

**NOBLE ENERGY, INC.  
HOWARD A27-17 DRILL PAD  
WATERS OF THE UNITED STATES IDENTIFICATION  
AND WETLAND DELINEATION  
WELD COUNTY, COLORADO**



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### FIGURES

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U.S. Army Corps of Engineers Great Plains – Interim Version Data Sheets

## INTRODUCTION

Savage and Savage conducted a wetland delineation for the proposed Howard A27-17 well site for Noble Energy, Inc. on October 29, 2010. The proposed well site is located southwest of the intersection of Weld County Roads 66 and 57 in Weld County, Colorado (Figure 1.). From Lucerne, the site is accessed by traveling east on State Highway 392 for approximately 9.0 miles to Weld County Road 57, south on Weld County Road for approximately 1.20 miles, then west onto an undeveloped road (turn at mail box #31635, County Road 57) that is situated between homesteads for approximately 0.18 miles to the site. The latitude of the project site is 40.4613 degrees North and longitude is 104.5298 degrees West. The average elevation of the project site is 4697 feet. The site lies within NE¼ Section 27, Township 6 North, Range 64 West of the 6<sup>th</sup> Prime Meridian, Weld County, Colorado.

## STUDY METHODS

A wetland delineation was conducted within the boundary of the proposed disturbance site 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 three sample points within the proposed disturbance envelope 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 approximately 20 inches from the soil surface. Soil horizons were inspected and

described using texture, soil color (Munsell, 1992), and moisture. Observations were recorded on the attached USACE Great Plains – Interim Version approved data sheets.

## **PROJECT DESCRIPTION**

Proposed temporary disturbance will include construction of one well pad that is approximately 1.5 to 2.0 acres in size within the investigated disturbance envelope. Permanent disturbance will include one fenced well head located on the well pad remnant. The well pad will be accessed via an existing access road with an extension added to complete the road to the drill site.

## **SITE DESCRIPTION**

The wetland delineation was conducted within a broad swale that slopes gently to the southeast. The swale is located within a field that is used for cattle grazing. The field to the east is also used for cattle grazing. The Greeley Canal No. 2 is located upgradient and west of the proposed development site.

One soil map unit was identified in the area of the proposed drill site. According to the Soil Survey of Weld County, Southern Part (1980), aquoll and aquept soils are the dominant soil type within the proposed development area. 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 usually 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 within the sample points did confirm the presence of this map unit at Sample Points 002 and 003.

Vegetation within the site was dominated by meadow foxtail (*Hordeum jubatum*) (Figures 2., 3., and 4.). Meadow foxtail is a facultative/wet wetland indicator species that often occurs in wetlands.

