4.4 WETLANDS

4.4.1 Introduction

This section describes potential impacts to wetland resources associated with the construction and operation of the proposed Project and connected actions and discusses potential mitigation measures that would avoid or minimize the potential impacts. The information, data, methods, and/or analyses used in this discussion are based on information provided in the 2011 Final Environmental Impact Statement (Final EIS) as well as new circumstances or information relevant to environmental concerns that have become available since the publication of the Final EIS, including the proposed reroute in Nebraska. The information that is provided here builds on the information provided in the Final EIS, and in many instances, replicates that information with relatively minor changes and updates. Other information is entirely new or substantially altered from that presented in the Final EIS. Specifically, the following items have been substantially updated from the 2011 document related to impacts to wetland resources:

- A new section (Section 4.4.2, Impact Assessment Methodology) was added to explain the wetland assessment methodology used to evaluate potential wetland impacts associated with the proposed Project. This section describes how the assessment methodology used for the Supplemental Environmental Impact Statement (Supplemental EIS) evaluation differs in some respects from the methodology used for the Final EIS evaluation;
- Wetland acreage impacts differ from those presented in the Final EIS due to route alterations and the modified wetland evaluation method;
- Impact reduction procedures identified in the Final EIS were carried over to the Supplemental EIS and expanded upon to include recommendations from natural resource agencies;
- Section 4.4.4, Recommended Additional Mitigation, provides a list of additional mitigation measures to further reduce impacts to wetland resources; and
- Updates were made to the connected actions based on additional data and information provided since the publication of the Final EIS.

4.4.2 Impact Assessment Methodology

The potential wetland impacts for the proposed Project presented below are based on an evaluation of the wetland resources along the Project corridor, review of available Project reports and data, and public comments received during the Supplemental EIS scoping period.

Wetlands within the proposed Project area were mapped using a combination of wetland data from various TransCanada Keystone Pipeline, LP (Keystone) sources, including the 2011 Final EIS, the TransCanada Keystone XL Pipeline Project: Supplemental Environmental Report for the Nebraska Reroute (exp Energy Services Inc. 2012a), the TransCanada Keystone Pipeline Project: Environmental Report (exp Energy Services Inc. 2012b), and additional 2012 field data gathered by Keystone during the development of this Supplemental EIS document. Wetland impacts described in previous Project reports relied primarily on field data, aerial photo interpretation, and National Wetland Inventory (NWI) data (USFWS 2012a). For the purpose of the SEIS, wetland data presented in the above sources were supplemented by two additional

national wetland datasets: National Land Cover Dataset (NLCD [Fry 2011]), and U.S. Geological Survey (USGS) Gap Analysis Program (GAP) (USGS 2011). In addition, a desktop analysis of 2010 National Aerial Imagery Program (NAIP) orthoimagery (NAIP 2010 and 2011), National Hydrography Data (USGS 2012), and U.S. Department of Agriculture (USDA) Natural Resources Conservation Service (NRCS) soil data (UGSG 2012) was used to check the quality of the wetland data from the above sources.

Potential wetland impacts for the SEIS were analyzed by assessing the area of wetland overlapped by the proposed Project area. Field and desktop analysis data provided by Keystone were given priority, followed by wetland coverage in the NWI, NLCD, and GAP datasets, respectively. Data from these four sources were analyzed using ArcInfo GIS software whereby wetland data were mapped in the following order of priority: Keystone wetland data (field data and desktop data), NWI wetlands, NLCD wetland communities, and GAP wetland communities. When more than one dataset provided wetland coverage for a given location, overlapping acreages were clipped (removed) to avoid double-counting. No further edits to the wetland boundaries and acreages resulting from the combined datasets were made.

While the additional wetland coverage from the combined datasets provides a more representative picture of potential wetland distribution throughout the proposed Project area, there are limitations to the data presented in the potential wetland impact analysis section. Field-based data have been incorporated into the estimated affected wetland acreage. However, most of these wetland acreage estimates are based on desktop analysis using the data sources noted. As a result, wetland boundaries and wetland acreages may be under- or over-estimated in some locations. In addition, certain wetland types may be under-represented in this analysis because they require field-based surveys to accurately evaluate wetland characteristics and wetland boundary locations. Wetland types that may be under-represented include narrow wetland fringe along small streams and rivers; seasonal wetlands in topographic depressions; small depressional wetlands, particularly in the Prairie Pothole Region; wetland mosaics in forested areas, particularly in floodplains; wetlands in areas that are managed for agricultural purposes, and small riverine/open water features. As noted in Sections 3.4.4 and 4.4.3, while the impacts presented in the Supplemental EIS may not be fully quantified at this time, all existing wetlands would be accounted for during the Section 401 certification and Section 404 permitting process.

It is also important to recognize that in some cases, the wetland acreages presented in Section 4.4.3 will be different than the acreages presented in other sections of this Supplemental EIS document, such as Section 4.5, Terrestrial Vegetation, and Section 4.9, Land Use, Recreation, and Visual Resources. This is the result of incorporating additional wetland data sources into the Section 4.3 Wetlands analysis to more accurately describe impacts to U.S. Army Corps of Engineers (USACE)-defined wetlands. Other sections such as Land Use are interested in broader land use classifications that have unique land use classifications. These were drawn from different data sources. For example, a *farmed wetland* area would be considered a wetland in Section 4.4.3 below, while in Section 4.9, Land Use it may be classified as an ‘agricultural’ land use.

