

Savage and Savage *Environmental*

practical solutions for environmental issues

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August 12, 2010

Mike Rodine
Noble Energy, Inc.
804 Grand Avenue
Platteville, Colorado 80651

RE: Noble Energy Boulter G14-19 and G14-29 Drill Sites Wetland Delineation

Dear Mr. Rodine:

Savage and Savage conducted a wetland delineation at the Boulter G14-19 and G14-29 proposed drill sites on August 9, 2010. The proposed well sites are located in a pasture south of Weld County Road 46 and east of Weld County Road 45 in Weld County, Colorado. The site lies within the NW¹/₄NW¹/₄ of Section 14, Township 4 North, Range 65 West of the 6th Prime Meridian, Weld County, Colorado.

Based on the proposed locations of the wells, these sites are constrained by the presence of wetlands. The pasture to the immediate east of the area investigated is topographically elevated (and owned by Mr. Boulter) and there is only a small area of wetlands at the southwest corner of this fenced pasture. If this pasture is within the drilling window, there should be no constraints due to wetlands.

Sincerely,

A handwritten signature in black ink that reads "Michael S. Savage". The signature is written in a cursive, flowing style.

Michael S. Savage
Principal

**NOBLE ENERGY PRODUCTION, INC.
BOULTER G14-19 AND G14-29 WELLS
WATERS OF THE UNITED STATES IDENTIFICATION
AND WETLAND DELINEATION
WELD COUNTY, COLORADO**



Prepared by: *Savage and Savage, Inc.*
4610 Haystack Drive
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970 674 8080

August 2010

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INTRODUCTION

Savage and Savage conducted a wetland delineation within the area proposed for drilling the Boulter G14-19 and G14-29 wells for Noble Energy Production, Inc. on August 9, 2010. The proposed well sites are located in a pasture south of Weld County Road 46 and east of Weld County Road 45 in Weld County, Colorado (Figure 1.). From Denver, the site is accessed by traveling north on U.S. Highway 85 to Weld County Road 44, east on Weld County Road 44 for six miles to Weld County Road 45, then north on Weld County Road 45 for one mile to Weld County Road 46. The proposed drill sites are located approximately 0.3 miles east of the intersection, to the south in the pasture. The latitude of the center of the project site is 40.3185 degrees North and longitude is 104.635 degrees West. The average elevation of the project site is 4690 feet. The site lies within the NW¹/₄NW¹/₄ of Section 14, Township 4 North, Range 65 West of the 6th Prime Meridian, Weld County, Colorado.

STUDY METHODS

A wetland delineation was conducted within the proposed drill site windows in accordance with the requirements of the U.S. Army Corps of Engineers Wetlands Delineation Manual and Interim Supplement (USACE, 1987, 2008). To determine the areas subject to Corps jurisdiction, three criteria were evaluated: (1) evidence of a hydrologic regime reflecting saturation or periodic inundation by surface or ground water of sufficient duration and frequency, (2) soils which are considered hydric by classification or field characteristics indicating anaerobic conditions, and (3) a prevalence of vegetation typically adapted to areas of wetland hydrology and soils.

At four sample points within the pasture the three wetland criteria were evaluated. Dominant individual plant species were identified, and their wetland indicator status was assessed (USFWS, 1988). Evidence of the hydrologic regime was collected and evaluated. Soil test pits were dug using a core auger to at least 20 inches. Soil horizons were inspected and described using texture, soil color (Munsell, 1992), and moisture.

Two soils map units are found in the area of the proposed drill sites. According to the Soil Survey of Weld County, Southern Part, aquoll and aquept soils (map unit 4) are located within and immediately adjacent to the broad swale. This map unit is found within depressions in smooth plains and along the bottoms of natural drainageways throughout Weld County. They are deep, poorly drained soils that have formed in recent alluvium. Aquolls have a dark colored surface layer and make up about 55 percent of the unit. Aquepts, which make up about 25 percent of the soil unit, have a lighter colored surface layer. Surface layers are often yellowish brown silty clay, underlain by silty clay. About 20 percent are soils that are well drained and soils that have sandstone or shale within 48 inches of the surface. Aquoll and aquept soils are defined by the U.S. Army Corps of Engineers as hydric. On-site observation of soils at sample points 001, 002, and 004 within the swale of the project area confirmed the presence of this map unit.

The soil map unit above the perimeters of the broad swale consists of Valent sand (map unit 70) (USDA, 1980). This map unit is a deep, excessively drained soil formed in aeolian deposits on the plains. Typically, the surface layer of Valent soil is brown sand about six inches thick. The underlying material is brown sand to sixty inches. This soil unit is not defined as a hydric soil by the U.S. Army Corps of Engineers Wetlands Delineation Manual (USACE, 1987). Sample point 003 contained soil similar in character to the Valent sand, yet still exhibiting some transitional characteristics of the adjacent aquoll and aquept soils.

Vegetation within the project area was dominated by inland saltgrass, meadow foxtail, three-square, and clover. The first three species are considered indicative of hydrophytic or wetland conditions (Figure 2). Vegetation immediately adjacent to the swale, and outside the influence of seasonal ground and surface water, contained a mix of inland saltgrass and mesic and xeric pasture species including western wheatgrass and Rocky Mountain beeplant.

RESULTS/CONCLUSION

Savage and Savage conducted a wetland delineation within the area proposed for drilling the Boulder G14-19 and G14-29 wells for Noble Energy Production, Inc. on August 9, 2010. This delineation was conducted in order to determine the presence and extent of wetlands in and adjacent to the proposed drill sites, access road, and any ancillary sites.

