Overview of the Valve and Pump Station Relocation Rationale

March 2007

Keystone is continually evaluating its pipeline system to identify methods that can reduce potential impacts to the environment. As part of that ongoing analysis, Keystone has relocated some valves and pump stations and has added additional valves in key locations. This submittal identifies these modifications and provides the rationale for the changes.

Pump Stations

Since Keystone initially sited the pump stations, supplemental information has been gathered from electrical power utilities. As a result, seven pump stations have been relocated. Keystone discussed the pump stations' specific electric power requirements with local utility providers. Based on the information obtained from these providers, Keystone has moved pump stations #31 and #36 so that they will now be located adjacent to substations. Minor adjustments were made to the locations of pump stations #27, #30, #34, and #35 to reduce the length of transmission power lines required. Relocation of pump station #27 also moved the site out of native grasslands and into pasture lands. Similarly, relocation of pump station #30 moved the site out of a creek bed. Additionally, pump station #21 was relocated across the road, from Clark and into Beadle County, in an effort to equitable distribute the tax benefits among the affected counties.

Valves

Keystone has evaluated the location of valves through an iterative process involving regulatory, environmental, and HCA considerations. While U.S. Department of Transportation (USDOT) regulations stipulate the minimum number of valves required to protect environmental resources, Keystone has elected to add additional valves to further segment the pipeline, increasing the ability of Keystone to isolate the pipeline in the unlikely event of a pipeline spill.

Initially, valves were placed in locations as required by federal regulations (49 CFR 195), including on either sides of large rivers and in areas to protect drinking water reservoirs. Further analysis has been subsequently conducted to determine if other sensitive resources could be protected by shifting these initial valve sites (while still complying with federal regulations) or by the addition of new valves. Keystone evaluated valve locations in relation to environmental resources, including HCAs and shallow aquifers.

After initial valve locations were identified, a preliminary evaluation of USDOT-defined HCAs was conducted by Keystone (Appendix B of the Keystone Risk Assessment). This evaluation identified and ranked HCAs that could be potentially affected by a pipeline spill. Upon completion of the HCA evaluation, valve locations were re-assessed to determine where relocation (while still complying with federal regulations) or the addition of new valves could mitigate potential risk to HCAs.

These revised locations were then compared to the location of shallow groundwater aquifers (as identified in Data Request #1). Valve locations were again re-assessed to determine where relocation (while still complying with federal regulations and providing protection of HCAs) or the addition of new valves could mitigate potential risk to shallow aquifers.

Finally, additional valves were added to reduce the length of pipe between isolating valves, particularly in those areas where spill volumes and frequencies were predicted to be higher than other areas. Appendix A of the Risk Assessment discusses the process used to identify those areas. However, these sites are not specifically identified due to Homeland security issues.

The results of this iterative process are provided in **Table 1**, Valve and Pump Station Relocation Rationale.

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Valve and Pump Station Relocation Rationale

Keystone Pipeline Project
March 22, 2007

LINE	Old MP - mi -	New MP - mi -	COUNTY	STATE	OBJECT	OBJECT ID	RATIONALE FOR RELOCATION
KEYSTONE MAINLINE							
ML	5.592	5.592	Cavalier	ND	VALVE	V-01	
ML	8.220	8.220	Pembina	ND	VALVE	V-02	
ML	16.756	16.756	Pembina	ND	VALVE	V-03	
ML	19.518	19.518	Pembina	ND	VALVE	V-04	
ML	33.032	33.032	Walsh	ND	PUMP STATION	PS-15	
ML	-	49.450	Walsh	ND	VALVE	V-47	New Valve: Check valve which protects Lankin PA and surface water HCA on South Park River below Hammel Reservoir
ML	75.916	75.916	Nelson	ND	PUMP STATION	PS-16	
ML	123.411	123.411	Steele	ND	PUMP STATION	PS-17	
ML	167.219	167.219	Barnes	ND	VALVE	V-05	
ML	170.222	170.222	Ransom	ND	PUMP STATION/ PIGGING FACILITY	PS-18	
ML	179.601	179.601	Ransom	ND	VALVE	V-06	
ML	184.696	184.696	Ransom	ND	VALVE	V-07	
ML	-	201.879	Sargent	ND	VALVE	V-51	New Valve: Valve will protect downstream aquifer located between MP 203-217
ML	216.820	216.820	Dickey	ND	PUMP STATION	PS-19	
ML	-	239.939	Marshall	SD	VALVE	V-48	New Valve: Valve reduces distance between facilities to reduce overall maximum spill volumes
ML	262.161	262.161	Day	SD	PUMP STATION	PS-20	
ML	-	276.398	Clark	SD	VALVE	V-52	New Valve: valve will protect downstream aquifer located between MP 278-290
ML	292.908	292.908	Clark	SD	VALVE	V-08	
ML	300.932	300.932	Clark	SD	VALVE	V-09	
ML	308.950	309.038	Clark	SD	PUMP STATION	PS-21	Pump station was moved across street out of Clark County and into Beadle County
ML	-	330.761	Kingsbury	SD	VALVE	V-49	New Valve: Valve reduces distance between facilities to reduce overall maximum spill volumes
ML	353.501	353.501	Miner	SD	VALVE	V-10	
ML	356.820	356.820	Miner	SD	PUMP STATION	PS-22	
ML	365.864	372.225	Hanson	SD	VALVE	V-11	Moves V-11 to protect aquifer located between MP 358-371
ML	391.765	387.673	McCook	SD	VALVE	V-12	Moves V-12 to north side of Wolf Creek ESA
ML	404.853	404.853	Hutchinson	SD	PUMP STATION/ PIGGING FACILITY	PS-23	
ML	420.790	417.485	Yankton	SD	VALVE	V-13	Moves V-13 further north from James River ESA to capture tributary of James River
ML	422.548	-	Yankton	SD	VALVE	V-14	Eliminated V-14, V-15 will serve as valve on the north side of the Missouri River, protecting James River, Beaver Creek, and HCAs associated with the James and Missouri rivers area
ML	434.066	429.912	Yankton	SD	VALVE	V-15	Moves V-15 further north of Yankton PA, protecting James River, Beaver Creek, and HCAs associated with the James and Missouri rivers area
ML	438.754	444.093	Cedar	NE	VALVE	V-16	Move V-16 further downstream to protect Yankton, Surface DW USA and multiple Missouri River ESAs
ML	452.691	452.691	Cedar	NE	PUMP STATION	PS-24	
ML	499.099	499.099	Stanton	NE	PUMP STATION	PS-25	
ML	505.375	505.375	Stanton	NE	VALVE	V-17	
ML	532.146	532.146	Colfax	NE	VALVE	V-18	
ML	533.131	537.311	Colfax	NE	VALVE	V-19	Moves V-19 south, closer to Platte River and its ESAs
ML	540.926	-	Colfax	NE	VALVE	V-20	Remove V-20, V-19 will serve as valve for Platte River ESAs
ML	542.845	546.361	Butler	NE	VALVE	V-21	Move V-21 outside of Deer Creek which flows into Platte River ESAs
ML	549.536	549.536	Butler	NE	PUMP STATION	PS-26	
ML	572.026	572.026	Seward	NE	VALVE	V-22	
ML	576.086	576.086	Seward	NE	VALVE	V-23	
ML	587.284	587.284	Seward	NE	VALVE	V-24	
ML	591.748	591.748	Saline	NE	VALVE	V-25	
ML	601.802	601.802	Saline	NE	PUMP STATION	PS-27	It avoids the need for longer new overhead transmission lines and lowers the cost of the power infrastructure for the project
ML	-	611.819	Saline	NE	VALVE	V-53	New Valve to decrease spacing between PS-27 and PS-28 and the Ogallala Aquifer
ML	625.800	625.800	Jefferson	NE	DENSITOMETER	D-1	
ML	637.301	637.301	Jefferson	NE	PUMP STATION/ PIGGING FACILITY	PS-28	
ML	658.030	654.954	Marshall	KS	VALVE	V-26	Move V-26 further east to protect Deer Creek as well as North Elm Creek ESA

Based on September 7, 2006 Centerline

CONFIDENTIAL

Valve and Pump Station Relocation Rationale

Keystone Pipeline Project

March 22, 2007

LINE	Old MP - mi -	New MP - mi -	COUNTY	STATE	OBJECT	OBJECT ID	RATIONALE FOR RELOCATION
ML	660.157	667.520	Marshall	KS	VALVE	V-27	Move V-27 further west to protect North Elm Creek ESA and its tributaries
ML	681.925	681.925	Nemaha	KS	VALVE	V-28	
ML	688.198	688.198	Nemaha	KS	PUMP STATION	PS-29	
ML	690.271	698.876	Nemaha	KS	VALVE	V-29	Move V-29 (check valve) to the east of multiple surface and ground water USA buffers and also protects downstream transport along South Fork Big Nemaha River or Harris Creek
ML	-	718.343	Brown	KS	VALVE	V-54	New Valve: Valve will help isolate multiple aquifers upstream and downstream
ML	736.837	736.837	Doniphan	KS	PUMP STATION/ PIGGING FACILITY	PS-30	It avoids the need for longer new overhead transmission lines and lowers the cost of the power infrastructure for the project.
ML	747.475	741.502	Doniphan	KS	VALVE	V-30	Move V-30 further east of tributaries that flow into Missouri River ESAs
ML	749.834	749.834	Buchanan	MO	VALVE	V-31	
ML	760.962	756.000	Buchanan	MO	VALVE	V-32	Move V-32 further east to help protect tributaries that flow into Missouri River ESAs and also move east of Agency PA
ML	763.841	763.841	Buchanan	MO	VALVE	V-33	
ML	782.330	784.057	Clinton	MO	PUMP STATION	PS-31	It avoids the need for longer new overhead transmission lines and lowers the cost of the power infrastructure for the project.
ML	829.799	829.799	Carroll	MO	PUMP STATION	PS-32	
ML	839.502	839.502	Carroll	MO	VALVE	V-34	
ML	843.546	847.080	Chariton	MO	VALVE	V-35	Move V-35 to isolate aquifer and incorporate Salt Creek into isolation area
ML	859.748	859.748	Chariton	MO	VALVE	V-36	
ML	864.679	864.679	Chariton	MO	PUMP STATION	PS-33	
ML	-	883.644	Randolph	MO	VALVE	V-50	New Valve: Valve reduces distance between facilities to reduce overall maximum spill volumes
ML	903.804	898.923	Audrain	MO	PUMP STATION	PS-34	It avoids the need for longer new overhead transmission lines and lowers the cost of the power infrastructure for the project.
ML	918.380	918.380	Audrain	MO	VALVE	V-37	
ML	919.965	919.965	Audrain	MO	VALVE	V-38	
ML	947.536	944.581	Montgomery	MO	PUMP STATION	PS-35	It avoids the need for longer new overhead transmission lines and lowers the cost of the power infrastructure for the project.
ML	970.398	968.192	Lincoln	MO	VALVE	V-39	Move V-39 east of Troy PA
ML	972.803	972.803	Lincoln	MO	VALVE	V-40	
ML	980.898	980.898	Lincoln	MO	VALVE	V-41	
ML	984.865	984.865	St. Charles	MO	PUMP STATION	PS-36	Pump station will be co-located with Central Electric substation, eliminating the need for transmission powe lines
ML	-	999.770	St. Charles	MO	VALVE	V-46	New Valve: Valve to protect east side of multiple ESAs (Missouri and Mississippi rivers) and surface and ground water drinking water USAs near Mississippi River
ML	1012.078	1012.078	St. Charles	MO	DENSITOMETER	D-2	
ML	1019.876	1015.119	St. Charles	MO	VALVE	V-42	Move V-42 next to Highway 67 to provide better access to valve in case of flooding
ML	1022.756	1022.756	Madison	IL	PUMP STATION/ PIGGING FACILITY	PS-37/ WOOD RIVER TERMINAL	
ML	1044.945	1044.945	Madison	IL	VALVE	V-43	
ML	1049.814	1049.814	Bond	IL	PUMP STATION	PS-38	
ML	1065.465	1065.465	Bond	IL	VALVE	V-44	
ML	1074.951	1074.951	Fayette	IL	VALVE	V-45	
ML	1077.925	1077.925	Marion	IL	PUMP STATION/ PIGGING FACILITY	PATOKA TERMINAL	

Based on September 7, 2006 Centerline

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Valve and Pump Station Relocation Rationale

Keystone Pipeline Project

March 22, 2007

LINE	Old MP - mi -	New MP - mi -	COUNTY	STATE	OBJECT	OBJECT ID	RATIONALE FOR RELOCATION
CUSHING EXTENSION							
CE	15.581	15.581	Washington	KS	VALVE	V-01	
CE	-	36.664	Clay	KS	VALVE	V-14	New Valve: Valve would isolate multiple aquifers
CE	49.971	49.971	Clay	KS	VALVE	V-02	
CE	53.867	53.866	Clay	KS	VALVE	V-03	
CE	74.043	67.445	Dickinson	KS	VALVE	V-04	Move V-04 north of multiple groundwater USAs and Chapman PA also moved upstream of Chapman Creek
CE	77.087	77.090	Dickinson	KS	VALVE	V-05	
CE	94.398	94.398	Dickinson	KS	PUMP STATION	CE30	
CE	113.443	102.466	Marion	KS	VALVE	V-06	Move V-06 to protect downstream side of multiple ESAs of Lyon Creek and upstream side of Mud Creek ESA, also multiple DW USAs
CE	117.453	121.507	Marion	KS	VALVE	V-07	Move V-07 downstream to protect Marion PA and Clear and Cottonwood Creeks surface water USA
CE	-	145.862	Butler	KS	VALVE	V-15	New Valve: Valve will reduce gap between V-07 and PS-CE32
CE	183.470	183.470	Cowley	KS	PUMP STATION	CE32	
CE	194.537	194.537	Cowley	KS	VALVE	V-08	
CE	10210.580	10210.580	Cowley	KS	VALVE	V-09	
CE	10224.554	10224.554	Kay	OK	DENSITOMETER	D-1-CE	
CE	228.389	228.389	Kay	OK	PUMP STATION	CE33	
CE	235.934	235.934	Kay	OK	PIGGING FACILITY	PONCA CITY TERMINAL	
CE	244.763	244.763	Noble	OK	VALVE	V-10	
CE	-	256.571	Noble	OK	VALVE	V-13	New Valve: valve protects south side of surface water USA and terrestrial ESAs at Sooner Lake and HCAs associated with Arkansas River
CE	284.333	278.242	Payne	OK	VALVE	V-11	Move V-11 further north of Cimarron River ESA and associated surface water USA
CE	279.442	279.442	Payne	OK	PAD CENTROID	D-2-CE	
CE	285.462	285.462	Payne	OK	VALVE	V-12	
CE	291.770	291.770	Payne	OK	PIGGING FACILITY	CUSHING TERMINAL	

LINE	MP - mi -	New MP - mi -			OBJECT	OBJECT ID	RATIONALE FOR RELOCATION
HCS	10217.579	10217.579	Sargent	SD	PUMP STATION	PS-19-ALT	
BCR	10981.245	10981.245	St. Charles	MO	PUMP STATION	PS-36-ALT	
BCR	10986.029	10986.029	St. Charles	MO	VALVE	V-41-ALT	
WR	11025.437	11025.437	Madison	IL	PUMP STATION/ PIGGING FACILITY	PS-37-ALT/ WOOD RIVER TERMINAL	

Based on September 7, 2006 Centerline

Document Control Number: KAA10-01011-01-AA-0600

Overview – Keystone Pipeline Project Biological Survey Reports

March 2007

Biological Surveys and Reports

Construction and operation of the Keystone Pipeline Project may affect habitats and populations of species protected under the federal Endangered Species Act and by individual State legislation. During 2006, TransCanada Keystone Pipeline, L.P. (Keystone) initiated contact with the U.S. Fish and Wildlife Service (USFWS), and state natural heritage programs and wildlife agencies to identify species and habitats of concern. After receiving lists of species and habitats, Keystone developed field survey protocols, target survey areas, and survey schedules. These protocols were submitted to the USFWS and state agencies for review. No agencies objected to the proposed protocols; agency comments received on the protocols were incorporated into survey protocols. Agency coordination documentation and survey protocols were filed by Keystone with the Department of State (DOS) on September 15, 2006, and in January 2007. Further Agency coordination that has taken place since the January filing date is included in this March 2007 supplemental filing.

Biological field surveys along the proposed Keystone Mainline pipeline right-of-way were initiated in late summer and fall of 2006..Additional field surveys will be conducted in 2007 where necessary to determine species occurrence in the appropriate season, to survey pipeline reroutes, pump stations, pipe storage yards, and contractor yards, as well as pipeline segments where access was not previously available. Field surveys also will be conducted along the Cushing Extension and its pump station sites, pipe storage yards, and contractor yards during 2007.

The biological survey reports included in this filing will be used for: 1) preparation of a Biological Assessment as part of the USFWS Section 7 consultation; 2) documentation for the Environmental Impact Statement; and 3) preparation of state agency permit applications.

The reports filed herein include the results of field work completed in the winter, 2007. In addition, desktop analysis reports were prepared based on agency correspondence (e.g., USFWS, Missouri Department of Conservation, and Natural Heritage Program/NatureServe), and species habitat association, in combination with aerial habitat surveys and wetland/waterbody field surveys, U.S. Geological Survey Land Use Land Cover data, and aerial photography, and are included in this filing.

Wetlands Report

Construction and operation of the Keystone Pipeline Project may also affect wetlands and Waters of the U.S. (WUS). During 2006, Keystone initiated contact with the U.S. Army Corps of Engineers (USACE) and USFWS regarding wetlands survey protocols and potential impacts. Wetland survey protocols were submitted to the individual USACE Districts along the proposed right-of-way (ROW) for review. These include the Omaha, Kansas City, St. Louis, and Tulsa Districts. Agency comments received were incorporated into wetland survey protocols. Agency coordination documentation and survey protocols were filed by Keystone with the DOS on September 15, 2006. Further Agency coordination that has taken place since the September filing date is included in this March 2007 supplemental filing.

Wetlands and WUS surveys along the proposed Keystone Mainline pipeline ROW were initiated in summer 2006. Wetlands and WUS surveys along the proposed Cushing Extension pipeline ROW were initiated in the spring of 2007. These surveys were conducted along the pipeline ROW that was filed with the DOS on September 15, 2006. Additional field surveys will be conducted in 2007 where necessary to complete survey requirements in each District, including reroutes and pipeline segments where access was not previously available.

The report filed herein includes the results of all wetlands survey work completed along the Cushing Extension to-date.

Biological and Wetlands Survey Progress

The attached table outlines Keystone's process for the collection and submission of biological and wetlands/WUS data.