4.4.3 Potential Wetland Impacts

An estimate of wetland acreage that would be affected by the proposed Project is summarized in Table 4.4-1 and Table 4.4-2. Refer to Appendix D, Waterbody Crossing Tables and Required Crossing Criteria for Reclamation Facilities, for additional wetland data. Estimated impacts are based on the impact analysis methods described above and the best available information. Impacts are categorized by proposed Project phase (construction versus operations) and by location (Project corridor right-of-way [ROW] versus ancillary facilities). The potential wetland impact discussion that follows applies to all identified wetland types, including 'sensitive wetlands' previously described in Section 3.4.3, Wetlands of Special Concern or Value.

Construction-related wetland impacts are associated with construction activities occurring within the proposed Project right-of-way (ROW) and in support of Project-related ancillary facilities. Operations-related wetland impacts are associated with both ROW and ancillary facilities that would persist for the life of the proposed Project. Construction-related impacts would occur within the 110-foot construction ROW as a result of proposed pipeline installation activities. The 110-foot construction corridor width would be reduced to 85 feet for wetlands in Montana and Nebraska, and 75 feet for wetlands in South Dakota, unless conditions require a wider construction corridor, per state requirements. For the purpose of this analysis, estimated construction-related ROW wetland impact calculations are based on a general 110-foot construction corridor to provide a high-end estimate.

Operations-related wetland impacts are those that are expected to occur within the 50-foot permanent operations ROW. Estimated operations-related wetland impact calculations are based on a general 50-foot permanent ROW, again as a high-end estimate.

Impacts associated with ancillary facilities include impacts for access roads, construction camps, staging areas, pipe yards, contractor yards, rail sidings, and pump stations. Construction-related ancillary facilities would only be used during construction and would be removed when the construction phase is complete. Operations-related ancillary facility impacts are considered permanent and would persist for the life of the proposed Project. Operations-related ancillary facilities include permanent access roads (30-foot ROW width for access roads), emergency response staging areas, and pump stations. The construction and operations wetland impacts summarized in Table 4.4-1 are not additive. Construction related wetland impacts include all impacts that will occur within the 110-foot construction corridor, including construction impacts that will occur within the 50-foot permanent ROW. Operations impacts are those impacts that will persist within the 50-foot permanent ROW following the construction phase.

South Dakota has approximately half of the estimated wetland acreage that would be affected during pipeline construction (47 percent; 124.3 acres of 262.2 acres; Table 4.4-1). Emergent wetlands are the most common wetland type affected by the proposed Project. Total estimated palustrine emergent (PEM), palustrine scrub-shrub (PSS), palustrine forested (PFO), and riverine/open water wetlands affected during construction are 78.4 acres in Montana, 124.3 acres in South Dakota, and 59.5 acres in Nebraska. This does not imply a permanent loss of wetland acreage due to construction, but identifies the total number of wetlands acres that would be affected to some degree by construction related activities and may need minor to more involved post-construction reclamation.

Table 4.4-1 Estimated Wetlands Affected by Proposed Project ROW and Ancillary Facilities

State	Impact Area	Length of Wetlands Crossed (miles)[b]				Wetland Area Affected During Construction (acres)[c]				Wetland Area Affected During Operations (acres)[d]			
Montana		**PEM**	**PSS**	**PFO**	**Riv-OW**	**PEM**	**PSS**	**PFO**	**Riv-OW**	**PEM**	**PSS**	**PFO**	**Riv-OW**
	ROW	1.7	1.2	0.003	2.3	23.5	16.9	0.1	28.8	10.2	7.1	0.0	14.1
	Ancillary[e]	0.3	1.3	0.0	0.2	3.0	4.8	0.0	1.3	0.4	0.4	0.0	0.02
Subtotal		*2.0*	*2.5*	*0.003*	*2.5*	*26.5*	*21.7*	*0.1*	*30.1*	*10.6*	*7.5*	*0.0*	*14.2*
South Dakota													
	ROW	5.6	1.4	0.04	2.1	73.5	19.8	0.6	26.1	33.4	8.3	0.2	13.0
	Ancillary[e]	0.2	0.1	0.0	0.1	2.7	1.2	0.0	0.4	0.4	0.6	0.0	0.2
Subtotal		*5.8*	*1.4*	*0.04*	*2.2*	*76.2*	*21.0*	*0.6*	*26.5*	*33.8*	*8.9*	*0.2*	*13.2*
Nebraska													
	ROW	1.8	1.0	0.8	1.7	24.3	10.6	6.3	17.4	10.8	6.1	4.7	10.4
	Ancillary[f]	0.1	0.0	0.02	0.0	0.6	0.0	0.1	0.2	0.0	0.0	0.0	0.0
Subtotal		*1.9*	*1.0*	*0.8*	*1.7*	*24.9*	*10.6*	*6.4*	*17.6*	*10.8*	*6.1*	*4.7*	*10.4*
North Dakota													
	Ancillary[g]	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Kansas													
	Ancillary[g]	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Grand Total		9.7	4.9	0.9	6.4	127.6	53.3	7.1	74.2	55.2	22.5	4.9	37.8

Sources: exp Energy Services Inc. 2012a, b; USFWS 2012a; Fry 2011; USGS 2011.

[a] Cowardin et al., 1979; PEM-palustrine emergent; PSS-palustrine scrub-shrub; PFO-palustrine forested; Riv-OW-riverine-open water; NA-Not Available.
[b] Length of wetlands crossed for ROW is the length of wetlands bisected by pipeline centerline; length of wetlands crossed for ancillary facilities length of wetlands bisected by access roads centerlines only.
[c] Construction ROW impacts calculated using a 110-foot general construction corridor width.
[d] Operational ROW impacts were calculated based on a 50-foot permanent ROW corridor width.
[e] Ancillary facilities located outside of the ROW include: access roads (30-foot easement), pump stations, pipe yards, contractor yards, rail sidings, and construction camps.
[f] Ancillary facilities impacts for Nebraska do not include construction camps, temporary staging areas, pipe yards, contractor yards, and rail sidings, but does include access roads, all of which are temporary. The location of some Nebraska ancillary facilities is pending and will be evaluated for the Final Supplemental EIS when it becomes available.
[g] There are no NWI data in these areas.

Approximately 1,073 waterbodies may be crossed by the proposed Project, see Sections 3.3, Affected Environment, Water Resources, and 4.3, Environmental Consequences, Water Resources, for further details.

Similar to construction, half of the estimated wetland acreage that would be affected by proposed pipeline operations is located in South Dakota (47 percent; 56.1 acres of 120.4 acres). Total wetland acres affected during operation are estimated at 32.3, 56.1, and 32.0 acres in Montana, South Dakota, and Nebraska, respectively. Again, this does not imply a permanent loss of wetland acreage due to the continued operation of the proposed Project. Many of the wetlands affected by operations would remain as functioning wetlands provided impact minimization and restoration efforts described in the Construction, Mitigation, and Reclamation Plan (CMRP) (Appendix G, CMRP) are successful. Permanent conversion from one wetland type to another are estimated to be 7.1 acres in Montana, 8.3 acres in South Dakota, and 10.8 acres in Nebraska (see Wetland to Wetland Conversions in Table 4.4-2).

Table 4.4-2 Estimated Permanent Wetland Impacts[a]

Permanent Wetland to Wetland Conversions (acres)				Permanent Wetland to Upland Conversions (acres)			
	MT	**SD**	**NE**		**MT**	**SD**	**NE[d]**
PSS to PEM[b]	7.1	8.3	6.1	PEM to UPL	0.4	0.4	0.0
PFO to PEM	0.0	0.1	4.7	PSS to UPL	0.4	0.6	0.0
Riv/OW to PEM[c]	0.0	0.0	0.0	PFO to UPL	0.0	0.0	0.0
				Riv/OW to UPL	0.02	0.2	0.0
Total	7.1	8.3	10.8	Total	0.8	1.2	0.0

Sources: exp Energy Services Inc. 2012 a, b; USFWS 2012a; Fry 2011; USGS 2011.

[a] Permanent wetland impacts include PSS/PFO conversions to PEM wetlands within the 50-foot-wide permanent ROW; and wetland to upland conversion resulting from fills associated with the construction of permanent ancillary facilities.
[b] Cowardin et al., 1979; PEM-palustrine emergent; PSS-palustrine scrub-shrub; PFO-palustrine forested; Riv-OW-riverine-open water; UPL-upland
[c] Refer to Section 4.3 for details related to surface water feature impacts.
[d] Some ancillary facilities in Nebraska have not been sighted yet.

Wetland losses (wetland conversion to uplands) would only be associated with the construction of permanent ancillary facilities such as permanent access roads, pump stations, and emergency response staging areas. Permanent wetland losses due to operational ancillary facilities are estimated to be 0.82 acres in Montana and 1.2 acres in South Dakota (see Wetland to Upland Conversion in Table 4.4-2). At the time of this report the location of some Nebraska ancillary facilities were still unknown. For the purpose of this SEIS, the total number of wetlands that would be converted to uplands in Nebraska would likely be similar to the Montana and South Dakota totals. Where required, all permanent wetland impacts would be mitigated by following standard USACE-required mitigation protocols and ratios, negotiated during the Project permitting.

In the methodology section above, data presented in Table 4.4-1 have limitations and may underestimate the actual acreage of PEM, PSS, PFO, and riverine/open water wetlands that would be affected by the proposed Project. In addition, a large proportion of the proposed Project corridor passes through sub-irrigated agricultural lands that may include wetlands on grazed, cultivated, or other agricultural lands. Wetlands occurring on lands that are actively managed for agricultural purposes are difficult to map from aerial photo interpretation, are not well represented in national wetland databases, and are difficult to accurately delineate in the field

due to agricultural-related changes to the soil, vegetation, and hydrology. As a result, wetlands occurring on lands managed for agricultural use may be under-represented by the acreages presented in Table 4.4-1 and Table 4.4-2. This under-representation may be balanced, at least in part, by the wider construction and operation corridor used in estimates of wetland impacts, as described above.

While acreages presented in the tables may not be fully quantified at this time, they would be accounted for during the subsequent federal and state permitting process. These data do capture the wetland types (PEM, PSS, PFO, and riverine / open water) that are encountered within the proposed Project area, thus enabling reasonable discussions regarding impact analysis. For the purpose of this analysis, impacts to riverine and open water features are addressed in Section 4.3, Water Resources, while the remainder of this section focuses on impacts to vegetated wetland communities (PEM, PSS, and PFO).