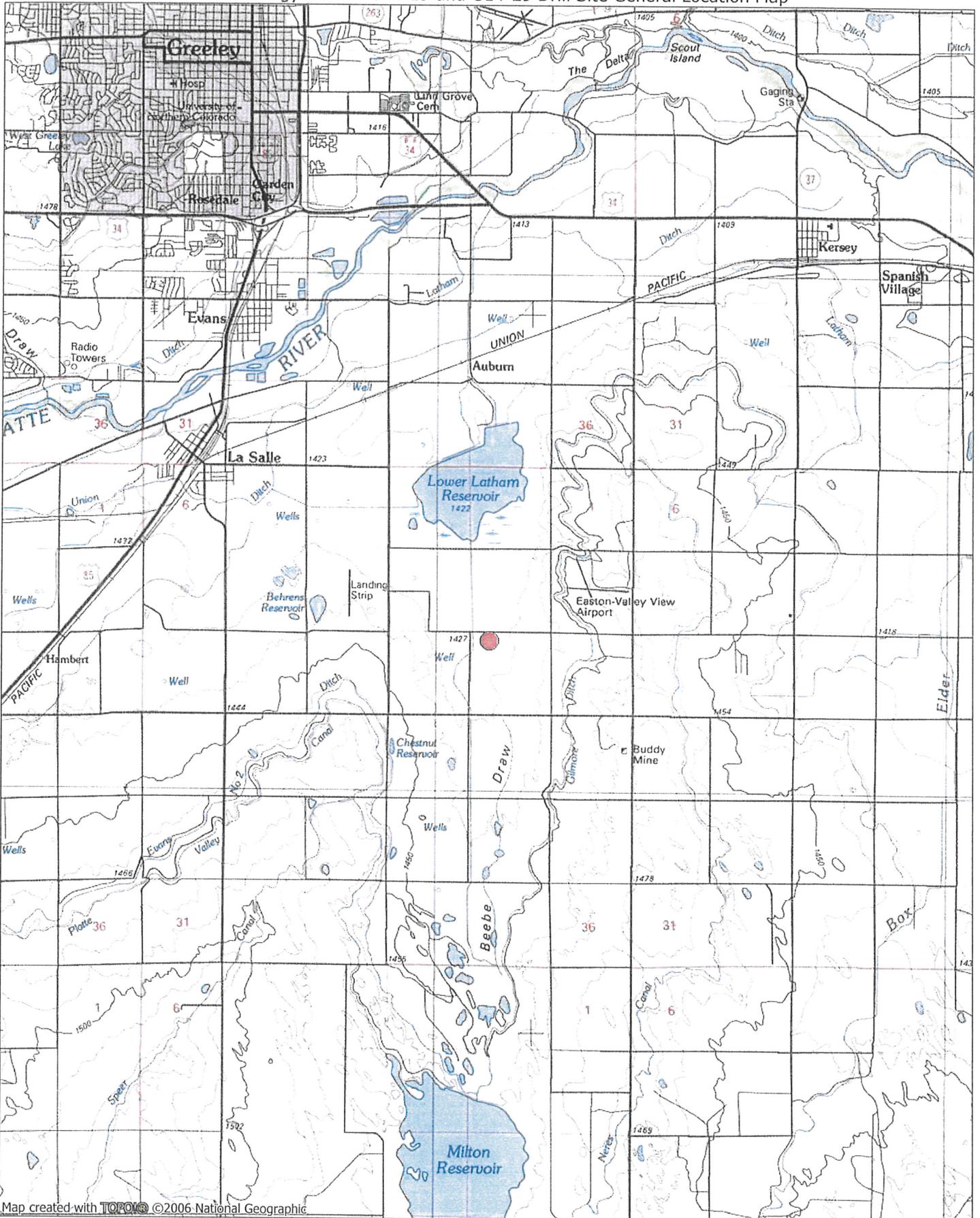
The entire broad swale was determined to contain wetlands extending to and slightly up the slopes at the perimeter of the broad swale. Except for areas where the topography was elevated by at least 0.75 feet (predominantly the east and south perimeters of the pasture, and a small area immediately south of Weld County Road 46 in the center of the project area), the project site was concluded to be wetlands as defined by the Corps of Engineers. The proposed locations for the drill sites were within the boundaries of wetlands. The project boundaries of the wetlands are identified on Figure 3.

LITERATURE CITED

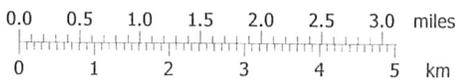
- Killmorgen Instruments Corp. 1992. Munsell® Soil Color Charts. Newburg, NW.
- Munshower, Frank F. 1991. Perennial Grasses for Revegetation of Disturbed Lands in the Northern Great Plains and the Intermountain Region. Reclamation Research Unit, Montana State University, Bozeman, Montana.
- U.S. Army Corps of Engineers. 1987. Corps of Engineers Wetlands Delineation Manual. Technical Report Y-87-1. Department of the Army, Waterways Experiment Station, Vicksburg, Mississippi.
- U.S. Army Corps of Engineers. 2008. Interim Regional Supplement to the Corps of Engineers Wetland Delineation Manual: Great Plains Region, ed. J.S. Wakeley, R.W. Lichvar, and C.V. Noble, ERDC/EL TR-08-12. Vicksburg, MS: U.S. Army Engineer Research and Development Center.
- U.S. Department of Agriculture Soil Conservation Service. 1980. Soil Survey of Weld County, Colorado, Southern Part.
- U.S. Fish and Wildlife Service. 1988. National List of Plant Species that Occur in Wetlands: Central Plains (Region 5). U.S. Department of Interior, Fish and Wildlife Service Research and Project, Biological Report 88(26.5), Washington, D.C.

FIGURES

Noble Energy Boulder G14-19 and G14-29 Drill Site General Location Map



Map created with TOPOIG ©2006 National Geographic

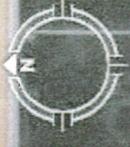


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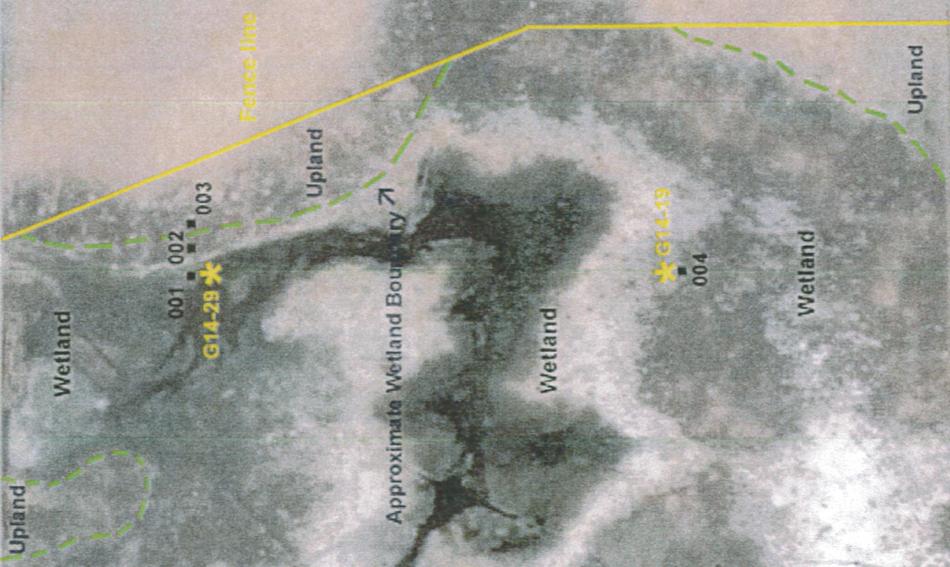