Keystone Pipeline Project – Biological Survey Report Completion Plan – March 2007

Survey Objective	Survey Status	September 2006 DOS Filing	November 2006 DOS Filing	January 2007 DOS Filing	March 2007 DOS Filing	Future DOS Filing Dates
Rare Plants (western fringed orchid, eastern fringed orchid, small white ladies slipper orchid, decurrent false aster, running buffalo clover, prairie spiderwort, royal catchfly, spring ladies tresses)	Survey completion status: Western prairie fringed orchid: Habitat surveys – 90% Occurrence surveys – 0% Other rare plants: Habitat surveys – 0% Occurrence Surveys – 0% 2007 spring /summer – Occurrence surveys (Keystone Mainline and Cushing Extension).	Agency consultation records and species lists. Preliminary survey areas.	Documentation of potential suitable orchid habitats in North and South Dakota, and Nebraska (including photographs and habitat suitability for western fringed orchid is provided in the Native Prairie Survey Report above discussed below).	Agency consultation records.	Agency consultation records.	August 2007 • Summary of surveys completed; occurrence data.
Wetlands and Waters of the U.S.	2006 delineation surveys Keystone Mainline survey completion status as of December 2006 ND – 95% SD – 83% NE – 100% KS – 98% MO – 83% IL – 89% Overall – 85% Spring 2007-Cushing delineation surveys. Cushing survey completion status as of February 23, 2007 NE – 100% (L)	Consultation records with USACE. Preliminary survey areas.	Summary of survey progress. List of wetland crossings by type, and distances crossed.		Wetlands Survey Status Report – Cushing Extension.	April 2007 • Cushing Extension – additional survey reports and wetland crossing list. September 2007 • 404 Applications filed with USACE Districts.

Keystone Pipeline Project – Biological Survey Report Completion Plan – March 2007

Survey Objective	Survey Status	September 2006 DOS Filing	November 2006 DOS Filing	January 2007 DOS Filing	March 2007 DOS Filing	Future DOS Filing Dates
	KS – 84% (L) OK – 50% (M) Overall – 85% (L) Overall – 50% (M)					
Native Prairie	Survey completion status: SD, ND -90% (Keystone Mainline) NE– 0% (Keystone Mainline) KS, OK – 0% (Cushing) Fall 2006 – Preliminary Spring 2007 – Supplemental surveys (Keystone Mainline, Cushing Extension).	Agency consultation records and species lists. Preliminary survey areas.	Habitat Assessment for ND and SD	Agency consultation records.	Agency consultation records.	May 2007 • Keystone Mainline - Supplemental surveys with site descriptions (reroutes). April or May 2007 • Cushing Extension habitat descriptions.
Mussels	Survey completion status - SD (James River) - 100% KS (Cottonwood River, Doyle Creek) – 0% 2007 late summer/fall – habitat/occurrence surveys completed along Cushing Extension	Agency consultation records and species lists. Preliminary survey areas.	Survey methods and results, habitat descriptions. No listed mussels were found.	Agency consultation records.	Agency consultation records.	Fall 2007 • KS (Cushing) survey reports based on spring/summer field reconnaissance

Keystone Pipeline Project – Biological Survey Report Completion Plan – March 2007

Survey Objective	Survey Status	September 2006 DOS Filing	November 2006 DOS Filing	January 2007 DOS Filing	March 2007 DOS Filing	Future DOS Filing Dates
Dakota Skipper butterfly	Survey completion status: Habitat – 90% Occurrence – 0% Summer 2007 (Occurrence Surveys -Keystone Mainline in ND and SD).	Agency consultation records Preliminary survey areas.	Documentation of potential suitable habitats in North and South Dakota (including photographs and habitat suitability for Dakota skipper is provided in the Native Prairie Survey Report above discussed above).	Agency consultation records.	Agency consultation records.	July 2007 • Occurrence surveys with site descriptions.
Topeka Shiner	Survey completion status: Habitat Surveys SD, KS, MO – 94% (Keystone Mainline) KS – 0% (Cushing) Occurrence Surveys KS, MO – 100% (Keystone Mainline) SD, KS – 0% Spring 2007 Keystone Mainline and Cushing occurrence surveys – SD, KS (Cushing)	Agency consultation records. Preliminary survey areas.	Survey methods and results, habitat descriptions.	Updated KS/MO Topeka shiner survey report. Agency consultation records.	Agency consultation records.	July 2007 • Survey reports based on spring/summer field reconnaissance in SD and KS (Keystone Mainline and Cushing).
Fish (Arkansas River shiner, Arkansas darter, silver chub, speckled chub, Neosho madtom)	Survey completion status: Habitat surveys: KS – 0% (Cushing) Occurrence surveys: KS – 0% (Cushing) Spring 2007 habitat and occurrence surveys – KS (Cushing)	No information filed.	No information filed.	Agency consultation records.	Agency consultation records.	Fall 2007 • Survey reports based on spring/summer field reconnaissance in KS (Cushing).

Keystone Pipeline Project – Biological Survey Report Completion Plan – March 2007

Survey Objective	Survey Status	September 2006 DOS Filing	November 2006 DOS Filing	January 2007 DOS Filing	March 2007 DOS Filing	Future DOS Filing Dates
Reptiles and Amphibians (Massasauga, Kirtland's snake, Western fox snake)	Survey completion status: Habitat Surveys: MO, IL – 100% of accessible sites IL – 0% Occurrence Surveys: MO, IL– 0% Spring 2007 – Complete habitat surveys – MO, IL. Spring/summer 2007 – Occurrence surveys.	Agency consultation records. Preliminary survey areas and protocols.	No information filed.	Habitat survey reports based on surveys completed in fall/winter 2006. Report letters detailing further survey work to be completed. Agency consultation records.	Habitat survey reports based on winter 2007 field reconnaissance.	May 2007 • Habitat Survey Reports based on spring 2007 field reconnaissance and updated agency consultation records. August 2007 • Snake Survey Reports.
Least tern and piping plover	No 2006 Surveys were conducted. Occurrence Surveys – 2007 (Keystone Mainline and Cushing Extension).	Agency consultation records. Preliminary survey areas.	Documentation of potential suitable habitats.	No information filed.	Agency consultation records.	August 2007 • Results of 2007 surveys (Keystone Mainline and Cushing)
Raptor Nests (including bald eagle)	Spring 2006 – • Preliminary Survey 2006 Survey Completion Status – 70% Spring 2007 – • Aerial Surveys – 2007 Conducted Keystone Mainline and Cushing Extension Raptor Surveys within construction ROW. • Potential Preconstruction	Agency consultation records.	List of raptor nests and locations encountered during spring 2006 helicopter surveys.	Agency consultation records.	Results of 2007 aerial raptor/bald eagle surveys (Keystone Mainline and Cushing Extension).	

Keystone Pipeline Project – Biological Survey Report Completion Plan – March 2007

Survey Objective	Survey Status	September 2006 DOS Filing	November 2006 DOS Filing	January 2007 DOS Filing	March 2007 DOS Filing	Future DOS Filing Dates
	Surveys – 2008 (Keystone Mainline and Cushing Extension).					
Greater Prairie Chicken	Winter 2007 – Phone surveys with landowners to determine potential presence. Completion status – 100%. Spring 2007 – breeding surveys, depending on phone survey results.	Agency consultation records. Preliminary survey areas and protocols.	No information filed.	Agency consultation records.	Phone survey report detailing results of phone surveys with landowners in MO and agency coordination regarding further survey requirements.	August 2007 • Results of breeding surveys, if surveys are required by the Missouri Department of Conservation.
King rail	Spring 2007 MO - Surveys may be conducted in large complex wetlands.	Agency consultation records Preliminary survey areas and protocols.	No information filed.	Agency consultation records.	Desktop habitat analysis report based on wetland delineations.	April 2007 • Further agency coordination regarding survey requirements, and survey protocols. August 2007 • Habitat survey report, if surveys are necessary based on wetland habitat assessment.

Keystone Pipeline Project – Biological Survey Report Completion Plan – March 2007

Survey Objective	Survey Status	September 2006 DOS Filing	November 2006 DOS Filing	January 2007 DOS Filing	March 2007 DOS Filing	Future DOS Filing Dates
Barn owl	To date, no structures will be destroyed during construction, therefore; no surveys planned. However, 2008 preconstruction surveys in MO, IL would be conducted if structures (old barns or homes) would be affected by construction activities.	Agency consultation records Preliminary survey areas and protocols.	No information filed.	Agency consultation records.	No information filed.	Spring 2008 • Report filed only if habitat is present.
Bats (Indiana bat, gray bat)	Survey completion status: Fall 2006 habitat surveys: MO – 84% of accessible sites, IL – 100% of accessible sites Completions status - 84% Spring 2007 – Complete habitat surveys Spring/summer 2007 – Potential Mist net surveys – MO, IL.	Agency consultation records Preliminary survey areas and protocols.	No information filed.	Habitat survey reports (MO, IL) based on surveys completed in fall/winter 2006. Report letters detailing further survey work to be completed.	Habitat survey reports based on spring 2007 field reconnaissance and updated agency consultation records.	Fall 2007 • Mist Net/Occurrence survey reports – MO, IL (if required).
River otter denning	2007 – Occurrence surveys in NE, IL	Agency consultation records	No information filed.	No information filed.	Agency consultation records.	August 2007 • Results of surveys conducted in NE and IL.

Note on Migratory Birds: Keystone will discuss options for complying with the Migratory Bird Treaty Act with the USFWS. Future surveys will depend on the outcome of these discussions.

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Prepared for:
Keystone Pipeline Project

A Phone Survey for Potentially Suitable Greater Prairie Chicken Habitat within the Proposed Keystone Mainline Project Right-Of-Way in Audrain County, Missouri

ENSR Corporation
March 2007
Document No.: 10623-004

Contents

List of Appendices

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1.0 Executive Summary

Seventeen landowners and 21 land tracts were identified as having potentially suitable greater prairie chicken (*Tympanuchus cupido)* habitat along the proposed Keystone Mainline right-of-way in Audrain County, Missouri. Private landowners were contacted during January 2007 to determine if greater prairie chickens have been observed on private lands within the past 5 years. Fifteen of the landowners were available for comment. A telephone questionnaire (Appendix A), developed by ENSR Corporation (ENSR), in cooperation with Missouri Department of Conservation (MDC), was used to contact landowners. No greater prairie chickens or greater prairie chicken signs were identified by landowners within the past 5 years. The results of the telephone surveys are provided in **Table 2**. Based on the outcome of this survey, it is unlikely that the proposed Keystone Pipeline Project will impact the greater prairie chicken.

2.0 Purpose

As requested by the MDC during a meeting on July 19, 2006, ENSR conducted a desktop habitat assessment and contacted landowners to determine the potential for occurrence of greater prairie chickens along the proposed Keystone Mainline Project route in Audrain County, Missouri.

2.1 Relevant Life History

Prime habitat for greater prairie chickens consists of large, unbroken expanses of native tallgrass prairie and other grassland habitats with few trees taller than 15 feet. In Missouri, habitat available for greater prairie chickens is typically limited to grassland/prairie fragments interspersed with cropland, woodland, and forest (MDC 2006).

The breeding season begins in early spring and extends until June. Cocks occupy the "booming grounds" or "leks" in the early morning and late afternoon where males display to establish territories. Lek sites tend to remain at the same location from year to year. At the height of the breeding season, hens visit the booming grounds and mating occurs.

Greater prairie chickens are ground nesters. Nests are simple, saucer-shaped structures, about 7 inches in diameter and 2 to 3 inches deep. Nests are usually located in high, arching clumps of grass but sometimes are built in weedy areas. The average clutch contains about a dozen eggs. Incubation requires about 3 weeks. The peak of the hatching period comes in late May to early June, depending on weather conditions. The chicks remain with the hen for 8 to 10 weeks, and then the brood disperses (MDC 2004).

3.0 Methods

Potential habitat locations for greater prairie chickens were determined based on species habitat association and agency correspondence (e.g., U.S. Fish and Wildlife Service, MDC, and Natural Heritage Program/NatureServe), in combination with aerial habitat surveys, wetland/waterbody field surveys, U.S. Geological Survey Land Use Land Cover data, and aerial photography. The MDC documented that Audrain County, Missouri, was the only Missouri county along the proposed Keystone Mainline route that had any historic occurrence records of greater prairie chickens.

For the Keystone Mainline, ENSR originally identified 22 properties and 17 landowners in Audrain County, Missouri with potentially suitable greater prairie chicken habitat. ENSR submitted the list of these properties to the MDC for approval (Appendix B). Due to small deviations from the originally identified route, twenty of these properties and one later identified property are currently identified as properties with potentially suitable habitat for the greater prairie chicken along the Keystone mainline. These properties are shown in **Table 1**.

Table 1 Potential Greater Prairie Chicken Habitat Locations

Approximate Keystone MP	Keystone Tract ID
904.3	ML-MO-AU-4512
908.3 – 908.8	ML-MO-AU-4539
908.9 – 909.2	ML-MO-AU-4541
913.9 – 914.6	ML-MO-AU-4553, ML-MO-AU-4554, ML-MO-AU-4555
914.7	ML-MO-AU-4558
914.8	ML-MO-AU-4557
914.9 – 915.2	ML-MO-AU-4559
915.2 – 915.5	ML-MO-AU-4560
915.8 – 916.1	ML-MO-AU-4561
917.0 – 917.3	ML-MO-AU-4566
917.6 – 917.8	ML-MO-AU-4569
917.6 – 917.8	ML-MO-AU-4571
917.8 – 918.4	ML-MO-AU-4570
917.8 – 918.4	ML-MO-AU-4571
918.6	ML-MO-AU-4572
918.8 – 919.1	ML-MO-AU-4573
919.1 – 919.4	ML-MO-AU-4574
919.6	ML-MO-AU-4576
928.6	ML-MO-AU-4607

ENSR attempted to contact landowners by telephone using the questionnaire template found in Appendix A. This template also was approved by the MDC. All telephone conversations were documented.

4.0 Results

ENSR was able to make contact with 15 landowners for the telephone questionnaire. The results of the telephone questionnaire are listed in **Table 2**. No greater prairie chickens or signs of greater prairie chickens were identified by landowners within the last 5 years.

One of the landowners did observe three individual greater prairie chickens and one nest on his property approximately 6 to 7 years ago, but has not seen or heard any prairie chickens since that time.

5.0 Discussion

Greater prairie chickens were not observed in the last 5 years by any of the private landowners as documented in **Table 2**. Therefore, based on the accumulated information from the telephone questionnaires, it is unlikely that pipeline construction would have any foreseeable negative affect on the greater prairie chicken in Audrain County, Missouri. ENSR will consult with the MDC to confirm that no additional surveys are required.

6.0 References

Missouri Department of Conservation (MDC). 2006. Email correspondence with Andrew Forbes (MDC Ornithologist) with Patti Lorenz (ENSR) on 10/18/06.

_____. 2004. Missouri Department of Conservation Website. 2004. http://www.mdc.mo.gov/nathis/birds/ chickens/. Accessed by ENSR on 10/13/06.

Table 2 Greater Prairie Chicken Telephone Questionnaire Responses

MP	Tract ID	Date Called	Greater Prairie Chickens Observed		Comments
			Yes	No	
904.3	ML-MO-AU-4512	1/2/2007			No answer – ENSR left a voicemail message.
				X	The landowner called ENSR back at 2:50 p.m. The landowner has never observed a greater prairie chicken or signs on his property but was aware of what they looked like.
908.3-908.8	ML-MO-AU-4539	1/2/2007		X	The landowner was not aware of what a greater prairie chicken looked like. After describing greater prairie chicken's the landowner said that he had never seen anything like that on his land. No signs of greater prairie chickens had been seen either.
908.92-909.19	ML-MO-AU-4541	1/2/2007			No answer – ENSR left a voicemail message.
		1/3/2007		X	The landowner called back at 2:30 p.m. He said that he had a nest on the property 6 to 7 years ago near the proposed pipeline route. He had seen three individual greater prairie chickens the spring before he found the nest. The nest was predated and the eggs were destroyed. At the time he also had seen greater prairie chickens about 5 miles north of his property. He used to be able to hear them booming. He hasn't seen or heard any since. He keeps cattle on his property and they have grazed down all of the native tallgrass prairie. He wished he still had them around but said that there were too many owls and no habitat left.
913.95-914.65	ML-MO-AU-4553 ML-MO-AU-4554 ML-MO-AU-4555	1/3/2007		X	The landowner has owned the land since 1991. The property has deer and turkey. She stated that Audrain County is not known to have had greater prairie chicken in over 40 years. The landowner is 85 years old. More than 80 years ago there used to be a booming ground about 3 miles from where she grew up in eastern Audrain County. The farm crossed by the proposed route of the pipeline is in western Audrain County. The farm is slight rolling hillsides whereas eastern Audrain County was flat prairie. She has never seen a greater prairie chicken on her land.
914.75	ML-MO-AU-4556	1/2/2007			No answer – ENSR left a voicemail message.
		1/3/2007			The landowner called back and left a message to return his call. No answer – ENSR left a voicemail message.
		1/5/2007		X	The landowner called back and said that he had never seen any greater prairie chickens on his property. He was not aware of what they looked liked but after ENSR described their appearance, he responded by saying that he had never seen anything like that. The landowner has had the property for approximately 1.5 years and has never seen a greater prairie chicken.

