Resource Report 10
Alternatives

Resource Report No. 10

Alternatives

Central Mainline Corridor Expansion Project

FERC Docket No. CP26-___-000

Volume I - Public

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RESOURCE REPORT NO. 10 – ALTERNATIVES
SUMMARY OF FILING INFORMATION

MINIMUM REQUIREMENTS	LOCATION ADDRESSED
Address the "no action" alternative. (§ 380.12(I)(1))	Section 10.1
For large projects, address the effect of energy conservation or energy alternatives to the project. (§ 380.12(I)(1))	Sections 10.2 and 10.3
Identify system alternatives considered during the identification of the project and provide the rationale for rejecting each alternative. (§ 380.12(I)(1))	Section 10.4
Identify major and minor route alternatives considered to avoid impact on sensitive environmental areas (for example, wetlands, parks, or residences) and provide sufficient comparative data to justify the selection of the proposed route. (§ 380.12(I)(2)(ii))	Section 10.5
Identify alternative sites considered for the location of major new aboveground facilities and provide sufficient comparative data to justify the selection of the proposed site. (§ 380.12(I)(2)(ii))	Section 10.6
ADDITIONAL INFORMATION	
Ensure that project objectives that serve as the basis for evaluating alternatives are consistent with the purpose and need discussion in Resource Report 1.	Section 10.0
Identify and evaluate alternatives identified by stakeholders.	Not applicable
Clearly identify and compare the corresponding segments of route alternatives and route variations with the segments of the proposed route that they would replace if adopted.	Not applicable

Table of Contents

List of Tables

List of Figures

Abbreviations and Acronyms

CMC	Central Mainline Corridor
FERC	Federal Energy Regulatory Commission
HDD	horizontal directional drill
MAOP	maximum allowable operating pressure
MP	milepost
Northern	Northern Natural Gas
NPPD	Nebraska Public Power District
PHMSA	Pipeline and Hazardous Materials Administration
Project	Central Mainline Corridor Expansion Project
ROW	right of way

10.0 RESOURCE REPORT 10 – ALTERNATIVES

Resource Report 10 describes the alternatives that were evaluated for Northern's Project, including a no-action alternative, energy conservation alternative, alternative energy sources, pipeline system alternatives, route alternatives, and facility alternatives. These alternatives were evaluated to determine whether they will be reasonable and environmentally preferable to the proposed action. The following evaluation criteria were used in this analysis for the Project:

- Does the alternative have the ability to meet the Project's objectives?
- Is the alternative technically and economically feasible and practical?
- Does the alternative offer a substantial environmental advantage over the proposed Project?

Northern owns and operates a natural gas transmission pipeline system and associated aboveground facilities, including pipelines and facilities in Iowa and Nebraska. Northern is proposing to construct the Project, which will consist of (1) install 9.03 miles of 20-inch-diameter Omaha 3rd branch line loop, (2) install 14.64 miles of 30-inch-diameter NPPD Princeton Road power station branch line, (3) install 2.48 miles extension of the 20-inch-diameter Des Moines C-line, (4) uprate of the 20-inch-diameter Des Moines C-line south loop, (5) install new compressor station near Clarion, Iowa, (6) modify five compressor stations in Iowa and Nebraska allowing bidirectional flow, (7) install NPPD Princeton Road power station meter station, (8) install aboveground facilities including a launcher, receiver, tie-in valve settings, and uprate ancillary equipment. All Project components are located in various counties in Nebraska and Iowa.

Table 10.0-1 provides a list of Project components along with their associated counties.