Figure 2. – Sample Point 004 - Looking South



Co. R. 146

© 2007 Google



Noble Energy Boulder G14-19 and G14-29 Drill Sites Wetland Delineation

© 2010 Google
 Data SIO, NOAA, U.S. Navy, NGA, GEBCO
 Image © 2010 DigitalGlobe



APPENDIX

WETLAND DETERMINATION DATA FORM – Great Plains Region

Project/Site: BOULDER G14-29, G14-19 City/County: WELD Sampling Date: AUG 9, 2010
 Applicant/Owner: NORVE ENERGY State: CO Sampling Point: 001
 Investigator(s): US SAVAGE / E.A SAVAGE Section, Township, Range: S14, T4N, R65W
 Landform (hillslope, terrace, etc.): BROAD SWALE Local relief (concave, convex, none): _____ Slope (%): < 1%
 Subregion (LRR): _____ Lat: 40.3185° Long: -104.635° Datum: _____
 Soil Map Unit Name: AQUOLLS & AQULEPTS, FLOODED NWI classification: HYDRIC
 Are climatic / hydrologic conditions on the site typical for this time of year? Yes No _____ (If no, explain in Remarks.)
 Are Vegetation _____, Soil _____, or Hydrology _____ significantly disturbed? Are "Normal Circumstances" present? Yes No _____
 Are Vegetation _____, Soil _____, or Hydrology _____ naturally problematic? (If needed, explain any answers in Remarks.)

SUMMARY OF FINDINGS – Attach site map showing sampling point locations, transects, important features, etc.

Hydrophytic Vegetation Present? Yes <input checked="" type="checkbox"/> No _____	Is the Sampled Area within a Wetland? Yes <input checked="" type="checkbox"/> No _____
Hydric Soil Present? Yes <input checked="" type="checkbox"/> No _____	
Welland Hydrology Present? Yes <input checked="" type="checkbox"/> No _____	

Remarks: 150' SOUTH OF E-W BOUNDARY FENCE (CRAG)
72' WEST OF N-S BOUNDARY FENCE
LOCATED AT EDGE OF SWALE BOTTOM AND EDGE OF VEGETATION CHANGE

VEGETATION – Use scientific names of plants.

Tree Stratum (Plot size: <u>N/A</u>)	Absolute % Cover	Dominant Species?	Indicator Status	Dominance Test worksheet:	
1. _____				Number of Dominant Species That Are OBL, FACW, or FAC (excluding FAC-): <u>3</u> (A)	
2. _____				Total Number of Dominant Species Across All Strata: <u>4</u> (B)	
3. _____				Percent of Dominant Species That Are OBL, FACW, or FAC: <u>75%</u> (A/B)	
4. _____				Prevalence Index worksheet:	
= Total Cover				Total % Cover of:	
Sapling/Shrub Stratum (Plot size: <u>N/A</u>)				OBL species	<u>15</u> x 1 = <u>15</u>
1. _____				FACW species	<u>1</u> x 2 = <u>2</u>
2. _____				FAC species	<u>30</u> x 3 = <u>90</u>
3. _____				FACU species	<u>20</u> x 4 = <u>80</u>
4. _____				UPL species	_____ x 5 = _____
5. _____				Column Totals:	<u>67</u> (A) <u>187</u> (B)
= Total Cover				Prevalence Index = B/A = <u>187/67 = 2.8</u>	
Herb Stratum (Plot size: <u>10' X 10'</u>)				Hydrophytic Vegetation Indicators:	
1. <u>Scirpus americana</u>	<u>15</u>	<u>Y</u>	<u>OBL</u>	<input checked="" type="checkbox"/> Dominance Test is >50%	
2. <u>Distichlis spicata</u>	<u>20</u>	<u>Y</u>	<u>NI(FAC)</u>	<input checked="" type="checkbox"/> Prevalence Index is ≤3.0 ¹	
3. <u>Plantago major</u>	<u>10</u>	<u>Y</u>	<u>FAC</u>	____ Morphological Adaptations ¹ (Provide supporting data in Remarks or on a separate sheet)	
4. <u>Trifolium repens</u>	<u>20</u>	<u>Y</u>	<u>FACU</u>	____ Problematic Hydrophytic Vegetation ¹ (Explain)	
5. <u>Hordeum jubatum</u>	<u>< 1%</u>	<u>N</u>	<u>FACW</u>		
6. _____					
7. _____					
8. _____					
9. _____					
10. _____					
= Total Cover				¹ Indicators of hydric soil and welland hydrology must be present, unless disturbed or problematic.	
Woody Vine Stratum (Plot size: <u>N/A</u>)				Hydrophytic Vegetation Present? Yes <input checked="" type="checkbox"/> No _____	
1. _____					
2. _____					
= Total Cover					
% Bare Ground in Herb Stratum <u>20</u>					
Remarks: <u>SWALE PASTURE, GRAZED ACTIVELY</u>					

SOIL

Sampling Point: 001

Profile Description: (Describe to the depth needed to document the indicator or confirm the absence of indicators.)

Depth (inches)	Matrix		Redox Features			Texture	Remarks
	Color (moist)	%	Color (moist)	%	Type ¹		
0-10"	5YR 3/1	98	N/A			CLAY WAXY	
10-22x"	2.5Y 4/1	95	5YR 5/6	5%	MOTTLE	CLAY	

¹Type: C=Concentration, D=Depletion, RM=Reduced Matrix, CS=Covered or Coated Sand Grains. ²Location: PL=Pore Lining, M=Matrix.

Hydric Soil Indicators: (Applicable to all LRRs, unless otherwise noted.)

<input type="checkbox"/> Histosol (A1)	<input type="checkbox"/> Sandy Gleyed Matrix (S4)	<input type="checkbox"/> 1 cm Muck (A9) (LRR I, J)
<input type="checkbox"/> Histic Epipedon (A2)	<input type="checkbox"/> Sandy Redox (S5)	<input type="checkbox"/> Coast Prairie Redox (A16) (LRR F, G, H)
<input type="checkbox"/> Black Histic (A3)	<input type="checkbox"/> Stripped Matrix (S6)	<input type="checkbox"/> Dark Surface (S7) (LRR G)
<input type="checkbox"/> Hydrogen Sulfide (A4)	<input type="checkbox"/> Loamy Mucky Mineral (F1)	<input type="checkbox"/> High Plains Depressions (F16)
<input type="checkbox"/> Strallified Layers (A5) (LRR F)	<input checked="" type="checkbox"/> Loamy Gleyed Matrix (F2)	(LRR H outside of MLRA 72 & 73)
<input type="checkbox"/> 1 cm Muck (A9) (LRR F, G, H)	<input type="checkbox"/> Depleted Matrix (F3)	<input type="checkbox"/> Reduced Vertic (F18)
<input type="checkbox"/> Depleted Below Dark Surface (A11)	<input type="checkbox"/> Redox Dark Surface (F6)	<input type="checkbox"/> Red Parent Material (TF2)
<input type="checkbox"/> Thick Dark Surface (A12)	<input type="checkbox"/> Depleted Dark Surface (F7)	<input type="checkbox"/> Other (Explain in Remarks)
<input type="checkbox"/> Sandy Mucky Mineral (S1)	<input type="checkbox"/> Redox Depressions (F8)	³ Indicators of hydrophytic vegetation and wetland hydrology must be present, unless disturbed or problematic.
<input type="checkbox"/> 2.5 cm Mucky Peat or Peat (S2) (LRR G, H)	<input type="checkbox"/> High Plains Depressions (F16)	
<input type="checkbox"/> 5 cm Mucky Peat or Peat (S3) (LRR F)	(MLRA 72 & 73 of LRR H)	