Table 2 Greater Prairie Chicken Telephone Questionnaire Responses

MP	Tract ID	Date Called	Greater Prairie Chickens Observed		Comments
			Yes	No	
914.85	ML-MO-AU-4571	1/2/2007		X	The landowner has never seen a greater prairie chicken or its sign on his property. He was aware of what they look like from pictures in magazines. His neighbor hit one on the road a few years ago about 10 miles south of Mexico, Missouri.
914.95-915.2	ML-MO-AU-4559	1/2/2007		X	The landowner has never seen a greater prairie chicken or its sign on his property. He was aware of what they look like. He said they used to be observed in fields just east of Mexico, Missouri. He has seen their breeding behaviors. He would like to see them come back to the area and asked if it would be possible for the MDC to stock them.
915.2-915.5	ML-MO-AU-4560	1/2/2007			ENSR talked with the respondent. The landowner is deceased and the respondent handles the management of that land. He can be reached at (phone number withheld). ENSR left a voice message for the respondent.
		1/3/2007		X	The landowner called back and left a message to call him. ENSR called him at 11:15 a.m. and he stated that he was aware of what a greater prairie chicken looked like and that he had never seen one on the property. He has walked a lot of his land and has kicked up a bunch of different birds but has never seen a greater prairie chicken.
915.75-916.1	ML-MO-AU-4561	1/2/2007			No answer – ENSR left a voicemail message.
		1/3/2007		X	ENSR spoke with the landowner at 5:12 pm. He stated that there haven't been greater prairie chickens in his area in 50 years. He stated there were some 10 to 15 miles east of his property in Rafael.
917.0-917.3	ML-MO-AU-4566	1/2/2007		X	The landowner has never seen a greater prairie chicken or signs of greater prairie chickens on his property. He was aware of what they look like.
917.6-917.85 917.85-918.4	ML-MO-AU-4569 ML-MO-AU-4570	1/2/2007			The respondent (receptionist for the landowner) is answering all calls regarding the pipeline projects. She will contact the farm manager and the landowner to see if they have ever seen a greater prairie chicken on the land. She has never seen a greater prairie chicken and doesn't think anyone else on the property has either. She is familiar with what they look like. She will call ENSR back with a response.
		1/3/2007		X	The respondent (receptionist for the landowner) called back and left a voicemail message saying that no one has ever seen a greater prairie chicken on Yellowstone Farms, LLC.
918.4-918.45	ML-MO-AU-4571	1/2/2007			No answer – ENSR left a voicemail message.
		1/3/2007			ENSR left a message.
		1/8/2007		X	The landowner was not aware of what a greater prairie chicken looked like. After greater prairie chickens were described, he stated that he had never seen anything like that on

Table 2 Greater Prairie Chicken Telephone Questionnaire Responses

MP	Tract ID	Date Called	Greater Prairie Chickens Observed		Comments
			Yes	No	
					the property or in his life. He has owned the land for 6 years and has been planting a warm season mix for 3 years to reestablish native habitat. In those 3 years, he has seen an increase in quail but no greater prairie chickens.
918.8-919.1	ML-MO-AU-4573	1/2/2007		X	The landowner indicated that she doesn't have any greater prairie chickens on her land. She has never observed the prairie chicken or its sign on her property. She was aware of what greater prairie chicken looked like. She is from South Dakota and is familiar with quail and pheasant. Her family hunts deer on the property and no one has ever seen a greater prairie chicken or its sign.
919.1-919.4	ML-MO-AU-4574	1/2/2007			ENSR spoke with respondent (granddaughter of property owner). Her grandparents are failing and she would prefer any pipeline representatives to contact her or another respondent with any questions or concerns. The respondent will look into the greater prairie chicken issue. She will ask those who hunt on the land, friends, and family members if they have ever seen greater prairie chicken's on the land. She will call back with a reply.
				X	ENSR spoke with the respondent. She spoke with everyone on and around the property and asked if they have ever seen a greater prairie chicken. No one has ever seen a prairie chicken on the property.
919.42-919.55	ML-MO-AU-4576	1/2/2007			No answer – ENSR left a voicemail message.
		1/3/2007			ENSR left a message.
		1/4/2007			The landowner called back and left a message. ENSR returned call at 3:25 p.m. There was no answer.
		1/11/2007		X	Although the landowner has never seen a greater prairie chicken on the land, he is aware of what they look like. He does not live on the land but has owned the land for 4 to 5 years and is confident that there are no greater prairie chicken on that property. He has spoken with many of the farmers in the area, and they have never seen a greater prairie chicken.

Appendix A

Telephone Questionnaire for the Greater Prairie Chicken

Telephone Questionnaire for the Greater Prairie Chicken

Hello Sir or Madam:

On behalf of the Rockies Express Pipeline-West (REX-West) Project, I am conducting a telephone questionnaire to address impacts to the greater prairie chicken. Could you please help us by taking a few minutes to answer some questions?

The reason for this telephone questionnaire is that the greater prairie chicken is endangered in the state of Missouri. Eighty percent of Missouri's remaining prairie chickens live on and around remnant native prairies. If prairie habitat and populations continue to decline at the present rate, the prairie chicken may disappear from Missouri in as little as 10 years. The population may fall so low that it cannot recover. If that happens, the species will be extirpated from the state (MDC 2004). REX-West would like to minimize impacts to this species. The questions are as follows:

1. **Do you know what a greater prairie chicken looks like?**

The prairie chicken is strongly barred brown and tan to white, especially on the under parts. The tail is short and square, dark brown in males, barred brown and tan in females. The legs are feathered down to the toes; nostrils are hidden by feathers. Orange-colored air sacs and eyebrows are conspicuous on males in the spring. Individuals are about 18 inches long and weigh about 2 pounds (MDC 2004).

Greater Prairie-Chickens may sometimes be confused with female Ring-necked Pheasants (an introduced game bird). Both are brown overall, have similar body sizes, and occur in similar habitats. However, Pheasants have a long, pointed tail as opposed to the Prairie-Chickens' short, rounded tail. Also, Prairie-Chickens are heavily barred above and below, whereas Pheasants have no barring underneath, and are more buffy brown overall with only some bars and spots on their upperparts.

2. **Have you seen a prairie chicken on your property in the past 5 years?**

3. **Have you observed prairie chicken feathers or droppings on your property?**

Prime habitat for Greater Prairie-Chickens consists of large, unbroken expanses of native tallgrass prairie and other grassland habitats with minimal trees above 15 feet. In Missouri, habitat available for Prairie-Chickens is typically limited to grassland/prairie fragments interspersed with cropland, woodland, and forest.

4. **Have you observed or heard breeding prairie chickens or young on your property?**

    a. **If yes, how many and when?**

The breeding season begins in early spring and extends until June. Cocks make early morning and late afternoon visits to certain areas called "booming grounds" or "leks," which are used traditionally. Here the males dance, call and fight among themselves as they establish territories. At the height of the breeding season, hens visit the booming grounds and mating occurs (MDC 2004).

Greater prairie chicken are ground nesters. Nests are simple, flimsy structures of dead grass; they are saucer-shaped, about 7 inches in diameter and perhaps 2 to 3 inches deep. Nests are usually located in high, arching clumps of grass but sometimes are built in weedy areas (MDC 2004).

The average clutch contains about a dozen eggs. The eggs, only a little smaller than domestic chicken eggs, are dark olive-buff to grayish-olive with fine spots and occasional red flecks. Incubation requires about 3 weeks. The peak of the hatching period comes in late May to early June depending on weather conditions. The chicks remain with the hen for 8 to 10 weeks, and then the brood breaks up (MDC 2004).

Reference

Missouri Department of Conservation Website. 2004. http://www.mdc.mo.gov/nathis/birds/chickens/. Accessed by ENSR on 10/13/06.

Appendix B

Correspondence with the Missouri Department of Conservation

Stribley, Sara

Subject: FW: Greater Prairie Chicken

Attachments: GPC.jpg

>>> "Lorenz, Patricia" < plorenz@ensr.aecom.com > 10/18/06 9:54 AM >>>
Great, thanks Andrew. The MDC website has a great link with GPC information. Could we distribute that information to landowners if they request additional information?

Patti

-----Original Message-----
From: Andrew Forbes [mailto:Andrew.Forbes@mdc.mo.gov]
Sent: Wednesday, October 18, 2006 8:44 AM
To: Lorenz, Patricia
Cc: Barnes, Chad; Johnson, Charlie; Tillquist, Heidi; Ellis, Scott; Patti, Scott; Stribley, Sara; Doyle Brown
Subject: Re: REX-West and Keystone Greater Prairie Chicken Information

Patti,

I've reviewed the questionnaires. They look fine to me overall. I would suggest the following changes to both versions-

Under "Do you know what a Prairie-Chicken looks like", ADD to supplemental information:

Greater Prairie-Chickens may sometimes be confused with female Ring-necked Pheasants (an introduced game bird). Both are brown overall, have similar body sizes, and occur in similar habitats. However, Pheasants have a long, pointed tail as opposed to the Prairie-Chickens' short, rounded tail. Also, Prairie-Chickens are heavily barred above and below, whereas Pheasants have no barring underneath, and are more buffy brown overall with only some bars and spots on their upperparts.

Under "Have you observed prairie-chicken feathers or droppings on your property", CHANGE supplemental information to:

"Prime habitat for Greater Prairie-Chickens consists of large, unbroken expanses of native tallgrass prairie and other grassland habitats with minimal trees above 15'. In Missouri, habitat available for Prairie-Chickens is typically limited to grassland/prairie fragments interspersed with cropland, woodland, and forest."

Andrew Forbes
Ornithologist
Missouri Dept. of Conservation/Audubon Missouri
phone: 573-447-2249
573-447-2428

>>> "Lorenz, Patricia" < plorenz@ensr.aecom.com > 10/16/06 5:40 PM >>>
Andrew,

Attached is the information regarding greater prairie chicken telephone surveys that we spoke of on Friday 10/13/06. The attached document contains two sets of letters and telephone questionnaires in order to keep the projects separate. If you have any questions, please feel free to contact me at the number below. Again, thank you for your help.

Sincerely,

Patti Lorenz
ENSR
1601 Prospect Parkway
Fort Collins, CO 80525
T: (970) 493-8878 x179
F: (970) 493-0213

Stribley, Sara

From: Lorenz, Patricia
Sent: Monday, October 16, 2006 4:40 PM
To: Andrew.Forbes@mdc.mo.gov
Cc: Doyle Brown; Johnson, Charlie; Stribley, Sara; Patti, Scott; Barnes, Chad; Tillquist, Heidi; Ellis, Scott
Subject: REX-West and Keystone Greater Prairie Chicken Information
Attachments: Greater Prairie Chicken Information for MDC.PDF

Andrew,

Attached is the information regarding greater prairie chicken telephone surveys that we spoke of on Friday 10/13/06. The attached document contains two sets of letters and telephone questionnaires in order to keep the projects separate. If you have any questions, please feel free to contact me at the number below. Again, thank you for your help.

Sincerely,

Patti Lorenz
ENSR
1601 Prospect Parkway
Fort Collins, CO 80525
T: (970) 493-8878 x179
F: (970) 493-0213
[illegible]nz@ensr.aecom.com

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ENSR
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T 970.493.8878 F 970.493.0213 www.ensr.aecom.com

October 16, 2006

Andrew Forbes
Missouri Department of Conservation/Audubon Missouri
P.O. Box 180
Jefferson City, MO 65102

RE: Rockies Express Pipeline-West (REX-West) Project
Greater Prairie Chicken Telephone Questionnaire

Dear Mr. Forbes:

Thank you for agreeing to review the material prepared by ENSR Corporation (ENSR) regarding a telephone questionnaire to determine the occurrence of greater prairie chickens (GPC) along the Rockies Express Pipeline-West (REX-West) Project in Audrain County, Missouri. As discussed during our phone conversation, the Missouri Department of Conservation (MDC) is requesting that ENSR conduct a telephone questionnaire with private land owners whose property could provide potential habitat for GPC in Audrain County.

Attached for your review is a preliminary table with potential GPC habitat locations along the REX-West route. Potential habitat locations for GPC were determined based on species habitat association and agency correspondence (e.g., U.S. Fish and Wildlife Service, Missouri Department of Conservation, and Natural Heritage Program/ NatureServe), in combination with aerial habitat surveys, wetland/waterbody field surveys, U.S. Geological Survey Land Use Land Cover data, and aerial photography. Also enclosed is a draft telephone questionnaire that will be used during phone surveys with private land owners for the REX-West Project. ENSR would appreciate any input regarding the questions that will be asked during these surveys.

Doyle Brown has been identified as the point of contact for the MDC for the project. He has been given maps of the proposed route through Missouri. If you have any questions regarding the enclosed materials or need any additional information, please contact me at (970) 493-8878 ext. 179 or email plorenz@ensr.aecom.com.

Sincerely,

Patricia M. Lorenz

Patricia M. Lorenz
Biologist

PL

Enc: GPC Habitat Table
GPC Telephone Questionnaire

Potential Greater Prairie Chicken (GPC) Habitat Locations

Milepost (MP)	Tract ID
707.8	MO-AU-100
707.4-707.8	MO-AU-097
707.2-707.4	MO-AU-096
706.8	MO-AU-094
706.5-706.7	MO-AU-093
706.4	MO-AU-093.S14
706.3	MO-AU-093.S08
706.2-706.3	MO-AU-093
706.0-706.2	MO-AU-092
705.4-705.6	MO-AU-090
704.1-704.4	MO-AU-084
703.6-703.8	MO-AU-083
703.2-703.6	MO-AU-082
703.2	MO-AU-081
703.1	MO-AU-077
702.3-703.0	MO-AU-074, MO-AU-075, MO-AU-076
697.3-697.4	MO-AU-059
696.6-697.1	MO-AU-056
692.6	MO-AU-028.S01

Phone Questionnaire for Contract Land Staff (CLS) Agent:

Hello Sir or Madam:

On behalf of the Rockies Express Pipeline-West (REX-West) Project, I am conducting a telephone questionnaire to address impacts to the greater prairie chicken. Could you please help us by taking a few minutes to answer some questions?

The reason for this telephone questionnaire is that the greater prairie chicken is endangered in the state of Missouri. Eighty percent of Missouri's remaining prairie chickens live on and around remnant native prairies. If prairie habitat and populations continue to decline at the present rate, the prairie chicken may disappear from Missouri in as little as 10 years. The population may fall so low that it cannot recover. If that happens, the species will be extirpated from the state (MDC 2004). REX-West would like to minimize impacts to this species. The questions are as follows:

1. **Do you know what a greater prairie chicken looks like?**

The prairie chicken is strongly barred brown and tan to white, especially on the underparts. The tail is short and square, dark brown in males, barred brown and tan in females. The legs are feathered down to the toes; nostrils are hidden by feathers. Orange-colored air sacs and eyebrows are conspicuous on males in the spring. Individuals are about 18 inches long and weigh about 2 pounds (MDC 2004).

2. **Have you seen a prairie chicken on your property in the past five years?**

3. **Have you observed prairie chicken feathers or droppings on your property?**

Prime habitat for this species includes mid-grass and tall-grass prairies bordered by open oak woodlands, oak forests, and cropland. In Missouri, nesting habitat is limited to cropland and nearby prairies.

4. **Have you observed or heard breeding prairie chickens or young on your property?**
    a. **If yes, how many and when?**

The breeding season begins in early spring and extends until June. Cocks make early morning and late afternoon visits to certain areas called "booming grounds" or "leks", which are used traditionally. Here the males dance, call and fight among themselves as they establish territories. At the height of the breeding season, hens visit the booming grounds and mating occurs (MDC 2004).

GPC are ground nesters. Nests are simple, flimsy structures of dead grass; they are saucer-shaped, about 7 inches in diameter and perhaps 2 to 3 inches deep. Nests are usually located in high, arching clumps of grass but sometimes are built in weedy areas (MDC 2004).

The average clutch contains about a dozen eggs. The eggs, only a little smaller than domestic chicken eggs, are dark olive-buff to grayish-olive with fine spots and occasional red flecks. Incubation requires about three weeks. The peak of the hatching period comes in late May to early June depending on weather conditions. The chicks remain with the hen for 8-10 weeks, then the brood breaks up (MDC 2004).

Reference:
Missouri Department of Conservation Website. 2004. http://www.mdc.mo.gov/nathis/birds/chickens/. Accessed by ENSR on 10/13/06.

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T 970.493.8878 F 970.493.0213 www.ensr.aecom.com

October 16, 2006

Andrew Forbes
Missouri Department of Conservation/Audubon Missouri
P.O. Box 180
Jefferson City, MO 65102

RE: Keystone Pipeline Project Greater Prairie Chicken Telephone Questionnaire

Dear Mr. Forbes:

Thank you for agreeing to review the material prepared by ENSR Corporation (ENSR) regarding a telephone questionnaire to determine the occurrence of greater prairie chickens (GPC) along the Keystone Pipeline Project (Keystone) in Audrain County, Missouri. As requested by the Missouri Department of Conservation (MDC), ENSR is conducting a telephone questionnaire with private land owners whose property could provide potential habitat for GPC in Audrain County.

A total of 22 areas have been identified as having potential GPC habitat along the project route in Audrain County. Of the 22 areas, 21 of the areas are co-located with the REX-West Pipeline. As a result, these 21 GPC areas will be covered under the REX-West Pipeline Project (contacted by a REX-West land agent). The remaining potential GPC habitat area that is not co-located with the REX-West pipeline occurs between mileposts 928.0-928.2 (Tract Number: ML-MO-AU-4607; Property Owner: William Deimke). This land owner will be contacted separately by a Keystone land agent. Potential habitat locations for GPC were determined based on species habitat association and agency correspondence (e.g., U.S. Fish and Wildlife Service, Missouri Department of Conservation, and Natural Heritage Program/ NatureServe), in combination with aerial habitat surveys, wetland/waterbody field surveys, U.S. Geological Survey Land Use Land Cover data, and aerial photography. Also enclosed is a draft telephone questionnaire that will be used during the phone survey with the private land owner for the Keystone Project. ENSR would appreciate any input regarding the questions that will be asked during these surveys.

Doyle Brown has been identified as the point of contact for the MDC for the project. He has been given maps of the proposed route through Missouri. If you have any questions regarding the enclosed materials or need any additional information, please contact me at (970) 493-8878 ext. 168 or email sstribley@ensr.aecom.com.

Sincerely,

Sara Stribley
Biologist

SS

Enc: GPC Telephone Questionnaire

Phone Questionnaire for Ellis & Associates Land Staff Agent:

Hello Sir or Madam:

On behalf of the Keystone Pipeline Project, I am conducting a telephone questionnaire to address impacts to the greater prairie chicken. Could you please help us by taking a few minutes to answer some questions?

The reason for this telephone questionnaire is that the greater prairie chicken is endangered in the state of Missouri. Eighty percent of Missouri's remaining prairie chickens live on and around remnant native prairies. If prairie habitat and populations continue to decline at the present rate, the prairie chicken may disappear from Missouri in as little as 10 years. The population may fall so low that it cannot recover. If that happens, the species will be extirpated from the state (MDC 2004). Keystone would like to minimize impacts to this species. The questions are as follows:

1. **Do you know what a greater prairie chicken looks like?**

The prairie chicken is strongly barred brown and tan to white, especially on the underparts. The tail is short and square, dark brown in males, barred brown and tan in females. The legs are feathered down to the toes; nostrils are hidden by feathers. Orange-colored air sacs and eyebrows are conspicuous on males in the spring. Individuals are about 18 inches long and weigh about 2 pounds (MDC 2004).

2. **Have you seen a prairie chicken on your property in the past five years?**

3. **Have you observed prairie chicken feathers or droppings on your property?**

Prime habitat for this species includes mid-grass and tall-grass prairies bordered by open oak woodlands, oak forests, and cropland. In Missouri, nesting habitat is limited to cropland and nearby prairies.

4. **Have you observed or heard breeding prairie chickens or young on your property?**
    a. **If yes, how many and when?**

The breeding season begins in early spring and extends until June. Cocks make early morning and late afternoon visits to certain areas called "booming grounds" or "leks", which are used traditionally. Here the males dance, call and fight among themselves as they establish territories. At the height of the breeding season, hens visit the booming grounds and mating occurs (MDC 2004).