Table 10.0-1 Project Facilities and Location

Component	Project Facility	Facility Description	County, State
Omaha 3rd branch line loop	9.03-mile pipeline	20-inch-diameter loop	Cass and Sarpy, NE
	Palmyra compressor station	Temporary compression site	Otoe, NE
NPPD Princeton Road power station branch line	14.64-mile pipeline	30-inch-diameter branch line	Gage and Lancaster, NE
	Beatrice to Palmyra D-line and Beatrice to Palmyra E-line Block Valve 5 Setting	Temporary compression site	Lancaster, NE
Des Moines C-line branch line extension	2.48-mile pipeline	20-inch-diameter extension	Dallas, IA
	Ogden compressor station	Temporary compression site	Boone, IA
Des Moines C-line south loop uprate	Royal Estates reducing station	Disconnect existing MAOP control valve	Polk, IA
	Grimes Iowa Town Border Station	New MAOP regulator	Polk, IA
	Des Moines A-line launcher	New control valve	Polk, IA

Component	Project Facility	Facility Description	County, State
Clarion compressor station	Proposed compressor station	ISO-rated 20,500-horsepower	Wright, IA
Beatrice compressor station	Facility modification	New scrubber install	Gage, NE
Guthrie Center compressor	Facility modification	New piping and valves	Guthrie, IA
Oakland compressor station	Facility modification	New piping and valves	Pottawattamie, IA
Ogden compressor station	Facility modification	New piping and valves	Boone, IA
Palmyra compressor station	Facility modification	New piping, valves and regulation	Otoe, NE

The Project objective is to meet gas transportation requirements and continue to provide reliable and safe gas deliveries throughout its market area by constructing three pipelines, installing a compressor station, and modify existing facilities throughout Northern's Market Area. Therefore, a preferable alternative must be able to meet these objectives or provide an equal volume of natural gas to Northern's customers. An alternative that does not meet this objective cannot be considered a reasonable alternative and is not considered in our evaluation. The exception is the No-Action Alternative, which is required to be evaluated under the National Environmental Policy Act.

Technically practical alternatives must be able to meet the Project objective using proven construction methods. An alternative that will require the use of a new or unique construction method may not be technically practical because the required technology is experimental or unproven. Such an alternative, with certain exceptions, cannot be considered a reasonable alternative and is not considered in this evaluation. Economically practical alternatives will result in an action that generally maintains the price competitive nature of the action. An alternative that renders the action too expensive to implement cannot be considered a reasonable alternative and is not considered in this evaluation.

To determine if an alternative provides a significant environmental advantage, the impacts of the alternative must be compared to the impacts of the Project on each resource. An alternative that results in equal or minor environmental benefit is typically not incorporated into the Project plans because the alternative merely shifts the impacts from one area and/or set of resources to another area and/or set of resources.

10.1 No-Action Alternative

Under the no-action alternative, Northern would not construct any component of the Project and consequently would be unable to meet the natural gas requirements of its customers. The customers, however, would still require additional natural gas transportation capacity to meet industrial, commercial and residential needs. This includes the delivery of natural gas to operate a new NPPD facility, heat homes and businesses, as well as supplying natural gas for appliance and machinery operation. The Project is designed to optimize the placement of facilities to meet customer needs.

If no action is taken by Northern, other natural gas transmission companies would most likely be required to construct new facilities to meet the requirements for additional capacity. This action would result in similar or greater environmental impact in another

area but would not eliminate the impact. The no-action alternative was found not to be a feasible alternative for either purpose.

Because the pipeline capacity is needed to support current customers' requirements, Northern found the no-action alternative to be infeasible for the Project.

10.2 Energy Conservation

Energy conservation reduces the need for natural gas and other energy resources. Energy conservation is not considered a viable alternative to the Project because the entire volume of the natural gas product delivered as a result of the Project is subscribed by Northern's customers to meet industrial, commercial and residential growth demands in spite of on-going conservation efforts.

10.3 Energy Alternatives

Various energy generating sources were considered as alternatives for the Project, including geothermal resources; hydroelectric power and wind generation; solar power; biomass resources; nuclear power; and petroleum and coal-based energy. Because the purpose of the Project is to expand existing pipelines in order to maintain a consistent delivery capacity in Northern's system, these alternative energy generating sources are not feasible alternatives.

10.4 System Alternatives

System alternatives can include looping or new pipelines along existing ROW, alternative pipe diameters or compression scenarios, or alternative placement of pipeline loop that may avoid sensitive resource areas. Northern evaluated several system alternatives that could meet the objectives of the Project. The proposed Project includes the pipeline components that were selected to minimize impacts on environmental resources and landowners by paralleling existing pipelines. Further, Northern selected pipeline routes were the most effective at meeting the proposed natural gas volumes at the various delivery points.

