

APPENDIX B

**BIOLOGICAL ASSESSMENT
(INCLUDING WETLAND ASSESSMENT REPORT)**

Biological Assessment
for the
Vantage Pipeline Project

Date: May 3, 2012

TABLE OF CONTENTS

EXECUTIVE SUMMARY	B-ES-1
1.0 INTRODUCTION.....	B-1-1
1.1 Background.....	B-1-1
1.2 Project Purpose and Need	B-1-2
1.3 Project Description and Location.....	B-1-2
1.3.1 Connected Actions.....	B-1-3
1.4 Alternatives.....	B-1-5
1.5 Project Construction and Operation.....	B-1-5
1.5.1 Project Construction	B-1-5
1.5.2 Operations and Maintenance	B-1-9
1.5.3 Cumulative Effects	B-1-10
2.0 ANALYSIS OF EFFECT OF THE ACTION	B-2-1
2.1 Piping Plover – Threatened and Critical Habitat	B-2-1
2.1.1 Direct Effects	B-2-3
2.1.2 Indirect Effects.....	B-2-5
2.1.3 Estimated Take	B-2-5
2.1.4 Cumulative Effects	B-2-8
2.2 Whooping Crane – Endangered.....	B-2-9
2.2.1 Direct Effects.....	B-2-11
2.2.2 Indirect Effects.....	B-2-12
2.2.3 Estimated Take	B-2-12
2.2.4 Cumulative Effects	B-2-12
2.3 Sprague’s pipit – Candidate Species.....	B-2-12
2.3.1 Direct Effects.....	B-2-13
2.3.2 Estimated Take	B-2-14
2.3.3 Cumulative Effects	B-2-14
2.4 Least Interior Tern – Endangered	B-2-15
2.4.1 Direct and Indirect Effects.....	B-2-15
2.4.2 Estimated Take	B-2-15
2.4.3 Cumulative Effects	B-2-16
2.5 Pallid Sturgeon – Endangered.....	B-2-16
2.5.1 Direct and Indirect Effects.....	B-2-16
2.5.2 Estimated Take	B-2-16
2.5.3 Cumulative Effects	B-2-16
2.6 Gray Wolf – Endangered	B-2-17
2.6.1 Direct and Indirect Effects.....	B-2-17
2.6.2 Estimated Take	B-2-18
2.6.3 Cumulative Effects	B-2-18
3.0 PLANNING MITIGATION MEASURES	B-3-1
4.0 CONSTRUCTION MITIGATION AND MONITORING	B-4-1
4.1 Operational Mitigation and Response Contingencies.....	B-4-2
5.0 CONCLUSIONS	B-5-1
6.0 REFERENCES.....	B-6-1
7.0 LIST OF ACRONYMS	B-7-4
8.0 LIST OF FIGURES	B-8-1

List of Tables

Table 1. Location and Length of the Vantage Pipeline Route B-1-3
Table 2. Wetlands by Type within the Project Area (500-foot Corridor) B-1-8
Table 3. Past, Present, and Reasonably Foreseeable Projects or Activities Evaluated for Cumulative Impacts B-1-10
Table 4. Average Wind Speed and Direction in Crosby, ND B-2-5
Table 5. Summary of Drainage Intersections at Piping Plover Habitat B-2-5
Table 6. Wetlands Horizontally Bored by the Vantage Pipeline Route B-2-11
Table 7. Land Affected by Construction and Operations of the Vantage Pipeline Project B-2-13

List of Figures

Figure 1 – Project Area Location Map
Figure 2 – Alternative Routes
Figure 3 – Hapet Lake Location Map
Figure 4 – Piping Plover Critical Habitat Location Map
Figure 5 – Radar WPA Critical Habitat
Figure 6 – McCone Lake Critical Habitat
Figure 7 – Local Whooping Crane Migration Corridor
Figure 8 – Regional Whooping Crane Migration Corridor
Figure 9 – Unavoidable USFWS Grassland Easement
Figure 10 – Land Cover within the 500ft Survey Corridor

List of Appendices

Appendix A Correspondence and Documents
Appendix B Wetland Assessment Report

EXECUTIVE SUMMARY

This Biological Assessment (BA) has been prepared for the Vantage Pipeline Project (Project) consistent with the federal Endangered Species Act of 1973 (ESA) (16 U.S.C. 1531 *et seq.*), in particular consistent with Section 7 of the Act requiring that federal agencies ensure that any actions authorized, funded, or carried out by them is not likely to jeopardize the continued existence of listed species or their critical habitats. The BA was prepared under the advisement and direction of the North Dakota Ecological Services Field Office of the U.S. Fish and Wildlife Service (FWS) Mountain-Prairie Region (Region 6), and in response to a FWS letter to the U.S. Department of State (DOS) dated September 22, 2011 requesting that the DOS, as the lead federal agency, or its designated non-federal agent, make a determination of the proposed projects' effects on listed species, including whether there is anticipated destruction or adverse modification of designated critical habitat, and identify these determinations in a BA of effects to federally listed species. In a letter dated December 16, 2011, the DOS requested that the FWS recognize Vantage Pipeline US LP (Vantage) and its consultants as the DOS's designated non-federal representatives for informal Section 7 consultation for the Project. Since that time, the DOS, FWS, and Vantage have worked together to finalize the BA. This BA has been reviewed and revised substantially by the DOS in response to discussions, additional reviews, and comments from the FWS and Vantage consistent with Section 7(c) of the ESA.

The analyses provided in the BA address occurrences of federally threatened, endangered, candidate species, and critical habitat. Analysis typically involved consultation with the FWS and North Dakota Game and Fish Department (NDGF), field surveys and assessments, and siting-related planning to avoid impacts on these resources. This BA addresses the results of the analyses and FWS consultation, the condition of the species or resource, and anticipated Project effects on resources, species, and habitats. Proposed mitigation measures are also addressed. The following species listed under the ESA are known to potentially occur in the Project area based on DOS and Vantage's informal consultations with the FWS, along with each species' status and recommended Project determinations:

Species: Common name - <i>scientific name</i>	Federal Status	Effect Determination
Piping plover - <i>Charadrius melodus</i> (Great Plains population)	Threatened	"may affect, but not likely to adversely affect" (MANLAA)
Whooping crane - <i>Grus americana</i>	Endangered	MANLAA
Gray wolf - <i>Canis lupus</i>	Endangered	MANLAA
Pallid sturgeon - <i>Scaphirhynchus albus</i>	Endangered	MANLAA
Interior least tern - <i>Sterna antillarum athaloassos</i>	Endangered	MANLAA
Sprague's pipit - <i>Anthus spragueii</i>	Candidate	MANLAA
Critical Habitat for the piping plover	Endangered	MANLAA

As a result of the analyses, informal consultation between the DOS, FWS, and Vantage, and Vantage's proposed mitigation, a "*may affect, but not likely to adversely affect*" determination is recommended for the federally listed piping plover, whooping crane, gray wolf, pallid sturgeon, least interior tern, Sprague's pipit, and designated piping plover Critical Habitat. This recommendation is based on an assessment of the resource, the biology of the species, the impact avoidance and minimization measures, and construction and operations mitigation measures proposed by Vantage.

1.0 INTRODUCTION

1.1 Background

This Biological Assessment (BA) has been prepared for the Vantage Pipeline Project (Project) consistent with the federal Endangered Species Act of 1973 (ESA) (16 U.S.C. 1531 *et seq.*), in particular consistent with Section 7 of the Act requiring that federal agencies ensure that any actions authorized, funded, or carried out by them are not likely to jeopardize the continued existence of listed species or their critical habitats. The BA was prepared in consultation with and under the advisement and direction of the North Dakota Ecological Services Field Office of the U.S. Fish and Wildlife Service (FWS) Mountain-Prairie Region (Region 6).

In late 2011, Vantage Pipeline US LP (Vantage) applied to the Department of State (DOS) for a Presidential Permit for the construction, operation, and maintenance of a pipeline facility on the United States-Canada border. The DOS considers applications for Presidential Permits for facilities such as pipelines pursuant to the authority delegated to it by the President of the United States under Executive Order 13337, as amended (69 Federal Register 25299). As designated by Executive Order 13337, the DOS is the lead federal agency for the Project consistent with the requirements of the National Environmental Policy Act (NEPA). The DOS has determined that issuance of a Presidential Permit for the proposed Project would necessitate the preparation of an Environmental Assessment (EA) for the United States portion of the project providing sufficient evidence and analysis for determining whether to prepare an Environmental Impact Statement or a Finding of No Significant Impact consistent with NEPA (42 U.S.C. 4321 *et seq.*). As such, the DOS consulted with federal, state, and local agencies, Native American tribes, landowners, and other parties to identify issues during their NEPA review of the Project.

In a letter to the DOS dated September 22, 2011, the FWS requested that the DOS, as the lead federal agency, or its designated non-federal agent, make a determination of the proposed Project's effects on listed species, including whether there is anticipated destruction or adverse modification of designated critical habitat, and identify these determinations in a BA of effects to federally listed species. In a letter dated December 16, 2011, the DOS requested that the FWS recognize Vantage and its consultants (i.e., KC Harvey) as the DOS's designated non-federal representatives for informal Section 7 consultation for the Project. Since that time, the DOS, FWS, and Vantage have worked together to finalize the BA. This BA has been reviewed and revised substantially by the DOS in response to discussions, additional reviews, and comments from the FWS and Vantage consistent with Section 7(c) of the ESA.

In addition to the DOS's activities, Vantage conducted early agency coordination with the FWS and other federal and state agencies at a kick-off meeting in Bismarck, North Dakota in August 2010. The agency meeting was attended by the representatives from: Vantage, KC Harvey Environmental LLC, Ethnoscience Incorporated, the North Dakota Ecological Field Office of the FWS, the North Dakota Regulatory Office of the U.S. Army Corps of Engineers (USACE), the North Dakota Game and Fish Department (NDGF), North Dakota Health Department, and the North Dakota State Historic Preservation Office. Soon after, the FWS provided a comment letter dated October 1, 2010, addressing its jurisdictional involvement and coordination for the Project, including for the ESA. Attached to the letter was a listing of federally threatened, endangered, and candidate species, as well as any critical habitat occurrences in the two Project counties (Williams and Divide). The species listed in this letter were also included in a letter to DOS dated September 22, 2011 from the FWS and were verified by the DOS as potentially occurring in the Project area based on a review of the FWS's website (FWS, 2012). Numerous phone contacts with the FWS were also conducted by Vantage during Project planning in regards to FWS wetland easements and refuge parcels, migratory birds, and listed species.

The information presented in this BA is specific to impacts on federally listed species. It is supported by information presented in the EA, which is referenced throughout. The EA provides a detailed discussion of the Project, alternatives, and Project-related impacts on other environmental resources.

1.2 Project Purpose and Need

The purpose of the Project is to transport liquid ethane from the Hess Corporation's (Hess) natural gas processing plant in Tioga, North Dakota, to the Alberta Ethane Gathering System (AEGS) in Alberta, Canada. Vantage submits that the Project would benefit the nation by providing the oil and gas producing Bakken Formation region of North Dakota with access to the existing ethane AEGS infrastructure and market in Alberta. Currently no market exists for petrochemical grade (also known as "specification" or "pure grade") ethane in North Dakota; however, the construction of the Project would make it feasible to extract the ethane byproduct from North Dakota-produced natural gas and export it for use in the Canadian petrochemical industry. Vantage maintains that the pipeline would enhance exports from the United States, consistent with national policy, and allow U.S. natural gas producers to recognize additional revenue from an existing resource, and contribute to the national economy in terms of jobs and tax payments.

1.3 Project Description and Location

Vantage Pipeline Canada, ULC and Vantage is proposing the construction of a new pipeline in North Dakota, United States, and Saskatchewan and Alberta, Canada to transport ethane from the Williston Basin in North Dakota to the petrochemical industry in Alberta. The U.S. segment of the Project is shown on **Figure 1**. The overall Vantage pipeline would transport ethane from Hess's existing Tioga Gas Plant near Tioga, North Dakota to an existing pipeline, the AEGS, near Empress Alberta. AEGS would transport the ethane to NOVA's Joffre Petrochemical Complex. The proposed Vantage pipeline in Canada and the United States would require construction and operation of:

- approximately 79.8 miles of new 10-inch-diameter underground high vapor pressure (HVP) pipeline on Vantage right-of-way from near Tioga, North Dakota to an international border crossing near Beaubier, Saskatchewan;
- approximately 350 miles of new 10-inch-diameter underground HVP pipeline on Vantage right-of-way from the United States-Canada border extending northwest near the junction of the North Dakota-Montana-Canada borders through Saskatchewan to the Saskatchewan-Alberta border;
- approximately 2 miles of new 10-inch-diameter underground HVP pipeline on Vantage Pipeline right-of-way from the Saskatchewan-Alberta border to an area near McNeil, Alberta;
- two new pump stations: one located at the midpoint of the pipeline between Lafleche and Assiniboia, Saskatchewan, and a second located near Empress, Alberta;
- mainline valve (MLBV) sites, which would include eight locations along the U.S. portion of the pipeline route as listed in table 1.4.2-1 in the EA;
- in-line inspection facilities;
- a cathodic protection system;

- a supervisory control and data acquisition (SCADA) system; and
- associated miscellaneous works such as pipeline warning signs and markers.

Canadian National Energy Board approval for the Canadian portion of the Vantage pipeline was granted on January 19, 2012.

This BA is specific to the U.S. portion of the Project, which would cross portions of Williams and Divide Counties, North Dakota as listed in **Table 1**.

County, State	Mileposts	Pipeline Length (miles)
Williams County, ND	0 to 37.5	37.5
Divide County, ND	37.5 to 79.8	42.3

1.3.1 Connected Actions

Heater

Hess Corporation (Hess) is expanding its existing Tioga Gas Plant in Tioga, North Dakota by installing a new, 21-acre gas processing plant adjacent to the existing gas processing plant on land owned by Hess. As described in Hess' permit application materials to the North Dakota Public Service Commission (NDPSC) (discussed further below), the existing Tioga Gas Plant has been operational since the 1950s and primarily serves to separate out natural gas liquids and other impurities from methane collected from production wells in the Tioga, North Dakota area before it can be used as a fuel. Once all of the impurities are removed, the resulting purified methane is transported via existing pipelines to markets in the east and south.

The current gas processing technique conducted at Hess' Tioga Gas Plant is called a refrigerated lean oil fractionation. Hess has proposed to change the processing technique from lean oil fractionation to a cryogenic turboexpander process. To accommodate the conversion, Hess would expand the existing gas plant footprint and construct new underground piping and above-ground gas processing facilities. The proposed gas plant expansion would produce the same products as it currently does, including pipeline grade natural gas, propane, butane, natural gasoline, and molten sulfur. Ethane would be an additional product that is either separated during ethane recovery or would be combined with the natural gas during ethane rejection. In addition to the processing plant expansion, approximately 4 miles of four pipelines (one 8-inch-diameter and three 6-inch-diameter) would also be constructed by Hess from the plant to a rail terminal currently in construction. The rail terminal is located on the west side of Tioga, North Dakota. The rail terminal would be designed to load 1.3 million gallons of liquefied product per day.

Activities at the Tioga Gas Plant are under the jurisdiction of the NDPSC. On April 13, 2010, Hess filed with the NDPSC a letter of intent to construct an addition to the existing Tioga Gas Plant and, on June 25, 2010, Hess filed its application for a Certificate of Site Compatibility for the Tioga Gas Plant Expansion Project. The application included a summary of biological field surveys (e.g., wetlands, wildlife), threatened and endangered species review, and consultations with state and federal agencies. As committed to in its Certificate of Site Compatibility, Hess would obtain the necessary licenses and permits. On September 8, 2010, the NDPSC released its Finding of Facts, Conclusions of Law, and Order, which approved of the plant expansion and ordered issuance of a Certificate of Site Compatibility.

Expansion of the existing plant has been on-going since October 2010 and the new expanded facilities are expected to be in service by the end of 2012.

The DOS has determined that the Tioga Gas Plant modifications would be an independent action and the only component of the Hess facility modification that is specifically related to allowing for ethane recovery required for Vantage's Project is the operation of a heater. Therefore, the impacts resulting from operation of the heater are a connected action for the purposes of this review consistent with NEPA and 40 Code of Federal Regulations (CFR) 1508.25(a)(1). Section 2.12 of the EA describes the connected action (i.e., heater) and the associated additional air and carbon dioxide emissions. Any other significant impact resulting from the proposed Project in addition to the ongoing Hess activities has been summarized in section 2.15 of the EA.

Electric Transmission Lines and Interconnections

Electrical service requirements for the proposed Project include utilizing existing electric transmission lines and constructing new electric transmission interconnections to the MLBVs. Because local electrical power providers, not Vantage, would be constructing and operating the electric transmission lines, the local utilities (Mountrail Williams and Burke Divide Electric) would be responsible for obtaining any necessary approvals or authorizations from federal, state, and local governments. While the permitting for the electrical facilities is independent from the Presidential Permit process, the construction and operation of these electric transmission lines are considered connected actions consistent with NEPA and, therefore, are evaluated within the EA for the proposed Project.

Vantage anticipates that the new interconnections would be constructed below ground, and that electric power requirements for eight MLBVs would be approximately 10 kilowatts per MLBV site and may be supplied from distribution service interconnects from proximate existing distribution lines (i.e., distribution lines with voltage ranging between 12.5 kilovolts to 25 kilovolts). Vantage has attempted to locate the proposed MLBVs near existing electric power lines. Accordingly, the length of these proposed new below-ground interconnections would range in length between approximately 25 feet to 1 mile. Each of these new interconnecting lines would require the installation of new underground transmission cable. The new electric transmission interconnection lines would be located entirely on private land.

In the event power cannot be provided to an individual MLBV by the local power companies or is uneconomic, Vantage would use solar photo-voltaic panel technology at the MLBVs that would eliminate the need for electric transmission interconnections at these MLBV sites.

The transmission interconnection facilities would be installed below ground and, thus, the construction process would be broadly similar to that of pipeline construction: right-of-way acquisition; right-of-way clearing; construction, including excavating a narrow trench, installing the electric transmission line, and backfilling; and site restoration and cleanup. Utilities installing the transmission lines would be expected to restore the work area as required on completion of the new interconnect in accordance with local standards. The soil in the disturbed areas would be reshaped and contoured to its original condition. Reseeding would follow landowner requirements. All construction debris and other remaining materials would be removed from the construction areas and properly disposed. The construction right-of-way width for these facilities is currently unknown and actual electrical line construction procedures would be developed by each local electric utility to address site-specific conditions. The electric utilities would obtain any necessary easements and permits required to install the facilities.

Construction and operation impacts on soils, vegetation, and land uses associated with the interconnects are expected to be temporary, minor, and comparable to those associated with supplying

electricity to the average home or farm. Although the construction right-of-way width for these facilities is currently unknown, it is anticipated that the construction and operation impacts on soils, vegetation, and land uses associated with these facilities would be lesser than those associated with pipeline construction described in this EA because the interconnects would have a narrow diameter, can be installed with minor disturbance to the land, and would affect a smaller area than that required for pipeline installation. Construction of the interconnects would have a temporary and relatively minor impact on agricultural land or grassland, and these land uses would be allowed to revert to previous conditions following construction. Based on the proximity of the proposed MLBV sites to existing electric power lines, it is anticipated that no wetlands or waterbodies would be affected by new electric transmission line construction and operation. Further, because the electrical lines would be installed underground, there would be no potential flight collision risks to birds and other wildlife (e.g., bats). While the new electric transmission interconnections would overlap in space and time with the Project, and could act cumulatively with the other activities in the area, the amount of surface disturbance caused by powerline construction is anticipated to be negligible compared to other development projects discussed in section 2.15 of the EA. Further, it is anticipated that the electric utilities would use best management practices (BMPs) to install the facilities and be subject to permits requirements that would, if necessary, mitigate for potential impacts on environmental resources.

1.4 Alternatives

In developing its pipeline route, Vantage studied a variety of alternatives for routing the proposed pipeline facilities. The DOS further considered the No Action Alternative; System Alternatives; two potential Alternative Routes; two potential Route Variations; and Alternative MLBV Locations based on information provided in Vantage's Presidential Permit application and supplemental submittals related to the application, comments received in the scoping process, and information obtained from research of relevant available information conducted by the DOS and its third-party contractor.

Section 3.0 of the EA provides a more detailed description of the alternatives considered for the Project. The effects and mitigation presented in this BA is relevant to the agency-preferred route (**Figure 2**) identified in the EA.

1.5 Project Construction and Operation

The following sections describe the proposed Project construction and operations for the U.S. portion of the Project.

1.5.1 Project Construction

Vantage proposes to begin construction of the Project in late 2012. Construction would occur over approximately 6 months, with an in-service date of on or before April 1, 2013.

Construction of the proposed pipeline would require a 70-foot-wide construction right-of-way to allow for temporary storage of topsoil and spoil and to accommodate safe operation of construction equipment. The spoil side (i.e., topsoil and ditch spoil stockpile area) would typically be 25 feet wide and generally located partially within the existing maintained right-of-way. The working side (i.e., equipment work area and travel lane) would typically be 45 feet wide and generally located outside the existing maintained right-of-way. Following construction, Vantage would maintain a 30-foot-wide permanent right-of-way for operation of the pipeline.

During construction, Vantage would temporarily use off-right-of-way areas for pipe and materials storage. In addition, construction contractors would require off-right-of-way areas to park equipment and

stage construction activities. To minimize environmental and new right-of-way impacts, these areas would be located within previously developed parcels (i.e., farmsteads).

Public roads would typically be used to gain access to the construction right-of-way. In areas where public roads are limited, existing privately owned roads may be used to provide access to the construction right-of-way. If neither public nor privately owned roads are available, Vantage may need to construct new access roads, which would require landowner permission and environmental surveys prior to construction. To date, Vantage has identified seven new roads to access the MLBVs as necessary for the Project, which are listed in table 1.4.3-1 of the EA

Clearing and Grading

Vantage would clear the 70-foot-wide construction right-of-way and temporary work spaces. The clear width is being narrowed to minimize impacts on sensitive locations in accordance with the Environmental Protection Plan (EPP) that would be established for the Project.¹ Following clearing, grading of the ground surface is proposed to provide a relatively smooth working surface and a safe working area. An undisturbed 10-foot-wide buffer would be at waterbody crossings except where grading is needed for bridge installation.

Following clearing and grading, temporary bridges are proposed at waterbodies, except for drainage ditches, intermittent waterbodies, and other non-fisheries waters to provide temporary access for equipment traveling along the construction right-of-way. In addition, temporary erosion control measures would be installed in accordance with National Pollutant Discharge Elimination System (NPDES) permit requirements and BMPs.

Topsoil Stripping

Topsoil would be stripped and segregated in agricultural areas, cropland, hayfields, pasture, and unavoidable native grasslands. Topsoil stockpiling and replacement would be addressed in the EPP.

Pipe Assembly

Before excavating pipeline trenches, individual joints of pipe would be strung along the construction right-of-way and arranged to be accessible to construction personnel. Small portable cranes and/or side-boom tractors would be used to unload the stringing trucks and place pipe along the right-of-way. After stringing and bending are complete, pipe sections would be aligned, welded together, and placed on temporary supports along the edge of the trench.

Trenching

Backhoes and/or ditching machines would be used to excavate trenches with a minimum 4 feet of cover for normal excavations and 18 to 30 inches of cover in rocky areas. In unstable and saturated soils, trenches may be wider.

Where trench dewatering is needed, water would be discharged in accordance with requirements for the temporary discharge permit issued by the North Dakota Department of Health – Division of Water Quality. NPDES BMPs would be used to mitigate potential for erosion and sediment discharge.

¹ The EPP has not been included as an attachment to this BA. However, a draft copy provided by Vantage is available for review on the DOS's website for the Project at: <http://www.vantagepipeline.state.gov/>. See Vantage Documents and "Environmental Data Provided by Vantage in Support of an Application for a Presidential Permit (March 2011)."

Lowering-in and Backfilling

The pipe would be lowered into the trench by side-boom tractors. Backfilling would consist of replacing the material excavated from the trench to the approximate ground surface elevation. In areas where topsoil has been segregated, subsoil would be replaced first, and topsoil would be spread uniformly on top. Directly above the pipeline, an excess of soil or “crown” would be placed to allow for future settling.

Hydrostatic Testing

After backfilling, the pipeline would be hydrostatically tested in accordance with state and federal regulations to ensure that there are no leaks in the pipeline and that the system is capable of operating at the design pressure.

Water withdrawals used to fill and test the pipelines would be consistent with applicable regulations, and would be obtained from municipal or private sources along the pipeline route.

Post-Construction Reclamation and Restoration

After the backfilling is completed, Vantage would re-grade and restore work areas as nearly as practicable to the original contour of the land. Topsoil would be redistributed over areas from which it was originally removed. Permanent soil stabilization efforts would primarily include revegetation of the right-of-way, including with diverse, local genotyped, and weed free certified native prairie seed mixes in grasslands. Certification is provided by the seed supplier and transferred through a chain of custody to the grower. Weed free certification is regulated by the U.S. Department of Agriculture (USDA) and State of North Dakota.

Following installation and final cleanup, original grade and contours would be restored to the extent practicable and permanent erosion controls would be installed. Disturbed areas would be revegetated in accordance with the EPP, other permit requirements, and site-specific landowner requests. As discussed in the EPP, Vantage would visually inspect the right-of-way for vegetation issues such as invasive weed infestations, poor vegetation establishment, and reduced crop growth along the right-of-way following construction. Particular attention would be paid to areas with extensive surface disturbance, moderate to steep slopes, watercourse and wetlands crossings, and areas of terrain instability that may be prone to erosion. Detailed vegetation assessments would be conducted, if warranted, at sites where reclamation problems are identified and Vantage would implement mitigation measures as soon as feasible.

Waterbody Crossings

In Divide and Williams Counties (the entire U.S. portion), the proposed Project would avoid perennial streams and not cross any navigable waters; therefore, a River and Harbors Act Section 10 permit would not be required. Further, the Project would not affect any streams or drainages within 1 stream mile of Lake Sakakawea or the Missouri River. In several locations the alignment would cross ephemeral or intermittent streams. These areas exhibit flow primarily during periods of snowmelt and rainfall, but are more characteristic of wetlands. As such, intermittent and ephemeral drainages affected by the Project were identified as wetlands.

Vantage would clear existing vegetation from the construction right-of-way as necessary to prepare for grading operations. A 10-foot buffer of undisturbed vegetation less would be maintained at streams and approaches to wetlands.

Wetland Construction

Wetlands along the pipeline route were mapped using the National Wetland Inventory (NWI) and field surveying by wetland scientists during the growing season in 2010 and 2011 followed with digitization on a Geographic Information System (GIS) database. Due to the relatively flexible and small diameter of the proposed pipeline, wetlands were avoided to the greatest extent practicable. The NWI was first used during preliminary route planning and alternative analysis, and then followed with further avoidance and minimization through the field survey (see Wetland Assessment Report in **Appendix B**) following the parameters defined *Corps of Engineers Wetland Delineation Manual* (USACE, 1987).

An agency early coordination/kick-off meeting was held with state and federal agencies in August 2010, including with staff from the Regulatory Branch of the Omaha District of the USACE. The USACE informed the Project that given the lack of anticipated permanent dredge and fill impacts (all Project wetland impacts would be temporary) and navigable water crossings, and ease of implementation of wetland impact avoidance and minimization, an Individual Permit would not be required. The Project would be subject to a Nationwide Permit No. 12 (NWP-12) assuming that the Project would not adversely affect federally regulated species, cultural/historic resources, or other federally protected issues. Furthermore, subsequent discussions with the USACE confirmed that the Project does not meet the conditions requiring pre-construction notification under NWP-12.

Approximately 201 wetlands are present within the 500 foot Project corridor study area (see Table 2); however, by implementing minor route realignments of the pipeline within the 500-foot-wide study corridor, Vantage was able to avoid all but 13 wetland areas. To further minimize disturbance to the wetlands, Vantage would install the pipeline beneath the wetland areas using the horizontal bore method, a technique that avoids dredge and fill impacts. Additional measures to protect wetland areas include retaining a buffer of undisturbed vegetative cover between horizontal bore operations and the wetland boundary, and all bore workspaces would be subject to water quality BMPs and erosion control required under the NPDES permit. Workspaces in the upland areas would be restored at the same time as the right-of-way.

Table 2. Wetlands by Type within the Project Area (500-foot Corridor) ^a			
CLASSIFICATION		WETLANDS OBSERVED	
Wetlands of the United States, Circular 39 ^b	Classification of Wetlands and Deepwater Habitats of the United States ^c	Number	Area (acres)
1	PEMA	25	5.18
1/2	PAMA/B	1	0.50
2	PEMB	101	40.90
2/3	PEMB/C	40	28.10
2/5	PEMB/PUBx	1	0.12
3	PEMC	20	13.21
3/4	PEMC/F	8	8.38
4	PEMF	2	2.10
4/5	PEMF/ PUB	1	0.21
5	PUB	1	3.59
6	PSS1B	1	0.08
Totals		201	102.36
NOTES:			
^a Includes only wetland area within the 500-foot pipeline corridor. Actual wetland boundaries may extend past the Project limits and may be larger than indicated.			
^b <i>Wetlands of the United States, Circular 39.</i> (Shaw and Fredine, United States Fish and Wildlife Service, 1956)			
^c <i>Classification of Wetlands and Deepwater Habitats of the United States.</i> (Cowardin <i>et al.</i> , December 1979)			

Inadvertent releases (i.e., leaks or “frac out”) of drilling fluid, a mixture of water and non-toxic bentonite clay used in the horizontal bore process, are not expected. Inadvertent releases typically occur where the overburden is thin, unconsolidated or porous. Most of the pothole wetland basins in the region are immediately underlain by clay hardpans and soils in the region are dense glacial tills which reduce the risk for inadvertent leaks. Horizontal borings would be inspected by environmental monitors during construction and after construction following the monitoring and construction protocols established in the EPP. If a leak or “frac out” is detected, the boring operation would cease and evaluated for drilling an alternate boring path at the location to avoid the wetland. If a horizontal bore is not possible, the wetlands would be evaluated for open-cut trenching, which would optimally occur during the winter to reduce impacts.

Open-cut trench wetland soils would be stockpiled and replaced after completion. Open-cut trenched wetlands would be subject to post-construction monitoring for recovery following the terms defined in the EPP. All open-cut trenches in wetlands would be considered temporary impacts and not subject to dredge and fill permitting requirements of Section 404. The above-mentioned Section 404 conditions apply to all open cut trench worse case scenarios where horizontal boring is not possible. According to Vantage, the potential for an open-cut trench in wetlands is very rare as there is little to no near surface bedrock in the Project area. Most of the Project area subsoils are deep glacial tills extending to 500 feet below ground surface.

1.5.2 Operations and Maintenance

Vantage would operate and maintain the Project facilities in accordance with the Pipeline and Hazardous Materials Safety Administration’s (PHSMA) regulations applicable to the transportation of hazardous liquids by pipeline found at 49 CFR Part 195, as well as other applicable federal and state regulations. During normal operations and routine maintenance, the pipeline would be inspected periodically from the air and on foot as operating conditions permit but no less frequently than as required by 49 CFR Part 195. These surveillance activities would provide information on possible encroachments and nearby construction activities, erosion, exposed pipe, and other potential concerns that may affect the safety and operation of the pipeline.

Cultivated croplands, pasture lands, and native grassland cover would be allowed to grow in the permanent right-of-way.

In accordance with federal requirements a Health and Safety Plan (HASP) would be developed with emergency contingencies in the case of a pipeline accident.² Contingencies in the HASP would include operational and emergency response protocols that would be followed in the case of a pipeline leak, rupture, or failure. The HASP would include Occupational Health and Safety (OSHA) required hazardous materials procedures and risks assessments related to ethane, high pressure, human health, combustion and explosives, natural disasters, and other required items. The HASP would serve as the primary guiding document for addressing risks and response contingencies related to minimizing impacts on federally protected species and their habitats.

This BA includes a discussion of the worst-case scenario impacts on each species and/or critical habitat that may result from an inadvertent leak of the pipeline during operations.

² The HASP would be prepared by the construction contractor immediately prior to construction.

1.5.3 Cumulative Effects

The past, present, and reasonably foreseeable Projects or activities evaluated for cumulative impacts are listed in **Table 3**.

Table 3. Past, Present, and Reasonably Foreseeable Projects or Activities Evaluated for Cumulative Impacts ^a			
Project/Activity	Description	Estimated Construction Dates	Location Relative to the Vantage Pipeline Project
North Dakota Oil and Natural Gas Production	Ongoing activities associated with oil and gas drilling and development, and subsequent petroleum production.	Potential 10 to 20 years of drilling and development; additional time for petroleum production.	Majority of nearby development is in the southern half of Williams County, not in the vicinity of the Project.
Ethane Production in Canada	Processing and marketing of the additional ethane that is transported to Red Deer, Alberta, Canada.	Ongoing.	Outside the U.S. Project area, but connected to the larger Vantage Pipeline Project.
Tioga Plant Expansion, Hess Corporation	Expansion to double the current plant capacity to exceed 250 million cubic feet per day (mmcf) of natural gas; construction of a 120,000 barrel per day oil and natural gas liquid rail loading terminal.	Scheduled in-service at end of 2012.	Tioga, North Dakota near MP 0.0.
ONEOK Stateline Gas Plant	Processing plant designed for 100 mmcf of natural gas.	Scheduled completion in mid-2012.	Approximately 35 miles south of the southern end of the pipeline route.
ONEOK Garden Creek Plant	Processing plant designed for 100 mmcf of natural gas.	Construction recently completed.	Approximately 42 miles south of the southern end of the pipeline route.
Hiland Partners Watford City Plant (PU-10-554)	Processing plant designed for 50 mmcf of natural gas.	Construction recently completed.	Approximately 55 miles southwest of the southern end of the pipeline route.
Plains Bakken North Pipeline	Proposed oil pipeline.	Construction scheduled to occur in 2012.	Approximately 8 miles south of the northern end of the pipeline route.
Enbridge Portal Reversal (Phase 7 Expansion)	Proposed oil pipeline.	Construction recently completed.	Approximately 7 miles from the proposed route.
Bridger Pipeline Four Bears Pipeline Expansion	Proposed oil pipeline.	Construction recently completed.	Approximately 30 miles from the proposed route.
Quintanna Bakken Link Pipeline	Proposed oil pipeline.	Construction schedule undetermined.	Approximately 36 miles from the proposed route.
Rangeland Energy COLT Hub	Proposed oil pipeline.	Scheduled completion in early 2012.	Approximately 8 miles from the proposed route.
Annabelle Homes	Proposed commercial/residential development.	No construction schedule has been established.	Within 0.25 mile of the south end of the pipeline route.
NOTES:			
^a Cumulative impacts associated with the connected actions (i.e., heater at Hess' Tioga Gas Plant and electric transmission lines and interconnections) are discussed in section 1.3.1 of this BA and in sections 1.5 and 2.15 of the EA.			

A detailed discussion of the cumulative impacts associated with the Project and the projects listed in **Table 2** is included in sections 1.5 and 2.15 of the EA. However, in summary, the Project is not anticipated to contribute significantly to cumulative permanent habitat losses under direct effects. All unavoidable wetlands would be crossed using the horizontal bore method. All native grassland habitats would be subject to temporary disturbance during construction and would be restored using diverse, locally genotyped, and certified weed free native seed mixes, as listed in the EPP. All other areas disturbed by construction, with the exception of permanent access roads and mainline valve sites, would be restored and subject to post construction monitoring and remediation in accordance with Vantage's EPP. Indirect impacts through drainages and temporary work spaces would be subject to permit defined

BMPs and restoration and monitoring of areas disturbed by construction. While the placement of access roads and MLBV sites would result in the permanent loss of vegetation, nearly all are sited on cultivated lands that have already experienced a modification from their original vegetation type.

2.0 ANALYSIS OF EFFECT OF THE ACTION

Based on informal consultation and discussions with the FWS, the following occurrences of listed species and critical habitat are present in the Project action area defined as Divide and Williams Counties:

- Piping plover (*Charadrius melodus*). Status: Threatened in Great Plains. Project location: In Divide and Williams Counties.
- Critical habitat for the piping plover in Divide and Williams Counties.
- Whooping crane (*Grus americana*). Status: Endangered. Project location: In Divide and Williams Counties.
- Sprague's pipit (*Anthus spragueii*). Status: Candidate Species. Project location: In Divide and Williams Counties.
- Interior least tern (*Sterna antillarum athaloassos*). Status: Endangered. Project location: In Williams County.
- Pallid sturgeon (*Scaphirhynchus albus*). Status: Endangered. Project location: In Williams County.
- Gray wolf (*Canis lupus*). Status: Endangered. Project location: In Divide County.

2.1 Piping Plover – Threatened and Critical Habitat

Project Area Biology: North Dakota is the most important state in the U.S. Great Plains for nesting piping plovers (FWS, 1988a, 1988b, 1994), where the bird is associated with the Northern Great Plains population within a disjunct range also comprised of the Atlantic Coast and Northern Great Lakes populations.

In the Project area, unvegetated gravelly shorelines of alkali lakes provide two-thirds to three-fourths of the successful nesting habitat with a slight preference for relatively smaller lake basins (Haig and Plissner, 1993; Plissner and Haig, 2000) while large river channel features provide the remaining nesting habitat. The breeding period is May to June with significant variation in reproductive success (Murphy et al., 2000) attributed to depredation, weather, and high water. Nesting habitats in the Project area are typically encircled with an undisturbed grassland buffer.

Breeding activities, including courtship flights, nest bowl scraping, territorial interactions, egg laying, incubating, and chick rearing, can occur throughout the summer. Nests are shallow scrapes and are often lined with shell fragments, pebbles, or small sticks. Egg laying begins the second or third week of May. Females lay an egg every other day until a four-egg clutch is complete. Both sexes share incubation duties. Incubation lasts 27 to 31 days. The precocial young hatch one-half or 1 day apart and are able to feed within hours. Broods typically remain on nesting territories but may expand their movements as they mature or are disturbed. Chicks fledge at 18 to 25 days of age (FWS, 1988c).

Piping plover breeding habitat consists of open, sparsely vegetated areas with alkali or unconsolidated substrates. For these alkali lakes and wetlands, nesting sites are generally wide, gravelly, salt encrusted beaches with minimal vegetation (Prindiville, Gaines, and Ryan, 1988). Breeding site fidelity for piping plovers varies considerably. Conditions for nesting are also highly variable in the

Great Plains from year to year and, therefore, nesting success may depend on the availability of alternative habitat types (Plissner and Haig, 1997).

Observations in northern Minnesota indicate that breeding adults start departing the nesting grounds as early as mid-July, and the majority of the adults migrate by early August. However, adult males in Manitoba have been observed with their broods until after fledging and were frequently seen with nonbreeding flocks. Juveniles depart the nesting grounds later than the adults. All piping plovers typically migrate to the wintering grounds by the end of August.

Alkali lakes in the Project area are typically permanent to semi-permanently flooded (Cowardin et. al 1979) or shallow Type 4 or Type 5 (Shaw and Fredine, 1956) euhaline or hypersaline wetland basins that are characterized with low emergent vegetative cover, fringe vegetative communities comprised of halophytes, and salt encrusted gravelly shorelines and beaches that provide optimal nesting surfaces. The FWS has mapped the North Dakota alkali lakes and wetlands where breeding piping plovers have been observed in more than 1 year for the period of 1987 to 2001 survey record (Federal Register, Volume 67, No. 176, pages 57637-57717). The survey period encompassed both wet and dry cycles and reflects the dynamic nature of prairie alkali lakes and wetlands, and the resulting shift in use by piping plovers of different habitat types. All alkali lakes and wetlands mapped exhibit one or more of the primary constituent elements. In these surveys, the FWS did not include many areas that exhibited all of the primary constituent elements but breeding piping plovers were only observed once or were never observed (Federal Register, Volume 67, No. 176, pages 57637-57717).

Plovers in the Project area forage on margins of both breeding alkali lakes and neighboring wetlands where they prey on microinvertebrates (FWS, 2010). Breeding piping plovers in the Project area overwinter on the Texas and Mexico coast.

Limiting Factors for Recovery: Limiting factors include the availability and abundance of breeding habitat and the level of anthropogenic disturbance during nesting, sheltering, brood-rearing, foraging, roosting, and migration. Breeding habitat quality can further serve as a limiting factor when habitats are diminished by surrounding development, lack of a buffer, encroaching vegetation, or water elevations. The narrow range of variables that comprise suitable breeding habitats often leads to a patchy, infrequent distribution of habitats within the breeding range of this species.

Relationship between Habitat in Area and Biological Requirements: North Dakota's alkali lakes and wetlands provide a complex of various wetland types that are essential in providing habitat for plovers to feed, nest, and brood in most years, as site availability changes due to variations in the water cycle.

Project Area Occurrences and Findings: Two designated critical habitat areas for the piping plover are found in proximity to the Project alignment and are addressed below. Additional potential breeding habitat exists throughout the Project area including a known recent breeding occurrence on Hapet Lake, which is located outside of the established critical habitat boundaries (Carol Aron, FWS, *pers. comm.*, 2011) (**Figure 3**).

A survey for breeding birds and potential habitats along a 1.5-mile-wide corridor based on the centerline of the proposed pipeline route was planned for the breeding season of 2011; however, the planned Project survey was cancelled in 2011 due to high water levels and would be deferred until the 2012 breeding season when pre-construction surveys for raptors and other resources would also occur. Record water levels in the region persisted throughout the entire summer of 2011 and inundated the known breeding habitats to the point where piping plover were observed nesting on atypical substrates (e.g., gravel roads) by Lostwood Wildlife Refuge staff who conduct annual plover monitoring (Carol

Aron, FWS, *pers. comm.*, 2011). The 2012 survey team of biologists would coordinate closely with Lostwood Refuge staff to obtain the latest breeding records and share survey results. The results would be used to avoid direct and indirect effects during construction and during operation of the pipeline.

Critical Habitat: FWS-designated critical habitat for piping plovers is located at various locations associated with alkali lakes and wetlands, the Missouri River, and Lake Sakakawea in Williams County. Designated critical habitat is defined in Section 3(5)(A) of the ESA as specific areas within the geographical area occupied by a species on which are found physical or biological features that:

- are essential to the conservation of the species;
- may require special management considerations or protection; and
- consist of specific areas outside the geographical area occupied by a species at the time it is listed, upon a determination that such areas are essential for the conservation of the species.

The Project would be within 1 mile of two designated critical habitat areas in Divide County (**Figure 4**): Radar Waterfowl Production Area (WPA) and McCone Lake, which are known to provide breeding habitat for the federally threatened piping plover (FWS, 2011). The FWS also identified Hapet Lake, a known wetland used by piping plover (FWS, 2011). While the Project would be about 0.5 mile from McCone Lake, it would be within about 0.25 mile of Radar WPA near milepost (MP) 68 and within about 650 feet of Hapet Lake near MP 52. Critical habitat along Lake Sakakawea is greater than 15 miles from the southern end of the Project.

As recommended during early informal consultation with the FWS to avoid adverse impacts on these two critical habitat areas, Vantage made attempts to locate the Project beyond the recommended 0.5 mile buffer of the critical habitat wetland edge. However, at the Radar WPA attempts to route the pipeline outside the FWS-recommended 0.5-mile-wide buffer were unsuccessful due to landowner constraints on adjacent parcels to the east of the area (**Figure 5**). As a result, the pipeline route would be located at the greatest distance possible, approximately 0.25 mile, from the edge of the critical habitat (i.e., alkali wetland). Furthermore, no isolated wetlands located within the 0.5-mile-wide buffer area would be affected by the route.

Vantage would locate the pipeline beyond the recommended 0.5-mile-wide buffer of the McCone Lake critical habitat (**Figure 6**). Additionally, no isolated wetlands located within the 0.5-mile-wide buffer area would be affected by the pipeline route.

In addition to identified piping plover habitat, the FWS has stated that other wetlands near the Project may not be designated as critical habitat but are also suitable for piping plover nesting and feeding (FWS, 2011).

2.1.1 Direct Effects

Construction Effects: The proposed Project would be located within the FWS-recommended 0.5-mile-wide buffer area of Hapet Lake, and the pipeline alignment in this area cannot be shifted outside of the buffer area due to landowner and engineering constraints.

The Project would avoid wetland impacts on Hapet Lake and on all isolated wetlands with the buffer area. To avoid impacts on the piping plover as recommended by the FWS, no construction would occur during the April 1 – September 1 breeding season where the alignment occurs within the 0.5-mile-

wide buffer area around Hapet Lake or within a 0.5-mile-wide buffer area on other wetlands where breeding piping plovers are observed during the 2012 surveys.

Implementation of the FWS impact avoidance measures is anticipated to result in no direct effects to individual birds or adverse impacts on suitable habitat for the piping plover during construction of the Project. Suitable habitat is defined as nesting, brooding, roosting, and foraging habitat associated with alkaline wetlands. Buffer area is defined as management habitat.

Effects of fuel, hydraulic fluids, and oil spills on the piping plover and its habitat would be reduced by the implementation of a Spill Prevention, Control, and Containment (SPCC) Plan.³ The SPCC Plan would provide safeguards against spills, and Vantage personnel would be trained to prevent, detect, and promptly respond to spills. The effects of spills and inadvertent releases during construction are considered to be low and the overall effect is considered to be minor.

Operational Effects: The FWS has raised concerns in regard to the potential for pipeline leaks to result in incidental take during operations of the Project. Based on Vantage's Risk Assessment and responses to Canadian Energy Board application inquiries (**Appendix A**), the potential risk for leaks is believed to be very low, as summarized below for a "worst case" leak scenario.

Risk Analysis

The proposed Vantage pipeline is approximately 430 miles with a diameter of 10 inches. The proposed pipeline would be constructed of steel with a maximum operating pressure of 1,440 pounds per square inch. In order to assess the risk posed by a pipeline with these features, historical pipeline incidents were analyzed resulting from similar pipelines.

The Alberta data (1990 – 2005) was used as a historical basis in the frequency analysis to estimate the incident frequency for all diameters of high pressure pipelines. Incidents are defined as:

- Leak – An opening, hole, or crack in the pipeline causing some product to be released, but not immediately impairing the operation of the pipeline.
- Rupture – The instantaneous tearing or fracturing of pipe material, immediately impairing the operation of the pipeline.
- Hit – Striking a buried pipeline during ground disturbance activity resulting in the pipeline or pipeline coating being damaged. A release of product does not necessarily occur.

The pipeline substances are aggregated into groups (crude oil, natural gas, sour gas, water, multiphase, and other). The "other" category consists of products including ethane, a high vapor pressure product.

From 1990 to 2005, the ratio of leaks-to-ruptures for substances combined on 7,872 miles of 2- to 16-inch diameter pipelines were 9-to-1, and there were no hits. More specifically, there were only 2 leaks on a 10-inch diameter pipeline similar to that proposed by Vantage.

Other potential sources for "fugitive emissions" include pipe connections, valves, seals, and compression pumps.

³ The SPCC Plan would be prepared by the construction contractor immediately prior to construction.

Site Ethane Properties

Ethane has a specific gravity of 1.047 at 60 degrees Fahrenheit with a density greater than ambient air at ground level. Ethane released in a leak scenario would stay low to the ground in calm or mild wind conditions. The U.S. Geological Survey climate data for Crosby, North Dakota (approx. 25 miles west of the nearest Critical Habitat) shows that prevailing wind directions in the Project area are from the south during the piping plover habitat occupancy period (**Table 4**). During most months, the prevailing winds would typically carry emissions towards the north and away from the critical habitats and Hapet Lake (**Figures 3 and 4**).

2011 Month	Average Wind Direction	Average Wind Speed (mph)
April	S	11.0
May	SE	12.9
June	S	10.6
July	S	9.8
August	S	8.8

Source: North Dakota Agricultural Weather Network. Available online: <http://ndawn.ndsu.nodak.edu>

Operation activities are not anticipated to contribute to effects on the piping plover or its habitat. Prior to right-of-way maintenance surveys using either all-terrain vehicles or by foot within the 0.5-mile buffer areas, the FWS would be consulted before the onset of the surveys, and activities would be coordinated with the FWS. Additionally, Vantage would consult with the FWS prior to any excavations to expose, visually inspect, or repair the pipeline within the buffer areas to avoid any direct effects on the species.

2.1.2 Indirect Effects

Potential indirect effects include scour and deposition of sediment from Project crossings of drainages and upland areas that outlet to and occur within the watersheds of McClone Lake and Radar WPA, critical habitats, and Hapet Lake (**Figures 4 and 5, Table 5**). Sedimentation from upslope sources can cover nesting and foraging areas; however, the implementation of measures identified in the EPP would prevent impacts on plover habitat.

Drainage ID	Pipeline Intersection (ft.)	Construction Impacts	Operational Impacts
H1	70.7	0.11	0.0
R1	85.3	0.14	0.0
Total	156.0	0.25	0.0

Indirect effects under a worse case leak scenario include bird mortality. Mitigation is addressed below under operations related take.

2.1.3 Estimated Take

Construction-Related Take: It is anticipated that application of the FWS-recommended BMPs and impact avoidance measures would not result in *direct effect*-related take of individuals or habitat, including alkali wetlands, as the result of construction of the Project.

The Project would avoid wetland impacts on both subject wetlands in the Radar WPA and McCone Lake critical habitats. As recommended by the FWS, no construction or vehicle use would occur during the April 1 – September 1 breeding occupancy period where the alignment occurs within the recommended 0.5-mile-wide buffer area around the Radar WPA critical habitat.

The above-mentioned 0.5-mile-wide buffer area and construction occurring outside of the April 1 – September 1 breeding habitat occupancy period would also be implemented on all wetlands where breeding piping plovers are observed during the 2012 survey and on Hapet Lake.

It is anticipated that application of these FWS-recommended BMPs and impact avoidance measures would not result in direct effects to critical habitat for the piping plover as the result of construction of the Project.

Take-related to *indirect effects* on Project-related crossings of piping plover habitat drainages would be minimized by:

- horizontal boring under drainages that meet wetland criteria;
- limiting construction to the winter and/or outside of the piping plover habitat occupancy period;
- implementing and monitoring of BMPs and erosion control addressed in the EPP required at all drainage crossings;
- restoring drainage channel contours, vegetative cover, and buffers after construction; and
- post-construction monitoring of restored drainage channels with remediation as needed.

In addition, Vantage, in consultation with the FWS and DOS, has agreed to prepare a Conservation Agreement (Agreement) for the conservation of migratory bird species in furtherance of the Migratory Bird Treaty Act, the Bald and Golden Eagle Protection Act, and Executive Order 13186. The Agreement would represent a voluntary effort between Vantage and the FWS, and would be designed to include conservation measures that avoid and minimize potential adverse impacts on migratory birds and their habitats. The Agreement would also provide a list of conservation options that the FWS and Vantage would consider as compensatory mitigation for loss of “habitat services” from the temporary and permanent loss of migratory bird habitat for construction and operation of the Project. The goal of the Agreement would be to aid in the long-term conservation of migratory birds with active management of the species and the habitat on which they depend. A signed Agreement between the FWS and Vantage would be provided to the DOS prior to construction.

Operations-Related Take: The risk of incidental take from operations, in particular pipeline leaks, is considered very low as discussed in **section 2.1.1**. An EPP and HASP developed for the Project would include detailed provisions on the following to minimize the risk of incidental take. To minimize the risk for an inadvertent pipeline leak during operations, Vantage would conduct the following.

- 1) Regular scheduled monitoring for leaks and fugitive emissions following National Transportation Safety Board (NTSB) requirements, protocols, and BMPs.
- 2) Pipeline leak monitoring under implementation of a pipeline integrity management and safety program to include and be subject to independent auditing using the following:

- Regular risk assessment updates:
 - Would include items such as identifying factors that increase the risk of a release, identification of maintenance and operation risks, identification of risks due to mechanical damage from excavation, and identify issues relating to product quality risk
- Regular Hazard Identification and Control & Risk Reduction:
 - Would include items such as staff and public quality control on procedures, training, public awareness, slope stability, depth of cover, stream crossings.
- Inspection, Testing, Patrol and Monitoring
 - Would include regularly scheduled visual inspections, recording of operating parameters, cathodic protection surveys, aerial surveys, infrared surveys, sampling, corrosion monitoring and smart pigging.
- Installation of controls in the event of a leak or fugitive emission to include:
 - Block valves upstream of pressure safety devices to allow for services in the event of a leak
 - Also includes extra protection measures including installation of tandem seals on pumps
 - Installation of plugs at open ended devices
 - Inspection of flanges or gaskets prior to installation
 - Regular monitoring and tightening of flange bolts
- Develop and annually update a leak detection and repair program (LDAR) that incorporates the above measures and other required sampling.
- Develop and maintain annual updates of an Emergency Response Plan (ERP) to include notification and response procedures for local authorities, the general public, and the FWS in the case of a leak or rupture.

Under a worst-case scenario of a leak or rupture near the two critical habitats and Hapet Lake, block valves in close proximity would serve as control points (**Figures 3 and 4**) to shut-off ethane flow.

The risk analysis and these standards are developed to assess risk and implement pipeline safety in areas of high human populations where emergency responses are decisive, swift, and risk adverse. Under a “worst case” leak scenario, based on the properties of ethane when exposed to atmosphere and the small 10-inch-diameter pipeline, the risk of incidental take of piping plovers at critical habitat and alkali wetlands is low and further mitigated by the above-referenced contingencies.

2.1.4 Cumulative Effects

The potential cumulative effects of pipeline construction and operation on local waterbodies and wetlands (where plovers primarily occur in the Project area) are expected to be localized, short-term, and reversible in nature. The wetlands that were identified during Vantage's field surveys have already been directly impacted by agricultural activities, and approximately 5 percent of the potentially traversed wetlands are within areas already impacted by construction, drilling, and production activities related to oil well development, primarily in Williams County. Potential impacts on waterbodies and wetlands as a result of construction activities associated with the proposed Project would, therefore, overlap with effects from other activities in Divide and Williams Counties (particularly agriculture, well pad construction and drilling, pipelines, and roads) in terms of both time and space. This would result in the temporary, localized increase of certain effects such as sedimentation, disruption to local wildlife and vegetation, and alteration of surface drainage patterns. However, by adhering to established and successful mitigation practices and reclamation methods, and following a proactive post-construction monitoring program, it is believed that there would be no long-term or permanent cumulative impacts on local wetlands as a result of the proposed Project or other Projects in the area.

Specific to vegetation, future construction related to drilling and production activities during oil well development would act cumulatively with impacts from the proposed Project and past activities in areas where construction occurs within areas consisting of native grassland or pasture. Long-term impacts would occur in locations where well pads and roads are constructed in vegetated areas. The potential residual effects from construction of the proposed Project are expected to be localized, short-term, and, for most locations, reversible in nature. Approximately 80 percent of the lands traversed along the proposed pipeline route are used for agricultural purposes including the production of cultivated crops, pasture land, and hay production. The remaining 20 percent includes native grasslands, and less than 1 percent is wetlands. A small area of 0.7 acre would be required for permanent facilities (e.g., mainline valves) for pipeline operation. Grasslands disturbed during construction would be reclaimed with native species and minimal long-term disturbances would be anticipated. Agricultural lands would be returned to production in the growing season following construction. Introduction of invasive species along the pipeline route and its vicinity could be a cumulative impact with agricultural activities and future development of oil and gas. Construction-related disturbances could promote the spread of invasive weed species from disturbed croplands and their weedy fringes onto native prairie sites. The measures included in Vantage's EPP would minimize potential impacts on grasslands and agricultural lands, and help control the spread of invasive weed species.

The ongoing development of oil and gas in portions of the region may result in the further impacts on agricultural and native grasslands in the area. The new well sites and related facilities may further fragment native prairie features. However, given the small width of the Vantage pipeline right-of-way, trench line, and proposed Project service area, and the successful application of the construction and post-construction measures listed in Vantage's EPP, it is anticipated that the impacts on the regionally representative vegetation would be minimal.

In summary, the Project in addition to the past, present, and reasonably foreseeable Projects or activities identified in the EA are not expected to result in significant adverse cumulative effects to the piping plover and its habitat. The Project would not cause habitat losses to critical habitat, alkali wetlands, or result in wetland impacts. All unavoidable wetlands would be horizontally bored. Similarly, indirect impacts from drainages that outlet to wetlands would be subject to BMPs during construction and post construction restoration and monitoring of areas disturbed by construction.

2.2 Whooping Crane – Endangered

Project Area Biology: The Project area is known as a potential area for feeding and roosting stopover during the annual spring and fall migration of the Aransas Wood Buffalo Population (AWBP) of the endangered whooping crane. The proposed Project is located within the 90-mile-wide corridor that includes approximately 75 percent of all reported whooping crane sightings in North Dakota (**Figures 8 and 9**).

The whooping crane was federally listed as threatened in 1967 and endangered in 1970; both listings were “grandfathered” into the ESA. Critical habitat for the species was designated in 1978.

Whooping cranes occur only in North America within Canada and the United States. Approximately 83 percent of the wild nesting sites occur in Canada and 17 percent occur in the United States in Florida and Wisconsin. Birds currently exist in the wild at three sites and in captivity. In August 2011, the total wild population was estimated to be 474, which includes approximately 315 adults and juveniles in the self-sustaining AWBP of whooping cranes (FWS, 2011). The Aransas-Wood Buffalo Population of whooping cranes typically occurs in North Dakota during the spring and fall migration between breeding and wintering areas.

Whooping cranes typically arrive in the Wood Buffalo National Park in Alberta and Northwest Territories, Canada in late April or early May and nest selection occurs shortly thereafter. The birds demonstrate considerable fidelity to their breeding territories and normally nest in the same general vicinity each year. Several pairs have nested in the same areas for 22 consecutive years. These nesting territories, termed “composite nesting areas,” vary considerably in size, but average 2.5 square miles (Kuyt, 1993). Adjoining pairs usually nest at least 0.6 mile apart; however, nests have been recorded as close as 435 yards from each other. From the initiation of egg laying until chicks are a few months of age, the activities of pairs and family groups are restricted to the breeding territory.

Whooping cranes may start nesting as early as 3 years of age; however, the average age of first egg production is 5 years (Kuyt and Goossen, 1987). From the results of color-banding studies in the Aransas-Wood Buffalo Population, 3-year-old whooping cranes have been documented nesting 10 times, including one instance where both members of the pair were 3 years old (Kuyt and Goossen, 1987).

Eggs are normally laid in late April to mid May, and hatching occurs about 1 month later; the typical incubation period is from 29 to 31 days (Kuyt, 1982). Whooping cranes may re-nest if their first clutch is destroyed or lost before mid-incubation (Erickson and Derrickson, 1981; Kuyt, 1981b; Derrickson and Carpenter, 1982). Whooping cranes generally nest annually, but may skip a season when nesting habitat conditions are unsuitable, if they are nutritionally stressed, or for other unidentified reasons (Chavez-Ramirez et al., 1997; Johns, 1998). Whooping cranes usually produce clutches of two eggs laid 48 to 60 hours apart.

Incubation begins with the first egg laid, resulting in asynchronous hatching of the eggs. Whooping crane parents share incubation and brood-rearing duties. Except for brief intervals, one member of the pair remains on the nest at all times. Females tend to incubate at night (Allen, 1952; Walkinshaw, 1973) and take the primary role in feeding and caring for the young (Blankinship, 1976). Chicks are capable of swimming shortly after hatching; however, parents and young return to the nest each night during the first 3 to 4 days after hatching. Later, parents brood their young wherever they are at night or during foul weather. During the first 20 days after hatching, families generally remain within 1 mile of the nest with daily movements averaging about 350 yards. Information on marked individuals suggests that most juveniles and sub-adults spend the summer near their natal area (Kuyt, 1981a).

Sexually immature birds (up to 4 years old) spend the summer as singles, pairs or in small groups of three to five birds. These birds usually occur on the peripheries of territories of nesting pairs.

Autumn migration normally begins in mid-September from the Wood Buffalo National Park, where most of the cranes have staged for 2 to 4 weeks (FWS, 2009). Once migration starts, most birds arrive on the wintering grounds at the Aransas National Wildlife Refuge near Corpus Christ, Texas between late October and mid November. The migration may be completed in a week (Kuyt, 1992); however, occasional stragglers may not arrive until late December.

Whooping cranes migrate in sub-adult, bonded pair, and family groups of three to four. Migration pace and progress are dependent on several variables, including body condition, prevailing weather, drought conditions, and relative food availability. Whooping cranes spend approximately 3 months annually in migration, typically traveling between 200 and 400 miles per day. Thus, their appearance and departure from a specific spot on the landscape can occur suddenly.

During migratory flight, whooping cranes may be blown east or west by strong winds that can carry them off of the migration corridor centerline. This enlarges the corridor, expanding it to approximately 220 miles in width. The proposed Project lies within a 90-mile corridor that includes approximately 75 percent of all reported whooping crane sightings in North Dakota (FWS, 2011).

During migration, the birds use shallow, open-water wetlands and water-covered river sandbars for roosting during the day and night. The birds feed on waste grain in nearby agricultural croplands, as well as on frogs, crayfish, and plant tubers. Habitat characteristics that are preferred include wetlands of various sizes in proximity to areas producing grain. Although no traditional staging or use areas have been identified near the Project, potential whooping crane habitat (i.e., wetlands in association with agricultural grain crop fields) is present throughout the Project area. Additionally, no traditional roosting sites for whooping cranes have been identified in North Dakota, although hundreds of observations have been recorded in the state (Stephen, 1979; Johnson and Temple, 1980; Austin and Richert, 2001). Five of those sightings between 1967 and 2007 have been in Williams and Divide Counties (FWS, 2010).

Limiting Factors for Recovery: Habitat loss, disturbance, low reproduction rates, and a low, vulnerable population are considered limiting factors for recovery of this species. In the 1860s, whooping crane population levels were estimated at 700 to 1,400 individuals. By the 1940s, the population had been decimated by hunting and habitat loss when it was estimated to be 15 individuals (ICF and WIDNR, 2003). Discovery of the breeding habitat on the AWBP and aggressive recovery efforts have brought this species back from the brink of extinction to more than 278 individuals recorded in August 2011.

Relationship between Habitat in Area and the Biological Requirements: Migration feeding and roosting stopover habitats are used during the spring and fall, and are critical habitat elements for the migratory AWBP population. The above-referenced 90-mile-wide corridor demonstrates that these habitats within the migration corridor are used by the migrating birds at some time during migratory flights.

Project Area Occurrences and Findings: Whooping cranes have been observed in the Project area during migration in feeding and roosting wetland stopover habitats (Binkley and Miller, 1983). Stopover habitats are utilized for temporary periods, typically not lasting more than several days (ICF and WIDNR, 2003).

All of the wetlands within the Project area shown in Attachment 2 of the Wetland Assessment Report (**Appendix B**) are considered potential stopover roosting or feeding habitats for whooping cranes.

2.2.1 Direct Effects

Construction Effects: As recommended by the FWS, if birds are observed within a one-mile of the Project area during construction, all work on the right-of-way that is located within the one-mile radius would cease and the FWS would be notified. Environmental monitors would also inspect the Project construction area for listed species and other resources during construction. Construction would be re-initiated after the birds leave the area and at the consent of the FWS.

The small 10-inch-diameter pipe would allow flexibility for routing around and avoidance of most wetlands in the Project area; however, the Project would cross a few wetlands. All of the approximately 13 unavoidable wetlands would be horizontally bored to avoid impacts on potential whooping crane stopover roosting wetlands (**Table 4**). All wetlands in the whooping crane migration corridor are considered potential stopover habitat.

