Survey Boundary (NL27)
- Carbonate rocks buried under >50 ft of glacially derived insoluble sediments in a humid climate
- Late Cambrian - dolostone (dolomite), sandstone (Cu)
- Lower Ordovician - dolostone (dolomite), limestone (Ol)
- Middle Ordovician - sandstone, limestone (Om)



Notes
1. Coordinate System: NAD 1983 UTM Zone 15N
2. Data Sources: Stantec, NNG, Esri, USCB, USGS
3. Background: Esri World Hillshade

Stantec

Northern Natural Gas

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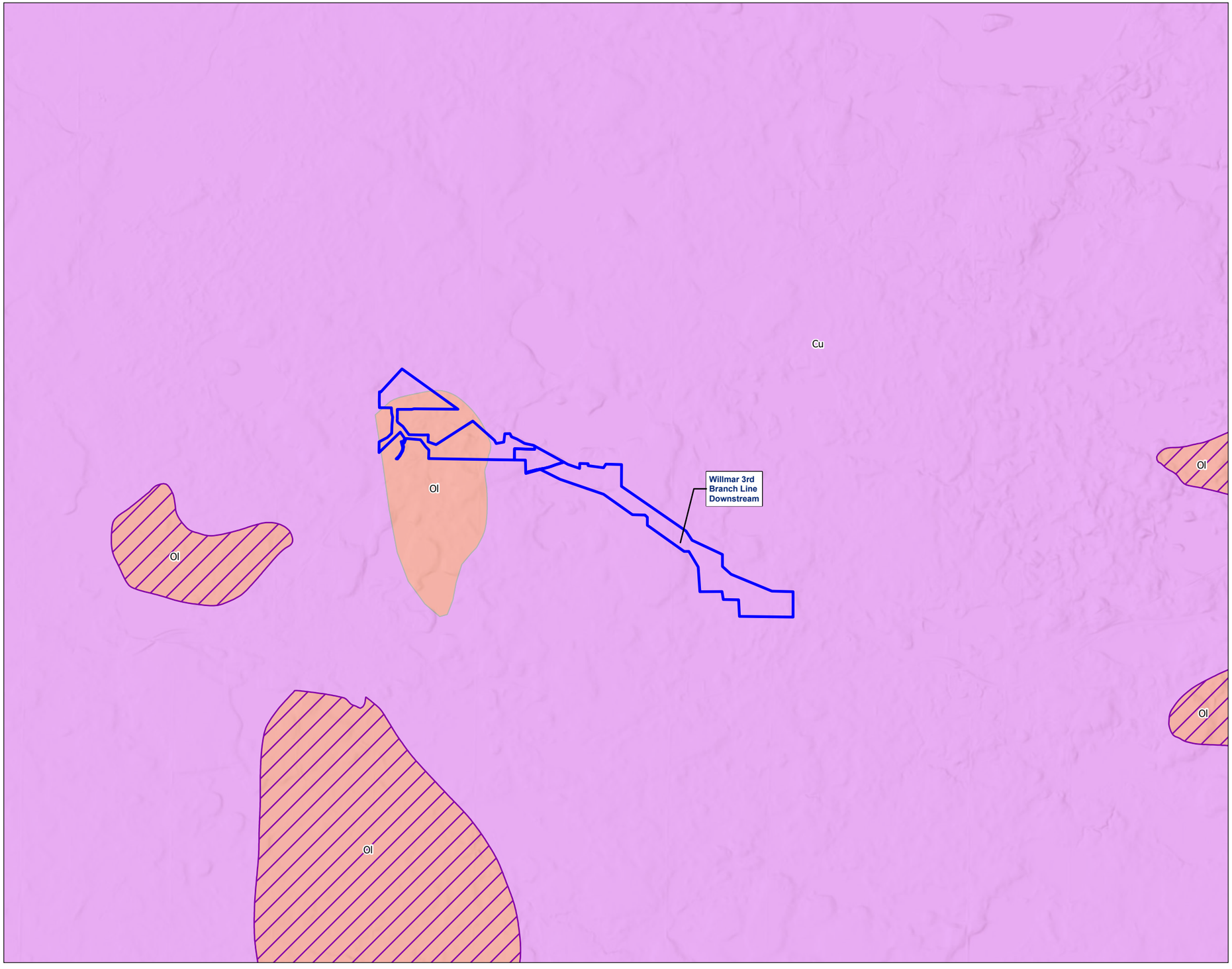


Figure No.

6-2

Title

Bedrock Geology
NL27 - Willmar 3rd Branch Line Downstream

Client/Project 172608813

Northern Natural Gas
Northern Lights 2027 Expansion Project / Ventura to Farmington A-Line Abandonment & Capacity Replacement Project

Project Location
Carver County, Minnesota

Prepared by JM on 2025-10-06
TR by SF on 2025-10-06
IR by SK on 2026-01-28

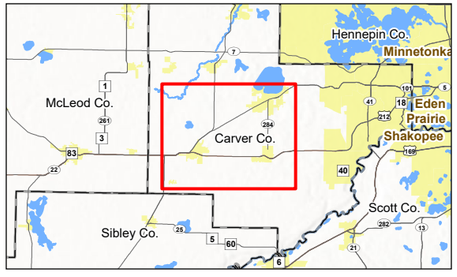
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(At original document size of 11x17)
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Legend

- Environmental Survey Boundary (NL27)
- Carbonate rocks buried under >50 ft of glacially derived insoluble sediments in a humid climate
- Late Cambrian - dolostone (dolomite), sandstone (Cu)
- Lower Ordovician - dolostone (dolomite), limestone (Ol)



Notes
1. Coordinate System: NAD 1983 UTM Zone 15N
2. Data Sources: Stantec, NNG, Esri, USCB, USGS
3. Background: Esri World Hillshade

Stantec

Northern Natural Gas

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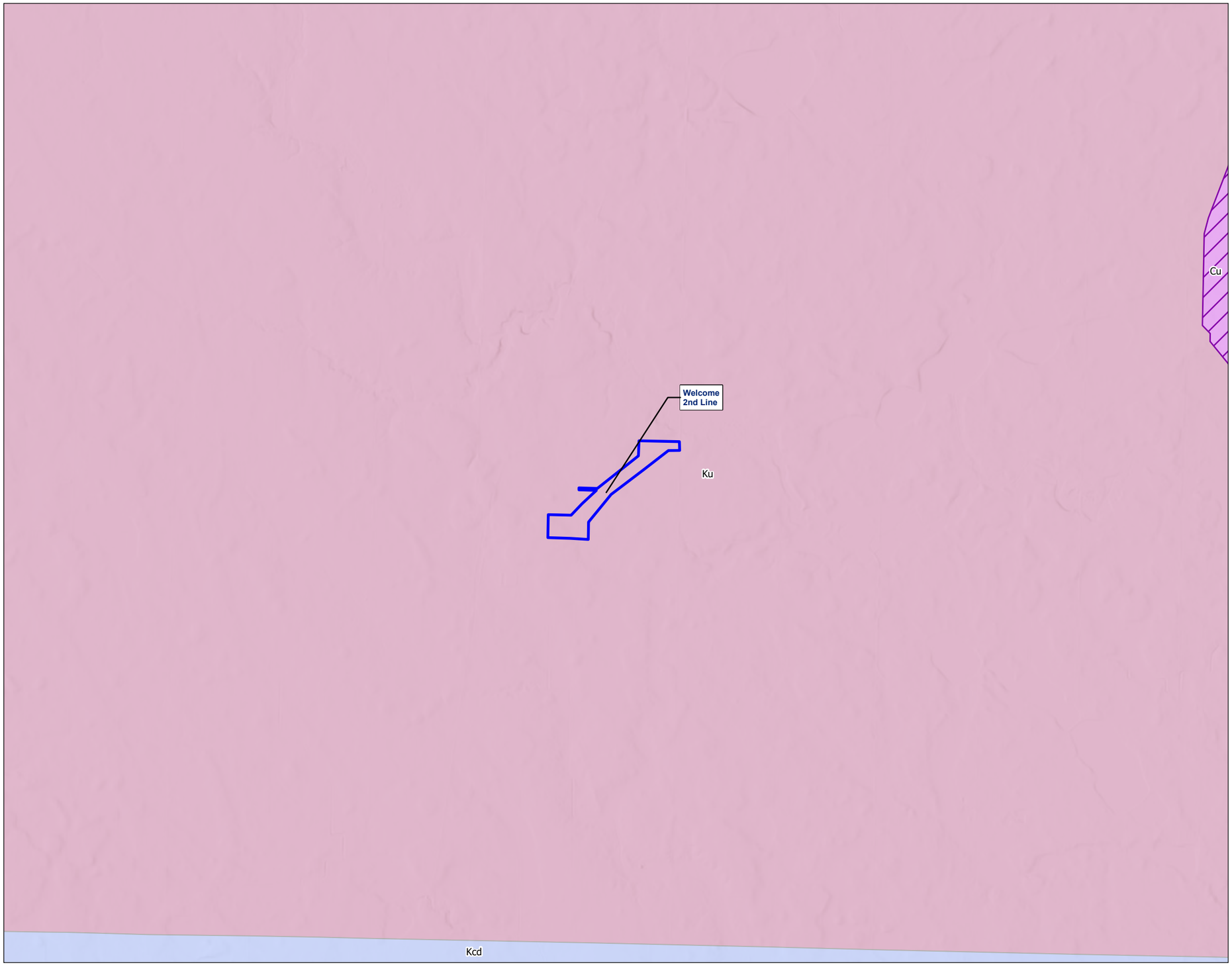


Figure No.

6-2

Title

Bedrock Geology
NL27 - Welcome 2nd line

Client/Project

172608813

Northern Natural Gas
Northern Lights 2027 Expansion Project / Ventura to Farmington A-Line Abandonment & Capacity Replacement Project

Project Location
Martin County, Minnesota

Prepared by JM on 2025-10-06
TR by SF on 2025-10-06
IR by SK on 2026-01-28

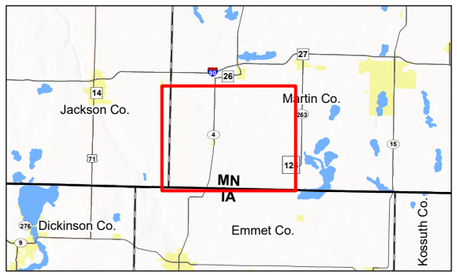
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(At original document size of 11x17)
1:63,360

Legend

- Environmental Survey Boundary (NL27)
- Carbonate rocks buried under >50 ft of glacially derived insoluble sediments in a humid climate
- Cretaceous - shale, sandstone (Ku)
- Late Cambrian - dolostone (dolomite), sandstone (Cu)
- Late Cretaceous to Early Cretaceous - sandstone, shale (Kcd)



Notes
1. Coordinate System: NAD 1983 UTM Zone 15N
2. Data Sources: Stantec, NNG, Esri, USCB, USGS
3. Background: Esri World Hillshade

Stantec

Northern Natural Gas

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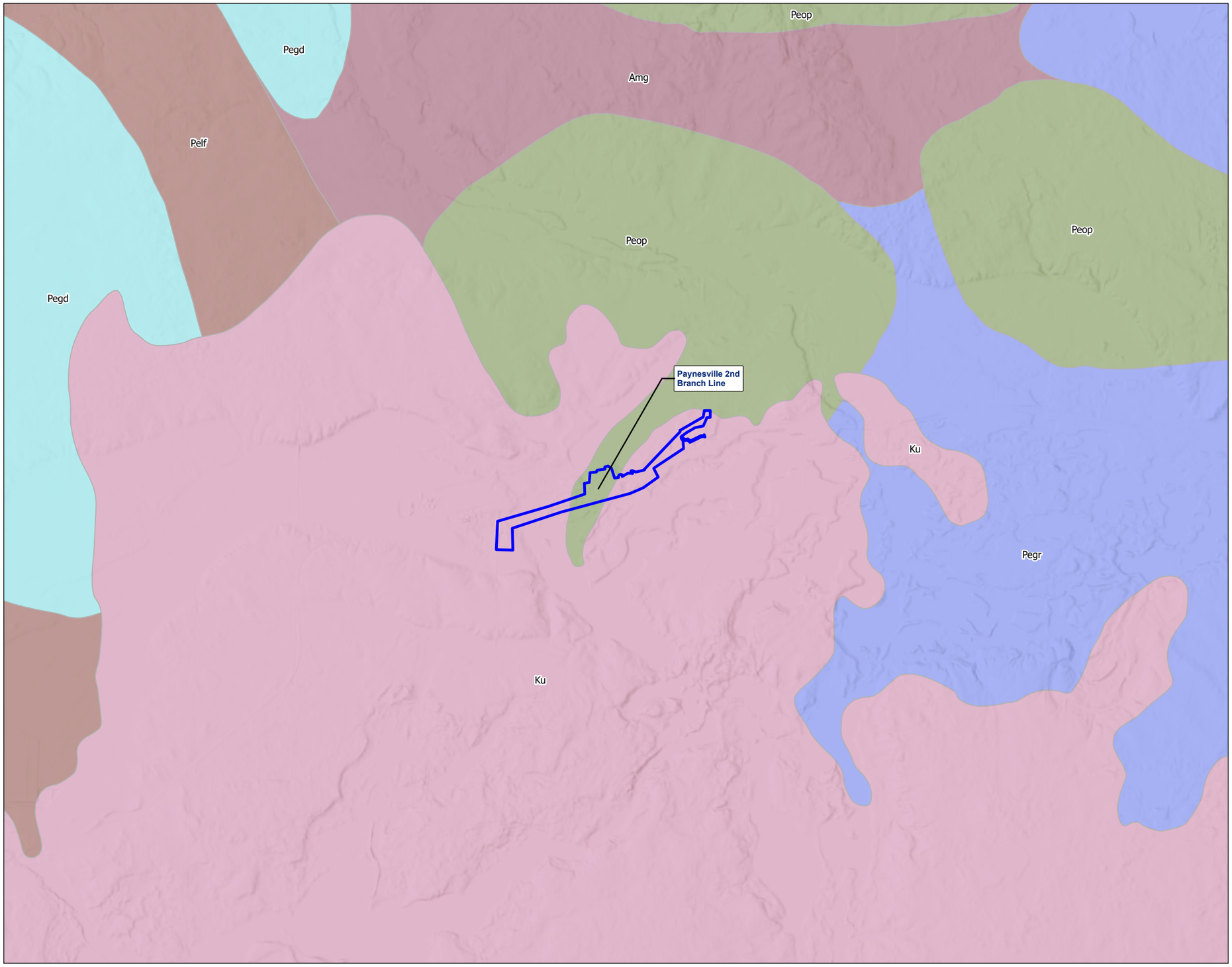


Figure No.
6-2

Title
Bedrock Geology
NL27 - Paynesville 2nd branch line

Client/Project 172608813
Northern Natural Gas
Northern Lights 2027 Expansion Project / Ventura to Farmington A-Line Abandonment & Capacity Replacement Project

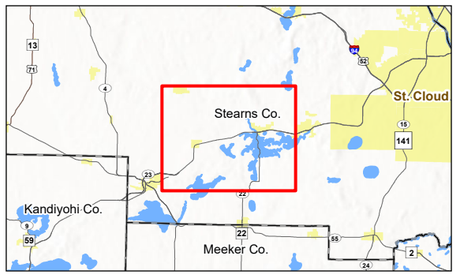
Project Location
Stearns County, Minnesota

Prepared by JM on 2025-10-06
TR by SF on 2025-10-06
IR by SK on 2026-01-28

N

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(At original document size of 11x17)
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Legend
- Environmental Survey Boundary (NL27)
- Cretaceous - shale, sandstone (Ku)
- Early Proterozoic - granite, granodiorite (Pegd)
- Early Proterozoic - granite, granodiorite (Pegr)
- Early Proterozoic - pyroxenite, diorite (Peop)
- Early Proterozoic - slate, argillite (Pelf)
- Middle to Early Archean - gneiss, amphibolite (Amg)



Notes
1. Coordinate System: NAD 1983 UTM Zone 15N
2. Data Sources: Stantec, NNG, Esri, USCB, USGS
3. Background: Esri World Hillshade

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Northern Natural Gas

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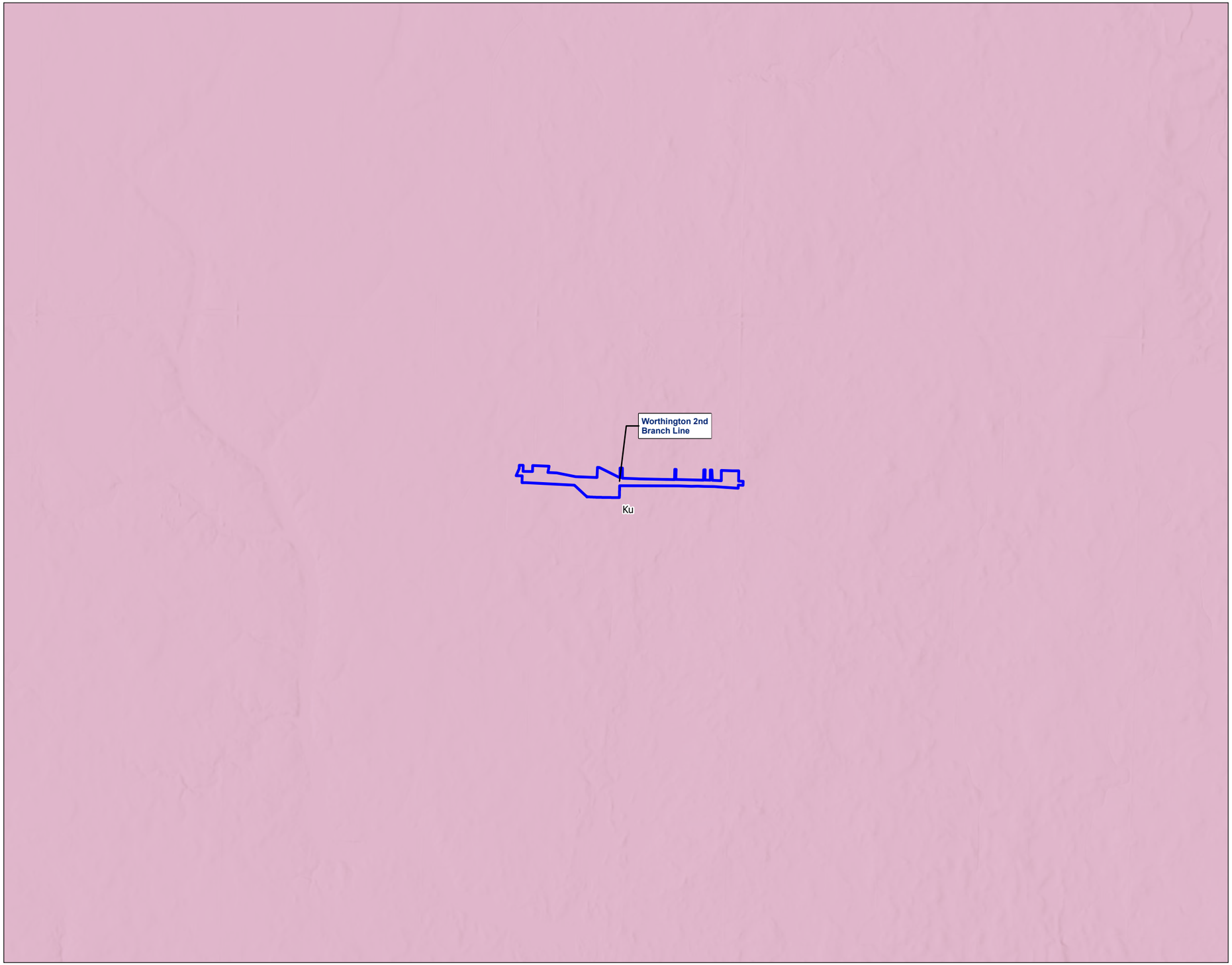


Figure No.

6-2

Title

Bedrock Geology
NL27 - Worthington 2nd branch line

Client/Project 172608813

Northern Natural Gas
Northern Lights 2027 Expansion Project / Ventura to Farmington A-Line Abandonment & Capacity Replacement Project

Project Location
Jackson County, Minnesota

Prepared by JM on 2025-10-06
TR by SF on 2025-10-06
IR by SK on 2026-01-28

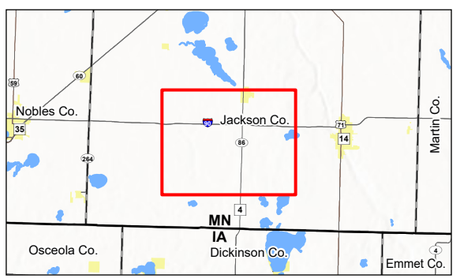
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(At original document size of 11x17)
1:63,360

Legend

- Environmental Survey Boundary (NL27)
- Cretaceous - shale, sandstone (Ku)



Notes
1. Coordinate System: NAD 1983 UTM Zone 15N
2. Data Sources: Stantec, NNG, Esri, USCB, USGS
3. Background: Esri World Hillshade

Stantec

Northern Natural Gas

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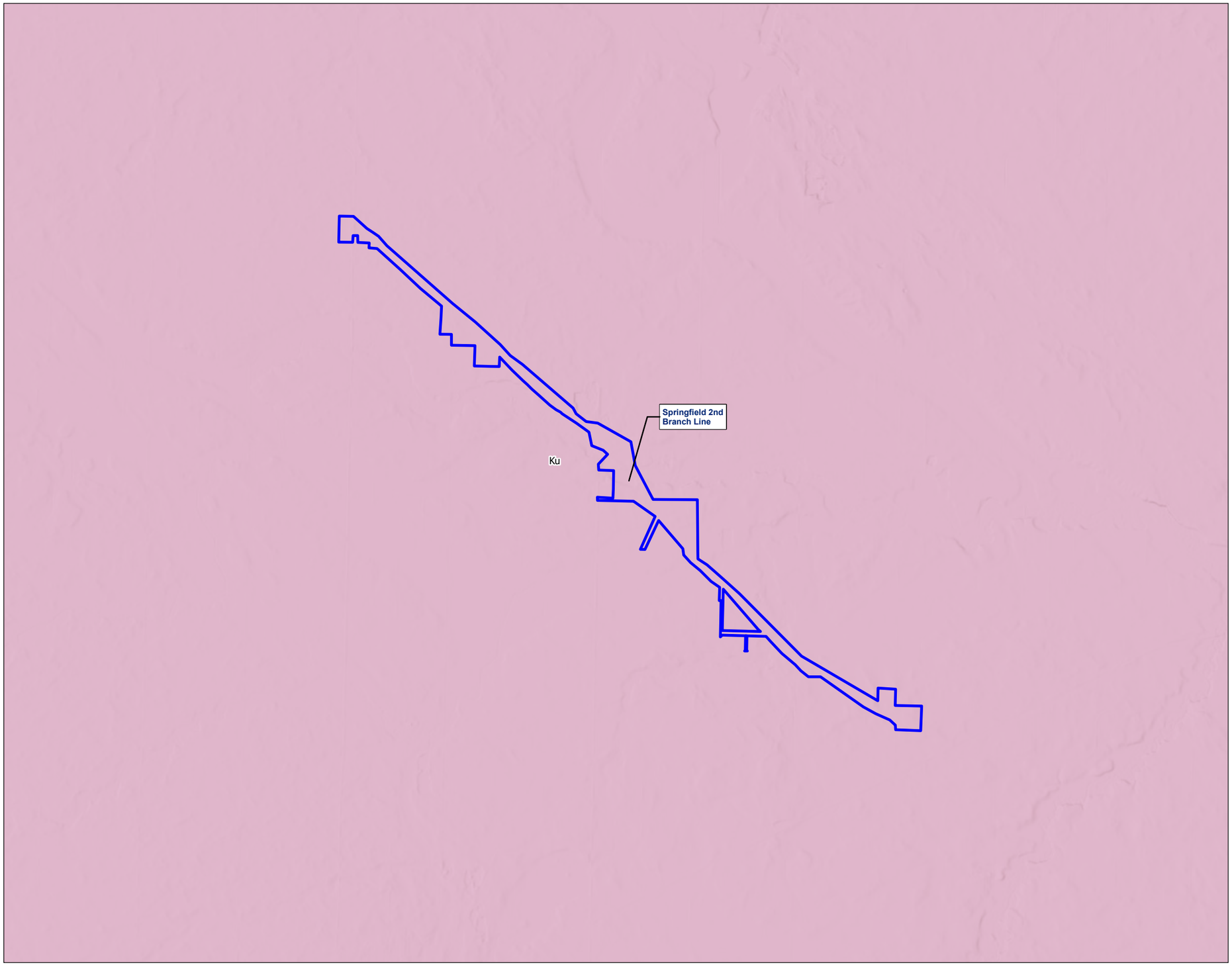


Figure No.

6-2

Title

Bedrock Geology
NL27 - Springfield 2nd branch line

Client/Project 172608813

Northern Natural Gas
Northern Lights 2027 Expansion Project / Ventura to Farmington A-Line Abandonment & Capacity Replacement Project

Project Location
Watonwan County, Minnesota

Prepared by JM on 2025-10-06
TR by SF on 2025-10-06
IR by SK on 2026-01-28

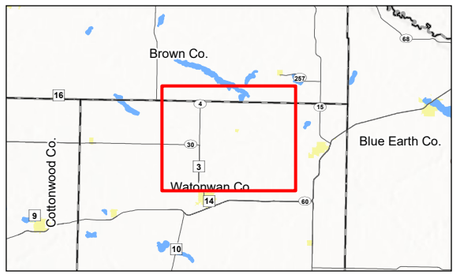
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(At original document size of 11x17)
1:63,360

Legend

- Environmental Survey Boundary (NL27)
- Cretaceous - shale, sandstone (Ku)



Notes
1. Coordinate System: NAD 1983 UTM Zone 15N
2. Data Sources: Stantec, NNG, Esri, USCB, USGS
3. Background: Esri World Hillshade

Stantec

Northern Natural Gas

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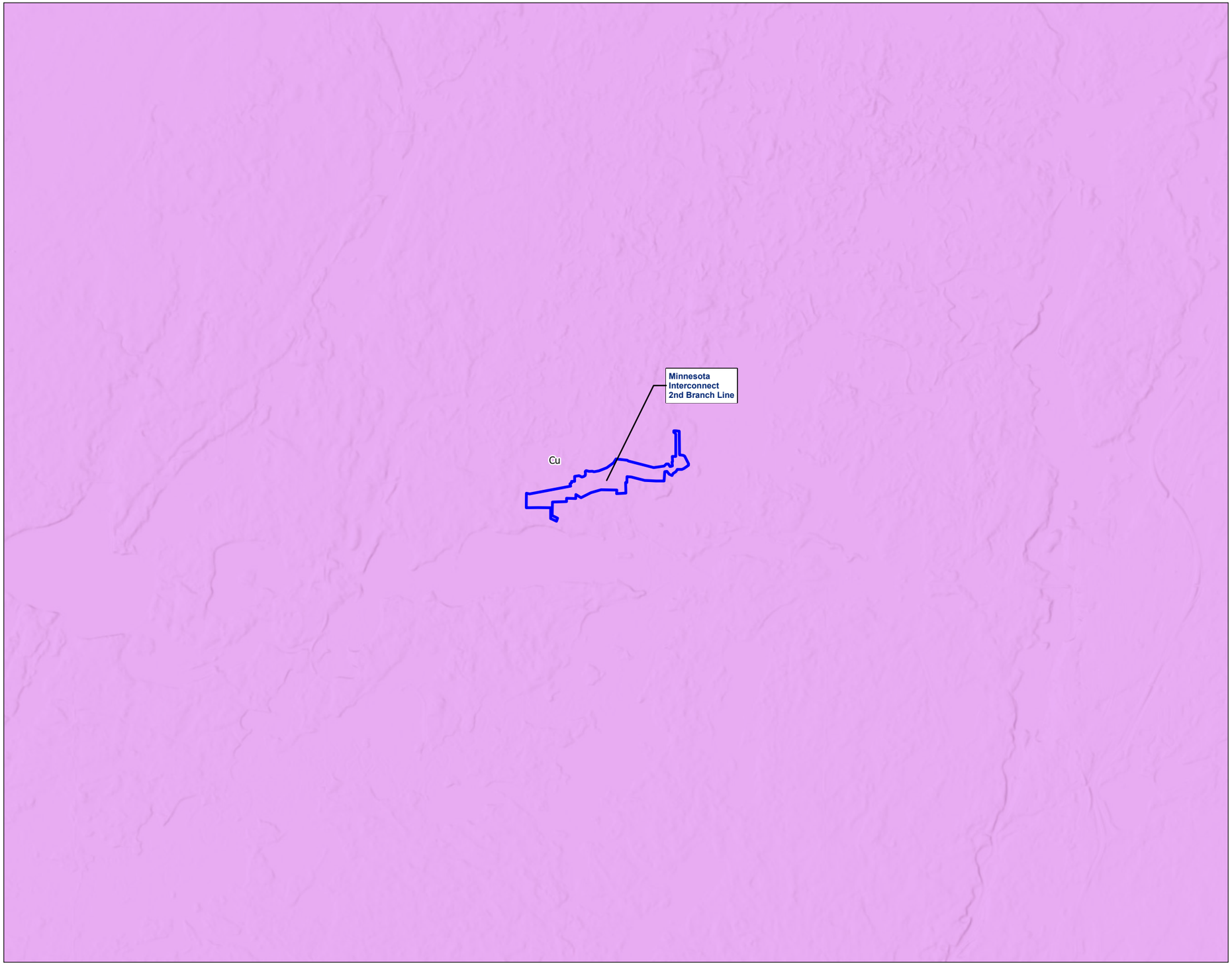


Figure No.

6-2

Title

Bedrock Geology
NL27 - Minnesota Interconnect 2nd branch line

Client/Project 172608813

Northern Natural Gas
Northern Lights 2027 Expansion Project / Ventura to Farmington A-Line Abandonment & Capacity Replacement Project

Project Location
Isanti County, Minnesota

Prepared by JM on 2025-10-06
TR by SF on 2025-10-06
IR by SK on 2026-01-28

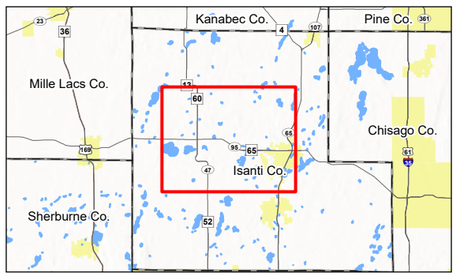
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(At original document size of 11x17)
1:63,360

Legend

- Environmental Survey Boundary (NL27)
- Late Cambrian - dolostone (dolomite), sandstone (Cu)



Notes
1. Coordinate System: NAD 1983 UTM Zone 15N
2. Data Sources: Stantec, NNG, Esri, USCB, USGS
3. Background: Esri World Hillshade

Stantec

Northern Natural Gas

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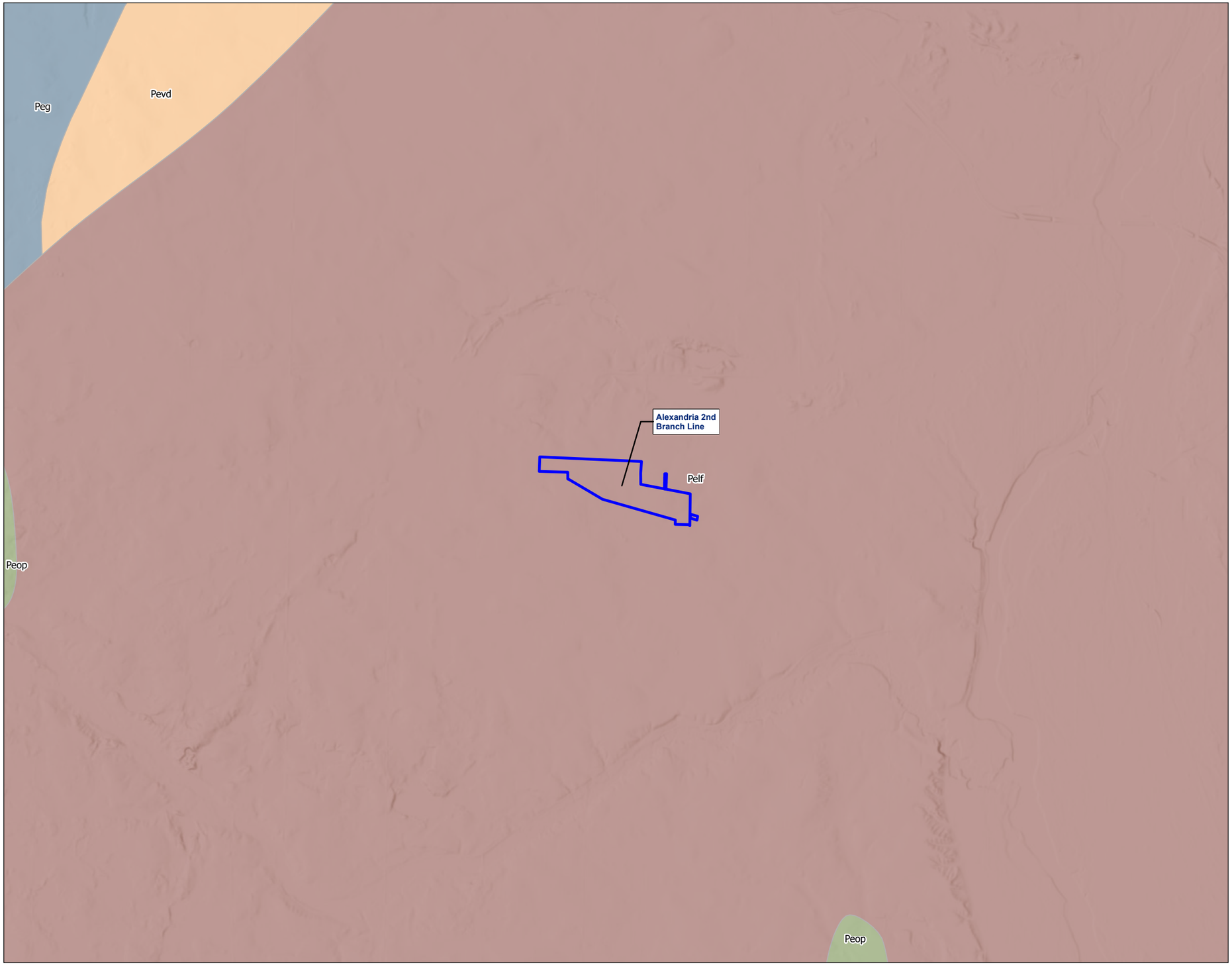


Figure No.

6-2

Title

Bedrock Geology
NL27 - Alexandria 2nd branch line

Client/Project 172608813

Northern Natural Gas
Northern Lights 2027 Expansion Project / Ventura to Farmington A-Line Abandonment & Capacity Replacement Project

Project Location
Morrison County, Minnesota

Prepared by JM on 2025-10-06
TR by SF on 2025-10-06
IR by SK on 2026-01-28

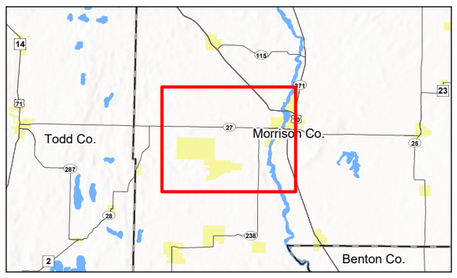
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(At original document size of 11x17)
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Legend

- Environmental Survey Boundary (NL27)
- Early Proterozoic - metavolcanic rock, diabase (Pevd)
- Early Proterozoic - pyroxenite, diorite (Peop)
- Early Proterozoic - shale, siltstone (Peg)
- Early Proterozoic - slate, argillite (Pelf)



Notes
1. Coordinate System: NAD 1983 UTM Zone 15N
2. Data Sources: Stantec, NNG, Esri, USCB, USGS
3. Background: Esri World Hillshade

Stantec

Northern Natural Gas

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Figure No.
6-2

Title
Bedrock Geology
NL27 - Hugo Compressor Station

Client/Project 172608813
Northern Natural Gas
Northern Lights 2027 Expansion Project / Ventura to Farmington A-Line Abandonment & Capacity Replacement Project

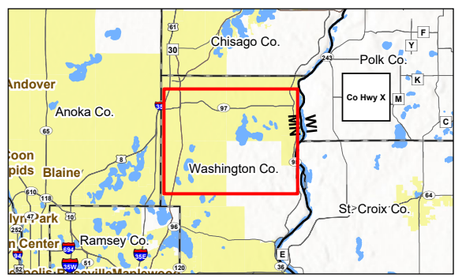
Project Location
Washington County, Minnesota

Prepared by JM on 2025-10-06
TR by SF on 2025-10-06
IR by SK on 2026-01-28

N

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(At original document size of 11x17)
1:63,360

Legend
- Environmental Survey Boundary (NL27)
- Carbonate rocks buried under =50 ft of glacially derived insoluble sediments in a humid climate
- Carbonate rocks buried under >50 ft of glacially derived insoluble sediments in a humid climate
- Late Cambrian - dolostone (dolomite), sandstone (Cu)
- Lower Ordovician - dolostone (dolomite), limestone (Ol)
- Middle Ordovician - sandstone, limestone (Om)
- Middle Ordovician - shale, limestone (Omd)



Notes
1. Coordinate System: NAD 1983 UTM Zone 15N
2. Data Sources: Stantec, NNG, Esri, USCB, USGS
3. Background: Esri World Hillshade

Stantec
Northern Natural Gas

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Figure 6-3
FEMA Flood Hazard Areas for V2F Project



Figure No.

6-3

Title

FEMA Flood Hazard Areas
V2F - Disconnect Site Ventura Compressor Station

Client/Project 172608813

Northern Natural Gas
Ventura to Farmington A-Line Abandonment & Capacity Replacement Project

Project Location
Hancock County, Iowa

Prepared by JM on 2025-10-06
TR by JL on 2025-10-27
IR by SK on 2026-01-28

N

0 1,000 2,000 Feet

(At original document size of 11x17)
1:24,000

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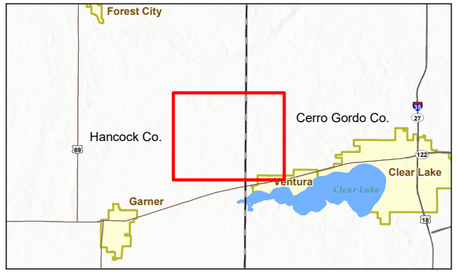
- Environmental Survey Boundary
- Extra Temporary Workspace
- Temporary Access Road
- Existing Pipeline

FEMA Flood Hazard Areas

- 100-Year Floodplain
- 500-Year Floodplain

National Hydrography Dataset

- Perennial Stream
- Intermittent Stream
- Canal/Ditch
- Waterbody



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

Stantec

Northern Natural Gas

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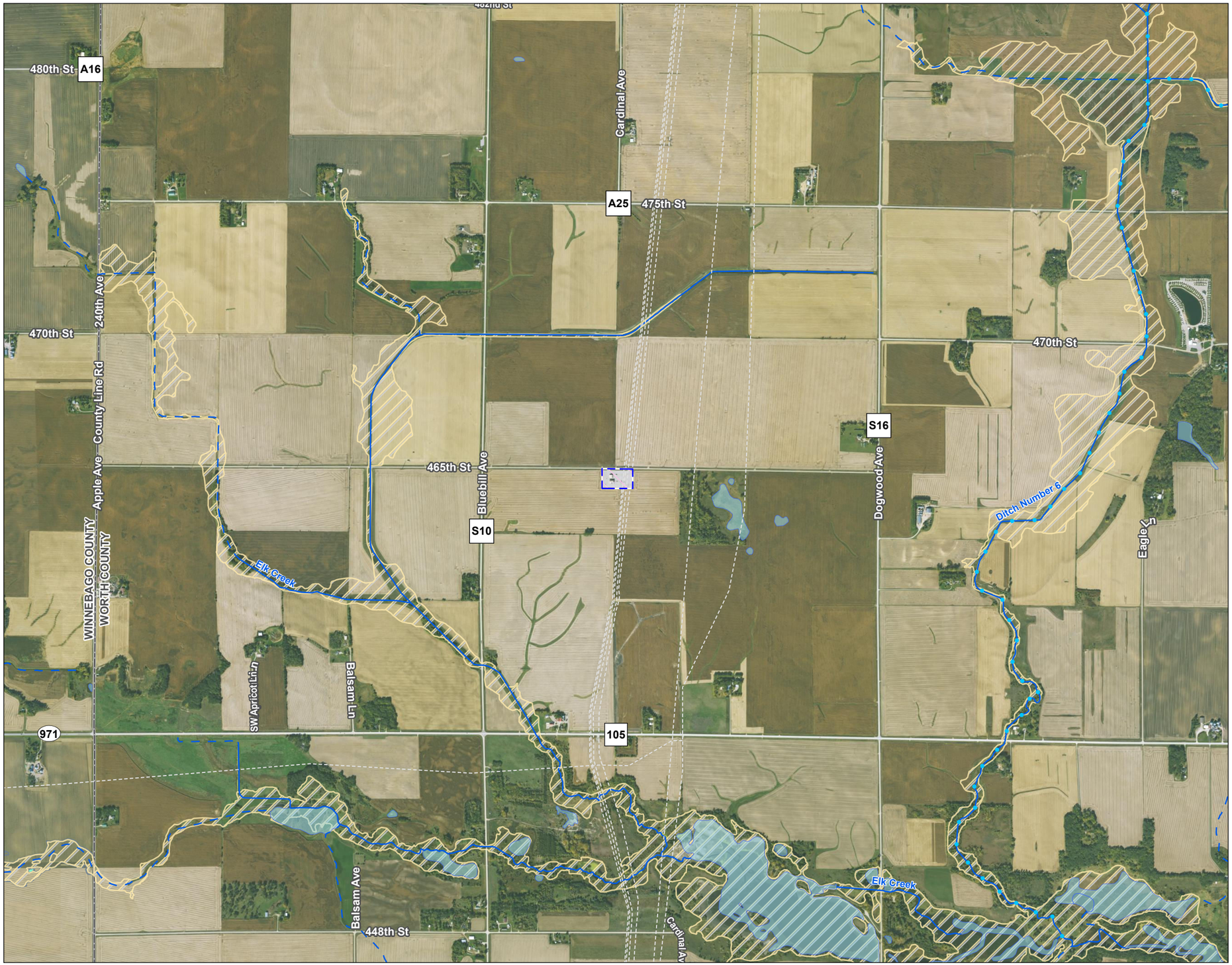


Figure No.

6-3

Title

FEMA Flood Hazard Areas
V2F - Temporary Compression Site Lake Mills Compressor Station

Client/Project 172608813

Northern Natural Gas
Ventura to Farmington A-Line Abandonment & Capacity Replacement Project

Project Location
Worth County, Iowa

Prepared by JM on 2025-10-06
TR by JL on 2025-10-27
IR by SK on 2026-01-28

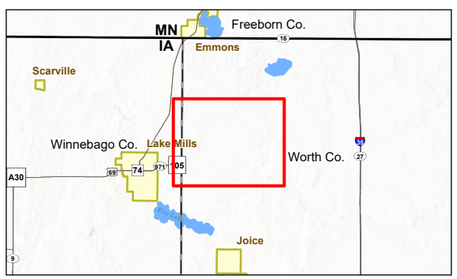
N

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1:24,000

Legend
- Environmental Survey Boundary
- Extra Temporary Workspace
- Existing Pipeline

FEMA Flood Hazard Areas
- 100-Year Floodplain
- 500-Year Floodplain

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



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

Stantec

Northern Natural Gas

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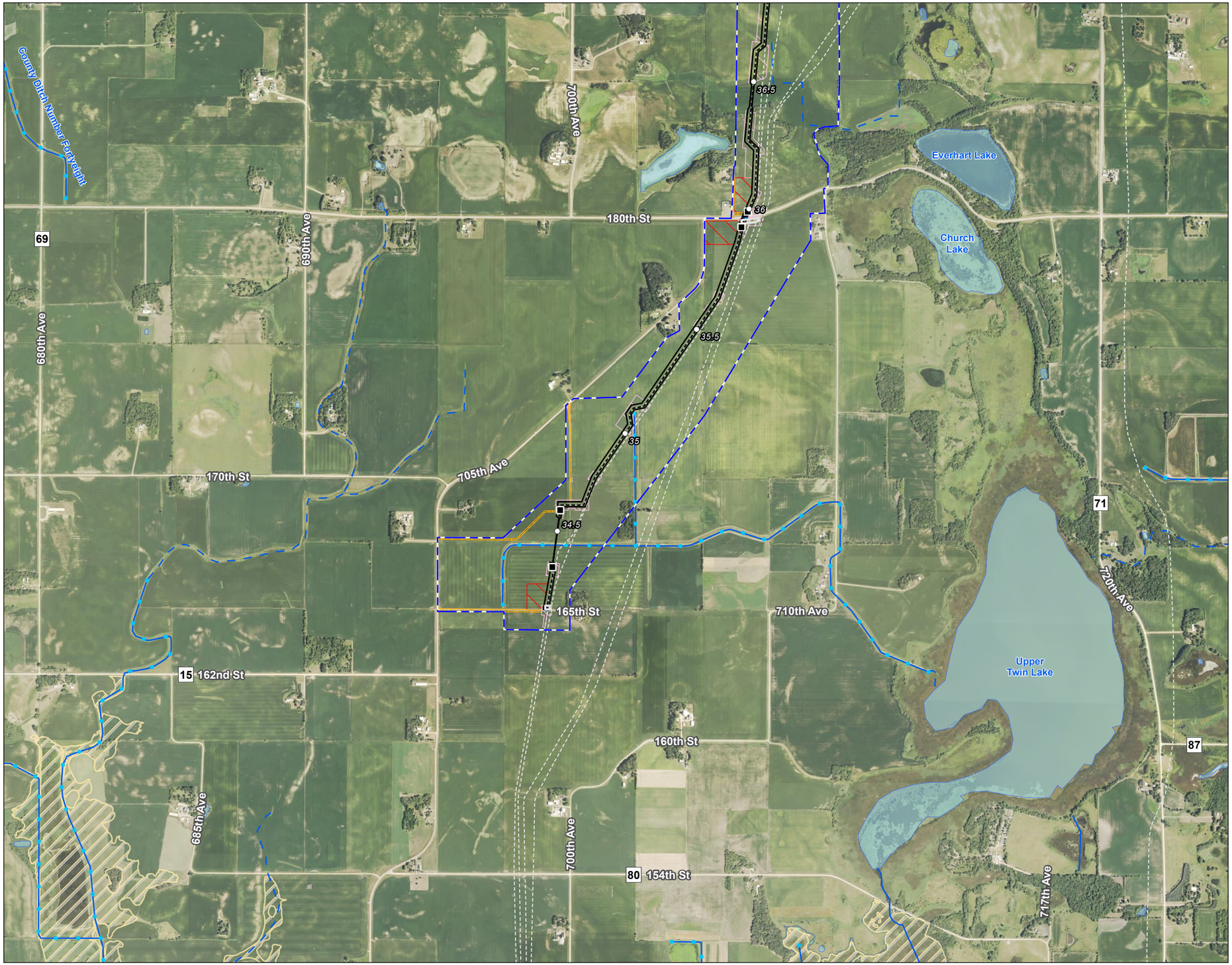


Figure No.

6-3

Title

FEMA Flood Hazard Areas
V2F - Lake Mills M500 E-Line

Client/Project 172608813

Northern Natural Gas
Ventura to Farmington A-Line Abandonment & Capacity Replacement Project

Project Location
Freeborn County, Minnesota

Prepared by JM on 2025-10-06
TR by JL on 2025-10-27
IR by SK on 2026-01-28

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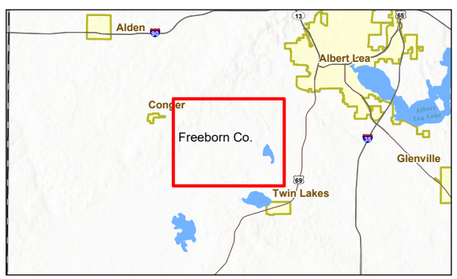
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- Existing Lot
- Existing Access Road
- Temporary Workspace
- Extra Temporary Workspace
- Staging Area
- Temporary Access Road
- Proposed Pipeline
- Existing Pipeline
- Mile Post
- HDD

FEMA Flood Hazard Areas

- 100-Year Floodplain
- 500-Year Floodplain

National Hydrography Dataset

- Perennial Stream
- Intermittent Stream
- Canal/Ditch
- Waterbody



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

Stantec

Northern Natural Gas

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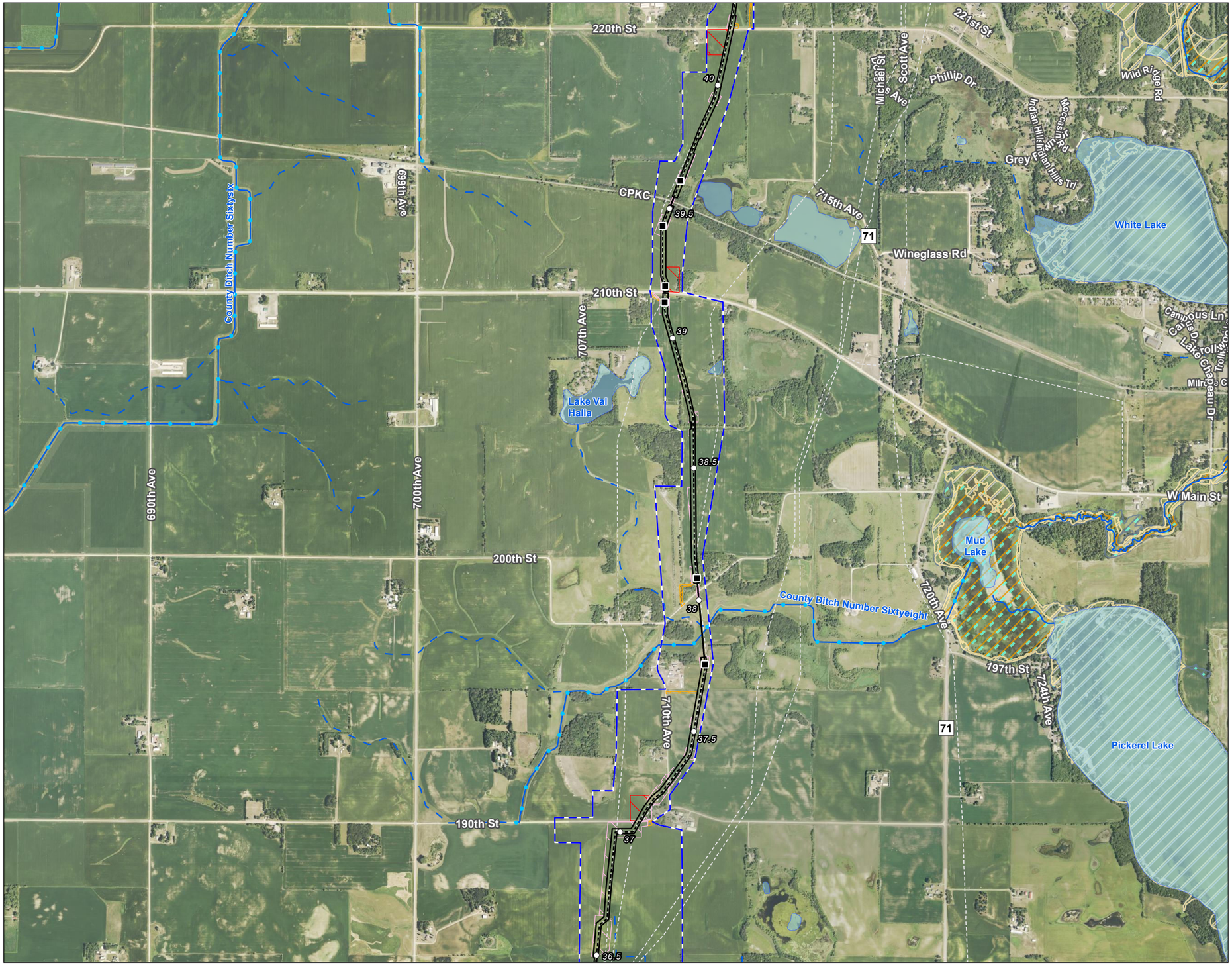


Figure No.
6-3

Title
FEMA Flood Hazard Areas
V2F - Lake Mills M500 E-Line

Client/Project
Northern Natural Gas
Ventura to Farmington A-Line Abandonment & Capacity Replacement Project

172608813

Project Location
Freeborn County, Minnesota

Prepared by JM on 2025-10-06
TR by JL on 2025-10-27
IR by SK on 2026-01-28

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Legend
- Environmental Survey Boundary
- Temporary Workspace
- Extra Temporary Workspace
- Staging Area
- Temporary Access Road
- Proposed Pipeline
- Existing Pipeline
- Mile Post
- HDD

FEMA Flood Hazard Areas
- Floodway
- 100-Year Floodplain
- 500-Year Floodplain

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



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

Stantec

Northern Natural Gas

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Figure No.

6-3

Title

FEMA Flood Hazard Areas
V2F - Lake Mills M500 E-Line

Client/Project 172608813

Northern Natural Gas
Ventura to Farmington A-Line Abandonment & Capacity Replacement Project

Project Location
Freeborn County, Minnesota

Prepared by JM on 2025-10-06
TR by JL on 2025-10-27
IR by SK on 2026-01-28

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- Environmental Survey Boundary
- Existing Lot
- Temporary Workspace
- Extra Temporary Workspace
- Staging Area
- Temporary Access Road
- Proposed Pipeline
- Existing Pipeline
- Mile Post
- HDD

FEMA Flood Hazard Areas

- Floodway
- 100-Year Floodplain
- 500-Year Floodplain

National Hydrography Dataset

- Perennial Stream
- Intermittent Stream
- Canal/Ditch
- Waterbody



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

Stantec

Northern Natural Gas

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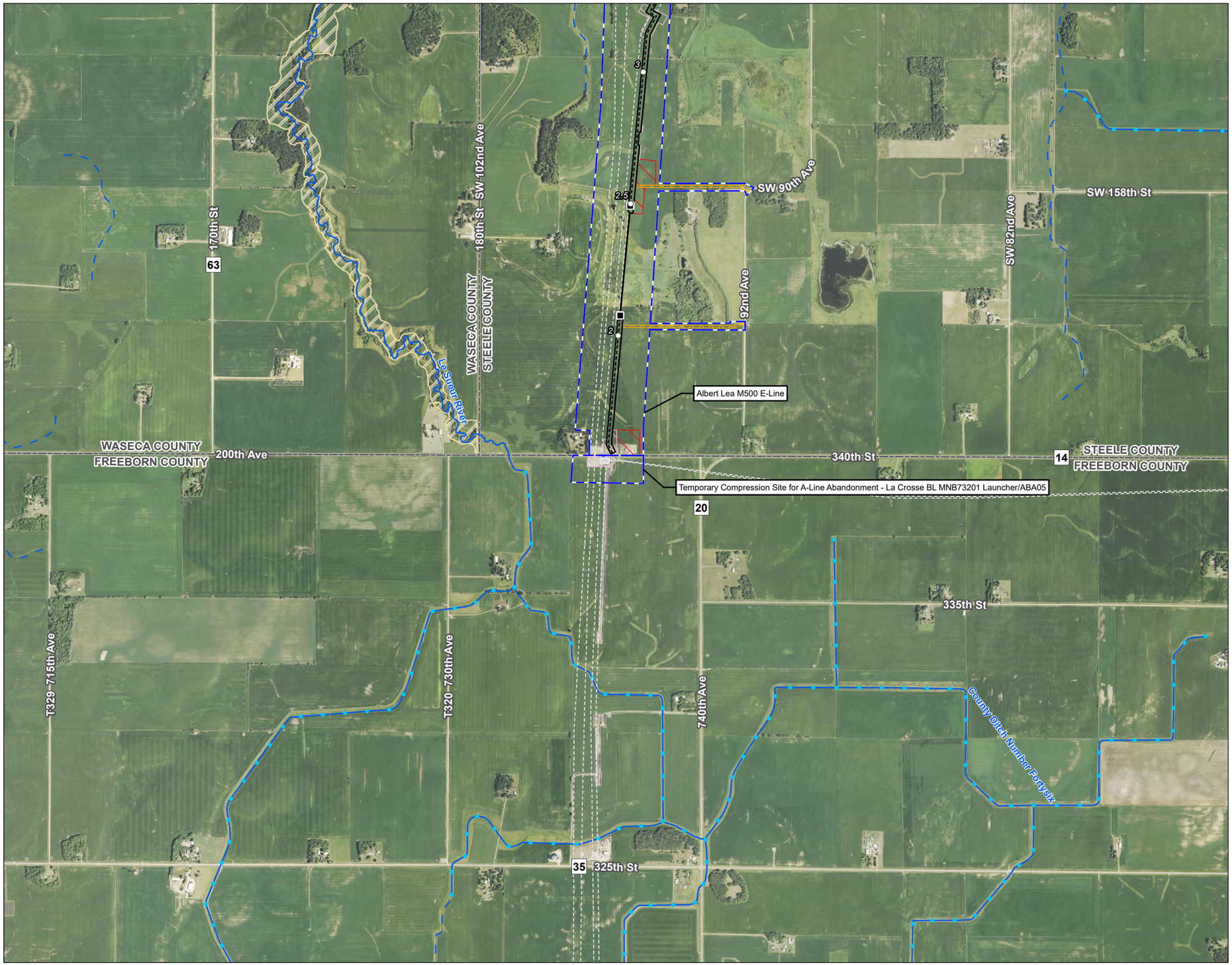


Figure No.

6-3

Title

FEMA Flood Hazard Areas
V2F - Albert Lea M500 E-Line

Client/Project 172608813

Northern Natural Gas
Ventura to Farmington A-Line Abandonment & Capacity Replacement Project

Project Location
Steele County, Minnesota

Prepared by JM on 2025-10-06
TR by JL on 2025-10-27
IR by SK on 2026-01-28

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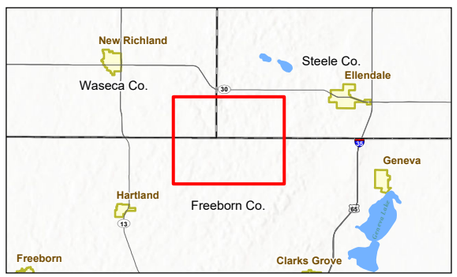
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- Existing Lot
- Existing Access Road
- Temporary Workspace
- Extra Temporary Workspace
- Staging Area
- Temporary Access Road
- Proposed Pipeline
- Existing Pipeline
- Mile Post
- HDD

FEMA Flood Hazard Areas

- 100-Year Floodplain

National Hydrography Dataset

- Perennial Stream
- Intermittent Stream
- Canal/Ditch



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

Stantec

Northern Natural Gas

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Figure No.

6-3

Title

FEMA Flood Hazard Areas
V2F - Albert Lea M500 E-Line

Client/Project 172608813

Northern Natural Gas
Ventura to Farmington A-Line Abandonment & Capacity Replacement Project

Project Location
Steele County, Minnesota

Prepared by JM on 2025-10-06
TR by JL on 2025-10-27
IR by SK on 2026-01-28

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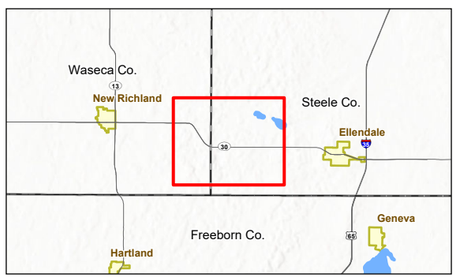
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- Extra Temporary Workspace
- Staging Area
- Temporary Access Road
- Proposed Pipeline
- Existing Pipeline
- Mile Post
- HDD

FEMA Flood Hazard Areas

- 100-Year Floodplain

National Hydrography Dataset

- Perennial Stream
- Intermittent Stream
- Canal/Ditch
- Waterbody



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

Stantec

Northern Natural Gas

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Figure No.

6-3

Title

FEMA Flood Hazard Areas
V2F - Temporary Compression Site Owatonna Compressor Station

Client/Project 172608813

Northern Natural Gas
Ventura to Farmington A-Line Abandonment & Capacity Replacement Project

Project Location
Steele County, Minnesota

Prepared by JM on 2025-10-06
TR by JL on 2025-10-27
IR by SK on 2026-01-28

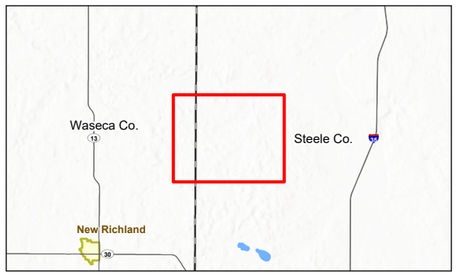
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Legend
- Environmental Survey Boundary
- Extra Temporary Workspace
- Temporary Access Road
- Existing Pipeline

FEMA Flood Hazard Areas
- 100-Year Floodplain

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



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

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Northern Natural Gas

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Figure No.

6-3

Title

FEMA Flood Hazard Areas
V2F - Temporary Compression Site Northfield #1

Client/Project 172608813

Northern Natural Gas
Ventura to Farmington A-Line Abandonment & Capacity Replacement Project

Project Location
Dakota County, Minnesota

Prepared by JM on 2025-10-06
TR by JL on 2025-10-27
IR by SK on 2026-01-28

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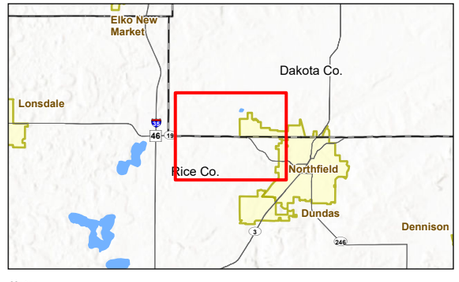
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- Existing Access Road
- Extra Temporary Workspace
- Temporary Access Road
- Existing Pipeline

FEMA Flood Hazard Areas

- Floodway
- 100-Year Floodplain
- 500-Year Floodplain

National Hydrography Dataset

- Perennial Stream
- Intermittent Stream
- Waterbody



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

Stantec

Northern Natural Gas

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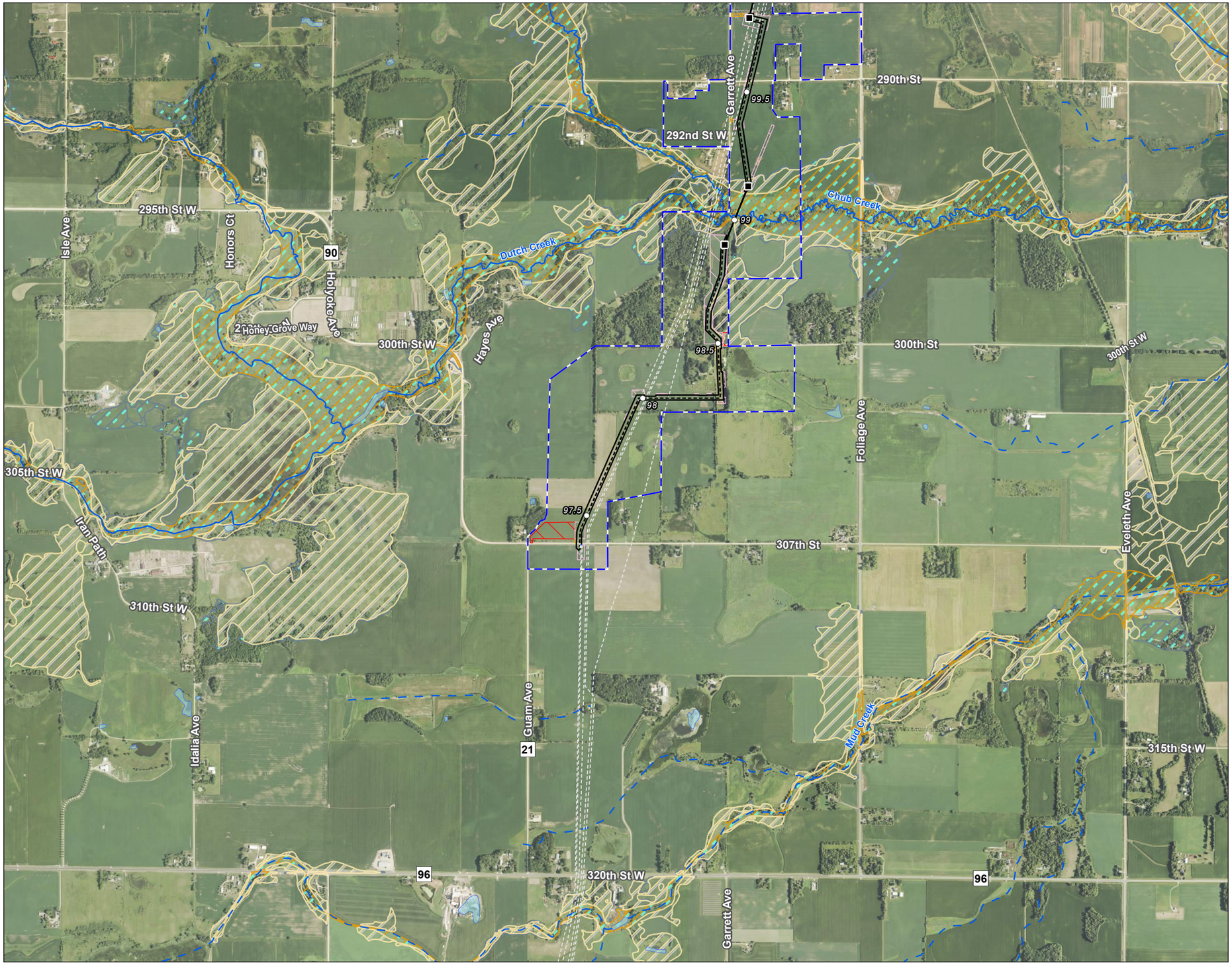


Figure No.

6-3

Title

FEMA Flood Hazard Areas
V2F - Faribault M500 D-Line

Client/Project 172608813

Northern Natural Gas
Ventura to Farmington A-Line Abandonment & Capacity Replacement Project

Project Location
Dakota County, Minnesota

Prepared by JM on 2025-10-06
TR by JL on 2025-10-27
IR by SK on 2026-01-28

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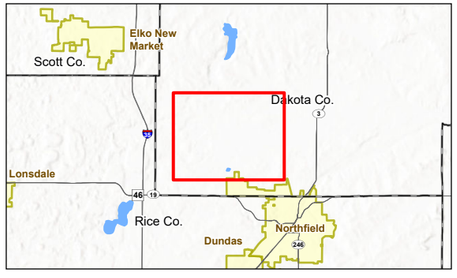
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- Existing Lot
- Existing Access Road
- Temporary Workspace
- Extra Temporary Workspace
- Staging Area
- Temporary Access Road
- Proposed Pipeline
- Existing Pipeline
- Mile Post
- HDD

FEMA Flood Hazard Areas

- Floodway
- 100-Year Floodplain
- 500-Year Floodplain

National Hydrography Dataset

- Perennial Stream
- Intermittent Stream
- Waterbody



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

Stantec

Northern Natural Gas

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Figure No.

6-3

Title

FEMA Flood Hazard Areas
V2F - Faribault M500 D-Line

Client/Project 172608813

Northern Natural Gas
Ventura to Farmington A-Line Abandonment & Capacity Replacement Project

Project Location
Dakota County, Minnesota

Prepared by JM on 2025-10-06
TR by JL on 2025-10-27
IR by SK on 2026-01-28

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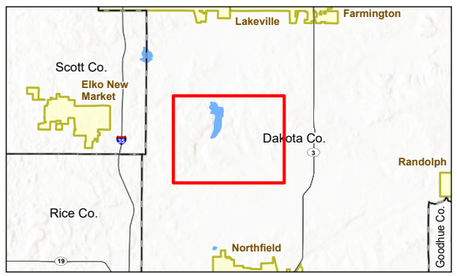
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- Existing Lot
- Temporary Workspace
- Extra Temporary Workspace
- Staging Area
- Temporary Access Road
- Proposed Pipeline
- Existing Pipeline
- Mile Post
- HDD

FEMA Flood Hazard Areas

- Floodway
- 100-Year Floodplain
- 500-Year Floodplain

National Hydrography Dataset

- Perennial Stream
- Intermittent Stream
- Waterbody



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

Stantec

Northern Natural Gas

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Figure No.

6-3

Title

FEMA Flood Hazard Areas
V2F - Faribault M500 D-Line

Client/Project 172608813

Northern Natural Gas
Ventura to Farmington A-Line Abandonment & Capacity Replacement Project

Project Location
Dakota County, Minnesota

Prepared by JM on 2025-10-06
TR by JL on 2025-10-27
IR by SK on 2026-01-28

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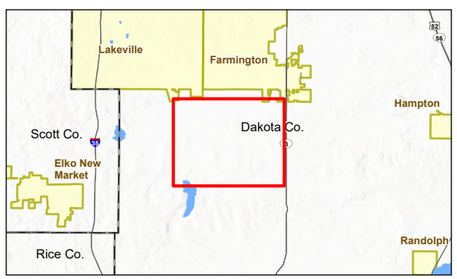
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- Existing Lot
- Existing Access Road
- Temporary Workspace
- Extra Temporary Workspace
- Staging Area
- Temporary Access Road
- Proposed Pipeline
- Existing Pipeline
- Mile Post
- HDD

FEMA Flood Hazard Areas

- Floodway
- 100-Year Floodplain
- 500-Year Floodplain

National Hydrography Dataset

- Perennial Stream
- Intermittent Stream
- Canal/Ditch
- Waterbody



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

Stantec

Northern Natural Gas

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Figure No.

6-3

Title

FEMA Flood Hazard Areas
V2F - Disconnect Site for A-Line Abandonment
Farmington Compressor Station

Client/Project 172608813

Northern Natural Gas
Ventura to Farmington A-Line Abandonment & Capacity Replacement Project

Project Location
Dakota County, Minnesota

Prepared by JM on 2025-10-06
TR by JL on 2025-10-27
IR by SK on 2026-01-28

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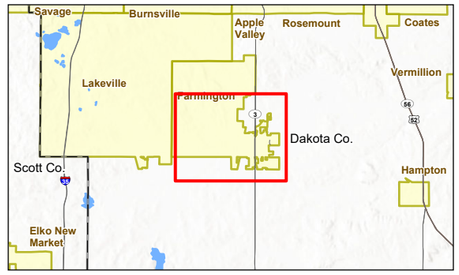
- Environmental Survey Boundary
- Extra Temporary Workspace
- Temporary Access Road
- Existing Pipeline

FEMA Flood Hazard Areas

- Floodway
- 100-Year Floodplain
- 500-Year Floodplain

National Hydrography Dataset

- Perennial Stream
- Intermittent Stream
- Canal/Ditch
- Waterbody



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

Stantec

Northern Natural Gas

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Figure 6-4
FEMA Flood Hazard Areas for NL27 Project

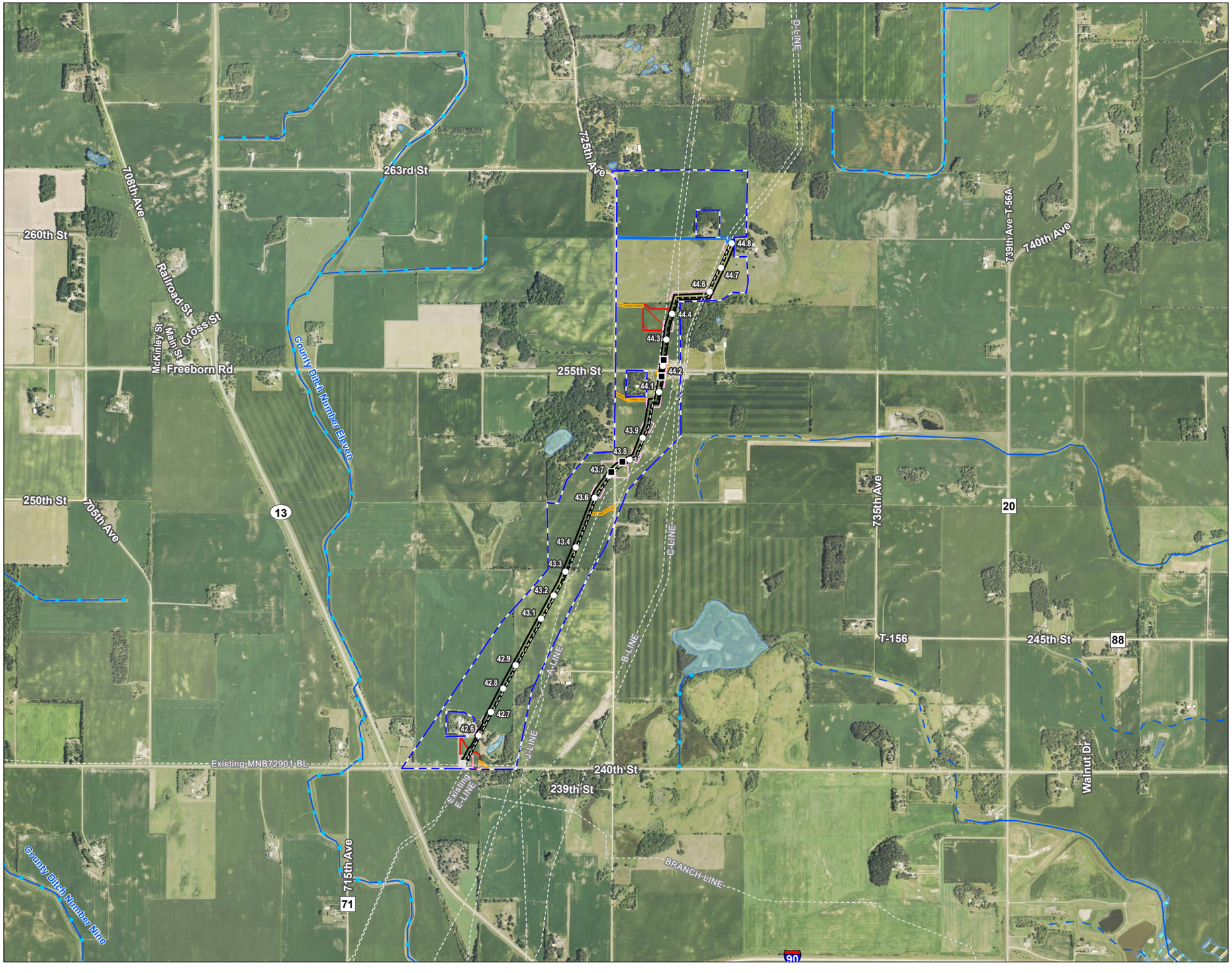


Figure No.

6-4

Title

FEMA Flood Hazard Areas
NL27 - Lake Mills M500 E-line

Client/Project 172609138

Northern Natural Gas
Northern Lights 2027 Expansion Project

Project Location
Freeborn County, Minnesota

Prepared by JM on 2025-12-15
TR by SF on 2026-01-15
IR by SK on 2026-01-15

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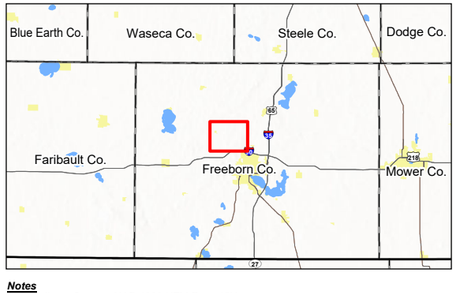
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- Existing Facility
- Proposed Facility
- Permanent Access Road
- Temporary Workspace
- Extra Temporary Workspace
- Temporary Access Road
- Staging Area
- Proposed Pipeline
- Existing Pipeline
- Mile Post
- HDD

Flood Hazard Zones

- Regulatory Floodway
- 100-year Floodplain
- 500-year Floodplain

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, FEMA
3. Background: 2023 NAIP

Stantec

Northern Natural Gas

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Figure No.

6-4

Title

FEMA Flood Hazard Areas
NL27 - Albert Lea M500 E-line

Client/Project 172609138

Northern Natural Gas
Northern Lights 2027 Expansion Project

Project Location
Steele County, Minnesota

Prepared by JM on 2025-12-15
TR by SF on 2026-01-15
IR by SK on 2026-01-15

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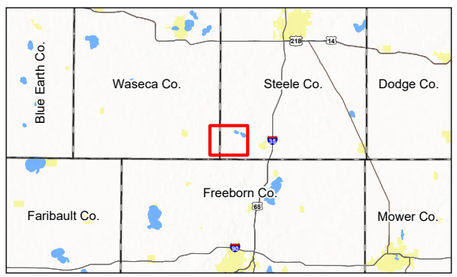
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- Temporary Workspace
- Extra Temporary Workspace
- Temporary Access Road
- Staging Area
- Proposed Pipeline
- Existing Pipeline
- Mile Post
- HDD

Flood Hazard Zones

- Regulatory Floodway
- 100-year Floodplain
- 500-year Floodplain

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, FEMA
3. Background: 2023 NAIP

Stantec

Northern Natural Gas

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Figure No.

6-4

Title

FEMA Flood Hazard Areas
NL27 - Albert Lea M500 E-line

Client/Project 172609138

Northern Natural Gas
Northern Lights 2027 Expansion Project

Project Location
Steele County, Minnesota

Prepared by JM on 2025-12-15
TR by SF on 2026-01-15
IR by SK on 2026-01-15

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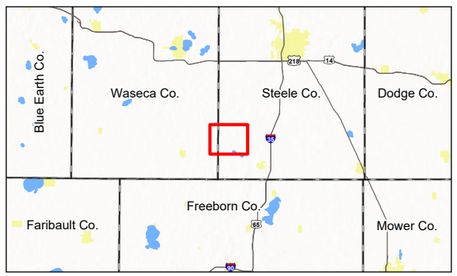
- Environmental Survey Boundary
- Proposed Facility
- Permanent Access Road
- Temporary Workspace
- Extra Temporary Workspace
- Temporary Access Road
- Staging Area
- Proposed Pipeline
- Existing Pipeline
- Mile Post
- HDD

Flood Hazard Zones

- Regulatory Floodway
- 100-year Floodplain
- 500-year Floodplain

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, FEMA
3. Background: 2023 NAIP

Stantec

Northern Natural Gas

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Figure No.

6-4

Title

FEMA Flood Hazard Areas
NL27 - Willmar 3rd Branch Line Upstream

Client/Project 172609138

Northern Natural Gas
Northern Lights 2027 Expansion Project

Project Location
Scott County, Minnesota

Prepared by JM on 2025-12-15
TR by SF on 2026-01-15
IR by SK on 2026-01-15

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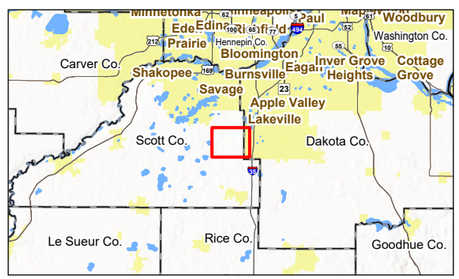
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- Existing Facility
- Temporary Workspace
- Extra Temporary Workspace
- Temporary Access Road
- Staging Area
- Proposed Pipeline
- Existing Pipeline
- Mile Post
- HDD

Flood Hazard Zones

- Regulatory Floodway
- 100-year Floodplain
- 500-year Floodplain

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, FEMA
3. Background: 2023 NAIP

Stantec

Northern Natural Gas

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Figure No.

6-4

Title

FEMA Flood Hazard Areas
NL27 - Willmar 3rd Branch Line Downstream

Client/Project 172609138

Northern Natural Gas
Northern Lights 2027 Expansion Project

Project Location
Carver County, Minnesota

Prepared by JM on 2025-12-15
TR by SF on 2026-01-15
IR by SK on 2026-01-15

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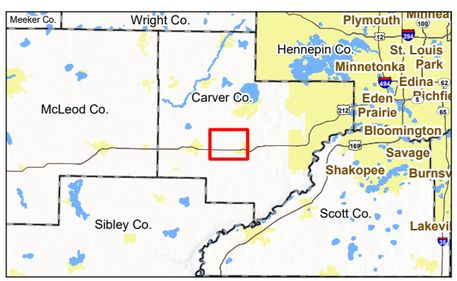
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- Temporary Workspace
- Extra Temporary Workspace
- Temporary Access Road
- Staging Area
- Proposed Pipeline
- Existing Pipeline
- Mile Post
- HDD

Flood Hazard Zones

- Regulatory Floodway
- 100-year Floodplain
- 500-year Floodplain

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, FEMA
3. Background: 2023 NAIP

Stantec

Northern Natural Gas

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Figure No.
6-4

Title
FEMA Flood Hazard Areas
NL27 - Willmar 3rd Branch Line Downstream

Client/Project
172609138
Northern Natural Gas
Northern Lights 2027 Expansion Project

Project Location
Carver County, Minnesota

Prepared by JM on 2025-12-15
TR by SF on 2026-01-15
IR by SK on 2026-01-15

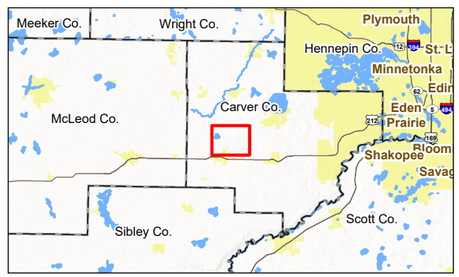
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- Environmental Survey Boundary To Be Surveyed
- Proposed Facility
- Permanent Access Road
- Temporary Workspace
- Extra Temporary Workspace
- Temporary Access Road
- Staging Area
- Proposed Pipeline
- Existing Pipeline
- Mile Post
- HDD

Flood Hazard Zones
- Regulatory Floodway
- 100-year Floodplain
- 500-year Floodplain

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, FEMA
3. Background: 2023 NAIP

Stantec
Northern Natural Gas

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Figure No.
6-4

Title
FEMA Flood Hazard Areas
NL27 - Welcome 2nd Line

Client/Project 172609138
Northern Natural Gas
Northern Lights 2027 Expansion Project

Project Location
Martin County, Minnesota

Prepared by JM on 2025-12-15
TR by SF on 2026-01-15
IR by SK on 2026-01-15

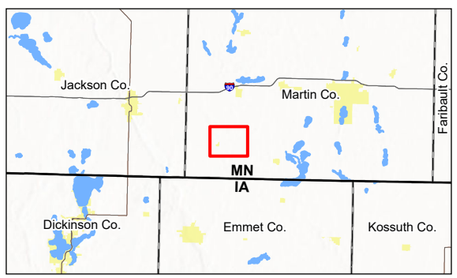
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- Proposed Facility
- Permanent Access Road
- Temporary Workspace
- Extra Temporary Workspace
- Temporary Access Road
- Staging Area
- Proposed Pipeline
- Existing Pipeline
- Mile Post

Flood Hazard Zones
- Regulatory Floodway
- 100-year Floodplain
- 500-year Floodplain

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, FEMA
3. Background: 2023 NAIP

Stantec
Northern Natural Gas

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Figure No.

6-4

Title

FEMA Flood Hazard Areas
NL27 - Paynesville 2nd Branch Line

Client/Project 172609138

Northern Natural Gas
Northern Lights 2027 Expansion Project

Project Location
Stearns County, Minnesota

Prepared by JM on 2025-12-15
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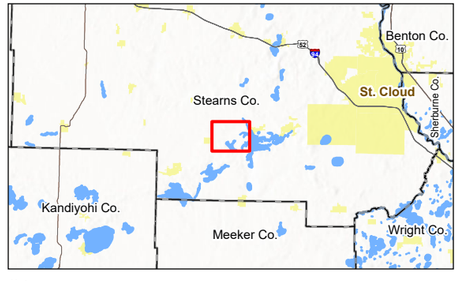
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- Extra Temporary Workspace
- Temporary Access Road
- Staging Area
- Proposed Pipeline
- Existing Pipeline
- Mile Post
- HDD

Flood Hazard Zones

- Regulatory Floodway
- 100-year Floodplain
- 500-year Floodplain

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, FEMA
3. Background: 2023 NAIP

Stantec

Northern Natural Gas

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Figure No.
6-4

Title
FEMA Flood Hazard Areas
NL27 - Worthington 2nd Branch Line

Client/Project
Northern Natural Gas
Northern Lights 2027 Expansion Project

172609138

Project Location
Jackson County, Minnesota

Prepared by JM on 2025-12-15
TR by SF on 2026-01-15
IR by SK on 2026-01-15

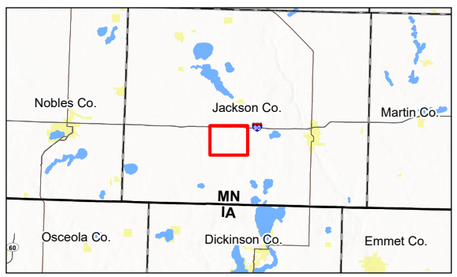
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- Existing Facility
- Proposed Facility
- Permanent Access Road
- Temporary Workspace
- Extra Temporary Workspace
- Temporary Access Road
- Staging Area
- Proposed Pipeline
- Existing Pipeline
- Mile Post
- HDD

Flood Hazard Zones
- Regulatory Floodway
- 100-year Floodplain
- 500-year Floodplain

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, FEMA
3. Background: 2023 NAIP

Stantec

Northern Natural Gas

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Figure No.

6-4

Title

FEMA Flood Hazard Areas
NL27 - Springfield 2nd Branch Line

Client/Project 172609138

Northern Natural Gas
Northern Lights 2027 Expansion Project

Project Location
Watonwan County, Minnesota

Prepared by JM on 2025-12-15
TR by SF on 2026-01-15
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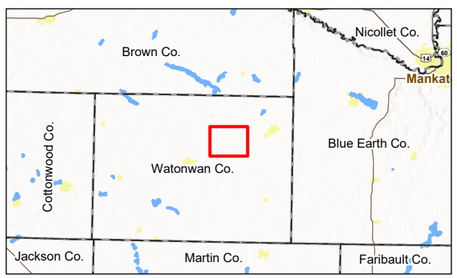
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- Environmental Survey Boundary To Be Surveyed
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- Extra Temporary Workspace
- Temporary Access Road
- Staging Area
- Proposed Pipeline
- Existing Pipeline
- Mile Post
- HDD

Flood Hazard Zones

- Regulatory Floodway
- 100-year Floodplain
- 500-year Floodplain

National Hydrography Dataset

- Perennial Stream
- Intermittent Stream
- Canal/Ditch
- Waterbody



Notes
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2. Data Sources: Stantec, Northern Natural Gas, Esri, USCB, USGS, FEMA
3. Background: 2023 NAIP

Stantec

Northern Natural Gas

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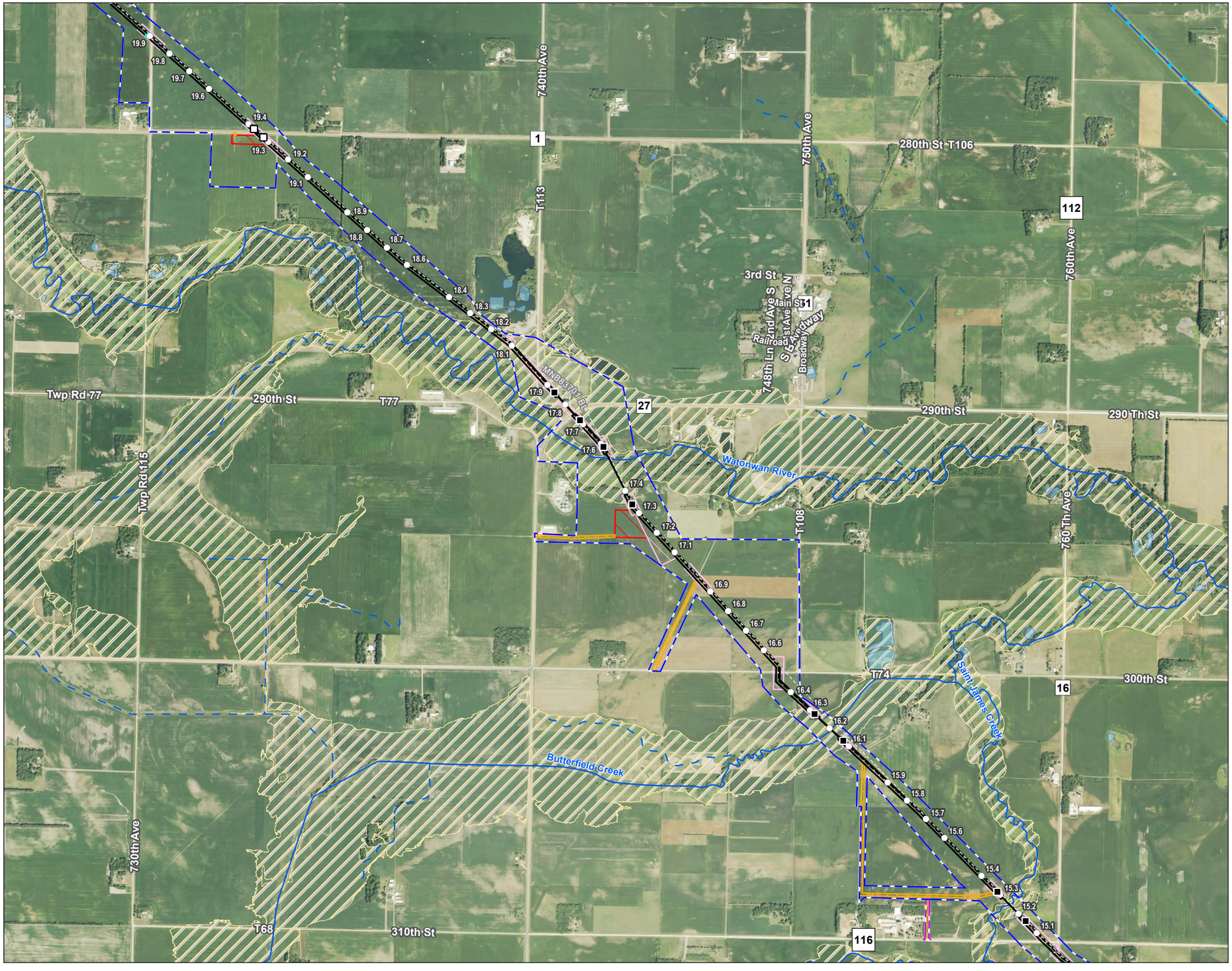


Figure No.

6-4

Title

FEMA Flood Hazard Areas
NL27 - Springfield 2nd Branch Line

Client/Project 172609138

Northern Natural Gas
Northern Lights 2027 Expansion Project

Project Location
Watonwan County, Minnesota

Prepared by JM on 2025-12-15
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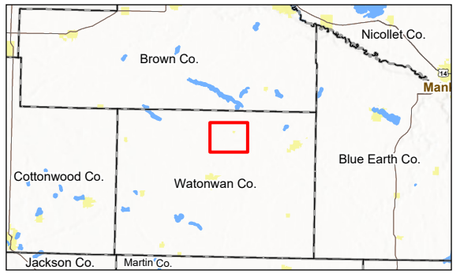
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- Permanent Access Road
- Temporary Workspace
- Extra Temporary Workspace
- Temporary Access Road
- Staging Area
- Proposed Pipeline
- Existing Pipeline
- Mile Post
- Auger Bore
- HDD

Flood Hazard Zones

- Regulatory Floodway
- 100-year Floodplain
- 500-year Floodplain

National Hydrography Dataset

- Perennial Stream
- Intermittent Stream
- Canal/Ditch
- Waterbody



Notes
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2. Data Sources: Stantec, Northern Natural Gas, Esri, USCB, USGS, FEMA
3. Background: 2023 NAIP

Stantec

Northern Natural Gas

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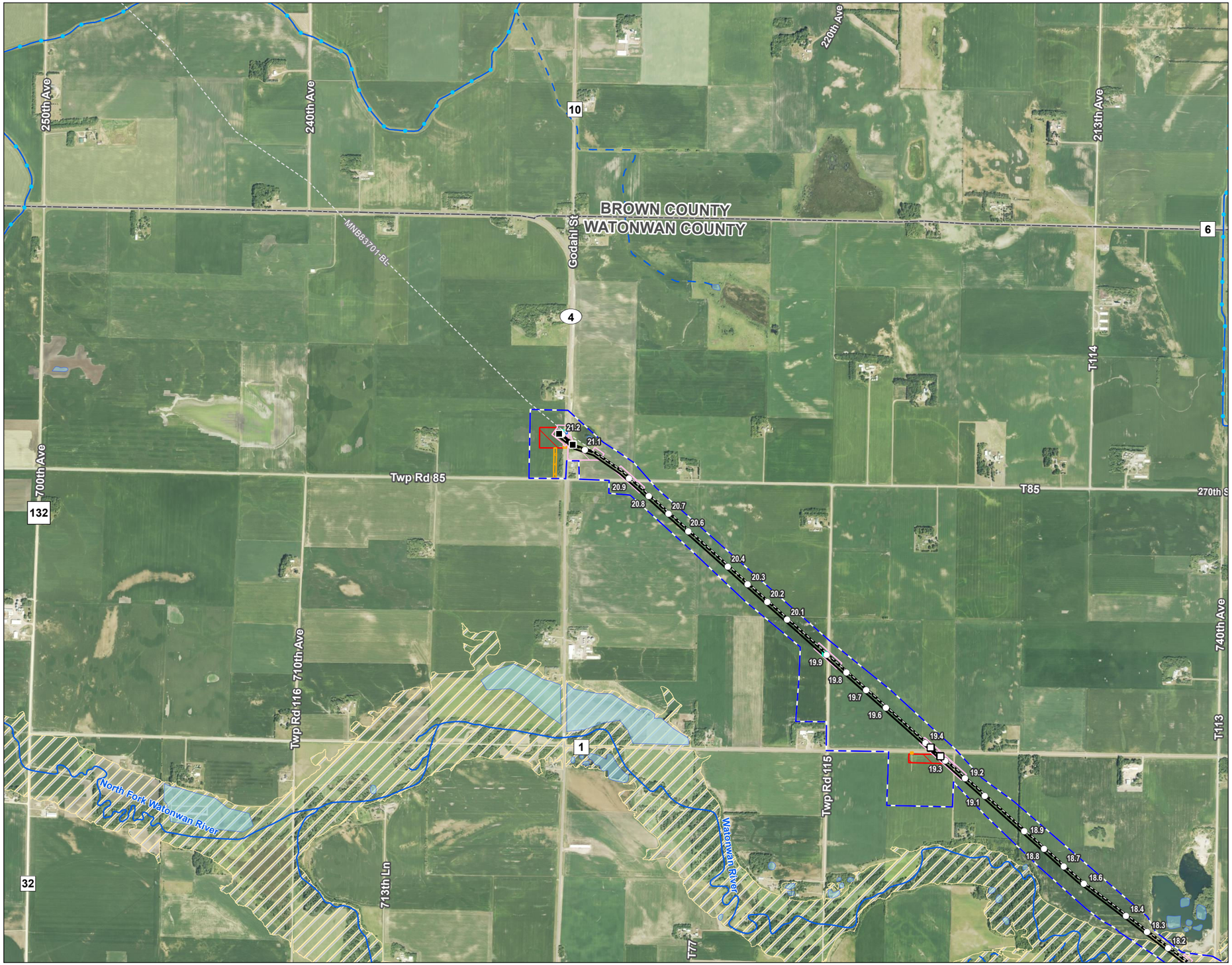


Figure No.

6-4

Title

FEMA Flood Hazard Areas
NL27 - Springfield 2nd Branch Line

Client/Project 172609138

Northern Natural Gas
Northern Lights 2027 Expansion Project

Project Location
Watonwan County, Minnesota

Prepared by JM on 2025-12-15
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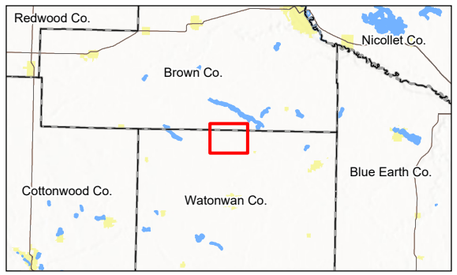
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- Extra Temporary Workspace
- Temporary Access Road
- Staging Area
- Proposed Pipeline
- Existing Pipeline
- Mile Post
- Auger Bore
- HDD

Flood Hazard Zones

- Regulatory Floodway
- 100-year Floodplain
- 500-year Floodplain

National Hydrography Dataset

- Perennial Stream
- Intermittent Stream
- Canal/Ditch
- Waterbody



Notes
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2. Data Sources: Stantec, Northern Natural Gas, Esri, USCB, USGS, FEMA
3. Background: 2023 NAIP

Stantec

Northern Natural Gas

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Figure No.

6-4

Title

FEMA Flood Hazard Areas
NL27 - Minnesota Interconnect 2nd Branch Line

Client/Project 172609138

Northern Natural Gas
Northern Lights 2027 Expansion Project

Project Location
Isanti County, Minnesota

Prepared by JM on 2025-12-15
TR by SF on 2026-01-15
IR by SK on 2026-01-15

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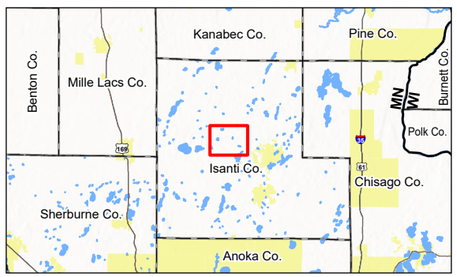
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- Temporary Workspace
- Extra Temporary Workspace
- Temporary Access Road
- Staging Area
- Proposed Pipeline
- Existing Pipeline
- Mile Post
- HDD

Flood Hazard Zones

- Regulatory Floodway
- 100-year Floodplain
- 500-year Floodplain

National Hydrography Dataset

- Perennial Stream
- Intermittent Stream
- Canal/Ditch
- Waterbody



Notes
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2. Data Sources: Stantec, Northern Natural Gas, Esri, USCB, USGS, FEMA
3. Background: 2023 NAIP

Stantec

Northern Natural Gas

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Disclaimer: This document has been prepared based on information provided by others as cited in the Notes section. Stantec has not verified the accuracy and/or completeness of this information and shall not be responsible for any errors or omissions which may be incorporated herein as a result. Stantec assumes no responsibility for data supplied in electronic format, and the recipient accepts full responsibility for verifying the accuracy and completeness of the data.

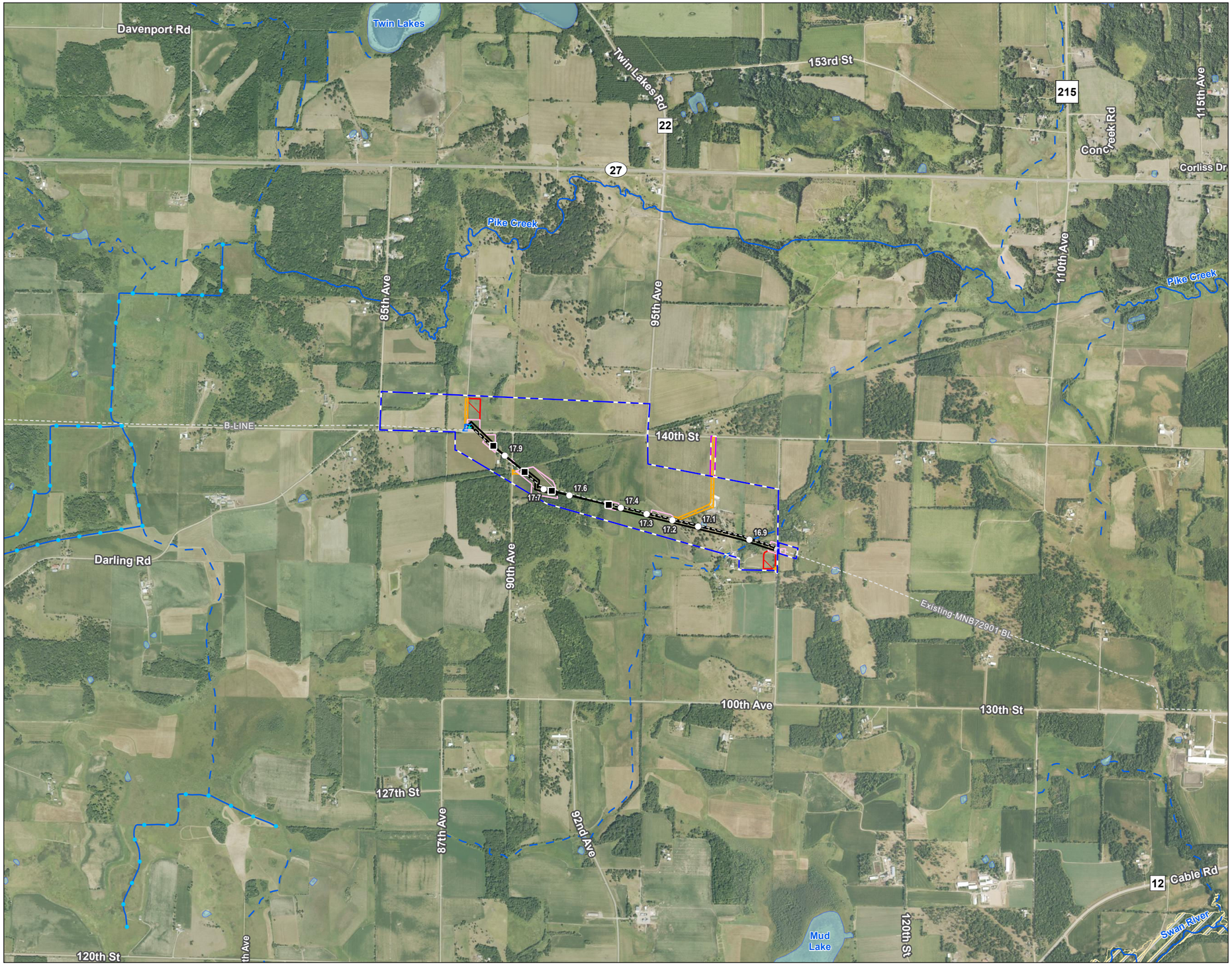


Figure No.
6-4

Title
FEMA Flood Hazard Areas
NL27 - Alexandria 2nd Branch Line

Client/Project 172609138
Northern Natural Gas
Northern Lights 2027 Expansion Project

Project Location
Morrison County, Minnesota

Prepared by JM on 2025-12-15
TR by SF on 2026-01-15
IR by SK on 2026-01-15

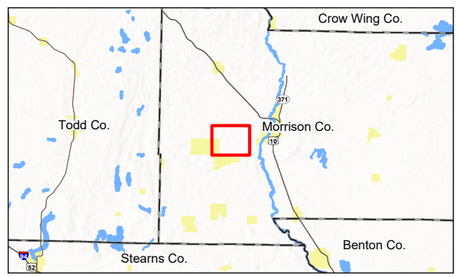
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(At original document size of 11x17)
1:24,000

Legend
- Environmental Survey Boundary
- Environmental Survey Boundary To Be Surveyed
- Existing Facility
- Proposed Facility
- Permanent Access Road
- Temporary Workspace
- Extra Temporary Workspace
- Temporary Access Road
- Staging Area
- Proposed Pipeline
- Existing Pipeline
- Mile Post
- HDD

Flood Hazard Zones
- Regulatory Floodway
- 100-year Floodplain
- 500-year Floodplain

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, FEMA
3. Background: 2023 NAIP

Stantec

Northern Natural Gas

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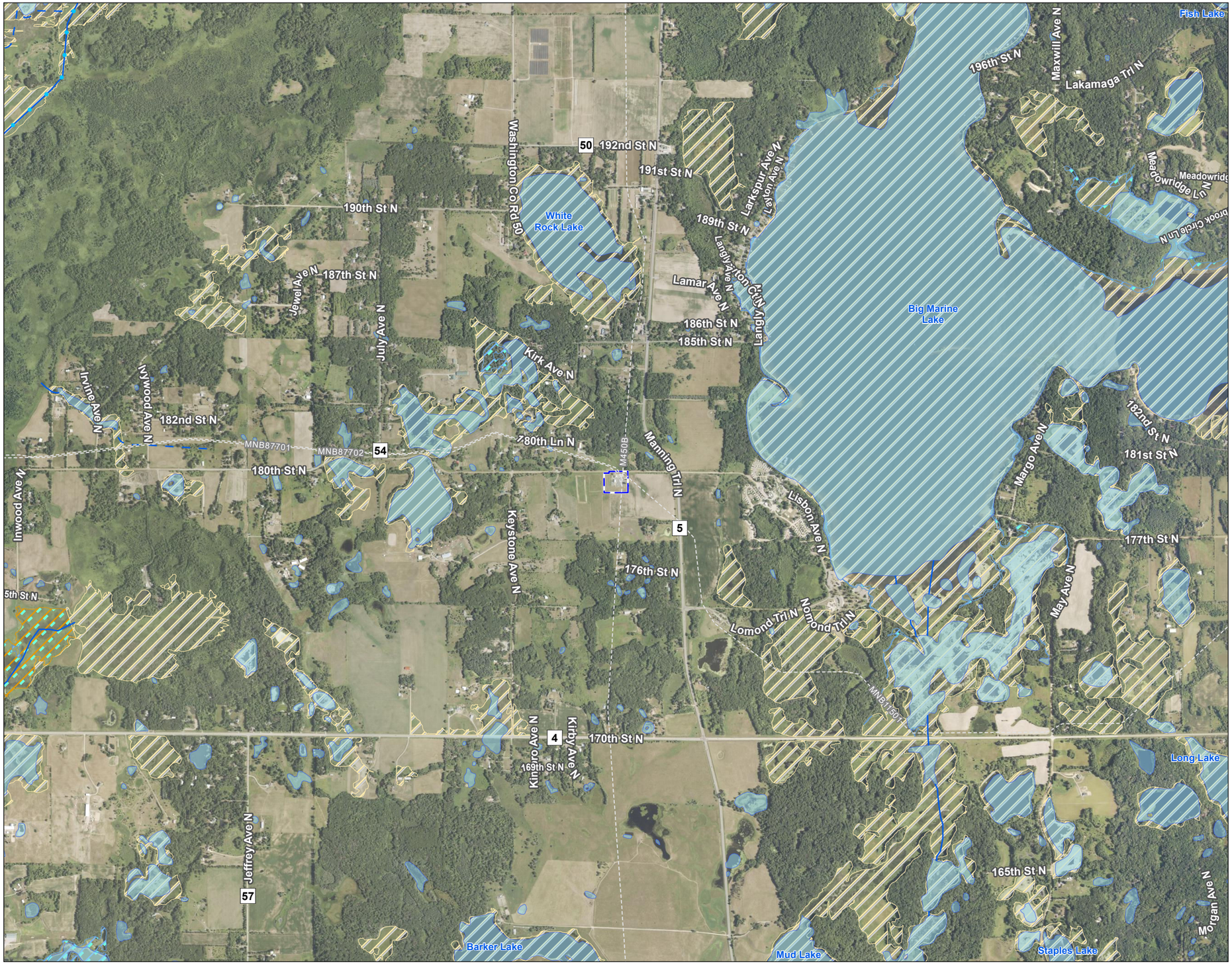


Figure No.

6-4

Title

FEMA Flood Hazard Areas
NL27 - Hugo Compressor Station

Client/Project 172609138

Northern Natural Gas
Northern Lights 2027 Expansion Project

Project Location
Washington County, Minnesota

Prepared by JM on 2025-12-15
TR by SF on 2026-01-15
IR by SK on 2026-01-15

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(At original document size of 11x17)
1:24,000

Legend

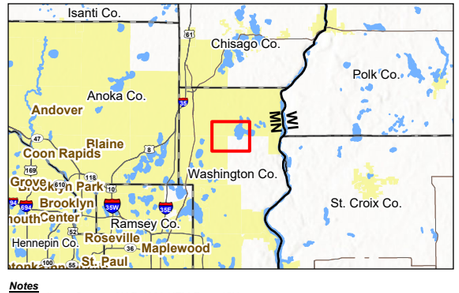
- Environmental Survey Boundary
- Existing Facility
- Existing Pipeline

Flood Hazard Zones

- Regulatory Floodway
- 100-year Floodplain
- 500-year Floodplain

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, FEMA
3. Background: 2023 NAIP

Stantec

Northern Natural Gas

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U:\172611726091\3803_data\gis_cad\gis\ArcPro\172609138_NNG_NL2027_ResourceReports\172609138_NNG_NL2027_ResourceReports.aprx Revised: 2026-02-17 By: jmarly

Appendix 6A-1
Steep Slopes for V2F Project

Appendix 6A-1 Steep Slopes for the V2F Project

MP Begin	MP End	Slope Category[1]	Length (feet)
Lake Mills M500 E-line			
35.58	35.61	5-15	154
36.36	36.40	5-15	204[2]
36.51	36.54	5-15	150[2]
36.73	36.76	5-15	201
37.17	37.21	5-15	228
37.36	37.37	5-15	79
37.77	37.84	5-15	375[2]
37.99	38.05	5-15	363[2]
38.16	38.22	5-15	313
38.26	38.28	5-15	89
38.39	38.46	5-15	367
38.60	38.72	5-15	634
38.78	38.81	5-15	154
38.85	38.87	5-15	86
39.00	39.02	5-15	92
39.06	39.10	5-15	243
39.13	39.18	5-15	261[2]
39.23	39.25	5-15	103
39.53	39.55	5-15	66[2]
40.12	40.16	5-15	184
40.26	40.28	5-15	104
40.78	40.80	5-15	116[2]
42.41	42.42	5-15	70
Albert Lea M500 E-line			
2.11	2.15	5-15	204[2]
2.36	2.39	5-15	171[2]
2.55	2.56	5-15	73
2.58	2.64	5-15	297
2.66	2.71	5-15	264
3.39	3.44	5-15	242
3.47	3.51	5-15	194
Faribault M500 D-line			
98.40	98.41	5-15	57
98.98	99.02	5-15	175[2]
99.16	99.24	5-15	402

MP Begin	MP End	Slope Category[1]	Length (feet)
99.55	99.61	5-15	309
99.70	99.76	5-15	345
99.86	99.87	5-15	94[2]
100.28	100.36	5-15	443
100.38	100.44	5-15	294
100.46	100.52	5-15	331
100.76	100.77	5-15	74[2]
101.11	101.18	5-15	393
101.26	101.29	5-15	149
101.62	101.65	5-15	150
102.02	102.03	5-15	78[2]
102.05	102.11	5-15	288[2]
102.67	102.69	5-15	101
102.74	102.79	5-15	281
103.80	103.83	5-15	111[2]

[1] Slopes were obtained from civil survey data.
[2] Area is within an HDD or auger bore.

Appendix 6A-2
Steep Slopes for NL27 Project

Appendix 6A-2 Steep Slopes for the NL27 Project

MP Begin	MP End	Slope Category[1]	Length (feet)
Lake Mills M500 E-line			
42.63	42.64	5-15	47
42.65	42.66	5-15	74
42.82	42.87	5-15	252
43.16	43.18	5-15	61
43.26	43.27	5-15	39
43.30	43.31	5-15	46
43.87	43.92	5-15	226
44.09	44.15	5-15	336
44.16	44.18	5-15	98[2]
44.40	44.44	5-15	205
44.46	44.48	5-15	84
44.54	44.57	5-15	145
44.61	44.64	5-15	166
44.68	44.69	5-15	59
44.74	44.75	5-15	64
Albert Lea M500 E-line			
3.71	3.77	5-15	343
3.90	3.91	5-15	50
3.99	4.03	5-15	197
4.52	4.54	5-15	100
4.62	4.68	5-15	285
4.81	4.85	5-15	222
5.05	5.08	5-15	149
5.22	5.24	>30	94[2]
5.39	5.41	5-15	131[2]
6.24	6.27	5-15	169
6.40	6.42	5-15	109
Willmar 3rd Branch Line Upstream			
3.36	3.41	5-15	231[2]
3.51	3.58	5-15	380
3.63	3.64	5-15	64
3.71	3.75	5-15	175
3.85	3.89	5-15	251
3.95	3.97	5-15	67
3.97	4.01	5-15	194
4.11	4.12	5-15	86
4.15	4.17	5-15	65

MP Begin	MP End	Slope Category[1]	Length (feet)
4.23	4.25	5-15	100
4.25	4.27	5-15	89[2]
4.30	4.33	5-15	164[2]
4.33	4.35	5-15	83[2]
4.37	4.39	>30	100[2]
4.43	4.43	15-30	45[2]
4.44	4.49	5-15	310[2]
4.91	4.92	5-15	70[2]
5.03	5.06	5-15	143
5.08	5.10	5-15	118
Willmar 3rd Branch Line Downstream			
7.00	7.08	5-15	428
7.31	7.39	5-15	422
7.41	7.44	5-15	134
7.45	7.47	5-15	95
7.89	7.90	5-15	52
8.28	8.32	5-15	207
8.33	8.36	5-15	149
8.43	8.46	5-15	176
8.47	8.51	5-15	177
8.93	8.98	5-15	231[2]
9.02	9.03	5-15	91[2]
9.04	9.05	5-15	56[2]
9.21	9.23	5-15	100
9.27	9.29	5-15	145
9.32	9.36	5-15	206
9.38	9.45	5-15	400
9.77	9.80	5-15	162
9.83	9.85	5-15	115[2]
9.91	9.93	5-15	109
9.98	10.03	5-15	236
10.05	10.07	5-15	97
10.12	10.14	5-15	97
10.20	10.23	5-15	154[2]
10.24	10.26	5-15	116[2]
10.74	10.75	5-15	56
11.09	11.10	5-15	50
Welcome 2nd Line			
No Steep Slopes			

MP Begin	MP End	Slope Category[1]	Length (feet)
Paynesville 2nd Branch Line			
0.06	0.10	5-15	221
0.42	0.43	5-15	39
0.54	0.57	5-15	194[2]
0.60	0.65	5-15	234[2]
0.83	0.86	5-15	151[2]
0.99	1.00	5-15	68
1.07	1.10	5-15	147
1.13	1.15	5-15	125
1.53	1.55	5-15	148
1.90	1.91	15-30	50[2]
1.94	1.97	5-15	142[2]
2.35	2.38	5-15	155[2]
2.39	2.41	5-15	61
Worthington 2nd Branch Line			
19.47	19.49	5-15	98
19.55	19.57	5-15	74[2]
19.59	19.61	5-15	145[2]
20.45	20.46	5-15	73
Springfield 2nd Branch Line			
14.17	14.20	5-15	159
15.19	15.20	5-15	69[2]
17.33	17.36	5-15	206[2]
17.52	17.54	15-30	100[2]
Minnesota Interconnect 2nd Branch Line			
17.75	17.78	5-15	117
17.83	17.86	15-30	145[2]
17.89	17.91	5-15	74
18.22	18.24	5-15	76[2]
18.37	18.38	5-15	61
18.41	18.42	5-15	78
18.87	18.90	5-15	149
Alexandria 2nd Branch Line			
17.86	17.87	5-15	69[2]

[1] Slopes were obtained from civil survey data.

[2] Area is within an HDD or auger bore.

Appendix 6B
Reports of Geotechnical Investigation for the V2F Project

Lake Mills M500 E-line

VFM-Component 1 – 8.1 Miles Lake Mills M500E

Subsurface Exploration and Lab Testing Report

February 17, 2025 | Terracon Project No. JY245041

Freeborn County, Minnesota

Prepared for:

Stantec, Inc.
200-325 25 Street Southeast
Calgary, Alberta, Canada T2A 7H8

Prepared by:

Terracon Consultants



Terracon
Explore with us
Nationwide
Terracon.com
Facilities
Environmental
Geotechnical
Materials

2625 Highway 14 W, Suite F
Rochester, Minnesota 55901
P (507) 722-7365
Terracon.com

February 17, 2025

Stantec, Inc.
200-325 25 Street Southeast
Calgary, Alberta, Canada T2A 7H8

Attn: Ginger Chan
P: (587) 437-5068
E: ginger.chan@stantec.com

Re: Subsurface Exploration and Lab Testing Report
VFM-Component 1 – 8.1 Miles Lake Mills M500E
Task Order No. 060246-091002
Freeborn County, Minnesota
Terracon Project No. JY245041

Dear Ms. Chan:

We have performed geotechnical services for the above referenced project in general accordance with Task Order No. 060246-091002 and authorization via email dated November 6, 2024. This report presents the findings of the subsurface exploration for Borings BH-00 and BH-02 through BH-17 for the proposed project.

We appreciate the opportunity to be of service to you on this project. If you have any questions concerning this report or if we may be of further service, please contact us.

Sincerely,

Terracon

Kyle T. Schmidt, EIT
Staff Engineer

Kyle M. Shubert, PE
Office Manager/Senior Engineer

Table of Contents

Introduction **1**
Site Conditions **2**
Project Description **2**
Geotechnical Characterization **3**
Subsurface Profile 3
Groundwater Conditions 3
General Comments **4**

Figures

GeoModel

Attachments

Exploration and Testing Procedures
Site Location and Exploration Plans
Exploration and Laboratory Results
Supporting Information

Note: This report was delivered in a web-based format. **Blue Bold** text in the report indicates a referenced section heading. The PDF version also includes hyperlinks which direct the reader to that section and clicking on the Terracon logo will bring you back to this page. For more interactive features, please view your project online at **client.terracon.com**.

Refer to each individual Attachment for a listing of contents.

Introduction

This Subsurface Exploration and Lab Testing Report presents the results of our subsurface exploration and geotechnical engineering services performed for the proposed pipeline corridor.

The purpose of these services was to provide information relative to:

- Subsurface soil conditions
- Groundwater conditions

The geotechnical engineering Scope of Services for this project included the advancement of seventeen test borings (BH-00 and BH-02 through BH-17) to depths ranging from about 30 to 100 feet below existing site grades.

In addition to geotechnical soil sampling, environmental soil sampling and chemical laboratory analysis was performed on samples collected at approximately 10 feet above the bottom of each borehole. Results of the chemical laboratory analysis of the soil samples is provided under a separate cover.

Maps showing the site and boring locations are shown on the **Site Location** and **Exploration Plans**, respectively. The results of the laboratory testing performed on geotechnical soil samples obtained from the site during our field exploration are included on the boring logs and/or as separate graphs in the **Exploration and Laboratory Results** section.

Site Conditions

The following description of site conditions is derived from our site visit in association with the field exploration and our review of publicly available geologic and topographic maps.

Item	Description
Site Location	The project is generally located in Freeborn County Minnesota, west of Albert Lea in a north-south corridor about 1.5-3.5 miles west of US-69. Latitude/Longitude (approximate): 43.6410°, -93.4472° See **Site Location** and **Exploration Plan**.
Current Ground Cover	Snow over various vegetation
Geology	Our investigation and review of geologic maps and well logs indicated subsurface conditions mainly consist of sandy glacial till or sand and gravel glacial outwash soils.

Project Description

Our final understanding of the project conditions is as follows:

Item	Description
Information Provided	An email request for proposal was provided by Stantec on October 3, 2024. The request included a Google Earth .kmz file showing the location and depths of the requested borings for planned projects. Revised scope information was provided by email on November 4, 2024.
Project Description	Project consists of a new pipeline section near Freeborn County, Minnesota. The proposed subsurface investigation will help Stantec assess the technical feasibility and constructability of using various trenchless or trenched pipe installation methods to install the new pipeline at various crossings along the proposed pipeline corridor.

Geotechnical Characterization

Subsurface Profile

We have developed a general characterization of the subsurface conditions based upon our review of the subsurface exploration, geologic setting and our understanding of the project. This characterization, termed GeoModel, forms the basis of our geotechnical evaluation of the site. Conditions observed at each exploration point are indicated on the individual logs. The individual logs can be found in the **Exploration and Laboratory Results** and the GeoModel can be found in the **Figures** attachment of this report.

As part of our analyses, we identified the following model layers within the subsurface profile. For an approximate elevation view of the model layer depths at each boring location, refer to the GeoModel.

Model Layer	Layer Name	General Description
1	**Surficial Layer**	Topsoil/till zone/fill when present is approximately 0.4 to 6.5 feet, consisting of lean clay and sand with varying amounts of clay, silt, gravel, and organics, gray, brown, dark brown, and black in color.
2	**Native Sand Soils**	Poorly graded sand (SP, SP-SC, and SP-SM), silty sand (SM) and clayey sand (SC), with varying amounts of gravel and occasional sand, silt, or clay seams, fine to coarse grained, gray and brown in color, and very loose to very dense in relative density.
3	**Native Fine-Grained Soils**	Silt (MH, ML, and CL-ML) and clay (CL, CH, and CL-ML) with varying amounts of sand and gravel, brown, dark brown and gray in color, and soft to hard in consistency.

Although not encountered at the boring locations, glacial soils such as those observed at the boring locations, can contain cobbles and boulders.

Groundwater Conditions

The boreholes were observed while drilling for the presence and level of groundwater. The water levels observed in the boreholes can be found on the boring logs in **Exploration and Laboratory Results**.

Groundwater was observed during drilling at depths ranging from about 8 to 53 feet below the existing ground surface at the boring locations. Groundwater was not observed at Borings BH-5, 6, 9, and 10; however, mud rotary drilling techniques in these borings may have resulted in the water level not being recognized. A relatively long period can be necessary for a groundwater level to develop and stabilize in a borehole; however, groundwater level observations made within granular soils are usually a reliable indication of the current groundwater conditions. Long-term observations in piezometers or observation wells, sealed from the influence of surface water, are recommended if it is necessary to better define groundwater levels.

Groundwater level fluctuations occur due to seasonal variations in the amount of rainfall, runoff, and other factors not evident at the time the borings were performed. Therefore, groundwater levels during construction or at other times in the life of the pipeline will vary. The possibility of groundwater level fluctuations should be considered when developing the design and construction plans for the project.

General Comments

Our report presents the results of our fieldwork and laboratory tests. Natural variations will occur between exploration point locations or due to the modifying effects of construction or weather. The nature and extent of such variations may not become evident until during or after construction. Terracon should be retained to review the final design plans and specifications so comments can be made regarding interpretation of the results of our geotechnical investigation. Terracon should be retained to provide observation and testing services during earth-related construction phases of the project. If variations appear, we can provide further evaluation and supplemental recommendations. If variations are noted in the absence of our observation and testing services on-site, we should be immediately notified so that we can provide additional evaluation and supplemental recommendations.

Our Scope of Services included specific environmental testing as noted above; however, it does not include either specifically or by implication any environmental or biological (e.g., mold, fungi, bacteria) assessment of the site or identification or prevention of pollutants, hazardous materials or conditions. If the owner is concerned about the potential for such contamination or pollution, other studies should be undertaken.

Our services and any correspondence are intended for the sole benefit and exclusive use of our client for specific application to the project discussed and are accomplished in accordance with generally accepted geotechnical engineering practices with no third-party beneficiaries intended. Any third-party access to services or correspondence is solely for information purposes to support the services provided by Terracon to our client. Reliance upon the services and any work product is limited to our client and is not

intended for third parties. Any use or reliance of the provided information by third parties is done solely at their own risk. No warranties, either express or implied, are intended or made.

Site characteristics as provided are for design purposes and not to estimate excavation cost. Any use of our report in that regard is done at the sole risk of the excavating cost estimator as there may be variations on the site that are not apparent in the data that could significantly affect excavation cost. Any parties charged with estimating excavation costs should seek their own site characterization for specific purposes to obtain the specific level of detail necessary for costing. Site safety and cost estimating including excavation support and dewatering requirements/design are the responsibility of others. Construction and site development have the potential to affect adjacent properties. Such impacts can include damages due to vibration, modification of groundwater/surface water flow during construction, foundation movement due to undermining or subsidence from excavation, as well as noise or air quality concerns. Evaluation of these items on nearby properties are commonly associated with contractor means and methods and are not addressed in this report. The owner and contractor should consider a preconstruction/precondition survey of surrounding development. If changes in the nature, design, or location of the project are planned, the results presented in this factual report shall not be considered valid unless we review the changes and either verify or modify our conclusions in writing.

Figures

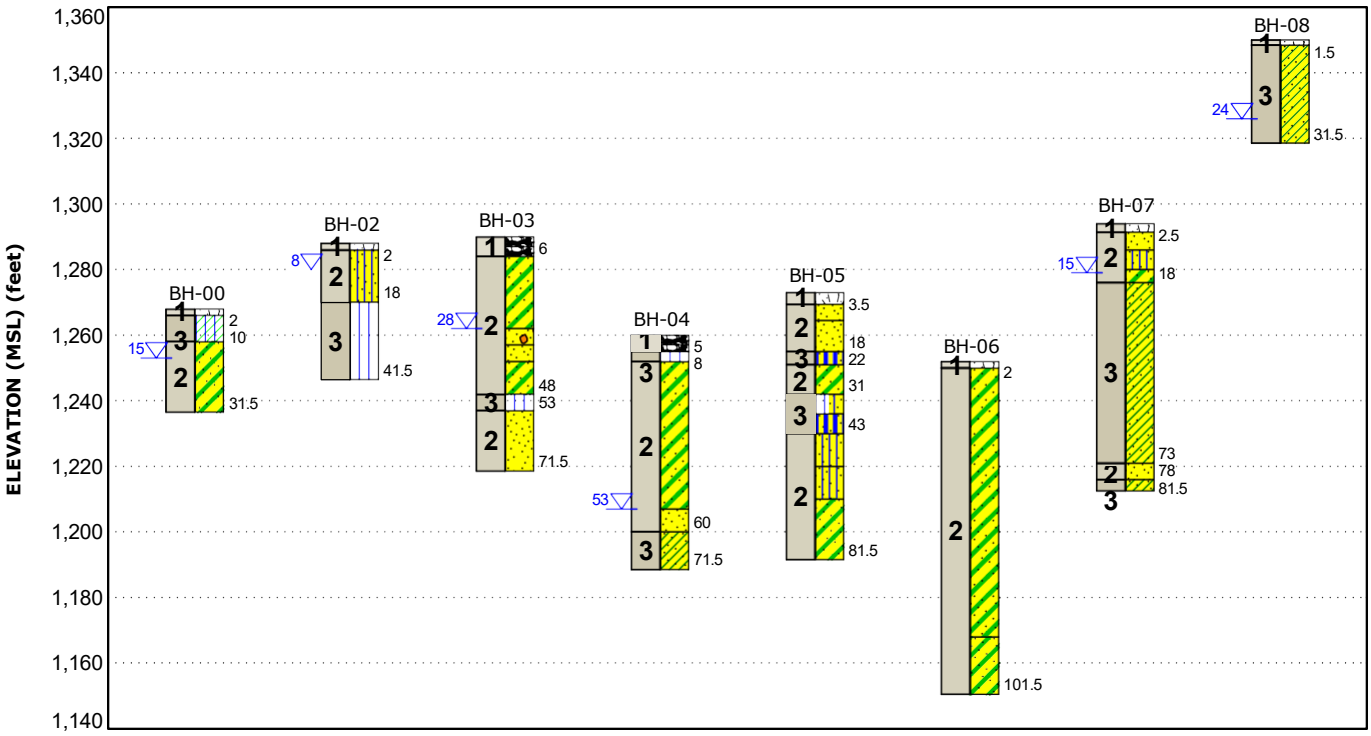
Contents:

GeoModel

VFM-Component 1 - 8.1 Miles Lake Mills M500E
690th Avenue | Albert Lea, MN
Terracon Project No. JY245041

Terracon
2625 Highway 14 W, Ste F
Rochester, MN

GeoModel



This is not a cross section. This is intended to display the Geotechnical Model only. See individual logs for more detailed conditions.

Model Layer	Layer Name	General Description
1	Surficial Layer	Topsoil/till zone/fill when present is approximately 0.4 to 6.5 feet, consisting of sand with varying amounts of clay, silt, gravel, and organics, and lean clay that was gray, brown, dark brown, and black in color.
2	Native Sand Soils	Poorly graded sands (SP, SP-SC, and SP-SM), silty sands (SM) and clayey sands (SC), with varying amounts of gravel and occasional sand, silt, or clay seams, fine to coarse grained, gray and brown in color, and very loose to very dense in relative density.
3	Native Fine-Grained Soils	Silts (MH, ML, and CL-ML) and clays (CL, CH, and CL-ML) with varying amounts of sand and gravel, brown, dark brown and gray in color, and soft to hard in consistency.

Legend

- Topsoil
- Silty Clay
- Clayey Sand
- Silty Sand
- Silt
- Fill
- Poorly-graded Sand with Gravel
- Poorly-graded Sand
- Sandy Lean Clay
- Sandy Silt
- Silt with Sand

▽ First Water Observation

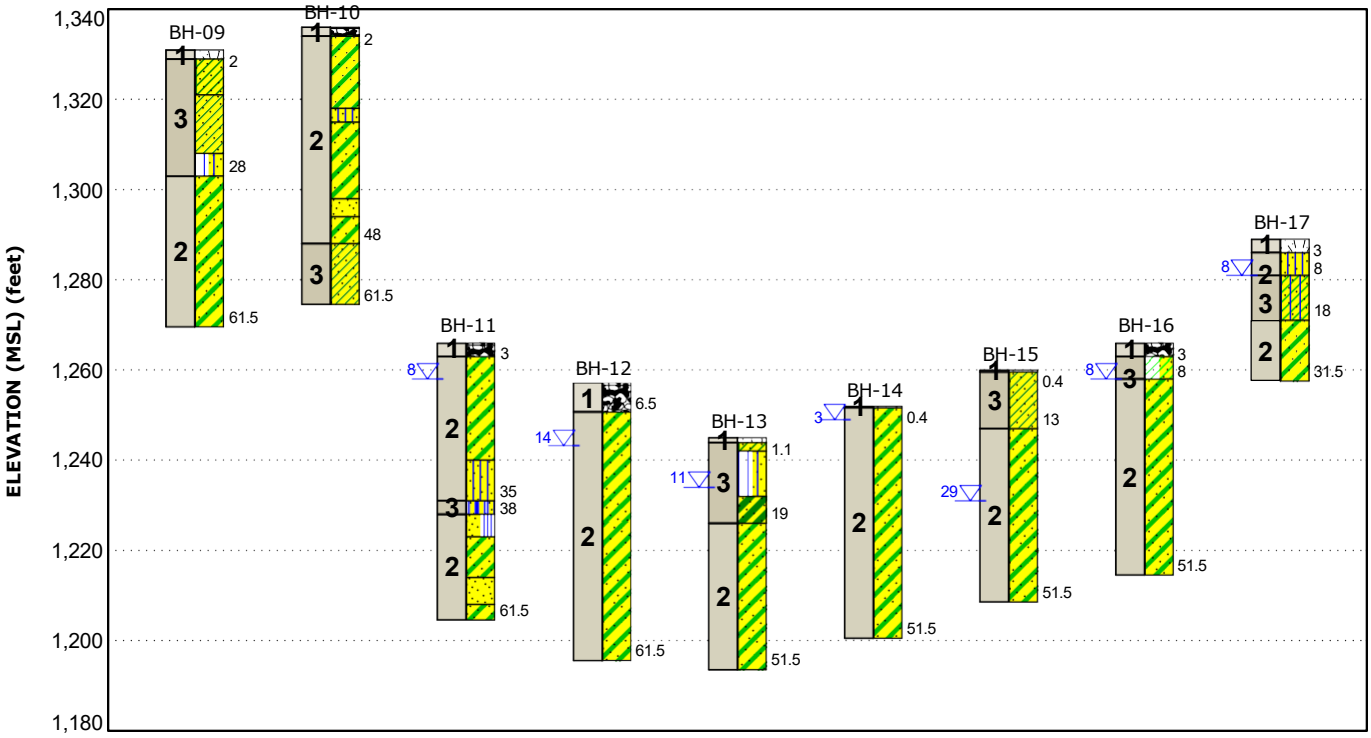
Groundwater levels are temporal. The levels shown are representative of the date and time of our exploration. Significant changes are possible over time.
Water levels shown are as measured during and/or after drilling. In some cases, boring advancement methods mask the presence/absence of groundwater. See individual logs for details.

NOTES:
Layering shown on this figure has been developed by the geotechnical engineer for purposes of modeling the subsurface conditions as required for the subsequent geotechnical engineering for this project. Numbers adjacent to soil column indicate depth below ground surface.

VFM-Component 1 - 8.1 Miles Lake Mills M500E
690th Avenue | Albert Lea, MN
Terracon Project No. JY245041

Terracon
2625 Highway 14 W, Ste F
Rochester, MN

GeoModel



This is not a cross section. This is intended to display the Geotechnical Model only. See individual logs for more detailed conditions.

Model Layer	Layer Name	General Description
1	Surficial Layer	Topsoil/till zone/fill when present is approximately 0.4 to 6.5 feet, consisting of sand with varying amounts of clay, silt, gravel, and organics, and lean clay that was gray, brown, dark brown, and black in color.
2	Native Sand Soils	Poorly graded sands (SP, SP-SC, and SP-SM), silty sands (SM) and clayey sands (SC), with varying amounts of gravel and occasional sand, silt, or clay seams, fine to coarse grained, gray and brown in color, and very loose to very dense in relative density.
3	Native Fine-Grained Soils	Silts (MH, ML, and CL-ML) and clays (CL, CH, and CL-ML) with varying amounts of sand and gravel, brown, dark brown and gray in color, and soft to hard in consistency.

Legend

- Topsoil
- Silt with Sand
- Fill
- Poorly-graded Sand
- Poorly-graded Sand with Silt
- Lean Clay with Sand
- Sandy Lean Clay
- Clayey Sand
- Silty Sand
- Sandy Silt
- Sandy Fat Clay
- Sandy Silty Clay

▽ First Water Observation

Groundwater levels are temporal. The levels shown are representative of the date and time of our exploration. Significant changes are possible over time.
Water levels shown are as measured during and/or after drilling. In some cases, boring advancement methods mask the presence/absence of groundwater. See individual logs for details.

NOTES:
Layering shown on this figure has been developed by the geotechnical engineer for purposes of modeling the subsurface conditions as required for the subsequent geotechnical engineering for this project. Numbers adjacent to soil column indicate depth below ground surface.

Attachments

Exploration and Testing Procedures

Field Exploration

Boring Numbers	Boring Depths (feet)	Location
BH-00	31.5	East of 690th Ave and north of 165th St
BH-2	41.5	About 900 feet east of the intersection of 705th Ave and 180th St, and extending north
BH-3	71.5	
BH-4	71.5	
BH-5	81.5	About 700 feet east of the intersection of 710th Ave and 200th St, crossing through 200th St
BH-6	101.5	
BH-7	81.5	
BH-8	31.5	About 1600 feet east of the intersection of 707th Ave and 110th St
BH-9	61.5	About 1 mile east of the intersection of 700th Ave and the railroad north of 110th St
BH-10	61.5	
BH-11	61.5	About 1 ¼ mile east of the intersection of 700th Ave and I-90, extending north
BH-12	61.5	
BH-13	51.5	
BH-14	51.5	Starting at about 700 feet east of 715th Ave and 0.5 mile south of 240th St and crossing through State Highway 13 to about 0.5 mile east of 715th Ave along 240th St
BH-15	51.5	
BH-16	51.5	
BH-17	31.5	

Boring Layout and Elevations: Terracon personnel staked the boring locations using handheld GPS equipment (estimated horizontal accuracy of about ±10 feet) with respect to the provided boring location plans. The boring locations are shown on the **Exploration Plans**. The approximate coordinates of the borings are indicated on the boring logs. Approximate ground surface elevations were estimated using the Minnesota Department of Natural Resources, MnTOPO LiDAR map and reported on the logs to the nearest foot. If more accurate boring locations and surface elevations are desired, we recommend the boring locations be surveyed.

Subsurface Exploration Procedures: We advanced the borings with ATV and truck-mounted rotary drill rigs using continuous flight augers and mud-rotary drilling techniques. Split-spoon samples were obtained at intervals of 5 feet. In the split-barrel sampling procedure, a standard 2-inch outer diameter split-barrel sampling spoon was driven into the ground by a 140-pound automatic hammer falling a distance of 30 inches. The number of blows required to advance the sampling spoon the last 12 inches of a normal 18-inch penetration is recorded as the Standard Penetration Test (SPT) resistance value. The SPT resistance values, also referred to as N-values, are indicated on the boring logs at the test depths. The samples were placed in appropriate containers and transported to our laboratory for testing. We observed and recorded groundwater levels during drilling and sampling.

The boreholes were backfilled with grout/neat cement after completion to within 2 feet of the ground surface. The boreholes were backfilled with auger cuttings from a depth of 2 feet to the ground surface.

The drill crew prepared a field log of each boring to record field data including visual descriptions of the materials encountered during drilling as well as the driller's interpretation of the subsurface conditions between samples. The boring logs included with this report represent an interpretation of the subsurface conditions at each boring location based on field data and observation of the samples.

Laboratory Testing

The project engineer reviewed the field data and assigned laboratory tests. The laboratory testing program included the following tests on retrieved soil samples:

Geotechnical Testing

- Moisture Content
- Grain size analysis (through a #200 sieve only)
- Atterberg Limits (3-point)

Site Location and Exploration Plans

Contents:

Site Location Plan
Exploration Plans (4 pages)

Note: All attachments are one page unless noted above.