10.5 Route Alternatives

The goal of the route selection analysis for the three proposed pipelines was to identify alignments that represent a minimal and acceptable level of environmental impact coupled with attainment of the Project goal of maintaining Northern's delivery capacity. Northern sought to identify routes that utilize existing easements, fit within their multiple line rights and maximize co-location.

Paramount in the development of routing criteria is the proximity of the proposed route to existing utility infrastructure. Ground reconnaissance, aerial photography and National Wetland Inventory maps were used to study routing alternatives. The intent of the evaluation is to identify the most environmentally sound and efficient route and the route with the least impact on landowners and the least adverse impact on the environment.

A set of preliminary routes was initially developed and screened with respect to the following parameters.

- Use of existing corridors and minimization of the need to create new corridors
- Potential impacts on cultural and environmental resources
- Land use concerns

- Proximity to residential/congested areas
- Engineering and construction criteria
- Operation and maintenance considerations
- Supporting infrastructure

During the design phase, Northern evaluated two route alternatives for the Omaha 3rd branch line loop and one route alternative for the NPPD Princeton Road power station branch line that varied from the preliminary routes. Figures 10-1 through 10-3 depict the route alternatives.

Route Alternative 1 Omaha 3rd branch line loop

Between MP 5.50 and MP 7.35 on the Omaha 3rd branch line loop, Northern's original route diagonally crossed several farm fields and a highway to shorten the project length and reduce the number of field bends. After a landowner request, Northern rerouted the pipeline to follow the edges of the farm fields, more closely parallel the road ROW to 358th Street, and increase the distance to an open water feature and several environmentally sensitive areas. This change was made to limit impacts on several landowners' farming practices.

Route Alternative 2 Omaha 3rd branch line loop

Between MP 8.30 and MP 9.03 on the Omaha 3rd branch line loop, Northern's original route went straight north of the HDD drill box on the north side of the Platte River. However, after an evaluation of land use and civil survey data along the proposed route, Northern located a large ravine and waterbody with concrete retaining walls in its centerline that would have required an additional HDD. Northern shifted its centerline to the east to open cut an emergent wetland and more closely parallel Northern's other pipeline in the area.

Route Alternative 3 NPPD Princeton Road power station branch line

From MP 9.70 to the end of the NPPD Princeton Road power station branch line, Northern evaluated a route alternative approximately 1.5 miles west of the current route. Discussions with landowners along the route alternative indicated that a newly constructed electric power substation, multiple new power lines and solar farms have been constructed or would be constructed by 2028. All of the infrastructure constricted the workspace options to the point where it was infeasible to construct. Additionally, the new infrastructure would have significantly increased the alternating current and cathodic protection interference and added a high consequence area on the proposed pipeline, which would have required substantial mitigation to address. Shifting the centerline to the east allowed Northern to eliminate the existing infrastructure crossing and eliminated crossing multiple surface water features.

10.6 Aboveground Site Alternatives

Northern evaluated alternative locations for the Clarion compressor station; however, the current location is preferred as the existing infrastructure (Ogden to Ventura Valve 7 site) contains the necessary block valves, cross-over valves and regulation that is optimal for operation of the station. Site alternatives would have required additional pipeline or greenfield aboveground facility installation to achieve the capacity required. This additional pipeline length or facility installation would have increased the environmental and landowner impacts. To avoid additional pipeline installation or impacts on new landowners, Northern selected its current location for the compressor station.

10.7 Temporary Compression Site Alternatives

Northern selected the three temporary compression sites to minimize the venting required to complete the tie-ins of the three proposed pipelines. Northern evaluated other potential site alternatives but all would have required increased venting volumes.

10.8 Uprate Alternatives

Northern is completing a MAOP uprate in lieu of installation of 1.75 miles of Des Moines C-line south loop extension. The entire 1.75 miles would have been located on federal land managed by the U.S. Army Corps of Engineers (Camp Dodge). The pipeline extension would have crossed an area with known sensitive species and a high probability for cultural resources.