GPC are ground nesters. Nests are simple, flimsy structures of dead grass; they are saucer-shaped, about 7 inches in diameter and perhaps 2 to 3 inches deep. Nests are usually located in high, arching clumps of grass but sometimes are built in weedy areas (MDC 2004).

The average clutch contains about a dozen eggs. The eggs, only a little smaller than domestic chicken eggs, are dark olive-buff to grayish-olive with fine spots and occasional red flecks. Incubation requires about three weeks. The peak of the hatching period comes in late May to early June depending on weather conditions. The chicks remain with the hen for 8-10 weeks, then the brood breaks up (MDC 2004).

Reference:
Missouri Department of Conservation Website. 2004. http://www.mdc.mo.gov/nathis/birds/chickens/. Accessed by ENSR on 10/13/06.

Potential Greater Prairie Chicken (GPC) Habitat Locations

MP		Tract ID	
REX-West	Keystone	REX-West	Keystone
707.8	919.6	MO-AU-100	ML-MO-AU-4576
707.4-707.8	919.1-919.3	MO-AU-097	ML-MO-AU-4574
707.2-707.4	918.9-919.1	MO-AU-096	ML-MO-AU-4573
706.8	918.6	MO-AU-094	ML-MO-AU-4572.1
706.5-706.7	918.2-91804	MO-AU-093	ML-MO-AU-4571
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KEYSTONE SUPPLEMENTAL FILING, MARCH 2007

BIOLOGICAL

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Prepared for:
Keystone Pipeline Project

A Summary Report of the January-February 2007 Aerial Raptor Nest / Bald Eagle Nest and Winter Roost Survey Completed for the Keystone Mainline and Cushing Extension Rights-of-Way

ENSR Corporation
March 2007
Document No.: 10623-004

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Executive Summary

Two aerial surveys were previously completed to collect raptor nest occurrence information along portions of the proposed Keystone Pipeline right-of-way (ROW) from March 28 through April 1, 2006, in Kansas and Missouri and from April 26 through May 2, 2006, in North Dakota, South Dakota, and Nebraska (ENSR 2006). This report covers a third additional raptor nest aerial survey conducted along the entire Keystone ROW (Illinois, Missouri, Kansas, Nebraska, South Dakota, and North Dakota) and the Cushing Extension ROW (Nebraska, Kansas, and Oklahoma) from January 30 through February 4, 2007. All aerial surveys were conducted in a helicopter with a pilot and a two-person survey team. The 2006 surveys covered an area of at least 0.25-mile on each side of the proposed ROW alignment, while the 2007 survey addressed only an approximate 150-foot ROW corridor along each side of the proposed pipeline centerline (300-foot-wide survey path). At major river crossings, survey coverage was expanded to 1 mile on each side of the ROW to search for bald eagle nests and their winter roost sites.

The 2007 survey documented 112 raptor nests within the proposed Keystone Pipeline Project construction ROW. These included 93 nests along the Mainline ROW (2-Illinois, 44-Missouri, 19-Kansas, 15-Nebraska, 4-South Dakota, 9-North Dakota) and 19 nests along the Cushing Extension (16-Kansas, 3-Oklahoma).

Additionally, two osprey hack sites have been identified within the immediate vicinity of the proposed Missouri River crossing near Yankton, South Dakota. Discussion with the South Dakota Game, Fish, and Parks Department (SDGFP) indicates that the two hack sites may be used again in 2007, 2008, and 2009.

Surveys for wintering bald eagles identified transitory or communal roosts and winter concentration areas within 1 mile of the Mainline ROW at the Mississippi River crossing, the Missouri River near its confluence with the Mississippi, the Cuivre River, the West Fork of the Cuivre River, the Missouri River at the Kansas/Missouri state line, and the Big Blue River. Roosts and wintering concentrations of bald eagles within 1 mile of the Cushing Extension ROW were identified at the Little Blue River, Mill Creek, Republican River, Smoky Hill River, Arkansas River, and Salt Fork of the Arkansas River.

A total of 7 bald eagle nests were located within 1 mile of the Mainline ROW. These included two bald eagle nests at the Mississippi River crossing near Confluence Park, three nests in the Cuivre and Missouri River floodplain in Missouri, one nest at the Big Blue River in Kansas, and one at the Pembina River in North Dakota. Two nests were observed within 1 mile of the Cushing Extension ROW, one on the Smoky Hill River in Kansas and one nest in poor shape at the Arkansas River in Oklahoma.

1.0 Introduction

Keystone is planning to construct, operate, and maintain an approximately 1,845-mile-long interstate crude oil transmission system from an oil supply hub near Hardisty, Alberta, Canada to destinations in the Midwestern United States (U.S.) (**Figure 1**). ENSR Corporation (ENSR) has been retained by Keystone to assist with environmental permitting for the proposed Keystone Pipeline Project (Project) within the U.S. In the U.S., the proposed Project consists of approximately 1,078 miles of new pipeline constructed from the U.S.-Canada border in Pembina County, North Dakota, to terminals and refineries in Salisbury (Chariton County), Missouri; Wood River (Madison County); and Patoka (Marion County), Illinois. This route is identified as the Mainline. Based on interest expressed by crude oil shippers, Keystone also is considering the construction of a 294-mile pipeline extension, which would extend the Keystone Pipeline south from the Nebraska/Kansas border (Jefferson County) to Cushing, Oklahoma. The primary delivery point would be in the Cushing area, with potential connections to refineries or pipelines in Kansas and North Texas as well as Oklahoma. This portion

of the Keystone Pipeline system is named the Cushing Extension. Keystone proposes to begin construction of the new pipeline in the spring of 2008, with the Keystone Mainline in-service by the end of 2009.

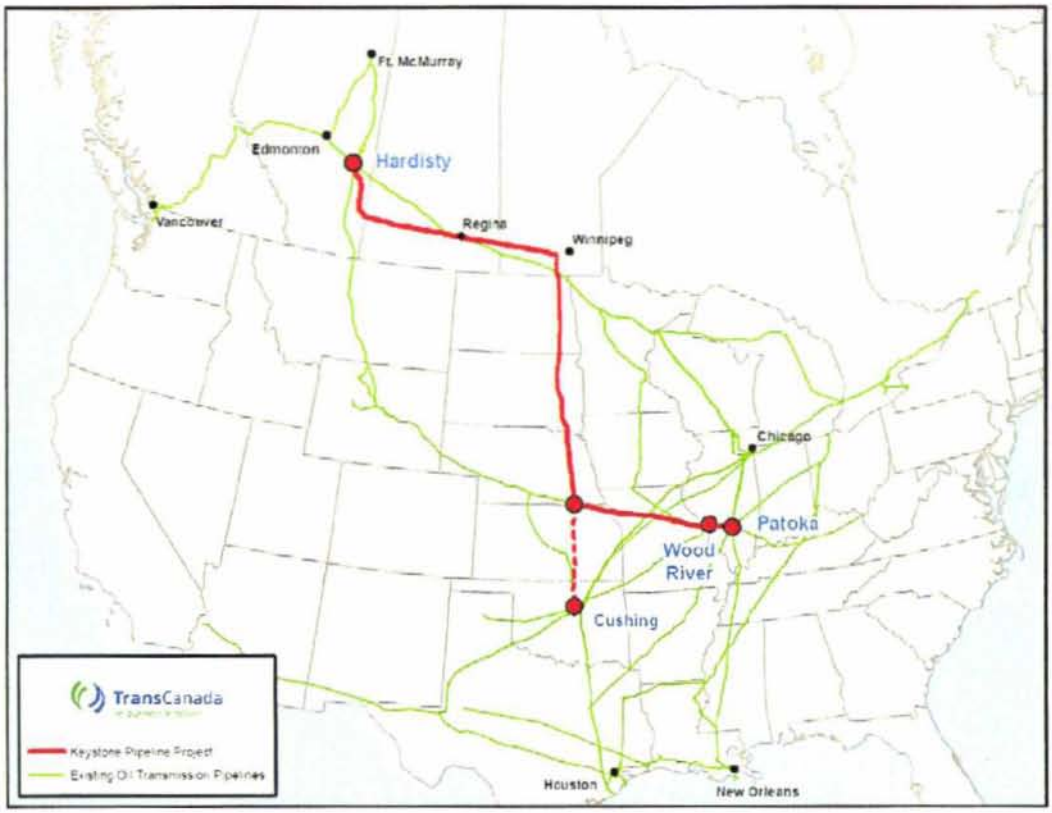

Figure 1 Proposed Keystone Pipeline Route (Cushing Extension represented by the dotted line)

The Project also will require the construction of pump stations, valves, meters, and other ancillary facilities. Location data for these facilities was not available at the time of this survey; therefore, surveys required for these project features need to be completed prior to construction.

Background Information

A variety of raptor species are known to nest in the region of the proposed Project. These species include eagles, buteos, falcons, owls, harriers, osprey, and other birds of prey. Breeding and nest building/tending activities can begin as early as February for some raptor species, and the rearing of young and fledgling dependency can last into early August for some of the later nesting species. Protected raptor species occurring along the proposed Keystone Pipeline Project route include the bald eagle, northern harrier, peregrine falcon, and barn owl. Other raptors identified as species of special concern include the Cooper's hawk, red-shouldered hawk, broad-winged hawk, and short-eared owl.

Information obtained by Keystone on historic raptor nest sites in the vicinity of the proposed ROW was primarily limited to listed species, including bald eagles. The principal methods for locating nest sites along the proposed pipeline route were the aerial surveys conducted by helicopter in late March through early May 2006 and the January-February 2007 survey.

2.0 Methods

Aerial survey methods for the 2007 followed those outlined by Call (1978). Two surveyors (seated in left- and right-hand positions of the helicopter) examined the area within the 300-foot-wide construction corridor along the entire Mainline and Cushing Extension ROW to locate existing raptor nest sites. In addition, a 1-mile survey area on each side of the ROW was employed to locate potential bald eagle nest and winter roost sites where the ROW intercepted major river crossings, such as the Platte and Missouri rivers. Aircraft navigation along the proposed pipeline ROW and maintenance of appropriate aircraft position in relation to the ROW was then facilitated using a pilot operated and monitored GPS unit and real time GPS tracking on an on-board computer. Aircraft position and location along the ROW was further monitored by the front, right-hand observer using a separate GPS unit that displayed real time position and the ROW centerline on DRG (digital raster graphic) 7.5-minute USGS topographic maps exhibited on the observer's laptop computer screen.

The 2007 aerial raptor survey focused on locating raptor stick nests constructed in trees in riparian zones, shelterbelts, and other wooded areas, and on locating bald eagle winter roost sites along the major river crossings. Winter timing of the survey facilitated locating nests in deciduous trees prior to leaf-out. No areas of cliffs, rock outcrop, knolls, and topographic features suitable for raptor nesting use were located within the Keystone Mainline or Cushing Extension ROW. In addition to recording raptor nest sites, heron rookeries (communal nest areas) were also recorded by the survey since herons are migratory along most portions of the Keystone Pipeline ROW. Herons are protected under the Migratory Bird Treaty Act (MBTA). Nesting herons are susceptible to disturbance and pipeline construction near a rookery during the nesting season and could result in nest abandonment and a potential "take" or loss of young of these bird species.

The January-February 2007 survey started at the eastern terminus (Patoka) of the Keystone Mainline on January 30, and proceeded westward to the junction of the Keystone Mainline and Cushing Extension. The Cushing Extension segment was surveyed on February 1, and the remainder of the Keystone Mainline, north of the Keystone Mainline/Cushing Extension junction, was surveyed from February 2 through 4.

Surveys were conducted between sunrise and sunset (approximately 0800 to 1730 Central Time). The date, temperature, wind, and cloud cover were recorded at the beginning of each survey day and at the end of each survey day; changes in overall weather conditions during the survey were also recorded.

Temperatures during the survey ranged from highs of approximately 20 degrees Fahrenheit (°F) to lows of minus 25°F. Skies were generally clear to partly cloudy with little to no precipitation. Sporadic, light snowfall events were encountered the morning of January 30 in western Illinois and the afternoon of January 31 in western Missouri and eastern Kansas along the Mainline ROW, but visibility of the ROW was not compromised. West/northwest winds were fairly consistent, ranging from 5 to 15 miles per hour (mph) during most of the survey period.

Complete coverage of the entire ROW was obtained by traveling down the ROW centerline and visually scanning all areas of potential nesting habitat. This typically involved slowing aircraft speed to 25 to 40 mph when woodlands, shelterbelts, riparian areas, and isolated trees were encountered. Once a possible nest site was located, a second pass-over was made to confirm nest type and condition and to obtain accurate GPS location coordinates using the front observer's GPS unit. The rear observer recorded notes on nest configuration, condition, possible species, habitat, and nearest pipeline milepost.

All major rivers crossed by the Keystone Mainline and Cushing Extension ROW were initially selected as potential areas to be searched for bald eagle winter roosting activity (**Table 1**). However, during the January-February 2007 aerial survey a number of these crossings were determined not to support suitable bald eagle winter roosting habitat, either because the river was completely frozen over and there was no open water for bald eagle foraging and/or there were no suitably sized roost trees along the river within 1 mile of the ROW

(**Table 1**). At major river crossings where suitable bald eagle winter roosting habitat (large trees and open water) was present, a 2-mile survey corridor centered on the ROW was obtained by flying 1 mile from the ROW centerline along one side of the river and returning along the opposite side of the river to the ROW centerline. The same process was then repeated on the opposite side of the ROW. Only raptor nests large enough to support eagle nesting activity were recorded outside of the 300-foot ROW but within 1 mile of the ROW centerline. The observers were also alert to noting and recording perched bald eagles in trees as well as bald eagles flying along the river corridor. GPS location coordinates were recorded for all bald eagle nest and roost sites observed. In addition, general GPS coordinates were recorded for areas along the river where bald eagles were observed in flight. General observations on bald eagle behavior and numbers were also recorded where birds were observed.

Initially, the focus of the bald eagle roosting portion of the surveys was to survey major river crossings either early in the morning (within an hour after sunrise) or late in the afternoon (1 hour before sunset) when eagles were most likely to found using nighttime roost sites. However, as the survey progressed, it was noted that bald eagles appeared to be remaining in or near roost sites along the major rivers during most of the day as a result of the cold temperatures (less than 20°F down to subzero temperatures) that were encountered throughout the survey period. In addition, it also was noted that bald eagles often flushed from perch sites as the helicopter flew into the vicinity making accurate identification of specific roosts difficult. As a result, survey emphasis shifted to recording bald eagle presence rather than specific roost trees although eagle perch site locations were still recorded. It was assumed that if bald eagles were located within 1 mile of the ROW then nighttime roost sites were also likely to be present within 1 mile of the ROW.

3.0 Results

3.1 Bald Eagle Winter Roost and Nest Sites

The U.S. Fish and Wildlife Service (USFWS) defines two types of bald eagle winter roost sites. Transitory roosts are described as sites with three or more eagles within 100 meters of each other for at least two nights in an area with no previous history of winter communal roosting. Communal roosts are defined as six or more eagles in a small area for extended periods of time or used for multiple years. Since a one-time winter aerial survey cannot distinguish between transitory roosts versus communal roosts, it was assumed that if bald eagles were observed perching along a river within 1 mile of the ROW then at least some type of roosting activity occurs within 1 mile of the ROW. Follow-up ground surveys would be required to determine if identified roosting areas represent transitory or communal roost sites.

3.1.1 Mainline ROW

Out of the 24 major river crossings initially selected as potential bald eagle winter roost areas on the Keystone Mainline ROW, 14 were found to be frozen solid and/or supported no suitable-sized perch trees near the ROW. These river crossing were not surveyed for bald eagle winter roosting use (**Table 1**). The Pembina River in North Dakota was frozen solid making it unsuitable for winter roosting use, but one historic bald eagle nest was located on the south side of the river. Four additional river crossings (Missouri River at South Dakota/ Nebraska border, Platte River in Nebraska, Grand River in Missouri, and Kaskaskia River in Missouri) were surveyed for bald eagle use, but no eagles were observed within 1 mile of the ROW. The Missouri River ROW crossing at the South Dakota/Nebraska border exhibited suitable stretches of open water for bald eagle foraging, but the south bank had few large perch trees. The north bank crossing is close to Yankton and other human activities rendering this area unsuitable for bald eagle roosting use. One historic eagle nest was located approximately 1.5 miles downstream of the ROW on the north side of the river, and two adults were seen nearby. In addition, at least 10 adult and immature bald eagles were observed along the river corridor near the Lewis and Clark Lake dam (Gavins Point Dam) approximately 5 miles upstream of the ROW. The area of the Platte River ROW crossing in Nebraska exhibited only one very narrow, short stretch of open water making this reach of the river unsuitable for bald eagle foraging. Suitable roost trees and open water were

determined to be present at the Grand River ROW crossing in Missouri, but no eagles or eagle nests were found within 1 mile of the ROW. The ROW crossing at the Kaskaskia River and adjacent wetland complexes was found to exhibit only limited areas of open water with few potential perch trees within 1 mile of the ROW, and no eagles were noted using this area.

Bald eagles and bald eagle perch/roost trees were recorded at the five remaining major rivers either crossed or approached by the Keystone Mainline ROW. These were the Big Blue River in Kansas, the Missouri River at the Kansas/Missouri state line, West Fork of the Cuivre and the Cuivre River (two locations) in Missouri, and the Mississippi River at the Missouri/Illinois state line (**Tables 1** and **2**). Two adult eagles were noted roosting on the Big Blue River within 1 mile of the ROW. In addition, one possible eagle nest was located in a heron rookery within 1 mile of the ROW on the Big Blue River. Several eagles and perch/roost locations were observed within 1 mile of the ROW on the Missouri River at the Kansas/Missouri state line. Eagle roosting use was documented for both the West Fork of the Cuivre River and the Cuivre River within 1 mile of the ROW, and two eagle nests were found on the Cuivre River within 1 mile of the ROW (**Table 2**).

3.1.2 Cushing Extension

Bald eagle presence and roosting use was documented within 1 mile of the ROW along six of the seven major rivers crossed by the Cushing Extension ROW (**Tables 1** and **2**). Observations within 1 mile of the ROW included two adults and one immature eagle on the Little Blue River, two adult eagles on Mill Creek, several adult eagles on the Republican River, one adult and one eagle nest on the Smoky Hill River, three adult and two immature eagles on the Arkansas River, and three adults and one immature eagle on the Salt Fork Arkansas River at its confluence with the Bois'd Arc River. The confluence of the Salt Fork Arkansas River and Bois'd Arc River is a documented historic eagle concentration area. The Cimarron River was the only major river crossed by the Cushing Extension where eagle presence was not documented within 1 mile of the ROW. This segment of the river also supported few suitable roost sized trees. Three perched eagles, however, were located along a segment of the Cimarron River approximately 1.5 to 4 miles downstream of the ROW, and one nest in poor condition was found approximately 1 mile downstream of the ROW.