Restrictive Layer (if present):
 Type: _____
 Depth (inches): _____

Hydric Soil Present? Yes No

Remarks:

HYDROLOGY

Wetland Hydrology Indicators:

Primary Indicators (minimum of one required; check all that apply)

<input type="checkbox"/> Surface Water (A1)	<input checked="" type="checkbox"/> Salt Crust (B11)	<input type="checkbox"/> Secondary Indicators (minimum of two required)
<input type="checkbox"/> High Water Table (A2)	<input type="checkbox"/> Aquatic Invertebrates (B13)	<input checked="" type="checkbox"/> Surface Soil Cracks (B6)
<input checked="" type="checkbox"/> Saturation (A3)	<input type="checkbox"/> Hydrogen Sulfide Odor (C1)	<input type="checkbox"/> Sparsely Vegetated Concave Surface (B8)
<input type="checkbox"/> Water Marks (B1)	<input type="checkbox"/> Dry-Season Water Table (C2)	<input checked="" type="checkbox"/> Drainage Patterns (B10)
<input type="checkbox"/> Sediment Deposits (B2)	<input type="checkbox"/> Oxidized Rhizospheres on Living Roots (C3)	<input type="checkbox"/> Oxidized Rhizospheres on Living Roots (C3)
<input type="checkbox"/> Drift Deposits (B3)	(where not tilled)	(where tilled)
<input type="checkbox"/> Algal Mat or Crust (B4)	<input type="checkbox"/> Presence of Reduced Iron (C4)	<input type="checkbox"/> Crayfish Burrows (C8)
<input type="checkbox"/> Iron Deposits (B5)	<input type="checkbox"/> Thin Muck Surface (C7)	<input type="checkbox"/> Saturation Visible on Aerial Imagery (C9)
<input type="checkbox"/> Inundation Visible on Aerial Imagery (B7)	<input type="checkbox"/> Other (Explain in Remarks)	<input checked="" type="checkbox"/> Geomorphic Position (D2)
<input type="checkbox"/> Water-Stained Leaves (B9)		<input type="checkbox"/> FAC-Neutral Test (D5)
		<input type="checkbox"/> Frost-Heave Hummocks (D7) (LRR F)

Field Observations:

Surface Water Present?	Yes _____ No <input checked="" type="checkbox"/>	Depth (inches): _____	Wetland Hydrology Present? Yes <input checked="" type="checkbox"/> No _____
Water Table Present?	Yes _____ No <input checked="" type="checkbox"/>	Depth (inches): _____	
Saturation Present? (Includes capillary fringe)	Yes _____ No <input checked="" type="checkbox"/>	Depth (inches): _____	

Describe Recorded Data (stream gauge, monitoring well, aerial photos, previous inspections), if available:

Remarks:

WETLAND DETERMINATION DATA FORM – Great Plains Region

Project/Site: BOULDER G14-29, G14-19 City/County: WELD Sampling Date: 002
 Applicant/Owner: NOBLE ENERGY State: CO Sampling Point: AUG 9, 2010
 Investigator(s): MS SAVAGE / E A SAVAGE Section, Township, Range: S14, T4N, R65W
 Landform (hillslope, terrace, etc.): BROAD SWALE EDGE Local relief (concave, convex, none): _____ Slope (%): < 1%
 Subregion (LRR): _____ Lat: 40.3185° Long: -104.635° Datum: _____
 Soil Map Unit Name: AQUOUS & AQUPTS, FLOODPT NWI classification: HYDRIC
 Are climatic / hydrologic conditions on the site typical for this time of year? Yes No _____ (If no, explain in Remarks.)
 Are Vegetation _____, Soil _____, or Hydrology _____ significantly disturbed? Are "Normal Circumstances" present? Yes No _____
 Are Vegetation _____, Soil _____, or Hydrology _____ naturally problematic? (If needed, explain any answers in Remarks.)

SUMMARY OF FINDINGS – Attach site map showing sampling point locations, transects, important features, etc.

Hydrophytic Vegetation Present? Yes <input checked="" type="checkbox"/> No _____ Hydric Soil Present? Yes <input checked="" type="checkbox"/> No _____ Wetland Hydrology Present? Yes <input checked="" type="checkbox"/> No _____	Is the Sampled Area within a Wetland? Yes <input checked="" type="checkbox"/> No _____
Remarks: <u>150'S OF E-W FENCE</u> <u>50' W OF N-S FENCE</u> <u>TRANSITIONAL AREA BTW WETLAND / UPLAND</u>	

VEGETATION – Use scientific names of plants.

Tree Stratum (Plot size: <u>N/A</u>)	Absolute % Cover	Dominant Species?	Indicator Status	Dominance Test worksheet:
1. _____	_____	_____	_____	Number of Dominant Species That Are OBL, FACW, or FAC (excluding FAC-): <u>2</u> (A) Total Number of Dominant Species Across All Strata: <u>3</u> (B) Percent of Dominant Species That Are OBL, FACW, or FAC: <u>67%</u> (A/B)
2. _____	_____	_____	_____	
3. _____	_____	_____	_____	
4. _____	_____	_____	_____	
_____ = Total Cover				Prevalence Index worksheet: Total % Cover of: _____ Multiply by: _____ OBL species <u>0</u> x 1 = _____ FACW species <u>10</u> x 2 = <u>20</u> FAC species <u>30</u> x 3 = <u>90</u> FACU species <u>25</u> x 4 = <u>100</u> UPL species _____ x 5 = _____ Column Totals: <u>65</u> (A) <u>210</u> (B) Prevalence Index = B/A = <u>210/65 = 3.2</u>
Sapling/Shrub Stratum (Plot size: <u>N/A</u>) 1. _____ 2. _____ 3. _____ 4. _____ 5. _____ _____ = Total Cover				
Herb Stratum (Plot size: <u>10'x10'</u>) 1. <u>Distichlis spicata</u> <u>30</u> <u>Y</u> <u>NT(FAC)</u> 2. <u>Hordeum jubatum</u> <u>10</u> <u>Y</u> <u>FACW</u> 3. <u>Agropyron smithii</u> <u>25</u> <u>Y</u> <u>FACU</u> 4. _____ 5. _____ 6. _____ 7. _____ 8. _____ 9. _____ 10. _____ _____ = Total Cover				
Woody Vine Stratum (Plot size: <u>N/A</u>) 1. _____ 2. _____ _____ = Total Cover				
% Bare Ground In Herb Stratum <u>20</u> _____ = Total Cover				
Remarks: _____				

SOIL

Sampling Point: 002

Profile Description: (Describe to the depth needed to document the indicator or confirm the absence of indicators.)