Resource Report 10
Figures

Figure 10-1
Route Alternative 1 – Omaha 3rd branch line loop

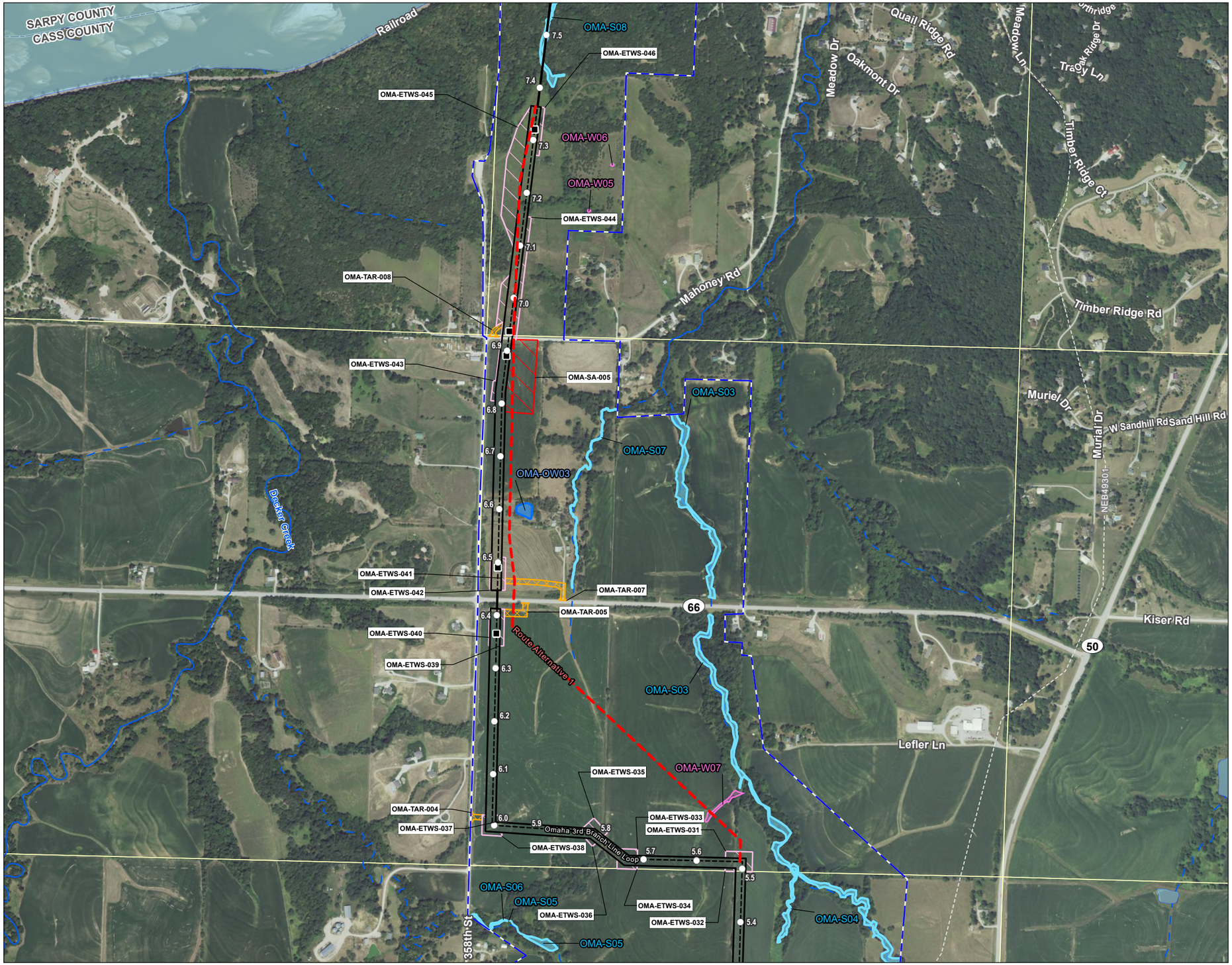


Figure No.