## **RESULTS/CONCLUSION**

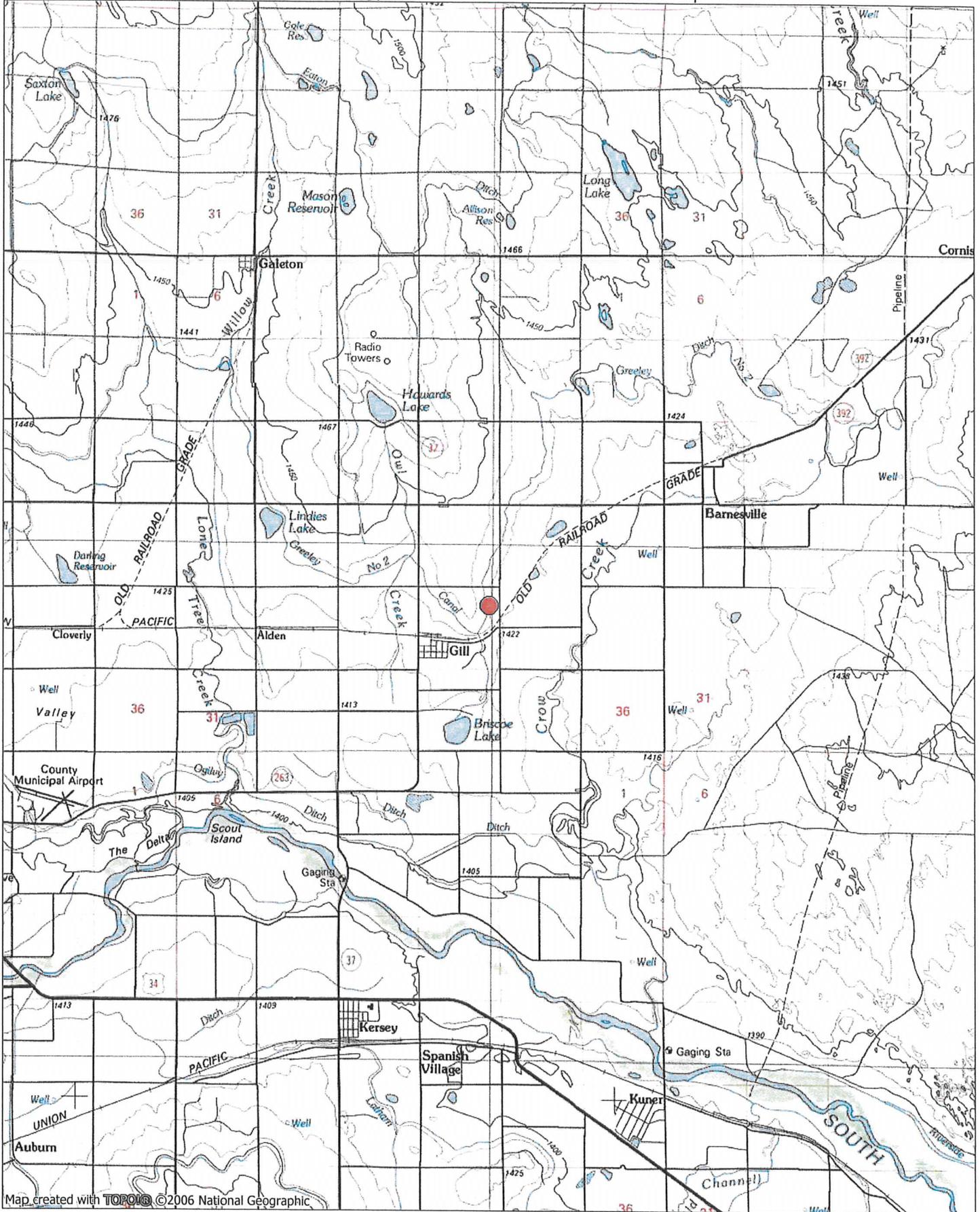
Savage and Savage conducted a wetland delineation at the proposed Noble Energy, Inc. Howard A27-17 well pad site on October 29, 2010. This delineation was conducted in order to determine the presence and extent of wetlands. Wetlands were found to be present within the broad swale on the site. (Figure 5.).

## LITERATURE CITED

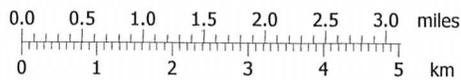
- Killmorgen Instruments Corp. 1992. Munsell® Soil Color Charts. Newburg, NW.
- U.S. Army Corps of Engineers. 1987. Corps of Engineers Wetlands Delineation Manual. Technical Report Y-87-1. Department of the Army, Waterways Experiment Station, Vicksburg, Mississippi.
- U.S. Army Corps of Engineers. 2008. 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 Howard A27-17 Well Pad Location Map



Map created with **TOPOIG** ©2006 National Geographic



TN MN  
9 1/2°  
11/02/10



**Figure 2. Sample Point 001 Facing Southeast**



**Figure 3. Sample Point 002 Facing Southeast**



**Figure 4. Sample Point 003 Facing Southeast**

# Noble Energy Howard A27-17 Well Pad Wetland Delineation



001  
002  
003

Wetland Boundary

500 ft

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



**WETLAND DETERMINATION DATA FORM – Great Plains Region**

Project/Site: HOWARD A27-17 City/County: W&LD Sampling Date: OCT 29, 2010  
 Applicant/Owner: NOBLE ENERGY State: CO Sampling Point: 001  
 Investigator(s): MS SAVAGE / EA SAVAGE Section, Township, Range: NE 1/4 SEC 27, T6N, R64W  
 Landform (hillslope, terrace, etc.): BROAD SWALE / HILLSLOPE Local relief (concave, convex, none): \_\_\_\_\_ Slope (%): 2%  
 Subregion (LRR): \_\_\_\_\_ Lat: 40.4613° Long: -104.5298° Datum: \_\_\_\_\_  
 Soil Map Unit Name: AGULLS & AGUEPTS, 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 <input checked="" type="checkbox"/> No _____	Is the Sampled Area within a Wetland? Yes _____ No <input checked="" type="checkbox"/>
Remarks: _____ _____ _____	