ID	County	Start Milepost	End Milepost	NWI Classification	Crossing Width (feet)	Wetland Area Horizontally Bored Under during Construction (acres) ^a	Wetland Area Affected during Operations (acres) ^b
F17	Williams	2.51	2.53	PEMB/C	72.9	0.0	0.1
B104	Williams	9.38	9.40	PEMC/F	67.7	0.0	0.1
A73	Williams	12.82	12.83	PEMB/C	53.1	0.0	<0.1
G2	Williams	14.97	14.98	PEMB	44.0	0.0	<0.1
G3	Williams	16.02	16.03	PEMB	24.5	0.0	<0.1
B77	Williams	18.47	18.48	PEMA	74.6	0.0	0.1
G7/8	Williams	25.51	25.53	PEMB/C	110.4	0.0	0.1
G7/8	Williams	25.93	25.93	PEMB/C	31.4	0.0	0.1
G42	Williams	30.22	30.25	PEMB/C	121.4	0.0	0.1
H1	Divide	43.56	43.63	PEMC	326.7	0.0	0.2
E25	Divide	44.79	44.80	PEMB/C	54.5	0.0	<0.1
E13	Divide	69.52	69.62	PUB	485.1	0.0	0.3
B49	Divide	77.60	77.61	PEMB	51.1	0.0	<0.1
Total					1517.3	0.0	1.0
NOTES: ^a Because the pipeline would be installed using the bore crossing method, direct impacts on wetlands as a result of construction would be reduced. ^b Assumes a 30-foot- wide permanent right-of-way. However, no wetlands would be filled or permanently lost, and wetlands would retain functionality similar to that of the pre-construction state.							

No permanent dredge and fill impacts would occur. Assuming other federal clearances are obtained, the Project would not require a Section 404 Clean Water Act or Section 10 Navigable Waters permit according to the North Dakota Office of the USACE, Omaha District. The Project would fall under the NWP-12, but based on discussions with the USACE, the Project does not meet the conditions requiring pre-construction notification.

Operational Effects: The FWS has raised concerns with regard to the potential for pipeline leaks to result in incidental take during operations of the Project. Contingencies and details related to a worst case leak scenario are addressed above in **section 2.1.1** and are also applicable to the potential for effects on whooping cranes during migration stopovers. All of the proposed electric transmission line interconnections for the seven proposed block valve stations would be constructed entirely below ground to eliminate the risks for bird collisions. There are no other electric transmission lines proposed in association with the Project.

2.2.2 Indirect Effects

Construction Effects: Indirect effects on drainages into potential stopover wetlands would be minimized by:

- horizontal boring under drainages that meet wetland criteria;
- implementing and monitoring of BMPs and erosion control required under the NPDES at all drainage crossings;
- restoring drainage channel contours, vegetative cover, and buffers after construction; and
- post-construction monitoring of restored drainage channels with remediation as needed.

2.2.3 Estimated Take

Construction-Related Take: No take of whooping crane individuals or habitat loss to stopover wetlands would occur as a result of construction and operation of the Project. If birds are observed within a 1-mile radius of the Project during construction, all work within that area would cease and the FWS would be notified. Construction would be resumed only when the birds depart from the area of observation and under FWS consent.

In addition, as discussed in **section 2.1.3**, because the Whooping crane is considered a migratory bird, Vantage, in consultation with the FWS and DOS, has agreed to prepare an Agreement for the conservation of migratory bird species.

Operational-Related Take: The risks of incidental take from operations, in particular pipeline leaks, are considered insignificant and are addressed in detail in **section 2.1**.

2.2.4 Cumulative Effects

Similar to the discussion in **section 2.1.4**, the Project in addition to the past, present, and reasonably foreseeable projects or activities identified in the EA analysis are not expected to result in significant adverse cumulative effects to the whooping crane and its habitat. The Project would not cause permanent habitat losses to stopover wetlands as all unavoidable wetlands would be horizontally bored. Similarly, indirect impacts from drainages that outlet to wetlands would be subject to BMPs during construction and post construction restoration and monitoring of areas disturbed by construction.

2.3 Sprague's pipit – Candidate Species

Project Area Biology: The Sprague's pipit was listed by the FWS as a candidate species in 2010. Candidate species are plants and animals for which the FWS has sufficient information on their biological status and threats to propose them as endangered or threatened under the ESA, but for which development of a proposed listing regulation is precluded by other higher priority listing activities. Candidate species receive no statutory protection under the ESA; however, the FWS encourages cooperative conservation efforts for these species because they are, by definition, species that may warrant future protection under the ESA.

Sprague's pipit is listed as a candidate species in Williams and Divide Counties. The birds breed from north central Alberta to central Manitoba, south to Montana and north central South Dakota, and east to northwestern Minnesota. Suitable habitat is native grassland of intermediate height and sparse to

intermediate density. Although the birds would use exotic vegetation, they are significantly more abundant in sparsely vegetated native prairie. Within grazed mixed-grass areas in North Dakota, abundance of Sprague’s pipits was positively associated with percent clubmoss (*Selaginella densa*) cover and plant communities dominated by native grass (*Stipa*, *Bouteloua*, *Koeleria*, and *Schizachyrium* spp.). In areas not used by Sprague’s pipits, percent grass cover, litter depth, and vegetation density were greater than in areas where Sprague’s pipits were present. The strongest vegetational predictors of the presence of Sprague’s pipit were decreasing bare ground and decreasing litter depth.

Potential grassland and aspen parkland breeding habitats for the species occur in the Project area as North Dakota is located at the southern end of the breeding range. The wintering range for the Sprague’s pipit is located in the southern U.S. and Mexico. Sprague’s pipit’s prefer at least 72 acre patches of mixed, tall vegetated grassland for breeding and are adverse to human disturbances and features (Jones, 2010). Throughout its breeding range, the species has contracted compared to anecdotal accounts of abundance during European settlement. Specific occurrences of this species in the Project area are not known, but potential breeding habitat is widespread.

Limiting Factors for Recovery: Jones (2010) cites habitat loss, fragmentation, conversion of native grassland to other uses, cowbird parasitism, and human development as limiting factors for recovery of this species.

2.3.1 Direct Effects

Construction Effects: Anticipated effects on the Sprague’s pipit and suitable grassland habitat (Table 7 and Figures 9 and 10) is would be minimized through pre-construction monitoring of areas disturbed by construction and implementation of BMPs. Construction, including clearing of vegetative cover, would be timed to occur outside of the breeding season starting on April 1, where possible. Construction activities conducted during the breeding season in potential breeding habitats would be preceded with a field survey for nesting migratory birds, including the Sprague’s pipit. These potential habitats would be monitored for nesting activities by the environmental monitor. If nesting birds are observed prior to construction, efforts would be made to avoid direct effects and take until the young have fledged.

Facility	Agricultural		Grassland		Pasture/Hay		Wetlands		Total	
	Con ^a	Op ^b	Con	Op	Con	Op	Con	Op	Con	Op
Pipeline Right -of-Way										
Williams County	243.2	0.0	47.4	0.0	26.7	0.0	0.4	0.0	317.6	0.0
Divide County	160.7	0.0	85.5	0.0	110.2	0.0	0.6	0.0	357.0	0.0
Additional Temporary Workspace	30.7	0.0	11.5	0.0	9.3	0.0	0.0	0.0	51.6	0.0
Mainline Valves	0.2	0.2	0.1	0.1	0.0	0.0	0.0	0.0	0.4	0.4
Access roads	0.1	0.1	0.1	0.1	0.0	0.0	0.0	0.0	0.2	0.2
Pipe storage/contractor yards	8.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	8.0	0.0
NOTES:										
^a Construction impacts. Assumes a 70-foot-wide temporary right-of-way and/or the area necessary to install a facility.										
^b Operational impacts. Assumes a 30-foot-wide permanent right-of-way and/or the area necessary to operate the facility. No impacts are associated with operation along the pipeline right-of-way because the area would be allowed to revert to prior uses following construction.										

Post-construction restoration would include restoration of the right-of-way and construction areas to pre-construction grade, and Vantage proposes to reseed disturbed native prairie and grassland areas with a native species seed mix (as listed in the EPP) with species diversity that is representative of the

Project area native community and sourced from local sources to the greatest extent practicable to maintain local genotypes. On privately owned grasslands and pastures, landowner consultation and preferences would also apply in advance of reseeding. Seed mixes would be certified weed free by the appropriate certification body prior to construction and approved for use by the affected private landowners. Permanent structures would be limited to eight aboveground MLBVs, with a relatively small total disturbance area of 0.4 acre. Nearly all of the MLBVs are located in actively cultivated fields. Total impact from valve stations and access roads in grassland during operations is approximately 0.2 acre. All other impacts on grassland would be temporary and limited to the time of construction.

Operational Effects: The FWS has raised concerns with regard to the potential for pipeline leaks to result in incidental take during operations of the Project. As discussed in **section 2.1.1**, the potential risk for leaks is anticipated to be very low. Vantage would implement the contingencies addressed in the Project HASP, which include continuous pressure and leak detection monitoring, aerial and foot surveillance, emergency valve closure, and hazardous materials response protocols.

2.3.2 Estimated Take

Construction-Related Take: All reasonable and prudent efforts would be implemented to avoid and minimize construction-related take on the Sprague's pipit during construction of the Project. These efforts include adopting the FWS-recommended mitigation measures, which include, but are not limited to, scheduling land clearing and construction outside of the nesting season to the greatest extent practicable, conducting monitoring of areas disturbed by construction and implementation of BMPs in potential breeding habitat during construction, and restoring native prairie and grasslands to pre-construction conditions. Permanent impacts (habitat loss) to grassland are estimated to be 0.2 acre.

In addition, as discussed in **section 2.1.3**, because the Sprague's pipit is considered a migratory bird, Vantage, in consultation with the FWS and DOS, has agreed to prepare an Agreement for the conservation of migratory bird species.

Operational-Related Take: The risks of incidental take from operations, in particular pipeline leaks is very low. Contingencies and details related to a worst case leak scenario are addressed above in **section 2.1** and are applicable to the potential for effects on the Sprague's pipit. The resulting permanent right-of-way corridor would also result in fragmentation of grassland habitat; however, habitat fragmentation would be minimized to the greatest extent practicable through reseeding with the above-mentioned native grassland seed mix.

2.3.3 Cumulative Effects

As discussed in **section 2.1.4**, future construction related to drilling and production activities during oil well development would act cumulatively with impacts from the proposed Project and past activities in areas where construction occurs within areas consisting of native grassland, home to grassland nesters such as the Sprague's pipit. Long-term impacts would occur in locations where well pads and roads are constructed in vegetated areas. The potential residual effects from construction of the proposed Project are expected to be localized, short-term, and, for most locations, reversible in nature. The amount of Project-related grassland habitat loss is 0.2 acre. Vantage would reclaim grasslands disturbed during construction with native species and minimal long-term disturbances would be anticipated. Introduction of invasive species along the pipeline route and its vicinity could be a cumulative impact with agricultural activities and future development of oil and gas. Construction-related disturbances could promote the spread of invasive weed species from disturbed croplands and their weedy fringes onto native prairie sites. The measures included in Vantage's EPP would minimize potential impacts on grasslands and agricultural lands, and help control the spread of invasive weed species.

The ongoing development of oil and gas in portions of the region may result in the further impacts on Sprague's pipit habitat (i.e., native grasslands) in the area. The new well sites and related facilities may further fragment native prairie features. However, given the small width of the Vantage pipeline right-of-way, trench line, and proposed Project service area, and the successful application of the construction and post-construction measures listed in Vantage's EPP, it is anticipated that the impacts on the regionally representative vegetation would be minimal.

The Project in addition to the past, present, and reasonably foreseeable projects or activities identified in the EA are not expected to result in significant adverse cumulative effects to the Sprague's pipit and its habitat. The resulting permanent right-of-way corridor would also result in fragmentation of grassland habitat; however, habitat fragmentation would be minimized to the greatest extent practicable through reseeding with the above-mentioned native grassland seed mix.

2.4 Least Interior Tern – Endangered

Project Area Biology: The interior least tern is federally listed as endangered in Williams County. The interior population of the species consists of 8,000 birds that breed in the Mississippi, Missouri, and Rio Grande River systems. These birds typically nest on sparsely vegetated sandbars along the river. Eggs are commonly laid in clutches of two from late May through June, and are incubated by both sexes. The young fledge in 19 to 20 days. By late August and early September, least terns depart from the northern breeding grounds to winter habitat along the Gulf of Mexico and on Caribbean Islands.

Williams County is known to have occurrences of the interior least tern, which nests along midstream sandbars of the Missouri and Yellowstone Rivers. The interior population of the least tern has declined due to loss of habitat from dam construction and river channelization on major rivers throughout the Mississippi, Missouri, and Rio Grande River systems. Because of dams, river flows are managed in a non-historic fashion and are not conducive to the creation and maintenance of sandbars with sparse vegetation. Human disturbance is also a problem.

The Project would not cross nor is within close proximity of these or other navigable waters. Furthermore no depletions of downstream waters are anticipated to result from the Project. The interior least tern in North Dakota is known to maintain fidelity to a home range and dispersal limited to its riverine breeding habitats which they also use for foraging. Observations outside of the river corridors are considered rare (FWS, 1990).

Limiting Factors for Recovery: The FWS (1990) recovery plan for the species cites channelization, irrigation, impoundment, and other water flow related factors as the primary limiting factor for the recovery of the interior least tern.

2.4.1 Direct and Indirect Effects

Construction and Operational Effects: Construction and operation effects on the interior least tern are not anticipated due to the location of the proposed Project. Habitat and occurrences of this species are restricted to the Missouri and Yellowstone Rivers, both of which are located over 15 miles from the Project. The Project would also not result in depletions or alterations in water flow associated with these rivers.

2.4.2 Estimated Take

There would be no anticipated take on the interior least tern as a result of construction and operation of the Project.

2.4.3 Cumulative Effects

The Vantage pipeline would not directly or indirectly affect interior least tern habitat. Consequently, the Project in addition to the past, present, and reasonably foreseeable projects or activities identified in the EA would not result in adverse cumulative effects on interior least tern and its habitat.

2.5 Pallid Sturgeon – Endangered

Project Area Biology: The pallid sturgeon is a federally listed endangered fish that occurs in Williams County. The species dates to prehistoric times and can weigh up to 80 pounds. Pallid sturgeons prefer the bottom of large, shallow rivers with sand and gravel bars, and flows with high turbidity without obstructions. Construction of dams and armored bank stabilization has damaged or destroyed its preferred habitat. The preferred habitat has a diversity of depths and velocities formed by braided channels, sandbars, islands, sand flats, and gravel bars.

The pallid sturgeon was relatively common in the Missouri and Yellowstone River systems in North Dakota as late as the 1950s, but biologists believe fewer than 250 of the fish remain. Consequently, the pallid sturgeon was placed on the Endangered Species List in 1990. Historically, pallid sturgeon were found in the Missouri River from Fort Benton, Montana; in the Mississippi River from above St. Louis to the Gulf of Mexico; and in the lower reaches of other large tributaries, including the Yellowstone, Platte, Kansas, Ohio, Arkansas, Red, and Sunflower Rivers; and in the first 60 miles of the Atchafalaya River in Louisiana.

In the Missouri River, the pallid sturgeon populations are currently fragmented by dams. As a result, the pallid sturgeon is scarce in the upper Missouri River above the Ft. Peck Reservoir; in the middle Missouri and lower Yellowstone Rivers between Ft. Peck Dam and Lake Sakakawea; and in the lower Missouri River downstream of Gavins Point Dam at Yankton, South Dakota. It is also scarce in the Mississippi and Atchafalaya Rivers.

No reproduction has been documented in North Dakota in 15 years (FWS, 2010).

2.5.1 Direct and Indirect Effects

Construction and Operational Effects: The proposed Project does not cross the Missouri or Yellowstone Rivers, nor is it in close proximity. No direct or indirect effects on pallid sturgeon or its habitat are anticipated as a result of construction or operations of the pipeline facilities.

2.5.2 Estimated Take

The proposed Project does not involve crossings of the Missouri or Yellowstone Rivers. No estimated take is anticipated as a result of construction or operation of the pipeline facilities.

2.5.3 Cumulative Effects

The Project would not directly or indirectly affect the pallid sturgeon or its habitat. Consequently, the Project in addition to the past, present, and reasonably foreseeable projects or activities identified in the EA would not result in adverse cumulative effects on the pallid sturgeon and its habitat.

2.6 Gray Wolf – Endangered

Project Area Biology: Since 1978, the gray wolf has been federally listed as endangered in Williams and Divide Counties; however, gray wolf habitat is sparse and sightings have been concentrated well away from the Project. While having a relatively small pack range, the gray wolf is a species whose individuals are known to travel great distances over a large geographic region (Treves et. al., 2009) and observations in any location in the state are possible. In 2002, a radio collared 2 year old male of the Camp Ripley Minnesota pack travelled over 600 miles over a 9 month time frame throughout eastern Minnesota and Wisconsin only to return to the pack in central Minnesota (Minnesota Department of Natural Resources, 2003).

Thirty-four reports of observations of wolves by the public and agency personnel were recorded by the FWS Ecological Services program from January 1992 to December 1995, but no sightings were recorded in the Project area. According to the FWS (2010), the gray wolf is an occasional visitor to North Dakota and is primarily observed in the Turtle Mountains.

The 579-square-mile Turtle Mountains region is an elevated physiographic feature that supports a deciduous forest ecosystem of paper birch (*Betula papyrifera*), quaking aspen (*Populus tremuloides*), and bur oak (*Quercus macrocarpa*). The area is about 90 percent uplands and small wetlands and 10 percent lakes and large wetlands. The uplands are 68 percent forested with the remainder being pasture and cropland. The region also has non-migratory white-tailed deer (*Odocoileus virginianus*), moose (*Alces alces*), and elk (*Cervus elaphus*) populations.

Of the 34 reported sightings of wolves, 12 occurred in the Turtle Mountains of which 4 were by the USDA, Animal Damage Control (ADC) personnel. ADC personnel reported 17 incidents of wolf tracks in the Turtle Mountains. These tracks included tracks of pups in 1994. During the same period, ADC personnel also reported several possible, although unconfirmed, cases of wolf depredation of livestock. Other reports of wolves, including observations by ADC personnel, came from within 15 miles of the Turtle Mountains, which is located approximately 150 miles east of the Project. The relatively large number of recent reports of wolves from the Turtle Mountains vicinity and the reports that have been received during all seasons suggest that wolves may have established a territory in the area.

The Turtle Mountains appear to be suitable for some level of wolf activity. Studies in Minnesota and Wisconsin suggest that wolves are more likely to survive in forested habitats with low road densities such as is available in the Turtle Mountains region. The data suggest that the presence of wolves in most of North Dakota will remain sporadic and consist of occasional dispersing animals from Minnesota and Manitoba. Although most of North Dakota is sparsely populated, and has low road densities, the mostly wide-open prairie habitat makes wolves vulnerable to being shot, and, therefore, colonization by wolves is unlikely. The exception is the Turtle Mountains region. This region provides marginal habitat that may be able to support a very small non-viable population of territorial wolves.

2.6.1 Direct and Indirect Effects

Construction and Operational Effects: There are no known packs or occurrences of the gray wolf within or in proximity to the Project area. No direct or indirect effects on the gray wolf are anticipated as a result of construction or operation of the pipeline facilities.

2.6.2 Estimated Take

There are no known packs or occurrences of the gray wolf within or in proximity to the Project area; therefore, no estimated take is anticipated as a result of construction or operation of the pipeline facilities.

2.6.3 Cumulative Effects

Due to the transitory nature and historically known preferred habitat of the gray wolf (i.e., outside the Project area), no cumulative effects on the gray wolf or its habitat are anticipated as a result of the Project in addition to the past, present, and reasonably foreseeable projects or activities identified in the EA.

3.0 PLANNING MITIGATION MEASURES

Impact avoidance and minimization measures for federally listed species that were identified during Project planning are described below. The interior least tern, pallid sturgeon, and gray wolf are not addressed as these species are not anticipated to be directly or indirectly affected by the construction and operation of the Project.

The following avoidance and minimization efforts were implemented during planning and design phases of the Project:

- Piping plover
 - Two Critical Habitats in Divide County were avoided and the pipeline route would be located beyond the FWS-recommended 0.5-mile-wide buffer or to the greatest distance possible from the critical wetland habitat boundary.
 - A survey for breeding piping plovers in areas outside of the two critical habitats planned for 2011 was cancelled due to record high water conditions. The survey would be re-initiated in 2012 prior to construction and would include close coordination with Lostwood Refuge staff engaged in regional monitoring of the piping plover.
- Whooping crane
 - The small 10-inch-diameter of the proposed pipeline would allow for siting flexibility to avoid most wetlands in the Project area.
- Sprague's pipit
 - A land use survey was conducted in 2010 to identify suitable grassland habitats for the implementation of construction mitigation measures.

4.0 CONSTRUCTION MITIGATION AND MONITORING

The following mitigation and monitoring measures are proposed for implementation during construction of the Project. These measures are also included in the EPP.

- Piping plover
 - Construction within the FWS's recommended 0.5-mile-wide buffer of Hapet Lake or any other breeding habitat identified in the 2012 surveys or through FWS communications would be conducted outside of the April 1 – September 1 breeding occupancy period.
 - Environmental monitors (trained biologists) would inspect all wetlands within 0.5 mile of the Project where construction is planned during the April 1 – September 1 breeding occupancy period. If birds or active nests are observed, the above restrictions would apply.
 - Unavoidable wetlands would be horizontally bored to avoid direct impacts and habitat loss.
 - Drainages crossed by the Project that outlet into piping plover wetland habitat would be subject to permit-required BMPs, inspection during construction, and post-construction restoration and monitoring of areas disturbed by construction as discussed in the EPP to minimize indirect effects.

- Whooping crane
 - Environmental monitors (trained biologists) would monitor upland areas and wetlands in the vicinity of active construction during the fall whooping crane migration period. The FWS would be consulted to determine the monitoring dates for migration periods.
 - As recommended by the FWS, if birds are observed within 1 mile of the Project during construction, all work within that 1 mile area would cease and the FWS would be notified immediately. Coordination with the FWS would be conducted prior to re-initiating Project-related activities.
 - Unavoidable wetlands would be horizontally bored to avoid direct impacts and habitat loss to stopover wetlands.
 - Drainages discharging into potential stopover wetland habitat crossed by the Project would be subject to permit-required BMPs, inspection during construction, and post construction restoration and monitoring of areas disturbed by construction as discussed in the EPP to minimize indirect effects.

- Sprague's pipit
 - Land clearing of Project work space within potential Sprague's pipit habitat would be implemented to the greatest extent practicable outside of the April 1 – July 15 nesting period.

- If construction occurs during the April 1 – July 15 nesting period in potential Sprague’s pipit habitat, these areas would be inspected by environmental monitors prior to the start of work. If observations or evidence of active nesting is detected, construction would be delayed until after July 15 or when the young have fledged, or coordination with the FWS on appropriate nest buffers would occur.
- Permanent grassland habitat loss is limited to 0.2 acre. All other impacts on grassland are temporary and would be restored with original topsoil, seeded with diverse, local genotyped, and certified weed free native mixes, and subject to post-construction monitoring of areas disturbed by construction and maintenance in accordance with Vantage’s EPP. Seed mixes would be certified by the producers as required by the USDA and other regulating bodies.
- Habitat fragmentation is anticipated, but would be minimized through the installation of the above-referenced native seed mix and subject to post construction monitoring.

In addition, as discussed in **section 2.1.3**, Vantage, in consultation with the FWS and DOS, has agreed to prepare an Agreement for the conservation of migratory bird species in furtherance of the Migratory Bird Treaty Act, the Bald and Golden Eagle Protection Act, and Executive Order 13186. The Agreement would represent a voluntary effort between Vantage and the FWS, and would be designed to include conservation measures that avoid and minimize potential adverse impacts on migratory birds and their habitats. The Agreement would also provide a list of conservation options that the FWS and Vantage would consider as compensatory mitigation for loss of “habitat services” from the temporary and permanent loss of migratory bird habitat for construction and operation of the Project. The goal of the Agreement would be to aid in the long-term conservation of migratory birds with active management of the species and the habitat on which they depend. A signed Agreement between the FWS and Vantage would be provided to the DOS prior to construction.

4.1 Operational Mitigation and Response Contingencies

Risks parameters and contingencies under a worst case leak scenario are addressed in **section 2.1.3**. The potential for wildlife collisions and strikes is believed to be insignificant due to the below ground nature of the pipeline, and habitat fragmentation is anticipated, but would be minimized through the above-mentioned native grassland seed mix. With the exception of about 0.2 acre, all Project permanent right-of-way areas in grassland would be reseeded, restored, and subject to post construction monitoring of areas disturbed by construction and maintenance in accordance with Vantage’s EPP.

5.0 CONCLUSIONS

Based on the findings addressed in this BA, a “*may affect, but not likely to adversely affect*” determination is recommended for the piping plover, whooping crane, Sprague’s pipit, least interior tern, pallid sturgeon, and gray wolf as summarized below.

Species: Common name - <i>scientific name</i>	Federal Status	Effect Determination
Piping plover - <i>Charadrius melodus</i> (Great Plains population)	Threatened	“may affect, but not likely to adversely affect” (MANLAA)
Whooping crane - <i>Grus americana</i>	Endangered	MANLAA
Gray wolf - <i>Canis lupus</i>	Endangered	MANLAA
Pallid sturgeon - <i>Scaphirhynchus albus</i>	Endangered	MANLAA
Interior least tern - <i>Sterna antillarum athaloassos</i>	Endangered	MANLAA
Sprague’s pipit - <i>Anthus spragueii</i>	Candidate	MANLAA
Critical Habitat for the piping plover	Endangered	MANLAA

The recommendations are based on the following:

- Early informal consultation with the FWS to identify, assess, and avoid/minimize impacts to the greatest extent practicable.
- Lack of habitat and/or occurrences in the Project area for the least interior tern, pallid sturgeon, and gray wolf.
- Migration presence of whooping crane.
- Avoidance of wetland impacts by horizontally boring under wetlands.
- Location of the Project beyond the 0.5-mile-wide buffer at the McCone Lake critical habitat.
- Location of the Project at the farthest distances possible at the Radar WPA critical habitat and Hapet Lake piping plover breeding habitat.
- Minimizing grassland habitat fragmentation through reseeding the permanent right-of-way with a diverse, local genotyped, and weed free native grassland mix.
- Minimizing grassland habitat loss to 0.2 acre.
- Minor to nonexistent cumulative effects on grassland and wetland habitat from the Project in addition to the identified past, present, and reasonably foreseeable projects or activities.
- Preparation of an Agreement for the conservation of migratory bird species in furtherance of the Migratory Bird Treaty Act, the Bald and Golden Eagle Protection Act, and Executive Order 13186. The Agreement would represent a voluntary effort between Vantage and the FWS, and would be designed to include conservation measures that avoid and minimize potential adverse impacts on migratory birds and their habitats. The Agreement would also provide a list of conservation options that the FWS and Vantage would consider as compensatory mitigation for loss of “habitat services” from the

temporary and permanent loss of migratory bird habitat for construction and operation of the Project. The goal of the Agreement would be to aid in the long-term conservation of migratory birds with active management of the species and the habitat on which they depend. A signed Agreement between the FWS and Vantage would be provided to the DOS prior to construction.

- Construction measures that include:
 - environmental monitoring by trained, experienced biologists;
 - environmental training would be required for all construction crews prior to construction;
 - timing construction to the greatest extent possible outside of the Sprague's pipit and piping plover breeding season. Delaying construction until after fledging where known occurrences have been identified;
 - no construction within the 0.5-mile-wide buffers of piping plover breeding habitats during the site occupancy season;
 - construction cessation if roosting or foraging whooping cranes are observed within a one-mile of active construction. Construction would resume after the birds have departed from the area where observed with FWS consent;
 - clearing of grassland habitat outside of the Sprague's pipit nesting season to pre-empt nest establishment. The nesting season for the subject construction year will be advised by FWS staff at the Lostwood Refuge Office who are annually monitoring the bird's breeding (prior to construction);
 - if construction progresses into the spring, pre-construction clearing of grassland habitat prior to nesting would be intended to preclude the establishment of nesting in the workspace, a common mitigation practice recommended by the FWS and other resource agencies. The birds would establish nests in the widely available habitat adjacent to the Project workspace;
 - horizontal borings under all unavoidable wetlands to avoid impacts or habitat loss to whooping crane stopover roosting habitat and potential piping plover habitat. Construction measures and vehicular travel restrictions on and around wetlands;
 - topsoil salvage and replacement, reseeding native grassland with a diverse, locally genotyped, and certified weed free native species grassland seed mix, and post-construction monitoring and maintenance in all grassland habitats affected by the temporary and permanent right-of-way; and
 - permit-required BMPs and inspections during construction, and post-construction restoration and monitoring at all drainages, including drainages into piping plover and whooping crane stopover wetlands by Project trained and assigned environmental monitors. Environmental monitors would complete daily inspection reports, summarized in regular reports provided to the FWS and other interested agencies. Monitoring reports would be provided, as requested, to the FWS, landowners, other interested agencies, and stakeholders.

- Operations measures that include:
 - analysis of risk factors and emergency contingencies under a worse case leak or rupture scenario as addressed in detail in **section 2.1.3**;
 - adoption of emergency leak and rupture contingencies addressed in the EPP, EA, and HASP, which would be developed prior to construction and applicable during operations;
 - post-construction monitoring in accordance with a Project EPP and remediation of temporary impacts on habitats within the temporary and construction right-of-way. A monitoring plan would be included in the EPP, and would include reporting protocols, thresholds, metrics, and follow-up maintenance BMPs. The length of monitoring period would be flexible to account for variation and the time needed to achieve success. Monitoring reports would be provided, as requested, to the FWS, landowners, other interested agencies, and stakeholders. The FWS, landowners, and other agencies would have full authority to conduct follow-up review of monitored areas; and
 - the assumed nature of the Project during operations: a below-ground pipeline with no risk for wildlife collision or conflicts, and minimal habitat loss.

6.0 REFERENCES

- 2002 Animal Survey Report for the Minnesota Army National Guard Camp Ripley Training Site *and Arden Hills Training Site* by the Minnesota Department of Natural Resources (MNDNR), Camp Ripley Report No. 13, 2003.
- Allen, R.P. 1952. The whooping crane. *National Audubon Society Resource Report Number 3*. 246 pp.
- Austin, J.E. and A.L. Richert. 2001. A comprehensive review of the observational and site evaluation data of migrant whooping cranes in the United States, 1943-99. U.S. Geological Survey, Northern Prairie Wildlife Research Center, Jamestown, North Dakota, and State Museum, University of Nebraska, Lincoln, Nebraska. 157 pp.
- Binkley, C.S. and R.S. Miller. 1983. Population characteristics of the whooping crane, *Grus americana*. *Can. J. Zool.* 61:2768 – 2776.
- Blankinship, D.R. 1976. Studies of whooping cranes on the wintering grounds. Pages 197-206 in J.C. Lewis, ed. *Proceedings of the International Crane Workshop*, Oklahoma State University Press, Stillwater.
- Chavez-Ramirez, F., J.T. Nelson, and R.D. Slack. 1997. Food and energy intake rates of wintering whooping cranes foraging on two selected food items. *Proceedings of the North American Crane Workshop* 7:259.
- Cowardin, L. M., V. Carter, F. C. Golet, E. T. LaRoe. 1979. Classification of wetlands and deepwater habitats of the United States. U.S. Department of the Interior, Fish and Wildlife Service, Washington, D.C. 131pp.
- Derrickson, S.R. and J.W. Carpenter. 1982. Whooping crane production at the Patuxent Wildlife Research Center, 1967-1981. Pages 190-198 in J.C. Lewis, eds. *Proceedings of the 1981 International Crane Workshop*. National Audubon Society, Tavernier, Florida.
- Erickson, R.C. and S.R. Derrickson. 1981. Whooping crane (*Grus americana*). Pages 104-118, in J.C. Lewis and H. Masatomi, eds. *Crane Research Around the World*. International Crane Foundation, Baraboo, Wisconsin.
- Federal Register. 2002. Volume 67, No. 176, pages 57637-57717. 50 CFR Part 17. Endangered and Threatened Wildlife and Plants; Designation of Critical Habitat for the Northern Great Plains Breeding Population of the Piping Plover; Final Rule. Available online at: <http://www.fws.gov/mountain-prairie/species/birds/pipingplover/fedreg091102.htm>.
- Haig, S.M., and J.H. Plissner. 1993. Distribution and abundance of piping plovers: results and implications of the 1991 international census. *Condor* 95:145-156.
- Johns, B.W. 1998. Year of the crane. *Alberta Naturalist*. 28:3-4.
- Johnson, K.A. and S.A. Temple. 1980. The migration ecology of the whooping crane. Unpublished report prepared under contract 14-16-0009-78-034 to the U.S. Fish and Wildlife Service. University of Wisconsin, Madison. 87pp.

- Jones, S. L. 2010. Sprague's Pipit (*Anthus spragueii*) conservation plan. U.S. Department of Interior, Fish and Wildlife Service, Washington, D.C.
- Kuyt, E. 1981a. Population status, nest site fidelity, and breeding habitat of whooping cranes. Pages 119-125, in J.C. Lewis and H. Masatomi, eds. *Crane Research Around the World*. Proceedings of the International Crane Symposium, Sapporo, Japan, International Crane Foundation, Baraboo, Wisconsin.
- Kuyt, E. 1981b. Clutch size, hatching success, and survival of whooping crane chicks, Wood Buffalo National Park, Canada. Pages 126-129, in J.C. Lewis and H. Masatomi, eds. *Crane Research Around the World*. Proceedings of the International Crane Symposium, Sapporo, Japan, International Crane Foundation, Baraboo, Wisconsin.
- Kuyt, E. 1982. Whooping crane. *Hinterland Who's Who*. Canadian Wildlife Service, Ottawa. 6pp.
- Kuyt, E. and J.P. Goossen. 1987. Survival, age composition, sex ratio, and age at first breeding of whooping cranes in Wood Buffalo National Park, Canada. Pages 230-244, in J.C. Lewis and J.W. Ziewitz, eds. Proceedings of the 1985 Crane Workshop, Platte River Whooping Crane Habitat Maintenance Trust and U.S. Fish and Wildlife Service, Grand Island, Nebraska.
- Kuyt, E. 1993. Whooping crane, *Grus americana*, home range and breeding range expansion in Wood Buffalo National Park, 1970-1991. *Canadian Field-Naturalist*. 107:1-12.
- Minnesota Department of Natural Resources. 2003. *2002 Annual Animal Survey Report for the Minnesota Army National Guard Camp Ripley Training Site and Arden Hills Army Training Site*. Camp Ripley Series Report No. 13. Division of Ecological Services, Minnesota Department of Natural Resources.
- Murphy, R.K., M.J. Rabenberg, M.J. Sondreal, B.R. Casler, and D.H. Guenther. 2000. Reproductive success of piping plovers on alkali lakes in North Dakota and Montana. U.S. Fish and Wildlife Service Publications.
- Plissner, J.H. and S.M. Haig. 1997. 1996 International Piping Plover Census. Report to the U.S. Geological Survey, Biological Resources Division, Forest and Rangeland Ecosystem Science Center, Corvallis, Oregon, USA.
- Plissner, J.H. and S.M. Haig. 2000. Status of broadly distributed endangered species: results and implications of the second International Piping Plover Census. *Can. Zool.* 78:128-139.
- Prindiville Gaines, E.M. and M.R. Ryan. 1988. Piping plover habitat use and reproductive success in North Dakota. *Journal of Wildlife Management*. 52:266-273.
- Shaw, Samuel P. and C. Gordon Fredine 1956. Wetlands of the United States -their extent and their value to waterfowl and other wildlife. U.S. Department of the Interior, Washington, D.C. Circular 39.
- Stephen, W.J.D. 1979. Whooping crane sightings in prairie provinces, 1977 and 1978. *Blue Jay*.
- Treves, A., Martin, K.A., Wiedenhoef, J.E., Wydeven, A.P. 2009. *Gray wolf dispersal in the Great Lakes Region*, in *Recovery of Gray Wolves in the Great Lakes Region of the United States: an Endangered Species Success Story*. Springer: New York

- U.S. Fish and Wildlife Service. 1988a. Final recovery plan for piping plovers breeding on the Great Lakes Northern Great *Plains of the U.S.* by U.S. Fish and Wildlife Service.
- U.S. Fish and Wildlife Service. 1988b. Great Lakes and Northern Great Plains Piping Plover Recovery Plan. U.S. Fish and Wildlife Service, Twin Cities, Minnesota. 160 pp.
- U.S. Fish and Wildlife Service. 1988c. Waterfowl Management Handbook. U.S. Department of the Interior, U.S. Fish and Wildlife Service. *Fish and Wildlife Leaflet 13*. Washington, D.C. U.S. Fish and Wildlife Service. 1990. Recovery Plan for the Interior Population of the Least Tern(*Sternus antillarum*). Twin Cities, Minnesota. 90 pp.
- U.S. Fish and Wildlife Service. 1994. Draft revised recovery plan for piping plovers breeding on the Great Lakes Northern Great *Plains of the U.S.* by U.S. Fish and Wildlife Service.
- U.S. Fish and Wildlife Service. 2003. Recovery Plan for the Great Lakes Piping Plover (*Charadrius melodus*). Ft. Snelling, Minnesota. viii + 141 pp.
- U.S. Fish and Wildlife Service. 2009. Whooping Cranes and Wind Development – An Issue Paper, Regions 2 and 6, U.S. Fish and Wildlife Service, April 2009.
- U.S. Fish and Wildlife Service. 2010. fws.gov/mountain-prairie/species/birds/piping_plover/
- U.S. Fish and Wildlife Service. 2010a. GIS Data Shape files-Confirmed Sightings in South and North Dakota.
- U.S. Fish and Wildlife Service. 2010b. Required Reading for Users of the Whooping Crane Tracking Project Database. U.S. Fish and Wildlife Service. 2 pages.
- U.S. Fish and Wildlife Service. 2011. Letter dated September 16, from D. Gillund (Project Leader, FWS) to A. Yuan (DOS).
- U.S. Fish and Wildlife Service. 2012. County Occurrence of Endangered, Threatened and Candidate Species and Designated Critical Habitat in North Dakota. February 2012. Available online at: http://www.fws.gov/northdakotafieldoffice/county_list.htm. Accessed April 2012.
- Walkinshaw, L.H. 1965. Attentiveness of cranes at their nests. *Auk* 82:465-476.
- Whooping Cranes: North America's Endangered Legacy. International Crane Foundation (ICF) and Wisconsin Department of Natural Resources (WIDNR). 2003.

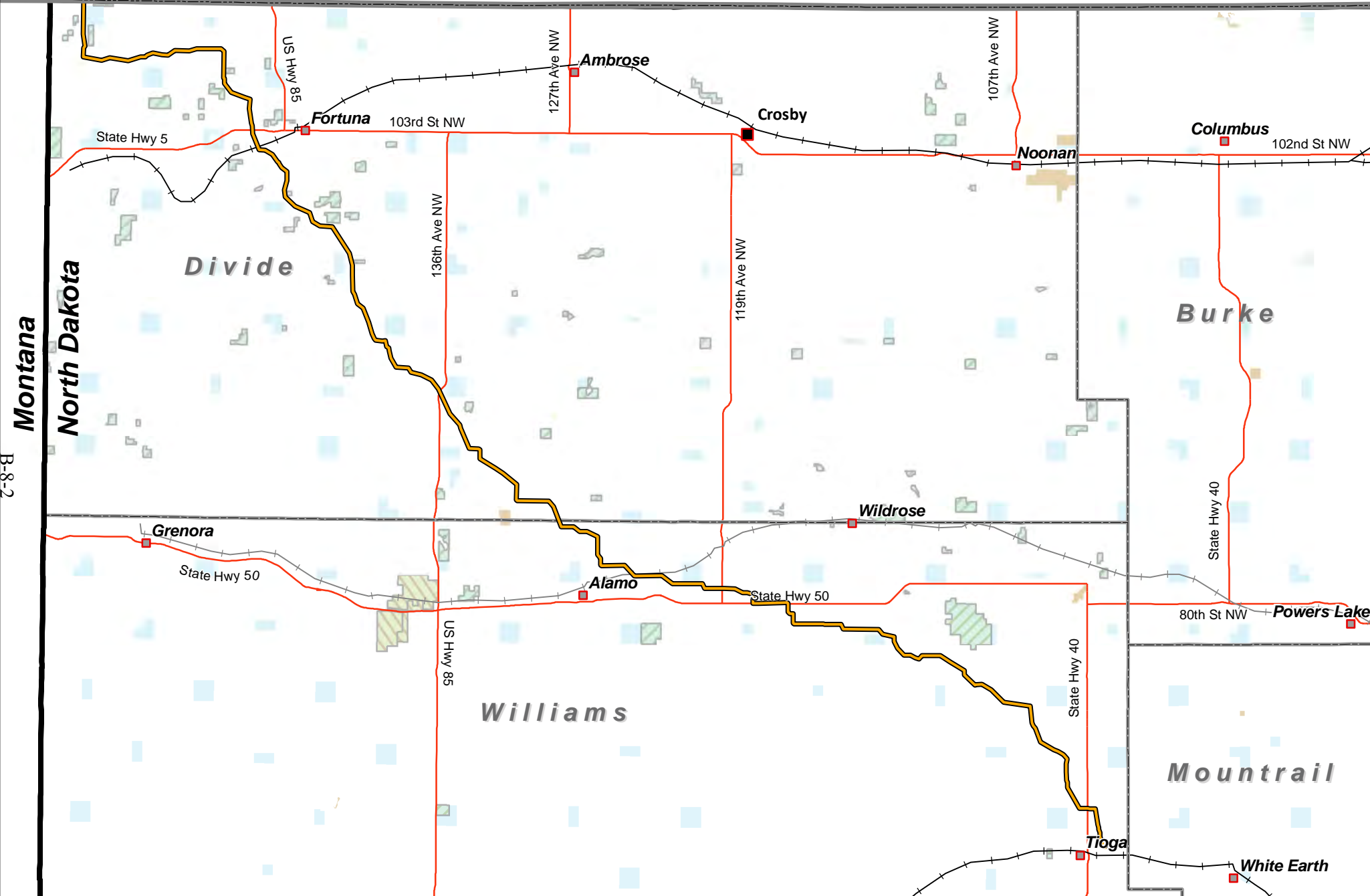
7.0 LIST OF ACRONYMS

AEGS – Alberta Ethane Gathering System
Agreement – Conservation Agreement
AWBP - Aransas Wood Buffalo Population
BA – Biological Assessment
BMPs – Best Management Practices
CFR – Code of Federal Regulations
CRP – Conservation Reserve Program
DOS – Department of State
EA – Environmental Assessment
EPP – Environmental Protection Plan
GPS – Global positioning unit
HASP – Health and Safety Plan
HVP- High vapor pressure
MANLAA – may affect, but not likely to adversely affect
MLBV – mainline block valve
MOU – Memorandum of Understanding
ND – North Dakota
NDGF – North Dakota Game and Fish Department
NDHD – North Dakota Health Department
NEPA – National Environmental Policy Act
NPDES – National Pollutant Discharge Elimination System
NOI - Notice of Intent
NWP – Nationwide Permit
U.S. – United States
USACE – U.S. Army Corps of Engineers
USDA – U.S. Department of Agriculture
FWS – U.S. Fish and Wildlife Service
USGS – U.S. Geological Service
WPA – Waterfowl Production Area

8.0 LIST OF FIGURES

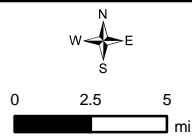
- Figure 1 – Project Area Location Map
- Figure 2 – Alternative Routes
- Figure 3 – Hapet Lake Location Map
- Figure 4 – Piping Plover Critical Habitat Location Map
- Figure 5 – Radar WPA Critical Habitat
- Figure 6 – McCone Lake Critical Habitat
- Figure 7 – Local Whooping Crane Migration Corridor
- Figure 8 – Regional Whooping Crane Migration Corridor
- Figure 9 – Unavoidable USFWS Grassland Easement
- Figure 10 – Land Cover within the 500ft Survey Corridor

Saskatchewan



B-8-2

KC HARVEY
ENVIRONMENTAL, LLC
 376 Gallatin Park Drive
 Bozeman, Montana 59715
 Phone: 406-585-7402
 Fax: 406-585-7428

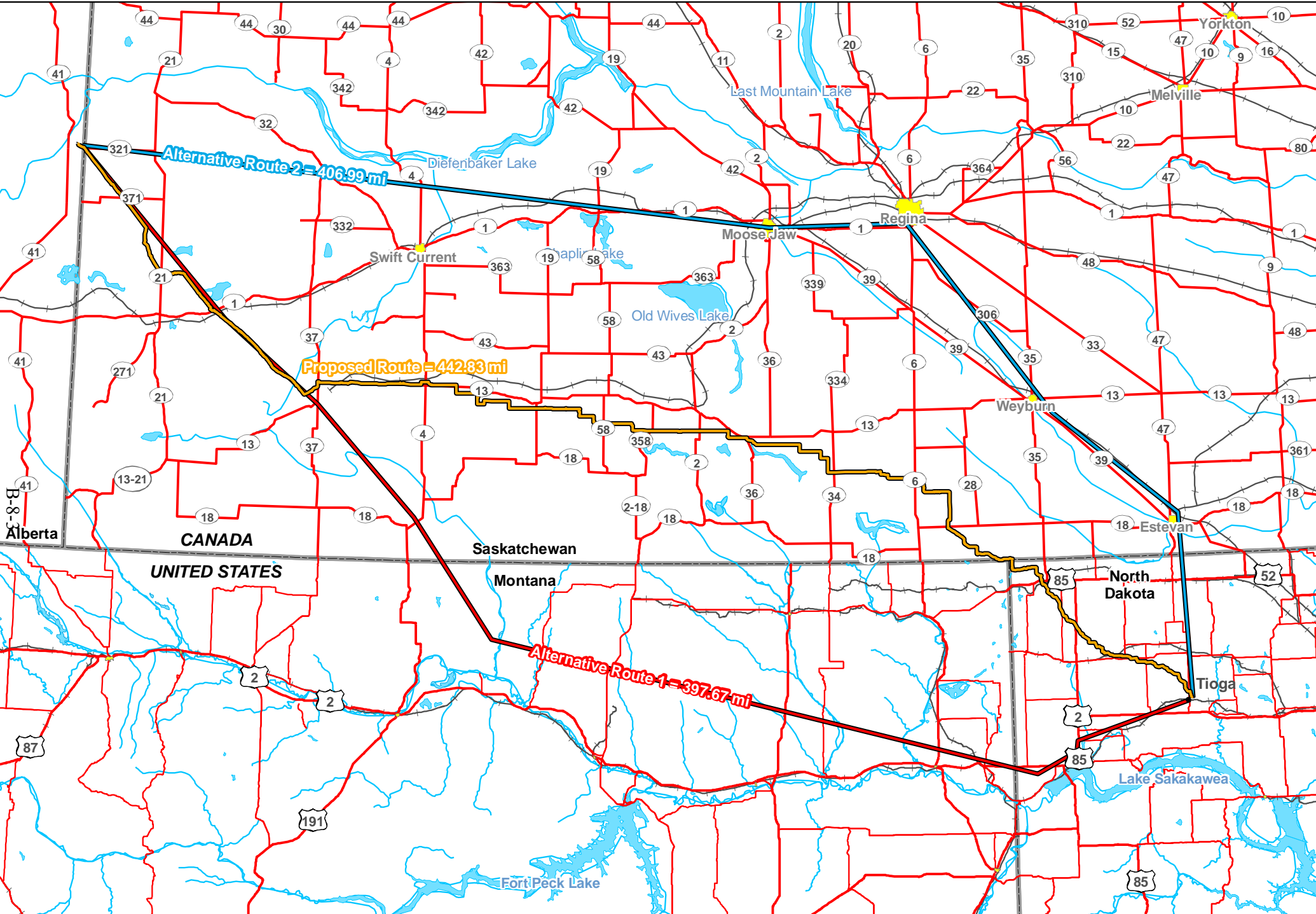


- Proposed Pipeline Route
- Cities
- County Boundaries
- State Boundaries
- International Boundaries
- Water Fowl Production Area
- National Wildlife Refuge
- North Dakota Game and Fish
- North Dakota Land Department
- US Bureau of Land Management

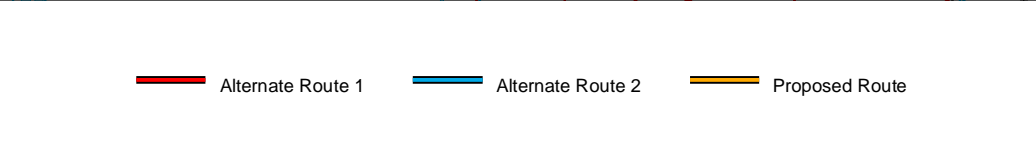
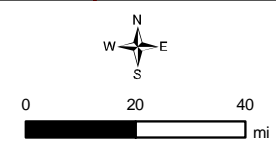


Mistral Energy Inc., Vantage Pipeline Project
 Figure 1: Project Area Location Map
 Date: December 2011 Version: 2011-1






KC HARVEY ENVIRONMENTAL, LLC
 376 Gallatin Park Drive
 Bozeman, Montana 59715
 Phone: 406-585-7402
 Fax: 406-585-7428



Mistral Energy Inc., Vantage Pipeline Project
 Figure 2: Alternative Routes
 Date: April 2012 Version: 2012-1

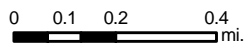













**KC HARVEY
ENVIRONMENTAL, LLC**

376 Gallatin Park Drive
Bozeman, Montana 59715
Phone: 406-585-7402
Fax: 406-585-7428

1 : 24,000 2,000 ft = 1 in



-  Pipeline with 16ft buffer
-  Potential Drainage
-  North Dakota Game and Fish
-  Piping Plover Occurrence Area
-  Waterfowl Production Area
-  North Dakota Land Department
-  Occurrence Area 1/2 Mile Buffer
-  National Wildlife Refuge
-  US Bureau of Land Management

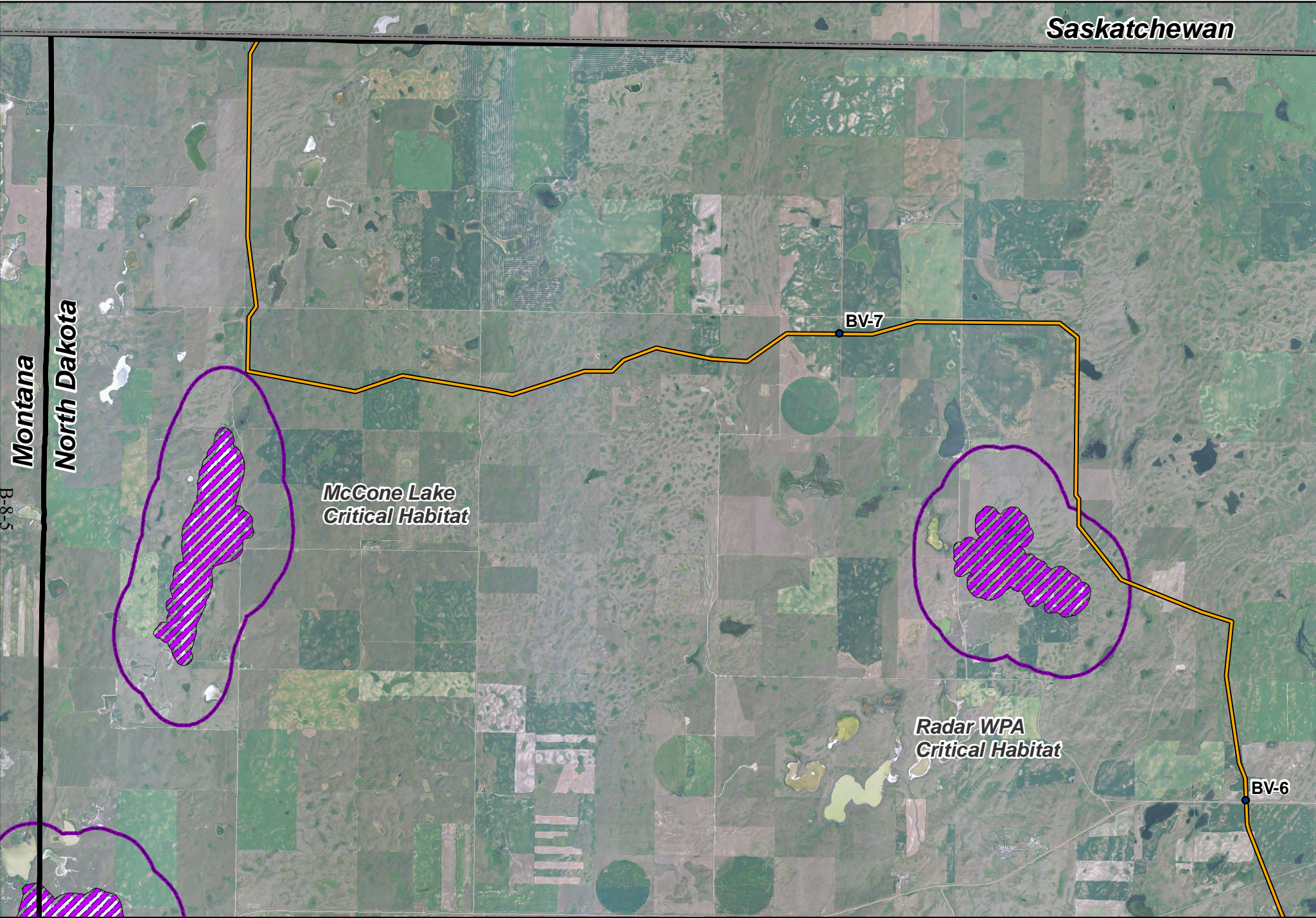


Mistral Energy Inc., Vantage Pipeline Project

Figure 3:
Hapet Lake Location Map



Date: February 2012 Version: 2012-1



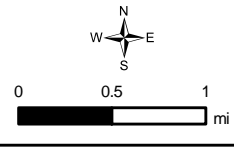
McCone Lake
Critical Habitat

Radar WPA
Critical Habitat

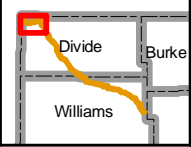
BV-7

BV-6

KC HARVEY
ENVIRONMENTAL, LLC
 376 Gallatin Park Drive
 Bozeman, Montana 59715
 Phone: 406-585-7402
 Fax: 406-585-7428



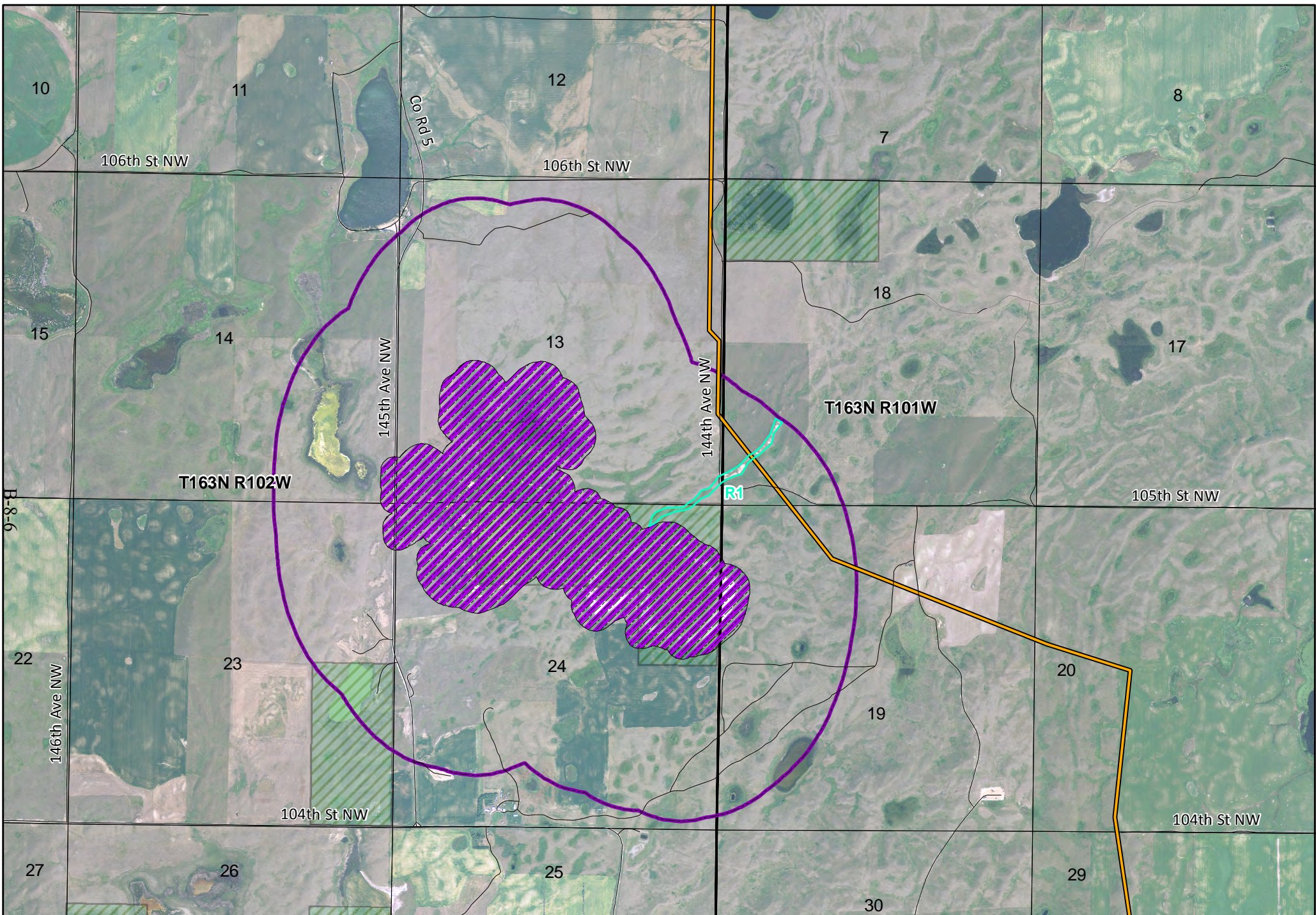
- Proposed Pipeline Route
- Block Valve
- Cities
- Critical Habitat 1/2 Mile Buffer
- Piping Plover Critical Habitat
- State Boundaries
- International Boundaries



Mistral Energy Inc., Vantage Pipeline Project

Figure 4:
Piping Plover Critical Habitat Location Map

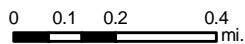
Date: February 2012 Version: 2012-1



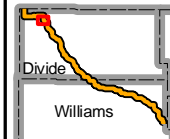
KC HARVEY
ENVIRONMENTAL, LLC

376 Gallatin Park Drive
 Bozeman, Montana 59715
 Phone: 406-585-7402
 Fax: 406-585-7428

1 : 24,000 2,000 ft = 1 in



- Pipeline with 16ft buffer
- Critical Habitat
- Critical Habitat 1/2 Mile Buffer
- Potential Drainage
- Waterfowl Production Area
- National Wildlife Refuge
- North Dakota Game and Fish
- North Dakota Land Department
- US Bureau of Land Management



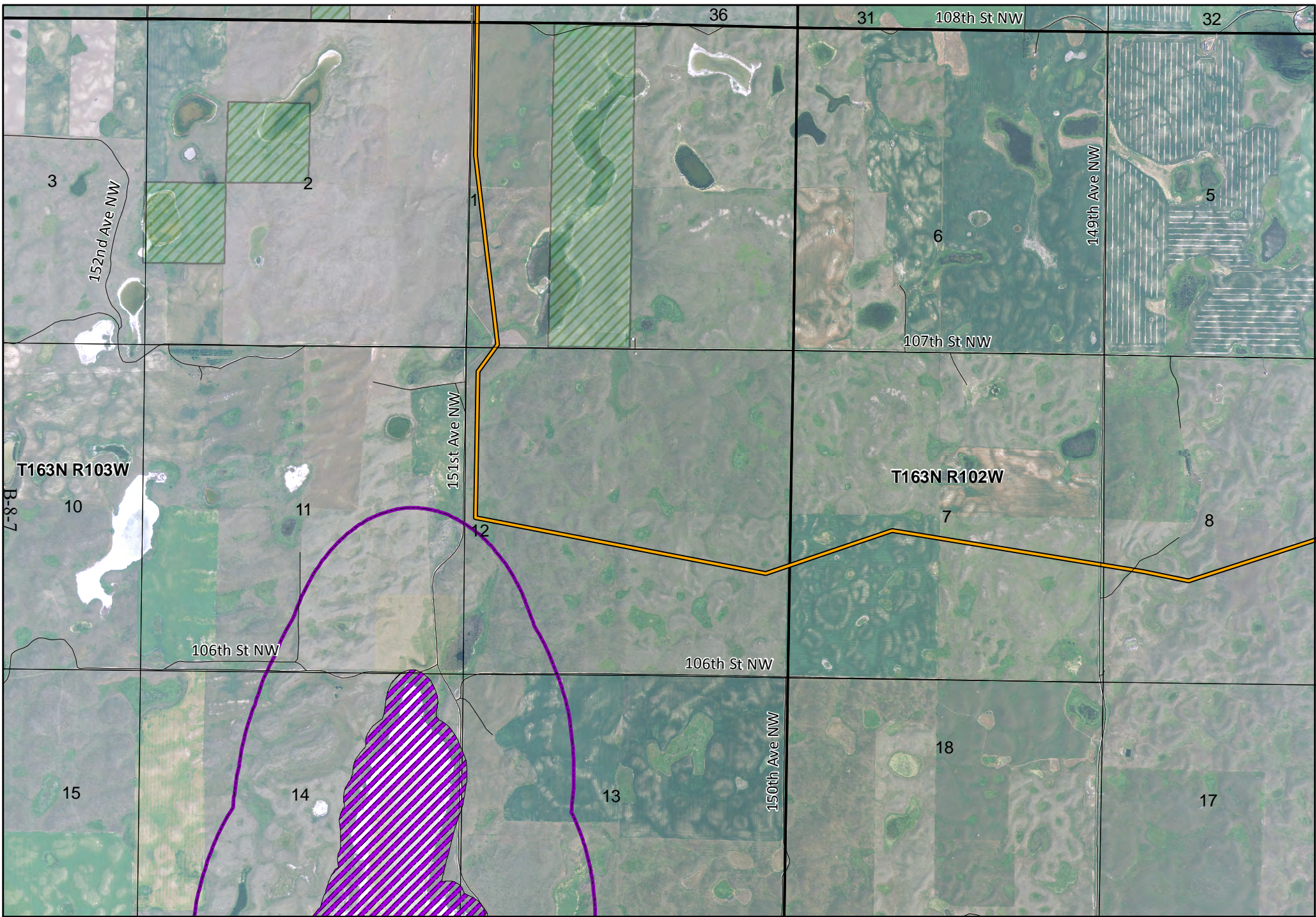
Mistral Energy Inc., Vantage Pipeline Project

Figure 5: Radar WPA Critical Habitat



Date: February 2012

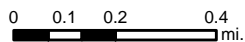
Version: 2012-1



KC HARVEY
ENVIRONMENTAL, LLC

376 Gallatin Park Drive
 Bozeman, Montana 59715
 Phone: 406-585-7402
 Fax: 406-585-7428

1 : 24,000 2,000 ft = 1 in



- Pipeline with 16ft buffer
- Critical Habitat
- Critical Habitat 1/2 Mile Buffer

- Waterfowl Production Area
- National Wildlife Refuge

- North Dakota Game and Fish
- North Dakota Land Department
- US Bureau of Land Management



Mistral Energy Inc., Vantage Pipeline Project

Figure 6: McCone Lake Critical Habitat



Date: December 2011

Version: 2011-1

Saskatchewan

Montana

North Dakota

B-8-8

Grenora

Crosby

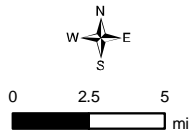
Noonan

Columbus

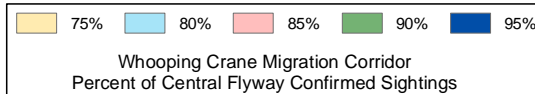
Wildrose

Tioga

KC HARVEY ENVIRONMENTAL, LLC
376 Gallatin Park Drive
Bozeman, Montana 59715
Phone: 406-585-7402
Fax: 406-585-7428