Site Location

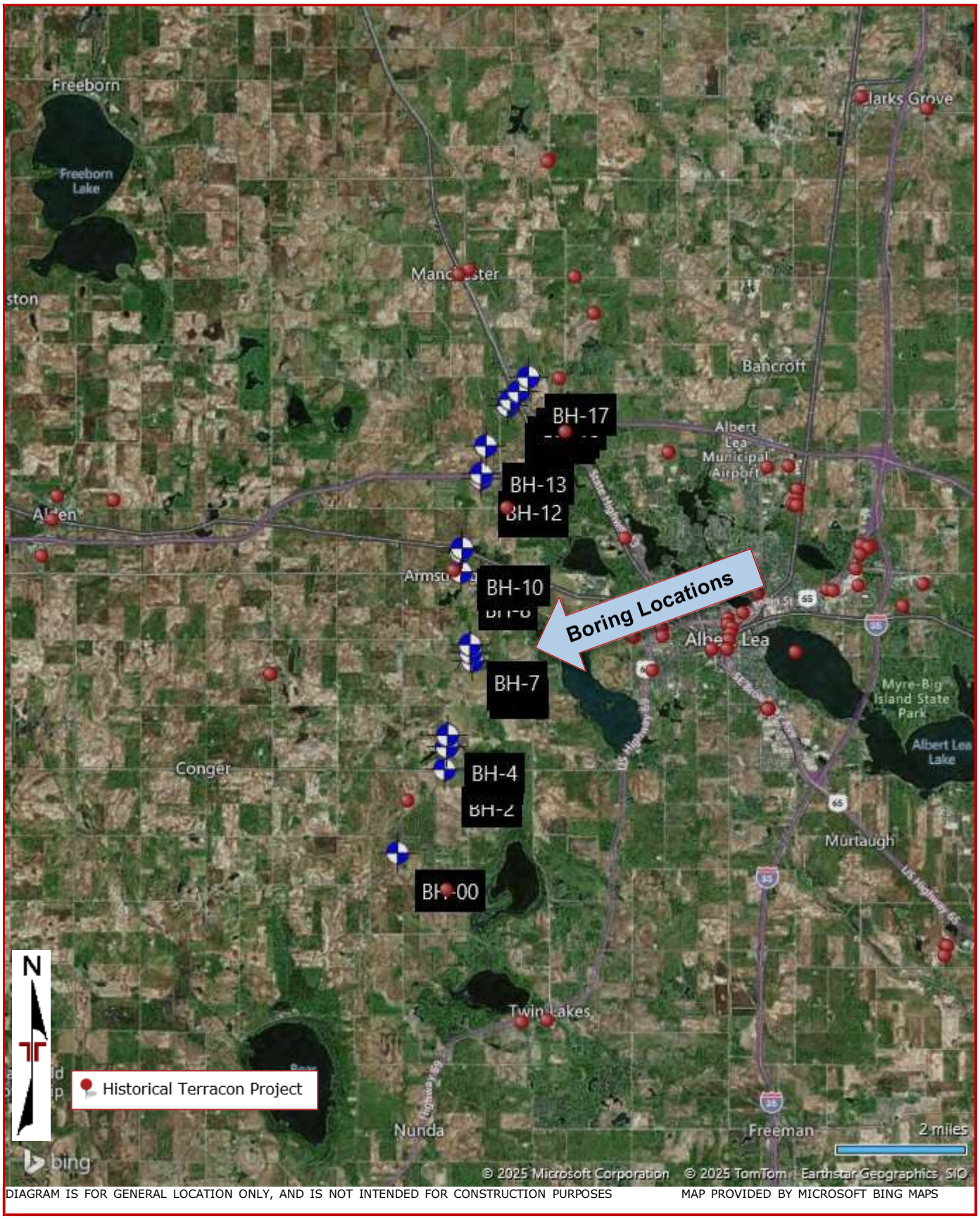


DIAGRAM IS FOR GENERAL LOCATION ONLY, AND IS NOT INTENDED FOR CONSTRUCTION PURPOSES

MAP PROVIDED BY MICROSOFT BING MAPS

Exploration Plan – BH-00, 02, 03, & 04

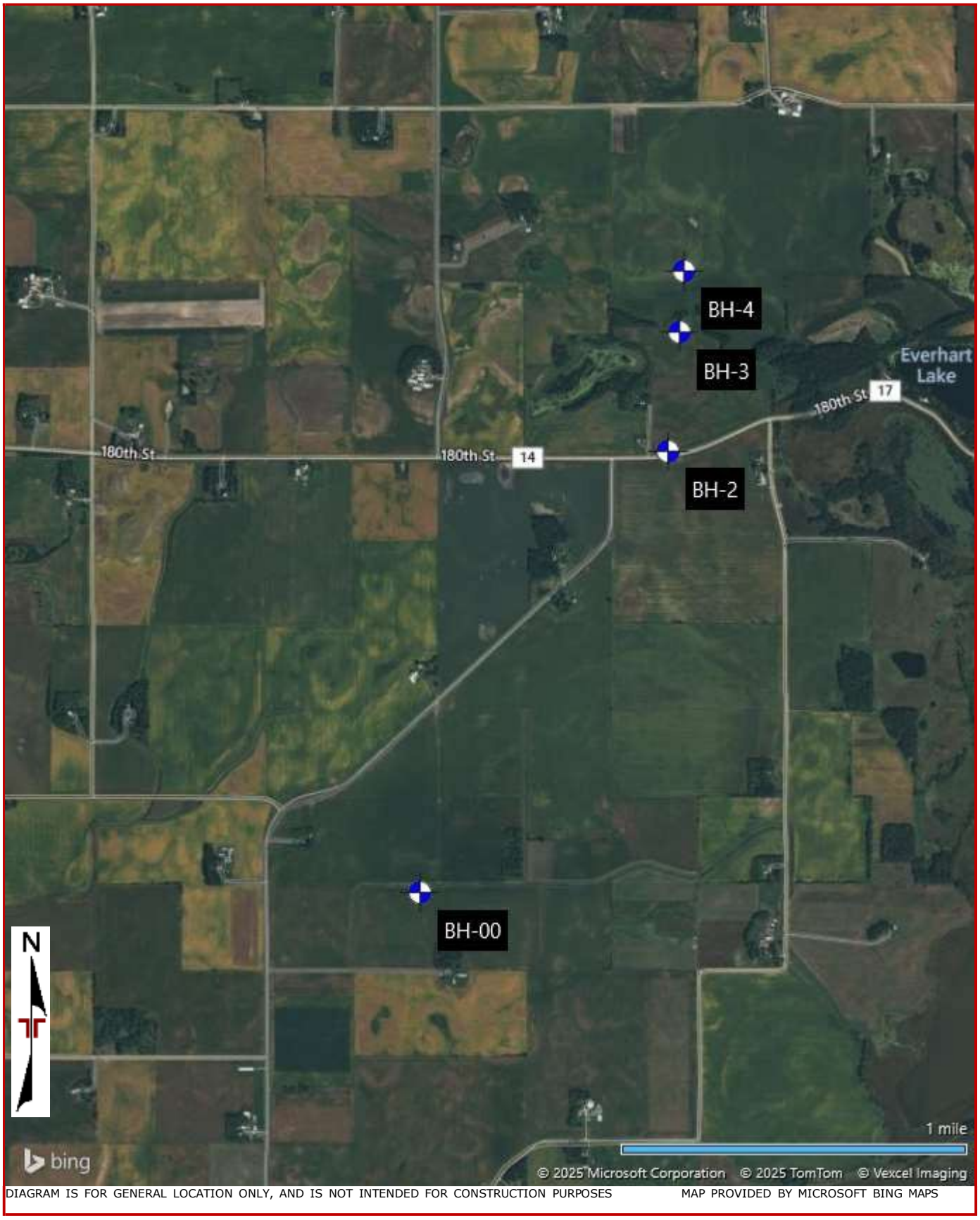


DIAGRAM IS FOR GENERAL LOCATION ONLY, AND IS NOT INTENDED FOR CONSTRUCTION PURPOSES MAP PROVIDED BY MICROSOFT BING MAPS

Exploration Plan – BH-05, 06, 07, 08, 09, & 10

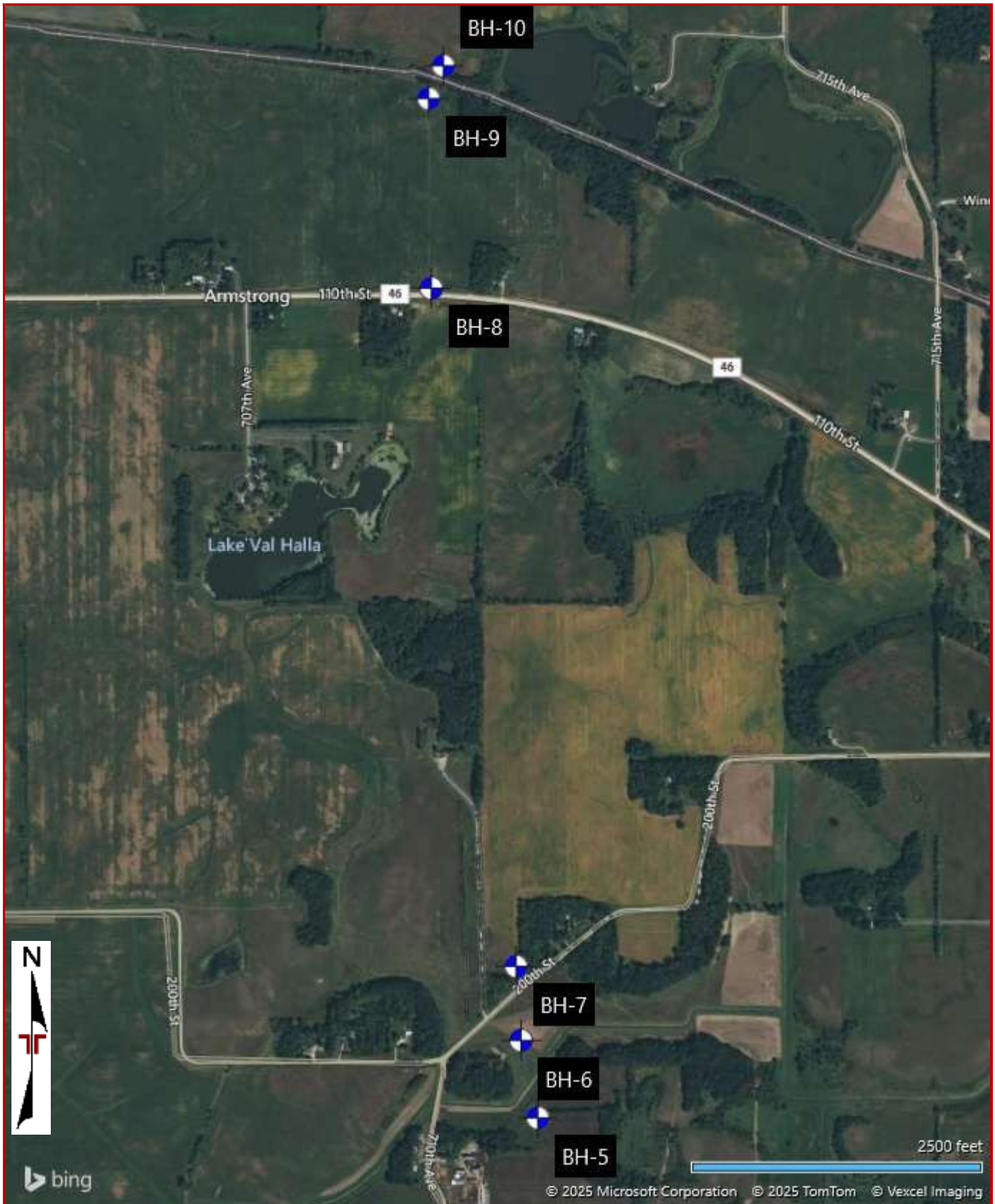


DIAGRAM IS FOR GENERAL LOCATION ONLY, AND IS NOT INTENDED FOR CONSTRUCTION PURPOSES

MAP PROVIDED BY MICROSOFT BING MAPS

Exploration Plan - BH-11, 12, & 13



DIAGRAM IS FOR GENERAL LOCATION ONLY, AND IS NOT INTENDED FOR CONSTRUCTION PURPOSES MAP PROVIDED BY MICROSOFT BING MAPS

Exploration Plan – BH-14, 15, 16, & 17



DIAGRAM IS FOR GENERAL LOCATION ONLY, AND IS NOT INTENDED FOR CONSTRUCTION PURPOSES MAP PROVIDED BY MICROSOFT BING MAPS

Exploration and Laboratory Results

Contents:

Boring Logs (BH-00 and BH-02 through BH-17)
Atterberg Limit Results

VFM-Component 1 - 8.1 Miles Lake Mills M500E
690th Avenue | Albert Lea, MN
Terracon Project No. JY245041

2625 Highway 14 W, Ste F
Rochester, MN

Boring Log No. BH-00

Location: See Exploration Plan

Latitude: 43.5967° Longitude: -93.4695°

Depth (Ft.) Elevation: 1268 (Ft.) +/-

Model Layer	Graphic Log	Depth (Ft.)	Water Level Observations	Sample Type	Recovery (In.)	Field Test Results	Water Content (%)	Atterberg Limits LL-PL-PI	Percent Fines
1		**TOPSOIL** 2.0 (1266)			5	6-5-3 N=8			
3		**ELASTIC SILT (MH)**, trace sand, gray and dark brown, medium stiff 10.0 (1258)			14	2-3-3 N=6	50.6	51-32-19	
2		**CLAYEY SAND (SC)**, trace gravel, fine to medium grained, gray, loose to medium dense 31.5 (1236.5)	▽		14	1-2-3 N=5	25.6		
					18	2-3-4 N=7	17.6		
					18	2-4-6 N=10	14.2		45
					14	4-7-9 N=16	15.0		
					13	6-10-11 N=21	15.7		
		Boring Terminated at 31.5 Feet							

See Exploration and Testing Procedures for a description of field and laboratory procedures used and additional data (If any).

See Supporting Information for explanation of symbols and abbreviations.

Elevation Reference: Elevations estimated from MnTOPO website

Water Level Observations
▽ Water observed at 15 feet while drilling

Drill Rig
CME 550X

Hammer Type
Automatic

Driller
M. Nunez

Logged by
K. Watt

Boring Started
12-19-2024

Boring Completed
12-19-2024

Notes
Equipment Reference:
-Energy Transfer Ratio: 90.4% +/- 2.1%
-Hammer Efficiency Correction: 1.51

Advancement Method
3 1/4" Hollow Stem Auger

Abandonment Method
Boring backfilled with cuttings from 0'-2' then neat cement to completion

VFM-Component 1 - 8.1 Miles Lake Mills M500E
690th Avenue | Albert Lea, MN
Terracon Project No. JY245041

2625 Highway 14 W, Ste F
Rochester, MN

Boring Log No. BH-02

Location: See Exploration Plan

Latitude: 43.6152° Longitude: -93.4551°

Depth (Ft.) Elevation: 1288 (Ft.) +/-

Model Layer	Graphic Log	Depth (Ft.)	Water Level Observations	Sample Type	Recovery (In.)	Field Test Results	Water Content (%)	Atterberg Limits LL-PL-PI	Percent Fines
1		**TOPSOIL** frost to 9" 2.0 1286			9	20-50/5"	19.2		
2		**SILTY SAND (SM)**, trace sand, fine grained, brown, very loose to loose			12	3-3-4 N=7	14.6		
		trace clay at 8'			13	2-2-2 N=4	31.1		25
		18.0 1270			16	0-1-1 N=2	32.4		
3		**SILT (ML)**, trace sand, brown and gray, soft to stiff			17	2-2-2 N=4	35.5		
		gray only at 25'			16	2-3-2 N=5	32.5	27-23-4	91
					10	4-4-5 N=9	35.0		
					13	4-6-7 N=13	33.5		85
		41.5 1246.5			12	6-7-7 N=14	33.9		
		Boring Terminated at 41.5 Feet							

See Exploration and Testing Procedures for a description of field and laboratory procedures used and additional data (If any).

See Supporting Information for explanation of symbols and abbreviations.

Elevation Reference: Elevations estimated from MnTOPO website

Water Level Observations
Water observed at 8 feet while drilling

Drill Rig
CME 550X

Hammer Type
Automatic

Driller
M. Nunez

Notes
Equipment Reference:
-Energy Transfer Ratio: 90.4% +/- 2.1%
-Hammer Efficiency Correction: 1.51

Advancement Method
3 1/4" Hollow Stem Auger

Abandonment Method
Boring backfilled with cuttings from 0'-2' then neat cement to completion

Logged by
R. Rodriquez

Boring Started
01-23-2025

Boring Completed
01-23-2025

VFM-Component 1 - 8.1 Miles Lake Mills M500E
690th Avenue | Albert Lea, MN
Terracon Project No. JY245041

Terracon
2625 Highway 14 W, Ste F
Rochester, MN

Boring Log No. BH-03

Location: See Exploration Plan

Latitude: 43.6202° Longitude: -93.4545°

Depth (Ft.) Elevation: 1290 (Ft.) +/-

Model Layer	Graphic Log	Depth (Ft.)	Water Level Observations	Sample Type	Recovery (In.)	Field Test Results	Water Content (%)	Atterberg Limits LL-PL-PI	Percent Fines
1		**FILL - TOPSOIL** 3.0 (1287)			18	15-15-20 N=35	28.5		
1		**FILL - SAND, SILT, CLAY**, trace gravel, brown and gray 6.0 (1284)							
2		**CLAYEY SAND (SC)**, trace gravel, fine to medium grained, brown and gray, medium dense			12	3-4-5 N=9	19.4		
2					18	3-5-7 N=12	16.9		
2					18	4-5-6 N=11	16.4		46
2		gray only at 22'			18	4-6-8 N=14	14.8		
2		28.0 (1262)	▽		18	4-6-9 N=15	14.4		
2		**POORLY GRADED SAND WITH GRAVEL (SP)**, trace silt, trace clay, fine to coarse grained, brown, medium dense trace gravel at 30' 33.0 (1257)			15	7-11-15 N=26	13.6		
2		**POORLY GRADED SAND (SP)**, trace silt, trace gravel, fine to medium grained, brown, dense 38.0 (1252)			16	15-20-20 N=40	16.0		
2		**CLAYEY SAND (SC)**, trace gravel, fine to medium grained, gray, medium dense 48.0 (1242)			8	6-9-12 N=21	14.5		
2					17	7-9-9 N=18	13.1		43
3		**SILT (ML)**, trace sand, gray, very stiff 53.0 (1237)			16	7-12-13 N=25	26.1	25-22-3	91
2									

See Exploration and Testing Procedures for a description of field and laboratory procedures used and additional data (If any).

See Supporting Information for explanation of symbols and abbreviations.

Elevation Reference: Elevations estimated from MnTOPO website

Water Level Observations
▽ Water observed at 28 feet while drilling

Drill Rig
CME 550X

Hammer Type
Automatic

Driller
M. Nunez

Notes
Equipment Reference:
-Energy Transfer Ratio: 90.4% +/- 2.1%
-Hammer Efficiency Correction: 1.51

Advancement Method
3 1/4" Hollow Stem Auger

Abandonment Method
Boring backfilled with cuttings from 0'-2' then neat cement to completion

Logged by
R. Rodriquez

Boring Started
01-23-2025

Boring Completed
01-23-2025

VFM-Component 1 - 8.1 Miles Lake Mills M500E
690th Avenue | Albert Lea, MN
Terracon Project No. JY245041

Terracon
2625 Highway 14 W, Ste F
Rochester, MN

Boring Log No. BH-03

Location: See Exploration Plan

Latitude: 43.6202° Longitude: -93.4545°

Depth (Ft.) Elevation: 1290 (Ft.) +/-

Model Layer	Graphic Log	Depth (Ft.)	Water Level Observations	Sample Type	Recovery (In.)	Field Test Results	Water Content (%)	Atterberg Limits LL-PL-PI	Percent Fines
2		**POORLY GRADED SAND (SP)**, fine to coarse grained, gray, very loose to medium dense *(continued)*							
		55		X	18	7-0-0 N=0	20.3		
		60		X	16	5-5-5 N=10	14.6		
		65		X	17	6-6-7 N=13	17.7		
		70		X	16	7-8-8 N=16	13.6		
		71.5 1218.5 ***Boring Terminated at 71.5 Feet***							

See Exploration and Testing Procedures for a description of field and laboratory procedures used and additional data (If any).

See Supporting Information for explanation of symbols and abbreviations.

Elevation Reference: Elevations estimated from MnTOPO website

Water Level Observations
Water observed at 28 feet while drilling

Drill Rig
CME 550X

Hammer Type
Automatic

Driller
M. Nunez

Notes

Advancement Method
3 1/4" Hollow Stem Auger

Abandonment Method
Boring backfilled with cuttings from 0'-2' then neat cement to completion

Logged by
R. Rodriquez

Boring Started
01-23-2025

Boring Completed
01-23-2025

VFM-Component 1 - 8.1 Miles Lake Mills M500E
690th Avenue | Albert Lea, MN
Terracon Project No. JY245041

Terracon
2625 Highway 14 W, Ste F
Rochester, MN

Boring Log No. BH-04

Location: See Exploration Plan

Latitude: 43.6228° Longitude: -93.4542°

Depth (Ft.) Elevation: 1260 (Ft.) +/-

Model Layer	Graphic Log	Depth (Ft.)	Water Level Observations	Sample Type	Recovery (In.)	Field Test Results	Water Content (%)	Atterberg Limits LL-PL-PI	Percent Fines
1		**FILL - TOPSOIL** frost to 12" 3.0 1257		X	18	16-21-17 N=38	44.3		
		FILL - LEAN CLAY, with organics, dark brown and black 5.0 1255							
3		**SILT (ML)**, trace sand, gray, soft 8.0 1252		X	13	1-2-1 N=3	32.8	27-23-4	92
2		**CLAYEY SAND (SC)**, trace gravel, fine to medium grained, gray loose to medium dense		X	18	0-2-3 N=5	18.3		
				X	15	2-2-3 N=5	12.9		
				X	17	0-3-3 N=6	30.0		
				X	16	1-3-4 N=7	16.7		
				X	18	2-4-5 N=9	17.5		49
				X	18	3-4-7 N=11	15.0		
				X	18	2-4-6 N=10	13.5		
				X	17	2-4-7 N=11	12.9		
				X	18	4-6-7 N=13	12.5		
		53.0 1207							

See Exploration and Testing Procedures for a description of field and laboratory procedures used and additional data (If any).
See Supporting Information for explanation of symbols and abbreviations.

Elevation Reference: Elevations estimated from MnTOPO website

Water Level Observations
▽ Water observed at 53 feet while drilling

Drill Rig
CME 550X

Hammer Type
Automatic

Driller
M. Nunez

2625 Highway 14 W, Ste F
Rochester, MN

Boring Log No. BH-04

Notes
Equipment Reference:
-Energy Transfer Ratio: 90.4% +/- 2.1%
-Hammer Efficiency Correction: 1.51

Advancement Method
3 1/4" Hollow Stem Auger

Abandonment Method
Boring backfilled with cuttings from 0'-2' then neat cement to completion

Logged by
R. Rodriquez

Boring Started
01-23-2025

Boring Completed
01-23-2025

VFM-Component 1 - 8.1 Miles Lake Mills M500E
690th Avenue | Albert Lea, MN
Terracon Project No. JY245041

Terracon
2625 Highway 14 W, Ste F
Rochester, MN

Boring Log No. BH-04

Location: See Exploration Plan

Latitude: 43.6228° Longitude: -93.4542°

Depth (Ft.) Elevation: 1260 (Ft.) +/-

Model Layer	Graphic Log		Depth (Ft.)	Water Level Observations	Sample Type	Recovery (In.)	Field Test Results	Water Content (%)	Atterberg Limits LL-PL-PI	Percent Fines
2		**POORLY GRADED SAND (SP)**, trace gravel, fine to coarse grained, gray, medium dense *(continued)*	55		X	17	6-6-7 N=13	14.3		
		60.0 1200								
3		**SANDY LEAN CLAY (CL)**, trace gravel, gray, very stiff	60		X	4	7-8-8 N=16	15.9		
			65		X	0	8-11-12 N=23	17.2		
		71.5 1188.5	70		X	10	8-9-8 N=17	15.7		59
		Boring Terminated at 71.5 Feet								

See Exploration and Testing Procedures for a description of field and laboratory procedures used and additional data (If any).

See Supporting Information for explanation of symbols and abbreviations.

Elevation Reference: Elevations estimated from MnTOPO website

Water Level Observations
▽ Water observed at 53 feet while drilling

Drill Rig
CME 550X

Hammer Type
Automatic

Driller
M. Nunez

Notes

Advancement Method
3 1/4" Hollow Stem Auger

Abandonment Method
Boring backfilled with cuttings from 0'-2' then neat cement to completion

Logged by
R. Rodriquez

Boring Started
01-23-2025

Boring Completed
01-23-2025

VFM-Component 1 - 8.1 Miles Lake Mills M500E
690th Avenue | Albert Lea, MN
Terracon Project No. JY245041

Terracon
2625 Highway 14 W, Ste F
Rochester, MN

Boring Log No. BH-05

Location: See Exploration Plan

Latitude: 43.6392° Longitude: -93.4467°

Depth (Ft.) Elevation: 1273 (Ft.) +/-

Model Layer	Graphic Log	Depth (Ft.)	Elevation	Description	Water Level Observations	Sample Type	Recovery (In.)	Field Test Results	Water Content (%)	Atterberg Limits LL-PL-PI	Percent Fines
1		0.0	1273.0	**TOPSOIL** Frost to 8"			11	14-12-6 N=18	14.1		
		3.5	1269.5								
2		3.5	1269.5	**POORLY GRADED SAND WITH CLAY (SP-SC)**, trace gravel, fine to coarse grained, brown, loose			6	3-3-4 N=7	18.5		
		8.5	1264.5								
2		8.5	1264.5	**POORLY GRADED SAND (SP)**, trace gravel, trace clay, fine to coarse grained, brown, loose to medium dense			13	4-4-5 N=9	9.5		
							15	6-7-7 N=14	13.9		
		18.0	1255								
3		18.0	1255	**SANDY SILT (ML)**, brown, stiff			14	7-7-7 N=14	19.2	29-23-6	62
		22.0	1251								
2		22.0	1251	**CLAYEY SAND (SC)**, trace gravel, fine to coarse grained, brown, loose to medium dense			18	4-7-7 N=14	26.6		30
							15	7-4-4 N=8	33.6		
		31.0	1242								
3		31.0	1242	**SILT WITH SAND (ML)**, trace clay, gray, stiff			16	3-5-7 N=12	34.4	34-24-10	72
		37.0	1236								
		37.0	1236	**SANDY SILT (ML)**, gray, medium stiff			15	2-3-3 N=6	25.3	31-23-8	61
		43.0	1230								
2		43.0	1230	**SILTY SAND (SM)**, trace gravel, fine to medium grained, gray, medium dense			7	4-5-5 N=10	20.6		
							13	5-5-6 N=11	16.0		14
		53.0	1220								

See Exploration and Testing Procedures for a description of field and laboratory procedures used and additional data (If any).

See Supporting Information for explanation of symbols and abbreviations.

Elevation Reference: Elevations estimated from MnTOPO website

Water Level Observations
No free water observed

Drill Rig
CME 550X

Hammer Type
Automatic

Driller
M. Nunez

Notes
Equipment Reference:
-Energy Transfer Ratio: 90.4% +/- 2.1%
-Hammer Efficiency Correction: 1.51

Advancement Method
0'-16.5': 3 1/4" Hollow Stem Auger
16.5'-80': Mud rotary

Abandonment Method
Boring backfilled with cuttings from 0'-2' then neat cement to completion

Logged by
K. Watt

Boring Started
12-18-2024

Boring Completed
12-18-2024

VFM-Component 1 - 8.1 Miles Lake Mills M500E
690th Avenue | Albert Lea, MN
Terracon Project No. JY245041

Terracon
2625 Highway 14 W, Ste F
Rochester, MN

Boring Log No. BH-05

Location: See Exploration Plan

Latitude: 43.6392° Longitude: -93.4467°

Depth (Ft.) Elevation: 1273 (Ft.) +/-

Model Layer	Graphic Log	Depth (Ft.)	Water Level Observations	Sample Type	Recovery (In.)	Field Test Results	Water Content (%)	Atterberg Limits LL-PL-PI	Percent Fines
2		**SILTY SAND WITH CLAY (SM)**, trace gravel, fine to medium grained, gray, medium dense *(continued)*							
		55			16	7-7-9 N=16	18.1		
		60			18	4-8-13 N=21	16.5		50
		63.0 1210							
		CLAYEY SAND (SC), trace gravel, trace silt, occasional sand seams, fine to medium grained, gray, medium dense to very dense							
		65			15	10-11-15 N=26	17.8		
		70			16	11-13-19 N=32	18.1		50
		75			9	14-15-19 N=34	22.6		
		80			8	22-24-27 N=51	19.5		
		81.5 1191.5							
		Boring Terminated at 81.5 Feet							

See Exploration and Testing Procedures for a description of field and laboratory procedures used and additional data (If any).

See Supporting Information for explanation of symbols and abbreviations.

Elevation Reference: Elevations estimated from MnTOPO website

Water Level Observations
No free water observed

Drill Rig
CME 550X

Hammer Type
Automatic

Driller
M. Nunez

Notes

Advancement Method
0'-16.5': 3 1/4" Hollow Stem Auger
16.5'-80': Mud rotary

Abandonment Method
Boring backfilled with cuttings from 0'-2' then neat cement to completion

Logged by
K. Watt

Boring Started
12-18-2024

Boring Completed
12-18-2024

VFM-Component 1 - 8.1 Miles Lake Mills M500E
690th Avenue | Albert Lea, MN
Terracon Project No. JY245041

Terracon
2625 Highway 14 W, Ste F
Rochester, MN

Boring Log No. BH-06

Location: See Exploration Plan

Latitude: 43.6410° Longitude: -93.4472°

Depth (Ft.) Elevation: 1252 (Ft.) +/-

Model Layer	Graphic Log	Depth (Ft.)	Water Level Observations	Sample Type	Recovery (In.)	Field Test Results	Water Content (%)	Atterberg Limits LL-PL-PI	Percent Fines
1		**TOPSOIL**, frost to 8" 2.0 1250							
2		**CLAYEY SAND (SC)**, trace gravel, fine to medium grained, gray, very loose to medium dense							
		5			12	9-6-5 N=11	33.3		
					10	0-0-1 N=1	25.4		
		10			15	2-4-4 N=8	17.7		
		15			18	2-4-5 N=9	17.7		
		20			15	4-8-10 N=18	17.2		
		25			18	4-5-5 N=10	18.5		
		30			18	3-5-5 N=10	19.8		
		35			18	3-5-5 N=10	22.5		
		40			18	3-5-8 N=13	15.7		43
		45			14	3-5-6 N=11	17.3		
		50			15	4-4-4 N=8	16.3		

See Exploration and Testing Procedures for a description of field and laboratory procedures used and additional data (If any).

See Supporting Information for explanation of symbols and abbreviations.

Elevation Reference: Elevations estimated from MnTOPO website

Water Level Observations
No free water observed

Drill Rig
CME 550X

Hammer Type
Automatic

Driller
M. Nunez

Logged by
K. Watt

Boring Started
12-18-2024

Boring Completed
12-18-2024

Notes
Equipment Reference:
-Energy Transfer Ratio: 90.4% +/- 2.1%
-Hammer Efficiency Correction: 1.51

Advancement Method
0'-10': 3 1/4" Hollow Stem Auger
10'-100': Mud rotary

Abandonment Method
Boring backfilled with cuttings from 0'-2' then neat cement to completion

Terracon
2625 Highway 14 W, Ste F
Rochester, MN

Boring Log No. BH-06

Location: See Exploration Plan

Latitude: 43.6410° Longitude: -93.4472°

Depth (Ft.) Elevation: 1252 (Ft.) +/-

Model Layer	Graphic Log	Depth (Ft.)	Water Level Observations	Sample Type	Recovery (In.)	Field Test Results	Water Content (%)	Atterberg Limits LL-PL-PI	Percent Fines
2		**CLAYEY SAND (SC)**, trace gravel, fine to medium grained, gray, very loose to medium dense *(continued)*							
		55		X	8	3-5-6 N=11	18.7		
		60		X	18	4-4-6 N=10	17.9		
		65		X	18	4-6-7 N=13	15.8		
		70		X	18	5-8-10 N=18	16.1		
		75		X	12	6-8-11 N=19	16.2		
		80		X	14	5-7-10 N=17	18.1		
		84.0 / 1168							
		CLAYEY SAND (SC), trace gravel, fine to medium grained, gray, very dense							
		85		X	5	19-31-36 N=67	15.8		
		90		X	4	15-21-45 N=66	14.4		
		95		X	5	25-32-44 N=76	15.5		25
		100		X	3	28-42-50/4"	15.7		
		101.5 / 1150.5							
		Boring Terminated at 101.5 Feet							

See Exploration and Testing Procedures for a description of field and laboratory procedures used and additional data (If any).

See Supporting Information for explanation of symbols and abbreviations.

Elevation Reference: Elevations estimated from MnTOPO website

Water Level Observations
No free water observed

Drill Rig
CME 550X

Hammer Type
Automatic

Driller
M. Nunez

Notes

Advancement Method
0'-10': 3 1/4" Hollow Stem Auger
10'-100': Mud rotary

Abandonment Method
Boring backfilled with cuttings from 0'-2' then neat cement to completion

Logged by
K. Watt

Boring Started
12-18-2024

Boring Completed
12-18-2024

VFM-Component 1 - 8.1 Miles Lake Mills M500E
690th Avenue | Albert Lea, MN
Terracon Project No. JY245041

Terracon
2625 Highway 14 W, Ste F
Rochester, MN

Boring Log No. BH-07

Location: See Exploration Plan

Latitude: 43.6428° Longitude: -93.4474°

Depth (Ft.) Elevation: 1294 (Ft.) +/-

Model Layer	Depth (Ft.)	Elevation	Material Description	Sample Type	Recovery (In.)	Field Test Results	Water Content (%)	Atterberg Limits LL-PL-PI	Percent Fines
1	0	1294	**TOPSOIL**, frost to 10"						
	2.5	1291.5							
2	2.5	1291.5	**POORLY GRADED SAND (SP)**, trace gravel, fine to medium grained, brown, medium dense						
	8.0	1286							
	8.0	1286	**SILTY SAND (SM)**, trace gravel, trace clay, fine to medium grained, brown, loose						
	14.0	1280							
	14.0	1280	**CLAYEY SAND (SC)**, trace gravel, fine to medium grained, brown, medium dense						
	18.0	1276							
3	18.0	1276	**SANDY LEAN CLAY (CL)**, trace gravel, gray, medium stiff to hard						
					10	15-24-24 N=48	13.0		
					14	3-6-10 N=16	7.0		
					16	3-3-5 N=8	23.3		34
					18	16-13-10 N=23	13.4		14
					14	15-22-27 N=49	15.8		
					18	3-3-4 N=7	18.3		
					18	3-4-5 N=9	18.6		
					18	6-8-8 N=16	19.3		
					18	3-4-5 N=9	24.1		
					18	3-3-5 N=8	21.4	34-17-17	55
					14	4-6-5 N=11	28.2		

Water Level Observations: ▽ at 15 ft

See Exploration and Testing Procedures for a description of field and laboratory procedures used and additional data (If any).

See Supporting Information for explanation of symbols and abbreviations.

Elevation Reference: Elevations estimated from MnTOPO website

Water Level Observations
▽ Water observed at 15 feet while drilling

Drill Rig
CME 550X

Hammer Type
Automatic

Driller
M. Nunez

Logged by
K. Watt

Boring Started
12-17-2024

Boring Completed
12-17-2024

Notes
Equipment Reference:
-Energy Transfer Ratio: 90.4% +/- 2.1%
-Hammer Efficiency Correction: 1.51

Advancement Method
0'-18': 3 1/4" Hollow Stem Auger
18'-80': Mud rotary

Abandonment Method
Boring backfilled with cuttings from 0'-2' then neat cement to completion

Terracon
2625 Highway 14 W, Ste F
Rochester, MN

Boring Log No. BH-07

Location: See Exploration Plan

Latitude: 43.6428° Longitude: -93.4474°

Depth (Ft.) Elevation: 1294 (Ft.) +/-

Model Layer	Graphic Log		Depth (Ft.)	Water Level Observations	Sample Type	Recovery (In.)	Field Test Results	Water Content (%)	Atterberg Limits LL-PL-PI	Percent Fines
3		**SANDY LEAN CLAY (CL)**, trace gravel, gray, medium stiff to hard *(continued)*	55		X	16	3-5-8 N=13	28.1		
			60		X	12	12-16-16 N=32	19.0		
			65		X	13	5-8-10 N=18	12.8		
			70		X	8	11-13-14 N=27	10.2		
2		**POORLY GRADED SAND (SP)**, trace gravel, fine to coarse grained, gray, dense	75		X	12	12-16-20 N=36	14.0		
3		**SANDY LEAN CLAY (CL)**, trace gravel, gray and dark brown, hard	80		X	11	15-19-23 N=42	29.8		59
		Boring Terminated at 81.5 Feet								

73.0 1221

78.0 1216

81.5 1212.5

See Exploration and Testing Procedures for a description of field and laboratory procedures used and additional data (If any).

See Supporting Information for explanation of symbols and abbreviations.

Elevation Reference: Elevations estimated from MnTOPO website

Water Level Observations
▽ Water observed at 15 feet while drilling

Drill Rig
CME 550X

Hammer Type
Automatic

Driller
M. Nunez

Logged by
K. Watt

Boring Started
12-17-2024

Boring Completed
12-17-2024

Notes

Advancement Method
0'-18': 3 1/4" Hollow Stem Auger
18'-80': Mud rotary

Abandonment Method
Boring backfilled with cuttings from 0'-2' then neat cement to completion

VFM-Component 1 - 8.1 Miles Lake Mills M500E
690th Avenue | Albert Lea, MN
Terracon Project No. JY245041

Terracon
2625 Highway 14 W, Ste F
Rochester, MN

Boring Log No. BH-08

Location: See Exploration Plan

Latitude: 43.6589° Longitude: -93.4502°

Depth (Ft.) Elevation: 1350 (Ft.) +/-

Model Layer	Graphic Log	Depth (Ft.)	Water Level Observations	Sample Type	Recovery (In.)	Field Test Results	Water Content (%)	Atterberg Limits LL-PL-PI	Percent Fines
1		1.5 **TOPSOIL** frost to 1' 1348.5			15	4-9-3 N=12	24.3		
3		**SANDY LEAN CLAY (CL)**, trace gravel, brown and gray, medium stiff to very stiff			18	2-3-4 N=7	22.0		
					18	3-4-5 N=9	21.4		
					18	2-6-8 N=14	20.6		
		gray at 18'			18	6-9-11 N=20	19.9	31-19-12	61
			▽		0				
					18	6-6-7 N=13	21.6		
		31.5 1318.5			18	5-8-9 N=17	21.7		
		Boring Terminated at 31.5 Feet							

See Exploration and Testing Procedures for a description of field and laboratory procedures used and additional data (If any).

See Supporting Information for explanation of symbols and abbreviations.

Elevation Reference: Elevations estimated from MnTOPO website

Water Level Observations
▽ Water observed at 24 feet while drilling

Drill Rig
CME 550X

Hammer Type
Automatic

Driller
M. Nunez

Notes
Equipment Reference:
-Energy Transfer Ratio: 90.4% +/- 2.1%
-Hammer Efficiency Correction: 1.51

Advancement Method
3 1/4" Hollow Stem Auger

Abandonment Method
Boring backfilled with cuttings from 0'-2' then neat cement to completion

Logged by
K. Watt

Boring Started
12-17-2024

Boring Completed
12-17-2024

VFM-Component 1 - 8.1 Miles Lake Mills M500E
690th Avenue | Albert Lea, MN
Terracon Project No. JY245041

Terracon
2625 Highway 14 W, Ste F
Rochester, MN

Boring Log No. BH-09

Location: See Exploration Plan
Latitude: 43.6633° Longitude: -93.4502°
Depth (Ft.) Elevation: 1331 (Ft.) +/-

Model Layer	Graphic Log		Depth (Ft.)	Water Level Observations	Sample Type	Recovery (In.)	Field Test Results	Water Content (%)	Atterberg Limits LL-PL-PI	Percent Fines
1		**TOPSOIL**, frost to 1' 2.0 1329								
3		**SANDY LEAN CLAY (CL)**, trace gravel, brown and gray, soft				15	9-9-6 N=15	26.3		
			5			14	2-2-1 N=3	24.6	31-21-10	52
		10.0 1321								
		SANDY LEAN CLAY (CL), trace gravel, gray, medium stiff to stiff	10			15	3-4-6 N=10	24.0		
			15			18	2-3-3 N=6	24.9	35-19-16	68
			20			24				
		23.0 1308								
		SILT WITH SAND (ML), trace clay, dark brown and gray, very stiff	25			18	5-8-10 N=18	28.0	33-25-8	81
		28.0 1303								
2		**CLAYEY SAND (SC)**, trace gravel, fine to medium grained, gray, medium dense to dense	30			18	2-4-6 N=10	24.9		
		sand seam fine to coarse grained at 29.5-30.5'	35			18	4-5-8 N=13	20.0		
			40			18	4-6-9 N=15	19.1		
			45			18	5-6-10 N=16	19.1		46
			50			15	8-8-9 N=17	18.3		

See Exploration and Testing Procedures for a description of field and laboratory procedures used and additional data (If any).
See Supporting Information for explanation of symbols and abbreviations.
Elevation Reference: Elevations estimated from MnTOPO website

Water Level Observations
No free water observed

Drill Rig
CME 550X

Hammer Type
Automatic

Driller
M. Nunez

Logged by
K. Watt

Boring Started
12-17-2024

Boring Completed
12-17-2024

Notes
Equipment Reference:
-Energy Transfer Ratio: 90.4% +/- 2.1%
-Hammer Efficiency Correction: 1.51

Advancement Method
0'-10': 3 1/4" Hollow Stem Auger
10'-60': Mud rotary

Abandonment Method
Boring backfilled with cuttings from 0'-2' then neat cement to completion

Terracon
2625 Highway 14 W, Ste F
Rochester, MN

Boring Log No. BH-09

Model Layer	Graphic Log	Location: See Exploration Plan Latitude: 43.6633° Longitude: -93.4502° Depth (Ft.) Elevation: 1331 (Ft.) +/-	Depth (Ft.)	Water Level Observations	Sample Type	Recovery (In.)	Field Test Results	Water Content (%)	Atterberg Limits LL-PL-PI	Percent Fines
2		**CLAYEY SAND (SC)**, trace gravel, fine to medium grained, gray, medium dense to dense *(continued)*	55							
					X	15	7-12-14 N=26	18.8		
			60							
		61.5 1269.5			X	14	10-17-13 N=30	18.9		
		Boring Terminated at 61.5 Feet								

See Exploration and Testing Procedures for a description of field and laboratory procedures used and additional data (If any).

See Supporting Information for explanation of symbols and abbreviations.

Elevation Reference: Elevations estimated from MnTOPO website

Water Level Observations
No free water observed

Drill Rig
CME 550X

Hammer Type
Automatic

Driller
M. Nunez

Logged by
K. Watt

Boring Started
12-17-2024

Boring Completed
12-17-2024

Notes

Advancement Method
0'-10': 3 1/4" Hollow Stem Auger
10'-60': Mud rotary

Abandonment Method
Boring backfilled with cuttings from 0'-2' then neat cement to completion

VFM-Component 1 - 8.1 Miles Lake Mills M500E
690th Avenue | Albert Lea, MN
Terracon Project No. JY245041

2625 Highway 14 W, Ste F
Rochester, MN

Boring Log No. BH-10

Location: See Exploration Plan

Latitude: 43.6641° Longitude: -93.4498°

Depth (Ft.) | Elevation: 1336 (Ft.) +/-

Model Layer	Depth (Ft.)	Elevation	Material Description	Recovery (In.)	Field Test Results	Water Content (%)	Atterberg Limits LL-PL-PI	Percent Fines
1	0.3	1335.7	**FILL - TOPSOIL**, frost to 8"	14	6-6-4 N=10	24.0		
	2.0	1334	**FILL - TILL ZONE - SAND AND CLAY**, trace gravel, brown, frost to 8"					
2			**CLAYEY SAND (SC)**, trace gravel, fine to medium grained, gray and brown, loose to medium dense	16	2-4-4 N=8	21.4		
				17	2-3-4 N=7	21.4		
				18	4-7-8 N=15	21.2		47
	18.0	1318	**SILTY SAND (SM)**, trace gravel, fine to medium grained, brown and gray, medium dense					
	21.0	1315	**CLAYEY SAND (SC)**, trace gravel, fine to medium grained, gray, loose to medium dense	18	5-6-7 N=13	22.4		49
				18	3-3-5 N=8	19.5		
				18	4-4-5 N=9	18.8		
				18	3-5-6 N=11	20.4		37
	38.0	1298	**POORLY GRADED SAND (SP)**, trace silt, fine to medium grained, gray, medium dense					
				14	5-10-10 N=20	24.8		
	42.0	1294	**CLAYEY SAND (SC)**, trace gravel, fine to coarse grained, gray, medium dense					
				14	8-10-12 N=22	15.8		26
	48.0	1288						
3			**SANDY LEAN CLAY (CL)**, trace gravel, gray, stiff	14	5-5-7 N=12	19.2		53

See Exploration and Testing Procedures for a description of field and laboratory procedures used and additional data (If any).

See Supporting Information for explanation of symbols and abbreviations.

Elevation Reference: Elevations estimated from MnTOPO website

Water Level Observations
No free water observed

Drill Rig
CME 550X

Hammer Type
Automatic

Driller
M. Nunez

Logged by
K. Watt

Boring Started
12-16-2024

Boring Completed
12-17-2024

Notes
Equipment Reference:
-Energy Transfer Ratio: 90.4% +/- 2.1%
-Hammer Efficiency Correction: 1.51

Advancement Method
0'-10': 3 1/4" Hollow Stem Auger
10'-60': Mud rotary

Abandonment Method
Boring backfilled with cuttings from 0'-2' then neat cement to completion

Terracon
2625 Highway 14 W, Ste F
Rochester, MN

Boring Log No. BH-10

Model Layer	Graphic Log	Location: See Exploration Plan Latitude: 43.6641° Longitude: -93.4498° Depth (Ft.) Elevation: 1336 (Ft.) +/-	Depth (Ft.)	Water Level Observations	Sample Type	Recovery (In.)	Field Test Results	Water Content (%)	Atterberg Limits LL-PL-PI	Percent Fines
3		**SANDY LEAN CLAY (CL)**, trace gravel, gray, stiff *(continued)*	55							
					X	11	3-4-5 N=9	19.2		
			60							
					X	14	4-5-5 N=10	16.1		
		61.5 1274.5 ***Boring Terminated at 61.5 Feet***								

See Exploration and Testing Procedures for a description of field and laboratory procedures used and additional data (If any).

See Supporting Information for explanation of symbols and abbreviations.

Elevation Reference: Elevations estimated from MnTOPO website

Water Level Observations
No free water observed

Drill Rig
CME 550X

Hammer Type
Automatic

Driller
M. Nunez

Notes

Advancement Method
0'-10': 3 1/4" Hollow Stem Auger
10'-60': Mud rotary

Abandonment Method
Boring backfilled with cuttings from 0'-2' then neat cement to completion

Logged by
K. Watt

Boring Started
12-16-2024

Boring Completed
12-17-2024

VFM-Component 1 - 8.1 Miles Lake Mills M500E
690th Avenue | Albert Lea, MN
Terracon Project No. JY245041

2625 Highway 14 W, Ste F
Rochester, MN

Boring Log No. BH-11

Location: See Exploration Plan

Latitude: 43.6795° Longitude: -93.4440°

Depth (Ft.) | Elevation: 1266 (Ft.) +/-

Model Layer	Depth (Ft.)	Elevation	Material Description	Water Level Observations	Sample Type	Recovery (In.)	Field Test Results	Water Content (%)	Atterberg Limits LL-PL-PI	Percent Fines
1	0.5	1265.5	**FILL - TOPSOIL**, Frost to 6"							
1	3.0	1263	**FILL - TILL ZONE - CLAYEY SAND**, trace gravel, trace roots, fine to medium grained, brown and gray			9	5-3-4-5 N=7	22.0		
2			**CLAYEY SAND (SC)**, trace gravel, fine to medium grained, gray and brown, loose to medium dense			18	3-4-5 N=9	15.9		
2			silt seam at 8'-10'	▽		18	3-4-6 N=10	21.1		43
2			gray after 12'			17	2-2-3 N=5	24.5		
2						18	2-2-5 N=7	19.0		
2	26.0	1240				11	3-4-8 N=12	12.4		
2			**SILTY SAND (SM)**, trace gravel, fine to coarse grained, gray, medium dense			18	8-7-8 N=15	14.4		15
3	35.0	1231	**SANDY SILT (ML)**, gray and dark brown, very stiff			18	7-12-16 N=28	19.0	30-29-1	63
2	38.0	1228	**POORLY GRADED SAND WITH SILT (SP-SM)**, trace gravel, fine to coarse grained, gray, dense			18	15-24-14 N=38	12.0		5
2	43.0	1223	**CLAYEY SAND (SC)**, trace gravel, fine to medium grained, gray, dense to very dense			8	15-22-24 N=46	16.3		34
2	52.0	1214				6	22-31-24 N=55	16.3		
			POORLY GRADED SAND (SP), trace gravel, trace clay, trace silt, fine to coarse grained, gray, dense							

See Exploration and Testing Procedures for a description of field and laboratory procedures used and additional data (If any).

See Supporting Information for explanation of symbols and abbreviations.

Elevation Reference: Elevations estimated from MnTOPO website

Water Level Observations
▽ Water observed at 8 feet while drilling

Drill Rig
CME 550X / Geoprobe 3100GT

Hammer Type
Automatic

Driller
E. Widmark/M. Nunez

Notes
0'-41.5' Equipment Reference:
-Energy Transfer Ratio: 94.0% +/- 3.6%
-Hammer Efficiency Correction: 1.57
41.5'-61.5' Equipment Reference:
-Energy Transfer Ratio: 90.4% +/- 2.1%
-Hammer Efficiency Correction: 1.51
70 gallon of mud loss from 30'-35'
75 gallon of mud loss from 40'-45'

Advancement Method
0'-10': 3 1/4" Hollow Stem Auger
10'-60': Mud rotary

Abandonment Method
Boring backfilled with cuttings from 0'-2' then neat cement to completion

Logged by
B. Kern/K. Watt

Boring Started
12-11-2024

Boring Completed
12-16-2024

VFM-Component 1 - 8.1 Miles Lake Mills M500E
690th Avenue | Albert Lea, MN
Terracon Project No. JY245041

Terracon
2625 Highway 14 W, Ste F
Rochester, MN

Boring Log No. BH-11

Model Layer	Graphic Log	Location: See Exploration Plan Latitude: 43.6795° Longitude: -93.4440° Depth (Ft.) / Elevation: 1266 (Ft.) +/-	Depth (Ft.)	Water Level Observations	Sample Type	Recovery (In.)	Field Test Results	Water Content (%)	Atterberg Limits LL-PL-PI	Percent Fines
2		**POORLY GRADED SAND (SP)**, trace gravel, trace clay, trace silt, fine to coarse grained, gray, dense *(continued)*	55		X	11	15-21-27 N=48	12.3		
		58.0 / 1208								
		CLAYEY SAND (SC), trace gravel, fine to medium grained, gray, dense	60		X	13	13-18-20 N=38	18.4		31
		61.5 / 1204.5								
		Boring Terminated at 61.5 Feet								

See Exploration and Testing Procedures for a description of field and laboratory procedures used and additional data (If any).

See Supporting Information for explanation of symbols and abbreviations.

Elevation Reference: Elevations estimated from MnTOPO website

Water Level Observations
▽ Water observed at 8 feet while drilling

Drill Rig
CME 550X / Geoprobe 3100GT

Hammer Type
Automatic

Driller
E. Widmark/M. Nunez

Notes

Advancement Method
0'-10': 3 1/4" Hollow Stem Auger
10'-60': Mud rotary

Abandonment Method
Boring backfilled with cuttings from 0'-2' then neat cement to completion

Logged by
B. Kern/K. Watt

Boring Started
12-11-2024

Boring Completed
12-16-2024

VFM-Component 1 - 8.1 Miles Lake Mills M500E
690th Avenue | Albert Lea, MN
Terracon Project No. JY245041

Terracon
2625 Highway 14 W, Ste F
Rochester, MN

Boring Log No. BH-12

Location: See Exploration Plan

Latitude: 43.6806° Longitude: -93.4440°

Depth (Ft.) Elevation: 1257 (Ft.) +/-

Model Layer	Graphic Log	Depth (Ft.)	Water Level Observations	Sample Type	Recovery (In.)	Field Test Results	Water Content (%)	Atterberg Limits LL-PL-PI	Percent Fines
1		0.6 **FILL - TOPSOIL**, Frost to 5" 1256.4 **FILL - CLAYEY SAND**, trace gravel, trace roots, fine to medium grained, dark brown, brown, and gray		X	1	1-1-2-3 N=3	23.0		
				X	15	2-2-2 N=4	31.6		34
2		6.5 1250.5 **CLAYEY SAND (SC)**, trace gravel, occasional silt, sand, and clay seams, fine to medium grained, gray, very loose to loose	▽	X	18	2-2-2 N=4	19.3		
				X	17	3-4-5 N=9	23.4		
				X	18	3-2-4 N=6	17.3		
				X	18	3-3-5 N=8	18.8		
				X	18	2-2-4 N=6	17.8		
				X	18	3-2-3 N=5	19.6		34
				X	18	2-3-3 N=6	19.0		
				X	18	2-4-4 N=8	19.0		
				X	18	2-3-5 N=8	22.3		

See Exploration and Testing Procedures for a description of field and laboratory procedures used and additional data (If any).

See Supporting Information for explanation of symbols and abbreviations.

Elevation Reference: Elevations estimated from MnTOPO website

Water Level Observations
▽ Water observed at 14 feet while drilling

Drill Rig
Geoprobe 3100GT

Hammer Type
Automatic

Driller
E. Widmark

Logged by
B. Kern

Boring Started
12-10-2024

Boring Completed
12-10-2024

Notes
Equipment Reference:
-Energy Transfer Ratio: 94.0% +/- 3.6%
-Hammer Efficiency Correction: 1.57

Advancement Method
3 1/4" Hollow Stem Auger

Abandonment Method
Boring backfilled with cuttings from 0'-2' then grout from 2'-20', then neat cement to completion

VFM-Component 1 - 8.1 Miles Lake Mills M500E
690th Avenue | Albert Lea, MN
Terracon Project No. JY245041

Terracon
2625 Highway 14 W, Ste F
Rochester, MN

Boring Log No. BH-12

Model Layer	Graphic Log	Location: See Exploration Plan Latitude: 43.6806° Longitude: -93.4440° Depth (Ft.) Elevation: 1257 (Ft.) +/-	Depth (Ft.)	Water Level Observations	Sample Type	Recovery (In.)	Field Test Results	Water Content (%)	Atterberg Limits LL-PL-PI	Percent Fines
2		**CLAYEY SAND (SC)**, trace gravel, occasional silt, sand, and clay seams, fine to medium grained, gray, very loose to loose *(continued)*	55							
					X	18	2-1-1 N=2	22.5		
			60							
		61.5 1195.5			X	18	2-3-5 N=8	21.7		
		Boring Terminated at 61.5 Feet								

See Exploration and Testing Procedures for a description of field and laboratory procedures used and additional data (If any).

See Supporting Information for explanation of symbols and abbreviations.

Elevation Reference: Elevations estimated from MnTOPO website

Water Level Observations
▽ Water observed at 14 feet while drilling

Drill Rig
Geoprobe 3100GT

Hammer Type
Automatic

Driller
E. Widmark

Logged by
B. Kern

Boring Started
12-10-2024

Boring Completed
12-10-2024

Notes

Advancement Method
3 1/4" Hollow Stem Auger

Abandonment Method
Boring backfilled with cuttings from 0'-2' then grout from 2'-20', then neat cement to completion

VFM-Component 1 - 8.1 Miles Lake Mills M500E
690th Avenue | Albert Lea, MN
Terracon Project No. JY245041

Terracon
2625 Highway 14 W, Ste F
Rochester, MN

Boring Log No. BH-13

Location: See Exploration Plan

Latitude: 43.6867° Longitude: -93.4425°

Model Layer	Depth (Ft.)	Elevation: 1245 (Ft.) +/-	Depth (Ft.)	Water Level Observations	Sample Type	Recovery (In.)	Field Test Results	Water Content (%)	Atterberg Limits LL-PL-PI	Percent Fines
1	1.1	**TOPSOIL**, Frost to 4" 1243.9			X	2	3-3-4-4 N=7	26.2		
3	3.0	**SANDY LEAN CLAY (CL)**, trace roots, brown and gray, medium stiff 1242			X	6	3-3-4 N=7	30.8		
3	13.0	**SILT WITH SAND (ML)**, trace clay, occasional sand seams, brown and gray, medium stiff 1232	10	▽	X	18	2-2-3 N=5	31.0		76
3	19.0	**SANDY FAT CLAY (CH)**, gray, soft sand seam at 15' silt seam at 18' 1226	15		X	14	2-1-2 N=3	39.9	63-28-35	59
2	51.5	**CLAYEY SAND (SC)**, trace gravel, occasional silt seams, fine to medium grained, very loose to loose 1193.5	20		■	24				
			25		X	18	0-1-2 N=3	24.7		
			30		X	18	0-1-2 N=3	24.0		
			35		X	18	0-2-2 N=4	18.9		48
			40		X	18	1-2-3 N=5	18.8		
			45		X	18	2-3-4 N=7	23.5		
			50		X	18	2-3-5 N=8	17.2		
		Boring Terminated at 51.5 Feet								

See Exploration and Testing Procedures for a description of field and laboratory procedures used and additional data (If any).

See Supporting Information for explanation of symbols and abbreviations.

Elevation Reference: Elevations estimated from MnTOPO website

Water Level Observations
▽ Water observed at 11 feet while drilling

Drill Rig
Geoprobe 3100GT

Hammer Type
Automatic

Driller
E. Widmark

Logged by
B. Kern

Boring Started
12-10-2024

Boring Completed
12-10-2024

Notes
Equipment Reference:
-Energy Transfer Ratio: 94.0% +/- 3.6%
-Hammer Efficiency Correction: 1.57

Advancement Method
3 1/4" Hollow Stem Auger

Abandonment Method
Boring backfilled with cuttings from 0'-2' then grout from 2'-20', then neat cement to completion

VFM-Component 1 - 8.1 Miles Lake Mills M500E
690th Avenue | Albert Lea, MN
Terracon Project No. JY245041

Terracon
2625 Highway 14 W, Ste F
Rochester, MN

Boring Log No. BH-14

Location: See Exploration Plan

Latitude: 43.6956° Longitude: -93.4359°

Depth (Ft.) Elevation: 1252 (Ft.) +/-

Model Layer	Graphic Log	Depth (Ft.)	Water Level Observations	Sample Type	Recovery (In.)	Field Test Results	Water Content (%)	Atterberg Limits LL-PL-PI	Percent Fines
		0.4 **TOPSOIL**, frost to 3" 1251.6							
		CLAYEY SAND (SC), trace gravel, occasional silt and sand seams, fine to medium grained, gray, very loose to medium dense	▽		10	1-2-4-5 N=6	21.1		
		5			2	3-1-2 N=3	20.6		
		10			10	4-3-5 N=8	19.9		
		15			18	2-2-3 N=5	17.9		
		20			18	1-2-3 N=5	19.1		
2		25			10	3-2-4 N=6	18.3		
		30			18	2-2-2 N=4	18.4		44
		35			18	2-2-4 N=6	18.4		
		40			18	1-2-2 N=4	19.7		
		45			18	2-3-5 N=8	17.8		
		50			18	4-9-15 N=24	18.8		
		51.5 1200.5							
		Boring Terminated at 51.5 Feet							

See Exploration and Testing Procedures for a description of field and laboratory procedures used and additional data (If any).

See Supporting Information for explanation of symbols and abbreviations.

Elevation Reference: Elevations estimated from MnTOPO website

Water Level Observations
▽ Water observed at 3 feet while drilling

Drill Rig
Geoprobe 3100GT

Hammer Type
Automatic

Driller
E. Widmark

Logged by
B. Kern

Boring Started
12-09-2024

Boring Completed
12-09-2024

Notes
Equipment Reference:
-Energy Transfer Ratio: 94.0% +/- 3.6%
-Hammer Efficiency Correction: 1.57

Advancement Method
3 1/4" Hollow Stem Auger

Abandonment Method
Boring backfilled with cuttings from 0'-2' then grout from 2'-20', then neat cement to completion

VFM-Component 1 - 8.1 Miles Lake Mills M500E
690th Avenue | Albert Lea, MN
Terracon Project No. JY245041

2625 Highway 14 W, Ste F
Rochester, MN

Boring Log No. BH-15

Location: See Exploration Plan

Latitude: 43.6970° Longitude: -93.4349°

Depth (Ft.) | Elevation: 1260 (Ft.) +/-

Model Layer	Depth (Ft.)	Elevation	Material Description	Sample Type	Recovery (In.)	Field Test Results	Water Content (%)	Atterberg Limits LL-PL-PI	Percent Fines
1	0.4	1259.6	**TOPSOIL**, frost to 5"						
3			**SANDY LEAN CLAY (CL)**, trace gravel, brown, gray and red, medium stiff to stiff						
					14	1-3-2-3 N=5	25.4		
					18	2-2-3 N=5	21.5	32-20-12	52
			silt seam at 6'						
					11	2-4-6 N=10	20.1		
	13.0	1247							
2			**CLAYEY SAND (SC)**, trace gravel, fine to medium grained, gray, loose to dense						
					15	3-3-3 N=6	24.6		32
					17	3-4-5 N=9	16.8		
					18	2-3-5 N=8	16.5		
					18	2-3-5 N=8	17.1		
					18	2-4-5 N=9	17.4		48
					18	2-4-5 N=9	12.5		
					18	2-4-6 N=10	11.7		
	51.5	1208.5			18	11-17-14 N=31	17.9		
			Boring Terminated at 51.5 Feet						

Depth (Ft.): 5, 10, 15, 20, 25, 30, 35, 40, 45, 50

Water Level Observations: ▽ at 29 feet

See Exploration and Testing Procedures for a description of field and laboratory procedures used and additional data (If any).

See Supporting Information for explanation of symbols and abbreviations.

Elevation Reference: Elevations estimated from MnTOPO website

Water Level Observations
▽ Water observed at 29 feet while drilling

Drill Rig
Geoprobe 3100GT

Hammer Type
Automatic

Driller
E. Widmark

Logged by
B. Kern

Boring Started
12-09-2024

Boring Completed
12-09-2024

Notes
Equipment Reference:
-Energy Transfer Ratio: 94.0% +/- 3.6%
-Hammer Efficiency Correction: 1.57

Advancement Method
3 1/4" Hollow Stem Auger

Abandonment Method
Boring backfilled with cuttings from 0'-2' then grout from 2'-20', then neat cement to completion

VFM-Component 1 - 8.1 Miles Lake Mills M500E
690th Avenue | Albert Lea, MN
Terracon Project No. JY245041

2625 Highway 14 W, Ste F
Rochester, MN

Boring Log No. BH-16

Location: See Exploration Plan

Latitude: 43.6987° Longitude: -93.4325°

Depth (Ft.) Elevation: 1266 (Ft.) +/-

Model Layer	Graphic Log	Depth (Ft.)	Water Level Observations	Sample Type	Recovery (In.)	Field Test Results	Water Content (%)	Atterberg Limits LL-PL-PI	Percent Fines
1		**FILL - TOPSOIL/TILL ZONE-LEAN CLAY**, with organics, dark brown and black frost to 8" 3.0 1263			17	15-33-24 N=57	21.4		
3		**LEAN CLAY WITH SAND (CL)**, gray and brown, soft 8.0 1258			14	0-2-2 N=4	29.2	41-18-23	72
2		**CLAYEY SAND (SC)**, trace gravel, fine to medium grained, brown and gray, very loose to medium dense			14	0-0-1 N=1	17.1		
					18	0-0-3 N=3	18.6		49
					18	0-3-4 N=7	16.6		
					18	3-3-4 N=7	17.8		
					18	0-3-3 N=6	17.4		39
					18	3-5-6 N=11	18.5		
					18	3-4-6 N=10	17.6		
		51.5 1214.5			18	4-5-6 N=11	19.8		
		Boring Terminated at 51.5 Feet							

See Exploration and Testing Procedures for a description of field and laboratory procedures used and additional data (If any).

See Supporting Information for explanation of symbols and abbreviations.

Elevation Reference: Elevations estimated from MnTOPO website

Water Level Observations
Water observed at 8 feet while drilling

Drill Rig
CME 550X

Hammer Type
Automatic

Driller
M. Nunez

Logged by
R. Rodriquez

Boring Started
01-23-2025

Boring Completed
01-23-2025

Notes
Equipment Reference:
-Energy Transfer Ratio: 90.4% +/- 2.1%
-Hammer Efficiency Correction: 1.51

Advancement Method
3 1/4" Hollow Stem Auger

Abandonment Method
Boring backfilled with cuttings from 0'-2' then neat cement to completion

VFM-Component 1 - 8.1 Miles Lake Mills M500E
690th Avenue | Albert Lea, MN
Terracon Project No. JY245041

Terracon
2625 Highway 14 W, Ste F
Rochester, MN

Boring Log No. BH-17

Location: See Exploration Plan

Latitude: 43.7019° Longitude: -93.4296°

Model Layer	Graphic Log	Depth (Ft.)	Elevation: 1289 (Ft.) +/-	Depth (Ft.)	Water Level Observations	Sample Type	Recovery (In.)	Field Test Results	Water Content (%)	Atterberg Limits LL-PL-PI	Percent Fines
1		0.0	**TOPSOIL** frost to 12"				12	30-50	16.2		
		3.0	1286								
2		3.0	**SILTY SAND (SM)**, fine to medium grained, brown and gray, loose	5			11	3-2-2 N=4	10.5		15
		8.0	1281		▽						
3		8.0	**SANDY CLAYEY SILT (CL-ML)**, trace gravel, fine to medium grained, gray and brown, loose to medium dense	10			15	2-2-2 N=4	25.9	27-20-7	51
				15			17	4-8-3 N=11	18.3		
		18.0	1271								
2		18.0	**CLAYEY SAND (SC)**, trace gravel, fine to medium grained, gray, medium dense to dense	20			17	5-8-10 N=18	17.2		44
			fine to coarse grained at 22' brown at 22'	25			18	5-6-8 N=14	19.7		19
		31.5	1257.5	30			18	15-18-20 N=38	15.6		
			Boring Terminated at 31.5 Feet								

See Exploration and Testing Procedures for a description of field and laboratory procedures used and additional data (If any).

See Supporting Information for explanation of symbols and abbreviations.

Elevation Reference: Elevations estimated from MnTOPO website

Water Level Observations
▽ Water observed at 8 feet while drilling

Drill Rig
CME 550X

Hammer Type
Automatic

Driller
M. Nunez

Notes
Equipment Reference:
-Energy Transfer Ratio: 90.4% +/- 2.1%
-Hammer Efficiency Correction: 1.51

Advancement Method
3 1/4" Hollow Stem Auger

Abandonment Method
Boring backfilled with cuttings from 0'-2' then neat cement to completion

Logged by
R. Rodriquez

Boring Started
01-23-2025

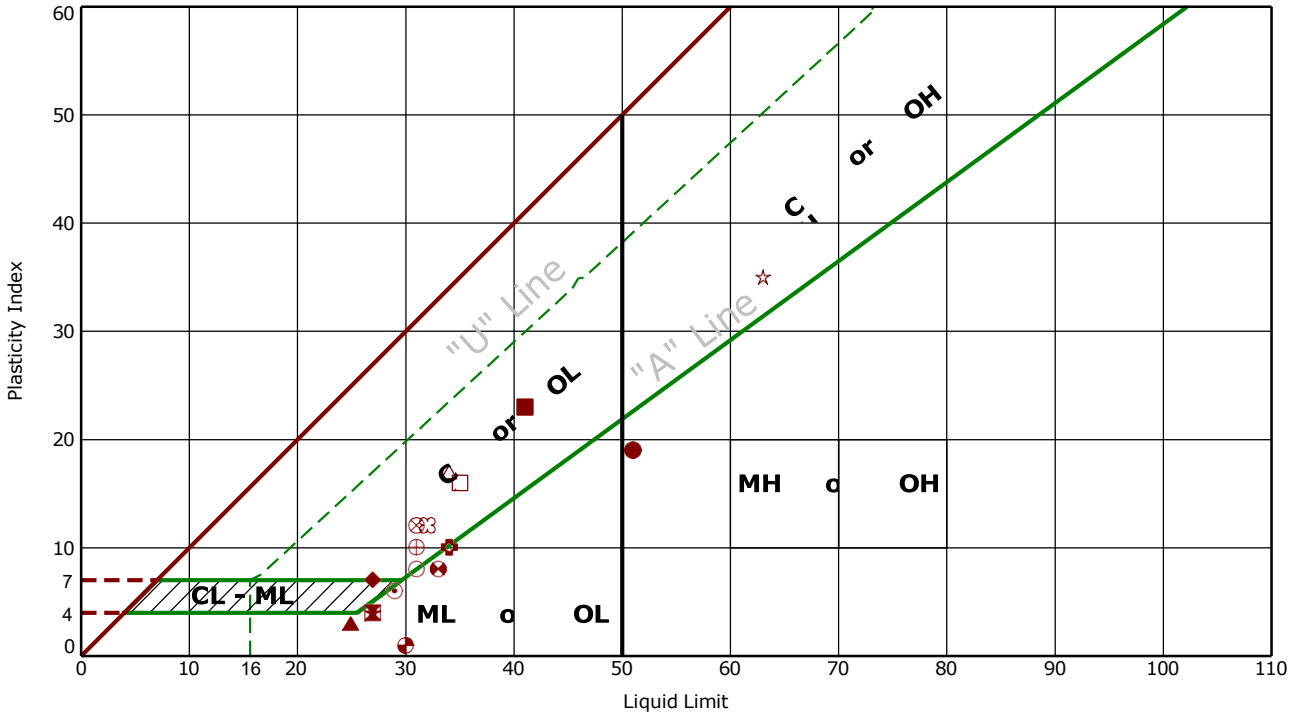
Boring Completed
01-23-2025

VFM-Component 1 - 8.1 Miles Lake Mills M500E
690th Avenue | Albert Lea, MN
Terracon Project No. JY245041

Terracon
2625 Highway 14 W, Ste F
Rochester, MN

Atterberg Limit Results

ASTM D4318



	Boring ID	Depth (Ft)	LL	PL	PI	Fines	USCS	Description
●	BH-00	5 - 6.5	51	32	19		MH	ELASTIC SILT
⊠	BH-02	25 - 26.5	27	23	4	91.1	ML	SILT
▲	BH-03	50 - 51.5	25	22	3	91.0	ML	SILT
★	BH-04	5 - 6.5	27	23	4	91.9	ML	SILT
⊙	BH-05	20 - 21.5	29	23	6	62.1	ML	SANDY SILT
✿	BH-05	35 - 36.5	34	24	10	72.1	ML	SILT with SAND
○	BH-05	40 - 41.5	31	23	8	61.0	ML	SANDY SILT
△	BH-07	45 - 46.5	34	17	17	54.7	CL	SANDY LEAN CLAY
⊗	BH-08	20 - 21.5	31	19	12	61.4	CL	SANDY LEAN CLAY
⊕	BH-09	5 - 6.5	31	21	10	51.9	CL	SANDY LEAN CLAY
□	BH-09	15 - 16.5	35	19	16	67.9	CL	SANDY LEAN CLAY
⊛	BH-09	25 - 26.5	33	25	8	80.7	ML	SILT with SAND
◒	BH-11	35 - 36.5	30	29	1	62.7	ML	SANDY SILT
☆	BH-13	15 - 16.5	63	28	35	59.0	CH	SANDY FAT CLAY
⊠	BH-15	5 - 6.5	32	20	12	52.4	CL	SANDY LEAN CLAY
■	BH-16	5 - 6.5	41	18	23	72.4	CL	LEAN CLAY with SAND
◆	BH-17	10 - 11.5	27	20	7	51.3	CL-ML	SANDY CLAYEY SILT

Supporting Information

Contents:

General Notes
Unified Soil Classification System

Terracon
2625 Highway 14 W, Ste F
Rochester, MN

General Notes

Sampling



Water Level



Water Initially Encountered

Water Level After a Specified Period of Time

Water Level After a Specified Period of Time

Cave In Encountered

Water levels indicated on the soil boring logs are the levels measured in the borehole at the times indicated. Groundwater level variations will occur over time. In low permeability soils, accurate determination of groundwater levels is not possible with short term water level observations.

Field Tests

N	Standard Penetration Test Resistance (Blows/Ft.)
(HP)	Hand Penetrometer
(T)	Torvane
(DCP)	Dynamic Cone Penetrometer
UC	Unconfined Compressive Strength
(PID)	Photo-Ionization Detector
(OVA)	Organic Vapor Analyzer

Descriptive Soil Classification

Soil classification as noted on the soil boring logs is based Unified Soil Classification System. Where sufficient laboratory data exist to classify the soils consistent with ASTM D2487 "Classification of Soils for Engineering Purposes" this procedure is used. ASTM D2488 "Description and Identification of Soils (Visual-Manual Procedure)" is also used to classify the soils, particularly where insufficient laboratory data exist to classify the soils in accordance with ASTM D2487. In addition to USCS classification, coarse grained soils are classified on the basis of their in-place relative density, and fine-grained soils are classified on the basis of their consistency. See "Strength Terms" table below for details. The ASTM standards noted above are for reference to methodology in general. In some cases, variations to methods are applied as a result of local practice or professional judgment.

Location And Elevation Notes

Exploration point locations as shown on the Exploration Plan and as noted on the soil boring logs in the form of Latitude and Longitude are approximate. See Exploration and Testing Procedures in the report for the methods used to locate the exploration points for this project. Surface elevation data annotated with +/- indicates that no actual topographical survey was conducted to confirm the surface elevation. Instead, the surface elevation was approximately determined from topographic maps of the area.

Strength Terms

Relative Density of Coarse-Grained Soils
(More than 50% retained on No. 200 sieve.)
Density determined by Standard Penetration Resistance

Relative Density	Standard Penetration or N-Value (Blows/Ft.)
Very Loose	0 - 3
Loose	4 - 9
Medium Dense	10 - 29
Dense	30 - 50
Very Dense	> 50

Consistency of Fine-Grained Soils
(50% or more passing the No. 200 sieve.)
Consistency determined by laboratory shear strength testing, field visual-manual procedures or standard penetration resistance

Consistency	Unconfined Compressive Strength Qu (tsf)	Standard Penetration or N-Value (Blows/Ft.)
Very Soft	less than 0.25	0 - 1
Soft	0.25 to 0.50	2 - 4
Medium Stiff	0.50 to 1.00	4 - 8
Stiff	1.00 to 2.00	8 - 15
Very Stiff	2.00 to 4.00	15 - 30
Hard	> 4.00	> 30

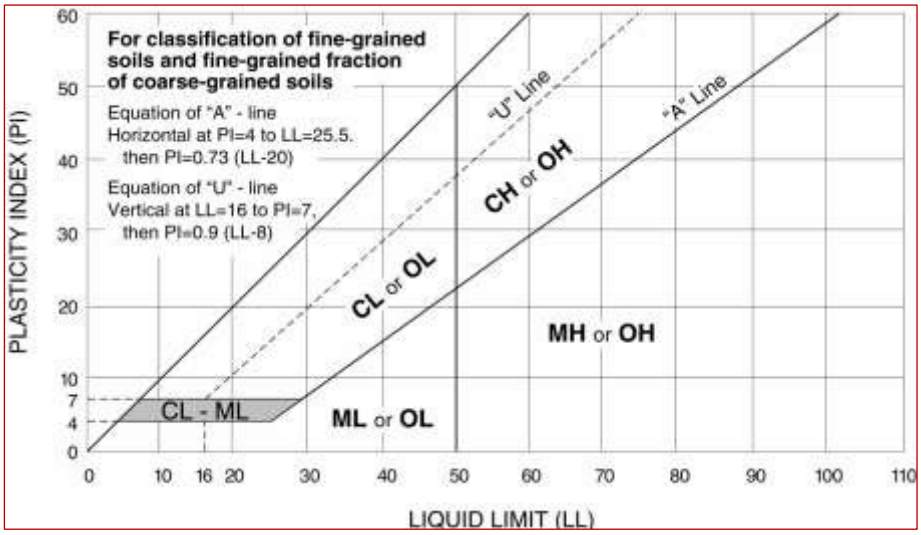
Relevance of Exploration and Laboratory Test Results

Exploration/field results and/or laboratory test data contained within this document are intended for application to the project as described in this document. Use of such exploration/field results and/or laboratory test data should not be used independently of this document.

Unified Soil Classification System

Criteria for Assigning Group Symbols and Group Names Using Laboratory Tests [A]				Soil Classification	
				Group Symbol	Group Name [B]
Coarse-Grained Soils: More than 50% retained on No. 200 sieve	**Gravels:** More than 50% of coarse fraction retained on No. 4 sieve	**Clean Gravels:** Less than 5% fines [C]	Cu≥4 and 1≤Cc≤3 [E]	GW	Well-graded gravel [F]
			Cu<4 and/or [Cc<1 or Cc>3.0] [E]	GP	Poorly graded gravel [F]
		Gravels with Fines: More than 12% fines [C]	Fines classify as ML or MH	GM	Silty gravel [F, G, H]
			Fines classify as CL or CH	GC	Clayey gravel [F, G, H]
	Sands: 50% or more of coarse fraction passes No. 4 sieve	**Clean Sands:** Less than 5% fines [D]	Cu≥6 and 1≤Cc≤3 [E]	SW	Well-graded sand [I]
			Cu<6 and/or [Cc<1 or Cc>3.0] [E]	SP	Poorly graded sand [I]
		Sands with Fines: More than 12% fines [D]	Fines classify as ML or MH	SM	Silty sand [G, H, I]
			Fines classify as CL or CH	SC	Clayey sand [G, H, I]
Fine-Grained Soils: 50% or more passes the No. 200 sieve	**Silts and Clays:** Liquid limit less than 50	**Inorganic:**	PI > 7 and plots above "A" line [J]	CL	Lean clay [K, L, M]
			PI < 4 or plots below "A" line [J]	ML	Silt [K, L, M]
		Organic:	$\frac{LL\ oven\ dried}{LL\ not\ dried} < 0.75$	OL	Organic clay [K, L, M, N] Organic silt [K, L, M, O]
	Silts and Clays: Liquid limit 50 or more	**Inorganic:**	PI plots on or above "A" line	CH	Fat clay [K, L, M]
			PI plots below "A" line	MH	Elastic silt [K, L, M]
		Organic:	$\frac{LL\ oven\ dried}{LL\ not\ dried} < 0.75$	OH	Organic clay [K, L, M, P] Organic silt [K, L, M, Q]
Highly organic soils:	Primarily organic matter, dark in color, and organic odor			PT	Peat

[A] Based on the material passing the 3-inch (75-mm) sieve.
[B] If field sample contained cobbles or boulders, or both, add "with cobbles or boulders, or both" to group name.
[C] Gravels with 5 to 12% fines require dual symbols: GW-GM well-graded gravel with silt, GW-GC well-graded gravel with clay, GP-GM poorly graded gravel with silt, GP-GC poorly graded gravel with clay.
[D] Sands with 5 to 12% fines require dual symbols: SW-SM well-graded sand with silt, SW-SC well-graded sand with clay, SP-SM poorly graded sand with silt, SP-SC poorly graded sand with clay.
[E] $Cu = D_{60}/D_{10}$ $\quad Cc = \frac{(D_{30})^2}{D_{10} \times D_{60}}$
[F] If soil contains ≥ 15% sand, add "with sand" to group name.
[G] If fines classify as CL-ML, use dual symbol GC-GM, or SC-SM.
[H] If fines are organic, add "with organic fines" to group name.
[I] If soil contains ≥ 15% gravel, add "with gravel" to group name.
[J] If Atterberg limits plot in shaded area, soil is a CL-ML, silty clay.
[K] If soil contains 15 to 29% plus No. 200, add "with sand" or "with gravel," whichever is predominant.
[L] If soil contains ≥ 30% plus No. 200 predominantly sand, add "sandy" to group name.
[M] If soil contains ≥ 30% plus No. 200, predominantly gravel, add "gravelly" to group name.
[N] PI ≥ 4 and plots on or above "A" line.
[O] PI < 4 or plots below "A" line.
[P] PI plots on or above "A" line.
[Q] PI plots below "A" line.



Albert Lea M500 E-line

VFM-Component 2 – 2.1 Miles Albert Lea

Subsurface Exploration and Lab Testing Report

February 21, 2025 | Terracon Project No. JY245040

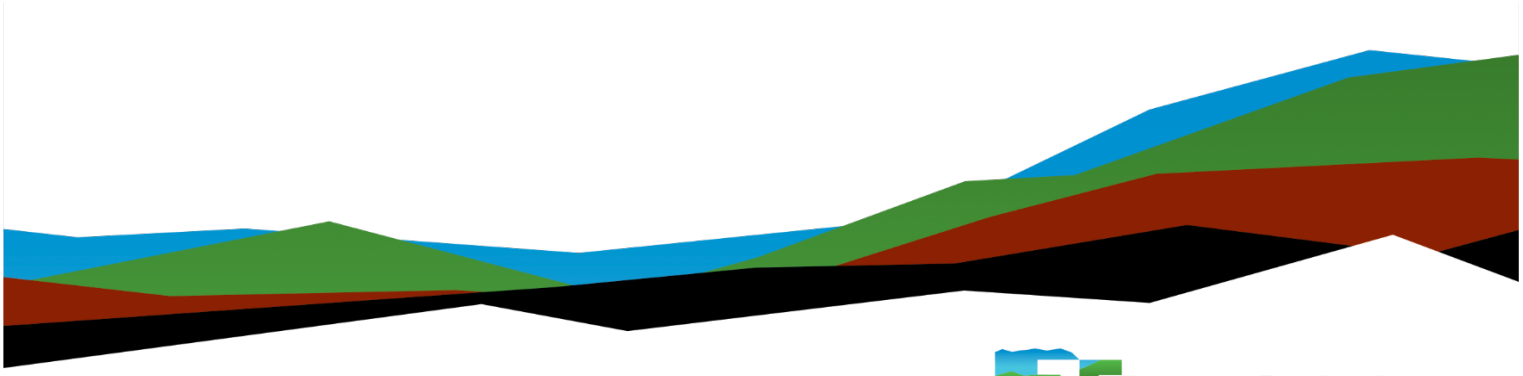
Steele County, Minnesota

Prepared for:

Stantec, Inc.
200-325 25 Street Southeast
Calgary, Alberta, Canada T2A 7H8

Prepared by:

Terracon Consultants



Terracon
Explore with us

Nationwide
Terracon.com

- Facilities
- Environmental
- Geotechnical
- Materials

2625 Highway 14 W, Suite F
Rochester, Minnesota 55901
P (507) 722-7365
Terracon.com

February 21, 2025

Stantec, Inc.
200-325 25 Street Southeast
Calgary, Alberta, Canada T2A 7H8

Attn: Ginger Chan
P: (587) 437-5068
E: ginger.chan@stantec.com

Re: Subsurface Exploration and Lab Testing Report
VFM-Component 2 – 2.1 Miles Albert Lea
Task Order No. 060246-091002
Steele County, Minnesota
Terracon Project No. JY245040

Dear Ms. Chan:

We have performed geotechnical services for the above referenced project in general accordance with Task Order No. 060246-091002 and authorization via email dated November 6, 2024. This report presents the findings of the subsurface exploration for Borings BH-01 through BH-04 for the proposed project.

We appreciate the opportunity to be of service to you on this project. If you have any questions concerning this report or if we may be of further service, please contact us.

Sincerely,

Terracon

Debra A. Schroeder, PE
Senior Engineer

Kyle M. Shubert, PE
Office Manager/Senior Engineer

Table of Contents

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Site Conditions **2**
Project Description **2**
Geotechnical Characterization **3**
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GeoModel

Attachments

Exploration and Testing Procedures
Site Location and Exploration Plans
Exploration and Laboratory Results
Supporting Information

Note: This report was delivered in a web-based format. **Blue Bold** text in the report indicates a referenced section heading. The PDF version also includes hyperlinks which direct the reader to that section and clicking on the Terracon logo will bring you back to this page. For more interactive features, please view your project online at **client.terracon.com**.

Refer to each individual Attachment for a listing of contents.

Introduction

This Subsurface Exploration and Lab Testing Report presents the results of our subsurface exploration and geotechnical engineering services performed for the proposed pipeline corridor.

The purpose of these services was to provide information relative to:

- Subsurface soil conditions
- Groundwater conditions

The geotechnical engineering Scope of Services for this project included the advancement of four test borings (BH-01 through BH-04) to depths ranging from about 31.5 to 121.5 feet below existing site grades.

In addition to geotechnical soil sampling, environmental soil sampling was performed on samples collected at approximately 10 feet above the bottom of each borehole and sent to a national laboratory for testing. The results of these tests are provided under a separate cover. As an exception, the sample from Boring BH-02 was found to be not viable and laboratory tests were not performed.

Maps showing the site and boring locations are shown on the **Site Location** and **Exploration Plans**, respectively. The results of the laboratory testing performed on geotechnical soil samples obtained from the site during our field exploration are included on the boring logs and/or as separate graphs in the **Exploration and Laboratory Results** section.

Site Conditions

The following description of site conditions is derived from our site visit in association with the field exploration and our review of publicly available geologic and topographic maps.

Item	Description
Site Location	The project is generally located in Steele County Minnesota, west of Ellendale, Minnesota. Latitude/Longitude (approximate): 43.8647°, -93.3948° See **Site Location** and **Exploration Plan**.
Current Ground Cover	Exposed agricultural fields with some snow cover.
Geology	Our investigation and review of geologic maps and well logs indicated subsurface conditions mainly consist of silt, sand, and clay glacial till soils. Bedrock was not encountered to the depths of our exploration.

Project Description

Our final understanding of the project conditions is as follows:

Item	Description
Information Provided	An email request for proposal was provided by Stantec on October 3, 2024. The request included a Google Earth kmz file showing the location and depths of the requested borings for planned projects. Revised scope information was provided by email on November 4, 2024.
Project Description	Project consists of a new pipeline section in Steele County, Minnesota. The proposed subsurface investigation will help Stantec assess the technical feasibility and constructability of using various trenchless or trenched pipe installation methods to install the new pipeline at various crossings along the proposed pipeline corridor.

Geotechnical Characterization

Subsurface Profile

We have developed a general characterization of the subsurface conditions based upon our review of the subsurface exploration, geologic setting and our understanding of the project. This characterization, termed GeoModel, forms the basis of our geotechnical evaluation of the site. Conditions observed at each exploration point are indicated on the individual logs. The individual logs can be found in the **Exploration and Laboratory Results** and the GeoModel can be found in the **Figures** attachment of this report.

As part of our analyses, we identified the following model layers within the subsurface profile. For an approximate elevation view of the model layer depths at each boring location, refer to the GeoModel.

Model Layer	Layer Name	General Description
1	Surficial Layer	Topsoil, approximately 5 to 9 inches thick
2	Fill - (Soils modified by agricultural use)	Sandy Lean Clay, Clayey Sand, and Lean Clay with Sand, trace roots, dark brown, dark gray, brown, and gray
3	Native Clay Soils	Sandy Lean Clay and Lean Clay, gray and brown, soft to hard
4	Native Sand Soils	Clayey Sand, Silty Sand, and Silty Sand with Gravel, grayish brown, brown and gray, loose to medium dense
5	Native Silt Soils	Sandy Silt, Silt with Sand, brown, light brown, gray, and dark gray, medium stiff to hard

Although not encountered at the boring locations, glacial soils such as those observed at the boring locations, can contain cobbles and boulders.

Groundwater Conditions

The boreholes were observed while drilling for the presence and level of groundwater. The water levels observed in the boreholes can be found on the boring logs in **Exploration and Laboratory Results**.

Groundwater was observed during drilling at depths ranging from about 21 to 26 feet below the existing ground surface at the boring locations. A relatively long period can be necessary for a groundwater level to develop and stabilize in a borehole. Long-term observations in piezometers or observation wells, sealed from the influence of surface water, are recommended if it is necessary to better define groundwater levels.

Groundwater level fluctuations occur due to seasonal variations in the amount of rainfall, runoff, and other factors not evident at the time the borings were performed. Therefore, groundwater levels during construction or at other times in the life of the pipeline will vary. The possibility of groundwater level fluctuations should be considered when developing the design and construction plans for the project.

General Comments

Our report presents the results of our fieldwork and laboratory tests. Natural variations will occur between exploration point locations or due to the modifying effects of construction or weather. The nature and extent of such variations may not become evident until during or after construction. Terracon should be retained to review the final design plans and specifications so comments can be made regarding interpretation of the results of our geotechnical investigation. Terracon should be retained to provide observation and testing services during earth-related construction phases of the project. If variations appear, we can provide further evaluation and supplemental recommendations. If variations are noted in the absence of our observation and testing services on-site, we should be immediately notified so that we can provide additional evaluation and supplemental recommendations.

Our Scope of Services included specific environmental testing as noted above; however, it does not include either specifically or by implication any environmental or biological (e.g., mold, fungi, bacteria) assessment of the site or identification or prevention of pollutants, hazardous materials or conditions. If the owner is concerned about the potential for such contamination or pollution, other studies should be undertaken.

Our services and any correspondence are intended for the sole benefit and exclusive use of our client for specific application to the project discussed and are accomplished in accordance with generally accepted geotechnical engineering practices with no third-party beneficiaries intended. Any third-party access to services or correspondence is solely for information purposes to support the services provided by Terracon to our client. Reliance upon the services and any work product is limited to our client and is not intended for third parties. Any use or reliance of the provided information by third parties is done solely at their own risk. No warranties, either express or implied, are intended or made.

Site characteristics as provided are for design purposes and not to estimate excavation cost. Any use of our report in that regard is done at the sole risk of the excavating cost estimator as there may be variations on the site that are not apparent in the data that could significantly affect excavation cost. Any parties charged with estimating excavation costs should seek their own site characterization for specific purposes to obtain the specific level of detail necessary for costing. Site safety and cost estimating including excavation support and dewatering requirements/design are the responsibility of others. Construction and site development have the potential to affect adjacent properties. Such impacts can include damages due to vibration, modification of groundwater/surface water flow during construction, foundation movement due to undermining or subsidence from excavation, as well as noise or air quality concerns. Evaluation of these items on nearby properties are commonly associated with contractor means and methods and are not addressed in this report. The owner and contractor should consider a preconstruction/precondition survey of surrounding development. If changes in the nature, design, or location of the project are planned, the results presented in this factual report shall not be considered valid unless we review the changes and either verify or modify our conclusions in writing.

Figures

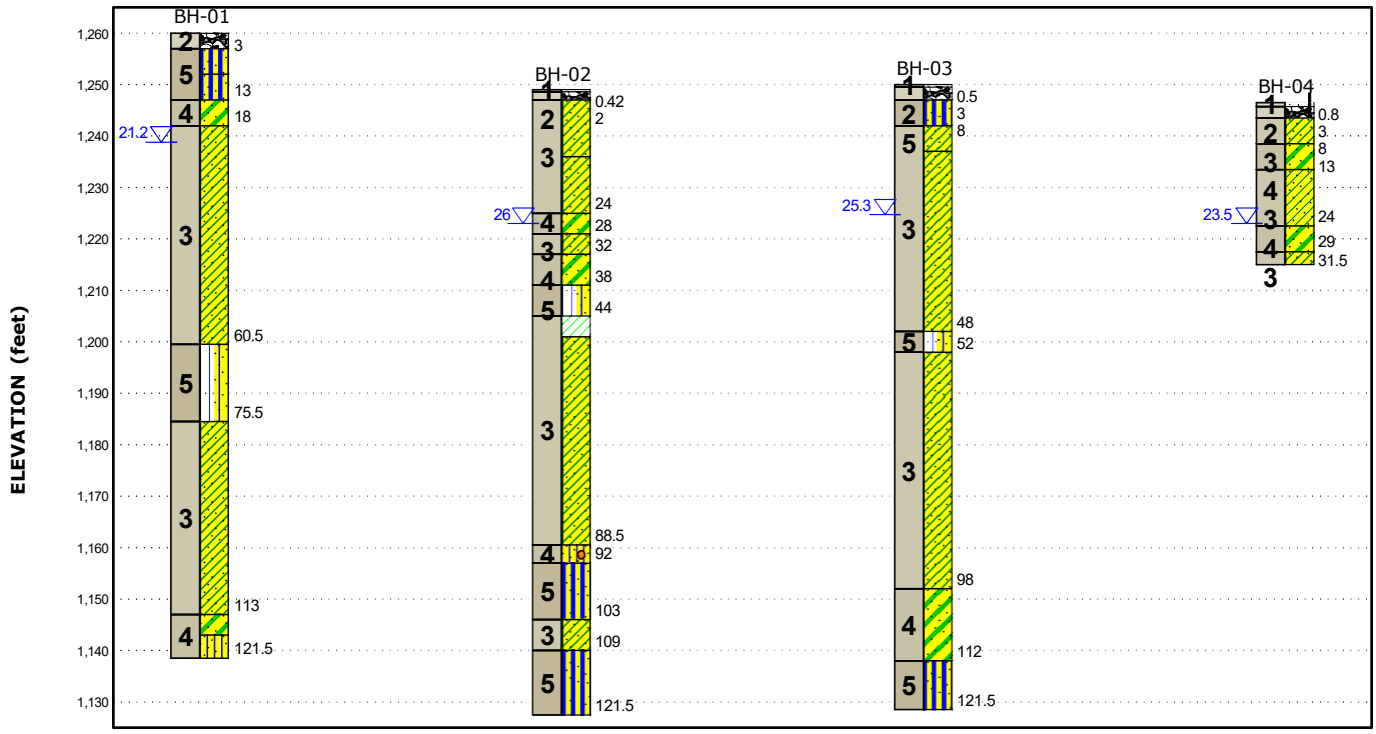
Contents:

GeoModel

VFM-Component 2 - 2.1 Miles Albert Lea
SW 168th | Steele County, Minnesota
Terracon Project No. JY245040

Terracon
2625 Highway 14 W, Ste F
Rochester, MN

GeoModel



This is not a cross section. This is intended to display the Geotechnical Model only. See individual logs for more detailed conditions.

Model Layer	Layer Name	General Description
1	**Surficial Layer**	Topsoil, approximately 5 to 9 inches thick
2	**Fill - (Soils modified by agricultural use)**	Sandy Lean Clay, Clayey Sand, and Lean Clay with Sand, trace roots, dark brown, dark gray, brown, and gray
3	**Native Clay Soils**	Sandy Lean Clay and Lean Clay, gray and brown, soft to hard
4	**Native Sand Soils**	Clayey Sand, Silty Sand, and Silty Sand with Gravel, grayish brown, brown and gray, loose to medium dense
5	**Native Silt Soils**	Sandy Silt, Silt with Sand, brown, light brown, gray, and dark gray, medium stiff to hard

Legend

- Fill
- Clayey Sand
- Silt with Sand
- Topsoil
- Silty Sand with Gravel
- Sandy Silt
- Sandy Lean Clay
- Silty Sand
- Lean Clay

▽ First Water Observation

Groundwater levels are temporal. The levels shown are representative of the date and time of our exploration. Significant changes are possible over time.
Water levels shown are as measured during and/or after drilling. In some cases, boring advancement methods mask the presence/absence of groundwater. See individual logs for details.

NOTES:
Layering shown on this figure has been developed by the geotechnical engineer for purposes of modeling the subsurface conditions as required for the subsequent geotechnical engineering for this project.
Numbers adjacent to soil column indicate depth below ground surface.

Attachments

Exploration and Testing Procedures

Field Exploration

Boring Numbers	Boring Depths (feet)	Location
BH-01	121.5	North of Southwest 168 Street between Southwest 102nd Avenue and southwest 90th Avenue
BH-02	121.5	
BH-03	121.5	
BH-04	31.5	

Boring Layout and Elevations: The boring locations were staked by a representative of the client and the Global Positioning System (GPS) coordinates were provided to Terracon. The approximate boring locations are shown on the **Exploration Plans**. The approximate coordinates of the borings are indicated on the boring logs. Approximate ground surface elevations were estimated using the Minnesota Department of Natural Resources, MnTOPO LiDAR map and reported on the logs to the nearest foot. If more accurate boring locations and surface elevations are desired, we recommend the boring locations be surveyed.

Subsurface Exploration Procedures: We advanced the borings with ATV and truck-mounted rotary drill rigs using continuous flight augers and mud-rotary drilling techniques. Split-spoon samples were obtained at intervals of 5 feet. In the split-barrel sampling procedure, a standard 2-inch outer diameter split-barrel sampling spoon was driven into the ground by a 140-pound automatic hammer falling a distance of 30 inches. As an exception, a modified California sampler was used at approximately 110 feet below the existing grade at Boring BH-02. The number of blows required to advance the sampling spoon the last 12 inches of a normal 18-inch penetration is recorded as the Standard Penetration Test (SPT) resistance value.

The SPT resistance values, also referred to as N-values, are indicated on the boring logs at the test depths. The samples were placed in appropriate containers and transported to our laboratory for testing. We observed and recorded groundwater levels during drilling and sampling.

The boreholes were backfilled with grout/neat cement after completion to within 2 feet of the ground surface. The boreholes were backfilled with auger cuttings from a depth of 2 feet to the ground surface.

The drill crew prepared a field log of each boring to record field data including visual descriptions of the materials encountered during drilling as well as the driller's

interpretation of the subsurface conditions between samples. The boring logs included with this report represent an interpretation of the subsurface conditions at each boring location based on field data and observation of the samples.

Laboratory Testing

The project engineer reviewed the field data and assigned laboratory tests. The laboratory testing program included the following tests on retrieved soil samples:

Geotechnical Testing

- Moisture Content
- Grain size analysis (through a No. 200 sieve only)
- Atterberg Limits (3-point)

The laboratory testing program included examination of soil samples. Based on the results of our field and laboratory programs, we described and classified the soil samples in general accordance with the Unified Soil Classification System.

The environmental laboratory tests that were performed are shown below. The results of these tests are provided under a separate cover.

Environmental Testing

- TPH-DRO (total petroleum hydrocarbons – diesel range organics)
- TCLP 8 RCRA metals
- BTEX/GRO
- TCLP herbicides
- TCLP pesticides

Site Location and Exploration Plans

Contents:

Site Location Plan
Exploration Plan

Note: All attachments are one page unless noted above.

Site Location



DIAGRAM IS FOR GENERAL LOCATION ONLY, AND IS NOT INTENDED FOR CONSTRUCTION PURPOSES MAP PROVIDED BY MICROSOFT BING MAPS

Exploration Plan

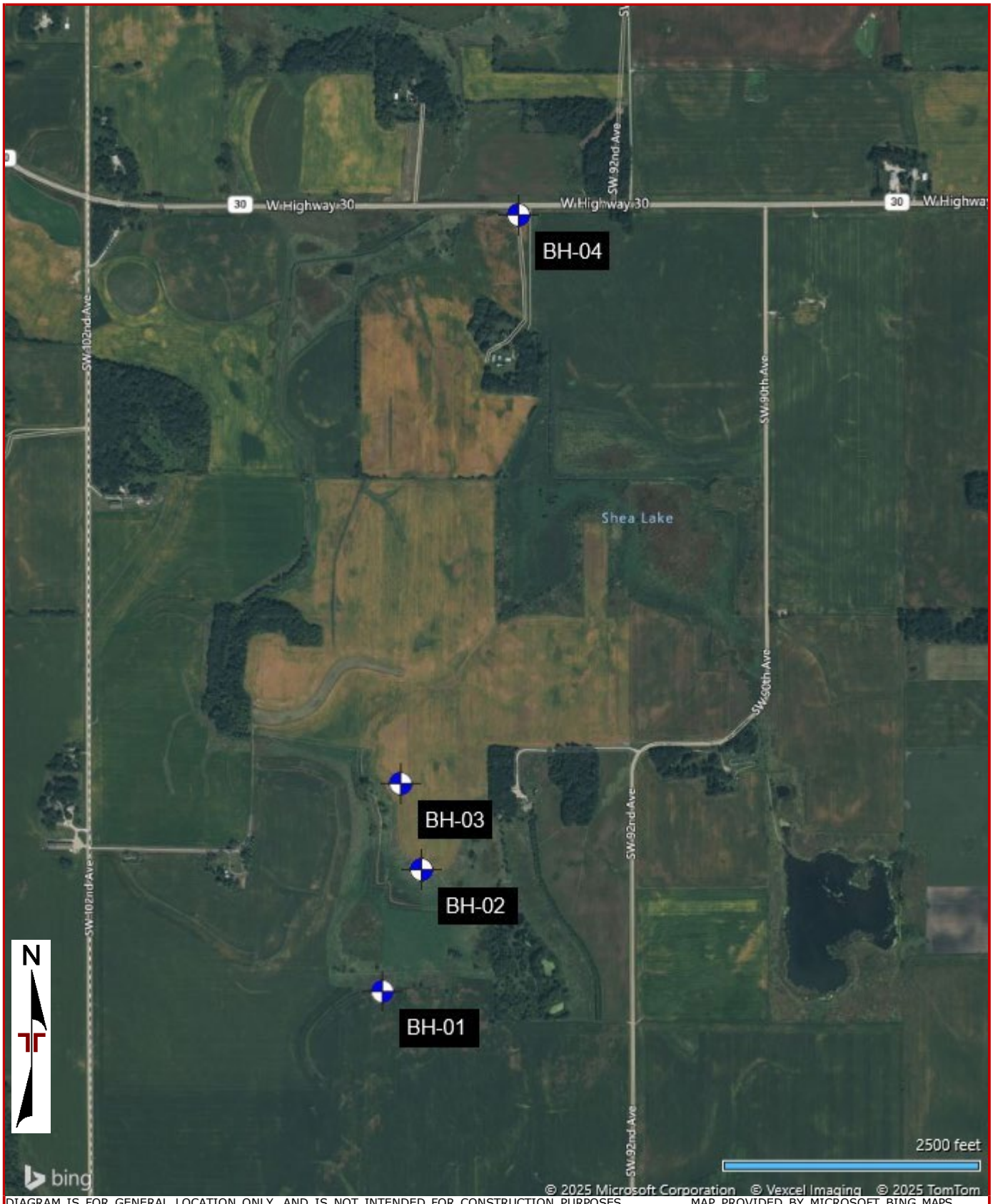


DIAGRAM IS FOR GENERAL LOCATION ONLY, AND IS NOT INTENDED FOR CONSTRUCTION PURPOSES MAP PROVIDED BY MICROSOFT BING MAPS

Exploration and Laboratory Results

Contents:

Boring Logs (BH-01 through BH-04)
Atterberg Limit Results

VFM-Component 2 - 2.1 Miles Albert Lea
SW 168th | Steele County, Minnesota
Terracon Project No. JY245040

Terracon
2625 Highway 14 W, Ste F
Rochester, MN

Boring Log No. BH-01

Location: See Exploration Plan

Latitude: 43.8562° Longitude: -93.3959°

Depth (Ft.) | Approximate Elevation: 1260 (Ft.)

Model Layer	Graphic Log	Depth (Ft.)	Water Level Observations	Sample Type	Recovery (In.)	Field Test Results	Water Content (%)	Atterberg Limits LL-PL-PI	Percent Fines
2		**FILL - SANDY LEAN CLAY**, trace gravel, trace roots, dark brown Agricultural till zone. Frost Depth-Approx. 17 inches			17	12-26-22 N=48	22.8		
		3.0 1257							
5		**SANDY SILT (ML)**, trace gravel, trace roots, brown and light brown, stiff			18	4-5-7 N=12	22.4		55.4
		8.0 1252							
		SANDY SILT (ML), trace gravel, brown, stiff			17	4-6-8 N=14	20.5		52
		13.0 1247							
4		**CLAYEY SAND (SC)**, trace gravel, clay lenses, fine grained, grayish brown, medium dense			16	4-7-10 N=17	22.4		
		18.0 1242							
3		**SANDY LEAN CLAY (CL)**, trace gravel, gray, soft to stiff	▽		18	3-3-3 N=6	20.1		55
					18	0-0-3 N=3	21.2		
					14	3-3-9 N=12	19.5		52.8
					18	3-3-4 N=7	19.9		
		silt lenses at 40 feet			14	3-4-7 N=11	29.2	39-19-20	
					5	3-4-6 N=10			
					18	2-3-6 N=9	21.0		57.4
					18	4-5-7 N=12	21.3		
		60.5 1199.5							
5		**SILT WITH SAND (ML)**, trace gravel, gray, very stiff to stiff			18	5-7-9 N=16	18.2		
					18	4-5-8 N=13	23.7		75.5
					17	3-4-6 N=10	29.4		

See Exploration and Testing Procedures for a description of field and laboratory procedures used and additional data (If any).

See Supporting Information for explanation of symbols and abbreviations.

Elevation Reference: Elevations estimated from MnTOPO website

Water Level Observations
▽ Water observed at 21.2 feet while drilling

Drill Rig
CME-550X

Hammer Type
Automatic

Driller
M. Nunez

Logged by
R. Rodriguez

Boring Started
01-27-2025

Boring Completed
01-28-2025

Notes

Advancement Method
3 1/4" Hollow Stem Auger to 11.5 feet
Mud Rotary to 121.5 feet

Abandonment Method
Boring backfilled with neat cement-bentonite grout upon completion.

VFM-Component 2 - 2.1 Miles Albert Lea
SW 168th | Steele County, Minnesota
Terracon Project No. JY245040

Terracon
2625 Highway 14 W, Ste F
Rochester, MN

Boring Log No. BH-01

Location: See Exploration Plan

Latitude: 43.8562° Longitude: -93.3959°

Depth (Ft.) Approximate Elevation: 1260 (Ft.)

Model Layer	Graphic Log	Depth (Ft.)	Water Level Observations	Sample Type	Recovery (In.)	Field Test Results	Water Content (%)	Atterberg Limits LL-PL-PI	Percent Fines
5		**SILT WITH SAND (ML)**, trace gravel, gray, very stiff to stiff 75.5 *(continued)* 1184.5							
3		**SANDY LEAN CLAY (CL)**, trace gravel, gray, stiff to very stiff			18	5-5-6 N=11	28.9		
					17	4-7-8 N=15	22.9		
					16	6-8-10 N=18	29.3		
					5	4-8-10 N=18			
					16	5-6-8 N=14	19.9		
					17	6-8-11 N=19	19.4		
					0	7-7-10 N=17			
					17	8-10-11 N=21			
		113.0 1147							
4		**CLAYEY SAND (SC)**, trace gravel, fine grained, gray, medium dense 117.0 1143			8	6-9-12 N=21	14.5		
		SILTY SAND (SM), trace gravel, fine to medium grained, gray, medium dense 121.5 1138.5			11	7-8-13 N=21			24.3
		Boring Terminated at 121.5 Feet							

80 90 100 110 120

See Exploration and Testing Procedures for a description of field and laboratory procedures used and additional data (If any).

See Supporting Information for explanation of symbols and abbreviations.

Elevation Reference: Elevations estimated from MnTOPO website

Water Level Observations
Water observed at 21.2 feet while drilling

Drill Rig
CME-550X

Hammer Type
Automatic

Driller
M. Nunez

Logged by
R. Rodriguez

Boring Started
01-27-2025

Boring Completed
01-28-2025

Notes

Advancement Method
3 1/4" Hollow Stem Auger to 11.5 feet
Mud Rotary to 121.5 feet

Abandonment Method
Boring backfilled with neat cement-bentonite grout upon completion.

VFM-Component 2 - 2.1 Miles Albert Lea
SW 168th | Steele County, Minnesota
Terracon Project No. JY245040

Terracon
2625 Highway 14 W, Ste F
Rochester, MN

Boring Log No. BH-02

Location: See Exploration Plan

Latitude: 43.8595° Longitude: -93.3944°

Depth (Ft.) Approximate Elevation: 1249 (Ft.)

Model Layer	Graphic Log	Depth (Ft.)	Water Level Observations	Sample Type	Recovery (In.)	Field Test Results	Water Content (%)	Atterberg Limits LL-PL-PI	Percent Fines
1		0.4							
2		**TOPSOIL**, **Approx. 5 inches** 1248.58							
		2.0 **FILL - CLAYEY SAND**, trace gravel, fine grained, dark gray 1247 Frost Depth-Approx. 5 inches Agricultural till zone.							
		SANDY LEAN CLAY (CL), trace gravel, brown, stiff		X	15	10-5-4 N=9	18.9		
				X	18	3-3-10 N=13	22.3		
				X	17	3-5-6 N=11	20.4		
3		13.0 1236							
		SANDY LEAN CLAY (CL), trace gravel, gray, stiff		X	18	4-5-6 N=11	18.5		
				X	18	2-4-7 N=11	18.1		
		24.0 1225							
4		**CLAYEY SAND (SC)**, trace gravel, fine grained, gray, medium dense	▽	X	18	3-7-7 N=14	16.3		40.3
		28.0 1221							
3		**SANDY LEAN CLAY (CL)**, trace gravel, gray, stiff		X	17	5-6-7 N=13	19.8		
		32.0 1217							
4		**CLAYEY SAND (SC)**, trace gravel, fine grained, gray, loose		X	16	2-3-3 N=6	27.8		
		38.0 1211							
5		**SILT WITH SAND (ML)**, gray, stiff		X	18	3-4-6 N=10	21.8		74.5
		44.0 1205							
		LEAN CLAY (CL), trace gravel and sand, with silt, gray, medium stiff		X	16	3-3-3 N=6	28.6		86.4
		48.0 1201							
3		**SANDY LEAN CLAY (CL)**, trace gravel, gray, stiff to very stiff		X	14	5-6-7 N=13	21.6		
				X	18	5-7-9 N=16	19.9		
				X	17	5-7-7 N=14	19.0		
				X	16	6-7-9 N=16	19.6		
				X	14	6-6-8 N=14	19.6		

10 20 30 40 50 60 70

See Exploration and Testing Procedures for a description of field and laboratory procedures used and additional data (If any).

See Supporting Information for explanation of symbols and abbreviations.

Elevation Reference: Elevations estimated from MnTOPO website

Water Level Observations
▽ Water observed at 26 feet while drilling

Drill Rig
Geoprobe 3126

Hammer Type
Automatic

Driller
C. Hehn

Logged by
R. Rodriguez

Boring Started
12-03-2024

Boring Completed
12-06-2024

Notes
Shelby Tube attempted at 37 feet. No recovery.

Advancement Method
3 1/4" Hollow Stem Auger to 25 feet
Mud Rotary to 121.5 feet

Abandonment Method
Boring backfilled with cuttings from 0 to 2 feet; neat cement-bentonite grout to boring termination depth upon completion.

VFM-Component 2 - 2.1 Miles Albert Lea
SW 168th | Steele County, Minnesota
Terracon Project No. JY245040

Terracon
2625 Highway 14 W, Ste F
Rochester, MN

Boring Log No. BH-02

Location: See Exploration Plan
Latitude: 43.8595° Longitude: -93.3944°
Depth (Ft.) Approximate Elevation: 1249 (Ft.)

Model Layer	Graphic Log	Depth (Ft.)	Water Level Observations	Sample Type	Recovery (In.)	Field Test Results	Water Content (%)	Atterberg Limits LL-PL-PI	Percent Fines
3		**SANDY LEAN CLAY (CL)**, trace gravel, gray, stiff to very stiff *(continued)*							
					17	6-7-10 N=17	15.7		
		80							
					17	6-8-10 N=18	15.1		
		No recovery due to gravel							
					1	7-8-9 N=17			
		88.5 1160.5							
4		**SILTY SAND WITH GRAVEL (SM)**, fine to coarse grained, gray, medium dense							
		90							
					11	8-8-10 N=18	13.0		
		92.0 1157							
5		**SANDY SILT (ML)**, clay lenses, gray, hard							
					12	13-19-24 N=43	20.7		54.4
		100							
					10	23-32-32 N=64	21.6		
		103.0 1146							
3		**SANDY LEAN CLAY (CL)**, trace gravel, gray, hard							
					12	17-29-30 N=59	16.5		
		109.0 1140							
5		**SANDY SILT (ML)**, clay lenses, gray, hard to very stiff							
		110							
					15	8-12-49/4"	16.2		
					16	8-8-10 N=18	13.3		
		120							
					17	11-12-14 N=26	12.9		
		121.5 1127.5							
		Boring Terminated at 121.5 Feet							

See Exploration and Testing Procedures for a description of field and laboratory procedures used and additional data (If any).

See Supporting Information for explanation of symbols and abbreviations.

Elevation Reference: Elevations estimated from MnTOPO website

Notes
Driller noted loss of approx. 50 gallons of drilling fluid at 104 to 110 feet.

Water Level Observations
▽ Water observed at 26 feet while drilling

Advancement Method
3 1/4" Hollow Stem Auger to 25 feet
Mud Rotary to 121.5 feet

Abandonment Method
Boring backfilled with cuttings from 0 to 2 feet; neat cement-bentonite grout to boring termination depth upon completion.

Drill Rig
Geoprobe 3126

Hammer Type
Automatic

Driller
C. Hehn

Logged by
R. Rodriguez

Boring Started
12-03-2024

Boring Completed
12-06-2024

VFM-Component 2 - 2.1 Miles Albert Lea
SW 168th | Steele County, Minnesota
Terracon Project No. JY245040

Terracon
2625 Highway 14 W, Ste F
Rochester, MN

Boring Log No. BH-03

Location: See Exploration Plan
Latitude: 43.8618° Longitude: -93.3952°

Model Layer	Depth (Ft.)	Approximate Elevation: 1250 (Ft.)	Water Level Observations	Sample Type	Recovery (In.)	Field Test Results	Water Content (%)	Atterberg Limits LL-PL-PI	Percent Fines
1	0.5	**TOPSOIL**, Approx. 5 inches — 1249.5							
2	3.0	**FILL - SANDY LEAN CLAY**, brown and gray — 1247			5	3-3-3 N=6	20.4		
		Agricultural till zone.							
5	8.0	**SANDY SILT (ML)**, brown and gray, medium stiff — 1242			16	3-4-4 N=8	35.5		
3	13.0	**SANDY LEAN CLAY (CL)**, trace gravel, brown, stiff — 1237			18	4-5-6 N=11	20.8		
		SANDY LEAN CLAY (CL), trace gravel, gray, medium stiff to very stiff			15	3-3-3 N=6	18.5		
					7	3-4-5 N=9	18.7		
			▽		18	3-4-4 N=8	18.6		50.9
					18	4-5-7 N=12	17.3		
					18	3-3-4 N=7	20.1		
					18	3-4-5 N=9	19.8		
	48.0	1202			18	5-7-9 N=16	16.4		58.6
5		**SILT WITH SAND (ML)**, gray to dark gray, stiff							
	52.0	1198			18	3-4-5 N=9	30.8		
3		**SANDY LEAN CLAY (CL)**, trace gravel, gray, very stiff to stiff			16	5-8-10 N=18	18.1		
					17	6-7-8 N=15	20.6		
					16	7-7-8 N=15	20.3		51.2
					18	6-7-9 N=16	19.2		

See Exploration and Testing Procedures for a description of field and laboratory procedures used and additional data (If any).

See Supporting Information for explanation of symbols and abbreviations.

Elevation Reference: Elevations estimated from MnTOPO website

Water Level Observations
▽ Water observed at 25.3 feet while drilling.

Drill Rig
Geoprobe 3126

Hammer Type
Automatic

Driller
C. Hehn

Logged by
R. Rodriguez

Boring Started
11-26-2024

Boring Completed
12-02-2024

Notes

Advancement Method
3 1/4" Hollow Stem Auger to 20 feet
Mud Rotary to 121.5 feet

Abandonment Method
Boring backfilled with cuttings from 0 to 2 feet; neat cement-bentonite grout to boring termination depth upon completion.

VFM-Component 2 - 2.1 Miles Albert Lea
SW 168th | Steele County, Minnesota
Terracon Project No. JY245040

Terracon
2625 Highway 14 W, Ste F
Rochester, MN

Boring Log No. BH-03

Location: See Exploration Plan
Latitude: 43.8618° Longitude: -93.3952°
Depth (Ft.) Approximate Elevation: 1250 (Ft.)

Model Layer	Graphic Log	Depth (Ft.)	Water Level Observations	Sample Type	Recovery (In.)	Field Test Results	Water Content (%)	Atterberg Limits LL-PL-PI	Percent Fines
3		**SANDY LEAN CLAY (CL)**, trace gravel, gray, very stiff to stiff *(continued)*			0	6-8-9 N=17			
					12	5-8-9 N=17	18.9		
		Driller noted hard drilling between approx. 85 and 86.5 feet.			10	6-9-9 N=18	20.3		
					13	6-8-10 N=18	18.2		
					15	19-8-9 N=17	20.8		
		98.0 1152							
4		**CLAYEY SAND (SC)**, trace gravel, fine grained, gray, dense to very dense			18	14-18-22 N=40	12.8		
					18	17-17-20 N=37	13.6		
		112.0 1138			14	30-36-41 N=77	16.8		
5		**SANDY SILT (ML)**, sand lenses, gray, hard			8	28-33-39 N=72	16.4		63.9
		121.5 1128.5			16	31-35-39 N=74	13.2		
		Boring Terminated at 121.5 Feet							

80 90 100 110 120

See Exploration and Testing Procedures for a description of field and laboratory procedures used and additional data (If any).

See Supporting Information for explanation of symbols and abbreviations.

Elevation Reference: Elevations estimated from MnTOPO website

Water Level Observations
Water observed at 25.3 feet while drilling.

Drill Rig
Geoprobe 3126

Hammer Type
Automatic

Driller
C. Hehn

Logged by
R. Rodriguez

Boring Started
11-26-2024

Boring Completed
12-02-2024

Notes

Advancement Method
3 1/4" Hollow Stem Auger to 20 feet
Mud Rotary to 121.5 feet

Abandonment Method
Boring backfilled with cuttings from 0 to 2 feet; neat cement-bentonite grout to boring termination depth upon completion.

VFM-Component 2 - 2.1 Miles Albert Lea
SW 168th | Steele County, Minnesota
Terracon Project No. JY245040

2625 Highway 14 W, Ste F
Rochester, MN

Boring Log No. BH-04

Location: See Exploration Plan

Latitude: 43.8769° Longitude: -93.3908°

Depth (Ft.) Approximate Elevation: 1246.5 (Ft.)

Model Layer	Graphic Log	Depth (Ft.)	Water Level Observations	Sample Type	Recovery (In.)	Field Test Results	Water Content (%)	Atterberg Limits LL-PL-PI	Percent Fines
1		0.8 **TOPSOIL**, **Approx. 9 inches** 1245.7							
2		3.0 **LEAN CLAY WITH SAND**, trace roots, dark gray 1243.5							
		Agricultural till zone.							
3		**SANDY LEAN CLAY (CL)**, trace gravel, brown and gray, stiff			11	2-3-4 N=7	24.5		
		8.0 1238.5			13	4-5-6 N=11	27.7		
4		**CLAYEY SAND (SC)**, trace gravel, fine grained, brown and gray, medium dense			13	5-6-10 N=16	16.0		43.9
		13.0 1233.5							
3		**SANDY LEAN CLAY (CL)**, trace gravel, gray, soft to medium stiff			18	2-2-2 N=4	18.5		50.5
					18	3-4-4 N=8	18.5		
		24.0 1222.5							
4		**CLAYEY SAND (SC)**, trace gravel, fine grained, gray, medium dense			16	5-7-8 N=15	19.0		
		29.0 1217.5							
3		**SANDY LEAN CLAY (CL)**, trace gravel, gray, very stiff			18	7-8-9 N=17	17.3		
		31.5 1215							
		Boring Terminated at 31.5 Feet							

10 20 30

See Exploration and Testing Procedures for a description of field and laboratory procedures used and additional data (If any).

See Supporting Information for explanation of symbols and abbreviations.

Elevation Reference: Elevations estimated from MnTOPO website

Water Level Observations
Water observed at 23.5 feet while drilling.

Notes

Advancement Method
3 1/4" Hollow Stem Auger

Abandonment Method
Boring backfilled with cuttings from 0 to 2 feet; neat cement-bentonite grout to boring termination depth upon completion.

Drill Rig
Geoprobe 3126

Hammer Type
Automatic

Driller
C. Hehn

Logged by
R. Rodriguez

Boring Started
11-25-2024

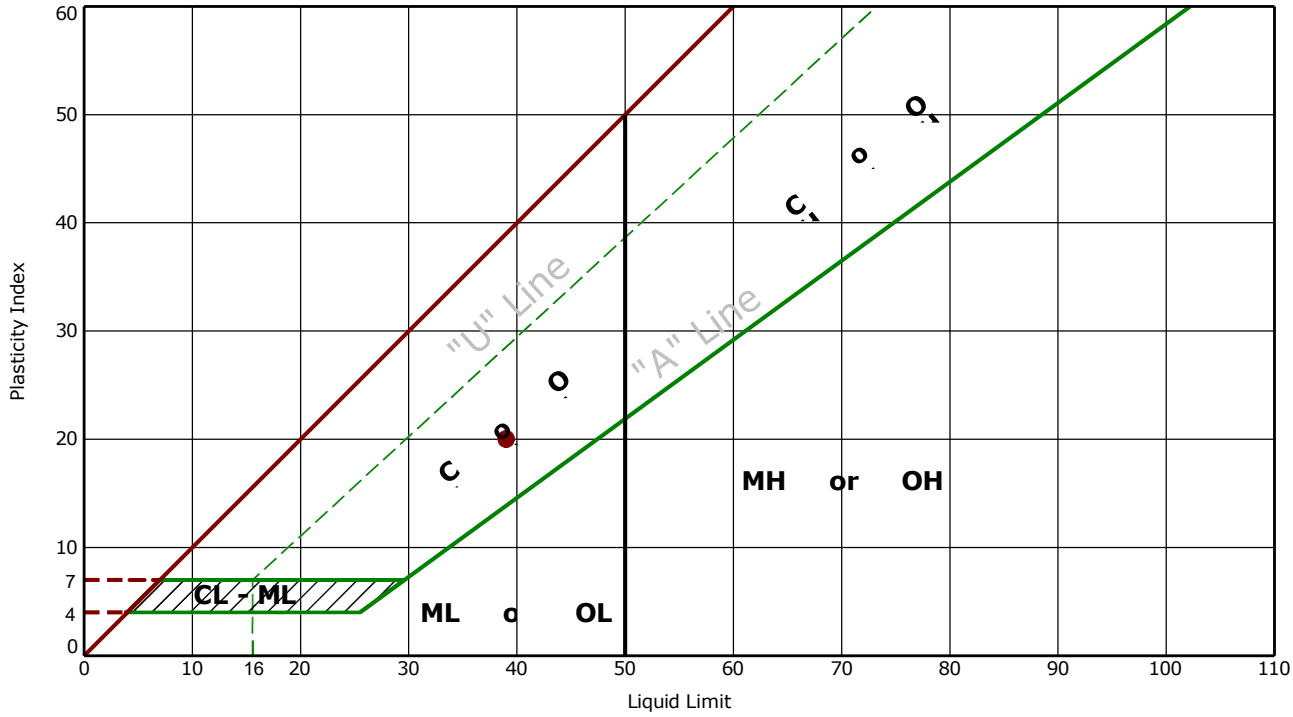
Boring Completed
11-25-2024

VFM-Component 2 - 2.1 Miles Albert Lea
SW 168th | Steele County, Minnesota
Terracon Project No. JY245040

2625 Highway 14 W, Ste F
Rochester, MN

Atterberg Limit Results

ASTM D4318



	Boring ID	Depth (Ft)	LL	PL	PI	Fines	USCS	Description
●	BH-01	40 - 41.5	39	19	20		CL	Sandy Lean Clay

Supporting Information

Contents:

General Notes
Unified Soil Classification System

Terracon
2625 Highway 14 W, Ste F
Rochester, MN

General Notes

Sampling	Water Level	Field Tests
Modified California Ring Sampler Split Spoon	Water Initially Encountered Water Level After a Specified Period of Time Water Level After a Specified Period of Time Cave In Encountered Water levels indicated on the soil boring logs are the levels measured in the borehole at the times indicated. Groundwater level variations will occur over time. In low permeability soils, accurate determination of groundwater levels is not possible with short term water level observations.	N Standard Penetration Test Resistance (Blows/Ft.) (HP) Hand Penetrometer (T) Torvane (DCP) Dynamic Cone Penetrometer UC Unconfined Compressive Strength (PID) Photo-Ionization Detector (OVA) Organic Vapor Analyzer

Descriptive Soil Classification

Soil classification as noted on the soil boring logs is based Unified Soil Classification System. Where sufficient laboratory data exist to classify the soils consistent with ASTM D2487 "Classification of Soils for Engineering Purposes" this procedure is used. ASTM D2488 "Description and Identification of Soils (Visual-Manual Procedure)" is also used to classify the soils, particularly where insufficient laboratory data exist to classify the soils in accordance with ASTM D2487. In addition to USCS classification, coarse grained soils are classified on the basis of their in-place relative density, and fine-grained soils are classified on the basis of their consistency. See "Strength Terms" table below for details. The ASTM standards noted above are for reference to methodology in general. In some cases, variations to methods are applied as a result of local practice or professional judgment.

Location And Elevation Notes

Exploration point locations as shown on the Exploration Plan and as noted on the soil boring logs in the form of Latitude and Longitude are approximate. See Exploration and Testing Procedures in the report for the methods used to locate the exploration points for this project. Surface elevation data annotated with +/- indicates that no actual topographical survey was conducted to confirm the surface elevation. Instead, the surface elevation was approximately determined from topographic maps of the area.

Strength Terms

Relative Density of Coarse-Grained Soils
(More than 50% retained on No. 200 sieve.)
Density determined by Standard Penetration Resistance

Relative Density	Standard Penetration or N-Value (Blows/Ft.)
Very Loose	0 - 3
Loose	4 - 9
Medium Dense	10 - 29
Dense	30 - 50
Very Dense	> 50

Consistency of Fine-Grained Soils
(50% or more passing the No. 200 sieve.)
Consistency determined by laboratory shear strength testing, field visual-manual procedures or standard penetration resistance

Consistency	Unconfined Compressive Strength Qu (tsf)	Standard Penetration or N-Value (Blows/Ft.)
Very Soft	less than 0.25	0 - 1
Soft	0.25 to 0.50	2 - 4
Medium Stiff	0.50 to 1.00	4 - 8
Stiff	1.00 to 2.00	8 - 15
Very Stiff	2.00 to 4.00	15 - 30
Hard	> 4.00	> 30

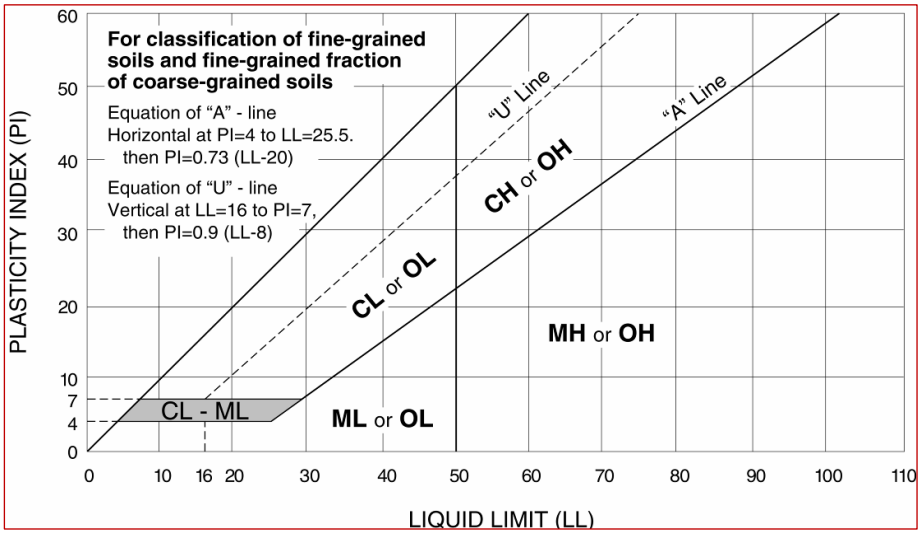
Relevance of Exploration and Laboratory Test Results

Exploration/field results and/or laboratory test data contained within this document are intended for application to the project as described in this document. Use of such exploration/field results and/or laboratory test data should not be used independently of this document.

Unified Soil Classification System

Criteria for Assigning Group Symbols and Group Names Using Laboratory Tests [A]				Soil Classification	
				Group Symbol	Group Name [B]
Coarse-Grained Soils: More than 50% retained on No. 4 sieve	**Gravels:** More than 50% of coarse fraction retained on No. 4 sieve	**Clean Gravels:** Less than 5% fines [C]	Cu≥4 and 1≤Cc≤3 [E]	GW	Well-graded gravel [F]
			Cu<4 and/or [Cc<1 or Cc>3.0] [E]	GP	Poorly graded gravel [F]
		Gravels with Fines: More than 12% fines [C]	Fines classify as ML or MH	GM	Silty gravel [F, G, H]
			Fines classify as CL or CH	GC	Clayey gravel [F, G, H]
	Sands: 50% or more of coarse fraction passes No. 4 sieve	**Clean Sands:** Less than 5% fines [D]	Cu≥6 and 1≤Cc≤3 [E]	SW	Well-graded sand [I]
			Cu<6 and/or [Cc<1 or Cc>3.0] [E]	SP	Poorly graded sand [I]
		Sands with Fines: More than 12% fines [D]	Fines classify as ML or MH	SM	Silty sand [G, H, I]
			Fines classify as CL or CH	SC	Clayey sand [G, H, I]
Fine-Grained Soils: 50% or more passes the No. 200 sieve	**Silts and Clays:** Liquid limit less than 50	**Inorganic:**	PI > 7 and plots above "A" line [J]	CL	Lean clay [K, L, M]
			PI < 4 or plots below "A" line [J]	ML	Silt [K, L, M]
		Organic:	$\frac{LL\ oven\ dried}{LL\ not\ dried} < 0.75$	OL	Organic clay [K, L, M, N] Organic silt [K, L, M, O]
	Silts and Clays: Liquid limit 50 or more	**Inorganic:**	PI plots on or above "A" line	CH	Fat clay [K, L, M]
			PI plots below "A" line	MH	Elastic silt [K, L, M]
		Organic:	$\frac{LL\ oven\ dried}{LL\ not\ dried} < 0.75$	OH	Organic clay [K, L, M, P] Organic silt [K, L, M, Q]
Highly organic soils:	Primarily organic matter, dark in color, and organic odor			PT	Peat

[A] Based on the material passing the 3-inch (75-mm) sieve.
[B] If field sample contained cobbles or boulders, or both, add "with cobbles or boulders, or both" to group name.
[C] Gravels with 5 to 12% fines require dual symbols: GW-GM well-graded gravel with silt, GW-GC well-graded gravel with clay, GP-GM poorly graded gravel with silt, GP-GC poorly graded gravel with clay.
[D] Sands with 5 to 12% fines require dual symbols: SW-SM well-graded sand with silt, SW-SC well-graded sand with clay, SP-SM poorly graded sand with silt, SP-SC poorly graded sand with clay.
[E] $Cu = D_{60}/D_{10}$ $\quad Cc = \frac{(D_{30})^2}{D_{10} \times D_{60}}$
[F] If soil contains ≥ 15% sand, add "with sand" to group name.
[G] If fines classify as CL-ML, use dual symbol GC-GM, or SC-SM.
[H] If fines are organic, add "with organic fines" to group name.
[I] If soil contains ≥ 15% gravel, add "with gravel" to group name.
[J] If Atterberg limits plot in shaded area, soil is a CL-ML, silty clay.
[K] If soil contains 15 to 29% plus No. 200, add "with sand" or "with gravel," whichever is predominant.
[L] If soil contains ≥ 30% plus No. 200 predominantly sand, add "sandy" to group name.
[M] If soil contains ≥ 30% plus No. 200, predominantly gravel, add "gravelly" to group name.
[N] PI ≥ 4 and plots on or above "A" line.
[O] PI < 4 or plots below "A" line.
[P] PI plots on or above "A" line.
[Q] PI plots below "A" line.



Faribault M500 D-line

Field Exploration and Laboratory Testing Report

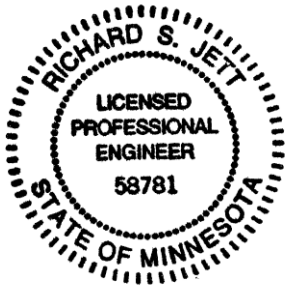
NNG Ventura to Farmington Abandonment and Capacity Replacement
Dakota County, Minnesota

Prepared for

Stantec Consulting Services, Inc.

Professional Certification:
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.

Richard S. Jett, PE
Senior Engineer
License Number: 58781
March 12, 2025



Project B2410136

Braun Intertec Corporation

BRAUN INTERTEC
The Science You Build On.

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11001 Hampshire Avenue S
Minneapolis, MN 55438

Phone: 952.995.2000
Fax: 952.995.2020
Web: braunintertec.com

March 12, 2025 Project B2410136

Ms. Ginger Chan
Stantec Consulting Services, Inc.
340-1200 59th Avenue SE
Calgary, Canada AB T2H 2M4

Re: Field Exploration and Laboratory Testing Report
NNG Ventura to Farmington Abandonment and Capacity Replacement
Dakota County, Minnesota

Dear Ms. Chan:

We have completed the soil boring and laboratory testing services requested by Stantec Consulting Services for the replacement and abandonment of portions of the existing Northern Natural Gas (NNG) lines in Dakota County, Minnesota.

Project Information

The project is divided into three components, and this report addresses our scope of services for Component 3 (Faribault M500D-Line Extension). We understand that horizontal directional drilling (HDD) techniques will be utilized for the installation and abandonment of the existing pipeline.

Our services were performed to provide soil profile data only. Our scope of services did not include providing geotechnical analysis or recommendations for the design and construction of the above referenced project.

Purpose

The purpose of our geotechnical exploration was to characterize subsurface geologic conditions at selected exploration locations and perform laboratory testing of select samples.

Scope of Services

We performed our scope of services for this project in accordance with the subconsultant agreement between Stantec Consulting Services, Inc. and Braun Intertec dated December 19, 2024 (Stantec Purchase Order PGW12972NNG and Project Number 172608813) and our Proposal for Geotechnical and Environmental Services (QTB204563) dated October 8, 2024.

The following list describes the tasks completed for the NNG Ventura to Farmington project site in accordance with our scope of services.

- Clearing the exploration locations of underground utilities. A representative of Stantec Consulting Services, Inc. selected and staked the exploration locations in the field. A representative of Stantec also provided us with surface elevations and GPS coordinates at the completed boring locations. The Soil Boring Location Sketch included in the Attachments shows the approximate locations of the borings.

- Performing the requested 21 standard penetration test (SPT) borings, denoted as BH-01 through BH-06, BH-07A, BH-08A, BH-10, BH-10A, BH-11, BH-11A, BH-12, BH12A, and BH-13 through BH-19, to nominal depths ranging from 30 to 120 feet below existing grade. We note that Borings BH-2, BH-3, BH-10, BH-10A, BH-11, BH-11A, BH-12, and BH-12A encountered practical auger or sampler refusal on the apparent bedrock material prior to their planned termination depths and rock coring to extend the borings beyond practical refusal was not included in our scope. The soil borings were generally completed using a combination of hollow stem auger and mud rotary drilling techniques.

- Reviewing the recovered soil samples and preparing boring logs.

- Performing laboratory testing on select soil samples with input following review by Stantec.

- Preparation of this factual field exploration and laboratory testing report.

As part of our services, we also performed limited environmental screening and testing of the recovered soil samples during drilling operations. The results from this screening and laboratory testing will be sent under separate cover at a later date.

Results

Table 1 provides a summary of the soil boring results in the general order we encountered the strata. Please refer to the Log of Boring sheets in the Appendix for additional details. The Descriptive Terminology sheet in the Appendix includes definitions of abbreviations used in Table 1.