3.2 Other Raptor Nest Sites

Table 3 provides a listing of all raptor nest locations (including great blue heron rookeries) identified by January-February 2007 aerial survey along the Keystone Mainline ROW and Cushing Extension ROW. A total of 112 nest sites were documented within the survey area. Of these, seven were heron nest sites representing three separate rookery areas (two on the Keystone Mainline ROW and one on the Cushing Extension). The remaining 105 nests were potential raptor nest sites with 90 on the Keystone Mainline ROW (2 in Illinois, 43 in Missouri, 17 in Kansas, 15 in Nebraska, 4 in South Dakota, and 9 in North Dakota) and 15 nests along the Cushing Extension (12 in Kansas, 3 in Oklahoma). The listing includes bald eagle nests within 1 mile of the ROW centerline and all other possible raptor and heron nests within a 150-foot construction corridor on each side of the ROW centerline. **Table 3** also includes GPS coordinates for each nest location as well as information on species ownership, nest condition, and habitat. All nests located were tree nests, and no other types of potential nesting habitat, such as cliffs or rock outcrops, were located within the survey corridor.

Twenty-six of the 2007 survey nests had been identified during the 2006 surveys of the Keystone Mainline ROW. Nine other previously identified raptor nest locations within the Keystone Mainline ROW were either not found (site #75, 86, 98, 111, and 133), were located just outside of the proposed ROW corridor (site #190 and 191), or were determined not to be raptor nests (site #83 and 184). The remainder of the nests documented by the 2006 surveys were well outside of the 300-foot ROW corridor. It is quite possible that nests not relocated by the 2007 survey had been lost to the severe winter ice storms that had plagued the region prior to the survey. Considerable ice storm damage to trees in the form of broken limbs and trunks was clearly evident along many portions of the ROW during the January-February 2007 survey.

Because of the winter timing of the survey, information on activity status of nests was limited to a few bald eagle, great horned owl, and red-tailed hawk nests that showed evidence of early season nesting use. Active

nests included three bald eagle nests that either had an adult on a nest or adults nearby that were assumed to be establishing a nesting territory, one red-tailed hawk nest with a pair of adults nearby, one red-tailed hawk nest with an adult incubating a single egg, and a great horned owl nest with an adult in incubation posture. The one red-tailed hawk nest with an adult incubating an egg was a very early nesting attempt for this species.

Species ownership determinations for remaining nests were based on nest size, configuration, and location. Beyond the few nests where species ownership was determined by presence of adults, the majority were classified as red-tailed hawk or accipiter (either Cooper's hawk or sharp-shinned hawk) (**Table 3**). Great horned owl, long-eared owl, and American crow could also use nests classified as accipiter.

In addition to the raptor nest sites identified above, two osprey hack sites were identified during field reconnaissance efforts in 2006 near the Missouri River crossing near Yankton, South Dakota. The hack sites are artificial nesting towers approximately 15 feet aboveground, located in the Paddlewheel Point Natural Area. The nearest hack site is located approximately 450 feet east from the Project ROW. The second hack site is located approximately 750 feet east from the Project ROW. The hack sites were used to hack osprey in 2006. The birds were placed in the hack site on July 26 and were considered fledged by August 12. The SDGFP indicated that this site could possibly be used again in 2008 and 2009, if appropriate funding was available.

4.0 Discussion

Based on the findings of the 2006 and 2007 aerial surveys, a number of raptor species breed and forage in and near the Project ROW. The most common species include red-tailed hawks and great-horned owls, with scattered breeding records for the Swainson's hawk, northern harrier, American kestrel, red-shouldered hawk, osprey, and bald eagle. Given the aerial survey method employed for the project, nests of some species such as cavity nesters (American kestrel and eastern screech owl) ground nesters (short-eared owl, burrowing owl, turkey vulture, and northern harrier), and woodland nesters in evergreens (accipiters, long-eared owl, and great horned owl) could not be effectively located. Survey emphasis was placed on locating nests of eagles, buteos (broad-winged hawks), and accipiters and owls that nest in deciduous trees. These are the most common species that could be affected by project construction, particularly if it were to occur within the breeding season (February through August).

The intent of these surveys was to identify as many raptor nests as possible within the immediate vicinity of the proposed pipeline ROW. The surveys were conducted in 2006 and 2007, in anticipation of construction in 2008. Nest data will aid in project planning in two ways: 1) provide information to avoid the disturbance of nest sites located within the construction ROW during the breeding season, or if necessary, identify nests that may need to be removed outside of the nesting season; and 2) provide historic nest location information for specific follow-up surveys that may need to be completed to determine activity status immediately prior to construction. For the purposes of avoiding adverse impacts to wintering bald eagles, follow-up surveys would need to be employed at major river crossings with documented eagle use to confirm the location of transitory or communal winter roost sites, if pipeline construction will occur at any of these crossings between October 1 and January 31. Winter roost surveys need to be conducted at least one day prior to the first date of construction.

Use of GPS

GPS provides an advanced, practical method for precise navigation and to obtain accurate location data, particularly in areas with little to no topographic relief or prominent landmarks; however, use of GPS can occasionally have limitations. Due to wind movement and positioning of the helicopter, GPS coordinate locations could be up to 100 to 200 feet in error from the actual nest location. All efforts were made to obtain

the most accurate GPS coordinate locations possible during the aerial surveys. However, two principal factors are believed to affect the overall accuracy of GPS recorded raptor nest locations during aerial surveys.

First, it was often difficult to maintain aircraft position directly over a nest site long enough to obtain GPS accuracy because of nest location, topography, wind, and other factors affecting flight conditions. Second, the GPS units used during the aerial surveys required several seconds of acquiring and averaging satellite position data to compute the most accurate location coordinates for each waypoint recorded. This factor in combination with difficulties in maintaining aircraft position exactly over the nest site were believed to be the greatest contributing factors to errors in obtaining the most accurate GPS coordinates for nest sites. Another complication related to obtaining accurate GPS coordinates, especially for active nest sites, was the aerial survey crew's concern for potential disturbance of active nests, particularly when an incubating adult bird was present on the nest. In order to avoid undue disturbance of these nests, the extent of aircraft time near the nest was kept to a minimum, and these nests were only approached close enough to obtain accurate information regarding nest type and species presence.

The accuracy of the majority of the nest location coordinates obtained during the January-February 2007 survey was believed to very high (±15 meters or less) during this survey period for two reasons: 1) relatively calm or steady winds and 2) inactive status of most nests because of winter timing of survey. The combination of these two factors permitted the pilot to maintain aircraft position directly over each nest site until the observer's GPS had locked in on the location coordinates thereby obtaining as accurate a GPS reading as possible. During the 2007 survey, there were only a small number of nests (**Table 3**) with early season activity (presence of adults on nest or in incubation posture). At these nests the GPS location was taken as quickly as possible and not immediately over the nest, and location accuracy was slightly compromised to avoid undue disturbance of the nest.

Even with less than optimal accuracy for some nest location coordinates, ENSR is confident that the data provided in this report and for the 2006 survey will be sufficient for future nest identification, project planning, and application of appropriate mitigation measures, if warranted. The next important step in the protection of breeding raptors from project construction and operation will be consultation with the USFWS, as well as applicable state game and fish departments, and the development of an agency approved mitigation plan and implementation process.

5.0 Mitigation Planning

The data from these surveys will allow Keystone and appropriate wildlife agencies to plan construction along the ROW and temporary use areas to avoid the removal of existing raptor nests, where possible. Raptor nest surveys were conducted during the 2006 breeding season and late winter 2007 to obtain complete coverage for the Keystone Mainline ROW and Cushing Extension ROW. However, pipeline construction is currently proposed to commence in 2008. It is highly likely that activity status of nests will change, some existing nests may be lost, and new nests constructed in the interim between survey completion and pipeline construction in 2008. It is Keystone's intent to minimize impacts to wildlife species, including breeding raptors, and it is anticipated that additional raptor surveys would be completed immediately prior to construction to confirm nest locations and activity status. All attempts would be made to construct during periods with the most minimal impacts to breeding birds. In the event that construction occurs during the breeding season, it may be necessary to provide a biological monitor or clearance surveys along certain portions of the route that would be scheduled for construction between February 1 and August 31 to prevent disturbance to nesting raptor species. However, these measures would depend on a number of site-specific factors and would be determined on a case-by-case basis with the applicable agencies.

It is anticipated that areas that would be disturbed by project construction and reclamation would be resurveyed prior to commencement of construction activities, or a biological monitor would be present to

determine whether birds were moving into the area and could be affected by project activities. Based on these survey results, Keystone would coordinate with the applicable agencies to determine whether additional protection measures may be warranted. It is possible that construction could proceed in certain areas near known nests depending on the activity status of a given nest, the distance between construction and the nest site, line-of-sight implications between the nest site and construction activities, duration and type of construction activity, and/or the presence of a qualified biologist to monitor bird behavior and response to construction activity. However, it is also likely under certain conditions that the agencies would require a buffer area around an active site and a construction constraint period within this buffer area until breeding is complete and the young had fledged.

The development and implementation of potential mitigation measures would depend on a number of factors, including species involved, its relative sensitivity to disturbance, the time of year, the type of activity proposed (e.g., trenching versus reclamation), the duration and timing of this activity, and possible topographical shielding. The use of a biological monitor may be warranted to allow construction to proceed in certain areas to ensure that nest sites are not disturbed and/or abandoned. These decisions would be made by the applicable agencies in consultation with Keystone.

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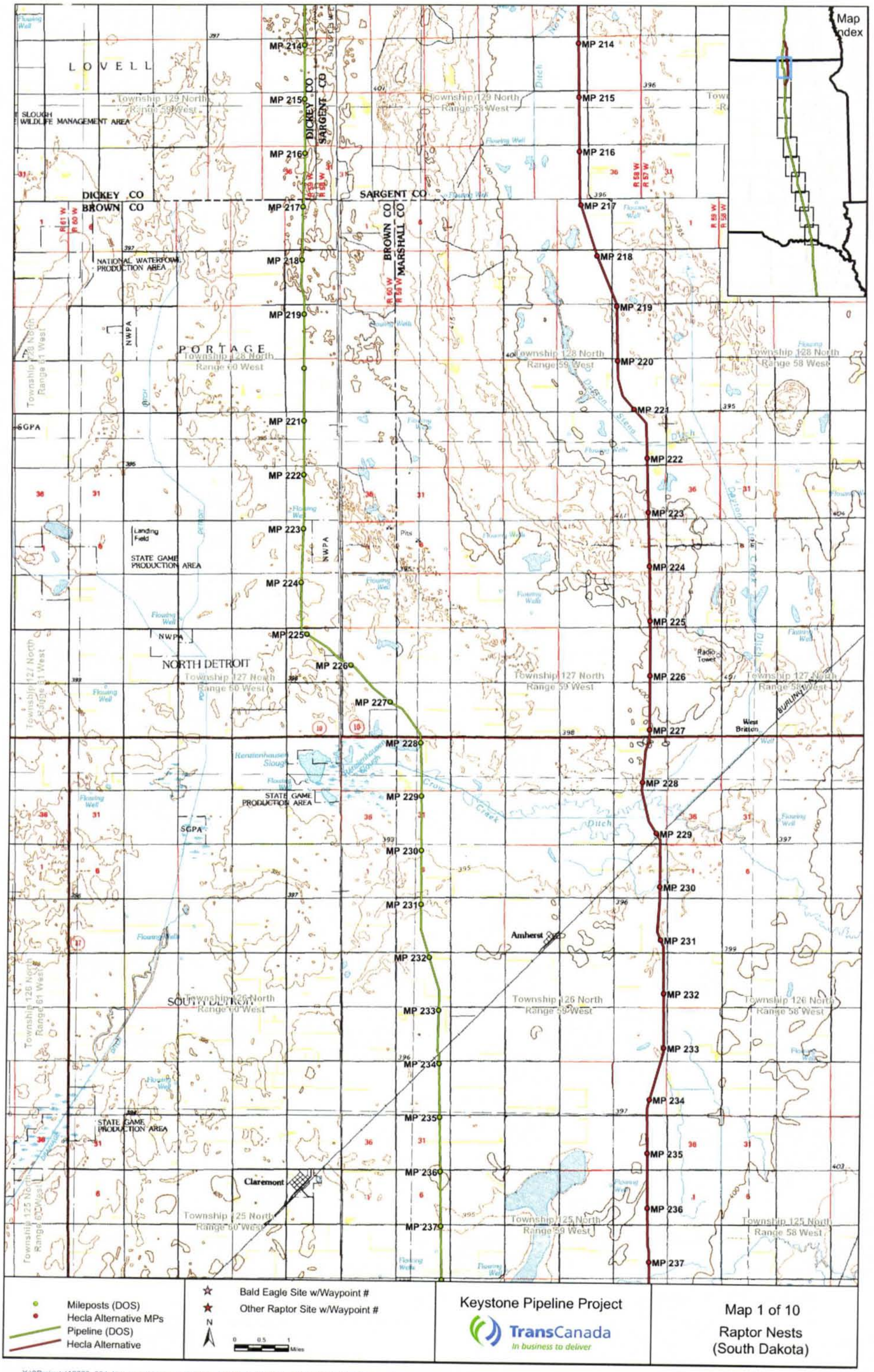

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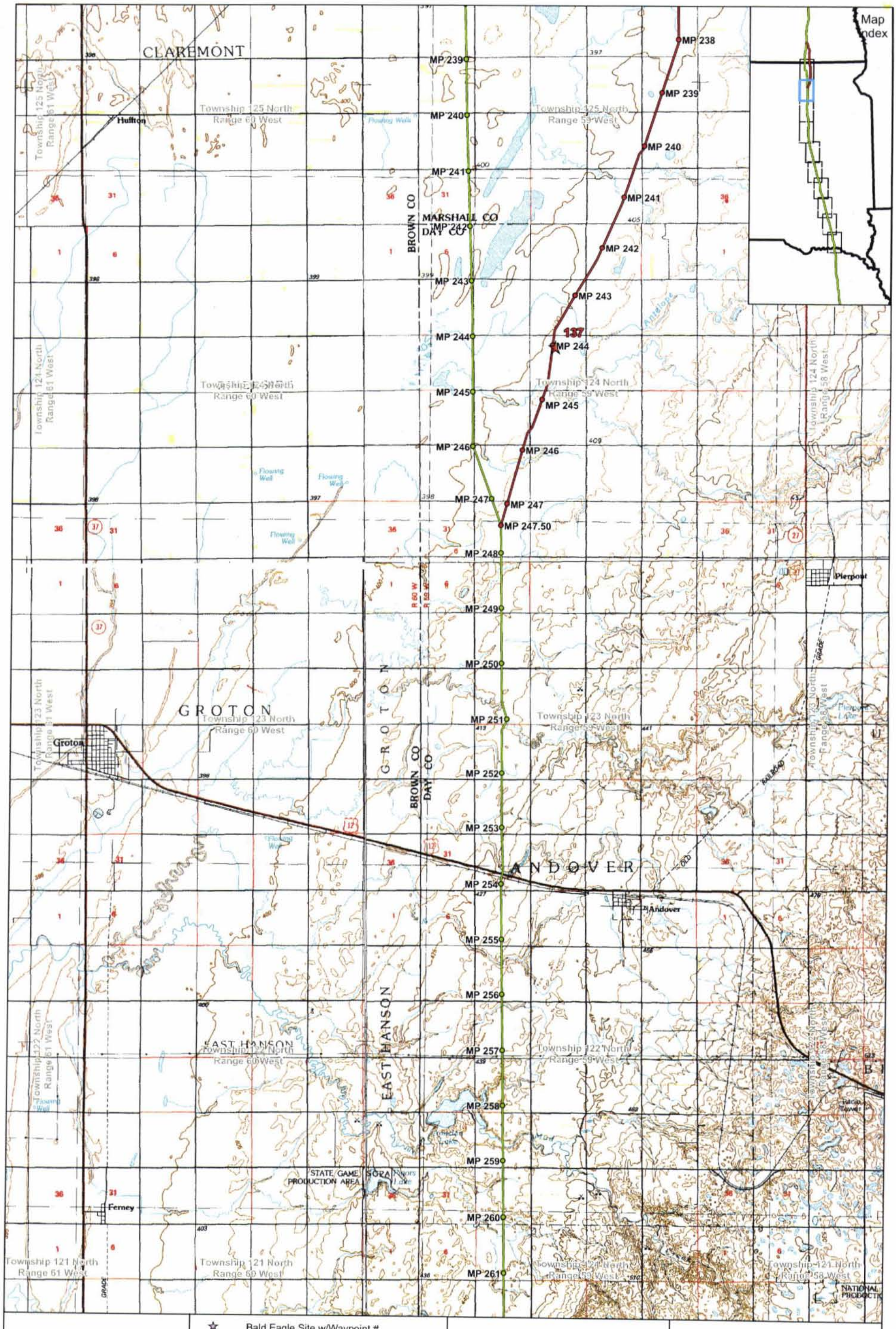