Depth (inches)	Matrix		Redox Features				Texture	Remarks
	Color (moist)	%	Color (moist)	%	Type ¹	Loc ²		
0-12"	5YR 4/1	95	5YR 5/6	2	MOTTLES		LOAM	
12-21 1/2"	5YR 4/1	98	5YR 5/6	2	MOTTLES		CLAY LOAM	

¹Type: C=Concentration, D=Depletion, RM=Reduced Matrix, CS=Covered or Coated Sand Grains. ²Location: PL=Pore Lining, M=Matrix.

Hydric Soil Indicators: (Applicable to all LRRs, unless otherwise noted.)

<input type="checkbox"/> Histosol (A1)	<input type="checkbox"/> Sandy Gleyed Matrix (S4)	Indicators for Problematic Hydric Soils ³ :
<input type="checkbox"/> Histic Epipedon (A2)	<input type="checkbox"/> Sandy Redox (S5)	
<input type="checkbox"/> Black Histic (A3)	<input type="checkbox"/> Stripped Matrix (S6)	
<input type="checkbox"/> Hydrogen Sulfide (A4)	<input type="checkbox"/> Loamy Mucky Mineral (F1)	
<input type="checkbox"/> Stratified Layers (A5) (LRR F)	<input type="checkbox"/> Loamy Gleyed Matrix (F2)	
<input type="checkbox"/> 1 cm Muck (A9) (LRR F, G, H)	<input type="checkbox"/> Depleted Matrix (F3)	
<input type="checkbox"/> Depleted Below Dark Surface (A11)	<input type="checkbox"/> Redox Dark Surface (F6)	
<input type="checkbox"/> Thick Dark Surface (A12)	<input type="checkbox"/> Depleted Dark Surface (F7)	
<input type="checkbox"/> Sandy Mucky Mineral (S1)	<input type="checkbox"/> Redox Depressions (F8)	
<input type="checkbox"/> 2.5 cm Mucky Peat or Peat (S2) (LRR G, H)	<input type="checkbox"/> High Plains Depressions (F16)	
<input type="checkbox"/> 5 cm Mucky Peat or Peat (S3) (LRR F)	(MLRA 72 & 73 of LRR H)	

³Indicators of hydrophytic vegetation and wetland hydrology must be present, unless disturbed or problematic.

Restrictive Layer (if present):
 Type: _____
 Depth (inches): _____

Hydric Soil Present? Yes No

Remarks:

HYDROLOGY

Wetland Hydrology Indicators:

Primary Indicators (minimum of one required; check all that apply)		Secondary Indicators (minimum of two required)
<input type="checkbox"/> Surface Water (A1)	<input type="checkbox"/> Salt Crust (B11)	<input type="checkbox"/> Surface Soil Cracks (B6)
<input type="checkbox"/> High Water Table (A2)	<input type="checkbox"/> Aquatic Invertebrates (B13)	<input type="checkbox"/> Sparsely Vegetated Concave Surface (B8)
<input type="checkbox"/> Saturation (A3)	<input type="checkbox"/> Hydrogen Sulfide Odor (C1)	<input type="checkbox"/> Drainage Patterns (B10)
<input type="checkbox"/> Water Marks (B1)	<input type="checkbox"/> Dry-Season Water Table (C2)	<input type="checkbox"/> Oxidized Rhizospheres on Living Roots (C3) (where tilled)
<input type="checkbox"/> Sediment Deposits (B2)	<input type="checkbox"/> Oxidized Rhizospheres on Living Roots (C3) (where not tilled)	<input type="checkbox"/> Crayfish Burrows (C8)
<input type="checkbox"/> Drift Deposits (B3)	<input type="checkbox"/> Presence of Reduced Iron (C4)	<input type="checkbox"/> Saturation Visible on Aerial Imagery (C9)
<input type="checkbox"/> Algal Mat or Crust (B4)	<input type="checkbox"/> Thin Muck Surface (C7)	<input type="checkbox"/> Geomorphic Position (D2)
<input type="checkbox"/> Iron Deposits (B5)	<input checked="" type="checkbox"/> Other (Explain in Remarks)	<input type="checkbox"/> FAC-Neutral Test (D5)
<input type="checkbox"/> Inundation Visible on Aerial Imagery (B7)		<input type="checkbox"/> Frost-Heave Hummocks (D7) (LRR F)
<input type="checkbox"/> Water-Stained Leaves (B9)		

Field Observations:

Surface Water Present? Yes <input type="checkbox"/> No <input checked="" type="checkbox"/>	Depth (inches): _____	Wetland Hydrology Present? Yes <input checked="" type="checkbox"/> No <input type="checkbox"/>
Water Table Present? Yes <input type="checkbox"/> No <input checked="" type="checkbox"/>	Depth (inches): _____	
Saturation Present? (includes capillary fringe) Yes <input type="checkbox"/> No <input checked="" type="checkbox"/>	Depth (inches): _____	

Describe Recorded Data (stream gauge, monitoring well, aerial photos, previous inspections), if available:

Remarks: EVIDENCE OF HYDROLOGY DURING GROWING SEASON, BASED ON TOPOGRAPHIC POSITION,

WETLAND DETERMINATION DATA FORM – Great Plains Region

Project/Site: BOULDER G14-29, G14-19 City/County: WELD Sampling Date: AUG 9, 2010
 Applicant/Owner: NOBU ENERGY State: CO Sampling Point: 003
 Investigator(s): MS SAVAGE / EA SAVAGE Section, Township, Range: S14, T4N, R65W
 Landform (hillslope, terrace, etc.): BROAD SWALE VEGET Local relief (concave, convex, none): _____ Slope (%): < 1%
 Subregion (LRR): _____ Lat: 40.3185° Long: -104.635° Datum: _____
 Soil Map Unit Name: AQUOUS & AQUIC, FLOODED NWI classification: HYDRIC
 Are climatic / hydrologic conditions on the site typical for this time of year? Yes No _____ (If no, explain in Remarks.)
 Are Vegetation _____, Soil _____, or Hydrology _____ significantly disturbed? Are "Normal Circumstances" present? Yes No _____
 Are Vegetation _____, Soil _____, or Hydrology _____ naturally problematic? (If needed, explain any answers in Remarks.)