Table 1. Subsurface Profile Summary

Strata	Soil Type - ASTM Classification	N values	Commentary and Details
Topsoil	SC, SM, CL	N/A	▪ Observed at the boring locations with total topsoil thicknesses ranging from approximately 1/2 to 2 feet. ▪ Generally black to dark brown in color. ▪ Moisture condition was generally moist. ▪ Trace amounts of gravel were encountered.
Existing fill	SM, SC, CL, OL, SP-SM	4 to 19	▪ Observed in Borings BH-3, BH-6, BH-7A, BH-10, BH-10A, BH-11, BH-12, BH-12A, BH-13 through BH-16, and BH-18 below surficial soils and extended to depths ranging from approximately 4 1/2 to 9 1/2 feet below existing grade. ▪ Organic soils were observed in Borings BH-07A, BH-12, and BH-14 extending to depths of about 7 feet below existing grade. ▪ Trace to little amounts of gravel observed at the boring locations. ▪ Generally brown to black in color. ▪ Moisture conditions were generally moist.
Alluvial	CL, SC, ML, SP-SM, SM	2 to 26	▪ Observed in Borings BH-08A, BH-12, BH-13, BH-14, and BH-18 below the surficial soils and fill soils and extended to depths ranging from approximately 17 to 19 1/2 feet below existing grade. ▪ Predominantly clay-laden soils (SC, CL). ▪ Relative consistencies of clays were generally soft to medium with occasional zones of very soft and very stiff soils. ▪ Relative consistencies of the granular alluvial soils were very loose to medium dense. ▪ Generally gray and brown in color. ▪ Trace amounts of gravel were observed. ▪ Moisture conditions were generally moist.
Glacial deposits	SP, SP-SM, SW-SM, SM	2 to 50+	▪ Observed at the boring locations below the topsoil, fill soils, and alluvial soils and extended to the termination depths of the borings. ▪ Relative consistencies of clays were generally medium to very stiff with occasional zones of hard soils. ▪ Relative consistencies of granular soils were generally medium dense to dense with occasional zones of very loose to very dense soils.
	CL, SC, ML	4 to 50+	

Strata	Soil Type - ASTM Classification	N values	Commentary and Details
			▪ Generally brown to gray in color with dark gray clay soils at depth. ▪ Intermixed layers of glacial outwash and till observed in several borings. ▪ Variable amounts of gravel observed with potential for cobbles and boulders throughout. ▪ Moisture conditions were generally moist to wet.
Apparent bedrock (Sandstone)	SP, SP-SM, SM	15 to 50+	▪ Encountered beneath the glacial soils in Borings BH-02, BH-03, BH-10, BH-10A, BH-11, BH-11A, BH-12, and BH-12A. ▪ Generally encountered apparent sandstone with deformed samples identified as SP or SM soils. ▪ Top of apparent bedrock varied from approximate elevation of 909 feet in BH-03 to 1008 feet in BH-10. ▪ Rock coring was not completed to advance the borings beyond refusal depth.

We did not perform a laboratory analysis on the topsoil material in accordance with our scope of work. Therefore, we cannot conclusively determine if the encountered material satisfies a particular specification.

For simplicity in this report, we define existing fill to mean existing, uncontrolled or undocumented fill.

The exploration locations were selected by Stantec and performed near the approximate locations as indicated in the attached Soil Boring Location Sketch. Stantec provided us with the surface elevations and GPS coordinates of the boring locations.

Groundwater

Table 2 summarizes the depths where we observed groundwater within the borings at the time of drilling; the attached Log of Boring sheets in the Appendix also include this information and additional details.

Table 2. Groundwater Summary

Location	Surface Elevation (feet)	Estimated Depth to Groundwater (feet)	Corresponding Groundwater Elevation (feet)
BH-01	977.4	None Observed	None Observed
BH-02	962.5	15	927 1/2
BH-03	953.5	7	946 1/2
BH-04	978.5	55	923 1/2
BH-05	964.3	85	879 ½
BH-06	963.6	4 1/2	959
BH-07A	965.5	12	953 1/2
BH-08A	993.1	24	969
BH-10	1019.9	None Observed	None Observed
BH-10A	1003.2	39	964
BH-11	1002.7	40	962 1/2
BH-11A	1001.4	None Observed	None Observed
BH-12	1034.1	None Observed	None Observed
BH-12A	1013.6	49 1/2	964
BH-13	998.4	20	978 1/2
BH-14	994.4	11 1/2	983
BH-15	1026.7	None Observed	None Observed
BH-16	941.5	7	934 1/2
BH-17	1008.2	12	996
BH-18	991.7	54	937 1/2
BH-19	983.2	None Observed	None Observed

Groundwater was observed at the 15 boring locations at depths ranging from approximately 4 1/2 to 110 feet below existing grade (approximate elevations ranging from 854 1/2 to 993 feet). Groundwater may take days or longer to reach equilibrium in the boreholes and we immediately backfilled the boreholes, in accordance with our scope of work. If the project team identifies a need for more accurate determination of groundwater depth at specific locations, a groundwater monitoring program can be completed under separate contract.

Seasonal and annual fluctuations of groundwater should be anticipated.

The exploration locations completed at this site were denoted as BH-1 through BH-6, BH-7A, BH-8, BH-8A, BH-10, BH-10A, BH-11, BH-11A, BH-12, BH-12A, and BH-13 through BH-19, for a total of 22 borings. The exploration locations were selected by Stantec and performed near the approximate locations as indicated in the attached Soil Boring Location Sketch. Stantec provided us with the surface elevations and GPS coordinates of the boring locations.

Drilling and Sampling

SPT Borings

The SPT borings were drilled with an All-Terrain Vehicle (ATV) mounted drill rig equipped with 3 1/4-inch diameter hollow-stem auger and using either hollow stem auger drilling techniques or mud rotary drilling techniques. We performed the borings in general accordance with ASTM D6151 obtaining penetration test samples at 2 1/2- or 5-foot intervals in general accordance with ASTM D1586. A 140-pound automatic hammer was used to determine the N-values. The boring logs show the actual sample intervals, N-values and corresponding depths.

Groundwater Observations and Borehole Abandonment

The drillers checked for groundwater as the borings were advanced. The borings were typically checked again for the presence of groundwater after auger withdrawal. However, we note that where mud rotary drilling techniques were utilizes, the actual groundwater level is difficult to determine.

The boreholes were then sealed with bentonite grout in accordance with applicable state regulations.

Exploration Logs

Log of Boring Sheets

Log of Boring sheets for the SPT borings are attached to this report. The logs identify and describe the penetrated geologic materials, and present the results of penetration resistance tests, laboratory tests performed on penetration test samples, and groundwater measurements.

We inferred strata boundaries from changes in the penetration test samples and/or auger cuttings. Because we did not perform continuous sampling, the strata boundary depths are only approximate. The boundary depths likely vary away from the boring locations, and the boundaries themselves may also occur as gradual rather than abrupt transitions.

Geologic Origins

We assigned geologic origins to the materials shown on the logs based on: (1) a review of local geology maps, (2) visual classification of the various geologic material samples retrieved during the course of our subsurface exploration, (3) penetration resistance testing performed for the project, and (4) available common knowledge of the geologic processes and environments that have impacted the site and surrounding area in the past. A full review of the geologic origins was not performed.

Material Classification and Testing

Visual and Manual Classification

We visually and manually classified the geologic materials encountered based on ASTM D2488. When we performed laboratory classification tests, we used the results to classify the geologic materials in accordance with ASTM D2487. The attached Descriptive Terminology of Soil sheet includes a chart explaining the classification system we used.

Geotechnical Laboratory Testing

Laboratory testing was performed on samples recovered from the borings as selected by Braun Intertec and following review by Stantec Consulting Services. Laboratory testing performed included moisture content tests and mechanical sieve analysis tests. The tests were performed in accordance with ASTM procedures.

The attached exploration logs note most of the results of the laboratory tests performed on geologic material samples.

Sample Storage

Representative soil samples remaining following laboratory testing will remain in our Bloomington, Minnesota office for a period of about 60 days after drilling operations were completed. After this time, the samples will be disposed.

Groundwater Fluctuations

Groundwater measurements were made under the conditions reported herein and shown on the exploration logs. It should be noted that the observation period was relatively short (borings were backfilled immediately), and groundwater can be expected to fluctuate in response to rainfall, flooding, irrigation, seasonal freezing and thawing, surface drainage modifications, drilling methods, and other seasonal and annual factors. Our scope of services did not include monitoring of groundwater conditions over an extended period.

If more detailed information regarding groundwater levels is needed, we recommend that piezometers are installed, and a long-term groundwater monitoring program is completed.

Standard of Care

In performing our services, Braun Intertec has used that degree of care and skill ordinarily exercised under similar circumstances by reputable members of our profession currently practicing in the same locality. No warranty, express or implied, is made.

General

We appreciate the opportunity to be of service to you on this project. If you have any questions regarding this report, please contact Richard Jett at 815.545.7059 (rjett@braunintertec.com) or Brad McCarter at 952.995.2268 (bmccarter@braunintertec.com).

Sincerely,

BRAUN INTERTEC CORPORATION

Richard S. Jett, PE
Senior Engineer

Bradley J. McCarter, PE
Director, Senior Engineer

Appendix:
Soil Boring Location Sketch
Log of Boring Sheets BH-1 through BH-19 (56 pages)
Sieve Analysis Results (29 pages)
Descriptive Terminology of Soil

Appendix

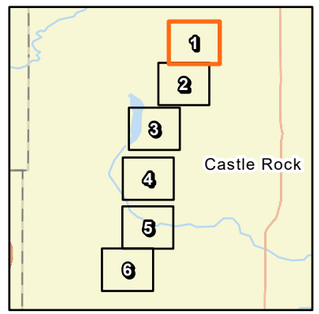


Denotes Surveyed Boring Location

N

0 300 600 Feet

1" = 600 Feet



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The Science You Build On.
11001 Hampshire Avenue S
Minneapolis, MN 55438
952.995.2000
braunintertec.com

Drawing Information

Project No: B2410136

Drawing No: Boring Location Sketch

Drawn By:	ZS
Date Drawn:	12/17/2024
Checked By:	RSJ
Last Modified:	2/4/2025

Project Information

NNG Ventura to Farmington Abandonment and Capacity Replacement

Freebourne, Steele, and Dakota Counties

Minnesota

Boring Location Sketch

Sheet: 1 of 6

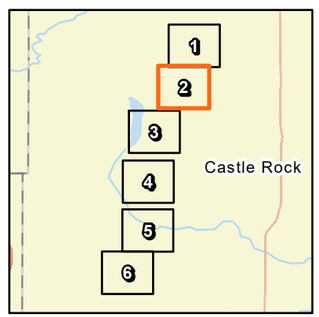


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NNG Ventura to Farmington Abandonment and Capacity Replacement

Freebourne, Steele, and Dakota Counties

Minnesota

Boring Location Sketch

Sheet: 2 of 6

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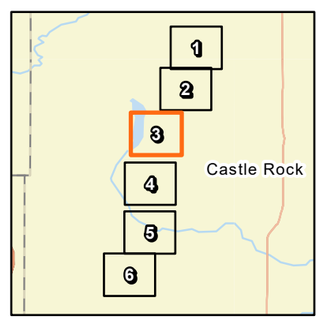


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1" = 600 Feet



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Minneapolis, MN 55438
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braunintertec.com

Drawing Information

Project No: B2410136

Drawing No: Boring Location Sketch

Drawn By:	ZS
Date Drawn:	12/17/2024
Checked By:	RSJ
Last Modified:	2/4/2025

Project Information

NNG Ventura to Farmington Abandonment and Capacity Replacement

Freebourne, Steele, and Dakota Counties

Minnesota

Boring Location Sketch

Sheet: 3 of 6

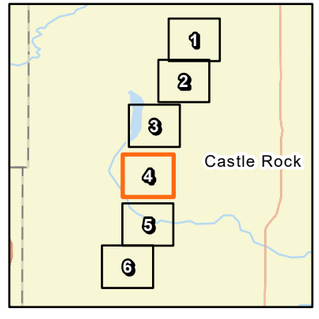


Denotes Surveyed Boring Location

N

0 300 600 Feet

1" = 600 Feet



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Minneapolis, MN 55438
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Drawing Information

Project No: B2410136

Drawing No: Boring Location Sketch

Drawn By:	ZS
Date Drawn:	12/17/2024
Checked By:	RSJ
Last Modified:	2/4/2025

Project Information

NNG Ventura to Farmington Abandonment and Capacity Replacement

Freebourne, Steele, and Dakota Counties

Minnesota

Boring Location Sketch

Sheet: 4 of 6

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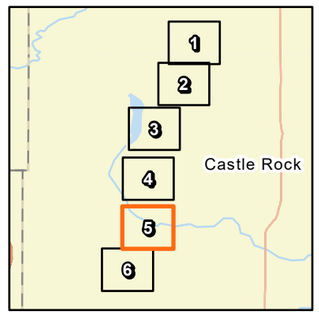


Denotes Surveyed Boring Location

N

0 300 600 Feet

1" = 600 Feet



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Drawing Information

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Drawing No: Boring Location Sketch

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Last Modified:	2/4/2025

Project Information

NNG Ventura to Farmington Abandonment and Capacity Replacement

Freebourne, Steele, and Dakota Counties

Minnesota

Boring Location Sketch

Sheet: 5 of 6

F:\2024\B2410136\GIS\B2410136\B2410136.aprx

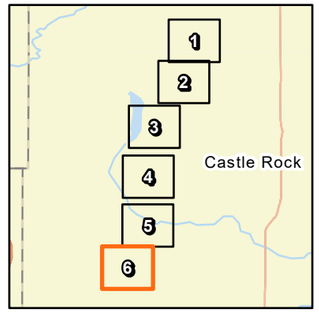


Denotes Surveyed Boring Location

N

0 300 600 Feet

1" = 600 Feet



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The Science You Build On.
11001 Hampshire Avenue S
Minneapolis, MN 55438
952.995.2000
braunintertec.com

Drawing Information

Project No: B2410136

Drawing No: Boring Location Sketch

Drawn By:	ZS
Date Drawn:	12/17/2024
Checked By:	RSJ
Last Modified:	2/4/2025

Project Information

NNG Ventura to Farmington Abandonment and Capacity Replacement

Freebourne, Steele, and Dakota Counties

Minnesota

Boring Location Sketch

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LOG OF BORING

See Descriptive Terminology sheet for explanation of abbreviations

Project Number B2410136
Geotechnical & Environmental Evaluation
NNG Ventura to Farmington Abandonment
Minnesota

BORING: **BH-01**
LOCATION: Captured with RTK GPS.
DATUM: WGS 84
LATITUDE: 44.504311 LONGITUDE: -93.222419
DRILLER: M. Hoppe LOGGED BY: R. Jett START DATE: 01/06/25 END DATE: 01/06/25
SURFACE ELEVATION: 977.4 ft RIG: 7504 METHOD: 3 1/4" HSA SURFACING: Soil WEATHER:

Elev./ Depth ft	Water Level	Description of Materials (Soil-ASTM D2488 or 2487; Rock-USACE EM 1110-1-2908)	Sample	Blows (N-Value) Recovery	PID ppm	MC %	Tests or Remarks
976.7		CLAYEY SAND (SC), trace Gravel, black, moist (TOPSOIL)			0.0		Elevations and coordinates were provided by the client
0.7		SANDY LEAN CLAY (CL), trace Gravel, gray to brown, moist, medium to stiff (GLACIAL TILL)		8-4-3 (7) 12"	0.0		Soil sample BH-01 (1-2') @ 10:25 collected for pesticides
			5	2-4-4 (8) 16"	0.0		Soil sample BH-01 (4.5-6') @ 10:15 collected for BTEX, DRO, GRO, RCRA Metals
				3-5-7 (12) 16"	0.1		
967.9							
9.5		SANDY LEAN CLAY (CL), trace Gravel, dark gray, moist, stiff to very stiff (GLACIAL TILL)	10	4-5-6 (11) 16"	0.0	19	q_p=3.5 tsf
				5-8-8 (16) 10"	0.0	18	LL=34, PL=18, PI=16 q_p=2.25 tsf
			15	4-5-5 (10) 18"	0.0	18	P200=56% DD=112 pcf q_p=2 tsf %Sand=42% %Gravel=2%
			20	5-4-6 (10) 18"	0.0	16	DD=114 pcf q_p=3.5 tsf
			25	4-6-6 (12) 18"		18	q_p=1.5 tsf
			30	5-6-6 (12) 18"			q_p=1.5 tsf Water not observed while drilling.
946.4							
31.0		END OF BORING Boring then grouted					

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LOG OF BORING

See Descriptive Terminology sheet for explanation of abbreviations

Project Number B2410136
Geotechnical & Environmental Evaluation
NNG Ventura to Farmington Abandonment
Minnesota

BORING: **BH-02**
LOCATION: Captured with RTK GPS.
DATUM: WGS 84
LATITUDE: 44.520984 LONGITUDE: -93.211278
DRILLER: M. Hoppe LOGGED BY: R. Jett START DATE: 01/06/25 END DATE: 01/06/25
SURFACE ELEVATION: 962.5 ft RIG: 7504 METHOD: 3 1/4" HSA SURFACING: Soil WEATHER:

Elev./ Depth ft	Water Level	Description of Materials (Soil-ASTM D2488 or 2487; Rock-USACE EM 1110-1-2908)	Sample	Blows (N-Value) Recovery	PID ppm	MC %	Tests or Remarks
961.9		SILTY SAND (SM), fine to medium-grained, trace Gravel, black, moist (TOPSOIL)			0.3		Elevations and coordinates were provided by the client
0.6		SANDY LEAN CLAY (CL), brown, medium to stiff (GLACIAL TILL)		2-3-3 (6) 12"	0.1		Soil sample BH-02 (1-2') @ 11:30 collected for pesticides
			5	4-5-5 (10) 14"	0.1		q_p=2 tsf
		SAND layer at 7 feet		4-6-7 (13) 12"	0.1		Soil sample BH-02 (4.5-6') @ 11:20 collected for BTEX, DRO, GRO, RCRA Metals
			10	4-5-5 (10) 14"	0.0		q_p=2 tsf
950.5							
12.0		SANDY SILT (ML), brown, moist, medium dense (GLACIAL TILL)		5-6-7 (13) 16"			
948.0							
14.5	▽	SILTY SAND (SM), fine to medium-grained, trace Gravel, brown to dark brown, wet, medium dense (GLACIAL TILL)	15	5-6-7 (13) 14"			Wet below 15 feet
943.0							
19.5		SANDY SILT (ML), gray, wet, loose (GLACIAL TILL)	20	2-5-5 (10) 14"			Drilling method switched to mud rotary at 20 feet
938.0							
24.5		SANDY LEAN CLAY (CL), trace Gravel, contains seams of Silt, gray, wet, medium to stiff (GLACIAL TILL)	25	3-4-4 (8) 14"			
		Driller noted void at 30 feet	30	4-6-8 (14) 16"			

Continued on next page

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LOG OF BORING

See Descriptive Terminology sheet for explanation of abbreviations

Project Number B2410136
Geotechnical & Environmental Evaluation
NNG Ventura to Farmington Abandonment
Minnesota

BORING: **BH-02**
LOCATION: Captured with RTK GPS.
DATUM: WGS 84
LATITUDE: 44.520984 LONGITUDE: -93.211278
DRILLER: M. Hoppe LOGGED BY: R. Jett START DATE: 01/06/25 END DATE: 01/06/25
SURFACE ELEVATION: 962.5 ft RIG: 7504 METHOD: 3 1/4" HSA SURFACING: Soil WEATHER:

Elev./ Depth ft	Water Level	Description of Materials (Soil-ASTM D2488 or 2487; Rock-USACE EM 1110-1-2908)	Sample	Blows (N-Value) Recovery	PID ppm	MC %	Tests or Remarks
928.0							
34.5		SANDY LEAN CLAY (CL), trace Gravel, contains seams of Silt, gray, wet, medium to stiff (GLACIAL TILL)	35	5-4-6 (10) 16"		28	
923.0		SANDY LEAN CLAY (CL), contains seams of Silt, stiff (GLACIAL TILL)					
39.5		CLAYEY SAND (SC), gray, wet, stiff (GLACIAL TILL)	40	5-6-6 (12) 15"		17	LL=24, PL=15, PI=9 DD=134 pcf
			45	6-7-8 (15) 20"			P200=46% DD=125 pcf %Sand=51% %Gravel=3%
913.0							
49.5		SANDSTONE, tan, Limestone pieces, hand deformed sample classified as "SILTY SAND (SM)" (APPARENT BEDROCK)	50	6-7-12 (19) 14"			
907.8							
54.7		END OF BORING Boring then grouted	55	50/2" (REF) 4"			Water observed at 15.0 feet while drilling.
			60				
			65				

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LOG OF BORING

See Descriptive Terminology sheet for explanation of abbreviations

Project Number B2410136
Geotechnical & Environmental Evaluation
NNG Ventura to Farmington Abandonment
Minnesota

BORING: **BH-03**
LOCATION: Captured with RTK GPS.
DATUM: WGS 84
LATITUDE: 44.523223 LONGITUDE: -93.210022
DRILLER: M. Hoppe LOGGED BY: R. Jett START DATE: 01/29/25 END DATE: 01/29/25
SURFACE ELEVATION: 953.5 ft RIG: 7504 METHOD: 3 1/4" HSA SURFACING: Soil WEATHER:

Elev./ Depth ft	Water Level	Description of Materials (Soil-ASTM D2488 or 2487; Rock-USACE EM 1110-1-2908)	Sample	Blows (N-Value) Recovery	PID ppm	MC %	Tests or Remarks
952.8		CLAYEY SAND (SC), trace Gravel, black, moist (TOPSOIL FILL)			1.1		Elevations and coordinates were provided by the client
0.7		FILL: SILTY SAND (SM), trace Gravel, slightly organic, dark brown to black, moist		2-3-3 (6) 12"	0.6		Soil sample BH-03 (0-1') @ 13:28 collected for pesticides
949.0							
4.5		SILTY SAND (SM), fine to coarse-grained, trace Gravel, contains seams of Clay, dark gray to brown, moist, loose (GLACIAL TILL)	5	2-3-2 (5) 12"	0.7		Soil sample BH-03 (2-3.5') @ 13:34 collected for BTEX, GRO, DRO, RCRA Metals
946.5	▽						
7.0		SILTY SAND (SM), fine to coarse-grained, little Gravel, brown, wet, loose (GLACIAL TILL)		4-3-3 (6) 10"			
			10	3-4-4 (8) 12"			
941.5							
12.0		CLAYEY SAND (SC), trace Gravel, gray, wet, medium (GLACIAL TILL)		2-4-4 (8) 16"			
939.0							
14.5		SILTY SAND (SM), fine to coarse-grained, trace Gravel, gray to brown, wet, medium dense (GLACIAL TILL)	15	4-5-6 (11) 14"			
			20	4-5-7 (12) 10"			
929.0							
24.5		SANDY SILT (ML), gray to brown, wet, loose to medium dense (GLACIAL TILL)	25	4-3-3 (6) 18"			
			30	4-5-6 (11) 16"		24	LL=27, PL=22, PI=5 P200=94% %Sand=6%

Continued on next page

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LOG OF BORING

See Descriptive Terminology sheet for explanation of abbreviations

Project Number B2410136
Geotechnical & Environmental Evaluation
NNG Ventura to Farmington Abandonment
Minnesota

BORING: **BH-03**
LOCATION: Captured with RTK GPS.
DATUM: WGS 84
LATITUDE: 44.523223 LONGITUDE: -93.210022
DRILLER: M. Hoppe LOGGED BY: R. Jett START DATE: 01/29/25 END DATE: 01/29/25
SURFACE ELEVATION: 953.5 ft RIG: 7504 METHOD: 3 1/4" HSA SURFACING: Soil WEATHER:

Elev./ Depth ft	Water Level	Description of Materials (Soil-ASTM D2488 or 2487; Rock-USACE EM 1110-1-2908)	Sample	Blows (N-Value) Recovery	PID ppm	MC %	Tests or Remarks
919.0		SANDY SILT (ML), gray to brown, wet, loose to medium dense (GLACIAL TILL)					
34.5		POORLY GRADED SAND with SILT and GRAVEL (SP-SM), fine to coarse-grained, trace Gravel, reddish brown, wet, medium dense (GLACIAL TILL)	35	4-5-8 (13) 14"			%Sand=75% %Gravel=2%
914.0							
39.5		SILTY SAND (SM), fine-grained, little Gravel, tan to light brown, wet, medium dense (GLACIAL TILL)	40	4-8-10 (18) 18"			%Sand=49% %Gravel=13%
909.0							
44.5		SANDSTONE, light brown, decomposed, hand deformed sample classified as "SILTY SAND (SM)" (APPARENT BEDROCK)	45	50/2" (REF) 3"			Practical auger refusal on apparent bedrock at 44.7 feet
908.8		END OF BORING					Water observed at 7.0 feet while drilling.
44.7		Boring then grouted					
			50				
			55				
			60				
			65				

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LOG OF BORING

See Descriptive Terminology sheet for explanation of abbreviations

Project Number B2410136
Geotechnical & Environmental Evaluation
NNG Ventura to Farmington Abandonment
Minnesota

BORING: **BH-04**
LOCATION: Captured with RTK GPS.
DATUM: WGS 84
LATITUDE: 44.533093 LONGITUDE: -93.209649
DRILLER: M. Hoppe LOGGED BY: R. Jett START DATE: 01/07/25 END DATE: 01/07/25
SURFACE ELEVATION: 978.5 ft RIG: 7504 METHOD: 3 1/4" HSA SURFACING: Soil WEATHER:

Elev./ Depth ft	Water Level	Description of Materials (Soil-ASTM D2488 or 2487; Rock-USACE EM 1110-1-2908)	Sample	Blows (N-Value) Recovery	PID ppm	MC %	Tests or Remarks
976.5		LEAN CLAY (CL), trace Gravel, dark brown, moist (TOPSOIL)			0.2		Elevations and coordinates were provided by the client
2.0		CLAYEY SAND (SC), trace Gravel, brown, moist, loose to medium dense (GLACIAL TILL)		2-3-4 (7) 14"	0.1		Soil sample BH-04 (0-1') @ 09:46 collected for pesticides
		Contains lenses of Sand at 4 1/2 feet	5	2-4-4 (8) 14"	0.0		Soil sample BH-04 (2-3.5') @ 09:33 collected for BTEX, DRO, GRO, RCRA Metals
				3-4-5 (9) 14"	0.1		q_p=2 tsf
		Gravel pocket at 9 1/2 feet	10	5-7-7 (14) 16"	0.1		
966.5							
12.0		POORLY GRADED SAND with SILT (SP-SM), fine to medium-grained, trace Gravel, tan, moist, medium dense (GLACIAL TILL)		8-12-12 (24) 18"	0.1		
964.0							
14.5		SILTY SAND (SM), fine to medium-grained, trace to with Gravel, tan, moist, medium dense (GLACIAL TILL)	15	7-8-6 (14) 15"	0.2		
959.0							
19.5		POORLY GRADED SAND with SILT (SP-SM), fine to coarse-grained, brown, wet, loose to medium dense (GLACIAL TILL)	20	4-5-4 (9) 18"	0.1		Wet below 20 feet
			25	4-6-6 (12) 10"			Drillers noted Cobbles from 27 to 28 feet
949.0							
29.5		SANDY LEAN CLAY (CL), trace Gravel, dark gray, moist, stiff to very stiff (GLACIAL TILL)	30	4-5-6 (11) 14"			q_p=2 tsf

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BRAUN INTERTEC
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LOG OF BORING

See Descriptive Terminology sheet for explanation of abbreviations

Project Number B2410136
Geotechnical & Environmental Evaluation
NNG Ventura to Farmington Abandonment
Minnesota

BORING: **BH-04**
LOCATION: Captured with RTK GPS.
DATUM: WGS 84
LATITUDE: 44.533093 LONGITUDE: -93.209649
DRILLER: M. Hoppe LOGGED BY: R. Jett START DATE: 01/07/25 END DATE: 01/07/25
SURFACE ELEVATION: 978.5 ft RIG: 7504 METHOD: 3 1/4" HSA SURFACING: Soil WEATHER:

Elev./ Depth ft	Water Level	Description of Materials (Soil-ASTM D2488 or 2487; Rock-USACE EM 1110-1-2908)	Sample	Blows (N-Value) Recovery	PID ppm	MC %	Tests or Remarks
		SANDY LEAN CLAY (CL), trace Gravel, dark gray, moist, stiff to very stiff (GLACIAL TILL)	35	5-5-6 (11) 16"			q_p=3 tsf
			40	7-8-9 (17) 14"			q_p=3.5 tsf
			45	5-6-9 (15) 16"			q_p=4 tsf
			50	7-8-8 (16) 18"			
	▽	*SAND layer at 55 feet*	55	5-6-7 (13) 18"		15	Wet below 54 1/2 feet q_p=2.5 tsf
919.0 59.5		SANDY SILT (ML), dark gray, moist, dense (GLACIAL TILL)	60	8-12-19 (31) 16"		13	LL=28, PL=27, PI=1 DD=108 pcf q_p=2.5 tsf
914.0 64.5		SILTY SAND (SM), fine to medium-grained, trace Gravel, gray, wet, medium dense to very dense (GLACIAL TILL)	65	8-12-12 (24) 14"		11	P200=14%

Continued on next page

BRAUN INTERTEC
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LOG OF BORING

See Descriptive Terminology sheet for explanation of abbreviations

Project Number B2410136
Geotechnical & Environmental Evaluation
NNG Ventura to Farmington Abandonment
Minnesota

BORING: **BH-04**
LOCATION: Captured with RTK GPS.
DATUM: WGS 84
LATITUDE: 44.533093 LONGITUDE: -93.209649
DRILLER: M. Hoppe LOGGED BY: R. Jett START DATE: 01/07/25 END DATE: 01/07/25
SURFACE ELEVATION: 978.5 ft RIG: 7504 METHOD: 3 1/4" HSA SURFACING: Soil WEATHER:

Elev./ Depth ft	Water Level	Description of Materials (Soil-ASTM D2488 or 2487; Rock-USACE EM 1110-1-2908)	Sample	Blows (N-Value) Recovery	PID ppm	MC %	Tests or Remarks
		SILTY SAND (SM), fine to medium-grained, trace Gravel, gray, wet, medium dense to very dense (GLACIAL TILL)					%Sand=83% %Gravel=3%
			70	29-50/5" (REF) 10"		14	P200=29% %Sand=70% %Gravel=1%
			75	32-35-39 (74) 14"			
899.0 79.5		SANDY LEAN CLAY (CL), trace Gravel, gray, wet, hard (GLACIAL TILL)	80	34-36-42 (78) 16"			q_p=4.5 tsf
			85	24-33-35 (68) 16"			q_p=4.5 tsf
			90	33-43-45 (88) 18"			q_p=4.5 tsf
884.0 94.5		SILTY SAND (SM), fine-grained, trace Gravel, gray, wet, very dense (GLACIAL TILL)	95	37-50/4" (REF) 14"			

Continued on next page

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LOG OF BORING

See Descriptive Terminology sheet for explanation of abbreviations

Project Number B2410136
Geotechnical & Environmental Evaluation
NNG Ventura to Farmington Abandonment
Minnesota

BORING: **BH-04**
LOCATION: Captured with RTK GPS.
DATUM: WGS 84
LATITUDE: 44.533093 LONGITUDE: -93.209649
DRILLER: M. Hoppe LOGGED BY: R. Jett START DATE: 01/07/25 END DATE: 01/07/25
SURFACE ELEVATION: 978.5 ft RIG: 7504 METHOD: 3 1/4" HSA SURFACING: Soil WEATHER:

Elev./ Depth ft	Water Level	Description of Materials (Soil-ASTM D2488 or 2487; Rock-USACE EM 1110-1-2908)	Sample	Blows (N-Value) Recovery	PID ppm	MC %	Tests or Remarks
877.5		SILTY SAND (SM), fine-grained, trace Gravel, gray, wet, very dense (GLACIAL TILL)	100	45-19-30 (49) 18"			
101.0		END OF BORING Boring then grouted					Water observed at 55.0 feet while drilling.
			105				
			110				
			115				
			120				
			125				
			130				

BRAUN INTERTEC
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LOG OF BORING

See Descriptive Terminology sheet for explanation of abbreviations

Project Number B2410136
Geotechnical & Environmental Evaluation
NNG Ventura to Farmington Abandonment
Minnesota

BORING: **BH-05**
LOCATION: Captured with RTK GPS.
DATUM: WGS 84
LATITUDE: 44.534492 LONGITUDE: -93.209545
DRILLER: M. Hoppe LOGGED BY: R. Jett START DATE: 01/08/25 END DATE: 01/08/25
SURFACE ELEVATION: 964.3 ft RIG: 7504 METHOD: 3 1/4" HSA SURFACING: Soil WEATHER:

Elev./ Depth ft	Water Level	Description of Materials (Soil-ASTM D2488 or 2487; Rock-USACE EM 1110-1-2908)	Sample	Blows (N-Value) Recovery	PID ppm	MC %	Tests or Remarks
962.3		CLAYEY SAND (SC), trace Gravel, black, moist (TOPSOIL)			0.3		Elevations and coordinates were provided by the client
2.0		SILTY SAND (SM), fine to coarse-grained, with Gravel, gray, moist, loose (GLACIAL OUTWASH)		2-3-3 (6) 12"	0.1		Soil sample BH-05 (0-1') @ 09:34 collected for pesticides
959.8							
4.5		POORLY GRADED SAND with SILT (SP-SM), fine to coarse-grained, little Gravel, brown, wet, loose to medium dense (GLACIAL OUTWASH)	5	4-3-3 (6) 14"	0.1		Soil sample BH-05 (2-3.5') @ 09:26 collected for BTEX, GRO, DRO, RCRA Metals
				6-4-4 (8) 12"	0.1		
			10	2-4-3 (7) 14"	0.2		
				4-5-6 (11) 14"	0.3		
			15	5-5-7 (12) 16"	0.3		
944.8							
19.5		SANDY LEAN CLAY (CL), trace Gravel, gray, moist, stiff to hard (GLACIAL TILL)	20	4-5-7 (12) 16"	0.5		Drilling method switched to mud rotary at 20 feet q_p=1.5 tsf
			25	5-5-6 (11) 14"			q_p=2 tsf
			30	4-6-6 (12) 16"			q_p=2.5 tsf

Continued on next page

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LOG OF BORING

See Descriptive Terminology sheet for explanation of abbreviations

Project Number B2410136
Geotechnical & Environmental Evaluation
NNG Ventura to Farmington Abandonment
Minnesota

BORING: **BH-05**
LOCATION: Captured with RTK GPS.
DATUM: WGS 84
LATITUDE: 44.534492 LONGITUDE: -93.209545
DRILLER: M. Hoppe LOGGED BY: R. Jett START DATE: 01/08/25 END DATE: 01/08/25
SURFACE ELEVATION: 964.3 ft RIG: 7504 METHOD: 3 1/4" HSA SURFACING: Soil WEATHER:

Elev./ Depth ft	Water Level	Description of Materials (Soil-ASTM D2488 or 2487; Rock-USACE EM 1110-1-2908)	Sample	Blows (N-Value) Recovery	PID ppm	MC %	Tests or Remarks
		SANDY LEAN CLAY (CL), trace Gravel, gray, moist, stiff to hard (GLACIAL TILL)					
35				10-18-13 (31) 18"			q_p=3.5 tsf
40				12-15-17 (32) 18"		11	q_p=3.5 tsf
45				10-12-13 (25) 18"		12	LL=27, PL=14, PI=13 DD=129 pcf q_p=3 tsf
50				8-11-13 (24) 18"		12	P200=61% DD=124 pcf q_p=3 tsf %Sand=37% %Gravel=2%
55				10-13-16 (29) 18"		12	DD=128 pcf q_p=3 tsf
60				12-14-14 (28) 18"			DD=12 pcf q_p=3.5 tsf
65				14-17-24 (41) 18"			q_p=3 tsf

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LOG OF BORING

See Descriptive Terminology sheet for explanation of abbreviations

Project Number B2410136
Geotechnical & Environmental Evaluation
NNG Ventura to Farmington Abandonment
Minnesota

BORING: **BH-05**
LOCATION: Captured with RTK GPS.
DATUM: WGS 84
LATITUDE: 44.534492 LONGITUDE: -93.209545

DRILLER:	M. Hoppe	LOGGED BY:	R. Jett	START DATE:	01/08/25	END DATE:	01/08/25
SURFACE ELEVATION:	964.3 ft	RIG:	7504	METHOD:	3 1/4" HSA	SURFACING:	Soil

WEATHER:

Elev./ Depth ft	Water Level	Description of Materials (Soil-ASTM D2488 or 2487; Rock-USACE EM 1110-1-2908)	Sample	Blows (N-Value) Recovery	PID ppm	MC %	Tests or Remarks
		SANDY LEAN CLAY (CL), trace Gravel, gray, moist, stiff to hard (GLACIAL TILL)	70	20-24-30 (54) 18"			q_p=4.5 tsf
			75	18-27-32 (59) 16"			q_p=4.5 tsf Drillers noted Cobbles and rock from 77 to 80 feet
		Gravel pocket at 80 feet	80	31-43-20 (63) 10"			
879.8							
84.5	▽	POORLY GRADED SAND with SILT (SP-SM), fine to coarse-grained, little Gravel, gray, wet, dense to loose (GLACIAL OUTWASH)	85	20-18-22 (40) 14"			
			90	14-16-16 (32) 10"			
			95	10-15-14 (29) 16"			

Continued on next page

BRAUN INTERTEC
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LOG OF BORING

See Descriptive Terminology sheet for explanation of abbreviations

Project Number B2410136
Geotechnical & Environmental Evaluation
NNG Ventura to Farmington Abandonment
Minnesota

BORING: **BH-05**
LOCATION: Captured with RTK GPS.
DATUM: WGS 84
LATITUDE: 44.534492 LONGITUDE: -93.209545
DRILLER: M. Hoppe LOGGED BY: R. Jett START DATE: 01/08/25 END DATE: 01/08/25
SURFACE ELEVATION: 964.3 ft RIG: 7504 METHOD: 3 1/4" HSA SURFACING: Soil WEATHER:

Elev./ Depth ft	Water Level	Description of Materials (Soil-ASTM D2488 or 2487; Rock-USACE EM 1110-1-2908)	Sample	Blows (N-Value) Recovery	PID ppm	MC %	Tests or Remarks
		POORLY GRADED SAND with SILT (SP-SM), fine to coarse-grained, little Gravel, gray, wet, dense to loose (GLACIAL OUTWASH)	100	4-5-5 (10) 10"			
			105				
854.8							
109.5		POORLY GRADED SAND (SP), fine to medium-grained, little Gravel, brown, wet, medium dense (GLACIAL OUTWASH)	110	10-12-12 (24) 12"			
			115				
			120	12-23-19 (42) 14"			
843.3							
121.0		END OF BORING Boring then grouted					Water observed at 85.0 feet while drilling.
			125				
			130				

BRAUN INTERTEC
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LOG OF BORING

See Descriptive Terminology sheet for explanation of abbreviations

Project Number B2410136
Geotechnical & Environmental Evaluation
NNG Ventura to Farmington Abandonment
Minnesota

BORING: **BH-06**
LOCATION: Captured with RTK GPS.
DATUM: WGS 84
LATITUDE: 44.535830 LONGITUDE: -93.209171
DRILLER: M. Hoppe LOGGED BY: R. Jett START DATE: 01/09/25 END DATE: 01/09/25
SURFACE ELEVATION: 963.6 ft RIG: 7504 METHOD: 3 1/4" HSA SURFACING: Soil WEATHER:

Elev./ Depth ft	Water Level	Description of Materials (Soil-ASTM D2488 or 2487; Rock-USACE EM 1110-1-2908)	Sample	Blows (N-Value) Recovery	PID ppm	MC %	Tests or Remarks
962.8		CLAYEY SAND (SC), trace Gravel, black, moist (TOPSOIL FILL)			0.1		Elevations and coordinates were provided by the client
0.8		FILL: SILTY SAND (SM), fine to coarse-grained, little Gravel, brown, moist		5-7-12 (19) 14"	0.1		Soil sample BH-06 (0-1') @ 10:32 collected for pesticides
959.1	▽						
4.5		SILTY SAND (SM), fine to coarse-grained, trace Gravel, brown, wet, medium dense (GLACIAL OUTWASH)	5	7-10-12 (22) 16"			
956.6							Soil sample BH-06 (4.5-6') @ 10:19 collected for BTEX, GRO, DRO, RCRA Metals
7.0		POORLY GRADED SAND with SILT (SP-SM), fine to coarse-grained, trace Gravel, brown, wet, loose to medium dense (GLACIAL OUTWASH)		7-6-8 (14) 12"			
			10	1-1-5 (6) 16"			
				1-3-5 (8) 12"			
			15	4-5-5 (10) 18"			
			20	3-5-6 (11) 10"			
			25	2-1-4 (5) 18"			
934.1							
29.5		POORLY GRADED SAND with SILT (SP-SM), fine to medium-grained, trace Gravel, light brown, wet, very loose to dense (GLACIAL OUTWASH)	30	1-1-1 (2) 18"			Drilling method switched to mud rotary at 30 feet

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LOG OF BORING

See Descriptive Terminology sheet for explanation of abbreviations

Project Number B2410136
Geotechnical & Environmental Evaluation
NNG Ventura to Farmington Abandonment
Minnesota

BORING: **BH-06**
LOCATION: Captured with RTK GPS.
DATUM: WGS 84
LATITUDE: 44.535830 LONGITUDE: -93.209171
DRILLER: M. Hoppe LOGGED BY: R. Jett START DATE: 01/09/25 END DATE: 01/09/25
SURFACE ELEVATION: 963.6 ft RIG: 7504 METHOD: 3 1/4" HSA SURFACING: Soil WEATHER:

Elev./ Depth ft	Water Level	Description of Materials (Soil-ASTM D2488 or 2487; Rock-USACE EM 1110-1-2908)	Sample	Blows (N-Value) Recovery	PID ppm	MC %	Tests or Remarks
		POORLY GRADED SAND with SILT (SP-SM), fine to medium-grained, trace Gravel, light brown, wet, very loose to dense (GLACIAL OUTWASH)	35	14-16-50/5" (REF) 14"			
924.1							
39.5		SANDY LEAN CLAY (CL), trace Gravel, dark gray, wet, very stiff to hard (GLACIAL TILL)	40	8-10-10 (20) 16"		15	q_p=0.75 tsf
			45	10-12-12 (24) 16"		12	LL=29, PL=13, PI=16 DD=125 pcf q_p=3 tsf
			50	12-15-15 (30) 18"		11	P200=61% DD=129 pcf q_p=4 tsf %Sand=38% %Gravel=1%
			55	12-13-28 (41) 18"		13	LL=29, PL=14, PI=15 q_p=3.5 tsf
			60	12-15-15 (30) 16"		11	q_p=4.5 tsf
			65	12-16-30 (46) 12"			q_p=3 tsf

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BRAUN INTERTEC
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LOG OF BORING

See Descriptive Terminology sheet for explanation of abbreviations

Project Number B2410136
Geotechnical & Environmental Evaluation
NNG Ventura to Farmington Abandonment
Minnesota

BORING: **BH-06**
LOCATION: Captured with RTK GPS.
DATUM: WGS 84
LATITUDE: 44.535830 LONGITUDE: -93.209171

DRILLER:	M. Hoppe	LOGGED BY:	R. Jett	START DATE:	01/09/25	END DATE:	01/09/25
SURFACE ELEVATION:	963.6 ft	RIG:	7504	METHOD:	3 1/4" HSA	SURFACING:	Soil

WEATHER:

Elev./ Depth ft	Water Level	Description of Materials (Soil-ASTM D2488 or 2487; Rock-USACE EM 1110-1-2908)	Sample	Blows (N-Value) Recovery	PID ppm	MC %	Tests or Remarks
		SANDY LEAN CLAY (CL), trace Gravel, dark gray, wet, very stiff to hard (GLACIAL TILL)	70	23-32-50/3" (REF) 16"			
			75	14-21-31 (52) 18"			q_p=3.75 tsf
			80	12-16-20 (36) 20"			q_p=4.5 tsf
879.1 84.5		SILTY SAND (SM), fine to coarse-grained, trace to little Gravel, gray, wet, dense (GLACIAL TILL)	85	16-24-18 (42) 16"			
			90	22-24-17 (41) 18"			
			95	22-23-27 (50) 12"			

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BRAUN INTERTEC
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LOG OF BORING

See Descriptive Terminology sheet for explanation of abbreviations

Project Number B2410136
Geotechnical & Environmental Evaluation
NNG Ventura to Farmington Abandonment
Minnesota

BORING: **BH-06**
LOCATION: Captured with RTK GPS.
DATUM: WGS 84
LATITUDE: 44.535830 LONGITUDE: -93.209171

DRILLER:	M. Hoppe	LOGGED BY:	R. Jett	START DATE:	01/09/25	END DATE:	01/09/25
SURFACE ELEVATION:	963.6 ft	RIG:	7504	METHOD:	3 1/4" HSA	SURFACING:	Soil

WEATHER:

Elev./ Depth ft	Water Level	Description of Materials (Soil-ASTM D2488 or 2487; Rock-USACE EM 1110-1-2908)	Sample	Blows (N-Value) Recovery	PID ppm	MC %	Tests or Remarks
862.6		SILTY SAND (SM), fine to coarse-grained, trace to little Gravel, gray, wet, dense (GLACIAL TILL)		19-23-24 (47) 14"			
101.0		END OF BORING Boring then grouted					Water observed at 4.5 feet while drilling.

100
105
110
115
120
125
130

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LOG OF BORING

See Descriptive Terminology sheet for explanation of abbreviations

Project Number B2410136
Geotechnical & Environmental Evaluation
NNG Ventura to Farmington Abandonment
Minnesota

BORING: **BH-07A**
LOCATION: Captured with RTK GPS.
DATUM: WGS 84
LATITUDE: 44.542545 LONGITUDE: -93.205979
DRILLER: M. Hoppe LOGGED BY: R. Jett START DATE: 01/10/25 END DATE: 01/10/25
SURFACE ELEVATION: 965.5 ft RIG: 7504 METHOD: 3 1/4" HSA SURFACING: Soil WEATHER:

Elev./ Depth ft	Water Level	Description of Materials (Soil-ASTM D2488 or 2487; Rock-USACE EM 1110-1-2908)	Sample	Blows (N-Value) Recovery	PID ppm	MC %	Tests or Remarks
964.7		SILTY SAND (SM), fine to medium-grained, trace Gravel, black, moist (TOPSOIL FILL)			0.1		Elevations and coordinates were provided by the client
0.8		FILL: ORGANIC CLAY (OL), black, moist		3-3-3 (6) 12"	0.0		Soil sample BH-07A (0-1') @ 09:31 collected for pesticides
			5	3-3-3 (6) 14"	0.1		Soil sample BH-07A (2-3.5') @ 09:17 collected for BTEX, GRO, DRO, RCRA Metals
958.5							
7.0		SANDY LEAN CLAY (CL), trace Gravel, brown to gray, moist, medium to stiff (GLACIAL TILL)		3-2-3 (5) 16"	0.0		
			10	2-5-5 (10) 4"	0.1		
953.5	▽						
12.0		SILTY SAND (SM), fine to medium-grained, trace Gravel, brown, wet, very loose (GLACIAL TILL)		2-3-2 (5) 2"			
951.0							
14.5		SANDY LEAN CLAY (CL), trace Gravel, dark gray, wet, stiff to very stiff (GLACIAL TILL)	15	2-4-5 (9) 14"			
			20	4-5-5 (10) 18"			q_p=4.5 tsf
			25	4-5-5 (10) 4"			
			30	7-7-6 (13) 4"			

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LOG OF BORING

See Descriptive Terminology sheet for explanation of abbreviations

Project Number B2410136
Geotechnical & Environmental Evaluation
NNG Ventura to Farmington Abandonment
Minnesota

BORING: **BH-07A**
LOCATION: Captured with RTK GPS.
DATUM: WGS 84
LATITUDE: 44.542545 LONGITUDE: -93.205979
DRILLER: M. Hoppe LOGGED BY: R. Jett START DATE: 01/10/25 END DATE: 01/10/25
SURFACE ELEVATION: 965.5 ft RIG: 7504 METHOD: 3 1/4" HSA SURFACING: Soil WEATHER:

Elev./ Depth ft	Water Level	Description of Materials (Soil-ASTM D2488 or 2487; Rock-USACE EM 1110-1-2908)	Sample	Blows (N-Value) Recovery	PID ppm	MC %	Tests or Remarks
		SANDY LEAN CLAY (CL), trace Gravel, dark gray, wet, stiff to very stiff (GLACIAL TILL)	35	7-8-8 (16) 16"			q_p=1 tsf
			40	7-8-9 (17) 18"		11	DD=132 pcf q_p=4 tsf
921.0							
44.5		POORLY GRADED SAND with SILT and GRAVEL (SP-SM), fine to coarse-grained, dark gray, wet, medium dense (GLACIAL TILL)	45	8-7-6 (13) 18"		12	P200=9% %Sand=73% %Gravel=18% Drilling method switched to mud rotary at 45 feet
			50	5-6-6 (12) 18"		17	
911.0							
54.5		SANDY LEAN CLAY (CL), trace Gravel, dark gray, wet, very stiff (GLACIAL TILL)	55	5-12-17 (29) 16"		11	LL=29, PL=14, PI=15 q_p=2.25 tsf
906.0							
59.5		SILTY SAND (SM), fine-grained, gray, wet, very dense (GLACIAL TILL)	60	20-31-28 (59) 16"			
901.0							
64.5		SANDY LEAN CLAY (CL), trace Gravel, dark gray, moist, hard (GLACIAL TILL)	65	18-31-16 (47) 18"			q_p=4.5 tsf

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LOG OF BORING

See Descriptive Terminology sheet for explanation of abbreviations

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Geotechnical & Environmental Evaluation
NNG Ventura to Farmington Abandonment
Minnesota

BORING: **BH-07A**
LOCATION: Captured with RTK GPS.
DATUM: WGS 84
LATITUDE: 44.542545 LONGITUDE: -93.205979
DRILLER: M. Hoppe LOGGED BY: R. Jett START DATE: 01/10/25 END DATE: 01/10/25
SURFACE ELEVATION: 965.5 ft RIG: 7504 METHOD: 3 1/4" HSA SURFACING: Soil WEATHER:

Elev./ Depth ft	Water Level	Description of Materials (Soil-ASTM D2488 or 2487; Rock-USACE EM 1110-1-2908)	Sample	Blows (N-Value) Recovery	PID ppm	MC %	Tests or Remarks
		SANDY LEAN CLAY (CL), trace Gravel, dark gray, moist, hard (GLACIAL TILL)	70	18-24-25 (49) 16"			q_p=3.75 tsf
			75	23-28-33 (61) 18"			q_p=3.5 tsf
886.0 79.5		SILTY SAND (SM), fine to medium-grained, trace Gravel, brown, wet, very dense (GLACIAL TILL)	80	27-32-33 (65) 16"			
			85	23-29-32 (61) 18"			
876.0 89.5		SILTY SAND (SM), fine to coarse-grained, trace Gravel, brown, wet, very dense (GLACIAL TILL)	90	18-28-30 (58) 16"			
			95	1-3-1 (4) 18"			

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LOG OF BORING

See Descriptive Terminology sheet for explanation of abbreviations

Project Number B2410136
Geotechnical & Environmental Evaluation
NNG Ventura to Farmington Abandonment
Minnesota

BORING: **BH-07A**
LOCATION: Captured with RTK GPS.
DATUM: WGS 84
LATITUDE: 44.542545 LONGITUDE: -93.205979
DRILLER: M. Hoppe LOGGED BY: R. Jett START DATE: 01/10/25 END DATE: 01/10/25
SURFACE ELEVATION: 965.5 ft RIG: 7504 METHOD: 3 1/4" HSA SURFACING: Soil WEATHER:

Elev./ Depth ft	Water Level	Description of Materials (Soil-ASTM D2488 or 2487; Rock-USACE EM 1110-1-2908)	Sample	Blows (N-Value) Recovery	PID ppm	MC %	Tests or Remarks
864.5		SILTY SAND (SM), fine to coarse-grained, trace Gravel, brown, wet, very dense (GLACIAL TILL)	100	1-3-2 (5) 10"			Water observed at 12.0 feet while drilling.
101.0		END OF BORING Boring then grouted					

105
110
115
120
125
130

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LOG OF BORING

See Descriptive Terminology sheet for explanation of abbreviations

Project Number B2410136
Geotechnical & Environmental Evaluation
NNG Ventura to Farmington Abandonment
Minnesota

BORING: **BH-08A**
LOCATION: Captured with RTK GPS.
DATUM: WGS 84
LATITUDE: 44.547647 LONGITUDE: -93.205834
DRILLER: M. Hoppe LOGGED BY: R. Jett START DATE: 01/29/25 END DATE: 01/29/25
SURFACE ELEVATION: 993.1 ft RIG: 7504 METHOD: 3 1/4" HSA SURFACING: Soil WEATHER:

Elev./ Depth ft	Water Level	Description of Materials (Soil-ASTM D2488 or 2487; Rock-USACE EM 1110-1-2908)	Sample	Blows (N-Value) Recovery	PID ppm	MC %	Tests or Remarks
992.2		SANDY LEAN CLAY (CL), black, moist (TOPSOIL)			1.0		Elevations and coordinates were provided by the client
0.8		SANDY LEAN CLAY (CL), gray to brown, moist, medium to soft (ALLUVIUM)		2-3-3 (6) 6"	0.1		Soil sample BH-08A (0-1') @ 08:45 collected for pesticides
			5	1-1-1 (2) 14"	0.1		Soil sample BH-08A (4.5-6') @ 08:54 collected for BTEX, GRO, DRO, RCRA Metals
986.1							
7.0		CLAYEY SAND (SC), trace Gravel, black, moist, medium (ALLUVIUM)		1-2-3 (5) 16"	0.2		
983.6							
9.5		SANDY LEAN CLAY (CL), SILT layers, brown to gray, moist, medium (GLACIAL TILL)	10	2-3-4 (7) 18"	0.2		
981.1							
12.0		SANDY LEAN CLAY (CL), trace Gravel, dark gray, moist, medium to stiff (GLACIAL TILL)		3-4-4 (8) 18"	0.3		q_p=1 tsf
			15	3-4-5 (9) 18"	0.2		
973.6							
19.5		SANDY SILT (ML), contains seams of Clay, dark gray, wet, stiff to hard (GLACIAL TILL)	20	4-5-5 (10) 10"	0.2		
968.6	▽						
24.5		SANDY LEAN CLAY (CL), trace Gravel, POORLY GRADED SAND layers, dark gray, wet, stiff to hard (GLACIAL TILL)	25	10-12-12 (24) 18"			
			30	3-5-6 (11) 18"			q_p=3 tsf

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BRAUN INTERTEC
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LOG OF BORING

See Descriptive Terminology sheet for explanation of abbreviations

Project Number B2410136
Geotechnical & Environmental Evaluation
NNG Ventura to Farmington Abandonment
Minnesota

BORING: **BH-08A**
LOCATION: Captured with RTK GPS.
DATUM: WGS 84
LATITUDE: 44.547647 LONGITUDE: -93.205834
DRILLER: M. Hoppe LOGGED BY: R. Jett START DATE: 01/29/25 END DATE: 01/29/25
SURFACE ELEVATION: 993.1 ft RIG: 7504 METHOD: 3 1/4" HSA SURFACING: Soil WEATHER:

Elev./ Depth ft	Water Level	Description of Materials (Soil-ASTM D2488 or 2487; Rock-USACE EM 1110-1-2908)	Sample	Blows (N-Value) Recovery	PID ppm	MC %	Tests or Remarks
		SANDY LEAN CLAY (CL), trace Gravel, POORLY GRADED SAND layers, dark gray, wet, stiff to hard (GLACIAL TILL)					
35				4-7-8 (15) 18"			q_p=3.5 tsf
40				10-12-13 (25) 16"			q_p=3 tsf
45				12-14-16 (30) 18"			q_p=3.75 tsf
50				14-17-18 (35) 18"			q_p=3.25 tsf
55				18-24-20 (44) 16"			q_p=4.5 tsf
60				16-17-18 (35) 18"			q_p=4.5 tsf
65				16-18-18 (36) 18"		11	Wet below 65 feet DD=129 pcf q_p=4 tsf

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LOG OF BORING

See Descriptive Terminology sheet for explanation of abbreviations

Project Number B2410136
Geotechnical & Environmental Evaluation
NNG Ventura to Farmington Abandonment
Minnesota

BORING: **BH-08A**
LOCATION: Captured with RTK GPS.
DATUM: WGS 84
LATITUDE: 44.547647 LONGITUDE: -93.205834
DRILLER: M. Hoppe LOGGED BY: R. Jett START DATE: 01/29/25 END DATE: 01/29/25
SURFACE ELEVATION: 993.1 ft RIG: 7504 METHOD: 3 1/4" HSA SURFACING: Soil WEATHER:

Elev./ Depth ft	Water Level	Description of Materials (Soil-ASTM D2488 or 2487; Rock-USACE EM 1110-1-2908)	Sample	Blows (N-Value) Recovery	PID ppm	MC %	Tests or Remarks
		SANDY LEAN CLAY (CL), trace Gravel, POORLY GRADED SAND layers, dark gray, wet, stiff to hard (GLACIAL TILL)					
			70	12-16-16 (32) 18"		10	Drilling method switched to mud rotary at 70 feet LL=24, PL=13, PI=11 DD=121 pcf
			75	24-27-28 (55)			No recovery at 75 feet
913.6							
79.5		SANDY LEAN CLAY (CL), trace Gravel, gray, wet, hard (GLACIAL TILL)	80	26-28-33 (61) 18"		13	LL=24, PL=14, PI=10 DD=124 pcf
			85	16-23-36 (59) 18"			q_p=4.5 tsf
			90	22-23-22 (45) 18"			q_p=4.5 tsf
			95	20-32-37 (69) 18"			q_p=4.75 tsf

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LOG OF BORING

See Descriptive Terminology sheet for explanation of abbreviations

Project Number B2410136
Geotechnical & Environmental Evaluation
NNG Ventura to Farmington Abandonment
Minnesota

BORING: **BH-08A**

LOCATION: Captured with RTK GPS.

DATUM: WGS 84

LATITUDE: 44.547647 LONGITUDE: -93.205834

DRILLER: M. Hoppe | LOGGED BY: R. Jett | START DATE: 01/29/25 | END DATE: 01/29/25

SURFACE ELEVATION: 993.1 ft | RIG: 7504 | METHOD: 3 1/4" HSA | SURFACING: Soil | WEATHER:

Elev./ Depth ft	Water Level	Description of Materials (Soil-ASTM D2488 or 2487; Rock-USACE EM 1110-1-2908)	Sample	Blows (N-Value) Recovery	PID ppm	MC %	Tests or Remarks
892.1		SANDY LEAN CLAY (CL), trace Gravel, gray, wet, hard (GLACIAL TILL)	100	22-26-28 (54) 18"			q_p=4 tsf
101.0		END OF BORING Boring then grouted					Water observed at 24.0 feet while drilling.
			105				
			110				
			115				
			120				
			125				
			130				

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LOG OF BORING

See Descriptive Terminology sheet for explanation of abbreviations

Project Number B2410136
Geotechnical & Environmental Evaluation
NNG Ventura to Farmington Abandonment
Minnesota

BORING: **BH-10**
LOCATION: Captured with RTK GPS.
DATUM: WGS 84
LATITUDE: 44.564576 LONGITUDE: -93.205106
DRILLER: M. Hoppe LOGGED BY: R. Jett START DATE: 01/16/25 END DATE: 01/16/25
SURFACE ELEVATION: 1019.9 ft RIG: 7504 METHOD: 3 1/4" HSA SURFACING: Soil WEATHER:

Elev./ Depth ft	Water Level	Description of Materials (Soil-ASTM D2488 or 2487; Rock-USACE EM 1110-1-2908)	Sample	Blows (N-Value) Recovery	PID ppm	MC %	Tests or Remarks
1019.1		SILTY SAND (SM), fine to medium-grained, trace Gravel, dark brown, moist (TOPSOIL FILL)			0.1		Elevations and coordinates were provided by the client
0.8		FILL: SANDY LEAN CLAY (CL), trace Gravel, dark brown, moist		3-3-3 (6) 12"	0.1		Soil sample BH-10 (0-1') @ 13:42 collected for pesticides
1015.4							
4.5		FILL: SANDY LEAN CLAY (CL), trace Gravel, brown, moist	5	2-3-3 (6) 14"	0.1		Soil sample BH-10 (4.5-6') @ 13:49 collected for BTEX, GRO, DRO, RCRA Metals P200=31% %Sand=69%
1012.9							
7.0		SILTY SAND (SM), fine to medium-grained, trace Gravel, brown, moist, loose to medium dense (GLACIAL TILL)		4-3-5 (8) 14"	0.1	16	
			10	6-8-8 (16) 14"	0.1	14	
1007.9							
12.0		SANDSTONE, light brown to white, moist, decomposed, hand deformed sample classified as "POORLY GRADED SAND (SP)" (APPARENT BEDROCK)		14-13-24 (37) 16"	0.2	4	P200=4% %Sand=96%
			15	25-50/3" (REF) 12"	0.1		
			20	50/4" (REF) 10"	0.1	2	
			25	50/4" (REF) 10"			
			30	50/3" (REF) 6"			

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LOG OF BORING

See Descriptive Terminology sheet for explanation of abbreviations

Project Number B2410136
Geotechnical & Environmental Evaluation
NNG Ventura to Farmington Abandonment
Minnesota

BORING: **BH-10**
LOCATION: Captured with RTK GPS.
DATUM: WGS 84
LATITUDE: 44.564576 LONGITUDE: -93.205106
DRILLER: M. Hoppe LOGGED BY: R. Jett START DATE: 01/16/25 END DATE: 01/16/25
SURFACE ELEVATION: 1019.9 ft RIG: 7504 METHOD: 3 1/4" HSA SURFACING: Soil WEATHER:

Elev./ Depth ft	Water Level	Description of Materials (Soil-ASTM D2488 or 2487; Rock-USACE EM 1110-1-2908)	Sample	Blows (N-Value) Recovery	PID ppm	MC %	Tests or Remarks
		SANDSTONE, light brown to white, moist, decomposed, hand deformed sample classified as "POORLY GRADED SAND (SP)" (APPARENT BEDROCK)		50/3" (REF) 6"			
				50/3" (REF) 6"			
				50/2" (REF) 6"			
970.2							
49.7		END OF BORING		50/2" (REF) 4"			Practical auger refusal on apparent bedrock at 49.7 feet
		Boring then grouted					Water not observed while drilling.

BRAUN INTERTEC
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LOG OF BORING

See Descriptive Terminology sheet for explanation of abbreviations

Project Number B2410136
Geotechnical & Environmental Evaluation
NNG Ventura to Farmington Abandonment
Minnesota

BORING: **BH-10A**
LOCATION: Captured with RTK GPS.
DATUM: WGS 84
LATITUDE: 44.560319 LONGITUDE: -93.203763
DRILLER: M. Hoppe LOGGED BY: R. Jett START DATE: 01/14/25 END DATE: 01/14/25
SURFACE ELEVATION: 1003.2 ft RIG: 7504 METHOD: 3 1/4" HSA SURFACING: Soil WEATHER:

Elev./ Depth ft	Water Level	Description of Materials (Soil-ASTM D2488 or 2487; Rock-USACE EM 1110-1-2908)	Sample	Blows (N-Value) Recovery	PID ppm	MC %	Tests or Remarks
1002.4		CLAYEY SAND (SC), trace Gravel, dark brown to brown, moist (TOPSOIL FILL)			0.7		Elevations and coordinates were provided by the client
0.8		FILL: CLAYEY SAND (SC), trace Gravel, brown, moist		2-2-2 (4) 12"	0.1		Soil sample BH-10A (1-2') @ 13:14 collected for pesticides
			5	2-5-6 (11) 12"	0.2		Soil sample BH-10A (2-3.5') @ 13:27 collected for BTEX, GRO, DRO, RCRA Metals
996.2							
7.0		CLAYEY SAND (SC), trace Gravel, brown, moist, medium (GLACIAL TILL)		3-4-4 (8) 16"	0.1		
993.7							
9.5		SANDSTONE, light brown to white, moist to wet, decomposed, SILTY SAND layers, hand deformed sample classified as "POORLY GRADED SAND (SP)" (APPARENT BEDROCK)	10	2-14-16 (30) 14"	0.5		
				6-7-8 (15) 16"	0.4	3	
			15	14-28-36 (64) 18"	0.6	1	P200=4% %Sand=96%
			20	50/5" (REF) 10"	0.3		
			25	50/5" (REF) 10"		3	P200=13% %Sand=87%
			30	50/5" (REF) 10"		1	

Continued on next page

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LOG OF BORING

See Descriptive Terminology sheet for explanation of abbreviations

Project Number B2410136
Geotechnical & Environmental Evaluation
NNG Ventura to Farmington Abandonment
Minnesota

BORING: **BH-10A**

LOCATION: Captured with RTK GPS.

DATUM: WGS 84

LATITUDE: 44.560319 LONGITUDE: -93.203763

DRILLER:	M. Hoppe	LOGGED BY:	R. Jett	START DATE:	01/14/25	END DATE:	01/14/25
SURFACE ELEVATION:	1003.2 ft	RIG:	7504	METHOD:	3 1/4" HSA	SURFACING:	Soil

WEATHER:

Elev./ Depth ft	Water Level	Description of Materials (Soil-ASTM D2488 or 2487; Rock-USACE EM 1110-1-2908)	Sample	Blows (N-Value) Recovery	PID ppm	MC %	Tests or Remarks
	▽	SANDSTONE, light brown to white, moist to wet, decomposed, SILTY SAND layers, hand deformed sample classified as "POORLY GRADED SAND (SP)" (APPARENT BEDROCK)		50/3" (REF) 6"		1	
963.3				50/4" (REF) 8"			Wet below 39 feet
39.9		END OF BORING Boring then grouted					Practical auger refusal at 39.9 feet on apparent bedrock Water observed at 39.0 feet while drilling.

35 40 45 50 55 60 65

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LOG OF BORING

See Descriptive Terminology sheet for explanation of abbreviations

Project Number B2410136
Geotechnical & Environmental Evaluation
NNG Ventura to Farmington Abandonment
Minnesota

BORING: **BH-11**
LOCATION: Captured with RTK GPS.
DATUM: WGS 84
LATITUDE: 44.564684 LONGITUDE: -93.204212
DRILLER: M. Hoppe LOGGED BY: R. Jett START DATE: 01/16/25 END DATE: 01/16/25
SURFACE ELEVATION: 1002.7 ft RIG: 7504 METHOD: 3 1/4" HSA SURFACING: Soil WEATHER:

Elev./ Depth ft	Water Level	Description of Materials (Soil-ASTM D2488 or 2487; Rock-USACE EM 1110-1-2908)	Sample	Blows (N-Value) Recovery	PID ppm	MC %	Tests or Remarks
1001.9		CLAYEY SAND (SC), trace Gravel, dark brown, moist (TOPSOIL FILL)			0.1		Elevations and coordinates were provided by the client
0.8		FILL: SILTY SAND (SM), fine to medium-grained, trace Gravel, contains seams of Clay, brown, moist		2-2-2 (4) 12"	0.1		Soil sample BH-11 (0-1') @ 08:48 collected for pesticides
			5	2-3-3 (6) 12"	0.1		Soil sample BH-11 (2-3.5') @ 08:53 collected for BTEX, GRO, DRO, RCRA Metals
995.7							
7.0		SANDY LEAN CLAY (CL), trace Gravel, contains seams of Silt, light brown, moist, medium (GLACIAL TILL)		2-3-3 (6) 14"	0.6		
			10	2-2-3 (5) 16"	0.1	28	
990.7							
12.0		WELL-GRADED SAND with SILT (SW-SM), fine to coarse-grained, little Gravel, light brown, moist, medium dense (GLACIAL OUTWASH)		5-6-12 (18) 14"	0.1	4	P200=8% %Sand=81% %Gravel=11%
			15	5-7-12 (19) 12"	0.1		
983.2							
19.5		SANDSTONE, light brown to white, moist to wet, decomposed, hand deformed sample classified as "POORLY GRADED SAND (SP)" (APPARENT BEDROCK)	20	34-50/3" (REF) 12"	0.1	1	P200=5% %Sand=95%
			25	50/5" (REF) 10"		1	
			30	50/3" (REF) 6"			

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BRAUN INTERTEC
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LOG OF BORING

See Descriptive Terminology sheet for explanation of abbreviations

Project Number B2410136
Geotechnical & Environmental Evaluation
NNG Ventura to Farmington Abandonment
Minnesota

BORING: **BH-11**
LOCATION: Captured with RTK GPS.
DATUM: WGS 84
LATITUDE: 44.564684 LONGITUDE: -93.204212

DRILLER:	M. Hoppe	LOGGED BY:	R. Jett	START DATE:	01/16/25	END DATE:	01/16/25
SURFACE ELEVATION:	1002.7 ft	RIG:	7504	METHOD:	3 1/4" HSA	SURFACING:	Soil

WEATHER:

Elev./ Depth ft	Water Level	Description of Materials (Soil-ASTM D2488 or 2487; Rock-USACE EM 1110-1-2908)	Sample	Blows (N-Value) Recovery	PID ppm	MC %	Tests or Remarks
	▽	SANDSTONE, light brown to white, moist to wet, decomposed, hand deformed sample classified as "POORLY GRADED SAND (SP)" (APPARENT BEDROCK)		50/3" (REF) 6"			
				50/4" (REF) 10"			
957.9				50/3" (REF) 14"			
44.8		END OF BORING Boring then grouted					Practical auger refusal at 44.8 feet on apparent bedrock Water observed at 40.0 feet while drilling.

35
40
45
50
55
60
65

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LOG OF BORING

See Descriptive Terminology sheet for explanation of abbreviations

Project Number B2410136
Geotechnical & Environmental Evaluation
NNG Ventura to Farmington Abandonment
Minnesota

BORING: **BH-11A**
LOCATION: Captured with RTK GPS.
DATUM: WGS 84
LATITUDE: 44.561106 LONGITUDE: -93.203390
DRILLER: M. Hoppe LOGGED BY: R. Jett START DATE: 01/15/25 END DATE: 01/15/25
SURFACE ELEVATION: 1001.4 ft RIG: 7504 METHOD: 3 1/4" HSA SURFACING: Soil WEATHER:

Elev./ Depth ft	Water Level	Description of Materials (Soil-ASTM D2488 or 2487; Rock-USACE EM 1110-1-2908)	Sample	Blows (N-Value) Recovery	PID ppm	MC %	Tests or Remarks
1000.7		CLAYEY SAND (SC), trace Gravel, black to dark brown, moist (TOPSOIL)			0.0		Elevations and coordinates were provided by the client
0.7		SANDY LEAN CLAY (CL), trace Gravel, brown, moist, medium to very stiff (GLACIAL TILL)		2-3-4 (7) 14"	0.0		Soil sample BH-11A (0-1') @ 08:37 collected for pesticides
			5	2-3-4 (7) 16"	0.0		Soil sample BH-11A (2-3.5') @ 08:48 collected for BTEX, GRO, DRO, RCRA Metals
				2-4-6 (10) 16"	0.0		q_p=1 tsf
			10	4-8-10 (18) 16"	0.0		q_p=3 tsf
				9-13-14 (27) 16"	0.0	13	DD=125 pcf
		SILTY SAND layer at 15 feet	15	2-12-10 (22) 16"	0.0	13	P200=52% %Sand=41% %Gravel=7%
981.9							
19.5		SANDY LEAN CLAY (CL), trace Gravel, gray to brown, moist, stiff to very stiff (GLACIAL TILL)	20	3-5-7 (12) 16"	0.0	17	LL=26, PL=14, PI=12
			25	5-12-16 (28)			No recovery at 25 feet
971.9							
29.5		SANDSTONE, light brown to white, moist, decomposed, hand deformed sample classified as "SILTY SAND (SM)" (APPARENT BEDROCK)	30	5-7-8 (15) 16"		9	P200=29% %Sand=71%

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LOG OF BORING

See Descriptive Terminology sheet for explanation of abbreviations

Project Number B2410136
Geotechnical & Environmental Evaluation
NNG Ventura to Farmington Abandonment
Minnesota

BORING: **BH-11A**
LOCATION: Captured with RTK GPS.
DATUM: WGS 84
LATITUDE: 44.561106 LONGITUDE: -93.203390
DRILLER: M. Hoppe LOGGED BY: R. Jett START DATE: 01/15/25 END DATE: 01/15/25
SURFACE ELEVATION: 1001.4 ft RIG: 7504 METHOD: 3 1/4" HSA SURFACING: Soil WEATHER:

Elev./ Depth ft	Water Level	Description of Materials (Soil-ASTM D2488 or 2487; Rock-USACE EM 1110-1-2908)	Sample	Blows (N-Value) Recovery	PID ppm	MC %	Tests or Remarks
		SANDSTONE, light brown to white, moist, decomposed, hand deformed sample classified as "SILTY SAND (SM)" (APPARENT BEDROCK)	35	17-22-24 (46) 14"		10	
961.0			40	22-50/4" (REF) 12"			
40.3		END OF BORING Boring then grouted					Practical auger refusal at 40.3 feet on apparent bedrock Water not observed while drilling.
			45				
			50				
			55				
			60				
			65				

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LOG OF BORING

See Descriptive Terminology sheet for explanation of abbreviations

Project Number B2410136
Geotechnical & Environmental Evaluation
NNG Ventura to Farmington Abandonment
Minnesota

BORING: **BH-12**
LOCATION: Captured with RTK GPS.
DATUM: WGS 84
LATITUDE: 44.565904 LONGITUDE: -93.201957
DRILLER: M. Hoppe LOGGED BY: R. Jett START DATE: 01/16/25 END DATE: 01/16/25
SURFACE ELEVATION: 1034.1 ft RIG: 7504 METHOD: 3 1/4" HSA SURFACING: Soil WEATHER:

Elev./ Depth ft	Water Level	Description of Materials (Soil-ASTM D2488 or 2487; Rock-USACE EM 1110-1-2908)	Sample	Blows (N-Value) Recovery	PID ppm	MC %	Tests or Remarks
1033.4		CLAYEY SAND (SC), trace Gravel, black, moist (TOPSOIL FILL)			0.1		Elevations and coordinates were provided by the client
0.7		FILL: ORGANIC CLAY (OL), black, moist		2-3-3 (6) 12"	0.0		Soil sample BH-12 (0-1') @ 10:04 collected for pesticides
			5	2-3-3 (6) 14"	0.0		Soil sample BH-12 (4.5-6') @ 10:09 collected for BTEX, GRO, DRO, RCRA Metals
1027.1							
7.0		LEAN CLAY (CL), contains seams of Silty Sand, gray, moist, soft to very soft (ALLUVIUM)		1-2-2 (4) 16"	0.0		
			10	1-1-1 (2) 14"	0.1		
1022.1							
12.0		LEAN CLAY (CL), dark gray, moist, soft (ALLUVIUM)		1-2-2 (4) 16"	0.1		
1019.6							
14.5		SANDY SILT (ML), gray, moist, very loose (ALLUVIUM)	15	1-2-2 (4) 16"	0.0		
1014.6							
19.5		SANDY LEAN CLAY (CL), trace Gravel, dark gray, moist, medium to very stiff (GLACIAL TILL)	20	2-3-3 (6) 14"	0.1		
			25	2-3-3 (6) 0"			No recovery at 25 feet
		SILT layer at 30 feet	30	4-6-8 (14) 16"			

Continued on next page

BRAUN INTERTEC
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LOG OF BORING

See Descriptive Terminology sheet for explanation of abbreviations

Project Number B2410136
Geotechnical & Environmental Evaluation
NNG Ventura to Farmington Abandonment
Minnesota

BORING: **BH-12**
LOCATION: Captured with RTK GPS.
DATUM: WGS 84
LATITUDE: 44.565904 LONGITUDE: -93.201957
DRILLER: M. Hoppe LOGGED BY: R. Jett START DATE: 01/16/25 END DATE: 01/16/25
SURFACE ELEVATION: 1034.1 ft RIG: 7504 METHOD: 3 1/4" HSA SURFACING: Soil WEATHER:

Elev./ Depth ft	Water Level	Description of Materials (Soil-ASTM D2488 or 2487; Rock-USACE EM 1110-1-2908)	Sample	Blows (N-Value) Recovery	PID ppm	MC %	Tests or Remarks
		SANDY LEAN CLAY (CL), trace Gravel, dark gray, moist, medium to very stiff (GLACIAL TILL)	35	7-8-13 (21) 16"			q_p=4.5 tsf
994.6							
39.5		SILTY SAND (SM), fine to medium-grained, trace Gravel, dark gray, moist, dense (GLACIAL TILL)	40	13-16-22 (38) 16"			
		CLAY layer at 45 feet	45	12-14-16 (30) 18"			
984.6							
49.5		SANDY LEAN CLAY (CL), trace Gravel, dark gray, moist, very stiff (GLACIAL TILL)	50	13-14-15 (29) 18"			q_p=4.5 tsf
			55	6-8-14 (22) 18"		10	DD=132 pcf q_p=4.5 tsf
			60	12-13-15 (28) 18"		9	LL=22, PL=13, PI=9 DD=134 pcf q_p=4.5 tsf
969.6							
64.5		SANDY LEAN CLAY (CL), trace Gravel, light brown, moist, very stiff (GLACIAL TILL)	65	12-14-14 (28) 18"		15	LL=28, PL=17, PI=11 DD=119 pcf
		Continued on next page					

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LOG OF BORING

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Project Number B2410136
Geotechnical & Environmental Evaluation
NNG Ventura to Farmington Abandonment
Minnesota

BORING: **BH-12**

LOCATION: Captured with RTK GPS.

DATUM: WGS 84

LATITUDE: 44.565904 LONGITUDE: -93.201957

DRILLER:	M. Hoppe	LOGGED BY:	R. Jett	START DATE:	01/16/25	END DATE:	01/16/25
SURFACE ELEVATION:	1034.1 ft	RIG:	7504	METHOD:	3 1/4" HSA	SURFACING:	Soil

WEATHER:

Elev./ Depth ft	Water Level	Description of Materials (Soil-ASTM D2488 or 2487; Rock-USACE EM 1110-1-2908)	Sample	Blows (N-Value) Recovery	PID ppm	MC %	Tests or Remarks
964.6		SANDY LEAN CLAY (CL), trace Gravel, light brown, moist, very stiff (GLACIAL TILL)					
69.5							
964.2		SANDSTONE, light brown to white, wet, decomposed, hand deformed sample classified as "POORLY GRADED SAND WITH SILT AND GRAVEL (SP-SMwG)" (APPARENT BEDROCK)	X	50/4" (REF) 12"		11	Water not observed while drilling.
69.8		END OF BORING					P200=11% %Sand=74% %Gravel=15% Practical auger refusal at 69.9 feet on apparent bedrock
		Boring then grouted					

70 75 80 85 90 95

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LOG OF BORING

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Project Number B2410136
Geotechnical & Environmental Evaluation
NNG Ventura to Farmington Abandonment
Minnesota

BORING: **BH-12A**
LOCATION: Captured with RTK GPS.
DATUM: WGS 84
LATITUDE: 44.563493 LONGITUDE: -93.202890
DRILLER: M. Hoppe LOGGED BY: R. Jett START DATE: 01/15/25 END DATE: 01/15/25
SURFACE ELEVATION: 1013.6 ft RIG: 7504 METHOD: 3 1/4" HSA SURFACING: Soil WEATHER:

Elev./ Depth ft	Water Level	Description of Materials (Soil-ASTM D2488 or 2487; Rock-USACE EM 1110-1-2908)	Sample	Blows (N-Value) Recovery	PID ppm	MC %	Tests or Remarks
1011.6		CLAYEY SAND (SC), trace Gravel, dark brown to brown (TOPSOIL FILL)					Elevations and coordinates were provided by the client
2.0		FILL: SILTY SAND (SM), fine to medium-grained, trace Gravel, brown, moist		4-5-5 (10) 14"			Soil sample BH-12A (0-1') @ 09:55 collected for pesticides
1009.1							
4.5		FILL: CLAYEY SAND (SC), trace Gravel, brown to dark brown, moist	5	3-4-3 (7) 18"			
1006.6							Soil sample BH-12A (4.5-6') @ 10:09 collected for BTEX, GRO, DRO, RCRA Metals
7.0		SANDY LEAN CLAY (CL), trace Gravel, light brown, moist, soft (GLACIAL TILL)		2-2-2 (4) 18"			
1004.1							
9.5		SANDY LEAN CLAY (CL), trace Gravel, dark brown to dark gray, moist, medium to very stiff (GLACIAL TILL)	10	2-3-3 (6) 18"			
				5-10-12 (22) 16"			
			15	12-14-15 (29) 16"			
994.1							
19.5		SANDY SILT (ML), light brown to gray, moist, medium dense (GLACIAL TILL)	20	5-8-10 (18) 16"	0.0		
			25	8-12-14 (26) 18"			
984.1							
29.5		SANDSTONE, light brown to white, moist, decomposed, hand deformed sample classified as "POORLY GRADED SAND WITH SILT (SP-SM)" (APPARENT BEDROCK)	30	23-50/4" (REF) 10"			

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BRAUN INTERTEC
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LOG OF BORING

See Descriptive Terminology sheet for explanation of abbreviations

Project Number B2410136
Geotechnical & Environmental Evaluation
NNG Ventura to Farmington Abandonment
Minnesota

BORING: **BH-12A**
LOCATION: Captured with RTK GPS.
DATUM: WGS 84
LATITUDE: 44.563493 LONGITUDE: -93.202890
DRILLER: M. Hoppe LOGGED BY: R. Jett START DATE: 01/15/25 END DATE: 01/15/25
SURFACE ELEVATION: 1013.6 ft RIG: 7504 METHOD: 3 1/4" HSA SURFACING: Soil WEATHER:

Elev./ Depth ft	Water Level	Description of Materials (Soil-ASTM D2488 or 2487; Rock-USACE EM 1110-1-2908)	Sample	Blows (N-Value) Recovery	PID ppm	MC %	Tests or Remarks
		SANDSTONE, light brown to white, moist, decomposed, hand deformed sample classified as "POORLY GRADED SAND WITH SILT (SP-SM)" (APPARENT BEDROCK)	35	50/5" (REF) 10"		2	P200=6% %Sand=94%
			40	50/4" (REF) 10"		1	
			45	50/4" (REF) 10"		11	P200=6% %Sand=94%
963.8	▽		50	50/4" (REF) 12"			Practical auger refusal at 49.9 feet on apparent bedrock
49.8		END OF BORING Boring then grouted					Water observed at 49.5 feet while drilling.
			55				
			60				
			65				

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LOG OF BORING

See Descriptive Terminology sheet for explanation of abbreviations

Project Number B2410136
Geotechnical & Environmental Evaluation
NNG Ventura to Farmington Abandonment
Minnesota

BORING: **BH-13**
LOCATION: Captured with RTK GPS.
DATUM: WGS 84
LATITUDE: 44.575533 LONGITUDE: -93.193947
DRILLER: M. Hoppe LOGGED BY: R. Jett START DATE: 01/17/25 END DATE: 01/17/25
SURFACE ELEVATION: 998.4 ft RIG: 7504 METHOD: 3 1/4" HSA SURFACING: Soil WEATHER:

Elev./ Depth ft	Water Level	Description of Materials (Soil-ASTM D2488 or 2487; Rock-USACE EM 1110-1-2908)	Sample	Blows (N-Value) Recovery	PID ppm	MC %	Tests or Remarks
997.1		CLAYEY SAND (SC), trace Gravel, dark brown, moist (TOPSOIL FILL)			0.1		Elevations and coordinates were provided by the client
1.3		FILL: CLAYEY SAND (SC), trace Gravel, dark brown, moist		2-3-3 (6) 6"	0.1		Soil sample BH-13 (0-1') @ 08:35 collected for pesticides
993.4			5	2-3-2 (5) 6"			Soil sample BH-13 (2-3.5') @ 08:40 collected for BTEX, GRO, DRO, RCRA Metals
5.0		FILL: POORLY GRADED SAND with SILT (SP-SM), fine to coarse-grained, little Gravel, brown, moist			0.0		
988.9				10-12-16 (28) 12"	0.1		
9.5		SANDY LEAN CLAY (CL), trace Gravel, contains seams of Silt, light brown, moist, medium to very stiff (ALLUVIUM)	10	3-3-4 (7) 12"	0.1		
983.9				13-16-6 (22) 12"	0.1		
14.5		SILTY SAND with GRAVEL (SM), fine to coarse-grained, brown, moist, medium dense (ALLUVIUM)	15	4-10-16 (26) 14"	0.1		
978.9							
19.5	▽	SANDY LEAN CLAY (CL), trace Gravel, dark gray, moist, very stiff to hard (GLACIAL TILL)	20	8-12-12 (24) 16"	0.2		Wet below 20 feet
			25	8-10-9 (19) 16"		11	P200=56% q_p=3 tsf %Sand=42% %Gravel=2%
			30	6-8-10 (18) 18"		13	LL=28, PL=15, PI=13 DD=125 pcf q_p=1 tsf

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LOG OF BORING

See Descriptive Terminology sheet for explanation of abbreviations

Project Number B2410136
Geotechnical & Environmental Evaluation
NNG Ventura to Farmington Abandonment
Minnesota

BORING: **BH-13**
LOCATION: Captured with RTK GPS.
DATUM: WGS 84
LATITUDE: 44.575533 LONGITUDE: -93.193947

DRILLER:	M. Hoppe	LOGGED BY:	R. Jett	START DATE:	01/17/25	END DATE:	01/17/25
SURFACE ELEVATION:	998.4 ft	RIG:	7504	METHOD:	3 1/4" HSA	SURFACING:	Soil

WEATHER:

Elev./ Depth ft	Water Level	Description of Materials (Soil-ASTM D2488 or 2487; Rock-USACE EM 1110-1-2908)	Sample	Blows (N-Value) Recovery	PID ppm	MC %	Tests or Remarks
963.9		SANDY LEAN CLAY (CL), trace Gravel, dark gray, moist, very stiff to hard (GLACIAL TILL)					
34.5		POORLY GRADED SAND with SILT (SP-SM), fine-grained, gray, wet, medium dense (GLACIAL TILL)	35	8-7-7 (14) 18"		17	P200=11% %Sand=89%
958.9							
39.5		SANDY LEAN CLAY (CL), trace Gravel, dark gray, moist, very stiff (GLACIAL TILL)	40	6-12-13 (25) 18"		11	LL=22, PL=13, PI=9 DD=122 pcf
			45	6-8-9 (17) 18"		12	DD=126 pcf q_p=3.5 tsf
			50	10-12-12 (24) 16"			q_p=2 tsf
			55	10-11-12 (23) 18"			q_p=1.75 tsf
			60	12-16-16 (32) 18"			q_p=2.5 tsf
			65	10-12-12 (24) 18"			

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LOG OF BORING

See Descriptive Terminology sheet for explanation of abbreviations

Project Number B2410136
Geotechnical & Environmental Evaluation
NNG Ventura to Farmington Abandonment
Minnesota

BORING: **BH-13**
LOCATION: Captured with RTK GPS.
DATUM: WGS 84
LATITUDE: 44.575533 LONGITUDE: -93.193947
DRILLER: M. Hoppe LOGGED BY: R. Jett START DATE: 01/17/25 END DATE: 01/17/25
SURFACE ELEVATION: 998.4 ft RIG: 7504 METHOD: 3 1/4" HSA SURFACING: Soil WEATHER:

Elev./ Depth ft	Water Level	Description of Materials (Soil-ASTM D2488 or 2487; Rock-USACE EM 1110-1-2908)	Sample	Blows (N-Value) Recovery	PID ppm	MC %	Tests or Remarks
928.9		SANDY LEAN CLAY (CL), trace Gravel, dark gray, moist, very stiff (GLACIAL TILL)					
69.5		SILTY SAND (SM), fine to coarse-grained, trace Gravel, contains seams of Clay, brown, wet, medium dense to dense (GLACIAL TILL)	70	6-7-16 (23) 16"			
			75	8-12-15 (27) 18"			
			80	12-14-16 (30) 18"			
917.4							
81.0		END OF BORING Boring then grouted					Water observed at 20.0 feet while drilling.
			85				
			90				
			95				

BRAUN INTERTEC
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LOG OF BORING

See Descriptive Terminology sheet for explanation of abbreviations

Project Number B2410136
Geotechnical & Environmental Evaluation
NNG Ventura to Farmington Abandonment
Minnesota

BORING: **BH-14**
LOCATION: Captured with RTK GPS.
DATUM: WGS 84
LATITUDE: 44.576526 LONGITUDE: -93.193076
DRILLER: M. Hoppe LOGGED BY: R. Jett START DATE: 01/22/25 END DATE: 01/22/25
SURFACE ELEVATION: 994.4 ft RIG: 7504 METHOD: 3 1/4" HSA SURFACING: Soil WEATHER:

Elev./ Depth ft	Water Level	Description of Materials (Soil-ASTM D2488 or 2487; Rock-USACE EM 1110-1-2908)	Sample	Blows (N-Value) Recovery	PID ppm	MC %	Tests or Remarks
		FILL: CLAYEY SAND (SC), trace Gravel, organic, black, moist			0.7		Elevations and coordinates were provided by the client
				3-3-2 (5) 6"	0.9		Soil sample BH-14 (0-1') @ 08:50 collected for pesticides
			5	2-2-2 (4) 2"	0.4		Soil sample BH-14 (2-3.5') @ 08:59 collected for BTEX, GRO, DRO
987.4 7.0		SANDY LEAN CLAY (CL), trace Gravel, contains seams of Silt, brown, moist (ALLUVIUM)		3-3-4 (7) 12"	2.7		
984.9 9.5	▽	POORLY GRADED SAND (SP), fine to medium-grained, trace Gravel, contains seams of Silt, light brown, moist to wet, loose to medium dense (GLACIAL OUTWASH)	10	4-3-2 (5) 16"	0.1		
				4-4-6 (10) 16"			Wet below 12 feet
			15	15-12-12 (24) 4"			
974.9 19.5		SILTY SAND (SM), fine to coarse-grained, trace Gravel, brown, wet, very loose (GLACIAL OUTWASH)	20	3-2-2 (4) 16"			
969.9 24.5		POORLY GRADED SAND (SP), fine to coarse-grained, trace Gravel, SILTY SAND layers, brown, wet, very loose to medium dense (GLACIAL OUTWASH)	25	3-2-2 (4) 6"		18	P200=4% %Sand=90% %Gravel=6%
			30	12-7-13 (20) 18"		15	P200=23% %Sand=75% %Gravel=2%

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BRAUN INTERTEC
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LOG OF BORING

See Descriptive Terminology sheet for explanation of abbreviations

Project Number B2410136
Geotechnical & Environmental Evaluation
NNG Ventura to Farmington Abandonment
Minnesota

BORING: **BH-14**
LOCATION: Captured with RTK GPS.
DATUM: WGS 84
LATITUDE: 44.576526 LONGITUDE: -93.193076
DRILLER: M. Hoppe LOGGED BY: R. Jett START DATE: 01/22/25 END DATE: 01/22/25
SURFACE ELEVATION: 994.4 ft RIG: 7504 METHOD: 3 1/4" HSA SURFACING: Soil WEATHER:

Elev./ Depth ft	Water Level	Description of Materials (Soil-ASTM D2488 or 2487; Rock-USACE EM 1110-1-2908)	Sample	Blows (N-Value) Recovery	PID ppm	MC %	Tests or Remarks
959.9							
34.5		POORLY GRADED SAND (SP), fine to coarse-grained, trace Gravel, SILTY SAND layers, brown, wet, very loose to medium dense (GLACIAL OUTWASH)	35	12-15-16 (31) 16"		13	
		LEAN CLAY (CL), trace Gravel, brown, wet, hard (GLACIAL OUTWASH)					
954.9							
39.5		POORLY GRADED SAND (SP), fine to medium-grained, trace Gravel, light brown, wet, dense (GLACIAL OUTWASH)	40	12-15-15 (30) 18"			
			45	12-14-16 (30) 18"			
944.9							
49.5		SANDY LEAN CLAY (CL), trace Gravel, dark gray, moist, very stiff to hard (GLACIAL TILL)	50	17-12-10 (22) 18"			q_p=3 tsf
			55	12-13-14 (27) 16"			q_p=4.5 tsf
			60	14-23-36 (59) 18"			
929.9							
64.5		SANDY LEAN CLAY (CL), trace Gravel, slightly organic, black to dark gray, moist, hard (GLACIAL TILL)	65	50/6" (REF) 10"			

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LOG OF BORING

See Descriptive Terminology sheet for explanation of abbreviations

Project Number B2410136
Geotechnical & Environmental Evaluation
NNG Ventura to Farmington Abandonment
Minnesota

BORING: **BH-14**
LOCATION: Captured with RTK GPS.
DATUM: WGS 84
LATITUDE: 44.576526 LONGITUDE: -93.193076
START DATE: 01/22/25 END DATE: 01/22/25
SURFACE ELEVATION: 994.4 ft
DRILLER: M. Hoppe
LOGGED BY: R. Jett
RIG: 7504
METHOD: 3 1/4" HSA
SURFACING: Soil
WEATHER:

Elev./ Depth ft	Water Level	Description of Materials (Soil-ASTM D2488 or 2487; Rock-USACE EM 1110-1-2908)	Sample	Blows (N-Value) Recovery	PID ppm	MC %	Tests or Remarks
924.9		SANDY LEAN CLAY (CL), trace Gravel, slightly organic, black to dark gray, moist, hard (GLACIAL TILL)					
69.5		CLAYEY SAND (SC), trace Gravel, gray, moist, hard (GLACIAL TILL)	70	39-50/4" (REF) 12"			
919.9							
74.5		SILTY SAND (SM), fine to coarse-grained, trace Gravel, light gray, moist, very dense (GLACIAL TILL)	75	36-50/5" (REF) 16"			
913.4			80	50/4" (REF) 10"			
81.0		END OF BORING Boring then grouted					Water observed at 11.5 feet while drilling.
			85				
			90				
			95				

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LOG OF BORING

See Descriptive Terminology sheet for explanation of abbreviations

Project Number B2410136
Geotechnical & Environmental Evaluation
NNG Ventura to Farmington Abandonment
Minnesota

BORING: **BH-15**
LOCATION: Captured with RTK GPS.
DATUM: WGS 84
LATITUDE: 44.579838 LONGITUDE: -93.190336
DRILLER: M. Hoppe LOGGED BY: R. Jett START DATE: 01/27/25 END DATE: 01/27/25
SURFACE ELEVATION: 1026.7 ft RIG: 7504 METHOD: 3 1/4" HSA SURFACING: Soil WEATHER:

Elev./ Depth ft	Water Level	Description of Materials (Soil-ASTM D2488 or 2487; Rock-USACE EM 1110-1-2908)	Sample	Blows (N-Value) Recovery	PID ppm	MC %	Tests or Remarks
1026.1		CLAYEY SAND (SC), trace Gravel, black, moist (TOPSOIL FILL)			0.5		Elevations and coordinates were provided by the client
0.7		FILL: SANDY LEAN CLAY (CL), trace Gravel, black to dark brown, moist		2-3-3 (6) 12"	0.8		Soil sample BH-15 (0-1') @ 12:13 collected for pesticides
			5	4-3-3 (6) 4"	0.9		Soil sample BH-15 (2-3.5') @ 12:17 collected for BTEX, GRO, DRO, RCRA Metals
1019.7							
7.0		SANDY LEAN CLAY (CL), trace Gravel, light brown, moist, soft (GLACIAL TILL)		2-2-2 (4) 16"	0.7	14	q_p=0.5 tsf
1017.2							
9.5		SANDY LEAN CLAY (CL), trace Gravel, dark brown, moist, medium to stiff (GLACIAL TILL)	10	3-2-3 (5) 18"	0.6		q_p=4 tsf
				3-5-9 (14) 16"	0.5		
1012.2							
14.5		SANDY LEAN CLAY (CL), trace Gravel, dark gray, moist, stiff to very stiff (GLACIAL TILL)	15	4-5-5 (10) 18"	0.6	12	LL=30, PL=15, PI=15 DD=118 pcf
			20	4-7-8 (15) 18"	0.6	10	
			25	8-12-14 (26) 18"			q_p=2.5 tsf
			30	10-13-14 (27) 18"			q_p=4.25 tsf
995.7							Water not observed while drilling.
31.0		END OF BORING Boring then grouted					

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LOG OF BORING

See Descriptive Terminology sheet for explanation of abbreviations

Project Number B2410136
Geotechnical & Environmental Evaluation
NNG Ventura to Farmington Abandonment
Minnesota

BORING: **BH-16**
LOCATION: Captured with RTK GPS.
DATUM: WGS 84
LATITUDE: 44.582640 LONGITUDE: -93.188032
DRILLER: M. Hoppe LOGGED BY: R. Jett START DATE: 01/24/25 END DATE: 01/24/25
SURFACE ELEVATION: 1022.5 ft RIG: 7504 METHOD: 3 1/4" HSA SURFACING: Soil WEATHER:

Elev./ Depth ft	Water Level	Description of Materials (Soil-ASTM D2488 or 2487; Rock-USACE EM 1110-1-2908)	Sample	Blows (N-Value) Recovery	PID ppm	MC %	Tests or Remarks
1020.5		SILTY SAND (SM), fine to medium-grained, trace Gravel, black, moist (TOPSOIL FILL)			0.0		Elevations and coordinates were provided by the client
2.0		FILL: SANDY LEAN CLAY (CL), trace Gravel, slightly organic, brown to dark brown, moist		3-3-3 (6) 10"	0.0		Soil sample BH-16 (0-1') @ 08:47 collected for pesticides
			5	4-3-3 (6) 6"	0.0		Soil sample BH-16 (2-3.5') @ 08:53 collected for BTEX, GRO, DRO, RCRA Metals
1015.5	▽						
7.0		CLAYEY SAND (SC), trace Gravel, light brown, wet, stiff (GLACIAL TILL)		3-4-6 (10) 10"			
1013.0							
9.5		SILTY SAND (SM), fine to medium-grained, trace Gravel, light brown, wet, medium dense (GLACIAL TILL)	10	3-6-7 (13) 12"			
				8-7-11 (18) 12"			
			15	6-16-13 (29) 20"			
1003.0							
19.5		POORLY GRADED SAND with SILT (SP-SM), fine to medium-grained, trace Gravel, brown, wet, medium dense to dense (GLACIAL OUTWASH)	20	6-8-16 (24) 14"			
			25	2-6-10 (16) 14"			
			30	1-8-22 (30) 18"			

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LOG OF BORING

See Descriptive Terminology sheet for explanation of abbreviations

Project Number B2410136
Geotechnical & Environmental Evaluation
NNG Ventura to Farmington Abandonment
Minnesota

BORING: **BH-16**
LOCATION: Captured with RTK GPS.
DATUM: WGS 84
LATITUDE: 44.582640 LONGITUDE: -93.188032
DRILLER: M. Hoppe LOGGED BY: R. Jett START DATE: 01/24/25 END DATE: 01/24/25
SURFACE ELEVATION: 1022.5 ft RIG: 7504 METHOD: 3 1/4" HSA SURFACING: Soil WEATHER:

Elev./ Depth ft	Water Level	Description of Materials (Soil-ASTM D2488 or 2487; Rock-USACE EM 1110-1-2908)	Sample	Blows (N-Value) Recovery	PID ppm	MC %	Tests or Remarks
		POORLY GRADED SAND with SILT (SP-SM), fine to medium-grained, trace Gravel, brown, wet, medium dense to dense (GLACIAL OUTWASH)					
35				4-4-9 (13) 18"			
40				22-28-21 (49) 18"			
45				20-13-20 (33) 16"			
50				18-22-25 (47) 18"			
55				33-40-33 (73) 18"			
60				29-35-49 (84) 10"			
65				47-50/4" (REF) 8"		20	P200=7% %Sand=93%

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NNG Ventura to Farmington Abandonment
Minnesota

BORING: **BH-16**
LOCATION: Captured with RTK GPS.
DATUM: WGS 84
LATITUDE: 44.582640 LONGITUDE: -93.188032
DRILLER: M. Hoppe LOGGED BY: R. Jett START DATE: 01/24/25 END DATE: 01/24/25
SURFACE ELEVATION: 1022.5 ft RIG: 7504 METHOD: 3 1/4" HSA SURFACING: Soil WEATHER:

Elev./ Depth ft	Water Level	Description of Materials (Soil-ASTM D2488 or 2487; Rock-USACE EM 1110-1-2908)	Sample	Blows (N-Value) Recovery	PID ppm	MC %	Tests or Remarks
953.0		POORLY GRADED SAND with SILT (SP-SM), fine to medium-grained, trace Gravel, brown, wet, medium dense to dense (GLACIAL OUTWASH)					
69.5		SANDY LEAN CLAY (CL), trace Gravel, dark gray, wet (GLACIAL TILL)	70	12-23-30 (53) 14"		17	q_p=3 tsf
			75	12-16-21 (37) 10"		13	LL=30, PL=14, PI=16 DD=127 pcf
941.5			80	15-17-13 (30) 18"			
81.0		END OF BORING Boring then grouted					Water observed at 7.0 feet while drilling.
			85				
			90				
			95				

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LOG OF BORING

See Descriptive Terminology sheet for explanation of abbreviations

Project Number B2410136
Geotechnical & Environmental Evaluation
NNG Ventura to Farmington Abandonment
Minnesota

BORING: **BH-17**
LOCATION: Captured with RTK GPS.
DATUM: WGS 84
LATITUDE: 44.584693 LONGITUDE: -93.186971
DRILLER: M. Hoppe LOGGED BY: R. Jett START DATE: 01/28/25 END DATE: 01/28/25
SURFACE ELEVATION: 1008.2 ft RIG: 7504 METHOD: 3 1/4" HSA SURFACING: Soil WEATHER:

Elev./ Depth ft	Water Level	Description of Materials (Soil-ASTM D2488 or 2487; Rock-USACE EM 1110-1-2908)	Sample	Blows (N-Value) Recovery	PID ppm	MC %	Tests or Remarks
1007.5		SILTY SAND (SM), fine to medium-grained, trace Gravel, black, moist (TOPSOIL)			0.7		Elevations and coordinates were provided by the client
0.7		SANDY LEAN CLAY (CL), trace Gravel, brown, moist, medium (GLACIAL TILL)		3-4-3 (7) 14"	1.5		Soil sample BH-17 (0-1') @ 09:18 collected for pesticides
			5	3-3-4 (7) 16"	0.4		q_p=0.5 tsf
1001.2							Soil sample BH-17 (4.5-6') @ 09:22 collected for BTEX, GRO, DRO, RCRA Metals
7.0		SANDY LEAN CLAY (CL), trace Gravel, dark gray, moist, very stiff (GLACIAL TILL)		5-10-12 (22) 18"	3.3		
			10	6-6-10 (16) 16"	1.3		
996.2	▽						
12.0		POORLY GRADED SAND (SP), fine to medium-grained, trace Gravel, gray, wet, dense (GLACIAL TILL)		12-19-26 (45) 18"			
993.7							
14.5		CLAYEY SAND (SC), trace Gravel, contains seams of Silty Sand, gray, wet, hard (GLACIAL TILL)	15	8-14-16 (30) 16"			Wet below 15 feet, Drilling method switched to mud rotary at 15 feet
988.7							
19.5		POORLY GRADED SAND (SP), fine to medium-grained, trace Gravel, gray, wet, dense (GLACIAL TILL)	20	12-15-17 (32) 18"			
983.7							
24.5		SANDY LEAN CLAY (CL), trace Gravel, dark gray, wet, very stiff to hard (GLACIAL TILL)	25	12-15-15 (30) 18"			q_p=2.5 tsf
			30	13-14-15 (29) 18"			q_p=3.25 tsf

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LOG OF BORING

See Descriptive Terminology sheet for explanation of abbreviations

Project Number B2410136
Geotechnical & Environmental Evaluation
NNG Ventura to Farmington Abandonment
Minnesota

BORING: **BH-17**
LOCATION: Captured with RTK GPS.
DATUM: WGS 84
LATITUDE: 44.584693 LONGITUDE: -93.186971
DRILLER: M. Hoppe LOGGED BY: R. Jett START DATE: 01/28/25 END DATE: 01/28/25
SURFACE ELEVATION: 1008.2 ft RIG: 7504 METHOD: 3 1/4" HSA SURFACING: Soil WEATHER:

Elev./ Depth ft	Water Level	Description of Materials (Soil-ASTM D2488 or 2487; Rock-USACE EM 1110-1-2908)	Sample	Blows (N-Value) Recovery	PID ppm	MC %	Tests or Remarks
		SANDY LEAN CLAY (CL), trace Gravel, dark gray, wet, very stiff to hard (GLACIAL TILL)					
35				8-16-24 (40) 18"			
40				12-14-15 (29) 18"			q_p=2.5 tsf
45				13-18-25 (43) 16"		15	
50				13-16-17 (33) 18"			q_p=3.5 tsf
55				18-25-24 (49) 18"		12	LL=30, PL=14, PI=16 DD=124 pcf q_p=3.5 tsf
60		*Contains seams of Sand at 60 feet*		14-15-15 (30) 6"		22	P200=53% %Sand=47%
65				14-16-18 (34) 16"		15	DD=122 pcf q_p=4 tsf

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LOG OF BORING

See Descriptive Terminology sheet for explanation of abbreviations

Project Number B2410136
Geotechnical & Environmental Evaluation
NNG Ventura to Farmington Abandonment
Minnesota

BORING: **BH-17**
LOCATION: Captured with RTK GPS.
DATUM: WGS 84
LATITUDE: 44.584693 LONGITUDE: -93.186971

DRILLER:	M. Hoppe	LOGGED BY:	R. Jett	START DATE:	01/28/25	END DATE:	01/28/25
SURFACE ELEVATION:	1008.2 ft	RIG:	7504	METHOD:	3 1/4" HSA	SURFACING:	Soil

WEATHER:

Elev./ Depth ft	Water Level	Description of Materials (Soil-ASTM D2488 or 2487; Rock-USACE EM 1110-1-2908)	Sample	Blows (N-Value) Recovery	PID ppm	MC %	Tests or Remarks
		SANDY LEAN CLAY (CL), trace Gravel, dark gray, wet, very stiff to hard (GLACIAL TILL)					
70				14-18-21 (39) 18"			q_p=4 tsf
75				12-16-16 (32) 18"			q_p=4.5 tsf
80				16-25-34 (59) 18"			q_p=3 tsf
85				14-23-36 (59) 18"			q_p=3.5 tsf
90				22-24-34 (58) 18"			q_p=3.25 tsf
95				22-27-30 (57) 18"			q_p=3 tsf

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Project Number B2410136
Geotechnical & Environmental Evaluation
NNG Ventura to Farmington Abandonment
Minnesota

BORING: **BH-17**
LOCATION: Captured with RTK GPS.
DATUM: WGS 84
LATITUDE: 44.584693 LONGITUDE: -93.186971
DRILLER: M. Hoppe LOGGED BY: R. Jett START DATE: 01/28/25 END DATE: 01/28/25
SURFACE ELEVATION: 1008.2 ft RIG: 7504 METHOD: 3 1/4" HSA SURFACING: Soil WEATHER:

Elev./ Depth ft	Water Level	Description of Materials (Soil-ASTM D2488 or 2487; Rock-USACE EM 1110-1-2908)	Sample	Blows (N-Value) Recovery	PID ppm	MC %	Tests or Remarks
		SANDY LEAN CLAY (CL), trace Gravel, dark gray, wet, very stiff to hard (GLACIAL TILL)		17-12-40 (52) 18"			q_p=4.5 tsf
				27-40-50/4" (REF) 18"			q_p=4.5 tsf
				16-39-43 (82) 18"			q_p=4.5 tsf
887.2							Water observed at 12.0 feet while drilling.
121.0		END OF BORING Boring then grouted					

100 105 110 115 120 125 130

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LOG OF BORING

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Project Number B2410136
Geotechnical & Environmental Evaluation
NNG Ventura to Farmington Abandonment
Minnesota

BORING: **BH-18**
LOCATION: Captured with RTK GPS.
DATUM: WGS 84
LATITUDE: 44.587454 LONGITUDE: -93.185189
DRILLER: M. Hoppe LOGGED BY: R. Jett START DATE: 01/27/25 END DATE: 01/27/25
SURFACE ELEVATION: 991.7 ft RIG: 7504 METHOD: 3 1/4" HSA SURFACING: Soil WEATHER:

Elev./ Depth ft	Water Level	Description of Materials (Soil-ASTM D2488 or 2487; Rock-USACE EM 1110-1-2908)	Sample	Blows (N-Value) Recovery	PID ppm	MC %	Tests or Remarks
991.2		SILTY SAND (SM), fine to medium-grained, trace Gravel, black, moist (TOPSOIL FILL)			0.4		Elevations and coordinates were provided by the client
0.5		FILL: SANDY LEAN CLAY (CL), trace Gravel, dark brown to gray, moist		3-3-4 (7) 12"	0.4		Soil sample BH-18 (0-1') @ 08:41 collected for pesticides
987.2							
4.5		POORLY GRADED SAND with SILT (SP-SM), fine to medium-grained, trace Gravel, brown, wet, loose (ALLUVIUM)	5	4-5-3 (8) 14"	0.3		Soil sample BH-18 (2-3.5') @ 08:45 collected for BTEX, GRO, DRO, RCRA Metals
984.7							
7.0		SANDY LEAN CLAY (CL), trace Gravel, brown, wet, medium (GLACIAL TILL)		2-3-3 (6) 18"	0.4		
982.2							
9.5		SANDY LEAN CLAY (CL), trace Gravel, dark gray, wet, stiff to hard (GLACIAL TILL)	10	4-6-7 (13) 16"	0.4		q_p=4.5 tsf
				4-5-5 (10) 13"	0.2		
			15	5-7-8 (15) 14"	0.1		
			20	6-8-12 (20) 14"	0.3		q_p=3.5 tsf
			25	8-12-12 (24) 18"			q_p=3.5 tsf
			30	10-11-13 (24) 18"			q_p=3.5 tsf

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LOG OF BORING

See Descriptive Terminology sheet for explanation of abbreviations

Project Number B2410136
Geotechnical & Environmental Evaluation
NNG Ventura to Farmington Abandonment
Minnesota

BORING: **BH-18**
LOCATION: Captured with RTK GPS.
DATUM: WGS 84
LATITUDE: 44.587454 LONGITUDE: -93.185189
DRILLER: M. Hoppe LOGGED BY: R. Jett START DATE: 01/27/25 END DATE: 01/27/25
SURFACE ELEVATION: 991.7 ft RIG: 7504 METHOD: 3 1/4" HSA SURFACING: Soil WEATHER:

Elev./ Depth ft	Water Level	Description of Materials (Soil-ASTM D2488 or 2487; Rock-USACE EM 1110-1-2908)	Sample	Blows (N-Value) Recovery	PID ppm	MC %	Tests or Remarks
		SANDY LEAN CLAY (CL), trace Gravel, dark gray, wet, stiff to hard (GLACIAL TILL)					
35				11-13-15 (28) 16"		12	LL=31, PL=15, PI=16 DD=126 pcf q_p=4.5 tsf
40				31-36-29 (65) 6"		12	LL=30, PL=14, PI=16 DD=119 pcf
45				8-12-13 (25) 16"		11	DD=129 pcf q_p=4.5 tsf
50				8-12-12 (24) 18"		10	q_p=4.5 tsf
55	▽			12-16-20 (36) 18"			Wet below 55 feet
60				4-12-16 (28) 18"			q_p=3.5 tsf
65				13-16-28 (44) 16"			

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LOG OF BORING

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Geotechnical & Environmental Evaluation
NNG Ventura to Farmington Abandonment
Minnesota

BORING: **BH-18**
LOCATION: Captured with RTK GPS.
DATUM: WGS 84
LATITUDE: 44.587454 LONGITUDE: -93.185189

DRILLER:	M. Hoppe	LOGGED BY:	R. Jett	START DATE: 01/27/25	END DATE: 01/27/25
SURFACE ELEVATION:	991.7 ft	RIG: 7504	METHOD: 3 1/4" HSA	SURFACING: Soil	WEATHER:

Elev./ Depth ft	Water Level	Description of Materials (Soil-ASTM D2488 or 2487; Rock-USACE EM 1110-1-2908)	Sample	Blows (N-Value) Recovery	PID ppm	MC %	Tests or Remarks
		SANDY LEAN CLAY (CL), trace Gravel, dark gray, wet, stiff to hard (GLACIAL TILL)					
70				30-36-32 (68) 16"			q_p=3.5 tsf
75				18-23-20 (43) 18"			q_p=4.25 tsf
80				17-21-28 (49) 18"			q_p=4.5 tsf
910.7 81.0		END OF BORING Boring then grouted					Water observed at 54.0 feet while drilling.
85							
90							
95							

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LOG OF BORING

See Descriptive Terminology sheet for explanation of abbreviations

Project Number B2410136
Geotechnical & Environmental Evaluation
NNG Ventura to Farmington Abandonment
Minnesota

BORING: **BH-19**
LOCATION: Captured with RTK GPS.
DATUM: WGS 84
LATITUDE: 44.594716 LONGITUDE: -93.180733
DRILLER: M. Hoppe LOGGED BY: R. Jett START DATE: 01/14/25 END DATE: 01/14/25
SURFACE ELEVATION: 983.2 ft RIG: 7504 METHOD: 3 1/4" HSA SURFACING: Soil WEATHER:

Elev./ Depth ft	Water Level	Description of Materials (Soil-ASTM D2488 or 2487; Rock-USACE EM 1110-1-2908)	Sample	Blows (N-Value) Recovery	PID ppm	MC %	Tests or Remarks
982.5		CLAYEY SAND (SC), trace Gravel, black, moist (TOPSOIL)			0.8		Elevations and coordinates were provided by the client
0.7		SANDY LEAN CLAY (CL), trace Gravel, brown, moist, stiff to medium (GLACIAL TILL)		4-5-4 (9) 12"	0.4		Soil sample BH-19 (0-1') @ 11:29 collected for pesticides
			5	4-4-4 (8) 14"	0.6		Soil sample BH-19 (4.5-6') @ 11:36 collected for BTEX, GRO, DRO, RCRA Metals q_p=1.25 tsf
				3-4-4 (8) 16"	1.8		
			10	4-5-3 (8) 16"	1.7		q_p=3 tsf
971.2							
12.0		SANDY LEAN CLAY (CL), trace Gravel, dark gray, moist, medium to hard (GLACIAL TILL)		3-4-5 (9) 18"	2.7	12	LL=29, PL=15, PI=14 DD=121 pcf q_p=3.25 tsf
			15	3-3-3 (6) 16"	0.2	12	LL=29, PL=14, PI=15 DD=127 pcf q_p=3.5 tsf
			20	3-5-7 (12) 14"	0.1	11	P200=60% DD=128 pcf q_p=3.75 tsf %Sand=39% %Gravel=1%
			25	5-7-12 (19) 16"		10	q_p=4.5 tsf
			30	12-13-22 (35) 18"			q_p=4.5 tsf Water not observed while drilling.
952.2							
31.0		END OF BORING Boring then grouted					

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Sieve Analysis Of Soil

ASTM D6913

02/24/2025

11001 Hampshire Avenue S
Minneapolis, MN 55438
Phone: 952-995-2000

Client:

Stantec Consulting Services Inc.
733 Marquette Ave Ste 1000
Suite 1000
Minneapolis, MN 55402

Project:

B2410136
NNG Ventura to Farmington Abandonment and Capacity Replaceme
Freebourne County, Steele County, Dakota Coun... , MN

Sample Information

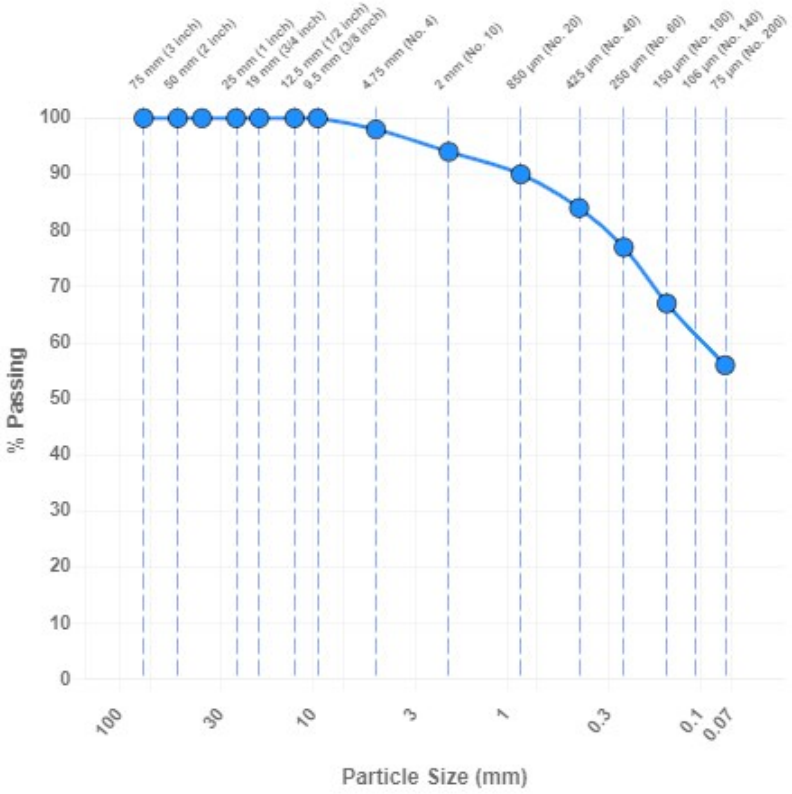
Sample Number:	642149	**Depth (ft):**	15
Boring Number:	BH-1	**Sampled By:**	Drill Crew
Sample Date:	02/24/2025		
Received Date:	02/24/2025	**Lab:**	11001 Hampshire Ave S, Bloomington, MN
Tested Date:	02/24/2025	**Tested By:**	Streier, Jim

Laboratory Data

Sieve Size	Passing (%)	Specification
9.5 mm (3/8 inch)	100	
4.75 mm (No. 4)	98	
2 mm (No. 10)	94	
850 µm (No. 20)	90	
425 µm (No. 40)	84	
250 µm (No. 60)	77	
150 µm (No. 100)	67	
75 µm (No. 200)	56	

Gravel (%)	Sand (%)	Silt & Clay (%)
2.0	42.0	56.0

D60
0.086



Classification: CL Sandy lean clay

General

Results: The test is for informational purposes.

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Sieve Analysis Of Soil

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Project:

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Sample Information

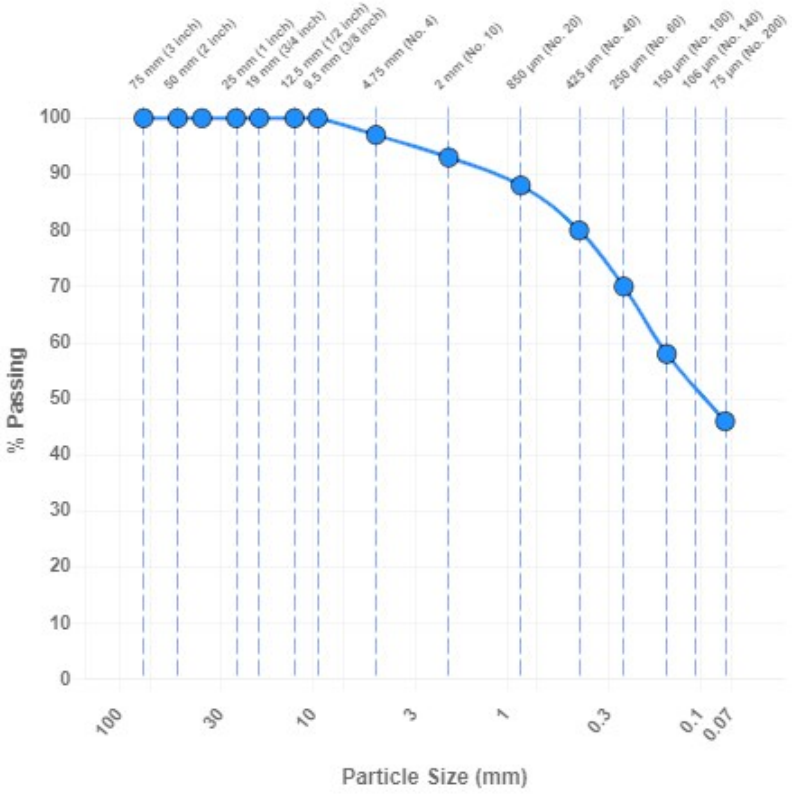
Sample Number:	642150	**Depth (ft):**	45
Boring Number:	BH-2	**Sampled By:**	Drill Crew
Sample Date:	02/24/2025		
Received Date:	02/24/2025	**Lab:**	11001 Hampshire Ave S, Bloomington, MN
Tested Date:	02/24/2025	**Tested By:**	Streier, Jim

Laboratory Data

Sieve Size	Passing (%)	Specification
9.5 mm (3/8 inch)	100	
4.75 mm (No. 4)	97	
2 mm (No. 10)	93	
850 µm (No. 20)	88	
425 µm (No. 40)	80	
250 µm (No. 60)	70	
150 µm (No. 100)	58	
75 µm (No. 200)	46	

Gravel (%)	Sand (%)	Silt & Clay (%)
3.0	51.0	46.0

D60
0.167



Classification: SC Clayey sand

General

Results: The test is for informational purposes.

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Sieve Analysis Of Soil

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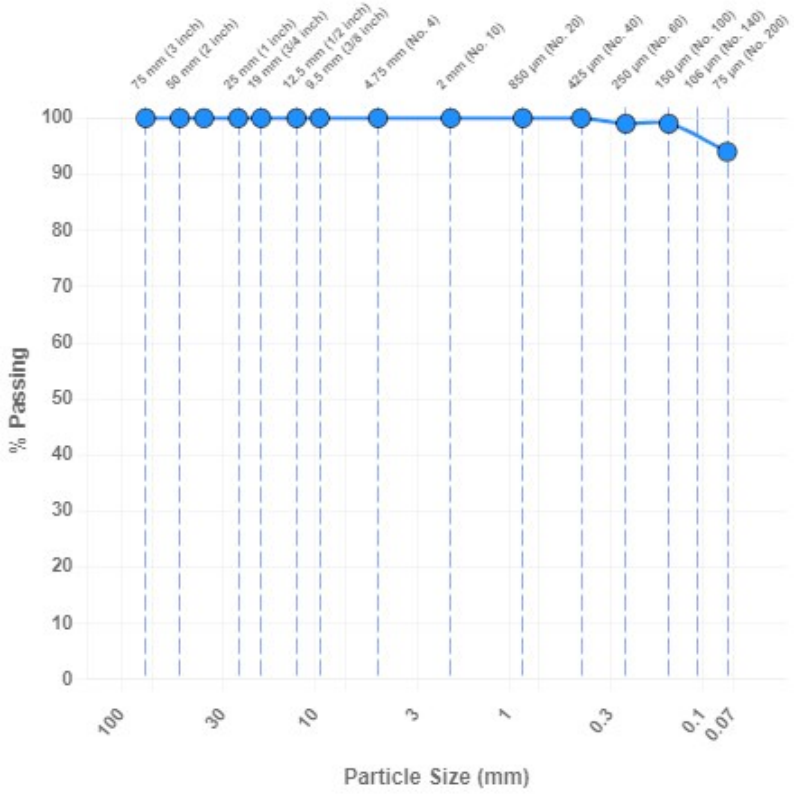
Sample Information

Sample Number:	642152	**Depth (ft):**	30
Boring Number:	BH-3	**Sampled By:**	Drill Crew
Sample Date:	02/24/2025		
Received Date:	02/24/2025	**Lab:**	11001 Hampshire Ave S, Bloomington, MN
Tested Date:	02/24/2025	**Tested By:**	Streier, Jim

Laboratory Data

Sieve Size	Passing (%)	Specification
4.75 mm (No. 4)	100	
2 mm (No. 10)	100	
850 µm (No. 20)	100	
425 µm (No. 40)	100	
250 µm (No. 60)	99	
150 µm (No. 100)	99	
75 µm (No. 200)	94	

Sand (%)	Silt & Clay (%)
6.0	94.0



Classification: ML Silt

General

Results: The test is for informational purposes.

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Sample Information

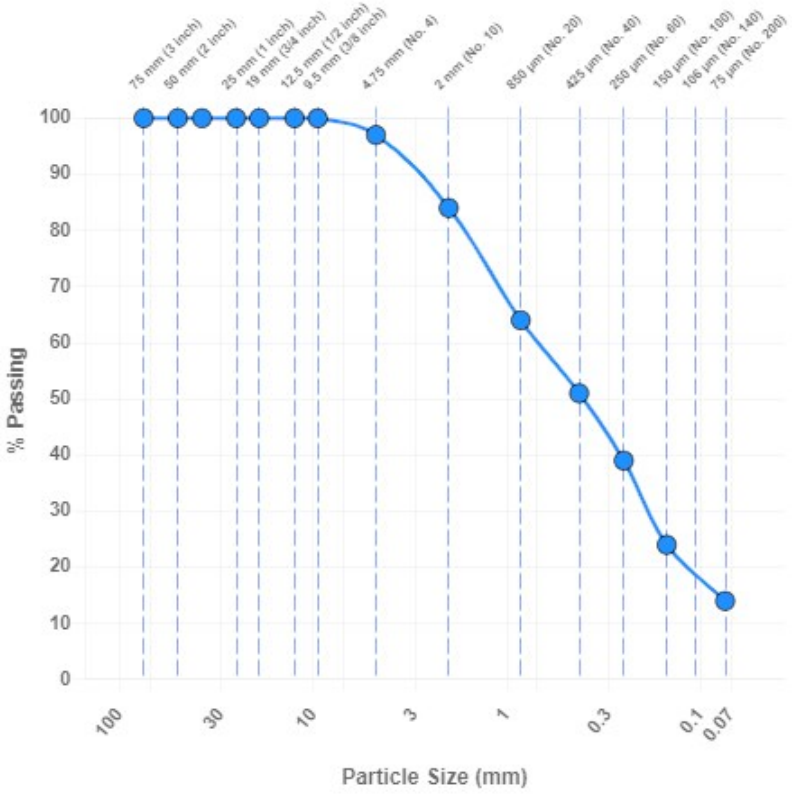
Sample Number:	642153	**Depth (ft):**	65
Boring Number:	BH-4	**Sampled By:**	Drill Crew
Sample Date:	02/24/2025		
Received Date:	02/24/2025	**Lab:**	11001 Hampshire Ave S, Bloomington, MN
Tested Date:	02/24/2025	**Tested By:**	Streier, Jim

Laboratory Data

Sieve Size	Passing (%)	Specification
9.5 mm (3/8 inch)	100	
4.75 mm (No. 4)	97	
2 mm (No. 10)	84	
850 µm (No. 20)	64	
425 µm (No. 40)	51	
250 µm (No. 60)	39	
150 µm (No. 100)	24	
75 µm (No. 200)	14	

Gravel (%)	Sand (%)	Silt & Clay (%)
3.0	83.0	14.0

D30	D60
0.190	0.719



Classification: SM Silty sand

General

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Sieve Analysis Of Soil

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Sample Information

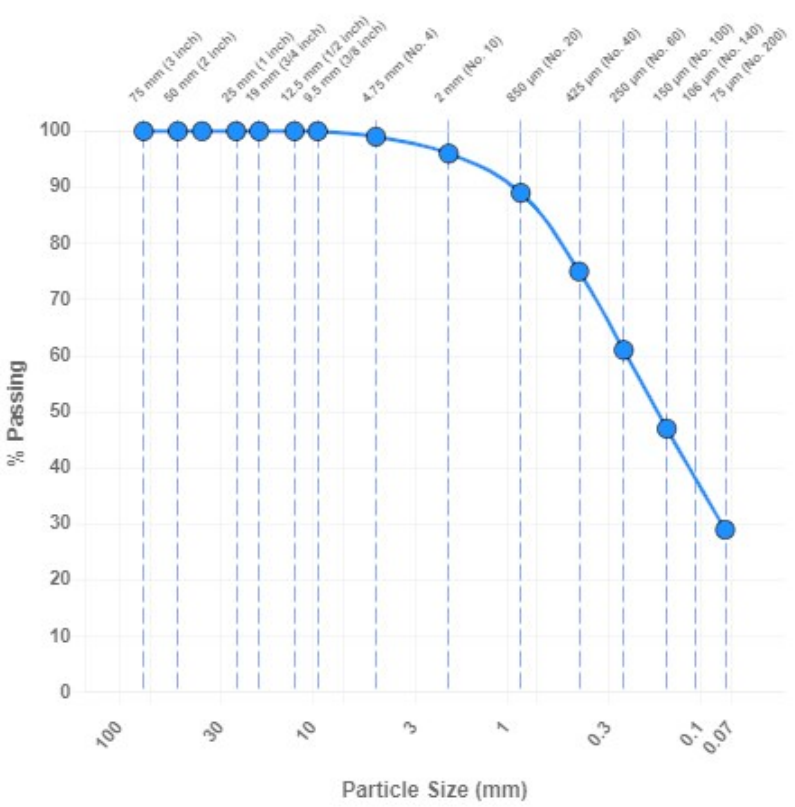
Sample Number:	642155	**Depth (ft):**	70
Boring Number:	BH-4	**Sampled By:**	Drill Crew
Sample Date:	02/24/2025		
Received Date:	02/24/2025	**Lab:**	11001 Hampshire Ave S, Bloomington, MN
Tested Date:	02/24/2025	**Tested By:**	Streier, Jim

Laboratory Data

Sieve Size	Passing (%)	Specification
9.5 mm (3/8 inch)	100	
4.75 mm (No. 4)	99	
2 mm (No. 10)	96	
850 µm (No. 20)	89	
425 µm (No. 40)	75	
250 µm (No. 60)	61	
150 µm (No. 100)	47	
75 µm (No. 200)	29	

Gravel (%)	Sand (%)	Silt & Clay (%)
1.0	70.0	29.0

D30	D60
0.077	0.243



Classification: SM Silty sand

General

Results: The test is for informational purposes.

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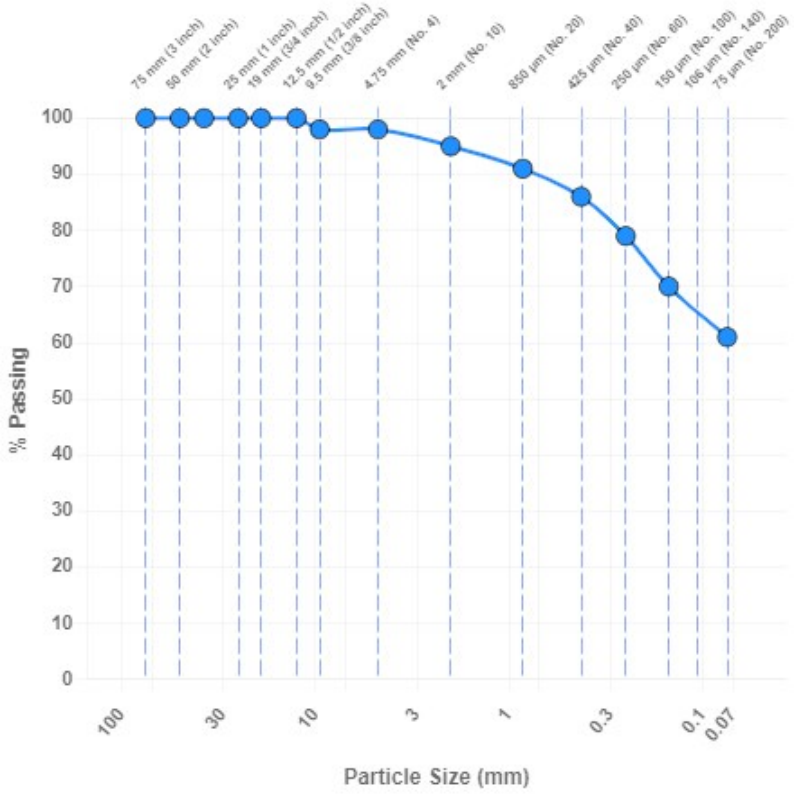
Sample Information

Sample Number:	642156	**Depth (ft):**	50
Boring Number:	BH-5	**Sampled By:**	Drill Crew
Sample Date:	02/24/2025		
Received Date:	02/24/2025	**Lab:**	11001 Hampshire Ave S, Bloomington, MN
Tested Date:	02/24/2025	**Tested By:**	Streier, Jim

Laboratory Data

Sieve Size	Passing (%)	Specification
12.5 mm (1/2 inch)	100	
9.5 mm (3/8 inch)	98	
4.75 mm (No. 4)	98	
2 mm (No. 10)	95	
850 µm (No. 20)	91	
425 µm (No. 40)	86	
250 µm (No. 60)	79	
150 µm (No. 100)	70	
75 µm (No. 200)	61	

Gravel (%)	Sand (%)	Silt & Clay (%)
2.0	37.0	61.0



Classification: CL Sandy lean clay

General

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Sieve Analysis Of Soil

ASTM D6913

02/24/2025

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Freebourne County, Steele County, Dakota Coun... , MN

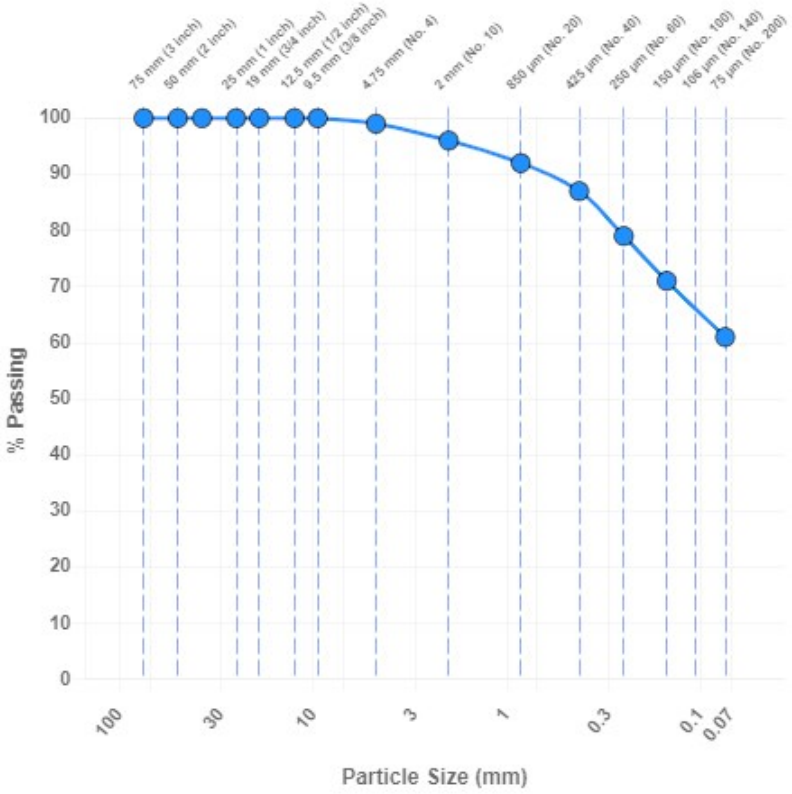
Sample Information

Sample Number:	642158	**Depth (ft):**	50
Boring Number:	BH-6	**Sampled By:**	Drill Crew
Sample Date:	02/24/2025		
Received Date:	02/24/2025	**Lab:**	11001 Hampshire Ave S, Bloomington, MN
Tested Date:	02/24/2025	**Tested By:**	Streier, Jim

Laboratory Data

Sieve Size	Passing (%)	Specification
9.5 mm (3/8 inch)	100	
4.75 mm (No. 4)	99	
2 mm (No. 10)	96	
850 µm (No. 20)	92	
425 µm (No. 40)	87	
250 µm (No. 60)	79	
150 µm (No. 100)	71	
75 µm (No. 200)	61	

Gravel (%)	Sand (%)	Silt & Clay (%)
1.0	38.0	61.0



Classification: CL Sandy lean clay

General

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Sieve Analysis Of Soil

ASTM D6913

02/24/2025

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733 Marquette Ave Ste 1000
Suite 1000
Minneapolis, MN 55402

Project:

B2410136
NNG Ventura to Farmington Abandonment and Capacity Replaceme
Freebourne County, Steele County, Dakota Coun... , MN

Sample Information

Sample Number:	642160	**Depth (ft):**	45
Boring Number:	BH-7A	**Sampled By:**	Drill Crew
Sample Date:	02/24/2025		
Received Date:	02/24/2025	**Lab:**	11001 Hampshire Ave S, Bloomington, MN
Tested Date:	02/24/2025	**Tested By:**	Streier, Jim

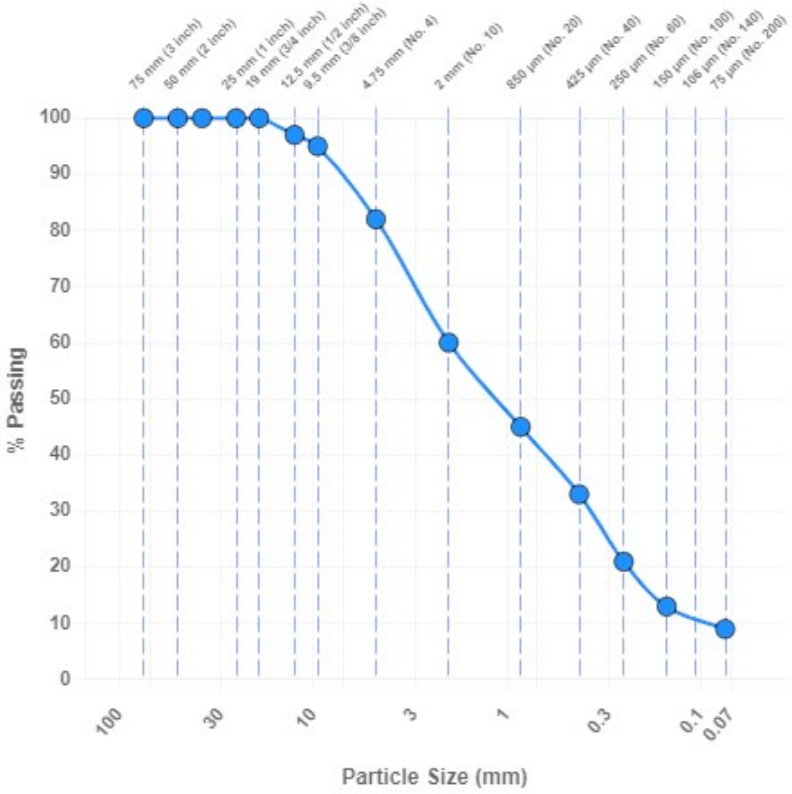
Laboratory Data

Sieve Size	Passing (%)	Specification
19 mm (3/4 inch)	100	
12.5 mm (1/2 inch)	97	
9.5 mm (3/8 inch)	95	
4.75 mm (No. 4)	82	
2 mm (No. 10)	60	
850 µm (No. 20)	45	
425 µm (No. 40)	33	
250 µm (No. 60)	21	
150 µm (No. 100)	13	
75 µm (No. 200)	9	

Gravel (%)	Sand (%)	Silt & Clay (%)
18.0	73.0	9.0

D10	D30	D60
0.083	0.381	2.000

C_U	C_C
24.10	0.87



Classification: SP-SM Poorly graded sand with silt and gravel

General

Results: The test is for informational purposes.