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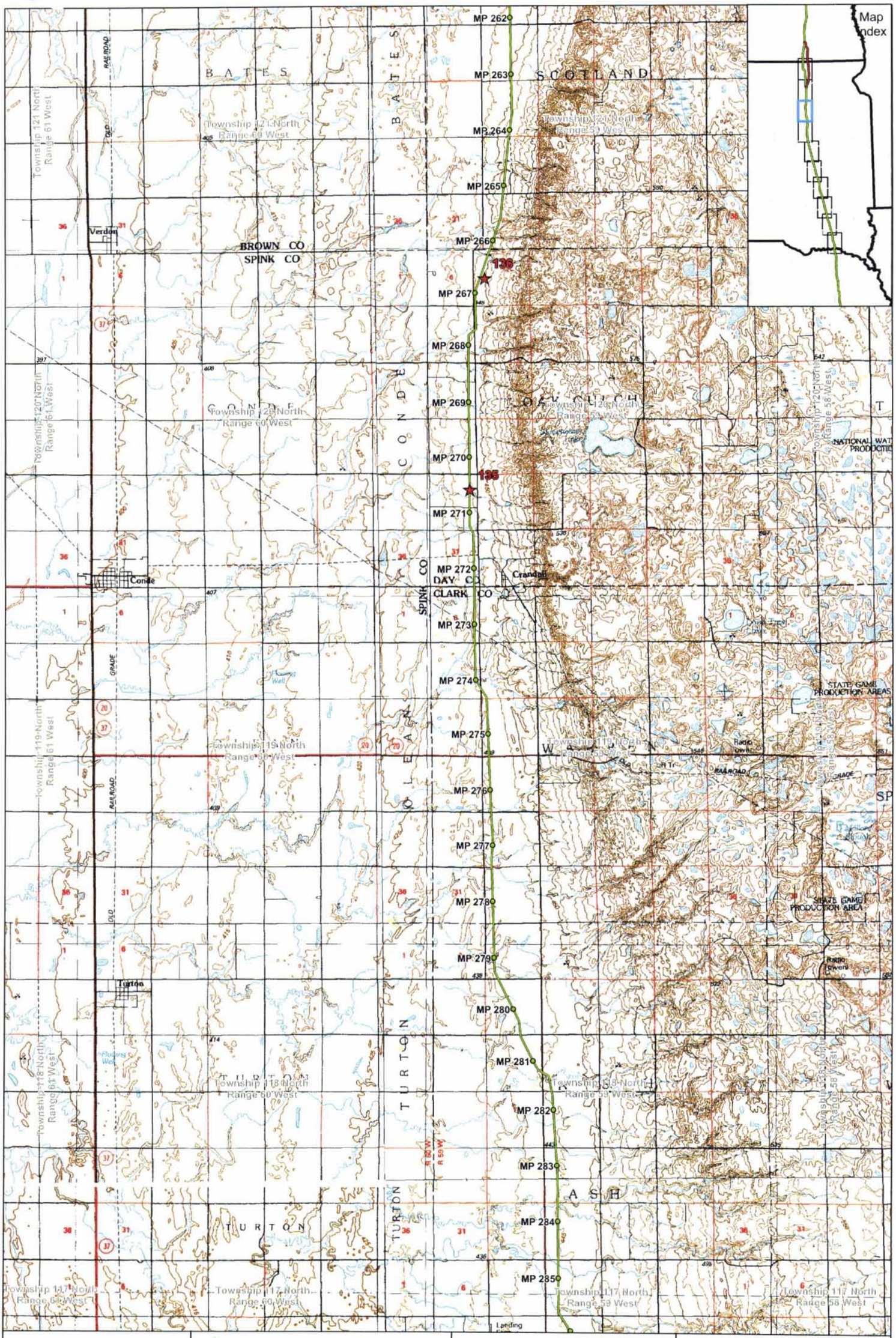

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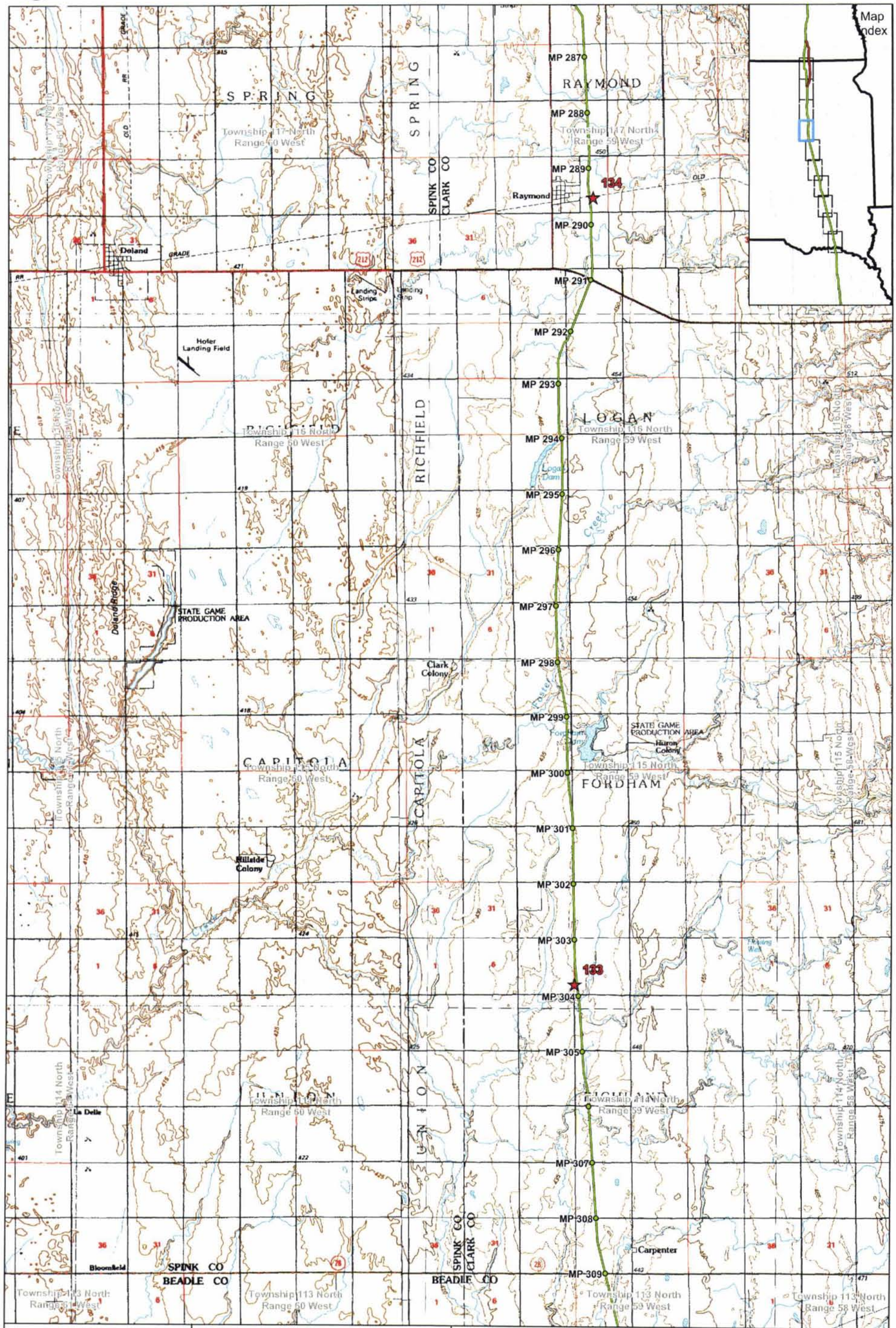

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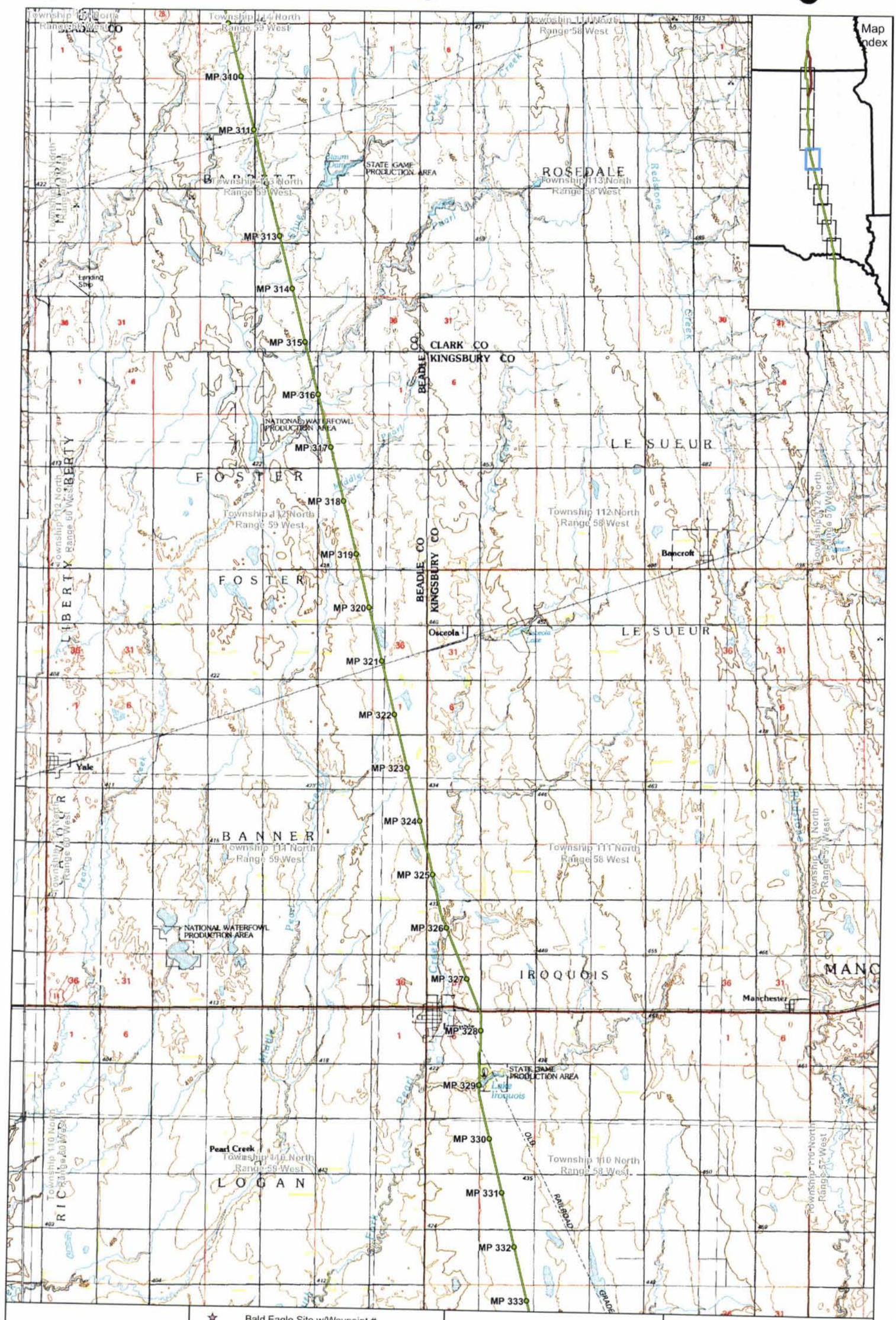

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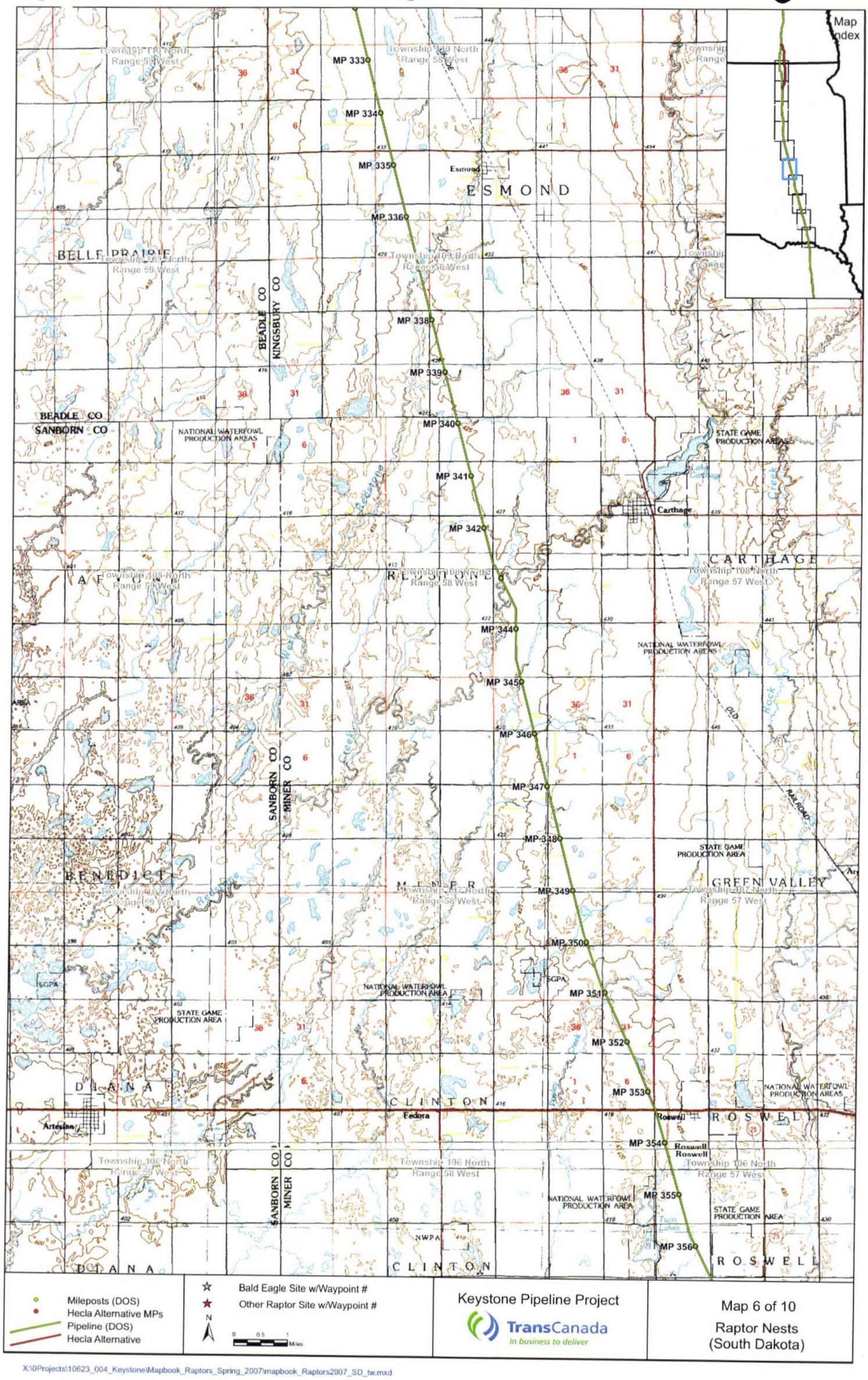

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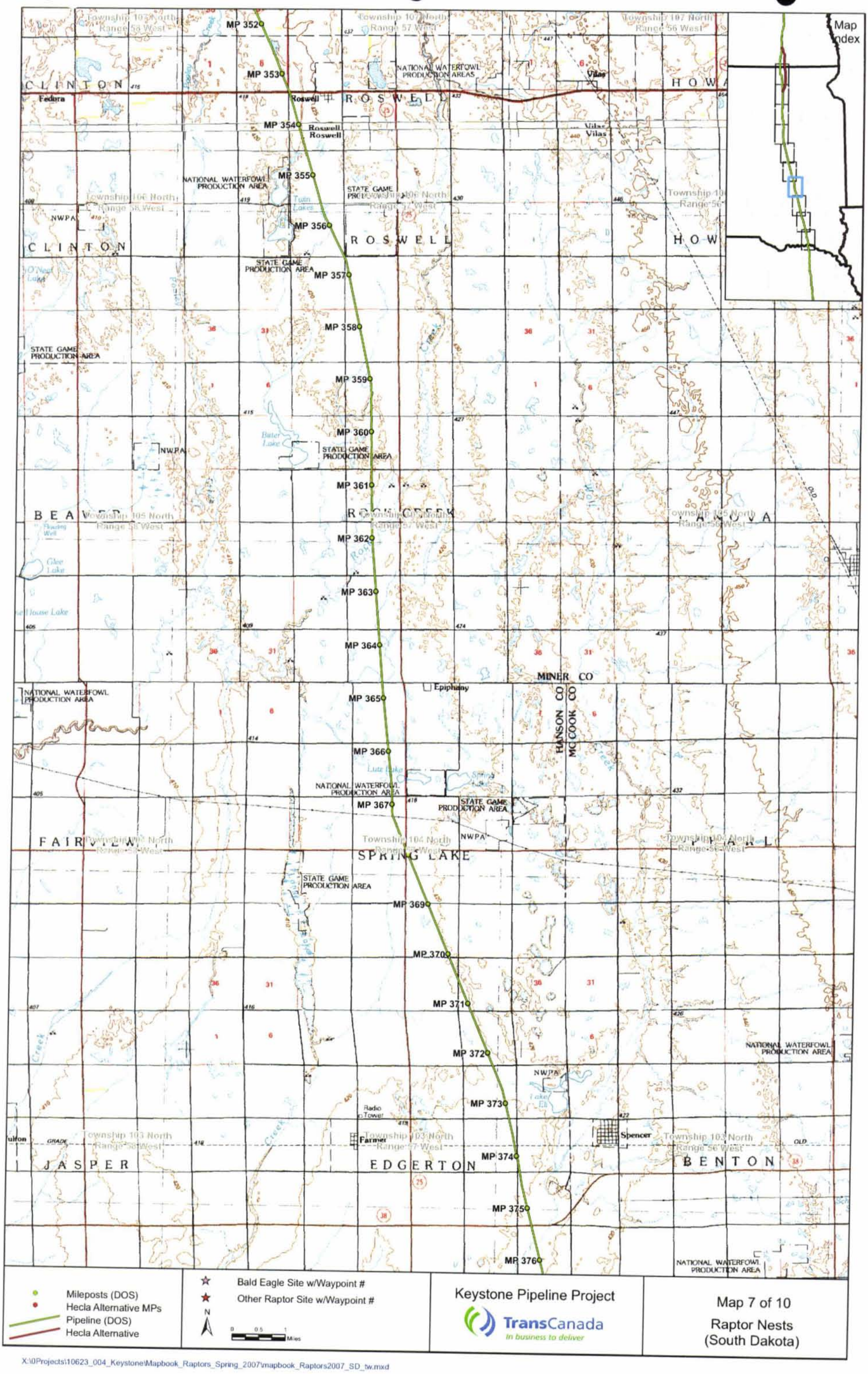

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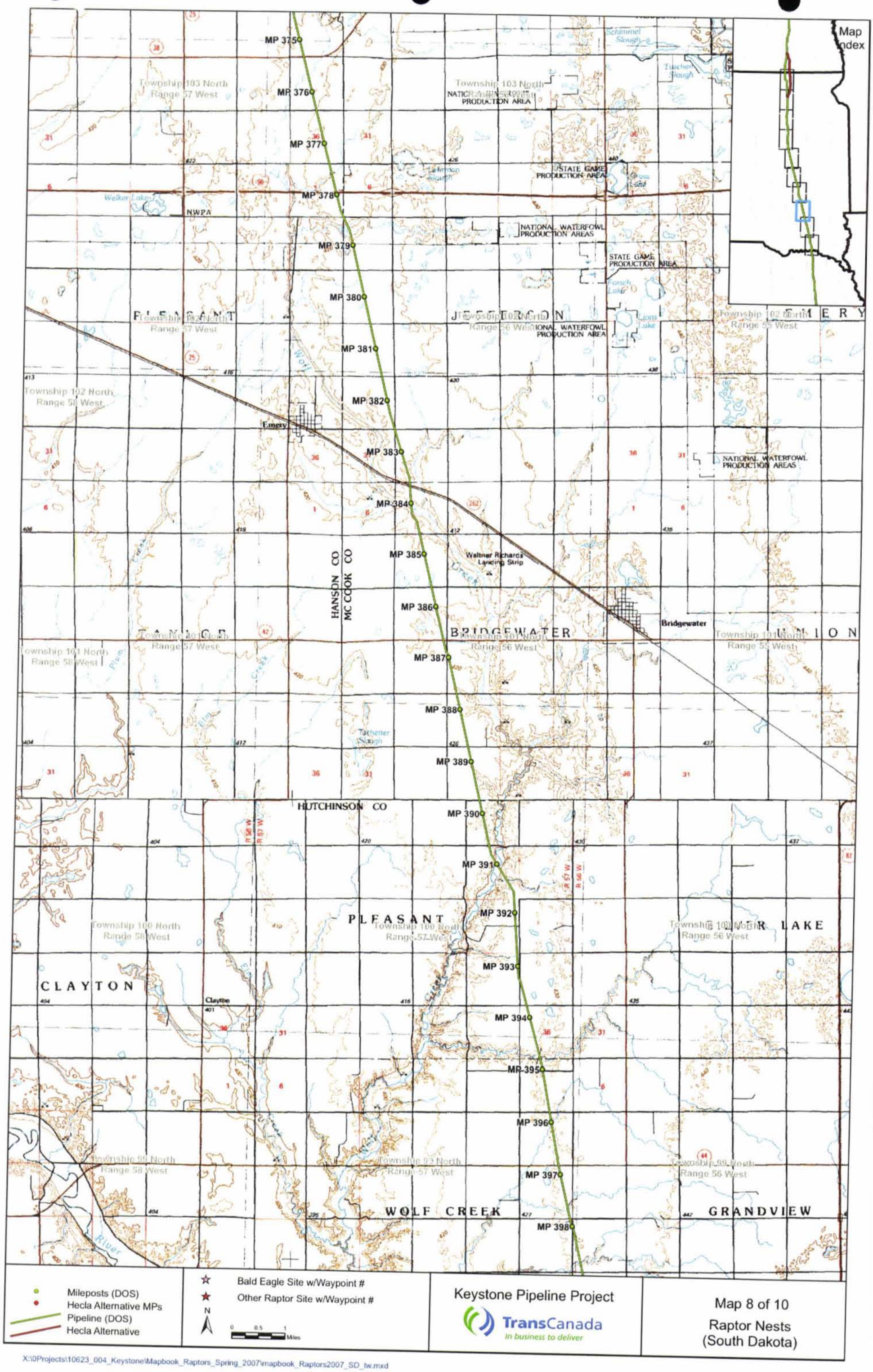
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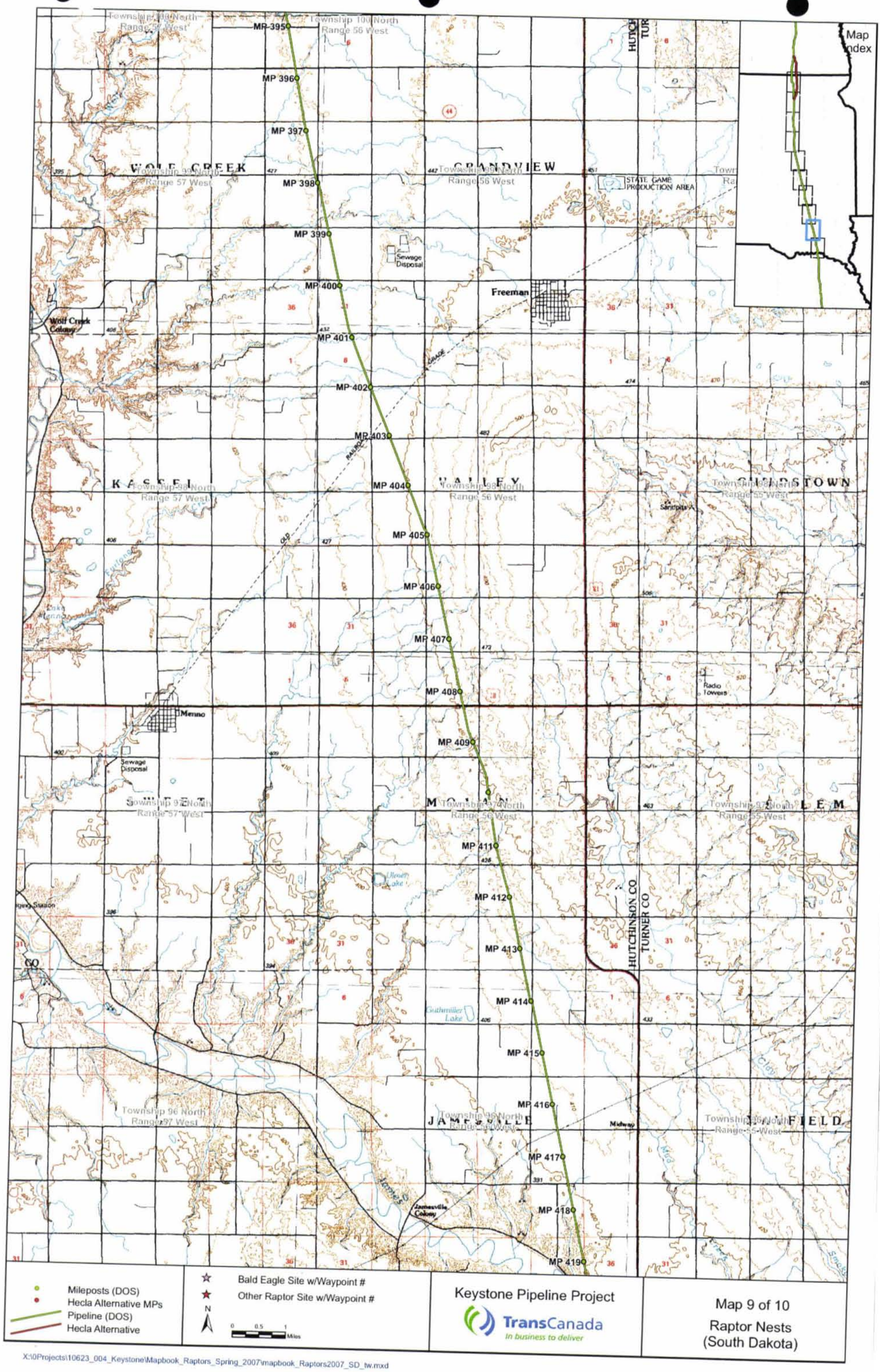

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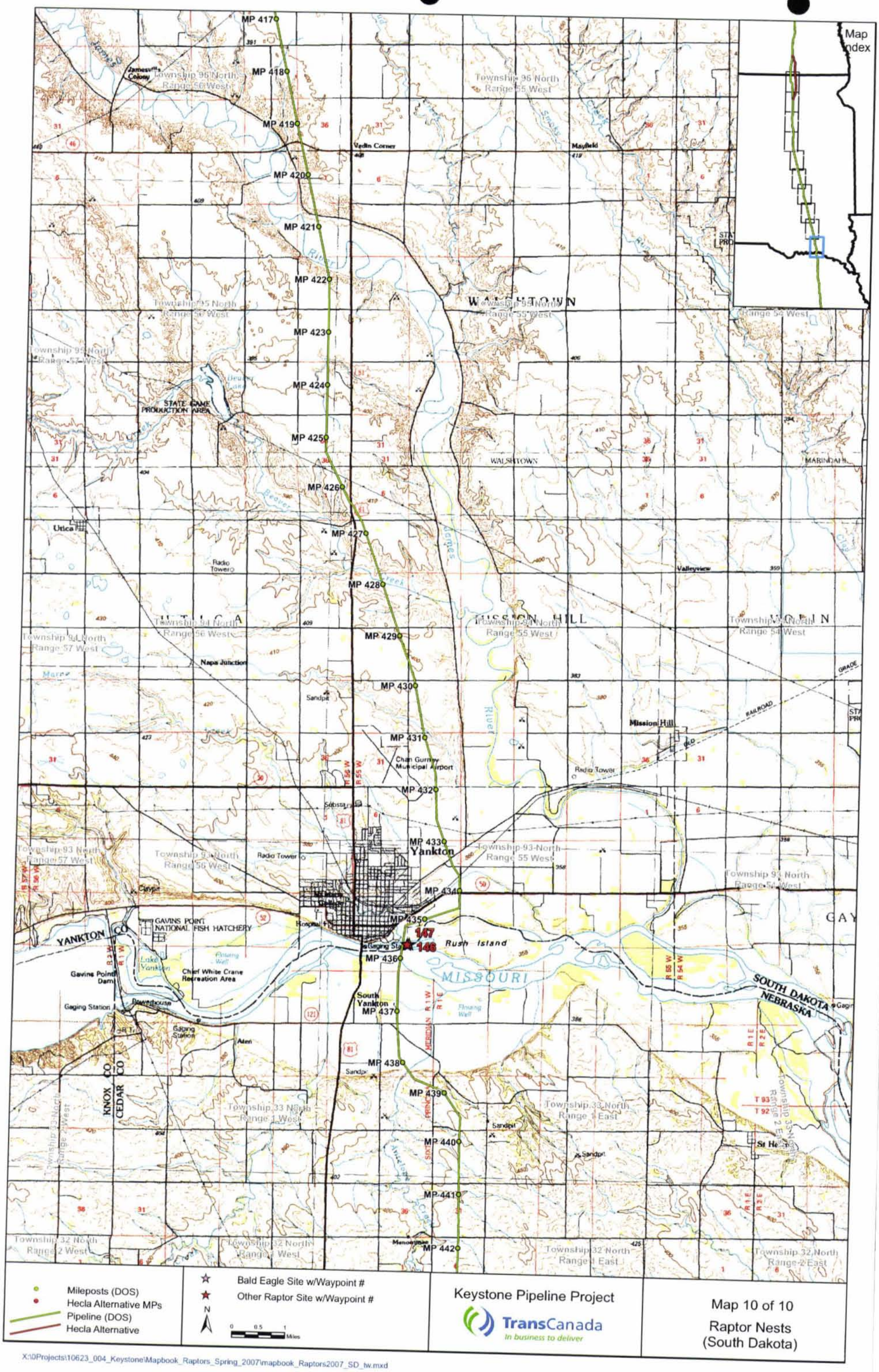

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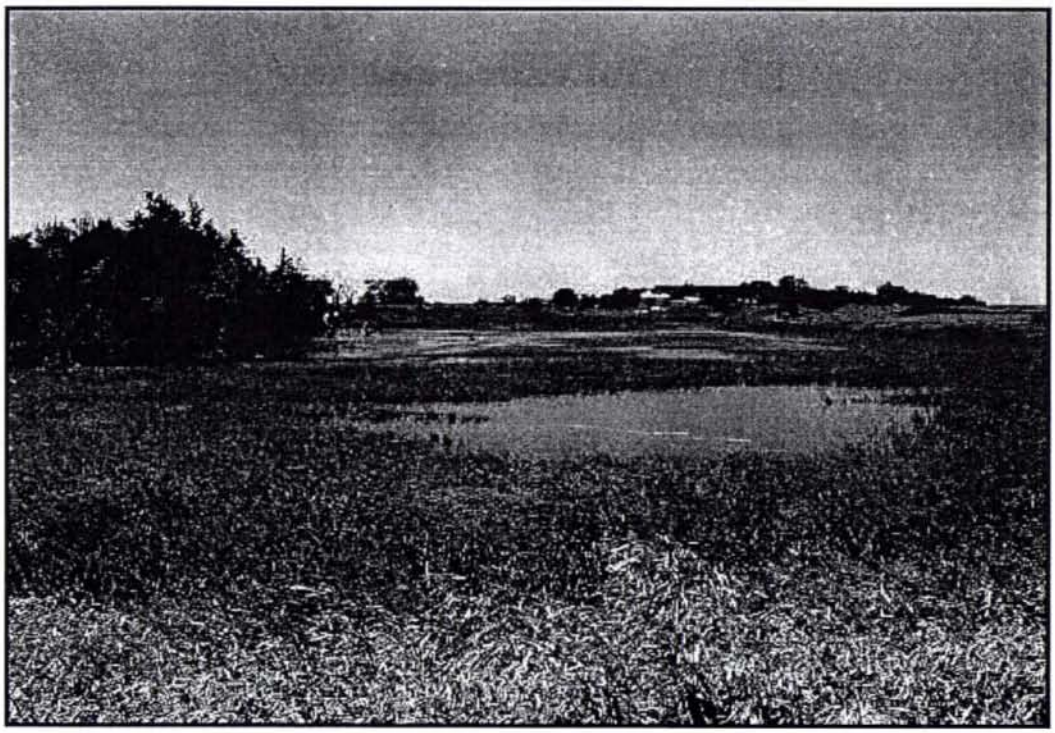

Keystone Pipeline Project
Progress Report for Wetland Surveys on the Cushing Extension

ENSR Corporation
March 2007
Document No.: 10623-005

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Prepared for:
Keystone Pipeline Project

Keystone Pipeline Project
Progress Report for Wetland Surveys on the Cushing Extension

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March 2007
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Executive Summary

Wetlands, waterbodies (including rivers, streams, lakes, and ponds), and riparian areas have been identified along the proposed Cushing Extension of the Keystone Pipeline Project right-of-way (ROW) through ongoing field surveys and the review of aerial photographs for areas where reroutes have been developed. The purpose of this report is to review the methodologies being used to collect wetland and waterbody data, summarize the data that was collected for wetlands during the spring 2007 field effort and discuss projected wetland survey needs for summer 2007.

1.0 Introduction

As part of federal regulatory requirements under the Clean Water Act (CWA), wetland and other waters of the U.S. (WUS) inventories involving field surveys are required to evaluate the potential for adverse effects to WUS along the proposed pipeline right-of-way (ROW) and other associated areas of disturbance related to project construction. Information gathered during the inventories will be used to complete notification and permitting requirements under Section 401 and 404 of the CWA, as managed by the U.S. Army Corps of Engineers (USACE) and applicable state agencies. The Cushing Extension of the Keystone Pipeline Project crosses three USACE districts including the Omaha, Kansas City, and Tulsa districts. Each of these districts has slightly different surveying and permitting requirements. Meetings were held in 2006 with the Omaha (February 6, March 29), Tulsa (March 13), and Kansas City (March 27) districts to discuss surveying, permitting, and construction requirements.

Consultation with the various USACE districts resulted in the following general survey requirements:

- Omaha District (Nebraska): Field surveys along the Cushing Extension ROW route through Nebraska will be required only at specific locations. Information will be provided to the USACE on other crossings, such as ephemeral streams and farmed wetlands, using remote sensing and GIS.
- Kansas City District (Kansas): All wetland and drainage crossings along the Cushing Extension in Kansas will require ground surveys
- Tulsa District (Oklahoma): All wetland and drainage crossings along the Cushing Extension in Oklahoma will require ground surveys.

More specific information regarding discussions with the USACE districts' personnel, level of effort, wetland and other WUS delineation methodology and permitting requirements has been provided in a submittal to the Department of State (September 15, 2006). In partial fulfillment of USACE requirements, field surveys commenced in the spring of 2007 and will be completed by summer 2007. The remainder of this report provides a summary of data collection efforts for wetlands through March 2007 and discusses projected wetland survey needs for the summer of 2007.

2.0 Data Collection Methods for Wetlands and Other WUS

To initiate this project, ENSR completed a review of U.S. Geological Survey (USGS) topographic maps, National Wetland Inventory (NWI) maps, available soil surveys, and 2005 aerial photographs pertaining to the proposed ROW. The objectives of this data review were to identify wetlands and other WUS intercepted by the proposed pipeline route, including intermittent and ephemeral streams, and to identify specific wetlands and other WUS that will require field evaluation to confirm their status. Areas identified for field verification

included: 1) NWI-mapped wetlands intercepted by the pipeline route that are not farmed; 2) areas that appear to meet the wetlands three-parameter criteria (discussed below), but are not mapped on NWI maps; and 3) forested areas where wetland boundaries could not be estimated from aerial photographs. Additional areas to be field verified were included if recommended by the various USACE districts. Areas identified on the NWI maps as farmed wetlands or agricultural or roadway drainage ditches were eliminated from field delineations.

ENSR coordinated with USACE representatives regarding features requiring field verification and delineation. Preliminary survey areas were identified on maps of the proposed ROW previously provided by the district offices. For each site surveyed, a decision was made by the field team regarding the presence of wetlands and other WUS. For drainages with no wetland characteristics (e.g., unvegetated channel, defined bed and bank), a Stream Data Form developed by ENSR was completed to evaluate stream crossing characteristics. This form applied to stream crossings whether or not it supported adjunct wetland plant communities. If both wetlands and other WUS were present, a Stream Data Form and a Routine Wetland Determination Form was completed for the survey site.

The methods and techniques used to evaluate and delineate wetlands and other WUS on the maps of the proposed route corresponded to those specified for "routine on-site delineations" in the USACE Wetlands Delineation Manual (Manual; USACE 1987). The Manual identifies a "three-parameter" approach used for defining wetlands which requires that all three of the conditions listed below be met under normal circumstances for an area to be defined and delineated as wetland.

1. The prevalent vegetation consists of hydrophytic plants that have the ability to grow in water or on a substrate that is at least periodically deficient in oxygen as a result of excessive water content and depleted soil oxygen levels.

2. Soils are present and are classified as hydric or possessing characteristics that are associated with reducing soil conditions. Hydric soils are poorly drained and have a seasonal high water table within 6 inches of the surface.

3. The area is inundated either permanently or periodically at mean water depths less than or equal to 6.6 feet or the soil is saturated to the surface at some time during the growing season of the prevalent vegetation (usually 12.5 percent of the growing season) (USACE 1987).

Vegetation, soil, and hydrology data was collected at each sample point within the wetlands and immediately adjacent uplands and was entered onto a standardized wetland delineation field data form. The form also included a field sketch, which illustrated the wetlands and uplands. Wetland/upland boundaries were delineated using a handheld Global Positioning System (GPS) receiver. Photographs showing a representative view of each wetland visited also were taken. In addition to collecting sufficient data for "routine on-site delineations" and channel characteristics data for drainage crossings, wetland survey teams collected sufficient data (e.g., defined bed and bank and connectivity to navigable waters) for the USACE to make jurisdictional determinations for all wetlands and drainage crossings surveyed in the field.

Wetlands and other WUS along the proposed route were delineated in accordance with the direction provided by the USACE – Omaha, Kansas City, and Tulsa districts. The requirements and level of effort to complete wetland other WUS delineations differed within each district. The level of effort completed within each of the respective states has been provided below.

Cushing Extension

- Nebraska: Preliminary identification of wetlands and other WUS was based on the review of aerial photographs. Delineations of wetlands and other WUS will be initiated and completed in the spring/summer of 2007.

- Kansas: Preliminary identification of wetlands and other WUS was based on the review of aerial photographs. Delineations of wetlands and other WUS will be initiated and completed in the spring/summer of 2007.
- Oklahoma: Preliminary identification of wetlands and other WUS was based on the review of aerial photographs. Delineations of all wetlands and other WUS will be initiated and completed in the spring/summer of 2007.

A table of all potential wetlands identified which require ground-verification/field delineation in Nebraska and Kansas may be found in Appendix A.

3.0 Results of Spring 2007 Wetland Surveys

Maps of the proposed route, including USGS topographic maps and high resolution aerial photography overlaid with NWI wetland polygons, were evaluated for wetland crossings. Based on this evaluation, priority wetland survey areas were identified along the Cushing Extension ROW. Based on surveys conducted to date, a total of 145 wetlands have been field delineated along the Cushing Extension ROW in Nebraska, Kansas, and Oklahoma.

Of the 145 wetlands identified to date, the vast majority are classified as palustrine emergent (PEM) wetlands (**Figure 1**), representing 64 percent of all identified. PEM wetlands are dominated by persistent and nonpersistent grasses, rushes, sedges, forbs and other herbaceous or grass-like plants. The second most common wetland type identified is palustrine forested (PFO) wetlands, comprising 29 percent of the total. PFO wetlands are dominated by woody vegetation, generally greater than ten feet in height. One percent of wetlands identified are classified as palustrine scrub-shrub (PSS) wetlands (dominated by shrubs), while 6 percent are classified as wetlands dominated by open water (OW). A complete list of wetlands identified to date for the Cushing Extension may be found in Appendix B.

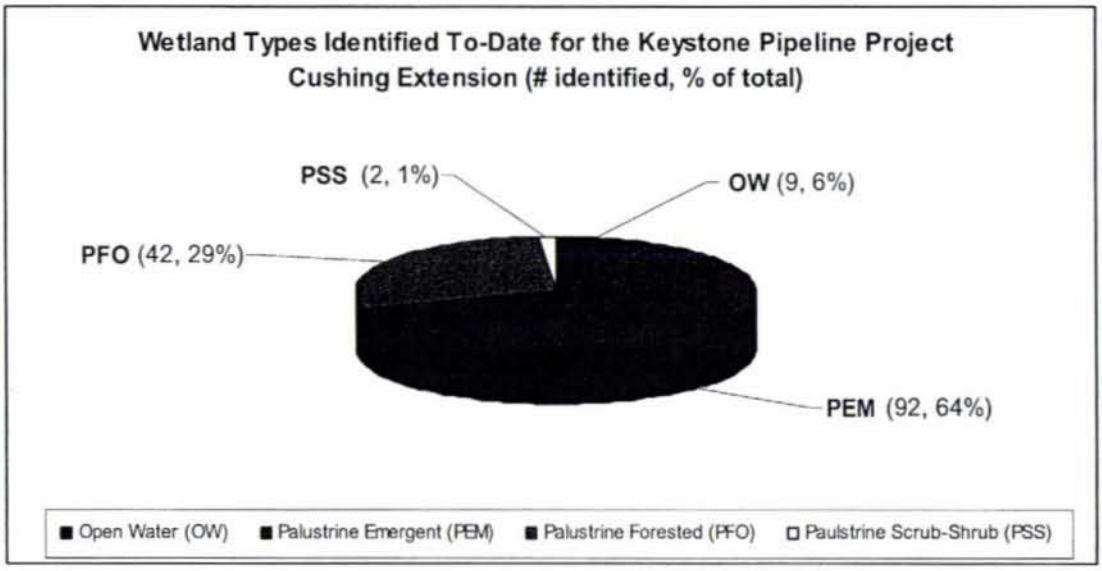

Figure 1 Wetland Types Identified To-Date on the Cushing Extension

Currently, wetland survey status for the Cushing Extension of the Keystone Pipeline Project is variable by state. Nebraska is currently complete, with further surveys necessary in Kansas and Oklahoma (**Table 1**). The current wetland survey status by state is provided in detail below:

- Nebraska: Wetland delineations are 100 percent complete. Of 10 total locations requiring survey, all 10 have been completed.
- Kansas: Wetland delineations are approximately 84 percent complete, based on pre-survey location estimates. Delineations have been completed for 190 of the 226 locations identified prior to survey initiation. Based on mileage, wetland and WUS surveys in Kansas are approximately 80 percent complete. Further wetland surveys will be conducted in spring/summer 2007 on tracts where permission was recently obtained and for any potential reroutes.
- Oklahoma: Wetland delineations are approximately 50 percent complete. Of the 80 total miles requiring wetland survey from the Kansas border to the Cushing Terminal, 40 miles have been successfully completed. Further wetland surveys will be conducted in spring/summer 2007 on tracts where permission was recently obtained and for any potential reroutes.

Table 1 Cushing Wetlands Survey Progress as of February 24, 2007

State	Locations (L) Requiring Pedestrian Survey[1]	Miles (M) Requiring Pedestrian Survey[1]	Total Locations (L) Surveyed[1]	Total Miles (M) Surveyed[1]	Percent Complete
Nebraska	10 (L)	---	10(L)	---	100
Kansas	226 (L)	210 (M)	190 (L)[2]	170 (M)	84
Oklahoma	---	80 (M)	---	40(M)	50
Total locations	**236 (L)**	**---**	**200 (L)**	**---**	**---**
Total miles	**---**	**290 (M)**	**---**	**210 (M)**	**---**

[1]Numbers of wetlands for survey subject to verification.

[2]Kansas requires 100 percent pedestrian survey. Location records have been kept to track survey progress. Mileage numbers reflect areas void of features, in addition to areas where survey crews have found and delineated wetlands.

4.0 Projected Survey Needs (Spring/Summer 2007)

Cushing Extension

Remaining wetland survey work on the Keystone Pipeline Project Cushing Extension includes:

- Nebraska: Complete. No further surveys on the Cushing Extension required.
- Kansas and Oklahoma: Further wetland surveys will be conducted in spring/summer 2007 on tracts where permission was recently obtained and for any potential reroutes.

5.0 References

U.S. Army Corps of Engineers (USACE). 1987. Corps of Engineers Wetlands Delineation Manual, Technical Report Y-87-1, U.S. Army Engineer Waterways Experiment Station, Vicksburg, Mississippi. Available online at: http://www.wes.army.mil/el/wetlands/pdfs/wlman87.pdf.

Appendix A

Potential Wetlands Identified for Field Verification/Delineation in Nebraska and Kansas along the Cushing Extension

Table A-1 **Potential Wetlands Identified for Field Verification/ Delineation In Nebraska and Kansas Along the Cushing Extension[1]**

Enter MP	Exit MP	Miles Crossed	WL Type	Name	State	Survey Site Count
0.239	0.247	0.008	OW		NE	1
0.431	0.435	0.004	OW		NE	2
0.568	0.570	0.002	OW		NE	3
0.636	0.638	0.002	OW		NE	4
0.745	0.747	0.002	OW		NE	5
1.717	1.719	0.002	OW		NE	6
1.840	1.843	0.003	OW		NE	7
1.851	1.857	0.006	OW		NE	8
1.890	1.892	0.002	OW		NE	9
2.823	2.824	0.002	OW		KS	10
3.570	3.572	0.002	OW		KS	11
4.113	4.156	0.042	OW	Little Blue River	KS	12
4.822	4.847	0.026	PEM		KS	13
5.652	5.669	0.018	PEM		KS	14
7.452	7.467	0.015	PEM		KS	15
7.601	7.613	0.012	PEM		KS	16
7.758	7.771	0.013	PEM		KS	17
7.793	7.808	0.015	PEM		KS	18
7.985	8.029	0.043	PEM		KS	19
8.924	8.958	0.034	PEM		KS	20
9.071	9.089	0.018	PFO		KS	21
9.089	9.091	0.002	OW		KS	
9.091	9.098	0.008	PFO		KS	
9.631	9.640	0.009	PFO		KS	22
9.640	9.642	0.002	OW		KS	
9.642	9.657	0.015	PFO		KS	
10.888	10.929	0.041	PFO		KS	23
11.661	11.677	0.016	PFO		KS	24
12.046	12.056	0.010	PFO		KS	25
12.056	12.058	0.002	OW	Mill Creek	KS	
12.058	12.073	0.015	PFO		KS	
13.484	13.505	0.021	PFO		KS	26
13.505	13.507	0.002	OW	Mill Creek	KS	
13.507	13.520	0.012	PFO		KS	
15.793	15.807	0.013	PFO		KS	27
16.469	16.478	0.009	PEM		KS	28
16.773	16.783	0.010	PEM		KS	29
16.854	16.866	0.011	PEM		KS	30
17.050	17.062	0.011	PEM		KS	31
17.397	17.430	0.033	PEM		KS	32
18.353	18.384	0.031	PEM		KS	33
18.518	18.536	0.018	PEM		KS	34
20.004	20.036	0.032	PEM		KS	35

Table A-1 **Potential Wetlands Identified for Field Verification/ Delineation In Nebraska and Kansas Along the Cushing Extension[1]**

Enter MP	Exit MP	Miles Crossed	WL Type	Name	State	Survey Site Count
20.570	20.576	0.006	PEM		KS	36
21.703	21.710	0.007	PEM		KS	37
21.718	21.726	0.008	PEM		KS	38
21.737	21.743	0.006	PEM		KS	39
21.918	21.983	0.065	PEM		KS	40
22.625	22.635	0.010	PFO		KS	41
22.635	22.637	0.003	OW		KS	
22.637	22.655	0.018	PFO		KS	
23.620	23.636	0.016	PEM		KS	42
23.847	23.877	0.030	PFO		KS	43
24.088	24.155	0.067	PEM		KS	44
25.954	26.010	0.056	PFO		KS	45
28.697	28.699	0.002	OW		KS	46
29.649	29.651	0.002	OW		KS	47
30.263	30.283	0.020	PFO		KS	48
30.283	30.285	0.002	OW		KS	
30.285	30.297	0.011	PFO		KS	
30.475	30.477	0.002	OW		KS	49
31.315	31.317	0.002	OW		KS	50
32.135	32.137	0.002	OW		KS	51
33.251	33.253	0.002	OW		KS	52
34.699	34.701	0.002	OW		KS	53
36.284	36.297	0.013	PFO		KS	54
36.297	36.299	0.002	OW	West Fancy Creek	KS	
36.299	36.310	0.011	PFO		KS	
43.876	43.878	0.002	OW		KS	55
45.475	45.477	0.002	OW		KS	56
46.209	46.317	0.108	PEM		KS	57
46.357	46.390	0.033	PEM		KS	58
46.391	46.475	0.084	PEM		KS	59
50.288	51.130	0.842	PFO		KS	60
51.142	51.182	0.039	OW	Republican River	KS	
51.182	51.233	0.051	PFO		KS	
51.247	51.293	0.046	PEM		KS	61
52.514	52.516	0.002	OW		KS	62
53.989	54.028	0.038	PEM		KS	63
54.028	54.030	0.002	OW		KS	
54.030	54.050	0.020	PEM		KS	
54.114	54.253	0.139	PEM		KS	64
59.294	59.296	0.003	OW		KS	65
60.063	60.067	0.005	OW		KS	66
68.781	68.813	0.032	PFO		KS	67
68.813	68.815	0.002	OW	Chapman Creek	KS	
68.815	68.836	0.021	PFO		KS	
69.921	69.943	0.022	PFO		KS	68
69.950	69.981	0.031	PFO		KS	69

Table A-1 **Potential Wetlands Identified for Field Verification/ Delineation In Nebraska and Kansas Along the Cushing Extension[1]**

Enter MP	Exit MP	Miles Crossed	WL Type	Name	State	Survey Site Count
70.234	70.246	0.012	PFO		KS	70
70.246	70.248	0.002	OW		KS	
70.248	70.261	0.013	PFO		KS	
70.627	70.643	0.016	PFO		KS	71
70.643	70.645	0.002	OW		KS	
70.645	70.652	0.007	PFO		KS	
71.899	71.903	0.003	PFO		KS	72
71.903	71.905	0.002	OW		KS	
71.905	71.908	0.004	PFO		KS	
72.024	72.027	0.002	OW		KS	73
72.052	72.055	0.003	OW		KS	74
72.100	72.105	0.005	OW		KS	75
76.080	76.253	0.174	PFO		KS	76
76.533	76.552	0.019	PFO		KS	77
76.552	76.582	0.030	OW	Smoky Hill River	KS	
76.582	76.604	0.022	PFO		KS	
78.920	78.944	0.024	PEM		KS	78
79.373	79.426	0.053	PFO		KS	79
80.022	80.037	0.015	PEM		KS	80
80.037	80.039	0.002	OW		KS	
80.039	80.052	0.013	PEM		KS	
81.427	81.429	0.002	OW		KS	81
81.429	81.438	0.009	PEM		KS	
81.899	81.904	0.006	PEM		KS	82
83.571	83.580	0.009	PEM		KS	83
83.580	83.582	0.002	OW		KS	
83.582	83.593	0.011	PEM		KS	
85.079	85.087	0.008	PEM		KS	84
85.087	85.088	0.002	OW		KS	
85.088	85.101	0.012	PEM		KS	
85.816	85.836	0.020	PEM		KS	85
86.206	86.217	0.012	PEM		KS	86
86.217	86.219	0.002	OW		KS	
86.219	86.233	0.014	PEM		KS	
86.919	86.932	0.012	PFO		KS	87
87.002	87.019	0.017	PFO		KS	88
87.053	87.068	0.015	PFO		KS	89
87.068	87.070	0.002	OW		KS	
87.070	87.073	0.003	PFO		KS	
87.622	87.635	0.013	PEM		KS	90
87.635	87.637	0.002	OW		KS	
87.637	87.652	0.015	PEM		KS	
89.604	89.616	0.012	PEM		KS	91
89.616	89.618	0.002	OW		KS	
89.618	89.634	0.016	PEM		KS	
90.990	91.028	0.038	PFO		KS	92

Table A-1 **Potential Wetlands Identified for Field Verification/ Delineation In Nebraska and Kansas Along the Cushing Extension**[1]

Enter MP	Exit MP	Miles Crossed	WL Type	Name	State	Survey Site Count
91.028	91.032	0.004	OW		KS	
91.032	91.065	0.033	PFO		KS	
92.032	92.039	0.007	PFO		KS	
92.039	92.040	0.002	OW		KS	93
92.040	92.049	0.008	PFO		KS	
92.649	92.660	0.011	PEM		KS	94
95.169	95.234	0.065	PFO		KS	
95.234	95.239	0.005	OW		KS	95
95.239	95.246	0.007	PFO		KS	
95.841	95.848	0.007	PEM		KS	
95.848	95.850	0.002	OW		KS	96
95.850	95.866	0.016	PEM		KS	
96.294	96.320	0.026	PFO		KS	
96.320	96.323	0.003	OW		KS	97
96.323	96.337	0.014	PFO		KS	
97.013	97.068	0.056	PFO		KS	98
97.082	97.127	0.045	PFO		KS	99
97.163	97.174	0.011	PFO		KS	
97.174	97.175	0.002	OW		KS	100
97.175	97.195	0.020	PFO		KS	
98.759	98.772	0.012	PEM		KS	
98.772	98.775	0.003	OW		KS	101
98.775	98.780	0.005	PEM		KS	
99.967	99.979	0.012	PFO		KS	
99.979	99.981	0.002	OW		KS	102
99.981	99.986	0.005	PFO		KS	
101.615	101.652	0.037	PEM		KS	
101.652	101.655	0.003	OW		KS	103
101.655	101.673	0.018	PEM		KS	
105.113	105.121	0.008	PEM		KS	
105.121	105.123	0.003	OW		KS	
105.123	105.127	0.004	PEM		KS	104
105.127	105.130	0.002	OW		KS	
105.130	105.137	0.007	PEM		KS	
105.151	105.157	0.007	PEM		KS	
105.157	105.160	0.003	OW		KS	105
105.160	105.173	0.012	PEM		KS	
105.189	105.197	0.008	PEM		KS	
105.197	105.201	0.004	OW		KS	
105.201	105.233	0.032	PEM		KS	106
105.233	105.238	0.005	OW		KS	
105.238	105.272	0.034	PEM		KS	
106.301	106.311	0.010	PFO		KS	
106.311	106.313	0.002	OW		KS	107
106.313	106.384	0.071	PFO		KS	
108.685	108.700	0.016	PEM		KS	108

Table A-1 Potential Wetlands Identified for Field Verification/ Delineation In Nebraska and Kansas Along the Cushing Extension[1]

Enter MP	Exit MP	Miles Crossed	WL Type	Name	State	Survey Site Count
108.700	108.702	0.002	OW		KS	
108.702	108.709	0.007	PEM		KS	
109.386	109.394	0.008	OW		KS	109
111.599	111.605	0.007	OW		KS	110
111.632	111.637	0.005	OW		KS	111
111.921	111.924	0.002	OW		KS	112
112.704	112.712	0.009	PEM		KS	
112.712	112.714	0.002	OW		KS	113
112.714	112.730	0.016	PEM		KS	
114.106	114.128	0.022	PFO		KS	
114.128	114.141	0.013	OW		KS	114
114.141	114.175	0.034	PFO		KS	
116.928	116.930	0.002	OW		KS	115
117.104	117.127	0.023	PFO		KS	116
117.127	117.134	0.007	OW	Cottonwood River	KS	
118.852	118.854	0.003	OW		KS	117
119.833	119.864	0.031	OW		KS	118
120.590	120.592	0.002	OW		KS	119
122.577	122.582	0.005	PEM		KS	
122.582	122.585	0.003	OW		KS	120
122.585	122.592	0.007	PEM		KS	
123.385	123.426	0.041	PFO		KS	121
123.438	123.442	0.003	OW		KS	
124.211	124.216	0.005	OW		KS	122
124.265	124.267	0.002	OW		KS	123
126.606	126.615	0.008	PEM		KS	124
128.217	128.219	0.002	OW		KS	125
128.950	128.952	0.002	OW	Doyle Creek	KS	126
129.488	129.491	0.003	PEM		KS	
129.491	129.493	0.002	OW		KS	127
129.493	129.496	0.003	PEM		KS	
130.187	130.196	0.008	PEM		KS	
130.196	130.200	0.005	OW		KS	
130.200	130.203	0.003	PEM		KS	128
130.203	130.208	0.005	OW		KS	
130.208	130.216	0.008	PEM		KS	
130.253	130.258	0.005	PEM		KS	
130.258	130.260	0.002	OW		KS	129
130.260	130.264	0.004	PEM		KS	
130.275	130.283	0.008	PEM		KS	
130.283	130.286	0.003	OW		KS	130
130.286	130.288	0.002	PEM		KS	
130.359	130.361	0.002	PEM		KS	131
131.026	131.034	0.007	PEM		KS	132
133.040	133.043	0.003	OW		KS	133
133.044	133.046	0.002	OW		KS	134