SUMMARY OF FINDINGS – Attach site map showing sampling point locations, transects, important features, etc.

Hydrophytic Vegetation Present? Yes <input checked="" type="checkbox"/> No _____ Hydric Soil Present? Yes _____ No <input checked="" type="checkbox"/> Wetland Hydrology Present? Yes _____ No <input checked="" type="checkbox"/>	Is the Sampled Area within a Wetland? Yes _____ No <input checked="" type="checkbox"/>
Remarks: <u>30' WEST OF N-S FENCE</u> <u>150' SOUTH OF E-W FENCE</u> <u>ABOVE SWALE BOTTOM</u>	

VEGETATION – Use scientific names of plants.

Tree Stratum (Plot size: <u>N/A</u>)	Absolute % Cover	Dominant Species?	Indicator Status	Dominance Test worksheet:														
1. _____	_____	_____	_____	Number of Dominant Species That Are OBL, FACW, or FAC (excluding FAC-): <u>2</u> (A) Total Number of Dominant Species Across All Strata: <u>3</u> (B) Percent of Dominant Species That Are OBL, FACW, or FAC: <u>67</u> (A/B)														
2. _____	_____	_____	_____															
3. _____	_____	_____	_____															
4. _____	_____	_____	_____															
_____ = Total Cover				Prevalence Index worksheet: <table style="width:100%; border-collapse: collapse;"> <tr> <td style="width:50%;">Total % Cover of:</td> <td style="width:50%;">Multiply by:</td> </tr> <tr> <td>OBL species <u>0</u></td> <td>x 1 = _____</td> </tr> <tr> <td>FACW species <u>10</u></td> <td>x 2 = <u>20</u></td> </tr> <tr> <td>FAC species <u>35</u></td> <td>x 3 = <u>105</u></td> </tr> <tr> <td>FACU species <u>20</u></td> <td>x 4 = <u>80</u></td> </tr> <tr> <td>UPL species _____</td> <td>x 5 = _____</td> </tr> <tr> <td>Column Totals: <u>65</u> (A)</td> <td><u>205</u> (B)</td> </tr> </table> Prevalence Index = B/A = <u>205/65 = 3.1</u>	Total % Cover of:	Multiply by:	OBL species <u>0</u>	x 1 = _____	FACW species <u>10</u>	x 2 = <u>20</u>	FAC species <u>35</u>	x 3 = <u>105</u>	FACU species <u>20</u>	x 4 = <u>80</u>	UPL species _____	x 5 = _____	Column Totals: <u>65</u> (A)	<u>205</u> (B)
Total % Cover of:	Multiply by:																	
OBL species <u>0</u>	x 1 = _____																	
FACW species <u>10</u>	x 2 = <u>20</u>																	
FAC species <u>35</u>	x 3 = <u>105</u>																	
FACU species <u>20</u>	x 4 = <u>80</u>																	
UPL species _____	x 5 = _____																	
Column Totals: <u>65</u> (A)	<u>205</u> (B)																	
Sapling/Shrub Stratum (Plot size: <u>N/A</u>)																		
1. _____	_____	_____	_____															
2. _____	_____	_____	_____															
3. _____	_____	_____	_____															
4. _____	_____	_____	_____															
_____ = Total Cover																		
Herb Stratum (Plot size: <u>10'x10'</u>)																		
1. <u>Distichlis spicata</u>	<u>35</u>	<u>Y</u>	<u>NI(FAC)</u>															
2. <u>Hordeum jubatum</u>	<u>10</u>	<u>Y</u>	<u>FACW</u>															
3. <u>Apocynon smithii</u>	<u>20</u>	<u>Y</u>	<u>FACU</u>															
4. _____	_____	_____	_____															
5. _____	_____	_____	_____															
6. _____	_____	_____	_____															
7. _____	_____	_____	_____															
8. _____	_____	_____	_____															
9. _____	_____	_____	_____															
10. _____	_____	_____	_____															
<u>65</u> = Total Cover																		
Woody Vine Stratum (Plot size: <u>N/A</u>)																		
1. _____	_____	_____	_____															
2. _____	_____	_____	_____															
_____ = Total Cover																		
% Bare Ground in Herb Stratum <u>20</u>																		
Remarks: _____																		
Hydrophytic Vegetation Present? Yes <input checked="" type="checkbox"/> No _____																		

SOIL

Sampling Point: 003

Profile Description: (Describe to the depth needed to document the indicator or confirm the absence of indicators.)

Depth (inches)	Matrix		Redox Features			Texture	Remarks
	Color (moist)	%	Color (moist)	%	Type ¹		
0-3"	5YR 3/1	98	NONE			LOAM	
3-8"	5YR 4/1	98	NONE			LOAM	
8-20"	5YR 4/1	98%	NONE			CLAY LOAM	

¹Type: C=Concentration, D=Depletion, RM=Reduced Matrix, CS=Covered or Coated Sand Grains. ²Location: PL=Pore Lining, M=Matrix.

Hydric Soil Indicators: (Applicable to all LRRs, unless otherwise noted.)

<input type="checkbox"/> Histosol (A1)	<input type="checkbox"/> Sandy Gleyed Matrix (S4)	<input type="checkbox"/> 1 cm Muck (A9) (LRR I, J)
<input type="checkbox"/> Histic Epipedon (A2)	<input type="checkbox"/> Sandy Redox (S5)	<input type="checkbox"/> Coast Prairie Redox (A16) (LRR F, G, H)
<input type="checkbox"/> Black Histic (A3)	<input type="checkbox"/> Stripped Matrix (S6)	<input type="checkbox"/> Dark Surface (S7) (LRR G)
<input type="checkbox"/> Hydrogen Sulfide (A4)	<input type="checkbox"/> Loamy Mucky Mineral (F1)	<input type="checkbox"/> High Plains Depressions (F16)
<input type="checkbox"/> Strallified Layers (A5) (LRR F)	<input type="checkbox"/> Loamy Gleyed Matrix (F2)	<input type="checkbox"/> (LRR H outside of MLRA 72 & 73)
<input type="checkbox"/> 1 cm Muck (A9) (LRR F, G, H)	<input type="checkbox"/> Depleted Matrix (F3)	<input type="checkbox"/> Reduced Vertic (F18)
<input type="checkbox"/> Depleted Below Dark Surface (A11)	<input type="checkbox"/> Redox Dark Surface (F6)	<input type="checkbox"/> Red Parent Material (TF2)
<input type="checkbox"/> Thick Dark Surface (A12)	<input type="checkbox"/> Depleted Dark Surface (F7)	<input type="checkbox"/> Other (Explain in Remarks)
<input type="checkbox"/> Sandy Mucky Mineral (S1)	<input type="checkbox"/> Redox Depressions (F8)	³ Indicators of hydrophytic vegetation and wetland hydrology must be present, unless disturbed or problematic.
<input type="checkbox"/> 2.5 cm Mucky Peat or Peat (S2) (LRR G, H)	<input type="checkbox"/> High Plains Depressions (F16)	
<input type="checkbox"/> 5 cm Mucky Peat or Peat (S3) (LRR F)	<input type="checkbox"/> (MLRA 72 & 73 of LRR H)	