**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>1</u> (A)  Total Number of Dominant Species Across All Strata: <u>1</u> (B)  Percent of Dominant Species That Are OBL, FACW, or FAC: <u>100</u> (A/B)
2. _____	_____	_____	_____	
3. _____	_____	_____	_____	
4. _____	_____	_____	_____	
_____ = Total Cover				<b>Prevalence Index worksheet:</b> 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 = _____
<b>Sapling/Shrub Stratum (Plot size: <u>N/A</u>)</b>				
1. _____	_____	_____	_____	
2. _____	_____	_____	_____	
3. _____	_____	_____	_____	
_____ = Total Cover				
<b>Herb Stratum (Plot size: <u>10x10'</u>)</b>				
1. <u>Hordeum jubatum</u>	<u>40</u>	<u>Y</u>	<u>FACW</u>	
2. <u>Unknown herb</u>	<u>10</u>	<u>N</u>	<u>FAC</u>	
3. _____	_____	_____	_____	
4. _____	_____	_____	_____	
5. _____	_____	_____	_____	
6. _____	_____	_____	_____	
7. _____	_____	_____	_____	
8. _____	_____	_____	_____	
9. _____	_____	_____	_____	
10. _____	_____	_____	_____	
<u>50</u> = Total Cover				
<b>Woody Vine Stratum (Plot size: <u>N/A</u>)</b>				
1. _____	_____	_____	_____	
2. _____	_____	_____	_____	
_____ = Total Cover				
<b>% Bare Ground in Herb Stratum <u>30%</u></b>				
_____ = Total Cover				
Remarks: _____ _____ _____				

**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 <sup>1</sup>	Loc <sup>2</sup>		
0-10"	2.5Y 3/1	98	NONE				CLAY	
10-20"	2.5Y 4/2	98	NONE				CLAY	

<sup>1</sup>Type: C=Concentration, D=Depletion, RM=Reduced Matrix, CS=Covered or Coated Sand Grains. <sup>2</sup>Location: 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)	<b>Indicators for Problematic Hydric Soils<sup>3</sup>:</b> <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) <b>(LRR H outside of MLRA 72 &amp; 73)</b> <input type="checkbox"/> Reduced Vertic (F18) <input type="checkbox"/> Red Parent Material (TF2) <input type="checkbox"/> Very Shallow Dark Surface (TF12) <input type="checkbox"/> Other (Explain in Remarks)
<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)	<b>(MLRA 72 &amp; 73 of LRR H)</b>	

<sup>3</sup>Indicators 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: CLAY SOIL RETAINS MOISTURE DURING GROWING SEASON, LIKELY FROM UPGRADEMENT IRRIGATION

**HYDROLOGY**

**Wetland Hydrology Indicators:**

<b>Primary Indicators (minimum of one required; check all that apply)</b>		<b>Secondary Indicators (minimum of two required)</b>
<input type="checkbox"/> Surface Water (A1)	<input checked="" 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)	<b>(where tilled)</b>
<input type="checkbox"/> Drift Deposits (B3)	<b>(where not tilled)</b>	<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): _____	<b>Wetland Hydrology Present? Yes <input checked="" type="checkbox"/> No _____</b>
Water Table Present? Yes _____ No <input checked="" type="checkbox"/>	Depth (inches): _____	
Saturation Present? Yes _____ No <input checked="" type="checkbox"/>	Depth (inches): _____	

(includes capillary fringe)

Describe Recorded Data (stream gauge, monitoring well, aerial photos, previous inspections), if available:  
NONE