10-1

Title

Route Alternative 1
Omaha 3rd Branch Line Loop

Client/Project 172609221

Northern Natural Gas
Central Mainline Corridor Expansion Project

Project Location
Precinct of Louisville
Cass County, Nebraska

Prepared by JM on 2026-02-09
TR by SF on 2026-02-27
IR by SK on 2026-03-23

N

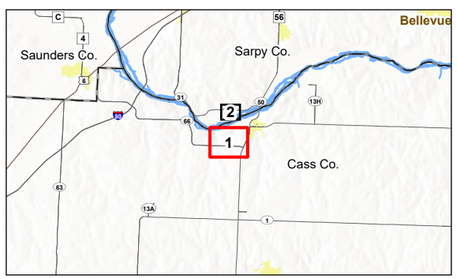
0 500 1,000 Feet
(At original document size of 11x17)
1:12,000

Legend

- Mile Post
- HDD
- Proposed Pipeline
- Existing Pipeline
- Route Alternative
- Environmental Survey Boundary
- Temporary Workspace
- Extra Temporary Workspace
- Temporary Access Road
- Staging Area
- Field Delineated Waterway Line
- Field Delineated Waterway Area
- Field Delineated Open Water
- Field Delineated Wetland

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
3. Background: NAIP 2022

Stantec

Northern Natural Gas

Figure 10-2
Route Alternative 2 – Omaha 3rd branch line loop

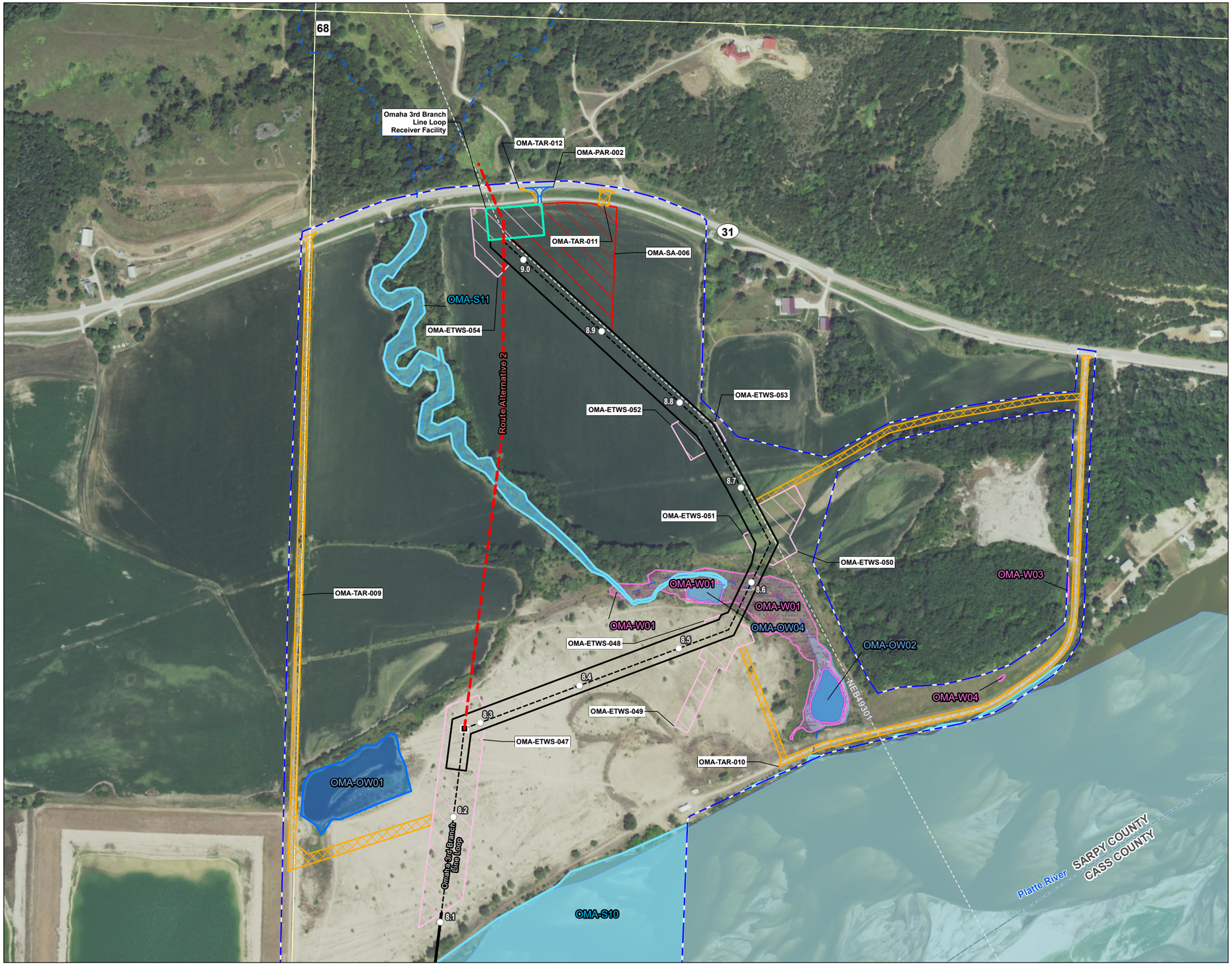