Restrictive Layer (if present):
 Type: _____
 Depth (inches): _____

Hydric Soil Present? Yes _____ No

Remarks: **TRANSITIONAL BUT INSUFFICIENT HYDRIC SOIL INDICATORS TO CLASSIFY AS WETLAND SOIL**

HYDROLOGY

Wetland Hydrology Indicators:

Primary Indicators (minimum of one required; check all that apply) NONE

<input type="checkbox"/> Surface Water (A1)	<input type="checkbox"/> Salt Crust (B11)	<input type="checkbox"/> Surface Soil Cracks (B6)
<input type="checkbox"/> High Water Table (A2)	<input type="checkbox"/> Aquatic Invertebrates (B13)	<input type="checkbox"/> Sparsely Vegetated Concave Surface (B8)
<input type="checkbox"/> Saturation (A3)	<input type="checkbox"/> Hydrogen Sulfide Odor (C1)	<input type="checkbox"/> Drainage Patterns (B10)
<input type="checkbox"/> Water Marks (B1)	<input type="checkbox"/> Dry-Season Water Table (C2)	<input type="checkbox"/> Oxidized Rhizospheres on Living Roots (C3)
<input type="checkbox"/> Sediment Deposits (B2)	<input type="checkbox"/> Oxidized Rhizospheres on Living Roots (C3)	<input type="checkbox"/> (where tilled)
<input type="checkbox"/> Drift Deposits (B3)	<input type="checkbox"/> (where not tilled)	<input type="checkbox"/> Crayfish Burrows (C8)
<input type="checkbox"/> Algal Mat or Crust (B4)	<input type="checkbox"/> Presence of Reduced Iron (C4)	<input type="checkbox"/> Saturation Visible on Aerial Imagery (C9)
<input type="checkbox"/> Iron Deposits (B5)	<input type="checkbox"/> Thin Muck Surface (C7)	<input type="checkbox"/> Geomorphic Position (D2)
<input type="checkbox"/> Inundation Visible on Aerial Imagery (B7)	<input type="checkbox"/> Other (Explain in Remarks)	<input type="checkbox"/> FAC-Neutral Test (D5)
<input type="checkbox"/> Water-Stained Leaves (B9)		<input type="checkbox"/> Frost-Heave Hummocks (D7) (LRR F)

Field Observations:

Surface Water Present? Yes _____ No <input checked="" type="checkbox"/>	Depth (inches): _____	Wetland Hydrology Present? Yes _____ No <input checked="" type="checkbox"/>
Water Table Present? Yes _____ No <input checked="" type="checkbox"/>	Depth (inches): _____	
Saturation Present? (includes capillary fringe) Yes _____ No <input checked="" type="checkbox"/>	Depth (inches): _____	

Describe Recorded Data (stream gauge, monitoring well, aerial photos, previous inspections), if available:

Remarks:

WETLAND DETERMINATION DATA FORM – Great Plains Region

Project/Site: BOULDER G14-19, G14-29 City/County: WELD Sampling Date: AUG 9, 2010
 Applicant/Owner: NOBVE ENERGY State: CO Sampling Point: 004
 Investigator(s): M. SAVAGE / E.A. SAVAGE Section, Township, Range: S14, TAN, R65W
 Landform (hillslope, terrace, etc.): TO EAST SIDE OF SWALE Local relief (concave, convex, none): _____ Slope (%): 1%
 Subregion (LRR): _____ Lat: 40.3185° Long: -104.635° Datum: _____
 Soil Map Unit Name: AQUOLIS & AQULEPTS, FLOODED NWI classification: HYDRIC
 Are climatic / hydrologic conditions on the site typical for this time of year? Yes No _____ (If no, explain in Remarks.)
 Are Vegetation _____, Soil _____, or Hydrology _____ significantly disturbed? Are "Normal Circumstances" present? Yes No _____
 Are Vegetation _____, Soil _____, or Hydrology _____ naturally problematic? (If needed, explain any answers in Remarks.)

SUMMARY OF FINDINGS – Attach site map showing sampling point locations, transects, important features, etc.

Hydrophytic Vegetation Present? Yes <input checked="" type="checkbox"/> No _____ Hydric Soil Present? Yes <input checked="" type="checkbox"/> No _____ Welland Hydrology Present? Yes <input checked="" type="checkbox"/> No _____	Is the Sampled Area within a Wetland? Yes <input checked="" type="checkbox"/> No _____
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Remarks: TOPOGRAPHIC BROAD SWALE BELOW IRRIGATED FIELDS. SAMPLE POINT @ PROPOSED DRILLING LOCATION

VEGETATION – Use scientific names of plants.