Remarks: EVIDENCE OF SATURATION/AND/OR NEAR SURFACE WATER DURING GROWING SEASON

**WETLAND DETERMINATION DATA FORM – Great Plains Region**

Project/Site: HOWARD A27-17 City/County: WABD Sampling Date: OCT 29, 2010  
 Applicant/Owner: NOBLE ENERGY State: CO Sampling Point: 002  
 Investigator(s): MSSAVAGE/EASAVAGE Section, Township, Range: NE 1/4 SEC 27, T6N, R64W  
 Landform (hillslope, terrace, etc.): \_\_\_\_\_ Local relief (concave, convex, none): \_\_\_\_\_ Slope (%): 2  
 Subregion (LRR): \_\_\_\_\_ Lat: 40.4613° Long: -104.5298° Datum: \_\_\_\_\_  
 Soil Map Unit Name: AQUIC & AQUPTS, 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 _____ Wetland Hydrology Present? Yes <input checked="" type="checkbox"/> No _____	Is the Sampled Area within a Wetland? Yes <input checked="" type="checkbox"/> No _____
Remarks: <u>30' SOUTH OF SAMPLE POINT 001</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>1</u> (A)  Total Number of Dominant Species Across All Strata: <u>1</u> (B)  Percent of Dominant Species That Are OBL, FACW, or FAC: <u>100</u> (A/B)
2. _____	_____	_____	_____	
3. _____	_____	_____	_____	
4. _____	_____	_____	_____	
_____ = Total Cover				<b>Prevalence Index worksheet:</b> 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 = _____
<b>Sapling/Shrub Stratum (Plot size: <u>N/A</u>)</b>				
1. _____	_____	_____	_____	
2. _____	_____	_____	_____	
3. _____	_____	_____	_____	
_____ = Total Cover				
<b>Herb Stratum (Plot size: <u>10' x 10'</u>)</b>				
1. <u>Hordeum jubatum</u>	<u>70</u>	<u>Y</u>	<u>FACW</u>	
2. _____	_____	_____	_____	
3. _____	_____	_____	_____	
4. _____	_____	_____	_____	
5. _____	_____	_____	_____	
6. _____	_____	_____	_____	
7. _____	_____	_____	_____	
8. _____	_____	_____	_____	
9. _____	_____	_____	_____	
10. _____	_____	_____	_____	
<u>70</u> = Total Cover				
<b>Woody Vine Stratum (Plot size: <u>N/A</u>)</b>				
1. _____	_____	_____	_____	
2. _____	_____	_____	_____	
_____ = Total Cover				
<b>% Bare Ground in Herb Stratum <u>10</u></b>				
_____ = Total Cover				
Remarks: <u>Hordeum jubatum mesocultural stand</u>				
<b>Hydrophytic Vegetation Present?</b> Yes <input checked="" type="checkbox"/> No _____				

**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 <sup>1</sup>	Loc <sup>2</sup>		
0-10"	2.5Y 2.5/1	98	NONE				CLAY LOAM	VERY MOIST
10-20"	2.5Y 4/2	98	NONE				CLAY LOAM	VERY MOIST

<sup>1</sup>Type: C=Concentration, D=Depletion, RM=Reduced Matrix, CS=Covered or Coated Sand Grains. <sup>2</sup>Location: 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 checked="" 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 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 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)	<b>Indicators for Problematic Hydric Soils<sup>3</sup>:</b> <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"/> Very Shallow Dark Surface (TF12) <input type="checkbox"/> Other (Explain in Remarks)
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<sup>3</sup>Indicators of hydrophytic vegetation and wetland hydrology must be present, unless disturbed or problematic.

**Restrictive Layer (if present):**  
 Type: \_\_\_\_\_  
 Depth (inches): \_\_\_\_\_

Remarks: \_\_\_\_\_

Hydric Soil Present? Yes  No

**HYDROLOGY**

**Wetland Hydrology Indicators:**

<b>Primary Indicators (minimum of one required; check all that apply)</b> <input type="checkbox"/> Surface Water (A1) <input type="checkbox"/> High Water Table (A2) <input 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 checked="" 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 checked="" type="checkbox"/> Other (Explain in Remarks)	<b>Secondary Indicators (minimum of two required)</b> <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 checked="" 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 <input type="checkbox"/> No <input checked="" type="checkbox"/>	Depth (inches): _____
Water Table Present? Yes <input checked="" type="checkbox"/> No <input type="checkbox"/>	Depth (inches): <u>19"</u>
Saturation Present? (includes capillary fringe) Yes <input type="checkbox"/> No <input checked="" type="checkbox"/>	Depth (inches): _____

Wetland Hydrology Present? Yes  No

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

Remarks: REDUCTION ODOR W/IN SOIL COLUMN, SOFT SURFACE INDICATIVE OF RETAINED MOISTURE, HOOF PRINTS. CLOSE TO SATURATION NEAR SURFACE