Proposed Pipeline Route
Cities



Source: U.S. Fish and Wildlife Service



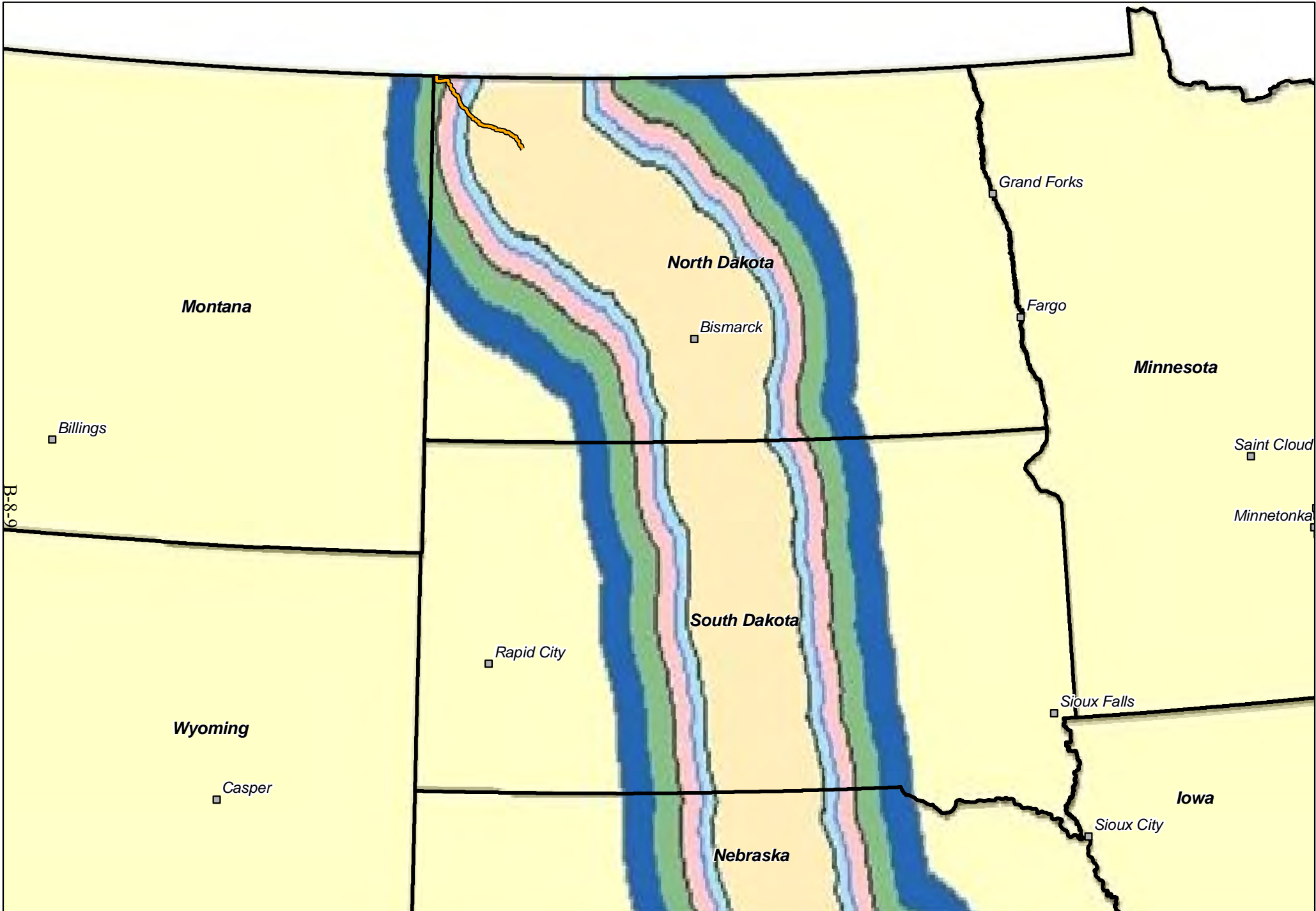
Mistral Energy Inc., Vantage Pipeline Project

Figure 7:
Local Whooping Crane Migration Corridor

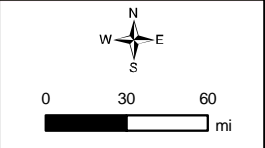


Date: December 2011

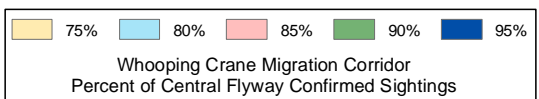
Version: 2011-1



KC HARVEY
ENVIRONMENTAL, LLC
 376 Gallatin Park Drive
 Bozeman, Montana 59715
 Phone: 406-585-7402
 Fax: 406-585-7428

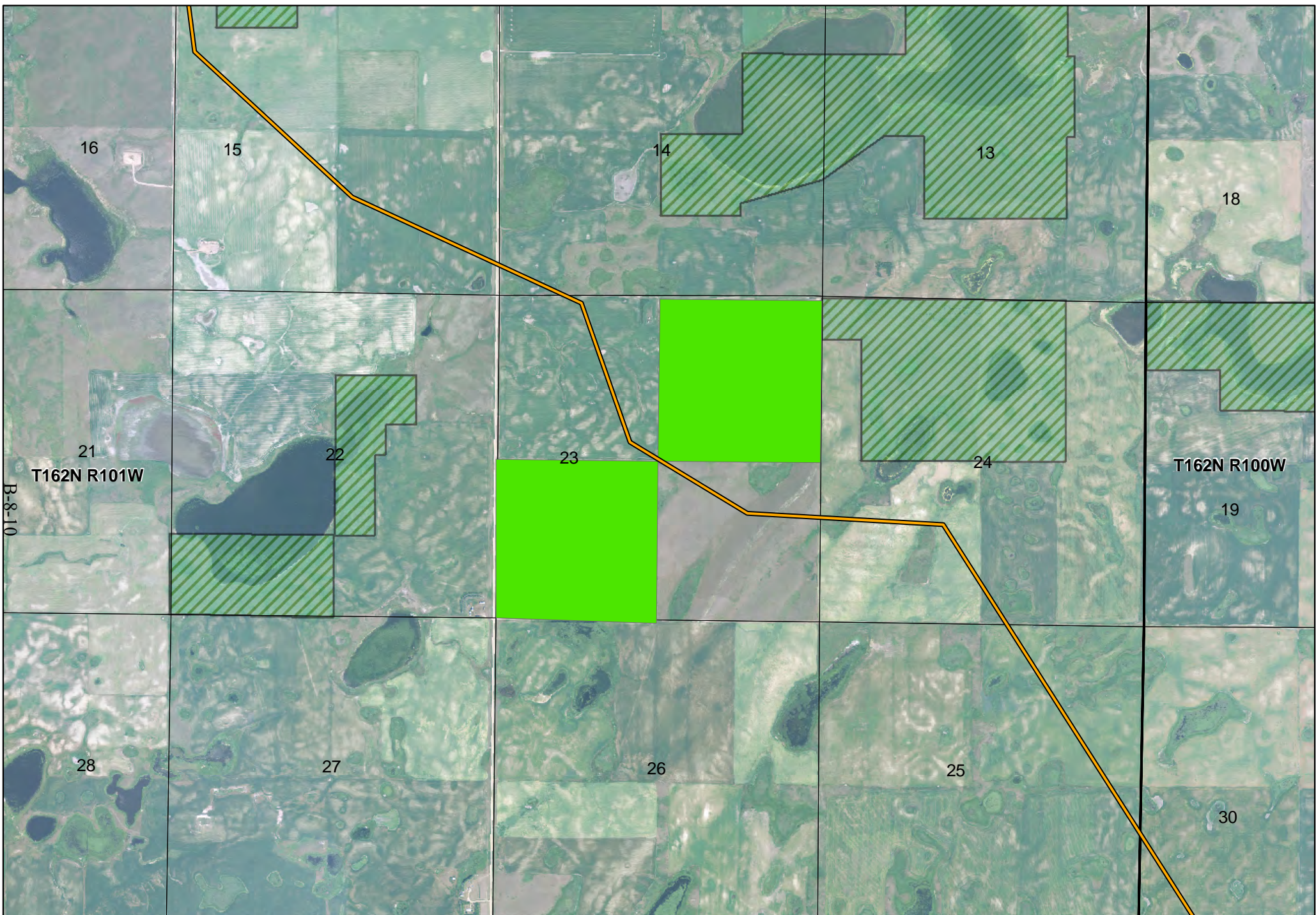


— Proposed Pipeline Route
 ■ Cities

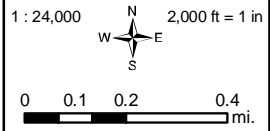


Mistral Energy Inc., Vantage Pipeline Project
 Figure 8:
 Regional Whooping Crane Migration Corridor
 VANTAGE PIPELINE US LP
 Date: April 2012
 Version: 2012-1

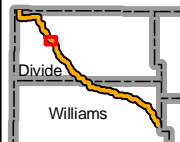
Source: U.S. Fish and Wildlife Service



KC HARVEY ENVIRONMENTAL, LLC
 376 Gallatin Park Drive
 Bozeman, Montana 59715
 Phone: 406-585-7402
 Fax: 406-585-7428



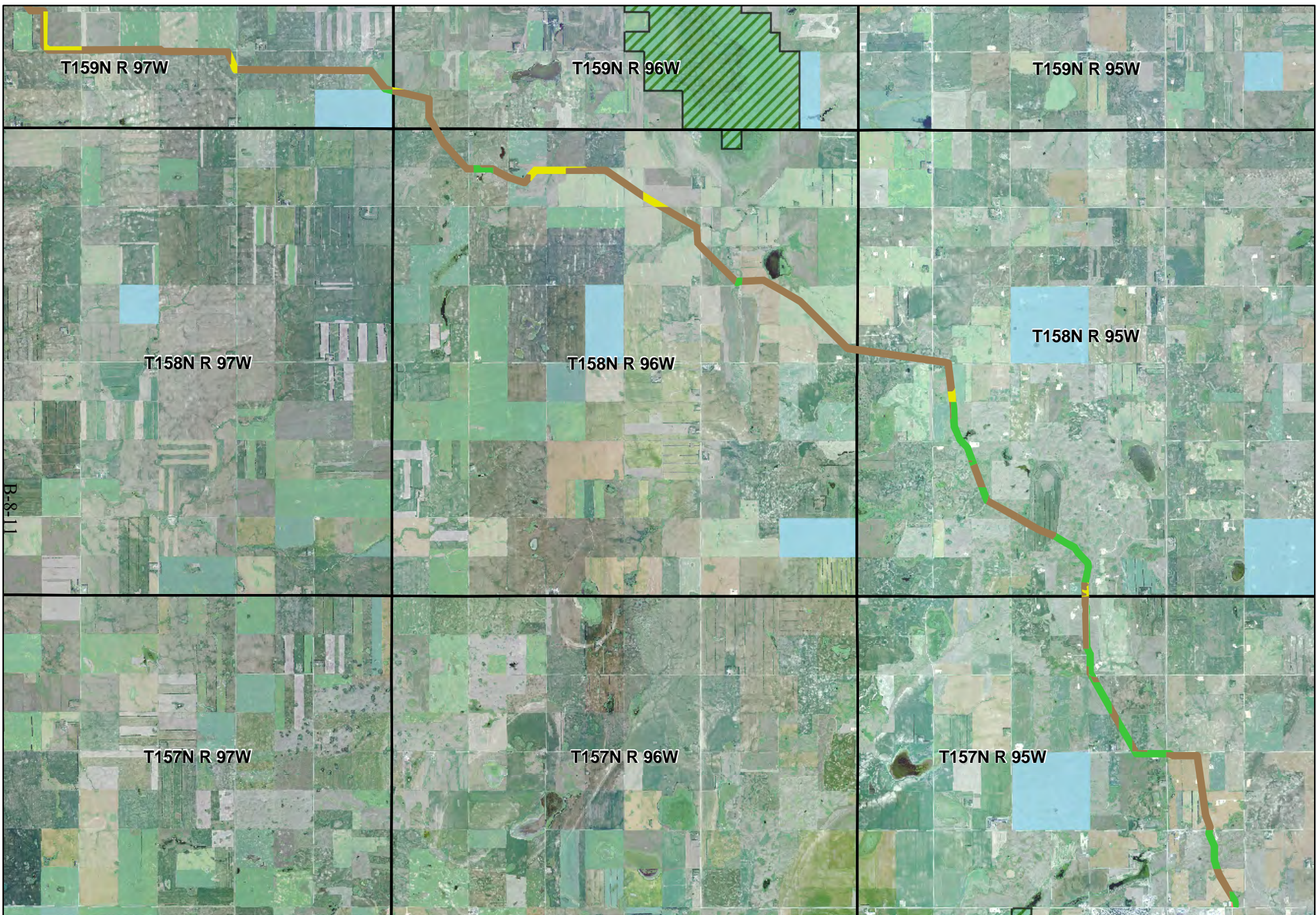
- Pipeline with 16ft buffer
- Grassland Easement
- Waterfowl Production Area



Mistral Energy Inc., Vantage Pipeline Project

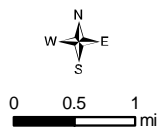
Figure 9: Unavoidable USFWS Grassland Easement

Date: December 2011 Version: 2011-1



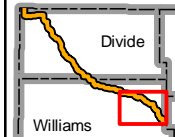
KC HARVEY
ENVIRONMENTAL, LLC

376 Gallatin Park Drive
Bozeman, Montana 59715
Phone: 406-585-7402
Fax: 406-585-7428



Landcover Classes

- | | | | |
|------------------|----------------|--------------------------------|------------------------------|
| Cultivated Crops | Grassland | Waterfowl Production Area | North Dakota Game and Fish |
| Developed | Pasture or Hay | Piping Plover Critical Habitat | North Dakota Land Department |
| | | Half mile bufer | US Bureau of Land Management |



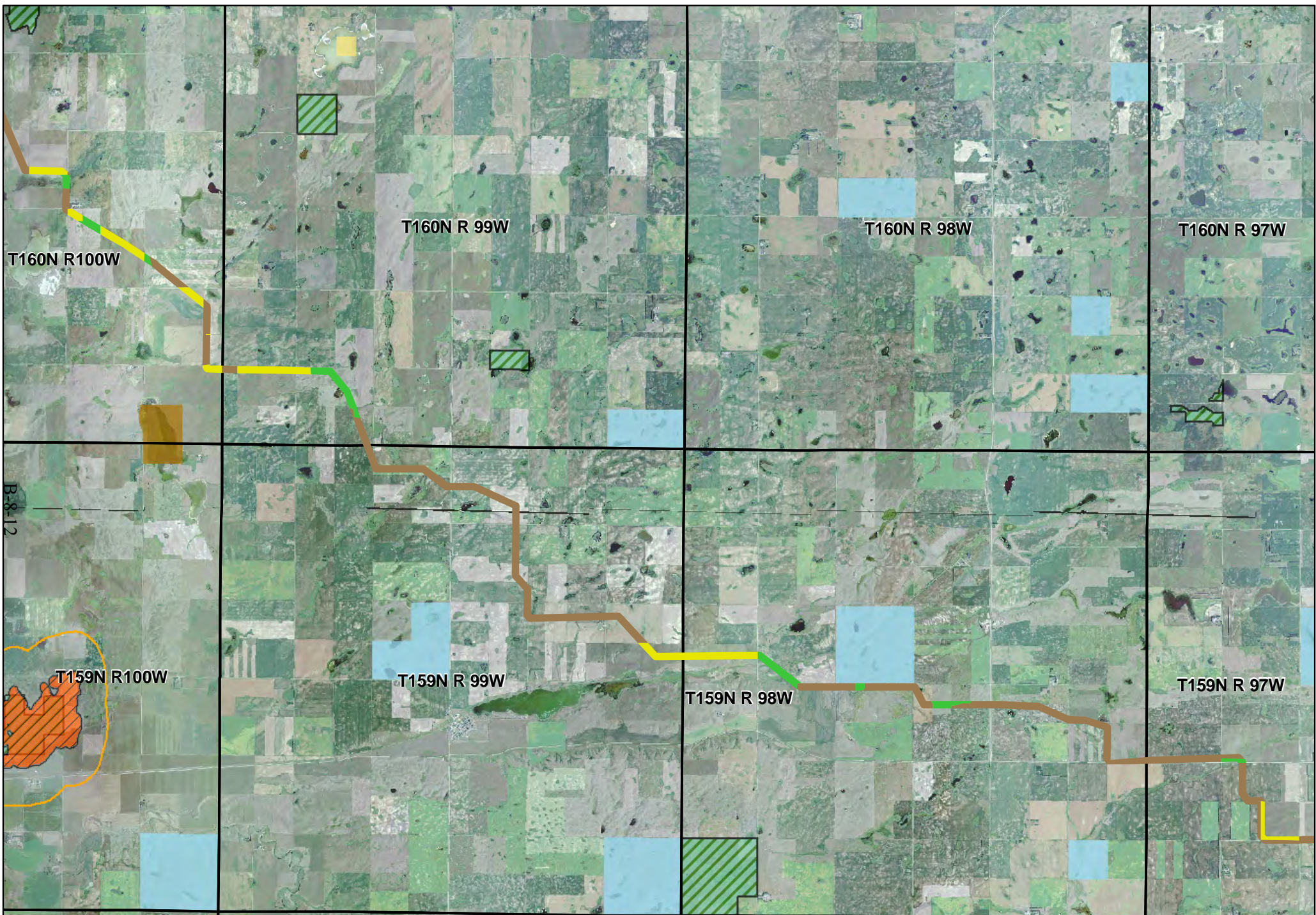
Mistral Energy Inc., Vantage Pipeline Project

Figure 10: Land Cover within the 500ft Survey Corridor (1 of 4)

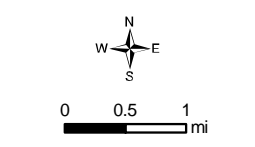


Date: February 2012

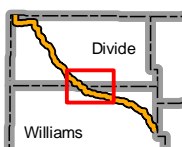
Version: 2012-1



KC HARVEY
ENVIRONMENTAL, LLC
 376 Gallatin Park Drive
 Bozeman, Montana 59715
 Phone: 406-585-7402
 Fax: 406-585-7428

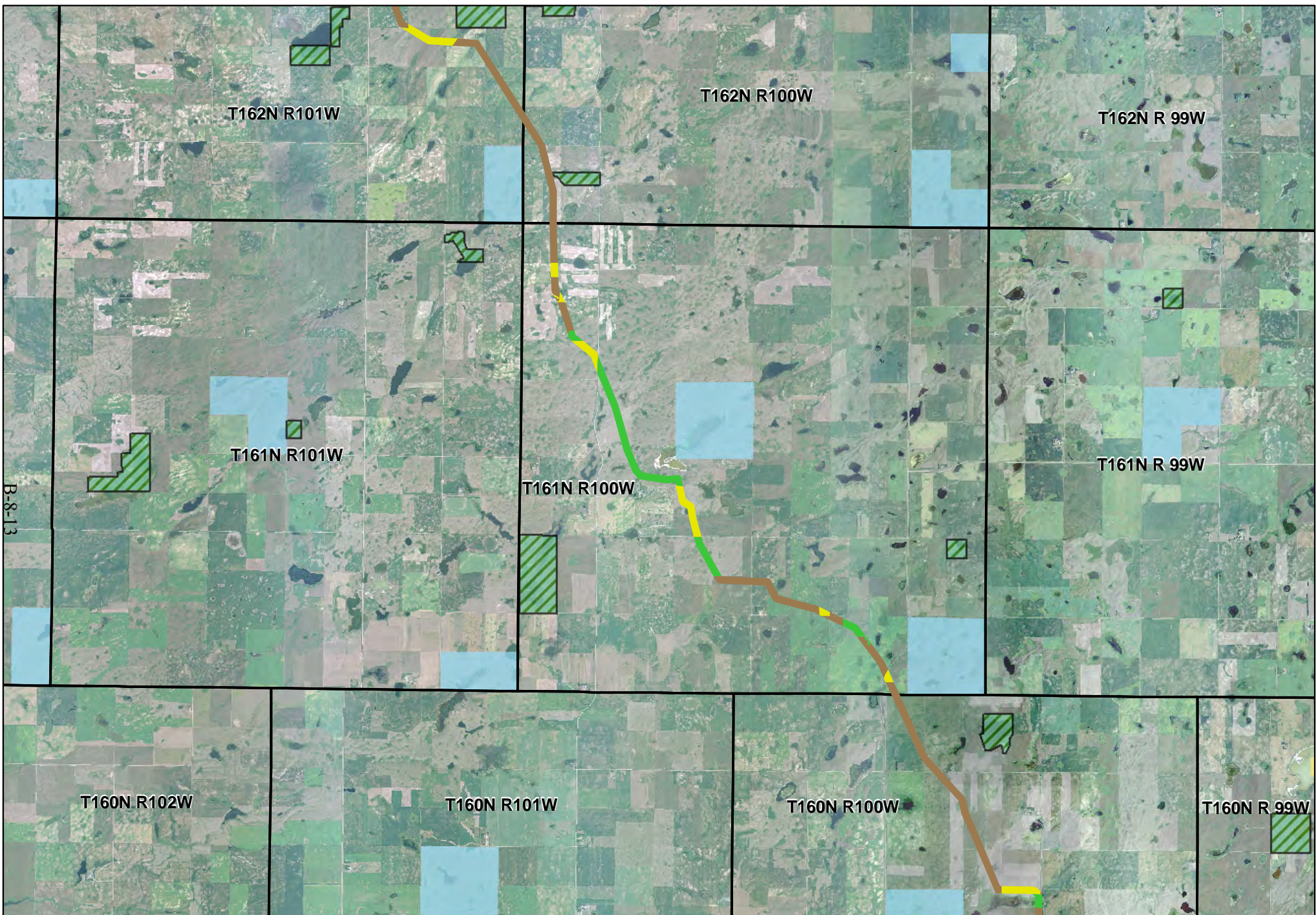


Landcover Classes			
Cultivated Crops	Grassland	Waterfowl Production Area	North Dakota Game and Fish
Developed	Pasture or Hay	Piping Plover Critical Habitat	North Dakota Land Department
	Half mile bufer		US Bureau of Land Management



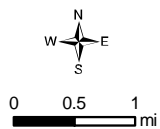
Mistral Energy Inc., Vantage Pipeline Project
 Figure 10: Land Cover within the 500ft Survey Corridor (2 of 4)
 Date: February 2012 | Version: 2012-1





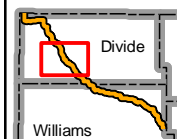
KC HARVEY
ENVIRONMENTAL, LLC

376 Gallatin Park Drive
 Bozeman, Montana 59715
 Phone: 406-585-7402
 Fax: 406-585-7428



Landcover Classes

- | | | | |
|------------------|-----------------|--------------------------------|------------------------------|
| Cultivated Crops | Grassland | Waterfowl Production Area | North Dakota Game and Fish |
| Developed | Pasture or Hay | Piping Plover Critical Habitat | North Dakota Land Department |
| | Half mile bufer | | US Bureau of Land Management |



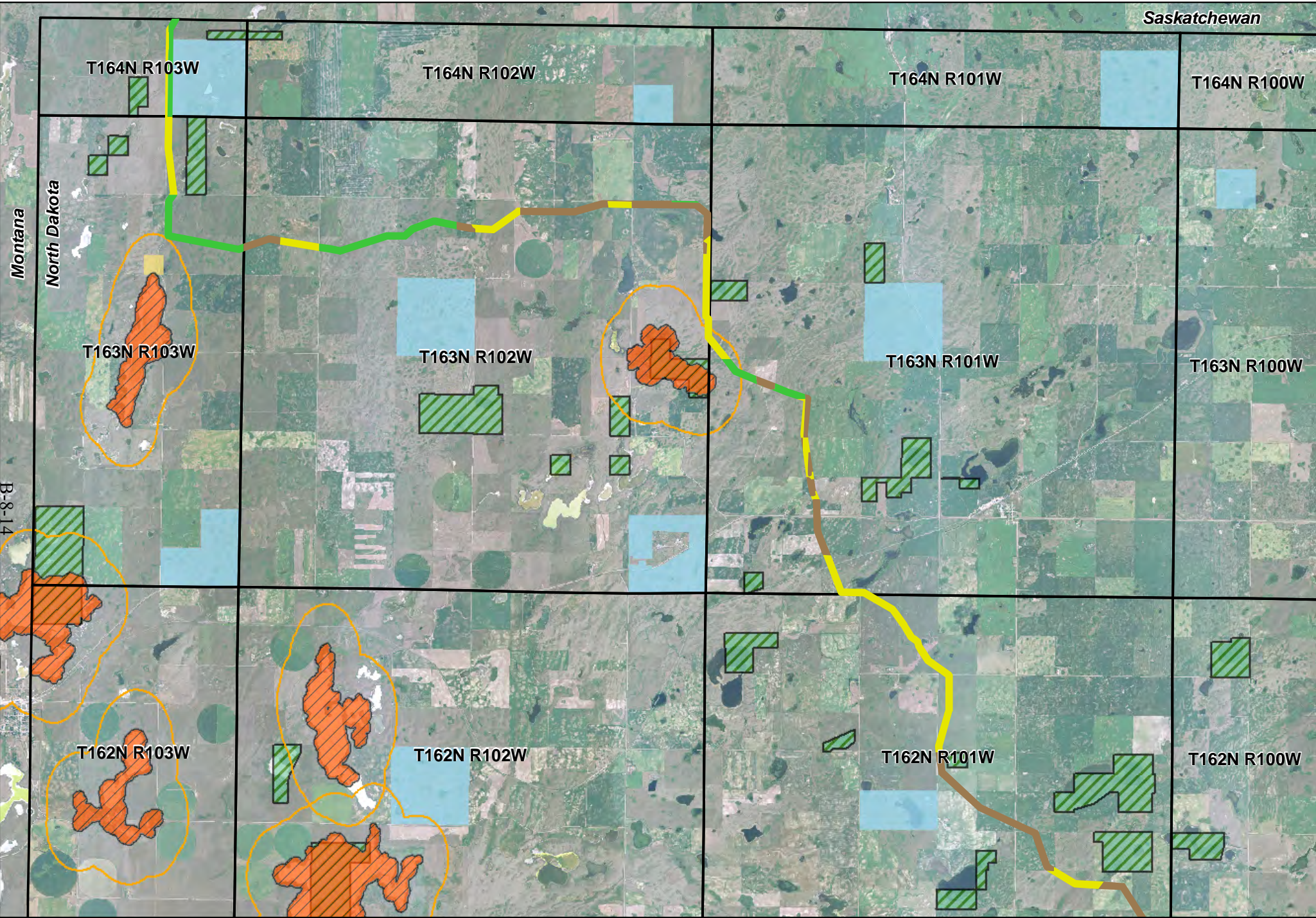
Mistral Energy Inc., Vantage Pipeline Project

Figure 10: Land Cover within the 500ft Survey Corridor (3 of 4)

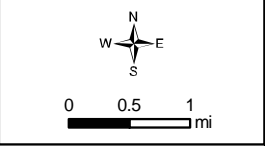


Date: February 2012

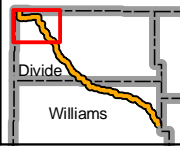
Version: 2012-1



KC HARVEY ENVIRONMENTAL, LLC
 376 Gallatin Park Drive
 Bozeman, Montana 59715
 Phone: 406-585-7402
 Fax: 406-585-7428



Landcover Classes			
Cultivated Crops	Grassland	Waterfowl Production Area	North Dakota Game and Fish
Developed	Pasture or Hay	Piping Plover Critical Habitat	North Dakota Land Department
		Half mile bufer	US Bureau of Land Management



Mistral Energy Inc., Vantage Pipeline Project

Figure 10: Land Cover within the 500ft Survey Corridor (4 of 4)

Date: February 2012 Version: 2012-1

Appendix A – Correspondence and Documents



MEETING NOTES

Date:

December 12, 2011

To:

Meeting Attendees and Alex Yuan

From:

Kim Jessen

Subject:

Vantage Pipeline Project – Section 7 process and Biological Assessment

Meeting Date & Location:

Monday, December 12, 2011

Conference Call

Meeting Attendees:

Heidi Riddle, U.S. Fish and Wildlife Service

Dave Cameron, KC Harvey

Brad Kovach, KC Harvey

Steve Elbert, Merjent – Biological Specialist

Kim Jessen, Merjent – Project Manager

Meeting Notes:

The meeting began with an introduction of the attendees and each person's role on the Vantage Pipeline Project. K. Jessen thanked everyone for attending and explained that the project requires a Presidential Permit from the U.S. Department of State (DOS) and, therefore, a National Environmental Policy Act (NEPA) review of the project in the form of an environmental assessment (EA) was being completed by DOS. K. Jessen clarified that Merjent is a third-party contractor to the DOS and assisting the DOS in completing the EA as well as in meeting its Section 7 (Endangered Species Act) and Section 106 (National Historic Preservation Act) obligations. It was recognized that while the DOS' and Merjent's involvement with the project had been delayed until the signing of a Memorandum of Understanding between DOS, Vantage, and Merjent, Vantage has been informally corresponding with the U.S. Fish and Wildlife Service (FWS) to identify species and preliminary recommendations for avoidance and mitigation measures. K. Jessen noted that a letter will be issued by the DOS hopefully within the next 2 weeks that states that Vantage and its consultants will be identified as the DOS' non-federal agent for informal Section 7 consultations for the project.

Regarding Section 7 and the Biological Assessment (BA), B. Kovach verified that Vantage has already completed a draft BA. K. Jessen noted that there appear to be a few options available on how to proceed with Section 7 and the BA, and the goal of the meeting was to identify and come to a consensus on which route would be most advantageous to all parties. The options include:

- 1) As the non-federal agency, Vantage submits the draft BA directly to the FWS and works with the agency to develop avoidance or mitigation measures, determinations, etc. and the DOS and Merjent are cc:'d on all substantive correspondence prior to the EA issuance and post-EA as necessary;
- 2) Vantage submits the draft BA to the DOS and Merjent, who will repackage the draft BA and submit to the FWS, and subsequently work directly with the FWS to develop determinations, avoidance or mitigation measures, etc. and work with Vantage to adopt the FWS-recommended measures and/or develop alternative measures prior to the EA issuance and post-EA as necessary; or
- 3) Vantage submits the draft EA to the DOS and Merjent, the BA information is incorporated into the EA, and the DOS requests that once the EA is issued the FWS adopt the EA as the BA and provide comments.

H. Riddle stated that the FWS did not have a preference but did note that if the draft BA were to come from Vantage, that it be clear to her agency that Vantage is the DOS' non-federal agent for Section 7. She also noted that there are other "trust" issues that the FWS would need to provide comment on that should be addressed in the EA or draft BA, which include the Bald and Golden Eagle Protection Act (BGEPA) and Migratory Bird Treaty Act (MBTA).

B. Kovach responded that the draft BA currently discusses the BGEPA and MBTA issues along with federally threatened and endangered species in the project area. He added that Vantage has made a significant investment in drafting a draft BA and it seemed that Vantage providing it to the FWS/Vantage working with the FWS directly was the most direct route.

K. Jessen agreed, especially considering the upcoming DOS-to-FWS letter designating Vantage as a non-federal agent, and inquired with S. Elbert whether he had any concerns with that option. S. Elbert agreed that it would be the most direct approach and that we (for DOS) could add the BA as an appendix to the EA. Therefore, it was agreed by all parties that once the DOS-to-FWS letter was issued, Vantage would submit the draft BA to the FWS and the two parties would work together to develop final impact determinations, avoidance and mitigation measures, etc. as necessary.

K. Jessen noted that it was critical to the process and for the administrative record that Vantage and FWS cc: DOS and Merjent on any and all substantive correspondence. Additionally, the correspondence is critical for drafting the EA discussion regarding threatened and endangered species impacts and mitigation. All parties agreed and K. Jessen offered to provide contact information to the FWS and Vantage representatives (i.e., KC Harvey) after the call.

H. Riddle inquired whether a DOS representative had or will be joining the call. K. Jessen noted that Alexander Yuan, the DOS manager for the project, will be provided a copy of the meeting notes and also offered to arrange for a call between the FWS and DOS. H. Riddle stated that was not necessary at this time and that she will wait for the DOS-to-FWS letter that will identify Vantage as the non-federal representative for Section 7 consultations. B. Kovach added that he will postpone forwarding the draft BA to the FWS until the aforementioned letter is issued.

B. Kovach asked at what point "informal" versus "formal" consultation will be determined by the FWS. H. Riddle stated that is still not known and will be an ongoing process. She added that

hopefully there will be a dialog and all parties will agree to avoidance measures such that formal consultation does not need to occur.

K. Jessen asked if some species determinations could, for lack of a better term, be “segmented” or does the FWS have to comment on the project as a whole. For example, it is desired that, if completed in a timely fashion, the EA document species where it is obvious there will be a not likely to adversely affect determination made and agreed upon by the FWS so no further discussion or correspondence regarding these species is needed. Any remaining species could be classified under “consultations are ongoing” in the EA. H. Riddle responded that she was not certain but that it is likely possible to issue determinations for those species when it was clear the project will not result in adverse impacts, while still continuing the Section 7 consultation process for other species. B. Kovach added that the draft applicant-prepared EA also had some discussions presented regarding species that are not within the project area (e.g., Interior Least Terns).

H. Riddle and K. Jessen finished the meeting by communicating that a letter to the FWS from the DOS will be issued soon, with Vantage, other FWS staff, and Merjent cc:'d, and the importance of maintaining correspondence for the administrative record. Lastly, K. Jessen asked if any of the information presented in the draft BA might be sensitive and not shared with the public. H. Riddle stated that the only information that might be confidential is very specific bald eagle nest locations; however, it was unlikely the draft BA has such site-specific information.

All parties thanked one another for their attendance and exited the conference call.

Action Item:

- Merjent to notify the DOS of the BA discussion and recommended, agreed-upon option of Vantage submitting draft BA to FWS (discussion contained within).
- Merjent to assist the DOS in issuance of referenced DOS-to-FWS letter regarding Vantage as non-federal agent; Merjent to email copy of letter to call attendees once issued.
- Merjent to provide contact information to Vantage representatives (KC Harvey) and FWS of DOS and Merjent staff to cc: on all substantive correspondence for administrative record. Includes but not limited to draft BA.

Attachments:

None



TO: Project File – Vantage Pipeline Environmental Assessment

CC: David Schmunk – Mistral Energy; Alexander Yuan – U.S. Department of State

FROM: Brad Kovach – KC Harvey Environmental, LLC

DATE: February 23, 2012

SUBJECT: Meeting Minutes – 2/23/12 Conference Call with U.S. Fish and Wildlife Service, North Dakota Ecological Services Re. comments on draft Biological Assessment for Vantage Pipeline

These meeting minutes address a conference call with the North Dakota Ecological Services Office of the U.S. Fish and Wildlife Service (USFWS) at 9:00 AM CST February 23, 2012. Responses to USFWS comments received on February 9, 2012 on the draft Biological Assessment (BA) prepared for the proposed Vantage Pipeline project were discussed. The draft BA was prepared by KC Harvey Environmental, LLC. The U.S. Department of State (DoS) is the approving federal agency for the National Environmental Policy Act (NEPA) Environmental Assessment (EA) being prepared for the project and Merjent, Inc. is the DoS contractor preparing the draft EA.

Attendees: Heidi Riddle – USFWS; Alexander W. Yuan – DoS; Kim A. Jessen, Steve Elbert – Merjent, Inc.; Brad R. Kovach – KC Harvey Environmental

Summary of Minutes: Comments and the interactive discussion that followed are summarized below.

1. The USFWS comment letter requested that Section 7 ESA topics remain in the BA and other subjects including the Migratory Bird Treaty Act (MGTA) and Bald and Golden Eagle Protection Act (BGEPA) be addressed separately in the EA.
 - a. **Action Item:** the revised BA will only address Section 7 ESA topics.
 - b. The comments on other subjects were beneficial for the purposes of the EA and discussed at today’s meeting.
2. USFWS concerns over “worst case scenario” effects of a leak on ESA listed species were inadequately addressed in the draft BA. A more thorough analysis was requested.
 - a. Providing the Environmental Protection Plan (EPP) and Health and Safety Plan (HASP) or parts thereof in the revised BA along with other details, data, and contingencies under a leak scenario would likely be sufficient. Recognize the different properties between liquid (crude) and gas.
 - i. **Action Item:** These recommendations will be incorporated into the revised BA
3. USFWS requested that BA effects determination on whooping crane should also include an analysis of stopover wetlands.

- a. Quantification and map project impacted and project area wetlands with additional descriptive text on habitat affected would likely be sufficient
 - i. **Action Item:** these are existing data and figures that will be incorporated into the revised BA with additional descriptive text. A one-mile radius around the project will be the overlay
- 4. USFWS requested additional information on and quantification of impacts to drainages within the pipeline route that outfall into piping plover alkali wetlands
 - a. Response to this request can be generated using existing wetland impact data and minor GIS analysis with supplemental descriptive text on BMPs' and items addressed in # 2 above pursuant to the leak scenario.
 - i. **Action Item:** these will be addressed in the revised BA
- 5. USFWS requested more analysis of cumulative effects on ESA listed species
 - a. Address in terms of cumulative habitat loss. This may be attainable for project with some ranges or assumptions from other reasonable and foreseeable actions. Clarify relationship of project with oil and gas development; i.e. it's an outcome not a generator of more development. Be consistent with cumulative effects addressed in EA. Be sure to address direct and indirect impacts, even those that are highly assumptive. Check State of N. Dakota data on wells and related mitigation off-sets (if any?).
 - b. The piping plover and habitat loss is of particular interest in regards to cumulative effects
 - c. There was full acknowledgement that this is a tough topic to quantify and place hard parameters on. A general overview will likely suffice.
 - i. **Action Item:** a best effort on the above will be made in the revised BA.
- 6. USFWS recommended a habitat assessment describing impacts to native habitats and Vantage Pipeline development of a Conservation Plan through cooperation between DoS and USFWS. The Conservation Plan should include a Habitat Equivalency Analysis.
 - a. This is a USFWS recommendation, mostly related to MBTA. The need may be dependent on the amount of native grassland habitat impacted by the project.
 - i. **Action Items:** Revisit the amount of native grassland habitat impacts
 - 1. Then DoS and Vantage Pipeline should confer
 - 2. Contact the USFWS for further direction based on native habitat impacts
 - ii. **Action Item:** the revised BA will include additional analysis on potential habitat fragmentation and impacts on native grassland habitat for the Sprague's pipit, an ESA Candidate species
- 7. DoS and Merjent inquired if a separate determination letter of "no effect" could be issued for the ESA listed species that are obviously beyond the project scope of effect.
 - a. **Action Item:** Heidi has not seen these happen before as typically all ESA listed species are addressed in a single Section 7 Consultation completion letter, but she will check and get back to the DoS on the possibility.
- 8. The remaining meeting time briefly went through the specific comments in the USFWS letter, most of which are editorial, redundant to the general comments, or simple BA

revisions. Action items on those discussed are summarized below and all others will be addressed in the revised BA.

a. Action items

- i. Potential listed species habitats at stream crossings will be addressed and quantified.
- ii. Include wetland impacts quantities and interpolate effects on listed species. Clarify nature of wetland impacts
- iii. Identify on a figure and quantify borings under wetlands and habitat
- iv. Ramp up any anticipated habitat fragmentation language.



MEETING NOTES

Date:

April 12, 2012

To:

Meeting Attendees and Alex Yuan

From:

Steve Elbert (on behalf of Kim Jessen)

Subject:

Vantage Pipeline Project – Section 7 process and Biological Assessment Discussion

Meeting Date & Location:

Thursday, April 12, 2012

Conference Call

Meeting Attendees:

Heidi Riddle, U.S. Fish and Wildlife Service
George Sibley, Department of State
Nicole Gibson, Department of State
Patrick Pearsall, Department of State
Steve Elbert, Merjent – Biological Specialist
Brad Kovach, KC Harvey
David Schmunk, Vantage
Brad Kovach, KC Harvey
Kate Johnson, KC Harvey
Josh Runyan, Steptoe & Johnson, LLP

Meeting Notes:

The meeting began with an introduction of the attendees and each person's role on the Vantage Pipeline Project. B. Kovach thanked everyone for participating and expressed that the intent of the conference call was to discuss Section 7 Consultation on the Biological Assessment (BA) regarding U.S. Fish and Wildlife Service (FWS) comments on an earlier BA [applicant prepared] draft with FWS subjects, including the Migratory Bird Treaty Act (MBTA), Bald and Golden Eagle Protection Act, conservation easements, Waterfowl Production Areas, and other issues will be addressed in the FWS comments and coordination on the draft Environmental Assessment (EA). The meeting will also address DOS comments and questions on the BA [applicant prepared] and migratory bird issues covered in the EA. H. Riddle verified that the FWS would prefer to limit the scope of the Biological Assessment (BA) to only Section 7 (Endangered Species Act) issues. Migratory birds and eagles should be addressed in the Environmental Assessment (EA).

A brief explanation of the Section 7 process as it goes forward was discussed. G. Sibley indicated that a final revision of the BA should be available soon, but only after a final review has been completely by the DOS. N. Gibson requested clarification on several issues, including the status

Meeting Notes

Vantage Pipeline Project, April 12, 2012

of a “no affect letter”; the migratory birds Conservation Plan; and the plans for 2012 pre-construction surveys and monitoring.

H. Riddle indicated that at the end of the informal consultation, the action agency (i.e., DOS) is required to prepare the affects statement based on the conclusion in the BA. H. Riddle also mentioned that a Biological Opinion is only necessary if informal consultations progress to formal consultations. The project is currently within the informal consultation process and H. Riddle stated that it was the intent of the FWS to limit Section 7 coordination on the project as informal consultation. Three affect conclusions can be reached in BA:

- “No affect”;
- “May affect, but not likely to adversely affect”; or
- “Likely to adversely affect.”

Based on the information included in the BA, the project conclusion should be: “may affect, but not likely to adversely affect” for all project subject threatened, endangered, and candidate species. The DOS would prepare a letter to the FWS requesting that the FWS concurs with its findings in the BA.

H. Riddle indicated the FWS does not believe that there are any “show stoppers” in the BA and there is no reason to believe that the FWS would not concur with the BA’s conclusions. When asked about final BA review timing, H. Riddle indicated that the FWS cannot commit to providing comments on the final BA in less than a week’s time.

N. Gibson asked that a table be inserted in the BA that identifies each species, the species’ status, and a separate affects statement for each species. B. Kovach committed to inserting edits into the BA and distributing the revision to others.

The MBTA and a FWS-recommended Conservation Plan to protect grassland birds and enhance habitat was also discussed. N. Gibson was aware the FWS encourages companies to “go beyond” standard mitigative measures in construction and restoration of their projects, and that a statement regarding development of a Conservation Plan, if the applicant decided to prepare one, should be included in the EA. S. Elbert mentioned that a draft paragraph regarding development of a voluntary Conservation Plan was submitted to Alex Yuan (DOS) yesterday. Vantage indicated that a Conservation Plan would be developed for the project at a later date. N. Gibson emphasized that the details of the plan are not required for issuance of the EA, but a reference should be included in the EA that a Conservation Plan would be finalized before construction and the plan would be agreed upon by the FWS and Vantage, if the applicant decided to prepare such a plan. H. Riddle would prefer to have grassland habitat fragmentation issues also addressed in the Conservation Plan.

H. Riddle stated that issues related to the MBTA should only be included in the EA and not the BA in order to complete the Section 7 consultation process. She reiterated that determinations in the EA cannot be considered finalized until the Section 7 letter is in hand. It was agreed, however, that the EA may be published for public comment prior to receipt of the Section 7 letter from DOS to FWS that would request concurrence with effect determinations.

Meeting Notes

Vantage Pipeline Project, April 12, 2012

N. Gibson requested a description of Vantage's plans for the pre-construction surveys and construction monitoring. B. Kovach described Vantage's survey plans, which would consist of:

- Reconnaissance for new eagle and raptor nests would be completed immediately prior to construction; and
- Surveys for potential pipeline plover habitat in areas not within the boundaries of the designated critical habitat (e.g., alkali wetlands and lakes along the pipeline corridor) would also be conducted.

Construction monitoring would be performed by full-time trained biologists and the roles and responsibilities will be included in the Environmental Protection Plan (EPP), which would be finalized in the summer prior to construction. H. Riddle requested that the monitors report key findings and observations to the FWS and Vantage agreed. Additionally, H. Riddle indicated that monitoring reports should be submitted to the agencies during construction. The DOS (N. Gibson) raised the issue of the timeline for post-construction monitoring and the potential use of a third-party contractor to perform the monitoring. B. Kovach indicated that Vantage would consider a monitoring period as long as would be necessary or until the FWS and other agencies would sign off on the project. Also discussed was the metric that would be used to measure successful reclamation. No criteria were discussed or agreed upon, but Vantage confirmed that it would be included in the EPP.

N. Gibson suggested some global edits and figure revisions to the EA. She also mentioned that the columns "Construction" and "Operations" be reversed in the table.

N. Gibson also asked about the probability of new power lines that might be installed to provide power to the mainline valve sites. Vantage indicated that voltaic cells with battery backup or electric power supplied by underground or overhead power lines could be used. H. Riddle indicated that if overhead power lines would be used as power source, the FWS would need to know the distance of the overhead line and where the over lines would be located as overhead power lines constitute a significant hazard to whooping cranes. Before the Section 7 process can be finalized, it is essential that this information be identified and discussed in the BA. If electric power would be supplied by an underground power line or by voltaic cells (with battery backup), there would not be any potential affect and the BA would not need to be modified. H. Riddle also indicated that if an overhead line would be built, line markers (i.e., flight diverters) would be required on the new line and an equal amount on the exiting line. Vantage would need to discuss placement of flight diverters with the power company before making a commitment.

Using boring or horizontal directional drilling to avoid wetland impacts was discussed. B. Kovach stated that a contingency plan would be prepared in the event of a drill failure. Additionally, N. Gibson added that the DOS would like to have an inadvertent release containment and cleanup plan prepared. In these plans, the properties of bentonite clay should be included for the public's benefit.

Meeting Notes

Vantage Pipeline Project, April 12, 2012

Action Items:

- Vantage to incorporate DOS comments into BA, both from electronic edits provided in March and those discussed during conference call. B. Kovach and N. Gibson will be in contact and coordinate on the remaining BA edits.
- Merjent to draft letter to FWS requesting concurrence with BA.

Attachments:

None



MEETING NOTES

Date:

April 16, 2012

To:

Meeting Attendees

From:

Kim Jessen

Subject:

Vantage Pipeline Project – Follow-up to April 12, 2012 meeting with U.S. Fish and Wildlife Service regarding Section 7 process and Biological Assessment Discussion

Meeting Date & Location:

Monday, April 16, 2012
Conference Call

Meeting Attendees:

Nicole Gibson, Department of State
Alexander Yuan, Department of State
Jeffrey Towner, U.S. Fish and Wildlife Service
Heidi Riddle, U.S. Fish and Wildlife Service
Kim Jessen, Merjent
Steve Elbert, Merjent

Meeting Notes:

The meeting began with an introduction of the attendees and each person's role on the Vantage Pipeline Project. N. Gibson noted the purpose of the call was to follow-up to the April 12, 2012 meeting between the U.S. Fish and Wildlife Service (FWS), Department of State (DOS), and Vantage, and to clarify other project-related items, including:

- 1) the timing of the Environmental Assessment (EA) and the Biological Assessment (BA);
- 2) language for insertion into the EA and BA regarding a Migratory Bird Conservation Plan;
and
- 3) the special status species listed in a September 2011 letter from the FWS to the DOS.

N. Gibson began by stating that the EA had been provided to the FWS for a preliminary review and that the DOS would appreciate the agency's comments if schedules allowed. H. Riddle and J. Towner agreed that the FWS would be able to provide informal comments on the EA to the DOS in a track changes version of the document, and that, if necessary, a formal response to the DOS regarding the EA would be provided once the EA was made available for public and agency review. H. Riddle stated that she would attempt to provide comments to the DOS by the end of this week (Friday, April 20, 2012).

Meeting Notes

Vantage Pipeline Project, April 16, 2012

N. Gibson noted that the DOS is currently working on language specific to the Migratory Bird Conservation Plan that the FWS had recommended Vantage complete for the project. N. Gibson added that once language regarding a migratory bird conservation plan was developed and agreed by all parties, it would be inserted into the EA and, where applicable, into the BA. J. Towner noted that the FWS would recommend that the EA have an environmental analysis regarding migratory birds and their habitat, potential project impacts, and references to the Migratory Bird Treaty Act, the Bald and Golden Eagle Protection Act, and Executive Order 13186. A. Yuan, S. Elbert, and K. Jessen confirmed that these items are included in the EA and would be supported by additional Migratory Bird Conservation Plan language. K. Jessen added that Vantage agreed to adopt all of the FWS' recommended mitigation measures for the species potentially affected by the project.

S. Elbert asked if the FWS had a recent example Migratory Bird Conservation Plan that Vantage might use as a template. A. Yuan, N. Gibson, and H. Riddle stated that one had been provided to the DOS [from the Ruby Pipeline Project] and that it would be shared with Merjent and Vantage.

J. Towner noted that the FWS would prefer to see the Migratory Bird Conservation Plan completed and approved prior to issuance of a Presidential Permit by the DOS.

H. Riddle inquired who the point of contact would be moving forward. A. Yuan and N. Gibson noted that KC Harvey is the contractor working for Vantage on biological issues.

N. Gibson pointed out that the BA is still an applicant-prepared document and that it would ultimately be transferred to the DOS prior to requesting FWS comment on the final BA. H. Riddle asked if the FWS would be allowed another opportunity to review the applicant-prepared BA after KC Harvey has addressed the comments from the DOS and the April 12, 2012 interagency meeting. N. Gibson confirmed that the FWS would indeed be provided another draft of the applicant-prepared BA prior to it being finalized by the DOS and issued to the FWS and public. N. Gibson added that, it would be preferable to have the BA attached to the EA, the timing of the documents is such that the BA may follow the EA. J. Towner noted that a BA normally is issued at the same time as the EA. N. Gibson and A. Yuan noted that BAs are standalone documents that may be issued separately from the EA.

N. Gibson stated that the most recent letter from the FWS listing the potentially affected special status species in the project area was dated September 22, 2011, and that the letter noted the list of species was valid for only 90 days. H. Riddle thanked the DOS for recognizing this as it is sometimes possible for a new species to occur in an area since the last consultation. J. Towner and H. Riddle noted that the DOS could review the FWS' website for the counties affected by the project (Williams and Divide), which has a current list of special status species, for a more recent reference. K. Jessen and S. Elbert stated that Merjent would complete this for the EA and the BA and update the special status species references. J. Towner and H. Riddle noted that, based on a review of the FWS' website, there are no new species of concern in the project area. J. Towner added that if the DOS would prefer a formal letter from the FWS for the administrative record, his office could produce one. All parties agreed that the FWS' website would suffice.

J. Towner inquired if the DOS has any policy regarding candidate species, and noted that some agencies treat candidate species similarly to proposed or protected species. A. Yuan and N.

Meeting Notes

Vantage Pipeline Project, April 16, 2012

Gibson stated that they were not aware of a specific DOS policy [Sprague's pipit is a candidate species and will be addressed in the BA].

N. Gibson asked if the FWS had any concerns regarding the confidentiality of species information presented in the EA or BA. S. Elbert noted that the FWS had not provided specific species location data, only public data such as whooping crane migration route maps. H. Riddle recalled that Vantage's piping plover surveys had not occurred during 2011 due to flooding and that the surveys to be conducted in 2012 would result in specific location information, which would be used to create FWS-recommended buffer zones. H. Riddle stated that the FWS would prefer to have the piping plover survey information be treated as confidential and not released, but the FWS would request that Vantage share the data with the FWS.

In closing, J. Towner noted that, regarding the earlier discussion of the Migratory Bird Conservation Plan, the Migratory Bird Treaty Act does not have a provision for "take." Therefore, the FWS recommends that the language to be focused on mitigating for migratory bird habitat loss versus species take. All parties agreed this would be the direction of the mitigation discussion in the EA and, as appropriate, in the BA.

Action Items:

- FWS to provide track-changes comments to internal draft of EA to DOS.
- DOS to suggest possible language to FWS and Vantage regarding Migratory Bird Conservation Plan.
- Merjent to review FWS' website for updated special status species list in project area and revise EA with updated reference.

Attachments:

None



MEETING NOTES

Date:

April 18, 2012

To:

Meeting Attendees

From:

Kim Jessen

Subject:

Vantage Pipeline Project – Weekly Conference Call

Meeting Date & Location:

Wednesday, April 18, 2012
Conference Call

Meeting Attendees:

Alex Yuan, DOS
George Sibley, DOS
Patrick Pearsall, DOS
Nicole Gibson, DOS
Kim Jessen, Merjent

Zeke Rice, Merjent
Peg Boden, Merjent
David Schmunk, Vantage
Josh Runyan, Steptoe & Johnson, LLP
David Cameron, KC Harvey

Meeting Notes:

Ms. Jessen provided an update on the preparation of the Environmental Assessment (EA). Merjent received comments from the DOS on Tuesday and Wednesday, and is reviewing and addressing them. She noted that Merjent hopes to provide a revised EA to the DOS by tomorrow (Thursday). Mr. Sibley said that at a minimum the DOS would like the revised Executive Summary by Thursday, April 19 for the Assistant Secretary's review.

Ms. Jessen provided an update on the Biological Assessment (BA). KC Harvey is updating the applicant-prepared BA, Ms. Gibson has been working with KC Harvey and the U.S. Fish and Wildlife Service (FWS) to make revisions, and it is anticipated that a revised applicant-prepared BA would be provided by KC Harvey by the end of the week. Ms. Gibson confirmed that the FWS would like to review the revised BA, and that the FWS is also reviewing the EA and intends to provide comments by the close-of-business Thursday, April 19. Specifically, the FWS is looking at the language related to the Migratory Bird Treaty Act (MBTA) and the Conservation Plan.

Mr. Sibley discussed Mr. Runyan's edits to the meeting notes for the April 12, 2012 conference call between the DOS, the FWS, KC Harvey, Vantage, and Merjent. Mr. Sibley stated that he thought there had been agreement amongst all parties that Vantage would develop a Conservation Plan to mitigate for project-related impacts on grassland bird habitat to address potential MBTA concerns. After a discussion between Mr. Sibley and Mr. Runyan regarding the Conservation Plan, Mr. Schmunk confirmed that Vantage is comfortable committing to the development of a Conservation Plan and will

negotiate with the FWS regarding the contents of the plan. Mr. Runyan stated that he would revise his edits to the April 12 meeting notes and redistribute them.

Regarding the April 12 meeting notes, Mr. Sibley and Ms. Gibson also clarified the language related to how the BA is described. The BA is considered applicant-prepared on behalf of the DOS, but will be transferred to the DOS at which time it becomes a DOS-maintained document. Mr. Pearsall and Ms. Gibson added that the DOS would like the meeting notes to be clear that the document is KC Harvey's now, but will be transferred to the DOS.

Dr. Boden asked Mr. Schmunk if any new progress has been made on the tribal surveys. Mr. Schmunk stated that he has sent shape files to Tim Mintz and the land agents are beginning work to obtain landowner permissions. Mr. Schmunk also indicated that Pete Coffey of the Three Affiliated Tribes had contacted him to request that his group participate. It was noted that the Rosebud Sioux Tribe has also contacted Mr. Schmunk via email. Dr. Boden recommended that Mr. Schmunk suggest the Rosebud Tribe contact Tim Mintz regarding participation in the survey, or Dr. Boden could call them. Mr. Schmunk asked that Dr. Boden call them and direct any necessary requests/actions to Mr. Schmunk.

Dr. Boden asked the group if any other tribes had contacted Vantage or the DOS (none have), and asked that all parties let her know if any further follow-up contacts occur so they may be documented.

Dr. Boden also stated that the transcripts of the tribal meetings in New Town, North Dakota had been received and distributed to the attendees, the North Dakota State Historic Preservation Office, Vantage, and Ethnoscience.

Action Items:

- Merjent – Follow-up with the Rosebud Sioux Tribe
- Runyan – Revisions to the April 12 meeting notes

Attachments:

None



MEETING NOTES

Date:

April 25, 2012

To:

Meeting Attendees

From:

Kim Jessen

Subject:

Vantage Pipeline Project – Weekly Conference Call

Meeting Date & Location:

Wednesday, April 25, 2012
Conference Call

Meeting Attendees:

Alex Yuan, DOS
George Sibley, DOS
Patrick Pearsall, DOS
Kim Jessen, Merjent
Zeke Rice, Merjent
Peg Boden, Merjent

Steve Elbert, Merjent
Josh Runyan, Steptoe & Johnson, LLP
David Coburn, Steptoe & Johnson, LLP
Brad Kovach, KC Harvey
Lynelle Peterson, Ethnoscience

Meeting Notes:

The status of the Environmental Assessment (EA) was discussed by all parties. Merjent has updated the working version of the EA with edits from the DOS. Mr. Sibley indicated that the changes remaining for the EA are small, and the Biological Assessment (BA) has been shifted to the DOS and is being finalized.

Ms. Jessen noted that the latest draft of the BA was provided to the U.S. Fish and Wildlife Service (FWS), as promised, for another review. Ms. Jessen added that it was sent to Heidi Riddle of the FWS yesterday with the edits shown in track changes, and the DOS is waiting for Ms. Riddle to confirm that the edits are acceptable so that it can be included as an appendix to the EA. Ms. Jessen added that Nicole Gibson of the DOS will be following up with Ms. Riddle regarding the status of her review.

Ms. Jessen mentioned that the transcript from the tribal meeting in North Dakota have been provided to the meeting participants, but asked the DOS if they should also be sent to the remaining tribes. Dr. Boden indicated that we asked for comments from the tribes on the transcripts by May 1. Mr. Sibley requested that we wait until May 1 and, if no response from the meeting participants provided a copy of the transcript is received, the transcript should be sent to the tribal members who have been in contact with Dr. Boden but who did not attend the meeting.

Dr. Boden provided an update on the tribal contacts that she has made in the past week. She spoke with Conrad Fischer of the Northern Cheyenne Tribe, who wanted an update on the activities since the meeting in North Dakota. She informed him that Vantage is working with Tim Mintz to set up surveys

and that the DOS and Merjent have had telephone meetings with the North Dakota State Historic Preservation Office (SHPO) and the Advisory Council on Historic Preservation.

Dr. Boden contacted the Rosebud Sioux Tribe, specifically Kathy Arcoren, who had previously contacted David Schmunk. However, Dr. Boden has been unable to reach Ms. Arcoren by telephone, and therefore sent a detailed email regarding the status of the project.

Dr. Boden has also been in contact with Kade Ferris, the Tribal Historic Preservation Officer of the Turtle Mountain Band of Chippewa. Mr. Ferris has provided a proposal to conduct his own ethnographic study, and Dr. Boden forwarded the proposal to Mr. Schmunk yesterday.

Per an email from Ethnoscience dated March 19, Mr. Sibley asked about the status of a historic homestead site that was defined ambiguously in the Class III survey report. The group discussed the necessity of contacting the North Dakota SHPO regarding the site recommendations, with Mr. Runyan pointing out that the lead federal agency on a project usually makes the final determinations of eligibility and effect. Dr. Boden stated, however, that the DOS would want to consult with the North Dakota SHPO to determine what the state agency would require for the site (e.g., additional survey) for its records. Dr. Boden noted that Vantage has previously provided the Class III report to the North Dakota SHPO for comment, with the DOS being copied on the correspondence, and recommended the same approach be taken to clarify the historic homestead site's status and potential need for additional survey or site description. It was agreed that Dr. Boden and Ms. Peterson would contact the North Dakota SHPO regarding the issue.

Dr. Boden asked Ms. Peterson if additional surveys were currently being conducted. Ms. Peterson indicated that they are not yet underway; additional work areas (e.g., laydown areas, access roads, yards) are being identified and the locations will be finalized in the next few weeks. Dr. Boden confirmed with Ms. Peterson that the reports for the additional survey will be provided to the DOS and North Dakota SHPO when they are completed.

Action Items:

None

Attachments:

None

NATIONAL ENERGY BOARD

Hearing Order OH-3-2011

**Vantage Pipeline Canada Inc.
Section 52 of the NEB Act Application for Vantage Pipeline Project
Application filed 8 February 2011**

**VANTAGE PIPELINE CANADA INC. RESPONSE TO
NEB INFORMATION REQUEST NO. 5**

Supply Matters

5.1 Resource Definition

Reference: Vantage Pipeline Project, Vol. 1, Appendix A, Section V, page 17 (PDF page 23) [\[A1X5W3\]](#)

Preamble: In the reference, Vantage states, "The Williston Basin is estimated to contain several hundred billion barrels of oil in place. Of the estimated oil in place, about 4 billion barrels of oil is considered recoverable with existing technology, based on US Geological Survey reports." Some clarification is required.

Request: Please provide the following:

- (a) more precise evidence to support a volume for the estimated oil-in-place, such as a range of recent estimates and a mean volume;
- (b) a complete reference to the U. S. Geological Survey (USGS) report that indicates recoverable resources utilizing existing technology are 4 billion barrels; and,
- (c) confirmation that the USGS reports pertain only to the area south of the Canada-United States border.

Response: (a) & (b)

In 2008, the USGS estimated that North Dakota and Montana alone have an estimated 3.0 to 4.3 billion barrels of undiscovered, technically recoverable oil in the Bakken Formation. The USGS estimate had a mean value of 3.65 billion barrels. See

Attachment 5.1(a), being Fact Sheet 2008-3092 issued by the U.S. Department of the Interior and USGS.

The reference to the complete USGS report is: Pollastro, R.M, Cook, T.A., Roberts, L.N.R., Schenk, C.J., Lewan, M.D., Anna, L.O., Gaswirth, S.B., Lillis, P.G., Klett, T.R., and Charpentier, R.R., 2008, Assessment of Undiscovered Oil Resources in the Devonian-Mississippian Bakken Formation, Williston Basin Province, Montana and North Dakota, 2008: United States Geological Survey. The following provides a link to the original 2008 USGS Assessment, as well as more recent work completed by the USGS in relation to the Bakken Formation:

<http://www.usgs.gov/newsroom/article.asp?ID=1911>

On May 19, 2011, the U.S. Department of the Interior announced that the Bakken Formation Oil Assessment in North Dakota and Montana will be updated by the USGS. See:

<http://www.doi.gov/news/pressreleases/Bakken-Formation-Oil-Assessment-in-North-Dakota-Montana-will-be-updated-by-US-Geological-Survey.cfm>

It is anticipated that the USGS' estimate of technically recoverable oil in the Bakken Formation will increase.

(c) Confirmed.

5.2 ***Extent of Area that will Provide Supply***

Reference: Vantage Pipeline Project, Vol. 1, Appendix A, Section V, page 18 (PDF page 24) [A1X5W3]

Preamble: In the reference Vantage states, "We currently expect crude oil production from North Dakota to peak between 400,000 bpd and 450,000 bpd in the near term, with a relatively stable outlook through the later part of the decade, and then a subsequent slow decline of between 2.5 and 3 percent per year through the end of the forecast period."

Vantage further states, "It should be noted that several producers have very optimistic outlooks for North Dakota similar to North Dakota Department of Mineral Resources [ND-DMR]'s P10 forecast."

Additional detailed information in support of these forecasted volumes is required, such as the drilling activity required to reach the suggested

peak and to maintain it at the level indicated until the end of the forecast period.

The Board is also seeking additional information on Vantage's supply projection and its sensitivity to different price levels.

Request: Please provide the following:

- (a) the production forecast of crude oil on an annual basis over the forecast period;
- (b) the forecasts of individual producers in support of the more optimistic outlooks mentioned;
- (c) the price forecast of crude oil in support of the production forecast as per (a) above; and,
- (d) assuming a price projection 25% lower than in (c), the impact that may have on the production forecast provided in (a).

Response: (a) Purvin & Gertz was not retained to provide a detailed production forecast of crude oil on an annual basis over the forecast period. Vantage instead relied on the P50 forecast developed by the North Dakota Department of Mineral Resources. See Attachment 5.2(a) for a graph taken from a North Dakota Department of Mineral Resources presentation. The full presentation may be found at:

<https://www.drm.nd.gov/oilgas/presentations/HouseApprop2011-01-07.pdf>

See also Figure 10-2: Production Forecast - North Dakota/Eastern Montana Region from the Application by Enbridge Bakken Pipeline Company Inc. respecting the Bakken Pipeline Project Canada dated January 2011, Volume 1, NEB Applications at page 10-213.

- (b) Vantage is not able to provide forecasts of individual producers because producers have asked that the forecasts remain confidential. However, publicly available information confirms that producers are optimistic about production from the Bakken Formation.

Attachment 5.2 (b-1) is a recent presentation prepared by Continental Resources Inc., an independent oil and natural gas exploration and production company with the largest acreage

position in the Bakken resource play. Slide 5 of the Attachment shows Continental's forecast Bakken production to reach 1 million bpd by 2015, steadily increasing to 2025 and beyond.

Attachment 5.2 (b-2) is a collection of News Releases issued by Hess Corporation, a producer with significant interests in the Bakken shale region. Hess Corporation acquired additional acreage in the Bakken play in late 2010, and has allocated significant amounts of money in 2011 towards production and field development of the Bakken oil shale play in North Dakota.

Finally, Attachment 5.2 (b-3) is a collection of News Releases issued by Oneok Partners, the largest independent operator of natural gas gathering and processing facilities in the Bakken shale region. Oneok has committed investments in the amount of US\$300 to \$355 million to the end of 2012, and an additional US\$260 to \$305 million to the end of 2014, in the Bakken region.

(c) & (d)

Purvin & Gertz was not retained to provide a price forecast of crude oil in support of the production forecast, and therefore, cannot provide a detailed analysis of the impact that a 25% lower price may have on the production forecast referenced in 5.2(a) above. Supply, demand and price forecasts require many detailed assumptions including, among others, world and regional economic growth and energy demand, various governments' fiscal and monetary policies, levels of reserves and technological developments. However, directionally, a lower price outlook could reasonably be expected to lead to a lower production forecast.

Also, please see Attachment 5.2(a), being the graph taken from a North Dakota Department of Mineral Resources presentation. The graph provides an oil production forecast given a starting oil price in 2011 that ranges between \$50 and \$100 per barrel and that increases over a five year period to between \$110 and \$200 per barrel.

5.3 North Dakota Gas Production

Reference: Vantage Pipeline Project, Vol. 1, Appendix A, Section V, page 20 (PDF page 26) [\[A1X5W3\]](#)

Preamble: In the reference Vantage indicates that North Dakota gas production is expected to grow to 500 mmcf/d. The Board requires additional information on the gas production outlook, such as the source of the gas and more detail on the gas production forecast.

Request: With reference to the oil supply forecast identified in Information Request 5.2, please provide the total natural gas production forecast, indicating production by year.

Response: See Attachment 5.3, which is "An Update to the May 2010 Pipeline Authority Natural Gas Report" prepared August 18, 2010. The Update Report provides data on natural gas production in North Dakota.

Figure 1 of the Update Report illustrates how natural gas production has risen from an average of 150 mmscfd, in the 5 year period from 2000 to 2005, to an all-time record of over 280 mmscfd in February of 2010. This February production corresponds to the state oil production volume of approximately 200,000 bpd referenced in the graph in Attachment 5.2(a) above.

Further data on gas production expectations can be inferred from the gas processing capacity in North Dakota. Figure 5 of the Updated Report gives a 2010 gas processing capacity of 475 mmscfd. The Updated Report also describes several projects involving new or expanded processing capacity in North Dakota. These projects include:

- Hiland Partners, Watford – 50 mmscfd
- Hess, Tioga – 130 mmscfd
- Oneok, Garden Creek – 100 mmscfd

Oneok has announced two additional processing plants, Stateline I and Stateline II, each having a capacity of 100 mmscfd. This would add a total of 480 mmscfd of processing capacity, doubling the capacity in place in 2010, and resulting in almost 1 bcf of processing capacity in North Dakota.

See also Attachment 5.2 (b-1) which provides the Continental Resources gas forecast on slide 5 reaching 1 bcf per day in 2015 and 2 bcf per day by 2020. Slide 7 provides a breakdown of the various gas processing options available and indicates that the total gas processing capacity planned to be available by mid-2013 is in excess of 1 bcf per day.

5.4 Gas Composition

Reference: Vantage Pipeline Project, Vol. 1, Appendix A, Section V, pages 18-19 (PDF pages 24-25) [A1X5W3]

Preamble: In the reference Vantage states, “North Dakota gas processing and NGL production is dominated by three plants, namely Hess Corporation’s Tioga facility (120 mmcf/d), Bear Paw Energy/Oneok’s Grasslands facility (100 mmcf/d) and Hiland Partners Badlands facility (40 mmcf/d) which together produce approximately 75% of the state’s total NGL production. The associated natural gas processed at the North Dakota gas processing facilities is very rich in NGL. Current deliveries to the Williston Basin Interstate Pipeline from the Tioga area typically contain in excess of 20% ethane.”

Vantage further states “Assuming that the composition of raw gas remains similar to what is being currently produced, then Purvin & Gertz estimates there will be approximately 40,000 to 50,000 bpd of potential ethane volumes in reasonable proximity to the Vantage Pipeline.”

Clarification of the gas composition and NGL content of the gas that will support this project is required.

Request: Please provide the following:

- (a) additional evidence relating to the NGL content and gas composition to support the estimate that potential ethane volumes will be 40,000 to 50,000 bpd; and,
- (b) additional evidence to support the assumption that the composition of the raw gas will not change over time.

Response: (a) As discussed in the Purvin & Gertz Report, current deliveries to the Williston Basin Interstate Pipeline from the Tioga area typically contain in excess of 20% ethane. Detailed gas quality information is available at <http://ebb.wbip.com/> under the Gas Quality tab.

A summary of the ethane content in the Williston Basin Interstate Pipeline for the most recent 12 month period is given below.

Month	Ethane Composition
May 2010	17.8

June 2010	18.7
July 2010	18.7
August 2010	18.9
September 2010	19.0
October 2010	18.1
November 2010	17.6
December 2010	18.7
January 2011	19.3
February 2011	20.1
March 2011	19.8
April 2011	19.4
May 2011	19.2

This composition corresponds to data from slide 7 of Attachment 5.2 (b-1), which states a liquid yield in the range of 11.5 to 13 GPM, or gallons per 1000 cubic feet (mcf), of which ethane would be approximately 50%. Therefore, assuming the production volume of 1 bcf per day, the ethane produced from the Bakken would be as follows:

$1,000,000 \text{ mcf per day} \times 12 \text{ gallons per mcf} \times 50\% = 6 \text{ million gallons of ethane available}$

$6,000,000 \text{ gallons} \times \text{a recovery of } 80\% = 4,800,000$

$4,800,000 \text{ gallons} \div 42 \text{ gallons in a barrel} = 115,000 \text{ bpd}$

- (b) Vantage does not currently have access to sufficient production data to definitively determine how the composition of associated gas from the Bakken Formation will change over time. Given that the majority of the Bakken natural gas is associated gas, meaning that it is produced with oil, Vantage believes it is reasonable to

assume that this gas will continue to exhibit a relatively high liquids content, similar to today.

For example, oil and associated gas have been produced for over 20 years from southern Saskatchewan. This area has been the main source of supply for the Steelman Gas Plant, which is capable of recovering specification ethane. The table below shows the gas heating value for 2 receipt points in this area onto the TransGas system, being the gas transmission service provider in Saskatchewan. Heating value serves as a proxy for NGL content in natural gas, with high heating values typically associated with high NGL content. This table illustrates that the associated gas in this area has not changed significantly over the 13 year period that data was collected.

HEAT VALUE		
Year	NAL - Nottingham	BP - Steelman
1997	42.20	37.39
1998	43.64	38.23
1999	43.34	37.17
2000	42.72	38.06
2001	43.83	38.96
2002	43.25	39.48
2003	42.83	39.34
2004	43.06	38.32
2005	43.00	38.81
2006	43.00	38.93
2007	42.96	39.65
2008	42.78	40.62
2009	42.68	40.90
2010	42.55	39.38

Environment Matters

5.5 Atmospheric Environment

- Reference:**
- i) Vantage Pipeline Project, Vol. 2, Section 6.3.4, pages 42-45 (PDF pages 8-11) [A1X5X3]
 - ii) Vantage Pipeline Project, Vol. 2, Section 6.3.5, pages 45-46 (PDF pages 11-12) [A1X5X3]

Preamble: Reference (i) provides tables with predicted air emissions for the construction and operations phases of the proposed Vantage Pipeline Project. It is not clear how these numbers were derived (i.e., standard calculations) and what assumptions were used to derive them (e.g., number of vehicles, vehicle operating time, fuel use, any burning of woody debris, number and timing of survey vehicles, etc.). The assumptions and inputs used to calculate predicted air emissions can have a large effect on the output numbers.

Also in the operations phase, Reference (i) indicates that the total annual emission rate of CO₂ equivalent (eq) greenhouse gas (GHG) emissions expected from the proposed pipeline is 805 tonnes. Most of these emissions (682 tonnes) are classified as fugitive emissions from the pipeline and pump stations that may occur during normal pipeline operation. Reference (ii) states that additional mitigation measures, such as those outlined in the Best Management Practices for Fugitive Emissions Management (Canadian Association of Petroleum Producers; CAPP) will be evaluated and implemented during the design, construction, and operation of the two pump stations. No specific mitigation, monitoring or detection measures for GHG emissions have yet been identified or committed to.

Request: Please provide the following:

- (a) a description of the calculation methodology, including assumptions, inputs, standards and references used to derive the emissions estimates in Tables 6-3 and 6-4 of Reference (i);
- (b) the criteria against which additional mitigation measures such as those outlined by CAPP will be evaluated and implemented;
- (c) proposed mitigation measures additional to those identified in the application that can be committed to at this time, such as those outlined by CAPP, and the date when Vantage will make decisions on the remaining mitigation measures to be evaluated;
- (d) an assessment of:
 - (d.1) potential sources of fugitive emissions;
 - (d.2) the contribution of each potential source to the estimated total annual fugitive emissions;
 - (d.3) detailed mitigation measures;

(d.4) proposed methods for monitoring and detecting fugitive emissions and the effectiveness of these methods; and,

(d.5) a planned response should the fugitive emissions increase for any reason (e.g., leak, release, process change).

Response: (a) See Attachment 5.5(a).

(b) & (c)

Vantage has committed to the following mitigation measures to minimize fugitive emissions, being the mitigation measures outlined by CAPP:

- Installation of tandem seals on all pumps.
- Installation of block valves upstream of pressure safety devices to allow for services in the event of leakage.
- Installation of plugs in all open ended devices to minimize fugitive emissions.
- Inspection of flanges and gaskets prior to installation to ensure they are clean.
- Provide instructions for and monitor flange bolt tightening.
- Develop an annual fugitive emissions leak detection and repair (LDAR) program, as outlined in the response to (d.5) below, which involves the use of gas detection or infra-red detection. Some leakage is expected through the normal course of operations (i.e. from valves, flanges, etc.). Prudent practice within industry is to use LDAR to reduce emissions below an economic threshold.

(d.1) Potential sources of fugitive emissions include:

- Connections
- Valves
- Open ended lines
- Pump seals

(d.2) In the Vantage Application, ethane was evaluated as methane. Since filing the Application, Vantage has undertaken more research on the effect fugitive emissions from ethane may have on the determination of CO₂E (equivalent). Ethane has been evaluated as a non-methane volatile organic compound (NMVOC) and according to the US Environmental Protection Agency, it is not considered to be sufficiently photo chemically active to be an ozone or photochemical smog pre-cursor. In a report prepared by the Intergovernmental Panel on Climate Change entitled "Climate Change 2007: Working Group I: The Physical Science Basis", Chapter 2 on "Changes in Atmospheric Constituents and in Radiative Forcing" discusses global warming potential (GWP) of methane and ethane. Methane has a *direct* 100 year GWP of 21 (multiplier to CO₂ set as 1). Ethane has a calculated *indirect* net GWP as a NMVOC of 5.5. The full IPCC report is available at http://www.ipcc.ch/publications_and_data/ar4/wg1/en/ch2s2-10-3-2.html

Based on this research, Vantage re-calculated the fugitive emissions from the pipeline operations to be as follows:

- Connections: 4 tonnes CO₂E per year
 - Valves: 158 tonnes CO₂E per year
 - Open ended Lines: 6 tonnes CO₂E per year
 - Pump Seals: 11 tonnes CO₂E per year
- Total 179 tonnes CO₂E per year

The annual fugitive emissions are expected to be less than 0.03% of the total annual throughput of the Vantage Pipeline (based on the design capacity of 40,000 bpd).

(d.3) Mitigation measures are outlined in (c) above.

(d.4) Monitoring will involve regular inspections of the valve sites and pump stations along with an annual fugitive emissions survey utilizing gas detection or infra-red technology. Both of these methods detect and/or quantify actual emissions and are considered an effective means to identify fugitive emissions.

- (d.5) If fugitive emissions increase relative to previous readings or exceed an economic threshold, there are three possible planned responses:
1. If the equipment can be shutdown, isolated and repaired without taking the pipeline out of service, the work will be scheduled and done within a reasonable time schedule.
 2. Schedule the emission repair during the next scheduled outage for the pipeline.
 3. Shutdown the pipeline, isolate and repair the emission as soon as the work can reasonably be done.

5.6 Environmental Management System

Reference: i) Vantage Pipeline Project, Vol. 1, Section 7.1, pages 35-36 (PDF pages 43-44) [\[A1X5W0\]](#)

ii) *Onshore Pipeline Regulations, 1999*, (OPR-99) section 48

Preamble: Vantage has committed to operate the pipeline and associated facilities in accordance with all governing regulatory requirements, permit conditions and other approvals, including the OPR 99 and CSA Z662-07 (Reference (i)).

Reference (ii) requires companies to develop and implement an environmental protection program to anticipate, prevent, mitigate and manage conditions which have a potential to adversely affect the environment.

Vantage stated in Reference (i) that it will address responsibilities for health, safety and environmental performance by utilizing a Health, Safety and Environmental Management System. No further detail is provided.

Request: Please provide the following:

- (a) an explanation of how the Health, Safety and Environmental Management System described in reference (i) will meet the requirements of OPR 99 section 48, or if this Management System is not intended to meet this requirement please describe the program that will meet it;
- (b) the organizational and accountability structure for Vantage's Environmental Management System;

- (c) the process for how management plans and directives will be implemented in the field;
- (d) how the structure described in (a) ensures that environmental plans and directives are implemented; and,
- (e) how monitoring and surveillance in the field will feed back into management plans and directives.

Response:

- (a) The Environmental Management System will meet the requirements of section 48 of OPR-99 which states a program must "anticipate, prevent, mitigate and manage conditions which may have a potential to adversely affect the environment." The Environmental Management System will identify the risks associated with the operation of the pipeline and discuss the prevention and mitigation procedures necessary to manage all identifiable conditions that may have an effect on the environment. For example, when a flare is used, there is a risk of igniting surrounding vegetation. The risk would be mitigated by having a program to manage vegetation growth in the vicinity of flare locations and ensure that a procedure is in place to check for adequate vegetation control prior to use of a flare.
- (b) It is anticipated that pipeline operations employees would report to an operations manager, who would in turn report to the Chief Operating Officer. The Chief Operating Officer will ultimately be accountable and responsible for ensuring the organizational structure and systems are in place to manage the health, safety and environmental programs.
- (c) Management plans and directives will be communicated directly to pipeline operations employees through regular meetings. Each employee will be required to provide written acknowledgement that they have read and understood the management plans and directives.
- (d) Both internal and external auditing will be used to ensure the plans and directives are implemented. The internal and external auditors will report directly to the Chief Operating Officer who will follow up on all issues identified by the audits.
- (e) Direct feedback from the field staff, along with a record of all "near misses", audits and safety/environmental meeting minutes, will be reviewed by the management and the Chief Operating Officer. This information will be used to determine whether the

management plan and directives are effective or need to be supplemented or amended.

5.7 ***Post-construction Monitoring***

Reference: Vantage Pipeline Project, Vol. 3 Appendix A, Section 1.11, pages 33-34 (PDF pages 38-39) [[A1X5Z8](#)]

Preamble: The reference lists several monitoring assessments planned for post-construction, including soils, vegetation, watercourses, and wildlife. For wildlife post-construction monitoring (PCM), the first year following construction is given as the recommended duration. The duration for PCM for the other elements is not clear. The reference also states that, following the first year after construction, routine monitoring by Vantage personnel will be continuous for the life of the pipeline.

It is not clear what will be monitored continuously as part of ongoing operations and maintenance, and what will be monitored as part of a defined PCM program that would be provided to regulatory agencies.

Request: Please describe:

- (a) what Vantage will consider to be PCM and what Vantage will consider to be ongoing operations and maintenance monitoring, including the rationale for the distinction and the scope, duration of program, and monitoring intervals for each;
- (b) the desired objectives of Vantage's PCM program; and,
- (c) the rationale for the chosen duration and monitoring intervals of PCM in meeting the objectives described in (b).

Response: (a) Post-Construction Monitoring (PCM) will occur immediately following construction and continue until the ROW is reclaimed, which is expected to be one year after construction. Reclamation results will be assessed after one year to determine whether continued monitoring is warranted. Vantage will consider feedback from landowners of cultivated lands, hay lands and native prairie to ensure that the reclamation of the ROW is adequate and crop growth has returned to normal. Vantage will be in contact with all landowners following construction to ensure they are satisfied with the ROW reclamation.

PCM in native prairie areas will be performed by Vantage's environmental consultants with an objective of ensuring that reclamation of the ROW is progressing as expected. The PCM

program will then transition to the Operations Group for ongoing monitoring of the pipeline ROW and facilities.

The PCM will consist of the following elements:

Soils

No specific measures are required.

Vegetation Monitoring

Vegetation inspections will occur following completion of construction in mid to late summer when vegetation is mature enough for accurate identification and evaluation. The ROW will be visually inspected for vegetation issues such as weed infestations, invasive species, poor vegetation establishment, and reduced crop growth along the ROW. PCM will also assess success of mitigative measures recommended for native communities and rare plants. Particular attention will be paid to areas with extensive surface disturbance, moderate to steep slopes, watercourse crossings, wetlands and areas of terrain instability.

Watercourse Monitoring

All watercourse crossings will be inspected during the PCM and also following significant precipitation events. The banks and approach slopes will be monitored for stability, erosion, invasive species, weed infestations and re-vegetation.

Wildlife

PCM wildlife surveys will occur in the first year at various times specific to each species. The PCM will focus on areas with recommended regulatory setbacks in habitats of species of management concern.

Following the PCM program, Vantage Operations personnel will perform regular inspections of the facilities and the ROW. These inspections will consist of a monthly aerial reconnaissance, a biweekly visual inspection of block valves and a weekly visual inspection of pump station locations, along with ongoing visual inspections of the ROW in areas where the pipeline is visible from the roads.

- (b) The desired objectives for the PCM program are to:
- restore agricultural capability to pre-construction conditions;
 - allow native prairie and wildlife habitat areas to recover to pre-construction quality (species/density/vigour);
 - utilize data gathered during the PCM to assess construction and mitigation success. This information may be used to further add to the knowledge base for future projects; and
 - promote ongoing, proactive discourse between Vantage representatives and landowners, occupants and government agencies.
- (c) The duration of and intervals between monitoring are designed to allow for early identification of any areas that requires further mitigation measures. Assessments will be undertaken during the most appropriate time of the season or lifecycle, or if a significant weather event occurs which could cause specific impacts to the ROW.

Engineering Matters

5.8 Integrity Management Program

- Reference:**
- i) Vantage Pipeline Project, Vol. 1, Section 7.1.4, page 35 (PDF Page 43) [A1X5W0]
 - ii) Alberta Energy and Resources Conservation Board (ERCB) Directive 041 - Adoption of CSA Z662-03, Annex N, as Mandatory, July 20, 2006
 - iii) CSA Z662-07 Oil and gas pipeline systems
 - iv) Onshore Pipeline Regulations 1999 (OPR-99) , Section 40 and Guidance Notes
 - v) CSA Z662-07 Oil and gas pipeline systems, Annex N – Guidelines for pipeline integrity management programs

Preamble: Reference (i) indicates that Vantage will establish a Pipeline Integrity Quality Assurance System in accordance with ERCB Directive 041.

However, reference (ii) points to an out-of-date version (2003) of CSA Z662 Annex N.

Reference (iii) Clause 10.14 requires a company to develop and implement a pipeline integrity management program that includes effective procedures for managing the integrity of pipeline systems so that they are suitable for continued service, including procedures to monitor for conditions that may lead to failures, to eliminate or mitigate such conditions, and to manage integrity data.

Reference (iii) Clause 10.2 specifies requirements for the development, implementation and maintenance of the safety and loss management system that provides for the protection of people, environment and property.

Reference (iv) requires companies to develop an integrity management program which may include the following four essential elements: Management System, Records Management System, Condition Monitoring and Mitigation Program.

Reference (v) provides guidelines for developing pipeline Integrity Management Programs.

Further clarification is required as to how Vantage's Pipeline Integrity Quality Assurance System complies with the specific regulatory requirements in OPR-99 and CSA-Z662.

Request:

Please provide:

- (a) details on how the proposed pipeline Integrity Quality Assurance System complies with the OPR-99 and CSA Z662-07, Clauses 10.14 and 10.2;
- (b) confirmation that the latest version of CSA Z662 standard will be used for the development of the Integrity Management Program and its supporting management system for the proposed project;
- (c) a Table of Contents for the Integrity Management Program (high level) reflecting the associated management system elements; and,
- (d) the date when the Integrity Management Program will be available for the Board's review.

Response:

- (a) The proposed pipeline Integrity Quality Assurance System will comply with section 40 of OPR-99 and clauses 10.14 and 10.20 of

CSA Z-662. Specific elements of Vantage's Integrity Quality Assurance System are outlined in Volume 1 of the Application, Section 7.1.4, page 35 and include the following:

- Risk Assessment
 - will include items such as identifying factors that increase the risk of a release, identification of maintenance and operation risks, identification of risks due to mechanical damage from excavation, identify issues relating to product quality risk.
- Hazard Identification and Control & Risk Reduction
 - will includes items such as procedures, training, public awareness, slope stability, dept of cover, stream crossings.
- Inspection, Testing, Patrol and Monitoring
 - will includes items such as visual inspections, recording of operating parameters, cathodic protection surveys, aerial surveys, infrared surveys, sampling, corrosion monitoring and smart pigging.

Risks will be managed, in part, through a public awareness program to alert the public to "call before you dig", aerial patrols to spot activity near the pipeline, a cathodic protection program to minimize external corrosion and smart pigging to monitor the integrity of the pipeline, both inside and out.

All the results of this program will be monitored by both internal employees and external experts who will advise as to corrective actions that may need to be undertaken to minimize risks.

(b) Confirmed.

(c) A detailed Table of Contents for the Integrity Management Program has not yet been developed, but the elements of the program are outlined in Volume 1 of the Application, Section 7.1.4, page 35. It is anticipated that the Table of Contents would include:

- Program Records and Information Management
- Personnel Competency and Training

- Management of Change
- Failure and Damage Incident Investigation
- Hazard Identification and Control & Risk Reduction
- Risk Assessment
- Program Planning and Execution
- Inspection, Testing, Patrol and Monitoring
- Evaluation of Inspection
- Mitigation and Repair
- Facilities Integrity
- Program Review and Evaluation

(d) The Integrity Management Program will be available for the Board's review 3 months prior to operation.

5.9 Training and Competency

Reference: i) Vantage Pipeline Project, Vol. 1, Section 7.2.2, page 37 (PDF page 45) [A1X5W0]

ii) *Onshore Pipeline Regulations, 1999*, (OPR-99) section 46

Preamble: Reference (i) indicates Central Control Facility (CCF) emergency procedures and other necessary work instructions will be developed for the Project and will be completed prior to pipeline start-up to allow for the training of personnel.

Reference (ii) requires a company to develop and implement a training program for any employee of the company who is directly involved in the operation of the pipeline.

There is minimal information provided in Vantage's application regarding the operating procedures for the proposed liquid ethane pipeline. Clarification is required on the levels of training, scope and methods of the training, competency and qualifications for personnel, contractors and/or consultants who will be involved in the operation and maintenance of the proposed pipeline.

Request: Please submit:

- (a) Vantage's procedures which outline the required levels of training, scope and methods of the training, competency, and qualifications for the personnel, contractors and/or consultants who will be involved in the operation and maintenance of the proposed pipeline and facilities (such as CCF, pump stations, etc); and,
- (b) please advise the date that the operating procedures (work instructions) will be available for the Board's review.

Response: (a) Vantage has not yet developed detailed requirements addressing competency and qualifications for the personnel and contractors. It is anticipated that at minimum, a grade 12 diploma with post-secondary training in an area such as process operations or relevant oil and gas experience, will be required. Vantage's training program, once developed, will provide training in the following areas:

- Health, Environment and Safety Program
 - Emergency Response Program
 - Pipeline Integrity Program
 - Public Awareness Program
 - Safety manual and operating procedures manual
 - Regulatory reporting
 - Hazard identification, mitigation and management of hazards
 - First Aid
 - Workplace Hazardous Materials Information System (WHMIS)
 - Transportation of Dangerous Goods (TDG)
 - Fire and vapor release training
- (b) The operating procedures will be available for the Board's review 3 months prior to operation.

5.10 *Launching and Receiving Facilities*

Reference: i) Vantage Pipeline Project, Vol. 1, Section 5.4.3, page 25 (PDF Page 32) [A1X5W0]

ii) CSA Z662-07 Oil and gas pipeline systems, Clause 4.3.13.1

Preamble: Reference (i) indicates the proposed pipeline will include pig launching and receiving facilities (pig traps) that will be used for cleaning pigs and will be able to accommodate tools for internal inspection of pipelines. In addition, Table 5-5 of the same reference summarizes locations for pig traps between the Assiniboia pump station and the AEGS Tie-in; however, it does not provide details on pig trap locations for inspecting the pipeline between the Assiniboia pump station and Tioga meter station.

Reference (ii) requires the operator to have a documented operating procedure to ensure the proper depressurizing of the pig trap prior to opening the closure.

Further details on the pig launching and receiving facilities are required.

Request: Please provide the following:

- (a) typical drawings (schematics) of the launching/receiving facilities including the transition from below to above ground (S-bend riser) and pig trap reducer details;
- (b) Process and Instrumentation Diagrams (P&IDs) for the launching/receiving facilities with details on isolation and venting equipment which will ensure the safe opening of the closure;
- (c) details on when the operating procedure for launching and receiving facilities will be available for the Board's review; and,
- (d) details on how the proposed pipeline will be inspected between Assiniboia pump station and Tioga meter station including the location of the pig trap.

Response: (a)&(b) Please see Attachments 5.10 (a&b-1) and (a&b-2).

- (c) The operating procedure for the launching and receiving facilities will be developed 3 months prior to pipeline start-up.
- (d) There will be facilities installed between the Assiniboia pump station and Tioga meter station in order to inspect the pipeline. The following table lists all of the proposed locations of the

Launching and Receiving Traps that will be installed on the Vantage Pipeline in Canada and the United States.

Location	Type	Location	Province
AEGS Tie-In	Receiving	SE 11-20-1 W4M	Alberta
Empress Pump Station	Launching & Receiving	15-10-7-30 W2M	Alberta
BV-25	Launching & Receiving	SW 15-9-17 W3M	Saskatchewan
Assiniboia Pump Station	Launching & Receiving	14-36-19-1 W4M	Saskatchewan
BV-12	Launching & Receiving	NE 12-5-23 W2M	Saskatchewan
Tioga	Launching Trap	Township 157 North, Range 95 West, Section 26, W/2 NE/4	North Dakota

The traps will be used for maintenance and integrity pig runs during the operation and internal inspection of the pipeline.

5.11 *Railway Crossings*

Reference: Vantage Pipeline Project, Vol. 1, Appendices A-C, Attachment B-1, Figure 3.0 - Typical Railway Crossing, page 116 (PDF page 39) [\[A1X5W3\]](#)

Preamble: The reference states within note 1 to the figure, “The pipeline construction shall comply with the regulations of local authorities, Transport Canada Guide TC E-10, Order E-10, CSA Z662-07 and conditions specified in Railway Crossing Agreement.”

The Board is seeking further clarification related to the railway crossings.

Request: Please:

- (a) file with the Board a copy of the referenced Order E-10;
- (b) file with the Board a copy of the referenced Transport Canada - Standards Respecting Pipeline Crossings Under Railways TC E-10;
- (c) provide a document summarizing the type (cased or uncased) and location of every railway crossing;
- (d) provide confirmation that every railway crossing will comply with requirements of Transport Canada TC E-10;

- (e) indicate the location of emergency valves to meet requirements of clause 5.3 of TC E-10 and update table 5-4 as necessary; and,
- (f) commit that the most stringent requirement will apply to each railway crossing in circumstances where there is a conflict between the requirements of OPR-99, regulations of local authorities, Transport Canada TC E-10, Order E-10, CSA Z662-07 and conditions specified in Railway Crossing Agreements (reference (i)).

- Response:**
- (a) The reference to Order E-10 is in error and should be removed from the Volume 1 of the Application, Attachment B-1, Figure 3.0 – Typical Railway Crossing, page 116. The reference should be to TC E-10 only.
 - (b) See Attachment 5.11(b).
 - (c)

RAILROAD CROSSINGS	LSD	Type
CANADIAN PACIFIC RAILWAY	SE-21-19-29-W3M	Uncased
CANADIAN PACIFIC RAILWAY	SE-25-17-28-W3M	Uncased
CANADIAN PACIFIC RAILWAY	NW-16-12-23-W3M	Uncased
101052644 SASKATCHEWAN LTD.	SE-17-09-17-W3M	Uncased
101052644 SASKATCHEWAN LTD.	SE-15-09-17-W3M	Uncased
101052644 SASKATCHEWAN LTD.	SE-14-09-13-W3M	Uncased
FIFE LAKE RAILWAY LTD.	NE-11-07-01-W3M	Uncased
RED COAT ROAD & RAIL LTD.	NW-08-07-27-W2M	Uncased
UN-NAMED	SE-21-06-25-W2M	Uncased
CANADIAN PACIFIC RAILWAY	NW-15-05-24-W2M	Uncased
LABATTE LAND & CATTLE LTD.	SW-31-02-18-W2M	Uncased

- (d) The design and construction of the pipeline crossings will comply with the requirements of Transport Canada TC E-10.
- (e) The automated emergency block valves are located upstream and downstream of the railway crossings at the indicated location on the following Table:

	LSD	Upstream Block Valve	Downstream Block Valve
CANADIAN PACIFIC RAILWAY	SE-21-19-29-W3M	NW 9-18-28 W3M	Empress Pump Station
CANADIAN PACIFIC RAILWAY	SE-25-17-28-W3M	NW 7-16-26 W3M	NW 9-18-28 W3M
CANADIAN PACIFIC RAILWAY	NW-16-12-23-W3M	NE 21-11-22 W3M	SW 15-13-24 W3M
101052644 SASKATCHEWAN LTD.	SE-17-09-17-W3M	SW 15-9-17 W3M	NW 26-8-19 W3M

101052644 SASKATCHEWAN LTD.	SE-15-09-17-W3M	SW 18-9-14 W3M	SW 15-9-17 W3M
101052644 SASKATCHEWAN LTD.	SE-14-09-13-W3M	SW 16-9-12 W3M	SW 18-9-14 W3M
FIFE LAKE RAILWAY LTD.	NE-11-07-01-W3M	Assiniboia Pump St	NW 9-7-2 W3M
RED COAT ROAD & RAIL LTD.	NW-08-07-27-W2M	NW 22-6-26 W2M	NW 12-7-28 W2M
UN-NAMED	SW-17-06-25-W2M	SE 4-6-24 W2M	NW 22-6-26 W2M
CANADIAN PACIFIC RAILWAY	NW-15-05-24-W2M	NE 12-5-23 W2M	SE 4-6-24 W2M
LABATTE LAND & CATTLE LTD.	SW-31-02-18-W2M	NW 19-2-18 W2M	SW 30-3-19 W2M

- (f) Where there is a conflict between the requirements of OPR-99, regulations of local authorities, Transport Canada TC E-10, Order E-10, CSA Z662-07 and conditions specified in the Railway Crossing Agreements, the most stringent requirements will apply to each railway crossing.

Emergency Response Matters

5.12 Emergency Preparedness and Response Program

- Reference:**
- i) Vantage Pipeline Project, Vol. 1, Section 7.1.1, page 35 (PDF page 43) [A1X5W0]
 - ii) Onshore Pipeline Regulations – 1999 (OPR-99), sections 4, 32-35 and 46-48
 - iii) CSA Z662 07 Oil and gas pipeline systems, clause 10
 - iv) Board letter dated 24 April 2002 regarding Security and Emergency Preparedness and Response Programs [A0G1E4]

Preamble: Reference (i) describes Vantage’s commitment to develop an Emergency Response Plan (ERP) for the Project that will meet regulatory requirements. Vantage notes that the ERP will be developed to comply with Directive 071 of the Alberta Energy and Resources Conservation Board (ERCB) for HVP Pipelines and also to meet the requirements of OPR-99.

Reference (ii) highlights OPR-99 requirements pertaining to emergency preparedness and response, including requirements to comply with CSA Z662.

Reference (iii) cites CSA Z662 requirements of companies to establish emergency procedures and prepare emergency response plans as well as a safety and loss management system.

Reference (iv) cites the 24 April 2002 Board letter sent to industry which sets out the Board’s expectations that companies develop and implement

an emergency preparedness and response (EPR) program for all aspects of their operations.

Vantage has made several key commitments to comply with applicable regulations in the development of their ERP; however there is a lack of detail with respect to the depth of its EPR Program. As per the 24 April 2002 Board letter, the NEB has determined that its regulated companies must develop and maintain EPR Programs to minimize the effects of incidents and emergencies that have the potential to impact the health and safety of the public, company employees, property and the environment.

Request: Please provide the following:

- (a) confirmation that Vantage's EPR program, procedures and plans will be developed in accordance with the requirements of the sections of OPR-99 noted in reference (ii), the CSA Z662 07 and the Board's expectations outlined in its 24 April 2002 letter;
- (b) the hazard assessment which will be used to develop the EPR program;
- (c) the Table of Contents for Vantage's emergency procedures manual; and,
- (d) an overview of applicable HVP Pipeline regulatory requirements for the U.S. portion of the proposed project that would be used to develop the EPR Program and its components, including a comparison with the applicable Canadian regulatory requirements.

Response:

- (a) Confirmed.
- (b) The hazard assessment that will be used to develop the EPR program will be a pipeline rupture.
- (c) Vantage has not developed the emergency procedures manual or the Table of Content but it is anticipated that the Table of Contents will include:
 - i. Immediate Actions
 - 1. Flowcharts
 - 2. Emergency Levels

3. Contacts
4. Time and Event Logs
- ii. Organization
 1. All internal contact information
 2. All external contact information
- iii. Roles and Responsibilities
 1. Field response responsibilities
 2. Emergency operations center responsibilities
- iv. Alarms and Activation
 1. Emergency criteria
 2. Emergency Levels
 3. Alarms and initial calls
 4. Communications
- v. Specific Plans and Responses
 1. Line Rupture
 2. Security/Bomb Threat
 3. Vandalism
 4. Serious injury
 5. Natural Disaster
 6. Block Valve Closing
 7. Vapor Cloud Ignition
 8. Evacuation
 9. Decommissioning
 10. Commissioning

- 11. Portable Flare Operation
- vi. Resources
 - 1. Internal
 - 2. External
 - 3. Governmental
 - 4. Community/Rural
- vii. Recovery, clean up and reporting
 - 1. Recovery activities
 - 2. Stakeholder relations
 - 3. Reporting
 - 4. Post incident investigation
- viii. Emergency Preparedness
 - 1. Team
 - 2. Risk assessment and hazards
 - 3. Training
 - 4. Exercises
- ix. Administration
 - 1. Policies and philosophy
 - 2. Plan update plan
 - 3. Distribution
- x. Technical Data
- xi. Product Data
- xii. Maps
- xiii. Pump Station Information

- (d) The US regulatory agency that governs the requirements of an emergency response manual is US Department of Transportation Pipeline and Hazardous Materials Safety Administration. The US and Canadian requirements are similar. The following table lists the US and Canadian requirements:

US Regulatory Requirement	NEB Guideline for an Emergency Procedures Manual
Identify event and notice to appropriate officials and operating personnel for corrective action.	Definition and levels of emergency, internal and external contact lists, site specific emergency procedures
Prompt and effective response	Roles and responsibilities
Personnel, equipment and material available at the scene	Description and location of response equipment
Taking action to minimize hazardous liquid that is released	Description of general and site specific emergency response procedures
Control of released hazardous liquid to minimize the hazards	Description of general and site specific emergency response procedures
Minimize public exposure to injury by assisting with evacuation and traffic management	Site specific emergency information
Notify fire, police and other public officials of pipeline emergency and coordinate a preplanned and actual response during an emergency	Internal and external reporting requirements, role of government departments
Use of instruments of assess the extent and coverage of the vapor cloud and determine hazardous area	Description and location of response equipment, site specific emergency procedures
Post accident review	Training requirements
Actions to be taken by controller	Description of general and site specific emergency response procedures
Training	Training requirements
Annually update manual	Manual Updating Procedure and Schedule

Safety Matters

5.13 Safety Program

Reference: Vantage Pipeline Project, Vol. 1, Section 7.1.2, page 35 (PDF page 43) [\[A1X5W0\]](#)

Preamble: The reference describes Vantage’s commitment to operate the pipeline and associated facilities in accordance with all governing regulatory requirements, permit conditions and other approvals, including the OPR-

99 and CSA Z662-07. Further, Vantage commits to address responsibilities for health, safety and environmental performance by utilizing a Health, Safety and Environmental Management System.

Although Vantage has made several key commitments to comply with applicable regulations, there is a lack of detail with respect to the depth of its programs, including the safety program. The Board defines a program as a documented set of procedures that accomplish a goal or goals as defined by a company's policy. At a minimum the program should set out how procedures are linked and how each one contributes toward these goals.

Request: Please provide the following:

- (a) an overview of the framework of Vantage's safety program, including but not limited to a discussion of which standards have been applied in developing this aspect of Vantage's management system; and,
- (b) an overview of Vantage's safety management approach which includes construction as well as operational safety as well as how the program would identify and address safety issues on the proposed Vantage Pipeline Project.

Response: (a) Vantage's safety program will follow the principles outlined in CSA Z-662, Annex A. The basic elements of Vantage's safety program is as follows:

- xiv. Policies
- xv. Responsibilities
- xvi. Hazard Identification and Control
 - 1. Inspections
 - 2. Risk Control and Permitting
 - 3. Preventative Maintenance
- xvii. Management of Change
 - 1. Procedure and project management
 - 2. Engineering design

3. Hazop
4. Material control/procurement
5. Construction management
- xviii. Training
- xix. Communication
- xx. Incident Reporting and Investigation
- xxi. Operating Procedures
- xxii. Emergency Preparedness
- xxiii. Personnel Protective Equipment
- xxiv. Contractor Safety
- xxv. Continuous Improvement and Audits
- xxvi. Document control

- (b) Vantage's management is committed to ensuring that safety is top priority. Each contractor and employee is expected to understand and adhere to the safety program.

Prior to and during construction, pipeline contractors will be required to have a safety program in place that will be pre-approved by Vantage. Vantage will have inspectors on site that will monitor the safe work of the pipeline contractor and ensure that the safety program is being followed. If any concerns arise, they will be immediately documented and addressed by Vantage and the pipeline contractor.

During operations, safety awareness will be constantly reinforced to every employee through regular discussions and monthly meetings. A safe work permit system will be used to identify hazards on the job site and to identify ways of eliminating or managing the hazards prior to any work starting. An open system of communication will be developed and maintained such that all employees know and understand they will be supported by management in relation to safe work concerns. All safety issues identified through this collaborative process will be recorded and addressed by both management and employees. In addition,

internal audits and inspections will be undertaken to identify and address safety issues.

Security Matters

5.14 Security Management

- Reference:**
- i) NEB Filing Manual, Facility Security, Section 1.9
 - ii) Board letter dated 24 May 2006 regarding Proposed Regulatory Change 2006-01 – Pipeline Security Management Programs [\[A1 Q8R0\]](#)
 - iii) Board letter dated 3 May 2010 regarding Proposed Regulatory Change (PRC) 2010-01 – Adoption of CSA Z246.1-09 Security Management for Petroleum and Natural Gas Industry Systems [\[A1 S7H7\]](#)

Preamble: The Canadian Public Safety Act (Bill C-7) came into force on 20 April 2005. This act amends the *National Energy Board Act* to explicitly include “security” within the Board's mandate and provides the Board with the basis for regulating security of energy infrastructure under its jurisdiction.

Reference (i) highlights the section of the Filing Manual where the Board notes its expectation that applicants consider security during project design and when preparing subsequent applications.

Reference (ii) cites the 24 May 2006 letter in which the Board informed industry of proposed amendments to both the *Onshore Pipeline Regulations, 1999* (OPR-99) and the *National Energy Board Processing Plant Regulations*. The proposed amendments require companies to have a Pipeline Security Management Program.

Reference (iii) cites the 3 May 2010 letter in which the Board informed industry of Proposed Regulatory Change (PRC) 2010-01, which notes the requirement that companies develop a Security Management Program in accordance with CSA Z246.1-09, Security Management for Petroleum and Natural Gas Industry Systems (the Standard or CSA Z246.1-09). The Board defines a program as a documented set of procedures that accomplish a goal or goals as defined by a company's policy. At a minimum the program should set out how procedures are linked and how each one contributes toward these goals.

Although Vantage has made several key commitments to comply with applicable regulations, there is a lack of detail with respect to the depth of its programs.

Request: Please provide the following:

- (a) confirmation that Vantage's security management program has been developed in accordance with the CSA Z246.1-09 Security Management for Petroleum and Natural Gas Industry Systems standard (the Standard or CSA Z246.1-09) outlined in the Board Proposed Regulatory Change (PRC) 2010-01 letter dated 3 May 2010 and effective 1 April 2011;
- (b) an overview of Vantage's security management approach which includes physical security, personnel security, and operational control security (SCADA) and how the program would address security issues on the proposed Vantage Pipeline Project; and,
- (c) an overview of how Vantage will manage security matters during times of increased construction activity. Please include in your response confirmation that Vantage has evaluated or will evaluate the vulnerabilities and security risks associated with construction, new facilities and operations and will implement measures to mitigate any additional risks.

- Response:**
- (a) Although Vantage's detailed security management program has not yet been developed, Vantage confirms that the program will be developed in accordance with CSA Z246.1-09. A copy of Vantage's security management program will be submitted to the Board 3 months prior to the start of construction.
 - (b) Vantage is committed to the security of its employees, its stakeholders and its facilities. Vantage's security management program will identify and assess risks and measures to avoid risks, as well as outline appropriate mitigation strategies and how employees or contractors will respond to situations in a safe and effective manner.

With regards to physical security of its facilities, Vantage will employ the following security measures:

- all sites will be fenced and locked for security and protection of wildlife and the public;
- fences around the sites will include a barb wire top section;

- all buildings located within the fenced compounds will be locked;
- buildings will be equipped with alarms notifying Vantage pipeline operators of an intrusion and personnel will be dispatched to the site;
- sites will be visited by pipeline operations and maintenance staff at least every 2 weeks.

With regards to operational safety, Vantage's operations control centre will be in constant, 24 hour communication with pipeline-related equipment via the SCADA system. All aboveground block valves and pumps will be operable from the operations control centre. All such equipment may also be operated manually at the site.

In addition, Vantage's emergency response manual will include a security threat procedure to be followed in the event of a security threat. All personnel will be trained in this procedure.

Vantage's operations personnel will be in constant contact with the control centre by cellular phone, and will receive training relating to personal security measures, as well as how to identify and deal with security risks.

Finally, Vantage will work with local and federal enforcement authorities and industry associations to identify and monitor trends, risks and issues related to security.

- (c) It is anticipated that the pipeline contractors will play an integral role in implementing security measures and procedures, including measures undertaken to ensure that the construction site remains secure and that only qualified personnel are able to access the construction site. The pipeline contractor will be required to submit a security management program for the construction of the pipeline. Vantage will review this plan with respect to vulnerabilities and security risks associated with construction and ensure appropriate mitigative measures are taken to reduce the security risks identified. The security management program will be monitored by Vantage's on-site construction monitors and will be adjusted if the security measures put in place need to be supplemented or amended.

The security management program to be developed by Vantage will identify risks associated with new facilities and operations and Vantage will implement measures to mitigate any additional risks identified as a result of the new facilities and operations as indicated in 5.14(b).

VANTAGE PIPELINE RISK ASSESSMENT

Summary

The National Energy Board of Canada specifies that companies shall develop a documented risk assessment for installations of high vapor pressure (HVP) pipelines under the Guidance Notes for Onshore Pipeline Regulations for pipeline systems located near major roadways. With the commencement of the Vantage Pipeline Project in Southern Saskatchewan and North Dakota which will supply ethane to the NOVA Chemicals Joffre facility, a risk analysis was completed using historical incident rates published by the Alberta Energy and Utilities Board (EUB) for HVP products. The geographic risk resulting from a leak or rupture was compared to risk criteria published in the MIACC Risk-based Land Use Planning Guidelines.

In summary, the measured geographic risk for this pipeline was found to range from between $9.88\text{e-}6$ and $1.63\text{e-}5$ fatalities per year which, within the MIACC guidance represents an appropriate risk level for the neighboring land uses. Given the highly conservative nature of the assumptions in the presented model (e.g., probability of ignition and probability of fatality were both set equal to 1.0), it is anticipated that the true risk falls well below the upper limit of $1.00\text{e-}5$ fatalities per year for “low density residential and commercial” allowable land uses.

This document contains the valuable proprietary and confidential information of NOVA Chemicals Corporation. It may not be used, disclosed or reproduced either in print or electronic format, without permission in writing from NOVA Chemicals Corporation. If you are not the originator of this document, this is a copy and in accordance with Records Management policy, should be destroyed upon completion of research. The original document will be kept on file for future use.

Introduction

Based on the Guidance Notes for Onshore Pipeline Regulations specified by the National Energy Board (NEB) of Canada, companies shall develop a documented risk assessment to determine the need for heavier wall design for high vapor pressure pipelines¹. Informative (i.e., non-mandatory) guidelines are provided by the Canadian Standards Association (CSA) to assist in preparing the risk assessments². The purpose of this risk assessment report is to address the requirements of the NEB guidance notes.

Discussion

The proposed Vantage pipeline is a HVP pipeline which will transport ethane from a source near Tioga, North Dakota, U.S. to a destination point near Empress, Alberta, Canada³. The overall length of the pipeline is approximately 430 miles with a diameter of 10 inches (originally specified, but subject to change to a 12-inch diameter). The proposed pipeline will be constructed of steel with a maximum operating pressure of 1,440 pounds per square inch. It will have the capacity to transport 43,000 barrels per day and will be expandable to 60,000 barrels per day by adding two additional pump stations. In order to assess the risk posed by a pipeline with these features, historical pipeline incidents were analyzed resulting from similar pipelines in Alberta which are monitored by the Alberta EUB. This approach is consistent with the recommended guidelines specified in the CSA standards under Section B.5.2.4 Frequency Analysis of Annex B which state that approaches available for frequency analysis include “historical operational and incident data”. An assumption being made is that pipeline failure rates for rural locations within southern Saskatchewan will be similar or lower than that observed within Alberta covering both rural and urban areas and a far broader range of landscape types.

Frequency Analysis

The Alberta EUB Report 2007-A (Pipeline Performance in Alberta, 1990 – 2005) was used as a historical basis in the frequency analysis to estimate the incident frequency for all diameters of HVP pipelines⁴. In a supplemental legend to the report⁵, incidents consist of leaks, ruptures, and hits according to the following definitions:

- Leak – An opening, hole, or crack in the pipeline causing some product to be released, but not immediately impairing the operation of the pipeline.
- Rupture – The instantaneous tearing or fracturing of pipe material, immediately impairing the operation of the pipeline.
- Hit – Striking a buried pipeline during ground disturbance activity resulting in the pipeline or pipeline coating being damaged. A release of product does not necessarily occur.

The report provides the total number of leaks, ruptures, and hits for pipelines with diameters from 2 inches up to 60 inches. The pipelines contain substances such as crude oil, fuel gas, natural gas, sour gas, fresh water, salt water, oil well effluent, LVP, HVP, miscellaneous gases, and miscellaneous liquids. The report shows the incident data but the substances are aggregated into groups (crude oil, natural gas, sour gas, water, multiphase, and other). The “other” category consists of HVP products (ethane, propane, butane, ethylene, and mixes of natural gas liquids), LVP products (fuel oil, motor oil, and condensate), and additional substances including hydrogen, carbon dioxide, nitrogen, ammonia, polymer, sulphur, etc. Thus, the report itself does not directly provide the number of incidents specific to HVP products for each line size, however this level of detail is available in the EUB database. Therefore, the EUB was contacted (Dave Grzyb, 403-297-8432, dave.grzyb@ercb.ca) to obtain more detailed incident records specific to HVP pipelines. Since ethane is a high vapor pressure product, incident frequency data for HVP products were relevant to model the risk for the proposed Vantage pipeline.

From 1990 to 2005, the ratio of leaks-to-ruptures for HVP substances on line diameters from 2 to 16 inches were 9-to-1, respectively, and there were no hits. More specifically, there were only 2 leaks on a 10-inch diameter and 1 leak on a 12-inch diameter pipeline with no ruptures on either. The incident data for HVP products does not suggest a correlation exists between line diameter and leak or rupture frequency. For example, over a 15-year period there were zero incidents on 9,420 km of 2-inch diameter HVP pipeline, two incidents on 2,534 km of 10-inch diameter HVP pipeline, and one incident on 3,010 km of 12-inch diameter HVP pipeline. Therefore, the total distance for HVP pipelines from 2 to 16 inches and the total number of leaks and ruptures were considered to obtain an “average” leak per kilometer per year and an “average” rupture per kilometer per year. To be conservative with this analysis, both this average incident frequency and the specific diameter incident frequency were assessed. However, since there were no ruptures on 10-inch and 12-inch pipelines, an approximation had to be applied in order to estimate a rupture frequency.

The approximation used an average rupture-to-leak ratio taken from “all substances” that could be applied to HVP products. This information was provided in Figure 6 of the report for all substances transported in the pipelines. Over the entire 16-yr period of data collection the average leak-to-rupture ratio was 15.1 which increased to 20.2 and 34.2 leaks per rupture over the past 10 and 5 years, respectively. This is likely due to the increased monitoring and recording of leaks on pipelines, not necessarily an increase in the actual number of leaks. To be conservative, the 15.1 (16-yr) and 20.2 (10-yr) leak-to-rupture ratios were considered instead of the ratio of 34.2 (5-yr) based on more recent historical records. Refer to Attachment I in the Appendix for the historical average leak-to-rupture ratio incident records. An even more conservative approach would be to directly apply the actual leak-to-rupture ratio of 9:1 for HVP products. Table 1 provides a summary of the results for the frequency analysis. Comparing the “actual” ruptures per year per 1000 km to the “estimated” ruptures per year per 1000 km in the table, it shows that the actual rupture rate (0.005) is more conservative than the estimated rates (0.0031 and 0.0023).

Line Diameter, inch	10	12	2 through 16
Total Distance, km	2,534	3,010	11,880
Total Leaks	2	1	9
Total Ruptures	0	0	1
Total Hits	0	0	0
Total Incidents	2	1	10
Total number of years	16	16	16
"Actual" Leaks/yr/1000 km	0.049	0.021	0.047
"Actual" Ruptures/yr/1000 km	0.000	0.000	0.005
"Estimated" Ruptures/yr/1000 km (16-yr)	0.0033	0.0014	0.0031
"Estimated" Ruptures/yr/1000 km (10-yr)	0.0024	0.0010	0.0023

Table 1. Estimation of Leak and Rupture Frequency

Consequence Analysis

Following a pipeline rupture event, the maximum hazard distance that would be impacted by the release and subsequent ignition was simply assessed based on the Emergency Planning Zones (EPZ) distances specified in Canadian Association of Petroleum Producers (CAPP) Companion Planning Guide to ERCB Directive 071 (July 2008)⁶. EPZ distances are very conservative guidelines based on a "guillotine" failure and worst-case meteorological conditions. Appendix 10 of the guide specifies EPZ distances for 10-inch and 12-inch pipelines as 900 meters and 1,100 meters for ethane, respectively. Since the EPZ represents the distance from the source to the endpoint, it must be multiplied by a factor of two to obtain a bi-directional impact distance.

The EPZ method approximates the impact distances from ruptures equal to the full diameter of the pipeline (i.e., guillotine failure), not leaks from cracks or holes in the pipeline. Therefore, leaks will have a smaller hazard distance than ruptures. In this analysis, in order to estimate the EPZ distance for leaks, the relationship between EPZ and pipeline diameter for ruptures was fit to a second-order polynomial regression in order to obtain a "leak diameter" and related EPZ. This regression methodology and selection of a diameter to represent leaks provided an "effective" EPZ for leaks. Extrapolation of the regression to zero diameter results in the minimum EPZ distance of 10 meters. As a more conservative approach, an EPZ of 50 meters was selected, corresponding to an approximate line diameter of 9/16 inch. Refer to Attachment II for the EPZ distance chart and the polynomial regression. Table 2 provides the EPZ distances multiplied by two to obtain the hazard distances. The hazard distance, probability of ignition, and probability of fatality could then be multiplied by the leak and rupture frequencies to estimate the risk of the release scenarios.

The probabilities for ignition and fatality were conservatively held constant at 1.0 which assumes that every leak or rupture results in an ignition and a fatality to any individual within the EPZ distance. The probability of ignition is complex and is typically modeled as a function of two components (probability that an ignition source is present and the probability that it ignites the cloud in a time interval, given the ignition source is present). Although not specifically analyzed in this model, the following off-site ignition probabilities determined by the Gas Research Institute (1980-1981) are provided to illustrate the range of possible values that may be considered in this type of analysis. Again, this model assumed 1.0 to be conservative.

- Automobile electrical systems: 0.06
- Continuously operating traffic signals: 0.24
- Flashing intermittent signal lights: 0.8
- Residential gas heating units using outside air: 1.0

Line Diameter, inch	10	12	2 through 16
LEAK (regression): 2X EPZ Distance (diameter), km	0.1	0.1	0.1
RUPTURE: 2X EPZ Distance (diameter), km	1.8	2.2	2.2
Probability of ignition	1.0	1.0	1.0
Probability of fatality	1.0	1.0	1.0

Table 2. Estimation of hazard distance for leaks, ruptures, and probabilities of ignition/fatality

Risk Analysis

Table 3 shows the output of the risk model when the inputs in Tables 1 and 2 are combined. The risk estimates are reported on a fatality equivalent per year basis (i.e., annual individual risk of fatality). In summary, the risk of a leak and rupture for all pipelines (2 through 16 inches) is 4.73e-6 and 1.16e-5 (most conservative value identified from described data) fatality equivalents per year, respectively. Adding the leak and rupture risk together for all pipelines results in a total risk of 1.63e-5 fatality equivalents per year, which is based on the more conservative (i.e., higher) estimates from the actual data on pipelines 2 through 16 inch in diameter.

It appears from the table that a 10-inch pipeline may have a higher risk than a 12-inch pipeline. However, recalling that the data does not suggest a correlation between diameter and incident rate, the higher result is more likely due to random variation than a causal factor. Thus, given the available data, an average risk based on total leaks and ruptures for all diameters (2 through 16 inches) is a more appropriate estimate of the actual risk. Using the more conservative actual leak-to-rupture ratio of 9:1 results in a rupture risk of 1.16e-5 and a combined (leak and rupture) risk of 1.63e-5 which is more conservative than either of the 10-inch or 12-inch line diameters independently.

Line Diameter, inch	10	12	2 through 16
Leak	4.93e-6	2.08e-6	4.73e-6
Rupture (estimated by 16-yr avg. L/R ratio)	5.89e-6	3.03e-6	6.91e-6
Rupture (estimated by 10-yr avg. L/R ratio)	4.39e-6	2.26e-6	5.15e-6
Rupture (based on actual data for 2 – 16 inch lines)	N/A	N/A	1.16e-5
L+R (estimated by 16-yr avg. L/R ratio)	1.08e-5	5.11e-6	1.16e-5
L+R (estimated by 10-yr avg. L/R ratio)	9.32e-6	4.33e-6	9.88e-6
L+R (based on actual data for 2 – 16 inch lines)	N/A	N/A	1.63e-5

Table 3. Risk estimates for leaks and ruptures (expressed as annual individual risk of fatality)

Table 4 summarizes criteria from the MIACC Risk-based Land Use Planning Guidelines which were used to determine the acceptable annual individual risk for various land use levels⁷ (e.g., manufacturing, commercial, low-density residential, high-density residential). Since the geographic risk of a pipeline leak and rupture was estimated to be less than 1.63e-5 fatalities per year, then the estimated risk falls somewhere between “low density residential and commercial” and “open space, warehouse, manufacturing plants”. The conservative nature of the assumptions make it likely that the true risk falls below the upper limit of the low-density residential and commercial land use (1.00e-5).

Allowable Land Uses	Minimum	Maximum
Facility, pipeline, corridor (no other land use)	1.00e-4	To risk at source
Open space, warehouses, manufacturing plants	1.00e-5	1.00e-4
Low density residential and commercial	1.00e-6	1.00e-5
High density residential	0	1.00e-6

Table 4. MIACC Risk-based Land Use Planning Guidelines (expressed as annual individual risk of fatality)

Conclusions

- The risk posed by the transport of ethane through the Vantage pipeline was estimated based on historical incident rates on Alberta pipelines over a 16-year period (1990 to 2005).
- Data from the EUB report and database for HVP products (ethane, propane, butane, ethylene, and mixes of natural gas liquids) specific to pipeline diameters from 2 to 16 inches were used to estimate the frequency of leaks and ruptures for ethane.

- The measured geographic risk from this pipelines was found to range from 9.88e-6 to 1.63e-5 fatalities per year which falls somewhere between “low density residential and commercial” and “open space, warehouse, manufacturing plants” in the MIACC guidelines.
- Given the conservative nature of the assumptions used in the model for HVP products, it is anticipated that the true risk posed by a new HVP pipeline is less than the estimated risk calculated by this model and likely falls well below the upper limit of 1.00e-5 fatalities per year for “low density residential and commercial” allowable land uses.

References

1. Canadian National Energy Board, Guidance Notes for the Onshore Pipeline Regulations, 1999, Amendment 1 – January 20, 2003: http://www.neb-one.gc.ca/clf-nsi/rpblctn/ctsndrgltn/rrggnmgpnb/nshrpln/gdncntsfrthnshrplnrgltn-eng.html#hvp_pipeline
2. Canadian Standards Association, CSA Z662-07, Annex B (informative), Guidelines for risk assessment of pipelines, June 2007
3. Vantage Pipeline Website: <http://www.vantagepipeline.com/>
4. Alberta Energy and Utilities Board, Pipeline Performance in Alberta, 1990 – 2005, April 2007: <http://www.ercb.ca/docs/documents/reports/r2007-a.pdf>



EUB

PipelineIncident_Lege

5. Visible Data Inc., Alberta Pipeline Incident Legend, 2010,
6. Canadian Association of Petroleum Producers, Companion Planning Guide to ERCB Directive 071, July 2008: <http://www.capp.ca/GetDoc.aspx?DocID=140751&DT=PDF>
7. Major Industrial Accidents Council of Canada, Risk-based Land Use Planning Guidelines, June 1995: <http://psm.chemeng.ca/pdf/MIACC%20Risk-based%20Land%20Use%20Planning%20Guidelines.pdf>

Appendix

Attachment I

All Substances	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002	2003	2004	2005	TOTAL
Hit	0	0	0	0	51	44	42	53	58	33	58	53	38	61	61	105	657
Leak	721	674	681	653	707	633	714	689	737	827	801	752	686	661	709	788	11433
Rupture	71	66	56	61	85	55	66	64	45	43	41	27	31	23	13	11	758
TOTAL	792	740	737	714	843	732	822	806	840	903	900	832	755	745	783	904	

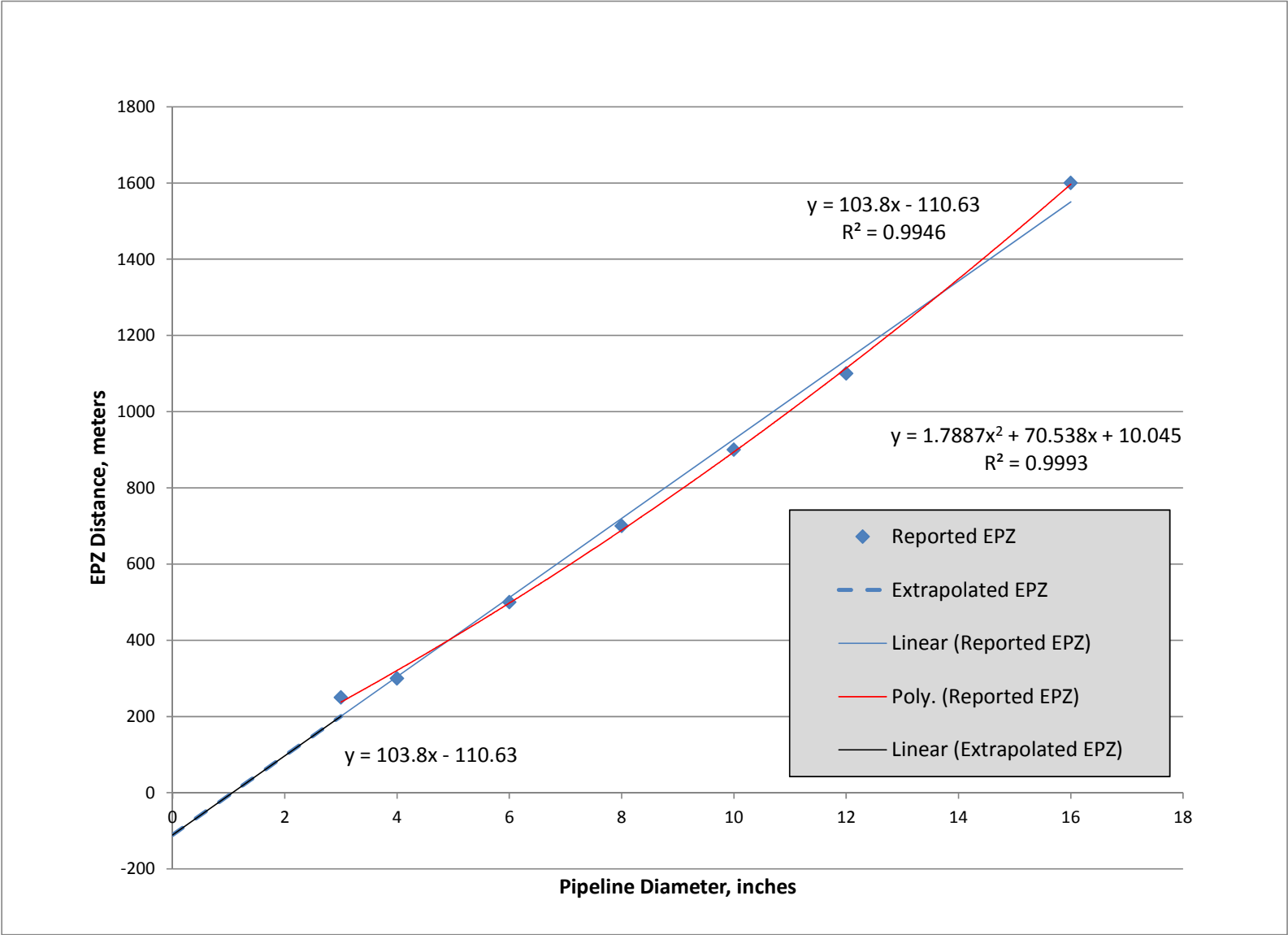
Leak/Rupture	10.2	10.2	12.2	10.7	8.32	11.5	10.8	10.8	16.4	19.2	19.5	27.9	22.1	28.7	54.5	71.6	15.08
--------------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	-------

16-yr avg.	15.1
10-yr avg.	20.2
5-yr avg.	34.2

B-A-60

Attachment II

B-A-61



Appendix B – Wetland Assessment

WETLAND ASSESSMENT REPORT

An initial wetland inventory was completed in July and August of 2010 by KC Harvey and SEH biologists. Wetlands in the vicinity of the pipeline were identified based on dominant vegetative cover and observable hydrology. Subsequent to the initial survey, surveys were completed in June 2011 to address approximately 32 miles of re-routes and in September – November, 2011 to address smaller sections of re-routes.

SCOPE OF WORK

A field survey to ground truth, classify, and map wetlands was conducted within a 500-foot corridor along the approximately 80-mile pipeline route. Preliminary meetings and correspondence with the U.S. Army Corps of Engineers (USACE) indicated that formal wetland delineations were not necessary for pipeline route planning. Rather, a conservative and approximate wetland boundary based on visible hydrology and vegetation would be appropriate for impact avoidance and minimization efforts. For this reason, full jurisdictional wetland delineations were not completed during the preliminary field surveys.

METHODOLOGY

Vantage completed a pre-field survey inventory of wetlands along the proposed pipeline route utilizing aerial photography, the U.S. Fish and Wildlife Service (USFWS) National Wetlands Inventory (NWI), and the Soil Surveys for Divide and Williams Counties. These data sources were used to create GIS field maps, which were the primary resources used to locate and confirm potential wetland habitat during the field surveys.

Wetland classification follows the methods described in *Wetlands and Deepwater Habitats of the United States* (Cowardin, *et al.* 1979) used by the USFWS NWI. The Circular 39 classification (Shaw and Fredine 1956) is also provided. Primary and secondary indicators of wetland hydrology are defined in the *Regional Supplement to the USACE Wetland Delineation Manual: Great Plains Region* (USACE 2010), a supplement to the 1987 Corps Wetland Delineation Manual.

Furthermore, wetlands are defined in federal Executive Order 11990 as follows:

“Those areas that are inundated or saturated by surface or ground water at a frequency and duration sufficient to support, and that under normal circumstances do support, a prevalence of vegetation typically adapted for life in saturated soil conditions. Wetlands generally include swamps, marshes, bogs, and similar areas.”

According to the USACE *Wetlands Delineation Manual* (USACE 1987) and the 2010 *Regional Supplement*, one positive indicator (except in certain situations) from each of three elements must be present in order to make a positive wetland determination. Wetland indicators are as follows:

- Greater than 50 percent dominance of hydrophytic plant species
- Presence of hydric soil
- The area is either permanently or periodically inundated, or soil is saturated to the surface during the growing season of the dominant vegetation

FIELD PROCEDURES

The pipeline route, 500-foot survey corridor, and the NWI were loaded into a Magellan Mobile Mapper global positioning system (GPS) to aid in field navigation and identification of potential wetland areas. Wetlands were identified primarily by vegetation and surficial hydrology indicators. As the wetland survey was not a formal jurisdictional wetland delineation, soil data was not collected during the field survey. Wetlands were classified and photographed, dominant vegetation was documented, and approximate wetland boundaries were mapped using GPS. Wetland plant species nomenclature and wetland indicator status following the *National List of Plant Species that Occur in Wetlands* (U.S. Department of the Interior 1988) for the Mountain-Prairie Region (Region 6). Identification was supplemented when necessary with field guides for the region.

Although the field surveys were completed in the fall, the active growing season for the area had not yet ended. The *Regional Supplement* describes several criteria for an active growing season which includes fresh growth on wetland herbaceous vegetative species and/or active flowering plants. Water smartweed (*Polygonum amphibium*), an obligate wetland plant, was flowering at the time of the delineation and other herbs and forbs were still detectable due to the wet and warm growing seasons in 2010 and 2011.

Each wetland was assigned a unique alphanumeric ID. The letter corresponds to the field team that identified the wetland and the number indicates each individual wetland identified by that survey team. Letters correspond to field surveys as outlined below:

- “A” wetlands were surveyed August 25–September 2, 2010.
- “B” wetlands were surveyed August 25–September 2, 2010 and September 7–10, 2010.
- “C” wetlands were surveyed October 26–30, 2010.
- “D” wetlands were surveyed on October 11–16, 2010.
- “E” and “F” wetlands were surveyed June 13–19, 2011.
- “G” wetlands were surveyed between September 18–22, 2011.
- “H” wetlands were surveyed November 8, 2011.

RESULTS

The wetland investigations resulted in the identification and mapping of 201 wetlands within the survey corridor. Table 3-1 summarizes the wetlands within the 500-foot corridor by wetland type. The attached table (see Attachment 3-1) provides a complete summary of the classification and dominant species of all surveyed wetlands in the project area. Brief descriptions of the vegetation and hydrology characteristics for each wetland type observed throughout the project corridor are provided below.

Table 3-1. Wetlands by Type within the Project Area (500-ft Corridor)¹

CLASSIFICATION		WETLANDS OBSERVED	
Circular 39 ²	Cowardin ³	Number	Area (acres)
1	PEMA	25	5.18
1/2	PAMA/B	1	0.50
2	PEMB	101	40.90
2/3	PEMB/C	40	28.10
2/5	PEMB/PUBx	1	0.12
3	PEMC	20	13.21
3/4	PEMC/F	8	8.38
4	PEMF	2	2.10
4/5	PEMF/ PUB	1	0.21
5	PUB	1	3.59
6	PSS1B	1	0.08
Totals		201	102.36

¹ Includes only wetland area within the 500-foot pipeline corridor. Actual wetland boundaries may extend past the project limits and may be larger than indicated.

² *Wetlands of the United States, Circular 39.* (Shaw and Fredine, United States Fish and Wildlife Service, 1956)

³ *Classification of Wetlands and Deepwater Habitats of the United States.* (Cowardin *et al.*, December 1979)

Type 1 (Palustrine Emergent A): Seasonally Flooded Basins

A total of 25 Type 1 wetlands, encompassing approximately 5.18 acres, were identified in the project area. Additional Type 1 wetlands were also identified as occurring with Type 2 wetlands. Seasonally flooded basins are shallow depressions that may have standing water for a small portion of the growing season, but are usually dry for a portion to a majority of the growing season. This type of wetland is very common throughout the prairie pothole region. Many of the seasonally flooded basins observed in the project area were cultivated with a variety of crops, although those basins that were fallow developed a dominance of wetland vegetation. Dominant vegetation in the seasonally flooded basins included water smartweed (*Polygonum amphibium*), reed canary grass (*Phalaris arundinacea*), foxtail barley (*Hordeum jubatum*), curly dock (*Rumex crispus*), field mint (*Mentha arvensis*), field sowthistle (*Sonchus arvensis*), and barnyard grass (*Echinochloa crus-gali*).

No primary indicators of wetland hydrology were observed in the seasonally flooded basins. However, several secondary indicators were observed including surface soil cracks, sparsely vegetated concave surface, saturation visible on aerial imagery, geomorphic position, and the FAC-neutral test. Figure 1 illustrates a typical PEMA wetland.



Figure 1. PEMA Seasonally Flooded Basins

Type 2 (Palustrine Emergent B): Fresh Wet Meadows

A total of 101 Type 2 wetlands, encompassing approximately 40.90 acres, were identified in the project area. Additional Type 2 wetlands were also identified as occurring with Type 1, Type 3, and Type 5 wetlands. Fresh wet meadows are depressions that may contain standing water for a short duration early in the growing season, but typically are saturated within 12 inches of the surface and lack surface water for most of the growing season. Fresh wet meadows are usually dominated by grasses, sedges, and forbs with little woody species present. Many of these wetlands observed in the project area were cultivated but crops showed evidence of stress due to the long duration of saturation. Dominant vegetation in the fresh wet meadows included water smartweed, reed canary grass, various species of sedges (*Carex spp.*) and rushes (*Juncus spp.*), and field sow thistle.

Primary indicators of wetland hydrology as defined by the Great Plains Regional Supplement to the USACE Wetland Delineation Manual were observed in few of the fresh wet meadows where the wetlands were saturated to the surface, but saturation would most likely have been observed if subsurface soils were investigated. Secondary indicators observed in the fresh wet meadows included sparsely vegetated concave surface, saturation visible on aerial imagery, geomorphic position, and the FAC-neutral test. Figure 2 illustrates a typical PEMB wetland.



Figure 2. PEMB Fresh Wet Meadows

Type 3 (Palustrine Emergent C): Shallow Marshes

A total of 20 Type 3 wetlands, encompassing approximately 13.21 acres, were identified in the project area. Additional Type 3 wetlands were also identified as occurring in complexes with Type 2 and Type 4 wetlands. Shallow marshes have soils that are saturated and are usually inundated with up to six inches of standing water throughout the growing season. Most of the shallow marshes observed within the project area were adjacent to areas of deeper water, although several of the shallow marshes were deep, inundated depressions. Dominant vegetation in the shallow marshes included broad-leaved cattail (*Typha latifolia*) and softstem bulrush (*Scirpus validus*) with water smartweed in areas with drawn-down hydrology.

Surface water was the primary indicator of hydrology that was observed in the shallow marsh wetlands. The shallow marshes in the project area varied in the amount of standing water. Several wetlands did not have visible standing water but were saturated to the surface, had a thin muck surface, and contained vegetation typical of a shallow marsh. These wetlands were likely drawn down as the growing season progressed and were still considered shallow marshes.

Type 4 (Palustrine Emergent F): Deep Marshes

A total of two Type 4 wetlands, encompassing approximately 2.10 acres, were identified in the project area. Additional Type 4 wetlands were also identified as occurring in complexes with Type 3 wetlands. Deep marshes are typically inundated with between six inches and three or more feet of standing water throughout the growing season. They are dominated by emergent vegetation but may also be composed of floating-leaved and submergent vegetation. Both of the deep marshes observed in the project area were open water with a Type 2 or Type 3 fringes. Broad-leaved cattail and lake sedge (*Carex lacustris*) were dominant in the deep marsh habitats.

Surface water was the primary indicator of hydrology that was observed in the deep marsh wetlands. Deep marshes rarely draw down to expose the aquatic bed and standing water should be expected throughout the growing season.

Type 5 (Palustrine Unconsolidated Bottom): Shallow Open Water

One Type 5 wetland encompassing approximately 3.59 acres was identified within the project area. Additional Type 5 wetlands identified in the project area were complexes with Type 4 wetlands or had Type 2 fringes. Shallow open water communities have water depths of less than 6.6 ft. Water bodies with a depth greater than 6 ft. are deep water habitat and are not considered wetlands. Shallow open water communities differ from deep marshes in that floating-leaved and submergent vegetation is dominant rather than emergent vegetation, as in a deep marsh. Typical dominant species in shallow open water habitats include duckweed (*Lemna spp.*), pondweed (*Potamogeton spp.*), and various species of water lilies (*Nymphaea sp.* and *Nuphar sp.*). Both of the shallow open water communities observed within the project area showed historical evidence of excavation.

Surface water was the primary indicator of hydrology that was observed in the shallow open water wetlands. Shallow open water communities persist throughout growing season.

Type 6 (Palustrine Scrub-Shrub Broad-leaved Deciduous [PSS1B]): Shrub-carrs

One Type 6 shrub-carr community was identified within the study corridor, encompassing approximately 0.08 acres. Shrub-carrs are plant communities composed of tall, deciduous shrubs growing on saturated to seasonally flooded soils. They are typically dominated by willows (*Salix spp.*) or dogwood (*Cornus spp.*) shrub canopy with a ground layer of ferns, sedges, grasses and forbs of sedge meadow and fresh (wet) meadow communities. The diversity of species composing the ground layer is dependent on degree of shrub canopy cover, degree of disturbance, and water source. The observed Shrub-carr wetland was dominated by a mixed species willow shrub canopy.

Primary indicators of wetland hydrology as defined by the *Regional Supplement* were not directly observed in the Type 6 shrub swamp basin, but saturation would most likely have been observed if subsurface soils were investigated. Secondary indicators observed in the shrub swamp included a sparsely vegetated concave surface, saturation visible on aerial imagery, geomorphic position, and vegetation type.

Wetland Complexes

Wetland complexes are wetlands that are comprised of more than one wetland community type. Wetlands plant communities are dependent upon hydrology present. Depressional wetlands often have more than one wetland community type due to variation in topography, water depth, and

hydrology patterns. Deeper water wetland types are often located in the central portions of the basins with shallower wetland types on the fringes or edges of these complexes. Wetland complexes were frequently observed throughout the project area with shallow marsh/fresh wet meadow complexes being the most frequently encountered along with several deep marsh/shallow marsh and shallow open water/fresh wet meadow complexes observed as well. These complexes are comprised of vegetation characteristic of each wetland type present and are often indicative of a transition between two wetland types. Figure 3 illustrates a typical PEMB/C wetland complex:



Figure 3. PEMB/C Wetland Complex

USFWS Wetland Easements

The USFWS Wetland Easement program pays landowners to enter wetlands in this permanent protection program. Wetlands protected under a wetland easement are regulated by the USFWS and cannot be drained, filled, graded, or burned. The Vantage Pipeline does cross parcels enrolled in the wetlands protection program, and has avoided any wetlands protected by a wetland easement where possible. (USFWS 2011)

Vantage has been working closely with the USFWS to identify wetlands under easement. In areas where wetland easements have been identified, the temporary construction right-of-way will be narrowed and oak matting may be used to avoid impact to any wetlands protected by a wetland easement.

Wetland Reserve Program

The Wetlands Reserve Program (WRP) provides landowner assistance in protecting, restoring, and enhancing wetlands in an effort to preserve wildlife habitat. There are no WRP tracts within the Vantage Pipeline corridor (NRCS 2010).

REFERENCES

- Cowardin, L. M., V. Carter, F. C. Golet, and E. T. LaRoe. 1979. *Classification of Wetlands and Deepwater Habitats of the United States*. U.S. Fish and Wildlife Service. 131 pp.
- Shaw, S. P. and C. G. Fredine. 1956. Wetlands of the United States. U.S. Fish and Wildlife Service, Circular 39. 67 pp.
- Dewald, David. "Information Request for Reserve Programs in Divide and Williams Counties, North Dakota" Email correspondence. 9/1/2010 <dave.dewald@nd.usda.gov>
- U.S. Army Corps of Engineers. 1987. *Corps of Engineers Wetlands Delineation Manual. Technical Report Y-87-1*. Waterways Experiment Station, Vicksburg, Mississippi.
- U.S. Army Corps of Engineers. 2010. *Regional Supplement to the Corps of Engineers Wetland Delineation Manual: Great Plains Region (Version 2.0)*. 128 pp. plus appendices.
- U.S. Department of the Interior. 1988. National List of Plant Species that Occur in Wetlands: Mountain Prairie (Region 6). Biological Report 88 (26.3), Fish and Wildlife Service. In cooperation with the National and Regional Interagency Review Panels. Washington, D.C
- U.S. Fish and Wildlife Service, Lostwood Wetland Management District Complex. Ongoing correspondence. 6/7/2010-Present.

ATTACHMENT 1: SUMMARY OF SURVEYED WETLANDS

Basin ID	Circular 39 ² Classification	Cowardin ¹ Classification	Hydrologic ³ Connectivity	Comments
A1	2	PEMB	Isolated	Mix of <i>Phalaris arundinacea</i> , <i>Rumex crispus</i> , <i>Polygonum amphibium</i> , <i>Carex sp.</i>
A22	2	PEMB	Isolated	<i>P. amphibium</i> , <i>P. arundinacea</i>
A24	3	PEMC	Isolated	Water present with <i>T. latifolia</i> edges
A29	3	PEMC	Isolated	<i>P. amphibium</i> , <i>Echinochloa crus-gali</i>
A33	3	PEMC	Isolated	Deep water in middle with mix of <i>T. latifolia</i> , <i>P. amphibium</i> , <i>P. arundinacea</i>
A35	3	PEMC	Isolated	All <i>T. latifolia</i>
A36	3	PEMC	Isolated	Surrounded by wheat fields; middle is all water with <i>T. latifolia</i> , <i>Scirpus sp.</i> , <i>P. arundinacea</i>
A37	3	PEMC	Isolated	Bottom of wheat field; mostly <i>T. latifolia</i> with <i>P. arundinacea</i> edges
A38	3	PEMC	Isolated	Mostly <i>P. amphibium</i> with some <i>R. crispus</i> , <i>Scirpus sp.</i> surrounded by wheat field
A4	2	PEMB	Isolated	<i>P. amphibium</i> , <i>P. arundinacea</i> , <i>R. crispus</i> , <i>Carex sp.</i>
A4	2	PEMB	Isolated	<i>P. amphibium</i> , <i>P. arundinacea</i> , <i>R. crispus</i> , <i>Carex sp.</i>
A44	2	PEMB	Isolated	<i>P. amphibium</i> , <i>Carex sp.</i>
A50	2	PEMB	Isolated	<i>P. amphibium</i> and <i>P. arundinacea</i>
A51	2/3	PEMB/C	Isolated	Middle is <i>P. arundinacea</i> and <i>Carex sp.</i> with evidence of high water
A57	2	PEMB	Isolated	<i>Carex sp.</i> , <i>P. arundinacea</i>
A58	2	PEMB	Isolated	<i>Carex sp.</i> , <i>P. arundinacea</i> , recently grazed
A60	2	PEMB	Isolated	<i>Carex sp.</i>
A69	2	PEMB	Isolated	<i>P. amphibium</i> ; more of a depression than A68
A70	1	PEMA	Isolated	<i>R. crispus</i>
A71	1	PEMA	Isolated	<i>Mentha sp.</i> , <i>R. crispus</i>

B-B-10

Basin ID	Circular 39 ² Classification	Cowardin ¹ Classification	Hydrologic ³ Connectivity	Comments
A73	2/3	PEMB/C	Potentially Isolated Complex	Appears to have seasonal flow through it. Pockets of <i>T. latifolia</i> with a strip of <i>P. arundinacea</i> following drainage. Surrounded by wheat field.
A74	2/3	PEMB/C	Isolated	<i>P. amphibium</i> , <i>P. arundinacea</i>
A75	2/3	PEMB/C	Potentially Isolated Complex	Pockets of <i>T. latifolia</i> , standing water and <i>A. alba</i>
A76	2	PEMB	Potentially Isolated Complex	Strip of <i>P. arundinacea</i> connecting A 75 to A 77 which appears to have seasonal flow
B10	2	PEMB	Isolated	<i>E. crus-gali</i> and <i>P. amphibium</i> , larger than NWI
B100	3	PEMC	Isolated	<i>T. latifolia</i> , <i>P. amphibium</i> , <i>Scirpus</i> sp.
B101	2	PEMB	Isolated	<i>P. amphibium</i> , <i>S. arvensis</i>
B102	3/4	PEMC/F	Potentially Isolated Complex	<i>T. latifolia</i> and standing water
B103	2	PEMB	Potentially Isolated Complex	Appears to be seasonal drainage that connects B102 to B104 and further south through culvert underneath road; <i>P. arundinacea</i>
B104	3/4	PEMC/F	Potentially Isolated Complex	<i>T. latifolia</i> and standing water
B105	2	PEMB	Potentially Isolated Complex	Mostly <i>P. amphibium</i> with <i>T. latifolia</i>
B106	2/3	PEMB/C	Isolated	<i>T. latifolia</i> , <i>Hordeum jubatum</i>
B107	2	PEMB	Isolated	<i>P. amphibium</i> , <i>P. arundinacea</i>
B108	1	PEMA	Isolated	<i>P. amphibium</i> , <i>R. crispus</i>
B109	2	PEMB	Isolated	<i>P. amphibium</i> , <i>Poa</i> sp.
B110	2	PEMB	Isolated	<i>P. amphibium</i> , <i>Poa</i> sp.
B111	2	PEMB	Isolated	<i>P. amphibium</i>
B112	2	PEMB	Isolated	<i>P. amphibium</i>
B113	2	PEMB	Isolated	<i>P. amphibium</i>
B114	2	PEMB	Isolated	<i>P. amphibium</i>
B124	2	PEMB	Isolated	<i>P. amphibium</i> , <i>S. arvensis</i> within a garbage pile
B125	1	PEMA	Isolated	Small depression with <i>P. amphibium</i>
B126	2	PEMB	Isolated	<i>Carex</i> sp. and <i>R. crispus</i>
B127	2	PEMB	Isolated	<i>P. amphibium</i> , <i>Carex</i> sp. <i>R. crispus</i>
B128	2	PEMB	Isolated	Mostly <i>P. amphibium</i>
B129	2	PEMB	Isolated	Mostly <i>P. amphibium</i>
B13	1	PEMA	Isolated	<i>Ambrosia artemisiifolia</i> , <i>E. crus-gali</i> , dried mud

B-B-11

Basin ID	Circular 39 ² Classification	Cowardin ¹ Classification	Hydrologic ³ Connectivity	Comments
B130	2	PEMB	Isolated	Mostly <i>P. amphibium</i> with some <i>P. arundinacea</i>
B131	2	PEMB	Isolated	<i>S. arvensis</i> , <i>P. amphibium</i> , grasses
B134	2	PEMB	Isolated	Along 105th Avenue: <i>P. amphibium</i>
B134	2	PEMB	Isolated	0
B135	1	PEMA	Isolated	<i>P. arundinacea</i> , portions hayed; very marginal
B14	2/3	PEMB/C	Isolated	<i>Carex sp.</i> , <i>T. latifolia</i> , <i>P. amphibium</i> .
B16	1	PEMA	Isolated	<i>Carex sp.</i> , <i>Poa sp.</i> , grazed
B18	2	PEMB	Isolated	<i>P. amphibium</i> and <i>Carex sp.</i> dominant
B24	2	PEMB	Isolated	<i>P. amphibium</i> and <i>Carex sp.</i> in ag field
B25	2/3	PEMB/C	Isolated	<i>Carex sp.</i> , <i>T. latifolia</i>
B26	2	PEMB	Isolated	<i>P. amphibium</i> and <i>R. crispus</i> in lentil field
B27	2	PEMB	Isolated	<i>P. arundinacea</i> and <i>P. amphibium</i> in wheat field
B3	3/4	PEMC/F	Isolated	<i>Scirpus sp.</i> in center, <i>T. latifolia</i> near edge
B30	2/3	PEMB/C	Isolated	<i>P. arundinacea</i> , <i>P. amphibium</i> , some <i>T. latifolia</i>
B31	2	PEMB	Isolated	<i>P. amphibium</i> , <i>R. crispus</i> , <i>P. arundinacea</i>
B32	2	PEMB	Isolated	<i>P. amphibium</i> and <i>Carex sp.</i>
B34	2	PEMB	Isolated	<i>P. amphibium</i> and <i>Carex sp.</i> adjacent to rock pile
B35	2	PEMB	Isolated	<i>P. arundinacea</i> , <i>P. amphibium</i> at road toe of slope
B36	2	PEMB	Isolated	<i>P. arundinacea</i> , <i>P. amphibium</i> at road toe of slope
B37	2/3	PEMB/C	Isolated	<i>P. arundinacea</i> , <i>T. latifolia</i> in center; <i>Cirsium arvense</i> , <i>Sonchus arvensis</i> invading
B4	2/5	PEMB/PUBx	Isolated	No vegetation, excavated cattle pond. Small T2 wetland adjacent, dominated by grasses.
B40	3/4	PEMC/F	Potentially Isolated Complex	Open water <i>T. latifolia</i> , <i>Scirpus sp.</i> in center, <i>P. arundinacea</i> , <i>P. amphibium</i> in fringe
B42	1	PEMA	Isolated	<i>P. arundinacea</i> monoculture
B43	2	PEMB	Isolated	<i>P. arundinacea</i> , <i>Agrostis alba</i> , some <i>R. crispus</i> in wheat field
B48	2/3	PEMB/C	Isolated Complex	<i>Carex sp.</i> , <i>Scirpus sp.</i> NE corner of 151st and 107th intersection, culvert connection to B51
B49	2	PEMB	Potentially Isolated Complex	Excavated wet ditch connecting to a waterfowl area
B5	2	PEMB	Isolated	<i>P. arundinacea</i> , smaller than NWI shows

B-B-12

Basin ID	Circular 39 ² Classification	Cowardin ¹ Classification	Hydrologic ³ Connectivity	Comments
B51	3	PEMC	Isolated Complex	<i>T. latifolia</i> , <i>Scirpus sp.</i> SE corner of 151st and 107th intersection, culvert connection to B48
B52	1	PEMA	Isolated	<i>P. arundinacea</i> , some <i>R. crispus</i>
B54	2/3	PEMB/C	Isolated	<i>T. latifolia</i> in center with <i>P. arundinacea</i> , <i>P. amphibium</i> , <i>Carex sp.</i> in fringe
B60	2/3	PEMB/C	Isolated	<i>T. latifolia</i> , <i>P. amphibium</i> dominate
B75	1	PEMA	Isolated Complex	<i>P. arundinacea</i> and <i>H. jubatum</i> , 20–30' wide seasonal drainage swale in agriculture fields
B76	1	PEMA	Isolated Complex	<i>P. arundinacea</i> and <i>H. jubatum</i> , 20–30' wide seasonal drainage swale in agriculture fields
B77	1	PEMA	Isolated	<i>P. amphibium</i> monoculture surrounded by wheat field
B77	1	PEMA	Isolated	<i>P. amphibium</i> monoculture surrounded by wheat field
B78	1	PEMA	Isolated	<i>P. amphibium</i> with some <i>C. arvense</i> creeping in
B79	1	PEMA	Isolated	<i>P. amphibium</i> with some <i>C. arvense</i> , <i>S. arvensis</i>
B80	1	PEMA	Isolated	<i>Carex sp.</i> , <i>P. amphibium</i> with some <i>C. arvense</i>
B81	2	PEMB	Isolated	<i>Carex sp.</i> , <i>P. arundinacea</i> , some <i>P. amphibium</i>
B83	3	PEMC	Isolated Complex	<i>T. latifolia</i> , <i>P. amphibium</i> , part of swale to pond
B84	3	PEMC	Isolated Complex	<i>T. latifolia</i> drainage into pond, some <i>P. amphibium</i>
B85	4	PEMF	Isolated Complex	Mostly open water with fringe of <i>Carex sp.</i> , <i>P. amphibium</i>
B86	2/3	PEMB/C	Isolated	<i>T. latifolia</i> , <i>Carex sp.</i> , <i>P. arundinacea</i> , adjacent to road but no visible culverts
B87	2	PEMB	Isolated	<i>Carex sp.</i> depression surrounded by N/NN grassland
B88	2/3	PEMB/C	Isolated	<i>T. latifolia</i> , <i>Carex sp.</i> , <i>P. amphibium</i> , <i>Scirpus sp.</i> in wheat field
B90	2	PEMB	Isolated	<i>Carex sp.</i> and <i>Scirpus sp.</i> Isolated portion of seasonal drainage pattern
B91	2	PEMB	Isolated	<i>P. arundinacea</i> , <i>P. amphibium</i> with some <i>Carex sp.</i> in sunflower field
B92	2	PEMB	Isolated	<i>Carex sp.</i> and <i>P. amphibium</i>
C16	2	PEMB	Isolated	0
C21	2	PEMB	Isolated	0
E13	5	PUB	Isolated	Mapped edge of water during flooding. Mostly open water with <i>Schoenoplectus sp.</i> and <i>T. latifolia</i> on western edge.

B-B-13

Basin ID	Circular 39 ² Classification	Cowardin ¹ Classification	Hydrologic ³ Connectivity	Comments
E15	4	PEMF	Isolated	Mapped edge of water during flooding. Large open water wetland with <i>T. latifolia</i> and <i>Scirpus</i> sp.
E16	2	PEMB	Isolated	Mapped largest extent of wetland hydrology during flooding. <i>P. amphibium</i> and <i>P. arundinacea</i> .
E17	2	PEMB	Isolated	Mapped largest extent of wetland hydrology during flooding. Both sides of road; <i>P. amphibium</i> and <i>P. arundinacea</i> .
E18	2/3	PEMB/C	Isolated	Mapped edge of water during flooding. 80% open water with <i>T. latifolia</i> , <i>P. amphibium</i> , <i>P. arundinacea</i> and <i>Echinochloa crus-gali</i> along fringe.
E19	2	PEMB	Isolated	Mapped edge of water during flooding; <i>Poa pratensis</i> , <i>Phleum pratense</i> and <i>R. crispus</i> .
E20	2	PEMB	Isolated	Mapped edge of water during flooding; 90% open water with <i>P. pratense</i> and <i>R. crispus</i>
E21	2	PEMB	Isolated	Mapped edge of water during flooding; shallow water with <i>P. pratense</i> , <i>Senecio Integerrimus</i> , and <i>Eleocharis</i> sp.
E22	2	PEMB	Isolated	Mapped edge of water during flooding. <i>P. amphibium</i> , <i>R. crispus</i> , <i>P. arundinacea</i> and <i>Scirpus</i> sp.
E23	2	PEMB	Isolated	Mapped edge of water during flooding; very small depression with <i>R. crispus</i> and grasses
E24	2	PEMB	Isolated	Mapped edge of water during flooding; very small depression with <i>R. crispus</i> and grasses
E25	2/3	PEMB/C	Potentially Isolated	Mapped edge of water during flooding; slightly flowing water into wetland with <i>Eleocharis</i> sp., <i>T. latifolia</i> , <i>R. crispus</i> , <i>Bromus inermis</i> , <i>P. arundinacea</i> , and <i>Carex</i> sp.
E26	2/3	PEMB/C	Isolated	Same basin as A29, but mapped edge of water during flooding; mostly open water with <i>P. amphibium</i> and scattered grasses
E26	2/3	PEMB/C	Isolated	Same basin as A29, but mapped edge of water during flooding; mostly open water with <i>P. amphibium</i> and scattered grasses
E27	2	PEMB	Isolated	Same basin as C25, but mapped edge of water during flooding; <i>Eleocharis</i> sp., <i>P. amphibium</i> and <i>Sonchus arvensis</i>
E28	2/3	PEMB/C	Isolated	Same basin as C24, but mapped edge of water during flooding; shallow water with <i>T. latifolia</i> edges
E29	3	PEMC	Isolated	Same basin as C23, but mapped edge of water during flooding; 95% open water with <i>P. arundinacea</i> and <i>P. amphibium</i>

B-B-14

Basin ID	Circular 39 ² Classification	Cowardin ¹ Classification	Hydrologic ³ Connectivity	Comments
E30	1/2	PEMA/B	Isolated	Same basin as C22, but mapped edge of water during flooding; grasses, <i>R. crispus</i> and rose family species
E31	3	PEMC	Potentially Isolated	Same basin as C17, but mapped edge of water during flooding; part of larger T4/5 basin. <i>Poa pratensis</i> , <i>Phleum pratense</i> and <i>R. crispus</i> .
E32	3	PEMC	Isolated	Same basin as C18, but mapped edge of water during flooding; deep water with <i>P. amphibium</i> and <i>R. crispus</i> .
E34	2/3	PEMB/C	Isolated	Mapped edge of water during flooding; part of larger T4/5 wetland; <i>Eleocharis sp.</i> , <i>Carex sp.</i> , and <i>P. arundinacea</i> edges.
E35	3/4	PEMC/F	Isolated	Same basin as C19, but mapped edge of water during flooding; <i>T. latifolia</i> with some <i>P. amphibium</i> with lots of nesting songbirds in area.
E36	2	PEMB	Isolated	Same basin as A4, but mapped edge of water during flooding. <i>P. amphibium</i> with small patches of <i>P. arundinacea</i> and <i>R. crispus</i> .
E36	2	PEMB	Isolated	Same basin as A4, but mapped edge of water during flooding; <i>P. amphibium</i> with small patches of <i>P. arundinacea</i> and <i>R. crispus</i> .
E38	2/3	PEMB/C	Isolated	Mapped edge of water during flooding; 40% open water with <i>P. amphibium</i> and <i>Bromus inermis</i> .
E39	2	PEMB	Isolated	Mapped edge of water during flooding; open water in middle with <i>P. arundinacea</i> , <i>P. amphibium</i> , <i>Poa pratensis</i> , <i>bromus inermis</i> , <i>Taraxacum officinale</i> , and <i>Glycyrrhiza lepidota</i> .
E40	3	PEMC	Isolated	Mapped edge of water during flooding; <i>P. amphibium</i> , <i>Carex sp.</i> , <i>Poa pratensis</i> , and <i>R. crispus</i> .
E41	2/3	PEMB/C	Potentially Isolated	Mapped edge of water during flooding; long, linear wetland along U.S. 50 with <i>T. latifolia</i> , <i>Bromus inermis</i> , and <i>P. pratense</i> .
E42	2/3	PEMB/C	Potentially Isolated	Mapped edge of water during flooding. Linear ditch on south side of U.S. 50 with <i>T. latifolia</i> , <i>Bromus inermis</i> , and <i>P. pratense</i> .
E8	6	PSS1B	Isolated	Mapped edge of water during flooding; willow shrubs dominant.
F1	2	PEMB	Isolated	Mapped edge of water during flooding; <i>P. arundinacea</i>
F1	2	PEMB	Isolated	Mapped edge of water during flooding; <i>P. arundinacea</i>
F10	2	PEMB	Isolated	Mapped edge of water during flooding. <i>Eleocharis sp.</i> , <i>Carex</i>

B-B-15

Basin ID	Circular 39 ² Classification	Cowardin ¹ Classification	Hydrologic ³ Connectivity	Comments
				<i>sp.</i> , <i>R. crispus</i> , and <i>P. amphibium</i> .
F12	2	PEMB	Isolated	Mapped edge of water during flooding; <i>R. crispus</i> , <i>Carex sp.</i> , <i>Juncus sp.</i>
F13	2	PEMB	Isolated	Same as C1, but mapped edge of water during flooding; <i>Juncus sp.</i> , <i>Scirpus sp.</i> , <i>P. arundinacea</i> . Mostly open water during flooding.
F14	2/3	PEMB/C	Isolated	Mapped edge of water during flooding; <i>P. arundinacea</i> , <i>P. amphibium</i> , and <i>R. crispus</i> .
F15	2	PEMB	Isolated	Same as C8, but mapped edge of water during flooding; <i>R. crispus</i> , <i>P. amphibium</i> , <i>P. arundinacea</i> .
F16	2	PEMB	Isolated	Same as C9, but mapped edge of water during flooding; <i>P. arundinacea</i> and <i>P. amphibium</i> .
F17	2/3	PEMB/C	Connected to Tioga Dam	Same as C6 and C7, but mapped edge of water during flooding; <i>T. latifolia</i> and flowing water through channel.
F18	2/3	PEMB/C	Isolated	Same as E37, mapped edge of water during flooding; <i>P. amphibium</i> and <i>T. latifolia</i> mix with small amounts of <i>Carex nebraskensis</i> and <i>Mentha sp.</i>
F19	2	PEMB	Isolated	Mapped edge of water during flooding; open water with <i>P. amphibium</i> and <i>P. arundinacea</i> .
F2	2	PEMB	Isolated	Same as B42, but mapped edge of water during flooding; <i>P. arundinacea</i>
F24	2	PEMB	Potentially Isolated	Mapped edge of water during flooding; wet ditch with <i>P. arundinacea</i> and <i>R. crispus</i> .
F25	1	PEMA	Isolated	Mapped edge of water during flooding; no vegetation; farmed during normal conditions
F26	2	PEMB	Isolated	Same as basin D1, but mapped edge of water during flooding; open water with <i>R. crispus</i> , <i>P. arundinacea</i> , and <i>P. amphibium</i>
F28	2/3	PEMB/C	Isolated	Mapped edge of water during flooding; <i>Carex sp.</i> , <i>T. latifolia</i> , and <i>Scirpus sp</i> with <i>P. arundinacea</i> , <i>P. amphibium</i> , and <i>R. crispus</i> on fringe
F3	2/3	PEMB/C	Isolated	Mapped edge of water during flooding; <i>Carex sp.</i> and <i>Scirpus sp.</i>
F32	2/3	PEMB/C	Isolated	Mapped edge of water during flooding; open water with <i>T. latifolia</i> , <i>Scirpus sp.</i>
F33	2	PEMB	Isolated	Mapped edge of water during flooding; <i>Carex sp.</i> , <i>R. crispus</i> ,

B-B-16

Basin ID	Circular 39 ² Classification	Cowardin ¹ Classification	Hydrologic ³ Connectivity	Comments
				<i>Scirpus sp</i> with open water.
F34	2	PEMB	Isolated	Mapped edge of water during flooding; open water with <i>P. arundinacea</i> and <i>R. crispus</i> .
F35	1	PEMA	Isolated	Mapped edge of water during flooding; probably not a wetland but has ~2' of open water and is dominated by upland grasses
F36	2	PEMB	Isolated	Mapped edge of water during flooding; open water with <i>Carex sp.</i> , <i>P. amphibium</i> , and <i>P. arundinacea</i>
F37	2/3	PEMB/C	Isolated	Mapped edge of water during flooding; <i>P. arundinacea</i> , <i>P. amphibium</i> , and <i>T. latifolia</i> with open water
F38	1	PEMA	Isolated	Mapped edge of water during flooding; <i>P. arundinacea</i> with very shallow open water
F39	2	PEMB	Isolated	Mapped edge of water during flooding; <i>P. arundinacea</i> , <i>P. amphibium</i> with shallow open water; very small depression
F4	2/3	PEMB/C	Isolated	Mapped edge of water during flooding; open water with <i>P. amphibium</i>
F46	2	PEMB	Isolated	Mapped edge of water during flooding; <i>P. amphibium</i> and <i>P. arundinacea</i> ; <i>Bromus inermis</i> at edge of water
F51	2/3	PEMB/C	Connected to Tioga Dam	Mapped edge of water during flooding; drainage with mixed wetland/upland during normal conditions; <i>Juncus sp.</i> , <i>Carex sp.</i> , and various grasses; channelized
F8	2	PEMB	Isolated	Same as C27, but mapped edge of water during flooding <i>Carex sp.</i> , <i>Juncus sp.</i> , <i>R. crispus</i> , <i>P. amphibium</i>
F9	2	PEMB	Isolated	Same as C26, but mapped edge of water during flooding; <i>Carex sp.</i> , <i>Scirpus sp.</i> , <i>P. amphibium</i> , <i>R. crispus</i>
G1	1	PEMA	Isolated	<i>P. arundinacea</i> , <i>R. crispus</i> , <i>S. pectinata</i> , <i>Carex sp.</i>
G10	2/3	PEMB/C	Isolated	<i>T. latifolia</i> and open water from flooding
G11	2	PEMB	Isolated	<i>P. amphibium</i> and <i>P. arundinacea</i>
G12	2/3	PEMB/C	Isolated	<i>C. stricta</i> , <i>Scirpus sp.</i> , and <i>P. amphibium</i> ; approximately 1' standing water
G14	2	PEMB	Isolated	<i>Bidens sp.</i> , <i>P. arundinacea</i> , and <i>Carex sp.</i> on fringe
G15	1	PEMA	Isolated	<i>R. crispus</i> , <i>P. amphibium</i> , thistle in fringe
G16	2	PEMB	Isolated	<i>R. crispus</i> , <i>P. amphibium</i> , with <i>T. latifolia</i> and 6" of standing water in center.
G17	3/4	PEMC/F	Isolated	<i>T. latifolia</i> with 2–3' of standing water in center; <i>P.</i>

B-B-17

Basin ID	Circular 39 ² Classification	Cowardin ¹ Classification	Hydrologic ³ Connectivity	Comments
				<i>arundinacea</i> , <i>C.stricta</i> , and <i>P. amphibium</i> on fringe
G18	2	PEMB	Isolated	<i>Polygonum monoculture</i>
G19	2/3	PEMB/C	Potentially Isolated	<i>T. latifolia</i> in center, <i>P. arundinace</i> and <i>P. amphibium</i> in fringe
G2	2	PEMB	Isolated	Small drainage swale dominated by <i>P. arundinacea</i> , <i>T. latifolia</i> , and <i>C. arvense</i> on the fringe
G20	2	PEMB	Isolated	<i>R. crispus</i> , <i>P. arundinacea</i> , <i>P. amphibium</i>
G22	2	PEMB	Isolated	<i>P. amphibium</i> and <i>P. arundiacea</i>
G23	2	PEMB	Isolated	<i>R. crispus</i> , <i>Carex sp.</i> , <i>P. arundinacea</i>
G25	1	PEMA	Isolated	<i>P. amphibium</i> and <i>R. Crispus</i>
G26	1	PEMA	Isolated	<i>Carex sp.</i> and <i>R. crispus</i>
G27	3/4	PEMC/F	Isolated	<i>Scirpus sp.</i> in center with <i>P. arundinacea</i> and <i>Carex sp.</i> in fringe. 2–3' of standing water in center
G28	2	PEMB	Isolated	<i>Carex sp.</i> with <i>P. arundinacea</i> fringe
G29	2	PEMB	Isolated	<i>Carex sp.</i> and <i>R. crispus</i>
G3	2	PEMB		Drainage swale dominated by <i>P. arundinacea</i> and <i>R. crispus</i>
G30	3	PEMC	Isolated	<i>Carex sp.</i> , <i>P. amphibium</i> in 1–2' of standing water; wetland to toe of slope of road
G31	3	PEMC	Isolated	<i>Carex sp.</i> and <i>T. latifolia</i> with 1' of standing water; wet to toe of slope of road
G32	2/3	PEMB/C	Isolated	Grazed <i>Carex sp.</i> and <i>T. latifolia</i> with approximately 1' of standing water
G33	4/5	PUB	Isolated	Open water in grazed area, <i>T. latifolia</i> and <i>P. arundinacea</i> on fringe
G34	3	PEMC	Isolated	<i>T. latifolia</i> and <i>Eleocharis sp.</i> , 1–2' of standing water
G35	1	PEMA	Isolated	<i>P. amphibium</i> and <i>Carex sp.</i>
G36	1	PEMA	Isolated	<i>P. amphibium</i> and <i>R. crispus</i> ; very small depression, no visible hydrology
G37	2	PEMB	Isolated	<i>P. amphibium</i> with some <i>Carex sp.</i> ; approximately 6" of standing water in center
G38	2	PEMB	Isolated	<i>P. amphibium</i> monoculture
G39	2	PEMB	Isolated	<i>P. amphibium</i> and <i>Carex sp.</i> ; approximately 6" of standing water in center
G4	2/3	PEMB/C	Isolated	<i>P. amphibium</i> and bare ground, appears to have been plowed

B-B-18

Basin ID	Circular 39 ² Classification	Cowardin ¹ Classification	Hydrologic ³ Connectivity	Comments
				1–2 seasons ago
G40	2	PEMB	Isolated	<i>Carex sp. Monoculture</i> ; approximately 6” standing water in center
G41	2	PEMB	Isolated	0
G42	2/3	PEMB/C	Connected to Cottonwood Lake	<i>T. latifolia, Spartina pectinata</i> , flows into road ditch system
G5	2	PEMB	Isolated	<i>P. amphibium</i> monoculture
G6	2/3	PEMB/C	Isolated	<i>Carex sp., T. latifolia</i> , and <i>Scirpus sp.</i>
G7/8	2/3	PEMB/C	Potentially Isolated Complex	<i>T. latifolia, P. arundinacea, Carex sp., and Elyocharis sp.</i>
G9	3/4	PEMC/F	Isolated	<i>T. latifolia, Scirpus sp., and P. amphibium</i> ; 2–3’ of standing water from flooding
H1	3	PEMC	Connected to drainage/creek	<i>T. latifolia, Scirpus spp., Carex spp.</i> on fringe
H1	3	PEMC	Connected to drainage/creek	<i>T. latifolia, Scirpus spp., Carex spp.</i> on fringe
H2	2	PEMB	Isolated	<i>Carex spp., T. latifolia, Scirpus americana</i>
H3	2	PEMB	Isolated	<i>Polygonum amphibium, Carex spp.</i>
H4	2	PEMA	Isolated	<i>Carex spp., T. laifolia, Polygonum</i>

B-B-19

ATTACHMENT 2: WETLAND MAPS

Saskatchewan

Mistral Energy Inc.,
Vantage Pipeline Project



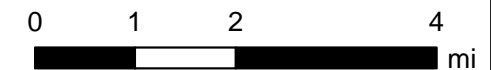
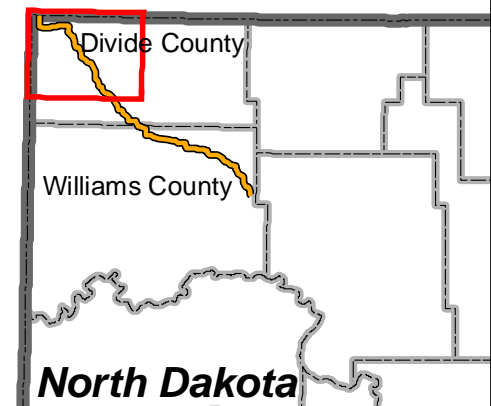
Survey Mapbook - Map Sheet Index

Date: 12/06/2011

Version: 2011-7

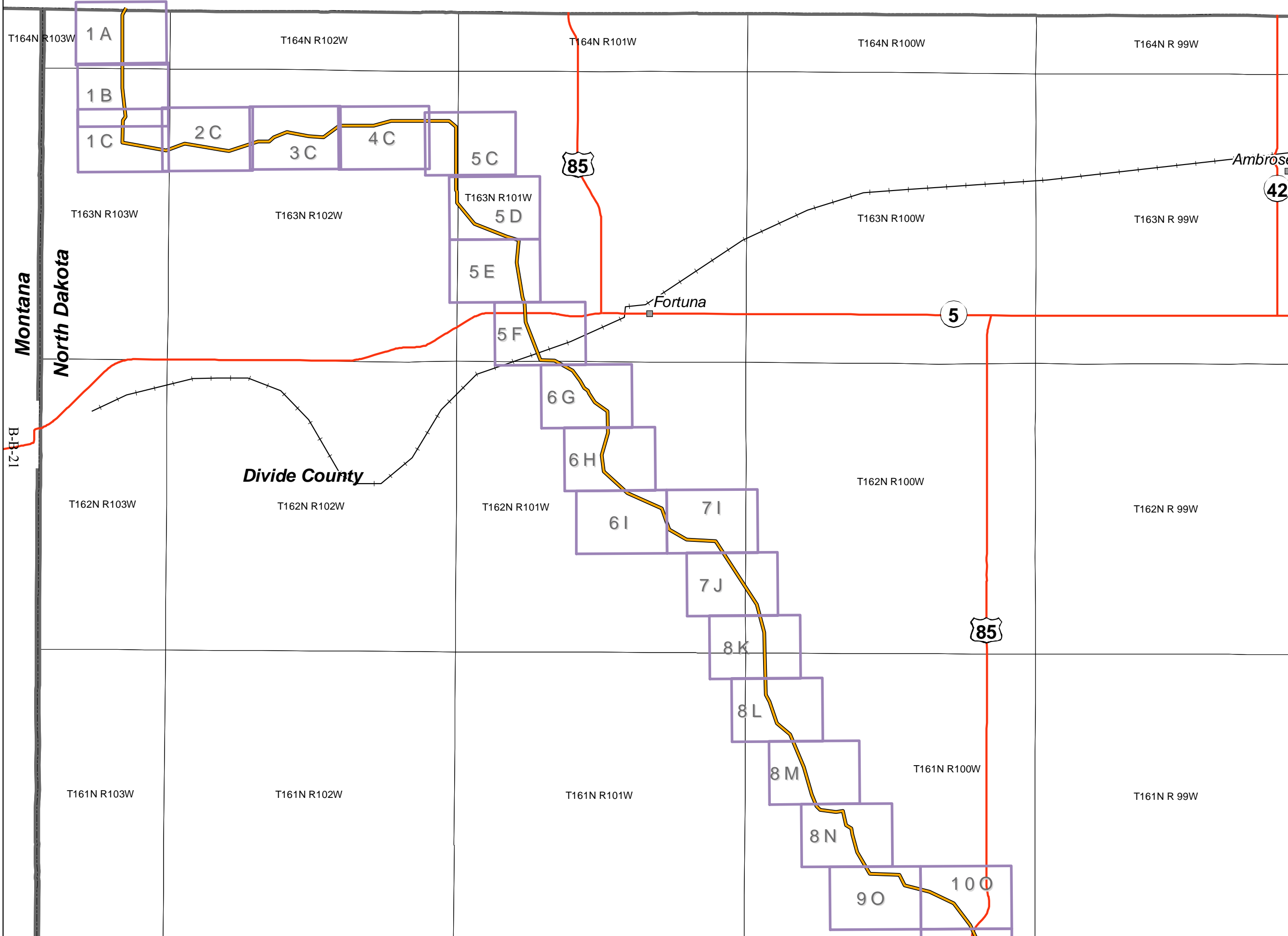
INDEX MAP 1

- Map Book
- Populated Place
- Abandoned Railroad
- Functioning Railroad
- Secondary Road








KC HARVEY
ENVIRONMENTAL, LLC

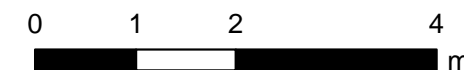
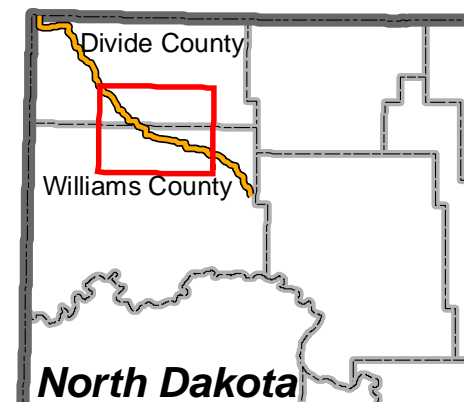
376 Gallatin Park Drive
Bozeman, MT 59715
406-585-7402
www.kcharvey.com





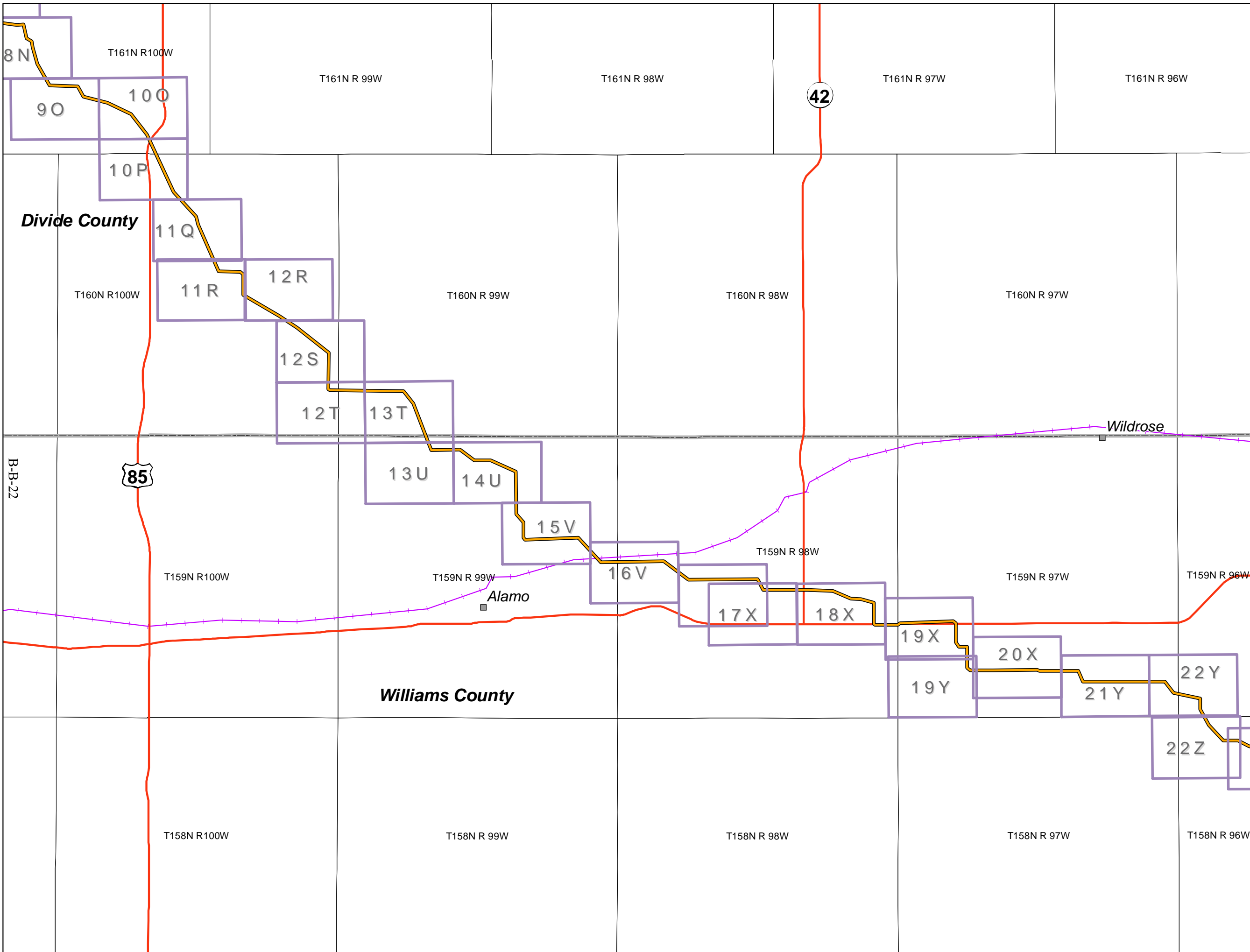
INDEX MAP 2

-  Map Book
-  Populated Place
-  Abandoned Railroad
-  Functioning Railroad
-  Secondary Road








KC HARVEY
ENVIRONMENTAL, LLC

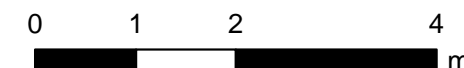
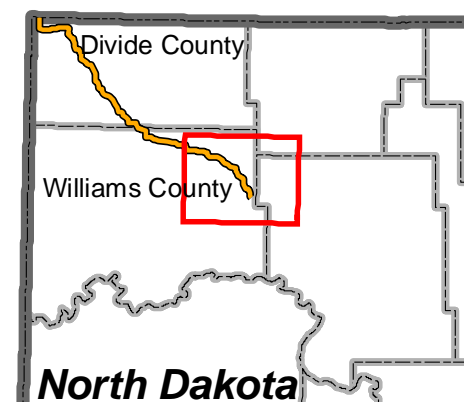
376 Gallatin Park Drive
Bozeman, MT 59715
406-585-7402
www.kcharvey.com





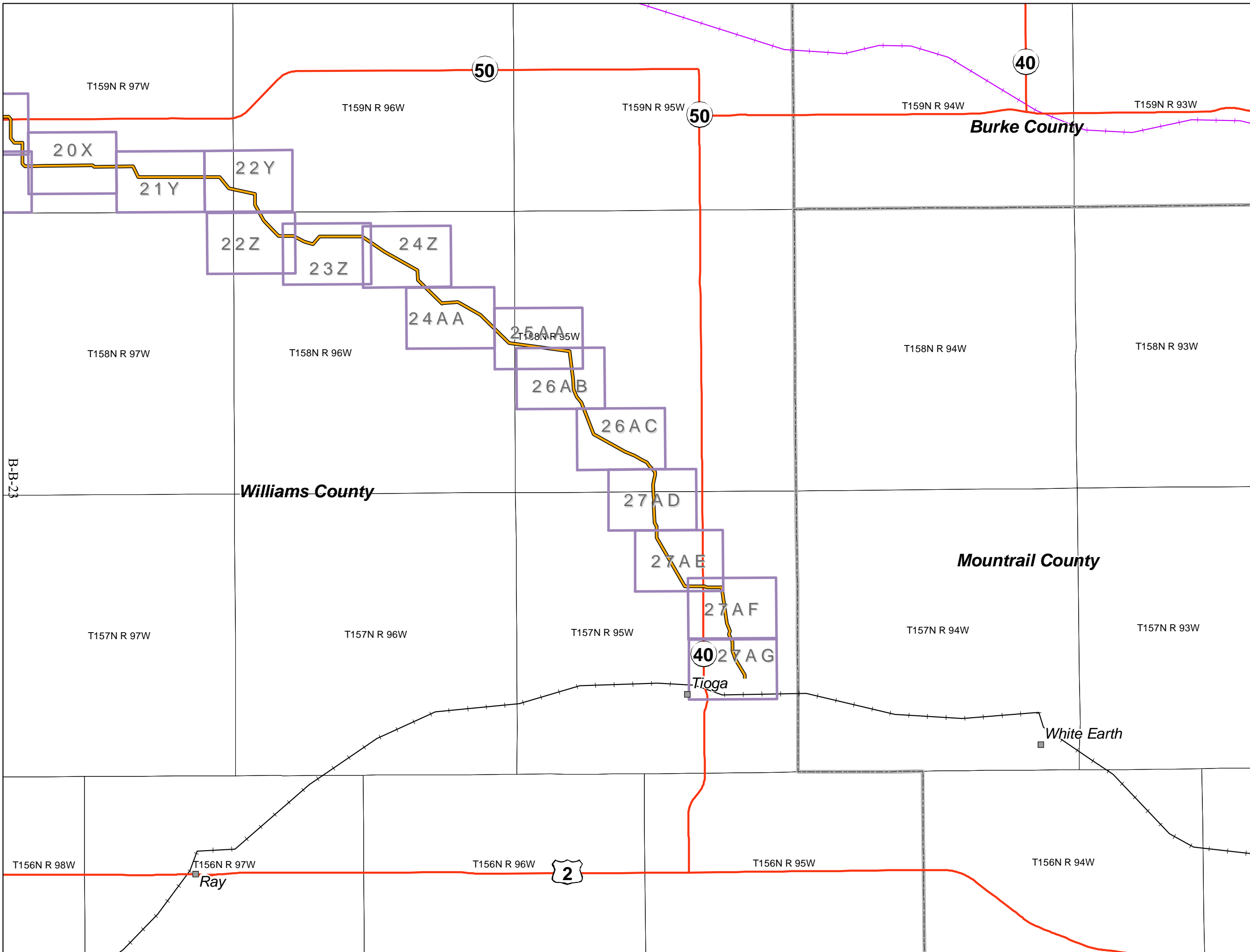
INDEX MAP 3

-  Map Book
-  Populated Place
-  Abandoned Railroad
-  Functioning Railroad
-  Secondary Road



KC HARVEY
ENVIRONMENTAL, LLC

376 Gallatin Park Drive
Bozeman, MT 59715
406-585-7402
www.kcharvey.com





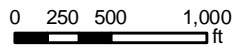
KC HARVEY
ENVIRONMENTAL, LLC

376 Gallatin Park Drive
 Bozeman, Montana 59715
 Phone: 406-585-7402
 Fax: 406-585-7428

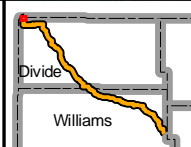
1 : 12,000



1,000 ft = 1 in



- | | | |
|---------------------------|-----------------------------------|------------------------------|
| Pipeline with 16ft buffer | Vehicular Trail (4WD) | Waterfowl Production Area |
| 500 ft corridor | Secondary Road | National Wildlife Refuge |
| SEH Confirmed Wetlands | Private Road for service vehicles | North Dakota Game and Fish |
| NWI Wetlands | Local Neighborhood Road | North Dakota Land Department |
| | | US Bureau of Land Management |



Mistral Energy Inc., Vantage Pipeline Project

Proposed Pipeline Route
 1:12,000 Map Book
 Sheet: 1A



Date: 12/06/2011

Version: 2011 - 7

T164N R103W

35
108th St NW

36

T163N R103W

151st Ave NW

107th St NW

11

12

KC HARVEY
ENVIRONMENTAL, LLC














376 Gallatin Park Drive
Bozeman, Montana 59715
Phone: 406-585-7402
Fax: 406-585-7428

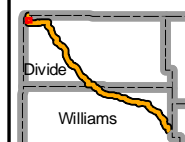
1 : 12,000



1,000 ft = 1 in

0 250 500 1,000
ft

-  Pipeline with 16ft buffer
-  500 ft corridor
-  SEH Confirmed Wetlands
-  NWI Wetlands
-  Vehicular Trail (4WD)
-  Secondary Road
-  Private Road for service vehicles
-  Local Neighborhood Road
-  Waterfowl Production Area
-  National Wildlife Refuge
-  North Dakota Game and Fish
-  North Dakota Land Department
-  US Bureau of Land Management



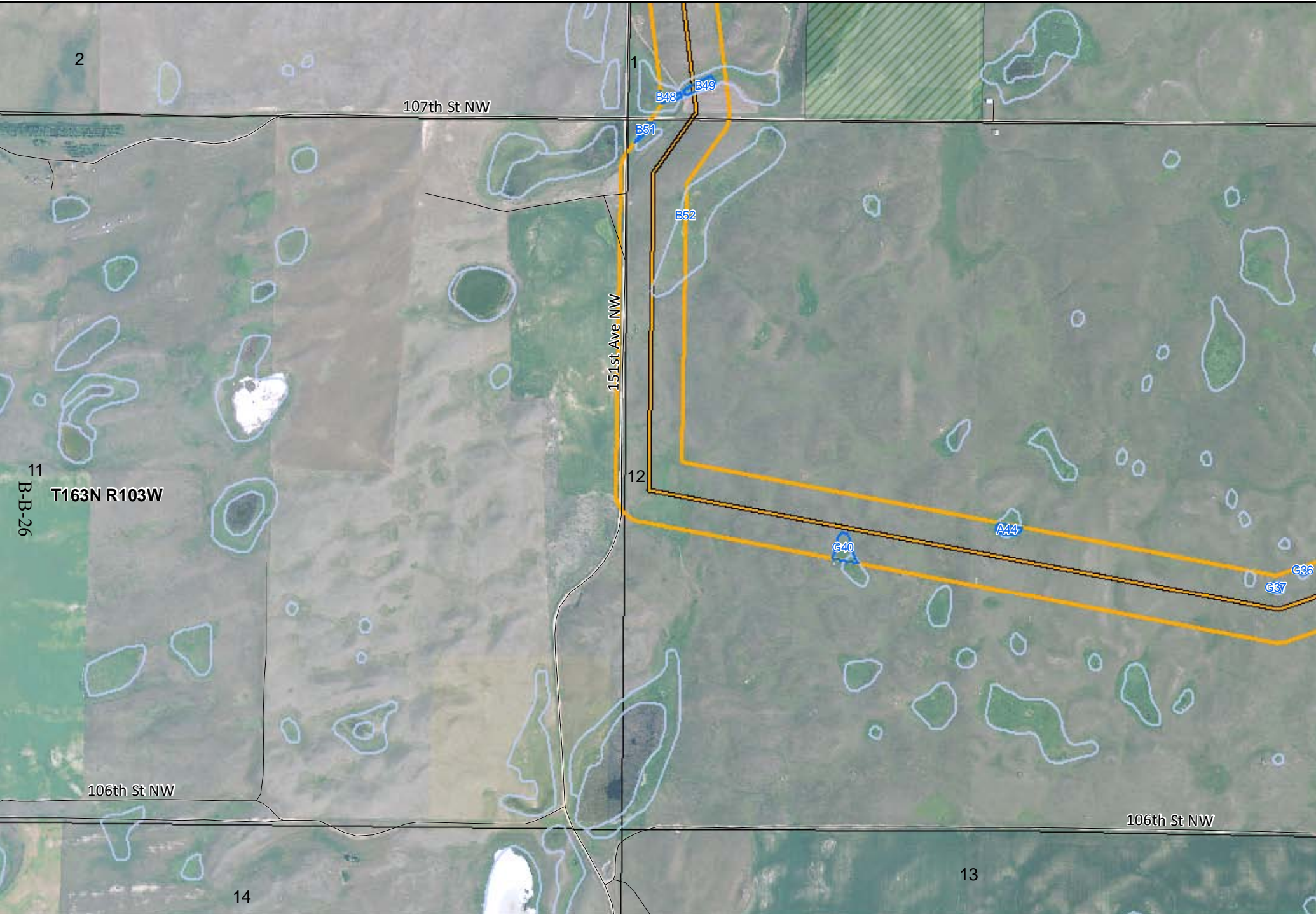
Mistral Energy Inc., Vantage Pipeline Project

Proposed Pipeline Route
1:12,000 Map Book
Sheet: 1B



Date: 12/06/2011

Version: 2011 - 7



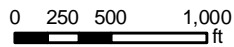
KC HARVEY
ENVIRONMENTAL, LLC

376 Gallatin Park Drive
 Bozeman, Montana 59715
 Phone: 406-585-7402
 Fax: 406-585-7428

1 : 12,000



1,000 ft = 1 in



- | | | |
|---------------------------|-----------------------------------|------------------------------|
| Pipeline with 16ft buffer | Vehicular Trail (4WD) | Waterfowl Production Area |
| 500 ft corridor | Secondary Road | National Wildlife Refuge |
| SEH Confirmed Wetlands | Private Road for service vehicles | North Dakota Game and Fish |
| NWI Wetlands | Local Neighborhood Road | North Dakota Land Department |
| | | US Bureau of Land Management |



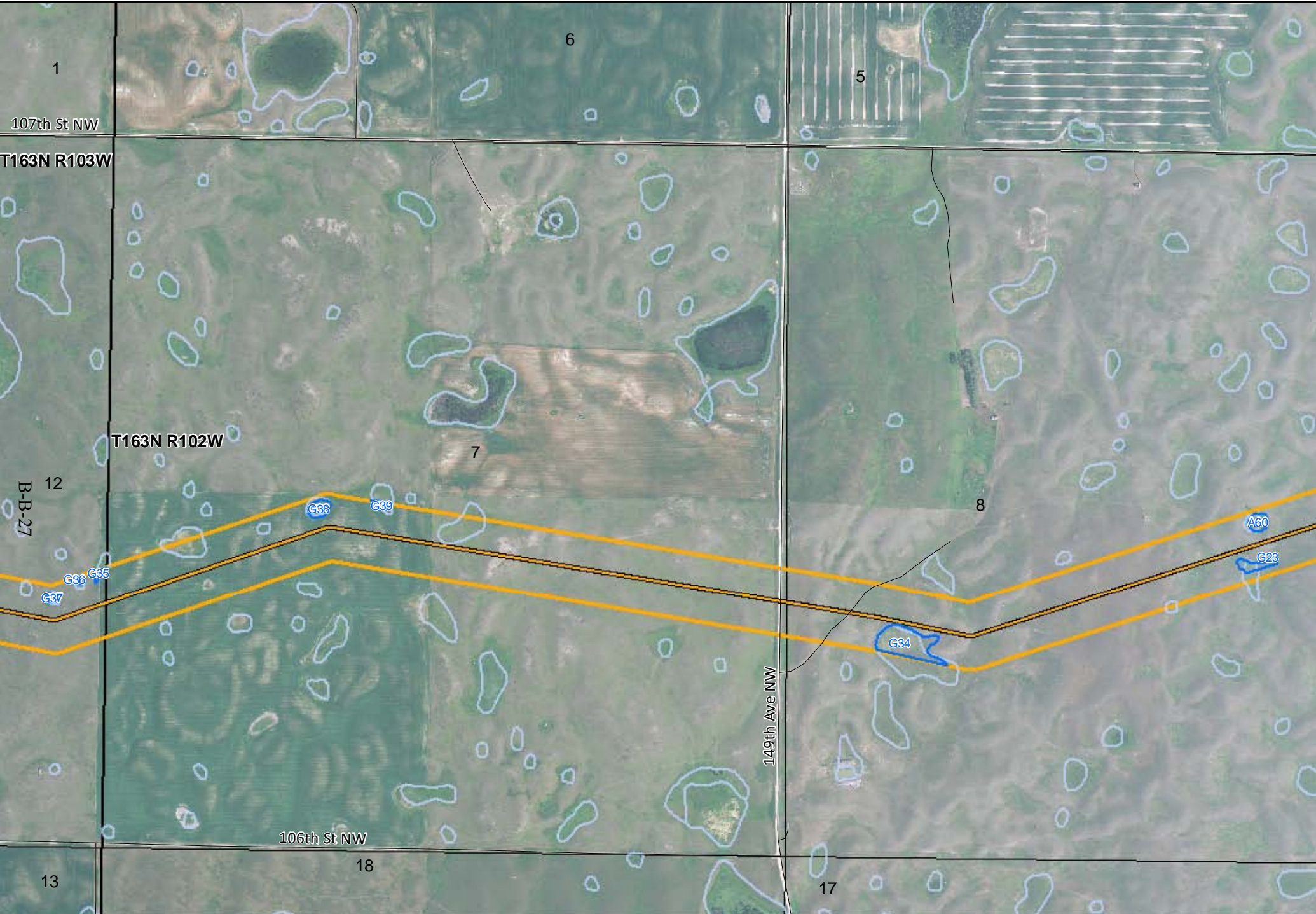
Mistral Energy Inc., Vantage Pipeline Project

Proposed Pipeline Route
 1:12,000 Map Book
 Sheet: 1C

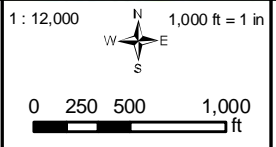


Date: 12/06/2011

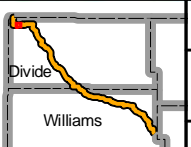
Version: 2011 - 7



KC HARVEY ENVIRONMENTAL, LLC
 376 Gallatin Park Drive
 Bozeman, Montana 59715
 Phone: 406-585-7402
 Fax: 406-585-7428



Pipeline with 16ft buffer	Vehicular Trail (4WD)	Waterfowl Production Area
500 ft corridor	Secondary Road	National Wildlife Refuge
SEH Confirmed Wetlands	Private Road for service vehicles	North Dakota Game and Fish
NWI Wetlands	Local Neighborhood Road	North Dakota Land Department
		US Bureau of Land Management



Mistral Energy Inc., Vantage Pipeline Project

Proposed Pipeline Route
 1:12,000 Map Book
 Sheet: 2C

Date: 12/06/2011

Version: 2011 - 7



KC HARVEY
ENVIRONMENTAL, LLC

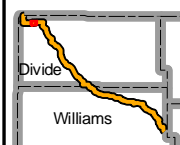
376 Gallatin Park Drive
 Bozeman, Montana 59715
 Phone: 406-585-7402
 Fax: 406-585-7428

1 : 12,000 1,000 ft = 1 in



0 250 500 1,000
 ft

- | | | |
|---------------------------|-----------------------------------|------------------------------|
| Pipeline with 16ft buffer | Vehicular Trail (4WD) | Waterfowl Production Area |
| 500 ft corridor | Secondary Road | National Wildlife Refuge |
| SEH Confirmed Wetlands | Private Road for service vehicles | North Dakota Game and Fish |
| NWI Wetlands | Local Neighborhood Road | North Dakota Land Department |
| | | US Bureau of Land Management |



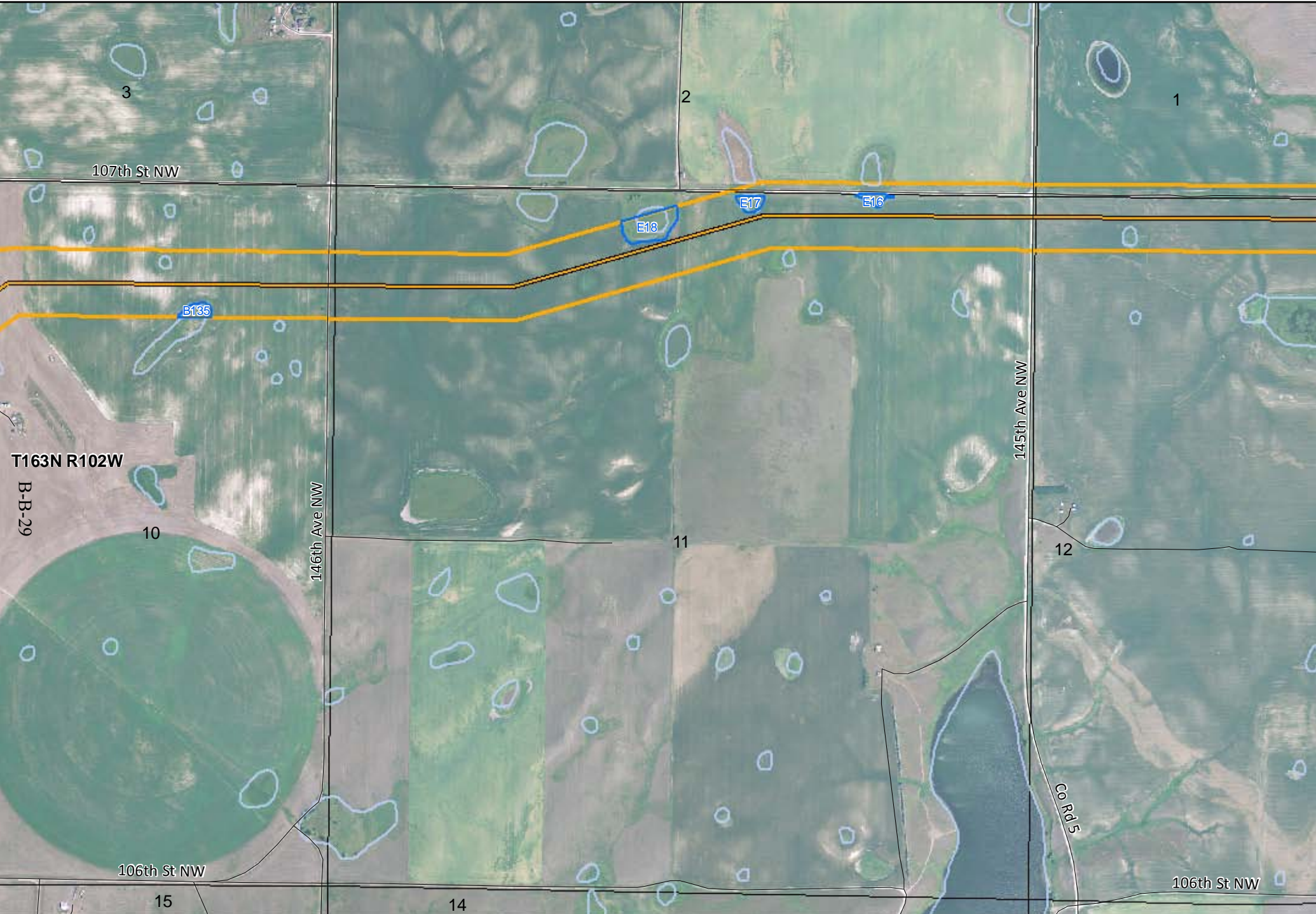
Mistral Energy Inc., Vantage Pipeline Project

Proposed Pipeline Route
 1:12,000 Map Book
 Sheet: 3C

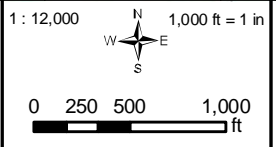


Date: 12/06/2011

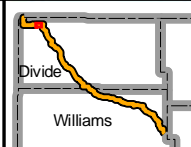
Version: 2011 - 7



KC HARVEY ENVIRONMENTAL, LLC
 376 Gallatin Park Drive
 Bozeman, Montana 59715
 Phone: 406-585-7402
 Fax: 406-585-7428



- Pipeline with 16ft buffer
- 500 ft corridor
- SEH Confirmed Wetlands
- NWI Wetlands
- Vehicular Trail (4WD)
- Secondary Road
- Private Road for service vehicles
- Local Neighborhood Road
- Waterfowl Production Area
- National Wildlife Refuge
- North Dakota Game and Fish
- North Dakota Land Department
- US Bureau of Land Management



Mistral Energy Inc., Vantage Pipeline Project

Proposed Pipeline Route
 1:12,000 Map Book
 Sheet: 4C

VANTAGE PIPELINE US LP

Date: 12/06/2011 Version: 2011 - 7



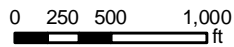
KC HARVEY
ENVIRONMENTAL, LLC

376 Gallatin Park Drive
 Bozeman, Montana 59715
 Phone: 406-585-7402
 Fax: 406-585-7428

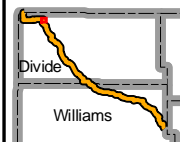
1 : 12,000



1,000 ft = 1 in



- | | | |
|---------------------------|-----------------------------------|------------------------------|
| Pipeline with 16ft buffer | Vehicular Trail (4WD) | Waterfowl Production Area |
| 500 ft corridor | Secondary Road | National Wildlife Refuge |
| SEH Confirmed Wetlands | Private Road for service vehicles | North Dakota Game and Fish |
| NWI Wetlands | Local Neighborhood Road | North Dakota Land Department |
| | | US Bureau of Land Management |



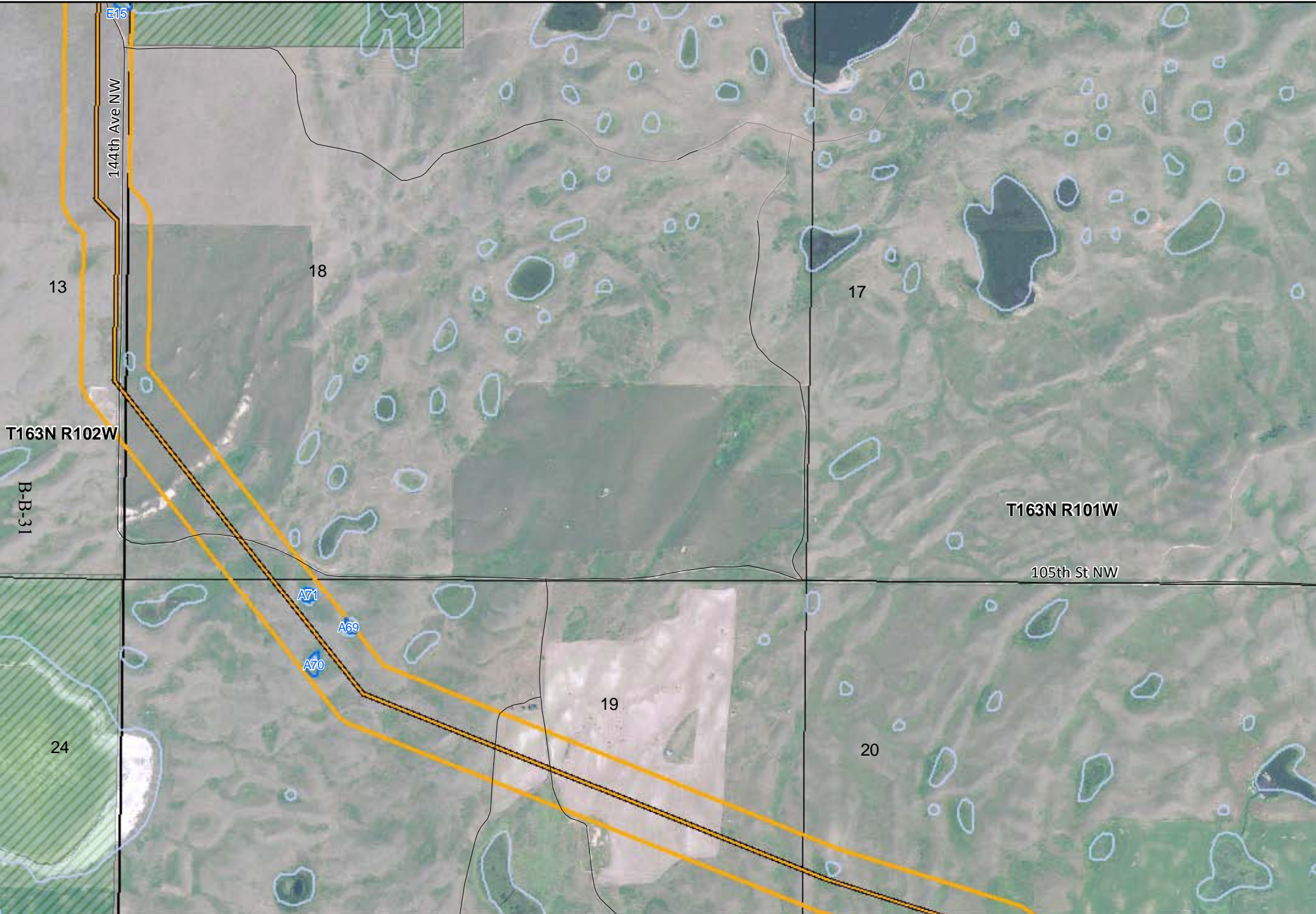
Mistral Energy Inc., Vantage Pipeline Project

Proposed Pipeline Route
 1:12,000 Map Book
 Sheet: 5C

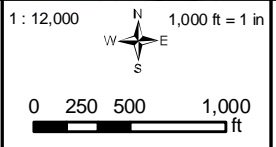


Date: 12/06/2011

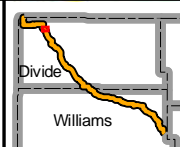
Version: 2011 - 7



KC HARVEY ENVIRONMENTAL, LLC
 376 Gallatin Park Drive
 Bozeman, Montana 59715
 Phone: 406-585-7402
 Fax: 406-585-7428



- | | | |
|---------------------------|-----------------------------------|------------------------------|
| Pipeline with 16ft buffer | Vehicular Trail (4WD) | Waterfowl Production Area |
| 500 ft corridor | Secondary Road | National Wildlife Refuge |
| SEH Confirmed Wetlands | Private Road for service vehicles | North Dakota Game and Fish |
| NWI Wetlands | Local Neighborhood Road | North Dakota Land Department |
| | | US Bureau of Land Management |

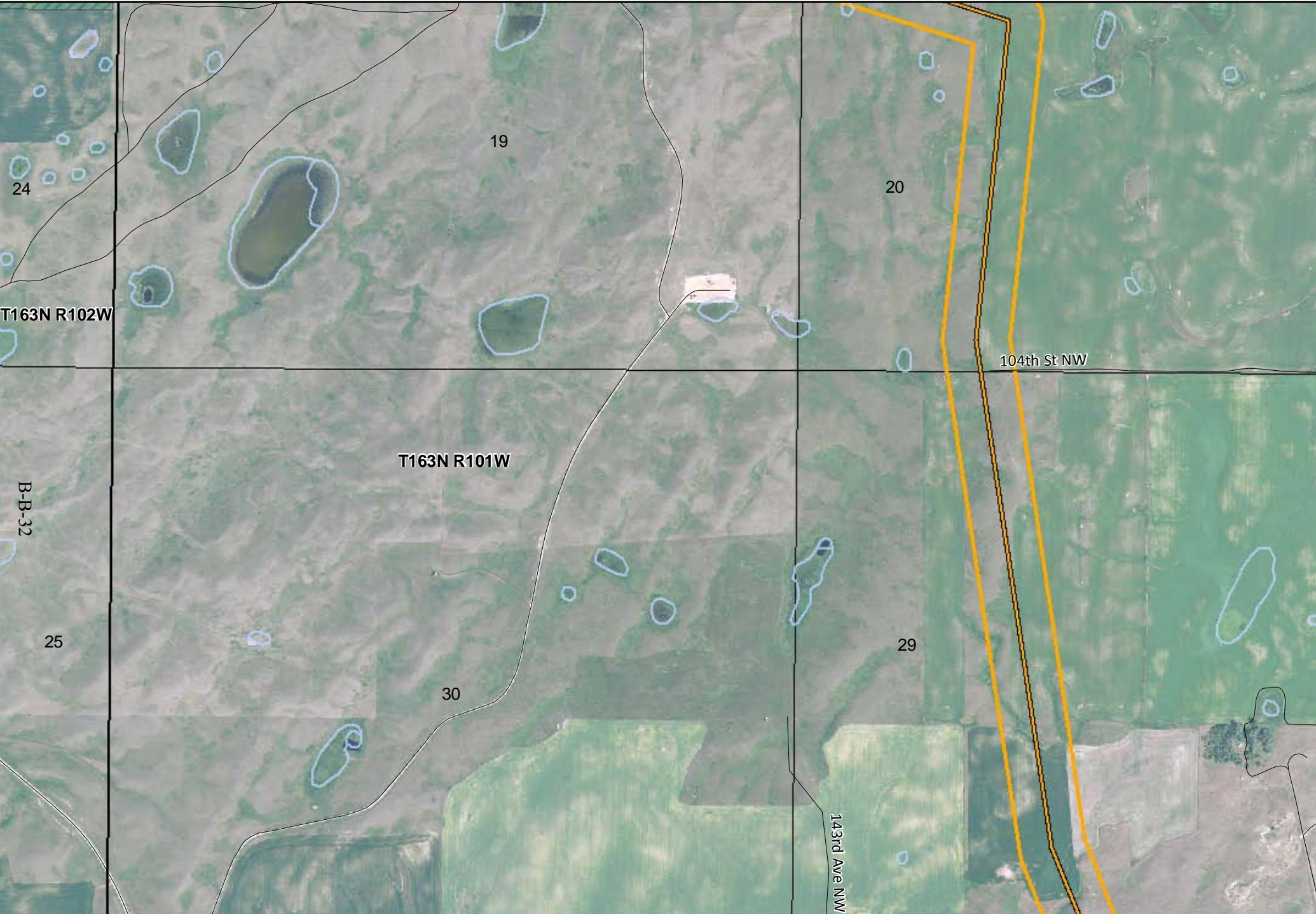


Mistral Energy Inc., Vantage Pipeline Project

Proposed Pipeline Route
 1:12,000 Map Book
 Sheet: 5D

VANTAGE PIPELINE US LP

Date: 12/06/2011 Version: 2011 - 7



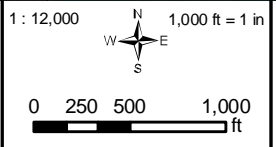
T163N R102W

T163N R101W

104th St NW

143rd Ave NW

KC HARVEY
ENVIRONMENTAL, LLC
 376 Gallatin Park Drive
 Bozeman, Montana 59715
 Phone: 406-585-7402
 Fax: 406-585-7428



- Pipeline with 16ft buffer
- 500 ft corridor
- SEH Confirmed Wetlands
- NWI Wetlands
- Vehicular Trail (4WD)
- Secondary Road
- Private Road for service vehicles
- Local Neighborhood Road
- Waterfowl Production Area
- National Wildlife Refuge
- North Dakota Game and Fish
- North Dakota Land Department
- US Bureau of Land Management



Mistral Energy Inc., Vantage Pipeline Project

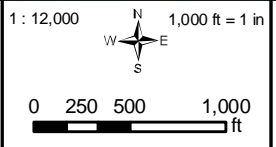
Proposed Pipeline Route
 1:12,000 Map Book
 Sheet: 5E

VANTAGE
 PIPELINE US LP

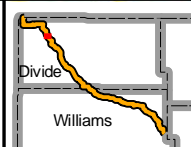
Date: 12/06/2011 Version: 2011 - 7



KC HARVEY ENVIRONMENTAL, LLC
 376 Gallatin Park Drive
 Bozeman, Montana 59715
 Phone: 406-585-7402
 Fax: 406-585-7428



- | | | |
|---------------------------|-----------------------------------|------------------------------|
| Pipeline with 16ft buffer | Vehicular Trail (4WD) | Waterfowl Production Area |
| 500 ft corridor | Secondary Road | National Wildlife Refuge |
| SEH Confirmed Wetlands | Private Road for service vehicles | North Dakota Game and Fish |
| NWI Wetlands | Local Neighborhood Road | North Dakota Land Department |
| | | US Bureau of Land Management |

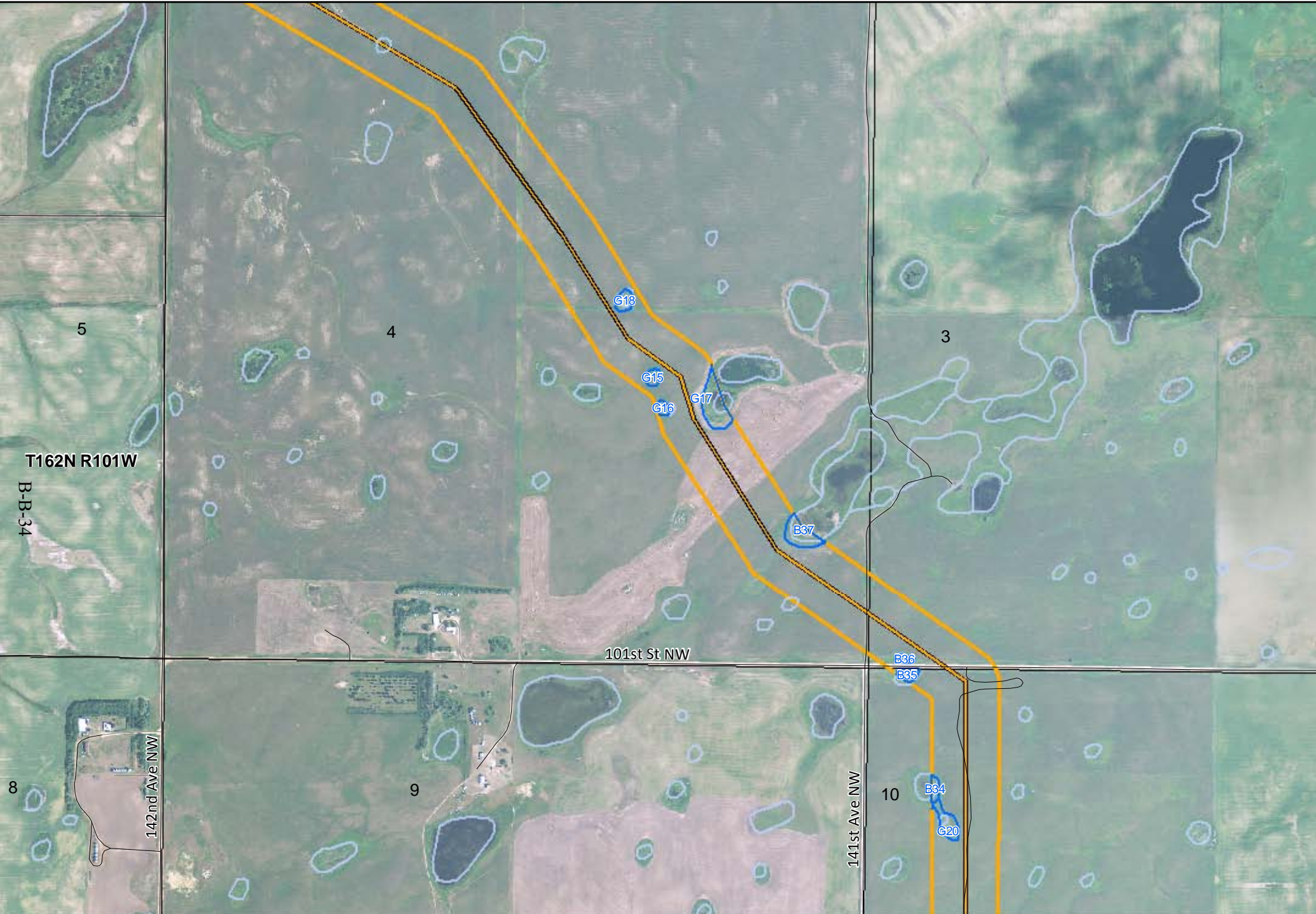


Mistral Energy Inc., Vantage Pipeline Project

Proposed Pipeline Route
 1:12,000 Map Book
 Sheet: 5F

VANTAGE PIPELINE US LP

Date: 12/06/2011 Version: 2011 - 7



T162N R101W

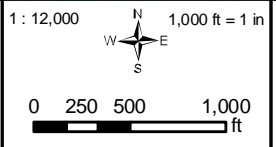
B-B-34

142nd Ave NW

101st St NW

141st Ave NW

KC HARVEY ENVIRONMENTAL, LLC
 376 Gallatin Park Drive
 Bozeman, Montana 59715
 Phone: 406-585-7402
 Fax: 406-585-7428



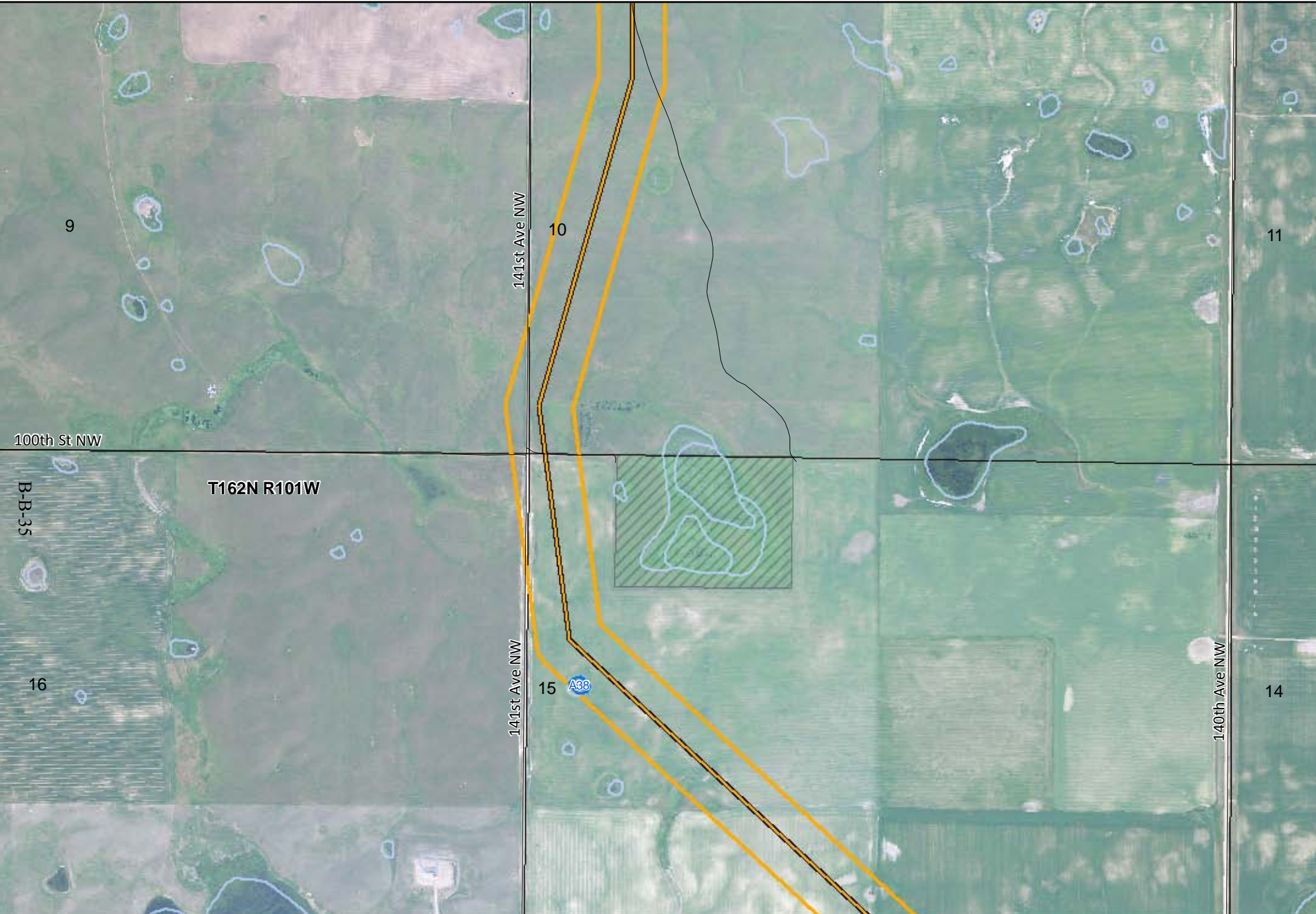
- | | | |
|---------------------------|-----------------------------------|------------------------------|
| Pipeline with 16ft buffer | Vehicular Trail (4WD) | Waterfowl Production Area |
| 500 ft corridor | Secondary Road | National Wildlife Refuge |
| SEH Confirmed Wetlands | Private Road for service vehicles | North Dakota Game and Fish |
| NWI Wetlands | Local Neighborhood Road | North Dakota Land Department |
| | | US Bureau of Land Management |



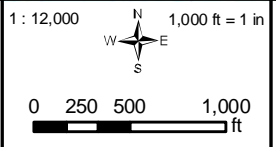
Mistral Energy Inc., Vantage Pipeline Project

Proposed Pipeline Route
 1:12,000 Map Book
 Sheet: 6G

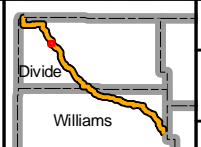
Date: 12/06/2011 Version: 2011 - 7



KC HARVEY ENVIRONMENTAL, LLC
 376 Gallatin Park Drive
 Bozeman, Montana 59715
 Phone: 406-585-7402
 Fax: 406-585-7428



- Pipeline with 16ft buffer
- 500 ft corridor
- SEH Confirmed Wetlands
- NWI Wetlands
- Vehicular Trail (4WD)
- Secondary Road
- Private Road for service vehicles
- Local Neighborhood Road
- Waterfowl Production Area
- National Wildlife Refuge
- North Dakota Game and Fish
- North Dakota Land Department
- US Bureau of Land Management

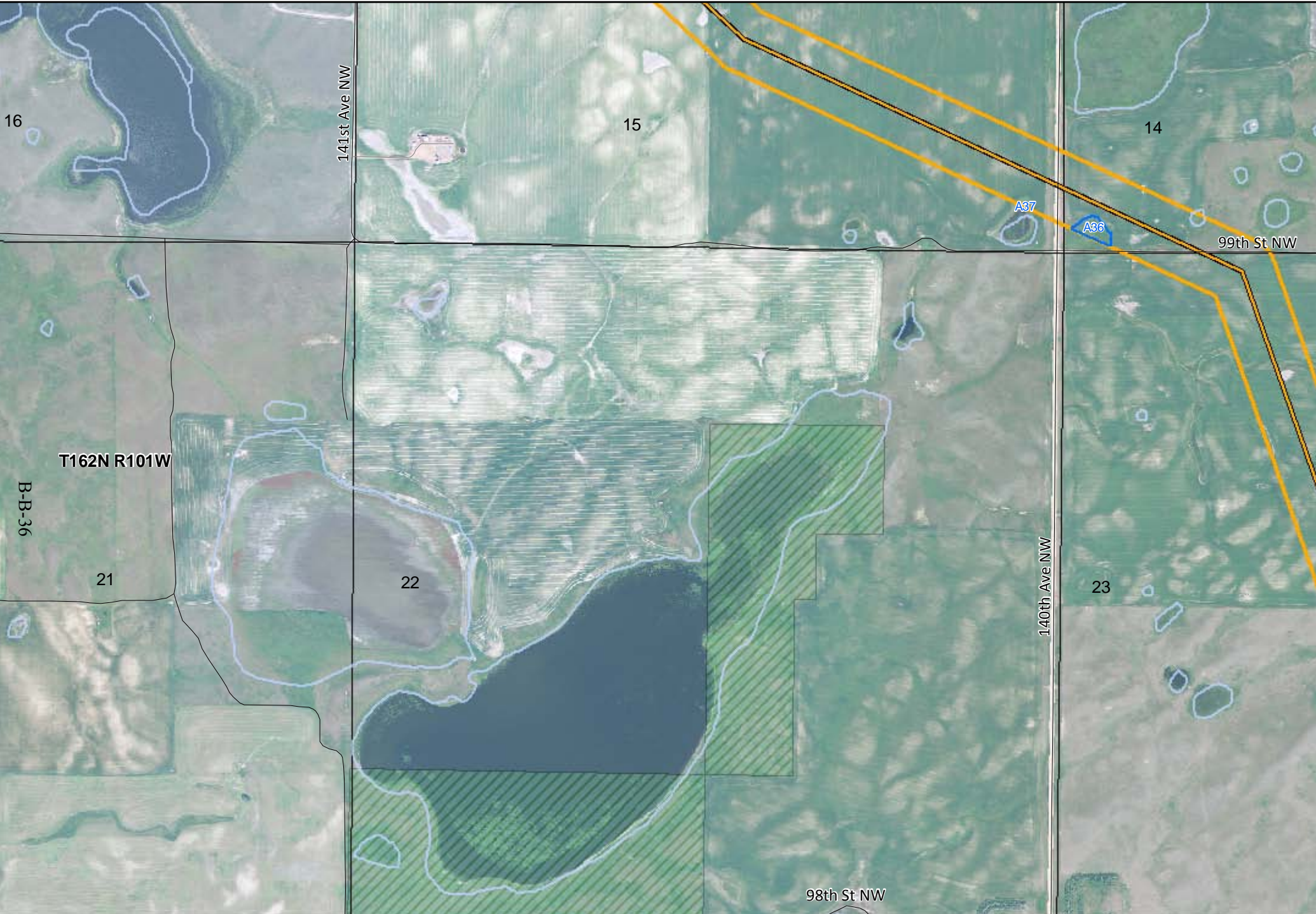


Mistral Energy Inc., Vantage Pipeline Project

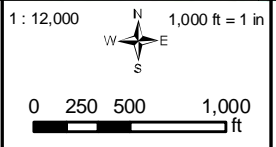
Proposed Pipeline Route
 1:12,000 Map Book
 Sheet: 6H

VANTAGE PIPELINE US LP

Date: 12/06/2011 Version: 2011 - 7



KC HARVEY ENVIRONMENTAL, LLC
 376 Gallatin Park Drive
 Bozeman, Montana 59715
 Phone: 406-585-7402
 Fax: 406-585-7428



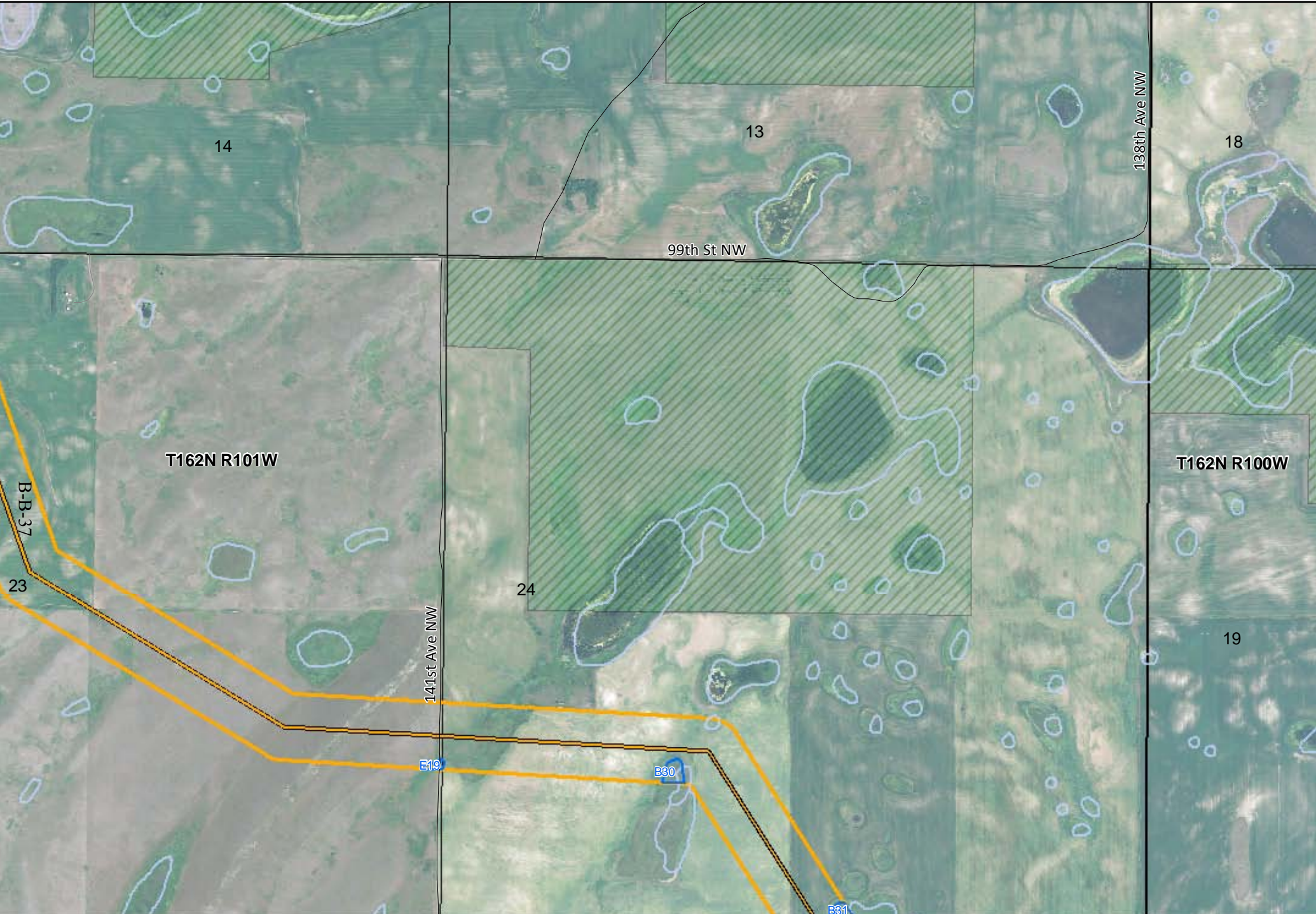
- Pipeline with 16ft buffer
- 500 ft corridor
- SEH Confirmed Wetlands
- NWI Wetlands
- Vehicular Trail (4WD)
- Secondary Road
- Private Road for service vehicles
- Local Neighborhood Road
- Waterfowl Production Area
- National Wildlife Refuge
- North Dakota Game and Fish
- North Dakota Land Department
- US Bureau of Land Management



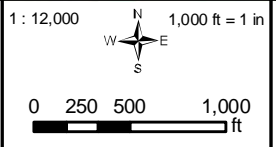
Mistral Energy Inc., Vantage Pipeline Project

Proposed Pipeline Route
 1:12,000 Map Book
 Sheet: 6I

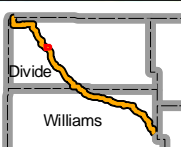
Date: 12/06/2011 Version: 2011 - 7



KC HARVEY ENVIRONMENTAL, LLC
 376 Gallatin Park Drive
 Bozeman, Montana 59715
 Phone: 406-585-7402
 Fax: 406-585-7428



- | | | |
|---------------------------|-----------------------------------|------------------------------|
| Pipeline with 16ft buffer | Vehicular Trail (4WD) | Waterfowl Production Area |
| 500 ft corridor | Secondary Road | National Wildlife Refuge |
| SEH Confirmed Wetlands | Private Road for service vehicles | North Dakota Game and Fish |
| NWI Wetlands | Local Neighborhood Road | North Dakota Land Department |
| | | US Bureau of Land Management |

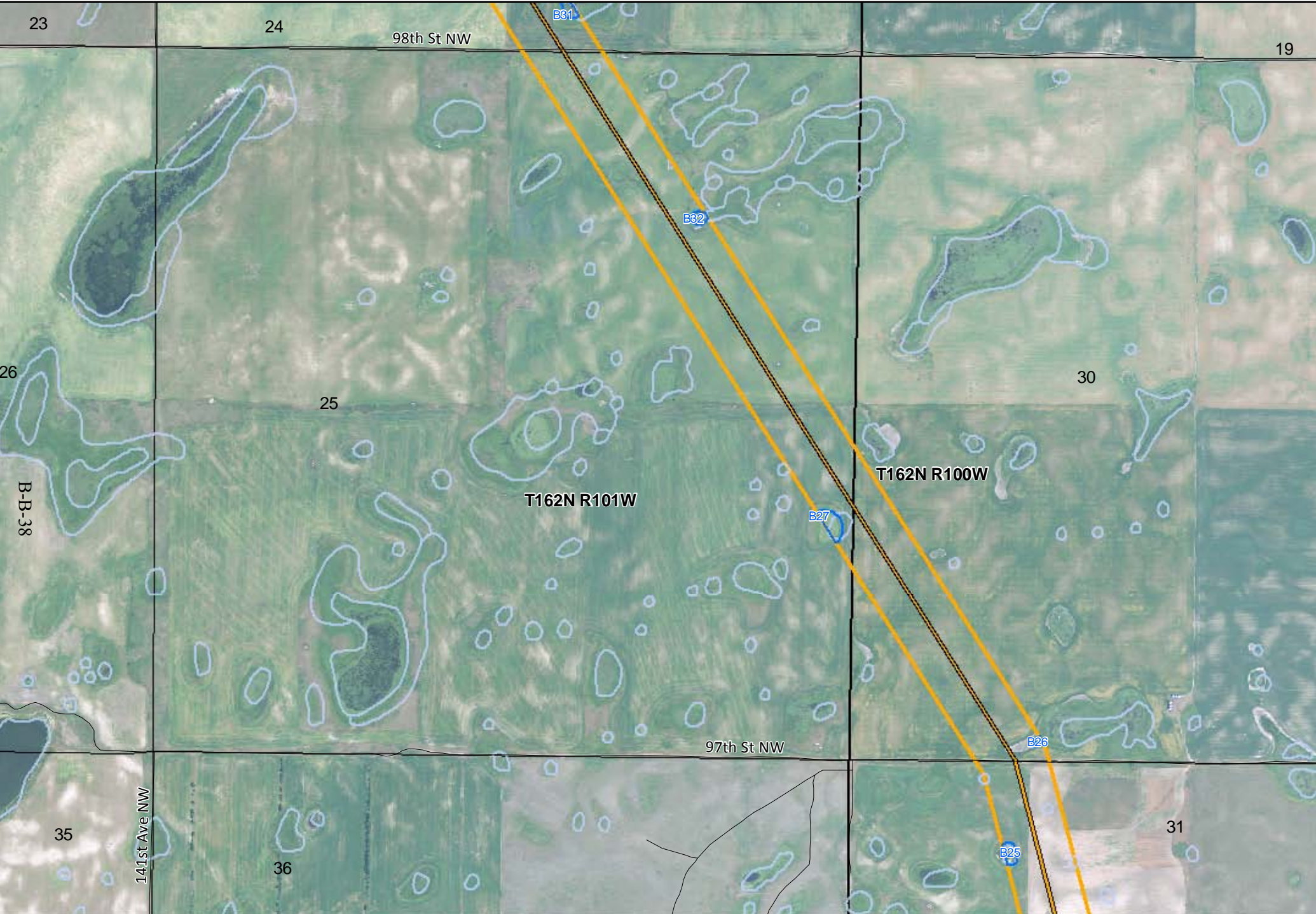


Mistral Energy Inc., Vantage Pipeline Project

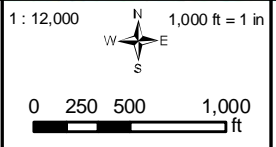
Proposed Pipeline Route
 1:12,000 Map Book
 Sheet: 71

VANTAGE PIPELINE US LP

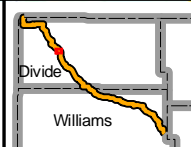
Date: 12/06/2011 Version: 2011 - 7



KC HARVEY ENVIRONMENTAL, LLC
 376 Gallatin Park Drive
 Bozeman, Montana 59715
 Phone: 406-585-7402
 Fax: 406-585-7428



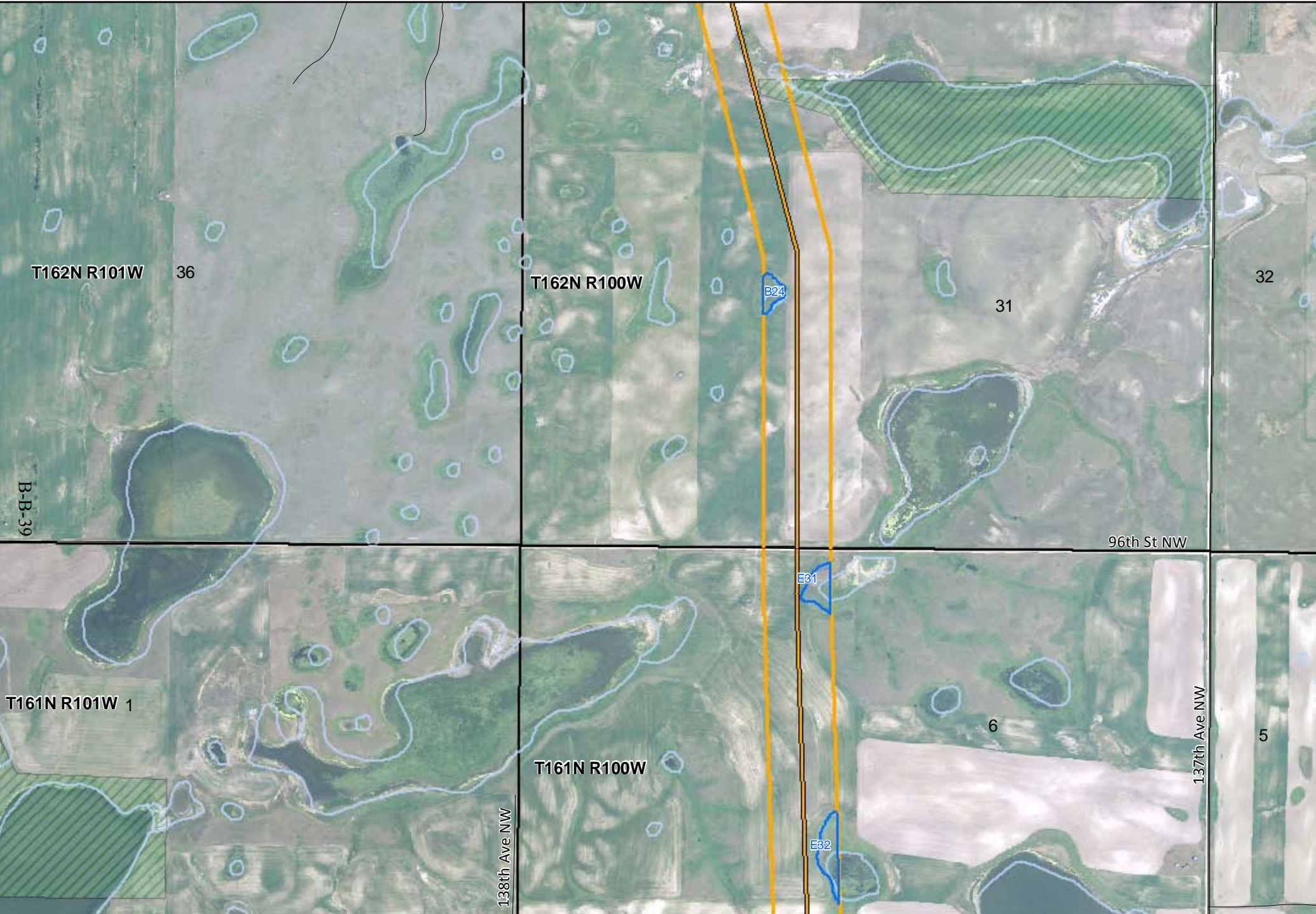
- Pipeline with 16ft buffer
- 500 ft corridor
- SEH Confirmed Wetlands
- NWI Wetlands
- Vehicular Trail (4WD)
- Secondary Road
- Private Road for service vehicles
- Local Neighborhood Road
- Waterfowl Production Area
- National Wildlife Refuge
- North Dakota Game and Fish
- North Dakota Land Department
- US Bureau of Land Management



Mistral Energy Inc., Vantage Pipeline Project

Proposed Pipeline Route
 1:12,000 Map Book
 Sheet: 7J

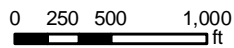
Date: 12/06/2011 Version: 2011 - 7



KC HARVEY ENVIRONMENTAL, LLC

376 Gallatin Park Drive
Bozeman, Montana 59715
Phone: 406-585-7402
Fax: 406-585-7428

1 : 12,000 1,000 ft = 1 in



- Pipeline with 16ft buffer
- 500 ft corridor
- SEH Confirmed Wetlands
- NWI Wetlands
- Vehicular Trail (4WD)
- Secondary Road
- Private Road for service vehicles
- Local Neighborhood Road
- Waterfowl Production Area
- National Wildlife Refuge
- North Dakota Game and Fish
- North Dakota Land Department
- US Bureau of Land Management



Mistral Energy Inc., Vantage Pipeline Project

Proposed Pipeline Route
1:12,000 Map Book
Sheet: 8K



Date: 12/06/2011

Version: 2011 - 7



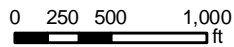
KC HARVEY
ENVIRONMENTAL, LLC

376 Gallatin Park Drive
Bozeman, Montana 59715
Phone: 406-585-7402
Fax: 406-585-7428

1 : 12,000



1,000 ft = 1 in



- | | | |
|---------------------------|-----------------------------------|------------------------------|
| Pipeline with 16ft buffer | Vehicular Trail (4WD) | Waterfowl Production Area |
| 500 ft corridor | Secondary Road | National Wildlife Refuge |
| SEH Confirmed Wetlands | Private Road for service vehicles | North Dakota Game and Fish |
| NWI Wetlands | Local Neighborhood Road | North Dakota Land Department |
| | | US Bureau of Land Management |



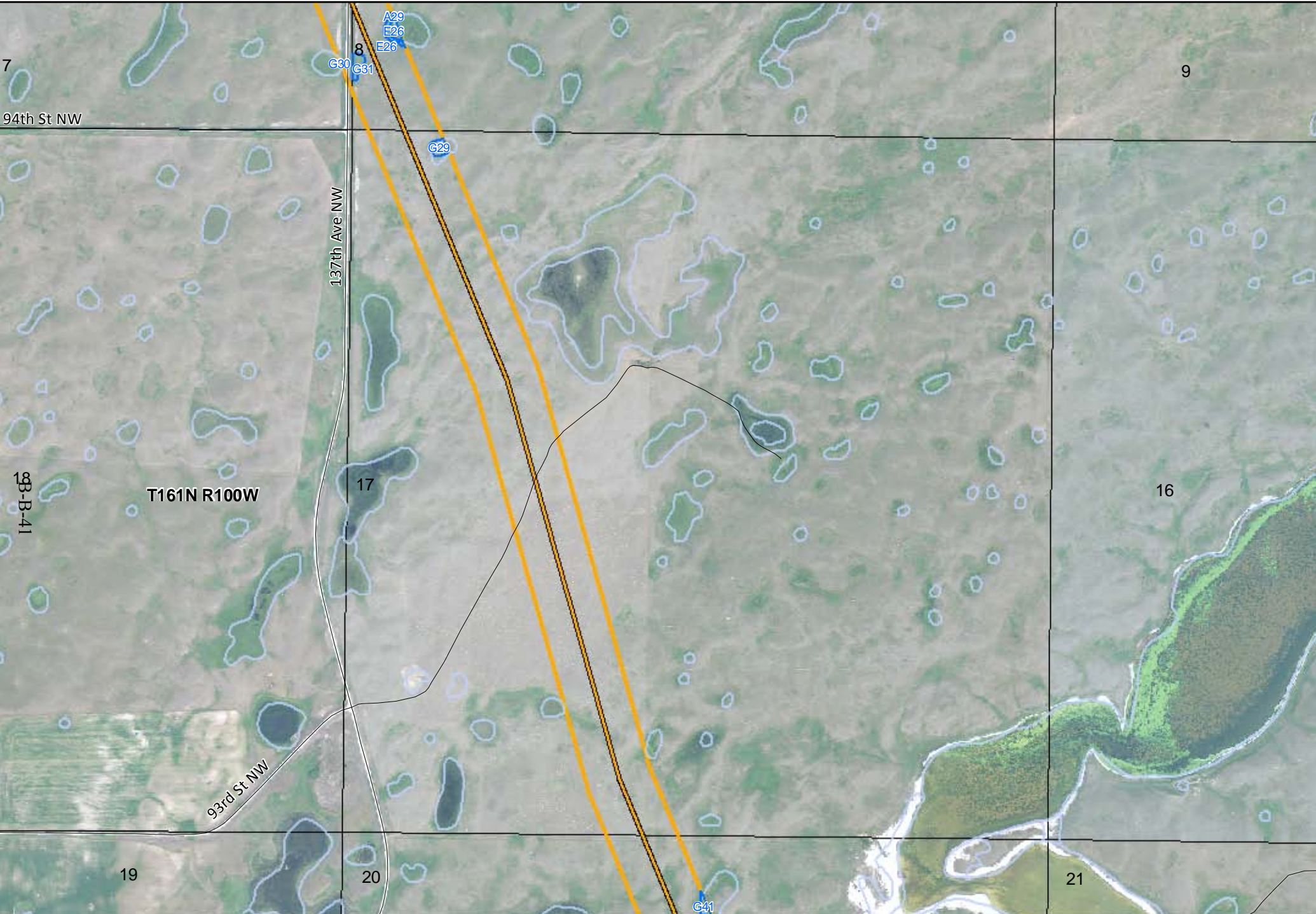
Mistral Energy Inc., Vantage Pipeline Project

Proposed Pipeline Route
1:12,000 Map Book
Sheet: 8L

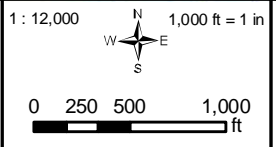


Date: 12/06/2011

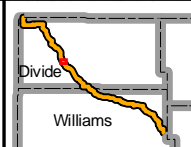
Version: 2011 - 7



KC HARVEY ENVIRONMENTAL, LLC
 376 Gallatin Park Drive
 Bozeman, Montana 59715
 Phone: 406-585-7402
 Fax: 406-585-7428



- | | | |
|---------------------------|-----------------------------------|------------------------------|
| Pipeline with 16ft buffer | Vehicular Trail (4WD) | Waterfowl Production Area |
| 500 ft corridor | Secondary Road | National Wildlife Refuge |
| SEH Confirmed Wetlands | Private Road for service vehicles | North Dakota Game and Fish |
| NWI Wetlands | Local Neighborhood Road | North Dakota Land Department |
| | | US Bureau of Land Management |

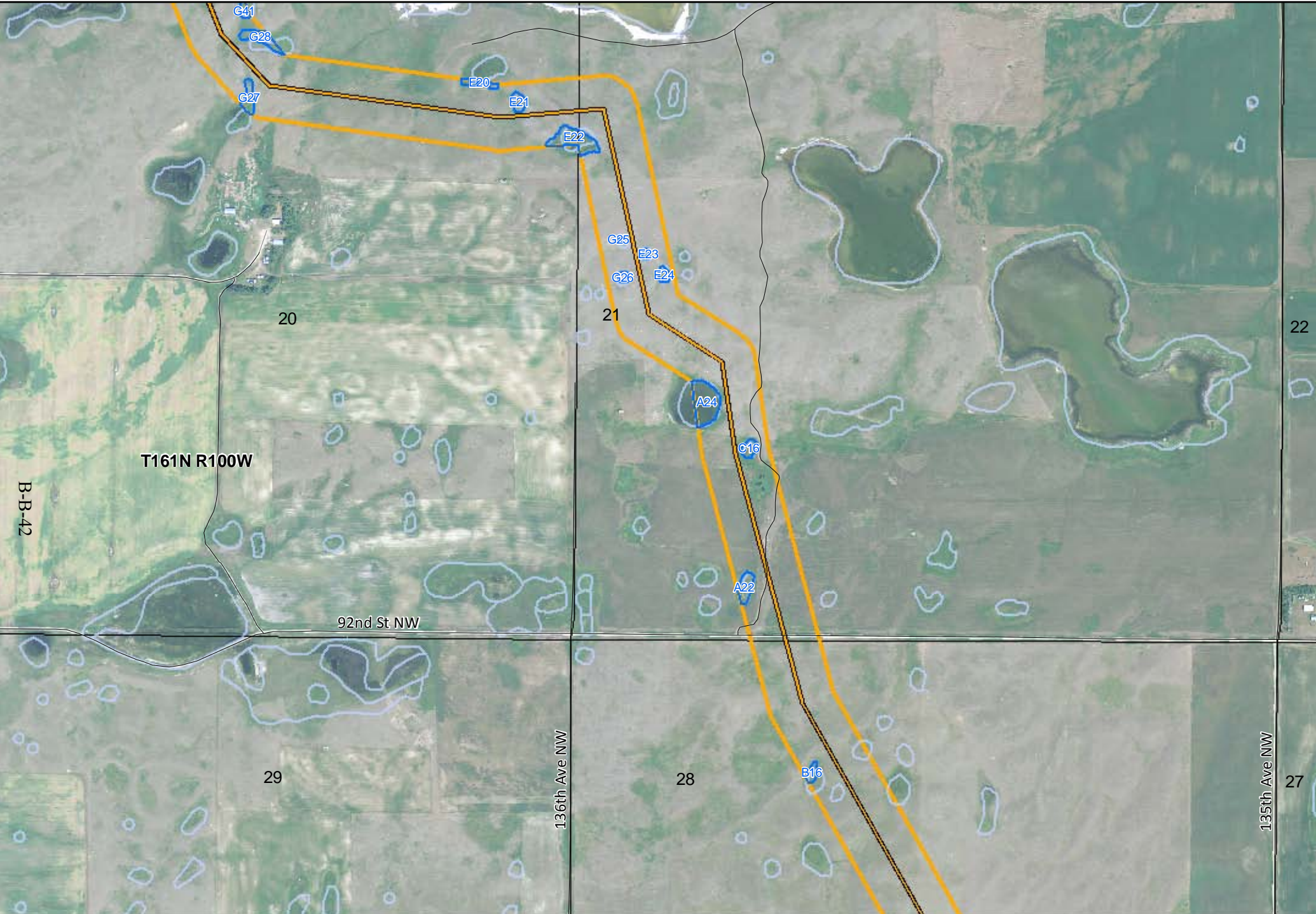


Mistral Energy Inc., Vantage Pipeline Project

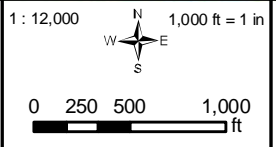
Proposed Pipeline Route
 1:12,000 Map Book
 Sheet: 8M

VANTAGE PIPELINE US LP

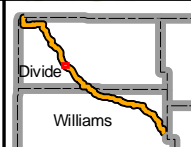
Date: 12/06/2011 Version: 2011 - 7



KC HARVEY ENVIRONMENTAL, LLC
 376 Gallatin Park Drive
 Bozeman, Montana 59715
 Phone: 406-585-7402
 Fax: 406-585-7428



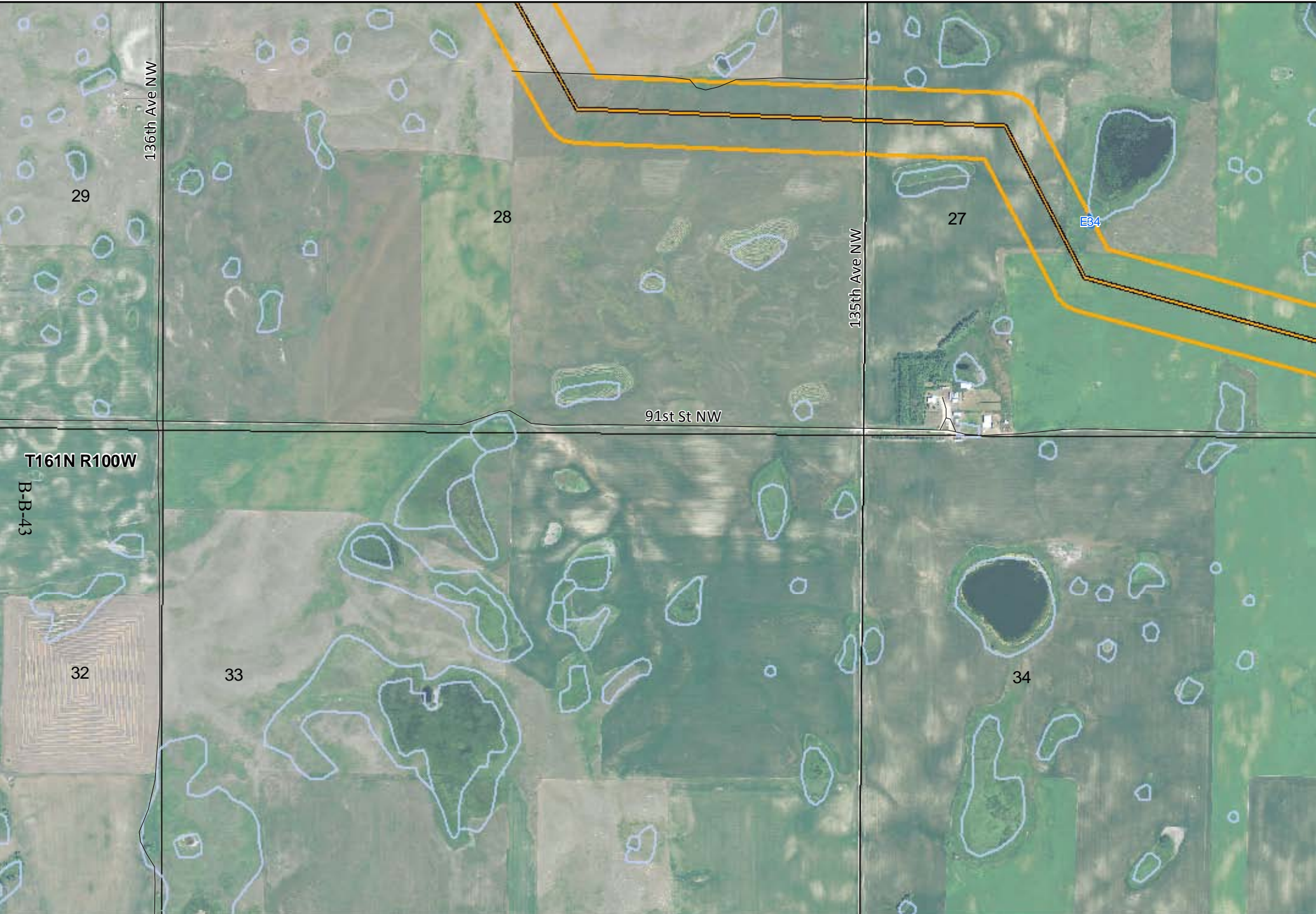
Pipeline with 16ft buffer	Vehicular Trail (4WD)	Waterfowl Production Area
500 ft corridor	Secondary Road	National Wildlife Refuge
SEH Confirmed Wetlands	Private Road for service vehicles	North Dakota Game and Fish
NWI Wetlands	Local Neighborhood Road	North Dakota Land Department
		US Bureau of Land Management



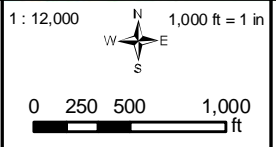
Mistral Energy Inc., Vantage Pipeline Project

Proposed Pipeline Route
 1:12,000 Map Book
 Sheet: 8N

Date: 12/06/2011 Version: 2011 - 7



KC HARVEY ENVIRONMENTAL, LLC
 376 Gallatin Park Drive
 Bozeman, Montana 59715
 Phone: 406-585-7402
 Fax: 406-585-7428



- Pipeline with 16ft buffer
- 500 ft corridor
- SEH Confirmed Wetlands
- NWI Wetlands
- Vehicular Trail (4WD)
- Secondary Road
- Private Road for service vehicles
- Local Neighborhood Road
- Waterfowl Production Area
- National Wildlife Refuge
- North Dakota Game and Fish
- North Dakota Land Department
- US Bureau of Land Management

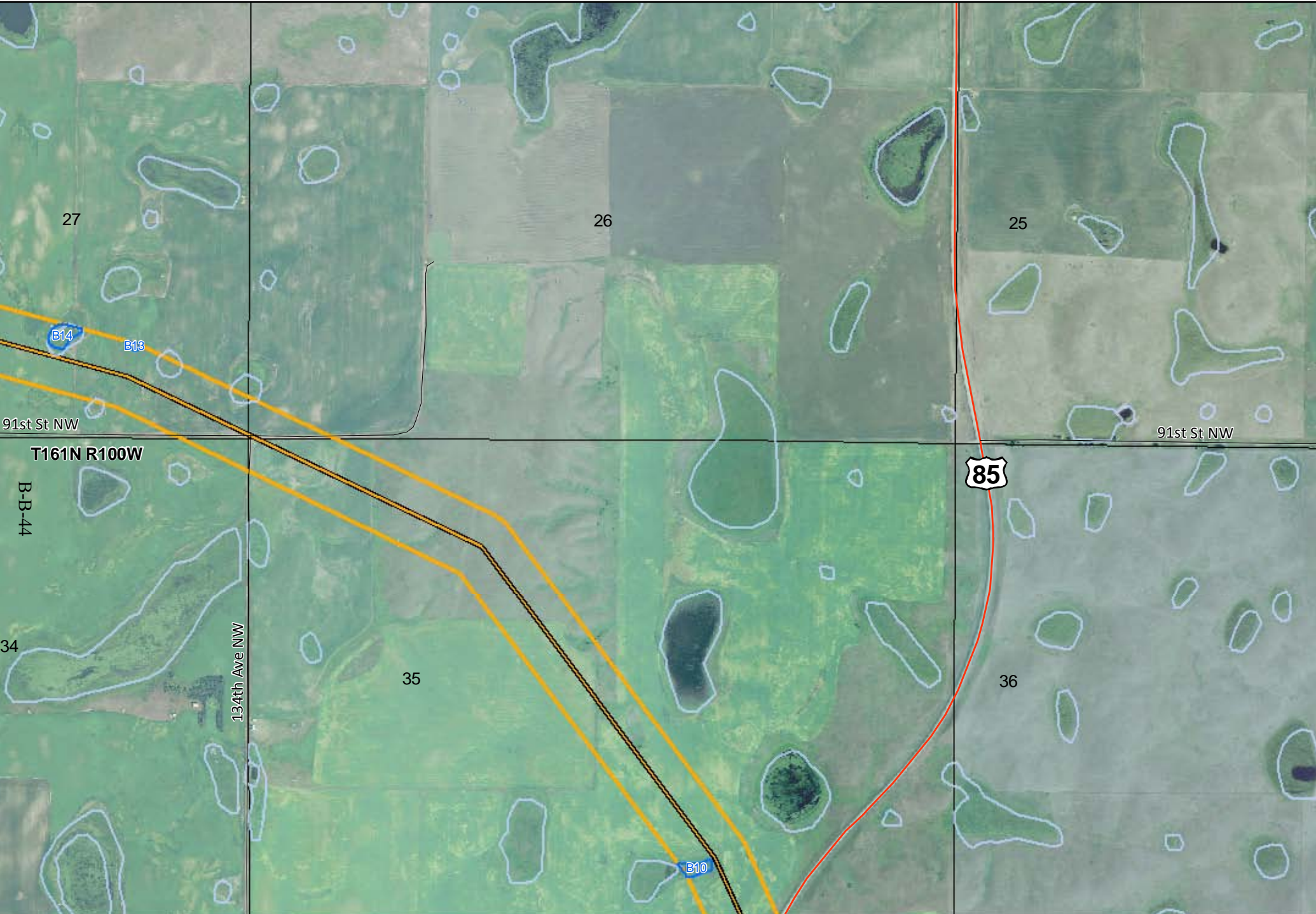


Mistral Energy Inc., Vantage Pipeline Project

Proposed Pipeline Route
 1:12,000 Map Book
 Sheet: 90

VANTAGE PIPELINE US LP

Date: 12/06/2011 Version: 2011 - 7



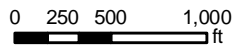
KC HARVEY
ENVIRONMENTAL, LLC

376 Gallatin Park Drive
 Bozeman, Montana 59715
 Phone: 406-585-7402
 Fax: 406-585-7428

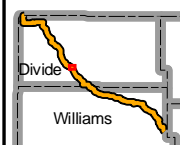
1 : 12,000



1,000 ft = 1 in



- | | | |
|---------------------------|-----------------------------------|------------------------------|
| Pipeline with 16ft buffer | Vehicular Trail (4WD) | Waterfowl Production Area |
| 500 ft corridor | Secondary Road | National Wildlife Refuge |
| SEH Confirmed Wetlands | Private Road for service vehicles | North Dakota Game and Fish |
| NWI Wetlands | Local Neighborhood Road | North Dakota Land Department |
| | | US Bureau of Land Management |



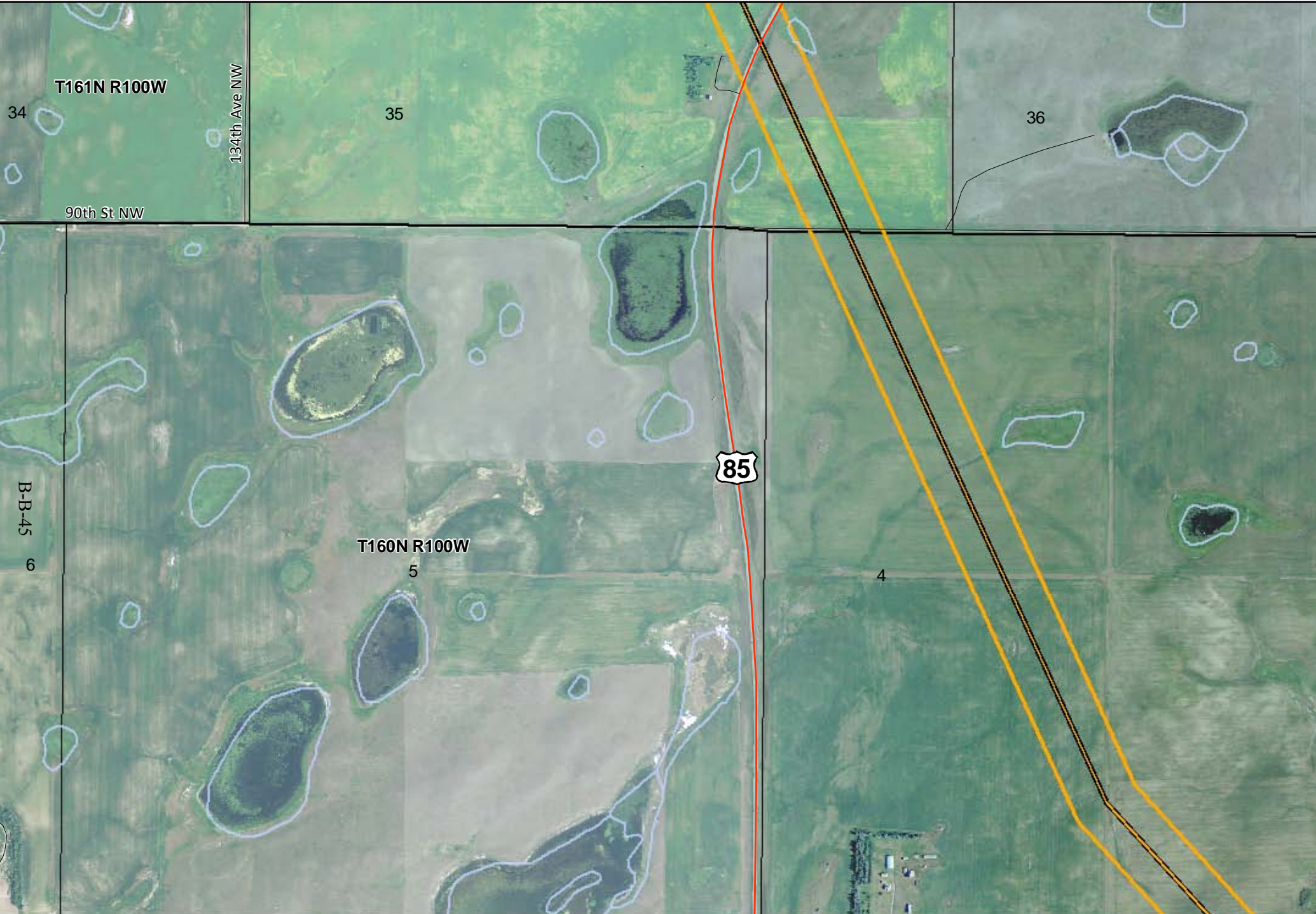
Mistral Energy Inc., Vantage Pipeline Project

Proposed Pipeline Route
 1:12,000 Map Book
 Sheet: 100

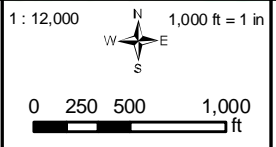


Date: 12/06/2011

Version: 2011 - 7



KC HARVEY ENVIRONMENTAL, LLC
 376 Gallatin Park Drive
 Bozeman, Montana 59715
 Phone: 406-585-7402
 Fax: 406-585-7428



- Pipeline with 16ft buffer
- 500 ft corridor
- SEH Confirmed Wetlands
- NWI Wetlands
- Vehicular Trail (4WD)
- Secondary Road
- Private Road for service vehicles
- Local Neighborhood Road
- Waterfowl Production Area
- National Wildlife Refuge
- North Dakota Game and Fish
- North Dakota Land Department
- US Bureau of Land Management



Mistral Energy Inc., Vantage Pipeline Project

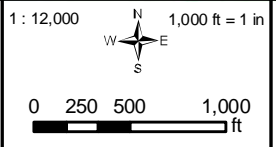
Proposed Pipeline Route
 1:12,000 Map Book
 Sheet: 10P

VANTAGE PIPELINE US LP

Date: 12/06/2011 Version: 2011 - 7



KC HARVEY ENVIRONMENTAL, LLC
 376 Gallatin Park Drive
 Bozeman, Montana 59715
 Phone: 406-585-7402
 Fax: 406-585-7428



- Pipeline with 16ft buffer
- 500 ft corridor
- SEH Confirmed Wetlands
- NWI Wetlands
- Vehicular Trail (4WD)
- Secondary Road
- Private Road for service vehicles
- Local Neighborhood Road
- Waterfowl Production Area
- National Wildlife Refuge
- North Dakota Game and Fish
- North Dakota Land Department
- US Bureau of Land Management



Mistral Energy Inc., Vantage Pipeline Project

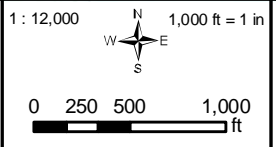
Proposed Pipeline Route
 1:12,000 Map Book
 Sheet: 11Q

VANTAGE PIPELINE US LP

Date: 12/06/2011 Version: 2011 - 7



KC HARVEY ENVIRONMENTAL, LLC
 376 Gallatin Park Drive
 Bozeman, Montana 59715
 Phone: 406-585-7402
 Fax: 406-585-7428



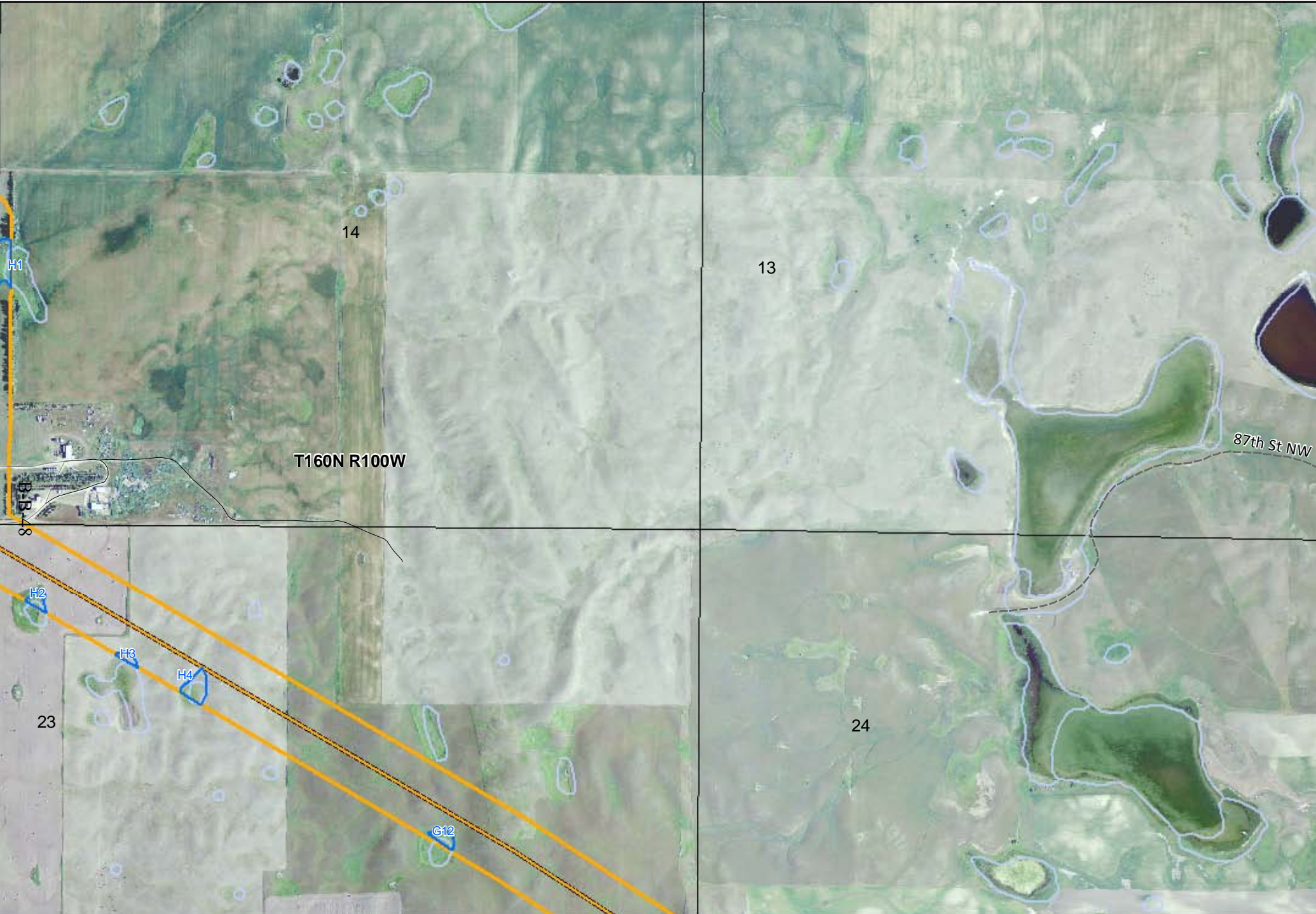
- Pipeline with 16ft buffer
- 500 ft corridor
- SEH Confirmed Wetlands
- NWI Wetlands
- Vehicular Trail (4WD)
- Secondary Road
- Private Road for service vehicles
- Local Neighborhood Road
- Waterfowl Production Area
- National Wildlife Refuge
- North Dakota Game and Fish
- North Dakota Land Department
- US Bureau of Land Management



Mistral Energy Inc., Vantage Pipeline Project

Proposed Pipeline Route
 1:12,000 Map Book
 Sheet: 11R

Date: 12/06/2011 Version: 2011 - 7



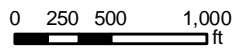
KC HARVEY
ENVIRONMENTAL, LLC

376 Gallatin Park Drive
Bozeman, Montana 59715
Phone: 406-585-7402
Fax: 406-585-7428

1 : 12,000



1,000 ft = 1 in



- | | | |
|---------------------------|-----------------------------------|------------------------------|
| Pipeline with 16ft buffer | Vehicular Trail (4WD) | Waterfowl Production Area |
| 500 ft corridor | Secondary Road | National Wildlife Refuge |
| SEH Confirmed Wetlands | Private Road for service vehicles | North Dakota Game and Fish |
| NWI Wetlands | Local Neighborhood Road | North Dakota Land Department |
| | | US Bureau of Land Management |



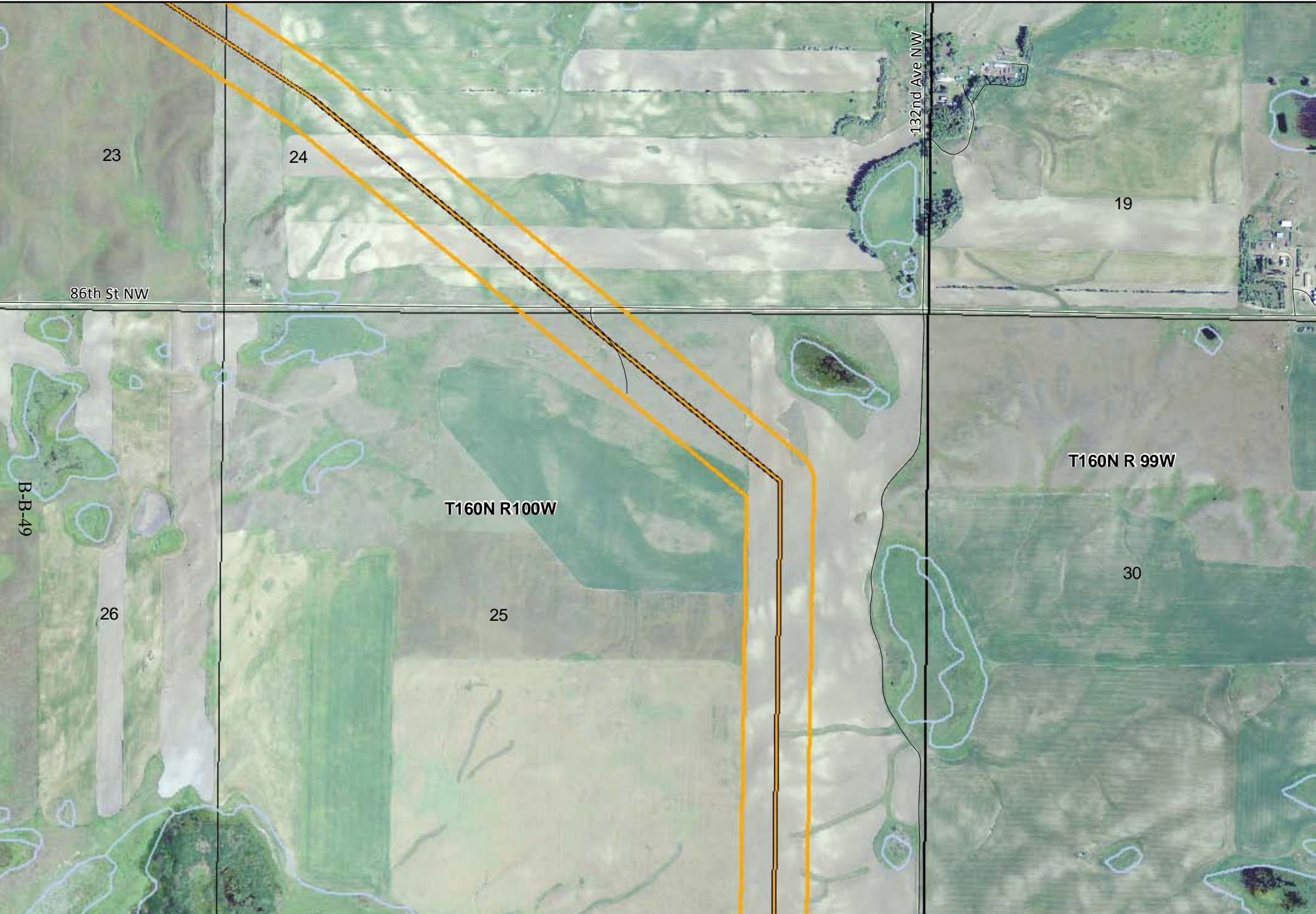
Mistral Energy Inc., Vantage Pipeline Project

Proposed Pipeline Route
1:12,000 Map Book
Sheet: 12R

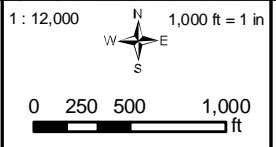


Date: 12/06/2011

Version: 2011 - 7



KC HARVEY ENVIRONMENTAL, LLC
 376 Gallatin Park Drive
 Bozeman, Montana 59715
 Phone: 406-585-7402
 Fax: 406-585-7428



- Pipeline with 16ft buffer
- 500 ft corridor
- SEH Confirmed Wetlands
- NWI Wetlands
- Vehicular Trail (4WD)
- Secondary Road
- Private Road for service vehicles
- Local Neighborhood Road
- Waterfowl Production Area
- National Wildlife Refuge
- North Dakota Game and Fish
- North Dakota Land Department
- US Bureau of Land Management

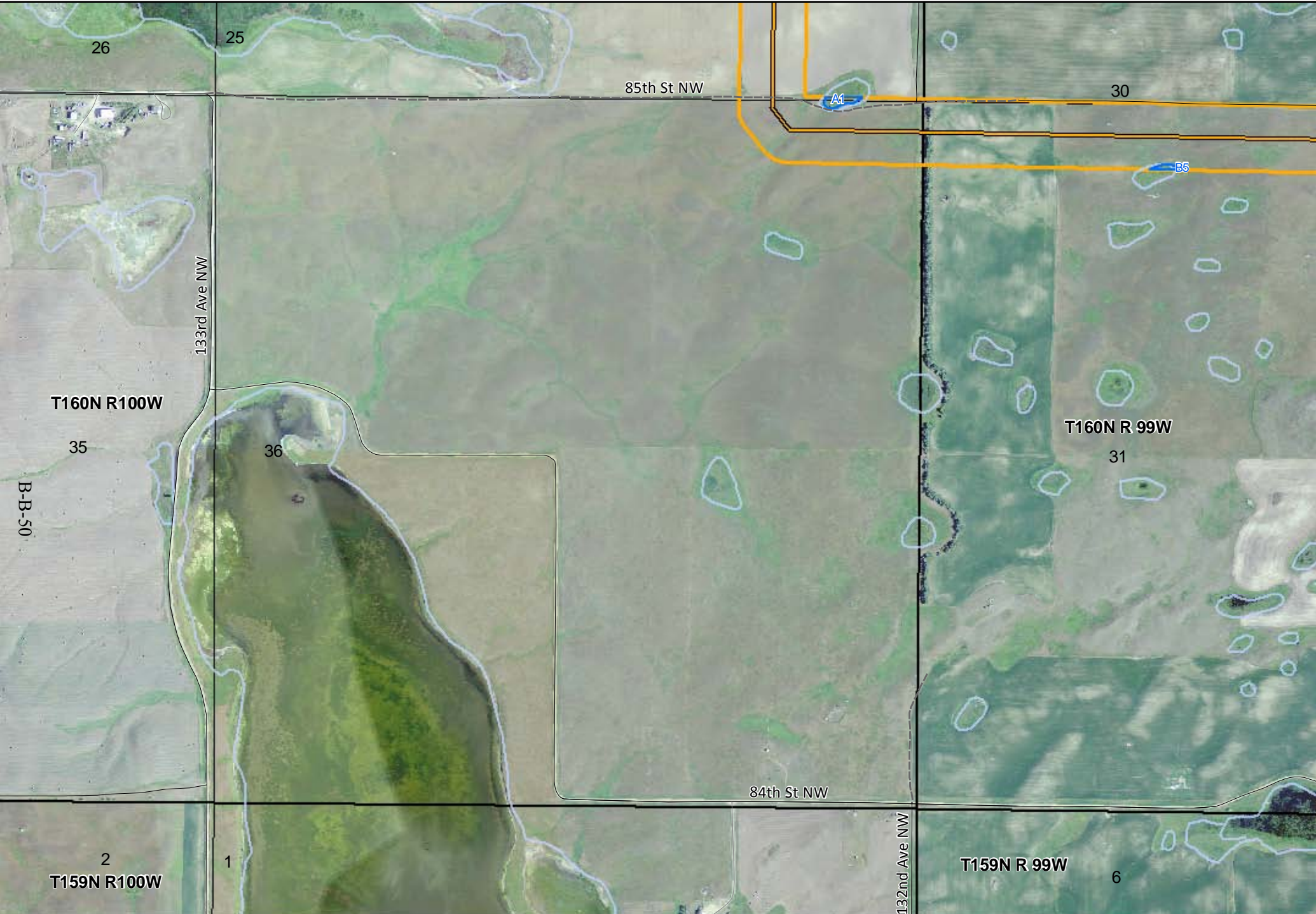


Mistral Energy Inc., Vantage Pipeline Project

Proposed Pipeline Route
 1:12,000 Map Book
 Sheet: 12S

VANTAGE PIPELINE US LP

Date: 12/06/2011 Version: 2011 - 7



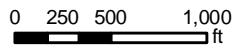
KC HARVEY
ENVIRONMENTAL, LLC

376 Gallatin Park Drive
 Bozeman, Montana 59715
 Phone: 406-585-7402
 Fax: 406-585-7428

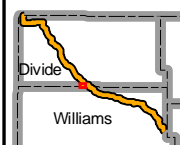
1 : 12,000



1,000 ft = 1 in



- | | | |
|---------------------------|-----------------------------------|------------------------------|
| Pipeline with 16ft buffer | Vehicular Trail (4WD) | Waterfowl Production Area |
| 500 ft corridor | Secondary Road | National Wildlife Refuge |
| SEH Confirmed Wetlands | Private Road for service vehicles | North Dakota Game and Fish |
| NWI Wetlands | Local Neighborhood Road | North Dakota Land Department |
| | | US Bureau of Land Management |



Mistral Energy Inc., Vantage Pipeline Project

Proposed Pipeline Route
 1:12,000 Map Book
 Sheet: 12T

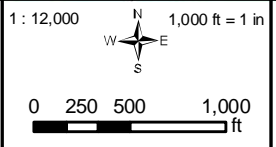


Date: 12/06/2011

Version: 2011 - 7



KC HARVEY ENVIRONMENTAL, LLC
 376 Gallatin Park Drive
 Bozeman, Montana 59715
 Phone: 406-585-7402
 Fax: 406-585-7428



- Pipeline with 16ft buffer
- 500 ft corridor
- SEH Confirmed Wetlands
- NWI Wetlands
- Vehicular Trail (4WD)
- Secondary Road
- Private Road for service vehicles
- Local Neighborhood Road
- Waterfowl Production Area
- National Wildlife Refuge
- North Dakota Game and Fish
- North Dakota Land Department
- US Bureau of Land Management

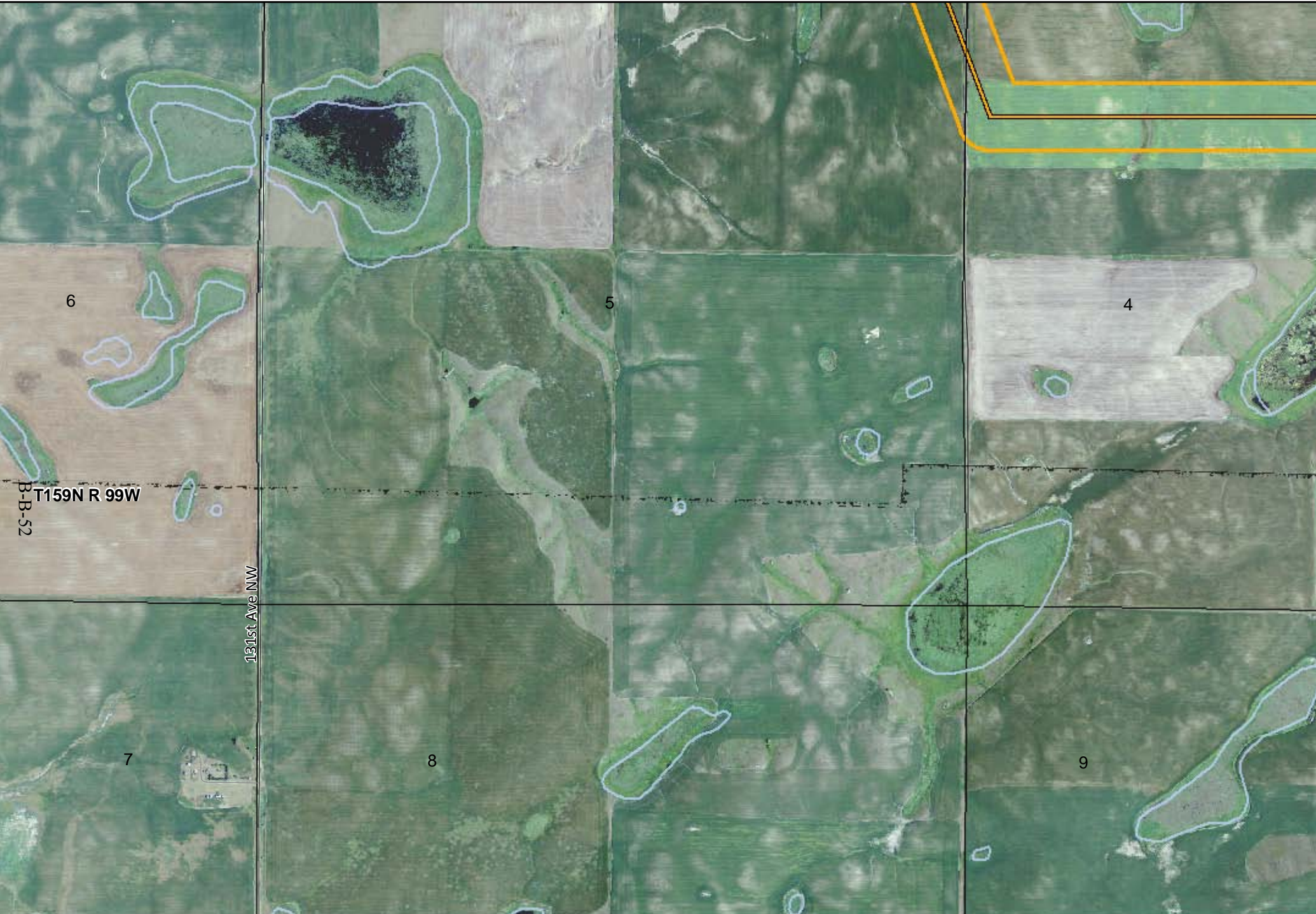


Mistral Energy Inc., Vantage Pipeline Project

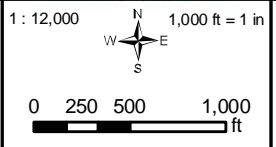
Proposed Pipeline Route
 1:12,000 Map Book
 Sheet: 13T

VANTAGE PIPELINE US LP

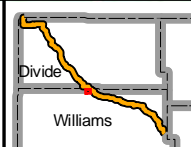
Date: 12/06/2011 Version: 2011 - 7



KC HARVEY
ENVIRONMENTAL, LLC
 376 Gallatin Park Drive
 Bozeman, Montana 59715
 Phone: 406-585-7402
 Fax: 406-585-7428



- | | | |
|---------------------------|-----------------------------------|------------------------------|
| Pipeline with 16ft buffer | Vehicular Trail (4WD) | Waterfowl Production Area |
| 500 ft corridor | Secondary Road | National Wildlife Refuge |
| SEH Confirmed Wetlands | Private Road for service vehicles | North Dakota Game and Fish |
| NWI Wetlands | Local Neighborhood Road | North Dakota Land Department |
| | | US Bureau of Land Management |

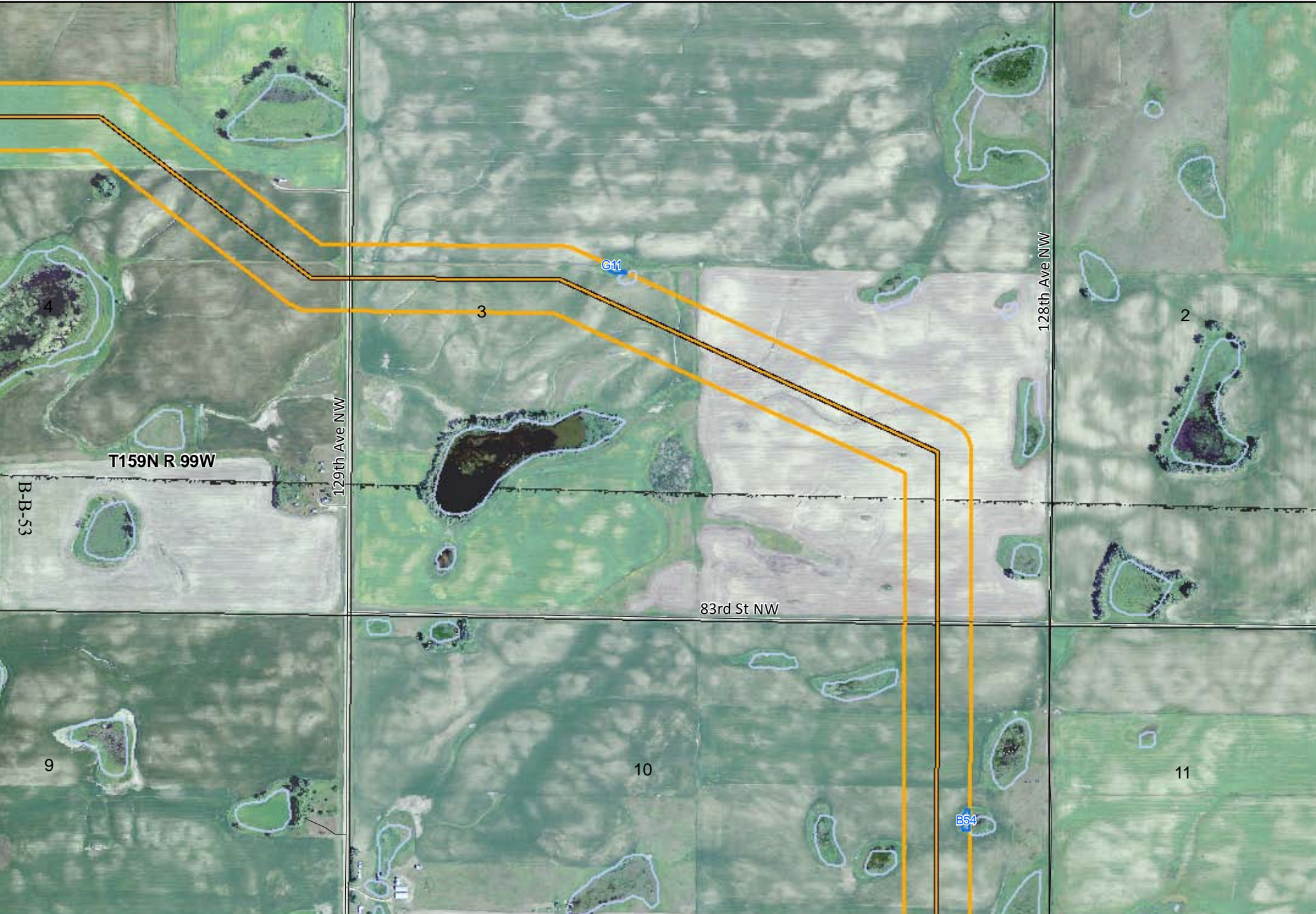


Mistral Energy Inc., Vantage Pipeline Project

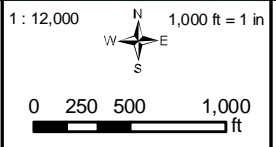
Proposed Pipeline Route
 1:12,000 Map Book
 Sheet: 13U

VANTAGE
 PIPELINE US LP

Date: 12/06/2011 Version: 2011 - 7



KC HARVEY ENVIRONMENTAL, LLC
 376 Gallatin Park Drive
 Bozeman, Montana 59715
 Phone: 406-585-7402
 Fax: 406-585-7428



- | | | |
|---------------------------|-----------------------------------|------------------------------|
| Pipeline with 16ft buffer | Vehicular Trail (4WD) | Waterfowl Production Area |
| 500 ft corridor | Secondary Road | National Wildlife Refuge |
| SEH Confirmed Wetlands | Private Road for service vehicles | North Dakota Game and Fish |
| NWI Wetlands | Local Neighborhood Road | North Dakota Land Department |
| | | US Bureau of Land Management |

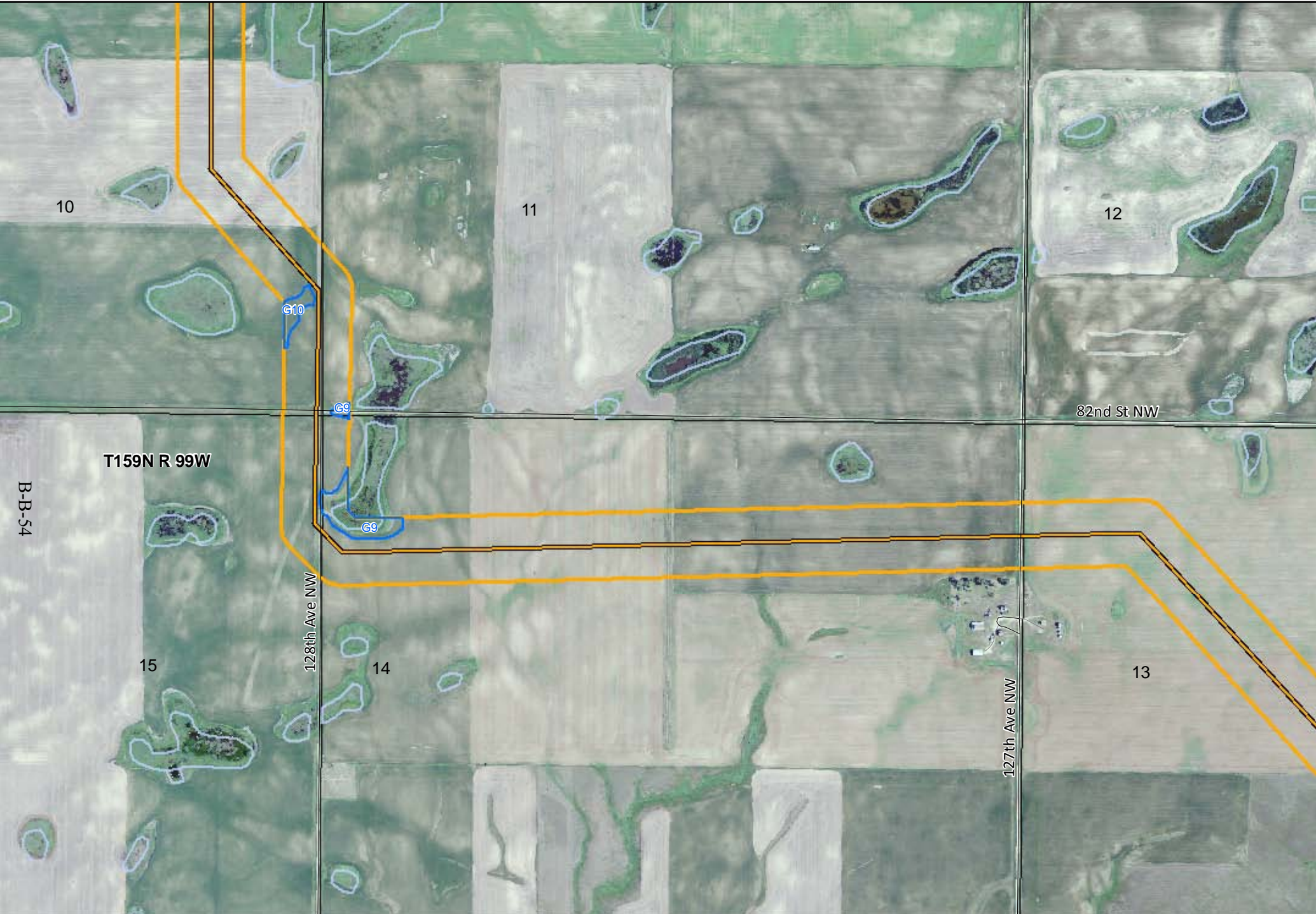


Mistral Energy Inc., Vantage Pipeline Project

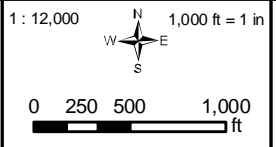
Proposed Pipeline Route
 1:12,000 Map Book
 Sheet: 14U

VANTAGE PIPELINE US LP

Date: 12/06/2011 Version: 2011 - 7



KC HARVEY ENVIRONMENTAL, LLC
 376 Gallatin Park Drive
 Bozeman, Montana 59715
 Phone: 406-585-7402
 Fax: 406-585-7428



- Pipeline with 16ft buffer
- 500 ft corridor
- SEH Confirmed Wetlands
- NWI Wetlands
- Vehicular Trail (4WD)
- Secondary Road
- Private Road for service vehicles
- Local Neighborhood Road
- Waterfowl Production Area
- National Wildlife Refuge
- North Dakota Game and Fish
- North Dakota Land Department
- US Bureau of Land Management

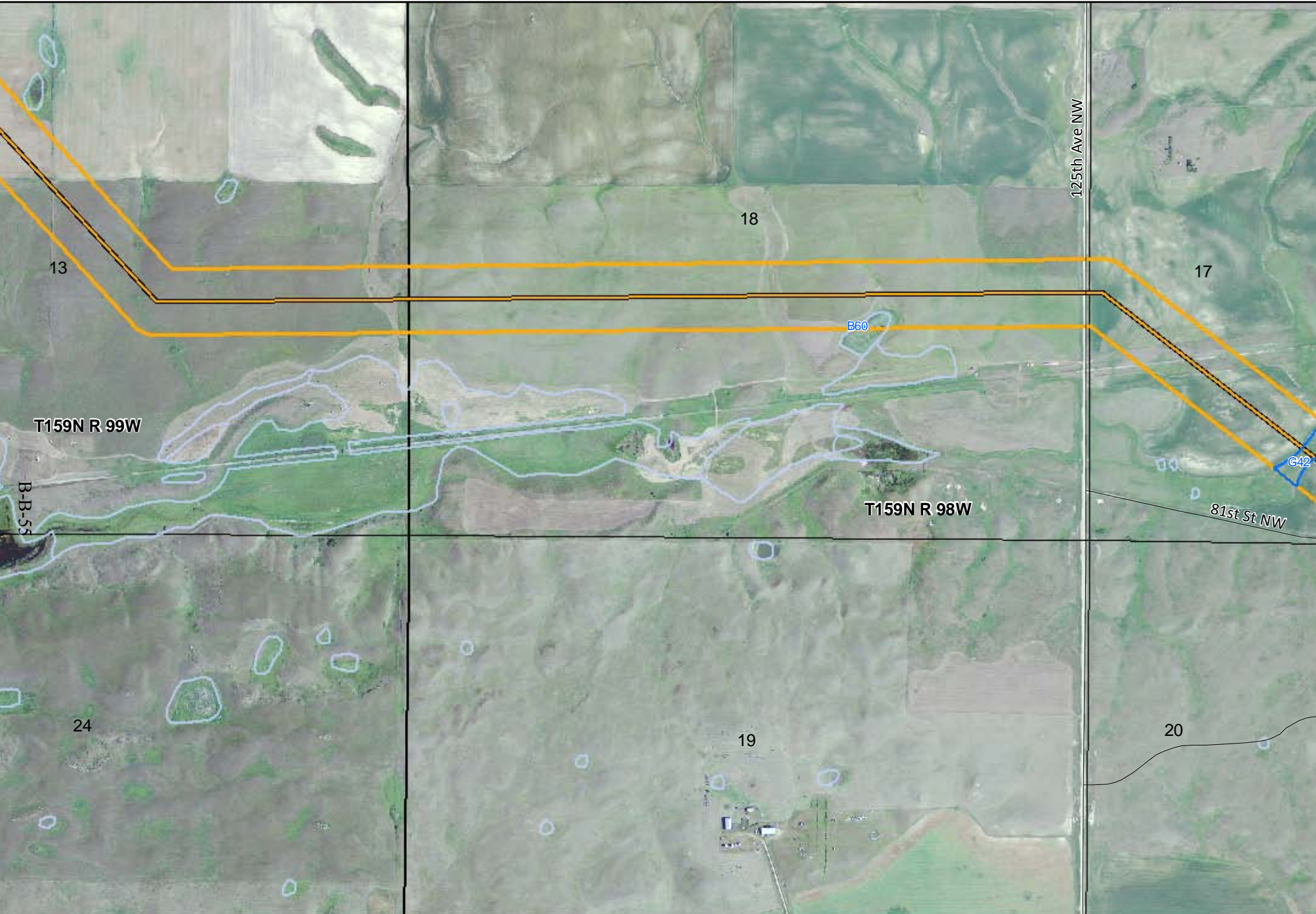


Mistral Energy Inc., Vantage Pipeline Project

Proposed Pipeline Route
 1:12,000 Map Book
 Sheet: 15V

VANTAGE PIPELINE US LP

Date: 12/06/2011 Version: 2011 - 7



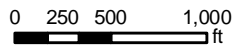
KC HARVEY
ENVIRONMENTAL, LLC

376 Gallatin Park Drive
Bozeman, Montana 59715
Phone: 406-585-7402
Fax: 406-585-7428

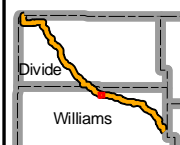
1 : 12,000



1,000 ft = 1 in



- Pipeline with 16ft buffer
- 500 ft corridor
- SEH Confirmed Wetlands
- NWI Wetlands
- Vehicular Trail (4WD)
- Secondary Road
- Private Road for service vehicles
- Local Neighborhood Road
- Waterfowl Production Area
- National Wildlife Refuge
- North Dakota Game and Fish
- North Dakota Land Department
- US Bureau of Land Management



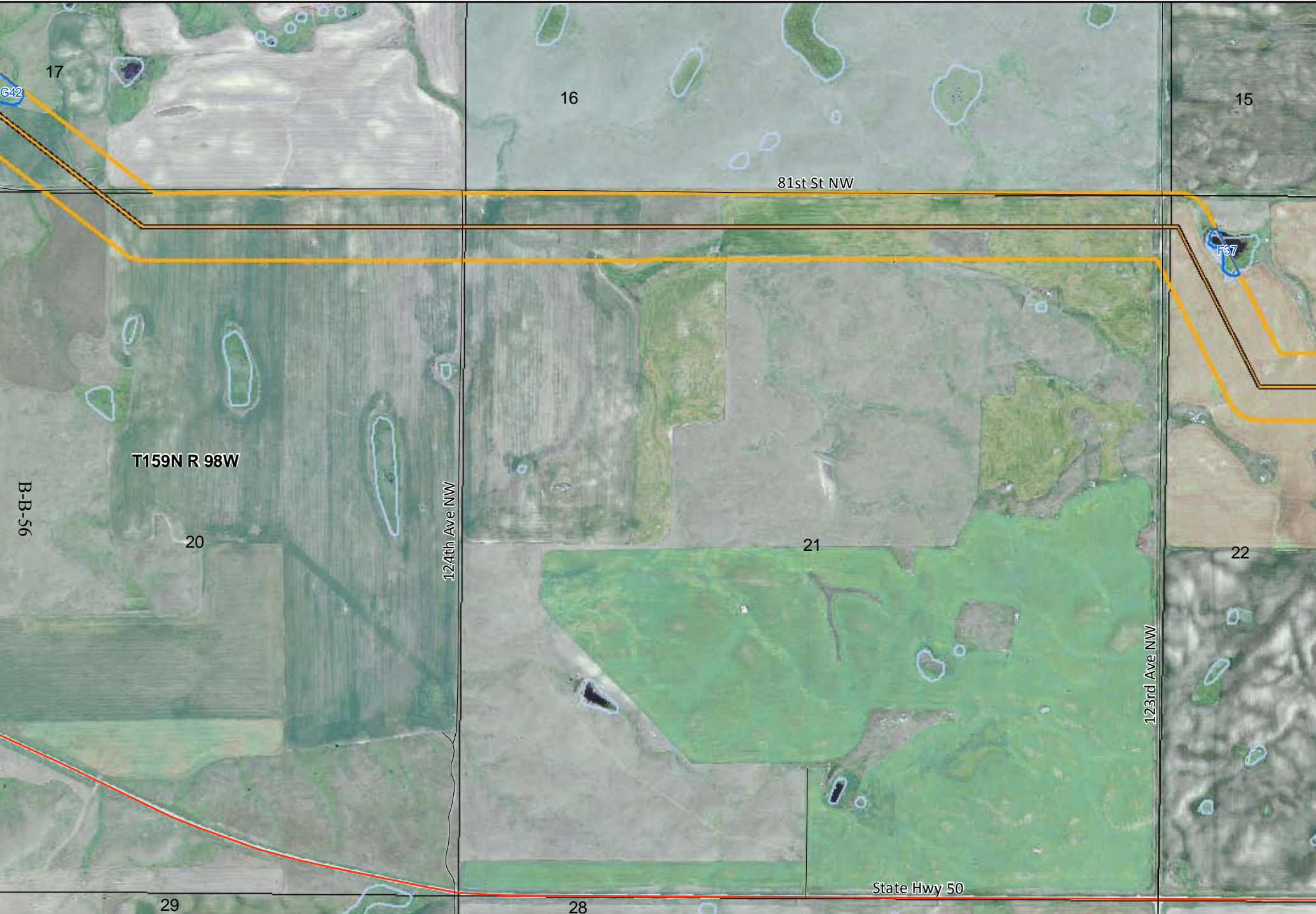
Mistral Energy Inc., Vantage Pipeline Project

Proposed Pipeline Route
1:12,000 Map Book
Sheet: 16V



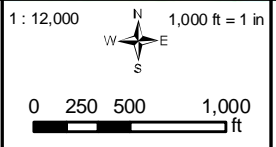
Date: 12/06/2011

Version: 2011 - 7



KC HARVEY
ENVIRONMENTAL, LLC

376 Gallatin Park Drive
 Bozeman, Montana 59715
 Phone: 406-585-7402
 Fax: 406-585-7428



- Pipeline with 16ft buffer
- 500 ft corridor
- SEH Confirmed Wetlands
- NWI Wetlands
- Vehicular Trail (4WD)
- Secondary Road
- Private Road for service vehicles
- Local Neighborhood Road
- Waterfowl Production Area
- National Wildlife Refuge
- North Dakota Game and Fish
- North Dakota Land Department
- US Bureau of Land Management



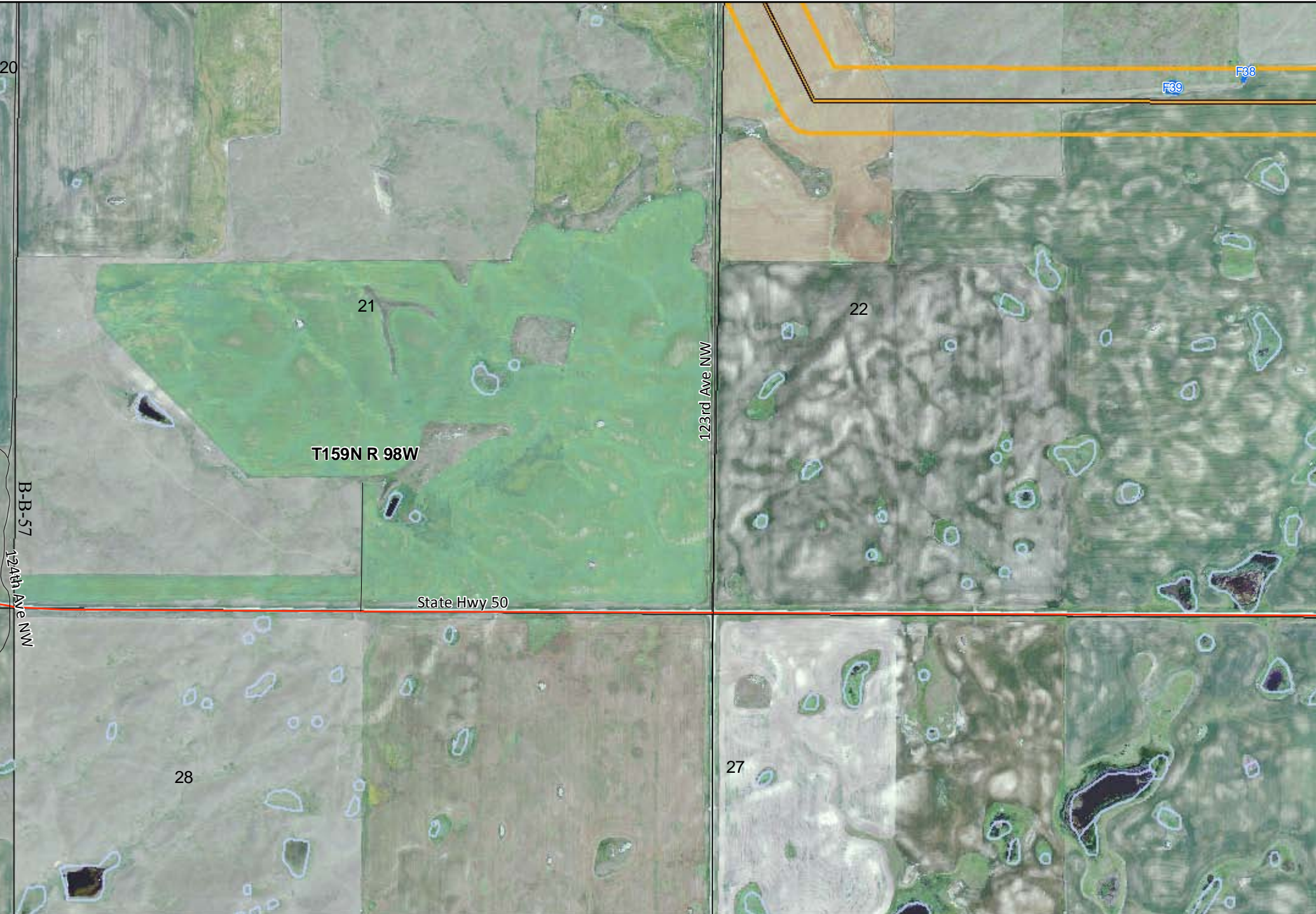
Mistral Energy Inc., Vantage Pipeline Project

Proposed Pipeline Route
 1:12,000 Map Book
 Sheet: 16W



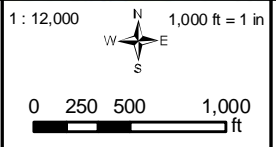
Date: 12/06/2011

Version: 2011 - 7

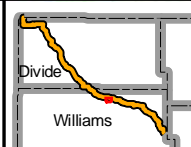


KC HARVEY
ENVIRONMENTAL, LLC

376 Gallatin Park Drive
 Bozeman, Montana 59715
 Phone: 406-585-7402
 Fax: 406-585-7428



- | | | |
|---------------------------|-----------------------------------|------------------------------|
| Pipeline with 16ft buffer | Vehicular Trail (4WD) | Waterfowl Production Area |
| 500 ft corridor | Secondary Road | National Wildlife Refuge |
| SEH Confirmed Wetlands | Private Road for service vehicles | North Dakota Game and Fish |
| NW1 Wetlands | Local Neighborhood Road | North Dakota Land Department |
| | | US Bureau of Land Management |



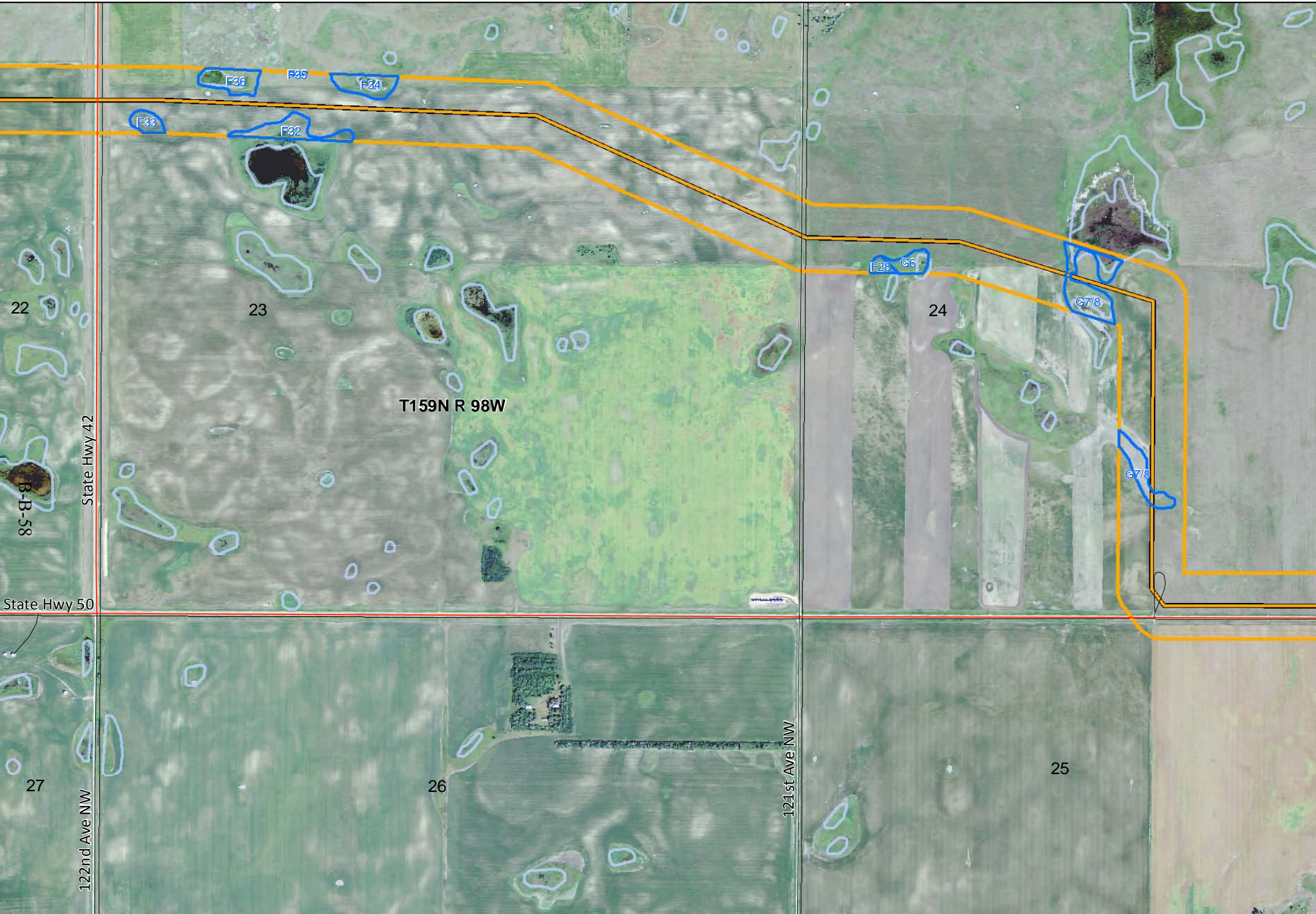
Mistral Energy Inc., Vantage Pipeline Project

Proposed Pipeline Route
 1:12,000 Map Book
 Sheet: 17X

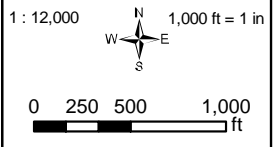


Date: 12/06/2011

Version: 2011 - 7



KC HARVEY ENVIRONMENTAL, LLC
 376 Gallatin Park Drive
 Bozeman, Montana 59715
 Phone: 406-585-7402
 Fax: 406-585-7428



- Pipeline with 16ft buffer
- 500 ft corridor
- SEH Confirmed Wetlands
- NWI Wetlands
- Vehicular Trail (4WD)
- Secondary Road
- Private Road for service vehicles
- Local Neighborhood Road
- Waterfowl Production Area
- National Wildlife Refuge
- North Dakota Game and Fish
- North Dakota Land Department
- US Bureau of Land Management

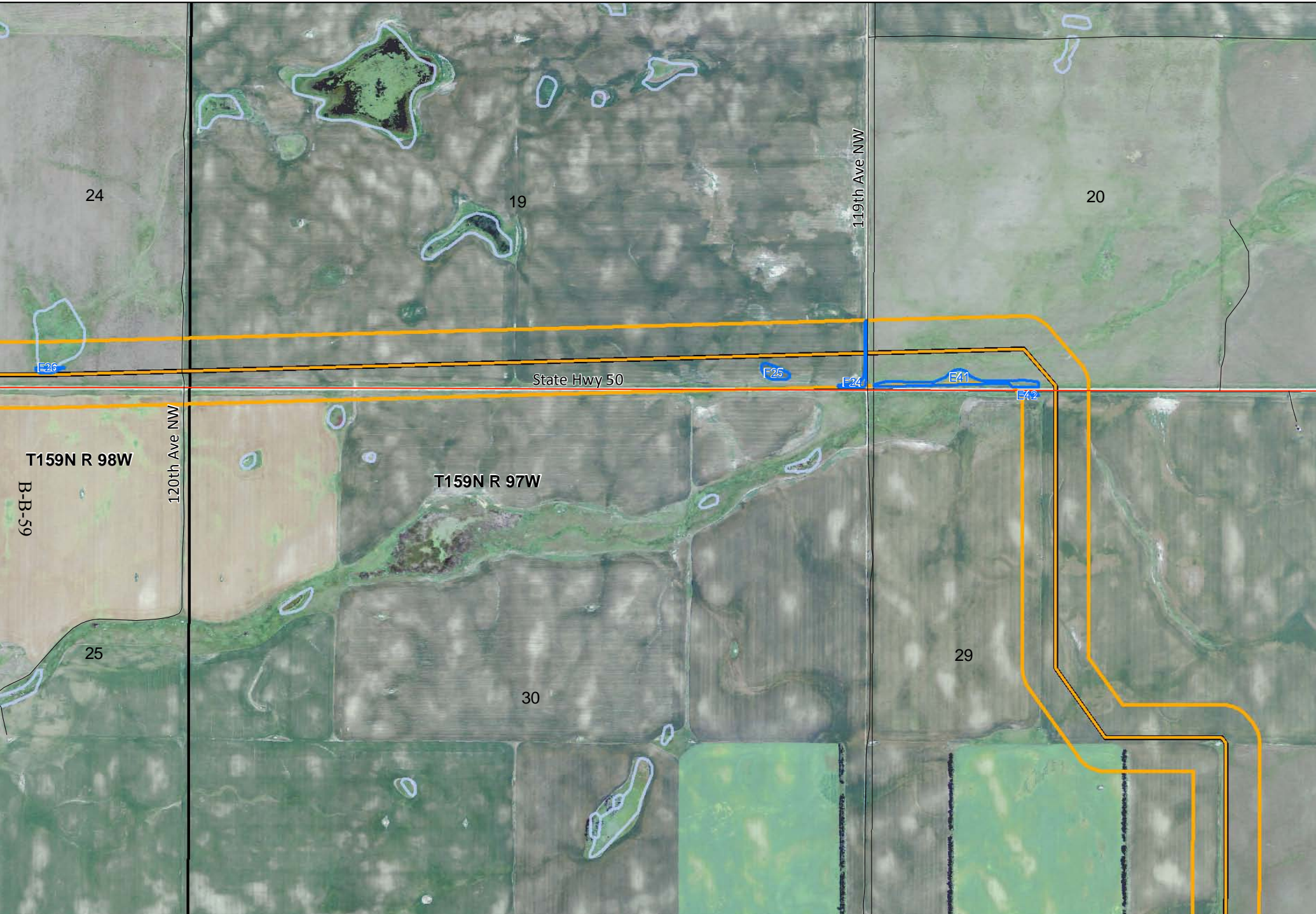


Mistral Energy Inc., Vantage Pipeline Project

Proposed Pipeline Route
 1:12,000 Map Book
 Sheet: 18X

VANTAGE PIPELINE US LP

Date: 12/06/2011 Version: 2011 - 7



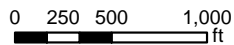
KC HARVEY
ENVIRONMENTAL, LLC

376 Gallatin Park Drive
 Bozeman, Montana 59715
 Phone: 406-585-7402
 Fax: 406-585-7428

1 : 12,000



1,000 ft = 1 in



- | | | |
|---------------------------|-----------------------------------|------------------------------|
| Pipeline with 16ft buffer | Vehicular Trail (4WD) | Waterfowl Production Area |
| 500 ft corridor | Secondary Road | National Wildlife Refuge |
| SEH Confirmed Wetlands | Private Road for service vehicles | North Dakota Game and Fish |
| NWI Wetlands | Local Neighborhood Road | North Dakota Land Department |
| | | US Bureau of Land Management |



Mistral Energy Inc., Vantage Pipeline Project

Proposed Pipeline Route
 1:12,000 Map Book
 Sheet: 19X

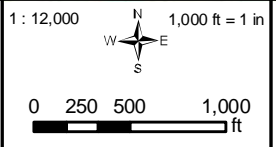


Date: 12/06/2011

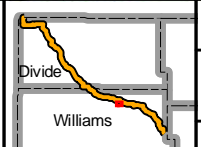
Version: 2011 - 7



KC HARVEY
ENVIRONMENTAL, LLC
 376 Gallatin Park Drive
 Bozeman, Montana 59715
 Phone: 406-585-7402
 Fax: 406-585-7428



- Pipeline with 16ft buffer
- 500 ft corridor
- SEH Confirmed Wetlands
- NWI Wetlands
- Vehicular Trail (4WD)
- Secondary Road
- Private Road for service vehicles
- Local Neighborhood Road
- Waterfowl Production Area
- National Wildlife Refuge
- North Dakota Game and Fish
- North Dakota Land Department
- US Bureau of Land Management

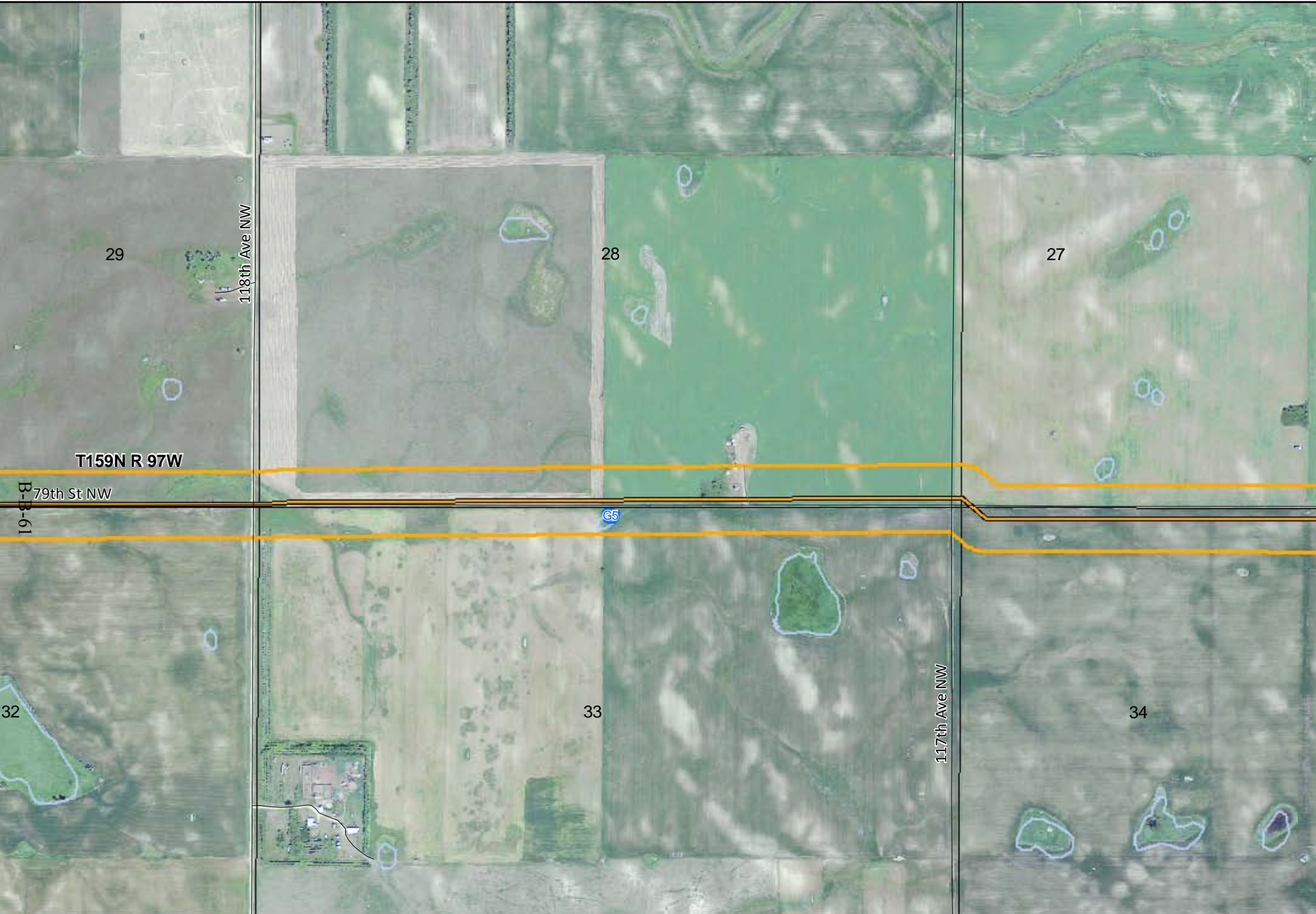


Mistral Energy Inc., Vantage Pipeline Project

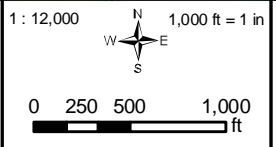
Proposed Pipeline Route
 1:12,000 Map Book
 Sheet: 19Y

VANTAGE
 PIPELINE US LP

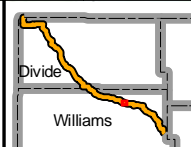
Date: 12/06/2011 Version: 2011 - 7



KC HARVEY ENVIRONMENTAL, LLC
 376 Gallatin Park Drive
 Bozeman, Montana 59715
 Phone: 406-585-7402
 Fax: 406-585-7428



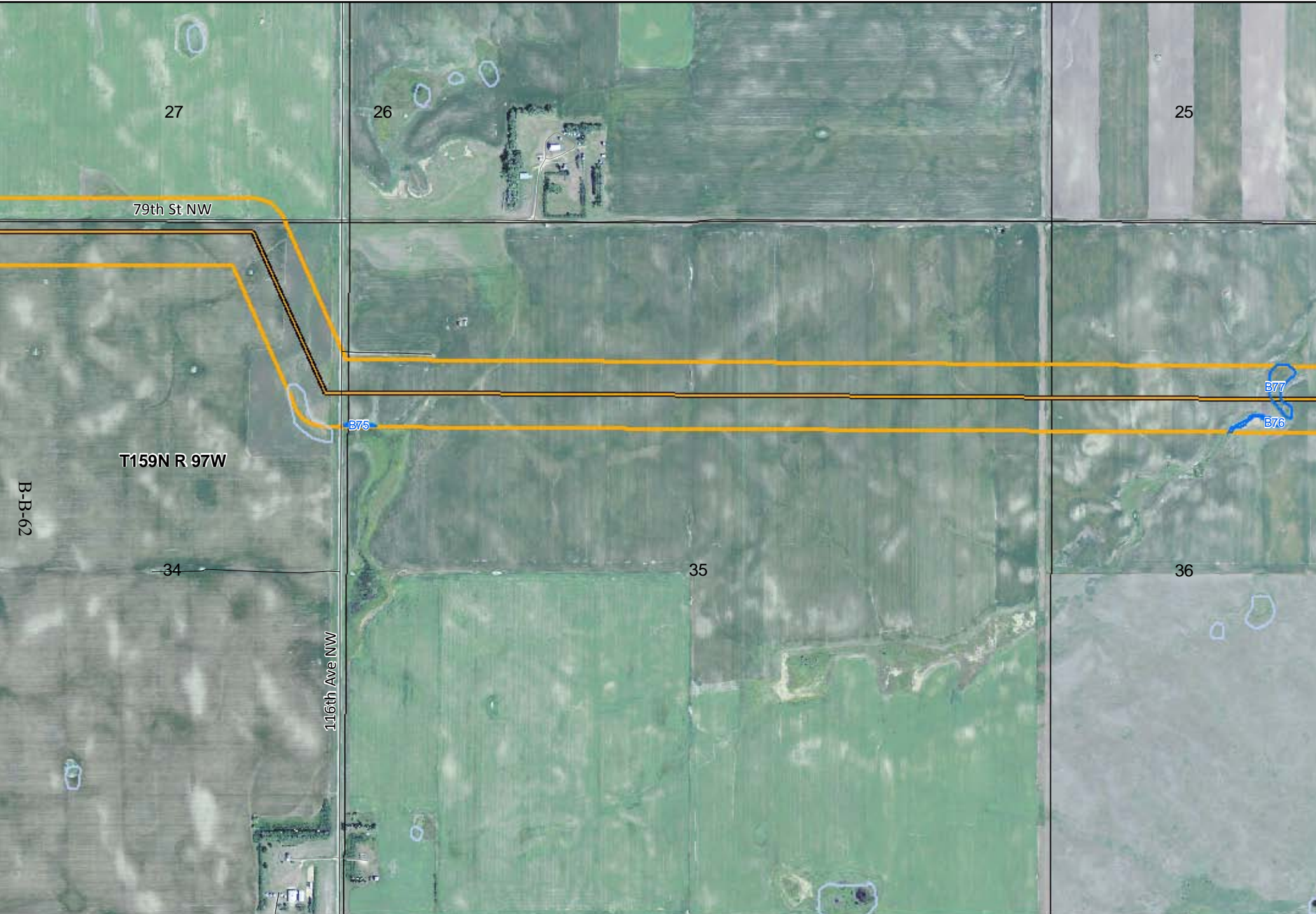
- Pipeline with 16ft buffer
- 500 ft corridor
- SEH Confirmed Wetlands
- NWI Wetlands
- Vehicular Trail (4WD)
- Secondary Road
- Private Road for service vehicles
- Local Neighborhood Road
- Waterfowl Production Area
- National Wildlife Refuge
- North Dakota Game and Fish
- North Dakota Land Department
- US Bureau of Land Management



Mistral Energy Inc., Vantage Pipeline Project

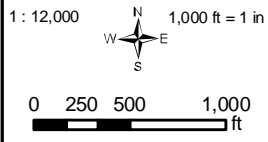
Proposed Pipeline Route
 1:12,000 Map Book
 Sheet: 20X

Date: 12/06/2011 Version: 2011 - 7

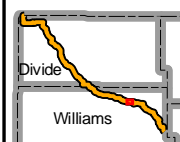


KC HARVEY
ENVIRONMENTAL, LLC

376 Gallatin Park Drive
 Bozeman, Montana 59715
 Phone: 406-585-7402
 Fax: 406-585-7428



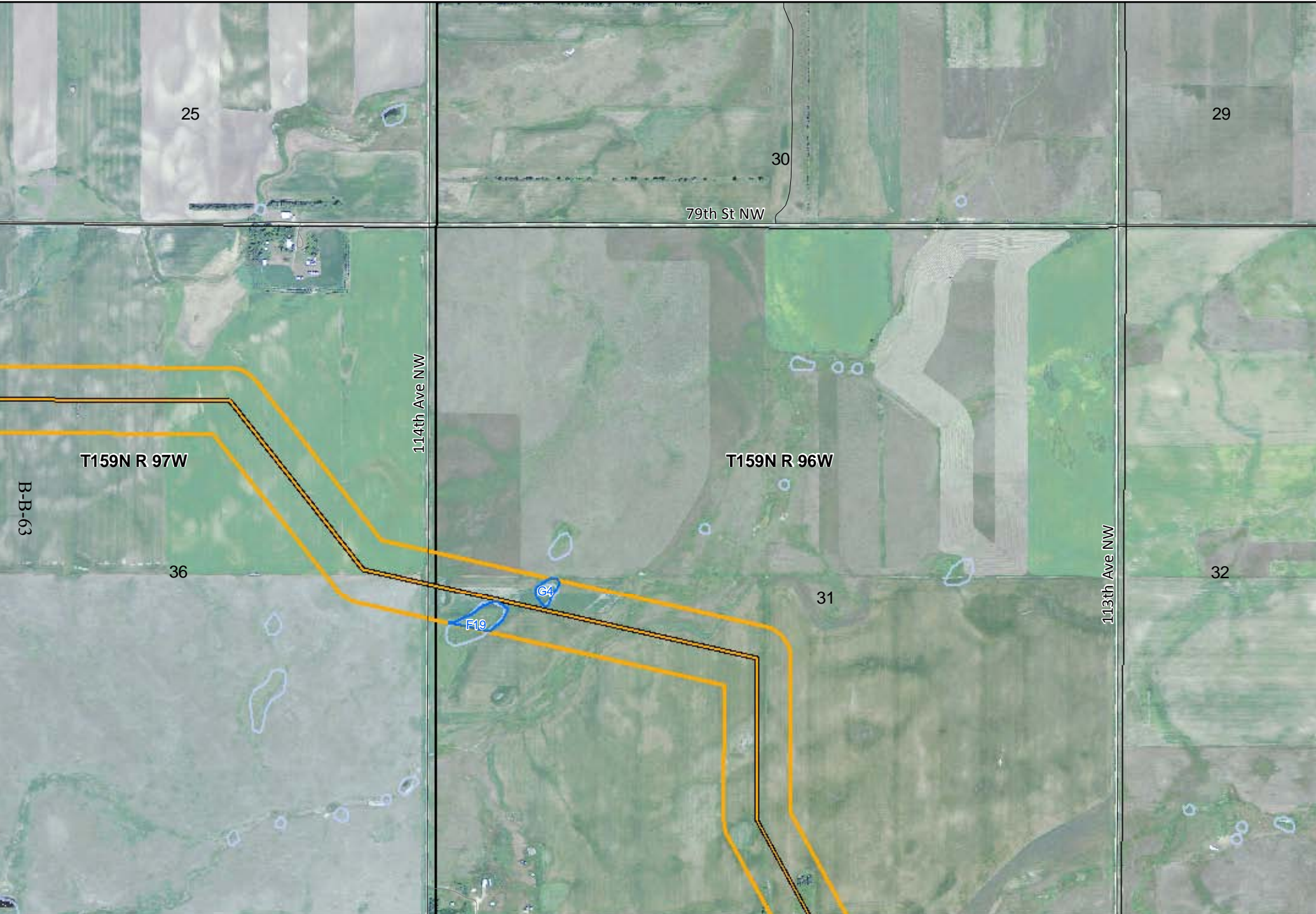
- | | | |
|---------------------------|-----------------------------------|------------------------------|
| Pipeline with 16ft buffer | Vehicular Trail (4WD) | Waterfowl Production Area |
| 500 ft corridor | Secondary Road | National Wildlife Refuge |
| SEH Confirmed Wetlands | Private Road for service vehicles | North Dakota Game and Fish |
| NWI Wetlands | Local Neighborhood Road | North Dakota Land Department |
| | | US Bureau of Land Management |



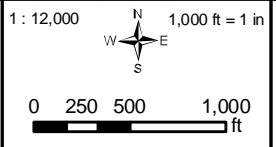
Mistral Energy Inc., Vantage Pipeline Project

Proposed Pipeline Route
 1:12,000 Map Book
 Sheet: 21Y

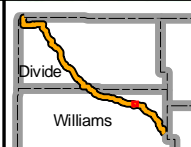
Date: 12/06/2011 Version: 2011 - 7



KC HARVEY ENVIRONMENTAL, LLC
 376 Gallatin Park Drive
 Bozeman, Montana 59715
 Phone: 406-585-7402
 Fax: 406-585-7428



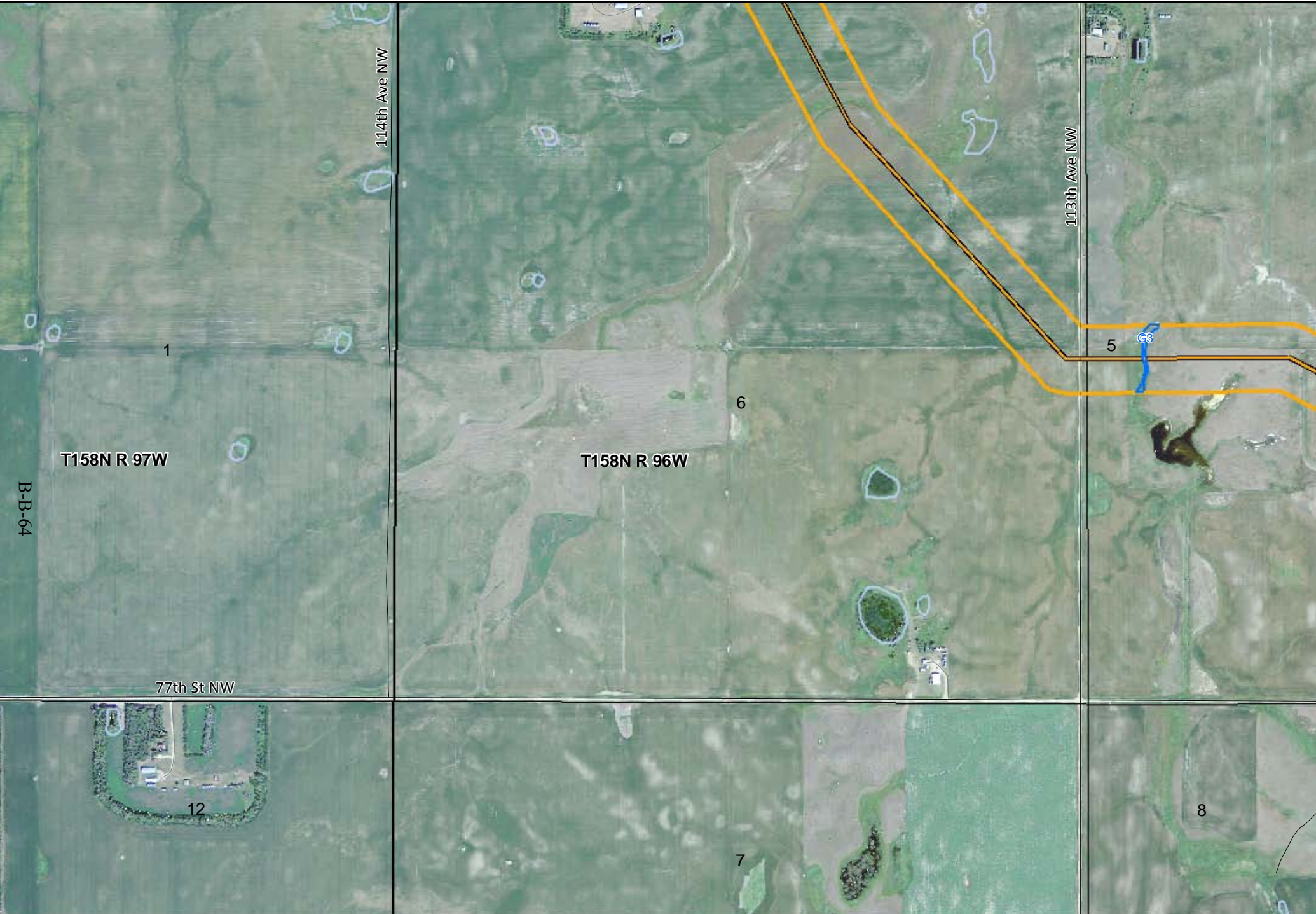
- Pipeline with 16ft buffer
- 500 ft corridor
- SEH Confirmed Wetlands
- NWI Wetlands
- Vehicular Trail (4WD)
- Secondary Road
- Private Road for service vehicles
- Local Neighborhood Road
- Waterfowl Production Area
- National Wildlife Refuge
- North Dakota Game and Fish
- North Dakota Land Department
- US Bureau of Land Management



Mistral Energy Inc., Vantage Pipeline Project

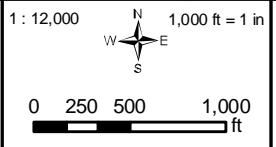
Proposed Pipeline Route
 1:12,000 Map Book
 Sheet: 22Y

Date: 12/06/2011 Version: 2011 - 7



KC HARVEY
ENVIRONMENTAL, LLC

376 Gallatin Park Drive
 Bozeman, Montana 59715
 Phone: 406-585-7402
 Fax: 406-585-7428



- | | | |
|---------------------------|-----------------------------------|------------------------------|
| Pipeline with 16ft buffer | Vehicular Trail (4WD) | Waterfowl Production Area |
| 500 ft corridor | Secondary Road | National Wildlife Refuge |
| SEH Confirmed Wetlands | Private Road for service vehicles | North Dakota Game and Fish |
| NWI Wetlands | Local Neighborhood Road | North Dakota Land Department |
| | | US Bureau of Land Management |



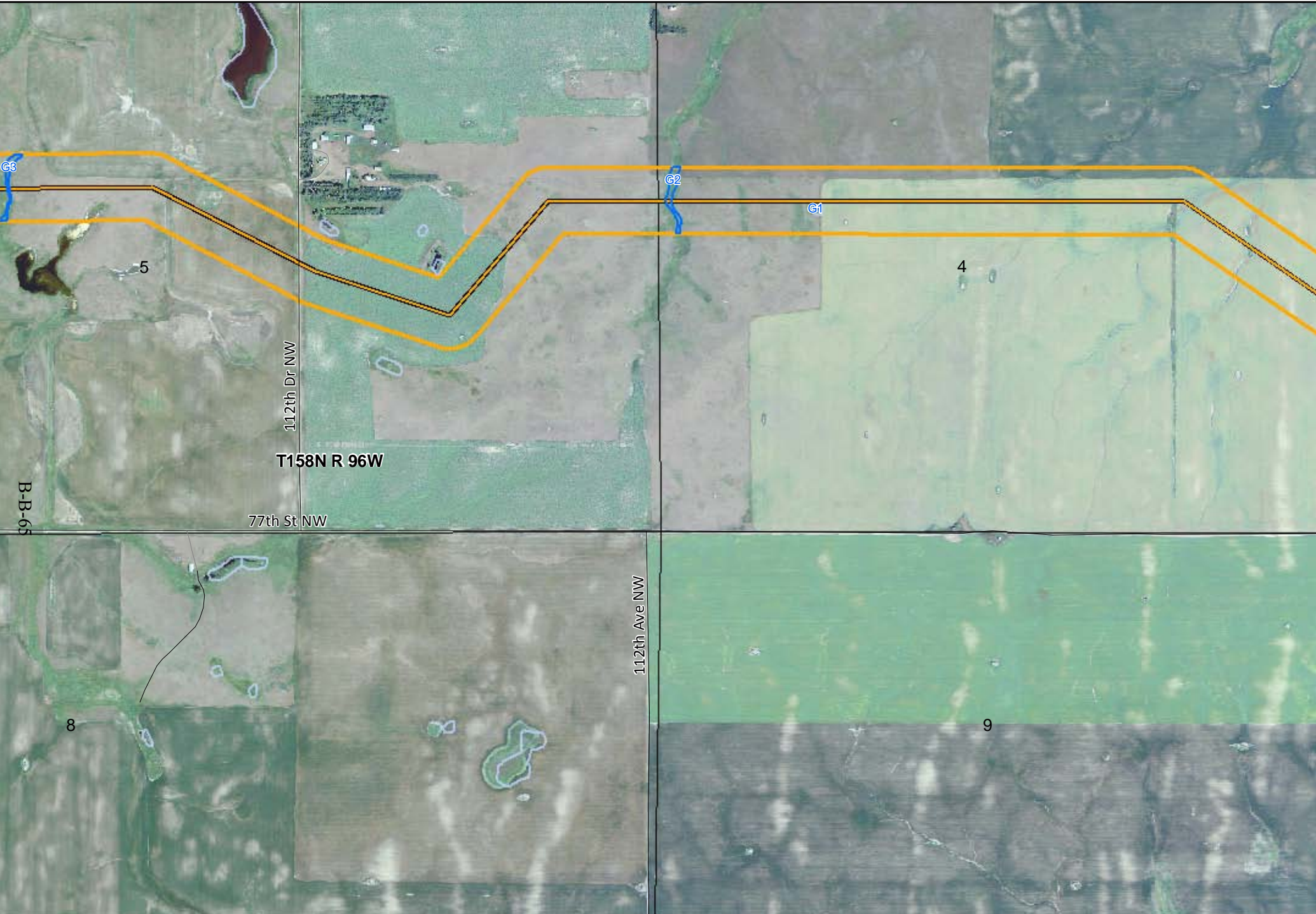
Mistral Energy Inc., Vantage Pipeline Project

Proposed Pipeline Route
 1:12,000 Map Book
 Sheet: 22Z

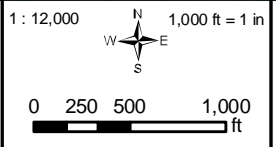


Date: 12/06/2011

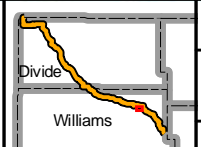
Version: 2011 - 7



KC HARVEY
ENVIRONMENTAL, LLC
 376 Gallatin Park Drive
 Bozeman, Montana 59715
 Phone: 406-585-7402
 Fax: 406-585-7428



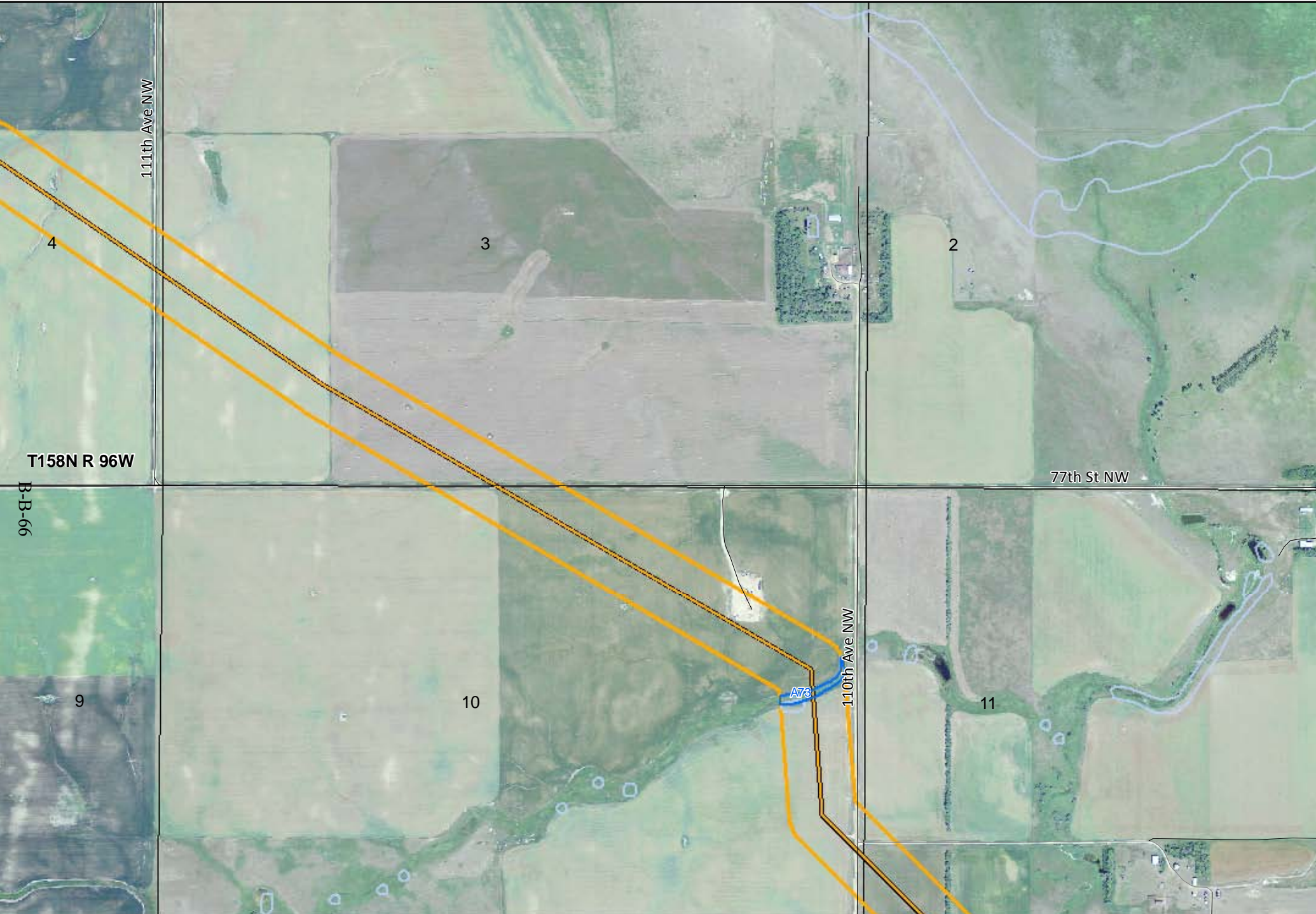
- | | | |
|---------------------------|-----------------------------------|------------------------------|
| Pipeline with 16ft buffer | Vehicular Trail (4WD) | Waterfowl Production Area |
| 500 ft corridor | Secondary Road | National Wildlife Refuge |
| SEH Confirmed Wetlands | Private Road for service vehicles | North Dakota Game and Fish |
| NWI Wetlands | Local Neighborhood Road | North Dakota Land Department |
| | | US Bureau of Land Management |



Mistral Energy Inc., Vantage Pipeline Project

Proposed Pipeline Route
 1:12,000 Map Book
 Sheet: 23Z

Date: 12/06/2011 Version: 2011 - 7



111th Ave NW

T158N R 96W

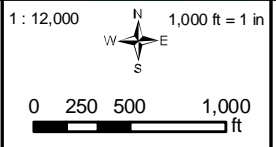
B-B-66

77th St NW

110th Ave NW

A73

KC HARVEY
ENVIRONMENTAL, LLC
 376 Gallatin Park Drive
 Bozeman, Montana 59715
 Phone: 406-585-7402
 Fax: 406-585-7428



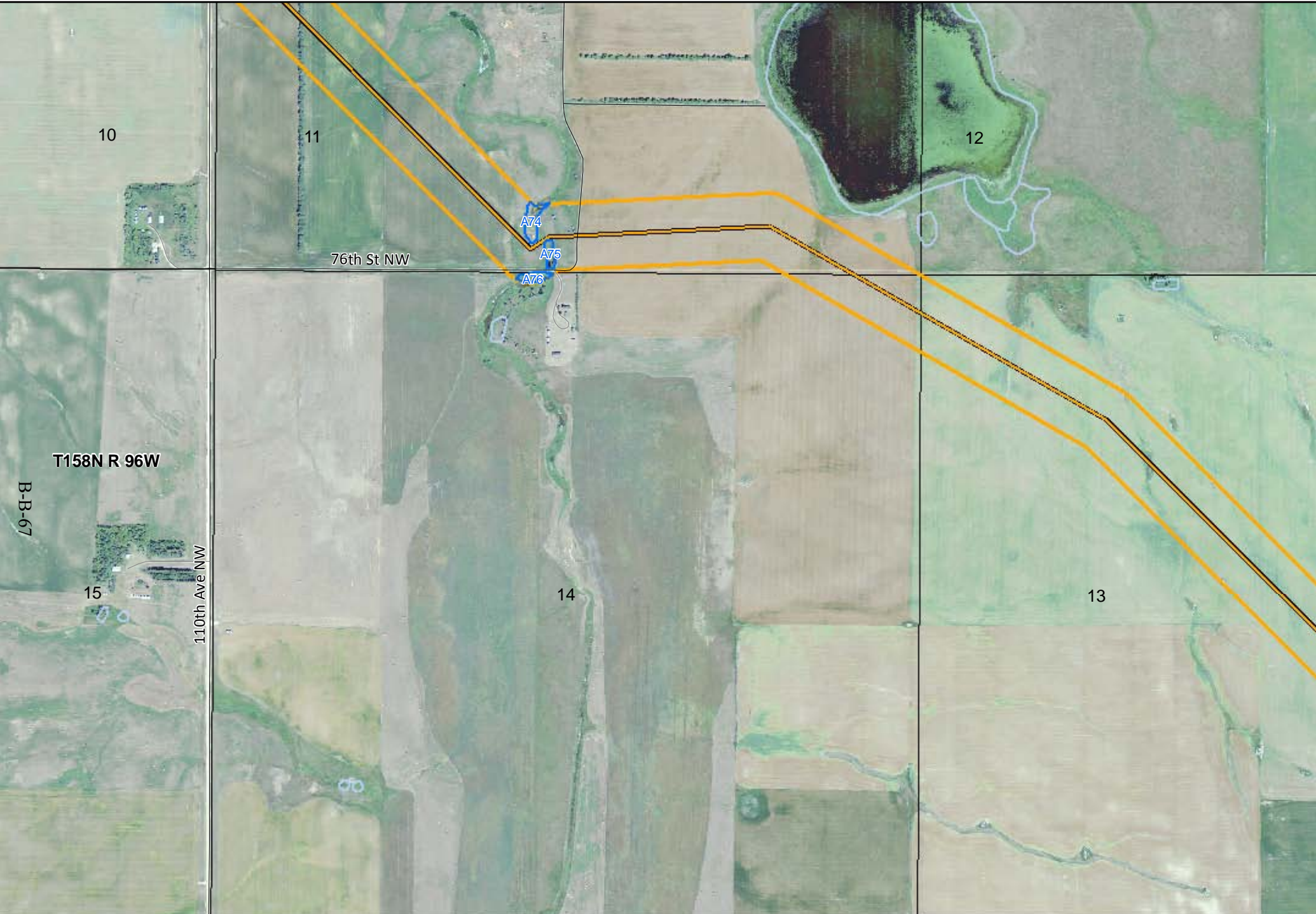
- | | | |
|---------------------------|-----------------------------------|------------------------------|
| Pipeline with 16ft buffer | Vehicular Trail (4WD) | Waterfowl Production Area |
| 500 ft corridor | Secondary Road | National Wildlife Refuge |
| SEH Confirmed Wetlands | Private Road for service vehicles | North Dakota Game and Fish |
| NWI Wetlands | Local Neighborhood Road | North Dakota Land Department |
| | | US Bureau of Land Management |



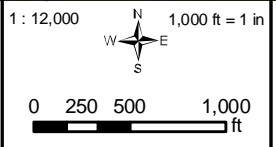
Mistral Energy Inc., Vantage Pipeline Project

Proposed Pipeline Route
 1:12,000 Map Book
 Sheet: 24Z

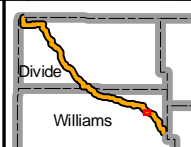
Date: 12/06/2011 Version: 2011 - 7



KC HARVEY ENVIRONMENTAL, LLC
 376 Gallatin Park Drive
 Bozeman, Montana 59715
 Phone: 406-585-7402
 Fax: 406-585-7428



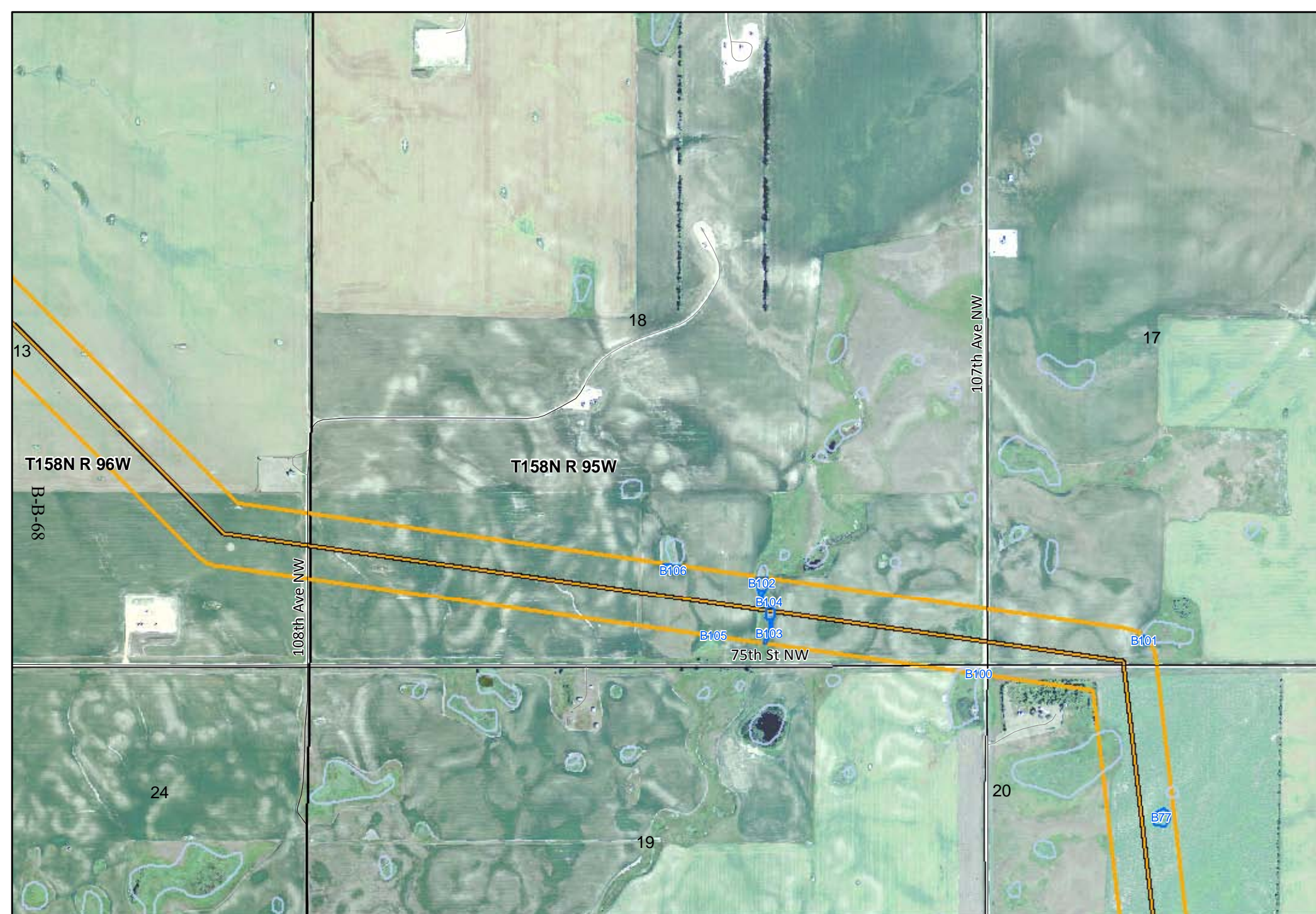
- Pipeline with 16ft buffer
- 500 ft corridor
- SEH Confirmed Wetlands
- NWI Wetlands
- Vehicular Trail (4WD)
- Secondary Road
- Private Road for service vehicles
- Local Neighborhood Road
- Waterfowl Production Area
- National Wildlife Refuge
- North Dakota Game and Fish
- North Dakota Land Department
- US Bureau of Land Management



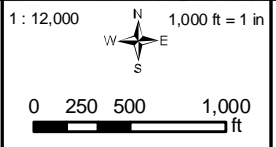
Mistral Energy Inc., Vantage Pipeline Project

Proposed Pipeline Route
 1:12,000 Map Book
 Sheet: 24AA

Date: 12/06/2011 Version: 2011 - 7



KC HARVEY ENVIRONMENTAL, LLC
 376 Gallatin Park Drive
 Bozeman, Montana 59715
 Phone: 406-585-7402
 Fax: 406-585-7428



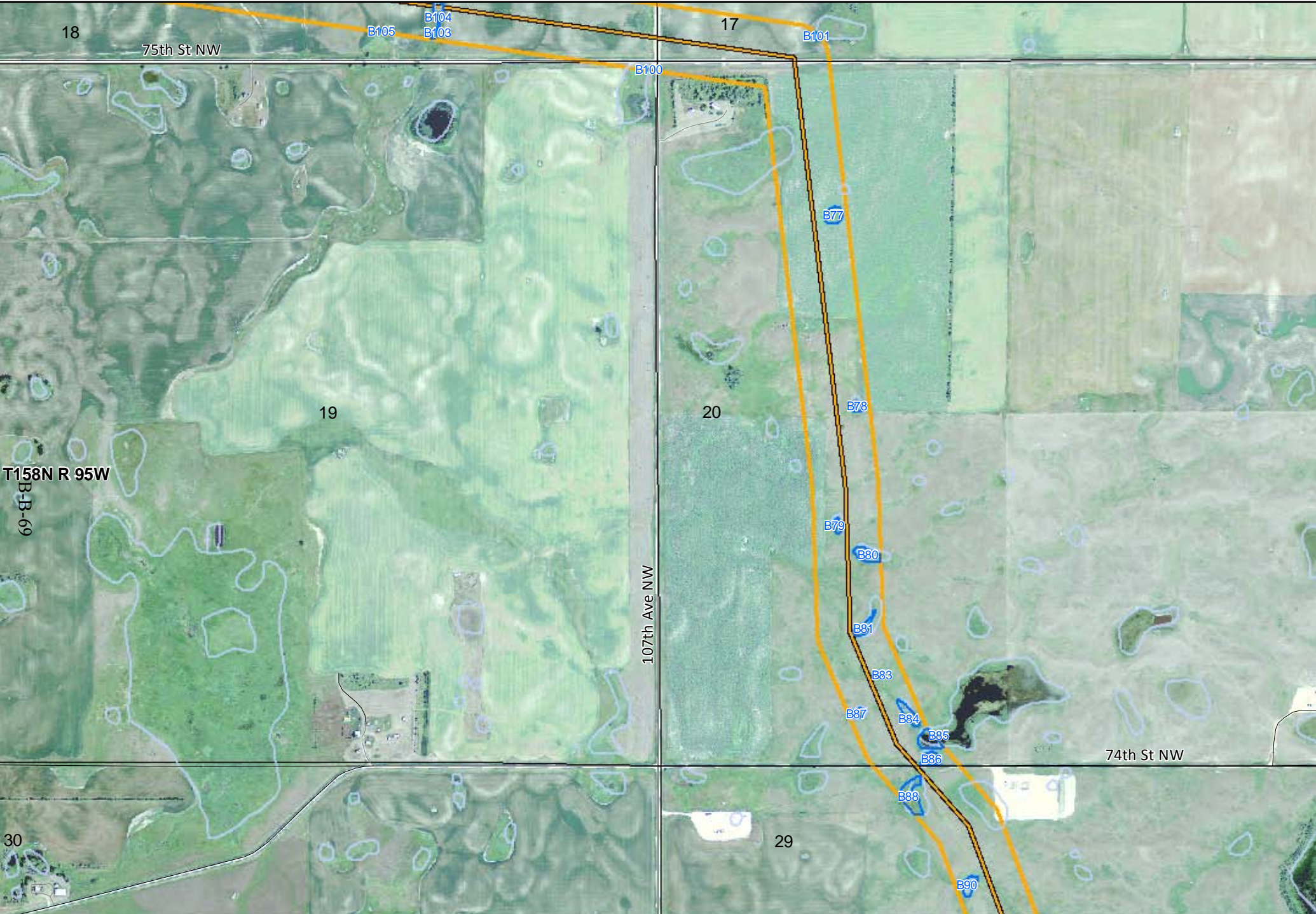
- Pipeline with 16ft buffer
- 500 ft corridor
- SEH Confirmed Wetlands
- NWI Wetlands
- Vehicular Trail (4WD)
- Secondary Road
- Private Road for service vehicles
- Local Neighborhood Road
- Waterfowl Production Area
- National Wildlife Refuge
- North Dakota Game and Fish
- North Dakota Land Department
- US Bureau of Land Management



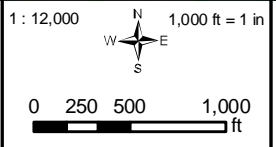
Mistral Energy Inc., Vantage Pipeline Project

Proposed Pipeline Route
 1:12,000 Map Book
 Sheet: 25AA

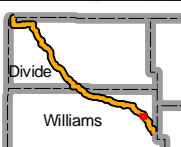
Date: 12/06/2011 Version: 2011 - 7



KC HARVEY ENVIRONMENTAL, LLC
 376 Gallatin Park Drive
 Bozeman, Montana 59715
 Phone: 406-585-7402
 Fax: 406-585-7428



- | | | |
|---------------------------|-----------------------------------|------------------------------|
| Pipeline with 16ft buffer | Vehicular Trail (4WD) | Waterfowl Production Area |
| 500 ft corridor | Secondary Road | National Wildlife Refuge |
| SEH Confirmed Wetlands | Private Road for service vehicles | North Dakota Game and Fish |
| NWI Wetlands | Local Neighborhood Road | North Dakota Land Department |
| | | US Bureau of Land Management |



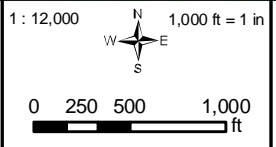
Mistral Energy Inc., Vantage Pipeline Project

Proposed Pipeline Route
 1:12,000 Map Book
 Sheet: 26AB

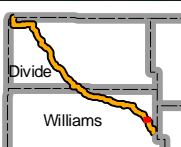
Date: 12/06/2011 Version: 2011 - 7



KC HARVEY ENVIRONMENTAL, LLC
 376 Gallatin Park Drive
 Bozeman, Montana 59715
 Phone: 406-585-7402
 Fax: 406-585-7428



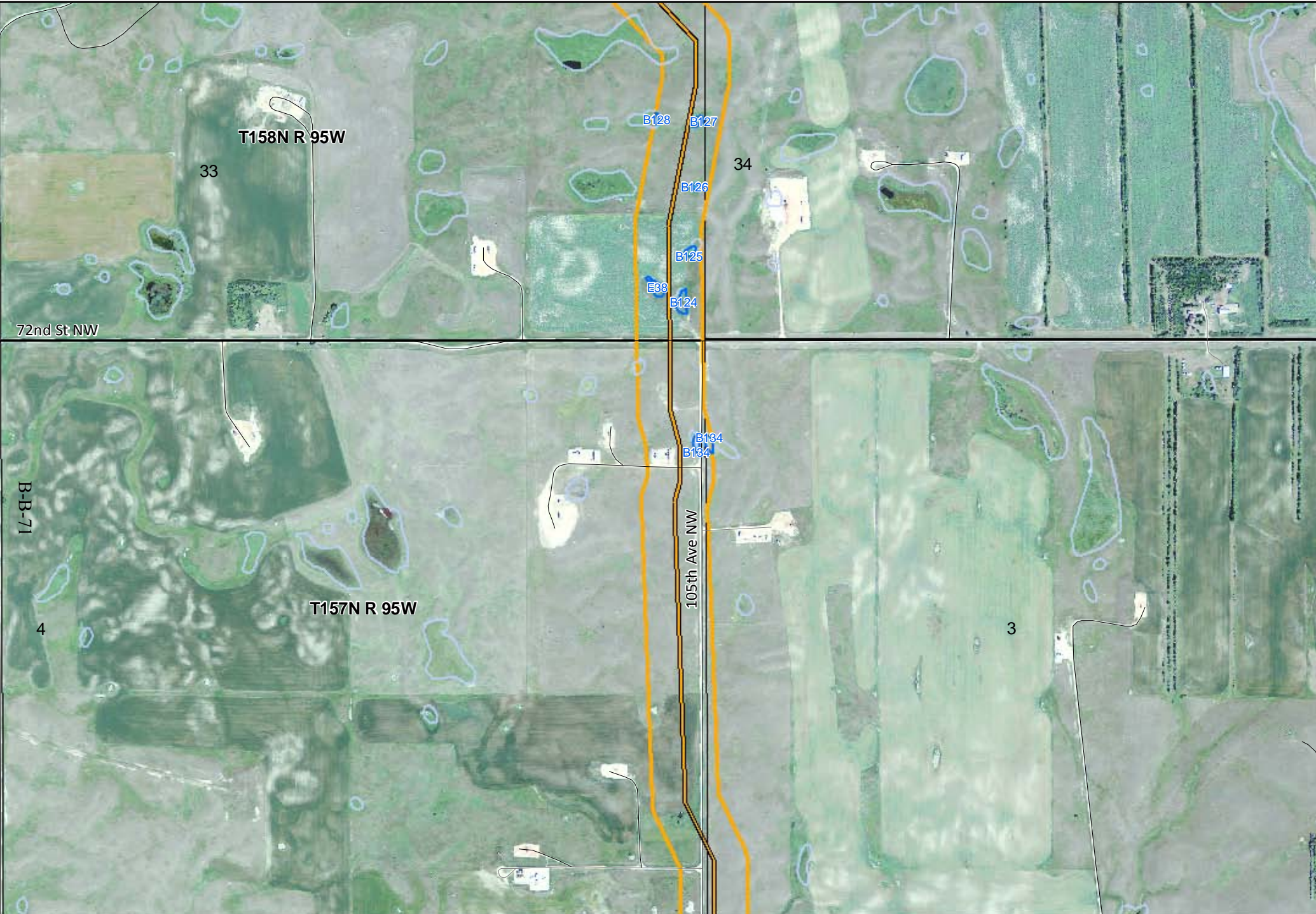
- | | | |
|---------------------------|-----------------------------------|------------------------------|
| Pipeline with 16ft buffer | Vehicular Trail (4WD) | Waterfowl Production Area |
| 500 ft corridor | Secondary Road | National Wildlife Refuge |
| SEH Confirmed Wetlands | Private Road for service vehicles | North Dakota Game and Fish |
| NWI Wetlands | Local Neighborhood Road | North Dakota Land Department |
| | | US Bureau of Land Management |



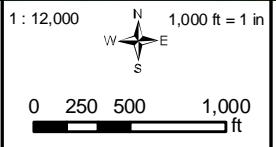
Mistral Energy Inc., Vantage Pipeline Project

Proposed Pipeline Route
 1:12,000 Map Book
 Sheet: 26AC

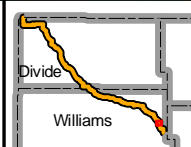
Date: 12/06/2011 Version: 2011 - 7



KC HARVEY ENVIRONMENTAL, LLC
 376 Gallatin Park Drive
 Bozeman, Montana 59715
 Phone: 406-585-7402
 Fax: 406-585-7428



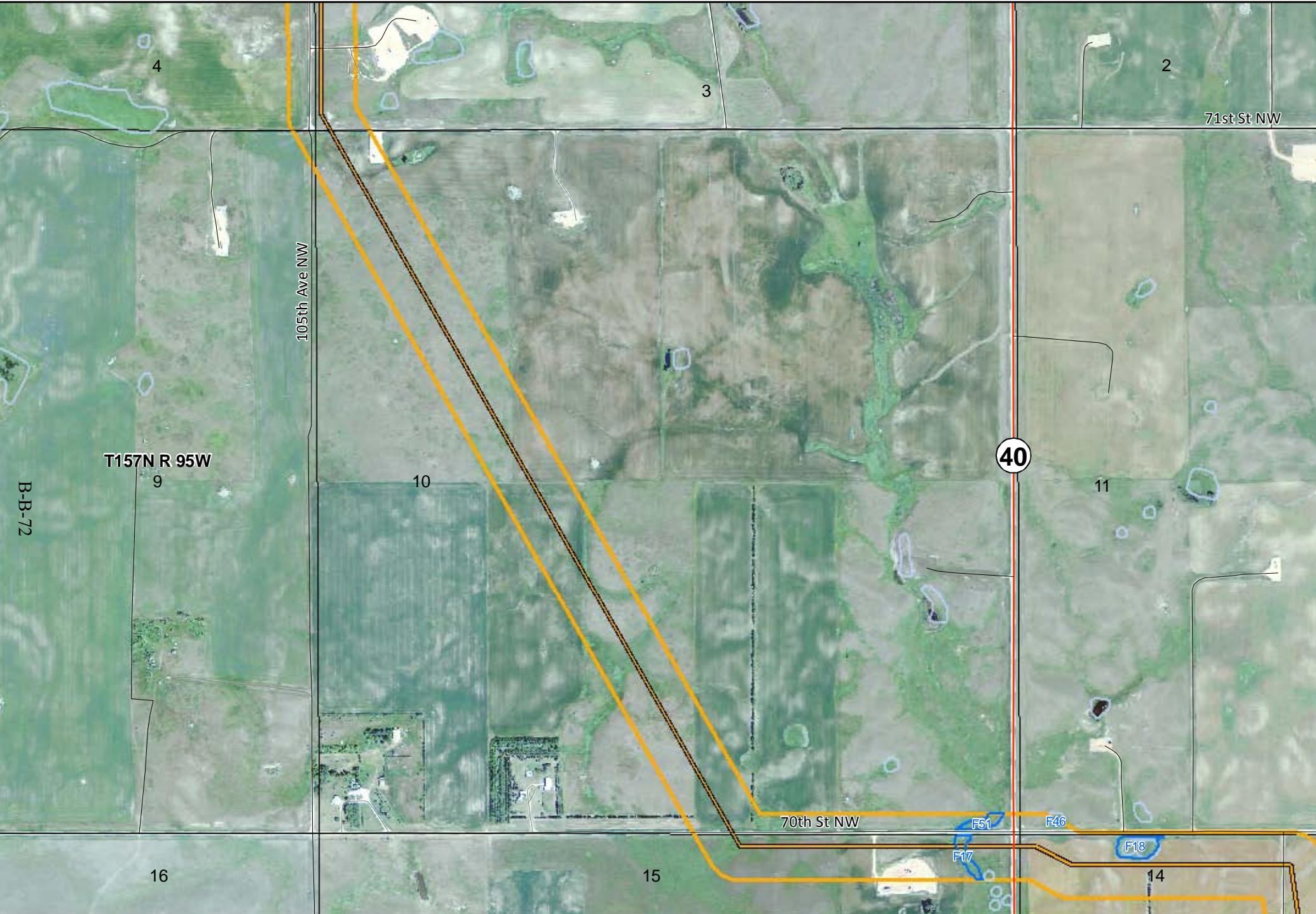
Pipeline with 16ft buffer	Vehicular Trail (4WD)	Waterfowl Production Area
500 ft corridor	Secondary Road	National Wildlife Refuge
SEH Confirmed Wetlands	Private Road for service vehicles	North Dakota Game and Fish
NWI Wetlands	Local Neighborhood Road	North Dakota Land Department
		US Bureau of Land Management



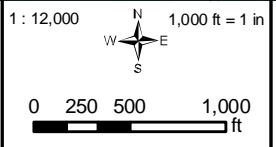
Mistral Energy Inc., Vantage Pipeline Project

Proposed Pipeline Route
 1:12,000 Map Book
 Sheet: 27AD

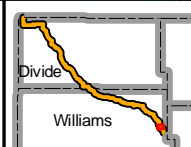
Date: 12/06/2011 Version: 2011 - 7



KC HARVEY ENVIRONMENTAL, LLC
 376 Gallatin Park Drive
 Bozeman, Montana 59715
 Phone: 406-585-7402
 Fax: 406-585-7428



- | | | |
|---------------------------|-----------------------------------|------------------------------|
| Pipeline with 16ft buffer | Vehicular Trail (4WD) | Waterfowl Production Area |
| 500 ft corridor | Secondary Road | National Wildlife Refuge |
| SEH Confirmed Wetlands | Private Road for service vehicles | North Dakota Game and Fish |
| NWI Wetlands | Local Neighborhood Road | North Dakota Land Department |
| | | US Bureau of Land Management |

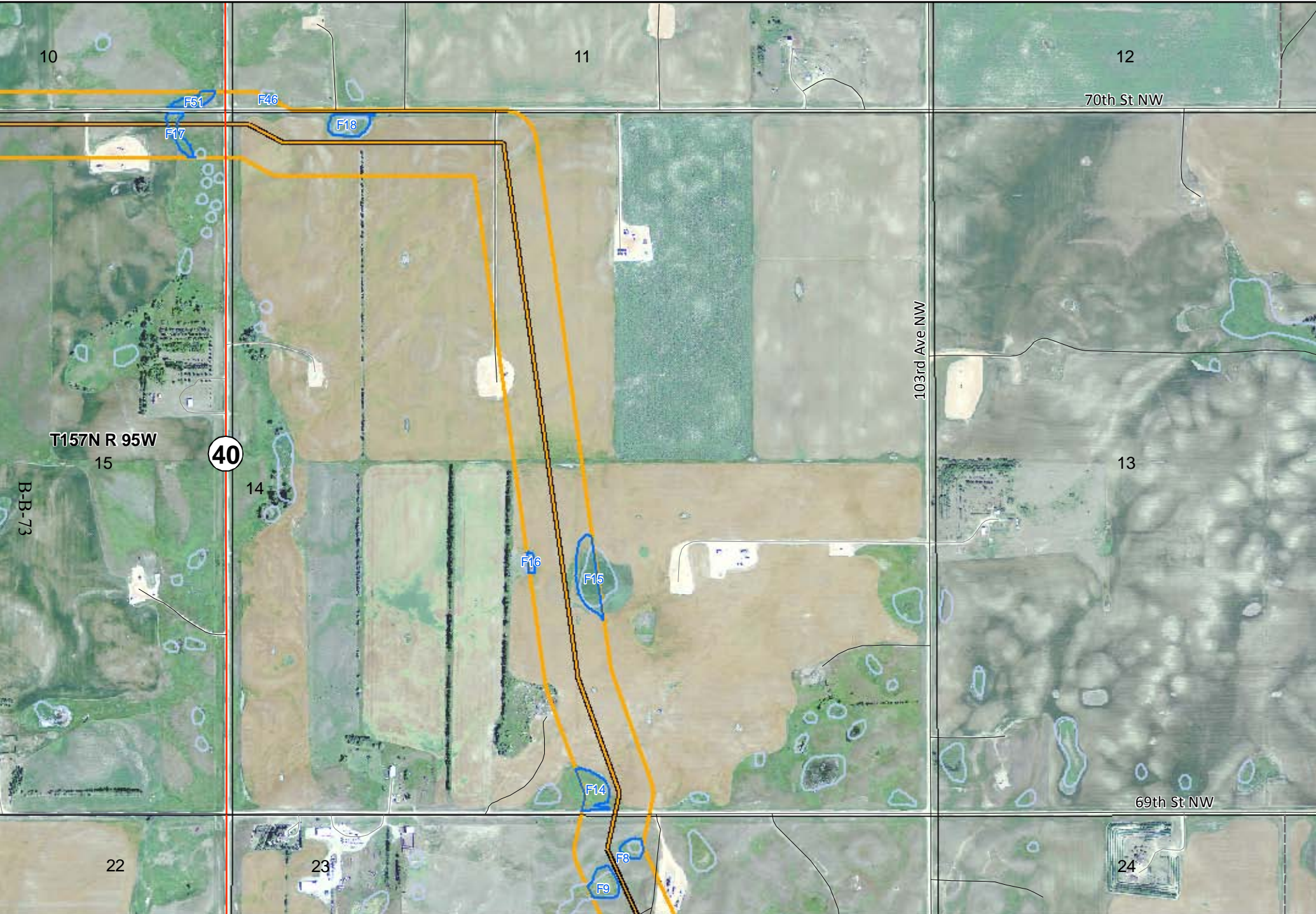


Mistral Energy Inc., Vantage Pipeline Project

Proposed Pipeline Route
 1:12,000 Map Book
 Sheet: 27AE

VANTAGE PIPELINE US LP

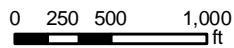
Date: 12/06/2011 Version: 2011 - 7



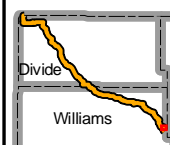
KC HARVEY
ENVIRONMENTAL, LLC

376 Gallatin Park Drive
 Bozeman, Montana 59715
 Phone: 406-585-7402
 Fax: 406-585-7428

1 : 12,000 1,000 ft = 1 in



- | | | |
|---------------------------|-----------------------------------|------------------------------|
| Pipeline with 16ft buffer | Vehicular Trail (4WD) | Waterfowl Production Area |
| 500 ft corridor | Secondary Road | National Wildlife Refuge |
| SEH Confirmed Wetlands | Private Road for service vehicles | North Dakota Game and Fish |
| NWI Wetlands | Local Neighborhood Road | North Dakota Land Department |
| | | US Bureau of Land Management |



Mistral Energy Inc., Vantage Pipeline Project

Proposed Pipeline Route
 1:12,000 Map Book
 Sheet: 27AF

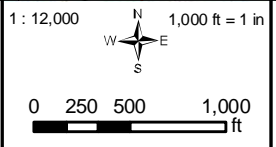


Date: 12/06/2011

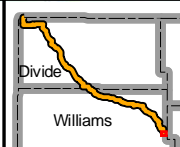
Version: 2011 - 7



KC HARVEY ENVIRONMENTAL, LLC
 376 Gallatin Park Drive
 Bozeman, Montana 59715
 Phone: 406-585-7402
 Fax: 406-585-7428



- Pipeline with 16ft buffer
- 500 ft corridor
- SEH Confirmed Wetlands
- NWI Wetlands
- Vehicular Trail (4WD)
- Secondary Road
- Private Road for service vehicles
- Local Neighborhood Road
- Waterfowl Production Area
- National Wildlife Refuge
- North Dakota Game and Fish
- North Dakota Land Department
- US Bureau of Land Management



Mistral Energy Inc., Vantage Pipeline Project

Proposed Pipeline Route
 1:12,000 Map Book
 Sheet: 27AG

Date: 12/06/2011 Version: 2011 - 7