The term *affected* wetland implies a temporary, short-term, long-term, or permanent impact. A temporary impact would generally occur during construction with recovery following almost immediately afterwards, a short-term impact would have duration of up to 3 years, a long-term impact would have duration greater than 3 years but with recovery achievable over time, and a permanent impact would be an impact that persists over the life of the proposed Project or longer. Temporary, short-term, and long-term impacts noted below are based on the assumption that post-construction restoration efforts would be successful and no unforeseen conditions resulting from proposed pipeline operations (e.g., pipeline soil temperature effects, potential spills) delay anticipated recovery rates. Note that a long-term or permanent *affect* or *impact* does not necessarily mean a permanent loss of wetland habitat. For example conversion of scrub-shrub or forested wetlands to herbaceous wetlands is considered a permanent impact to those woody wetland classes, but does not represent a complete loss of wetland habitat; whereas a permanent wetland loss would be a conversion of a wetland to an upland as a result of the construction of a pump station or access road.

Impacts to emergent wetlands affected within the proposed construction corridor width, which would encompass the permanently maintained operations ROW, would likely be short-term to long-term, with successful re-establishment within 3 to 5 years. All impacted emergent wetlands would be restored to near pre-construction conditions following proposed pipeline installation. Emergent wetlands would be allowed to persist outside of and within the permanent operations ROW for the life of the proposed Project. The only permanent loss of emergent wetlands would be associated with the construction of permanent ancillary facilities such as permanent access roads, emergency response staging areas, and pump stations. Permanent emergent wetland losses are estimated to be 0.4 acres in Montana and 0.4 acres in South Dakota. At the time of this report the location of some Nebraska ancillary facilities were still unknown.

In forested and scrub-shrub wetlands, the effects of proposed construction would be longer term due to the longer period needed to regenerate a mature forest or shrub community. Prior to proposed pipeline installation, scrub-shrub and forested wetland vegetation within the construction corridor (area between the approximate 50-foot permanently-maintained operations ROW and 110-foot construction corridor limit) would be cut to ground level and root systems would be left in place. Once construction activities were completed, woody vegetation outside of the 50-ft permanently maintained corridor and outside of permanent ancillary footprint facilities would be restored to near pre-construction conditions and woody vegetation would be allowed to regrow. Shrubs and trees would also be allowed to regrow at horizontal directional drilling

(HDD) locations within the permanent ROW after construction activities are complete. Scrub-shrub and forested wetlands that would be initially cleared (cut to ground surface) for construction, but would be allowed to regrow over time are estimated at 14.3 acres in Montana, 12.5 acres in South Dakota, and 6.2 acres of scrub-shrub/forested wetlands in Nebraska. This would be considered a long-term impact based on the slower growth rate of trees and shrubs, which may require decades for complete regeneration.

The 50-foot-wide permanently-maintained ROW would be kept free of woody vegetation for the life of the project. Woody vegetation within the 50-foot ROW would be completely removed during construction and would be prevented from re-establishing due to periodic mowing and brush cutting during pipeline operation. Scrub-shrub and forest wetlands within the 50-foot ROW would be converted to emergent wetlands, which represents a permanent impact to the woody wetland class, but does not represent a permanent loss of wetland habitat. Scrub-shrub and forested conversion to emergent wetlands is estimated to be 7.1 acres, 8.3 acres, and 10.8 acres in Montana, South Dakota, and Nebraska, respectively (Table 4.4-2). The only permanent conversion of scrub-shrub and forested wetlands to uplands would be associated with the construction of permanent ancillary facilities such as permanent access roads, emergency response staging areas, and pump stations. Permanent scrub-shrub and forested wetland losses are estimated to be 0.4 acres in Montana and 0.6 acres in South Dakota. At the time of this report the location of some Nebraska ancillary facilities were still unknown (Table 4.4-2).

Construction and operation of ancillary facilities would result in short-term, long-term and permanent impacts. Impacts associated with non-permanent ancillary facilities (i.e. temporary access roads) would be similar to those described above for emergent wetlands (short-term to long-term with recovery in 3 to 5 years), and long-term to permanent for scrub-shrub and forested wetlands. The continued operation of permanent ancillary facilities (i.e. permanent access roads, emergency response staging areas, and pump stations) would require permanent wetland fills and represent a permanent wetland loss (wetland to upland conversion) of approximately 0.82 acres in Montana and 1.2 acres in South Dakota. At the time of this report the location of some Nebraska ancillary facilities were still unknown. (see Wetland to Upland Conversion in Table 4.4-2).

Construction of the proposed pipeline would affect wetlands and their functions primarily during and immediately following construction activities; however, permanent changes also are possible (Federal Energy Regulatory Commission [FERC] 2004). Wetland functions that may be affected include surface water storage (flood control); shoreline stabilization (wave damage protection/shoreline erosion control); stream flow maintenance (maintaining aquatic habitat and aesthetic appreciation opportunities); groundwater recharge; sediment removal and nutrient cycling (water quality protection); aquatic productivity support (fishing, shell fishing, and waterfowl hunting); production of trees (timber harvest); production of herbaceous growth (livestock grazing and haying); production of peaty soils (peat harvest); and provision of plant and wildlife habitat (federally listed and candidate species, photography, nature observation, and aesthetics) (U.S. Environmental Protection Agency [USEPA] 2001). The degree to which a given wetland and its functions are impaired depends on a number of factors including wetland type (e.g., wet meadow versus forested), landscape position (riverine versus wet meadow), level of impairment or impact, and success of restoration efforts. Potential construction- and operations-related effects include the following:

- Permanent loss of wetlands as a result of permanent fill (e.g., backfilling at permanent ancillary facility locations or improper removal of temporarily staged soils in wetlands adjacent to the pipeline trench).
- Disturbances that result in permanent wetland loss as a result of improperly maintained wetland integrity (hydrology, hydric soil strata, or hydrophytic vegetation).
- Temporary to permanent modification of surface and subsurface flow patterns that could result in modification in wetland productivity (rate of seed maturity, wildlife usage, etc.), wetland plant community diversity, and wetland to upland plant community conversion.
- Temporary to permanent modification of wetland vegetation community composition and structure from clearing and operational maintenance (e.g., wetland scrub-shrub and forested communities would not be allowed to regenerate within the permanent ROW and would permanently be maintained as emergent wetlands; in some HDD crossing areas, regeneration of shrub and forested communities would be allowed, but would require several decades to reach maturity).
- Loss or alteration of wetland soil integrity as a result of improperly restored hydric soil strata (topsoil and root stock, clays, and gravels/cobbles), rutting, and compaction that could result in altered biological activities and chemical conditions that could affect re-establishment and natural recruitment of native wetland vegetation after restoration.
- Temporary increase in turbidity and water quality.
- Permanent alteration in water-holding capacity in the Prairie Pothole, Rainwater Basin and Playa regions due to alteration or breaching of water-retaining substrates.
- Permanent alteration in vegetation productivity and life-stage timing to wetlands located directly over the pipeline due to increased soil temperatures associated with heat generation of the pipeline (during the cooler months of January to May and November to December, operation of the proposed Project would cause increases of 4 degrees Fahrenheit [˚F] to 8˚F in soil temperatures at the soil surface directly over the proposed pipeline, and 10 to 15˚F at 6 inches below the surface directly over the pipeline [Appendix S, Pipeline Temperature Effects Study]).
- Permanent alteration of freeze-thaw timing in wetlands directly over the proposed pipeline as a result of the increased soil temperatures associated with heat generation from the pipeline. In the event of a spill incident along the proposed pipeline during the winter months, open-water areas that refreeze could hamper recovery efforts and lead to emergent wetland vegetation die-off or cause harmful effects to wildlife (amphibians, fish) as a result of further drops in dissolved oxygen.
- Permanent alteration of soil water availability, soil biological activity, and soil chemical conditions to wetlands located directly over the proposed pipeline due to the increased soil temperature associated with the heat generated by the pipeline.

- General wetland impacts associated with hazardous liquid spills and leaks during the construction and operation phase are addressed in Section 4.13.3, Spill Impact Assessment. In the event of a spill during construction and reclamation activities, Keystone has identified and prepared written procedures to address a response action. These activities are provided in Keystone's Draft Spill Prevention, Control and Countermeasure (SPCC) Plan (Appendix I, Spill Prevention Control and Countermeasure Plan and Emergency Response Plan Sections). An Emergency Response Plan (ERP) would be prepared 6 months prior to project initiation.

Procedures outlined in the proposed Project CMRP (Appendix G) for wetland crossings would be implemented to minimize potential construction- and operations-related effects, and wetlands affected by construction activities would be restored to the extent practicable. Implementation of measures in the CMRP (Appendix G) would avoid or minimize most impacts on wetlands associated with construction and operation activities and would ensure that potential effects would be primarily short-term.

Keystone has made route modifications to avoid known wetland areas and to generally minimize wetland impacts, based on aerial mapping, field surveys, and consultation with agencies. Involvement of the USACE and U.S. Fish and Wildlife Service (USFWS), as well as other federal and state agencies, during the early phases of project routing and siting identified high quality wetlands or areas requiring additional protection to be avoided. Data reviewed to avoid and minimize impacts to wetlands to the extent possible included: National Wetland Inventory maps, aerial imagery, soil surveys, and field wetland surveys. Wetland impacts were further avoided or minimized by HDD to avoid impacts, locating the route next to existing utilities to minimize impacts, perpendicular crossing of riparian wetland features to minimize impacts where possible, and route variation to reduce the total length of the wetland crossing to minimize impacts.

The U.S. Fish and Wildlife Service (USFWS) has expressed concerns about any water withdrawals from the Platte River. They were requested to provide informal section 7 consultation and technical assistance for the Project. In their response letter dated September 4, 2012 (FWS NE: 2013-013) from Michael D. George to K. Nicole Gibson, Ph.D., they state: "Since 1978, the USFWS has concluded in all of its section 7 consultations on water projects in the Platte River basin that the Platte River ecosystem is in a state of jeopardy, and any federal action resulting in a water depletion to the Platte River System will further or continue the deterioration of the stressed habitat conditions." They go on the say that any depletion of flows, either direct or indirect, from the Platte River System would be considered significant and they consider the river and associated wetland habitats to be "resources of national and international importance." To mitigate any impacts to the Platte River ecosystem, Keystone would coordinate with the USFWS before any water withdrawals.

Commitments described in the proposed Project CMRP (Appendix G) and additional Keystone correspondence to protect and restore wetlands include the following general measures (refer to the CMRP for additional details and figures):

- Avoid placement of aboveground facilities in a wetland, except where the location of such facilities outside of wetlands would preclude compliance with DOT pipeline safety regulations or the 57 Project-specific Special Conditions developed by the Pipeline Hazardous Material Safety Administration (PHMSA) (see Appendix G, CMRP);

- Clearly mark wetland boundaries with signs and/or highly visible flagging during construction and maintain markers until permanent seeding is completed;
- Reduce the width of the proposed construction ROW to 85 feet or less in Montana and Nebraska, and 75 feet or less in South Dakota in standard wetlands unless non-cohesive soil conditions require a greater width and unless the USACE or other regulatory authority authorizes a greater width;
- Locate extra work spaces at least 10 feet away from wetland boundaries, where topographic conditions permit;
- Limit clearing of vegetation between extra work areas and the edge of the wetlands to the proposed construction ROW and limit the size of extra work areas to the minimum needed to construct the wetland crossing;
- Clear the construction ROW, dig the trench, fabricate and install the pipeline, backfill the trench, and restore the construction ROW using wide-track or low-ground pressure construction equipment and/or conventional equipment operating from timber and slash (riprap) cleared from the ROW, timber mats, or prefabricated equipment mats;
- Install and maintain sediment barriers at all saturated wetlands or wetlands with standing water across the entire construction ROW upslope of the wetland boundary and where saturated wetlands or wetlands with standing water are adjacent to the construction ROW as necessary to prevent sediment flow into the wetland;
- Limit the duration of construction-related disturbance within wetlands to the extent practicable;
- Use no more than two layers of timber riprap to stabilize the proposed construction ROW;
- Cut vegetation off at ground level leaving existing root systems in place and remove it from the wetland for disposal;
- Limit pulling of tree stumps and grading activities to directly over the trench line unless safety concerns require the removal of stumps from the working side of the construction ROW;
- Segregate and salvage all topsoil up to a maximum of 12 inches of topsoil from the area disturbed by trenching in dry wetlands, where practicable, and restore topsoil to its approximate original stratum after backfilling is complete;
- Dewater the trench in a manner to prevent erosion and to prevent heavily silt-laden water from flowing directly into any wetland or waterbody;
- Remove all timber riprap and prefabricated equipment mats upon completion of construction;
- Locate hydrostatic test manifolds outside wetlands and riparian areas to the maximum extent practicable;
- Prohibit storage of hazardous materials, chemicals, fuels, lubricating oils, or perform concrete coating activities within a wetland or within 100 feet of any wetland boundary, if possible;

- Perform all equipment maintenance, repairs, and refueling in upland locations at least 100 feet from waterbodies and wetlands, if possible;
- Avoid parking equipment overnight within 100 feet of a watercourse or wetland, if possible;
- Prohibit washing equipment in streams or wetlands;
- Install trench breakers and/or seal the trench to maintain the original wetland hydrology, where the pipeline trench may drain a wetland;
- Develop compensation for impacts to forested wetlands impacted by the construction ROW through the USACE Clean Water Act Section 404 and 401 permitting program. Keystone would mitigate for impacts to non-jurisdictional, as well as jurisdictional forested wetlands;
- Refuel all construction equipment in an upland area at least 100 feet from a wetland boundary, if possible; and
- Avoid sand blasting in wetlands to the extent practicable; if unavoidable, place a tarp or suitable material to collect as much waste shot as possible, clean up all visible wastes, and dispose of collected waste at an approved disposal facility.
- Apply seeding requirements for agricultural lands or as required by the landowner for farmed wetlands;
- Use no application of fertilizer, lime, or mulch unless required by the appropriate land management or resource agency and with land owner permission;
- Restore wetland areas within conservation lands or easements to a level consistent with any additional criteria established by the relevant managing agency;
- Prohibit use of herbicides or pesticides within 100 feet of any wetland (unless allowed by the appropriate land management or state agency); and
- Develop compensation for both jurisdictional and non-jurisdictional forested wetlands impacted by the construction of the proposed right-of-way through the USACE's Section 404 and 401 permitting program.

In the Final EIS document, various state and federal agencies have expressed concerns about and provided recommendations for compensatory mitigation of jurisdictional wetland losses. Proposed pipeline construction through wetlands must comply with USACE Section 404 permit conditions. The requirements for compensatory mitigation would depend on final USACE decisions on jurisdictional delineations. Under the authority of Section 404 of the CWA, USACE permits are required for the discharge of fill material into waters of the U.S. As noted in Section 3.4.4, waters of the United States include the area below the ordinary high water mark of stream channels and lakes or ponds connected to the tributary system, and wetlands adjacent to these waters, including wetlands that have a 'significant nexus' to these waters. Isolated waters and wetlands, as well as man-made channels and ditches, may be waters of the U.S. in certain circumstances, which must be determined on a case-by-case basis by the USACE. Under the authority of Section 10 of the Rivers and Harbors Act, USACE permits are required for structures or work in, over, under or affecting navigable Waters of the United States.

All wetlands and waterways crossed by the proposed Project would be evaluated under the preliminary jurisdictional determination process. Under this process, all wetlands are tentatively

considered jurisdictional until an approved determination is made by USACE (Regulatory Guidance Letter No. 08-02). A more detailed explanation of wetland regulatory framework can be found in Section 3.4.4, Federal and State Regulatory Setting. Compensatory mitigation, where required by USACE or state agencies, would be provided for permanent losses of jurisdictional wetlands and water resources. Compensatory Mitigation Plans would be developed and carried out in accordance with Title 33 of the Code of Federal Regulations Part 332 (Compensatory Mitigation for Losses of Aquatic Resources) or applicable state standards. All non-permanent wetland impacts due to construction activities would be restored in accordance with the proposed Project CMRP (Appendix G).

The USACE Omaha District would be consulted to determine the kind of compensatory mitigation that would be required for losses of wetlands and water resources, including the permanent conversion of forested wetland to herbaceous wetland. USACE would determine eligibility for each wetland crossing under the nationwide and individual permit program. Pre-construction notification packages would include the mitigation plans agreed upon with the USACE.

In an effort to avoid and minimize impacts to sensitive wetlands that may provide important habitat resources for federally listed species, the USFWS recommends that HDD be considered during the permitting process when crossing streams and wetland habitats containing high diversity and unique aquatic species assemblages (USFWS 2012b).

Additionally, Keystone would follow state-specific impact reduction, mitigation, and reclamation plans as outlined in the following Project-related publicly available documents:

- Montana—Keystone XL Project: Supplemental Information for Compliance With the Montana Environmental Policy Act and Support for Decisions Under the Major Facility Siting Acting (signed March 30, 2012) (Appendix N, Supplemental Information for Compliance with MEPA). For example, where Prairie Pothole wetlands would be affected, develop pre- and post-construction monitoring plans for depressional wetlands of the Prairie Potholes region in Montana and wetlands that no longer pond water after the proposed pipeline is installed. These affected wetlands should receive additional compaction, replacement, or at the landowner's or managing agency's discretion compensatory payments should be made for drainage of the wetland (Appendix G, CMRP).
- South Dakota—South Dakota Public Utilities Commission Final Decision and Order (SDPUC 2010)
- Nebraska—2012 Nebraska Supplement Environmental Report (Nebraska Department of Environmental Quality, pending report available in December 2012).

In addition to these additional mitigation measures offered by the Department and other participating federal, state, and local agencies, supplementary list of recommendations has been generated through the Supplemental Environmental Impact Statement development process. Where appropriate and applicable, a plan to compensate for permanent wetland losses and to prevent temporary to permanent wetland degradation would be developed to include the following:

- Jurisdictional and non-jurisdictional wetlands within the Prairie Pothole Region (Montana, South Dakota, northern Nebraska), sand hill-type wetlands (if any are affected in Nebraska), and Rainwater Basin Region wetlands (Nebraska), according to state and USACE regulations;
- Final restoration for all jurisdictional wetlands, and other wetlands of state or federal concern, according to the USACE and other agencies as required;
- Monitoring of wetland mitigation sites for success according to applicable federal and state permit conditions;
- For temporarily disturbed wetland hydrology that does not recover (i.e., disturbance resulted in permanent hydrologic change or loss) from construction, compaction testing to determine if compaction is excessive or insufficient, soil strata replacement, or at the landowner's or managing agency's discretion, compensatory payments or wetland replacement;
- Compensation for conversion of scrub-shrub or forested wetlands to emergent wetlands if required by local, state, or federal agencies;
- Removal of soil and vegetation in areas of noxious weed infestation to areas outside of a wetland and avoidance of use to restore wetland contours or soil strata above the pipeline;
- Consultation of local and/or state agencies to address weed management within wetland areas;
- During freezing temperatures, special accommodations to adequately wash noxious weed plant seeds and parts from machinery and other vehicles prior to entering a wetland area; and,
- Approval by appropriate agencies for all seed mixes and revegetation materials used to restore wetlands or agricultural farmed wetlands.

4.4.4 Recommended Additional Mitigation

This section describes additional mitigation measures that are recommended to reduce construction impacts and to improve restoration activities.

- "Dry" and "standard" (e.g., saturated) wetlands are approached in a similar manner. This construction and mitigation approach would provide the greatest amount of protection for all wetland types, and potentially eliminate confusion of contract workers when dealing with wetland construction, restoration, and spill response methods, for example.
- Clearly mark wetland boundaries with signs and/or highly visible flagging during construction and maintain markers until USACE-, and/or state-approved restoration methods and monitoring requirements are completed.
- To prevent compaction of wetland soils, low ground pressure equipment construction equipment or conventional equipment on supportive mats would be used in all wetland areas. It is recommended that timber riprap, timber mats or other pre-fabricated equipment mats that can be easily removed following construction would be used to support conventional construction equipment.
- Install and maintain sediment barriers at all wetlands across the entire construction ROW upslope of the wetland boundary and where any wetlands are adjacent to the construction

ROW as necessary to prevent sediment flow into the wetland. It is recommended that "dry" and "standard" wetlands are treated equally where restoration or mitigation measures are concerned.

- Segregate and salvage topsoil, sod mats, and root stock (maximum of 12 inches), as well as clays, and gravel/cobbles in all wetlands where practicable. Segregating soil strata in wetlands with surface or standing water may not be practicable. Restore wetland soil to its approximate original stratum after pipe installation is complete.
- After installation of pipe is complete; replace salvaged wetland vegetation and spread soil to its original contours with no crown over the trench; surface soils would be left slightly rough (not be smoothed or overly compacted) in order to maximize wetland revegetation re-growth and seed germination potential.
- Remove any excess spoil, stabilize wetland edges and adjacent upland areas using permanent erosion control measures and USACE-, state-, or locally mandated revegetation methods.
- For all wetlands, install a permanent slope breaker and trench breaker at the base of slopes near the boundary between the wetland and adjacent upland areas where necessary to prevent the wetland from draining.
- In the absence of detailed revegetation plans or until appropriate seeding season, apply temporary vegetation cover at a rate adequate for germination and ground cover using an appropriate wetland seed mix approved by local, state, and/or federal agencies unless standing water is present.

4.4.5 Connected Actions

4.4.5.1 Bakken Marketlink Project

Construction and operation of the Bakken Marketlink Project would include metering systems, three new storage tanks near Baker, Montana, and two new storage tanks within the boundaries of the proposed Cushing tank farm. No wetland impacts are expected for this 5-mile pipeline. The permit applications for these proposed projects would be reviewed and acted on by other agencies. Those agencies would conduct more detailed environmental review of the Bakken Marketlink Project. Potential wetland impacts would be evaluated during the environmental reviews for these projects and potential wetland impacts would be evaluated and avoided, minimized, or mitigated in accordance with direction from the appropriate USACE district offices.

4.4.5.2 Big Bend to Witten 230-Kilovolt (kV) Transmission Line

Upgrades to the power grid in South Dakota to support power requirements for pump stations in South Dakota would include construction of a new 230-kV transmission line and a new substation through Lyman and Tripp counties in south-central South Dakota. The Western Area Power Administration (Western) and Basin Electric Power Cooperative (BEPC) have identified a preferred corridor for the proposed Big Bend to Witten 230-kV Transmission Line project (Figure 2.1.12-3). This proposed connected action is more fully explained in Section 2.1.12.2, Big Bend to Witten 230-kV Transmission Line, and the in the Basin Electric Big Bend to Witten 230-kV Transmission Project Routing Report (Appendix J).

As described in BEPC's Routing Report, the Big Bend to Witten project would be constructed using 230-kV transmission structures that allow for an average span length of 650 to 950 feet. Surface water bodies and wetlands that are less than 950 feet wide could be spanned by the proposed transmission line. Most surface water features and wetlands would be spanned; however, those that fall within the ROW would need to be delineated in localized areas prior to construction and measures to avoid impacts would be implemented. The applicant preferred route would cross approximately 1,600 surface water bodies and approximately 6,000 feet of wetlands, most of which could be spanned by the transmission line. Refer to Appendix J for a complete discussion of the selected alternatives as well as the surface water and wetland analysis that was performed to estimate potential impacts.

The permit applications for the Big Bend to Witten project would be reviewed and acted on separately by agencies and those agencies would conduct more detailed environmental review of the project. Potential wetland impacts would be evaluated during the environmental reviews for these projects and potential wetland impacts would be evaluated and avoided, minimized, or mitigated in accordance with direction from the appropriate USACE district offices.

4.4.5.3 Electrical Distribution Lines and Substations

Electrical distribution line construction and operation requires clearing of trees and shrubs, and maintaining vegetation under the power lines in an herbaceous state. Electrical distribution lines and substations constructed to provide power for the Project pump stations could affect wetland resources through the following:

- Temporary, short-term, long-term, and permanent modification of wetland vegetation community composition, community structure, potential increase in noxious weeds, and the wetland's capacity to perform existing wetland functions;
- Alteration of drainage patterns and wetland hydrology;
- Compaction and rutting of wetland soils from movement of heavy machinery and transport and installation of transmission structures, inhibiting seed germination, or increasing siltation; and
- Temporary increase in turbidity and water quality and changes in wetland hydrology.

In general, electrical distribution line construction impacts to wetlands would be temporary and short-term, as most lines would run alongside existing roadways and smaller wetlands might be spanned. Trees in forested wetlands crossed by the electrical distribution line ROW would be removed, and the ROW would be maintained free of woody vegetation. Table 4.4-3 provides preliminary estimates of wetland impacts in Montana and South Dakota. Impacts were calculated based on a 150-foot wide ROW corridor width, which provides a high-end estimate of potential wetland impacts. Specific location data for ancillary and ROW proposed Project components for this connected action are to be determined, the impacts notes in Table 4.4-3 are considered interim. Electricity service providers would avoid and minimize impacts by spanning wetlands and selecting pole locations away from sensitive habitats. The exact locations of operational structures, such as poles, are still to be determined, however, permanent impacts are expected to be substantially lower than the estimated construction related impacts noted in Table 4.4-3.

Table 4.4-3 Estimated Impacts to Wetlands Associated with the Electrical Distribution Lines and Substations

State	Impact Area	Length of Wetlands Crossed (miles)[a]				Wetland Area Affected During Construction (acres)[b]			
		PEM	PSS	PFO	Riv-OW	PEM	PSS	PFO	Riv-OW
Montana									
	ROW[d]	2.8	1.3	0.04	1.6	49.7	24.1	0.6	28.1
South Dakota									
	ROW[d]	1.8	0.6	0.1	1.9	31.9	11.0	0.7	35.8
Nebraska									
	ROW[e]	NA	NA	NA	NA	NA	NA	NA	NA
Grand Total		4.6	1.9	0.1	3.5	81.6	35.1	1.3	63.9

Sources: exp Energy Services Inc. 2012 a, b; USFWS 2012a; Fry 2011; USGS 2011.

[a] Length of wetlands crossed for ROW is the length of wetlands bisected by transmission centerline.
[b] Construction electrical distribution line impacts were calculated based on a 150-foot general construction corridor width. These impacts do not include ancillary impacts. Actual construction corridor width will be 80 feet, and expanded to 150-feet wide around pole structures. Pole structure location was unknown at the time of this report. This estimate represents the maximum extent of wetland impacts associated with this connected action. Actual wetland impacts will likely be significantly lower. Location of operational structures is to be determined, therefore wetland acreage affected by operations is undetermined at this time, but would likely be substantially lower than construction related impacts.
[c] Cowardin et al., 1979; PEM-palustrine emergent; PSS-palustrine scrub-shrub; PFO-palustrine forested; Riv-OW-riverine-open water; NA-Not Available.
[d] Complete data for the electric distribution lines and substations were not available for Nebraska or Kansas at the time of this report.

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