Figure No.
10-2

Title
Route Alternative 2
Omaha 3rd Branch Line Loop

Client/Project
172609221
Northern Natural Gas
Central Mainline Corridor Expansion Project

Project Location
Precinct of Platford-Springfield II
Sarpy County, Nebraska

Prepared by JM on 2026-02-09
TR by SF on 2026-02-27
IR by SK on 2026-03-23

N

0 240 480 Feet
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Legend
- Mile Post
- HDD
- Proposed Pipeline
- Existing Pipeline
- Route Alternative
- Environmental Survey Boundary
- Proposed Facility
- Permanent Access Road
- Temporary Workspace
- Extra Temporary Workspace
- Temporary Access Road
- Staging Area
- Field Delineated Waterway Line
- Field Delineated Waterway Area
- Field Delineated Open Water
- Field Delineated Wetland

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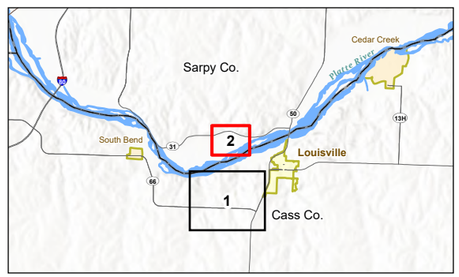

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Stantec
Northern Natural Gas

Figure 10-3
Route Alternative 3 – NPPD Princeton Road power station branch line

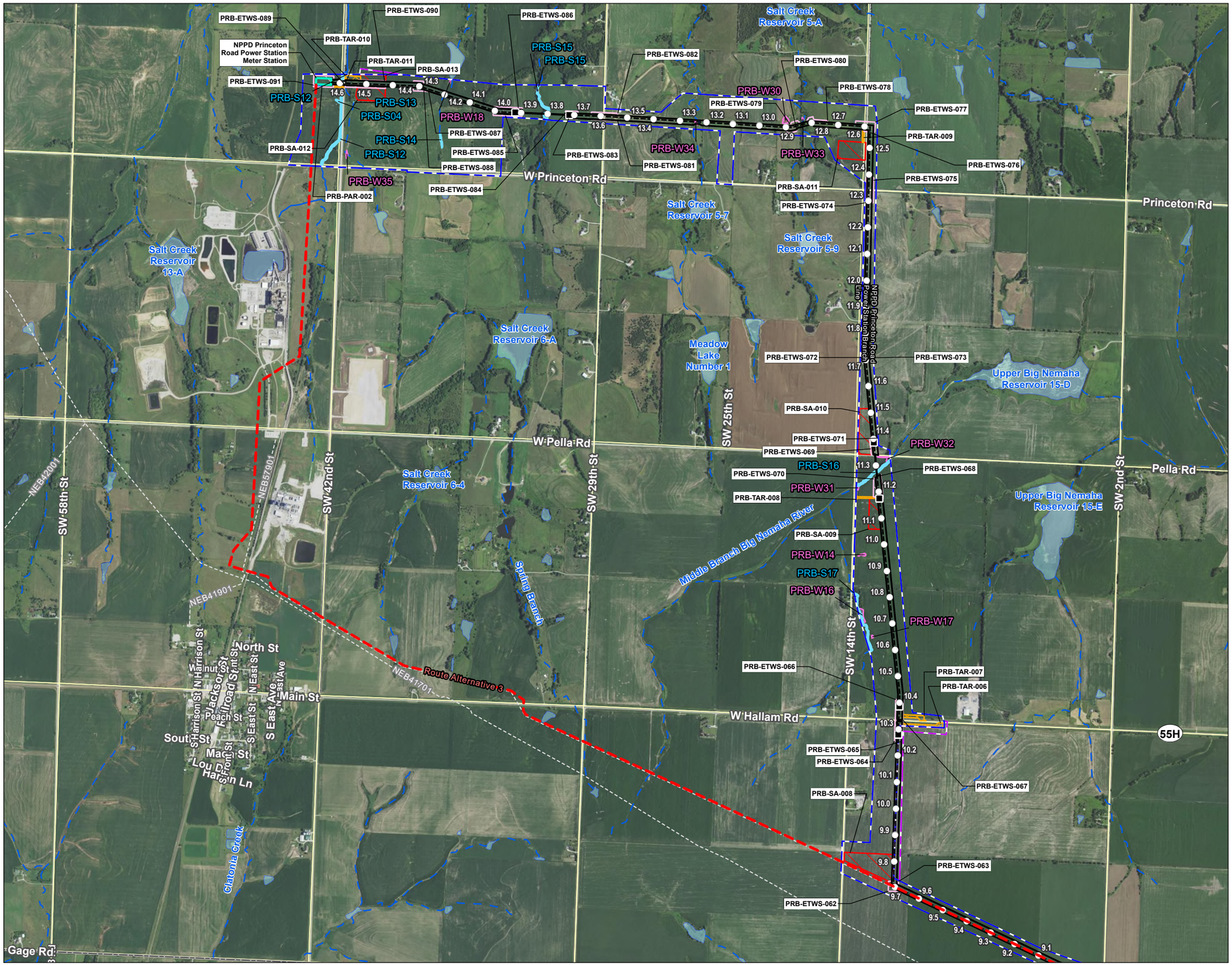

Figure No.

10-3

Title

Route Alternative 3
NPPD Princeton Road Power Station Branch Line

Client/Project

172609221

Northern Natural Gas
Central Mainline Corridor Expansion Project

Project Location

Precinct of Buda
Lancaster County, Nebraska

Prepared by JM on 2026-02-09
TR by SF on 2026-02-27
IR by SK on 2026-03-23

N

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(At original document size of 11x17)
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Legend

- Mile Post
- HDD
- Proposed Pipeline
- Existing Pipeline
- Route Alternative
- Environmental Survey Boundary
- Environmental Survey Boundary To Be Surveyed
- Proposed Facility
- Permanent Access Road
- Temporary Workspace
- Extra Temporary Workspace
- Temporary Access Road
- Staging Area
- Field Delineated Waterway Line
- Field Delineated Waterway Area
- Field Delineated Wetland

National Hydrography Dataset

- Perennial Stream
- Intermittent Stream
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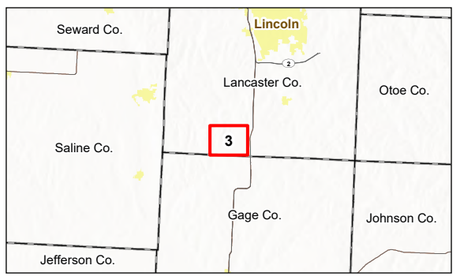
- Waterbody



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Stantec

Northern Natural Gas