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NNG Ventura to Farmington Abandonment and Capacity Replaceme
Freebourne County, Steele County, Dakota Coun... , MN

Sample Information

Sample Number:	642161	**Depth (ft):**	15
Boring Number:	BH-10A	**Sampled By:**	Drill Crew
Sample Date:	02/24/2025		
Received Date:	02/24/2025	**Lab:**	11001 Hampshire Ave S, Bloomington, MN
Tested Date:	02/24/2025	**Tested By:**	Streier, Jim

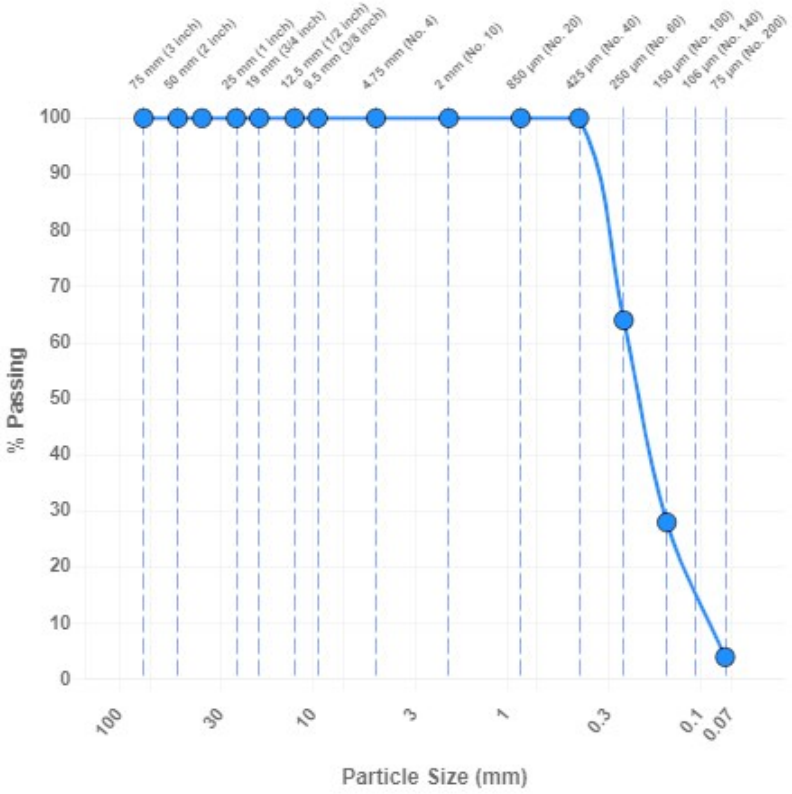
Laboratory Data

Sieve Size	Passing (%)	Specification
850 µm (No. 20)	100	
425 µm (No. 40)	100	
250 µm (No. 60)	64	
150 µm (No. 100)	28	
75 µm (No. 200)	4	

Sand (%)	Silt & Clay (%)
96.0	4.0

D10	D30	D60
0.083	0.156	0.239

C_U	C_C
2.88	1.23



Classification: SP Poorly graded sand

General

Results: The test is for informational purposes.

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B2410136
NNG Ventura to Farmington Abandonment and Capacity Replaceme
Freebourne County, Steele County, Dakota Coun... , MN

Sample Information

Sample Number:	642162	**Depth (ft):**	12
Boring Number:	BH-11	**Sampled By:**	Drill Crew
Sample Date:	02/24/2025		
Received Date:	02/24/2025	**Lab:**	11001 Hampshire Ave S, Bloomington, MN
Tested Date:	02/24/2025	**Tested By:**	Streier, Jim

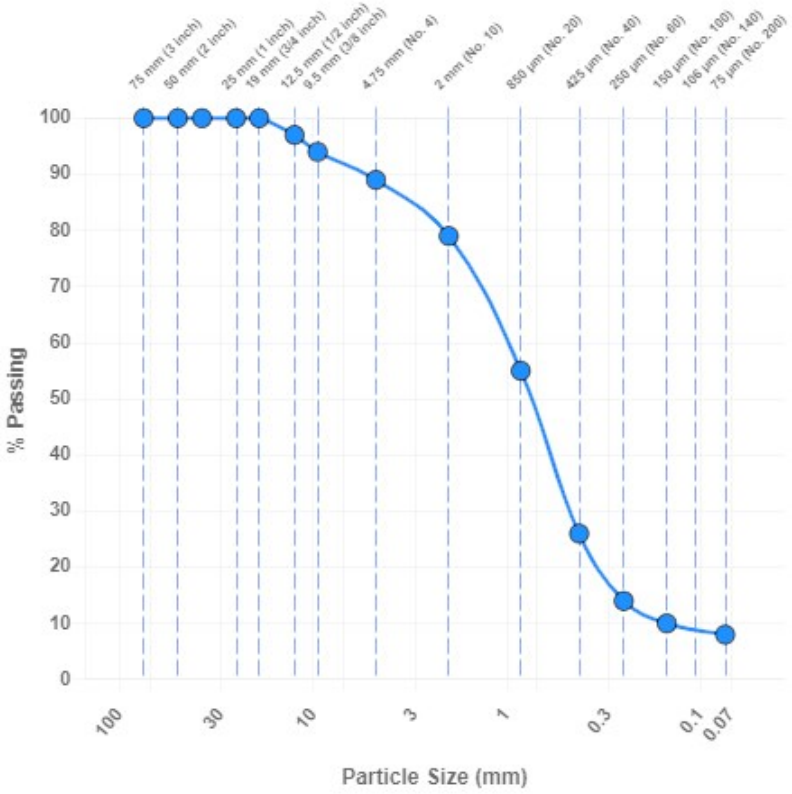
Laboratory Data

Sieve Size	Passing (%)	Specification
19 mm (3/4 inch)	100	
12.5 mm (1/2 inch)	97	
9.5 mm (3/8 inch)	94	
4.75 mm (No. 4)	89	
2 mm (No. 10)	79	
850 µm (No. 20)	55	
425 µm (No. 40)	26	
250 µm (No. 60)	14	
150 µm (No. 100)	10	
75 µm (No. 200)	8	

Gravel (%)	Sand (%)	Silt & Clay (%)
11.0	81.0	8.0

D10	D30	D60
0.150	0.484	1.090

C_U	C_C
7.27	1.43



Classification: SW-SM Well graded sand with silt

General

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Sample Information

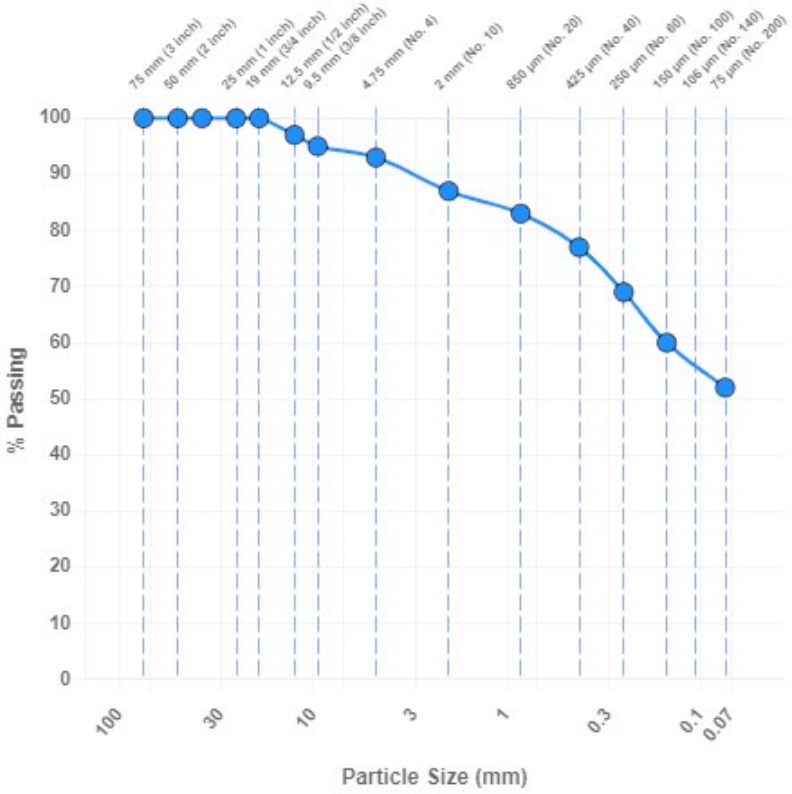
Sample Number:	642163	**Depth (ft):**	15
Boring Number:	BH-11A	**Sampled By:**	Drill Crew
Sample Date:	02/24/2025		
Received Date:	02/24/2025	**Lab:**	11001 Hampshire Ave S, Bloomington, MN
Tested Date:	02/24/2025	**Tested By:**	Streier, Jim

Laboratory Data

Sieve Size	Passing (%)	Specification
19 mm (3/4 inch)	100	
12.5 mm (1/2 inch)	97	
9.5 mm (3/8 inch)	95	
4.75 mm (No. 4)	93	
2 mm (No. 10)	87	
850 µm (No. 20)	83	
425 µm (No. 40)	77	
250 µm (No. 60)	69	
150 µm (No. 100)	60	
75 µm (No. 200)	52	

Gravel (%)	Sand (%)	Silt & Clay (%)
7.0	41.0	52.0

D60
0.150



Classification: CL Sandy lean clay

General

Results: The test is for informational purposes.

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BRAUN INTERTEC
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Sieve Analysis Of Soil

ASTM D6913

02/24/2025

11001 Hampshire Avenue S
Minneapolis, MN 55438
Phone: 952-995-2000

Client:

Stantec Consulting Services Inc.
733 Marquette Ave Ste 1000
Suite 1000
Minneapolis, MN 55402

Project:

B2410136
NNG Ventura to Farmington Abandonment and Capacity Replaceme
Freebourne County, Steele County, Dakota Coun... , MN

Sample Information

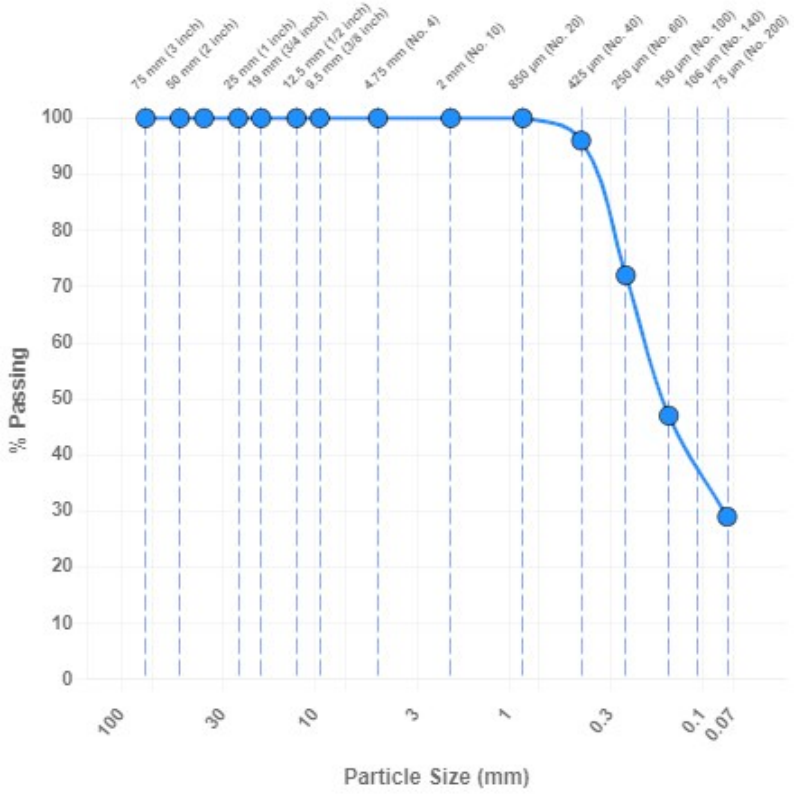
Sample Number:	642165	**Depth (ft):**	30
Boring Number:	BH-11A	**Sampled By:**	Drill Crew
Sample Date:	02/24/2025		
Received Date:	02/24/2025	**Lab:**	11001 Hampshire Ave S, Bloomington, MN
Tested Date:	02/24/2025	**Tested By:**	Streier, Jim

Laboratory Data

Sieve Size	Passing (%)	Specification
4.75 mm (No. 4)	100	
2 mm (No. 10)	100	
850 µm (No. 20)	100	
425 µm (No. 40)	96	
250 µm (No. 60)	72	
150 µm (No. 100)	47	
75 µm (No. 200)	29	

Sand (%)	Silt & Clay (%)
71.0	29.0

D30	D60
0.077	0.202



Classification: SM Silty sand

General

Results: The test is for informational purposes.

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NNG Ventura to Farmington Abandonment and Capacity Replaceme
Freebourne County, Steele County, Dakota Coun... , MN

Sample Information

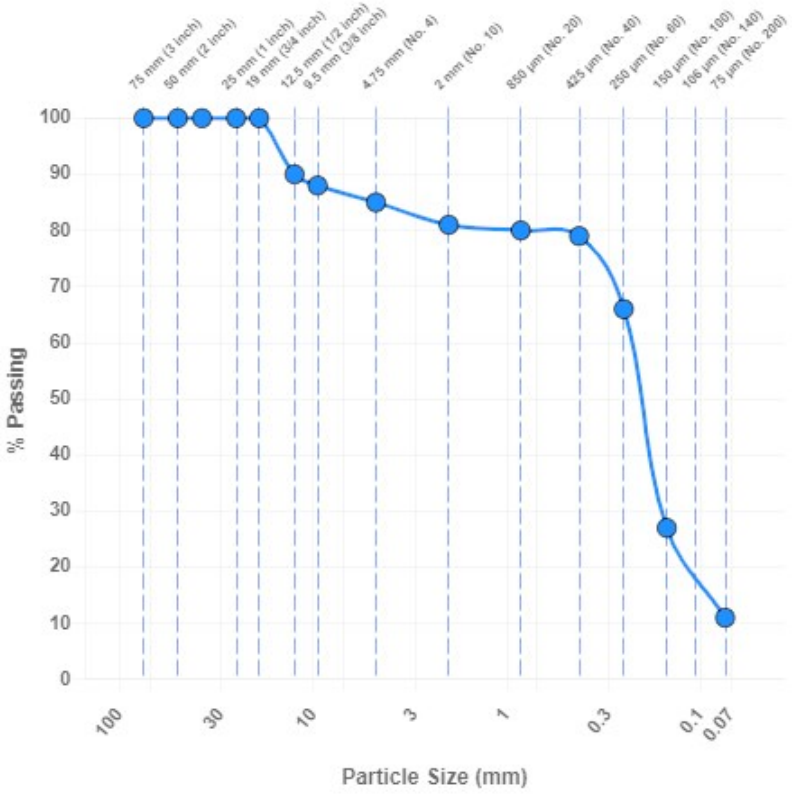
Sample Number:	642166	**Depth (ft):**	70
Boring Number:	BH-12	**Sampled By:**	Drill Crew
Sample Date:	02/24/2025		
Received Date:	02/24/2025	**Lab:**	11001 Hampshire Ave S, Bloomington, MN
Tested Date:	02/24/2025	**Tested By:**	Streier, Jim

Laboratory Data

Sieve Size	Passing (%)	Specification
19 mm (3/4 inch)	100	
12.5 mm (1/2 inch)	90	
9.5 mm (3/8 inch)	88	
4.75 mm (No. 4)	85	
2 mm (No. 10)	81	
850 µm (No. 20)	80	
425 µm (No. 40)	79	
250 µm (No. 60)	66	
150 µm (No. 100)	27	
75 µm (No. 200)	11	

Gravel (%)	Sand (%)	Silt & Clay (%)
15.0	74.0	11.0

D30	D60
0.158	0.235



Classification: SP-SM Poorly graded sand with silt and gravel

General

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Sieve Analysis Of Soil

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B2410136
NNG Ventura to Farmington Abandonment and Capacity Replaceme
Freebourne County, Steele County, Dakota Coun... , MN

Sample Information

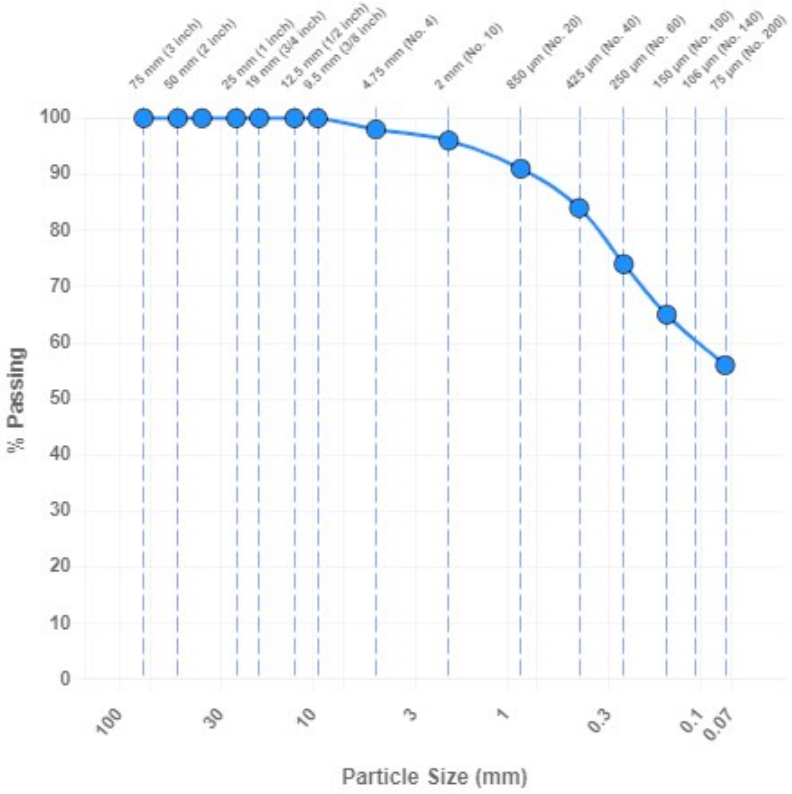
Sample Number:	642167	**Depth (ft):**	25
Boring Number:	BH-13	**Sampled By:**	Drill Crew
Sample Date:	02/24/2025		
Received Date:	02/24/2025	**Lab:**	11001 Hampshire Ave S, Bloomington, MN
Tested Date:	02/24/2025	**Tested By:**	Streier, Jim

Laboratory Data

Sieve Size	Passing (%)	Specification
9.5 mm (3/8 inch)	100	
4.75 mm (No. 4)	98	
2 mm (No. 10)	96	
850 µm (No. 20)	91	
425 µm (No. 40)	84	
250 µm (No. 60)	74	
150 µm (No. 100)	65	
75 µm (No. 200)	56	

Gravel (%)	Sand (%)	Silt & Clay (%)
2.0	42.0	56.0

D60
0.089



Classification: CL Sandy lean clay

General

Results: The test is for informational purposes.

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Project:

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NNG Ventura to Farmington Abandonment and Capacity Replaceme
Freebourne County, Steele County, Dakota Coun... , MN

Sample Information

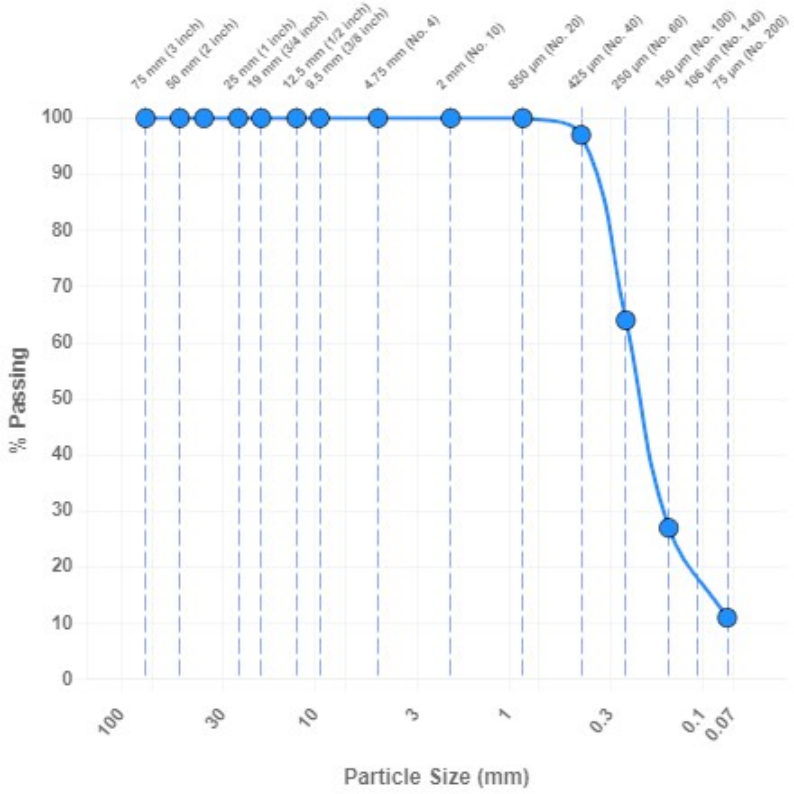
Sample Number:	642168	**Depth (ft):**	35
Boring Number:	BH-13	**Sampled By:**	Drill Crew
Sample Date:	02/24/2025		
Received Date:	02/24/2025	**Lab:**	11001 Hampshire Ave S, Bloomington, MN
Tested Date:	02/24/2025	**Tested By:**	Streier, Jim

Laboratory Data

Sieve Size	Passing (%)	Specification
4.75 mm (No. 4)	100	
2 mm (No. 10)	100	
850 µm (No. 20)	100	
425 µm (No. 40)	97	
250 µm (No. 60)	64	
150 µm (No. 100)	27	
75 µm (No. 200)	11	

Sand (%)	Silt & Clay (%)
89.0	11.0

D30	D60
0.158	0.239



Classification: SP-SM Poorly graded sand with silt

General

Results: The test is for informational purposes.

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Project:

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Freebourne County, Steele County, Dakota Coun... , MN

Sample Information

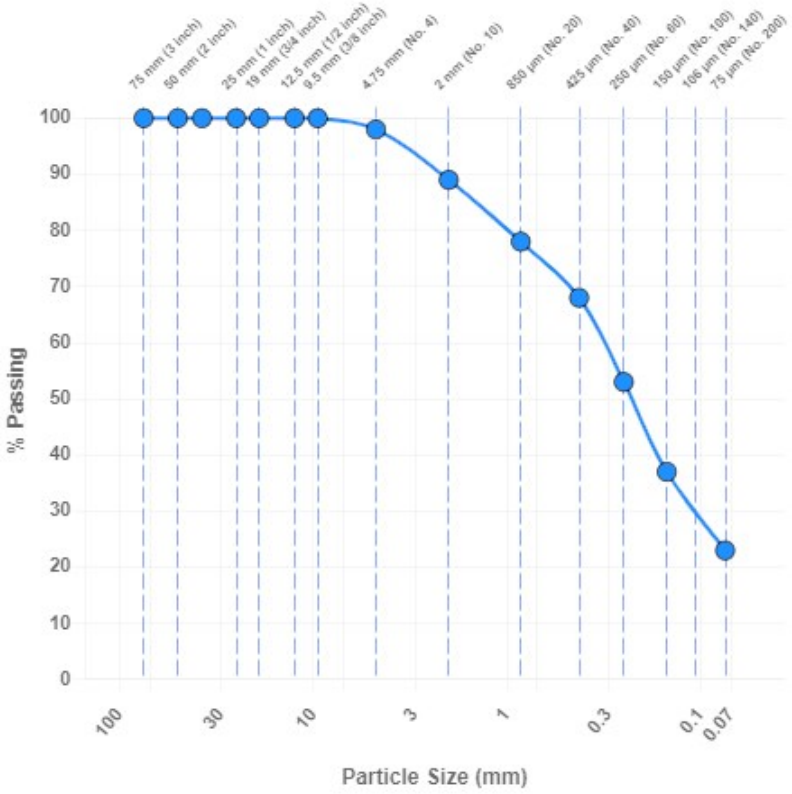
Sample Number:	642169	**Depth (ft):**	30
Boring Number:	BH-14	**Sampled By:**	Drill Crew
Sample Date:	02/24/2025		
Received Date:	02/24/2025	**Lab:**	11001 Hampshire Ave S, Bloomington, MN
Tested Date:	02/24/2025	**Tested By:**	Streier, Jim

Laboratory Data

Sieve Size	Passing (%)	Specification
9.5 mm (3/8 inch)	100	
4.75 mm (No. 4)	98	
2 mm (No. 10)	89	
850 µm (No. 20)	78	
425 µm (No. 40)	68	
250 µm (No. 60)	53	
150 µm (No. 100)	37	
75 µm (No. 200)	23	

Gravel (%)	Sand (%)	Silt & Clay (%)
2.0	75.0	23.0

D30	D60
0.091	0.332



Classification: SM Silty sand

General

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Sieve Analysis Of Soil

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Project:

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NNG Ventura to Farmington Abandonment and Capacity Replaceme
Freebourne County, Steele County, Dakota Coun... , MN

Sample Information

Sample Number:	642170	**Depth (ft):**	70
Boring Number:	BH-16	**Sampled By:**	Drill Crew
Sample Date:	02/24/2025		
Received Date:	02/24/2025	**Lab:**	11001 Hampshire Ave S, Bloomington, MN
Tested Date:	02/24/2025	**Tested By:**	Streier, Jim

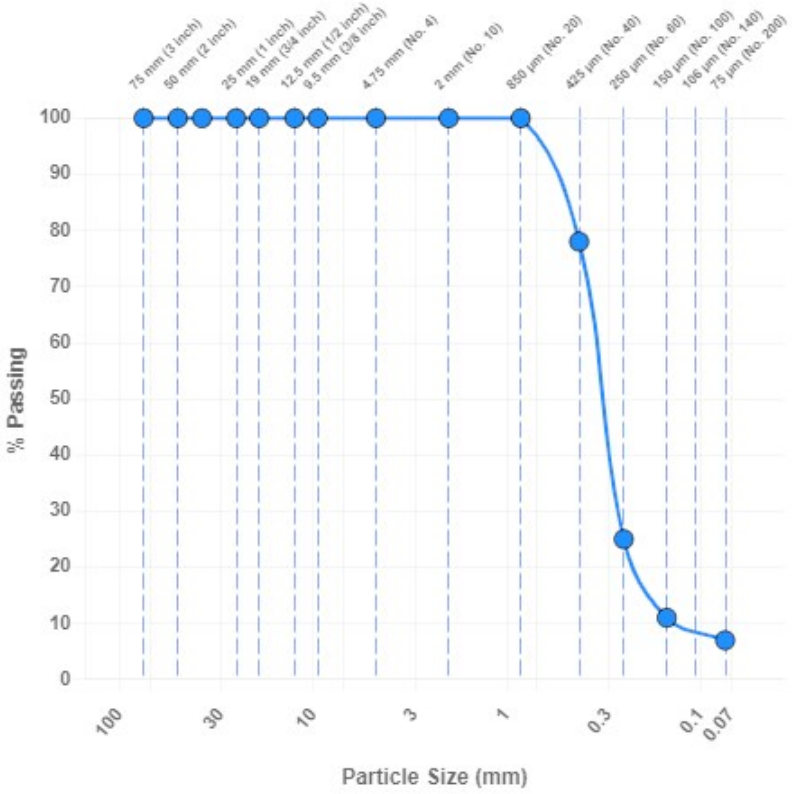
Laboratory Data

Sieve Size	Passing (%)	Specification
2 mm (No. 10)	100	
850 µm (No. 20)	100	
425 µm (No. 40)	78	
250 µm (No. 60)	25	
150 µm (No. 100)	11	
75 µm (No. 200)	7	

Sand (%)	Silt & Clay (%)
93.0	7.0

D10	D30	D60
0.098	0.267	0.366

C_U	C_C
3.73	1.99



Classification: SP-SM Poorly graded sand with silt

General

Results: The test is for informational purposes.

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Project:

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Freebourne County, Steele County, Dakota Coun... , MN

Sample Information

Sample Number:	642171	**Depth (ft):**	60
Boring Number:	BH-17	**Sampled By:**	Drill Crew
Sample Date:	02/24/2025		
Received Date:	02/24/2025	**Lab:**	11001 Hampshire Ave S, Bloomington, MN
Tested Date:	02/24/2025	**Tested By:**	Streier, Jim

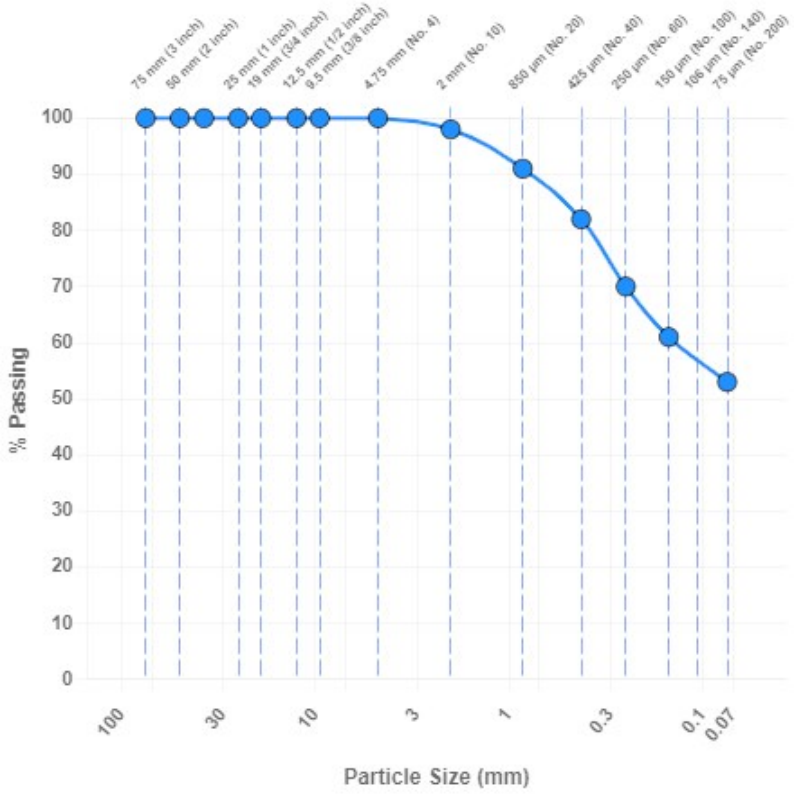
Laboratory Data

Sieve Size	Passing (%)	Specification
4.75 mm (No. 4)	100	
2 mm (No. 10)	98	
850 µm (No. 20)	91	
425 µm (No. 40)	82	
250 µm (No. 60)	70	
150 µm (No. 100)	61	
75 µm (No. 200)	53	

Sand (%)
47.0

Silt & Clay (%)
53.0

D60
0.102



Classification: CL Sandy lean clay

General

Results: The test is for informational purposes.

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Freebourne County, Steele County, Dakota Coun... , MN

Sample Information

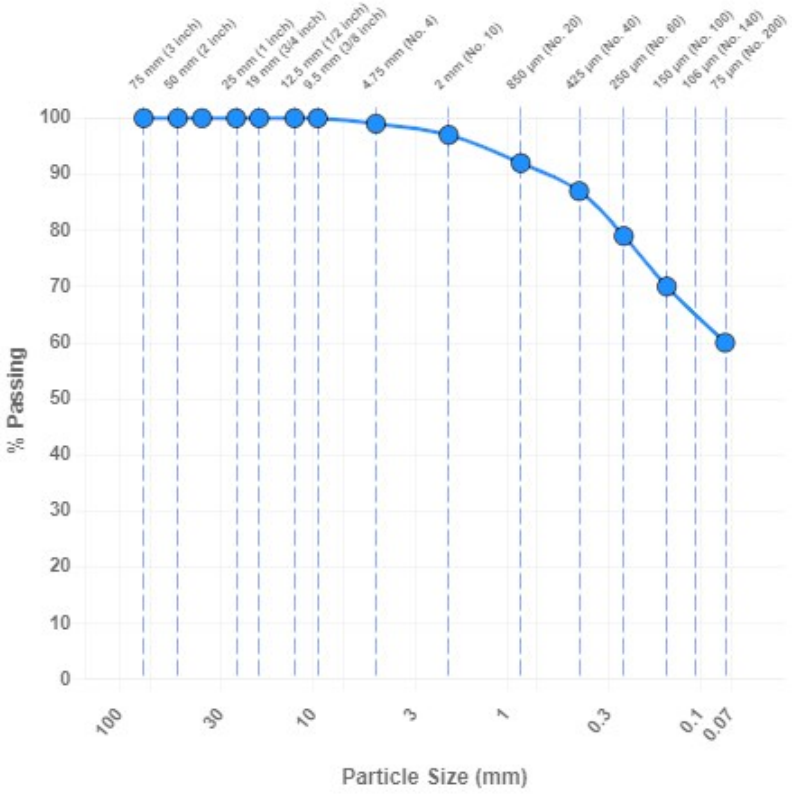
Sample Number:	642174	**Depth (ft):**	20
Boring Number:	BH-19	**Sampled By:**	Drill Crew
Sample Date:	02/24/2025		
Received Date:	02/24/2025	**Lab:**	11001 Hampshire Ave S, Bloomington, MN
Tested Date:	02/24/2025	**Tested By:**	Streier, Jim

Laboratory Data

Sieve Size	Passing (%)	Specification
9.5 mm (3/8 inch)	100	
4.75 mm (No. 4)	99	
2 mm (No. 10)	97	
850 µm (No. 20)	92	
425 µm (No. 40)	87	
250 µm (No. 60)	79	
150 µm (No. 100)	70	
75 µm (No. 200)	60	

Gravel (%)	Sand (%)	Silt & Clay (%)
1.0	39.0	60.0

D60
0.075



Classification: CL Sandy lean clay

General

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Sample Information

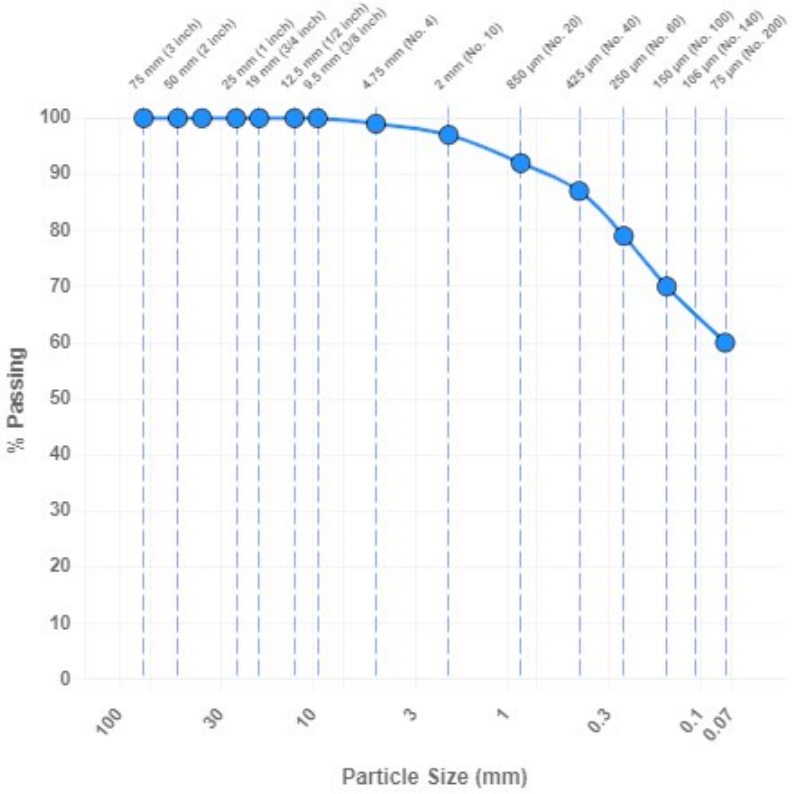
Sample Number:	642174	**Depth (ft):**	20
Boring Number:	BH-19	**Sampled By:**	Drill Crew
Sample Date:	02/24/2025		
Received Date:	02/24/2025	**Lab:**	11001 Hampshire Ave S, Bloomington, MN
Tested Date:	02/24/2025	**Tested By:**	Streier, Jim

Laboratory Data

Sieve Size	Passing (%)	Specification
9.5 mm (3/8 inch)	100	
4.75 mm (No. 4)	99	
2 mm (No. 10)	97	
850 µm (No. 20)	92	
425 µm (No. 40)	87	
250 µm (No. 60)	79	
150 µm (No. 100)	70	
75 µm (No. 200)	60	

Gravel (%)	Sand (%)	Silt & Clay (%)
1.0	39.0	60.0

D60
0.075



Classification: CL Sandy lean clay

General

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NNG Ventura to Farmington Abandonment and Capacity Replaceme
Freebourne County, Steele County, Dakota Coun... , MN

Sample Information

Sample Number:	642208	**Depth (ft):**	35
Boring Number:	BH-3	**Sampled By:**	Drill Crew
Sample Date:	02/24/2025		
Received Date:	02/24/2025	**Lab:**	11001 Hampshire Ave S, Bloomington, MN
Tested Date:	02/24/2025	**Tested By:**	Streier, Jim

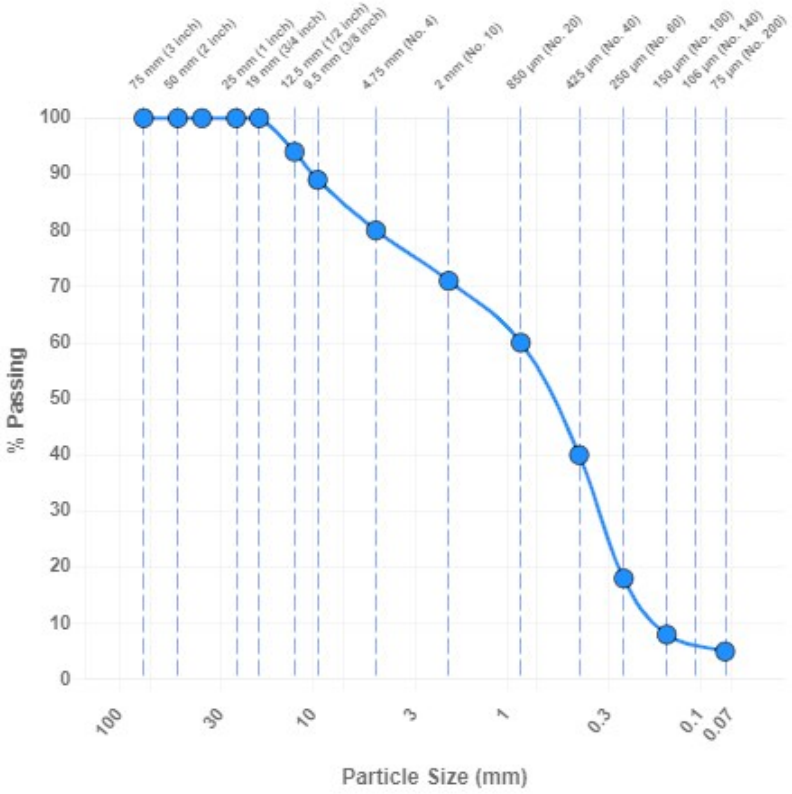
Laboratory Data

Sieve Size	Passing (%)	Specification
19 mm (3/4 inch)	100	
12.5 mm (1/2 inch)	94	
9.5 mm (3/8 inch)	89	
4.75 mm (No. 4)	80	
2 mm (No. 10)	71	
850 µm (No. 20)	60	
425 µm (No. 40)	40	
250 µm (No. 60)	18	
150 µm (No. 100)	8	
75 µm (No. 200)	5	

Gravel (%)	Sand (%)	Silt & Clay (%)
20.0	75.0	5.0

D10	D30	D60
0.170	0.345	0.850

C_U	C_C
5.00	0.82



Classification: SP-SM Poorly graded sand with silt and gravel

General

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Sample Information

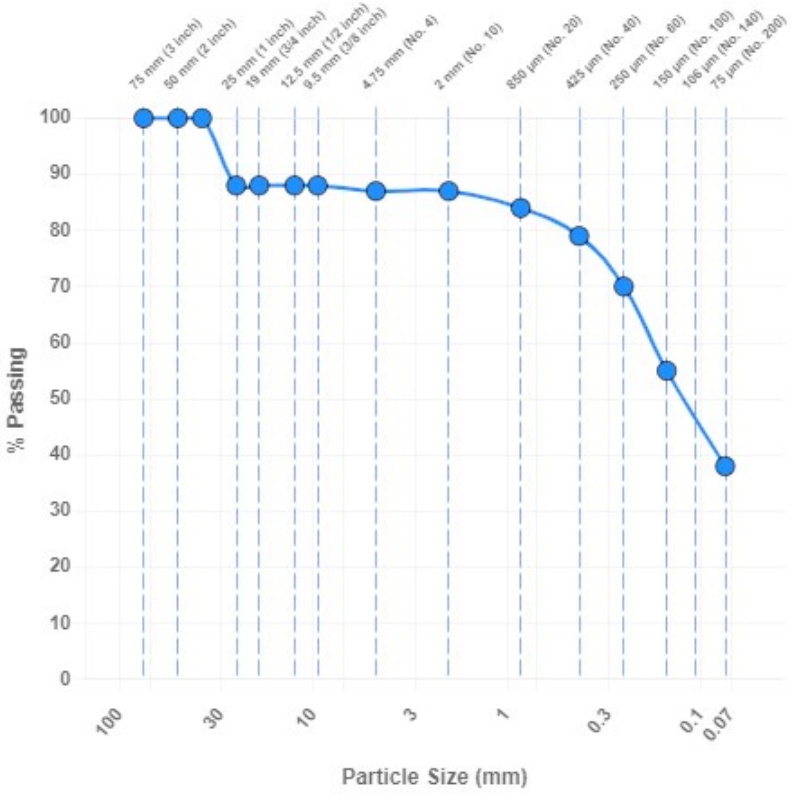
Sample Number:	642209	**Depth (ft):**	40
Boring Number:	BH-3	**Sampled By:**	Drill Crew
Sample Date:	02/24/2025		
Received Date:	02/24/2025	**Lab:**	11001 Hampshire Ave S, Bloomington, MN
Tested Date:	02/24/2025	**Tested By:**	Streier, Jim

Laboratory Data

Sieve Size	Passing (%)	Specification
37.5 mm (1.5 inch)	100	
25 mm (1 inch)	88	
19 mm (3/4 inch)	88	
12.5 mm (1/2 inch)	88	
9.5 mm (3/8 inch)	88	
4.75 mm (No. 4)	87	
2 mm (No. 10)	87	
850 µm (No. 20)	84	
425 µm (No. 40)	79	
250 µm (No. 60)	70	
150 µm (No. 100)	55	
75 µm (No. 200)	38	

Gravel (%)	Sand (%)	Silt & Clay (%)
13.0	49.0	38.0

D60
0.183



Classification: SM Silty sand

General

Results: The test is for informational purposes.

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Project:

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NNG Ventura to Farmington Abandonment and Capacity Replaceme
Freebourne County, Steele County, Dakota Coun... , MN

Sample Information

Sample Number:	642210	**Depth (ft):**	7
Boring Number:	BH-10	**Sampled By:**	Drill Crew
Sample Date:	02/24/2025		
Received Date:	02/24/2025	**Lab:**	11001 Hampshire Ave S, Bloomington, MN
Tested Date:	02/24/2025	**Tested By:**	Streier, Jim

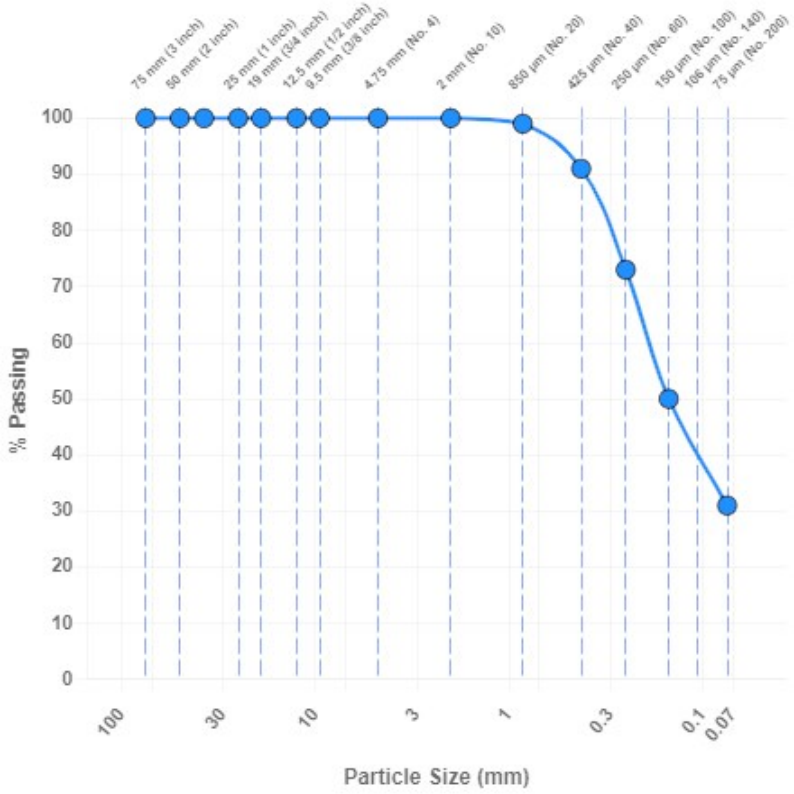
Laboratory Data

Sieve Size	Passing (%)	Specification
4.75 mm (No. 4)	100	
2 mm (No. 10)	100	
850 µm (No. 20)	99	
425 µm (No. 40)	91	
250 µm (No. 60)	73	
150 µm (No. 100)	50	
75 µm (No. 200)	31	

Sand (%)
69.0

Silt & Clay (%)
31.0

D60
0.193



Classification: SM Silty sand

General

Results: The test is for informational purposes.

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Sieve Analysis Of Soil

ASTM D6913

02/24/2025

11001 Hampshire Avenue S
Minneapolis, MN 55438
Phone: 952-995-2000

Client:

Stantec Consulting Services Inc.
733 Marquette Ave Ste 1000
Suite 1000
Minneapolis, MN 55402

Project:

B2410136
NNG Ventura to Farmington Abandonment and Capacity Replaceme
Freebourne County, Steele County, Dakota Coun... , MN

Sample Information

Sample Number:	642211	**Depth (ft):**	12
Boring Number:	BH-10	**Sampled By:**	Drill Crew
Sample Date:	02/24/2025		
Received Date:	02/24/2025	**Lab:**	11001 Hampshire Ave S, Bloomington, MN
Tested Date:	02/24/2025	**Tested By:**	Streier, Jim

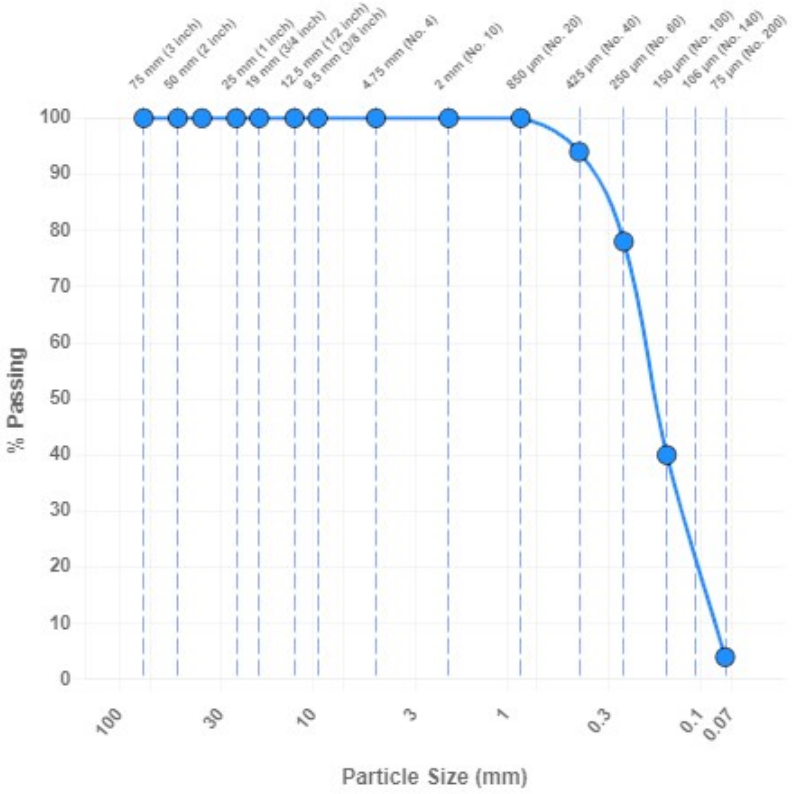
Laboratory Data

Sieve Size	Passing (%)	Specification
850 µm (No. 20)	100	
425 µm (No. 40)	94	
250 µm (No. 60)	78	
150 µm (No. 100)	40	
75 µm (No. 200)	4	

Sand (%)	Silt & Clay (%)
96.0	4.0

D10	D30	D60
0.080	0.097	0.203

C_U	C_C
2.54	0.58



Classification: SP Poorly graded sand

General

Results: The test is for informational purposes.

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Freebourne County, Steele County, Dakota Coun... , MN

Sample Information

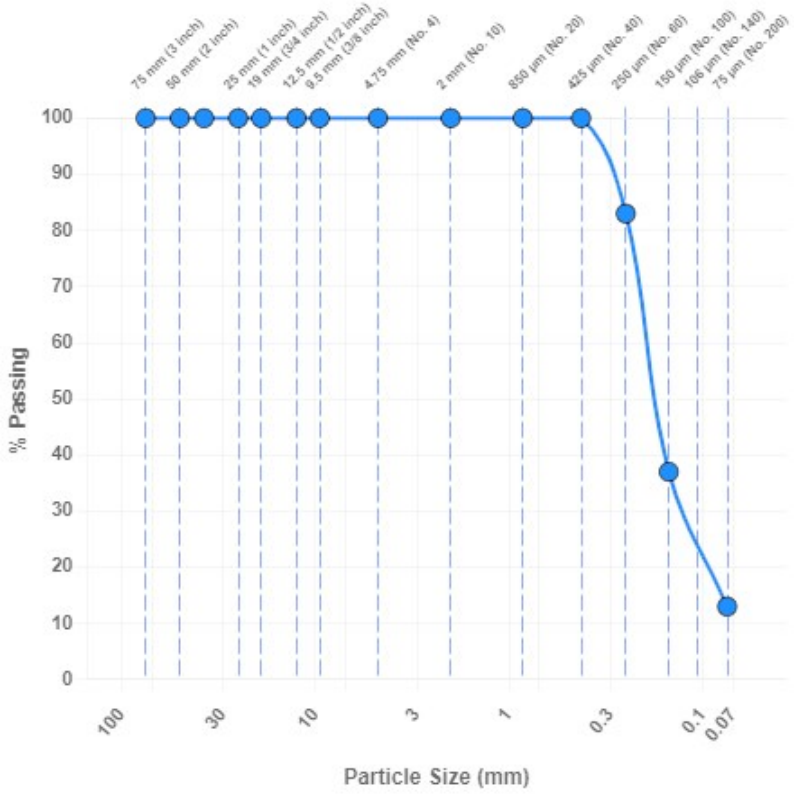
Sample Number:	642212	**Depth (ft):**	25
Boring Number:	BH-10A	**Sampled By:**	Drill Crew
Sample Date:	02/24/2025		
Received Date:	02/24/2025	**Lab:**	11001 Hampshire Ave S, Bloomington, MN
Tested Date:	02/24/2025	**Tested By:**	Streier, Jim

Laboratory Data

Sieve Size	Passing (%)	Specification
850 µm (No. 20)	100	
425 µm (No. 40)	100	
250 µm (No. 60)	83	
150 µm (No. 100)	37	
75 µm (No. 200)	13	

Sand (%)	Silt & Clay (%)
87.0	13.0

D30	D60
0.097	0.200



Classification: SM Silty sand

General

Results: The test is for informational purposes.

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Suite 1000
Minneapolis, MN 55402

Project:

B2410136
NNG Ventura to Farmington Abandonment and Capacity Replaceme
Freebourne County, Steele County, Dakota Coun... , MN

Sample Information

Sample Number:	642213	**Depth (ft):**	20
Boring Number:	BH-11	**Sampled By:**	Drill Crew
Sample Date:	02/24/2025		
Received Date:	02/24/2025	**Lab:**	11001 Hampshire Ave S, Bloomington, MN
Tested Date:	02/24/2025	**Tested By:**	Streier, Jim

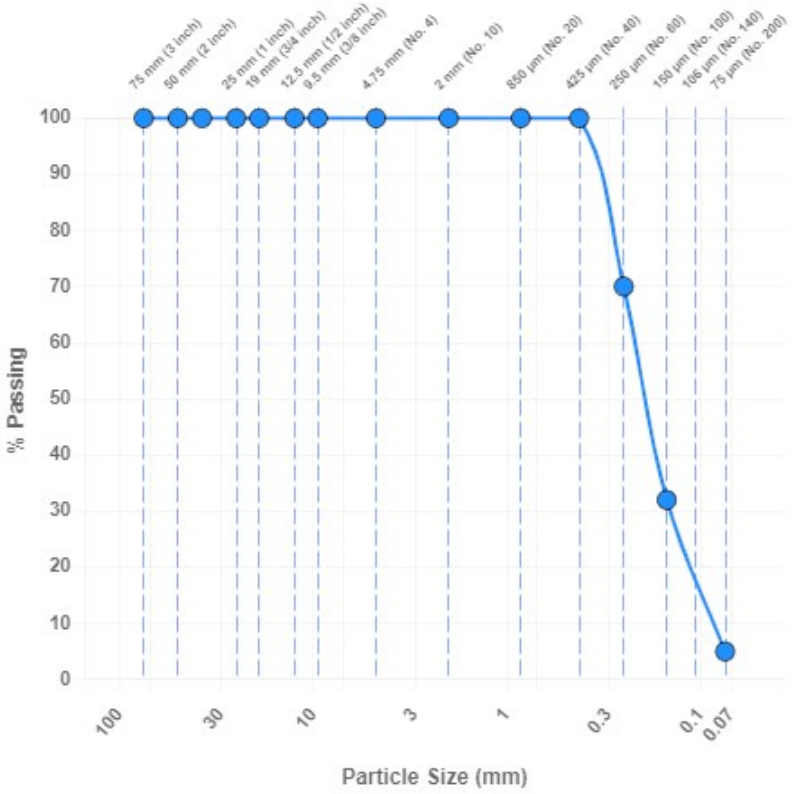
Laboratory Data

Sieve Size	Passing (%)	Specification
2 mm (No. 10)	100	
850 µm (No. 20)	100	
425 µm (No. 40)	100	
250 µm (No. 60)	70	
150 µm (No. 100)	32	
75 µm (No. 200)	5	

Sand (%)	Silt & Clay (%)
95.0	5.0

D10	D30	D60
0.081	0.104	0.224

C_U	C_C
2.77	0.60



Classification: SP-SM Poorly graded sand with silt

General

Results: The test is for informational purposes.

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Project:

B2410136
NNG Ventura to Farmington Abandonment and Capacity Replaceme
Freebourne County, Steele County, Dakota Coun... , MN

Sample Information

Sample Number:	642214	**Depth (ft):**	35
Boring Number:	BH-12A	**Sampled By:**	Drill Crew
Sample Date:	02/24/2025		
Received Date:	02/24/2025	**Lab:**	11001 Hampshire Ave S, Bloomington, MN
Tested Date:	02/24/2025	**Tested By:**	Streier, Jim

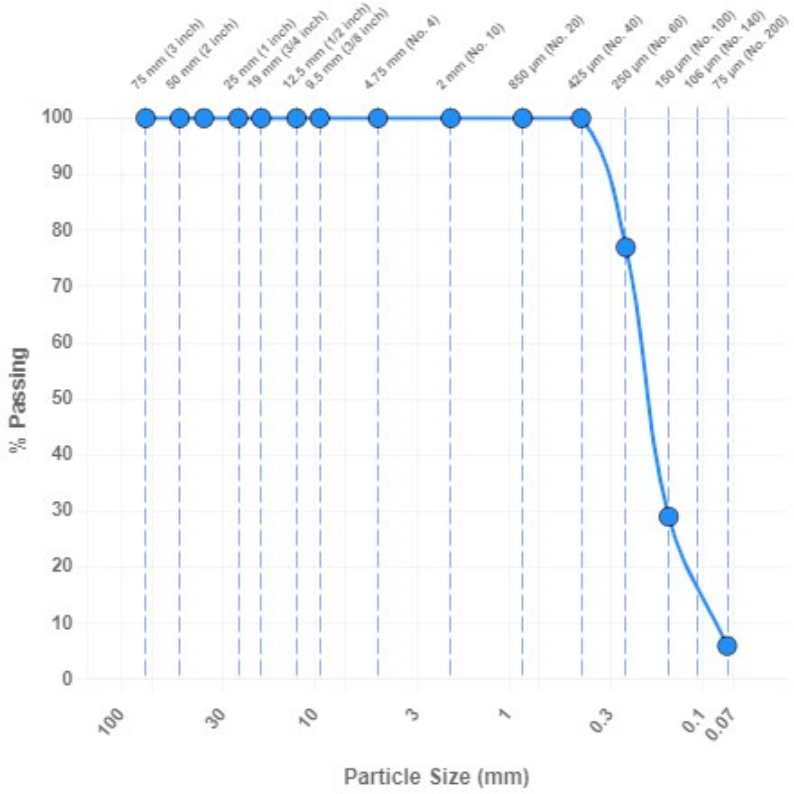
Laboratory Data

Sieve Size	Passing (%)	Specification
2 mm (No. 10)	100	
850 µm (No. 20)	100	
425 µm (No. 40)	100	
250 µm (No. 60)	77	
150 µm (No. 100)	29	
75 µm (No. 200)	6	

Sand (%)	Silt & Clay (%)
94.0	6.0

D10	D30	D60
0.080	0.152	0.215

C_U	C_C
2.69	1.34



Classification: SP-SM Poorly graded sand with silt

General

Results: The test is for informational purposes.

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Minneapolis, MN 55402

Project:

B2410136
NNG Ventura to Farmington Abandonment and Capacity Replaceme
Freebourne County, Steele County, Dakota Coun... , MN

Sample Information

Sample Number:	642215	**Depth (ft):**	45
Boring Number:	BH-12A	**Sampled By:**	Drill Crew
Sample Date:	02/24/2025		
Received Date:	02/24/2025	**Lab:**	11001 Hampshire Ave S, Bloomington, MN
Tested Date:	02/24/2025	**Tested By:**	Streier, Jim

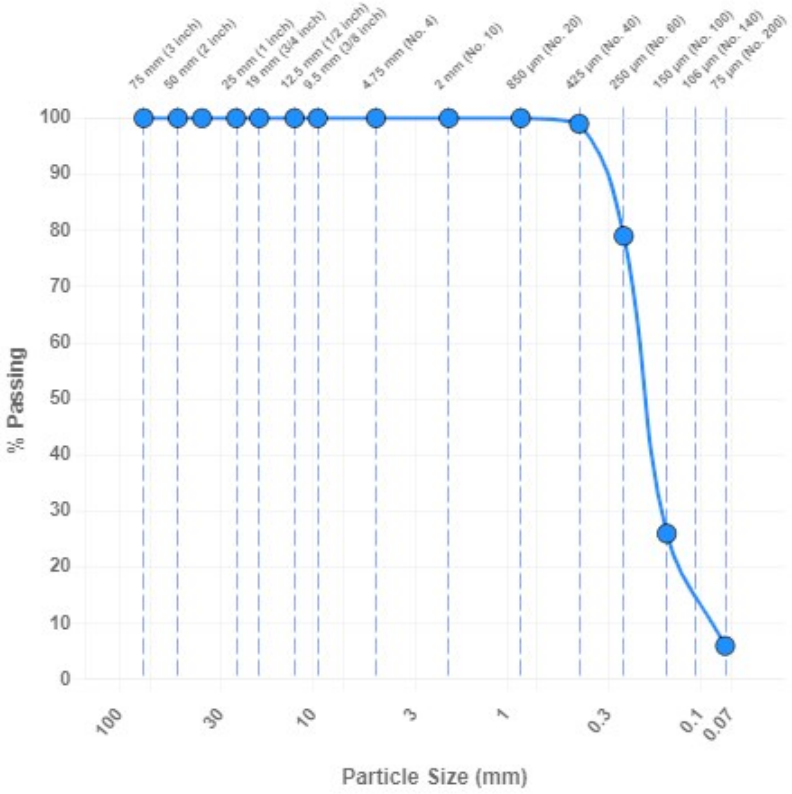
Laboratory Data

Sieve Size	Passing (%)	Specification
2 mm (No. 10)	100	
850 µm (No. 20)	100	
425 µm (No. 40)	99	
250 µm (No. 60)	79	
150 µm (No. 100)	26	
75 µm (No. 200)	6	

Sand (%)	Silt & Clay (%)
94.0	6.0

D10	D30	D60
0.081	0.158	0.214

C_U	C_C
2.64	1.44



Classification: SP-SM Poorly graded sand with silt

General

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Sieve Analysis Of Soil

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733 Marquette Ave Ste 1000
Suite 1000
Minneapolis, MN 55402

Project:

B2410136
NNG Ventura to Farmington Abandonment and Capacity Replaceme
Freebourne County, Steele County, Dakota Coun... , MN

Sample Information

Sample Number:	642216	**Depth (ft):**	25
Boring Number:	BH-14	**Sampled By:**	Drill Crew
Sample Date:	02/24/2025		
Received Date:	02/24/2025	**Lab:**	11001 Hampshire Ave S, Bloomington, MN
Tested Date:	02/24/2025	**Tested By:**	Streier, Jim

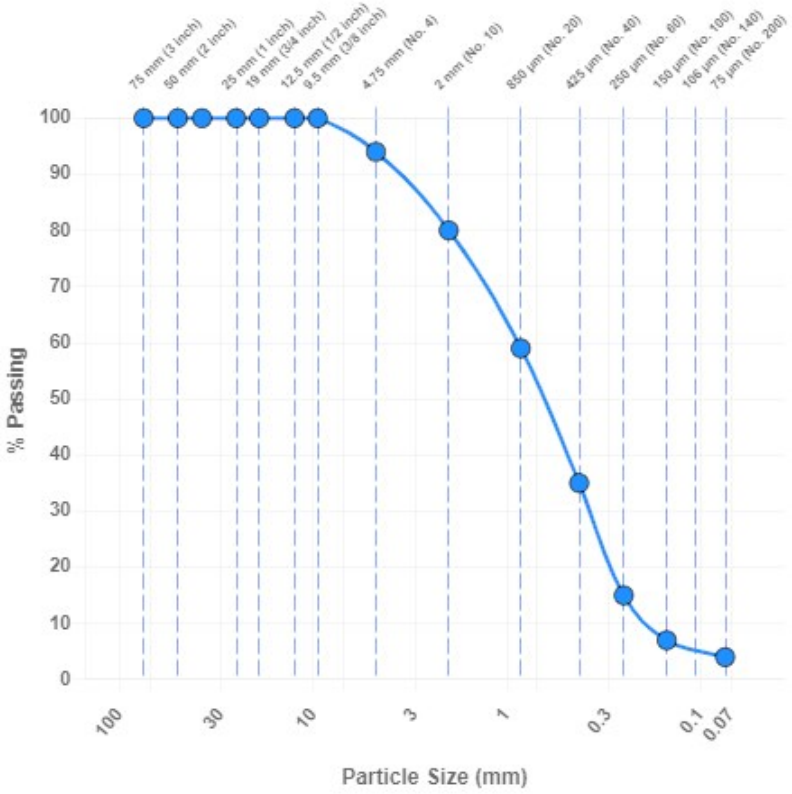
Laboratory Data

Sieve Size	Passing (%)	Specification
9.5 mm (3/8 inch)	100	
4.75 mm (No. 4)	94	
2 mm (No. 10)	80	
850 µm (No. 20)	59	
425 µm (No. 40)	35	
250 µm (No. 60)	15	
150 µm (No. 100)	7	
75 µm (No. 200)	4	

Gravel (%)	Sand (%)	Silt & Clay (%)
6.0	90.0	4.0

D10	D30	D60
0.188	0.381	0.905

C_U	C_C
4.81	0.85



Classification: SP Poorly graded sand

General

Results: The test is for informational purposes.

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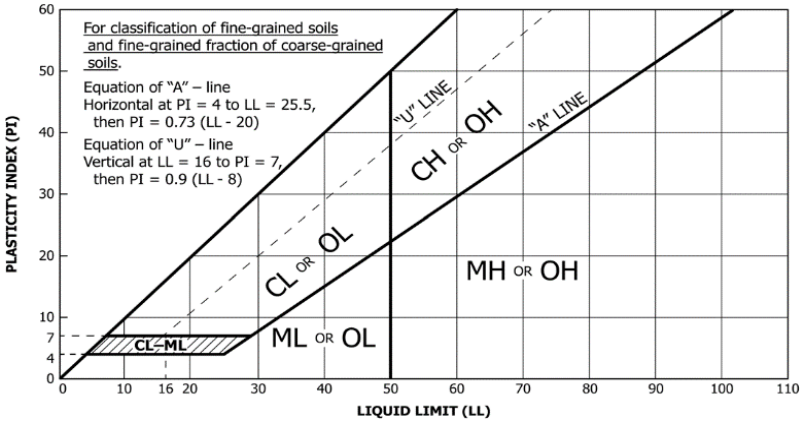
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Descriptive Terminology of Soil

Based on Standards ASTM D2487/2488
(Unified Soil Classification System)

Criteria for Assigning Group Symbols and Group Names Using Laboratory Tests[A]				Soil Classification	
				Group Symbol	Group Name[B]
Coarse-grained Soils (more than 50% retained on No. 200 sieve)	Gravels (More than 50% of coarse fraction retained on No. 4 sieve)	Clean Gravels (Less than 5% fines[C])	$C_u \geq 4$ and $1 \leq C_c \leq 3^D$	GW	Well-graded gravel[E]
			$C_u < 4$ and/or ($C_c < 1$ or $C_c > 3$)[D]	GP	Poorly graded gravel[E]
		Gravels with Fines (More than 12% fines[C])	Fines classify as ML or MH	GM	Silty gravel[E F G]
			Fines Classify as CL or CH	GC	Clayey gravel[E F G]
	Sands (50% or more coarse fraction passes No. 4 sieve)	Clean Sands (Less than 5% fines[H])	$C_u \geq 6$ and $1 \leq C_c \leq 3^D$	SW	Well-graded sand[I]
			$C_u < 6$ and/or ($C_c < 1$ or $C_c > 3$)[D]	SP	Poorly graded sand[I]
		Sands with Fines (More than 12% fines[H])	Fines classify as ML or MH	SM	Silty sand[F G I]
			Fines classify as CL or CH	SC	Clayey sand[F G I]
Fine-grained Soils (50% or more passes the No. 200 sieve)	Silts and Clays (Liquid limit less than 50)	Inorganic	PI > 7 and plots on or above "A" line[J]	CL	Lean clay[K L M]
			PI < 4 or plots below "A" line[J]	ML	Silt[K L M]
		Organic	Liquid Limit – oven dried / Liquid Limit – not dried <0.75	OL	Organic clay[K L M N] / Organic silt[K L M O]
	Silts and Clays (Liquid limit 50 or more)	Inorganic	PI plots on or above "A" line	CH	Fat clay[K L M]
			PI plots below "A" line	MH	Elastic silt[K L M]
		Organic	Liquid Limit – oven dried / Liquid Limit – not dried <0.75	OH	Organic clay[K L M P] / Organic silt[K L M Q]
Highly Organic Soils		Primarily organic matter, dark in color, and organic odor		PT	Peat

A. Based on the material passing the 3-inch (75-mm) sieve.
B. If field sample contained cobbles or boulders, or both, add "with cobbles or boulders, or both" to group name.
C. Gravels with 5 to 12% fines require dual symbols:
   GW-GM well-graded gravel with silt
   GW-GC well-graded gravel with clay
   GP-GM poorly graded gravel with silt
   GP-GC poorly graded gravel with clay
D. $C_u = D_{60} / D_{10}$ $C_c = (D_{30})^2 / (D_{10} \times D_{60})$
E. If soil contains ≥ 15% sand, add "with sand" to group name.
F. If fines classify as CL-ML, use dual symbol GC-GM or SC-SM.
G. If fines are organic, add "with organic fines" to group name.
H. Sands with 5 to 12% fines require dual symbols:
   SW-SM well-graded sand with silt
   SW-SC well-graded sand with clay
   SP-SM poorly graded sand with silt
   SP-SC poorly graded sand with clay
I. If soil contains ≥ 15% gravel, add "with gravel" to group name.
J. If Atterberg limits plot in hatched area, soil is CL-ML, silty clay.
K. If soil contains 15 to < 30% plus No. 200, add "with sand" or "with gravel", whichever is predominant.
L. If soil contains ≥ 30% plus No. 200, predominantly sand, add "sandy" to group name.
M. If soil contains ≥ 30% plus No. 200 predominantly gravel, add "gravelly" to group name.
N. PI ≥ 4 and plots on or above "A" line.
O. PI < 4 or plots below "A" line.
P. PI plots on or above "A" line.
Q. PI plots below "A" line.



Laboratory Tests

DD	Dry density, pcf	**q_p**	Pocket penetrometer strength, tsf
WD	Wet density, pcf	**q_U**	Unconfined compression test, tsf
P200	% Passing #200 sieve	**LL**	Liquid limit
MC	Moisture content, %	**PL**	Plastic limit
OC	Organic content, %	**PI**	Plasticity index

Particle Size Identification

Boulders..... over 12"
Cobbles..... 3" to 12"
Gravel
  Coarse..... 3/4" to 3" (19.00 mm to 75.00 mm)
  Fine..... No. 4 to 3/4" (4.75 mm to 19.00 mm)
Sand
  Coarse..... No. 10 to No. 4 (2.00 mm to 4.75 mm)
  Medium..... No. 40 to No. 10 (0.425 mm to 2.00 mm)
  Fine..... No. 200 to No. 40 (0.075 mm to 0.425 mm)
Silt..... No. 200 (0.075 mm) to .005 mm
Clay..... < .005 mm

Relative Proportions[L, M]

trace..... 0 to 5%
little..... 6 to 14%
with..... ≥ 15%

Inclusion Thicknesses

lens..... 0 to 1/8"
seam..... 1/8" to 1"
layer..... over 1"

Apparent Relative Density of Cohesionless Soils

Very loose ..... 0 to 4 BPF
Loose ..... 5 to 10 BPF
Medium dense..... 11 to 30 BPF
Dense..... 31 to 50 BPF
Very dense..... over 50 BPF

Consistency of Cohesive Soils	Blows Per Foot	Approximate Unconfined Compressive Strength
Very soft	0 to 1 BPF	< 0.25 tsf
Soft	2 to 4 BPF	0.25 to 0.5 tsf
Medium	5 to 8 BPF	0.5 to 1 tsf
Stiff	9 to 15 BPF	1 to 2 tsf
Very Stiff	16 to 30 BPF	2 to 4 tsf
Hard	over 30 BPF	> 4 tsf

Moisture Content:

Dry: Absence of moisture, dusty, dry to the touch.
Moist: Damp but no visible water.
Wet: Visible free water, usually soil is below water table.

Drilling Notes:

Blows/N-value: Blows indicate the driving resistance recorded for each 6-inch interval. The reported N-value is the blows per foot recorded by summing the second and third interval in accordance with the Standard Penetration Test, ASTM D1586.

Partial Penetration: If the sampler could not be driven through a full 6-inch interval, the number of blows for that partial penetration is shown as #/x" (i.e. 50/2"). The N-value is reported as "REF" indicating refusal.

Recovery: Indicates the inches of sample recovered from the sampled interval. For a standard penetration test, full recovery is 18", and is 24" for a thinwall/shelby tube sample.

WOH: Indicates the sampler penetrated soil under weight of hammer and rods alone; driving not required.

WOR: Indicates the sampler penetrated soil under weight of rods alone; hammer weight and driving not required.

Water Level: Indicates the water level measured by the drillers either while drilling (▽), at the end of drilling (▼), or at some time after drilling (▼).

Sample Symbols

Standard Penetration Test
Modified California (MC)
Auger
Grab Sample
Rock Core
Thinwall (TW)/Shelby Tube (SH)
Texas Cone Penetrometer
Dynamic Cone Penetrometer

Appendix 6C
Reports of Geotechnical Investigation for the NL27 Project

Lake Mills M500 E-line

NL27 Lake Mills M500E Extension

Subsurface Exploration and Lab Testing Report

Manchester, Minnesota

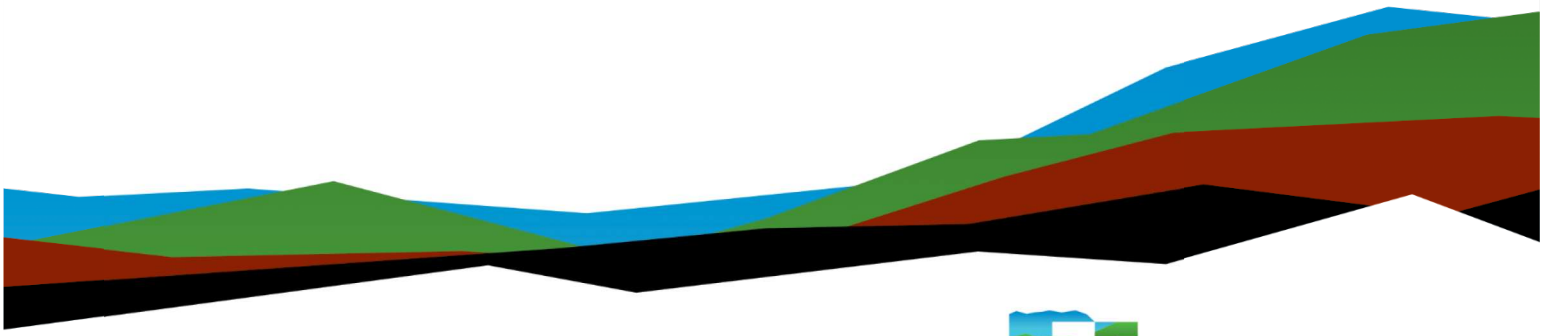
October 24, 2025 | Terracon Project No. JY255045

Prepared for:

Stantec Consulting Services Inc.
200-325 25 Street Southeast
Calgary, Alberta, Canada T2A 7H8

Prepared by:

Terracon Consultants



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- Materials

2625 Highway 14 W, Suite F
Rochester, Minnesota 55901
P (507) 722-7365
Terracon.com

October 24, 2025

Stantec Consulting Services Inc.
200-325 25 Street Southeast
Calgary, Alberta, Canada T2A 7H8

Attn: Ginger Chan
P: (587) 437-5068
E: ginger.chan@stantec.com

Re: Subsurface Exploration and Lab Testing Report
NL27 Lake Mills M500E Extension
Task Order No. 060246-091002
Manchester, Minnesota
Terracon Project No. JY255045

Dear Ms. Chan:

We have performed geotechnical services for the above referenced project in general accordance with Task Order No. 060246-091002, authorization via email dated July 28, 2025, and Change Order No. 001 dated August 19, 2025. This report presents the findings of the subsurface exploration for borings BH-09 through BH-11 for the proposed project.

We appreciate the opportunity to be of service to you on this project. If you have any questions concerning this report or if we may be of further service, please contact us.

Sincerely,

Terracon

Kyle T. Schmidt, EIT
Staff Engineer

Debra A. Schroeder, PE
Senior Engineer

Table of Contents

Introduction **1**
Site Conditions **2**
Project Description **2**
Geotechnical Characterization **3**
Subsurface Profile 3
Groundwater Conditions 3
General Comments **4**

Figures

GeoModel

Attachments

Exploration and Testing Procedures
Site Location and Exploration Plans
Exploration and Laboratory Results
Supporting Information

Note: This report was delivered in a web-based format. **Blue Bold** text in the report indicates a referenced section heading. The PDF version also includes hyperlinks which direct the reader to that section and clicking on the Terracon logo will bring you back to this page. For more interactive features, please view your project online at **client.terracon.com**.

Refer to each individual Attachment for a listing of contents.

Introduction

This Subsurface Exploration and Lab Testing Report presents the results of our subsurface exploration and geotechnical engineering services performed for the proposed pipeline corridor.

The purpose of these services was to provide information relative to:

- Subsurface soil conditions
- Groundwater conditions

The geotechnical engineering Scope of Services for this project included the advancement of three test borings (BH-09 through BH-11) to depths of approximately 40 feet below the existing ground surface.

In addition to geotechnical soil sampling, environmental soil sampling was performed on samples collected at approximately 10 feet above the bottom of each borehole. And sent to a national laboratory for testing. The results of these tests are provided under a separate cover.

Maps showing the site and boring locations are shown on the **Site Location** and **Exploration Plans**, respectively. The results of the laboratory testing performed on geotechnical soil samples obtained from the site during our field exploration are included on the boring logs and/or as separate graphs in the **Exploration and Laboratory Results** section.

Site Conditions

The following description of site conditions is derived from our site visit in association with the field exploration and our review of publicly available geologic and topographic maps.

Item	Description
Site Location	The project is located in Manchester, Minnesota. Latitude/Longitude (approximate): 43.7240°, -93.4158° See **Site Location** and **Exploration Plan**.
Current Ground Cover	Moderately vegetated with grasses, low brush, trees, and agricultural crops.
Geology	Our investigation and review of geologic maps and well logs indicated subsurface conditions mainly consist of glacial outwash and till soils, including silty sand (SM), clayey sand (SC), and sandy lean clay (CL).

Project Description

Our final understanding of the project conditions is as follows:

Item	Description
Information Provided	An email request for proposal was provided by Stantec on June 23, 2025. The request included a Google Earth .kmz file showing the location and depths of the requested borings for planned projects. Since this original request we have been notified via email of changes to the project scope and timelines. Our current understanding of the final scope of services is presented in this report.
Project Description	The project consists of a pipeline extension section near Manchester, Minnesota. The proposed subsurface investigation will help Stantec assess the technical feasibility and constructability of using various trenchless or trenched pipe installation methods to install the new pipeline at various crossings along the proposed pipeline corridor.

Geotechnical Characterization

Subsurface Profile

We have developed a general characterization of the subsurface conditions based upon our review of the subsurface exploration, geologic setting and our understanding of the project. This characterization, termed GeoModel, forms the basis of our geotechnical evaluation of the site. Conditions observed at each exploration point are indicated on the individual logs. The individual logs can be found in the **Exploration and Laboratory Results** and the GeoModel can be found in the **Figures** attachment of this report.

As part of our analyses, we identified the following model layers within the subsurface profile. For an approximate elevation view of the model layer depths at each boring location, refer to the GeoModel.

Model Layer	Layer Name	General Description
1	**Surficial Layer**	Topsoil, approximately 9 to 12 inches.
2	**Native Sands**	Sands (SP, SM, SC) with varying amounts of fines and gravel, fine to coarse grained, brown and gray in color, very loose to medium dense in relative density.
3	**Native Fine Grained Soils**	Clays and Silts (CL, ML), with varying amounts of sands and gravel, gray and brown in color, soft to very stiff in consistency.

Groundwater Conditions

The boreholes were observed while drilling for the presence and level of groundwater. The water levels observed in the boreholes can be found on the boring logs in **Exploration and Laboratory Results**.

Groundwater was observed during drilling at depths ranging from about 2 to 37 feet below the existing ground surface at the boring locations. A relatively long period can be necessary for a groundwater level to develop and stabilize in a borehole; however, groundwater level observations made within granular soils are usually a reliable indication of the current groundwater conditions. Long-term observations in piezometers or observation wells, sealed from the influence of surface water, are recommended if it is necessary to better define groundwater levels.

Groundwater level fluctuations occur due to seasonal variations in the amount of rainfall, runoff, and other factors not evident at the time the borings were performed. Therefore, groundwater levels during construction or at other times in the life of the pipeline will

vary. The possibility of groundwater level fluctuations should be considered when developing the design and construction plans for the project.

General Comments

Our report presents the results of our fieldwork and laboratory tests. Natural variations will occur between exploration point locations or due to the modifying effects of construction or weather. The nature and extent of such variations may not become evident until during or after construction. Terracon should be retained to review the final design plans and specifications so comments can be made regarding interpretation of the results of our geotechnical investigation. Terracon should be retained to provide observation and testing services during earth-related construction phases of the project. If variations appear, we can provide further evaluation and supplemental recommendations. If variations are noted in the absence of our observation and testing services on-site, we should be immediately notified so that we can provide additional evaluation and supplemental recommendations.

Our Scope of Services included specific environmental testing as noted above; however, it does not include either specifically or by implication any environmental or biological (e.g., mold, fungi, bacteria) assessment of the site or identification or prevention of pollutants, hazardous materials or conditions. If the owner is concerned about the potential for such contamination or pollution, other studies should be undertaken.

Our services and any correspondence are intended for the sole benefit and exclusive use of our client for specific application to the project discussed and are accomplished in accordance with generally accepted geotechnical engineering practices with no third-party beneficiaries intended. Any third-party access to services or correspondence is solely for information purposes to support the services provided by Terracon to our client. Reliance upon the services and any work product is limited to our client and is not intended for third parties. Any use or reliance of the provided information by third parties is done solely at their own risk. No warranties, either express or implied, are intended or made.

Site characteristics as provided are for design purposes and not to estimate excavation cost. Any use of our report in that regard is done at the sole risk of the excavating cost estimator as there may be variations on the site that are not apparent in the data that could significantly affect excavation cost. Any parties charged with estimating excavation costs should seek their own site characterization for specific purposes to obtain the specific level of detail necessary for costing. Site safety and cost estimating including excavation support and dewatering requirements/design are the responsibility of others. Construction and site development have the potential to affect adjacent properties. Such impacts can include damages due to vibration, modification of groundwater/surface water flow during construction, foundation movement due to undermining or subsidence

from excavation, as well as noise or air quality concerns. Evaluation of these items on nearby properties are commonly associated with contractor means and methods and are not addressed in this report. The owner and contractor should consider a preconstruction/precondition survey of surrounding development. If changes in the nature, design, or location of the project are planned, the results presented in this factual report shall not be considered valid unless we review the changes and either verify or modify our conclusions in writing.

Figures

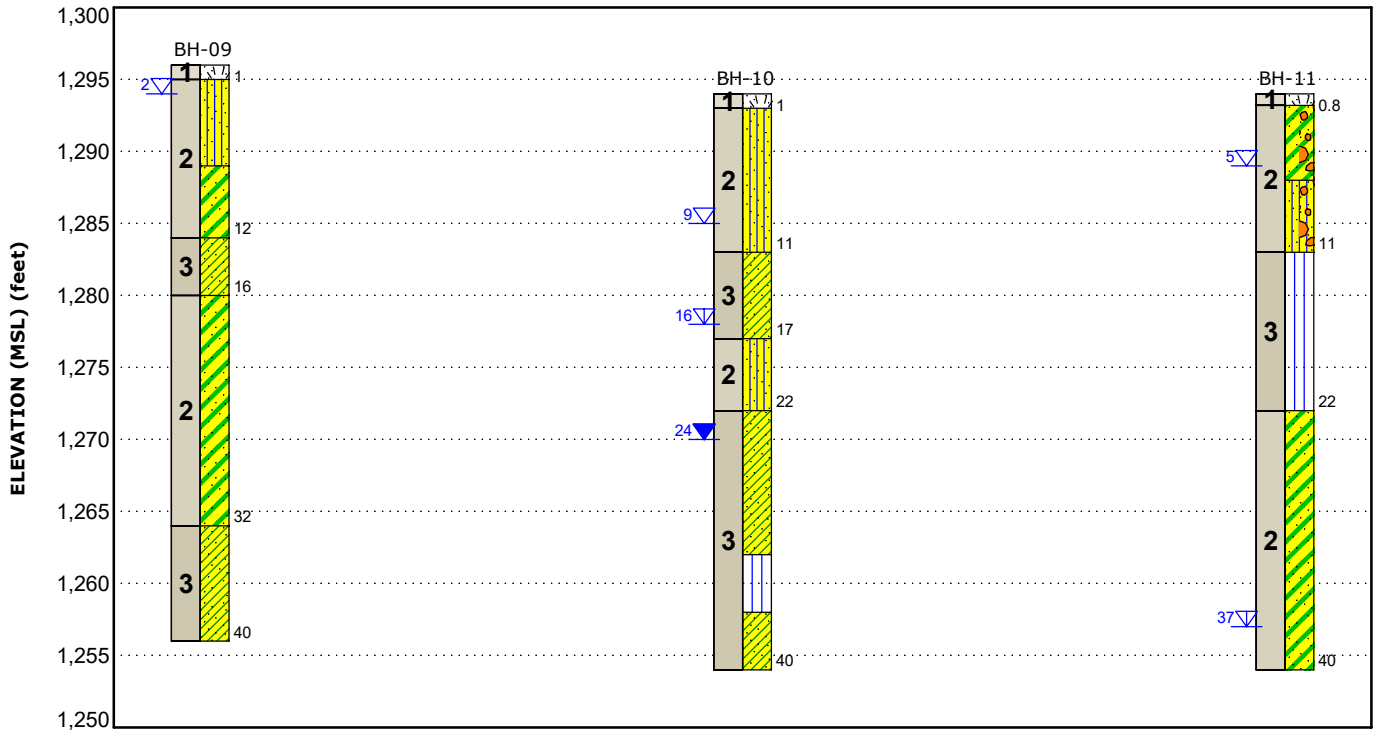
Contents:

GeoModel

NL27 Lake Mills M500E Extension
| Manchester, MN
Terracon Project No. JY255045

Terracon
2625 Highway 14 W, Ste F
Rochester, MN

GeoModel



This is not a cross section. This is intended to display the Geotechnical Model only. See individual logs for more detailed conditions.

Model Layer	Layer Name	General Description
1	**Surficial Layer**	Topsoil, approximately 9 to 12 inches.
2	**Native Sands**	Sands (SP, SM, SC) with varying amounts of fines and gravel, fine to coarse grained, brown and gray in color, very loose to medium dense in relative density.
3	**Native Fine Grained Soils**	Clays and Silts (CL, ML), with varying amounts of sands and gravel, gray and brown in color, soft to very stiff in consistency.

Legend

- Topsoil
- Clayey Sand
- Silt
- Silty Sand with Gravel
- Silty Sand
- Sandy Lean Clay
- Clayey Sand with Gravel

▽ First Water Observation
▽ Second Water Observation
▼ Third Water Observation
Groundwater levels are temporal. The levels shown are representative of the date and time of our exploration. Significant changes are possible over time.
Water levels shown are as measured during and/or after drilling. In some cases, boring advancement methods mask the presence/absence of groundwater. See individual logs for details.

NOTES:
Layering shown on this figure has been developed by the geotechnical engineer for purposes of modeling the subsurface conditions as required for the subsequent geotechnical engineering for this project. Numbers adjacent to soil column indicate depth below ground surface.

Attachments

Exploration and Testing Procedures

Field Exploration

Boring Numbers	Boring Depths (feet)	Location
BH-09	40	43.7241° N, 93.4158° W
BH-10	40	43.7186° N, 93.4189° W
BH-11	40	43.7038° N, 93.4292° W

Boring Layout and Elevations: Stantec representatives staked the boring locations. We were provided with the Google Earth kmz file showing the boring locations and these locations are shown on the **Exploration Plans**. The approximate coordinates of the borings are indicated on the boring logs. Approximate ground surface elevations were estimated using the Minnesota Department of Natural Resources, MnTOPO LiDAR map and reported on the logs to the nearest foot. If more accurate boring locations and surface elevations are desired, we recommend the boring locations be surveyed.

Subsurface Exploration Procedures: We advanced the borings with ATV and track-mounted rotary drill rigs using continuous flight augers and mud-rotary drilling techniques. Split-spoon samples were obtained at intervals of 5 feet. In the split-barrel sampling procedure, a standard 2-inch outer diameter split-barrel sampling spoon was driven into the ground by a 140-pound automatic hammer falling a distance of 30 inches. The number of blows required to advance the sampling spoon the last 12 inches of a normal 18-inch penetration (the second and third 6 inches of penetration for a 24-inch penetration) is recorded as the Standard Penetration Test (SPT) resistance value. The SPT resistance values, also referred to as N-values, are indicated on the boring logs at the test depths. The samples were placed in appropriate containers and transported to our laboratory for testing. We observed and recorded groundwater levels during drilling and sampling.

The boreholes were backfilled with grout/neat cement after completion to within 2 feet of the ground surface. The boreholes were backfilled with auger cuttings from a depth of 2 feet to the ground surface.

The drill crew prepared a field log of each boring to record field data including visual descriptions of the materials encountered during drilling as well as the driller's interpretation of the subsurface conditions between samples. The boring logs included with this report represent an interpretation of the subsurface conditions at each boring location based on field data and observation of the samples.

Laboratory Testing

The project engineer reviewed the field data and assigned laboratory tests. The laboratory testing program included the following tests on retrieved soil samples:

Geotechnical Testing

- Moisture Content
- Grain size analysis (through a No. 200 sieve only)

The laboratory testing program included examination of soil samples. Based on the results of our field and laboratory programs, we described and classified the soil samples in general accordance with the Unified Soil Classification System.

The environmental laboratory tests that were performed are shown below. The results of these tests are provided under a separate cover.

Environmental Testing

- TPH-DRO (total petroleum hydrocarbons – diesel range organics)
- TCLP 8 RCRA metals
- BTEX/GRO
- TCLP herbicides
- TCLP pesticides

Site Location and Exploration Plans

Contents:

Site Location Plan
Exploration Plan

Note: All attachments are one page unless noted above.

Site Location



DIAGRAM IS FOR GENERAL LOCATION ONLY, AND IS NOT INTENDED FOR CONSTRUCTION PURPOSES MAP PROVIDED BY MICROSOFT BING MAPS

Exploration Plan

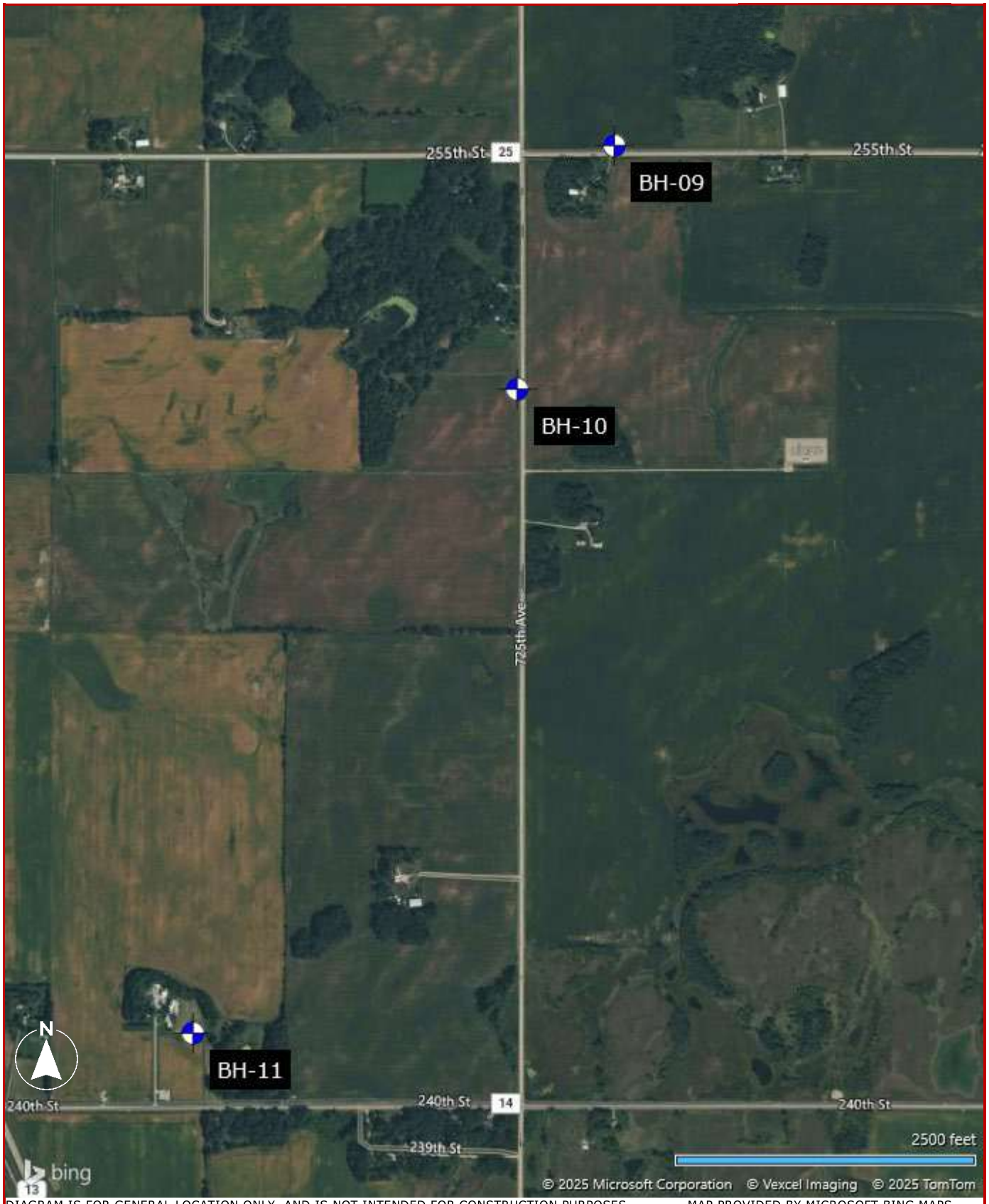


DIAGRAM IS FOR GENERAL LOCATION ONLY, AND IS NOT INTENDED FOR CONSTRUCTION PURPOSES MAP PROVIDED BY MICROSOFT BING MAPS

Exploration and Laboratory Results

Contents:

Boring Logs (BH-09 through BH-11)

NL27 Lake Mills M500E Extension
| Manchester, MN
Terracon Project No. JY255045

Terracon
2625 Highway 14 W, Ste F
Rochester, MN

Boring Log No. BH-09

Location: See Exploration Plan

Latitude: 43.7241° Longitude: -93.4158°

Model Layer	Graphic Log	Depth (Ft.)	Elevation: 1296 (Ft.) +/-	Depth (Ft.)	Water Level Observations	Sample Type	Recovery (In.)	Field Test Results	Water Content (%)	Percent Fines
1		1.0	**TOPSOIL**, Approximately 12 inches 1295							
2		7.0	**SILTY SAND (SM)**, trace gravel, fine to medium grained, brown, loose 1289		▽		19	3-3-3-3 N=6	19.5	
							6	2-3-4 N=7	22.4	13
		12.0	**CLAYEY SAND (SC)**, trace gravel, fine to medium grained, brown, loose 1284	5						
							14	3-3-5 N=8	16.9	
3		16.0	**SANDY LEAN CLAY (CL)**, trace gravel, gray, medium stiff 1280	10						
							18	2-3-4 N=7	19.8	
2		32.0	**CLAYEY SAND (SC)**, trace gravel, fine to medium grained, gray, loose to medium dense 1264	15						
							18	1-3-5 N=8	18.8	42
				20			16			
							18	3-4-5 N=9	18.7	
				25						
							18	3-5-7 N=12	17.0	
3		40.0	**SANDY LEAN CLAY (CL)**, trace gravel, gray, stiff 1256	30						
							18	3-5-7 N=12	16.5	
				35						
							18	5-5-7 N=12	17.5	
			Boring Terminated at 40 Feet	40						

See Exploration and Testing Procedures for a description of field and laboratory procedures used and additional data (If any).

See Supporting Information for explanation of symbols and abbreviations.

Elevation Reference: Elevation estimated from MnTOPO website

Water Level Observations
▽ Water observed at 2 feet while drilling

Drill Rig
CME 550X

Hammer Type
Automatic

Driller
M. Nunez

Notes
Equipment Reference:
- Energy Transfer Ratio = 89.8% +/- 3.2%
- Hammer Efficiency Correction = 1.50

Advancement Method
3 1/4" Hollow Stem Auger

Abandonment Method
Borings backfilled with neat cement grout upon completion

Logged by
R. Rodriguez

Boring Started
07-31-2025

Boring Completed
07-31-2025

Terracon
2625 Highway 14 W, Ste F
Rochester, MN

Boring Log No. BH-10

Location: See Exploration Plan

Latitude: 43.7186° Longitude: -93.4189°

Model Layer	Graphic Log	Depth (Ft.)	Elevation: 1294 (Ft.) +/-	Recovery (In.)	Field Test Results	Water Content (%)	Percent Fines
1		1.0	**TOPSOIL**, Approximately 12 inches 1293	12	2-2-2-3 N=4	21.3	
2		11.0	**SILTY SAND (SM)**, trace gravel, fine to medium grained, brown, loose lean clay lenses from 8'-11' 1283	5	2-3-4 N=7	19.5	
				17	1-2-3 N=5	25.1	48
3		17.0	**SANDY LEAN CLAY (CL)**, trace gravel, gray, soft Driller noted sand seam at 16' 1277	18			
				18	2-2-2 N=4	25.5	
2		22.0	**SILTY SAND (SM)**, fine to medium grained, gray, very loose 1272	17	1-1-1 N=2	22.0	27
3		32.0	**SANDY LEAN CLAY (CL)**, trace gravel, gray, medium stiff to stiff Driller noted sand seam at 24' 1262	17	4-3-6 N=9	18.5	
				16	3-3-4 N=7	18.8	
		36.0	**SILT (ML)**, gray, very stiff 1258	17	5-8-10 N=18	17.9	
		40.0	**SANDY LEAN CLAY (CL)**, trace gravel, gray, stiff 1254	18	3-4-5 N=9	19.7	
			Boring Terminated at 40 Feet				

Depth (Ft.): 5, 10, 15, 20, 25, 30, 35, 40

Water Level Observations: ▽ Water observed at 9 feet while drilling; ▽ Water observed at 16 feet while drilling; ▼ Water observed at 24 feet while drilling

See Exploration and Testing Procedures for a description of field and laboratory procedures used and additional data (If any).

See Supporting Information for explanation of symbols and abbreviations.

Elevation Reference: Elevation estimated from MnTOPO website

Notes

Equipment Reference:
- Energy Transfer Ratio = 89.8% +/- 3.2%
- Hammer Efficiency Correction = 1.50

Advancement Method
3 1/4" Hollow Stem Auger

Abandonment Method
Borings backfilled with neat cement grout upon completion

Drill Rig
CME 550X

Hammer Type
Automatic

Driller
M. Nunez

Logged by
R. Rodriguez

Boring Started
07-31-2025

Boring Completed
07-31-2025

NL27 Lake Mills M500E Extension
| Manchester, MN
Terracon Project No. JY255045

Terracon
2625 Highway 14 W, Ste F
Rochester, MN

Boring Log No. BH-11

Location: See Exploration Plan

Latitude: 43.7038° Longitude: -93.4292°

Model Layer	Graphic Log	Depth (Ft.)	Elevation: 1294 (Ft.) +/-	Depth (Ft.)	Water Level Observations	Sample Type	Recovery (In.)	Field Test Results	Water Content (%)	Percent Fines
1		0.8	**TOPSOIL**, Approximately 9 inches 1293.2							
2		6.0	**CLAYEY SAND WITH GRAVEL (SC)**, fine to medium grained, brown and gray, loose 1288	5	▽		11	0-2-2-2 N=4		
							10	1-2-2 N=4	15.1	
		11.0	**SILTY SAND WITH GRAVEL (SM)**, fine to medium grained, brown, loose 1283		▨					
				10			10	1-3-3 N=6	23.5	19
3		22.0	**SILT (ML)**, with sand lenses, medium stiff to stiff 1272	15			14	2-1-5 N=6	28.8	
				20			18	3-7-8 N=15	25.9	
2		40.0	**CLAYEY SAND (SC)**, trace gravel, fine to coarse grained, brown and gray, loose 1254	25			15	3-4-3 N=7	25.2	
			gray at 32'	30			16	1-3-3 N=6		
				35	▽		13	1-3-4 N=7	18.6	41
				40			21	4-4-5 N=9	19.1	
			Boring Terminated at 40 Feet							

See Exploration and Testing Procedures for a description of field and laboratory procedures used and additional data (If any).

See Supporting Information for explanation of symbols and abbreviations.

Elevation Reference: Elevation estimated from MnTOPO website

Water Level Observations

▽ Water observed at 5 feet while drilling

▽ Water observed at 37 feet at completion of drilling

▨ Cave in at 8 feet.

Drill Rig
Mobile B-51

Hammer Type
Automatic

Driller
T. Wolfe

Logged by
T. Higgins

Boring Started
09-18-2025

Boring Completed
09-18-2025

Notes

Driller noted borehole cave in at 8 and 38 feet
Equipment Reference:
- Energy Transfer Ratio = 86.9% +/- 1.9%
- Hammer Efficiency Correction = 1.45

Advancement Method
3 1/4" Hollow Stem Auger

Abandonment Method
Borings backfilled with cuttings 0 to 2 feet and neat cement grout to completion

Supporting Information

Contents:

General Notes
Unified Soil Classification System

Terracon
2625 Highway 14 W, Ste F
Rochester, MN

General Notes

Sampling	Water Level	Field Tests
Shelby Tube Split Spoon	Water Initially Encountered Water Level After a Specified Period of Time Water Level After a Specified Period of Time Cave In Encountered Water levels indicated on the soil boring logs are the levels measured in the borehole at the times indicated. Groundwater level variations will occur over time. In low permeability soils, accurate determination of groundwater levels is not possible with short term water level observations.	N Standard Penetration Test Resistance (Blows/Ft.) (HP) Hand Penetrometer (T) Torvane (DCP) Dynamic Cone Penetrometer UC Unconfined Compressive Strength (PID) Photo-Ionization Detector (OVA) Organic Vapor Analyzer

Descriptive Soil Classification

Soil classification as noted on the soil boring logs is based Unified Soil Classification System. Where sufficient laboratory data exist to classify the soils consistent with ASTM D2487 "Classification of Soils for Engineering Purposes" this procedure is used. ASTM D2488 "Description and Identification of Soils (Visual-Manual Procedure)" is also used to classify the soils, particularly where insufficient laboratory data exist to classify the soils in accordance with ASTM D2487. In addition to USCS classification, coarse grained soils are classified on the basis of their in-place relative density, and fine-grained soils are classified on the basis of their consistency. See "Strength Terms" table below for details. The ASTM standards noted above are for reference to methodology in general. In some cases, variations to methods are applied as a result of local practice or professional judgment.

Location And Elevation Notes

Exploration point locations as shown on the Exploration Plan and as noted on the soil boring logs in the form of Latitude and Longitude are approximate. See Exploration and Testing Procedures in the report for the methods used to locate the exploration points for this project. Surface elevation data annotated with +/- indicates that no actual topographical survey was conducted to confirm the surface elevation. Instead, the surface elevation was approximately determined from topographic maps of the area.

Strength Terms

Relative Density of Coarse-Grained Soils
(More than 50% retained on No. 200 sieve.)
Density determined by Standard Penetration Resistance

Relative Density	Standard Penetration or N-Value (Blows/Ft.)
Very Loose	0 - 3
Loose	4 - 9
Medium Dense	10 - 29
Dense	30 - 50
Very Dense	> 50

Consistency of Fine-Grained Soils
(50% or more passing the No. 200 sieve.)
Consistency determined by laboratory shear strength testing, field visual-manual procedures or standard penetration resistance

Consistency	Unconfined Compressive Strength Qu (tsf)	Standard Penetration or N-Value (Blows/Ft.)
Very Soft	less than 0.25	0 - 1
Soft	0.25 to 0.50	2 - 4
Medium Stiff	0.50 to 1.00	4 - 8
Stiff	1.00 to 2.00	8 - 15
Very Stiff	2.00 to 4.00	15 - 30
Hard	> 4.00	> 30

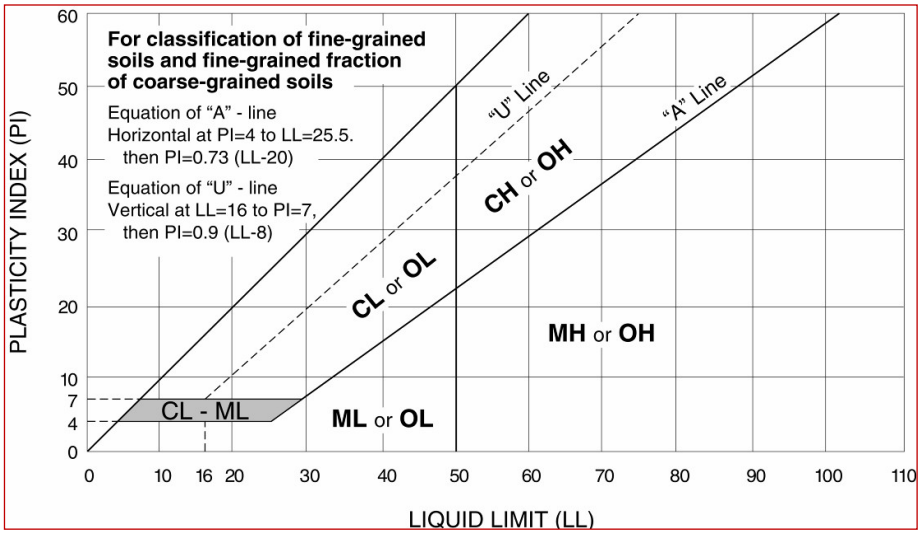
Relevance of Exploration and Laboratory Test Results

Exploration/field results and/or laboratory test data contained within this document are intended for application to the project as described in this document. Use of such exploration/field results and/or laboratory test data should not be used independently of this document.

Unified Soil Classification System

Criteria for Assigning Group Symbols and Group Names Using Laboratory Tests [A]				Soil Classification	
				Group Symbol	Group Name [B]
Coarse-Grained Soils: More than 50% retained on No. 200 sieve	**Gravels:** More than 50% of coarse fraction retained on No. 4 sieve	**Clean Gravels:** Less than 5% fines [C]	Cu≥4 and 1≤Cc≤3 [E]	GW	Well-graded gravel [F]
			Cu<4 and/or [Cc<1 or Cc>3.0] [E]	GP	Poorly graded gravel [F]
		Gravels with Fines: More than 12% fines [C]	Fines classify as ML or MH	GM	Silty gravel [F, G, H]
			Fines classify as CL or CH	GC	Clayey gravel [F, G, H]
	Sands: 50% or more of coarse fraction passes No. 4 sieve	**Clean Sands:** Less than 5% fines [D]	Cu≥6 and 1≤Cc≤3 [E]	SW	Well-graded sand [I]
			Cu<6 and/or [Cc<1 or Cc>3.0] [E]	SP	Poorly graded sand [I]
		Sands with Fines: More than 12% fines [D]	Fines classify as ML or MH	SM	Silty sand [G, H, I]
			Fines classify as CL or CH	SC	Clayey sand [G, H, I]
Fine-Grained Soils: 50% or more passes the No. 200 sieve	**Silts and Clays:** Liquid limit less than 50	**Inorganic:**	PI > 7 and plots above "A" line [J]	CL	Lean clay [K, L, M]
			PI < 4 or plots below "A" line [J]	ML	Silt [K, L, M]
		Organic:	$\frac{LL\ oven\ dried}{LL\ not\ dried} < 0.75$	OL	Organic clay [K, L, M, N]
					Organic silt [K, L, M, O]
	Silts and Clays: Liquid limit 50 or more	**Inorganic:**	PI plots on or above "A" line	CH	Fat clay [K, L, M]
			PI plots below "A" line	MH	Elastic silt [K, L, M]
		Organic:	$\frac{LL\ oven\ dried}{LL\ not\ dried} < 0.75$	OH	Organic clay [K, L, M, P]
					Organic silt [K, L, M, Q]
Highly organic soils:	Primarily organic matter, dark in color, and organic odor			PT	Peat

[A] Based on the material passing the 3-inch (75-mm) sieve.
[B] If field sample contained cobbles or boulders, or both, add "with cobbles or boulders, or both" to group name.
[C] Gravels with 5 to 12% fines require dual symbols: GW-GM well-graded gravel with silt, GW-GC well-graded gravel with clay, GP-GM poorly graded gravel with silt, GP-GC poorly graded gravel with clay.
[D] Sands with 5 to 12% fines require dual symbols: SW-SM well-graded sand with silt, SW-SC well-graded sand with clay, SP-SM poorly graded sand with silt, SP-SC poorly graded sand with clay.
[E] $Cu = D_{60}/D_{10}$ $\quad Cc = \frac{(D_{30})^2}{D_{10} \times D_{60}}$
[F] If soil contains ≥ 15% sand, add "with sand" to group name.
[G] If fines classify as CL-ML, use dual symbol GC-GM, or SC-SM.
[H] If fines are organic, add "with organic fines" to group name.
[I] If soil contains ≥ 15% gravel, add "with gravel" to group name.
[J] If Atterberg limits plot in shaded area, soil is a CL-ML, silty clay.
[K] If soil contains 15 to 29% plus No. 200, add "with sand" or "with gravel," whichever is predominant.
[L] If soil contains ≥ 30% plus No. 200 predominantly sand, add "sandy" to group name.
[M] If soil contains ≥ 30% plus No. 200, predominantly gravel, add "gravelly" to group name.
[N] PI ≥ 4 and plots on or above "A" line.
[O] PI < 4 or plots below "A" line.
[P] PI plots on or above "A" line.
[Q] PI plots below "A" line.



Albert Lea M500 E-line

NL27 Albert Lea M500E Extension

Subsurface Exploration and Lab Testing Report

New Richland, Minnesota

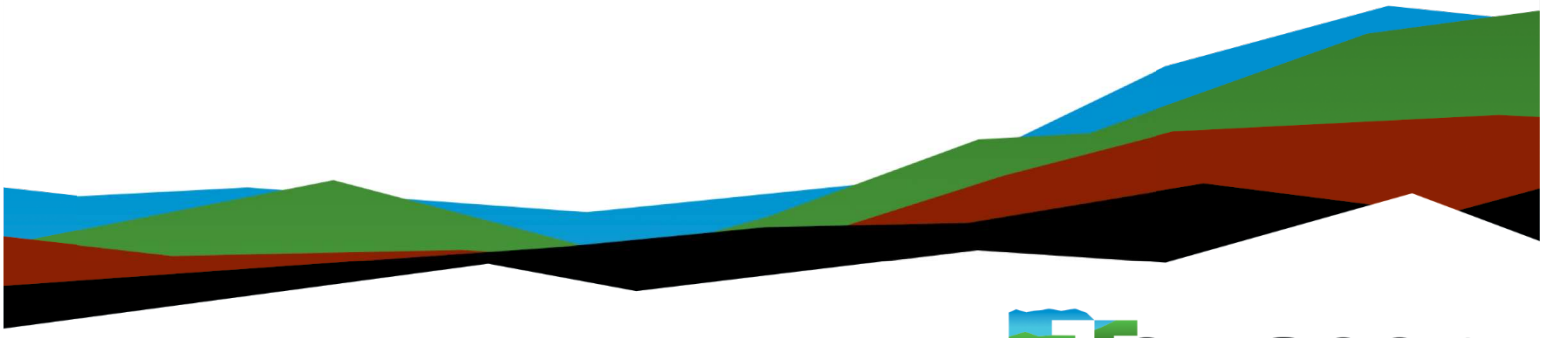
October 24, 2025 | Terracon Project No. JY255044

Prepared for:

Stantec Consulting Services Inc.
200-325 25 Street Southeast
Calgary, Alberta, Canada T2A 7H8

Prepared by:

Terracon Consultants



Terracon
Explore with us
Nationwide
Terracon.com
Facilities
Environmental
Geotechnical
Materials

2625 Highway 14 W, Suite F
Rochester, Minnesota 55901
P (507) 722-7365
Terracon.com

October 24, 2025

Stantec Consulting Services Inc.
200-325 25 Street Southeast
Calgary, Alberta, Canada T2A 7H8

Attn: Ginger Chan
P: (587) 437-5068
E: ginger.chan@stantec.com

Re: Subsurface Exploration and Lab Testing Report
NL27 Albert Lea M500E Extension
Task Order No. 060246-091002
New Richland, Minnesota
Terracon Project No. JY255044

Dear Ms. Chan:

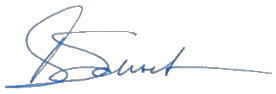
We have performed geotechnical services for the above referenced project in general accordance with Task Order No. 060246-091002, authorization via email dated July 28, 2025, and Change Order No. 001 dated August 19, 2025. This report presents the findings of the subsurface exploration for borings BH-01 through BH-04, BH-07, and BH-07A for the proposed project.

We appreciate the opportunity to be of service to you on this project. If you have any questions concerning this report or if we may be of further service, please contact us.

Sincerely,

Terracon





Kyle T. Schmidt, EIT
Staff Engineer

Debra A. Schroeder, PE
Senior Engineer

Table of Contents

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Site Location and Exploration Plans
Exploration and Laboratory Results
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Note: This report was delivered in a web-based format. **Blue Bold** text in the report indicates a referenced section heading. The PDF version also includes hyperlinks which direct the reader to that section and clicking on the Terracon logo will bring you back to this page. For more interactive features, please view your project online at **client.terracon.com**.

Refer to each individual Attachment for a listing of contents.

Introduction

This Subsurface Exploration and Lab Testing Report presents the results of our subsurface exploration and geotechnical engineering services performed for the proposed pipeline corridor.

The purpose of these services was to provide information relative to:

- Subsurface soil conditions
- Groundwater conditions

The geotechnical engineering Scope of Services for this project included the advancement of six test borings (BH-01 through BH-04, BH-07, and BH-07A) to depths ranging from about 40 to 101.5 feet below existing site grades.

Due to the locations of the agricultural drain-tiles, Boring BH-03 was moved south from the proposed boring location.

In addition to geotechnical soil sampling, environmental soil sampling was performed on samples collected at approximately 10 feet above the bottom of each borehole. And sent to a national laboratory for testing. As an exception at BH-03, due to encountering what was thought to be apparent bedrock, the environmental soil sample was obtained at a depth of approximately 85 feet below the existing ground surface instead of at 90 feet. The results of these tests are provided under a separate cover.

Maps showing the site and boring locations are shown on the **Site Location** and **Exploration Plans**, respectively. The results of the laboratory testing performed on geotechnical soil samples obtained from the site during our field exploration are included on the boring logs and/or as separate graphs in the **Exploration and Laboratory Results** section.

Site Conditions

The following description of site conditions is derived from our site visit in association with the field exploration and our review of publicly available geologic and topographic maps.

Item	Description
Site Location	The project is located in New Richland, Minnesota. Latitude/Longitude (approximate): 43.8896°, -93.3834° See **Site Location** and **Exploration Plan**.
Current Ground Cover	Moderately vegetated with grasses, low brush, trees, and agricultural crops.
Geology	Our investigation and review of geologic maps and well logs indicated subsurface conditions mainly consist of glacial till, outwash sand, and interbedded silt and clay deposits.

Project Description

Our final understanding of the project conditions is as follows:

Item	Description
Information Provided	An email request for proposal was provided by Stantec on June 23, 2025. The request included a Google Earth .kmz file showing the location and depths of the requested borings for planned projects. Since this original request we have been notified via email of changes to the project scope and timelines. Our current understanding of the final scope of services is presented in this report.
Project Description	The project consists of a pipeline extension section near New Richland, Minnesota. The proposed subsurface investigation will help Stantec assess the technical feasibility and constructability of using various trenchless or trenched pipe installation methods to install the new pipeline at various crossings along the proposed pipeline corridor.

Geotechnical Characterization

Subsurface Profile

We have developed a general characterization of the subsurface conditions based upon our review of the subsurface exploration, geologic setting and our understanding of the project. This characterization, termed GeoModel, forms the basis of our geotechnical evaluation of the site. Conditions observed at each exploration point are indicated on the individual logs. The individual logs can be found in the **Exploration and Laboratory Results** and the GeoModel can be found in the **Figures** attachment of this report.

As part of our analyses, we identified the following model layers within the subsurface profile. For an approximate elevation view of the model layer depths at each boring location, refer to the GeoModel.

Model Layer	Layer Name	General Description
1	**Surficial Layer**	Topsoil, approximately 3 to 18 inches.
2	**Native Fine Soils**	Clays and silts (CL, ML) with varying amounts of sands and gravels, with occasional trace organics near the surface and cobbles at lower depths, brown and gray in color, very soft to hard in consistency.
3	**Native Granular soils**	Poorly graded sands (SP, SP-SM, SP-SC, SC), fine to coarse grained, with varying amounts of fines and gravels, with occasional silt seams and cobbles, brown, gray, and red in color, loose to dense in relative density.
4	**Organic Silt**	Organic silt with peat seams, black and dark gray in color, and very soft in consistency.
5	**Native Gravels**	Sandy gravel (GP), fine to coarse grained, with probable cobbles or boulders, gray in color, and very dense in relative density.

Groundwater Conditions

The boreholes were observed while drilling for the presence and level of groundwater. The water levels observed in the boreholes can be found on the boring logs in **Exploration and Laboratory Results**.

Groundwater was observed during drilling at depths ranging from about 23 to 46 feet below the existing ground surface at the boring BH-01, BH-02, and BH-07 locations.

Groundwater was not observed at borings BH-03, BH-04, and BH-07A; however, mud rotary drilling techniques in boring BH-03 may have resulted in the water level not being recognized. A relatively long period can be necessary for a groundwater level to develop and stabilize in a borehole; however, groundwater level observations made within granular soils are usually a reliable indication of the current groundwater conditions. Long-term observations in piezometers or observation wells, sealed from the influence of surface water, are recommended if it is necessary to better define groundwater levels.

Groundwater level fluctuations occur due to seasonal variations in the amount of rainfall, runoff, and other factors not evident at the time the borings were performed. Therefore, groundwater levels during construction or at other times in the life of the pipeline will vary. The possibility of groundwater level fluctuations should be considered when developing the design and construction plans for the project.

General Comments

Our report presents the results of our fieldwork and laboratory tests. Natural variations will occur between exploration point locations or due to the modifying effects of construction or weather. The nature and extent of such variations may not become evident until during or after construction. Terracon should be retained to review the final design plans and specifications so comments can be made regarding interpretation of the results of our geotechnical investigation. Terracon should be retained to provide observation and testing services during earth-related construction phases of the project. If variations appear, we can provide further evaluation and supplemental recommendations. If variations are noted in the absence of our observation and testing services on-site, we should be immediately notified so that we can provide additional evaluation and supplemental recommendations.

Our Scope of Services included specific environmental testing as noted above; however, it does not include either specifically or by implication any environmental or biological (e.g., mold, fungi, bacteria) assessment of the site or identification or prevention of pollutants, hazardous materials or conditions. If the owner is concerned about the potential for such contamination or pollution, other studies should be undertaken.

Our services and any correspondence are intended for the sole benefit and exclusive use of our client for specific application to the project discussed and are accomplished in accordance with generally accepted geotechnical engineering practices with no third-party beneficiaries intended. Any third-party access to services or correspondence is solely for information purposes to support the services provided by Terracon to our client. Reliance upon the services and any work product is limited to our client and is not intended for third parties. Any use or reliance of the provided information by third parties is done solely at their own risk. No warranties, either express or implied, are intended or made.

Site characteristics as provided are for design purposes and not to estimate excavation cost. Any use of our report in that regard is done at the sole risk of the excavating cost estimator as there may be variations on the site that are not apparent in the data that could significantly affect excavation cost. Any parties charged with estimating excavation costs should seek their own site characterization for specific purposes to obtain the specific level of detail necessary for costing. Site safety and cost estimating including excavation support and dewatering requirements/design are the responsibility of others. Construction and site development have the potential to affect adjacent properties. Such impacts can include damages due to vibration, modification of groundwater/surface water flow during construction, foundation movement due to undermining or subsidence from excavation, as well as noise or air quality concerns. Evaluation of these items on nearby properties are commonly associated with contractor means and methods and are not addressed in this report. The owner and contractor should consider a preconstruction/precondition survey of surrounding development. If changes in the nature, design, or location of the project are planned, the results presented in this factual report shall not be considered valid unless we review the changes and either verify or modify our conclusions in writing.

Figures

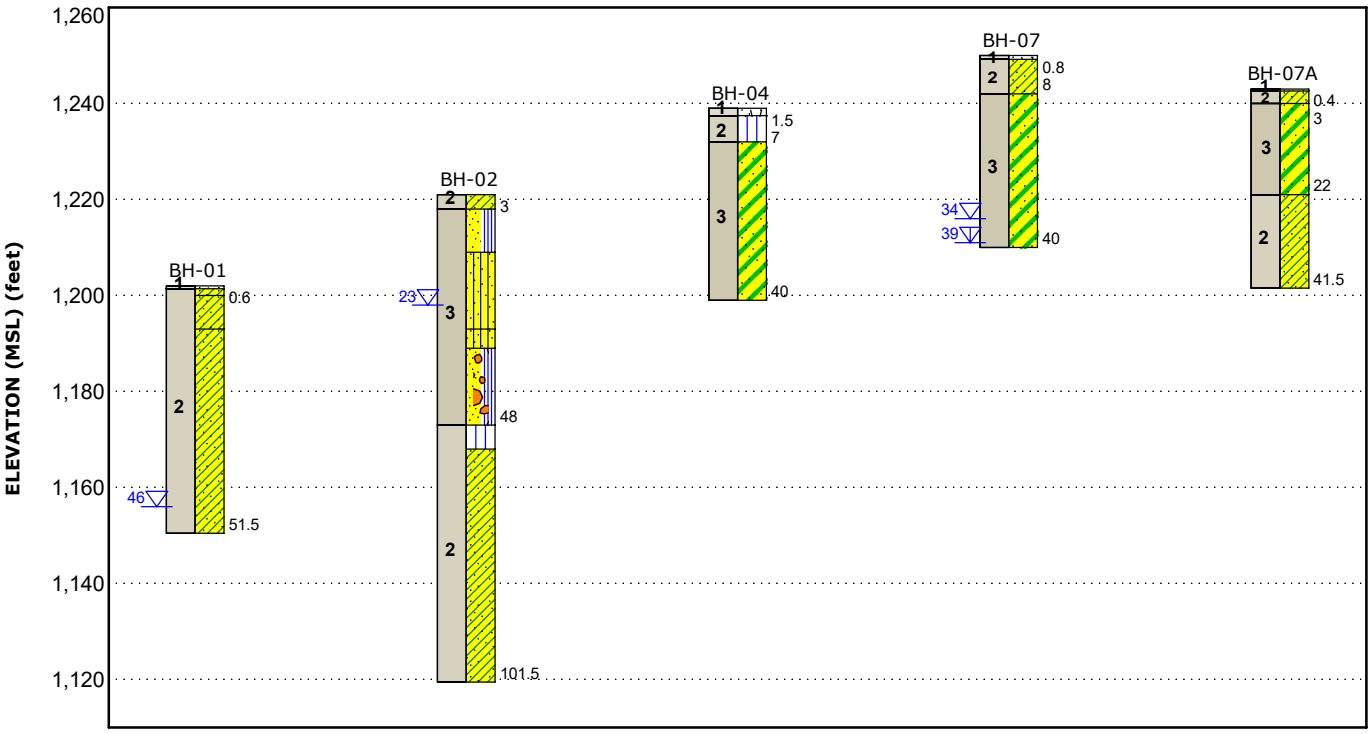
Contents:

GeoModel

NL27 Albert Lea M500E Extension
| New Richland, MN
Terracon Project No. JY255044

2625 Highway 14 W, Ste F
Rochester, MN

GeoModel



This is not a cross section. This is intended to display the Geotechnical Model only. See individual logs for more detailed conditions.

Model Layer	Layer Name	General Description
1	**Surficial Layer**	Topsoil, approximately 3 to 18 inches.
2	**Native Fine Soils**	Clays and silts (CL, ML) with varying amounts of sands and gravels, with occasional trace organics near the surface and cobbles at lower depths, brown and gray in color, very soft to hard in consistency.
3	**Native Granular soils**	Poorly graded sands (SP, SP-SM, SP-SC, SC), fine to coarse grained, with varying amounts of fines and gravels, with occasional silt seams and cobbles, brown, gray, and red in color, loose to dense in relative density.
4	**Organic Silt**	Organic silt with peat seams, black and dark gray in color, and very soft in consistency.
5	**Native Gravels**	Sandy gravel (GP), fine to coarse grained, with probable cobbles or boulders, gray in color, and very dense in relative density.

Legend

- Topsoil
- Poorly-graded Sand with Silt
- Poorly-graded Sand with Silt and Gravel
- Clayey Sand
- Sandy Lean Clay
- Silty Sand
- Silt

▽ First Water Observation
▽ Second Water Observation

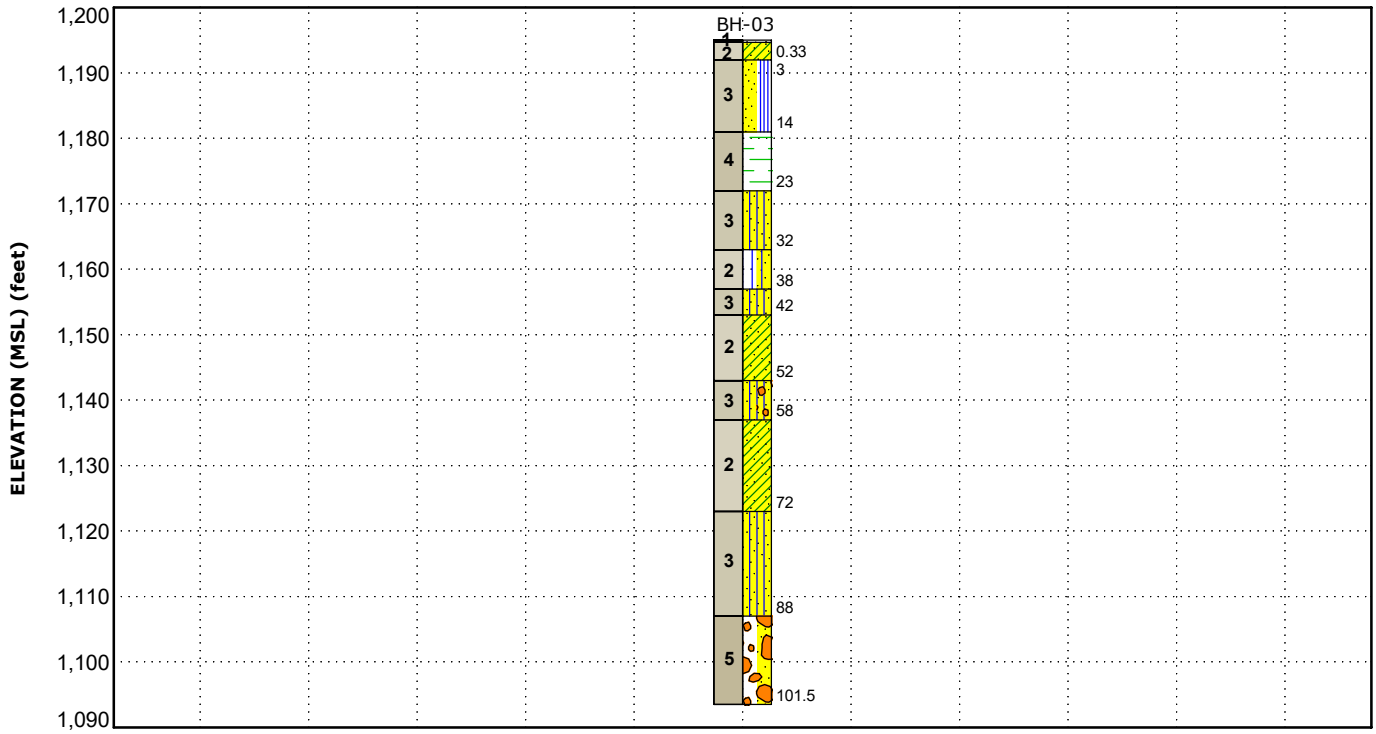
Groundwater levels are temporal. The levels shown are representative of the date and time of our exploration. Significant changes are possible over time.
Water levels shown are as measured during and/or after drilling. In some cases, boring advancement methods mask the presence/absence of groundwater. See individual logs for details.

NOTES:
Layering shown on this figure has been developed by the geotechnical engineer for purposes of modeling the subsurface conditions as required for the subsequent geotechnical engineering for this project. Numbers adjacent to soil column indicate depth below ground surface.

NL27 Albert Lea M500E Extension
| New Richland, MN
Terracon Project No. JY255044

Terracon
2625 Highway 14 W, Ste F
Rochester, MN

GeoModel



This is not a cross section. This is intended to display the Geotechnical Model only. See individual logs for more detailed conditions.

Model Layer	Layer Name	General Description
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Legend

- Topsoil
- Poorly-graded Sand with Silt
- Silty Sand
- Silty Sand with Gravel
- Sandy Lean Clay
- Organic Silt
- Silt with Sand
- Poorly-graded Gravel with Sand

▽ First Water Observation
▽ Second Water Observation

Groundwater levels are temporal. The levels shown are representative of the date and time of our exploration. Significant changes are possible over time.
Water levels shown are as measured during and/or after drilling. In some cases, boring advancement methods mask the presence/absence of groundwater. See individual logs for details.

NOTES:
Layering shown on this figure has been developed by the geotechnical engineer for purposes of modeling the subsurface conditions as required for the subsequent geotechnical engineering for this project. Numbers adjacent to soil column indicate depth below ground surface.

Attachments

Exploration and Testing Procedures

Field Exploration

Boring Numbers	Boring Depths (feet)	Location
BH-01	51.5	43.8896° N, 93.3835° W
BH-02	101.5	43.8965° N, 93.3843° W
BH-03	101.5	43.8986° N, 93.3850° W
BH-04	40	43.9063° N, 93.3843° W
BH-07	40	43.9205° N, 93.3819° W
BH-07A	41.5	43.9204° N, 93.3759° W

Boring Layout and Elevations: Stantec representatives staked the boring locations. We were provided with the Google Earth kmz file showing the boring locations and these locations are shown on the **Exploration Plans**. The approximate coordinates of the borings are indicated on the boring logs. Approximate ground surface elevations were estimated using the Minnesota Department of Natural Resources, MnTOPO LiDAR map and reported on the logs to the nearest foot. If more accurate boring locations and surface elevations are desired, we recommend the boring locations be surveyed.

Subsurface Exploration Procedures: We advanced the borings with ATV and track-mounted rotary drill rigs using continuous flight augers and mud-rotary drilling techniques. Split-spoon samples were obtained at intervals of 5 feet. In the split-barrel sampling procedure, a standard 2-inch outer diameter split-barrel sampling spoon was driven into the ground by a 140-pound automatic hammer falling a distance of 30 inches. The number of blows required to advance the sampling spoon the last 12 inches of a normal 18-inch penetration (the second and third 6 inches of penetration for a 24-inch penetration) is recorded as the Standard Penetration Test (SPT) resistance value. The SPT resistance values, also referred to as N-values, are indicated on the boring logs at the test depths. The samples were placed in appropriate containers and transported to our laboratory for testing. We observed and recorded groundwater levels during drilling and sampling.

The boreholes were backfilled with grout/neat cement after completion to within 2 feet of the ground surface. The boreholes were backfilled with auger cuttings from a depth of 2 feet to the ground surface.

The drill crew prepared a field log of each boring to record field data including visual descriptions of the materials encountered during drilling as well as the driller's interpretation of the subsurface conditions between samples. The boring logs included

with this report represent an interpretation of the subsurface conditions at each boring location based on field data and observation of the samples.

Laboratory Testing

The project engineer reviewed the field data and assigned laboratory tests. The laboratory testing program included the following tests on retrieved soil samples:

Geotechnical Testing

- Moisture Content
- Grain size analysis
- Atterberg Limits (3-point)
- Organic Content

The laboratory testing program included examination of soil samples. Based on the results of our field and laboratory programs, we described and classified the soil samples in general accordance with the Unified Soil Classification System.

The environmental laboratory tests that were performed are shown below. The results of these tests are provided under a separate cover.

Environmental Testing

- TPH-DRO (total petroleum hydrocarbons – diesel range organics)
- TCLP 8 RCRA metals
- BTEX/GRO
- TCLP herbicides
- TCLP pesticides

Site Location and Exploration Plans

Contents:

Site Location Plan
Exploration Plan

Note: All attachments are one page unless noted above.

Site Location



DIAGRAM IS FOR GENERAL LOCATION ONLY, AND IS NOT INTENDED FOR CONSTRUCTION PURPOSES

MAP PROVIDED BY MICROSOFT BING MAPS

Exploration Plan



DIAGRAM IS FOR GENERAL LOCATION ONLY, AND IS NOT INTENDED FOR CONSTRUCTION PURPOSES MAP PROVIDED BY MICROSOFT BING MAPS

Exploration and Laboratory Results

Contents:

Boring Logs (BH-01 through BH-04, BH-07, and BH-07A)
Grain Size Distribution
Atterberg Limits

NL27 Albert Lea M500E Extension
| New Richland, MN
Terracon Project No. JY255044

Terracon
2625 Highway 14 W, Ste F
Rochester, MN

Boring Log No. BH-01

Location: See Exploration Plan

Latitude: 43.8896° Longitude: -93.3835°

Depth (Ft.) Elevation: 1202 (Ft.) +/-

Model Layer	Depth (Ft.)	Elevation (Ft.)	Description	Water Level Observations	Sample Type	Recovery (In.)	Field Test Results	Organic Content (%)	Water Content (%)	Atterberg Limits LL-PL-PI	Percent Fines
1	0.6	1201.4	**TOPSOIL**, Approximately 7 inches								
	2.0	1200	**SANDY LEAN CLAY (CL)**, trace gravel, trace roots, dark gray, medium stiff								
			SANDY LEAN CLAY (CL), trace gravel, silt seams, grayish brown, very soft			7	3-3-3 N=6		26.6		
						12	0-0-1 N=1		26.3		57
	9.0	1193	**SANDY LEAN CLAY (CL)**, trace gravel, gray, medium stiff to very stiff			18	2-2-3 N=5		17.3		
						18	2-3-3 N=6		17.8		
						18	2-3-4 N=7		20.2		
2						18	3-4-5 N=9		18.7		64
						18	4-5-6 N=11		12.3		
						18	2-2-3 N=5		14.1		
						18	3-5-7 N=12		23.9		
				▽		17	4-6-10 N=16				
	51.5	1150.5				3	5-7-11 N=18				
			Boring Terminated at 51.5 Feet								

See Exploration and Testing Procedures for a description of field and laboratory procedures used and additional data (If any).

See Supporting Information for explanation of symbols and abbreviations.

Elevation Reference: Elevation estimated from MnTOPO website

Water Level Observations
▽ Water observed at 46 feet while drilling

Drill Rig
CME-550X

Hammer Type
Automatic

Driller
M. Nunez

Logged by
R. Rodriguez

Boring Started
09-09-2025

Boring Completed
09-09-2025

Notes
Equipment Reference:
- Energy Transfer Ratio = 89.8% +/- 3.2%
- Hammer Efficiency Correction = 1.50

Advancement Method
3 1/4" Hollow Stem Auger

Abandonment Method
Boring backfilled with cuttings from 0 to 2 feet and neat cement grout to completion

Terracon
2625 Highway 14 W, Ste F
Rochester, MN

Boring Log No. BH-02

Location: See Exploration Plan

Latitude: 43.8965° Longitude: -93.3843°

Depth (Ft.) Elevation: 1221 (Ft.) +/-

Model Layer	Graphic Log	Depth (Ft.)	Water Level Observations	Sample Type	Recovery (In.)	Field Test Results	Organic Content (%)	Water Content (%)	Atterberg Limits LL-PL-PI	Percent Fines
2		**SANDY LEAN CLAY (CL)**, trace gravel, brown, stiff 3.0 1218			9	3-6-8 N=14		17.7		60
3		**POORLY GRADED SAND WITH SILT (SP-SM)**, trace gravel, fine grained, brown, medium dense 12.0 1209			7	5-8-8 N=16		5.6		
		SILTY SAND (SM), trace gravel, silt seams, fine to medium grained, brown, medium dense			9	3-5-8 N=13		8.4		12
					14	10-10-12 N=22		22.6		25
			▽		12	6-7-8 N=15		24.1		
		Potential cobbles at 26 to 28' 28.0 1193			10	5-6-10 N=16		30.5		
		SILTY SAND (SM), fine grained, gray, medium dense 32.0 1189			10	12-11-10 N=21		26.6		
		POORLY GRADED SAND WITH SILT AND GRAVEL (SP-SM), fine to medium grained, gray, dense to medium dense			8	28-26-13 N=39				
		Hit a rock at 35-36.5'			14	14-16-19 N=35				10
		48.0 1173			12	10-10-13 N=23				
2		**SILT (ML)**, gray, hard 53.0 1168			16	9-15-32 N=47		23.6		88
		Potential cobbles at 52.5 to 53'								
		SANDY LEAN CLAY (CL), trace gravel, gray, hard to very stiff			18	11-20-30 N=50		18.7		

See Exploration and Testing Procedures for a description of field and laboratory procedures used and additional data (If any).

See Supporting Information for explanation of symbols and abbreviations.

Elevation Reference: Elevation estimated from MnTOPO website

Water Level Observations
▽ Water observed at 23 feet while drilling.

Drill Rig
CME-550X

Hammer Type
Automatic

Driller
M. Nunez

Logged by
R. Rodriguez

Boring Started
09-09-2025

Boring Completed
09-09-2025

Notes
Equipment Reference:
- Energy Transfer Ratio = 89.8% +/- 3.2%
- Hammer Efficiency Correction = 1.50

Advancement Method
0-10' Hollow Stem Auger 3 1/4"
10-101.5' - Mud Rotary

Abandonment Method
Boring backfilled with cuttings from 0 to 2 feet and neat cement grout to completion

Terracon
2625 Highway 14 W, Ste F
Rochester, MN

Boring Log No. BH-02

Location: See Exploration Plan

Latitude: 43.8965° Longitude: -93.3843°

Depth (Ft.) Elevation: 1221 (Ft.) +/-

Model Layer	Graphic Log	Depth (Ft.)	Water Level Observations	Sample Type	Recovery (In.)	Field Test Results	Organic Content (%)	Water Content (%)	Atterberg Limits LL-PL-PI	Percent Fines
2		**SANDY LEAN CLAY (CL)**, trace gravel, gray, hard to very stiff *(continued)*								
		60			16	11-13-20 N=33		17.8	34-18-16	63
		65			18	9-13-15 N=28		19.6		
		70			16	6-10-16 N=26		18.8		
		75			18	6-10-15 N=25		19.7		
		80			18	8-9-15 N=24		15.1		58
		85			17	8-10-15 N=25		14.6		
		90			18	9-9-14 N=23				
		95			18	10-12-15 N=27		20.2		
		100			16	10-11-15 N=26		19.7		
		101.5 1119.5								
		Boring Terminated at 101.5 Feet								

See Exploration and Testing Procedures for a description of field and laboratory procedures used and additional data (If any).

See Supporting Information for explanation of symbols and abbreviations.

Elevation Reference: Elevation estimated from MnTOPO website

Water Level Observations
Water observed at 23 feet while drilling.

Drill Rig
CME-550X

Hammer Type
Automatic

Driller
M. Nunez

Logged by
R. Rodriguez

Boring Started
09-09-2025

Boring Completed
09-09-2025

Notes
Equipment Reference:
- Energy Transfer Ratio = 89.8% +/- 3.2%
- Hammer Efficiency Correction = 1.50

Advancement Method
0-10' Hollow Stem Auger 3 1/4"
10-101.5' - Mud Rotary

Abandonment Method
Boring backfilled with cuttings from 0 to 2 feet and neat cement grout to completion

Terracon
2625 Highway 14 W, Ste F
Rochester, MN

Boring Log No. BH-03

Location: See Exploration Plan

Latitude: 43.8986° Longitude: -93.3850°

Model Layer	Graphic Log	Depth (Ft.)	Elevation: 1195 (Ft.) +/-	Depth (Ft.)	Water Level Observations	Sample Type	Recovery (In.)	Field Test Results	Organic Content (%)	Water Content (%)	Atterberg Limits LL-PL-PI	Percent Fines
1		0.3	**TOPSOIL**, Approximately 4 inches 1194.67									
2		3.0	**SANDY LEAN CLAY (CL)**, trace gravel, trace organics, dark brown, medium stiff 1192				8	2-2-3 N=5		38.2		
3		14.0	**POORLY GRADED SAND WITH SILT (SP-SM)**, trace gravel, fine to coarse grained, gray, very loose 1181	5			3	0-0-2 N=2				
				10			9	0-0-0 N=0		18.8		9
4		23.0	**ORGANIC SILT (OL)**, peat seams, black and dark gray, very soft 1172	15			18	0-0-0 N=0	8.7			
				20			18	0-0-0 N=0				
3		32.0	**SILTY SAND (SM)**, fine grained, gray, loose 1163	25			5	3-4-3 N=7		35.2		
				30			18	3-4-4 N=8		31.8		46
2		38.0	**SILT WITH SAND (ML)**, trace gravel, gray, medium stiff 1157	35			18	3-4-4 N=8		24.9		82
3		42.0	**SILTY SAND (SM)**, fine grained, gray, medium dense 1153	40			15	7-8-10 N=18		20.5		31
2		52.0	**SANDY LEAN CLAY (CL)**, trace gravel, gray, stiff 1143	45			18	3-4-6 N=10		18.6		50
				50			17	3-5-5 N=10		22.2		
3		58.0	**SILTY SAND WITH GRAVEL (SM)**, fine to coarse grained, gray, medium dense 1137	55			4	3-4-7 N=11				

See Exploration and Testing Procedures for a description of field and laboratory procedures used and additional data (If any).

See Supporting Information for explanation of symbols and abbreviations.

Elevation Reference: Elevation estimated from MnTOPO website

Water Level Observations
No free water observed

Drill Rig
CME-550X

Hammer Type
Automatic

Driller
M. Nunez

Logged by
R. Rodriguez

Boring Started
09-12-2025

Boring Completed
09-12-2025

Notes
Equipment Reference:
- Energy Transfer Ratio = 89.8% +/- 3.2%
- Hammer Efficiency Correction = 1.50

Advancement Method
0-10' - Hollow Stem Auger 3 1/4"
10-90' - Mud Rotary
90-92' - Core
92-101.5 - Mud Rotary

Abandonment Method
Boring backfilled with cuttings from 0 to 2 feet and neat cement grout to completion

Terracon
2625 Highway 14 W, Ste F
Rochester, MN

Boring Log No. BH-03

Location: See Exploration Plan

Latitude: 43.8986° Longitude: -93.3850°

Depth (Ft.) Elevation: 1195 (Ft.) +/-

Model Layer	Graphic Log	Depth (Ft.)	Water Level Observations	Sample Type	Recovery (In.)	Field Test Results	Organic Content (%)	Water Content (%)	Atterberg Limits LL-PL-PI	Percent Fines
2		**SANDY LEAN CLAY (CL)**, trace gravel, gray, very stiff to hard								
					12	10-8-11 N=19		18.4		
		Hit a rock at 65-66.5'			18	10-16-20 N=36		20.9		
					18	11-15-24 N=39		18.6		56
		72.0 1123								
3		**SILTY SAND (SM)**, trace gravel, fine to medium grained, gray, medium dense to dense			15	8-12-14 N=26		28.0		
					15	6-14-16 N=30		20.6		12
					16	12-15-15 N=30				
		88.0 1107								
5		**SANDY GRAVEL (GP)**, fine to coarse grained, gray, very dense								
		Hit rock at 90-92'								
					2	50/2"				
					2	50/3"				
		101.5 1093.5								
		Boring Terminated at 101.5 Feet								

Depth (Ft.): 60, 65, 70, 75, 80, 85, 90, 95, 100

See Exploration and Testing Procedures for a description of field and laboratory procedures used and additional data (If any).

See Supporting Information for explanation of symbols and abbreviations.

Elevation Reference: Elevation estimated from MnTOPO website

Water Level Observations
No free water observed

Drill Rig
CME-550X

Hammer Type
Automatic

Driller
M. Nunez

Logged by
R. Rodriguez

Boring Started
09-12-2025

Boring Completed
09-12-2025

Notes
Equipment Reference:
- Energy Transfer Ratio = 89.8% +/- 3.2%
- Hammer Efficiency Correction = 1.50

Advancement Method
0-10' - Hollow Stem Auger 3 1/4"
10-90' - Mud Rotary
90-92' - Core
92-101.5 - Mud Rotary

Abandonment Method
Boring backfilled with cuttings from 0 to 2 feet and neat cement grout to completion

Terracon
2625 Highway 14 W, Ste F
Rochester, MN

Boring Log No. BH-04

Location: See Exploration Plan

Latitude: 43.9063° Longitude: -93.3843°

Model Layer	Graphic Log	Depth (Ft.)	Elevation: 1239 (Ft.) +/-	Depth (Ft.)	Water Level Observations	Sample Type	Recovery (In.)	Field Test Results	Organic Content (%)	Water Content (%)	Atterberg Limits LL-PL-PI	Percent Fines
1		1.5	**TOPSOIL**, Approximately 18 inches 1237.5									
2		7.0	**SILT WITH CLAY (ML)**, trace gravel, mottled - brown, gray, and red, medium stiff 1232	5			17	2-2-2-2 N=4		20.4		
							9	2-3-3 N=6		23.7		
3		40.0	**CLAYEY SAND (SC)**, trace gravel, fine to medium grained, brown, gray, and red, loose to medium dense gray at 17' 1199	10			18	3-3-4 N=7		21.5		
				15			18	5-6-9 N=15		20.0		49
				20			18	3-5-6 N=11		16.7		
				25			18	2-4-6 N=10		17.6		
				30			18	4-5-7 N=12		17.0		
				35			18	4-5-7 N=12		16.1		47
				40			18	5-5-7 N=12		16.8		
			Boring Terminated at 40 Feet									

See Exploration and Testing Procedures for a description of field and laboratory procedures used and additional data (If any).

See Supporting Information for explanation of symbols and abbreviations.

Elevation Reference: Elevation estimated from MnTOPO website

Water Level Observations
No free water observed

Drill Rig
CME-550X

Hammer Type
Automatic

Driller
M. Nunez

Notes
Equipment Reference:
- Energy Transfer Ratio = 89.8% +/- 3.2%
- Hammer Efficiency Correction = 1.50

Advancement Method
3 1/4" Hollow Stem Auger

Abandonment Method
Boring backfilled with cuttings from 0 to 2 feet and neat cement grout to completion

Logged by
R. Rodriguez

Boring Started
08-01-2025

Boring Completed
08-01-2025

Terracon
2625 Highway 14 W, Ste F
Rochester, MN

Boring Log No. BH-07

Location: See Exploration Plan

Latitude: 43.9205° Longitude: -93.3819°

Depth (Ft.) Elevation: 1250 (Ft.) +/-

Model Layer	Graphic Log	Depth (Ft.)	Water Level Observations	Sample Type	Recovery (In.)	Field Test Results	Organic Content (%)	Water Content (%)	Atterberg Limits LL-PL-PI	Percent Fines
1		0.8 **TOPSOIL**, Approximately 9 inches 1249.2								
2		**SANDY LEAN CLAY (CL)**, trace gravel, brown and gray, medium stiff			12	1-2-2-2 N=4		25.5		
					13	2-3-3 N=6		26.0		
		8.0 1242								
3		**CLAYEY SAND (SC)**, trace gravel, fine to medium grained, brown and gray, loose to medium dense			16	2-3-6 N=9		19.4		47
					19					
		gray only at 17'			14	3-2-2 N=4		16.8		
					18	3-2-4 N=6		17.1		46
					19	1-3-5 N=8				
			▽		19	0-2-4 N=6		17.2		
			▽		22	3-5-5 N=10		17.9		
		40.0 1210								
		Boring Terminated at 40 Feet								

Depth (Ft.): 5, 10, 15, 20, 25, 30, 35, 40

See Exploration and Testing Procedures for a description of field and laboratory procedures used and additional data (If any).

See Supporting Information for explanation of symbols and abbreviations.

Elevation Reference: Elevation estimated from MnTOPO website

Water Level Observations

▽ Water observed at 34 feet while drilling

▽ Water observed at 39 feet at completion of drilling

Drill Rig
Mobile B-51

Hammer Type
Automatic

Driller
T. Wolfe

Logged by
T. Higgins

Boring Started
08-05-2025

Boring Completed
08-05-2025

Notes

Equipment Reference:
- Energy Transfer Ratio: =86.9% +/- 1.9%
- Hammer Efficiency Correction: =1.45

Advancement Method
3 1/4" Hollow Stem Auger

Abandonment Method
Boring backfilled with cuttings from 0 to 2 feet and neat cement grout to completion

Terracon
2625 Highway 14 W, Ste F
Rochester, MN

Boring Log No. BH-07A

Location: See Exploration Plan

Latitude: 43.9204° Longitude: -93.3759°

Model Layer	Graphic Log	Depth (Ft.)	Elevation: 1243 (Ft.) +/-	Depth (Ft.)	Water Level Observations	Sample Type	Recovery (In.)	Field Test Results	Organic Content (%)	Water Content (%)	Atterberg Limits LL-PL-PI	Percent Fines
1		0.4	**TOPSOIL**, Approximately 5 inches									
2		1242.6										
			SANDY LEAN CLAY (CL), trace gravel, brown and gray, medium stiff				5	2-3-3 N=6				
		3.0										
		1240										
3			**CLAYEY SAND (SC)**, trace gravel, fine to medium grained, brown and gray, loose to medium dense	5			11	3-4-5 N=9		18.1		45
				10			18	5-6-9 N=15		17.5		
			gray at 15'	15			13	2-4-6 N=10		15.0		49
		22.0		20			18	2-4-7 N=11		14.6		
		1221										
2			**SANDY LEAN CLAY (CL)**, trace gravel, gray, medium stiff to stiff	25			18	3-4-6 N=10		17.2		
				30			18	2-3-5 N=8		17.4		51
				35			18	3-6-6 N=12		17.1		
		41.5		40			18	3-5-6 N=11		18.0		
		1201.5										
			Boring Terminated at 41.5 Feet									

See Exploration and Testing Procedures for a description of field and laboratory procedures used and additional data (If any).

See Supporting Information for explanation of symbols and abbreviations.

Elevation Reference: Elevation estimated from MnTOPO website

Water Level Observations
No free water observed

Drill Rig
CME-550X

Hammer Type
Automatic

Driller
M. Nunez

Notes
Equipment Reference:
- Energy Transfer Ratio = 89.8% +/- 3.2%
- Hammer Efficiency Correction = 1.50

Advancement Method
3 1/4" Hollow Stem Auger

Abandonment Method
Boring backfilled with cuttings from 0 to 2 feet and neat cement grout to completion

Logged by
R. Rodriguez

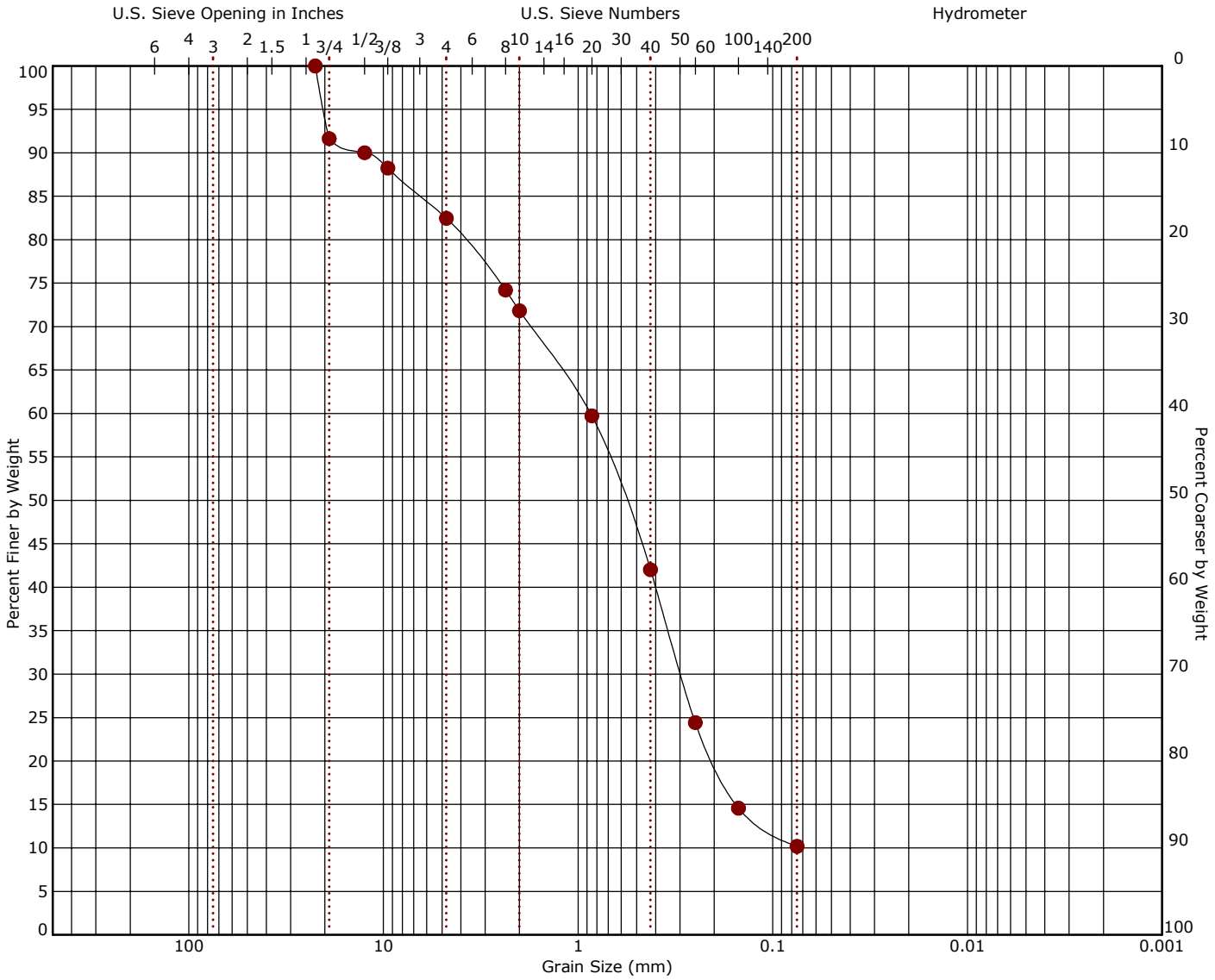
Boring Started
09-09-2025

Boring Completed
09-09-2025

Terracon
2625 Highway 14 W, Ste F
Rochester, MN

Grain Size Distribution

ASTM D422 / ASTM C136 / AASHTO T27



Cobbles	Gravel		Sand			Silt or Clay
	coarse	fine	coarse	medium	fine	

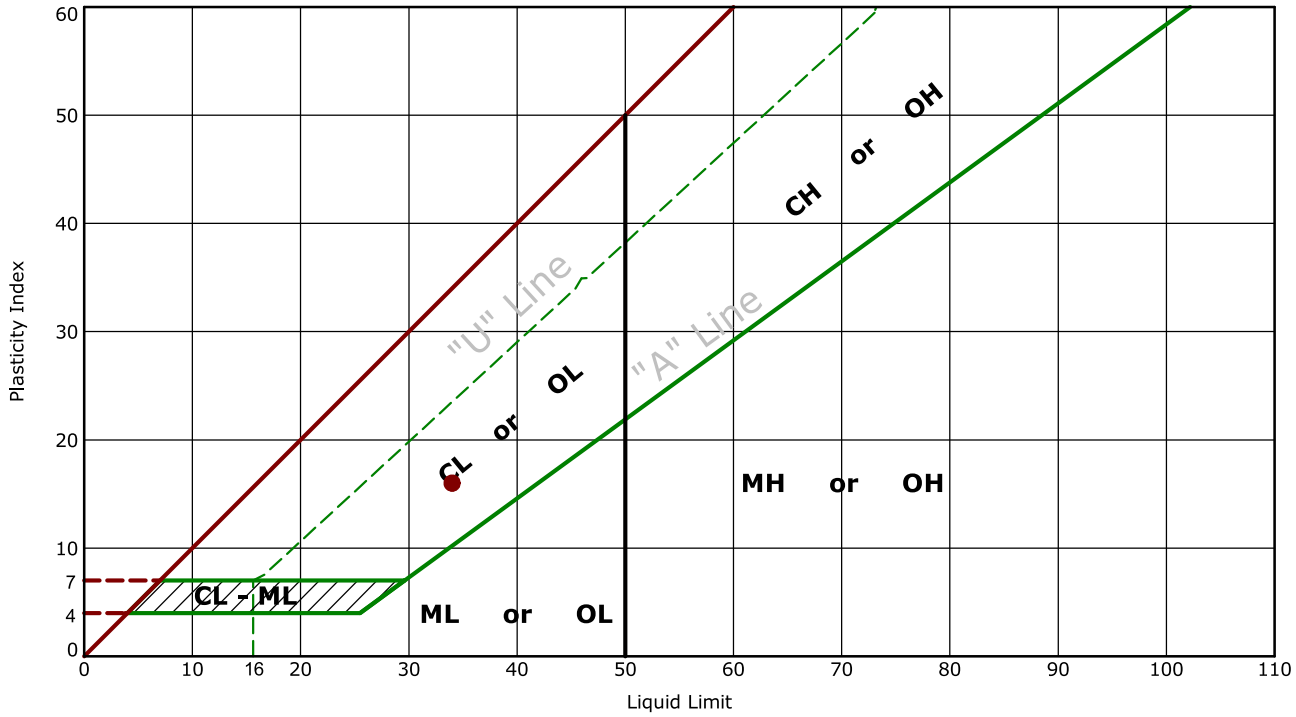
Boring ID	Depth (Ft)	Description		LL	PL	PI	Cc	Cu
BH-02	40 - 41.5	POORLY GRADED SAND WITH SILT AND GRAVEL (SP-SM)					1.39	11.90

Boring ID	Depth (Ft)	D_{100}	D_{60}	D_{30}	D_{10}	%Cobbles	%Gravel	%Sand	%Fines	%Silt	%Clay
BH-02	40 - 41.5	22.4	0.867	0.296		0.0	17.5	72.3	10.2		

Terracon
2625 Highway 14 W, Ste F
Rochester, MN

Atterberg Limit Results

ASTM D4318



	Boring ID	Depth (Ft)	LL	PL	PI	Fines	USCS	Description
●	BH-02	60 - 61.5	34	18	16	62.5	CL	SANDY LEAN CLAY

Supporting Information

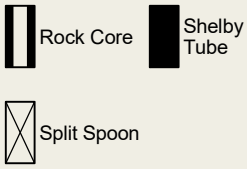
Contents:

General Notes
Unified Soil Classification System

Terracon
2625 Highway 14 W, Ste F
Rochester, MN

General Notes

Sampling



Water Level



Water levels indicated on the soil boring logs are the levels measured in the borehole at the times indicated. Groundwater level variations will occur over time. In low permeability soils, accurate determination of groundwater levels is not possible with short term water level observations.

Field Tests

N	Standard Penetration Test Resistance (Blows/Ft.)
(HP)	Hand Penetrometer
(T)	Torvane
(DCP)	Dynamic Cone Penetrometer
UC	Unconfined Compressive Strength
(PID)	Photo-Ionization Detector
(OVA)	Organic Vapor Analyzer

Descriptive Soil Classification

Soil classification as noted on the soil boring logs is based Unified Soil Classification System. Where sufficient laboratory data exist to classify the soils consistent with ASTM D2487 "Classification of Soils for Engineering Purposes" this procedure is used. ASTM D2488 "Description and Identification of Soils (Visual-Manual Procedure)" is also used to classify the soils, particularly where insufficient laboratory data exist to classify the soils in accordance with ASTM D2487. In addition to USCS classification, coarse grained soils are classified on the basis of their in-place relative density, and fine-grained soils are classified on the basis of their consistency. See "Strength Terms" table below for details. The ASTM standards noted above are for reference to methodology in general. In some cases, variations to methods are applied as a result of local practice or professional judgment.

Location And Elevation Notes

Exploration point locations as shown on the Exploration Plan and as noted on the soil boring logs in the form of Latitude and Longitude are approximate. See Exploration and Testing Procedures in the report for the methods used to locate the exploration points for this project. Surface elevation data annotated with +/- indicates that no actual topographical survey was conducted to confirm the surface elevation. Instead, the surface elevation was approximately determined from topographic maps of the area.

Strength Terms

Relative Density of Coarse-Grained Soils
(More than 50% retained on No. 200 sieve.)
Density determined by Standard Penetration Resistance

Consistency of Fine-Grained Soils
(50% or more passing the No. 200 sieve.)
Consistency determined by laboratory shear strength testing, field visual-manual procedures or standard penetration resistance

Relative Density	Standard Penetration or N-Value (Blows/Ft.)	Consistency	Unconfined Compressive Strength Qu (tsf)	Standard Penetration or N-Value (Blows/Ft.)
Very Loose	0 - 3	Very Soft	less than 0.25	0 - 1
Loose	4 - 9	Soft	0.25 to 0.50	2 - 4
Medium Dense	10 - 29	Medium Stiff	0.50 to 1.00	4 - 8
Dense	30 - 50	Stiff	1.00 to 2.00	8 - 15
Very Dense	> 50	Very Stiff	2.00 to 4.00	15 - 30
		Hard	> 4.00	> 30

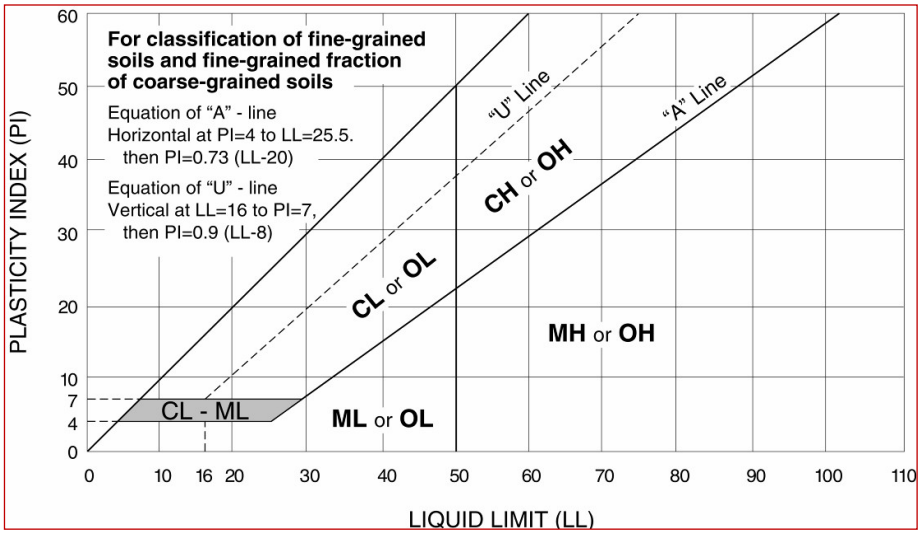
Relevance of Exploration and Laboratory Test Results

Exploration/field results and/or laboratory test data contained within this document are intended for application to the project as described in this document. Use of such exploration/field results and/or laboratory test data should not be used independently of this document.

Unified Soil Classification System

Criteria for Assigning Group Symbols and Group Names Using Laboratory Tests [A]				Soil Classification	
				Group Symbol	Group Name [B]
Coarse-Grained Soils: More than 50% retained on No. 200 sieve	**Gravels:** More than 50% of coarse fraction retained on No. 4 sieve	**Clean Gravels:** Less than 5% fines [C]	Cu≥4 and 1≤Cc≤3 [E]	GW	Well-graded gravel [F]
			Cu<4 and/or [Cc<1 or Cc>3.0] [E]	GP	Poorly graded gravel [F]
		Gravels with Fines: More than 12% fines [C]	Fines classify as ML or MH	GM	Silty gravel [F, G, H]
			Fines classify as CL or CH	GC	Clayey gravel [F, G, H]
	Sands: 50% or more of coarse fraction passes No. 4 sieve	**Clean Sands:** Less than 5% fines [D]	Cu≥6 and 1≤Cc≤3 [E]	SW	Well-graded sand [I]
			Cu<6 and/or [Cc<1 or Cc>3.0] [E]	SP	Poorly graded sand [I]
		Sands with Fines: More than 12% fines [D]	Fines classify as ML or MH	SM	Silty sand [G, H, I]
			Fines classify as CL or CH	SC	Clayey sand [G, H, I]
Fine-Grained Soils: 50% or more passes the No. 200 sieve	**Silts and Clays:** Liquid limit less than 50	**Inorganic:**	PI > 7 and plots above "A" line [J]	CL	Lean clay [K, L, M]
			PI < 4 or plots below "A" line [J]	ML	Silt [K, L, M]
		Organic:	$\frac{LL\ oven\ dried}{LL\ not\ dried} < 0.75$	OL	Organic clay [K, L, M, N]
					Organic silt [K, L, M, O]
	Silts and Clays: Liquid limit 50 or more	**Inorganic:**	PI plots on or above "A" line	CH	Fat clay [K, L, M]
			PI plots below "A" line	MH	Elastic silt [K, L, M]
		Organic:	$\frac{LL\ oven\ dried}{LL\ not\ dried} < 0.75$	OH	Organic clay [K, L, M, P]
					Organic silt [K, L, M, Q]
Highly organic soils:	Primarily organic matter, dark in color, and organic odor			PT	Peat

[A] Based on the material passing the 3-inch (75-mm) sieve.
[B] If field sample contained cobbles or boulders, or both, add "with cobbles or boulders, or both" to group name.
[C] Gravels with 5 to 12% fines require dual symbols: GW-GM well-graded gravel with silt, GW-GC well-graded gravel with clay, GP-GM poorly graded gravel with silt, GP-GC poorly graded gravel with clay.
[D] Sands with 5 to 12% fines require dual symbols: SW-SM well-graded sand with silt, SW-SC well-graded sand with clay, SP-SM poorly graded sand with silt, SP-SC poorly graded sand with clay.
[E] $Cu = D_{60}/D_{10}$ $Cc = \frac{(D_{30})^2}{D_{10} \times D_{60}}$
[F] If soil contains ≥ 15% sand, add "with sand" to group name.
[G] If fines classify as CL-ML, use dual symbol GC-GM, or SC-SM.
[H] If fines are organic, add "with organic fines" to group name.
[I] If soil contains ≥ 15% gravel, add "with gravel" to group name.
[J] If Atterberg limits plot in shaded area, soil is a CL-ML, silty clay.
[K] If soil contains 15 to 29% plus No. 200, add "with sand" or "with gravel," whichever is predominant.
[L] If soil contains ≥ 30% plus No. 200 predominantly sand, add "sandy" to group name.
[M] If soil contains ≥ 30% plus No. 200, predominantly gravel, add "gravelly" to group name.
[N] PI ≥ 4 and plots on or above "A" line.
[O] PI < 4 or plots below "A" line.
[P] PI plots on or above "A" line.
[Q] PI plots below "A" line.



Willmar 3rd Branch Line Upstream

BRAUN INTERTEC

the science you build on

Factual Geotechnical Data Report

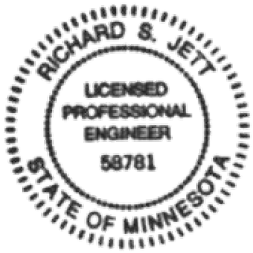
NNG Northern Lights 2027 – Wilmar 3rd Line Upstream

Intersection of 196th Street East and Highway 27
Prior Lake, Minnesota

Prepared for

Stantec Consulting Services, Inc.

Professional Certification:
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.



Richard S. Jett, PE
Senior Engineer
License Number: 58781
December 12, 2025

Braun Intertec Corporation

Project B2506260

December 12, 2025 Project B2506260

Ginger Chan
Stantec Consulting Services, Inc.
200-325 25 Street SE
Calgary, AB T2A 7H8

Re: Factual Geotechnical Data Report
NNG Northern Lights 2027 – Wilmar 3rd Line Upstream
Intersection of 196th Street East and Highway 27
Prior Lake, Minnesota

Dear Ms. Chan:

We are pleased to present this factual geotechnical data report for the above referenced project.

Thank you for making Braun Intertec Corporation (Braun Intertec) your geotechnical consultant for this project. If you have questions about this report, or if there are other services that we can provide in support of our work to date, please contact Richard Jett at 815.545.7059 (rjett@braunintertec.com) or Chad Lukkarila at 952.995.2322 (clukkarila@braunintertec.com).

Sincerely,
Braun Intertec Corporation

Richard S. Jett, PE
Senior Engineer

Chad R. Lukkarila, PE
Associate Director, Senior Engineer

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Appendix

Soil Boring Location Sketch

Log of Boring Sheets BH-02 through BH-10

Descriptive Terminology of Soil

Descriptive Terminology of Rock

List of Tables

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1.1 Scope of Services

We performed our scope of services for the project in accordance with the task order from Stantec Consulting Services, Inc. dated July 15, 2025, Change Order #1 dated August 21, 2025, and Change Order #2 dated September 25, 2025.The following list describes the geotechnical tasks completed in accordance with our authorized scope of services.

- Reviewing the background information and reference documents previously cited.
- Coordinating the clearance of the exploration locations of public underground utilities.
- Performing nine standard penetration test (SPT) borings, denoted as BH-02 through BH-10, to nominal depths ranging from 40 to 150 feet below grade across the site. Boring BH-01 was cancelled prior to our arrival on site.
- Performing laboratory testing on samples selected by Braun Intertec Corporation with input from Stantec Consulting Services, Inc.
- Preparing this report containing a boring location sketch, logs of soil borings, a summary of the soils encountered, and results of laboratory tests performed on select soil samples.

We performed this geotechnical exploration concurrently with environmental screening and laboratory testing, the results of which will be submitted under separate cover. The project team should review the environmental report in conjunction with this geotechnical data report to understand both the geotechnical and environmental aspects of the site and how they may impact one another.

2.0 Results

2.1 Boring Results

Table 2-1 provides a summary of the soil boring results, in the general order we encountered the strata. Please refer to the Log of Boring sheets in the Appendix for additional details. The Descriptive Terminology sheet in the Appendix includes definitions of abbreviations used in the table below.

Table 2-1. Subsurface Profile Summary

Strata	Soil Type -ASTM Classification	Range of Penetration Resistances (N Values)	Commentary and Details
Topsoil[1] / Topsoil fill	CL, SC, SM	3 to 10	▪ Observed at the boring locations with thicknesses ranging from approximately 1/2 to 2 feet. ▪ Predominantly clay and silt laden soils ▪ Generally brown to black in color. ▪ Moisture conditions were generally moist.
Fill[2]	CL, SM	3 to 12	▪ Observed in Borings BH-03, BH-08, and BH-09 below the surficial soils and extended to depths ranging from 3 1/2 to 8 feet below existing grade. ▪ Generally brown in color. ▪ Moisture conditions were generally moist. ▪ Variable amounts of gravel; may contain cobbles and boulders.
Alluvial	CL-ML, CL, ML, SC, SP-SM	2 to 12	▪ Observed in Borings BH-03, BH-07, BH-80, and BH-10 below the surficial soils and fill soils and extended to depths ranging from approximately 12 to 25 feet below existing grade. ▪ Relative densities of the sand soils were generally loose. ▪ Relative consistencies of the clay and silt laden soils were generally medium to stiff. ▪ Generally light brown to gray in color. ▪ Moisture conditions were generally moist to wet.
Glacial deposits	SP, SP-SM, SM	4 to 48	▪ Observed at the boring locations below the surficial soils, fill soils, and alluvial soils and extended to depths ranging from 90 to 150 feet below existing grade. ▪ Borings BH-02 through 06 and BH-08 through BH-10 terminated within the glacially deposited ▪ soils. Relative densities of the granular soils were generally medium dense to dense with isolated zones of loose soils. ▪ Relative consistencies of the clay and silt laden soils were generally stiff to hard with isolated zones of soft soils. ▪ Variable amounts of gravel; may contain cobbles and boulders. ▪ Moisture conditions were generally moist to wet. ▪ Generally light brown to gray in color.
	SC, CL, ML, CL-ML	3 to 50+	

Strata	Soil Type -ASTM Classification	Range of Penetration Resistances (N Values)	Commentary and Details
Apparent bedrock	Sandstone	45 to 50+	▪ Observed in Boring BH-07 at a depth of approximately 100 feet below existing grade. ▪ No rock coring was performed to further advance this soil boring. ▪ Generally consisted of decomposed sandstone soils. ▪ Generally brown in color.

[1]We did not perform gradation analysis on the apparent topsoil material encountered, in accordance with our scope of work. Therefore, we cannot conclusively determine if the encountered material satisfies a particular specification, and it should not be assumed it is suitable for reuse.

[2]For simplicity in this report, we define existing fill to mean existing, uncontrolled, or undocumented fill.

The exploration locations completed at this site were denoted as BH-02 through BH-10. The exploration locations were selected by Stantec and performed near the approximate locations as indicated in the attached Soil Boring Location Sketch. Stantec provided us with the surface elevations and GPS coordinates of the boring locations.

2.2 Groundwater

Apparent groundwater was observed in seven of the nine completed soil borings at depths ranging from approximately 9 to 38 feet below existing grade (approximate elevations ranging from 935 to 965 1/2 feet). We did not observe apparent groundwater while advancing borings BH-05 and BH-08. Groundwater may take days or longer to reach equilibrium in the boreholes and we immediately backfilled the boreholes, in accordance with our scope of work. If the project team identifies a need for more accurate determination of groundwater depth, we can install piezometers and complete a long term groundwater monitoring program.

Table 2-2 summarizes the depths where we observed groundwater; the attached Log of Boring sheets in the Appendix also include this information and additional details.

Table 2-2.GroundwaterSummary

Locations	Surface Elevation (feet)	Measured or Estimated Depth to Groundwater (feet)	Corresponding Groundwater Elevation (feet)
BH-2	961.4	16	945 1/2
BH-3	972.9	38	935
BH-4	966.9	23	944
BH-5	967.5	None Observed	None Observed

Locations	Surface Elevation (feet)	Measured or Estimated Depth to Groundwater (feet)	Corresponding Groundwater Elevation (feet)
BH-6	949.1	9	940
BH-7	977.2	15 1/2	962
BH-8	1006.5	None Observed	None Observed
BH-9	1000.4	35	965 1/2
BH-10	1005.9	6	1000

2.3 Laboratory Test Results

The boring logs show the results of laboratory testing we performed, next to the tested sample depth. The Appendix contains the results of these tests.

Moisture content tests performed select soil samples indicated moisture contents ranging from 5 to 29 percent moisture by weight for clay and silt laden soils and from 9 to 14 percent moisture by weight for granular soils. Sieve analysis tests performed on select soil samples indicated from 13 to 97 percent particles, by weight, passing the No. 200 sieve. Atterberg limits performed on select clay laden soils indicated liquid limits ranging from 17 to 40 percent moisture and plastic limits ranging from 12 to 20 percent moisture. Two organic content tests were performed in Boring BH-07 at depths of 40 and 50 feet below existing grade. The results of these tests indicated organic contents of 5 percent (40-foot sample) and 1 percent (50-foot sample) percent organic material by weight. Dry density tests performed on select clay laden soils indicated dry densities ranging from 104 to 129 pcf.

3.0 Procedures

3.1 Penetration Test Borings

We drilled the penetration test borings with an All-Terrain Vehicle (ATV)-mounted core and auger drill equipped with hollow-stem auger. We performed the borings in general accordance with ASTM D6151 taking penetration test samples at 2 1/2- or 5-foot intervals in general accordance with ASTM D1586. The boring logs show the actual sample intervals and corresponding depths.

We sealed penetration test boreholes meeting the Minnesota Department of Health (MDH) Environmental Borehole criteria with an MDH-approved grout.

3.2 Exploration Logs

3.2.1 Log of Boring Sheets

The Appendix includes Log of Boring sheets for our penetration test borings. The logs identify and describe the penetrated geologic materials and present the results of penetration resistance and other in-situ tests performed. The logs also present the results of organic vapor screening, laboratory tests performed on penetration test samples, and groundwater measurements.

We inferred strata boundaries from changes in the penetration test samples and the auger cuttings. Because we did not perform continuous sampling, the strata boundary depths are only approximate. The boundary depths likely vary away from the boring locations, and the boundaries themselves may occur as gradual rather than abrupt transitions.

3.2.2 Organic Vapor Screening

We conducted the geotechnical data collection concurrently with on-site environmental screening and provided the results of the screening under separate cover. The project team should review the environmental report in conjunction with this geotechnical data report to understand both the geotechnical and environmental aspects of the site and how they may impact one another.

An environmental technician examined soil samples from the borings for staining, odors, and other apparent signs of contamination within the top 20 feet of each boring. In addition, the environmental technician screened the soil samples for the presence of organic vapors using a photoionization detector (PID). The boring logs in the Appendix include the PID results, which we discuss further in the companion environmental report.

3.2.3 Geologic Origins

We assigned geologic origins to the materials shown on the logs and referenced within this report, based on: (1) a review of the background information and reference documents cited above, (2) visual classification of the various geologic material samples retrieved during the course of our subsurface exploration, (3) penetration resistance and other in-situ testing performed for the project, (4) laboratory test results, and (5) available common knowledge of the geologic processes and environments that have impacted the site and surrounding area in the past .

3.3 Material Classification and Testing

3.3.1 Visual and Manual Classification

We visually and manually classified the geologic materials encountered based on ASTM D2488. When we performed laboratory classification tests, we used the results to classify the geologic materials in accordance with ASTM D2487. The Appendix includes a chart explaining the classification system we used.

3.3.2 Laboratory Testing

The exploration logs in the Appendix note the results of the laboratory tests performed on geologic material samples. We performed the tests in general accordance with ASTM procedures.

3.4 Groundwater Measurements

The drillers checked for groundwater while advancing the penetration test borings, and again after auger withdrawal. We then filled the boreholes noted on the boring logs.

4.0 Qualifications

4.1 Variations in Subsurface Conditions

4.1.1 Material Strata

We developed our evaluation, analyses, and recommendations from a limited amount of site and subsurface information. It is not standard engineering practice to retrieve material samples from exploration locations continuously with depth. Therefore, we must infer strata boundaries and thicknesses to some extent. Strata boundaries may also be gradual transitions, and project planning should expect the strata to vary in depth, elevation, and thickness, away from the exploration locations.

Variations in subsurface conditions present between exploration locations may not be revealed until performing additional exploration work or starting construction. If future activity for this project reveals any such variations, you should notify us so that we may reevaluate our recommendations. Such variations could increase construction costs, and we recommend including a contingency to accommodate them.

4.1.2 Groundwater Levels

We made groundwater measurements under the conditions reported herein and shown on the exploration logs and interpreted in the text of this report. Note that the observation periods were relatively short, and project planning can expect groundwater levels to fluctuate in response to rainfall, flooding, irrigation, seasonal freezing and thawing, surface drainage modifications and other seasonal and annual factors.

4.2 Use of Report

This report is for the exclusive use of the addressed parties. Without written approval, we assume no responsibility to other parties regarding this report.

4.3 Standard of Care

In performing its services, Braun Intertec used that degree of care and skill ordinarily exercised under similar circumstances by reputable members of its profession currently practicing in the same locality. No warranty, express or implied, is made.

Appendix

Soil Boring Location Sketch
Log of Boring Sheets BH-2 through BH-10
Descriptive Terminology of Soil
Descriptive Terminology of Rock

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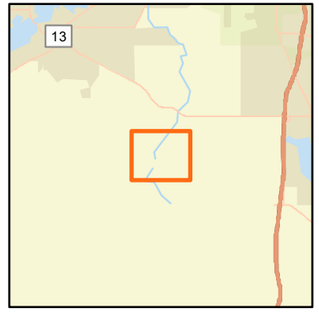
Denotes Location of Proposed Borings

Access Path

N

0 350 700 Feet

1" = 700 Feet



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11001 Hampshire Avenue S
Minneapolis, MN 55438
952.995.2000
braunintertec.com

Project No: B2506260

Drawing No: Boring Sketch Wilmar

Drawn By:	ZS
Date Drawn:	7/22/2025
Checked By:	RSJ
Last Modified:	12/11/2025

Wilmar 3rd Line Upstream

Prior Lake

Scott County, Minnesota

Boring Location Sketch

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LOG OF BORING

See Descriptive Terminology sheet for explanation of abbreviations

Project Number B2506260
Geotechnical & Environmental Evaluation
Northern Lights 2027 Expansion Project

BORING: **BH-02 Wilmar 3rd Line Upstream**
LOCATION: Captured with RTK GPS. 196th Street. See attached sketch.
DATUM: NAD83 / UTM zone 11N
NORTHING: 5225330.6 EASTING: 2371787.3
DRILLER: M. Hoppe LOGGED BY: J. Franz START DATE: 09/08/25 END DATE: 09/08/25
SURFACE ELEVATION: 961.4 ft RIG: 7504 METHOD: 3 1/4" HSA SURFACING: Soil WEATHER: Sunny

Elev./ Depth ft	Water Level	Description of Materials (Soil-ASTM D2488 or 2487; Rock-USACE EM 1110-1-2908)	Sample	Blows (N-Value) Recovery	PID ppm	MC %	Tests or Remarks
960.4		LEAN CLAY (CL), with roots, dark brown, moist (TOPSOIL)		2-2-3-4 (5) 10"	0.1		BH-02 (0-2) collected on 9/8/25 @ 1110 for MDA 1, MDA 2, OC
1.0		SANDY LEAN CLAY (CL), trace Gravel, brown to dark brown, moist, medium to stiff (GLACIAL TILL)		3-3-4-3 (7) 20"	0.2		BH-02 (2-4) collected on 9/8/25 @ 1100 for GRO, DRO, BETX, RCRA metals
				4-4-3-4 (7) 20"	0.1		q_p=2.5 tsf
			5	5-6-6-5 (12) 12"	0.1		q_p=3.25 tsf
				4-5-6-6 (11) 14"	0.2		q_p=3 tsf
			10	4-6-6-5 (12) 16"	0.1		q_p=3.5 tsf
				4-5-7-7 (12) 18"	0.3		q_p=3.25 tsf
	▽		15	4-6-7-7 (13) 18"	0.2		q_p=2.75 tsf
			20	5-7-8 (15) 16"			q_p=3 tsf
			25	5-7-7 (14) 16"			
931.9							
29.5		SILTY SAND (SM), fine to coarse-grained, trace Gravel, wet, medium dense (GLACIAL OUTWASH)	30	5-7-5 (12) 14"			
929.4							
32.0		Continued on next page					

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LOG OF BORING

See Descriptive Terminology sheet for explanation of abbreviations

Project Number B2506260
Geotechnical & Environmental Evaluation
Northern Lights 2027 Expansion Project

BORING: **BH-02 Wilmar 3rd Line Upstream**

LOCATION: Captured with RTK GPS. 196th Street. See attached sketch.

DATUM: NAD83 / UTM zone 11N

NORTHING: 5225330.6 EASTING: 2371787.3

DRILLER: M. Hoppe | LOGGED BY: J. Franz | START DATE: 09/08/25 | END DATE: 09/08/25

SURFACE ELEVATION: 961.4 ft | RIG: 7504 | METHOD: 3 1/4" HSA | SURFACING: Soil | WEATHER: Sunny

Elev./ Depth ft	Water Level	Description of Materials (Soil-ASTM D2488 or 2487; Rock-USACE EM 1110-1-2908)	Sample	Blows (N-Value) Recovery	PID ppm	MC %	Tests or Remarks
		SANDY LEAN CLAY (CL), trace Gravel, gray, moist, stiff (GLACIAL TILL)	35	4-7-7 (14) 16"			q_p=0.75 tsf
			40	5-7-8 (15) 20"			q_p=1.5 tsf
			45	5-5-7 (12) 18"			
911.9							
49.5		CLAYEY SAND (SC), fine to coarse-grained, trace to with Gravel, gray, moist, stiff to very stiff (GLACIAL TILL)	50	4-5-4 (9) 18"		12	LL=21, PL=13, PI=8 DD=129 pcf q_p=2 tsf
			55				
			60	10-12-14 (26) 18"		8	%Gravel=17% %Sand=51% P200=32% q_p=1.75 tsf
897.4							
64.0							

Continued on next page

BRAUN INTERTEC
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LOG OF BORING

See Descriptive Terminology sheet for explanation of abbreviations

Project Number B2506260
Geotechnical & Environmental Evaluation
Northern Lights 2027 Expansion Project

BORING: **BH-02 Wilmar 3rd Line Upstream**
LOCATION: Captured with RTK GPS. 196th Street. See attached sketch.
DATUM: NAD83 / UTM zone 11N
NORTHING: 5225330.6 EASTING: 2371787.3

DRILLER:	M. Hoppe	LOGGED BY:	J. Franz	START DATE:	09/08/25	END DATE:	09/08/25
SURFACE ELEVATION:	961.4 ft	RIG:	7504	METHOD:	3 1/4" HSA	SURFACING:	Soil	WEATHER:	Sunny

Elev./ Depth ft	Water Level	Description of Materials (Soil-ASTM D2488 or 2487; Rock-USACE EM 1110-1-2908)	Sample	Blows (N-Value) Recovery	PID ppm	MC %	Tests or Remarks
		SILTY SAND (SM), fine to coarse-grained, trace to with Gravel, gray, wet, dense (GLACIAL TILL)					
			65				
			70	12-14-18 (32) 14"		9	%Gravel=19% %Sand=60% P200=21%
			75				
881.9							
79.5		POORLY GRADED SAND (SP), fine to medium-grained, brown, wet, dense to medium dense (GLACIAL OUTWASH)	80	14-17-15 (32) 16"			
			85				
			90	10-12-15 (27) 16"			
870.4							
91.0		END OF BORING Boring then grouted					Water observed at 16.0 feet while drilling.
			95				

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LOG OF BORING

See Descriptive Terminology sheet for explanation of abbreviations

Project Number B2506260
Geotechnical & Environmental Evaluation
Northern Lights 2027 Expansion Project

BORING: **BH-03 Wilmar 3rd Line Upstream**
LOCATION: Captured with RTK GPS. 196th Street. See attached sketch.
DATUM: NAD83 / UTM zone 11N
NORTHING: 5225399.4 EASTING: 2372056.7

DRILLER:	K. Caudill	LOGGED BY:	J. Franz	START DATE:	09/08/25	END DATE:	09/08/25
SURFACE ELEVATION:	972.9 ft	RIG:	7505	METHOD:	3 1/4" HSA	SURFACING:	Grass	WEATHER:	Cloudy

Elev./ Depth ft	Water Level	Description of Materials (Soil-ASTM D2488 or 2487; Rock-USACE EM 1110-1-2908)	Sample	Blows (N-Value) Recovery	PID ppm	MC %	Tests or Remarks
970.9		LEAN CLAY (CL), trace roots, dark brown, moist (TOPSOIL FILL)		3-5-5-6 (10) 12"	0.6		BH-03 (0-2) collected on 9/8//25 @ 1245 for MDA 1, MDA 2, OC, RCRA metals.
2.0		FILL: LEAN CLAY (CL), trace roots, brown, moist		3-5-7-6 (12) 12"	5.6		BH-03 (2-4) collected on 9/8/25 @ at 1300 for GRO, DRO, BETX
			5	1-2-3-5 (5) 14"	0.8		
964.9				3-4-5-5 (9) 18"	1.0		
8.0		SILTY CLAY (CL-ML), gray and brown, moist, stiff to medium (ALLUVIUM)		4-6-6-7 (12) 18"	1.3		
			10	2-4-5-5 (9) 18"	0.7		
				2-3-4-5 (7) 18"	0.7		q_p=0.75 tsf
			15	2-2-3-5 (5) 18"	0.6		
953.4					0.3		
19.5		LEAN CLAY (CL), brown, moist, medium (ALLUVIUM)	20	2-3-5 (8) 18"	0.6		q_p=1.5 tsf
					0.5		
948.4					0.8		
24.5		SANDY LEAN CLAY (CL), trace Gravel, with POORLY GRADED SAND layers, brown and gray, moist, hard to very stiff (GLACIAL TILL)	25	10-18-24 (42) 18"	0.6		q_p=1.75 tsf
			30	4-7-13 (20) 20"			q_p=2.75 tsf
940.9							
32.0		Continued on next page					

BRAUN INTERTEC
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LOG OF BORING

See Descriptive Terminology sheet for explanation of abbreviations

Project Number B2506260
Geotechnical & Environmental Evaluation
Northern Lights 2027 Expansion Project

BORING: **BH-03 Wilmar 3rd Line Upstream**
LOCATION: Captured with RTK GPS. 196th Street. See attached sketch.
DATUM: NAD83 / UTM zone 11N
NORTHING: 5225399.4 EASTING: 2372056.7
DRILLER: K. Caudill LOGGED BY: J. Franz START DATE: 09/08/25 END DATE: 09/08/25
SURFACE ELEVATION: 972.9 ft RIG: 7505 METHOD: 3 1/4" HSA SURFACING: Grass WEATHER: Cloudy

Elev./ Depth ft	Water Level	Description of Materials (Soil-ASTM D2488 or 2487; Rock-USACE EM 1110-1-2908)	Sample	Blows (N-Value) Recovery	PID ppm	MC %	Tests or Remarks
	▽	SILTY SAND (SM), trace Gravel, brown, moist to wet, medium dense to dense (GLACIAL TILL)	35	12-15-12 (27) 18"			
							Wet below 38 feet
			40	10-13-20 (33) 16"			
928.4							
44.5		SANDY LEAN CLAY (CL), trace Gravel, gray, moist, stiff to hard (GLACIAL TILL)	45	15-11-11 (22) 16"		18	Drilling method switched to mud rotary DD=115 pcf q_p=2.5 tsf
			50	5-8-10 (18) 14"		20	LL=35, PL=17, PI=18 q_p=1.75 tsf
			55				
			60	6-8-13 (21) 18"		21	%Sand=22% P200=78%

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LOG OF BORING

See Descriptive Terminology sheet for explanation of abbreviations

Project Number B2506260
Geotechnical & Environmental Evaluation
Northern Lights 2027 Expansion Project

BORING: **BH-03 Wilmar 3rd Line Upstream**
LOCATION: Captured with RTK GPS. 196th Street. See attached sketch.
DATUM: NAD83 / UTM zone 11N
NORTHING: 5225399.4 EASTING: 2372056.7

DRILLER:	K. Caudill	LOGGED BY:	J. Franz	START DATE:	09/08/25	END DATE:	09/08/25
SURFACE ELEVATION:	972.9 ft	RIG:	7505	METHOD:	3 1/4" HSA	SURFACING:	Grass	WEATHER:	Cloudy

Elev./ Depth ft	Water Level	Description of Materials (Soil-ASTM D2488 or 2487; Rock-USACE EM 1110-1-2908)	Sample	Blows (N-Value) Recovery	PID ppm	MC %	Tests or Remarks
		SANDY LEAN CLAY (CL), trace Gravel, gray, moist, stiff to hard (GLACIAL TILL)					
65							
70				11-17-21 (38) 16"		13	q_p=1.5 tsf
75							
80				10-15-21 (36) 10"			q_p=2 tsf
85							
90				12-19-19 (38) 18"			q_p=2.5 tsf
881.9							Water observed at 38.0 feet while drilling.
91.0		END OF BORING Boring then grouted					
95							

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LOG OF BORING

See Descriptive Terminology sheet for explanation of abbreviations

Project Number B2506260
Geotechnical & Environmental Evaluation
Northern Lights 2027 Expansion Project

BORING: **BH-04 Wilmar 3rd Line Upstream**

LOCATION: Captured with RTK GPS. 196th Street. See attached sketch.

DATUM: NAD83 / UTM zone 11N

NORTHING:	5225505.2	EASTING:	2372561.5
DRILLER:	M. Hoppe	LOGGED BY:	J. Franz
START DATE:	09/11/25	END DATE:	09/11/25
SURFACE ELEVATION:	966.9 ft	RIG:	7504
METHOD:	3 1/4" HSA	SURFACING:	Soil
WEATHER:	Cloudy		

Elev./ Depth ft	Water Level	Description of Materials (Soil-ASTM D2488 or 2487; Rock-USACE EM 1110-1-2908)	Sample	Blows (N-Value) Recovery	PID ppm	MC %	Tests or Remarks
~~966.6~~ 0.3		CLAYEY SAND (SC), trace roots, brown, moist (TOPSOIL)		3-2-2-4 (4) 14"	1.0		BH-04 (0-2) collected on 9/10/25 @ 1005 MDA 1, MDA 2, OC, RCRA metals
		POORLY GRADED SAND (SP), fine to coarse-grained, trace Gravel, brown, moist, very loose (GLACIAL OUTWASH)		2-2-2-3 (4) 14"	0.5		
962.9 4.0		SILTY SAND (SM), fine-grained, tan, moist (GLACIAL OUTWASH)	5	8-4-3-3 (7) 16"	1.0		BH-04 (2-4) collected on 9/10/25 @ 1015 for GRO, DRO, BETX
				3-3-3-3 (6) 16"	0.9		
958.9 8.0		POORLY GRADED SAND with SILT (SP-SM), fine-grained, light brown, moist, loose to medium dense (GLACIAL OUTWASH)		4-5-5-6 (10) 16"	0.9		
			10	5-6-6-7 (12) 16"	0.8		
				7-5-5-4 (10) 16"	1.0		
	▽		15	5-6-5-5 (11) 16"	0.8		
			20	7-5-5 (10) 14"	0.7		
942.4 24.5		SILTY SAND (SM), fine-grained, brown and black, wet, medium dense (GLACIAL OUTWASH)	25	5-7-8 (15) 16"	0.7		
937.4 29.5		SILT (ML), gray, wet, very loose (GLACIAL TILL)	30	1-2-2 (4) 14"			
934.9 32.0		Continued on next page					

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LOG OF BORING

See Descriptive Terminology sheet for explanation of abbreviations

Project Number B2506260
Geotechnical & Environmental Evaluation
Northern Lights 2027 Expansion Project

BORING: **BH-04 Wilmar 3rd Line Upstream**

LOCATION: Captured with RTK GPS. 196th Street. See attached sketch.

DATUM: NAD83 / UTM zone 11N

NORTHING: 5225505.2	EASTING: 2372561.5		
DRILLER: M. Hoppe	LOGGED BY: J. Franz	START DATE: 09/11/25	END DATE: 09/11/25
SURFACE ELEVATION: 966.9 ft	RIG: 7504	METHOD: 3 1/4" HSA	SURFACING: Soil	WEATHER: Cloudy

Elev./ Depth ft	Water Level	Description of Materials (Soil-ASTM D2488 or 2487; Rock-USACE EM 1110-1-2908)	Sample	Blows (N-Value) Recovery	PID ppm	MC %	Tests or Remarks
		LEAN CLAY (CL), trace Gravel, gray, moist, medium to stiff (GLACIAL TILL)	35	3-3-3 (6) 14"			
			40	4-7-7 (14)			
922.4							
44.5		SILTY SAND (SM), fine to coarse-grained, trace Gravel, gray, wet to moist, stiff (GLACIAL TILL)	45	5-7-5 (12) 16"		10	
			50	5-7-7 (14) 18"		12	LL=18, PL=15, PI=3
			55				
			60	7-8-7 (15) 16"		10	%Gravel=7% %Sand=54% P200=39%

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LOG OF BORING

See Descriptive Terminology sheet for explanation of abbreviations

Project Number B2506260
Geotechnical & Environmental Evaluation
Northern Lights 2027 Expansion Project

BORING: **BH-04 Wilmar 3rd Line Upstream**
LOCATION: Captured with RTK GPS. 196th Street. See attached sketch.
DATUM: NAD83 / UTM zone 11N
NORTHING: 5225505.2 EASTING: 2372561.5
DRILLER: M. Hoppe LOGGED BY: J. Franz START DATE: 09/11/25 END DATE: 09/11/25
SURFACE ELEVATION: 966.9 ft RIG: 7504 METHOD: 3 1/4" HSA SURFACING: Soil WEATHER: Cloudy

Elev./ Depth ft	Water Level	Description of Materials (Soil-ASTM D2488 or 2487; Rock-USACE EM 1110-1-2908)	Sample	Blows (N-Value) Recovery	PID ppm	MC %	Tests or Remarks
		SILTY SAND (SM), fine to coarse-grained, trace Gravel, gray, wet to moist, stiff (GLACIAL TILL)					
897.4							
69.5		SILTY SAND (SM), fine to coarse-grained, trace Gravel, gray, moist, medium dense (GLACIAL TILL)		12-14-14 (28) 16"		10	%Gravel=9% %Sand=46% P200=45%
				13-15-15 (30) 2"			
				7-12-12 (24) 2"			
875.9							
91.0		END OF BORING Boring then grouted					Water observed at 23.0 feet while drilling.

65 70 75 80 85 90 95

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LOG OF BORING

See Descriptive Terminology sheet for explanation of abbreviations

Project Number B2506260
Geotechnical & Environmental Evaluation
Northern Lights 2027 Expansion Project

BORING: **BH-05 Wilmar 3rd Line Upstream**
LOCATION: Captured with RTK GPS. 196th Street. See attached sketch.
DATUM: NAD83 / UTM zone 11N
NORTHING: 5225511.0 EASTING: 2372954.5
DRILLER: M. Hoppe LOGGED BY: L. Schaefer START DATE: 09/10/25 END DATE: 09/10/25
SURFACE ELEVATION: 967.5 ft RIG: 7504 METHOD: 3 1/4" HSA SURFACING: Soil WEATHER: Cloudy

Elev./ Depth ft	Water Level	Description of Materials (Soil-ASTM D2488 or 2487; Rock-USACE EM 1110-1-2908)	Sample	Blows (N-Value) Recovery	PID ppm	MC %	Tests or Remarks
967.0		SILTY SAND (SM) (TOPSOIL FILL)		4-4-3-3 (7) 16"	0.4		BH-05 (0-2) collected on 9/9/25 @ 1040 for MDA 1, MDA 2, OC, RCRA metals
0.5		SANDY LEAN CLAY (CL), brown, dry, medium to stiff (GLACIAL TILL)		3-5-4-4 (9) 14"	0.6		BH-05 (2-4) collected on 9/9/25 @ 1050 for GRO, DRO, BETX
			5	5-6-4-4 (10) 16"	0.6		
				5-5-7-8 (12) 16"	0.4		
				5-7-7-8 (14) 18"	0.5		
			10	5-4-4-5 (8) 18"	0.4		
954.5				5-6-7-8 (13) 18"	0.4		
13.0		CLAYEY SAND (SC), brown, moist, stiff to very stiff (GLACIAL TILL)		8-8-5-5 (13) 16"	0.4		
			15				
			20	7-8-8 (16) 16"	0.3		
943.0							
24.5		SANDY LEAN CLAY (CL), brown, moist, very stiff (GLACIAL TILL)	25	8-10-12 (22) 16"	0.4		
938.0							
29.5		SANDY LEAN CLAY (CL), gray, moist, very stiff (GLACIAL TILL)	30	8-14-15 (29) 18"			

Continued on next page

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LOG OF BORING

See Descriptive Terminology sheet for explanation of abbreviations

Project Number B2506260
Geotechnical & Environmental Evaluation
Northern Lights 2027 Expansion Project

BORING: **BH-05 Wilmar 3rd Line Upstream**

LOCATION: Captured with RTK GPS. 196th Street. See attached sketch.

DATUM: NAD83 / UTM zone 11N

NORTHING: 5225511.0 EASTING: 2372954.5

DRILLER: M. Hoppe | LOGGED BY: L. Schaefer | START DATE: 09/10/25 | END DATE: 09/10/25

SURFACE ELEVATION: 967.5 ft | RIG: 7504 | METHOD: 3 1/4" HSA | SURFACING: Soil | WEATHER: Cloudy

Elev./ Depth ft	Water Level	Description of Materials (Soil-ASTM D2488 or 2487; Rock-USACE EM 1110-1-2908)	Sample	Blows (N-Value) Recovery	PID ppm	MC %	Tests or Remarks
933.0		SANDY LEAN CLAY (CL), gray, moist, very stiff (GLACIAL TILL)					
34.5		SILT (ML), gray, moist, very stiff (GLACIOFLUVIUM)	35	10-14-12 (26) 18"			
928.0							
39.5		SANDY LEAN CLAY (CL), gray, moist, stiff (GLACIAL TILL)	40	5-7-7 (14) 18"			
			45	5-5-4 (9) 18"		10	
918.0							
49.5		SILTY SAND (SM), fine-grained, gray, moist, stiff (GLACIAL TILL)	50	35-7-8 (15) 12"		9	%Gravel=7% %Sand=57% P200=36%
			55				
908.0							
59.5		SILTY CLAY (CL-ML), with Gravel, gray and brown, moist, very stiff (GLACIAL TILL)	60	12-14-14 (28) 16"		10	LL=18, PL=12, PI=6

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LOG OF BORING

See Descriptive Terminology sheet for explanation of abbreviations

Project Number B2506260
Geotechnical & Environmental Evaluation
Northern Lights 2027 Expansion Project

BORING: **BH-05 Wilmar 3rd Line Upstream**

LOCATION: Captured with RTK GPS. 196th Street. See attached sketch.

DATUM: NAD83 / UTM zone 11N

NORTHING: 5225511.0 EASTING: 2372954.5

DRILLER: M. Hoppe | LOGGED BY: L. Schaefer | START DATE: 09/10/25 | END DATE: 09/10/25

SURFACE ELEVATION: 967.5 ft | RIG: 7504 | METHOD: 3 1/4" HSA | SURFACING: Soil | WEATHER: Cloudy

Elev./ Depth ft	Water Level	Description of Materials (Soil-ASTM D2488 or 2487; Rock-USACE EM 1110-1-2908)	Sample	Blows (N-Value) Recovery	PID ppm	MC %	Tests or Remarks
		SILTY CLAY (CL-ML), with Gravel, gray and brown, moist, very stiff (GLACIAL TILL)					
65							
70				12-15-15 (30) 10"		14	
75							
80				12-10-14 (24) 12"			
85							
878.0							
89.5		CLAYEY SAND (SC), with Gravel, brown, moist, very stiff (GLACIAL TILL)		10-12-10 (22) 12"			
90							
876.5							
91.0		END OF BORING					Water not observed while drilling.
		Boring then grouted					
95							

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LOG OF BORING

See Descriptive Terminology sheet for explanation of abbreviations

Project Number B2506260
Geotechnical & Environmental Evaluation
Northern Lights 2027 Expansion Project

BORING: **BH-06 Wilmar 3rd Line Upstream**
LOCATION: Captured with RTK GPS. 196th Street. See attached sketch.
DATUM: NAD83 / UTM zone 11N
NORTHING: 5225494.3 EASTING: 2373288.0

DRILLER:	M. Hoppe	LOGGED BY:	J. Franz	START DATE:	09/11/25	END DATE:	09/11/25
SURFACE ELEVATION:	949.1 ft	RIG:	7504	METHOD:	3 1/4" HSA	SURFACING:	Soil	WEATHER:	Cloudy

Elev./ Depth ft	Water Level	Description of Materials (Soil-ASTM D2488 or 2487; Rock-USACE EM 1110-1-2908)	Sample	Blows (N-Value) Recovery	PID ppm	MC %	Tests or Remarks
947.1		LEAN CLAY (CL), with roots, black, moist (TOPSOIL)		3-3-3-3 (6) 12"	1.5		BH-06 (0-2) collected on 9/11/25 @ 1025 for MDA 1, MDA 2, OC
2.0		LEAN CLAY (CL), trace roots, gray, moist, soft to medium (GLACIAL TILL)		2-1-1-1 (2) 16"	1.0		BH-06 (2-4) collected on 9/11/25 @ 1035 for GRO, DRO,BETX, RCRA metals
			5	2-3-2-2 (5) 18"	5.5		
943.1							
6.0		SILTY SAND (SM), fine to medium-grained, trace Gravel, gray and brown, wet, loose to medium dense (GLACIAL TILL)		4-5-4-4 (9) 18"			
				5-4-4-5 (8) 16"			
			10	4-5-4-5 (9) 18"			
				5-7-7-8 (14) 16"			
				6-7-5-5 (12) 12"			
			15				
929.6							
19.5		CLAYEY SAND (SC), trace Gravel, gray, moist, stiff to hard (GLACIAL TILL)	20	4-5-7 (12) 18"			
			25	5-7-7 (14) 18"			
			30	5-8-8 (16) 14"	1.8		q_p=1.75 tsf

Continued on next page

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LOG OF BORING

See Descriptive Terminology sheet for explanation of abbreviations

Project Number B2506260
Geotechnical & Environmental Evaluation
Northern Lights 2027 Expansion Project

BORING: **BH-06 Wilmar 3rd Line Upstream**
LOCATION: Captured with RTK GPS. 196th Street. See attached sketch.
DATUM: NAD83 / UTM zone 11N
NORTHING: 5225494.3 EASTING: 2373288.0

DRILLER:	M. Hoppe	LOGGED BY:	J. Franz	START DATE:	09/11/25	END DATE:	09/11/25
SURFACE ELEVATION:	949.1 ft	RIG:	7504	METHOD:	3 1/4" HSA	SURFACING:	Soil	WEATHER:	Cloudy

Elev./ Depth ft	Water Level	Description of Materials (Soil-ASTM D2488 or 2487; Rock-USACE EM 1110-1-2908)	Sample	Blows (N-Value) Recovery	PID ppm	MC %	Tests or Remarks
		CLAYEY SAND (SC), trace Gravel, gray, moist, stiff to hard (GLACIAL TILL)					
35				7-8-7 (15) 18"			q_p=1.75 tsf
40				5-7-8 (15) 18"		19	LL=36, PL=17, PI=19 q_p=0.75 tsf
45				8-5-10 (15) 18"		15	DD=122 pcf
50				5-7-5 (12)			
55							
60				14-10-23 (33) 4"		11	%Gravel=4% %Sand=-56% P200=46%

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See Descriptive Terminology sheet for explanation of abbreviations

Project Number B2506260
Geotechnical & Environmental Evaluation
Northern Lights 2027 Expansion Project

BORING: **BH-06 Wilmar 3rd Line Upstream**

LOCATION: Captured with RTK GPS. 196th Street. See attached sketch.

DATUM: NAD83 / UTM zone 11N

NORTHING: 5225494.3	EASTING: 2373288.0		
DRILLER: M. Hoppe	LOGGED BY: J. Franz	START DATE: 09/11/25	END DATE: 09/11/25
SURFACE ELEVATION: 949.1 ft	RIG: 7504	METHOD: 3 1/4" HSA	SURFACING: Soil	WEATHER: Cloudy

Elev./ Depth ft	Water Level	Description of Materials (Soil-ASTM D2488 or 2487; Rock-USACE EM 1110-1-2908)	Sample	Blows (N-Value) Recovery	PID ppm	MC %	Tests or Remarks
		CLAYEY SAND (SC), trace Gravel, gray, moist, stiff to hard (GLACIAL TILL)					
			70	12-16-21 (37) 16"		13	q_p=1.25 tsf
869.6							
79.5							
868.1		SILTY SAND (SM), fine to coarse-grained, trace Gravel, gray, wet, medium dense (GLACIAL TILL)	80	12-14-14 (28) 14"			
81.0		END OF BORING					Water not observed while drilling.
		Boring then grouted					

65 75 85 90 95

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See Descriptive Terminology sheet for explanation of abbreviations

Project Number B2506260
Geotechnical & Environmental Evaluation
Northern Lights 2027 Expansion Project

BORING: **BH-07 Wilmar 3rd Line Upstream**
LOCATION: Captured with RTK GPS. 196th Street. See attached sketch.
DATUM: NAD83 / UTM zone 11N
NORTHING: 5225426.4 EASTING: 2373428.9
DRILLER: M. Hoppe LOGGED BY: J. Franz START DATE: 09/11/25 END DATE: 09/11/25
SURFACE ELEVATION: 977.2 ft RIG: 7504 METHOD: 3 1/4" HSA SURFACING: Soil WEATHER: Sunny

Elev./ Depth ft	Water Level	Description of Materials (Soil-ASTM D2488 or 2487; Rock-USACE EM 1110-1-2908)	Sample	Blows (N-Value) Recovery	PID ppm	MC %	Tests or Remarks
975.2		FILL: SILTY SAND (SM), trace roots, brown, moist, loose		2-3-3-3 (6) 14"	0.2		BH-07 (0-2) collected on 9/11/25 @ 1305 for MDA 1, MDA 2, OC, RCRA metals
2.0 973.7		POORLY GRADED SAND with SILT (SP-SM), fine to medium-grained, light brown, moist, loose (ALLUVIUM)		4-5-4-4 (9) 16"	0.2		BH-07 (2-4) collected on 9/11/25 @ 1315 for GRP. DRO, BETX
3.5		SILTY SAND (SM), fine to medium-grained, light brown, moist, loose (ALLUVIUM)	5	5-4-4-4 (8) 14"	0.2		
969.2				4-4-5-4 (9) 18"	0.2		
8.0	▽	SILT (ML), contains seams of Lean Clay, light brown, moist, loose to medium dense (ALLUVIUM)	10	4-3-4-4 (7) 18"	0.2		Wet below 9 feet
				5-5-4-5 (9) 18"	0.2		
		Poorly Graded Sand seams at 13 feet		7-5-6-6 (11) 18"	0.4		
957.7			15	4-3-3-4 (6) 18"			
19.5		LEAN CLAY (CL), gray, moist, stiff (ALLUVIUM)	20	5-6-6 (12) 18"			q_p=1.25 tsf
952.7							
24.5		SANDY LEAN CLAY (CL), trace Gravel, gray, moist, stiff (GLACIAL TILL)	25	5-6-7 (13) 16"			q_p=1.75 tsf
947.7							
29.5		SANDY LEAN CLAY (CL), trace Gravel, slightly organic, gray, moist, stiff to very stiff (GLACIAL TILL)	30	5-7-7 (14) 18"			q_p=1.5 tsf

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BRAUN INTERTEC
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See Descriptive Terminology sheet for explanation of abbreviations

Project Number B2506260
Geotechnical & Environmental Evaluation
Northern Lights 2027 Expansion Project

BORING: **BH-07 Wilmar 3rd Line Upstream**
LOCATION: Captured with RTK GPS. 196th Street. See attached sketch.
DATUM: NAD83 / UTM zone 11N
NORTHING: 5225426.4 EASTING: 2373428.9
DRILLER: M. Hoppe LOGGED BY: J. Franz START DATE: 09/11/25 END DATE: 09/11/25
SURFACE ELEVATION: 977.2 ft RIG: 7504 METHOD: 3 1/4" HSA SURFACING: Soil WEATHER: Sunny

Elev./ Depth ft	Water Level	Description of Materials (Soil-ASTM D2488 or 2487; Rock-USACE EM 1110-1-2908)	Sample	Blows (N-Value) Recovery	PID ppm	MC %	Tests or Remarks
		SANDY LEAN CLAY (CL), trace Gravel, slightly organic, gray, moist, stiff to very stiff (GLACIAL TILL)					
35				5-7-7 (14) 16"		13	q_p=2.75 tsf
40				5-6-6 (12) 16"		33	OC=5%
45				5-12-10 (22) 10"		21	LL=23, PL=14, PI=9 q_p=2 tsf
50				7-8-10 (18) 12"		14	%Gravel=5% %Sand=47% P200=48% OC=1% q_p=2 tsf
55							
60				6-7-7 (14) 18"		17	q_p=4.25 tsf

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See Descriptive Terminology sheet for explanation of abbreviations

Project Number B2506260
Geotechnical & Environmental Evaluation
Northern Lights 2027 Expansion Project

BORING: **BH-07 Wilmar 3rd Line Upstream**
LOCATION: Captured with RTK GPS. 196th Street. See attached sketch.
DATUM: NAD83 / UTM zone 11N
NORTHING: 5225426.4 EASTING: 2373428.9
DRILLER: M. Hoppe LOGGED BY: J. Franz START DATE: 09/11/25 END DATE: 09/11/25
SURFACE ELEVATION: 977.2 ft RIG: 7504 METHOD: 3 1/4" HSA SURFACING: Soil WEATHER: Sunny

Elev./ Depth ft	Water Level	Description of Materials (Soil-ASTM D2488 or 2487; Rock-USACE EM 1110-1-2908)	Sample	Blows (N-Value) Recovery	PID ppm	MC %	Tests or Remarks
		SANDY LEAN CLAY (CL), trace Gravel, slightly organic, gray, moist, stiff to very stiff (GLACIAL TILL)					
			65				
			70	12-10-10 (20) 18"			q_p=3 tsf
			75				
			80	12-14-10 (24) 18"			q_p=2 tsf
			85				
887.7							
89.5		POORLY GRADED SAND with SILT (SP-SM), fine-grained, brown, moist, dense (GLACIAL OUTWASH)	90	22-24-24 (48) 16"			
			95				

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See Descriptive Terminology sheet for explanation of abbreviations

Project Number B2506260
Geotechnical & Environmental Evaluation
Northern Lights 2027 Expansion Project

BORING: **BH-07 Wilmar 3rd Line Upstream**
LOCATION: Captured with RTK GPS. 196th Street. See attached sketch.
DATUM: NAD83 / UTM zone 11N
NORTHING: 5225426.4 EASTING: 2373428.9
DRILLER: M. Hoppe LOGGED BY: J. Franz START DATE: 09/11/25 END DATE: 09/11/25
SURFACE ELEVATION: 977.2 ft RIG: 7504 METHOD: 3 1/4" HSA SURFACING: Soil WEATHER: Sunny

Elev./ Depth ft	Water Level	Description of Materials (Soil-ASTM D2488 or 2487; Rock-USACE EM 1110-1-2908)	Sample	Blows (N-Value) Recovery	PID ppm	MC %	Tests or Remarks
877.7		POORLY GRADED SAND with SILT (SP-SM), fine-grained, brown, moist, dense (GLACIAL OUTWASH)					
99.5		SANDSTONE, brown, wet, decomposed, moderately hard, fine-grained to medium-grained, (APPARENT BEDROCK)	100	12-25-20 (45) 16"			
			105				
			110	50/2" (REF) 2"			
			115				
857.5				50/2" (REF) 1"			
119.7		END OF BORING Boring then grouted	120				Water observed at 9.0 feet while drilling.
			125				

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See Descriptive Terminology sheet for explanation of abbreviations

Project Number B2506260
Geotechnical & Environmental Evaluation
Northern Lights 2027 Expansion Project

BORING: **BH-08 Wilmar 3rd Line Upstream**
LOCATION: Captured with RTK GPS. 196th Street. See attached sketch.
DATUM: NAD83 / UTM zone 11N
NORTHING: 5225410.8 EASTING: 2373652.1
DRILLER: M. Hoppe LOGGED BY: S. Niraula START DATE: 08/06/25 END DATE: 08/06/25
SURFACE ELEVATION: 1006.5 ft RIG: 7504 METHOD: 3 1/4" HSA SURFACING: Soil WEATHER: Cloudy

Elev./ Depth ft	Water Level	Description of Materials (Soil-ASTM D2488 or 2487; Rock-USACE EM 1110-1-2908)	Sample	Blows (N-Value) Recovery	PID ppm	MC %	Tests or Remarks
1005.8		CLAYEY SAND (SC), fine-grained, trace roots, trace Gravel, brown, moist (TOPSOIL FILL)		3-4-4-3 (8) 18"	0.3		BH-08 (0-2) collected on 8/6/25 @ 0910 for RCRA metals
0.7		FILL: SILTY SAND (SM), fine-grained, brown, wet		3-2-2-2 (4) 18"	0.3		Perched water at 2 feet q_p=<0.5 tsf
1003.0							
3.5		LEAN CLAY (CL), trace Sand, intermixed with Silt, light gray and brown, moist, soft to medium (ALLUVIUM)	5	2-2-3-3 (5) 20"	0.3		BH-08 (2-4) collected on 8/6/25 @ 0915 for MDA 1, MDA 2, OC
				2-3-2-3 (5) 20"	0.5		BH-08 (6-8) collected on 8/6/25 @ 0950 for GRO, DRO, BETX q_p=<0.5 tsf
				2-3-4-3 (7) 20"	0.1		q_p=0.5 tsf
			10	2-4-4-2 (8) 20"	0.5		q_p=0.75 tsf
				4-3-2-3 (5) 20"	0.2		q_p=1 tsf
		Brown at 13 1/2 feet		3-2-3-3 (5) 20"	0.1		q_p=0.75 tsf
			15				
					0.2		
			20	4-5-3 (8) 20"	0.3	29	LL=40, PL=20, PI=20 q_p=1.5 tsf
					0.2		
982.0					0.1		
24.5		CLAYEY SAND (SC), fine-grained, trace Gravel, gray, moist, stiff (GLACIAL TILL)	25	4-5-4 (9) 20"	0.1	14	DD=129 pcf q_p=1 tsf
977.0							
29.5		LEAN CLAY (CL), trace Sand, gray, moist, stiff (GLACIAL TILL)	30	4-5-5 (10) 20"		25	%Sand=3% P200=97% q_p=1 tsf

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See Descriptive Terminology sheet for explanation of abbreviations

Project Number B2506260
Geotechnical & Environmental Evaluation
Northern Lights 2027 Expansion Project

BORING: **BH-08 Wilmar 3rd Line Upstream**
LOCATION: Captured with RTK GPS. 196th Street. See attached sketch.
DATUM: NAD83 / UTM zone 11N
NORTHING: 5225410.8 EASTING: 2373652.1
DRILLER: M. Hoppe LOGGED BY: S. Niraula START DATE: 08/06/25 END DATE: 08/06/25
SURFACE ELEVATION: 1006.5 ft RIG: 7504 METHOD: 3 1/4" HSA SURFACING: Soil WEATHER: Cloudy

Elev./ Depth ft	Water Level	Description of Materials (Soil-ASTM D2488 or 2487; Rock-USACE EM 1110-1-2908)	Sample	Blows (N-Value) Recovery	PID ppm	MC %	Tests or Remarks
972.0		LEAN CLAY (CL), trace Sand, gray, moist, stiff (GLACIAL TILL)					
34.5		SANDY LEAN CLAY (CL), trace Gravel, brown, moist, stiff (GLACIAL TILL)	35	5-5-6 (11) 18"		12	LL=27, PL=16, PI=11 q_p=1.75 tsf
967.0							
39.5		LEAN CLAY (CL), trace Sand, slightly organic, gray, moist, medium (GLACIAL TILL)	40	5-3-3 (6) 18"			Switched to mud rotary drilling method at 40 feet q_p=1 tsf
962.0							
44.5		CLAYEY SAND (SC), fine-grained, trace Gravel, gray, moist, stiff (GLACIAL TILL)	45	5-7-8 (15) 18"		12	q_p=1.5 tsf
957.0							
49.5		SILTY SAND (SM), fine-grained, trace Gravel, gray, wet, medium dense (GLACIAL OUTWASH)	50	5-7-8 (15) 18"		14	%Gravel=2% %Sand=83% P200=15%
			55				
947.0							
59.5		SANDY LEAN CLAY (CL), trace Gravel, gray, wet, stiff to hard (GLACIAL TILL)	60	5-7-7 (14) 18"		20	LL=40, PL=17, PI=23 q_p=1.5 tsf

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See Descriptive Terminology sheet for explanation of abbreviations

Project Number B2506260
Geotechnical & Environmental Evaluation
Northern Lights 2027 Expansion Project

BORING: **BH-08 Wilmar 3rd Line Upstream**

LOCATION: Captured with RTK GPS. 196th Street. See attached sketch.

DATUM: NAD83 / UTM zone 11N

NORTHING: 5225410.8 EASTING: 2373652.1

DRILLER: M. Hoppe | LOGGED BY: S. Niraula | START DATE: 08/06/25 | END DATE: 08/06/25

SURFACE ELEVATION: 1006.5 ft | RIG: 7504 | METHOD: 3 1/4" HSA | SURFACING: Soil | WEATHER: Cloudy

Elev./ Depth ft	Water Level	Description of Materials (Soil-ASTM D2488 or 2487; Rock-USACE EM 1110-1-2908)	Sample	Blows (N-Value) Recovery	PID ppm	MC %	Tests or Remarks
		SANDY LEAN CLAY (CL), trace Gravel, gray, wet, stiff to hard (GLACIAL TILL)					
65							
70				5-5-6 (11) 18"		15	q_p=1 tsf
75							
80				7-8-7 (15) 20"			q_p=1.5 tsf
85							
90				8-16-10 (26) 18"			q_p=1.25 tsf
95							

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See Descriptive Terminology sheet for explanation of abbreviations

Project Number B2506260
Geotechnical & Environmental Evaluation
Northern Lights 2027 Expansion Project

BORING: **BH-08 Wilmar 3rd Line Upstream**
LOCATION: Captured with RTK GPS. 196th Street. See attached sketch.
DATUM: NAD83 / UTM zone 11N
NORTHING: 5225410.8 EASTING: 2373652.1
DRILLER: M. Hoppe LOGGED BY: S. Niraula START DATE: 08/06/25 END DATE: 08/06/25
SURFACE ELEVATION: 1006.5 ft RIG: 7504 METHOD: 3 1/4" HSA SURFACING: Soil WEATHER: Cloudy

Elev./ Depth ft	Water Level	Description of Materials (Soil-ASTM D2488 or 2487; Rock-USACE EM 1110-1-2908)	Sample	Blows (N-Value) Recovery	PID ppm	MC %	Tests or Remarks
		SANDY LEAN CLAY (CL), trace Gravel, gray, wet, stiff to hard (GLACIAL TILL)					
100				5-5-8 (13) 18"			q_p=1 tsf
105							
110				20-18-32 (50) 18"			q_p=3.5 tsf
115							
120				18-32-33 (65) 20"			q_p=>4.5 tsf
125							

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See Descriptive Terminology sheet for explanation of abbreviations

Project Number B2506260
Geotechnical & Environmental Evaluation
Northern Lights 2027 Expansion Project

BORING: **BH-08 Wilmar 3rd Line Upstream**
LOCATION: Captured with RTK GPS. 196th Street. See attached sketch.
DATUM: NAD83 / UTM zone 11N
NORTHING: 5225410.8 EASTING: 2373652.1
DRILLER: M. Hoppe LOGGED BY: S. Niraula START DATE: 08/06/25 END DATE: 08/06/25
SURFACE ELEVATION: 1006.5 ft RIG: 7504 METHOD: 3 1/4" HSA SURFACING: Soil WEATHER: Cloudy

Elev./ Depth ft	Water Level	Description of Materials (Soil-ASTM D2488 or 2487; Rock-USACE EM 1110-1-2908)	Sample	Blows (N-Value) Recovery	PID ppm	MC %	Tests or Remarks
		SANDY LEAN CLAY (CL), trace Gravel, gray, wet, stiff to hard (GLACIAL TILL)					
130				14-20-18 (38) 18"			q_p=2.5 tsf
135							
140		*Slightly organic at 140 feet*		18-23-29 (52) 18"			q_p=4 tsf
		Very hard at 142 feet					
145		*Possible weathered bedrock at 145 feet*					
856.9							
149.6		END OF BORING		50/1" (REF) 1"			No recovery
150		Boring immediately grouted					Bedrock at 149 1/2 feet Water not observed while drilling.
155							

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See Descriptive Terminology sheet for explanation of abbreviations

Project Number B2506260
Geotechnical & Environmental Evaluation
Northern Lights 2027 Expansion Project

BORING: **BH-09 Wilmar 3rd Line Upstream**
LOCATION: Captured with RTK GPS. 196th Street. See attached sketch.
DATUM: NAD83 / UTM zone 11N
NORTHING: 5225360.2 EASTING: 2373884.8
DRILLER: M. Hoppe LOGGED BY: S. Niraula START DATE: 08/06/25 END DATE: 08/06/25
SURFACE ELEVATION: 1000.4 ft RIG: 7504 METHOD: 3 1/4" HSA SURFACING: Field WEATHER: Sunny

Elev./ Depth ft	Water Level	Description of Materials (Soil-ASTM D2488 or 2487; Rock-USACE EM 1110-1-2908)	Sample	Blows (N-Value) Recovery	PID ppm	MC %	Tests or Remarks
999.9		SILTY SAND (SM), fine-grained, trace roots, brown, moist (TOPSOIL FILL)		1-2-4 (3) 14"	0.5		BH-09 (0-2) collected on 7/31/25 @ 1137 for RCRA metals
0.5		FILL: SILTY SAND (SM), fine-grained, brown, moist		2-3-3 (5) 14"	0.5		BH-09 (2-4) collected on 7/31/25 @ 1142 for MDA 1, MDA 2, OC, GRO, DRO, BETX
998.4		FILL: SANDY LEAN CLAY (CL), trace roots, trace Gravel, brown, moist		1-1-4-5 (5) 14"	0.5		q_p=1.5 tsf
2.0		CLAYEY SAND (SC), trace Gravel, light brown to gray, moist, soft to very stiff (GLACIAL TILL)	5	3-4-6-6 (10) 18"	0.6		q_p=2.5 tsf
995.9				1-4-5-7 (9) 18"	0.5		q_p=1.75 tsf
4.5			10	1-5-5-6 (10) 20"	0.8		q_p=2.75 tsf
				12-14-14-13 (28) 6"	1.1		q_p=1 tsf
		Gray below 14 feet	15	2-5-6-7 (11) 24"	0.4		q_p=1.25 tsf
			20	4-5-6 (11) 18"	12.8	10	LL=22, PL=13, PI=9 q_p=2.25 tsf
			25	3 (3) 18"	3.2	20	DD=110 pcf q_p=1 tsf
			30	3-5-5 (10) 15"		9	P200=36% q_p=1.25 tsf Chatter at 31 feet

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Project Number B2506260
Geotechnical & Environmental Evaluation
Northern Lights 2027 Expansion Project

BORING: **BH-09 Wilmar 3rd Line Upstream**
LOCATION: Captured with RTK GPS. 196th Street. See attached sketch.
DATUM: NAD83 / UTM zone 11N
NORTHING: 5225360.2 EASTING: 2373884.8
DRILLER: M. Hoppe LOGGED BY: S. Niraula START DATE: 08/06/25 END DATE: 08/06/25
SURFACE ELEVATION: 1000.4 ft RIG: 7504 METHOD: 3 1/4" HSA SURFACING: Field WEATHER: Sunny

Elev./ Depth ft	Water Level	Description of Materials (Soil-ASTM D2488 or 2487; Rock-USACE EM 1110-1-2908)	Sample	Blows (N-Value) Recovery	PID ppm	MC %	Tests or Remarks
		CLAYEY SAND (SC), trace Gravel, light brown to gray, moist, soft to very stiff (GLACIAL TILL)					%Gravel=11% %Sand=53%
965.9							
34.5	▽	SILTY SAND (SM), fine to coarse-grained, little Gravel, gray, wet, medium dense (GLACIAL OUTWASH)	35	5-10-6 (16) 18"		9	%Gravel=11% %Sand=76% P200=13%
960.9							
39.5		SANDY LEAN CLAY (CL), trace Gravel, gray, wet, very stiff to hard	40	5-7-12 (19) 20"			Switched to mud rotary drilling method at 40 feet q_p=2.75 tsf
			45	8-11-20 (31) 20"			q_p=2.75 tsf
			50	17-22-30 (52) 20"		12	LL=28, PL=13, PI=15 q_p=3.25 tsf
			55				
			60	27-33-42 (75) 20"		11	DD=104 pcf q_p=3 tsf

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See Descriptive Terminology sheet for explanation of abbreviations

Project Number B2506260
Geotechnical & Environmental Evaluation
Northern Lights 2027 Expansion Project

BORING: **BH-09 Wilmar 3rd Line Upstream**

LOCATION: Captured with RTK GPS. 196th Street. See attached sketch.

DATUM: NAD83 / UTM zone 11N

NORTHING: 5225360.2 EASTING: 2373884.8

DRILLER: M. Hoppe | LOGGED BY: S. Niraula | START DATE: 08/06/25 | END DATE: 08/06/25

SURFACE ELEVATION: 1000.4 ft | RIG: 7504 | METHOD: 3 1/4" HSA | SURFACING: Field | WEATHER: Sunny

Elev./ Depth ft	Water Level	Description of Materials (Soil-ASTM D2488 or 2487; Rock-USACE EM 1110-1-2908)	Sample	Blows (N-Value) Recovery	PID ppm	MC %	Tests or Remarks
		SANDY LEAN CLAY (CL), trace Gravel, gray, wet, very stiff to hard					
65							
70				16-25-37 (62) 16"		10	DD=134 pcf q_p=3 tsf
75							
80				15-25-40 (65) 18"			q_p=2.5 tsf
85							
90				34-30-37 (67) 16"			q_p=4.5 tsf
95							

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See Descriptive Terminology sheet for explanation of abbreviations

Project Number B2506260
Geotechnical & Environmental Evaluation
Northern Lights 2027 Expansion Project

BORING: **BH-09 Wilmar 3rd Line Upstream**
LOCATION: Captured with RTK GPS. 196th Street. See attached sketch.
DATUM: NAD83 / UTM zone 11N
NORTHING: 5225360.2 EASTING: 2373884.8
DRILLER: M. Hoppe LOGGED BY: S. Niraula START DATE: 08/06/25 END DATE: 08/06/25
SURFACE ELEVATION: 1000.4 ft RIG: 7504 METHOD: 3 1/4" HSA SURFACING: Field WEATHER: Sunny

Elev./ Depth ft	Water Level	Description of Materials (Soil-ASTM D2488 or 2487; Rock-USACE EM 1110-1-2908)	Sample	Blows (N-Value) Recovery	PID ppm	MC %	Tests or Remarks
		SANDY LEAN CLAY (CL), trace Gravel, gray, wet, very stiff to hard					
899.4			100	28-37-47 (84) 14"			q_p=>4.5 tsf
101.0		END OF BORING Boring immediately grouted					Water observed at 35.0 feet while drilling.
			105				
			110				
			115				
			120				
			125				

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LOG OF BORING

See Descriptive Terminology sheet for explanation of abbreviations

Project Number B2506260
Geotechnical & Environmental Evaluation
Northern Lights 2027 Expansion Project

BORING: **BH-10 Wilmar 3rd Line Upstream**
LOCATION: Captured with RTK GPS. 196th Street. See attached sketch.
DATUM: NAD83 / UTM zone 11N
NORTHING: 5228783.2 EASTING: 2324537.3
DRILLER: M. Hoppe LOGGED BY: S. Niraula START DATE: 08/06/25 END DATE: 08/06/25
SURFACE ELEVATION: 1005.9 ft RIG: 7504 METHOD: 3 1/4" HSA SURFACING: Grass WEATHER: Sunny

Elev./ Depth ft	Water Level	Description of Materials (Soil-ASTM D2488 or 2487; Rock-USACE EM 1110-1-2908)	Sample	Blows (N-Value) Recovery	PID ppm	MC %	Tests or Remarks
1003.9		FILL: SANDY LEAN CLAY (CL), trace Gravel, light brown, moist		1-2-3 (3) 12"	1.3		BH-10 (2-4) collected on 8/1/25 @ 1003 for MDA 1, MDA 2, OC
2.0		SANDY LEAN CLAY (CL), trace Gravel, light brown and gray, moist, soft to stiff (ALLUVIUM)		1-1-3 (2) 18"	0.9		BH-10 (6-8) collected on 8/1/25 @ 0956 for GRO, DRO, BETX, RCRA metals
			5	6-4-5 (10) 16"	1.0		q_p=0.25 tsf
	▽			3-5-5 (8) 12"			Wet below 6 feet
997.9							q_p=1 tsf
8.0		LEAN CLAY (CL), intermixed with Silt, light gray, moist, soft (ALLUVIUM)		2-2 (2) 14"			q_p=1.25 tsf
995.9			10				
10.0		CLAYEY SAND (SC), fine-grained, brown and gray, moist, stiff (ALLUVIUM)		7-5 (7) 1"			q_p=0.75 tsf
993.9							
12.0		SANDY LEAN CLAY (CL), trace Gravel, light brown, wet, very stiff (GLACIAL TILL)		5-6-6-10 (12) 24"			q_p=1.75 tsf
991.9							
14.0		CLAYEY SAND (SC), fine-grained, trace Gravel, light brown, wet, very stiff to stiff (GLACIAL TILL)	15	6-5-10-9 (15) 20"		8	LL=17, PL=12, PI=5 q_p=2 tsf
			20	6-5-9 (14) 6"		5	%Gravel=5% %Sand=65% P200=27%
981.4							
24.5		SANDY LEAN CLAY (CL), trace Gravel, gray, moist, stiff to very stiff (GLACIAL TILL)	25	4-5-8 (13) 14"		14	q_p=2.25 tsf
			30	6-11-12 (23) 16"		11	q_p=3.5 tsf

Continued on next page

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LOG OF BORING

See Descriptive Terminology sheet for explanation of abbreviations

Project Number B2506260
Geotechnical & Environmental Evaluation
Northern Lights 2027 Expansion Project

BORING: **BH-10 Wilmar 3rd Line Upstream**

LOCATION: Captured with RTK GPS. 196th Street. See attached sketch.

DATUM: NAD83 / UTM zone 11N

NORTHING: 5228783.2	EASTING: 2324537.3		
DRILLER: M. Hoppe	LOGGED BY: S. Niraula	START DATE: 08/06/25	END DATE: 08/06/25
SURFACE ELEVATION: 1005.9 ft	RIG: 7504	METHOD: 3 1/4" HSA	SURFACING: Grass	WEATHER: Sunny

Elev./ Depth ft	Water Level	Description of Materials (Soil-ASTM D2488 or 2487; Rock-USACE EM 1110-1-2908)	Sample	Blows (N-Value) Recovery	PID ppm	MC %	Tests or Remarks
		SANDY LEAN CLAY (CL), trace Gravel, gray, moist, stiff to very stiff (GLACIAL TILL)					
35				6-8-10 (18) 14"			q_p=2.75 tsf
40				9-11-14 (25) 14"			q_p=2.75 tsf
964.9							
41.0		END OF BORING Boring immediately grouted					Water observed at 6.0 feet while drilling.
45							
50							
55							
60							

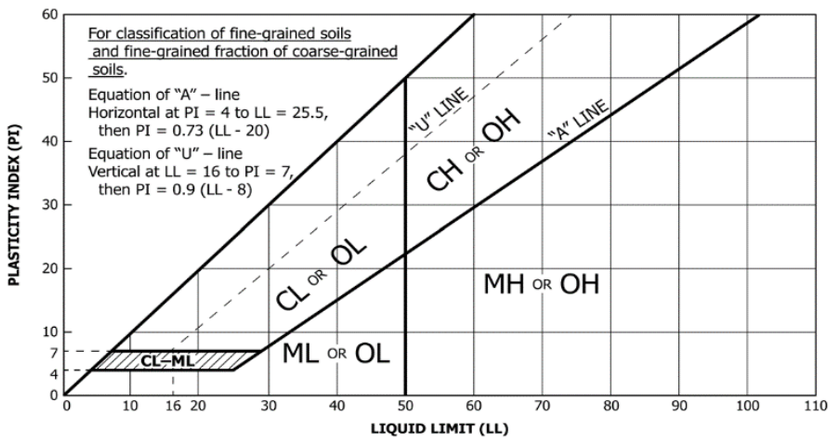
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Descriptive Terminology of Soil

Based on Standards ASTM D2487/2488
(Unified Soil Classification System)

Criteria for Assigning Group Symbols and Group Names Using Laboratory Tests[A]				Soil Classification	
				Group Symbol	Group Name[B]
Coarse-grained Soils (more than 50% retained on No. 200 sieve)	Gravels (More than 50% of coarse fraction retained on No. 4 sieve)	Clean Gravels (Less than 5% fines[C])	$C_u \geq 4$ and $1 \leq C_c \leq 3^D$	GW	Well-graded gravel[E]
			$C_u < 4$ and/or ($C_c < 1$ or $C_c > 3$)[D]	GP	Poorly graded gravel[E]
		Gravels with Fines (More than 12% fines[C])	Fines classify as ML or MH	GM	Silty gravel[E F G]
			Fines Classify as CL or CH	GC	Clayey gravel[E F G]
	Sands (50% or more coarse fraction passes No. 4 sieve)	Clean Sands (Less than 5% fines[H])	$C_u \geq 6$ and $1 \leq C_c \leq 3^D$	SW	Well-graded sand[I]
			$C_u < 6$ and/or ($C_c < 1$ or $C_c > 3$)[D]	SP	Poorly graded sand[I]
		Sands with Fines (More than 12% fines[H])	Fines classify as ML or MH	SM	Silty sand[F G I]
			Fines classify as CL or CH	SC	Clayey sand[F G I]
Fine-grained Soils (50% or more passes the No. 200 sieve)	Silts and Clays (Liquid limit less than 50)	Inorganic	PI > 7 and plots on or above "A" line[J]	CL	Lean clay[K L M]
			PI < 4 or plots below "A" line[J]	ML	Silt[K L M]
		Organic	Liquid Limit – oven dried / Liquid Limit – not dried <0.75	OL	Organic clay[K L M N] / Organic silt[K L M O]
	Silts and Clays (Liquid limit 50 or more)	Inorganic	PI plots on or above "A" line	CH	Fat clay[K L M]
			PI plots below "A" line	MH	Elastic silt[K L M]
		Organic	Liquid Limit – oven dried / Liquid Limit – not dried <0.75	OH	Organic clay[K L M P] / Organic silt[K L M Q]
Highly Organic Soils		Primarily organic matter, dark in color, and organic odor		PT	Peat

A. Based on the material passing the 3-inch (75-mm) sieve.
B. If field sample contained cobbles or boulders, or both, add "with cobbles or boulders, or both" to group name.
C. Gravels with 5 to 12% fines require dual symbols:
   GW-GM well-graded gravel with silt
   GW-GC well-graded gravel with clay
   GP-GM poorly graded gravel with silt
   GP-GC poorly graded gravel with clay
D. $C_u = D_{60} / D_{10}$ $C_c = (D_{30})^2 / (D_{10} \times D_{60})$
E. If soil contains ≥ 15% sand, add "with sand" to group name.
F. If fines classify as CL-ML, use dual symbol GC-GM or SC-SM.
G. If fines are organic, add "with organic fines" to group name.
H. Sands with 5 to 12% fines require dual symbols:
   SW-SM well-graded sand with silt
   SW-SC well-graded sand with clay
   SP-SM poorly graded sand with silt
   SP-SC poorly graded sand with clay
I. If soil contains ≥ 15% gravel, add "with gravel" to group name.
J. If Atterberg limits plot in hatched area, soil is CL-ML, silty clay.
K. If soil contains 15 to < 30% plus No. 200, add "with sand" or "with gravel", whichever is predominant.
L. If soil contains ≥ 30% plus No. 200, predominantly sand, add "sandy" to group name.
M. If soil contains ≥ 30% plus No. 200 predominantly gravel, add "gravelly" to group name.
N. PI ≥ 4 and plots on or above "A" line.
O. PI < 4 or plots below "A" line.
P. PI plots on or above "A" line.
Q. PI plots below "A" line.



Laboratory Tests

DD	Dry density, pcf	**q_p**	Pocket penetrometer strength, tsf
WD	Wet density, pcf	**q_U**	Unconfined compression test, tsf
P200	% Passing #200 sieve	**LL**	Liquid limit
MC	Moisture content, %	**PL**	Plastic limit
OC	Organic content, %	**PI**	Plasticity index

Particle Size Identification

Boulders..... over 12"
Cobbles..... 3" to 12"
Gravel
  Coarse..... 3/4" to 3" (19.00 mm to 75.00 mm)
  Fine..... No. 4 to 3/4" (4.75 mm to 19.00 mm)
Sand
  Coarse..... No. 10 to No. 4 (2.00 mm to 4.75 mm)
  Medium..... No. 40 to No. 10 (0.425 mm to 2.00 mm)
  Fine..... No. 200 to No. 40 (0.075 mm to 0.425 mm)
Silt..... No. 200 (0.075 mm) to .005 mm
Clay..... < .005 mm

Relative Proportions[L,M]

trace..... 0 to 5%
little..... 6 to 14%
with..... ≥ 15%

Inclusion Thicknesses

lens..... 0 to 1/8"
seam..... 1/8" to 1"
layer..... over 1"

Apparent Relative Density of Cohesionless Soils

Very loose ..... 0 to 4 BPF
Loose ..... 5 to 10 BPF
Medium dense..... 11 to 30 BPF
Dense..... 31 to 50 BPF
Very dense..... over 50 BPF

Consistency of Cohesive Soils	Blows Per Foot	Approximate Unconfined Compressive Strength
Very soft	0 to 1 BPF	< 0.25 tsf
Soft	2 to 4 BPF	0.25 to 0.5 tsf
Medium	5 to 8 BPF	0.5 to 1 tsf
Stiff	9 to 15 BPF	1 to 2 tsf
Very Stiff	16 to 30 BPF	2 to 4 tsf
Hard	over 30 BPF	> 4 tsf

Moisture Content:

Dry: Absence of moisture, dusty, dry to the touch.
Moist: Damp but no visible water.
Wet: Visible free water, usually soil is below water table.

Drilling Notes:

Blows/N-value: Blows indicate the driving resistance recorded for each 6-inch interval. The reported N-value is the blows per foot recorded by summing the second and third interval in accordance with the Standard Penetration Test, ASTM D1586.

Partial Penetration: If the sampler could not be driven through a full 6-inch interval, the number of blows for that partial penetration is shown as #/x" (i.e. 50/2"). The N-value is reported as "REF" indicating refusal.

Recovery: Indicates the inches of sample recovered from the sampled interval. For a standard penetration test, full recovery is 18", and is 24" for a thinwall/shelby tube sample.

WOH: Indicates the sampler penetrated soil under weight of hammer and rods alone; driving not required.

WOR: Indicates the sampler penetrated soil under weight of rods alone; hammer weight and driving not required.

Water Level: Indicates the water level measured by the drillers either while drilling (▽), at the end of drilling (▼), or at some time after drilling (▽▼).

Sample Symbols

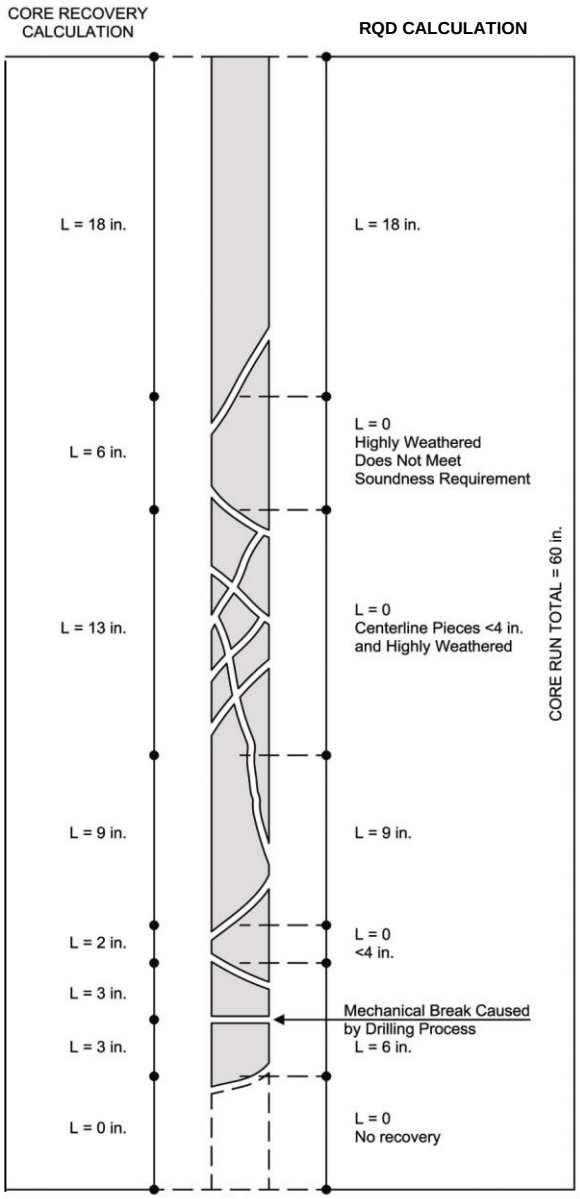
Standard Penetration Test
Modified California (MC)
Auger
Grab Sample
Rock Core
Thinwall (TW)/Shelby Tube (SH)
Texas Cone Penetrometer
Dynamic Cone Penetrometer

5/2021

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Descriptive Terminology of Rock

Based on U.S. Army Corps of Engineers EM 1110-1-2908



Example Calculations

Core Recovery, CR = $\frac{\text{Total length of rock recovered}}{\text{Total core run length}}$

Example: $CR = \frac{(18 + 6 + 13 + 9 + 2 + 3 + 3)}{(60)}$

CR = 90%

RQD = $\frac{\text{Sum of sound pieces 4 inches or larger}}{\text{Total core run length}}$

RQD Percent	Rock Quality
< 25	very poor
25 < 50	poor
50 < 75	fair
75 < 90	good
90 < 100	excellent

Example: $RQD = \frac{(18 + 9 + 6)}{(60)}$

RQD = 55%

Weathering

Unweathered: No evidence of chemical or mechanical alteration.

Slightly weathered: Slight discoloration on surface, slight alteration along discontinuities, less than 10% of rock volume altered.

Moderately Weathered: Discoloration evident, surface pitted and altered with alteration penetrating well below rock surfaces, weathering halos evident, 10% to 50% of the rock altered.

Highly Weathered: Entire mass discolored, alteration pervading nearly all of the rock, with some pockets of slightly weathered rock noticeable, some mineral leached away.

Decomposed: Rock reduced to a soil consistency with relict rock texture, generally molded and crumbled by hand.

Hardness

Very soft:	Can be deformed by hand
Soft:	Can be scratched with a fingernail
Moderately hard:	Can be scratched easily with a knife
Hard:	Can be scratched with difficulty with a knife
Very hard:	Cannot be scratched with a knife

Texture

Sedimentary Rocks:	*Grain Size*
Coarse grained	2 – 5 mm
Medium grained	0.4 – 2 mm
Fine grained	0.1 – 0.4 mm
Very fine grained	< 0.1 mm

Igneous and Metamorphic Rocks:	
Coarse grained	5 mm
Medium grained	1 – 5 mm
Fine grained	0.1 – 1 mm
Aphanitic	< 0.1 mm

Thickness of Bedding

Massive:	3 ft. thick or greater
Thick bedded:	1 to 3 ft. thick
Medium bedded:	4 in. to 1 ft. thick
Thin bedded:	4 in. thick or less

Degree of Fracturing (Jointing)

Unfractured:	Fracture spacing 6 ft. of more
Slightly fractured:	Fracture spacing 2 to 6 ft.
Moderately fractured:	Fracture spacing 8 in. to 2 ft.
Highly fractured:	Fracture spacing 2 in. to 8 in.
Intensely fractured:	Fracture spacing 2 in. or less

Willmar 3rd Branch Line Downstream

NL27 Wilmar 3rd Line Downstream Extension

Subsurface Exploration and Lab Testing Report

Norwood Young America, Minnesota

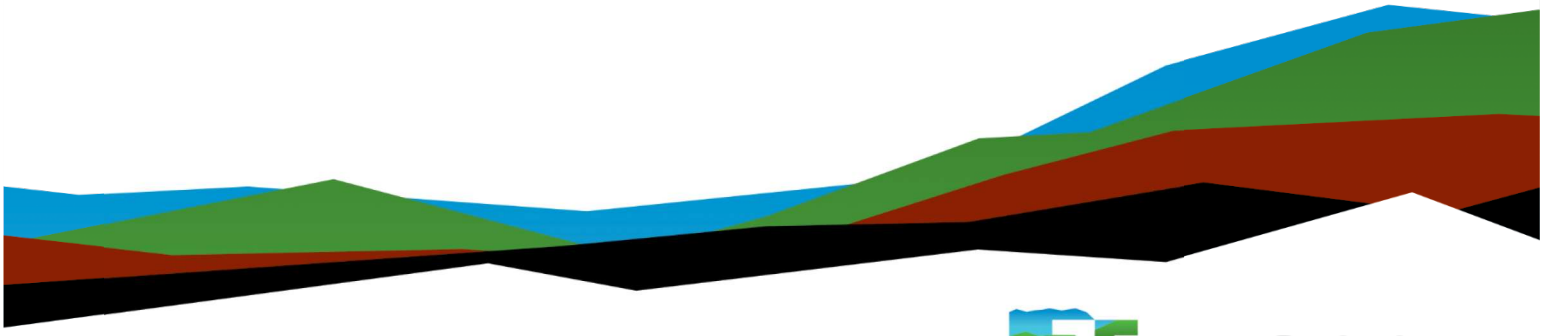
December 8, 2025 | Terracon Project No. MP255127

Prepared for:

Stantec Consulting Services Inc.
200-325 25 Street Southeast
Calgary, Alberta, Canada T2A 7H8

Prepared by:

Terracon Consultants



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- Materials

2625 Highway 14 W, Suite F
Rochester, Minnesota 55901
P (507) 722-7365
Terracon.com

December 8, 2025

Stantec Consulting Services Inc.
200-325 25 Street Southeast
Calgary, Alberta, Canada T2A 7H8

Attn: Ginger Chan
P: (587) 437-5068
E: ginger.chan@stantec.com

Re: Subsurface Exploration and Lab Testing Report
NL27 Wilmar 3rd Line Downstream Extension
Task Order No. 060246-091002
Norwood Young America, Minnesota
Terracon Project No. MP255127

Dear Ms. Chan:

We have performed geotechnical services for the above referenced project in general accordance with Task Order No. 060246-091002, authorization via email dated July 28, 2025, and Change Order No. 001 dated August 19, 2025. This report presents the findings of the subsurface exploration for borings BH-01 through BH-06 and BH-07A through BH-07E for the proposed project.

We appreciate the opportunity to be of service to you on this project. If you have any questions concerning this report or if we may be of further service, please contact us.

Sincerely,

Terracon

Kyle T. Schmidt, EIT
Staff Engineer

Debra A. Schroeder, PE
Senior Engineer

Table of Contents

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Subsurface Profile 3
Groundwater Conditions 3
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Attachments

Exploration and Testing Procedures
Site Location and Exploration Plans
Exploration and Laboratory Results
Supporting Information

Note: This report was delivered in a web-based format. **Blue Bold** text in the report indicates a referenced section heading. The PDF version also includes hyperlinks which direct the reader to that section and clicking on the Terracon logo will bring you back to this page. For more interactive features, please view your project online at **client.terracon.com**.

Refer to each individual Attachment for a listing of contents.

Introduction

This Subsurface Exploration and Lab Testing Report presents the results of our subsurface exploration and geotechnical engineering services performed for the proposed pipeline corridor.

The purpose of these services was to provide information relative to:

- Subsurface soil conditions
- Groundwater conditions

The geotechnical engineering Scope of Services for this project included the advancement of eleven test borings (BH-01 through BH-06 and BH-07A through BH-07E) to depths of approximately 41.5 and 101.5 feet below the existing ground surface.

In addition to geotechnical soil sampling, environmental soil sampling was performed on samples collected at approximately 10 feet above the bottom of each borehole and sent to a national laboratory for testing. The results of these tests are provided under a separate cover.

Maps showing the site and boring locations are shown on the **Site Location** and **Exploration Plans**, respectively. The results of the laboratory testing performed on geotechnical soil samples obtained from the site during our field exploration are included on the boring logs and/or as separate graphs in the **Exploration and Laboratory Results** section.

Site Conditions

The following description of site conditions is derived from our site visit in association with the field exploration and our review of publicly available geologic and topographic maps.

Item	Description
Site Location	The project is located in Norwood Young America, Minnesota. Latitude/Longitude (approximate): 44.7774°, -93.8289° See **Site Location** and **Exploration Plan**.
Current Ground Cover	Moderately vegetated with grasses, low brush, trees, and agricultural crops.
Geology	Our investigation and review of geologic maps and well logs indicated subsurface conditions mainly consist of glacial outwash and till soils, including mostly silty sand (SM), clayey sand (SC), and sandy lean clay (CL).

Project Description

Our final understanding of the project conditions is as follows:

Item	Description
Information Provided	An email request for proposal was provided by Stantec on July 3, 2025. The request included a Google Earth .kmz file showing the location and depths of the requested borings for planned projects. Since this original request we have been notified via email of changes to the project scope and timelines. Our current understanding of the final scope of services is presented in this report.
Project Description	The project consists of a pipeline extension section near Norwood Young America, Minnesota. The proposed subsurface investigation will help Stantec assess the technical feasibility and constructability of using various trenchless or trenched pipe installation methods to install the new pipeline at various crossings along the proposed pipeline corridor.

Geotechnical Characterization

Subsurface Profile

We have developed a general characterization of the subsurface conditions based upon our review of the subsurface exploration, geologic setting and our understanding of the project. This characterization, termed GeoModel, forms the basis of our geotechnical evaluation of the site. Conditions observed at each exploration point are indicated on the individual logs. The individual logs can be found in the **Exploration and Laboratory Results** and the GeoModel can be found in the **Figures** attachment of this report.

As part of our analyses, we identified the following model layers within the subsurface profile. For an approximate elevation view of the model layer depths at each boring location, refer to the GeoModel.

Model Layer	Layer Name	General Description
1	**Surficial Layer**	Topsoil, approximately 2 to 12 inches.
2	**Native Clay Soils**	Clays (CL), with varying amounts of sands and gravel, dark gray, gray, dark brown, brownish gray, and brown in color, very soft to very stiff in consistency
3	**Native Sand Soils**	Sands (SM, SC) with varying amounts of fines and gravel, fine to coarse grained, brown and gray in color, loose to medium dense in relative density
4	**Native Silt Soils**	Silts (ML, CL-ML) with varying amounts of clay, sands, and gravel, gray and brown in color, medium stiff to hard in consistency

Groundwater Conditions

The boreholes were observed while drilling for the presence and level of groundwater. The water levels observed in the boreholes can be found on the boring logs in **Exploration and Laboratory Results**.

Groundwater was observed during drilling at depths of about 27 to 31 feet below the existing ground surface at the boring BH-01 and BH-02 locations. Groundwater was not observed at the other boring locations. A relatively long period can be necessary for a groundwater level to develop and stabilize in a borehole; however, groundwater level observations made within granular soils are usually a reliable indication of the current groundwater conditions. Long-term observations in piezometers or observation wells,

sealed from the influence of surface water, are recommended if it is necessary to better define groundwater levels.

Groundwater level fluctuations occur due to seasonal variations in the amount of rainfall, runoff, and other factors not evident at the time the borings were performed. Therefore, groundwater levels during construction or at other times in the life of the pipeline will vary. The possibility of groundwater level fluctuations should be considered when developing the design and construction plans for the project.

General Comments

Our report presents the results of our fieldwork and laboratory tests. Natural variations will occur between exploration point locations or due to the modifying effects of construction or weather. The nature and extent of such variations may not become evident until during or after construction. Terracon should be retained to review the final design plans and specifications so comments can be made regarding interpretation of the results of our geotechnical investigation. Terracon should be retained to provide observation and testing services during earth-related construction phases of the project. If variations appear, we can provide further evaluation and supplemental recommendations. If variations are noted in the absence of our observation and testing services on-site, we should be immediately notified so that we can provide additional evaluation and supplemental recommendations.

Our Scope of Services included specific environmental testing as noted above; however, it does not include either specifically or by implication any environmental or biological (e.g., mold, fungi, bacteria) assessment of the site or identification or prevention of pollutants, hazardous materials or conditions. If the owner is concerned about the potential for such contamination or pollution, other studies should be undertaken.

Our services and any correspondence are intended for the sole benefit and exclusive use of our client for specific application to the project discussed and are accomplished in accordance with generally accepted geotechnical engineering practices with no third-party beneficiaries intended. Any third-party access to services or correspondence is solely for information purposes to support the services provided by Terracon to our client. Reliance upon the services and any work product is limited to our client and is not intended for third parties. Any use or reliance of the provided information by third parties is done solely at their own risk. No warranties, either express or implied, are intended or made.

Site characteristics as provided are for design purposes and not to estimate excavation cost. Any use of our report in that regard is done at the sole risk of the excavating cost estimator as there may be variations on the site that are not apparent in the data that could significantly affect excavation cost. Any parties charged with estimating excavation

costs should seek their own site characterization for specific purposes to obtain the specific level of detail necessary for costing. Site safety and cost estimating including excavation support and dewatering requirements/design are the responsibility of others. Construction and site development have the potential to affect adjacent properties. Such impacts can include damages due to vibration, modification of groundwater/surface water flow during construction, foundation movement due to undermining or subsidence from excavation, as well as noise or air quality concerns. Evaluation of these items on nearby properties are commonly associated with contractor means and methods and are not addressed in this report. The owner and contractor should consider a preconstruction/precondition survey of surrounding development. If changes in the nature, design, or location of the project are planned, the results presented in this factual report shall not be considered valid unless we review the changes and either verify or modify our conclusions in writing.

Figures

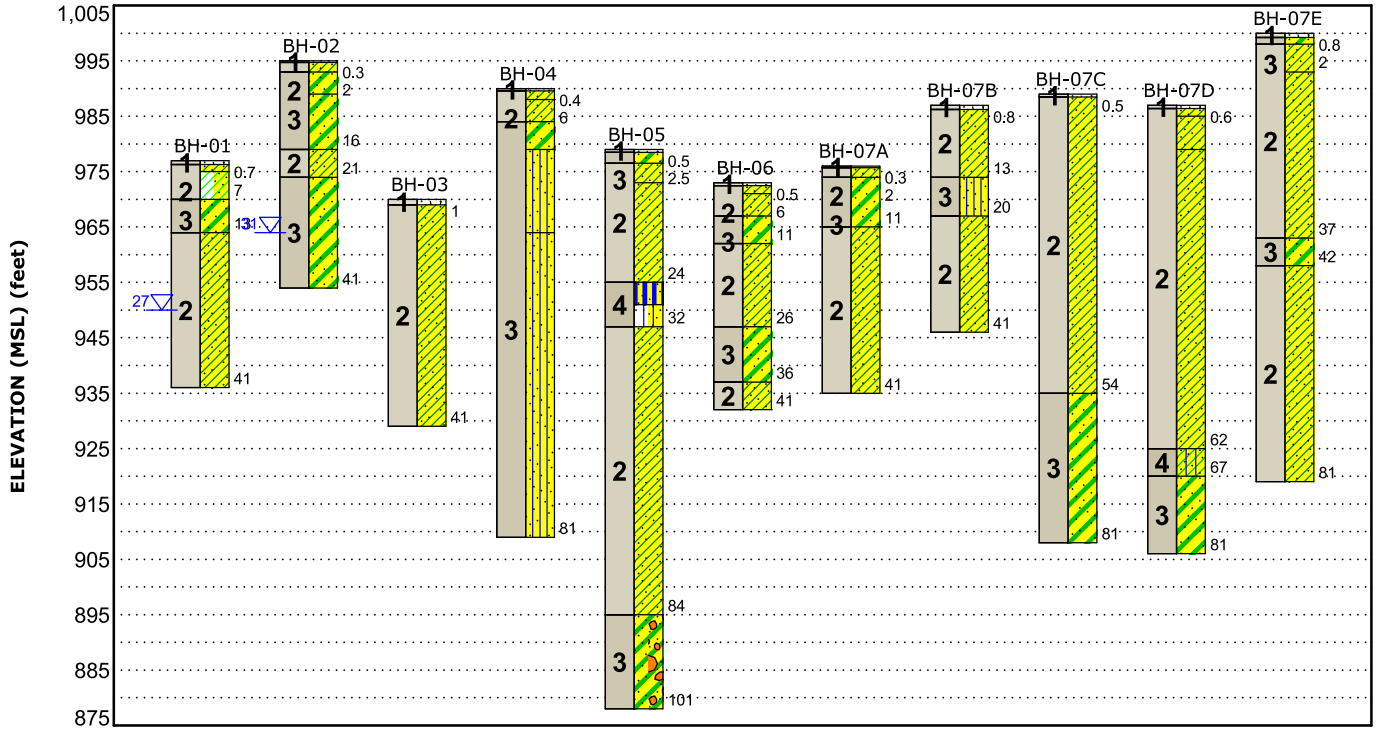
Contents:

GeoModel

NL27 Wilmar 3rd Line Downstream Extension
12275 122nd Street | Cologne, MN
Terracon Project No. MP255127

Terracon
13400 15th Ave N
Plymouth, MN

GeoModel



This is not a cross section. This is intended to display the Geotechnical Model only. See individual logs for more detailed conditions.

Model Layer	Layer Name	General Description
1	**Surficial Layer**	Topsoil, approximately 2 to 12 inches.
2	**Native Clay Soils**	Clays (CL), with varying amounts of sands and gravel, dark gray, gray, dark brown, brownish gray, and brown in color, very soft to very stiff in consistency
3	**Native Sand Soils**	Sands (SM, SC) with varying amounts of fines and gravel, fine to coarse grained, brown and gray in color, loose to medium dense in relative density
4	**Native Silt Soils**	Silts (ML, CL-ML) with varying amounts of clay, sands, and gravel, gray and brown in color, medium stiff to hard in consistency

Legend

- Topsoil
- Lean Clay with Sand
- Silty Sand
- Silt with Sand
- Sandy Silty Clay
- Sandy Lean Clay
- Clayey Sand
- Sandy Silt
- Clayey Sand with Gravel

▽ First Water Observation

Groundwater levels are temporal. The levels shown are representative of the date and time of our exploration. Significant changes are possible over time.
Water levels shown are as measured during and/or after drilling. In some cases, boring advancement methods mask the presence/absence of groundwater. See individual logs for details.

NOTES:
Layering shown on this figure has been developed by the geotechnical engineer for purposes of modeling the subsurface conditions as required for the subsequent geotechnical engineering for this project. Numbers adjacent to soil column indicate depth below ground surface.

Attachments

Exploration and Testing Procedures

Field Exploration

Boring Numbers	Boring Depths (feet)	Location
BH-01	41	44.7774° N, 93.8289° W
BH-02	41	44.7824° N, 93.8408° W
BH-03	41	44.7875° N, 93.8492° W
BH-04	81	44.7957° N, 93.8715° W
BH-05	101	44.7966° N, 93.8742° W
BH-06	41	44.8003° N, 93.8881° W
BH-07A	41	44.7987° N, 93.8972° W
BH-07B	41	44.8006° N, 93.9035° W
BH-07C	81	44.7997° N, 93.8989° W
BH-07D	81	44.8049° N, 93.9061° W
BH-07E	81	44.8029° N, 93.9058° W

Boring Layout and Elevations: Stantec representatives staked the boring locations. We were provided with the Google Earth kmz file showing the boring locations and these locations are shown on the **Exploration Plans**. The approximate coordinates of the borings are indicated on the boring logs. Approximate ground surface elevations were estimated using the Minnesota Department of Natural Resources, MnTOPO LiDAR map and reported on the logs to the nearest foot. If more accurate boring locations and surface elevations are desired, we recommend the boring locations be surveyed.

Subsurface Exploration Procedures: We advanced the borings with ATV and track-mounted rotary drill rigs using continuous flight augers and mud-rotary drilling techniques. Split-spoon samples were obtained at intervals of 5 feet. In the split-barrel sampling procedure, a standard 2-inch outer diameter split-barrel sampling spoon was driven into the ground by a 140-pound automatic hammer falling a distance of 30 inches. The number of blows required to advance the sampling spoon the last 12 inches of a normal 18-inch penetration (the second and third 6 inches of penetration for a 24-inch penetration) is recorded as the Standard Penetration Test (SPT) resistance value. The SPT resistance values, also referred to as N-values, are indicated on the boring logs at the test depths. The samples were placed in appropriate containers and transported to our laboratory for testing. We observed and recorded groundwater levels during drilling and sampling.

The boreholes were backfilled with grout/neat cement after completion to within 2 feet of the ground surface. The boreholes were backfilled with auger cuttings from a depth of 2 feet to the ground surface.

The drill crew prepared a field log of each boring to record field data including visual descriptions of the materials encountered during drilling as well as the driller's interpretation of the subsurface conditions between samples. The boring logs included with this report represent an interpretation of the subsurface conditions at each boring location based on field data and observation of the samples.

Laboratory Testing

The project engineer reviewed the field data and assigned laboratory tests. The laboratory testing program included the following tests on retrieved soil samples:

Geotechnical Testing

- Moisture Content
- Grain size analysis (through a No. 200 sieve only)
- Atterberg Limits (3-point)

The laboratory testing program included examination of soil samples. Based on the results of our field and laboratory programs, we described and classified the soil samples in general accordance with the Unified Soil Classification System.

The environmental laboratory tests that were performed are shown below. The results of these tests are provided under a separate cover.

Environmental Testing

- TPH-DRO (total petroleum hydrocarbons – diesel range organics)
- TCLP 8 RCRA metals
- BTEX/GRO
- TCLP herbicides
- TCLP pesticides

Site Location and Exploration Plans

Contents:

Site Location Plan
Exploration Plan (3 pages)

Note: All attachments are one page unless noted above.

Site Location

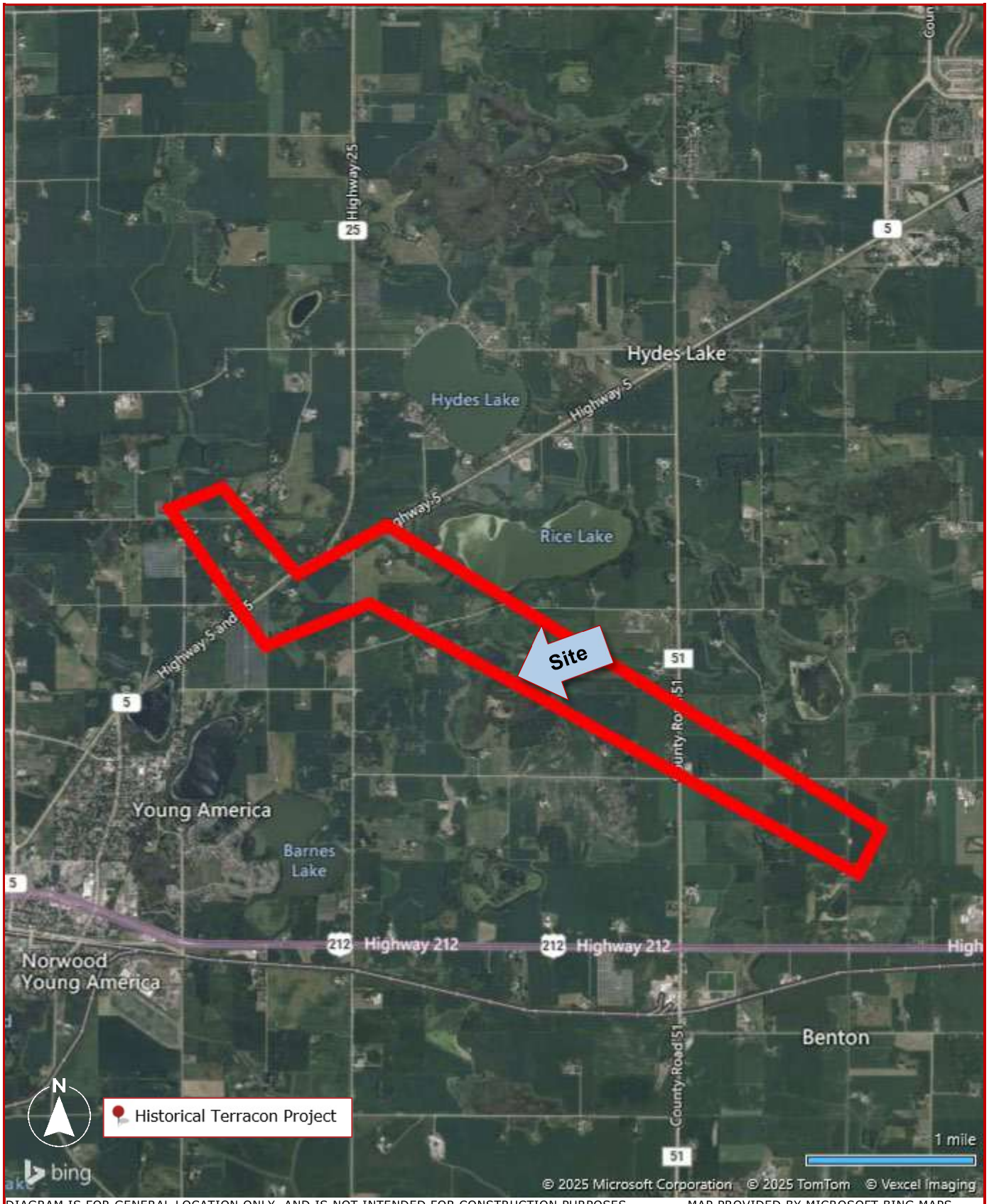


DIAGRAM IS FOR GENERAL LOCATION ONLY, AND IS NOT INTENDED FOR CONSTRUCTION PURPOSES MAP PROVIDED BY MICROSOFT BING MAPS

Exploration Plan – BH-01, 02, 03

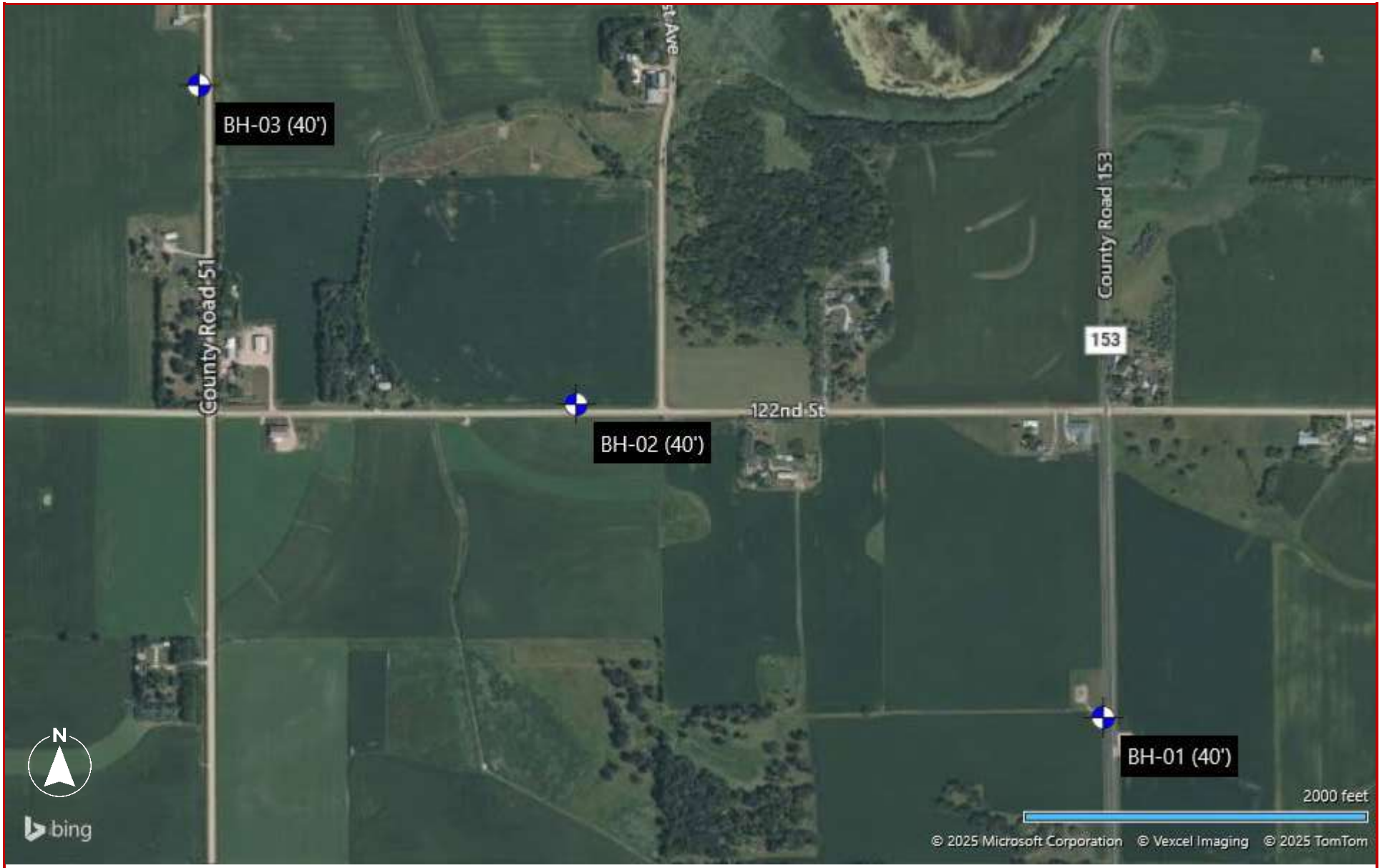


DIAGRAM IS FOR GENERAL LOCATION ONLY, AND IS NOT INTENDED FOR CONSTRUCTION PURPOSES

MAP PROVIDED BY MICROSOFT BING MAPS

Exploration Plan – BH-04, 05, 06

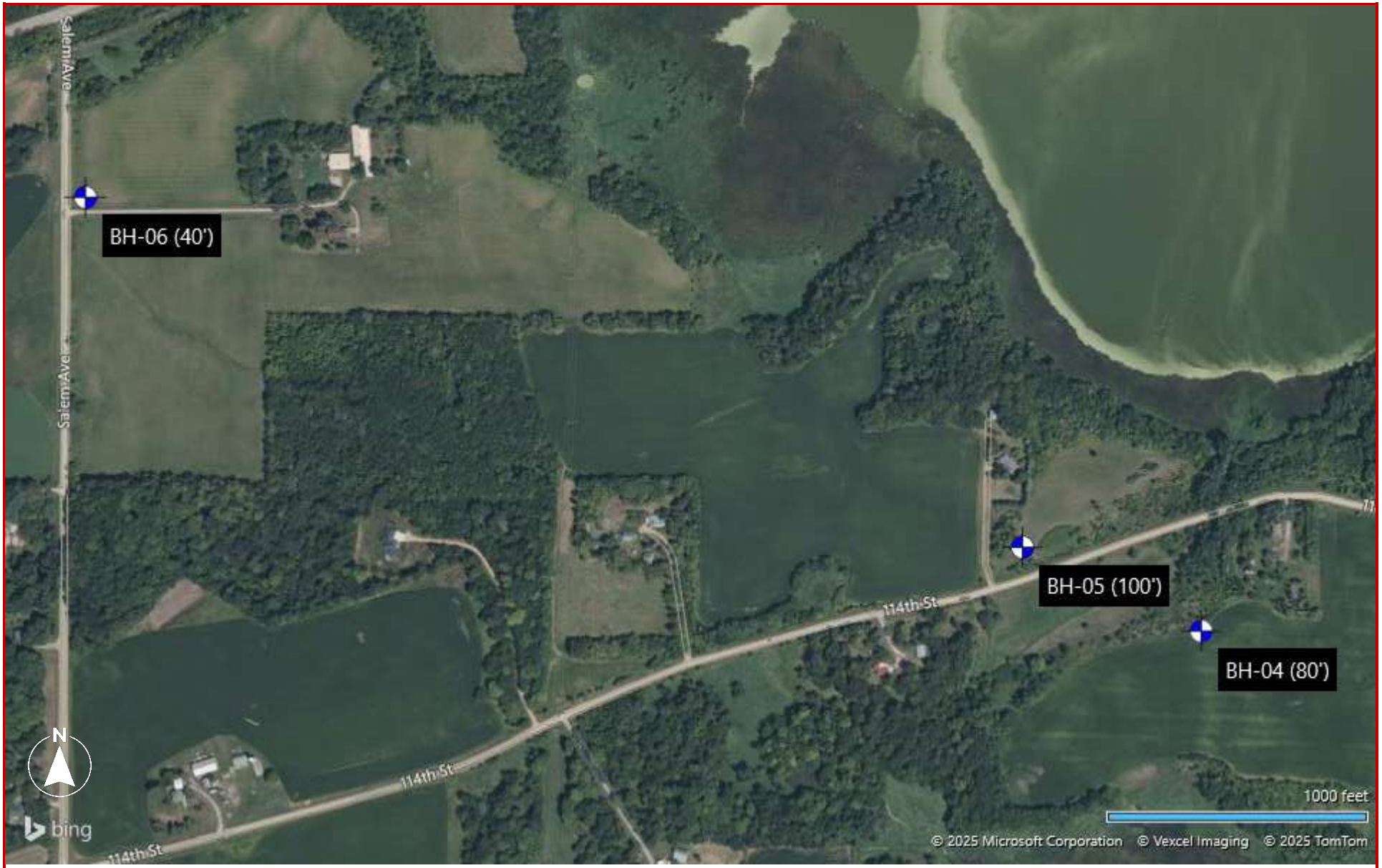


DIAGRAM IS FOR GENERAL LOCATION ONLY, AND IS NOT INTENDED FOR CONSTRUCTION PURPOSES

MAP PROVIDED BY MICROSOFT BING MAPS

Exploration Plan – BH-07A, 07B, 07C, 07D, 07E



DIAGRAM IS FOR GENERAL LOCATION ONLY, AND IS NOT INTENDED FOR CONSTRUCTION PURPOSES

MAP PROVIDED BY MICROSOFT BING MAPS

Exploration and Laboratory Results

Contents:

Borings (BH-01 through BH-06 and BH-07A through BH-07E)
Atterberg Limit Results

NL27 Wilmar 3rd Line Downstream Extension
12275 122nd Street | Cologne, MN
Terracon Project No. MP255127

Terracon
13400 15th Ave N
Plymouth, MN

Boring Log No. BH-01

Location: See Exploration Plan

Latitude: 44.7774° Longitude: -93.8289°

Model Layer	Depth (Ft.)	Elevation: 977 (Ft.)	Depth (Ft.)	Water Level Observations	Sample Type	Recovery (In.)	Field Test Results	Water Content (%)	Atterberg Limits LL-PL-PI	Percent Fines
1	0.7	**TOPSOIL**, Approx. 8 inches 976.3								
2	2.0	**SANDY LEAN CLAY (CL)**, trace gravel, dark brown, medium stiff 975				9	2-2-5-6 N=7	28.6		
		LEAN CLAY WITH SAND (CL), gray and brown, soft				2	1-1-1 N=2			
	7.0	970				17				
3		**CLAYEY SAND (SC)**, trace gravel, fine grained, brown and gray, medium dense	10			13	29-12-8 N=20	20.7		
	13.0	964								
2		**SANDY LEAN CLAY (CL)**, trace gravel, gray, medium stiff to stiff				18	2-2-3 N=5	21.0	31-15-16	53.4
			20			18	2-2-3 N=5	21.5		
						24				
				▽		9	4-6-6 N=12	20.7		
		silt lenses at 30'	30			18	3-3-5 N=8	23.0		
						18	5-7-8 N=15	21.2		
	41.0	936	40			17	6-6-9 N=15	19.2		52.3
		Boring Terminated at 41 Feet								

See Exploration and Testing Procedures for a description of field and laboratory procedures used and additional data (If any).

See Supporting Information for explanation of symbols and abbreviations.

Elevation Reference: Elevations estimated from MnTOPO website

Water Level Observations
▽ Water perched at 27 feet

Drill Rig
Geoprobe 3126GT

Hammer Type
Automatic

Driller
C. Hehn

Notes
Equipment Reference:
Energy Transfer Ratio=92.8 +/- 3.3%
Hammer Efficiency Correction=1.55

Advancement Method
3 1/4" Hollow Stem Auger

Abandonment Method
Boring backfilled with cuttings from 0 to 2 feet and neat cement grout to completion

Logged by
B. Kern

Boring Started
10-22-2025

Boring Completed
10-22-2025

NL27 Wilmar 3rd Line Downstream Extension
12275 122nd Street | Cologne, MN
Terracon Project No. MP255127

Terracon
13400 15th Ave N
Plymouth, MN

Boring Log No. BH-02

Location: See Exploration Plan

Latitude: 44.7824° Longitude: -93.8408°

Model Layer	Graphic Log	Depth (Ft.)	Elevation: 995 (Ft.)	Depth (Ft.)	Water Level Observations	Sample Type	Recovery (In.)	Field Test Results	Water Content (%)	Atterberg Limits LL-PL-PI	Percent Fines
1 2		0.3	**TOPSOIL**, Approx. 4 inches 994.7				15	3-4-5-9 N=9	23.5		
		2.0	**SANDY LEAN CLAY**, trace gravel, trace roots, dark brown and brown, stiff 993								
3		6.0	**CLAYEY SAND (SC)**, trace gravel, fine to coarse grained, brown and gray, loose 989				18	3-3-4 N=7	20.5		49.2
			CLAYEY SAND (SC), trace gravel, fine to medium grained, brown and gray, medium dense	10			18	4-5-5 N=10	21.1		
		16.0	979				18	4-4-6 N=10	21.2		45.8
2			**SANDY LEAN CLAY (CL)**, trace gravel, brownish gray, stiff								
		21.0	974	20			18	4-5-7 N=12	21.1		
3			**CLAYEY SAND (SC)**, trace gravel, fine to medium grained, brown and gray, medium dense				18	2-4-6 N=10	18.8		40.5
			gray at 31'	30	▽		18	3-6-6 N=12	16.9		
							24				
		41.0	954	40			18	4-6-7 N=13	18.6		
			Boring Terminated at 41 Feet								

See Exploration and Testing Procedures for a description of field and laboratory procedures used and additional data (If any).

See Supporting Information for explanation of symbols and abbreviations.

Elevation Reference: Elevations estimated from MnTOPO website

Water Level Observations
▽ Water observed at 31 feet while drilling.

Drill Rig
CME 550X

Hammer Type
Automatic

Driller
M. Nunez

Notes
Equipment Reference:
Energy Transfer Ratio=89.8 +/- 3.2%
Hammer Efficiency Correction=1.50

Advancement Method
3 1/4" Hollow Stem Auger

Abandonment Method
Boring backfilled with neat cement grout to completion

Logged by
R. Rodriguez

Boring Started
09-23-2025

Boring Completed
09-23-2025

NL27 Wilmar 3rd Line Downstream Extension
12275 122nd Street | Cologne, MN
Terracon Project No. MP255127

Terracon
13400 15th Ave N
Plymouth, MN

Boring Log No. BH-03

Location: See Exploration Plan

Latitude: 44.7875° Longitude: -93.8492°

Model Layer	Depth (Ft.)	Elevation: 970 (Ft.)	Water Level Observations	Sample Type	Recovery (In.)	Field Test Results	Water Content (%)	Atterberg Limits LL-PL-PI	Percent Fines
1	1.0	**TOPSOIL**, Approx. 12 inches (969)							
2		**SANDY LEAN CLAY (CL)**, trace gravel, trace silt, brown and gray, medium stiff to very stiff			12	2-3-3-3 N=6	30.1		
					18	2-3-4 N=7	25.4		
	10				18	6-8-9 N=17	22.3		
		gray at 13'			17	4-5-6 N=11	22.7		
	20				18	4-4-7 N=11	23.0		
		gray sand seam at 25'			18	3-5-6 N=11	21.8		56.3
	30				18	4-6-10 N=16	24.2		
					17	4-6-8 N=14	19.9		
	40				18	4-6-11 N=17	18.3		
	41.0	(929)							
		Boring Terminated at 41 Feet							

See Exploration and Testing Procedures for a description of field and laboratory procedures used and additional data (If any).

See Supporting Information for explanation of symbols and abbreviations.

Elevation Reference: Elevations estimated from MnTOPO website

Water Level Observations
No free water observed

Drill Rig
CME 550X

Hammer Type
Automatic

Driller
M. Nunez

Logged by
R. Rodriguez

Boring Started
10-28-2025

Boring Completed
10-28-2025

Notes
Equipment Reference:
Energy Transfer Ratio=89.8 +/- 3.2%
Hammer Efficiency Correction=1.50

Advancement Method
3 1/4" Hollow Stem Auger from 0 to 9.5 feet. Mud rotary drilling from 9.5 feet to 41 feet.

Abandonment Method
Boring backfilled with neat cement grout to completion

NL27 Wilmar 3rd Line Downstream Extension
12275 122nd Street | Cologne, MN
Terracon Project No. MP255127

Terracon
13400 15th Ave N
Plymouth, MN

Boring Log No. BH-04

Location: See Exploration Plan

Latitude: 44.7957° Longitude: -93.8715°

Model Layer	Depth (Ft.)	Elevation: 990 (Ft.)	Depth (Ft.)	Sample Type	Recovery (In.)	Field Test Results	Water Content (%)	Atterberg Limits LL-PL-PI	Percent Fines
1	0.4	**TOPSOIL**, Approx. 5 inches — 989.6							
2	2.0	**SANDY LEAN CLAY**, trace gravel, trace roots, dark brown and brown, stiff — 988							
		SANDY LEAN CLAY (CL), trace gravel, brown, stiff			20	4-4-6-6 N=10	18.1		
	6.0	984			18	3-4-5 N=9	22.1		56.3
3		**CLAYEY SAND (SC)**, trace gravel, fine to medium grained, brown, medium dense	10		18	5-6-6 N=12	20.4		49.1
	11.0	979			18	3-4-6 N=10	24.6		
		SILTY SAND (SM), with clay, trace gravel, fine to medium grained, brown, medium dense to loose	20		16	5-6-8 N=14	22.4		45.7
					12	3-4-5 N=9	26.7		
	26.0	964	30		18	1-3-3 N=6	20.6		
		SILTY SAND (SM), with clay, trace gravel, fine to medium grained, gray, loose to medium dense			18	3-4-5 N=9	24.3		
			40		18	4-4-6 N=10	18.9		
					18	3-5-7 N=12	19.0		
			50		17	4-6-9 N=15	25.0		49.7
					18	4-5-9 N=14	19.5		
			60		18	4-6-10 N=16	19.8		

See Exploration and Testing Procedures for a description of field and laboratory procedures used and additional data (If any).

See Supporting Information for explanation of symbols and abbreviations.

Elevation Reference: Elevations estimated from MnTOPO website

Water Level Observations
No free water observed

Drill Rig
CME 550X

Hammer Type
Automatic

Driller
M. Nunez

Logged by
R. Rodriguez

Boring Started
09-24-2025

Boring Completed
09-24-2025

Notes
Equipment Reference:
Energy Transfer Ratio=89.8 +/- 3.2%
Hammer Efficiency Correction=1.50

Advancement Method
3 1/4" Hollow Stem Auger from 0 to 9.5 feet. Mud rotary drilling from 9.5 feet to 81 feet.

Abandonment Method
Boring backfilled with neat cement grout to completion

NL27 Wilmar 3rd Line Downstream Extension
12275 122nd Street | Cologne, MN
Terracon Project No. MP255127

Terracon
13400 15th Ave N
Plymouth, MN

Boring Log No. BH-04

Location: See Exploration Plan

Latitude: 44.7957° Longitude: -93.8715°

Depth (Ft.) Elevation: 990 (Ft.)

Model Layer	Graphic Log	Depth (Ft.)	Water Level Observations	Sample Type	Recovery (In.)	Field Test Results	Water Content (%)	Atterberg Limits LL-PL-PI	Percent Fines
3		**SILTY SAND (SM)**, with clay, trace gravel, fine to medium grained, gray, loose to medium dense *(continued)*							
				X	18	5-6-9 N=15	20.0		
		70		X	18	4-6-7 N=13	17.3		
				X	18	5-6-9 N=15	17.5		
		80		X	18	5-6-10 N=16	17.5		
		81.0 909							
		Boring Terminated at 81 Feet							

See Exploration and Testing Procedures for a description of field and laboratory procedures used and additional data (If any).

See Supporting Information for explanation of symbols and abbreviations.

Elevation Reference: Elevations estimated from MnTOPO website

Water Level Observations
No free water observed

Drill Rig
CME 550X

Hammer Type
Automatic

Driller
M. Nunez

Notes
Equipment Reference:
Energy Transfer Ratio=89.8 +/- 3.2%
Hammer Efficiency Correction=1.50

Advancement Method
3 1/4" Hollow Stem Auger from 0 to 9.5 feet. Mud rotary drilling from 9.5 feet to 81 feet.

Abandonment Method
Boring backfilled with neat cement grout to completion

Logged by
R. Rodriguez

Boring Started
09-24-2025

Boring Completed
09-24-2025

NL27 Wilmar 3rd Line Downstream Extension
12275 122nd Street | Cologne, MN
Terracon Project No. MP255127

Terracon
13400 15th Ave N
Plymouth, MN

Boring Log No. BH-05

Location: See Exploration Plan

Latitude: 44.7966° Longitude: -93.8742°

Model Layer	Graphic Log	Depth (Ft.)	Elevation: 979 (Ft.)	Depth (Ft.)	Water Level Observations	Sample Type	Recovery (In.)	Field Test Results	Water Content (%)	Atterberg Limits LL-PL-PI	Percent Fines
3		0.5	**TOPSOIL**, Approx. 6 inches 978.5								
3		2.5	**CLAYEY SAND (SC)**, trace gravel, fine grained, brown, medium dense 976.5								
2		6.0	**SANDY LEAN CLAY (CL)**, trace gravel, trace roots, silt lenses, brown and gray, stiff 973								
2			**SANDY LEAN CLAY (CL)**, trace gravel, silt seams, brown and gray, very soft to stiff				15	4-7-7-6 N=14	20.9		
							11	5-6-7 N=13	21.3		61.9
				10			0	0-0-0 N=0			
							16	3-5-6 N=11	24.6	32-16-16	63.0
				20			17	3-4-5 N=9	21.1		
		24.0	955				10	7-8-9 N=17	22.2		
4			**SANDY SILT (ML)**, trace gravel, sand seam, brown, very stiff								
4		28.0	951								
			SILT WITH SAND (ML), gray, medium stiff	30			16	3-4-3 N=7	27.3		79.1
		32.0	947								
2			**SANDY LEAN CLAY (CL)**, trace gravel, gray, stiff to very stiff				15	3-4-5 N=9	19.4		
				40			16	5-6-7 N=13	22.7		
							17	3-5-7 N=12	20.8		
				50			14	4-6-9 N=15	18.5		
							0	4-6-9 N=15	16.7		
				60			17	4-6-8 N=14	18.6		52.6

See Exploration and Testing Procedures for a description of field and laboratory procedures used and additional data (If any).

See Supporting Information for explanation of symbols and abbreviations.

Elevation Reference: Elevations estimated from MnTOPO website

Water Level Observations
No free water observed

Drill Rig
CME 550X

Hammer Type
Automatic

Driller
M. Nunez

Logged by
J. Magoon

Boring Started
11-21-2025

Boring Completed
11-21-2025

Notes

Equipment Reference:
Energy Transfer Ratio=89.8 +/- 3.2%
Hammer Efficiency Correction=1.50

Advancement Method
3 1/4" Hollow Stem Auger from 0 to 10 feet. Mud rotary drilling from 10 feet to 101 feet.

Abandonment Method
Boring backfilled with neat cement grout to completion

NL27 Wilmar 3rd Line Downstream Extension
12275 122nd Street | Cologne, MN
Terracon Project No. MP255127

Terracon
13400 15th Ave N
Plymouth, MN

Boring Log No. BH-05

Location: See Exploration Plan

Latitude: 44.7966° Longitude: -93.8742°

Depth (Ft.) Elevation: 979 (Ft.)

Model Layer	Graphic Log	Depth (Ft.)	Water Level Observations	Sample Type	Recovery (In.)	Field Test Results	Water Content (%)	Atterberg Limits LL-PL-PI	Percent Fines
2		**SANDY LEAN CLAY (CL)**, trace gravel, gray, stiff to very stiff *(continued)*							
					17	4-6-8 N=14	20.0		
		70			15	4-6-8 N=14	19.1		
					15	11-10-14 N=24	19.8		
		80			16	5-8-12 N=20	18.1		
					14	5-9-14 N=23	16.4		
		84.0 895							
3		**CLAYEY SAND WITH GRAVEL (SC)**, trace gravel, fine to medium grained, gray, medium dense driller noted gravel seam between 85.7 feet and 85.9 feet							
		90			18	7-13-14 N=27	17.8		42.8
					2	10-12-13 N=25	17.4		
		100			18	6-9-13 N=22	18.5		
		101.0 878							
		Boring Terminated at 101 Feet							

See Exploration and Testing Procedures for a description of field and laboratory procedures used and additional data (If any).

See Supporting Information for explanation of symbols and abbreviations.

Elevation Reference: Elevations estimated from MnTOPO website

Water Level Observations
No free water observed

Drill Rig
CME 550X

Hammer Type
Automatic

Driller
M. Nunez

Notes
Equipment Reference:
Energy Transfer Ratio=89.8 +/- 3.2%
Hammer Efficiency Correction=1.50

Advancement Method
3 1/4" Hollow Stem Auger from 0 to 10 feet. Mud rotary drilling from 10 feet to 101 feet.

Abandonment Method
Boring backfilled with neat cement grout to completion

Logged by
J. Magoon

Boring Started
11-21-2025

Boring Completed
11-21-2025

NL27 Wilmar 3rd Line Downstream Extension
12275 122nd Street | Cologne, MN
Terracon Project No. MP255127

Terracon
13400 15th Ave N
Plymouth, MN

Boring Log No. BH-06

Location: See Exploration Plan

Latitude: 44.8003° Longitude: -93.8881°

Model Layer	Graphic Log	Depth (Ft.)	Elevation: 973 (Ft.)	Depth (Ft.)	Water Level Observations	Sample Type	Recovery (In.)	Field Test Results	Water Content (%)	Atterberg Limits LL-PL-PI	Percent Fines
1		0.5	**TOPSOIL**, Approx. 5 inches 972.5								
2		2.0	**SANDY LEAN CLAY**, trace gravel, with roots, dark brown, stiff 971				17	4-5-6-7 N=11	24.3		
			SANDY LEAN CLAY (CL), trace gravel, trace roots, dark brown, medium stiff				17	2-3-3 N=6	21.4		
		6.0	967								
3			**CLAYEY SAND (SC)**, trace gravel, fine to medium grained, brown, medium dense	10			18	3-6-7 N=13	20.3		49.4
		11.0	962								
2			**SANDY LEAN CLAY (CL)**, trace gravel, gray, medium stiff to stiff				18	3-3-4 N=7	19.6		
				20			18	2-2-3 N=5	18.7		
		26.0	947				15	3-4-5 N=9	19.4		
3			**CLAYEY SAND (SC)**, trace gravel, fine to medium grained, gray, loose	30			18	2-4-4 N=8	17.6		
		36.0	937				18	2-3-6 N=9	16.4		33.1
2			**SANDY LEAN CLAY (CL)**, trace gravel, gray, stiff								
		41.0	932	40			18	3-3-5 N=8	18.6		
			Boring Terminated at 41 Feet								

See Exploration and Testing Procedures for a description of field and laboratory procedures used and additional data (If any).

See Supporting Information for explanation of symbols and abbreviations.

Elevation Reference: Elevations estimated from MnTOPO website

Water Level Observations
No free water observed

Drill Rig
CME 550X

Hammer Type
Automatic

Driller
M. Nunez

Notes
Equipment Reference:
Energy Transfer Ratio=89.8 +/- 3.2%
Hammer Efficiency Correction=1.50

Advancement Method
3 1/4" Hollow Stem Auger

Abandonment Method
Boring backfilled with neat cement grout to completion

Logged by
R. Rodriguez

Boring Started
09-23-2025

Boring Completed
09-23-2025

NL27 Wilmar 3rd Line Downstream Extension
12275 122nd Street | Cologne, MN
Terracon Project No. MP255127

Terracon
13400 15th Ave N
Plymouth, MN

Boring Log No. BH-07A

Location: See Exploration Plan

Latitude: 44.7987° Longitude: -93.8972°

Model Layer	Graphic Log	Depth (Ft.)	Elevation: 976 (Ft.)	Depth (Ft.)	Water Level Observations	Sample Type	Recovery (In.)	Field Test Results	Water Content (%)	Atterberg Limits LL-PL-PI	Percent Fines
1 2		0.3	**TOPSOIL**, Approx. 2 inches 975.7								
		2.0	**SANDY LEAN CLAY**, trace gravel, trace roots, dark brown 974								
3			**CLAYEY SAND (SC)**, trace gravel, fine to medium grained, brown, loose to medium dense				8	3-4-3-4 N=7	18.6		
							18	3-3-3 N=6	26.0		43.7
		11.0	965	10			18	3-5-6 N=11	22.5		
2			**SANDY LEAN CLAY (CL)**, trace gravel, gray, medium stiff to stiff				17	2-3-4 N=7	23.7		
				20			18	2-3-4 N=7	23.9		
							18	3-3-6 N=9	22.4		
				30			18	3-4-6 N=10	19.5		54.8
							18	3-5-8 N=13	9.1		
		41.0	935	40			18	3-5-6 N=11	11.2		
			Boring Terminated at 41 Feet								

See Exploration and Testing Procedures for a description of field and laboratory procedures used and additional data (If any).

See Supporting Information for explanation of symbols and abbreviations.

Elevation Reference: Elevations estimated from MnTOPO website

Water Level Observations
No free water observed

Drill Rig
CME 550X

Hammer Type
Automatic

Driller
M. Nunez

Notes
Equipment Reference:
Energy Transfer Ratio=89.8 +/- 3.2%
Hammer Efficiency Correction=1.50

Advancement Method
3 1/4" Hollow Stem Auger

Abandonment Method
Boring backfilled with neat cement grout to completion

Logged by
R. Rodriguez

Boring Started
09-24-2025

Boring Completed
09-24-2025

NL27 Wilmar 3rd Line Downstream Extension
12275 122nd Street | Cologne, MN
Terracon Project No. MP255127

Terracon
13400 15th Ave N
Plymouth, MN

Boring Log No. BH-07B

Location: See Exploration Plan

Latitude: 44.8006° Longitude: -93.9035°

Model Layer	Depth (Ft.)	Elevation: 987 (Ft.)	Depth (Ft.)	Water Level Observations	Sample Type	Recovery (In.)	Field Test Results	Water Content (%)	Atterberg Limits LL-PL-PI	Percent Fines
1	0.8	**TOPSOIL**, Approx. 10 inches 986.2								
2		**SANDY LEAN CLAY (CL)**, trace gravel, trace roots, brown, stiff to medium stiff				14	1-2-3-4 N=5	27.1		
		brown and gray at 5'				12	4-4-5 N=9	22.5		
	13.0	974	10			18	3-3-4 N=7	23.3		
3		**SILTY SAND WITH GRAVEL (SM)**, fine to coarse grained, brown, loose				17	3-3-6 N=9	30.2		18.3
	20.0	967	20			15	3-4-5 N=9	31.9		
2		**SANDY LEAN CLAY (CL)**, trace gravel, gray, stiff to medium stiff				18	4-4-6 N=10	17.8		
			30			14	2-3-4 N=7	17.1		53.3
						18	3-4-4 N=8	16.4		
	41.0	946	40			9	3-4-4 N=8	19.3		55.6
		Boring Terminated at 41 Feet								

See Exploration and Testing Procedures for a description of field and laboratory procedures used and additional data (If any).

See Supporting Information for explanation of symbols and abbreviations.

Elevation Reference: Elevations estimated from MnTOPO website

Water Level Observations
No free water observed

Drill Rig
CME 550X

Hammer Type
Automatic

Driller
M. Nunez

Logged by
R. Rodriguez

Boring Started
10-28-2025

Boring Completed
10-29-2025

Notes
Equipment Reference:
Energy Transfer Ratio=89.8 +/- 3.2%
Hammer Efficiency Correction=1.50

Advancement Method
3 1/4" Hollow Stem Auger from 0 to 9.5 feet. Mud rotary drilling from 9.5 feet to 41 feet.

Abandonment Method
Boring backfilled with neat cement grout to completion

NL27 Wilmar 3rd Line Downstream Extension
12275 122nd Street | Cologne, MN
Terracon Project No. MP255127

Terracon
13400 15th Ave N
Plymouth, MN

Boring Log No. BH-07C

Location: See Exploration Plan

Latitude: 44.7997° Longitude: -93.8989°

Depth (Ft.) Elevation: 989 (Ft.)

Model Layer	Depth (Ft.)	Elevation	Material Description	Sample Type	Recovery (In.)	Field Test Results	Water Content (%)	Atterberg Limits LL-PL-PI	Percent Fines
1	0.5	988.5	**TOPSOIL**, Approx. 6 inches						
2			**SANDY LEAN CLAY (CL)**, trace gravel, brown, stiff to medium stiff		7	4-5-4-4 N=9	20.5		
					16	4-5-5 N=10	21.3		
	10				18	4-5-6 N=11	20.2		
					18	3-6-8 N=14	25.6		
	20				17	4-6-8 N=14	20.3		
					15	3-4-5 N=9	22.6		
	30				18	3-4-6 N=10	21.0		
					18	3-4-6 N=10	19.0		
	40				18	3-3-5 N=8	17.4		54.1
					18	3-5-7 N=12	15.8		
	50				18	4-5-6 N=11	15.3		
3	54.0	935	**CLAYEY SAND (SC)**, trace gravel, fine grained, gray, medium dense		18	6-9-14 N=23	16.8		
	60				16	7-9-16 N=25	17.5		

See Exploration and Testing Procedures for a description of field and laboratory procedures used and additional data (If any).

See Supporting Information for explanation of symbols and abbreviations.

Elevation Reference: Elevations estimated from MnTOPO website

Water Level Observations
No free water observed

Drill Rig
CME 550X

Hammer Type
Automatic

Driller
M. Nunez

Logged by
R. Rodriguez

Boring Started
10-28-2025

Boring Completed
10-29-2025

Notes
Equipment Reference:
Energy Transfer Ratio=89.8 +/- 3.2%
Hammer Efficiency Correction=1.50

Advancement Method
3 1/4" Hollow Stem Auger from 0 to 9.5 feet. Mud rotary drilling from 9.5 feet to boring termination.

Abandonment Method
Boring backfilled with neat cement grout to completion

Terracon
13400 15th Ave N
Plymouth, MN

Boring Log No. BH-07C

Location: See Exploration Plan

Latitude: 44.7997° Longitude: -93.8989°

Depth (Ft.) Elevation: 989 (Ft.)

Model Layer	Graphic Log	Depth (Ft.)	Water Level Observations	Sample Type	Recovery (In.)	Field Test Results	Water Content (%)	Atterberg Limits LL-PL-PI	Percent Fines
3		**CLAYEY SAND (SC)**, trace gravel, fine grained, gray, medium dense *(continued)*							
		70			18	6-10-16 N=26	19.1		
					18	6-11-16 N=27	19.0		45.2
					18	6-10-15 N=25	16.4		
		80			18	6-11-16 N=27	16.2		44.6
		81.0 908 ***Boring Terminated at 81 Feet***							

See Exploration and Testing Procedures for a description of field and laboratory procedures used and additional data (If any).

See Supporting Information for explanation of symbols and abbreviations.

Elevation Reference: Elevations estimated from MnTOPO website

Water Level Observations
No free water observed

Drill Rig
CME 550X

Hammer Type
Automatic

Driller
M. Nunez

Notes
Equipment Reference:
Energy Transfer Ratio=89.8 +/- 3.2%
Hammer Efficiency Correction=1.50

Advancement Method
3 1/4" Hollow Stem Auger from 0 to 9.5 feet. Mud rotary drilling from 9.5 feet to boring termination.

Abandonment Method
Boring backfilled with neat cement grout to completion

Logged by
R. Rodriguez

Boring Started
10-28-2025

Boring Completed
10-29-2025

NL27 Wilmar 3rd Line Downstream Extension
12275 122nd Street | Cologne, MN
Terracon Project No. MP255127

Terracon
13400 15th Ave N
Plymouth, MN

Boring Log No. BH-07D

Location: See Exploration Plan

Latitude: 44.8049° Longitude: -93.9061°

Model Layer	Graphic Log	Depth (Ft.)	Elevation: 987 (Ft.)	Depth (Ft.)	Water Level Observations	Sample Type	Recovery (In.)	Field Test Results	Water Content (%)	Atterberg Limits LL-PL-PI	Percent Fines
1		0.6	**TOPSOIL**, Approx. 7 inches 986.4								
		2.0	**SANDY LEAN CLAY (CL)**, trace gravel, trace organics, dark gray, stiff 985				11	2-5-5-5 N=10	27.5		
			SANDY LEAN CLAY (CL), trace gravel, brown and gray, stiff				11	3-4-6 N=10	19.9		
		8.0	979								
			SANDY LEAN CLAY (CL), trace gravel, gray, medium stiff to very stiff	10			13	2-2-4 N=6	19.8		
							18	2-3-4 N=7	20.0		
							24				
				20			18	2-3-3 N=6	19.2		
							18	2-3-2 N=5	19.3	27-15-12	53.0
2				30			18	2-3-3 N=6	19.0		
							18	4-4-6 N=10	16.0		
				40			18	4-5-6 N=11	15.5		
							18	5-6-8 N=14	15.8		
				50			18	4-5-7 N=12	17.5		
							18	5-7-9 N=16	16.4		
				60			18	5-8-11 N=19	16.6		
		62.0	925								
4			**SANDY SILTY CLAY (CL-ML)**, gray, hard								

See Exploration and Testing Procedures for a description of field and laboratory procedures used and additional data (If any).

See Supporting Information for explanation of symbols and abbreviations.

Elevation Reference: Elevations estimated from MnTOPO website

Water Level Observations
No free water observed

Drill Rig
Geoprobe 3126GT

Hammer Type
Automatic

Driller
C. Hehn

Logged by
B. Kern

Boring Started
10-23-2025

Boring Completed
10-24-2025

Notes
Equipment Reference:
Energy Transfer Ratio=92.8 +/- 3.3%
Hammer Efficiency Correction=1.55

Advancement Method
3 1/4" Hollow Stem Auger from 0 to 19.5 feet. Mud rotary drilling from 19.5 feet to 81 feet.

Abandonment Method
Boring backfilled with cuttings from 0 to 2 feet and neat cement grout to completion

NL27 Wilmar 3rd Line Downstream Extension
12275 122nd Street | Cologne, MN
Terracon Project No. MP255127

Terracon
13400 15th Ave N
Plymouth, MN

Boring Log No. BH-07D

Location: See Exploration Plan

Latitude: 44.8049° Longitude: -93.9061°

Depth (Ft.) Elevation: 987 (Ft.)

Model Layer	Graphic Log		Depth (Ft.)	Water Level Observations	Sample Type	Recovery (In.)	Field Test Results	Water Content (%)	Atterberg Limits LL-PL-PI	Percent Fines
4		**SANDY SILTY CLAY (CL-ML)**, gray, hard *(continued)*								
		67.0 920			X	18	20-34-25 N=59	20.3	22-18-4	63.6
		CLAYEY SAND (SC), trace gravel, fine to medium grained, gray, medium dense	70		X	18	5-7-10 N=17	16.1	26-13-13	48.0
3					X	18	8-9-13 N=22	16.0		
		81.0 906	80		X	18	11-12-17 N=29	16.7		
		Boring Terminated at 81 Feet								

See Exploration and Testing Procedures for a description of field and laboratory procedures used and additional data (If any).

See Supporting Information for explanation of symbols and abbreviations.

Elevation Reference: Elevations estimated from MnTOPO website

Water Level Observations
No free water observed

Drill Rig
Geoprobe 3126GT

Hammer Type
Automatic

Driller
C. Hehn

Notes
Equipment Reference:
Energy Transfer Ratio=92.8 +/- 3.3%
Hammer Efficiency Correction=1.55

Advancement Method
3 1/4" Hollow Stem Auger from 0 to 19.5 feet. Mud rotary drilling from 19.5 feet to 81 feet.

Abandonment Method
Boring backfilled with cuttings from 0 to 2 feet and neat cement grout to completion

Logged by
B. Kern

Boring Started
10-23-2025

Boring Completed
10-24-2025

NL27 Wilmar 3rd Line Downstream Extension
12275 122nd Street | Cologne, MN
Terracon Project No. MP255127

Terracon
13400 15th Ave N
Plymouth, MN

Boring Log No. BH-07E

Location: See Exploration Plan

Latitude: 44.8029° Longitude: -93.9058°

Model Layer	Graphic Log	Depth (Ft.)	Elevation: 1000 (Ft.)	Depth (Ft.)	Water Level Observations	Sample Type	Recovery (In.)	Field Test Results	Water Content (%)	Atterberg Limits LL-PL-PI	Percent Fines
1		0.8	**TOPSOIL**, Approx. 9 inches 999.2								
3		2.0	**CLAYEY SAND (SC)**, trace gravel, fine grained, brown and gray, loose 998				18	2-4-4-4 N=8	19.7		
2		7.0	**SANDY LEAN CLAY (CL)**, trace gravel, silt seams, brown and gray, stiff 993				13	3-5-6 N=11	18.7		54.9
			SANDY LEAN CLAY (CL), trace gravel, brown, soft to stiff				24				
				10			18	4-5-6 N=11	20.5		
							15	5-6-7 N=13	20.0		
				20			18	4-5-9 N=14	19.2		55.9
			gray at 24'				18	3-1-3 N=4	16.9		
				30			18	2-4-4 N=8	17.1		
							18	3-5-6 N=11	16.3		
3		37.0	**CLAYEY SAND (SC)**, trace gravel, fine grained, gray, medium dense 963	40			15	4-6-7 N=13	18.5		43.5
2		42.0	**SANDY LEAN CLAY (CL)**, trace gravel, gray, stiff to very stiff 958				18	4-4-7 N=11	16.5		
				50			16	3-5-8 N=13	18.6		
							18	4-5-7 N=12	16.1		
				60			18	5-7-8 N=15	16.1		

See Exploration and Testing Procedures for a description of field and laboratory procedures used and additional data (If any).

See Supporting Information for explanation of symbols and abbreviations.

Elevation Reference: Elevations estimated from MnTOPO website

Water Level Observations
No free water observed

Drill Rig
Geoprobe 3126GT

Hammer Type
Automatic

Driller
C. Hehn

Notes
Equipment Reference:
Energy Transfer Ratio=92.8 +/- 3.3%
Hammer Efficiency Correction=1.55

Advancement Method
3 1/4" Hollow Stem Auger from 0 to 19.5 feet. Mud rotary drilling from 19.5 feet to 81 feet.

Abandonment Method
Boring backfilled with cuttings from 0 to 2 feet and neat cement grout to completion

Logged by
B. Kern

Boring Started
10-27-2025

Boring Completed
10-27-2025

NL27 Wilmar 3rd Line Downstream Extension
12275 122nd Street | Cologne, MN
Terracon Project No. MP255127

Terracon
13400 15th Ave N
Plymouth, MN

Boring Log No. BH-07E

Model Layer	Graphic Log	Location: See Exploration Plan Latitude: 44.8029° Longitude: -93.9058° Depth (Ft.) Elevation: 1000 (Ft.)	Depth (Ft.)	Water Level Observations	Sample Type	Recovery (In.)	Field Test Results	Water Content (%)	Atterberg Limits LL-PL-PI	Percent Fines
2		**SANDY LEAN CLAY (CL)**, trace gravel, gray, stiff to very stiff *(continued)*				17	5-8-10 N=18			
			70			18	5-7-11 N=18	18.7		
						18	4-9-10 N=19	17.2		
		81.0 919	80			18	4-8-13 N=21	18.1		
		Boring Terminated at 81 Feet								

See Exploration and Testing Procedures for a description of field and laboratory procedures used and additional data (If any).

See Supporting Information for explanation of symbols and abbreviations.

Elevation Reference: Elevations estimated from MnTOPO website

Water Level Observations
No free water observed

Drill Rig
Geoprobe 3126GT

Hammer Type
Automatic

Driller
C. Hehn

Notes
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Abandonment Method
Boring backfilled with cuttings from 0 to 2 feet and neat cement grout to completion

Logged by
B. Kern

Boring Started
10-27-2025

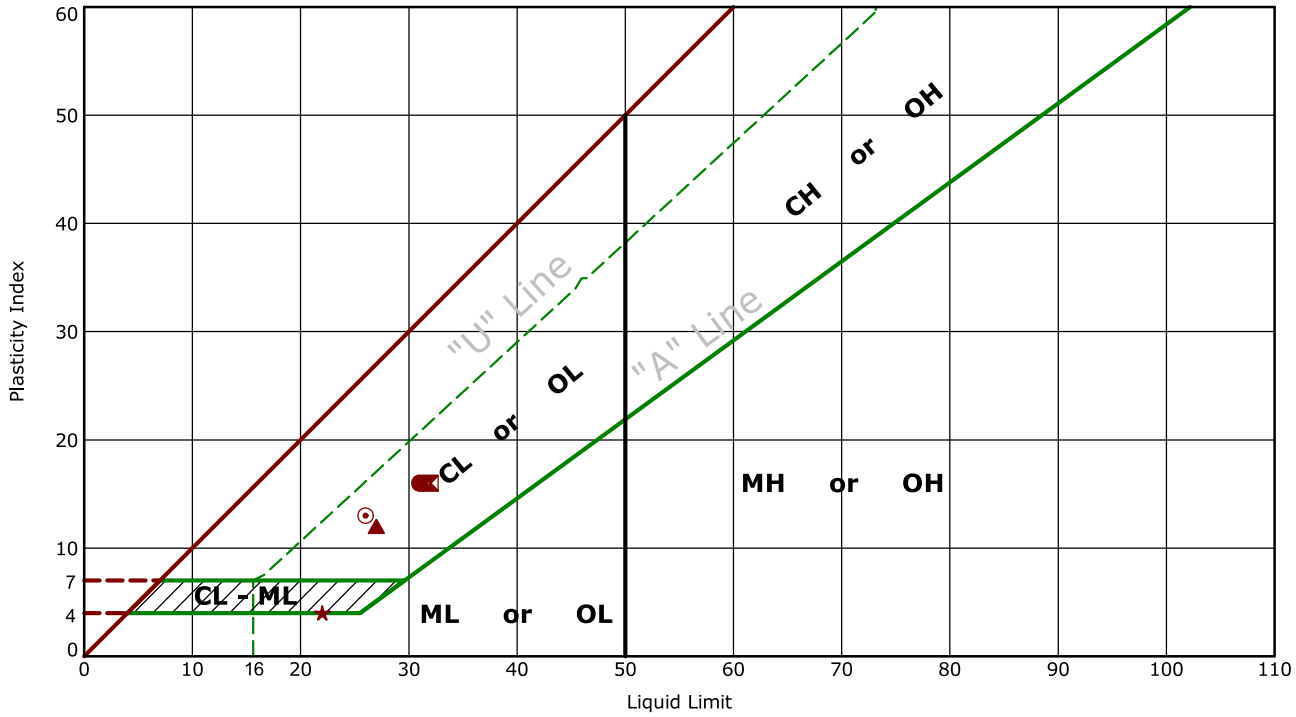
Boring Completed
10-27-2025

NL27 Wilmar 3rd Line Downstream Extension
12275 122nd Street | Cologne, MN
Terracon Project No. MP255127

Terracon
13400 15th Ave N
Plymouth, MN

Atterberg Limit Results

ASTM D4318



	Boring ID	Depth (Ft)	LL	PL	PI	Fines	USCS	Description
●	BH-01	14.5 - 16	31	15	16	53.4	CL	SANDY LEAN CLAY
⊠	BH-05	14.5 - 16	32	16	16	63.0	CL	SANDY LEAN CLAY
▲	BH-07D	24.5 - 26	27	15	12	53.0	CL	SANDY LEAN CLAY
★	BH-07D	64.5 - 66	22	18	4	63.6	CL-ML	SANDY SILTY CLAY
⊙	BH-07D	69.5 - 71	26	13	13	48.0	SC	CLAYEY SAND

Supporting Information

Contents:

General Notes
Unified Soil Classification System

Terracon
13400 15th Ave N
Plymouth, MN

General Notes

Sampling	Water Level	Field Tests
Shelby Tube Split Spoon	Water Initially Encountered Water Level After a Specified Period of Time Water Level After a Specified Period of Time Cave In Encountered Water levels indicated on the soil boring logs are the levels measured in the borehole at the times indicated. Groundwater level variations will occur over time. In low permeability soils, accurate determination of groundwater levels is not possible with short term water level observations.	N Standard Penetration Test Resistance (Blows/Ft.) (HP) Hand Penetrometer (T) Torvane (DCP) Dynamic Cone Penetrometer UC Unconfined Compressive Strength (PID) Photo-Ionization Detector (OVA) Organic Vapor Analyzer

Descriptive Soil Classification

Soil classification as noted on the soil boring logs is based Unified Soil Classification System. Where sufficient laboratory data exist to classify the soils consistent with ASTM D2487 "Classification of Soils for Engineering Purposes" this procedure is used. ASTM D2488 "Description and Identification of Soils (Visual-Manual Procedure)" is also used to classify the soils, particularly where insufficient laboratory data exist to classify the soils in accordance with ASTM D2487. In addition to USCS classification, coarse grained soils are classified on the basis of their in-place relative density, and fine-grained soils are classified on the basis of their consistency. See "Strength Terms" table below for details. The ASTM standards noted above are for reference to methodology in general. In some cases, variations to methods are applied as a result of local practice or professional judgment.

Location And Elevation Notes

Exploration point locations as shown on the Exploration Plan and as noted on the soil boring logs in the form of Latitude and Longitude are approximate. See Exploration and Testing Procedures in the report for the methods used to locate the exploration points for this project. Surface elevation data annotated with +/- indicates that no actual topographical survey was conducted to confirm the surface elevation. Instead, the surface elevation was approximately determined from topographic maps of the area.

Strength Terms

Relative Density of Coarse-Grained Soils
(More than 50% retained on No. 200 sieve.)
Density determined by Standard Penetration Resistance

Relative Density	Standard Penetration or N-Value (Blows/Ft.)
Very Loose	0 - 3
Loose	4 - 9
Medium Dense	10 - 29
Dense	30 - 50
Very Dense	> 50

Consistency of Fine-Grained Soils
(50% or more passing the No. 200 sieve.)
Consistency determined by laboratory shear strength testing, field visual-manual procedures or standard penetration resistance

Consistency	Unconfined Compressive Strength Qu (tsf)	Standard Penetration or N-Value (Blows/Ft.)
Very Soft	less than 0.25	0 - 1
Soft	0.25 to 0.50	2 - 4
Medium Stiff	0.50 to 1.00	5 - 8
Stiff	1.00 to 2.00	9 - 15
Very Stiff	2.00 to 4.00	16 - 30
Hard	> 4.00	> 30

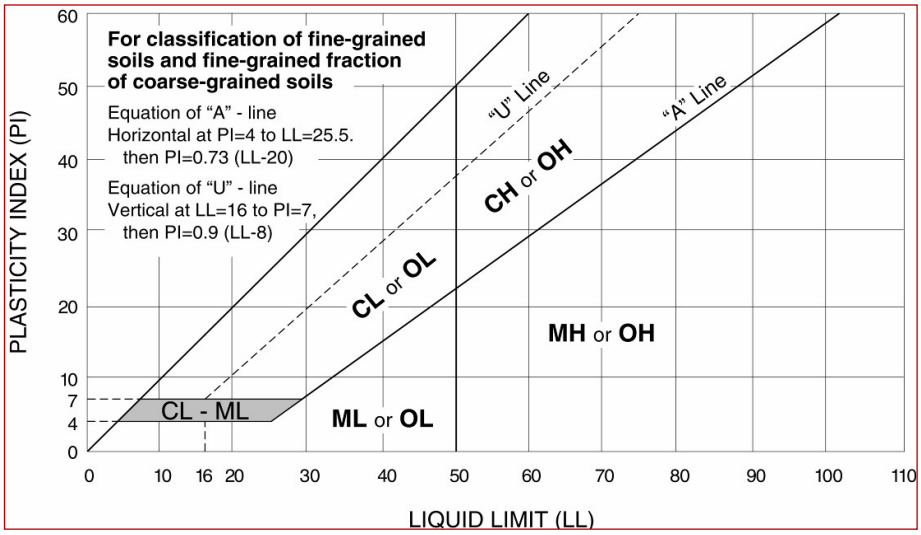
Relevance of Exploration and Laboratory Test Results

Exploration/field results and/or laboratory test data contained within this document are intended for application to the project as described in this document. Use of such exploration/field results and/or laboratory test data should not be used independently of this document.

Unified Soil Classification System

Criteria for Assigning Group Symbols and Group Names Using Laboratory Tests [A]				Soil Classification	
				Group Symbol	Group Name [B]
Coarse-Grained Soils: More than 50% retained on No. 200 sieve	**Gravels:** More than 50% of coarse fraction retained on No. 4 sieve	**Clean Gravels:** Less than 5% fines [C]	Cu≥4 and 1≤Cc≤3 [E]	GW	Well-graded gravel [F]
			Cu<4 and/or [Cc<1 or Cc>3.0] [E]	GP	Poorly graded gravel [F]
		Gravels with Fines: More than 12% fines [C]	Fines classify as ML or MH	GM	Silty gravel [F, G, H]
			Fines classify as CL or CH	GC	Clayey gravel [F, G, H]
	Sands: 50% or more of coarse fraction passes No. 4 sieve	**Clean Sands:** Less than 5% fines [D]	Cu≥6 and 1≤Cc≤3 [E]	SW	Well-graded sand [I]
			Cu<6 and/or [Cc<1 or Cc>3.0] [E]	SP	Poorly graded sand [I]
		Sands with Fines: More than 12% fines [D]	Fines classify as ML or MH	SM	Silty sand [G, H, I]
			Fines classify as CL or CH	SC	Clayey sand [G, H, I]
Fine-Grained Soils: 50% or more passes the No. 200 sieve	**Silts and Clays:** Liquid limit less than 50	**Inorganic:**	PI > 7 and plots above "A" line [J]	CL	Lean clay [K, L, M]
			PI < 4 or plots below "A" line [J]	ML	Silt [K, L, M]
		Organic:	$\frac{LL\ oven\ dried}{LL\ not\ dried} < 0.75$	OL	Organic clay [K, L, M, N]
					Organic silt [K, L, M, O]
	Silts and Clays: Liquid limit 50 or more	**Inorganic:**	PI plots on or above "A" line	CH	Fat clay [K, L, M]
			PI plots below "A" line	MH	Elastic silt [K, L, M]
		Organic:	$\frac{LL\ oven\ dried}{LL\ not\ dried} < 0.75$	OH	Organic clay [K, L, M, P]
					Organic silt [K, L, M, Q]
Highly organic soils:	Primarily organic matter, dark in color, and organic odor			PT	Peat

[A] Based on the material passing the 3-inch (75-mm) sieve.
[B] If field sample contained cobbles or boulders, or both, add "with cobbles or boulders, or both" to group name.
[C] Gravels with 5 to 12% fines require dual symbols: GW-GM well-graded gravel with silt, GW-GC well-graded gravel with clay, GP-GM poorly graded gravel with silt, GP-GC poorly graded gravel with clay.
[D] Sands with 5 to 12% fines require dual symbols: SW-SM well-graded sand with silt, SW-SC well-graded sand with clay, SP-SM poorly graded sand with silt, SP-SC poorly graded sand with clay.
[E] $Cu = D_{60}/D_{10}$ $Cc = \frac{(D_{30})^2}{D_{10} \times D_{60}}$
[F] If soil contains ≥ 15% sand, add "with sand" to group name.
[G] If fines classify as CL-ML, use dual symbol GC-GM, or SC-SM.
[H] If fines are organic, add "with organic fines" to group name.
[I] If soil contains ≥ 15% gravel, add "with gravel" to group name.
[J] If Atterberg limits plot in shaded area, soil is a CL-ML, silty clay.
[K] If soil contains 15 to 29% plus No. 200, add "with sand" or "with gravel," whichever is predominant.
[L] If soil contains ≥ 30% plus No. 200 predominantly sand, add "sandy" to group name.
[M] If soil contains ≥ 30% plus No. 200, predominantly gravel, add "gravelly" to group name.
[N] PI ≥ 4 and plots on or above "A" line.
[O] PI < 4 or plots below "A" line.
[P] PI plots on or above "A" line.
[Q] PI plots below "A" line.



Welcome 2nd Line

BRAUN INTERTEC

the science you build on

Factual Geotechnical Data Report

NNG Northern Lights 2027 - Welcome 2nd Line

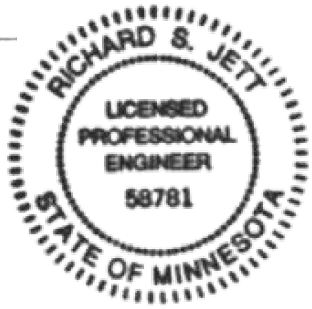
Intersection of 50th Street and 60th Avenue
Welcome, Minnesota

Prepared for

Stantec Consulting Services, Inc.

Professional Certification:
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.

Richard S. Jett, PE
Senior Engineer
License Number: 58781
December 12, 2025



Braun Intertec Corporation

Project B2506260

December 12, 2025 Project B2506260

Ginger Chan
Stantec Consulting Services, Inc.
200-325 25 Street SE
Calgary, AB T2A 7H8

Re: Factual Geotechnical Data Report
NNG Northern Lights 2027 - Welcome 2nd Line
Intersection of 50th Street and 60th Avenue
Welcome, Minnesota

Dear Ms. Chan:

We are pleased to present this factual geotechnical data report for the above referenced project.

Thank you for making Braun Intertec Corporation (Braun Intertec) your geotechnical consultant for this project. If you have questions about this report, or if there are other services that we can provide in support of our work to date, please contact Richard Jett at 815.545.7059 (rjett@braunintertec.com) or Chad Lukkarila at 952.995.2322 (clukkarila@braunintertec.com).

Sincerely,
Braun Intertec Corporation

Richard S. Jett, PE
Senior Engineer

Chad R. Lukkarila, PE
Associate Director, Senior Engineer

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Appendix

Soil Boring Location Sketch

Log of Boring Sheets BH-1 and BH-2

Descriptive Terminology of Soil

List of Tables

Table 2-1. Subsurface Profile Summary 2

1.1 Scope of Services

We performed our scope of services for the project in accordance with the task order from Stantec Consulting Services, Inc. dated July 15, 2025, Change Order #1 dated August 21, 2025, and Change Order #2 dated September 25, 2025.The following list describes the geotechnical tasks completed in accordance with our authorized scope of services.

- Reviewing the background information and reference documents previously cited.
- Coordinating the clearance of the exploration locations of public underground utilities.
- Performing two standard penetration test (SPT) borings, denoted as BH-1 and BH-2, to nominal depths of 40 feet below grade across the site.
- Performing laboratory testing on samples selected by Braun Intertec Corporation with input from Stantec Consulting Services, Inc.
- Preparing this report containing a boring location sketch, logs of soil borings, a summary of the soils encountered, and results of laboratory tests performed on select soil samples.

We performed this geotechnical exploration concurrently with environmental screening and laboratory testing, the results of which will be submitted under separate cover. The project team should review the environmental report in conjunction with this geotechnical data report to understand both the geotechnical and environmental aspects of the site and how they may impact one another.

2.0 Results

2.1 Boring Results

Table 2-1 provides a summary of the soil boring results, in the general order we encountered the strata. Please refer to the Log of Boring sheets in the Appendix for additional details. The Descriptive Terminology sheet in the Appendix includes definitions of abbreviations used in the table below.

Table 2-1. Subsurface Profile Summary

Strata	Soil Type -ASTM Classification	Range of Penetration Resistances (N Value)	Commentary and Details
Topsoil fill[1]	OL, CL	4 to 9	▪ Predominantly clay laden soils (OL, CL). ▪ Generally dark brown to black in color. ▪ Thicknesses ranged from approximately 4 inches to 2 feet. ▪ Moisture condition generally (dry, moist or wet) inches.
Fill[2]	CL	4 to 7	▪ Observed below the topsoil fill soils and extended to depths of approximately 2 feet and 4 feet below existing grade. ▪ Predominantly clay-laden soils. ▪ Slightly organic soils encountered in Boring BH-01. ▪ Moisture conditions were generally moist.
Alluvial	CL	6 to 9	▪ Observed in Boring BH-01 below the surficial soils and fill soils and extended to a depth of approximately 8 feet below existing grade. ▪ Generally consisted of clay soils with intermixed silt layers ▪ Generally brown in color. ▪ Moisture conditions were generally moist.
Glacial deposits	SP-SM	9 to 11	▪ Observed below the surficial soils, fill soils, and alluvial soils and extended to the termination depths of the borings. ▪ Relative consistencies of the clay soils were generally medium to stiff. ▪ Generally included gray to brown clay laden soils with occasional sand soil layers. ▪ Variable amounts of gravel were encountered; may contain cobbles and boulders. ▪ Moisture conditions were generally moist.
	CL	6 to 11	

[1]We did not perform gradation analysis on the apparent topsoil material in accordance with our scope of work. Therefore, we cannot conclusively determine if the encountered material satisfies a particular specification, and it should not be assumed it is suitable for reuse.

[2]For simplicity in this report, we define existing fill to mean existing, uncontrolled, or undocumented fill.

The exploration locations completed at this site were denoted as BH-01 and BH-02. The exploration locations were selected by Stantec and performed near the approximate locations as indicated in the attached Soil Boring Location Sketch. Stantec provided us with the surface elevations and GPS coordinates of the boring locations.

2.2 Groundwater

Apparent groundwater was observed in one of the two completed soil borings (BH-01) at a depth of approximately 9 1/2 feet below existing grade (approximate elevation of 1278 feet). We did not observe groundwater in Boring BH-02. Groundwater may take days or longer to reach equilibrium in the boreholes and we immediately backfilled the boreholes, in accordance with our scope of work. If the project team identifies a need for more accurate determination of groundwater depth, we can install piezometers and complete a long term groundwater monitoring program.

2.3 Laboratory Test Results

The boring logs show the results of laboratory testing we performed, next to the tested sample depth. The Appendix contains the results of these tests.

Moisture content tests performed on select soil samples indicated moisture contents ranging from 14 to 18 percent moisture by weight. Sieve analysis tests performed on select granular soil samples indicated 11 percent particles, by weight, passing the No. 200 sieve. Atterberg limit tests performed on select clay soils indicated liquid limits ranging from 29 to 33 percent moisture and plastic limits from 16 to 18 percent moisture.

3.0 Procedures

3.1 Penetration Test Borings

We drilled the penetration test borings with an All-Terrain Vehicle (ATV)-mounted core and auger drill equipped with hollow-stem auger. We performed the borings in general accordance with ASTM D6151 taking penetration test samples at 2 1/2- or 5-foot intervals in general accordance with ASTM D1586. The boring logs show the actual sample intervals and corresponding depths.

We sealed penetration test boreholes meeting the Minnesota Department of Health (MDH) Environmental Borehole criteria with an MDH-approved grout.

3.2 Exploration Logs

3.2.1 Log of Boring Sheets

The Appendix includes Log of Boring sheets for our penetration test borings. The logs identify and describe the penetrated geologic materials and present the results of penetration resistance and other in-situ tests performed. The logs also present the results of organic vapor screening, laboratory tests performed on penetration test samples, and groundwater measurements.

We inferred strata boundaries from changes in the penetration test samples and the auger cuttings. Because we did not perform continuous sampling, the strata boundary depths are only approximate. The boundary depths likely vary away from the boring locations, and the boundaries themselves may occur as gradual rather than abrupt transitions.

3.2.2 Organic Vapor Screening

We conducted the geotechnical evaluation concurrently with on-site environmental screening and provided the results of the screening under separate cover. The project team should review the environmental report in conjunction with this geotechnical data report to understand both the geotechnical and environmental aspects of the site and how they may impact one another.

An environmental technician examined soil samples from the borings for staining, odors, and other apparent signs of contamination within the top 20 feet of each boring. In addition, the environmental technician screened the soil samples for the presence of organic vapors using a photoionization detector (PID). The boring logs in the Appendix include the PID results, which we discuss further in the companion environmental report.

3.2.3 Geologic Origins

We assigned geologic origins to the materials shown on the logs and referenced within this report, based on: (1) a review of the background information and reference documents cited above, (2) visual classification of the various geologic material samples retrieved during the course of our subsurface exploration, (3) penetration resistance and other in-situ testing performed for the project, (4) laboratory test results, and (5) available common knowledge of the geologic processes and environments that have impacted the site and surrounding area in the past .

3.3 Material Classification and Testing

3.3.1 Visual and Manual Classification

We visually and manually classified the geologic materials encountered based on ASTM D2488. When we performed laboratory classification tests, we used the results to classify the geologic materials in accordance with ASTM D2487. The Appendix includes a chart explaining the classification system we used.

3.3.2 Laboratory Testing

The exploration logs in the Appendix note the results of the laboratory tests performed on geologic material samples. We performed the tests in general accordance with ASTM procedures.

3.4 Groundwater Measurements

The drillers checked for groundwater while advancing the penetration test borings, and again after auger withdrawal. We then filled the boreholes noted on the boring logs.

4.0 Qualifications

4.1 Variations in Subsurface Conditions

4.1.1 Material Strata

We developed our evaluation, analyses, and recommendations from a limited amount of site and subsurface information. It is not standard engineering practice to retrieve material samples from exploration locations continuously with depth. Therefore, we must infer strata boundaries and thicknesses to some extent. Strata boundaries may also be gradual transitions, and project planning should expect the strata to vary in depth, elevation, and thickness, away from the exploration locations.

Variations in subsurface conditions present between exploration locations may not be revealed until performing additional exploration work or starting construction. If future activity for this project reveals any such variations, you should notify us so that we may reevaluate our recommendations. Such variations could increase construction costs, and we recommend including a contingency to accommodate them.

4.1.2 Groundwater Levels

We made groundwater measurements under the conditions reported herein and shown on the exploration logs and interpreted in the text of this report. Note that the observation periods were relatively short, and project planning can expect groundwater levels to fluctuate in response to rainfall, flooding, irrigation, seasonal freezing and thawing, surface drainage modifications and other seasonal and annual factors.

4.2 Use of Report

This report is for the exclusive use of the addressed parties. Without written approval, we assume no responsibility to other parties regarding this report. Our report may not be appropriate for other parties or projects.

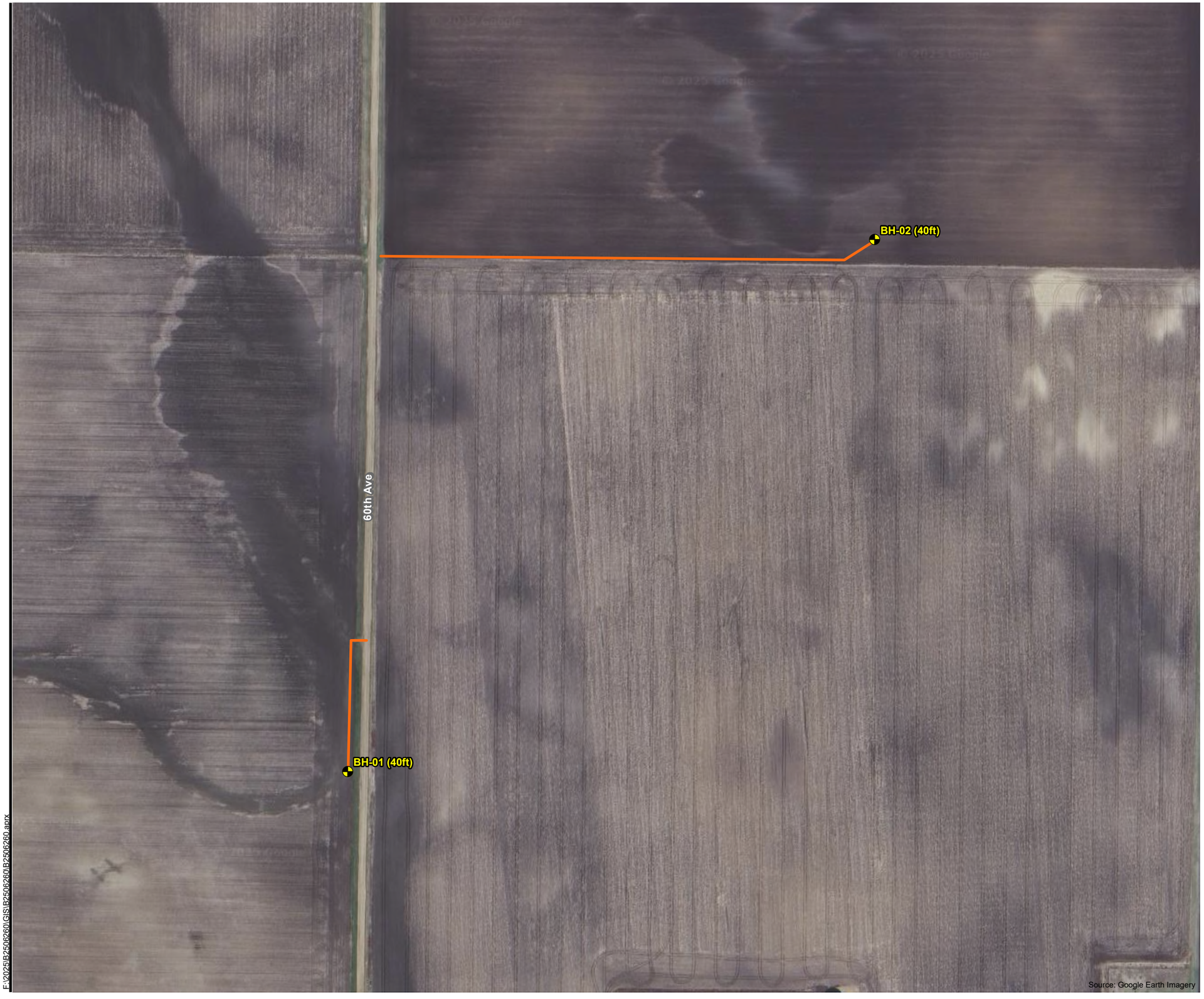
4.3 Standard of Care

In performing its services, Braun Intertec used that degree of care and skill ordinarily exercised under similar circumstances by reputable members of its profession currently practicing in the same locality. No warranty, express or implied, is made.

Appendix

Soil Boring Location Sketch
Log of Boring Sheets BH-1 and BH-2
Descriptive Terminology of Soil

BRAUN
INTERTEC



Denotes Location of Proposed Boring

Access Path

N

0 150 300 Feet

1" = 300 Feet



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the science you build on
11001 Hampshire Avenue S
Minneapolis, MN 55438
952.995.2000
braunintertec.com

Project No: B2506260

Drawing No: Boring Sketch Welcome

Drawn By:	ZS
Date Drawn:	8/7/2025
Checked By:	RSJ
Last Modified:	12/11/2025

Welcome 2nd Line

Welcome

Martin County, Minnesota

Boring Location Sketch

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LOG OF BORING

See Descriptive Terminology sheet for explanation of abbreviations

Project Number B2506260
Geotechnical & Environmental Evaluation
Northern Lights 2027 Expansion Project

BORING: **BH-01 Welcome 2nd Line**

LOCATION: Captured with RTK GPS. Intersection of 50th Street and 60th Avenue. See attached sketch

DATUM: NAD83 / UTM zone 11N

NORTHING: 5070078.2 EASTING: 2297916.0

DRILLER: M. Hoppe | LOGGED BY: S. Niraula | START DATE: 08/11/25 | END DATE: 08/11/25

SURFACE ELEVATION: 1287.5 ft | RIG: 7504 | METHOD: 3 1/4" HSA | SURFACING: Soil | WEATHER: Sunny

Elev./ Depth ft	Water Level	Description of Materials (Soil-ASTM D2488 or 2487; Rock-USACE EM 1110-1-2908)	Sample	Blows (N-Value) Recovery	PID ppm	MC %	Tests or Remarks
1285.5		ORGANIC SOIL (OL), with roots, black, moist (TOPSOIL FILL)		4-4-5-4 (9) 10"	0.0		BH-01 (0-2) collected on 8/11/25 @ 1420 MDA 1, MDA 2, OC, RCRA metals
2.0 / 1283.5		FILL: SANDY LEAN CLAY (CL), slightly organic, brown, moist		4-3-4-5 (7) 12"	0.0		BH-01 (4-6) collected on 8/11/25 @ 1430 for GRO, DRO, BETX
4.0		LEAN CLAY (CL), intermixed with Silt, trace Sand, with POORLY GRADED SAND layer, gray to brown, moist, medium to stiff (ALLUVIUM)	5	3-3-3-4 (6) 18"	0.0		q_p=0.25 tsf
1279.5		*Brown at 6 feet*		3-4-5-5 (9) 18"	0.0		q_p=<0.25 tsf
8.0	▽	POORLY GRADED SAND with SILT (SP-SM), fine to coarse-grained, with Gravel, brown and gray, wet, loose to medium dense (GLACIAL OUTWASH)	10	4-5-4-4 (9) 18"		16	P200=11% Wet below 9 1/2 feet
1275.5				4-5-6-5 (11) 14"			
12.0		SANDY LEAN CLAY (CL), trace Gravel, gray, moist, medium to stiff (GLACIAL TILL)		4-5-5-5 (10) 16"		14	LL=29, PL=16, PI=13 q_p=1.75 tsf
			15	4-4-4-5 (8) 14"			q_p=1 tsf
			20	4-5-5 (10) 16"		16	q_p=1 tsf
			25	5-6-5 (11) 10"			q_p=1.25 tsf
			30	4-5-6 (11) 14"		16	q_p=1 tsf

Continued on next page

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LOG OF BORING

See Descriptive Terminology sheet for explanation of abbreviations

Project Number B2506260
Geotechnical & Environmental Evaluation
Northern Lights 2027 Expansion Project

BORING: **BH-01 Welcome 2nd Line**

LOCATION: Captured with RTK GPS. Intersection of 50th Street and 60th Avenue. See attached sketch

DATUM: NAD83 / UTM zone 11N

NORTHING: 5070078.2 EASTING: 2297916.0

DRILLER: M. Hoppe | LOGGED BY: S. Niraula | START DATE: 08/11/25 | END DATE: 08/11/25

SURFACE ELEVATION: 1287.5 ft | RIG: 7504 | METHOD: 3 1/4" HSA | SURFACING: Soil | WEATHER: Sunny

Elev./ Depth ft	Water Level	Description of Materials (Soil-ASTM D2488 or 2487; Rock-USACE EM 1110-1-2908)	Sample	Blows (N-Value) Recovery	PID ppm	MC %	Tests or Remarks
		SANDY LEAN CLAY (CL), trace Gravel, gray, moist, medium to stiff (GLACIAL TILL)					
35				4-5-5 (10) 18"			q_p=1.25 tsf
40				4-5-5 (10) 18"			q_p=0.75 tsf
1246.5							Water observed at 9.5 feet while drilling.
41.0		END OF BORING Boring immediately grouted					
45							
50							
55							
60							

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LOG OF BORING

See Descriptive Terminology sheet for explanation of abbreviations

Project Number B2506260
Geotechnical & Environmental Evaluation
Northern Lights 2027 Expansion Project

BORING: **BH-02 Welcome 2nd Line**

LOCATION: Captured with RTK GPS. Intersection of 50th Street and 60th Avenue. See attached sketch

DATUM: NAD83 / UTM zone 11N

NORTHING: 5070790.9 EASTING: 2298264.5

DRILLER: M. Hoppe | LOGGED BY: S. Niraula | START DATE: 08/06/25 | END DATE: 08/06/25

SURFACE ELEVATION: 1292.6 ft | RIG: 7504 | METHOD: 3 1/4" HSA | SURFACING: Soil | WEATHER: Cloudy

Elev./ Depth ft	Water Level	Description of Materials (Soil-ASTM D2488 or 2487; Rock-USACE EM 1110-1-2908)	Sample	Blows (N-Value) Recovery	PID ppm	MC %	Tests or Remarks
~~1292.3~~ 0.3		SANDY LEAN CLAY (CL), dark brown, moist (TOPSOIL FILL)		3-2-2-2 (4) 12"	0.0		BH-02 (0-2) collected on 8/11/25 @ 1240 for MDA 1, MDA 2, OC
1290.6 2.0		FILL: SANDY LEAN CLAY (CL), gray and brown, moist		2-2-3-2 (5) 14"	4.6		BH-02 (2-4) collected on 8/11/25 @ 1250 for GRO, DRO, BETX, RCRA metals
		SANDY LEAN CLAY (CL), trace Gravel, gray and brown, moist, medium to stiff (GLACIAL TILL)		2-3-3-2 (6) 18"	0.0		q_p=0.5 tsf q_p=1.5 tsf
			5	4-3-4-4 (7) 16"	0.0		q_p=1.75 tsf
				3-4-2-2 (6) 16"	0.0	18	LL=33, PL=18, PI=15 q_p=2.25 tsf
			10	4-5-4-4 (9) 16"	0.0		q_p=1.75 tsf
				5-5-4-5 (9) 18"	0.0	17	q_p=1 tsf
		Gray below 14 feet		3-3-4-3 (7) 18"	0.0		q_p=1 tsf
			15		0.0		
					0.0		
				5-5-6 (11) 14"	0.0	17	q_p=0.75 tsf
			20		0.0		
					0.0		
				5-4-4 (8) 18"	0.0		q_p=1 tsf
			25				
				5-4-5 (9) 18"		17	q_p=1.25 tsf
			30				

Continued on next page

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LOG OF BORING

See Descriptive Terminology sheet for explanation of abbreviations

Project Number B2506260
Geotechnical & Environmental Evaluation
Northern Lights 2027 Expansion Project

BORING: **BH-02 Welcome 2nd Line**

LOCATION: Captured with RTK GPS. Intersection of 50th Street and 60th Avenue. See attached sketch

DATUM: NAD83 / UTM zone 11N

NORTHING: 5070790.9 EASTING: 2298264.5

DRILLER: M. Hoppe | LOGGED BY: S. Niraula | START DATE: 08/06/25 | END DATE: 08/06/25

SURFACE ELEVATION: 1292.6 ft | RIG: 7504 | METHOD: 3 1/4" HSA | SURFACING: Soil | WEATHER: Cloudy

Elev./ Depth ft	Water Level	Description of Materials (Soil-ASTM D2488 or 2487; Rock-USACE EM 1110-1-2908)	Sample	Blows (N-Value) Recovery	PID ppm	MC %	Tests or Remarks
		SANDY LEAN CLAY (CL), trace Gravel, gray and brown, moist, medium to stiff (GLACIAL TILL)					
35				3-4-3 (7) 14"			q_p=1 tsf
40				5-5-5 (10) 16"			q_p=1.25 tsf
1251.6 41.0		END OF BORING Boring immediately grouted					Water not observed while drilling.
45							
50							
55							
60							

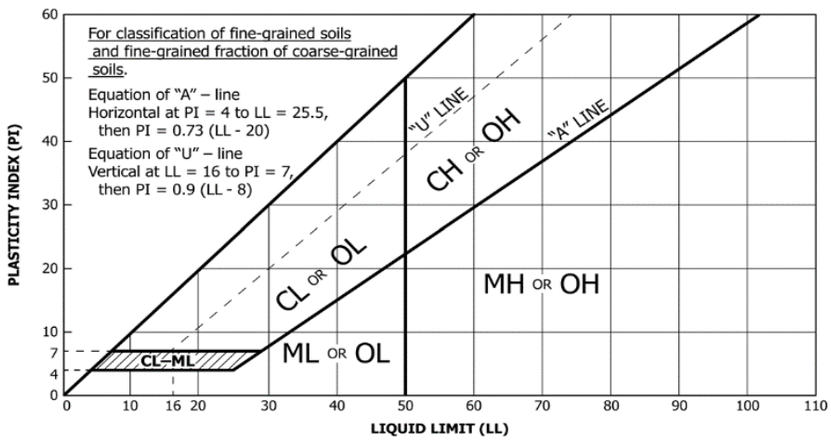
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Descriptive Terminology of Soil

Based on Standards ASTM D2487/2488
(Unified Soil Classification System)

Criteria for Assigning Group Symbols and Group Names Using Laboratory Tests[A]				Soil Classification	
				Group Symbol	Group Name[B]
Coarse-grained Soils (more than 50% retained on No. 200 sieve)	Gravels (More than 50% of coarse fraction retained on No. 4 sieve)	Clean Gravels (Less than 5% fines[C])	$C_u \geq 4$ and $1 \leq C_c \leq 3^D$	GW	Well-graded gravel[E]
			$C_u < 4$ and/or ($C_c < 1$ or $C_c > 3$)[D]	GP	Poorly graded gravel[E]
		Gravels with Fines (More than 12% fines[C])	Fines classify as ML or MH	GM	Silty gravel[E F G]
			Fines Classify as CL or CH	GC	Clayey gravel[E F G]
	Sands (50% or more coarse fraction passes No. 4 sieve)	Clean Sands (Less than 5% fines[H])	$C_u \geq 6$ and $1 \leq C_c \leq 3^D$	SW	Well-graded sand[I]
			$C_u < 6$ and/or ($C_c < 1$ or $C_c > 3$)[D]	SP	Poorly graded sand[I]
		Sands with Fines (More than 12% fines[H])	Fines classify as ML or MH	SM	Silty sand[F G I]
			Fines classify as CL or CH	SC	Clayey sand[F G I]
Fine-grained Soils (50% or more passes the No. 200 sieve)	Silts and Clays (Liquid limit less than 50)	Inorganic	PI > 7 and plots on or above "A" line[J]	CL	Lean clay[K L M]
			PI < 4 or plots below "A" line[J]	ML	Silt[K L M]
		Organic	Liquid Limit – oven dried / Liquid Limit – not dried <0.75	OL	Organic clay[K L M N] / Organic silt[K L M O]
	Silts and Clays (Liquid limit 50 or more)	Inorganic	PI plots on or above "A" line	CH	Fat clay[K L M]
			PI plots below "A" line	MH	Elastic silt[K L M]
		Organic	Liquid Limit – oven dried / Liquid Limit – not dried <0.75	OH	Organic clay[K L M P] / Organic silt[K L M Q]
Highly Organic Soils		Primarily organic matter, dark in color, and organic odor		PT	Peat

A. Based on the material passing the 3-inch (75-mm) sieve.
B. If field sample contained cobbles or boulders, or both, add "with cobbles or boulders, or both" to group name.
C. Gravels with 5 to 12% fines require dual symbols:
   GW-GM well-graded gravel with silt
   GW-GC well-graded gravel with clay
   GP-GM poorly graded gravel with silt
   GP-GC poorly graded gravel with clay
D. $C_u = D_{60} / D_{10}$ $C_c = (D_{30})^2 / (D_{10} \times D_{60})$
E. If soil contains ≥ 15% sand, add "with sand" to group name.
F. If fines classify as CL-ML, use dual symbol GC-GM or SC-SM.
G. If fines are organic, add "with organic fines" to group name.
H. Sands with 5 to 12% fines require dual symbols:
   SW-SM well-graded sand with silt
   SW-SC well-graded sand with clay
   SP-SM poorly graded sand with silt
   SP-SC poorly graded sand with clay
I. If soil contains ≥ 15% gravel, add "with gravel" to group name.
J. If Atterberg limits plot in hatched area, soil is CL-ML, silty clay.
K. If soil contains 15 to < 30% plus No. 200, add "with sand" or "with gravel", whichever is predominant.
L. If soil contains ≥ 30% plus No. 200, predominantly sand, add "sandy" to group name.
M. If soil contains ≥ 30% plus No. 200 predominantly gravel, add "gravelly" to group name.
N. PI ≥ 4 and plots on or above "A" line.
O. PI < 4 or plots below "A" line.
P. PI plots on or above "A" line.
Q. PI plots below "A" line.



Laboratory Tests

DD	Dry density, pcf	**q_p**	Pocket penetrometer strength, tsf
WD	Wet density, pcf	**q_U**	Unconfined compression test, tsf
P200	% Passing #200 sieve	**LL**	Liquid limit
MC	Moisture content, %	**PL**	Plastic limit
OC	Organic content, %	**PI**	Plasticity index

Particle Size Identification

Boulders..... over 12"
Cobbles..... 3" to 12"
Gravel
  Coarse..... 3/4" to 3" (19.00 mm to 75.00 mm)
  Fine..... No. 4 to 3/4" (4.75 mm to 19.00 mm)
Sand
  Coarse..... No. 10 to No. 4 (2.00 mm to 4.75 mm)
  Medium..... No. 40 to No. 10 (0.425 mm to 2.00 mm)
  Fine..... No. 200 to No. 40 (0.075 mm to 0.425 mm)
Silt..... No. 200 (0.075 mm) to .005 mm
Clay..... < .005 mm

Relative Proportions[L,M]

trace..... 0 to 5%
little..... 6 to 14%
with..... ≥ 15%

Inclusion Thicknesses

lens..... 0 to 1/8"
seam..... 1/8" to 1"
layer..... over 1"

Apparent Relative Density of Cohesionless Soils

Very loose ..... 0 to 4 BPF
Loose ..... 5 to 10 BPF
Medium dense..... 11 to 30 BPF
Dense..... 31 to 50 BPF
Very dense..... over 50 BPF

Consistency of Cohesive Soils	Blows Per Foot	Approximate Unconfined Compressive Strength
Very soft	0 to 1 BPF	< 0.25 tsf
Soft	2 to 4 BPF	0.25 to 0.5 tsf
Medium	5 to 8 BPF	0.5 to 1 tsf
Stiff	9 to 15 BPF	1 to 2 tsf
Very Stiff	16 to 30 BPF	2 to 4 tsf
Hard	over 30 BPF	> 4 tsf

Moisture Content:

Dry: Absence of moisture, dusty, dry to the touch.
Moist: Damp but no visible water.
Wet: Visible free water, usually soil is below water table.

Drilling Notes:

Blows/N-value: Blows indicate the driving resistance recorded for each 6-inch interval. The reported N-value is the blows per foot recorded by summing the second and third interval in accordance with the Standard Penetration Test, ASTM D1586.

Partial Penetration: If the sampler could not be driven through a full 6-inch interval, the number of blows for that partial penetration is shown as #/x" (i.e. 50/2"). The N-value is reported as "REF" indicating refusal.

Recovery: Indicates the inches of sample recovered from the sampled interval. For a standard penetration test, full recovery is 18", and is 24" for a thinwall/shelby tube sample.

WOH: Indicates the sampler penetrated soil under weight of hammer and rods alone; driving not required.

WOR: Indicates the sampler penetrated soil under weight of rods alone; hammer weight and driving not required.

Water Level: Indicates the water level measured by the drillers either while drilling (▽), at the end of drilling (▼), or at some time after drilling (▽▼).

Sample Symbols

Standard Penetration Test
Modified California (MC)
Auger
Grab Sample
Rock Core
Thinwall (TW)/Shelby Tube (SH)
Texas Cone Penetrometer
Dynamic Cone Penetrometer

5/2021

Paynesville 2nd Branch Line

BRAUN INTERTEC

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Factual Geotechnical Data Report

NNG Northern Lights 2027 – Paynesville 2nd Line

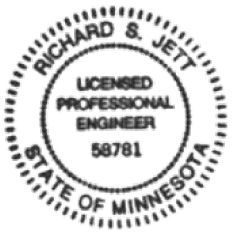
Intersection of Highway 21 and County Road 23
Richmond, Minnesota

Prepared for

Stantec Consulting Services, Inc.

Professional Certification:
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.





Richard S. Jett, PE
Senior Engineer
License Number: 58781
December 12, 2025

Braun Intertec Corporation

Project B2506260

December 12, 2025 Project B2506260

Ginger Chan
Stantec Consulting Services, Inc.
200-325 25 Street SE
Calgary, AB T2A 7H8

Re: Factual Geotechnical Data Report
NNG Northern Lights 2027 – Paynesville 2nd Line
Intersection of Highway 21 and County Road 23
Richmond, Minnesota

Dear Ms. Chan:

We are pleased to present this factual geotechnical data report for the above referenced project.

Thank you for making Braun Intertec Corporation (Braun Intertec) your geotechnical consultant for this project. If you have questions about this report, or if there are other services that we can provide in support of our work to date, please contact Richard Jett at 815.545.7059 (rjett@braunintertec.com) or Chad Lukkarila at 952.995.2322 (clukkarila@braunintertec.com).

Sincerely,
Braun Intertec Corporation

Richard S. Jett, PE
Senior Engineer

Chad R. Lukkarila, PE
Associate Director, Senior Engineer

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Appendix

Soil Boring Location Sketch

Log of Boring Sheets BH-01 through BH-07

Descriptive Terminology of Soil

Descriptive Terminology of Rock

List of Tables

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Table 2-3. Groundwater Summary 3

1.1 Scope of Services

We performed our scope of services for the project in accordance with the task order from Stantec Consulting Services, Inc. dated July 15, 2025, Change Order #1 dated August 21, 2025, and Change Order #2 dated September 25, 2025.The following list describes the geotechnical tasks completed in accordance with our authorized scope of services.

- Reviewing the background information and reference documents previously cited.
- Coordinating the clearance of the exploration locations of public underground utilities.
- Performing seven standard penetration test (SPT) borings, denoted as BH-01 through BH-07, to nominal depths ranging from 40 to 120 feet below grade across the site.
- Performing laboratory testing on samples selected by Braun Intertec Corporation with input from Stantec Consulting Services, Inc.
- Preparing this report containing a boring location sketch, logs of soil borings, a summary of the soils encountered, and results of laboratory tests performed on select soil samples.

We performed this geotechnical data collection concurrently with environmental screening and laboratory testing, the results of which will be submitted under separate cover. The project team should review the environmental report in conjunction with this geotechnical data report to understand both the geotechnical and environmental aspects of the site and how they may impact one another.

2.0 Results

2.1 Boring Results

Table 2-1 provides a summary of the soil boring results, in the general order we encountered the strata. Please refer to the Log of Boring sheets in the Appendix for additional details. The Descriptive Terminology sheet in the Appendix includes definitions of abbreviations used in the table below.

Table 2-1. Subsurface Profile Summary

Strata	Soil Type -ASTM Classification	Range of Penetration Resistances (N Values)	Commentary and Details
Topsoil / topsoil fill	SP-SM, SM, SC	3 to 18	▪ Observed at the boring locations and extended to depths ranging from approximately 1/2 foot to 4 feet below existing grade. ▪ Predominantly sandy soils. ▪ Generally dark brown to brown in color. ▪ Moisture conditions were generally moist
Fill[2]	SM, SC, SP	3 to 12	▪ Observed in Borings BH-01, BH-04, and BH-06 below the surficial soils and extended to a depth of approximately 7 to 12 feet below existing grade. ▪ Moisture conditions were generally moist. ▪ Generally brown to dark brown in color with occasional zones of slightly organic soils. ▪ Variable amounts of gravel; may contain cobbles
Glacial deposits	SP, SP-SM, SW-SM	5 to 46	▪ Observed at the boring locations below the surficial soils and fill soils and extended to depths ranging from approximately 14 to 35 feet below existing grade. ▪ Relative densities of the granular soils were generally loose to medium dense with occasional zones of dense soils. ▪ Relative consistencies of the clay-laden soils were generally soft to stiff with occasional zones of very stiff soils. ▪ Generally light brown to gray in color. ▪ Variable amounts of gravel; may contain cobbles and boulders. ▪ Moisture conditions were generally moist to wet.
	CL	3 to 19	
Glaciofluvial	CH, ML, CL-ML, SM	9 to 34	▪ Observed in Borings BH-01 through BH-03 below the surficial soils, fill soils, and glacially deposited soils and extended to depths ranging from approximately 30 to 60 feet below existing grade. ▪ Generally dark gray to gray in color. ▪ Moisture conditions were generally wet. ▪ Relative consistencies of the clay and silt laden soils were generally stiff to hard. ▪ Relative densities of the silty sand soils were generally medium dense.

Strata	Soil Type -ASTM Classification	Range of Penetration Resistances (N Values)	Commentary and Details
Apparent bedrock	Gabbro	10 to 50+	▪ Observed at the boring locations below the surficial soils, fill soils, glacially deposited soils, and alluvial soils and extended to the termination depths of the borings. ▪ Generally encountered in a decomposed condition. ▪ Deformed hand samples identified as CL, CH, ML, and SM soils ▪ No rock coring was performed. ▪ Generally light blue to gray in color.

[1]We did not perform gradation analysis on the apparent topsoil material encountered, in accordance with our scope of work. Therefore, we cannot conclusively determine if the encountered material satisfies a particular specification, and it should not be assumed it is suitable for reuse.

[2]For simplicity in this report, we define existing fill to mean existing, uncontrolled, or undocumented fill.

The exploration locations completed at this site were denoted as BH-01 through BH-07. The exploration locations were selected by Stantec and performed near the approximate locations as indicated in the attached Soil Boring Location Sketch. Stantec provided us with the surface elevations and GPS coordinates of the boring locations.

2.2 Groundwater

Groundwater was observed in five out of the completed seven SPT soil borings at depths ranging from approximately 8 to 33 feet below existing grade (approximate elevations ranging from 1084 to 1097 feet). Given the encountered soil conditions, groundwater may take days or longer to reach equilibrium in the boreholes and we immediately backfilled the boreholes, in accordance with our scope of work. If the project team identifies a need for more accurate determination of groundwater depth, we can install piezometers and complete a long term groundwater monitoring plan.

Table 2-2 summarizes the depths where we observed groundwater; the attached Log of Boring sheets in the Appendix also include this information and additional details.

Table 2-2. Groundwater Summary

Locations	Surface Elevation (feet)	Measured Depth to Groundwater (feet)	Corresponding Groundwater Elevation (feet)
BH-1	1105.1	8	1097
BH-2	1103.7	20	1084
BH-3	1127.7	None Observed	None Observed
BH-4	1113.4	25	1088 1/2

Locations	Surface Elevation (feet)	Measured Depth to Groundwater (feet)	Corresponding Groundwater Elevation (feet)
BH-5	1105.6	17	1088 1/2
BH-6	1106.1	None Observed	None Observed
BH-7	1121.8	33	1089

2.3 Laboratory Test Results

The boring logs show the results of laboratory testing we performed next to the tested sample depth. The Appendix also contains the results of these tests.

Moisture content tests performed on select soil samples indicated moisture contents ranging from 2 to 13 percent moisture by weight for granular soils and from 13 to 39 percent moisture by weight for clay and silt laden soils. Sieve analysis tests performed on select soil samples indicated from 6 to 55 percent particles, by weight, passing the No. 200 sieve. Atterberg limit tests performed on select soil samples indicated liquid limits ranging from 24 to 26 for clay and silt laden soils and from 35 to 62 percent moisture for the apparent gabbro samples. Plastic limits ranged from 13 to 17 percent moisture for clay and silt laden soils and from 25 to 38 percent moisture for apparent gabbro samples.

3.0 Procedures

3.1 Penetration Test Borings

We drilled the penetration test borings with an All-Terrain Vehicle (ATV)-mounted core and auger drill equipped with hollow-stem auger. We performed the borings in general accordance with ASTM D6151 taking penetration test samples at 2 1/2- or 5-foot intervals in general accordance with ASTM D1586. The boring logs show the actual sample intervals and corresponding depths.

We sealed penetration test boreholes meeting the Minnesota Department of Health (MDH) Environmental Borehole criteria with an MDH-approved grout.

3.2 Exploration Logs

3.2.1 Log of Boring Sheets

The Appendix includes Log of Boring sheets for our penetration test borings. The logs identify and describe the penetrated geologic materials and present the results of penetration resistance and other in-situ tests performed. The logs also present the results of organic vapor screening, laboratory tests performed on penetration test samples, and groundwater measurements.

We inferred strata boundaries from changes in the penetration test samples and the auger cuttings. Because we did not perform continuous sampling, the strata boundary depths are only approximate. The boundary depths likely vary away from the boring locations, and the boundaries themselves may occur as gradual rather than abrupt transitions.

3.2.2 Organic Vapor Screening

We conducted the geotechnical exploration concurrently with on-site environmental screening and provided the results of the screening under separate cover. The project team should review the environmental report in conjunction with this geotechnical data report to understand both the geotechnical and environmental aspects of the site and how they may impact one another.

An environmental technician examined soil samples from the borings for staining, odors, and other apparent signs of contamination within the top 20 feet of each boring. In addition, the environmental technician screened the soil samples for the presence of organic vapors using a photoionization detector (PID). The boring logs in the Appendix include the PID results, which we discuss further in the companion environmental report.

3.2.3 Geologic Origins

We assigned geologic origins to the materials shown on the logs and referenced within this report, based on: (1) a review of the background information and reference documents cited above, (2) visual classification of the various geologic material samples retrieved during the course of our subsurface exploration, (3) penetration resistance and other in-situ testing performed for the project, (4) laboratory test results, and (5) available common knowledge of the geologic processes and environments that have impacted the site and surrounding area in the past .

3.3 Material Classification and Testing

3.3.1 Visual and Manual Classification

We visually and manually classified the geologic materials encountered based on ASTM D2488. When we performed laboratory classification tests, we used the results to classify the geologic materials in accordance with ASTM D2487. The Appendix includes a chart explaining the classification system we used.

3.3.2 Laboratory Testing

The exploration logs in the Appendix note the results of the laboratory tests performed on geologic material samples. We performed the tests in general accordance with ASTM procedures.

3.4 Groundwater Measurements

The drillers checked for groundwater while advancing the penetration test borings, and again after auger withdrawal. We then filled the boreholes noted on the boring logs.

4.0 Qualifications

4.1 Variations in Subsurface Conditions

4.1.1 Material Strata

We developed data from a limited amount of site and subsurface information. It is not standard engineering practice to retrieve material samples from exploration locations continuously with depth. Therefore, we must infer strata boundaries and thicknesses to some extent. Strata boundaries may also be gradual transitions, and project planning should expect the strata to vary in depth, elevation, and thickness, away from the exploration locations.

Variations in subsurface conditions present between exploration locations may not be revealed until performing additional exploration work or starting construction. If future activity for this project reveals any such variations, you should notify us so that we may reevaluate our recommendations. Such variations could increase construction costs, and we recommend including a contingency to accommodate them.

4.1.2 Groundwater Levels

We made groundwater measurements under the conditions reported herein and shown on the exploration logs and interpreted in the text of this report. Note that the observation periods were relatively short, and project planning can expect groundwater levels to fluctuate in response to rainfall, flooding, irrigation, seasonal freezing and thawing, surface drainage modifications and other seasonal and annual factors.

4.2 Use of Report

This report is for the exclusive use of the addressed parties. Without written approval, we assume no responsibility to other parties regarding this report.

4.3 Standard of Care

In performing its services, Braun Intertec used that degree of care and skill ordinarily exercised under similar circumstances by reputable members of its profession currently practicing in the same locality. No warranty, express or implied, is made.

Appendix

Soil Boring Location Sketch
Log of Boring Sheets BH-1 through BH-7
Descriptive Terminology of Soil
Descriptive Terminology of Rock

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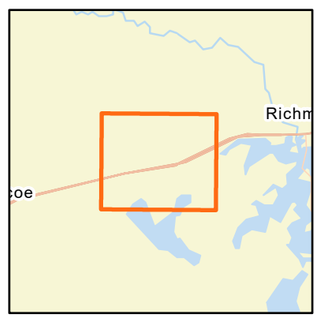
Denotes Location of Proposed Borings

Access Path

N

0 450 900 Feet

1" = 900 Feet



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11001 Hampshire Avenue S
Minneapolis, MN 55438
952.995.2000
braunintertec.com

Project No: B2506260

Drawing No: Boring Sketch Paynesville

Drawn By:	ZS
Date Drawn:	7/22/2025
Checked By:	RSJ
Last Modified:	12/11/2025

Paynesville 2nd Line

Paynesville

Stearns County, Minnesota

Boring Location Sketch

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LOG OF BORING

See Descriptive Terminology sheet for explanation of abbreviations

Project Number B2506260
Geotechnical & Environmental Evaluation
Northern Lights 2027 Expansion Project

BORING: **BH-01 Paynesville 2nd Line**

LOCATION: Captured with RTK GPS. Intersection of Highway 21 and County Road 123. See attached sketch.

DATUM: NAD83 / UTM zone 11N

NORTHING: 5281352.4 EASTING: 2250673.1

DRILLER: K. Caudill | LOGGED BY: R. Jett | START DATE: 08/27/25 | END DATE: 08/27/25

SURFACE ELEVATION: 1105.1 ft | RIG: 7505 | METHOD: 3 1/4" HSA | SURFACING: Grass | WEATHER: Sunny

Elev./ Depth ft	Water Level	Description of Materials (Soil-ASTM D2488 or 2487; Rock-USACE EM 1110-1-2908)	Sample	Blows (N-Value) Recovery	PID ppm	MC %	Tests or Remarks
1103.9		SILTY SAND (SM), fine to medium-grained, trace Gravel, dark brown to black, moist (TOPSOIL FILL)		0-1-2-2 (3) 12"	1.8		BH-01 (0-2) collected on 9/4/25 @ 1308 for MDA 1, MDA 2, OC
1.2		FILL: SILTY SAND (SM), fine to coarse-grained, trace Gravel, contains seams of Clay, slightly organic, dark brown, moist		7-2-2-2 (4) 12"	1.4		BH-01 (2-4) collected on 9/4/25 @ 1301 for GRO, DRO, BETX, RCRA metals
1099.1			5				
6.0		FILL: SILTY SAND (SM), fine to coarse-grained, trace Gravel, brown, moist		1-3-2-3 (5) 12"	1.7		
1097.1	▽			2-3-6-5 (9) 14"	5.0		Wet below 8 feet
8.0		POORLY GRADED SAND with GRAVEL (SP), fine to coarse-grained, light brown, wet, loose to medium dense (GLACIAL OUTWASH)	10	2-5-6-8 (11) 14"	1.2		
				0-6-8-8 (14) 14"			
			15	0-0-3-5 (3) 10"			
			20	5-6-8 (14) 12"			Drilling method switched to mud rotary at 20 feet
			25	8-7-7 (14) 14"			
1075.6							
29.5		POORLY GRADED SAND with SILT (SP-SM), fine to coarse-grained, little Gravel, brown, wet, medium dense (GLACIAL OUTWASH)	30	6-7-9 (16) 12"			

Continued on next page

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Project Number B2506260
Geotechnical & Environmental Evaluation
Northern Lights 2027 Expansion Project

BORING: **BH-01 Paynesville 2nd Line**

LOCATION: Captured with RTK GPS. Intersection of Highway 21 and County Road 123. See attached sketch.

DATUM: NAD83 / UTM zone 11N

NORTHING: 5281352.4 EASTING: 2250673.1

DRILLER: K. Caudill | LOGGED BY: R. Jett | START DATE: 08/27/25 | END DATE: 08/27/25

SURFACE ELEVATION: 1105.1 ft | RIG: 7505 | METHOD: 3 1/4" HSA | SURFACING: Grass | WEATHER: Sunny

Elev./ Depth ft	Water Level	Description of Materials (Soil-ASTM D2488 or 2487; Rock-USACE EM 1110-1-2908)	Sample	Blows (N-Value) Recovery	PID ppm	MC %	Tests or Remarks
		POORLY GRADED SAND with SILT (SP-SM), fine to coarse-grained, little Gravel, brown, wet, medium dense (GLACIAL OUTWASH)	35	0-8-7 (15) 12"			
1065.6							
39.5		SILTY CLAY (CL-ML), CLAY layers, gray, wet (GLACIOFLUVIUM)	40	5-10-9 (19) 12"		17	LL=24, PL=17, PI=7
			45	17-19-12 (31) 16"		35	%Gravel=4% %Sand=41% P200=55%
1055.6							
49.5		GABBRO, gray to light blue, moist, decomposed, hand deformed sample classified as "SILTY SAND (SM)" (APPARENT BEDROCK)	50	7-12-20 (32) 16"		26	LL=48, PL=38, PI=10
			55				
			60	17-30-45 (75) 18"		21	

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Project Number B2506260
Geotechnical & Environmental Evaluation
Northern Lights 2027 Expansion Project

BORING: **BH-01 Paynesville 2nd Line**

LOCATION: Captured with RTK GPS. Intersection of Highway 21 and County Road 123. See attached sketch.

DATUM: NAD83 / UTM zone 11N

NORTHING: 5281352.4 EASTING: 2250673.1

DRILLER: K. Caudill | LOGGED BY: R. Jett | START DATE: 08/27/25 | END DATE: 08/27/25

SURFACE ELEVATION: 1105.1 ft | RIG: 7505 | METHOD: 3 1/4" HSA | SURFACING: Grass | WEATHER: Sunny

Elev./ Depth ft	Water Level	Description of Materials (Soil-ASTM D2488 or 2487; Rock-USACE EM 1110-1-2908)	Sample	Blows (N-Value) Recovery	PID ppm	MC %	Tests or Remarks
65		GABBRO, gray to light blue, moist, decomposed, hand deformed sample classified as "SILTY SAND (SM)" (APPARENT BEDROCK)					
70				27-38-50/4" (REF) 16"			
75							
80				25-32-50/3" (REF) 15"			
85							
90				22-50/5" (REF) 8"		19	LL=35, PL=30, PI=5
95							

Continued on next page

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See Descriptive Terminology sheet for explanation of abbreviations

Project Number B2506260
Geotechnical & Environmental Evaluation
Northern Lights 2027 Expansion Project

BORING: **BH-01 Paynesville 2nd Line**

LOCATION: Captured with RTK GPS. Intersection of Highway 21 and County Road 123. See attached sketch.

DATUM: NAD83 / UTM zone 11N

NORTHING: 5281352.4 EASTING: 2250673.1

DRILLER: K. Caudill | LOGGED BY: R. Jett | START DATE: 08/27/25 | END DATE: 08/27/25

SURFACE ELEVATION: 1105.1 ft | RIG: 7505 | METHOD: 3 1/4" HSA | SURFACING: Grass | WEATHER: Sunny

Elev./ Depth ft	Water Level	Description of Materials (Soil-ASTM D2488 or 2487; Rock-USACE EM 1110-1-2908)	Sample	Blows (N-Value) Recovery	PID ppm	MC %	Tests or Remarks
		GABBRO, gray to light blue, moist, decomposed, hand deformed sample classified as "SILTY SAND (SM)" (APPARENT BEDROCK)					
100				34-50/4" (REF) 8"		18	DD=119 pcf
105							
110				27-50/6" (REF) 12"		15	DD=120 pcf
115							
120				38-50/6" (REF) 12"			
984.6							
120.5		END OF BORING Boring then grouted					Water observed at 8.0 feet while drilling.
125							

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Project Number B2506260
Geotechnical & Environmental Evaluation
Northern Lights 2027 Expansion Project

BORING: **BH-02 Paynesville 2nd Line**

LOCATION: Captured with RTK GPS. Intersection of Highway 21 and County Road 123. See attached sketch.

DATUM: NAD83 / UTM zone 11N

NORTHING: 5281777.8 EASTING: 2251314.0

DRILLER: K. Caudill | LOGGED BY: R. Jett | START DATE: 08/27/25 | END DATE: 08/27/25

SURFACE ELEVATION: 1103.7 ft | RIG: 7505 | METHOD: 3 1/4" HSA | SURFACING: Soil | WEATHER: Cloudy

Elev./ Depth ft	Water Level	Description of Materials (Soil-ASTM D2488 or 2487; Rock-USACE EM 1110-1-2908)	Sample	Blows (N-Value) Recovery	PID ppm	MC %	Tests or Remarks
		SILTY SAND (SM), fine to medium-grained, trace Gravel, dark brown to black, moist (TOPSOIL FILL)		2-3-3-3 (6) 14"	1.3		
				2-2-8-11 (10) 14"	1.4		
1099.7 4.0		POORLY GRADED SAND with GRAVEL (SP), fine to coarse-grained, light brown, moist, dense (GLACIAL OUTWASH)	5	18-16-15-15 (31) 14"	1.9		
1097.7 6.0		SANDY LEAN CLAY (CL), trace Gravel, dark gray, moist, very stiff to stiff (GLACIAL TILL)		14-9-8-8 (17) 14"	1.7		
				3-4-6-7 (10) 20"	2.3		q_p=2 tsf
			10	3-4-5-5 (9) 24"	2.4		q_p=1 tsf
				1-4-5-7 (9) 14"	5.7		
1089.7 14.0		SANDY SILT (ML), CLAY layers, gray, moist to wet, loose to dense (GLACIOFLUVIUM)	15	2-5-7-9 (12) 24"	3.2		
					3.2		
	▽	*Wet below 20 feet*	20	1-3-6 (9) 14"	1.4		
			25	1-13-14 (27) 18"			
			30	13-15-19 (34) 14"			Drilling method switched to mud rotary at 30 feet

Continued on next page

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Project Number B2506260
Geotechnical & Environmental Evaluation
Northern Lights 2027 Expansion Project

BORING: **BH-02 Paynesville 2nd Line**

LOCATION: Captured with RTK GPS. Intersection of Highway 21 and County Road 123. See attached sketch.

DATUM: NAD83 / UTM zone 11N

NORTHING: 5281777.8 EASTING: 2251314.0

DRILLER: K. Caudill | LOGGED BY: R. Jett | START DATE: 08/27/25 | END DATE: 08/27/25

SURFACE ELEVATION: 1103.7 ft | RIG: 7505 | METHOD: 3 1/4" HSA | SURFACING: Soil | WEATHER: Cloudy

Elev./ Depth ft	Water Level	Description of Materials (Soil-ASTM D2488 or 2487; Rock-USACE EM 1110-1-2908)	Sample	Blows (N-Value) Recovery	PID ppm	MC %	Tests or Remarks
		SANDY SILT (ML), CLAY layers, gray, moist to wet, loose to dense (GLACIOFLUVIUM)					
1069.2							
34.5		FAT CLAY (CH), dark gray, moist, stiff (GLACIOFLUVIUM)	35	3-5-8 (13) 14"			
1064.2							
39.5		SILTY SAND (SM), contains seams of Clay, gray, wet, medium dense (GLACIOFLUVIUM)	40	5-9-10 (19) 14"		26	Non-plastic
			45	7-10-10 (20) 14"		23	%Sand=51% P200=49%
			50	5-10-11 (21) 14"		39	
			55				
1044.2							
59.5		GABBRO, light blue, moist, decomposed, hand deformed sample classified as "CLAYEY SAND (SC)" (APPARENT BEDROCK)	60	11-19-26 (45) 16"			

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Project Number B2506260
Geotechnical & Environmental Evaluation
Northern Lights 2027 Expansion Project

BORING: **BH-02 Paynesville 2nd Line**

LOCATION: Captured with RTK GPS. Intersection of Highway 21 and County Road 123. See attached sketch.

DATUM: NAD83 / UTM zone 11N

NORTHING: 5281777.8 EASTING: 2251314.0

DRILLER: K. Caudill | LOGGED BY: R. Jett | START DATE: 08/27/25 | END DATE: 08/27/25

SURFACE ELEVATION: 1103.7 ft | RIG: 7505 | METHOD: 3 1/4" HSA | SURFACING: Soil | WEATHER: Cloudy

Elev./ Depth ft	Water Level	Description of Materials (Soil-ASTM D2488 or 2487; Rock-USACE EM 1110-1-2908)	Sample	Blows (N-Value) Recovery	PID ppm	MC %	Tests or Remarks
		GABBRO, light blue, moist, decomposed, hand deformed sample classified as "CLAYEY SAND (SC)" (APPARENT BEDROCK)					
1034.2							
69.5		GABBRO, light blue to gray, moist, decomposed, hand deformed sample classified as "SILTY SAND (SM)" (APPARENT BEDROCK)		33-50/5" (REF) 11"			
1014.2				37-45-50/3" (REF) 15"			
89.5		GABBRO, dark green to dark brown, moist, decomposed, hand deformed sample classified as "FAT CLAY (CH)" (APPARENT BEDROCK)		13-17-25 (42) 18"		31	LL=62, PL=30, PI=32

65 70 75 80 85 90 95

Continued on next page

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See Descriptive Terminology sheet for explanation of abbreviations

Project Number B2506260
Geotechnical & Environmental Evaluation
Northern Lights 2027 Expansion Project

BORING: **BH-02 Paynesville 2nd Line**

LOCATION: Captured with RTK GPS. Intersection of Highway 21 and County Road 123. See attached sketch.

DATUM: NAD83 / UTM zone 11N

NORTHING: 5281777.8 EASTING: 2251314.0

DRILLER:	K. Caudill	LOGGED BY:	R. Jett	START DATE:	08/27/25	END DATE:	08/27/25
SURFACE ELEVATION:	1103.7 ft	RIG:	7505	METHOD:	3 1/4" HSA	SURFACING:	Soil
WEATHER:	Cloudy						

Elev./ Depth ft	Water Level	Description of Materials (Soil-ASTM D2488 or 2487; Rock-USACE EM 1110-1-2908)	Sample	Blows (N-Value) Recovery	PID ppm	MC %	Tests or Remarks
1004.1		GABBRO, dark green to dark brown, moist, decomposed, hand deformed sample classified as "FAT CLAY (CH)" (APPARENT BEDROCK)					
99.6		END OF BORING Boring then grouted		50/1" (REF) 0"			Water observed at 20.0 feet while drilling. No recovery at 100 feet

100
105
110
115
120
125

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LOG OF BORING

See Descriptive Terminology sheet for explanation of abbreviations

Project Number B2506260
Geotechnical & Environmental Evaluation
Northern Lights 2027 Expansion Project

BORING: **BH-03 Paynesville 2nd Line**

LOCATION: Captured with RTK GPS. Intersection of Highway 21 and County Road 123. See attached sketch.

DATUM: NAD83 / UTM zone 11N

NORTHING: 5282485.7 EASTING: 2252068.6

DRILLER: K. Caudill | LOGGED BY: R. Jett | START DATE: 08/27/25 | END DATE: 08/27/25

SURFACE ELEVATION: 1127.7 ft | RIG: 7505 | METHOD: 3 1/4" HSA | SURFACING: Corn field | WEATHER: Cloudy

Elev./ Depth ft	Water Level	Description of Materials (Soil-ASTM D2488 or 2487; Rock-USACE EM 1110-1-2908)	Sample	Blows (N-Value) Recovery	PID ppm	MC %	Tests or Remarks
1125.7		FILL: POORLY GRADED SAND with SILT (SP-SM), fine to coarse-grained, trace Gravel, dark brown, moist		12-10-8-5 (18) 12"	3.9		BH-03 (0-2) collected on 9/2/25 @ 1646 for MDA 2
2.0		POORLY GRADED SAND (SP), fine to coarse-grained, little Gravel, light brown, moist, medium dense to dense (GLACIAL OUTWASH)		6-5-5-7 (10) 12"	8.5		BH-03 (2-4) collected on 9/2/25 @ 1641 for MDA 1, OC, RCRA metals
			5	8-10-12-12 (22) 14"	4.4		BH-03 (6-8) collected on 9/2/25 @ 16:36 for GRO, DRO, BETX
		Gravel pocket at 6 feet		10-17-25-29 (42) 14"	3.4		
1117.7				20-20-26-34 (46) 2"			
10.0		SANDY LEAN CLAY (CL), trace Gravel, dark gray, moist, very stiff (GLACIAL TILL)	10	10-9-10-14 (19) 16"	2.0		
				6-12-10-14 (22) 16"	2.3		q_p=4.25 tsf
			15	6-8-10-12 (18) 16"	2.5		q_p=4 tsf
			20	3-5-12 (17) 14"	18.3		
1103.2							
24.5		FAT CLAY (CH), dark gray, moist, stiff (GLACIOFLUVIUM)	25	4-6-9 (15) 14"	7.5		
1098.2							
29.5		GABBRO, light gray to greenish blue, moist, hand deformed sample classified as "SILTY SAND (SM)" (APPARENT BEDROCK)	30	8-13-14 (27) 16"			

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LOG OF BORING

See Descriptive Terminology sheet for explanation of abbreviations

Project Number B2506260
Geotechnical & Environmental Evaluation
Northern Lights 2027 Expansion Project

BORING: **BH-03 Paynesville 2nd Line**

LOCATION: Captured with RTK GPS. Intersection of Highway 21 and County Road 123. See attached sketch.

DATUM: NAD83 / UTM zone 11N

NORTHING: 5282485.7 EASTING: 2252068.6

DRILLER: K. Caudill | LOGGED BY: R. Jett | START DATE: 08/27/25 | END DATE: 08/27/25

SURFACE ELEVATION: 1127.7 ft | RIG: 7505 | METHOD: 3 1/4" HSA | SURFACING: Corn field | WEATHER: Cloudy

Elev./ Depth ft	Water Level	Description of Materials (Soil-ASTM D2488 or 2487; Rock-USACE EM 1110-1-2908)	Sample	Blows (N-Value) Recovery	PID ppm	MC %	Tests or Remarks
		GABBRO, light gray to greenish blue, moist, hand deformed sample classified as "SILTY SAND (SM)" (APPARENT BEDROCK)	35	7-13-15 (28) 20"			
			40	13-23-27 (50) 20"			
1086.7 41.0		END OF BORING Boring then grouted					Water not observed while drilling.
			45				
			50				
			55				
			60				

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See Descriptive Terminology sheet for explanation of abbreviations

Project Number B2506260
Geotechnical & Environmental Evaluation
Northern Lights 2027 Expansion Project

BORING: **BH-04 Paynesville 2nd Line**

LOCATION: Captured with RTK GPS. Intersection of Highway 21 and County Road 123. See attached sketch.

DATUM: NAD83 / UTM zone 11N

NORTHING: 5282803.2 EASTING: 2252517.9

DRILLER: K. Caudill | LOGGED BY: R. Jett | START DATE: 08/27/25 | END DATE: 08/27/25

SURFACE ELEVATION: 1113.4 ft | RIG: 7505 | METHOD: 3 1/4" HSA | SURFACING: Grass | WEATHER: Cloudy/rain

Elev./ Depth ft	Water Level	Description of Materials (Soil-ASTM D2488 or 2487; Rock-USACE EM 1110-1-2908)	Sample	Blows (N-Value) Recovery	PID ppm	MC %	Tests or Remarks
1112.7		CLAYEY SAND (SC), trace Gravel, dark brown, moist (TOPSOIL FILL)		1-4-5-7 (9) 14"	1.2		BH-04 (0-2) collected on 9/2/25 @ 1333 for MDA 1, MDA 2, OC
0.8		FILL: CLAYEY SAND (SC), trace Gravel, slightly organic, brown to dark brown, moist		4-5-7-7 (12) 14"	2.0		BH-04 (2-4) collected on 9/2/25 @ 1328 for GRO, DRO, BETX, RCRA metals
			5	3-4-5-4 (9) 12"	3.7		
1106.4				2-2-3-4 (5) 10"	6.5		
7.0		POORLY GRADED SAND (SP), fine to coarse-grained, trace to little Gravel, brown, moist, loose to medium dense (GLACIAL OUTWASH)		5-5-7-8 (12) 12"	11.3		
1103.4			10				
10.0		POORLY GRADED SAND with GRAVEL (SP), fine to coarse-grained, brown, moist, medium dense (GLACIAL OUTWASH)		2-6-10-12 (16) 12"	10.4		
1101.4							
12.0		WELL-GRADED SAND with SILT and GRAVEL (SW-SM), fine to coarse-grained, light brown, moist, medium dense (GLACIAL OUTWASH)		7-10-11-10 (21) 12"	18.1		
				8-10-10-13 (20) 14"	10.3		
			15				
			20	7-8-11 (19) 14"	9.7		
	▽	*Wet below 25 feet*	25	6-8-10 (18) 14"		13	%Gravel=16% %Sand=78% P200=6%
1083.9							
29.5		SANDY LEAN CLAY (CL), trace Gravel, dark gray, wet, medium (GLACIAL TILL)	30	2-2-4 (6) 12"		14	LL=26, PL=14, PI=12

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See Descriptive Terminology sheet for explanation of abbreviations

Project Number B2506260
Geotechnical & Environmental Evaluation
Northern Lights 2027 Expansion Project

BORING: **BH-04 Paynesville 2nd Line**

LOCATION: Captured with RTK GPS. Intersection of Highway 21 and County Road 123. See attached sketch.

DATUM: NAD83 / UTM zone 11N

NORTHING: 5282803.2 EASTING: 2252517.9

DRILLER: K. Caudill | LOGGED BY: R. Jett | START DATE: 08/27/25 | END DATE: 08/27/25

SURFACE ELEVATION: 1113.4 ft | RIG: 7505 | METHOD: 3 1/4" HSA | SURFACING: Grass | WEATHER: Cloudy/rain

Elev./ Depth ft	Water Level	Description of Materials (Soil-ASTM D2488 or 2487; Rock-USACE EM 1110-1-2908)	Sample	Blows (N-Value) Recovery	PID ppm	MC %	Tests or Remarks
1078.9		SANDY LEAN CLAY (CL), trace Gravel, dark gray, wet, medium (GLACIAL TILL)					
34.5		GABBRO, greenish blue, moist, hand deformed sample classified as "FAT CLAY (CH)" (APPARENT BEDROCK)	35	5-10-13 (23) 14"		24	LL=54, PL=25, PI=29 P200=53%
			40	17-33-32 (65) 14"			
1072.4							
41.0		END OF BORING Boring then grouted					Water observed at 25.0 feet while drilling.
			45				
			50				
			55				
			60				

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See Descriptive Terminology sheet for explanation of abbreviations

Project Number B2506260
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BORING: **BH-05 Paynesville 2nd Line**

LOCATION: Captured with RTK GPS. Intersection of Highway 21 and County Road 123. See attached sketch.

DATUM: NAD83 / UTM zone 11N

NORTHING: 5283281.7 EASTING: 2252824.7

DRILLER: M. Takada | LOGGED BY: J. Franz | START DATE: 09/25/25 | END DATE: 09/25/25

SURFACE ELEVATION: 1105.6 ft | RIG: 75011 | METHOD: 3 1/4" HSA | SURFACING: Grass | WEATHER: Sunny

Elev./ Depth ft	Water Level	Description of Materials (Soil-ASTM D2488 or 2487; Rock-USACE EM 1110-1-2908)	Sample	Blows (N-Value) Recovery	PID ppm	MC %	Tests or Remarks
1103.6		SILTY SAND (SM), trace Gravel, dark brown, moist (TOPSOIL)		3-2-2-3 (4) 14"	0.1		BH-05 (0-2) collected on 9/25/25 @ 0852 for MDA 1, MDA 2, OC
2.0		POORLY GRADED SAND (SP), fine to coarse-grained, trace Gravel, with Silt clumps, light brown, dry, loose to medium dense (GLACIAL OUTWASH)		2-3-5-6 (8) 14"	1.0		BH-05 (2-4) collected on 9/25/25 @ 0855 for RCRA metals
			5	3-4-6-8 (10) 14"	0.1		BH-05 (4-6) collected on 9/25/25 @ 0845 for GRO, DRO, BETX
				7-10-9-9 (19) 14"	0.1		
				9-9-9-13 (18) 14"	0.1		
			10	11-12-13-16 (25) 10"	0.1		
				7-9-11-14 (20) 14"	0.2		
	▽		15	6-7-11-14 (18) 16"	0.1		Wet below 17 feet
1086.1							
19.5		SANDY LEAN CLAY (CL), trace Gravel, gray, moist, soft to medium (GLACIAL TILL)	20	1-1-2 (3) 14"	0.0		q_p=1 tsf
			25	2-2-3 (5) 14"	0.1		q_p=0.5 tsf
			30	4-4-5 (9) 14"			

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See Descriptive Terminology sheet for explanation of abbreviations

Project Number B2506260
Geotechnical & Environmental Evaluation
Northern Lights 2027 Expansion Project

BORING: **BH-05 Paynesville 2nd Line**

LOCATION: Captured with RTK GPS. Intersection of Highway 21 and County Road 123. See attached sketch.

DATUM: NAD83 / UTM zone 11N

NORTHING: 5283281.7 EASTING: 2252824.7

DRILLER:	M. Takada	LOGGED BY:	J. Franz	START DATE:	09/25/25	END DATE:	09/25/25
SURFACE ELEVATION:	1105.6 ft	RIG:	75011	METHOD:	3 1/4" HSA	SURFACING:	Grass	WEATHER:	Sunny

Elev./ Depth ft	Water Level	Description of Materials (Soil-ASTM D2488 or 2487; Rock-USACE EM 1110-1-2908)	Sample	Blows (N-Value) Recovery	PID ppm	MC %	Tests or Remarks
		SANDY LEAN CLAY (CL), trace Gravel, gray, moist, soft to medium (GLACIAL TILL)					
1071.1							
34.5		GABBRO, dark gray and white, decomposed, hand deformed sample classified as "FAT CLAY (CH)" (APPARENT BEDROCK)	35	2-3-7 (10) 16"		25	LL=57, PL=28, PI=29
			40	12-16-18 (34) 18"		26	P200=43%
			45	8-50/3" (REF) 9"		25	LL=54, PL=25, PI=29
			50	23-50/4" (REF) 10"			Drilling method switched to mud rotary at 50 feet
			55				
			60	23-50/3" (REF) 9"			

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See Descriptive Terminology sheet for explanation of abbreviations

Project Number B2506260
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Northern Lights 2027 Expansion Project

BORING: **BH-05 Paynesville 2nd Line**

LOCATION: Captured with RTK GPS. Intersection of Highway 21 and County Road 123. See attached sketch.

DATUM: NAD83 / UTM zone 11N

NORTHING: 5283281.7 EASTING: 2252824.7

DRILLER: M. Takada | LOGGED BY: J. Franz | START DATE: 09/25/25 | END DATE: 09/25/25

SURFACE ELEVATION: 1105.6 ft | RIG: 75011 | METHOD: 3 1/4" HSA | SURFACING: Grass | WEATHER: Sunny

Elev./ Depth ft	Water Level	Description of Materials (Soil-ASTM D2488 or 2487; Rock-USACE EM 1110-1-2908)	Sample	Blows (N-Value) Recovery	PID ppm	MC %	Tests or Remarks
65		GABBRO, dark gray and white, decomposed, hand deformed sample classified as "FAT CLAY (CH)" (APPARENT BEDROCK)					
70				50/4" (REF) 3"			
75							
80				50/3" (REF) 3"			
85							
90				50/2" (REF) 1"			
95							

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See Descriptive Terminology sheet for explanation of abbreviations

Project Number B2506260
Geotechnical & Environmental Evaluation
Northern Lights 2027 Expansion Project

BORING: **BH-05 Paynesville 2nd Line**

LOCATION: Captured with RTK GPS. Intersection of Highway 21 and County Road 123. See attached sketch.

DATUM: NAD83 / UTM zone 11N

NORTHING: 5283281.7 EASTING: 2252824.7

DRILLER: M. Takada | LOGGED BY: J. Franz | START DATE: 09/25/25 | END DATE: 09/25/25

SURFACE ELEVATION: 1105.6 ft | RIG: 75011 | METHOD: 3 1/4" HSA | SURFACING: Grass | WEATHER: Sunny

Elev./ Depth ft	Water Level	Description of Materials (Soil-ASTM D2488 or 2487; Rock-USACE EM 1110-1-2908)	Sample	Blows (N-Value) Recovery	PID ppm	MC %	Tests or Remarks
1006.0		GABBRO, dark gray and white, decomposed, hand deformed sample classified as "FAT CLAY (CH)" (APPARENT BEDROCK)					
99.6		END OF BORING Boring then grouted		50/1" (REF) 1"			Water observed at 17.0 feet while drilling.

100
105
110
115
120
125

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See Descriptive Terminology sheet for explanation of abbreviations

Project Number B2506260
Geotechnical & Environmental Evaluation
Northern Lights 2027 Expansion Project

BORING: **BH-06 Paynesville 2nd Line**

LOCATION: Captured with RTK GPS. Intersection of Highway 21 and County Road 123. See attached sketch.

DATUM: NAD83 / UTM zone 11N

NORTHING: 5283039.5 EASTING: 2252667.3

DRILLER: M. Hoppe | LOGGED BY: S. Niraula | START DATE: 10/06/25 | END DATE: 10/06/25

SURFACE ELEVATION: 1106.1 ft | RIG: 7504 | METHOD: 3 1/4" HSA | SURFACING: Soil | WEATHER:

Elev./ Depth ft	Water Level	Description of Materials (Soil-ASTM D2488 or 2487; Rock-USACE EM 1110-1-2908)	Sample	Blows (N-Value) Recovery	PID ppm	MC %	Tests or Remarks
~~1105.8~~ 0.3		SILTY SAND (SM), fine-grained, with roots, dark brown, moist (TOPSOIL FILL)		2-3-3-3 (6) 12"	0.3		BH-06 (0-2) collected on 10/6/25 @ 1122 for MDA 1, MDA 2, OC
1104.1 2.0		FILL: SILTY SAND (SM), fine to medium-grained, trace Gravel, dark brown, moist		3-4-3-3 (7) 10"	0.2		BH-06 (2-4) collected on 10/6/25 @ 1124 for RCRA metals
1102.1 4.0		FILL: POORLY GRADED SAND (SP), fine-grained, trace Gravel, brown, moist		3-3-5-5 (8) 12"	73.9		BH-06 (4-6) collected on 10/6/25 @ 1112 for GRO, DRO, BETX
1100.1 6.0		FILL: SILTY SAND (SM), with roots, slightly organic, dark brown, moist	5	3-3-4-3 (7) 16"	11.1		
		FILL: CLAYEY SAND (SC), trace Gravel, and roots, brown, moist		4-5-7-5 (12) 14"	24.5		
		Slightly organic at 10 feet	10	4-5-5-6 (10) 16"	7.9		
1094.1 12.0		POORLY GRADED SAND (SP), fine to medium-grained, trace Gravel, brown, moist (GLACIAL OUTWASH)		5-6-5-5 (11) 14"	0.4		
			15	4-5-5-5 (10) 16"	1.1		
1086.6 19.5		SANDY LEAN CLAY (CL), trace Gravel, gray and brown, moist (GLACIAL TILL)	20	4-5-5 (10) 14"	0.2		
			25	2-2-3 (5) 16"	0.2		
			30	4-5-3 (8) 18"			

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See Descriptive Terminology sheet for explanation of abbreviations

Project Number B2506260
Geotechnical & Environmental Evaluation
Northern Lights 2027 Expansion Project

BORING: **BH-06 Paynesville 2nd Line**

LOCATION: Captured with RTK GPS. Intersection of Highway 21 and County Road 123. See attached sketch.

DATUM: NAD83 / UTM zone 11N

NORTHING: 5283039.5 EASTING: 2252667.3

DRILLER:	M. Hoppe	LOGGED BY:	S. Niraula	START DATE:	10/06/25	END DATE:	10/06/25
SURFACE ELEVATION:	1106.1 ft	RIG:	7504	METHOD:	3 1/4" HSA	SURFACING:	Soil

Elev./ Depth ft	Water Level	Description of Materials (Soil-ASTM D2488 or 2487; Rock-USACE EM 1110-1-2908)	Sample	Blows (N-Value) Recovery	PID ppm	MC %	Tests or Remarks
1071.6		SANDY LEAN CLAY (CL), trace Gravel, gray and brown, moist (GLACIAL TILL)					
34.5		GABBRO, white and greenish gray, decomposed, sample retrieved as non-cemented "SANDY SILT (ML)" (APPARENT BEDROCK)	35	7-8-10 (18) 14"			
			40	23-41-36 (77) 12"			
			45	26-30-41 (71) 16"			
			50	37-50/3" (REF) 14"			
			55				
			60	31-36-50/4" (REF) 16"			

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See Descriptive Terminology sheet for explanation of abbreviations

Project Number B2506260
Geotechnical & Environmental Evaluation
Northern Lights 2027 Expansion Project

BORING: **BH-06 Paynesville 2nd Line**

LOCATION: Captured with RTK GPS. Intersection of Highway 21 and County Road 123. See attached sketch.

DATUM: NAD83 / UTM zone 11N

NORTHING: 5283039.5 EASTING: 2252667.3

DRILLER: M. Hoppe | LOGGED BY: S. Niraula | START DATE: 10/06/25 | END DATE: 10/06/25

SURFACE ELEVATION: 1106.1 ft | RIG: 7504 | METHOD: 3 1/4" HSA | SURFACING: Soil | WEATHER:

Elev./ Depth ft	Water Level	Description of Materials (Soil-ASTM D2488 or 2487; Rock-USACE EM 1110-1-2908)	Sample	Blows (N-Value) Recovery	PID ppm	MC %	Tests or Remarks
65		GABBRO, white and greenish gray, decomposed, sample retrieved as non-cemented "SANDY SILT (ML)" (APPARENT BEDROCK)					
70				23-41-50/3" (REF) 15"			
75							
80				37-50/3" (REF) 9"			
85							
90				35-41-50/3" (REF) 15"			
95							

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See Descriptive Terminology sheet for explanation of abbreviations

Project Number B2506260
Geotechnical & Environmental Evaluation
Northern Lights 2027 Expansion Project

BORING: **BH-06 Paynesville 2nd Line**

LOCATION: Captured with RTK GPS. Intersection of Highway 21 and County Road 123. See attached sketch.

DATUM: NAD83 / UTM zone 11N

NORTHING: 5283039.5 EASTING: 2252667.3

DRILLER:	M. Hoppe	LOGGED BY:	S. Niraula	START DATE:	10/06/25	END DATE:	10/06/25
SURFACE ELEVATION:	1106.1 ft	RIG:	7504	METHOD:	3 1/4" HSA	SURFACING:	Soil

Elev./ Depth ft	Water Level	Description of Materials (Soil-ASTM D2488 or 2487; Rock-USACE EM 1110-1-2908)	Sample	Blows (N-Value) Recovery	PID ppm	MC %	Tests or Remarks
		GABBRO, white and greenish gray, decomposed, sample retrieved as non-cemented "SANDY SILT (ML)" (APPARENT BEDROCK)					
1005.8			100	37-50/4" (REF) 10"			
100.3		END OF BORING Boring immediately grouted					Water not observed while drilling.
			105				
			110				
			115				
			120				
			125				

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See Descriptive Terminology sheet for explanation of abbreviations

Project Number B2506260
Geotechnical & Environmental Evaluation
Northern Lights 2027 Expansion Project

BORING: **BH-07 Paynesville 2nd Line**

LOCATION: Captured with RTK GPS. Intersection of Highway 21 and County Road 123. See attached sketch.

DATUM: NAD83 / UTM zone 11N

NORTHING: 5284018.7 EASTING: 2253220.9

DRILLER: M. Takada | LOGGED BY: J. Franz | START DATE: 09/24/25 | END DATE: 09/24/25

SURFACE ELEVATION: 1121.8 ft | RIG: 75011 | METHOD: 3 1/4" HSA | SURFACING: Grass | WEATHER: Sunny

Elev./ Depth ft	Water Level	Description of Materials (Soil-ASTM D2488 or 2487; Rock-USACE EM 1110-1-2908)	Sample	Blows (N-Value) Recovery	PID ppm	MC %	Tests or Remarks
1117.8		POORLY GRADED SAND with SILT (SP-SM), trace roots, brown, dry (TOPSOIL)		2-3-5-5 (8) 14"	0.1		BH-07 (0-2) collected on 9/24/25 @ 1624 for MDA 1, MDA 2, OC
				3-4-7-8 (11) 4"	0.2		BH-07 (2-4) collected on 9/24/25 @ 1626 for RCRA metals
4.0		POORLY GRADED SAND with SILT (SP-SM), fine to coarse-grained, trace Gravel, light brown, dry to moist, loose to medium dense (GLACIAL OUTWASH)	5	4-3-6-7 (9) 14"	0.0	2	BH-07 (4-6) collected on 9/24/25 @ 1618 for GRO, DRO, BETX
				4-6-8-9 (14) 16"	0.2		P200=8%
				7-6-8-11 (14) 16"	0.0		
1109.8			10	6-9-7-8 (16) 18"	0.0		
12.0		SANDY LEAN CLAY (CL), trace Gravel, gray, moist, soft to medium (GLACIAL TILL)		1-1-2-1 (3) 18"	0.0	13	LL=24, PL=13, PI=11 q_p=0.75 tsf
			15	1-2-3-1 (5) 18"	0.1		q_p=1.25 tsf
			20	1-2-3 (5) 18"	0.3	14	q_p=1 tsf
1098.8							
23.0		LEAN CLAY (CL), gray, moist, medium to stiff (GLACIAL TILL)	25	2-3-5 (8) 18"	0.3		q_p=2 tsf
			30	3-3-6 (9) 18"			q_p=3 tsf

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See Descriptive Terminology sheet for explanation of abbreviations

Project Number B2506260
Geotechnical & Environmental Evaluation
Northern Lights 2027 Expansion Project

BORING: **BH-07 Paynesville 2nd Line**

LOCATION: Captured with RTK GPS. Intersection of Highway 21 and County Road 123. See attached sketch.

DATUM: NAD83 / UTM zone 11N

NORTHING: 5284018.7 EASTING: 2253220.9

DRILLER:	M. Takada	LOGGED BY:	J. Franz	START DATE:	09/24/25	END DATE:	09/24/25
SURFACE ELEVATION:	1121.8 ft	RIG:	75011	METHOD:	3 1/4" HSA	SURFACING:	Grass	WEATHER:	Sunny

Elev./ Depth ft	Water Level	Description of Materials (Soil-ASTM D2488 or 2487; Rock-USACE EM 1110-1-2908)	Sample	Blows (N-Value) Recovery	PID ppm	MC %	Tests or Remarks
1088.8	▽	LEAN CLAY (CL), gray, moist, medium to stiff (GLACIAL TILL)					Wet below 33 feet
33.0		GABBRO, white, moist, decomposed, hand deformed sample classified as "SILT (ML)" (APPARENT BEDROCK)					
35				6-11-12 (23) 14"			
40				7-17-24 (41) 14"			
1080.8							
41.0		END OF BORING Boring then grouted					Water observed at 33.0 feet while drilling.
45							
50							
55							
60							

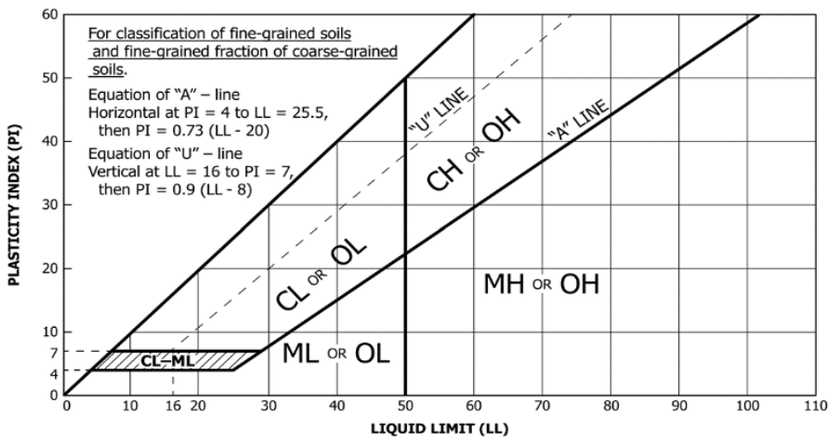
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Descriptive Terminology of Soil

Based on Standards ASTM D2487/2488
(Unified Soil Classification System)

Criteria for Assigning Group Symbols and Group Names Using Laboratory Tests[A]				Soil Classification	
				Group Symbol	Group Name[B]
Coarse-grained Soils (more than 50% retained on No. 200 sieve)	Gravels (More than 50% of coarse fraction retained on No. 4 sieve)	Clean Gravels (Less than 5% fines[C])	$C_u \geq 4$ and $1 \leq C_c \leq 3^D$	GW	Well-graded gravel[E]
			$C_u < 4$ and/or ($C_c < 1$ or $C_c > 3$)[D]	GP	Poorly graded gravel[E]
		Gravels with Fines (More than 12% fines[C])	Fines classify as ML or MH	GM	Silty gravel[E F G]
			Fines Classify as CL or CH	GC	Clayey gravel[E F G]
	Sands (50% or more coarse fraction passes No. 4 sieve)	Clean Sands (Less than 5% fines[H])	$C_u \geq 6$ and $1 \leq C_c \leq 3^D$	SW	Well-graded sand[I]
			$C_u < 6$ and/or ($C_c < 1$ or $C_c > 3$)[D]	SP	Poorly graded sand[I]
		Sands with Fines (More than 12% fines[H])	Fines classify as ML or MH	SM	Silty sand[F G I]
			Fines classify as CL or CH	SC	Clayey sand[F G I]
Fine-grained Soils (50% or more passes the No. 200 sieve)	Silts and Clays (Liquid limit less than 50)	Inorganic	PI > 7 and plots on or above "A" line[J]	CL	Lean clay[K L M]
			PI < 4 or plots below "A" line[J]	ML	Silt[K L M]
		Organic	Liquid Limit – oven dried / Liquid Limit – not dried <0.75	OL	Organic clay[K L M N] / Organic silt[K L M O]
	Silts and Clays (Liquid limit 50 or more)	Inorganic	PI plots on or above "A" line	CH	Fat clay[K L M]
			PI plots below "A" line	MH	Elastic silt[K L M]
		Organic	Liquid Limit – oven dried / Liquid Limit – not dried <0.75	OH	Organic clay[K L M P] / Organic silt[K L M Q]
Highly Organic Soils		Primarily organic matter, dark in color, and organic odor		PT	Peat

A. Based on the material passing the 3-inch (75-mm) sieve.
B. If field sample contained cobbles or boulders, or both, add "with cobbles or boulders, or both" to group name.
C. Gravels with 5 to 12% fines require dual symbols:
   GW-GM well-graded gravel with silt
   GW-GC well-graded gravel with clay
   GP-GM poorly graded gravel with silt
   GP-GC poorly graded gravel with clay
D. $C_u = D_{60} / D_{10}$ $C_c = (D_{30})^2 / (D_{10} \times D_{60})$
E. If soil contains ≥ 15% sand, add "with sand" to group name.
F. If fines classify as CL-ML, use dual symbol GC-GM or SC-SM.
G. If fines are organic, add "with organic fines" to group name.
H. Sands with 5 to 12% fines require dual symbols:
   SW-SM well-graded sand with silt
   SW-SC well-graded sand with clay
   SP-SM poorly graded sand with silt
   SP-SC poorly graded sand with clay
I. If soil contains ≥ 15% gravel, add "with gravel" to group name.
J. If Atterberg limits plot in hatched area, soil is CL-ML, silty clay.
K. If soil contains 15 to < 30% plus No. 200, add "with sand" or "with gravel", whichever is predominant.
L. If soil contains ≥ 30% plus No. 200, predominantly sand, add "sandy" to group name.
M. If soil contains ≥ 30% plus No. 200 predominantly gravel, add "gravelly" to group name.
N. PI ≥ 4 and plots on or above "A" line.
O. PI < 4 or plots below "A" line.
P. PI plots on or above "A" line.
Q. PI plots below "A" line.



Laboratory Tests

DD	Dry density, pcf	**q_p**	Pocket penetrometer strength, tsf
WD	Wet density, pcf	**q_U**	Unconfined compression test, tsf
P200	% Passing #200 sieve	**LL**	Liquid limit
MC	Moisture content, %	**PL**	Plastic limit
OC	Organic content, %	**PI**	Plasticity index

Particle Size Identification

Boulders..... over 12"
Cobbles..... 3" to 12"
Gravel
  Coarse..... 3/4" to 3" (19.00 mm to 75.00 mm)
  Fine..... No. 4 to 3/4" (4.75 mm to 19.00 mm)
Sand
  Coarse..... No. 10 to No. 4 (2.00 mm to 4.75 mm)
  Medium..... No. 40 to No. 10 (0.425 mm to 2.00 mm)
  Fine..... No. 200 to No. 40 (0.075 mm to 0.425 mm)
Silt..... No. 200 (0.075 mm) to .005 mm
Clay..... < .005 mm

Relative Proportions[L,M]

trace..... 0 to 5%
little..... 6 to 14%
with..... ≥ 15%

Inclusion Thicknesses

lens..... 0 to 1/8"
seam..... 1/8" to 1"
layer..... over 1"

Apparent Relative Density of Cohesionless Soils

Very loose ..... 0 to 4 BPF
Loose ..... 5 to 10 BPF
Medium dense..... 11 to 30 BPF
Dense..... 31 to 50 BPF
Very dense..... over 50 BPF

Consistency of Cohesive Soils	Blows Per Foot	Approximate Unconfined Compressive Strength
Very soft	0 to 1 BPF	< 0.25 tsf
Soft	2 to 4 BPF	0.25 to 0.5 tsf
Medium	5 to 8 BPF	0.5 to 1 tsf
Stiff	9 to 15 BPF	1 to 2 tsf
Very Stiff	16 to 30 BPF	2 to 4 tsf
Hard	over 30 BPF	> 4 tsf

Moisture Content:

Dry: Absence of moisture, dusty, dry to the touch.
Moist: Damp but no visible water.
Wet: Visible free water, usually soil is below water table.

Drilling Notes:

Blows/N-value: Blows indicate the driving resistance recorded for each 6-inch interval. The reported N-value is the blows per foot recorded by summing the second and third interval in accordance with the Standard Penetration Test, ASTM D1586.

Partial Penetration: If the sampler could not be driven through a full 6-inch interval, the number of blows for that partial penetration is shown as #/x" (i.e. 50/2"). The N-value is reported as "REF" indicating refusal.

Recovery: Indicates the inches of sample recovered from the sampled interval. For a standard penetration test, full recovery is 18", and is 24" for a thinwall/shelby tube sample.

WOH: Indicates the sampler penetrated soil under weight of hammer and rods alone; driving not required.

WOR: Indicates the sampler penetrated soil under weight of rods alone; hammer weight and driving not required.

Water Level: Indicates the water level measured by the drillers either while drilling (▽), at the end of drilling (▼), or at some time after drilling (▽▼).

Sample Symbols

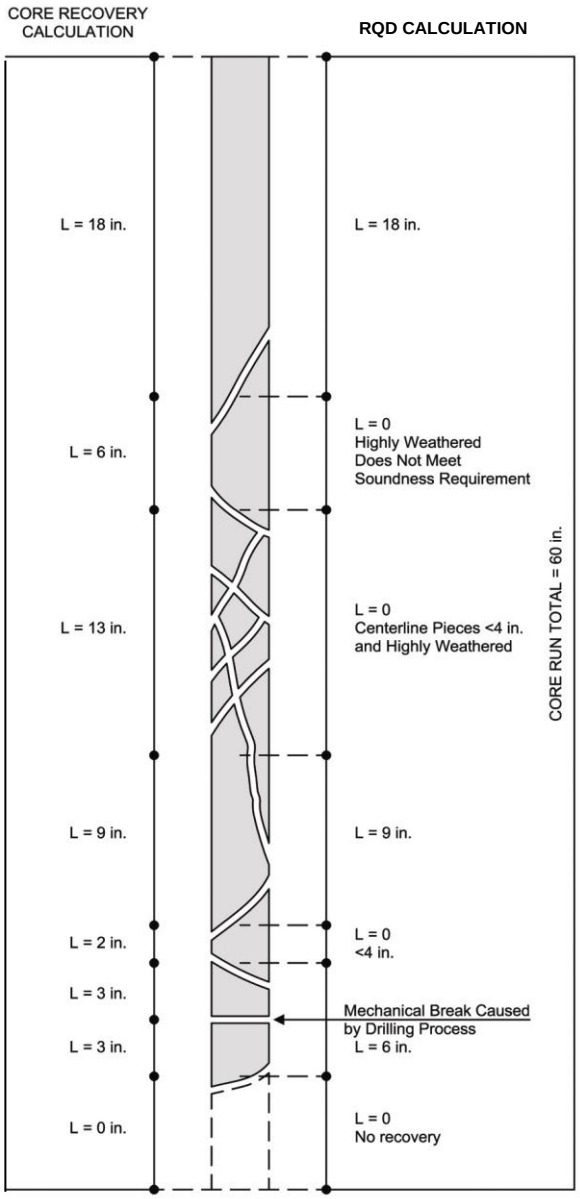
Standard Penetration Test
Modified California (MC)
Auger
Grab Sample
Rock Core
Thinwall (TW)/Shelby Tube (SH)
Texas Cone Penetrometer
Dynamic Cone Penetrometer

5/2021

BRAUN INTERTEC
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Descriptive Terminology of Rock

Based on U.S. Army Corps of Engineers EM 1110-1-2908



Example Calculations

Core Recovery, CR = $\frac{\text{Total length of rock recovered}}{\text{Total core run length}}$

Example: $CR = \frac{(18 + 6 + 13 + 9 + 2 + 3 + 3)}{(60)}$

CR = 90%

RQD = $\frac{\text{Sum of sound pieces 4 inches or larger}}{\text{Total core run length}}$

RQD Percent	Rock Quality
< 25	very poor
25 < 50	poor
50 < 75	fair
75 < 90	good
90 < 100	excellent

Example: $RQD = \frac{(18 + 9 + 6)}{(60)}$

RQD = 55%

Weathering

Unweathered: No evidence of chemical or mechanical alteration.

Slightly weathered: Slight discoloration on surface, slight alteration along discontinuities, less than 10% of rock volume altered.

Moderately Weathered: Discoloration evident, surface pitted and altered with alteration penetrating well below rock surfaces, weathering halos evident, 10% to 50% of the rock altered.

Highly Weathered: Entire mass discolored, alteration pervading nearly all of the rock, with some pockets of slightly weathered rock noticeable, some mineral leached away.

Decomposed: Rock reduced to a soil consistency with relict rock texture, generally molded and crumbled by hand.

Hardness

Very soft:	Can be deformed by hand
Soft:	Can be scratched with a fingernail
Moderately hard:	Can be scratched easily with a knife
Hard:	Can be scratched with difficulty with a knife
Very hard:	Cannot be scratched with a knife

Texture

Sedimentary Rocks:	*Grain Size*
Coarse grained	2 – 5 mm
Medium grained	0.4 – 2 mm
Fine grained	0.1 – 0.4 mm
Very fine grained	< 0.1 mm

Igneous and Metamorphic Rocks:	
Coarse grained	5 mm
Medium grained	1 – 5 mm
Fine grained	0.1 – 1 mm
Aphanitic	< 0.1 mm

Thickness of Bedding

Massive:	3 ft. thick or greater
Thick bedded:	1 to 3 ft. thick
Medium bedded:	4 in. to 1 ft. thick
Thin bedded:	4 in. thick or less

Degree of Fracturing (Jointing)

Unfractured:	Fracture spacing 6 ft. of more
Slightly fractured:	Fracture spacing 2 to 6 ft.
Moderately fractured:	Fracture spacing 8 in. to 2 ft.
Highly fractured:	Fracture spacing 2 in. to 8 in.
Intensely fractured:	Fracture spacing 2 in. or less

Worthington 2nd Branch Line

NL27 Worthington 2nd Line Extension

Subsurface Exploration and Lab Testing Report

Lakefield, Minnesota

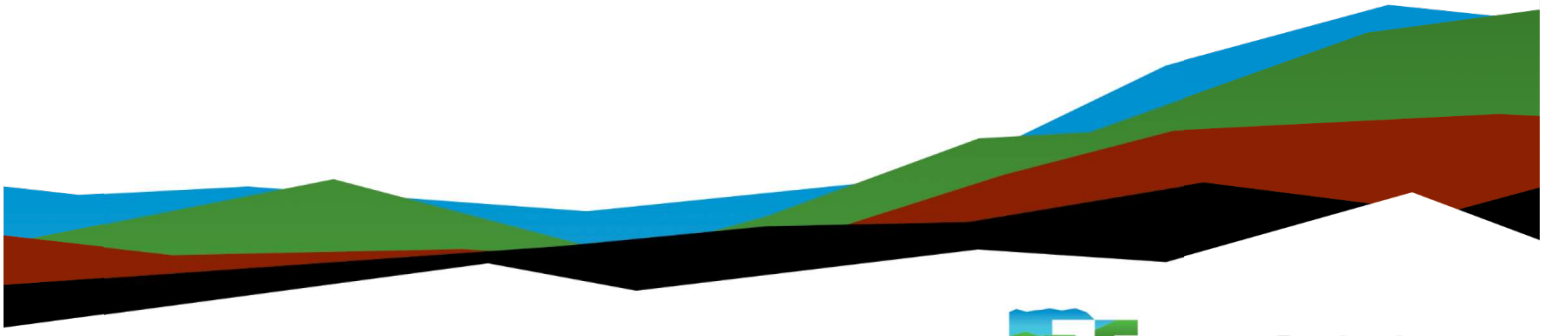
October 24, 2025 | Terracon Project No. JY255053

Prepared for:

Stantec Consulting Services Inc.
200-325 25 Street Southeast
Calgary, Alberta, Canada T2A 7H8

Prepared by:

Terracon Consultants



Terracon
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Nationwide
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- Facilities
- Environmental
- Geotechnical
- Materials

2625 Highway 14 W, Suite F
Rochester, Minnesota 55901
P (507) 722-7365
Terracon.com

October 24, 2025

Stantec Consulting Services Inc.
200-325 25 Street Southeast
Calgary, Alberta, Canada T2A 7H8

Attn: Ginger Chan
P: (587) 437-5068
E: ginger.chan@stantec.com

Re: Subsurface Exploration and Lab Testing Report
NL27 Worthington 2nd Line Extension
Task Order No. 060246-091002
Lakefield, Minnesota
Terracon Project No. JY255053

Dear Ms. Chan:

We have performed geotechnical services for the above referenced project in general accordance with Task Order No. 060246-091002, authorization via email dated July 28, 2025, and Change Order No. 001 dated August 19, 2025. This report presents the findings of the subsurface exploration for borings BH-01 through BH-04 for the proposed project.

We appreciate the opportunity to be of service to you on this project. If you have any questions concerning this report or if we may be of further service, please contact us.

Sincerely,

Terracon

Kyle T. Schmidt, EIT
Staff Engineer

Debra A. Schroeder, PE
Senior Engineer

Table of Contents

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Project Description **2**
Geotechnical Characterization **3**
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Groundwater Conditions 3
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GeoModel

Attachments

Exploration and Testing Procedures
Site Location and Exploration Plans
Exploration and Laboratory Results
Supporting Information

Note: This report was delivered in a web-based format. **Blue Bold** text in the report indicates a referenced section heading. The PDF version also includes hyperlinks which direct the reader to that section and clicking on the Terracon logo will bring you back to this page. For more interactive features, please view your project online at **client.terracon.com**.

Refer to each individual Attachment for a listing of contents.

Introduction

This Subsurface Exploration and Lab Testing Report presents the results of our subsurface exploration and geotechnical engineering services performed for the proposed pipeline corridor.

The purpose of these services was to provide information relative to:

- Subsurface soil conditions
- Groundwater conditions

The geotechnical engineering Scope of Services for this project included the advancement of three test borings (BH-01 through BH-04) to depths of approximately 41.5 and 61.5 feet below the existing ground surface.

In addition to geotechnical soil sampling, environmental soil sampling was performed on samples collected at approximately 10 feet above the bottom of each borehole and sent to a national laboratory for testing. The results of these tests are provided under a separate cover.

Maps showing the site and boring locations are shown on the **Site Location** and **Exploration Plans**, respectively. The results of the laboratory testing performed on geotechnical soil samples obtained from the site during our field exploration are included on the boring logs and/or as separate graphs in the **Exploration and Laboratory Results** section.

Site Conditions

The following description of site conditions is derived from our site visit in association with the field exploration and our review of publicly available geologic and topographic maps.

Item	Description
Site Location	The project is located in Lakefield, Minnesota. Latitude/Longitude (approximate): 43.6150°, -95.1870° See **Site Location** and **Exploration Plan**.
Current Ground Cover	Moderately vegetated with grasses, low brush, trees, and agricultural crops.
Geology	Our investigation and review of geologic maps and well logs indicated subsurface conditions mainly consist of glacial outwash and till soils, including silty sand (SM), clayey sand (SC), and sandy lean clay (CL).

Project Description

Our final understanding of the project conditions is as follows:

Item	Description
Information Provided	An email request for proposal was provided by Stantec on July 3, 2025. The request included a Google Earth .kmz file showing the location and depths of the requested borings for planned projects.
Project Description	The project consists of a pipeline extension section near Lakefield, Minnesota. The proposed subsurface investigation will help Stantec assess the technical feasibility and constructability of using various trenchless or trenched pipe installation methods to install the new pipeline at various crossings along the proposed pipeline corridor.

Geotechnical Characterization

Subsurface Profile

We have developed a general characterization of the subsurface conditions based upon our review of the subsurface exploration, geologic setting and our understanding of the project. This characterization, termed GeoModel, forms the basis of our geotechnical evaluation of the site. Conditions observed at each exploration point are indicated on the individual logs. The individual logs can be found in the **Exploration and Laboratory Results** and the GeoModel can be found in the **Figures** attachment of this report.

As part of our analyses, we identified the following model layers within the subsurface profile. For an approximate elevation view of the model layer depths at each boring location, refer to the GeoModel.

Model Layer	Layer Name	General Description
1	**Surficial Layer**	Topsoil, approximately 8 to 30 inches.
2	**Native Fine Grained Soils**	Clays and Silts (CL, ML), with varying amounts of sands and gravel, dark gray, gray, dark brown, grayish brown, and brown in color, soft to stiff in consistency.
3	**Native Sands**	Sands (SP-SM, SM, SC) with varying amounts of fines and gravel, fine to medium grained, brown and gray in color, loose to medium dense in relative density.

Groundwater Conditions

The boreholes were observed while drilling for the presence and level of groundwater. The water levels observed in the boreholes can be found on the boring logs in **Exploration and Laboratory Results**.

Groundwater was observed during drilling at a depth of approximately 25 feet below the existing ground surface at boring BH-01 location. Groundwater was not observed at the other boring locations. A relatively long period can be necessary for a groundwater level to develop and stabilize in a borehole; however, groundwater level observations made within granular soils are usually a reliable indication of the current groundwater conditions. Long-term observations in piezometers or observation wells, sealed from the influence of surface water, are recommended if it is necessary to better define groundwater levels.

Groundwater level fluctuations occur due to seasonal variations in the amount of rainfall, runoff, and other factors not evident at the time the borings were performed. Therefore,

groundwater levels during construction or at other times in the life of the pipeline will vary. The possibility of groundwater level fluctuations should be considered when developing the design and construction plans for the project.

General Comments

Our report presents the results of our fieldwork and laboratory tests. Natural variations will occur between exploration point locations or due to the modifying effects of construction or weather. The nature and extent of such variations may not become evident until during or after construction. Terracon should be retained to review the final design plans and specifications so comments can be made regarding interpretation of the results of our geotechnical investigation. Terracon should be retained to provide observation and testing services during earth-related construction phases of the project. If variations appear, we can provide further evaluation and supplemental recommendations. If variations are noted in the absence of our observation and testing services on-site, we should be immediately notified so that we can provide additional evaluation and supplemental recommendations.

Our Scope of Services included specific environmental testing as noted above; however, it does not include either specifically or by implication any environmental or biological (e.g., mold, fungi, bacteria) assessment of the site or identification or prevention of pollutants, hazardous materials or conditions. If the owner is concerned about the potential for such contamination or pollution, other studies should be undertaken.

Our services and any correspondence are intended for the sole benefit and exclusive use of our client for specific application to the project discussed and are accomplished in accordance with generally accepted geotechnical engineering practices with no third-party beneficiaries intended. Any third-party access to services or correspondence is solely for information purposes to support the services provided by Terracon to our client. Reliance upon the services and any work product is limited to our client and is not intended for third parties. Any use or reliance of the provided information by third parties is done solely at their own risk. No warranties, either express or implied, are intended or made.

Site characteristics as provided are for design purposes and not to estimate excavation cost. Any use of our report in that regard is done at the sole risk of the excavating cost estimator as there may be variations on the site that are not apparent in the data that could significantly affect excavation cost. Any parties charged with estimating excavation costs should seek their own site characterization for specific purposes to obtain the specific level of detail necessary for costing. Site safety and cost estimating including excavation support and dewatering requirements/design are the responsibility of others. Construction and site development have the potential to affect adjacent properties. Such impacts can include damages due to vibration, modification of groundwater/surface

water flow during construction, foundation movement due to undermining or subsidence from excavation, as well as noise or air quality concerns. Evaluation of these items on nearby properties are commonly associated with contractor means and methods and are not addressed in this report. The owner and contractor should consider a preconstruction/precondition survey of surrounding development. If changes in the nature, design, or location of the project are planned, the results presented in this factual report shall not be considered valid unless we review the changes and either verify or modify our conclusions in writing.

Figures

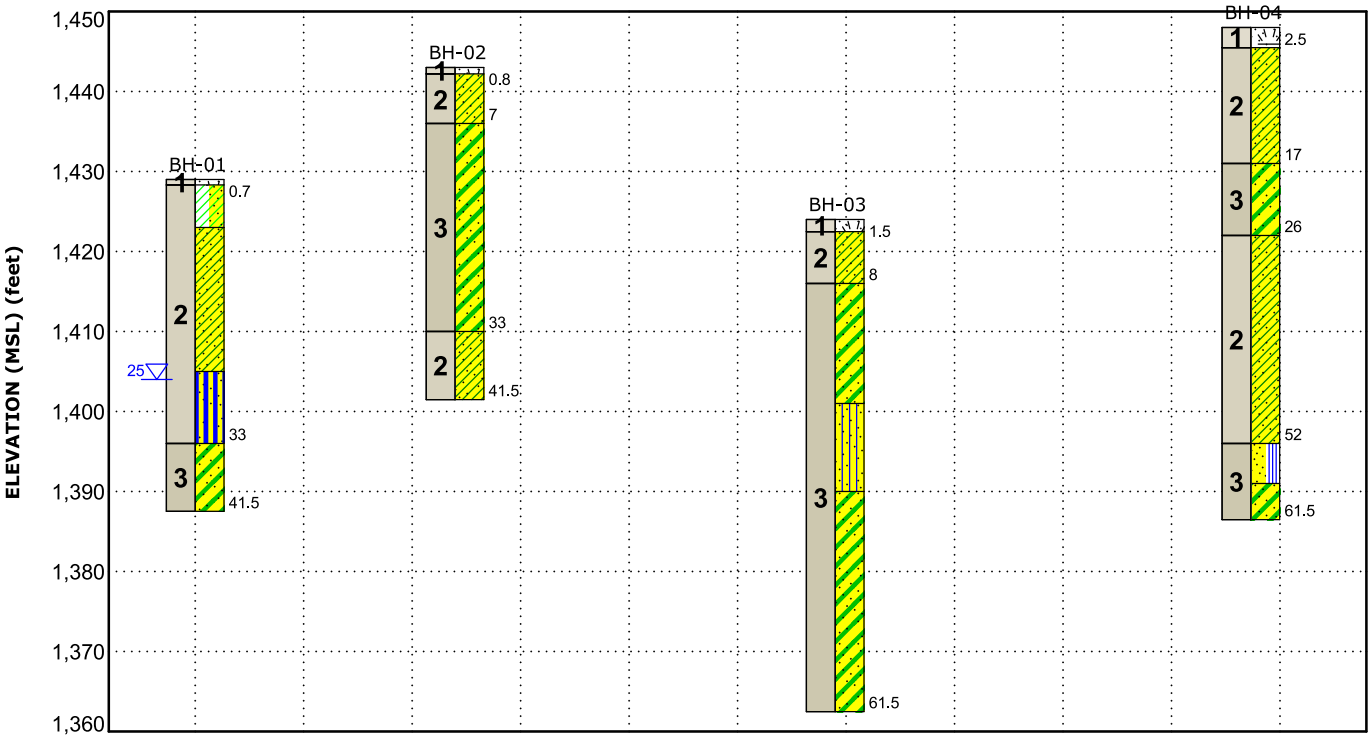
Contents:

GeoModel

NL27 Worthington 2nd Line Extension
79287 430th Ave | Lakefield, MN
Terracon Project No. JY255053

Terracon
2625 Highway 14 W, Ste F
Rochester, MN

GeoModel



This is not a cross section. This is intended to display the Geotechnical Model only. See individual logs for more detailed conditions.

Model Layer	Layer Name	General Description
1	Surficial Layer	Topsoil, approximately 8 to 30 inches.
2	Native Fine Grained Soils	Clays and Silts (CL, ML), with varying amounts of sands and gravel, dark gray, gray, dark brown, grayish brown, and brown in color, soft to stiff in consistency.
3	Native Sands	Sands (SP-SM, SM, SC) with varying amounts of fines and gravel, fine to medium grained, brown, grayish brown, and gray in color, loose to medium dense in relative density.

Legend

- Topsoil
- Lean Clay with Sand
- Sandy Lean Clay
- Sandy Silt
- Clayey Sand
- Silty Sand
- Poorly-graded Sand with Silt

▽ First Water Observation

Groundwater levels are temporal. The levels shown are representative of the date and time of our exploration. Significant changes are possible over time.
Water levels shown are as measured during and/or after drilling. In some cases, boring advancement methods mask the presence/absence of groundwater. See individual logs for details.

NOTES:
Layering shown on this figure has been developed by the geotechnical engineer for purposes of modeling the subsurface conditions as required for the subsequent geotechnical engineering for this project. Numbers adjacent to soil column indicate depth below ground surface.

Attachments

Exploration and Testing Procedures

Field Exploration

Boring Numbers	Boring Depths (feet)	Location
BH-01	41.5	43.6148° N, 95.1989° W
BH-02	41.5	43.6148° N, 95.1941° W
BH-03	61.5	43.6149° N, 95.1871° W
BH-04	61.5	43.6150° N, 95.1794° W

Boring Layout and Elevations: Stantec representatives staked the boring locations. We were provided with the Google Earth kmz file showing the boring locations and these locations are shown on the **Exploration Plans**. The approximate coordinates of the borings are indicated on the boring logs. Approximate ground surface elevations were estimated using the Minnesota Department of Natural Resources, MnTOPO LiDAR map and reported on the logs to the nearest foot. If more accurate boring locations and surface elevations are desired, we recommend the boring locations be surveyed.

Subsurface Exploration Procedures: We advanced the borings with ATV and track-mounted rotary drill rigs using continuous flight augers and mud-rotary drilling techniques. Split-spoon samples were obtained at intervals of 5 feet. In the split-barrel sampling procedure, a standard 2-inch outer diameter split-barrel sampling spoon was driven into the ground by a 140-pound automatic hammer falling a distance of 30 inches. The number of blows required to advance the sampling spoon the last 12 inches of a normal 18-inch penetration (the second and third 6 inches of penetration for a 24-inch penetration) is recorded as the Standard Penetration Test (SPT) resistance value. The SPT resistance values, also referred to as N-values, are indicated on the boring logs at the test depths. The samples were placed in appropriate containers and transported to our laboratory for testing. We observed and recorded groundwater levels during drilling and sampling.

The boreholes were backfilled with grout/neat cement after completion to within 2 feet of the ground surface. The boreholes were backfilled with auger cuttings from a depth of 2 feet to the ground surface.

The drill crew prepared a field log of each boring to record field data including visual descriptions of the materials encountered during drilling as well as the driller's interpretation of the subsurface conditions between samples. The boring logs included with this report represent an interpretation of the subsurface conditions at each boring location based on field data and observation of the samples.

Laboratory Testing

The project engineer reviewed the field data and assigned laboratory tests. The laboratory testing program included the following tests on retrieved soil samples:

Geotechnical Testing

- Moisture Content
- Grain size analysis (through a No. 200 sieve only)
- Atterberg Limits (3-point)
- Unconfined Compressive Strength
- Dry Unit Weights

The laboratory testing program included examination of soil samples. Based on the results of our field and laboratory programs, we described and classified the soil samples in general accordance with the Unified Soil Classification System.

The environmental laboratory tests that were performed are shown below. The results of these tests are provided under a separate cover.

Environmental Testing

- TPH-DRO (total petroleum hydrocarbons – diesel range organics)
- TCLP 8 RCRA metals
- BTEX/GRO
- TCLP herbicides
- TCLP pesticides

Site Location and Exploration Plans

Contents:

Site Location Plan
Exploration Plan

Note: All attachments are one page unless noted above.

Site Location

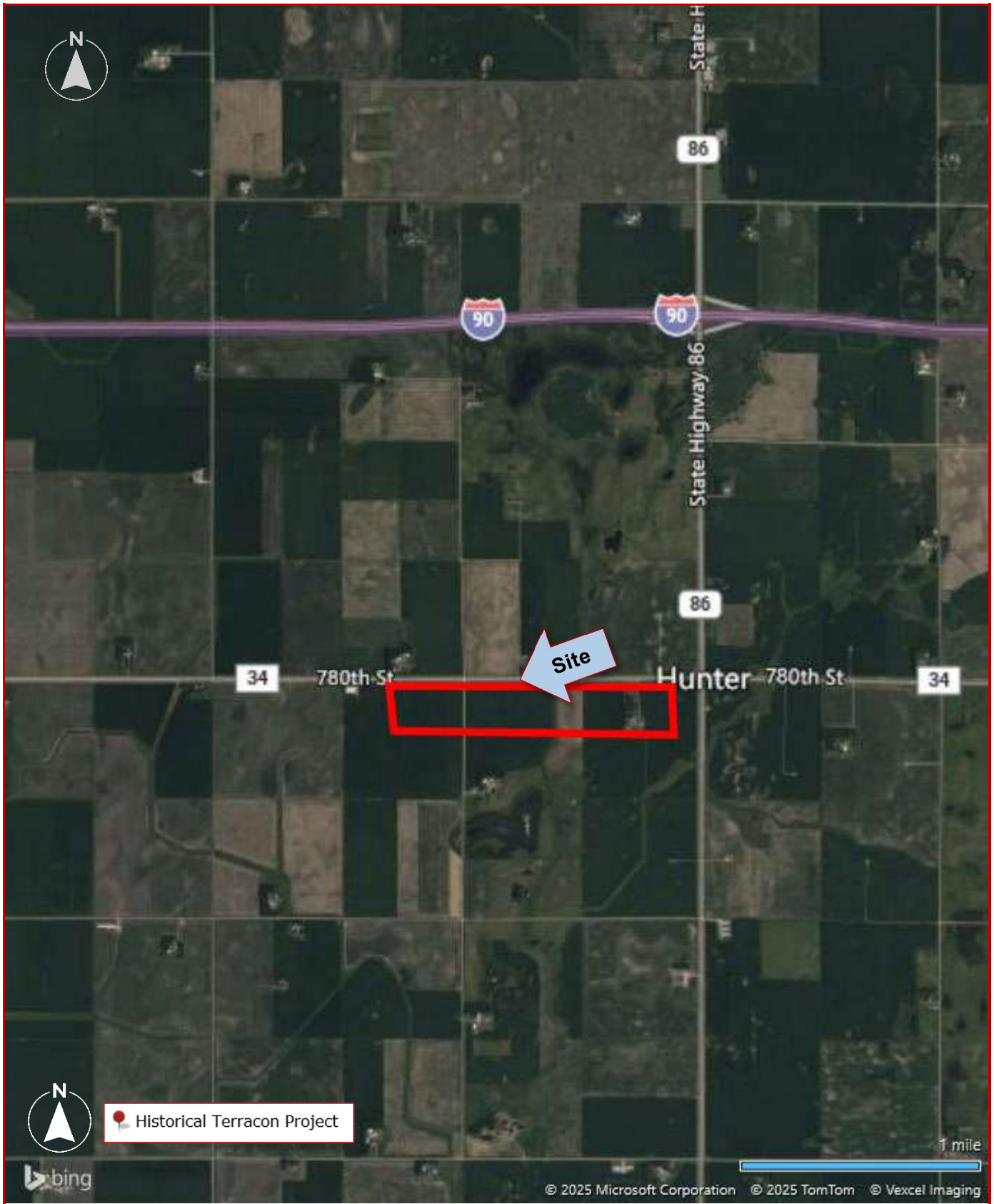


DIAGRAM IS FOR GENERAL LOCATION ONLY, AND IS NOT INTENDED FOR CONSTRUCTION PURPOSES MAP PROVIDED BY MICROSOFT BING MAPS

Exploration Plan



DIAGRAM IS FOR GENERAL LOCATION ONLY, AND IS NOT INTENDED FOR CONSTRUCTION PURPOSES

MAP PROVIDED BY MICROSOFT BING MAPS

Exploration and Laboratory Results

Contents:

Boring Logs (BH-01 through BH-04)
Atterberg Limits
Unconfined Compressive Strength

NL27 Worthington 2nd Line Extension
79287 430th Ave | Lakefield, MN
Terracon Project No. JY255053

Terracon
2625 Highway 14 W, Ste F
Rochester, MN

Boring Log No. BH-01

Location: See Exploration Plan

Latitude: 43.6148° Longitude: -95.1989°

Depth (Ft.) Approximate Elevation: 1429 (Ft.)

Model Layer	Depth (Ft.)	Material Description	Elevation	Water Level Observations	Sample Type	Recovery (In.)	Field Test Results	Unconfined Compressive Strength (tsf)	Water Content (%)	Dry Unit Weight (pcf)	Atterberg Limits LL-PL-PI	Percent Fines
1	0.7	**TOPSOIL**, Approximately 8 inches	1428.3									
2	6.0	**LEAN CLAY WITH SAND (CL)**, slighlty organic, trace shells, trace roots, dark brown, dark gray, and gray, medium stiff	1423			4	2-2-4 N=6		33.8			
						15			37.2			
		SANDY LEAN CLAY (CL), trace gravel, occasional silt seams, gray, soft to stiff				13	1-1-2 N=3		25.3			60.7
						14	5-5-4 N=9		18.1			58.5
						8			23.4	105	29-14-15	68.9
	24.0		1405	▽								
		SANDY SILT (ML), gray, stiff				3	5-6-8 N=14		22.0			54.6
	33.0		1396			14	4-4-6 N=10					
3		**CLAYEY SAND (SC)**, trace gravel, fine to medium grained, gray, medium dense				11	4-4-6 N=10		13.9			
	41.5	occasional silt seams at 40'	1387.5			16	3-4-8 N=12		15.3			46.5
		Boring Terminated at 41.5 Feet										

See Exploration and Testing Procedures for a description of field and laboratory procedures used and additional data (If any).

See Supporting Information for explanation of symbols and abbreviations.

Elevation Reference: Elevations estimated from MnTOPO website

Water Level Observations
▽ Perched water observed at 25 feet while drilling

Drill Rig
Mobile B-51

Hammer Type
Automatic

Driller
T. Wolfe

Logged by
T. Higgins

Boring Started
09-10-2025

Boring Completed
09-10-2025

Notes
Equipment Reference:
- Energy Transfer Ratio = 86.9% +/- 1.9%
- Hammer Efficiency Correction = 1.45

Advancement Method
3 1/4" Hollow Stem Auger

Abandonment Method
Boring backfilled with cuttings 0 to 2 feet and neat cement grout to completion

NL27 Worthington 2nd Line Extension
79287 430th Ave | Lakefield, MN
Terracon Project No. JY255053

Terracon
2625 Highway 14 W, Ste F
Rochester, MN

Boring Log No. BH-02

Location: See Exploration Plan

Latitude: 43.6148° Longitude: -95.1941°

Depth (Ft.) Approximate Elevation: 1443 (Ft.)

Model Layer	Graphic Log	Depth (Ft.)	Water Level Observations	Sample Type	Recovery (In.)	Field Test Results	Unconfined Compressive Strength (tsf)	Water Content (%)	Dry Unit Weight (pcf)	Atterberg Limits LL-PL-PI	Percent Fines
1		0.8 **TOPSOIL**, Approximately 9 inches 1442.2									
2		**SANDY LEAN CLAY (CL)**, with organics and roots, dark brown, medium stiff			5	2-3-4 N=7		24.0			
		7.0 1436			3	2-3-3 N=6		22.3			58.9
3		**CLAYEY SAND (SC)**, trace gravel, fine to medium grained, grayish brown, loose to medium dense			16	1-3-5 N=8		16.5			32.4
		gray at 16'			21			14.1			
					18	3-5-4 N=9		13.4			44.7
		occasional silt seams at 25'			22	3-7-9 N=16		16.2			
					22	3-4-7 N=11					
		33.0 1410									
2		**SANDY LEAN CLAY (CL)**, trace gravel, gray, stiff									
		occasional silt seams at 35'			24			18.0	104	30-17-13	64.2
		41.5 1401.5			21	2-4-6 N=10		18.2			62.5
		Boring Terminated at 41.5 Feet									

See Exploration and Testing Procedures for a description of field and laboratory procedures used and additional data (If any).

See Supporting Information for explanation of symbols and abbreviations.

Elevation Reference: Elevations estimated from MnTOPO website

Water Level Observations
No free water observed

Drill Rig
Mobile B-51

Hammer Type
Automatic

Driller
T. Wolfe

Logged by
T. Higgins

Boring Started
09-10-2025

Boring Completed
09-10-2025

Notes
Equipment Reference:
- Energy Transfer Ratio = 86.9% +/- 1.9%
- Hammer Efficiency Correction = 1.45

Advancement Method
3 1/4" Hollow Stem Auger

Abandonment Method
Boring backfilled with cuttings 0 to 2 feet and neat cement grout to completion

NL27 Worthington 2nd Line Extension
79287 430th Ave | Lakefield, MN
Terracon Project No. JY255053

Terracon
2625 Highway 14 W, Ste F
Rochester, MN

Boring Log No. BH-03

Location: See Exploration Plan

Latitude: 43.6149° Longitude: -95.1871°

Depth (Ft.) Approximate Elevation: 1424 (Ft.)

Model Layer	Graphic Log	Depth (Ft.)	Water Level Observations	Sample Type	Recovery (In.)	Field Test Results	Unconfined Compressive Strength (tsf)	Water Content (%)	Dry Unit Weight (pcf)	Atterberg Limits LL-PL-PI	Percent Fines
1		1.5 **TOPSOIL**, Approximately 18 inches 1422.5			4	1-3-4 N=7		24.9			
2		**SANDY LEAN CLAY (CL)**, trace gravel, grayish brown, soft 8.0 1416			10	1-2-2 N=4		24.8			58.9
		CLAYEY SAND (SC), trace gravel, fine to medium grained, brown and gray, medium dense			17			15.2			
		gray at 15'			8	6-9-7 N=16		19.7			
		23.0 1401			1	3-5-6 N=11					
		SILTY SAND (SM), trace gravel, clay seams, fine grained, gray, medium dense			24						
		34.0 1390			15	4-4-6 N=10		14.3			47.0
3		**CLAYEY SAND (SC)**, with silt, trace gravel, fine to medium grained, gray, medium dense to dense			13	3-4-8 N=12		17.3			
					7	3-9-7 N=16		16.6			40.0
					14	3-4-6 N=10		16.1			
						3-4-8 N=12		16.9			45.8
					15	7-33-16 N=49		18.3			
		61.5 1362.5			20	3-5-8 N=13					
		Boring Terminated at 61.5 Feet									

See Exploration and Testing Procedures for a description of field and laboratory procedures used and additional data (If any).

See Supporting Information for explanation of symbols and abbreviations.

Elevation Reference: Elevations estimated from MnTOPO website

Water Level Observations
No free water observed

Drill Rig
Mobile B-51

Hammer Type
Automatic

Driller
T. Wolfe

Logged by
T. Higgins

Boring Started
09-09-2025

Boring Completed
09-09-2025

Notes
Equipment Reference:
- Energy Transfer Ratio = 86.9% +/- 1.9%
- Hammer Efficiency Correction = 1.45

Advancement Method
0'-31.5': 3 1/4" Hollow Stem Auger
31.5'-61.5': Mud Rotary

Abandonment Method
Boring backfilled with cuttings 0 to 2 feet and neat cement grout to completion

NL27 Worthington 2nd Line Extension
79287 430th Ave | Lakefield, MN
Terracon Project No. JY255053

Terracon
2625 Highway 14 W, Ste F
Rochester, MN

Boring Log No. BH-04

Location: See Exploration Plan
Latitude: 43.6150° Longitude: -95.1794°
Depth (Ft.) Approximate Elevation: 1448 (Ft.)

Model Layer	Graphic Log	Depth (Ft.)	Water Level Observations	Sample Type	Recovery (In.)	Field Test Results	Unconfined Compressive Strength (tsf)	Water Content (%)	Dry Unit Weight (pcf)	Atterberg Limits LL-PL-PI	Percent Fines
1		**TOPSOIL**, Approximately 30 inches 2.5 1445.5			11	3-3-4-3 N=7		22.3			
2		**SANDY LEAN CLAY (CL)**, trace gravel, brown and gray, medium stiff to very soft			15	3-3-3 N=6		18.6			59.2
							1.19	21.1	108	32-19-13	
					18	2-3-3 N=6		18.0			
		17.0 1431			9	0-0-1 N=1		17.7			
3		**CLAYEY SAND (SC)**, trace gravel, fine to medium grained, brown, medium dense to loose gray at 20'			18	4-5-6 N=11		17.1			48.4
		26.0 1422			18	1-2-4 N=6		17.5			
2		**SANDY LEAN CLAY (CL)**, trace gravel, gray and brown, medium stiff to stiff 30' to 60' - small gravel seams throughout			10	2-4-4 N=8		16.6			
					1	2-4-4 N=8					
					3	4-5-7 N=12		21.4			
					18	4-4-7 N=11		17.0			52.5
		52.0 1396			18	5-5-9 N=14					
3		**POORLY GRADED SAND WITH SILT (SP-SM)**, trace gravel, fine to medium grained, gray, medium dense 57.0 1391			16	9-9-9 N=18		17.2			8.3
		CLAYEY SAND (SC), trace gravel, fine to medium grained, gray, medium dense 61.5 1386.5			18	6-9-11 N=20		17.2			
		Boring Terminated at 61.5 Feet									

See Exploration and Testing Procedures for a description of field and laboratory procedures used and additional data (If any).
See Supporting Information for explanation of symbols and abbreviations.
Elevation Reference: Elevations estimated from MnTOPO website

Water Level Observations
No free water observed

Drill Rig
Geoprobe 3126GT

Hammer Type
Automatic

Driller
C. Hehn

Logged by
B. Kern

Boring Started
10-16-2025

Boring Completed
10-16-2025

Notes
Equipment Reference:
- Energy Transfer Ratio = 92.8% +/- 3.3%
- Hammer Efficiency Correction = 1.55

Advancement Method
0'-10': 3 1/4" Hollow Stem Auger
10'-61.5': Mud Rotary

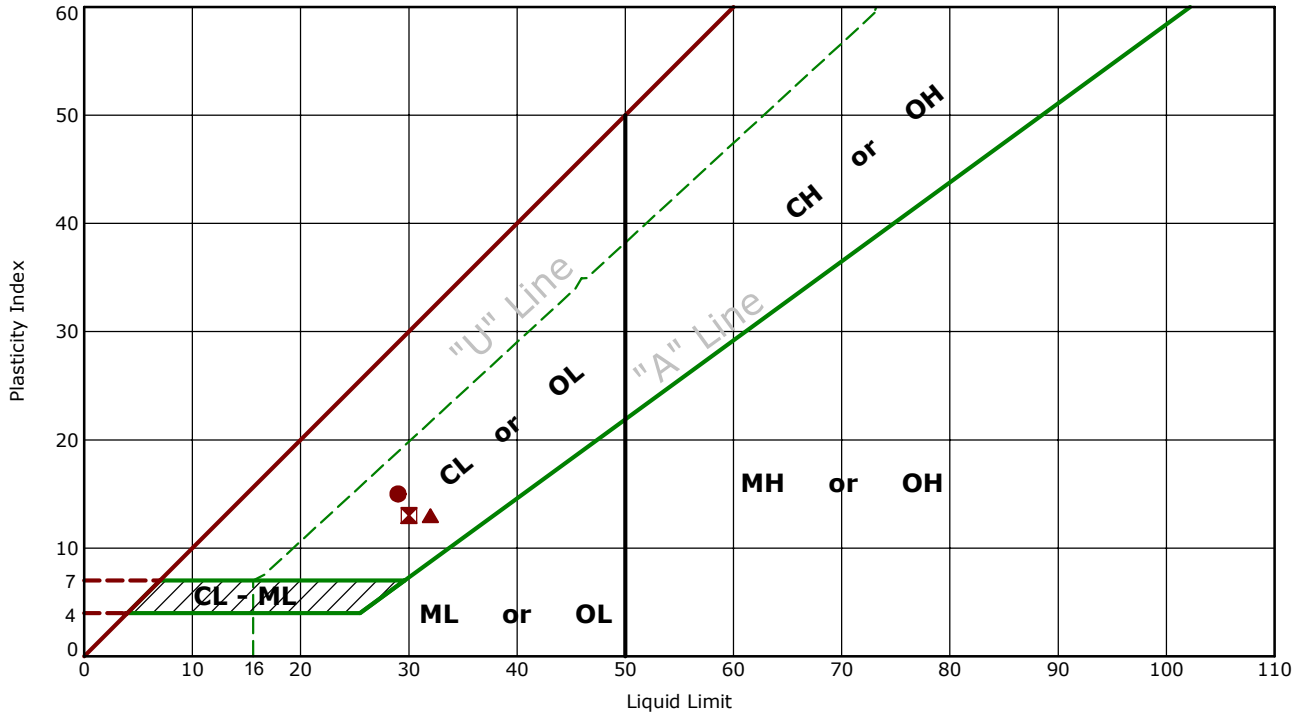
Abandonment Method
Boring backfilled with cuttings 0 to 2 feet and neat cement grout to completion

NL27 Worthington 2nd Line Extension
79287 430th Ave | Lakefield, MN
Terracon Project No. JY255053

2625 Highway 14 W, Ste F
Rochester, MN

Atterberg Limit Results

ASTM D4318



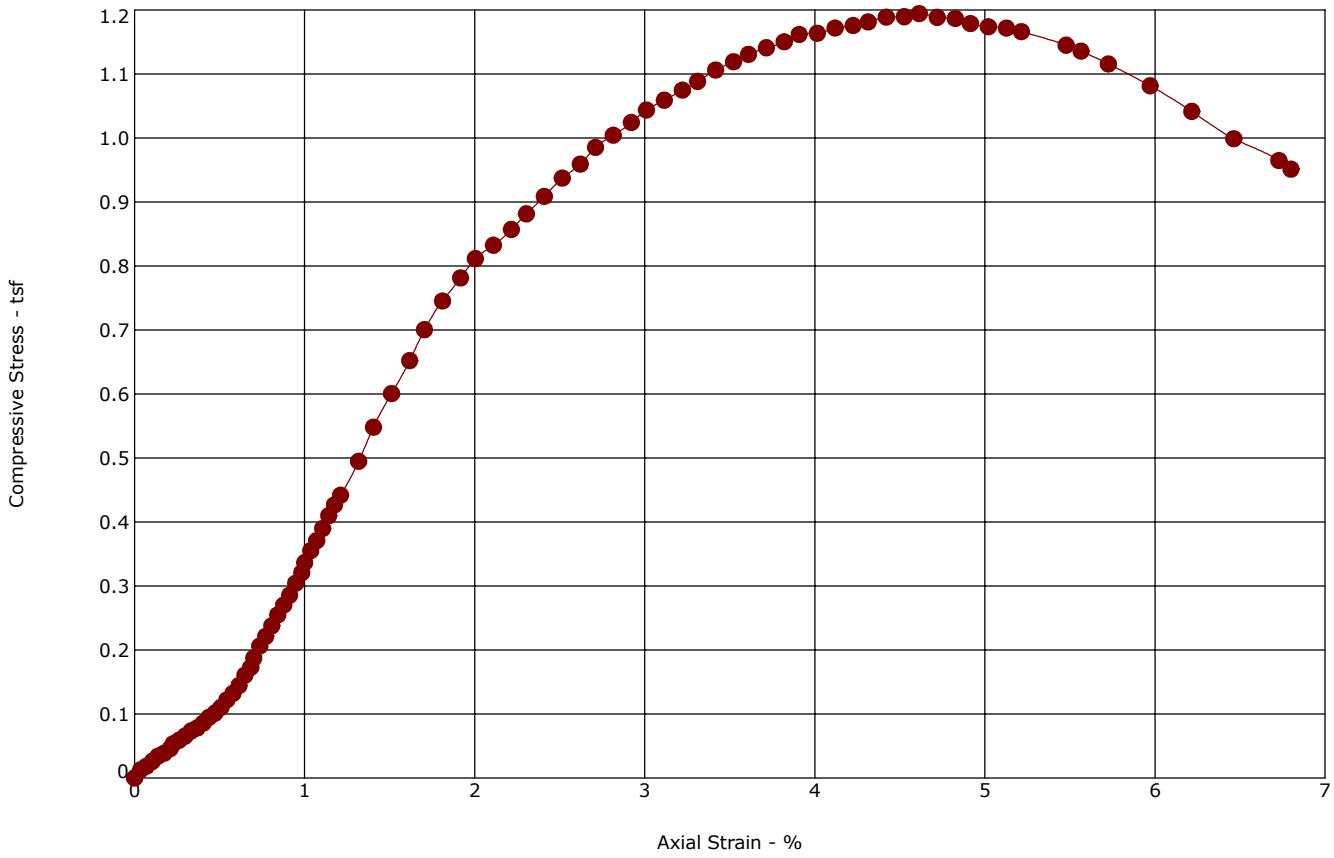
	Boring ID	Depth (Ft)	LL	PL	PI	Fines	USCS	Description
●	BH-01	20 - 22	29	14	15	68.9	CL	SANDY LEAN CLAY
⊠	BH-02	35 - 37	30	17	13	64.2	CL	SANDY LEAN CLAY
▲	BH-04	10 - 12	32	19	13		CL	SANDY LEAN CLAY

NL27 Worthington 2nd Line Extension
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Terracon Project No. JY255053

Terracon
2625 Highway 14 W, Ste F
Rochester, MN

Unconfined Compression Test

ASTM D2166



Boring ID	Depth (Ft)	Sample type	LL	PL	PI	Fines (%)	Description
BH-04	10 - 12	Shelby Tube	32	19	13		SANDY LEAN CLAY, TRACE GRAVEL

Specimen Failure Mode



Specimen Test Data

Moisture Content (%):	21.1
Dry Density (pcf):	108
Diameter (in.):	2.84
Height (in.):	5.71
Height / Diameter Ratio:	2.01
Calculated Saturation (%):	105.26
Calculated Void Ratio:	0.53
Assumed Specific Gravity:	2.65
Failure Strain (%):	4.61
Unconfined Compressive Strength (tsf):	1.19
Undrained Shear Strength (tsf):	0.60
Strain Rate (in/min):	0.1141
Remarks:	

Supporting Information

Contents:

General Notes
Unified Soil Classification System

NL27 Worthington 2nd Line Extension
79287 430th Ave | Lakefield, MN
Terracon Project No. JY255053

Terracon
2625 Highway 14 W, Ste F
Rochester, MN

General Notes

Sampling	Water Level	Field Tests
Shelby Tube Split Spoon	Water Initially Encountered Water Level After a Specified Period of Time Water Level After a Specified Period of Time Cave In Encountered Water levels indicated on the soil boring logs are the levels measured in the borehole at the times indicated. Groundwater level variations will occur over time. In low permeability soils, accurate determination of groundwater levels is not possible with short term water level observations.	N Standard Penetration Test Resistance (Blows/Ft.) (HP) Hand Penetrometer (T) Torvane (DCP) Dynamic Cone Penetrometer UC Unconfined Compressive Strength (PID) Photo-Ionization Detector (OVA) Organic Vapor Analyzer

Descriptive Soil Classification

Soil classification as noted on the soil boring logs is based Unified Soil Classification System. Where sufficient laboratory data exist to classify the soils consistent with ASTM D2487 "Classification of Soils for Engineering Purposes" this procedure is used. ASTM D2488 "Description and Identification of Soils (Visual-Manual Procedure)" is also used to classify the soils, particularly where insufficient laboratory data exist to classify the soils in accordance with ASTM D2487. In addition to USCS classification, coarse grained soils are classified on the basis of their in-place relative density, and fine-grained soils are classified on the basis of their consistency. See "Strength Terms" table below for details. The ASTM standards noted above are for reference to methodology in general. In some cases, variations to methods are applied as a result of local practice or professional judgment.

Location And Elevation Notes

Exploration point locations as shown on the Exploration Plan and as noted on the soil boring logs in the form of Latitude and Longitude are approximate. See Exploration and Testing Procedures in the report for the methods used to locate the exploration points for this project. Surface elevation data annotated with +/- indicates that no actual topographical survey was conducted to confirm the surface elevation. Instead, the surface elevation was approximately determined from topographic maps of the area.

Strength Terms

Relative Density of Coarse-Grained Soils
(More than 50% retained on No. 200 sieve.)
Density determined by Standard Penetration Resistance

Relative Density	Standard Penetration or N-Value (Blows/Ft.)
Very Loose	0 - 3
Loose	4 - 9
Medium Dense	10 - 29
Dense	30 - 50
Very Dense	> 50

Consistency of Fine-Grained Soils
(50% or more passing the No. 200 sieve.)
Consistency determined by laboratory shear strength testing, field visual-manual procedures or standard penetration resistance

Consistency	Unconfined Compressive Strength Qu (tsf)	Standard Penetration or N-Value (Blows/Ft.)
Very Soft	less than 0.25	0 - 1
Soft	0.25 to 0.50	2 - 4
Medium Stiff	0.50 to 1.00	4 - 8
Stiff	1.00 to 2.00	8 - 15
Very Stiff	2.00 to 4.00	15 - 30
Hard	> 4.00	> 30

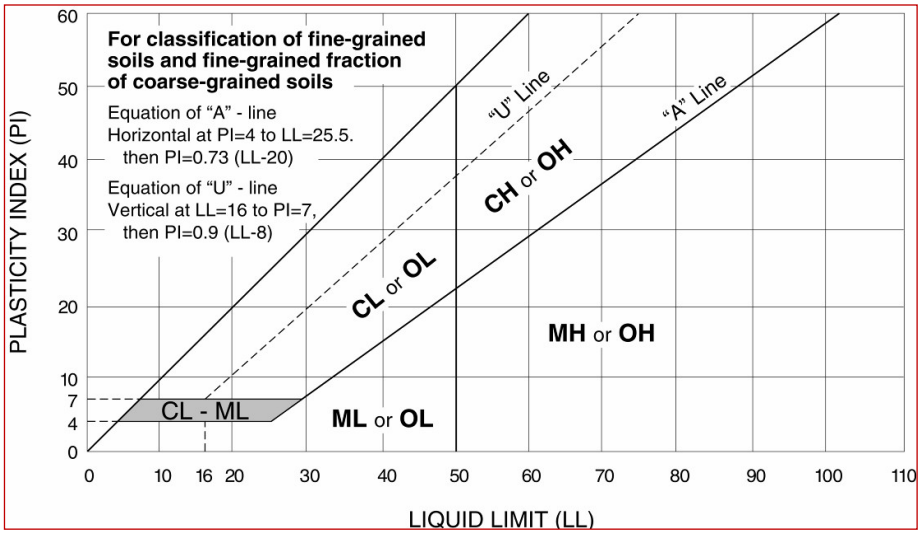
Relevance of Exploration and Laboratory Test Results

Exploration/field results and/or laboratory test data contained within this document are intended for application to the project as described in this document. Use of such exploration/field results and/or laboratory test data should not be used independently of this document.

Unified Soil Classification System

Criteria for Assigning Group Symbols and Group Names Using Laboratory Tests [A]				Soil Classification	
				Group Symbol	Group Name [B]
Coarse-Grained Soils: More than 50% retained on No. 200 sieve	**Gravels:** More than 50% of coarse fraction retained on No. 4 sieve	**Clean Gravels:** Less than 5% fines [C]	Cu≥4 and 1≤Cc≤3 [E]	GW	Well-graded gravel [F]
			Cu<4 and/or [Cc<1 or Cc>3.0] [E]	GP	Poorly graded gravel [F]
		Gravels with Fines: More than 12% fines [C]	Fines classify as ML or MH	GM	Silty gravel [F, G, H]
			Fines classify as CL or CH	GC	Clayey gravel [F, G, H]
	Sands: 50% or more of coarse fraction passes No. 4 sieve	**Clean Sands:** Less than 5% fines [D]	Cu≥6 and 1≤Cc≤3 [E]	SW	Well-graded sand [I]
			Cu<6 and/or [Cc<1 or Cc>3.0] [E]	SP	Poorly graded sand [I]
		Sands with Fines: More than 12% fines [D]	Fines classify as ML or MH	SM	Silty sand [G, H, I]
			Fines classify as CL or CH	SC	Clayey sand [G, H, I]
Fine-Grained Soils: 50% or more passes the No. 200 sieve	**Silts and Clays:** Liquid limit less than 50	**Inorganic:**	PI > 7 and plots above "A" line [J]	CL	Lean clay [K, L, M]
			PI < 4 or plots below "A" line [J]	ML	Silt [K, L, M]
		Organic:	$\frac{LL\ oven\ dried}{LL\ not\ dried} < 0.75$	OL	Organic clay [K, L, M, N]
					Organic silt [K, L, M, O]
	Silts and Clays: Liquid limit 50 or more	**Inorganic:**	PI plots on or above "A" line	CH	Fat clay [K, L, M]
			PI plots below "A" line	MH	Elastic silt [K, L, M]
		Organic:	$\frac{LL\ oven\ dried}{LL\ not\ dried} < 0.75$	OH	Organic clay [K, L, M, P]
					Organic silt [K, L, M, Q]
Highly organic soils:	Primarily organic matter, dark in color, and organic odor			PT	Peat

[A] Based on the material passing the 3-inch (75-mm) sieve.
[B] If field sample contained cobbles or boulders, or both, add "with cobbles or boulders, or both" to group name.
[C] Gravels with 5 to 12% fines require dual symbols: GW-GM well-graded gravel with silt, GW-GC well-graded gravel with clay, GP-GM poorly graded gravel with silt, GP-GC poorly graded gravel with clay.
[D] Sands with 5 to 12% fines require dual symbols: SW-SM well-graded sand with silt, SW-SC well-graded sand with clay, SP-SM poorly graded sand with silt, SP-SC poorly graded sand with clay.
[E] $Cu = D_{60}/D_{10}$ $\quad Cc = \frac{(D_{30})^2}{D_{10} \times D_{60}}$
[F] If soil contains ≥ 15% sand, add "with sand" to group name.
[G] If fines classify as CL-ML, use dual symbol GC-GM, or SC-SM.
[H] If fines are organic, add "with organic fines" to group name.
[I] If soil contains ≥ 15% gravel, add "with gravel" to group name.
[J] If Atterberg limits plot in shaded area, soil is a CL-ML, silty clay.
[K] If soil contains 15 to 29% plus No. 200, add "with sand" or "with gravel," whichever is predominant.
[L] If soil contains ≥ 30% plus No. 200 predominantly sand, add "sandy" to group name.
[M] If soil contains ≥ 30% plus No. 200, predominantly gravel, add "gravelly" to group name.
[N] PI ≥ 4 and plots on or above "A" line.
[O] PI < 4 or plots below "A" line.
[P] PI plots on or above "A" line.
[Q] PI plots below "A" line.



Springfield 2nd Branch Line

BRAUN INTERTEC

the science you build on

Factual Geotechnical Data Report

NNG Northern Lights 2027 – Springfield 2nd Line

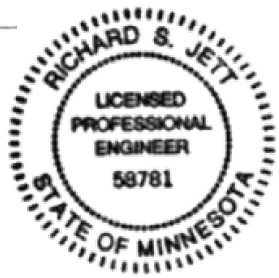
Intersection of County Road 85 and MN-4
St. James, Minnesota

Prepared for

Stantec Consulting Services, Inc.

Professional Certification:
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.

Richard S. Jett, PE
Senior Engineer
License Number: 58781
December 12, 2025



Braun Intertec Corporation

Project B2506260

December 12, 2025 Project B2506260

Ginger Chan
Stantec Consulting Services, Inc.
200-325 25 Street SE
Calgary, AB T2A 7H8

Re: Factual Geotechnical Data Report
NNG Northern Lights 2027 – Springfield 2nd Line
Intersection of County Road 85 and MN-4
St. James, Minnesota

Dear Ms. Chan:

We are pleased to present this factual geotechnical data report for the above referenced project.

Thank you for making Braun Intertec Corporation (Braun Intertec) your geotechnical consultant for this project. If you have questions about this report, or if there are other services that we can provide in support of our work to date, please contact Richard Jett at 815.545.7059 (rjett@braunintertec.com) or Chad Lukkarila at 952.995.2322 (clukkarila@braunintertec.com).

Sincerely,
Braun Intertec Corporation

Richard S. Jett, PE
Senior Engineer

Chad R. Lukkarila, PE
Associate Director, Senior Engineer

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Appendix

Soil Boring Location Sketch

Log of Boring Sheets BH-01 through BH-15

Descriptive Terminology of Soil

Descriptive Terminology of Rock

List of Tables

Table 2-1. Subsurface Profile Summary 1

Table 2-2. Groundwater Summary 3

1.1 Scope of Services

We performed our scope of services for the project in accordance with the task order from Stantec Consulting Services, Inc. dated July 15, 2025, Change Order #1 dated August 21, 2025, and Change Order #2 dated September 25, 2025.The following list describes the geotechnical tasks completed in accordance with our authorized scope of services.

- Reviewing the background information and reference documents previously cited.
- Coordinating the clearance of the exploration locations of public underground utilities.
- Performing 15 standard penetration test (SPT) borings, denoted as BH-01 through BH-15, to nominal depths ranging from 40 to 100 feet below grade across the site.
- Performing laboratory testing on samples selected by Braun Intertec Corporation with input from Stantec Consulting Services, Inc.
- Preparing this report containing a boring location sketch, logs of soil borings, a summary of the soils encountered, and results of laboratory tests performed on select soil samples.

We performed this geotechnical exploration concurrently with environmental screening and laboratory testing, the results of which will be submitted under separate cover. The project team should review the environmental report in conjunction with this geotechnical data report to understand both the geotechnical and environmental aspects of the site and how they may impact one another.

2.0 Results

2.1 Boring Results

Table 2-1 provides a summary of the soil boring results, in the general order we encountered the strata. Please refer to the Log of Boring sheets in the Appendix for additional details. The Descriptive Terminology sheet in the Appendix includes definitions of abbreviations used in the table below.

Table 2-1. Subsurface Profile Summary

Strata	Soil Type -ASTM Classification	Range of Penetration Resistances (N Values)	Commentary and Details
Topsoil / Topsoil fill[1]	SC, CL, OL, SP-SM	4 to 9	▪ Observed at the boring locations with thicknesses generally ranging from approximately 1 to 4 feet. ▪ Generally dark brown to black in color. ▪ Moisture conditions were generally moist.

Strata	Soil Type -ASTM Classification	Range of Penetration Resistances (N Values)	Commentary and Details
Fill[2]	CL, SM	1 to 7	▪ Observed in Borings BH-07 and BH-15 below the surficial soils and extended to depths of approximately 2 and 6 feet below existing grade. ▪ Moisture conditions were generally moist. ▪ Generally dark brown to black in color.
Alluvial	SP, SP-SM, SM, SC, CL, CH	4 to 7	▪ Observed below the surficial soils and fill soils in Borings BH-8 through BH-10, BH-12, and BH-15 to depths ranging from 4 to 14 feet below existing grade. ▪ Relative densities of the granular soils were generally very loose to loose. ▪ Relative consistencies of the clay laden soils were generally soft to medium. ▪ Generally brown to gray in color. ▪ Moisture conditions were generally moist.
Glacial deposits	SP, SP-SM, SM, ML	4 to 50+	▪ Observed below the surficial soils, fill soils, and alluvial soils at the borings and extended to depths ranging from 60 to 100 feet. ▪ Borings BH-01 through BH-04, BH-07, and BH-09 through BH-12 terminated within the glacially deposited soils. ▪ Relative densities of the granular soils and silt soils were generally medium dense to dense with occasional zones of loose soils. ▪ Relative consistencies of the clay and silt laden soils were generally stiff to hard with isolated zones of soft and medium soils. ▪ Variable amounts of gravel; may contain cobbles and boulders. ▪ Moisture conditions were generally moist.
	SC, CL, CH, CL-ML	2 to 50+	
Apparent bedrock	Shale	43 to 50+	▪ Apparent shale bedrock was observed in Borings BH-05, BH-06, BH-08 and BH-13 to BH-15 and extended to the termination depths of these borings. ▪ Rock coring was not performed to extend the soil borings past their anticipated termination depths. ▪ Generally gray in color. ▪ Deformed hand samples generally classified as CH or CL soils.

[1]We did not perform gradation analysis on the apparent topsoil, in accordance with our scope of work. Therefore, we cannot conclusively determine if the encountered material satisfies a particular specification, and it should not be assumed it is suitable for reuse.

[2]For simplicity in this report, we define existing fill to mean existing, uncontrolled, or undocumented fill.

The exploration locations completed at this site were denoted as BH-01 through BH-15. The exploration locations were selected by Stantec and performed near the approximate locations as indicated in the attached Soil Boring Location Sketch. Stantec provided us with the surface elevations and GPS coordinates of the boring locations.

2.2 Groundwater

Groundwater was observed at the boring locations at depths ranging from approximately 4 to 35 feet below existing grade (approximate elevations ranging from 993 to 1047 feet). Given the encountered on site soils, groundwater may take days or longer to reach equilibrium in the boreholes and we immediately backfilled the boreholes, in accordance with our scope of work. If the project team identifies a need for more accurate determination of groundwater depth, we can install piezometers and complete a long term groundwater monitoring program.

Table 2-2 summarizes the depths where we observed groundwater; the attached Log of Boring sheets in the Appendix also include this information and additional details.

Table 2-2. Groundwater Summary

Locations	Surface Elevation (feet)	Measured Depth to Groundwater (feet)	Corresponding Groundwater Elevation (feet)
BH-1	1056.4	9 1/2	1047
BH-2	1049.8	27	1023
BH-3	1055.2	19	1036 1/2
BH-4	1048.6	24	1024 1/2
BH-5	1027.9	10	1018
BH-6	1023.3	8 1/2	1015
BH-7	1024.0	15	1009
BH-8	1019.4	18	1001 1/2
BH-9	1035.2	29	1006 1/2
BH-10	1027.8	35	993
BH-11	1019.9	4	1016
BH-12	1019.1	4 1/2	1014 1/2
BH-13	1029.4	25	1004 1/2
BH-14	1032.1	5 1/2	1026 1/2
BH-15	1035.7	6	1030

2.3 Laboratory Test Results

The boring logs show the results of laboratory testing we performed next to the tested sample depth. The Appendix contains the results of these tests.

Moisture content tests performed on select soil samples indicated moisture contents ranging from 9 to 44 percent moisture by weight for clay and silt laden soils and from 9 to 25 percent moisture by weight for granular soils. Sieve analysis tests performed on select soil samples indicated from 7 to 90 percent particles, by weight, passing the No. 200 sieve. Atterberg limit tests performed on select soil samples indicated liquid limits ranging from 22 to 52 percent moisture and plastic limits ranging from 12 to 21 percent moisture. Dry density tests performed on select clay laden samples indicated dry densities ranging from 107 to 123 pcf.

3.0 Procedures

3.1 Penetration Test Borings

We drilled the penetration test borings with an All-Terrain Vehicle (ATV)-mounted core and auger drill equipped with hollow-stem auger. We performed the borings in general accordance with ASTM D6151 taking penetration test samples at 2 1/2- or 5-foot intervals in general accordance with ASTM D1586. The boring logs show the actual sample intervals and corresponding depths.

We sealed penetration test boreholes meeting the Minnesota Department of Health (MDH) Environmental Borehole criteria with an MDH-approved grout.

3.2 Exploration Logs

3.2.1 Log of Boring Sheets

The Appendix includes Log of Boring sheets for our penetration test borings. The logs identify and describe the penetrated geologic materials and present the results of penetration resistance and other in-situ tests performed. The logs also present the results of organic vapor screening, laboratory tests performed on penetration test samples, and groundwater measurements.

We inferred strata boundaries from changes in the penetration test samples and the auger cuttings. Because we did not perform continuous sampling, the strata boundary depths are only approximate. The boundary depths likely vary away from the boring locations, and the boundaries themselves may occur as gradual rather than abrupt transitions.

3.2.2 Organic Vapor Screening

We conducted the geotechnical exploration concurrently with on-site environmental screening and provided the results of the screening under separate cover. The project team should review the environmental report in

conjunction with this geotechnical data report to understand both the geotechnical and environmental aspects of the site and how they may impact one another.

An environmental technician examined soil samples from the borings for staining, odors, and other apparent signs of contamination within the top 20 feet of each boring. In addition, the environmental technician screened the soil samples for the presence of organic vapors using a photoionization detector (PID). The boring logs in the Appendix include the PID results, which we discuss further in the companion environmental report.

3.2.3 Geologic Origins

We assigned geologic origins to the materials shown on the logs and referenced within this report, based on: (1) a review of the background information and reference documents cited above, (2) visual classification of the various geologic material samples retrieved during the course of our subsurface exploration, (3) penetration resistance and other in-situ testing performed for the project, (4) laboratory test results, and (5) available common knowledge of the geologic processes and environments that have impacted the site and surrounding area in the past .

3.3 Material Classification and Testing

3.3.1 Visual and Manual Classification

We visually and manually classified the geologic materials encountered based on ASTM D2488. When we performed laboratory classification tests, we used the results to classify the geologic materials in accordance with ASTM D2487. The Appendix includes a chart explaining the classification system we used.

3.3.2 Laboratory Testing

The exploration logs in the Appendix note the results of the laboratory tests performed on geologic material samples. We performed the tests in general accordance with ASTM procedures.

3.4 Groundwater Measurements

The drillers checked for groundwater while advancing the penetration test borings, and again after auger withdrawal. We then filled the boreholes noted on the boring logs.

4.0 Qualifications

4.1 Variations in Subsurface Conditions

4.1.1 Material Strata

We developed our evaluation, analyses, and recommendations from a limited amount of site and subsurface information. It is not standard engineering practice to retrieve material samples from exploration locations continuously with depth. Therefore, we must infer strata boundaries and thicknesses to some extent. Strata boundaries may also be gradual transitions, and project planning should expect the strata to vary in depth, elevation, and thickness, away from the exploration locations.

Variations in subsurface conditions present between exploration locations may not be revealed until performing additional exploration work or starting construction. If future activity for this project reveals any such variations, you should notify us so that we may reevaluate. Such variations could increase construction costs, and we recommend including a contingency to accommodate them.

4.1.2 Groundwater Levels

We made groundwater measurements under the conditions reported herein and shown on the exploration logs and interpreted in the text of this report. Note that the observation periods were relatively short, and project planning can expect groundwater levels to fluctuate in response to rainfall, flooding, irrigation, seasonal freezing and thawing, surface drainage modifications and other seasonal and annual factors.

4.2 Use of Report

This report is for the exclusive use of the addressed parties. Without written approval, we assume no responsibility to other parties regarding this report.

4.3 Standard of Care

In performing its services, Braun Intertec used that degree of care and skill ordinarily exercised under similar circumstances by reputable members of its profession currently practicing in the same locality. No warranty, express or implied, is made.

Appendix

Soil Boring Location Sketch
Log of Boring Sheets BH-1 through BH-15
Descriptive Terminology of Soil
Descriptive Terminology of Rock

BRAUN
INTERTEC



Denotes Location of Proposed Boring

N

0 75 150 Feet

1" = 150 Feet



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11001 Hampshire Avenue S
Minneapolis, MN 55438
952.995.2000
braunintertec.com

Project No: B2506260

Drawing No: Boring Sketch Springfield

Drawn By:	ZS
Date Drawn:	8/7/2025
Checked By:	RSJ
Last Modified:	12/11/2025

Springfield 2nd Line

Tracy

Watonwan County, Minnesota

Boring Location Sketch



Denotes Location of Proposed Boring

N

0 100 200 Feet

1" = 200 Feet



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Drawn By:	ZS
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Springfield 2nd Line

Tracy

Watonwan County, Minnesota

Boring Location Sketch



Denotes Location of Proposed Boring

N

0 150 300 Feet

1" = 300 Feet



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Drawing No: Boring Sketch Springfield

Drawn By:	ZS
Date Drawn:	8/7/2025
Checked By:	RSJ
Last Modified:	12/11/2025

Springfield 2nd Line

Tracy

Watonwan County, Minnesota

Boring Location Sketch

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Denotes Location of Proposed Boring

N

0 200 400 Feet

1" = 400 Feet



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Project No: B2506260

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Drawn By:	ZS
Date Drawn:	8/7/2025
Checked By:	RSJ
Last Modified:	12/11/2025

Springfield 2nd Line

Tracy

Watonwan County, Minnesota

Boring Location Sketch



Denotes Location of Proposed Boring

N

0 100 200 Feet

1" = 200 Feet



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Project No: B2506260

Drawing No: Boring Sketch Springfield

Drawn By:	ZS
Date Drawn:	8/7/2025
Checked By:	RSJ
Last Modified:	12/11/2025

Springfield 2nd Line

Tracy

Watonwan County, Minnesota

Boring Location Sketch

Sheet: 5 of 5

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LOG OF BORING

See Descriptive Terminology sheet for explanation of abbreviations

Project Number B2506260
Geotechnical & Environmental Evaluation
Northern Lights 2027 Expansion Project

BORING: **BH-01 Springfield 2nd Line**

LOCATION: Captured with RTK GPS. Intersection of 270th Street and CR-4. See attached sketch.

DATUM: NAD83 / UTM zone 11N

NORTHING: 5132087.2 EASTING: 2290271.5

DRILLER: M. Hoppe | LOGGED BY: S. Niraula | START DATE: 08/20/25 | END DATE: 08/20/25

SURFACE ELEVATION: 1056.4 ft | RIG: 7504 | METHOD: 3 1/4" HSA | SURFACING: Soil | WEATHER: Sunny

Elev./ Depth ft	Water Level	Description of Materials (Soil-ASTM D2488 or 2487; Rock-USACE EM 1110-1-2908)	Sample	Blows (N-Value) Recovery	PID ppm	MC %	Tests or Remarks
1055.2		CLAYEY SAND (SC), fine-grained, with roots, dark brown, moist (TOPSOIL)		3-3-4-3 (7) 18"	0.1		BH-01 (0-2) collected on 8/20/25 @ 1415 for MDA 1, MDA 2, OC, RCRA metals
1.2		SANDY LEAN CLAY (CL), trace Gravel, light brown and gray, moist, soft to stiff (GLACIAL TILL)		2-2-2-2 (4) 18"	0.2		q_p=0.5 tsf
			5	2-2-3-2 (5) 16"	0.3		BH-01 (4-6) collected on 8/20/25 @ 1420 for GRO, DRO, BETX
				3-5-6-5 (11) 18"	0.1		q_p=0.5 tsf q_p=1.75 tsf
	▽			4-4-6-7 (10) 16"	0.2		q_p=0.75 tsf
			10	5-6-7-5 (13) 18"	0.1		q_p=1.75 tsf
1044.4							
12.0		CLAYEY SAND (SC), fine-grained, trace Gravel, light brown and brown, moist, very stiff (GLACIAL TILL)		5-8-8-8 (16) 18"	0.1		
1042.4							
14.0		SILTY CLAY (CL-ML), trace Gravel, brown to gray, moist to wet, stiff to soft (GLACIAL TILL)	15	5-7-5-5 (12) 18"	0.2		q_p=2.75 tsf
		With intermixed Poorly Graded Sand seams at 20 feet	20	3-2-2 (4) 16"	0.1	22	LL=24, PL=20, PI=4
		Intermixed with Poorly Graded Sand lenses at 25 feet	25	4-5-5 (10) 18"		19	q_p=1.75 tsf
			30	5-6-7 (13) 18"		14	P200=57% DD=117 pcf q_p=3 tsf

Continued on next page

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LOG OF BORING

See Descriptive Terminology sheet for explanation of abbreviations

Project Number B2506260
Geotechnical & Environmental Evaluation
Northern Lights 2027 Expansion Project

BORING: **BH-01 Springfield 2nd Line**

LOCATION: Captured with RTK GPS. Intersection of 270th Street and CR-4. See attached sketch.

DATUM: NAD83 / UTM zone 11N

NORTHING: 5132087.2 EASTING: 2290271.5

DRILLER: M. Hoppe | LOGGED BY: S. Niraula | START DATE: 08/20/25 | END DATE: 08/20/25

SURFACE ELEVATION: 1056.4 ft | RIG: 7504 | METHOD: 3 1/4" HSA | SURFACING: Soil | WEATHER: Sunny

Elev./ Depth ft	Water Level	Description of Materials (Soil-ASTM D2488 or 2487; Rock-USACE EM 1110-1-2908)	Sample	Blows (N-Value) Recovery	PID ppm	MC %	Tests or Remarks
1021.9		SILTY CLAY (CL-ML), trace Gravel, brown to gray, moist to wet, stiff to soft (GLACIAL TILL)					
34.5		SANDY SILT (ML), trace Gravel, contains lenses of Lean Clay, gray, moist, medium dense (GLACIAL TILL)	35	7-10-8 (18) 18"			
			40	5-7-8 (15) 18"			
1015.4							
41.0		END OF BORING Boring immediately grouted					Water observed at 9.5 feet while drilling.
			45				
			50				
			55				
			60				

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See Descriptive Terminology sheet for explanation of abbreviations

Project Number B2506260
Geotechnical & Environmental Evaluation
Northern Lights 2027 Expansion Project

BORING: **BH-02 Springfield 2nd Line**

LOCATION: Captured with RTK GPS. Intersection of 270th Street and CR-4. See attached sketch.

DATUM: NAD83 / UTM zone 11N

NORTHING: 5132030.5 EASTING: 2290682.5

DRILLER: M. Hoppe | LOGGED BY: S. Niraula | START DATE: 08/20/25 | END DATE: 08/20/25

SURFACE ELEVATION: 1049.8 ft | RIG: 7504 | METHOD: 3 1/4" HSA | SURFACING: Soil | WEATHER: Sunny

Elev./ Depth ft	Water Level	Description of Materials (Soil-ASTM D2488 or 2487; Rock-USACE EM 1110-1-2908)	Sample	Blows (N-Value) Recovery	PID ppm	MC %	Tests or Remarks
1047.8		SANDY LEAN CLAY (CL), trace Gravel, light brown, moist (TOPSOIL)		2-3-3-2 (6) 14"	0.1		BH-02 (0-2) collected on 8/20/25 @ 1215 for MDA 1, MDA 2, OC, RCRA metals
2.0		SANDY LEAN CLAY (CL), light brown and brown, moist, stiff to soft (GLACIAL TILL)		4-4-5-4 (9) 16"	0.2		BH-02 (2-4) collected on 8/20/25 @ 1220 for GRO, DRO, BETX
			5	3-2-2-2 (4) 16"	0.1	20	q_p=2 tsf
				4-3-5-5 (8) 18"	0.2		q_p=<0.5 tsf
1039.8				2-2-2-3 (4) 18"	0.1	19	q_p=2 tsf
10.0		CLAYEY SAND (SC), fine-grained, trace Gravel, brown, moist, medium (GLACIAL TILL)	10	3-2-4-4 (6) 18"	0.2		
1037.8							
12.0		SANDY SILT (ML), light brown, moist, medium dense (GLACIAL TILL)		5-7-7-6 (14) 16"	0.1	20	P200=77%
1035.8							
14.0		SANDY LEAN CLAY (CL), trace Gravel, gray, moist to wet, very stiff to stiff (GLACIAL TILL)	15	7-8-10-9 (18) 16"	0.0		q_p=2.5 tsf
			20	5-7-8 (15) 18"	0.2	20	q_p=2.25 tsf
			25	4-5-7 (12) 18"			q_p=2.5 tsf
	▽						Wet below 27 feet
		Wet at 27 feet	30	5-5-4 (9) 16"			q_p=0.75 tsf

Continued on next page

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LOG OF BORING

See Descriptive Terminology sheet for explanation of abbreviations

Project Number B2506260
Geotechnical & Environmental Evaluation
Northern Lights 2027 Expansion Project

BORING: **BH-02 Springfield 2nd Line**

LOCATION: Captured with RTK GPS. Intersection of 270th Street and CR-4. See attached sketch.

DATUM: NAD83 / UTM zone 11N

NORTHING: 5132030.5 EASTING: 2290682.5

DRILLER:	M. Hoppe	LOGGED BY:	S. Niraula	START DATE:	08/20/25	END DATE:	08/20/25
SURFACE ELEVATION:	1049.8 ft	RIG:	7504	METHOD:	3 1/4" HSA	SURFACING:	Soil
WEATHER:	Sunny						

Elev./ Depth ft	Water Level	Description of Materials (Soil-ASTM D2488 or 2487; Rock-USACE EM 1110-1-2908)	Sample	Blows (N-Value) Recovery	PID ppm	MC %	Tests or Remarks
		SANDY LEAN CLAY (CL), trace Gravel, gray, moist to wet, very stiff to stiff (GLACIAL TILL)					
35				5-5-5 (10) 18"			q_p=1.75 tsf
40				5-6-7 (13) 18"			q_p=1.75 tsf
1008.8 41.0		END OF BORING Boring immediately grouted					Water observed at 27.0 feet while drilling.
45							
50							
55							
60							

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See Descriptive Terminology sheet for explanation of abbreviations

Project Number B2506260
Geotechnical & Environmental Evaluation
Northern Lights 2027 Expansion Project

BORING: **BH-03 Springfield 2nd Line**

LOCATION: Captured with RTK GPS. Intersection of 270th Street and CR-4. See attached sketch.

DATUM: NAD83 / UTM zone 11N

NORTHING: 5131281.8 EASTING: 2292280.0

DRILLER: M. Hoppe | LOGGED BY: S. Niraula | START DATE: 08/20/25 | END DATE: 08/20/25

SURFACE ELEVATION: 1055.2 ft | RIG: 7504 | METHOD: 3 1/4" HSA | SURFACING: Soil | WEATHER: Sunny

Elev./ Depth ft	Water Level	Description of Materials (Soil-ASTM D2488 or 2487; Rock-USACE EM 1110-1-2908)	Sample	Blows (N-Value) Recovery	PID ppm	MC %	Tests or Remarks
1054.2		ORGANIC SOIL (OL), black, moist (TOPSOIL)		3-2-2-2 (4) 16"	0.3		BH-03 (0-2) collected on 8/20/25 @ 1035 for MDA 1, MDA 2, OC, RCRA metals
1.0		SANDY LEAN CLAY (CL), trace Gravel, brown and gray, moist, medium (GLACIAL TILL)		2-2-3-2 (5) 18"	0.1		q_p=0.75 tsf
1051.2							
4.0		CLAYEY SAND (SC), fine-grained, trace Gravel, light brown and gray, moist, medium (GLACIAL TILL)	5	2-3-3-3 (6) 18"	0.2	18	
1049.2							
6.0		SANDY LEAN CLAY (CL), trace Gravel, light brown and gray, moist, medium (GLACIAL TILL)		3-4-4-4 (8) 18"	0.2		q_p=1.5 tsf
1047.2							
8.0		CLAYEY SAND (SC), fine-grained, trace Gravel, brown, moist, stiff to medium (GLACIAL TILL)		4-5-4-4 (9) 18"	0.3	19	BH-03 (8-10) collected on 8/20/25 @ 1045 for GRO, DRO, BETX P200=45%
			10	5-4-3-4 (7) 18"	0.1		
1043.2							
12.0		SANDY LEAN CLAY (CL), trace Gravel, brown to gray, moist, stiff (GLACIAL TILL)		4-5-5-4 (10) 18"	0.2	18	q_p=2 tsf
			15	5-7-4-4 (11) 18"	0.2		q_p=2.25 tsf
1035.7	▽						Wet below 19 feet
19.5		SILTY SAND (SM), fine-grained, trace Gravel, gray, wet, stiff to very stiff (GLACIAL TILL)	20	5-6-8 (14) 18"	0.3		
		With Intermixed Lean Clay seams at 25 feet	25	7-8-8 (16) 18"	0.3		
			30	5-5-6 (11) 14"			

Continued on next page

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See Descriptive Terminology sheet for explanation of abbreviations

Project Number B2506260
Geotechnical & Environmental Evaluation
Northern Lights 2027 Expansion Project

BORING: **BH-03 Springfield 2nd Line**

LOCATION: Captured with RTK GPS. Intersection of 270th Street and CR-4. See attached sketch.

DATUM: NAD83 / UTM zone 11N

NORTHING: 5131281.8 EASTING: 2292280.0

DRILLER: M. Hoppe | LOGGED BY: S. Niraula | START DATE: 08/20/25 | END DATE: 08/20/25

SURFACE ELEVATION: 1055.2 ft | RIG: 7504 | METHOD: 3 1/4" HSA | SURFACING: Soil | WEATHER: Sunny

Elev./ Depth ft	Water Level	Description of Materials (Soil-ASTM D2488 or 2487; Rock-USACE EM 1110-1-2908)	Sample	Blows (N-Value) Recovery	PID ppm	MC %	Tests or Remarks
1020.7		SILTY SAND (SM), fine-grained, trace Gravel, gray, wet, stiff to very stiff (GLACIAL TILL)					
34.5		SANDY LEAN CLAY (CL), trace Gravel, gray, wet, stiff (GLACIAL TILL)	35	10-7-8 (15) 16"			q_p=3.5 tsf
1015.7							
39.5		POORLY GRADED SAND (SP), fine to coarse-grained, little Gravel, gray, wet, medium dense (GLACIAL OUTWASH)	40	7-9-9 (18) 40"			
1014.2							Water observed at 19.0 feet while drilling.
41.0		END OF BORING Boring immediately grouted					
			45				
			50				
			55				
			60				

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LOG OF BORING

See Descriptive Terminology sheet for explanation of abbreviations

Project Number B2506260
Geotechnical & Environmental Evaluation
Northern Lights 2027 Expansion Project

BORING: **BH-04 Springfield 2nd Line**

LOCATION: Captured with RTK GPS. Intersection of 270th Street and CR-4. See attached sketch.

DATUM: NAD83 / UTM zone 11N

NORTHING: 5130952.0 EASTING: 2293013.0

DRILLER: M. Hoppe | LOGGED BY: S. Niraula | START DATE: 08/20/25 | END DATE: 08/20/25

SURFACE ELEVATION: 1048.6 ft | RIG: 7504 | METHOD: 3 1/4" HSA | SURFACING: Soil | WEATHER: Sunny

Elev./ Depth ft	Water Level	Description of Materials (Soil-ASTM D2488 or 2487; Rock-USACE EM 1110-1-2908)	Sample	Blows (N-Value) Recovery	PID ppm	MC %	Tests or Remarks
1047.6		ORGANIC SOIL (OL), black, moist (TOPSOIL)		2-2-4-2 (6) 12"	0.2		BH-04 (0-2) collected on 8/20/25 @ 0910 for MDA 1, MDA 2, OC, RCRA metals
1.0		SANDY LEAN CLAY (CL), trace Gravel, brown, moist, medium (GLACIAL TILL)		2-3-2-2 (5) 16"	0.0		q_p=2 tsf
			5	5-3-4-5 (7) 16"	0.1		q_p=1.75 tsf
1042.6							
6.0		CLAYEY SAND (SC), fine-grained, trace Gravel, brown and gray, moist, stiff, strong cementation (GLACIAL TILL)		5-6-7-9 (13) 14"	0.2		BH-04 (6-8) collected on 8/20/25 @ 0915 for GRO, DRO, BETX
				5-7-7-9 (14) 14"	0.0		
1038.6			10				
10.0		SANDY LEAN CLAY (CL), trace Gravel, gray, moist to wet, very stiff to stiff (GLACIAL TILL)		7-8-9-8 (17) 18"	0.0		q_p=2.25 tsf
		With intermixed layer of POORLY GRADED SAND from 12 to 14 feet		6-7-5-8 (12) 18"	0.1		q_p=1.75 tsf
			15	4-5-5-8 (10) 18"	0.0		q_p=2 tsf
			20	5-7-7 (14) 18"	0.0	19	DD=107 pcf
	▽						Wet below 24 feet
		Intermixed with Poorly Graded Sand, wet at 25 feet	25	5-7-8 (15) 18"	0.0	21	
1019.1							
29.5		SILTY SAND (SM), fine to medium-grained, trace Gravel, intermixed with Clay lenses and seams, gray, wet, medium dense (GLACIAL TILL)	30	5-7-7 (14) 18"		24	P200=32%

Continued on next page

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See Descriptive Terminology sheet for explanation of abbreviations

Project Number B2506260
Geotechnical & Environmental Evaluation
Northern Lights 2027 Expansion Project

BORING: **BH-04 Springfield 2nd Line**

LOCATION: Captured with RTK GPS. Intersection of 270th Street and CR-4. See attached sketch.

DATUM: NAD83 / UTM zone 11N

NORTHING: 5130952.0 EASTING: 2293013.0

DRILLER: M. Hoppe | LOGGED BY: S. Niraula | START DATE: 08/20/25 | END DATE: 08/20/25

SURFACE ELEVATION: 1048.6 ft | RIG: 7504 | METHOD: 3 1/4" HSA | SURFACING: Soil | WEATHER: Sunny

Elev./ Depth ft	Water Level	Description of Materials (Soil-ASTM D2488 or 2487; Rock-USACE EM 1110-1-2908)	Sample	Blows (N-Value) Recovery	PID ppm	MC %	Tests or Remarks
		SILTY SAND (SM), fine to medium-grained, trace Gravel, intermixed with Clay lenses and seams, gray, wet, medium dense (GLACIAL TILL)	35	6-8-8 (16) 14"			
			40	5-7-9 (16) 14"			
1007.6							
41.0		END OF BORING Boring immediately grouted					Water observed at 24.0 feet while drilling.
			45				
			50				
			55				
			60				

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LOG OF BORING

See Descriptive Terminology sheet for explanation of abbreviations

Project Number B2506260
Geotechnical & Environmental Evaluation
Northern Lights 2027 Expansion Project

BORING: **BH-05 Springfield 2nd Line**

LOCATION: Captured with RTK GPS. Intersection of 270th Street and CR-4. See attached sketch.

DATUM: NAD83 / UTM zone 11N

NORTHING: 5130066.2 EASTING: 2295172.3

DRILLER: M. Hoppe | LOGGED BY: S. Niraula | START DATE: 08/20/25 | END DATE: 08/20/25

SURFACE ELEVATION: 1027.9 ft | RIG: 7504 | METHOD: 3 1/4" HSA | SURFACING: Soil | WEATHER: Sunny

Elev./ Depth ft	Water Level	Description of Materials (Soil-ASTM D2488 or 2487; Rock-USACE EM 1110-1-2908)	Sample	Blows (N-Value) Recovery	PID ppm	MC %	Tests or Remarks
1025.9		POORLY GRADED SAND with SILT (SP-SM), fine-grained, trace Gravel, brown, moist (TOPSOIL)		2-2-3-2 (5) 16"	0.3		BH-05 (0-2) collected on 8/19/25 @ 1215 for MDA 1, MDA 2, OC, RCRA metals
2.0		POORLY GRADED SAND with SILT (SP-SM), fine to coarse-grained, trace to with Gravel, brown to gray, moist to wet, loose to dense (GLACIAL OUTWASH)		4-5-5-7 (10) 16"	0.3		BH-05 (4-6) collected on 8/19/25 @ 1220 for GRO, DRO, BETX
			5	3-5-7-10 (12) 16"	0.5		
				4-5-5-8 (10) 14"	0.5	9	%Gravek=10% %Sand=82% P200=8%
				5-6-5-5 (11) 14"	0.3		
	▽	*Wet below 10 feet*	10	5-5-5-7 (10) 16"		15	Wet below 10 feet
				5-6-6-5 (12) 16"			
			15	7-8-7-7 (15) 18"			Drilling method switched to mud rotary at 16 feet
			20	7-10-10 (20) 16"			
			25	12-14-18 (32) 16"			
998.4							
29.5		CLAYEY SAND (SC), fine-grained, trace Gravel, brown and brown, moist, very stiff to hard (GLACIAL TILL)	30	13-15-14 (29) 12"			

Continued on next page

BRAUN INTERTEC
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LOG OF BORING

See Descriptive Terminology sheet for explanation of abbreviations

Project Number B2506260
Geotechnical & Environmental Evaluation
Northern Lights 2027 Expansion Project

BORING: **BH-05 Springfield 2nd Line**

LOCATION: Captured with RTK GPS. Intersection of 270th Street and CR-4. See attached sketch.

DATUM: NAD83 / UTM zone 11N

NORTHING: 5130066.2 EASTING: 2295172.3

DRILLER: M. Hoppe | LOGGED BY: S. Niraula | START DATE: 08/20/25 | END DATE: 08/20/25

SURFACE ELEVATION: 1027.9 ft | RIG: 7504 | METHOD: 3 1/4" HSA | SURFACING: Soil | WEATHER: Sunny

Elev./ Depth ft	Water Level	Description of Materials (Soil-ASTM D2488 or 2487; Rock-USACE EM 1110-1-2908)	Sample	Blows (N-Value) Recovery	PID ppm	MC %	Tests or Remarks
		CLAYEY SAND (SC), fine-grained, trace Gravel, brown and brown, moist, very stiff to hard (GLACIAL TILL)	35	8-16-15 (31) 18"		12	
988.4 39.5		SANDY LEAN CLAY (CL), slightly organic, gray to dark gray, moist, hard (GLACIAL TILL)	40	14-13-28 (41) 18"		12	LL=34, PL=15, PI=19 q_p=3.5 tsf
			45	12-16-16 (32) 18"		16	DD=117 pcf q_p=3.75 tsf
978.4 49.5		SILTY SAND (SM), with intermixed Lean Clay seams, gray and brown, moist, very dense (GLACIAL TILL)	50	21-23-30 (53) 18"		21	
			55				
			60	50/2" (REF) 10"		18	No recovery at 60 feet, auger cuttings sampled. LL=49, PL=19, PI=30

Continued on next page

BRAUN INTERTEC
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LOG OF BORING

See Descriptive Terminology sheet for explanation of abbreviations

Project Number B2506260
Geotechnical & Environmental Evaluation
Northern Lights 2027 Expansion Project

BORING: **BH-05 Springfield 2nd Line**

LOCATION: Captured with RTK GPS. Intersection of 270th Street and CR-4. See attached sketch.

DATUM: NAD83 / UTM zone 11N

NORTHING: 5130066.2 EASTING: 2295172.3

DRILLER: M. Hoppe | LOGGED BY: S. Niraula | START DATE: 08/20/25 | END DATE: 08/20/25

SURFACE ELEVATION: 1027.9 ft | RIG: 7504 | METHOD: 3 1/4" HSA | SURFACING: Soil | WEATHER: Sunny

Elev./ Depth ft	Water Level	Description of Materials (Soil-ASTM D2488 or 2487; Rock-USACE EM 1110-1-2908)	Sample	Blows (N-Value) Recovery	PID ppm	MC %	Tests or Remarks
		SILTY SAND (SM), with intermixed Lean Clay seams, gray and brown, moist, very dense (GLACIAL TILL)					
958.4							
69.5		SHALE, gray, moist, hard, intermixed with Silt, hand deformed sample classified as "FAT CLAY (CH)" (APPARENT BEDROCK)		22-23-20 (43) 16"			q_p=3.5 tsf
947.7				32-50/3" (REF) 6"			q_p=3.75 tsf
80.3		END OF BORING Boring immediately grouted					Water observed at 10.0 feet while drilling.

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LOG OF BORING

See Descriptive Terminology sheet for explanation of abbreviations

Project Number B2506260
Geotechnical & Environmental Evaluation
Northern Lights 2027 Expansion Project

BORING: **BH-06 Springfield 2nd Line**

LOCATION: Captured with RTK GPS. Intersection of 270th Street and CR-4. See attached sketch.

DATUM: NAD83 / UTM zone 11N

NORTHING: 5129896.5 EASTING: 2295395.4

DRILLER: M. Hoppe | LOGGED BY: S. Niraula | START DATE: 08/19/25 | END DATE: 08/19/25

SURFACE ELEVATION: 1023.3 ft | RIG: 7504 | METHOD: 3 1/4" HSA | SURFACING: Soil | WEATHER: Sunny

Elev./ Depth ft	Water Level	Description of Materials (Soil-ASTM D2488 or 2487; Rock-USACE EM 1110-1-2908)	Sample	Blows (N-Value) Recovery	PID ppm	MC %	Tests or Remarks
1021.3		ORGANIC SOIL (OL), black, moist (TOPSOIL)		2-2-3-3 (5) 18"	0.1		BH-06 (0-2) collected on 8/18/25 @ 1620 for MDA 1, MDA 2, OC, RCRA metals
2.0		POORLY GRADED SAND (SP), fine to coarse-grained, trace to with Gravel, trace Clay lenses, brown to gray, moist to wet, loose to very dense (GLACIAL OUTWASH)		2-3-3-4 (6) 14"	0.1		
			5	5-4-5-5 (9) 16"	0.4		BH-06 (4-6) collected on 8/18/25 @ 1625 for GRO, DRO, BETX
		Little Gravel at 6 feet		12-34-25-13 (59) 14"	0.1		
	▽	*Wet at 8 feet* *With Gravel below 8 feet*		12-15-14 (29) 14"	0.2		
			10	10-9-8-10 (17) 16"	0.1		
				12-16-14-15 (30) 16"	0.4		
				10-10-12-10 (22) 16"	0.1		Drilling method switched to mud rotary at 16 feet
			15				
			20	4-4-5 (9) 16"			
			25	5-7-7 (14) 16"			
993.8							
29.5		CLAYEY SAND (SC), fine to coarse-grained, intermixed with Silt, light brown, wet, stiff (GLACIAL TILL)	30	5-6-6 (12) 16"			

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BRAUN INTERTEC
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LOG OF BORING

See Descriptive Terminology sheet for explanation of abbreviations

Project Number B2506260
Geotechnical & Environmental Evaluation
Northern Lights 2027 Expansion Project

BORING: **BH-06 Springfield 2nd Line**

LOCATION: Captured with RTK GPS. Intersection of 270th Street and CR-4. See attached sketch.

DATUM: NAD83 / UTM zone 11N

NORTHING: 5129896.5 EASTING: 2295395.4

DRILLER: M. Hoppe | LOGGED BY: S. Niraula | START DATE: 08/19/25 | END DATE: 08/19/25

SURFACE ELEVATION: 1023.3 ft | RIG: 7504 | METHOD: 3 1/4" HSA | SURFACING: Soil | WEATHER: Sunny

Elev./ Depth ft	Water Level	Description of Materials (Soil-ASTM D2488 or 2487; Rock-USACE EM 1110-1-2908)	Sample	Blows (N-Value) Recovery	PID ppm	MC %	Tests or Remarks
988.8		CLAYEY SAND (SC), fine to coarse-grained, intermixed with Silt, light brown, wet, stiff (GLACIAL TILL)					
34.5		SANDY LEAN CLAY (CL), very stiff to stiff (GLACIAL TILL)	35	9-10-12 (22) 16"			q_p=2.75 tsf
			40	12-10-8 (18) 18"			q_p=>4.5 tsf
			45	5-7-8 (15) 18"			q_p=2.75 tsf
973.8							
49.5		SILTY SAND (SM), fine-grained, light gray and white, wet, medium dense (GLACIAL OUTWASH)	50	9-12-12 (24) 18"		21	%Sand=70% P200=30%
			55				
963.8							
59.5		FAT CLAY (CH), with Silt lenses, gray, moist, very stiff to hard (GLACIAL TILL)	60	7-14-10 (24) 16"			q_p=3.5 tsf

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See Descriptive Terminology sheet for explanation of abbreviations

Project Number B2506260
Geotechnical & Environmental Evaluation
Northern Lights 2027 Expansion Project

BORING: **BH-06 Springfield 2nd Line**

LOCATION: Captured with RTK GPS. Intersection of 270th Street and CR-4. See attached sketch.

DATUM: NAD83 / UTM zone 11N

NORTHING: 5129896.5 EASTING: 2295395.4

DRILLER: M. Hoppe | LOGGED BY: S. Niraula | START DATE: 08/19/25 | END DATE: 08/19/25

SURFACE ELEVATION: 1023.3 ft | RIG: 7504 | METHOD: 3 1/4" HSA | SURFACING: Soil | WEATHER: Sunny

Elev./ Depth ft	Water Level	Description of Materials (Soil-ASTM D2488 or 2487; Rock-USACE EM 1110-1-2908)	Sample	Blows (N-Value) Recovery	PID ppm	MC %	Tests or Remarks
		FAT CLAY (CH), with Silt lenses, gray, moist, very stiff to hard (GLACIAL TILL)					
			65				
			70	12-23-30 (53) 16"			q_p=2.5 tsf
			75				
943.8							
79.5		SANDY SILT (ML), gray, moist, very dense (GLACIAL TILL)	80	23-43-50/2" (REF) 12"			
			85				
			90	18-43-50/3" (REF) 15"			
			95				

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See Descriptive Terminology sheet for explanation of abbreviations

Project Number B2506260
Geotechnical & Environmental Evaluation
Northern Lights 2027 Expansion Project

BORING: **BH-06 Springfield 2nd Line**

LOCATION: Captured with RTK GPS. Intersection of 270th Street and CR-4. See attached sketch.

DATUM: NAD83 / UTM zone 11N

NORTHING: 5129896.5 EASTING: 2295395.4

DRILLER: M. Hoppe | LOGGED BY: S. Niraula | START DATE: 08/19/25 | END DATE: 08/19/25

SURFACE ELEVATION: 1023.3 ft | RIG: 7504 | METHOD: 3 1/4" HSA | SURFACING: Soil | WEATHER: Sunny

Elev./ Depth ft	Water Level	Description of Materials (Soil-ASTM D2488 or 2487; Rock-USACE EM 1110-1-2908)	Sample	Blows (N-Value) Recovery	PID ppm	MC %	Tests or Remarks
923.8		SANDY SILT (ML), gray, moist, very dense (GLACIAL TILL)					
99.5		SHALE, light gray, hard, intermixed with Silt, hand deformed sample classified as "FAT CLAY (CH)" (APPARENT BEDROCK)	100	31-50/3" (REF) 6"			Water observed at 8.5 feet while drilling.
923.1		END OF BORING					
100.3		Boring immediately grouted					

105
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See Descriptive Terminology sheet for explanation of abbreviations

Project Number B2506260
Geotechnical & Environmental Evaluation
Northern Lights 2027 Expansion Project

BORING: **BH-07 Springfield 2nd Line**

LOCATION: Captured with RTK GPS. Intersection of 270th Street and CR-4. See attached sketch.

DATUM: NAD83 / UTM zone 11N

NORTHING: 5129765.8 EASTING: 2295760.1

DRILLER: K. Caudill | LOGGED BY: R. Jett | START DATE: 08/27/25 | END DATE: 08/27/25

SURFACE ELEVATION: 1024.0 ft | RIG: 7505 | METHOD: 3 1/4" HSA | SURFACING: Corn Field | WEATHER: Sunny

Elev./ Depth ft	Water Level	Description of Materials (Soil-ASTM D2488 or 2487; Rock-USACE EM 1110-1-2908)	Sample	Blows (N-Value) Recovery	PID ppm	MC %	Tests or Remarks
1022.5		SILT (ML), trace roots, dark brown, moist (TOPSOIL FILL)		3-4-5-5 (9) 6"	0.2		BH-07 (0-2) collected on 9/15/25 @ 1230 for RCRA metals
1.5		FILL: LEAN CLAY (CL), trace roots, dark brown and black, moist		1-3-4-5 (7) 8"	0.1		BH-07 (2-4) collected on 9/15/25 @ 1231 for MDA 1, MDA 2, OC
			5	0-0-1-1 (1) 12"	0.1		
1018.0							
6.0		SANDY LEAN CLAY (CL), trace Gravel, gray and brown, moist, medium to very stiff, iron oxide staining (GLACIAL TILL)		1-3-3-4 (6) 14"	0.4		BH-07 (6-8) collected on 9/15/25 @ 1237 for GRO, DRO, BETX
				3-4-5-8 (9) 20"	0.4		q_p=1.5 tsf
			10	6-7-11-4 (18) 20"	0.5		q_p=2.75 tsf q_p=3.5 tsf
				4-6-7-6 (13) 18"	0.4		q_p=2 tsf
	▽		15	3-4-6-6 (10) 18"	0.8		Wet below 15 feet q_p=1.75 tsf
1004.5							
19.5		POORLY GRADED SAND (SP), fine to coarse-grained, trace Gravel, contains seams of Silt, gray, wet, medium dense to dense (GLACIAL OUTWASH)	20	6-7-14 (21) 18"			
			25	11-22-17 (39) 12"			
			30	15-14-15 (29) 10"			

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See Descriptive Terminology sheet for explanation of abbreviations

Project Number B2506260
Geotechnical & Environmental Evaluation
Northern Lights 2027 Expansion Project

BORING: **BH-07 Springfield 2nd Line**

LOCATION: Captured with RTK GPS. Intersection of 270th Street and CR-4. See attached sketch.

DATUM: NAD83 / UTM zone 11N

NORTHING: 5129765.8 EASTING: 2295760.1

DRILLER: K. Caudill | LOGGED BY: R. Jett | START DATE: 08/27/25 | END DATE: 08/27/25

SURFACE ELEVATION: 1024.0 ft | RIG: 7505 | METHOD: 3 1/4" HSA | SURFACING: Corn Field | WEATHER: Sunny

Elev./ Depth ft	Water Level	Description of Materials (Soil-ASTM D2488 or 2487; Rock-USACE EM 1110-1-2908)	Sample	Blows (N-Value) Recovery	PID ppm	MC %	Tests or Remarks
989.5		POORLY GRADED SAND (SP), fine to coarse-grained, trace Gravel, contains seams of Silt, gray, wet, medium dense to dense (GLACIAL OUTWASH)					
34.5		SANDY LEAN CLAY (CL), trace Gravel, brown to gray, moist, very stiff (GLACIAL TILL)	35	7-11-14 (25) 18"			q_p=3 tsf
			40	8-11-18 (29) 18"			q_p=3.25 tsf
979.5							
44.5		SILTY SAND (SM), fine to medium-grained, brown, moist, very dense (GLACIAL OUTWASH)	45	11-22-35 (57) 16"			
974.5							
49.5		SANDY LEAN CLAY (CL), trace Gravel, gray, moist, hard (GLACIAL TILL)	50	17-25-38 (63) 6"			
			55				
964.5							
59.5		LEAN CLAY (CL), layers of SILT, gray, wet to moist, dense to very dense (GLACIAL TILL) *With POORLY GRADED SAND layer at 61 feet*	60	10-12-22 (34) 10"		9	%Gravel=3% %Sand=45% P200=57%

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See Descriptive Terminology sheet for explanation of abbreviations

Project Number B2506260
Geotechnical & Environmental Evaluation
Northern Lights 2027 Expansion Project

BORING: **BH-07 Springfield 2nd Line**

LOCATION: Captured with RTK GPS. Intersection of 270th Street and CR-4. See attached sketch.

DATUM: NAD83 / UTM zone 11N

NORTHING: 5129765.8 EASTING: 2295760.1

DRILLER: K. Caudill | LOGGED BY: R. Jett | START DATE: 08/27/25 | END DATE: 08/27/25

SURFACE ELEVATION: 1024.0 ft | RIG: 7505 | METHOD: 3 1/4" HSA | SURFACING: Corn Field | WEATHER: Sunny

Elev./ Depth ft	Water Level	Description of Materials (Soil-ASTM D2488 or 2487; Rock-USACE EM 1110-1-2908)	Sample	Blows (N-Value) Recovery	PID ppm	MC %	Tests or Remarks
65		LEAN CLAY (CL), layers of SILT, gray, wet to moist, dense to very dense (GLACIAL TILL)					
70				27-35-50/6" (REF) 14"		15	LL=40, PL=18, PI=22 q_p=4.5 tsf
75							
80				38-50/6" (REF) 10"		14	DD=123 pcf
85							
90				45-50/4" (REF) 8"			
95							

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See Descriptive Terminology sheet for explanation of abbreviations

Project Number B2506260
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Northern Lights 2027 Expansion Project

BORING: **BH-07 Springfield 2nd Line**

LOCATION: Captured with RTK GPS. Intersection of 270th Street and CR-4. See attached sketch.

DATUM: NAD83 / UTM zone 11N

NORTHING: 5129765.8 EASTING: 2295760.1

DRILLER: K. Caudill | LOGGED BY: R. Jett | START DATE: 08/27/25 | END DATE: 08/27/25

SURFACE ELEVATION: 1024.0 ft | RIG: 7505 | METHOD: 3 1/4" HSA | SURFACING: Corn Field | WEATHER: Sunny

Elev./ Depth ft	Water Level	Description of Materials (Soil-ASTM D2488 or 2487; Rock-USACE EM 1110-1-2908)	Sample	Blows (N-Value) Recovery	PID ppm	MC %	Tests or Remarks
		LEAN CLAY (CL), layers of SILT, gray, wet to moist, dense to very dense (GLACIAL TILL)					
		With POORLY GRADED SAND layer at 99 feet					
924.0							
100.0		END OF BORING		50/6" (REF) 6"			Water observed at 15.0 feet while drilling.
		Boring then grouted					

100
105
110
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125

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See Descriptive Terminology sheet for explanation of abbreviations

Project Number B2506260
Geotechnical & Environmental Evaluation
Northern Lights 2027 Expansion Project

BORING: **BH-08 Springfield 2nd Line**

LOCATION: Captured with RTK GPS. Intersection of 270th Street and CR-4. See attached sketch.

DATUM: NAD83 / UTM zone 11N

NORTHING: 5129454.9 EASTING: 2295875.2

DRILLER: M. Hoppe | LOGGED BY: S. Niraula | START DATE: 08/21/25 | END DATE: 08/21/25

SURFACE ELEVATION: 1019.4 ft | RIG: 7504 | METHOD: 3 1/4" HSA | SURFACING: Soil | WEATHER: Sunny

Elev./ Depth ft	Water Level	Description of Materials (Soil-ASTM D2488 or 2487; Rock-USACE EM 1110-1-2908)	Sample	Blows (N-Value) Recovery	PID ppm	MC %	Tests or Remarks
1015.4		ORGANIC SOIL (OL), black, moist (TOPSOIL)		3-4-5-5 (9) 16"	0.0		BH-08 (0-2) collected on 8/20/25 @ 1610 for MDA 1, MDA 2, OC, RCRA metals
				3-2-2-2 (4) 14"	0.0		
4.0 1011.4		LEAN CLAY (CL), trace Sand, slightly organic to organic, dark brown, moist, soft to medium (ALLUVIUM)	5	2-2-2-2 (4) 16"	0.0		
				2-3-2-3 (5) 18"	0.3		
8.0 1009.4		POORLY GRADED SAND (SP), fine-grained, trace Gravel, gray, wet, soft (GLACIAL OUTWASH)		2-2-2-2 (4) 16"	0.4		BH-08 (8-10) collected on 8/20/25 @ 1615 for GRO, DRO, BETX
10.0		SANDY LEAN CLAY (CL), trace Gravel, intermixed with POORLY GRADED SAND layer, gray to brown, wet, medium to hard (GLACIAL TILL)	10	2-3-3-3 (6) 18"	0.1		q_p=1.5 tsf
				4-4-5-4 (9) 16"	0.8		q_p=0.75 tsf
			15	5-6-6-5 (12) 18"	0.2		q_p=3.5 tsf
	▽						Wet below 18 feet
			20	7-12-18 (30) 16"			q_p=>4.5 tsf
			25	14-16-16 (32) 18"			q_p=4.5 tsf
			30	16-26-31 (57) 18"			q_p=>4.5 tsf

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BRAUN INTERTEC
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See Descriptive Terminology sheet for explanation of abbreviations

Project Number B2506260
Geotechnical & Environmental Evaluation
Northern Lights 2027 Expansion Project

BORING: **BH-08 Springfield 2nd Line**

LOCATION: Captured with RTK GPS. Intersection of 270th Street and CR-4. See attached sketch.

DATUM: NAD83 / UTM zone 11N

NORTHING: 5129454.9 EASTING: 2295875.2

DRILLER: M. Hoppe | LOGGED BY: S. Niraula | START DATE: 08/21/25 | END DATE: 08/21/25

SURFACE ELEVATION: 1019.4 ft | RIG: 7504 | METHOD: 3 1/4" HSA | SURFACING: Soil | WEATHER: Sunny

Elev./ Depth ft	Water Level	Description of Materials (Soil-ASTM D2488 or 2487; Rock-USACE EM 1110-1-2908)	Sample	Blows (N-Value) Recovery	PID ppm	MC %	Tests or Remarks
		SANDY LEAN CLAY (CL), trace Gravel, intermixed with POORLY GRADED SAND layer, gray to brown, wet, medium to hard (GLACIAL TILL)	35	17-18-15 (33) 18"			q_p=3 tsf
			40	15-15-27 (42) 18"			q_p=2.75 tsf
974.8 44.5		SANDY SILT (ML), intermixed Lean Clay lenses, light gray, moist, medium dense (GLACIAL TILL)	45	12-25-13 (38) 18"			
969.8 49.5		SILTY SAND (SM), fine-grained, light gray and brown, moist, medium dense (GLACIAL TILL)	50	14-15-15 (30) 18"			
			55				
959.8 59.5		SHALE, gray, moist, hard, intermixed with Silt, hand deformed sample classified as "FAT CLAY (CH)" (APPARENT BEDROCK)	60	28-21-25 (46) 18"		18	LL=52, PL=21, PI=31 q_p=>4.5 tsf

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See Descriptive Terminology sheet for explanation of abbreviations

Project Number B2506260
Geotechnical & Environmental Evaluation
Northern Lights 2027 Expansion Project

BORING: **BH-08 Springfield 2nd Line**

LOCATION: Captured with RTK GPS. Intersection of 270th Street and CR-4. See attached sketch.

DATUM: NAD83 / UTM zone 11N

NORTHING: 5129454.9 EASTING: 2295875.2

DRILLER: M. Hoppe | LOGGED BY: S. Niraula | START DATE: 08/21/25 | END DATE: 08/21/25

SURFACE ELEVATION: 1019.4 ft | RIG: 7504 | METHOD: 3 1/4" HSA | SURFACING: Soil | WEATHER: Sunny

Elev./ Depth ft	Water Level	Description of Materials (Soil-ASTM D2488 or 2487; Rock-USACE EM 1110-1-2908)	Sample	Blows (N-Value) Recovery	PID ppm	MC %	Tests or Remarks
		SHALE, gray, moist, hard, intermixed with Silt, hand deformed sample classified as "FAT CLAY (CH)" (APPARENT BEDROCK)					
		65					
		70		27-50/4" (REF) 8"		14	DD=120 pcf q_p=3.5 tsf
		75					
939.8							
79.5		SHALE, gray, moist to wet, hard, intermised with Silty Sand, intermixed with Silt, hand deformed sample classified as "LEAN CLAY (CL)" (APPARENT BEDROCK)		50/4" (REF) 4"		17	LL=23, PL=16, PI=7 q_p=2.5 tsf
		80					
		85					
		Wet at 90 feet 90		15-26-39 (65) 10"			
		95					

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See Descriptive Terminology sheet for explanation of abbreviations

Project Number B2506260
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Northern Lights 2027 Expansion Project

BORING: **BH-08 Springfield 2nd Line**

LOCATION: Captured with RTK GPS. Intersection of 270th Street and CR-4. See attached sketch.

DATUM: NAD83 / UTM zone 11N

NORTHING: 5129454.9 EASTING: 2295875.2

DRILLER: M. Hoppe | LOGGED BY: S. Niraula | START DATE: 08/21/25 | END DATE: 08/21/25

SURFACE ELEVATION: 1019.4 ft | RIG: 7504 | METHOD: 3 1/4" HSA | SURFACING: Soil | WEATHER: Sunny

Elev./ Depth ft	Water Level	Description of Materials (Soil-ASTM D2488 or 2487; Rock-USACE EM 1110-1-2908)	Sample	Blows (N-Value) Recovery	PID ppm	MC %	Tests or Remarks
919.8		SHALE, gray, moist to wet, hard, intermised with Silty Sand, intermixed with Silt, hand deformed sample classified as "LEAN CLAY (CL)" (APPARENT BEDROCK)					
99.5							
918.4		SHALE, gray, intermixed with Silt, hand deformed sample classified as "FAT CLAY (CH)" (APPARENT BEDROCK)		28-32-41 (73) 16"			q_p=>4 tsf
101.0		END OF BORING					Water observed at 18.0 feet while drilling.
		Boring immediately backfilled					

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See Descriptive Terminology sheet for explanation of abbreviations

Project Number B2506260
Geotechnical & Environmental Evaluation
Northern Lights 2027 Expansion Project

BORING: **BH-09 Springfield 2nd Line**

LOCATION: Captured with RTK GPS. Intersection of 270th Street and CR-4. See attached sketch.

DATUM: NAD83 / UTM zone 11N

NORTHING: 5129080.8 EASTING: 2296520.9

DRILLER: M. Hoppe | LOGGED BY: S. Niraula | START DATE: 08/18/25 | END DATE: 08/18/25

SURFACE ELEVATION: 1035.2 ft | RIG: 7504 | METHOD: 3 1/4" HSA | SURFACING: Soil | WEATHER: Cloudy

Elev./ Depth ft	Water Level	Description of Materials (Soil-ASTM D2488 or 2487; Rock-USACE EM 1110-1-2908)	Sample	Blows (N-Value) Recovery	PID ppm	MC %	Tests or Remarks
1033.2		CLAYEY SAND (SC), fine-grained, trace roots, dark brown, moist (TOPSOIL)		3-2-2-2 (4) 18"	0.3		BH-09 (0-2) collected on 8/18/25 @ 1420 for MDA 1, MDA 2, OC, RCRA metals
2.0 1031.2		CLAYEY SAND (SC), fine-grained, light brown, moist, medium (ALLUVIUM)		3-3-2-2 (5) 18"	0.3		
4.0		FAT CLAY (CH), trace Gravel, light brown and gray, moist, stiff to medium (ALLUVIUM)	5	3-5-4-5 (9) 18"	0.4		BH-09 (4-6) collected on 8/18/25 @ 1430 for GRO, DRO, BETX
				4-5-5-4 (10) 18"	0.4	44	q_p=1.5 tsf q_p=1 tsf
1025.2				3-4-3-3 (7) 18"	0.4		q_p=1 tsf
10.0		CLAYEY SAND (SC), trace Gravel, brown to gray, moist, medium to stiff (GLACIAL TILL)	10	4-4-5-4 (9) 12"	0.6	17	%Gravel=6% %Sand=48% P200=46%
				5-5-4-4 (9) 14"	0.4		q_p=1.5 tsf q_p=2.75 tsf
		Gray below 14 feet	15	5-4-4-5 (8) 18"	0.2		q_p=1.75 tsf
					0.0		
			20	3-3-4 (7) 18"			q_p=1.5 tsf
			25	4-5-5 (10) 18"	0.0		q_p=2.25 tsf
1005.7	▽						Wet below 29 feet
29.5		POORLY GRADED SAND (SP), fine-grained, trace Gravel, gray, moist, loose to medium dense (GLACIAL OUTWASH)	30	5-4-5 (9) 16"			

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See Descriptive Terminology sheet for explanation of abbreviations

Project Number B2506260
Geotechnical & Environmental Evaluation
Northern Lights 2027 Expansion Project

BORING: **BH-09 Springfield 2nd Line**

LOCATION: Captured with RTK GPS. Intersection of 270th Street and CR-4. See attached sketch.

DATUM: NAD83 / UTM zone 11N

NORTHING: 5129080.8 EASTING: 2296520.9

DRILLER: M. Hoppe | LOGGED BY: S. Niraula | START DATE: 08/18/25 | END DATE: 08/18/25

SURFACE ELEVATION: 1035.2 ft | RIG: 7504 | METHOD: 3 1/4" HSA | SURFACING: Soil | WEATHER: Cloudy

Elev./ Depth ft	Water Level	Description of Materials (Soil-ASTM D2488 or 2487; Rock-USACE EM 1110-1-2908)	Sample	Blows (N-Value) Recovery	PID ppm	MC %	Tests or Remarks
		POORLY GRADED SAND (SP), fine-grained, trace Gravel, gray, moist, loose to medium dense (GLACIAL OUTWASH)	35	5-12-16 (28) 20"			
995.7 39.5							
994.2 41.0		CLAYEY SAND (SC), fine-grained, trace Gravel, light brown, moist, very stiff (GLACIAL TILL)	40	7-14-15 (29) 20"			Water observed at 29.0 feet while drilling.
		END OF BORING					
		Boring immediately grouted					
			45				
			50				
			55				
			60				

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See Descriptive Terminology sheet for explanation of abbreviations

Project Number B2506260
Geotechnical & Environmental Evaluation
Northern Lights 2027 Expansion Project

BORING: **BH-10 Springfield 2nd Line**

LOCATION: Captured with RTK GPS. Intersection of 270th Street and CR-4. See attached sketch.

DATUM: NAD83 / UTM zone 11N

NORTHING: 5128703.8 EASTING: 2297170.2

DRILLER:	M. Hoppe	LOGGED BY:	S. Niraula	START DATE:	08/18/25	END DATE:	08/18/25
SURFACE ELEVATION:	1027.8 ft	RIG:	7504	METHOD:	3 1/4" HSA	SURFACING:	Soil	WEATHER:	Rain

Elev./ Depth ft	Water Level	Description of Materials (Soil-ASTM D2488 or 2487; Rock-USACE EM 1110-1-2908)	Sample	Blows (N-Value) Recovery	PID ppm	MC %	Tests or Remarks
1025.8		CLAYEY SAND (SC), fine-grained, organic, dark brown, moist (TOPSOIL)		2-2-4-2 (6) 12"	0.4		BH-10 (0-2) collected on 8/18/25 @ 1125 for MDA 1, MDA 2, OC, RCRA metals
2.0 1023.8		SILTY SAND (SM), fine to medium-grained, trace Gravel, reddish brown, moist, loose (ALLUVIUM)		2-3-3-3 (6) 14"	0.1		BH-10 (2-4) collected on 8/18/25 @ 1130 for GRO, DRO, BETX
4.0 1021.8		POORLY GRADED SAND with SILT (SP-SM), fine to medium-grained, trace Gravel, brown, wet, loose (GLACIAL OUTWASH)	5	2-2-2-3 (4) 16"	0.1		
6.0		POORLY GRADED SAND with SILT (SP-SM), fine to medium-grained, trace Gravel, brown to gray, wet, very loose to medium dense (GLACIAL OUTWASH)		2-3-3-3 (6) 16"	0.1	16	%Gravel=5% %Sand=88% P200=7%
				4-3-3-4 (6) 16"	0.3		
			10	3-3-2-2 (5) 16"	0.1		
				5-7-5-6 (12) 18"	0.1		
				5-3-6-10 (9) 20"	0.1	24	
			15		0.0		
					0.0		
			20	4-3-3 (6) 20"	0.0		
					0.2		
			25	4-4-5 (9) 20"			
998.3 29.5		SANDY LEAN CLAY (CL), trace Gravel, light brown, moist, hard (GLACIAL TILL)	30	14-17-25 (42) 16"			

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BRAUN INTERTEC
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See Descriptive Terminology sheet for explanation of abbreviations

Project Number B2506260
Geotechnical & Environmental Evaluation
Northern Lights 2027 Expansion Project

BORING: **BH-10 Springfield 2nd Line**

LOCATION: Captured with RTK GPS. Intersection of 270th Street and CR-4. See attached sketch.

DATUM: NAD83 / UTM zone 11N

NORTHING: 5128703.8 EASTING: 2297170.2

DRILLER: M. Hoppe | LOGGED BY: S. Niraula | START DATE: 08/18/25 | END DATE: 08/18/25

SURFACE ELEVATION: 1027.8 ft | RIG: 7504 | METHOD: 3 1/4" HSA | SURFACING: Soil | WEATHER: Rain

Elev./ Depth ft	Water Level	Description of Materials (Soil-ASTM D2488 or 2487; Rock-USACE EM 1110-1-2908)	Sample	Blows (N-Value) Recovery	PID ppm	MC %	Tests or Remarks
	▽	SANDY LEAN CLAY (CL), trace Gravel, light brown, moist, hard (GLACIAL TILL)					
35				22-25-30 (55) 16"			Wet below 35 feet
40				12-19-42 (61) 16"			
986.8							
41.0		END OF BORING Boring immediately grouted					Water observed at 35.0 feet while drilling.
45							
50							
55							
60							

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See Descriptive Terminology sheet for explanation of abbreviations

Project Number B2506260
Geotechnical & Environmental Evaluation
Northern Lights 2027 Expansion Project

BORING: **BH-11 Springfield 2nd Line**

LOCATION: Captured with RTK GPS. Intersection of 270th Street and CR-4. See attached sketch.

DATUM: NAD83 / UTM zone 11N

NORTHING: 5128499.5 EASTING: 2297547.7

DRILLER: M. Hoppe | LOGGED BY: S. Niraula | START DATE: 08/15/25 | END DATE: 08/15/25

SURFACE ELEVATION: 1019.9 ft | RIG: 7504 | METHOD: 3 1/4" HSA | SURFACING: Soil | WEATHER: Sunny

Elev./ Depth ft	Water Level	Description of Materials (Soil-ASTM D2488 or 2487; Rock-USACE EM 1110-1-2908)	Sample	Blows (N-Value) Recovery	PID ppm	MC %	Tests or Remarks
1017.9		SANDY LEAN CLAY (CL), slightly organic, dark brown and black, moist (TOPSOIL)		2-4-4-5 (8) 18"	0.2		BH-11 (0-2) collected on 8/14/25 @ 1350 for MDA 1, MDA 2, OC, RCRA metals
2.0 / 1015.9		POORLY GRADED SAND (SP), fine to medium-grained, trace Gravel, gray, wet, very loose (GLACIAL OUTWASH)		3-2-2-2 (4) 16"	0.1		BH-11 (2-4) collected on 8/14/25 @ 1355 for GRO, DRO, BETX
4.0	▽	SANDY LEAN CLAY (CL), trace Gravel, gray, moist, soft to stiff (GLACIAL TILL)	5	2-2-2-2 (4) 18"	0.1		Wet below 4 feet q_p=1.25 tsf
				2-3-3-4 (6) 18"			q_p=1.75 tsf
				3-2-2-3 (4) 16"			q_p=2 tsf
			10	4-3-3-3 (6) 18"			q_p=1.75 tsf
				3-4-5-3 (9) 18"			q_p=1.25 tsf
1005.9							
14.0		POORLY GRADED SAND (SP), fine-grained, trace Gravel, brown and gray, wet, loose to medium dense (GLACIAL TILL)	15	3-4-4-4 (8) 16"			Drilling method switched to mud rotary at 16 feet
		Intermixed with SILT and LEAN CLAY layers from 20 to 25 feet	20	6-7-8 (15) 12"			
			25	13-12-14 (26) 10"			
990.4							
29.5		SANDY LEAN CLAY (CL), trace Gravel, gray, moist, hard to very stiff (GLACIAL TILL)	30	12-17-18 (35) 16"	>4.5		q_p=>4.5 tsf

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See Descriptive Terminology sheet for explanation of abbreviations

Project Number B2506260
Geotechnical & Environmental Evaluation
Northern Lights 2027 Expansion Project

BORING: **BH-11 Springfield 2nd Line**

LOCATION: Captured with RTK GPS. Intersection of 270th Street and CR-4. See attached sketch.

DATUM: NAD83 / UTM zone 11N

NORTHING: 5128499.5 EASTING: 2297547.7

DRILLER: M. Hoppe | LOGGED BY: S. Niraula | START DATE: 08/15/25 | END DATE: 08/15/25

SURFACE ELEVATION: 1019.9 ft | RIG: 7504 | METHOD: 3 1/4" HSA | SURFACING: Soil | WEATHER: Sunny

Elev./ Depth ft	Water Level	Description of Materials (Soil-ASTM D2488 or 2487; Rock-USACE EM 1110-1-2908)	Sample	Blows (N-Value) Recovery	PID ppm	MC %	Tests or Remarks
		SANDY LEAN CLAY (CL), trace Gravel, gray, moist, hard to very stiff (GLACIAL TILL)					
			35	7-14-16 (30) 18"			q_p=>4.5 tsf
			40	13-16-16 (32) 18"			q_p=>4.5 tsf
			45	16-15-15 (30) 18"			q_p=3.75 tsf
			50	14-10-12 (22) 18"		19	LL=45, PL=19, PI=26 q_p=3 tsf
			55				
960.4							
59.5		LEAN CLAY (CL), trace Sand, slightly organic, dark gray, moist, hard (GLACIAL TILL)	60	12-16-16 (32) 18"		20	DD=108 pcf q_p=2.5 tsf

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See Descriptive Terminology sheet for explanation of abbreviations

Project Number B2506260
Geotechnical & Environmental Evaluation
Northern Lights 2027 Expansion Project

BORING: **BH-11 Springfield 2nd Line**

LOCATION: Captured with RTK GPS. Intersection of 270th Street and CR-4. See attached sketch.

DATUM: NAD83 / UTM zone 11N

NORTHING: 5128499.5 EASTING: 2297547.7

DRILLER: M. Hoppe | LOGGED BY: S. Niraula | START DATE: 08/15/25 | END DATE: 08/15/25

SURFACE ELEVATION: 1019.9 ft | RIG: 7504 | METHOD: 3 1/4" HSA | SURFACING: Soil | WEATHER: Sunny

Elev./ Depth ft	Water Level	Description of Materials (Soil-ASTM D2488 or 2487; Rock-USACE EM 1110-1-2908)	Sample	Blows (N-Value) Recovery	PID ppm	MC %	Tests or Remarks
950.4		LEAN CLAY (CL), trace Sand, slightly organic, dark gray, moist, hard (GLACIAL TILL)					
69.5		SILTY SAND (SM), fine-grained, gray, wet, medium dense (GLACIAL TILL)		6-14-12 (26) 16"		15	%Sand=72% P200=28%
940.4		SANDY LEAN CLAY (CL), trace Gravel, gray, moist, very stiff (GLACIAL TILL)		12-12-13 (25) 18"			q_p=2 tsf
930.4		POORLY GRADED SAND (SP), fine to coarse-grained, with Gravel, brown, wet, medium dense (GLACIAL OUTWASH)		14-10-10 (20) 14"			
89.5							
928.9							Water observed at 4.0 feet while drilling.
91.0		END OF BORING Boring immediately grouted					

65 70 75 80 85 90 95

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See Descriptive Terminology sheet for explanation of abbreviations

Project Number B2506260
Geotechnical & Environmental Evaluation
Northern Lights 2027 Expansion Project

BORING: **BH-12 Springfield 2nd Line**

LOCATION: Captured with RTK GPS. Intersection of 270th Street and CR-4. See attached sketch.

DATUM: NAD83 / UTM zone 11N

NORTHING: 5128421.2 EASTING: 2297733.4

DRILLER: M. Hoppe | LOGGED BY: S. Niraula | START DATE: 08/13/25 | END DATE: 08/13/25

SURFACE ELEVATION: 1019.1 ft | RIG: 7504 | METHOD: 3 1/4" HSA | SURFACING: Soil | WEATHER: Sunny

Elev./ Depth ft	Water Level	Description of Materials (Soil-ASTM D2488 or 2487; Rock-USACE EM 1110-1-2908)	Sample	Blows (N-Value) Recovery	PID ppm	MC %	Tests or Remarks
1015.1		ORGANIC SOIL (OL), black, moist to wet (TOPSOIL)		2-3-3-2 (6) 14"	0.3		BH-12 (0-2) collected on 8/13/25 @ 1615 for MDA 1, MDA 2, OC, RCRA metals
				2-3-3-3 (6) 16"	0.3		BH-12 (2-4) collected on 8/13/25 @ 1620 for GRO, DRO, BETX
4.0 1011.1	▽	SILTY SAND (SM), fine-grained, slightly organic, gray, moist, very loose to loose (ALLUVIUM) *Wet at 4 feet*	5	2-2-2-2 (4) 18"			Wet below 4 1/2 feet
				2-3-4-4 (7) 16"			
8.0		SANDY LEAN CLAY (CL), trace Gravel, gray, moist to wet, medium to stiff (GLACIAL TILL)		2-3-4-4 (7) 18"			q_p=0.25 tsf
			10	4-3-2-2 (5) 18"			q_p=1.5 tsf
				2-3-3-6 (6) 18"			q_p=1.5 tsf
				4-3-5-4 (8) 18"			q_p=0.25 tsf
			15				
			20	4-5-6 (11) 16"			q_p=4.5 tsf
		Trace Silt lenses and seams	25	5-6-6 (12) 16"			q_p=4.5 tsf
989.6							
29.5		SANDY SILT (ML), fine-grained, trace Gravel, gray, wet, loose (GLACIAL TILL)	30	5-4-5 (9) 16"			

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BRAUN INTERTEC
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LOG OF BORING

See Descriptive Terminology sheet for explanation of abbreviations

Project Number B2506260
Geotechnical & Environmental Evaluation
Northern Lights 2027 Expansion Project

BORING: **BH-12 Springfield 2nd Line**
LOCATION: Captured with RTK GPS. Intersection of 270th Street and CR-4. See attached sketch.
DATUM: NAD83 / UTM zone 11N
NORTHING: 5128421.2 EASTING: 2297733.4
DRILLER: M. Hoppe LOGGED BY: S. Niraula START DATE: 08/13/25 END DATE: 08/13/25
SURFACE ELEVATION: 1019.1 ft RIG: 7504 METHOD: 3 1/4" HSA SURFACING: Soil WEATHER: Sunny

Elev./ Depth ft	Water Level	Description of Materials (Soil-ASTM D2488 or 2487; Rock-USACE EM 1110-1-2908)	Sample	Blows (N-Value) Recovery	PID ppm	MC %	Tests or Remarks
984.6		SANDY SILT (ML), fine-grained, trace Gravel, gray, wet, loose (GLACIAL TILL)					
34.5		SANDY LEAN CLAY (CL), trace Gravel, gray, moist, very stiff to hard (GLACIAL TILL)	35	6-12-15 (27) 18"			q_p=4.5 tsf
			40	7-12-18 (30) 18"			q_p=>4.5 tsf
			45	16-21-31 (52) 18"			q_p=>4.5 tsf
			50	14-17-16 (33) 18"		16	Drilling method switched to mud rotary at 50 feet LL=40, PL=16, PI=24 q_p=3.75 tsf
			55				
959.6							
59.5		LEAN CLAY (CL), trace Sand, and Gravel, brown and gray, moist to wet, very stiff to hard (GLACIAL TILL)	60	7-10-10 (20) 18"		19	%Sand=10% P200=90% q_p=3.75 tsf

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BRAUN INTERTEC
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See Descriptive Terminology sheet for explanation of abbreviations

Project Number B2506260
Geotechnical & Environmental Evaluation
Northern Lights 2027 Expansion Project

BORING: **BH-12 Springfield 2nd Line**

LOCATION: Captured with RTK GPS. Intersection of 270th Street and CR-4. See attached sketch.

DATUM: NAD83 / UTM zone 11N

NORTHING: 5128421.2 EASTING: 2297733.4

DRILLER: M. Hoppe | LOGGED BY: S. Niraula | START DATE: 08/13/25 | END DATE: 08/13/25

SURFACE ELEVATION: 1019.1 ft | RIG: 7504 | METHOD: 3 1/4" HSA | SURFACING: Soil | WEATHER: Sunny

Elev./ Depth ft	Water Level	Description of Materials (Soil-ASTM D2488 or 2487; Rock-USACE EM 1110-1-2908)	Sample	Blows (N-Value) Recovery	PID ppm	MC %	Tests or Remarks
		LEAN CLAY (CL), trace Sand, and Gravel, brown and gray, moist to wet, very stiff to hard (GLACIAL TILL)					
			70	12-16-14 (30) 16"		17	DD=114 pcf q_p=3.5 tsf
		With intermixed FAT CLAY and SILT layers, wet at 80 feet	80	14-18-15 (33) 16"			
			90	12-20-22 (42) 16"			q_p=3.5 tsf
928.1		*Slightly organic at 90 feet*					
91.0		END OF BORING Boring immediately grouted					Water observed at 4.5 feet while drilling.

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See Descriptive Terminology sheet for explanation of abbreviations

Project Number B2506260
Geotechnical & Environmental Evaluation
Northern Lights 2027 Expansion Project

BORING: **BH-13 Springfield 2nd Line**

LOCATION: Captured with RTK GPS. Intersection of 270th Street and CR-4. See attached sketch.

DATUM: NAD83 / UTM zone 11N

NORTHING: 5127709.1 EASTING: 2298932.0

DRILLER: M. Takada | LOGGED BY: S. Niraula | START DATE: 08/13/25 | END DATE: 08/13/25

SURFACE ELEVATION: 1029.4 ft | RIG: 7504 | METHOD: 3 1/4" HSA | SURFACING: Corn Field | WEATHER: Cloudy

Elev./ Depth ft	Water Level	Description of Materials (Soil-ASTM D2488 or 2487; Rock-USACE EM 1110-1-2908)	Sample	Blows (N-Value) Recovery	PID ppm	MC %	Tests or Remarks
1027.4		CLAYEY SAND (SC), fine-grained, dark brown, moist (TOPSOIL)		1-2-2-2 (4) 14"	0.1		BH-13 (0-2) collected on 8/22/25 @ 0930 for MDA 1, MDA 2, OC, RCRA metals
2.0		SANDY LEAN CLAY (CL), trace Gravel, brown to gray, moist, medium to very stiff (GLACIAL TILL)		1-2-3-6 (5) 14"	0.1		
			5	6-5-8-3 (13) 14"	0.2		BH-13 (4-6) collected on 8/22/25 @ 0935 for GRO, DRO, BETX
				11-12-13-13 (25) 14"	0.2		
				8-11-16-12 (27) 18"	0.0		
			10	10-11-12-11 (23) 18"	0.0		
				1-3-5-7 (8) 18"	0.0		
				2-4-7-7 (11) 18"	0.0		
			15				
			20	4-6-9 (15) 18"			
1004.9							
24.5	▽	POORLY GRADED SAND with SILT (SP-SM), fine to medium-grained, little Gravel, gray, wet, dense to very dense (GLACIAL OUTWASH)	25	6-20-21 (41) 18"			Wet below 25 feet
			30	16-48-35 (83) 8"			

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See Descriptive Terminology sheet for explanation of abbreviations

Project Number B2506260
Geotechnical & Environmental Evaluation
Northern Lights 2027 Expansion Project

BORING: **BH-13 Springfield 2nd Line**
LOCATION: Captured with RTK GPS. Intersection of 270th Street and CR-4. See attached sketch.
DATUM: NAD83 / UTM zone 11N
NORTHING: 5127709.1 EASTING: 2298932.0
DRILLER: M. Takada LOGGED BY: S. Niraula START DATE: 08/13/25 END DATE: 08/13/25
SURFACE ELEVATION: 1029.4 ft RIG: 7504 METHOD: 3 1/4" HSA SURFACING: Corn Field WEATHER: Cloudy

Elev./ Depth ft	Water Level	Description of Materials (Soil-ASTM D2488 or 2487; Rock-USACE EM 1110-1-2908)	Sample	Blows (N-Value) Recovery	PID ppm	MC %	Tests or Remarks
994.9		POORLY GRADED SAND with SILT (SP-SM), fine to medium-grained, little Gravel, gray, wet, dense to very dense (GLACIAL OUTWASH)					
34.5		SILTY SAND (SM), fine to medium-grained, orangish brown, wet, very dense (GLACIAL TILL)	35	16-23-36 (59) 16"			
989.9							
39.5		SANDY LEAN CLAY (CL), trace Gravel, brown, moist, hard (GLACIAL TILL)	40	11-14-21 (35) 16"			
			45	13-21-27 (48) 14"			
			50	16-22-25 (47) 14"		11	LL=22, PL=12, PI=10
			55				
			60	13-21-29 (50) 18"		16	DD=119 pcf

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See Descriptive Terminology sheet for explanation of abbreviations

Project Number B2506260
Geotechnical & Environmental Evaluation
Northern Lights 2027 Expansion Project

BORING: **BH-13 Springfield 2nd Line**

LOCATION: Captured with RTK GPS. Intersection of 270th Street and CR-4. See attached sketch.

DATUM: NAD83 / UTM zone 11N

NORTHING: 5127709.1 EASTING: 2298932.0

DRILLER: M. Takada | LOGGED BY: S. Niraula | START DATE: 08/13/25 | END DATE: 08/13/25

SURFACE ELEVATION: 1029.4 ft | RIG: 7504 | METHOD: 3 1/4" HSA | SURFACING: Corn Field | WEATHER: Cloudy

Elev./ Depth ft	Water Level	Description of Materials (Soil-ASTM D2488 or 2487; Rock-USACE EM 1110-1-2908)	Sample	Blows (N-Value) Recovery	PID ppm	MC %	Tests or Remarks
959.9		SANDY LEAN CLAY (CL), trace Gravel, brown, moist, hard (GLACIAL TILL)					
69.5		SILTY SAND with GRAVEL (SM), intermixed with Lean Clay, light brown and brown, wet, very dense (GLACIAL TILL)		13-50/3" (REF) 6"		18	%Gravel=15% %Sand=36% P200=49%
949.9							
79.5		SHALE, light gray to reddish brown, moist, intermixed with Silt, hand deformed sample classified as "FAT CLAY (CH)" (APPARENT BEDROCK)		27-30-50/4" (REF) 16"			
938.5		*Reddish brown at 90 feet*		17-35-50/5" (REF) 16"			
90.9		END OF BORING Boring immediately grouted					Water observed at 25.0 feet while drilling.

65 70 75 80 85 90 95

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See Descriptive Terminology sheet for explanation of abbreviations

Project Number B2506260
Geotechnical & Environmental Evaluation
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BORING: **BH-14 Springfield 2nd Line**

LOCATION: Captured with RTK GPS. Intersection of 270th Street and CR-4. See attached sketch.

DATUM: NAD83 / UTM zone 11N

NORTHING: 5127579.7 EASTING: 2299201.6

DRILLER: M. Hoppe | LOGGED BY: S. Niraula | START DATE: 08/13/25 | END DATE: 08/13/25

SURFACE ELEVATION: 1032.1 ft | RIG: 7504 | METHOD: 3 1/4" HSA | SURFACING: Soil | WEATHER: Sunny

Elev./ Depth ft	Water Level	Description of Materials (Soil-ASTM D2488 or 2487; Rock-USACE EM 1110-1-2908)	Sample	Blows (N-Value) Recovery	PID ppm	MC %	Tests or Remarks
1030.4		SILTY SAND (SM), fine-grained, with roots, trace Gravel, brown and black, moist (TOPSOIL)		2-2-3-2 (5) 16"	0.2		BH-14 (0-2) collected on 8/13/25 @ 0925 for MDA 1, MDA 2, OC, RCRA metals
1.7		POORLY GRADED SAND (SP), fine to coarse-grained, trace to with Gravel, gray and brown, wet, very loose to loose (GLACIAL OUTWASH)		3-3-2-4 (5) 16"	0.1		BH-14 (2-4) collected on 8/13/25 @ 0935 for GRO, DRO, BETX
	▽		5	3-2-2-2 (4) 18"	0.3		Wet below 5 1/2 feet
				3-2-4-4 (6) 18"			
		With Gravel at 8 feet		2-2-3-2 (5) 16"			
		Trace Gravel at 10 feet	10	2-3-3-4 (6) 18"			
1020.1							
12.0		SANDY LEAN CLAY (CL), trace Gravel, gray, moist, soft to very stiff (GLACIAL TILL)		2-2-2-3 (4) 18"			q_p=1.5 tsf
			15	2-1-1-1 (2) 18"			Drilling method switched to mud rotary at 16 feet
			20	2-3-3 (6) 18"			q_p=1.25 tsf
			25	3-4-3 (7) 18"			q_p=1.5 tsf
			30	12-16-18 (34) 14"	4.5		q_p=4.5 tsf

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See Descriptive Terminology sheet for explanation of abbreviations

Project Number B2506260
Geotechnical & Environmental Evaluation
Northern Lights 2027 Expansion Project

BORING: **BH-14 Springfield 2nd Line**

LOCATION: Captured with RTK GPS. Intersection of 270th Street and CR-4. See attached sketch.

DATUM: NAD83 / UTM zone 11N

NORTHING: 5127579.7 EASTING: 2299201.6

DRILLER: M. Hoppe | LOGGED BY: S. Niraula | START DATE: 08/13/25 | END DATE: 08/13/25

SURFACE ELEVATION: 1032.1 ft | RIG: 7504 | METHOD: 3 1/4" HSA | SURFACING: Soil | WEATHER: Sunny

Elev./ Depth ft	Water Level	Description of Materials (Soil-ASTM D2488 or 2487; Rock-USACE EM 1110-1-2908)	Sample	Blows (N-Value) Recovery	PID ppm	MC %	Tests or Remarks
997.6		SANDY LEAN CLAY (CL), trace Gravel, gray, moist, soft to very stiff (GLACIAL TILL)					
34.5		SILTY SAND (SM), fine-grained, trace Gravel, brown and gray, moist, dense to medium dense (GLACIAL TILL)	35	12-14-20 (34) 16"			
			40	14-15-12 (27) 18"			
987.6							
44.5		SANDY LEAN CLAY (CL), trace Gravel, light brown, moist, very stiff (GLACIAL TILL)	45	14-10-11 (21) 16"			q_p=2.75 tsf
982.6							
49.5		CLAYEY SAND (SC), fine-grained, trace Gravel, light brown, moist, very stiff to hard (GLACIAL TILL)	50	16-12-15 (27) 18"		9	LL=25, PL=13, PI=12
			55				
			60	12-10-8 (18) 16"		8	DD=120 pcf

Continued on next page

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LOG OF BORING

See Descriptive Terminology sheet for explanation of abbreviations

Project Number B2506260
Geotechnical & Environmental Evaluation
Northern Lights 2027 Expansion Project

BORING: **BH-14 Springfield 2nd Line**

LOCATION: Captured with RTK GPS. Intersection of 270th Street and CR-4. See attached sketch.

DATUM: NAD83 / UTM zone 11N

NORTHING: 5127579.7 EASTING: 2299201.6

DRILLER: M. Hoppe | LOGGED BY: S. Niraula | START DATE: 08/13/25 | END DATE: 08/13/25

SURFACE ELEVATION: 1032.1 ft | RIG: 7504 | METHOD: 3 1/4" HSA | SURFACING: Soil | WEATHER: Sunny

Elev./ Depth ft	Water Level	Description of Materials (Soil-ASTM D2488 or 2487; Rock-USACE EM 1110-1-2908)	Sample	Blows (N-Value) Recovery	PID ppm	MC %	Tests or Remarks
		CLAYEY SAND (SC), fine-grained, trace Gravel, light brown, moist, very stiff to hard (GLACIAL TILL)					
65							
70				14-22-30 (52) 18"		8	
75							
952.6							
79.5		SANDY LEAN CLAY (CL), trace Gravel, gray, moist, hard (GLACIAL TILL)		14-17-24 (41) 16"			q_p=>4.5 tsf
80							
85							
942.6							
89.5		SHALE, light gray, moist, hard, intermixed with Silt, hand deformed sample classified as "FAT CLAY (CH)" (APPARENT BEDROCK)		22-31-33 (64) 18"			q_p=4.5 tsf
90							
941.1							
91.0		END OF BORING					Water observed at 5.5 feet while drilling.
		Boring immediately grouted					
95							

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LOG OF BORING

See Descriptive Terminology sheet for explanation of abbreviations

Project Number B2506260
Geotechnical & Environmental Evaluation
Northern Lights 2027 Expansion Project

BORING: **BH-15 Springfield 2nd Line**

LOCATION: Captured with RTK GPS. Intersection of 270th Street and CR-4. See attached sketch.

DATUM: NAD83 / UTM zone 11N

NORTHING: 5127455.3 EASTING: 2299452.7

DRILLER: M. Hoppe | LOGGED BY: S. Niraula | START DATE: 08/12/25 | END DATE: 08/12/25

SURFACE ELEVATION: 1035.7 ft | RIG: 7504 | METHOD: 3 1/4" HSA | SURFACING: Soil | WEATHER: Sunny

Elev./ Depth ft	Water Level	Description of Materials (Soil-ASTM D2488 or 2487; Rock-USACE EM 1110-1-2908)	Sample	Blows (N-Value) Recovery	PID ppm	MC %	Tests or Remarks
1034.2		SILTY SAND (SM), fine-grained, slightly organic, dark brown, moist (TOPSOIL FILL)		2-3-3-3 (6) 14"	0.6		BH-15 (0-2) collected on 8/12/25 @ 1130 for MDA 1, MDA 2, OC, RCRA metals
1.5		FILL: SILTY SAND (SM), fine-grained, brown, moist		2-2-3-2 (5) 18"	0.8		BH-15 (2-4) collected on 8/12/25 @ 1140 for GRO, DRO, BETX
1033.7 2.0		SILTY SAND (SM), fine-grained, trace Gravel, brown, moist, loose to very loose (ALLUVIUM)		2-2-2-2 (4) 16"	0.7		
1029.7	▽		5				Wet below 6 feet
6.0		POORLY GRADED SAND with SILT (SP-SM), fine-grained, brown and gray, wet, loose (ALLUVIUM)		2-3-4-4 (7) 16"		25	%Sand=88% P200=12%
				3-4-3-2 (7) 16"			
			10	4-3-3-3 (6) 16"			
1023.7							
12.0		POORLY GRADED SAND (SP), fine-grained, gray, wet, loose (ALLUVIUM)		3-3-2-3 (5) 18"			
1021.7							
14.0		SANDY LEAN CLAY (CL), trace Gravel, gray, moist, soft to stiff (GLACIAL TILL)		2-2-2-3 (4) 18"			
			15			19	q_p=0.5 tsf
							Drilling method switched to mud rotary at 16 feet
			20	2-4-3 (7) 20"			q_p=1.25 tsf
			25	3-3-4 (7) 20"			q_p=1.5 tsf
			30	4-4-5 (9) 16"			q_p=1.25 tsf

Continued on next page

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LOG OF BORING

See Descriptive Terminology sheet for explanation of abbreviations

Project Number B2506260
Geotechnical & Environmental Evaluation
Northern Lights 2027 Expansion Project

BORING: **BH-15 Springfield 2nd Line**

LOCATION: Captured with RTK GPS. Intersection of 270th Street and CR-4. See attached sketch.

DATUM: NAD83 / UTM zone 11N

NORTHING: 5127455.3 EASTING: 2299452.7

DRILLER: M. Hoppe | LOGGED BY: S. Niraula | START DATE: 08/12/25 | END DATE: 08/12/25

SURFACE ELEVATION: 1035.7 ft | RIG: 7504 | METHOD: 3 1/4" HSA | SURFACING: Soil | WEATHER: Sunny

Elev./ Depth ft	Water Level	Description of Materials (Soil-ASTM D2488 or 2487; Rock-USACE EM 1110-1-2908)	Sample	Blows (N-Value) Recovery	PID ppm	MC %	Tests or Remarks
1001.2		SANDY LEAN CLAY (CL), trace Gravel, gray, moist, soft to stiff (GLACIAL TILL)					
34.5		CLAYEY SAND (SC), fine-grained, trace Gravel, with Silt lenses, light brown and brown, moist, hard (GLACIAL TILL)	35	12-14-17 (31) 14"			
			40	16-18-20 (38) 16"			
			45	14-15-15 (30) 14"			
986.2							
49.5		SANDY LEAN CLAY (CL), trace Gravel, gray, moist, very stiff to hard (GLACIAL TILL)	50	12-15-13 (28) 16"			q_p=>4.75 tsf
			55				
			60	16-23-15 (38) 18"			q_p=3.75 tsf

Continued on next page

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LOG OF BORING

See Descriptive Terminology sheet for explanation of abbreviations

Project Number B2506260
Geotechnical & Environmental Evaluation
Northern Lights 2027 Expansion Project

BORING: **BH-15 Springfield 2nd Line**

LOCATION: Captured with RTK GPS. Intersection of 270th Street and CR-4. See attached sketch.

DATUM: NAD83 / UTM zone 11N

NORTHING: 5127455.3 EASTING: 2299452.7

DRILLER: M. Hoppe | LOGGED BY: S. Niraula | START DATE: 08/12/25 | END DATE: 08/12/25

SURFACE ELEVATION: 1035.7 ft | RIG: 7504 | METHOD: 3 1/4" HSA | SURFACING: Soil | WEATHER: Sunny

Elev./ Depth ft	Water Level	Description of Materials (Soil-ASTM D2488 or 2487; Rock-USACE EM 1110-1-2908)	Sample	Blows (N-Value) Recovery	PID ppm	MC %	Tests or Remarks
		SANDY LEAN CLAY (CL), trace Gravel, gray, moist, very stiff to hard (GLACIAL TILL)					
			65				
			70	16-23-26 (49) 18"			q_p=4.5 tsf
			75				
956.2							
79.5		SILTY SAND (SM), fine-grained, trace Gravel, gray, moist, very dense (GLACIAL TILL)	80	23-31-25 (56) 18"			
			85				
946.2							
89.5		SHALE, gray, moist, intermixed with Silt, hand deformed sample classified as "FAT CLAY (CH)" (APPARENT BEDROCK)	90	23-25-30 (55) 20"			q_p=>4.5 tsf
944.7							Water observed at 6.0 feet while drilling.
91.0		END OF BORING					
		Boring immediately grouted					
			95				

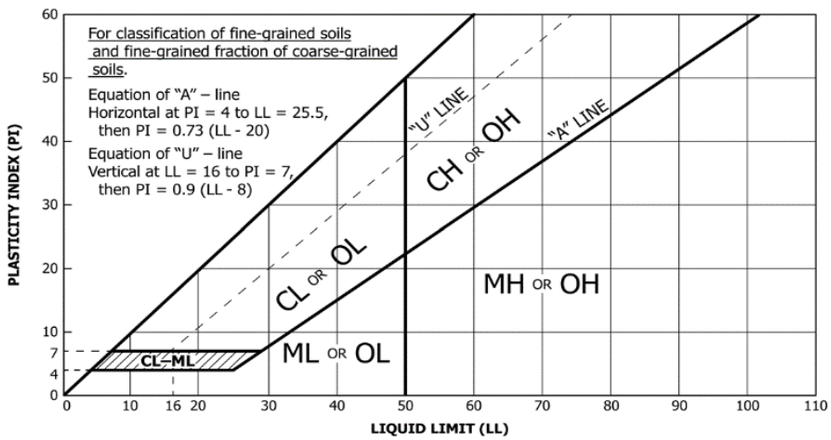
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Descriptive Terminology of Soil

Based on Standards ASTM D2487/2488
(Unified Soil Classification System)

Criteria for Assigning Group Symbols and Group Names Using Laboratory Tests[A]				Soil Classification	
				Group Symbol	Group Name[B]
Coarse-grained Soils (more than 50% retained on No. 200 sieve)	Gravels (More than 50% of coarse fraction retained on No. 4 sieve)	Clean Gravels (Less than 5% fines[C])	$C_u \geq 4$ and $1 \leq C_c \leq 3^D$	GW	Well-graded gravel[E]
			$C_u < 4$ and/or ($C_c < 1$ or $C_c > 3$)[D]	GP	Poorly graded gravel[E]
		Gravels with Fines (More than 12% fines[C])	Fines classify as ML or MH	GM	Silty gravel[E F G]
			Fines Classify as CL or CH	GC	Clayey gravel[E F G]
	Sands (50% or more coarse fraction passes No. 4 sieve)	Clean Sands (Less than 5% fines[H])	$C_u \geq 6$ and $1 \leq C_c \leq 3^D$	SW	Well-graded sand[I]
			$C_u < 6$ and/or ($C_c < 1$ or $C_c > 3$)[D]	SP	Poorly graded sand[I]
		Sands with Fines (More than 12% fines[H])	Fines classify as ML or MH	SM	Silty sand[F G I]
			Fines classify as CL or CH	SC	Clayey sand[F G I]
Fine-grained Soils (50% or more passes the No. 200 sieve)	Silts and Clays (Liquid limit less than 50)	Inorganic	PI > 7 and plots on or above "A" line[J]	CL	Lean clay[K L M]
			PI < 4 or plots below "A" line[J]	ML	Silt[K L M]
		Organic	Liquid Limit – oven dried / Liquid Limit – not dried <0.75	OL	Organic clay[K L M N] / Organic silt[K L M O]
	Silts and Clays (Liquid limit 50 or more)	Inorganic	PI plots on or above "A" line	CH	Fat clay[K L M]
			PI plots below "A" line	MH	Elastic silt[K L M]
		Organic	Liquid Limit – oven dried / Liquid Limit – not dried <0.75	OH	Organic clay[K L M P] / Organic silt[K L M Q]
Highly Organic Soils		Primarily organic matter, dark in color, and organic odor		PT	Peat

A. Based on the material passing the 3-inch (75-mm) sieve.
B. If field sample contained cobbles or boulders, or both, add "with cobbles or boulders, or both" to group name.
C. Gravels with 5 to 12% fines require dual symbols:
   GW-GM well-graded gravel with silt
   GW-GC well-graded gravel with clay
   GP-GM poorly graded gravel with silt
   GP-GC poorly graded gravel with clay
D. $C_u = D_{60} / D_{10}$ $C_c = (D_{30})^2 / (D_{10} \times D_{60})$
E. If soil contains ≥ 15% sand, add "with sand" to group name.
F. If fines classify as CL-ML, use dual symbol GC-GM or SC-SM.
G. If fines are organic, add "with organic fines" to group name.
H. Sands with 5 to 12% fines require dual symbols:
   SW-SM well-graded sand with silt
   SW-SC well-graded sand with clay
   SP-SM poorly graded sand with silt
   SP-SC poorly graded sand with clay
I. If soil contains ≥ 15% gravel, add "with gravel" to group name.
J. If Atterberg limits plot in hatched area, soil is CL-ML, silty clay.
K. If soil contains 15 to < 30% plus No. 200, add "with sand" or "with gravel", whichever is predominant.
L. If soil contains ≥ 30% plus No. 200, predominantly sand, add "sandy" to group name.
M. If soil contains ≥ 30% plus No. 200 predominantly gravel, add "gravelly" to group name.
N. PI ≥ 4 and plots on or above "A" line.
O. PI < 4 or plots below "A" line.
P. PI plots on or above "A" line.
Q. PI plots below "A" line.



Laboratory Tests

DD	Dry density, pcf	**q_p**	Pocket penetrometer strength, tsf
WD	Wet density, pcf	**q_U**	Unconfined compression test, tsf
P200	% Passing #200 sieve	**LL**	Liquid limit
MC	Moisture content, %	**PL**	Plastic limit
OC	Organic content, %	**PI**	Plasticity index

Particle Size Identification

Boulders..... over 12"
Cobbles..... 3" to 12"
Gravel
  Coarse..... 3/4" to 3" (19.00 mm to 75.00 mm)
  Fine..... No. 4 to 3/4" (4.75 mm to 19.00 mm)
Sand
  Coarse..... No. 10 to No. 4 (2.00 mm to 4.75 mm)
  Medium..... No. 40 to No. 10 (0.425 mm to 2.00 mm)
  Fine..... No. 200 to No. 40 (0.075 mm to 0.425 mm)
Silt..... No. 200 (0.075 mm) to .005 mm
Clay..... < .005 mm

Relative Proportions[L,M]

trace..... 0 to 5%
little..... 6 to 14%
with..... ≥ 15%

Inclusion Thicknesses

lens..... 0 to 1/8"
seam..... 1/8" to 1"
layer..... over 1"

Apparent Relative Density of Cohesionless Soils

Very loose ..... 0 to 4 BPF
Loose ..... 5 to 10 BPF
Medium dense..... 11 to 30 BPF
Dense..... 31 to 50 BPF
Very dense..... over 50 BPF

Consistency of Cohesive Soils	Blows Per Foot	Approximate Unconfined Compressive Strength
Very soft	0 to 1 BPF	< 0.25 tsf
Soft	2 to 4 BPF	0.25 to 0.5 tsf
Medium	5 to 8 BPF	0.5 to 1 tsf
Stiff	9 to 15 BPF	1 to 2 tsf
Very Stiff	16 to 30 BPF	2 to 4 tsf
Hard	over 30 BPF	> 4 tsf

Moisture Content:

Dry: Absence of moisture, dusty, dry to the touch.
Moist: Damp but no visible water.
Wet: Visible free water, usually soil is below water table.

Drilling Notes:

Blows/N-value: Blows indicate the driving resistance recorded for each 6-inch interval. The reported N-value is the blows per foot recorded by summing the second and third interval in accordance with the Standard Penetration Test, ASTM D1586.

Partial Penetration: If the sampler could not be driven through a full 6-inch interval, the number of blows for that partial penetration is shown as #/x" (i.e. 50/2"). The N-value is reported as "REF" indicating refusal.

Recovery: Indicates the inches of sample recovered from the sampled interval. For a standard penetration test, full recovery is 18", and is 24" for a thinwall/shelby tube sample.

WOH: Indicates the sampler penetrated soil under weight of hammer and rods alone; driving not required.

WOR: Indicates the sampler penetrated soil under weight of rods alone; hammer weight and driving not required.

Water Level: Indicates the water level measured by the drillers either while drilling (▽), at the end of drilling (▼), or at some time after drilling (▽▼).

Sample Symbols

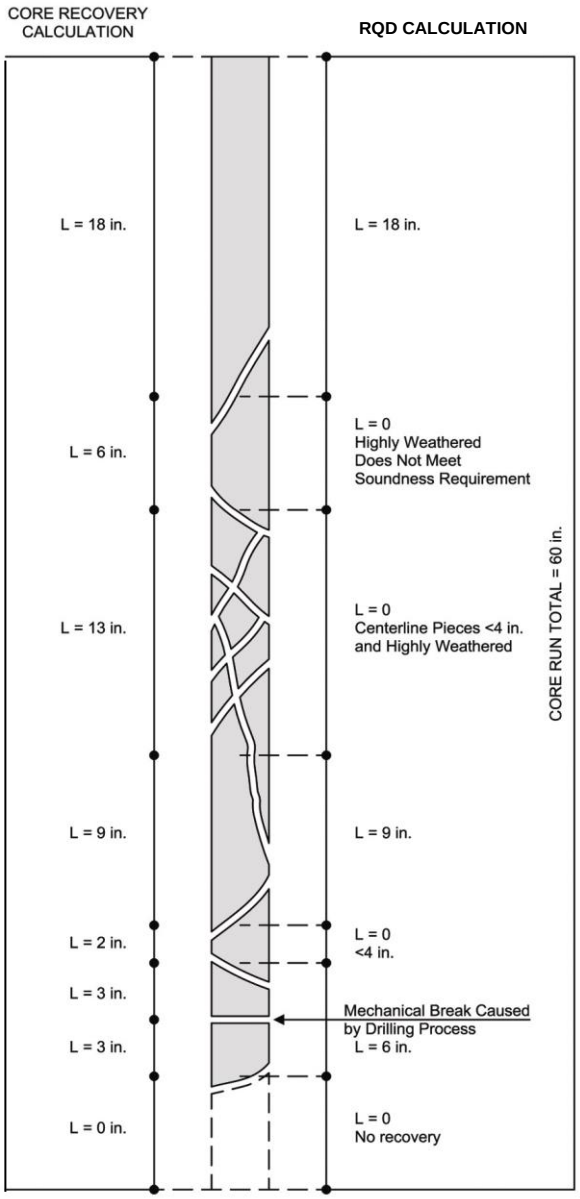
Standard Penetration Test
Modified California (MC)
Auger
Grab Sample
Rock Core
Thinwall (TW)/Shelby Tube (SH)
Texas Cone Penetrometer
Dynamic Cone Penetrometer

5/2021

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Descriptive Terminology of Rock

Based on U.S. Army Corps of Engineers EM 1110-1-2908



Example Calculations

Core Recovery, CR = $\frac{\text{Total length of rock recovered}}{\text{Total core run length}}$

Example: $CR = \frac{(18 + 6 + 13 + 9 + 2 + 3 + 3)}{(60)}$

CR = 90%

RQD = $\frac{\text{Sum of sound pieces 4 inches or larger}}{\text{Total core run length}}$

RQD Percent	Rock Quality
< 25	very poor
25 < 50	poor
50 < 75	fair
75 < 90	good
90 < 100	excellent

Example: $RQD = \frac{(18 + 9 + 6)}{(60)}$

RQD = 55%

Weathering

Unweathered: No evidence of chemical or mechanical alteration.

Slightly weathered: Slight discoloration on surface, slight alteration along discontinuities, less than 10% of rock volume altered.

Moderately Weathered: Discoloration evident, surface pitted and altered with alteration penetrating well below rock surfaces, weathering halos evident, 10% to 50% of the rock altered.

Highly Weathered: Entire mass discolored, alteration pervading nearly all of the rock, with some pockets of slightly weathered rock noticeable, some mineral leached away.

Decomposed: Rock reduced to a soil consistency with relict rock texture, generally molded and crumbled by hand.

Hardness

Very soft:	Can be deformed by hand
Soft:	Can be scratched with a fingernail
Moderately hard:	Can be scratched easily with a knife
Hard:	Can be scratched with difficulty with a knife
Very hard:	Cannot be scratched with a knife

Texture

Sedimentary Rocks:	*Grain Size*
Coarse grained	2 – 5 mm
Medium grained	0.4 – 2 mm
Fine grained	0.1 – 0.4 mm
Very fine grained	< 0.1 mm

Igneous and Metamorphic Rocks:	
Coarse grained	5 mm
Medium grained	1 – 5 mm
Fine grained	0.1 – 1 mm
Aphanitic	< 0.1 mm

Thickness of Bedding

Massive:	3 ft. thick or greater
Thick bedded:	1 to 3 ft. thick
Medium bedded:	4 in. to 1 ft. thick
Thin bedded:	4 in. thick or less

Degree of Fracturing (Jointing)

Unfractured:	Fracture spacing 6 ft. of more
Slightly fractured:	Fracture spacing 2 to 6 ft.
Moderately fractured:	Fracture spacing 8 in. to 2 ft.
Highly fractured:	Fracture spacing 2 in. to 8 in.
Intensely fractured:	Fracture spacing 2 in. or less

Minnesota Interconnect 2nd Branch Line

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Factual Geotechnical DataReport

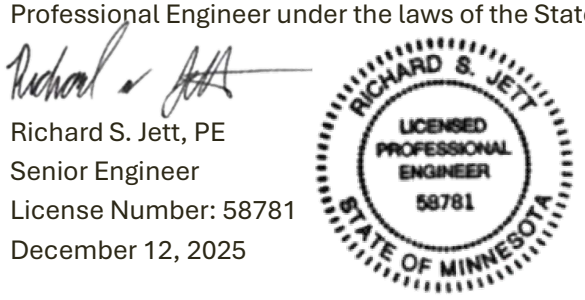
NNG Northern Lights 2027 – Minn IC 2nd Line

Intersection of Highway 95 and 341st Avenue Northwest
Cambridge, Minnesota

Prepared for

Stantec Consulting Services, Inc.

Professional Certification:
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.



Richard S. Jett, PE
Senior Engineer
License Number: 58781
December 12, 2025

Braun Intertec Corporation

Project B2506260

December 12, 2025 Project B2506260

Ginger Chan
Stantec Consulting Services, Inc.
200-325 25 Street SE
Calgary, AB T2A 7H8

Re: Factual Geotechnical Data Report
NNG Northern Lights 2027 – Minn IC 2nd Line
Intersection of Highway 95 and 341st Avenue Northwest
Cambridge, Minnesota

Dear Ms. Chan:

We are pleased to present this factual geotechnical data report for the above referenced project.

Thank you for making Braun Intertec Corporation (Braun Intertec) your geotechnical consultant for this project. If you have questions about this report, or if there are other services that we can provide in support of our work to date, please contact Richard Jett at 815.545.7059 (rjett@braunintertec.com) or Chad Lukkarila at 952.995.2322 (clukkarila@braunintertec.com).

Sincerely,
Braun Intertec Corporation

Richard S. Jett, PE
Senior Engineer

Chad R. Lukkarila, PE
Associate Director, Senior Engineer

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Appendix

Soil Boring Location Sketch

Log of Boring Sheets BH-26 through BH-30

Descriptive Terminology of Soil

List of Tables

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1.1 Scope of Services

We performed our scope of services for the project in accordance with the task order from Stantec Consulting Services, Inc. dated July 15, 2025, Change Order #1 dated August 21, 2025, and Change Order #2 dated September 25, 2025. The following list describes the geotechnical tasks completed in accordance with our authorized scope of services.

- Reviewing the background information and reference documents previously cited.
- Coordinating the clearance of the exploration locations of public underground utilities.
- Performing six standard penetration test (SPT) borings, denoted as BH-26, BH-27, BH-28, BH-28A, BH-29, and BH-30 to nominal depths ranging from 60 to 80 feet below grade across the site.
- Performing laboratory testing on samples selected by Braun Intertec Corporation with input from Stantec Consulting Services, Inc.
- Preparing this report containing a boring location sketch, logs of soil borings, a summary of the soils encountered, and results of laboratory tests performed on select soil samples.

We performed this geotechnical data collection concurrently with environmental screening and laboratory testing, the results of which will be submitted under separate cover. The project team should review the environmental report in conjunction with this geotechnical evaluation report to understand both the geotechnical and environmental aspects of the site and how they may impact one another.

2.0 Results

2.1 Boring Results

Table 2-1 provides a summary of the soil boring results, in the general order we encountered the strata. Please refer to the Log of Boring sheets in the Appendix for additional details. The Descriptive Terminology sheet in the Appendix includes definitions of abbreviations used in the table below.

Table 2-1. Subsurface Profile Summary

Strata	Soil Type -ASTM Classification	Range of Penetration Resistances (N Values)	Commentary and Details
Topsoil / topsoil fill	SM	2 to 10	▪ Observed at the surface of the borings and extended to depths ranging from less than 1 foot to 6 feet below existing grade. ▪ Predominantly dark brown to brown silty sand soils. ▪ Moisture conditions were generally moist.
Lacustrine	SP, SP-SM, SM	2 to 24	▪ Observed below the topsoil layers at the boring locations and extended to depths ranging from approximately 25 to 60 feet below existing grade. ▪ Generally consisted of light brown to brown granular soils. ▪ Generally loose to medium dense with occasional zones of very loose soils.
Glacial deposits	SP, SP-SM, SM, ML	3 to 50+	▪ Observed below the topsoil and lacustrine deposit soils and extended to the termination depths of the borings. ▪ Relative densities of the granular soils were generally loose to dense with occasional zones of very dense and very loose soils. ▪ Relative consistencies of the clay ladens soils were generally medium to stiff with isolated zones of very stiff and hard soils. ▪ Variable amounts of gravel; may contain cobbles and boulders. ▪ Generally red brown to brown in color. ▪ Moisture conditions were generally moist to wet.
	SC, CL, CL-ML	7 to 50+	

[1]We did not perform gradation analysis on the apparent topsoil, in accordance with our scope of work. Therefore, we cannot conclusively determine if the encountered material satisfies a particular specification, and it should not be assumed it is suitable for reuse.
[2]For simplicity in this report, we define existing fill to mean existing, uncontrolled, or undocumented fill.

The exploration locations completed at this site were denoted as BH-26, BH-27. BH-28, BH-28A, BH-29, and BH-30. The exploration locations were selected by Stantec and performed near the approximate locations as indicated in the attached Soil Boring Location Sketch. Stantec provided us with the surface elevations and GPS coordinates of the boring locations.

2.2 Groundwater

Groundwater was observed at the soil boring locations at depths ranging from approximately 11 to 25 feet below existing grade (approximate elevations ranging from 926 1/2 to 933 feet). Groundwater may take days or longer to reach equilibrium in the boreholes and we immediately backfilled the boreholes, in accordance with our scope of work. If the project team identifies a need for more accurate determination of groundwater depth, we can install piezometers and complete a groundwater monitoring program.

Table 2-2 summarizes the depths where we observed groundwater; the attached Log of Boring sheets in the Appendix also include this information and additional details.

Table 2-2. Groundwater Summary

Locations	Surface Elevation (feet)	Measured Depth to Groundwater (feet)	Corresponding Groundwater Elevation (feet)
BH-26	944.9	12	933
BH-27	956.5	25	932
BH-28	951.4	20	931 1/2
BH-28A	951.4	25	926 1/2
BH-29	951.2	20	931 1/2
BH-30	940.2	11	929 1/2

2.3 Laboratory Test Results

The boring logs show the results of laboratory testing we performed next to the tested sample depth. The Appendix contains the results of these tests.

Moisture content tests performed on select soil samples indicated moisture contents ranging from 6 to 24 percent moisture by weight for granular soils and from 14 to 27 percent moisture by weight for clay and silt laden soils.

Sieve Analysis tests performed on select soil samples indicated from 2 to 80 percent particles, by weight passing the No. 200 sieve. Atterberg limit tests performed on select soil samples indicated liquid limits ranging from 13 to 28 percent moisture and plastic limits ranging from 12 to 22 percent moisture.

3.0 Procedures

3.1 Penetration Test Borings

We drilled the penetration test borings with an All-Terrain Vehicle (ATV)-mounted core and auger drill equipped with hollow-stem auger. We performed the borings in general accordance with ASTM D6151 taking penetration test samples at 2 1/2- or 5-foot intervals in general accordance with ASTM D1586. The boring logs show the actual sample intervals and corresponding depths.

We sealed penetration test boreholes meeting the Minnesota Department of Health (MDH) Environmental Borehole criteria with an MDH-approved grout.

3.2 Exploration Logs

3.2.1 Log of Boring Sheets

The Appendix includes Log of Boring sheets for our penetration test borings. The logs identify and describe the penetrated geologic materials and present the results of penetration resistance and other in-situ tests performed. The logs also present the results of organic vapor screening, laboratory tests performed on penetration test samples, and groundwater measurements.

We inferred strata boundaries from changes in the penetration test samples and the auger cuttings. Because we did not perform continuous sampling, the strata boundary depths are only approximate. The boundary depths likely vary away from the boring locations, and the boundaries themselves may occur as gradual rather than abrupt transitions.

3.2.2 Organic Vapor Screening

We conducted the geotechnical exploration concurrently with on-site environmental screening and provided the results of the screening under separate cover. The project team should review the environmental report in conjunction with this geotechnical data report to understand both the geotechnical and environmental aspects of the site and how they may impact one another.

An environmental technician examined soil samples from the borings for staining, odors, and other apparent signs of contamination within the top 20 feet of each boring. In addition, the environmental technician screened the soil samples for the presence of organic vapors using a photoionization detector (PID). The boring logs in the Appendix include the PID results, which we discuss further in the companion environmental report.

3.2.3 Geologic Origins

We assigned geologic origins to the materials shown on the logs and referenced within this report, based on: (1) a review of the background information and reference documents cited above, (2) visual classification of the various geologic material samples retrieved during the course of our subsurface exploration, (3) penetration resistance and other in-situ testing performed for the project, (4) laboratory test results, and (5) available common knowledge of the geologic processes and environments that have impacted the site and surrounding area in the past .

3.3 Material Classification and Testing

3.3.1 Visual and Manual Classification

We visually and manually classified the geologic materials encountered based on ASTM D2488. When we performed laboratory classification tests, we used the results to classify the geologic materials in accordance with ASTM D2487. The Appendix includes a chart explaining the classification system we used.

3.3.2 Laboratory Testing

The exploration logs in the Appendix note the results of the laboratory tests performed on geologic material samples. We performed the tests in general accordance with ASTM procedures.

3.4 Groundwater Measurements

The drillers checked for groundwater while advancing the penetration test borings, and again after auger withdrawal. We then filled the boreholes noted on the boring logs.

4.0 Qualifications

4.1 Variations in Subsurface Conditions

4.1.1 Material Strata

We developed our data from a limited amount of site and subsurface information. It is not standard engineering practice to retrieve material samples from exploration locations continuously with depth. Therefore, we must infer strata boundaries and thicknesses to some extent. Strata boundaries may also be gradual transitions, and project planning should expect the strata to vary in depth, elevation, and thickness, away from the exploration locations.

Variations in subsurface conditions present between exploration locations may not be revealed until performing additional exploration work or starting construction.

4.1.2 Groundwater Levels

We made groundwater measurements under the conditions reported herein and shown on the exploration logs and interpreted in the text of this report. Note that the observation periods were relatively short, and project planning can expect groundwater levels to fluctuate in response to rainfall, flooding, irrigation, seasonal freezing and thawing, surface drainage modifications and other seasonal and annual factors.

4.2 Use of Report

This report is for the exclusive use of the addressed parties. Without written approval, we assume no responsibility to other parties regarding this report.

4.3 Standard of Care

In performing its services, Braun Intertec used that degree of care and skill ordinarily exercised under similar circumstances by reputable members of its profession currently practicing in the same locality. No warranty, express or implied, is made.

Appendix

Soil Boring Location Sketch
Log of Boring Sheets BH-26 through BH-30
Descriptive Terminology of Soil

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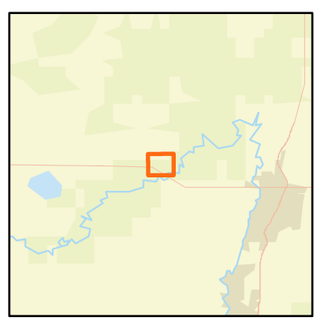
Denotes Location of Proposed Borings

Access Path

N

0 250 500 Feet

1" = 500 Feet



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11001 Hampshire Avenue S
Minneapolis, MN 55438
952.995.2000
braunintertec.com

Project No: B2506260

Drawing No: Boring Sketch Minn IC

Drawn By:	ZS
Date Drawn:	7/22/2025
Checked By:	RSJ
Last Modified:	12/11/2025

Minn IC 2nd Line

Isanti County

Minnesota

Boring Location Sketch

F:\2025\B2506260\GIS\B2506260\B2506260.aprx

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LOG OF BORING

See Descriptive Terminology sheet for explanation of abbreviations

Project Number B2506260
Geotechnical & Environmental Evaluation
Northern Lights 2027 Expansion Project

BORING: **BH-26 Minn IC 2nd Line**

LOCATION: Captured with RTK GPS. 341st Avenue NW. See attached sketch.

DATUM: NAD83 / UTM zone 11N

NORTHING: 5327882.8 EASTING: 2343359.6

DRILLER: K. Caudill | LOGGED BY: J. Franz | START DATE: 09/11/25 | END DATE: 09/11/25

SURFACE ELEVATION: 944.9 ft | RIG: 7505 | METHOD: 3 1/4" HSA | SURFACING: Grass | WEATHER: Sunny

Elev./ Depth ft	Water Level	Description of Materials (Soil-ASTM D2488 or 2487; Rock-USACE EM 1110-1-2908)	Sample	Blows (N-Value) Recovery	PID ppm	MC %	Tests or Remarks
		SILTY SAND (SM), trace roots, brown, moist (TOPSOIL FILL)		1-1-1-2 (2) 16"	0.3		BH-26 (0-2) collected on 9/8/25 @ 1230 for MDA 1, MDA 2, OC, RCRA metals
				0-1-4-5 (5) 16"	0.2		BH-26 (2-4) collected on 9/8/2025 @ 1235 for GRO, DRO, BETX
			5	4-5-5-5 (10) 16"	1.4		
938.9 6.0 936.9		SILTY SAND (SM), fine-grained, light brown, moist, medium dense (LACUSTRINE)		2-4-5-6 (9) 16"	1.3		
8.0		POORLY GRADED SAND (SP), fine to medium-grained, light brown, moist to wet, loose to medium dense (LACUSTRINE)		2-3-6-7 (9) 18"	0.3		
			10	5-6-9-11 (15) 16"	0.4		
	▽			6-8-9-6 (17) 16"			Wet below 12 feet
			15	3-4-5-5 (9) 16"			
			20	3-4-7 (11) 14"			Drilling method switched to mud rotary
			25	8-12-12 (24) 20"			
			30	6-6-7 (13) 12"			

Continued on next page

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LOG OF BORING

See Descriptive Terminology sheet for explanation of abbreviations

Project Number B2506260
Geotechnical & Environmental Evaluation
Northern Lights 2027 Expansion Project

BORING: **BH-26 Minn IC 2nd Line**

LOCATION: Captured with RTK GPS. 341st Avenue NW. See attached sketch.

DATUM: NAD83 / UTM zone 11N

NORTHING: 5327882.8 EASTING: 2343359.6

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SURFACE ELEVATION: 944.9 ft | RIG: 7505 | METHOD: 3 1/4" HSA | SURFACING: Grass | WEATHER: Sunny

Elev./ Depth ft	Water Level	Description of Materials (Soil-ASTM D2488 or 2487; Rock-USACE EM 1110-1-2908)	Sample	Blows (N-Value) Recovery	PID ppm	MC %	Tests or Remarks
		POORLY GRADED SAND (SP), fine to medium-grained, light brown, moist to wet, loose to medium dense (LACUSTRINE)	35	7-8-10 (18) 14"			
905.4							
39.5		SILT (ML), gray, moist, medium dense (GLACIAL TILL)	40	5-7-13 (20) 6"			
900.4							
44.5		SANDY SILTY CLAY (ML), trace Gravel, dark brown, moist, medium dense (GLACIAL TILL)	45	8-13-15 (28) 14"			
895.4							
49.5		POORLY GRADED SAND (SP), fine to medium-grained, dark brown, wet, medium dense (GLACIAL OUTWASH)	50	8-11-16 (27) 6"			
893.9							
51.0		SILTY SAND (SM), fine to medium-grained, trace Gravel, dark brown, wet, medium dense (GLACIAL OUTWASH)	55				
884.9							
60.0		SILTY CLAY (CL-ML), trace Gravel, reddish brown, moist, hard (GLACIAL TILL)	60	8-15-20 (35) 12"		15	LL=16, PL=12, PI=4

Continued on next page

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LOG OF BORING

See Descriptive Terminology sheet for explanation of abbreviations

Project Number B2506260
Geotechnical & Environmental Evaluation
Northern Lights 2027 Expansion Project

BORING: **BH-26 Minn IC 2nd Line**

LOCATION: Captured with RTK GPS. 341st Avenue NW. See attached sketch.

DATUM: NAD83 / UTM zone 11N

NORTHING: 5327882.8 EASTING: 2343359.6

DRILLER: K. Caudill | LOGGED BY: J. Franz | START DATE: 09/11/25 | END DATE: 09/11/25

SURFACE ELEVATION: 944.9 ft | RIG: 7505 | METHOD: 3 1/4" HSA | SURFACING: Grass | WEATHER: Sunny

Elev./ Depth ft	Water Level	Description of Materials (Soil-ASTM D2488 or 2487; Rock-USACE EM 1110-1-2908)	Sample	Blows (N-Value) Recovery	PID ppm	MC %	Tests or Remarks
875.4		SILTY CLAY (CL-ML), trace Gravel, reddish brown, moist, hard (GLACIAL TILL)					
69.5		SILTY SAND (SM), fine to medium-grained, brown, wet, very dense (GLACIAL OUTWASH)		20-27-36 (63) 14"		18	P200=37%
865.3							
79.6		END OF BORING Boring then grouted		50/1" (REF) 1"		10	Water observed at 12.0 feet while drilling.

65 70 75 80 85 90 95

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LOG OF BORING

See Descriptive Terminology sheet for explanation of abbreviations

Project Number B2506260
Geotechnical & Environmental Evaluation
Northern Lights 2027 Expansion Project

BORING: **BH-27 Minn IC 2nd Line**

LOCATION: Captured with RTK GPS. 341st Avenue NW. See attached sketch.

DATUM: NAD83 / UTM zone 11N

NORTHING: 5327968.1 EASTING: 2343433.0

DRILLER: K. Caudill | LOGGED BY: J. Franz | START DATE: 09/11/25 | END DATE: 09/11/25

SURFACE ELEVATION: 956.5 ft | RIG: 7505 | METHOD: 3 1/4" HSA | SURFACING: Soil | WEATHER: Sunny

Elev./ Depth ft	Water Level	Description of Materials (Soil-ASTM D2488 or 2487; Rock-USACE EM 1110-1-2908)	Sample	Blows (N-Value) Recovery	PID ppm	MC %	Tests or Remarks
952.5		SILTY SAND (SM), trace Gravel, brown, moist (TOPSOIL)		1-2-3-4 (5) 14"	0.3		BH-27 (0-2) collected on 9/8/25 @ 1600 for MDA 1, MDA 2, OC, RCRA metals
				0-2-3-4 (5) 14"	0.3		BH-27 (2-4) collected on 9/8/25 @ 1558 for BETX, DRO, and GRO
4.0		POORLY GRADED SAND with SILT (SP-SM), fine-grained, light brown, moist, loose to medium dense (LACUSTRINE)	5	0-2-3-3 (5) 14"	0.4		
				2-2-3-4 (5) 14"	0.2		
				4-6-9-9 (15) 16"	0.2		
			10	6-8-9-10 (17) 10"	0.2		
				8-8-6-7 (14) 14"	0.4		
				5-6-7-7 (13) 16"			
			15				
937.0							
19.5		POORLY GRADED SAND (SP), fine to medium-grained, light brown, moist to wet, medium dense (LACUSTRINE)	20	4-6-7 (13) 14"			
	▽		25	4-6-6 (12) 16"			
			30	5-7-8 (15) 14"			Drilling method switched to mud rotary

Continued on next page

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See Descriptive Terminology sheet for explanation of abbreviations

Project Number B2506260
Geotechnical & Environmental Evaluation
Northern Lights 2027 Expansion Project

BORING: **BH-27 Minn IC 2nd Line**

LOCATION: Captured with RTK GPS. 341st Avenue NW. See attached sketch.

DATUM: NAD83 / UTM zone 11N

NORTHING: 5327968.1 EASTING: 2343433.0

DRILLER: K. Caudill | LOGGED BY: J. Franz | START DATE: 09/11/25 | END DATE: 09/11/25

SURFACE ELEVATION: 956.5 ft | RIG: 7505 | METHOD: 3 1/4" HSA | SURFACING: Soil | WEATHER: Sunny

Elev./ Depth ft	Water Level	Description of Materials (Soil-ASTM D2488 or 2487; Rock-USACE EM 1110-1-2908)	Sample	Blows (N-Value) Recovery	PID ppm	MC %	Tests or Remarks
		POORLY GRADED SAND (SP), fine to medium-grained, light brown, moist to wet, medium dense (LACUSTRINE)	35	5-7-8 (15) 12"			
			40	5-7-9 (16) 12"			
			45	5-7-10 (17) 12"			
			50	5-8-11 (19) 12"			
			55				
897.0							
59.5		SILT (ML), trace Gravel, gray, wet, loose (GLACIOFLUVIUM) *With SILT layer at 60 feet*	60	10-11-12 (23) 6"		27	Non-plastic

Continued on next page

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See Descriptive Terminology sheet for explanation of abbreviations

Project Number B2506260
Geotechnical & Environmental Evaluation
Northern Lights 2027 Expansion Project

BORING: **BH-27 Minn IC 2nd Line**

LOCATION: Captured with RTK GPS. 341st Avenue NW. See attached sketch.

DATUM: NAD83 / UTM zone 11N

NORTHING: 5327968.1 EASTING: 2343433.0

DRILLER: K. Caudill | LOGGED BY: J. Franz | START DATE: 09/11/25 | END DATE: 09/11/25

SURFACE ELEVATION: 956.5 ft | RIG: 7505 | METHOD: 3 1/4" HSA | SURFACING: Soil | WEATHER: Sunny

Elev./ Depth ft	Water Level	Description of Materials (Soil-ASTM D2488 or 2487; Rock-USACE EM 1110-1-2908)	Sample	Blows (N-Value) Recovery	PID ppm	MC %	Tests or Remarks
		SILT (ML), trace Gravel, gray, wet, loose (GLACIOFLUVIUM)					
887.0							
69.5		POORLY GRADED SAND (SP), fine to medium-grained, brown, wet (GLACIOFLUVIUM)		10-13-15 (28) 12"		24	P200=5%
877.0							
79.5		SANDY SILT (ML), fine-grained, red, wet, medium dense (GLACIOFLUVIUM)		10-14-14 (28) 12"		23	P200=80%
875.5							
81.0		END OF BORING Boring then grouted					Water observed at 25.0 feet while drilling.

65 70 75 80 85 90 95

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See Descriptive Terminology sheet for explanation of abbreviations

Project Number B2506260
Geotechnical & Environmental Evaluation
Northern Lights 2027 Expansion Project

BORING: **BH-28 Minn IC 2nd Line**

LOCATION: Captured with RTK GPS. 341st Avenue NW. See attached sketch.

DATUM: NAD83 / UTM zone 11N

NORTHING: 5328034.9 EASTING: 2343466.9

DRILLER: K. Caudill | LOGGED BY: J. Franz | START DATE: 09/11/25 | END DATE: 09/11/25

SURFACE ELEVATION: 951.4 ft | RIG: 7505 | METHOD: 3 1/4" HSA | SURFACING: Grass | WEATHER: Cloudy

Elev./ Depth ft	Water Level	Description of Materials (Soil-ASTM D2488 or 2487; Rock-USACE EM 1110-1-2908)	Sample	Blows (N-Value) Recovery	PID ppm	MC %	Tests or Remarks
949.4		SILTY SAND (SM), trace roots, dark brown, moist (TOPSOIL)		1-3-5-8 (8) 14"	94.7		BH-28 (0-2) collected on 9/9/25 @ 1145 for MDA 1, MDA 2, OC, RCRA metals
2.0		POORLY GRADED SAND with SILT (SP-SM), brown, moist (LACUSTRINE)		5-5-6-7 (11) 16"	5.3		BH-28 (2-4) collected on 9/9/2025 @ 1155 for GRO, DRO, BETX
			5	6-8-8-9 (16) 16"	2.9		
944.4				4-6-8-9 (14) 16"	1.0		
7.0		POORLY GRADED SAND (SP), fine to medium-grained, light brown, moist to wet (LACUSTRINE)		5-6-4-6 (10) 16"	0.9		
			10	4-4-4-5 (8) 16"	0.6		
				4-5-6-7 (11) 16"	1.3		
				5-5-6-5 (11) 16"	1.5		
	▽		20	3-3-4 (7) 16"	0.9		Wet below 20 feet
			25	4-5-5 (10) 12"	1.0		
			30	2-3-4 (7) 10"			

Continued on next page

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LOG OF BORING

See Descriptive Terminology sheet for explanation of abbreviations

Project Number B2506260
Geotechnical & Environmental Evaluation
Northern Lights 2027 Expansion Project

BORING: **BH-28 Minn IC 2nd Line**

LOCATION: Captured with RTK GPS. 341st Avenue NW. See attached sketch.

DATUM: NAD83 / UTM zone 11N

NORTHING: 5328034.9 EASTING: 2343466.9

DRILLER: K. Caudill | LOGGED BY: J. Franz | START DATE: 09/11/25 | END DATE: 09/11/25

SURFACE ELEVATION: 951.4 ft | RIG: 7505 | METHOD: 3 1/4" HSA | SURFACING: Grass | WEATHER: Cloudy

Elev./ Depth ft	Water Level	Description of Materials (Soil-ASTM D2488 or 2487; Rock-USACE EM 1110-1-2908)	Sample	Blows (N-Value) Recovery	PID ppm	MC %	Tests or Remarks
916.9		POORLY GRADED SAND (SP), fine to medium-grained, light brown, moist to wet (LACUSTRINE)					
34.5		SANDY SILT (ML), fine to medium-grained, with Gravel, gray, wet to moist, medium dense to dense (GLACIAL TILL)	35	6-7-9 (16) 14"		24	LL=22, PL=20, PI=2
			40	5-7-8 (15) 14"		25	
		SILTY SAND layer at 45 feet	45	12-15-18 (33) 14"		14	P200=29%
		LEAN CLAY layer at 50 feet	50	5-8-10 (18) 12"		18	LL=13, PL=12, PI=1
			55				
890.4			60	5-6-7 (13) 12"			
61.0		END OF BORING Boring then grouted					Water observed at 20.0 feet while drilling.

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See Descriptive Terminology sheet for explanation of abbreviations

Project Number B2506260
Geotechnical & Environmental Evaluation
Northern Lights 2027 Expansion Project

BORING: **BH-28A Minn IC 2nd Line**

LOCATION: Captured with RTK GPS. 341st Avenue NW. See attached sketch.

DATUM: NAD83 / UTM zone 11N

NORTHING: 5328034.9 EASTING: 2343466.9

DRILLER: K. Caudill | LOGGED BY: J. Franz | START DATE: 09/11/25 | END DATE: 09/11/25

SURFACE ELEVATION: 951.4 ft | RIG: 7505 | METHOD: 3 1/4" HSA | SURFACING: Grass | WEATHER: Sunny

Elev./ Depth ft	Water Level	Description of Materials (Soil-ASTM D2488 or 2487; Rock-USACE EM 1110-1-2908)	Sample	Blows (N-Value) Recovery	PID ppm	MC %	Tests or Remarks
950.8							
0.6		SILTY SAND (SM), trace roots, dark brown, moist (TOPSOIL)		1-1-2-3 (3) 14"	2.6		BH-28A (0-2) collected on 9/12/25 @ 0910 for MDA 1, MDA 2, OC, RCRA metals
		POORLY GRADED SAND (SP), fine to medium-grained, light brown to gray, wet, loose to medium dense (LACUSTRINE)		2-3-4-4 (7) 12"	4.4		BH-28A(2-4) collected on 9/12/25 @ 0920 for GRO, DRO, BETX
				2-2-3-3 (5) 14"			
			5	2-3-5-5 (8) 14"			
				2-4-5-5 (9) 24"			
			10	2-3-4-4 (7) 24"			
				2-2-2-3 (4) 24"			
				2-2-3-4 (5) 24"			
			15				
			20	2-3-6 (9) 14"			
	▽		25	3-5-7 (12) 14"			
921.9							
29.5		SILTY SAND (SM), fine to coarse-grained, trace Gravel, gray to red, wet, loose to medium dense (GLACIAL TILL)	30	6-5-7 (12) 12"			

Continued on next page

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LOG OF BORING

See Descriptive Terminology sheet for explanation of abbreviations

Project Number B2506260
Geotechnical & Environmental Evaluation
Northern Lights 2027 Expansion Project

BORING: **BH-28A Minn IC 2nd Line**

LOCATION: Captured with RTK GPS. 341st Avenue NW. See attached sketch.

DATUM: NAD83 / UTM zone 11N

NORTHING: 5328034.9 EASTING: 2343466.9

DRILLER:	K. Caudill	LOGGED BY:	J. Franz	START DATE:	09/11/25	END DATE:	09/11/25
SURFACE ELEVATION:	951.4 ft	RIG:	7505	METHOD:	3 1/4" HSA	SURFACING:	Grass	WEATHER:	Sunny

Elev./ Depth ft	Water Level	Description of Materials (Soil-ASTM D2488 or 2487; Rock-USACE EM 1110-1-2908)	Sample	Blows (N-Value) Recovery	PID ppm	MC %	Tests or Remarks
		SILTY SAND (SM), fine to coarse-grained, trace Gravel, gray to red, wet, loose to medium dense (GLACIAL TILL)	35	6-8-13 (21) 10"		12	P200=30%
			40	9-12-16 (28) 12"		12	
906.9 44.5		SILTY SAND (SM), fine-grained, trace Gravel, red, wet, medium dense to loose (GLACIAL TILL)	45	5-8-8 (16) 10"		18	Non-plastic P200=47%
			50	2-3-5 (8) 12"		17	
891.9			55				
59.5 890.4		POORLY GRADED SAND with SILT (SP-SM), fine to medium-grained, red, wet, dense (GLACIAL OUTWASH)	60	12-18-25 (43) 14"		21	P200=57%
61.0		END OF BORING					Water observed at 25.0 feet while drilling.
		Boring then grouted					

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LOG OF BORING

See Descriptive Terminology sheet for explanation of abbreviations

Project Number B2506260
Geotechnical & Environmental Evaluation
Northern Lights 2027 Expansion Project

BORING: **BH-29 Minn IC 2nd Line**

LOCATION: Captured with RTK GPS. 341st Avenue NW. See attached sketch.

DATUM: NAD83 / UTM zone 11N

NORTHING: 5328525.5 EASTING: 2344082.7

DRILLER: K. Caudill | LOGGED BY: J. Franz | START DATE: 09/11/25 | END DATE: 09/11/25

SURFACE ELEVATION: 951.2 ft | RIG: 7505 | METHOD: 3 1/4" HSA | SURFACING: Grass | WEATHER: Cloudy

Elev./ Depth ft	Water Level	Description of Materials (Soil-ASTM D2488 or 2487; Rock-USACE EM 1110-1-2908)	Sample	Blows (N-Value) Recovery	PID ppm	MC %	Tests or Remarks
		SILTY SAND (SM), fine to medium-grained, brown, moist, loose (LACUSTRINE)		1-2-2-3 (4) 16"	0.1		BH-29 (0-2) collected on 9/10/25 @ 1100 for MDA 1, MDA 2, OC, RCRA metals
				0-1-4-6 (5) 12"	0.0		BH-29 (2-4) collected on 9/10/25 @ 1110 for GRO, DRO, BETX
			5	0-4-4-4 (8) 14"	0.0		
945.2 6.0		POORLY GRADED SAND with SILT (SP-SM), fine to medium-grained, brown, moist, loose (LACUSTRINE)		2-2-3-3 (5) 14"	0.0		
941.2				1-2-3-4 (5) 14"	0.2		
10.0		POORLY GRADED SAND with SILT (SP-SM), fine to medium-grained, light brown, moist, medium dense to loose (LACUSTRINE)	10	4-4-5-6 (9) 16"	0.6		
				4-4-5-5 (9) 16"	0.6		
			15	7-5-6-5 (11) 16"	0.6	6	P200=6%
931.7 19.5	▽	SILTY SAND (SM), fine to medium-grained, brown, moist, loose (LACUSTRINE)	20	3-4-5 (9) 16"	0.6	11	Wet below 20 feet P200=14%
926.7 24.5		CLAYEY SAND (SC), fine to coarse-grained, trace Gravel, brown and gray, wet, very stiff (GLACIAL TILL)	25	8-9-12 (21) 14"	0.6	17	LL=24, PL=16, PI=8
921.7 29.5		SANDY SILT (ML), trace Gravel, red, wet, medium dense (GLACIAL TILL)	30	9-9-13 (22) 12"		16	

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LOG OF BORING

See Descriptive Terminology sheet for explanation of abbreviations

Project Number B2506260
Geotechnical & Environmental Evaluation
Northern Lights 2027 Expansion Project

BORING: **BH-29 Minn IC 2nd Line**

LOCATION: Captured with RTK GPS. 341st Avenue NW. See attached sketch.

DATUM: NAD83 / UTM zone 11N

NORTHING: 5328525.5 EASTING: 2344082.7

DRILLER: K. Caudill | LOGGED BY: J. Franz | START DATE: 09/11/25 | END DATE: 09/11/25

SURFACE ELEVATION: 951.2 ft | RIG: 7505 | METHOD: 3 1/4" HSA | SURFACING: Grass | WEATHER: Cloudy

Elev./ Depth ft	Water Level	Description of Materials (Soil-ASTM D2488 or 2487; Rock-USACE EM 1110-1-2908)	Sample	Blows (N-Value) Recovery	PID ppm	MC %	Tests or Remarks
		SANDY SILT (ML), trace Gravel, red, wet, medium dense (GLACIAL TILL)	35	4-7-10 (17) 14"			
911.7							
39.5		SILTY SAND (SM), fine to medium-grained, trace Gravel, red, wet, medium dense (GLACIAL TILL)	40	3-5-7 (12) 14"			
906.7							
44.5		SANDY SILT (ML), trace Gravel, red, wet, very loose (GLACIAL TILL)	45	2-1-2 (3) 18"			
901.7							
49.5		SILTY SAND (SM), fine to medium-grained, trace Gravel, red, wet, medium dense (GLACIAL TILL)	50	5-8-10 (18) 10"			
			55				
891.7							
59.5		CLAYEY SAND (SC), fine to medium-grained, gray, wet, very dense (GLACIAL OUTWASH)	60	23-25-30 (55) 12"			
890.2							
61.0		END OF BORING Boring then grouted					Water observed at 20.0 feet while drilling.

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LOG OF BORING

See Descriptive Terminology sheet for explanation of abbreviations

Project Number B2506260
Geotechnical & Environmental Evaluation
Northern Lights 2027 Expansion Project

BORING: **BH-30 Minn IC 2nd Line**

LOCATION: Captured with RTK GPS. 341st Avenue NW. See attached sketch.

DATUM: NAD83 / UTM zone 11N

NORTHING: 5328616.0 EASTING: 2344652.4

DRILLER: K. Caudill | LOGGED BY: J. Franz | START DATE: 09/11/25 | END DATE: 09/11/25

SURFACE ELEVATION: 940.2 ft | RIG: 7505 | METHOD: 3 1/4" HSA | SURFACING: Grass | WEATHER: Cloudy

Elev./ Depth ft	Water Level	Description of Materials (Soil-ASTM D2488 or 2487; Rock-USACE EM 1110-1-2908)	Sample	Blows (N-Value) Recovery	PID ppm	MC %	Tests or Remarks
939.7							
0.5		SILTY SAND (SM), trace roots, dark brown, moist (TOPSOIL)		2-3-4-2 (7) 16"	1.0		BH-30 (0-2) collected on 9/10/25 @ 1540 for MDA 1, MDA 2, OC, RCRA metals
		POORLY GRADED SAND with SILT (SP-SM), brown, moist (LACUSTRINE)		3-4-4-3 (8) 14"	0.8		BH-30 (2-4) collected on 9/10/25 @ 1545 for GRO, DRO, BETX
			5	4-6-6-8 (12) 14"	1.3		
				6-9-9-10 (18) 16"	1.5		
932.2							
8.0		POORLY GRADED SAND with SILT (SP-SM), fine to medium-grained, light brown, moist to wet, medium dense to very loose (LACUSTRINE)		4-6-5-6 (11) 16"	1.5		
			10	3-5-6-4 (11) 16"	1.4		Wet below 11 feet
	▽			2-2-2-2 (4) 16"			
926.2							
14.0		POORLY GRADED SAND (SP), fine to medium-grained, light brown to gray, wet, very loose to loose (LACUSTRINE)	15	0-2-2-2 (4) 14"			
			20	4-1-1 (2) 10"			
			25	2-2-4 (6) 10"			
			30	2-3-4 (7) 12"		28	P200=2%

Continued on next page

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LOG OF BORING

See Descriptive Terminology sheet for explanation of abbreviations

Project Number B2506260
Geotechnical & Environmental Evaluation
Northern Lights 2027 Expansion Project

BORING: **BH-30 Minn IC 2nd Line**

LOCATION: Captured with RTK GPS. 341st Avenue NW. See attached sketch.

DATUM: NAD83 / UTM zone 11N

NORTHING: 5328616.0 EASTING: 2344652.4

DRILLER: K. Caudill | LOGGED BY: J. Franz | START DATE: 09/11/25 | END DATE: 09/11/25

SURFACE ELEVATION: 940.2 ft | RIG: 7505 | METHOD: 3 1/4" HSA | SURFACING: Grass | WEATHER: Cloudy

Elev./ Depth ft	Water Level	Description of Materials (Soil-ASTM D2488 or 2487; Rock-USACE EM 1110-1-2908)	Sample	Blows (N-Value) Recovery	PID ppm	MC %	Tests or Remarks
		POORLY GRADED SAND (SP), fine to medium-grained, light brown to gray, wet, very loose to loose (LACUSTRINE)	35	2-2-3 (5) 10"			
900.7							
39.5		LEAN CLAY (CL), SILT layers, gray, wet, loose (GLACIOFLUVIUM)	40	2-3-4 (7) 16"		38	LL=48, PL=22, PI=26
895.7							
44.5		SILTY SAND (SM), fine to medium-grained, brown, wet, medium dense (GLACIOFLUVIUM)	45	9-11-12 (23) 12"		29	P200=33%
890.7							
49.5		SANDY SILT (ML), trace Gravel, brown, wet, medium dense (GLACIAL TILL)	50	6-6-7 (13) 12"			
			55				
			60	6-8-11 (19) 12"			
879.2							
61.0		END OF BORING Boring then grouted					Water observed at 11.0 feet while drilling.

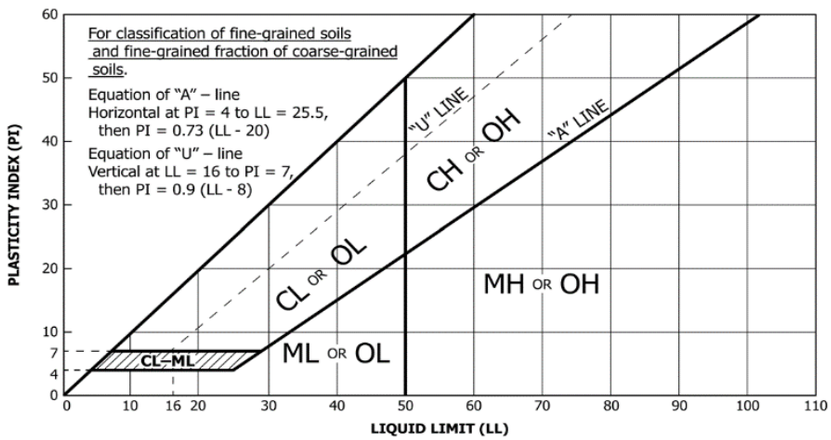
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Descriptive Terminology of Soil

Based on Standards ASTM D2487/2488
(Unified Soil Classification System)

Criteria for Assigning Group Symbols and Group Names Using Laboratory Tests[A]				Soil Classification	
				Group Symbol	Group Name[B]
Coarse-grained Soils (more than 50% retained on No. 200 sieve)	Gravels (More than 50% of coarse fraction retained on No. 4 sieve)	Clean Gravels (Less than 5% fines[C])	$C_u \geq 4$ and $1 \leq C_c \leq 3^D$	GW	Well-graded gravel[E]
			$C_u < 4$ and/or ($C_c < 1$ or $C_c > 3$)[D]	GP	Poorly graded gravel[E]
		Gravels with Fines (More than 12% fines[C])	Fines classify as ML or MH	GM	Silty gravel[E F G]
			Fines Classify as CL or CH	GC	Clayey gravel[E F G]
	Sands (50% or more coarse fraction passes No. 4 sieve)	Clean Sands (Less than 5% fines[H])	$C_u \geq 6$ and $1 \leq C_c \leq 3^D$	SW	Well-graded sand[I]
			$C_u < 6$ and/or ($C_c < 1$ or $C_c > 3$)[D]	SP	Poorly graded sand[I]
		Sands with Fines (More than 12% fines[H])	Fines classify as ML or MH	SM	Silty sand[F G I]
			Fines classify as CL or CH	SC	Clayey sand[F G I]
Fine-grained Soils (50% or more passes the No. 200 sieve)	Silts and Clays (Liquid limit less than 50)	Inorganic	PI > 7 and plots on or above "A" line[J]	CL	Lean clay[K L M]
			PI < 4 or plots below "A" line[J]	ML	Silt[K L M]
		Organic	Liquid Limit – oven dried / Liquid Limit – not dried <0.75	OL	Organic clay[K L M N] / Organic silt[K L M O]
	Silts and Clays (Liquid limit 50 or more)	Inorganic	PI plots on or above "A" line	CH	Fat clay[K L M]
			PI plots below "A" line	MH	Elastic silt[K L M]
		Organic	Liquid Limit – oven dried / Liquid Limit – not dried <0.75	OH	Organic clay[K L M P] / Organic silt[K L M Q]
Highly Organic Soils		Primarily organic matter, dark in color, and organic odor		PT	Peat

A. Based on the material passing the 3-inch (75-mm) sieve.
B. If field sample contained cobbles or boulders, or both, add "with cobbles or boulders, or both" to group name.
C. Gravels with 5 to 12% fines require dual symbols:
   GW-GM well-graded gravel with silt
   GW-GC well-graded gravel with clay
   GP-GM poorly graded gravel with silt
   GP-GC poorly graded gravel with clay
D. $C_u = D_{60} / D_{10}$ $C_c = (D_{30})^2 / (D_{10} \times D_{60})$
E. If soil contains ≥ 15% sand, add "with sand" to group name.
F. If fines classify as CL-ML, use dual symbol GC-GM or SC-SM.
G. If fines are organic, add "with organic fines" to group name.
H. Sands with 5 to 12% fines require dual symbols:
   SW-SM well-graded sand with silt
   SW-SC well-graded sand with clay
   SP-SM poorly graded sand with silt
   SP-SC poorly graded sand with clay
I. If soil contains ≥ 15% gravel, add "with gravel" to group name.
J. If Atterberg limits plot in hatched area, soil is CL-ML, silty clay.
K. If soil contains 15 to < 30% plus No. 200, add "with sand" or "with gravel", whichever is predominant.
L. If soil contains ≥ 30% plus No. 200, predominantly sand, add "sandy" to group name.
M. If soil contains ≥ 30% plus No. 200 predominantly gravel, add "gravelly" to group name.
N. PI ≥ 4 and plots on or above "A" line.
O. PI < 4 or plots below "A" line.
P. PI plots on or above "A" line.
Q. PI plots below "A" line.



Laboratory Tests

DD	Dry density, pcf	**q_p**	Pocket penetrometer strength, tsf
WD	Wet density, pcf	**q_U**	Unconfined compression test, tsf
P200	% Passing #200 sieve	**LL**	Liquid limit
MC	Moisture content, %	**PL**	Plastic limit
OC	Organic content, %	**PI**	Plasticity index

Particle Size Identification

Boulders..... over 12"
Cobbles..... 3" to 12"
Gravel
  Coarse..... 3/4" to 3" (19.00 mm to 75.00 mm)
  Fine..... No. 4 to 3/4" (4.75 mm to 19.00 mm)
Sand
  Coarse..... No. 10 to No. 4 (2.00 mm to 4.75 mm)
  Medium..... No. 40 to No. 10 (0.425 mm to 2.00 mm)
  Fine..... No. 200 to No. 40 (0.075 mm to 0.425 mm)
Silt..... No. 200 (0.075 mm) to .005 mm
Clay..... < .005 mm

Relative Proportions[L,M]

trace..... 0 to 5%
little..... 6 to 14%
with..... ≥ 15%

Inclusion Thicknesses

lens..... 0 to 1/8"
seam..... 1/8" to 1"
layer..... over 1"

Apparent Relative Density of Cohesionless Soils

Very loose ..... 0 to 4 BPF
Loose ..... 5 to 10 BPF
Medium dense..... 11 to 30 BPF
Dense..... 31 to 50 BPF
Very dense..... over 50 BPF

Consistency of Cohesive Soils	Blows Per Foot	Approximate Unconfined Compressive Strength
Very soft	0 to 1 BPF	< 0.25 tsf
Soft	2 to 4 BPF	0.25 to 0.5 tsf
Medium	5 to 8 BPF	0.5 to 1 tsf
Stiff	9 to 15 BPF	1 to 2 tsf
Very Stiff	16 to 30 BPF	2 to 4 tsf
Hard	over 30 BPF	> 4 tsf

Moisture Content:

Dry: Absence of moisture, dusty, dry to the touch.
Moist: Damp but no visible water.
Wet: Visible free water, usually soil is below water table.

Drilling Notes:

Blows/N-value: Blows indicate the driving resistance recorded for each 6-inch interval. The reported N-value is the blows per foot recorded by summing the second and third interval in accordance with the Standard Penetration Test, ASTM D1586.

Partial Penetration: If the sampler could not be driven through a full 6-inch interval, the number of blows for that partial penetration is shown as #/x" (i.e. 50/2"). The N-value is reported as "REF" indicating refusal.

Recovery: Indicates the inches of sample recovered from the sampled interval. For a standard penetration test, full recovery is 18", and is 24" for a thinwall/shelby tube sample.

WOH: Indicates the sampler penetrated soil under weight of hammer and rods alone; driving not required.

WOR: Indicates the sampler penetrated soil under weight of rods alone; hammer weight and driving not required.

Water Level: Indicates the water level measured by the drillers either while drilling (▽), at the end of drilling (▼), or at some time after drilling (▽▼).

Sample Symbols

Standard Penetration Test
Modified California (MC)
Auger
Grab Sample
Rock Core
Thinwall (TW)/Shelby Tube (SH)
Texas Cone Penetrometer
Dynamic Cone Penetrometer

5/2021

Alexandria 2nd Branch Line

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Factual Geotechnical Data Report

NNG Northern Lights 2027 – Alexandria 2nd Line

Intersection of 140th Street and 85th Avenue
Little Falls, Minnesota

Prepared for

Stantec Consulting Services, Inc.

Professional Certification:
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.

Richard S. Jett, PE
Senior Engineer
License Number: 58781
December 12, 2025



Braun Intertec Corporation
Project B2506260

December 12, 2025 Project B2506260

Ginger Chan
Stantec Consulting Services, Inc.
200-325 25 Street SE
Calgary, AB T2A 7H8

Re: Factual Geotechnical Data Report
NNG Northern Lights 2027 – Alexandria 2nd Line
Intersection of 140th Street and 85th Avenue
Little Falls, Minnesota

Dear Ms. Chan:

We are pleased to present this factual geotechnical data report for the above referenced project.

Thank you for making Braun Intertec Corporation (Braun Intertec) your geotechnical consultant for this project. If you have questions about this report, or if there are other services that we can provide in support of our work to date, please contact Richard Jett at 815.545.7059 (rjett@braunintertec.com) or Chad Lukkarila at 952.995.2322 (clukkarila@braunintertec.com).

Sincerely,
Braun Intertec Corporation

Richard S. Jett, PE
Senior Engineer

Chad R. Lukkarila, PE
Associate Director, Senior Engineer

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Appendix

Soil Boring Location Sketch

Log of Boring Sheets BH-01 through BH-03 and BH-01A through BH-04A

Descriptive Terminology of Soil

List of Tables

Table 2-1. Subsurface Profile Summary 1

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1.1 Scope of Services

We performed our scope of services for the project in accordance with the task order from Stantec Consulting Services, Inc. dated July 15, 2025, Change Order #1 dated August 21, 2025, and Change Order #2 dated September 25, 2025.The following list describes the geotechnical tasks completed in accordance with our authorized scope of services.

- Reviewing the background information and reference documents previously cited.
- Coordinating the clearance of the exploration locations of public underground utilities.
- Performing seven standard penetration test (SPT) borings, denoted as BH-01 through BH-03 and BH-01A through BH-04A to nominal depths ranging from 40 to 140 feet below grade across the site.
- Performing laboratory testing on samples selected by Braun Intertec Corporation with input from Stantec Consulting Services, Inc.
- Preparing this report containing a boring location sketch, logs of soil borings, a summary of the soils encountered, and results of laboratory tests performed on select soil samples.

We performed this geotechnical data collection concurrently with environmental screening and laboratory testing, the results of which will be submitted under separate cover. The project team should review the environmental report in conjunction with this geotechnical evaluation report to understand both the geotechnical and environmental aspects of the site and how they may impact one another.

2.0 Results

2.1 Boring Results

Table 2-1 provides a summary of the soil boring results, in the general order we encountered the strata. Please refer to the Log of Boring sheets in the Appendix for additional details. The Descriptive Terminology sheet in the Appendix includes definitions of abbreviations used in the table below.

Table 2-1. Subsurface Profile Summary

Strata	Soil Type -ASTM Classification	Range of Penetration Resistances (N Values)	Commentary and Details
Topsoil[1] / Topsoil fill	SM	7 to 9	▪ Observed at the boring locations with thicknesses ranging from approximately 1/2 feet to 2 feet. ▪ Generally dark brown to brown in color. ▪ Moisture conditions were generally moist.

Strata	Soil Type -ASTM Classification	Range of Penetration Resistances (N Values)	Commentary and Details
Fill[2]	SC, SM, SP	8 to 12	▪ Observed in Borings BH-01A and 02A below the surficial soils and extended to a depth of approximately 4 to 8 feet below existing grade. ▪ Generally consisted of brown clay and silt laden soils with some more granular soils. ▪ Moisture conditions were generally moist. ▪ Trace amounts of gravel were encountered.
Glacial deposits	SW-SM, SP, SP-SM, SM, GP	14 to 50+	▪ Observed at the boring locations below the surficial soils and fill soils and extended to the termination depths of the borings. ▪ Relative densities of the granular soils were generally dense to very dense with isolated zones of medium dense soils. ▪ Relative consistencies of the clay and silt laden soils were generally stiff to hard with isolated zones of soft to medium soils. ▪ Variable amounts of gravel; likely contains cobbles and boulders. ▪ Moisture conditions were generally moist to wet.
	SC, CL, ML	4 to 50+	

[1]We did not perform gradation analysis on the apparent topsoil encountered, in accordance with our scope of work. Therefore, we cannot conclusively determine if the encountered material satisfies a particular specification, and it should not be assumed it is suitable for reuse.

[2]For simplicity in this report, we define existing fill to mean existing, uncontrolled, or undocumented fill.

The exploration locations completed at this site were denoted as BH-01 through BH-03 and BH-01A through BH-04A. The exploration locations were selected by Stantec and performed near the approximate locations as indicated in the attached Soil Boring Location Sketch. Stantec provided us with the surface elevations and GPS coordinates of the boring locations.

2.2 Groundwater

Apparent groundwater was observed at six of the seven completed boring locations at depths ranging from approximately 16 to 33 feet below existing grade (approximate elevations ranging from 1129 to 1162 1/2 feet). Groundwater may take days or longer to reach equilibrium in the boreholes and we immediately backfilled the boreholes, in accordance with our scope of work. If the project team identifies a need for more accurate determination of groundwater depth, we can install piezometers and complete a groundwater monitoring program.

Table 2-2 summarizes the depths where we observed groundwater; the attached Log of Boring sheets in the Appendix also include this information and additional details.

Table 2-2. Groundwater Summary

Locations	Surface Elevation (feet)	Measured Depth to Groundwater (feet)	Corresponding Groundwater Elevation (feet)
BH-1	1163.4	18 1/2	1145
BH-1A	1181.3	19	1162 1/2
BH-2	1160.4	None Observed	None Observed
BH-2A	1178.6	19	1160
BH-3	1167.4	20 1/2	1147
BH-3A	1175.6	16	1160
BH-4A	1161.8	33	1129

2.3 Laboratory Test Results

The boring logs show the results of laboratory testing we performed next to the tested sample depth. The Appendix contains the results of these tests.

Moisture content tests performed on select soil samples indicated moisture contents ranging from 9 to 23 percent moisture by weight. Sieve analysis tests performed on select soil samples indicated from 8 to 97 percent particles, by weight, passing the No. 200 sieve. Atterberg limit tests performed on select soil samples indicated liquid limits ranging form 25 to 34 percent moisture and plastic limits ranging from 15 to 29 percent moisture. A dry density test performed at a depth of approximately 60 feet below existing grade in Boring BH-4A indicated a dry density of 128pcf.

3.0 Procedures

3.1 Penetration Test Borings

We drilled the penetration test borings with an All-Terrain Vehicle (ATV)-mounted core and auger drill equipped with hollow-stem auger. We performed the borings in general accordance with ASTM D6151 taking penetration test samples at 2 1/2- or 5-foot intervals in general accordance with ASTM D1586. The boring logs show the actual sample intervals and corresponding depths.

We sealed penetration test boreholes meeting the Minnesota Department of Health (MDH) Environmental Borehole criteria with an MDH-approved grout.

3.2 Exploration Logs

3.2.1 Log of Boring Sheets

The Appendix includes Log of Boring sheets for our penetration test borings. The logs identify and describe the penetrated geologic materials and present the results of penetration resistance and other in-situ tests performed. The logs also present the results of organic vapor screening, laboratory tests performed on penetration test samples, and groundwater measurements.

We inferred strata boundaries from changes in the penetration test samples and the auger cuttings. Because we did not perform continuous sampling, the strata boundary depths are only approximate. The boundary depths likely vary away from the boring locations, and the boundaries themselves may occur as gradual rather than abrupt transitions.

3.2.2 Organic Vapor Screening

We conducted the geotechnical exploration concurrently with on-site environmental screening and provided the results of the screening under separate cover. The project team should review the environmental report in conjunction with this geotechnical data report to understand both the geotechnical and environmental aspects of the site and how they may impact one another.

An environmental technician examined soil samples from the borings for staining, odors, and other apparent signs of contamination within the top 20 feet of each boring. In addition, the environmental technician screened the soil samples for the presence of organic vapors using a photoionization detector (PID). The boring logs in the Appendix include the PID results, which we discuss further in the companion environmental report.

3.2.3 Geologic Origins

We assigned geologic origins to the materials shown on the logs and referenced within this report, based on: (1) a review of the background information and reference documents cited above, (2) visual classification of the various geologic material samples retrieved during the course of our subsurface exploration, (3) penetration resistance and other in-situ testing performed for the project, (4) laboratory test results, and (5) available common knowledge of the geologic processes and environments that have impacted the site and surrounding area in the past .

3.3 Material Classification and Testing

3.3.1 Visual and Manual Classification

We visually and manually classified the geologic materials encountered based on ASTM D2488. When we performed laboratory classification tests, we used the results to classify the geologic materials in accordance with ASTM D2487. The Appendix includes a chart explaining the classification system we used.

3.3.2 Laboratory Testing

The exploration logs in the Appendix note the results of the laboratory tests performed on geologic material samples. We performed the tests in general accordance with ASTM procedures.

3.4 Groundwater Measurements

The drillers checked for groundwater while advancing the penetration test borings, and again after auger withdrawal. We then filled the boreholes noted on the boring logs.

4.0 Qualifications

4.1 Variations in Subsurface Conditions

4.1.1 Material Strata

We developed our site data from a limited amount of site and subsurface information. It is not standard engineering practice to retrieve material samples from exploration locations continuously with depth. Therefore, we must infer strata boundaries and thicknesses to some extent. Strata boundaries may also be gradual transitions, and project planning should expect the strata to vary in depth, elevation, and thickness, away from the exploration locations.

Variations in subsurface conditions present between exploration locations may not be revealed until performing additional exploration work or starting construction.

4.1.2 Groundwater Levels

We made groundwater measurements under the conditions reported herein and shown on the exploration logs and interpreted in the text of this report. Note that the observation periods were relatively short, and project planning can expect groundwater levels to fluctuate in response to rainfall, flooding, irrigation, seasonal freezing and thawing, surface drainage modifications and other seasonal and annual factors.

4.2 Use of Report

This report is for the exclusive use of the addressed parties. Without written approval, we assume no responsibility to other parties regarding this report.

4.3 Standard of Care

In performing its services, Braun Intertec used that degree of care and skill ordinarily exercised under similar circumstances by reputable members of its profession currently practicing in the same locality. No warranty, express or implied, is made.

Appendix

Soil Boring Location Sketch
Log of Boring Sheets BH-1 through BH-3 and BH-1A through BH-4A
Descriptive Terminology of Soil

BRAUN
INTERTEC



Denotes Location of Proposed Boring

Access Path

N

0 200 400 Feet

1" = 400 Feet



BRAUN INTERTEC
the science you build on
11001 Hampshire Avenue S
Minneapolis, MN 55438
952.995.2000
braunintertec.com

Project No: B2506260

Drawing No: Boring Sketch Alexandria

Drawn By:	ZS
Date Drawn:	8/7/2025
Checked By:	RSJ
Last Modified:	12/11/2025

Alexandria 2nd Line

Alexandria

Morrison County, Minnesota

Boring Location Sketch

F:\2025\B2506260\GIS\B2506260\B2506260.aprx

BRAUN INTERTEC
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LOG OF BORING

See Descriptive Terminology sheet for explanation of abbreviations

Project Number B2506260
Geotechnical & Environmental Evaluation
Northern Lights 2027 Expansion Project

BORING: **BH-01 Alexandria 2nd Line**

LOCATION: Captured with RTK GPS. Intersection of 140th Street and 85th Avenue. See attached sketch.

DATUM: NAD83 / UTM zone 11N

NORTHING: 5342671.9 EASTING: 2242782.0

DRILLER: M. Hoppe | LOGGED BY: J. Franz | START DATE: 09/11/25 | END DATE: 09/15/25

SURFACE ELEVATION: 1163.4 ft | RIG: 7504 | METHOD: 3 1/4" HSA | SURFACING: Soil | WEATHER: Sunny

Elev./ Depth ft	Water Level	Description of Materials (Soil-ASTM D2488 or 2487; Rock-USACE EM 1110-1-2908)	Sample	Blows (N-Value) Recovery	PID ppm	MC %	Tests or Remarks
1162.9							
0.5		SILTY SAND (SM), fine to medium-grained, trace Gravel, dark brown, moist (TOPSOIL)		3-3-2-3 (5) 12"	2.5		BH-01 (0-2) collected on 09/15/25 @1108 for MDA 1, MDA 2, OC
1160.4		SANDY LEAN CLAY (CL), trace Gravel, brown, moist, medium (GLACIAL TILL)		3-4-4-3 (8) 6"	1.7		BH-01 (2-4) collected on 09/15/25 @1113 for RCRA metals
3.0		CLAYEY SAND (SC), fine to medium-grained, trace Gravel, brown to gray, moist, stiff (GLACIAL TILL)	5	5-5-4-4 (9) 12"	1.5	11	
				4-5-5-5 (10) 16"	1.6		BH-01 (4-6) collected on 09/15/25 @1058 for GRO, DRO, BETX
			10	5-4-5-5 (9) 14"	1.1	9	
				5-5-4-5 (9) 18"	1.6		
1149.4				12-10-18-50/ 2" (28) 16"	1.3		
14.0		SANDY SILT (ML), gray, moist, medium dense (GLACIAL TILL)	15	10-14-12-10 (26) 18"	1.2	15	P200=80%
	▽						Wet below 18 1/2 feet
1143.9							
19.5		CLAYEY SAND (SC), fine to medium-grained, trace organic, gray and brown, wet, very stiff (GLACIAL TILL)	20	12-14-14 (28) 6"	1.2	15	
1138.9							
24.5		SILTY SAND (SM), fine-grained, trace Gravel, gray, moist, dense (GLACIAL TILL)	25	16-17-18 (35) 16"	1.3		Drilling method switched to mud rotary at 25 feet
1133.9							
29.5		SILT (ML), gray, moist, medium dense (GLACIAL TILL)	30	14-15-15 (30) 12"			

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LOG OF BORING

See Descriptive Terminology sheet for explanation of abbreviations

Project Number B2506260
Geotechnical & Environmental Evaluation
Northern Lights 2027 Expansion Project

BORING: **BH-01 Alexandria 2nd Line**

LOCATION: Captured with RTK GPS. Intersection of 140th Street and 85th Avenue. See attached sketch.

DATUM: NAD83 / UTM zone 11N

NORTHING: 5342671.9 EASTING: 2242782.0

DRILLER: M. Hoppe | LOGGED BY: J. Franz | START DATE: 09/11/25 | END DATE: 09/15/25

SURFACE ELEVATION: 1163.4 ft | RIG: 7504 | METHOD: 3 1/4" HSA | SURFACING: Soil | WEATHER: Sunny

Elev./ Depth ft	Water Level	Description of Materials (Soil-ASTM D2488 or 2487; Rock-USACE EM 1110-1-2908)	Sample	Blows (N-Value) Recovery	PID ppm	MC %	Tests or Remarks
1128.9		SILT (ML), gray, moist, medium dense (GLACIAL TILL)					
34.5		CLAYEY SAND (SC), fine to medium-grained, trace Gravel, brown, moist, hard (GLACIAL TILL)	35	15-18-18 (36) 18"			
1123.9							
39.5		SILTY SAND (SM), fine to coarse-grained, trace Gravel, brown, wet, dense (GLACIAL OUTWASH)	40	12-16-15 (31) 16"			
1118.9							
44.5		SILT (ML), gray, moist, medium dense (GLACIAL TILL)	45	12-14-14 (28) 16"			
1113.9							
49.5		POORLY GRADED SAND (SP), fine to medium-grained, brown, wet (GLACIAL OUTWASH)	50	13-10-12 (22) 10"			
			55				
			60	12-16-14 (30) 16"			

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See Descriptive Terminology sheet for explanation of abbreviations

Project Number B2506260
Geotechnical & Environmental Evaluation
Northern Lights 2027 Expansion Project

BORING: **BH-01 Alexandria 2nd Line**

LOCATION: Captured with RTK GPS. Intersection of 140th Street and 85th Avenue. See attached sketch.

DATUM: NAD83 / UTM zone 11N

NORTHING: 5342671.9 EASTING: 2242782.0

DRILLER: M. Hoppe | LOGGED BY: J. Franz | START DATE: 09/11/25 | END DATE: 09/15/25

SURFACE ELEVATION: 1163.4 ft | RIG: 7504 | METHOD: 3 1/4" HSA | SURFACING: Soil | WEATHER: Sunny

Elev./ Depth ft	Water Level	Description of Materials (Soil-ASTM D2488 or 2487; Rock-USACE EM 1110-1-2908)	Sample	Blows (N-Value) Recovery	PID ppm	MC %	Tests or Remarks
		POORLY GRADED SAND (SP), fine to medium-grained, brown, wet (GLACIAL OUTWASH)					
			65				
			70	12-16-16 (32) 14"			
		POORLY GRADED GRAVEL layer from 74 to 76 feet	75				
			80	50/3" (REF) 2"			
			85				
1073.9 89.5		SILT (ML), dark gray, moist, hard to medium dense (GLACIAL TILL)	90	50/4" (REF) 3"			
			95				

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See Descriptive Terminology sheet for explanation of abbreviations

Project Number B2506260
Geotechnical & Environmental Evaluation
Northern Lights 2027 Expansion Project

BORING: **BH-01 Alexandria 2nd Line**

LOCATION: Captured with RTK GPS. Intersection of 140th Street and 85th Avenue. See attached sketch.

DATUM: NAD83 / UTM zone 11N

NORTHING: 5342671.9 EASTING: 2242782.0

DRILLER: M. Hoppe | LOGGED BY: J. Franz | START DATE: 09/11/25 | END DATE: 09/15/25

SURFACE ELEVATION: 1163.4 ft | RIG: 7504 | METHOD: 3 1/4" HSA | SURFACING: Soil | WEATHER: Sunny

Elev./ Depth ft	Water Level	Description of Materials (Soil-ASTM D2488 or 2487; Rock-USACE EM 1110-1-2908)	Sample	Blows (N-Value) Recovery	PID ppm	MC %	Tests or Remarks
		SILT (ML), dark gray, moist, hard to medium dense (GLACIAL TILL)					
100				16-50/2" (REF) 6"			
105							
110				12-14-18 (32) 18"			
115							
120				14-18-20 (38) 18"			
125							

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See Descriptive Terminology sheet for explanation of abbreviations

Project Number B2506260
Geotechnical & Environmental Evaluation
Northern Lights 2027 Expansion Project

BORING: **BH-01 Alexandria 2nd Line**

LOCATION: Captured with RTK GPS. Intersection of 140th Street and 85th Avenue. See attached sketch.

DATUM: NAD83 / UTM zone 11N

NORTHING: 5342671.9 EASTING: 2242782.0

DRILLER: M. Hoppe | LOGGED BY: J. Franz | START DATE: 09/11/25 | END DATE: 09/15/25

SURFACE ELEVATION: 1163.4 ft | RIG: 7504 | METHOD: 3 1/4" HSA | SURFACING: Soil | WEATHER: Sunny

Elev./ Depth ft	Water Level	Description of Materials (Soil-ASTM D2488 or 2487; Rock-USACE EM 1110-1-2908)	Sample	Blows (N-Value) Recovery	PID ppm	MC %	Tests or Remarks
		SILT (ML), dark gray, moist, hard to medium dense (GLACIAL TILL)					
130				12-10-16 (26) 16"			
135							
140				20-18-21 (39) 18"			
1022.4							
141.0		END OF BORING Boring then grouted					Water observed at 18.5 feet while drilling.
145							
150							
155							

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See Descriptive Terminology sheet for explanation of abbreviations

Project Number B2506260
Geotechnical & Environmental Evaluation
Northern Lights 2027 Expansion Project

BORING: **BH-02 Alexandria 2nd Line**

LOCATION: Captured with RTK GPS. Intersection of 140th Street and 85th Avenue. See attached sketch.

DATUM: NAD83 / UTM zone 11N

NORTHING: 5342976.1 EASTING: 2243482.7

DRILLER: M. Hoppe | LOGGED BY: J. Franz | START DATE: 09/16/25 | END DATE: 09/16/25

SURFACE ELEVATION: 1160.4 ft | RIG: 7504 | METHOD: 3 1/4" HSA | SURFACING: Soil | WEATHER: Sunny

Elev./ Depth ft	Water Level	Description of Materials (Soil-ASTM D2488 or 2487; Rock-USACE EM 1110-1-2908)	Sample	Blows (N-Value) Recovery	PID ppm	MC %	Tests or Remarks
~~1160.1~~							
0.3		SILTY SAND (SM), brown, moist (TOPSOIL)		4-4-5-3 (9) 16"	0.7		BH-02 (0-2) collected on 09/16/25 @0914 for MDA 1, MDA 2, OC
		CLAYEY SAND (SC), fine to medium-grained, trace Gravel, gray and brown, moist, soft to stiff (GLACIAL TILL)		2-2-2-2 (4) 16"	0.9		BH-02 (2-4) collected on 09/16/25 @0905 for GRO, DRO, BETX, RCRA metals
			5	2-3-2-2 (5) 18"	0.8		
				3-4-5-5 (9) 18"	0.7		
				4-4-5-6 (9) 18"	0.8		
1150.4			10				
10.0		SANDY LEAN CLAY (CL), trace Gravel, brown to dark brown, moist, stiff to hard (GLACIAL TILL)		12-16-14-12 (30) 18"	0.7		
				14-16-18-15 (34) 16"	0.8		
			15	16-18-15-15 (33) 16"	0.7		Drilling method switched to mud rotary at 16 feet
			20	14-16-18 (34) 18"			q_p=>4.5 tsf
1135.9							
24.5		LEAN CLAY (CL), trace Gravel, dark gray, moist, very stiff (GLACIAL TILL)	25	16-14-14 (28) 18"	0.5		
			30	12-15-15 (30) 16"			q_p=3 tsf
1128.4							
32.0							

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See Descriptive Terminology sheet for explanation of abbreviations

Project Number B2506260
Geotechnical & Environmental Evaluation
Northern Lights 2027 Expansion Project

BORING: **BH-02 Alexandria 2nd Line**

LOCATION: Captured with RTK GPS. Intersection of 140th Street and 85th Avenue. See attached sketch.

DATUM: NAD83 / UTM zone 11N

NORTHING: 5342976.1 EASTING: 2243482.7

DRILLER: M. Hoppe | LOGGED BY: J. Franz | START DATE: 09/16/25 | END DATE: 09/16/25

SURFACE ELEVATION: 1160.4 ft | RIG: 7504 | METHOD: 3 1/4" HSA | SURFACING: Soil | WEATHER: Sunny

Elev./ Depth ft	Water Level	Description of Materials (Soil-ASTM D2488 or 2487; Rock-USACE EM 1110-1-2908)	Sample	Blows (N-Value) Recovery	PID ppm	MC %	Tests or Remarks
		LEAN CLAY (CL), dark gray, moist, stiff (GLACIAL TILL)	35	5-5-4 (9) 16"	0.8		q_p=0.75 tsf
1120.9							
39.5		SILT (ML), dark gray, moist, medium dense (GLACIAL TILL)	40	5-7-7 (14) 16"			
1115.9							
44.5		SANDY LEAN CLAY (CL), with Gravel, gray, moist, hard (GLACIAL TILL)	45	43-50/3" (REF) 8"			
			50	56-50/4" (REF) 7"			
			55				
1100.9							
59.5		SILTY SAND (SM), fine to coarse-grained, trace Gravel, gray, wet, very dense (GLACIAL TILL)	60	14-32-36 (68) 14"			

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See Descriptive Terminology sheet for explanation of abbreviations

Project Number B2506260
Geotechnical & Environmental Evaluation
Northern Lights 2027 Expansion Project

BORING: **BH-02 Alexandria 2nd Line**

LOCATION: Captured with RTK GPS. Intersection of 140th Street and 85th Avenue. See attached sketch.

DATUM: NAD83 / UTM zone 11N

NORTHING: 5342976.1 EASTING: 2243482.7

DRILLER: M. Hoppe | LOGGED BY: J. Franz | START DATE: 09/16/25 | END DATE: 09/16/25

SURFACE ELEVATION: 1160.4 ft | RIG: 7504 | METHOD: 3 1/4" HSA | SURFACING: Soil | WEATHER: Sunny

Elev./ Depth ft	Water Level	Description of Materials (Soil-ASTM D2488 or 2487; Rock-USACE EM 1110-1-2908)	Sample	Blows (N-Value) Recovery	PID ppm	MC %	Tests or Remarks
		SILTY SAND (SM), fine to coarse-grained, trace Gravel, gray, wet, very dense (GLACIAL TILL)					
1090.9							
69.5		SANDY LEAN CLAY (CL), trace Gravel, gray, moist, hard (GLACIAL TILL)		16-22-25 (47) 16"			
1080.9							
79.5		SILTY SAND (SM), fine to coarse-grained, trace Gravel, gray, wet, dense (GLACIAL OUTWASH)		20-22-25 (47) 14"			
1070.9							
89.5		CLAYEY SAND (SC), fine to coarse-grained, trace Gravel, gray, wet, hard (GLACIAL TILL)		14-25-25 (50) 14"			

65 70 75 80 85 90 95

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See Descriptive Terminology sheet for explanation of abbreviations

Project Number B2506260
Geotechnical & Environmental Evaluation
Northern Lights 2027 Expansion Project

BORING: **BH-02 Alexandria 2nd Line**

LOCATION: Captured with RTK GPS. Intersection of 140th Street and 85th Avenue. See attached sketch.

DATUM: NAD83 / UTM zone 11N

NORTHING: 5342976.1 EASTING: 2243482.7

DRILLER: M. Hoppe | LOGGED BY: J. Franz | START DATE: 09/16/25 | END DATE: 09/16/25

SURFACE ELEVATION: 1160.4 ft | RIG: 7504 | METHOD: 3 1/4" HSA | SURFACING: Soil | WEATHER: Sunny

Elev./ Depth ft	Water Level	Description of Materials (Soil-ASTM D2488 or 2487; Rock-USACE EM 1110-1-2908)	Sample	Blows (N-Value) Recovery	PID ppm	MC %	Tests or Remarks
		CLAYEY SAND (SC), fine to coarse-grained, trace Gravel, gray, wet, hard (GLACIAL TILL)					
1060.9							
99.5		LEAN CLAY (CL), trace organic, with Shale, gray, wet, hard (GLACIAL TILL)		50/2" (REF) 1"			
100							
105							
				50/2" (REF) 1"			
110							
115							
				50/3" (REF) 2"			
120							
125							
1032.4							
128.0		Continued on next page					

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See Descriptive Terminology sheet for explanation of abbreviations

Project Number B2506260
Geotechnical & Environmental Evaluation
Northern Lights 2027 Expansion Project

BORING: **BH-02 Alexandria 2nd Line**

LOCATION: Captured with RTK GPS. Intersection of 140th Street and 85th Avenue. See attached sketch.

DATUM: NAD83 / UTM zone 11N

NORTHING: 5342976.1 EASTING: 2243482.7

DRILLER: M. Hoppe | LOGGED BY: J. Franz | START DATE: 09/16/25 | END DATE: 09/16/25

SURFACE ELEVATION: 1160.4 ft | RIG: 7504 | METHOD: 3 1/4" HSA | SURFACING: Soil | WEATHER: Sunny

Elev./ Depth ft	Water Level	Description of Materials (Soil-ASTM D2488 or 2487; Rock-USACE EM 1110-1-2908)	Sample	Blows (N-Value) Recovery	PID ppm	MC %	Tests or Remarks
		SANDY LEAN CLAY (CL), trace Gravel, gray, moist, hard (GLACIAL TILL)					
				50/3" (REF) 1"			
130							
135							
1020.8							
139.6		END OF BORING		50/1" (REF) 1"			Water not observed while drilling.
140		Boring then grouted					
145							
150							
155							

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See Descriptive Terminology sheet for explanation of abbreviations

Project Number B2506260
Geotechnical & Environmental Evaluation
Northern Lights 2027 Expansion Project

BORING: **BH-03 Alexandria 2nd Line**

LOCATION: Captured with RTK GPS. Intersection of 140th Street and 85th Avenue. See attached sketch.

DATUM: NAD83 / UTM zone 11N

NORTHING: 5342799.8 EASTING: 2243702.1

DRILLER: M. Takada | LOGGED BY: J. Franz | START DATE: 09/24/25 | END DATE: 09/24/25

SURFACE ELEVATION: 1167.4 ft | RIG: 75011 | METHOD: 3 1/4" HSA | SURFACING: Corn field | WEATHER: Sunny

Elev./ Depth ft	Water Level	Description of Materials (Soil-ASTM D2488 or 2487; Rock-USACE EM 1110-1-2908)	Sample	Blows (N-Value) Recovery	PID ppm	MC %	Tests or Remarks
1165.4		SILTY SAND (SM), trace Gravel, brown, moist (TOPSOIL)		3-3-4-5 (7) 4"	0.4		BH-03 (0-2) collected on 09/24/25 @1308 for MDA 1, MDA 2, OC
2.0		SANDY LEAN CLAY (CL), trace Gravel, contains seams of Poorly Graded Sand, brown, moist, medium to hard (GLACIAL TILL)		1-3-4-4 (7) 14"	0.1		BH-03 (2-4) collected on 09/24/25 @1312 for RCRA metals
			5	2-4-3-4 (7) 14"	0.1		q_p=0.5 tsf q_p=1 tsf
				3-4-7-12 (11) 16"	0.2		BH-03 (4-6) collected on 09/24/25 @1300 for GRO, DRO, BETX
				6-7-11-8 (18) 16"	0.1		
			10	17-50/5" (REF) 10"	0.6		q_p=1.75 tsf
1153.4				22-38-32-32 (70) 14"	0.1		
14.0		CLAYEY SAND (SC), fine to medium-grained, trace Gravel, brown, moist, hard (GLACIAL TILL)	15	17-25-27-29 (52) 14"	0.1		
1147.9							
19.5	▽	POORLY GRADED SAND (SP), fine to coarse-grained, trace Gravel, brown, moist, very dense (GLACIAL OUTWASH)	20	23-27-41 (68) 14"	0.6		Wet below 20 1/2 feet
1142.9							
24.5		SANDY LEAN CLAY (CL), trace Gravel, gray, moist, very dense to hard (GLACIAL TILL)	25	15-21-27 (48) 14"	0.1		
			30	7-11-15 (26) 14"			

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See Descriptive Terminology sheet for explanation of abbreviations

Project Number B2506260
Geotechnical & Environmental Evaluation
Northern Lights 2027 Expansion Project

BORING: **BH-03 Alexandria 2nd Line**

LOCATION: Captured with RTK GPS. Intersection of 140th Street and 85th Avenue. See attached sketch.

DATUM: NAD83 / UTM zone 11N

NORTHING: 5342799.8 EASTING: 2243702.1

DRILLER: M. Takada | LOGGED BY: J. Franz | START DATE: 09/24/25 | END DATE: 09/24/25

SURFACE ELEVATION: 1167.4 ft | RIG: 75011 | METHOD: 3 1/4" HSA | SURFACING: Corn field | WEATHER: Sunny

Elev./ Depth ft	Water Level	Description of Materials (Soil-ASTM D2488 or 2487; Rock-USACE EM 1110-1-2908)	Sample	Blows (N-Value) Recovery	PID ppm	MC %	Tests or Remarks
		SANDY LEAN CLAY (CL), trace Gravel, gray, moist, very dense to hard (GLACIAL TILL)					
			35	12-15-18 (33) 16"			
			40	11-26-33 (59) 16"			
1126.4							
41.0		END OF BORING					Water observed at 20.5 feet while drilling.
		Boring then grouted					
			45				
			50				
			55				
			60				

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See Descriptive Terminology sheet for explanation of abbreviations

Project Number B2506260
Geotechnical & Environmental Evaluation
Northern Lights 2027 Expansion Project

BORING: **BH-01A Alexandria 2nd Line**

LOCATION: Captured with RTK GPS. Intersection of 140th Street and 85th Avenue. See attached sketch.

DATUM: NAD83 / UTM zone 11N

NORTHING: 5342484.5 EASTING: 2242860.6

DRILLER: K. Caudill | LOGGED BY: J. Franz | START DATE: 09/20/25 | END DATE: 09/20/25

SURFACE ELEVATION: 1181.3 ft | RIG: 7505 | METHOD: 3 1/4" HSA | SURFACING: Field | WEATHER: Sunny

Elev./ Depth ft	Water Level	Description of Materials (Soil-ASTM D2488 or 2487; Rock-USACE EM 1110-1-2908)	Sample	Blows (N-Value) Recovery	PID ppm	MC %	Tests or Remarks
1180.4		SILTY SAND (SM), with roots, dark brown, moist (TOPSOIL FILL)		2-4-4-4 (8) 14"	0.3		BH-01A (0-2) collected on 09/16/25 @1525 for MDA 1, MDA 2, OC
0.9		FILL: SILTY SAND (SM), trace roots, trace Gravel, brown, moist		3-4-4-4 (8) 16"	0.3		BH-01A (2-4) collected on 09/16/25 @1520 for RCRA metals
1177.3							
4.0		FILL: CLAYEY SAND (SC), trace Gravel, brown, moist	5	4-4-6-4 (10) 18"	0.3		
				1-4-6-8 (10) 16"	0.9		
1173.3							
8.0		CLAYEY SAND (SC), trace Gravel, brown, moist, stiff (GLACIAL TILL)		4-7-7-6 (14) 16"	0.7		
			10	4-5-6-6 (11) 18"	0.3		q_p=1.75 tsf
1169.3							
12.0		SANDY LEAN CLAY (CL), trace Gravel, brown, moist, very stiff to stiff (GLACIAL TILL)		13-13-12-11 (25) 18"	36.5		BH-01A (12-14) collected on 09/16/25 @1510 for GRO, DRO, BETX
			15	4-4-6-7 (10) 18"	0.9		q_p=1.5 tsf
					0.5		
	▽						Wet below 19 feet
			20	3-5-8 (13) 14"			q_p=2.5 tsf
1156.8							
24.5		SILTY SAND (SM), fine to coarse-grained, trace Gravel, light brown, wet, dense to very dense (GLACIAL OUTWASH)	25	50/0" (REF) 0"			No recovery at 24 feet, auger cuttings sampled.
			30	17-23-27 (50) 18"			

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See Descriptive Terminology sheet for explanation of abbreviations

Project Number B2506260
Geotechnical & Environmental Evaluation
Northern Lights 2027 Expansion Project

BORING: **BH-01A Alexandria 2nd Line**

LOCATION: Captured with RTK GPS. Intersection of 140th Street and 85th Avenue. See attached sketch.

DATUM: NAD83 / UTM zone 11N

NORTHING: 5342484.5 EASTING: 2242860.6

DRILLER: K. Caudill | LOGGED BY: J. Franz | START DATE: 09/20/25 | END DATE: 09/20/25

SURFACE ELEVATION: 1181.3 ft | RIG: 7505 | METHOD: 3 1/4" HSA | SURFACING: Field | WEATHER: Sunny

Elev./ Depth ft	Water Level	Description of Materials (Soil-ASTM D2488 or 2487; Rock-USACE EM 1110-1-2908)	Sample	Blows (N-Value) Recovery	PID ppm	MC %	Tests or Remarks
		SILTY SAND (SM), fine to coarse-grained, trace Gravel, light brown, wet, dense to very dense (GLACIAL OUTWASH)	35	22-43-25 (68) 18"			
1141.8							
39.5		SANDY LEAN CLAY (CL), trace Gravel, gray, moist, hard (GLACIAL TILL)	40	24-30-31 (61) 18"	4.5	15	LL=26, PL=15, PI=11 q_p=4.5 tsf
			45	20-26-31 (57) 16"		10	
			50	11-20-31 (51) 18"		14	
			55				
			60	23-30-35 (65) 14"			

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See Descriptive Terminology sheet for explanation of abbreviations

Project Number B2506260
Geotechnical & Environmental Evaluation
Northern Lights 2027 Expansion Project

BORING: **BH-01A Alexandria 2nd Line**

LOCATION: Captured with RTK GPS. Intersection of 140th Street and 85th Avenue. See attached sketch.

DATUM: NAD83 / UTM zone 11N

NORTHING: 5342484.5 EASTING: 2242860.6

DRILLER: K. Caudill | LOGGED BY: J. Franz | START DATE: 09/20/25 | END DATE: 09/20/25

SURFACE ELEVATION: 1181.3 ft | RIG: 7505 | METHOD: 3 1/4" HSA | SURFACING: Field | WEATHER: Sunny

Elev./ Depth ft	Water Level	Description of Materials (Soil-ASTM D2488 or 2487; Rock-USACE EM 1110-1-2908)	Sample	Blows (N-Value) Recovery	PID ppm	MC %	Tests or Remarks
		SANDY LEAN CLAY (CL), trace Gravel, gray, moist, hard (GLACIAL TILL)					
1110.3				30-42-48 (90) 2"			
71.0		END OF BORING Boring then grouted					Water observed at 19.0 feet while drilling.

65 70 75 80 85 90 95

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See Descriptive Terminology sheet for explanation of abbreviations

Project Number B2506260
Geotechnical & Environmental Evaluation
Northern Lights 2027 Expansion Project

BORING: **BH-02A Alexandria 2nd Line**

LOCATION: Captured with RTK GPS. Intersection of 140th Street and 85th Avenue. See attached sketch.

DATUM: NAD83 / UTM zone 11N

NORTHING: 5342439.5 EASTING: 2243102.6

DRILLER: K. Caudill | LOGGED BY: J. Franz | START DATE: 09/20/25 | END DATE: 09/20/25

SURFACE ELEVATION: 1178.6 ft | RIG: 7505 | METHOD: 3 1/4" HSA | SURFACING: Field | WEATHER: Sunny

Elev./ Depth ft	Water Level	Description of Materials (Soil-ASTM D2488 or 2487; Rock-USACE EM 1110-1-2908)	Sample	Blows (N-Value) Recovery	PID ppm	MC %	Tests or Remarks
1176.6		SILTY SAND (SM), dark brown, moist (TOPSOIL FILL)		2-4-5-7 (9) 14"	0.3		BH-02A (0-2) collected on 09/17/25 @1000 for MDA 1, MDA 2, OC
2.0 1174.6		FILL: POORLY GRADED SAND (SP), fine to medium-grained, brown, dry		4-5-7-8 (12) 16"	0.3		BH-02A (2-4) collected on 09/17/25 @1005 for DRO, GRO, BTEX, RCRA metals
4.0		SANDY LEAN CLAY (CL), trace Gravel, brown, moist, stiff to hard (GLACIAL TILL)	5	6-7-7-8 (14) 18"	0.2		
				2-3-5-5 (8) 16"	0.4		
				3-4-5-6 (9) 16"	0.3		
			10	11-16-23-32 (39) 18"	0.5		
				17-30-25-60/ 6" (55) 18"	0.5		
			15	11-23-30-36 (53) 16"	0.6		
1159.1	▽						Wet below 19 feet
19.5		SILTY SAND (SM), fine to coarse-grained, trace Gravel, brown, moist, very dense (GLACIAL OUTWASH)	20	48-50/3" (REF) 8"			
1154.1							
24.5		POORLY GRADED SAND with SILT (SP-SM), fine to medium-grained, trace Gravel, brown, wet, very dense (GLACIAL OUTWASH)	25	36-45-50/6" (REF) 14"			Drilling method switched to mud rotary at 25 feet
			30	50/6" (REF) 3"			

Continued on next page

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LOG OF BORING

See Descriptive Terminology sheet for explanation of abbreviations

Project Number B2506260
Geotechnical & Environmental Evaluation
Northern Lights 2027 Expansion Project

BORING: **BH-02A Alexandria 2nd Line**

LOCATION: Captured with RTK GPS. Intersection of 140th Street and 85th Avenue. See attached sketch.

DATUM: NAD83 / UTM zone 11N

NORTHING: 5342439.5 EASTING: 2243102.6

DRILLER: K. Caudill | LOGGED BY: J. Franz | START DATE: 09/20/25 | END DATE: 09/20/25

SURFACE ELEVATION: 1178.6 ft | RIG: 7505 | METHOD: 3 1/4" HSA | SURFACING: Field | WEATHER: Sunny

Elev./ Depth ft	Water Level	Description of Materials (Soil-ASTM D2488 or 2487; Rock-USACE EM 1110-1-2908)	Sample	Blows (N-Value) Recovery	PID ppm	MC %	Tests or Remarks
1144.1		POORLY GRADED SAND with SILT (SP-SM), fine to medium-grained, trace Gravel, brown, wet, very dense (GLACIAL OUTWASH)					
34.5		SANDY LEAN CLAY (CL), trace Gravel, trace organic, brown to gray, moist, hard (GLACIAL TILL)	35	14-25-33 (58) 14"			
			40	23-23-24 (47) 16"		16	
1134.1							
44.5		SILT (ML), gray, moist, dense (GLACIAL TILL)	45	10-14-17 (31) 14"		23	%Sand=3% P200=97%
			50	12-15-22 (37) 18"		23	LL=34, PL=29, PI=5
			55				
1119.1							
59.5		SANDY LEAN CLAY (CL), trace Gravel, contains seams of Silt, gray, moist, hard (GLACIAL TILL)	60	11-14-23 (37) 16"			

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Geotechnical & Environmental Evaluation
Northern Lights 2027 Expansion Project

BORING: **BH-02A Alexandria 2nd Line**

LOCATION: Captured with RTK GPS. Intersection of 140th Street and 85th Avenue. See attached sketch.

DATUM: NAD83 / UTM zone 11N

NORTHING: 5342439.5 EASTING: 2243102.6

DRILLER: K. Caudill | LOGGED BY: J. Franz | START DATE: 09/20/25 | END DATE: 09/20/25

SURFACE ELEVATION: 1178.6 ft | RIG: 7505 | METHOD: 3 1/4" HSA | SURFACING: Field | WEATHER: Sunny

Elev./ Depth ft	Water Level	Description of Materials (Soil-ASTM D2488 or 2487; Rock-USACE EM 1110-1-2908)	Sample	Blows (N-Value) Recovery	PID ppm	MC %	Tests or Remarks
		SANDY LEAN CLAY (CL), trace Gravel, contains seams of Silt, gray, moist, hard (GLACIAL TILL)					
1109.1							
69.5		SILT (ML), gray, wet, dense (GLACIAL TILL)		11-21-24 (45) 16"			
1107.6							
71.0		END OF BORING Boring then grouted					Water observed at 19.0 feet while drilling.

65 70 75 80 85 90 95

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See Descriptive Terminology sheet for explanation of abbreviations

Project Number B2506260
Geotechnical & Environmental Evaluation
Northern Lights 2027 Expansion Project

BORING: **BH-03A Alexandria 2nd Line**

LOCATION: Captured with RTK GPS. Intersection of 140th Street and 85th Avenue. See attached sketch.

DATUM: NAD83 / UTM zone 11N

NORTHING: 5342404.8 EASTING: 2243271.1

DRILLER: K. Caudill | LOGGED BY: J. Franz | START DATE: 09/20/25 | END DATE: 09/20/25

SURFACE ELEVATION: 1175.6 ft | RIG: 7505 | METHOD: 3 1/4" HSA | SURFACING: Grass | WEATHER: Sunny

Elev./ Depth ft	Water Level	Description of Materials (Soil-ASTM D2488 or 2487; Rock-USACE EM 1110-1-2908)	Sample	Blows (N-Value) Recovery	PID ppm	MC %	Tests or Remarks
~~1175.3~~ 0.3		SILTY SAND (SM), dark brown, moist (TOPSOIL)		7-11-8-6 (19) 10"	0.3		Soil sample BH-03A (0-2') collected on 9/17/25 @ 16:32 for RCRA Metals
		CLAYEY SAND (SC), trace Gravel, brown, moist, medium to stiff (GLACIAL TILL)		4-3-3-5 (6) 14"	1.1		Soil sample BH-03A (2-4') collected on 9/17/25 @ 16:35 for MDA, MDA 2, OC, GRo, DRO, BETX
			5	4-6-6-8 (12) 12"	0.7		
1169.6 6.0		SILTY SAND (SM), fine to coarse-grained, trace Gravel, brown, moist, medium dense (GLACIAL TILL)		4-6-8-4 (14) 12"	2.3		
1167.6 8.0		SANDY LEAN CLAY (CL), trace Gravel, brown, moist to wet, hard (GLACIAL TILL)		11-18-22-30 (40) 14"	0.5		
			10	22-20-35-48 (55) 14"	0.4		
				48-50/5" (REF) 5"	0.2		
	▽		15	50/6" (REF) 2"	0.3		Wet below 16 feet
			20	27-50/6" (REF) 10"			Drilling method switched to mud rotary at 20 feet
			25	26-50/3" (REF) 6"			
1146.1 29.5		SILTY SAND (SM), with Gravel, brown, wet, very dense (GLACIAL OUTWASH)	30	22-38-45 (83) 12"			

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Northern Lights 2027 Expansion Project

BORING: **BH-03A Alexandria 2nd Line**

LOCATION: Captured with RTK GPS. Intersection of 140th Street and 85th Avenue. See attached sketch.

DATUM: NAD83 / UTM zone 11N

NORTHING: 5342404.8 EASTING: 2243271.1

DRILLER: K. Caudill | LOGGED BY: J. Franz | START DATE: 09/20/25 | END DATE: 09/20/25

SURFACE ELEVATION: 1175.6 ft | RIG: 7505 | METHOD: 3 1/4" HSA | SURFACING: Grass | WEATHER: Sunny

Elev./ Depth ft	Water Level	Description of Materials (Soil-ASTM D2488 or 2487; Rock-USACE EM 1110-1-2908)	Sample	Blows (N-Value) Recovery	PID ppm	MC %	Tests or Remarks
		SILTY SAND (SM), with Gravel, brown, wet, very dense (GLACIAL OUTWASH)					
1141.1							
34.5		POORLY GRADED GRAVEL with SAND (GP), black, wet, hard (GLACIAL OUTWASH)	35	50/6" (REF) 6"			
1136.1							
39.5		SILTY SAND (SM), fine to medium-grained, trace Gravel, brown, wet, dense to very dense (GLACIAL OUTWASH)	40	22-29-31 (60) 8"			
			45	17-23-24 (47) 12"			
			50	20-23-31 (54) 14"			
			55				
			60	26-26-15 (41) 12"		15	%Gravel=8% %Sand=84% P200=8%

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Northern Lights 2027 Expansion Project

BORING: **BH-03A Alexandria 2nd Line**

LOCATION: Captured with RTK GPS. Intersection of 140th Street and 85th Avenue. See attached sketch.

DATUM: NAD83 / UTM zone 11N

NORTHING: 5342404.8 EASTING: 2243271.1

DRILLER: K. Caudill | LOGGED BY: J. Franz | START DATE: 09/20/25 | END DATE: 09/20/25

SURFACE ELEVATION: 1175.6 ft | RIG: 7505 | METHOD: 3 1/4" HSA | SURFACING: Grass | WEATHER: Sunny

Elev./ Depth ft	Water Level	Description of Materials (Soil-ASTM D2488 or 2487; Rock-USACE EM 1110-1-2908)	Sample	Blows (N-Value) Recovery	PID ppm	MC %	Tests or Remarks
		SILTY SAND (SM), fine to medium-grained, trace Gravel, brown, wet, dense to very dense (GLACIAL OUTWASH)					
		SHALE layer at 70 feet		45-50/3" (REF) 8"		11	
1096.1							
79.5		SANDY SILT (ML), gray, wet, very dense (GLACIAL TILL)		12-23-30 (53) 12"			
				22-31-32 (63)			
1084.6							
91.0		END OF BORING Boring then grouted					Water observed at 16.0 feet while drilling.

65 70 75 80 85 90 95

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See Descriptive Terminology sheet for explanation of abbreviations

Project Number B2506260
Geotechnical & Environmental Evaluation
Northern Lights 2027 Expansion Project

BORING: **BH-04A Alexandria 2nd Line**

LOCATION: Captured with RTK GPS. Intersection of 140th Street and 85th Avenue. See attached sketch.

DATUM: NAD83 / UTM zone 11N

NORTHING: 5342406.2 EASTING: 2243659.9

DRILLER: M. Hoppe | LOGGED BY: J. Franz | START DATE: 09/19/25 | END DATE: 09/19/25

SURFACE ELEVATION: 1161.8 ft | RIG: 7504 | METHOD: 3 1/4" HSA | SURFACING: Soil | WEATHER: Cloudy

Elev./ Depth ft	Water Level	Description of Materials (Soil-ASTM D2488 or 2487; Rock-USACE EM 1110-1-2908)	Sample	Blows (N-Value) Recovery	PID ppm	MC %	Tests or Remarks
1161.3							
0.5		SILTY SAND (SM), trace roots, brown, moist (TOPSOIL)		3-4-4-4 (8) 16"	0.0		BH-04A (0-2) collected on 09/19/25 @ 0936 for RCRA metals
		SANDY LEAN CLAY (CL), trace Gravel, brown, moist, medium to very dense (GLACIAL TILL)		3-3-2-2 (5) 18"	0.1		
			5	3-4-5-5 (9) 18"	0.4		BH-04A (2-4) collected on 09/19/25 @ 0940 for MDA 1, MDA 2, OC
				4-3-3-3 (6) 18"	0.2		BH-04A(4-6) collected on 09/19/25 @ 0948 for GRO, DRO, BETX
				3-4-5-5 (9) 18"	0.2		q_p=3 tsf
			10	5-7-12-14 (19) 16"	0.2		q_p=>4.5 tsf
1149.8							
12.0		SILT (ML), contains seams of Poorly Graded Sand, brown to gray, moist, medium dense (GLACIAL TILL)		5-5-6-5 (11) 16"	0.1		
			15	6-10-14-13 (24) 18"	0.1		
					0.2		
1142.3							
19.5		SANDY LEAN CLAY (CL), trace Gravel, brown, moist, hard (GLACIAL TILL)	20	16-23-27 (50) 16"	0.1		
			25	14-16-20 (36) 16"			
1132.3							
29.5		SILT (ML), contains seams of Lean Clay, brown, moist, medium dense (GLACIAL TILL)	30	14-10-10 (20) 16"			

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Project Number B2506260
Geotechnical & Environmental Evaluation
Northern Lights 2027 Expansion Project

BORING: **BH-04A Alexandria 2nd Line**

LOCATION: Captured with RTK GPS. Intersection of 140th Street and 85th Avenue. See attached sketch.

DATUM: NAD83 / UTM zone 11N

NORTHING: 5342406.2 EASTING: 2243659.9

DRILLER: M. Hoppe | LOGGED BY: J. Franz | START DATE: 09/19/25 | END DATE: 09/19/25

SURFACE ELEVATION: 1161.8 ft | RIG: 7504 | METHOD: 3 1/4" HSA | SURFACING: Soil | WEATHER: Cloudy

Elev./ Depth ft	Water Level	Description of Materials (Soil-ASTM D2488 or 2487; Rock-USACE EM 1110-1-2908)	Sample	Blows (N-Value) Recovery	PID ppm	MC %	Tests or Remarks
1128.8	▽	SILT (ML), contains seams of Lean Clay, brown, moist, medium dense (GLACIAL TILL)					
33.0		SANDY LEAN CLAY (CL), trace Gravel, contains seams of Poorly Graded Sand, contains lenses of Silt, brown, wet to moist, very stiff to hard (GLACIAL TILL)					
			35	13-12-12 (24) 10"			
			40	12-14-15 (29) 10"	2.5		q_p=2.5 tsf
			45	16-18-22 (40) 14"	3.8		q_p=3.75 tsf
			50	20-24-42 (66) 16"			
			55				
			60	16-18-15 (33) 18"	4.5	12	LL=25, PL=18, PI=7 DD=128 pcf q_p=4.5 tsf

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Geotechnical & Environmental Evaluation
Northern Lights 2027 Expansion Project

BORING: **BH-04A Alexandria 2nd Line**

LOCATION: Captured with RTK GPS. Intersection of 140th Street and 85th Avenue. See attached sketch.

DATUM: NAD83 / UTM zone 11N

NORTHING: 5342406.2 EASTING: 2243659.9

DRILLER: M. Hoppe | LOGGED BY: J. Franz | START DATE: 09/19/25 | END DATE: 09/19/25

SURFACE ELEVATION: 1161.8 ft | RIG: 7504 | METHOD: 3 1/4" HSA | SURFACING: Soil | WEATHER: Cloudy

Elev./ Depth ft	Water Level	Description of Materials (Soil-ASTM D2488 or 2487; Rock-USACE EM 1110-1-2908)	Sample	Blows (N-Value) Recovery	PID ppm	MC %	Tests or Remarks
1096.8							
65.0		SANDY LEAN CLAY (CL), trace Gravel, contains seams of Poorly Graded Sand, contains lenses of Silt, brown, wet to moist, very stiff to hard (GLACIAL TILL)	65				
		POORLY GRADED SAND with GRAVEL (SP-SM), fine to coarse-grained, brown, wet, dense (GLACIAL OUTWASH)					
			70	12-15-23 (38) 10"		12	%Gravel=21% %Sand=67% P200=12%
			75				
1082.3							
79.5		SANDY LEAN CLAY (CL), trace Gravel, gray, moist, hard (GLACIAL TILL)	80	32-50/3" (REF) 9"		13	
			85				
			90	50/5" (REF) 5"			
			95				

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Northern Lights 2027 Expansion Project

BORING: **BH-04A Alexandria 2nd Line**

LOCATION: Captured with RTK GPS. Intersection of 140th Street and 85th Avenue. See attached sketch.

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SURFACE ELEVATION: 1161.8 ft | RIG: 7504 | METHOD: 3 1/4" HSA | SURFACING: Soil | WEATHER: Cloudy

Elev./ Depth ft	Water Level	Description of Materials (Soil-ASTM D2488 or 2487; Rock-USACE EM 1110-1-2908)	Sample	Blows (N-Value) Recovery	PID ppm	MC %	Tests or Remarks
		SANDY LEAN CLAY (CL), trace Gravel, gray, moist, hard (GLACIAL TILL)					
1062.1			M	50/3" (REF) 3"			Water observed at 33.0 feet while drilling.
99.8		END OF BORING Boring then grouted					

100
105
110
115
120
125

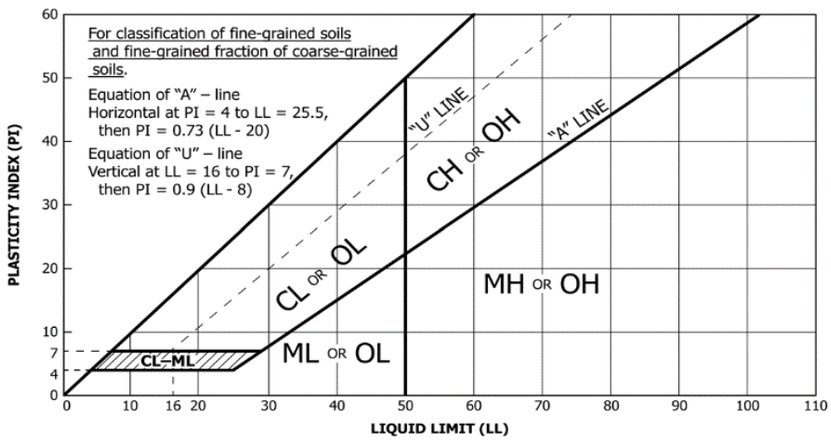
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Descriptive Terminology of Soil

Based on Standards ASTM D2487/2488
(Unified Soil Classification System)

Criteria for Assigning Group Symbols and Group Names Using Laboratory Tests[A]				Soil Classification	
				Group Symbol	Group Name[B]
Coarse-grained Soils (more than 50% retained on No. 200 sieve)	Gravels (More than 50% of coarse fraction retained on No. 4 sieve)	Clean Gravels (Less than 5% fines[C])	$C_u \geq 4$ and $1 \leq C_c \leq 3^D$	GW	Well-graded gravel[E]
			$C_u < 4$ and/or ($C_c < 1$ or $C_c > 3$)[D]	GP	Poorly graded gravel[E]
		Gravels with Fines (More than 12% fines[C])	Fines classify as ML or MH	GM	Silty gravel[E F G]
			Fines Classify as CL or CH	GC	Clayey gravel[E F G]
	Sands (50% or more coarse fraction passes No. 4 sieve)	Clean Sands (Less than 5% fines[H])	$C_u \geq 6$ and $1 \leq C_c \leq 3^D$	SW	Well-graded sand[I]
			$C_u < 6$ and/or ($C_c < 1$ or $C_c > 3$)[D]	SP	Poorly graded sand[I]
		Sands with Fines (More than 12% fines[H])	Fines classify as ML or MH	SM	Silty sand[F G I]
			Fines classify as CL or CH	SC	Clayey sand[F G I]
Fine-grained Soils (50% or more passes the No. 200 sieve)	Silts and Clays (Liquid limit less than 50)	Inorganic	PI > 7 and plots on or above "A" line[J]	CL	Lean clay[K L M]
			PI < 4 or plots below "A" line[J]	ML	Silt[K L M]
		Organic	Liquid Limit – oven dried / Liquid Limit – not dried <0.75	OL	Organic clay[K L M N] / Organic silt[K L M O]
	Silts and Clays (Liquid limit 50 or more)	Inorganic	PI plots on or above "A" line	CH	Fat clay[K L M]
			PI plots below "A" line	MH	Elastic silt[K L M]
		Organic	Liquid Limit – oven dried / Liquid Limit – not dried <0.75	OH	Organic clay[K L M P] / Organic silt[K L M Q]
Highly Organic Soils		Primarily organic matter, dark in color, and organic odor		PT	Peat

A. Based on the material passing the 3-inch (75-mm) sieve.
B. If field sample contained cobbles or boulders, or both, add "with cobbles or boulders, or both" to group name.
C. Gravels with 5 to 12% fines require dual symbols:
   GW-GM well-graded gravel with silt
   GW-GC well-graded gravel with clay
   GP-GM poorly graded gravel with silt
   GP-GC poorly graded gravel with clay
D. $C_u = D_{60} / D_{10}$ $C_c = (D_{30})^2 / (D_{10} \times D_{60})$
E. If soil contains ≥ 15% sand, add "with sand" to group name.
F. If fines classify as CL-ML, use dual symbol GC-GM or SC-SM.
G. If fines are organic, add "with organic fines" to group name.
H. Sands with 5 to 12% fines require dual symbols:
   SW-SM well-graded sand with silt
   SW-SC well-graded sand with clay
   SP-SM poorly graded sand with silt
   SP-SC poorly graded sand with clay
I. If soil contains ≥ 15% gravel, add "with gravel" to group name.
J. If Atterberg limits plot in hatched area, soil is CL-ML, silty clay.
K. If soil contains 15 to < 30% plus No. 200, add "with sand" or "with gravel", whichever is predominant.
L. If soil contains ≥ 30% plus No. 200, predominantly sand, add "sandy" to group name.
M. If soil contains ≥ 30% plus No. 200 predominantly gravel, add "gravelly" to group name.
N. PI ≥ 4 and plots on or above "A" line.
O. PI < 4 or plots below "A" line.
P. PI plots on or above "A" line.
Q. PI plots below "A" line.



Laboratory Tests

DD	Dry density, pcf	**q_p**	Pocket penetrometer strength, tsf
WD	Wet density, pcf	**q_U**	Unconfined compression test, tsf
P200	% Passing #200 sieve	**LL**	Liquid limit
MC	Moisture content, %	**PL**	Plastic limit
OC	Organic content, %	**PI**	Plasticity index

Particle Size Identification

Boulders..... over 12"
Cobbles..... 3" to 12"
Gravel
  Coarse..... 3/4" to 3" (19.00 mm to 75.00 mm)
  Fine..... No. 4 to 3/4" (4.75 mm to 19.00 mm)
Sand
  Coarse..... No. 10 to No. 4 (2.00 mm to 4.75 mm)
  Medium..... No. 40 to No. 10 (0.425 mm to 2.00 mm)
  Fine..... No. 200 to No. 40 (0.075 mm to 0.425 mm)
Silt..... No. 200 (0.075 mm) to .005 mm
Clay..... < .005 mm

Relative Proportions[L,M]

trace..... 0 to 5%
little..... 6 to 14%
with..... ≥ 15%

Inclusion Thicknesses

lens..... 0 to 1/8"
seam..... 1/8" to 1"
layer..... over 1"

Apparent Relative Density of Cohesionless Soils

Very loose ..... 0 to 4 BPF
Loose ..... 5 to 10 BPF
Medium dense..... 11 to 30 BPF
Dense..... 31 to 50 BPF
Very dense..... over 50 BPF

Consistency of Cohesive Soils	Blows Per Foot	Approximate Unconfined Compressive Strength
Very soft	0 to 1 BPF	< 0.25 tsf
Soft	2 to 4 BPF	0.25 to 0.5 tsf
Medium	5 to 8 BPF	0.5 to 1 tsf
Stiff	9 to 15 BPF	1 to 2 tsf
Very Stiff	16 to 30 BPF	2 to 4 tsf
Hard	over 30 BPF	> 4 tsf

Moisture Content:

Dry: Absence of moisture, dusty, dry to the touch.
Moist: Damp but no visible water.
Wet: Visible free water, usually soil is below water table.

Drilling Notes:

Blows/N-value: Blows indicate the driving resistance recorded for each 6-inch interval. The reported N-value is the blows per foot recorded by summing the second and third interval in accordance with the Standard Penetration Test, ASTM D1586.

Partial Penetration: If the sampler could not be driven through a full 6-inch interval, the number of blows for that partial penetration is shown as #/x" (i.e. 50/2"). The N-value is reported as "REF" indicating refusal.

Recovery: Indicates the inches of sample recovered from the sampled interval. For a standard penetration test, full recovery is 18", and is 24" for a thinwall/shelby tube sample.

WOH: Indicates the sampler penetrated soil under weight of hammer and rods alone; driving not required.

WOR: Indicates the sampler penetrated soil under weight of rods alone; hammer weight and driving not required.

Water Level: Indicates the water level measured by the drillers either while drilling (▽), at the end of drilling (▼), or at some time after drilling (▽▼).

Sample Symbols

Standard Penetration Test
Modified California (MC)
Auger
Grab Sample
Rock Core
Thinwall (TW)/Shelby Tube (SH)
Texas Cone Penetrometer
Dynamic Cone Penetrometer

5/2021