**WETLAND DETERMINATION DATA FORM – Great Plains Region**

Project/Site: HOWARD A27-17 City/County: WELD Sampling Date: OCT 29, 2010  
 Applicant/Owner: NOBVE ENERGY State: CO Sampling Point: 003  
 Investigator(s): MSSAVAGE / DE SAVAGE Section, Township, Range: NE 1/4, SEC 27, T6N, R64W  
 Landform (hillslope, terrace, etc.): BROAD SWALE Local relief (concave, convex, none): \_\_\_\_\_ Slope (%): 2  
 Subregion (LRR): \_\_\_\_\_ Lat: 40.46130 Long: -104.52980 Datum: \_\_\_\_\_  
 Soil Map Unit Name: AQUICLS & AQUETS, 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 _____ Wetland Hydrology Present? Yes <input checked="" type="checkbox"/> No _____	Is the Sampled Area within a Wetland? Yes <input checked="" type="checkbox"/> No _____
Remarks: <u>WETLAND BOUNDARY 10 FT. WEST OF SAMPLE POINT 003</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>1</u> (A)  Total Number of Dominant Species Across All Strata: <u>1</u> (B)  Percent of Dominant Species That Are OBL, FACW, or FAC: <u>100</u> (A/B)
2. _____	_____	_____	_____	
3. _____	_____	_____	_____	
4. _____	_____	_____	_____	
_____ = Total Cover				<b>Prevalence Index worksheet:</b> 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 = _____
<b>Sapling/Shrub Stratum (Plot size: <u>N/A</u>)</b>				
1. _____	_____	_____	_____	
2. _____	_____	_____	_____	
3. _____	_____	_____	_____	
4. _____	_____	_____	_____	
_____ = Total Cover				
<b>Herb Stratum (Plot size: <u>10'x10'</u>)</b>				
1. <u>Hordeum jubatum</u>	<u>50</u>	<u>Y</u>	<u>FACW</u>	
2. <u>Xanthium strumarium</u>	<u>7</u>	<u>N</u>	<u>FAC</u>	
3. _____	_____	_____	_____	
4. _____	_____	_____	_____	
5. _____	_____	_____	_____	
6. _____	_____	_____	_____	
7. _____	_____	_____	_____	
8. _____	_____	_____	_____	
9. _____	_____	_____	_____	
10. _____	_____	_____	_____	
<u>57</u> = Total Cover				
<b>Woody Vine Stratum (Plot size: <u>N/A</u>)</b>				
1. _____	_____	_____	_____	
2. _____	_____	_____	_____	
_____ = Total Cover				
<b>% Bare Ground in Herb Stratum <u>25</u></b>				
_____ = Total Cover				
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 <sup>1</sup>	Loc <sup>2</sup>		
0-16"	2.5Y 5/3	80	10YR 5/8	5	RM	M	CLAY LOAM	SATURATED
			2.5Y 2-5/1	10	C	M		
16-23 1/2"	2.5Y 6/3	98	NONE				CLAY LOAM	SATURATED

<sup>1</sup>Type: C=Concentration, D=Depletion, RM=Reduced Matrix, CS=Covered or Coated Sand Grains. <sup>2</sup>Location: 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"/> Stratified 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"/> Very Shallow Dark Surface (TF12)
<input type="checkbox"/> Sandy Mucky Mineral (S1)	<input type="checkbox"/> Redox Depressions (F8)	<input checked="" type="checkbox"/> Other (Explain in Remarks)
<input type="checkbox"/> 2.5 cm Mucky Peat or Peat (S2) (LRR G, H)	<input type="checkbox"/> High Plains Depressions (F16)	<sup>3</sup> Indicators of hydrophytic vegetation and wetland hydrology must be present, unless disturbed or problematic.
<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: MOTTLES & GLEYING INDICATIVE OF REDUCED CONDITIONS

**HYDROLOGY**

**Wetland Hydrology Indicators:**

<b>Primary Indicators (minimum of one required; check all that apply)</b>		<b>Secondary Indicators (minimum of two required)</b>
<input type="checkbox"/> Surface Water (A1)	<input checked="" 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 checked="" 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  Depth (inches): \_\_\_\_\_

Water Table Present? Yes  No  Depth (inches): 18" *→ AFTER 5 MINUTES*

Saturation Present? (includes capillary fringe) Yes  No  Depth (inches): 1"

Wetland Hydrology Present? Yes  No

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

NONE

Remarks: NO VEGETATION, SOFT SURFACE