Tree Stratum (Plot size: <u>N/A</u>)	Absolute % Cover	Dominant Species?	Indicator Status	Dominance Test worksheet:
1. _____	_____	_____	_____	Number of Dominant Species That Are OBL, FACW, or FAC (excluding FAC-): <u>2</u> (A) Total Number of Dominant Species Across All Strata: <u>2</u> (B) Percent of Dominant Species That Are OBL, FACW, or FAC: <u>100%</u> (A/B)
2. _____	_____	_____	_____	
3. _____	_____	_____	_____	
4. _____	_____	_____	_____	
_____ = Total Cover				Prevalence Index worksheet: Total % Cover of: _____ Multiply by: _____ OBL species _____ x 1 = _____ FACW species _____ x 2 = _____ FAC species _____ x 3 = _____ FACU species _____ x 4 = _____ UPL species _____ x 5 = _____ Column Totals: _____ (A) _____ (B) Prevalence Index = B/A = _____
Sapling/Shrub Stratum (Plot size: <u>N/A</u>)				
1. _____	_____	_____	_____	
2. _____	_____	_____	_____	
3. _____	_____	_____	_____	
_____ = Total Cover				
Herb Stratum (Plot size: <u>10' x 10'</u>)				
1. <u>Scirpus americana</u>	<u>25</u>	<u>Y</u>	<u>OBL</u>	
2. <u>Distichlis spicata</u>	<u>35</u>	<u>Y</u>	<u>UPL(FAC)</u>	
3. <u>Urb. Arb</u>	<u>10</u>	<u>N</u>	<u>FAC</u>	
4. _____	_____	_____	_____	
5. _____	_____	_____	_____	
6. _____	_____	_____	_____	
7. _____	_____	_____	_____	
8. _____	_____	_____	_____	
9. _____	_____	_____	_____	
10. _____	_____	_____	_____	
<u>70</u> = Total Cover				
Woody Vine Stratum (Plot size: <u>N/A</u>)				
1. _____	_____	_____	_____	
2. _____	_____	_____	_____	
_____ = Total Cover				
% Bare Ground in Herb Stratum <u>15</u>				
_____ = Total Cover				

Hydrophytic Vegetation Indicators:
 Dominance Test is >50%
 Prevalence Index is ≤3.0¹
 Morphological Adaptations¹ (Provide supporting data in Remarks or on a separate sheet)
 Problematic Hydrophytic Vegetation¹ (Explain)

¹Indicators of hydric soil and wetland hydrology must be present, unless disturbed or problematic.

Hydrophytic Vegetation Present? Yes No _____

Remarks:

SOIL

Sampling Point: 004

Profile Description: (Describe to the depth needed to document the indicator or confirm the absence of indicators.)

Depth (inches)	Matrix		Redox Features				Texture	Remarks
	Color (moist)	%	Color (moist)	%	Type ¹	Loc ²		
0-3"	2.5/N	98	NONE				SANDY CLAY	MOIST
3-20"	2YR 3/2	95	5YR 5R	2			SANDY LOAM	MOIST → SATURATED

¹Type: C=Concentration, D=Depletion, RM=Reduced Matrix, CS=Covered or Coated Sand Grains. ²Location: PL=Pore Lining, M=Matrix.

Hydric Soil Indicators: (Applicable to all LRRs, unless otherwise noted.) <input type="checkbox"/> Histosol (A1) <input type="checkbox"/> Histic Epipedon (A2) <input type="checkbox"/> Black Histic (A3) <input type="checkbox"/> Hydrogen Sulfide (A4) <input type="checkbox"/> Stratified Layers (A5) (LRR F) <input type="checkbox"/> 1 cm Muck (A9) (LRR F, G, H) <input type="checkbox"/> Depleted Below Dark Surface (A11) <input type="checkbox"/> Thick Dark Surface (A12) <input type="checkbox"/> Sandy Mucky Mineral (S1) <input type="checkbox"/> 2.5 cm Mucky Peat or Peat (S2) (LRR G, H) <input type="checkbox"/> 5 cm Mucky Peat or Peat (S3) (LRR F)		<input checked="" type="checkbox"/> Sandy Gleyed Matrix (S4) <input type="checkbox"/> Sandy Redox (S5) <input type="checkbox"/> Stripped Matrix (S6) <input type="checkbox"/> Loamy Mucky Mineral (F1) <input checked="" type="checkbox"/> Loamy Gleyed Matrix (F2) <input type="checkbox"/> Depleted Matrix (F3) <input type="checkbox"/> Redox Dark Surface (F6) <input type="checkbox"/> Depleted Dark Surface (F7) <input type="checkbox"/> Redox Depressions (F8) <input type="checkbox"/> High Plains Depressions (F16) (MLRA 72 & 73 of LRR H)	Indicators for Problematic Hydric Soils³: <input type="checkbox"/> 1 cm Muck (A9) (LRR I, J) <input type="checkbox"/> Coast Prairie Redox (A16) (LRR F, G, H) <input type="checkbox"/> Dark Surface (S7) (LRR G) <input type="checkbox"/> High Plains Depressions (F16) (LRR H outside of MLRA 72 & 73) <input type="checkbox"/> Reduced Vertic (F18) <input type="checkbox"/> Red Parent Material (TF2) <input type="checkbox"/> Other (Explain in Remarks)
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Restrictive Layer (if present):
 Type: _____
 Depth (inches): _____

Hydric Soil Present? Yes No

Remarks:

HYDROLOGY

Wetland Hydrology Indicators:

Primary Indicators (minimum of one required; check all that apply) <input type="checkbox"/> Surface Water (A1) <input type="checkbox"/> High Water Table (A2) <input checked="" type="checkbox"/> Saturation (A3) <input type="checkbox"/> Water Marks (B1) <input type="checkbox"/> Sediment Deposits (B2) <input type="checkbox"/> Drift Deposits (B3) <input type="checkbox"/> Algal Mat or Crust (B4) <input type="checkbox"/> Iron Deposits (B5) <input type="checkbox"/> Inundation Visible on Aerial Imagery (B7) <input type="checkbox"/> Water-Stained Leaves (B9)		<input type="checkbox"/> Salt Crust (B11) <input type="checkbox"/> Aquatic Invertebrates (B13) <input type="checkbox"/> Hydrogen Sulfide Odor (C1) <input type="checkbox"/> Dry-Season Water Table (C2) <input type="checkbox"/> Oxidized Rhizospheres on Living Roots (C3) (where not tilled) <input type="checkbox"/> Presence of Reduced Iron (C4) <input type="checkbox"/> Thin Muck Surface (C7) <input type="checkbox"/> Other (Explain in Remarks)	Secondary Indicators (minimum of two required) <input type="checkbox"/> Surface Soil Cracks (B6) <input type="checkbox"/> Sparsely Vegetated Concave Surface (B8) <input type="checkbox"/> Drainage Patterns (B10) <input type="checkbox"/> Oxidized Rhizospheres on Living Roots (C3) (where tilled) <input type="checkbox"/> Crayfish Burrows (C8) <input type="checkbox"/> Saturation Visible on Aerial Imagery (C9) <input type="checkbox"/> Geomorphic Position (D2) <input type="checkbox"/> FAC-Neutral Test (D5) <input type="checkbox"/> Frost-Heave Hummocks (D7) (LRR F)
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Field Observations:

Surface Water Present? Yes No Depth (inches): _____

Water Table Present? Yes No Depth (inches): _____

Saturation Present? Yes No Depth (inches): 15"

Wetland Hydrology Present? Yes No

Describe Recorded Data (stream gauge, monitoring well, aerial photos, previous inspections), if available:

Remarks: