Cherokee Wind Energy Development

Feasibility & Pre-Construction Studies

FINAL REPORT

June 30, 2017

Cherokee Nation Businesses
777 West Cherokee St
Catoosa, OK 74015

Project Title:	Cherokee Wind Energy Development: Feasibility and Pre-Construction Studies
Award Number:	DE-EE0002498
Report Date:	June 30, 2017
Recipient Organization:	Cherokee Nation Businesses, LLC 777 West Cherokee Street Catoosa, OK 74015
Award Number:	DE-EE0002498
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I. Executive Summary

Cherokee Nation Businesses (CNB) received a grant from the US Department of Energy to explore feasibility and pursue development of a wind power generation facility on Cherokee land in north-central Oklahoma. This project followed several years of initial study exploring the possibility of commercial-scale wind power generation on primarily agricultural land owned by the Cherokee Nation. This project produced detailed analysis of the legal, financial and market viability of such generation facilities, and encompassed a full technical evaluation of the engineering, environmental, and geotechnical aspects of installing this capacity. During the course of this project, information gleaned from this exploration changed CNB's thinking about the best course of action for Cherokee participation in the development, eventually moving away from an equity-owner model and towards utilization of the land asset as a resource while mitigating Cherokee financial and operational risk. As a result of this multi-year project, Cherokee Nation and CNB entered into a long-term ground lease with PNE Wind USA, Inc. (PNE). PNE is developing a wind farm producing in excess of 150MW of renewable electricity on Cherokee land as part of a larger 200MW development also involving adjacent tribal lands. Cherokee Nation will receive the benefit of lease payments and retain ultimate ownership of the land, and the region will see an increase in installed capacity for clean, renewable wind power.

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III. Project Overview

A. Cherokee Nation:

The Cherokee Nation is the largest federally-recognized sovereign Indian Nation in the United States, with over 330,000 citizens. The tribal headquarters for Cherokee Nation is located in Tahlequah, Oklahoma. The jurisdiction of Cherokee Nation consists of a 14-county area in northeastern Oklahoma. Cherokee Nation's citizens are represented by an elected, 17-member Tribal Council, tasked with creating and enacting the laws of the Nation and providing oversight on behalf of their constituents. The government of the Cherokee Nation is administered by an elected Principal Chief, and its Constitution and laws are safeguarded by an appointed and confirmed judicial system overseen by district courts and the Cherokee Supreme Court. Combined with its business entities, the Cherokee Nation employs over 10,000 people and has over a $1.2B impact on the regional economy while supporting the preservation and continuance of Cherokee culture, promoting and funding education, providing robust healthcare to Cherokees and Native people across the region, and providing various services like housing, nutrition, workforce and economic development throughout the region.

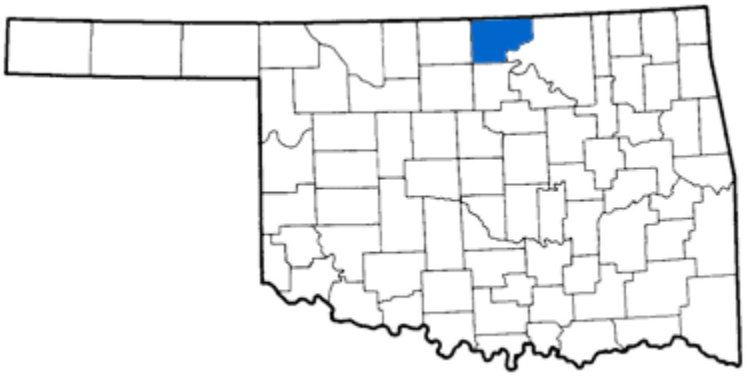
B. Cherokee Nation Businesses:

Cherokee Nation Businesses, LLC, (CNB) is the economic engine of the Cherokee Nation, and is wholly-owned by the tribe. CNB has its primary offices in Catoosa, Oklahoma. It is overseen by a board of directors appointed by the Principal Chief and confirmed by the Cherokee Nation Tribal Council. CNB has interests in diverse industries ranging from manufacturing, supply chain and logistics management, to property management, gaming, and hospitality operations. CNB was the recipient of this Department of Energy award in 2009, and managed the project and grant funds from project start in 2010 through completion in 2017.

C. Project Location:

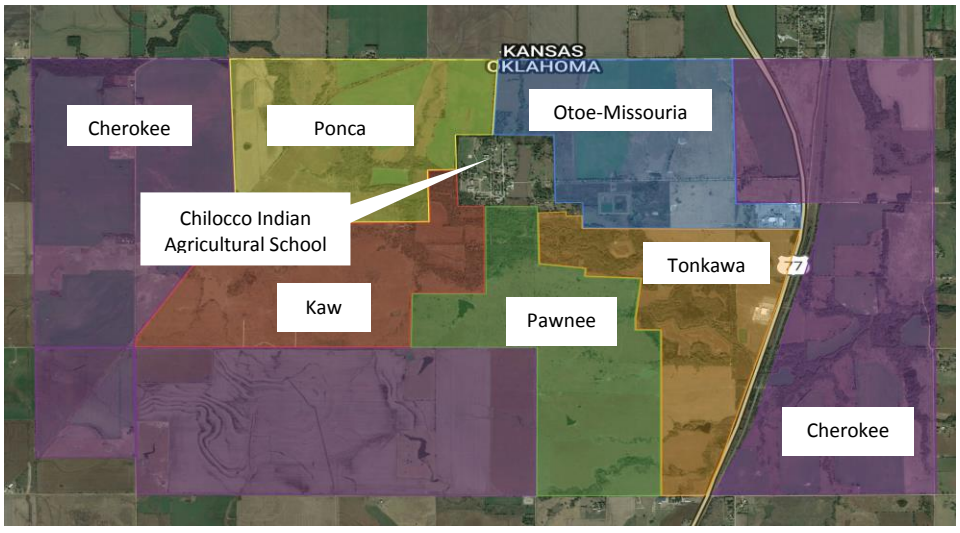
The project is sited in north-central Kay County, Oklahoma (Fig 1).

Fig 1. – Kay County



This property is known locally as the "Chilocco area," so named for the former Chilocco Indian Agricultural School situated in close proximity and the creek that runs through the area. The Cherokee-owned land is part of a larger group of properties in the area owned by several Indian Nations (Fig 2). This area is itself part of a larger region known as the "Cherokee Outlet" that stretched across the northern portion of Oklahoma (then Indian Territory). The total land base for this project is 4,275 acres, divided into two separate tracts of land less than one mile apart, both of which are held in trust for the benefit of the Cherokee Nation by the US government. These tracts are optimal for wind energy production as well as a substation location, and are adjacent to additional lands under development for wind power production. The historic Chilocco Indian Agricultural School will not be disturbed as a result of this development. Upon completion of wind power generation facilities, it is expected that agricultural uses can continue.

Fig 2. Chilocco Area Tribal Lands



D. Project History / Purpose

Cherokee Nation, though endowed with significant natural resources, has not historically been an energy-producing tribe given its geography and the relatively small amounts of accessible petroleum and natural gas reserves within its jurisdictional area. The Nation has long held a keen interest in environmental issues, and has been focused on conservation and responsible stewardship of the natural environment and resources. Renewable power generation via wind turbines captured the attention of the Nation as more and more viable options emerged for wind power production in the central United States in the early 2000s. CNB received support for the concept of developing wind power generation in this area from the Department of Energy (DOE) starting with a small award in 2003, beginning with initial wind measurements, and continuing with some support from the Department of the Interior in 2006, 2007, and 2008. Project support culminated with the completion of this DOE project. This award was provided to continue exploration and analysis of establishing wind power generation with either direct or indirect involvement of the Cherokee Nation and its entities. The project focused on continuing pre-construction activities, the creation of a Cherokee-owned power generation capability and attendant marketing and sales, and to develop knowledge in wind farm development including technical aspects of resource assessment, equipment selection and layout, transmission and power purchasing, commissioning, and ongoing operations. Over the course of this project, CNB examined the commercial viability of wind at this location, gained knowledge of the wind power industry, gained understanding of power markets and pricing, and received detailed analysis on the viability of wind power production on this site. CNB selected PNE Wind USA, Inc. (PNE) as its project manager and developer for this project based on their interest in the Oklahoma wind market and history of developing projects in Europe.

Project development and studies continued with this award in 2010, and proceeded through 2013. At that point, Cherokee Nation and CNB's risk tolerance began to shift, and the project was put on hold after appetite for participation as an equity investor and operator waned. After a hiatus, the project concept shifted focus toward a private developer leasing the ground from Cherokee Nation and proceeding with commercial power development. Cherokee Nation and CNB restarted the project with this concept in mind in 2016 and pursued development of a ground lease, wind resource development agreements, and consulting agreements to achieve installation and activation of this project.

IV. Objectives:

From the application and award documents, the stated project objectives were as follows:

- Complete Power Purchase Agreement(s)
  Result: Draft completed

- Complete Phase II and Phase III of the transmission and interconnection study
  Result: Study completed

- Determine project size per verified location as it pertains to load and wind resource
  Result: Project size verified, resource and technology analyses completed

- Complete Wind Farm Project Cost Analysis
  Result: Various cost analyses complete

- Gain knowledge in the area of wind farm development
  Result: Deeper understanding of wind resource development and power production and marketing gained, resulting in business decision on how to proceed with development.

V. Scope of Work and Activities:

From the application and award documents, the following scope of work and activities were included in this phase of the project to address the stated project objectives:

- Continue Phases II and III of the Transmission and Interconnect Study
- Negotiate interconnect and power purchase agreements
- Determine project size (MW)
- Complete wind farm project cost analysis
- Complete environmental and NEPA studies
- Conduct soil sampling and design turbine foundations
- Complete turbine assessment and selection
- Design turbine communication system
- Lay out electrical and civil engineering
- Continue to gather load data
- Update the wind energy business plan

CNB contracted with PNE to accomplish specific tasks in pursuit of the project's objectives. PNE, in turn, acquired expertise in various fields to bring the project forward.

A. **Southwest Power Pool Integrated Market Study:** In order to gain a greater understanding and bolster the chances of signing a power purchase agreement for the generation from the Chilocco Wind Farm and potential future generation a consulting firm experienced in market forecasts of the SPP IM (Burns and McDonnell) was engaged. The purpose of this study was to provide a future rate estimate for the power that would be sold into the newly created SPP IM to determine the profitability of such sales, and to provide a transmission engineering review.

   See Appendix A for SPP Integrated Market Study
   See Appendix B for Review of SPP Cost Allocation Proposal

B. **Legal and Regulatory Review:** CNB requested a review of federal and state laws and regulations to determine the operating boundaries for tribal organizations to act as their own hub for the purchase and resale of electrical generation and to develop necessary frameworks for tribal participation in the power market, and in this project in particular including strategies to address issues of tribal sovereignty. These consulting services took place over an extended period of time and involved numerous meetings and a great deal of research and correspondence. Development of necessary ground leases, resource development agreements, and consulting agreements resulted in the successful completion of a ground lease with Cherokee Nation, approved by the Bureau of Indian Affairs.

   See Appendix C for Project FAQ Developed For Cherokee Nation

C. **Power Purchase Agreement:** Draft document templates were developed and refined resulting in a draft Power Purchase Agreement (PPA) and the creation of a number of draft sub-PPAs. These documents were drafted with the idea that CNB would continue to be an investor and operator.

   See Appendix D for Template PPA

D. **Economic and Pro Forma Analysis:** Various scenarios were modelled based on assumptions about market pricing for power, financing costs, and ownership structure. Ultimately, with the change in proposed structure away from CNB as an investor and operator, the focus shifted toward a return structure based on land lease rates and capturing excess upside for the benefit of the Nation.

See Appendix E-1 – E3 for Sample Pro Formas and CN Return Summary
See Appendix F for Detailed Market Analysis

E. Geotechnical and Engineering Reports: CNB acquired various technical engineering, geotechnical, and site-specific reports to support wind power development on the project site. These pre-constructions reports included the soils report, preliminary mechanical and electrical engineering design plans, preliminary civil engineering designs plans, and site layouts.

See Appendix G for Geotechnical Report
See Appendix H Soils Report
See Appendix I for Preliminary M&E Design
See Appendix J for Electrical Impedance Table
See Appendix K for Preliminary Civil Design
See Appendix L for Site Layout Diagram

F. Environmental Reports: CNB received comprehensive environmental impact reports evaluating the potential disruptions caused by placing wind turbines in the project area, as well as archaeological and cultural assessments to ensure that no critical historical or cultural sites would be negatively impacted by this development. Two separate evaluations were provided, as the initial concept included only the western parcel. As the eastern parcel was added, an additional study was performed to identify any issues there as well. As a result of these studies, permits were submitted and received as noted in the Conclusions section below.

See Appendix M for Wetlands Study
See Appendix N-1 - N-4 for Avian and Wildlife Studies
See Appendix O for Critical Issues Analysis – Cultural Resources
See Appendix P1 and P2 for Archaeological Study – West Parcel
See Appendix Q1 and Q2 for Archaeological Studies – East Parcel
See Appendix R for Water Resource Maps
See Appendix S for EPA Water Quality Certification Submittal
See Appendix T for USACE NWP Letter

G. Turbine Assessment: CNB requested updated analysis of the energy potential and recommended turbine technologies useful to the site, resulting in a detailed analysis of the potential power generated and a recommendation on turbine size.

See Appendix U for Energy and Turbine Assessment

H. Business Plan Update: CNB requested updates to the wind power business plan over time, with that plan taking on various iterations as thinking on the project shifted from an ownership model to a ground lease.

See Appendix V For Business Plan Update
See Appendix W For Term and Document Review Process

See Appendix X For Potential Buyer Investment Summary
See Appendix Y For Electric Power Source Options Decision Tree
See Appendix Z for 2016 Plan Briefing to DOE

VI. Conclusions and Recommendations:

Cherokee Nation and CNB concluded that commercial renewable power generation is both technically feasible and economically viable in this location. Negative environmental impacts are minor and / or relatively uncomplicated to mitigate. The legal and regulatory environment is acceptable for the production of renewable power from this location. The technical recommendations and analyses included in the project moved the endeavor from an exploratory phase to implementation, with work proceeding currently to develop generation.

CNB made the recommendation to Cherokee Nation to consider entering into a ground lease rather than participate as an equity investor and operator. Ultimately, after exploring the project thoroughly, Cherokee Nation and CNB made the decision to lease land to an experienced developer rather than act as developer or equity investor. The Cherokee Nation Tribal Council approved a resolution to lease the land in 2016, and the lease package was submitted for review and approval by the Bureau of Indian Affairs in late 2016. The permitting process was also finalized for project in 2017 culminating with final approvals from relevant agencies and a final determination by the Bureau of Indian Affairs:

- United State Fish and Wildlife-Endanger Species Act-Section 7
- National Historic Preservation Act-Section 106
- United States Army Core of Engineers-Section 404
- EPA Clean Water Act 401
- Bureau of Indian Affairs-Finding of No Significant Impact

Ongoing development of the project provides the opportunity for the Nation and CNB to continue to observe and learn from renewable power development and operations while mitigating some of the substantial financial burden and attendant risk that would have placed a potential constraint on the project and / or constrained Cherokee Nation and CNB's capacity to provide necessary focus and services to Cherokee citizens and the broader region. Adjacent tribal landowners – Kaw Nation and Otoe-Missouria – are participants in the larger wind farm development as well. Through long-term ground leases, renewable power generation – in total over 200MW worth - will be installed as part of a series of developments now populating north-central Oklahoma and creating significant zero-emissions capacity in the region. Cherokee Nation will benefit

from the financial outputs of the project (primarily rent). Via arrangement with the developer, Cherokee Nation has the potential to benefit in any project upside as the development matures and market conditions evolve.

CNB notes that as the development is underway at present, certain technical materials are potentially sensitive and could negatively impact the ability of the developer to bring the project successfully to market. As a result, CNB is attempting to exercise great care in disseminating those materials while maintaining an interest in disclosure and the prudent utilization of public funds.

VII. Lessons Learned:

- CNB and Cherokee Nation determined that the current power market continues to be favorable for the development of renewable generation.

- CNB determined that equity participation in the project as an owner-operator was not preferable given the company's current operating environment and strategic objectives.

- CNB and Cherokee Nation came to the conclusion that a long-term ground lease would result in the highest and best use for this land asset.

- Cherokee Nation has long experience managing leases on properties held in trust, and has extensive experience in collaborating with the Bureau of Indian Affairs and the Department of the Interior on such matters. As such, Cherokee Nation is better suited as a landlord and facilitator for development of this kind of project rather than as an owner-operator.

- CNB and Cherokee Nation gained significant experience navigating the legal, regulatory, and business environment for developing and commissioning renewable wind power generation facilities, and gained a deeper understanding of how power markets function. This knowledge will inform Cherokee Nation's ongoing exploration of another long-standing renewable energy project. Further, this project has led to renewed exploration in the positive and negative aspects of establishing a tribal utility authority.

APPENDICES

BURNS McDONNELL

Oklahoma I Transfer Study Report

PNE Wind USA, Inc.

Oklahoma I Transfer Study
Project No. 90053

Revision 1
06/29/2016

Oklahoma I
Transfer Study Report

prepared for

PNE Wind USA, Inc.
Oklahoma I Transfer Study
Chicago, Illinois

Project No. 90053

06/29/2016

prepared by

Burns & McDonnell Engineering Company, Inc.
Houston, Texas

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EXECUTIVE SUMMARY

Burns & McDonnell was retained by PNE Wind USA, Inc. to determine the potential network impacts of interconnecting the proposed Oklahoma I Project (Project), a 200 MW project wind farm on the Western Farmers Electric Cooperative (WFEC) transmission system. The proposed Point of Interconnection (POI) is the existing Chilocco 138 kV substation. The purpose of this study was to identify the incremental transfer limit that can be injected at the POI without additional loading violations on the system.

A transfer analysis was performed to determine the amount of power (MW) that could be injected at the Chilocco 138 kV substation before any thermal loading violations were reported as a result of the Project, and to identify the thresholds for additional thermal loading violations at generation intervals up to 200 MW.

With the planned in-service date of the generation as Q4 2016 or Q1 2017, a 2017 Summer peak and a 2020 Summer peak power flow model from the SPP 2015 MDWG model series was used for the study.

The transfer analysis was performed using the Transmission Adequacy and Reliability Assessment (TARA) software. The loading levels in the study system were monitored according to the reliability criteria outlined in Section 2.1 during the simulation. Thermal violations and the assicated transfer amount was recorded.. The injection of the Project was displaced by all other generators in the SPP footprint.

The study results indicated that the Project is limited to 106 MW without causing thermal overloads in the study system. The only constratint that was reported for an injection amount of 200 MW is the Middleton Tap to Chilocco 138 kV line.

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1.0 INTRODUCTION

Burns & McDonnell was retained by PNE Wind USA, Inc. to determine the potential network impacts of interconnecting the proposed Oklahoma I Project (Project), a 200 MW project wind farm on the Western Farmers Electric Cooperative (WFEC) transmission system. The proposed Point of Interconnection (POI) is the existing Chilocco 138 kV substation. The purpose of this study was to identify the incremental transfer limit that can be injected at the POI without additional loading violations on the system.

A transfer analysis was performed to determine the amount of power (MW) that could be injected at the Chilocco 138 kV substation before any thermal loading violations were reported as a result of the Project, and to identify the thresholds for additional thermal loading violations at generation intervals up to 200 MW.

1.1 Limitations

In the preparation of this report, the information provided to Burns & McDonnell by others was used by Burns & McDonnell to make certain assumptions with respect to conditions which may exist in the future. While Burns & McDonnell believes the assumptions made are reasonable for the purposes of this report, Burns & McDonnell makes no representation that the conditions assumed will, in fact, occur. In addition, while Burns & McDonnell has no reason to believe that the information provided by others, and on which this report is based, is inaccurate in any material respect, Burns & McDonnell has not independently verified such information and cannot guarantee its accuracy or completeness. To the extent that actual future conditions differ from those assumed herein or from the information provided to Burns & McDonnell, the actual results will vary from those presented.

2.0 STUDY ASSUMPTIONS, CRITERIA AND METHODOLOGY

The following criteria, assumptions and methodology reflect the development of the study cases and the methodology used in the study.

2.1 Reliability Criteria

This study was performed in accordance to the SPP reliability criteria. Equipment loadings were monitored to identify any thermal violations based on their applicable 100% static rating. The reliability criteria require all transmission elements to operate within their thermal ratings under normal system conditions (Rate A) as well as loss of any single transmission element (Rate B). Loading levels that exceeded the 'Rate A' or 'Rate B' rating of the facility for normal system or single transmission element out-of-service (N-1) were identified as overloads.

2.2 Base Study Model

With the planned in-service date of the generation as Q4 2016 or Q1 2017, a 2017 Summer peak and a 2020 Summer peak power flow model from the SPP 2015 MDWG model series was used for the study. It is important to note that the SPP power flow models may not reflect the most up-to-date study area facility configuration information, as well as load and generation expectations. As a result, the conclusions of this study should be evaluated with the consideration for the limitations of the study assumptions.

2.3 Study Model

The 2017 summer peak and 2020 summer peak study models were developed to identify the transfer limit at which the injection of the Project would create loading violations in the system. GenOFF models were created by adding a generator dispatched to zero with a capacity of 200 MW to the base models described in Section 2.2.

2.4 Study Methodology

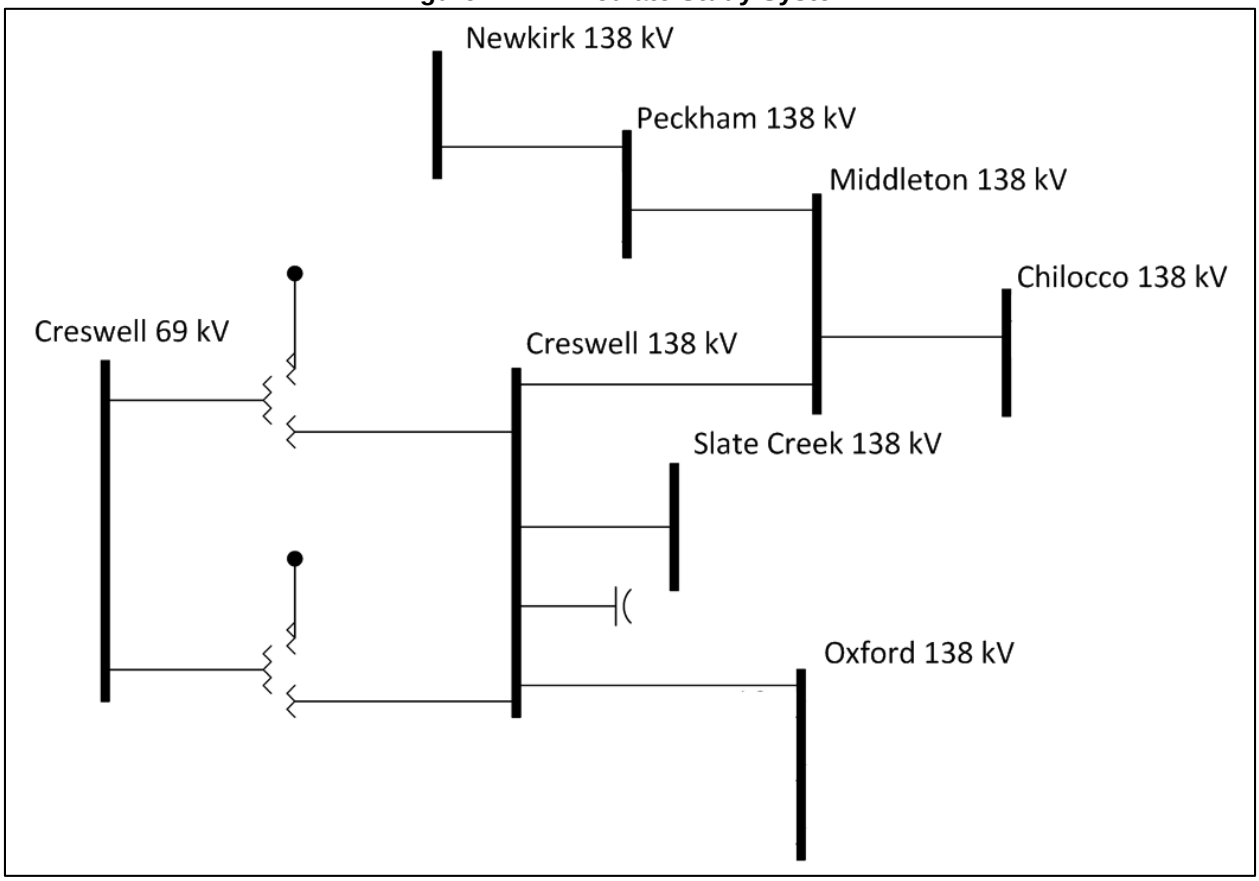
The transfer analysis was performed using the Transmission Adequacy and Reliability Assessment (TARA) software. The loading levels in the study system were monitored according to the reliability criteria outlined in Section 2.1 during the simulation. Thermal violations and the assicated transfer amount was recorded.. The injection of the Project was displaced by all other generators in the SPP footprint.

2.5 Study System

The study system consisted of facilities within Western Farmers Electric Cooperative, Westar Energy systems and their direct neighbors. Equipment loadings were monitored for all elements 100kV and above

in the study system. Figure 2-1 provides a one-line diagram of the point of interconnection and local transmission facilities.

Figure 2-1: Immediate Study System



3.0 STUDY RESULTS

The following sections summarize the results of the transfer study.

3.1 Transfer Study Results

For both study cases, the maximum injection at the POI is limited by the radial transmission line from the Oklahoma Gas & Electric (OG&E) owned Middleton Tap 138 kV substation to the Western Farmers Electric Cooperative owned Chilocco 138 kV substation. The tabular results of the transfer study for the 2017 and 2020 summer peak cases are shown in Table 3-1 and Table 3-2 below.

Table 3-1: 2017 Summer Peak Transfer Study Results

Monitored Facility	Rating (MVA)	Contingency Name	2017 Summer			
			Injection Limit (MW)	AC %Loading No Injection	AC %Loading at Injection Limit	% Impact
Middleton Tap to Chilocco 138 kV line	106	Base Case	105.8	3.2	100.0	96.8
Middleton Tap to Chilocco 138 kV line	130	Middleton Tap to Creswell 138 kV line	129.8	3.2	100.0	96.8
Middleton Tap to Chilocco 138 kV line	130	Kildare to Newkirk Tap 138 kV line	129.8	3.2	100.0	96.8

Table 3-2: 2020 Summer Peak Transfer Study Results

Monitored Facility	Rating (MVA)	Contingency Name	2020 Summer			
			Injection Limit (MW)	AC %Loading No Injection	AC %Loading at Injection Limit	% Impact
Middleton Tap to Chilocco 138 kV line	106	Base Case	107.3	4.2	100.0	95.8
Middleton Tap to Chilocco 138 kV line	130	Middleton Tap to Creswell 138 kV line	131.6	4.2	100.0	95.8
Middleton Tap to Chilocco 138 kV line	130	Kildare to Newkirk Tap 138 kV line	131.6	4.2	100.0	95.8

3.2 Conclusion

The study results indicated that the Project is limited to 106 MW without causing thermal overloads in the study system. The only constratint that was reported for an injection amount of 200 MW is the Middleton Tap to Chilocco 138 kV line.

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Appendix B

SPP Cost Allocation Proposal Analysis

Vendor: nFront Consulting

Date: 3/3/2017

		Scenarios	Base	Scenario A	Scenario B	Scenario C	Scenario D	Scenario B + C + D
ID	*Total Upgrade Costs*	Upgrades	DISIS Results	Gen-2016-012 and 2016-024 Withdraw - Voltage Instability remains	Gen-2016-012 and 2016-024 Withdraw - Voltage Instability alleviated	Neosho to Riverton upgrade not required	Gen-2015-083 Exits Queue	Scenario B + C + D all together
0	*$4,612,190*	Interconnection	$4,612,190	$4,612,190	$4,612,190	$4,612,190	$4,612,190	$4,612,190
1	*$117,126,900*	Wolf Creek- Neosho 345kV	$8,827,993	$16,703,877	$0	$8,827,993	$8,827,993	$0
2	*$10,545,000*	Osage-Webb Tap 138kV	$8,027,870	$8,027,870	$8,027,870	$8,027,870	$8,027,870	$8,027,870
3	*$9,000,000*	Farber-Belle Plains 138kV	$6,102,762	$6,102,762	$6,102,762	$6,102,762	$0	$0
4	*$3,000,000*	Middleton Tap- Chilocco 138kV	$3,000,000	$3,000,000	$3,000,000	$3,000,000	$3,000,000	$3,000,000
5	*$2,805,000*	Kildare- White Eagle 138kV	$2,805,000	$2,805,000	$2,805,000	$2,805,000	$2,805,000	$2,805,000
6	*$23,000,000*	Neosho-Riverton 161kV	$2,132,495	$2,132,495	$2,132,495	$0	$2,132,495	$0
7	*$600,000*	Kinze-McElroy 138kV	$270,477	$270,477	$270,477	$270,477	$270,477	$270,477
8	*$500,000*	Caney River-Neosho 345kV	$90,002	$90,002	$90,002	$90,002	$90,002	$90,002
9	*$500,000*	Cleveland-Tulsa 345kV	$52,867	$52,867	$52,867	$52,867	$52,867	$52,867
10	*$50,000*	Osage-White Eagles 138kV	$48,992	$48,992	$48,992	$48,992	$48,992	$48,992
11	*$31,600,000*	Gen-2016-012 Tap-Waverly Tap	$31,798	$0	$0	$31,798	$31,798	$0
12	*$500,000*	Gen 2016-012Tap-La Cygne 345kV	$2,009,614	$0	$0	$2,009,614	$2,009,614	$0
		Total Cost	$38,012,060	$43,846,532	$27,142,655	$35,879,565	$31,909,298	$18,907,398
		Change from Base Scenaro		$5,834,472	($10,869,405)	($2,132,495)	($6,102,762)	($19,104,662)

Scenario A Allocated upgrade costs for both 2016-012 and 2016-024 are each ~$83M ($416/kW and $1660/kW respecitvely) and could likely exit queue. May not resolve need for Wolf Creek - Neosho Upgrade, would increase allocated cost of Wolf Creek - Neosho upgrade to $16.7M. Upgrade #12 removed for 16-012 withdrawal.

Scenario B Allocated upgrade costs for both 2016-012 and 2016-024 are each ~$83M ($416/kW and $1660/kW respecitvely) and could likely exit queue. If no longer voltage stability in models, Wolf Creek - Neosho Upgrade no longer required. Upgrade #12 removed for 16-012 withdrawal.

Scenario C No results reported for this line being impacted by Project in DISIS. Line scheduled for upgrade to 243 MVA in July 2018. Unknown if Base Rating will be increased for N-0 violations.

Scenario D Alleviates Farber to Belle Plains upgrade. Total Interconnection Costs ~$7M. Unlikely gen will exit queue due to interconnect costs.

Causes of Upgrades per DISIS 2016-001

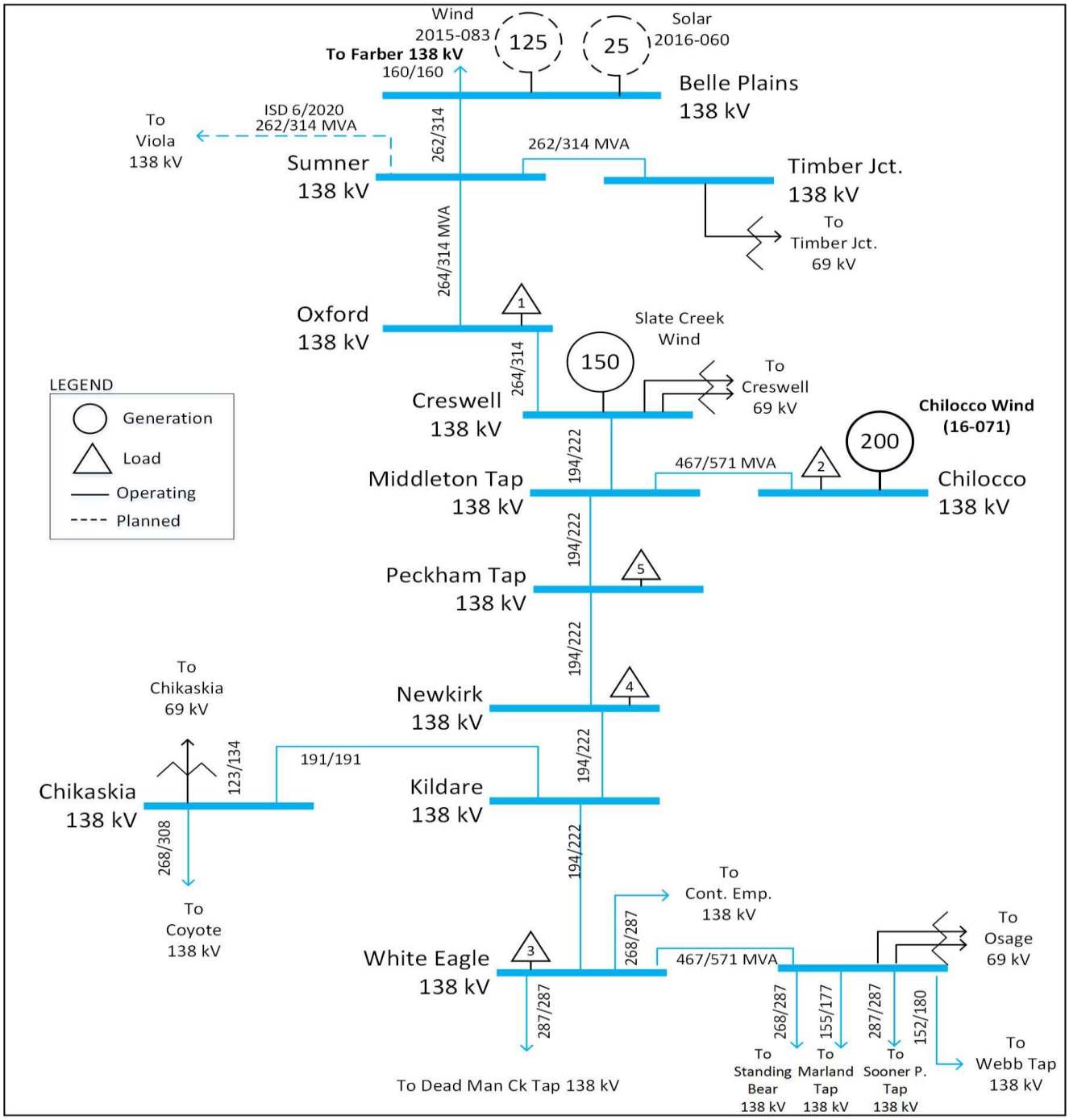
ID	Upgrades
0	Interconnection
1	Wolf Creek- Neosho 345kV
2	Osage-Webb Tap 138kV
3	Farber-Belle Plains 138kV
4	Middleton Tap- Chilocco 138kV
5	Kildare- White Eagle 138kV
6	Neosho-Riverton 161kV
7	Kinze-McElroy 138kV
8	Caney River-Neosho 345kV
9	Cleveland-Tulsa 345kV
10	Osage-White Eagles 138kV
11	Gen-2016-012 Tap-Waverly Tap
12	Gen 2016-012Tap-La Cygne 345kV

v2

Monitored Element
Non-Convergence
BUTLER - MIDIAN 138KV CKT 1
WOLF CREEK (WOLF TX-6) 345/69/17.0KV TRANSFORMER CKT 1
PAWHUSKA TAP - WEST PAWHUSKA 138KV CKT 1
SHIDLER - WEST PAWHUSKA 138KV CKT 1
OSAGE - WEBB CITY TAP 138KV CKT 1
FARBER - SUMNER COUNTY NO. 10 BELLE PLAIN 138KV CKT 1
FARBER - SUMNER COUNTY NO. 10 BELLE PLAIN 138KV CKT 1
CHILOCCO4 138.00 - MIDLTNT4 138.00 138KV CKT 1
KILDARE4 - WHITE EAGLE 138KV CKT 1
NEOSHO - SUB 452 - RIVERTON 161KV CKT 1
NEOSHO - SUB 452 - RIVERTON 161KV CKT 1
KINZE - MCELROY 138KV CKT 1
CANEYRV7 345.00 - NEOSHO 345KV CKT 1
CLEVELAND - TULSA NORTH 345KV CKT 1
OSAGE - WHITE EAGLE 138KV CKT 1
G16-012-TAP 345.00 - WAVERLY 345KV CKT 1
G16-012-TAP 345.00 - LACYGNE 345KV CKT 1
G16-012-TAP 345.00 - LACYGNE 345KV CKT 1

Contigency	Type	DF	Total Cost
			$4,612,190
MIDIAN (MIDI TX-1) 138/69/13.2KV TRANSFORMER CKT 1 G16-012-TAP 345.00 -LACYGNE 345KV CKT 1 CLEVELAND - TULSA NORTH 345KV CKT 1 CLEVELAND - TULSA NORTH 345KV CKT 1	ERIS NRIS NRIS NRIS NRIS		$117,126,900
System Intact	ERIS	7.0%	$10,545,000
System Intact MIDLTNT4 138.00 -PECKHAM TAP 138KV CKT 1	ERIS ERIS	25.4% 69.4%	$9,000,000
System Intact	ERIS	100%	$3,000,000
HUNTERS7 345.00 -WOODRING 345KV CKT 1	ERIS	40.2%	$2,805,000
System Intact LITCHFIELD - SUB 349 -ASBURY 161KV CKT 1	ERIS NRIS		$23,000,000
System Intact	ERIS	3.7%	$600,000
System Intact	ERIS	5.9%	$500,000
System Intact	ERIS	6.7%	$500,000
CONTINENTAL EMPIRE - WHITE EAGLE 138KV CKT 1	ERIS	22.0%	$50,000
NEOSHO - WOLF CREEK 345KV CKT 1	ERIS		$500,000
System Intact CANEYRV7 345.00 -NEOSHO 345KV CKT 1	ERIS ERIS		$31,600,000

Allocated Cost	Re-Allocated Cost	Comments
$4,612,190	$4,612,190	
$8,827,993	$8,827,993	Required for voltage stability. Not required stand alone.
$8,027,870	$8,027,870	Constraint still exists as stand alone, but barely 102.3% and for only 20L Scen 2
$6,102,762	$6,102,762	Constraint still exists as stand alone in multiple seasons. 10 mi. may not have to be reconductored
$3,000,000	$3,000,000	Gen outlet. 100% project. But rating in power flow model show 467 MVA not 106 MVA
$2,805,000	$2,805,000	Only Gen contributing. Line showing up as constraint in SCED often
$2,132,495	$0	No results reported for this line being impacted by Project. Line scheduled for upgrade to 243 MVA 7/2018. Base rate should be 209 MVA not 190 MVA
$270,477	$270,477	Constraint still exists as stand alone at 103.6% for 2017 only
$90,002	$90,002	Not required if ALL projects drop out. 20L case O/L for N-0 only. Some projects dropping out can alleviate this constraint
$52,867	$52,867	Not required if ALL projects drop out. 20L case O/L for N-0 only. Some projects dropping out can alleviate this constraint
$48,992	$48,992	Only Gen contributing.
$31,798	$31,798	No results reported for this line being impacted by Project.
$2,009,614	$0	Some projects dropping out can alleviate this constraint (G16_012 the biggest)
$38,012,060	**$33,869,951**	


Wind
2015-083
125
25
Solar
2016-060
To Farber 138 kV
160/160
Belle Plains
138 kV
To
Viola
138 kV
ISD 6/2020
262/314 MVA
262/314
Sumner
138 kV
262/314 MVA
Timber Jct.
138 kV
To
Timber Jct.
69 kV
264/314 MVA
Oxford
138 kV
1
Slate Creek
Wind
150
To
Creswell
69 kV
264/314
Creswell
138 kV
Chilocco Wind
(16-071)
200
194/222
467/571 MVA
2
Middleton Tap
138 kV
Chilocco
138 kV
194/222
Peckham Tap
138 kV
5
194/222
To
Chikaskia
69 kV
Newkirk
138 kV
4
123/134
191/191
194/222
Chikaskia
138 kV
Kildare
138 kV
268/308
To
Coyote
138 kV
194/222
To
Cont. Emp.
138 kV
268/287
To
Osage
69 kV
White Eagle
138 kV
3
467/571 MVA
287/287
268/287
155/177
287/287
152/180
To
Standing
Bear
138 kV
To
Marland
Tap
138 kV
To
Sooner P.
Tap
138 kV
To
Webb Tap
138 kV
To Dead Man Ck Tap 138 kV
LEGEND
Generation
Load
Operating
Planned

Group 8

	Request	Size (MW)	Generation	Point of Interconnection	Total Allocated Cost	Wolf Creek- Neosho 345kV		Osage-Webb Tap 138kV		Farber-Belle Plaine 138kV		Gen-2016-071 Interconnection		Middleton Tap- Chilocco 138kV		Kildare- White Eagle 138kV		Neosho-Riverton 161kV		Gen-2016-012Tap-La Cygne 345kV		Kiowa-McElroy 138kV		Caney River-Neosho 345kV		Cleveland-Tulsa 345kV		Osage-White Eagles 138kV		Gen-2016-012 Tap-Waverly Tap	
							$117,124,400		$ 81,146,000		$ 91,991,000		$4,613,100		$ 2,203,000		$ 2,401,000		$21,991,000		$ 31,482,000		$606,000		$556,000		$ 550,000		$ 550,000		$ 691,000	
1	Gen-2016-009	20		Osage 69kV OKGE	$956,218	0	0.00%	0	0.00%	0	0.00%	0	0.00%	0	0.00%	0	0.00%	0	0.00%	0	0.00%	0	0.00%	0	0.00%	0	0.00%	0	0.00%	0	0.00%	0	0.00%	
2	Gen-2016-012	200	wind	Tap Waverly (532799) La Cygne (542981) 345kV, (G16-012-TAP, 560071)	$83,146,835	$50,458,207	43.08%	0	0.00%	0	0.00%	0	0.00%	0	0.00%	0	0.00%	0	0.00%	$4,807,001	21.36%	$15,766,430	49.83%	0	0.00%	0	0.00%	$2,701	0.54%	0	0.00%	$249,152	49.83%
3	Gen-2016-022	151.8	wind	Ranch Road 345kV (515576)	$14,451,758	$6,056,748	5.40%	0	0.00%	0	0.00%	0	0.00%	0	0.00%	0	0.00%	0	0.00%	$1,824,518	7.96%	$1,703,245	5.47%	0	0.00%	0	0.00%	$63,247	12.85%	0	0.00%	$27,361	5.47%
4	Gen-2016-024	50	solar	Midian 138kV (532990)	$83,451,511	$4,767,170	4.07%	0	0.00%	0	0.00%	0	0.00%	0	0.00%	0	0.00%	0	0.00%	$1,369,173	5.52%	$800,659	2.13%	0	0.00%	0	0.00%	$6,962	1.36%	0	0.00%	$12,688	2.53%
5	Gen-2016-031	201.3	wind	Ranch Road 345kV (515576)	$98,825	$68,790	0.06%	0	0.00%	0	0.00%	0	0.00%	0	0.00%	0	0.00%	0	0.00%	$16,053	0.07%	$17,987	0.05%	0	0.00%	0	0.00%	$625	0.13%	0	0.00%	$295	0.05%
6	Gen-2016-032	200	wind	Tap Marshall (514733)-Cottonwood Creek (514827) 138kV, (G16-032-TAP, 560077)	$6,555,499	$987,169	0.84%	0	0.00%	0	0.00%	0	0.00%	0	0.00%	0	0.00%	0	0.00%	$746,713	3.25%	$1,412,447	4.47%	0	0.00%	0	0.00%	$42,773	8.55%	0	0.00%	$22,349	4.47%
7	Gen-2016-048	74	solar	Sooner 138kV (514802)	$12,167,241	$887,143	0.76%	$2,517,130	23.87%	$349,223	1.86%	0	0.00%	0	0.00%	0	0.00%	0	0.00%	$460,542	2.00%	$680,765	2.15%	$329,533	54.92%	0	0.00%	$34,042	6.81%	$1,008	2.02%	$10,772	2.15%
8	Gen-2016-060	25.3	wind	Belle Plain 138kV (533063)	$5,317,686	$3,031,702	5.73%	0	0.00%	$2,549,017	28.31%	0	0.00%	0	0.00%	0	0.00%	0	0.00%	$459,222	1.78%	$261,265	1.02%	0	0.00%	$17,004	5.58%	$4,496	0.90%	0	0.00%	$5,083	1.02%
9	Gen-2016-061	250.7	wind	Tap Woodring (514715) –Sooner (514803) 345kV (G16-061-TAP, 560084)	$21,118,904	$4,507,759	3.85%	0	0.00%	0	0.00%	0	0.00%	0	0.00%	0	0.00%	0	0.00%	$1,574,901	6.85%	$2,088,100	6.61%	0	0.00%	$72,092	14.42%	$105,456	21.09%	0	0.00%	$33,040	6.61%
10	Gen-2016-068	250	wind	Woodring 345kV (514715)	$16,198,392	$1,448,034	4.65%	0	0.00%	0	0.00%	0	0.00%	0	0.00%	0	0.00%	0	0.00%	$1,635,106	7.11%	$2,027,663	6.42%	0	0.00%	$73,171	14.51%	$80,080	16.14%	0	0.00%	$32,052	6.42%
11	Gen-2016-073	200.1	wind	Chilocco 138kV (521338)	$38,013,060	$8,827,995	7.54%	$10,765,877	58.07	$8,077,870	76.13%	66,163,763	67.81%	54,613,100	100.00%	$3,000,000	100.00%	$2,801,000	100.00%	$3,132,495	9.27%	$2,069,659	6.36%	$270,977	45.08%	$60,022	14.00%	$52,867	10.57%	$48,982	97.98%	$33,798	6.36%
12	Gen-2016-072	300	wind	Renfrow (515543) 345 kV	$13,983,746	$14,052,677	12.00%	0	0.00%	0	0.00%	0	0.00%	0	0.00%	0	0.00%	0	0.00%	$3,052,791	12.27%	$2,710,247	8.58%	0	0.00%	$124,581	24.92%	$75,565	15.11%	0	0.00%	$42,884	8.58%
13	Gen-2016-073	220	wind	Tap on Thistle (536861) to Wichita (532796) 345kV, ckt1&2 (Buffalo Flats 345kV-560013)	$33,825,320	$18,136,458	15.83%	0	0.00%	0	0.00%	0	0.00%	0	0.00%	0	0.00%	0	0.00%	$3,322,784	10.45%	$2,058,459	6.54%	0	0.00%	$122,847	24.57%	$30,578	6.14%	0	0.00%	$22,435	6.54%
14*	GEN-2016-013	60 winter/52 summer	combustion turbine (ieu)		$3,694,351	0	0.00%	0	0.00%	0	0.00%	0	0.00%	0	0.00%	0	0.00%	0	0.00%	$364,351	4.11%	0	0.00%	0	0.00%	0	0.00%	0	0.00%	0	0.00%	0	0.00%	
15*	GEN-2016-014	60 winter/52 summer	combustion turbine (ieu)		$3,694,351	0	0.00%	0	0.00%	0	0.00%	0	0.00%	0	0.00%	0	0.00%	0	0.00%	$364,351	4.11%	0	0.00%	0	0.00%	0	0.00%	0	0.00%	0	0.00%	0	0.00%	

	Monitored Element		OSAGE - WEBB CITY TAP 138KV CKT 1	OSAGE - WEBB CITY TAP 138KV CKT 1	OSAGE - WEBB CITY TAP 138KV CKT 1
	Contigency	Capacty (MW)	System Intact	System Intact	CLEVELAND - G15066_T 345.00 345KV CKT 1
	Line Rating A/B (MVA)		152	152	180
	TC% Loading (%MVA)		105.2	99.8	137.8
	DISIS OverLoad (MW)		7.9	(0.3)	68.1
	Change in flow after Redispatch		0.0	0.0	0.0
	ReDispatch Overload? (MW)		7.9	(0.3)	68.1
	New TC% Loading (%MVA)		*105.2*	*99.8*	*137.8*
In/Out	**Source**				
In	G16_009	29	0.0	0.0	0.0
In	G16_012	200	0.0	0.0	0.0
In	G16_022	151.8	0.0	0.0	0.0
In	G16_024	55.9	0.0	0.0	0.0
In	G16_031	1.5	0.0	0.0	0.0
In	G16-032	200	0.0	0.0	0.0
In	G16_048	82.3	4.3	4.2	4.9
In	G16_060	25.3	0.0	0.0	0.0
In	G16_061	250.7	0.0	0.0	0.0
In	G16_068	250	0.0	0.0	0.0
In	G16_071	200.1	14.0	0.0	0.0
In	G16_072	300	0.0	0.0	0.0
In	G16_073	220	0.0	0.0	0.0
In	G16_013_SP	10	0.0	0.0	0.0
In	G16_014_SP	10	0.0	0.0	0.0
In	G16_013_WP	10	0.0	0.0	0.0
In	G16_014_WP	10	0.0	0.0	0.0

Farber-Belle Plains 138kV	Farber-Belle Plains 138kV	Farber-Belle Plains 138kV	Middleton Tap- Chilocco 138kV	Kildare-White Eagle 138kV	Neosho-Riverton 161kV	Neosho-Riverton 161kV
System Intact	MIDLTNT4 138.00 - PECKHAM TAP 138KV CKT 1	G15-015T 138.00 - MDFRDTP4 138.00 138KVCKT 1	System Intact	HUNTERS7 345.00 - WOODRING 345KV CKT 1	System Intact	LITCHFIELD - SUB 349 - ASBURY 161KV CKT 1
160	160	160	106	222	191	223
126.2	167.5	104.8	**184.2**	***121.0***	***101.7***	***139.1***
41.9	107.9	7.7	89.3	46.7	3.3	87.2
0.0	0.0	0.0	0.0	0.0	0.0	0.0
41.9	107.9	7.7	89.3	46.7	3.3	87.2
126.2	*167.5*	*104.8*	*184.2*	*121.0*	*101.7*	*139.1*
0.0	0.0	0.0	0.0	0.0	0.0	0.0
0.0	0.0	0.0	0.0	0.0	0.0	0.0
0.0	0.0	0.0	0.0	0.0	0.0	0.0
0.0	0.0	0.0	0.0	0.0	0.0	0.0
0.0	0.0	0.0	0.0	0.0	0.0	0.0
0.0	0.0	0.0	0.0	0.0	0.0	0.0
2.8	0.0	2.7	0.0	0.0	0.0	0.0
17.7	21.5	0.0	0.0	0.0	0.0	0.0
0.0	0.0	0.0	0.0	0.0	0.0	0.0
0.0	0.0	0.0	0.0	0.0	0.0	0.0
50.8	138.8	0.0	200.1	80.5	0.0	0.0
0.0	0.0	0.0	0.0	0.0	0.0	0.0
0.0	0.0	0.0	0.0	0.0	0.0	0.0
0.0	0.0	0.0	0.0	0.0	0.6	0.0
0.0	0.0	0.0	0.0	0.0	0.6	0.0
0.0	0.0	0.0	0.0	0.0	0.0	0.7
0.0	0.0	0.0	0.0	0.0	0.0	0.7

Kinze-McElroy 138kV	Kinze-McElroy 138kV	Kinze-McElroy 138kV	Gen 2016-012Tap-La Cygne 345kV	Gen 2016-012Tap-La Cygne 345kV	Gen 2016-012Tap-La Cygne 345kV	Gen 2016-012Tap-La Cygne 345kV
System Intact	SOONER (SOONER5) 345/138/13.8KV TRANSFORMER CKT 1	CLEVELAND - G15066_T 345.00 345KV CKT 1	System Intact	CANEYRV7 345.00 - NEOSHO 345KV CKT 1	System Intact	CANEYRV7 345.00 - NEOSHO 345KV CKT 1
194	222	222	1141	1195	1141	1195
107.9	*103.2*	*115.5*	***110.9***	***122.1***	***99.1***	***108.9***
15.3	7.1	34.5	124.5	264.3	(10.3)	106.2
0.0	0.0	0.0	0.0	0.0	0.0	0.0
15.3	7.1	34.5	124.5	264.3	(10.3)	106.2
107.9	*103.2*	*115.5*	*110.9*	*122.1*	*99.1*	*108.9*
0.0	0.0	0.0	0.0	0.0	0.0	0.0
0.0	0.0	0.0	124.7	121.6	130.9	133.1
0.0	0.0	0.0	0.0	0.0	0.0	0.0
0.0	0.0	0.0	0.0	0.0	0.0	0.0
0.0	0.0	0.0	0.0	0.0	0.0	0.0
0.0	0.0	0.0	0.0	0.0	0.0	0.0
8.4	19.4	9.0	5.5	0.0	0.0	0.0
0.0	0.0	0.0	3.1	0.0	0.0	0.0
0.0	0.0	0.0	17.1	0.0	0.0	0.0
0.0	0.0	0.0	16.8	0.0	0.0	0.0
7.3	0.0	0.0	18.3	0.0	0.0	0.0
0.0	0.0	0.0	23.5	0.0	0.0	0.0
0.0	0.0	0.0	20.8	0.0	27.6	32.9
0.0	0.0	0.0	0.0	0.0	0.0	0.0
0.0	0.0	0.0	0.0	0.0	0.0	0.0
0.0	0.0	0.0	0.0	0.0	0.0	0.0
0.0	0.0	0.0	0.0	0.0	0.0	0.0

CANEYRV7 345.00 - NEOSHO 345KV CKT 1	CANEYRV7 345.00 - NEOSHO 345KV CKT 1	Cleveland-Tulsa 345kV	OSAGE - WHITE EAGLE 138KV CKT 1
System Intact	G16-012-TAP 345.00 - LACYGNE 345KV CKT 1	System Intact	CONTINENTAL EMPIRE - WHITE EAGLE 138KV CKT 1
766	923	1135	191
106.4	***106.2***	***103.4***	***103.4***
48.9	57.0	38.7	6.5
0.0	0.0	0.0	0.0
48.9	57.0	38.7	6.5
106.4	*106.2*	*103.4*	*103.4*
0.0	0.0	0.0	0.0
0.0	32.1	0.0	0.0
0.0	0.0	0.0	0.0
0.0	0.0	0.0	0.0
0.0	0.0	0.0	0.0
0.0	0.0	0.0	0.0
0.0	2.5	10.3	0.0
2.6	0.0	0.9	0.0
7.9	0.0	32.4	0.0
8.1	9.4	22.4	0.0
11.9	0.0	13.3	44.0
15.8	0.0	18.9	0.0
17.2	20.9	0.0	0.0
0.0	0.0	0.0	0.0
0.0	0.0	0.0	0.0
0.0	0.0	0.0	0.0
0.0	0.0	0.0	0.0

Monitored Element		OSAGE - WEBB CITY TAP 138KV CKT 1	OSAGE - WEBB CITY TAP 138KV CKT 1	OSAGE - WEBB CITY TAP 138KV CKT 1	Farber-Belle Plains 138kV	Farber-Belle Plains 138kV	Farber-Belle Plains 138kV	Middleton Tap-Chilocco 138kV	Kildare-White Eagle 138kV	Neosho-Riverton 161kV	Neosho-Riverton 161kV	Kinze-McElroy 138kV	Kinze-McElroy 138kV	Kinze-McElroy 138kV	Gen 2016-012Tap-La Cygne 345kV	Gen 2016-012Tap-La Cygne 345kV	Gen 2016-012Tap-La Cygne 345kV	Gen 2016-012Tap-La Cygne 345kV	CANEYRV7 345.00 - NEOSHO 345KV CKT 1	CANEYRV7 345.00 - NEOSHO 345KV CKT 1	Cleveland-Tulsa 345kV	OSAGE - WHITE EAGLE 138KV CKT 1
Contigency	Capacity (MW)	System Intact	System Intact	CLEVELAND - G15066_T 345.00 345KV CKT 1	System Intact	MIDLTNT4 138.00 - PECKHAM TAP 138KV CKT 1	G15-015T 138.00 - MDFRDTP4 138.00 138KVCKT 1	System Intact	HUNTERS7 345.00 - WOODRING 345KV CKT 1	System Intact	LITCHFIELD - SUB 349 - ASBURY 161KV CKT 1	System Intact	SOONER (SOONERS) 345/138/13.8KV TRANSFORMER CKT 1	CLEVELAND - G15066_T 345.00 345KV CKT 1	System Intact	CANEYRV7 345.00 - NEOSHO 345KV CKT 1	System Intact	CANEYRV7 345.00 - NEOSHO 345KV CKT 1	System Intact	G16-012-TAP 345.00 - LACYGNE 345KV CKT 1	System Intact	CONTINENTAL EMPIRE - WHITE EAGLE 138KV CKT 1
Line Rating A/B (MVA)		152	152	180	160	160	160	106	222	191	223	194	222	222	1141	1195	1141	1195	766	923	1135	191
TC% Loading (%MVA)		105.1799	99.8	137.8406	126.1996	167.456	104.8009	184.2206	121.0178	101.7166	139.0951	107.8981	103.1848	115.5184	110.913	122.1176	99.1	108.8839	106.3795	106.1701	103.411	103.407
DISIS OverLoad (MW)		7.87	-0.30	68.11	41.92	107.93	7.68	89.27	46.66	3.28	87.18	15.32	7.07	34.45	124.52	264.31	-10.27	106.16	48.87	56.95	38.71	6.51
Source																						
G16_009	29	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
G16_012	200	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.6233	0.6079	0.6544	0.6654	0.0000	0.1605	0.0000	0.0000
G16_022	151.8	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
G16_024	55.9	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
G16_031	1.5	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
G16-032	200	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
G16_048	82.3	0.0525	0.0512	0.0600	0.0342	0.0000	0.0327	0.0000	0.0000	0.0000	0.0000	0.1016	0.2356	0.1091	0.0666	0.0000	0.0000	0.0000	0.0000	0.0305	0.1250	0.0000
G16_060	25.3	0.0000	0.0000	0.0000	0.7011	0.8498	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.1241	0.0000	0.0000	0.0000	0.1023	0.0000	0.0349	0.0000
G16_061	250.7	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0681	0.0000	0.0000	0.0000	0.0314	0.0000	0.1291	0.0000
G16_068	250	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0671	0.0000	0.0000	0.0000	0.0323	0.0378	0.0897	0.0000
G16_071	200.1	0.0698	0.0000	0.0000	0.2538	0.6939	0.0000	1.0000	0.4021	0.0000	0.0000	0.0367	0.0000	0.0000	0.0915	0.0000	0.0000	0.0000	0.0594	0.0000	0.0666	0.2201
G16_072	300	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0784	0.0000	0.0000	0.0000	0.0528	0.0000	0.0630	0.0000
G16_073	220	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0945	0.0000	0.1257	0.1494	0.0780	0.0950	0.0000	0.0000
G16_013_SP	10	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0577	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
G16_014_SP	10	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0577	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
G16_013_WP	10	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0728	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
G16_014_WP	10	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0728	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000

Chilocco Wind Project
FAQ - 130308

1. **Why is a Limited Waiver of Sovereign Immunity required?**

   A Limited Waiver is necessary to assure investors and banks who are risking hundreds of millions of dollars that there is a common basis for addressing disputes. Investors and banks want to insure access to the property to operate the project, reclaim the equipment in the event the project owner defaults. Investors and banks require the protection of their investment by the ability to initiate court actions in federal courts, and that all parties to the agreements have agreed to be subject to and bound by federal court for this limited and specific purpose.

2. **Is this the final language for these agreements and the Limited Waiver of Sovereign Immunity?**

   This is a large project (over $300 million) that generates significant income for the CN. The project involves a number of parties and stake holders who will have input into the final agreements. These include the BIA, lender banks, investors and CN. Although there is complete agreement on terms and substantial agreement on the documents as reviews advance there may be changes to the language of some of the documents as they advance through the various reviews and approvals. The terms and the language of the Limited Waiver of Sovereign Immunity have been reviewed and accepted by the banks and developer who assure CN of its acceptability to the investors. If however any changes are needed that require Tribal Council approval then further approvals may be sought although not currently anticipated. The approval of the limited waiver is an important step but it is but a step in the process of implementation of this significant project.

3. **What is the rush for the approval of the Waiver?**

   a. *<u>The Tax Credits for the project are time limited.</u> Recent legislation concerning the "Fiscal Cliff" extended the federal Production Tax Credit (PTC) to include Wind Projects installed before the end of December 31, 2103. This tax credit is sold to investors, and is a major contributor to the financial viability of the Project. Without the PTC, the project is less valuable and perhaps not viable.*

b. *<u>There is an impending deadline on the CNB connection agreement which adds considerable value to the CN's land.</u> The CNB applied for and received a Generator Interconnection Agreement (GIA) that was originally thought to be expiring at the end of 2012. CPV has confirmed with the utility and the regional transmission authorities that it will not expire until September, 2013. The process for reapplying if the GIA expires is costly and time consuming as it has to follow a specific process established by the Federal Energy Regulatory Commission. The GIA provides the Project with the means of fully exporting the power from the Project to its customers. Without this capability, exports from the Project would become hit-or-miss, resulting in a significantly reduced value of the Project until such time as a new GIA could be received. Reapplying for a new GIA could take several years to fully process as once expired the process requires an applicant to start over at the back of the line. While September seems like a long way away…by the time the agreements are completed, investors lined up, bank financing arranged and proper notice is provided to the utility for the connection the September date will be upon us.*
c. *<u>The sooner the Project is started the faster CN gets paid.</u> The Cherokee Nation has now arranged for a significant amount of compensation direct to the general fund at the completion of the project.*

4. What does CN receive and give up in the transaction?

a. *CN gives up the exclusive development rights on its fee and trust lands for a period of three years. This will not interrupt the current surface or mineral rights leases on the property unless a development proceeds and then only minimally.*
b. *CN will receive an estimated total payment of $6,820,000 at the completion of the Project and the sale of the equity in the Project. The ongoing lease payments each year if the project is completed will be a minimum of $391,000 each year that has a net present value of $3,729,855 over 20 years (discounted at 10%).*

5. What if <u>no</u> wind generation facilities are installed on CN lands?

There are three possible outcomes that would have no wind generation facilities installed on CN lands…all highly unlikely.

a. *PNE decides not to execute the WRL within the 3 year period of the WEEL. This could result from investors or financing not materializing, the off take agreement may not be finalized or the BIA may not approve of the lease.*

   In this case CN would receive no compensation and the WEEL would expire and option to lease the property would be dissolved.

b. *PNE exercises its option under the WEEL to execute the WRL but then does not proceed with the project.*

   i. *The WRL terminates one (1) year after the execution of the WRL unless construction on CN fee or trust lands are not commenced beforehand. As such all agreements terminate and the CN would receive no compensation, although none of CN's activities or leases would have been affected.*
   ii. *If the BIA approved the WRL which would have happened prior to its execution, then the wind data held by the developer would be released to CN, which takes time and money to collect and is a valuable asset that could be used to develop the property independently or with another developer.*

c. *Although it is highly unlikely and frankly nearly impossible, but PNE could exercises the option to sign the WRL and build the project entirely on the adjacent land leased from the other tribes.*

   i. *CN would still enjoy the benefits of "ownership" but not of the lease.*
   ii. *CNB's $588,160 non-grant project development expenses would be reimbursed at financial closing.*
   iii. *Assuming BIA has approved the trust portion of the WRL, CN will gain access and use of the wind data previously collected by PNE*
   iv. *CN will earn $15/acre -or- 0.5% of gross project revenues: value is about $39,225/yr (land payment) – the revenue portion should produce a higher return. Assuming the full 153 MW Project is developed, with no facilities on CN lands, CN would earn $9 million over a 20 year period, with a NPV (10% disc) of $3.9 million*
   v. *Per WDA, the five percent ownership granted in CWP remains intact – value is approximately $3.9 million*

6. **Who will fund development of the GIA to keep it from expiring in September?**

   If the project agreements are completed, PNE will pay the deposit to OG&E (estimated at $1.2M) and recoup this expense from proceeds from the project financing or from the sale of the Project to Investors.

7. **Who is CPV?**

   Cimarron Power Ventures, LLC is the consulting subsidiary of Walters Power International, LLC, based in Oklahoma City, Oklahoma. In the power generation and development business for over 18 years WPI has developed large and small project all over the world. WPI is currently an owner developer of two power projects in Pakistan and is part of a consortium awarded a 15 year, $25 billion contract to provide the first liquefied natural gas plant in Pakistan. WPI initiated a new business in 2009 in the United Kingdom to support the renewable energy generation. UK Power Reserve is led by the principal of WPI as Chairman and CEO and has two large institutional investment partners based in the US and England. UKPR current owns and operates 11 plants totaling 129MW and expects to grow significantly in the power reserve markets. WPI own with large institutional partners two power plants in California and has actively pursued renewable energy projects in California. WPI is currently pursuing reserve power projects in the Texas ERCOT market.

8. **Why was CPV engaged to support this project?**

   Cimarron Power Ventures, LLC is involved by invitation of CNB, who contacted CPV in late December, 2012. CPV was asked to independently evaluate the Project and provide its assessment and recommendation regarding the benefits of CN's participation or not. CPV is also under a prior agreement to provide similar guidance and recommendations for similar work to CNB for an evaluation and recommendation of the W.D. Mayo Hydroelectric Project. As such, CPV was a natural selection for providing a fast-turnaround regarding the Chilocco Wind Project.

   CPV's recommendation was submitted to CNB in early February with a recommendation to proceed. CPV has asked to represent CN directly with the developer of the Project and has taken the lead on renegotiating terms and compensation benefits to CN. CPV recommended independent council

to work with the CN AG's office to redraft the documents to further mitigate the risk to CN.

Although an agreement has not yet been signed it is anticipated that CPV will have its cost reimbursed from DOE project grant funds as a project representative and receive a contingent fee based on improvements in compensation to CN that it generates.

9. What does CPV provide that CNB cannot?

CNB has tenaciously pursued the project for many years and organized the DOE grant and the connection application and the developer identification process. A devoted team at CNB has done an excellent job of navigating through the development process. CPV brings an intense level of experience in all aspects of power plant development including financing, building and operations. CPV's parent and principals have bought and sold dozens of large and small projects and are familiar with the project agreements and the issues from both parties perspective.

CPV has established it value by getting the project moving quickly on better terms with less risk to CN.

10. How were the returns increased?

a. *CPV negotiated the inclusion of Phase 1 (CN lands) and Phase 2 (other tribal properties) into the compensation in order for CN to benefit from the efficiencies and increased return to the developer by developing Phase 1 and Phase 2 together. CN's leverage was increased when CPV demonstrated in writing from two sources that the GIA had not in fact expired as the developer maintained; the GIA is a crucial project element that would have threatened its participation in CWF and significantly delayed Phase 1 earnings. This was accomplished by simply substituting a more global SPV to include Phases 1 and 2 rather than just an SPV for Phase 1.*
b. *The result of the above change caused the COD to double and the ownership sales payment to CN upon sale to increase by more than a factor of 5.5X. The later occurred due to the attractiveness to investors of the larger project in addition to CN participating in the sale proceeds from a project twice the size as originally anticipated.*

c. *CPV has also negotiated the reimbursement to CNB of the approximate $588,361 of project-related development expenses not funded by grants expended over the last several years.*
d. *The result of the above is a 175% increase in the year one cash to CN and a 70% increase in the NPV of the project over the 20 year lease period.*

11. Who will purchase the power generated from the plant?

Although proprietary, PNE has secured a purchaser, Western Farmers.

12. Can CN receive power from the project for use at the CN Casinos?

Since the buyer is Western Farmers and CN is served by PSO, who has exclusive jurisdiction in their service territory, it is not possible for CN to buy the energy from the project.

13. What other usage options were considered prior to deciding on a wind farm?

A wind farm was deemed highest and best use due to its location in the "wind corridor" and the current economics (PTCs and public/private green initiatives) that support development, as well as the Federal initiative to develop renewable resources on tribal lands. Legacy usage is agricultural and O&G leases.

14. Is there any opportunity for CN to own the project?

There may be an opportunity for ownership. CPV is currently reviewing the option of CN borrowing the equity required to own the project, recourse only to the project and have the equity loan retired from the tax savings that result from CN's ownership. This is still in the exploration stage.

POWER PURCHASE AGREEMENT

BETWEEN

AND

CHILOCCO WIND FARM LLC

DATED AS OF [_____], 2014

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POWER PURCHASE AGREEMENT

THIS POWER PURCHASE AGREEMENT ("Agreement") is entered into as of the [___] day of [_____], 2014 by and between_____, a ____ ("Buyer"), and Chilocco Wind Farm LLC, a Delaware limited liability company ("Seller"). Each of Buyer and Seller is referred to individually under this Agreement as a "Party" and together they are referred to as the "Parties".

RECITALS

WHEREAS, Seller desires to develop, design, construct, own and operate a wind powered electric generating facility with an expected total nominal nameplate rated capacity of 76.5 MW (the "Facility" as further described herein);

WHEREAS, Seller intends to locate the Facility in Kay County, Oklahoma at the Facility Premises (such term, together with other initially capitalized terms used in the Recitals, having the meaning assigned to it in Section 1.1), and to interconnect the Facility with the Southwest Power Pool ("SPP") transmission network;

WHEREAS, Seller desires to sell and deliver to Buyer 100% of the Energy output from the Facility plus all Environmental Attributes and Buyer desires to accept and purchase the same from Seller; and

WHEREAS, the Parties desire to set forth the terms and conditions pursuant to which such sales and purchases shall be made;

NOW, THEREFORE, in consideration of the mutual covenants and agreements herein set forth, the sufficiency and adequacy of which are hereby acknowledged, the Parties agree as follows:

ARTICLE I
DEFINITIONS AND INTERPRETATION

Section 1.1. Definitions.

The following capitalized terms shall have the following meanings:

"Accountant" means [_____].

"Affiliate" means, as to any Person, any other Person that, directly or indirectly, is in control of, is controlled by or is under common control with such Person or is a director or officer of such Person or of an Affiliate of such Person.

"Agreement" means this Power Purchase Agreement.

"Authorized Auditors" means representatives of Buyer who are authorized to conduct audits on behalf of Buyer.

"Authorized Representative" means, with respect to each Party, the person designated as such Party's authorized representative pursuant to Section 10.6.

"Bankruptcy" means any case, action or proceeding under any bankruptcy, reorganization, debt arrangement, insolvency or receivership law or any dissolution or liquidation proceeding commenced by or against a Person and, if such case, action or proceeding is not commenced by such Person, such case or proceeding shall be consented to, not timely contested or acquiesced in by such Person or shall result in an order for relief or shall remain undismissed for ninety (90) days.

"BOP Contract" means that certain agreement for construction of the Facility balance of plant to be entered into by Seller.

"Business Day" means any calendar day that is not a Saturday, a Sunday, or a day on which commercial banks are authorized or required to be closed in Oklahoma City, Oklahoma.

"Buyer" has the meaning set forth in the Preamble.

"Central Prevailing Time" means Central Standard Time or Central Daylight Savings Time, whichever is in effect in Oklahoma City, Oklahoma.

"Change in Law" has the meaning set forth in Section 11.1(a).

"Code" means the Internal Revenue Code of 1986, as amended, and the U.S. Treasury Regulations promulgated thereunder.

"Commercial Operation" means the satisfaction, occurrence or waiver of the conditions set forth in Section 4.4 with respect to the Facility.

"Commercial Operation Date" means the date on which Commercial Operation is achieved by the Facility.

"Confidential Information" has the meaning set forth in Section 14.19(a).

"Contract Year" means each twelve-month period commencing on the Commercial Operation Date and each anniversary thereof, as applicable, and ending on the day before the subsequent anniversary of the Commercial Operation Date.

"Default" means any of the events or circumstances set forth in Section 12.1.

"Default Termination Notice" has the meaning set forth in Section 12.4(a).

"Defaulting Party" has the meaning set forth in Section 12.1.

"Delivered Output" means the Energy produced by wind turbines at the Facility that is delivered to and metered at the Point of Delivery on and after the Commercial Operation

Date, together with the Environmental Attributes associated therewith, which amount will be adjusted pursuant to Section 8.5(b).

"Delivery Term" has the meaning set forth in Section 2.1.

"Dispute" and "Dispute Notice" have the respective meanings set forth in Section 10.8(a).

"Due Date" has the meaning set forth in Section 6.2.

"Early Termination Payment" has the meaning set forth in Section 7.2.

"Effective Date" has the meaning set forth in Section 2.1.

"Electric Metering Device(s)" means all meters, metering equipment, and data processing equipment used to measure, record, or transmit data relating to the Energy output from the Facility. Electric Metering Devices include the metering current transformers and the metering voltage transformers.

"Energy" means electric energy in MWh.

"Energy Rate" has the meaning set forth in Section 11.1(b).

"Environmental Attributes" means any and all credits, benefits (other than Tax Benefits), offsets, reductions, or allowances, howsoever defined, entitled or recognized, resulting from the generation of renewable Energy and its subsequent displacement of conventional energy generation. Environmental Attributes include without limitation: (1) any avoided emission of carbon dioxide (CO_2), methane (CH_4), or any other greenhouse gas, and (2) any avoided emission of sulfur oxides (SO_x), nitrogen oxides (NO_x), carbon monoxide (CO), particulate matter (PM), or any other sources or air, soil, or water pollution. Environmental Attributes received hereunder may be applied under any governmental, regulatory, or voluntary program, including but not limited to the United Nations Framework Convention on Climate Change (UNFCC) and the Kyoto Protocol to the UNFCC, in accordance with applicable law. Environmental Attributes are also commonly known as renewable energy credits (RECs) and green tags, and the terms shall have identical meanings for the purposes of this Agreement. Seller shall transfer and sell and Buyer shall receive and purchase all Environmental Attributes associated with all Energy produced by wind turbines at the Facility pursuant to Article V.

"Facility" means the wind powered electric generating facility, including the Facility Premises, the wind turbine generators, substation, structures, facilities, equipment, fixtures, improvements and associated real and personal property and the other rights and interests related thereto, as further described in Exhibit A.

"Facility Capacity" means the maximum net continuous output level (in MW) that the Facility is designed to produce and is capable of delivering to the Point of Delivery, which is planned to be 76.5 MW.

"Facility Lender" means any financing party providing senior or subordinated development, construction, interim or long-term debt or equity financing or refinancing (through lease financing or otherwise) for or in connection with the development, construction, purchase, installation or operation of the Facility, including any equity or tax investor or lessor providing financing or refinancing for the Facility or purchasing equity ownership interests of Seller and/or its Affiliates, and any trustee or agent acting on their behalf, and any Person or entity providing interest rate protection agreements to hedge any of the foregoing debt or financing obligations.

"Facility Premises" means the real estate on which the Facility is, or will be, constructed and located, including any interests reasonably necessary for the construction, operation and maintenance of the Facility. The Facility Premises is more specifically described in Exhibit A.

"FERC" means the Federal Energy Regulatory Commission or any successor agency thereto.

"Force Majeure" has the meaning set forth in Section 14.2(b).

"Forced Outage" means the removal of service availability of the Facility, or any portion of the Facility, for emergency reasons or conditions in which the Facility, or any portion thereof, is unavailable due to unanticipated failure, including as a result of Force Majeure.

"Full Access" has the meaning set forth in Section 11.4(b).

"Government Entity" means the United States of America, any state thereof, or any local jurisdiction, or any political subdivision of any of the foregoing including, but not limited to courts, administrative bodies, departments, commissions, boards, bureaus, agencies, municipalities or other instrumentalities.

"Increased Cost Notice" has the meaning set forth in Section 11.1(b).

"Insurance" means the policies of insurance as set forth in Exhibit B.

"Interconnection Agreement" has the meaning set forth in Section 9.2(g).

"Interconnection Facilities" means any and all equipment located from and including the high side of the transformer located on the Facilities Premises to and including the [substation] located on the 136 kV Newkirk Line [owned by Oklahoma Gas & Electric].

"Invoice" has the meaning set forth in Section 6.1(b).

"Law" means any statute, law, rule or regulation or any judicial or administrative interpretation thereof having the effect of the foregoing imposed by a Government Entity.

"Lien" means any lien, mortgage, encumbrance, attachment, pledge, charge, lease, sublease, easement or security interest of any kind.

"Leases and Property Agreements" means (A) the leases and property agreements and instruments under which Seller shall acquire the Facility Premises listed on Schedule 9.1(i), as well as other undeveloped property in connection therewith, and (B) the grants of rights of way and the leases, agreements, deeds and other instruments providing for the acquisition by Seller of the Interconnection Facilities right of way and associated property rights and interests.

"Major Equipment Reserve" has the meaning set forth in Section 10.1(d).

"Minimum Annual Quantity" means, for each Contract Year, eighty percent of the P50 Energy Output as set forth on Schedule 5.2, and the Environmental Attributes associated therewith.

"Monthly Billing Period" has the meaning set forth in Section 6.1(b).

"MW" means megawatt or megawatts, as applicable.

"MWh" means megawatt-hour or megawatt-hours, as applicable.

"NERC" means the North American Electric Reliability Council or its successor organization, if any.

"Non-Defaulting Party" has the meaning set forth in Section 12.4(a).

"Notice" has the meaning set forth in Section 10.7.

"Notifying Party" has the meaning set forth in Section 10.8(a).

"O&M Reserve" has the meaning set forth in Section 10.1(c).

"Operating Insurance" means the Insurance associated with the Facility from and after the Commercial Operation Date, all as set forth in Exhibit B.

"Operating Statement" has the meaning set forth in Section 6.1(a).

"P50 Energy Output" means the annual amount of Energy predicted to be generated by the wind turbines at the Facility with a probability of exceedance of 50%, as set forth in the written certificate delivered pursuant to Section 5.2.

"Party" has the meaning set forth in the Preamble.

"Permitted Assignee" has the meaning set forth in Section 9.3(a).

"Permitted Encumbrances" means (i) any Lien expressly provided for or permitted by the terms of the Agreement, (ii) Liens for taxes not yet due or for taxes being contested in good faith by appropriate proceedings so long as such proceedings do not involve a material risk of the sale, forfeiture, loss or restriction on the use of the Facility or any part thereof, provided that such proceedings end by the expiration of the Delivery Term, (iii) suppliers', vendors', mechanics', workman's, repairman's, employees' or other like Liens arising in the ordinary course of business for work or service performed or materials furnished in

connection with the Facility for amounts the payment of which is either not yet delinquent or is being contested in good faith by appropriate proceedings so long as such proceedings do not involve a material risk of the sale, forfeiture, loss or restriction on use of the Facility or any part thereof, provided that such proceedings end by the expiration of the Delivery Term, (iv) easements, rights of way, use rights, exceptions, encroachments, reservations, restrictions, conditions or limitations, provided that in each case the same do not interfere with or impair the operation or use of the Facility or any interest therein as contemplated by the Agreement, or have a material adverse effect on the value, the remaining useful life or the utility of the Facility or any interest therein, and (v) any Lien against the Facility in connection with any development, construction or interim financing or refinancing of the Facility in effect prior to the Commercial Operation Date.

"Person" means any individual, corporation, partnership, joint venture, limited liability company, association, joint stock company, trust, unincorporated organization, entity, government or other political subdivision.

"Point of Delivery" means Seller's Electric Metering Device situated at the high side of the transformer at the substation located on the Facilities Premises.

"Price" means the price (in $/MWh) specified in Schedule 5.5.

"Project Agreements" means: (i) as to Seller, this Agreement, the Turbine Supply Agreement, the BOP Contract and any operation and maintenance agreement with respect to the Facility and any other contract relating to the Facility having a value greater than $50,000; and (ii) as to Buyer, this Agreement.

"Prudent Utility Practices" means those practices, methods, and acts, that are commonly used by a significant portion of the electric wind power generation industry in prudent engineering and operations to design, construct and operate electric equipment (including wind powered facilities) lawfully and with safety, dependability, efficiency, and economy, including any applicable practices, methods, acts, guidelines, standards and criteria of FERC, NERC, and all applicable Laws.

"Recipient Party" has the meaning set forth in Section 10.8(a).

"Replacement Energy" has the meaning set forth in Section 7.3.

"Scheduled Outage" means any outage with respect to the Facility other than a Forced Outage.

"Seller" has the meaning set forth in the Preamble.

"Shortfall Output" has the meaning set forth in Section 7.1.

"Shortfall Output Payment" has the meaning set forth in Section 7.2.

"Special Purpose Entity" has the meaning set forth in Section 9.1(g).

"SPP" has the meaning set forth in the Recitals.

"Startup and Test Energy" means the energy produced by the Facility and delivered to the Point of Delivery prior to the Commercial Operation Date.

"Step-in Rights" has the meaning set forth in Section 7.4(a).

"Tariff Rates" has the meaning set forth in Section 3.5(b).

"Tax Benefits" means all tax deductions, tax credits, and depreciation and ownership benefits available under applicable Laws to owners or operators of the Facility, including Tax Credits, or such substantially equivalent tax credits that provide Seller with a tax credit based on energy production from any portion of the Facility and all tax deductions, tax credits and depreciation and ownership benefits that are now or may in the future be, applicable to owners and/or operators of the Facility under the laws of the United States or the laws of the State of Oklahoma.

"Tax Credits" means either (a) the Production Tax Credit or "PTCs" under Section 45 of the Code, or (b) the Investment Tax Credit or "ITCs" under Section 48 of the Code, including any grants in lieu of such credits, as such credits may be amended, supplemented, extended or replaced from time to time, and including all successor enactments or legislation relating thereto.

"Taxes" has the meaning set forth in Section 10.9(a).

"Termination Date" has the meaning set forth in Section 11.1(c).

"Termination Notice" has the meaning set forth in Section 11.1(c).

"Transmission Services Agreement" means an agreement between Buyer and [SPP] providing for the transmission of electricity from the Point of Delivery.

"Turbine Supply Agreement" means that certain turbine supply agreement to be entered into by Seller and Turbine Supplier.

"Turbine Supplier" means [General Electric].

"Updated Base Case Model" has the meaning set forth in Section 4.2.

"Wind Expert" has the meaning set forth in Section 5.2.

Section 1.2. Interpretation. In this Agreement, unless a clear contrary intention appears:

(a) the singular number includes the plural number and vice versa;

(b) reference to any Person includes such Person's successors and assigns but, in case of a Party hereto, only if such successors and assigns are permitted by this Agreement,

and reference to a Person in a particular capacity excludes such Person in any other capacity or individually;

(c) reference to any gender includes the other;

(d) reference to any agreement (including this Agreement), document, instrument or tariff means such agreement, document, instrument or tariff as amended or modified and in effect from time to time in accordance with the terms thereof and, if applicable, the terms hereof;

(e) reference to any Article, Section, Schedule or Exhibit means such Article of this Agreement, Section of this Agreement, or such Schedule or Exhibit to this Agreement, as the case may be, and references in any Article or Section or definition to any clause means such clause of such Article or Section or definition;

(f) "hereunder", "hereof", "hereto" and words of similar import shall be deemed references to this Agreement as a whole and not to any particular Article or Section or other provision hereof or thereof;

(g) "including" (and with correlative meaning "include") means including without limiting the generality of any description preceding such term;

(h) relative to the determination of any period of time, "from" means "from and including", "to" means "to but excluding" and "through" means "through and including";

(i) reference to time shall always refer to Central Prevailing Time; and

(j) reference to any "day" shall mean a calendar day unless otherwise indicated.

ARTICLE II
TERM

Section 2.1. Term. This Agreement shall become effective as of the date of its execution (the "Effective Date"). Subject to any early termination provisions set forth herein, this Agreement shall remain in full force and effect for a period of thirty (30) years following the Commercial Operation Date (the "Delivery Term"). The term of this Agreement shall commence on the Effective Date and shall end upon the expiration or termination for any reason of the Delivery Term.

ARTICLE III
FACILITY DESCRIPTION

Section 3.1. Summary Description. Seller shall construct, own and operate and maintain the Facility, which shall consist of wind turbines and associated equipment having an expected Facility Capacity of 76.5 MW. Exhibit A provides a detailed description of the Facility.

Section 3.2. Location. The Facility shall be located on the Facility Premises. A map of the Facility is included in Exhibit A.

Section 3.3. General Design and Operation of the Facility. Seller shall develop, construct, operate and maintain the Facility in compliance with all applicable Laws, Prudent Utility Practices and applicable manufacturer's and operator's warranties, specifications and recommended procedures.

ARTICLE IV
COMMERCIAL OPERATION

Section 4.1. Progress Reports. Commencing upon the Effective Date, and continuing until the Commercial Operation Date, Seller shall provide to Buyer quarterly written reports describing permitting and development activities in the previous quarter and anticipated progress and activities for the upcoming quarter. Seller shall provide to Buyer such other information regarding the permitting, engineering, construction or operations, of Seller, its subcontractors or the Facility, financial or otherwise, and other data concerning Seller, its subcontractors or the Facility as Buyer may, from time to time, reasonably request. Seller shall, as and when reasonably requested, provide Buyer with copies of completion certificates and other deliverables that are required from the counterparties under the Turbine Supply Agreement and the BOP Contract. Buyer shall be permitted to inspect the Facility from time to time upon reasonable notice to Seller and during reasonable business hours, provided that Buyer is accompanied by Seller's employees made available for such purpose. Seller shall provide Buyer the reasonable opportunity to be present for any start-up or other testing of the Facility.

Section 4.2. Commercial Operation. Seller shall provide Buyer with a written notice when Seller believes that all conditions precedent to achieving Commercial Operation of the Facility have been satisfied. The conditions precedent to Commercial Operation are as follows:

(a) The Facility is installed and physically complete, SPP has issued written confirmation that the Interconnection Facilities are complete and operational (but only if such confirmation(s) are required under the Interconnection Agreement), and the Facility and Interconnection Facilities are capable of generating, transmitting, transforming and delivering all of the Energy from the Facility to the Point of Delivery;

(b) An officer of Seller, familiar with the Facility, has provided a list of the Facility's equipment, showing the make, model, and designed maximum output (nameplate capacity) of such equipment, and has certified the Facility Capacity;

(c) The Facility has demonstrated the reliability of its communications systems and communications with SPP;

(d) The wind turbines have been commissioned by the Turbine Supplier as reflected in a commissioning certificate;

(e) Seller and SPP have entered into the Interconnection Agreement;

(f) An officer of Seller, familiar with the Facility, has certified that all arrangements for the supply of required electric services to the Facility, including the supply of station power have been completed by Seller separate from this Agreement, are in effect, and are available for the supply of such electric services to the Facility;

(g) Certificates of insurance evidencing the coverages required under this Agreement have been obtained and submitted to Buyer; and

(h) Seller has submitted to Buyer a certificate of an officer of Seller familiar with the Facility after due inquiry stating that all permits, consents, licenses, approvals, and authorizations required at that time to be obtained by Seller from any Government Entity to operate the Facility in compliance with applicable Law and this Agreement have been obtained and are in full force and effect, and that Seller is in compliance with the terms and conditions of this Agreement in all material respects.

Section 4.3. Startup and Test Energy. Seller shall deliver to Buyer and Buyer shall accept at the Point of Delivery any and all Startup and Test Energy at no charge to Buyer.

ARTICLE V
PURCHASE AND SALE OF ENERGY AND ENVIRONMENTAL ATTRIBUTES; POINT OF DELIVERY

Section 5.1. Sale and Purchase of Energy and Environmental Attributes. From and after the Commercial Operation Date and continuing through the end of the Delivery Term, Seller shall make available and deliver to the Point of Delivery all of the Energy generated by the Facility and all associated Environmental Attributes, and Buyer shall accept and purchase all such Energy and Environmental Attributes in accordance with this Agreement.

Section 5.2. Facility Capacity and P50 Energy Output. [Schedule 5.2 sets forth (in MWh) the P50 Energy Output and the Minimum Annual Quantity, as certified by [DNV] or another independent wind expert of recognized standing selected by Seller and reasonably acceptable to Buyer (the "Wind Expert") on or before the Effective Date.]

Section 5.3. Taxes and Operating Insurance Payments. Commencing on the Commercial Operation Date, Buyer shall reimburse Seller for all Taxes and Operating Insurance premiums following the Commercial Operation Date. Such reimbursement amounts shall be estimated by Seller prior to the year of payment, divided by twelve (12) and included on each Invoice. Any overpayment or underpayment by Buyer of reimbursement amounts for such actual Taxes and Operating Insurance premiums paid by Seller shall be reconciled through an adjustment to the Invoice sent to Buyer in the month following the applicable calendar year of payment.

Section 5.4. Price. Schedule 5.4 sets forth the Price for each Contract Year.

ARTICLE VI
BILLING; PAYMENT

Section 6.1. Operating Statements and Billing Invoices.

(a) No later than ten (10) Business Days after the end of each calendar month, commencing with the calendar month in which the Commercial Operation Date occurs, Seller shall deliver to Buyer a written statement (the "Operating Statement") showing the operations of the Facility for the preceding month. The Operating Statement shall include:

(i) the amount of Delivered Output for such month and the total amount of Delivered Output for the current Contract Year as of the end of such month;

(ii) the number of hours in such month during which the Facility was unable to produce Energy due to events of Force Majeure; and

(iii) in the case of the Operating Statement for the last month in each Contract Year, (A) a statement as to whether the Minimum Annual Quantity was delivered during such Contract Year, (B) the amount, if any, of Shortfall Output that accrued during such Contract Year and (C) the total amount of Shortfall Output outstanding as of the end of such Contract Year.

(b) No later than ten (10) Business Days after the end of each calendar month (the "Monthly Billing Period"), Seller shall provide to Buyer an invoice (the "Invoice") which shall set forth:

(i) the amount owed by Buyer for Delivered Output Section 5.4 and Schedule 5.4;

(ii) the amount owed by Buyer for Taxes and Operating Insurance premiums pursuant to Section 5.3;

(iii) the amount owed by Seller to reimburse Buyer for Replacement Energy pursuant to Section 7.3; and

(iv) the amount owed by Seller to reimburse Buyer for expenses incurred by Buyer in accordance with Section 7.4.

(c) The Operating Statement and Invoice for each Monthly Billing Period may be combined into a single document, and shall be sent to the address of Buyer set forth in Exhibit C, or such other address as may be provided in writing by Buyer to Seller from time to time for such purpose.

(d) Notwithstanding the foregoing, the Operating Statement and Invoice shall be prepared by Buyer for each month during which the Step-in Rights are exercised.

Section 6.2. Payments. Unless otherwise specified herein, payments due under this Agreement shall be due and payable by check or by electronic funds transfer, as designated by the owed Party, on or before twenty (20) days following the date of the Invoice (the "Due Date"). Remittances received by mail will be considered to have been paid when due if the postmark indicates the payment was mailed on or before the Due Date. If the amount due is not paid on or before the Due Date, a late payment charge shall be applied to the unpaid balance and shall be added to the next Invoice. Any unpaid balance shall accrue a late payment interest charge at the rate of one percent (1.0%) per month or the maximum rate permitted by law, whichever is less, from and including the Due Date but excluding the date such payment is made.

Section 6.3. Billing Disputes. In the event any portion of any bill is in dispute, the disputed amount shall nonetheless be paid under protest when due. The Party disputing a payment shall promptly notify the other Party in writing of the basis for the dispute. Billing disputes shall be discussed and resolved by the Authorized Representatives, who shall use their best efforts to amicably and promptly resolve the disputes, and any failure to agree shall be subject to resolution in accordance with Section 10.8. Upon resolution of any billing dispute, the required amount of payment or refund shall be paid within ten (10) days after such determination, with interest accrued at the rate of one percent (1.0%) per month or the maximum rate permitted by law, whichever is less, computed from and including the Due Date but excluding the date such payment or refund is made.

ARTICLE VII
SHORTFALL OUTPUT; STEP-IN RIGHTS

Section 7.1. Shortfall OutputIf Seller fails to deliver the Minimum Annual Quantity during any Contract Year, then the amount of the deficiency shall constitute "Shortfall Output." During any period in which there is Shortfall Output due to Buyer, Seller may from time to time elect upon notice to Buyer to deliver to Buyer an amount of Energy and Environmental Attributes up to the amount of Shortfall Output to reduce or eliminate any amount of Shortfall Output.

(b) Buyer shall keep and maintain accurate books and records showing for each Contract Year the amounts of Shortfall Output which shall be open for inspection by Seller upon reasonable notice. Absent manifest error, Buyer's determination of the amounts of Shortfall Output shall be conclusive and binding upon the Parties.

Section 7.2. Shortfall Output Payment. Upon the expiration or termination of this Agreement prior to the end of the Delivery Term, Seller shall promptly pay to Buyer, in addition to all other amounts payable hereunder, (a) an amount equal to the product of (i) the Price and (ii) the accrued and outstanding amount of Shortfall Output (the "Shortfall Output Payment"). In the event Buyer exercises its Step-in Rights in accordance with Section 7.4, Seller may pay to Buyer the Shortfall Output Payment and following receipt of such payment Buyer shall return possession, control and operation of the Facility to Seller as provided in Section 7.4(c).

Section 7.3. Replacement Energy. If Seller fails to deliver the Minimum Annual Quantity for three consecutive Contract Years, Seller shall, if requested by Buyer,

provide to Buyer replacement energy at the Point of Delivery, or at such other delivery point as may be mutually agreed upon by the parties, including associated Environmental Attributes comparable to those associated with the Energy produced by the Facility ("Replacement Output") within 180-days after the third anniversary, or fourth anniversary if shortfall is caused by events of Force Majeure, on a delivery schedule mutually agreed upon by the Parties, provided that such schedule shall not cause the Delivered Output to be delivered at a rate greater than 76.5 MW. If Seller fails to deliver Replacement Output as described above then Buyer may purchase Replacement Output and promptly notify Seller of the cost of such Replacement Output and Seller shall reimburse Buyer for said Replacement Output as provided in Article VI. Notwithstanding anything in this Section 7.3 to the contrary, in the event a shortfall is caused by events of Force Majeure, Seller shall have no obligation to deliver to Buyer any Replacement Output or to reimburse Buyer for any Replacement Output if (a) Seller has commenced remediation of the Facility, and (b) Seller is proceeding diligently to complete such remediation.

Section 7.4. Step-in RightsIn the event (1) of the Bankruptcy of Seller or (2) that Seller ceases, for a period of ninety (90) days or longer, to operate the Facility in accordance with Prudent Utility Practices resulting in a failure by Seller to deliver the Minimum Annual Quantity during such ninety (90) day period (a "Step-in Event"), Buyer shall have the right to provide written notice to Seller of such Step-in Event and, following such notice, Buyer shall commence a review and investigation of Seller's operation of the Facility. Following receipt of such notice, Seller shall reasonably cooperate with Buyer's review and investigation. The Parties shall mutually cooperate during such review and investigation to cure the Step-in Event.

(b) If, following the review and investigation of the Facility described in Section 7.4(a), which review and investigation shall last no less then ninety (90) days and be pursued diligently by Buyer during such time, (1) the Step-in Event shall remain uncured and (2) the Step-in Event is not due to events of Force Majeure, Seller shall, at Buyer's written request, permit Buyer to step in and possess, assume control of, and operate the Facility as agent for Seller (in accordance with Seller's rights, obligations and interest under this Agreement, all subject and subordinate to the rights of any lender or mortgagee of the Facility (the "Step-in Rights"); provided, that by assuming such possession, control and operational responsibility for the Facility as Seller's agent, Buyer shall in no way become or be liable to any such lender or mortgagee by virtue of sole possession, control and operation.

(c) During the period in which Buyer is in possession of the Facility, Buyer shall operate the Facility using Prudent Utility Practices and Buyer shall use commercially reasonable efforts to maximize the profitability of the Facility; provided that any capital improvements or replacements or repairs of the Facility shall require mutual agreement by Buyer and Seller and Seller shall be obligated to finance and fund all of the costs of any such capital improvements or replacements or repairs of the Facility for its own account, and Buyer shall have no direct or indirect liability to make any such payments. At the end of each Monthly Billing Period, Buyer shall invoice Seller for the full amount of any and all expenses reasonably incurred by Buyer to operate and maintain the Facility during such period, and Seller shall reimburse Buyer for said invoiced amounts in accordance with Section 6.2.

(d) Buyer shall return possession, control and operation of the Facility to Seller and cease acting as Seller's agent under this Section 7.4 upon the earliest to occur of

(i) cure of the Step-in Event, (ii) Buyer's return, in its sole discretion at any time, of possession, control and operation of the Facility to Seller and Buyer's ceasing to act as Seller's agent under this Section 7.4, or (iii) termination of this Agreement. Notwithstanding anything in this Section 7.4 to the contrary, in the event that Seller's failure to deliver the Minimum Annual Quantity is caused by one or more events of Force Majeure, Seller shall have no obligation to permit Buyer to step in and possess, assume control of, and operate the Facility as agent for Seller in accordance with this Section 7.4 if (d) Seller has commenced remediation of the Facility, and (b) Seller is proceeding diligently to complete such remediation.

(e) Seller agrees that, if the balance in the Major Equipment Reserve is less than_____ at the time of Buyer's exercise of its Step-in Rights, then Seller shall contribute to the Major Equipment Reserve the amount of cash necessary to increase the balance of the Major Equipment Reserve to _____.

ARTICLE VIII
POINT OF DELIVERY; METERING

Section 8.1. Point of Delivery. Seller shall deliver Energy to Buyer, and Buyer shall receive Energy from Seller, under this Agreement at the Point of Delivery. Seller will be responsible for all losses to the Point of Delivery. Buyer will be responsible for all losses from the Point of Delivery.

Section 8.2. Title and Risk of Loss. As between the Parties, Seller shall be deemed to be in control of the Energy from the Facility up to and until delivery at the Point of Delivery and Buyer shall be deemed to be in control of such Energy from and after delivery at the Point of Delivery. Title and risk of loss related to the Energy shall transfer from Seller to Buyer at the Point of Delivery.

Section 8.3. Electric Metering Devices. Seller shall be responsible for reading the Electric Metering Devices at the end of each calendar month. All Electric Metering Devices used to measure the Delivered Output made available to Buyer by Seller under this Agreement and to monitor and coordinate operation of the Facility shall be owned, installed, and maintained in accordance with the Interconnection Agreement at no cost to Buyer under this Agreement. If Electric Metering Devices are installed at a location other than the Point of Delivery, meters or meter readings will be adjusted to reflect losses from the Electric Metering Devices to the Point of Delivery. Seller shall provide Buyer access to all Electric Metering Devices for all purposes necessary to perform under this Agreement and shall provide Buyer the reasonable opportunity to be present at any time any Electric Metering Devices are to be inspected and tested or adjusted in accordance with the Interconnection Agreement. Seller shall provide Buyer with all authorizations necessary to have access to the Electric Metering Devices, including obtaining any consent or other agreement from the Interconnection Provider necessary to allow Buyer such access.

Section 8.4. Testing, Inspection and Adjustment of Meters. All Electronic Metering Devices shall be tested, inspected and adjusted, as necessary in accordance with the Interconnection Agreement.

Section 8.5. Scheduling of EnergySeller shall be responsible for scheduling the forecast of Energy to the Point of Delivery during the Delivery Term, on a non-binding basis, in accordance with the terms of the Interconnection Agreement and any dispatch and scheduling procedures that may be updated from time to time by Buyer. Seller shall submit schedules, and any updates to such schedules, to Buyer based on the most current forecast of Energy as reasonably requested by Buyer. All generation scheduling and transmission services shall be performed in accordance with the applicable NERC operating policies, criteria, and any other applicable guidelines and shall be non-binding on Seller as to forecast of Energy deliveries. Seller shall also fulfill the contractual, metering and interconnection requirements set forth in this Agreement, so as to be able to deliver Energy to the Point of Delivery. Notwithstanding anything in this Agreement to the contrary, Seller shall in no event have any liability for any imbalance charges for transmitting energy.

(b) If required by events of Force Majeure, conditions on transmission systems downstream of the Point of Delivery or otherwise by the terms of the Interconnection Agreement, Seller shall curtail deliveries of Energy to the Point of Delivery. For purposes of Section 7.3 and Section 7.4, Seller shall receive a credit against its obligation to deliver the Minimum Annual Quantity in an amount equal to all such curtailed Energy (and associated Environmental Attributes) that would have been Delivered Output had the curtailment not occurred; and such curtailed Energy shall be reasonably estimated by the Parties and deemed Delivered Output for invoicing and payment purposes. All payments due under Section 6.2 shall include all such adjusted Delivered Output. In addition to payments due pursuant to this Agreement for non-curtailed Delivered Output, Buyer shall pay to Seller all amounts, including any applicable Tax Credits, to which Seller would have been entitled but did not receive for Energy and associated Environmental Attributes curtailed by Buyer pursuant to this Section 8.5. Seller shall install sufficient measuring equipment at the Facility to collect data necessary to reasonably estimate the quantity of curtailed Energy.

ARTICLE IX
REPRESENTATIONS, WARRANTIES AND COVENANTS

Section 9.1. Seller's Representations, Warranties and Covenants. Seller hereby represents, warrants and covenants as follows:

(a) Seller is a limited liability company, duly organized, validly existing and in good standing under the laws of the State of Delaware, is qualified to do business in the State of Delaware and has the legal power and authority to own its properties, to carry on its business as now being conducted and to enter into the Project Agreements executed as of the Effective Date and, subject to the receipt of the regulatory approvals identified in Schedule 9.1(d), carry out the transactions contemplated hereby and perform and carry out all covenants and obligations on its part to be performed under and pursuant to the Project Agreements executed as of the Effective Date.

(b) The execution, delivery and performance by Seller of the Project Agreements executed as of the Effective Date have been duly authorized by all necessary action, and do not and will not require any consent or approval of any member or manager of Seller other than that which has been obtained.

(c) The execution and delivery of the Project Agreements executed as of the Effective Date, the consummation of the transactions contemplated hereby and thereby, and the fulfillment of and compliance with the provisions of the Project Agreements executed as of the Effective Date, do not and will not conflict with or constitute a breach of or a default under, any of the terms, conditions or provisions of any Law, or any organizational documents, agreement, deed of trust, mortgage, loan agreement, other evidence of indebtedness or any other agreement or instrument to which Seller is a party or by which it or any of its property is bound, or result in a breach of or a default under any of the foregoing.

(d) Except for those permits, consents, approvals, licenses and authorizations identified in Schedule 9.1(d), which Seller shall use commercially reasonable efforts to obtain, and which Seller anticipates will be obtained by Seller, all permits, consents, approvals, licenses, authorizations, or other action required by any Government Entity to authorize Seller's execution, delivery and performance of the Project Agreements executed as of the Effective Date have been duly obtained and are in full force and effect.

(e) The Project Agreements executed as of the Effective Date constitute the legal, valid and binding obligations of Seller enforceable in accordance with their respective terms, except as such enforceability may be limited by bankruptcy, insolvency, reorganization or similar laws relating to or affecting the enforcement of creditors' rights generally or by general equitable principles, regardless of whether such enforceability is considered in a proceeding in equity or at law.

(f) There is no pending, or to the knowledge of Seller, threatened action or proceeding affecting Seller before any Government Entity, which purports to affect the legality, validity or enforceability of any of the Project Agreements executed as of the Effective Date.

(g) Seller has been, is, and covenants and agrees that it shall remain, a Special Purpose Entity. For purposes of this Agreement, a "Special Purpose Entity" means an entity which:

(i) shall not (A) engage in any dissolution, liquidation or consolidation or merger with or into any other business entity, (B) transfer, lease or sell, in one transaction or any combination of transactions, all or substantially all of its properties or assets except to the extent permitted herein, (C) modify, amend or waive any provisions of its organizational documents related to its status as a Special Purpose Entity or (D) terminate its organizational documents or its qualifications and good standing in any jurisdiction;

(ii) was, is and will be organized solely for the purpose of (A) acquiring, developing, owning, holding, selling, leasing, transferring, exchanging, managing and operating the Facility, and (B) entering into the Project Agreements and transacting lawful business that is incident, necessary and appropriate to accomplish the foregoing;

(iii) has not been, is not, and will not be engaged in any business unrelated to the acquisition, development, ownership, management or operation of the Facility;

(iv) has not failed and will not fail to correct any known misunderstanding regarding the separate identity of such entity; and

(v) has maintained and will maintain its accounts, books, resolutions, agreements and records separate from any other Person and has filed and will file its own tax returns or has filed and will file tax returns together with its sole member.

(h) Seller has (i) not entered into this Agreement or any other documents related thereto with the actual intent to hinder, delay or defraud any creditor and (ii) received reasonably equivalent value in exchange for its obligations under this Agreement. No petition in bankruptcy has been filed against Seller, and neither Seller nor any of its constituent Persons has ever made an assignment for the benefit of creditors or taken advantage of any insolvency act for its benefit as a debtor.

(i) Seller is the legal lessee (by original execution or legal and valid assignment) under all of the Leases and Property Agreements as listed in Schedule 9.1(i). The Leases and Property Agreements provide Seller with all necessary leaseholds or other property rights and interests necessary for Seller to construct, install, operate and maintain the Facility. All Leases and Property Agreements, to the extent recordable under federal or state law, have been duly recorded in the land records of Kay County, Oklahoma or as otherwise provided by applicable law. The Leases and Property Agreements are in full force and effect, and Seller is in compliance with the terms and conditions of the Leases and Property Agreements in all material respects.

(j) Prior to the Commercial Operation Date, Seller and SPP shall enter into an interconnection agreement, to define the equipment to be installed at the Point of Delivery, to provide firm interconnection of the Facility at the Point of Delivery, and to provide for all other interconnection issues (the "Interconnection Agreement").

(k) Seller agrees that on and as of the Commercial Operation Date Seller shall have all Government Entity approvals, permits, consents, licenses and authorizations necessary to own and operate the Facility and to sell electricity at wholesale hereunder, including any FERC or other regulatory approvals.

Section 9.2. Buyer's Representations, Warranties and Covenants. Buyer hereby represents, warrants and covenants as follows:

(a) Buyer is duly organized, validly existing and in good standing under the laws of the State of Oklahoma and has the legal power and authority to (i) own its properties, (ii) carry on its business as now being conducted, (iii) enter into the Project Agreements and carry out the transactions contemplated hereby and thereby and (iv) perform and carry out all covenants and obligations on its part to be performed under and pursuant to the Project Agreements.

(b) The execution, delivery and performance by Buyer of the Project Agreements have been duly authorized by all necessary action, and do not and will not require any consent, approval or other action of Buyer's [governing body] or members, or any Government Entity , other than that which has been obtained.

(c) The execution and delivery of the Project Agreements, the consummation of the transactions contemplated hereby and thereby and the fulfillment of and compliance with the provisions of the Project Agreements do not and will not conflict with or constitute a breach of or a default under, any of the terms, conditions or provisions of any Law, or its organization agreement or bylaws, or any agreement, deed of trust, mortgage, loan agreement, other evidence of indebtedness or any other agreement or instrument to which Buyer is a party or by which it or any of its property is bound, or result in a breach of or a default under any of the foregoing.

(d) The Project Agreements constitute the legal, valid and binding obligations of Buyer enforceable in accordance with their respective terms, except as such enforceability may be limited by bankruptcy, insolvency, reorganization or similar laws relating to or affecting the enforcement of creditors' rights generally or by general equitable principles, regardless of whether such enforceability is considered in a proceeding in equity or at law.

(e) There is no pending, or to the knowledge of Buyer, threatened action or proceeding affecting Buyer before any Government Entity, which purports to affect the legality, validity or enforceability of this Agreement.

(f) Buyer shall, as reasonably requested by Seller, cooperate with Seller in development of the Facility.

ARTICLE X
CONTRACT ADMINISTRATION; NOTICES; DISPUTES

Section 10.1. Facility OperationSeller shall, at all times staff, control, and operate the Facility consistent with all applicable Laws, Prudent Utility Practices, the terms of any operating agreement and applicable manufacturer's and operator's specifications and recommended procedures. Personnel capable of starting, operating, and stopping the Facility shall be available, either at the Facility, or capable of remotely starting, operating, and stopping the Facility within two (2) hours and capable of being at the Facility with no more than two (2) hours notice. In all cases personnel capable of starting, operating and stopping the Facility shall be continuously reachable by phone. Seller shall provide Buyer with copies of any default notice or other notice that Seller may from time to time receive from the operator pursuant to the terms of any operating agreement relating to operation of the Facility.

(b) Seller shall provide annually to Buyer a proposed maintenance schedule for the Facility showing the work to be performed and the duration of all Scheduled Outages, and shall reasonably cooperate with Buyer so that Scheduled Outages occur at such times as shall least interfere with Buyer's utilization of the output of the Facility.

(c) Subject to Prudent Utility Practice, Seller shall, on or before the Commercial Operation Date, establish an operations and maintenance reserve, which shall be a part of the project budget (the "O&M Reserve"). The O&M Reserve may be used for

extraordinary costs and expenses which may arise from time to time following the Commercial Operation Date that directly relate to operation and maintenance of the Facility.

(d) Subject to Prudent Utility Practice, Seller shall, on or before the date that is five years from the Commercial Operation Date, establish a major equipment reserve, which shall be a part of the project budget (the "Major Equipment Reserve"). The Major Equipment Reserve may be used for costs and expenses arising from and incurred in connection with the replacement or refurbishment of the Facility's major equipment.

Section 10.2. Operating Records. Seller and Buyer shall each keep complete and accurate records and all other data required by each of them for the purposes of proper administration of this Agreement, including such records as may be required by a Government Entity in the prescribed format.

Section 10.3. Operating Log. Seller shall maintain an accurate and up-to-date operating log, in electronic format, at the Facility with records of production for each clock hour; changes in operating status; Scheduled Outages and Forced Outages for the purposes of proper administration of this Agreement and preparation of complete and accurate Operating Statements pursuant to Section 6.1, including such records as may be required by a Government Entity in the prescribed format.

Section 10.4. Billing and Payment Records and AuditsTo facilitate payment and verification, Seller and Buyer shall keep and preserve all books and records necessary for billing and payments in accordance with Article VI for a period of not less than six (6) years following the date of final payment under this Agreement.

(b) Seller shall be subject, at any time upon seven (7) days' prior written notice, to an audit by Authorized Auditors relating to the accuracy of all billings and of all costs for which Buyer is required to reimburse Seller pursuant to Article VI. The Authorized Auditors shall have access to all records and data relating to such billings, costs and metering. Seller shall maintain and the Authorized Auditors will have the right to examine and audit all books, records, documents, accounting procedures and practices, and other evidence, regardless of form (e.g., machine readable media such as disk, tape, etc.) or type (e.g., databases, applications software, database management software, utilities, etc.), sufficient to properly reflect all such billings and costs. Any information provided on machine-readable media shall be provided in a format accessible and readable by the Authorized Auditors. Seller shall not, however, be required to furnish the Authorized Auditors with commonly available software. The Authorized Auditors will also have the right to reproduce, photocopy, download, or transcribe, such billing and cost records. Seller shall make such records, or to the extent accepted by the Authorized Auditors, photographs, micro-photographs etc. or other authentic reproductions thereof available to the Authorized Auditors at Seller's offices at all reasonable times and without charge. Notwithstanding the foregoing, if the audit reveals that the overpayment is more than 5% of the billing, Seller shall pay all expenses and costs incurred by the Authorized Auditors arising out of or related to the audit.

Section 10.5. Examination of Records. Subject to the confidentiality provisions of Section 14.19, Seller and Buyer may examine the operating records kept by the other Party

relating to transactions under and administration of this Agreement, at any time during the period the records are required to be maintained, upon request and during normal business hours. Seller shall maintain a copy of all operating records after completion of the Agreement, for five (5) years, or as required by applicable law, whichever time period is greater.

Section 10.6. Authorized Representative. Each Party hereto shall designate an authorized representative who shall be authorized to act on its behalf with respect to those matters contained herein (each an "Authorized Representative"), which shall be the functions and responsibilities of such Authorized Representatives. Each Party may also designate an alternate who may act for the Authorized Representative. Within thirty (30) days after execution of this Agreement, each Party shall notify the other Party in writing of the identity of its Authorized Representative, and alternate if designated, and shall promptly notify the other Party of any subsequent changes in such designation. The Authorized Representatives shall have no authority to alter, modify, or delete any of the provisions of this Agreement. Prior to the Commercial Operation Date, the Authorized Representative of each Party will meet periodically to discuss issues related to the sharing of information on the operation and maintenance of the Facility, provided, however, that Buyer shall have no right to approve Seller's schedules or budgets.

Section 10.7. Notices. Notices, demands and other communications made by one Party to the other pursuant to this Agreement (each, a "Notice") may be sent by facsimile, electronic mail, other mutually acceptable electronic means, a nationally recognized overnight courier service, first class mail or hand delivery at the addresses set forth on Exhibit D. Any Party may change its address at any time by giving notice of such change to the other Party in the manner provided herein. Notice shall be given when received by the addressee, unless received on a day that is not a Business Day or received after 5:00 p.m. on a Business Day, in which case Notice shall be deemed to have been received on the next following Business Day. In the absence of proof of the actual receipt date, the following presumptions will apply: (i) Notice sent by facsimile or electronic mail shall be deemed to have been received upon the sending party's receipt of electronic confirmation of successful transmission; (ii) Notice sent by overnight mail or courier shall be deemed to have been received on the next Business Day after it was sent or such earlier time as is confirmed by the receiving party; and (iii) Notice sent by first class mail shall be deemed to have been received five Business Days after mailing.

Section 10.8. Dispute Resolution. Except as provided in Section 12.2(c), regarding suits for injunctive relief, disputes under this Agreement between Seller and Buyer may be resolved in accordance with the provisions of this Section 10.8.

(a) In the event of any claim, controversy or dispute between the Parties arising out of or relating to or in connection with this Agreement (including any dispute concerning the validity of this Agreement or the scope and interpretation of this Section 10.8) (a "Dispute"), either Party (the "Notifying Party") may deliver to the other Party (the "Recipient Party") notice of the Dispute with a detailed description of the underlying circumstances of such Dispute (a "Dispute Notice"); provided, however, that a Defaulting Party may not deliver a Dispute Notice to a Non-Defaulting Party for the purpose of avoiding the Non-Defaulting Party's rights under Section 12.4, including the Non-Defaulting Party's right to terminate this Agreement.

(b) The Dispute Notice shall include a schedule of the availability of the Notifying Party's managers or senior officers (having a title of senior vice president (or its equivalent) or higher), as applicable, duly authorized to settle the Dispute during the thirty (30) day period following the delivery of the Dispute Notice.

(c) The Recipient Party shall within five (5) Business Days following receipt of the Dispute Notice, provide to the Notifying Party a parallel schedule of availability of the Recipient Party's managers or senior officers (having a title of senior vice president (or its equivalent) or higher), as applicable, duly authorized to settle the Dispute. Following delivery of the respective senior management members' schedules of availability, the senior management of the Parties shall meet and confer as often as they deem reasonably necessary during the remainder of the thirty (30) day period in good faith negotiations to resolve the Dispute to the satisfaction of each Party.

(d) In the event a Dispute is not resolved pursuant to the procedures set forth in Subsections 10.8(a), 10.8(b) and 10.8(c) by the expiration of the thirty (30) day period set forth in Subsection 10.8(b) then either Party may pursue any legal remedy available to it in accordance with Section 14.8.

Section 10.9. TaxesSubject to the limitations in Section 5.4, Buyer will be responsible for, and will reimburse Seller if paid by Seller, lawful state and local taxes assessed within the State of Oklahoma, which are directly associated with the Facility or the delivery or sale of Energy, including all property taxes or payments in lieu of property taxes directly associated with the Facility and excluding income, payroll, and sales taxes other than sales taxes directly imposed on the delivery or sale of Energy ("Taxes"). To the extent reasonably able to do so, either Party, upon written request of the other, shall provide a certificate of exemption or other reasonably satisfactory evidence of exemption if either Party is exempt from any Taxes, and shall use all reasonable efforts to obtain or maintain, or to enable the other Party to obtain or maintain, any exemption from or reduction of any Taxes, whether currently available or becoming available in the future.

(b) Seller will pay all lawful Taxes and will use reasonable efforts to minimize Taxes, and will consult with Buyer on any negotiations Seller may undertake with Government Entities responsible for imposing Taxes. Promptly following its payment of any Taxes, Seller shall provide Buyer with copies of receipts or other evidence of the payment of such Taxes. Seller shall also promptly provide to Buyer copies of all notices, correspondence or other items (including, without limitation, written reports on any verbal exchanges with the relevant taxing authorities) to the extent relating to Taxes, and shall afford Buyer a reasonable opportunity to participate in any discussions or other communications with any taxing authority relating to Taxes. To the extent it is legally able to do so, Seller will follow the written instructions of Buyer with respect to the negotiation, reporting, payment and contest (and shall permit Buyer to conduct such contest, to the extent it is legally able to do so) of any Taxes for which Seller is liable hereunder. Seller shall promptly pay to Buyer the amount of any refunds or other credits against any Taxes or other economic benefits which Seller receives or to which it is entitled with respect to any Taxes for which Buyer is responsible hereunder. Without limiting the generality of the foregoing, the Parties agree that, if beneficial to the efforts of either Party to obtain or maintain any exemption from or reduction of any Taxes, whether currently available or

becoming available in the future, the Parties will cooperate to restructure the transactions contemplated by this Agreement so as to enable either Party to obtain or maintain such exemption or reduction, as the case may be, provided, however, that any such restructuring shall not affect adversely the economic consequences to either Party. Buyer shall have no obligations with respect to any Taxes to the extent such Taxes (i) are attributable to any period prior to the Commercial Operation Date, or following the expiration or termination of this Agreement in accordance with the terms hereof, (ii) are imposed as a result of the gross negligence or willful misconduct by Seller, the breach by Seller of any of its obligations under this Agreement or any related transaction document, or (iii) are imposed as a result of any transfers by Seller of any interest in the Facility, this Agreement or any transaction contemplated hereby or related hereto (except to the extent resulting from a breach by Buyer of its obligations under this Agreement).

Section 10.10. Damage or Destruction. In the event of any damage or destruction of the Facility or any part thereof, the Facility or such part thereof shall be diligently repaired, replaced or reconstructed by Seller so that the Facility or such part thereof shall be restored to substantially the same general condition and use as existed prior to such damage or destruction, unless a different condition or use is approved by Buyer. Proceeds of Insurance with respect to such damage or destruction maintained as provided in this Agreement shall be applied to the payment for such repair, replacement or reconstruction of the damage or destruction as provided in Section 10.11.

Section 10.11. InsuranceSeller shall obtain and maintain the Insurance coverages listed in Exhibit B on the terms set forth in Exhibit B and such premiums shall be reimbursed to Seller by Buyer pursuant to and subject to the limitations of Section 5.4. Insurance coverages for jointly owned facilities shall be apportioned to Seller in an equitable manner. In the event that the cost of obtaining and maintaining coverage required by this Agreement materially increases from the cost that applies to such Insurance coverage as of the Effective Date, or if any risk required to be insured in connection with this Agreement becomes uninsurable after the Effective Date, then at Seller's request the Parties shall, using reasonably prudent risk management practices and insurance industry standards, revise such insurance coverages then in effect as the parties mutually determine to be necessary so as to enable Seller to provide Insurance to the extent available on commercially reasonable terms.

(b) If at any time there shall have occurred a casualty event with respect to all or a substantial portion of the Facility, all Insurance proceeds relating to such event shall be paid by the insurer to an escrow agent named in the insurance policy as the loss payee and deposited in an escrow account held by such escrow agent. Such escrow agent shall be mutually agreed upon by Buyer and Seller. Seller may request a withdrawal or transfer from the escrow account by delivering to the escrow agent, with a copy to Buyer, a requisition of funds no fewer than five (5) days in advance of any proposed transfers or withdrawals from the escrow account. Each requisition of funds shall be accompanied by a certification by a financial officer of Seller to the effect that (i) the directed withdrawals, transfers or payments will be used exclusively for repair, replacement or restoration of the Facility and (ii) such repair, replacement, or restoration are being conducted either (x) pursuant to plans and specifications that have been previously approved in writing by Buyer, or (y) pursuant to such other arrangements approved in writing by Buyer. Upon receipt of a requisition of funds, the escrow agent shall make the withdrawals, transfers or payments directed therein.

ARTICLE XI
CHANGE IN LAW; EARLY TERMINATION

Section 11.1. Change in LawFor purposes of this Agreement, a "Change in Law" means a change in Law occurring after the Effective Date that imposes additional costs on the performance by Seller of its obligations under this Agreement or on Seller's ownership, construction and/or operation and maintenance of the Facility that would cause the development or operation of the Facility to be infeasible or uneconomic. The operation of the Facility shall not be rendered infeasible or uneconomic within the meaning of the preceding sentence unless the Change in Law shall (i) prevent the operation of the Facility as intended by this Agreement or (ii) cause an increase in annual operating expenses exceeding $[25,000]. A "Change in Law" shall not include a loss, reduction or recapture of Tax Benefits resulting from any failure by Seller to maintain its eligibility to receive Tax Benefits or to comply with any ongoing requirements of Law necessary to maintain its right to receive Tax Benefits. For the avoidance of doubt, this Section 11.1 shall not apply to a change in Law relating to Taxes.

(b) Upon the occurrence of a Change in Law, Seller shall have the right to submit a request (an "Increased Cost Notice") to Buyer for an additional payment per MWh of Delivered Output ("Energy Rate") determined by Seller to be the per MWh rate necessary (but not more than the rate necessary) to enable it to recover such increased costs. The Increased Cost Notice shall include sufficient detail regarding the Change in Law, the increased costs imposed on Seller and such revenue and cost projections as shall be reasonably necessary to enable Buyer to verify the proposed Energy Rate. If Buyer determines that it is willing to agree to the Energy Rate proposed by Seller, Buyer shall, within ninety (90) days of the date of the Increased Cost Notice, notify Seller thereof, and the Parties shall amend this Agreement to reflect such Energy Rate and this Agreement, as so amended, shall continue in full force and effect.

(c) If Buyer fails to provide such notice, Seller may elect to terminate this Agreement by providing written notice (a "Termination Notice") to Buyer at any time not less than ninety (90) days nor more than one hundred twenty (120) days from the date of the Increased Cost Notice. The Termination Notice shall specify the date on which termination of this Agreement is to become effective (the "Termination Date"), which shall be not earlier than thirty (30) days from the date of the Termination Notice.

Section 11.2. Early Termination.

(a) On the Termination Date pursuant to termination of this Agreement in accordance with Section 11.1 or Section 12.4, Seller shall pay to Buyer an amount equal to the Shortfall Output Payment, if any.

(b) Upon payment in full of the Shortfall Output Payment, if any, this Agreement shall terminate without any further financial or other obligation of Seller in favor of Buyer as a result of such termination.

ARTICLE XII
DEFAULT; REMEDIES

Section 12.1. Default. Each of the following events or circumstances shall constitute a "Default" by the responsible Party (the "Defaulting Party"):

(a) Payment Default. Failure by either Party to pay any amount when due under this Agreement which is not cured within ten (10) Business Days after receiving written notice thereof from the other Party hereto.

(b) Performance Default. Failure by any Party to perform and observe each of its material covenants and agreements set forth in Article IX or to perform any of its other material duties or obligations under this Agreement, in either case when and as due (other than the failure to make any payment) which is not cured within thirty (30) days after receipt of written notice thereof from the other Party hereto.

(c) Inaccuracy of Representations and Warranties. Inaccuracy of any representations and warranties made herein at the time made or deemed to be made. For the avoidance of doubt, the representations and warranties of the Parties are made on and as of the Effective Date and are deemed to be made on such other dates as are provided herein.

(d) Failure to Achieve Commercial Operation. Failure by Seller to achieve Commercial Operation within ninety (90) days following December 21, 2014, and such failure is not cured within thirty (30) days following Seller's receipt of written notice thereof from Buyer.

(e) Failure to Accept Energy and Environmental Attributes. Failure by Buyer to accept all Energy and Environmental Attributes produced by the Facility.

Section 12.2. Default Remedies.

(a) Upon a Default by Buyer under Section 12.1(a), Seller may, at its sole option, suspend service and sell Energy to third parties or continue to provide services pursuant to its obligations under this Agreement; provided that nothing in this Section 12.2(a) shall affect Seller's rights and remedies set forth in this Section 12.2. If Seller elects to suspend service to Buyer, it shall exercise commercially reasonable efforts to (i) sell the Energy and Environmental Attributes from the Facility to third parties at market rates and (ii) mitigate Buyer's damages. Proceeds from the sale of Energy and Environmental Attributes to third parties shall be allocated in the following order of priority:

(i) *first*, to the reasonable costs and expenses incurred by Seller in remarketing the Energy and Environmental Attributes from the Facility;

(ii) *second*, to the payments due by Buyer under Section 5.4;

(iii) *third*, to Seller.

Seller's continued service to Buyer shall not act to relieve Buyer of any of its duties or obligations under this Agreement.

(b) If Seller is in Default for any reason, Buyer may by notice to Seller invoke and exercise the Step-in Rights as and to the extent provided in Section 7.4. Buyer shall return possession, control and operation of the Facility to Seller and cease acting as Seller's agent under this Section 12.2(b) upon such Default being cured to Buyer's reasonable satisfaction.

(c) Notwithstanding any other provision herein, if any Default has occurred and is continuing, the affected Party may, whether or not the dispute resolution procedure set forth in Section 10.8 has been invoked or completed, bring an action in any state or federal court of competent jurisdiction, as authorized by and consistent with the provisions of Section 14.8 of this Agreement, seeking injunctive relief in accordance with applicable Oklahoma or Federal rules of civil procedure.

(d) Except as expressly limited by this Agreement, if a Default has occurred and is continuing and Buyer is the Defaulting Party, Seller may without further notice exercise any rights and remedies provided herein or otherwise available at law or in equity, including the right to terminate this Agreement pursuant to Section 12.4. No failure of Seller to exercise, and no delay in exercising, any right, remedy or power hereunder shall operate as a waiver thereof, nor shall any single or partial exercise by Seller of any right, remedy or power hereunder preclude any other or future exercise of any right, remedy or power.

(e) Except as expressly limited by this Agreement, if a Default has occurred and is continuing and Seller is the Defaulting Party, Buyer may without further notice exercise any rights and remedies provided for herein, or otherwise available at law or equity, including termination of this Agreement pursuant to Section 12.4. No failure of Buyer to exercise, and no delay in exercising, any right, remedy or power hereunder shall operate as a waiver thereof, nor shall any single or partial exercise by Buyer of any right, remedy or power hereunder preclude any other or future exercise of any right, remedy or power.

Section 12.3. Effect of Termination on Agreements. The expiration or termination for any reason of this Agreement shall not affect the Leases and Property Agreements or the continuing effectiveness thereof.

Section 12.4. Termination for Default.

(a) If a Default occurs, the Party that is not the Defaulting Party (the "Non-Defaulting Party") shall, without limiting any other rights or remedies available to the Non-Defaulting Party under this Agreement, possess the right to terminate this Agreement upon notice (by facsimile or other reasonable means) to the Defaulting Party (a "Default Termination Notice"). A Default Termination Notice shall specify the Termination Date and shall include the Non-Defaulting Party's calculation of the amount owed by Seller on the Termination Date in respect of the Shortfall Output Payment, if any.

(b) On the Termination Date the Shortfall Output Payment, if any, shall be due and payable by Seller.

(c) If the Non-Defaulting Party fails to furnish a Default Termination Notice within one-hundred eighty (180) days following the date on which the Default becomes known to the Non-Defaulting Party (or such later date if the Non-Defaulting and Defaulting Parties

agree to an extension), then such right of termination shall no longer be available to the Non-Defaulting Party as a remedy for the event(s) of Default.

ARTICLE XIII
LEGAL AND REGULATORY COMPLIANCE

Section 13.1. Compliance with Laws. Each Party shall at all times comply with all Laws applicable to it, except for any noncompliance which, individually or in the aggregate, could not reasonably be expected to have a material effect on the business or financial condition of the Party or its ability to fulfill its commitments hereunder. As applicable, each Party shall give all required notices, shall procure and maintain all necessary governmental permits, licenses, and inspections necessary for performance of this Agreement, and shall pay its respective charges and fees in connection therewith. In the event any permits, licenses or similar governmental or regulatory grants of authority necessary to operate or construct the Facility expire, terminate, or are revoked, encumbered, lost or otherwise become ineffective, notice shall immediately be given to the other Party by the Party responsible for obtaining the permit or license. Further that responsible Party shall take all necessary actions to replace or reinstate the permit or license.

Section 13.2. Certificates. Each Party shall deliver or cause to be delivered to the other Party certificates of its officers, accountants, engineers or agents as to matters as may be reasonably requested, and shall make available, upon reasonable request, personnel and records relating to the Facility to the extent that the requesting Party requires the same in order to fulfill any regulatory reporting requirements, or to assist the requesting Party in litigation, including, but not limited to, administrative proceedings before Government Entities.

ARTICLE XIV
MISCELLANEOUS

Section 14.1. Decommissioning and Other Costs. Buyer shall not be responsible for any cost of decommissioning or demolition of the Facility or any environmental liability associated with the construction, operation, or decommissioning thereof without regard to the timing or the cause of such decommissioning or demolition.

Section 14.2. Force Majeure.

(a) Neither Party hereto shall be considered to be in default in the performance of any of its obligations under this Agreement (other than the obligations of a Party to make payment of amounts due under this Agreement, which are not subject to Force Majeure) when the failure of performance shall be due to Force Majeure despite commercially reasonable efforts of such Party to prevent or mitigate its effects. A Party which is not able to perform its obligations under this Agreement as a result of Force Majeure shall give prompt, written notice including a detailed description of the Force Majeure to the other Party, which notice shall include information with respect to the nature, cause and date of commencement of such event, and the anticipated scope and duration of the delay. The Party providing such notice shall be excused from fulfilling its obligations under this Agreement to the extent and until such time that the Force Majeure has ceased to prevent performance or other remedial action is taken, at which

time the Party shall promptly notify the other Party of the resumption of its performance under this Agreement. This Section 14.2 does not excuse Buyer from payments due to Seller up to the time that Seller ceased deliveries of Energy due to a Force Majeure. Any Party whose performance under this Agreement is affected by Force Majeure shall make all reasonable efforts to remove and cure the Force Majeure and perform its obligations under this Agreement and to mitigate the effects of the Force Majeure. It is understood by the Parties that the foregoing provisions do not excuse any obligations of Seller with respect to Shortfall Output resulting from events of Force Majeure.

(b) In the event of any Force Majeure, the milestone deadlines set forth in this Agreement, including the dates by which Seller will achieve Commercial Operation pursuant to Section 12.1(d), shall be extended for the same number of days as the duration of such Force Majeure.

(c) The term "Force Majeure" means causes or events beyond the reasonable control of, and without the fault or negligence of the Party claiming Force Majeure, including, without limitation, acts of God, sudden actions of the elements such as floods, earthquakes, hurricanes, or tornadoes; high winds of sufficient strength or duration to materially damage a facility or significantly impair its operation; lightning; fire; ice storms; sabotage; vandalism beyond that which could reasonably be prevented by Seller or Buyer; terrorism; war; fire; riots; explosion; blockades; insurrection; strike; slow down or labor disruptions (even if such difficulties could be resolved by conceding to the demands of a labor group); actions or inactions by any governmental authority taken after the date hereof (including the adoption or change in any rule or regulation or environmental constraints lawfully imposed by such governmental authority) but only if such requirements, actions, or failures to act prevent or delay performance; and inability, despite due diligence, to obtain any licenses, permits, or approvals required by any governmental authority. A Force Majeure does not include (i) an act of negligence or wrongdoing; (ii) events arising from the failure by Seller to operate and maintain the Facility in accordance with Prudent Utility Practices and the standards set forth in this Agreement; (iii) an increase in the variable and fixed costs of operation and maintenance of the Facility; (iv) failure of third parties to provide goods or services essential to a Party's performance, unless such failure is caused by a Force Majeure; (v) delays in or an inability of a Party hereto to obtain financing or (vi) economic hardship.

Section 14.3. Assignment of Agreement; Facility Lender Accommodations.

(a) Except as set forth in this Section 14.3, neither Party hereto shall assign or transfer this Agreement, in whole or in part, or any of its interests hereunder to any other Person without the prior written consent of the other Party hereto. Such consent shall not be unreasonably withheld by either Party. Any attempt to transfer or assign this Agreement, or any privilege hereunder, without such prior written consent, except as provided herein, shall be void and confer no right on any Person that is not a party to this Agreement.

(b) Buyer's consent shall not be required for Seller to assign this Agreement to an Affiliate of Seller; provided that such assignee is a Special Purpose Entity and provided further that Seller provides reasonable assurances and executes documents reasonably required

by Buyer regarding Seller's continued liability for all of Seller's obligations under this Agreement in the event of any nonperformance on the part of such assignee.

(c) Buyer's consent shall not be required for Affiliates of Seller to assign or sell any membership interest in Seller, provided that Seller remains a Special Purpose Entity.

(d) Buyer's consent shall not be required for Seller to assign this Agreement for collateral purposes to any Facility Lender; provided however that the terms of such financing and the documentation relating thereto shall comply with the applicable terms and conditions of this Agreement. Seller shall provide Buyer with written notice of any such assignment to any Facility Lender no later than thirty (30) days after the assignment.

(e) To facilitate Seller's obtaining of financing to construct and operate the Facility, Buyer shall provide such consents to assignment or other documents as may be reasonably requested by Seller or any Facility Lender in connection with the financing of the Facility, including the acquisition of equity for the development, construction and operation of the Facility; provided however that the terms of such financing and the documentation relating thereto shall comply with the applicable terms and conditions of this Agreement. Seller shall reimburse, or shall cause the Facility Lender to reimburse, Buyer for the incremental direct expenses (including the reasonable fees and expenses of outside counsel) incurred by Buyer in the preparation, negotiation, execution and/or delivery of any documents requested by Seller or the Facility Lender, and provided by Buyer, pursuant to this Section 14.3(e).

(f) Seller may subcontract its duties or obligations under this Agreement without the prior written consent of Buyer, provided, that no such subcontract shall relieve Seller of any of its duties or obligations hereunder.

Section 14.4. Ambiguity. The Parties acknowledge that this Agreement was jointly prepared by them, by and through their respective legal counsel, and any uncertainty or ambiguity existing herein shall not be interpreted against either Party on the basis that the Party drafted the language, but otherwise shall be interpreted according to the application of the rules on interpretation of contracts.

Section 14.5. Attorney Fees & Costs. Both Parties hereto agree that in any action to enforce the terms of this Agreement that each Party shall be responsible for its own attorney fees and costs.

Section 14.6. Voluntary Execution. Both Parties hereto acknowledge that they have read and fully understand the content and effect of this Agreement. The Parties to this Agreement further acknowledge that they have executed this Agreement voluntarily, subject only to the advice of their own counsel, and do not rely on any promise, inducement, representation or warranty that is not expressly stated herein.

Section 14.7. Entire Agreement. This Agreement (including all Appendices, Exhibits and Schedules) contains the entire understanding concerning the subject matter herein and supersedes and replaces any prior negotiations, discussions or agreements between the Parties, or any of them, concerning the subject matter, whether written or oral, except as expressly provided for herein. This is a fully integrated document. Each Party acknowledges

that no other party, representative or agent, has made any promise, representation or warranty, express or implied, that is not expressly contained in this Agreement that induced the other Party to sign this document.

Section 14.8. Governing Law. This Agreement shall be interpreted, governed by, and construed under the laws of the State of Oklahoma without consideration of conflicts of law principles. Each Party irrevocably and unconditionally consents to the jurisdiction of any state or federal court located in Oklahoma City, Oklahoma, and any appellate court from any decision thereof, in any action or proceeding arising out of or relating to this Agreement or for recognition or enforcement of any judgment, and each of the Parties irrevocably and unconditionally agrees that all claims in respect of any such action or proceeding shall be heard and determined in such court, including such court's authority to determine and award damages as well as injunctive and declaratory relief. Only should such courts in Oklahoma City, Oklahoma not have subject matter jurisdiction over the cause or claim for any reason, the Parties agree that each Party may file in such other state or federal court that does have jurisdiction over the cause or claim of that Party. Each of the Parties agrees that a final judgment in any such action or proceeding shall be conclusive and may be enforced in other jurisdictions by suit on the judgment or in any other manner provided by law.

Section 14.9. Tax Treatment of Agreement. It is the intention of the Parties and the Parties acknowledge and agree that this Agreement is not and shall not be construed as a loan or a lease and, pursuant to Section 7701(e)(3) of the Code, this Agreement is and shall be deemed to be a service contract for the sale of electric energy produced at an alternative energy facility. The Parties further agree that this Agreement is not intended to create a partnership between Buyer and Seller for tax purposes.

Section 14.10. Execution in Counterparts. This Agreement may be executed in two or more counterparts, each of which shall be deemed to be an original, but all of which shall be one and the same document. Facsimile or PDF transmission of any signed original document, and retransmission of any facsimile or PDF transmission, will be the same as delivery of any original document. At the request of either Party, the other Party will confirm facsimile or PDF signatures by signing an original document.

Section 14.11. Effect of Section Headings. Section headings appearing in this Agreement are inserted for convenience only and shall not be construed as interpretations of text.

Section 14.12. Waiver. The failure of either Party to this Agreement to enforce or insist upon compliance with or strict performance of any of the terms or conditions hereof, or to take advantage of any of its rights hereunder, shall not constitute a waiver or relinquishment of any such terms, conditions or rights, but the same shall be and remain at all times in full force and effect.

Section 14.13. Independent Contractor; Relationship of the Parties. Seller shall at all times have the status of an independent contractor without the right or authority to impose tort or contractual liability upon Buyer. Neither Buyer nor Seller shall represent to others that one Party is a partner, joint venturer, agent or representative of, or otherwise associated with, the other Party. This Agreement shall not be interpreted to create an association, joint venture or

partnership between the Parties hereto or to impose any partnership obligation or liability upon either such Party. Neither Party shall have any right, power or authority to enter into any agreement or undertaking for, or act on behalf of, or to act as an agent or representative of, the other Party, except as set forth in Section 7.4.

Section 14.14. Third Party Beneficiaries. This Agreement shall not be construed to create rights in, or to grant remedies to, any third party as a beneficiary of this Agreement or any duty, obligation or undertaking established herein.

Section 14.15. Indemnification.

(a) Seller shall indemnify and defend Buyer and its respective officers, directors and employees against, and hold Buyer and its respective officers, directors and employees harmless from, at all times after the Effective Date, any and all Claims incurred, suffered, sustained or required to be paid, directly or indirectly, by, or sought to be imposed upon, Buyer or any of its respective officers, directors and employees for personal injury or death to persons or damages to property arising out of any negligent act or omission or any intentional misconduct by Seller in connection with this Agreement. "Claims" in this Section means all third party claims or actions, threatened or filed and, whether groundless, false, fraudulent or otherwise, that relate to the subject matter of an indemnity, and the resulting losses, damages, expenses, attorneys' fees and court costs, whether incurred by settlement or otherwise, and whether such claims or actions are threatened or filed prior to or after the termination of this Agreement.

(b) Buyer shall indemnify and defend Seller, its Affiliates and their respective managers, officers, directors and employees against, and hold Seller, its Affiliates and their respective managers, officers, directors and employees harmless from, at all times after the Effective Date, any and all Claims incurred, suffered, sustained or required to be paid, directly or indirectly, by, or sought to be imposed upon, Seller, its Affiliates or any of their respective managers, officers, directors and employees for personal injury or death to persons or damage to property arising out of any negligent act or omission or any intentional misconduct by Buyer in connection with this Agreement.

(c) In the event injury or damage results from the joint or concurrent negligent or intentional acts or omissions of both Buyer and Seller, the Parties shall be deemed to be equally liable for such injury or damages unless it is established that the Parties' relative degree of fault is other than 50/50, in which event each Party shall be liable in proportion to its relative degree of fault.

Section 14.16. Limitation of Liability. Neither Party will be liable to the other Party for indirect, consequential or special damages under this Agreement, except with respect to indemnification obligations related to third party claims. Notwithstanding anything in this Agreement to the contrary, Seller's obligation to make any payments, including the Shortfall Output Payment to Buyer shall be satisfied solely from Seller's assets and no Affiliate of Seller shall have any liability with respect to any such payments.

Section 14.17. Severability. In the event any of the terms, covenants, or conditions of this Agreement, or the application of any such terms, covenants, or conditions, shall be held invalid, illegal or unenforceable by any court or administrative body having jurisdiction, all other terms, covenants, and conditions of this Agreement and their application not adversely affected thereby shall remain in force and effect; provided, however, that Buyer and Seller shall negotiate in good faith to attempt to implement an equitable adjustment in the provisions of this Agreement with a view toward effecting the purposes of this Agreement by replacing the provision that is held invalid, illegal, or unenforceable with a valid provision the economic effect of which comes as close as possible to that of the provision that has been found to be invalid, illegal or unenforceable.

Section 14.18. Survival of Obligations. Cancellation, expiration, or earlier termination of this Agreement shall not relieve the Parties of obligations that by their nature should survive such cancellation, expiration, or termination, prior to the term of the applicable statute of limitations, including without limitation warranties, remedies, or indemnities, which obligations shall survive for the period of the applicable statute(s) of limitation.

Section 14.19. Confidentiality.

(a) Each Party agrees, and shall cause its Affiliates and its and their respective managers, directors, officers, employees and representatives, as a condition to receiving confidential information hereunder, to keep confidential all documents, data, drawings, studies, projections, plans and other information, whether oral or written, that relate to economic benefits to or amounts payable by either Party under this Agreement, and, with respect to any written materials, any other written materials that are clearly marked "Confidential" at the time a Party shares such information with the other Party (collectively, "Confidential Information"). The provisions of this Section 14.19 shall survive and shall continue to be binding upon the Parties for a period of one (1) year following the date of termination of this Agreement. Notwithstanding the foregoing, information shall not be considered confidential which (i) was in the public domain prior to disclosure, (ii) was lawfully in a Party's possession or acquired by a Party outside of this Agreement, which acquisition was not known by the receiving Party to be in breach of any confidentiality obligation, or (iii) developed independently by a Party based solely on information that is not considered confidential under this Agreement.

(b) Either Party may, without violating this Section 14.19, disclose matters that are made confidential by this Agreement:

(i) To actual or prospective, co-owners, lenders, underwriters, contractors, suppliers, and others involved in construction, operation, and financing transactions and arrangements for a Party or its subsidiaries, affiliates, or parent, if the Party making the disclosure obtains, as a condition precedent to the disclosure, a confidentiality agreement with the person, corporation, or other entity to whom the disclosure is being made with terms substantially the same as this Section 14.19; and

(ii) To governmental officials and parties involved in any proceeding in which either Party is seeking a permit, certificate, or other regulatory approval or

order necessary or appropriate to carry out this Agreement, but the Party making the disclosure shall make reasonable efforts to restrict public access to the information disclosed, by protective order or otherwise; to governmental officials or the public as required by any law, regulation, or order, including without limitation laws or regulations requiring disclosure of financial information, information material to financial matters, and filing of financial reports, but the Party making the disclosure shall make reasonable efforts to restrict public access to the information disclosed, by protective order or otherwise.

(c) Notwithstanding anything in this Agreement to the contrary, Buyer and/or Seller may disclose to any and all persons, without limitation of any kind, the U.S. federal income tax treatment and tax structure of any transaction relating to the Facility and all materials of any kind (including opinions and other tax analyses) relating to such tax treatment and tax structure, except where confidentiality is reasonably necessary to comply with securities laws. For this purpose, "tax structure" is limited to facts relevant to the U.S. federal income tax treatment of a transaction and does not include information relating to the identity of the owners of the Facility, their affiliates, agents or advisors.

[SIGNATURE PAGE FOLLOWS]

IN WITNESS WHEREOF, the Parties hereto have executed this Agreement as of the date set forth in the Preamble to this Agreement.

By:_____
Name:
Its:

CHILOCCO WIND FARM LLC

By:_____
Name:
Its:

Chilocco Wind Partners ("CWP")
IRR and Investor Returns

Project Cash Flows ($000)			Year 0	Year 1	Year 2	Year 3	Year 4	Year 5	Year 6	Year 7	Year 8	Year 9	Year 10	Year 11	Year 12	Year 13	Year 14	Year 15	Year 16	Year 17	Year 18	Year 19	Year 20	Year 21	Year 22	Year 23	Year 24	Year 25
			2016	2017	2018	2019	2020	2021	2022	2023	2024	2025	2026	2027	2028	2029	2030	2031	2032	2033	2034	2035	2036	2037	2038	2039	2040	2041
			3/15/2016	7/1/2017	7/1/2018	7/1/2019	7/1/2020	7/1/2021	7/1/2022	7/1/2023	7/1/2024	7/1/2025	7/1/2026	7/1/2027	7/1/2028	7/1/2029	7/1/2030	7/1/2031	7/1/2032	7/1/2033	7/1/2034	7/1/2035	7/1/2036	7/1/2037	7/1/2038	7/1/2039	7/1/2040	7/1/2041
Buyer PPA with Purchase in Year 10																												
Base Case (27.75 esc 2.50%) Trading Profits (1-10) BT CF (11-25)																												
Share of Development Fee	50%			$1,000																								
Trading Margins				$0	$0	$23	$411	$873	$1,308	$1,508	$1,658	$1,865	$2,071															
Share of BT Profit for Merchant Case	80%													$2,937	$2,756	$2,725	$2,713	$2,879	$3,069	$3,415	$6,162	$6,556	$6,708	$6,850	$6,994	$7,492	$7,412	$8,637
CF Impact from Change in Assumptions																												
Less Net of Debt Purchase Price													($10,000)															
Total Buyer Return				**$1,000**	**$0**	**$23**	**$411**	**$873**	**$1,308**	**$1,508**	**$1,658**	**$1,865**	**($7,929)**	**$2,937**	**$2,756**	**$2,725**	**$2,713**	**$2,879**	**$3,069**	**$3,415**	**$6,162**	**$6,556**	**$6,708**	**$6,850**	**$6,994**	**$7,492**	**$7,412**	**$8,637**
Cumulative Total				$1,000	$1,000	$1,023	$1,434	$2,307	$3,615	$5,123	$6,781	$8,647	$718	$3,655	$6,411	$9,137	$11,850	$14,729	$17,798	$21,213	$27,374	$33,930	$40,638	$47,488	$54,482	$61,974	$69,386	$78,023
NPV (25 year cash flow)	**8%**	**$19,561**									**IRR (Net CF Year 10)**		**40.08%**															
											IRR (Full Price Year 10))		**36.40%**															
Investor Returns with Sale in Year 10																												
Base Case (27.75 esc 2.50%)																												
Share of Development Fee	25%			$500																								
Management Fee	50%			$142	$161	$250	$250	$250	$250	$250	$250	$250	$250															
Share of BT Profit for Base Case	10%													$367	$345	$341	$339	$360	$384	$427	$770	$819	$839	$856	$874	$937	$927	$1,080
CF Impact from Change in Assumptions																												
Net Income from Sale of Plant													$10,000															
Cash Flow from Plant		$0		$568	$942	$897	$979	$1,000	$1,022	$1,046	$1,067	$1,083	$1,105															
Total Investor Return		**($8,358)**		**$1,209**	**$1,103**	**$1,147**	**$1,229**	**$1,250**	**$1,272**	**$1,296**	**$1,317**	**$1,333**	**$11,355**	**$367**	**$345**	**$341**	**$339**	**$360**	**$384**	**$427**	**$770**	**$819**	**$839**	**$856**	**$874**	**$937**	**$927**	**$1,080**
Cumulative Total				$1,209	$2,312	$3,459	$4,688	$5,938	$7,210	$8,506	$9,823	$11,156	$22,511	$22,878	$23,223	$23,563	$23,903	$24,262	$24,646	$25,073	$25,843	$26,663	$27,501	$28,357	$29,232	$30,168	$31,095	$32,174
IRR Full Term		**16.91%**		**IRR First 10 Years Only**			**15.58%**																					
NPV	**8%**	**$6,296**																										
Income Potential for WPI																												
Share of Development Fee	**25%**			$500																								
Management Fee	**50%**			$142	$161	$250	$250	$250	$250	$250	$250	$250	$250															
Ownrshp in Plant CF's	**10%**													$367	$345	$341	$339	$360	$384	$427	$770	$819	$839	$856	$874	$937	$927	$1,080
Total CF				$642	$161	$250	$250	$250	$250	$250	$250	$250	$250	$367	$345	$341	$339	$360	$384	$427	$770	$819	$839	$856	$874	$937	$927	$1,080
Cumulative CF				$642	$802	$1,052	$1,302	$1,552	$1,802	$2,052	$2,302	$2,552	$2,802	$3,169	$3,514	$3,855	$4,194	$4,554	$4,937	$5,364	$6,134	$6,954	$7,792	$8,648	$9,523	$10,459	$11,386	$12,465

Investor-Chilocco, LLC			**Model 48 MW P50 Base Case**																				**10 Yr Totals**					
Initial Capital Contribution	-																						-					
																							-					
Investor-Chilocco Tax Profit (Losses) 48MW P50 Base Case				(126)	(215)	(112)	(50)	(49)	(4)	42	43	44	46											(384)					
CF Changes				-	1	1	1	0	(1)	0	(1)	0	(1)											1					
- Blacklever interest expense	$27,162			(1,644)	(1,644)	(1,605)	(1,570)	(1,522)	(1,468)	(1,408)	(1,342)	(1,270)	(1,190)											(14,663)					
Subtotal Taxable Profits (losses)				(1,770)	(1,858)	(1,717)	(1,620)	(1,571)	(1,473)	(1,366)	(1,300)	(1,226)	(1,145)											(15,046)					
- Investor-Chilocco Equity Financing Interes	$0	5.0%		-	-	-	-	-	-	-	-	-	-											-					
Tax Loss - Annual				(3,540)	(3,716)	(3,433)	(3,240)	(3,142)	(2,945)	(2,732)	(2,600)	(2,453)	(2,290)	-	-	-	-	-	-	-	-	-	-	(15,046)					
																								(15,046)					

estor Sheltered Profits and Cash Flows

			Alt #1 Investor Finance			Alt #2 Investor Equity																						
			(Cash Basis)	(Tax Basis)		(Cash Basis)	(Tax Basis)																					
Sales Price			10,000	-		10,000	-																					
Chilocco CF Distributions (1-10yr.) + CF Changes			34,194	-		34,194	-																					
Chilocco CF Distributions (11-25yr.)			9,663	-		9,663	-																					
Development Fee (Investor Share)			500	500		500	500																					
Management Fee (Investor Share)			2,302	2,302		2,302	2,302																					
Investor BT Profits			56,659	2,802		56,659	2,802																					
Less: Cumulative Tax Losses				(15,046)			(15,046)																					
Less: Equity Debt Service (P&I)			-			n/a	n/a																					
Less: Back Lever Debt Services (P&I)			(24,485)			(24,485)	-																					
Investor BT Cash Flow/Cumulative Ordinary Tax Loss			32,174	(12,244)		32,174	(12,244)																					
Taxable Capital Gain on Sale																												
Sales Price			10,000	10,000		10,000	10,000																					
"Net" Cumulative Interest - Back Lever Debt			(15,046)			(15,046)	-																					
Cumulative Interest - Equity Debt			-			-	-																					
Tax Basis on Sale of Interest						(7,522)	(7,522)																					
Net Taxable Capital Gain			(5,046)	10,000		(12,568)	2,478																					
								Diff.																					
Taxable Income and Gain			41,613	(2,244)		34,091	(9,766)	(7,522)																					
Capital Gains - Tax Estimate	20%	39.6%	14,519			13,014																						
Ordinary Gains - Tax Estimate		39.6%		888			3,867																					
After Tax Income			17,655	(1,355)		19,160	(5,898)																					
			55%			60%																						

Cash Flows																												
Chilocco Ptnrshp Cash Distrib - 48 MW P50 Base Case				2,212	3,296	3,134	3,422	3,499	3,577	3,657	3,737	3,790	3,870										34,193					
Chilocco Ptrnshp Federal & State Tax Benefit				-	-	-	-	-	-	-	-	-	-										-					
Backlever Financing P&I Pmts				(1,644)	(2,354)	(2,238)	(2,444)	(2,499)	(2,554)	(2,612)	(2,669)	(2,707)	(2,764)										(24,485)					
Investor Equity Financing P&I Pmts				-	-	-	-	-	-	-	-	-	-										-					
CF Changes			$ -	$ 1	$ 1	$ 1	$ 0	$ (1)	$ 0	$ (1)	$ 0	$ (1)											1					
Net CF			568	942	897	979	1,000	1,022	1,046	1,067	1,083	1,105	-	-	-	-	-	-	-	-	-	-	9,709					

Base Case Cash Flows - 27.75 with 2.5% - 48MW																												
Before Tax				$568	$942	$896	$978	$1,000	$1,023	$1,045	$1,068	$1,083	$1,106	$1,320	$1,222	$1,235	$1,267	$1,301	$1,335	$1,558	$4,775	$5,056	$5,186	$5,323	$5,465	$6,048	$5,908	$6,977
After Tax				$1,295	$1,703	$1,604	$1,649	$1,653	$1,637	$1,620	$1,617	$1,605	$1,596	$35	$8	-$82	-$101	-$133	-$276	-$187	$2,917	$3,102	$3,175	$3,256	$3,344	$3,697	$3,612	$4,211

Merchant Cash Flows - Brattle Weighted Avg. - 48MW																												
Before Tax				$691	$1,083	$1,183	$1,540	$1,912	$2,261	$2,453	$2,590	$2,753	$2,927	$3,672	$3,445	$3,407	$3,391	$3,599	$3,836	$4,269	$7,702	$8,195	$8,385	$8,562	$8,742	$9,366	$9,265	$10,796
After Tax				$1,416	$1,843	$1,889	$2,207	$2,560	$2,869	$3,021	$3,131	$2,105	$1,221	$1,390	$1,299	$1,218	$1,130	$1,173	$1,228	$1,469	$4,706	$5,018	$5,132	$5,235	$5,347	$5,724	$5,663	$6,544

Chilocco Wind Partners ("CWP")
IRR and Investor Returns

Project Cash Flows ($000)		Year 0	Year 1	Year 2	Year 3	Year 4	Year 5	Year 6	Year 7	Year 8	Year 9	Year 10	Year 11	Year 12	Year 13	Year 14	Year 15	Year 16	Year 17	Year 18	Year 19	Year 20	Year 21	Year 22	Year 23	Year 24	Year 25
		2016	2017	2018	2019	2020	2021	2022	2023	2024	2025	2026	2027	2028	2029	2030	2031	2032	2033	2034	2035	2036	2037	2038	2039	2040	2041
		3/15/2016	7/1/2017	7/1/2018	7/1/2019	7/1/2020	7/1/2021	7/1/2022	7/1/2023	7/1/2024	7/1/2025	7/1/2026	7/1/2027	7/1/2028	7/1/2029	7/1/2030	7/1/2031	7/1/2032	7/1/2033	7/1/2034	7/1/2035	7/1/2036	7/1/2037	7/1/2038	7/1/2039	7/1/2040	7/1/2041
Investor Returns with Sale in Year 10																											
Base Case																											
Net Income from Sale of Plant												$8,000															
Cash Flow from Plant		$0	$234	$590	$524	$586	$586	$586	$586	$585	$575	$572															
Total Investor Return		($8,358)	**$234**	**$590**	**$524**	**$586**	**$586**	**$586**	**$586**	**$585**	**$575**	**$8,572**	**$0**	**$0**	**$0**	**$0**	**$0**	**$0**	**$0**	**$0**	**$0**	**$0**	**$0**	**$0**	**$0**	**$0**	**$0**
Cumulative Total			$234	$824	$1,349	$1,935	$2,520	$3,107	$3,693	$4,278	$4,853	$13,426	$13,426	$13,426	$13,426	$13,426	$13,426	$13,426	$13,426	$13,426	$13,426	$13,426	$13,426	$13,426	$13,426	$13,426	$13,426
Pre Tax IRR Full Term		**6.04%**	**IRR First 10 Years Only**		**6.04%**																						
Pre Tax NPV	8%	($1,022)																									
Corporate Fed/Ok Tax Benefit			$820	$862	$815	$785	$774	$744	$712	$695	$676	$468															
AT Total Investor Return		($8,358)	**$1,055**	**$1,452**	**$1,339**	**$1,371**	**$1,360**	**$1,331**	**$1,298**	**$1,280**	**$1,252**	**$9,040**															
Cumultative Total			$1,055	$2,506	$3,846	$5,217	$6,577	$7,907	$9,206	$10,486	$11,737	$20,778															
After Tax IRR Full Term		**15.17%**																									
CF with Tax Benefit NPV	8%	**$3,667**	**$5,064**																								

Investor-Chilocco, LLC			**Model 48 MW P50 Base Case**																				**10 Yr Totals**
Initial Capital Contribution		-																					-
Taxable Gain from Sale of Chilocco												478											478
Investor-Chilocco Tax Profit (Losses) 48MW P50 Base Case			(126)	(215)	(112)	(50)	(49)	(4)	42	43	44	46											(384)
CF Changes			(333)	(352)	(371)	(392)	(414)	(437)	(459)	(483)	(507)	(534)											(4,283)
- Blacklever interest expense	$27,162		(1,644)	(1,644)	(1,605)	(1,570)	(1,522)	(1,468)	(1,408)	(1,342)	(1,270)	(1,190)											(14,663)
Subtotal Taxable Profits (losses)			(2,103)	(2,210)	(2,089)	(2,013)	(1,985)	(1,909)	(1,825)	(1,783)	(1,734)	(1,200)											(18,851)
- Investor-Chilocco Equity Financing Inter	$0	5.0%	-	-	-	-	-	-	-	-	-	-											-
Tax Loss - Annual			(2,103)	(2,210)	(2,089)	(2,013)	(1,985)	(1,909)	(1,825)	(1,783)	(1,734)	(1,200)	-	-	-	-	-	-	-	-	-	-	(18,851)
Corporate Blended Tax Benefit		39.00%	820	862	815	785	774	744	712	695	676	468											
																							(18,851)

estor Sheltered Profits and Cash Flows

			Alt #1 Investor Finance (Cash Basis)	(Tax Basis)		Alt #2 Investor Equity (Cash Basis)	(Tax Basis)																
Sales Price			8,000	-		8,000	-																
Chilocco CF Distributions (1-10yr.) + CF Changes			29,911	-		29,911	-																
Investor BT Profits			37,911	-		37,911	-																
Less: Cumulative Tax Losses				(19,329)			(19,329)																
Less: Equity Debt Service (P&I)			-			n/a	n/a																
Less: Back Lever Debt Services (P&I)			(24,485)			(24,485)	-																
Investor BT Cash Flow/Cumulative Ordinary Tax Loss			13,426	(19,329)		13,426	(19,329)																
Taxable Capital Gain on Sale																							
Sales Price			8,000	8,000		8,000	8,000																
"Net" Cumulative Interest - Back Lever Debt			(19,329)			(19,329)	-																
Cumulative Interest - Equity Debt			-			-	-																
Tax Basis on Sale of Interest	90%					(7,522)	(7,522)																
Net Taxable Capital Gain			(11,329)	8,000		(18,851)	478																
								Diff.															
Taxable Income and Gain			18,582	(11,329)		11,059	(18,851)	(7,522)															
Capital Gains - Tax Estimate	20%	39.6%	5,790			4,286																	
Ordinary Gains - Tax Estimate		39.6%		4,486			7,465																
After Tax Income			7,635	(6,843)		9,140	(11,386)																
			57%			68%																	
Cash Flows																							
Chilocco Ptnrshp Cash Distrib - 48 MW P50 Base Case			2,212	3,296	3,134	3,422	3,499	3,577	3,657	3,737	3,790	3,870											34,193
Chilocco Ptrnshp Federal & State Tax Benefit			-	-	-	-	-	-	-	-	-	-											
Backlever Financing P&I Pmts			(1,644)	(2,354)	(2,238)	(2,444)	(2,499)	(2,554)	(2,612)	(2,669)	(2,707)	(2,764)											(24,485)
Investor Equity Financing P&I Pmts			-	-	-	-	-	-	-	-	-	-											-
CF Changes			$ (333)	$ (352)	$ (371)	$ (392)	$ (414)	$ (437)	$ (459)	$ (483)	$ (507)	$ (534)											(4,283)
Net CF			234	590	524	586	586	586	586	585	575	572	-	-	-	-	-	-	-	-	-	-	5,426

#1 Base Case Cash Flows - 27.75 with 2.5% - 48MW																											
Before Tax			$568	$942	$896	$978	$1,000	$1,023	$1,045	$1,068	$1,083	$1,106	$1,320	$1,222	$1,235	$1,267	$1,301	$1,335	$1,558	$4,775	$5,056	$5,186	$5,323	$5,465	$6,048	$5,908	$6,977
After Tax			$1,295	$1,703	$1,604	$1,649	$1,653	$1,637	$1,620	$1,617	$1,605	$1,596	$35	$8	-$82	-$101	-$133	-$276	-$187	$2,917	$3,102	$3,175	$3,256	$3,344	$3,697	$3,612	$4,211
#2 Base Case Cash Flows - 25.75 with 2.25% - 48MW																											
Before Tax			$502	$805	$758	$830	$846	$716	$727	$751	$768	$792	$1,017	$922	$938	$971	$1,007	$1,043	$1,080	$1,256	$4,043	$4,174	$4,311	$4,451	$5,032	$4,888	$5,826
After Tax			$1,114	$1,452	$1,352	$1,388	$1,388	$1,225	$1,207	$1,217	$1,218	$1,223	$97	$80	$3	-$2	-$19	-$109	-$189	-$172	$2,492	$2,617	$2,703	$2,712	$3,213	$3,012	$5,615
Merchant Cash Flows - Brattle Weighted Avg. - 48MW																											4.0%
Before Tax			$691	$1,083	$1,183	$1,540	$1,912	$2,261	$2,453	$2,590	$2,753	$2,927	$3,672	$3,445	$3,407	$3,391	$3,599	$3,836	$4,269	$7,702	$8,195	$8,385	$8,562	$8,742	$9,366	$9,265	$10,796
After Tax			$1,416	$1,843	$1,889	$2,207	$2,560	$2,869	$3,021	$3,131	$2,105	$1,221	$1,390	$1,299	$1,218	$1,130	$1,173	$1,228	$1,469	$4,706	$5,018	$5,132	$5,235	$5,347	$5,724	$5,663	$6,544
year to year growth				57%	9%	30%	24%	18%	8%	6%	6%	6%	25%	-6%	-1%	0%	6%	7%	11%	80%	6%	2%	2%	2%	7%	-1%	17%

Appendix E-3

Cherokee Nation Return Summary

Redacted for Confidentiality

Appendix F

Power Market Analysis

Redacted for Confidentiality

PRELIMINARY GEOTECHNICAL REPORT

CHILOCCO WIND PROJECT
KAY COUNTY, OKLAHOMA

For Review Purposes Only

RRC Renewable Resource Consultants

September 11, 2013

www.RenewableLLC.com

3801 Doris Lane
Round Rock, TX 78664
512.992.2087

September 11, 2013

Mortenson Construction
700 Meadow Lane
Minneapolis, MN 55422

Attn: Mr. Aaron Rasmus

Re: Preliminary Geotechnical Report
Chilocco Wind Project
Kay County, Oklahoma
RRC Project No. 130222

Dear Mr. Rasmus:

Renewable Resource Consultants (RRC) has completed the authorized subsurface exploration and preliminary geotechnical engineering evaluation for the proposed Chilocco Wind project. The purpose of the geotechnical engineering study was to explore and evaluate the subsurface conditions at various locations on the site, and develop preliminary geotechnical design and construction recommendations for the project. The attached report contains:

- A description of our findings from the field exploration and laboratory-testing program;
- Our engineering interpretation of the results with respect to the project characteristics; and
- Our preliminary geotechnical site development and foundation design recommendations for the planned project.

We appreciate the opportunity to be of service to Mortenson Construction and are prepared to provide final geotechnical engineering services, structural engineering design services, and construction materials testing services during the construction phase of the project. Please call us if you have any questions concerning this report or any of our services.

Respectfully submitted,
RENEWABLE RESOURCE CONSULTANTS, LLC

Mohammed H. Abusalih, P.E.
Associate Principal

For Review Purposes Only

PRELIMINARY GEOTECHNICAL REPORT

CHILOCCO WIND PROJECT
KAY COUNTY, OKLAHOMA

prepared for

MORTENSON CONSTRUCTION
MINNEAPOLIS, MINNESOTA

For Review Purposes Only

Prepared by

Eng-Chew Ang, Ph.D, P.E. (KS)
Senior Structural Engineer

Reviewed by

Mohammed H. Abusalih, P.E.
Associate Principal

September 11, 2013 ***Project No. 130222***

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For Review Purposes Only

Important Information About Your

Geotechnical Engineering Report

Subsurface problems are a principal cause of construction delays, cost overruns, claims, and disputes.

The following information is provided to help you manage your risks.

Geotechnical Services Are Performed for Specific Purposes, Persons, and Projects

Geotechnical engineers structure their services to meet the specific needs of their clients. A geotechnical engineering study conducted for a civil engineer may not fulfill the needs of a construction contractor or even another civil engineer. Because each geotechnical engineering study is unique, each geotechnical engineering report is unique, prepared *solely* for the client. No one except you should rely on your geotechnical engineering report without first conferring with the geotechnical engineer who prepared it. *And no one — not even you* — should apply the report for any purpose or project except the one originally contemplated.

Read the Full Report

Serious problems have occurred because those relying on a geotechnical engineering report did not read it all. Do not rely on an executive summary. Do not read selected elements only.

A Geotechnical Engineering Report Is Based on A Unique Set of Project-Specific Factors

Geotechnical engineers consider a number of unique, project-specific factors when establishing the scope of a study. Typical factors include: the client's goals, objectives, and risk management preferences; the general nature of the structure involved, its size, and configuration; the location of the structure on the site; and other planned or existing site improvements, such as access roads, parking lots, and underground utilities. Unless the geotechnical engineer who conducted the study specifically indicates otherwise, do not rely on a geotechnical engineering report that was:

- not prepared for you,
- not prepared for your project,
- not prepared for the specific site explored, or
- completed before important project changes were made.

Typical changes that can erode the reliability of an existing geotechnical engineering report include those that affect:

- the function of the proposed structure, as when it's changed from a parking garage to an office building, or from a light industrial plant to a refrigerated warehouse,
- elevation, configuration, location, orientation, or weight of the proposed structure,
- composition of the design team, or
- project ownership.

As a general rule, *always* inform your geotechnical engineer of project changes—even minor ones—and request an assessment of their impact. *Geotechnical engineers cannot accept responsibility or liability for problems that occur because their reports do not consider developments of which they were not informed.*

Subsurface Conditions Can Change

A geotechnical engineering report is based on conditions that existed at the time the study was performed. *Do not rely on a geotechnical engineering report* whose adequacy may have been affected by: the passage of time; by man-made events, such as construction on or adjacent to the site; or by natural events, such as floods, earthquakes, or groundwater fluctuations. *Always* contact the geotechnical engineer before applying the report to determine if it is still reliable. A minor amount of additional testing or analysis could prevent major problems.

Most Geotechnical Findings Are Professional Opinions

Site exploration identifies subsurface conditions only at those points where subsurface tests are conducted or samples are taken. Geotechnical engineers review field and laboratory data and then apply their professional judgment to render an opinion about subsurface conditions throughout the site. Actual subsurface conditions may differ—sometimes significantly—from those indicated in your report. Retaining the geotechnical engineer who developed your report to provide construction observation is the most effective method of managing the risks associated with unanticipated conditions.

A Report's Recommendations Are *Not* Final

Do not overrely on the construction recommendations included in your report. *Those recommendations are not final*, because geotechnical engineers develop them principally from judgment and opinion. Geotechnical engineers can finalize their recommendations only by observing actual

subsurface conditions revealed during construction. *The geotechnical engineer who developed your report cannot assume responsibility or liability for the report's recommendations if that engineer does not perform construction observation.*

A Geotechnical Engineering Report Is Subject to Misinterpretation

Other design team members' misinterpretation of geotechnical engineering reports has resulted in costly problems. Lower that risk by having your geotechnical engineer confer with appropriate members of the design team after submitting the report. Also retain your geotechnical engineer to review pertinent elements of the design team's plans and specifications. Contractors can also misinterpret a geotechnical engineering report. Reduce that risk by having your geotechnical engineer participate in prebid and preconstruction conferences, and by providing construction observation.

Do Not Redraw the Engineer's Logs

Geotechnical engineers prepare final boring and testing logs based upon their interpretation of field logs and laboratory data. To prevent errors or omissions, the logs included in a geotechnical engineering report should *never* be redrawn for inclusion in architectural or other design drawings. Only photographic or electronic reproduction is acceptable, *but recognize that separating logs from the report can elevate risk.*

Give Contractors a Complete Report and Guidance

Some owners and design professionals mistakenly believe they can make contractors liable for unanticipated subsurface conditions by limiting what they provide for bid preparation. To help prevent costly problems, give contractors the complete geotechnical engineering report, *but* preface it with a clearly written letter of transmittal. In that letter, advise contractors that the report was not prepared for purposes of bid development and that the report's accuracy is limited; encourage them to confer with the geotechnical engineer who prepared the report (a modest fee may be required) and/or to conduct additional study to obtain the specific types of information they need or prefer. A prebid conference can also be valuable. *Be sure contractors have sufficient time* to perform additional study. Only then might you be in a position to give contractors the best information available to you, while requiring them to at least share some of the financial responsibilities stemming from unanticipated conditions.

Read Responsibility Provisions Closely

Some clients, design professionals, and contractors do not recognize that geotechnical engineering is far less exact than other engineering disciplines. This lack of understanding has created unrealistic expectations that have led to disappointments, claims, and disputes. To help reduce the risk of such outcomes, geotechnical engineers commonly include a variety of explanatory provisions in their reports. Sometimes labeled "limitations" many of these provisions indicate where geotechnical engineers' responsibilities begin and end, to help others recognize their own responsibilities and risks. *Read these provisions closely.* Ask questions. Your geotechnical engineer should respond fully and frankly.

Geoenvironmental Concerns Are Not Covered

The equipment, techniques, and personnel used to perform a *geoenvironmental* study differ significantly from those used to perform a *geotechnical* study. For that reason, a geotechnical engineering report does not usually relate any geoenvironmental findings, conclusions, or recommendations; e.g., about the likelihood of encountering underground storage tanks or regulated contaminants. *Unanticipated environmental problems have led to numerous project failures.* If you have not yet obtained your own geoenvironmental information, ask your geotechnical consultant for risk management guidance. *Do not rely on an environmental report prepared for someone else.*

Obtain Professional Assistance To Deal with Mold

Diverse strategies can be applied during building design, construction, operation, and maintenance to prevent significant amounts of mold from growing on indoor surfaces. To be effective, all such strategies should be devised for the *express purpose* of mold prevention, integrated into a comprehensive plan, and executed with diligent oversight by a professional mold prevention consultant. Because just a small amount of water or moisture can lead to the development of severe mold infestations, a number of mold prevention strategies focus on keeping building surfaces dry. While groundwater, water infiltration, and similar issues may have been addressed as part of the geotechnical engineering study whose findings are conveyed in this report, the geotechnical engineer in charge of this project is not a mold prevention consultant; ***none of the services performed in connection with the geotechnical engineer's study were designed or conducted for the purpose of mold prevention. Proper implementation of the recommendations conveyed in this report will not of itself be sufficient to prevent mold from growing in or on the structure involved.***

Rely, on Your ASFE-Member Geotechncial Engineer for Additional Assistance

Membership in ASFE/The Best People on Earth exposes geotechnical engineers to a wide array of risk management techniques that can be of genuine benefit for everyone involved with a construction project. Confer with you ASFE-member geotechnical engineer for more information.

ASFE
The Best People on Earth

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PRELIMINARY GEOTECHNICAL REPORT

CHILOCCO WIND PROJECT
KAY COUNTY, OKLAHOMA

1.0 INTRODUCTION

RRC has completed the authorized subsurface exploration and preliminary geotechnical engineering evaluation for the proposed Chilocco Wind Project. The site is located about 5 to 8 miles north of the Town of Newkirk in Kay County, Oklahoma. The approximate boundaries of the site are shown on Figure 1, Site Location Map.

The purpose of this investigation and preliminary report was to:

- Explore subsurface soil, bedrock and groundwater conditions;
- Conduct field and laboratory testing to characterize the subsurface soil and bedrock properties at selected locations across the site; and
- Provide preliminary geotechnical engineering parameters for the design of foundation systems and private access roadways.

The recommendations contained in this report are based upon results of field and laboratory testing, engineering analyses, experience with similar soil and bedrock conditions, and our understanding of the proposed project. As part this preliminary study, laboratory thermal resistivity testing was performed on disturbed soil samples collected from designated locations at or near anticipated cable burial depths and the results are presented in Section 4.6 of this report.

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2.0 PROPOSED CONSTRUCTION

We understand the overall project will consist of the construction of approximately 153 MW of wind power provided by 90-GE 1.7 MW wind turbine generators (WTG's) and associated facilities within the project site. Gravity foundation systems are being considered for support of the turbines with an embedment depth of about 7 to 10 feet below existing site grade.

Private-access roadways will most likely be surfaced with imported road-base materials from nearby quarry pits to support construction and vehicular traffic loads during and after construction.

3.0 SITE EXPLORATION

A subsurface exploration program was conducted at the project site. The subsurface exploration program consisted of drilling a total of 10 borings at selected WTG locations and a boring at a substation location. Figure 2 within Appendix A shows the WTG and substation boring locations plotted on a topographic map.

Figure 3 within Appendix A shows the thermal resistivity sample locations. The thermal resistivity testing results are discussed in Section 4.6 of the report.

Engineering properties of soils and bedrock were assessed through field testing, and laboratory testing on selected samples. The following section describes our overall site exploration program in detail.

3.1 Field Exploration and Testing

As part of the preliminary subsurface exploration program, a total of 11 borings were drilled between the period of August 21 through August 26, 2013. The WTG borings were drilled at or near the centerline of each turbine location included as part of this study and within the footprint of the proposed substation.

A summary of geographic latitude and longitude coordinates and depth of each boring drilled as part of the subsurface exploration program is presented in Table 3.1.1.

Table 3.1.1 Summary of Borings Geographic Coordinates

Boring / WTG No.	Latitude (North)	Longitude (West)	Approximate Total Boring Depth (feet)
Substation	36.956548	-97.064465	34.5
T-012	36.978553	-97.104971	55.5
T-015	36.961501	-97.104337	55.5
T-017	36.990233	-97.100389	55.0
T-019	36.962787	-97.100057	55.5
T-025	36.970728	-97.095886	55.5
T-041	36.997004	-97.086545	55.5
T-063	36.992868	-97.070974	54.5
T-067	36.958553	-97.067550	36.5
T-071	36.968496	-97.063727	54.5
T-086	36.988345	-97.051775	43.5

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The borings were staked in the field by a surveyor working directly for Mortenson Construction. The accuracy of the boring locations should only be assumed to the level implied by the method used.

Field logs were prepared for each boring at the time of drilling by RRC's field engineer. The project engineer reviewed the field logs of boring, and soil and bedrock samples, and made appropriate modifications to the logs of boring as necessary.

The field logs of boring contain visual classification of the materials encountered during drilling as well as interpolation of the subsurface conditions between samples. Logs of boring, included in Appendix A represent our interpretation of the field logs of boring and may include modifications based on laboratory testing performed on select samples. The logs of boring describe the materials encountered, their approximate thickness, and the various depths at which the samples were obtained.

Soils were classified in general accordance with the Unified Soil Classification System (USCS); ASTM D 2488: "Standard Practice for Description and Identification of Soils (Visual-Manual Procedure.)" The soil classification symbols appear on the logs of boring and are briefly described in Appendix A.

The borings were advanced with truck-mounted drill rigs utilizing continuous flight hollow stem augers. Relatively undisturbed samples were obtained at selected intervals utilizing hydraulically advanced 3-inch (OD) diameter stainless steel, thin-walled tube (Shelby) samplers. Additionally, relatively undisturbed samples were obtained at selected intervals utilizing 2.5-inch diameter Modified California split-spoon while relatively disturbed samples were obtained using Standard Penetration Test (SPT) samplers. Representative bulk samples of the subgrade materials were also obtained from selected WTG locations for maximum dry density-optimum moisture content relationships, and laboratory thermal resistivity testing.

The field tests were conducted in general accordance with the basic requirements of the following:

- ASTM D 1586: Standard Test Method for Standard Penetration Test (SPT) and Split-Barrel Sampling of Soils;
- ASTM D 1587: Standard Practice for Thin-Walled Tube Sampling of Soils for Geotechnical Purposes;
- ASTM D3550: Standard Practice for Thick Wall, Ring Lined, Split Barrel, Drive Sampling of soils; and
- Locally accepted practices in this area.

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Subsurface materials were collected from the SPT samplers in the field, visually classified, placed in plastic bags, and labeled as to location and depth. Sleeve samples obtained using modified California samplers were capped, visually classified, and labeled as to location and depth. Undisturbed Shelby tube samples are capped in the field and are extruded from the samplers in the laboratory where they were visually classified. The samples were arranged in the field in core boxes, and transported to the laboratory for further analysis.

Penetration resistance values were recorded using methods based on the SPT in accordance with ASTM D 1586. This test consists of driving the sampler into the ground with a 140-pound hammer free-falling a distance of 30 inches. The number of blows required to advance the sampler 12 inches (18-inches for SPT samplers where the final 12-inches are recorded) or the interval indicated, is recorded as the standard penetration resistance value (N-value). Results of the field tests are shown on the logs of boring under the "Field Data" column and are preceded by the letter "N". Shelby tube samples were tested for consistency utilizing a pocket-sized penetrometer. The penetrometer readings are included on logs of boring preceded by the letter "P." Readings in excess of 4.5 tons per square feet (tsf), if any, indicate that the capacity of the devise has been exceeded.

During the field operations, the borings were observed for groundwater. At the completion of the

drilling operations, the borings were backfilled in accordance with the State of Oklahoma requirement for abandonment of geotechnical borings. Groundwater levels are noted at the top of the logs of boring and are discussed in subsequent sections of this report.

Two new auxiliary borings were also drilled near WTG Nos. T-19 and T-31. The shallow auxiliary borings were completed as temporary piezometers by installing 2" perforated and solid PVC pipes to a depth of about 13 feet below the existing ground surface. The perforated portion of the temporary piezometers was placed at depths of about 8 to 13 feet below existing site grade and backfilled with sand. The upper solid portion of the temporary piezometers was placed at depths of about 8 feet to slightly above the ground surface and backfilled with bentonite chips. The temporary piezometers will be monitored periodically by others.

3.2 Laboratory Analysis

The soil samples were returned to the laboratory, examined by the project geotechnical engineer, and applicable laboratory testing was assigned on selected soil samples. The following laboratory methods of analyses were generally utilized, where sample quality allowed:

- Standard Practice for Classification of Soils for Engineering Purposes (Unified Soil Classification System): ASTM D 2487;
- Standard Test Methods for Liquid Limit, Plastic Limit, and Plasticity Index of Soils: ASTM D 4318;
- Standard Test Method for Particle-Size Analysis of Soils: ASTM D 422;
- Standard Test Methods for Amount of Material in Soils Finer than No. 200 (75-µm) Sieve: ASTM D 1140;
- Standard Test Methods for Laboratory Determination of Water (Moisture) Content of Soil and Rock by Mass: ASTM D 2216;
- Standard Test Method for Unconfined Compressive Strength of Cohesive Soil: ASTM D 2166;
- Standard Test Method for Unconsolidated-Undrained Triaxial Compression Test on Cohesive Soils: ASTM D 2850;
- Standard Test Methods for One-Dimensional Consolidation Properties of Soils Using Incremental Loading: ASTM D 2435;
- Standard Test Methods for One-Dimensional Swell or Collapse of Cohesive Soils; ASTM D 4546;
- Standard Test Methods for Laboratory Compaction Characteristics of Soil Using Standard Effort: ASTM D 698;
- Standard Test Method for Measurement of Soil Resistivity using the Two-Electrode Soil Box Method: ASTM G 187;
- Standard Test Method for Measuring pH of Soil for Use in Corrosion Testing: ASTM G 51; and
- Sulfate and Chlorides Content: EPA 300/300.1.

Laboratory testing was performed in general accordance with ASTM and locally accepted practices.

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4.0 SUBSURFACE CONDITIONS

4.1 Geology

The geologic interpretations contained herein are based on available geological maps and literature, and review of the logs of boring drilled as part of this study.

The subsurface geology in Kay County is largely comprised of a geologic unit entitled the Wellington Formation which is present at or within the vicinity of the Chilocco Wind project site. The Wellington Formation is described as mostly red brown Shale which grades into a fine grained sandstone and mudstone conglomerate to the south. The formation depth on the order of about 850 feet (Reference 1). According to Figure 4 (Source: Reference 2) within Appendix A, Alluvium deposits and Chase Group deposits are also present at or within the vicinity the project site. Alluvium deposits comprise of clay, silt, sand, and some gravel composed of unconsolidated sediment. The Chase Group consists mostly of multicolored silty clay-shales, claystone and mudstone interlayered with prominent, escarpment forming limestone intervals.

4.2 Subsurface Stratigraphy

As indicated on the logs of boring drilled as part of this study, native soils were encountered at the ground surface and extended to the full depth of the exploration at Boring Nos. T-015 and T-017. For the remaining boring locations, native soils were encountered at the ground surface and extended to top of bedrock surface at depths of about 14 to 54 feet. The bedrock is comprised of Shale. In addition, limestone and sandstone bedrock were encountered at substation location and at WTG No. T-071, respectively.

The native soils generally consisted of:

- Lean to Fat clays with varying amounts of silt, and sand;
- Sand with varying amounts clay and silt.

The clay soils vary from soft to hard in consistency. The sand soils vary from loose to medium dense in relative density. The shale bedrock encountered was firm to very hard. The limestone bedrock encountered at substation location was highly weathered, moderately strong and hard. The sandstone bedrock encountered at Boring No. T-071 was hard.

The above descriptions are general and depth ranges are approximate because boundaries between different strata are seldom clear and abrupt in the field. In addition, the lines separating major strata types on the logs of boring do not necessarily represent distinct lines of demarcation of the various strata. Detailed logs of boring for locations drilled as part of this preliminary study, which present the stratum descriptions, types of sampling used, laboratory test data, and additional field data, are presented in Appendix A. The Boring Log Key, defining the terms and descriptive symbols used on each log of boring, is also presented in Appendix A.

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4.3 Field SPT Results

Figure 5 within Appendix A represents the harmonic means for measured Standard Penetration Test (SPT) N-values for soils and bedrock encountered at depths greater than 7 feet below existing site grade for all boring locations drilled at the project site. The measured SPT N-values above 7-foot are not included for these borings in the calculation since the foundation bearing elevation will be at least 7 feet below ground surface for this project.

The equation for the harmonic mean is shown below:

$$\frac{1}{H_y} = \frac{1}{n}\sum\frac{1}{Y_i}$$

Where:

H_y = Harmonic mean;
N = Total number of data points; and
Y_i = Measured SPT N-value.

The harmonic mean N-value calculated were summarized in Table 4.3.1 with the harmonic mean N-value sorted from the lowest to the highest. Table 4.3.1 indicates that the subsurface soils at the project site are relatively stiff or dense at most WTG locations with the harmonic mean value of greater than 25 blows per foot, except for WTG Nos. T-041, T-063 and T-086. Higher mean SPT N-values indicate stronger subgrade soils with higher bearing capacity and lower settlement; while lower mean SPT N-values indicate weaker subgrade soils with lower bearing capacity and larger settlement.

Table 4.3.1 Summary of Harmonic Mean N-value for Soils at Depths Greater Than 7 feet Below Existing Site Grade at WTG Locations (Sorted from Lowest to Highest)

Count	Boring/WTG No.	Harmonic Mean N-Value (blows/foot)*
1	T-086	11
2	T-063	17
3	T-041	17
4	T-067	28
5	T-019	29
6	T-017	30
7	T-012	32
8	T-015	32
9	T-025	47
10	T-071	50

*Harmonic mean N-value has been rounded to the nearest 1 blows/feet.

4.4 Laboratory Test Results

Figure 6 in Appendix A shows graphical representation of measured in-situ moisture contents and calculated average moisture content versus depth at the project site. The in-situ moisture contents range from about 14 to 33% with an average of about 21%.

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Laboratory test results indicate that the native soils have Liquid Limit (LL) values ranging from 29 to 70, with corresponding Plasticity Indices (PI) ranging from 16 to 52. The average liquid limit and plasticity index are summarized in Table 4.4.1. The plots of liquid limit and plasticity indices versus depth are shown on Figures 7 and 8, respectively, within Appendix A. Low plasticity clay soils are generally considered to exhibit a low to moderate expansive potential provided their moisture contents are stable. High plasticity clay soils are generally considered to exhibit higher expansive potential if their moisture contents are allowed to change significantly.

Table 4.4.1 Average Liquid Limit and Plasticity Index

Approximate Depth Range (feet)	Average Liquid Limit (%)	Average Plasticity Index (%)
0 – 8	57	39
8 – 20	49	32
20 – 35	34	19

The in-situ total unit weight of the soils at the project site ranges from 113 to 139 pounds per cubic foot (pcf) with an average of 127 pcf. Plot of in-situ total unit weights versus depth is shown on Figure 9 within Appendix A. The in-situ dry unit weight of the soils at the project site ranges from 90 to 115 pounds per cubic foot (pcf) with an average of 104 pcf. Plot of in-situ dry unit weights versus depth is shown on Figure 10 within Appendix A.

Standard Proctor Test was performed to obtain the maximum dry unit weight at optimum moisture content in accordance with ASTM D 698 on several disturbed representative bulk soil samples from selected locations. A summary of these test results is presented in Table 4.4.2.

Table 4.4.2 Summary of Standard Proctor Test Results

Sample Location	Depth (feet)	Material Type	Maximum Dry Unit Weight (pcf)	Optimum Moisture Content (%)
TR-1	2 to 4	CH	102.4	20.5
TR-2	2 to 4	CH	100.8	21.8
TR-3	2 to 4	CH	95.7	25.1
TR-4	2 to 4	CH	100.3	22.7
TR-5	2 to 4	CH	97.9	23.4
TR-6	2 to 4	CH	99.9	22.1
TR-7	2 to 4	CH	102.1	20.9
TR-8	2 to 4	CH	101.5	21.3
TR-9	2 to 4	CH	95.8	23.6
TR-10	2 to 4	CH	97.9	22.7
TR-11	2 to 4	CL	102.5	19.1

Notes: CH = Fat Clay; CL = Lean Clay; pcf = pounds per cubic foot; % = percent.

Results of swell potential testing performed, in accordance with ASTM D 4546, on selected undisturbed soil samples are summarized in Table 4.4.3.

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Table 4.4.3 Summary of Swell/Expansion Test Results

Boring No.	Depth (feet)	Material Type	Plasticity Index (%)	Surcharge Load (psf)	Swell Strain (%)	Swell Pressure (psf)
T-012	9	CH	32	1,000	0.6	4,100
T-019	12	CH	35	1,000	4.6	8,400
T-041	9	CH	40	1,000	4.2	15,500
T-067	9	CH	36	1,000	2.2	15,300

Notes: CH = Fat Clay; psf = pounds per square foot; % = percent.

One-dimensional consolidation tests in accordance with ASTM D 2435 on relatively undisturbed soil samples are currently in progress. This section will be updated when laboratory test results become available.

Results of Unconsolidated-Undrained (UU) Triaxial tests performed, in accordance with ASTM D 2850, on undisturbed soil samples are summarized in Table 4.4.4.

Table 4.4.4 Summary of Unconsolidated-Undrained Triaxial Test Results

Boring No.	Depth (feet)	Material Type	Confining Pressure (psi)	In-Situ Dry Unit Weight (pcf)	In-Situ Moisture Content (%)	Undrained Shear Strength, S_u (psf)
T-015	9	CH	7	101.5	24.3	2,880
T-019	12	CH	10	107.2	21.0	3,380
T-041	14	CL	10	103.5	20.7	2,830
T-041	29	CL	20	107.7	21.9	2,930
T-067	9	CH	7	109.5	20.1	5,040
T-067	14	CL	10	108.8	20.7	1,660
T-071	12	CH	10	100.2	24.3	3,220
T-086	19	CL	15	99.4	24.5	2,200

Notes: CH = Fat Clay; CL = Lean Clay; psi = pounds per square inch; pcf = pounds per cubic foot; % = percent; psf = pounds per square foot.

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Results of unconfined compression tests performed, in accordance with ASTM D 2166, on undisturbed soil samples are summarized in Table 4.4.5.

Table 4.4.5 Summary of Unconfined Compression Test Results

Boring No.	Depth (feet)	Material Type	In-Situ Dry Unit Weight (pcf)	In-Situ Moisture Content (%)	Unconfined Compressive Strength, q_u (psf)
Substation	4	CL	107.0	19.1	3,410
T-017	9	CL	110.4	19.3	5,410
T-017	19	CL	114.5	17.9	5,400
T-025	4	CH	104.2	20.7	15,550

Boring No.	Depth (feet)	Material Type	In-Situ Dry Unit Weight (pcf)	In-Situ Moisture Content (%)	Unconfined Compressive Strength, q_u (psf)
T-041	9	CH	107.8	18.6	5,330
T-071	4	CL	100.6	16.2	22,280

Notes: CH = Fat Clay; CL = Lean Clay; psi = pounds per square inch; pcf = pounds per cubic foot; % = percent; psf = pounds per square foot.

Results of Minimum Resistivity and pH testing performed on shallow soil samples from selected borings are summarized in Table 4.4.6.

Table 4.4.6 Summary of Minimum Resistivity and pH Test Results

Boring No.	Depth (feet)	Material Type	Minimum Resistivity (ohm-cm)	pH
Substation	1	CH	1,000	7.24
T-025	1	CH	820	6.25
T-041	4	CH	1,800	6.15
T-071	4	CL	1,800	6.21
T-086	1	CH	1,400	5.65

Notes: CL = Lean Clay; CH = Fat Clay.

Results of water-soluble sulfate and chloride testing performed on shallow soil samples from selected borings are summarized in Table 4.4.7.

Table 4.4.7 Summary of Water-Soluble Sulfate and Chloride Test Results

Boring No.	Depth (feet)	Material Type	Sulfate Contents (ppm)	Chloride Contents (ppm)
Substation	4	CL	45.3	BRL
T-025	4	CH	54.1	72.5
T-041	7	CH	21.1	BRL
T-071	7	CL	BRL	BRL
T-086	4	CH	19.3	BRL

Notes: CL = Lean Clay; ppm = parts per million; BRL refers to Below Recordable Limit.

Graphical test results of laboratory testing completed along with summary of laboratory testing conducted as part of this study are presented in Appendix B.

4.5 Groundwater Conditions

Groundwater was encountered in some of the WTG borings at the time of field exploration and immediately after the completion of drilling operations as summarized in Table 4.5.1. Groundwater was not encountered in the remaining borings during drilling operations and immediately after completion of drilling operations. Upon completion of the drilling operations, the borings were backfilled in accordance with applicable state and local regulations; therefore, subsequent groundwater measurements are not available.

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Table 4.5.1 Summary of Groundwater Level Encountered During Drilling

Count	Boring/WTG No.	Depth to Groundwater Level (feet)	
		During Drilling	Immediately After Drilling
1	Substation	17.0	10.5
2	T-015	49.0	28.0
3	T-017	29.0	28.5
4	T-019	39.5	Not Recorded
5	T-041	29.0	24.0
6	T-063	29.0	Not Recorded
7	T-067	14.0	7.0
8	T-071	24.0	23.5
9	T-086	19.0	20.5

It is imperative to note that the short-term groundwater level observations performed as part of this study are not an accurate evaluation of groundwater levels at the project site, and should not be interpreted as a comprehensive groundwater study. The observations made during this investigation may also not represent conditions at the time of construction and it should be understood the presence of groundwater may have an effect on certain construction activities and long-term performance of foundations and pavements. Groundwater levels are highly dependent on climatic and hydrologic conditions before and after construction, and site development including irrigation demands, drainage and other factors. If a detailed groundwater study is desired, a groundwater hydrologist should be retained to perform these services.

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4.6 Rho Thermal Resistivity Test Results

Thermal resistivity testing was performed on remolded and undisturbed soil samples obtained from the substation and designated locations as shown on Figure 3, Thermal Resistivity Sample Locations, within Appendix A. Disturbed samples were remolded to about 90% of their respective maximum dry densities at their in-place moisture contents prior to thermal resistivity testing. The thermal resistivity testing was performed in accordance with the IEEE 442 standards and results are included in Appendix C. A summary of thermal resistivity test locations is presented in Table 4.8.1.

Table 4.8.1 Thermal Resistivity Testing Locations

Sample Location	Latitude (North)	Longitude (West)	Approximate Sample Depth (feet)
TR-1	36.992868	-97.070974	2 to 4
TR-2	36.988345	-97.051775	2 to 4
TR-3	36.978553	-97.104971	2 to 4
TR-4	36.970728	-97.095886	2 to 4
TR-5	36.969087	-97.077910	2 to 4
TR-6	36.968496	-97.063727	2 to 4
TR-7	36.966138	-97.065645	2 to 4
TR-8	36.964623	-97.070576	2 to 4
TR-9	36.962787	-97.100057	2 to 4
TR-10	36.958553	-97.067550	2 to 4
TR-11	36.956548	-97.064465	2 to 4

The results of the thermal resistivity testing should be used by the designers in the determination of the cable sizes and compaction requirements.

5.0 PRELIMINARY GEOTECHNICAL RECOMMENDATIONS

5.1 General

The turbine sites drilled as part of this study appear suitable for the proposed construction provided the following recommendations are followed. A summary of anticipated conditions requiring particular attention in the preliminary planning and development processes and in the design and construction phases of the project is presented below:

I. Each boring log was carefully reviewed for the presence of soft or loose layer(s) below foundation bearing elevation. The following is a summary of anticipated issues and our recommendations:

   a. Based on review of measured N-values documented on the logs of boring, medium stiff clay, and/or loose sand layers were encountered at or below foundation bearing elevation at 3 WTG locations (at Boring Nos. T-041, T-063 and T-086) on the project site as summarized in Table 4.3.2. We recommend limiting the preliminary design net allowable bearing pressure to about 2,000 to 2,500 psf for these sites.

   b. For the remaining 7 WTG locations, we recommend using a preliminary design net allowable bearing pressure of 3,000 to 4,000 psf in the preliminary structural design.

   A summary of the recommended preliminary design net allowable bearing pressures at the 10 WTG locations is provided in Table 5.1.1.

Table 5.1.1 Recommended Preliminary Design Net Allowable Bearing Pressures

Boring No.	Preliminary Design Net Allowable Bearing Pressure (psf)
T-012	3,500
T-015	3,500
T-017	3,500
T-019	3,500
T-025	4,000
T-041	2,000
T-063	2,500
T-067	3,000
T-071	4,000
T-086	2,000

II. It should be noted that limited over-excavation, re-compaction, and/or replacement of unsuitable foundation subgrade soils may be required for some WTG locations in order to

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utilize the foundation bearing pressures outlined in this section. For WTG sites where soft or loose subsurface materials were encountered, and in order to improve foundation bearing capacity and to limit excessive settlement of these soils, we recommend these materials be partially removed to a competent soil layer. The removed materials may be re-compacted or replaced with structural fill with sufficient binder or on-site suitable materials, and meeting the compaction efforts and moisture condition outlined in Section 6.3 or Section 6.4 of this report. The over-excavation of unsuitable soils could be terminated prior to excavating the recommended depths provided suitable bearing conditions are uniformly exposed throughout the excavation. Excavations should be observed by a qualified representative of the geotechnical engineer prior to backfilling to assess the suitability of the foundation soils and to verify the over-excavation depths. In some cases, additional over-excavation may be necessary.

III. Fat clay soils with high plasticity indices were encountered at or near foundation bearing elevation at the majority of WTG sites. The high plasticity fat clay soils exhibit a high expansive potential and may exert high swelling pressures on the WTG foundation as indicated in Table 4.4.3. Mitigation of potentially expansive fat clay soils beneath foundations may be required in some areas. The mitigation measures should consist of partial removal of fat clay soils and replacing with low plasticity fine grained soils to a minimum of 2 feet below the foundation bearing elevation. The low plasticity fine grained soils shall meet the material requirements, and meet the compaction efforts and moisture condition outlined in Section 6.4 of this report. The expansive potential of fat clay soils should be further evaluated by performing additional swell/expansion testing, soil classifications, and moisture content testing at the time of final geotechnical engineering study.

IV. Relatively shallow groundwater conditions encountered immediately after the drilling operation in one of the WTG location (WTG No. T-067) will require particular attention in the design and construction of foundations, access roadways, and crane pads in the vicinity area. The stability of the subgrade at foundation bearing elevation may also be affected by the proximity to shallow groundwater levels and/or “Perched” Groundwater conditions which may be encountered when foundation excavations are completed. In order to improve stability and to establish a stable platform for construction, consideration should be given to dewatering the site during construction and/or the use of granular or crushed rock materials with or without geogrid/geotextile at the base of these unstable foundation excavations. Dewatering means and methods are the responsibility of the contractor. Over-excavation of loose, soft and wet soils and replacement with granular materials may be required at some locations. Unstable subgrade conditions may develop if excavations are left exposed for surface run-off after periods of rainfall for an extended period of time, or where perched groundwater is present, and where drying of wet soils is not practical. As a guide, larger sized crushed rock materials less than 6 inches in maximum overall length may be used at the bottom of over-excavated areas and capped off with well-graded fill materials to establish a stable platform prior to mud slab placement. We anticipate about 18 to 24 inches of rock and well-graded materials with sufficient

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amount of fines may be needed in areas where stabilization measures are required. The use of chemical stabilizers such as lime (dry or hydrated) and fly ash could also be considered to improve the stability of the subgrade; however, these alternatives must be evaluated and their feasibility assessed prior to use. Provisions to keep the excavations dry during construction and prior to backfill operations should also be implemented for all foundation sites. It is imperative a qualified representative of the geotechnical engineer observe each foundation excavation prior to construction to confirm the bearing surfaces and any need for remedial measures.

V. We recommend that piezometers be installed during the final geotechnical subsurface exploration program. The total number of piezometers should be at about 15 to 20 percent of the total number of WTGs. Foundation design for the WTG sites should be based upon the shallowest groundwater elevation recorded in the piezometers at the completion of the groundwater level monitoring period. Foundations in areas where groundwater was encountered at a depth of 10 feet or shallower in the temporary piezometers may require designing for limited uplift/buoyancy forces. Raising foundations to provide for a minimum vertical separation distance of 2 feet may be considered for sites where groundwater is encountered at depths of less than 10 feet, if feasible. It should be noted groundwater may exhibit "artesian" characteristics and the contractor should be prepared to provide acceptable dewatering methods that may include the installation of well points in order to provide for a stable platform for construction. Other alternatives to remedy shallow groundwater conditions include installation of permanent subsurface and/or trench/interceptor drainage systems day-lighted to suitable outlets, geo-composite drain systems, slurry cut-off walls, or completely abandoning these sites. These alternatives must be investigated and their feasibility assessed prior to implementation.

VI. It is anticipated that excavations may be advanced with conventional earth moving equipment. Excavation contractors and/or underground utility installers should consider performing test pits or probing tests to evaluate proper means and methods for advancing excavations. Potential caving/sloughing of loose/soft dry soils within narrow and shallow utility trenches may require sidewalls of trenches to be sloped in order to install utilities. Excavated trench bottoms should be thoroughly cleaned prior to cable placement and backfilling.

VII. It is highly imperative a qualified representative of RRC observe each foundation excavation at the time of excavation to verify exposed foundation soil bearing conditions and to assess the need and limits of removal and replacement.

Detailed preliminary foundation design and construction recommendations are outlined in subsequent sections of this report.

5.2 Preliminary Turbine Gravity Foundation System

The use of gravity foundation systems for support of the turbines is considered acceptable. Bearing capacity and settlement calculations were performed in general accordance with

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methodologies outlined in the 2nd Edition of "Guidelines for Design of Wind Turbines" (Reference 3) and generally accepted standard of care and practice along with experience with similar soil conditions in this type of geological setting.

The preliminary net allowable bearing pressures provided in Section 5.1 can be used in the structural design provided the remedial measures outlined in Section 5.1 are followed. *The outlined net allowable bearing pressures may be increased by 1/3 when considering short duration forces such as seismic and wind. Therefore, the overall factor of safety associated with the increased allowable bearing capacity is 2.25.*

Differential settlement is expected to be on the order of about ½ to ¾ of the total settlement.

Table 5.2.1 presents a summary of design parameters for on-site soil and structural fill materials required for the foundation design.

Table 5.2.1 Recommended Soil and Structural Fill Design Parameters

Material Type	Friction Coefficient**	Modulus of Subgrade Reaction, k_1 (pci)***
Medium Stiff Clay	0.30	40
Stiff to Hard Clay	0.30	100
Unsaturated Medium Dense Sand Soils	0.40	150
Structural Fill Materials*	0.45	200****

* Structural fill should be placed in accordance with the specifications outlined in this report.

** If necessary, lateral passive earth pressures can be considered to develop additional resistance. The coefficient of base friction should be reduced to 0.30 when used in conjunction with passive pressure.

*** For a 1 ft. x 1 ft. Plate.

**** If structural fill is less than 5 feet in thickness, then k_1 value of native soil below the structural fill should be used.

Ground supported structures such as transformers and utilities bearing on native clay soils could experience shrink/swell movements on the order of about 2 inch or more. Therefore, it is imperative proper drainage be maintained during construction and throughout the life of these structures.

The use of on-site sand and clay as backfill against foundations is considered acceptable provided the materials are properly processed and placed.

Based on the results of maximum dry density-optimum moisture content relationships performed as part of this phase (ASTM D 698), anticipated over-burden backfill densities are outlined in Table 5.2.2 below.

Table 5.2.2 Over-burden Backfill Density Design Range Requirement

Backfill Material Type	Dry Backfill Unit Weight Range, γ_d (pcf)	Moist Backfill Unit Weight Range, γ_{total} (pcf)
On-site Soils	85-115	105-135

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Backfill over foundations should be compacted to a minimum of 90% of the maximum dry density as determined by ASTM D 698 to reduce the potential of erosion and/or scour events. Clay soils should be moisture conditioned within -3 to +2% of optimum moisture content prior to compaction. Sand soils should be moisture conditioned within 3% of optimum moisture content prior to compaction.

5.3 Substation Shallow Foundation Systems

Soft fat clay soils with high plasticity indices were encountered between about 1 to 4 feet below existing ground surface in Boring No. Substation that may require particular attention in the design and construction of shallow footing. To improve the foundation bearing capacity of the soft clay soils and mitigate potential swelling problem, we recommend the soft clay soils be removed to a minimum depth of 3 feet below foundation bearing elevation and replaced with suitable backfill material. The backfill materials may structural fill or be on-site suitable materials meeting the requirements including the compaction efforts outlined in Sections 6.3 and 6.4 of this report. Excavations should be observed by a qualified representative of the geotechnical engineer prior to backfilling to assess the suitability of the foundation soils and to verify the over-excavation depths. In some cases, additional over-excavation may be necessary. The over-excavation area should extend a minimum lateral distance of about 2 feet beyond the edge of the footings.

Small lightly loaded structures within the substation may utilize continuous or pad footings. For such foundations, a net allowable bearing pressure of 3,000 psf can be used when bearing on compacted clay soils or structural fills, which includes a safety factor of 3. The footing should have a minimum embedment of 2 feet below existing site grade for confinement and frost penetration. Anticipated settlement of the foundations under service loads will be on the order of about 1 inch or less.

It is imperative that a representative of the geotechnical engineer observe foundation excavations and confirm the bearing materials and assess possible needs for partial over-excavation and replacement. The shallow foundations should be adequately reinforced and proportioned to resist swell/uplift forces associated with the near surface clay soils. For structural design of the footings and mat foundations, the parameters outlined in Table 5.3.1 can be used.

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Table 5.3.1 Soil Parameters for Structural Design of Footings and Mat Foundations

Parameter	Design Value
Average Unit Weight , pcf	115
Modulus of Subgrade Reaction, pci	100*
Cohesion (undrained), psf	1,500
Friction Coefficient at Foundation Base	0.30

* For a 1 ft. x 1 ft. Plate.

Other design and construction recommendations are outlined in the ACI design Manual should be followed. It is imperative that proper drainage be maintained during construction and throughout the life of the substation structures to provide for adequate shallow foundation performance.

5.4 Substation Deep Foundation System

Substation with heavy axial loads and/or large overturning moments may utilize drilled pier foundations. Pier lengths will likely be dictated by overturning resistance. Allowable end bearing pressures and allowable skin friction values are provided in Table 5.4.1. Both allowable end bearing pressures and allowable skin frictions utilize a factor of safety of 3. Skin friction values should be reduced by 25% when calculating pull-out resistance, where applicable. Settlement associated with drilled piers is anticipated to be on the order of about ½ to 1 inch. Piers should have a minimum diameter of 1½ foot. The length of the drilled piers should be determined by the structural engineer to satisfy axial and lateral loading.

Table 5.4.1 Recommended Allowable Skin Friction Values

Material Type	Depth (feet)	Allowable End Bearing* (psf)	Allowable Skin Friction (psf)
Clay Soils	0 to 5	Neglect	Neglect
Clay Soils	5 to 19	5,000	350
Limestone Bedrock	19 to 24	10,000	1,300
Shale Bedrock	24 to 35	10,000	700

* We recommend the drilled shaft end bearing capacity be neglected unless adequate measures are taken during construction to remove any disturbed soils/bedrocks and loose settlements from the shaft base and only undisturbed soils/bedrocks are exposed.

Based upon swell test results performed as part of this study shown in Table 4.4.3, the in-situ fat clay soils within the top 10 to 12 feet of project site exhibit high swell potential. In order to mitigate potential swelling problem, we recommend removing and replacing the top 5 feet of fat clay soils with suitable backfill materials prior to constructing drilled piers at the substation location. The backfill materials should be low plasticity fine grained soils meeting the requirements including the compaction efforts and moisture condition outlined in Section 6.4 of this report. Uplift forces due to swelling can be neglected if the above recommendation is followed; otherwise uplift forces on drilled piers can be computed using the following equation:

U = 50*d (kips), where d is pier diameter in feet

This equation is based on the assumption that the soils within the upper 10 feet of the clay (the active zone) of the final ground surface contribute to uplift forces on the piers. The 10 feet zone represents the depth to which naturally occurring seasonal changes in soil water content would be expected to occur. The uplift forces could be reduced if potentially expansive clay soils are removed and replaced with structural engineered fill. Additional changes in the moisture content of the soils surrounding drilled piers caused by poor drainage, may cause an increase the active zone depth leading to larger uplift forces. Therefore, it is imperative that the design provides for proper drainage around the structures during construction and throughout the life of the structure. Uplift forces should be resisted by a combination of dead-load and skin friction contribution of the clay soils and limestone and shale bedrocks below a depth of 10 feet.

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Lateral load analysis may be performed using the LPILE computer program. LPILE uses a p-y curve finite difference technique for predicting the soil-structure interaction and response. Based on our interpretation of the subsurface strata and the results of the field and laboratory tests, the parameters outlined in Table D-1 within Appendix D may be used to evaluate drilled piers under lateral loads.

Vertical steel reinforcement to resist tensile loads caused by uplift forces should extend the full length of the pier shaft. Additional reinforcement required by structural demands for axial compressive loads, lateral loads, or minimum reinforcement required by design codes should be satisfied.

5.5 Lateral Earth Pressures

Lateral earth pressures will apply in strata where soils are the main constituent. The turbine will be designed to resist all lateral movements; therefore, the "at rest" lateral earth pressure will develop.

Where the design includes restrained elements, the following "at rest" equivalent fluid pressures are recommended as shown in Table 5.5.1:

Table 5.5.1 Recommended Equivalent Fluid Pressures for "At Rest" Lateral Earth Pressures

Material Type	"At Rest" Coefficient of Lateral Earth Pressure	Equivalent Fluid Pressure for "At Rest" Lateral Earth Pressure (psf/ft)
Clay Soils	0.66	82.5
Sand Soils	0.50	65.0

Passive and active earth pressure resistance will only mobilize after significant movement of the foundation. The passive case occurs where a structural element tends to move into the soil mass. The active case occurs when the element tends to move away from the soil mass. Both cases are applicable for unrestrained foundation elements.

For soils above any free water surface, recommended equivalent fluid pressures for unrestrained foundation elements when using on-site soils as backfill are shown on Table 5.5.2 and Table 5.5.3 for active and passive lateral earth pressures, respectively:

Table 5.5.2 Recommended Equivalent Fluid Pressures for Active Lateral Earth Pressures

Material Type	Active Coefficient of Lateral Earth Pressure	Equivalent Fluid Pressure for Active Lateral Earth Pressure (psf/ft)
Clay Soils	0.49	60
Sand Soils	0.33	45

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Table 5.5.3 Recommended Equivalent Fluid Pressures for Passive Lateral Earth Pressures

Material Type	Passive Coefficient of Lateral Earth Pressure	Equivalent Fluid Pressure for Passive Lateral Earth Pressure (psf/ft)
Clay Soils	2.03	255
Sand Soils	3.00	390

The values apply only to cases where the ground surface is level. We should be contacted to provide suitable values for cases where the ground surface is sloped. These earth pressure values do not include safety factors or hydrostatic pressure. Surcharge loads should also be considered.

5.6 Seismic Considerations

For structural designs based upon the 2009 International Building Code (IBC), a Site Class D should be used for this project. The Mapped Spectral Response Acceleration at 1-second period (S_1) and at short period (S_S) were computed using the Earthquake Ground Motion Tool Version 5.1.0 developed by United State Geological Survey (USGS) (Reference 4). Table 5.6.1 summarizes recommended seismic parameters to be used in the design:

Table 5.6.1 Recommended Seismic Parameters

Parameter	Recommended Calculated Value
S_s – Mapped Spectral Response Acceleration at Short Period	0.142 g
S_1 – Mapped Spectral Response Acceleration at 1-Second Period	0.055 g
F_a (Site Coefficient)	1.6
F_v (Site Coefficient)	2.4

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6.0 FOUNDATION CONSTRUCTION CRITERIA

6.1 Site Preparation

Prior to construction, we recommend adequate positive drainage be provided to maintain a relatively dry condition in the area of proposed construction. This will be very important if any work is attempted during periods of prolonged rainfall. Ponding of water in the areas of construction should be avoided.

Winter conditions can also impact the construction process. Newly placed fill should not be placed on frozen subgrade and frozen material should not be used for fill.

Site preparation should begin by removing surface vegetation, organic topsoil, and major root systems within the foundation areas. Deleterious materials should be placed in non-structural areas or removed from the site. During excavation of the turbine foundations, every effort should

be made to avoid disturbing the subgrade materials at the planned foundation bearing elevation. When the subgrade is disturbed, the resulting surface should be recompacted to achieve a minimum compaction of 97% of the maximum dry density as determined by ASTM D 698 and moisture conditioned within 2% of optimum moisture content. In areas where densification of the subgrade materials is required, proper slopes meeting federal, and state OSHA requirements should be maintained. The base of each foundation excavation should be observed by the geotechnical engineer or a qualified representative prior to foundation installation.

6.2 On-Site Excavated Materials As Overburden Backfill

The use of on-site sand and clay soils is considered acceptable as backfill materials against foundations provided the materials are properly processed and placed. Excavated material may be stockpiled for later use as overburden backfill or structural backfill. These materials should be free of organics, roots, and deleterious materials before the stockpile is allowed for reuse. The backfill materials should be placed in thin, loose lifts not exceeding 12 inches prior to compacting.

Each overburden material lift should be compacted and moisture conditioned properly in order to provide the minimum and maximum dry and wet unit weight values used in the structural design. In areas where structural elements such as transformer pads are located within the backfill zone, these subgrade soils should be compacted to a minimum of 97 percent of the maximum dry density as outlined by ASTM D 698 and moisture conditioned within 2% (sand soils) or within -2 to +3% (clay soils) of optimum moisture content.

6.3 Structural Fill Specifications

Structural fill material beneath foundations and in areas where over-excavation is performed should consist of a non-expansive, well-graded material with sufficient binder for compaction purposes and must meet the Oklahoma Department of Transportation Aggregate Gradation Type "B" or better. As a guide structural fill must meet the following:

	Percent finer by weight
3"	100 (max)
1-1/2"	40-100
3/4"	30-75
3/8"	25-60
No. 4 Sieve	20-50
No. 10 Sieve	15-35
No. 40 Sieve	7-22
No. 200 Sieve	3-10

- Liquid Limit ..... 25 (max)
- Plastic Index ..... 6 (max)

Structural fill should be placed in lifts having a maximum loose lift thickness of 12 inches and should be compacted to a minimum of 95% of ASTM D 1557. The structural fill should be moisture conditioned within 2% of optimum moisture content.

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6.4 On-site Materials Foundation Fill Specifications

On-site lean clay and sand soils could be reused beneath foundations where over-excavation and replacement of unsuitable materials is performed. These reused materials should have a maximum Plasticity Index of 12 and a maximum Liquid Limit of 40. On-site approved fill materials placed beneath foundations should be placed in lifts having a maximum loose lift thickness of 12 inches and should be compacted to a minimum of 97% as determined by ASTM D 698, or 95% as determined by ASTM D 1557. The on-site approved fill materials should be moisture conditioned with 2% of optimum moisture content. If gapping is a concern, the use of well graded granular materials or structural fill meeting the specifications outlined in Section 6.3 will be required.

6.5 Shallow Foundation Construction

The following construction criteria and general guidance should be observed during foundation construction:

1. All foundation excavations should be observed by the Geotechnical Engineer or a qualified representative to assess proper bearing materials are present at foundation bearing elevation in accordance with the recommendations given herein, and to assess the need for densification of the subgrade materials.
2. Special care should be taken to protect the exposed soils from being disturbed, freezing or drying out prior to placement of the structural fill pad.
3. The foundation contactor should determine proper excavation means and methods. The foundation excavation should be sloped sufficiently to create internal sumps for runoff collection and removal. Foundation excavations subject to rainfall and possible deterioration from accumulated water should be protected using a protective “mud-slab” (concrete) not less than 2 inches in thickness. If surface runoff water or groundwater seepage accumulates at the bottom of the foundation excavation, it should be collected and removed and not allowed to adversely affect the quality of the bearing surface.
4. The foundation excavations should be checked for size and cleaned of loose material and debris prior to the placement of reinforcing steel. Precautions should be taken during the placement of reinforcement and concrete to prevent the loose excavated material from falling into the excavation. A proof-roll of the excavation subgrade should be performed with a fully-loaded front-end loader or a similar equipment to assess the need for any shallow remedial measures. If excessive deflection or soft areas are observed while performing the proof-roll operations, the remedial measures outlined in previous sections of this report should be followed. The proof-roll operations should be observed by a qualified representative of the geotechnical engineer. In addition, consideration should be given to the use of either Static or Dynamic Cone Penetrometer (depending on the subgrade materials exposed at foundation bearing elevation) as an added measure to verify design bearing pressures and the need for any remedial measures. Target Static and Dynamic Cone Penetrometer values and minimum number of tests will be provided in a separate document following completion of the final geotechnical engineering study and prior to the start of construction activities.
5. Prior to the placement of concrete, water or frozen ground if present must be removed

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from the foundation excavation.

6. Foundation concrete should be air entrained with about 3 to 5% air, or as required by design codes and local practices.
7. Prompt placement of concrete in the excavation as it is completed, cleaned, and observed is strongly recommended.

6.6 Drilled Pier Construction

The following items are important for the successful completion of drilled pier foundations:

1. The Geotechnical Engineer or his representative should observe all pier excavations. This pier inspection is to verify proper depth, bearing stratum and to record other observations regarding the pier construction.
2. The pier excavations should be checked for size and to document that all loose material and free water has been removed prior to the placement of concrete. Precautions should be taken during the placement of the pier reinforcement and concrete to prevent loose excavated material from falling into the excavation.
3. Prompt placement of concrete in the excavation as it is completed, cleaned, and inspected is strongly recommended. Under no circumstances should a pier shaft be drilled that cannot be filled with concrete before the end of the workday.
4. The reinforcement steel cage placed in the shaft should be designed to be stable and centered during the placement of concrete.
5. We recommend that the drilled pier construction contract include a budget for temporary steel casing, in case the sloughing of soils or entry of water prevents proper construction of the piers.

6.7 Open Excavations

Temporary construction slopes and/or permanent embankment slopes should be protected from surface runoff water. Site grading should be designed to allow drainage at planned areas where erosion protection is provided, instead of allowing surface water to flow down unprotected slopes. Surcharge loads, either static or dynamic, should not be applied to an excavation slope. Construction equipment should be prevented from traveling along or near the top of the excavation slope. Monitoring of temporary slopes, trenches, and dewatering during construction should be undertaken by the contractor to detect early warnings of movement within slopes, structures, pavements, etc.

In all cases of excavations, sloped excavations and trench shields are recommended for excavations greater than 4 feet in depth. OSHA and applicable state and local standards should be observed and followed. Site safety is the responsibility of the contractor.

6.8 Corrosivity

Water-soluble sulfate and chloride testing indicated Negligible sulfate contents. The use of Type I or II cement can be considered for all at grade and below ground concrete. If there is no or minimal cost differential, the use of Type II cement should be considered for higher sulfate resistance. Foundation concrete should be designed in accordance with Chapter 4 of Section 318

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of the ACI Design Manual.

Minimum resistivity and pH testing indicated the surficial soils exhibit "Corrosive" characteristics. Cathodic protection for buried metal pipe should be designed by a qualified corrosion engineer, if required.

6.9 Drainage

Proper drainage should be provided away from the foundation elements during all phases of construction and post-construction grading. Proper drainage is essential to the long-term stability of the structure. Ponding of water near the foundation elements from improper drainage should not be permitted.

6.10 Access Roadways and Crane Pads Design and Construction Recommendations

It is our understanding that private access roadways will be built for construction and maintenance purposes. Traffic volumes during construction are anticipated to be frequent with heavy equipment utilizing the access roadways. Following the construction period, the traffic volumes will be light and vehicles accessing the roadways will generally consist of pickup trucks and occasional single and multi- unit truck traffic. The section thickness design should be based upon the methodology outlined by the American Association of State Highways and Transportation Officials (AASHTO) for design of aggregate-surfaced roadways (Reference 5).

The surficial materials encountered within a majority of the borings consisted of clays with varying amounts of sand and silt, and sands with varying amounts of clay and silt. These materials are generally considered to be poor to fair in terms of supporting vehicular and construction traffic. Prior to the placement of the aggregate base materials, stripping and removal of existing vegetation and other deleterious materials from the proposed roadway alignment should be performed. Topsoil and organics could be up to about 12 to 24 inches or more in thickness in some areas and should not be allowed for use in structural areas or along roadway alignments.

The exposed subgrade should then be proof-rolled prior to the placement of the aggregate road base materials to assess the presence of loose or soft areas and the need for remedial measures. The proof-roll operations should be conducted with a fully loaded 4,800-gallon water truck or similar equipment. In areas where excessive "pumping" of the subgrade is encountered, partial removal of soils in these areas and re-compaction and/or replacement with granular soils will be required. These subgrade areas should be scarified to a minimum depth of about 12 inches, moisture conditioned within 2 percent of the optimum moisture content and re-compacted. The use of geotextile or geogrids may be required within some areas along the roadway alignments where excessive "pumping" is encountered.

As a minimum, we recommend a total aggregate base course material thickness of 8 inches should be specified for the private access roadways within the project. As a guide, the aggregate road base materials used along the access roadways should meet the requirements outlined in previous sections of this report. The aggregate road base materials should be compacted to a minimum of 95% of the maximum dry density and within 2% of the optimum moisture content as

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determined in accordance with ASTM D 1557.

As an alternative to the recommendations outlined above, the use of 6 inches of aggregate base course materials overlying georids such as Tensar TX 140/TX 160 or equivalent, or cement treatment of 8 inches of the subgrade soils could be considered.

The actual pavement thickness should be determined by the design/build contractor, keeping in mind the frequency, duration and requirements of the turbine manufacturer.

For the crane pad, consideration could be given to the use of composite mats that are capable of widely distributing the crane loads to the underlying soils. The type and number of layers of these composite mats should be determined by the contractor to assure proper performance of the crane pads. We recommend scarifying the upper 3 to 4 feet of subgrade materials as a minimum, moisture conditioning within -1 to +2% of optimum moisture content and re-compaction to a minimum of 97% of the maximum dry density as determined by ASTM D 698 along with placement of a minimum of 18 inches of structural fill meeting the requirements outlined in this report. The reworked area should extend a minimum horizontal distance of 4 feet beyond the edges of the crane pads. The structural fill materials should be compacted to a minimum of 98% of the maximum dry density and moisture conditioned within 2% of optimum moisture content as determined by ASTM D 698. Crane pads reworked as above are anticipated to have an allowable bearing capacity of about 4,000 psf. For bearing loads in excess of this amount, load distribution mats should be utilized so that the bearing capacity is not exceeded. Other alternatives such as using soil reinforced subgrade could also be considered.

It is imperative proper drainage of the subgrade be provided in the construction of the roadways and crane pads to enhance their performance. Post-construction proof rolling of the subgrade materials should be performed prior to re-opening the roadways for traffic after periods of heavy rainfall/snow melt to assess stability of the roadway and the need for remedial measures. The proof-roll should be accomplished with a fully loaded water truck or similar heavy equipment. Areas where remedial measures are required should be re-worked and corrected prior to acceptance. It is also imperative that periodic inspection of the access roadways be performed following periods of rainfall or snowmelt to assess the condition of the roads and the need for remedial measures.

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7.0 LIMITATIONS

Recommendations contained in this report are based on our field observations and subsurface explorations, limited laboratory tests, and our present knowledge of the proposed construction. It is likely soil and/or bedrock conditions will vary between or beyond the points explored. If soil and bedrock conditions are encountered during construction that differ from those described herein, we should be notified immediately in order to provide supplemental recommendations (if needed). If the scope of the proposed construction, including the proposed loads or structural locations, changes from those described in this report, our data should also be reviewed.

We have prepared this report in substantial accordance with the generally accepted geotechnical engineering practice as it exists in the site area at the time of our study. No warranty is expressed or implied. The recommendations provided in this report are based on the assumption RRC will conduct an adequate program of tests and observations during the construction phase in order to evaluate compliance with our recommendations.

This report may be used only by the client and only for the purposes stated, within three years from its issuance. Land use, site conditions (both on site and off site) or other factors may change over time, and additional work may be required with the passage of time. Any party other than the client, or the client's design team members for this particular project, who wishes to use this report shall notify RRC of such intended use. Based on the intended use of the report, RRC may require that additional work be performed and that an updated report be issued. Non-compliance with any of these requirements by the client or anyone else will release RRC from any liability resulting from the use of this report by any unauthorized party.

Other standards or documents referenced in any given standard cited in this report, or otherwise relied upon by the authors of this report, are only mentioned in the given standard; they are not incorporated into it or "included by reference," as that latter term is used relative to contracts or other matters of law.

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8.0 REFERENCES

1. http://mrdata.usgs.gov/geology/state/sgmc-unit.php?unit=OKPw;0
2. http://www.ogs.ou.edu/StatemapOGQ/OGQ-69_Ponca_City_100K.pdf
3. Risø National Laboratory, Guidelines for Design of Wind Turbines, 2nd Edition, Det Norske Veritas, Copenhagen, 2002.
4. Java Ground Motion Parameter Calculator, Version 5.1.0, Available at the United State Geological Survey website: http://earthquake.usgs.gov/hazards/designmaps/javacalc.php
5. AASHTO Guide for Design of Pavement Structures, Washington, D.C., 1993.

RRC Renewable Resource Consultants

www.RenewableLLC.com

3801 Doris Lane
Round Rock, TX 78664
512.992.2087

APPENDIX A

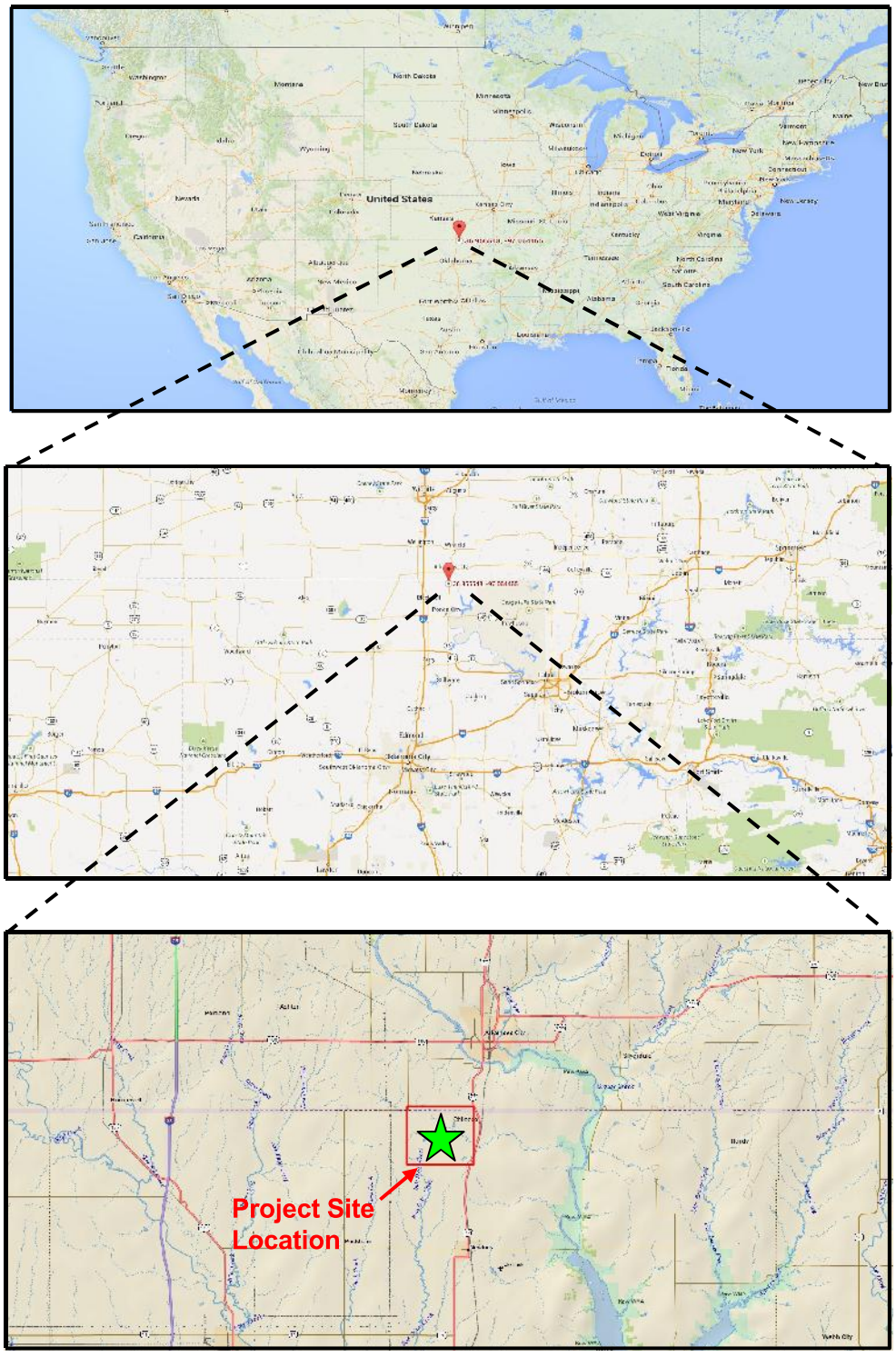
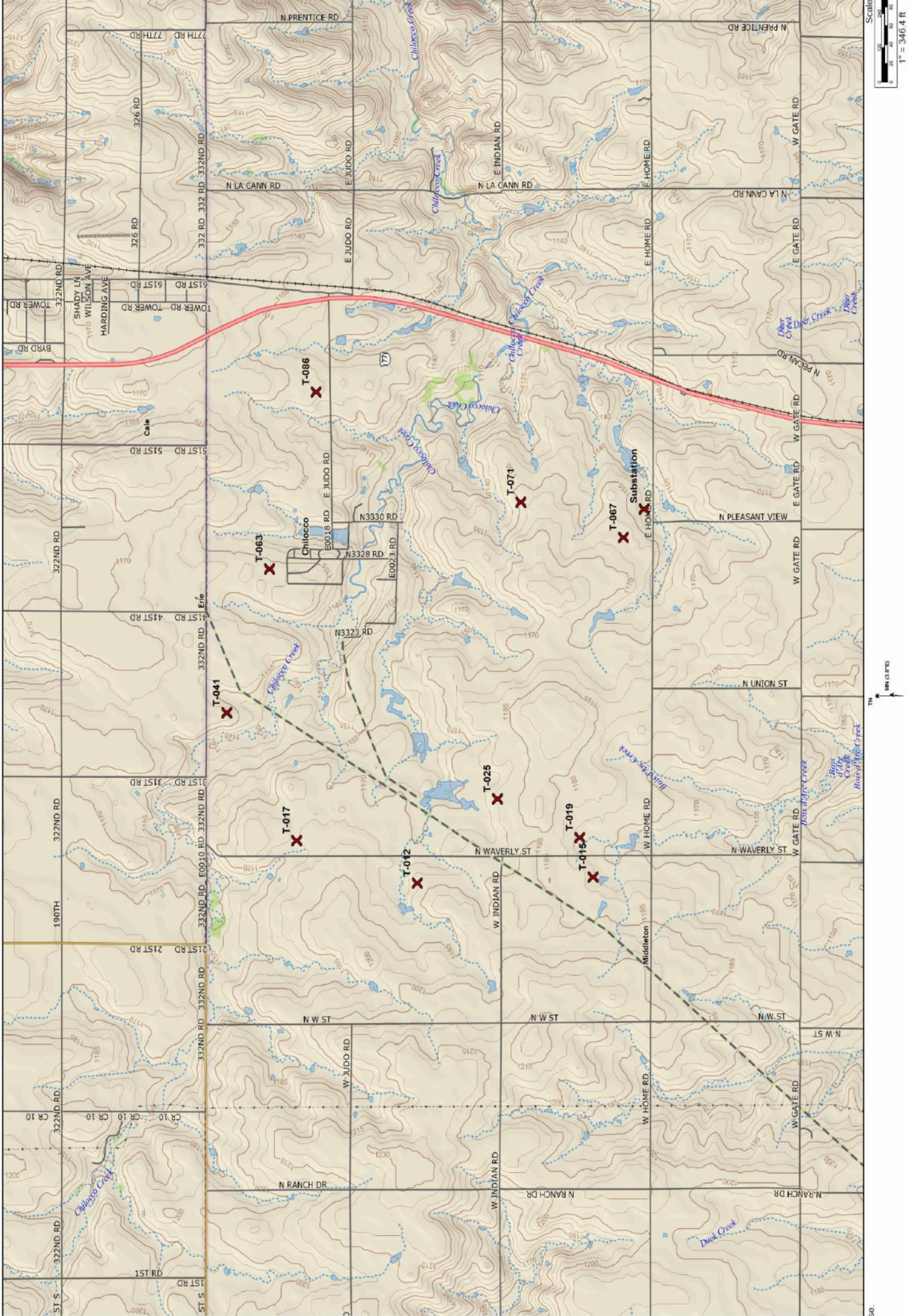
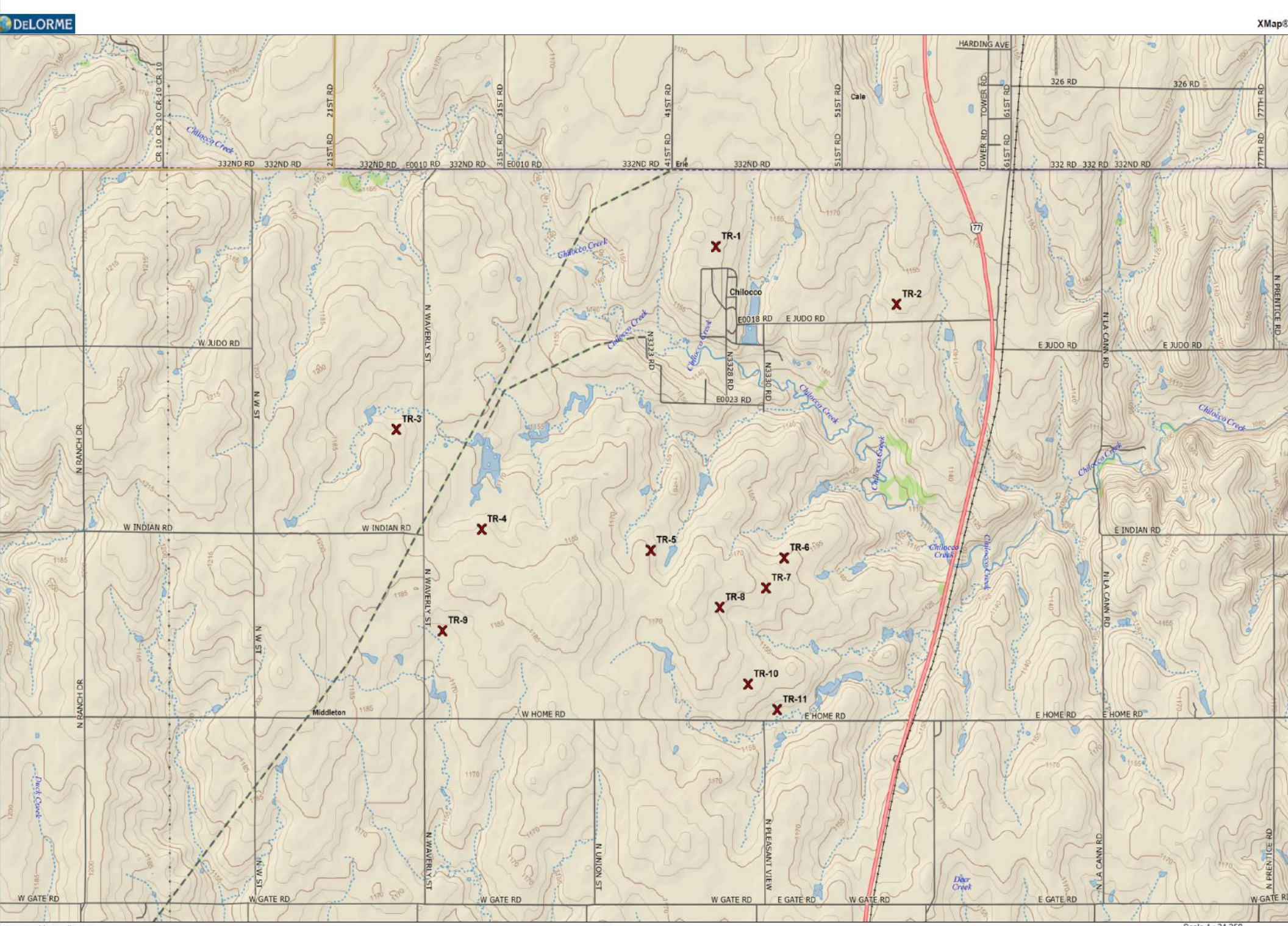
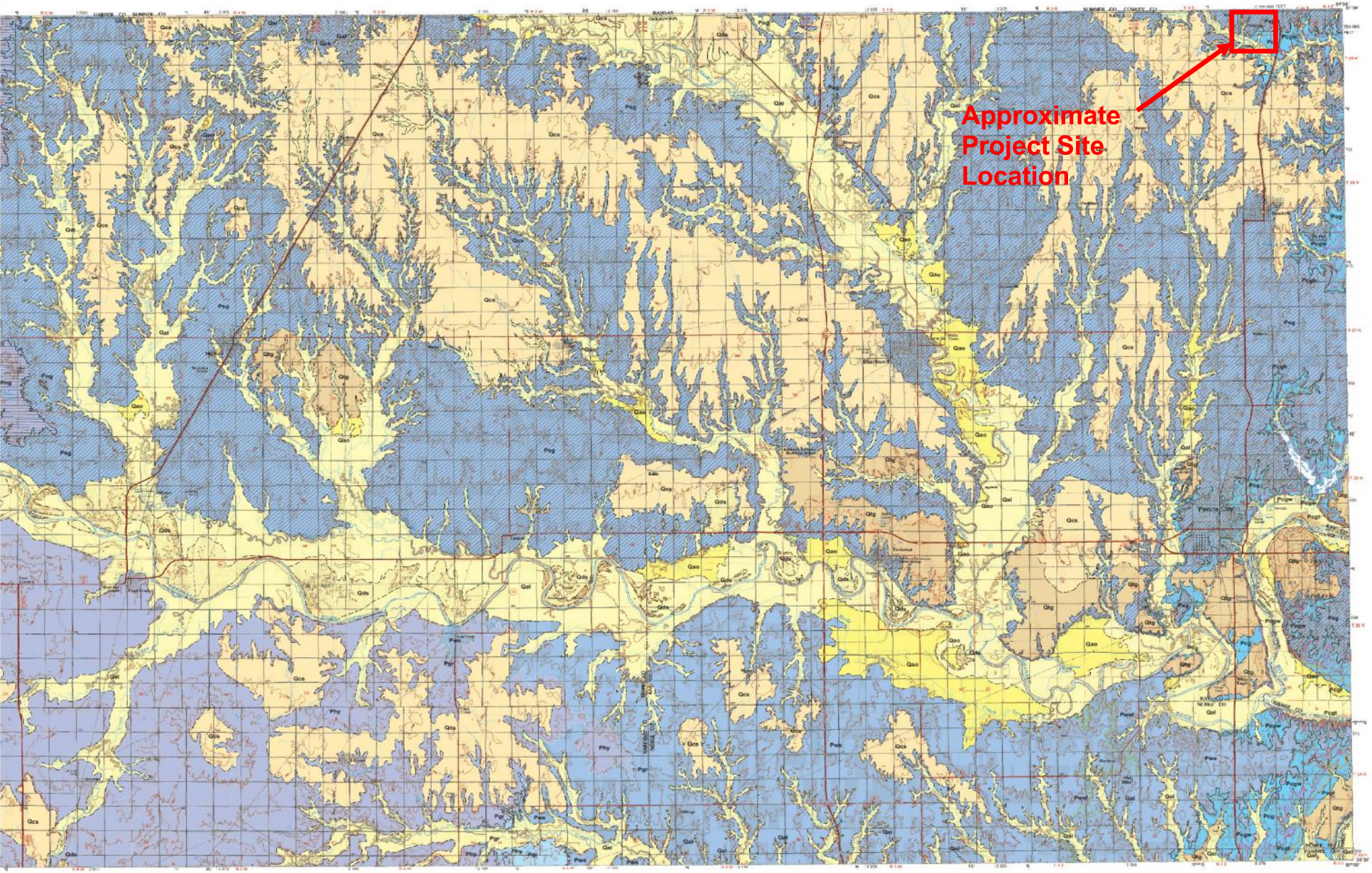


Figure 1 – Site Location Map


N PRENTICE RD
N LA CANN RD
N PLEASANT VIEW
N UNION ST
N WAVERLY ST
N W ST
N RANCH DR
E JUDO RD
W JUDO RD
E HOME RD
W HOME RD
E GATE RD
W GATE RD
W INDIAN RD
E INDIAN RD
N PECAN RD
322ND RD
332ND RD
326 RD
332 RD
190TH
E0018 RD
E0023 RD
E0010 RD
N3330 RD
N3328 RD
N3323 RD
77TH RD
61ST RD
51ST RD
41ST RD
31ST RD
21ST RD
1ST RD
TOWER RD
BYRD RD
SHADY LN
WILSON AVE
HARDING AVE
CR 10
Chilocco
Erie
Cale
Middleton
Substation
Chilocco Creek
Deer Creek
Duck Creek
Bois d'Arc Creek
T-086
T-063
T-071
T-067
T-041
T-025
T-017
T-019
T-012
T-015
Scale
1" = 346.4 ft


DeLORME
XMap®
TR-1
TR-2
TR-3
TR-4
TR-5
TR-6
TR-7
TR-8
TR-9
TR-10
TR-11
Chilocco
Cale
Erie
Middleton
HARDING AVE
326 RD
332ND RD
E0010 RD
E0018 RD
E0023 RD
E JUDO RD
W JUDO RD
W INDIAN RD
E INDIAN RD
W HOME RD
E HOME RD
W GATE RD
E GATE RD
N3323 RD
N3328 RD
N3330 RD
21ST RD
31ST RD
41ST RD
51ST RD
61ST RD
77TH RD
TOWER RD
N W ST
N WAVERLY ST
N RANCH DR
N L A CANN RD
N PRENTICE RD
N UNION ST
N PLEASANT VIEW
CR 10
Chilocco Creek
Deer Creek
Duck Creek
77
TN
MN (3.8°E)
Scale 1 : 31,250
1" = 295.6 ft
Data Zoom 12-6
ata use subject to license.
DeLorme. XMap® 8.
ww.delorme.com



GEOLOGIC MAP OF THE THE PONCA CITY 30′ X 60′ QUADRANGLE, GARFIELD, GRANT, KAY, NOBLE, OSAGE, AND PAWNEE COUNTIES, OKLAHOMA

Compiled by Thomas M. Stanley and Galen W. Miller
Cartography by G. Russell Standridge

2007

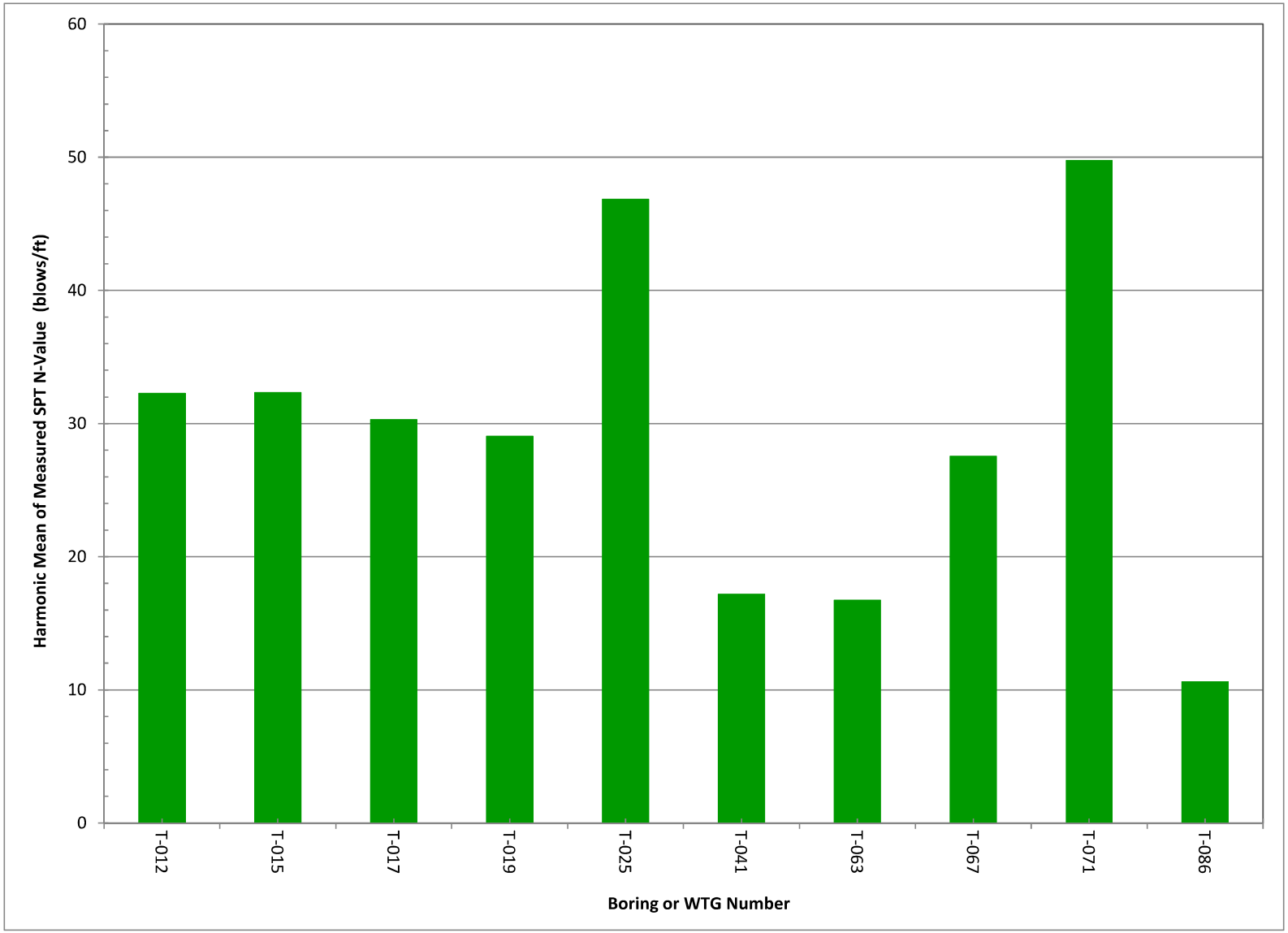


Figure 5 – Harmonic Mean of SPT N-values below 7 Feet from the Ground Surface

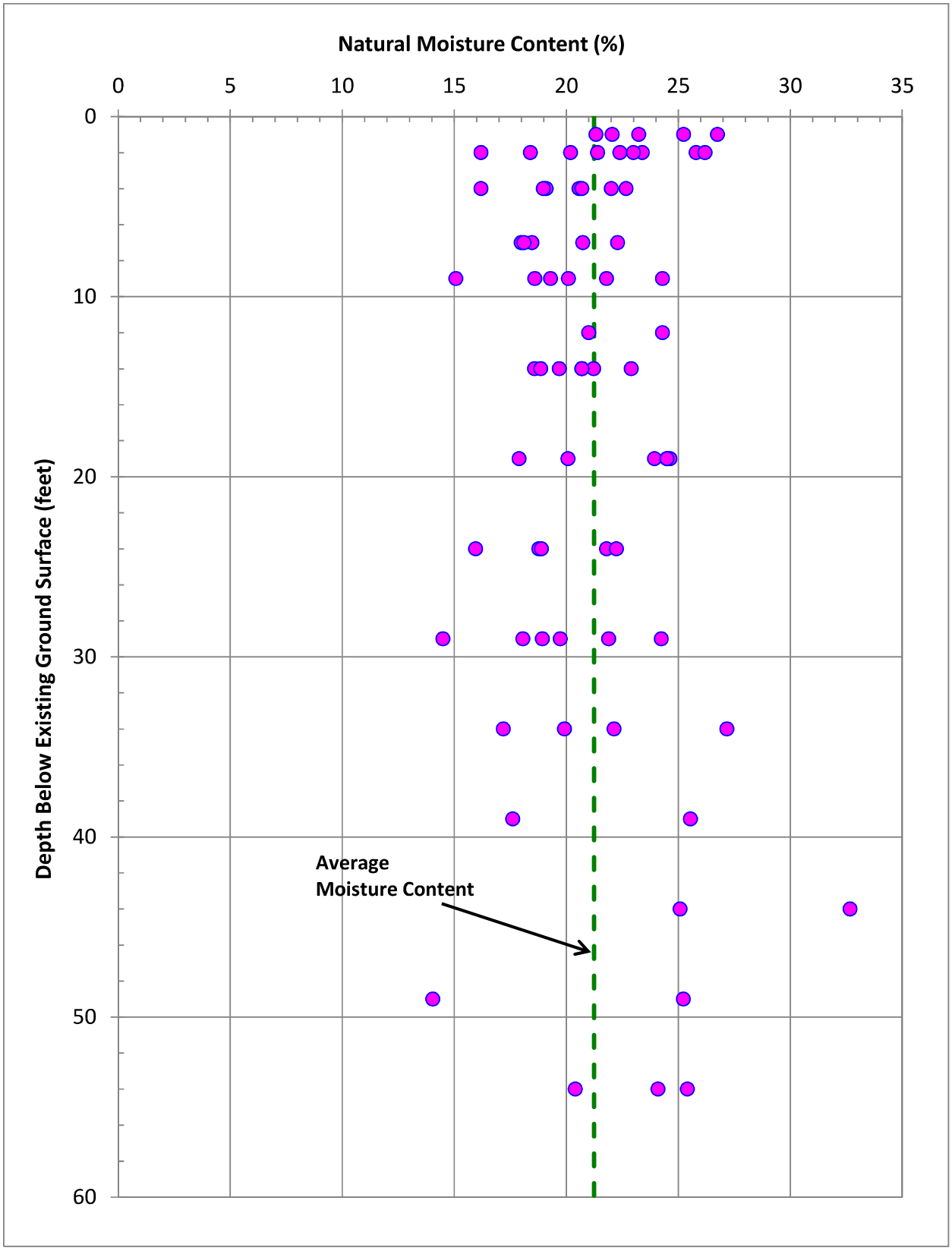


Figure 6 – Moisture Content versus Depth

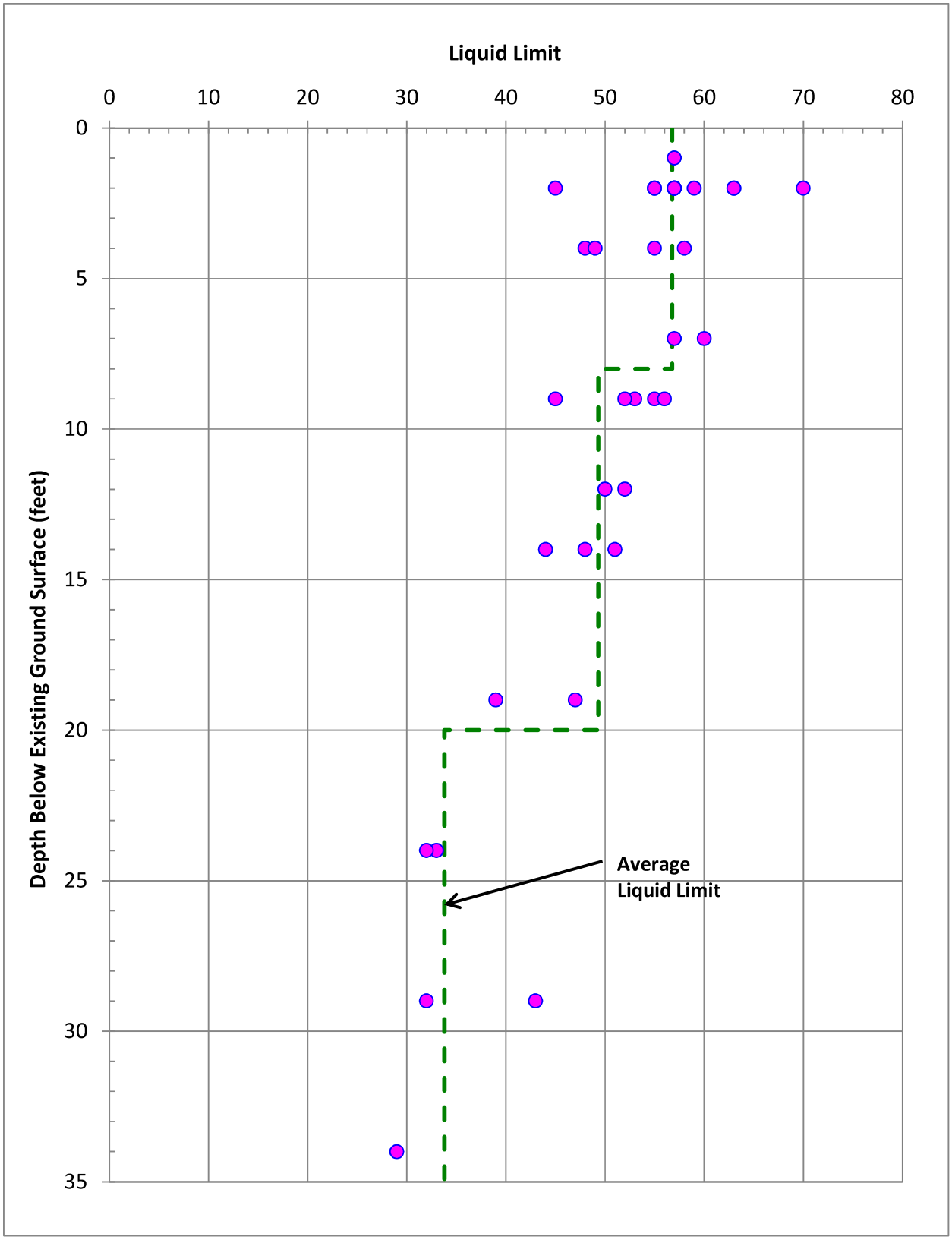


Figure 7 – Liquid Limit versus Depth

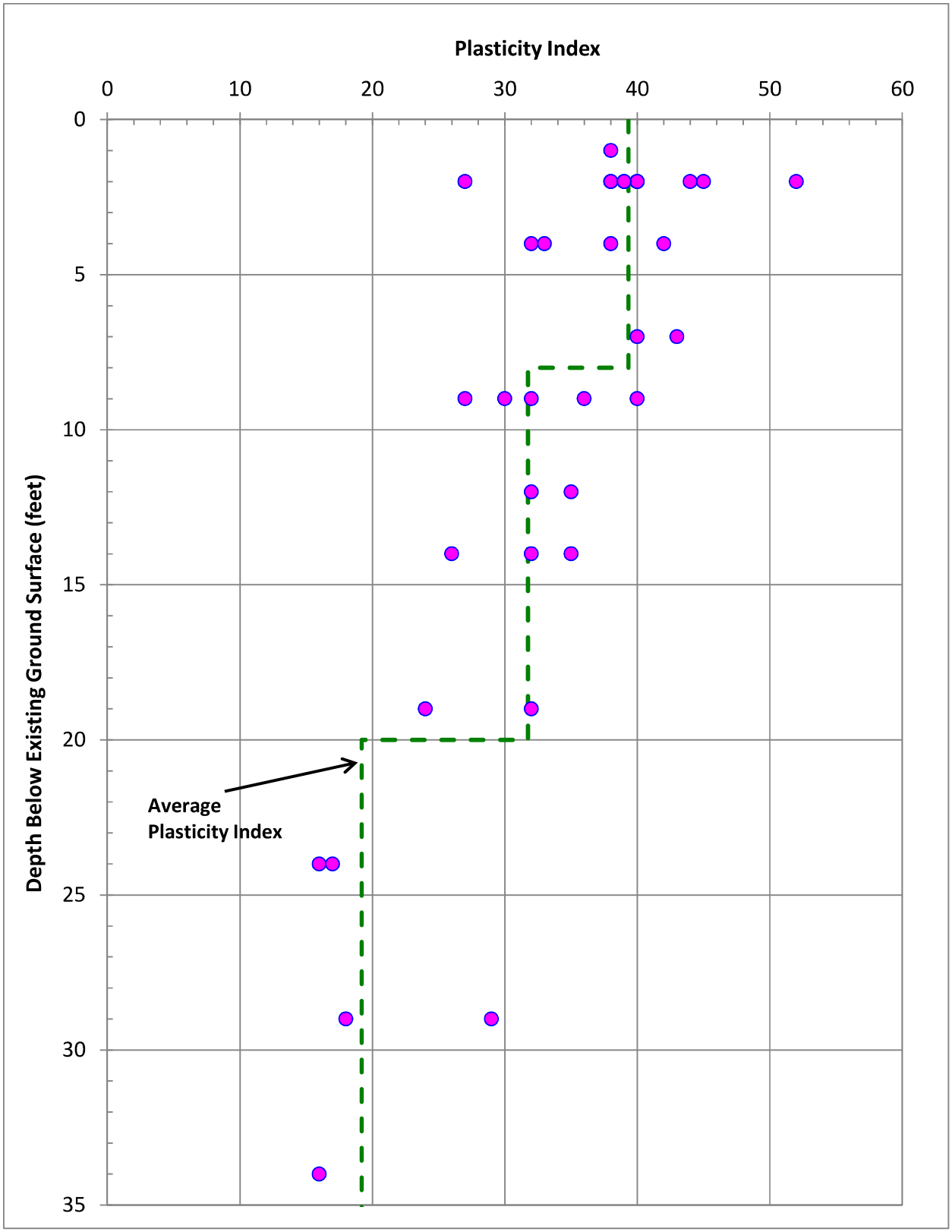


Figure 8 – Plasticity Index versus Depth

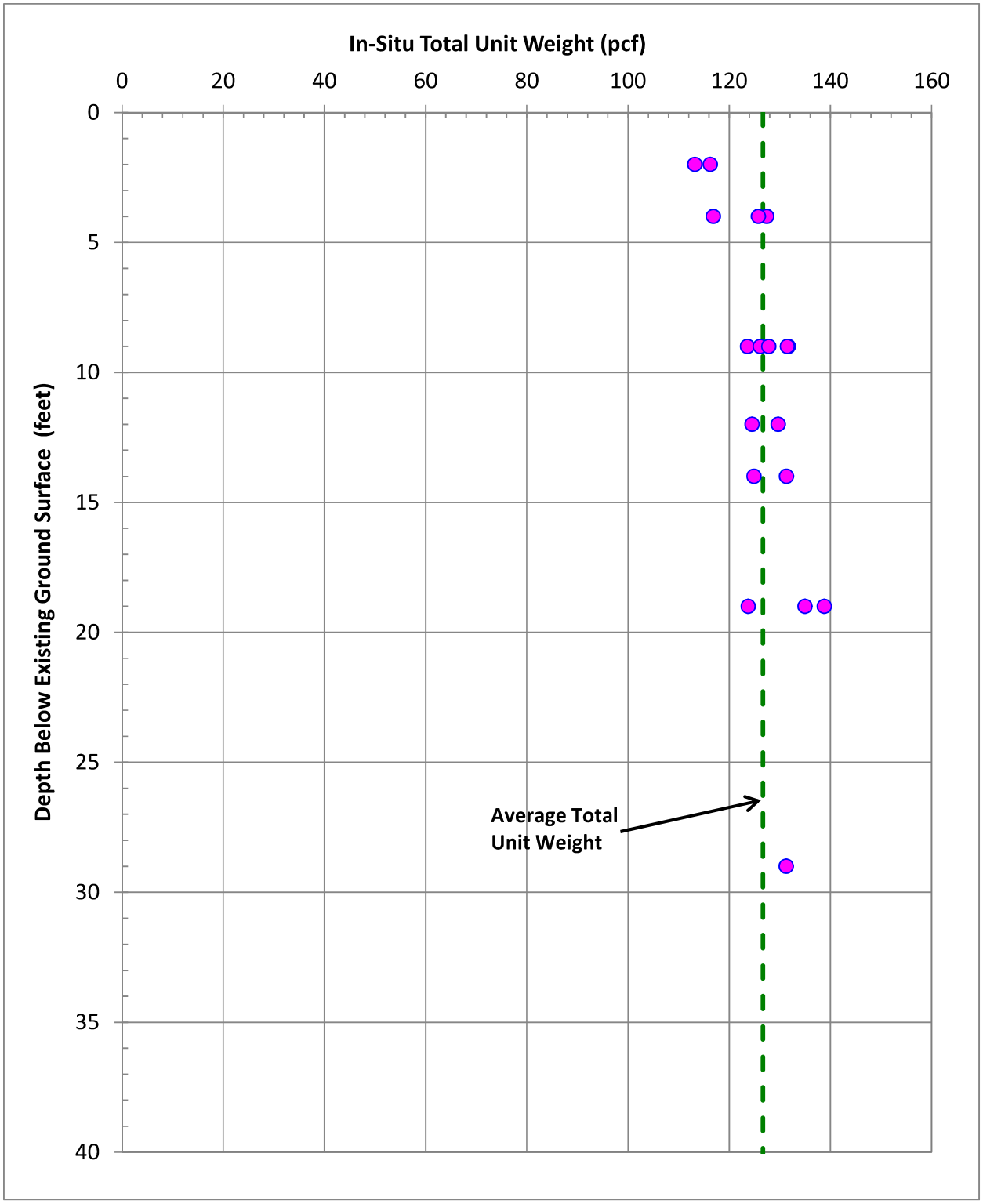


Figure 9 – Total Unit Weight versus Depth

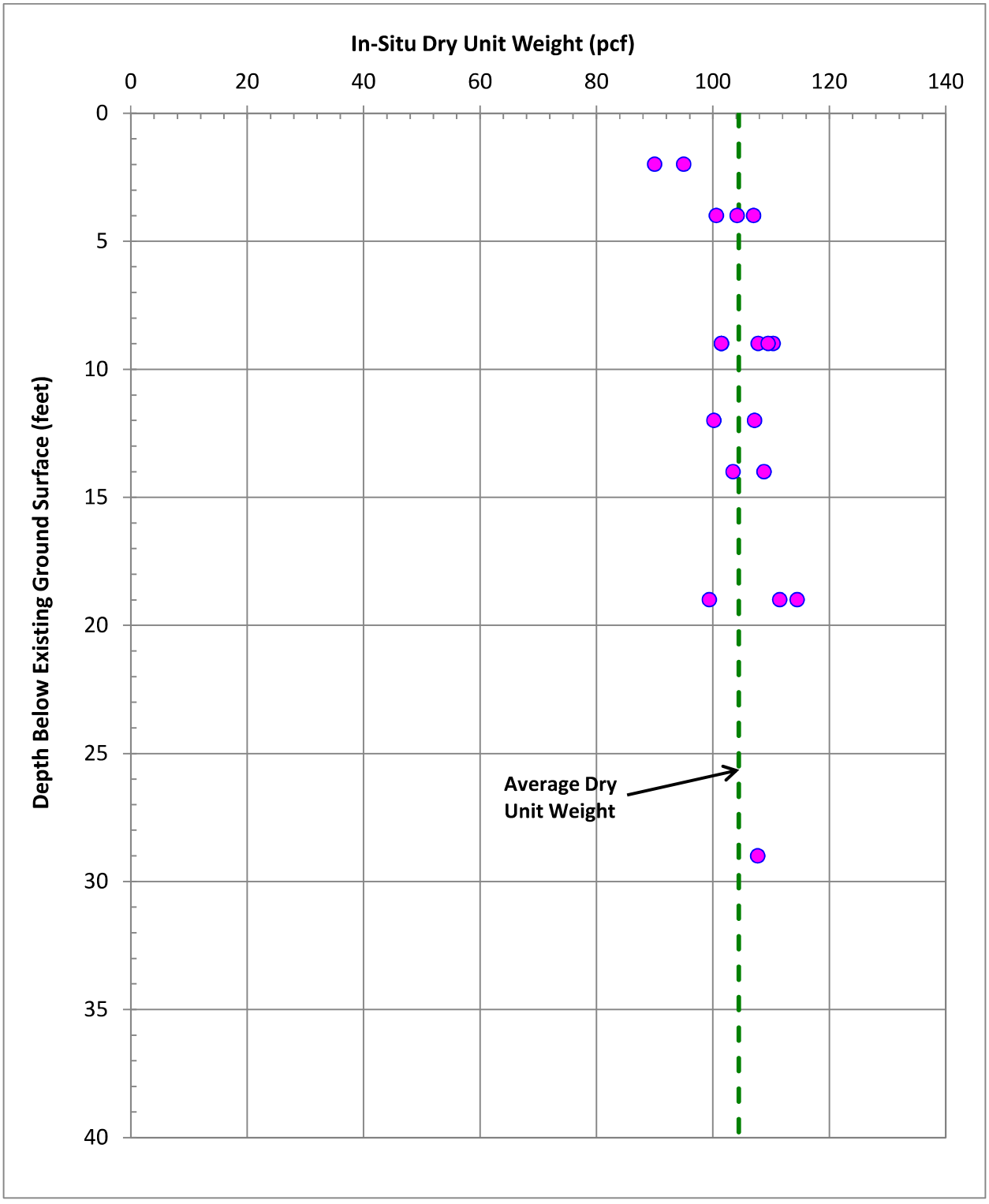
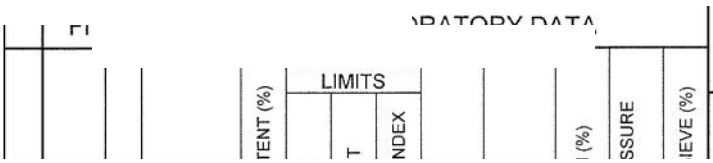


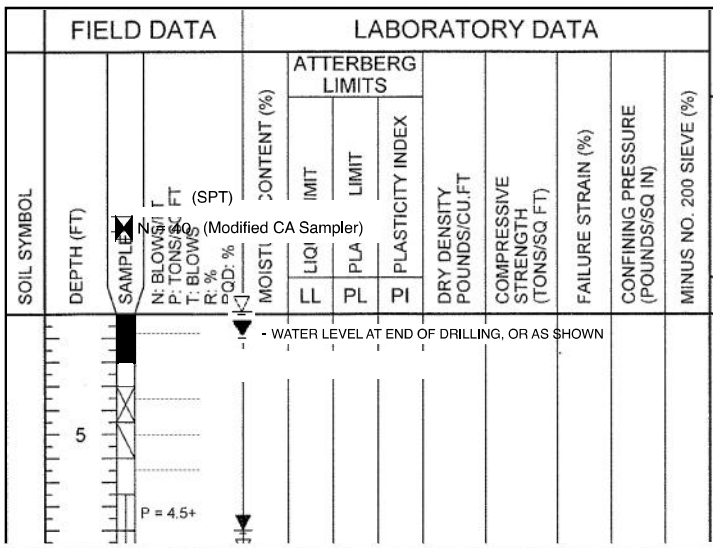
Figure 10 – Dry Unit Weight versus Depth

Continuous Flight Auger/Hollow-stem Auger/Wet Rotary/NX Core



DRILLING METHOD(S):
Push Tube/SPT/Auger/THD

GROUNDWATER INFORMATION:
Subsurface water was not encountered either during or upon completion of the drilling operations



DRILLING METHOD(S):
Push Tube/SPT/Auger/THD

GROUNDWATER INFORMATION:
Subsurface water was not encountered either during or upon completion of the drilling operations.

SURFACE ELEVATION: ft.

DESCRIPTION OF STRATUM

TYPICAL SOIL AND ROCK SYMBOLS (USCS CLASSIFICATION)

- Lean Clay (CL)
- Fat Clay (CH)
- Silt (ML)
- Elastic Silt (MH)
- Silty Sand (SM)
- Clayey Sand (SC)
- Silty, Clayey Sand (SC-SM)
- Poorly-Graded Sand (SP)
- Well-Graded Sand (SW)
- Poorly-Graded Gravel (GP)
- Well-Graded Gravel (GW)
- Clayey Gravel (GC)
- Silty Gravel (GM)
- Silty Clay (CL-ML)
- Claystone
- BASALT
- Limestone
- Sandstone
- Siltstone
- Fill Material
- Shale

DEGREE OF WEATHERING

1) Unweathered: No evidence of any chemical or mechanical alteration.
2) Slightly weathered: Slight discoloration on surface, slight alteration along discontinuities, less than 10% of the rock volume altered.
3) Moderately weathered: Discoloring evident, surface pitted and altered with alteration penetrating well below rock surfaces, weathering "halos" evident, 10% to 50% of the rock volume altered.
4) Highly weathered: Entire mass discolored, alteration pervading nearly all of the rock with some pockets of slightly weathered rock noticeable, some minerals leached away.
5) Decomposed: rock reduced to a soil with relicit rock texture, generally molded and crumbled by hand.

SOIL STRUCTURE

Calcareous..... Containing calcium carbonate

Slickensided..... The presence of planes of weakness having a slick and glossy appearance

Interbedded..... Alternating layers of varying material

LOG OF BORING: Substation

Renewable Resource Consultants, LLC
3801 Doris Lane
Round Rock, TX 78664
Telephone: (512) 992-2087
Fax: (512) 251-2518

CLIENT: Mortenson Construction
PROJECT: Chilocco Wind Farm
LOCATION: Chilocco, OK
NUMBER: 130222
DATE(S) DRILLED: 8/21/13

DRILLING METHOD(S):
Hollow Stem Auger

GROUNDWATER INFORMATION:
Groundwater encountered at 17 ft. during drilling and at 10.5 ft. after drilling

SURFACE ELEVATION:

SOIL SYMBOL	DEPTH (FT)	SAMPLES	N: BLOWS/FT P: TONS/SQ FT T: BLOWS R: % RQD: %	MOISTURE CONTENT (%)	ATTERBERG LIMITS LIQUID LIMIT LL	ATTERBERG LIMITS PLASTIC LIMIT PL	ATTERBERG LIMITS PLASTICITY INDEX PI	DRY DENSITY POUNDS/CU.FT	UNDRAINED SHEAR STRENGTH (TONS/SQ. FT)	STRAIN AT FAILURE (%)	CONFINING PRESSURE (POUNDS/SQ IN)	MINUS NO. 200 SIEVE (%)	DESCRIPTION OF STRATUM
													12 in Topsoil
			N = 4	25									FAT CLAY (CH), with Sand, dark brown, soft, moist, with Organics
	5		P = 2.75	19	48	16	32	107	0.9	15.0	0.0	91	LEAN CLAY (CL), with Sand, greenish gray to brown, very stiff, moist
	10		N = 73/11.5"	15									SILTY SAND (SM), brown, very dense, moist, fine to medium grained, weakly to moderately cemented
	15		N = 39	21									FAT CLAY (CH), greenish gray, hard, moist to wet, iron stained
	20		N = 50/2"										LIMESTONE, gray, very hard, moist, highly weathered
	25		N = 78/10"	19									SHALE, gray, very hard, moist, iron stained
	30		N = 50/0"										Iron stained grades out
			N = 50/4"										Total Depth = 34.5 ft.

N - STANDARD PENETRATION TEST RESISTANCE
P - POCKET PENETROMETER RESISTANCE
T - TXDOT CONE PENETRATION RESISTANCE
R - ROCK CORE RECOVERY
RQD - ROCK QUALITY DESIGNATION

REMARKS:
GPS COORDINATES: Lat. 36.956548, Long. -97.064465

RENEWABLE LOG - LOG A GNNL01.GDT - 9/11/13 11:36 - Z:\GINT\PROJECTS\2013\130222 CHILOCCO WIND PROJECT\130222 CHILOCCO WIND FARM.GPJ

LOG OF BORING: T-012

Renewable Resource Consultants, LLC
3801 Doris Lane
Round Rock, TX 78664
Telephone: (512) 992-2087
Fax: (512) 251-2518

CLIENT: Mortenson Construction
PROJECT: Chilocco Wind Farm
LOCATION: Chilocco, OK
NUMBER: 130222
DATE(S) DRILLED: 8/26/13

DRILLING METHOD(S):
Hollow Stem Auger

GROUNDWATER INFORMATION:
No groundwater encountered during and after drilling

SURFACE ELEVATION:

SOIL SYMBOL	DEPTH (FT)	SAMPLES	N: BLOWS/FT P: TONS/SQ FT T: BLOWS R: % RQD: %	MOISTURE CONTENT (%)	ATTERBERG LIMITS LIQUID LIMIT LL	ATTERBERG LIMITS PLASTIC LIMIT PL	ATTERBERG LIMITS PLASTICITY INDEX PI	DRY DENSITY POUNDS/CU.FT	UNDRAINED SHEAR STRENGTH (TONS/SQ. FT)	STRAIN AT FAILURE (%)	CONFINING PRESSURE (POUNDS/SQ IN)	MINUS NO. 200 SIEVE (%)	DESCRIPTION OF STRATUM
													12 in. Topsoil
			N = 8										FAT CLAY (CH), with Sand, dark brown to black, medium stiff to hard, moist
	5		N = 19	19									Grading iron stained
			N = 12										
	10		P = 4.25	22	53	21	32	102				80	Grading brown to olive gray
			N = 19										
	15		N = 27										
	20		N = 60	25				112					
	25		N = 29										Grading olive to gray, dry to moist
	30		N = 48	19									Grading reddish brown to olive, moist, with Sand seams
	35		N = 75										
	40		N = 75	26									
	45		N = 43										
	50		N = 89/11"	14									SHALE, dark gray, very hard, moist, iron stained
	55		N = 68										SANDY SHALE, dark gray to yellowish brown, hard, moist, iron stained, with Gypsum seams
													Total Depth = 55.5 ft.

N - STANDARD PENETRATION TEST RESISTANCE
P - POCKET PENETROMETER RESISTANCE
T - TXDOT CONE PENETRATION RESISTANCE
R - ROCK CORE RECOVERY
RQD - ROCK QUALITY DESIGNATION

REMARKS:
GPS COORDINATES: Lat. 36.978553, Long. -97.104971

RENEWABLE LOG - LOG A GNNL01.GDT - 9/11/13 11:36 - Z:\GINT\PROJECTS\2013\130222 CHILOCCO WIND PROJECT\130222 CHILOCCO WIND FARM.GPJ

LOG OF BORING: T-015

Renewable Resource Consultants, LLC
3801 Doris Lane
Round Rock, TX 78664
Telephone: (512) 992-2087
Fax: (512) 251-2518

CLIENT: Mortenson Construction
PROJECT: Chilocco Wind Farm
LOCATION: Chilocco, OK
NUMBER: 130222
DATE(S) DRILLED: 8/22/13

DRILLING METHOD(S):
Hollow Stem Auger

GROUNDWATER INFORMATION:
Groundwater encountered at 49 ft. during drilling and at 28 ft. after drilling

SURFACE ELEVATION:

SOIL SYMBOL	DEPTH (FT)	SAMPLES	N: BLOWS/FT P: TONS/SQ FT T: BLOWS R: % RQD: %	MOISTURE CONTENT (%)	ATTERBERG LIMITS LIQUID LIMIT LL	ATTERBERG LIMITS PLASTIC LIMIT PL	ATTERBERG LIMITS PLASTICITY INDEX PI	DRY DENSITY POUNDS/CU.FT	UNDRAINED SHEAR STRENGTH (TONS/SQ. FT)	STRAIN AT FAILURE (%)	CONFINING PRESSURE (POUNDS/SQ IN)	MINUS NO. 200 SIEVE (%)	DESCRIPTION OF STRATUM
													18 in. Topsoil
			N = 8	27									FAT CLAY (CH), trace Sand, dark brown, medium stiff to very stiff, moist, with Organics
	5		N = 20										Grading brown to brownish gray
			N = 14										Grading trace calcareous nodules
	10		P = 2.75	24	55	28	27	102	1.4	6.0	7.0	98	
			N = 26										SANDY LEAN CLAY (CL), olive, very stiff, moist, iron stained
	15		N = 34	19									LEAN CLAY (CL), trace Sand, brown, hard, moist
	20		N = 30										FAT CLAY (CH), trace Sand, greenish gray to dark brown, very stiff to hard, moist
	25		N = 50/4"										Grading greenish gray
	30		N = 50										Grading reddish brown
	35		N = 33	22									FAT CLAY (CH), with Gravel, olive, very stiff to hard, moist to wet
	40		N = 29										
	45		N = 65/11"										Grading with calcareous nodules
	50		N = 37										
	55		N = 28	25									FAT CLAY (CH), brown, very stiff, moist
													Total Depth = 55.5 ft.

N - STANDARD PENETRATION TEST RESISTANCE
P - POCKET PENETROMETER RESISTANCE
T - TXDOT CONE PENETRATION RESISTANCE
R - ROCK CORE RECOVERY
RQD - ROCK QUALITY DESIGNATION

REMARKS:
GPS COORDINATES: Lat. 36.961501, Long. -97.104337

RENEWABLE LOG - LOG A GNNL01.GDT - 9/11/13 11:36 - Z:\GINT\PROJECTS\2013\130222 CHILOCCO WIND PROJECT\130222 CHILOCCO WIND FARM.GPJ

LOG OF BORING: T-017

Renewable Resource Consultants, LLC
3801 Doris Lane
Round Rock, TX 78664
Telephone: (512) 992-2087
Fax: (512) 251-2518

CLIENT: Mortenson Construction
PROJECT: Chilocco Wind Farm
LOCATION: Chilocco, OK
NUMBER: 130222
DATE(S) DRILLED: 8/26/13

DRILLING METHOD(S):
Hollow Stem Auger

GROUNDWATER INFORMATION:
Groundwater encountered at 29 ft. during drilling and at 28.5 ft. after drilling

SURFACE ELEVATION:

SOIL SYMBOL	DEPTH (FT)	SAMPLES	N: BLOWS/FT P: TONS/SQ FT T: BLOWS R: % RQD: %	MOISTURE CONTENT (%)	ATTERBERG LIMITS: LIQUID LIMIT LL	ATTERBERG LIMITS: PLASTIC LIMIT PL	ATTERBERG LIMITS: PLASTICITY INDEX PI	DRY DENSITY POUNDS/CU.FT	UNDRAINED SHEAR STRENGTH (TONS/SQ. FT)	STRAIN AT FAILURE (%)	CONFINING PRESSURE (POUNDS/SQ IN)	MINUS NO. 200 SIEVE (%)	DESCRIPTION OF STRATUM
													12 in. Topsoil
			N = 9										FAT CLAY (CH), trace Sand, dark brown, stiff, moist
	5		N = 19	21									LEAN CLAY (CL), with Sand, brown, very stiff to hard, moist, iron stained
			N = 17										
	10		P = 4.5	19	45	15	30	110	1.4	7.0	0.0	85	
			N = 25										LEAN CLAY (CL), trace Sand, brown, very stiff, moist
	15		N = 21										
													CLAYEY SAND (SC), brown, moist, fine to medium grained
	20		P = 4.5	18	47	15	32	115	1.4	7.9	0.0	69	SANDY LEAN CLAY (CL), brown, very stiff to hard, moist, iron stained
	25		N = 27										
	30		N = 30	15	32	14	18					29	CLAYEY SAND (SC), trace Gravel, yellowish brown to brown, medium dense, wet, fine to coarse grained
	35		N = 27	27									
	40		N = 32										FAT CLAY (CH), trace to with Sand, yellowish brown to light gray, hard, moist, iron stained, with Gypsum seams
	45		N = 59	25									
	50		N = 56										
	55		N = 50/5"										
													Total Depth = 55 ft.

N - STANDARD PENETRATION TEST RESISTANCE
P - POCKET PENETROMETER RESISTANCE
T - TXDOT CONE PENETRATION RESISTANCE
R - ROCK CORE RECOVERY
RQD - ROCK QUALITY DESIGNATION

REMARKS:
GPS COORDINATES: Lat. 36.990233, Long. -97.100389

RENEWABLE LOG - LOG A GNNL01.GDT - 9/11/13 11:36 - Z:\GINT\PROJECTS\2013\130222 CHILOCCO WIND PROJECT\130222 CHILOCCO WIND FARM.GPJ

LOG OF BORING: T-019

Renewable Resource Consultants, LLC
3801 Doris Lane
Round Rock, TX 78664
Telephone: (512) 992-2087
Fax: (512) 251-2518

CLIENT: Mortenson Construction
PROJECT: Chilocco Wind Farm
LOCATION: Chilocco, OK
NUMBER: 130222
DATE(S) DRILLED: 8/22/13

DRILLING METHOD(S):
Hollow Stem Auger

GROUNDWATER INFORMATION:
Groundwater encountered at 39.5 ft. during drilling and not recorded after drilling

SURFACE ELEVATION:

SOIL SYMBOL	DEPTH (FT)	SAMPLES	N: BLOWS/FT P: TONS/SQ FT T: BLOWS R: % RQD: %	MOISTURE CONTENT (%)	ATTERBERG LIMITS LIQUID LIMIT LL	ATTERBERG LIMITS PLASTIC LIMIT PL	ATTERBERG LIMITS PLASTICITY INDEX PI	DRY DENSITY POUNDS/CU.FT	UNDRAINED SHEAR STRENGTH (TONS/SQ. FT)	STRAIN AT FAILURE (%)	CONFINING PRESSURE (POUNDS/SQ IN)	MINUS NO. 200 SIEVE (%)	DESCRIPTION OF STRATUM
													1 ft. Topsoil
			N = 7										FAT CLAY (CH), trace Sand, dark brown, medium to very stiff, moist, with Organics
	5		N = 24										
			N = 20	18									Grading iron stained
	10		N = 13										Grading brown, calcareous
			P = 3.5	21	52	17	35	107	1.7	15.0	10.0	91	Grading greenish gray to brown
	15		N = 28										FAT CLAY (CH), trace Sand, dark brown, very stiff to hard, moist
	20		N = 26	25									Grading greenish gray, iron stained, calcareous
	25		N = 75/10"										
	30		N = 38	24									Grading olive to yellowish brown
	35		N = 26										
	40		N = 46										6 in. Sandstone seam at 39 ft.
	45		N = 40										Grading gray
	50		N = 27	25									LEAN CLAY (CL), trace Sand, greenish gray, very stiff, moist, iron stained
	55		N = 53										SHALE, brown, hard, moist
													Total Depth = 55.5 ft.

N - STANDARD PENETRATION TEST RESISTANCE
P - POCKET PENETROMETER RESISTANCE
T - TXDOT CONE PENETRATION RESISTANCE
R - ROCK CORE RECOVERY
RQD - ROCK QUALITY DESIGNATION

REMARKS:
GPS COORDINATES: Lat. 36.962787, Long. -97.100057

RENEWABLE LOG - LOG A GNNL01.GDT - 9/11/13 11:36 - Z:\GINT\PROJECTS\2013\130222 CHILOCCO WIND PROJECT\130222 CHILOCCO WIND FARM.GPJ

LOG OF BORING: T-025

Renewable Resource Consultants, LLC
3801 Doris Lane
Round Rock, TX 78664
Telephone: (512) 992-2087
Fax: (512) 251-2518

CLIENT: Mortenson Construction
PROJECT: Chilocco Wind Farm
LOCATION: Chilocco, OK
NUMBER: 130222
DATE(S) DRILLED: 8/23/13

DRILLING METHOD(S):
Hollow Stem Auger

GROUNDWATER INFORMATION:
No groundwater encountered during and after drilling

SURFACE ELEVATION:

SOIL SYMBOL	DEPTH (FT)	SAMPLES	N: BLOWS/FT P: TONS/SQ FT T: BLOWS R: % RQD: %	MOISTURE CONTENT (%)	ATTERBERG LIMITS LIQUID LIMIT LL	ATTERBERG LIMITS PLASTIC LIMIT PL	ATTERBERG LIMITS PLASTICITY INDEX PI	DRY DENSITY POUNDS/CU.FT	UNDRAINED SHEAR STRENGTH (TONS/SQ. FT)	STRAIN AT FAILURE (%)	CONFINING PRESSURE (POUNDS/SQ IN)	MINUS NO. 200 SIEVE (%)	DESCRIPTION OF STRATUM
													24 in. Topsoil
			N = 13	22									FAT CLAY (CH), trace Sand, dark brown, stiff to hard, moist, with Organics
	5		P = 4.5	21	55	17	38	104	3.9	5.2	0.0	98	Grading gray to brown
			N = 22	21									Grading with Gravel, olive gray, calcareous
	10												
			N = 34										Grading iron stained
	15		N = 37	23									
	20		N = 43										
	25		N = 26	16									
	30		N = 56										Grading light olive gray
	35		N = 50/5.5"										SHALE, olive gray to gray, hard to very hard, moist, iron stained
	40		N = 87/8"	18									
	45		N = 75										Grading dark gray to brown
	50		N = 77/11"										Grading olive to brown
	55		N = 88/10"	20									Grading dark gray to brown
													Total Depth = 55.5 ft.

N - STANDARD PENETRATION TEST RESISTANCE
P - POCKET PENETROMETER RESISTANCE
T - TXDOT CONE PENETRATION RESISTANCE
R - ROCK CORE RECOVERY
RQD - ROCK QUALITY DESIGNATION

REMARKS:
GPS COORDINATES: Lat. 36.970728, Long. -97.095886

RENEWABLE LOG - LOG A GNNL01.GDT - 9/11/13 11:36 - Z:\GINT\PROJECTS\2013\130222 CHILOCCO WIND PROJECT\130222 CHILOCCO WIND FARM.GPJ

LOG OF BORING: T-041

Renewable Resource Consultants, LLC
3801 Doris Lane
Round Rock, TX 78664
Telephone: (512) 992-2087
Fax: (512) 251-2518

CLIENT: Mortenson Construction
PROJECT: Chilocco Wind Farm
LOCATION: Chilocco, OK
NUMBER: 130222
DATE(S) DRILLED: 8/23/13

DRILLING METHOD(S):
Hollow Stem Auger

GROUNDWATER INFORMATION:
Groundwater encountered at 29 ft. during drilling and at 24 ft. after drilling

SURFACE ELEVATION:

SOIL SYMBOL	DEPTH (FT)	SAMPLES	N: BLOWS/FT P: TONS/SQ FT T: BLOWS R: % RQD: %	MOISTURE CONTENT (%)	ATTERBERG LIMITS LIQUID LIMIT LL	ATTERBERG LIMITS PLASTIC LIMIT PL	ATTERBERG LIMITS PLASTICITY INDEX PI	DRY DENSITY POUNDS/CU.FT	UNDRAINED SHEAR STRENGTH (TONS/SQ. FT)	STRAIN AT FAILURE (%)	CONFINING PRESSURE (POUNDS/SQ IN)	MINUS NO. 200 SIEVE (%)	DESCRIPTION OF STRATUM
													14 in. Topsoil
	5		N = 14										FAT CLAY (CH), with Sand, dark brown, stiff, moist, with Organics
			N = 11	22									Grading brown to reddish brown
			N = 27	18	60	17	43					94	FAT CLAY (CH), trace Sand, reddish brown, very stiff to hard, moist
	10		P = 4.25	19	56	16	40	108	1.3	2.2	0.0	90	
			N = 16										
	15		P = 2.75	21	48	16	32	104	1.4	7.2	10.0	94	LEAN CLAY (CL), trace to with Sand, reddish brown, medium stiff to stiff, moist
	20		N = 10										Grading light olive brown to brown, iron stained
	25		N = 7	22	33	17	16					87	Grading with Silt
	30		P = 1.25	22	43	14	29	108	1.5	15.0	20.0	68	SANDY LEAN CLAY (CL), brown, stiff, wet
	35		N = 12										FAT CLAY (CH), with Sand, greenish gray to brown, stiff, moist
	40		N = 28										POORLY GRADED SAND (SP), brown, medium dense, moist, fine to coarse grained
	45		N = 29	33									SHALE, greenish gray to brown, firm to very hard, moist
	50		N = 50/2"										
	55		N = 57	24									
													Total Depth = 55.5 ft.

N - STANDARD PENETRATION TEST RESISTANCE
P - POCKET PENETROMETER RESISTANCE
T - TXDOT CONE PENETRATION RESISTANCE
R - ROCK CORE RECOVERY
RQD - ROCK QUALITY DESIGNATION

REMARKS:
GPS COORDINATES: Lat. 36.997004, Long. -97.086545

RENEWABLE LOG - LOG A GNNL01.GDT - 9/11/13 11:36 - Z:\GINT\PROJECTS\2013\130222 CHILOCCO WIND PROJECT\130222 CHILOCCO WIND FARM.GPJ

LOG OF BORING: T-063

Renewable Resource Consultants, LLC
3801 Doris Lane
Round Rock, TX 78664
Telephone: (512) 992-2087
Fax: (512) 251-2518

CLIENT: Mortenson Construction
PROJECT: Chilocco Wind Farm
LOCATION: Chilocco, OK
NUMBER: 130222
DATE(S) DRILLED: 8/24/13

DRILLING METHOD(S):
Hollow Stem Auger

GROUNDWATER INFORMATION:
Groundwater encountered at 29 ft. during drilling and not recorded after drilling

SURFACE ELEVATION:

SOIL SYMBOL	DEPTH (FT)	SAMPLES	N: BLOWS/FT P: TONS/SQ FT T: BLOWS R: % RQD: %	MOISTURE CONTENT (%)	ATTERBERG LIMITS LIQUID LIMIT LL	ATTERBERG LIMITS PLASTIC LIMIT PL	ATTERBERG LIMITS PLASTICITY INDEX PI	DRY DENSITY POUNDS/CU.FT	UNDRAINED SHEAR STRENGTH (TONS/SQ. FT)	STRAIN AT FAILURE (%)	CONFINING PRESSURE (POUNDS/SQ IN)	MINUS NO. 200 SIEVE (%)	DESCRIPTION OF STRATUM
													12 in. Topsoil
	5		N = 11	21									FAT CLAY (CH), trace Sand, dark brown, stiff, moist, trace Organics
			N = 9										Grading reddish brown
	10		N = 13										Grading reddish brown to greenish gray
	15		N = 21										FAT CLAY (CH), trace Sand, reddish brown, very stiff, moist, calcareous
			N = 16	20	51	16	35					96	
	20		N = 12										LEAN CLAY (CL), with Sand, reddish brown, stiff, moist, calcareous
	25		N = 10	22	32	15	17					85	Grading light brown to gray, wet
	30		N = 6	20								18	POORLY GRADED SAND (SP), light brown, loose, wet, fine to medium grained, with Silt seams
	35		N = 17	20	29	13	16					59	SANDY LEAN CLAY (CL), reddish brown, stiff, wet
	40		N = 32										SANDY FAT CLAY (CH), reddish brown to gray, hard, moist 4 in. Gravel seam at 40 ft.
	45		N = 75/9"										SHALE, light gray, very hard, moist, calcareous
	50		N = 50/4"										Grading gray to dark gray, with Sandstone
			N = 50/2"										Total Depth = 54.5 ft.

N - STANDARD PENETRATION TEST RESISTANCE
P - POCKET PENETROMETER RESISTANCE
T - TXDOT CONE PENETRATION RESISTANCE
R - ROCK CORE RECOVERY
RQD - ROCK QUALITY DESIGNATION

REMARKS:
GPS COORDINATES: Lat. 36.992868, Long. -97.070974

RENEWABLE LOG - LOG A GNNL01.GDT - 9/11/13 11:36 - Z:\GINT\PROJECTS\2013\130222 CHILOCCO WIND PROJECT\130222 CHILOCCO WIND FARM.GPJ

LOG OF BORING: T-067

Renewable Resource Consultants, LLC
3801 Doris Lane
Round Rock, TX 78664
Telephone: (512) 992-2087
Fax: (512) 251-2518

CLIENT: Mortenson Construction
PROJECT: Chilocco Wind Farm
LOCATION: Chilocco, OK
NUMBER: 130222
DATE(S) DRILLED: 8/21/13

DRILLING METHOD(S):
Hollow Stem Auger

GROUNDWATER INFORMATION:
Groundwater encountered at 14 ft. during drilling and at 7 ft. after drilling

SURFACE ELEVATION:

SOIL SYMBOL	DEPTH (FT)	SAMPLES	N: BLOWS/FT P: TONS/SQ FT T: BLOWS R: % RQD: %	MOISTURE CONTENT (%)	ATTERBERG LIMITS LIQUID LIMIT LL	ATTERBERG LIMITS PLASTIC LIMIT PL	ATTERBERG LIMITS PLASTICITY INDEX PI	DRY DENSITY POUNDS/CU.FT	UNDRAINED SHEAR STRENGTH (TONS/SQ. FT)	STRAIN AT FAILURE (%)	CONFINING PRESSURE (POUNDS/SQ IN)	MINUS NO. 200 SIEVE (%)	DESCRIPTION OF STRATUM
													18 in. Topsoil
	5		N = 12										FAT CLAY (CH), trace Sand, dark brown, stiff to very stiff, moist, with Organics
			N = 9										Grading dark reddish brown
			N = 14	22	57	17	40					96	Grading brown
	10		P = 2.5	20	52	16	36	110	2.5	15.0	7.0	93	
			N = 10										Grading greenish gray to brown, with Sand seams
	15		P = 2.25	21	44	18	26	109	0.8	14.9	7.0	65	SANDY LEAN CLAY (CL), greenish gray to brown, very stiff, moist
	20		N = 61	24									SHALE, olive, hard to very hard, moist
	25		N = 50/3"										Grading light olive to greenish gray
	30		N = 50/4"										Grading brown to olive
	35		N = 50/5.5"										SANDY SHALE, gray, very hard, moist
													Auger Refusal at 36.5 ft

N - STANDARD PENETRATION TEST RESISTANCE
P - POCKET PENETROMETER RESISTANCE
T - TXDOT CONE PENETRATION RESISTANCE
R - ROCK CORE RECOVERY
RQD - ROCK QUALITY DESIGNATION

REMARKS:
GPS COORDINATES: Lat. 36.958553, Long. -97.067550

RENEWABLE LOG - LOG A GNNL01.GDT - 9/11/13 11:36 - Z:\GINT\PROJECTS\2013\130222 CHILOCCO WIND PROJECT\130222 CHILOCCO WIND FARM.GPJ

LOG OF BORING: T-071

Renewable Resource Consultants, LLC
3801 Doris Lane
Round Rock, TX 78664
Telephone: (512) 992-2087
Fax: (512) 251-2518

CLIENT: Mortenson Construction
PROJECT: Chilocco Wind Farm
LOCATION: Chilocco, OK
NUMBER: 130222
DATE(S) DRILLED: 8/22/13

DRILLING METHOD(S):
Hollow Stem Auger

GROUNDWATER INFORMATION:
Groundwater encountered at 24 ft. during drilling and at 23.5 ft. after drilling

SURFACE ELEVATION:

SOIL SYMBOL	DEPTH (FT)	SAMPLES	N: BLOWS/FT P: TONS/SQ FT T: BLOWS R: % RQD: %	MOISTURE CONTENT (%)	ATTERBERG LIMITS: LIQUID LIMIT (LL)	ATTERBERG LIMITS: PLASTIC LIMIT (PL)	ATTERBERG LIMITS: PLASTICITY INDEX (PI)	DRY DENSITY POUNDS/CU.FT	UNDRAINED SHEAR STRENGTH (TONS/SQ. FT)	STRAIN AT FAILURE (%)	CONFINING PRESSURE (POUNDS/SQ IN)	MINUS NO. 200 SIEVE (%)	DESCRIPTION OF STRATUM
													1 ft. Topsoil
			N = 12										FAT CLAY (CH), trace Sand, dark brown, stiff, moist, trace Organics
	5		P = 4.5	16	49	16	33	101	5.6	11.3	0.0	97	LEAN CLAY (CL), trace Sand, reddish brown, very stiff to hard, moist
			N = 23	18									
	10		N = 15										
			P = 3.5	24	50	18	32	100	1.6	5.1	10.0	95	FAT CLAY (CH), trace Sand, dark brown, very stiff, moist, with Silt
	15		N = 50/5"										SHALE, gray, hard, moist, with Silt Claystone seam at 15.5 ft.
	20		N = 54	20									SHALE, gray, hard, moist
	25		N = 67										SANDSTONE, brown, hard, moist
	30		N = 57	18									SHALE, gray, hard to very hard, moist
	35		N = 50/5"										
	40		N = 50/0"										
	45		N = 50/4"										Grading Sandstone
	50		N = 50/2"										Grading Gypsum deposits
			N = 50/5.5"										Total Depth = 54.5 ft.

N - STANDARD PENETRATION TEST RESISTANCE
P - POCKET PENETROMETER RESISTANCE
T - TXDOT CONE PENETRATION RESISTANCE
R - ROCK CORE RECOVERY
RQD - ROCK QUALITY DESIGNATION

REMARKS:
GPS COORDINATES: Lat. 36.968496, Long. -97.063727

RENEWABLE LOG - LOG A GNNL01.GDT - 9/11/13 11:36 - Z:\GINT\PROJECTS\2013\130222 CHILOCCO WIND PROJECT\130222 CHILOCCO WIND FARM.GPJ

LOG OF BORING: T-086

Renewable Resource Consultants, LLC
3801 Doris Lane
Round Rock, TX 78664
Telephone: (512) 992-2087
Fax: (512) 251-2518

CLIENT: Mortenson Construction
PROJECT: Chilocco Wind Farm
LOCATION: Chilocco, OK
NUMBER: 130222
DATE(S) DRILLED: 8/26/13

DRILLING METHOD(S):
Hollow Stem Auger

GROUNDWATER INFORMATION:
Groundwater encountered at 19 ft. during drilling and at 20.5 ft. after drilling

SURFACE ELEVATION:

SOIL SYMBOL	DEPTH (FT)	SAMPLES	N: BLOWS/FT P: TONS/SQ FT T: BLOWS R: % RQD: %	MOISTURE CONTENT (%)	ATTERBERG LIMITS LIQUID LIMIT LL	ATTERBERG LIMITS PLASTIC LIMIT PL	ATTERBERG LIMITS PLASTICITY INDEX PI	DRY DENSITY POUNDS/CU.FT	UNDRAINED SHEAR STRENGTH (TONS/SQ. FT)	STRAIN AT FAILURE (%)	CONFINING PRESSURE (POUNDS/SQ IN)	MINUS NO. 200 SIEVE (%)	DESCRIPTION OF STRATUM
													12 in. Topsoil
			N = 14	23	57	19	38					98	FAT CLAY (CH), trace Sand, dark brown, medium stiff to hard, moist
	5		N = 8	23	58	16	42					95	Grading reddish, iron stained
			N = 21										
	10		P = 4.25										
			N = 23										Grading, brown to reddish brown to light gray
	15		N = 18	19									LEAN CLAY (CL), trace Sand, reddish brown to light gray, very stiff, moist to wet, iron stained
	20		P = 2.75	▼25	39	15	24	99	1.1	11.6	15.0	99	
	25		N = 8	19								5	POORLY GRADED SAND (SP), brown, loose to medium dense, wet, fine to medium grained
	30		N = 13										LEAN CLAY (CL), trace Sand, brown, medium stiff, moist
	35		N = 4	17								29	POORLY GRADED SAND (SP), brown, loose, wet, fine to medium grained
	40		N = 50/1"										SHALE, yellowish brown, very hard, moist
													Auger Refual at 43.5 ft.

N - STANDARD PENETRATION TEST RESISTANCE
P - POCKET PENETROMETER RESISTANCE
T - TXDOT CONE PENETRATION RESISTANCE
R - ROCK CORE RECOVERY
RQD - ROCK QUALITY DESIGNATION

REMARKS:
GPS COORDINATES: Lat. 36.988345, Long. -97.051775

RENEWABLE LOG - LOG A GNNL01.GDT - 9/11/13 11:36 - Z:\GINT\PROJECTS\2013\130222 CHILOCCO WIND PROJECT\130222 CHILOCCO WIND FARM.GPJ

RRC Renewable Resource Consultants

www.RenewableLLC.com

3801 Doris Lane
Round Rock, TX 78664
512.992.2087

APPENDIX B

Renewable Resource Consultants, LLC
3801 Doris Lane
Round Rock, TX 78664
Telephone: (512) 992-2087
Fax: (512) 251-2518

MOISTURE-DENSITY RELATIONSHIP

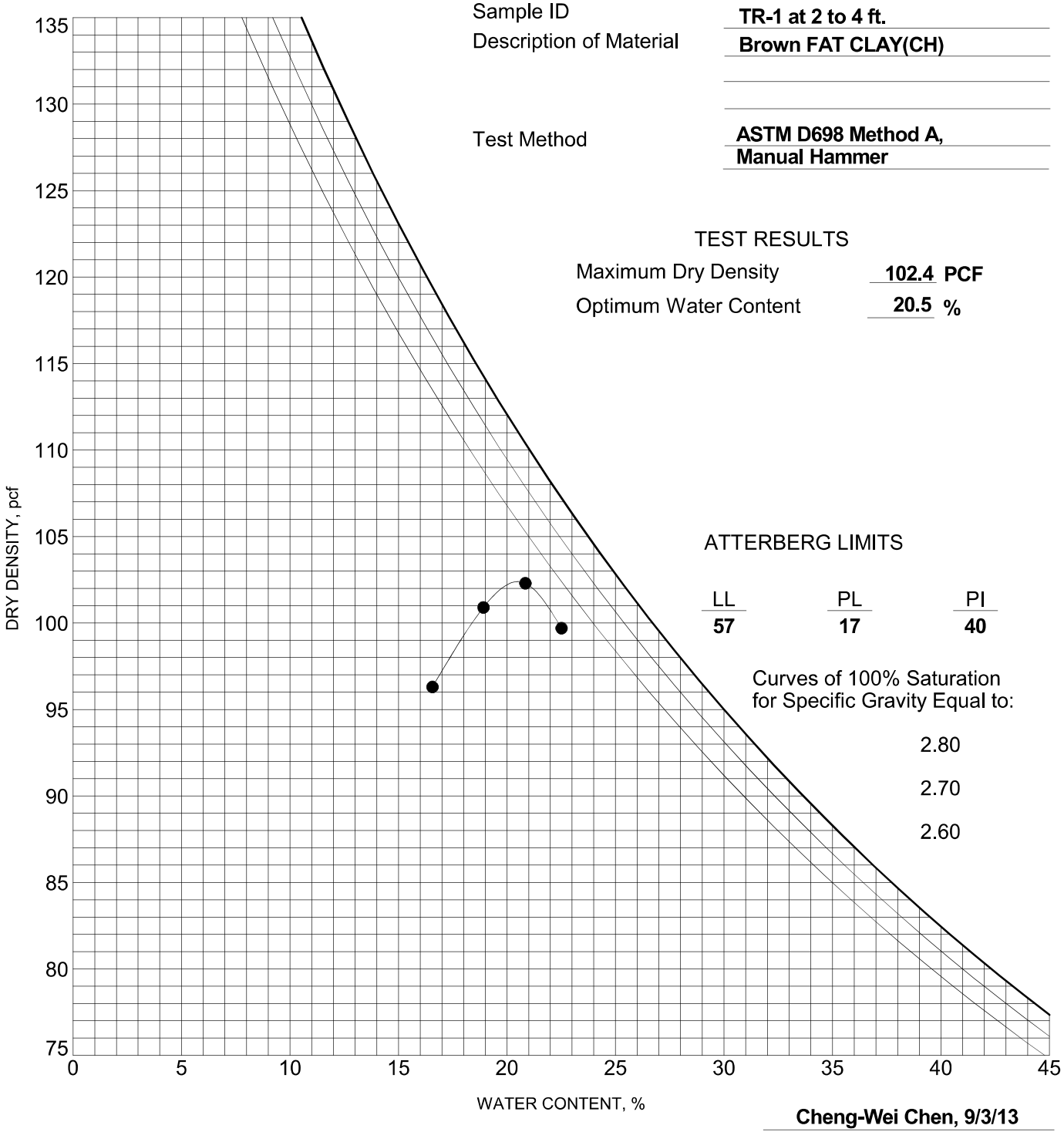
CLIENT: Mortenson Construction
PROJECT: Chilocco Wind Farm
LOCATION: Chilocco, OK
NUMBER: 130222

Sample ID: **TR-1 at 2 to 4 ft.**
Description of Material: **Brown FAT CLAY(CH)**

Test Method: **ASTM D698 Method A, Manual Hammer**

TEST RESULTS

Maximum Dry Density	**102.4**	**PCF**
Optimum Water Content	**20.5**	**%**



ATTERBERG LIMITS

LL	PL	PI
57	**17**	**40**

Curves of 100% Saturation for Specific Gravity Equal to:

2.80
2.70
2.60

Cheng-Wei Chen, 9/3/13
Analysis & Quality Review/Date

Specimens prepared by: C.M. & M.D.

The results shown on this report are for the exclusive use of the client for whom they were obtained and apply only to the sample tested and / or inspected. They are not intended to be indicative of qualities of apparently identical products. The use of our name must recieve prior written approval. Reports must be reproduced in their entirety. Unauthorized use or copying of this document is strictly prohibited by anyone other than the client for the specific project.

Renewable Resource Consultants, LLC
3801 Doris Lane
Round Rock, TX 78664
Telephone: (512) 992-2087
Fax: (512) 251-2518

MOISTURE-DENSITY RELATIONSHIP

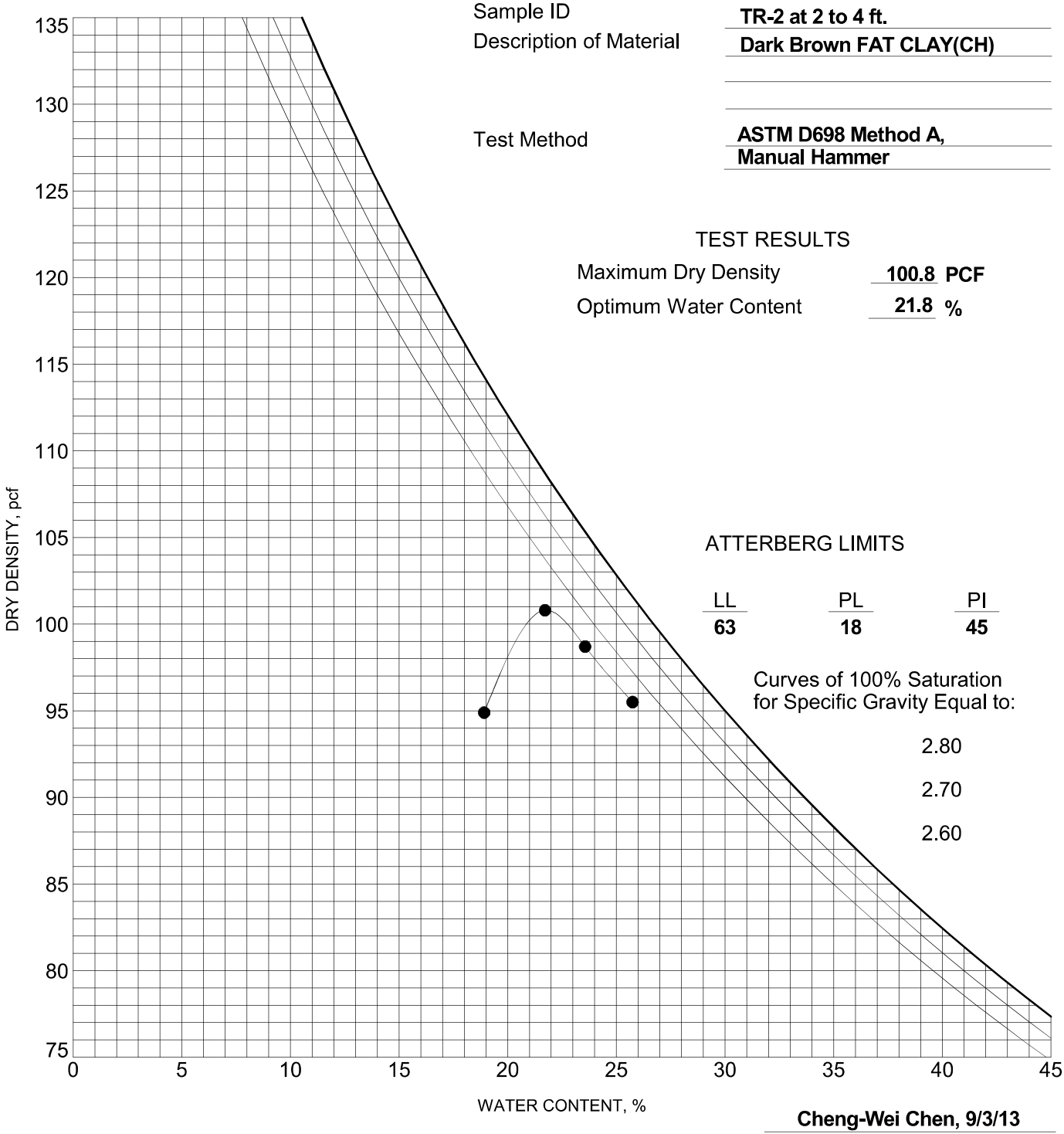
CLIENT: Mortenson Construction
PROJECT: Chilocco Wind Farm
LOCATION: Chilocco, OK
NUMBER: 130222

Sample ID: **TR-2 at 2 to 4 ft.**
Description of Material: **Dark Brown FAT CLAY(CH)**

Test Method: **ASTM D698 Method A, Manual Hammer**

TEST RESULTS

Maximum Dry Density	**100.8**	**PCF**
Optimum Water Content	**21.8**	**%**



ATTERBERG LIMITS

LL	PL	PI
63	**18**	**45**

Curves of 100% Saturation for Specific Gravity Equal to:

2.80
2.70
2.60

Cheng-Wei Chen, 9/3/13
Analysis & Quality Review/Date

Specimens prepared by: C.M. & M.D.

The results shown on this report are for the exclusive use of the client for whom they were obtained and apply only to the sample tested and / or inspected. They are not intended to be indicative of qualities of apparently identical products. The use of our name must recieve prior written approval. Reports must be reproduced in their entirety. Unauthorized use or copying of this document is strictly prohibited by anyone other than the client for the specific project.

Renewable Resource Consultants, LLC
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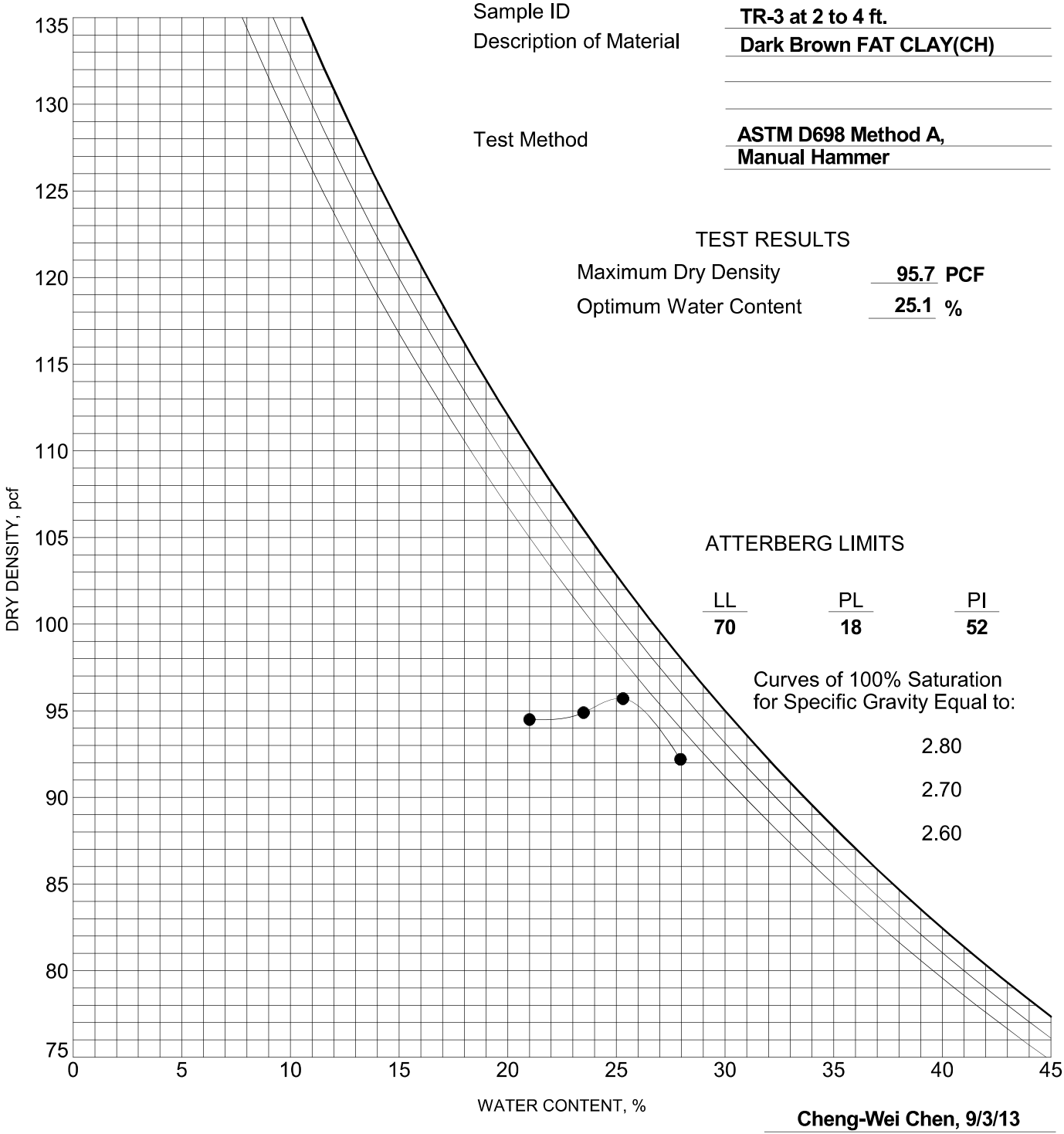
Round Rock, TX 78664
Telephone: (512) 992-2087
Fax: (512) 251-2518

MOISTURE-DENSITY RELATIONSHIP

CLIENT: Mortenson Construction
PROJECT: Chilocco Wind Farm
LOCATION: Chilocco, OK
NUMBER: 130222



Sample ID: **TR-3 at 2 to 4 ft.**
Description of Material: **Dark Brown FAT CLAY(CH)**

Test Method: **ASTM D698 Method A, Manual Hammer**

TEST RESULTS

Maximum Dry Density	**95.7**	**PCF**
Optimum Water Content	**25.1**	**%**

ATTERBERG LIMITS

LL	PL	PI
70	**18**	**52**

Curves of 100% Saturation for Specific Gravity Equal to:

2.80
2.70
2.60

Cheng-Wei Chen, 9/3/13
Analysis & Quality Review/Date

Specimens prepared by: C.M. & M.D.

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Telephone: (512) 992-2087
Fax: (512) 251-2518

MOISTURE-DENSITY RELATIONSHIP

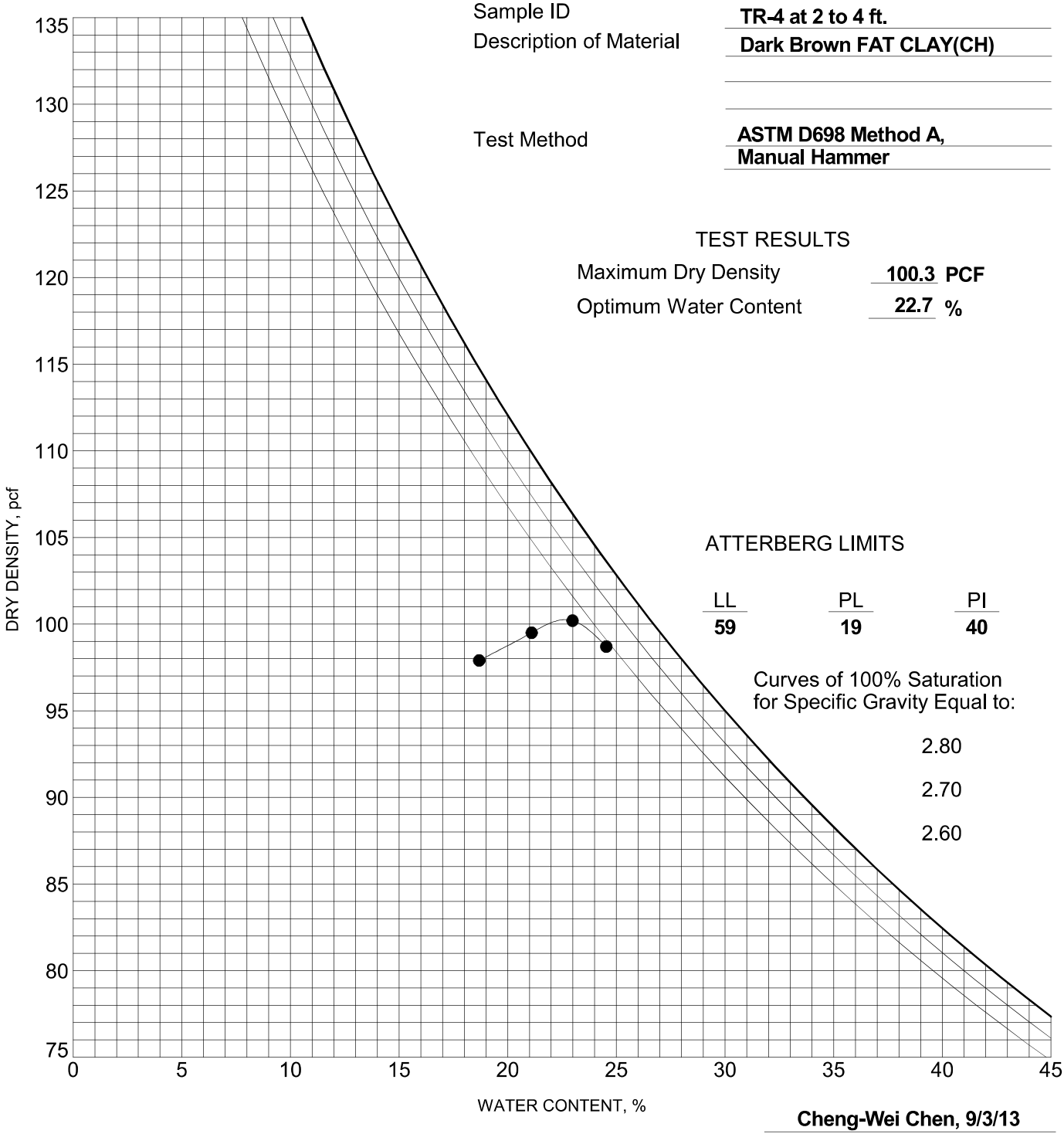
CLIENT: Mortenson Construction
PROJECT: Chilocco Wind Farm
LOCATION: Chilocco, OK
NUMBER: 130222

Sample ID: **TR-4 at 2 to 4 ft.**
Description of Material: **Dark Brown FAT CLAY(CH)**

Test Method: **ASTM D698 Method A, Manual Hammer**

TEST RESULTS

Maximum Dry Density	**100.3**	**PCF**
Optimum Water Content	**22.7**	**%**



ATTERBERG LIMITS

LL	PL	PI
59	**19**	**40**

Curves of 100% Saturation for Specific Gravity Equal to:

2.80
2.70
2.60

Cheng-Wei Chen, 9/3/13
Analysis & Quality Review/Date

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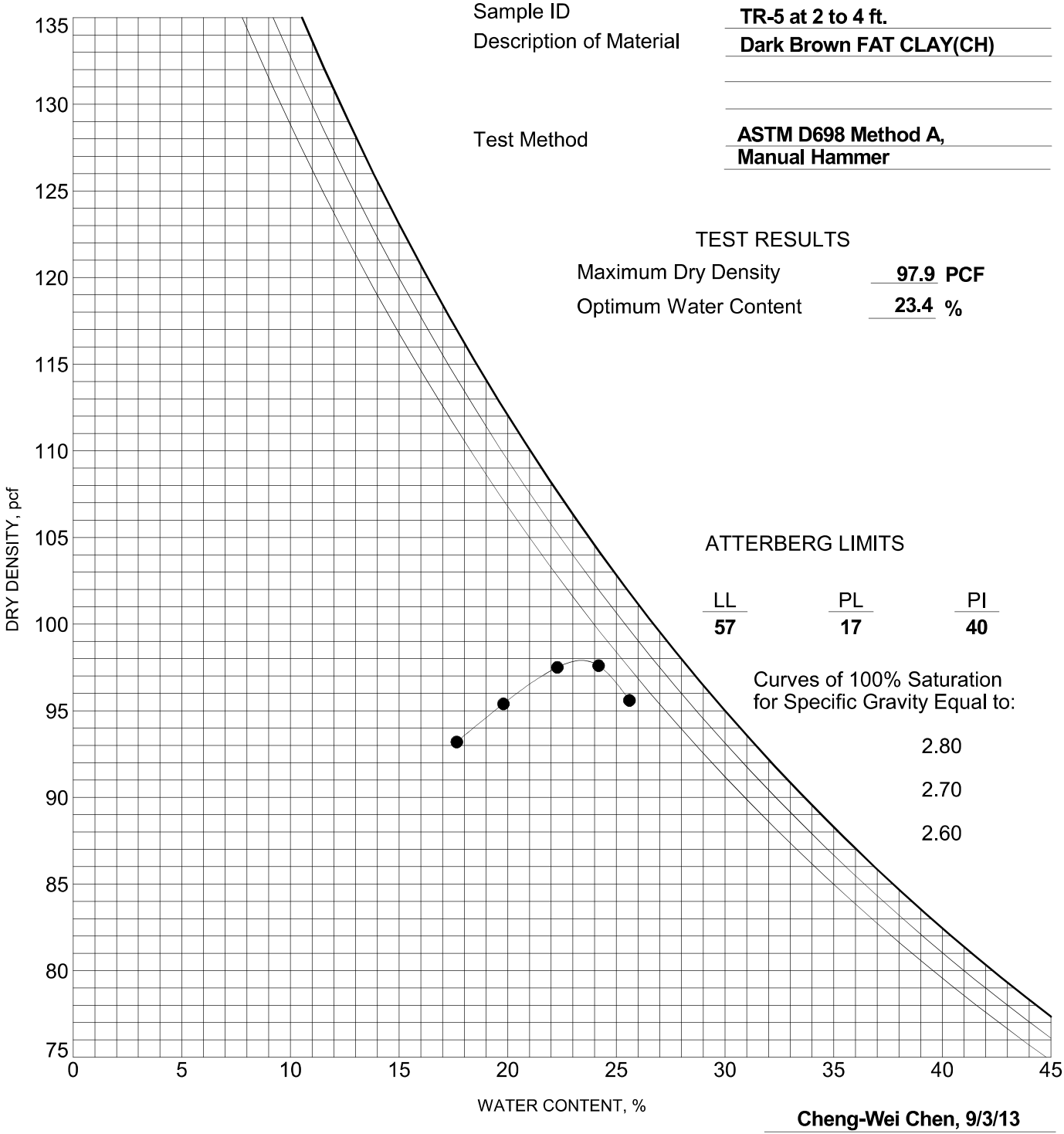
MOISTURE-DENSITY RELATIONSHIP

CLIENT: Mortenson Construction
PROJECT: Chilocco Wind Farm
LOCATION: Chilocco, OK
NUMBER: 130222

Sample ID: **TR-5 at 2 to 4 ft.**
Description of Material: **Dark Brown FAT CLAY(CH)**

Test Method: **ASTM D698 Method A, Manual Hammer**



TEST RESULTS

Maximum Dry Density	**97.9**	**PCF**
Optimum Water Content	**23.4**	**%**

ATTERBERG LIMITS

LL	PL	PI
57	**17**	**40**

Curves of 100% Saturation for Specific Gravity Equal to:

2.80
2.70
2.60

Cheng-Wei Chen, 9/3/13
Analysis & Quality Review/Date

Specimens prepared by: C.M. & M.D.

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MOISTURE-DENSITY RELATIONSHIP

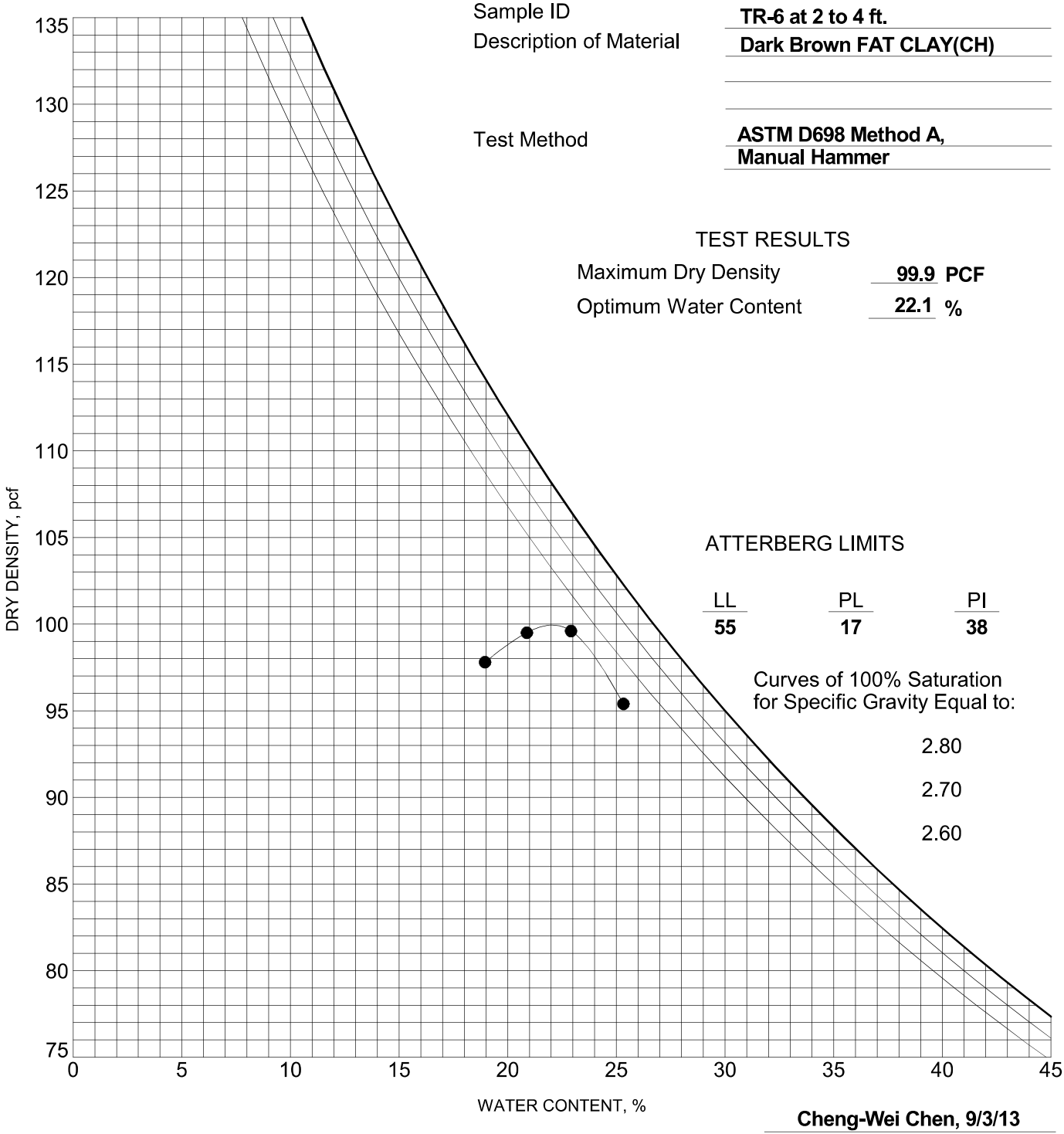
CLIENT: Mortenson Construction
PROJECT: Chilocco Wind Farm
LOCATION: Chilocco, OK
NUMBER: 130222

Sample ID: **TR-6 at 2 to 4 ft.**
Description of Material: **Dark Brown FAT CLAY(CH)**

Test Method: **ASTM D698 Method A, Manual Hammer**

TEST RESULTS

Maximum Dry Density	**99.9**	**PCF**
Optimum Water Content	**22.1**	**%**



ATTERBERG LIMITS

LL	PL	PI
55	**17**	**38**

Curves of 100% Saturation for Specific Gravity Equal to:

2.80
2.70
2.60

Cheng-Wei Chen, 9/3/13
Analysis & Quality Review/Date

Specimens prepared by: C.M. & M.D.

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MOISTURE-DENSITY RELATIONSHIP

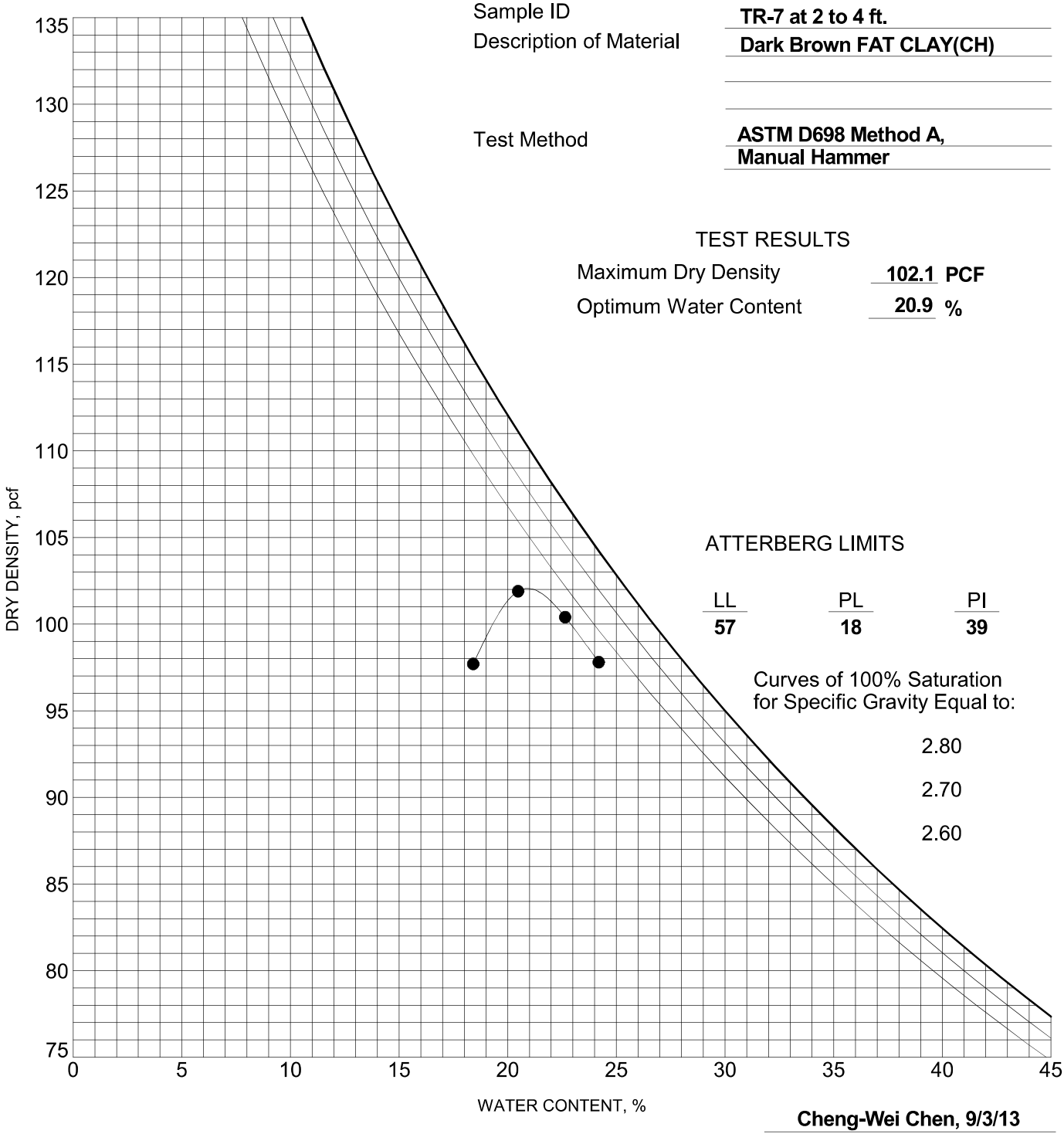
CLIENT: Mortenson Construction
PROJECT: Chilocco Wind Farm
LOCATION: Chilocco, OK
NUMBER: 130222

Sample ID: **TR-7 at 2 to 4 ft.**
Description of Material: **Dark Brown FAT CLAY(CH)**

Test Method: **ASTM D698 Method A, Manual Hammer**

TEST RESULTS

Maximum Dry Density	**102.1**	**PCF**
Optimum Water Content	**20.9**	**%**



ATTERBERG LIMITS

LL	PL	PI
57	**18**	**39**

Curves of 100% Saturation for Specific Gravity Equal to:

2.80
2.70
2.60

Cheng-Wei Chen, 9/3/13
Analysis & Quality Review/Date

Specimens prepared by: C.M. & M.D.

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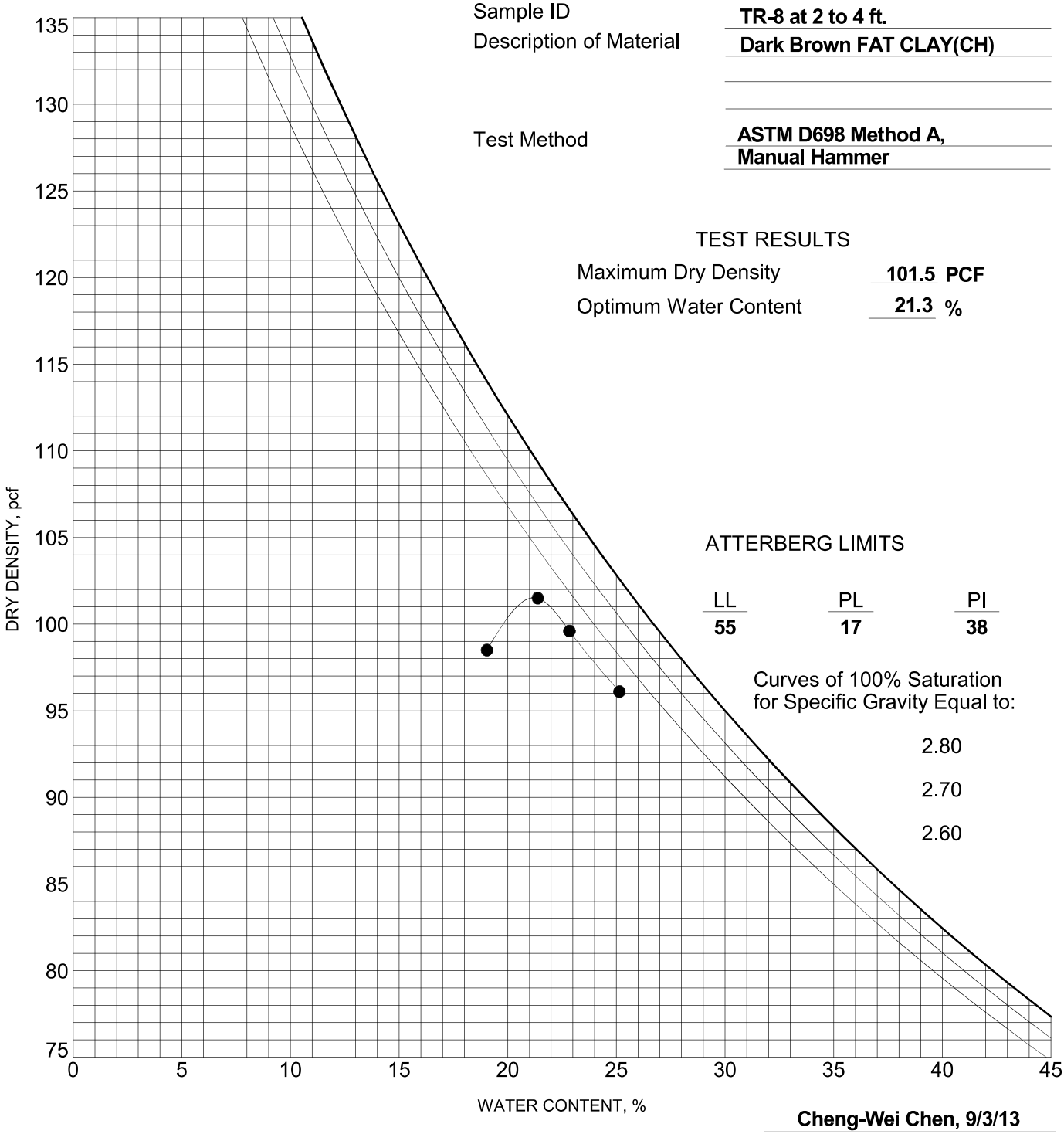
MOISTURE-DENSITY RELATIONSHIP

CLIENT: Mortenson Construction
PROJECT: Chilocco Wind Farm
LOCATION: Chilocco, OK
NUMBER: 130222

Sample ID: **TR-8 at 2 to 4 ft.**
Description of Material: **Dark Brown FAT CLAY(CH)**

Test Method: **ASTM D698 Method A, Manual Hammer**



TEST RESULTS

Maximum Dry Density	**101.5**	**PCF**
Optimum Water Content	**21.3**	**%**

ATTERBERG LIMITS

LL	PL	PI
55	**17**	**38**

Curves of 100% Saturation for Specific Gravity Equal to:

2.80
2.70
2.60

Cheng-Wei Chen, 9/3/13
Analysis & Quality Review/Date

Specimens prepared by: C.M. & M.D.

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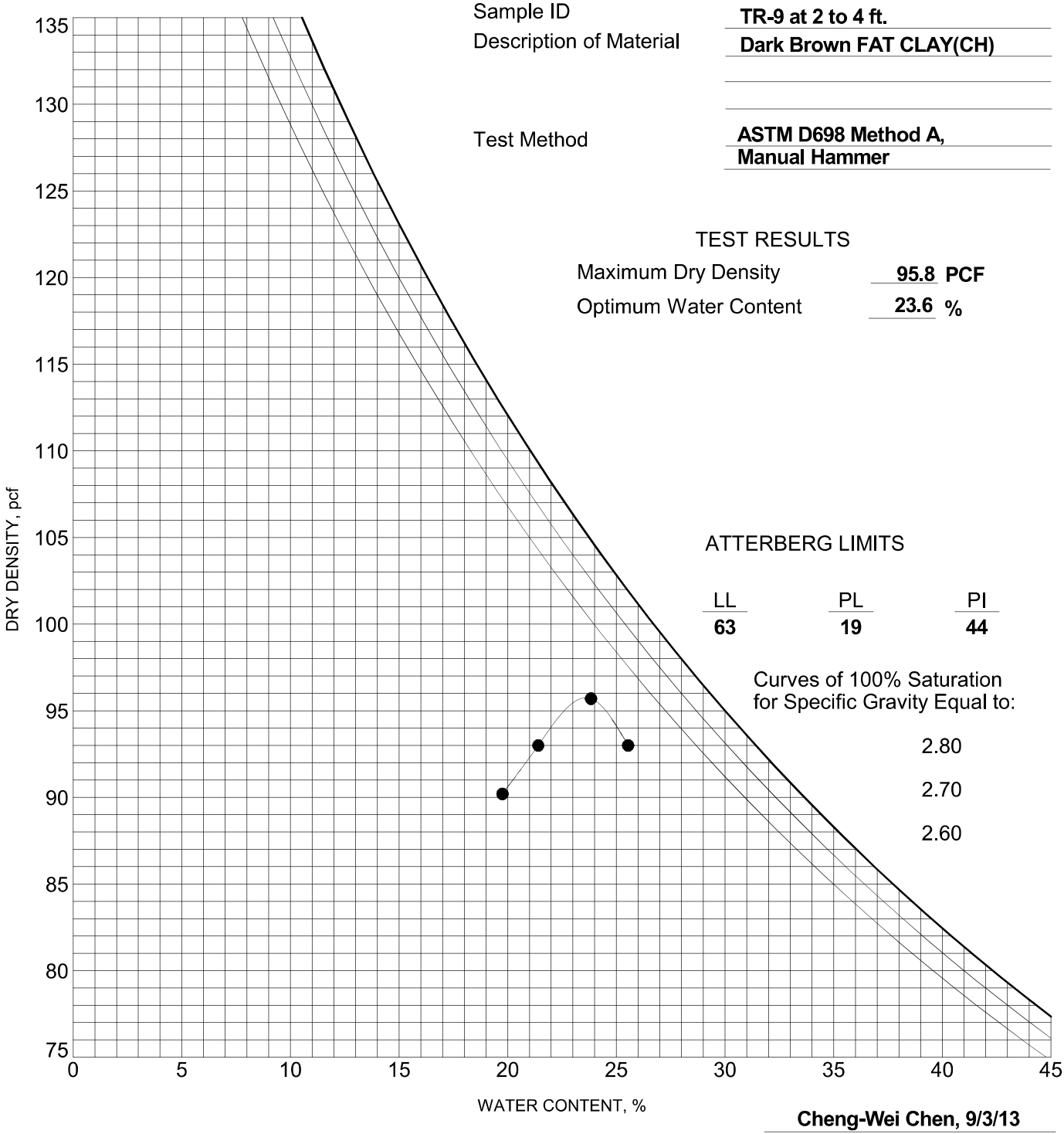
MOISTURE-DENSITY RELATIONSHIP

CLIENT: Mortenson Construction
PROJECT: Chilocco Wind Farm
LOCATION: Chilocco, OK
NUMBER: 130222

Sample ID: **TR-9 at 2 to 4 ft.**
Description of Material: **Dark Brown FAT CLAY(CH)**

Test Method: **ASTM D698 Method A, Manual Hammer**



TEST RESULTS

Maximum Dry Density	**95.8**	**PCF**
Optimum Water Content	**23.6**	**%**

ATTERBERG LIMITS

LL	PL	PI
63	**19**	**44**

Curves of 100% Saturation for Specific Gravity Equal to:

2.80
2.70
2.60

Cheng-Wei Chen, 9/3/13
Analysis & Quality Review/Date

Specimens prepared by: C.M. & M.D.

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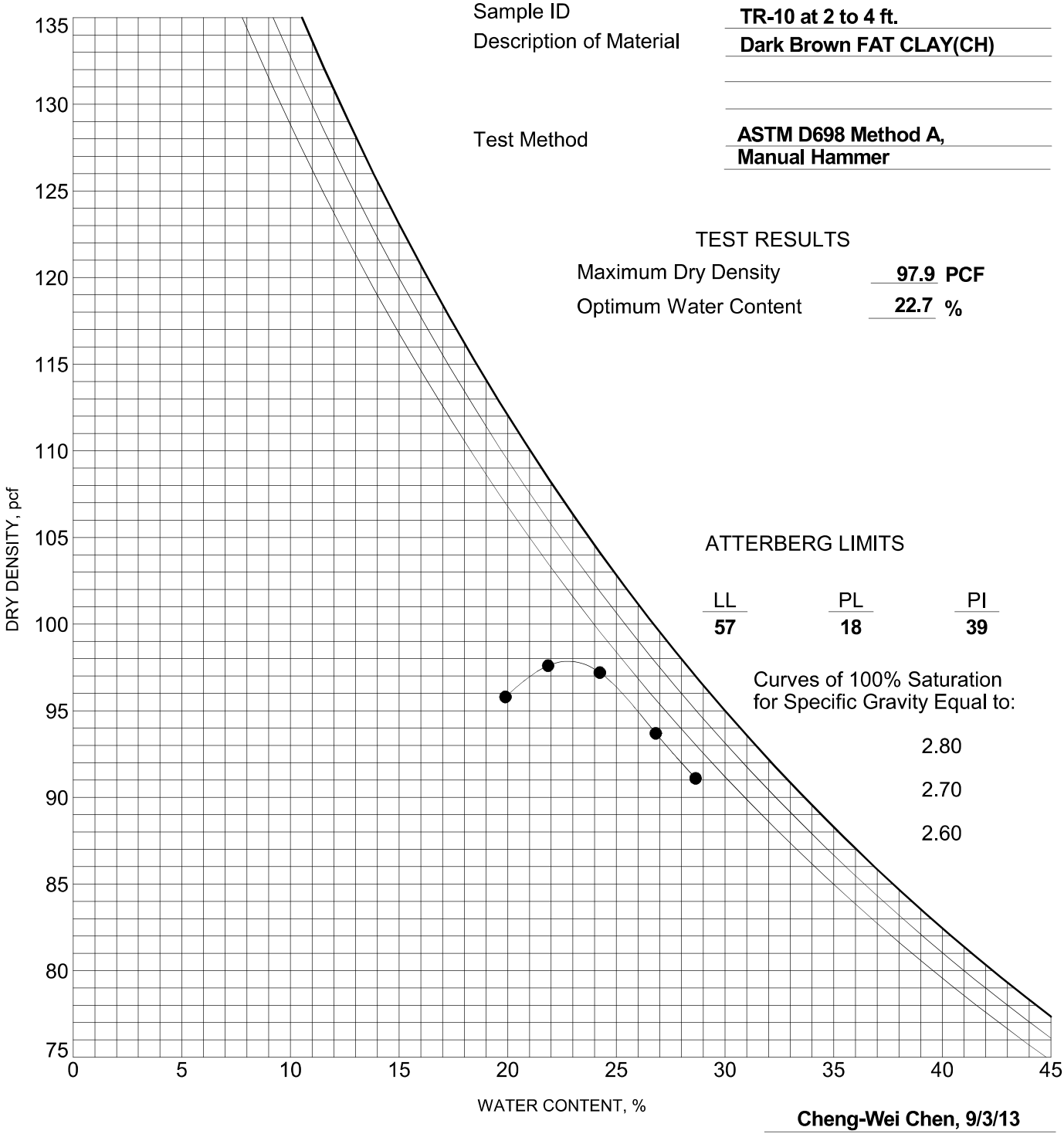
MOISTURE-DENSITY RELATIONSHIP

CLIENT: Mortenson Construction
PROJECT: Chilocco Wind Farm
LOCATION: Chilocco, OK
NUMBER: 130222



Sample ID: **TR-10 at 2 to 4 ft.**
Description of Material: **Dark Brown FAT CLAY(CH)**

Test Method: **ASTM D698 Method A, Manual Hammer**

TEST RESULTS

Maximum Dry Density	**97.9**	**PCF**
Optimum Water Content	**22.7**	**%**

ATTERBERG LIMITS

LL	PL	PI
57	**18**	**39**

Curves of 100% Saturation for Specific Gravity Equal to:

2.80
2.70
2.60

Cheng-Wei Chen, 9/3/13
Analysis & Quality Review/Date

Specimens prepared by: C.M. & M.D.

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MOISTURE-DENSITY RELATIONSHIP

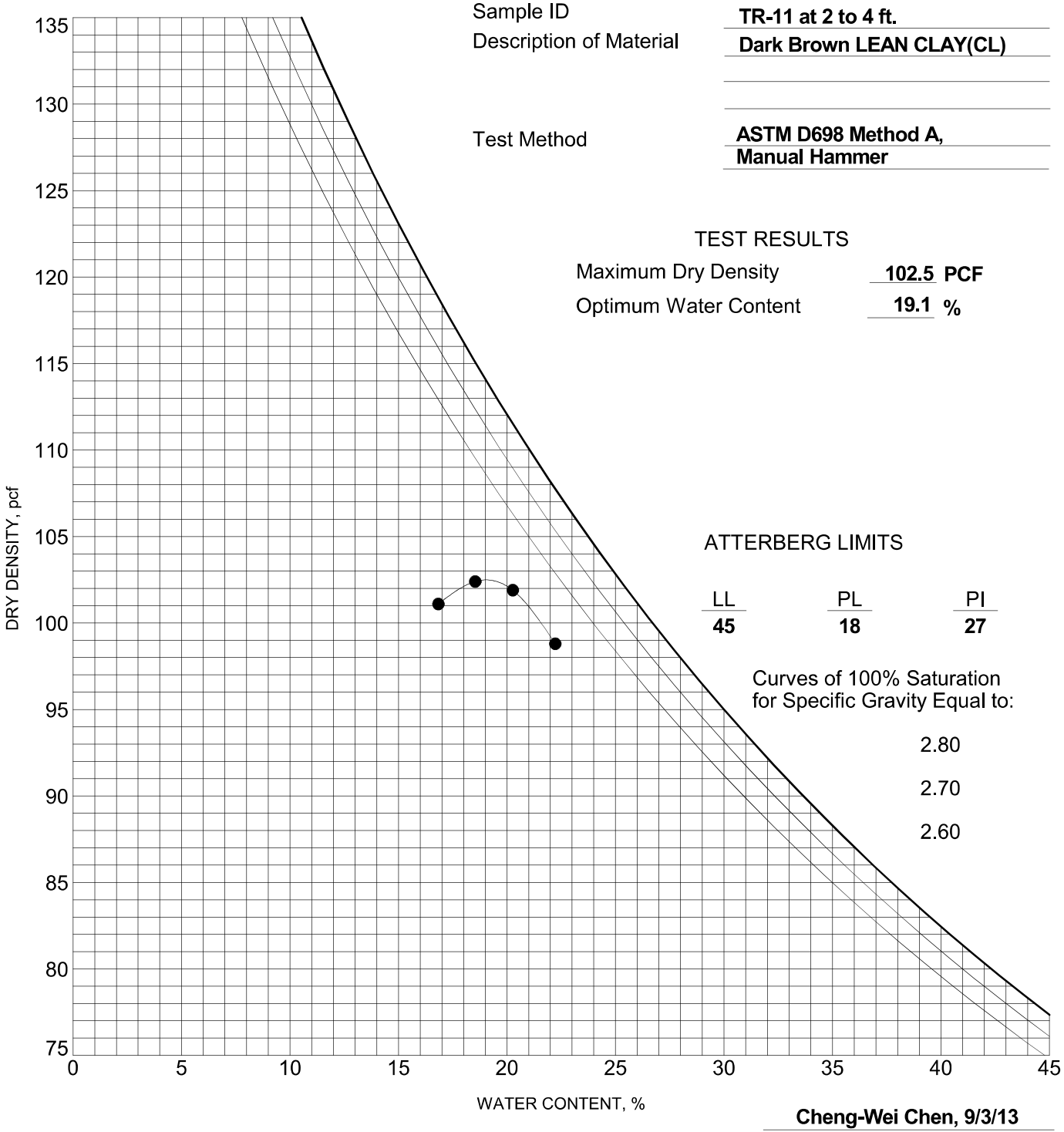
CLIENT: Mortenson Construction
PROJECT: Chilocco Wind Farm
LOCATION: Chilocco, OK
NUMBER: 130222

Sample ID: **TR-11 at 2 to 4 ft.**
Description of Material: **Dark Brown LEAN CLAY(CL)**

Test Method: **ASTM D698 Method A, Manual Hammer**

TEST RESULTS

Maximum Dry Density	**102.5**	**PCF**
Optimum Water Content	**19.1**	**%**



ATTERBERG LIMITS

LL	PL	PI
45	**18**	**27**

Curves of 100% Saturation for Specific Gravity Equal to:

2.80
2.70
2.60

Cheng-Wei Chen, 9/3/13
Analysis & Quality Review/Date

Specimens prepared by: C.M. & M.D.

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One-Dimensional Swell Potential Test

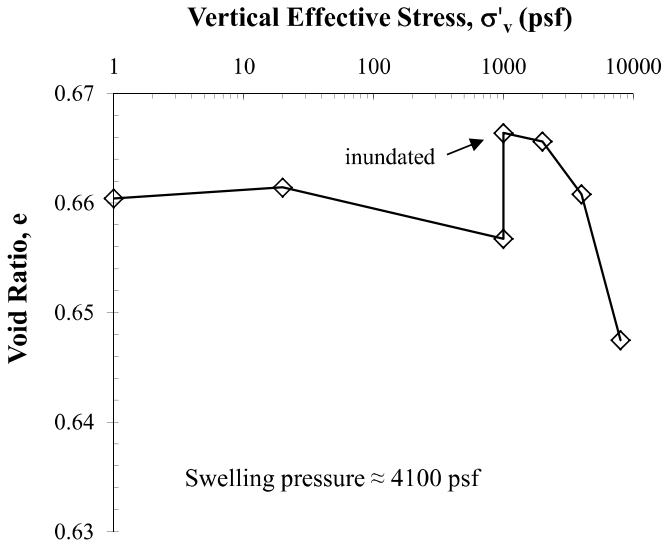
Client: M. A. Mortenson Company
Project Name: Chilocco Wind Farm
Specimen ID: T-12 at 9 ft

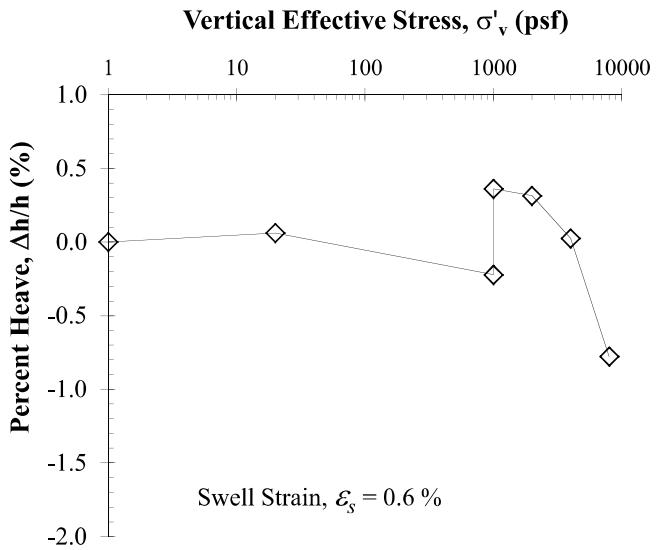
RRC Project No.: 130222
Test Method: ASTM D 4546-08, Method C
Test Date: 08/30/13

Soil Specimen Properties	
Average Water Content of Trimmings (%)	21.8
Initial Specimen Water Content (%)	21.8
Final Specimen Water Content (%)	24.8
Initial Specimen Height (in)	0.798
Final Specimen Height (in)	0.791
Initial Dry Unit Weight, γ_o (pcf)	101.5
Final Dry Unit Weight, γ_f (pcf)	102.4
Initial Void Ratio, e_o	0.661
Final Void Ratio, e_f	0.646
Initial Degree of Saturation (%)	89.2
Seating Load (psf)	20
Swell Pressure at Initial Void Ratio (psf)	4100
Swell Strain, $\mathcal{E}_S$ (%)	0.6

Specimen was inundated with tap water during testing. Loading increment duration was minimum 24 hours. G_s assumed to be 2.70. The calculation included the machine deflections that measured in each loading steps.

Specimen Diameter: 2.495 inches





σ'v (psf)	1	20	1000	1000	2000	4000	8000
e	0.660	0.661	0.657	0.666	0.666	0.661	0.647
Δh/h (%)	0.00	0.06	-0.22	0.36	0.31	0.02	-0.78

Cheng-Wei Chen, 09/09/13
Analysis & Quality Review/Date
Specimen prepared & tested by: Caleb McCord

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One-Dimensional Swell Potential Test

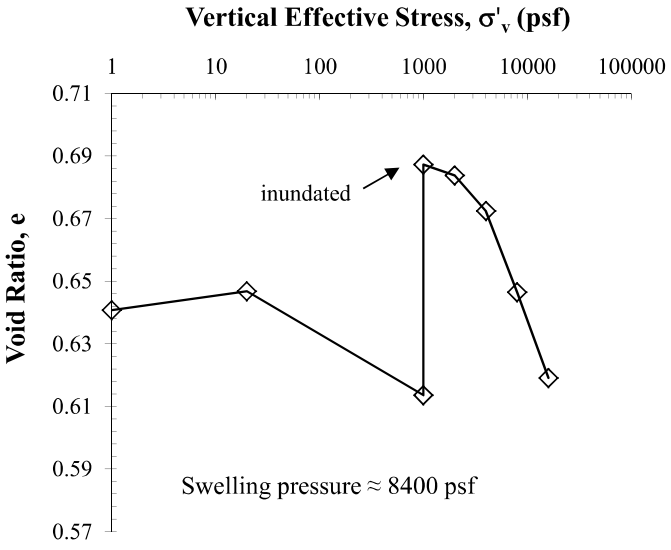
Client: M. A. Mortenson Company
Project Name: Chilocco Wind Farm
Specimen ID: T-19 at 12 ft

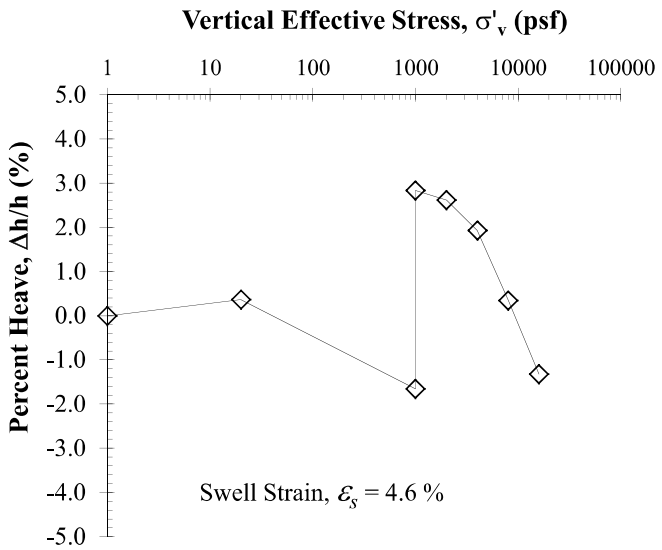
RRC Project No.: 130222
Test Method: ASTM D 4546-08, Method C
Test Date: 08/30/13

Soil Specimen Properties	
Average Water Content of Trimmings (%)	23.0
Initial Specimen Water Content (%)	23.0
Final Specimen Water Content (%)	24.5
Initial Specimen Height (in)	0.793
Final Specimen Height (in)	0.782
Initial Dry Unit Weight, γ_o (pcf)	102.7
Final Dry Unit Weight, γ_f (pcf)	104.2
Initial Void Ratio, e_o	0.641
Final Void Ratio, e_f	0.618
Initial Degree of Saturation (%)	96.9
Seating Load (psf)	20
Swell Pressure at Initial Void Ratio (psf)	8400
Swell Strain, $\mathcal{E}_S$ (%)	4.6

Specimen was inundated with tap water during testing. Loading increment duration was minimum 24 hours. G_s assumed to be 2.70. The calculation included the machine deflections that measured in each loading steps.

Specimen Diameter: 2.492 inches





σ'v (psf)	1	20	1000	1000	2000	4000	8000	16000
e	0.641	0.647	0.614	0.687	0.684	0.672	0.647	0.619
Δh/h (%)	0.00	0.37	-1.66	2.83	2.62	1.93	0.35	-1.32

Cheng-Wei Chen, 09/09/13
Analysis & Quality Review/Date
Specimen prepared & tested by: Caleb McCord

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One-Dimensional Swell Potential Test

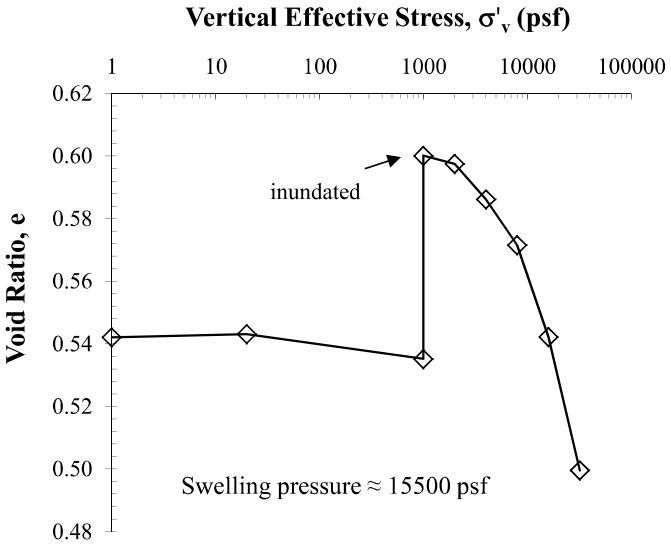
Client: M. A. Mortenson Company
Project Name: Chilocco Wind Farm
Specimen ID: T-41 at 9 ft

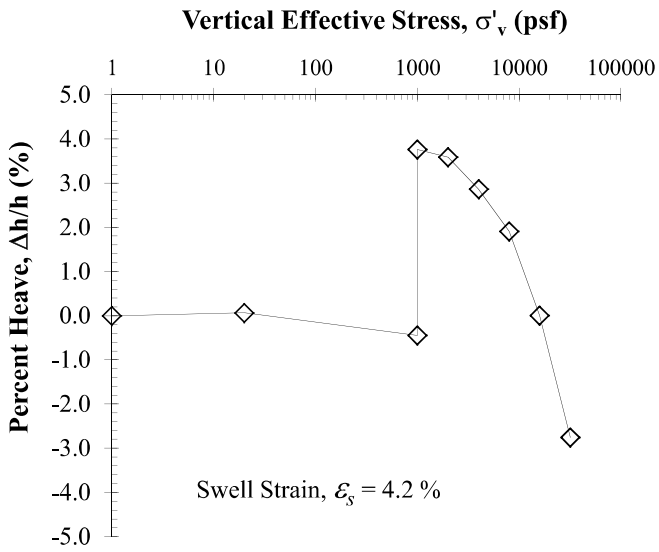
RRC Project No.: 130222
Test Method: ASTM D 4546-08, Method C
Test Date: 08/30/13

Soil Specimen Properties	
Average Water Content of Trimmings (%)	18.2
Initial Specimen Water Content (%)	18.2
Final Specimen Water Content (%)	18.0
Initial Specimen Height (in)	0.793
Final Specimen Height (in)	0.770
Initial Dry Unit Weight, γ_o (pcf)	109.3
Final Dry Unit Weight, γ_f (pcf)	112.5
Initial Void Ratio, e_o	0.542
Final Void Ratio, e_f	0.499
Initial Degree of Saturation (%)	90.6
Seating Load (psf)	20
Swell Pressure at Initial Void Ratio (psf)	15500
Swell Strain, $\mathcal{E}_S$ (%)	4.2

Specimen was inundated with tap water during testing. Loading increment duration was minimum 24 hours. G_s assumed to be 2.70. The calculation included the machine deflections that measured in each loading steps.

Specimen Diameter: 2.495 inches





σ'v (psf)	1	20	1000	1000	2000	4000	8000	16000	32000
e	0.542	0.543	0.535	0.600	0.597	0.586	0.571	0.542	0.500
Δh/h (%)	0.00	0.07	-0.45	3.76	3.59	2.86	1.91	0.01	-2.76

Cheng-Wei Chen, 09/09/13
Analysis & Quality Review/Date
Specimen prepared & tested by: Caleb McCord

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One-Dimensional Swell Potential Test

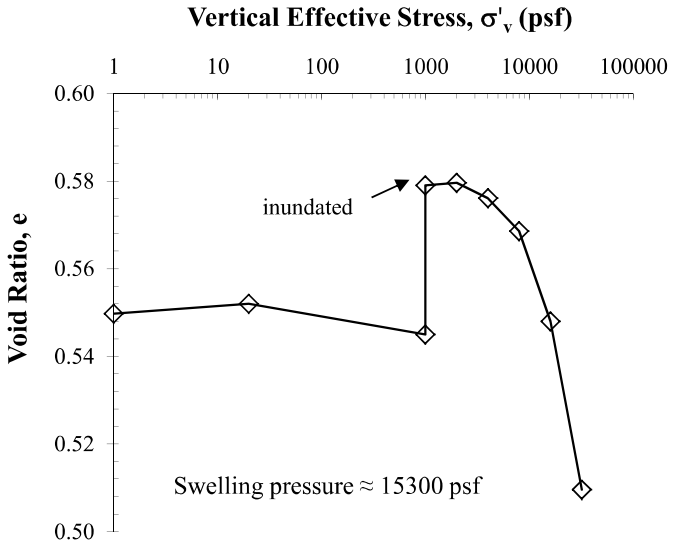
Client: M. A. Mortenson Company
Project Name: Chilocco Wind Farm
Specimen ID: T-67 at 9 ft

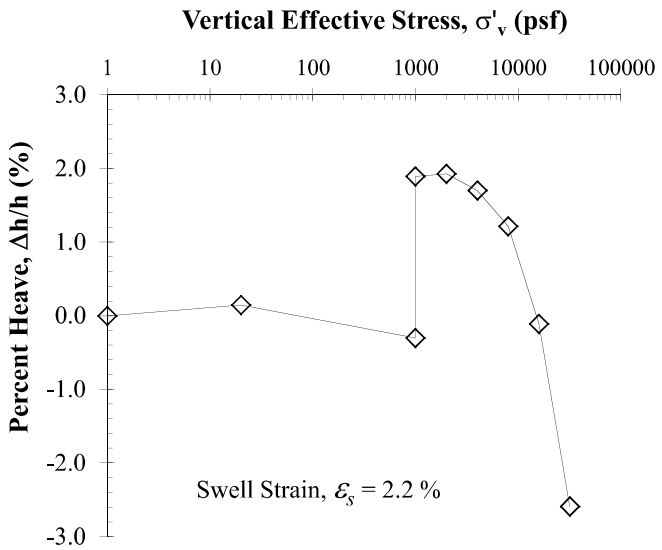
RRC Project No.: 130222
Test Method: ASTM D 4546-08, Method C
Test Date: 08/30/13

Soil Specimen Properties	
Average Water Content of Trimmings (%)	20.1
Initial Specimen Water Content (%)	20.1
Final Specimen Water Content (%)	19.4
Initial Specimen Height (in)	0.795
Final Specimen Height (in)	0.774
Initial Dry Unit Weight, γ_o (pcf)	108.7
Final Dry Unit Weight, γ_f (pcf)	111.7
Initial Void Ratio, e_o	0.550
Final Void Ratio, e_f	0.509
Initial Degree of Saturation (%)	98.8
Seating Load (psf)	20
Swell Pressure at Initial Void Ratio (psf)	15300
Swell Strain, $\mathcal{E}_S$ (%)	2.2

Specimen was inundated with tap water during testing. Loading increment duration was minimum 24 hours. G_s assumed to be 2.70. The calculation included the machine deflections that measured in each loading steps.

Specimen Diameter: 2.497 inches





σ'v (psf)	1	20	1000	1000	2000	4000	8000	16000	32000
e	0.550	0.552	0.545	0.579	0.580	0.576	0.569	0.548	0.510
Δh/h (%)	0.00	0.15	-0.30	1.89	1.93	1.70	1.21	-0.11	-2.59

Cheng-Wei Chen, 09/09/13
Analysis & Quality Review/Date
Specimen prepared & tested by: Caleb McCord

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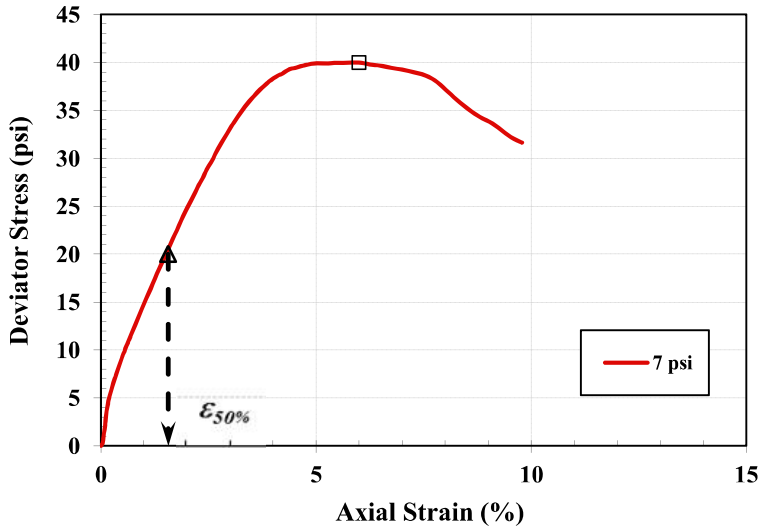
Unconsolidated-Undrained Triaxial Compression Test Report

Client: M. A. Mortenson Company
Project: Chilocco Wind Farm
Sample No.: T-15 at 9 ft.

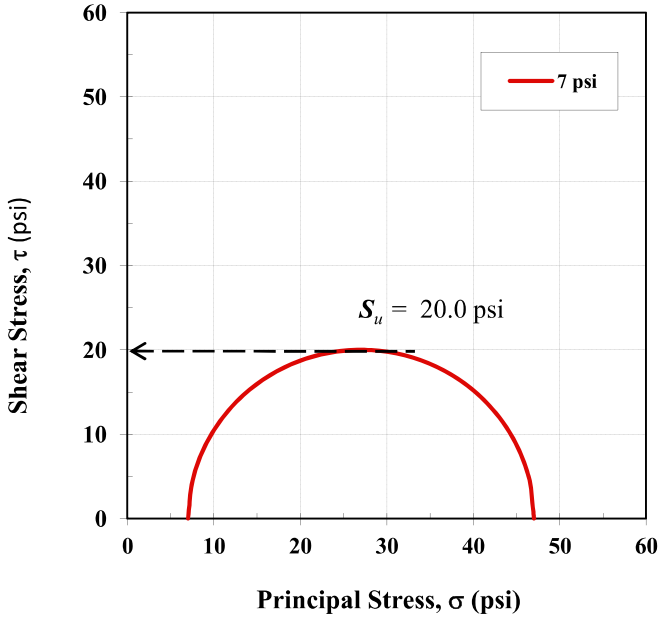
RRC Project No.: 130222
Test Method: ASTM D 2850
Test Date: 9/3/2013

Type of Specimen: Shelby Tube
Strain Rate (%/min): 1 % / min
Type of Test: Q-Test

Principal Stress Difference vs. Axial Strain



Mohr Circles (Total Stress) for Peak Stress at Failure



Initial Specimen Conditions		
Specimen No.		1
Confining Pressure (psi)		7.0
Avg. Diameter (in)	D_o	2.83
Avg. Height (in)	H_o	5.69
In-situ Moisture Content (%)	w_o	24.3
Total Unit Weight (pcf)	γ_{total}	126.1
Dry Unit Weight (pcf)	γ_{dry}	101.5
Saturation (%)	S_r	99.6
Void Ratio	e_o	0.66
Specific Gravity (Assumed)	G_s	2.70

Stresses at Failure	
Maximum Deviator Stress (psi)	40.0
Axial Strain at Failure (%)	6.0
Axial Strain at 50% of q_u (%)	1.6
Total Stresses at Failure	
Major Principal Stress, σ_1 (psi)	47.0
Minor Principal Stress, σ_3 (psi)	7.0

Test Results	
Friction Angle, ϕ_u (^{o})	- -
Cohesion Intercept, C_u (psi)	- -
Undrained Shear Strength, S_u (tsf)	1.44

Note: The test specimen was nearly saturated; the Mohr-Coulomb failure envelope was taken as a horizontal straight line. Failure was determined at the maximum deviator stress or deviator stress at 15 % axial strain, whenever is obtained first.

Cheng-Wei Chen, 09/05/13
Analysis & Quality Review/Date
Specimen Prepared by: C.M.

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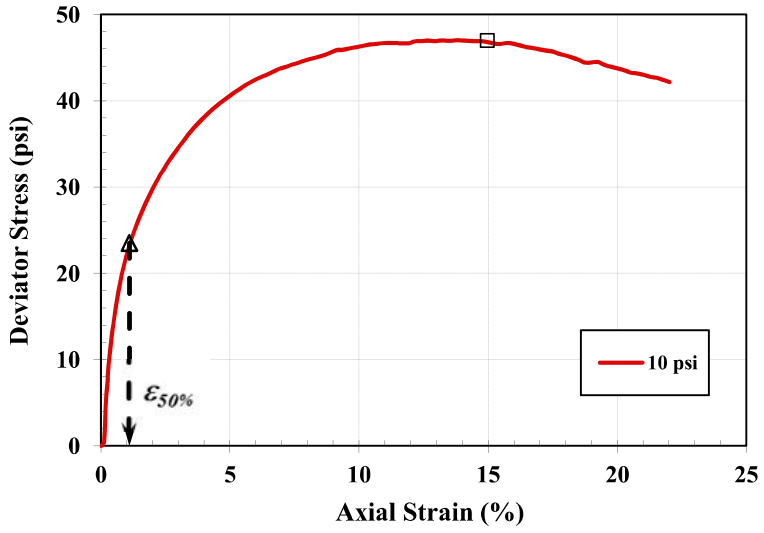
Unconsolidated-Undrained Triaxial Compression Test Report

Client: M. A. Mortenson Company
Project: Chilocco Wind Farm
Sample No.: T-19 at 12 ft.

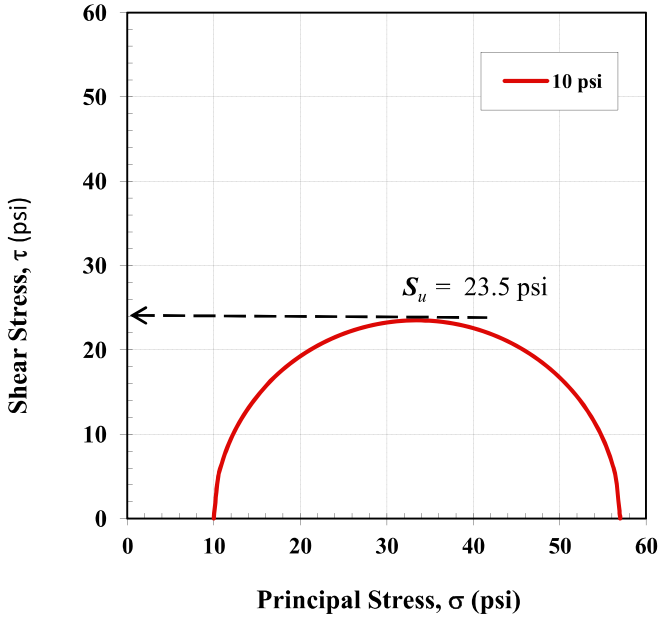
RRC Project No.: 130222
Test Method: ASTM D 2850
Test Date: 9/3/2013

Type of Specimen: Shelby Tube
Strain Rate (%/min): 1 % / min
Type of Test: Q-Test

Principal Stress Difference vs. Axial Strain



Mohr Circles (Total Stress) for Peak Stress at Failure



Initial Specimen Conditions		
Specimen No.		1
Confining Pressure (psi)		10.0
Avg. Diameter (in)	D_o	2.81
Avg. Height (in)	H_o	5.68
In-situ Moisture Content (%)	w_o	21.0
Total Unit Weight (pcf)	γ_{total}	129.7
Dry Unit Weight (pcf)	γ_{dry}	107.2
Saturation (%)	S_r	100.0
Void Ratio	e_o	0.57
Specific Gravity (Assumed)	G_s	2.70

Stresses at Failure	
Maximum Deviator Stress (psi)	47.0
Axial Strain at Failure (%)	15.0
Axial Strain at 50% of q_u (%)	1.1
Total Stresses at Failure	
Major Principal Stress, σ_1 (psi)	57.0
Minor Principal Stress, σ_3 (psi)	10.0

Test Results	
Friction Angle, ϕ_u (^{o})	- -
Cohesion Intercept, C_u (psi)	- -
Undrained Shear Strength, S_u (tsf)	1.69

Note: The test specimen was nearly saturated; the Mohr-Coulomb failure envelope was taken as a horizontal straight line. Failure was determined at the maximum deviator stress or deviator stress at 15 % axial strain, whenever is obtained first.

Cheng-Wei Chen, 09/05/13
Analysis & Quality Review/Date
Specimen Prepared by: C.M.

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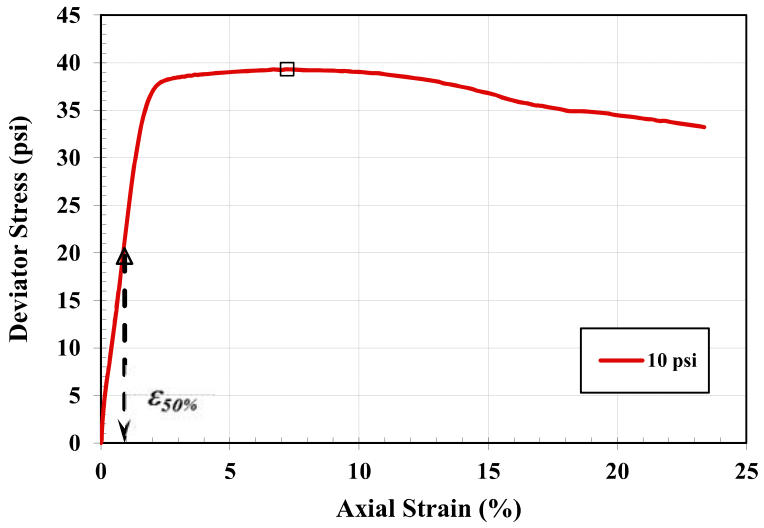
Unconsolidated-Undrained Triaxial Compression Test Report

Client: M. A. Mortenson Company
Project: Chilocco Wind Farm
Sample No.: T-41 at 14 ft.

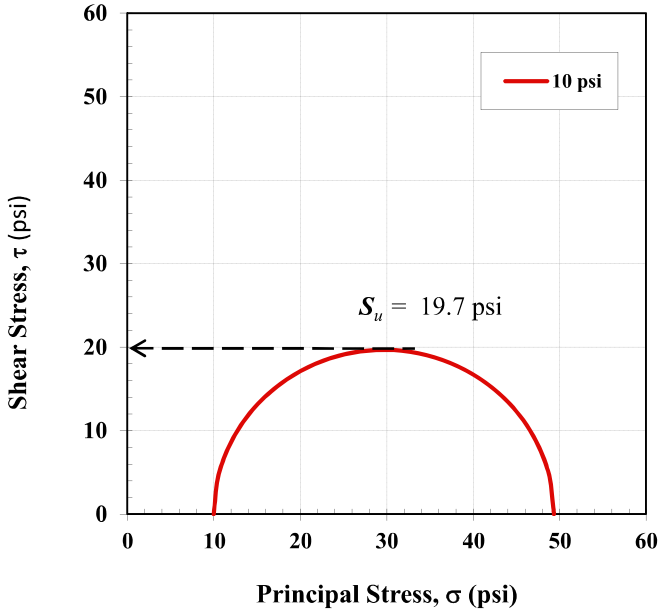
RRC Project No.: 130222
Test Method: ASTM D 2850
Test Date: 9/4/2013

Type of Specimen: Shelby Tube
Strain Rate (%/min): 1 % / min
Type of Test: Q-Test

Principal Stress Difference vs. Axial Strain



Mohr Circles (Total Stress) for Peak Stress at Failure



Initial Specimen Conditions		
Specimen No.		1
Confining Pressure (psi)		10.0
Avg. Diameter (in)	D_o	2.83
Avg. Height (in)	H_o	5.67
In-situ Moisture Content (%)	w_o	20.7
Total Unit Weight (pcf)	γ_{total}	124.9
Dry Unit Weight (pcf)	γ_{dry}	103.5
Saturation (%)	S_r	87.9
Void Ratio	e_o	0.63
Specific Gravity (Assumed)	G_s	2.70

Stresses at Failure	
Maximum Deviator Stress (psi)	39.3
Axial Strain at Failure (%)	7.2
Axial Strain at 50% of q_u (%)	0.9
Total Stresses at Failure	
Major Principal Stress, σ_1 (psi)	49.3
Minor Principal Stress, σ_3 (psi)	10.0

Test Results	
Friction Angle, ϕ_u (^{o})	- -
Cohesion Intercept, C_u (psi)	- -
Corresponding Undrained Shear Strength, S_u (tsf)	1.42

Note: The test specimens were partially saturated. Failure was determined at the maximum deviator stress or deviator stress at 15 % axial strain, whenever is obtained first.

Cheng-Wei Chen, 09/06/13
Analysis & Quality Review/Date
Specimen Prepared by: C.M.

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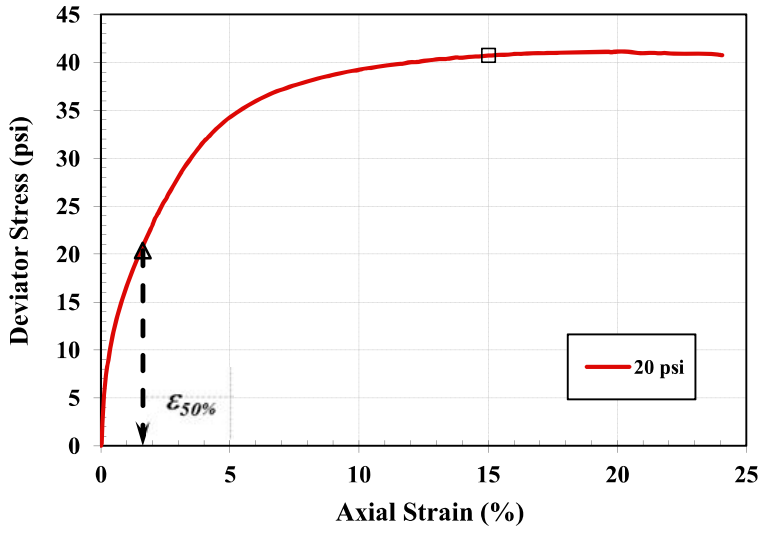
Unconsolidated-Undrained Triaxial Compression Test Report

Client: M. A. Mortenson Company
Project: Chilocco Wind Farm
Sample No.: T-41 at 29 ft.

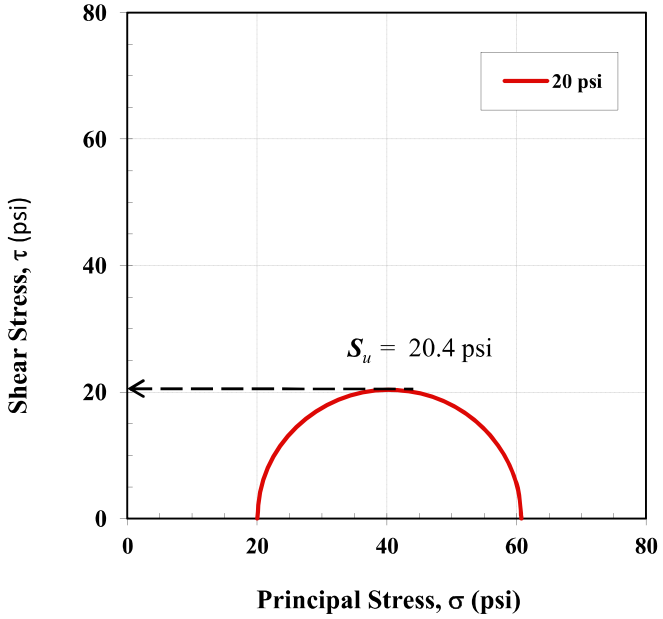
RRC Project No.: 130222
Test Method: ASTM D 2850
Test Date: 9/3/2013

Type of Specimen: Shelby Tube
Strain Rate (%/min): 1 % / min
Type of Test: Q-Test

Principal Stress Difference vs. Axial Strain



Mohr Circles (Total Stress) for Peak Stress at Failure



Initial Specimen Conditions		
Specimen No.		1
Confining Pressure (psi)		20.0
Avg. Diameter (in)	D_o	2.84
Avg. Height (in)	H_o	5.68
In-situ Moisture Content (%)	w_o	21.9
Total Unit Weight (pcf)	γ_{total}	131.3
Dry Unit Weight (pcf)	γ_{dry}	107.7
Saturation (%)	S_r	100.0
Void Ratio	e_o	0.56
Specific Gravity (Assumed)	G_s	2.70

Stresses at Failure	
Maximum Deviator Stress (psi)	40.7
Axial Strain at Failure (%)	15.0
Axial Strain at 50% of q_u (%)	1.6
Total Stresses at Failure	
Major Principal Stress, σ_1 (psi)	60.7
Minor Principal Stress, σ_3 (psi)	20.0

Test Results	
Friction Angle, ϕ_u (^{o})	- -
Cohesion Intercept, C_u (psi)	- -
Undrained Shear Strength, S_u (tsf)	1.47

Note: The test specimen was nearly saturated; the Mohr-Coulomb failure envelope was taken as a horizontal straight line. Failure was determined at the maximum deviator stress or deviator stress at 15 % axial strain, whenever is obtained first.

Cheng-Wei Chen, 09/06/13
Analysis & Quality Review/Date
Specimen Prepared by: C.M.

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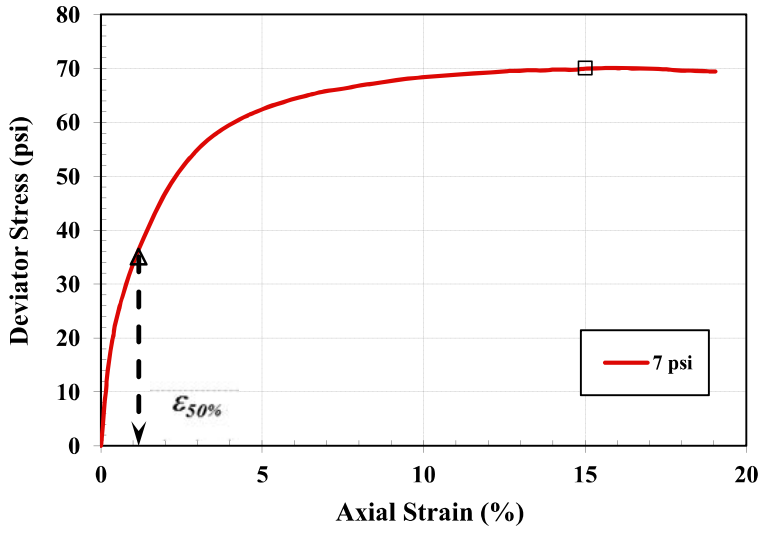
Unconsolidated-Undrained Triaxial Compression Test Report

Client: M. A. Mortenson Company
Project: Chilocco Wind Farm
Sample No.: T-67 at 9 ft.

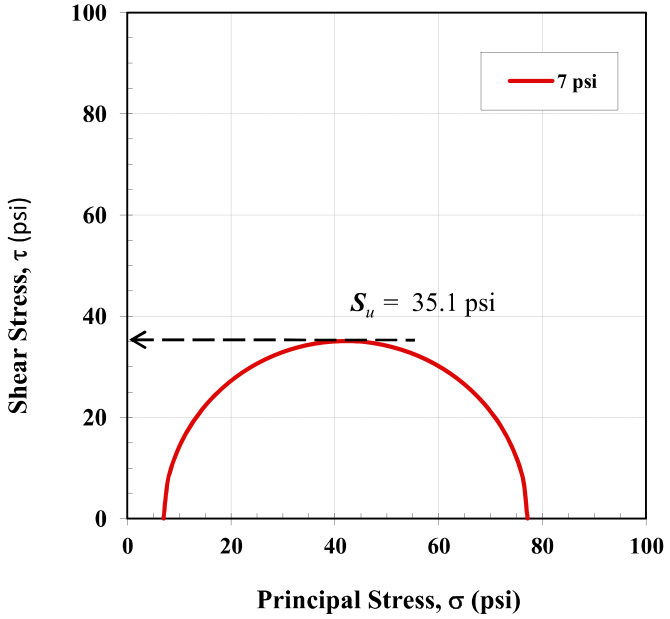
RRC Project No.: 130222
Test Method: ASTM D 2850
Test Date: 9/3/2013

Type of Specimen: Shelby Tube
Strain Rate (%/min): 1 % / min
Type of Test: Q-Test

Principal Stress Difference vs. Axial Strain



Mohr Circles (Total Stress) for Peak Stress at Failure



Initial Specimen Conditions		
Specimen No.		1
Confining Pressure (psi)		7.0
Avg. Diameter (in)	D_o	2.84
Avg. Height (in)	H_o	5.68
In-situ Moisture Content (%)	w_o	20.1
Total Unit Weight (pcf)	γ_{total}	131.5
Dry Unit Weight (pcf)	γ_{dry}	109.5
Saturation (%)	S_r	100.0
Void Ratio	e_o	0.54
Specific Gravity (Assumed)	G_s	2.70

Stresses at Failure	
Maximum Deviator Stress (psi)	70.1
Axial Strain at Failure (%)	15.0
Axial Strain at 50% of q_u (%)	1.2
Total Stresses at Failure	
Major Principal Stress, σ_1 (psi)	77.1
Minor Principal Stress, σ_3 (psi)	7.0

Test Results	
Friction Angle, ϕ_u (^{o})	- -
Cohesion Intercept, C_u (psi)	- -
Undrained Shear Strength, S_u (tsf)	2.52

Note: The test specimen was nearly saturated; the Mohr-Coulomb failure envelope was taken as a horizontal straight line. Failure was determined at the maximum deviator stress or deviator stress at 15 % axial strain, whenever is obtained first.

Cheng-Wei Chen, 09/05/13
Analysis & Quality Review/Date
Specimen Prepared by: C.M.

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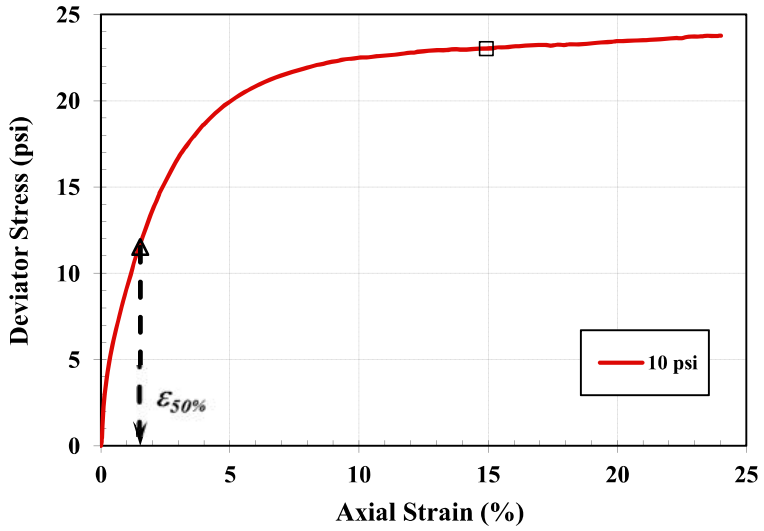
Unconsolidated-Undrained Triaxial Compression Test Report

Client: M. A. Mortenson Company
Project: Chilocco Wind Farm
Sample No.: T-67 at 14 ft.

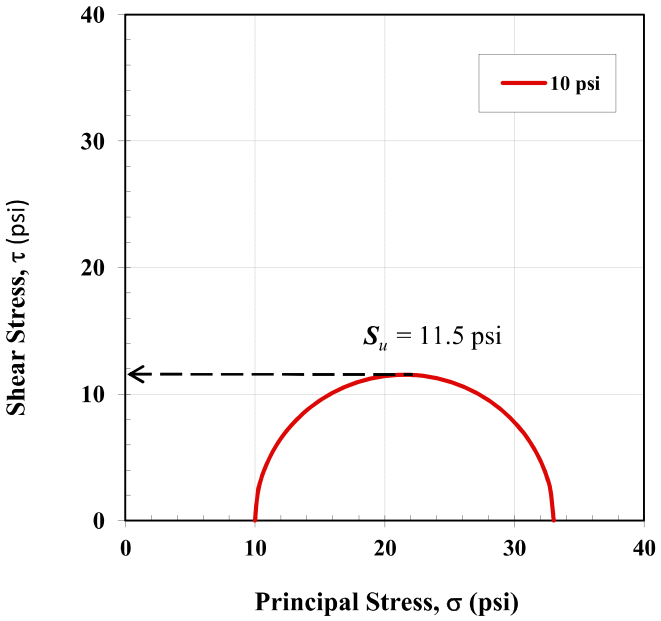
RRC Project No.: 130222
Test Method: ASTM D 2850
Test Date: 9/3/2013

Type of Specimen: Shelby Tube
Strain Rate (%/min): 1 % / min
Type of Test: Q-Test

Principal Stress Difference vs. Axial Strain



Mohr Circles (Total Stress) for Peak Stress at Failure



Initial Specimen Conditions		
Specimen No.		1
Confining Pressure (psi)		7.0
Avg. Diameter (in)	D_o	2.79
Avg. Height (in)	H_o	5.68
In-situ Moisture Content (%)	w_o	20.7
Total Unit Weight (pcf)	γ_{total}	131.2
Dry Unit Weight (pcf)	γ_{dry}	108.8
Saturation (%)	S_r	100.0
Void Ratio	e_o	0.55
Specific Gravity (Assumed)	G_s	2.70

Stresses at Failure	
Maximum Deviator Stress (psi)	23.0
Axial Strain at Failure (%)	14.9
Axial Strain at 50% of q_u (%)	1.5
Total Stresses at Failure	
Major Principal Stress, σ_1 (psi)	33.0
Minor Principal Stress, σ_3 (psi)	10.0

Test Results	
Friction Angle, ϕ_u (^{o})	- -
Cohesion Intercept, C_u (psi)	- -
Undrained Shear Strength, S_u (tsf)	0.83

Note: The test specimen was nearly saturated; the Mohr-Coulomb failure envelope was taken as a horizontal straight line. Failure was determined at the maximum deviator stress or deviator stress at 15 % axial strain, whenever is obtained first.

Cheng-Wei Chen, 09/05/13
Analysis & Quality Review/Date
Specimen Prepared by: C.M.

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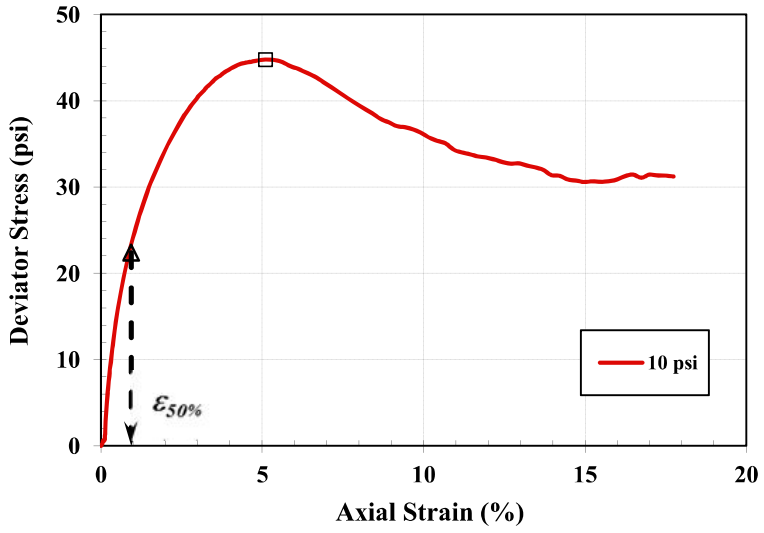
Unconsolidated-Undrained Triaxial Compression Test Report

Client: M. A. Mortenson Company
Project: Chilocco Wind Farm
Sample No.: T-71 at 12 ft.

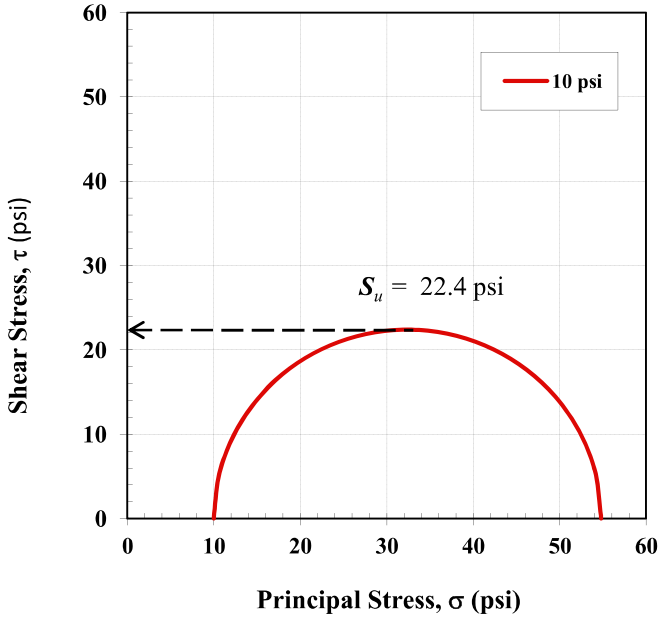
RRC Project No.: 130222
Test Method: ASTM D 2850
Test Date: 9/4/2013

Type of Specimen: Shelby Tube
Strain Rate (%/min): 1 % / min
Type of Test: Q-Test

Principal Stress Difference vs. Axial Strain



Mohr Circles (Total Stress) for Peak Stress at Failure



Initial Specimen Conditions		
Specimen No.		1
Confining Pressure (psi)		10.0
Avg. Diameter (in)	D_o	2.84
Avg. Height (in)	H_o	5.68
In-situ Moisture Content (%)	w_o	24.3
Total Unit Weight (pcf)	γ_{total}	124.5
Dry Unit Weight (pcf)	γ_{dry}	100.2
Saturation (%)	S_r	97.1
Void Ratio	e_o	0.68
Specific Gravity (Assumed)	G_s	2.70

Stresses at Failure	
Maximum Deviator Stress (psi)	44.8
Axial Strain at Failure (%)	5.1
Axial Strain at 50% of q_u (%)	0.9
Total Stresses at Failure	
Major Principal Stress, σ_1 (psi)	54.8
Minor Principal Stress, σ_3 (psi)	10.0

Test Results	
Friction Angle, ϕ_u (°)	- -
Cohesion Intercept, C_u (psi)	- -
Undrained Shear Strength, S_u (tsf)	1.61

Note: The test specimen was nearly saturated; the Mohr-Coulomb failure envelope was taken as a horizontal straight line. Failure was determined at the maximum deviator stress or deviator stress at 15 % axial strain, whenever is obtained first.

Cheng-Wei Chen, 09/06/13
Analysis & Quality Review/Date
Specimen Prepared by: C.M.

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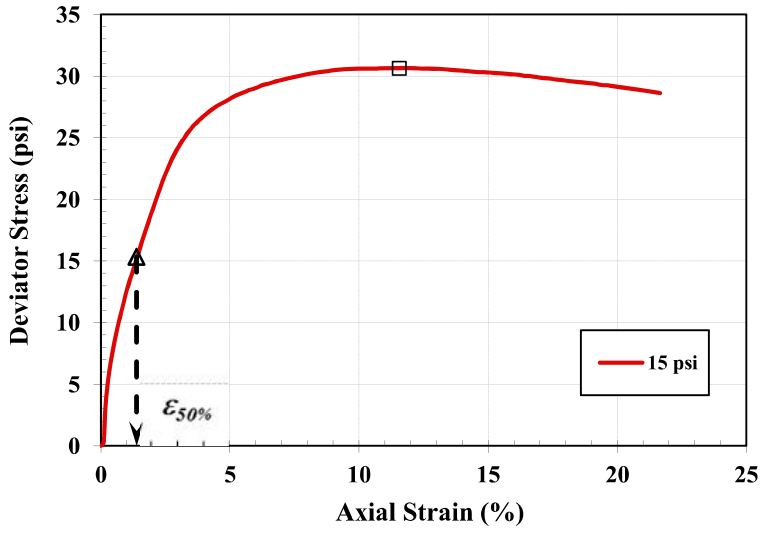
Unconsolidated-Undrained Triaxial Compression Test Report

Client: M. A. Mortenson Company
Project: Chilocco Wind Farm
Sample No.: T-86 at 19 ft.

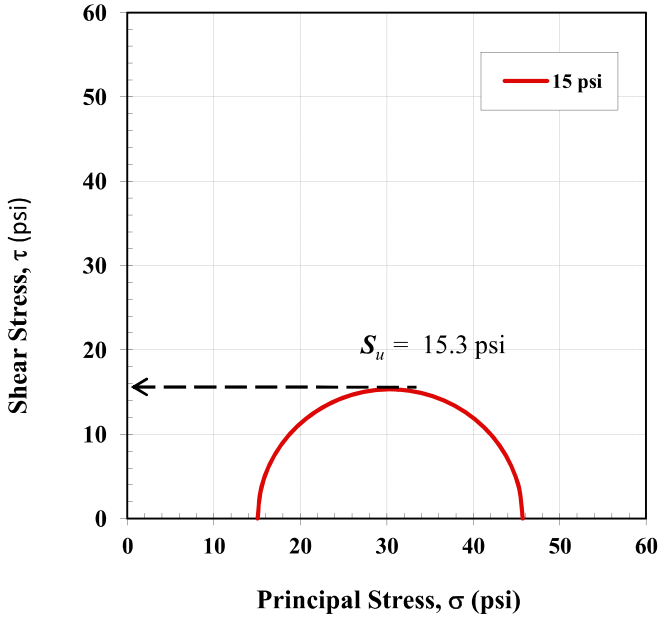
RRC Project No.: 130222
Test Method: ASTM D 2850
Test Date: 9/4/2013

Type of Specimen: Shelby Tube
Strain Rate (%/min): 1 % / min
Type of Test: Q-Test

Principal Stress Difference vs. Axial Strain



Mohr Circles (Total Stress) for Peak Stress at Failure



Initial Specimen Conditions		
Specimen No.		1
Confining Pressure (psi)		15.0
Avg. Diameter (in)	D_o	2.85
Avg. Height (in)	H_o	5.68
In-situ Moisture Content (%)	w_o	24.5
Total Unit Weight (pcf)	γ_{total}	123.7
Dry Unit Weight (pcf)	γ_{dry}	99.4
Saturation (%)	S_r	95.0
Void Ratio	e_o	0.70
Specific Gravity (Assumed)	G_s	2.70

Stresses at Failure	
Maximum Deviator Stress (psi)	30.7
Axial Strain at Failure (%)	11.6
Axial Strain at 50% of q_u (%)	1.4
Total Stresses at Failure	
Major Principal Stress, σ_1 (psi)	45.7
Minor Principal Stress, σ_3 (psi)	15.1

Test Results	
Friction Angle, ϕ_u (^{o})	- -
Cohesion Intercept, C_u (psi)	- -
Undrained Shear Strength, S_u (tsf)	1.10

Note: The test specimen was nearly saturated; the Mohr-Coulomb failure envelope was taken as a horizontal straight line. Failure was determined at the maximum deviator stress or deviator stress at 15 % axial strain, whenever is obtained first.

Cheng-Wei Chen, 09/06/13
Analysis & Quality Review/Date
Specimen Prepared by: C.M.

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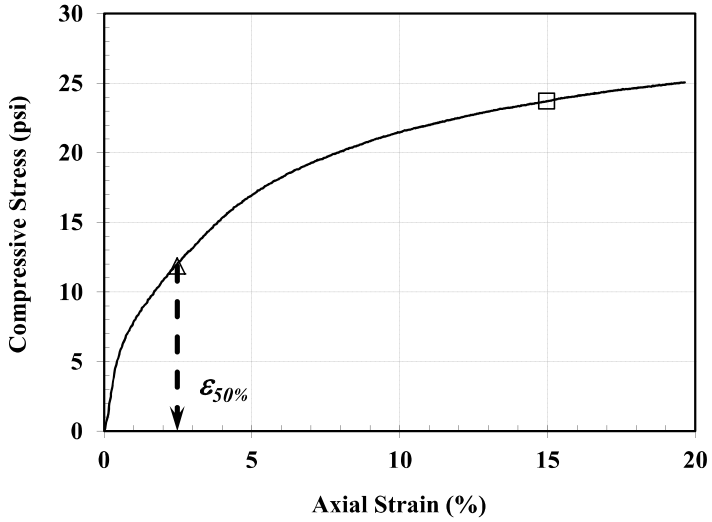
Unconfined Compression Test Report

Client: M. A. Mortenson Company
Project: Chilocco Wind Farm
Sample I.D.: Substation at 4 ft

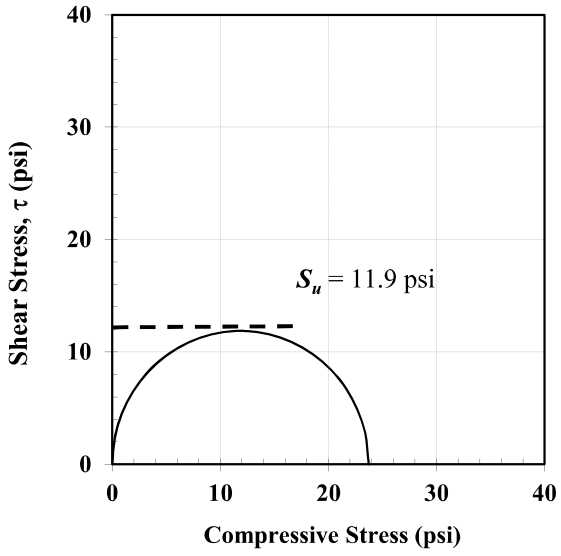
RRC Project No.: 130222
Test Method: ASTM D 2166
Test Date: 9/4/2013

Type of Specimen: Shelby Tube
Strain Rate (%/min): 1 % / min



Initial Specimen Conditions		
Specimen No.		1
Avg. Diameter (in)	D_o	2.83
Avg. Height (in)	H_o	5.68
In-situ Moisture Content (%)	w_o	19.1
Total Unit Weight (pcf)	γ_{total}	127.5
Dry Unit Weight (pcf)	γ_{dry}	107.0
Saturation (%)	S_r	95.1
Void Ratio	e_o	0.55
Specific Gravity (Assumed)	G_s	2.65

Mohr Circles for Peak Stress at Failure



Stresses at Failure	
Unconfined Compressive Strength, q_u (psi)	23.7
Axial Strain at Failure (%)	15.0
Axial Strain at 50% of q_u (%)	2.5
Total Stresses at Failure	
Major Principal Stress, σ_1 (psi)	23.7
Minor Principal Stress, σ_3 (psi)	0.0
Undrained Shear Strength, S_u (tsf)	0.85

Note: Failure was determined at the maximum deviator stress or deviator stress at 15 % axial strain, whenever is obtained first.

Cheng-Wei Chen, 09/06/13
Quality Review/Date
Specimen prepared & tested by: : C.M.

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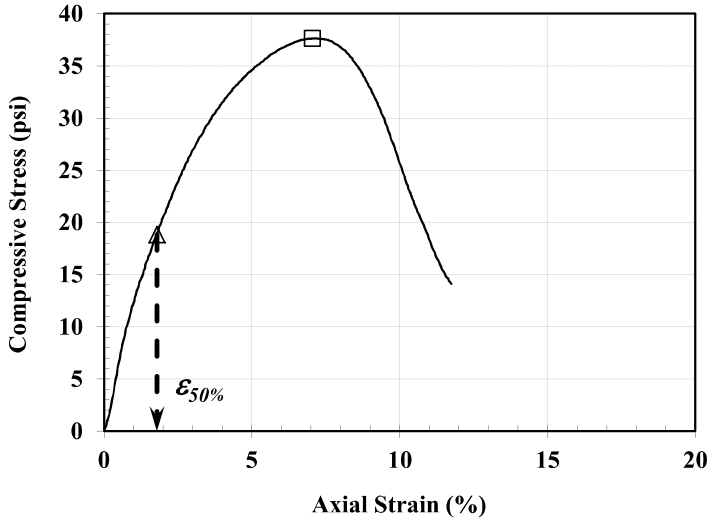
Unconfined Compression Test Report

Client: M. A. Mortenson Company
Project: Chilocco Wind Farm
Sample I.D.: T-17 at 9 ft

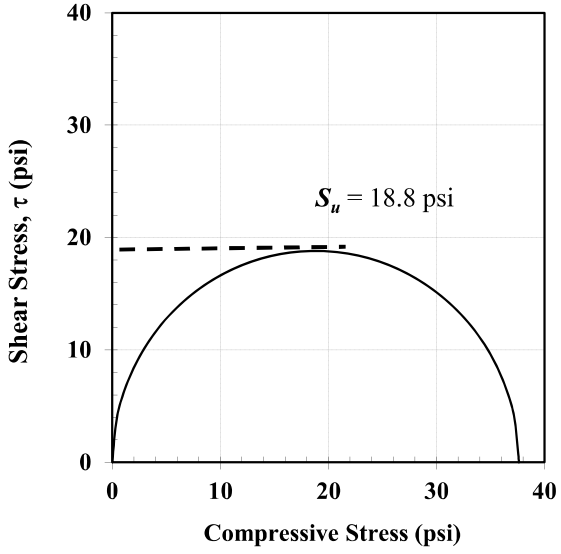
RRC Project No.: 130222
Test Method: ASTM D 2166
Test Date: 9/4/2013

Type of Specimen: Shelby Tube
Strain Rate (%/min): 1 % / min



Initial Specimen Conditions		
Specimen No.		1
Avg. Diameter (in)	D_o	2.83
Avg. Height (in)	H_o	5.68
In-situ Moisture Content (%)	w_o	19.3
Total Unit Weight (pcf)	γ_{total}	131.7
Dry Unit Weight (pcf)	γ_{dry}	110.4
Saturation (%)	S_r	100.0
Void Ratio	e_o	0.50
Specific Gravity (Assumed)	G_s	2.65

Mohr Circles for Peak Stress at Failure



Stresses at Failure	
Unconfined Compressive Strength, q_u (psi)	37.6
Axial Strain at Failure (%)	7.0
Axial Strain at 50% of q_u (%)	1.8
Total Stresses at Failure	
Major Principal Stress, σ_1 (psi)	37.6
Minor Principal Stress, σ_3 (psi)	0.0
Undrained Shear Strength, S_u (tsf)	1.35

Note: Failure was determined at the maximum deviator stress or deviator stress at 15 % axial strain, whenever is obtained first.

Cheng-Wei Chen, 09/06/13
Quality Review/Date
Specimen prepared & tested by: : C.M.

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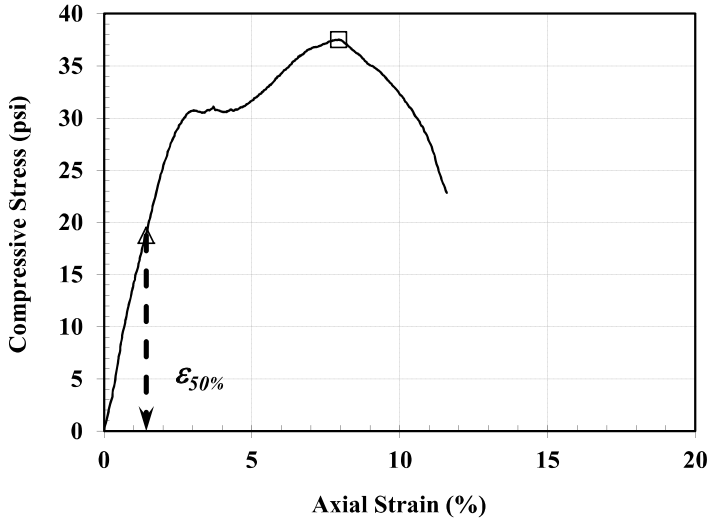
Round Rock, TX 78664
Phone: 512-992-2087

Unconfined Compression Test Report

Client: M. A. Mortenson Company
Project: Chilocco Wind Farm
Sample I.D.: T-17 at 19 ft

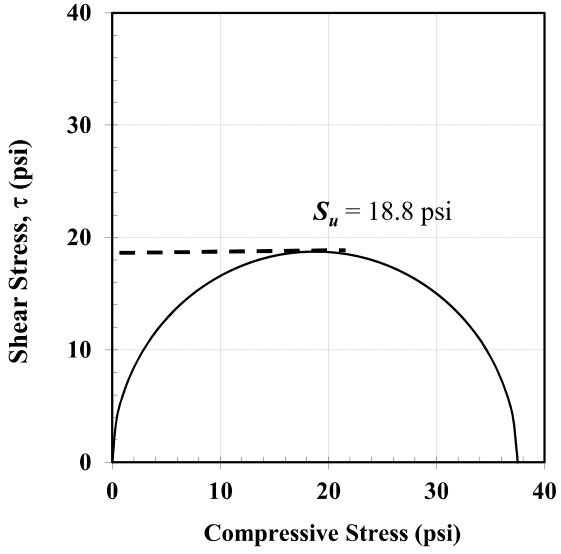
RRC Project No.: 130222
Test Method: ASTM D 2166
Test Date: 9/4/2013

Type of Specimen: Shelby Tube
Strain Rate (%/min): 1 % / min



Initial Specimen Conditions		
Specimen No.		1
Avg. Diameter (in)	D_o	2.80
Avg. Height (in)	H_o	5.68
In-situ Moisture Content (%)	w_o	17.9
Total Unit Weight (pcf)	γ_{total}	134.9
Dry Unit Weight (pcf)	γ_{dry}	114.5
Saturation (%)	S_r	100.0
Void Ratio	e_o	0.45
Specific Gravity (Assumed)	G_s	2.65

Mohr Circles for Peak Stress at Failure



Stresses at Failure	
Unconfined Compressive Strength, q_u (psi)	37.5
Axial Strain at Failure (%)	7.9
Axial Strain at 50% of q_u (%)	1.4
Total Stresses at Failure	
Major Principal Stress, σ_1 (psi)	37.5
Minor Principal Stress, σ_3 (psi)	0.0
Undrained Shear Strength, S_u (tsf)	1.35

Note: Failure was determined at the maximum deviator stress or deviator stress at 15 % axial strain, whenever is obtained first.

Cheng-Wei Chen, 09/06/13
Quality Review/Date
Specimen prepared & tested by: : C.M.

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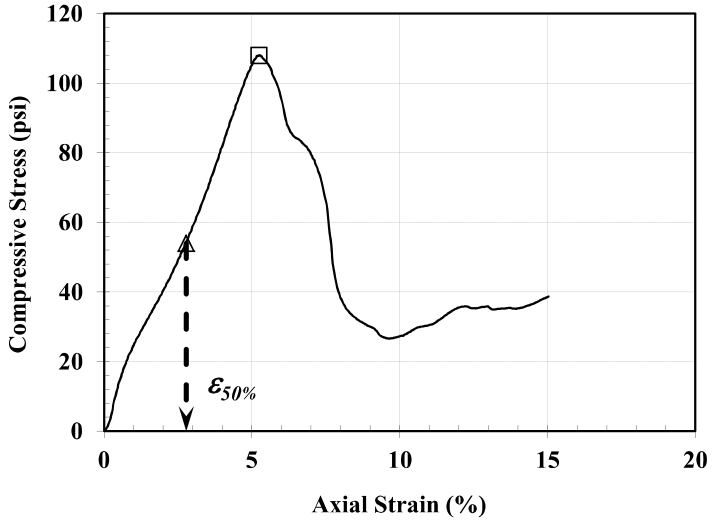
Unconfined Compression Test Report

Client: M. A. Mortenson Company
Project: Chilocco Wind Farm
Sample I.D.: T-25 at 4 ft

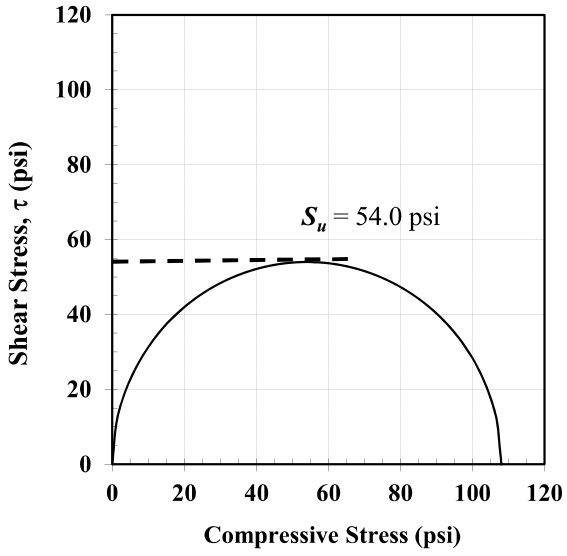
RRC Project No.: 130222
Test Method: ASTM D 2166
Test Date: 9/4/2013

Type of Specimen: Shelby Tube
Strain Rate (%/min): 1 % / min



Initial Specimen Conditions		
Specimen No.		1
Avg. Diameter (in)	D_o	2.83
Avg. Height (in)	H_o	5.68
In-situ Moisture Content (%)	w_o	20.7
Total Unit Weight (pcf)	γ_{total}	125.8
Dry Unit Weight (pcf)	γ_{dry}	104.2
Saturation (%)	S_r	93.8
Void Ratio	e_o	0.59
Specific Gravity (Assumed)	G_s	2.65

Mohr Circles for Peak Stress at Failure



Stresses at Failure	
Unconfined Compressive Strength, q_u (psi)	108.0
Axial Strain at Failure (%)	5.2
Axial Strain at 50% of q_u (%)	2.8
Total Stresses at Failure	
Major Principal Stress, σ_1 (psi)	108.0
Minor Principal Stress, σ_3 (psi)	0.0
Undrained Shear Strength, S_u (tsf)	3.89

Note: Failure was determined at the maximum deviator stress or deviator stress at 15 % axial strain, whenever is obtained first.

Cheng-Wei Chen, 09/06/13
Quality Review/Date
Specimen prepared & tested by: : C.M.

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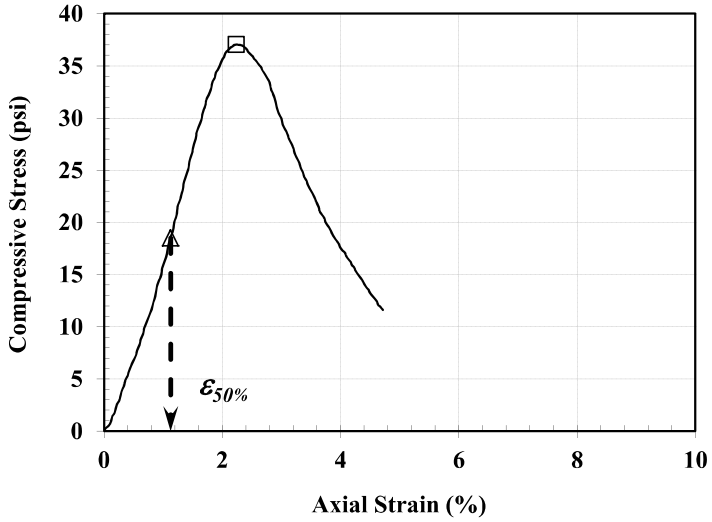
Unconfined Compression Test Report

Client: M. A. Mortenson Company
Project: Chilocco Wind Farm
Sample I.D.: T-41 at 9 ft

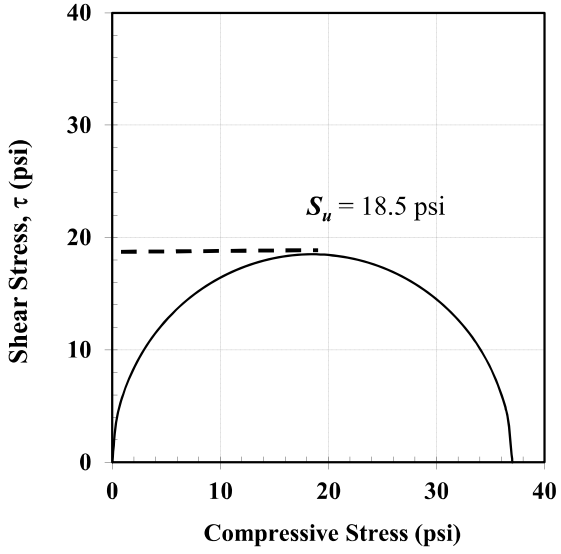
RRC Project No.: 130222
Test Method: ASTM D 2166
Test Date: 9/4/2013

Type of Specimen: Shelby Tube
Strain Rate (%/min): 1 % / min



Initial Specimen Conditions		
Specimen No.		1
Avg. Diameter (in)	D_o	2.84
Avg. Height (in)	H_o	5.68
In-situ Moisture Content (%)	w_o	18.6
Total Unit Weight (pcf)	γ_{total}	127.9
Dry Unit Weight (pcf)	γ_{dry}	107.8
Saturation (%)	S_r	92.3
Void Ratio	e_o	0.53
Specific Gravity (Assumed)	G_s	2.65

Mohr Circles for Peak Stress at Failure



Stresses at Failure	
Unconfined Compressive Strength, q_u (psi)	37.0
Axial Strain at Failure (%)	2.2
Axial Strain at 50% of q_u (%)	1.1
Total Stresses at Failure	
Major Principal Stress, σ_1 (psi)	37.0
Minor Principal Stress, σ_3 (psi)	0.0
Undrained Shear Strength, S_u (tsf)	1.33

Note: Failure was determined at the maximum deviator stress or deviator stress at 15 % axial strain, whenever is obtained first.

Cheng-Wei Chen, 09/06/13
Quality Review/Date
Specimen prepared & tested by: : C.M.

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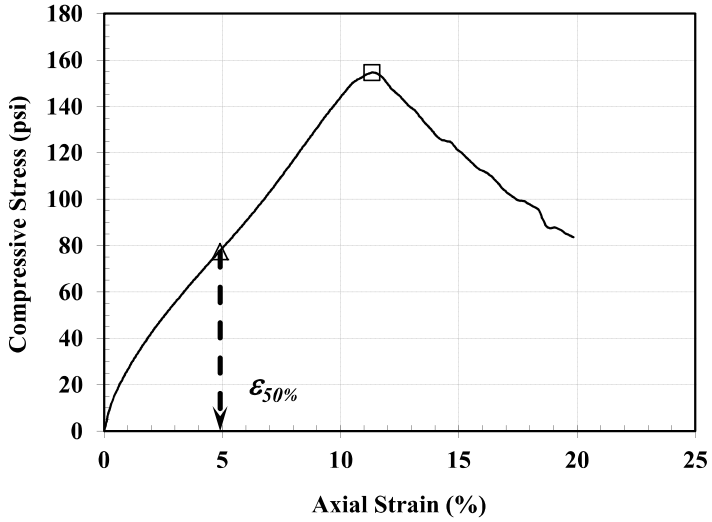
Unconfined Compression Test Report

Client: M. A. Mortenson Company
Project: Chilocco Wind Farm
Sample I.D.: T-71 at 4 ft

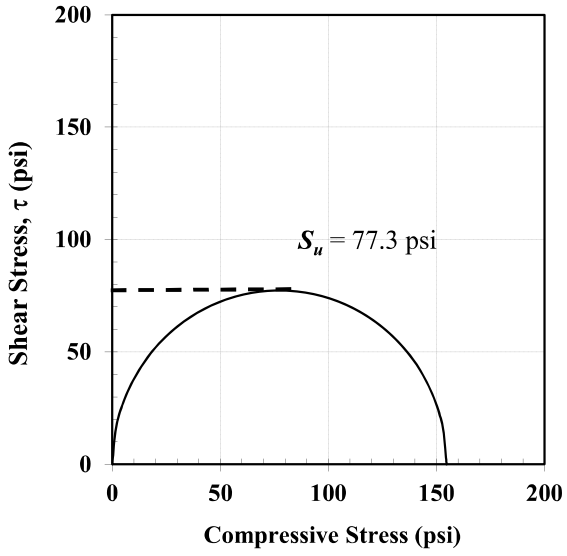
RRC Project No.: 130222
Test Method: ASTM D 2166
Test Date: 9/5/2013

Type of Specimen: Shelby Tube
Strain Rate (%/min): 1 % / min



Initial Specimen Conditions		
Specimen No.		1
Avg. Diameter (in)	D_o	2.83
Avg. Height (in)	H_o	5.69
In-situ Moisture Content (%)	w_o	16.2
Total Unit Weight (pcf)	γ_{total}	116.9
Dry Unit Weight (pcf)	γ_{dry}	100.6
Saturation (%)	S_r	67.4
Void Ratio	e_o	0.64
Specific Gravity (Assumed)	G_s	2.65

Mohr Circles for Peak Stress at Failure



Stresses at Failure	
Unconfined Compressive Strength, q_u (psi)	154.7
Axial Strain at Failure (%)	11.3
Axial Strain at 50% of q_u (%)	4.9
Total Stresses at Failure	
Major Principal Stress, σ_1 (psi)	154.7
Minor Principal Stress, σ_3 (psi)	0.0
Undrained Shear Strength, S_u (tsf)	5.57

Note: Failure was determined at the maximum deviator stress or deviator stress at 15 % axial strain, whenever is obtained first.

Cheng-Wei Chen, 09/06/13
Quality Review/Date
Specimen prepared & tested by: : C.M.

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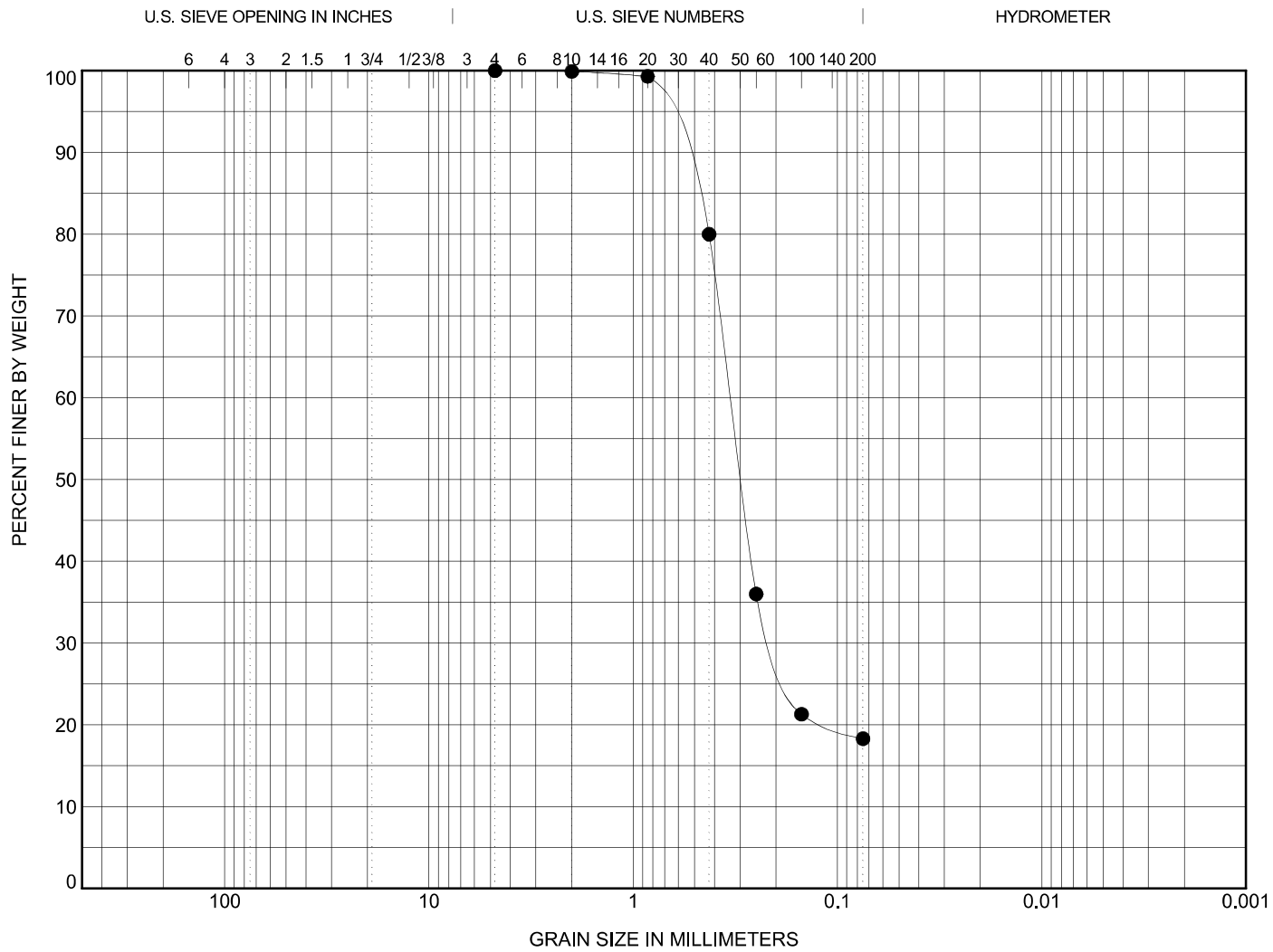
Renewable Resource Consultants, LLC
3801 Doris Lane
Round Rock, TX 78664
Telephone: (512) 992-2087
Fax: (512) 251-2518

GRAIN SIZE DISTRIBUTION

CLIENT: Mortenson Construction
PROJECT: Chilocco Wind Farm
LOCATION: Chilocco, OK
NUMBER: 130222

Sample ID: **T-063 at 29 ft.** Date: 9/9/2013

Test Method: **ASTM D422**



COBBLES	GRAVEL		SAND			SILT OR CLAY
	coarse	fine	coarse	medium	fine	

Classification	LL	PL	PI	Cc	Cu

D100	D60	D30	D10	%Gravel	%Sand	%Silt	%Clay
4.75	**0.334**	**0.203**		**0.0**	**81.7**	**18.3**	

Cheng-Wei Chen, 9/9/13
Analysis & Quality Review/Date

Specimens prepared by: C.M. & M.D.

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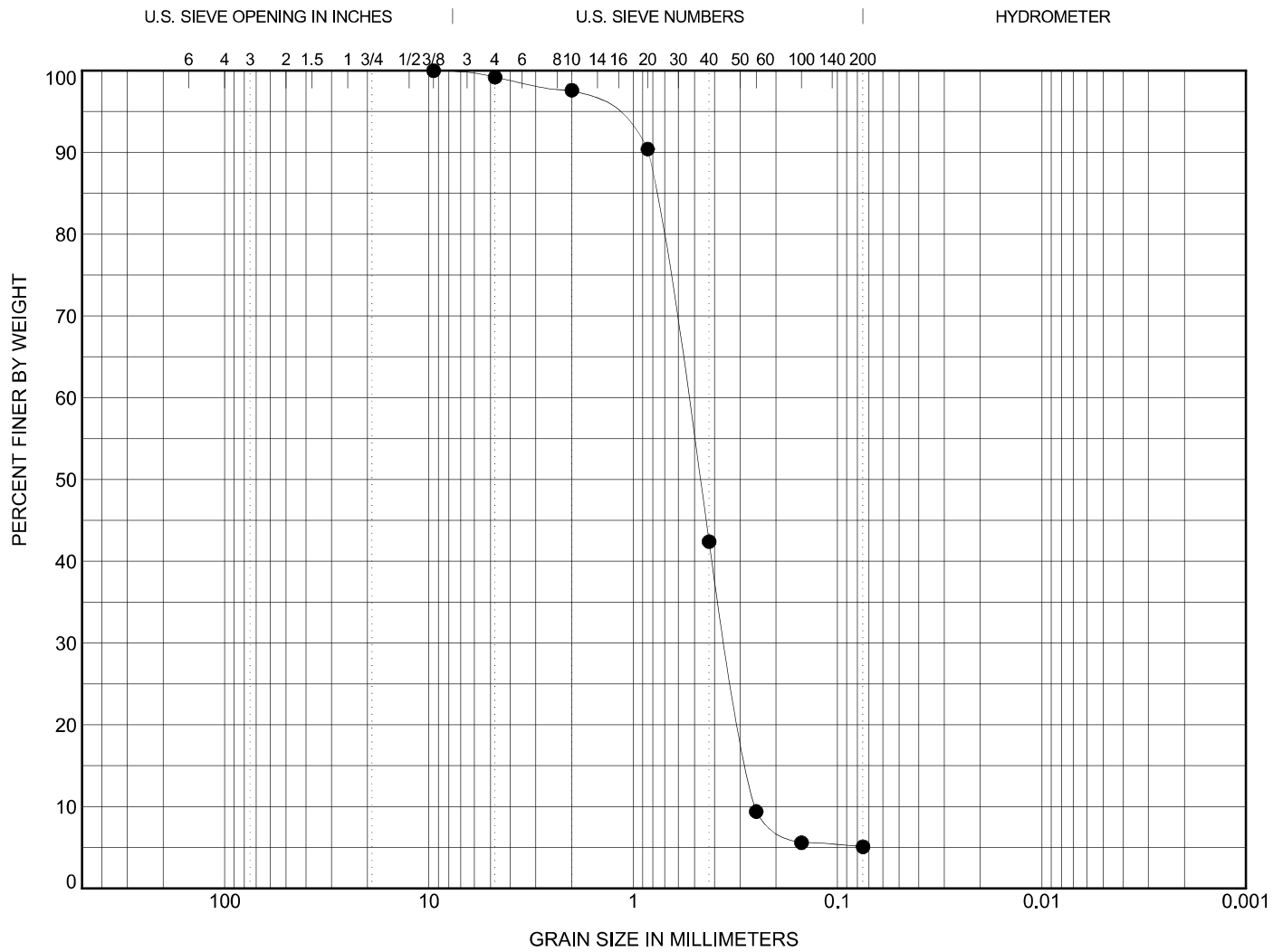
GRAIN SIZE DISTRIBUTION

CLIENT: Mortenson Construction
PROJECT: Chilocco Wind Farm
LOCATION: Chilocco, OK
NUMBER: 130222

Sample ID: **T-086 at 24 ft.** Date: 9/9/2013

Test Method: **ASTM D422**



COBBLES	GRAVEL		SAND			SILT OR CLAY
	coarse	fine	coarse	medium	fine	

Classification	LL	PL	PI	Cc	Cu
				0.88	**2.17**

D100	D60	D30	D10	%Gravel	%Sand	%Silt	%Clay
9.5	**0.548**	**0.348**	**0.252**	**0.8**	**94.1**	**5.1**	

Cheng-Wei Chen, 9/9/13
Analysis & Quality Review/Date

Specimens prepared by: C.M. & M.D.

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Round Rock, TX 78664
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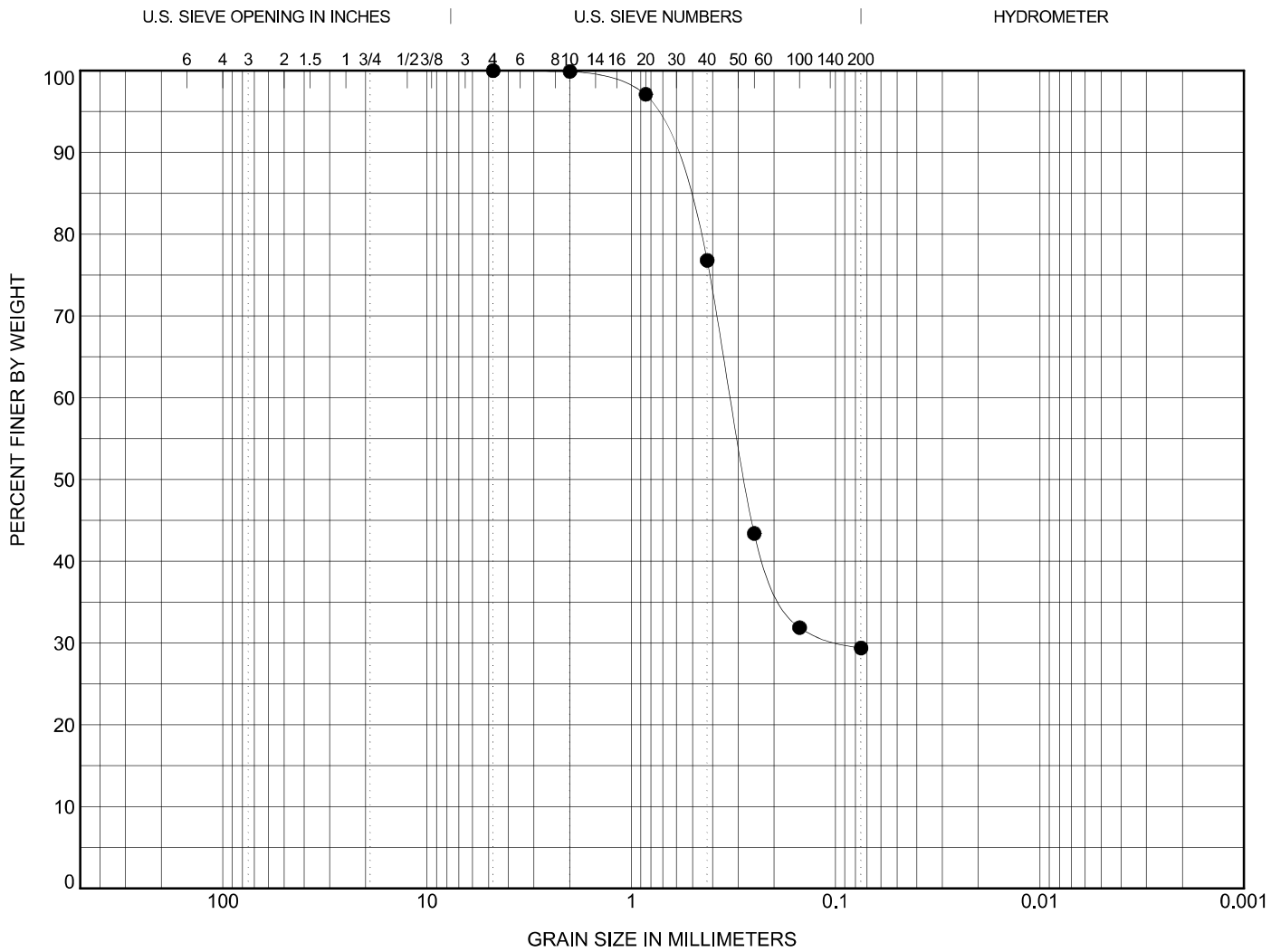
GRAIN SIZE DISTRIBUTION

CLIENT: Mortenson Construction
PROJECT: Chilocco Wind Farm
LOCATION: Chilocco, OK
NUMBER: 130222

Sample ID: **T-086 at 34 ft.** Date: 9/9/2013

Test Method: **ASTM D422**



COBBLES	GRAVEL		SAND			SILT OR CLAY
	coarse	fine	coarse	medium	fine	

Classification	LL	PL	PI	Cc	Cu

D100	D60	D30	D10	%Gravel	%Sand	%Silt	%Clay
4.75	**0.325**	**0.089**		**0.0**	**70.6**	**29.4**	

Cheng-Wei Chen, 9/9/13
Analysis & Quality Review/Date

Specimens prepared by: C.M. & M.D.

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Renewable Resource Consultants, LLC
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SUMMARY OF LABORATORY RESULTS

CLIENT: Mortenson Construction
PROJECT: Chilocco Wind Farm
LOCATION: Chilocco, OK
NUMBER: 130222

Borehole	Depth (ft)	USCS	Water Content (%)	Dry Unit Weight (pcf)	< No. 200	LL	PL	PI	Undrained Shear Strength (tsf)	Strain at Failure (%)	Confining Pressure (psi)	Chlorides (ppm)	Sulfates (ppm)	pH	Minimum Resistivity (ohm-cm)
Sub	1		25											7.2	1000
Sub	4	CL	19	107	91	48	16	32	0.9	15.0	0.0	BRL	45.3		
Sub	9		15												
Sub	14		21												
Sub	24		19												
T-012	4		19												
T-012	9	CH	22	102	80	53	21	32							
T-012	19		25	112											
T-012	29		19												
T-012	39		26												
T-012	49		14												
T-015	1		27												
T-015	9	CH	24	102	98	55	28	27	1.4	6.0	7.0				
T-015	14		19												
T-015	34		22												
T-015	54		25												
T-017	4		21												
T-017	9	CL	19	110	85	45	15	30	1.4	7.0	0.0				
T-017	19	CL	18	115	69	47	15	32	1.4	7.9	0.0				
T-017	29	SC	15		29	32	14	18							
T-017	34		27												
T-017	44		25												
T-019	7		18												
T-019	12	CH	21	107	91	52	17	35	1.7	15.0	10.0				
T-019	19		25												
T-019	29		24												
T-019	49		25												
T-025	1		22											6.3	820
T-025	4	CH	21	104	98	55	17	38	3.9	5.2	0.0	72.5	54.1		
T-025	7		21												
T-025	14		23												
T-025	24		16												
T-025	39		18												
T-025	54		20												
T-041	4		22											6.2	1800
T-041	7	CH	18		94	60	17	43				BRL	21.1		
T-041	9	CH	19	108	90	56	16	40	1.3	2.2	0.0				
T-041	14	CL	21	104	94	48	16	32	1.4	7.2	10.0				
T-041	24	CL	22		87	33	17	16							
T-041	29	CL	22	108	68	43	14	29	1.5	15.0	20.0				
T-041	44		33												
T-041	54		24												
T-063	1		21												

***BRL** Below Reporting Limit

Renewable Resource Consultants, LLC
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Telephone: (512) 992-2087
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SUMMARY OF LABORATORY RESULTS

CLIENT: Mortenson Construction
PROJECT: Chilocco Wind Farm
LOCATION: Chilocco, OK
NUMBER: 130222

Borehole	Depth (ft)	USCS	Water Content (%)	Dry Unit Weight (pcf)	< No. 200	LL	PL	PI	Undrained Shear Strength (tsf)	Strain at Failure (%)	Confining Pressure (psi)	Chlorides (ppm)	Sulfates (ppm)	pH	Minimum Resistivity (ohm-cm)
T-063	14	CH	20		96	51	16	35							
T-063	24	CL	22		85	32	15	17							
T-063	29		20		18										
T-063	34	CL	20		59	29	13	16							
T-067	7	CH	22		96	57	17	40							
T-067	9	CH	20	110	93	52	16	36	2.5	15.0	7.0				
T-067	14	CL	21	109	65	44	18	26	0.8	14.9	7.0				
T-067	19		24												
T-071	4	CL	16	101	97	49	16	33	5.6	11.3	0.0			6.2	1800
T-071	7		18									BRL	BRL		
T-071	12	CH	24	100	95	50	18	32	1.6	5.1	10.0				
T-071	19		20												
T-071	29		18												
T-086	1	CH	23		98	57	19	38						5.7	1400
T-086	4	CH	23		95	58	16	42				BRL	19.3		
T-086	14		19												
T-086	19	CL	25	99	99	39	15	24	1.1	11.6	15.0				
T-086	24		19		5										
T-086	34		17		29										
TR-1	2	CH			95	57	17	40							
TR-2	2	CH	22	95	98	63	18	45							
TR-3	2	CH	26	90	98	70	18	52							
TR-4	2	CH	16		96	59	19	40							
TR-5	2	CH			98	57	17	40							
TR-6	2	CH	18		97	55	17	38							
TR-7	2	CH	20		98	57	18	39							
TR-8	2	CH	21		96	55	17	38							
TR-9	2	CH	23		99	63	19	44							
TR-10	2	CH	23		97	57	18	39							
TR-11	2	CL	26		97	45	18	27							

***BRL** Below Reporting Limit

RRC Renewable Resource Consultants

www.RenewableLLC.com

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Round Rock, TX 78664
512.992.2087

APPENDIX C

6354 Clark Ave.
Dublin, CA 94568
Tel: 925-999-9232
Fax: 925-999-8837
info@geothermusa.com

September 10, 2013

Renewable Resource Consultants
3801 Doris Lane
Round Rock, TX 78664
Attn: Mohammed Abusalih

Re: Thermal Analysis of Native Soil Samples
Chilocco Wind Project, RRC Project No.130222

The following is the report of thermal dryout characterization tests conducted on a total of 11 bulk samples of native soil from the referenced project. The samples were from 2'-4' depth.

Test Procedure: For thermal dryout characterization tests the bulk samples were re-compacted at the 'as received' moisture content and at 90% of the standard Proctor density provided by RRC. The tests were conducted in accordance with the IEEE standard (442). The results are tabulated below and the thermal dryout curves are presented in **Figures 1 to 3.**

Sample ID, Moisture, Density and Thermal Resistivity

Sample ID	Visual Description	Thermal Resistivity (°C-cm/W)		Moisture Content (%)	Dry Density (lb/ft^3)
		Wet	Dry		
TR-01	Brown FAT CLAY(CH)	87	188	18	92
TR-02	Dark Brown FAT CLAY(CH)	84	182	20	91
TR-03	Dark Brown FAT CLAY(CH)	92	216	19	86
TR-04	Dark Brown FAT CLAY(CH)	94	193	16	90
TR-05	Dark Brown FAT CLAY(CH)	87	203	23	88
TR-06	Dark Brown FAT CLAY(CH)	88	183	19	90
TR-07	Dark Brown FAT CLAY(CH)	93	172	21	92
TR-08	Dark Brown FAT CLAY(CH)	97	194	25	91

Sample ID, Moisture, Density and Thermal Resistivity (Tube Samples)

Sample ID	Visual Description	Thermal Resistivity (°C-cm/W)		Moisture Content (%)	Dry Density (lb/ft^3)
		Wet	Dry		
TR-09	Dark Brown FAT CLAY(CH)	87	222	27	86
TR-10	Dark Brown FAT CLAY(CH)	97	193	22	88
TR-11	Dark Brown LEAN CLAY(CL)	77	154	21	92

Comments:

The thermal dryout characteristics depicted in **Figures 1 to 3** apply for the soils at their respective test dry density.

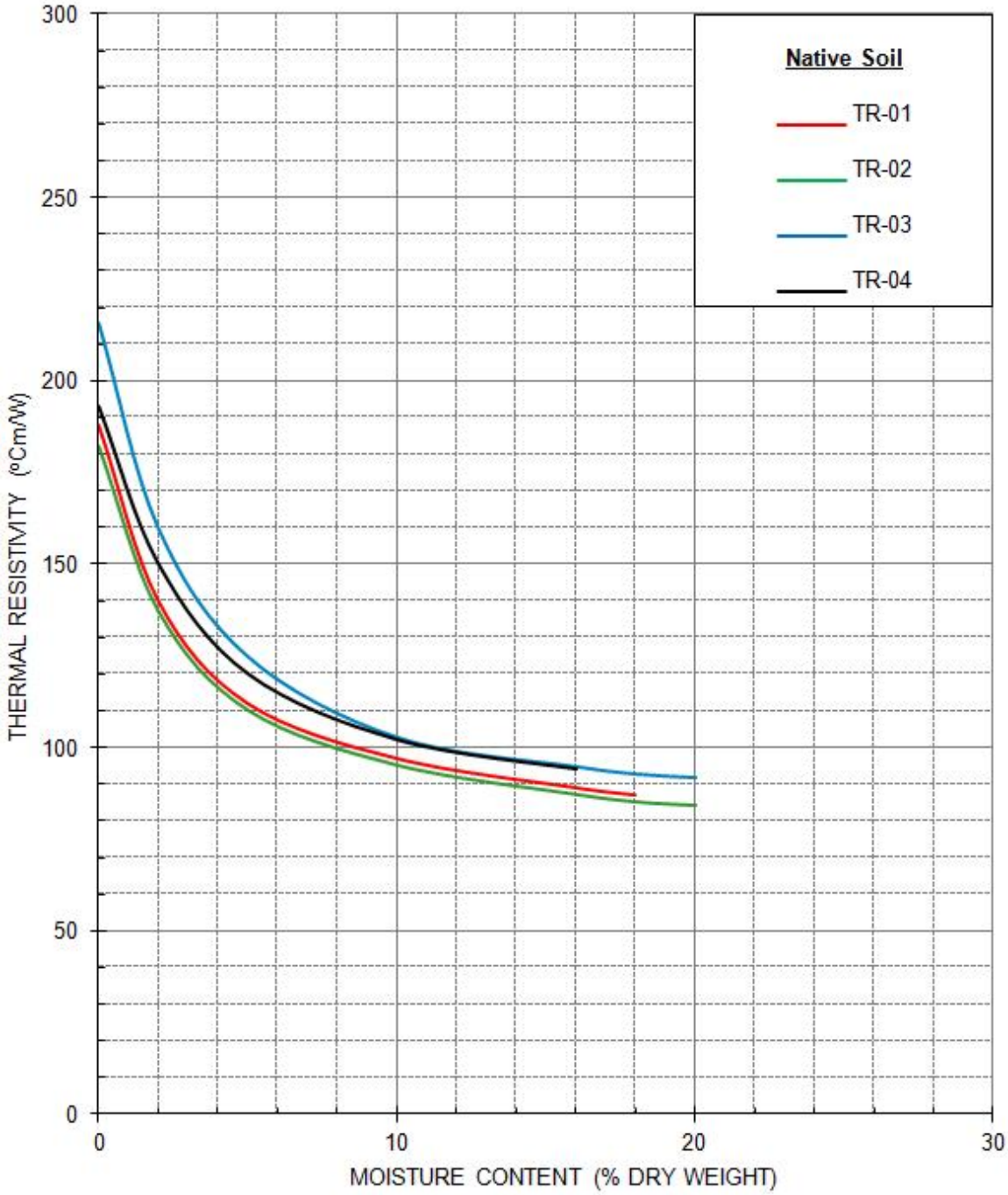
Please contact us if you have any questions, wish to discuss any part of this report or if we can be of further assistance.

Geotherm USA

Nimesh Patel

Please Note: Samples will be disposed of after 5 days from date of report

THERMAL DRYOUT CURVES



Renewable Resource Consultants

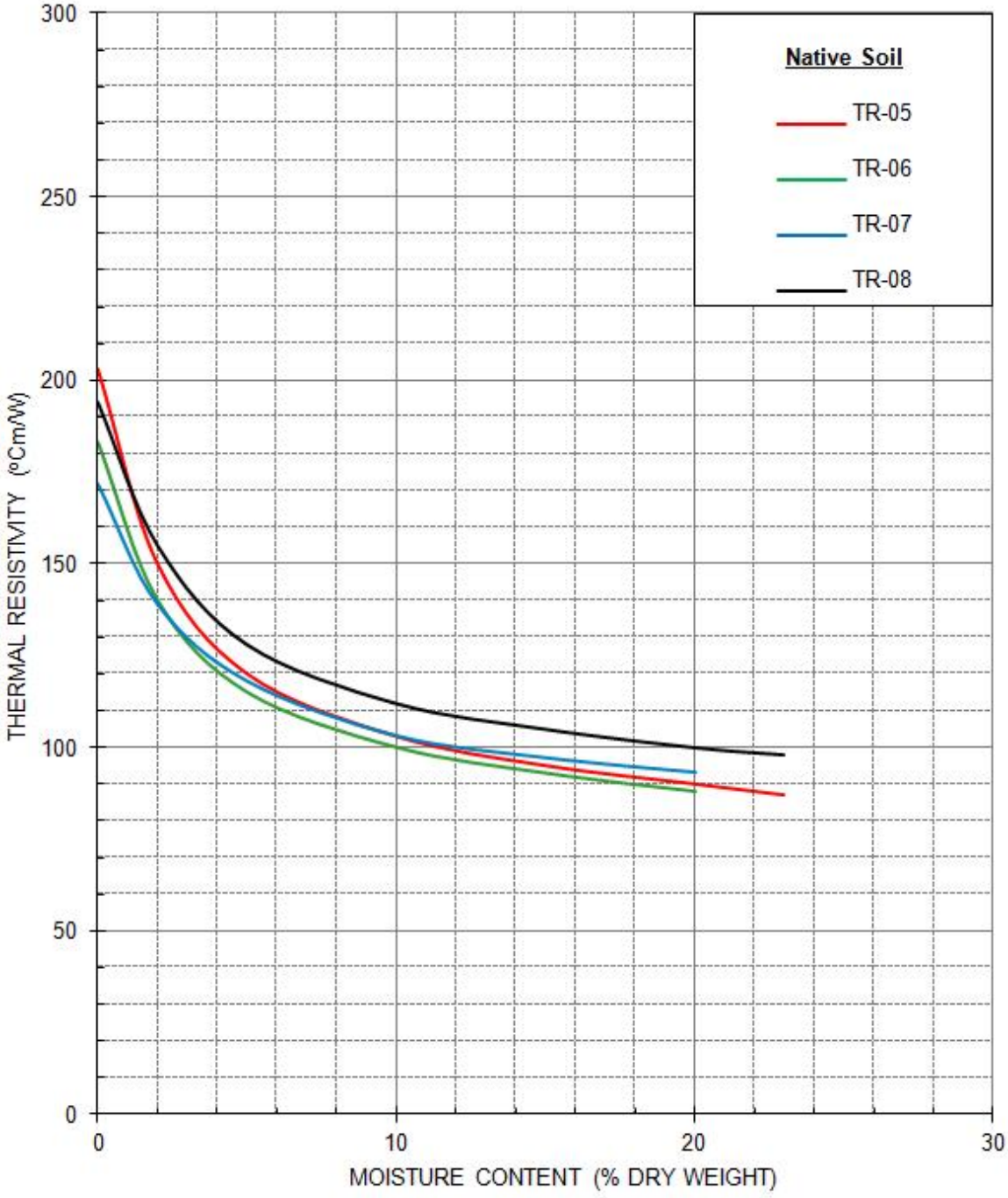
Thermal Analysis of Native Soil

Chilocco Wind Project - RRC Project No. 130222

September 2013

Figure 1

THERMAL DRYOUT CURVES



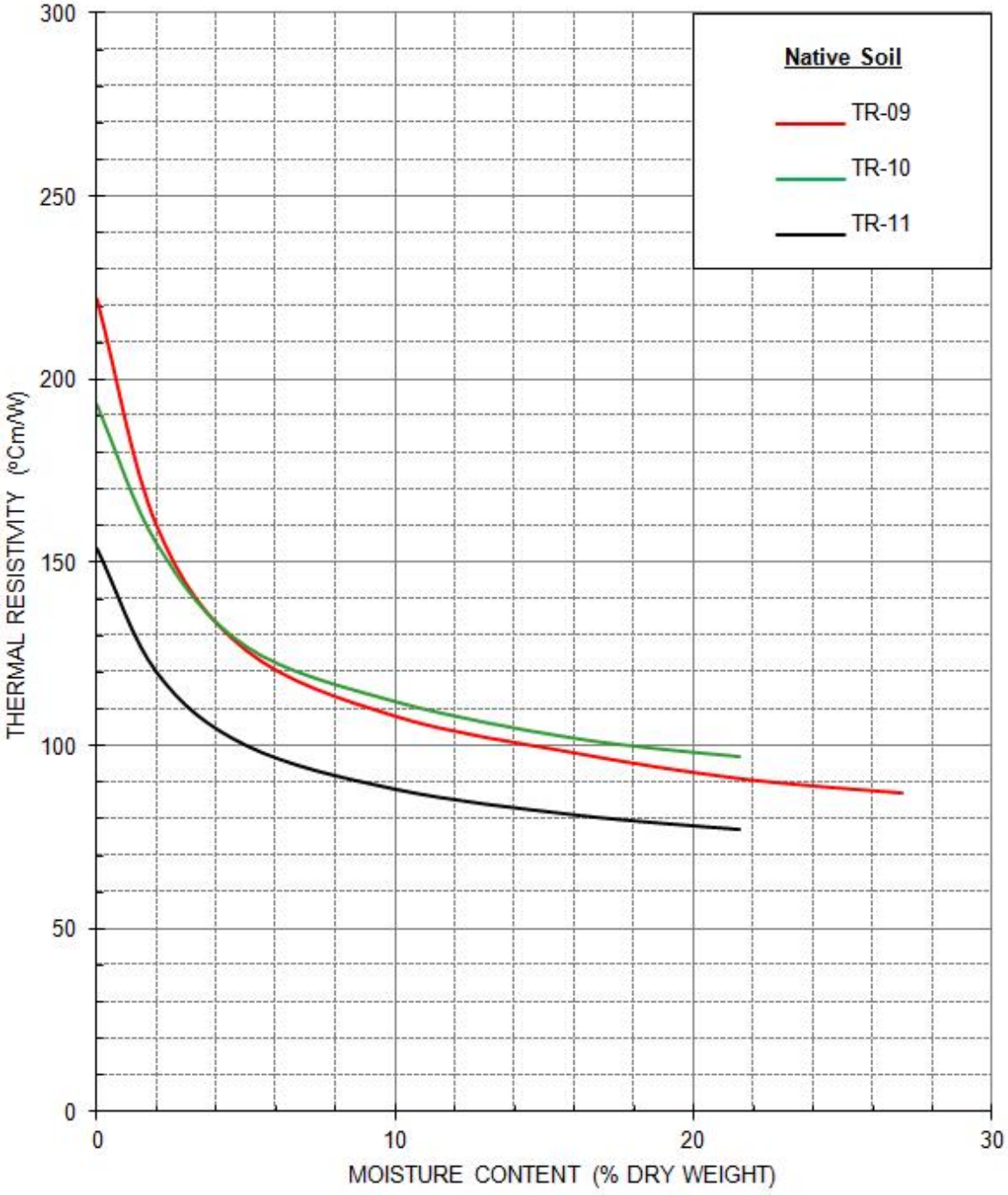
Renewable Resource Consultants

Thermal Analysis of Native Soil

Chilocco Wind Project - RRC Project No. 130222

September 2013 **Figure 2**

THERMAL DRYOUT CURVES



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Thermal Analysis of Native Soil

Chilocco Wind Project - RRC Project No. 130222

September 2013 **Figure 3**

RRC Renewable Resource Consultants

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APPENDIX D

Table D-1
LPILE Computer Program Parameters for Lateral Load Analysis at Boring No. Substation (Substation Location)

Soil Layer	Depth Interval (inches)		LPILE Soil Type	K (pci)		γ' (pci)	*C* (psi)	ϕ (deg)	ε_{50} (in/in)	E_{50} (psi)	UCS (psi)	RQD (%)	K_{rm}
				Static	Cyclic								
1*	0	60	--	--	--	0.064	--	--	–	--	--	--	--
2	60	228	Stiff Clay w/o Free Water (3)	–	--	0.033	14	--	0.0063	--	--	--	--
3	228	288	Weak Rock (9)	--	--	0.045	--	--	–	27,000	180	0	0.0004
4	288	420	Stiff Clay w/o Free Water (3)	–	--	0.045	40	--	0.0040	--	--	--	--

Notes: K is the modulus of subgrade reaction; γ is the effective unit weight; C is the cohesion of soil; ϕ is the friction angle of soil; ε_{50} is the soil strain parameter; E_{50} is the average elastic modulus of rock; UCS is average Unconfined Compressive Strength of rock; RQD is average Rock Quality Designation; K_{rm} is the rock strain parameter.

*** Upper 5 feet of soils should be neglected due to tension crack and seasonable moisture change**

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September 10, 2013

Renewable Resource Consultants
3801 Doris Lane
Round Rock, TX 78664
Attn: Mohammed Abusalih

Re: Thermal Analysis of Native Soil Samples
Chilocco Wind Project, RRC Project No.130222

The following is the report of thermal dryout characterization tests conducted on a total of 11 bulk samples of native soil from the referenced project. The samples were from 2'-4' depth.

Test Procedure: For thermal dryout characterization tests the bulk samples were re-compacted at the 'as received' moisture content and at 90% of the standard Proctor density provided by RRC. The tests were conducted in accordance with the IEEE standard (442). The results are tabulated below and the thermal dryout curves are presented in **Figures 1 to 3.**

Sample ID, Moisture, Density and Thermal Resistivity

Sample ID	Visual Description	Thermal Resistivity (°C-cm/W)		Moisture Content (%)	Dry Density (lb/ft^3)
		Wet	Dry		
TR-01	Brown FAT CLAY(CH)	87	188	18	92
TR-02	Dark Brown FAT CLAY(CH)	84	182	20	91
TR-03	Dark Brown FAT CLAY(CH)	92	216	19	86
TR-04	Dark Brown FAT CLAY(CH)	94	193	16	90
TR-05	Dark Brown FAT CLAY(CH)	87	203	23	88
TR-06	Dark Brown FAT CLAY(CH)	88	183	19	90
TR-07	Dark Brown FAT CLAY(CH)	93	172	21	92
TR-08	Dark Brown FAT CLAY(CH)	97	194	25	91

Sample ID, Moisture, Density and Thermal Resistivity (Tube Samples)

Sample ID	Visual Description	Thermal Resistivity (°C-cm/W)		Moisture Content (%)	Dry Density (lb/ft^3)
		Wet	Dry		
TR-09	Dark Brown FAT CLAY(CH)	87	222	27	86
TR-10	Dark Brown FAT CLAY(CH)	97	193	22	88
TR-11	Dark Brown LEAN CLAY(CL)	77	154	21	92

Comments:

The thermal dryout characteristics depicted in **Figures 1 to 3** apply for the soils at their respective test dry density.

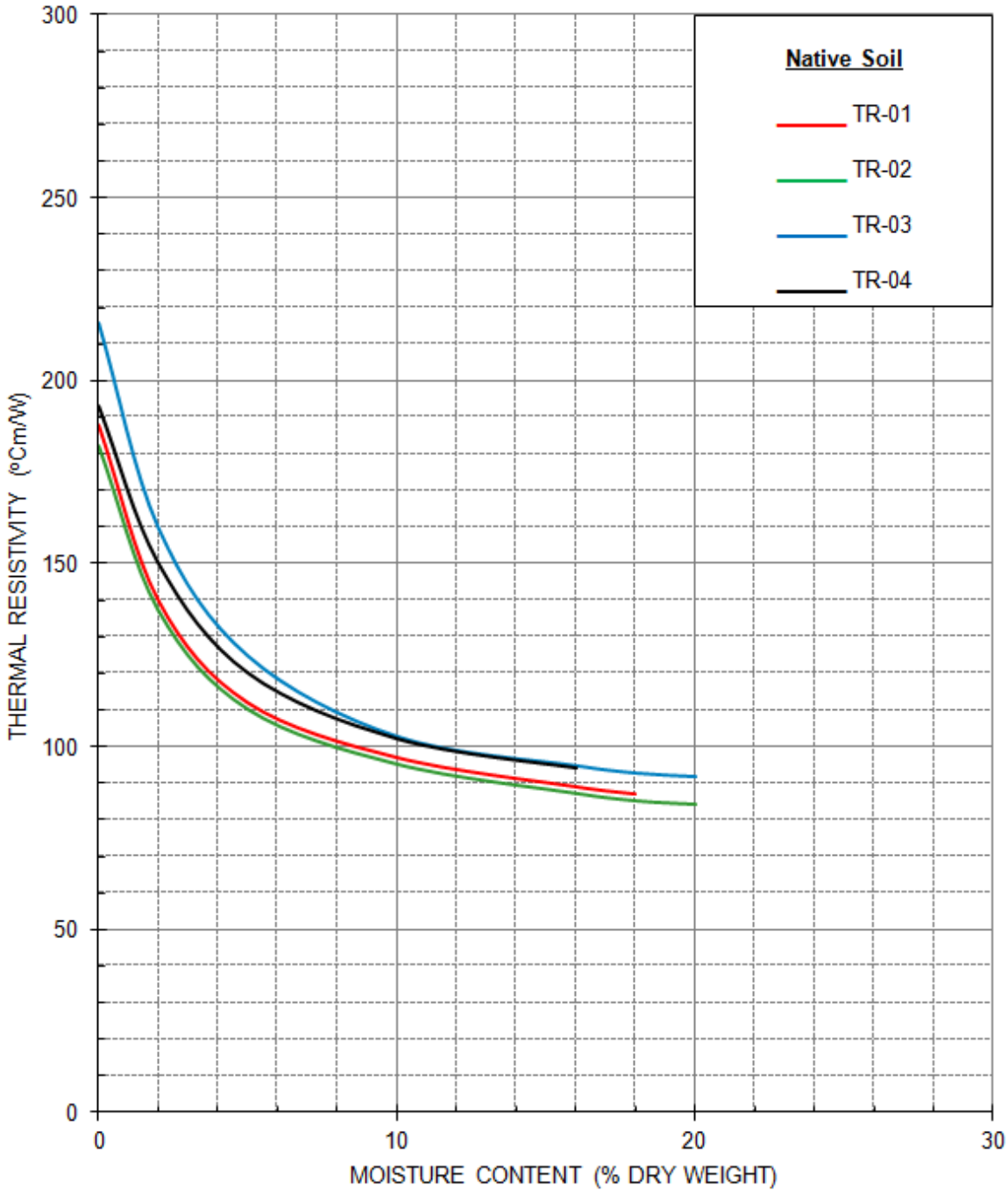
Please contact us if you have any questions, wish to discuss any part of this report or if we can be of further assistance.

Geotherm USA

Nimesh Patel

Please Note: Samples will be disposed of after 5 days from date of report

THERMAL DRYOUT CURVES



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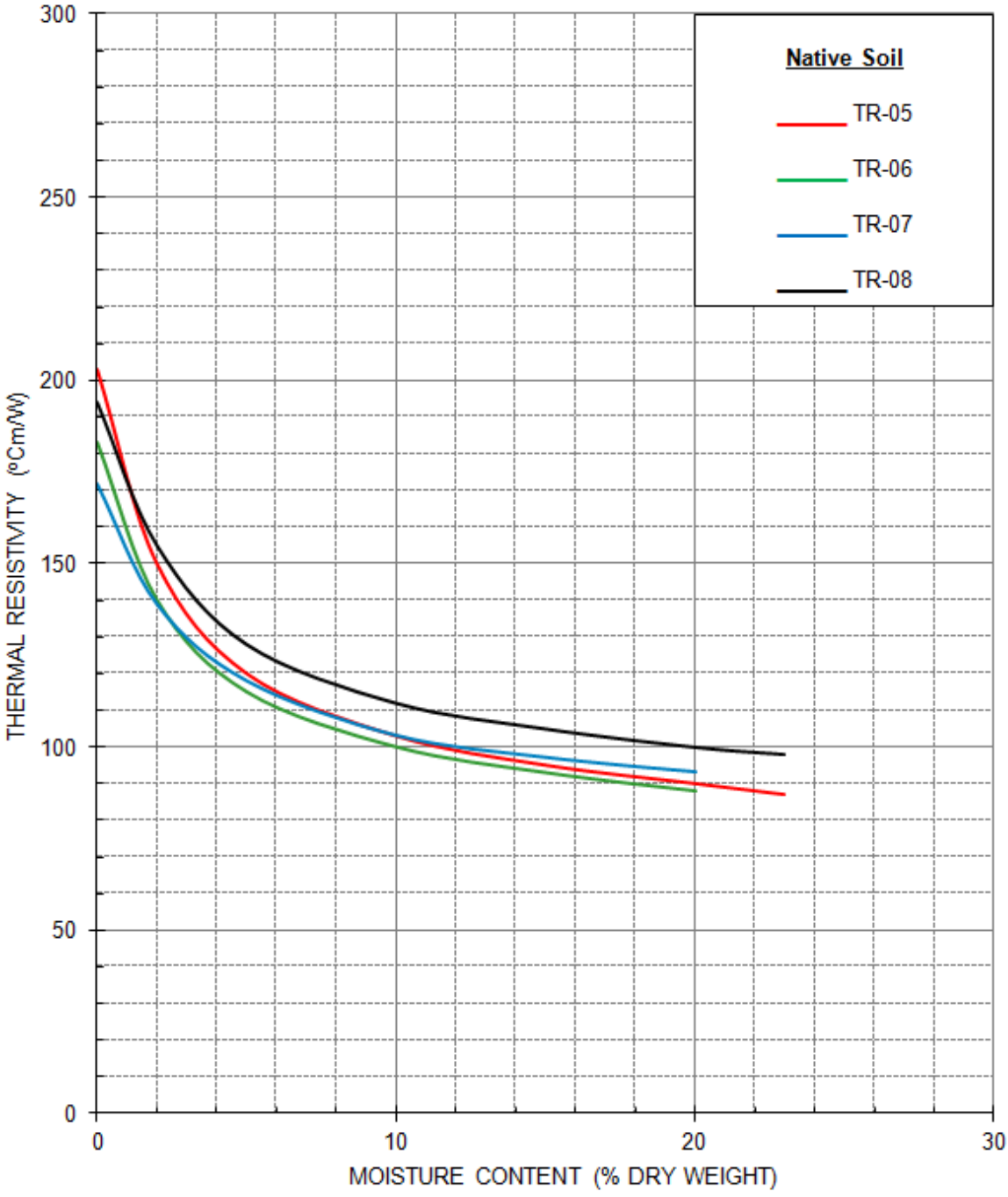
Thermal Analysis of Native Soil

Chilocco Wind Project - RRC Project No. 130222

September 2013 **Figure 1**

THERMAL DRYOUT CURVES



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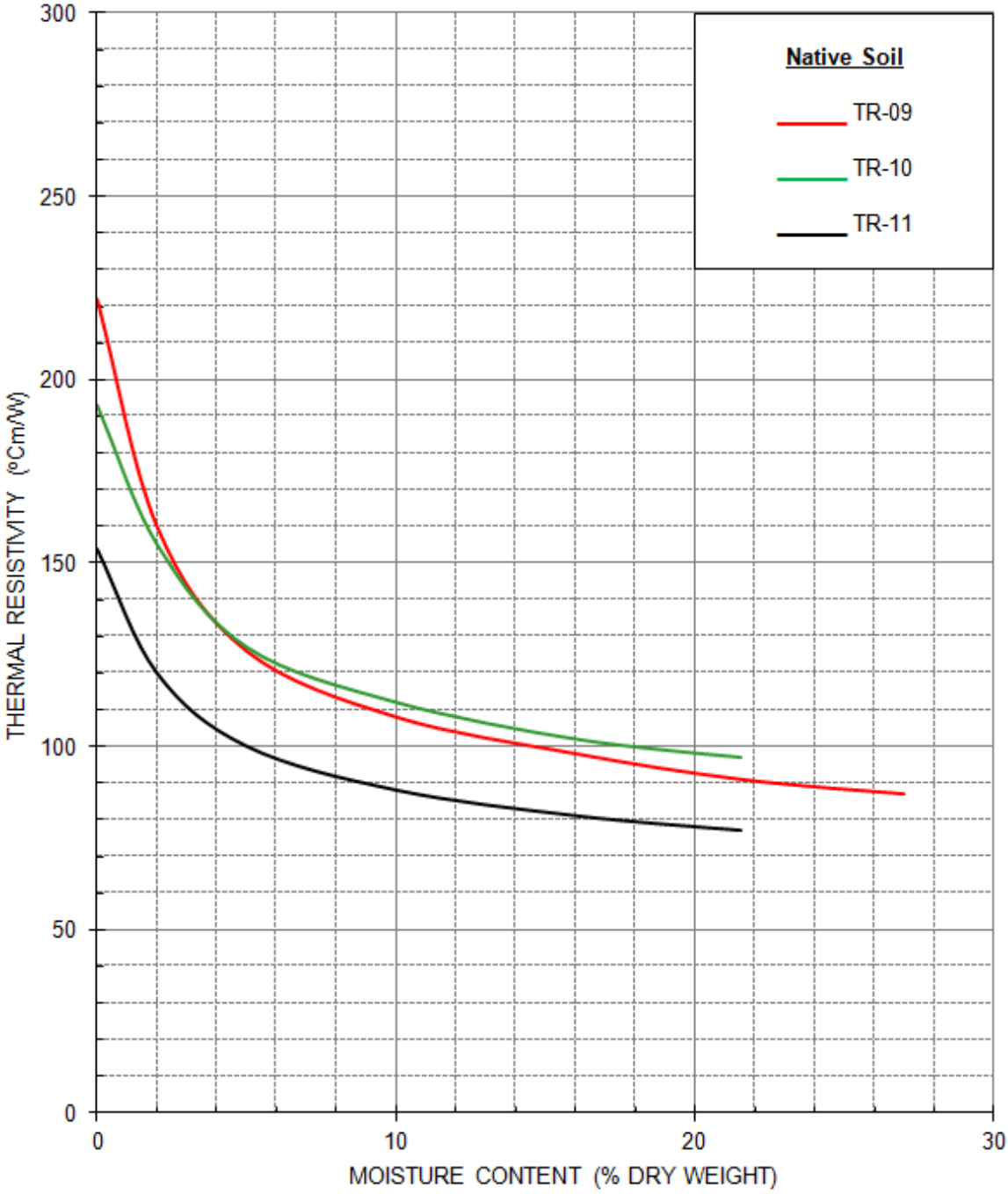
Thermal Analysis of Native Soil

Chilocco Wind Project - RRC Project No. 130222

September 2013 **Figure 2**

THERMAL DRYOUT CURVES



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Thermal Analysis of Native Soil

Chilocco Wind Project - RRC Project No. 130222

September 2013 **Figure 3**

Appendix I

Preliminary Mechanical and Electrical Engineering Design Specs

Redacted for Confidentiality

Chilocco - COLLECTION SYSTEM - GENERAL DESIGN DATA

GE 2.5MW Generator

Apparent Power (S)		Power		Primary Voltage (V)	Primary Current (I) Amperes	Secondary Voltage (V)	Current (I) Amperes
2777.778	kVA	2500	kW	690	2324.3	34.5kV	46.49

Wind Farm Capacity		No. of Turbines	No. of Feeder Circuits	Turbine/Feeder
200	MW	80	8	10

Conductor Ampacity (Verify Parameters and Assumptions)			Estimated Amps
1	1/0 Al TRXPLE	Direct Buried, 48"	120
2	4/0 Al TRXPLE	Direct Buried, 48"	226
3	500MCM Al TRXLPE	Direct Buried, 48"	357
4	750MCM Al TRXLPE	Direct Buried, 48"	435
5	1000MCM Al TRXLPE	Direct Buried, 48"	504
6	1250MCM Al TRXLPE	Direct Buried, 48"	566

Design Parameters					2.5MW
1	Spacing between turbines estimated off of conceptual site layout			1	46.5
2	Cable lengths does not account for cable tails required for installation.			2	93.0
3	Number of turbines per 1/0 Circuit (2.5MW)	1-2	Verify Voltage Drop on Ckt.	3	139.5
4	Number of turbines per 4/0 Circuit (2.5MW)	3-4	Verify Voltage Drop on Ckt.	4	185.9
5	Number of turbines per 500 Circuit (2.5MW)	5-7	Verify Voltage Drop on Ckt.	5	232.4
6	Number of turbines per 750Circuit (2.5MW)	8	Verify Voltage Drop on Ckt.	6	278.9
7	Number of turbines per 1000 Circuit (2.5MW)	9-10	Verify Voltage Drop on Ckt.	7	325.4
8	Number of turbines per 1250 Circuit (2.5MW)	11	Verify Voltage Drop on Ckt.	8	371.9
				9	418.4
				10	464.9
				11	511.3

GE - 2.5MW design

From	To	Total Length	Conductor Size	(Ohms/1000')					Ohms				
				R1	X1	R0	X0	Capacitance (µF/ft)	R1	X1	R0	X0	Capacitance (µF/ft)
Feeder 1													
1	8	1850	1/0 Cable	0.238	0.053	0.332	0.0238	0.043	0.4403	0.09805	0.6142	0.04403	0.07955
8	2	1360	1/0 Cable	0.238	0.053	0.332	0.0238	0.043	0.32368	0.07208	0.45152	0.032368	0.05848
2	13	1775	4/0 Cable	0.10873	0.04741	0.20811	0.02869	0.0486	0.19299575	0.08415275	0.36939525	0.05092475	0.086265
13	JB2	540	4/0 Cable	0.10873	0.04741	0.20811	0.02869	0.0486	0.0587142	0.0256014	0.1123794	0.0154926	0.026244
27	21	1365	1/0 Cable	0.238	0.053	0.332	0.0238	0.043	0.32487	0.072345	0.45318	0.032487	0.058695
21	28	1635	1/0 Cable	0.238	0.053	0.332	0.0238	0.043	0.38913	0.086655	0.54282	0.038913	0.070305
28	17	1685	4/0 Cable	0.10873	0.04741	0.20811	0.02869	0.0486	0.18321005	0.07988585	0.35066535	0.04834265	0.081891
17	JB1	1630	4/0 Cable	0.10873	0.04741	0.20811	0.02869	0.0486	0.1772299	0.0772783	0.3392193	0.0467647	0.079218
31	24	1045	1/0 Cable	0.238	0.053	0.332	0.0238	0.043	0.24871	0.055385	0.34694	0.024871	0.044935
24	JB1	50	1/0 Cable	0.238	0.053	0.332	0.0238	0.043	0.0119	0.00265	0.0166	0.00119	0.00215
JB1	JB2	1525	500 KCMIL	0.04753	0.04126	0.17477	0.02283	0.0662	0.07248325	0.0629215	0.26652425	0.03481575	0.100955
JB2	Sub	21720	1000 KCMIL	0.02585	0.03739	0.15387	0.01942	0.0861	0.561462	0.8121108	3.3420564	0.4218024	1.870092
Feeder 2													
3	10	1290	1/0 Cable	0.238	0.053	0.332	0.0238	0.043	0.30702	0.06837	0.42828	0.030702	0.05547
10	JB1	50	1/0 Cable	0.238	0.053	0.332	0.0238	0.043	0.0119	0.00265	0.0166	0.00119	0.00215
18	JB1	1515	1/0 Cable	0.238	0.053	0.332	0.0238	0.043	0.36057	0.080295	0.50298	0.036057	0.065145
JB1	12	1715	4/0 Cable	0.10873	0.04741	0.20811	0.02869	0.0486	0.18647195	0.08130815	0.35690865	0.04920335	0.083349
12	JB2	50	4/0 Cable	0.10873	0.04741	0.20811	0.02869	0.0486	0.0054365	0.0023705	0.0104055	0.0014345	0.00243
4	JB2	1435	1/0 Cable	0.238	0.053	0.332	0.0238	0.043	0.34153	0.076055	0.47642	0.034153	0.061705
29	20	2226	1/0 Cable	0.238	0.053	0.332	0.0238	0.043	0.529788	0.117978	0.739032	0.0529788	0.095718
20	JB2	1700	1/0 Cable	0.238	0.053	0.332	0.0238	0.043	0.4046	0.0901	0.5644	0.04046	0.0731
JB2	11	1740	500 KCMIL	0.04753	0.04126	0.17477	0.02283	0.0662	0.0827022	0.0717924	0.3040998	0.0397242	0.115188
11	5	1210	750 KCMIL	0.0322	0.0388	0.20183	0.02067	0.0775	0.038962	0.046948	0.2442143	0.0250107	0.093775
5	6	1730	1000 KCMIL	0.02585	0.03739	0.15387	0.01942	0.0861	0.0447205	0.0646847	0.2661951	0.0335966	0.148953
6	Sub	16667	1000 KCMIL	0.02585	0.03739	0.15387	0.01942	0.0861	0.43084195	0.62317913	2.56455129	0.32367314	1.4350287
Feeder 3													
37	JB1	1675	1/0 Cable	0.238	0.053	0.332	0.0238	0.043	0.39865	0.088775	0.5561	0.039865	0.072025
60	51	2000	1/0 Cable	0.238	0.053	0.332	0.0238	0.043	0.476	0.106	0.664	0.0476	0.086
51	JB1	50	1/0 Cable	0.238	0.053	0.332	0.0238	0.043	0.0119	0.00265	0.0166	0.00119	0.00215
JB1	47	1850	4/0 Cable	0.10873	0.04741	0.20811	0.02869	0.0486	0.2011505	0.0877085	0.3850035	0.0530765	0.08991
47	JB2	1325	4/0 Cable	0.10873	0.04741	0.20811	0.02869	0.0486	0.14406725	0.06281825	0.27574575	0.03801425	0.064395
16	25	1670	1/0 Cable	0.238	0.053	0.332	0.0238	0.043	0.39746	0.08851	0.55444	0.039746	0.07181
25	33	1500	1/0 Cable	0.238	0.053	0.332	0.0238	0.043	0.357	0.0795	0.498	0.0357	0.0645
33	39	1490	4/0 Cable	0.10873	0.04741	0.20811	0.02869	0.0486	0.1620077	0.0706409	0.3100839	0.0427481	0.072414
39	JB2	50	4/0 Cable	0.10873	0.04741	0.20811	0.02869	0.0486	0.0054365	0.0023705	0.0104055	0.0014345	0.00243
JB2	40	1910	750 KCMIL	0.0322	0.0388	0.20183	0.02067	0.0775	0.061502	0.074108	0.3854953	0.0394797	0.148025
40	55	3057	1000 KCMIL	0.02585	0.03739	0.15387	0.01942	0.0861	0.07902345	0.11430123	0.47038059	0.05936694	0.2632077
55	66	3396	1000 KCMIL	0.02585	0.03739	0.15387	0.01942	0.0861	0.0877866	0.12697644	0.52254252	0.06595032	0.2923956

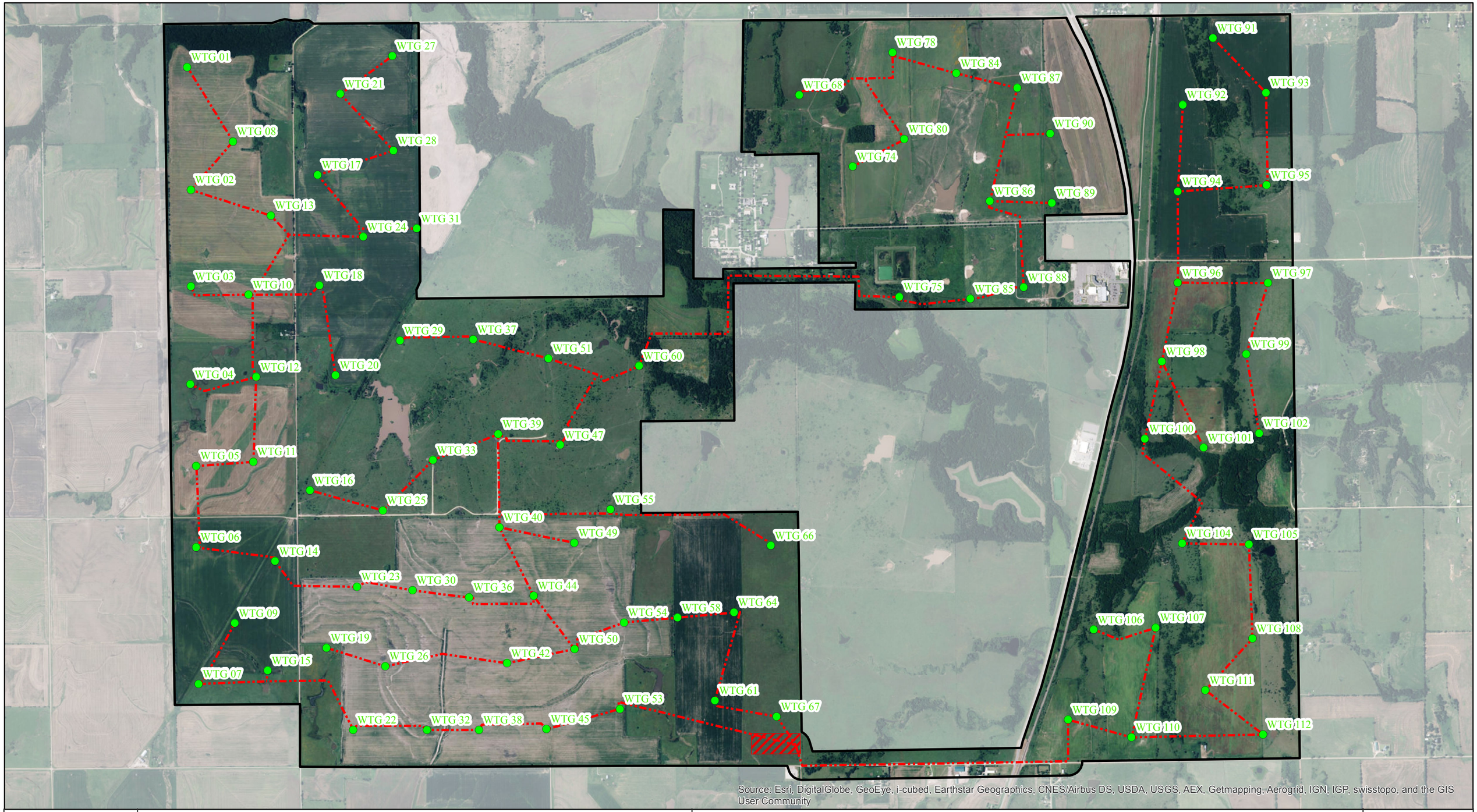
66	Sub	5034	1250 KCMIL	0.019	0.038	0.109	0.0206	0.1	0.095646	0.191292	0.548706	0.1037004	0.5034
Feeder 4													
30	36	1210	1/0 Cable	0.238	0.053	0.332	0.0238	0.043	0.28798	0.06413	0.40172	0.028798	0.05203
36	44	1420	1/0 Cable	0.238	0.053	0.332	0.0238	0.043	0.33796	0.07526	0.47144	0.033796	0.06106
44	JB1	1365	4/0 Cable	0.10873	0.04741	0.20811	0.02869	0.0486	0.14841645	0.06471465	0.28407015	0.03916185	0.066339
42	50	1465	1/0 Cable	0.238	0.053	0.332	0.0238	0.043	0.34867	0.077645	0.48638	0.034867	0.062995
50	JB1	50	1/0 Cable	0.238	0.053	0.332	0.0238	0.043	0.0119	0.00265	0.0166	0.00119	0.00215
JB1	54	1200	500 KCMIL	0.04753	0.04126	0.17477	0.02283	0.0662	0.057036	0.049512	0.209724	0.027396	0.07944
54	58	1135	500 KCMIL	0.04753	0.04126	0.17477	0.02283	0.0662	0.05394655	0.0468301	0.19836395	0.02591205	0.075137
58	64	1205	500 KCMIL	0.04753	0.04126	0.17477	0.02283	0.0662	0.05727365	0.0497183	0.21059785	0.02751015	0.079771
64	61	1945	750 KCMIL	0.0322	0.0388	0.20183	0.02067	0.0775	0.062629	0.075466	0.39255935	0.04020315	0.1507375
61	67	1360	1000 KCMIL	0.02585	0.03739	0.15387	0.01942	0.0861	0.035156	0.0508504	0.2092632	0.0264112	0.117096
67	Sub	955	1000 KCMIL	0.02585	0.03739	0.15387	0.01942	0.0861	0.02468675	0.03570745	0.14694585	0.0185461	0.0822255
Feeder 5													
7	15	1365	1/0 Cable	0.238	0.053	0.332	0.0238	0.043	0.32487	0.072345	0.45318	0.032487	0.058695
15	22	1570	1/0 Cable	0.238	0.053	0.332	0.0238	0.043	0.37366	0.08321	0.52124	0.037366	0.06751
22	32	1600	4/0 Cable	0.10873	0.04741	0.20811	0.02869	0.0486	0.173968	0.075856	0.332976	0.045904	0.07776
32	JB1	50	4/0 Cable	0.10873	0.04741	0.20811	0.02869	0.0486	0.0054365	0.0023705	0.0104055	0.0014345	0.00243
19	26	1310	1/0 Cable	0.238	0.053	0.332	0.0238	0.043	0.31178	0.06943	0.43492	0.031178	0.05633
26	JB1	1620	1/0 Cable	0.238	0.053	0.332	0.0238	0.043	0.38556	0.08586	0.53784	0.038556	0.06966
JB1	38	1060	500 KCMIL	0.04753	0.04126	0.17477	0.02283	0.0662	0.0503818	0.0437356	0.1852562	0.0241998	0.070172
38	45	1500	500 KCMIL	0.04753	0.04126	0.17477	0.02283	0.0662	0.071295	0.06189	0.262155	0.034245	0.0993
45	53	1615	750 KCMIL	0.0322	0.0388	0.20183	0.02067	0.0775	0.052003	0.062662	0.32595545	0.03338205	0.1251625
53	Sub	3629	1000 KCMIL	0.02585	0.03739	0.15387	0.01942	0.0861	0.09380965	0.13568831	0.55839423	0.07047518	0.3124569
Feeder 6													
68	JB1	1510	1/0 Cable	0.238	0.053	0.332	0.0238	0.043	0.35938	0.08003	0.50132	0.035938	0.06493
74	80	1240	1/0 Cable	0.238	0.053	0.332	0.0238	0.043	0.29512	0.06572	0.41168	0.029512	0.05332
80	JB1	1545	1/0 Cable	0.238	0.053	0.332	0.0238	0.043	0.36771	0.081885	0.51294	0.036771	0.066435
JB1	78	840	4/0 Cable	0.10873	0.04741	0.20811	0.02869	0.0486	0.0913332	0.0398244	0.1748124	0.0240996	0.040824
78	84	1580	4/0 Cable	0.10873	0.04741	0.20811	0.02869	0.0486	0.1717934	0.0749078	0.3288138	0.0453302	0.076788
84	87	1380	500 KCMIL	0.04753	0.04126	0.17477	0.02283	0.0662	0.0655914	0.0569388	0.2411826	0.0315054	0.091356
87	90	1898	500 KCMIL	0.04753	0.04126	0.17477	0.02283	0.0662	0.09021194	0.07831148	0.33171346	0.04333134	0.1256476
90	86	2340	500 KCMIL	0.04753	0.04126	0.17477	0.02283	0.0662	0.1112202	0.0965484	0.4089618	0.0534222	0.154908
			1/0 Cable	0.238	0.053	0.332	0.0238	0.043	0	0	0	0	0
86	88	2320	750 KCMIL	0.0322	0.0388	0.20183	0.02067	0.0775	0.074704	0.090016	0.4682456	0.0479544	0.1798
88	85	1150	1000 KCMIL	0.02585	0.03739	0.15387	0.01942	0.0861	0.0297275	0.0429985	0.1769505	0.022333	0.099015
85	75	1600	1000 KCMIL	0.02585	0.03739	0.15387	0.01942	0.0861	0.04136	0.059824	0.246192	0.031072	0.13776
75	Sub	18830	1250 KCMIL	0.019	0.038	0.109	0.0206	0.1	0.35777	0.71554	2.05247	0.387898	1.883
Feeder 7													
104	105	1415	1/0 Cable	0.238	0.053	0.332	0.0238	0.043	0.33677	0.074995	0.46978	0.033677	0.060845
105	108	2000	1/0 Cable	0.238	0.053	0.332	0.0238	0.043	0.476	0.106	0.664	0.0476	0.086
108	111	1490	4/0 Cable	0.10873	0.04741	0.20811	0.02869	0.0486	0.1620077	0.0706409	0.3100839	0.0427481	0.072414
111	112	1545	4/0 Cable	0.10873	0.04741	0.20811	0.02869	0.0486	0.16798785	0.07324845	0.32152995	0.04432605	0.075087
112	JB1	2770	500 KCMIL	0.04753	0.04126	0.17477	0.02283	0.0662	0.1316581	0.1142902	0.4841129	0.0632391	0.183374
106	107	1390	1/0 Cable	0.238	0.053	0.332	0.0238	0.043	0.33082	0.07367	0.46148	0.033082	0.05977

107	110	2375	1/0 Cable	0.238	0.053	0.332	0.0238	0.043	0.56525	0.125875	0.7885	0.056525	0.102125
110	JB1	50	4/0 Cable	0.10873	0.04741	0.20811	0.02869	0.0486	0.0054365	0.0023705	0.0104055	0.0014345	0.00243
JB1	109	1425	750 KCMIL	0.0322	0.0388	0.20183	0.02067	0.0775	0.045885	0.05529	0.28760775	0.02945475	0.1104375
109	Sub	7106	1250 KCMIL	0.019	0.038	0.109	0.0206	0.1	0.135014	0.270028	0.774554	0.1463836	0.7106
Feeder 8													
91	92	1590	1/0 Cable	0.238	0.053	0.332	0.0238	0.043	0.37842	0.08427	0.52788	0.037842	0.06837
92	94	1840	1/0 Cable	0.238	0.053	0.332	0.0238	0.043	0.43792	0.09752	0.61088	0.043792	0.07912
94	JB1	50	4/0 Cable	0.10873	0.04741	0.20811	0.02869	0.0486	0.0054365	0.0023705	0.0104055	0.0014345	0.00243
93	95	1825	1/0 Cable	0.238	0.053	0.332	0.0238	0.043	0.43435	0.096725	0.6059	0.043435	0.078475
95	JB1	2075	1/0 Cable	0.238	0.053	0.332	0.0238	0.043	0.49385	0.109975	0.6889	0.049385	0.089225
JB1	JB2	1890	500 KCMIL	0.04753	0.04126	0.17477	0.02283	0.0662	0.0898317	0.0779814	0.3303153	0.0431487	0.125118
99	97	1615	1/0 Cable	0.238	0.053	0.332	0.0238	0.043	0.38437	0.085595	0.53618	0.038437	0.069445
97	96	1730	1/0 Cable	0.238	0.053	0.332	0.0238	0.043	0.41174	0.09169	0.57436	0.041174	0.07439
96	JB2	50	4/0 Cable	0.10873	0.04741	0.20811	0.02869	0.0486	0.0054365	0.0023705	0.0104055	0.0014345	0.00243
JB2	JB3	1710	750 KCMIL	0.0322	0.0388	0.20183	0.02067	0.0775	0.055062	0.066348	0.3451293	0.0353457	0.132525
101	JB3	2010	1/0 Cable	0.238	0.053	0.332	0.0238	0.043	0.47838	0.10653	0.66732	0.047838	0.08643
JB3	100	1000	1000 KCMIL	0.02585	0.03739	0.15387	0.01942	0.0861	0.02585	0.03739	0.15387	0.01942	0.0861
100	Sub	16400	1250 KCMIL	0.019	0.038	0.109	0.0206	0.1	0.3116	0.6232	1.7876	0.33784	1.64

Appendix K

Preliminary Civil Engineering Design Specs

Redacted for Confidentiality



Source: Esri, DigitalGlobe, GeoEye, i-cubed, Earthstar Geographics, CNES/Airbus DS, USDA, USGS, AEX, Getmapping, Aerogrid, IGN, IGP, swisstopo, and the GIS User Community

N
W E
S

Legend

Collector System | Substation

87 WTG Layout | 87 WTG Boundary

Miles

0 0.225 0.45 0.9 1.35 1.8

Chilocco Project Site Overview

Layout Map

Confidential and Proprietary - For Internal Use Only - Not For Construction

Date: 03/08/2016
Document: Chilocco

Coordinate System: UTM 14
Map Datum: NAD 83

FIGURE

1

Wetland and Waterway Delineation

Associated with the

PNE Wind USA, Inc. – Chilocco Project
Kay County, Oklahoma

October 2016

Prepared for:

PNE Wind USA, Inc.
150 N. Michigan Ave., Ste. 1500
Chicago, IL 60601

Prepared By:

BLACKSHARE
ENVIRONMENTAL SOLUTIONS
5121 S. Wheeling Ave.
Tulsa, OK 74105
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Project Area:

Approximately 2,370 Acres Of Wetland Survey Area

Associated with the

PNE Chilocco Project
Kay County, Oklahoma

Prepared By:

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5121 S. Wheeling Ave.
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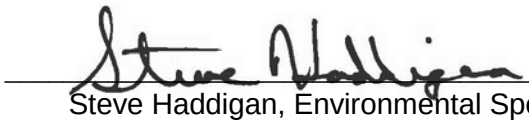
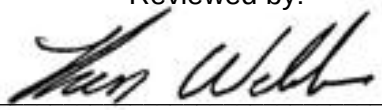


Steve Haddigan, Environmental Specialist

Reviewed by:



Ken Webb

11/2/2016
Date

DISCLAIMER

This investigation was performed by Blackshare Environmental Solutions (Blackshare) using the degree of care and skill ordinarily exercised, under similar circumstances, by professional consultants practicing in this or similar localities and no other warranty.

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Appendices

Appendix A – Maps

Appendix B – Photographic Log

Appendix C – Wetland/Waterway Chart

Appendix D – Reference Documents

1.0 Introduction and Background

Per directives received from PNE Wind USA, Inc. (PNE), a wetland/waterway investigation was performed by Blackshare Environmental Solutions (Blackshare) personnel on August 11 & 18, 2016 for the 2,370 acre (approximate) project proposed by PNE within Kay County, Oklahoma. Enclosed in Appendix A are USGS 7.5 minute series (Ponca City Quadrangle #69) topographic map and aerial maps exhibiting the location of the referenced project area.

The referenced project consists of constructing approximately twenty-one (21) wind turbines for energy production. Specifically, the proposed project would commence approximately four (4) miles north of Newkirk, Oklahoma within Section 25, Township 29 North, Range 2 East; Section 24, Township 29 North, Range 2 East; and Section 13, Township 29 North, Range 2 East. PNE will utilize an approximate 60-foot temporary right-of-way (ROW) corridor during the construction phase of the project (not including any additional temporary workspace). Roadways constructed will utilize a 75-foot temporary right-of-way (ROW) corridor during the construction phase of the project. Following construction of the access roads, a permanent maintained ROW will be sixteen (16) feet wide.

The purpose of the investigation was to determine if any potentially jurisdictional wetlands/waterways are located within the surveyed project area. All areas identified as “waters of the United States” will be considered jurisdictional and subject to regulation under section 404 of the Clean Water Act (CWA). If the identified areas are expected to be disturbed to an extent greater than 1/10 of an acre, authorization from the U.S. Army Corps of Engineers (USACE) would be required prior to construction. The proposed project area was investigated to determine the location and extent of any identified wetlands and waterways.

By definition, wetlands are a subset of “waters of the United States” and thus subject to Section 404 of the CWA. The term “waters of the United States” has a broad meaning and incorporates both deep-water aquatic habitats and special aquatic sites, including wetlands (*Federal Register* 1982), as follows:

a. The territorial seas with respect to the discharge of fill material.

b. Coastal and inland waters, lakes, rivers, and streams that are navigable waters of the United States, including their adjacent wetlands.
c. Tributaries to navigable waters of the United States, including adjacent wetlands.
d. Interstate waters and their tributaries, including adjacent wetlands.
e. All other waters of the United States not identified above, such as isolated wetlands and lakes, intermittent streams, prairie potholes, and other waters that are not a part of a tributary system to interstate waters or navigable waters of the United States, the degradation or destruction of which could affect interstate commerce.

Potential "waters of the United States" other than wetlands (hereinafter referred to as "waterways") include, but are not limited to, unvegetated ephemeral pools, lakes, and perennial, intermittent, and ephemeral stream channels that consist of navigable waters, tributaries to navigable waters, or waters that the destruction or degradation of which could affect or impact navigable waters.

Field methodologies were executed by a trained Blackshare wetlands specialist. In addition to the visual assessment, this evaluation was completed based on comprehensive data acquired from the following resources:

- Aerial photographs & topographic maps
- National Wetland Inventory (NWI) maps
- Natural Resources Conservation Service (NRCS) website
- United States Department of Agriculture (USDA) Web Soil Survey

Blackshare was to identify potential jurisdictional wetlands/waterways and/or identify pertinent conservation measures to avoid or minimize impacts to these features when necessary.

2.0 Technical Guidance

The following is technical guidance on the subject:

The interaction of hydrology, vegetation, and soil results in the development of characteristics unique to wetlands. Therefore, the following technical guideline for wetlands is based on these three parameters, and diagnostic environmental characteristics used in applying the technical guideline are represented by various indicators of these parameters.

Because wetlands may be bordered by both wetter areas (aquatic habitats) and by drier areas (nonwetlands), guidelines are presented for wetlands, deepwater aquatic habitats, and nonwetlands. However, procedures for applying the technical guidelines for deepwater aquatic habitats and nonwetlands are not included in the Manual.

2.1 Wetlands

The following definition, diagnostic environmental characteristics, and technical approach comprise a guideline for the identification and delineation of wetlands:

A. *Definition*. The USACE (Federal Register 1982) and the EPA (Federal Register 1980) jointly define wetlands as: Those areas that are inundated or saturated by surface or ground water at a frequency and duration sufficient to support, and that under normal circumstances do support, a prevalence of vegetation typically adapted for life in saturated soil conditions. Wetlands generally include swamps, marshes, bogs, and similar areas.

B. *Diagnostic environmental characteristics*. Wetlands have the following general diagnostic environmental characteristics:

(1) *Vegetation*. The prevalent vegetation consists of hydrophytes that are typically adapted to areas having hydrologic and soil conditions described in A (Definition) above. Hydrophytic species, due to morphological, physiological, and/or reproductive adaptations), have the ability to grow, effectively compete, reproduce, and/or persist in anaerobic soil conditions.

(2) *Soil*. Soils are present and have been classified as hydric, or they possess characteristics that are associated with reducing soil conditions.

(3) *Hydrology*. The area is inundated either permanently or periodically at mean water depths <6.6 ft, or the soil is saturated to the surface at some time during the growing season of the prevalent vegetation. The period of inundation or soil saturation varies according to the hydrologic/soil moisture regime and occurs in both tidal and nontidal situations.

C. *Technical approach for the identification and delineation of wetlands*. Except in certain situations defined in the Manual, evidence of a minimum of one positive wetland indicator from each parameter (hydrology, soil, and vegetation) must be found in order to make a positive wetland determination.

2.2 Deepwater Aquatic Habitats

The following definition, diagnostic environmental characteristics, and technical approach comprise a guideline for deepwater aquatic habitats:

A. *Definition*. Deepwater aquatic habitats are areas that are permanently inundated at mean annual water depths greater than 6.6 ft or permanently inundated areas less than 6.6 ft in depth that do not support rooted-emergent or woody plant species. Areas less than 6.6 ft mean annual depth that support only submergent aquatic plants are vegetated shallows, not wetlands.

B. *Diagnostic environmental characteristics*. Deepwater aquatic habitats have the following diagnostic environmental characteristics:

(1) *Vegetation*. No rooted-emergent or woody plant species are present in-these permanently inundated areas.

(2) *Soil*. The substrate technically is not defined as a soil if the mean water depth is greater than 6.6 ft. or if it will not support rooted emergent or woody plants.

(3) *Hydrology*. The area is permanently inundated at mean water depths greater than 6.6 ft.

C. *Technical approach for the identification and delineation of deepwater aquatic habitats*. When any one of the diagnostic characteristics identified in B above is present, the area is a deepwater aquatic habitat.

2.3 Nonwetlands

The following definition, diagnostic environmental characteristics, and technical approach comprise a guideline for the identification and delineation of nonwetlands:

A. *Definition*. Nonwetlands include uplands and lowland areas that are neither deepwater aquatic habitats, wetlands, nor other special aquatic sites. They are seldom or never inundated, or if frequently inundated, they have saturated soils for only brief periods during the growing season, and, if vegetated, they normally support a prevalence of vegetation typically adapted for life only in aerobic soil conditions.

B. *Diagnostic environmental characteristics*. Nonwetlands have the following general diagnostic environmental characteristics

(1) *Vegetation*. The prevalent vegetation consists of plant species that are typically adapted for life only in aerobic soils.

These mesophytic and/or xerophytic macrophytes cannot persist in predominantly anaerobic soil conditions. Some species, due to their broad ecological tolerances, occur in both wetlands and nonwetlands.

(2) *Soil*. Soils, when present, are not classified as hydric, and possess characteristics associated with aerobic conditions.

(3) *Hydrology*. Although the soil may be inundated or saturated by surface water or ground water periodically during the growing season of the prevalent vegetation, the average annual duration of inundation or soil saturation does not preclude the occurrence of plant species typically adapted for life in aerobic soil conditions. *Technical approach for the identification and delineation of nonwetlands*. When any one of the diagnostic characteristics identified in B above is present, the area is a nonwetland.

In addition to distinguishing characteristics of wetlands versus nonwetlands, jurisdictional determinations of waterways and their boundaries are largely dependent on following parameters:

(1) *Ordinary High Water Marks (OHWM)*. The presence/absence of an OHWM is considered an indication of whether or not the waterway conveys water for a sufficient duration of the year to have a significant impact to navigable waters of the United States. Section 404 of the CWA defines the landward limit of jurisdiction as the high tide line in tidal waters and the OHWM as the limit in non-tidal waters. When adjacent wetlands are present, the limit of jurisdiction extends to the limit of the wetland.

(2) *Topographic Map Classification.* Waterways that are illustrated on topographic maps by the U.S. Geological Survey (USGS) typically signify resources that eventually drain into tributary system to interstate waters or navigable waters of the United States.

(3) *Listing under Federal Register and/or other regulatory publications (i.e., water quality standards)*. Direct tributaries (non isolated) of listed aquatic resources should fall under the jurisdiction of USACE and other applicable agencies (i.e., Oklahoma Department of Environmental Quality) from the standpoint of maintaining water quality in conformance with the CWA.

2.4 USACE Consultation

Blackshare consulted with the USACE specifically for this project. Blackshare had conversations with Bryan Noblitt and Michael Ware. Their instructions were to conduct a delineation on the property in accordance with the 1987 USACE Wetlands Delineation Manual Appendix as well as the Great Plains Interim Regional Supplement with a transect spacing of 50 feet. This is the exact protocol by which Blackshare staff are trained in wetlands delineation.

Since the majority of the property is cultivated cropland and therefore not considered eligible for wetlands or jurisdictional waterway, only non-cultivated areas were delineated. Essentially, this yielded that the areas to be evaluated were similar to “corridors.” These “corridors” were evaluated on 50’ transects. Sample points for which wetlands delineation forms were completed – both those that resulted in classification as wetlands and several representative points that were not classified as wetlands – are identified on the maps in Appendix A. The corresponding forms are included in Appendix D. Resources identified as waters of the United States are included both on the maps in Appendix A and in the wetland/waterway chart in Appendix B.

In addition, Mr. Ware indicated that the utility line waterway crossings could be permitted under NWP 12 and considered separately, the road waterway crossings could be permitted under NWP 14 and considered separately, and the turbine tower impacts would be permitted under NWP 51. NWP 51, however, is cumulative meaning that crossings/impacts are added together to compare against the criteria allowed under the NWP.

3.0 Field Results

The proposed project area was investigated to determine the location and extent of aquatic resources. The descriptions for all areas identified as aquatic resources are contained below according to Field Site (FS) number which correspond to locations on the maps in Appendix A. Appendix B is a photo log of each FS site. Appendix C contains tow wetland/waterway charts. The first is a list of aquatic resources identified within the project boundary corresponding to a FS number. Note that all FS within the project area are described whether they are impacted by the proposed construction or not. If a FS is within the construction right-of-way (ROW), that is indicated in the individual FS description. The second chart is an impacts chart which identifies both permanent and temporary impacts.

Finally, note that only impacts from utility line and road crossings are referenced in the descriptions below under the assumption that any impacts from turbines/towers will be relocated to avoid impacts.

FS-1 is identified as an intermittent stream (waterway) originating outside the investigated property on the north and traveling south through the investigated property as an unnamed tributary to Chilocco Creek. The stream channel had a full bank width of 8 feet with a full bank depth of 4 feet and an OHWM of 5 feet. At the time of investigation, no water was observed within the referenced stream channel. Nevertheless, based on the stream features and a discernible OHWM, it would appear that FS-1 meets the criteria necessary for jurisdictional classification by the USACE.

Utility line construction activities cross FS-1 and will have an area of disturbance of 0.007 acres. Therefore, FS-1 can be disturbed utilizing conventional trenching methods operating under BMPs set forth under NWP 12 provisions.

FS-2 is identified as a man-made surface impoundment (stock pond) located outside of the construction right-of-way (ROW). Stock ponds usually are not considered to be jurisdictional by the USACE.

FS-3 has been identified as an emergent wetland located outside of the construction right-of-way (ROW). This area was investigated during the field survey and was found to exhibit positive indicators from all of the three (3) parameters (hydrophytic vegetation, hydric soil, and hydrology).

Dominant herbaceous vegetation in the area consisted of black willow, rushes, algae, and cattails. Hydrology indicators included surface water, high water table, saturation, and hydrogen sulfide odor.

Based on information obtained from the NRCS website, the assessment site is underlain by Agra-Foraker complex, 1 to 3 percent slopes. In addition, the soils observed during the site visit consisted of a layer of low chroma (2.5 YR 3/1 0-12") Detailed soil survey maps are located in Appendix D. According to the USACE, problem area wetlands are naturally occurring wetlands that may lack one or more indicators either periodically, due to seasonal or annual variability, or permanently, due to the nature of the soil or plant species of the site. Furthermore, some soils that meet the definition of "hydric soil" may not exhibit any of the definitive hydric soil indicators listed by the USACE. Based on the clear soil and hydrology indicators, this site is potentially a recently developed wetland that has not been in place long enough to develop clear hydrophytic vegetation indicators.

Based on the above findings, this area is considered to be an emergent wetland and in Blackshare's opinion meets the criteria necessary for jurisdictional classification by the USACE. Wetland determination sheets for this aquatic resource are included in Appendix D.

FS-4 has been identified as an emergent wetland located outside of the construction right-of-way (ROW). This area was investigated during the field survey and was found to exhibit positive indicators from all of the three (3) parameters (hydrophytic vegetation, hydric soil, and hydrology). Dominant herbaceous vegetation in the area consisted of black willow, rushes, algae and cattails. Hydrology indicators included surface water, high water table, saturation, and hydrogen sulfide odor. Based on information obtained from the NRCS website, the assessment site is Agra-Foraker complex, 1to 3 percent slopes. In addition, the soils observed during the site visit consisted of a layer of low chroma (2.5 YR 3/1 0-12"). Detailed soil survey maps are located in Appendix D.

According to the USACE, problem area wetlands are naturally occurring wetlands that may lack one or more indicators either periodically, due to seasonal or annual variability, or permanently, due to the nature of the soil or plant species of the site. Furthermore, some soils that meet the definition of “hydric soil” may not exhibit any of the definitive hydric soil indicators listed by the USACE.

Based on the clear soil and hydrology indicators, this site is potentially a recently developed wetland that has not been in place long enough to develop clear hydrophytic vegetation indicators.

Based on the above findings, this area is considered to be an emergent wetland and in Blackshare’s opinion meets the criteria necessary for jurisdictional classification by the USACE. Wetland determination sheets for this aquatic resource are included in Appendix D.

FS-5 is identified as an ephemeral stream (waterway) originating outside the project area on the north and traveling south through the project area as an unnamed tributary to Chilocco Creek. The stream channel had a full bank width of 6 feet with a full bank depth of 2 feet and an OHWM of 4 feet. At the time of investigation, no water was observed within the referenced stream channel. Nevertheless, based on the stream features and a discernible OHWM, it would appear that FS-5 meets the criteria necessary for jurisdictional classification by the USACE.

Utility line construction activities cross FS-5 and will have an area of disturbance of 0.006 acres. Therefore, FS-5 can be disturbed utilizing conventional trenching methods operating under BMPs set forth under NWP 12 provisions.

FS-6 is identified as a man-made surface impoundment (stock pond) located outside of the construction right-of-way (ROW). Stock ponds usually are not considered to be jurisdictional by the USACE.

FS-6A has been identified as an herbaceous wetland located outside of the construction right-of-way (ROW). This area was investigated during the field survey and was found to exhibit positive indicators from each of the three (3) parameters (hydrophytic vegetation, hydric soil, and hydrology).

Dominant herbaceous vegetation in the area consisted of cattail, black willow, duck weed, and spike bulrush. Hydrology indicators included surface water, high water table, saturation, and hydrogen sulfide odor. Based on information obtained from the NRCS website, the assessment site is underlain by Grainola-Ashport complex with 0-12 percent slopes. In addition, the soils observed during the site visit consisted of a layer of low chroma (2.5 YR 5/1 0”-6”, 7.5YR 4/2 6”-12”). Detailed soil survey maps are located in Appendix D.

Based on the above findings, this area is considered to be an herbaceous wetland and in Blackshare’s opinion meets the criteria necessary for jurisdictional classification by the USACE. Wetland determination sheets for this aquatic resource are included in Appendix D.

FS-7 is identified as an intermittent stream (waterway) originating outside of the project area on the west and traveling east within the project area as an unnamed tributary to Chilocco Creek. The stream channel had a full bank width of 8 feet with a full bank depth of 5 feet and an OHWM of 3 feet. At the time of investigation, no water was observed within the referenced stream channel. Nevertheless, based on the stream features and a discernible OHWM, it would appear that FS-7 meets the criteria necessary for jurisdictional classification by the USACE.

Utility line construction activities cross FS-7 and will have an area of disturbance of 0.004 acres. Therefore, FS-7 can be disturbed utilizing conventional trenching methods operating under BMPs set forth under NWP 12 provisions.

FS-7A is identified as an ephemeral stream (waterway) originating outside of the project area on the north and traveling south through the project area as an unnamed tributary to Chilocco Creek.

The stream channel had a full bank width of 5 feet with a full bank depth of 4 feet and an OHWM of 2 feet. At the time of investigation, no water was observed within the referenced stream channel. Nevertheless, based on the stream features and a discernible OHWM, it would appear that FS-7A meets the criteria necessary for jurisdictional classification by the USACE. Utility line and construction activities cross FS-7A and will have an area of disturbance of 0.003 acres. In addition, construction activities include the installation of a permanent road that crosses FS-7A and will have a permanent disturbance of 0.0007 acres. Therefore, FS-7A can be disturbed utilizing conventional trenching methods operating under BMPs set forth under NWP 12 and NWP 14 provisions.

FS-8 is identified as a perennial stream (waterway), known as Chilocco Creek, originating outside of the project area on the west and traveling east inside the project area as a tributary to the Arkansas River. The stream channel had a full bank width of 60 feet with a full bank depth of 18 feet and an OHWM of 50 feet. At the time of investigation, the stream dimensions were approximately 35 feet wide and 6 feet deep. Based on the stream features, flow characteristics and a discernible OHWM, it would appear that FS-8 meets the criteria necessary for jurisdictional classification by the USACE.

Utility line construction activities cross FS-8 and will have an area of disturbance of 0.069 acres. Therefore, FS-8 can be disturbed utilizing conventional trenching methods operating under BMPs set forth under NWP 12 provisions.

FS-9 is identified as an intermittent stream (waterway) located outside of the construction right-of-way (ROW). It originates outside of the project area on the west and travels northeast within the project area as an unnamed tributary to Chilocco Creek. The stream channel had a full bank width of 4 feet with a full bank depth of 2 feet and an OHWM of 2 feet. At the time of investigation, no water was observed within the referenced stream channel. Nevertheless, based on the stream features and a discernible OHWM, it would appear that FS-9 meets the criteria necessary for jurisdictional classification by the USACE.

FS-10 is identified as an ephemeral stream (waterway) originating outside of the project area on the south and traveling north through the project area as an unnamed tributary to Chilocco Creek. The stream channel had a full bank width of 5 feet with a full bank depth of 3 feet and an OHWM of 2 feet. At the time of investigation, no water was observed within the referenced stream channel. Nevertheless, based on the stream features and a discernible OHWM, it would appear that FS-10 meets the criteria necessary for jurisdictional classification by the USACE. Utility line construction activities cross FS-10 and will have an area of disturbance of 0.003 acre. Therefore, FS-10 can be disturbed utilizing conventional trenching methods operating under BMPs set forth under NWP 12 provisions.

FS-11 is identified as an intermittent stream (waterway) originating outside of the project area on the south and traveling north through the project area as an unnamed tributary to Chilocco Creek. The stream channel had a full bank width of 8 feet with a full bank depth of 5 feet and an OHWM of 3 feet. At the time of investigation, no water was observed within the referenced stream channel. Nevertheless, based on the stream features and a discernible OHWM, it would appear that FS-11 meets the criteria necessary for jurisdictional classification by the USACE.

Utility line construction activities cross FS-11 and will have an area of disturbance of 0.004 acres. Therefore, FS-11 can be disturbed utilizing conventional trenching methods operating under BMPs set forth under NWP 12 provisions.

FS-12 is identified as a man-made surface impoundment (stock pond) located outside of the construction right-of-way (ROW). Stock ponds usually are not considered to be jurisdictional by the USACE.

FS-13 is identified as an ephemeral stream (waterway) located outside of the construction right-of-way (ROW). It originates outside of the project area on the north and travels south through the project area as an unnamed tributary to Chilocco Creek. The stream channel had a full bank width of 5 feet with a full bank depth of 3 feet and an OHWM of 2 feet.

At the time of investigation, no water was observed within the referenced stream channel. Nevertheless, based on the stream features and a discernible OHWM, it would appear that FS-13 meets the criteria necessary for jurisdictional classification by the USACE.

FS-13A is identified as an ephemeral stream (waterway) located outside of the construction right-of-way (ROW). It originates outside of the project area on the north and travels south through the project area as an unnamed tributary to Chilocco Creek. The stream channel had a full bank width of 5 feet with a full bank depth of 3 feet and an OHWM of 2 feet. At the time of investigation, no water was observed within the referenced stream channel. Nevertheless, based on the stream features and a discernible OHWM, it would appear that FS-13A meets the criteria necessary for jurisdictional classification by the USACE.

FS-14 is identified as a man-made surface impoundment (stock pond) located outside of the construction right-of-way (ROW). Stock ponds usually are not considered to be jurisdictional by the USACE.

FS-15 is identified as a man-made surface impoundment (stock pond) located outside of construction right-of-way (ROW). Stock ponds usually are not considered to be jurisdictional by the USACE.

FS-16 has been identified as a forested wetland located outside of the construction right-of-way (ROW). This area was investigated during the field survey and was found to exhibit positive indicators from each of the three (3) parameters (hydrophytic vegetation, hydric soil, and hydrology). Dominant herbaceous vegetation in the area consisted of black willow, cottonwood, elm, and reeds.

Hydrology indicators included surface water, high water table, saturation, and hydrogen sulfide odor. Based on information obtained from the NRCS website, the assessment site is underlain by Agra-Foraker complex with 3 to 5 percent slopes, eroded.

In addition, the soils observed during the site visit consisted of a layer of low chroma (2.5 YR 4/1 0-12”). Detailed soil survey maps are located in Appendix D.

Based on the above findings, this area is considered to be a forested wetland and in Blackshare's opinion meets the criteria necessary for jurisdictional classification by the USACE. Wetland determination sheets for this aquatic resource are included in Appendix D.

4.0 Conclusions

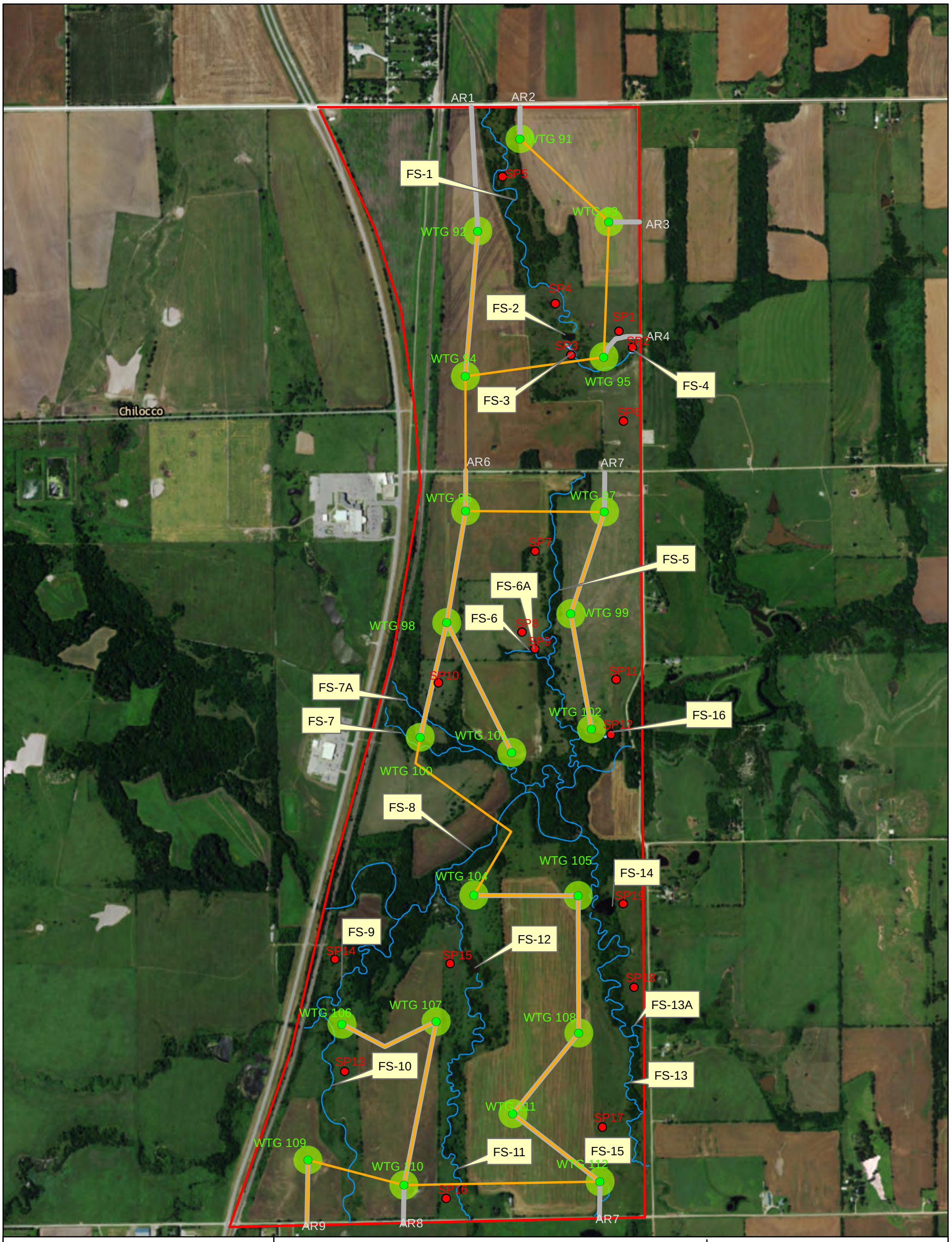
Based on Blackshare's assessment of the project area, the proposed project will warrant Section 404 coverage via a NWP 12 for the utility line crossings and NWP 14 for the roads. Impacts from turbine/tower construction currently exceed coverage allowances under NWP 51 and would require an Individual Permit (IP). However, moving several of the turbines/towers by only small distances avoids impacts altogether and, therefore, the need for use of NWP 51.

Coverage under NWP 12 for the utility line and NWP 14 for the road crossings will be achieved via self-verification. A Pre-Construction Notification (PCN) will not be submitted to the USACE offices due to the fact no criteria have been met that would trigger a PCN submittal for NWP 12 concurrence (i.e. disturbance >1/10th of an acre). All waterways that could potentially result in a disturbance greater than 1/10th of an acre, and all identified wetlands, are avoided.

If changes in the construction plan results in increased disturbance of the jurisdictional resources (i.e., discharges that result in loss of greater than 1/10th of an acre), PNE will need to submit a PCN to the Tulsa, OK District USACE Office for NWP 12 concurrence.

Similarly, if ***any*** impact is anticipated with the turbines/towers, PCN is required for NWP 51. Note also that the criteria of coverage under NWP 51 are restricted to 0.5 acres and/or 300 linear feet of streambed disturbance in TOTAL for the project. The current construction plan results, as indicated in the impact chart in Appendix C, in disturbance because of turbine construction of jurisdictional resources above NWP 51 criteria which would require an Individual Permit (IP). Measures which could avoid IP and NWP 51 altogether are provided in the impact chart.

Appendix A
Maps



KAY COUNTY, OKLAHOMA

N

= PROJECT BOUNDARY
= JURISDICTIONAL WATERWAY
= JURICTIONAL WETLAND
= IMPOUNDMENT
= WTG - WIND TURBINE GENERATOR
= UTILITY LINE
= ACCESS ROAD
= WTG TURBINE PAD
= SAMPLE POINT

0 0.25 0.5 Miles

BLACKSHARE ENVIRONMENTAL SOLUTIONS

PNE WIND USA, INC
CHILOCCO PROJECT
WETLAND WATERWAY MAP
SITE MAP OVERVIEW
KAY COUNTY, OKLAHOMA

PROJECT: 3463-16 DATE:09-13-2016 BY: STH

AR1
AR2
WTG 91
FS-1
SP5
WTG 93
AR3
WTG 92
SP4
FS-2
SP1
AR4
SP2
SP3
WTG 94
WTG 95
FS-4
FS-3
SP6
AR6
AR7
WTG 96
WTG 97
SP7
FS-5
FS-6A
WTG 99
FS-6
SP8
SP9
WTG 98

KAY COUNTY, OKLAHOMA

N

= PROJECT BOUNDARY
= JURISDICTIONAL WATERWAY
= JURICTIONAL WETLAND
= IMPOUNDMENT
= WTG - WIND TURBINE GENERATOR
= UTILITY LINE
= ACCESS ROAD
= WTG TURBINE PAD
= SAMPLE POINT

0 0.25 0.5 Miles

BLACKSHARE ENVIRONMENTAL SOLUTIONS

PNE WIND USA, INC
CHILOCCO PROJECT
WETLAND WATERWAY MAP
DETAIL VIEW - NORTH MAP
KAY COUNTY, OKLAHOMA

PROJECT: 3463-16 DATE:09-13-2016 BY: STH

FS-7A
FS-7
FS-8
FS-9
FS-10
FS-11
FS-12
FS-13
FS-13A
FS-14
FS-15
SP10
SP11
SP12
SP13
SP14
SP15
SP16
SP17
SP18
SP19
WTG 100
WTG 101
WTG 102
WTG 104
WTG 105
WTG 106
WTG 107
WTG 108
WTG 109
WTG 110
WTG 111
WTG 112
AR9
AR8
AR7

KAY COUNTY, OKLAHOMA

N

= PROJECT BOUNDARY
= JURISDICTIONAL WATERWAY
= JURICTIONAL WETLAND
= IMPOUNDMENT
= WTG - WIND TURBINE GENERATOR
= UTILITY LINE
= ACCESS ROAD
= WTG TURBINE PAD
= SAMPLE POINT

0 0.25 0.5 Miles

BLACKSHARE ENVIRONMENTAL SOLUTIONS

PNE WIND USA, INC
CHILOCCO PROJECT
WETLAND WATERWAY MAP
DETAIL VIEW - SOUTH MAP
KAY COUNTY, OKLAHOMA

PROJECT: 3463-16 DATE:09-13-2016 BY: STH

Appendix B
Photographic Log

PHOTOGRAPHIC LOG

Description: **FS-1**	

PHOTOGRAPHIC LOG

Description: **FS-2**	

PHOTOGRAPHIC LOG

Description: **FS-3**	

PHOTOGRAPHIC LOG

Description: **FS-4**	

PHOTOGRAPHIC LOG

Description: **FS-5**	

PHOTOGRAPHIC LOG

Description: **FS-6**	

PHOTOGRAPHIC LOG

Description: **FS-6A**	

PHOTOGRAPHIC LOG

Description: **FS-7**	

PHOTOGRAPHIC LOG

Description: **FS-7A**	

PHOTOGRAPHIC LOG

Description: **FS-8**	

PHOTOGRAPHIC LOG

Description: **FS-9**	

PHOTOGRAPHIC LOG

Description: **FS-10**	

PHOTOGRAPHIC LOG

Description:

FS-11

PHOTOGRAPHIC LOG

Description:

FS-12

PHOTOGRAPHIC LOG

Description:

FS-13

PHOTOGRAPHIC LOG

Description:

FS-13-A

PHOTOGRAPHIC LOG

Description:

FS-14

PHOTOGRAPHIC LOG

Description:

FS-15

PHOTOGRAPHIC LOG

Description: **FS-16**	

Appendix C

Wetland/Waterway Charts

Aquatic Resources

Waters_Name	Cowardin_Code	HGM_Code	Measurement_Type	Amount	Units	Waters_Type	Latitude	Longitude	Local_Waterway
FS-1	R4SB	RIVERINE	Linear	6324	FOOT	RPW	36.993663	-97.036512	Chilocco Creek
FS-2	PUB	DEPRESS	Area	0.636643	ACRE	NRPW	36.989916	-97.33348	Chilocco Creek
FS-3	PEM	DEPRESS	Area	0.178975	ACRE	NRPW	36.889754	-97.033259	Chilocco Creek
FS-4	PEM	DEPRESS	Area	0.103274	ACRE	NRPW	36.989135	-97.03064	Chilocco Creek
FS-5	R4SB	RIVERINE	Linear	5788	FOOT	RPW	36.982302	-97.34258	Chilocco Creek
FS-6	PUB	DEPRESS	Area	0.268875	ACRE	NRPW	36.977673	-97.035277	Chilocco Creek
FS-6A	PSS	DEPRESS	Area	0.03391	ACRE	NRPW	36.977929	-97.035118	Chilocco Creek
FS-7	R4SB	RIVERINE	Linear	4160	FOOT	RPW	36.974508	-97.040473	Chilocco Creek
FS-7A	R4SB	RIVERINE	Linear	1630	FOOT	RPW	36.975372	-97.038983	Chilocco Creek
FS-8	R4SB	RIVERINE	Linear	8905	FOOT	RPW	36.970826	-97.03746	Arkansas River
FS-9	R4SB	RIVERINE	Linear	3534	FOOT	RPW	36.96649	-97.043619	Chilocco Creek
FS-10	R4SB	RIVERINE	Linear	3595	FOOT	RPW	36.961334	-97.045343	Chilocco Creek
FS-11	R4SB	RIVERINE	Linear	6786	FOOT	RPW	36.966827	-97.038715	Chilocco Creek
FS-12	PUB	DEPRESS	Area	0.90273	ACRE	NRPW	36.965653	-97.03826	Chilocco Creek
FS-13	R4SB	RIVERINE	Linear	7870	FOOT	RPW	36.9691	-97.032621	Chilocco Creek
FS-13A	R4SB	RIVERINE	Linear	341	FOOT	RPW	36.963151	-97.030055	Chilocco Creek
FS-14	PUB	DEPRESS	Area	1.449859	ACRE	NRPW	36.96792	-97.031956	Chilocco Creek
FS-15	PUB	DEPRESS	Area	0.50645	ACRE	NRPW	36.957315	-97.031618	Chilocco Creek
FS-16	PFO	DEPRESS	Area	0.232004	ACRE	NRPW	36.974605	-97.031553	Chilocco Creek

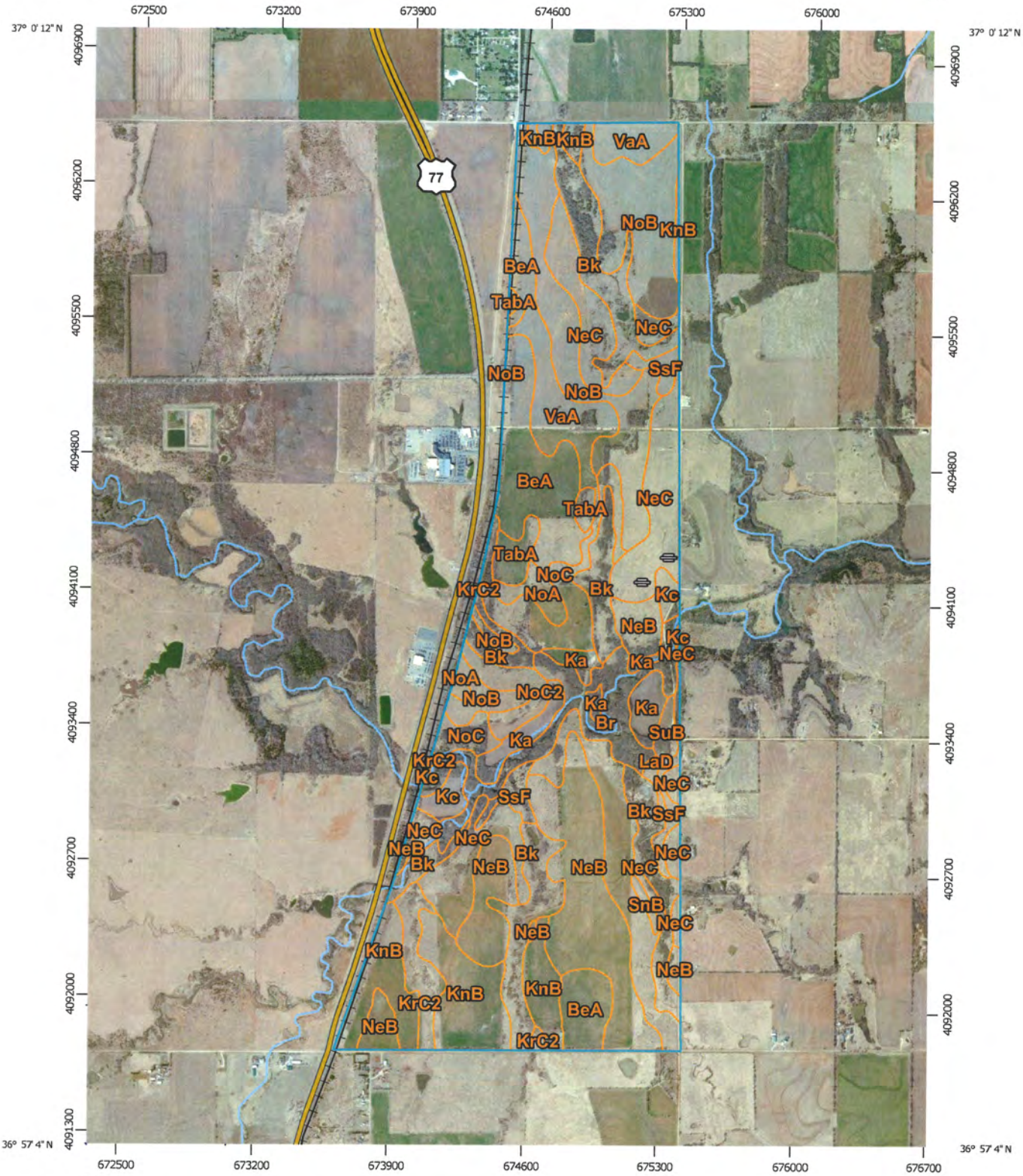
Impacts

Waters_Name	Name	Activity	Resource_Type	Permanent_Loss	Impact_Duration	Initially_Proposed_Area	Proposed_Area	Authorized_Area	Units_Area	Area_Type	Initially_Proposed_Linear	Proposed_Linear	Authorized_Linear	Units_Linear	Debits	Notes
FS-1	WTG95 - WTG94	Work (non-fill, Section 10)	River/Stream	NO	Temporary	0.007	0.007	0.007	Acres	Fill						Permitted under NWP 12
FS-5	WTG97 - WTG96	Work (non-fill, Section 10)	River/Stream	NO	Temporary	0.006	0.006	0.006	Acres	Fill						Permitted under NWP 12
FS-7	WTG100 - WTG10	Work (non-fill, Section 10)	River/Stream	NO	Temporary	0.004	0.004	0.004	Acres	Fill						Permitted under NWP 12
FS-7A	AR 6	Structure (Sec 10 only)	River/Stream	YES	Permanent	0.0007	0.0007	0.0007	Acres	Structure						Permitted under NWP 14
FS-7A	WTG98 - WTG100	Work (non-fill, Section 10)	River/Stream	NO	Temporary	0.003	0.003	0.003	Acres	Fill						Permitted under NWP 12
FS-8	WTG100 - WTG10	Work (non-fill, Section 10)	River/Stream	NO	Temporary	0.069	0.069	0.069	Acres	Fill						Permitted under NWP 12
FS-10	WTG 110 - WTG1C	Work (non-fill, Section 10)	River/Stream	NO	Temporary	0.003	0.003	0.003	Acres	Fill						Permitted under NWP 12
FS-11	WTG 110 - WTG11	Work (non-fill, Section 10)	River/Stream	NO	Temporary	0.004	0.004	0.004	Acres	Fill						Permitted under NWP 12
FS-1	WTG 95	Work (non-fill, Section 10)	River/Stream	NO	Temporary	0.026	0.026	0.026	Acres	Fill						Avoid by moving turbine 50' North
FS-5	WTG102	Work (non-fill, Section 10)	River/Stream	NO	Temporary	0.003	0.003	0.003	Acres	Fill						Avoid by moving turbine 25' North or fence off waterway
FS-7	WTG 100	Work (non-fill, Section 10)	River/Stream	NO	Temporary	0.031	0.031	0.031	Acres	Fill						Avoid by moving turbine 400' South
FS-7	WTG 101	Work (non-fill, Section 10)	River/Stream	NO	Temporary	0.004	0.004	0.004	Acres	Fill						Avoid by moving turbine 25' North or fence off waterway
FS-10	WTG 106	Work (non-fill, Section 10)	River/Stream	NO	Temporary	0.011	0.011	0.011	Acres	Fill						Avoid by moving turbine 75' East
FS-13	WTG 105	Work (non-fill, Section 10)	River/Stream	NO	Temporary	0.006	0.006	0.006	Acres	Fill						Avoid by moving turbine 50' West
FS-1	WTG 95	Work (non-fill, Section 10)	River/Stream	NO	Temporary						225 Linear ft.	225 Linear ft.	225 Linear ft.	Square Feet	Fill	Avoid by moving turbine 50' North
FS-5	WTG102	Work (non-fill, Section 10)	River/Stream	NO	Temporary						34 Linear ft.	34 Linear ft.	34 Linear ft.	Square Feet	Fill	Avoid by moving turbine 25' North or fence of waterway
FS-7	WTG 100	Work (non-fill, Section 10)	River/Stream	NO	Temporary						444 Linear ft.	444 Linear ft.	444 Linear ft.	Square Feet	Fill	Avoid by moving turbine 400' South
FS-7	WTG 101	Work (non-fill, Section 10)	River/Stream	NO	Temporary						51 Linear ft.	51 Linear ft.	51 Linear ft.	Square Feet	Fill	Avoid by moving turbine 25' North or fence off waterway
FS-10	WTG 106	Work (non-fill, Section 10)	River/Stream	NO	Temporary						240 Linear ft.	240 Linear ft.	240 Linear ft.	Square Feet	Fill	Avoid by moving turbine 75' East
FS-13	WTG 105	Work (non-fill, Section 10)	River/Stream	NO	Temporary						138 Linear ft.	138 Linear ft.	138 Linear ft.	Square Feet	Fill	Avoid by moving turbine 50' West

Appendix D

Reference Documents

Soil Map—Kay County, Oklahoma



MAP LEGEND

Area of Interest (AOI)
- Area of Interest (AOI)

Soils
- Soil Map Unit Polygons
- Soil Map Unit Lines
- Soil Map Unit Points

Special Point Features
- Blowout
- Borrow Pit
- Clay Spot
- Closed Depression
- Gravel Pit
- Gravelly Spot
- Landfill
- Lava Flow
- Marsh or swamp
- Mine or Quarry
- Miscellaneous Water
- Perennial Water
- Rock Outcrop
- Saline Spot
- Sandy Spot
- Severely Eroded Spot
- Sinkhole
- Slide or Slip
- Sodic Spot
- Spoil Area
- Stony Spot
- Very Stony Spot
- Wet Spot
- Other
- Special Line Features

Water Features
- Streams and Canals

Transportation
- Rails
- Interstate Highways
- US Routes
- Major Roads
- Local Roads

Background
- Aerial Photography

MAP INFORMATION

The soil surveys that comprise your AOI were mapped at 1:24,000.

Please rely on the bar scale on each map sheet for map measurements.

Source of Map: Natural Resources Conservation Service
Web Soil Survey URL: http://websoilsurvey.nrcs.usda.gov
Coordinate System: Web Mercator (EPSG:3857)

Maps from the Web Soil Survey are based on the Web Mercator projection, which preserves direction and shape but distorts distance and area. A projection that preserves area, such as the Albers equal-area conic projection, should be used if more accurate calculations of distance or area are required.

This product is generated from the USDA-NRCS certified data as of the version date(s) listed below.

Soil Survey Area: Kay County, Oklahoma
Survey Area Data: Version 11, Sep 29, 2015

Soil map units are labeled (as space allows) for map scales 1:50,000 or larger.

Date(s) aerial images were photographed: Feb 28, 2011—Mar 23, 2011

The orthophoto or other base map on which the soil lines were compiled and digitized probably differs from the background imagery displayed on these maps. As a result, some minor shifting of map unit boundaries may be evident.

Map Unit Legend

Kay County, Oklahoma (OK071)			
Map Unit Symbol	**Map Unit Name**	**Acres in AOI**	**Percent of AOI**
BeA	Bethany silt loam, 0 to 1 percent slopes	116.8	8.5%
Bk	Grainola-Ashport complex, 0 to 12 percent slopes	169.9	12.3%
Br	Ashport, Port, and Pulaski soils, 0 to 1 percent slopes, frequently flooded	74.0	5.4%
Ka	Port silt loam, 0 to 1 percent slopes, occasionally flooded	40.6	2.9%
Kc	Port silty clay loam, 0 to 1 percent slopes, occasionally flooded	18.1	1.3%
KnB	Kirkland silt loam, 1 to 3 percent slopes	120.4	8.7%
KrC2	Kirkland-Renfrow complex, 3 to 5 percent slopes, eroded	26.9	2.0%
LaD	Foraker clay loam, 5 to 8 percent slopes	3.6	0.3%
NeB	Agra-Foraker complex, 1 to 3 percent slopes	175.9	12.8%
NeC	Agra-Foraker complex, 3 to 5 percent slopes	219.2	15.9%
NoA	Milan loam, 0 to 1 percent slopes	15.5	1.1%
NoB	Milan loam, 1 to 3 percent slopes	189.1	13.7%
NoC	Milan loam, 3 to 5 percent slopes	63.2	4.6%
NoC2	Milan loam, 3 to 5 percent slopes, eroded	21.6	1.6%
SnB	Shidler silty clay loam, 1 to 3 percent slopes	3.3	0.2%
SsF	Shilder-Westsum complex, 5 to 20 percent slopes	27.9	2.0%
SuB	Westsum silty clay loam, 1 to 3 percent slopes	6.8	0.5%
TabA	Tabler silt loam, 0 to 1 percent slopes	19.9	1.4%
VaA	Vanoss silt loam, 0 to 1 percent slopes	64.0	4.6%
Totals for Area of Interest		**1,376.9**	**100.0%**

U.S. Fish and Wildlife Service

National Wetlands Inventory

3463-16 PNE Chilocco North

September 1, 2016

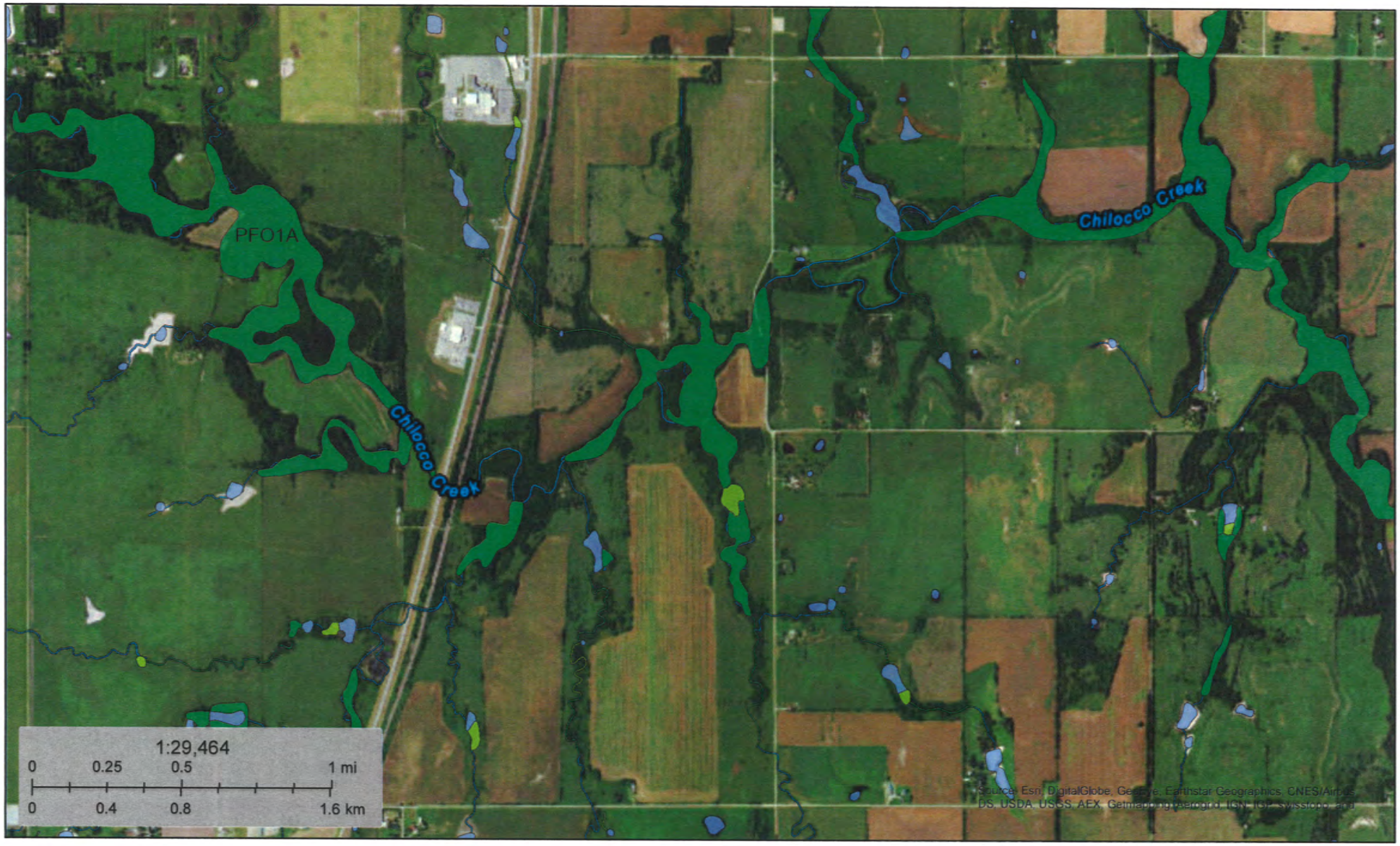
- Estuarine and Marine Deepwater
- Estuarine and Marine Wetland
- Freshwater Emergent Wetland
- Freshwater Forested/Shrub Wetland
- Freshwater Pond
- Lake
- Other
- Riverine

This map is for general reference only. The US Fish and Wildlife Service is not responsible for the accuracy or currentness of the base data shown on this map. All wetlands related data should be used in accordance with the layer metadata found on the Wetlands Mapper web site.

U.S. Fish and Wildlife Service

National Wetlands Inventory

3463-16 PNE Chilocco South



September 1, 2016

- Estuarine and Marine Deepwater
- Estuarine and Marine Wetland
- Freshwater Emergent Wetland
- Freshwater Forested/Shrub Wetland
- Freshwater Pond
- Lake
- Other
- Riverine

This map is for general reference only. The US Fish and Wildlife Service is not responsible for the accuracy or currentness of the base data shown on this map. All wetlands related data should be used in accordance with the layer metadata found on the Wetlands Mapper web site.

WETLAND DETERMINATION DATA FORM – Great Plains Region

Project/Site: Chilocco, Oklahoma City/County: Kay County Sampling Date: 8-11-2016

Applicant/Owner: PNE Wind USA, Inc. State: OK Sampling Point: SP #1

Investigator(s): Steve Haddigan, Lindsay McClendon Section, Township, Range: S13 T29N R2E

Landform (hillslope, terrace, etc.): Upland Prairie Local relief (concave, convex, none): convex Slope (%): 2-3

Subregion (LRR): Subregion H Lat: 36.990184 Long: -97.030963 Datum: _____

Soil Map Unit Name: NeC - Agra-Foraker complex NWI classification: No classification

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 _____	No ✔	**Is the Sampled Area within a Wetland?** **Yes** _____ **No** ✔
Hydric Soil Present?	Yes _____	No ✔	
Wetland Hydrology Present?	Yes _____	No ✔	

Remarks:
No wetland present in study location. Upland grassland.

VEGETATION – Use scientific names of plants.

	Absolute % Cover	Dominant Species?	Indicator Status
Tree Stratum (Plot size: _____)			
1. N/A			
2.			
3.			
4.			
	_____ = Total Cover		
Sapling/Shrub Stratum (Plot size: _____)			
1. N/A			
2.			
3.			
4.			
5.			
	_____ = Total Cover		
Herb Stratum (Plot size: _____)			
1. Switchgrass		Yes	FAC
2. Blue stem		Yes	FACU
3. Indiangrass		Yes	FACU
4. Milkweed		Yes	UPL
5. Ragweed		Yes	FACU
6.			
7.			
8.			
9.			
10.			
	_____ = Total Cover		
Woody Vine Stratum (Plot size: _____)			
1.			
2.			
	_____ = Total Cover		

% Bare Ground in Herb Stratum _____

Dominance Test worksheet:

Number of Dominant Species That Are OBL, FACW, or FAC (excluding FAC−): _____ (A)

Total Number of Dominant Species Across All Strata: _____ (B)

Percent of Dominant Species That Are OBL, FACW, or FAC: _____ (A/B)

Prevalence Index worksheet:

Total % Cover of:		Multiply by:	
OBL species	0	x 1 =	
FACW species	0	x 2 =	
FAC species	1	x 3 =	3
FACU species	3	x 4 =	12
UPL species	1	x 5 =	3
Column Totals:	4 (A)		20 (B)

Prevalence Index = B/A = 5

Hydrophytic Vegetation Indicators:

___ 1 - Rapid Test for Hydrophytic Vegetation

___ 2 - Dominance Test is >50%

___ 3 - Prevalence Index is ≤3.0[1]

___ 4 - Morphological Adaptations[1] (Provide supporting data in Remarks or on a separate sheet)

___ Problematic Hydrophytic Vegetation[1] (Explain)

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

Hydrophytic Vegetation Present? **Yes** _____ **No** ✔

Remarks:
No hydrophytic vegetation present.

SOIL

Sampling Point: SP #1

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

Depth (inches)	Matrix Color (moist)	%	Redox Features Color (moist)	%	Type[1]	Loc[2]	Texture	Remarks

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

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

- ___ Histosol (A1)
- ___ Histic Epipedon (A2)
- ___ Black Histic (A3)
- ___ Hydrogen Sulfide (A4)
- ___ Stratified Layers (A5) (**LRR F**)
- ___ 1 cm Muck (A9) (**LRR F, G, H**)
- ___ Depleted Below Dark Surface (A11)
- ___ Thick Dark Surface (A12)
- ___ Sandy Mucky Mineral (S1)
- ___ 2.5 cm Mucky Peat or Peat (S2) (**LRR G, H**)
- ___ 5 cm Mucky Peat or Peat (S3) (**LRR F**)
- ___ Sandy Gleyed Matrix (S4)
- ___ Sandy Redox (S5)
- ___ Stripped Matrix (S6)
- ___ Loamy Mucky Mineral (F1)
- ___ Loamy Gleyed Matrix (F2)
- ___ Depleted Matrix (F3)
- ___ Redox Dark Surface (F6)
- ___ Depleted Dark Surface (F7)
- ___ Redox Depressions (F8)
- ___ High Plains Depressions (F16) (**MLRA 72 & 73 of LRR H**)

Indicators for Problematic Hydric Soils[3]:

- ___ 1 cm Muck (A9) (**LRR I, J**)
- ___ Coast Prairie Redox (A16) (**LRR F, G, H**)
- ___ Dark Surface (S7) (**LRR G**)
- ___ High Plains Depressions (F16) (**LRR H outside of MLRA 72 & 73**)
- ___ Reduced Vertic (F18)
- ___ Red Parent Material (TF2)
- ___ Very Shallow Dark Surface (TF12)
- ___ Other (Explain in Remarks)

[3]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:

No hydric soils present.

HYDROLOGY

Wetland Hydrology Indicators:

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

- ___ Surface Water (A1)
- ___ High Water Table (A2)
- ___ Saturation (A3)
- ___ Water Marks (B1)
- ___ Sediment Deposits (B2)
- ___ Drift Deposits (B3)
- ___ Algal Mat or Crust (B4)
- ___ Iron Deposits (B5)
- ___ Inundation Visible on Aerial Imagery (B7)
- ___ Water-Stained Leaves (B9)
- ___ Salt Crust (B11)
- ___ Aquatic Invertebrates (B13)
- ___ Hydrogen Sulfide Odor (C1)
- ___ Dry-Season Water Table (C2)
- ___ Oxidized Rhizospheres on Living Roots (C3) (**where not tilled**)
- ___ Presence of Reduced Iron (C4)
- ___ Thin Muck Surface (C7)
- ___ Other (Explain in Remarks)

Secondary Indicators (minimum of two required)

- ___ Surface Soil Cracks (B6)
- ___ Sparsely Vegetated Concave Surface (B8)
- ___ Drainage Patterns (B10)
- ___ Oxidized Rhizospheres on Living Roots (C3) (**where tilled**)
- ___ Crayfish Burrows (C8)
- ___ Saturation Visible on Aerial Imagery (C9)
- ___ Geomorphic Position (D2)
- ___ FAC-Neutral Test (D5)
- ___ Frost-Heave Hummocks (D7) (**LRR F**)

Field Observations:

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

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

Saturation Present? (includes capillary fringe) Yes _____ No ✔ Depth (inches): _____

Wetland Hydrology Present? Yes _____ No ✔

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

Remarks:

No wetland hydrology present. Upland grassland prairie.

WETLAND DETERMINATION DATA FORM – Great Plains Region

Project/Site: Chilocco, OK City/County: Kay Sampling Date: 8-11-2016

Applicant/Owner: PNE Wind USA, Inc. State: OK Sampling Point: FS-3

Investigator(s): Steve Haddigan, Lindsay McClendon Section, Township, Range: S13 T29N R2E

Landform (hillslope, terrace, etc.): Depression Local relief (concave, convex, none): Concave Slope (%): 2%

Subregion (LRR): Subregion H Lat: 36.889754 Long: -97.033259 Datum: _____

Soil Map Unit Name: Bk - Grainola-Ashport Complex NWI classification: _____

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 ✔ No _____	**Is the Sampled Area within a Wetland?** Yes ✔ No _____
Hydric Soil Present?	Yes ✔ No _____	
Wetland Hydrology Present?	Yes ✔ No _____	

Remarks:
Wetland present in study location.

VEGETATION – Use scientific names of plants.

Tree Stratum (Plot size:_____)	Absolute % Cover	Dominant Species?	Indicator Status
1. Black Willow	30	Yes	FACW
2.			
3.			
4.			
	30 = Total Cover		
Sapling/Shrub Stratum (Plot size:_____)			
1.			
2.			
3.			
4.			
5.			
	= Total Cover		
Herb Stratum (Plot size:_____)			
1. Cattails	15	Yes	OBL
2. Sedges	15	Yes	OBL
3. Spike rush	15	Yes	OBL
4.			
5.			
6.			
7.			
8.			
9.			
10.			
	45 = Total Cover		
Woody Vine Stratum (Plot size:_____)			
1.			
2.			
	= Total Cover		

% Bare Ground in Herb Stratum 0

Dominance Test worksheet:

Number of Dominant Species That Are OBL, FACW, or FAC (excluding FAC−): 4 (A)

Total Number of Dominant Species Across All Strata: 4 (B)

Percent of Dominant Species That Are OBL, FACW, or FAC: 100 (A/B)

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 = _____

Hydrophytic Vegetation Indicators:

- ___ 1 - Rapid Test for Hydrophytic Vegetation
- ✔ 2 - Dominance Test is >50%
- ___ 3 - Prevalence Index is ≤3.0[1]
- ___ 4 - Morphological Adaptations[1] (Provide supporting data in Remarks or on a separate sheet)
- ___ Problematic Hydrophytic Vegetation[1] (Explain)

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

Hydrophytic Vegetation Present? Yes ✔ No _____

Remarks:
Hydrophytic vegetation present.

SOIL

Sampling Point: FS-3

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

Depth (inches)	Matrix Color (moist)	%	Redox Features Color (moist)	%	Type[1]	Loc[2]	Texture	Remarks
0-6	2.5 YR 4/4	80			CS	M	Sandy Clay	
6-12	2.5 YR 3/2	80			CS	M	Mucky	

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

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

- ___ Histosol (A1)
- ___ Histic Epipedon (A2)
- ___ Black Histic (A3)
- ✔ Hydrogen Sulfide (A4)
- ___ Stratified Layers (A5) (**LRR F**)
- ___ 1 cm Muck (A9) (**LRR F, G, H**)
- ___ Depleted Below Dark Surface (A11)
- ___ Thick Dark Surface (A12)
- ___ Sandy Mucky Mineral (S1)
- ___ 2.5 cm Mucky Peat or Peat (S2) (**LRR G, H**)
- ___ 5 cm Mucky Peat or Peat (S3) (**LRR F**)
- Sandy Gleyed Matrix (S4)
- Sandy Redox (S5)
- Stripped Matrix (S6)
- Loamy Mucky Mineral (F1)
- Loamy Gleyed Matrix (F2)
- Depleted Matrix (F3)
- Redox Dark Surface (F6)
- Depleted Dark Surface (F7)
- Redox Depressions (F8)
- High Plains Depressions (F16) (**MLRA 72 & 73 of LRR H**)

Indicators for Problematic Hydric Soils[3]:

- 1 cm Muck (A9) (**LRR I, J**)
- Coast Prairie Redox (A16) (**LRR F, G, H**)
- Dark Surface (S7) (**LRR G**)
- High Plains Depressions (F16) (**LRR H outside of MLRA 72 & 73**)
- Reduced Vertic (F18)
- Red Parent Material (TF2)
- Very Shallow Dark Surface (TF12)
- Other (Explain in Remarks)

[3]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:

Hydric soils present.

HYDROLOGY

Wetland Hydrology Indicators:

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

- ✔ Surface Water (A1)
- ✔ High Water Table (A2)
- ✔ Saturation (A3)
- ___ Water Marks (B1)
- ___ Sediment Deposits (B2)
- ___ Drift Deposits (B3)
- ✔ Algal Mat or Crust (B4)
- ___ Iron Deposits (B5)
- ___ Inundation Visible on Aerial Imagery (B7)
- ___ Water-Stained Leaves (B9)
- Salt Crust (B11)
- Aquatic Invertebrates (B13)
- ✔ Hydrogen Sulfide Odor (C1)
- ✔ Dry-Season Water Table (C2)
- Oxidized Rhizospheres on Living Roots (C3) (**where not tilled**)
- Presence of Reduced Iron (C4)
- Thin Muck Surface (C7)
- Other (Explain in Remarks)

Secondary Indicators (minimum of two required)

- Surface Soil Cracks (B6)
- Sparsely Vegetated Concave Surface (B8)
- ✔ Drainage Patterns (B10)
- Oxidized Rhizospheres on Living Roots (C3) (**where tilled**)
- Crayfish Burrows (C8)
- ✔ Saturation Visible on Aerial Imagery (C9)
- Geomorphic Position (D2)
- FAC-Neutral Test (D5)
- Frost-Heave Hummocks (D7) (**LRR F**)

Field Observations:

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

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

Saturation Present? (includes capillary fringe) Yes ✔ No Depth (inches): _____

Wetland Hydrology Present? Yes ✔ No ___

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

Remarks:

Wetland hydrology present.

WETLAND DETERMINATION DATA FORM – Great Plains Region

Project/Site: Chilocco, OK City/County: Kay Sampling Date: 8-11-2016

Applicant/Owner: PNE Wind USA, Inc. State: OK Sampling Point: FS-4

Investigator(s): Steve Haddigan, Lindsay McClendon Section, Township, Range: S13 T29N R2E

Landform (hillslope, terrace, etc.): Depression Local relief (concave, convex, none): Concave Slope (%): 2%

Subregion (LRR): Subregion H Lat: 36.989135 Long: -97.030640 Datum: _____

Soil Map Unit Name: Bk - Grainola-Ashport Complex NWI classification: _____

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 ✔ No _____	**Is the Sampled Area within a Wetland?** Yes ✔ No _____
Hydric Soil Present?	Yes ✔ No _____	
Wetland Hydrology Present?	Yes ✔ No _____	

Remarks:
Wetland present in study location.

VEGETATION – Use scientific names of plants.

Tree Stratum (Plot size:_____)	Absolute % Cover	Dominant Species?	Indicator Status
1. Black Willow	20	Yes	FACW
2.			
3.			
4.			
	20 = Total Cover		
Sapling/Shrub Stratum (Plot size:_____)			
1.			
2.			
3.			
4.			
5.			
	= Total Cover		
Herb Stratum (Plot size:_____)			
1. Cattails	30	Yes	OBL
2. Sedges	20	Yes	OBL
3. Spike rush	20	Yes	OBL
4.			
5.			
6.			
7.			
8.			
9.			
10.			
	45 = Total Cover		
Woody Vine Stratum (Plot size:_____)			
1.			
2.			
	= Total Cover		

% Bare Ground in Herb Stratum 0

Dominance Test worksheet:

Number of Dominant Species That Are OBL, FACW, or FAC (excluding FAC−): 4 (A)

Total Number of Dominant Species Across All Strata: 4 (B)

Percent of Dominant Species That Are OBL, FACW, or FAC: 100 (A/B)

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 = _____

Hydrophytic Vegetation Indicators:

___ 1 - Rapid Test for Hydrophytic Vegetation

✔ 2 - Dominance Test is >50%

___ 3 - Prevalence Index is ≤3.0[1]

___ 4 - Morphological Adaptations[1] (Provide supporting data in Remarks or on a separate sheet)

___ Problematic Hydrophytic Vegetation[1] (Explain)

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

Hydrophytic Vegetation Present? Yes ✔ No _____

Remarks:
Hydrophytic vegetation present.

SOIL

Sampling Point: FS-4

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

Depth (inches)	Matrix Color (moist)	%	Redox Features Color (moist)	%	Type[1]	Loc[2]	Texture	Remarks
0-6	2.5 YR 4/4	80			CS	M	Sandy Clay	
6-12	2.5 YR 3/2	80			CS	M	Mucky	

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

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

- ___ Histosol (A1)
- ___ Histic Epipedon (A2)
- ___ Black Histic (A3)
- ✔ Hydrogen Sulfide (A4)
- ___ Stratified Layers (A5) (**LRR F**)
- ___ 1 cm Muck (A9) (**LRR F, G, H**)
- ___ Depleted Below Dark Surface (A11)
- ___ Thick Dark Surface (A12)
- ___ Sandy Mucky Mineral (S1)
- ___ 2.5 cm Mucky Peat or Peat (S2) (**LRR G, H**)
- ___ 5 cm Mucky Peat or Peat (S3) (**LRR F**)
- ___ Sandy Gleyed Matrix (S4)
- ___ Sandy Redox (S5)
- ___ Stripped Matrix (S6)
- ___ Loamy Mucky Mineral (F1)
- ___ Loamy Gleyed Matrix (F2)
- ___ Depleted Matrix (F3)
- ___ Redox Dark Surface (F6)
- ___ Depleted Dark Surface (F7)
- ___ Redox Depressions (F8)
- ___ High Plains Depressions (F16) (**MLRA 72 & 73 of LRR H**)

Indicators for Problematic Hydric Soils[3]:

- ___ 1 cm Muck (A9) (**LRR I, J**)
- ___ Coast Prairie Redox (A16) (**LRR F, G, H**)
- ___ Dark Surface (S7) (**LRR G**)
- ___ High Plains Depressions (F16) (**LRR H outside of MLRA 72 & 73**)
- ___ Reduced Vertic (F18)
- ___ Red Parent Material (TF2)
- ___ Very Shallow Dark Surface (TF12)
- ___ Other (Explain in Remarks)

[3]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:

Hydric soils present.

HYDROLOGY

Wetland Hydrology Indicators:

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

- ✔ Surface Water (A1)
- ✔ High Water Table (A2)
- ✔ Saturation (A3)
- ___ Water Marks (B1)
- ___ Sediment Deposits (B2)
- ___ Drift Deposits (B3)
- ✔ Algal Mat or Crust (B4)
- ___ Iron Deposits (B5)
- ___ Inundation Visible on Aerial Imagery (B7)
- ___ Water-Stained Leaves (B9)
- ___ Salt Crust (B11)
- ___ Aquatic Invertebrates (B13)
- ✔ Hydrogen Sulfide Odor (C1)
- ✔ Dry-Season Water Table (C2)
- ___ Oxidized Rhizospheres on Living Roots (C3) (**where not tilled**)
- ___ Presence of Reduced Iron (C4)
- ___ Thin Muck Surface (C7)
- ___ Other (Explain in Remarks)

Secondary Indicators (minimum of two required)

- ___ Surface Soil Cracks (B6)
- ___ Sparsely Vegetated Concave Surface (B8)
- ✔ Drainage Patterns (B10)
- ___ Oxidized Rhizospheres on Living Roots (C3) (**where tilled**)
- ___ Crayfish Burrows (C8)
- ✔ Saturation Visible on Aerial Imagery (C9)
- ___ Geomorphic Position (D2)
- ___ FAC-Neutral Test (D5)
- ___ Frost-Heave Hummocks (D7) (**LRR F**)

Field Observations:

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

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

Saturation Present? (includes capillary fringe) Yes ✔ No ___ Depth (inches): _____

Wetland Hydrology Present? Yes ✔ No ___

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

Remarks:

Wetland hydrology present.

WETLAND DETERMINATION DATA FORM – Great Plains Region

Project/Site: Chilocco, Oklahoma City/County: Kay County Sampling Date: 8-11-2016

Applicant/Owner: PNE Wind USA, Inc. State: OK Sampling Point: SP #4

Investigator(s): Steve Haddigan, Lindsay McClendon Section, Township, Range: S13 T29N R2E

Landform (hillslope, terrace, etc.): Upland Prairie Local relief (concave, convex, none): _____ Slope (%): 1

Subregion (LRR): Subregion H Lat: 36.991146 Long: -97.034081 Datum: _____

Soil Map Unit Name: Bk - Grainola-Ashport complex NWI classification: _____

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 _____	No ✓	**Is the Sampled Area within a Wetland?** Yes _____ No ✓
Hydric Soil Present?	Yes _____	No ✓	
Wetland Hydrology Present?	Yes _____	No ✓	

Remarks:
No wetland present in study location. Upland grassland.

VEGETATION – Use scientific names of plants.

Tree Stratum (Plot size: _____)	Absolute % Cover	Dominant Species?	Indicator Status
1. N/A			
2.			
3.			
4.			
	_____ = Total Cover		
Sapling/Shrub Stratum (Plot size: _____)			
1. N/A			
2.			
3.			
4.			
5.			
	_____ = Total Cover		
Herb Stratum (Plot size: _____)			
1. Switchgrass		Yes	FAC
2. Blue stem		Yes	FACU
3. Milk thistle		No	
4. Indiangrass		Yes	FACU
5. Milk weed			UPL
6. Ragweed		Yes	FACU
7.			
8.			
9.			
10.			
	_____ = Total Cover		
Woody Vine Stratum (Plot size: _____)			
1.			
2.			
	_____ = Total Cover		

% Bare Ground in Herb Stratum _____

Dominance Test worksheet:

Number of Dominant Species That Are OBL, FACW, or FAC (excluding FAC−): _____ (A)

Total Number of Dominant Species Across All Strata: _____ (B)

Percent of Dominant Species That Are OBL, FACW, or FAC: _____ (A/B)

Prevalence Index worksheet:

Total % Cover of:		Multiply by:	
OBL species	0	x 1 =	
FACW species	0	x 2 =	
FAC species	1	x 3 =	3
FACU species	3	x 4 =	12
UPL species	1	x 5 =	5
Column Totals:	5 (A)		20 (B)

Prevalence Index = B/A = 4

Hydrophytic Vegetation Indicators:

___ 1 - Rapid Test for Hydrophytic Vegetation

___ 2 - Dominance Test is >50%

___ 3 - Prevalence Index is ≤3.0[1]

___ 4 - Morphological Adaptations[1] (Provide supporting data in Remarks or on a separate sheet)

___ Problematic Hydrophytic Vegetation[1] (Explain)

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

Hydrophytic Vegetation Present? Yes _____ No ✓

Remarks:
No hydrophytic vegetation present.

SOIL

Sampling Point: SP #4

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

Depth (inches)	Matrix Color (moist)	%	Redox Features Color (moist)	%	Type[1]	Loc[2]	Texture	Remarks

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

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

- ___ Histosol (A1)
- ___ Histic Epipedon (A2)
- ___ Black Histic (A3)
- ___ Hydrogen Sulfide (A4)
- ___ Stratified Layers (A5) (**LRR F**)
- ___ 1 cm Muck (A9) (**LRR F, G, H**)
- ___ Depleted Below Dark Surface (A11)
- ___ Thick Dark Surface (A12)
- ___ Sandy Mucky Mineral (S1)
- ___ 2.5 cm Mucky Peat or Peat (S2) (**LRR G, H**)
- ___ 5 cm Mucky Peat or Peat (S3) (**LRR F**)
- ___ Sandy Gleyed Matrix (S4)
- ___ Sandy Redox (S5)
- ___ Stripped Matrix (S6)
- ___ Loamy Mucky Mineral (F1)
- ___ Loamy Gleyed Matrix (F2)
- ___ Depleted Matrix (F3)
- ___ Redox Dark Surface (F6)
- ___ Depleted Dark Surface (F7)
- ___ Redox Depressions (F8)
- ___ High Plains Depressions (F16) (**MLRA 72 & 73 of LRR H**)

Indicators for Problematic Hydric Soils[3]:

- ___ 1 cm Muck (A9) (**LRR I, J**)
- ___ Coast Prairie Redox (A16) (**LRR F, G, H**)
- ___ Dark Surface (S7) (**LRR G**)
- ___ High Plains Depressions (F16) (**LRR H outside of MLRA 72 & 73**)
- ___ Reduced Vertic (F18)
- ___ Red Parent Material (TF2)
- ___ Very Shallow Dark Surface (TF12)
- ___ Other (Explain in Remarks)

[3]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:

No hydric soils present.

HYDROLOGY

Wetland Hydrology Indicators:

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

- ___ Surface Water (A1)
- ___ High Water Table (A2)
- ___ Saturation (A3)
- ___ Water Marks (B1)
- ___ Sediment Deposits (B2)
- ___ Drift Deposits (B3)
- ___ Algal Mat or Crust (B4)
- ___ Iron Deposits (B5)
- ___ Inundation Visible on Aerial Imagery (B7)
- ___ Water-Stained Leaves (B9)
- ___ Salt Crust (B11)
- ___ Aquatic Invertebrates (B13)
- ___ Hydrogen Sulfide Odor (C1)
- ___ Dry-Season Water Table (C2)
- ___ Oxidized Rhizospheres on Living Roots (C3) (**where not tilled**)
- ___ Presence of Reduced Iron (C4)
- ___ Thin Muck Surface (C7)
- ___ Other (Explain in Remarks)

Secondary Indicators (minimum of two required)

- ___ Surface Soil Cracks (B6)
- ___ Sparsely Vegetated Concave Surface (B8)
- ___ Drainage Patterns (B10)
- ___ Oxidized Rhizospheres on Living Roots (C3) (**where tilled**)
- ___ Crayfish Burrows (C8)
- ___ Saturation Visible on Aerial Imagery (C9)
- ___ Geomorphic Position (D2)
- ___ FAC-Neutral Test (D5)
- ___ Frost-Heave Hummocks (D7) (**LRR F**)

Field Observations:

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

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

Saturation Present? (includes capillary fringe) Yes _____ No ✓ Depth (inches): _____

Wetland Hydrology Present? Yes _____ No ✓

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

Remarks:

No wetland hydrology present.

WETLAND DETERMINATION DATA FORM – Great Plains Region

Project/Site: Chilocco, Oklahoma City/County: Kay County Sampling Date: 8-11-2016

Applicant/Owner: PNE Wind USA, Inc. State: OK Sampling Point: SP #5

Investigator(s): Steve Haddigan, Lindsay McClendon Section, Township, Range: S13 T29N R2E

Landform (hillslope, terrace, etc.): _____ Local relief (concave, convex, none): _____ Slope (%): 2

Subregion (LRR): Subregion H Lat: 36.996233 Long: -97.036434 Datum: _____

Soil Map Unit Name: Bk - Grainola-Ashport complex NWI classification: Freshwater Forested Wetl

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 _____ No ✓	**Is the Sampled Area within a Wetland?** Yes _____ No ✓
Hydric Soil Present?	Yes _____ No ✓	
Wetland Hydrology Present?	Yes _____ No ✓	

Remarks:
No wetland present in study location.

VEGETATION – Use scientific names of plants.

Tree Stratum (Plot size: _____)	Absolute % Cover	Dominant Species?	Indicator Status
1. Oak	10	No	
2.			
3.			
4.			
	_____ = Total Cover		
Sapling/Shrub Stratum (Plot size: _____)			
1. N/A			
2.			
3.			
4.			
5.			
	_____ = Total Cover		
Herb Stratum (Plot size: _____)			
1. Switchgrass	30	Yes	FAC
2. Milkthistle	2	No	
3. Ragweed	48	Yes	FACU
4. Indiangrass	20	Yes	FACU
5.			
6.			
7.			
8.			
9.			
10.			
	_____ = Total Cover		
Woody Vine Stratum (Plot size: _____)			
1.			
2.			
	_____ = Total Cover		
% Bare Ground in Herb Stratum _____			

Dominance Test worksheet:

Number of Dominant Species That Are OBL, FACW, or FAC (excluding FAC−): _____ (A)

Total Number of Dominant Species Across All Strata: _____ (B)

Percent of Dominant Species That Are OBL, FACW, or FAC: _____ (A/B)

Prevalence Index worksheet:

Total % Cover of:		Multiply by:	
OBL species	0	x 1 =	
FACW species	0	x 2 =	
FAC species	1	x 3 =	3
FACU species	2	x 4 =	8
UPL species	0	x 5 =	
Column Totals:	3 (A)		11 (B)

Prevalence Index = B/A = 3.66

Hydrophytic Vegetation Indicators:

___ 1 - Rapid Test for Hydrophytic Vegetation

___ 2 - Dominance Test is >50%

___ 3 - Prevalence Index is ≤3.0[1]

___ 4 - Morphological Adaptations[1] (Provide supporting data in Remarks or on a separate sheet)

___ Problematic Hydrophytic Vegetation[1] (Explain)

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

Hydrophytic Vegetation Present? Yes _____ No ✓

Remarks:
No hydrophytic vegetation present.

SOIL

Sampling Point: SP #5

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

Depth (inches)	Matrix Color (moist)	%	Redox Features Color (moist)	%	Type[1]	Loc[2]	Texture	Remarks

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

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

- ___ Histosol (A1)
- ___ Histic Epipedon (A2)
- ___ Black Histic (A3)
- ___ Hydrogen Sulfide (A4)
- ___ Stratified Layers (A5) (**LRR F**)
- ___ 1 cm Muck (A9) (**LRR F, G, H**)
- ___ Depleted Below Dark Surface (A11)
- ___ Thick Dark Surface (A12)
- ___ Sandy Mucky Mineral (S1)
- ___ 2.5 cm Mucky Peat or Peat (S2) (**LRR G, H**)
- ___ 5 cm Mucky Peat or Peat (S3) (**LRR F**)
- ___ Sandy Gleyed Matrix (S4)
- ___ Sandy Redox (S5)
- ___ Stripped Matrix (S6)
- ___ Loamy Mucky Mineral (F1)
- ___ Loamy Gleyed Matrix (F2)
- ___ Depleted Matrix (F3)
- ___ Redox Dark Surface (F6)
- ___ Depleted Dark Surface (F7)
- ___ Redox Depressions (F8)
- ___ High Plains Depressions (F16) (**MLRA 72 & 73 of LRR H**)

Indicators for Problematic Hydric Soils[3]:

- ___ 1 cm Muck (A9) (**LRR I, J**)
- ___ Coast Prairie Redox (A16) (**LRR F, G, H**)
- ___ Dark Surface (S7) (**LRR G**)
- ___ High Plains Depressions (F16) (**LRR H outside of MLRA 72 & 73**)
- ___ Reduced Vertic (F18)
- ___ Red Parent Material (TF2)
- ___ Very Shallow Dark Surface (TF12)
- ___ Other (Explain in Remarks)

[3]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:

No hydric soils present.

HYDROLOGY

Wetland Hydrology Indicators:

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

- ___ Surface Water (A1)
- ___ High Water Table (A2)
- ___ Saturation (A3)
- ___ Water Marks (B1)
- ___ Sediment Deposits (B2)
- ___ Drift Deposits (B3)
- ___ Algal Mat or Crust (B4)
- ___ Iron Deposits (B5)
- ___ Inundation Visible on Aerial Imagery (B7)
- ___ Water-Stained Leaves (B9)
- ___ Salt Crust (B11)
- ___ Aquatic Invertebrates (B13)
- ___ Hydrogen Sulfide Odor (C1)
- ___ Dry-Season Water Table (C2)
- ___ Oxidized Rhizospheres on Living Roots (C3) (**where not tilled**)
- ___ Presence of Reduced Iron (C4)
- ___ Thin Muck Surface (C7)
- ___ Other (Explain in Remarks)

Secondary Indicators (minimum of two required)

- ___ Surface Soil Cracks (B6)
- ___ Sparsely Vegetated Concave Surface (B8)
- ___ Drainage Patterns (B10)
- ___ Oxidized Rhizospheres on Living Roots (C3) (**where tilled**)
- ___ Crayfish Burrows (C8)
- ___ Saturation Visible on Aerial Imagery (C9)
- ___ Geomorphic Position (D2)
- ___ FAC-Neutral Test (D5)
- ___ Frost-Heave Hummocks (D7) (**LRR F**)

Field Observations:

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

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

Saturation Present? (includes capillary fringe) Yes _____ No ✓ Depth (inches): _____

Wetland Hydrology Present? Yes _____ No ✓

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

Remarks:

No wetland hydrology present.

WETLAND DETERMINATION DATA FORM – Great Plains Region

Project/Site: Chilocco, Oklahoma City/County: Kay County Sampling Date: 8-11-2016

Applicant/Owner: PNE Wind USA, Inc. State: OK Sampling Point: SP #6

Investigator(s): Steve Haddigan, Lindsay McClendon Section, Township, Range: S13 T29N R2E

Landform (hillslope, terrace, etc.): Upland Prairie Local relief (concave, convex, none): Convex Slope (%): 1

Subregion (LRR): Subregion H Lat: 36.986726 Long: -97.030930 Datum: _____

Soil Map Unit Name: SsF - Shilder-Westsum complex NWI classification: No classification

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 _____	No ✓	**Is the Sampled Area within a Wetland?** Yes _____ No ✓
Hydric Soil Present?	Yes _____	No ✓	
Wetland Hydrology Present?	Yes _____	No ✓	

Remarks:
No wetland present in study location. Upland grassland.

VEGETATION – Use scientific names of plants.

Tree Stratum (Plot size: _____)	Absolute % Cover	Dominant Species?	Indicator Status
1. N/A			
2.			
3.			
4.			
	_____ = Total Cover		
Sapling/Shrub Stratum (Plot size: _____)			
1. N/A			
2.			
3.			
4.			
5.			
	_____ = Total Cover		
Herb Stratum (Plot size: _____)			
1. Switchgrass		Yes	FAC
2. Blue Stem		Yes	FACU
3. Milk Thistle		No	
4. Indiangrass		Yes	FACU
5. Milk weed		Yes	UPL
6. Ragweed		Yes	FACU
7.			
8.			
9.			
10.			
	_____ = Total Cover		
Woody Vine Stratum (Plot size: _____)			
1.			
2.			
	_____ = Total Cover		

% Bare Ground in Herb Stratum _____

Dominance Test worksheet:

Number of Dominant Species That Are OBL, FACW, or FAC (excluding FAC−): _____ (A)

Total Number of Dominant Species Across All Strata: _____ (B)

Percent of Dominant Species That Are OBL, FACW, or FAC: _____ (A/B)

Prevalence Index worksheet:

Total % Cover of:		Multiply by:	
OBL species	0	x 1 =	
FACW species	0	x 2 =	
FAC species	1	x 3 =	3
FACU species	3	x 4 =	12
UPL species	1	x 5 =	5
Column Totals:	5 (A)		20 (B)

Prevalence Index = B/A = 4

Hydrophytic Vegetation Indicators:

___ 1 - Rapid Test for Hydrophytic Vegetation

___ 2 - Dominance Test is >50%

___ 3 - Prevalence Index is ≤3.0[1]

___ 4 - Morphological Adaptations[1] (Provide supporting data in Remarks or on a separate sheet)

___ Problematic Hydrophytic Vegetation[1] (Explain)

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

Hydrophytic Vegetation Present? Yes _____ No ✓

Remarks:
No hydrophytic vegetation present.

SOIL

Sampling Point: SP #6

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

Depth (inches)	Matrix Color (moist)	%	Redox Features Color (moist)	%	Type[1]	Loc[2]	Texture	Remarks

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

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

- ___ Histosol (A1)
- ___ Histic Epipedon (A2)
- ___ Black Histic (A3)
- ___ Hydrogen Sulfide (A4)
- ___ Stratified Layers (A5) (**LRR F**)
- ___ 1 cm Muck (A9) (**LRR F, G, H**)
- ___ Depleted Below Dark Surface (A11)
- ___ Thick Dark Surface (A12)
- ___ Sandy Mucky Mineral (S1)
- ___ 2.5 cm Mucky Peat or Peat (S2) (**LRR G, H**)
- ___ 5 cm Mucky Peat or Peat (S3) (**LRR F**)
- ___ Sandy Gleyed Matrix (S4)
- ___ Sandy Redox (S5)
- ___ Stripped Matrix (S6)
- ___ Loamy Mucky Mineral (F1)
- ___ Loamy Gleyed Matrix (F2)
- ___ Depleted Matrix (F3)
- ___ Redox Dark Surface (F6)
- ___ Depleted Dark Surface (F7)
- ___ Redox Depressions (F8)
- ___ High Plains Depressions (F16) (**MLRA 72 & 73 of LRR H**)

Indicators for Problematic Hydric Soils[3]:

- ___ 1 cm Muck (A9) (**LRR I, J**)
- ___ Coast Prairie Redox (A16) (**LRR F, G, H**)
- ___ Dark Surface (S7) (**LRR G**)
- ___ High Plains Depressions (F16) (**LRR H outside of MLRA 72 & 73**)
- ___ Reduced Vertic (F18)
- ___ Red Parent Material (TF2)
- ___ Very Shallow Dark Surface (TF12)
- ___ Other (Explain in Remarks)

[3]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:

No hydric soils present.

HYDROLOGY

Wetland Hydrology Indicators:

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

- ___ Surface Water (A1)
- ___ High Water Table (A2)
- ___ Saturation (A3)
- ___ Water Marks (B1)
- ___ Sediment Deposits (B2)
- ___ Drift Deposits (B3)
- ___ Algal Mat or Crust (B4)
- ___ Iron Deposits (B5)
- ___ Inundation Visible on Aerial Imagery (B7)
- ___ Water-Stained Leaves (B9)
- ___ Salt Crust (B11)
- ___ Aquatic Invertebrates (B13)
- ___ Hydrogen Sulfide Odor (C1)
- ___ Dry-Season Water Table (C2)
- ___ Oxidized Rhizospheres on Living Roots (C3) (**where not tilled**)
- ___ Presence of Reduced Iron (C4)
- ___ Thin Muck Surface (C7)
- ___ Other (Explain in Remarks)

Secondary Indicators (minimum of two required)

- ___ Surface Soil Cracks (B6)
- ___ Sparsely Vegetated Concave Surface (B8)
- ___ Drainage Patterns (B10)
- ___ Oxidized Rhizospheres on Living Roots (C3) (**where tilled**)
- ___ Crayfish Burrows (C8)
- ___ Saturation Visible on Aerial Imagery (C9)
- ___ Geomorphic Position (D2)
- ___ FAC-Neutral Test (D5)
- ___ Frost-Heave Hummocks (D7) (**LRR F**)

Field Observations:

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

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

Saturation Present? (includes capillary fringe) Yes _____ No ✓ Depth (inches): _____

Wetland Hydrology Present? Yes _____ No ✓

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

Remarks:

No wetland hydrology present. Upland grassland prairie.

WETLAND DETERMINATION DATA FORM – Great Plains Region

Project/Site: Chilocco, OK City/County: Kay Sampling Date: 8-17-2016

Applicant/Owner: PNE Wind USA, Inc. State: OK Sampling Point: FS-6A

Investigator(s): Steve Haddigan, Murray Verbonitz Section, Township, Range: S13 T29N R2E

Landform (hillslope, terrace, etc.): Depression Local relief (concave, convex, none): Concave Slope (%): 2%

Subregion (LRR): Subregion H Lat: 36.977929 Long: -97.035118 Datum: _____

Soil Map Unit Name: Bk - Grainola-Ashport Complex NWI classification: _____

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 ✔ No _____	**Is the Sampled Area within a Wetland?** Yes ✔ No _____
Hydric Soil Present?	Yes ✔ No _____	
Wetland Hydrology Present?	Yes ✔ No _____	

Remarks:
Wetland present in study location.

VEGETATION – Use scientific names of plants.

Tree Stratum (Plot size:_____)	Absolute % Cover	Dominant Species?	Indicator Status
1. Black Willow	35	Yes	FACW
2.			
3.			
4.			
	35 = Total Cover		
Sapling/Shrub Stratum (Plot size:_____)			
1.			
2.			
3.			
4.			
5.			
	= Total Cover		
Herb Stratum (Plot size:_____)			
1. Cattails	30	Yes	OBL
2. Sedges	15	Yes	OBL
3. Spike rush	30	Yes	OBL
4.			
5.			
6.			
7.			
8.			
9.			
10.			
	75 = Total Cover		
Woody Vine Stratum (Plot size:_____)			
1.			
2.			
	= Total Cover		

% Bare Ground in Herb Stratum 0

Dominance Test worksheet:

Number of Dominant Species That Are OBL, FACW, or FAC (excluding FAC−): 4 (A)

Total Number of Dominant Species Across All Strata: 4 (B)

Percent of Dominant Species That Are OBL, FACW, or FAC: 100 (A/B)

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 = _____

Hydrophytic Vegetation Indicators:

- ___ 1 - Rapid Test for Hydrophytic Vegetation
- ✔ 2 - Dominance Test is >50%
- ___ 3 - Prevalence Index is ≤3.0[1]
- ___ 4 - Morphological Adaptations[1] (Provide supporting data in Remarks or on a separate sheet)
- ___ Problematic Hydrophytic Vegetation[1] (Explain)

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

Hydrophytic Vegetation Present? Yes ✔ No _____

Remarks:
Hydrophytic vegetation present.

SOIL

Sampling Point: FS-6A

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

Depth (inches)	Matrix Color (moist)	%	Redox Features Color (moist)	%	Type[1]	Loc[2]	Texture	Remarks
0-6	2.5 YR 4/4	80			CS	M	Sandy Clay	
6-12	2.5 YR 5/1	80			CS	M	Sandy	

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

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

- ___ Histosol (A1)
- ___ Histic Epipedon (A2)
- ___ Black Histic (A3)
- ✔ Hydrogen Sulfide (A4)
- ___ Stratified Layers (A5) (**LRR F**)
- ___ 1 cm Muck (A9) (**LRR F, G, H**)
- ___ Depleted Below Dark Surface (A11)
- ___ Thick Dark Surface (A12)
- ___ Sandy Mucky Mineral (S1)
- ___ 2.5 cm Mucky Peat or Peat (S2) (**LRR G, H**)
- ___ 5 cm Mucky Peat or Peat (S3) (**LRR F**)
- Sandy Gleyed Matrix (S4)
- Sandy Redox (S5)
- Stripped Matrix (S6)
- Loamy Mucky Mineral (F1)
- Loamy Gleyed Matrix (F2)
- Depleted Matrix (F3)
- Redox Dark Surface (F6)
- Depleted Dark Surface (F7)
- Redox Depressions (F8)
- High Plains Depressions (F16) (**MLRA 72 & 73 of LRR H**)

Indicators for Problematic Hydric Soils[3]:

- 1 cm Muck (A9) (**LRR I, J**)
- Coast Prairie Redox (A16) (**LRR F, G, H**)
- Dark Surface (S7) (**LRR G**)
- High Plains Depressions (F16) (**LRR H outside of MLRA 72 & 73**)
- Reduced Vertic (F18)
- Red Parent Material (TF2)
- Very Shallow Dark Surface (TF12)
- Other (Explain in Remarks)

[3]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:

Hydric soils present.

HYDROLOGY

Wetland Hydrology Indicators:

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

- ✔ Surface Water (A1)
- ✔ High Water Table (A2)
- ✔ Saturation (A3)
- ___ Water Marks (B1)
- ___ Sediment Deposits (B2)
- ___ Drift Deposits (B3)
- ___ Algal Mat or Crust (B4)
- ___ Iron Deposits (B5)
- ___ Inundation Visible on Aerial Imagery (B7)
- ___ Water-Stained Leaves (B9)
- Salt Crust (B11)
- Aquatic Invertebrates (B13)
- ✔ Hydrogen Sulfide Odor (C1)
- ✔ Dry-Season Water Table (C2)
- Oxidized Rhizospheres on Living Roots (C3) (**where not tilled**)
- Presence of Reduced Iron (C4)
- Thin Muck Surface (C7)
- Other (Explain in Remarks)

Secondary Indicators (minimum of two required)

- Surface Soil Cracks (B6)
- Sparsely Vegetated Concave Surface (B8)
- ✔ Drainage Patterns (B10)
- Oxidized Rhizospheres on Living Roots (C3) (**where tilled**)
- Crayfish Burrows (C8)
- ✔ Saturation Visible on Aerial Imagery (C9)
- Geomorphic Position (D2)
- FAC-Neutral Test (D5)
- Frost-Heave Hummocks (D7) (**LRR F**)

Field Observations:

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

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

Saturation Present? (includes capillary fringe) Yes ✔ No Depth (inches): _____

Wetland Hydrology Present? Yes ✔ No ___

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

Remarks:

Wetland hydrology present.

WETLAND DETERMINATION DATA FORM – Great Plains Region

Project/Site: Chilocco, Oklahoma City/County: Kay County Sampling Date: 8-11-2016

Applicant/Owner: PNE Wind USA, Inc. State: OK Sampling Point: SP #7

Investigator(s): Steve Haddigan, Lindsay McClendon Section, Township, Range: S24 T29N R2E

Landform (hillslope, terrace, etc.): Upland Prairie Local relief (concave, convex, none): _____ Slope (%): 1

Subregion (LRR): Subregion H Lat: 36.981657 Long: -97.035029 Datum: _____

Soil Map Unit Name: TabA - Tabler silt loam NWI classification: No classification

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 _____	No ✓	**Is the Sampled Area within a Wetland?** Yes _____ No ✓
Hydric Soil Present?	Yes _____	No ✓	
Wetland Hydrology Present?	Yes _____	No ✓	

Remarks:
No wetland present in study location. Upland grassland.

VEGETATION – Use scientific names of plants.

Tree Stratum (Plot size: _____)	Absolute % Cover	Dominant Species?	Indicator Status
1. N/A			
2.			
3.			
4.			
	= Total Cover		
Sapling/Shrub Stratum (Plot size: _____)			
1. N/A			
2.			
3.			
4.			
5.			
	= Total Cover		
Herb Stratum (Plot size: _____)			
1. Switchgrass		Yes	FAC
2. Blue stem		Yes	FACU
3. Milk thistle		No	
4. Indiangrass		Yes	FACU
5. Milk weed			UPL
6. Ragweed		Yes	FACU
7.			
8.			
9.			
10.			
	= Total Cover		
Woody Vine Stratum (Plot size: _____)			
1.			
2.			
	= Total Cover		

% Bare Ground in Herb Stratum _____

Dominance Test worksheet:

Number of Dominant Species That Are OBL, FACW, or FAC (excluding FAC−): _____ (A)

Total Number of Dominant Species Across All Strata: _____ (B)

Percent of Dominant Species That Are OBL, FACW, or FAC: _____ (A/B)

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 = _____

Hydrophytic Vegetation Indicators:

___ 1 - Rapid Test for Hydrophytic Vegetation

___ 2 - Dominance Test is >50%

___ 3 - Prevalence Index is ≤3.0[1]

___ 4 - Morphological Adaptations[1] (Provide supporting data in Remarks or on a separate sheet)

___ Problematic Hydrophytic Vegetation[1] (Explain)

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

Hydrophytic Vegetation Present? Yes _____ No ✓

Remarks:
No hydrophytic vegetation present.

SOIL

Sampling Point: SP #7

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

Depth (inches)	Matrix Color (moist)	%	Redox Features Color (moist)	%	Type[1]	Loc[2]	Texture	Remarks

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

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

- ___ Histosol (A1)
- ___ Histic Epipedon (A2)
- ___ Black Histic (A3)
- ___ Hydrogen Sulfide (A4)
- ___ Stratified Layers (A5) (**LRR F**)
- ___ 1 cm Muck (A9) (**LRR F, G, H**)
- ___ Depleted Below Dark Surface (A11)
- ___ Thick Dark Surface (A12)
- ___ Sandy Mucky Mineral (S1)
- ___ 2.5 cm Mucky Peat or Peat (S2) (**LRR G, H**)
- ___ 5 cm Mucky Peat or Peat (S3) (**LRR F**)
- ___ Sandy Gleyed Matrix (S4)
- ___ Sandy Redox (S5)
- ___ Stripped Matrix (S6)
- ___ Loamy Mucky Mineral (F1)
- ___ Loamy Gleyed Matrix (F2)
- ___ Depleted Matrix (F3)
- ___ Redox Dark Surface (F6)
- ___ Depleted Dark Surface (F7)
- ___ Redox Depressions (F8)
- ___ High Plains Depressions (F16) (**MLRA 72 & 73 of LRR H**)

Indicators for Problematic Hydric Soils[3]:

- ___ 1 cm Muck (A9) (**LRR I, J**)
- ___ Coast Prairie Redox (A16) (**LRR F, G, H**)
- ___ Dark Surface (S7) (**LRR G**)
- ___ High Plains Depressions (F16) (**LRR H outside of MLRA 72 & 73**)
- ___ Reduced Vertic (F18)
- ___ Red Parent Material (TF2)
- ___ Very Shallow Dark Surface (TF12)
- ___ Other (Explain in Remarks)

[3]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:

No hydric soils present.

HYDROLOGY

Wetland Hydrology Indicators:

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

- ___ Surface Water (A1)
- ___ High Water Table (A2)
- ___ Saturation (A3)
- ___ Water Marks (B1)
- ___ Sediment Deposits (B2)
- ___ Drift Deposits (B3)
- ___ Algal Mat or Crust (B4)
- ___ Iron Deposits (B5)
- ___ Inundation Visible on Aerial Imagery (B7)
- ___ Water-Stained Leaves (B9)
- ___ Salt Crust (B11)
- ___ Aquatic Invertebrates (B13)
- ___ Hydrogen Sulfide Odor (C1)
- ___ Dry-Season Water Table (C2)
- ___ Oxidized Rhizospheres on Living Roots (C3) (**where not tilled**)
- ___ Presence of Reduced Iron (C4)
- ___ Thin Muck Surface (C7)
- ___ Other (Explain in Remarks)

Secondary Indicators (minimum of two required)

- ___ Surface Soil Cracks (B6)
- ___ Sparsely Vegetated Concave Surface (B8)
- ___ Drainage Patterns (B10)
- ___ Oxidized Rhizospheres on Living Roots (C3) (**where tilled**)
- ___ Crayfish Burrows (C8)
- ___ Saturation Visible on Aerial Imagery (C9)
- ___ Geomorphic Position (D2)
- ___ FAC-Neutral Test (D5)
- ___ Frost-Heave Hummocks (D7) (**LRR F**)

Field Observations:

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

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

Saturation Present? (includes capillary fringe) Yes _____ No ✓ Depth (inches): _____

Wetland Hydrology Present? Yes _____ No ✓

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

Remarks:

No wetland hydrology present. Upland grassland prairie.

WETLAND DETERMINATION DATA FORM – Great Plains Region

Project/Site: Chilocco, Oklahoma City/County: Kay County Sampling Date: 8-11-2016

Applicant/Owner: PNE Wind USA, Inc. State: OK Sampling Point: SP #8

Investigator(s): Steve Haddigan, Lindsay McClendon Section, Township, Range: S24 T29N R2E

Landform (hillslope, terrace, etc.): Upland Prairie Local relief (concave, convex, none): _____ Slope (%): 1

Subregion (LRR): Subregion H Lat: 36.978618 Long: -97.036074 Datum: _____

Soil Map Unit Name: BeA - Bethany silt loam NWI classification: No classification

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 _____	No ✓	**Is the Sampled Area within a Wetland?** Yes _____ No ✓
Hydric Soil Present?	Yes _____	No ✓	
Wetland Hydrology Present?	Yes _____	No ✓	

Remarks:
No wetland present in study location. Upland grassland.

VEGETATION – Use scientific names of plants.

Tree Stratum (Plot size: _____)	Absolute % Cover	Dominant Species?	Indicator Status
1. N/A			
2.			
3.			
4.			
	_____ = Total Cover		
Sapling/Shrub Stratum (Plot size: _____)			
1. N/A			
2.			
3.			
4.			
5.			
	_____ = Total Cover		
Herb Stratum (Plot size: _____)			
1. Switchgrass		Yes	FAC
2. Blue stem		Yes	FACU
3. Milk thistle		No	
4. Indiangrass		Yes	FACU
5. Milk weed			UPL
6. Ragweed		Yes	FACU
7.			
8.			
9.			
10.			
	_____ = Total Cover		
Woody Vine Stratum (Plot size: _____)			
1.			
2.			
	_____ = Total Cover		
% Bare Ground in Herb Stratum _____			

Dominance Test worksheet:

Number of Dominant Species That Are OBL, FACW, or FAC (excluding FAC−): _____ (A)

Total Number of Dominant Species Across All Strata: _____ (B)

Percent of Dominant Species That Are OBL, FACW, or FAC: _____ (A/B)

Prevalence Index worksheet:

Total % Cover of:		Multiply by:	
OBL species	_____	x 1 =	_____
FACW species	_____	x 2 =	_____
FAC species	1	x 3 =	3
FACU species	3	x 4 =	12
UPL species	1	x 5 =	5
Column Totals:	5 (A)		20 (B)

Prevalence Index = B/A = 4

Hydrophytic Vegetation Indicators:

___ 1 - Rapid Test for Hydrophytic Vegetation

___ 2 - Dominance Test is >50%

___ 3 - Prevalence Index is ≤3.0[1]

___ 4 - Morphological Adaptations[1] (Provide supporting data in Remarks or on a separate sheet)

___ Problematic Hydrophytic Vegetation[1] (Explain)

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

Hydrophytic Vegetation Present? Yes _____ No ✓

Remarks:
No hydrophytic vegetation present.

SOIL

Sampling Point: SP #8

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

Depth (inches)	Matrix Color (moist)	%	Redox Features Color (moist)	%	Type[1]	Loc[2]	Texture	Remarks

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

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

- ___ Histosol (A1)
- ___ Histic Epipedon (A2)
- ___ Black Histic (A3)
- ___ Hydrogen Sulfide (A4)
- ___ Stratified Layers (A5) (**LRR F**)
- ___ 1 cm Muck (A9) (**LRR F, G, H**)
- ___ Depleted Below Dark Surface (A11)
- ___ Thick Dark Surface (A12)
- ___ Sandy Mucky Mineral (S1)
- ___ 2.5 cm Mucky Peat or Peat (S2) (**LRR G, H**)
- ___ 5 cm Mucky Peat or Peat (S3) (**LRR F**)
- ___ Sandy Gleyed Matrix (S4)
- ___ Sandy Redox (S5)
- ___ Stripped Matrix (S6)
- ___ Loamy Mucky Mineral (F1)
- ___ Loamy Gleyed Matrix (F2)
- ___ Depleted Matrix (F3)
- ___ Redox Dark Surface (F6)
- ___ Depleted Dark Surface (F7)
- ___ Redox Depressions (F8)
- ___ High Plains Depressions (F16) (**MLRA 72 & 73 of LRR H**)

Indicators for Problematic Hydric Soils[3]:

- ___ 1 cm Muck (A9) (**LRR I, J**)
- ___ Coast Prairie Redox (A16) (**LRR F, G, H**)
- ___ Dark Surface (S7) (**LRR G**)
- ___ High Plains Depressions (F16) (**LRR H outside of MLRA 72 & 73**)
- ___ Reduced Vertic (F18)
- ___ Red Parent Material (TF2)
- ___ Very Shallow Dark Surface (TF12)
- ___ Other (Explain in Remarks)

[3]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:

No hydric soils present.

HYDROLOGY

Wetland Hydrology Indicators:

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

- ___ Surface Water (A1)
- ___ High Water Table (A2)
- ___ Saturation (A3)
- ___ Water Marks (B1)
- ___ Sediment Deposits (B2)
- ___ Drift Deposits (B3)
- ___ Algal Mat or Crust (B4)
- ___ Iron Deposits (B5)
- ___ Inundation Visible on Aerial Imagery (B7)
- ___ Water-Stained Leaves (B9)
- ___ Salt Crust (B11)
- ___ Aquatic Invertebrates (B13)
- ___ Hydrogen Sulfide Odor (C1)
- ___ Dry-Season Water Table (C2)
- ___ Oxidized Rhizospheres on Living Roots (C3) (**where not tilled**)
- ___ Presence of Reduced Iron (C4)
- ___ Thin Muck Surface (C7)
- ___ Other (Explain in Remarks)

Secondary Indicators (minimum of two required)

- ___ Surface Soil Cracks (B6)
- ___ Sparsely Vegetated Concave Surface (B8)
- ___ Drainage Patterns (B10)
- ___ Oxidized Rhizospheres on Living Roots (C3) (**where tilled**)
- ___ Crayfish Burrows (C8)
- ___ Saturation Visible on Aerial Imagery (C9)
- ___ Geomorphic Position (D2)
- ___ FAC-Neutral Test (D5)
- ___ Frost-Heave Hummocks (D7) (**LRR F**)

Field Observations:

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

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

Saturation Present? (includes capillary fringe) Yes _____ No ✓ Depth (inches): _____

Wetland Hydrology Present? **Yes** _____ **No** ✓

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

Remarks:

No wetland hydrology present. Upland grassland prairie.

WETLAND DETERMINATION DATA FORM – Great Plains Region

Project/Site: Chilocco, Oklahoma City/County: Kay County Sampling Date: 8-17-2016

Applicant/Owner: PNE Wind USA, Inc. State: OK Sampling Point: SP #10

Investigator(s): Steve Haddigan, Murray Verbonitz Section, Township, Range: S24 T29N R2E

Landform (hillslope, terrace, etc.): Upland Prairie Local relief (concave, convex, none): _____ Slope (%): 1

Subregion (LRR): Subregion H Lat: 36.976382 Long: -97.039923 Datum: _____

Soil Map Unit Name: KrC2 - Kirkland-Renfrow complex NWI classification: No classification.

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 _____	No ✓	**Is the Sampled Area within a Wetland?** Yes _____ No ✓
Hydric Soil Present?	Yes _____	No ✓	
Wetland Hydrology Present?	Yes _____	No ✓	

Remarks:
No wetland present in study location. Upland grassland.

VEGETATION – Use scientific names of plants.

Tree Stratum (Plot size: _____)	Absolute % Cover	Dominant Species?	Indicator Status
1. N/A			
2.			
3.			
4.			
	_____ = Total Cover		
Sapling/Shrub Stratum (Plot size: _____)			
1. N/A			
2.			
3.			
4.			
5.			
	_____ = Total Cover		
Herb Stratum (Plot size: _____)			
1. Switchgrass		Yes	FAC
2. Blue stem		Yes	FACU
3. Milk thistle		No	
4. Indiangrass		Yes	FACU
5. Milk weed			UPL
6. Ragweed		Yes	FACU
7.			
8.			
9.			
10.			
	_____ = Total Cover		
Woody Vine Stratum (Plot size: _____)			
1.			
2.			
	_____ = Total Cover		

% Bare Ground in Herb Stratum _____

Dominance Test worksheet:

Number of Dominant Species That Are OBL, FACW, or FAC (excluding FAC−): _____ (A)

Total Number of Dominant Species Across All Strata: _____ (B)

Percent of Dominant Species That Are OBL, FACW, or FAC: _____ (A/B)

Prevalence Index worksheet:

Total % Cover of:		Multiply by:	
OBL species	_____	x 1 =	_____
FACW species	_____	x 2 =	_____
FAC species	1	x 3 =	3
FACU species	3	x 4 =	12
UPL species	1	x 5 =	5
Column Totals:	5	(A)	20 (B)

Prevalence Index = B/A = 4

Hydrophytic Vegetation Indicators:

___ 1 - Rapid Test for Hydrophytic Vegetation

___ 2 - Dominance Test is >50%

___ 3 - Prevalence Index is ≤3.0[1]

___ 4 - Morphological Adaptations[1] (Provide supporting data in Remarks or on a separate sheet)

___ Problematic Hydrophytic Vegetation[1] (Explain)

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

Hydrophytic Vegetation Present? Yes _____ No ✓

Remarks:
No hydrophytic vegetation present.

SOIL

Sampling Point: SP #10

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

Depth (inches)	Matrix Color (moist)	%	Redox Features Color (moist)	%	Type[1]	Loc[2]	Texture	Remarks

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

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

- ___ Histosol (A1)
- ___ Histic Epipedon (A2)
- ___ Black Histic (A3)
- ___ Hydrogen Sulfide (A4)
- ___ Stratified Layers (A5) (**LRR F**)
- ___ 1 cm Muck (A9) (**LRR F, G, H**)
- ___ Depleted Below Dark Surface (A11)
- ___ Thick Dark Surface (A12)
- ___ Sandy Mucky Mineral (S1)
- ___ 2.5 cm Mucky Peat or Peat (S2) (**LRR G, H**)
- ___ 5 cm Mucky Peat or Peat (S3) (**LRR F**)
- ___ Sandy Gleyed Matrix (S4)
- ___ Sandy Redox (S5)
- ___ Stripped Matrix (S6)
- ___ Loamy Mucky Mineral (F1)
- ___ Loamy Gleyed Matrix (F2)
- ___ Depleted Matrix (F3)
- ___ Redox Dark Surface (F6)
- ___ Depleted Dark Surface (F7)
- ___ Redox Depressions (F8)
- ___ High Plains Depressions (F16) (**MLRA 72 & 73 of LRR H**)

Indicators for Problematic Hydric Soils[3]:

- ___ 1 cm Muck (A9) (**LRR I, J**)
- ___ Coast Prairie Redox (A16) (**LRR F, G, H**)
- ___ Dark Surface (S7) (**LRR G**)
- ___ High Plains Depressions (F16) (**LRR H outside of MLRA 72 & 73**)
- ___ Reduced Vertic (F18)
- ___ Red Parent Material (TF2)
- ___ Very Shallow Dark Surface (TF12)
- ___ Other (Explain in Remarks)

[3]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:

No hydric soils present.

HYDROLOGY

Wetland Hydrology Indicators:

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

- ___ Surface Water (A1)
- ___ High Water Table (A2)
- ___ Saturation (A3)
- ___ Water Marks (B1)
- ___ Sediment Deposits (B2)
- ___ Drift Deposits (B3)
- ___ Algal Mat or Crust (B4)
- ___ Iron Deposits (B5)
- ___ Inundation Visible on Aerial Imagery (B7)
- ___ Water-Stained Leaves (B9)
- ___ Salt Crust (B11)
- ___ Aquatic Invertebrates (B13)
- ___ Hydrogen Sulfide Odor (C1)
- ___ Dry-Season Water Table (C2)
- ___ Oxidized Rhizospheres on Living Roots (C3) (**where not tilled**)
- ___ Presence of Reduced Iron (C4)
- ___ Thin Muck Surface (C7)
- ___ Other (Explain in Remarks)

Secondary Indicators (minimum of two required)

- ___ Surface Soil Cracks (B6)
- ___ Sparsely Vegetated Concave Surface (B8)
- ___ Drainage Patterns (B10)
- ___ Oxidized Rhizospheres on Living Roots (C3) (**where tilled**)
- ___ Crayfish Burrows (C8)
- ___ Saturation Visible on Aerial Imagery (C9)
- ___ Geomorphic Position (D2)
- ___ FAC-Neutral Test (D5)
- ___ Frost-Heave Hummocks (D7) (**LRR F**)

Field Observations:

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

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

Saturation Present? (includes capillary fringe) Yes _____ No ✓ Depth (inches): _____

Wetland Hydrology Present? Yes _____ No ✓

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

Remarks:

No wetland hydrology present. Upland grassland prairie.

WETLAND DETERMINATION DATA FORM – Great Plains Region

Project/Site: Chilocco, Oklahoma City/County: Kay County Sampling Date: 8-17-2016

Applicant/Owner: PNE Wind USA, Inc. State: OK Sampling Point: SP #11

Investigator(s): Steve Haddigan, Murray Verbonitz Section, Township, Range: S24 T29N R2E

Landform (hillslope, terrace, etc.): Upland Prairie Local relief (concave, convex, none): _____ Slope (%): 1

Subregion (LRR): Subregion H Lat: 36.976710 Long: -97. Datum: _____

Soil Map Unit Name: NeB - Agra-Foraker complex NWI classification: No classification

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 _____	No ✓	**Is the Sampled Area within a Wetland?** Yes _____ No ✓
Hydric Soil Present?	Yes _____	No ✓	
Wetland Hydrology Present?	Yes _____	No ✓	

Remarks:
No wetland present in study location. Upland

VEGETATION – Use scientific names of plants.

	Absolute % Cover	Dominant Species?	Indicator Status
Tree Stratum (Plot size: _____)			
1. Oak	5	No	
2. Elm	5	No	
3.			
4.			
	_____ = Total Cover		
Sapling/Shrub Stratum (Plot size: _____)			
1. N/A			
2.			
3.			
4.			
5.			
	_____ = Total Cover		
Herb Stratum (Plot size: _____)			
1. Switchgrass		Yes	FAC
2. Blue stem		Yes	FACU
3. Ragweed		Yes	FACU
4. Indiangrass		Yes	FACU
5. Milk weed			UPL
6.			
7.			
8.			
9.			
10.			
	_____ = Total Cover		
Woody Vine Stratum (Plot size: _____)			
1.			
2.			
	_____ = Total Cover		

% Bare Ground in Herb Stratum _____

Dominance Test worksheet:

Number of Dominant Species That Are OBL, FACW, or FAC (excluding FAC−): _____ (A)

Total Number of Dominant Species Across All Strata: _____ (B)

Percent of Dominant Species That Are OBL, FACW, or FAC: _____ (A/B)

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	1	x 5 =	_____
Column Totals:	_____ (A)		_____ (B)

Prevalence Index = B/A = _____

Hydrophytic Vegetation Indicators:

___ 1 - Rapid Test for Hydrophytic Vegetation

___ 2 - Dominance Test is >50%

___ 3 - Prevalence Index is ≤3.0[1]

___ 4 - Morphological Adaptations[1] (Provide supporting data in Remarks or on a separate sheet)

___ Problematic Hydrophytic Vegetation[1] (Explain)

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

Hydrophytic Vegetation Present? Yes _____ No ✓

Remarks:
No hydrophytic vegetation present.

SOIL

Sampling Point: SP #11

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

Depth (inches)	Matrix Color (moist)	%	Redox Features Color (moist)	%	Type[1]	Loc[2]	Texture	Remarks

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

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

- ___ Histosol (A1)
- ___ Histic Epipedon (A2)
- ___ Black Histic (A3)
- ___ Hydrogen Sulfide (A4)
- ___ Stratified Layers (A5) (**LRR F**)
- ___ 1 cm Muck (A9) (**LRR F, G, H**)
- ___ Depleted Below Dark Surface (A11)
- ___ Thick Dark Surface (A12)
- ___ Sandy Mucky Mineral (S1)
- ___ 2.5 cm Mucky Peat or Peat (S2) (**LRR G, H**)
- ___ 5 cm Mucky Peat or Peat (S3) (**LRR F**)
- ___ Sandy Gleyed Matrix (S4)
- ___ Sandy Redox (S5)
- ___ Stripped Matrix (S6)
- ___ Loamy Mucky Mineral (F1)
- ___ Loamy Gleyed Matrix (F2)
- ___ Depleted Matrix (F3)
- ___ Redox Dark Surface (F6)
- ___ Depleted Dark Surface (F7)
- ___ Redox Depressions (F8)
- ___ High Plains Depressions (F16) (**MLRA 72 & 73 of LRR H**)

Indicators for Problematic Hydric Soils[3]:

- ___ 1 cm Muck (A9) (**LRR I, J**)
- ___ Coast Prairie Redox (A16) (**LRR F, G, H**)
- ___ Dark Surface (S7) (**LRR G**)
- ___ High Plains Depressions (F16) (**LRR H outside of MLRA 72 & 73**)
- ___ Reduced Vertic (F18)
- ___ Red Parent Material (TF2)
- ___ Very Shallow Dark Surface (TF12)
- ___ Other (Explain in Remarks)

[3]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:

No hydric soils present.

HYDROLOGY

Wetland Hydrology Indicators:

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

- ___ Surface Water (A1)
- ___ High Water Table (A2)
- ___ Saturation (A3)
- ___ Water Marks (B1)
- ___ Sediment Deposits (B2)
- ___ Drift Deposits (B3)
- ___ Algal Mat or Crust (B4)
- ___ Iron Deposits (B5)
- ___ Inundation Visible on Aerial Imagery (B7)
- ___ Water-Stained Leaves (B9)
- ___ Salt Crust (B11)
- ___ Aquatic Invertebrates (B13)
- ___ Hydrogen Sulfide Odor (C1)
- ___ Dry-Season Water Table (C2)
- ___ Oxidized Rhizospheres on Living Roots (C3) (**where not tilled**)
- ___ Presence of Reduced Iron (C4)
- ___ Thin Muck Surface (C7)
- ___ Other (Explain in Remarks)

Secondary Indicators (minimum of two required)

- ___ Surface Soil Cracks (B6)
- ___ Sparsely Vegetated Concave Surface (B8)
- ___ Drainage Patterns (B10)
- ___ Oxidized Rhizospheres on Living Roots (C3) (**where tilled**)
- ___ Crayfish Burrows (C8)
- ___ Saturation Visible on Aerial Imagery (C9)
- ___ Geomorphic Position (D2)
- ___ FAC-Neutral Test (D5)
- ___ Frost-Heave Hummocks (D7) (**LRR F**)

Field Observations:

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

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

Saturation Present? (includes capillary fringe) Yes _____ No ✓ Depth (inches): _____

Wetland Hydrology Present? Yes _____ No ✓

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

Remarks:

No wetland hydrology present. Upland grassland prairie.

WETLAND DETERMINATION DATA FORM – Great Plains Region

Project/Site: Chilocco, Oklahoma City/County: Kay County Sampling Date: 8-17-2016

Applicant/Owner: PNE Wind USA, Inc. State: OK Sampling Point: SP #13

Investigator(s): Steve Haddigan, Murray Verbonitz Section, Township, Range: S25 T29N R2E

Landform (hillslope, terrace, etc.): Prairie Local relief (concave, convex, none): _____ Slope (%): 1

Subregion (LRR): Subregion H Lat: 36.960405 Long: -97.044552 Datum: _____

Soil Map Unit Name: KnB - Kirkland silt loam NWI classification: No classification

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 _____	No ✓	**Is the Sampled Area within a Wetland?** Yes _____ No ✓
Hydric Soil Present?	Yes _____	No ✓	
Wetland Hydrology Present?	Yes _____	No ✓	

Remarks:
No wetland present in study location. Upland grassland.

VEGETATION – Use scientific names of plants.

Tree Stratum (Plot size: _____)	Absolute % Cover	Dominant Species?	Indicator Status
1. N/A			
2.			
3.			
4.			
	_____ = Total Cover		
Sapling/Shrub Stratum (Plot size: _____)			
1. N/A			
2.			
3.			
4.			
5.			
	_____ = Total Cover		
Herb Stratum (Plot size: _____)			
1. Switchgrass		Yes	FAC
2. Blue stem		Yes	FACU
3. Milk thistle		No	
4. Indiangrass		Yes	FACU
5. Milk weed			UPL
6. Ragweed		Yes	FACU
7.			
8.			
9.			
10.			
	_____ = Total Cover		
Woody Vine Stratum (Plot size: _____)			
1.			
2.			
	_____ = Total Cover		

% Bare Ground in Herb Stratum _____

Dominance Test worksheet:

Number of Dominant Species That Are OBL, FACW, or FAC (excluding FAC−): _____ (A)

Total Number of Dominant Species Across All Strata: _____ (B)

Percent of Dominant Species That Are OBL, FACW, or FAC: _____ (A/B)

Prevalence Index worksheet:

Total % Cover of:		Multiply by:	
OBL species	_____	x 1 =	_____
FACW species	_____	x 2 =	_____
FAC species	1	x 3 =	3
FACU species	3	x 4 =	12
UPL species	1	x 5 =	5
Column Totals:	5 (A)		20 (B)

Prevalence Index = B/A = 4

Hydrophytic Vegetation Indicators:

___ 1 - Rapid Test for Hydrophytic Vegetation

___ 2 - Dominance Test is >50%

___ 3 - Prevalence Index is ≤3.0[1]

___ 4 - Morphological Adaptations[1] (Provide supporting data in Remarks or on a separate sheet)

___ Problematic Hydrophytic Vegetation[1] (Explain)

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

Hydrophytic Vegetation Present? Yes _____ No ✓

Remarks:
No hydrophytic vegetation present.

SOIL

Sampling Point: SP #13

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

Depth (inches)	Matrix Color (moist)	%	Redox Features Color (moist)	%	Type[1]	Loc[2]	Texture	Remarks

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

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

- ___ Histosol (A1)
- ___ Histic Epipedon (A2)
- ___ Black Histic (A3)
- ___ Hydrogen Sulfide (A4)
- ___ Stratified Layers (A5) (**LRR F**)
- ___ 1 cm Muck (A9) (**LRR F, G, H**)
- ___ Depleted Below Dark Surface (A11)
- ___ Thick Dark Surface (A12)
- ___ Sandy Mucky Mineral (S1)
- ___ 2.5 cm Mucky Peat or Peat (S2) (**LRR G, H**)
- ___ 5 cm Mucky Peat or Peat (S3) (**LRR F**)
- ___ Sandy Gleyed Matrix (S4)
- ___ Sandy Redox (S5)
- ___ Stripped Matrix (S6)
- ___ Loamy Mucky Mineral (F1)
- ___ Loamy Gleyed Matrix (F2)
- ___ Depleted Matrix (F3)
- ___ Redox Dark Surface (F6)
- ___ Depleted Dark Surface (F7)
- ___ Redox Depressions (F8)
- ___ High Plains Depressions (F16) (**MLRA 72 & 73 of LRR H**)

Indicators for Problematic Hydric Soils[3]:

- ___ 1 cm Muck (A9) (**LRR I, J**)
- ___ Coast Prairie Redox (A16) (**LRR F, G, H**)
- ___ Dark Surface (S7) (**LRR G**)
- ___ High Plains Depressions (F16) (**LRR H outside of MLRA 72 & 73**)
- ___ Reduced Vertic (F18)
- ___ Red Parent Material (TF2)
- ___ Very Shallow Dark Surface (TF12)
- ___ Other (Explain in Remarks)

[3]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:

No hydric soils present.

HYDROLOGY

Wetland Hydrology Indicators:

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

- ___ Surface Water (A1)
- ___ High Water Table (A2)
- ___ Saturation (A3)
- ___ Water Marks (B1)
- ___ Sediment Deposits (B2)
- ___ Drift Deposits (B3)
- ___ Algal Mat or Crust (B4)
- ___ Iron Deposits (B5)
- ___ Inundation Visible on Aerial Imagery (B7)
- ___ Water-Stained Leaves (B9)
- ___ Salt Crust (B11)
- ___ Aquatic Invertebrates (B13)
- ___ Hydrogen Sulfide Odor (C1)
- ___ Dry-Season Water Table (C2)
- ___ Oxidized Rhizospheres on Living Roots (C3) (**where not tilled**)
- ___ Presence of Reduced Iron (C4)
- ___ Thin Muck Surface (C7)
- ___ Other (Explain in Remarks)

Secondary Indicators (minimum of two required)

- ___ Surface Soil Cracks (B6)
- ___ Sparsely Vegetated Concave Surface (B8)
- ___ Drainage Patterns (B10)
- ___ Oxidized Rhizospheres on Living Roots (C3) (**where tilled**)
- ___ Crayfish Burrows (C8)
- ___ Saturation Visible on Aerial Imagery (C9)
- ___ Geomorphic Position (D2)
- ___ FAC-Neutral Test (D5)
- ___ Frost-Heave Hummocks (D7) (**LRR F**)

Field Observations:

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

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

Saturation Present? (includes capillary fringe) Yes _____ No ✓ Depth (inches): _____

Wetland Hydrology Present? Yes _____ No ✓

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

Remarks:

No wetland hydrology present. Upland grassland prairie.

WETLAND DETERMINATION DATA FORM – Great Plains Region

Project/Site: Chilocco, Oklahoma City/County: Kay County Sampling Date: 8-17-2016

Applicant/Owner: PNE Wind USA, Inc. State: OK Sampling Point: SP #14

Investigator(s): Steve Haddigan, Murray Verbonitz Section, Township, Range: S25 T29N R2E

Landform (hillslope, terrace, etc.): Prairie Local relief (concave, convex, none): _____ Slope (%): 1

Subregion (LRR): Subregion H Lat: 36.965898 Long: -97.044983 Datum: _____

Soil Map Unit Name: KnB - Kirkland silt loam NWI classification: No classification

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 _____	No ✓	**Is the Sampled Area within a Wetland?** Yes _____ No ✓
Hydric Soil Present?	Yes _____	No ✓	
Wetland Hydrology Present?	Yes _____	No ✓	

Remarks:
No wetland present in study location. Upland grassland.

VEGETATION – Use scientific names of plants.

Tree Stratum (Plot size: _____)	Absolute % Cover	Dominant Species?	Indicator Status
1. N/A			
2.			
3.			
4.			
	_____ = Total Cover		
Sapling/Shrub Stratum (Plot size: _____)			
1. N/A			
2.			
3.			
4.			
5.			
	_____ = Total Cover		
Herb Stratum (Plot size: _____)			
1. Switchgrass		Yes	FAC
2. Blue stem		Yes	FACU
3. Milk thistle		No	
4. Indiangrass		Yes	FACU
5. Milk weed			UPL
6. Ragweed		Yes	FACU
7.			
8.			
9.			
10.			
	_____ = Total Cover		
Woody Vine Stratum (Plot size: _____)			
1.			
2.			
	_____ = Total Cover		
% Bare Ground in Herb Stratum _____			

Dominance Test worksheet:

Number of Dominant Species That Are OBL, FACW, or FAC (excluding FAC−): _____ (A)

Total Number of Dominant Species Across All Strata: _____ (B)

Percent of Dominant Species That Are OBL, FACW, or FAC: _____ (A/B)

Prevalence Index worksheet:

Total % Cover of:		Multiply by:	
OBL species	_____	x 1 =	_____
FACW species	_____	x 2 =	_____
FAC species	1	x 3 =	3
FACU species	3	x 4 =	12
UPL species	1	x 5 =	5
Column Totals:	5 (A)		20 (B)

Prevalence Index = B/A = 4

Hydrophytic Vegetation Indicators:

___ 1 - Rapid Test for Hydrophytic Vegetation

___ 2 - Dominance Test is >50%

___ 3 - Prevalence Index is ≤3.0[1]

___ 4 - Morphological Adaptations[1] (Provide supporting data in Remarks or on a separate sheet)

___ Problematic Hydrophytic Vegetation[1] (Explain)

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

Hydrophytic Vegetation Present? Yes _____ No ✓

Remarks:
No hydrophytic vegetation present.

WETLAND DETERMINATION DATA FORM – Great Plains Region

Project/Site: Chilocco, Oklahoma City/County: Kay County Sampling Date: 8-17-2016

Applicant/Owner: PNE Wind USA, Inc. State: OK Sampling Point: SP #14

Investigator(s): Steve Haddigan, Murray Verbonitz Section, Township, Range: S25 T29N R2E

Landform (hillslope, terrace, etc.): Prairie Local relief (concave, convex, none): _____ Slope (%): 1

Subregion (LRR): Subregion H Lat: 36.965898 Long: -97.044983 Datum: _____

Soil Map Unit Name: KnB - Kirkland silt loam NWI classification: No classification

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 _____	No ✓	**Is the Sampled Area within a Wetland?** Yes _____ No ✓
Hydric Soil Present?	Yes _____	No ✓	
Wetland Hydrology Present?	Yes _____	No ✓	

Remarks:
No wetland present in study location. Upland grassland.

VEGETATION – Use scientific names of plants.

Tree Stratum (Plot size: _____)	Absolute % Cover	Dominant Species?	Indicator Status
1. N/A			
2.			
3.			
4.			
	_____ = Total Cover		
Sapling/Shrub Stratum (Plot size: _____)			
1. N/A			
2.			
3.			
4.			
5.			
	_____ = Total Cover		
Herb Stratum (Plot size: _____)			
1. Switchgrass		Yes	FAC
2. Blue stem		Yes	FACU
3. Milk thistle		No	
4. Indiangrass		Yes	FACU
5. Milk weed			UPL
6. Ragweed		Yes	FACU
7.			
8.			
9.			
10.			
	_____ = Total Cover		
Woody Vine Stratum (Plot size: _____)			
1.			
2.			
	_____ = Total Cover		
% Bare Ground in Herb Stratum _____			

Dominance Test worksheet:

Number of Dominant Species That Are OBL, FACW, or FAC (excluding FAC−): _____ (A)

Total Number of Dominant Species Across All Strata: _____ (B)

Percent of Dominant Species That Are OBL, FACW, or FAC: _____ (A/B)

Prevalence Index worksheet:

Total % Cover of:		Multiply by:	
OBL species	_____	x 1 =	_____
FACW species	_____	x 2 =	_____
FAC species	1	x 3 =	3
FACU species	3	x 4 =	12
UPL species	1	x 5 =	5
Column Totals:	5 (A)		20 (B)

Prevalence Index = B/A = 4

Hydrophytic Vegetation Indicators:

___ 1 - Rapid Test for Hydrophytic Vegetation

___ 2 - Dominance Test is >50%

___ 3 - Prevalence Index is ≤3.0[1]

___ 4 - Morphological Adaptations[1] (Provide supporting data in Remarks or on a separate sheet)

___ Problematic Hydrophytic Vegetation[1] (Explain)

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

Hydrophytic Vegetation Present? Yes _____ No ✓

Remarks:
No hydrophytic vegetation present.

SOIL

Sampling Point: SP #14

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

Depth (inches)	Matrix Color (moist)	%	Redox Features Color (moist)	%	Type[1]	Loc[2]	Texture	Remarks

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

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

- ___ Histosol (A1)
- ___ Histic Epipedon (A2)
- ___ Black Histic (A3)
- ___ Hydrogen Sulfide (A4)
- ___ Stratified Layers (A5) (**LRR F**)
- ___ 1 cm Muck (A9) (**LRR F, G, H**)
- ___ Depleted Below Dark Surface (A11)
- ___ Thick Dark Surface (A12)
- ___ Sandy Mucky Mineral (S1)
- ___ 2.5 cm Mucky Peat or Peat (S2) (**LRR G, H**)
- ___ 5 cm Mucky Peat or Peat (S3) (**LRR F**)
- ___ Sandy Gleyed Matrix (S4)
- ___ Sandy Redox (S5)
- ___ Stripped Matrix (S6)
- ___ Loamy Mucky Mineral (F1)
- ___ Loamy Gleyed Matrix (F2)
- ___ Depleted Matrix (F3)
- ___ Redox Dark Surface (F6)
- ___ Depleted Dark Surface (F7)
- ___ Redox Depressions (F8)
- ___ High Plains Depressions (F16) (**MLRA 72 & 73 of LRR H**)

Indicators for Problematic Hydric Soils[3]:

- ___ 1 cm Muck (A9) (**LRR I, J**)
- ___ Coast Prairie Redox (A16) (**LRR F, G, H**)
- ___ Dark Surface (S7) (**LRR G**)
- ___ High Plains Depressions (F16) (**LRR H outside of MLRA 72 & 73**)
- ___ Reduced Vertic (F18)
- ___ Red Parent Material (TF2)
- ___ Very Shallow Dark Surface (TF12)
- ___ Other (Explain in Remarks)

[3]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:

No hydric soils present.

HYDROLOGY

Wetland Hydrology Indicators:

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

- ___ Surface Water (A1)
- ___ High Water Table (A2)
- ___ Saturation (A3)
- ___ Water Marks (B1)
- ___ Sediment Deposits (B2)
- ___ Drift Deposits (B3)
- ___ Algal Mat or Crust (B4)
- ___ Iron Deposits (B5)
- ___ Inundation Visible on Aerial Imagery (B7)
- ___ Water-Stained Leaves (B9)
- ___ Salt Crust (B11)
- ___ Aquatic Invertebrates (B13)
- ___ Hydrogen Sulfide Odor (C1)
- ___ Dry-Season Water Table (C2)
- ___ Oxidized Rhizospheres on Living Roots (C3) (**where not tilled**)
- ___ Presence of Reduced Iron (C4)
- ___ Thin Muck Surface (C7)
- ___ Other (Explain in Remarks)

Secondary Indicators (minimum of two required)

- ___ Surface Soil Cracks (B6)
- ___ Sparsely Vegetated Concave Surface (B8)
- ___ Drainage Patterns (B10)
- ___ Oxidized Rhizospheres on Living Roots (C3) (**where tilled**)
- ___ Crayfish Burrows (C8)
- ___ Saturation Visible on Aerial Imagery (C9)
- ___ Geomorphic Position (D2)
- ___ FAC-Neutral Test (D5)
- ___ Frost-Heave Hummocks (D7) (**LRR F**)

Field Observations:

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

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

Saturation Present? (includes capillary fringe) Yes _____ No ✓ Depth (inches): _____

Wetland Hydrology Present? Yes _____ No ✓

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

Remarks:

No wetland hydrology present. Upland grassland prairie.

WETLAND DETERMINATION DATA FORM – Great Plains Region

Project/Site: Chilocco, Oklahoma City/County: Kay County Sampling Date: 8-17-2016

Applicant/Owner: PNE Wind USA, Inc State: OK Sampling Point: SP #15

Investigator(s): Steve Haddigan, Murray Verbonitz Section, Township, Range: S25 T29N R2E

Landform (hillslope, terrace, etc.): Upland Prairie Local relief (concave, convex, none): _____ Slope (%): 1

Subregion (LRR): Subregion H Lat: 36.965408 Long: -97.039370 Datum: _____

Soil Map Unit Name: NeC - Agra-Foraker complex NWI classification: No classification

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 _____	No ✓	**Is the Sampled Area within a Wetland?** Yes _____ No ✓
Hydric Soil Present?	Yes _____	No ✓	
Wetland Hydrology Present?	Yes _____	No ✓	

Remarks:
No wetland present in study location. Upland grassland.

VEGETATION – Use scientific names of plants.

Tree Stratum (Plot size: _____)	Absolute % Cover	Dominant Species?	Indicator Status
1. N/A			
2.			
3.			
4.			
	_____ = Total Cover		
Sapling/Shrub Stratum (Plot size: _____)			
1. N/A			
2.			
3.			
4.			
5.			
	_____ = Total Cover		
Herb Stratum (Plot size: _____)			
1. Switchgrass		Yes	FAC
2. Blue stem		Yes	FACU
3. Milk thistle		No	
4. Indiangrass		Yes	FACU
5. Milk weed			UPL
6. Ragweed		Yes	FACU
7.			
8.			
9.			
10.			
	_____ = Total Cover		
Woody Vine Stratum (Plot size: _____)			
1.			
2.			
	_____ = Total Cover		

% Bare Ground in Herb Stratum _____

Dominance Test worksheet:

Number of Dominant Species That Are OBL, FACW, or FAC (excluding FAC−): _____ (A)

Total Number of Dominant Species Across All Strata: _____ (B)

Percent of Dominant Species That Are OBL, FACW, or FAC: _____ (A/B)

Prevalence Index worksheet:

Total % Cover of:		Multiply by:	
OBL species	_____	x 1 =	_____
FACW species	_____	x 2 =	_____
FAC species	1	x 3 =	3
FACU species	3	x 4 =	12
UPL species	1	x 5 =	5
Column Totals:	5 (A)		20 (B)

Prevalence Index = B/A = 4

Hydrophytic Vegetation Indicators:

___ 1 - Rapid Test for Hydrophytic Vegetation

___ 2 - Dominance Test is >50%

___ 3 - Prevalence Index is ≤3.0[1]

___ 4 - Morphological Adaptations[1] (Provide supporting data in Remarks or on a separate sheet)

___ Problematic Hydrophytic Vegetation[1] (Explain)

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

Hydrophytic Vegetation Present? Yes _____ No ✓

Remarks:
No hydrophytic vegetation present.

SOIL

Sampling Point: SP #15

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

Depth (inches)	Matrix Color (moist)	%	Redox Features Color (moist)	%	Type[1]	Loc[2]	Texture	Remarks

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

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

- ___ Histosol (A1)
- ___ Histic Epipedon (A2)
- ___ Black Histic (A3)
- ___ Hydrogen Sulfide (A4)
- ___ Stratified Layers (A5) (**LRR F**)
- ___ 1 cm Muck (A9) (**LRR F, G, H**)
- ___ Depleted Below Dark Surface (A11)
- ___ Thick Dark Surface (A12)
- ___ Sandy Mucky Mineral (S1)
- ___ 2.5 cm Mucky Peat or Peat (S2) (**LRR G, H**)
- ___ 5 cm Mucky Peat or Peat (S3) (**LRR F**)
- ___ Sandy Gleyed Matrix (S4)
- ___ Sandy Redox (S5)
- ___ Stripped Matrix (S6)
- ___ Loamy Mucky Mineral (F1)
- ___ Loamy Gleyed Matrix (F2)
- ___ Depleted Matrix (F3)
- ___ Redox Dark Surface (F6)
- ___ Depleted Dark Surface (F7)
- ___ Redox Depressions (F8)
- ___ High Plains Depressions (F16) (**MLRA 72 & 73 of LRR H**)

Indicators for Problematic Hydric Soils[3]:

- ___ 1 cm Muck (A9) (**LRR I, J**)
- ___ Coast Prairie Redox (A16) (**LRR F, G, H**)
- ___ Dark Surface (S7) (**LRR G**)
- ___ High Plains Depressions (F16) (**LRR H outside of MLRA 72 & 73**)
- ___ Reduced Vertic (F18)
- ___ Red Parent Material (TF2)
- ___ Very Shallow Dark Surface (TF12)
- ___ Other (Explain in Remarks)

[3]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:

No hydric soils present.

HYDROLOGY

Wetland Hydrology Indicators:

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

- ___ Surface Water (A1)
- ___ High Water Table (A2)
- ___ Saturation (A3)
- ___ Water Marks (B1)
- ___ Sediment Deposits (B2)
- ___ Drift Deposits (B3)
- ___ Algal Mat or Crust (B4)
- ___ Iron Deposits (B5)
- ___ Inundation Visible on Aerial Imagery (B7)
- ___ Water-Stained Leaves (B9)
- ___ Salt Crust (B11)
- ___ Aquatic Invertebrates (B13)
- ___ Hydrogen Sulfide Odor (C1)
- ___ Dry-Season Water Table (C2)
- ___ Oxidized Rhizospheres on Living Roots (C3) (**where not tilled**)
- ___ Presence of Reduced Iron (C4)
- ___ Thin Muck Surface (C7)
- ___ Other (Explain in Remarks)

Secondary Indicators (minimum of two required)

- ___ Surface Soil Cracks (B6)
- ___ Sparsely Vegetated Concave Surface (B8)
- ___ Drainage Patterns (B10)
- ___ Oxidized Rhizospheres on Living Roots (C3) (**where tilled**)
- ___ Crayfish Burrows (C8)
- ___ Saturation Visible on Aerial Imagery (C9)
- ___ Geomorphic Position (D2)
- ___ FAC-Neutral Test (D5)
- ___ Frost-Heave Hummocks (D7) (**LRR F**)

Field Observations:

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

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

Saturation Present? (includes capillary fringe) Yes _____ No ✓ Depth (inches): _____

Wetland Hydrology Present? Yes _____ No ✓

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

Remarks:

No wetland hydrology present. Upland grassland prairie.

WETLAND DETERMINATION DATA FORM – Great Plains Region

Project/Site: Chilocco, OK City/County: Kay Sampling Date: 8-17-2016

Applicant/Owner: PNE Wind USA, Inc. State: OK Sampling Point: FS-16

Investigator(s): Steve Haddigan, Murray Verbonitz Section, Township, Range: S13 T29N R2E

Landform (hillslope, terrace, etc.): Depression Local relief (concave, convex, none): Concave Slope (%): 2%

Subregion (LRR): Subregion H Lat: 36.974605 Long: -97.031553 Datum: _____

Soil Map Unit Name: Bk - Grainola-Ashport Complex NWI classification: _____

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 ✔ No _____	**Is the Sampled Area within a Wetland?** Yes ✔ No _____
Hydric Soil Present?	Yes ✔ No _____	
Wetland Hydrology Present?	Yes ✔ No _____	

Remarks:
Wetland present in study location.

VEGETATION – Use scientific names of plants.

Tree Stratum (Plot size:_____)	Absolute % Cover	Dominant Species?	Indicator Status
1. Elm	30	Yes	FACW
2. Cottonwood	30	Yes	FAC
3. Black Willow	10	Yes	FACW
4.			
	70	= Total Cover	
Sapling/Shrub Stratum (Plot size:_____)			
1. Elm	30	Yes	FACW
2.			
3.			
4.			
5.			
		= Total Cover	
Herb Stratum (Plot size:_____)			
1. Green Briar	30	Yes	FACU
2.			
3.			
4.			
5.			
6.			
7.			
8.			
9.			
10.			
	75	= Total Cover	
Woody Vine Stratum (Plot size:_____)			
1.			
2.			
		= Total Cover	

% Bare Ground in Herb Stratum 0

Dominance Test worksheet:

Number of Dominant Species That Are OBL, FACW, or FAC (excluding FAC−): 4 (A)

Total Number of Dominant Species Across All Strata: 4 (B)

Percent of Dominant Species That Are OBL, FACW, or FAC: 100 (A/B)

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 = _____

Hydrophytic Vegetation Indicators:

- ___ 1 - Rapid Test for Hydrophytic Vegetation
- ✔ 2 - Dominance Test is >50%
- ___ 3 - Prevalence Index is ≤3.0[1]
- ___ 4 - Morphological Adaptations[1] (Provide supporting data in Remarks or on a separate sheet)
- ___ Problematic Hydrophytic Vegetation[1] (Explain)

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

Hydrophytic Vegetation Present? Yes ✔ No _____

Remarks:
Hydrophytic vegetation present.

SOIL

Sampling Point: FS-16

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

Depth (inches)	Matrix Color (moist)	%	Redox Features Color (moist)	%	Type[1]	Loc[2]	Texture	Remarks
0-6	2.5 YR 4/4	80			CS	M	Sandy Clay	
6-12	2.5 YR 5/1	80			CS	M	Sandy	

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

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

- ___ Histosol (A1)
- ___ Histic Epipedon (A2)
- ✔ Black Histic (A3)
- ✔ Hydrogen Sulfide (A4)
- ___ Stratified Layers (A5) (**LRR F**)
- ___ 1 cm Muck (A9) (**LRR F, G, H**)
- ___ Depleted Below Dark Surface (A11)
- ___ Thick Dark Surface (A12)
- ✔ Sandy Mucky Mineral (S1)
- ___ 2.5 cm Mucky Peat or Peat (S2) (**LRR G, H**)
- ___ 5 cm Mucky Peat or Peat (S3) (**LRR F**)
- Sandy Gleyed Matrix (S4)
- Sandy Redox (S5)
- Stripped Matrix (S6)
- Loamy Mucky Mineral (F1)
- Loamy Gleyed Matrix (F2)
- Depleted Matrix (F3)
- Redox Dark Surface (F6)
- Depleted Dark Surface (F7)
- Redox Depressions (F8)
- High Plains Depressions (F16) (**MLRA 72 & 73 of LRR H**)

Indicators for Problematic Hydric Soils[3]:

- 1 cm Muck (A9) (**LRR I, J**)
- Coast Prairie Redox (A16) (**LRR F, G, H**)
- Dark Surface (S7) (**LRR G**)
- High Plains Depressions (F16) (**LRR H outside of MLRA 72 & 73**)
- Reduced Vertic (F18)
- Red Parent Material (TF2)
- Very Shallow Dark Surface (TF12)
- Other (Explain in Remarks)

[3]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:

Hydric soils present.

HYDROLOGY

Wetland Hydrology Indicators:

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

- ✔ Surface Water (A1)
- ✔ High Water Table (A2)
- ✔ Saturation (A3)
- ___ Water Marks (B1)
- ___ Sediment Deposits (B2)
- ___ Drift Deposits (B3)
- ___ Algal Mat or Crust (B4)
- ___ Iron Deposits (B5)
- ✔ Inundation Visible on Aerial Imagery (B7)
- ___ Water-Stained Leaves (B9)
- Salt Crust (B11)
- Aquatic Invertebrates (B13)
- ✔ Hydrogen Sulfide Odor (C1)
- ✔ Dry-Season Water Table (C2)
- Oxidized Rhizospheres on Living Roots (C3) (**where not tilled**)
- Presence of Reduced Iron (C4)
- Thin Muck Surface (C7)
- Other (Explain in Remarks)

Secondary Indicators (minimum of two required)

- Surface Soil Cracks (B6)
- Sparsely Vegetated Concave Surface (B8)
- ✔ Drainage Patterns (B10)
- Oxidized Rhizospheres on Living Roots (C3) (**where tilled**)
- Crayfish Burrows (C8)
- ✔ Saturation Visible on Aerial Imagery (C9)
- Geomorphic Position (D2)
- FAC-Neutral Test (D5)
- Frost-Heave Hummocks (D7) (**LRR F**)

Field Observations:

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

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

Saturation Present? (includes capillary fringe) Yes ✔ No Depth (inches): _____

Wetland Hydrology Present? Yes ✔ No ___

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

Remarks:

Wetland hydrology present.

WETLAND DETERMINATION DATA FORM – Great Plains Region

Project/Site: Chilocco, Oklahoma City/County: Kay County Sampling Date: 8-17-2016

Applicant/Owner: PNE Wind USA, Inc. State: OK Sampling Point: SP #16

Investigator(s): Steve Haddigan, Murray Verbonitz Section, Township, Range: S25 T29N R2E

Landform (hillslope, terrace, etc.): Upland Prairie Local relief (concave, convex, none): _____ Slope (%): 1

Subregion (LRR): Subregion H Lat: 36.956518 Long: -97.039644 Datum: _____

Soil Map Unit Name: NeC - Agra-Foraker complex NWI classification: No classification

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 _____	No ✓	**Is the Sampled Area within a Wetland?** Yes _____ No ✓
Hydric Soil Present?	Yes _____	No ✓	
Wetland Hydrology Present?	Yes _____	No ✓	

Remarks:
No wetland present in study location. Upland grassland.

VEGETATION – Use scientific names of plants.

Tree Stratum (Plot size: _____)	Absolute % Cover	Dominant Species?	Indicator Status
1. N/A			
2.			
3.			
4.			
	_____ = Total Cover		
Sapling/Shrub Stratum (Plot size: _____)			
1. N/A			
2.			
3.			
4.			
5.			
	_____ = Total Cover		
Herb Stratum (Plot size: _____)			
1. Switchgrass		Yes	FAC
2. Blue stem		Yes	FACU
3. Milk thistle		No	
4. Indiangrass		Yes	FACU
5. Milk weed			UPL
6. Ragweed		Yes	FACU
7.			
8.			
9.			
10.			
	_____ = Total Cover		
Woody Vine Stratum (Plot size: _____)			
1.			
2.			
	_____ = Total Cover		
% Bare Ground in Herb Stratum _____			

Dominance Test worksheet:

Number of Dominant Species That Are OBL, FACW, or FAC (excluding FAC−): _____ (A)

Total Number of Dominant Species Across All Strata: _____ (B)

Percent of Dominant Species That Are OBL, FACW, or FAC: _____ (A/B)

Prevalence Index worksheet:

Total % Cover of:		Multiply by:	
OBL species	_____	x 1 =	_____
FACW species	_____	x 2 =	_____
FAC species	1	x 3 =	3
FACU species	3	x 4 =	12
UPL species	1	x 5 =	5
Column Totals:	5 (A)		20 (B)

Prevalence Index = B/A = 4

Hydrophytic Vegetation Indicators:

___ 1 - Rapid Test for Hydrophytic Vegetation

___ 2 - Dominance Test is >50%

___ 3 - Prevalence Index is ≤3.0[1]

___ 4 - Morphological Adaptations[1] (Provide supporting data in Remarks or on a separate sheet)

___ Problematic Hydrophytic Vegetation[1] (Explain)

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

Hydrophytic Vegetation Present? Yes _____ No ✓

Remarks:
No hydrophytic vegetation present.

SOIL

Sampling Point: SP #16

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

Depth (inches)	Matrix Color (moist)	%	Redox Features Color (moist)	%	Type[1]	Loc[2]	Texture	Remarks

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

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

- ___ Histosol (A1)
- ___ Histic Epipedon (A2)
- ___ Black Histic (A3)
- ___ Hydrogen Sulfide (A4)
- ___ Stratified Layers (A5) (**LRR F**)
- ___ 1 cm Muck (A9) (**LRR F, G, H**)
- ___ Depleted Below Dark Surface (A11)
- ___ Thick Dark Surface (A12)
- ___ Sandy Mucky Mineral (S1)
- ___ 2.5 cm Mucky Peat or Peat (S2) (**LRR G, H**)
- ___ 5 cm Mucky Peat or Peat (S3) (**LRR F**)
- ___ Sandy Gleyed Matrix (S4)
- ___ Sandy Redox (S5)
- ___ Stripped Matrix (S6)
- ___ Loamy Mucky Mineral (F1)
- ___ Loamy Gleyed Matrix (F2)
- ___ Depleted Matrix (F3)
- ___ Redox Dark Surface (F6)
- ___ Depleted Dark Surface (F7)
- ___ Redox Depressions (F8)
- ___ High Plains Depressions (F16) (**MLRA 72 & 73 of LRR H**)

Indicators for Problematic Hydric Soils[3]:

- ___ 1 cm Muck (A9) (**LRR I, J**)
- ___ Coast Prairie Redox (A16) (**LRR F, G, H**)
- ___ Dark Surface (S7) (**LRR G**)
- ___ High Plains Depressions (F16) (**LRR H outside of MLRA 72 & 73**)
- ___ Reduced Vertic (F18)
- ___ Red Parent Material (TF2)
- ___ Very Shallow Dark Surface (TF12)
- ___ Other (Explain in Remarks)

[3]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:

No hydric soils present.

HYDROLOGY

Wetland Hydrology Indicators:

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

- ___ Surface Water (A1)
- ___ High Water Table (A2)
- ___ Saturation (A3)
- ___ Water Marks (B1)
- ___ Sediment Deposits (B2)
- ___ Drift Deposits (B3)
- ___ Algal Mat or Crust (B4)
- ___ Iron Deposits (B5)
- ___ Inundation Visible on Aerial Imagery (B7)
- ___ Water-Stained Leaves (B9)
- ___ Salt Crust (B11)
- ___ Aquatic Invertebrates (B13)
- ___ Hydrogen Sulfide Odor (C1)
- ___ Dry-Season Water Table (C2)
- ___ Oxidized Rhizospheres on Living Roots (C3) (**where not tilled**)
- ___ Presence of Reduced Iron (C4)
- ___ Thin Muck Surface (C7)
- ___ Other (Explain in Remarks)

Secondary Indicators (minimum of two required)

- ___ Surface Soil Cracks (B6)
- ___ Sparsely Vegetated Concave Surface (B8)
- ___ Drainage Patterns (B10)
- ___ Oxidized Rhizospheres on Living Roots (C3) (**where tilled**)
- ___ Crayfish Burrows (C8)
- ___ Saturation Visible on Aerial Imagery (C9)
- ___ Geomorphic Position (D2)
- ___ FAC-Neutral Test (D5)
- ___ Frost-Heave Hummocks (D7) (**LRR F**)

Field Observations:

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

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

Saturation Present? (includes capillary fringe) Yes _____ No ✓ Depth (inches): _____

Wetland Hydrology Present? Yes _____ No ✓

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

Remarks:

No wetland hydrology present. Upland grassland prairie.

WETLAND DETERMINATION DATA FORM – Great Plains Region

Project/Site: Chilocco, Oklahoma City/County: Kay County Sampling Date: 8-17-2016

Applicant/Owner: PNE Wind USA, Inc. State: OK Sampling Point: SP #17

Investigator(s): Steve Haddigan, Murray Verbonitz Section, Township, Range: S25 T29N R2E

Landform (hillslope, terrace, etc.): Upland Prairie Local relief (concave, convex, none): _____ Slope (%): 2

Subregion (LRR): Subregion H Lat: 36.958969 Long: -97.032087 Datum: _____

Soil Map Unit Name: SnB- Shidler silty clay loam NWI classification: No classification

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 _____ No ✓	**Is the Sampled Area within a Wetland?** Yes _____ No ✓
Hydric Soil Present?	Yes _____ No ✓	
Wetland Hydrology Present?	Yes _____ No ✓	

Remarks:
No wetland present in study location. Upland grassland.

VEGETATION – Use scientific names of plants.

Tree Stratum (Plot size: _____)	Absolute % Cover	Dominant Species?	Indicator Status
1. N/A			
2.			
3.			
4.			
	_____ = Total Cover		
Sapling/Shrub Stratum (Plot size: _____)			
1. N/A			
2.			
3.			
4.			
5.			
	_____ = Total Cover		
Herb Stratum (Plot size: _____)			
1. Switchgrass		Yes	FAC
2. Blue stem		Yes	FACU
3. Milk thistle		No	
4. Indiangrass		Yes	FACU
5. Milk weed			UPL
6. Ragweed		Yes	FACU
7.			
8.			
9.			
10.			
	_____ = Total Cover		
Woody Vine Stratum (Plot size: _____)			
1.			
2.			
	_____ = Total Cover		

% Bare Ground in Herb Stratum _____

Dominance Test worksheet:

Number of Dominant Species That Are OBL, FACW, or FAC (excluding FAC−): _____ (A)

Total Number of Dominant Species Across All Strata: _____ (B)

Percent of Dominant Species That Are OBL, FACW, or FAC: _____ (A/B)

Prevalence Index worksheet:

Total % Cover of:		Multiply by:	
OBL species	_____	x 1 =	_____
FACW species	_____	x 2 =	_____
FAC species	1	x 3 =	3
FACU species	3	x 4 =	12
UPL species	1	x 5 =	5
Column Totals:	5	(A)	20 (B)

Prevalence Index = B/A = 4

Hydrophytic Vegetation Indicators:

___ 1 - Rapid Test for Hydrophytic Vegetation

___ 2 - Dominance Test is >50%

___ 3 - Prevalence Index is ≤3.0[1]

___ 4 - Morphological Adaptations[1] (Provide supporting data in Remarks or on a separate sheet)

___ Problematic Hydrophytic Vegetation[1] (Explain)

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

Hydrophytic Vegetation Present? Yes _____ No ✓

Remarks:
No hydrophytic vegetation present.

SOIL

Sampling Point: SP #17

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

Depth (inches)	Matrix Color (moist)	%	Redox Features Color (moist)	%	Type[1]	Loc[2]	Texture	Remarks

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

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

- ___ Histosol (A1)
- ___ Histic Epipedon (A2)
- ___ Black Histic (A3)
- ___ Hydrogen Sulfide (A4)
- ___ Stratified Layers (A5) (**LRR F**)
- ___ 1 cm Muck (A9) (**LRR F, G, H**)
- ___ Depleted Below Dark Surface (A11)
- ___ Thick Dark Surface (A12)
- ___ Sandy Mucky Mineral (S1)
- ___ 2.5 cm Mucky Peat or Peat (S2) (**LRR G, H**)
- ___ 5 cm Mucky Peat or Peat (S3) (**LRR F**)
- ___ Sandy Gleyed Matrix (S4)
- ___ Sandy Redox (S5)
- ___ Stripped Matrix (S6)
- ___ Loamy Mucky Mineral (F1)
- ___ Loamy Gleyed Matrix (F2)
- ___ Depleted Matrix (F3)
- ___ Redox Dark Surface (F6)
- ___ Depleted Dark Surface (F7)
- ___ Redox Depressions (F8)
- ___ High Plains Depressions (F16) (**MLRA 72 & 73 of LRR H**)

Indicators for Problematic Hydric Soils[3]:

- ___ 1 cm Muck (A9) (**LRR I, J**)
- ___ Coast Prairie Redox (A16) (**LRR F, G, H**)
- ___ Dark Surface (S7) (**LRR G**)
- ___ High Plains Depressions (F16) (**LRR H outside of MLRA 72 & 73**)
- ___ Reduced Vertic (F18)
- ___ Red Parent Material (TF2)
- ___ Very Shallow Dark Surface (TF12)
- ___ Other (Explain in Remarks)

[3]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:

No hydric soils present.

HYDROLOGY

Wetland Hydrology Indicators:

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

- ___ Surface Water (A1)
- ___ High Water Table (A2)
- ___ Saturation (A3)
- ___ Water Marks (B1)
- ___ Sediment Deposits (B2)
- ___ Drift Deposits (B3)
- ___ Algal Mat or Crust (B4)
- ___ Iron Deposits (B5)
- ___ Inundation Visible on Aerial Imagery (B7)
- ___ Water-Stained Leaves (B9)
- ___ Salt Crust (B11)
- ___ Aquatic Invertebrates (B13)
- ___ Hydrogen Sulfide Odor (C1)
- ___ Dry-Season Water Table (C2)
- ___ Oxidized Rhizospheres on Living Roots (C3) (**where not tilled**)
- ___ Presence of Reduced Iron (C4)
- ___ Thin Muck Surface (C7)
- ___ Other (Explain in Remarks)

Secondary Indicators (minimum of two required)

- ___ Surface Soil Cracks (B6)
- ___ Sparsely Vegetated Concave Surface (B8)
- ___ Drainage Patterns (B10)
- ___ Oxidized Rhizospheres on Living Roots (C3) (**where tilled**)
- ___ Crayfish Burrows (C8)
- ___ Saturation Visible on Aerial Imagery (C9)
- ___ Geomorphic Position (D2)
- ___ FAC-Neutral Test (D5)
- ___ Frost-Heave Hummocks (D7) (**LRR F**)

Field Observations:

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

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

Saturation Present? (includes capillary fringe) Yes _____ No ✓ Depth (inches): _____

Wetland Hydrology Present? Yes _____ No ✓

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

Remarks:

No wetland hydrology present. Upland grassland prairie.

WETLAND DETERMINATION DATA FORM – Great Plains Region

Project/Site: Chilocco, Oklahoma City/County: Kay County Sampling Date: 8-17-2016

Applicant/Owner: PNE Wind USA, Inc. State: OK Sampling Point: SP #18

Investigator(s): Steve Haddigan, Murray Verbonitz Section, Township, Range: S25 T29N R2E

Landform (hillslope, terrace, etc.): Upland Prairie Local relief (concave, convex, none): _____ Slope (%): 4

Subregion (LRR): Subregion H Lat: 36.964755 Long: -97.030516 Datum: _____

Soil Map Unit Name: NeC - Agra-Foraker complex NWI classification: No classification

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 _____	No ✓	**Is the Sampled Area within a Wetland?** Yes _____ No ✓
Hydric Soil Present?	Yes _____	No ✓	
Wetland Hydrology Present?	Yes _____	No ✓	

Remarks:
No wetland present in study location. Upland grassland.

VEGETATION – Use scientific names of plants.

Tree Stratum (Plot size: _____)	Absolute % Cover	Dominant Species?	Indicator Status
1. N/A			
2.			
3.			
4.			
	_____ = Total Cover		
Sapling/Shrub Stratum (Plot size: _____)			
1. N/A			
2.			
3.			
4.			
5.			
	_____ = Total Cover		
Herb Stratum (Plot size: _____)			
1. Switchgrass		Yes	FAC
2. Blue stem		Yes	FACU
3. Milk thistle		No	
4. Indiangrass		Yes	FACU
5. Milk weed			UPL
6. Ragweed		Yes	FACU
7.			
8.			
9.			
10.			
	_____ = Total Cover		
Woody Vine Stratum (Plot size: _____)			
1.			
2.			
	_____ = Total Cover		

% Bare Ground in Herb Stratum _____

Dominance Test worksheet:

Number of Dominant Species That Are OBL, FACW, or FAC (excluding FAC−): _____ (A)

Total Number of Dominant Species Across All Strata: _____ (B)

Percent of Dominant Species That Are OBL, FACW, or FAC: _____ (A/B)

Prevalence Index worksheet:

Total % Cover of:		Multiply by:	
OBL species	_____	x 1 =	_____
FACW species	_____	x 2 =	_____
FAC species	1	x 3 =	3
FACU species	3	x 4 =	12
UPL species	1	x 5 =	5
Column Totals:	5 (A)		20 (B)

Prevalence Index = B/A = 4

Hydrophytic Vegetation Indicators:

___ 1 - Rapid Test for Hydrophytic Vegetation

___ 2 - Dominance Test is >50%

___ 3 - Prevalence Index is ≤3.0[1]

___ 4 - Morphological Adaptations[1] (Provide supporting data in Remarks or on a separate sheet)

___ Problematic Hydrophytic Vegetation[1] (Explain)

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

Hydrophytic Vegetation Present? Yes _____ No ✓

Remarks:
No hydrophytic vegetation present.

SOIL

Sampling Point: SP #18

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

Depth (inches)	Matrix Color (moist)	%	Redox Features Color (moist)	%	Type[1]	Loc[2]	Texture	Remarks

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

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

- ___ Histosol (A1)
- ___ Histic Epipedon (A2)
- ___ Black Histic (A3)
- ___ Hydrogen Sulfide (A4)
- ___ Stratified Layers (A5) (**LRR F**)
- ___ 1 cm Muck (A9) (**LRR F, G, H**)
- ___ Depleted Below Dark Surface (A11)
- ___ Thick Dark Surface (A12)
- ___ Sandy Mucky Mineral (S1)
- ___ 2.5 cm Mucky Peat or Peat (S2) (**LRR G, H**)
- ___ 5 cm Mucky Peat or Peat (S3) (**LRR F**)
- ___ Sandy Gleyed Matrix (S4)
- ___ Sandy Redox (S5)
- ___ Stripped Matrix (S6)
- ___ Loamy Mucky Mineral (F1)
- ___ Loamy Gleyed Matrix (F2)
- ___ Depleted Matrix (F3)
- ___ Redox Dark Surface (F6)
- ___ Depleted Dark Surface (F7)
- ___ Redox Depressions (F8)
- ___ High Plains Depressions (F16) (**MLRA 72 & 73 of LRR H**)

Indicators for Problematic Hydric Soils[3]:

- ___ 1 cm Muck (A9) (**LRR I, J**)
- ___ Coast Prairie Redox (A16) (**LRR F, G, H**)
- ___ Dark Surface (S7) (**LRR G**)
- ___ High Plains Depressions (F16) (**LRR H outside of MLRA 72 & 73**)
- ___ Reduced Vertic (F18)
- ___ Red Parent Material (TF2)
- ___ Very Shallow Dark Surface (TF12)
- ___ Other (Explain in Remarks)

[3]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:

No hydric soils present.

HYDROLOGY

Wetland Hydrology Indicators:

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

- ___ Surface Water (A1)
- ___ High Water Table (A2)
- ___ Saturation (A3)
- ___ Water Marks (B1)
- ___ Sediment Deposits (B2)
- ___ Drift Deposits (B3)
- ___ Algal Mat or Crust (B4)
- ___ Iron Deposits (B5)
- ___ Inundation Visible on Aerial Imagery (B7)
- ___ Water-Stained Leaves (B9)
- ___ Salt Crust (B11)
- ___ Aquatic Invertebrates (B13)
- ___ Hydrogen Sulfide Odor (C1)
- ___ Dry-Season Water Table (C2)
- ___ Oxidized Rhizospheres on Living Roots (C3) (**where not tilled**)
- ___ Presence of Reduced Iron (C4)
- ___ Thin Muck Surface (C7)
- ___ Other (Explain in Remarks)

Secondary Indicators (minimum of two required)

- ___ Surface Soil Cracks (B6)
- ___ Sparsely Vegetated Concave Surface (B8)
- ___ Drainage Patterns (B10)
- ___ Oxidized Rhizospheres on Living Roots (C3) (**where tilled**)
- ___ Crayfish Burrows (C8)
- ___ Saturation Visible on Aerial Imagery (C9)
- ___ Geomorphic Position (D2)
- ___ FAC-Neutral Test (D5)
- ___ Frost-Heave Hummocks (D7) (**LRR F**)

Field Observations:

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

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

Saturation Present? (includes capillary fringe) Yes _____ No ✓ Depth (inches): _____

Wetland Hydrology Present? Yes _____ No ✓

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

Remarks:

No wetland hydrology present. Upland grassland prairie.

WETLAND DETERMINATION DATA FORM – Great Plains Region

Project/Site: Chilocco, Oklahoma City/County: Kay County Sampling Date: 8-17-2016

Applicant/Owner: PNE Wind USA, Inc. State: OK Sampling Point: SP #19

Investigator(s): Steve Haddigan, Murray Verbonitz Section, Township, Range: S25 T29N R2E

Landform (hillslope, terrace, etc.): Upland Prairie Local relief (concave, convex, none): _____ Slope (%): 4

Subregion (LRR): Subregion H Lat: 36.967830 Long: -97.030865 Datum: _____

Soil Map Unit Name: NeC - Agra-Foraker complex NWI classification: No classification

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 _____	No ✓	**Is the Sampled Area within a Wetland?** Yes _____ No ✓
Hydric Soil Present?	Yes _____	No ✓	
Wetland Hydrology Present?	Yes _____	No ✓	

Remarks:
No wetland present in study location. Upland grassland.

VEGETATION – Use scientific names of plants.

	Absolute % Cover	Dominant Species?	Indicator Status
Tree Stratum (Plot size: _____)			
1. N/A			
2.			
3.			
4.			
	_____ = Total Cover		
Sapling/Shrub Stratum (Plot size: _____)			
1. N/A			
2.			
3.			
4.			
5.			
	_____ = Total Cover		
Herb Stratum (Plot size: _____)			
1. Switchgrass		Yes	FAC
2. Blue stem		Yes	FACU
3. Milk thistle		No	
4. Indiangrass		Yes	FACU
5. Milk weed			UPL
6. Ragweed		Yes	FACU
7.			
8.			
9.			
10.			
	_____ = Total Cover		
Woody Vine Stratum (Plot size: _____)			
1.			
2.			
	_____ = Total Cover		
% Bare Ground in Herb Stratum _____			

Dominance Test worksheet:

Number of Dominant Species That Are OBL, FACW, or FAC (excluding FAC−): _____ (A)

Total Number of Dominant Species Across All Strata: _____ (B)

Percent of Dominant Species That Are OBL, FACW, or FAC: _____ (A/B)

Prevalence Index worksheet:

Total % Cover of:		Multiply by:	
OBL species	_____	x 1 =	_____
FACW species	_____	x 2 =	_____
FAC species	1	x 3 =	_____
FACU species	3	x 4 =	_____
UPL species	1	x 5 =	_____
Column Totals:	5 (A)		20 (B)

Prevalence Index = B/A = 4

Hydrophytic Vegetation Indicators:

___ 1 - Rapid Test for Hydrophytic Vegetation

___ 2 - Dominance Test is >50%

___ 3 - Prevalence Index is ≤3.0[1]

___ 4 - Morphological Adaptations[1] (Provide supporting data in Remarks or on a separate sheet)

___ Problematic Hydrophytic Vegetation[1] (Explain)

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

Hydrophytic Vegetation Present? Yes _____ No ✓

Remarks:
No hydrophytic vegetation present.

SOIL

Sampling Point: SP #19

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

Depth (inches)	Matrix Color (moist)	%	Redox Features Color (moist)	%	Type[1]	Loc[2]	Texture	Remarks

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

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

- ___ Histosol (A1)
- ___ Histic Epipedon (A2)
- ___ Black Histic (A3)
- ___ Hydrogen Sulfide (A4)
- ___ Stratified Layers (A5) (**LRR F**)
- ___ 1 cm Muck (A9) (**LRR F, G, H**)
- ___ Depleted Below Dark Surface (A11)
- ___ Thick Dark Surface (A12)
- ___ Sandy Mucky Mineral (S1)
- ___ 2.5 cm Mucky Peat or Peat (S2) (**LRR G, H**)
- ___ 5 cm Mucky Peat or Peat (S3) (**LRR F**)
- ___ Sandy Gleyed Matrix (S4)
- ___ Sandy Redox (S5)
- ___ Stripped Matrix (S6)
- ___ Loamy Mucky Mineral (F1)
- ___ Loamy Gleyed Matrix (F2)
- ___ Depleted Matrix (F3)
- ___ Redox Dark Surface (F6)
- ___ Depleted Dark Surface (F7)
- ___ Redox Depressions (F8)
- ___ High Plains Depressions (F16) (**MLRA 72 & 73 of LRR H**)

Indicators for Problematic Hydric Soils[3]:

- ___ 1 cm Muck (A9) (**LRR I, J**)
- ___ Coast Prairie Redox (A16) (**LRR F, G, H**)
- ___ Dark Surface (S7) (**LRR G**)
- ___ High Plains Depressions (F16) (**LRR H outside of MLRA 72 & 73**)
- ___ Reduced Vertic (F18)
- ___ Red Parent Material (TF2)
- ___ Very Shallow Dark Surface (TF12)
- ___ Other (Explain in Remarks)

[3]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:

No hydric soils present.

HYDROLOGY

Wetland Hydrology Indicators:

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

- ___ Surface Water (A1)
- ___ High Water Table (A2)
- ___ Saturation (A3)
- ___ Water Marks (B1)
- ___ Sediment Deposits (B2)
- ___ Drift Deposits (B3)
- ___ Algal Mat or Crust (B4)
- ___ Iron Deposits (B5)
- ___ Inundation Visible on Aerial Imagery (B7)
- ___ Water-Stained Leaves (B9)
- ___ Salt Crust (B11)
- ___ Aquatic Invertebrates (B13)
- ___ Hydrogen Sulfide Odor (C1)
- ___ Dry-Season Water Table (C2)
- ___ Oxidized Rhizospheres on Living Roots (C3) (**where not tilled**)
- ___ Presence of Reduced Iron (C4)
- ___ Thin Muck Surface (C7)
- ___ Other (Explain in Remarks)

Secondary Indicators (minimum of two required)

- ___ Surface Soil Cracks (B6)
- ___ Sparsely Vegetated Concave Surface (B8)
- ___ Drainage Patterns (B10)
- ___ Oxidized Rhizospheres on Living Roots (C3) (**where tilled**)
- ___ Crayfish Burrows (C8)
- ___ Saturation Visible on Aerial Imagery (C9)
- ___ Geomorphic Position (D2)
- ___ FAC-Neutral Test (D5)
- ___ Frost-Heave Hummocks (D7) (**LRR F**)

Field Observations:

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

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

Saturation Present? (includes capillary fringe) Yes _____ No ✓ Depth (inches): _____

Wetland Hydrology Present? Yes _____ No ✓

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

Remarks:

No wetland hydrology present. Upland grassland prairie.

Desktop Review

Bald Eagle use of the Chilocco Wind Resource Area

Prepared for:

Cherokee Nation Businesses LLC
Tulsa, Oklahoma

Prepared by:

TETRA TECH EC, INC.

1750 SW Harbor Way, Ste 400
Portland, OR 97201

June 2011

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1.0 INTRODUCTION

1.1 Overview

Avian surveys of the Chilocco Wind Resource Area (WRA) detected bald eagles within the WRA (Young 2008). The bald eagle is currently protected under the Bald and Golden Eagle Protection Act (BGEPA) and the Migratory Bird Treaty Act (MBTA). The documentation of bald eagle use on the WRA indicates the need to further examine bald eagle use of the WRA and to evaluate the potential for negative interactions between bald eagles and wind turbines. The purpose of this document is to provide a summary of bald eagle activity in and near the WRA and to assess the level of collision risk for bald eagles. Publicly available data from Christmas Bird Counts (National Audubon Society), published literature, avian survey reports of the Chilocco WRA, Oklahoma Department of Wildlife Conservation, and the George Miksch Sutton Avian Research Center were reviewed and summarized in this report.

1.2 Bald Eagle Protections

The bald eagle is currently federally protected under the BGEPA and the MBTA. The BGEPA prohibits the take of any bald or golden eagle, alive or dead, including any part, nest, or egg. "Take" is defined as "pursue, shoot, shoot at, poison, wound, kill, capture, trap, collect, molest or disturb" a bald or golden eagle. "Disturb" means to agitate or bother an eagle to a degree that causes, or is likely to cause, 1) injury to an eagle, 2) a decrease in its productivity, by substantially interfering with normal breeding, feeding, or sheltering behavior, or 3) nest abandonment, by substantially interfering with normal breeding, feeding, or sheltering behavior. Currently, federal take permits are not available under the BGEPA, but are under consideration (USFWS 2009). The U.S. Fish and Wildlife Service (USFWS) uses discretion when prosecuting eagle mortality for energy development. The likelihood of prosecution can be reduced by demonstrating good faith effort to lower eagle mortality through avian use studies, micrositing turbines away from areas of high eagle use, and consulting with the USFWS.

1.3 Study Area

The Chilocco Wind Resource Area (WRA) is located in the north central portion of Kay County, Oklahoma (Figure 1). The Chilocco property includes two block areas, a western segment (approximately 2,633 acres) and an eastern segment (approximately 1,658 acres); however, the eastern segment is not included in the current WRA layout (Figure 1). The WRA is relatively flat mixed grass prairie with scattered rolling hills, occasional shelter belts, few scattered farm ponds, ditches, and altered wetland areas, and the Chilocco Creek (Woods et al. 2005). The WRA is located approximately 5 miles to the west and 3 miles to the south of the Arkansas River (Figure 1). Additional water bodies in the vicinity of the WRA include Wentz Lake approximately 7 miles to the southwest of the WRA, Newkirk Lake approximately 5 miles east of the WRA on the east side of the Arkansas River, and Kaw Lake, a large reservoir (17,000 acres) along the Arkansas River; the upper reaches of Kaw Lake are approximately 7 miles to the southeast of the WRA and the lower portion and dam of the reservoir is approximately 19 miles from the WRA (Figure 2).

2.0 BALD EAGLE REVIEW

2.1 Bald Eagle General Information

Population trends. Bald eagles suffered drastic population declines starting during early human settlement and continuing into the mid 1900s. Historic declines of bald eagle populations were linked to a variety of human related causes (Buehler 2000). Declines prompted listing as Endangered in 1967 under the Endangered Species Preservation Act of 1966 (Federal Register 32: 4001), followed by continued Endangered status with the passage of the Endangered Species Act (ESA) of 1973. Bald eagle populations have made dramatic recoveries since the early 1970s (Figure 3), and like historic bald eagle population declines, recovery is difficult to attribute to any single management effort (Buehler 2000). The bald eagle was delisted in 2007, as recovery goals had been met for over 10 years and populations continued to increase (USFWS 2010).

Breeding behavior. Bald eagle nests are typically constructed in the tallest available trees (Herrick 1924; Buehler 2000). Nests are used year after year in most areas; however, failed breeding attempts often cause mating pairs to build a new nest within their territory (Herrick 1924). Immature bald eagles tend to disperse from natal territory once they are independent of parents. Immature bald eagle dispersal patterns are unpredictable, and they appear to be opportunistic in their movements, depending on food availability and weather (Buehler 2010).

Migration. Adult bald eagles have a generalized migratory pattern, moving between breeding grounds in the north and wintering areas in the south. The timing of migration is variable and depends on the availability of food in the north with fall migration occurring mid-August to mid-November (primarily September-October) and spring migration occurring from March-May (Buehler 2000). Bald eagles are mainly solitary migrants, occasionally joining others on the wing, but they do not form large kettles as do some other raptor species (Buehler 2010). Migratory bald eagles typically fly during midday, soaring on thermals to reduce energy costs and following the general course of major rivers (Buehler 2000).

Wintering behavior. As a means of conserving energy, wintering bald eagles form large communal roosts and are largely sedentary, spending very little time flying (<3% of 24 hour cycle) (Stalmaster and Gessaman 1984). Roosts are typically formed in the tallest available trees and are often located adjacent to a regular source of prey (Buehler 2000). Roost site fidelity is high for wintering bald eagles with communal roosts forming year after year at the same location or tree (Buehler 2000). Winter roost sizes fluctuate from year to year, depending on the severity of the winter weather and related food availability in the north (A. Jenkins pers. comm. 2010).

2.1.1 Bald Eagles in Oklahoma

Breeding Season. Historically, bald eagles were common winter residents of Oklahoma and have not been known to breed in the state. Starting in the 1950s, occasional nesting records of bald eagles were reported (Jenkins and Sherrod 1993). Lish and Sherrod (1986) suggested that the large number of reservoirs created during the 1950s and the designation of a number of state and federal wildlife refuges created and enhanced wintering and breeding habitat for bald eagles in Oklahoma. Occasional records of nesting bald eagles continued into the 1990s (Jenkins and Sherrod 1993). Recently, the

numbers of nesting bald eagle pairs have increased considerably (Figure 4; Sutton Center 2010a). Currently, there are an estimated 120 pairs of adult bald eagles nesting in Oklahoma (A. Jenkins pers. comm. 2010).

Migration. Migration data for adult bald eagles in Oklahoma is lacking. However, dispersal data for immature bald eagles are available from the Sutton Avian Research Center 's (SARC) satellite telemetry study (SARC 2010b). In spring 2010, two nestlings (one female, one male) at Sand Springs, Oklahoma were fitted with satellite transmitters. The two nestlings successfully fledged, and data for June-November is available on-line as single point per day location data. While the male fledgling wandered near Tulsa, Oklahoma and then south to eastern Texas, the female fledgling extensively used the Arkansas River drainage from Kaw Lake to Arkansas City, Kansas. The Arkansas River corridor provides suitable foraging habitat for migrating bald eagles and might serve as a migratory path for some bald eagles.

Winter Season. Bald eagles are well-established common winter residents of Oklahoma, usually present from October-April (Lish and Sherrod 1986; Young 2006). During winter months, the state of Oklahoma hosts 800-2,000 bald eagles (Tulsa Audubon Society 2010). Wintering bald eagles in Oklahoma often roost communally near large reservoir dams where fish injured from dam turbines are a reliable source of prey (Lish 1997). The following reservoirs are regularly listed on agency websites (USGS, ODWC) as places to view large numbers of wintering bald eagles: Kaw, Keystone, Texoma, Tenkiller, Ft. Gibson, Grand, Canton, Great Salt Plains, Tishomingo, and Spavinaw (Figure 2). Occasionally, wintering bald eagles in Oklahoma are observed away from waterways when winter-killed livestock or deer are available prey items (A. Jenkins pers. comm. 2010).

Overall trends indicate increasing winter bald eagle populations in Oklahoma (National Audubon Society 2010). The population increase in Oklahoma wintering bald eagles is consistent with the continent-wide increase observed for bald eagle populations. Within the overall increase in numbers, wintering bald eagle populations in Oklahoma fluctuate from year to year depending on the severity of winters in the northern portions of the winter range (A. Jenkins pers. comm. 2010).

2.1.2 Bald Eagles in Kay County and the Chilocco Wind Resource Area

Breeding Season. Bald eagle breeding has been documented at Ponca City, 19 miles from the Chilocco WRA (Young 2006) and at Sooner Lake since 1995 (SARC 2010b), 36 miles to the south of the Chilocco WRA. Additionally, recent nest surveys conducted along the Arkansas River from Mulvane, Kansas to Kaw Reservoir, Oklahoma documented up to 10 active nests with one nest observed 4 miles north of the Walnut River and another approximately 9 miles to the southeast near Kaw Reservoir (E. Young pers. comm. 2010; Figure 2). Although bald eagles breed in Kay County, breeding is not known to occur or expected to occur on the WRA due to the lack of suitable nesting trees in proximity to foraging habitat (Young 2008). The Chilocco Creek on the WRA does offer a water feature with potential nest trees along its borders, however, the creek is largely grown over, and offers very little, if any, open water available to foraging bald eagles (Tetra Tech 2010). Furthermore, bald eagles are not regularly observed using the WRA during the breeding season (E. Young pers. comm. 2010).

Migration. According to Young (pers. comm. 2010), the bald eagle is a common spring and fall transient of Kay County. If the Arkansas River is used as a migratory path, then its proximity to the WRA might contribute to transient bald eagle use of the WRA. However, the quality of eagle habitat along the Arkansas River is better than the habitat available in the WRA, suggesting that transient eagles would be incidental in nature and rare in occurrence in the WRA.

Winter Season. Of the reservoirs known to attract large numbers of wintering bald eagles, Kaw Lake (Reservoir)(17,000 acres) of the Arkansas River is the closest to the Chilocco WRA with the upper reaches approximately 6.5 miles from the Chilocco WRA and the lower portion and dam 19 miles from the WRA (Figure 2). Other large reservoirs with winter eagle residents in the greater vicinity of the Chilocco WRA are Sooner Lake (36 mi.), Keystone (63 mi.), and Great Salt Plains Lake (65 mi.). In addition to using large reservoirs, wintering bald eagles in Oklahoma roost and forage along the Arkansas River Drainage (A. Jenkins pers. comm. 2010), which lies approximately 5 miles to the east and approximately 3 miles north in Kansas. Data from the Christmas Bird Counts at the Arkansas City, Kansas Count Circle, which includes the WRA and a portion of the Arkansas River, indicate increasing winter bald eagle numbers near the WRA (Figure 5; National Audubon Society 2010). The amount of use on the WRA by winter bald eagles is thought to be a function of local winter severity, the amount of ice on the Arkansas River, the abundance of waterfowl, and the number of deer carcasses available (E. Young pers. comm. 2010).

The status of bald eagles on the Chilocco WRA is characterized by Young (2006) as rare winter resident, as three individuals were observed from late December-February (two individuals flying low <500 ft (152 m) and one soaring at about 1000 ft (305 m). Young (2008) recorded an additional three bald eagles as incidentals flying over the WRA during the winter months of 2006, 2007, and 2008. Although Young uses the term resident, all individuals observed were in flight and might have been in transit, potentially looking for foraging opportunities over the WRA, and were winter residents of the Kaw Reservoir or Arkansas River. Young (2008) concluded that "The Bald Eagle is a common winter resident in Kay County". Young's assessment of the wintering bald eagle as rare on the WRA and common in Kay County reflects the relatively high use of the Arkansas River and Kaw Lake compared to the immediate surrounding areas.

3.0 CONCLUSIONS

Breeding Season. The risk of negative interactions between breeding bald eagles and wind turbines on the Chilocco WRA are likely to be low based on several criteria. To date, no breeding bald eagles have been documented nesting on the WRA. Breeding bald eagles are not expected to nest on the WRA for several reasons. Nesting bald eagles typically use the same nest site year after year, so the likelihood of established breeding pairs moving on to the WRA to nest is low. Although resident summer bald eagles and breeding pairs in Oklahoma have increased in recent years, new breeding pairs are not expected to nest on the WRA due to a lack of suitable eagle habitat. Summer resident bald eagles are not known or expected to travel over or forage on the WRA except on rare occasions. Summer resident eagles primarily use the Arkansas River and large reservoirs and lakes to nest and/or forage, and are not likely

to forage away from these areas, except to scavenge on large animal carcasses, such as dead livestock and deer. The risk of carcasses attracting eagles to the WRA can be minimized by proactively locating and immediately removing any deer or livestock carcasses from the WRA.

Migration. The risk of negative interactions between migrating bald eagles and wind turbines on the Chilocco WRA appears low based on several criteria. Bald eagles are solitary, diurnal migrants that soar at higher altitudes on thermals, all traits that reduce the likelihood of interactions with turbines. Local migratory paths are not known to occur near the WRA, however, the Arkansas River, located approximately 5 miles to the west and 3 miles to the north of the WRA, provides a potential migratory path. If migration along the Arkansas River occurs, there is the potential for transient migratory bald eagles to occur over the WRA. However, the lack of preferred foraging habitat on the WRA indicates that the likelihood of interactions between transient migrants and wind turbines is low.

Winter Season. The risk of negative interactions between wintering bald eagles and wind turbines on the Chilocco WRA appears to be low based on several criteria. Wintering bald eagles roost communally in large groups at established roost sites and show strong site fidelity to these roost sites year after year. These roost sites are located adjacent to large water sources, which the WRA lacks. Wintering bald eagles are sedentary in nature and are rarely observed away from roosts and adjacent waterways. However, bald eagles have been observed, though rarely, as winter transients of the WRA. The situations in which wintering bald eagles are found away from large waterways, e.g. scavenging winter-killed deer or livestock, are expected to be low on the WRA based on the minimal livestock grazing on the WRA. As previously mentioned, the risk of carcasses attracting eagles to the WRA can be minimized by proactively locating and immediately removing any deer or livestock carcasses from the WRA.

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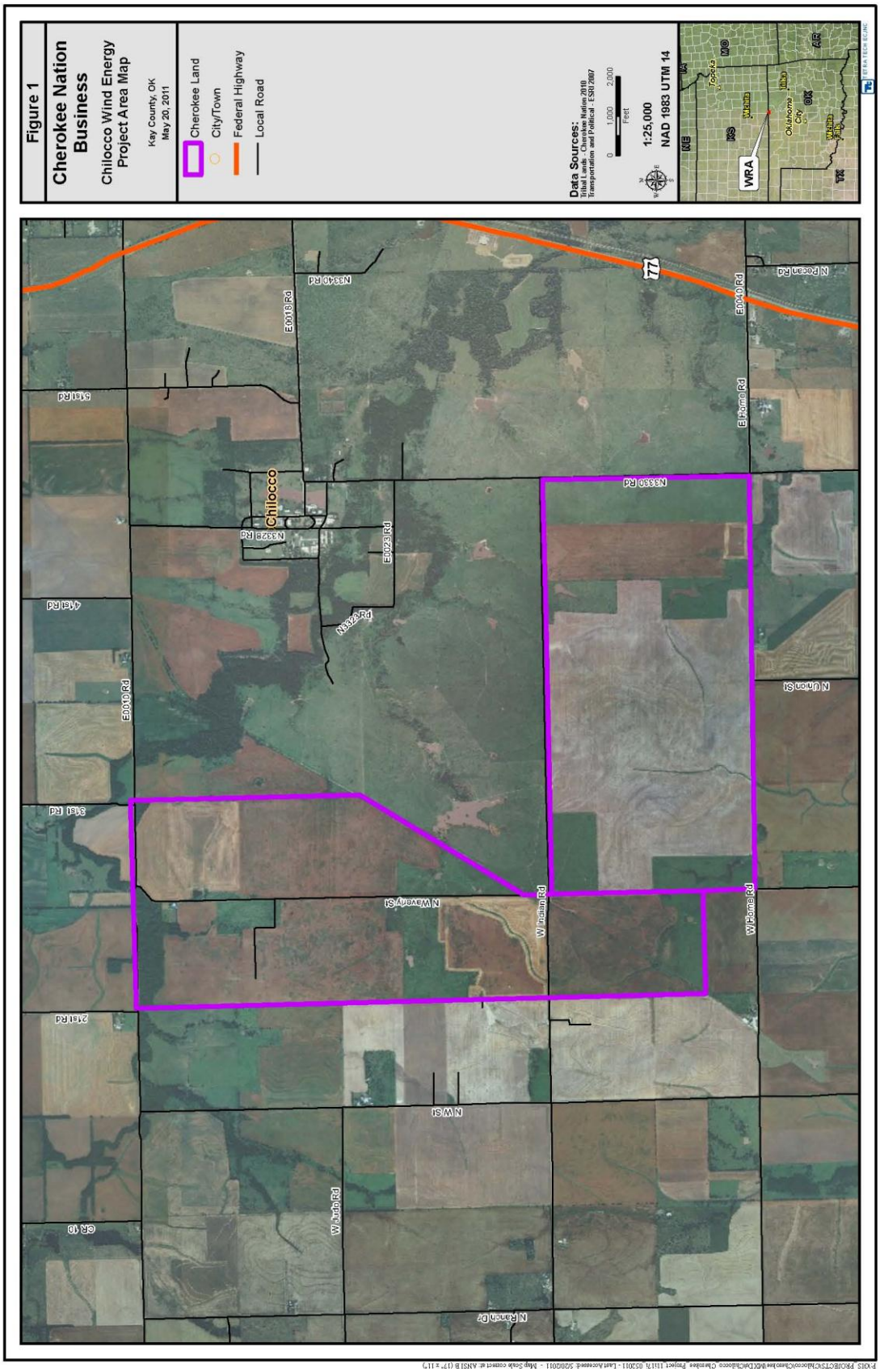


Figure 1
Cherokee Nation Business
Chilocco Wind Energy Project Area Map
Kay County, OK
May 20, 2011
Cherokee Land
City/Town
Federal Highway
Local Road
Data Sources:
Tribal Lands - Cherokee Nation 2010
Transportation and Political - ESRI 2007
0 1,000 2,000
Feet
1:25,000
NAD 1983 UTM 14
WRA
Chilocco
77
N3440 Rd
E0018 Rd
N3550 Rd
E0023 Rd
N3328 Rd
E0040 Rd
N Pecan Rd
N Union St
N W Ave
W Hubbell Rd
W Homer Rd
N W St
N Ranch Dr
E0010 Rd
CR 13

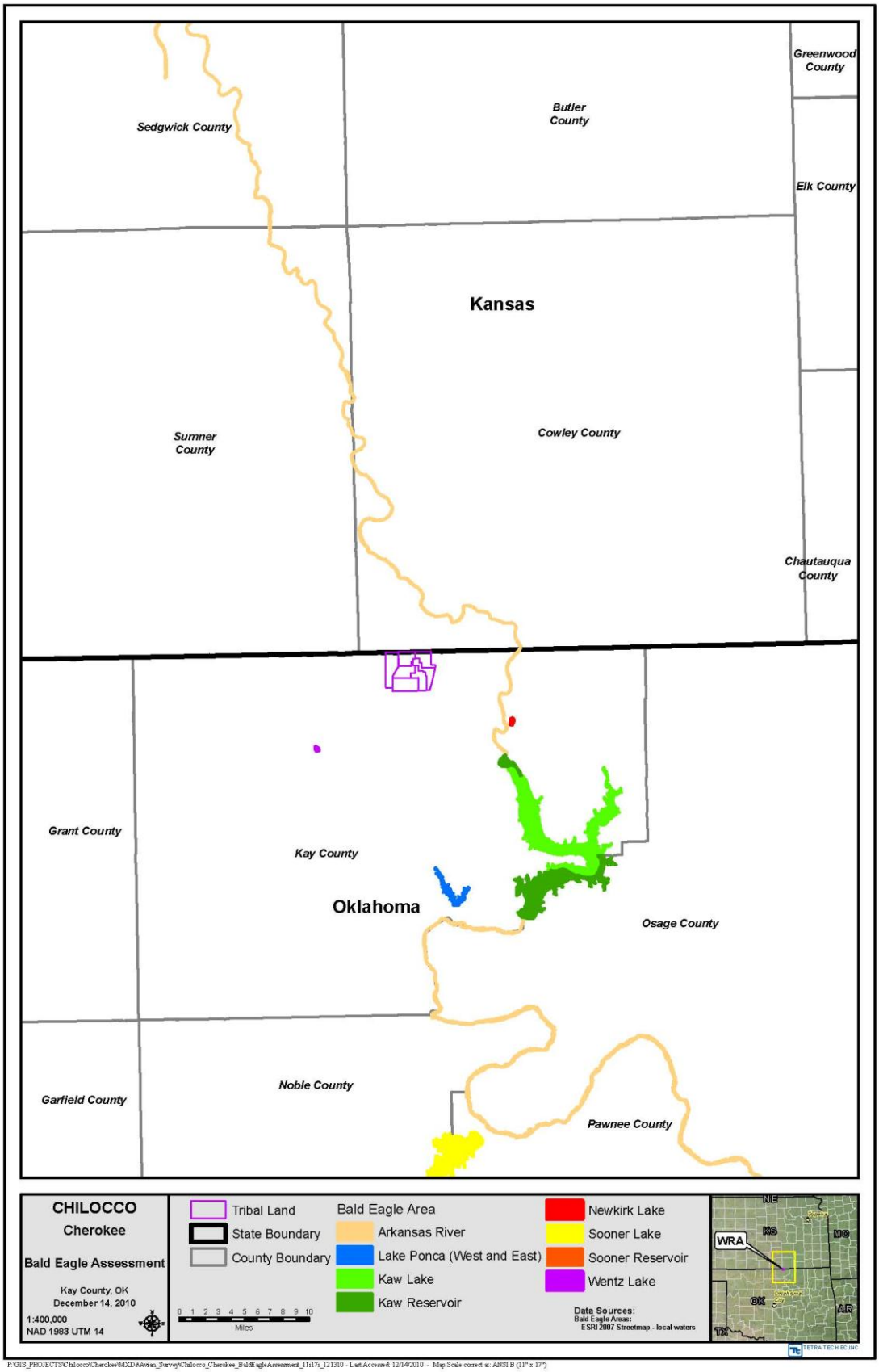

Greenwood County
Butler County
Sedgwick County
Elk County
Kansas
Sumner County
Cowley County
Chautauqua County
Grant County
Kay County
Oklahoma
Osage County
Noble County
Garfield County
Pawnee County
CHILOCCO
Cherokee
Bald Eagle Assessment
Kay County, OK
December 14, 2010
1:400,000
NAD 1983 UTM 14
Tribal Land
State Boundary
County Boundary
Miles
Bald Eagle Area
Arkansas River
Lake Ponca (West and East)
Kaw Lake
Kaw Reservoir
Newkirk Lake
Sooner Lake
Sooner Reservoir
Wentz Lake
Data Sources:
Bald Eagle Areas:
ESRI 2007 Streetmap - local waters
NE
KS
MO
WRA
OK
AR
TX
TETRA TECH EC, INC

Figure 3. Bald eagle population trends, 1960-1998 (Source: USFWS 2010)

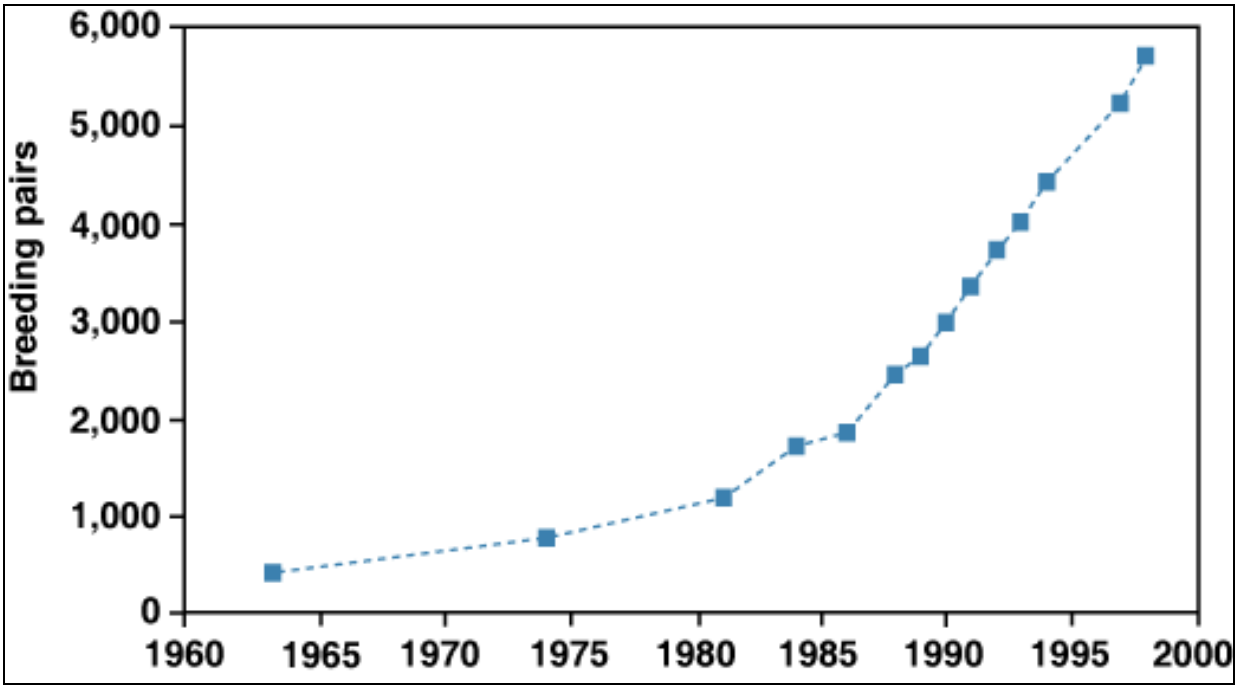


Figure 3. Bald eagle nesting data for Oklahoma, 1990-2009. Bars indicate number of occupied nests. (Increased numbers in 2009 attributed to increased survey effort) (Source: SARC 2010a)

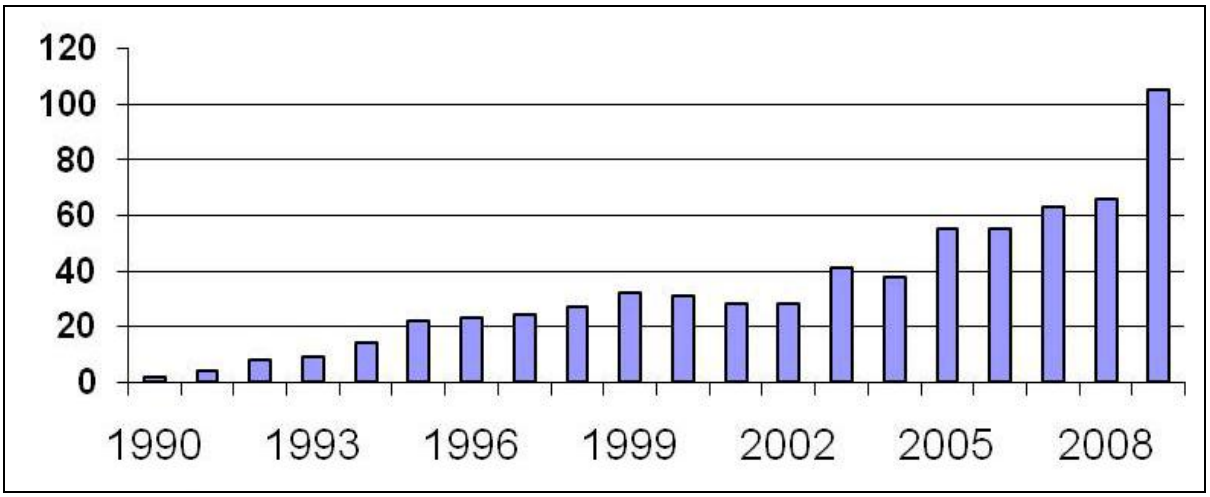
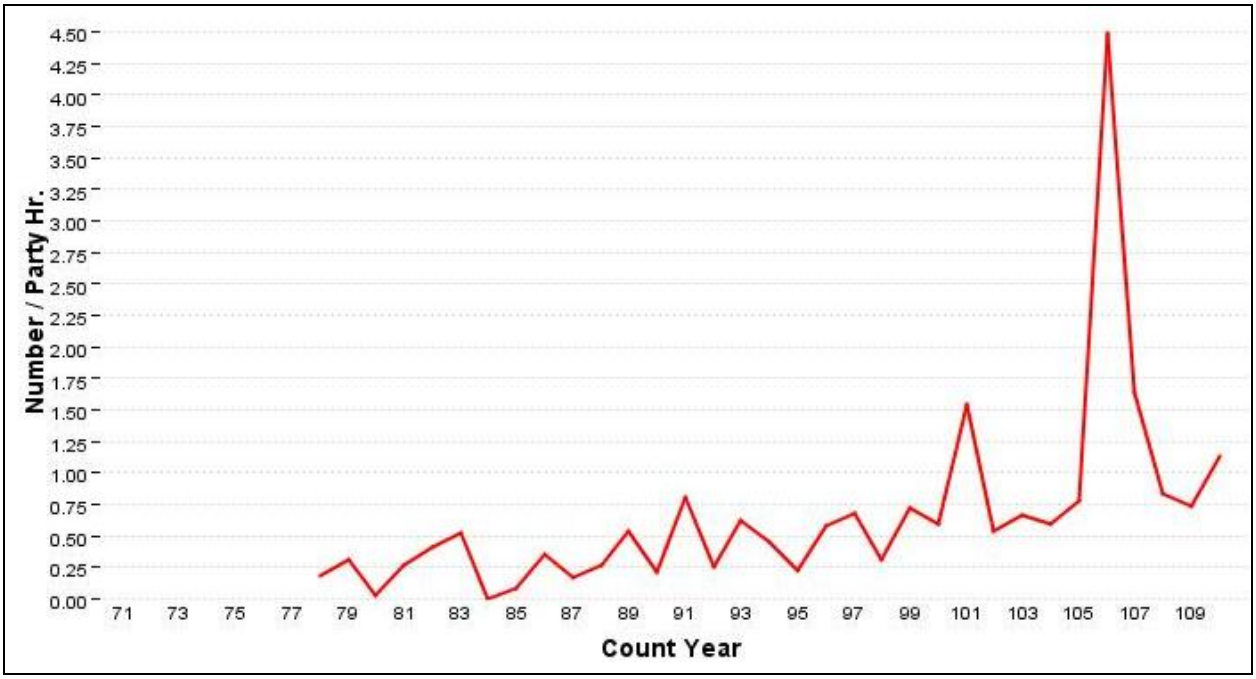


Figure 4. Bald eagle Christmas Bird Count data from the Arkansas City, Kansas Count Circle from winter 1970-1971 (year 71) to winter 2009-2010 (year 109) (Source: National Audubon Society 2010)



Study Report

Bald Eagle use of the Chilocco Wind Resource Area

Prepared for:

Cherokee Nation Businesses LLC
Tulsa, Oklahoma

Prepared by:

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August 2011

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1.0 INTRODUCTION

1.1 Overview

Wind energy provides a clean, renewable energy source that is currently in high demand. As the development of wind power generating facilities has increased, so has the need to address potential environmental impacts from those facilities. Birds have been identified as a wildlife group potentially at risk because of collisions with wind turbines and power lines, and displacement through development of wind energy infrastructure. Raptors are a source of specific concern because of raptor mortality levels observed at certain wind energy sites and the fact that the lower reproductive rate of this group increases the likelihood that fatalities might have population-level impacts (Erickson et al. 2005, Drewitt and Langston 2006). Concern about potential impacts on raptors from wind energy projects extends to bald eagles (*Haliaeetus leucocephalus*), although documented bald eagle fatalities are rare at wind energy projects in the United States (C. Farmer pers. Comm. 2011).

The bald eagle is currently federally protected under the BGEPA and the MBTA. The BGEPA prohibits the take of any bald or golden eagle, alive or dead, including any part, nest, or egg. "Take" is defined as "pursue, shoot, shoot at, poison, wound, kill, capture, trap, collect, molest or disturb" a bald or golden eagle. "Disturb" means to agitate or bother an eagle to a degree that causes, or is likely to cause, 1) injury to an eagle, 2) a decrease in its productivity, by substantially interfering with normal breeding, feeding, or sheltering behavior, or 3) nest abandonment, by substantially interfering with normal breeding, feeding, or sheltering behavior. Currently, federal take permits are not available under the BGEPA, but are under consideration (USFWS 2009). The U.S. Fish and Wildlife Service (USFWS) uses discretion when prosecuting eagle mortality for energy development. The likelihood of prosecution can be reduced by demonstrating good faith effort to lower eagle mortality through avian use studies, micrositing turbines away from areas of high eagle use, and consulting with the USFWS.

The Cherokee Nation is proposing to develop a commercial wind energy conversion facility (Chilocco Wind Resource Area [WRA]) in the north central portion of Kay County, Oklahoma. Currently, 1.6 Mega-Watt (MW) GE wind turbine generators (WGTs) are being proposed; these turbines will have a rotor swept area (RSA) of 38.75 to 118.75 meters or 30 to 130 meters, depending on the sub-model selected. Previous avian surveys of the Chilocco Wind Resource Area (WRA) detected occasional bald eagles within the WRA (Young 2008). The documentation of bald eagle use on the WRA indicated the need to further examine bald eagle use of the WRA and to evaluate the potential for negative interactions between bald eagles and wind turbines. In an effort to assess the potential risk to bald eagles at the WRA, the Cherokee Nation contracted Tetra Tech, EC to conduct a study of Spring bald eagle use within and near the WRA. Weekly road-side and observation point surveys were conducted by Cherokee biologists from February 22 to May 31, 2011 for a total of 15 bald eagle surveys.

1.2 Bald Eagle General Information

Population trends. Bald eagles suffered drastic population declines starting during early human settlement and continuing into the mid-1900s. Historic declines of bald eagle populations were linked to

a variety of human related causes (Buehler 2000). Declines prompted listing as Endangered in 1967 under the Endangered Species Preservation Act of 1966 (Federal Register 32: 4001), followed by continued Endangered status with the passage of the Endangered Species Act (ESA) of 1973. Bald eagle populations have made dramatic recoveries since the early 1970s, and like historic bald eagle population declines, recovery is difficult to attribute to any single management effort (Buehler 2000). The bald eagle was delisted in 2007, as recovery goals had been met for over 10 years and populations continued to increase (USFWS 2010).

Breeding behavior. Bald eagle nests are typically constructed in the tallest available trees (Herrick 1924; Buehler 2000). Nests are used year after year in most areas; however, failed breeding attempts often cause mating pairs to build a new nest within their territory (Herrick 1924). Immature bald eagles tend to disperse from natal territory once they are independent of parents. Immature bald eagle dispersal patterns are unpredictable, and they appear to be opportunistic in their movements, depending on food availability and weather (Buehler 2010).

Migration. Adult bald eagles have a generalized migratory pattern, moving between breeding grounds in the north and wintering areas in the south. The timing of migration is variable and depends on the availability of food in the north with fall migration occurring mid-August to mid-November (primarily September-October) and spring migration occurring from March-May (Buehler 2000). Bald eagles are mainly solitary migrants, occasionally joining others, but they do not form large kettles as do some other raptor species (Buehler 2000). Migratory bald eagles typically fly during midday, soaring on thermals to reduce energy costs and following the general course of major rivers (Buehler 2000).

Wintering behavior. As a means of conserving energy, wintering bald eagles form large communal roosts and are largely sedentary, spending very little time flying (<3% of 24 hour cycle) (Stalmaster and Gessaman 1984). Roosts are typically formed in the tallest available trees and are often located adjacent to a regular source of prey (Buehler 2000). Roost site fidelity is high for wintering bald eagles with communal roosts forming year after year at the same location or tree (Buehler 2000). Winter roost sizes fluctuate from year to year, depending on the severity of the winter weather and related food availability in the north (A. Jenkins pers. comm. 2010).

1.2.1 Bald Eagles in Oklahoma

Breeding Season. Historically, bald eagles were common winter residents of Oklahoma and have not been known to breed in the state. Starting in the 1950s, occasional nesting records of bald eagles were reported (Jenkins and Sherrod 1993). Lish and Sherrod (1986) suggested that the large number of reservoirs created during the 1950s and the designation of a number of state and federal wildlife refuges created and enhanced wintering and breeding habitat for bald eagles in Oklahoma. Occasional records of nesting bald eagles continued into the 1990s (Jenkins and Sherrod 1993). Recently, the numbers of nesting bald eagle pairs have increased considerably (Sutton Center 2010a). Currently, there are an estimated 120 pairs of adult bald eagles nesting in Oklahoma (A. Jenkins pers. comm. 2010).

Migration. Migration data for adult bald eagles in Oklahoma is lacking. However, dispersal data for immature bald eagles are available from the Sutton Avian Research Center ‘s (SARC) satellite telemetry study (SARC 2010). In spring 2010, two nestlings (one female, one male) at Sand Springs, Oklahoma

were fitted with satellite transmitters. The two nestlings successfully fledged, and data for June-November is available on-line as single point per day location data. While the male fledgling first flew near Tulsa, Oklahoma and then south to eastern Texas, the female fledgling extensively used the Arkansas River drainage from Kaw Lake to Arkansas City, Kansas. The Arkansas River corridor provides suitable foraging habitat for migrating bald eagles and might serve as a migratory path for some bald eagles.

Winter Season. Bald eagles are well-established common winter residents of Oklahoma, usually present from October-April (Lish and Sherrod 1986; Young 2006). During winter months, the state of Oklahoma hosts 800-2,000 bald eagles (Tulsa Audubon Society 2010). Wintering bald eagles in Oklahoma often roost communally near large reservoir dams where fish injured from dam turbines are a reliable source of prey (Lish 1997). The following reservoirs are regularly listed on agency websites (US Geological Survey, Oklahoma Department of Wildlife Conservation) as places to view large numbers of wintering bald eagles: Kaw, Keystone, Texoma, Tenkiller, Ft. Gibson, Grand, Canton, Great Salt Plains, Tishomingo, and Spavinaw. Occasionally, wintering bald eagles in Oklahoma are observed away from waterways when winter-killed livestock or deer are available prey items (A. Jenkins pers. comm. 2010).

Overall trends indicate increasing winter bald eagle populations in Oklahoma (National Audubon Society 2010). The population increase in Oklahoma wintering bald eagles is consistent with the continent-wide increase observed for bald eagle populations. Within the overall increase in numbers, wintering bald eagle populations in Oklahoma fluctuate from year to year depending on the severity of winters in the northern portions of the winter range (A. Jenkins pers. comm. 2010).

1.2.2 Bald Eagles in Kay County and the Chilocco Wind Resource Area

Breeding Season. Bald eagle breeding has been documented at Ponca City, 19 miles from the Chilocco WRA (Young 2006) and at Sooner Lake since 1995 (SARC 2010), 36 miles to the south of the Chilocco WRA. Additionally, recent nest surveys conducted along the Arkansas River from Mulvane, Kansas to Kaw Reservoir, Oklahoma documented up to 10 active nests with one nest observed 4 miles north of the Walnut River and another approximately 9 miles SE of the WRA near Kaw Reservoir (E. Young pers. comm. 2010). Although bald eagles breed in Kay County, breeding is not known to occur or expected to occur on the WRA due to the lack of suitable nesting trees in proximity to foraging habitat (Young 2008). The Chilocco Creek on the WRA does offer a water feature with potential nest trees along its borders; however, the creek is largely grown over, and offers very little, if any, open water available to foraging bald eagles (Tetra Tech 2010). Furthermore, bald eagles are not regularly observed using the WRA during the breeding season (E. Young pers. comm. 2010).

Migration. According to Young (pers. comm. 2010), the bald eagle is a common spring and fall transient of Kay County. If the Arkansas River is used as a migratory path, then its proximity to the WRA might contribute to transient bald eagle use of the WRA. However, the quality of eagle habitat along the Arkansas River is better than the habitat available in the WRA, suggesting that transient eagles would be incidental in nature and rare in occurrence in the WRA.

Winter Season. Of the reservoirs known to attract large numbers of wintering bald eagles, Kaw Lake (Reservoir)(17,000 acres) of the Arkansas River is the closest to the Chilocco WRA with the upper

reaches approximately 6.5 miles from the Chilocco WRA and the lower portion and dam 19 miles from the WRA. Other large reservoirs with winter eagle residents in the greater vicinity of the Chilocco WRA are Sooner Lake (36 mi.), Keystone (63 mi.), and Great Salt Plains Lake (65 mi.). In addition to using large reservoirs, wintering bald eagles in Oklahoma roost and forage along the Arkansas River Drainage (A. Jenkins pers. comm. 2010), which lies approximately 5 miles to the east and approximately 3 miles north in Kansas. Data from the Christmas Bird Counts at the Arkansas City, Kansas Count Circle, which includes the WRA and a portion of the Arkansas River, indicate increasing winter bald eagle numbers near the WRA (National Audubon Society 2010). The amount of use on the WRA by winter bald eagles is thought to be a function of local winter severity, the amount of ice on the Arkansas River, the abundance of waterfowl, and the number of deer carcasses available (E. Young pers. comm. 2010).

The status of bald eagles on the Chilocco WRA is characterized by Young (2006) as rare winter resident, as three individuals were observed from late December-February (two individuals flying <150 meters) and one soaring at approximately 300 meters). Young (2008) recorded an additional three bald eagles as incidentals flying over the WRA during the winter months of 2006, 2007, and 2008. Although Young uses the term resident, all individuals observed were in flight and might have been in transit, potentially looking for foraging opportunities over the WRA. Young (2008) concluded that "The Bald Eagle is a common winter resident in Kay County". Young's assessment of the wintering bald eagle as rare on the WRA and common in Kay County reflects the relatively high use of the Arkansas River and Kaw Lake compared to the immediate surrounding areas.

1.3 Study Objectives

The purpose of this study is to further evaluate bald eagle use and flight behavior within and near (within 2 miles) the Chilocco WRA during late winter, spring migration, and early breeding season. The study objective is to evaluate the potential risk to bald eagles from the development the WRA by conducting field studies to document the level and type of bald eagle use within and near the WRA, flight corridors, and flight heights in relation to the turbine rotor swept area (RSA).

2.0 METHODS

2.1 Study Area

The proposed Chilocco Wind Resource Area (WRA) is located in the north central portion of Kay County, Oklahoma (Figure 1). The Chilocco WRA was initially composed of two areas, a western segment (approximately 2,633 acres) and an eastern segment (approximately 1,658 acres). However, a constructability review of the areas identified a number of problems with the eastern segment and it was removed from further study (Figure 1). Currently, 1.6 MW GE wind turbine generators (WGTs) are being proposed; these turbines will have a rotor swept area (RSA) of 38.75 to 118.75 meters or 30 to 130 meters, depending on the sub-model selected.

The WRA is relatively flat mixed grass prairie with scattered rolling hills, occasional shelter belts, few scattered ponds, ditches, and altered wetland areas, and the Chilocco Creek (Woods et al. 2005). The

WRA is located approximately 5 miles to the west and 3 miles to the south of the Arkansas River. Additional water bodies in the vicinity of the WRA include Wentz Lake approximately 7 miles to the southwest of the WRA, Newkirk Lake approximately 5 miles east of the WRA on the east side of the Arkansas River, and Kaw Lake, a large reservoir (17,000 acres) along the Arkansas River; the upper reaches of Kaw Lake are approximately 7 miles to the southeast of the WRA and the lower portion and dam of the reservoir is approximately 19 miles from the WRA (Figure 2).

2.2 Survey Methods

Surveys were conducted once weekly from late February through the end of May to assess bald eagle use of the WRA during late winter, spring migration, and early breeding season. Intervals between weekly surveys were kept as close to one week as weather and scheduling allowed. The survey schedule was alternated weekly between an early start and a late start, so that all daylight hours were surveyed adequately during the study.

Each weekly bald eagle survey consisted of two survey components, 1) *road-side survey*: driving a road survey route at 10 - 25 mph and 2) *fixed-point survey*: conducting observation survey from established survey points. Biologists alternated weekly the order the two components were completed, i.e., if week 1 survey started with the road-side survey and ends with the roost survey, then week 2 will start the survey with the roost survey and end with the road-side survey.

This study approach provided the best coverage of the project area and maximized the likelihood of observing bald eagle use, if any, within the WRA. The focus of the study is the qualitative characterization of the level of use and the nature of bald eagle use within the WRA; however, eagle use is also presented in this report as quantified data (bald eagles observed/unit observation effort).

2.2.1 Road-side Survey

The road-side survey consisted of two biologists driving in a single vehicle along an established survey route (~40 miles) at a speed of 10 to 25 mph while scanning trees and the sky for perched or soaring eagles (Figure 2). The survey route was designed to maximize coverage of the WRA and the surrounding area, using the grid of state highway and county roads to survey an area of 2 miles out from the boundary of the WRA. Vehicle speed was varied and was adjusted to an appropriate speed for the complexity of the surrounding landscape. The exact route driven was varied from week to week with a minimum of three sides of each survey route driven. Additionally, biologists alternated the direction that the route was driven so that landscape features were viewed from different angles.

2.2.2 Fixed-point Survey

The fixed-point survey consisted of weekly surveys from 4 established observation points (Figure 2). The observation points were chosen based on topography, available roosting habitat, and road access. The observation points were chosen to maximize visibility of areas were bald eagles could potentially roost (e.g., riparian corridor along Chilocco Creek). Observation points were approached slowly in vehicle to avoid flushing any perched eagles. Two biologists conducted a 30-minute fixed-point observation survey

at each of the 4 designated points each week. Forested areas and open sky were scanned with and without binoculars during the 30 minutes.

2.2.3 Documenting Bald Eagle Observations

For all eagle observations, observers recorded the observation number, species code, times first and last seen, time spent below, within and above the anticipated rotor swept area (RSA), age class (adult, immature or unknown), activity type (perched, flying, swooping, or other behavior), estimated flight height range or specific heights along flight path, behavioral observations such as locations where eagles appeared to be obviously hunting as well as areas of high prey abundance, and flight path and flight heights recorded on WRA maps. The amount of time an eagle flies in the proposed RSA (RSA exposure) is simply the amount of time that an eagle is observed flying within the WRA at a height of 30 to 130-meters assuming the WGTs are equipped with 100-m blade option.

3.0 RESULTS

3.1.1 Road-side Results

No eagles were observed during the road-side survey portion of the eagle surveys. The road-side survey averaged 41 miles of survey route per weekly survey, with a total of 612 miles of survey route driven during the 15 week study. A total of 32 hours and 54 minutes of road-side survey were logged, resulting in an average of 2.19 hours per weekly road-side survey.

3.1.2 Fixed-point Results

The four observation points were each surveyed a total of 15 times for 30 minutes for a total of 30 observation hours during the 15 week study. A total of five bald eagles were observed during the fixed-point surveys (0.17 eagles/hour of observation). All 5 bald eagles were observed on March 2, 2011 from observation point 2 (Figure 2). These five eagles were observed at the same time (1158 hours) flying loosely together, and were all observed for approximately 3 minutes (Figure 3). The five eagles maintained constant flight heights during the 3 minutes of observation; the heights of the eagles ranged from 50 to 90 meters (50, 50, 50, 80, 90 meters). The five bald eagles were identified as 2 adults and 3 immature eagles. The 5 eagles were first observed flying over a small agricultural pond that held a large number of waterfowl (approximately 2000) and appeared to be looking for hunting opportunities. A large portion of the waterfowl had taken flight and began dispersing in groups, presumably because of the presence of the 5 bald eagles. No take of the waterfowl by a bald eagle was observed.

When first observed, the 5 bald eagles were flying adjacent to, but outside of the WRA. Four of the eagles (2 adults; 2 immature) flew north along the eastern boundary of the northern section of the WRA. The other eagle (an immature) flew south and eventually over the southern section of the WRA (Figure 3) which resulted in a total of 1 minute of eagle RSA exposure. No nesting eagles were detected within the WRA or within the survey area (2-mile buffer from WRA boundaries); furthermore, roosting behavior was not observed within the survey area.

4.0 DISCUSSION

Eagle activity within the WRA was low during this study and was consistent with the assessment provided in the eagle desktop review (Tetra Tech 2011). That eagle activity within and near the WRA was limited to a single observation of 5 eagles detected when large numbers of waterfowl were observed suggests that eagle use of the Chilocco WRA is restricted to times of high prey influx. The age structure of the group of eagles (i.e., two adult and three immature) suggests that this might have been a family group cooperatively hunting.

The presence of large numbers of waterfowl within and near the WRA during the study was episodic, with large numbers recorded during the first and third weeks of March, indicating that the available water within and near the WRA provides stopover opportunities for migratory waterfowl. As the location of the WRA is within the Central Flyway, the use of the area by migratory waterfowl is expected and is likely comparable to spring waterfowl migration stopover use at most available waterways within the Central Flyway. No eagles were detected during the third week of March when large numbers of migratory waterfowl were again observed.

Although site eagle activity was low, the 5 bald eagles observed flew at altitudes that would put them at risk of collision with turbine blades had they been flying through an active wind farm such as that proposed for Chilocco. However, previous studies suggest that bald eagles demonstrate turbine avoidance behavior (Sharp et al. 2010). Additionally, the agricultural pond feature whose waterfowl appears to have attracted the eagles is located outside of the WRA, furthering the potential for WTG avoidance by eagles.

The lack of roosting or nesting eagles within or near the WRA provides further evidence that eagles make limited use of the lands within or near the WRA; possibly because prey abundance is not consistent enough to support nesting. Additionally, available roosting structures (e.g., large cottonwoods, etc.) are limited within the WRA, especially when compared to the available nesting trees along the nearby Arkansas River (Lish and Sherrod 1986; E. Young pers. comm. 2010). The bald eagles occasionally using the WRA are likely individuals that roost and/or breed along the Arkansas River and Kaw Reservoir (Figure 2).

The results of this study are consistent with previous avian studies (Young 2006) and the desktop review of eagle use in the WRA (Tetra Tech 2011); bald eagle use of the WRA is occasional in nature and appears to be related to prey abundance. The potential for negative interactions between bald eagles and WGTs are expected to be low, and restricted to occasional periods when prey availability is high (e.g., during spring waterfowl migration). Potential for eagle take can be minimized by avoiding siting turbines near wetland features and reducing other potential sources of prey (e.g., livestock carcasses).

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Figure 1. Project area map of the Chilocco Wind Resource Area.

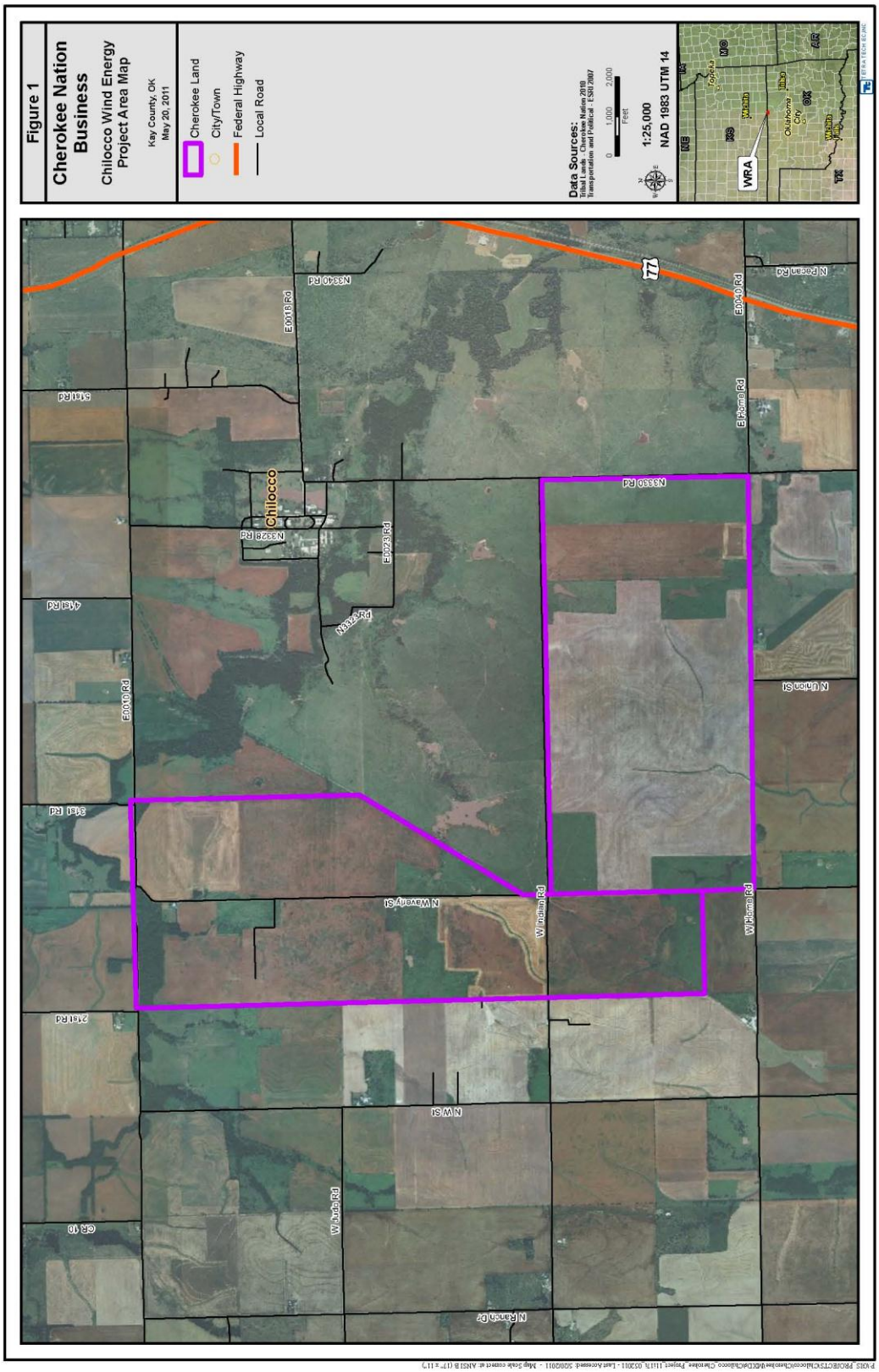

Figure 2. Waterways within the greater vicinity

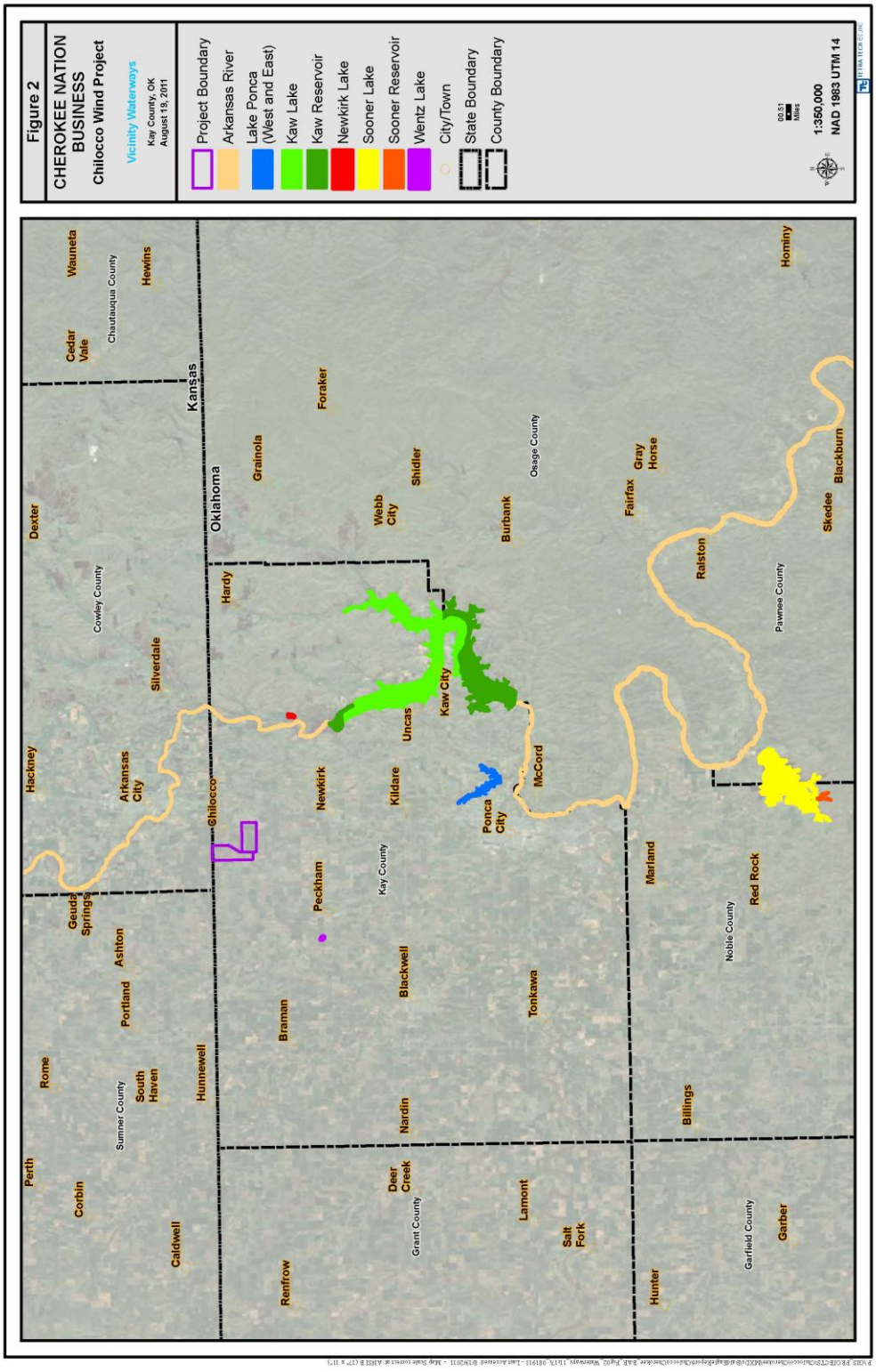

Figure 3. Road-side survey driving route and location of observation points

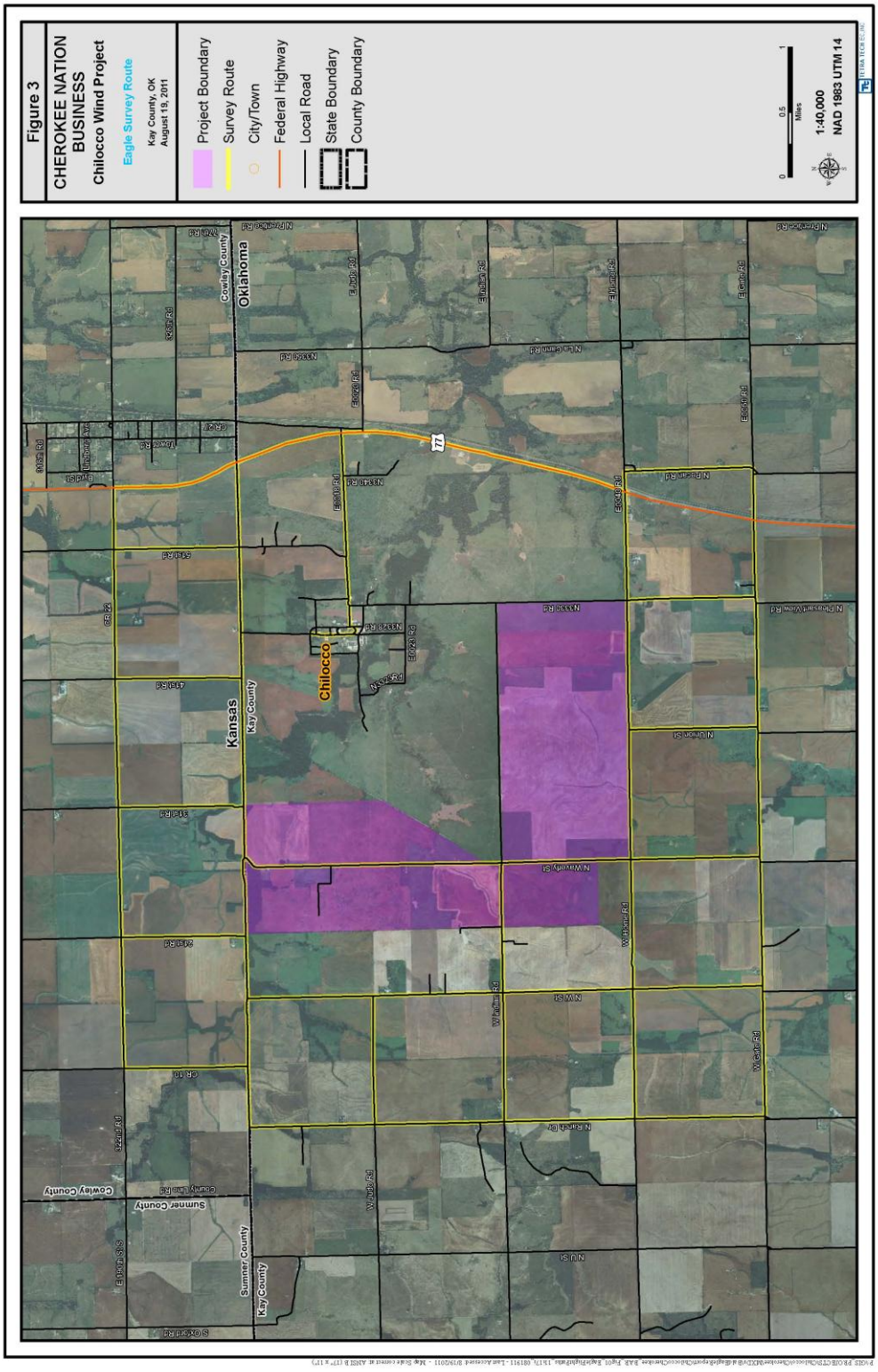

Figure 4. Flight paths of five bald eagles observed on March 2, 2011

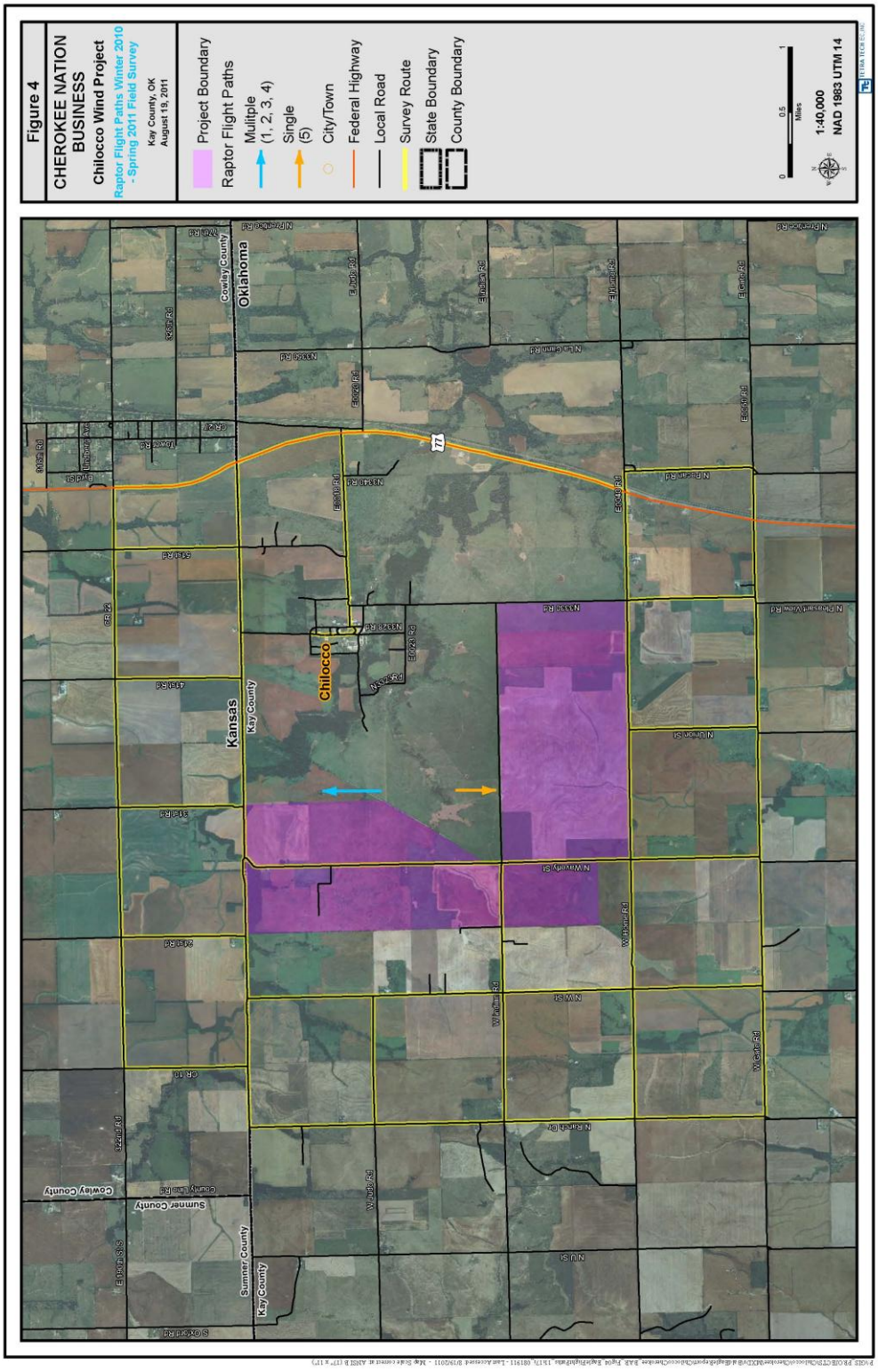

Table 1. Summary of survey periods and eagle observations overall, within the WRA (Chilocco Wind Resource Area), and within the RSA (Rotor Swept Area)

Week	Survey Date	Eagles Observed	Eagles within RSA	Eagles within WRA
1	2/22/2011	0	0	0
2	3/2/2011	5	5	1
3	3/10/2011	0	0	0
4	3/15/2011	0	0	0
5	3/22/2011	0	0	0
6	3/29/2011	0	0	0
7	4/5/2011	0	0	0
8	4/12/2011	0	0	0
9	4/19/2011	0	0	0
10	4/26/2011	0	0	0
11	5/3/2011	0	0	0
12	5/10/2011	0	0	0
13	5/17/2011	0	0	0
14	5/24/2011	0	0	0
15	5/31/2011	0	0	0
Total		**5**	**5**	**1**

OBS Ref. 2017-115-BUS-PNE

Dear Mr. Roden, Mar. 17, 2017

We have reviewed occurrence information on federal and state threatened, endangered or candidate species, as well as non-regulatory rare species and ecological systems of importance currently in the Oklahoma Natural Heritage Inventory database for the following location you provided:

Sec. 13 through 17 and 20 through 29-T29N-R2E, Kay County

We found 2 occurrence(s) of relevant species within the vicinity of the project location as described.

Bald Eagle(*Haliaeetus leucocephalus*), a federally protected species, two occurrences, one each in Sec. 22 and 23-T28N-R3E, Kay County.

Additionally, absence from our database does not preclude such species from occurring in the area.

If you have any questions about this response, please send me an email, or call us at the number given below.

Although not specific to your project, you may find the following links helpful.

ONHI, guide to ranking codes for endangered and threatened species:
http://vmpincel.ou.edu/heritage/ranking_guide.html

Information regarding the Oklahoma Natural Areas Registry:
http://www.oknaturalheritage.ou.edu/registry_faq.htm

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April 18, 2017

RE: Threatened and Endangered Species Update for the Proposed Chilocco Wind Farm

To Whom It May Concern:

SWCA Environmental Consultants (SWCA) has reviewed the biological studies associated with the previously approved EA for the purpose of updating any existing discrepancies between species federally listed at that time versus the current listings.

The 2012 species list included the piping plover (*Charadrius melodus*), whooping crane (*Grus Americana*) and the interior least tern (*Sterna antillarum athalassos*). The USFWS determined the project was not likely to adversely affect any of those species. SWCA ran a new IPaC report on March 15, 2017 that yielded two discrepancies, the listing of the red knot (*Calidris canutus rufa*) and the northern long-eared bat (NLEB, *Myotis septentrionalis*). The NLEB is, however, not listed for Kay County, Oklahoma where the project lies but rather Cowley County, Kansas, beyond the project area footprint. Upon further inspection, a shapefile projection issue in the IPaC system was discovered which resulted in the inclusion of the NLEB. After manual adjustment of the vertices to reflect the project footprint's actual setting being entirely within Kay County and re-running the IPaC report on April 18, 2017, the NLEB fell off the list. Therefore, the only discrepancy between the 2012 review and the current review is the inclusion of the red knot.

Most knots winter along the Chilean coast and migrate to the Canadian arctic breeding grounds by way of the Atlantic Coast. A small red knot population winters along the coast of Texas and migrates to the breeding grounds by way of the Great Plains. Even though this population passes over Oklahoma these birds are often flying thousands of feet above the ground, seldom making landfall in our state. To date, only 40 birds have been reported in Oklahoma. Of those birds, 85% have been reported during the fall migration. It is suspected inclement weather, inexperience of younger birds or weakened physical condition forces these birds to land during migration (https://www.wildlifedepartment.com/wildlife/nongamespecies/rufa-red-knot). According to the Oklahoma Natural Heritage Inventory, there are no known occurrence records for this species within the project area (ONHI 2017). Given the infrequent nature of landfall within Oklahoma and the project design that minimizes

wetland impacts which may serve as stopover habitat, adverse effects on red knots are considered unlikely.

If you have any questions or require any additional information, please contact Stephanie Rainwater at 918.219.9951 (SRainwater@swca.com) or Tom Koronkiewicz at 928.774.5500 (TKoronkiewicz@swca.com).

Sincerely,

SWCA Environmental Consultants

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Biologist
SWCA Environmental Consultants
233 S. Detroit, Suite 301
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P 918.770.7983 | M 918.219.9951

Attachments
IPaC Report
ONHI Report

United States Department of the Interior

FISH AND WILDLIFE SERVICE
Oklahoma Ecological Services Field Office
9014 East 21st Street
Tulsa, OK 74129-1428
Phone: (918) 581-7458 Fax: (918) 581-7467
http://www.fws.gov/southwest/es/Oklahoma/

In Reply Refer To: April 18, 2017
Consultation Code: 02EKOK00-2017-SLI-1354
Event Code: 02EKOK00-2017-E-02565
Project Name: Chilocco

Subject: List of threatened and endangered species that may occur in your proposed project location, and/or may be affected by your proposed project

To Whom It May Concern:

The enclosed species list identifies threatened, endangered, proposed and candidate species, as well as proposed and final designated critical habitat, that may occur within the boundary of your proposed project and/or may be affected by your proposed project. The species list fulfills the requirements of the U.S. Fish and Wildlife Service (Service) under section 7(c) of the Endangered Species Act (Act) of 1973, as amended (16 U.S.C. 1531 et seq.).

New information based on updated surveys, changes in the abundance and distribution of species, changed habitat conditions, or other factors could change this list. Please feel free to contact us if you need more current information or assistance regarding the potential impacts to federally proposed, listed, and candidate species and federally designated and proposed critical habitat. Please note that under 50 CFR 402.12(e) of the regulations implementing section 7 of the Act, the accuracy of this species list should be verified after 90 days. This verification can be completed formally or informally as desired. The Service recommends that verification be completed by visiting the ECOS-IPaC website at regular intervals during project planning and implementation for updates to species lists and information. An updated list may be requested through the ECOS-IPaC system by completing the same process used to receive the enclosed list.

The purpose of the Act is to provide a means whereby threatened and endangered species and the ecosystems upon which they depend may be conserved. Under sections 7(a)(1) and 7(a)(2) of the Act and its implementing regulations (50 CFR 402 et seq.), Federal agencies are required to utilize their authorities to carry out programs for the conservation of threatened and endangered species and to determine whether projects may affect threatened and endangered species and/or designated critical habitat.

A Biological Assessment is required for construction projects (or other undertakings having similar physical impacts) that are major Federal actions significantly affecting the quality of the

human environment as defined in the National Environmental Policy Act (42 U.S.C. 4332(2)(c)). For projects other than major construction activities, the Service suggests that a biological evaluation similar to a Biological Assessment be prepared to determine whether the project may affect listed or proposed species and/or designated or proposed critical habitat. Recommended contents of a Biological Assessment are described at 50 CFR 402.12.

If a Federal agency determines, based on the Biological Assessment or biological evaluation, that listed species and/or designated critical habitat may be affected by the proposed project, the agency is required to consult with the Service pursuant to 50 CFR 402. In addition, the Service recommends that candidate species, proposed species and proposed critical habitat be addressed within the consultation. More information on the regulations and procedures for section 7 consultation, including the role of permit or license applicants, can be found in the "Endangered Species Consultation Handbook" at:

http://www.fws.gov/endangered/esa-library/pdf/TOC-GLOS.PDF

Non-federal entities conducting activities that may result in take of listed species should consider seeking coverage under section 10 of the ESA, either through development of a Habitat Conservation Plan (HCP) or, by becoming a signatory to the General Conservation Plan (GCP) currently under development for the American burying beetle. Each of these mechanisms provides the means for obtaining a permit and coverage for incidental take of listed species during otherwise lawful activities.

Please be aware that bald and golden eagles are protected under the Bald and Golden Eagle Protection Act (16 U.S.C. 668 et seq.), and projects affecting these species may require development of an eagle conservation plan (http://www.fws.gov/windenergy/eagle_guidance.html). Additionally, wind energy projects should follow the wind energy guidelines (http://www.fws.gov/windenergy/) for minimizing impacts to migratory birds and bats.

Guidance for minimizing impacts to migratory birds for projects including communications towers (e.g., cellular, digital television, radio, and emergency broadcast) can be found at: http://www.fws.gov/migratorybirds/CurrentBirdIssues/Hazards/towers/towers.htm; http://www.towerkill.com; and http://www.fws.gov/migratorybirds/CurrentBirdIssues/Hazards/towers/comtow.html.

We appreciate your concern for threatened and endangered species. The Service encourages Federal agencies to include conservation of threatened and endangered species into their project planning to further the purposes of the Act. Please include the Consultation Tracking Number in the header of this letter with any request for consultation or correspondence about your project that you submit through our Project Review step-wise process http://www.fws.gov/southwest/es/oklahoma/OKESFO%20Permit%20Home.htm.

Attachment(s):

- Official Species List

- USFWS National Wildlife Refuges and Fish Hatcheries
- Migratory Birds
- Wetlands

Official Species List

This list is provided pursuant to Section 7 of the Endangered Species Act, and fulfills the requirement for Federal agencies to "request of the Secretary of the Interior information whether any species which is listed or proposed to be listed may be present in the area of a proposed action".

This species list is provided by:

Oklahoma Ecological Services Field Office
9014 East 21st Street
Tulsa, OK 74129-1428
(918) 581-7458

This project's location is within the jurisdiction of multiple offices. Expect additional species list documents from the following office:

Kansas Ecological Services Field Office
2609 Anderson Avenue
Manhattan, KS 66502-2801
(785) 539-3474

Project Summary

Consultation Code: 02EKOK00-2017-SLI-1354

Event Code: 02EKOK00-2017-E-02565

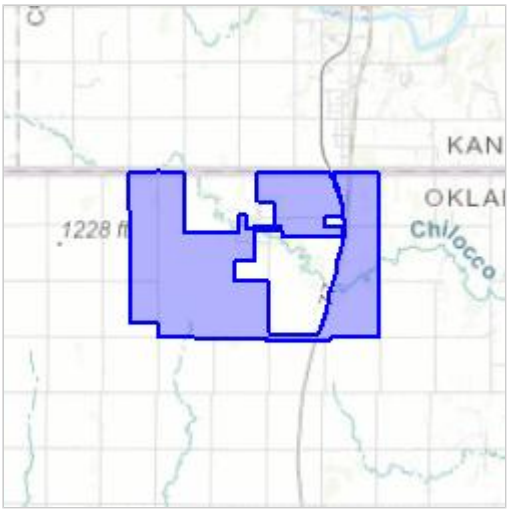
Project Name: Chilocco

Project Type: ** OTHER **

Project Description: wind farm

Project Location:

Approximate location of the project can be viewed in Google Maps: https://www.google.com/maps/place/36.976972833067144N97.09082796243568W



Counties: Cowley, KS | Kay, OK

Endangered Species Act Species

There is a total of 4 threatened, endangered, or candidate species on your species list. Species on this list should be considered in an effects analysis for your project and could include species that exist in another geographic area. For example, certain fish may appear on the species list because a project could affect downstream species. See the "Critical habitats" section below for those critical habitats that lie wholly or partially within your project area. Please contact the designated FWS office if you have questions.

Birds

NAME	STATUS
Least Tern *(Sterna antillarum)* Population: interior pop. No critical habitat has been designated for this species. Species profile: https://ecos.fws.gov/ecp/species/8505	Endangered
Piping Plover *(Charadrius melodus)* Population: except Great Lakes watershed There is a **final** critical habitat designated for this species. Your location is outside the designated critical habitat. Species profile: https://ecos.fws.gov/ecp/species/6039	Threatened
Red Knot *(Calidris canutus rufa)* No critical habitat has been designated for this species. Species profile: https://ecos.fws.gov/ecp/species/1864	Threatened
Whooping Crane *(Grus americana)* Population: Wherever found, except where listed as an experimental population There is a **final** critical habitat designated for this species. Your location is outside the designated critical habitat. Species profile: https://ecos.fws.gov/ecp/species/758	Endangered

Critical habitats

There are no critical habitats within your project area.

USFWS National Wildlife Refuges And Fish Hatcheries

Any activity proposed on National Wildlife Refuge lands must undergo a 'Compatibility Determination' conducted by the Refuge. Please contact the individual Refuges to discuss any questions or concerns.

There are no refuges or fish hatcheries within your project area.

Migratory Birds

Certain birds are protected under the Migratory Bird Treaty Act[1] and the Bald and Golden Eagle Protection Act[2].

Any activity that results in the take of migratory birds or eagles is prohibited unless authorized by the U.S. Fish and Wildlife Service[3]. There are no provisions for allowing the take of migratory birds that are unintentionally killed or injured.

Any person or organization who plans or conducts activities that may result in the take of migratory birds is responsible for complying with the appropriate regulations and implementing appropriate conservation measures.

---

1. The Migratory Birds Treaty Act of 1918.
2. The Bald and Golden Eagle Protection Act of 1940.
3. 50 C.F.R. Sec. 10.12 and 16 U.S.C. Sec. 668(a)

The migratory birds species listed below are species of particular conservation concern (e.g. Birds of Conservation Concern) that may be potentially affected by activities in this location. It is not a list of every bird species you may find in this location, nor a guarantee that all of the bird species on this list will be found on or near this location. Although it is important to try to avoid and minimize impacts to all birds, special attention should be made to avoid and minimize impacts to birds of priority concern. To view available data on other bird species that may occur in your project area, please visit the AKN Histogram Tools and Other Bird Data Resources. To fully determine any potential effects to species, additional site-specific and project-specific information is often required.

NAME	SEASON(S)
Chestnut-collared Longspur *(Calcarius ornatus)*	On Land: Wintering
Least Bittern *(Ixobrychus exilis)* https://ecos.fws.gov/ecp/species/6175	On Land: Breeding
Mississippi Kite *(Ictinia mississippiensis)*	On Land: Breeding
Rusty Blackbird *(Euphagus carolinus)*	On Land: Wintering
Harris's Sparrow *(Zonotrichia querula)*	On Land: Wintering
Scissor-tailed Flycatcher *(Tyrannus forficatus)*	On Land: Breeding
Lark Bunting *(Calamospiza melanocorys)*	On Land: Breeding
Little Blue Heron *(Egretta caerulea)*	On Land: Breeding

Dickcissel *(Spiza americana)*	On Land: Breeding
Henslow's Sparrow *(Ammodramus henslowii)* https://ecos.fws.gov/ecp/species/3941	On Land: Breeding
Painted Bunting *(Passerina ciris)*	On Land: Breeding
Prothonotary Warbler *(Protonotaria citrea)*	On Land: Breeding
Upland Sandpiper *(Bartramia longicauda)* https://ecos.fws.gov/ecp/species/9294	On Land: Breeding
Red-headed Woodpecker *(Melanerpes erythrocephalus)*	On Land: Year-round
Golden Eagle *(Aquila chrysaetos)* https://ecos.fws.gov/ecp/species/1680	On Land: Wintering
Bald Eagle *(Haliaeetus leucocephalus)* https://ecos.fws.gov/ecp/species/1626	On Land: Year-round
Bell's Vireo *(Vireo bellii)* https://ecos.fws.gov/ecp/species/9507	On Land: Breeding
Loggerhead Shrike *(Lanius ludovicianus)* https://ecos.fws.gov/ecp/species/8833	On Land: Year-round
Short-eared Owl *(Asio flammeus)* https://ecos.fws.gov/ecp/species/9295	On Land: Wintering
Snowy Plover *(Charadrius alexandrinus)*	On Land: Breeding
Swainson's Hawk *(Buteo swainsoni)* https://ecos.fws.gov/ecp/species/1098	On Land: Breeding
Hudsonian Godwit *(Limosa haemastica)*	On Land: Migrating

Additional information can be found using the following links:

- Birds of Conservation Concern http://www.fws.gov/birds/management/managed-species/birds-of-conservation-concern.php
- Conservation measures for birds http://www.fws.gov/birds/management/project-assessment-tools-and-guidance/conservation-measures.php
- Year-round bird occurrence data http://www.birdscanada.org/birdmon/default/datasummaries.jsp

Wetlands

Impacts to NWI wetlands and other aquatic habitats may be subject to regulation under Section 404 of the Clean Water Act, or other State/Federal statutes.

For more information please contact the Regulatory Program of the local U.S. Army Corps of Engineers District.

FRESHWATER EMERGENT WETLAND

- PEM1/SS1C
- PEM1Ch
- PEM1Ah
- PEM1C

FRESHWATER FORESTED/SHRUB WETLAND

- PSS1/EM1Ch
- PFO1/EM1A
- PFO1A
- PFO1Ch
- PFO1/EM1Ah
- PSS1Ch
- PFO1C

FRESHWATER POND

- PUSCh
- PUSAh
- PUBHh
- PUSA

OBS Ref. 2017-115-BUS-PNE

Dear Mr. Roden, Mar. 17, 2017

We have reviewed occurrence information on federal and state threatened, endangered or candidate species, as well as non-regulatory rare species and ecological systems of importance currently in the Oklahoma Natural Heritage Inventory database for the following location you provided:

Sec. 13 through 17 and 20 through 29-T29N-R2E, Kay County

We found 2 occurrence(s) of relevant species within the vicinity of the project location as described.

Bald Eagle(*Haliaeetus leucocephalus*), a federally protected species, two occurrences, one each in Sec. 22 and 23-T28N-R3E, Kay County.

Additionally, absence from our database does not preclude such species from occurring in the area.

If you have any questions about this response, please send me an email, or call us at the number given below.

Although not specific to your project, you may find the following links helpful.

ONHI, guide to ranking codes for endangered and threatened species:
http://vmpincel.ou.edu/heritage/ranking_guide.html

Information regarding the Oklahoma Natural Areas Registry:
http://www.oknaturalheritage.ou.edu/registry_faq.htm

Todd Fagin
Oklahoma Natural Heritage Inventory
(405) 325-4700
tfagin@ou.edu

Critical Issues Analysis: Cultural Resources

Chilocco Wind Resource Area
Kay County, Oklahoma

Prepared for
Cherokee Nation

June 2011

TETRA TECH EC, INC.

EXECUTIVE SUMMARY

A Critical Issues Analysis (CIA) of the proposed Chilocco Wind Resource Area (the Project) was completed to identify potential environmental, regulatory, and design issues associated with the Project. The CIA is a planning document based on desktop research intended to summarize avaiable resource information and highlight potential issues to be addressed during Project planning. It is not a substitute for more intensive investigations, such as archeological or architectural surveys that address Section 106 of the National Historic Preservation Act.

In the Project, the proponent, Cherokee Nation Enterprises, LLC, proposes to develop a wind farm comprising approximately 33 utility-scale wind turbines on 2,633 acres of Cherokee Nation tribal trust and fee land. The Project Area is situated south and west of the former Chilocco Indian School, in Kay County, Oklahoma. The proposed Project Area consists of all or portions of the following sections in Township 29 North, Range 2 East (T29N R2E): Sec 16 W½, 17 E½, 20 E½, 21 NW¼ and SW ¼ (portions), 27, 28, and 29 E½ (portions).

This CIA found that no comprehensive cultural resources survey of the Project Area or vicinity has been completed to date. There are no recorded archeological resources within the Project Area. Review of online sources also determined there are no inventoried historic properties within the physical boundaries of the Project Area as defined above. However, the Chilocco Indian Agricultural School, a historic district listed on the National Register of Historic Places, is situated approximately 1 mile from the Project boundaries. Visual and auditory elements of the proposed Project appear to have the potential to affect the district. Additional study is required to confirm these potential effects.

Planning for the Project has not yet progressed far enough to determine whether it will involve a federal nexus that would trigger review under Section 106 of the National Historic Preservation Act or the National Environmental Protection Act (NEPA). If either of these laws is triggered, then detailed study of the Project's effect on cultural resources would be necessary and would be undertaken in consultation with the Oklahoma State Historic Preservation Office (SHPO) and other parties, including interested Native American tribes.

Recommendations include:

1. Initiation of consultations with the SHPO at an early date;
2. Completion of required cultural resources studies;
3. Completion of due-diligence cultural resources studies if such studies are not required by applicable regulations; and
4. Inclusion of federally-recognized Native American tribes and other potential stakeholders in consultations concerning the possible effects of the Project on any significant archeological and historical resources or traditional cultural properties that may be present in the area.

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1.0 INTRODUCTION

Under contract to the Cherokee Nation Enterprises, LLC (CNE), Tetra Tech EC, Inc. (TtEC) has prepared a Critical Issues Analysis (CIA) for the proposed Chilocco Wind Resource Area (WRA), in northern Kay County, Oklahoma (Figure 1). The CIA is a confidential planning document intended to synthesize available planning and environmental information at an early stage of project design to identify potentially significant environmental and regulatory issues, design constraints, and necessary studies and permits. This document provides a CIA for cultural resources; other documents prepared by TtEC consider other resource types and issues.

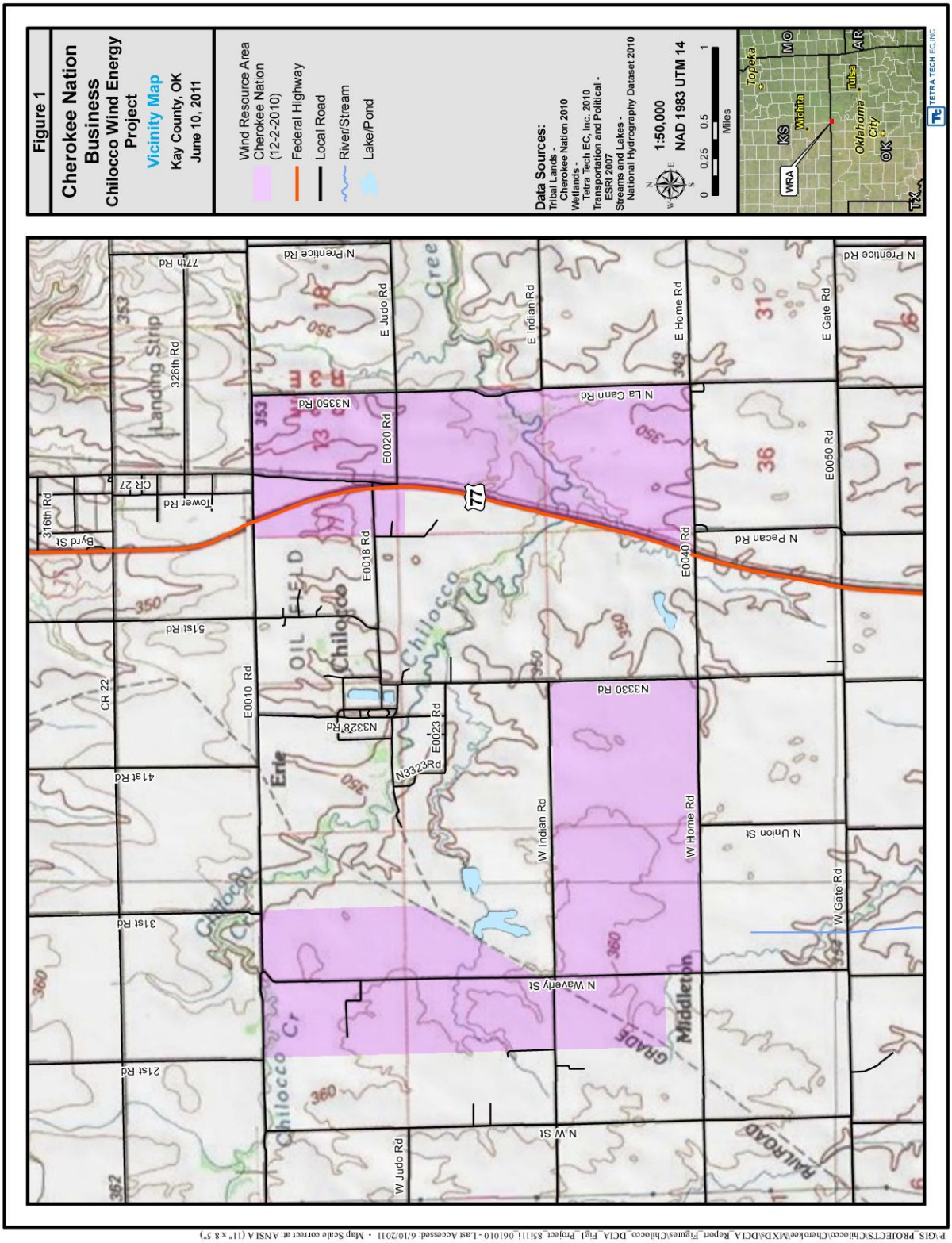
As part of the Chilocco WRA, CNE proposes to develop a wind farm comprising approximately 33 utility-scale wind turbines on 2,633 acres of Cherokee Nation fee and tribal trust land south and west of the former Chilocco Indian School, immediately south of the Kansas state border. For purposes of this document, the proposed Project Area consists of all or portions of the following sections in Township 29 North, Range 2 East (T29N R2E): Sec 16 W½, 17 E½, 20 E½, 21 NW¼ and SW ¼ (portions), 27, 28, and 29 E½ (portions) (Figure 2). The Project Area constitutes a portion of the historical Chilocco Reserve, an area of approximately 12 square miles established in the 1880s to support a federally-operated Indian boarding school. The Project Area is situated on agricultural land, including crop- and grazing land, outside the former core campus of the school.

Cultural resources include historically significant archeological sites, historic standing structures, objects, and districts, as well as traditional cultural properties. Such properties illustrate or illuminate significant aspects of prehistory or history or have significant cultural associations with long-standing communities or social groups. Designation of an archeological or architectural property as historically significant is based upon the eligibility criteria for the National Register of Historic Places (NRHP) (Title 36 *Code of Federal Regulations,* Part 63 [36 CFR 63]). The significance of sites or features identified as traditional cultural properties (TCPs) may be based on other, confidential, criteria that are not currently part of the NRHP evaluation process.

Available information indicates that the proposed Chilocco WRA may involve a federal nexus as a result both of the administration of Cherokee Nation tribal trust land through the Bureau of Indian Affairs (BIA) and because of potential federal funding assistance for developing the project. Depending upon future planning, the Project may be subject to review under both the National Environmental Policy Act (NEPA) and Section 106 of the National Historic Preservation Act (NHPA). Permits and review processes under the jurisdiction of the State of Oklahoma, Kay County, or the Cherokee Nation may also apply to the proposed project.

This document is not intended to address the requirements of the review process under Section 106 (36 CFR 800) or other pertinent statutes or regulations. It is, instead, intended to summarize readily available information on cultural resources, identify potential critical issues, and discuss how to address subsequent steps in the cultural resources regulatory process.

Figure 1. Vicinity Map



P:\GIS_PROJECTS\Chilocco\Cherokee\MXD\DCIA_Report_Figures\Chilocco_DCIA_Fig1_Project_851111_061010 - Laa Accessed: 6/10/2011 - Map Scale correct at: ANSI A (11" x 8.5")

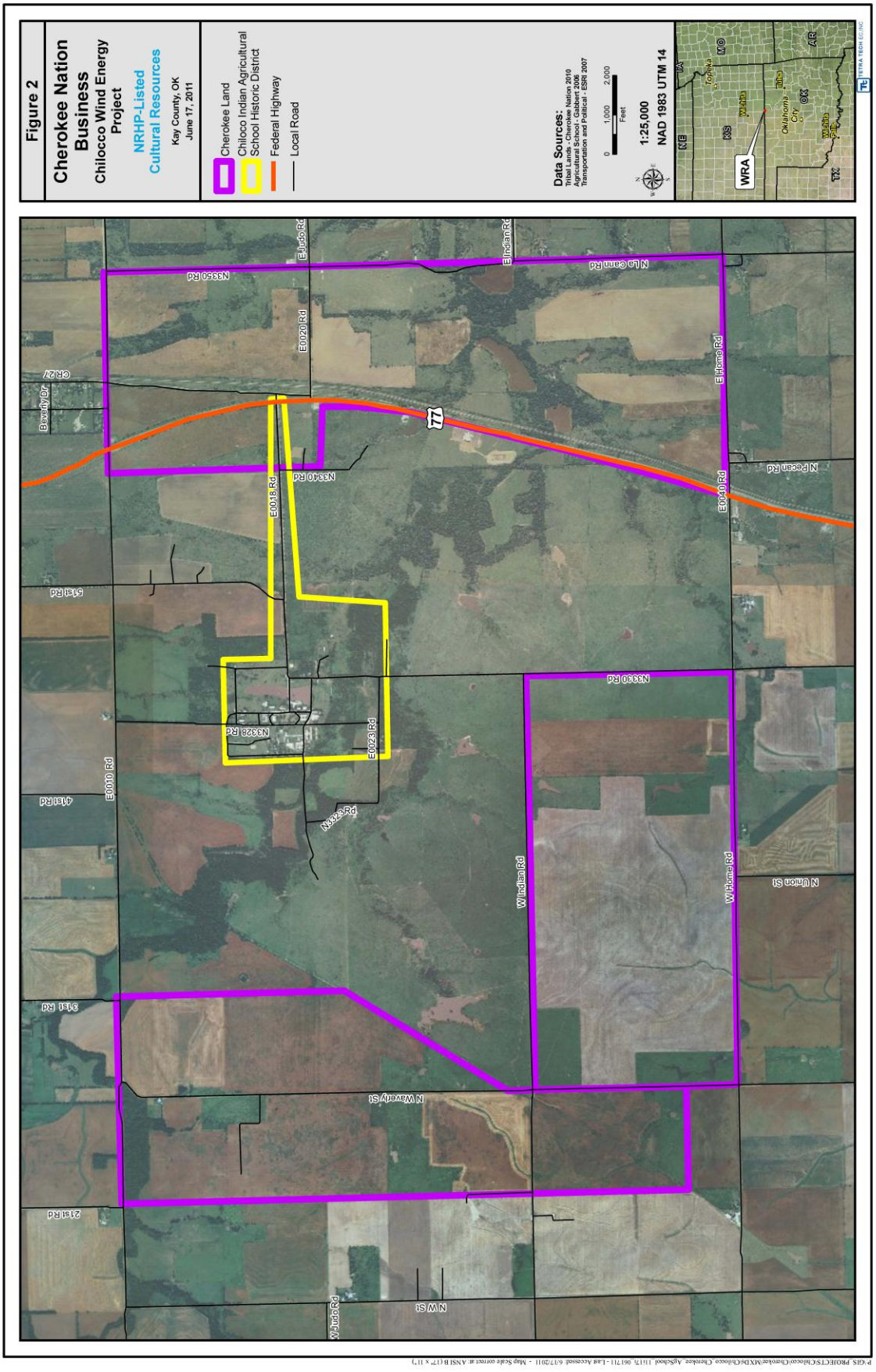


Figure 2
Cherokee Nation Business
Chilocco Wind Energy Project
NRHP-Listed Cultural Resources
Kay County, OK
June 17, 2011
Cherokee Land
Chilocco Indian Agricultural School Historic District
Federal Highway
Local Road
Data Sources:
Tribal Lands - Cherokee Nation 2010
Agricultural School - Gabbert 2006
Transportation and Political - ESRI 2007
0 1,000 2,000
Feet
1:25,000
NAD 1983 UTM 14
WRA
Oklahoma City
Wichita
Topeka
Omaha
Kansas
N Indian Rd
E Judo Rd
N 330 Rd
E 0020 Rd
N La Cann Rd
E Home Rd
77
N 340 Rd
E 0010 Rd
N Pecan Rd
E 0015 Rd
51st Rd
N 330 Rd
N 328 Rd
E 0025 Rd
41st Rd
E 0010 Rd
W Indian Rd
W Home Rd
N Union St
31st Rd
N Waverly St
21st Rd
N W St
W Judo Rd

2.0 INVENTORIED CULTURAL RESOURCES AND POTENTIAL RESOURCE ISSUES

Information on previously-inventoried cultural resources was obtained from several sources:

- Archeological site file check for a study area that included the current Project Area completed for CNE in December 2008 (Cojeen 2008);
- Telephone inquiries to the Oklahoma Archeological Survey (OAS) in April 2011; and
- Review in April 2011 of online databases, including the Oklahoma Landmarks Inventory (OLI) maintained by the State Historic Preservation Office (SHPO) and the NRHP's FOCUS database.

2.1 INVENTORIED ARCHEOLOGICAL SITES

No comprehensive, systematic archeological survey of the Project Area or vicinity has been completed to date. Available information is therefore necessarily incomplete.

According to an archeological records search in 2008 (Cojeen 2008), which was confirmed by a recent review of maps on file at the Oklahoma Archeological Survey (Thompson 2011), there are no inventoried archeological sites in the Project Area as defined herein.

The nearest recorded site is 34KA448. This site is situated approximately 3,100 feet east of the Project Area boundary in T29N R2E Sec 26. According to Cojeen (2008:1-2), Site 34KA448 is a collapsed stacked stone structure consisting of a "single cell… [and] wings," which has been dated to twentieth century on the basis of an inscribed date of 1934 found on the structure. The function of this structure and its NRHP eligibility are undetermined.

2.2 INVENTORIED HISTORIC RESOURCES

No comprehensive, systematic archeological survey of the Project Area or vicinity has been completed to date. Available information is therefore necessarily incomplete.

2.2.1 Oklahoma Landmarks Inventory (OLI)

The OLI (SHPO 2011a) lists five inventoried properties in the Chilocco area:

- Camp Schofield Site [historical monument]
- Chilocco Indian School Campus (Two Buildings) [sic—possibly Building 10, the Honors Dormitory, also known as the "Men's Club," a two-story, hip-roofed building constructed in 1937]
- Chilocco Indian School Reserve [campus and surrounding land, including Secs 13-16, 21-24, and 26-28 of T29N R2E]
- Chilocco National Guard Armory [Chilocco Indian School]

- Haworth Hall [Building 8, Chilocco Indian School]

The entry for the "Camp Schofield Site" refers to a purported Art Deco-style (ca. 1920-1940) historical monument memorializing a brief U.S. Army training encampment in 1889. The monument is supposedly located somewhere in T29N R3E Sec 17, some 2 or 3 miles east of the Project Area. The NRHP status of this monument is undetermined. The entry in the OLI contains a bare minimum of information, so it might actually refer not to a monument but to the site of the encampment itself, which is recorded in the Oklahoma Archeological Inventory as Site 34KA369, located in T29N R3E Secs 17 S½, 18 N½, and 19 (Cojeen 2008:2-4).

The remaining inventoried properties are all associated with the Chilocco Indian Agricultural School (operated 1884-1980). As discussed in the next section, the school's core campus area of about 288 acres was listed in the NRHP as a historic district in 2006, and Building 60, the National Guard armory, and Haworth Hall, all of which are included in the OLI as inventoried resources, are contributing elements to the district.

A check of the Historic Resources Inventory (KSHS 2011) determined that there are no inventoried historic properties close to the Project Area in neighboring Crowley County, Kansas.

2.2.2 National Register of Historic Places (NRHP)

Review of online information provided by the SHPO found only one property listed on the NRHP in the vicinity of the Project Area (SHPO 2011b). The Chilocco Indian Agricultural School (NR-06000792, listed September 8, 2006), a historic district of approximately 288 acres, is situated approximately 1 mile north of the Project Area in portions of T29N R2E Secs 14, 15, 22, and 23 (Figure 2). Encompassing 65 contributing resources and 11 non-contributing resources, this historic property comprises the core campus and main entrance for the now-closed school. The defined boundary of the property "includes the extant historic resources that represent the academic and vocational activities of the Chilocco Indian Agricultural School. The agricultural fields and pastures have been excluded, as has a section of farmland where agricultural buildings (no longer extant) were once located" (Gabbert 2006:39).

The Chilocco Indian Agricultural School is listed in the NRHP under Criterion A for its nationally-significant role in federal programs of Native American education from the late nineteenth to the mid-twentieth centuries. It is also listed under Criterion C for its distinctive assemblage of architectural styles and high degree of integrity associated with its period of historical significance (Gabbert 2006).

Checks of the NRHP FOCUS database (National Park and the Kansas Historical Society's National Register database (Kansas Historical Society 2011b) confirm that there are no other NRHP-listed resources in proximity to the Project.

In 2010, a state historic preservation society, Preservation Oklahoma, listed the Chilocco Indian School as one of Oklahoma's most endangered historic places (Preservation Oklahoma 2011a). According to the society, a nomination for listing the school as a National Historic Landmark (NHL) was prepared as a partnership project between Preservation Oklahoma, the Oklahoma SHPO, Native American tribes affiliated with the school, and others (Preservation Oklahoma 2011b). Like the NRHP listing, the draft NHL nomination emphasized the historical integrity of

the property. However, the draft NHL nomination also incorporated farmland adjoining the main campus on the north, east, and west for a total landmark area of 1,105 acres, nearly four times that of the listed NRHP district (Warde 2010). The NHL nomination was presented to and approved by the Landmarks Committee of the National Park System Advisory Board in November 2010, which forwarded it to the full advisory board for review in April 2011. However, the nomination is since reported to have been suspended or withdrawn, and its current status is unknown (National Park Service 2010, 2011b).

2.3 SENSITIVITY FOR ADDITIONAL ARCHEOLOGICAL AND HISTORIC RESOURCES

Prior to the expansion of Euroamerican settlement into Kansas and Oklahoma in the nineteenth century, the prairies in the Project vicinity were used for over 10,000 years by Native Americans, and numerous archeological traces of their presence occur in Kay County and in neighboring Crowley County, Kansas. According to Coojeen's (2008) report on the Project Area, a few ancient Native American archeological sites occur nearby. These sites are small lithic scatters, clusters of stone chips and similar debris left from the manufacture and maintenance of stone tools. Such sites typically represent brief episodes of occupation, such as travel or hunting camps, and usually contain small numbers of artifacts representing a limited range of activities. In the upland prairie environment characteristic of the Project Area, sites of this type are generally located close to the present ground surface. Though agricultural activities in the Project Area could potentially have diminished the integrity of such sites, archeological traces of ancient Native American use and occupation may still be present in the Project Area. If present, such sites most likely occur near springheads, along stream courses, at watercourse confluences, and near playas.

The Project Area has limited potential for containing historic archeological sites. Kay County was part of the Cherokee Outlet, a territory of 7 million acres ceded to the Cherokee Nation in 1835 by the Treaty of New Echota (Wilson 2011). With the Reconstruction Treaties of 1866, the Cherokee Nation was obliged to allow the federal government to situate other tribes there, but settlement of the Cherokee Outlet remained sparse. Early historic archeological sites in the region, if present, would therefore largely relate to transient activities, such as traveler, surveyor, and cattle camps. Significant Euroamerican settlement did not occur in the region surrounding the Chilocco Indian Agricultural School until the Cherokee Outlet land run of 1893 (Turner 2011). This opening of the former Cherokee lands to non-native settlement occurred nearly a decade after the 8,600-acre Chilocco Reserve was created in 1884, which was established for the use of the school. The reserve lands included the present Project Area, so available evidence indicates that any historic resources dating to the 1880s or later within the Project Area would relate to the school. Archeological sites associated with the school might include traces of agricultural outbuildings and other structures, such as bridges, as well as refuse disposal areas (dumps), temporary agricultural work areas, and the like.

Early twentieth-century plat maps emphasize the restricted nature of settlement within the historical Chilocco Reserve. A General Land Office survey plat of the reserve from 1907 indicates that the only buildings and structures within the school reserve at the beginning of the twentieth century were those associated with the school and that these buildings were concentrated in the historic core campus area (General Land Office 1907). No buildings or

structures are depicted in areas included in the current Project Area. Similarly, an early county atlas and plat book (Ogle 1910) shows several farmsteads immediately adjoining the Project Area to the west and south along Waverly and Home roads, respectively, but no development within the Chilocco Reserve, except by implication as associated with the school. Comparison of Ogle's (1910:42) map of the area in 1910 to a modern map (USGS 1976) indicates that some of these farmsteads are no long extant while others remain. Archeological traces of early farmsteads situated outside the boundaries of the Project Area would include building foundations, infrastructure such as wells and dumps, abandoned equipment, and similar traces. Small marked or unmarked family cemeteries or isolated graves may in some instances be associated with early prairie farmsteads.

Inspection of current Google Earth imagery indicates that outside the NRHP-listed Chilocco Indian Agricultural School, there are scattered buildings and structures, some of which occur at locations similar to structures shown on the early atlas and platbook (Ogle 1910). It is therefore likely that there are some uninventoried buildings and structures over 50 years old in the vicinity of the Project Area, but it is unknown whether such buildings are historically significant.

2.4 NATIVE AMERICAN TRADITIONAL CULTURAL PLACES (TCPs)

It is unknown whether the study area contains any traditional cultural properties (TCPs) associated with Native American groups or other communities or social groups that historically occupied the area. It is possible that historic-period TCPs existed at isolated places of the Chilocco Indian Agricultural School, outside the gaze of school authorities. Consultation with various tribes associated with the school would have to be undertaken to determine whether such resources are present.

According to the National Park Service's tribal consultation database (NPS 2008), there are 36 federally-recognized Native American tribes in Oklahoma:

- Absentee-Shawnee Tribe of Indians of Oklahoma
- Alabama-Quassarte Tribal Town, Oklahoma
- Apache Tribe of Oklahoma
- Caddo Nation of Oklahoma
- Cherokee Nation, Oklahoma*
- Cheyenne-Arapaho Tribes of Oklahoma
- Chickasaw Nation, Oklahoma
- Choctaw Nation of Oklahoma
- Citizen Potawatomi Nation, Oklahoma
- Comanche Nation, Oklahoma
- Delaware Nation, Oklahoma
- Fort Sill Apache Tribe of Oklahoma
- Iowa Tribe of Oklahoma
- Kaw Nation, Oklahoma*

- Kialegee Tribal Town, Oklahoma
- Kickapoo Tribe of Oklahoma
- Kiowa Indian Tribe of Oklahoma
- Miami Tribe of Oklahoma
- Modoc Tribe of Oklahoma
- Muscogee (Creek) Nation, Oklahoma
- Osage Nation, Oklahoma
- Otoe-Missouria Tribe of Indians, Oklahoma*
- Ottawa Tribe of Oklahoma
- Pawnee Nation of Oklahoma*
- Peoria Tribe of Indians of Oklahoma
- Ponca Tribe of Indians of Oklahoma*
- Quapaw Tribe of Indians, Oklahoma
- Sac & Fox Nation, Oklahoma
- Seminole Nation of Oklahoma
- Seneca-Cayuga Tribe of Oklahoma
- Shawnee Tribe, Oklahoma
- Thlopthlocco Tribal Town, Oklahoma
- Tonkawa Tribe of Indians of Oklahoma*
- United Keetoowah Band of Cherokee Indians in Oklahoma
- Wichita and Affiliated Tribes (Wichita, Keechi, Waco & Tawakonie), Oklahoma
- Wyandotte Nation, Oklahoma

*Has land interest in the Chilocco Indian Agricultural School historic district and vicinity.

Aside from these groups with potential interests in any consultations about the Project that may take place under Section 106, there may be additional groups located outside Oklahoma with substantial long-standing associations with the Chilocco Indian Agricultural School.

2.5 POTENTIAL CRITICAL ISSUES RELATED TO CULTURAL RESOURCES

To summarize the foregoing:

- No systematic archeological survey of the Project Area has been conducted.
    - Sensitivity or potential for the occurrence of prehistoric Native American archeological sites in the Project Area appears to be low to moderate;
    - Sensitivity for historic archeological sites predating the Chilocco Indian Agricultural School appears to be low; and

  - Sensitivity for historic archeological sites associated with the Chilocco Indian Agricultural School appears to be low to moderate.

- An NRHP-listed property, the Chilocco Indian Agricultural School, is situated approximately 1 mile north of the proposed Project.

- No systematic historic architectural survey of areas adjoining the Project Area and outside the boundaries of the historical Chilocco Reserve has been conducted. Buildings and structures more than 50 years old of unknown historic significance likely exist adjacent to the Project Area but outside the historical reserve boundaries.

- No information is available concerning the presence or absence of TCPs within the Project Area.

Gaps in the available data could be addressed by cultural resources surveys of the Project Area and vicinity. The design and level of effort required for such surveys would depend upon the specific regulatory context in which they are conducted. If there is no federal nexus, then the project proponent may not be obligated to conduct cultural resources surveys. If this is the case, however, the project proponent may still wish to conduct due-diligence investigations to identify and address any possible issues prior to project construction. On the other hand, if there is a federal nexus, then Section 106 of the NHPA would likely apply, and cultural resource investigations would need to conform to the requirements of the lead federal agency and would be conducted under guidelines of the Oklahoma SHPO. Such requirements and guidelines are likely to require a more intensive level of effort than an optional due-diligence survey.

Based on presently-available information, a single potential critical issue can be identified with respect to this project. This is the possible visual and auditory effects of the project on the NRHP-listed Chilocco Indian Agricultural School. The construction and operation of a utility-scale wind energy project in the vicinity of the historic property could introduce landscape elements that might affect the setting of the property and that detailed analysis might be assessed as an adverse effect. Given the early stage of planning for the project and the 1 mile separation between the Project Area and the resource, it is not currently possible to evaluate definitely whether adverse effects would occur. However, it is worth noting that the NRHP nomination highlights the existing integrity of the district, which is notable for its lack of "intrusions on the campus that are not related to its role in Indian education" (Gabbert 2006:37). As project planning advances, additional analysis may be necessary, and, if the effect of the project on the resource is determined to be adverse, direct or alternative mitigation measures might be necessary. Direct mitigation measures could include the introduction of vegetation screens adjustments to the layout to reduce the visibility of the turbines from the affected resource. Alternative mitigation measures might include projects that enhanced the condition or preservation of significant cultural resources in the Project vicinity or that enhanced the public education concerning such resources. The specific mitigation measures employed would be adopted in consultation with the relevant historic preservation agencies and various Project stakeholders.

3.0 REGULATORY COMPLIANCE AND PERMITS APPLICABLE TO CULTURAL RESOURCES

3.1 FEDERAL PERMITTING

If the Project is an "undertaking" by a federal agency, then it would be necessary for the agency to comply with Section 106 of the NHPA and its procedural regulations (36 CFR 800). These regulations require that the head of the relevant federal agency consider the effects of the agency's action on significant historic resources. Where more than one federal agency is involved, one is usually designated as the "lead federal agency," and it provides the primary review of the proposed action.

An undertaking is an action by an agency involving discretionary judgment or decision-making, and under Section 106, it entails an expenditure of funds or the grant of a license or permit. The proposed Project might involve an undertaking pursuant to Section 106 if, for example:

- The Bureau of Indian Affairs had to take action to transfer certain lands in the Project Area from fee status to tribal trust status; or
- Department of Energy or other federal agency funds were used to assist in development of the project; or
- A power-purchase agreement were executed with a federal agency (such as the Western Area Power Administration or the Tennessee Valley Authority);
- A U.S. Army Corps of Engineers permit was required to address wetlands or waterways issues; or
- The U.S. Fish and Wildlife Service issues an incidental take permit for incidental, inadvertant kills of organisms belonging to a species designated as threatened or endangered (a "T&E species").

The specific details of the project therefore drive the determination of whether Section 106 applies, and it is ultimately up to the federal agency or agencies involved to determine whether their actions constitute an undertaking under Section 106.

A Section 106 review would likely entail:

- An archeological investigation, including detailed background research and a field investigation to identify sites, possibly followed by further investigations to determine whether any of the identified sites are eligible for listing on the NRHP or the state-level OLI and to assess project effects;
- An architectural inventory to assess whether the Project Area and a surrounding buffer zone contain buildings or structures eligible for the NRHP or the OLI that may be affected by the project; and
- Consultation with Native American tribes with an interest in the area.

The involvement of federal agencies in the permitting process might also require Project review under the National Environmental Policy Act (NEPA), a law that subjects major federal actions to environmental review. Project impacts on historic and archeological resources are considered as part of a NEPA analysis, and it is generally advisable to coordinate cultural resources studies under Section 106 and NEPA for purposes of efficiency.

3.2 TRIBAL REGULATIONS

As of June 2011, there are apparently no Cherokee Nation environmental regulations that apply to Project effects on archeological and historic resources. However, the Cherokee Nation Environmental Protection Commission website notes that the Cherokee Nation Environmental Code "reserves Article 9 for historical and cultural preservation" (Cherokee Nation 2011). The Cherokee Nation in Oklahoma does not at present have a federally-recognized Tribal Historic Preservation Office (THPO).

3.3 STATE LAWS

As of June 2011, there is no comprehensive land use or similar regulations that require environmental review of Project impacts on historic and archeological resources. The Oklahoma Antiquities Law requires the State Archeologist to issue a permit prior to excavations or explorations of sites on state land or on the lands of its political subdivisions or on sites listed on the Oklahoma State Register (Oklahoma Statutes Title 53 ¶361). This statute also forbids unauthorized excavation or destruction of known sites on private land. The Oklahoma Burial Desecretation Law protects unmarked human graves and associated grave goods from unauthorized disturbance or destruction (Oklahoma Statutes Title 21 ¶1168) (Oklahoma Archeological Survey 2011; Oklahoma State Leglislature 2011).

3.4 LOCAL ORDINANCES

As of June 2011, there are no local ordinances applicable to the protection or investigation of archeological or historic properties in the Project Area.

4.0 RECOMMENDATIONS

1. At the earliest moment after a power-purchase agreement has been executed and design of the project is proceeding, consultation with the Oklahoma SHPO and pertinent tribal officials should be initiated. Such consultation should take the form of a letter with location map summarizing the purpose and design of the Project, known cultural resources in the Project vicinity, involved federal agencies, and anticipated permits and other factors that might trigger a formal project review under Section 106 or NEPA.

2. Conduct a field reconnaissance to confirm details of this desktop review and to obtain preliminary information on additional cultural resources that may be present in the Project Area.

3. If the project appears to involve a federal nexus, then cultural resource studies pursuant to Section 106 or NEPA should be initiated under federal agency and SHPO guidelines. A Section 106 review entails several stages of investigation and activity and may entail studies or other activities conducted by various types of specialists. Not all steps or activities may be needed in all cases, and the precise sequencing depends on Project specifics:

    - Detailed background research to establish cultural contexts and verify cultural resource inventories available from online sources;
    - Field identification surveys to systematically identify any archeological or architectural resources or traditional cultural properties that may be present in the Project area and that may be eligible for the NRHP;
    - Follow-up studies as needed to formally evaluate the NRHP eligibility of identified resources;
    - Assessment of Project effects on significant cultural resources;
    - Development of mitigation measures if needed and/or adjustments to Project designs to eliminate impacts; and
    - Execution of formal agreements among stakeholders concerning historic preservation issues.

4. If there does not appear to be a federal nexus triggering Section 106 studies, the project proponent should consider undertaking due-diligence cultural resource studies to ensure that the Project does not inadvertantly impact cultural resources. The studies and activities would be similar to those listed under the previous recommendation.

5. Stakeholders who may have an interest in the effects of the Project on cultural resources should be identified and afforded the opportunity to participate in consultations concerning these effects. Stakeholders might include, but would not necessarily be limited to: federally-recognized tribes in Oklahoma; federally-recognized tribes from outside Oklahoma who have a significant historical association with the Chilocco Indian Agricultural School; and any alumni or similar associations dedicated to preserving the history of the school.

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Class III Archaeological Survey

Proposed Chilocco Wind Farm Project

Kay County, Oklahoma
September 12, 2013

Prepared For:

PNE Wind, USA
9316 7th Ave S.
Seattle, WA 98108

Prepared By:

Westwood

Class III Archaeological Survey
For the Proposed Chilocco Wind Farm Project

Kay County, Oklahoma

Prepared for:
PNE Wind, USA
9316 7th Ave S.
Seattle, WA 98108

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Project Number: R0000488.00

Federal Lead Agency – U.S. Bureau of Indian Affairs
Southern Plains Region
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Anadarko, OK 73005

September 12, 2013

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ABSTRACT

Westwood Professional Services, Inc. (Westwood) was contracted by PNE Wind, USA of Chicago, Illinois to conduct a Class III Archaeological Survey of the proposed Chilocco Wind Farm Project. The Chilocco Wind Farm will be a 153-megawatt (MW) wind energy project consisting of 90, 1.7 MW GE wind turbines on tribal land situated in Kay County, Oklahoma. The project is being reviewed under Section 106 of the National Historic Preservation Act of 1966 (as amended), as much of the land is tribal trust land and therefore under legal title of the United States federal government. The United States Bureau of Indian Affairs (BIA) served as lead federal agency for the project. Abraham Ledezma Martinez, MS, RPA, served as Principal Investigator.

These investigations were conducted to determine if significant archaeological resources are located within the defined Area of Potential Effect (APE) of the proposed project. Field work was conducted on August 7-14, 2013. The APE was considered all locations which could potentially experience ground disturbing activities from the construction of proposed access roads, collector cable runs, crane paths, turbine locations, and a substation location. Field methodology included 100 percent pedestrian survey of the entire APE, a subsurface shovel test at every proposed turbine location, and subsurface shovel tests within the APE at 15-meter intervals within 300 feet of Chilocco Creek due to the higher potential for cultural resources near water sources. Finally, intuitive shovel testing was conducted in areas of high potential in locations with poor ground surface visibility.

Westwood also considered the Chilocco Indian Agricultural School. The school was an off-reservation boarding school used from 1884 through 1980. The school was listed on the National Register of Historic Places in 2006 under Criteria A and C. Tribal consultation was conducted directly by the BIA on a government to government basis.

Three previously undocumented archaeological sites were identified during this survey. The three sites, 34-KA-494, 34-KA-495, and 34-KA-496, are all prehistoric lithic scatters. All three sites will be avoided by project design, and a finding of *no historic properties affected* is recommended.

The Chilocco Indian Agricultural School will experience no direct physical effect from the proposed project. Extant trees which surround the school will limit indirect visual effects from the proposed project. All tribes which responded to the requests for consultation were satisfied with the level of work, and had no concerns of the project's effects upon archaeological sites, the Chilocco School, or traditional cultural properties and sacred sites.

No further work is recommended and the project may proceed as planned. Should there be additions or changes to the proposed construction plans, Westwood should be contacted to complete additional survey.

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1.0 INTRODUCTION

Westwood Professional Services, Inc. (Westwood) was contracted by PNE Wind, USA (PNE) of Chicago, Illinois to conduct a Class III Archaeological Survey of the proposed Chilocco Wind Farm Project. Chilocco Wind Farm LLC is proposing to design, permit, and construct an approximately 153-megawatt wind energy facility, known as the Chilocco Wind Farm, within Kay County in north-central Oklahoma (**Exhibit 1**). The Chilocco Wind Farm will consist of 90, 1.7 MW GE wind turbines that will interconnect to the Chilocco Substation north of Newkirk, Oklahoma. Chilocco Wind Farm LLC involves a partnership between five tribes (the Kaw Nation, the Otoe-Missouria Tribe, the Pawnee Nation, the Ponca Nation, and the Cherokee Nation) and PNE.

Chilocco Wind Farm will be located in Sections (or parts thereof) 13-17, 20-23, and 26-29, T29N, R2E (**Exhibit 2**). The Project will encompass approximately 3,000 acres of land owned by a partnership of four tribes (the Kaw Nation, the Otoe-Missouria Tribe, the Pawnee Nation, and the Ponca Nation) and approximately 3,000 acres of land owned by the Cherokee Nation. The Chilocco Wind Farm includes the site of the former Chilocco Indian Agricultural School, which educated students from 1884 to 1980 and was listed on the National Register of Historic Places (NRHP) in 2006.

As much of the land is tribal trust land and therefore under legal title of the United States federal government, the project was deemed a federal undertaking. As a federal undertaking, the project is subject to review under Section 106 of the National Historic Preservation Act of 1966 (as amended). The United States Bureau of Indian Affairs (BIA) served as the lead federal agency for this project.

Abraham Ledezma Martinez, MS, RPA, served as Principal Investigator for the project. Field work was conducted August 7-14, 2013. Project design will include approximately 28 miles of access roads, 39 miles of collector cable runs, 29 miles of crane paths, 90 turbine locations and a substation location (**Exhibit 3**). The Area of Potential Effect (APE) for the proposed project consists of all locations where physical ground disturbance may occur (**Exhibit 4**). The proposed project area was examined using background research, a literature review, pedestrian survey, and subsurface shovel testing. The environmental background and historic contexts were examined to assess the probability of sites and what types of sites might be identified. This report details the methodology, results, and recommendations of the archaeological investigations conducted in partial fulfillment of Section 106 review.

2.0 ENVIRONMENTAL BACKGROUND

2.1 Topography

The dominant physiographic feature in the project area is a gentle slope, from north to southeast with a 30-foot wide creek incised into the surrounding plain from northwest to southeast. Chilocco Creek bisects the project area and has the lowest elevation of

1,114 feet associated with it on the eastern edge of the project. The highest elevation is within a cultivated crop field in the south-central portion of the project area, where an existing meteorological tower is located at 1,194 feet. Total topographic relief in the area is approximately 80 feet.

2.2 Vegetation

Based on land cover, 44% of the roughly 6,000-acre project area consists of cultivated cropland. The predominant cultivated crop is dry land winter wheat and oats. Grassland makes up approximately 40% of the project area and is managed as pasture. These areas include native and non-native grasses mixed with invasive species.

Woodlands are limited to the riparian area surrounding Chilocco Creek and buffering the Chilocco Indian School. Dominant species include eastern cottonwood (Populus deltoids), black walnut (Juglans nigra), silver maple (Acer saccharinum), American elm (Ulmus Americana), and green ash (Fraxinus pennsylvanica).

2.3 Soils

Information regarding soil types in the vicinity of the site was obtained from the NRCS Soil Survey Geographic Database (NRCS 2013). The dominant soil is silty loam, associated with much of the cropland in the project area. Soil types that are considered prime farmland include Bethany, Port, Kirkland, Agra, Foraker, Milan, and Renfrow. Topsoil depths range from shallow (0-6 inches) to relatively deep (greater than 6 to 12 inches). Runoff class reflects slope, surface texture, and the presence of bedrock near the surface, with soils in higher runoff classes reflecting either finer textures, steep slopes, or the presence of bedrock near the surface.

2.4 Geology

The geologic setting of the Chilocco area in Kay County, Oklahoma exists in a transitional area between the central red-bed plains geologic province on the west and the northern limestone-cuesta plains in the east. This area is characterized by thin soils over shales, sandstones and limestone caps forming flat expansive plains and gently rolling hills. In this area, these shallow-marine, deltaic and alluvial sedimentary rock deposits are less than 100 feet thick. Underlying this are layers of marine shale with interbedded sandstone, limestone, and coal with a thickness of approximately 100 feet. Below these are layers of cherty marine limestone approximately 50 feet thick. The deepest sedimentary layers in the area are approximately 700 feet thick and consist of marine limestone and dolomite, sandstone and shale. Igneous and metamorphic rocks consisting of granite and gneiss underlie the sedimentary rocks to depths of more than 30,000 feet.

2.5 Land Use

Land use within the project area is primarily agricultural and consisting of cultivated cropland, pasture, or grassland. The project is located on land previously used by the

Chilocco Indian Agricultural School for agricultural and livestock education between the years of 1884 and 1980. A large portion of the project area is used for row crop and forage crop production or for cattle pasture.

3.0 ARCHAEOLOGICAL CONTEXT

3.1 Cultural History

The Oklahoma Archaeological Society has developed archaeological contexts for Oklahoma. These contexts are based on years of prehistoric and historic research in the region in order to examine regional historic (Contact and Post-Contact) and prehistoric (Pre-contact) past. They are a general description and interpretation of regional history. The contexts give basic observations of current theories relating to prehistoric and historic people from different locations throughout the history of the region.

The Pre-Contact period is focused solely on Native American peoples before the arrival of Euro-Americans. This period is divided into four traditions: Paleoindian, Archaic, Woodland, and Villagers. These traditions are defined, and sub defined, by changes in technology and food sources exploited.

The Protohistoric cultural history is focused on the interaction of American Indians and Euro-Americans during the Contact and Post-Contact periods. These contexts range from the first contact between Europeans and American Indians during European exploration in the region (Contact), through Euro-American settlement of traditionally American Indian lands (Post-contact).

3.1.1 Pre-Contact Period

Paleoindian Tradition (12,000 to 8,000 Before Present [B.P.])

The first people to arrive in North America, the Paleoindians, crossed the Bering land bridge from Siberia to Alaska. When they arrived, approximately half of North America was covered by a glacial ice sheet. As the glaciers melted, the people moved south and eventually spread throughout the entirety of the Americas (Dobbs 1990). Pleistocene megafauna, such as mammoth and mastodon, roamed the land.

Paleoindian sites are relatively uncommon and difficult to locate by archaeologists due to buried deposits. The lack of stratified sites and the small number of artifacts from sites suggests that Paleoindian people lived in small, nomadic groups (Frison 1998). In Kay County, most Paleoindian archaeological evidence consists of a few lithic scatters but no well-defined kill site or camps have yet been identified (Brooks 1988). Environmental information has been derived from finds consisting of extinct fauna like the Trepp mammoth locality (Brooks 1988).

Paleoindians were small groups known best for hunting large megafauna, including mammoth, mastodon, and Bison antiquus - an extinct bison up to one-third larger than modern bison (Frison 1998). By 11,000 years B.P., mammoth and other megafauna were extinct, and the Paleoindians shifted their hunting focus to bison, the next largest mammal (Frison 1998). Evidence also suggests that these people not only hunted megafauna and large mammals, but also exploited other food sources such as fish, berries, nuts, and small mammals (Tankersley 1998).

The earliest Paleoindian spearpoints are easily identified by a distinctive flute down both sides. During the middle of the Paleoindian period lanceolate, nonfluted points began to emerge. During the late Paleoindian periods, we see a shift from fluted and lanceolate to exclusively lanceolate points.

The earliest of the fluted point style is known as the Clovis point, dating from 12,000 – 11,000 years B.P. (Justice 1987). The original Clovis point was recovered from the Blackwater Draw site and named after the nearby town of Clovis, New Mexico. The spearpoints from Blackwater Draw were found in direct association with late Pleistocene fauna including Columbian mammoth, horse, camel, bison, and saber-tooth cat (Dobbs 1990).

Following the Clovis point is the Folsom point, differentiated from Clovis by a decrease in length and an increase in the length of the flute. Dates of the Folsom Complex last from approximately 11,000 – 10,200 years B.P. (Hofman 1995). The Folsom point and type site is named after the city of Folsom, New Mexico, where a Folsom projectile point was recovered with the ribcage of the now extinct species of bison, Bison antiquus (Dobbs 1990).

The Late Paleoindian period generally begins toward the end of the Folsom Complex and lasts to the beginning of the Archaic Period. Late Paleoindian technology is marked by a change from the distinctive Folsom style. Lanceolate points vary greatly in style, but share the features of being nonfluted, unnotched, and finely flaked. They arrive in the archaeological record during the Folsom Complex, and continue to the end of the Paleoindian Tradition (Dobbs 1990).

Archaic Tradition (8,000 to 2,000 B.P.)

Evidence suggests that Archaic people lived in small groups occupying seasonal camps, much like their Paleoindian predecessors (Jones et.al. 2003), although some research counters this belief, suggesting that community size increased and groups became more sedentary (Dobbs 1990). The major innovations differentiating the Archaic people from the Paleoindian people

include a change in projectile point technology, the invention of groundstone tools, and a change in subsistence strategies. The Archaic Tradition is also noted for the development of regional differences, possibly due to regionalization of particular groups (Anfinson 1987).

By the beginning of the Archaic period, the megafauna had long been extinct. This resulted in a shift towards a more effective hunting and gathering subsistence. Hunters now focused on bison, deer, and small mammals. Some archaeologists believe that Archaic people became more regionalized partly due to the major biomes. This regionalization allowed the people to perfect the exploitation of local raw material and food sources (Dobbs 1990).

The Archaic Tradition technology is marked by a change in projectile point manufacture. Projectile points have shifted from lanceolate to notched and stemmed points and the flaking quality begins to diminish. Other innovations of the Archaic people is the appearance of groundstone tools created by friction from grinding, polishing, and pecking igneous and metamorphic rocks, such as granite and basalt (Brooks 1988).

A variety of settlement types are defined for the study region, including base camps, temporary hunting camps, bison kill sites, cemeteries, quarries, and less defined activity areas. Several camps containing organic (bone and shell) tools are preserved. Most of the information on Archaic life is derived from sites in eastern Oklahoma (Brooks 1988).

Woodland Tradition (2,000 B.P. to 1,200 B.P.)

The Woodland Tradition is generally divided into three periods – Early, Middle and Late. The Woodland Tradition is marked by the emergence of ceramic pottery vessels and the adoption of farming practices. The multiple contexts describing the Woodland period are a result of increased regionalization of the Woodland people (Brooks 1988).

The Woodland people most certainly exploited similar food sources to their Archaic ancestors. Bison, deer, and small mammals were still a major food source. Plants, such as wild rice, were exploited more heavily than in previous times, and there is evidence of cultivation of maize and squash (Dobbs 1990).

The primary technological advance during the Woodland Tradition is the advent of ceramic pottery. The original divisions of Early, Middle, and Late Woodland were differentiated by their technology. Ceramics during the Early Woodland period are normally thick and crude with cord-marked decoration on the exterior. Middle Woodland shows early evidence of earthen burial

mounds. Late Woodland continues the tradition of ceramics and burial mounds. Woodland sites in this region of Oklahoma include small villages or hamlets, base and temporary camps, workshops, and small rock mounds associated with burials (Brooks 1988).

Villagers (1,200 B.P. to 500 B.P.)

At the end of the Woodland Tradition, large societies of farming people established themselves along major rivers in Oklahoma. The people of this period continued to create ceramic vessels and earthen burial mounds. Populations became larger and even more regionalized than previous. These traditions lasted from the end of the Woodland Tradition to first contact with European explorers (Anfinson 1987).

The Village Farming cultures relied heavily on raising corn, beans, and squash supplemented by hunting game and collecting seasonal resources. The establishment of small to moderate-sized villages along terraces of major rivers due an increase in population led to a greater complexity in social organization. Throughout the state of Oklahoma, groups shared similar economies and levels of technology. Variations in farming and village patterns were maintained by all dependent on the physical environment (Brooks 1988).

Villages were comprised of 10 to 20 houses and a burial area. Burial areas are often associated with exotic goods indicating special treatment of individuals and status differentiation in their social organization. Corn horticulture intensified, as people became more regionalized and limited the number of different species of plants exploited. Perhaps the intensification of corn horticulture is a response to larger community size.

The site types assigned to the Plains Village Tradition are similar to the Woodland Tradition, and the archaeological remains of these complexes range from cemeteries to small burials, limited use sites to extensive habitation sites. Site location is also consistent with the previous period and depends on numerous factors, including the location of specific resources the people were using or the presence of a particular desirable environment (Brooks 1988).

3.1.2 Protohistoric (500 B.P.)

This period generally refers to the span of time extending from the first European explorations until intensive Euro-American settlement of the region. Possible archaeological site types associated with this period are generally consistent with those of earlier periods, but the influence of European and Euro-American traders, missionaries, settlers, and industries affected the locations of these sites. This period also includes the settlement patterns,

subsistence activities, and economic strategies employed by Euro-American immigrants. Associated archaeological and historic site types categorized in the Contact/Post-Contact period include standing structures as well as archaeological sites.

3.2 Archival Research

On July 8, 2013, Principal Investigator Abraham Ledezma Martinez requested a background review of the project area from the Oklahoma Archeological Survey (OAS) located at Oklahoma University in Norman, Oklahoma. This review was conducted to update a records search conducted of the general area by Christopher Cojeen in 2008, as well as a cultural resource Critical Issues Analysis performed in June 2011 by Tetra Tech EC, Inc. On August 12, 2013, Westwood Cultural Resource Scientist, Ryan P. Grohnke, went to the OAS offices and performed a records search in person. The results were the same as previously obtained directly from the OAS and previous reports. The Oklahoma State Historic Preservation Office's (OK SHPO) online databases were also examined to obtain information on historic/architectural resources.

A review of mapping acquired from the OAS indicated that only limited locations in the project area had been previously surveyed for cultural resources. Several of the surveys included BIA pond repairs or construction. These previous surveys did not cover any of the current proposed project's APE. A possible survey may have been conducted in the current project's APE on the western edge of Section 26 of Township 29N, Range 2E; however, as details could not be found on the survey, Westwood chose to resurvey that location.

The largest area of previous survey had been conducted within the SE ¼ of Section 21 and the SW ¼ of Section 22 in Township 29N, Range 3E. This survey had been completed by Bossey on July 1, 1990, for a proposed disposal area. Westwood still chose to resurvey the APE within this location out of due diligence, although the shovel test at proposed wind turbine generator 47 was not conducted due to the previous survey.

3.2.1 Previously Inventoried Archaeological Resources

Previously recorded cultural resource investigations within the project area and the one-mile buffer yielded evidence of seven previously recorded archaeological sites. All of the sites are located outside of the project area, but within a one-mile buffer, except for site 34-KA-448. Site 34-KA-448 is either just within or just outside the project boundary but outside of the APE. Six of the previously recorded sites were inventoried, but found to be not eligible for listing on the NRHP. Site 34-KA-448 was also inventoried, but its recorders state "future historians may find out more about the land improvement practices undertaken on the Chilocco School properties and thus nominate the

site for inclusion on the NRHP." A summary of the previously recorded archaeological sites is provided in **Table 3-1** below.

Table 3-1: Previously Inventoried Archaeological Sites

Site Number	Site Type	Cultural Period	NRHP Status	Project Area / Buffer
34-KA-398	Lithic Scatter	Unassigned Prehistoric	Not Eligible	Buffer
34-KA -399	Historic Trash Dump	Historic non-Indian	Not Eligible	Buffer
34-KA -401	Historic Farmstead	Historic non-Indian	Not Eligible	Buffer
34-KA -448	Rock Alignment	Protohistoric/Historic Indian	Further work may be necessary	Project Area or Buffer
34-KA -465	Historic Farmstead	Historic non-Indian	Not Eligible	Buffer
34-KA -466	Historic Farmstead	Historic non-Indian	Not Eligible	Buffer
34-KA -467	Historic Farmstead	Historic non-Indian	Not Eligible	Buffer

Key: Site Number = site designation applied by Oklahoma Archeological Survey; Site Type = defined site use type; Cultural Period = reported culture historic period affiliation; NRHP Status = eligibility for listing on the National Register of Historic Places; Project Area / Buffer = denotes if listed site is immediately within the defined project corridor or within a one-mile buffer of the project corridor.

3.2.2 Previously Inventoried Historic Resources

The OK SHPO maintains two databases in which historic properties have been inventoried. The Oklahoma National Register of Historic Places website is a compilation of all NRHP-listed properties located within the state of Oklahoma. The Oklahoma Landmarks Inventory (OLI) is a collection of historic properties throughout Oklahoma that the SHPO has recorded. Both databases were reviewed to obtain information for the current project.

A review of the Oklahoma National Register of Historic Places website maintained by the OK SHPO lists only one property within the vicinity of the proposed project area. The Chilocco Indian Agricultural School (NR ID 06000792) is an off-reservation Indian boarding school first built in 1884. It was listed in the NRHP on September 8, 2006. This historic district is surrounded by the Chilocco Wind Farm Project Area.

A review of the OLI indicates four previously inventoried properties in or within one-mile of the project area. All four properties are associated with and/or contributing to the NRHP-listed property, the Chilocco Indian Agricultural School. These properties include: Chilocco Indian School Campus (Two Buildings), Chilocco Indian School Reserve, Chilocco National Guard Armory, and Haworth Hall.

Chilocco Indian Agricultural School

Prior to the latter part of the 19th century, education of Native Americans had been dealt with primarily through missions and reservation schools. This policy changed through the efforts of Captain Richard Henry Pratt. In 1878 Pratt brought in teachers to instruct prisoners of war from the Arapaho, Cheyenne, and Kiowa tribes who had been placed under his guard (Reyhner and Eder 2004). After their release, some of the prisoners wished to continue their education so Pratt had them enrolled into the Hampton Institute. Following the success of the Indian students at the Hampton Institute, Pratt received permission to create a school for Indians of all tribes. Pratt established the Carlisle Indian Industrial School in 1879. This was the first of the off-reservation boarding schools.

The off-reservation boarding school system allowed for the education of Indian youth away from the influence of their cultures. Using a strong military disciplinarian attitude, the system hoped to Christianize and civilize Indian students. As Pratt said, "…the end to be gained…is the complete civilization of the Indian and his absorption into our national life…the Indian to lose his identity as such, to give up his tribal relations and to be made to feel that he is an American citizen" (Utley 1964). Following Carlisle, schools were established in Chemawa Oregon in 1880 and Chilocco in 1884 (Reyhner and Eder 2004).

In 1882, the United States Congress authorized an off-reservation Indian boarding school in Indian Territory (Oklahoma) near the Kansas state line and the Ponca and Pawnee reservations on land that had been deeded by the Cherokee. Major James Haworth, the superintendent of Indian Schools, chose the location near Chilocco Creek (Lomawaima 1994). First called the Haworth Institute, Chilocco, Indian Territory the name was changed to the Chilocco Indian Industrial School and later the Chilocco Indian Agricultural School. The original school property including the campus and fields had over 8,000 acres. Although primarily an agricultural school, Chilocco also taught industrial trades.

The school began as a single three story building serving as classrooms and dorms constructed in 1883. Classes began in January of 1884 with 150 students. Over 500 students were attending by 1910, and that number grew to

almost 1,300 in the 1950s (NPS 2013). Over the years, as enrollment grew so did the number of buildings needed for housing, staffing, and education.

The school's decline began in the 1960s due to changes in society and the Indian Service (NRHP 2006). In 1979, the United States Senate recommended the closing of Chilocco. On July 15, 1980, Chilocco Indian Agricultural School was closed. The campus was to be jointly owned by the Ponca, Tonkawa, Kaw, Pawnee, and Otoe-Missouria, with the surrounding land to be split between the five tribes. The Cherokee were also a given a portion of the land as well as 50% of mineral rights (NRHP 2006). Since its closure, the school has been used for various purposes; however, the buildings have largely been left empty and fallen into disrepair.

In 2006 the Chilocco Indian Agricultural School was listed on the National Register of Historic Places. It was listed as significant under Criteria A, "Property is associated with events that have made a significant contribution to the broad patterns of our history" for its role in Indian Education on a national level, as well as within the policies of the United States government toward Native peoples. It was also found significant at a state level under Criteria C, "Property embodies the distinctive characteristics of a type, period, or method of construction or represents the work of a master, or possesses high artistic values, or represents a significant and distinguishable entity whose components lack individual distinction." The use of limestone in many of the buildings unites the different phases and styles of construction at the school, which is rare throughout the state of Oklahoma. Seventy-six resources were found to be located within the historic district, of which 65 are contributing to its listing on the NRHP. The NRHP-listed district is 288 acres in area and includes the campus and its entry road (**Exhibit 5**). The NRHP Registration form for the Chilocco Indian Agricultural School has been included as **Appendix A.**

4.0 METHODOLOGY

A Class III Archaeological Survey is conducted to determine if archaeological sites are present within the proposed project's APE. Should any sites be identified during the survey, enough information will be gathered to assess the impacts of proposed construction and provide recommendations on avoidance or additional work. The APE for this project was considered all locations within the project area that would potentially have direct physical disturbance by construction of the wind farm (**Exhibit 4**). The APE included access roads, collector cable runs, crane paths, turbine locations, and a substation location (**Exhibit 3**).

Previous record searches of the project area by Cojeen (2008) and Tetra Tech (2011) suggested that the area would have low potential for historic archaeological resources and a low to moderate potential for prehistoric archaeological resources. The most likely prehistoric

archaeological resources on the prairie would consist of lithic debitage most probably near the surface. The areas of highest potential for prehistoric cultural would be near water sources. Westwood concurs with the suggestions of Cojeen and Tetra Tech. The Scope of Work developed by the BIA also took into account this research.

The Scope of Work for the Class III Archaeological Survey was established by the BIA in a document dated August 5, 2013 (**Appendix B**). The scope called for 100 percent pedestrian survey of all locations of potential ground disturbing area. A subsurface shovel test would be placed at proposed turbine locations due to the significant amount of ground disturbance caused by turbine construction. Subsurface shovel tests would be placed at 15-meter intervals within 300 feet of Chilocco Creek due to the higher potential for cultural resources near water sources. Finally, intuitive shovel testing would also be conducted in areas of high potential in locations with poor ground surface visibility.

The investigative techniques utilized for this field work portion of the project were pedestrian survey and subsurface shovel testing. The techniques used in the field were the same as those established by the BIA in the scope of work. No deviation from the original scope was required.

Pedestrian survey of the entire APE was conducted at 5-15 meter intervals by teams of two. Pedestrian survey examined the ground surface for evidence of cultural surface features or the presence of artifacts. Much of the area had ample surface visibility for pedestrian survey. In locations with less visibility, the survey was still conducted to look for evidence of surface features, any areas with visibility were located and inspected, and the potential for cultural resources was assessed to determine if shovel testing should be conducted.

Shovel testing consisted of hand digging a 35-45 centimeter diameter excavation unit. Areas of low potential including wetlands or swampy areas, heavily sloped areas (greater than 20% slope), heavily disturbed locations, and areas that had been previously surveyed were not shovel tested. The depth of the excavated shovel test varied depending on the depth of the subsurface deposits. Shovel tests were excavated to culturally sterile sub-soil. All materials excavated from shovel tests or deep tests were screened through ¼" hardware mesh. All soil profiles were described in the field. Detailed field notes were recorded during field investigations.

5.0 INVESTIGATIONS AND RESULTS

Field work was conducted on August 7-14, 2013. Principal Investigator Abraham Ledezma Martinez directed the field investigations. Westwood Cultural Resource Scientist Ryan P. Grohnke assisted with project logistics. Field crew members included: John Fox, Elise Hargiss, Georgia LaMair, Grayson Larimer, Gregory Looney, and Mike Zuspann.

Prior to conducting field work, all required permissions were obtained from necessary parties. The BIA issued an ARPA (Archaeological Resources Protection Act) permit to conduct archaeological investigations on tribal trust lands administered by the BIA Southern Plains

Region and Eastern Oklahoma Region, as well as Cherokee tribally owned fee property (**Appendix C**). The BIA Pawnee Agency granted a permission to survey letter on trust lands of the Pawnee Nation of Oklahoma, the Otoe-Missouria Tribe of Indians, and the Ponca Tribe of Oklahoma (**Appendix D**). The Cherokee Nation granted right of entry on both tribal trust and fee lands (**Appendix E**). Additionally, right of entry to Kaw land was granted through the lease agreement between the Kaw Nation and PNE.

The entire APE, consisting of areas that could potentially experience ground disturbing activities, was investigated with pedestrian survey (**Exhibit 4**). A subsurface shovel test was placed at each turbine location, except for wind turbine generator 47 which was in a location that had been previously surveyed. Subsurface testing was conducted in intervals of 50 feet (15 meters) within 300 feet of Chilocco Creek; however, tests were not placed on slopes, or obviously inundated areas. Intuitive subsurface testing was conducted in two areas deemed high potential for the presence of archaeological sites based on distance from water, elevation, and lack of visibility. Intuitive area 1 is located near turbine 43 and resulted in a negative shovel test. Intuitive area 2 is located northwest of turbine 60 and resulted in a negative shovel test. Shovel test notes are located in **Appendix M**.

5.1 Archaeological Sites

Three previously unrecorded archaeological sites were identified during the Class III survey (**Exhibit 6**). All three sites were prehistoric lithic scatters. **Table 5-1** lists the archaeological sites identified during the survey.

Table 5-1: Identified Archaeological Sites

Site Number	Field Number	Site Type	Elevation	Site Acreage
34-KA-494	WPS-Chil-001	Lithic Scatter	1142 feet	0.55 acre
34-KA-495	WPS-Chil-002	Lithic Scatter	1138 feet	0.25 acre
34-KA-496	WPS-Chil-003	Lithic Scatter	1140 feet	0.75 acre

Key: Site Number = site designation applied by Oklahoma Archeological Survey; Field Number: site designation applied by Westwood personnel during field investigations; Site Type = defined site use type; Elevation = height of site above sea level; Site Acreage: size of site based on currently known site boundaries.

34-KA-494 (Field # WPS-Chil-001)

This site is a lithic scatter located in the SW ¼ of NE ¼ of SW ¼ of Section 15 in Township 29N, Range 2E of Kay County, OK (**Exhibit 6** and **Appendix F**). The site consists of a sparse lithic scatter of approximately 17 flakes of primarily Florence A chert observed on a two-track road. The two-track road is situated in a woodland approximately 150 meters east of Chilocco Creek on level land owned by the Ponca Tribe of Indians of Oklahoma. Agricultural fields are immediately to the north and south of the woodlot. The site most likely extends beyond the plotted boundary and outside of the current APE.

Site dimensions as currently defined are approximately 100 meters N-S X 45 meters E-W on 0.55 acre of land.

The APE intersecting with the site is a proposed collector run. Testing and evaluation of the site was not conducted, as the proposed project's design will be altered to avoid any impacts to the site.

34-KA-495 (Field # WPS-Chil-002)

This site is a lithic scatter located in the SE ¼ of NE ¼ of NW ¼ of Section 23 in Township 29N, Range 2E of Kay County, OK (**Exhibit 6** and **Appendix G**). This site was located outside of the project's APE on a nearby two-track dirt road on land owned by the Otoe-Missouria Tribe. A sparse lithic scatter of approximately 15 secondary and tertiary flakes of Florence A chert was observed. The two-track road is situated in grassland adjacent to Chilocco Creek. Immediately to the north of the site is a large lagoon and sewage disposal area. Should the site have extended to the north, that portion of the site would have been completely destroyed. It is possible that the site may extend further to the south toward Chilocco Creek. The site boundaries as currently defined are approximately 35 meters N-S X 50 meters E-W on 0.25 acre of land.

The APE in this area is a proposed crane path. It does not intersect the site, but instead is situated north of site 34-KA-495 in a heavily disturbed area. Testing and evaluation of the site was not conducted, as the proposed project will avoid any impacts to the site.

34-KA-496 (Field # WPS-Chil-003)

This site is a lithic scatter located in the SE ¼ of SW ¼ of SW ¼ of Section 15 in Township 29N, Range 2E of Kay County, OK (**Exhibit 6** and **Appendix H**). This site was located within the 300 foot corridor south of Chilocco Creek on land owned by the Ponca Tribe of Indians of Oklahoma. Shovel testing of the creek corridor revealed the presence of twelve Florence A flakes. A nearby two-track road bisects the site, indicating a possibly disturbed area of the site. Areas to the north and south of the two-track remain intact as revealed by shovel tests. A total of nineteen shovel tests were done in accordance with the 300 foot corridor. Twelve shovel tests tested positive for the presence of intact cultural deposits. It is possible that the site extends to the south. Site dimensions as currently defined are 60 meters N-S by 135 meters E-W on 0.75 acre of land.

The APE intersecting with the site is a proposed collector run and access road. Testing and evaluation of the site was not conducted, as the proposed project's design will be altered to avoid any impacts to the site.

5.2 Chilocco School

Although the project's APE for physical effects does not intersect with any of the NRHP contributing structures of the Chilocco Indian Agricultural School, the property was visited to assess its current condition and the potential for indirect visual effects. It was observed that with the exception of three structures currently being used for undisclosed purposes, all structures at the Chilocco School have become dilapidated and are in a serious state of disrepair. It was also noted that the school campus boundary is lined by trees which screen the external viewshed from the school itself.

5.3 Tribal Consultation

The BIA conducted consultation formally on a government to government basis with tribes whose lands will be affected by the proposed project. Those tribes who responded had no concerns in regards to the projects impacts on cultural resources including archaeological resources, the Chilocco School, or traditional cultural properties and sacred sites.

6.0 SUMMARY AND RECOMMENDATIONS

6.1 Archaeology

Three archaeological sites were identified as a result of this investigation. All the sites are prehistoric lithic surface scatters. Project design was altered to avoid all three sites. As all of the archaeological sites are being avoided by the proposed project, Westwood recommends a finding of *no historic properties affected* for the current project. Additionally Westwood recommends that no further archaeological investigations are warranted in the current APE (as of August 2013) and that the project may proceed as planned.

6.2 Chilocco School

Although turbines will be placed near the NRHP-listed property, the Chilocco Indian Agricultural School, the project will have no direct physical effects upon the school. Extant tree vegetation surrounding the school will screen the turbines from the campus and limit the indirect visual effects of the project upon the school. Additionally, four of the five tribes which make up the Chilocco Development Authority (the Kaw Nation, Otoe-Missouria, Pawnee Nation, and Ponca Nation) submitted a letter to the BIA that they, "agree and consent that the Chilocco School, though historically significant does not necessitate visual resource setbacks as it relates to wind power generation equipment" (**Appendix I**). The Tonkawa Tribe, which is the fifth member of the Chilocco Development Authority, did not sign the letter, but has provided no opposition or additional input.

6.3 Tribal Consultation

Formal government to government consultation was conducted by the BIA. Several tribes, including the Pawnee Nation of Oklahoma, the Otoe-Missouria Tribe of Indians, and the Ponca Tribe of Oklahoma, responded with letters that approved of the cultural resource survey, were satisfied with an unanticipated discovery provision in the lease, and gave consent for the project to proceed as there was no potential to affect known archaeological, historical, or sacred sites (**Appendix J**).

Westwood stresses that if any construction plans be altered to include areas that were not previously surveyed these locations must be examined for cultural resources. Although an archaeological survey was completed, there always remains the possibility of unidentified resources. If unrecorded archaeological sites are discovered during construction, all ground disturbing activities in the area should cease, and the BIA, the affected Tribes, and archaeologists at Westwood should be notified. *If human remains are encountered during construction activities, all ground disturbing activity must cease and local law enforcement must be notified as per the Burial Desecration Law (Oklahoma Statute Chapter 47 (Section 1168.0-1168.6).*

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APPENDICIES

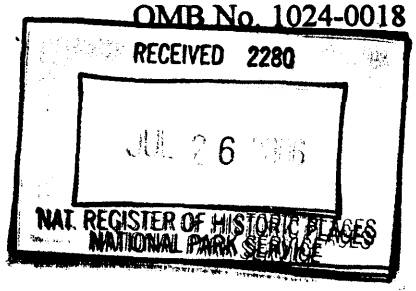
Appendix A:

Chilocco Indian Agricultural School –

National Register of Historic Places Registration Form

NPS Form 10-900
(Rev. 10-90)

OMB No. 1024-0018



United States Department of the Interior
National Park Service

NATIONAL REGISTER OF HISTORIC PLACES
REGISTRATION FORM

792

1. Name of Property

historic name Chilocco Indian Agricultural School

other names/site number Chilocco Indian School ; U. S. Indian School, Chilocco

2. Location

street & number US 77 & E0018 Road not for publication N/A
city or town Newkirk vicinity X
state Oklahoma code OK county Kay code 071 zip code 74647

3. State/Federal Agency Certification

As the designated authority under the National Historic Preservation Act of 1966, as amended, I hereby certify that this _X__ nomination ____ request for determination of eligibility meets the documentation standards for registering properties in the National Register of Historic Places and meets the procedural and professional requirements set forth in 36 CFR Part 60. In my opinion, the property _X__ meets ____ does not meet the National Register Criteria. I recommend that this property be considered significant _X__ nationally _X__ statewide ___ locally. (N/A See continuation sheet for additional comments.)

Signature of certifying official — Date 7-24-06

Oklahoma Historical Society, SHPO
State or Federal agency and bureau

In my opinion, the property ____ meets ____ does not meet the National Register criteria. (___ See continuation sheet for additional comments.)

Signature of commenting or other official — Date

State or Federal agency and bureau

4. National Park Service Certification

I, hereby certify that this property is:
X entered in the National Register 9/8/2006
___ See continuation sheet.
____ determined eligible for the _____ _____
National Register
___ See continuation sheet.
____ determined not eligible for the _____ _____
National Register
____ removed from the National Register _____ _____
____ other (explain): _____

_____ _____ _____
Signature of Keeper — Date of Action

5. Classification

Ownership of Property (Check as many boxes as apply)

_X_ private
___ public-local
___ public-State
___ public-Federal

Category of Property (Check only one box)

___ building(s)
_X_ district
___ site
___ structure
___ object

Number of Resources within Property

Contributing	Noncontributing	
43	4	buildings
1	0	sites
18	7	structures
3	0	objects
65	11	Total

Number of contributing resources previously listed in the National Register 0

Name of related multiple property listing (Enter "N/A" if property is not part of a multiple property listing.)
N/A

6. Function or Use

Historic Functions (Enter categories from instructions)
Cat: EDUCATION Sub: School

Current Functions (Enter categories from instructions)
Cat: VACANT/NOT IN USE Sub: _____

7. Description

Architectural Classification (Enter categories from instructions)
LATE VICTORIAN: Romanesque Revival; Folk Victorian
LATE 19TH & 20TH CENTURY REVIVAL: Colonial Revival
LATE 19TH & 20TH CENTURY AMERICAN MOVEMENTS: Craftsman
MODERN MOVEMENT
OTHER: No Distinctive Style

Materials (Enter categories from instructions)
foundation CONCRETE
roof ASPHALT
walls STONE: Limestone
BRICK; WOOD: Weatherboard
other _____

Narrative Description (Describe the historic and current condition of the property on one or more continuation sheets.)

8. Statement of Significance

Applicable National Register Criteria (Mark "x" in one or more boxes for the criteria qualifying the property for National Register listing)

XX A Property is associated with events that have made a significant contribution to the broad patterns of our history.

____ B Property is associated with the lives of persons significant in our past.

XX C Property embodies the distinctive characteristics of a type, period, or method of construction or represents the work of a master, or possesses high artistic values, or represents a significant and distinguishable entity whose components lack individual distinction.

____ D Property has yielded, or is likely to yield information important in prehistory or history.

Criteria Considerations (Mark "X" in all the boxes that apply.)

____ A owned by a religious institution or used for religious purposes.

____ B removed from its original location.

____ C a birthplace or a grave.

____ D a cemetery.

____ E a reconstructed building, object, or structure.

____ F a commemorative property.

____ G less than 50 years of age or achieved significance within the past 50 years.

Areas of Significance (Enter categories from instructions)

EDUCATION
ETHNIC HISTORY: Native American
POLITICS/GOVERNMENT
ARCHITECTURE

Period of Significance 1883-1956

8. Statement of Significance (Continued)

Significant Dates _____
_____

Significant Person (Complete if Criterion B is marked above)
_____

Cultural Affiliation _____
_____
_____

Architect/Builder Bidwell, Edmund, architect; Pauley, Hoyland & Smith, architects
Hopper, George, builder

Narrative Statement of Significance (Explain the significance of the property on one or more continuation sheets.)

9. Major Bibliographical References

(Cite the books, articles, and other sources used in preparing this form on one or more continuation sheets.)

Previous documentation on file (NPS)
__ preliminary determination of individual listing (36 CFR 67) has been requested.
__ previously listed in the National Register
__ previously determined eligible by the National Register
__ designated a National Historic Landmark
__ recorded by Historic American Buildings Survey # _____
__ recorded by Historic American Engineering Record # _____

Primary Location of Additional Data
_X_ State Historic Preservation Office
___ Other State agency
_X_ Federal agency : BIA
___ Local government
___ University
____ Other
Name of repository: _____

10. Geographical Data

Acreage of Property approx. 288

UTM References (Place additional UTM references on a continuation sheet)

	Zone	Easting	Northing		Zone	Easting	Northing
1	__	_____	_____	3	__	_____	_____
2	__	_____	_____	4	__	_____	_____

X See continuation sheet.

Verbal Boundary Description (Describe the boundaries of the property on a continuation sheet.)

Boundary Justification (Explain why the boundaries were selected on a continuation sheet.)

11. Form Prepared By

name/title Jim Gabbert, Architectural Historian

organization Oklahoma State Historic Preservation Office date _____

street & number _____ telephone _____

city or town _____ state __ zip code _____

Additional Documentation

Submit the following items with the completed form:
Continuation Sheets
Maps
A USGS map (7.5 or 15 minute series) indicating the property's location.
A sketch map for historic districts and properties having large acreage or numerous resources.

Photographs
Representative black and white photographs of the property.

Additional items (Check with the SHPO or FPO for any additional items)

Property Owner

(Complete this item at the request of the SHPO or FPO.)

name Kaw Tribe of Oklahoma; Chairman ******

street & number PO Box 50 telephone (580) 269-2552

city or town Kaw City state OK zip code 74641

name Otoe-Missouria Tribe; Chairman *******

street & number 8151 Highway 177 telephone (580) 723-4466

city or town Red Rock state OK zip code 74651

name Pawnee nation of Oklahoma; President *******

street & number PO Box 470 telephone (918) 762-3621

city or town Pawnee state OK zip code 74058

name Tonkawa Tribe; President******

street & number P.O. Box 70 telephone (580) 628-2561

city or town Tonkawa state OK zip code 74653

name Ponca Nation of Oklahoma

street & number 20 White Eagle Drive telephone (580) 762-8104

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Summary

The Chilocco Indian School is located in north central Oklahoma, just west of US Highway 77, between Newkirk, Oklahoma and Arkansas City, Kansas. The original Chilocco reservation consisted of over 8,000 acres; the nominated property contains approximately 288 acres centered on the campus of the school and extending along the entry road. The balance of the reservation was used as farm and grazing land in support of the school. The campus is located one mile west of US 77, ¾ mile south of the Oklahoma/Kansas state line. Chilocco Creek meanders northwest to southeast along the south edge of the campus through gently rolling prairie. Screens of mature trees mark the west and north edges of the campus; new stands of volunteer trees are filling in formerly open areas around the campus. There are 76 total resources in the district, including buildings, structures, sites, and objects.

The campus is reached through a mile-long *alee* of elm trees. Pastures and fields are to the north and south of this road. A cluster of buildings, most notably the National Guard armory, mark the entrance to the campus. Chilocco Lake separates these buildings from the main campus. The campus consists of 44 buildings – academic and residence, most of which are constructed of locally quarried limestone, laid out around a central mall. Buildings related to the various academic and vocational departments are clustered to the southeast, south, and west of the mall. A cluster of residences is located north of the mall. South of Chilocco Creek, a small cemetery and scattered agricultural buildings are set apart from the main campus.

The campus has not been utilized as a school since 1980 and the facilities have been left to deteriorate. Many of the buildings have been compromised by failing roofs or acts of vandalism. They do, however, retain excellent integrity of design, location, feeling, association, setting, materials, and workmanship. Alterations to the buildings reflect the many years of service they provided, both as functional resources but also as laboratories for the vocational departments of the school.

The focal point of the campus is an oval, central mall, around which were arrayed the primary academic and residential buildings of the school. On the east side of the oval is Hayworth Hall, the main classroom building. Built in 1910 after a fire had destroyed its predecessor, it is a three story limestone building with multiple gables, a complex footprint and a central tower. On the north edge of the oval is Leupp Hall, built in 1905, the home of the domestic sciences department and also, for many years, the main dining hall for the school. A three story, limestone building, Leupp Hall has had a number of additions over the years to accommodate the growth and changing needs of the school. On the west edge of the oval is the Administration Building, built in 1918, a single story limestone building with wide overhanging eaves supported by heavy knee braces. At the southeast corner of the oval are the power plant, print shop and the boys' honor dorm, all constructed of limestone. The south edge of the oval is dominated by Hayman Hall, a two story, limestone boys' dormitory constructed in 1933. Located within the oval is a fountain, a war memorial, and the student union building, a red brick, single story building constructed in 1965.

North of the oval, north of Leupp Hall, is a cluster of residential buildings. A large girls' dorm, a staff apartment

building, and a single dwelling, all constructed of limestone are intermixed with seven other frame cottages and numerous garages. These cottages were constructed primarily by the students.

West and southwest of the oval there are buildings dedicated to the vocational trades and some additional frame cottages used as staff residences. The warehouse, a limestone rubble building rebuilt in 1911 after a fire, is the oldest of these buildings. The largest buildings are the Practical Arts Shop, constructed in 1963, and the new boys' dorm, the newest building on campus, completed in 1966.

East of Chilocco Lake stand two stone cottages, built in 1903, a small, stone apartment building, the National Guard Armory, and various buildings related to the agricultural operations of the school. The cottages and apartment were for instructors and staff. Further south of the campus are more agricultural buildings, including a sheep barn and the ruins of the dairy barn.

The buildings, sites, and structures that comprise the campus of Chilocco Indian School are all directly related to the function and purpose of the school. They are, for the most part, united by a common use of materials and design. There are no intrusions in the campus that depart from the mission of the school, although there are buildings that are less than fifty years of age. Individual buildings have been altered over time, primarily reflecting the continued use of the school until its closing, its use as a laboratory for the students, and the eventual deterioration that came with abandonment. The campus retains excellent integrity of design, setting, feeling, association, location, workmanship, and materials.

Resources (Noncontributing resources are underlined)

1) Entrance Gate. C. 1920. Structure. Located approximately 100 feet west of US Highway 77, the entrance gate consists of two quarry faced, limestone piers (each approximately 12 feet tall and two feet square) that support a metal superstructure. This superstructure is arched and supports a sign reading "Chilocco Indian School" with each letter painted in red on an individual sheet of white-painted steel. Photo #1

2) Entrance Road. C. 1884/1925. Structure. Perpendicular to US Highway 77 and running due west is the original entrance road to the campus. Paved with asphalt in 1925, the road once terminated at the A.T. & S.F Railroad line. The road is lined with elm trees, forming an *alee.* Small concrete culverts are integral parts of the road, as is the causeway that carries it into the main campus. Photo #1

3) National Guard Armory. C. 1950. Building. This red brick, Modern Movement building is two stories in height. It has a square footprint, a flat roof with a central, flat-roofed monitor. The roof has a concrete coping.

The main entry is centrally placed and recessed; there are paired steel and glass doors, each with six lights. Flanking the entry are three steel sash, industrial type awning windows. The east and west sides of the monitor have a series of fifteen steel awning type windows, allowing light and ventilation into the drill hall. Two large overhead garage doors on the rear of the building allow access to the drill hall. Photo #2

4) Building 80, Staff Quarters. 1903. Building. A one story, pyramidal roof house constructed of ashlar limestone, quarried on the Reserve. The square footprint house had a rear addition at an unknown time. The roof has a flat deck at the apex and the eaves flare slightly; it is clad in composition shingles. There is a shed roof porch that spans the front; it is supported by simple 4x4 posts. It is not original, but was added in the 1930s. The porch ceiling is beadboard and the side gables of the shed roof feature vertical bead-board terminating in saw tooth ends. The façade is symmetrical, with the central entry flanked by square window openings. These are boarded. The walls are of rectangular limestone blocks, quarry-faced, laid up in a running bond. The lintels for the door and windows are dressed. There is a wooden frieze board. Photo #3

5) Building 83, Staff Quarters. 1903. Building. This building is identical in construction to Building 80, with the following exceptions. There is a small gabled stoop instead of a porch. The window openings on the façade have been altered; Matching stone has been laid in, truncating the sized of the opening. The windows are aluminum, dating to the 1960s. The rear addition, like that of Building 80, is frame with wide weatherboard siding and a gabled roof.

6) Building 85, Old Hospital/Staff Apartments. 1897/ 1925. Building. This two-and-a-half story building was once used as the hospital for the school. It was of Late Victorian Queen Anne style, heavily modified in 1925 when a new hospital was constructed. The building has a rectangular footprint and is oriented to the north. The gabled roof has two offset, lower cross gables that project from the main line of the facade. Inset in the valley of these gables once were towers; these were removed when the building was converted to apartments. The gable end walls are of wood scalloped shingles. The main walls are of coursed, quarry-faced limestone. A band of lighter, wider stone separated the two floors. Entries are into the former towers. Windows are paired and single 2/2, 1/1 and boarded. A second floor balcony, accessed bay a wide central stair, is located between the two projecting sections/towers. This allows access to the second floor apartments and is not original. Two original window openings were modified to provide entries. Small, frame shed roof additions on the rear enclose entries. Photo #4

7) Building 91, Granary. 1939. Building. A one story, wood clad, transverse frame, gabled building on a concrete foundation. The composition roof has exposed rafter tails. A large wagon entry is centered in each gable end; a single narrow window opening is centered in the east gable. Photo #5

8) Building 90, Scale House. 1952. Building. The scale house is a simple, stone, gabled structure. The walls are of random ashlar, cut limestone with quarry face finish. The lintels and sills for the fenestration is concrete. A window is centered in the west gable. A door and a window are located on the south side, facing the scale pit. The scale slab and mechanism have been removed and the windows are boarded. Photo #6

9) Building 93, Agricultural Vocational Building. 1952. Building. A long, rectangular building, oriented east/west, with a low-pitched gable roof, this classroom building is constructed of random ashlar, cut limestone. The roof is clad in corrugated tin; the gable ends with asbestos shingles. There is no overhanging eave. The north side of the building has ha series of large openings with overhead, garage-type doors. Man doors are located on the gable ends and are offset. The south wall has windows and large openings irregularly spaced. All are boarded.

10) Building 156, Agricultural Classroom. 1955. Building. The agricultural classroom building has a long, rectangular footprint. A low pitched gabled roof is covered in corrugated tin; the gable ends are clad in asbestos shingle while the main walls are random ashlar, cut limestone. There are entries centered in either gable end. A rank of five large, steel, industrial sash windows are located near the west end of the south and north sides. Photo #6

11) Building 159, Calf Barn. 1960. Structure. Similar in appearance to Building 156 and constructed at the same time. The gable end entries for this building are larger, to accommodate equipment. There are also more windows, with the south and north sides fully lighted with steel, industrial sash awning type windows. Each window is 3x4 lights. Photo #7

12) Building 154, Hay Storage. 1951. Structure. Quonset hut style of corrugated tin with large, sliding doors on each end. There are three ventilators evenly spaced along the apex of the building. Photo #8

13) Building 155, Heavy Equipment Storage. 1951. Structure. Identical to Building 154, with the exceptions that the end door is an overhead type and there is an offset, fixed metal sash window on the east end. Photo #8

14) Building 178, Sewage Treatment. C. 1965. 3 structures. There are two concrete-lined settling ponds and a small, concrete block gabled pump house. These structures are interrelated and are considered a single complex. They are noncontributing due to their age.

15) Building 92, Machine Shed. 1952. Structure. This long, one story building consists of three segments, oriented to the south, configured in a shallow "U." The central section is slightly higher than the wings. The gabled roof is covered with corrugated tin. The walls are random ashlar limestone. The south side is open.

16) Bridge. C. 1930. Structure. This single span, steel stringer concrete bridge spans Chilocco Creek. It appears to be a replacement for an earlier bridge similar to resource #20. The abutments are concrete. The old concrete railing is gone.

17) Building 94, Sheep Shed. 1952. Structure. This structure is similar to Buildings 156 and 159. As single story, gabled building with asbestos shingle gable ends and random ashlar limestone walls. The east gable end has an offset entry door and a single, steel sash awning type window. The south wall has three such windows centered on the wall and flanked by large equipment openings. Entry doors are located offset, near each corner. The north wall has no windows. Photo #9

18) Cemetery. 1889. Site. The cemetery for the school contains numerous unmarked graves and a single headstone dating to 1889. There is a chain link fence around the site and a small gate constructed of steel pipe. The gate has a sign reading "CEMETERY." Plain concrete crosses that once marked graves are uprooted and scattered along a fence line. Photo #10

19) Dairy Barn. Ruins. The remains of the school's dairy barn consist of the cement feeding troughs, concrete piers, and partially collapsed exterior walls. The barn was demolished by a fire and no longer retains enough historic integrity to reflect is original design. It is noncontributing due to loss of integrity.

20) Bridge. C. 1910. Structure. This bridge crosses Chilocco Creek south and west of the Gymnasium complex. A single span, concrete arch, the bridge has concrete abutments and a steel pipe and concrete post rail system. The arch is segmental. Photo #11

21) Building 97, Boys' Dressing Room. 1937. Building. Part of the Gymnasium complex. This rectangular, gabled building is sited parallel to the Wresting Room building, perpendicular to the Gymnasium. Constructed of clay tile and covered in stucco, the building is attached to the Gymnasium and the Pool by a covered hallway. There are steel casement windows on the east wall and a single exterior entry centered in the east wall.

22) Building 98, Swimming Pool. 1937. Building. The Swimming Pool Building is roughly "T" shaped, with the leg of the "T" wedged in between Buildings 97 & 99. It is a flat-roofed, stuccoed building numerous steel, industrial sash, awning type windows that are located high along the south, east, and west walls. These windows have simple, concrete lug sills. Entry into the building is through a common hallway shared with Buildings 97, 99, and 100.

23) Building 99, Wrestling Room. 1937. Building. Building 99 is virtually identical in its exterior arrangement to Building 97. On the west wall are four steel casement windows and a single entry door. Near the south end of the wall is a large, steel sash, industrial, awning-type window. The gable ends of both Building 99 and 97 are of wood clapboards. A single louvered vent is centered in the gable. Photo #12

24) Building 100, Gymnasium. 1925. Building. The Gymnasium building is a large, rectangular building with a gabled roof. The original construction of the building used locally quarried limestone laid up in a random ashlar. When the three buildings were constructed at the rear of the gymnasium in 1937, the building was stuccoed to match. The gable ends are of wood clapboard with louvered vents located near the apex of the gable. A small gablet is locate over the original entry to the gymnasium. A gabled extension, set perpendicular to the main body and lower than the eave line, was added in 1937. This extension provides an airlock, coatroom and ticket booth. The stucco walls are pierced with simple, steel sash, four pane, pivoted windows. A secondary entry is located to the west of the main entry. This building was rebuilt from an older stone building used as a stable. Photo #12

25) Building 180, Wheeler Hall, Boys' Dormitory. 1966. Building. This "H" plan, Modern Movement building is the largest and newest on the campus. It consists of a three story section with a flat roof and a one story section wit ha flat and sawtooth roof. The single story section is located to the north and served as the dining hall and common rooms. The three story section, on the rear or south, is sited to take advantage of the slope of the property and does not appear to rise much higher than the front section. The building is constructed of concrete with a veneer of random ashlar limestone. The flat roof cantilevers, providing sunshade to the windows. Each floor of the rear also has a cantilevered pent roof with a sunshade. The front section has a sawtooth roof over the core of the section. Clerestories are set into the sawtooth, lighting the interior. Windows in the building are regularly spaced and consist of fixed panes of glass with colored aluminum panels below. This building is an excellent example of Modern architecture from the mid-century. However, it is noncontributing due to its age. Photo #13

26) Building 189, Two Stall Garage. C. 1966. Structure. This simple stone and concrete garage was constructed along with the dormitory. It has a flat roof and two overhead doors, separated by stone-clad piers. Although compatible with the rest of the campus in design and materials, this resource is noncontributing due to age.

27) Building 151, Classroom. 1950. Building. Building 151 is a rectangular, metal-clad building resembling an oilfield or industrial building. The gabled roof and walls are clad in corrugated tin. A wooden shed roof extension is centered on the west wall. Windows are a mixture of steel sash fixed windows and wooden hung windows and are not symmetrically placed. A large, sliding door is located on the east wall, near the south side. Sections of siding are coming off an the southwest corner, exposing the steel structure. Photo #14

28) Building 116, Golf Shop. C. 1940. Building. Also referred to as the Country Club, this simple, stucco, gabled single story building served the 9 hole golf course that once was located along the south edge of campus. The gabled roof is clad in composition shingles and has exposed rafter tails. The walls are stucco and a single entry is centered on the north wall. A single window is located just to the right of this entry.

29) Building 107, Fire Station. 1944. Building. This building housed the fire equipment for the school. It is a single story with a flat roof and a roughly square footprint. The walls are of limestone. The building faces south; two large, wooden overhead doors are on the south side. The west and north sides have two, small, double hung windows each. The east side has two large, steel sash casement windows and an offset, wooden entry door. The lintels of the two casement windows are flat arched, molded to look like dressed limestone. They contrast with the walls, which are heavy, quarry faced random ashlar stone blocks ¾ of the way up, and thinner, semi-dressed blocks for the last 1/3. The roof has a stone coping that overhangs slightly.

30) Building 150, Filling Station. 1949. Building. A one story, "T" plan, gabled building with limestone ashlar veneer walls. The leg of the "T" is oriented south. The west gable end has a large overhead garage door while the west wall of the leg has a single entry door and a pair of 1/1, square windows. There is a single 1/1 window on the north wall and a pair of 1/1 windows on the south gable end. Photo #15

31) Building 108, Warehouse/Commissary. 1910. Building. This two story, limestone building has a low-pitched hip roof. The original, one story warehouse building burned in 1908. Parts of the original walls were retained in reconstructing the building after the fire. The limestone used in this building is load bearing. It was quarried nearby on the reserve and is rough cut and laid up in a random ashlar. A water table of slightly larger, elongated blocks is set at about three feet above grade. The building is oriented to the north. The roof is clad in composition shingles. Each elevation is symmetrical. The east and west elevations have single 4/4 windows centered on each floor. The south elevation has five 4/4 windows on each floor and the north has five windows on the second floor and four on the first, with a large central opening. All of the windows have flat stone sills and lintels. There is a concrete loading dock at the large opening. This opening has a segmental arch carried on rough cut voisseurs. There is a modern, wooden overhead garage door. The north and south sides also had small windows that light the basement. These align with the first floor windows and are wooden awning-type windows. Photo #15 & 16

32) Building 110/113, Vocational Shop. 1933. Building. Buildings 110-113 are virtually identical and were utilized for the same purposes as vocational educational shops. Buildings 110 and 113 are connected and are axially symmetrical. Building 111 mirrors 110 while Building 112 mirrors 113. Building 110/113 is an elongated rectangular building wit ha gable roof. There is a break in the roofline in the center where there is an inset of the main façade. Over the main entry into each section is a small gablet with a fan-shaped louvered vent. There is a smaller, similar vent in each gable end. The walls are limestone ashlar. The windows are

asymmetrically placed, some in pairs and others single. They have flat arch lintels of grey concrete and stone sills. The inset portion, what would be a drop wing, contains large double door openings. Building 110's large entry, though, has been filled in and replace with a window and a door. The masonry matches in design, but there is a slight color variation.

33) Building 111, Vocational Shop. 1933. Building. A free standing building with similar details the double building 110/113. The gabled roof, in this case, does form a drop wing. The building is oriented to the south. The gablet is offset. The fenestration pattern is, from east to west, W, W, W, D, D, W, W, W, W. The windows are all newer aluminum 1/1. The entry door is offset under the gablet and the large opening is to its west. The entry and its neighboring window share a common flat arch lintel. The east gable end has four window openings; the west gable end has two, although one is in an obviously larger opening that was infilled at some time. Photo #17

34) Building 112, Vocational Shop. 1933. Building. Building 112 is identical to Building 111, although mirrored. The east gable end, though, has a single, centered entry door and an offset window. Another window opening has been infilled. A small, flat roof addition of matching stone is located on the rear of the drop wing on this east end. It has a single, steel door. Photo #17

35) Building 161, Practical Arts Shop. 1963. Building. This flat-roofed, Modern Movement building is rectangular in footprint and is oriented to the east. It is constricted of a concrete frame that is expressed on the exterior. The interstitial spaces between the posts are filled in with random ashlar limestone. The beams of the frame are decorated with squares that are inset. There are few windows; the west side of the building has a number of metal, overhead garage doors. The east wall has a central entry. A flat, concrete awning is cantilevered over the entry. This building, though compatible with the rest of the campus in terms of design and materials, is noncontributing due to age. Photo #18

36) Building 152, Band & Vocal Music. 1950. Building. The band & Vocal Music Building is a rectangular footprint, gabled building of vaguely Colonial Revival styling. The building is oriented to the south and the primary entrance is off center. A gabled stoop covers the entry door. The fenestration pattern on the south façade is W, W, D, W, W, D, W, W. There is an entry door centered in the east gable end. The windows of this building are boarded up, but have concrete sills and no lintels. Photo #18 & 19

37) Building 17, Staff Quarters. C. 1910. Building. Craftsman bungalow style. A single story, California bungalow with a front gabled roof, large gabled porch supported by iron posts, and wood lap siding. The main entry door is centered with pairs of 1/1 windows flaking. All windows and doors have simple flat surrounds. A louvered vent is located in the front and rear gables. The roof is composition shingle and a brick chimney is off center and located on the south roof slope. A variety of window sizes, in pairs and singles are found on the north and south walls. The foundation is stone. Photo #20

38) Building 18, Staff Quarters. C. 1910. Building. Similar to Building 17 in window details and siding. This bungalow has a gabled front stoop with brick piers. The central entry is flanked by paired 1/1 windows. The roof is composition shingle and has exposed rafter tails. The foundation is cut stone blocks. Photo #20

39) Building 19, Four Stall Garage. C. 1930. Structure. A wood frame, side gabled structure with four stalls. The siding is shiplap and the foundation is concrete. Each of the four stalls has a simple 1x4 surrounds. The composition roof has exposed rafter tails.

40) Building 20, Four Stall Garage. C. 1930. Structure. Identical to Building 19 except that the siding on the front of this south-facing structure has only a 2" reveal. The east and west gable ends show where similar siding was used to patch the original 4" shiplap siding. Photo #21

41) Building 21, Staff Apartments. C. 1940. Building. This two story apartment building has four two-bedroom apartments. The building is clad in quarry faced, random ashlar limestone. The roof is hipped, covered in composition shingles, and has a low pitch. A breezeway separates the building into two sections, with one apartment on each floor. The building is oriented east/west, with each of the primary walls having two sets of paired windows for each apartment. The windows are aluminum, single hung. The end walls have two single 1/1 windows offset and a smaller 1/1 window. Apartment access is gained through the breezeway, where there is also a steel and concrete staircase. Photo #21 & 22

42) Building 22, Staff Quarters. C. 1910. Building. Bungalow. A one story, front gabled bungalow with an incised corner porch, lap siding, and a concrete foundation. The wide, low pitched roof has composition shingles, exposed rafter tails, exposed purlins, and a centered ridge chimney. The gable ends are clad in asphalt shingle. A large, wide, center pivot window is located in the front gable. It, like the rest of the fenestration, has wide surrounds and a simple crown mold. The entry is in the recessed porch; paired 1/1 windows are beside. A matching set of paired windows is on the east side of the front façade. The west wall has two sets of paired windows; the east wall has single windows. Photo #21 & 23

43) Building 23, Staff Quarters. 1903. Building. This single story, Folk Victorian cottage has a cruciform plan. The cross gabled roof is clad in composition shingles and there is a central chimney. The foundation is stone; the walls are clad in asbestos shingles, but the original lap siding is visible in spots. The corner boards have caps. There is a wide raking board in each gable. The full-width, hipped porch is supported by wrought iron posts. The main entry is offset; two single 1/1 windows are beside it. The east and west gable ends have single 1/1 windows with wide surrounds and crown molds. The north gable end has paired 1/1 windows centered and a single, smaller 1/1 offset to the east. The condition of the building is poor. Photo #24

44) Building 25, Four Stall Garage. C. 1940. Structure. (Ruins). All that remains of this four stall garage are the concrete block walls. There is enough integrity to see that it once was a side gabled structure, similar to resources 19 and 20. Noncontributing due to loss of integrity.

45) Water Tower. Structure. ****. Semi-cylindrical water tank supported on four tubular steel posts. Photo #22

46) Building 7, Administration Building. 1918. Building. One story, wit ha low-pitched, hip roof with wide eaves and knee braces. The building could be classified as Craftsman in style. The roof has composition shingles and a small ridge that is oriented east/east. The walls are cut limestone, quarry faced and laid in a running bond. Windows have large stone lintels and thin stone sills. The main entry, on the east side, faces out onto the oval. A central door, flanked by sidelights, is accessed by a set of concrete steps (five risers) with stone wing walls. Flanking the entry are two windows on each side. All windows have been replaced with modern aluminum sash. The south elevation has a single offset entry door, accessed by a small flight of five steps with large stone wing walls. There are four windows evenly spaced on the balance of the wall. The north elevation Has a central door flanked by four windows while the rear, or west elevation has a door offset to the north and five, small, square fixed sash windows asymmetrically placed. Photo #25

47) World War I Memorial. 1923. Object. This memorial, dedicated in 1923, consists of a stone base and a tall, steel flagpole. The base, of brush hammered limestone, has a slanted top with a bronze plaque that reads "IN MEMORIUM - WORLD WAR 1914-1918 – BENNETT LAVERS '14 - DAVID JOHNSON '17 – EDWARD NELSON '18 – SIMEON MOSELY EX – 1923" Photo #25

48) Building 5, Antonne Hall. 1932. Building. Constructed as a girls dormitory, Antonne Hall has a vaguely Colonial Revival styling. The plan of the building is complex, basically a lazy "I." The roof is hipped. The walls are quarry faced, cut limestone laid in a running bond. The courses are not uniform, though. The main entry is centered and has a pediment hood supported by console brackets. A series of six smooth concrete pilasters separates the main elevation. A single window is in each section on each floor (all have been replaced with aluminum sash). The wings project; the north wing has a bowed bay on the first floor that conforms to the common room. There is a large, stone chimney on the north elevation, near the east corner and ten sets of paired windows and three single windows on each floor. The rear elevation has few windows, none in the wings and the balance in the central section. The south elevation has 10 sets of paired windows and three singles on each floor. Photo #26 & 27

49) Building 58, Staff Housing. C. 1930. Building. A one story, clapboard sided bungalow with a side gabled roof. An offset, lower cross gable is on the front (east elevation, while an offset, lower gabled wing on located on the rear north corner. There is a brick, shouldered chimney on the south elevation near the east corner. The

porch is incised at the north east corner. The foundation is parged. Entry is into the side of the incised porch. A single 6/1 window is offset. Two 6/1 windows, with flat surrounds, are located on the east façade under the offset gable. The south elevation has a pair of 6/1 windows off center, a single 6/1 offset to the west, and a small casement window near the chimney. The rear, or west elevation, has two 6/1 windows offset, a small 1/1 window off center, and the rear extension that has paired 1/1 windows at the corners. The north elevation has paired 6/1 windows flanked by singles. Photo #28

50) Building 56, Staff Housing. C. 1930. Building. This building is reflectively identical to Building 58. Another house was once located between these two.

51) Building 54, Six Stall Garage, C. 1930. Structure. A side gabled, wood frame structure with lap siding and six overhead garage doors. The roof has composition shingles and the foundation is concrete.

52) Building 53, Superintendent's Home. C. 1930. Building. A one story, "L" plan cottage with a cross gabled roof and random ashlar limestone walls. The Side gables have wide weatherboard. The front, projecting gable has single window opening (all windows are modern vinyl sash) centered. The entry is into the wing and is reached by a flight of five concrete steps with a low stone wing wall. Two windows are located to the north of the door. The north elevation has two paired window sets flanking a single, smaller window. The rear elevation has a single window offset, two paired sets and an enclosed porch in a shed roof extension. The enclosure uses wide weatherboard for its walls. Photo #29

53) Building 60, Staff Apartments. 1940. Building. Constructed as staff single bedroom apartments, this two story, rectangular building has a hipped roof and random ashlar limestone walls. The building is oriented to the west and the main entry is centered in the west elevation and raised above grade. It is a modern aluminum and glass door with sidelights set into an elliptical arched opening. There are 13 window openings on the second floor, twelve on the first, in a pattern of three large, one small, five large, one small, three large. All have modern aluminum sash. The rear, or east elevation has the same pattern, with the arched entry replaced wit ha simple single entry. A water table delineates the raised first floor; the basement/crawl space has wide openings roughly equating to first floor windows. There is a large, steel set of fire stairs on the south elevation. Photo #30

54) Building 61, Eight Stall Garage. C. 1940. Structure. One story, side gabled with shiplap siding and eight overhead garage doors Photo #31

55) Building 59, Staff Quarters. C. 1940. Building. A single story, side gabled Minimal Traditional/bungalow type house. There is a brick chimney centered on the rear slope of the composition shingle roof. The walls are clapboard, with joined corners. Board and batten is in the gables. There is a shed roof porch on the south facade and a shed roof rear addition. The foundation is poured concrete. The porch supports are lattice steel and the deck is concrete. The entry is slightly off center; a single 6/6 window is to the west, paired 6/6 to the

east. The east elevation has a single 6/6 offset, a smaller 6/6 off center, and paired 6/6 offset at the rear. Windows have simple flat surrounds and drip caps. Photo #32

56) Building 148, Two Stall Garage. C. 1940. Structure. A single story, side gabled structure with two overhead garage doors. The roof's rear slope extends farther down than does the front; rafter tails are exposed. Wall siding is shiplap and the foundation is concrete.

57) Building 149, Staff Quarters. C. 1940. Building. Bungalow type cottage, front gabled with shaped fascia board, wide raking board and clapboard siding. The foundation is poured concrete. The front entry is slightly off center and is sheltered by a gabled stoop, supported on square posts. Offset is a set of paired 1/1 windows. The north elevation has paired windows near the front (west) corner, a single entry door centered and paired 1/1 windows at the rear (east) corner. The entry is sheltered with a shed roof stoop. A brick chimney is located on the north slope of the roof. The south elevation has a lower cross gable bumpout with a pair of 1/1 windows. To the west is a triple set and to the east of the bumpout is a paired set. Photo #32

58) Building 164, Two Stall Garage. C. 1940. Structure. Gable front with two overhead garage doors, this structure has shiplap siding and a shaped fascia board. The foundation is concrete. Photo #32

59) Building 157, Staff Quarters. C. 1955. Building. A single story, side gabled Minimal Traditional building of the ranch family. The composition shingle roof has no eaves. There is a gabled stoop over the off center entry. A pair of 1/1 windows is to the north of the entry, a triple set to the south. The north end of the building has a drop wing that is set back from the plane of the main facade. There is a single, large, sliding glass door. The siding is clapboard and the foundation is concrete. This house was constructed by students. Photo #31

60) Building 163, Garage/Shed. C. 1955. Structure. This side gabled building contains a single stall garage on the west and a storage shed on the east half. The structure is oriented to the north. The gabled roof, clad in composition shingles, has exposed rafter tails. There is a large overhead door on the east side of the front and a single 1/1 window off center. The west gable end has an offset entry door and the south wall has a single, off center 1/1 window. Photo #34

61) Building 158, Staff Quarters. C. 1955. Building. Identical to Building 157 with the exception that the drop wing is still a garage, with an overhead garage door.

62) Building 160, Ten Stall Garage. C. 1940. Structure. An elongated, side gabled structure with ten overhead garage doors. The siding is asbestos shingle. Interior evidence suggests that this structure was cobbled together from three or more smaller structures. The foundation is concrete.

63) Building 71, Employees Quarters/Club. 1924. Building. A two story, rectangular footprint building wit ha hipped roof. The walls are of rough cut, quarry faced random ashlar limestone. The building is oriented to the south; a hipped roof porch with steel posts is centered on the middle third of the main facade. The windows on the second floor are all 8/1 singles; on the first floor they are paired. All have flat, dressed stone lintels. The main entry has sidelights and a transom. The rear (north) elevation has all single windows, 12 per floor. Fire escape is located on the east and west ends. Photo #35 & 47

64) Building 12, Leupp Hall. 1905/C. 1925/C. 1940. Building. The oldest building on campus, Leupp Hall was built as the domestic science classroom and the main dining hall for the campus. The original incarnation of the building has a Romanesque Revival style; later additions reflect their own architectural periods. The building is two stories in height, with a complex footprint and a complex hip and gable roof. The walls are of cut, quarry faced limestone laid in a running bond. The central feature of the building is the center tower/entry. Once capped with an open, wooden pavilion, the tower has, since around 1940, been flat topped. It features three, tall, narrow window openings with round arch tops. The main entry, a double door set in a round arch, has distinct voussoirs. Flanking the tower, and slightly stepped back, are two forward facing gabled sections. The gables have full returns and a wide, three part window in the tympanum. These windows have a full entablature supported by pilasters. The west wing had an extension added to the north end in the 1920s. The original section has two large segmental arch windows and a central door with segmental arch opening on the first floor that light the dining hall. The newer extension has a stucco second floor. All windows are 6/1; those in the older section have flat-topped, segmental arch lintels. A flat roof, single story addition was added to the east side of the building around 1940. The stone used in the walls of this addition has a rougher texture than that of the original section. Windows are 6/1 with concrete sills and flat lintels. Edmund Bidwell, architect. Photo #36

65) Building 179, Student Union. 1965. Building. A flat roof, stone veneer, Modern Movement building with a large, covered patio area on the south side. Entries are on the east and west facades; the north, or rear, has five sets of paired windows. The entries are centered and have modern aluminum and glass doors with fixed transoms. The patio is supported by steel lally columns on a low, stone wall with concrete caps. This building, though compatible in materials, is noncontributing due to age. Photo #37 & 41

66) Building 4, Correll Hall. 1935. Building. Two stories on a raised basement, this Colonial Revival dormitory has a cross gabled roof and random ashlar limestone walls. The footprint of the building is rectangular, with the main entry on the long axis, oriented to the west. There is a large, stone chimney with four clay pots centered on the long ridge of the roof. Each end of the building has a cross gable with full returns. Each tympanum has an oculus louvered vent. The main entry is centered on the west elevation. The steel doors are sheltered by a stoop with full entablature, supported by Tuscan columns. There is a flight of fifteen concrete steps leading to the entry landing. There is a decorative iron balustrade. The windows of the building have all been replaced with aluminum sash, hung windows. They are located symmetrically across the face of the building, nine on the

second floor and eight on the first of the main body, two each on the gabled wings. The window openings have rough stone lintels with enlarged keystones. The north and south ends of the building are identical, with a centered entry reached by a flight of concrete stairs and a single round arch window centered directly above. The doors and arched windows are flanked by typical, single windows. The door has a wooden, classical surround with flat Tuscan pilasters and an entablature. The rear, or east, elevation mirrors the front, minus the entry. It is entirely obscured by vines. Photo #38 & 47

67) Building 8, Haworth Hall. 1910. Building. The main academic building of the campus, Hayworth hall was constructed in 1908-1910 to replace the former main building, destroyed by fire in 1908. An example of Late Victorian Romanesque architecture, it is an imposing, if deteriorating presence on the campus. The building is three stories in height, with a complex footprint and a complex, hip and gable roof. Along the ridge of the roof are large, galvanized metal ventilators. Originally, the building had two towers – one was truncated and transformed into a stairwell. The walls of the building are quarry faced limestone, laid in a combination of regular and random ashlar. The building is oriented to the west. This elevation is asymmetrical, wit ha wide, forward facing gable, a central gabled pavilion, and a rather plain wing. The front gabled section houses the auditorium and features a single, round arch window opening in the gable, two sets of three 6/2 windows on each floor. A square addition, replacing the old tower, is located south of this section; it has a flat roof, a single window on the second level and simple paired doors on the ground level. The southernmost wing is set back from the auditorium. There are three 6/2 windows on each floor and a small round arch window in the gable. The north wing houses classroom and has six windows on each floor, with a wider separation between the center windows. The entry pavilion has a small gable with returns and dentils, a single window on the second level, a dressed stone water table between floors, a battered lower section and a large, round arch opening. The entry has two doors and a fanlight. Below the second level window is a name plague of slightly lighted limestone that reads "HAYWORTH." The footprint of the building is a lazy "E." The three legs of the "E" extend out the rear, to the east. Centered on the middle leg is the square bell/clock tower. It has a crenellated top and round arch openings on each side. The center leg of the "E" is the widest and has two, widely space 6/2 windows on each floor, plus a single round arch window in the gable. The north and south legs have three windows on each floor, plus the round arch window in the gable. Pauley, Hoyland & Smith, architects. Photo #39, 40, 47 & 48

68) Foot Bridge. Structure. Constructed at an unknown time, this steel structure crosses Chilocco Lake from Hayworth Hall toward the former location of the Health Clinic. Historic photographs show that this, or a very similar bridge, has been at this location since around 1940.

69) Fountain. Object. Constructed at an unknown date, but within the period of significance, this round, concrete fountain is located on the south third of the campus oval. The walls, capped with a curved coping, are approximately 18" tall. Centered in the fountain basin is a cylindrical font, clad in green stone. Photo #41

70) World War II Memorial. Object. 1949. Located on the west edge of the oval, directly in front of the Administration Building, is a shouldered sandstone slab set in a concrete base. A perched eagle is outlined on the face of the slab and inscribed within is "DEDICATED TO THE YOUTH OF CHILOCCO WHO SERVED IN WORLD WAR II AND GAVE THEIR LIVES THAT WE MIGHT LIVE – PRESENTED BY THE STUDENT BODY." It appears that the slab has been broken off and reset in its current base. Photo #42

71) Building 9, Power Plant. 1918. Building. This one story, "L" plan building has flat and gabled roofs and quarry faced, random ashlar limestone walls. Projecting upward from the center is a battered, red brick chimney. The central section of the building is taller than the two wings. The end walls of each section have parapets projecting about two feet above the roof. The southernmost section has a flat roof with a stone coping. The north wall of the taller section has large industrial sash windows. The shorter wings have smaller steel hung windows and some newer, aluminum, replacement windows. There is a round arch opening on the east wall of the south wing. The end walls of the west section has recessed, paired doors with dressed, quoined surrounds. Most windows have flat, stone lintels, except the end windows of the west section, which have flat arch stone lintels with large keystones. Photo #43, 48 & 49

72) Building 10, Honors Dorm, 1937. Building. This building is two stories on a raised basement. It has a hipped roof, clad in composition shingles, and a rectangular footprint. It is oriented to the west. The entry is centered on the west elevation and is accessed by a flight of seven concrete steps with wrought iron banisters. The entry has a dressed limestone surround, wit ha cornice hood supported by console brackets and the date of construction inscribed in the frieze. The walls are quarry faced, random ashlar limestone with a water table separating the basement and first floor. The windows are all replacement, aluminum, hung sash. Those on the first floor have a flat spandrel panel below the sill and a flat arch lintel with large keystone. Second floor windows' lintels coincide with the eave of the roof. There are seven window openings on the second floor, and six (with central entry) on the first. Second floor windows alternate between regular size and half- sized, thinner windows. On the rear, or east, elevation, there is a half-shouldered chimney stack offset to the south. A central entry is located at grade, and there is a single, narrow window above it, mid floor. The balance of the windows alternate between thin and normal, six on each floor. All basement windows are half-height with flat lintels. Photo #44 & 48

73) Building 14, Lumber Shed. C. 1970. Structure. A simple, rectangular, gabled building constructed of concrete blocks and lap siding in the gables. A single man door is offset on the east end of the north elevation. Five large, wooden, sliding doors are located on this elevation, too. This building is noncontributing due to age. It also varies from the materials typically found on the campus. Photo #48 & 49

74) Building 11, Print Shop. 1941. Building. A single story, hipped roof building with quarry faced, random ashlar limestone walls. The composition shingle roof has no eaves. The rectangular footprint is axially oriented

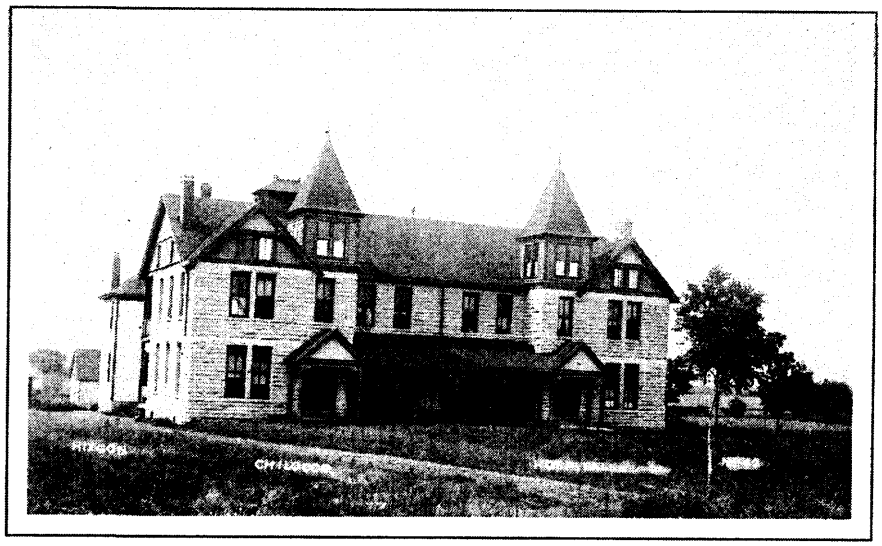
north/south. The main entry is on the west elevation. A single, steel door with the date "1941" brush hammered into the lintel, is centered between ranks of ten windows. All windows are modern, aluminum sash, hung units. The north and south elevations have paired, steel doors off center, with five windows while the rear elevation has smaller window openings, mirroring the front. Photo #45, 48, & 49

75) Building 6, Hayman Hall. 1932. Building. Constructed as a boys dormitory, Hayman Hall has a vaguely Colonial Revival styling. The plan of the building is complex, basically a lazy "I." The roof is hipped. The walls are quarry faced, cut limestone laid in a running bond. The courses are not uniform, though. The main entry is centered and has a pediment hood supported by console brackets. A series of six smooth concrete pilasters separates the main elevation. A single window is in each section on each floor (all have been replaced with aluminum sash). The wings project. There is a large, stone chimney on the west elevation, near the north corner, and ten sets of paired windows and three single windows on each floor. The rear elevation has few windows, none in the wings and the balance in the central section. The east elevation has 10 sets of paired windows and three singles on each floor. Photo #46

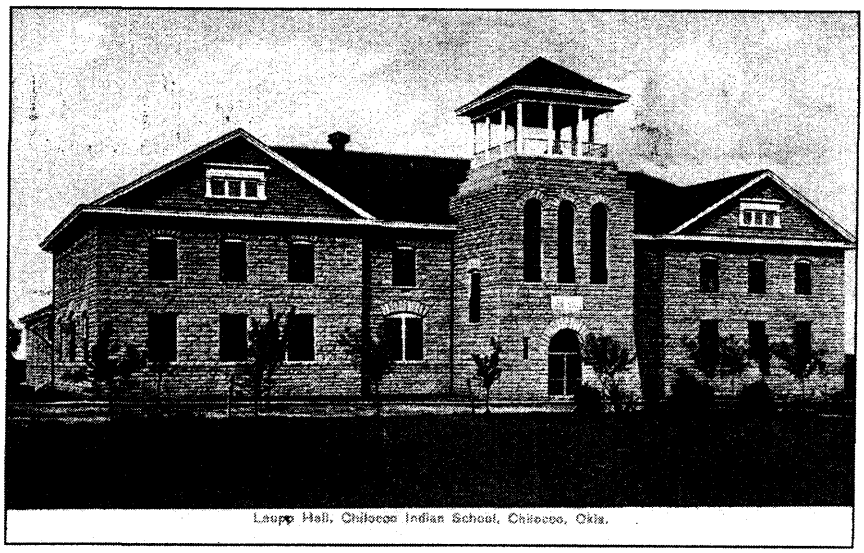
76) Building 195, Stadium Rest Room. Structure. Small, flat roofed structure constructed of concrete blocks. The roof is concrete and hangs over approximately 6".

There are numerous other structures and objects scattered around the area. Small concrete pump houses are common, as are the concrete culverts for the roads, and the sidewalks that hide steam tunnels. All of these could be considered landscape elements. In addition, there are former athletic facilities that have grown over and disappeared. There were tennis courts, basketball courts, a football field and a 9 hole golf course. The restrooms and the skeleton of bleachers and a press box mark the location of the football field; a low stone wall is located along the edge of the tennis courts. None of these facilities are recognizable anymore and are not included in the resource count.

The existing buildings, sites, structures, and objects are obvious on the landscape. They contribute to the story of the development and use of Chilocco Indian Agricultural School. Although neglected, and in many cases, deteriorated, they nonetheless retain high degrees of integrity of design, feeling, association, materials, setting, location and workmanship. They help to unify the campus as a nationally significant district.



Old Hospital (Building 85) c. 1910
Leupp Hall c. 1910



Summary Statement of Significance

The Chilocco Indian Agricultural School historic district is eligible for inclusion in the National Register of Historic Places under Criterion A at the national level of significance as an intact district that embodies the federal government's policies toward the education of Native American children from the inception of the non-reservation system in the late 19th Century through the mid 20th Century. Established as one of the first wave of schools modeled after Carlisle Indian School, Chilocco offered academic and vocational training to children of tribes across the United States. Its mission of assimilation and acculturation matured as advances in educational theory and relations between the federal government and the tribes improved. The campus, abandoned as a school in 1980, embodies in its buildings, structures, and layout the philosophy of the Bureau of Indian Affairs policies. Its collection of historic buildings, its overall historic integrity is second to none among the significant non-reservation schools, including sister school Haskell Institute (NHL) in Kansas and the model school Carlisle Indian School (NHL) in Pennsylvania.

The Chilocco Indian Agricultural School is also significant at the state level under Criterion C for its cohesive collection of limestone buildings, built by the federal government. The use of locally quarried stone in the vast majority of buildings on the campus provides a unity of design, a continuity of theme, and a visual cohesion that is rivaled only by the facilities at Fort Sill, a cavalry fort established in the 1870s and designated an NHL in 1960 . The stylistic elements of the campus reflect the maturity of the school from its inception in the 1880s through its eventual abandonment in 1980. Buildings representing different eras, different functions, and different stylistic vocabularies are unified by the common use of quarry faced limestone.

Historic Background – Indian Education

From its inception, the United States has had an evolving relationship with Native American tribes, at once antagonistic and then paternalistic. Official policies of the federal government have, for the most part, tended toward separation, isolation, assimilation, and finally accommodation and recognition. In referring to the Indians, President Thomas Jefferson set the tone in an address to Congress: "In truth, the ultimate point of rest and happiness for them is to let our settlements and theirs meet and blend together, to intermix and become one people. Incorporating themselves with us as citizens of the United States is what the natural progress of things will bring on; it is better to promote than retard it."[1] Official policy and public opinion, though, preferred isolation or separation to proximity and assimilation. The first treaty between the new United States and an Indian tribe was with the Delaware Indians in 1778, wherein the Delaware ceded their ancestral lands in the Delaware Valley for

1 Quoted by Edgar B. Merrit in a speech to the Maryland Federation of Women's Clubs at Baltimore, 11/1/1922, published in "The American Indian And Government Indian Administration," *The Indian School Journal*, (Chilocco, OK), Volume 22, Number 19, January, 1923.

new lands in the west (Ohio and Indiana). The ever-increasing thirst for land led to the removal of the Delaware and other northeastern tribes and later, on a greater scale, to the removal of the "Five Civilized Tribes" (Cherokee, Choctaw, Chickasaw, Creek, and Seminole) west to Indian Territory.

Even as the government waged war on some tribes, it acknowledged the need for accommodating and educating the many Indians who remained within the states or were removed west, to the territories. The first appropriations for Indian education were made in 1819, giving money to churches and missionary organizations to create schools, with the tribes themselves funding much of the expense as well.[2] In eastern Oklahoma, or Indian Territory, the first schools established in the lands of the Five Civilized Tribes were Christian mission schools, often started at the behest of the tribes themselves. The earliest mission school was Union Mission, established in 1820 for Osage Indians in what would become Cherokee land. Others followed, but not all lasted very long. Among the early, prominent mission schools were Dwight Mission, established in 1830 in the Cherokee Nation and Wheelock Seminary (later Academy), established in 1832 in the Choctaw Nation. Both were organized by the Presbyterian church at the behest of the tribes.

After the Civil War, Plains tribes were removed to Oklahoma and Indian Territories in the face of increasing settlement pressure, or placed on reservations of land thought worthless or substandard in other western territories. These removals were not always peaceful; this was the era of Indian Wars, of the Washita Massacre, of Little Big Horn. Tribes were often forcibly placed on reservations and many of them were considered prisoners of war. The US government encouraged the establishment of church missions and schools on these new reservations in order to help pacify the "wild" tribes.

1878 saw a change in government policy, brought about by the idea of one man. Captain Richard Henry Pratt had been assigned in 1875 to take Cheyenne, Arapaho, and Kiowa prisoners of war from Fort Sill, Indian Territory to Fort Marion, St. Augustine, Florida. Pratt brought in teachers to instruct the prisoners in English. In 1878, as the prisoners were to be released and returned to their homes, a group requested to remain and continue their education. Pratt, with the help of the Indian Bureau, enrolled them at Hampton Institute, in Hampton, Virginia, a historically Black college. The program of academic and industrial training appeared to Pratt to be the solution to the "Indian problem." In remarking on the program, the Commissioner of Education noted in his 1878 report that "Their (the Indian students) education there has gone forward with such satisfactory results that one addition after another has been made by government authority to the number of pupils under training..."[3] Pratt convinced the Indian Bureau and the War Department to allow him to set up a formal school open to all Indians, following a curriculum similar to that of Hampton Institute, but overlaid with rigid military discipline. An old cavalry barracks

2 Act of March 3, 1918, chapter 851, subsection 2; 3 Stat. 516, 517. $10,000 a year was appropriated for this "civilization fund" until repealed in 1873.

3 *Report of the Commissioner of Education, 1878.* (Washington, D.C.: Government Printing Office) 1880.

at Carlisle, Pennsylvania was made available and transferred to the Department of the Interior in 1879. The experiment, Carlisle Indian Industrial School, became a permanent institution when Congress enacted a law establishing the non-reservation school system in 1882.[4]

In addressing the educational needs of Indians at the time of the establishment of Carlisle, the Report of the Commissioner of Education, 1878 points out that: "A most promising effort for the education and civilization of a number of selected Indian youth in schools at the East superior to their own, and removed from all the bad influences of the wild tribes, was successfully begun in 1877-'78, and seems likely to be eminently beneficial." Boarding schools on the reservations had been established for individual tribes, but it was the prospect of removing the Indian youth from their usual environs that attracted the attention of policy makers and educators who subscribed to the philosophy of assimilation.

A year after the establishment of the Carlisle school, a small school was opened at Forest Grove, Oregon (later moved to Salem and renamed Chemawa). After the Congressional Act of 1882, nonreservation schools were opened in Kansas (Haskell Institute), Nebraska (Genoa), and Oklahoma (Chilocco) all opened in 1884. Others soon followed. By 1926, there were eighteen nonreservation schools, fifty-nine boarding schools and one hundred thirty-one day schools operated by the Indian Service. By 1959, there were fifteen nonreservation boarding schools, forty-six reservation schools, two hundred three day schools and eighteen special Navajo Community schools.[5] In Oklahoma at this time, there were eleven boarding schools (including Wheelock Academy) and one nonreservation school, Chilocco.

These schools, of various sizes, had varying degrees of quality, as well. A brief history of Indian Education published in an orientation manual for BIA employees summed up the state of these educational facilities in 1889: "'The Indian Bureau has been made the dumping ground for the sweepings of the political party that is in power....You will find people who are there only to draw their pay.'" A field report from that year indicates that many of the institutions were lacking proper facilities, that the teachers were incompetent, and that commissaries were poorly stocked, often with unnecessary items.[6]

Reform after reform brought changes to the schools, both in how they were managed and in the physical characteristics. Each wave of reform brought new buildings designed to address those conditions thought unsatisfactory. New curricula were introduced periodically, meant to address the shortcomings in the educational

4 Hendricks, Alexander; Land, Vernola; Irwin, James, "Brigadier General R. H. Pratt, Founder of Carlisle Indian School, Is Dead. *Indian School Journal*, March, 1924. Also, Craig, Robert W., Greiff, Constance M., Hunter, Richard W., "Carlisle Indian Industrial School National Historic Landmark" NHL nomination form, 10/15/84.

5 US Department of the Interior, Bureau of Indian Affairs, Branch of Education, *Orienting New Employees* (Chilocco, OK: Chilocco School Press) 1959. Page. 28-33.

6 *Ibid.*, Pages 30-31.

program. At the center of these curricula, though, was the idea that English be the centerpiece. In addressing a conference in 1918, H. B. Peairs, former Superintendent of Haskell Institute and Supervisor of Indian Schools discussed the newest curriculum introduced to the government schools: "...(T)he citizens of this nation must be English speaking people. They must not only be able to speak English but they must be capable of thinking in English to enable them to clearly understand and fully appreciate the Institutions of the United States of America...In the primary grades English is the center around which all other subjects are made to group." Peairs continued on to extol the virtues of physical education for the Indians ("...many tribes of Indians have gradually degenerated physically...") and manual or practical training.[7] This repression of native language and culture continued throughout Indian education until the 1928 Merriam Report, "The Problem of Indian Administration," spurred changes in the Indian Bureau as a whole, and especially in its Education Department.

Lewis Merriam summed up some of the changes made in the years immediately following publication of the Report. "The former practice of the government boarding-schools was to suppress all that was Indian in the children. English was the only language used. Indian art, Indian songs, Indian dances were taboo. Anything Indian was necessarily inferior." He decried the institutionalism of uniform curricula; "Gone are the days when all United States government Indian schools had a uniform course of study with standard examinations sent out at the end of the year from the Washington Office." [8]

As part of this new attitude and policy (and as a way to save money), Indian children were encouraged to attend their nearby public schools. The Johnson-O'Malley Act of 1934 (Indian Reorganization Act) provided federal funding for Indian students to attend public schools, helping to offset the loss of tax base for Indian land within the school districts. In some cases, where populations were widely dispersed, dormitories were constructed for Indian children near public schools.

The role of the government Indian schools continued in this vein through the next decades; the schools continued to combine academic and vocational training in an effort to serve a dual purpose – to promote pride in culture while preparing the students for productive life on or off the reservation. By the 1970s, though, budgetary constraints and cultural forces acted in concert to see a decline in attendance at many of the schools. Haskell Institute had transformed itself into a junior college in 1964, while many schools were closed, including Chilocco in 1980 and the Phoenix Indian School in 1987. The father of the schools, Carlisle, had closed in 1918. Of the large, nonreservation schools, only Chemawa, in Oregon, continued in its original mission.

7 Peairs, H. B., "Something New and Epoch-Making in Indian Education," address given at the Mohonk Conference, October 18, 1918. Unpublished transcription. Chilocco Indian School collection, Oklahoma Historical Society (OHS), Box 42.
8 Meriam, Lewis, "Indian Education Moves Ahead," *Graphic Survey*, June 1, 1931. p. 256-257.

Chilocco Indian Agricultural School

"The location of the industrial Indian school selected by Inspector Hayworth, is about six miles south of Arkansas City, in the Territory, on what is known as Chilochi creek. The section of ground on which the building is to be erected, is mostly bottom land, and contains several good springs. A better place could hardly be found in the Territory...We understand $25,000 has already been appropriated for the building, and $31,000 for supporting the school." So was announced to many in Indian Territory by the *Cherokee Advocate*, published in Tahlequah, the capital of the Cherokee Nation, on October 24, 1882. It was January, 1884, before the doors of the school were opened to students.

The Indian Appropriation Act of May 17, 1882 authorized the Secretary of the Interior to cause to be constructed 'a building suitable in size and convenience for the instruction and care of one hundred fifty Indian children' on a reserve of good agricultural land adjacent to the Kansas border, near the Ponca and Kaw reservations. The initial land acquisition was to have been one section, 640 acres, but upon inspection by James Hayworth, Superintendent of Indian Education, a tract of almost 1,200 acres was selected. After an Executive Order of the President in 1884, the final area for the Chilocco Reserve would encompass 8,598 contiguous acres, or twelve square miles.[9] The land was taken from a parcel known as the Cherokee Outlet, which after the treaty of 1866, was set aside for the settlement of Plains tribes. The first school building was begun in 1883 and opened for classes in January of the following year.[10] A three story, stone building, it served as dormitory, classroom, and dining hall. It stood as an imposing landmark on the treeless prairie.

The first Superintendent of the school was Jasper M. Hadley, a Quaker who transferred over from the Cheyenne Agency. The first students, recruited by Hayworth, were Cheyenne, Arapaho, and Kiowa children. The male students were immediately put to work on the farm, in addition to their English lessons; the female students were instructed in the domestic arts.

Hadley was replaced in the second year by Dr. Henry J. Minthorn, the foster father of Herbert Hoover. Minthorn successfully lobbied to raise the appropriation for the school; his efforts were successful and he began an expansion of the physical plant of the school, adding five new buildings in his first two years. This marked the first phase of campus expansion that lasted until about 1905. The second phase, from 1905 through 1935, was marked by the replacement of many of the original buildings and upgrades to the older building stock. After 1935, new

9 Quoted in *The Oklahoma Red Book*, Volume 1, edited by Seth K. Corden and W. B. Richards, Published in Oklahoma City, OK, 1912: "Executive mansion, July 12, 1884 – It is hereby ordered that the following described tracts of country in the Indian Territory, viz: Sections 13, 14, 15, 16, 21, 22, 23, 24, 25, 26, 27, 28 and the east half of sections 17, 20, and 29, all in township NO. 29 north, range No. 2, east if the Indian meridian, be, and the same are hereby, reserved and set apart for the settlement of such friendly Indians belonging within the Indian Territory as have been, or who may hereafter be educated at the Chilocco Indian Industrial School in said territory. – Chester A. Arthur"
10 "Fifty Years of Progress," *Indian School Journal*, Vol. 34, No. 24, March 8, 1935. Page 1.

construction slowed, with the exception of the Student Union in 1965 and the new Boys' Dorm in 1966, and some smaller cottages and outbuildings. Superintendent S. M. McCowan, overseeing the school at the turn of the century, was instrumental in devising the master plan for the campus.[11]

During the early expansion period, outside contractors performed much of the construction at the school. A quarry located on the south bank of Chilocco Creek, east of the Santa Fe tracks, was the primary source of building materials. George E. Hopper, a building contractor from Arkansas City, was the primary builder of many of the early buildings.[12] The school's vocational training focused primarily on agriculture for the male students and domestic science for the female students. A decision concerning the construction of a new staff cottage in 1907 would mark a change in the educational direction of the school as well as the construction and maintenance of its physical plant. A Request for Proposals was issued in 1905 for a simple stone cottage. Bids received were higher than expected and the decision was made to construct the cottage utilizing student labor and the plans and specifications previously used by George Hopper for other cottages.[13] The use of students to construct new buildings and then to make necessary repairs and maintenance would become a core aspect of the school's vocational curriculum for the next seventy-five years. While some of the larger buildings were overseen by outside contractors (or in cases where special skills were needed), for the most part students participated in ever increasing numbers in construction projects.

Another change that happened in the first decade of the new century was reflected in the makeup of the student body. In 1910, there were over five hundred students in residence at Chilocco. Until that year, none of them were from the Five Civilized Tribes of Oklahoma. The Cherokee, Choctaw, Chickasaw, Seminole and Creek had been barred from attending Chilocco; they had their own schools, both mission and government and had a special status in the Indian Service. The addition of these new students, coupled with increased interest in the school from other tribes, led to increasing economic pressures on the operation and maintenance of the school. Superintendent Edgar Allen, writing to U. S. Representative Bird S. McGuire in 1912, reflected on the perceived slight given to Chilocco in the Congressional budget for the Indian Office. Allen remarked on the proposed $103,000 for Chilocco:

> "This is $5,000 less than the Indian Office estimate and that much less than other schools of the same class are receiving on the same per capita basis. Other schools are allowed also an additional sum equal to the superintendent's salary. In the case of Chilocco, that is $2,750.00. This is the only school in the Service where this allowance is not made. At Haskell Institute, for example, the appropriation is for 750 children at $167 per capita whereas their capacity and average attendance is only about 650. We get an appropriation for 500 and our average

11 *Ibid.* Page 4.
12 See correspondence, invoices, reports found in Chilocco Indian School collection, Oklahoma Historical Society (OHS), Box 37.
13 *Ibid.*

> attendance was 526. You will see by that, Haskell gets an allowance for 100 children more than it has and we for at least 25 fewer than we have. On top of this Haskell is allowed an additional sum for the superintendent's salary and Chilocco is not. Then too, Haskell is allowed $11,000 for Repairs and Improvements and this school but $6,500, while we have the most expansive plant in the Service on account of our large farm..."

In requesting and increase of $10,000 to the proposed budget, Allen states that "This will have the effect of putting us on the same basis of other schools of the same class and we are certainly entitled to be so placed...I am able to carry this extra number (25-30 students) on account of the income that is received from our farming operations."[14]

The increase did not happen. Chilocco seemed to be both blessed and cursed by its size and success. The farming operation provided a good income to the school; enough, perhaps, that Congress and the Indian Service felt justified in keeping the appropriations down for the school, imagining that the operation of the farm could help the school toward self-sufficiency.

The farm and the farming operations were the central focus of the school and its academic and vocational training for the first half of its existence. In 1904, a small article in the *Cherokee Messenger* noted that "The Indian School Journal claims that at Chilocco is the only real agricultural college for Indians in the country," and that "...everything is based on the farm and its kindred industries. The language, the mathematics, the geography...is derived from and based upon farming and stock raising as far as possible."[15] While it might have been an exaggeration that everything revolved around agriculture, the subject was still the main focus. Half of each day was spent in the academic classroom and half in the vocational classes. Because of the size of Chilocco, the school offered unique opportunities in agricultural education for its students. In addition to the collective nature of the instruction in farming and stock-raising (Chilocco was renowned for its Percheron horses and its dairy herd), the school offered something akin to independent study. In 1924, a program that set aside parcels of land equal to the size of average farm in the state was implemented. Students could lease the tracts and work them as their own, using school equipment and seed. The student farmer, working half days during the school session and full time during the summer, ran the farm on his own. At the end of the period, the student kept one quarter of the fruit of their labor.[16]

As previously mentioned, although agricultural training was the primary vocation taught at Chilocco, other industrial training was offered. Some aspects of the vocational training, most notably the Print Shop, gained their

14 Allen, Edgar, letter to Representative Bird S. McGuire, 12/5/12. Similar letter to Senator Robert L. Owen, 1/4/13. Chilocco Indian School Collection, OHS, Box 38.

15 "Only Real Farm School," *Cherokee (OK) Messenger*, 2/17/04. Page 4.

16 "Student Farmers: An Experiment With the Project Method in Agriculture," *The Indian School Journal*, Volume 25, Number 14, February, 1926. Pages 157-159.

own renown and reputation. And, beginning in the 1910s, the academic program of the school was improved as the school sought accreditation. It became a graded school during this decade, adding a two-year high school program, and by 1927, offered a full course of accredited classes through grade twelve. Full accreditation came in 1932. Superintendent L. E. Correll, in a special edition of *The Oklahoma Indian School Magazine*, noted "...Administration at Chilocco is varied and unlike that of any other school in the Service, because it seeks to give training in so many fields."[17] Academic course, physical education, and a host of vocational programs (including, but not limited to, carpentry, masonry, printing, domestic science, and of course, agriculture and stock raising) were offered. This educational model, set forth as the school gained accreditation in the State of Oklahoma, was kept until the school's closing in 1980.

This new expansion of the academic and vocational course also led to an expansion of the physical plant. 1932 saw the beginning of a new phase of construction, including two new dormitories and a new vocational education complex. The four shop buildings, constructed with student labor, replaced a single vocational building.[18] By the time the United States entered World War II, a third new dormitory, two staff apartment buildings, and a new print shop building were constructed, as well as smaller outbuildings related to farming operations.

World War II saw a large number of Chilocco boys enter the service of the country. In 1924, Chilocco had petitioned the state for the establishment of an Oklahoma National Guard unit. Company C, 180th Infantry, 45th Infantry Division was established at the school and served with distinction in the European Theater of Operations during World War II and later served in Korea.

The end of WWII brought changes to the school – not in its educational mission, but to the composition of its students. An influx of Navajo children swelled the ranks of the student body. The Navajo students, for the most part, spoke no English and were initially segregated in special classes designed to accelerate their progress. The post war years marked the heyday of the school – its enrollment reached nearly 1,300 in the 1950s, it had many modern buildings and a diverse student body that represented tribes from coast to coast and Alaska.

Cultural changes, both in society and in the programs of Indian Service, that began in the 1960s led to a decline in the school. By 1973, the population of the school was halved. As the only vocational school in the Indian Service in Oklahoma, it still attracted students, but in many cases, Chilocco became choice of last resort for troubled youth. A student remarked that the vocational education was what brought him the Chilocco: "I can't do English very good, but I can do vocational things. If they close this school down, there is no place else to go. There are a lot of us who will either just go home and sit, or drop out and go on welfare." [19] By 1979, the student body numbered

17 Correll, L. E., "The Administration," *The Oklahoma Indian School Magazine*, Volume 1, Number 6, November, 1932. Pages 5-9.
18 "Chilocco Adding $35,000 in Shops," *Blackwell (OK) Morning Tribune*, 7/22/32. Page 7.
19 Ward, Mike, "This is a Home, Not Just a School," *Oklahoma City Times*, 11/14/79.

fewer than 150. Indian boarding schools, either on or off reservations, were seen as archaic by many and expensive by those who controlled the budgets. The U. S. Senate, in its budget recommendations for Fiscal Year 1979, recommended the closing of Chilocco and the Seneca Boarding School, also in Oklahoma. On July 15, Chilocco, the only vocational school operated by the BIA, closed its doors.

The closing of the school led to a dispute on the disposition of the land. The Cherokee Nation laid claim to all of the land, citing its previous ownership. The Confederated tribes of North Central Oklahoma, which included the Ponca, Tonkawa, Kaw, Pawnee, and Otoe-Missouria, also laid claim to the land. In the end, the five tribes divided the bulk of the reserve, and held the campus jointly. The Cherokee were granted a portion of the acreage and were also granted a 50% share in the mineral rights for the entire reserve.

The campus buildings have been under-utilized since the school closed. Initial attempts at creating an independent vocational training school failed. The site was leased to a controversial drug and alcohol treatment program for a number of years, but has been unused since 2000.

Chilocco in Context

National

Chilocco Indian Agricultural School was authorized in 1882 and opened in 1884 based on a model off-reservation school in Carlisle, Pennsylvania. Chilocco was among the first of these new boarding schools, along with Haskell Institute in Kansas, Salem (Chemawa) in Oregon, and Genoa in Nebraska. Other large, non-reservation schools opened in subsequent years, including the Phoenix Indian School in Arizona and Sherman Institute in California. These institutions comprise, with smaller reservation schools and existing mission schools, the U. S. government's official efforts to educate Native American children.

Of the large, nonreservation schools, two have been declared National Historic Landmarks – Carlisle Institute and Haskell Institute. One other has been listed in the National Register at the national level of significance, Phoenix Indian School. Sherman Institute and Chemawa are also represented in the National Register. In all of these cases, it is only a fraction of the original campus that is listed – a single building at Sherman, three at Phoenix, a scattering of historic buildings set amidst a modern campus at Haskell.

The missions of these schools, while similar to that of Chilocco, differed in their emphasis. The large reserve of Chilocco land allowed for it to concentrate on vocational agriculture to an extent unheard of in the Indian Service. Chemawa, for example, had less than 180 acres for agricultural use. The large physical plant of Chilocco also

allowed for an increasing emphasis on industrial vocational training; the students had the extensive collection of buildings to use as a laboratory, constructing new buildings, maintaining and repairing the older buildings and equipment.

Of these large, nonreservation schools, only Chemawa is still open in its original function. However, its campus is not historic; the original campus was abandoned in the 1970s. Haskell Institute became a Junior College in 1964. Its historic buildings, listed in the National Register and designated a National Historic Landmark, are a discontiguous collection of buildings located in a modern campus setting. Carlisle Indian School closed in 1918; its facilities had been leased from the U. S. Army and were returned to the Army where an expansion of the facility altered the historic landscape. The historic, Indian School era buildings are surrounded by, and interspersed with, buildings constructed during the 1930s and later. Phoenix Indian School, represented in the National Register by a small district of three buildings, is set in a more modern campus and has been surrounded by urban development. Chilocco retains its integrity of location, setting, and feeling. It was constructed in a large, empty prairie, miles from any settlement and so it remains.

Oklahoma

In Oklahoma, among the many Indian schools, there are two that are comparable to Chilocco. Wheelock Academy, in McCurtain County, was established in the 1840s as a Presbyterian mission school for the Choctaw Nation. It was operated as such until the early 20th century, when it was taken over by the Indian Service. It closed in the 1940s. The campus of Wheelock was designated a National Historic Landmark on December 21, 1965. Centered on Pushmataha Hall, built in the late 1870s, the dozen or so buildings of Wheelock represent Indian education in Indian Territory as administered by government chartered, but privately operated, religious organizations. Wheelock served only the Choctaw Nation and had a classical academic educational program. There were a great number of mission schools that operated in Indian Territory; all were affiliated with specific tribes and most were small, often with a single classroom building.

Riverside Indian School, a boarding school located near Anadarko, was originally established to serve the Wichita, Delaware, and affiliated tribes of the area. As a reservation school, it was smaller than Chilocco. It was after the 1930s that Riverside began to accept out of state students. The school is still in operation, however there are few of the historic buildings left. The 1920s gymnasium and four dormitories constructed with PWA funding in the 1930s remain among numerous newer buildings. Riverside was in a different category of schools than was Chilocco. Fort Sill Indian School, near Lawton, has a deteriorated dormitory listed in the National Register. It was one of many reservation boarding schools in Oklahoma, but with Riverside, was the only one to survive, outlasting Concho, Cantonment, Colony, and numerous other schools.

There are nineteen resources related to Indian education in Oklahoma that are listed in the National Register of Historic Places. These include resources identified as "academies," "seminaries," "missions," and "schools," all of which were dedicated to Indian education. Seven of these listed resources are sites, with no extant buildings associated. Most of them (fifteen) were administered by religious organizations and had their life spans primarily in the 19th century. Fort Sill Indian School, a reservation school for the Kiowa-Comanche-Apache lands, has a single building listed and it has deteriorated to the point of collapse.

Architectural Significance

Chilocco was the largest of all Indian schools in Oklahoma and was the only government, nonreservation school. Even when viewed beyond its role as an Indian school, its campus remains significant in its cohesion of design and its historic integrity. The unifying use of limestone in the buildings of Chilocco helps to bring buildings of disparate ages and styles together. This unity of materials is rare among larger academic campuses. Oklahoma State University, for example, once had a master plan that called for the use of red brick as the preferred material and Georgian Revival as the preferred architectural style. For the most part, the use of red brick has remained prevalent while modern architectural designs have been used. Campuses such as the University of Oklahoma or the smaller state schools, though, have a variety of styles and materials represented in their buildings.

The more than 70 buildings and structures of the Chilocco Indian Agricultural School represent a distinctive architectural collection. Examples of Romanesque Revival, Colonial Revival, and Modern Movements styles exist side-by-side, unified by a common use of materials and a logical arrangement on the site. Nowhere in Oklahoma is such a distinct and cohesive group of buildings, thematically related, that retains such excellent integrity of design, workmanship, feeling, materials, association, location, and setting.

Conclusion

Chilocco Indian Agricultural School is eligible for inclusion in the National Register of Historic Places under Criterion A, for its important role in Indian Education at the national level. It is significant architecturally at the state level, as a cohesive collection of unified materials unlike any similar environment.

Chilocco compares favorably with other nationally significant resources related to Indian Education. However, there are important differences related to its mission and its over-all historic integrity. Modeled after Carlisle Indian School, Chilocco grew to be the only true vocational school in the Indian Service, offering programs in agriculture, building, and industrial trades as well as a standard academic course of study. Its contemporaries, Genoa Indian School, Phoenix Indian School, Chemawa Indian School and others have suffered from the loss of their historic buildings. Haskell Institute, a National Historic Landmark, has suffered a loss of integrity by the addition of numerous new buildings to its campus following its conversion into a junior college in the 1960s. Chilocco retains

almost fifty buildings and twenty five structures on its campus, the vast majority of which date from the period of significance for the school. There are no intrusions on the campus that are not related to its role in Indian education. Unlike Wheelock Academy (NHL 1965), an early 19th century mission school, Chilocco represents the first incursion of the U. S. government into off-reservation Indian education. As such, and taking into account the integrity of the campus, Chilocco Indian Agricultural School is significant at the national level in the context of Indian education and U. S. government policies. It is significant at the state level in the area of architecture for its intact collection of educational buildings, distinct in their unified plan and use of materials.

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UTM Coordinates

Zone 14

1) E671480/N4095440	2) E672280/N4095460	3) E672290/N4095090
4) E674300/N4095090	5) E674310/N4094990	6) E672770/N4094870
7) E672720/N4094200	8) E671530/N4094180	

Verbal Boundary Description
Includes portions of the SE ½ of Section 14, SW ¼ of Section 15, NE ¼ Section 22, and NW ¼ Section 23, T29N, R4E, containing approximately 288 acres and corresponding to UTM points above.

Boundary Justification

The boundary is limited to the main academic campus and the main entry of the school reserve. The boundary includes the extant historic resources that represent the academic and vocational activities of the Chilocco Indian Agricultural School. The agricultural fields and pastures have been excluded, as has a section of farmland where agricultural outbuildings (no longer extant) were once located.

Photographs

The following is common to all photographs:

1) Chilocco Indian Agricultural School
2) Kay County, Oklahoma
3) Photographer: Jim Gabbert
4) Date of Photographs: 1/18/06
5) Location of negatives: OK/SHPO

Photograph #, Direction of camera, view:

1) Facing west: Entry gate and main drive.
2) Facing south-southwest: National Guard armory. C. 1950
3) Facing east-northeast: Building 80, staff quarters. 1903
4) Facing south: Building 85, old hospital/staff apartments. 1897/1925.
5) Facing west: Building 91, granary. 1939
6) Facing east: Building 90, scale house (1952) with Building 156 in background (1955)
7) Facing west: Building 159, calf barn (1960) Noncontributing due to age.
8) Facing southeast: Buildings 154 & 155. 1951.
9) Facing west-northwest: Building 94, sheep shed. 1952.
10) Facing north: Cemetery gate.
11) Facing southwest: Bridge – concrete arch over Chilocco creek. C. 1910.
12) Facing southwest: Buildings 100 and 97, gymnasium (1925/1937) and boys' dressing room at rear (1937)
13) Facing southwest: Building 180, Wheeler Hall. 1966. Dormitory, noncontributing due to age.
14) Facing southwest: Building 151, 1950. Classroom building for vocational classes.
15) Facing northeast: Building 150, filling station (1949), with Building 107 to right and Commissary behind.
16) Facing south-southeast: Building 108, warehouse/commissary. 1910.
17) Facing northwest: Buildings111 and 112, vocational shops. 1933. Filling station to right.
18) Facing northwest: Buildings 161 and 152, practical arts shop (1963) and band/music building.
19) Facing northwest: Building 152, band & vocal music building. 1933.
20) Facing southeast: Buildings 17 and 18, staff quarters. C. 1910. From rear.
21) Facing west-northwest: Buildings 22 and 21, staff quarters, with water tower behind.
22) Facing northwest: Building 21, staff apartments. C. 1940. Water tower behind.
23) Facing north: Building 22, staff quarters. C. 1910.
24) Facing northeast: Staff quarters. 1903.

25) Facing west: Building 7, administration building (1918) with World War I memorial and flagpole.
26) Facing north: View up driveway, with Leupp Hall and Student Union on right, Antonne Hall on left.
27) Facing west-northwest: Building 5, Antonne Hall. 1932. Girls dormitory.
28) Facing northwest: Buildings 56 and 58, staff housing. C. 1930.
29) Facing west: Building 53, Superintendent's house. C. 1930.
30) Facing southeast: Building 60, staff apartments. 1940.
31) Facing east-southeast: Buildings 61 (garage) and 157 (staff housing).
32) Facing west-northwest: Building 59, staff housing. C. 1940.
33) Facing east: Building 149 and 164, staff housing and garage. C. 1940.
34) Facing southeast: Building 158, garage/shed.
35) Facing northeast: Building 71, employees club/quarters. 1924.
36) Facing northeast: Building 12, Leupp Hall. 1905, showing c. 1925 rear addition.
37) Facing northwest: Buildings 179 and 12. Student union (1965), noncontributing; Leupp Hall in background.
38) Facing east: Building 4, Correll Hall. 1935.
39) Facing east: Haworth Hall. Main campus classroom building. 1910.
40) Facing northeast; Haworth Hall, showing newer stair tower addition.
41) Facing north: Fountain.
42) Facing east: World War II memorial tablet.
43) Facing east: Building 9, Powerhouse. 1918.
44) Facing east-southeast: Building 10, Honors dorm. 1937.
45) Facing northeast: Building 11, print shop. 1941.
46) Facing southwest: Building 6, Hayman Hall. 1932, boys dormitory.
47) Facing west-northwest. Looking toward campus across lake, showing footbridge, Haworth Hall, Correll Hall, and employees club buildings.
48) Facing west-southwest: Looking across lake toward powerhouse, lumber shed, print shop and gymnasium in background.
49) Facing west-northwest: Looking across lake; Print shop, lumber shed, honors dorm, powerhouse, Haworth Hall, Correll Hall.

Appendix B:

Scope of Work

SCOPE OF WORK
Class III Archaeological Survey and Report
Chilocco Wind Farm
Southern Plains Region
August 5, 2013

I. Background

As an agency of the U.S. Department of Interior, the Bureau of Indian Affairs (BIA), is mandated to comply with Federal laws and regulations on the identification and protection of cultural resources. These laws include the National Historic Preservation Act (NHPA), National Environmental Policy Act (NEPA), Native American Graves Protection and Repatriation Act, Archaeological Resources Protection Act, American Indian Religious Freedom Act, and implementing regulations.

As part of the compliance procedures for Section 106 of NHPA, the BIA requires a Class III archaeological survey and report on all new construction project(s) within the Southern Plains Region. All proposed projects are within Kay County, Oklahoma. The project(s) is designed to construct approximately 90 wind turbines on tribal trust and restricted lands within the jurisdiction of the Bureau of Indian Affairs.

II. Statement of Work

A. The contractor shall furnish all necessary labor, transportation, equipment, specialized personnel, and material to complete the archaeological survey and reports. At a minimum, the principal investigator, the archaeology field crew supervisor, and the field crew are to meet the Department of Interior qualifications. The principal investigator, and the archaeology field crew supervisor are to have a minimum of an MA degree in archaeology; at least one year of full time professional experience in archeological research, administration, or management; at least one year of supervised field and analytic experience in North American archaeology; in addition, at least one year of field experience in the Plains region.

B. A Class III archaeology inventory will consist of a 100 percent pedestrian survey of all affected wind turbine placements, cable lines, access roads, and other ground disturbing activities as shown on the attached maps.

1. A subsurface shovel test at every proposed turbine location. Pedestrian/surface survey of access roads/cables in between turbine locations in plowed fields. Subsurface shovel tests every 50' (15M) within 300' of Chilocco Creek. Intuitive shovel testing in areas of high potential on access roads/cables that are not plowed fields.

C. There will be no collecting of artifacts and no testing of cultural resources prior to approval from the Southern Plains Regional Archeologist (See ARPA Permit).

D. The report and the abstract must meet the Secretary of Interior's standards and be accepted by the Oklahoma State Historic Preservation Office.

F. The report will include the following:

1. SHPO Abstract. The abstract must outline the report contents and refer to specific highlights of the findings. If a survey report cover page and site summary table are provided, an abstract is optional.
2. Table of Contents.

3. Description of the project area and any areas within the project area that were not surveyed.
4. Description of field survey methods, procedures, reasoning, and strategy used to identify cultural resources.
5. A list of all recorded sites including site designation, elevation, and site type.
6. Pictures of project area and of sites.
7. A general vicinity map depicting the location of the project in Oklahoma.
8. Description, site legal location, and evaluation of all identified cultural resources; document their potential to contribute data on cultural resource problems of the project area; identify sites which may be eligible for the National Register of Historic Places, with rational and justification under National Register criteria (36CFR60.4).

G. All maps are to include a key, title, north arrow, and are to be drawn to scale in black and white, no colors. USGS 7.5 minute maps are to include quad map name and date, with townships and ranges placed in the margins.

H. 'Site' is to be defined by reference to any State of Oklahoma criteria. Prepare site records for newly discovered sites and updated for previously recorded sites. A specific narrative discussing the Chilocco Indian School including history, significance, and National Register status must be included in the report.

As a minimum, site records will include the following:

1. Oklahoma site designations
2. Pagination with page number and total number of pages on each page.
3. For previously recorded sites, include the original site record as well as all updates.
4. Maps: a portion of the USGS 7.5 minute topographic map showing the site locations, name of 7.5 minute USGS map; a site map depicting the location of the site datum (or site datum if secondary data are required), features, any site impacts, contour lines, UTM coordinates for site boundaries.
5. Site description: Global Positioning System (GPS) coordinates for the site datum/data: 7.5 minute USGS map name, township, range, 1/4 of 1/4 section; site elevation, site size in acres; a photo of the site area, a photo of the site datum which includes the immediate surrounding area, a description and photos of features and diagnostic artifacts; the location of any site impacts, and a photo and general description of the impacts. At a minimum, GPS coordinates are to be recorded with the level of accuracy with Trimble's GeoExplorer 3 or better and include Latitude and Longitude for previously recorded and newly recorded sites.

I. Within 30 days of the completion of the fieldwork, the contractor will deliver the following:

1. Eight copies of the final bound archeology report to the BIA Southern Plains Regional Archeologist.
2. Eight unbound copies of all site records to the BIA Southern Plains Regional Archeologist. All site records and maps are exempt from the Freedom of Information Act and will be delivered to the Landowner Tribes of Oklahoma as separate documents.
3. Photographs and slides: the negatives for all photographs (or memory sticks for digital cameras) and the original of any slides shall be delivered to the BIA Southern Plains Regional Archeologist.
4. Full size original 7.5 minute USGS quadrangle maps depicting the location of all sites shall be delivered to the BIA Southern Plains Regional Archeologist.

Note Any re-scheduling of the deliverable report must be agreed to by the BIA.

Appendix C:

ARPA Permit

Please use this number
when referring to this permit

No.: BIA0813-CWF-WW

DI Form 1991 (Rev Jan 2008)
for use with DI Form 1926
OMB No. 1024-0037
Exp. Date (6/30/2014)

United States Department of the Interior

PERMIT FOR ARCHEOLOGICAL INVESTIGATIONS

To conduct archeological work on Department of the Interior lands and Indian lands under the authority of:

- ■ The Archaeological Resources Protection Act of 1979 (16 U.S.C. 470aa-mm) and its regulations (43 CFR 7).
- ■ The Antiquities Act of 1906 (P.L. 59-209; 34 Stat. 225, 16 U.S.C. 431-433) and its regulations (43 CFR 3).
- ■ Supplemental regulations (25 CFR 262) pertaining to Indian lands.
- ■ Bureau-specific statutory and/or regulatory authority: 59 IAM 3-H

1. Permit issued to: Westwood Professional Services, Inc.	2. Under application dated: August 5, 2013
3. Address: 7699 Anagram Dr. Eden Prairie, MN 55344	4. Telephone number(s): (952) 937-5150
	5. E-mail address(es):

6. Name of Permit Administrator Abraham Ledezma Martinez Telephone number(s): (612) 269-8845 Email address(es): abraham.ledezma@westwoodps	7. Name of Principal Investigator(s) Abraham Ledezma Martinez Telephone number(s): (612) 269-8845 Email address(es): abraham.ledezma@westwoodps
8. Name of Field Director(s) authorized to carry out field projects Ryan Paul Grohnke	Telephone number(s): (612) 209-3352 Email address(es): ryan.grohnke@westwoodps.com

9. Activity authorized: To conduct Class I, II,and III, archaeological investigations for the proposed Chilocco Wind Farm on tribal trust lands administered by the Bureau of Indian Affairs, Southern Plains Region and Eastern Oklahoma Region. Also, Right of Entry on Cherokee tribally owned fee property.

10. On lands described as follows: See ownership legal descriptions information attached.

11. During the duration of the project From 08/05/2013 To 08/14/2013

12. Name and address of the curatorial facility in which collections, records, data, photographs, and other documents resulting from work under this permit shall be deposited for permanent preservation on behalf of the United States Government.

The final report and all supporting documentation will be submitted to the Southern Plains Regional Office , Regional Archeologist, John A. Worthington.

13. Permittee is required to observe the listed standard permit conditions and the special permit conditions attached to this permit.

14. Signature and title of approving official Robert R Baltrus C, Superintendent	15. Date 8/5/13

15. Standard Permit Conditions

a. This permit is subject to all applicable provisions of 43 CFR Part 3, 43 CFR 7, and 25 CFR 262, and applicable departmental and bureau policies and procedures, which are made a part hereof.

b. The permittee and this permit are subject to all other Federal, State, and local laws and regulations applicable to the public lands and resources.

c. This permit shall not be exclusive in character, and shall not affect the ability of the land managing bureau to use, lease or permit the use of lands subject to this permit for any purpose.

d. This permit may not be assigned.

e. This permit may be suspended or terminated for breach of any condition or for management purposes at the discretion of the approving official, upon written notice.

f. This permit is issued for the term specified in 11 above.

g. Permits issued for a duration of more than one year must be reviewed annually by the agency official and the permittee.

h. The permittee shall obtain all other required permit(s) to conduct the specified project.

i. Archeological project design, literature review, development of the regional historic context framework, site evaluation, and recommendations for subsequent investigations must be developed with direct involvement of an archeologist who meets the Secretary of the Interior's Standards for Archeology and Historic Preservation; fieldwork must be generally overseen by an individual who meets the Secretary of the Interior's Standards for Archeology and Historic Preservation.

j. Permittee shall immediately request that the approving official (14. above) make a modification to accommodate any change in an essential condition of the permit, including individuals named and the nature, location, purpose, and time of authorized work, and shall without delay notify the approving official of any other changes affecting the permit or regarding information submitted as part of the application for the permit. Failure to do so may result in permit suspension or revocation.

k. Permittee may request permit extension, in writing, at any time prior to expiration of the term of the permit, specifying a limited, definite amount of time required to complete permitted work.

l. Any correspondence about this permit or work conducted under its authority must cite the permit number. Any publication of results of work conducted under the authority of this permit must cite the approving bureau and the permit number.

m. Permittee shall submit a copy of any published journal article and any published or unpublished report, paper, and manuscript resulting from the permitted work (apart from those required in items q. and s., below), to the approving official and the appropriate official of the approved curatorial facility (item 12 above).

n. Prior to beginning any fieldwork under the authority of this permit, the permittee, following the affected bureau's policies and procedures, shall contact the field office manager responsible for administering the lands involved to obtain further instructions.

o. Permittee may request a review, in writing to the official concerned, of any disputed decision regarding inclusion of specific terms and conditions or the modification, suspension, or revocation of this permit, setting out reasons for believing that the decision should be reconsidered.

p. Permittee shall not be released from requirements of this permit until all outstanding obligations have been satisfied, whether or not the term of the permit has expired. Permittee may be subject to civil penalties for violation of any term or condition of this permit.

15. Standard Permit Conditions (continued)

q. Permittee shall submit a preliminary report to the approving official within a timeframe established by the approving official, which shall be no later than 6 weeks after the completion of any episode of fieldwork, setting out what was done, how it was done, by whom, specifically where, and with what results, including maps, GPS data, an approved site form for each newly recorded archeological site, and the permittee's professional recommendations, as results require. If other than 6 weeks, the timeframe shall be specified in Special Permit Condition p. Depending on the scope, duration, and nature of the work, the approving official may require progress reports, during or after the fieldwork period or both, and as specified in Special Permit Condition r.

r. Permittee shall submit a clean, edited draft final report to the agency official for review to insure conformance with standards, guidelines, regulations, and all stipulations of the permit. The schedule for submitting the draft shall be determined by the agency official.

s. Permittee shall submit a final report to the approving official not later than 180 days after completion of fieldwork. Where a fieldwork episode involved only minor work and/or minor findings, a final report may be submitted in place of the preliminary report. If the size or nature of fieldwork merits, the approving official may authorize a longer timeframe for the submission of the final report as specified in Special Permit Condition q.

t. Two copies of the final report, a completed NTIS Report Documentation Page (SF-298), available at http://www.ntis.gov/pdf/rdpform.pdf, and a completed NADB-Reports Citation Form, available at http://www.nps.gov/archeology/tools/nadbform_update.doc , will be submitted to the office issuing the permit.

u. The permittee agrees to keep the specific location of sensitive resources confidential. Sensitive resources include threatened species, endangered species, and rare species, archeological sites, caves, fossil sites, minerals, commercially valuable resources, and sacred ceremonial sites.

v. Permittee shall deposit all artifacts, samples and collections, as applicable, and original or clear copies of all records, data, photographs, and other documents, resulting from work conducted under this permit, with the curatorial facility named in item 12, above, not later than 90 days after the date the final report is submitted to the approving official. Not later than 180 days after the final report is submitted, permittee shall provide the approving official with a catalog and evaluation of all materials deposited with the curatorial facility, including the facility's accession and/or catalog numbers.

w. Permittee shall provide the approving official with a confirmation that museum collections described in v. above were deposited with the approved curatorial facility, signed by an authorized curatorial facility official, stating the date materials were deposited, and the type, number and condition of the collected museum objects deposited at the facility.

x. Permittee shall not publish, without the approving official's prior permission, any locational or other identifying archeological site information that could compromise the Government's protection and management of archeological sites.

y. For excavations, permittee shall consult the OSHA excavation standards which are contained in 29 CFR §1926.650, §1926.651 and §1926.652. For questions regarding these standards contact the local area OSHA office, OSHA at 1-800-321-OSHA, or the OSHA website at http://www.osha.gov.

z. Special permit conditions attached to this permit are made a part hereof.

16. Special Permit Conditions

- [x] a. Permittee shall allow the approving official and bureau field officials, or their representatives, full access to the work area specified in this permit at any time the permittee is in the field, for purposes of examining the work area and any recovered materials and related records.
- [x] b. Permittee shall cease work upon discovering any human remains and shall immediately notify the approving official or bureau field official. Work in the vicinity of the discovery may not resume until the authorized official has given permission.
- [x] c. Permittee shall backfill all subsurface test exposures and excavation units as soon as possible after recording the results, and shall restore them as closely as reasonable to the original contour.
- [ ] d. Permittee shall not use mechanized equipment in designated, proposed, or potential wilderness areas unless authorized by the agency official or a designee in additional specific conditions associated with this permit.
- [x] e. Permittee shall take precautions to protect livestock, wildlife, the public, or other users of the public lands from accidental injury in any excavation unit.
- [x] f. Permittee shall not conduct any flint knapping or lithic replication experiments at any archeological site, aboriginal quarry source, or non-site location that might be mistaken for an archeological site as a result of such experiments.
- [x] g. Permittee shall perform the fieldwork authorized in this permit in a way that does not impede or interfere with other legitimate uses of the public lands, except when the authorized officer specifically provides otherwise.
- [ ] h. Permittee shall restrict vehicular activity to existing roads and trails unless the authorized officer provides otherwise.
- [x] i. Permittee shall keep disturbance to the minimum area consistent with the nature and purpose of the fieldwork.
- [x] j. Permittee shall not cut or otherwise damage living trees unless the authorized officer gives permission.
- [x] k. Permittee shall take precautions at all times to prevent wildfire. Permittee shall be held responsible for suppression costs for any fires on public lands caused by the permittee's negligence. Permittee may not burn debris without the authorized officer's specific permission.
- [x] l. Permittee shall conduct all operations in such a manner as to prevent or minimize scarring and erosion of the land, pollution of the water resources, and damage to the watershed.
- [x] m. Permittee shall not disturb resource management facilities within the permit area, such as fences, reservoirs, and other improvements, without the authorized officer's approval. Where disturbance is necessary, permittee shall return the facility to its prior condition, as determined by the authorized officer.
- [x] n. Permittee shall remove temporary stakes and/or flagging, which the permittee has installed, upon completion of fieldwork.
- [x] o. Permittee shall clean all camp and work areas before leaving the permit area. Permittee shall take precautions to prevent littering or pollution on public lands, waterways, and adjoining properties. Refuse shall be carried out and deposited in approved disposal areas.
- [x] p. Permittee shall submit the preliminary report within 30 days/weeks of completion of any episode of fieldwork..
- [x] q. Permittee shall submit the final report within 60 days/weeks/months after completion of fieldwork..
- [ ] r. Permittee shall submit progress reports every _____ months over the duration of the project.
- [ ] s. Additional special permit conditions are attached.

Special Permit Conditions Continuation Sheet

The BIA, Southern Plains Region does not allow for collecting and testing of artifacts. This permit is specific only to the fieldwork for the proposed Chilocco Wind Farm. No other archaeological investigations are authorized under this permit. With the issuance of this permit, Westwood Professional Services, Inc. is accepting the scope of work (SOW) attached and all the deliverables.

The permitee is also responsible for gathering information and documentation relating to the Chilocco Indian School (CIS) that is situated within the Area of Potential Effect (APE). The CIS is on the National Register of Historic Places. A section of the final report should specifically address the significance of the property as well as the proposed wind farm impacts to the property for BIA, SHPO and THPO concurrence.

By signing below, I, the Principal Investigator, acknowledge that I have read and understand the Permit for Archeological Investigations and agree to its terms and conditions as evidenced by my signature below and initiation of work or other activities under the authority of this permit.

Signature and title:	Date:

Paperwork Reduction Act and Estimated Burden Statement: This information is being collected pursuant to 16 U.S.C. 470cc and 470mm, to provide the necessary facts to enable the Federal land manager (1) to evaluate the applicant's professional qualifications and organizational capability to conduct the proposed archeological work; (2) to determine whether the proposed work would be in the public interest; (3) to verify the adequacy of arrangements for permanent curatorial preservation, as United States property, of specimens and records resulting from the proposed work; (4) to ensure that the proposed activities would not be inconsistent with any management plan applicable to the public lands involved; (5) to provide the necessary information needed to complete the Secretary's Report to Congress on Federal Archeology Programs; and (6) to allow the National Park Service to evaluate Federal archeological protection programs and assess compliance with the Archaeological Resources Protection Act of 1979 (16 U.S.C. 470). Submission of the information is required before the applicant may enjoy the benefit of using publicly owned archeological resources. To conduct such activities without a permit is punishable by felony-level criminal penalties, civil penalties, and forfeiture of property. A federal agency may not conduct or sponsor, and a person is not required to respond to, a collection of information unless it displays a valid OMB control number. Public reporting for this collection of information is estimated to average three hours per response, including the time for reviewing instructions, searching existing data sources, gathering and maintaining the data needed, and completing and reviewing the collection of information. Send comments regarding this burden estimate or any other aspect of this collection of information, including suggestions for reducing this burden, to the Departmental Consulting Archeologist; NPS; 1849 C Street, NW (2275); Washington, DC 20240-0001.

Appendix D:

Permit to Survey-

BIA Pawnee Agency

United States Department of the Interior

BUREAU OF INDIAN AFFAIRS
PAWNEE AGENCY
P.O. BOX 440
PAWNEE, OKLAHOMA 74058
918-762-2585
FAX 918-762-3201

Westwood Professional Services
Attn: Ryan Grohnke
7699 Anagram Drive
Eden Prairie, MN 55344

Dear Mr. Grohnke:

This letter serves as a 60 day permit to conduct an archeological and cultural resources survey on the enclosed tracts of land which are owned by the following tribes and held in trust by the United States of America under the jurisdiction of the Bureau of Indian Affairs, Pawnee Agency. Those Tribes are:

- Pawnee Nation of Oklahoma
- Otoe-Missouria Tribe of Indians
- Ponca Tribe of Indians of Oklahoma

A survey crew employed by Westwood Professional Services is hereby permitted to enter onto the enclosed tracts of land to conduct an archeological and cultural resources survey in preparation for a wind energy project.

This permit expires 60 days from the date signed, or upon completion of work, whichever occurs first. A copy of this permit shall be carried by the Survey Party Chief, or his/her designate at all times while on the above described property.

If you have any questions or need additional information, please contact our office at (918) 762-2585.

8/2/13
DATE

Robin R Bellmard
ROBIN BELLMARD, SUPERINTENDENT

cc: Earl S. Howe, III, Chairman, Ponca Tribe of Indians of Oklahoma. 20 White Eagle Drive, Ponca City, OK 74601
John R. Shotton, Chairman, Otoe-Missouria Tribe of Indians, 8151 Highway 177, Red Rock, OK 74651
Marshall R. Gover, President, Pawnee Nation of Oklahoma, P.O. Box 470, Pawnee, OK 74058
BIA, Southern Plains Regional Office, Attn: John Worthington, P.O. Box 368, Anadarko, Ok 73005

United States Department of the Interior
Bureau of Indian Affairs
Title Status Report

Report Certification Time and Date: 05/01/1986 08:00:00 PM
Requestor: JLOVEKAM Date/Time: 08/01/2013 08:57:30

See Appendix C for Land Legal Descriptions

Title Status

Tract 811 ST 1005 is held by the United States of America in trust for the land owner(s) with trust interests and/or by the land owner(s) with restricted interests and/or fee simple interests, as listed in Appendix "A" attached to and incorporated in this Title Status Report.

The title to Tract 811 ST 1005 is current, complete, correct, and without defect. Ownership is in unity and interests are owned in the following title status: trust.

The tract ownership is encumbered by the title documents as listed on Appendix "B" attached to and incorporated in this Title Status Report.

No Tract Notes or Coded Remarks for this tract.

This report does not cover encroachments nor any other rights that might be disclosed by a physical inspection of the premises, nor questions of location or boundary that an accurate survey may disclose. This Report also does not cover encumbrances, including but not limited to irrigation charges, unpaid claims, not filed or recorded in this Land Titles and Records Office. This report does not state the current ownership of the interests owned in fee simple but states the ownership at the time the interest ceased to be held in trust or restricted ownership status.

This Title Status Report is a true and correct report of the status of title to the real estate described herein according to the official land records recorded and maintained in this office.

Appendix "A"

Effective Ownership as of 07/01/2000

---- OWNER ----				- DOCUMENT -		NAME IN WHICH ACQUIRED	FRACTION TRACT	AGGREGATE SHARE	AGGREGATE
Tribe	Indian or Non-Indian	Title Status	Interest*	Class	Type	SURNAME/FIRST NAME	AS ACQUIRED	CONVERTED TO LCD	DECIMAL
OTOE MISSOURIA - OK	Tribe	Trust	All	Acts Con	SPEC AUT	OTOE-MISSOURIA TRIBE	1 1	1 1	 1.0000000000

IN TRUST:	1	
	1	1.0000000000
IN FEE:	0	
	1	.0000000000
TOTAL:	1	
	1	1.0000000000

* "All" means the equitable beneficial interest and the legal title interest merged together.

Appendix "B"

Ownership of Tract 811 ST 1005 is encumbered by the following:

Contract Type/Contractor Name	Contract Number	Contractor ID	Begin Date	Expiration Date	Leased Acres	Record Image#
Oil and Gas Pipeline	0002330025	811C005601	02/17/2000	02/16/2025	.720	811-000233
OK NATURAL GAS CO.						

Type of Encumbrance	Encumbrance Holder	Expiration Date	Document Number	Description and Explanation	
SURVEY/SUPPLEMENTAL PLAT			030391988	SUPPLEMENTAL PLAT -- SURVEY BY R. E. KAULEY 7/28/86	DTD

Appendix "C"

Land Legal Description

Land Area	Land Area Name	Tract Number	LTRO	Region	Agency	Resources
811	OTOE	ST 1005	ANADARKO, OK	SOUTHERN PLAINS REGIONAL OFFICE	PAWNEE AGENCY	Surface

Section	Township	Range	State	County	Meridian	Legal Description	Acres
14	029.00N	002.00E	OKLAHOMA	KAY	Indian	E E W W SW	10.000
						E SW	80.000
						E W SW	40.000
						NW NW NW SW	2.500
						S NE	80.000
						S NW	80.000
						SE	160.000
						W NE NW NW SW	1.250
						LOT 01=NE NE	36.590
						LOT 02=NW NE	36.550
						LOT 03=NE NW	36.530
						LOT 04=NW NW	36.490
15	029.00N	002.00E	OKLAHOMA	KAY	Indian	E NE NW NE SE	1.250
						N NE NE SE	5.000
						LOT 99=SE NE	63.090
	METES AND BOUNDS: PART LOT 1 LYING EAST OF CENTERLINE OF NORTH ENTRANCE RD; PART SENE LYING EAST CENTERLINE OF NORTH ENTRANCE RD; N 268.17' OF NWNWNESE LYING EAST CENTERLINE OF NORTH ENTRANCE RD; N 268.17' OF WNENWNESE; ENENWNESE; NNENESE.						
23	029.00N	002.00E	OKLAHOMA	KAY	Indian	E E NE NW NW	2.500
						E NE SE NW NW	1.250
						N N NE	40.000
						N NE NW	20.000
						N S N NE	20.000
						N S NE NW	10.000
24	029.00N	002.00E	OKLAHOMA	KAY	Indian	N NW NW	20.000
						N S NW NW	10.000
						N SW NE NW	5.000
						NW NE NW	10.000
						LOT 99=NE NW	7.300
	METES AND BOUNDS: PART OF NENENW & NSENENW LYING WEST OF EAST R/W LINE OF ATCHISON, TOPEKA & SANTA FE RR						
						TOTAL TRACT ACRES:	815.300

United States Department of the Interior
Bureau of Indian Affairs
Title Status Report

Report Certification Time and Date: 05/01/1986 08:00:00 PM
Requestor: JLOVEKAM Date/Time: 08/01/2013 08:58:50

Land Legal Description

Land Area	Land Area Name	Tract Number	LTRO	Region	Agency	Resources
812	PAWNEE	ST 1021	ANADARKO, OK	SOUTHERN PLAINS REGIONAL OFFICE	PAWNEE AGENCY	Surface

Section	Township	Range	State	County	Meridian	Legal Description	Acres
22	029.00N	002.00E	OKLAHOMA	KAY	Indian	E SE SW	20.000
						NE SE	40.000
						S N NE NE	10.000
						S NE NE	20.000
						S NW SE	20.000
						SE NE	40.000
						SE NE SW	10.000
						SE SE	40.000
						SW SE	40.000
23	029.00N	002.00E	OKLAHOMA	KAY	Indian	S S SW NW	10.000
						SW	160.000
						SW SW SE	10.000
26	029.00N	002.00E	OKLAHOMA	KAY	Indian	N SW	80.000
						NW	160.000
						W NW SE	20.000
						W W NE	40.000
						LOT 02=SE SW	20.715
						LOT 03=SW SE	41.430
						LOT 04=SW SW	41.420

DESCRIPTION REMARKS: W/2 OF LOT 2 LV 20.715 ACS

TOTAL TRACT ACRES: 823.565

Title Status

Tract 812 ST 1021 is held by the United States of America in trust for the land owner(s) with trust interests and/or by the land owner(s) with restricted interests and/or fee simple interests, as listed in Appendix "A" attached to and incorporated in this Title Status Report.

The title to Tract 812 ST 1021 is current, complete, correct, and without defect. Ownership is in unity and interests are owned in the following title status: trust.

The tract ownership is encumbered by the title documents as listed on Appendix "B" attached to and incorporated in this Title Status Report.

No Tract Notes or Coded Remarks for this tract.

This report does not cover encroachments nor any other rights that might be disclosed by a physical inspection of the premises, nor questions of location or boundary that an accurate survey may disclose. This Report also does not cover encumbrances, including but not limited to irrigation charges, unpaid claims, not filed or recorded in this Land Titles and Records Office. This report does not state the current ownership of the interests owned in fee simple but states the ownership at the time the interest ceased to be held in trust or restricted ownership status.

This Title Status Report is a true and correct report of the status of title to the real estate described herein according to the official land records recorded and maintained in this office.

Appendix "A"

Effective Ownership as of 07/01/2000

---- OWNER ----				- DOCUMENT -		NAME IN WHICH ACQUIRED	FRACTION TRACT	AGGREGATE SHARE	AGGREGATE
Tribe	Indian or Non-Indian	Title Status	Interest*	Class	Type	SURNAME/FIRST NAME	AS ACQUIRED	CONVERTED TO LCD	DECIMAL
PAWNEE - OK	Tribe	Trust	All	Acts Con	SPEC AUT	PAWNEE INDIAN TRIBE OF OKLAHOMA	1 1	1 1	1.0000000000

* "All" means the equitable beneficial interest and the legal title interest merged together.

IN TRUST:	1	
	1	1.0000000000
IN FEE:	0	
	1	.0000000000
TOTAL:	1	
	1	1.0000000000

Appendix "B"

Ownership of Tract 812 ST 1021 is encumbered by the following:

Contract Type/Contractor Name	Contract Number	Contractor ID	Begin Date	Expiration Date	Leased Acres	Record Image#
AGRICULTURE LEASE	0000010900	812C250025	01/01/2010	12/31/2013	541.560	812-0000010900
FLYING L RANCH						

Type of Encumbrance	Encumbrance Holder	Expiration Date	Document Number	Description and Explanation
DEFECT	Other (see remarks)	12/31/2013	0000010900	
DEFECT	Other (see remarks)	12/31/2013	0000010900	

United States Department of the Interior
Bureau of Indian Affairs
Title Status Report

Report Certification Time and Date: 05/01/1986 08:00:00 PM
Requestor: JLOVEKAM Date/Time: 08/01/2013 08:58:01

See Appendix C for Land Legal Descriptions

Title Status

Tract 813 ST 1005 is held by the United States of America in trust for the land owner(s) with trust interests and/or by the land owner(s) with restricted interests and/or fee simple interests, as listed in Appendix "A" attached to and incorporated in this Title Status Report.

The title to Tract 813 ST 1005 is current, complete, correct, and without defect. Ownership is in unity and interests are owned in the following title status: trust.

The tract ownership is encumbered by the title documents as listed on Appendix "B" attached to and incorporated in this Title Status Report.

No Tract Notes or Coded Remarks for this tract.

This report does not cover encroachments nor any other rights that might be disclosed by a physical inspection of the premises, nor questions of location or boundary that an accurate survey may disclose. This Report also does not cover encumbrances, including but not limited to irrigation charges, unpaid claims, not filed or recorded in this Land Titles and Records Office. This report does not state the current ownership of the interests owned in fee simple but states the ownership at the time the interest ceased to be held in trust or restricted ownership status.

This Title Status Report is a true and correct report of the status of title to the real estate described herein according to the official land records recorded and maintained in this office.

Appendix "A"

Effective Ownership as of 07/01/2000

----- OWNER -----				- DOCUMENT -		NAME IN WHICH ACQUIRED	FRACTION TRACT	AGGREGATE SHARE	AGGREGATE
Tribe	Indian or Non-Indian	Title Status	Interest*	Class	Type	SURNAME/FIRST NAME	AS ACQUIRED	CONVERTED TO LCD	DECIMAL
PONCA - OK	Tribe	Trust	All	Acts Con	SPEC AUT	PONCA TRIBE	1 1	1 1	1.0000000000

* "All" means the equitable beneficial interest and the legal title interest merged together.

IN TRUST:	1 1	1.0000000000
IN FEE:	0 1	.0000000000
TOTAL:	1 1	1.0000000000

Appendix "B"

Ownership of Tract 813 ST 1005 is encumbered by the following:

Contract Type/Contractor Name	Contract Number	Contractor ID	Begin Date	Expiration Date	Leased Acres	Record Image#
Oil and Gas Pipeline	0318259217	813C006348	12/15/1992	12/14/2017	9.056	813-031825-93

TOTAL PIPELINE CORP.

NO REALTY DEFECTS FOUND

NO TITLE DEFECTS FOUND

NO ENCUMBRANCES FOUND

Appendix "C"

Land Legal Description

Land Area	Land Area Name	Tract Number	LTRO	Region	Agency	Resources
813	PONCA	ST 1005	ANADARKO, OK	SOUTHERN PLAINS REGIONAL OFFICE	PAWNEE AGENCY	Surface

Section	Township	Range	State	County	Meridian	Legal Description	Acres
15	029.00N	002.00E	OKLAHOMA	KAY	Indian	N NW NW SE	5.000
						N SW	80.000
						NW NE NW SE	2.500
						S NW	80.000
						SW NE	40.000
						SW NW NW SE	2.500
						SW SW	40.000
						W E E SE SW	5.000
						W E SE SW	10.000
						W E SW NW SE	2.500
						W SE NW NW SE	1.250
						W SE SW	20.000
						W SW NW SE	5.000
						LOT 01=NE NE	18.560
						LOT 02=NW NE	36.680
						LOT 03=NE NW	36.780
						LOT 04=NW NW	36.890
	METES AND BOUNDS: PART OF LOT 1 LYING WEST OF THE CENTERLINE OF THE NORTH ENTRANCE ROAD; AND THE PART LYING WEST OF THE CENTERLINE OF THE NORTH ENTRANCE ROAD IN THE SENE; AND THE NORTH 268.17' OF THE NWNWNESE LYING WEST OF THE CENTERLINE OF THE NORTH ENTRANCE ROAD; AND THE NORTH 268.17' OF THE NENENWSE.						
16	029.00N	002.00E	OKLAHOMA	KAY	Indian	S NE	80.000
						SE	160.000
						LOT 01=NE NE	36.960
						LOT 02=NW NE	36.950
21	029.00N	002.00E	OKLAHOMA	KAY	Indian	N N NE	40.000
						LOT 99=E NE NE NW	.770
	METES AND BOUNDS: THE PORTION LYING EAST OF THE WEST R/W LINE OF THE ST. LOUIS & SANTA FE RAILROAD OF THE ENENENW.						
22	029.00N	002.00E	OKLAHOMA	KAY	Indian	N NW NW	20.000
						NW NE NW	10.000
						W E NE NE NW	2.500
						W NE NE NW	5.000
					TOTAL TRACT ACRES:		814.840

Appendix E:

Right of Entry-

Cherokee Nation

UNITED STATES
DEPARTMENT OF THE INTERIOR
CHEROKEE NATION
BUREAU OF INDIAN AFFAIRS

OWNERS CONSENT TO RIGHT OF ENTRY

Date: **August 1, 2013**

Owner: **Cherokee Nation and United States of America in Trust for Cherokee Nation**

Grantor: **Cherokee Nation**

Legal Description:

Section 16, T29N, R2E Lot 3; Lot 4; S2 NW4 and SW4.
Containing 313.85 FEE acres, more or less.

Section 17, T29N, R2E Lot 1; Lot 2; Lot 5; Lot 6; Lot 7; SE4 NE4; and E2 SE4
LESS AND EXCEPT that part described as "Beginning at a point 39 rods South of the NE corner of the NE4 of Section 17, T29N, R2E, I.B.&M.; thence 24 rods South; thence 33 1/3 rods West; thence 24 rods North; thence 33 1/3 rods East to the Point of Beginning containing 5 acres". i.e. Rod = 16.5 feet.
Containing 313.62 FEE acres, more or less.

Section 20, T29N, R2E Lot 1; Lot 2; Lot 3; Lot 4; E2 SE4 and E2 NE4
LESS AND EXCEPT that part described as "Beginning at a point 67 rods North of SE corner of the NE4 of Section 20, T29N, R2E, I.B.&M.; thence North 20 rods; thence West 50 rods; thence South 10 rods; thence East 20 rods; thence South 10 rods; thence East 30 rods to Point of Beginning, containing 5 acres".
Containing 316.36 FEE acres, more or less.

Section 21, T29N, R2E Those parts of the NW4 and SW4 lying West of the West right-of-way line of the S.L. & S.F. Railroad .
Containing 150.26 FEE acres, more or less.

Section 29, T29N, R2E N2 SE4 and NE4.
Containing 240.00 FEE acres, more or less.

Section 13, T29N, R2E Lot 4; SW4 NW4; W2 SW4; and the parts of Lot 3, SE4 NW4, E2 SW4 lying west of the east right-of-way line of the Atchison, Topeka and Santa Fe Railroad.
Containing 281.17 TRUST acres, more or less.

Section 27, T29N, R2E All.
Containing 642.76 TRUST acres, more or less.

Section 28, T29N, R2E All.
Containing 637.88 TRUST acres, more or less.

all in Township 29 North, Range 2 East, I.B.&M., Kay County, Oklahoma.

Purpose of Right of Entry: **Site access for observation and sampling for Archaeological Survey.**

The undersigned authorized owner of said land hereby gives permission for entry upon said Fee Lands and USA in Trust Indian Lands to:

Westwood, 7699 Anagram Drive, Eden Prairie, MN 55344, contacts are Ryan Grohnke and Abraham Ledezma, office phone number is 952-937-5150. Emails are ryan.grohnke@westwoodps.com and abraham.ledezma@westwoodps.com.

AND

PNE Wind, 150 North Michigan Avenue, Suite 1500, Chicago, Illinois 60601, contacts are Kenny Wheeler, phone number 405-443-7531 and Jorge Obregon, phone number 312-873-2246

Other terms or comments: **This Right of Entry is for the aforementioned purpose and any other usage of this property will be treated as a trespass.**

Authorized Owner/Representative:

Ginger Brown, Realty Director
Cherokee Nation

SUBSCRIBED and sworn to before me this 1st day of August, 2013.

MARSHEA HALTERMAN NOTARY PUBLIC # 04006116 EXP. 07-08-16 IN AND FOR STATE OF OKLAHOMA

Marshea Halterman, Notary Public

My commission expires: 7-8-2016
My Commission No: 04006116
(SEAL)

Appendix F:

Site Form 34-KA-494

OKLAHOMA ARCHAEOLOGICAL SITE SURVEY FORM

Site#: 34-KA-494

County: Kay

COMPLETE ALL SECTIONS

1.SITE NUMBER AND NAME:

Site Name: (derived from owner's name, etc.)

Project No.: (Temporary number or name assigned during project.) WPS-Chil-001

2.LOCATIONAL INFORMATION:

U.T.M. Reference

Zone: 14
Northing: 4095338 meters **Easting:** 670920 meters

Legal Description

SW 1/4 of NE 1/4 of SW 1/4 **of Section** 15 **Township** 29N **Range** 2E

U.S.G.S. Quad Name: Newkirk Quad Date (revised): 10/30/2002

Other Locational References (i.e., benchmarks, road intersections, bridges, etc., please give distance and bearing to site):

1. Approximately 0.10 miles NE of Chilocco Creek
2. Approximately 0.20 miles NNW of the T-intersection on the North end of N3323 Road
3. Approximately 0.70 miles South of the State Line Road

3.OWNER(S) OF PROPERTY:

Name: The Ponca Tribe of Indians of Oklahoma
Street and Number:
City/Town, State:
Zip:

4.SITE SURVEYED BY:

Name: Grayson Larimer & Elise Hargiss

Date Recorded:August 9, 2013

Reported by (if different):

Name: Ryan Grohnke

Date Reported: August 21, 2013

Time spent at site and time of day: 45 minutes, late morning

5.CULTURAL AFFILIATION - Cultural Periods (underline one):

Unassigned prehistoric
Paleoindian:
- Early
- Middle
- Late

Archaic:
- Early
- Middle
- Late

Woodland:
- Eastern – may be eastern?
- Plains

Village Farming/Mississippi
Plains Village
Protohistoric/Historic Ind.
Historic non-Indian

Archaeological Cultures, Phases, etc. represented:

How was cultural affiliation determined (diagnostic artifacts, radiocarbon dates, etc.):

6.HISTORIC PHASE IDENTIFICATION (ETHNIC):
Underline appropriate group.

1. Choctaw
2. Cherokee
3. Saux-Fox
4. Pottawatomie
5. Seminole
6. Comanche
7. Apache
8. Kiowa
9. Kiowa-Apache
10. Kickapoo
11. Pawnee
12. Arapaho
13. Ottawas
14. Wichita
15. Quapaw
16. Osage
17. Cheyenne
18. Caddo
19. Shawnee
20. Delaware
21. Creek
22. Dakotas
23. Chickasaw
24. 12 & 17
25. Missouri-Otos
26. Iowa
27. Anglo-American
28. French
29. Spanish
20. Other:

How was historic identification determined?:

7.HISTORIC SITE RANGE (underline one):

0. Missing data; unknown
1. pre-1800
2. 1800-1830
3. 1830-1859
4. 1860-1889
5. 1890-1929
6. 1930-1950
7. 1800-1900
8. 1800-present
9. 1900-present

8.INFERRED SITE TYPE
Please underline those that apply (can be more than one category)

Open habitation w/o mounds	Petroglyph/pictograph
Open habitation with mounds	Isolated burials (<2)
Earth mound (not midden mound)	Cemetery (>2)
Mound complex	Specialized activity sites
Stone mounds/rock piles	Rock alignments (tepee rings, etc.)
Burned rock concentrations	Historic farmstead
Non-mound earthworks	Historic mill/industrial
Rock shelter	Historic fort
Cave	Dugout
Quarry/workshop	Historic trash dump

9.MIDDEN AT SITE (underline):

Don't know	Present, earth
Absent	Present, shell
	Present, rock

10.MATERIALS COLLECTED:

Type	**Number**
Ceramics	
Projectile points/base frags.	
Hafted scrapers	
Drills	
Bifaces/biface fragments	
Unifaces	
Perforators/gravers	
Spokeshaves	
Scrapers (unhafted)	
Debitage (flakes, cores, chunks)	
Ground/pecked/battered stone	
Worked bone/shell	
Human bone	
Faunal remains	
Floral remains	
Other prehistoric	
Historic (describe)	
	Total Items:

Briefly describe diagnostic artifacts including type names. Attach outline drawings:

Materials observed but not collected: 17 flakes of lithic debitage

Name and address of owner of other collections from site:

N/A

11.ARTIFACT REPOSITORY

Name of institution where artifacts are to be stored:

N/A

Photos: 2
Number of black and white photos:
Number of color photos: 2

Name and address of institution where photos are filed: Bureau of Indian Affairs – Southern Plains Region P.O. Box 368
Anadarko, OK 73005

12.EVIDENCE OF RECENT VANDALISM OBSERVED? (Yes or No): No

13.SITE CONDITION (underline one):

1. apparently undisturbed
2. <u><25% disturbed</u>
3. 26-50% disturbed
4. 51-75% disturbed
5. 76-99% disturbed
6. totally destroyed
7. disturbed, % unknown

14.MAJOR LAND USE (underline those that apply):

<u>Cultivated field</u>
Pasture
<u>Woods, forest</u>
Road/trail
Ditch/dike/borrow pit
Landfill
Modern cemetery
Mining
Inundated
Industrial
Residential
Recreation
Commercial
Military
Logging/fire break
Scrub/secondary growth/oil field
Modern dump

Other: Grassland/Herbaceous

15.AMOUNT OF GROUND SURFACE VISIBLE (underline one):

1. <10%	4. 51-75%
2. 11-25%	5. 76-90%
3. 26-50%	6. 91-100%

Survey Conditions (wet, dry, sunny, ground coverage, etc.):rain, overcast

---

16.PHYSIOGRAPHIC DIVISION (underline one):

1. High Plains	6. Sandstone Hills
2. Gypsum Hills	7. Prairie Plains
3. Wichita Mountains	8. Ozark Plateau
4. Red Bed Plains	9. Ouachita Mountains
5. Arbuckle Mountains	10. Red River Plains

17.LANDFORM TYPE (underline one):

1. Floodplain	4. Dissected Uplands
2. Terrace	5. Undissected Uplands
3. Hillside - Valley wall	

18.LOCALITY TYPE - SPECIFIC SITE SETTING (underline one):

1. Level	5. Mesa
2. Knoll - low land	6. Slope
3. Blowout	7. Bluff crest
4. Ridge – upland	8. Bluff base

19.SOILS (if known):
Association: Kirkland-Renfrow **Series:**
Type:

20.ELEVATION/SLOPE:

Elevation amsl: 1142 feet
Slope (degrees): 6 **Slope facing direction:** SE

21.NATURAL VEGETATION (underline one):

1. Short grasses	6. Mesquite
2. Mixed grasses	7. Juniper-pinon
3. Tall grasses	8. Oak-hickory forest
4. Cross Timber	9. Oak-pine
5. Shin-oak	10. Loblolly pine forest

22.SITE AREA (Square Meters): 11155
Basis for area estimate (underline one):
1. Taped 2. Paced 3. Guessed 4. Range-finder
5. Alidade/transit

Confident of site boundaries? (Yes or No): No

23.DESCRIPTION OF SITE:

Give physical description of site and its setting, including dimensions, features, nature of materials and artifact concentrations. Include copy of U.S.G.S. topographic map with site location and boundaries marked (and sketch map if appropriate).

A sparse lithic scatter of approximately 17 flakes of primarily Florence A chert were observed on a two-track road. The two-track road is situated in a woodland approximately 150 meters east of Chilocco Creek. Agricultural fields are immediately to the north and south of the woodlot. The site most likely extends beyond the plotted boundary and outside of the current APE. Site dimensions as currently defined are approximately 100 meters N-S X 45 meters E-W on .55 acres of land.

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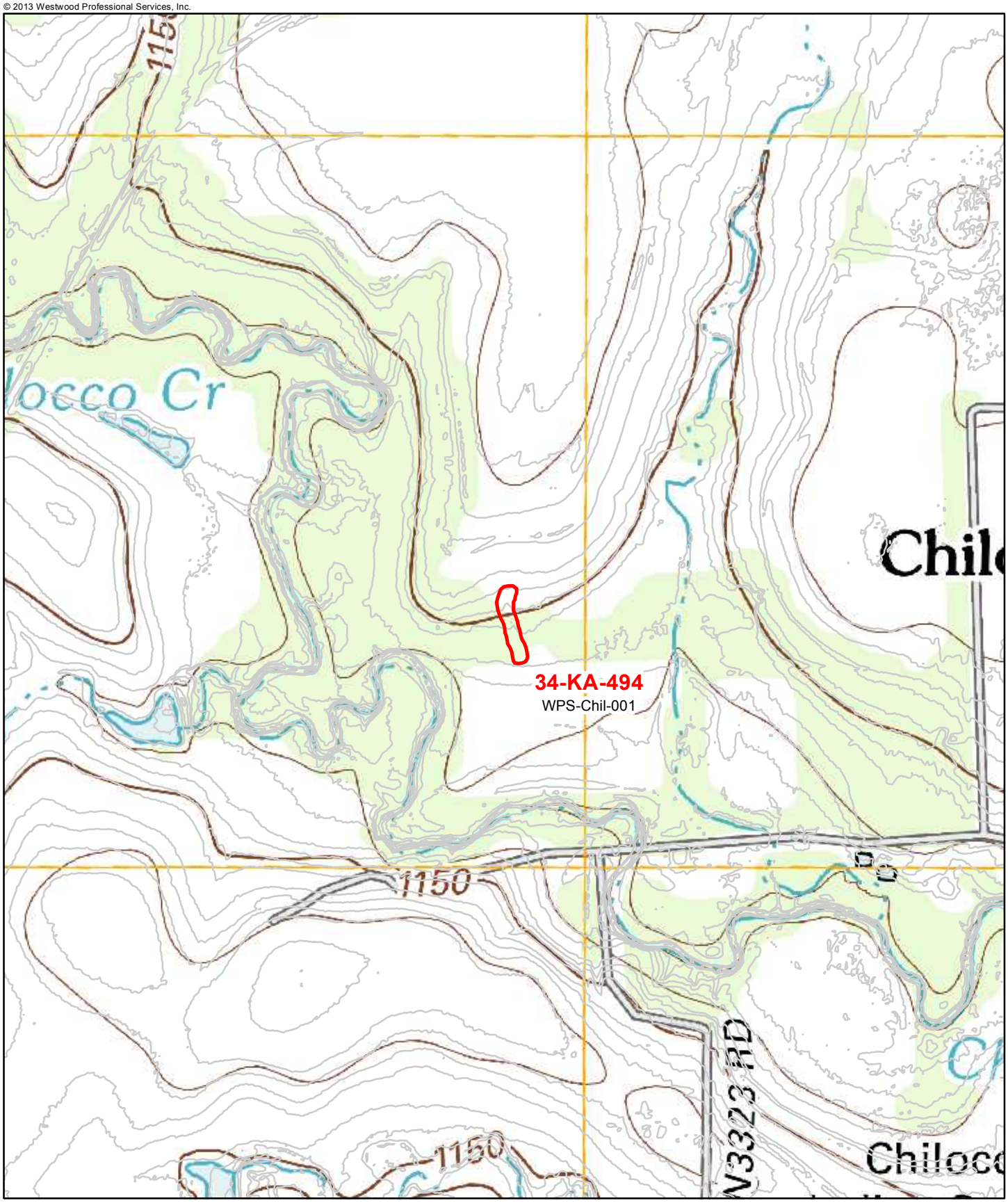

Data Source(s): Westwood (2013); United States Geological Survey Topographic Map (2013)

34-KA-494

2 Foot Contours

USGS 7.5-Minute Series
Newkirk Quadrangle

Chilocco Wind Farm

Kay County, Oklahoma

N

0 600 Feet

34-KA-494

EXHIBIT 1

Westwood

Westwood Professional Services, Inc.
7699 Anagram Drive
Eden Prairie, MN 55344

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FAX 952-937-5822
TOLL FREE 1-888-937-5150

www.westwoodps.com

Map Document: P:\0000488.00\GIS\CRM\WPS-Chil-001_130827.mxd 8/27/2013 9:47:37 AM

24.DRAINAGE (underline one):

1. Arkansas
2. Beaver - N. Canadian
3. Canadian
4. Caney
5. Cimarron
6. Deep Fork
7. Illinois
8. Kiamichi
9. Little R. (McCurtain County)
10. Muddy Boggy
11. Neosho
12. North Fork Red
13. Poteau
14. Red
15. Salt Fork Arkansas
16. Salt Fork Red
17. Verdigris
18. Washita

25.NEAREST NATURAL SOURCE OF WATER (underline one):

1. Permanent stream/creek
2. Intermittent stream
3. Permanent stream
4. Intermittent spring/seep/bog site
5. Natural lake
6. River
7. Slough or oxbow lake
8. Relic stream channel
9. Also consider wells if is historic

26.DISTANCE TO WATER (in 10's of meters):
15

27.INVESTIGATION TYPE (underline one):

1. Reconnaissance (survey)
2. Intensive (survey & testing)
3. Excavated
4. Volunteered report

28.SIGNIFICANCE STATUS (underline one):

National Register Property
Eligible for National Register
Nominated to National Register by S.H.P.O.
Considered eligible but not nominated by S.H.P.O.
Inventory site
National Register status not assessed

29.DISCUSS THE POTENTIAL SIGNIFICANCE OF THE SITE:
Site avoided by project design. Significance not assessed and unknown.

30.PUBLISHED OR FORTHCOMING REPORTS ON THE SITE: Class III Archaeological Survey For the Proposed Chilocco Wind Farm Project By Ryan P. Grohnke and Abraham Ledezma Martinez, August 2013

View to the North

View to the South.

Appendix G:

Site Form 34-KA-495

OKLAHOMA ARCHAEOLOGICAL SITE SURVEY FORM

Site#: 34-KA-495

County: Kay

COMPLETE ALL SECTIONS

1.SITE NUMBER AND NAME:

Site Name: (derived from owner's name, etc.)

Project No.: (Temporary number or name assigned during project.) WPS-Chil-002

2.LOCATIONAL INFORMATION:

U.T.M. Reference

Zone: 14
Northing: 4094691 meters **Easting:** 672757 meters

Legal Description

SE 1/4 of NE 1/4 of NW 1/4 **of Section** 23 **Township** 29N **Range** 2E

U.S.G.S. Quad Name: Newkirk Quad Date (revised): 10/30/2002

Other Locational References (i.e., benchmarks, road intersections, bridges, etc., please give distance and bearing to site):

1. Approximately 0.15 miles NE of Chilocco Creek
2. Approximately 0.96 miles West of Highway 77
3. Approximately 0.50 miles SE of the intersection of N3330 Road and 30018 Road.

3.OWNER(S) OF PROPERTY:

Name: The Otoe-Missouria Tribe
Street and Number:
City/Town, State:
Zip:

4.SITE SURVEYED BY:

Name: Ryan Grohnke

Date Recorded: August 10, 2013

Reported by (if different):

Name: Ryan Grohnke

Date Reported: August 21, 2013

Time spent at site and time of day: 20 minutes at approximately noon

5.CULTURAL AFFILIATION - Cultural Periods (underline one):

Unassigned prehistoric
Paleoindian:
- Early
- Middle
- Late

Archaic:
- Early
- Middle
- Late

Woodland:
- Eastern – may be eastern?
- Plains

Village Farming/Mississippi
Plains Village
Protohistoric/Historic Ind.
Historic non-Indian

Archaeological Cultures, Phases, etc. represented:

How was cultural affiliation determined (diagnostic artifacts, radiocarbon dates, etc.):

6.HISTORIC PHASE IDENTIFICATION (ETHNIC):
Underline appropriate group.

1. Choctaw
2. Cherokee
3. Saux-Fox
4. Pottawatomie
5. Seminole
6. Comanche
7. Apache
8. Kiowa
9. Kiowa-Apache
10. Kickapoo
11. Pawnee
12. Arapaho
13. Ottawas
14. Wichita
15. Quapaw
16. Osage
17. Cheyenne
18. Caddo
19. Shawnee
20. Delaware
21. Creek
22. Dakotas
23. Chickasaw
24. 12 & 17
25. Missouri-Otos
26. Iowa
27. Anglo-American
28. French
29. Spanish
20. Other:

How was historic identification determined?:

7.HISTORIC SITE RANGE (underline one):

0. Missing data; unknown
1. pre-1800
2. 1800-1830
3. 1830-1859
4. 1860-1889
5. 1890-1929
6. 1930-1950
7. 1800-1900
8. 1800-present
9. 1900-present

8.INFERRED SITE TYPE
Please underline those that apply (can be more than one category)

Open habitation w/o mounds	Petroglyph/pictograph
Open habitation with mounds	Isolated burials (<2)
Earth mound (not midden mound)	Cemetery (>2)
Mound complex	Specialized activity sites
Stone mounds/rock piles	Rock alignments (tepee rings, etc.)
Burned rock concentrations	Historic farmstead
Non-mound earthworks	Historic mill/industrial
Rock shelter	Historic fort
Cave	Dugout
Quarry/workshop	Historic trash dump

9.MIDDEN AT SITE (underline):

Don't know	Present, earth
Absent	Present, shell
	Present, rock

10.MATERIALS COLLECTED:

Type	**Number**
Ceramics	
Projectile points/base frags.	
Hafted scrapers	
Drills	
Bifaces/biface fragments	
Unifaces	
Perforators/gravers	
Spokeshaves	
Scrapers (unhafted)	
Debitage (flakes, cores, chunks)	
Ground/pecked/battered stone	
Worked bone/shell	
Human bone	
Faunal remains	
Floral remains	
Other prehistoric	
Historic (describe)	
	Total Items:

Briefly describe diagnostic artifacts including type names. Attach outline drawings:

Materials observed but not collected: Approximately 15 secondary and tertiary lithic flakes made from Florence A chert.
Name and address of owner of other collections from site:

N/A

11.ARTIFACT REPOSITORY

Name of institution where artifacts are to be stored:
N/A

Photos: 2
Number of black and white photos:
Number of color photos: 2

Name and address of institution where photos are filed: Bureau of Indian Affairs – Southern Plains Region P.O. Box 368
Anadarko, OK 73005

12.EVIDENCE OF RECENT VANDALISM OBSERVED? (Yes or No): No

13.SITE CONDITION (underline one):

1. apparently undisturbed
2. <25% disturbed
3. 26-50% disturbed
4. 51-75% disturbed
5. 76-99% disturbed
6. totally destroyed
7. disturbed, % unknown

14.MAJOR LAND USE (underline those that apply):

Cultivated field
Pasture
Woods, forest
Road/trail
Ditch/dike/borrow pit
Landfill
Modern cemetery
Mining
Inundated
Industrial
Residential
Recreation
Commercial
Military
Logging/fire break
Scrub/secondary growth/oil field
Modern dump

Other: Grassland/Herbaceous

15.AMOUNT OF GROUND SURFACE VISIBLE (underline one):

1. <10%	4. 51-75%
2. 11-25%	5. 76-90%
3. 26-50%	6. 91-100%

Survey Conditions (wet, dry, sunny, ground coverage, etc.): Sunny, warm conditions. Ground visibility was poor except for a dirt two-track road where artifacts were observed.

16.PHYSIOGRAPHIC DIVISION (underline one):

1. High Plains	6. Sandstone Hills
2. Gypsum Hills	7. Prairie Plains
3. Wichita Mountains	8. Ozark Plateau
4. Red Bed Plains	9. Ouachita Mountains
5. Arbuckle Mountains	10. Red River Plains

17.LANDFORM TYPE (underline one):

1. Floodplain	4. Dissected Uplands
2. Terrace	5. Undissected Uplands
3. Hillside - Valley wall	

18.LOCALITY TYPE - SPECIFIC SITE SETTING (underline one):

1. Level	5. Mesa
2. Knoll - low land	6. Slope
3. Blowout	7. Bluff crest
4. Ridge – upland	8. Bluff base

19.SOILS (if known):
Association: Kirkland-Renfrow **Series:**
Type:

20.ELEVATION/SLOPE:

Elevation amsl: 1138 feet
Slope (degrees): **4 degrees** **Slope facing direction:** **SW**

21.NATURAL VEGETATION (underline one):

1. Short grasses	6. Mesquite
2. Mixed grasses	7. Juniper-pinon
3. Tall grasses	8. Oak-hickory forest
4. Cross Timber	9. Oak-pine
5. Shin-oak	10. Loblolly pine forest

22.SITE AREA (Square Meters): 1035
Basis for area estimate (underline one):
1. Taped 2. Paced 3. Guessed 4. Range-finder
5. Alidade/transit

Confident of site boundaries? (Yes or No): No

23.DESCRIPTION OF SITE:

Give physical description of site and its setting, including dimensions, features, nature of materials and artifact concentrations. Include copy of U.S.G.S. topographic map with site location and boundaries marked (and sketch map if appropriate).

As APE for project was in a heavily disturbed location, a nearby two-track road was walked. A sparse lithic scatter of approximately 15 secondary and tertiary flakes of Florence A chert were observed. The two-track road is situated in a grassland adjacent to Chilocco Creek. Immediately to the north of the site is a large lagoon and sewage disposal area. Should the site have extended to the north, that portion of the site would be completely destroyed. It is possible that the site may extend further to the south toward Chilocco Creek. The site boundaries as currently defined are approximately 35 meters N-S X 50 meters E-W on .25 acres of land.

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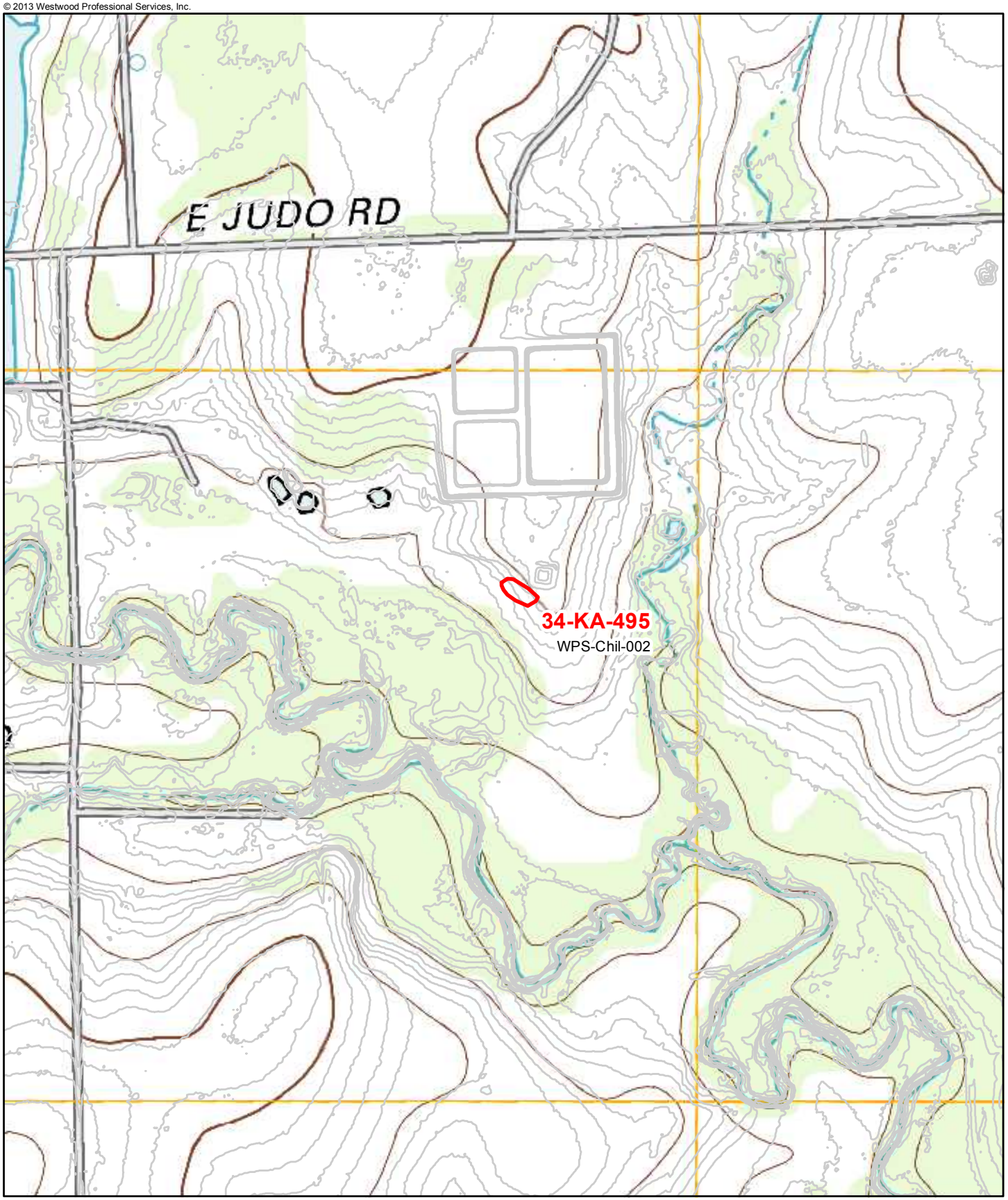

Data Source(s): Westwood (2013); United States Geological Survey Topographic Map (2013)

34-KA-495

2 Foot Contours

USGS 7.5-Minute Series
Newkirk Quadrangle

Chilocco Wind Farm

Kay County, Oklahoma

34-KA-495

N

0 600 Feet

EXHIBIT 1

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TOLL FREE 1-888-937-5150

www.westwoodps.com

Map Document: P:\0000488.00\GIS\CRM\WPS-Chil-002_130827.mxd 8/27/2013 9:11:16 AM

24.DRAINAGE (underline one):

1. Arkansas	10. Muddy Boggy
2. Beaver - N. Canadian	11. Neosho
3. Canadian	12. North Fork Red
4. Caney	13. Poteau
5. Cimarron	14. Red
6. Deep Fork	15. Salt Fork Arkansas
7. Illinois	16. Salt Fork Red
8. Kiamichi	17. Verdigris
9. Little R. (McCurtain County)	18. Washita

25.NEAREST NATURAL SOURCE OF WATER (underline one):

1. Permanent stream/creek	6. River
2. Intermittent stream	7. Slough or oxbow lake
3. Permanent stream	8. Relic stream channel
4. Intermittent spring/seep/bog	9. Also consider wells if site is historic
5. Natural lake	

26.DISTANCE TO WATER (in 10's of meters): 16

27.INVESTIGATION TYPE (underline one):

1. Reconnaissance (survey)	3. Excavated
2. Intensive (survey & testing)	4. Volunteered report

28.SIGNIFICANCE STATUS (underline one):

National Register Property
Eligible for National Register
Nominated to National Register by S.H.P.O.
Considered eligible but not nominated by S.H.P.O.
Inventory site
National Register status not assessed

29.DISCUSS THE POTENTIAL SIGNIFICANCE OF THE SITE:
Site avoided by project design. Significance not assessed and unknown.

30.PUBLISHED OR FORTHCOMING REPORTS ON THE SITE: Class III Archaeological Survey For the Proposed Chilocco Wind Farm Project By Ryan P. Grohnke and Abraham Ledezma Martinez, August 2013

View from the North-West

Representative artifacts.

Appendix H:

Site Form 34-KA-496

OKLAHOMA ARCHAEOLOGICAL SITE SURVEY FORM

Site#: 34-KA-496

County: Kay

COMPLETE ALL SECTIONS

1.SITE NUMBER AND NAME:

Site Name: (derived from owner's name, etc.)

Project No.: (Temporary number or name assigned during project.) WPS-Chil-003

2.LOCATIONAL INFORMATION:

U.T.M. Reference

Zone: 14
Northing: 4095004 meters **Easting:** 670898 meters

Legal Description

SE 1/4 of SW 1/4 of SW 1/4 **of Section** 15 **Township** 29N **Range** 2E

U.S.G.S. Quad Name: Newkirk Quad Date (revised): 10/30/2002

Other Locational References (i.e., benchmarks, road intersections, bridges, etc., please give distance and bearing to site):

1. Approximately 0.05 miles South of Chilocco Creek
2. Approximately 0.08 miles West of the T-intersection on the North end of N3323 Road
3. Approximately 0.92 miles South of the State Line Road

3.OWNER(S) OF PROPERTY:

Name: The Ponca Tribe of Indians of Oklahoma
Street and Number:
City/Town, State:
Zip:

4.SITE SURVEYED BY:

Name: Abraham Ledezma Martinez & Greg Looney

Date Recorded: August 13, 2013

Reported by (if different):

Name: Ryan Grohnke

Date Reported: August 21, 2013

Time spent at site and time of day: Mid-afternoon, 1 hour

5.CULTURAL AFFILIATION - Cultural Periods (underline one):

Unassigned prehistoric
Paleoindian:
- Early
- Middle
- Late

Archaic:
- Early
- Middle
- Late

Woodland:
- Eastern – may be eastern?
- Plains

Village Farming/Mississippi
Plains Village
Protohistoric/Historic Ind.
Historic non-Indian

Archaeological Cultures, Phases, etc. represented:

How was cultural affiliation determined (diagnostic artifacts, radiocarbon dates, etc.):

6.HISTORIC PHASE IDENTIFICATION (ETHNIC):
Underline appropriate group.

1. Choctaw
2. Cherokee
3. Saux-Fox
4. Pottawatomie
5. Seminole
6. Comanche
7. Apache
8. Kiowa
9. Kiowa-Apache
10. Kickapoo
11. Pawnee
12. Arapaho
13. Ottawas
14. Wichita
15. Quapaw
16. Osage
17. Cheyenne
18. Caddo
19. Shawnee
20. Delaware
21. Creek
22. Dakotas
23. Chickasaw
24. 12 & 17
25. Missouri-Otos
26. Iowa
27. Anglo-American
28. French
29. Spanish
20. Other:

How was historic identification determined?:

7.HISTORIC SITE RANGE (underline one):

0. Missing data; unknown
1. pre-1800
2. 1800-1830
3. 1830-1859
4. 1860-1889
5. 1890-1929
6. 1930-1950
7. 1800-1900
8. 1800-present
9. 1900-present

8.INFERRED SITE TYPE
Please underline those that apply (can be more than one category)

Open habitation w/o mounds	Petroglyph/pictograph
Open habitation with mounds	Isolated burials (<2)
Earth mound (not midden mound)	Cemetery (>2)
Mound complex	Specialized activity sites
Stone mounds/rock piles	Rock alignments (tepee rings, etc.)
Burned rock concentrations	Historic farmstead
Non-mound earthworks	Historic mill/industrial
Rock shelter	Historic fort
Cave	Dugout
Quarry/workshop	Historic trash dump

9.MIDDEN AT SITE (underline):

Don't know	Present, earth
Absent	Present, shell
	Present, rock

10.MATERIALS COLLECTED:

Type	**Number**
Ceramics	
Projectile points/base frags.	
Hafted scrapers	
Drills	
Bifaces/biface fragments	
Unifaces	
Perforators/gravers	
Spokeshaves	
Scrapers (unhafted)	
Debitage (flakes, cores, chunks)	
Ground/pecked/battered stone	
Worked bone/shell	
Human bone	
Faunal remains	
Floral remains	
Other prehistoric	
Historic (describe)	
	Total Items:

Briefly describe diagnostic artifacts including type names. Attach outline drawings:

Materials observed but not collected: 12 flakes of Florence A chert

Name and address of owner of other collections from site:

N/A

11.ARTIFACT REPOSITORY

Name of institution where artifacts are to be stored:

N/A

Photos: 1
Number of black and white photos:
Number of color photos: 1

Name and address of institution where photos are filed: Bureau of Indian Affairs – Southern Plains Region P.O. Box 368
Anadarko, OK 73005

12.EVIDENCE OF RECENT VANDALISM OBSERVED? (Yes or No): No

13.SITE CONDITION (underline one):

1. apparently undisturbed
2. <u><25% disturbed</u>
3. 26-50% disturbed
4. 51-75% disturbed
5. 76-99% disturbed
6. totally destroyed
7. disturbed, % unknown

14.MAJOR LAND USE (underline those that apply):

Cultivated field
<u>Pasture</u>
<u>Woods, forest</u>
Road/trail
Ditch/dike/borrow pit
Landfill
Modern cemetery
Mining
Inundated
Industrial
Residential
Recreation
Commercial
Military
Logging/fire break
Scrub/secondary growth/oil field
Modern dump

Other: Developed (Open Space)

15.AMOUNT OF GROUND SURFACE VISIBLE (underline one):

1. <10%	4. 51-75%
2. 11-25%	5. 76-90%
3. 26-50%	6. 91-100%

Survey Conditions (wet, dry, sunny, ground coverage, etc.):overcast

---

16.PHYSIOGRAPHIC DIVISION (underline one):

1. High Plains	6. Sandstone Hills
2. Gypsum Hills	7. Prairie Plains
3. Wichita Mountains	8. Ozark Plateau
4. Red Bed Plains	9. Ouachita Mountains
5. Arbuckle Mountains	10. Red River Plains

17.LANDFORM TYPE (underline one):

1. Floodplain	4. Dissected Uplands
2. Terrace	5. Undissected Uplands
3. Hillside - Valley wall	

18.LOCALITY TYPE - SPECIFIC SITE SETTING (underline one):

1. Level	5. Mesa
2. Knoll - low land	6. Slope
3. Blowout	7. Bluff crest
4. Ridge – upland	8. Bluff base

19.SOILS (if known):
Association: Kirkland-Renfrow **Series:**
Type:

20.ELEVATION/SLOPE:

Elevation amsl: 1140 feet
Slope (degrees): 1 **Slope facing direction:** NE

21.NATURAL VEGETATION (underline one):

1. Short grasses	6. Mesquite
2. Mixed grasses	7. Juniper-pinon
3. Tall grasses	8. Oak-hickory forest
4. Cross Timber	9. Oak-pine
5. Shin-oak	10. Loblolly pine forest

22.SITE AREA (Square Meters): 2950
Basis for area estimate (underline one):
1. Taped 2. Paced 3. Guessed 4. Range-finder
5. Alidade/transit

Confident of site boundaries? (Yes or No): No

23.DESCRIPTION OF SITE:

Give physical description of site and its setting, including dimensions, features, nature of materials and artifact concentrations. Include copy of U.S.G.S. topographic map with site location and boundaries marked (and sketch map if appropriate).
This site was located within the 300 feet corridor south of the Chilocco Creek. Shovel testing of the creek corridor revealed the presence of 12 Florence A flakes. A nearby two-track road bisects the site indicating a possibly disturbed area of the site. Areas to the north and south of a two-track remain intact as revealed by shovel tests. A total of nineteen shovel tests were done in accordance with the 300 foot corridor. Twelve shovel tests tested positive for the presence of intact cultural deposits. It is possible that the site extends to the south.

The APE intersecting with the site is a proposed collector run and access road. Testing and evaluation of the site was not conducted as the proposed project's design will be altered to avoid any impacts to the site. Site dimensions as currently defined are 60 meters N-S by 135 meters E-W on .75 acres of land.

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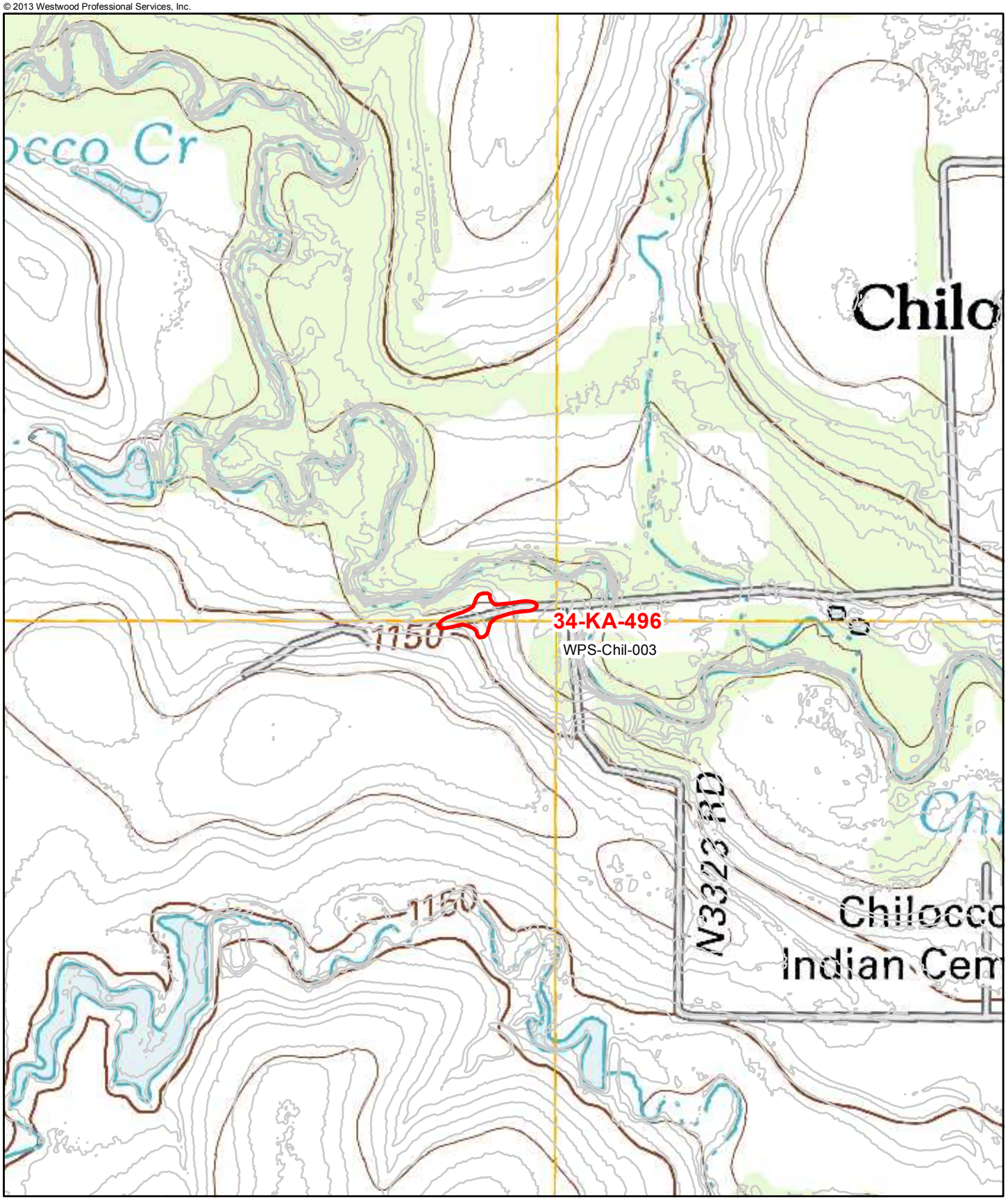


Data Source(s): Westwood (2013); United States Geological Survey Topographic Map (2013)

34-KA-496

2 Foot Contours

USGS 7.5-Minute Series
Newkirk Quadrangle

Chilocco Wind Farm

Kay County, Oklahoma

N

0 600 Feet

34-KA-496

EXHIBIT 1

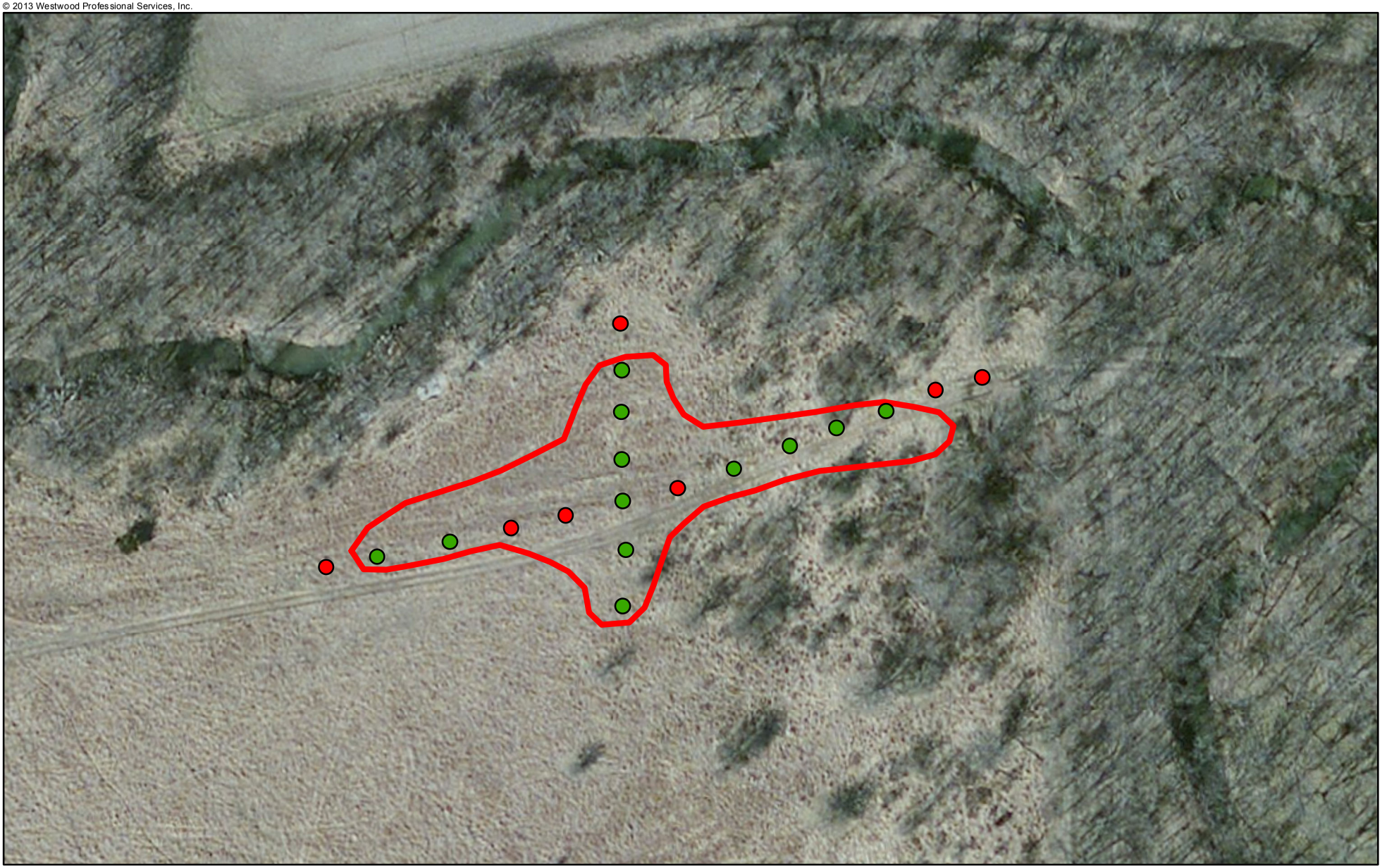
Westwood Professional Services, Inc.
7699 Anagram Drive
Eden Prairie, MN 55344

PHONE 952-937-5150
FAX 952-937-5822
TOLL FREE 1-888-937-5150

www.westwoodps.com

Map Document: P:\0000488.00\GIS\CRM\WPS-Chil-003_130827.mxd 8/27/2013 9:21:38 AM

© 2013 Westwood Professional Services, Inc.



Data Source(s):

Legend

Shovel Test Results

- Negative
- Positive
- 34KA496

USGS 7.5-Minute Series
Newkirk Quadrangle

N

0 100 Feet

Chilocco Wind Farm

Kay County, Oklahoma

Site 34-KA-496

Sketch Map

Westwood

Westwood Professional Services, Inc.
7699 Anagram Drive
Eden Prairie, MN 55344

PHONE 952-937-5150
FAX 952-937-5822
TOLL FREE 1-888-937-5150

www.westwoodps.com

24.DRAINAGE (underline one):

1. Arkansas	10. Muddy Boggy
2. Beaver - N. Canadian	11. Neosho
3. Canadian	12. North Fork Red
4. Caney	13. Poteau
5. Cimarron	14. Red
6. Deep Fork	15. Salt Fork Arkansas
7. Illinois	16. Salt Fork Red
8. Kiamichi	17. Verdigris
9. Little R. (McCurtain County)	18. Washita

25.NEAREST NATURAL SOURCE OF WATER (underline one):

1. Permanent stream/creek	6. River
2. Intermittent stream	7. Slough or oxbow lake
3. Permanent stream	8. Relic stream channel
4. Intermittent spring/seep/bog	9. Also consider wells if site is historic
5. Natural lake	

26.DISTANCE TO WATER (in 10's of meters): 4

27.INVESTIGATION TYPE (underline one):

1. Reconnaissance (survey)	3. Excavated
2. Intensive (survey & testing)	4. Volunteered report

28.SIGNIFICANCE STATUS (underline one):

National Register Property
Eligible for National Register
Nominated to National Register by S.H.P.O.
Considered eligible but not nominated by S.H.P.O.
Inventory site
National Register status not assessed

29.DISCUSS THE POTENTIAL SIGNIFICANCE OF THE SITE:
Site avoided by project design. Significance not assessed and unknown.

30.PUBLISHED OR FORTHCOMING REPORTS ON THE SITE: Class III Archaeological Survey For the Proposed Chilocco Wind Farm Project By Ryan P. Grohnke and Abraham Ledezma Martinez, August 2013

View toward North.

Appendix I:

Chilocco School Visual Impact Waiver

April 16, 2013

Mr. Robert Impson, Regional Director
Eastern Oklahoma Regional Office
Bureau of Indian Affairs
P.O. Box 8002
Muskogee, OK 74401-6201

Re: Chilocco Indian School

Dear Mr. Impson,

This letter is in regards to the Chilocco Wind Farm Project currently being developed by PNE Wind USA, Inc. The project is being developed on land which encompasses the Chilocco Indian School campus. Due to the fact the school is listed on the National Register of Historic Places, certain obstacles may arise. In an effort to negate any impediments to the placement of turbines near the school property, we collectively as the *Chilocco Development Authority* affirmatively state that we mutually agree and consent that the Chilocco School, though historically significant does not necessitate visual resource setbacks as it relates to wind power generation equipment.

Guy Munroe, Kaw Nation
Chair

John R. Shotton, Otoe-Missouria
Chairman

Marshall Gover, Pawnee Nation
President

Earl 'Trey' Howe, III, Ponca Nation
Chairman

Don Patterson, Tonkawa Tribe
President

Bill John Baker, Cherokee Nation
Chief

Appendix J:

Cultural Resource Letters

OTOE-MISSOURIA
TRIBE OF INDIANS

8151 HIGHWAY 177
RED ROCK, OK 74651-0348

August 15, 2013

Ms. Robin Bellmard, Superintendent,
Bureau of Indian Affairs, Pawnee Office
P.O. Box 440
Pawnee, OK 74058

RE: Chilocco Wind Farm Cultural Impacts

Dear Superintendent Bellmard,

The Otoe-Missouria Tribe of Oklahoma has reviewed the information and materials concerning the Chilocco Wind Farm's impact and potential impacts to Otoe-Missouria cultural and historic resources on the Tribe's Chilocco School property.

We are aware of and satisfied that Chilocco Wind Farm, LLC has properly surveyed the property for cultural resources prior to construction. In reviewing the lease, particularly, Pg. 29; Sec. 40 (6), which states, "In the event that historic properties, archaeological resources, human remains, or other cultural items, not previously reported are encountered during the course of an activity associate with this WRL, all activity in the immediate vicinity of the properties, resources, remains, or items will cease, and Company will contact BIA and Tribe to determine how to proceed and appropriate disposition", we are satisfied that any cultural, historic, or sacred resources that may be discovered during construction will be dealt with properly.

Given the information provided you are hereby notified that the proposed project should have no potential to adversely affect any known Otoe-Missouria archaeological, historical, or sacred sites.

This information is provided to you at your request to assist you in complying with 36 CFR Part 800 for Section 106 Consultation procedures. Please retain this correspondence to show compliance with Section 106. With questions, please contact John R. Shotton, Chairman, Otoe-Missouria Tribe of Indians.

Regards,

John R. Shotton, Chairman
Otoe Missouria of Indians

Pawnee Nation of Oklahoma
Office of Historic Preservation
657 Harrison Street
P.O. Box 470
Pawnee, OK 74058

July 31, 2013

Robin Bellmard
Superintendent
Bureau of Indian Affairs
Pawnee Agency
P.O. Box 440
Pawnee, OK 74058

RE: Section 106 Review of Chilocco Wind Farm, LLC – Wind Resource Lease

Superintendent Bellmard,

The Pawnee Nation Office of Historic Preservation has received all information and materials requested for our Section 106 Review and Consultation. As you know, our comment on this project and its potential to affect Historic or Archaeological Properties, Traditional Cultural Places (TCP), or Sacred Pawnee sites is required by Section 106 of the National Historic Preservation Act of 1966 (NHPA), and 36 CFR Part 800. The People of the Pawnee Nation thank you for submitting the Wind Resource Lease and Wind Energy Evaluation Lease for our review and comment.

We are aware of and satisfied with the Chilocco Wind Farm, LLC and in reviewing the lease, particularly, Pg. 29; Sec. 40 (6), which states, "In the event that historic properties, archaeological resources, human remains, or other cultural items, not previously reported are encountered during the course of an activity associate with this WRL, all activity in the immediate vicinity of the properties, resources, remains, or items will cease, and Company will contact BIA and Tribe to determine how to proceed and appropriate disposition".

Given the information provided you are hereby notified that the proposal project location should have no potential to adversely affect any known Archaeological, Historical, or Sacred Pawnee sites. Therefore, in accordance with 36 CFR 800.4(d)(1), the may proceed with your proposed project. However, please be aware that they may encounter undiscovered properties which must be immediately reported to us under both the NHPA and NAGPRA regulations.

This information is provided to you at your request to assist you in complying with 36 CFR Part 800 for Section 106 Consultation procedures. Please retain this correspondence to show

Rebekah Horsechief
ACTING | Tribal Historic Preservation Officer
Ph: 918.762.3227 *rebekahh@pawneenation.org* *Fax: 918.762.3662*

compliance with Section 106. With questions, please contact, Rebekah HorseChief, Acting THPO Director. We look forward to working with you.

Regards,

Rebekah Horsechief

Rebekah Horsechief
ACTING | Tribal Historic Preservation Officer
Ph: 918.762.3227
rebekahh@pawneenation.org
Fax: 918.762.3662

Ponca Tribe of Oklahoma

"Rich In Culture and Tradition"

"Equal Opportunity Employer"

August 21,2013

Ms. Robin Bellmard, Superintendent,
Bureau of Indian Affairs, Pawnee Office
P.O. Box 440
Pawnee, OK 74058

RE: Chilocco Wind Farm Cultural Impacts

Dear Superintendent Bellmard,

The Ponca Tribe of Oklahoma has reviewed the information and materials concerning the Chilocco Wind Farm's impact and potential impacts to Ponca cultural and historic resources on the Tribe's Chilocco School property.

We are aware of and satisfied that Chilocco Wind Farm, LLC has properly surveyed the property for cultural resources prior to construction. In reviewing the lease, particularly, Pg. 29; Sec. 40 (6), which states, "In the event that historic properties, archaeological resources, human remains, or other cultural items, not previously reported are encountered during the course of an activity associate with this WRL, all activity in the immediate vicinity of the properties, resources, remains, or items will cease, and Company will contact BIA and Tribe to determine how to proceed and appropriate disposition", we are satisfied that any cultural, historic, or sacred resources that may be discovered during construction will be dealt with properly.

Given the information provided you are hereby notified that the proposed project should have no potential to adversely affect any known Ponca archaeological, historical, or sacred sites.

This information is provided to you at your request to assist you in complying with 36 CFR Part 800 for Section 106 Consultation procedures. Please retain this correspondence to show
compliance with Section 106. With questions, please contact Mr. Earl Howe III, Chairman, Ponca Tribe of Oklahoma.

Regards,

Earl Howe III, Chairman
Ponca Tribe of Oklahoma

20 White Eagle Drive ♦♦ (580) 762-8104 ♦♦ Fax: (580) 762-2743 ♦♦ Ponca City, Oklahoma 74601

Appendix K:

Representative Photographs of Project Area

Grassland on Western edge of project.

Hayland on Western Edge of project.

Trees removed - south of Judo Road near center of project.

Agricultural field south-west side of project area.

Agricultural field north-east side of project area

Agricultural field west side of project area.

Chilocco School.

Chilocco School.

Chilocco School Campus.

View from western edge of campus toward west, toward proposed turbine location WTG 59.

Appendix L:

Vitae of Principal Investigator

Abraham Ledezma Martinez, MS, RPA

Abraham.ledezma@icloud.com
Phone: 218.790.0690
2502 Woodcrest Dr., Chaska, MN 55318

Education

B.A. Minnesota State University Moorhead, Moorhead, MN (Anthropology with an emphasis in Archaeology); May 2008

M.S. Missouri State University, Springfield, MO (Applied Anthropology); May 2012

- Thesis Title: Resistivity Survey to Identify Archaeological Features at the Nathan Boone Homestead State Historic Site

Archaeological Field Experience

2013 Principal Investigator; Westwood Professional Services, Inc. Conducted Background Literature Review and Field Survey of the Chilacco Wind farm near the Chilacco Indian School in Kay County, OK. The survey was done with coordination from the Bureau of Indian Affairs in Oklahoma. Report to Follow for submittal to Oklahoma Archaeological Survey and BIA for review. Project will be reviewed under section 106 due to the need of a regional permit from the United States Army Corps of Engineers. June 2013 - Present.

2013 Principal Investigator; Westwood Professional Services, Inc. Conducted Field Survey, Background Literature Review and Currently working on the report for the YGrade Pipeline Upgrade Project near Lisbon, OH. Performed visual inspection and shovel testing of proposed route along 18 mile pipeline route. Field Investigations are ongoing due to route changes, Report to follow in compliance with Nationwide 12 permit requirements for the United States Army Corps of Engineers. June 2013 - Present.

2013 Field Crew Chief and GIS Specialist; Conducted the Phase I Archaeological Reconnaissance Survey and created Geographical Information System database for the Northwest Ohio Wind Company Turbine Farm project in Paulding County, Ohio. The investigations and report submittal were completed in compliance with Ohio Power Siting Board permitting requirements. April 2013

2013 Field Crew Chief and GIS Specialist; Westwood Professional Services, Inc. Supervisor: Dean Sather. Conducted Phase I archaeological Investigations of the Savanna Transmission Line – Savanna to Cromwell Segment Project in St. Louis and Carlton Co. Minnesota. Performed visual inspection and shovel testing of proposed route along a 6 mile transmission route. Project was reviewed under Section 106 due to the need of a regional permit from the United States Army Corps of Engineers. May 2013

2013 Field Crew Chief and GIS Specialist; Westwood Professional Services, Inc. Supervisor: Dean Sather. Conducted Phase I archaeological Investigations of the Shell Lake 69kV Transmission Line Project in Becker Co. Minnesota. Performed visual inspection and shovel testing of proposed route along a 6 mile transmission route. Project was reviewed under Section 106 due to the need of a regional permit from the United States Army Corps of Engineers. May 2013

2013 Field Crew Chief and GIS Specialist; Westwood Professional Services, Inc. Supervisor: Dean Sather. Surveyed a 3 acre parcel at request of White Earth Nation THPO. The proposed supportive housing project was investigated using visual inspection, pedestrian survey, and shovel testing. Project was reviewed under Section 106 due to funding by HUD. June 2013

2012 Field Crew Chief and GIS Specialist; Westwood Professional Services, Inc. Supervisor: Dean Sather. Conducted Phase I archaeological Investigations of the Stinson to Bay Front Transmission Line Project near Iron River, in Bayfield Co. Wisconsin. August 2012

2012 Principal Investigator; Westwood Professional Services, Inc. Conducted Field Survey, Archaeological Monitoring, and Wrote Archaeological Report for the Three Rivers 74 Ranch to Marathon Central Tank Battery Pipeline near Campbellton, TX. September - November 2012.

2011 Thesis Work; Missouri State University, Springfield, MO. Advisor: Dr. Elizabeth Sobel. Conducted Resistivity and Ground Penetrating Radar surveys of the Nathan Boone Homestead State Historic Site near Ash Grove, MO. Using RM 15, 64 Channel GF Instruments DC-Resistivity Imaging System, and RAMAC Ground Penetrating Radar system to identify subsurface features. Mar-Apr 2011

2011 Field Crew Chief; Westwood Professional Services, Inc. Supervisor: Dean Sather. Conducted Phase III investigation at Gull River Lumber Camp near Baxter, MN October 2011-Novermber 2011.

2011 Field Crew Chief and Field Director; Westwood Professional Services, Inc. Supervisor: Dean Sather. Conducted Phase I surveys for three pipeline projects in South Texas; May 2011-October 2011. Pipeline projects included The Three Rivers Pipeline, Sweeny Switch Truck Terminal to Midstream Terminal Pipeline, and Gardendale Pipeline.

2010 Field Technician; Westwood Professional Services, Inc. Supervisor: Dean Sather Conducted Phase I surveys for five wind farms in the Midwest; May 2010-August 201

2009 Excavation Crew Member; Judy’s Cave, Wright Co., MO; directed by Dr. David Byers; Anthropology program, Missouri State University; November 2008–November 2009.

2008 Field Crew Member; KXL Pipeline, various counties in SD; directed by Scott Slessman; SWCA Environmental Consultants, CO; July 2008.

2007 Excavation Crew Member; Peterson Site, ND; directed by Michael Michlovic; Minnesota State University Moorhead; July 2007.

2007 Field Crew Member; Geophysical Methods Field School, Biesterfeldt Site, Ransom Co., ND; directed by Dr. Rinita Dalan; Anthropology Program, Minnesota State University Moorhead; Conducted geophysical survey of Biesterfeldt site using RM15 Resistivity System, FM 256 Gradiometer System, and seismic soundings. May–July 2007.

2006 Excavation Crew Member; various small CRM projects in MN and ND; directed by Dr. George Holley; Anthropology Program, Minnesota State University Moorhead; May 2006–May 2008.

2006 Excavation Crew Member; Sprunk Site, Cass Co., ND; Directed by Dr. Michael Michlovic; Anthropology Program, Minnesota State University Moorhead; May-July 2006.

Biological Field Experience

2013 Environmental Scientist; Westwood Professional Services, Inc. Supervisors Dean Sather and Eric Hansen. Environmental Crews Lead on the Delineation and Identification of Threatened and Endangered Indiana Bat Habitat on the Flanagan South Pipeline Project throughout Missouri and Illinois. December 2012 to January 2013. Field work included delineating all suitable Bat Habitat Tree Species within the pipeline corridor, determining tree diameter, and mapping trees on Trimble Yuma GPS unit.

2012 Environmental Scientist; Westwood Professional Services, Inc. Supervisors Jeff Richards. Assisted Environmental Crews on the Delineation and Identification of Wetlands and Threatened and Endangered Species on the Three Rivers 74 Ranch to Marathon Central Tank Battery Pipeline Project near Campbellton, Texas. September 2012. Field work included delineating all wetlands according to the U.S. Army Corps of Engineers 1987 Wetland Delineation manual, determining OHWL, width and depth of all potential drainage crossings within the corridor and reviewing the corridor for both federal and state listed rare and endangered plant and animal species and habitat.

2011 Environmental Scientist; Westwood Professional Services, Inc. Supervisors Jeff Richards. Assisted Environmental Crews on the Delineation and Identification of Wetlands and Threatened and Endangered Species on the Gardendale Pipeline Project in South Texas. August 2011-September 2011. Field work included delineating all wetlands according to the U.S. Army Corps of Engineers 1987 Wetland Delineation manual, determining OHWL, width and depth of all potential drainage crossings

within the corridor and reviewing the corridor for both federal and state listed rare and endangered plant and animal species and habitat.

2011 Environmental Scientist; Westwood Professional Services, Inc. Supervisors Jeff Richards. Assisted Environmental Crews on the Delineation and Identification of Wetlands and Threatened and Endangered Species on the Sweeny Switch Truck Terminal to Midstream Terminal Pipeline Project in South Texas. Jul 2011-Sep 2011. Field work included delineating all wetlands according to the U.S. Army Corps of Engineers 1987 Wetland Delineation manual, determining OHWL, width and depth of all potential drainage crossings within the corridor and reviewing the corridor for both federal and state listed rare and endangered plant and animal species and habitat.

2011 Environmental Scientist; Westwood Professional Services, Inc. Supervisors Jeff Richards. Assisted Environmental Crews on the Delineation and Identification of Wetlands and Threatened and Endangered Species on the Three Rivers Pipeline Project in South Texas. Jul 2011-Sep 2011. Field work included delineating all wetlands according to the U.S. Army Corps of Engineers 1987 Wetland Delineation manual, determining OHWL, width and depth of all potential drainage crossings within the corridor and reviewing the corridor for both federal and state listed rare and endangered plant and animal species and habitat.
.

Environmental Inspector Field Experience

2012 Environmental Monitor/Inspector; Westwood Professional Services, Inc. Supervisors Jeff Richards. Monitor and Inspect Work Done By Construction Crews on the Karnes County Crews Gathering System Pipeline Project near Karnes City, TX. September 2012-November 2012.

2012 Environmental Monitor/Inspector; Westwood Professional Services, Inc. Supervisors Jeff Richards. Monitor and Inspect Work Done By Construction Crews on the Three Rivers 74 Ranch to Marathon Central Tank Battery Pipeline Project near Campbellton, TX. September 2012-November 2012.

2012 Environmental Monitor/Inspector; Westwood Professional Services, Inc. Supervisors Dean Sather and Jeff Richards. Monitor and Inspect Work Done By Construction Crews on the EOG Hoff Pipeline Project near Cotulla, TX. July 2012-August 2012

Archaeological Lab Experience

2006 Archaeology Lab and Research Assistant; Anthropology Program, Minnesota State University Moorhead, Moorhead, MN; ceramic and lithic analysis from various field schools; various tasks including equipment management and maintenance, cataloging, mapping, and preparing photos for reports; supervised by Dr. Michael Michlovic and Dr. George Holley. May 2006-May 2008.

Other Relevant Experience

2008 Graduate Assistant; Latino Health Program (Por La Salud de Nuestros Ninos); sponsored by Missouri State University, Springfield, MO; supervised by Dr. Suzanne Walker

2008 Workshop Assistant for Dr. Rinita Dalan during the Park Service Geophysical Methods Workshop; sponsored by the Park Service and Minnesota State University Moorhead; Fargo, ND; supervised by Dr. Michael Michlovic. Assisted various instructors with geophysical surveys including: Resistivity, Magnetometery, Ground Penetrating Radar, Arial Photography, and Seismic. At the start of the workshop I led a crew of students out to site and shoot in the grid using a Nikon M series Total Station.

2007 Mapping Assistant during the mapping of various sites in ND (including Sprunk, Bisterfeldt, and Peterson sites); supervised by Dr. Michael Michlovic.

Other Relevant Skills

- Proficiency in Spanish (Native Speaker, Reading, and Writing)
- Geographical Information Systems (GIS) experience: Created maps and GIS databases for cultural resource management at Westwood Professional Services, Inc using ArcMap software, GeoMapper Software, and Google Earth Pro.
- Experience with GPS devices: Trimble Yuma series, Trimble Geo series, Trimble Juno series, Delorme PN60, and Garmin. Familiar with both Terrasync and ArcPad GPS software.
- Trained in using survey equipment including Nikon M series Total Station, Transit equipment, Sokkia Total Station.
- Experience texturing soils, using a total station to gather topographic data and setup archaeological grid. Extensive experience using geophysical equipment for geophysical survey and data processing using the Geoscan Geoplot 3.0 software and AGI Earth Imager 2D Inversion and Modeling Software. Experience with the following instruments: RM15-D Resistance Meter System, FM256 Gradiometer System, Mala GPR System, 64 Channel GF Instruments DC-Resistivity Imaging System, and RAMAC Ground Penetrating Radar system.

Professional Reports

Sep 2012 *Cultural Resources Intensive Survey for the Three Rivers 74 to Marathon Central Tank Battery Pipeline Project, Live Oak County, Texas.* Report prepared for Harvest Pipeline

Company, Houston, Texas. Prepared for Non-Reporting Nationwide 12 Permit process to the United States Army Corps of Engineers, Galveston District, Galveston, Texas.

Oct 2011 *Cultural Resources Intensive Survey for the Gardendale Pipeline Project La Salle, McMullen and Live Oak Counties, Texas.* Report prepared for Arrowhead Eagle Ford Pipeline, LLC., Houston, Texas. Submitted for review under the 106 process to the United States Army Corps of Engineers, Fort Worth District, Fort Worth, Texas.

Aug 2011 *Cultural Resources Intensive Survey for the Sweeny Switch Truck Terminal to Midstream Terminal Pipeline Project, Live Oak, San Patricio, and Nueces Counties, Texas.* Report prepared for Arrowhead Eagle Ford Pipeline, LLC., Houston, Texas. Submitted for review under the 106 process to the United States Army Corps of Engineers, Galveston District, Galveston, Texas.

Jun 2011 *Cultural Resources Intensive Survey for the Three Rivers Pipeline Project, Live Oak, Atascosa, and Karnes Counties, Texas*. Report prepared for Arrowhead Eagle Ford Pipeline, LLC., Houston, Texas. Submitted for review under the 106 process to the United States Army Corps of Engineers, Galveston District, Galveston, Texas.

May 2010 *Phase I Cultural Resources Intensive Survey for the Ridgeport Wind Energy Project*
Westwood Professional Services, Inc.
Boone and Hamilton Counties, Iowa
Kevin Mieras, Abraham Ledezma, and Craig Picka

July 2010 *Phase I Archaeological Reconnaissance Survey for the Goodhue Wind Energy Project*
Westwood Professional Services, Inc.
Goodhue County, Minnesota
Dean Sather, Abraham Ledezma, Daniel Salas, and Craig Picka

July 2010 *Phase II Intensive Cultural Resources Survey for the Proposed Solomon Forks Wind Project*
Westwood Professional Services, Inc.
Thomas County, Kansas
Dean Sather, Ryan Grohnke, Abraham Ledezma, Daniel Salas, and Craig Picka

Conference Presentations

2011 Ledezma, A., Kevin Mickus, and Elizabeth Sobel. Electrical Resistivity Survey of the Nathan Boone Homestead State Historic Site, Southwest Missouri. Presented at the Geology Society of America 2011 Meeting. September 2011, Minneapolis MN

2008 Ledezma, A., and G. Holley. Bisterfeldt Ceramics. Presented at the Annual Minnesota State University Moorhead. Student Conference, April 2008, Moorhead, MN

2007 Ledezma, A., and G. Holley. Sprunk Site: Ceramics Analysis. Presented at the Annual Minnesota State University Moorhead. Student Conference, April 2008, Moorhead, MN

Memberships

- Register for Professional Archaeologists
- Society for American Archaeology

References

Dean Sather, MA

- Senior Cultural Resource Specialist
- URS
- Fifth Street Towers Minneapolis, MN
- dean.sather@urs.com
- 218.373.6533

Dr. Elizabeth Sobel

- Assistant Professor of Anthropology
- Department of Sociology, Anthropology, and Criminology
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- 417.836.5145

Dr. George Holley

- Assistant Professor of Anthropology
- Department of Anthropology and Earth Science
- Minnesota State University Moorhead
- 1104 7th Ave South, Moorhead, MN
- Holley@mnstate.edu
- 218.477.2680

Dr. Michael Michlovic

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- Department of Anthropology and Earth Science
- Minnesota State University Moorhead
- 1104 7th Ave South, Moorhead, MN
- michlovc@mnstate.edu
- 218.477.2035

Dr. Rinita Dalan

- Chair and Professor of Anthropology
- Department of Anthropology and Earth Science
- Minnesota State University Moorhead

- 1104 7th Ave South, Moorhead, MN
- dalanri@mnstate.edu
- 218.477.5900

Appendix M:

Shovel Test Notes

Location	Description	Positive or negative
WTG 1	0-2 cmbs - 7.5YR 3/2 clay loam 2-10 cmbs - 7.5 YR 4/4 clay loam 10-25 cmbs - 7.5YR 4/5 clay loam	negative
WTG 2	0-22 cmbs - 7.5YR 3/2 silty clay 22-26 cmbs - 7.5YR 4/4 clay loam	negative
WTG 3	0-40 cmbs - 7.5YR 3/1 clay loam w/sand 40-45 cmbs - rusty red clay	negative
WTG 4	area flooded	negative
WTG 5	0-25 cmbs - 10YR 3/2 loam 25-41 cmbs - 10YR3/3 clay loam	negative
WTG 6	0-22 cmbs - 10YR 3/2 loam 22-55 cmbs - saturated clay/water filled	negative
WTG 7	0-6 cmbs - 10YR 2/2 clay loam 6-22 cmbs - 10YR 2/1 clay loam 22-35 cmbs - 10YR 3/3 clay loam	negative
WTG 8	0-19 cmbs - 7.5YR 3/2 silty clay 19-22 cmbs - 7.5YR 4/4 clay loam	negative
WTG 9	0-3 cmbs - 10YR 2/2 clay loam 3-28 cmbs - 10YR 2/1 clay loam 28-37 cmbs - 10YR 3/3 clay loam	negative
WTG 10	0-22 cmbs - 7.5YR 3/1 silty loam 22-35 cmbs - 7.5YR 4/4 clay loam	negative
WTG 11	0-28 cmbs - 10YR 3/2 loam 28-40 cmbs - 10YR3/3 clay loam	negative
WTG 12	0-4 cmbs - 10YR 2/2 clay loam 4-13 cmbs - 10YR 2/1 clay loam 13-28 cmbs - 10YR 3/3 clay loam	negative
WTG 13	0-9 cmbs - 7.5YR 3/2 silty clay 9-20 cmbs - 7.5YR 4/4 clay loam	negative
WTG 14	0-6 cmbs - 10YR 3/4 clay loam 6-28 cmbs - 10YR 3/4 clay loam 28-33 cmbs - 10YR 3/4 clay loam	negative
WTG 15	0-5 cmbs - 10YR 2/1 clay loam 5-28 cmbs - 10YR 3/2 clay loam 28-40 cmbs - 10YR 3/4 clay loam	negative
WTG 16	0-5 cmbs - 10YR 2/1 loam clay 5-29 cmbs - 10YR3/2 loam clay 29-39 cmbs - 10YR 3/1 loam clay	negative
WTG 17	0-4cmbs - 2.5YR 2/4 clay loam 4-22 cmbs - 2.5YR 2/4 clay loam 22-32 cmbs - 2.5YR 2/4 clay loam	negative
WTG 18	0-3 cmbs - 7.5YR 3/4 clay loam 3-26 cmbs - 7.5YR 3/4 clay loam 26-33 cmbs - 7.5YR 3/4 clay loam	negative

WTG 19	0-9 cmbs - 10YR 4/2 loam 9-24 cmbs - 10YR 2/1 loam 24-42 cmbs - 10YR 2/2 loam	negative
WTG 20	0-2cmbs - 7.5YR 3/4 clay loam 2-25 cmbs - 7.5YR 3/4 clay loam 25-29 cmbs - 7.5YR 3/4 clay loam	negative
WTG 21	0-2cmbs - 2.5YR 3/6 clay loam 2-18 cmbs - 2.5YR 3/6 clay loam 18-27 cmbs - 2.5YR 3/6 clay loam	negative
WTG 12	0-8 cmbs - 10YR 4/2 loam 8-24 cmbs - 10YR 2/1 loam 24-39 cmbs - 10YR 2/2 loam	negative
WTG 23	0-23 cmbs - 7.5YR 3/2 silty clay 23-28 cmbs - 7.5YR 4/4 clay loam	negative
WTG 24	0-2cmbs - 7.5YR 3/4 clay loam 2-19 cmbs - 7.5YR 3/4 clay loam 19-32 cmbs - 7.5YR 3/4 clay loam	negative
WTG 25	0-6 cmbs - 10YR 2/1 clay loam 6-31 cmbs - 10YR 3/2 clay loam 31-43 cmbs - 10YR 3/1 clay loam	negative
WTG 26	0-28 cmbs - 10YR 3/1 silty clay 28-33 cmbs - 10YR 3/4 silty clay	negative
WTG 27	0-2cmbs - 5YR 3/6 clay loam 2-21 cmbs - 5YR 3/6 clay loam 21-30 cmbs - 5YR 3/6 clay loam	negative
WTG 28	0-3cmbs - 5YR 3/6 clay loam 3-25 cmbs - 5YR 3/6 clay loam 25-32 cmbs - 5YR 3/6 clay loam	negative
WTG 29	0-27 cmbs - 10YR 3/4 loam 27-30 cmbs - 10YR 4/4 loam	negative
WTG 30	0-18 cmbs - 7.5YR 3/2 silty clay 18-27 cmbs - 7.5YR 4/4 clay loam	negative
WTG 31	0-3cmbs - 7.5YR 3/4 clay loam 3-9 cmbs - 7.5YR 3/4 clay loam 9-27 cmbs - 7.5YR 3/4 clay loam	negative
WTG 32	0-32 cmbs - 10YR 3/1 silty clay 32-34 cmbs - 10YR 3/4 silty clay	negative
WTG 33	0-3 cmbs - 10YR 2/1 clay loam 3-29 cmbs - 10YR 3/2 clay loam 29-41 cmbs - 10YR 3/1 clay loam	negative
WTG 34	0-10 cmbs - 10YR 2/2 clay loam 10-26 cmbs - 10YR 2/2 clay loam 26-33 cmbs - 10YR 3/6 clay loam	negative
WTG 35	0-12 cmbs - 10YR 2/2 clay loam 12-37 cmbs - 10YR 2/2 clay loam 37-55 cmbs - 10YR 3/6 clay loam	negative

WTG 36	0-18 cmbs - 7.5YR 3/2 silty clay 18-25 cmbs - 7.5YR 4/4 clay loam	negative
WTG 37	0-29 cmbs - 10YR 3/4 loam 29-32 cmbs - 10YR 4/4 loam	negative
WTG 38	0-24 cmbs - 10YR 3/1 silty clay 24-26 cmbs - 10YR 3/4 silty clay	negative
WTG 39	0-3 cmbs - 10YR 2/1 loam clay 3-18 cmbs - 10YR 3/2 loam clay 18-28 cmbs - 10YR4/3 loam clay	negative
WTG 40	0-7 cmbs - loam 7-22 cmbs - loamy clay 22-28 cmbs - clay loam	negative
WTG 41	0-32 cmbs -dark brown 32-40 cmbs - reddish dark brown	negative
WTG 42	0-24 cmbs - 7.5YR 3/2 silty clay 24-29 cmbs - 7.5YR 4/4 clay loam	negative
WTG 43	0-26 cmbs - 10YR 3/4 loam 26-30 cmbs - 10YR 4/4 loam	negative
WTG 44	0-26 cmbs - 7.5YR 3/2 silty clay 26-31 cmbs - 7.5YR 4/4 clay loam	negative
WTG 45	0-27 cmbs - 10YR 3/1 silty clay 27-30 cmbs - 10YR 3/4 silty clay	negative
WTG 46	0-35 cmbs- 10YR 3/4 silty clay	negative
WTG 47	not tested - previously surveyed	
WTG 48	0-24 cmbs - 10YR 3/4 loam 24-34 cmbs - 10YR 4/4 loam	negative
WTG 49	0-32 - test filled with water	
WTG 50	0-26 cmbs - 7.5YR 3/2 silty clay 26-32 cmbs - 7.5YR 4/4 clay loam	negative
WTG 51	0-4 cmbs - 10YR 2/1 loam clay 4-20 cmbs - 10YR 3/2 loam clay 20-31 cmbs - 10YR 4/3 loam clay	negative
WTG 52	0-31 cmbs - 10YR 3/3	negative
WTG 53	0-47 cmbs - 10YR 3/1 silty clay 47-50 cmbs - 10YR 3/4 silty clay	negative
WTG 54	0-36 cmbs - 7.5YR 3/2 silty clay 36-40 cmbs - 7.5YR 4/4 clay loam	negative
WTG 55	0-30 - test filled with water	
WTG 56	0-22 cmbs - 10YR 3/3 clay loam 22-30 cmbs - 10YR 3/4 clay loam	negative
WTG 57	0-7 cmbs - 10YR 2/1 clay loam 7-25 cmbs - 10YR 2/2 clay loam 25-39 cmbs - 10YR 3/2 clay loam	negative
WTG 58	0-24 cmbs - 7.5YR 3/2 silty clay 24-30 cmbs - 7.5YR 4/4 clay loam	negative
WTG 59	0-28 cmbs - reddish brown 28-35 cmbs - light reddish brown	negative

WTG 60	0-3 cmbs - 10YR 2/1 clay loam 3-22 cmbs - 10YR 3/2 clay loam 22-32 cmbs - 10YR 4/3 clay loam	negative
WTG 61	0-22 cmbs - 10YR 3/1 silty clay 22-30 cmbs - 10YR 3/4 silty clay	negative
WTG 62	0-12 cmbs - loam 12-24 cmbs - loamy clay 24-35 cmbs - clay loam	negative
WTG 63	0-8 cmbs - 10YR 2/1 clay loam 8-30 cmbs - 10YR 2/2 clay loam 30-40 cmbs - 10YR 3/2 clay loam	negative
WTG 64	0-26 cmbs - 7.5YR 3/2 silty clay 26-32 cmbs - 7.5YR 4/4 clay loam	negative
WTG 65	0-7 cmbs - 10YR 2/1 clay loam 7-28 cmbs - 10YR 2/2 clay loam 28-32 cmbs - 10YR 3/2 clay loam	negative
WTG 66	0-9 cmbs - loam 9-22 cmbs - loamy clay 22-31 cmbs - clay loam	negative
WTG 67	0-29 cmbs - 10YR 3/1 silty clay 29-37 cmbs - 10YR 3/4 silty clay	negative
WTG 68	0-30 cmbs -10 YR 3/3 clay loam	negative
WTG 69	0-5 cmbs - water level 5-30 cmbs - dark brown	negative
WTG 70	0-40 cmbs -loamy clay	negative
WTG 71	0-26 cmbs - 7.5YR 3/2 silty clay 26-30 cmbs - 7.5YR 4/4 clay loam	negative
WTG 72	0-26 cmbs - 10YR 3/1 silty clay 26-35 cmbs - 10YR 3/4 silty clay	negative
WTG 73	0-25 cmbs - 10YR 3/2 clay loam 25-46 cmbs - 7.5YR 4/6 clay loam	negative
WTG 74	0-9 cmbs - 10YR 2/2 loam 9-23 cmbs - 10YR 2/2 loam clay 23-34 cmbs - 10YR 3/3 loam clay	negative
WTG 75	0-4 cmbs - 10YR 2/2 loam 4-24 cmbs - 10YR 3/1 loam clay 24-28 cmbs - 10YR 3/2 loam	negative
WTG 76	0-38 cmbs -loamy clay	negative
WTG 77	0-17 cmbs - 7.5YR 3/2 silty clay 17-34 cmbs - 7.5YR 4/4 clay loam	negative
WTG 78	0-22 cmbs - 10YR 3/2 clay loam 22-33cmbs - 10YR 3/3 loam	negative
WTG 79	0-24 cmbs - 10YR 3/1 silty clay 24-34 cmbs - 10YR 3/4 silty clay	negative
WTG 80	0-5 cmbs - 10YR 2/2 loam 5-27 cmbs - 10YR 2/2 loam clay 27-32 cmbs - 10YR 3/3 loam clay	negative

WTG 81	0-24 cmbs - 10YR 3/2 silty clay 24-40 cmbs - 10YR 4/4 clay loam	negative
WTG 82	0-49 cmbs -loamy clay	negative
WTG 83	0-45 cmbs -loamy clay	negative
WTG 84	0-26 cmbs - 10YR 3/2 clay loam 26-43 cmbs - 10YR 3/3loam clay	negative
WTG 85	0-4 cmbs - 10YR 2/2 loam 4-24 cmbs - 10YR 3/1 loam clay 24-28 cmbs - 10YR 3/2 loam	negative
WTG 86	0-30 cmbs - 10YR 3/2 clay loam 30-40 cmbs - 10YR 3/4 clay loam	negative
WTG 87	0-28 cmbs - 10YR 2/2 clay loam 28-40 cmbs - 10YR 3/4 clay loam	negative
WTG 88	0-9 cmbs - 10YR 2/2 loam 9-24 cmbs - 10YR 3/1 loam clay 24-35 cmbs - 10YR 3/2 loam	negative
WTG 89	0-28 cmbs - 10YR 2/2 clay loam 28-38 cmbs - 10YR 4/2 clay loam	negative
WTG 90	0-40 cmbs - 10YR 3/1 clay loam	negative

South of Chilocco Creek

T1	0-7 cmbs - 10YR 3/1 loam clay 7-29 cmbs - 10YR 3/2 loam clay 29-38 cmbs - 10YR 3/3 loam clay	negative
T2	0-6 cmbs - 10YR 3/1 loam clay 6-26 cmbs - 10YR 3/2 loam clay 26-36 cmbs - 10YR 3/3 loam clay	negative
T3	0-6 cmbs - 10YR 3/1 loam clay 6-36 cmbs - 10YR 3/2 loam clay 36-42 cmbs - 10YR 3/3 loam clay	Flake of Florence A chert
T4	0-6 cmbs - 10YR 3/1 loam clay 6-30 cmbs - 10YR 3/2 loam clay 30-39 cmbs - 10YR 3/3 loam clay	Flake of Florence A chert
T5	0-5 cmbs - 10YR 3/1 loam clay 5-28 cmbs - 10YR 3/2 loam clay 28-34 cmbs - 10YR 3/3 loam clay	Flake of Florence A chert
T6	0-6 cmbs - 10YR 3/1 loam clay 6-27 cmbs - 10YR 3/2 loam clay 7-35 cmbs - 10YR 3/3 loam clay	Flake of Florence A chert
T7	0-7 cmbs - 10YR 3/2 loam clay 7-27 cmbs - 10YR 3/2 loam clay 27-39 cmbs - 10YR 3/6 loam clay	negative
T8	0-30 cmbs - 10YR 3/4 silty loam 30-40 cmbs - 10YR 4/4 clay loam	Flake of Florence A chert

T9	0-35 cmbs - 10YR 3/4 silty loam 35-43 cmbs - 10YR 4/4 clay loam	negative
T10	0-25 cmbs - 10YR 4/4 silty loam 35-43 cmbs - 10YR 4/4 clay loam	negative
T11	0-5 cmbs - 10YR 3/1 loam clay 5-24 cmbs - 10YR 3/2 loam clay 24-35 cmbs - 10YR 3/3 loam clay	Flake of Florence A chert
T12	0-6 cmbs - 10YR 3/1 loam clay 6-27 cmbs - 10YR 3/2 loam clay 7-35 cmbs - 10YR 3/3 loam clay	Flake of Florence A chert
T13	0-6 cmbs - 10YR 3/1 loam clay 6-28 cmbs - 10YR 3/2 loam clay 28-37 cmbs - 10YR 3/3 loam clay	negative
C1	Disturbed, but artifact found	Flake of Florence A chert
C2	0-26 cmbs - 10YR 3/4 silty loam 26-39 cmbs - 10YR 4/4 clay loam	Flake of Florence A chert
C3	0-4 cmbs - 10YR 3/1 loam clay 4-27 cmbs - 10YR 3/2 loam clay 27-35 cmbs - 10YR 3/3 loam clay	Flake of Florence A chert
C4	0-5 cmbs - 10YR 3/1 loam clay 5-28 cmbs - 10YR 3/2 loam clay 28-34 cmbs - 10YR 3/3 loam clay	Flake of Florence A chert
C5	0-6 cmbs - 10YR 3/1 loam clay 6-28 cmbs - 10YR 3/2 loam clay 28-35 cmbs - 10YR 3/3 loam clay	Flake of Florence A chert
C6	0-5 cmbs - 10YR 3/1 loam clay 5-26 cmbs - 10YR 3/2 loam clay 26-33 cmbs - 10YR 3/3 loam clay	negative

Intuitive Tests

I-1	0-27 cmbs - 7.5YR 3/2 silty clay 27-33 cmbs - 7.5YR 4/4 clay loam	negative
I-2	0-5 cmbs - 10YR 2/1 clay loam 5-21 cmbs - 10YR 3/2 clay loam 21-30 cmbs - 10YR 4/3 clay loam	negative

EXHIBITS

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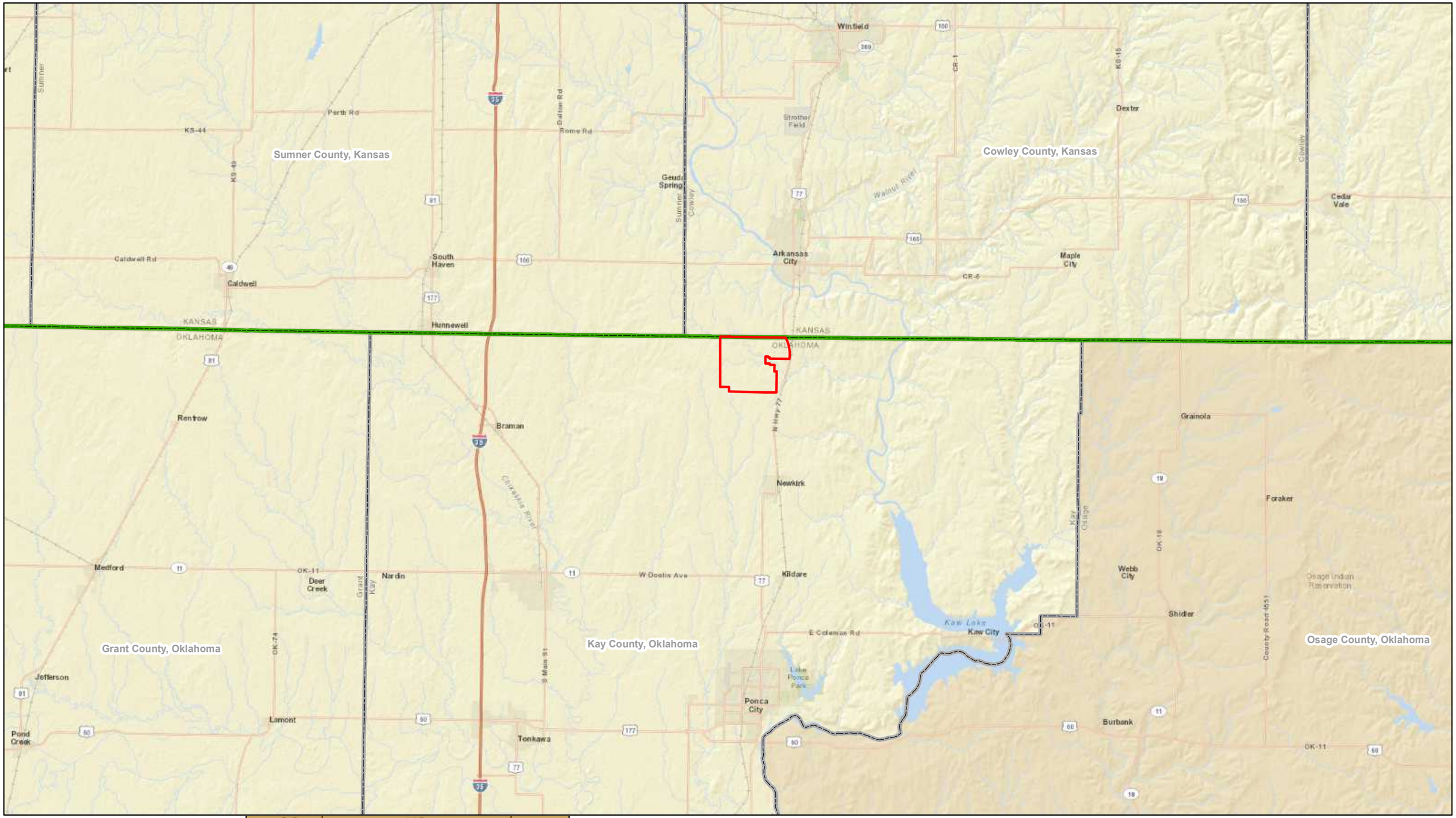

Data Source(s): Some data are approximate. Symbols are not representative of any dimension. Westwood (2013); PNE Wind USA, Inc. (2013); Bureau of Transportation Statistics National Transportation Atlas Database (2000); National Atlas of the United States of America; ESRI World Physical Map WMS (accessed 2013); ESRI USA Topographic Map (accessed 2013)

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Legend

- Project Boundary
- States
- Oklahoma Counties

N

0 5 Miles

Chilocco Wind Farm

Kay County, Oklahoma

Project Location

EXHIBIT 1

Map Document: P:\0000488.00\GIS\CRM\Chilocco_ProjLoc_130826.mxd 8/26/2013 1:36:13 PM

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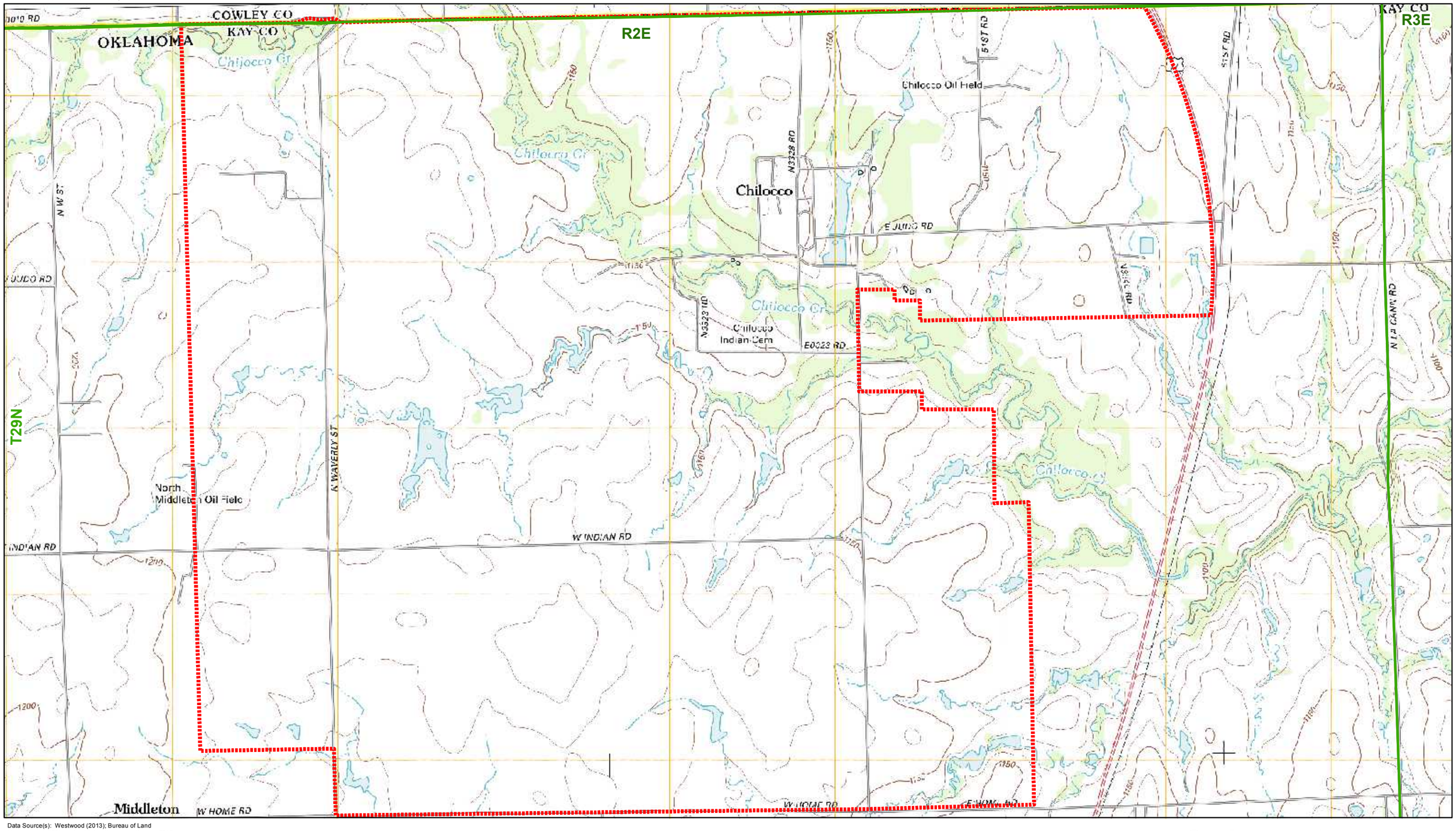

Data Source(s): Westwood (2013); Bureau of Land Management (200); United States Geological Survey (2012)

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N

0 Feet 1,800

Legend

- Townships
- Project Boundary

USGS 7.5-Minute Series
Newkirk Quadrangle

Chilocco Wind Farm

Kay County, Oklahoma

Project Area

EXHIBIT 2

Map Document: P:\0000488.00\GIS\CRM\Chilocco_ProjArea_130822_.mxd 8/22/2013 3:12:00 PM

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Data Source(s): Westwood (2013); PNE Wind (2013); ESRI WMS World Imagery (accessed 2013)

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N

0 2,000 Feet

Legend

- Turbine
- Meterological Tower
- Substation
- Project Boundary
- Collector Run
- Access Road
- Crane Path

Chilocco Wind Farm

Kay County, Oklahoma

Project Layout

EXHIBIT 3

Map Document: P:\0000488.00\GIS\CRM\Chilocco_PrgLayout_130822.mxd 8/22/2013 3:11:33 PM

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COWLEY CO
KAY CO
OKLAHOMA
R2E
R3E
T29N
WTG 01
WTG 02
WTG 03
WTG 04
WTG 05
WTG 06
WTG 07
WTG 08
WTG 09
WTG 10
WTG 11
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WTG 89
WTG 90
I-1
Chilocco Oil Field
Chilocco
Chilocco Indian Cem
Chilocco Cr
North Middleton Cemetery
Middleton
N WAYNE ST
N W ST
N LA CANN RD
W JUDD RD
W INDIAN RD
W HOME RD
E HOME RD
E JUDD RD
93329 RD
93328 RD
93323 RD
93319 RD
93318 RD
93317 RD
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93315 RD
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93301 RD
93300 RD

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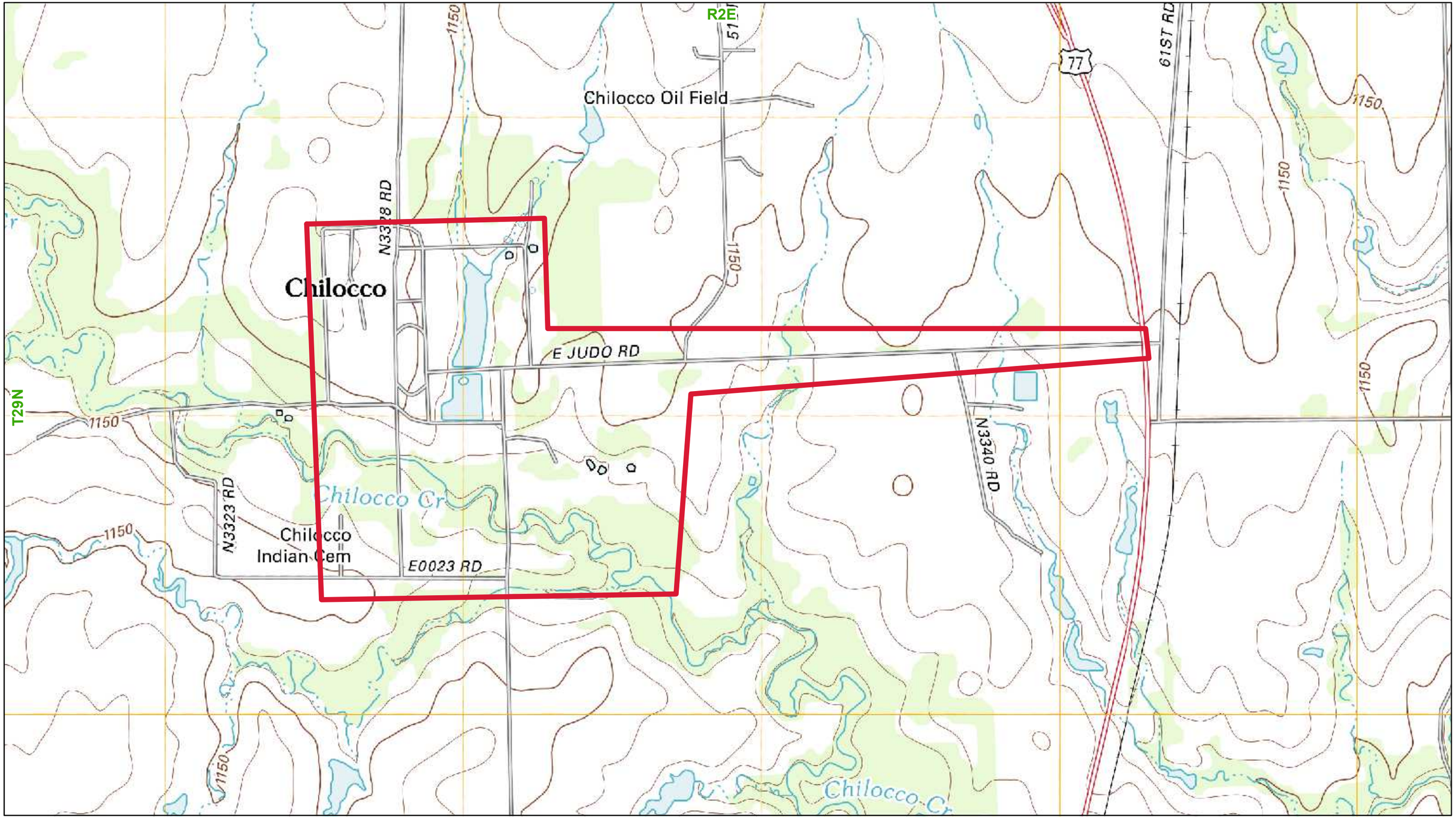

Data Source(s): Westwood (2013); PNE Wind (2013); Bureau of Land Management (2000); United States Geological Survey (2012)

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N

0 Feet 1,000

Legend

Chilocco Indian Agricultural School Historic District

USGS 7.5-Minute Series
Newkirk Quadrangle

Chilocco Wind Farm

Kay County, Oklahoma

Chilocco Indian Agricultural School Historic District

EXHIBIT 5

Map Document: P:\0000488.00\GIS\CRM\Chilocco_HistoricDistrict_130822.mxd 8/26/2013 1:00:58 PM

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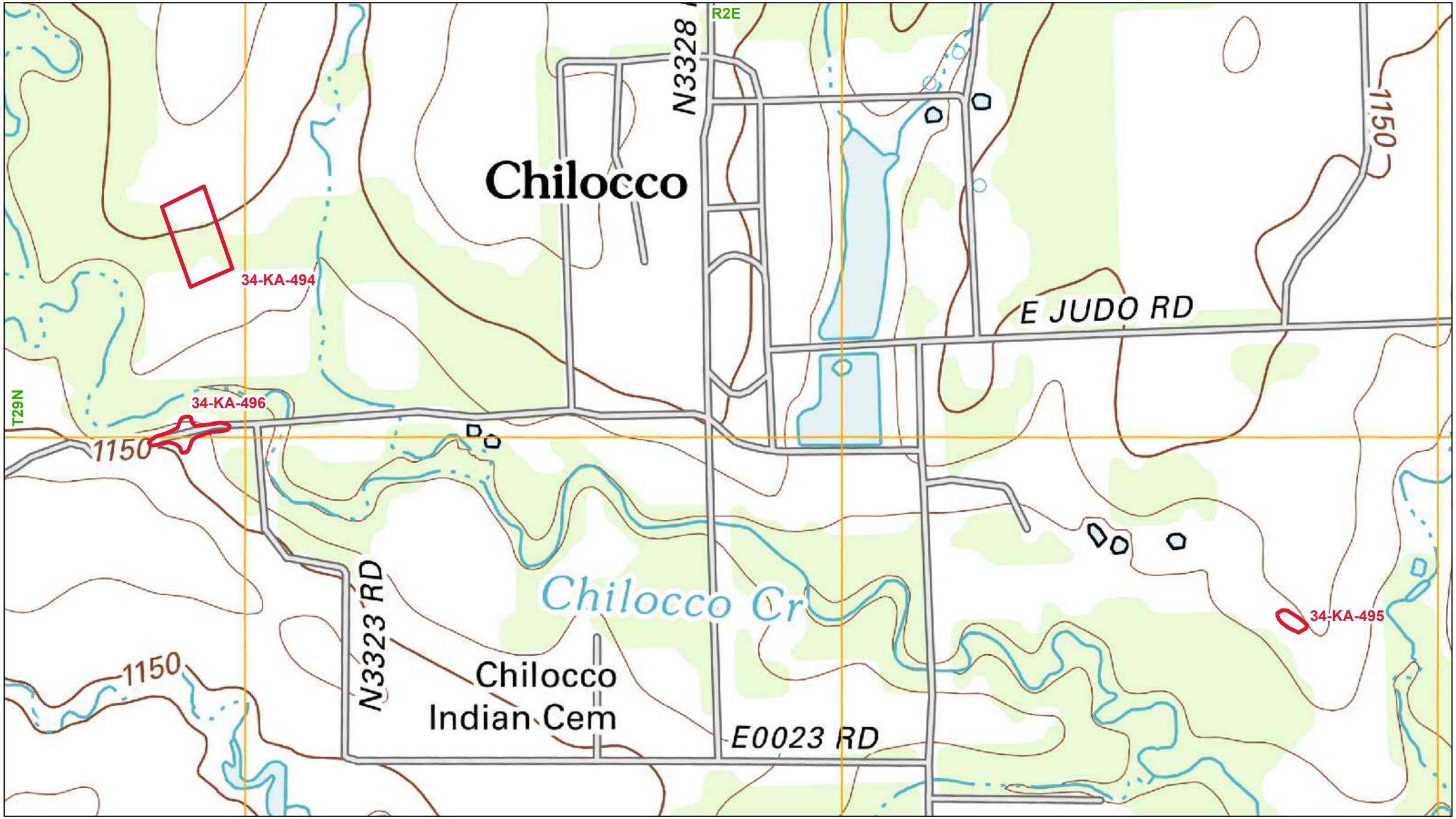

Data Source(s): Westwood (2013); PNE Wind (2013); United States Geological Survey (2012)

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N

0 500 Feet

Legend

Archaeological Sites

USGS 7.5-Minute Series
Newkirk Quadrangle

Chilocco Wind Farm

Kay County, Oklahoma

Archaeological Sites

EXHIBIT 6

Map Document: P:\0000488.00\GIS\CRM\Chilocco_ArchSites_130822.mxd 8/22/2013 3:09:33 PM

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Date: February 4, 2014

Re: Addendum to the Class III Archaeological Survey for the Proposed Chilocco Wind Farm Project, Kay County, Oklahoma
SHPO File #0502-14
File R000488.00

To: John A. Worthington
Regional Archaeologist
Southern Plains Region
Bureau of Indian Affairs

From: Ryan P. Grohnke; Amanda Gronhovd, MS, RPA

Westwood Professional Services, Inc. (Westwood) was contracted by PNE Wind, USA (PNE) to conduct a Class III Archaeological Survey of the Proposed Chilocco Wind Farm Project. The report which detailed the methods, results, and conclusions of the investigation was developed in consultation with the Bureau of Indian Affairs (BIA) which served as lead Federal Lead Agency for this project. The report, *Class III Archaeological Survey for the Proposed Chilocco Wind Farm Project, Kay County, Oklahoma*, prepared by Westwood on September 12, 2013 was submitted to the BIA in September of 2013.

After the BIA accepted and concurred with the report, they submitted the report to the Oklahoma Historical Society-State Historic Preservation Office (SHPO) and the Oklahoma Archeological Survey (OAS). Following review of the report, the SHPO and OAS requested additional information. The requests were detailed in letters dated January 10, 2014 from the SHPO and January 3, 2014 from OAS. This addendum is a submittal of the requested information.

1. **Request by SHPO for a map showing turbine locations and proximity to the Chilocco Indian Agricultural School historic district.**

The requested map is attached as Exhibit 1.

2. **Request by SHPO for a description of wind turbines including their height, lighting, and other information.**

The GE 1.7-100 MW wind turbines planned for installation have a monopole design, a hub height of 80 meters (262 feet), and rotors with a 97.4-meter (320-foot) diameter operating at approximately 9 to17.5 revolutions per minute. The maximum blade-extended height of each structure is approximately 128.7 meters (422 feet). GE wind turbines have a 20 to 25 year expected lifespan and are designed to operate effectively in areas with slower average wind speeds.

The FAA has oversight on any object that could have an impact on aviation. The FAA determines which turbines will be lit and how they will be lit. Flashing red lights (L864) will be used on this project. There will be no unlighted separations more than 0.5 miles in length. Lights will be placed on each turbine at the end of a turbine string as well as on isolated turbines. Flash frequency will be at 20 flashes per minutes to minimize any effects on ground structures. The flash frequency is the lowest rate permitted by the FAA. A total of 29 turbines will have the flashing red lights (Exhibit 1).

3. **Request by SHPO for total size of Area of Potential Effect in acres.**

The total size of the Area of Potential Effect (APE) which was surveyed for archaeology was 692 acres.

4. **Request by SHPO for total size of project area for which archival searches were conducted.**

The total size of the project area only, without a one-mile buffer is 6,210 acres. With a one-mile buffer included for archival searches, the entire study area is 16,765 acres. Both of the archival searched conducted by OAS and the archival search conducted by Westwood used the project area plus a one mile buffer (16,765 acres). Point # 10 below has additional comments on the project area and the study area for archival research.

5. **Request by SHPO to update site form for 34KA448.**

A review of the site form for 34KA448 indicates that the site is located on land owned by the Tonkawa Tribe. The written description and UTM coordinates also indicate the site is on land under ownership of the Tonkawa Tribe. This area is both outside of the Area of Potential Effect and the Project Area. The Tonkawa tribe is not participating in the current project and archaeologists did not have access to the site in order to ascertain its present condition or complete an updated form.

6. **Request by SHPO to provide a historic, post-contact period background summary. Additionally, add a more extensive and detailed prehistoric context per comments from OAS.**

The Oklahoma Archaeological Society has developed archaeological contexts for Oklahoma. These contexts are based on years of prehistoric and historic research in the region in order to examine regional historic (Contact and Post-contact) and prehistoric (Pre-contact) past. They are a general description and interpretation of regional history. The contexts give basic observations of current theories relating to prehistoric and historic people from different locations throughout the history of the region.

The Pre-Contact period is focused solely on Native American peoples before the arrival of Euro-Americans. This period is divided into four traditions: Paleoindian, Archaic, Woodland, and Villagers. These traditions are defined, and sub-defined, by changes in technology and food sources exploited.

The Protohistoric and Historic cultural history is focused on the interaction of American Indians and Euro-Americans during the Contact and Post-Contact periods. These contexts range from the first contact between Europeans and American Indians during European exploration in the region (Contact), through Euro-American settlement of traditionally American Indian lands (Post-contact).

The current project area is located within the Oklahoma biotic district known as Region 2, or the Mixed Grass-Tall Grass Prairie, which encompasses the area of north-central Oklahoma bounded by the Ozark Uplift on the east and the High Plains on the west. Up through and slightly past the middle of the 20th century, "archeological investigations in Region #2 were spotty and sporadic" (Wyckoff and Brooks 1983:34).

The pace of professional archaeological investigations in Region 2 increased exponentially during the 1960s and 1970s. The increased pace can be attributed largely to the proposed construction of a number of reservoirs. One area near the current project area that received a great deal of salvage archaeological attention in the early- to mid-1970s was the proposed Kaw Reservoir, on the Arkansas River between Kay and Osage counties.

Numerous archaeological reports detailing fieldwork conducted in and around the Kaw Reservoir were generated around that time, mostly under the auspices of the Oklahoma Archeological Survey and/or the Oklahoma River Basin Survey. Those investigations added a great deal to the knowledge of north-central Oklahoma's prehistory and proto-history, as they included both site-specific reports (e.g., Bastian 1969, Hartley 1974, Hartley and Miller 1977) as well as reports that trended more toward regional

syntheses (e.g., George 1982, Hartley 1975, Rohrbaugh 1973 and 1974, and Young 1978).

Many of the early initial published reports agreed that archaeological work in the vicinity of the Kaw Reservoir provided little if any new and compelling evidence on Paleoindian or Archaic period sites. Hartley (1974:7), for example, noted that up to the early 1970s, "no sites yielding good evidence for a Paleo-Indian occupation or kill site have been tested in the Kaw Reservoir [and that although] several Archaic complexes have been recognized in the area surrounding the Kaw Reservoir…evidence for an Archaic occupation in the Reservoir itself is rather scanty."

As opposed to the scant evidence for Paleoindian or Archaic sites, later period occupations were quite well represented. During his discussion of the northern section of the Kaw Reservoir, Young noted that the 22 sites investigated represented examples of Plains Woodland, Plains Village, and Proto-historic Plains Village sites, but nothing earlier.

Pre-Contact Period

Paleoindian Tradition (12,000 to 8,000 Before Present [B.P.])

The first people to arrive in North America, the Paleoindians, crossed the Bering land bridge from Siberia to Alaska. When they arrived, approximately half of North America was covered by a glacial ice sheet. As the glaciers melted, the people moved south and eventually spread throughout the entirety of the Americas (Dobbs 1990). Pleistocene megafauna, such as mammoth and mastodon, roamed the land.

Paleoindians were small groups known best for hunting large megafauna, including mammoth, mastodon, and Bison antiquus - an extinct bison up to one-third larger than modern bison (Frison 1998). By 11,000 years B.P., mammoth and other megafauna were extinct, and the Paleoindians shifted their hunting focus to bison, the next largest mammal (Frison 1998). Evidence also suggests that these people not only hunted megafauna and large mammals, but also exploited other food sources such as fish, berries, nuts, and small mammals (Tankersley 1998).

The earliest Paleoindian spearpoints are easily identified by a distinctive flute down both sides. During the middle of the Paleoindian period, lanceolate, nonfluted points began to emerge. During the late Paleoindian periods, we see a shift from fluted and lanceolate to exclusively lanceolate points.

The earliest of the fluted point style is known as the Clovis point, dating from 12,000 – 11,000 years B.P. (Justice 1987). The original Clovis point was recovered from the

Blackwater Draw site and named after the nearby town of Clovis, New Mexico. The spearpoints from Blackwater Draw were found in direct association with late Pleistocene fauna including Columbian mammoth, horse, camel, bison, and saber-tooth cat (Dobbs 1990).

Following the Clovis point is the Folsom point, differentiated from Clovis by a decrease in length and an increase in the length of the flute. Dates of the Folsom Complex last from approximately 11,000 – 10,200 years B.P. (Hofman 1995). The Folsom point and type site is named after the city of Folsom, New Mexico, where a Folsom projectile point was recovered with the ribcage of the now extinct species of bison, Bison antiquus (Dobbs 1990).

The Late Paleoindian period generally began toward the end of the Folsom Complex and lasted to the beginning of the Archaic Period. Late Paleoindian technology is marked by a change from the distinctive Folsom style. Lanceolate points vary greatly in style, but share the features of being nonfluted, unnotched, and finely flaked. They arrive in the archaeological record during the Folsom Complex, and continue to the end of the Paleoindian Tradition (Dobbs 1990).

Paleoindian sites are relatively uncommon and difficult to locate by archaeologists due to buried deposits. The lack of stratified sites and the small number of artifacts recovered from those sites suggests that Paleoindian people lived in small, nomadic groups (Frison 1998), and the most compelling evidence of a Paleoindian presence generally comes in the form of a well-defined kill site or camp.

Paleoindian sites accounted for only 228 of the 18,219 sites that had been documented in Oklahoma up to 2005 (Brooks 2005), and the majority of those were located in the western portion of the state. In Kay County, most Paleoindian archaeological evidence consists of a few lithic scatters but no well-defined kill site or camps have yet been identified (Brooks 1988). Environmental information has been derived from finds consisting of extinct fauna like the Trepp mammoth locality (Brooks 1988).

Archaic Tradition (8,000 to 2,000 B.P.)

Evidence suggests that Archaic people lived in small groups occupying seasonal camps, much like their Paleoindian predecessors (Jones et.al. 2003). Some research counters this belief, suggesting that community size increased and groups became more sedentary (Dobbs 1990). The major innovations differentiating the Archaic people from the Paleoindian people include a change in projectile point technology, the invention of groundstone tools, and a change in subsistence strategies. The Archaic Tradition is also noted for the development of regional differences, possibly due to regionalization of particular groups (Anfinson 1987).

By the beginning of the Archaic period, the megafauna had long been extinct. This resulted in a shift towards a more effective hunting and gathering subsistence. Hunters focused on bison, deer, and small mammals. Some archaeologists believe that Archaic people became more regionalized partly due to the major biomes. This regionalization allowed the people to perfect the exploitation of local raw material and food sources (Dobbs 1990).

The Archaic Tradition technology is marked by a change in projectile point manufacture. Projectile points have shifted from lanceolate to notched and stemmed points and the flaking quality begins to diminish. Other innovations of the Archaic people is the appearance of groundstone tools created by friction from grinding, polishing, and pecking igneous and metamorphic rocks, such as granite and basalt (Brooks 1988).

A variety of settlement types are defined for the study region, including base camps, temporary hunting camps, bison kill sites, cemeteries, quarries, and less defined activity areas. Several camps containing organic (bone and shell) tools are preserved. Most of the information on Archaic life was initially derived from sites in eastern Oklahoma (Brooks 1988), although the 1992 discovery of the Kubik Site (34KA354) in the Flint Hills region has provided solid evidence of an Archaic occupation in Kay County.

The Kubik Site has proven especially informative about Archaic period lifeways. The site's deeply buried cultural deposits, located approximately four to six feet below the present ground surface, yielded distinctive Calf Creek-style points as well as associated floral and faunal remains and dateable charcoal samples. Radiocarbon dates for the material recovered at the Kubik Site suggest an occupation of approximately 5,000 – 5,800 years ago.

Most of the previously known sites belonging to that geographic and temporal era (Calf Creek) had only surface manifestations. On sites that have only (or even mainly) a surface presence, archaeologists are often interpretively limited to gleaning some sense of time depth based on stone tool styles and perhaps to inferring some sort of landscape preferences of the groups subject to investigation. Excavation and subsequent interpretation of the deeply buried deposits at the Kubik Site therefore proved particularly valuable because the results "increased archaeologists' understanding of this group of prehistoric foragers, more accurately placing them in time and providing information about environmental conditions and diet" (www.digital.library.okstate.edu/encyclopedia/entries/K/KU002.html).

Woodland Tradition (2,000 B.P. to 1,200 B.P.)

The Woodland Tradition is generally divided into three periods – Early, Middle and Late. The Woodland Tradition is marked by the emergence of ceramic pottery vessels

and the adoption of farming practices. The multiple contexts describing the Woodland period are a result of increased regionalization of the Woodland people (Brooks 1988).

The Woodland people most certainly exploited similar food sources to their Archaic ancestors. Bison, deer, and small mammals were still a major food source. Plants, such as wild rice, were exploited more heavily than in previous times, and there is evidence of cultivation of maize and squash (Dobbs 1990).

The primary technological advance during the Woodland Tradition is the advent of ceramic pottery. The original divisions of Early, Middle, and Late Woodland were differentiated by their technology. Ceramics during the Early Woodland period are normally thick and crude with cord-marked decoration on the exterior. Middle Woodland shows early evidence of earthen burial mounds. Late Woodland continues the tradition of ceramics and burial mounds. Woodland sites in this region of Oklahoma include small villages or hamlets, base and temporary camps, workshops, and small rock mounds associated with burials (Brooks 1988).

Despite the notion that "Woodland, or perhaps more properly Plains-Woodland, material and sites are quite common in the Kaw Reservoir and surrounding regions" (Hartley 1974:8), the Woodland Tradition still is not well understood for northern Oklahoma. It is especially difficult to try and distinguish any type of transition from the Late Archaic into the Early Woodland. Indeed, during one of the initial attempts to define a cultural sequence for this area, Bastian (1969:7) suggested that "there appears to have been a direct transition from the Late Archaic horizon into the Middle Woodland or later horizons." Bastian's initial sequence, or at least parts of it, however, was challenged within just a few years (e.g., Hartley 1974:7) by subsequent fieldwork conducted in the region.

A few years farther into the archaeological investigations around the Kaw Reservoir, Young (1978:291) defined the Plains Woodland as the cultural stage that marked a transition from hunting and gathering to a sedentary horticultural subsistence mode. He suggested that, in addition to the appearance of pottery (which at this point was comprised of straight-sided vessels with pointed bottoms), during this transition stage diagnostic artifacts included combinations of corner-notched dart points, contracting stemmed dart points, and corner-notched arrow points.

The earliest Woodland Tradition sites in Kay County include Hudsonpillar, Von Elm, Vickery, and Hammons, all of which are located along the Arkansas River Valley (Wyckoff and Brooks 1983:38). Archaeological investigations at the Von Elm Site (34KA10) led to an interpretation that each of four distinct site areas had a Woodland component that dated to somewhere between AD 1 and 900 (Hartley 1974:124).

Villagers (1,200 B.P. to 500 B.P.)

At the end of the Woodland Tradition, large societies of farming people established themselves along major rivers in Oklahoma. The people of this period continued to create ceramic vessels and earthen burial mounds. Populations became larger and even more regionalized than previous. These traditions lasted from the end of the Woodland Tradition to first contact with European explorers (Anfinson 1987).

The Village Farming cultures relied heavily on raising corn, beans, and squash supplemented by hunting game and collecting seasonal resources. The establishment of small to moderate-sized villages along terraces of major rivers due an increase in population led to a greater complexity in social organization. Throughout the state of Oklahoma, groups shared similar economies and levels of technology. Variations in farming and village patterns were maintained by all dependent on the physical environment (Brooks 1988).

Villages were comprised of 10 to 20 houses and a burial area. Burial areas are often associated with exotic goods indicating special treatment of individuals and status differentiation in their social organization. Corn horticulture intensified, as these people became more regionalized and limited the number of different species of plants they exploited. Perhaps the intensification of corn horticulture is a response to larger community size.

The site types assigned to the Plains Village Tradition are similar to the Woodland Tradition, and the archaeological remains of these complexes range from cemeteries to small burials, limited use sites to extensive habitation sites. Site location is also consistent with the previous period and depends on numerous factors, including the location of specific resources the people were using or the presence of a particular desirable environment (Brooks 1988).

Archaeological manifestations of technological differences between the Woodland Tradition and the Plains Village Tradition include the distinction that stone projectiles are almost all arrow points, with side-notched and un-notched forms being the most common. Additionally, pottery is globular, and the presence of corn cobs and grain provide evidence of horticulture. One of the first excavated Plains Village sites in Kay County was the Uncas Site (34KA172), where investigators found evidence of increased sedentism in the form of a 700 year old house (Wyckoff and Brooks 1983:41).

Florence-A Chert

Florence-A chert was the primary raw material encountered during the archaeological survey of the Chilocco Wind Farm. This resource occurs naturally relatively near the proposed project area within Kay County, OK and Cowley County, KS (Vehik 1990). Florence-A is one of the most heavily used resources in the region, but it was traded

extensively to more distant locales. It generally can be found from outcrops and occasional erosional remnants in the Flint Hills area. This chert appears first to have been used by Caddoan peoples of the Arkansas River Valley beginning around A.D. 900, spread to the Plains Village people including the Washita River and Smoky Hill phases by A.D. 1000, but became the most common after A.D. 1450 (Vehick 1988).

Protohistoric and Historic (500 B.P. to present)

This period generally refers to the span of time extending from the first European explorations until intensive Euro-American settlement of the region. Possible archaeological site types associated with this period are generally consistent with those of earlier periods, but the influence of European and Euro-American traders, missionaries, settlers, and industries affected the locations of these sites. This period also includes the settlement patterns, subsistence activities, and economic strategies employed by Euro-American immigrants. Associated archaeological and historic site types categorized in the Contact/Post-Contact period include standing structures as well as archaeological sites.

The specific dates for the protohistoric vs. historic are still open to some debate. This section will look at the protohistoric and historic together as they both involve influence and activities of European newcomers on the region. While some researchers consider de Coronado's search for Quivira and thereby entering the state in A.D. 1541 as the beginning of the protohistoric, there are others who suggest an earlier date of A.D. 1450 (Perkins and Baugh 2008). Although this date is pre-Columbus, it takes into account changes already occurring in the region as well as later impacts from European trade goods, disease, and movement of peoples. Perkins and Baugh also suggest 1846 as the ending of the protohistoric. Brooks (1988) uses dates of A.D. 1500 to 1800 for the protohistoric. These dates incorporate the influence the Europeans prior to contact through the initial contact stage during European Expansion.

European Expansion 1541-1803

At the time of contact, Wichita and other Caddoan groups were living in villages in the southern and eastern portions of what is now present day Oklahoma, specifically along the Arkansas, Canadian, Washita, and Red Rivers (Baird and Goble 1994). Nomadic groups such as the Apache, the Osage, and Pawnee could be found in the prairies of the north and west (Everett 2007(a)). The current project area is in a location that would have had strong Wichita and Caddoan influence at the time of contact.

The first known European contact in the state of Oklahoma was the expedition of the Spaniard Francisco de Coronado in his search for gold and the city of Quivira in 1541 C.E. Besides being the first contact in the region between Europeans and Native Peoples, this expedition also gave Spain authority over the area, including Oklahoma

in the minds of the various European governments. Other Spanish journeys into Oklahoma included the de Padilla/do Compo attempt to found a Catholic Mission amongst the Kaw (1542-1547 C.E.) and de Onate's visit to Quivira in 1601 (Baird and Goble 1994).

French incursions into Oklahoma began following La Salle's claiming of the area called Louisiana. Jean –Baptiste de La Harpe led an expedition to explore the region and begin trade with the Native peoples in 1719 (Baird and Goble 1994). Additional French exploration and trade would follow. France would lose control of Louisiana (including Oklahoma) to Spain in 1763, but it would be returned in 1800.

Within Kay County are two significant sites related to this time period. The Deer Creek Site (34KA3) and the Bryson-Paddock Site (34KA5) are both listed as National Historic Landmarks. These 18th century, fortified Wichita villages associated with early trade are located on terraces of the Arkansas River (Wedel 1981). These villages were especially significant and different from other contemporaneous Wichita villages in that evidence indicates that French hunters were also present and interacted extensively with the Wichita (Wedel 1981). These sites also give evidence that the villages had become much larger than the previous Village Farming period (Brooks 1988).

Westward Expansion 1803-1861

The region would be acquired by the United States in 1803 as part of the Louisiana Purchase. The next 20 years would see significant exploration of Oklahoma by European Americans. These expeditions included Lewis and Clark's scientific expedition (1804-1806), the Sibley expedition (1811), Thomas Nuttall's explorations (1819) and the Long and Bell expeditions (1820) amongst others (Baird and Goble 1994). During his expedition to find the beginning of the Red River Zebulon Pike sent Lieutenant James Wilkinson with several men down the Arkansas River. This exploration went through Kay County and near the project area. Besides the government and scientific expeditions occurring at this time, extensive trading between the Native People's and private individuals and companies were taking place.

One of the reasons President Jefferson purchased the Louisiana Territory was for a location to relocate Native Americans who were not willing to assimilate (Baird and Goble 1994). Throughout the Jefferson administration and after, Eastern tribes were encouraged to move west. Following the Indian Removal Act in 1830 the "encouragement" became much more forceful and even included those tribes who were successfully assimilating into Euro-American culture. Initially the Act, which was to relocate all Eastern Indians west of the Mississippi, was to use treaties to pressure voluntary relocation.

By 1835, the Five Tribes (sometimes called the Five Civilized Tribes) except for the Cherokee had relocated. On December 29, 1835 the Treaty of New Echota was signed by a small group of the Cherokee and against the wishes of the Cherokee Nation as a whole (Dale and Wardell 1948). This treaty sold all Cherokee lands in the east to the United States for five million dollars and required the federal government to pay for the cost of removal and assistance in the new lands. The Cherokee were gathered up and forced to head west in adverse conditions. The conditions were so awful that 13% died on their journey, which is referred to as the Trail of Tears (Baird and Goble 1994).

Following the relocation and prior to the Civil War, the Five Tribes began to rebuild their governments and societies in their new lands. Economies were being reestablished with agriculture, ranching and even manufacturing being practiced. Schools were built and many missions established. Although problems did exist within the Tribes, it seemed that a time of prosperity had come (Dale and Wardell 1948).

Civil War 1861-1865

Slavery was practiced in the Indian Territory at the outbreak of the Civil War with approximately 14% of the population being African American Slaves (Huston 2007). Knowing that many of the Indian leaders supported the Confederate States of America, Jefferson Davis sent Albert Pike to negotiate with the Five Tribes (Dale and Wardell 1948). Treaties between the Five Tribes and the Confederacy were quickly signed with only the Cherokee refraining for a time due to some members of the tribe hoping to remain neutral during the war. The treaties promised that the Confederacy would uphold all previous treaties between the Five Tribes and the United States, they would defend the Tribes militarily, and even gave some rights to the Five Tribes in Confederate courts and government (Baird and Goble 1994). Following their signing treaties with the Confederacy, the Five Tribes quickly started to form military units.

Although the leadership of the Five Tribes supported the Confederacy, many of the people wished to remain neutral. The Creek Leader Opothleyahola gathered together 7,000 of the Creek and Seminole and declared loyalty to the United States (Baird and Goble 1994). Indian and Texas troops loyal to the Confederacy attacked these Loyalists at Round Mountain, Chusto-Talasah and Chustenahlah before the Loyalists escaped into Kansas (Huston 2007).

After the defeat of Confederate forces at the Battle of Pea Ridge in March of 1862, the Confederacy's military leaders accused the Indian troops of scalping the Union dead and performing poorly (Baird and Goble 1994). Albert Pike, now general of the Indian troops, took his command back to Indian Territory. He resigned in May 1862 as the Confederacy was discriminating against his troops and not fulfilling the treaties.

In June 1862, Colonel William Weer led the Union Indian Expedition, an attempt by the Union to retake the Indian Territory (Huston 2007). Although the Indian Expedition was initially successful, a breakdown in leadership forced Weer to retreat. Although ineffective, the Union Indian Expedition caused the divisions in the Cherokee to resurface.

Union Brigadier General James Blunt invaded Indian Territory. At the battle of Honey Springs in July, 1863 he easily defeated the Confederate forces. Over the next two months he had additional victories at Perryville and Fort Smith, thereby giving the Union control over the northern two thirds of Oklahoma (Baird and Goble 1994). Many of the Loyalists began to return at that time. The Confederate military in Indian Territory was reduced to guerilla warfare.

By the war's end, the Tribes had been weakened and the successes of the previous decades were gone. Over 10,000 members of the Five Tribes had perished during the war, both to battles and to the deprivations caused by the war (Baird and Goble 1994). Divisions amongst the tribes had resurfaced and worsened. Now weakened and defeated, the Five Tribes were in a poor position to negotiate what was to come.

Territorial Era 1861-1907

The United States determined that all previous treaties were void due to the Five Tribes support of the Confederacy (Pennington 2007(a)). The reconstruction treaties of 1866 abolished slavery and gave rights to freedmen, an intertribal council was formed, railroads would be permitted, annuities restored, and much land lost. The Cherokee lost the neutral lands of Kansas and the Cherokee Strip as well as the Cherokee Outlet. The Five Tribes were required to sell the western half of their land. The Seminole had to sell all of their land and then purchase land from the federal government. The land taken from the Five Tribes was now used for reservations for other Plains tribes (Dale and Wardell 1948).

Following the initial recovery after the Civil War, many whites began to enter Indian Territory. The Unassigned Lands, an area taken from the Creek and Seminole, was still unused (Baird and Goble 1994). Many whites began to push to have this opened for homesteading. A group referred to as Boomers used the approach of settling the Unassigned Lands without permission, but hoping the publicity would entice the government to make it available. The railroads encouraged settlement as well as the opening of the Unassigned Lands for the profit it would bring them. Finally in 1889 the United States Government opened the Unassigned Lands for settlement.

On May 2, 1890, the Organic Act for the Territory of Oklahoma was passed (Everett 2007(b)). The previously Unassigned Lands became the Territory of Oklahoma and a territorial government was to be established. No Man's Land (the current Oklahoma Panhandle) was included. Methods were set forth to incorporate other Indian Lands as

allotments were given and reservations disbanded per the Dawes Act. The Dawes Act of 1887 ended tribal ownership of lands. Instead small allotments would be given to individuals within the tribes. The remainder of the land would then be open to settlement. The land of the Five Tribes was not included, but was formally given the name "Indian Territory" as well as increased rights and connections to the laws of the United States.

Piece by piece the lands in the west were opened up to settlement by allotment. Settlement was generally done by land run, where prospective settlers would need to compete with others and claim their land. Once claimed, the lands needed to be improved as per the Homestead Act. In 1893 the Cherokee Outlet was opened and became the largest land run in the Territory's history (Baird and Goble 1994). The current project area is located on the eastern side of the Cherokee Outlet.

Initially the Dawes Act did not apply to Indian Territory, but a law passed in 1893 allowed the government to begin to negotiate the process with the Five Tribes. Despite resistance from the Tribes, the government began to survey the tribal lands and prepare census rolls. In 1898 the Curtis Act was passed. This law ended tribal governments and placed individuals under the authority of the territorial government (Tatro 2007). In order to keep some control over the process, the Tribes negotiated the allotment procedures with the federal government (Baird and Goble 1994).

Oklahoma Territory in the west and Indian Territory in the east were referred to as the Twin Territories. Attempts were made to bring about separate statehoods for the two territories. The Sequoyah Convention of 1905 was an attempt by the Five Tribes to draw up a constitution for the new state of Sequoyah which was presented to Congress. Instead Congress passed the Oklahoma Enabling Act in 1906 which would unite the Twin Territories and prepare them for statehood (Pennington, 2007(b)). On November 16, 1907 Oklahoma officially became the forty-sixth state.

Twentieth Century

The first decades following statehood were marked by political issues, racial divisions, and economic disparity. With the coming of the Great Depression, the economic problems only worsened, with the issues previously confined to rural area spreading to the cities (Agnew 2007). Even though many efforts were made to mitigate situation, financial issues persisted until spending for World War II helped to encourage a recovery.

While racial divides were as bad in Oklahoma as anywhere in the United States, and in some ways persist to this day, there was one event which differed in Oklahoma compared to other southern states. Governor Raymond Gary did not fight integration, but instead accepted it and helped to change the state constitution to fit with the Supreme Court's ruling in Browns vs. Board of Education of Topeka (Baird and Goble

1994). Because of this, the conflicts which followed were perhaps less in Oklahoma than in other southern states.

Throughout the Twentieth Century agriculture and oil were two of the primary focuses on the state economy. Both went through multiple booms and busts (Baird and Goble 1994).

Kay County

The area which is now Kay County was first entered by Euro-American explorers James Wilkinson (1806) and George Sibley (1811). When the United States gained control of the region it became part of the Cherokee Outlet. At the time that the Cherokee Outlet was set forth as land for other tribes, the Kaw, the Ponca and the Nez Perce were placed on reservations in what is now Kay County. The Nez Perce returned to their home in 1885 and that land was given to the Tonkawa and the Apache. The Tonkawas received land allotments in 1891, the Ponca in 1904, and the Kaw in 1906. The Cherokee Outlet was opened to settlement by a land run in 1893. The Ponca and Kaw reservations were not opened to non-Indian settlement.

The name Kay was adopted by the County as it was originally labeled as K when counties were formed from the Cherokee Outlet. Agriculture and the oil/gas industry are the primary components of the County's economy. The county seat is located in Newkirk. (From Wilson 2007)

Kay County is located in SHPO Management Region #2 as part of Oklahoma's Comprehensive Preservation Planning Process (OHS 2014). Management Region #2 is made of 10 counties in the north-west portion of Oklahoma. Kay County is the most north-east county in this Management Region, being bordered by Management Region #3 to the east and the State of Kansas to the north. Management Region #2 has multiple historic contexts associated with it, including: Agriculture, Energy, Exploration, Industry, Ranching, European Settlement, White Settlement, Transportation, and Area: Ponca City. Although all of the historic contexts would apply to Kay County, the Agriculture and White Settlement contexts may be of particular interest when looking at the immediate vicinity surrounding the project area. As the project area itself has remained under the ownership of Native American Tribes to present day and was used for a specific purpose (the Chilocco Indian Agricultural School) for over a century, many of the contexts would not directly apply to the Chilocco Wind Farm project area. As the purpose of the Chilocco Indian Agricultural School was to instruct Native American students in agriculture and industry, there is the possibility of properties relating to both the Agriculture and Industry contexts within the project area.

As of 2005, only 86 historic archaeological sites or sites with historic components had been identified in Kay County (Brooks 2005). This was approximately 19% of the 449

total archaeological sites which had been identified in Kay County at that time. Over the last nine years, the number of archaeological sites, both historic and prehistoric, has most certainly grown.

Chilocco Indian Agricultural School

Prior to the latter part of the 19th century, education of Native Americans had been dealt with primarily through Christian missions and reservation schools. This policy changed through the efforts of Captain Richard Henry Pratt. In 1878 Pratt brought in teachers to instruct prisoners of war from the Arapaho, Cheyenne, and Kiowa tribes who had been placed under his guard (Reyhner and Eder 2004). After their release, some of the prisoners wished to continue their education so Pratt had them enrolled into the Hampton Institute. Following the success of the Indian students at the Hampton Institute, Pratt received permission to create a school for Indians of all tribes. Pratt established the Carlisle Indian Industrial School in 1879. This was the first of the off-reservation boarding schools.

The off-reservation boarding school system allowed for the education of Indian youth away from the influence of their cultures. Using a strong military disciplinarian attitude, the system was designed to "Christianize" and "civilize" Indian students. As Pratt said, "…the end to be gained…is the complete civilization of the Indian and his absorption into our national life…the Indian to lose his identity as such, to give up his tribal relations and to be made to feel that he is an American citizen" (Utley 1964). Following Carlisle, schools were established in Chemawa, Oregon in 1880 and Chilocco in 1884 (Reyhner and Eder 2004).

In 1882, the United States Congress authorized an off-reservation Indian boarding school in Indian Territory (Oklahoma) near the Kansas state line and the Ponca and Pawnee reservations on land that had been deeded by the Cherokee. Major James Haworth, the superintendent of Indian Schools, chose the location near Chilocco Creek (Lomawaima 1994). First called the Haworth Institute, Chilocco, Indian Territory, the name was changed to the Chilocco Indian Industrial School and later the Chilocco Indian Agricultural School. The original school property including the campus and fields had over 8,000 acres. Although primarily an agricultural school, Chilocco also taught industrial trades.

The school began as a single three story building serving as classrooms and dorms, constructed in 1883. Classes began in January of 1884 with 150 students. Over 500 students were attending by 1910, and that number grew to almost 1,300 in the 1950s (NPS 2013). Over the years, as enrollment grew so did the number of buildings needed for housing, staffing, and education.

The school's decline began in the 1960s due to changes in society and the Indian Service (NRHP 2006). In 1979, the United States Senate recommended closing

Chilocco. On July 15, 1980, Chilocco Indian Agricultural School closed. The campus was to be jointly owned by the Ponca, Tonkawa, Kaw, Pawnee, and Otoe-Missouria, with the surrounding land to be split between the five tribes. The Cherokee were also a given a portion of the land as well as 50% of mineral rights (NRHP 2006). Since its closure, the school has been used for various purposes; however, the buildings have largely been left empty and fallen into disrepair. In 2006 the Chilocco Indian Agricultural School was listed on the National Register of Historic Places. The Chilocco Indian Agricultural School was also nominated for listing as a National Historic Landmark (NHL); however, in 2011 at the request of landowner tribes the review was postponed due to concerns of the effects of NHL designation upon economic development.

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1978 *Kaw Reservoir: The Northern Section – Part II.* Oklahoma River Basin Survey, Archaeological Site Report 33.

7. <u>Request by SHPO for assessment of indirect effects.</u>

The Chilocco Wind Farm will not have direct effects upon the Chilocco Indian Agricultural School and the proposed wind farm will not affect the eligibility of the school. The indirect effects of the wind farm upon the integrity of the Chilocco Indian Agricultural School are discussed here.

According to *National Register Bulletin 15: How to Apply the National Register Criteria for Evaluation* (1997), in order for a resource to be eligible for the NRHP under any of the Criteria, it must also retain historic integrity. The seven aspects of integrity include:

- **Location** – the resource remains where it was originally constructed or located, or remains associated with the place where an event occurred;
- **Design** – the elements that comprise the form, plan, space, and style of a resource remain unchanged;
- **Setting** – the site's physical environment remains recognizable;
- **Feeling** – the resource retains its aesthetic or historic sense of a specific period of time;
- **Association** – the resource represents a link between the site and an important historic event, pattern, or person;
- **Material** – the site holds a significant artifact assemblage and/or has good feature preservation;
- **Workmanship** – the labor or skill employed in constructing the site or carrying out the tasks performed at the site is evident.

Chilocco Indian Agricultural School was visited to assess its current condition and the potential for indirect visual effects. With the exception of three structures currently in use for research purposes by the University Multispectral Laboratories in coordination with the Department of Defense and others, all structures at the Chilocco School have become dilapidated and are in a serious state of disrepair. The school campus boundary is lined by trees which screen the external view shed from the school campus itself, and will limit the indirect visual impact the proposed turbines have on the site. The wind generating turbines themselves are symmetrical and will be painted neutral

white to blend in with the natural sky. The aspects of integrity taking into account these proposed changes are considered here.

- **Location** – The proposed project will not move or alter the location of the Chilocco Indian Agricultural School
- **Design** – The proposed project will not alter the layout or plan of the Chilocco Indian Agricultural School.
- **Setting** – Turbines for the proposed project will not be placed within the boundaries of the Chilocco Indian Agricultural School property. The physical environment within the boundaries of the Chilocco Indian Agricultural School will not be affected. Trees surround the campus and will limit the visual impact the turbines have on the campus's setting.
- **Feeling** – Turbines for the proposed project will not be placed within the boundaries of the Chilocco Indian Agricultural School property. Trees surround the campus and will limit the visual impact the turbines have on the campus's feeling.
- **Association** – The proposed project will not change the associations between the Chilocco Indian Agricultural School and the contexts of Indian education or U.S. Government Policies.
- **Material** – The proposed project will not affect the structures of the campus; therefore, there will be no changes the materials of the Chilocco Indian Agricultural School.
- **Workmanship** – The proposed project will not alter the structures or the layout of the campus; therefore, there will be no changes to the workmanship of the Chilocco Indian Agricultural School.

None of the buildings will be affected by the proposed project; therefore, the integrity of the Chilocco Indian Agricultural School in relation to its significance under Criterion C will not be affected. Considering the proposed project's effects upon the integrity of the Chilocco Indian Agricultural School in relation to its significance under Criterion A, the integrity aspects of Location, Design, Association, Material and Workmanship will be unaffected. Should the proposed wind farm potentially affect the integrity of Feeling and Setting in relation to its significance under Criterion A is subjective. The screening of the campus by the extant trees should limit the effect upon those aspects of integrity.

According to National Register Bulletin 15, under Criterion A, "A property important for association with an event, historical pattern, or person(s) ideally might retain *some* features of all seven aspects of integrity: location, design, setting, materials, workmanship, feeling, and association." The proposed project would at worst have limited affects upon the integrity of feeling and setting, but some features of feeling and setting would most certainly remain as the campus and the overall landscape will not be immediately affected. National Register Bulletin 15 also states, "A basic

integrity test for a property associated with an important event or person is whether a historical contemporary would recognize the property as it exists today." Even with the construction of the wind farm around the school, the property will undoubtedly remain recognizable as the Chilocco Indian Agricultural School.

The BIA conducted consultation formally on a government to government basis with tribes whose lands will be affected by the proposed project including: the five tribes of the Chilocco Development Authority (the Kaw Nation, Otoe-Missouria, Pawnee Nation, the Tonkawa Tribe and Ponca Nation) as well as the Cherokee Nation. The Chilocco Development Authority is comprised of the tribes who own the land of the Chilocco Indian Agricultural School. Four of the five tribes which make up the Chilocco Development Authority (the Kaw Nation, Otoe-Missouria, Pawnee Nation, and Ponca Nation) submitted a letter to the BIA that they, "agree and consent that the Chilocco School, though historically significant does not necessitate visual resource setbacks as it relates to wind power generation equipment." The Tonkawa Tribe, which is the fifth member of the Chilocco Development Authority, did not sign the letter, but has provided no opposition or additional input.

Other potential indirect effects might include vibration due to moving construction equipment as well as construction activity. These effects were considered. Access routes to all construction areas by machinery will avoid the Chilocco School campus preventing any vibration effects upon the historic structures. No construction will be taking places within the Chilocco School Campus.

The indirect effect of wind turbine operation vibration on the historic district buildings was also evaluated. The operation of commercial scale turbines creates both ground and air vibration. Because the historic district is comprised of buildings, potential impact would come from ground vibration, or seismic energy. The occurrence of air vibration is at frequencies and amplitudes that do not have the potential to impact physical structures. The study of the impacts of seismic vibrations created by commercial wind turbine is limited in the literature. Several studies have been performed on the health impacts of low frequency vibration, but these are not germane to seismic impacts to physical structures.

Foremost, the turbine manufacture, General Electric, was contacted for information regarding their GE 1.7 MW turbines. Based on their design and testing programs, GE is not aware that an operating GE wind turbine would seismically influence a structure located 800 feet or more from a turbine (Lobdell, 2014). This distance is based on the minimum setback typical of such development projects.

This opinion is consistent with available literature. Two studies were located that assessed seismic vibration created by operating commercial wind farms. Both are related to the impact commercial wind farms could have on scientific measurement

facilities. The first studied impacts to the Laser Interferometric Gravitational Wave Observatory on the Hanford reservation in Washington State (Schofield, 2002). The second studied impacts to a site in Scotland where compliance with the Comprehensive Test Ban Treaty for nuclear testing is seismically monitored (Styles, Stimpson et. al., 2005). Both studies conducted field measurements to monitor vibration propagating from operational wind farms. The turbines were found to produce seismic peaks at multiples of 3 times their rotational frequency. However, this amplitude of ground motion is significantly lower than the regional earthquake accelerations typical for Oklahoma. Similarly, the study done by Keele University determined that wind farm development could occur without compromising the mission of the sensitive monitoring facility.

Based on this research and experience with similar commercial scale wind farms across the Midwest, it is believed that vibration or ground motion from the proposed wind farm will not create a significant indirect impact on the Chilocco School historic district.

Other than those already considered, no additional indirect effects, further in the distance or in the future, are anticipated. It should be noted that the wind farm is not considered to be a permanent development. Chilocco Wind Farm will comply with rules set forth by the State of Oklahoma for decommissioning the facility. This includes setting aside funds for the facility's decommissioning beginning in year 15. Decommissioning will be completed within 12 months after abandonment or at the end of the useful life of the wind energy equipment. Upon termination of project operations, any necessary authorization and permits will be obtained, all infrastructure including wind turbines will be dismantled and removed, and the landscape will be restored to the same physical condition that existed prior to construction.

Lobdell, Scott K.
2014 Personal communication between PNE Wind USA, Inc. and GE Power and Water Renewables, January 22, 2014.

National Register Bulletin #15
1997 How to Apply the National Register Criteria for Evaluation. U.S. Department of the Interior, National Park Service.

Schofield, R.
2002 Seismic Measurements at the Stateline Wind Project and a Prediction of Seismic Signal that the Proposed Maiden Wind Project Would Produce at LIGO. University of Oregon, 14 p.

Styles, P., Stimpson, I., Toon, S., England, R. and Wright, M.

2005 Microseismic and Infrasound Monitoring of Low Frequency Noise and Vibrations from Windfarms. Keele University, 125 p.

8. Request by SHPO for information on consultation efforts.

This information will be provided by the Bureau of Indian Affairs in its role as federal lead agency.

9. Request by OAS for acreage of areas of potential ground disturbing activities that was surveyed for archaeology (the Area of Potential Effect).

The total size of the Area of Potential Effect which was surveyed for archaeology was 692 acres.

10. Request by OAS for information of prior cultural resource work in project area.

A review of mapping acquired from the OAS during a visit to the OAS offices in August, 2013, indicated that only a few locations in the project area had been previously surveyed for cultural resources. Several of the surveys included BIA pond repairs or construction. The BIA pond surveys were conducted in 2000 by Perry in limited locations of Sections 22, 23, and 26 of Township 29N, Range 2E. The BIA pond surveys did not include any of the current proposed project's APE.

According to mapping obtained from OAS, a survey might have been conducted in the current project's APE on the western edge of Section 26 of Township 29N, Range 2E. The mapping from OAS notes Austin Field Services, pipeline, 1/7/94. As additional details could not be found about this survey during a visit to OAS offices, Westwood chose to resurvey that location.

The largest area previously surveyed was in the SE ¼ of Section 21 and the SW ¼ of Section 22 in Township 29N, Range 3E. This survey was completed by S.Bossey on July 1, 1990, for a proposed hazardous waste disposal area. According to details obtained at the OAS offices, no sites were identified during this survey and the project was cleared. However, Westwood took this opportunity to conduct a surface survey of this area as part of their due diligence.

No previously recorded sites were identified within the Chilocco Wind Farm Project Area. Initially it was unclear exactly where site 34-KA-448 was located, but a thorough review of the site form indicates that the site is located outside of the Chilocco Wind Farm Project Area. Although no previously recorded sites were identified within the current project's Area of Potential Effect (692 acres) or within the entirety of the Chilocco Wind Farm Project Area (6,210 acres), the archival research

also looked at a one-mile buffer of the project area in order to understand what potential site types may be identified in the project area (16,765 acres). The seven sites previously identified outside of the project area, but within a one-mile buffer are listed in the following table.

Previously Inventoried Archaeological Sites Within One-Mile of Project Area				
Site Number	Site Type	Cultural Period	NRHP Status	Project Area / Buffer
34-KA-398	Lithic Scatter	Unassigned Prehistoric	Not Eligible	Buffer
34-KA -399	Historic Trash Dump	Historic non-Indian	Not Eligible	Buffer
34-KA -401	Historic Farmstead	Historic non-Indian	Not Eligible	Buffer
34-KA -448	Rock Alignment	Protohistoric/Historic Indian	Further work may be necessary	Buffer
34-KA -465	Historic Farmstead	Historic non-Indian	Not Eligible	Buffer
34-KA -466	Historic Farmstead	Historic non-Indian	Not Eligible	Buffer
34-KA -467	Historic Farmstead	Historic non-Indian	Not Eligible	Buffer

Sites 34-KA-398, 34-KA-399, and 34-KA-401 were identified in July 1998 during a survey by Cojeen Archaeological Services of the Conoco Ponca City to Arkansas City Pipeline. Site 34-KA-448 was identified by NRCS archaeologist K. Kraft in August 2002 during the Tonkawa Pond, EQIP survey. Sites 34-KA-465, 34-KA-466, and 34-KA-467 were identified in October 2009 by BCS as part of the WFEC Chilocco Sub and Tap project.

11. <u>Request by OAS for a more extensive/detailed discussion on the prehistory of Kay County.</u>

See point # 6 above.

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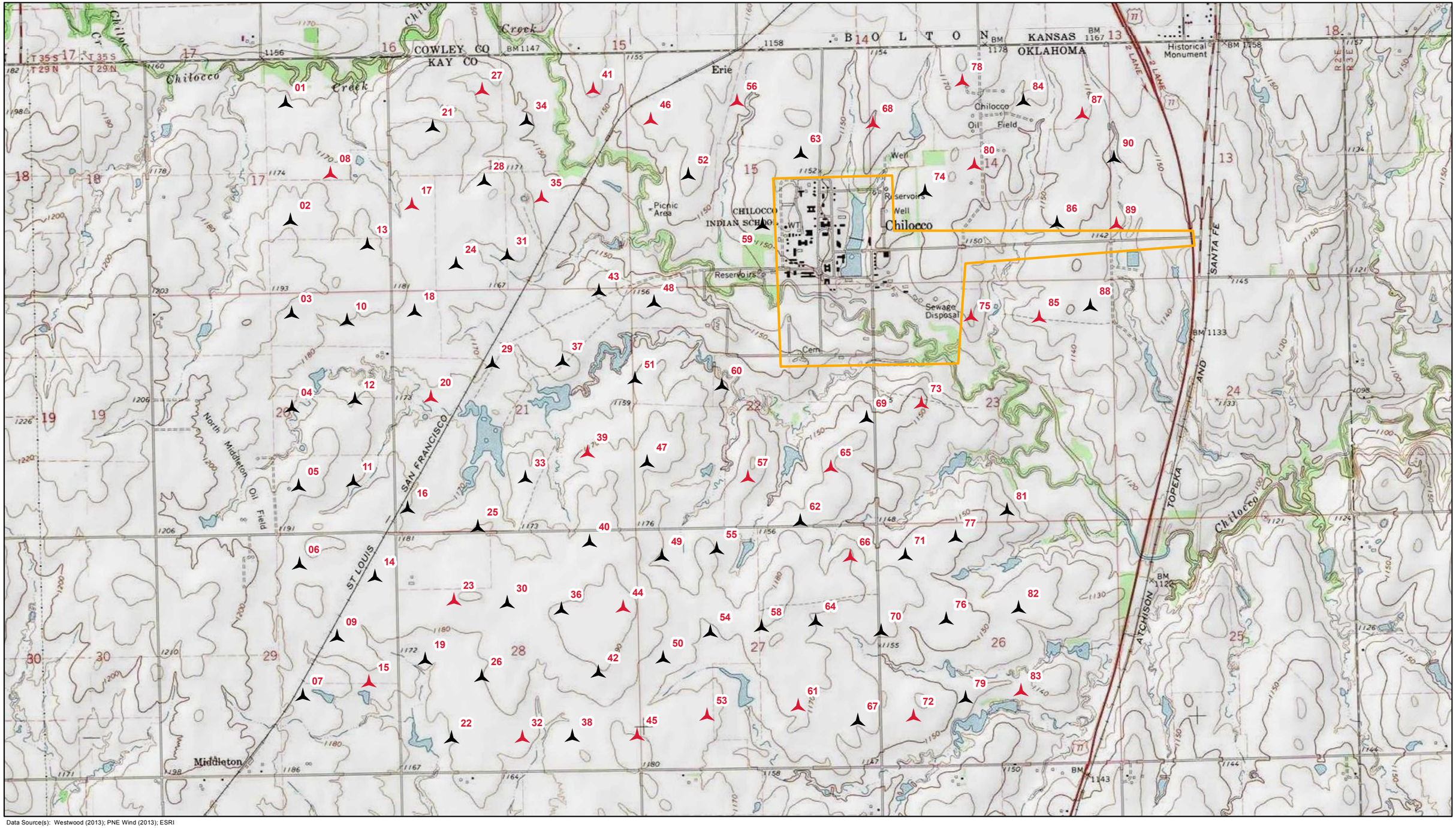

Data Source(s): Westwood (2013); PNE Wind (2013); ESRI WMS USA Topo (accessed 2013)

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Legend

- Chilocco Indian Agricultural School Historic District
- Turbines With Red Lights For Aviation Safety
- Turbines Without Red Lights

Chilocco Wind Farm

Kay County, Oklahoma

Historic District and Turbine Layout

EXHIBIT 1

Map Document: P:\0000488.00\GIS\CRM\Chilocco_TurbLayoutCIASHD_140122.mxd 1/22/2014 11:45:20 AM

Christopher A. Cojeen
Principal Investigator
Cojeen Archaeological Services, LLC
cojeenarch@sbcglobal.net

Archaeology
Research
History

Report on the Class III Archeological Survey of the PNE Wind, USA Proposed Cherokee East Addition to the Chilocco Wind Farm, Kay County, Oklahoma

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DRAFT 8/9/2016

Controlling Agency: Bureau of Indian Affairs, Eastern Oklahoma Region

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Project: Cherokee East Addition to the Chilocco Wind Farm
Prepared for: PNE Wind, USA
Location: Portions of Sections 13, 24, 25, 26, and 27 T29N, R2E, Kay County, Oklahoma
USGS Newkirk, OKLA quadrangle, 7.5-minute series 1976

File Search: 6/15/2016
Survey: Christopher Cojeen, James Munkres, Meghan Dudley, David Boling, and Faisal Muhammad, 6/22-24/2016 and 7/6-10/2016
Report: Christopher Cojeen, James Munkres, and Meghan Dudley, 8/9/2016

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ABSTRACT

Between June 22-24 and July 6-10, 2016, Cojeen Archeological Services, LLC (CAS) conducted an archeological survey of a proposed PNE Wind, USA wind farm in northern Kay County, Oklahoma. The project is located on lands owned by the Cherokee Nation and administered by the Bureau of Indian Affairs, Eastern Oklahoma Region.

Files at the Oklahoma Archeological Survey (OAS) in Norman indicate no previously recorded archeological sites are located in the specific project area. Survey methodology included pedestrian transects augmented by shovel testing. Along the proposed collector lines and access roads, a 100 foot wide corridor was studied. Approximately 3.7 acres (400 feet × 400 feet) were studied for each of the 21 proposed turbine locations. Approximately 10 acres were studied for a proposed substation in Section 27 T29N R2E. Approximately 165 acres of land area were studied for this report.

One 20th-century farmstead (34KA528), one large check dam, and one prehistoric archeological site (34KA529) were documented within the study area during the course of these investigations. 34KA528 has not been assessed for its inclusion to the National Register of Historic Places (NRHP). The project has been redesigned to avoid this resource.

Neither the rock check dam nor 34KA529 are recommended as eligible for inclusion to the NRHP. The project as planned will have no effect on significant cultural resources.

PROJECT LOCATION

The proposed project is located in portions of Sections 13, 24, 25, 26, and 27 T29N R2E in northern Kay County, Oklahoma (Figure 1). The project is located adjacent to U.S. Highway 77 approximately 6.5 miles north of Newkirk, Oklahoma. The project area occupies primarily cultivated fields and partially wooded pasture intersected by Chilocco Creek and its drainages (Figure 2).

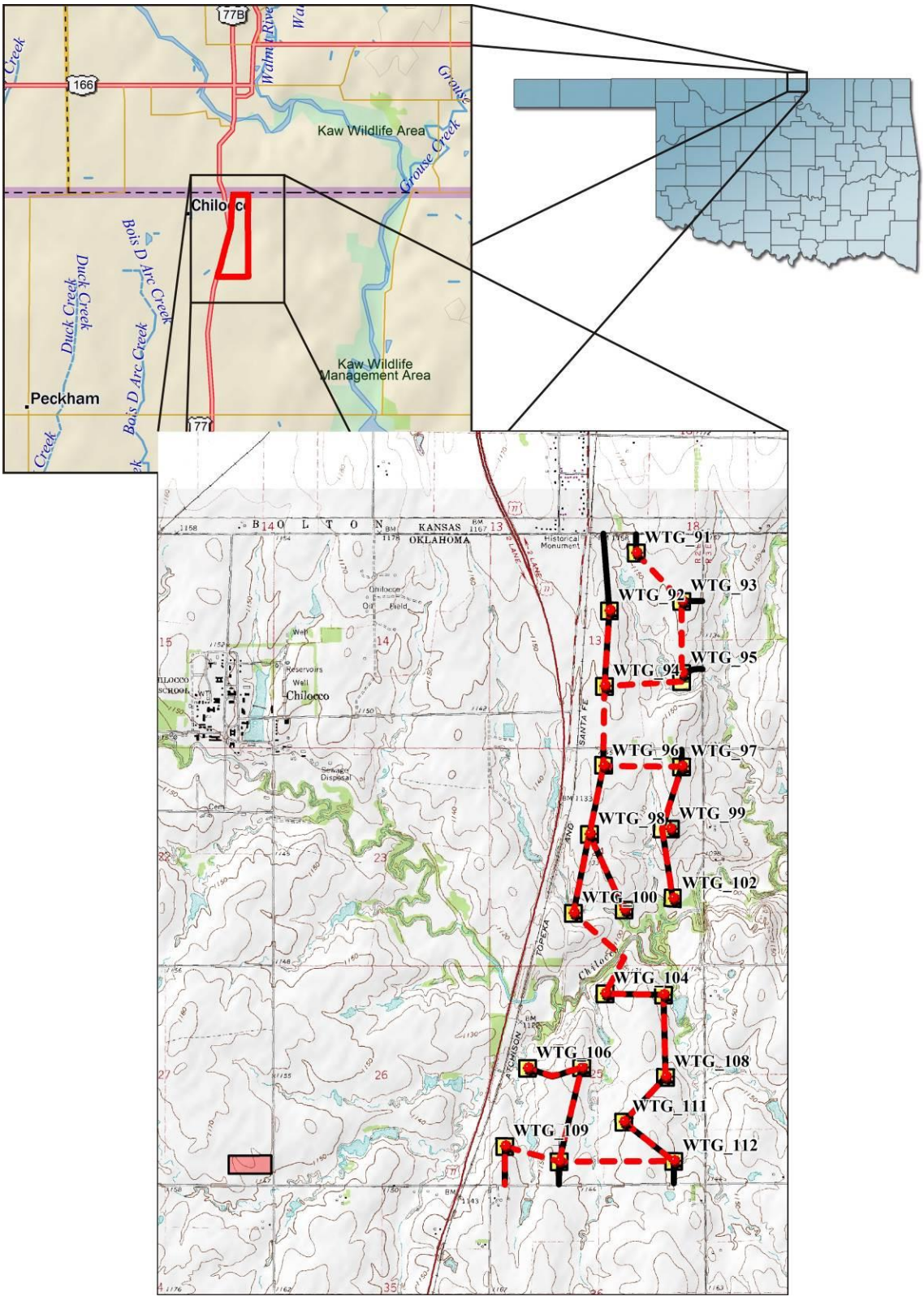

Figure 1. Project vicinity (redesigned turbine footprints in green) (USGS Newkirk, OKLA, 7.5-minute series 1976).

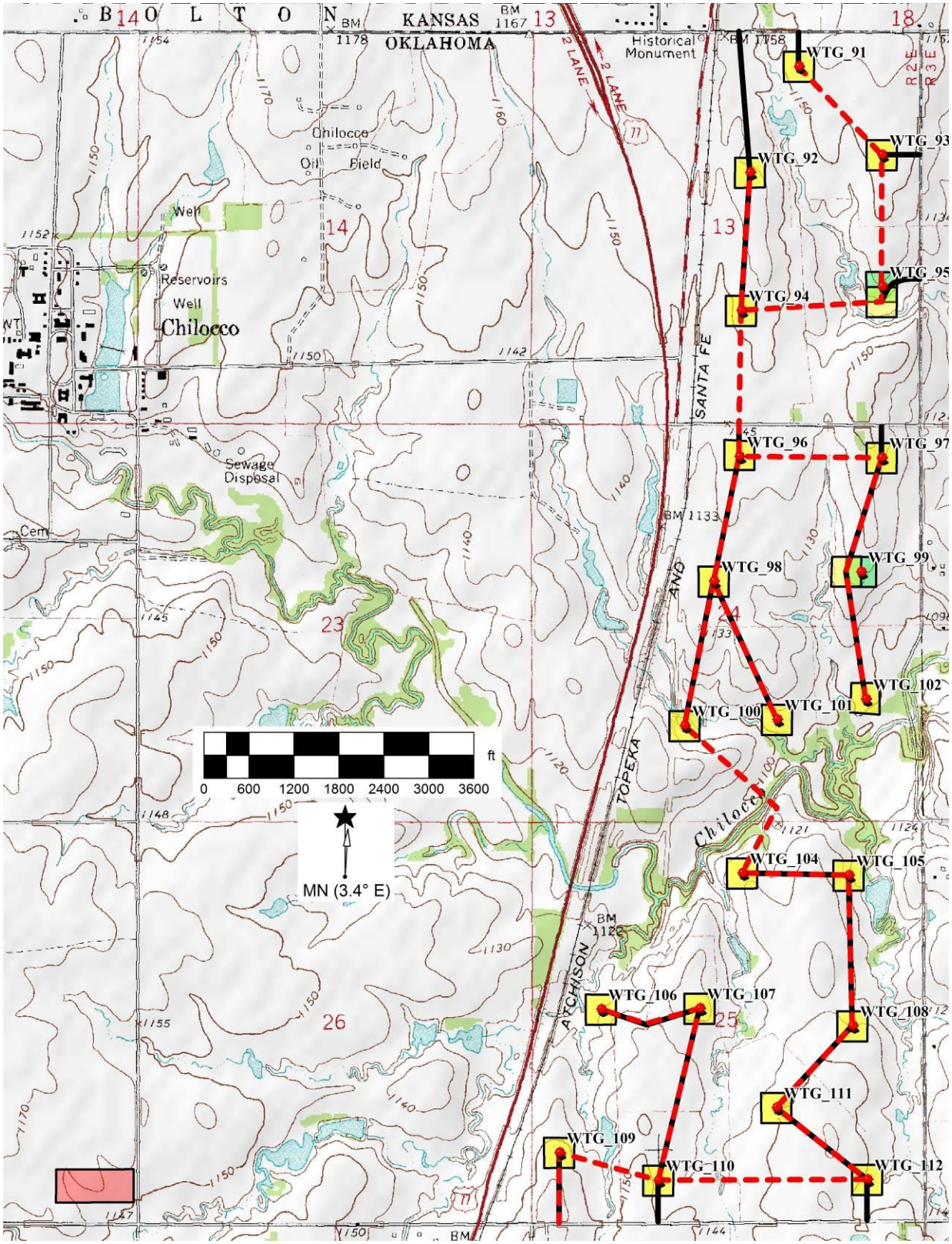

Figure 2. Project area depicting substation, turbine footprints (yellow squares), substation (red block area), collector lines (red dashed lines), and access routes (solid black lines) (redesigned turbine footprints in green).

DESCRIPTION OF PROJECT

The proposed project (Figure 2) occupies approximately 164.6 acres. There are 21 proposed turbine locations, each 400 feet by 400 feet, occupying approximately 77.1 acres (Table 1). There are approximately 7.39 miles (39,000 feet) of proposed collector line and approximately 5.18 miles (27,349 feet) of access routes. Approximately 4,994 feet (0.95 miles) of the access routes are not coterminous with the proposed collector line routes. Along the proposed collector lines and access roads, a 100 foot wide corridor was studied. Together the access and collector lines occupy approximately 77.5 acres. Approximately 10 acres were studied for a proposed substation located in Section 27 T29N R2E. The substation is located in a level cultivated field which offered 50% surface visibility. A chart of the proposed turbine locations is listed below:

WTG #	UTM (NAD83 Datum)	PLSS	Major Land Use	Visibility	Landform Type	Setting
WTG 91	14S E0674805 N4096418	NE/NW/NE Section 13 T29N R2E	Cultivated Field and Woods/Forest	50-75%	Dissected Uplands	Level
WTG 92	14S E0674616 N4095987	NW/SW/NE Section 13 T29N R2E	Cultivated Field	50-75%	Dissected Uplands	Level
WTG 93	14S E0675151 N4096069	NE/SE/NE Section 13 T29N R2E	Cultivated Field	50-75%	Dissected Uplands	Level
WTG 94	14S E0674591 N4095430	SW/NW/SE Section 13 T29N R2E	Cultivated Field	50-75%	Dissected Uplands	Level
WTG 95	14S E0675163 N4095477	SE/NE/SE Section 13 T29N R2E	Pasture, Scrub/Secondary Growth/Oil Field, and Woods/Forest	<10%	Dissected Uplands	Slope
WTG 96	14S E0674595 N4094841	NW/NW/NE Section 24 T29N R2E	Cultivated Field	50-75%	Dissected Uplands	Level
WTG 97	14S E0675176 N4094848	NE/NE/NE Section 24 T29N R2E	Pasture and Oil Field	<10%	Dissected Uplands	Slope
WTG 98	14S E0674502 N4094336	SE/SE/NW Section 24 T29N R2E	Cultivated Field	50-75%	Dissected Uplands	Level
WTG 99	14S E0675040 N4094386	NW/SE/NE Section 24 T29N R2E	Pasture	<10%	Dissected Uplands	Slope
WTG 100	14S E0674395 N4093751	NE/SE/SW Section 24 T29N R2E	Pasture and Woods/Forest	<10%	Dissected Uplands	Level
WTG 101	14S E0674771 N4093784	SE/NE/SE Section 24 T29N R2E	Cultivated Field and Woods/Forest	25-50%	Dissected Uplands	Level
WTG 102	14S E0675131	SW/NE/SE Section 24	Pasture and Woods/Forest	<10%	Dissected Uplands	Level

	N4093874	T29N R2E				
WTG 104	14S E0674642 N4093162	NW/NW/NE Section 25 T29N R2E	Pasture and Woods/Forest	<10%	Dissected Uplands	Slope
WTG 105	14S E0675076 N4093162	SW/NE/NE Section 25 T29N R2E	Pasture and Woods/Forest	<10%	Dissected Uplands	Slope
WTG 106	14S E0674078 N4092601	SE/SW/NW Section 25 T29N R2E	Pasture, Scrub/Secondary Growth, and Woods/Forest	<10%	Dissected Uplands	Level
WTG 107	14S E0674480 N4092613	SE/SE/NW Section 25 T29N R2E	Cultivated Field and Woods/Forest	10-25%	Dissected Uplands	Level
WTG 108	14S E0675104 N4092555	NW/NE/SE Section 25 T29N R2E	Cultivated Field and Pasture	25-50%	Dissected Uplands	Level
WTG 109	14S E0673920 N4092020	NW/SW/SW Section 25 T29N R2E	Cultivated Field	50-75%	Dissected Uplands	Level
WTG 110	14S E0674326 N4091916	SW/SE/SW Section 25 T29N R2E	Cultivated Field	50-75%	Dissected Uplands	Level
WTG 111	14S E0674801 N4092219	SE/NW/SE Section 25 T29N R2E	Cultivated Field	50-75%	Dissected Uplands	Level
WTG 112	14S E0675177 N4091937	SW/SE/SE Section 25 T29N R2E	Cultivated Field and Pasture	10-25%	Dissected Uplands	Level

Table 1. Turbine location descriptions.

Of the 21 proposed turbine locations, four (WTG 95, WTG 97, WTG 99, and WTG 100) require a more thorough description beyond that provided in Table 1 due to the presence of significant ground disturbance or observed cultural resource localities in their vicinity.

WTG 95

The footprint for WTG 95 (Figures 3-6), along with the other 20 proposed turbine locations, is 400 feet by 400 feet (3.67 acres) in size. The center point of WTG 95 is located at 14S E0675163 N4095477 in the SE/NE/SE Section 13 T29N R2E. WTG 95 is located on a gentle (~5°) south-facing slope on mixed grass dissected upland pasture overlooking an unnamed intermittent stream that drains into Chilocco Creek to the south. Approximately 25 percent of the footprint of the proposed turbine location (3.67 acres) is occupied by a well pad (0.88 acres) in the north half of the footprint. The well, presently operated by Musgrove Energy, Inc. (Operator No. 22252), is Cherokee Lease 3 and is located at 14S E0675146 N4095495. 34KA528, an historic farmstead or other agricultural facility, occupies the northeast corner of the footprint (see page 38). Access Route 4 accesses the location from a county line road (La Cann Road) to the east. A proposed collector line route enters the footprint from WTG 94 approximately 1,900 feet to the west and exits the footprint heading to WTG 93 approximately 1,900 feet to the north. Overall visibility is less than 10 percent.

Figure 3. Center stake for the proposed turbine location at WTG 95 facing south.

Figure 4. Cherokee Lease 3 well, located on the footprint for proposed turbine WTG 95, facing southwest.

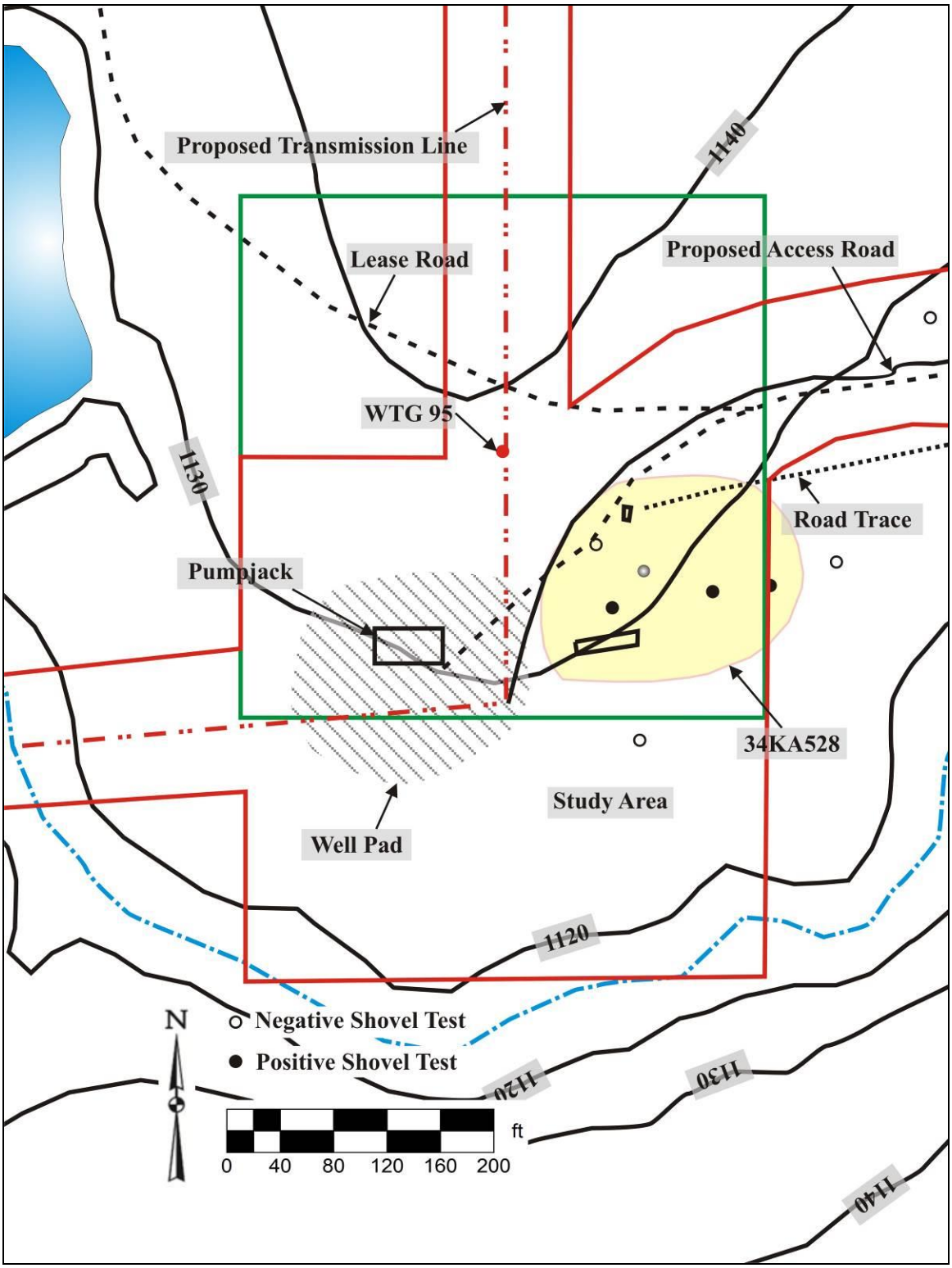

Figure 5. Sketch map of the turbine location at WTG 95 (redesigned turbine footprint in green).

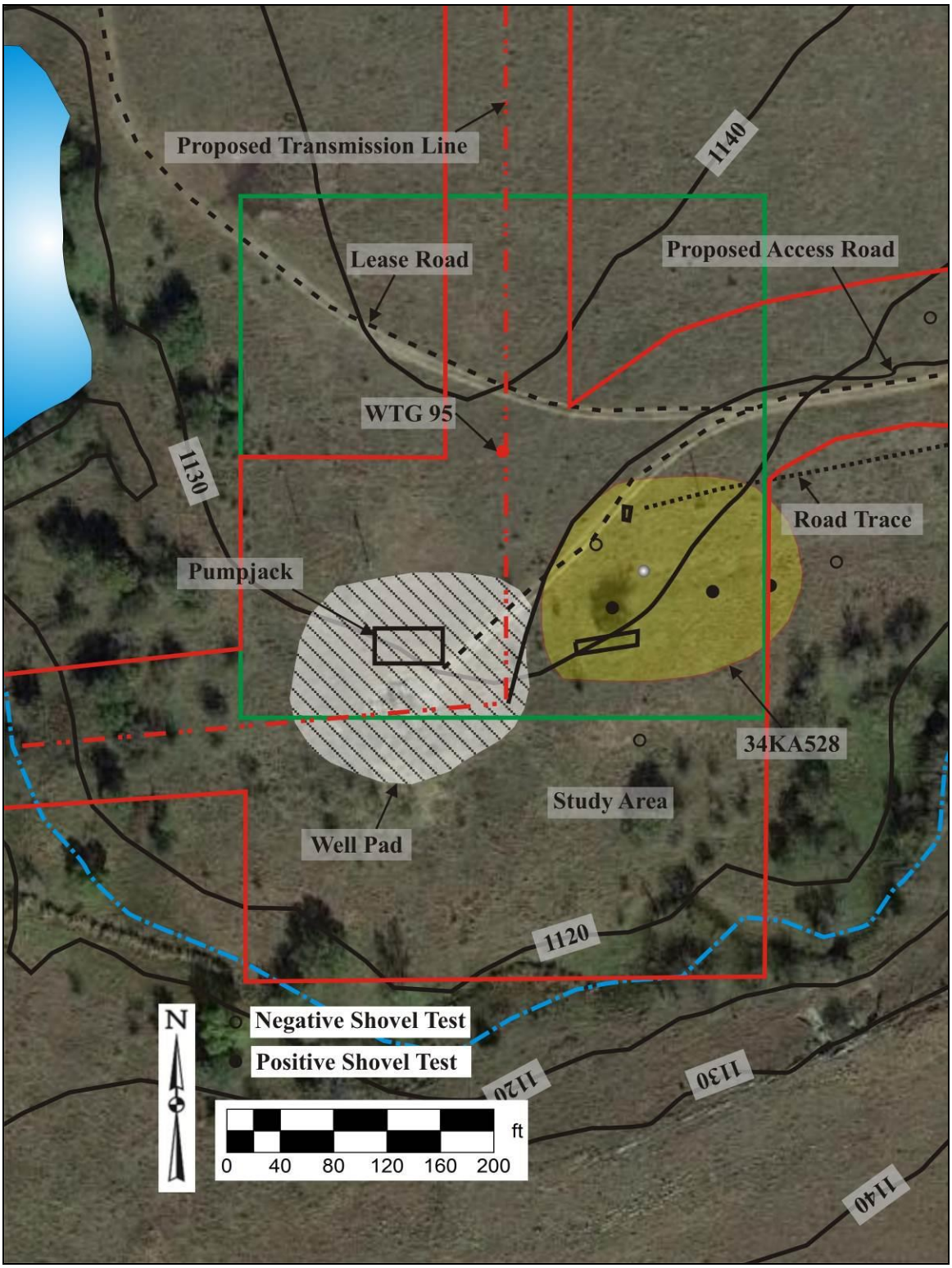

Figure 6. Aerial photograph of WTG 95 (redesigned turbine footprint in green).

WTG 97 (the in-use pumpjack is not considered a cultural resource).

The footprint for WTG 97 (Figures 7-10), along with the other 20 proposed turbine locations, is 400 feet by 400 feet (3.67 acres) in size. The center point of WTG 97 is located at 14S E0675176 N4094848 in the NE/NE/NE Section 24 T29N R2E. WTG 95 is located on a level (~0°) mixed grass dissected upland pasture. Approximately 12 percent of the footprint of the proposed turbine location (3.67 acres) is occupied by a well pad (0.43 acres) in the northeastern corner of the footprint. The well, presently operated by Musgrove Energy, Inc. (Operator No. 22252), is Cherokee B No. 1 and is located at 14S E0675236 N4094887. Access Route 5 accesses the location from a county line road (Juno Road) to the north. A proposed collector line route enters the footprint from WTG 99 approximately 1,600 feet to the south-southwest and exits the footprint heading to WTG 96 approximately 1,900 feet to the west. Overall visibility is less than 10 percent.

Figure 7. Center stake for the proposed turbine location at WTG 97 facing south.

Figure 8. Cherokee B No. 1 well, located in the northeast corner of the footprint for proposed turbine WTG 97, facing southwest.

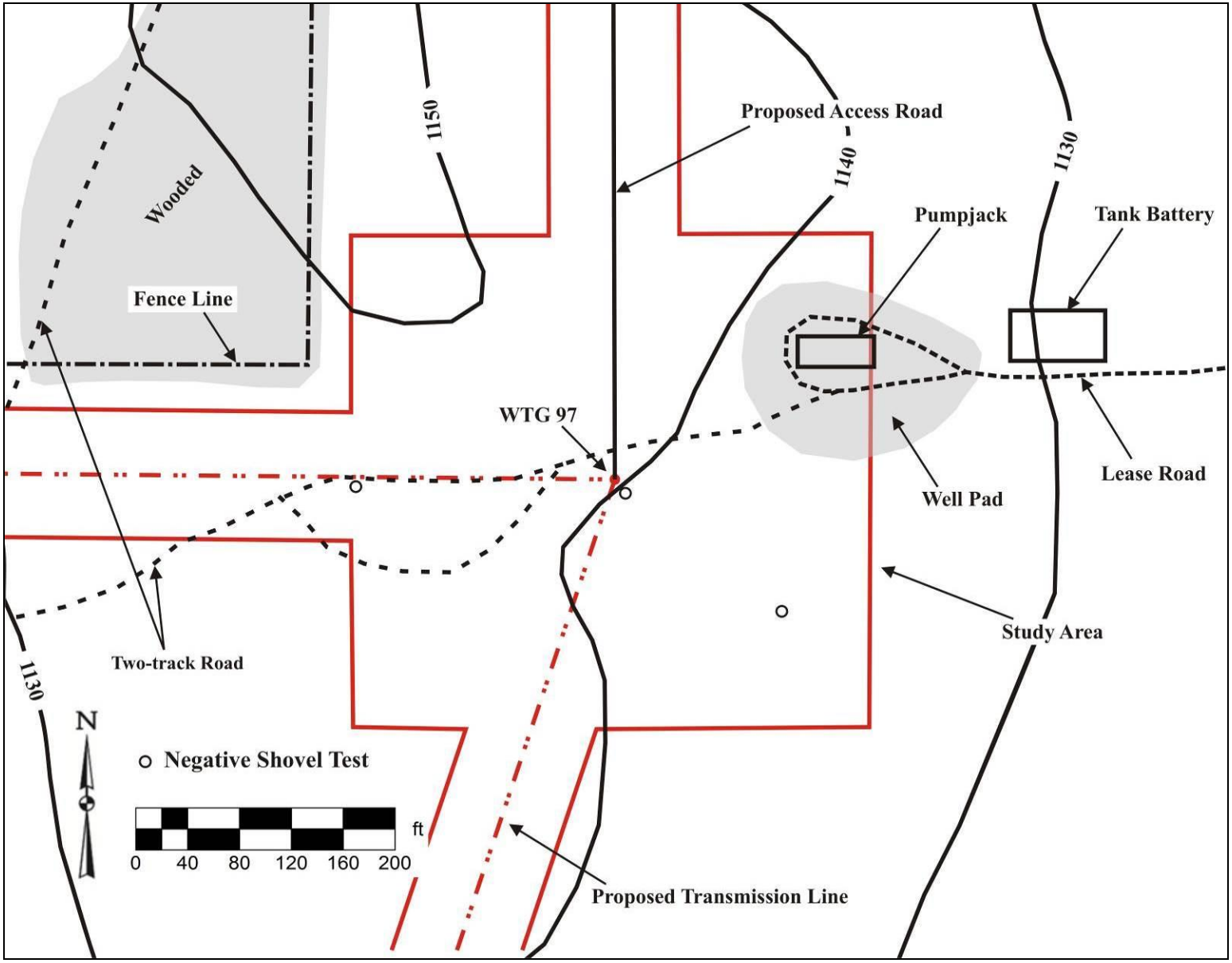

Figure 9. Sketch map of the turbine location at WTG 97.

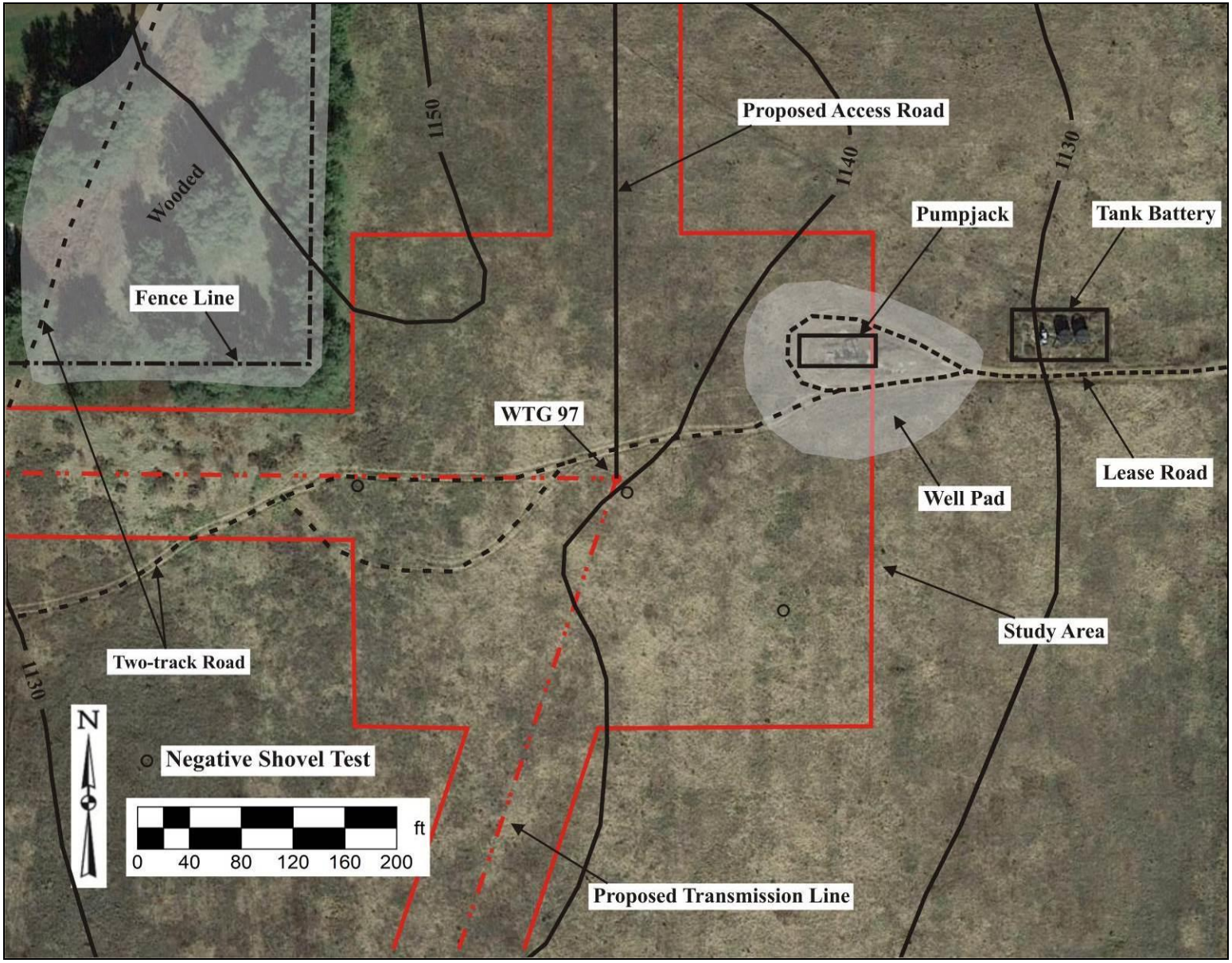

Figure 10. Aerial photograph of WTG 97.

WTG 99

The footprint for WTG 99 (Figure 11-14), along with the other 20 proposed turbine locations, is 400 feet by 400 feet (3.67 acres) in size. The center point of WTG 99 is located at 14S E0675040 N4094386 in the NW/SE/NE Section 24 T29N R2E. WTG 99 is located on a gentle (~5°) west-facing slope on mixed grass dissected upland pasture overlooking an unnamed intermittent stream approximately 300 feet to the west that drains into Chilocco Creek approximately 2,250 feet to the south. A large rock check dam (a 20th-century rainwater management structure) is located northwest of the footprint. IO 1 (two lithic flakes) was also observed (Appendix B). A proposed collector line route enters the footprint from WTG 97 approximately 1,575 feet to the north-northeast and exits the footprint heading to WTG 102 approximately 1,700 feet to the south-southeast. Overall visibility is less than 10 percent.

Figure 11. Center stake for the proposed turbine location at WTG 99 facing south (IO 1 is located in the foreground of the photograph).

Figure 12. The rock check dam facing northwest (the northwestern corner stake of WTG 99 is obscured but located in the left-hand portion of the photograph).

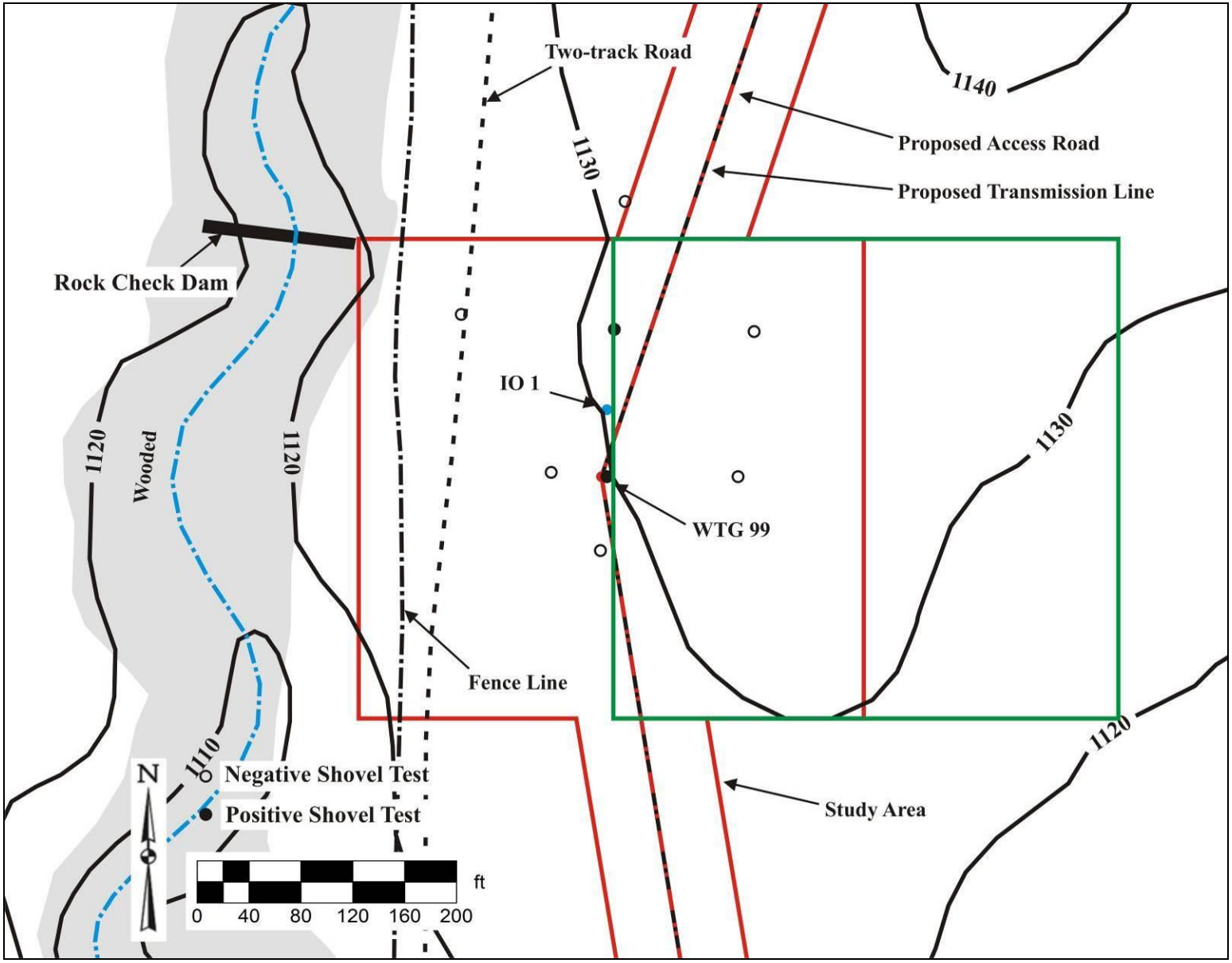

Figure 13. Sketch map of the turbine location at WTG 99 (redesigned turbine footprint in green).

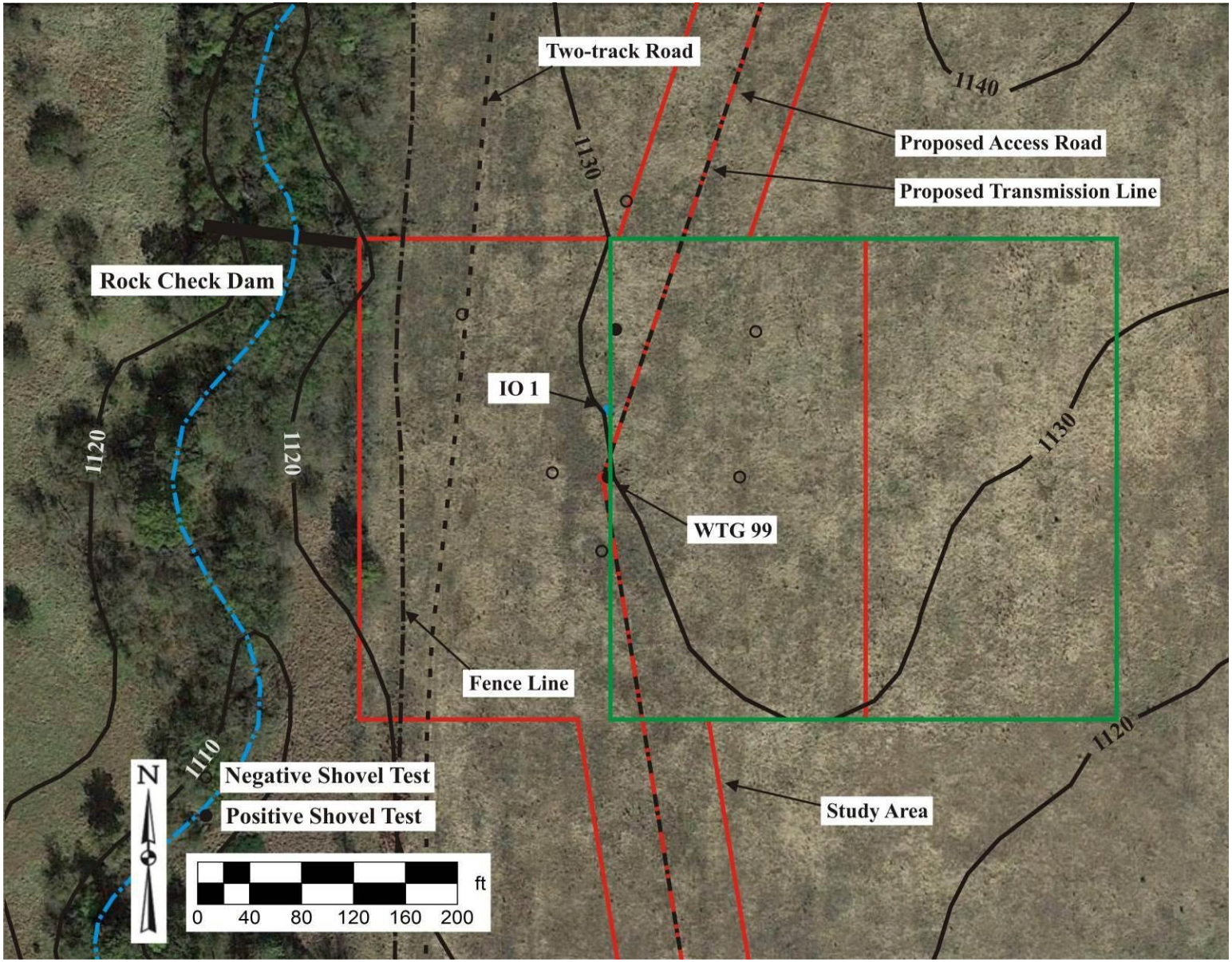

Figure 14. Aerial photograph of WTG 99 (redesigned turbine footprint in green).

WTG 100

The footprint for WTG 100 (Figures 15-18), along with the other 20 proposed turbine locations, is 400 feet by 400 feet (3.67 acres) in size. The center point of WTG 100 is located at 14S E0674395 N4093751 in the NE/SE/SW Section 24 T29N R2E. WTG 100 is located on a level (~5°) mixed grass dissected upland pasture bisected by a narrow, broad unnamed intermittent stream that drains into Chilocco Creek to the southeast. Approximately 21 percent (0.78 acres of 3.67 acres) of the footprint of the proposed turbine location is occupied by the original alignment of the Atchison, Topeka and Santa Fe Railroad right-of-way in the western half of the western half of the footprint. A proposed collector line route enters the footprint from WTG 98 approximately 1,950 feet to the north and exits the footprint heading to an intersection with Chilocco Creek approximately 1,450 feet to the southeast. Overall visibility is less than 10 percent.

Figure 15. Center stake for the proposed turbine location at WTG 100 facing northeast.

Figure 16. Original alignment of the Atchison, Topeka and Santa Fe Railway right-of-way to the west of WTG 100 facing north.

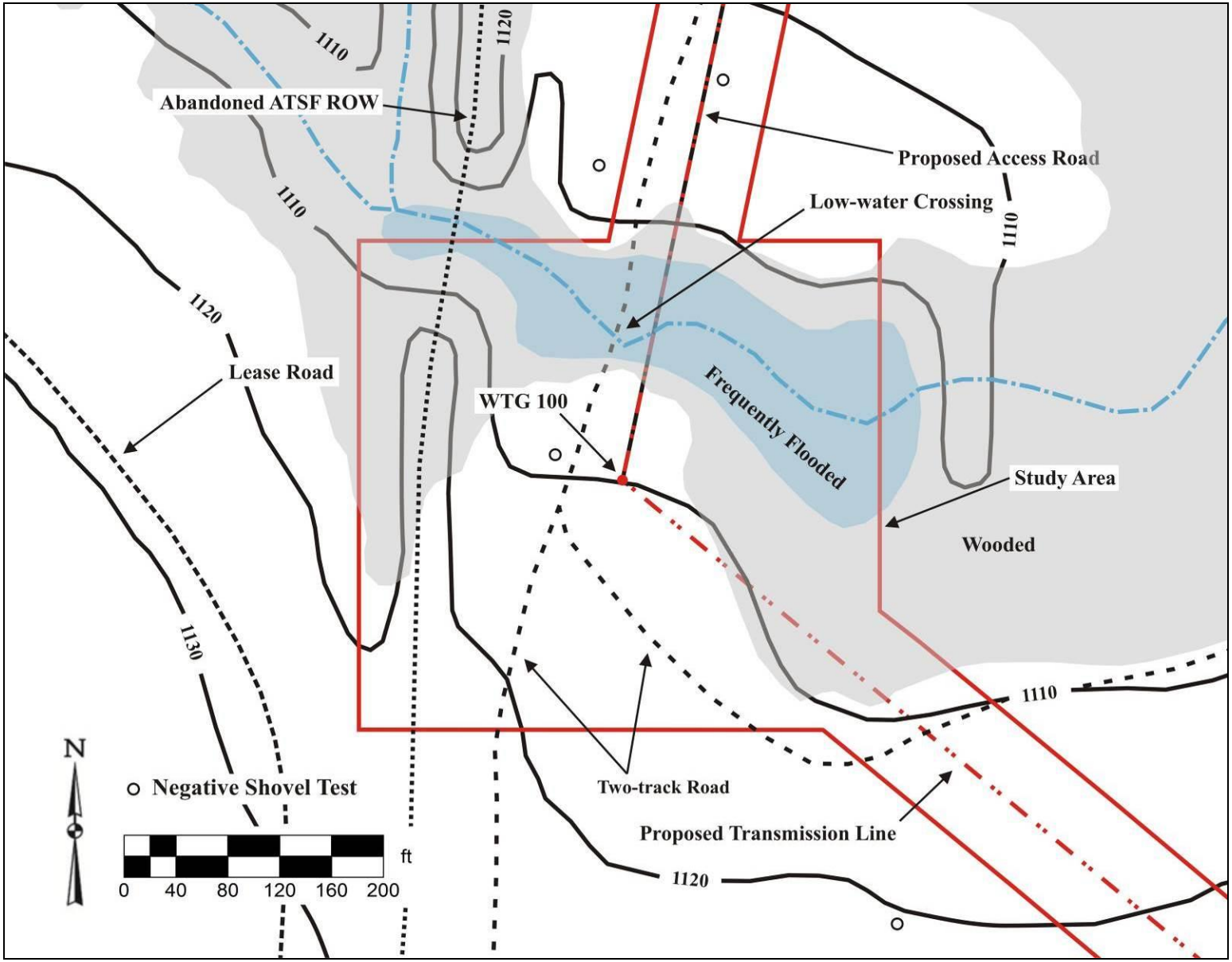

Figure 17. Sketch map of the turbine location at WTG 100.

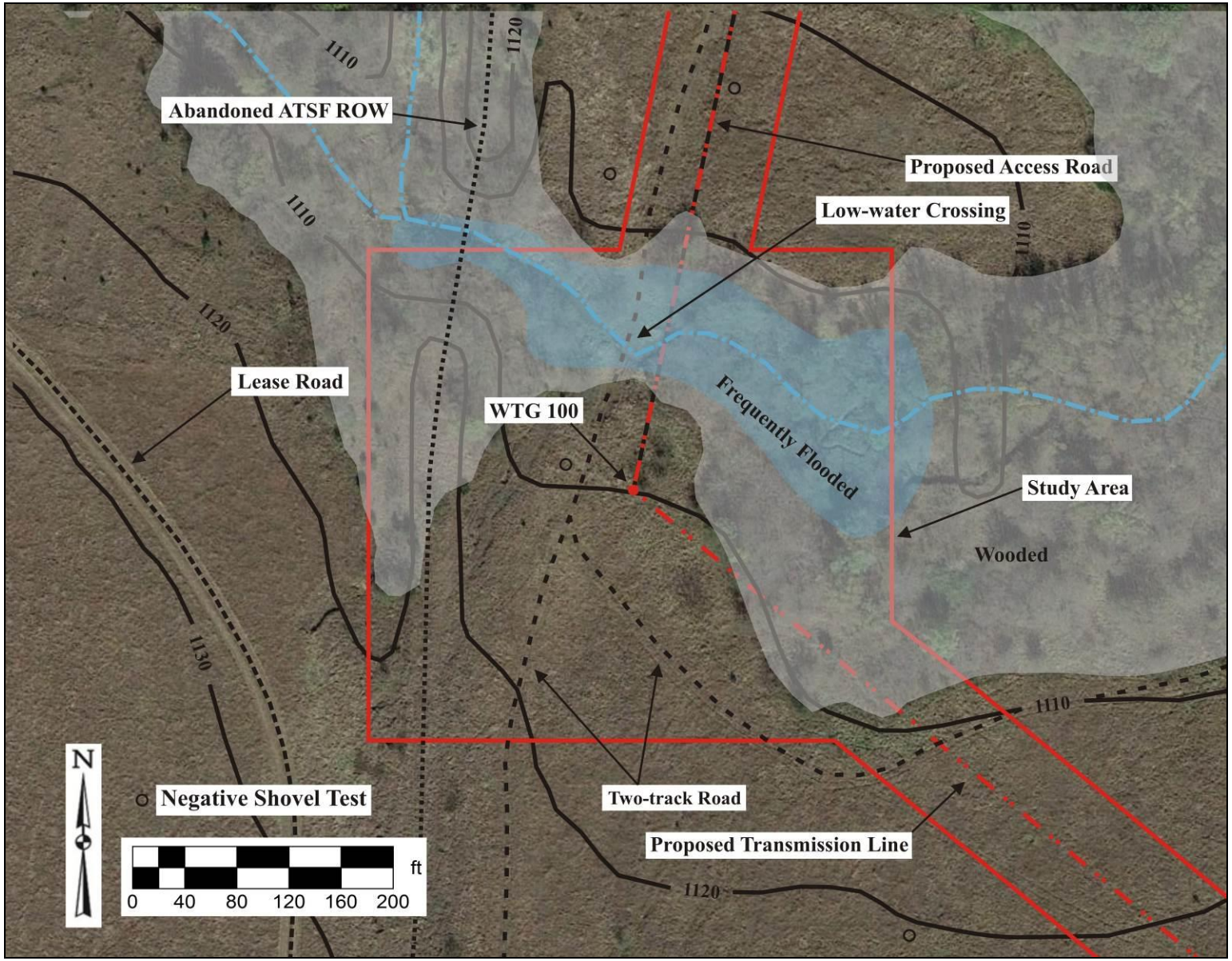

Figure 18. Aerial photograph of WTG 100.

ENVIRONMENTAL SETTING

The project is located within the Central Red-Bed Plains Geomorphic Province, an area generally described as "Permian red shales and sandstones [that] form gently rolling hills and broad, flat plains" (Curtis Jr., Ham and Johnson 2008). The project lies within the Tall Grass Prairie Vegetation Region described as "little bluestem, big bluestem, Indiangrass and switchgrass" and the dominant plant species include the "lead plant, Indian plantain, prairie clover, heath aster, small panic grass, pallid coneflower, ashy sunflower and Missouri goldenrod" (Hoagland 2008). The mean annual temperature in Kay County is 58° F, with mean seasonal temperatures as high as 80° F to a low of 36° F. Average precipitation in the county is 36-40 inches annually (Johnson 2008).

Habitat types in the project area include prairie habitat, edge-habitat associated with agricultural production and riparian bottomlands. Historically, the major grazing animals in the area were bison and pronghorn. Major predators were the wolf, coyote, bobcat and kit fox. Woodlands along streams supported wapiti, deer, and cottontail. Additionally, there were many burrowing animals (prairie dogs, pocket mice, kangaroo rats, etc.) and their predators (badger, black-footed ferret, etc.). The active hydrology and typography of the region support a wide variety of faunal resources. A more complete list is provided by Albert and Wyckoff (1984).

Soils in the project area are derived mostly from Quaternary and Recent fluvial deposits deposited along terraces of active streams and their tributaries, and local Permian bedrock material. Major soil mapping units along uplands overlooking Chilocco Creek and associate tributaries in the study area include Bethany silt loam (0-1% slopes), Kirkland silt loam (1-3% slopes), Agra-Foraker complex soils (1-3% and 3-5% slopes) and Milan loam (1-3% slopes). These soils are convex to linear, well drained soils derived from silty to clayey alluvium or residuum weathered from sedimentary rock or shale (Natural Resources Conservation Service [NRCS] 2016).

Soils adjacent Chilocco Creek and its tributaries consist of Grainola-Ashport complex (0-12% slopes), convex, well drained back- and side-slope soils parented from calcareous clayey residuum weathered from shale, and Ashport, Port and Pulaski soils (0-1% slopes, frequently flooded), linear soils derived from loamy alluvium (NRCS 2016).

PRE-FIELD RECORDS CHECK/REVIEW OF PREVIOUS RESEARCH

CAS visited the offices of the Oklahoma Archeological Survey (OAS) in Norman, Oklahoma to examine maps and files pertaining to the project area in an effort to identify previously recorded cultural resources within or near the project area. **OAS files indicate that no known archeological sites are located within the specific area of this project.**

According to the most recent listings, no properties listed on the NRHP are in the specific study area of this project. Additionally, no structures determined eligible by the Oklahoma State Historic Preservation Office (SHPO) but not listed on the NRHP are indicated within the project area (Determinations of Eligibility list, Oklahoma SHPO, 2016).

The main building complex for the Chilocco Indian Agricultural School (NPS #: 06000792), entered in the National Register on September 8, 2006, is located approximately 1.7 miles to the west of the project area. The district's boundary extends to US Highway 77 and includes the road leading to the highway and the school's main entrance. The entrance is approximately 900 feet west of the nearest proposed activities and will not be affected.

On behalf of PNE Wind, USA Westwood Professional Services conducted a survey of portions of Sections 13-17, 20-23, and 26-29 T29N R2E for the proposed Chilocco Wind Farm Project August 7-14, 2013 (Grohnke and Martinez 2013). The proposed activities included approximately 28 miles of access roads, 39 miles of collector cable runs, 29 miles of crane paths, 90 turbine locations and a substation location. In their report on the survey, dated September 12, 2013 and submitted to the U.S. Bureau of Indian Affairs, Southern Plains Region, they reported documenting three previously-identified prehistoric lithic scatters. All were avoided by design and a finding of *no historic properties affected* was recommended.

The 1872 General Land Office (GLO) plat maps for Sections 13, 24, 25, 26, and 27 T29N R2E (Figure 19) were examined. These maps show no structures, cultivated fields, fence lines, or roads in the project area.

The 1907 GLO plat map for Sections 13, 24, 25, 26, and 27 T29N R2E (Figure 20) was also examined. This map shows the original alignment for the Atchison, Topeka and Santa Fe Railway (ATSF) with a siding running north-south through the center of Sections 13 and 24 T29N R2E, southwest in the western half of Section 25 T29N R2E and through the southeastern quarter of Section 26 T29N R2E. An ATSF station, and an associated roadway, appears in the NE/SW Section 13 T29N R2E. A bridge carrying the old alignment also appears in the northeastern quarter of the northwestern quarter of Section 25 T29N R2E. The alignment is lined on both sides by a fence line. A quarry also appears in the northern portion of Section 25 T29N R2E. A short length of the road that runs along the eastern section line road of Section 24 T29N R2E appears in the eastern half of the southeastern quarter of Section 24 T29N R2E. A roadway bridge carrying the section line road that runs along the eastern section line road of Section 24 T29N R2E also appears in the southeastern quarter of the southeastern quarter of Section 24 T29N R2E. Project activities are located in the vicinity of a 200-foot-long section of the original ATSF alignment at the proposed turbine location at WTG 100 in the northeastern quarter of the southwestern quarter of Section 24 T29N R2E.

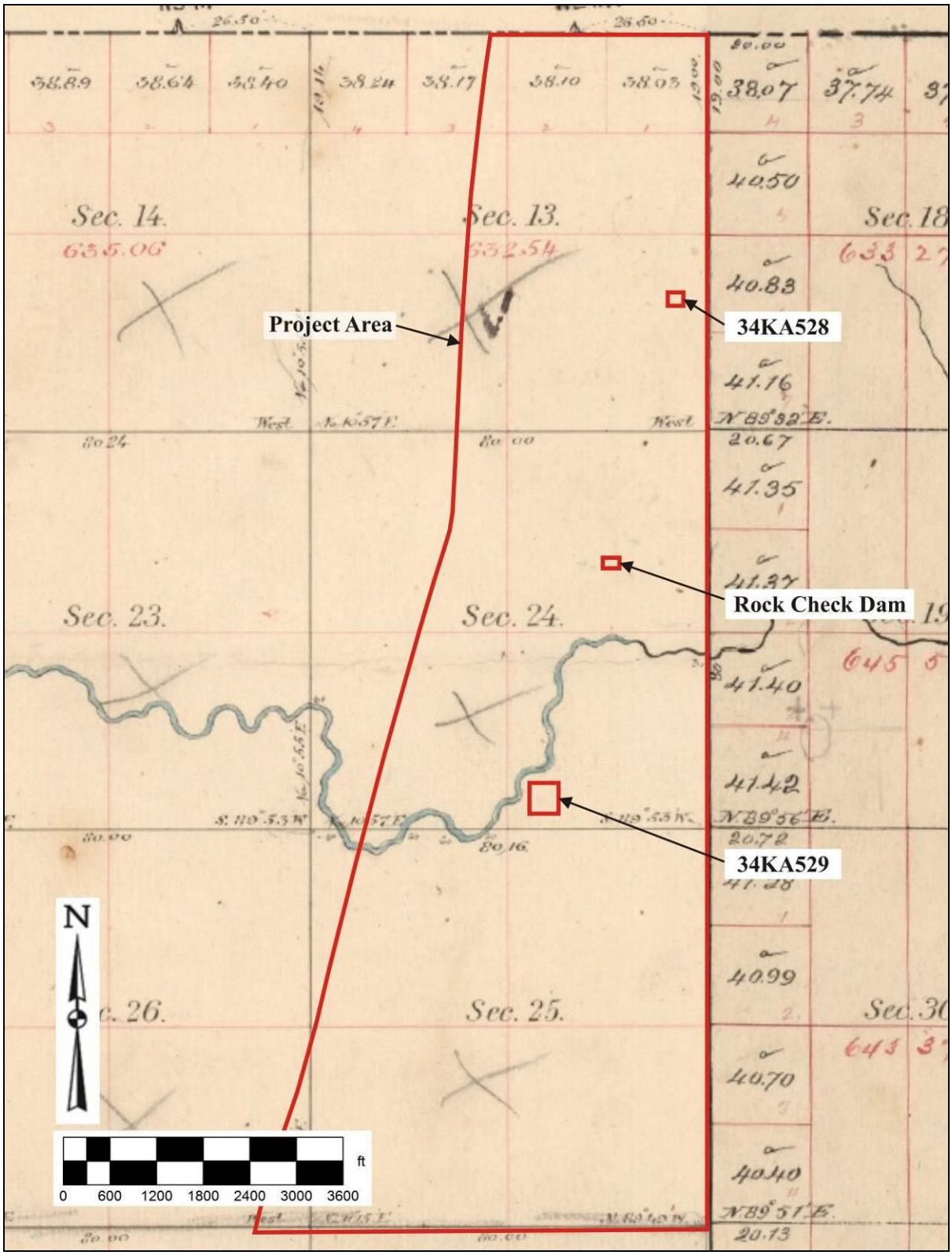

Figure 19. Detail of 1872 GLO plat maps of Sections 13, 24, 25, and 26 T29N R2E showing the study area and observed localities.

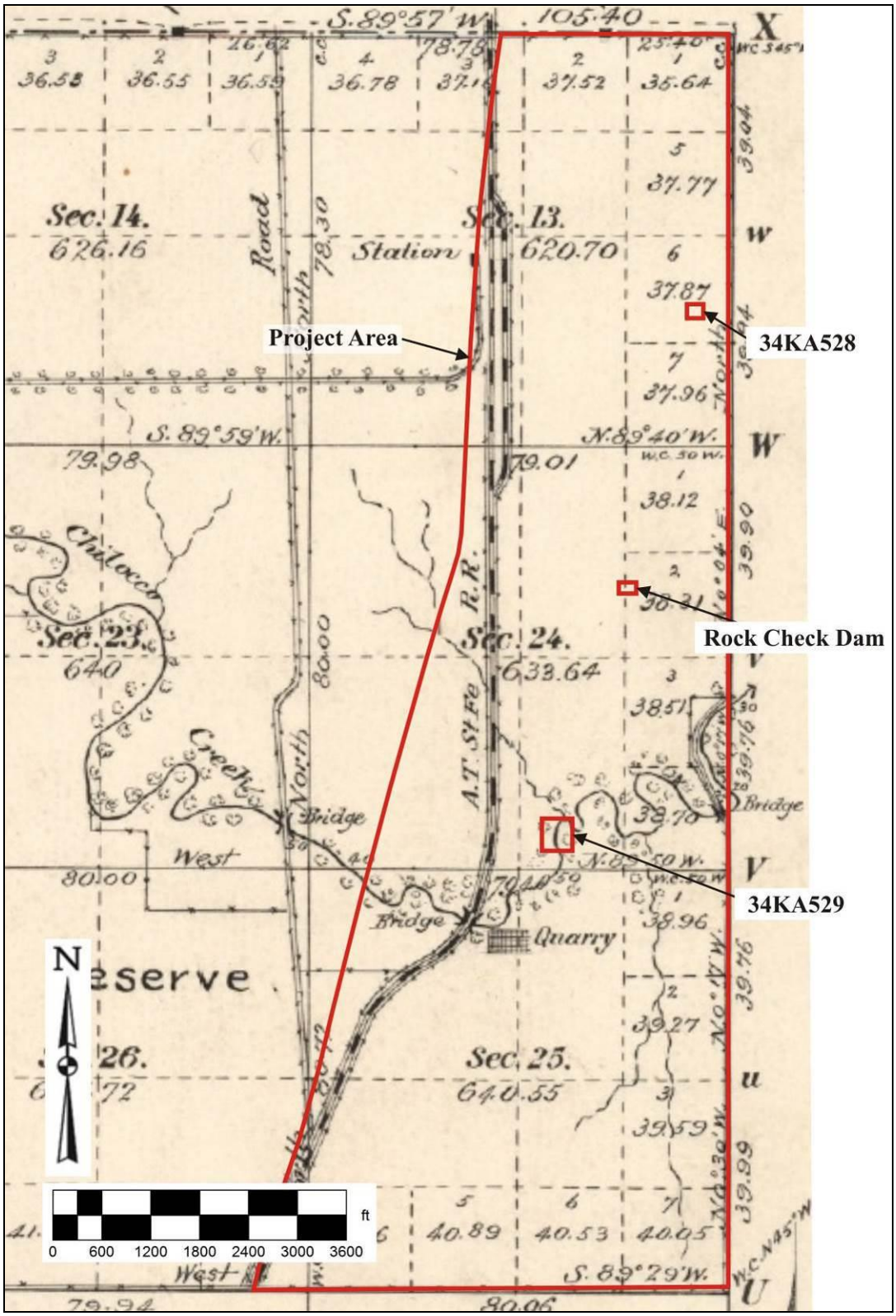

Figure 20. Detail of 1907 GLO plat map of Sections 13, 24, 25, and 26 T29N R2E showing the study area and observed localities.

Aerial photographs were also examined. An image taken in 1938 (Figure 21) shows several large cultivated fields, impoundments, and light-duty roads throughout Sections 13, 24, 25, 26, and 27 T29N R2E; two farmsteads in Section 13 T29N R2E; one farmstead in Section 24 T29N R2E; and three farmsteads in Section 25 T29N R2E. The image also shows that the ATSF alignment has been changed. The ATSF station appears in the northeastern quarter of the southwestern quarter of Section 13 T29N R2E and bridges carrying the new ATSF route appear in the western half of Section 24 T29N R2E. The remnants of the original alignment appear in the western half of Section 24 T29N R2E as well and the two bridges carrying the original alignment have been removed. Finally, the bridge in the southeastern quarter of the southeastern quarter of Section 24 T29N R2E carrying the eastern section line road of Section 24 T29N R2E is apparent. Project activities are located in the vicinity of a 200-foot-long section of the original ATSF alignment at the proposed turbine location at WTG 100 in the northeastern quarter of the southwestern quarter of Section 24 T29N R2E. The S ½ of the SE/SE of Section 27, T29N R2E (the location of the proposed substation) appears to be in pasture with no apparent structures or improvements.

An image taken in 1954 (Figure 22) shows that the objects and features indicated on the 1938 aerial photograph remain visible. The cultivated fields in the northeastern quarter of the northeastern quarter of Section 13 T29N R2E and in the eastern half of Section 24 T29N R2E appear to have been contour-terraced. An object, most likely a tree, appears in the vicinity of 34KA528.

An image taken in 1966 (Figure 23) shows that the objects and features indicated on the 1938 aerial photograph remain visible.

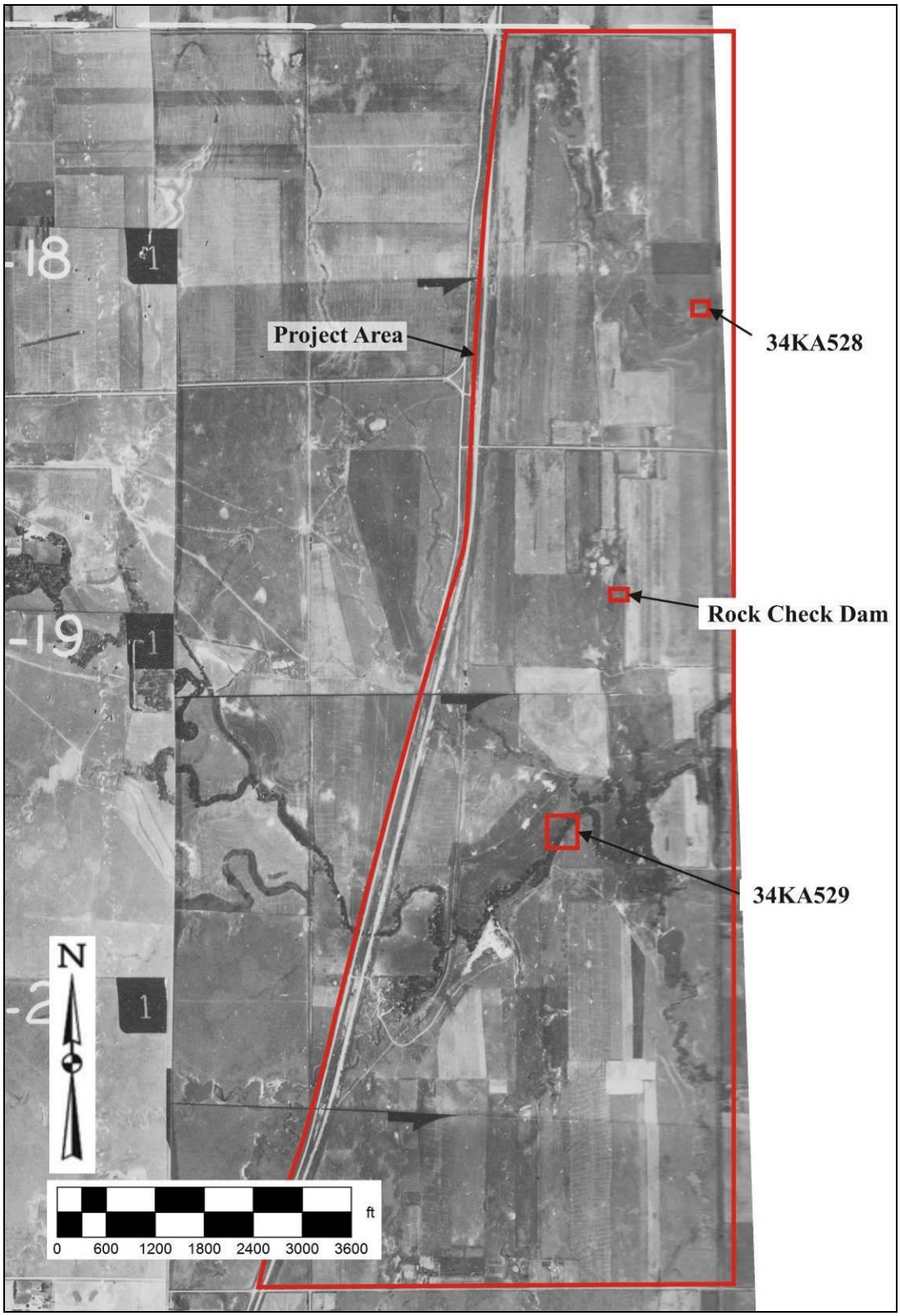

Figure 21. Detail of 1938 aerial photograph maps showing the study area and observed localities.

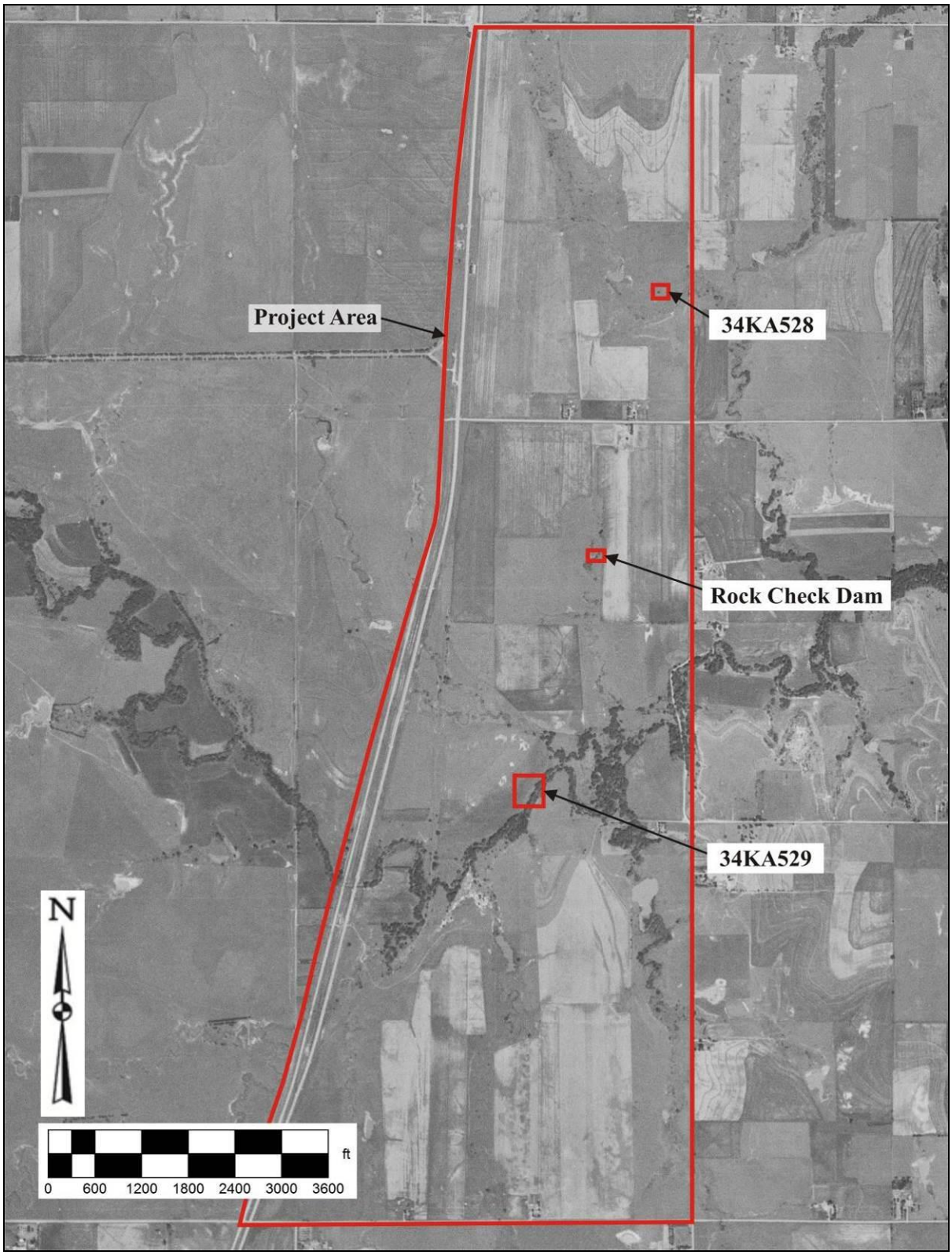

Figure 22. Detail of 1954 aerial photograph maps showing the study area and observed localities.

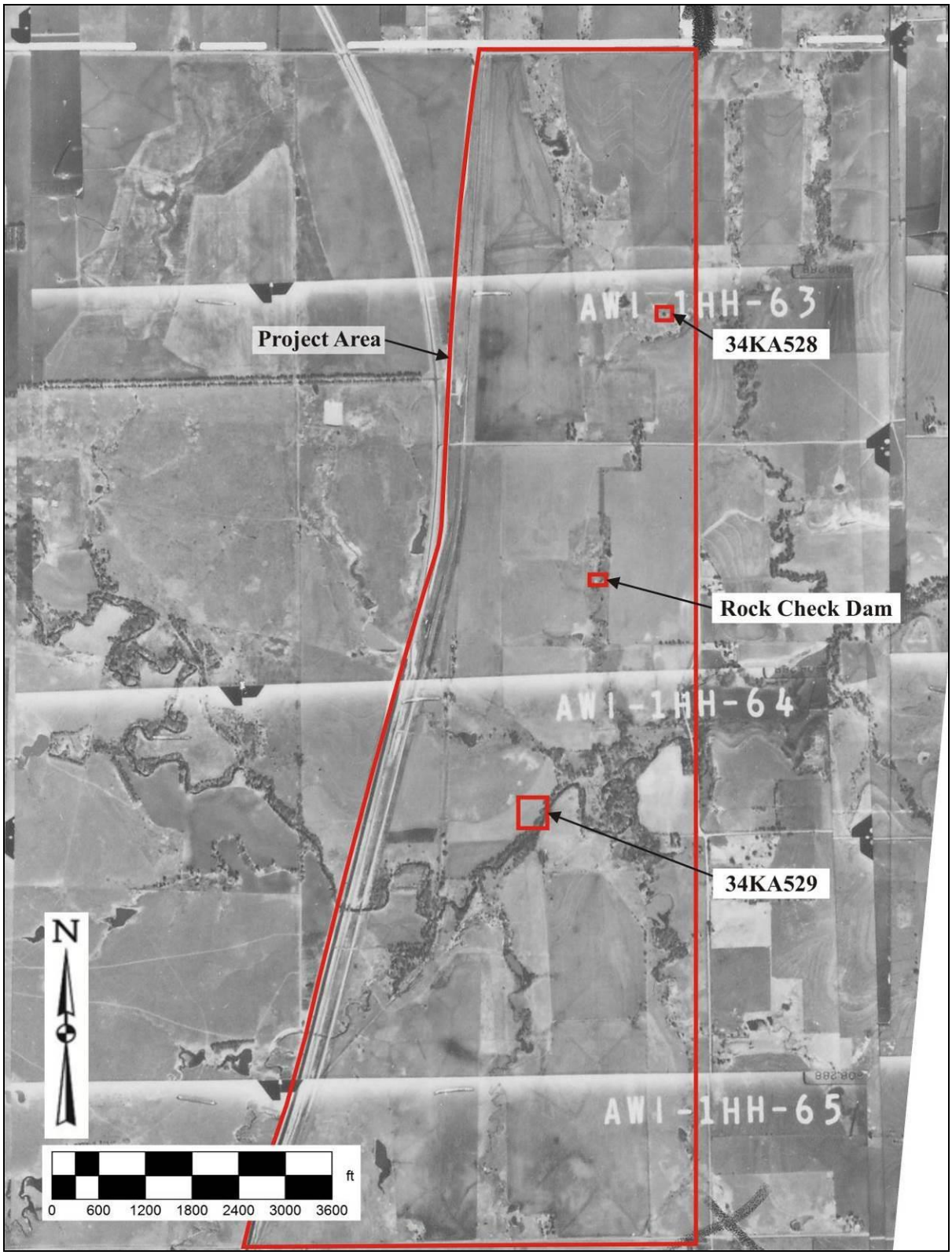

Figure 23. Detail of 1966 aerial photograph maps showing the study area and observed localities.

Cultural Setting

The majority of archeological research in Kay County in the 1960's through 2000 focused on reservoir and recreation facilities construction, thematic surveys along major drainages, and road construction. These studies mainly documented prehistoric components found along waterways and adjacent lowlands and include Kaw Reservoir, as well as Shidler Reservoir (proposed), Bluestem, and Keystone Reservoir in adjacent Osage County. Detailed summaries of these projects can be found in Hofman et. al (1989). From the late 1990's to the present, increased oil and gas development on tribal lands under Section 106 review have greatly increased studies beyond lowland and fluvial environments.

The initial colonization of North and South America has been categorized as Paleoindian, or "old Indian". In the Southern Plains this period is classically characterized by nomadic bands of hunters using lanceolate points to hunt various species of megafauna and other smaller game. The earliest generally accepted culture is the Clovis or Llano complex that is dated between 12,000-11,000 B.P. The Clovis complex is followed by the Folsom complex and then succeeded around 10,000 B.P. by what many researchers refer to as Late Paleoindian complexes. Paleoindian sites are uncommon, with only a few isolated or surface finds of diagnostic artifacts reported, mostly along the Arkansas River at Kaw Reservoir and below the dam at Keystone Reservoir (Bell 1977, George 1978, Johnson 1989) and the report of an isolated Clovis-like point near Hominy (Hofman 1971).

The Paleoindian period is followed by the Archaic Period and subsequently divided into the Early Archaic (8000-5000 B.P.), Middle Archaic (5000-3000 B.P.), and Late Archaic (3000-2000 B.P.). Based on geoarcheological investigations along the Walnut River in adjacent southern Kansas, the archeological record for much of the Archaic period is deeply buried, possibly several meters in depth, in alluvial deposits (Mandel 1995). An Early Archaic component in adjacent Kansas, the Stigenwalt site (14LT351) dates from 6190 to 7913 B.C. and contains burned rock features and a variety of lithic tools and debris and includes lanceolate, basally notched, side-notched, and corner-notched dart points in addition to grinding basins and manos, drills, knives, flake scrapers, hammerstones, bone awls, and bird bone beads (Thies 1990).

The only identified Middle Archaic component known from the area is from the Calf Creek horizon (Duncan 1995). The Calf Creek groups in north central Oklahoma appear to have relied heavily on Florence-A chert for use in manufacturing their chipped stone tools. Calf Creek points have been found at several sites in the Kaw Lake area. George (1985) reports on nineteen sites in the Kaw Lake area containing Calf Creek components. Splawn and Wyckoff (1995) report on an additional three sites in the Kaw Lake area with Calf Creek components and Sullivan (1995) reports on three additional Calf Creek bearing sites in the Kaw Lake area. Excavations at the Kubik site (34KA354) revealed hearths, a burned rock oven, bison and deer bone, Calf Creek points, and chipped stone debris (Neal and Drass 1998, Neal and Benefield 2001). This site has been radiocarbon dated (calibrated ages) to about 3660 to 3975 B.C., corrected.

Late Archaic sites in the region include temporary open camps situated on stream or river terraces and have been reported along the Arkansas River (Kaw Lake) area and Salt Creek

drainage (Vehik 1985), and as a minor constituent in other parts of the county. These sites tend to be located on sandy ridges overlooking streams (Moore 1988, Steinacher 1986) and have corner-notched, weakly barbed dart points (Marcos or Ellis, Palmillas or Williams, and Ensor) and contracting stem darts, primarily Gary points. One site along Salt Creek, 34OS245, has been tested and dated to about 160-430 B.C. (Buehler 1985). This site has small pits and burned rock features with contracting stem dart points and ground stone.

Vehik (1984) notes the transition from Late Archaic to Woodland is based on a change in food storage technology (pottery) and weaponry (bow and arrow). Settlement and subsistence patterns do not seem to have been drastically altered and technology advances are seen as an addition to the typical Late Archaic toolkit rather than a replacement. Research in the Kaw Lake area has provided many dated Woodland period sites. There are no defined complexes, but Vehik (1984) has suggested three groups or components for Woodland sites. These sites date from about 950 to 1850 YBP. Woodland period sites are by far the most common in north central Oklahoma (Drass 1985), and numerous sites along the Arkansas River (Kaw Lake) in Kay County (Hartley 1975; Rohrbaugh 1974; Young 1978); 34PW54 and 34PW92 in the Keystone Reservoir area (Moore 1980); and Weston (34OS99), Jackson Fall-Leaf (34WN42), and Drumming Sauna (34WN29) in the Copan Reservoir area (Farley and Keyser 1979; Howard 1970, 1971; Reid and Artz 1984). Woodland sites consisting of small to medium sized open occupations, rockshelters, and burned rock mounds have also been found in the Skiatook, Birch Creek, and Caney Lake Reservoir areas (Henry 1977a, 1977b, 1982, 2002; Saunders 1980), and along Bird Creek (Drass 1985).

An expanding population, increasing numbers of permanent or repeatedly occupied settlements, and the expansion of farming are iconic of the transition from the Woodland Period into the Late Prehistoric Period. Small villages previously established on floodplains of major watercourses become more intensively and more permanently occupied (Wyckoff et al. 1983). Most of the documented sites in the region are known from west of the Bird Creek drainage (Drass 1985) and several sites along the Arkansas River (Kaw Lake) area (Galm 1979; Sudbury 1976; Vehik and Flynn 1982). Late Prehistoric remains in the Bird Creek area have been identified in both the Birch Creek and Skiatook Reservoir areas and along the main branch of the creek (Drass 1985; Henry 1977a, 1977b, 1978, 1980). They include several caves or rockshelters used as transitory campsites, small upland camps, and probably seasonal base camps located on terraces.

The Late Ceramic or Protohistoric period represents the time of initial contact between Native American populations and European explorers, about A.D. 1500 to 1800. Indigenous populations of this period were able to gather into large villages due to reliable agricultural subsistence, while increasing their dependency on bison procurement. Until European trade avenues were fully opened, little was documented concerning the indigenous peoples of the Southern Plains. Poorly detailed journals of the Spanish Conquistadors indicate that only three incursions were made into the region. The protohistoric archeological settlements in southern Kansas and northcentral Oklahoma, particularly in the Arkansas River lowlands, are believed to be ancestral to the Caddoan-speaking Wichita Indians (Vehik and Flynn 1986, 1992; Wedel 1961). Wedel (1959) defined the Great Bend aspect, which extends from about the mid-l5th century until the early 18th century (Hawley and Haury 1994), on the basis of archeological investigations at a number of sites in McPherson, Rice, and Cowley counties, Kansas. Two significant early to mid-18th

century Wichita sites, the Deer Creek site (34KA3) and the Bryson-Paddock site (34KA5) have been studied in the Kaw Lake area (Sudbury 1976; Hartley and Miller 1977; Wedel 1961). These two sites, occupied most intensively from 1700 to 1750, have yielded through surface collections and test excavations an extensive series of trade items, such as gun parts, gun flints, knives, axes, scissor blades, pipes, ornaments, etc. Wichita groups subsequently moved south to the Red River in south central Oklahoma and northern Texas (Hofman et. al 1989).

The Civil War was an important period with regard to political and social developments in the area and had both direct and indirect impacts on the Native American landholdings in Indian Territory. The tribes of eastern and southeastern Oklahoma were as divided as the rest of the nation and the fighting within groups was often more merciless than fighting between groups. One battle, the battle of Chustenahlah, took place in eastern Osage County near the confluence of Battle and Quapaw Creeks. This battle was part of a running skirmish between Union Loyalist Native Americans and organized Confederate forces and resulted in the defeat of the Loyalists in December 1861. After the defeat of the Confederacy in 1865, tribes both sympathetic to and against the Union were forced to give up lands; for example, the Five Civilized Tribes gave up more than half their lands (Hofman, et al. 1989).

The Chilocco Indian Agricultural School (NRHP site ID #06000792) and its contributory elements were placed on the NRHP in 2006 under Criteria A and C. The period of significance is indicated as between 1883 to 1956 (Gabbert 2006). Approximately 50 buildings and seventy-five structures are associated with the campus, most of which are considered contributory elements. The general landscape, including pump houses, culverts, and sidewalks are also considered contributory, however are not accounted for in the above structure count. The plotted UTM boundaries of the District represent 407 acres.

According to the Bureau of Land Management, Native American Tribes/Groups primarily associated with Kay County include the Wichita and Affiliated, Kaw (Kansa), Tonkawa, Ponca and Cherokee (Bureau of Land Management 2012).

SURVEY METHODS

The purpose of this investigation was to locate any cultural resources along the defined impact area of the project, and to provide sufficient detail for the protection and management of such resources. By strict definition, cultural resources are any evidence of human use or occupation without any age limitations, but for this project, the term was restricted to cultural remains that were at least 45 years in age.

The proposed activities are planned for portions of Sections 13, 24, 25, 26, and 27 T29N R2E. These sections are presently occupied by several farmsteads, cultivated fields, and pasture (Figures 24-30). Survey methodology included pedestrian transects augmented by shovel testing. Approximately164.6 acres of land area were studied for this report.

Surface visibility averaged 25-50 percent overall due to intensive cultivation, previous development, and ground cover. Surface visibility in the corn fields was excellent (>90%).

Shovel tests were excavated to 30-50cmbs, screened through 1/4-inch hardware cloth, and backfilled (Appendix A). The study area was marked by GPS in the field. All UTM coordinates were recorded in datum NAD83 CONUS, using WAAS-enabled, handheld DeLorme Earthmate PN-60 units, offering optimal accuracy of < 3m.

Development activities including road, fence, and utility construction, installation, and maintenance and two instances of oil and gas exploitation have impacted the study area.

PALEONTOLOGICAL RESOURCES

No vertebrate paleontological resources or significant invertebrate resources were noted during the course of this archeological investigation.

CULTURAL RESOURCE FINDINGS AND DETRMINATION OF EFFECT

Between June 22-24 and July 6-10, 2016, CAS conducted an archeological survey of a proposed PNE Wind, USA wind farm in northern Kay County, Oklahoma. The project is located on lands owned by the Cherokee Nation and administered by the Bureau of Indian Affairs, Eastern Oklahoma Region.

Figure 24. Project setting in the southern portion of the project area in Section 13 T29N R2E facing east.

Figure 25. Project setting in the southeastern portion of Section 13 T29N R2E facing north.

Figure 26. Project setting in the western portion of Section 13 T29N R2E facing south.

Figure 27. Project setting in the eastern portion of the project area in Section 24 T29N R2E facing south.

Figure 28. Project setting in the northwestern portion of Section 24 T29N R2E facing south.

Figure 29. Chilocco Creek floodplain in the project area in the southeastern portion of Section 24 T29N R2E facing south.

Figure 30. Project setting for the proposed substation in Section 27 T29N R2E facing northwest.

One 20th-century farmstead (34KA528), one large check dam, and one prehistoric archeological site (34KA529) were documented within the study area during the course of these investigations (Figures 31 and 32).

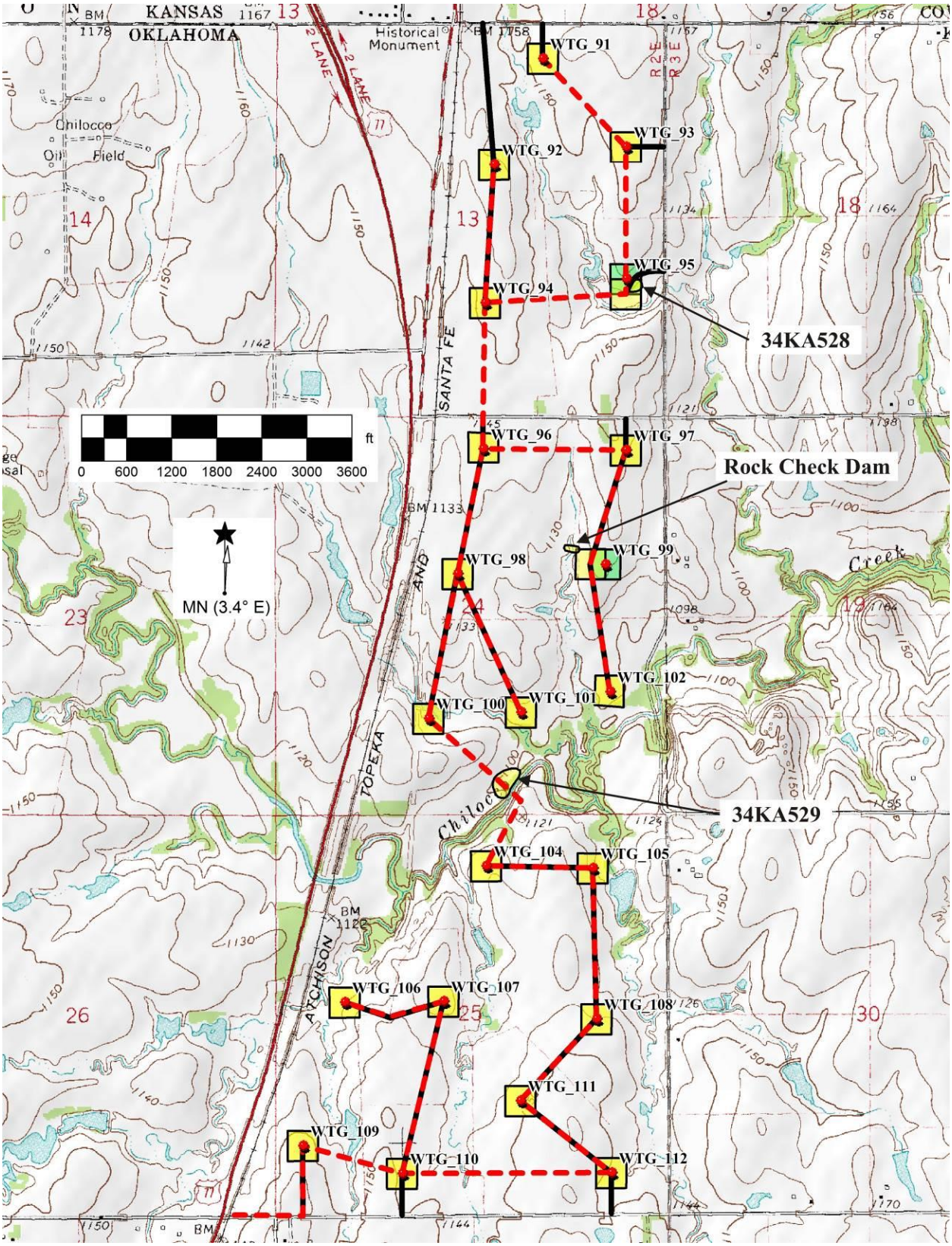

Figure 31. USGS topographic map (Newkirk 7.5″ series, 1976) showing the study area and observed localities (redesigned turbine footprints in green).

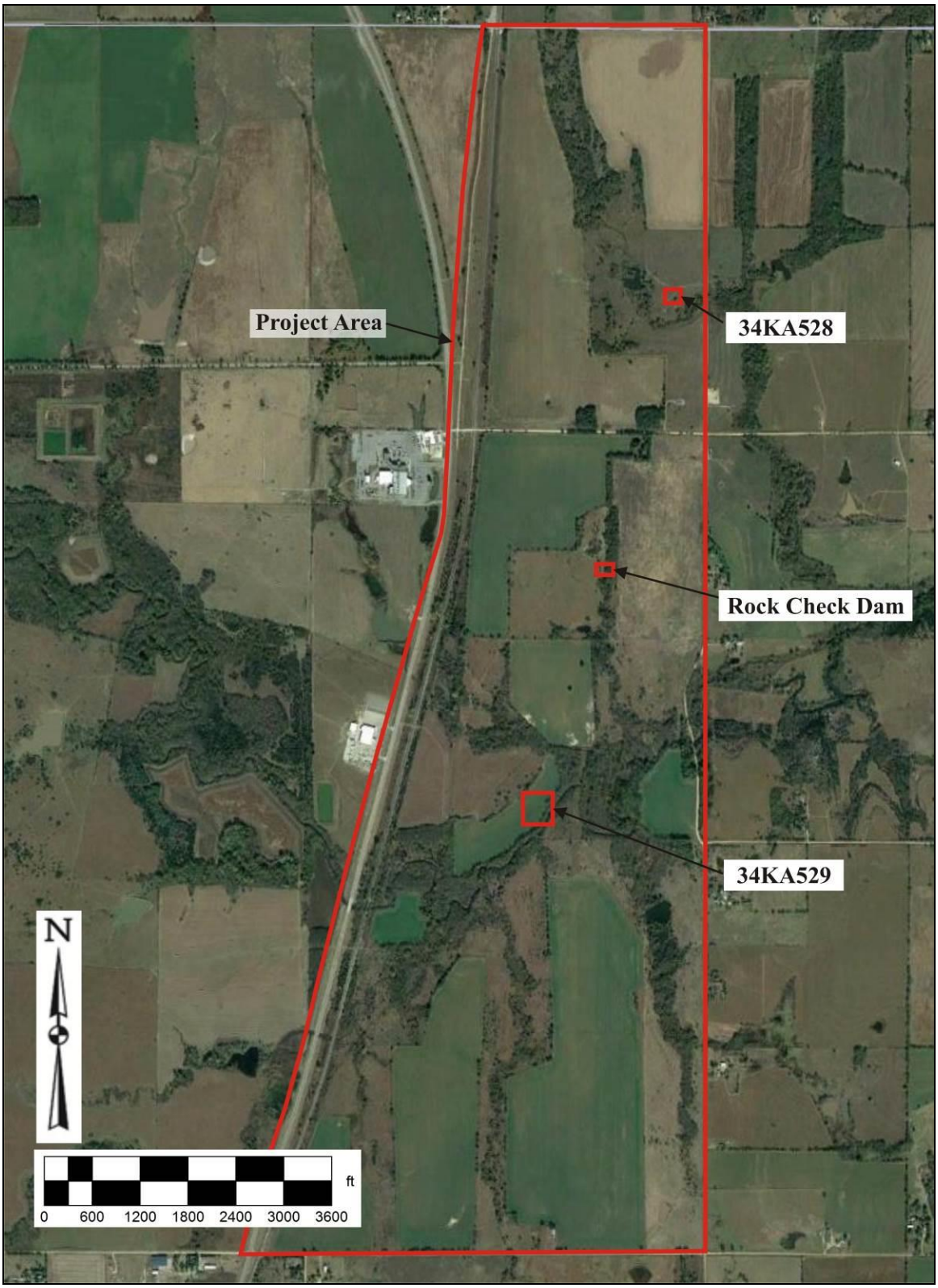

Figure 32. Detail of the 2014 aerial photograph map showing the study area and observed localities.

34KA528 (Farmstead)
SE/NE/SE Section 13 T29N R2E
UTM (CONUS NAD83): 14S E0675193 N4095496

34KA528 (Figures 33-35) is approximately 250 feet × 250 feet (1.4 acres) in size and is located at 14S E0675193 N4095496 (UTM CONUS NAD83) in the SE/NE/SE Section 13 T29N R2E. The site is located approximately 0.3 miles north-northwest of the intersection of Juno Road and North La Cann Road, Kay County, Oklahoma. The locality consists of two very low linear rock alignments and one limestone stone well or cistern. Rusted metal fragments were observed in the vicinity of the first, and larger, of the two linear rock alignments. A road trace runs from the north-central portion of the site for approximately 400 feet to the east. Three positive shovel tests yielded a total of 47 artifacts, including clinkers, clear bottle and window glass, round-head nails, and two horseshoe fragments. The features and artifacts suggest a twentieth-century farmstead, with possible landscape stabilization features and a structure that is now no longer present. The site is located on a gently sloping (~5°), south-facing, upland pasture. Surface visibility in the farmstead area was very low (<10 percent) and vegetation consisted of low mixed prairie grasses and sparse immature hardwoods and brush (Figure 36).

The first of the two very low rock alignments (Figure 37) consists of a single course of very roughly-cut limestone blocks approximately 1 ft^3 in size. The alignment is roughly oriented east-west and is approximately 40 feet in length. The western terminus of the alignment is located at 14S E0675179 N4095493 (UTM CONUS NAD83). The eastern terminus of the alignment is located at 14S E0675193 N4095496 (UTM CONUS NAD83). The alignment is located in the southwestern portion of the site area. A shovel test excavated approximately 10 feet to the north of the center of the alignment yielded eight clinkers, eight shards of clear pane and bottle glass, two horseshoe metal fragments, and one sherd of undecorated stoneware.

The second of the two very low rock alignments (Figure 38) consists of approximately eight thin (~6″), short (12″) blocks of cut limestone. These were roughly flush with the ground surface. The alignment was approximately eight feet in length, roughly oriented north-south, appears to be associated with the narrow road trace, and is located at 14S E0675190 N4095526 (UTM CONUS NAD83). Shovel tests excavated in the vicinity of the second alignment yielded no cultural material. The alignment is located in the north-central portion of the site.

The limestone stone well or cistern (Figure 39) consists of several courses of small 8″×5″×6″ rough-cut limestone blocks partially capped by a large (3′×3′×1.5′) limestone block. The large limestone block, a tree growing adjacent to the feature, and wood debris and leaves observed inside the well or cistern, obscure the bottom of the feature. The well or cistern is approximately 3 feet in diameter and is located at 14S E0675194 N4095512 (UTM CONUS NAD83). The well or cistern is located in the central portion of the site.

The locality is not apparent on GLO plat maps completed in 1872 and 1907 and aerial photographs taken in 1938, 1954, and 1966 (Figure 40).

The site is located in the northeast portion of the footprint of a proposed turbine at WTG 95. Approximately 25 percent of the footprint of the proposed turbine location (3.67 acres) is also occupied by a well pad (0.88 acres) in the north half of the footprint. PNE Wind, USA redesigned project activities in order to avoid 34KA528, moving the footprint for the turbine at WTG 95 200 feet to the north.

NRHP eligibility of this site has not been assessed. Three features, including a well or cistern, were observed and artifacts were recovered from three shovel tests. The site may be potentially eligible under criteria A, B, or D.

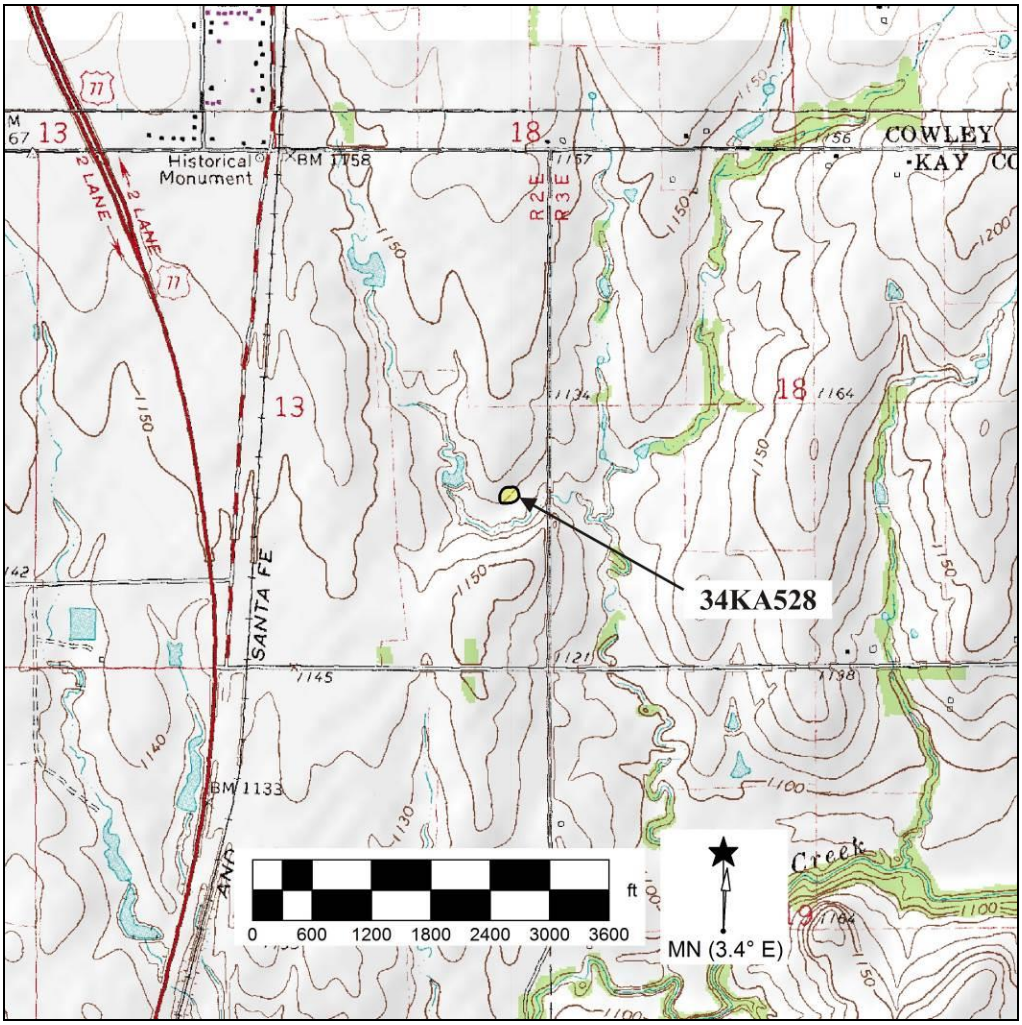

Figure 33. USGS topographic map (Newkirk 7.5″ series, 1976) showing the location of 34KA528.

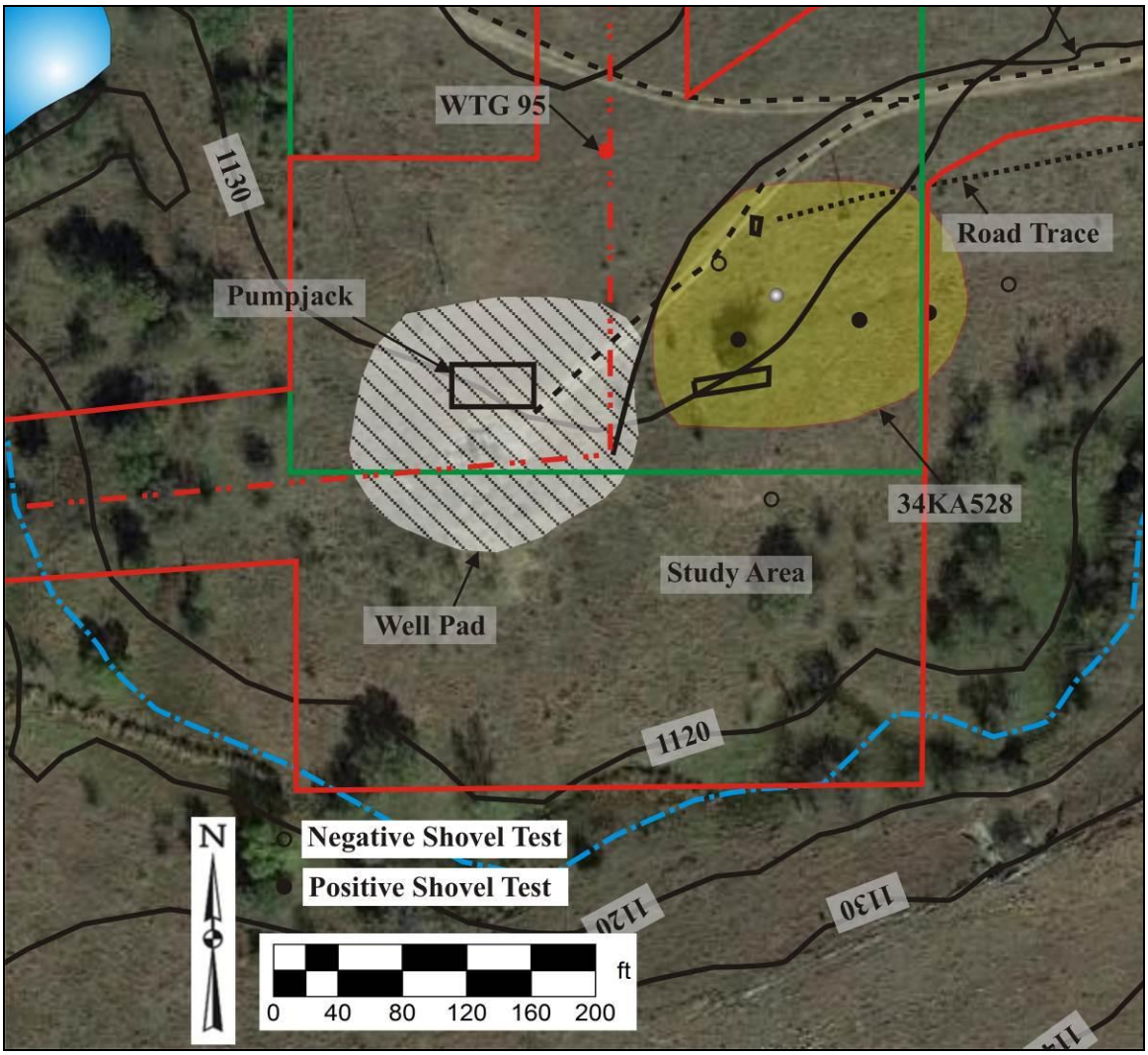

Figure 34. Aerial photograph of 34KA528 (redesigned turbine footprint in green).

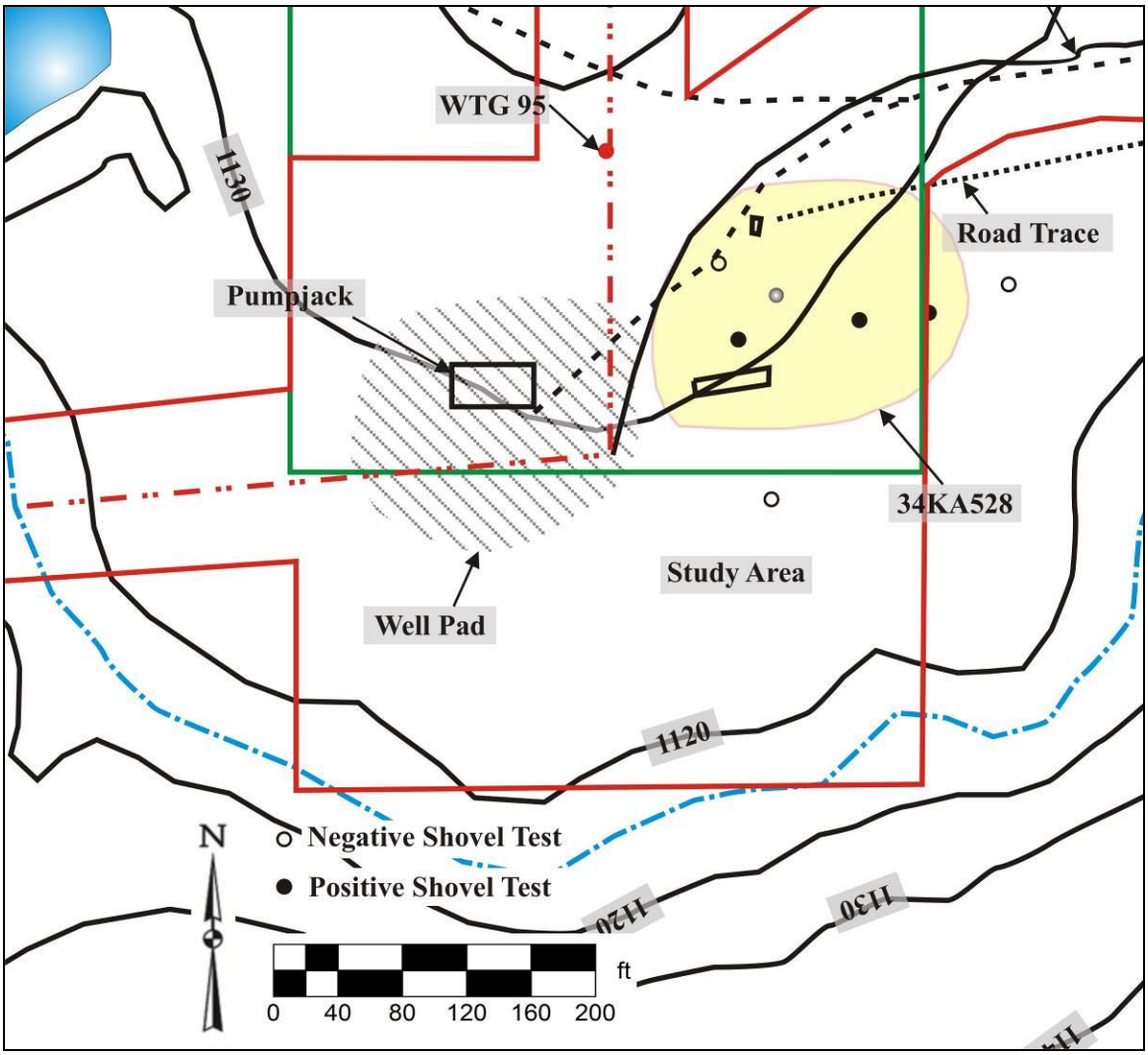

Figure 35. Sketch map of 34KA528 (redesigned turbine footprint in green).

Figure 36. Setting for 34KA528 facing west.

Figure 37. First rock alignment at 34KA528 facing west.

Figure 38. Second rock alignment at 34KA528 facing southwest.

Figure 39. Rock well or cistern observed at 34KA528 facing southwest.

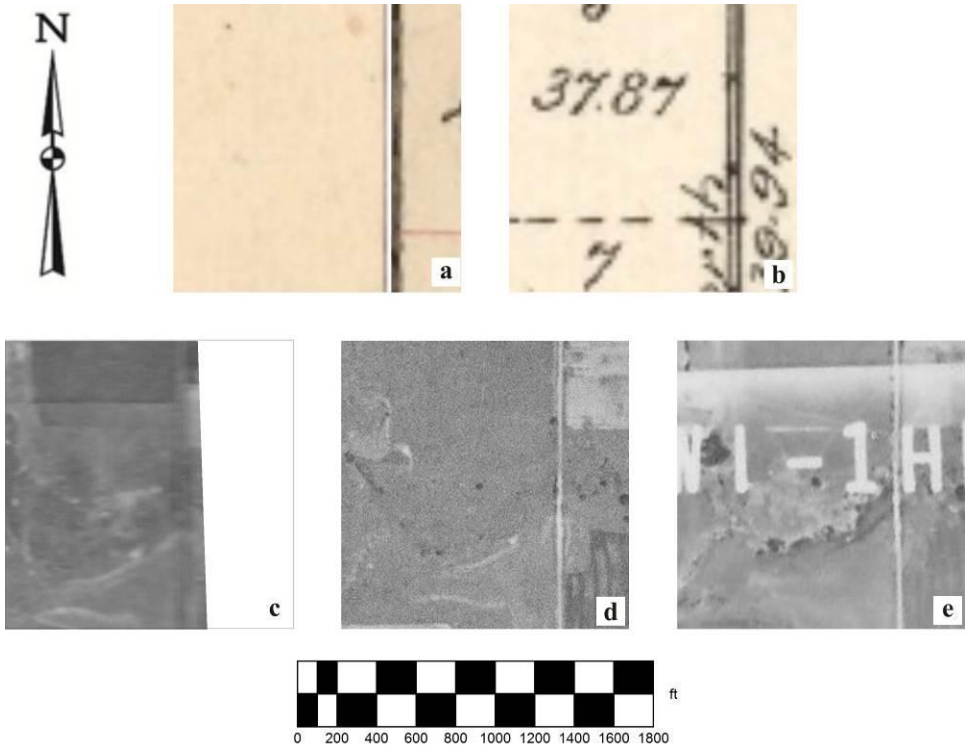

Figure 40.GLO maps and aerial photographs of 34KA528: (a) 1872; (b) 1907; (c) 1938; (d) 1954; and (e) 1966.

Rock Check Dam
NW/SE/NE Section 24 T29N R2E
UTM (CONUS NAD83): 14S E0674966 N4094442

The rock check dam (Figures 41-43) is approximately 150 feet × 10 feet (0.3 acres) in size and is located at 14S E0674966 N4094442 (UTM CONUS NAD83) in the NW/SE/NE Section 24 T29N R2E approximately 0.4 miles southwest of the intersection of Juno Road and North La Cann Road, Kay County, Oklahoma. The locality consists of an historic erosion control facility consisting of a 143 feet long, 2.5 feet wide, 2 feet high rough-cut limestone and coarse-aggregate mortar check dam with two 2 feet × 2 feet buttresses of the same material on either side of the main course of the draw that serve to stabilize the wall. It crosses a broad shallow draw that flows into Chilocco Creek approximately 0.5 miles to the south. Vegetation consists of dense mixed mature hardwoods and a low sparse understory. The site is located on a gently sloping (~5°), south-facing, densely wooded, upland pasture. Surface visibility in the farmstead area was very good (50-75 percent) (Figures 44-46).

The locality is not apparent on GLO plat maps completed in 1872 and 1907 but appears to be visible on aerial photographs taken in 1938, 1954, and 1966 (Figure 47).

The eastern end of the wall is located immediately adjacent to the northwestern corner of the footprint of the proposed turbine at WTG-99 and will not be disturbed by the proposed construction activities. PNE Wind, USA redesigned project activities in order to avoid the rock check dam, moving the footprint for the turbine at WTG 99 200 feet to the east.

This rock check dam does not appear to meet any criteria for inclusion on the NRHP. A Historic Preservation Resource Identification form was completed for the resource (Appendix D).

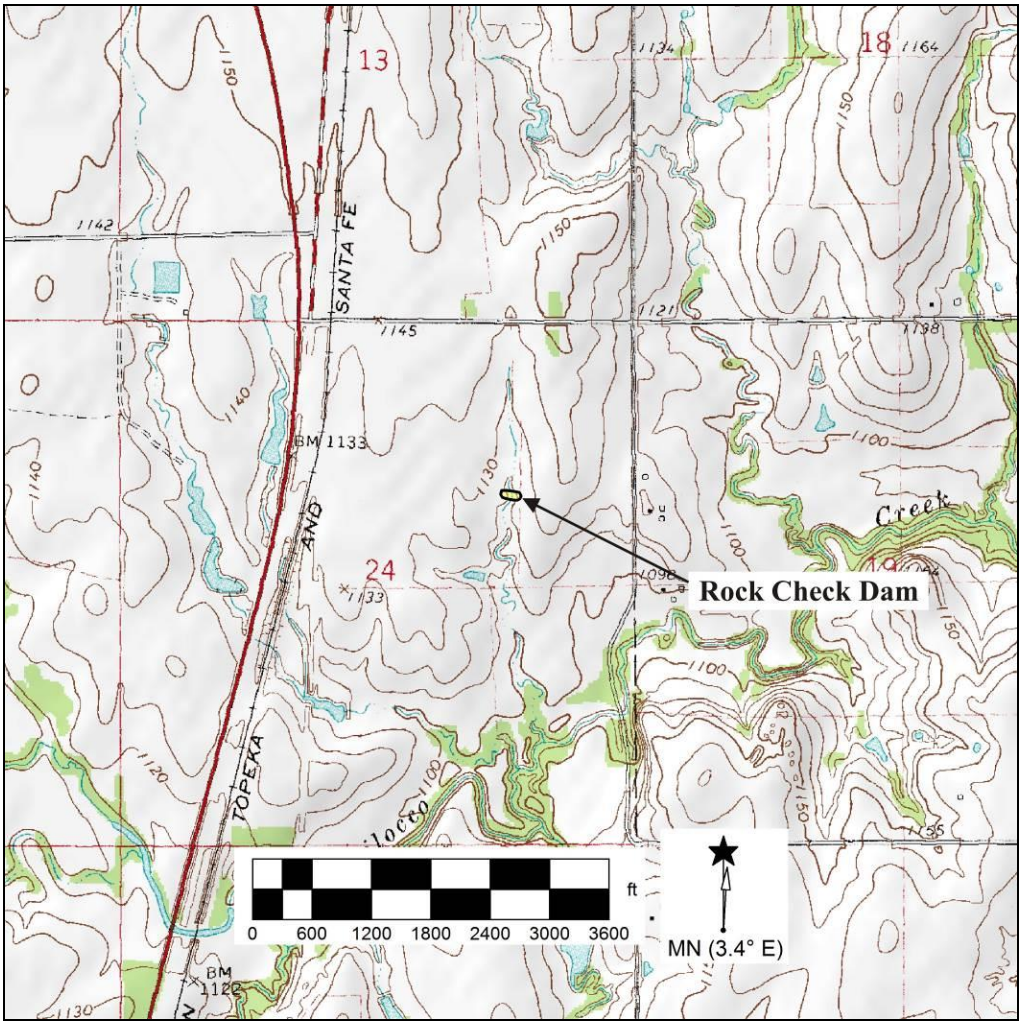

Figure 41. USGS topographic map (Newkirk 7.5″ series, 1976) showing the location of the Rock Check Dam.

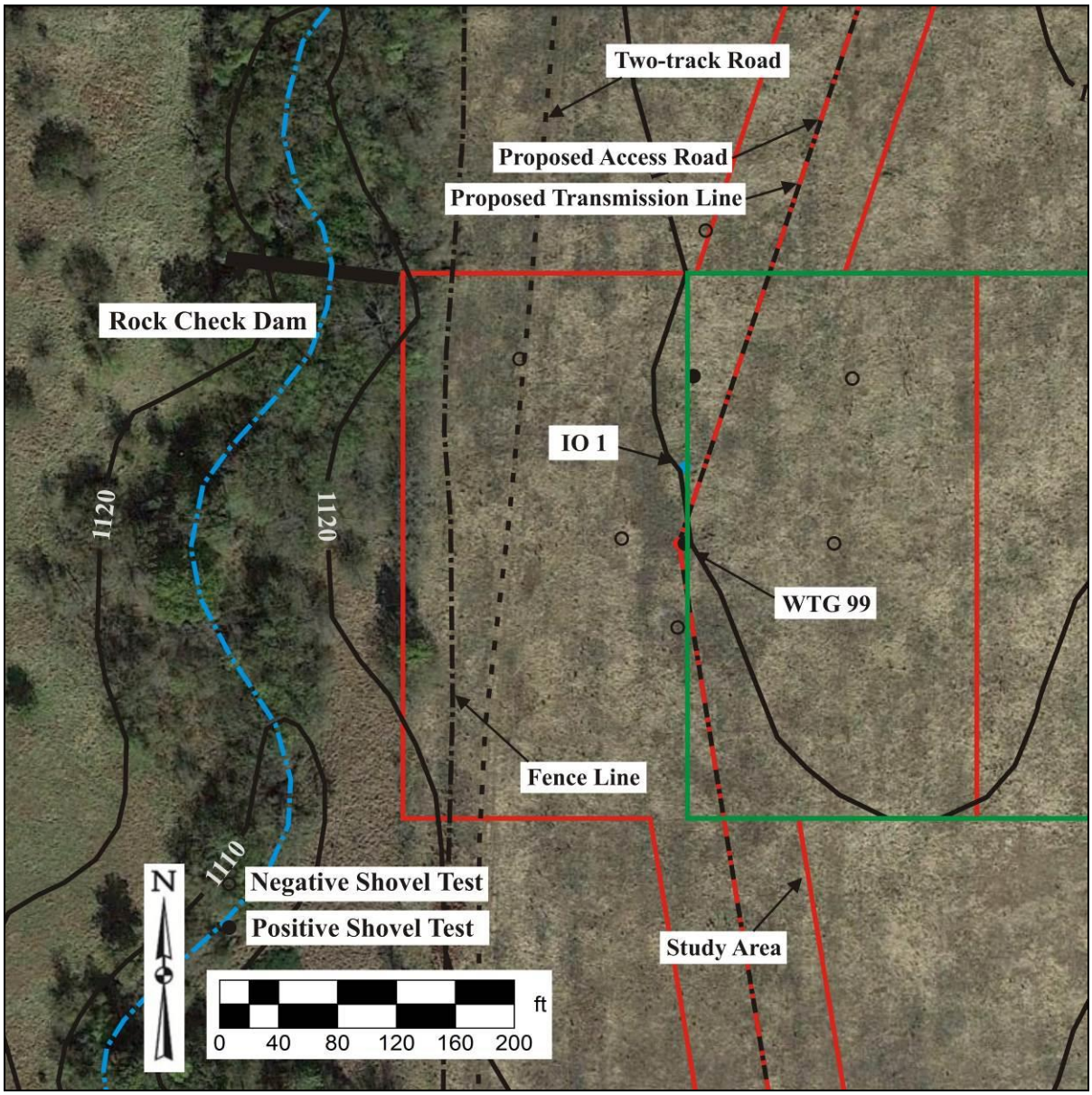

Figure 42. Aerial photograph of the Rock Check Dam (redesigned turbine footprint in green).

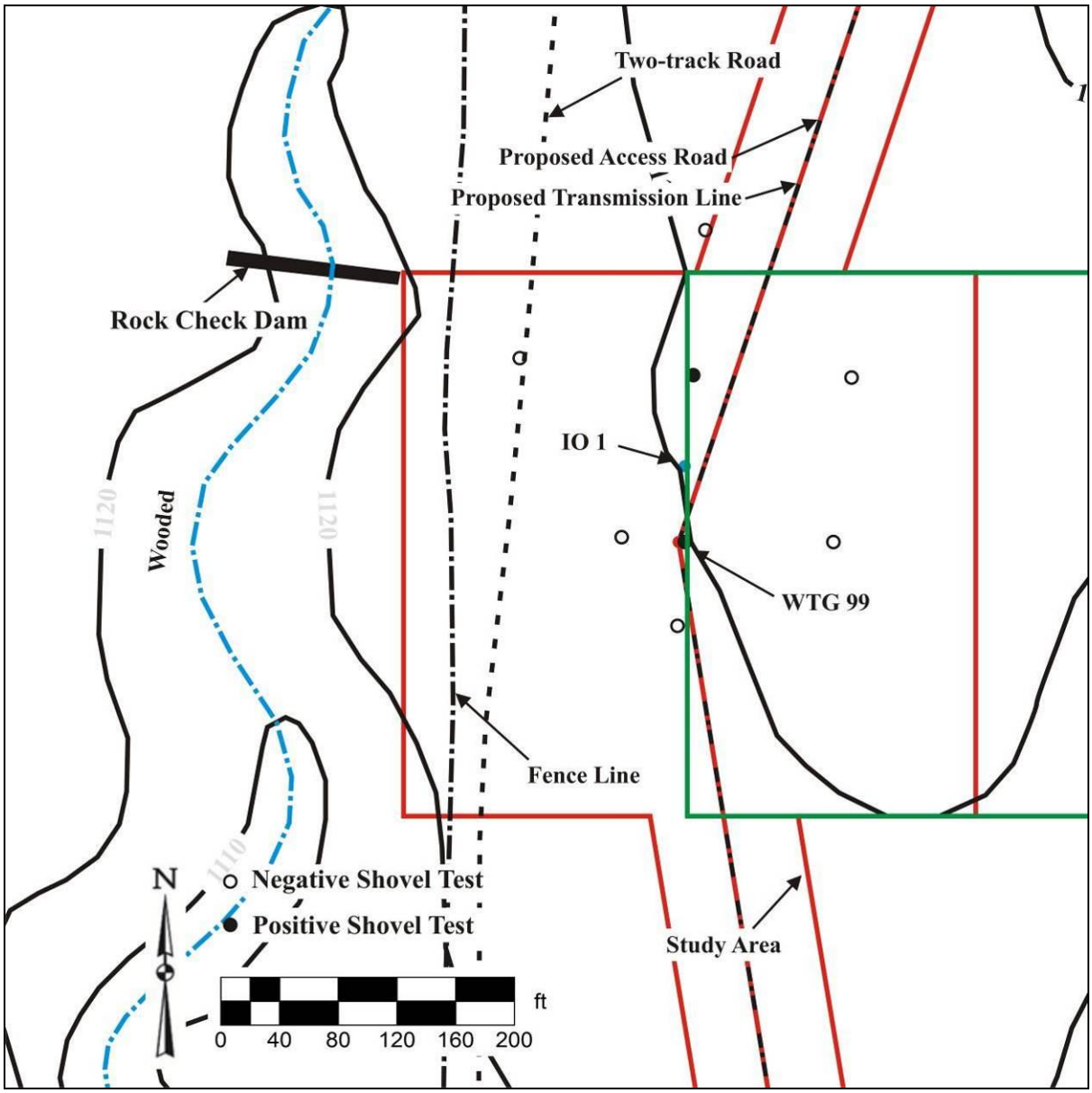

Figure 43. Sketch map of the Rock Check Dam (redesigned turbine footprint in green).

Figure 44. Rock Check Dam facing northwest.

Figure 45. Central portion of the check dam facing northeast.

Figure 46. Rock check dam facing east from the western terminus of the dam.

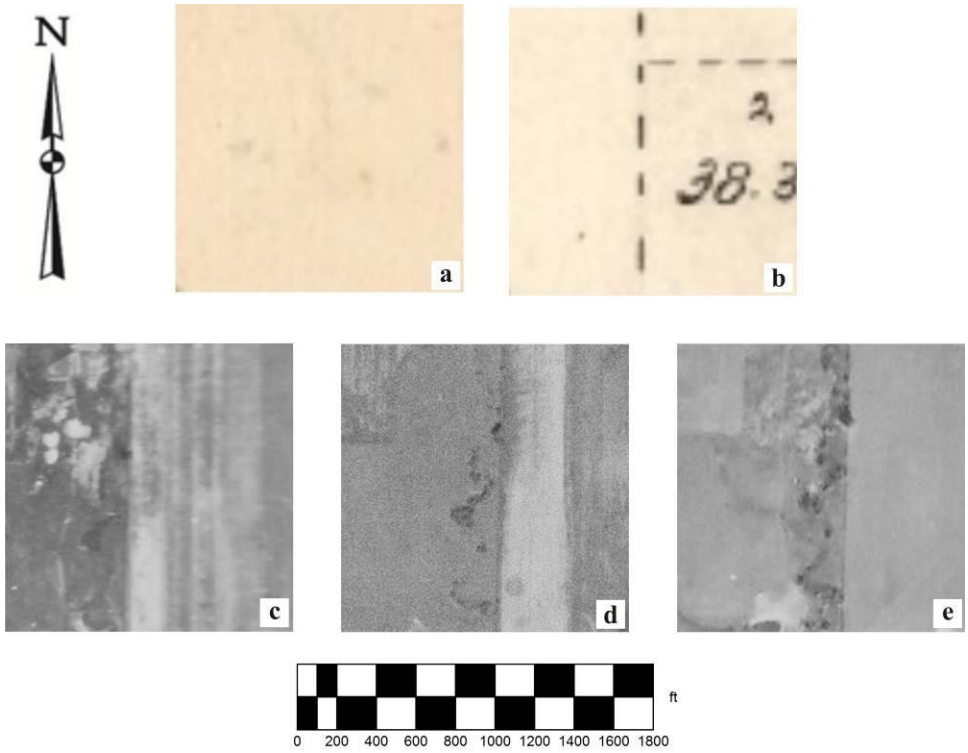

Figure 47.GLO maps and aerial photographs of the Rock Check Dam: (a) 1872; (b) 1907; (c) 1938; (d) 1954; and (e) 1966.

34KA529 (Sparse Surface Prehistoric Lithic Scatter)
SE/NE/SW Section 24 T29N R2E
UTM (CONUS NAD83): 14S E0674731 N4093535

34KA529 (Figures 48-51) is approximately 6400 m^2 in size and is located at 14S E0674731 N4093535 (UTM CONUS NAD83) in the SE/NE/SW Section 24 T29N R2E approximately 0.4 miles west of the intersection of East Indian Road and North La Cann Road, Kay County, Oklahoma. The locality consists of a sparse surface prehistoric lithic scatter consisting of 5 chert flakes (three thinning flakes, one heat-treated oolitic chert, and two larger flakes from tool manufacture) and one expedient flake tool of heat-treated oolitic chert. The artifacts were observed in a maturing corn field with very good visibility (50-75%). Nine shovel tests were excavated in the vicinity of the scatter. None yielded additional cultural material. The soils from those tests revealed an initial layer of very black silty clay loam or silty loam over very dark brown silty clay. The site is located on an upper floodplain of Chilocco Creek.

The vicinity of 34KA529 on GLO plat maps completed in 1872 and 1907 appears to have been unaffected by any specific form of land use. Aerial photographs taken in 1938, 1954, and 1966 (Figure 52) indicate that the area has been under cultivation since 1938.

The site will be bisected by a proposed collector line.

Based on the sparse nature of the findings at 34KA529, further excavation would not likely recover significant scientific information. This site does not appear to meet criteria for inclusion on the NRHP.

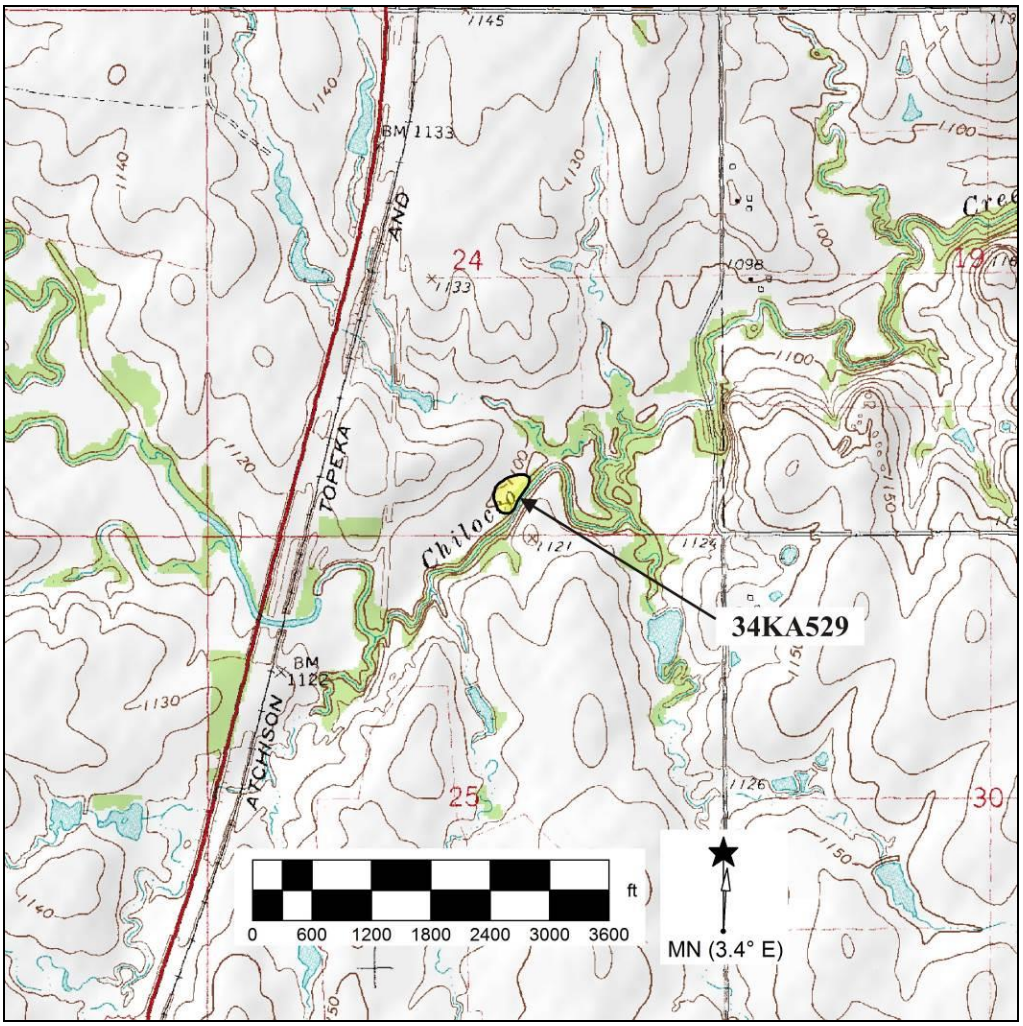

Figure 48. USGS topographic map (Newkirk 7.5″ series, 1976) showing the location of 34KA529.

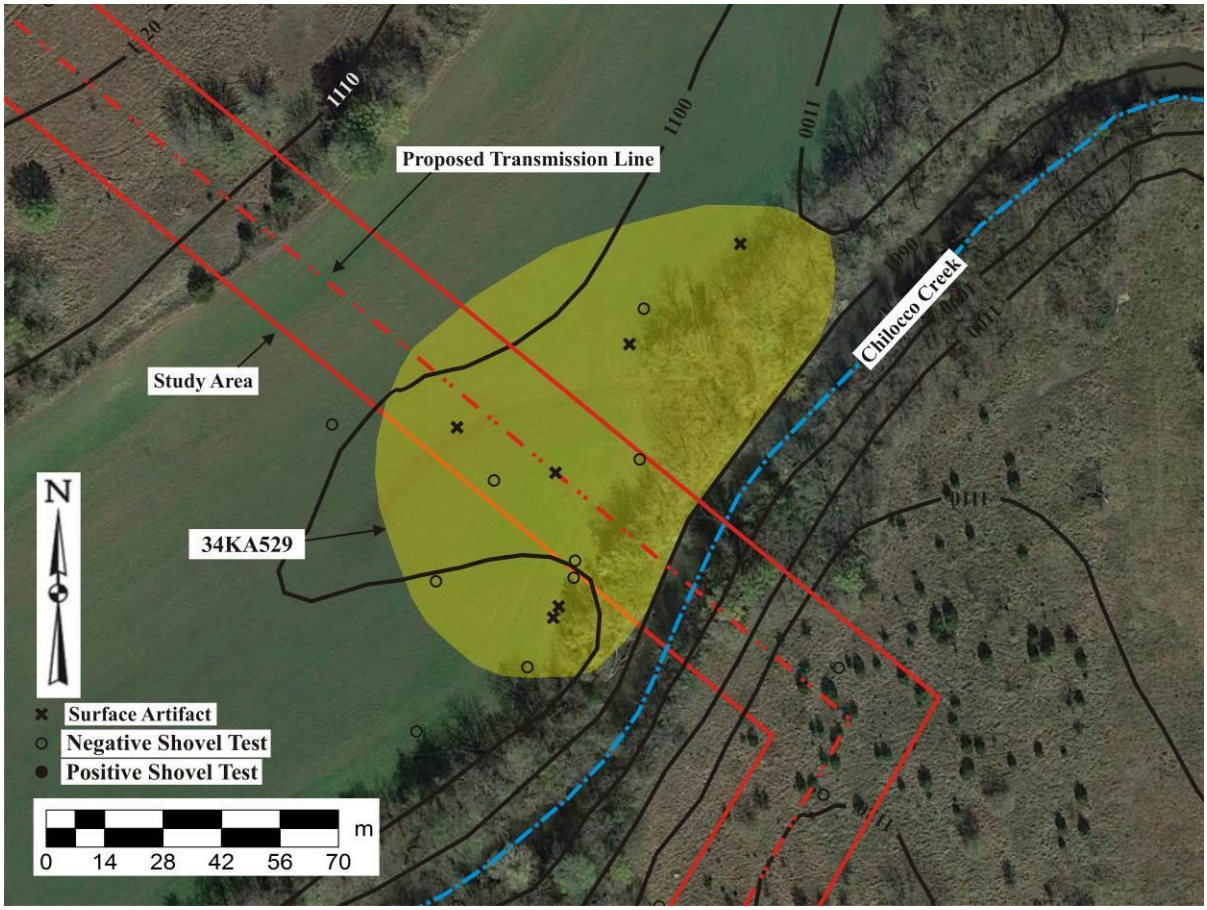

Figure 49. Aerial photograph of 34KA529.

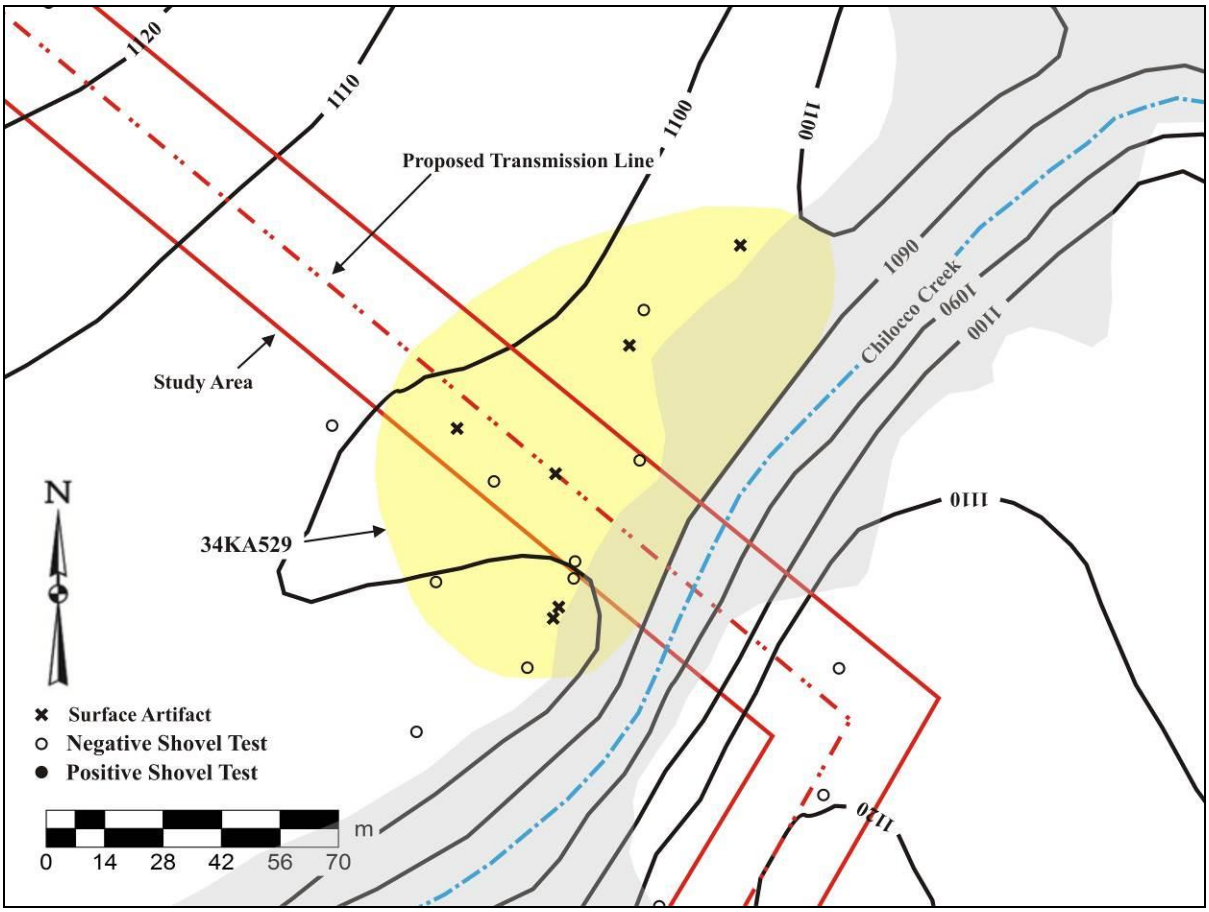

Figure 50. Sketch map of 34KA529.

Figure 51. Setting for 34KA529 facing south.

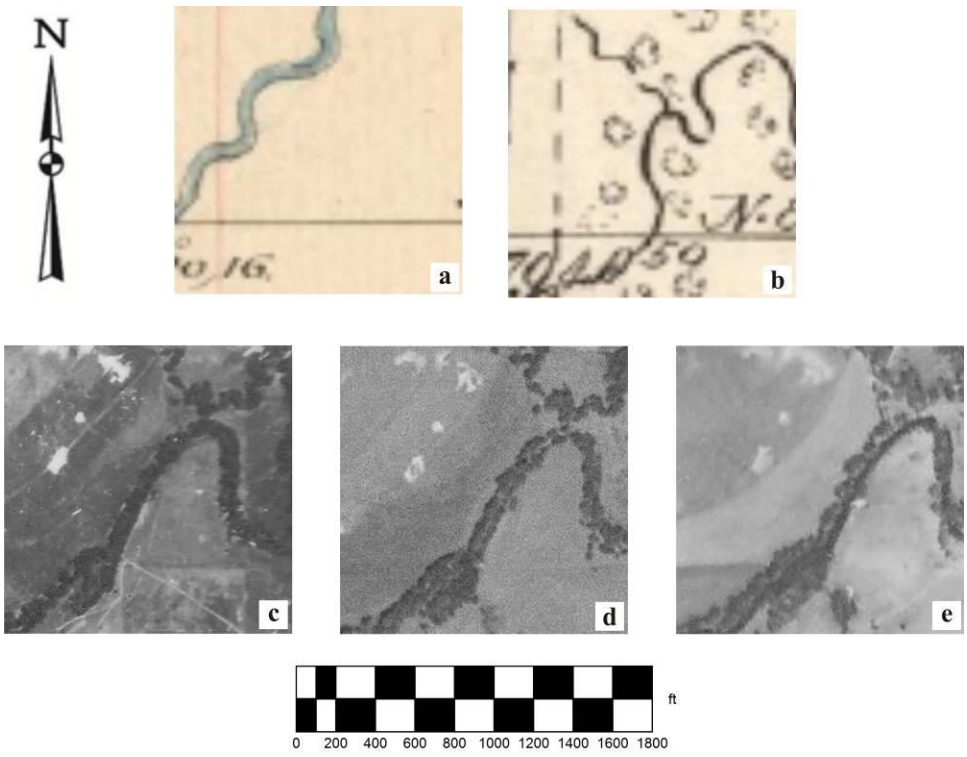

Figure 52. GLO maps and aerial photographs of 34KA529: (a) 1872; (b) 1907; (c) 1938; (d) 1954; and (e) 1966.

RECOMMENDATIONS

One 20th-century farmstead (34KA528), one large check dam, and one prehistoric archeological site (34KA529) were documented within the study area during the course of these investigations. 34KA528 has not been assessed for its inclusion to the NRHP. Three features, including a well or cistern, were observed and artifacts were recovered from three shovel tests. The site may be potentially eligible under criteria A, B, or D. It is PNE Wind USA's concern to avoid impacts to found cultural resources. The project has been redesigned to avoid impact to 34KA528.

Neither the rock check dam nor 34KA529 are recommended as eligible for inclusion to the NRHP. The project has been redesigned in order to allow a buffer of avoidance from the rock check dam. The project as now planned will have no effect on significant cultural resources.

Christopher Cojeen
Principal Investigator

copies:

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Attention: Mark Randall

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APPENDIX A
SHOVEL TEST LOG

Shovel Test	UTM (NAD83 Datum)	Soils	Visibility	Setting	Cultural Materials
JMST-001	14S E0674616 N4095988	0-50 cm red brown sandy clay silt	25-50%	Corn Field	Negative
JMST-002	14S E0674649 N4095965	0-50 cm red brown sandy clay silt	25-50%	Corn Field	Negative
JMST-003	14S E0674583 N4095419	0-50 cm red brown sandy clay silt	25-50%	Corn Field	Negative
JMST-004	14S E0674566 N4095468	0-50 cm red brown sandy clay silt	25-50%	Corn Field	Negative
JMST-005	14S E0675258 N4095575	0-30 cm dark brown clay silt, 30-40 cm red brown clay silt	<10%	Open Pasture	Negative
JMST-006	14S E0675171 N4095674	0-30 cm dark brown clay silt, 30-40 cm red brown silty clay	<10%	Open Pasture	Negative
JMST-007	14S E0675155 N4096072	0-50 cm red brown sandy clay silt	25-50%	Corn Field	Negative
JMST-008	14S E0675178 N4094845	0-30 cm dark brown clay loam, 30-40 cm brown fine sandy clay	<10%	Open Pasture	Negative
JMST-009	14S E0675115 N4094845	0-30 cm dark brown clay loam, 30-40 cm dark brown/red brown mottled fine sandy clay	<10%	Open Pasture	Negative
JMST-010	14S E0675216 N4094816	0-30 cm dark brown sandy clay loam, 30-40 cm red brown/dark brown silty fine sandy clay	<10%	Open Pasture	Negative
JMST-011	14S E0675108 N4094581	0-25 cm dark brown sandy clay loam, 25-40 cm red brown/dark brown silty fine sandy clay	<10%	Open Pasture	Negative
JMST-012	14S E0675041 N4094387	0-15 cm dark brown sandy loam, 15-30 cm dark brown sine sandy clay, 30-40 cm red brown fine sandy clay	<10%	Open Pasture	Positive (n =1)
JMST-013	14S E0675028 N4094387	0-20 cm red brown sandy clay, 20-30 cm very dense red brown fine sandy clay	<10%	Open Pasture	Negative
JMST-014	14S E0675040 N4094368	0-25 cm dark brown sandy clay, 25-40 cm red brown fine sandy clay	<10%	Open Pasture	Negative

JMST-015	14S E0675072 N4094387	0-30 cm dark brown sandy clay, 30-40 cm red brown fine sandy clay	<10%	Open Pasture	Negative
JMST-016	14S E0675042 N4094423	0-25 cm dark brown fine sandy clay, 25-40 cm red brown fine sandy clay	<10%	Open Pasture	Positive (n =1)
JMST-017	14S E0675006 N4094426	0-10 cm dark brown fine sandy clay loam, 10-35 cm dark brown fine sandy clay, 35-50 cm red brown fine sandy clay	<10%	Open Pasture	Negative
JMST-018	14S E0675044 N4094455	0-20 cm dark brown fine sandy clay loam, 20-30 cm dense red brown fine sandy clay, 0-30 cm dark brown fine sandy clay loam	<10%	Open Pasture	Negative
JMST-019	14S E0675075 N4094423	0-30 cm dark brown fine sandy clay loam, 30-40 cm dense red brown fine sandy clay	<10%	Open Pasture	Negative
JMST-020	14S E0675086 N4094138	0-30 cm compact strong brown fine sandy silt, 30-40 cm dark brown fine sandy clay	<10%	Open Pasture	Negative
JMST-021	14S E0675130 N4093876	0-15 cm strong brown fine sandy clay, 15-30 cm very dense mottled very dark brown/red brown fine sandy clay	<10%	Open Pasture	Negative
JMST-022	14S E0675159 N4093908	0-10 cm very strong brown fine sandy loam, 10-30 cm very strong brown fine sandy silt, 30-40 cm extremely dense very strong brown clay	<10%	Open Pasture	Negative
JMST-023	14S E0675106 N4093914	0-35 cm very strong brown fine sandy clay loam, 35-45 cm very strong brown fine sandy clay	<10%	Open Pasture	Negative
JMST-024	14S E0675157 N4093814	0-60 cm very strong brown sandy silt, 60-70 cm strong brown sandy clay	10-25%	Densely wooded pasture	Negative
JMST-025	14S E0674726 N4093531	0-40 cm very dark silty loam, 40-50 cm very dark silty clay	75-99%	Corn field	Negative
JMST-026	14S E0674726 N4093493	0-40 cm very dark silty loam, 40-50 cm very dark silty clay	75-99%	Corn field	Negative
JMST-027	14S E0674711	0-40 cm very dark silty loam,	75-99%	Corn field	Negative

	N4093467	40-50 cm very dark silty clay			
JMST-028	14S E0674700 N4093440	0-40 cm very dark silty loam, 40-50 cm very dark silty clay	75-99%	Corn field	Negative
JMST-029	14S E0674674 N4093423	0-40 cm very dark silty loam, 40-50 cm very dark silty clay	75-99%	Corn field	Negative
JMST-030	14S E0674678 N4093461	0-40 cm very dark silty loam, 40-50 cm very dark silty clay	75-99%	Corn field	Negative
JMST-031	14S E0674691 N4093487	0-40 cm very dark silty loam, 40-50 cm very dark silty clay	75-99%	Corn field	Negative
DBST-001	14S E0674595 N4094841	0-30 cm red brown silty clay loam, 30-40 cm red brown silty clay	25-50%	Corn Field	Negative
DBST-002	14S E0674631 N4094835	0-30 cm red brown silty clay loam, 30-40 cm red brown silty clay	25-50%	Corn Field	Negative
DBST-003	14S E0674649 N4094830	0-30 cm red brown silty clay loam, 30-40 cm red brown silty clay	25-50%	Corn Field	Negative
DBST-004	14S E0674593 N4094800	0-30 cm red brown silty clay loam, 30-40 cm red brown silty clay	25-50%	Corn Field	Negative
DBST-005	14S E0674514 N4094323	0-30 cm red brown silty clay loam, 30-40 cm red brown silty clay	25-50%	Corn Field	Negative
DBST-006	14S E0674514 N4094290	0-30 cm red brown silty clay loam, 30-40 cm red brown silty clay	25-50%	Corn Field	Negative
DBST-007	14S E0674622 N4094093	0-30 cm red brown silty clay loam, 30-40 cm red brown silty clay	25-50%	Corn Field	Negative
DBST-008	14S E0674702 N4093924	0-30 cm red brown silty clay loam, 30-40 cm red brown silty clay	25-50%	Corn Field	Negative
DBST-009	14S E0674723 N4093942	0-30 cm red brown silty clay loam, 30-40 cm red brown silty clay	25-50%	Corn Field	Negative
DBST-010	14S E0674722 N4094001	0-30 cm red brown silty clay loam, 30-40 cm red brown silty clay	25-50%	Corn Field	Negative
DBST-011	14S E0674663 N4094008	0-30 cm red brown silty clay loam, 30-40 cm red brown silty clay	25-50%	Corn Field	Negative
DBST-012	14S E0674642	0-30 cm red brown silty clay	50-75%	Corn Field	Negative

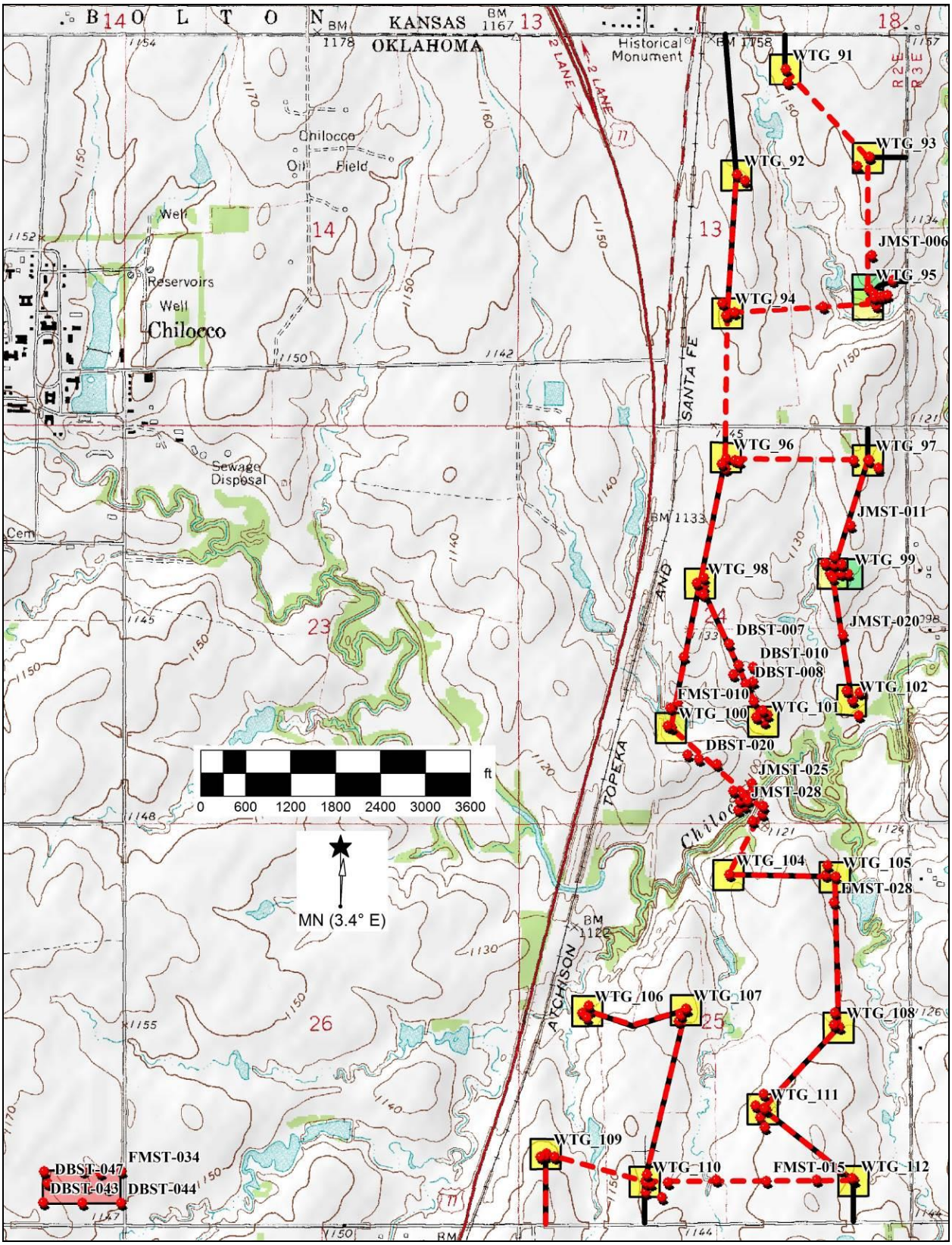
	N4093969	loam, 30-40 cm red brown silty clay			
DBST-013	14S E0674693 N4093934	0-30 cm red brown silty clay loam, 30-40 cm red brown silty clay	50-75%	Corn Field	Negative
DBST-014	14S E0674728 N4093863	0-30 cm red brown silty clay loam, 30-40 cm red brown silty clay	50-75%	Corn Field	Negative
DBST-015	14S E0674772 N4093782	0-30 cm red brown silty clay loam, 30-40 cm red brown silty clay	50-75%	Corn Field	Negative
DBST-016	14S E0674785 N4093810	0-30 cm red brown silty clay loam, 30-40 cm red brown silty clay	50-75%	Corn Field	Negative
DBST-017	14S E0674765 N4093827	0-30 cm red brown silty clay loam, 30-40 cm red brown silty clay	50-75%	Corn Field	Negative
DBST-018	14S E0674739 N4093800	0-30 cm dark red brown silty clay loam, 30-40 cm dark red brown silty clay	50-75%	Corn Field	Negative
DBST-019	14S E0674379 N4093757	0-30 cm dark red brown silty clay loam, 30-40 cm dark red brown silty clay	50-75%	Fallow Field	Negative
DBST-020	14S E0674509 N4093626	0-30 cm dark red brown silty clay loam, 30-40 cm dark red brown silty clay	50-75%	Fallow Field	Negative
DBST-021	14S E0674582 N4093606	0-30 cm dark red brown silty clay loam, 30-40 cm dark red brown silty clay	50-75%	Fallow Field	Negative
DBST-022	14S E0674328 N4091872	0-30 cm dark red brown silty clay loam, 30-40 cm dark red brown silty clay	50-75%	Corn Field	Negative
DBST-023	14S E0674330 N4091909	0-30 cm dark red brown silty clay loam, 30-40 cm dark red brown silty clay	50-75%	Corn Field	Negative
DBST-024	14S E0674347 N4091908	0-30 cm dark red brown silty clay loam, 30-40 cm dark red brown silty clay	50-75%	Corn Field	Negative
DBST-025	14S E0674331 N4091943	0-30 cm dark red brown silty clay loam, 30-40 cm dark red brown silty clay	50-75%	Corn Field	Negative
DBST-026	14S E0674449 N4092565	0-25 cm red brown silty loam, 25-35 cm red brown silty clay	50-75%	Corn Field	Negative
DBST-027	14S E0674457 N4092589	0-25 cm red brown silty loam, 25-35 cm red brown silty clay	50-75%	Corn Field	Negative

DBST-028	14S E0674476 N4092616	0-25 cm red brown silty loam, 25-35 cm red brown silty clay	50-75%	Corn Field	Negative
DBST-029	14S E0674084 N4092600	0-30 cm red brown silty loam, 30-40 cm red brown silty clay	<10%	Fallow Field	Negative
DBST-030	14S E0674080 N4092620	0-30 cm red brown silty loam, 30-40 cm red brown silty clay	<10%	Fallow Field	Negative
DBST-031	14S E0674054 N4092590	0-30 cm red brown silty loam, 30-40 cm red brown silty clay	<10%	Fallow Field	Negative
DBST-032	14S E0674074 N4092571	0-30 cm red brown silty loam, 30-40 cm red brown silty clay	<10%	Fallow Field	Negative
DBST-033	14S E0673953 N4092007	0-30 cm red brown silty loam, 30-40 cm red brown silty clay	50-75%	Corn Field	Negative
DBST-034	14S E0673914 N4092008	0-30 cm red brown silty loam, 30-40 cm red brown silty clay	50-75%	Corn Field	Negative
DBST-035	14S E0673896 N4092006	0-30 cm red brown silty loam, 30-40 cm red brown silty clay	50-75%	Corn Field	Negative
DBST-036	14S E0674803 N4092221	0-30 cm red brown silty loam, 30-40 cm red brown silty clay	50-75%	Corn Field	Negative
DBST-037	14S E0674814 N4092214	0-30 cm red brown silty loam, 30-40 cm red brown silty clay	50-75%	Corn Field	Negative
DBST-038	14S E0674789 N4092184	0-30 cm red brown silty loam, 30-40 cm red brown silty clay	50-75%	Corn Field	Negative
DBST-039	14S E0674769 N4092231	0-30 cm red brown silty loam, 30-40 cm red brown silty clay	50-75%	Corn Field	Negative
DBST-040	14S E0675076 N4093162	0-30 cm red brown silty clay	<10%	Fallow Field	Negative
DBST-041	14S E0675035 N4093168	0-30 cm red brown silty clay	<10%	Fallow Field	Negative
DBST-042	14S E0674733 N4093380	0-30 cm red brown silty clay	<10%	Fallow Field	Negative
DBST-043	14S E0671872 N4091780	0-30 cm brown silty loam no inclusions	<10%	Open pasture	Negative
DBST-044	14S E0672190 N4091785	0-30 cm brown silty loam no inclusions	<10%	Open pasture	Negative
DBST-045	14S E0672134	0-30 cm brown silty loam no	<10%	Open pasture	Negative

	N4091842	inclusions			
DBST-046	14S E0672048 N4091848	0-30 cm brown silty loam no inclusions	<10%	Open pasture	Negative
DBST-047	14S E0671889 N4091859	0-30 cm brown silty loam no inclusions	<10%	Open pasture	Negative
DBST-048	14S E0671873 N4091906	0-30 cm brown silty loam no inclusions	<10%	Open pasture	Negative
FMST-001	14S E0674617 N4095432	0-50 cm red brown sandy clay silt	25-50%	Corn Field	Negative
FMST-002	14S E0674977 N4095463	0-40cmbs Dark brown sandy-silty clay soil, 40-50cmbs Dark brown silty clay mottled with rusty orange clay	25-50%	Upland Pasture	Negative
FMST-003	14S E0675183 N4095518	0-30 cm dark brown clay silt, 30-40 cm red brown clay silt	<10%	Open Pasture	Negative
FMST-004	14S E0675105 N4096033	0-30 cm red brown silty loam, 30-40 cm red brown silty clay	50-75%	Corn Field	Negative
FMST-005	14S E0674815 N4096365	0-30 cm red brown silty loam, 30-40 cm red brown silty clay	50-75%	Corn Field	Negative
FMST-006	14S E0674578 N4094820	0-30 cm red brown silty loam, 30-40 cm red brown silty clay	50-75%	Corn Field	Negative
FMST-007	14S E0674514 N4094358	0-30 cm red brown silty loam, 30-40 cm red brown silty clay	50-75%	Corn Field	Negative
FMST-008	14S E0674486 N4094336	0-30 cm red brown silty loam, 30-40 cm red brown silty clay	50-75%	Corn Field	Negative
FMST-009	14S E0674439 N4094037	0-30 cm red brown silty loam, 30-40 cm red brown silty clay	50-75%	Corn Field	Negative
FMST-010	14S E0674388 N4093829	0-30 cm red brown silty loam, 30-40 cm red brown silty clay	50-75%	Corn Field	Negative
FMST-011	14S E0674417 N4093851	0-30 cm red brown silty loam, 30-40 cm red brown silty clay	50-75%	Corn Field	Negative
FMST-012	14S E0674462 N4093642	0-30 cm red brown silty loam, 30-40 cm red brown silty clay	50-75%	Corn Field	Negative
FMST-013	14S E0674652 N4093500	0-30 cm red brown silty loam, 30-40 cm red brown silty clay	50-75%	Corn Field	Negative
FMST-014	14S E0674711	0-30 cm red brown silty	50-75%	Corn Field	Negative

	N4093463	loam, 30-40 cm red brown silty clay			
FMST-015	14S E0674819 N4091927	0-30 cm red brown silty loam, 30-40 cm red brown silty clay	50-75%	Corn Field	Negative
FMST-016	14S E0675023 N4091936	0-30 cm red brown silty loam, 30-40 cm red brown silty clay	50-75%	Corn Field	Negative
FMST-017	14S E0675176 N4091937	0-30 cm red brown silty loam, 30-40 cm red brown silty clay	50-75%	Corn Field	Negative
FMST-018	14S E0675168 N4091946	0-30 cm red brown silty loam, 30-40 cm red brown silty clay	50-75%	Corn Field	Negative
FMST-019	14S E0675119 N4091979	0-30 cm red brown silty loam, 30-40 cm red brown silty clay	50-75%	Corn Field	Negative
FMST-020	14S E0674805 N4092219	0-30 cm red brown silty loam, 30-40 cm red brown silty clay	50-75%	Corn Field	Negative
FMST-021	14S E0674800 N4092278	0-30 cm red brown silty loam, 30-40 cm red brown silty clay	50-75%	Corn Field	Negative
FMST-022	14S E0674808 N4092144	0-30 cm red brown silty loam, 30-40 cm red brown silty clay	50-75%	Corn Field	Negative
FMST-023	14S E0674614 N4091928	0-30 cm red brown silty loam, 30-40 cm red brown silty clay	50-75%	Corn Field	Negative
FMST-024	14S E0674418 N4091913	0-30 cm red brown silty loam, 30-40 cm red brown silty clay	50-75%	Corn Field	Negative
FMST-025	14S E0674394 N4091852	0-30 cm red brown silty loam, 30-40 cm red brown silty clay	50-75%	Corn Field	Negative
FMST-026	14S E0675084 N4092612	0-30 cm red brown silty loam, 30-40 cm red brown silty clay	50-75%	Corn Field	Negative
FMST-027	14S E0675082 N4092564	0-30 cm red brown silty loam, 30-40 cm red brown silty clay	50-75%	Corn Field	Negative
FMST-028	14S E0675071 N4093058	0-30 cm red brown silty loam, 30-40 cm red brown silty clay	50-75%	Open Terrace Pasture	Negative
FMST-029	14S E0675042	0-30 cm red brown silty	50-75%	Open Terrace	Negative

	N4093207	loam, 30-40 cm red brown silty clay		Pasture	
FMST-030	14S E0674693 N4093235	0-30 cm red brown silty loam, 30-40 cm red brown silty clay	50-75%	Open Terrace Pasture	Negative
FMST-031	14S E0674772 N4093409	0-30 cm red brown silty loam, 30-40 cm red brown silty clay	50-75%	Open Terrace Pasture	Negative
FMST-032	14S E0674775 N4093441	0-30 cm red brown silty loam, 30-40 cm red brown silty clay	50-75%	Open Terrace Pasture	Negative
FMST-033	14S E0672031 N4091911	0-30 cm brown silty loam no inclusions	<10%	Open pasture	Negative
FMST-034	14S E0672188 N4091913	0-30 cm brown silty loam no inclusions	<10%	Open pasture	Negative
FMST-035	14S E0672032 N4091781	0-30 cm brown silty loam no inclusions	<10%	Open pasture	Negative
FMST-036	14S E0672103 N4091905	0-30 cm brown silty loam no inclusions	<10%	Open pasture	Negative
MDST-001	14S E0675194 N4095471	0-40cmbs Dark brown sandy-silty clay soil, 40-50cmbs Dark brown silty clay mottled with rusty orange clay	25-50%	Upland Pasture	Negative
MDST-002	14S E0675187 N4095503	0-50cmbs Dark brown sandy-silty clay soil (most artifacts between 0-30cmbs), 50-60cmbs Dark brown silty clay mottled with rusty orange clay	50-75%	Upland Pasture	Positive (n = 19)
MDST-003	14S E0675210 N4095507	0-40cmbs Dark brown sandy-silty clay soil, 40-50cmbs Dark brown silty clay mottled with rusty orange clay	50-75%	Upland Pasture	Positive (n =27)
MDST-004	14S E0675223 N4095509	0-40cmbs Dark brown sandy-silty clay soil, 40-50cmbs Dark brown silty clay mottled with lighter brown and rusty orange clay	50-75%	Upland Pasture	Positive (n = 1)
MDST-005	14S E0675238 N4095515	0-20cmbs Dark brown sandy-silty clay soil, 20-30cmbs Dark brown silty clay mottled with lighter brown and rusty orange clay	50-75%	Upland Pasture	Negative



Shovel Tests Placed in the Study Area (redesigned turbine footprints in green).

APPENDIX B
ISOLATED OCCURRENCES

CAS personnel observed and recorded one locality not considered an archaeological site in the project area (Figure 1):

IO 1
NW/SE/NE Section 24 T29N R2E
UTM (CONUS NAD83): 14S E0675040 N4094403
This is an Isolated Occurrence consisting of two chert flakes (one thinning, the other interior) recovered from shovel tests. Six additional shovel tests, excavated in the vicinity, failed to yield additional material. The IO is located on gently sloping, southwest-facing, open pasture. Soils consisted of dense dark brown and strong brown silty sandy loams above dense mottled red brown/dark brown or red brown fine sandy clay. Vegetation consisted of low to very low mixed prairies grasses with the occasional low shrub. Overall visibility was poor (10-25%) with the exception of bare ground (>90%) observed along a lease road located west of the IO. This IO is located on the extreme edge of the redesigned footprint at WTG 99 and should not be disturbed. IOs, by their very nature, are not considered eligible for inclusion to the NRHP.

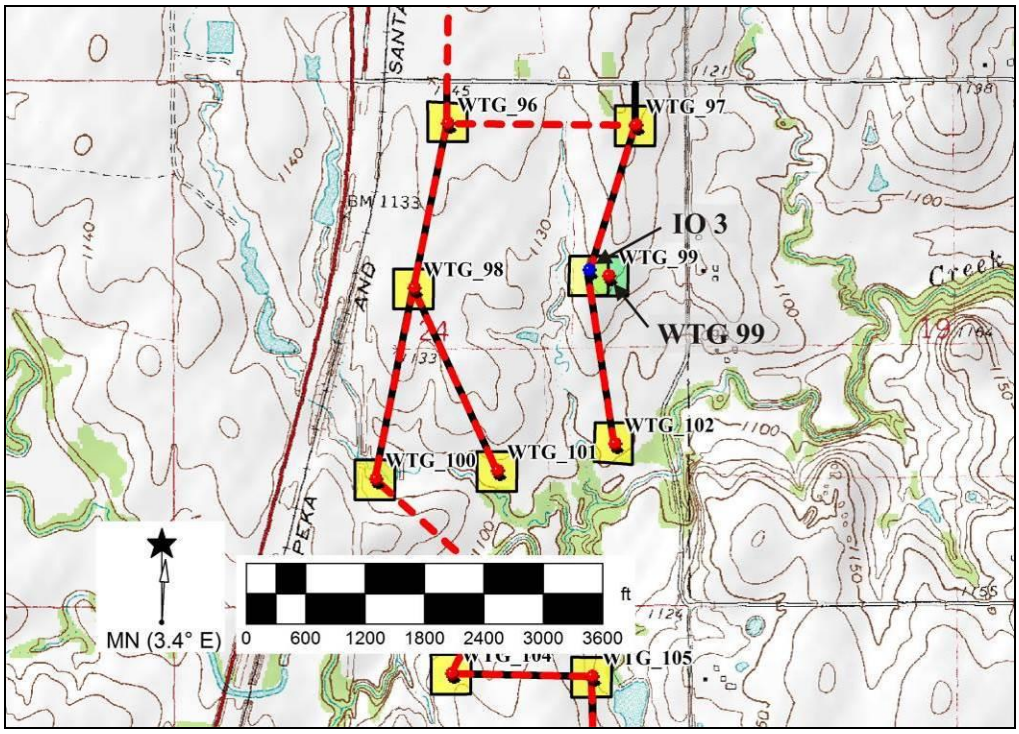


Figure 1. USGS topographic map (Newkirk 7.5″ series, 1976) showing the location of IO 1 (redesigned turbine footprint in green).

Figure 2. Setting for IO 1 facing south.

APPENDIX C
ARPA PERMIT and RIGHT OF ENTRY

Please use this number
when referring to this permit

No.: EOR-FAPWT-16-01

DI Form 1991 (Rev Jan 2008)
for use with DI Form 1926
OMB No 1024-0037
Exp. Date (6 30 2014)

United States Department of the Interior

PERMIT FOR ARCHEOLOGICAL INVESTIGATIONS

To conduct archeological work on Department of the Interior lands and Indian lands under the authority of:

- ☐ The Archaeological Resources Protection Act of 1979 (16 U.S.C. 470aa-mm) and its regulations (43 CFR 7).
- ☐ The Antiquities Act of 1906 (P.L. 59-209; 34 Stat. 225, 16 U.S.C. 431-433) and its regulations (43 CFR 3).
- ☐ Supplemental regulations (25 CFR 262) pertaining to Indian lands.
- ☐ Bureau-specific statutory and/or regulatory authority: _____

1. Permit issued to Cojeen Archaeological Services, LLC	2. Under application dated 5.26.2016
3. Address P.O. Box 1186, Norman, OK 73070	4. Telephone number(s) 405-360-9996
	5. E-mail address(es) cojeenarch@sbcglobal.net

6. Name of Permit Administrator Chris Cojeen Telephone number(s): 405-360-9996 Email address(es): cojeenarch@sbcglobal.net	7. Name of Principal Investigator(s) Chris Cojeen Telephone number(s): 405-360-9996 Email address(es): cojeenarch@sbcglobal.net
8. Name of Field Director(s) authorized to carry out field projects James Munkres, M.A. Amy Cojeen, M.A.	Telephone number(s): 405-360-9996 Email address(es): cojeenarch@sbcglobal.net

9. Activity authorized: Pedestrian Survey with Subsurface Sampling (shovel testing) and Recordation.
Artifacts recovered from testing will be returned to the Cherokee Nation.
Shovel testing will follow the methods as described in the permit application. Should anomalies be identified, additional consultation with the Cherokee Nation THPO may be necessary with potential for alternative methods of investigation authorized (ground penetrating radar).

10. On lands described as follows: Sections 13, 24, 25 of T 29N R 2E. See map attachment as described in permit application.

11. During the duration of the project From June 22, 2016 To December 22, 2016

12. Name and address of the curatorial facility in which collections, records, data, photographs, and other documents resulting from work under this permit shall be deposited for permanent preservation on behalf of the United States Government. N/A

A copy of the final report and CD with PDF copy will be submitted to the Bureau of Indian Affairs Eastern Oklahoma Region Office.

13. Permittee is required to observe the listed standard permit conditions and the special permit conditions attached to this permit.

14. Signature and title of approving official Acting Regional Director	15. Date 6-22-2016

15. Standard Permit Conditions

a. This permit is subject to all applicable provisions of 43 CFR Part 3, 43 CFR 7, and 25 CFR 262, and applicable departmental and bureau policies and procedures, which are made a part hereof.

b. The permittee and this permit are subject to all other Federal, State, and local laws and regulations applicable to the public lands and resources.

c. This permit shall not be exclusive in character, and shall not affect the ability of the land managing bureau to use, lease or permit the use of lands subject to this permit for any purpose.

d. This permit may not be assigned.

e. This permit may be suspended or terminated for breach of any condition or for management purposes at the discretion of the approving official, upon written notice.

f. This permit is issued for the term specified in 11 above.

g. Permits issued for a duration of more than one year must be reviewed annually by the agency official and the permittee.

h. The permittee shall obtain all other required permit(s) to conduct the specified project.

i. Archeological project design, literature review, development of the regional historic context framework, site evaluation, and recommendations for subsequent investigations must be developed with direct involvement of an archeologist who meets the Secretary of the Interior's Standards for Archeology and Historic Preservation; fieldwork must be generally overseen by an individual who meets the Secretary of the Interior's Standards for Archeology and Historic Preservation.

j. Permittee shall immediately request that the approving official (14. above) make a modification to accommodate any change in an essential condition of the permit, including individuals named and the nature, location, purpose, and time of authorized work, and shall without delay notify the approving official of any other changes affecting the permit or regarding information submitted as part of the application for the permit. Failure to do so may result in permit suspension or revocation.

k. Permittee may request permit extension, in writing, at any time prior to expiration of the term of the permit, specifying a limited, definite amount of time required to complete permitted work.

l. Any correspondence about this permit or work conducted under its authority must cite the permit number. Any publication of results of work conducted under the authority of this permit must cite the approving bureau and the permit number.

m. Permittee shall submit a copy of any published journal article and any published or unpublished report, paper, and manuscript resulting from the permitted work (apart from those required in items q. and s., below), to the approving official and the appropriate official of the approved curatorial facility (item 12 above).

n. Prior to beginning any fieldwork under the authority of this permit, the permittee, following the affected bureau's policies and procedures, shall contact the field office manager responsible for administering the lands involved to obtain further instructions.

o. Permittee may request a review, in writing to the official concerned, of any disputed decision regarding inclusion of specific terms and conditions or the modification, suspension, or revocation of this permit, setting out reasons for believing that the decision should be reconsidered.

p. Permittee shall not be released from requirements of this permit until all outstanding obligations have been satisfied, whether or not the term of the permit has expired. Permittee may be subject to civil penalties for violation of any term or condition of this permit.

15. Standard Permit Conditions (continued)

q. Permittee shall submit a preliminary report to the approving official within a timeframe established by the approving official, which shall be no later than 6 weeks after the completion of any episode of fieldwork, setting out what was done, how it was done, by whom, specifically where, and with what results, including maps, GPS data, an approved site form for each newly recorded archeological site, and the permittee's professional recommendations, as results require. If other than 6 weeks, the timeframe shall be specified in Special Permit Condition p. Depending on the scope, duration, and nature of the work, the approving official may require progress reports, during or after the fieldwork period or both, and as specified in Special Permit Condition r.

r. Permittee shall submit a clean, edited draft final report to the agency official for review to insure conformance with standards, guidelines, regulations, and all stipulations of the permit. The schedule for submitting the draft shall be determined by the agency official.

s. Permittee shall submit a final report to the approving official not later than 180 days after completion of fieldwork. Where a fieldwork episode involved only minor work and/or minor findings, a final report may be submitted in place of the preliminary report. If the size or nature of fieldwork merits, the approving official may authorize a longer timeframe for the submission of the final report as specified in Special Permit Condition q.

t. Two copies of the final report, a completed NTIS Report Documentation Page (SF-298), available at http://www.ntis.gov/pdf/rdpform.pdf, and a completed NADB-Reports Citation Form, available at http://www.cr.nps.gov/aad/tools/nadbform_update.doc, will be submitted to the office issuing the permit.

u. The permittee agrees to keep the specific location of sensitive resources confidential. Sensitive resources include threatened species, endangered species, and rare species, archeological sites, caves, fossil sites, minerals, commercially valuable resources, and sacred ceremonial sites.

v. Permittee shall deposit all artifacts, samples and collections, as applicable, and original or clear copies of all records, data, photographs, and other documents, resulting from work conducted under this permit, with the curatorial facility named in item 12, above, not later than 90 days after the date the final report is submitted to the approving official. Not later than 180 days after the final report is submitted, permittee shall provide the approving official with a catalog and evaluation of all materials deposited with the curatorial facility, including the facility's accession and/or catalog numbers.

w. Permittee shall provide the approving official with a confirmation that museum collections described in v. above were deposited with the approved curatorial facility, signed by an authorized curatorial facility official, stating the date materials were deposited, and the type, number and condition of the collected museum objects deposited at the facility.

x. Permittee shall not publish, without the approving official's prior permission, any locational or other identifying archeological site information that could compromise the Government's protection and management of archeological sites.

y. For excavations, permittee shall consult the OSHA excavation standards which are contained in 29 CFR §1926.650, §1926.651 and §1926.652. For questions regarding these standards contact the local area OSHA office, OSHA at 1-800-321-OSHA, or the OSHA website at http://www.osha.gov.

z. Special permit conditions attached to this permit are made a part hereof.

16. Special Permit Conditions

- ■ a. Permittee shall allow the approving official and bureau field officials, or their representatives, full access to the work area specified in this permit at any time the permittee is in the field, for purposes of examining the work area and any recovered materials and related records.
- ■ b. Permittee shall cease work upon discovering any human remains and shall immediately notify the approving official or bureau field official. Work in the vicinity of the discovery may not resume until the authorized official has given permission.
- ■ c. Permittee shall backfill all subsurface test exposures and excavation units as soon as possible after recording the results, and shall restore them as closely as reasonable to the original contour.
- ☐ d. Permittee shall not use mechanized equipment in designated, proposed, or potential wilderness areas unless authorized by the agency official or a designee in additional specific conditions associated with this permit.
- ■ e. Permittee shall take precautions to protect livestock, wildlife, the public, or other users of the public lands from accidental injury in any excavation unit.
- ■ f. Permittee shall not conduct any flint knapping or lithic replication experiments at any archeological site, aboriginal quarry source, or non-site location that might be mistaken for an archeological site as a result of such experiments.
- ■ g. Permittee shall perform the fieldwork authorized in this permit in a way that does not impede or interfere with other legitimate uses of the public lands, except when the authorized officer specifically provides otherwise.
- ■ h. Permittee shall restrict vehicular activity to existing roads and trails unless the authorized officer provides otherwise.
- ■ i. Permittee shall keep disturbance to the minimum area consistent with the nature and purpose of the fieldwork.
- ■ j. Permittee shall not cut or otherwise damage living trees unless the authorized officer gives permission.
- ■ k. Permittee shall take precautions at all times to prevent wildfire. Permittee shall be held responsible for suppression costs for any fires on public lands caused by the permittee's negligence. Permittee may not burn debris without the authorized officer's specific permission.
- ■ l. Permittee shall conduct all operations in such a manner as to prevent or minimize scarring and erosion of the land, pollution of the water resources, and damage to the watershed.
- ■ m. Permittee shall not disturb resource management facilities within the permit area, such as fences, reservoirs, and other improvements, without the authorized officer's approval. Where disturbance is necessary, permittee shall return the facility to its prior condition, as determined by the authorized officer.
- ■ n. Permittee shall remove temporary stakes and/or flagging, which the permittee has installed, upon completion of fieldwork.
- ■ o. Permittee shall clean all camp and work areas before leaving the permit area. Permittee shall take precautions to prevent littering or pollution on public lands, waterways, and adjoining properties. Refuse shall be carried out and deposited in approved disposal areas.
- ☐ p. Permittee shall submit the preliminary report within _____ days/weeks of completion of any episode of fieldwork..
- ■ q. Permittee shall submit the final report within _____ days/weeks/months after completion of fieldwork..
- ☐ r. Permittee shall submit progress reports every _____ months over the duration of the project.
- ■ s. Additional special permit conditions are attached.

Permit No. _ EOR-FAPWT-16-01

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Special Permit Conditions Continuation Sheet

Human Remains, funerary objects, sacred objects, and objects of cultural patrimony may not be excavated or removed unless the permittee has first obtained the written consent of the tribe having jurisdiction over the lands. Ownership and control of the items shall be in accordance with the order of priority provided in the Native American Graves Protection and Repatriation Act. The permittee must also obtain the written consent of the Regional Director.

Artifacts recovered from shovel testing activities are to be returned to the Cherokee Nation Tribal Historic Preservation Officer per the instruction of Sheila Bird. Please update the cultural preservation office on the project status as often as possible. Shelia Bird, Tribal Historic Preservation Officer, Cherokee Nation, PO Box 948, Tahlequah, Oklahoma. Phone: 918-453-5389

Email: sheila-bird@cherokee.org

The Tribal Historic Preservation Officer may instruct the use of Tribal monitoring in sensitive areas. The field director is responsible for communicating project highlights.

Should testing activities reveal anomalies, additional methods may be authorized through subsequent consultation prior to project construction.

By signing below, I, the Principal Investigator, acknowledge that I have read and understand the Permit for Archeological Investigations and agree to its terms and conditions as evidenced by my signature below and initiation of work or other activities under the authority of this permit.

Signature and title:	Date:
Christopher Cozen	6/22/16

Paperwork Reduction Act and Estimated Burden Statement: This information is being collected pursuant to 16 U.S.C. 470cc and 470mm, to provide the necessary facts to enable the Federal land manager (1) to evaluate the applicant's professional qualifications and organizational capability to conduct the proposed archeological work; (2) to determine whether the proposed work would be in the public interest; (3) to verify the adequacy of arrangements for permanent curatorial preservation, as United States property, of specimens and records resulting from the proposed work; (4) to ensure that the proposed activities would not be inconsistent with any management plan applicable to the public lands involved; (5) to provide the necessary information needed to complete the Secretary's Report to Congress on Federal Archeology Programs; and (6) to allow the National Park Service to evaluate Federal archeological protection programs and assess compliance with the Archaeological Resources Protection Act of 1979 (16 U.S.C. 470). Submission of the information is required before the applicant may enjoy the benefit of using publicly owned archeological resources. To conduct such activities without a permit is punishable by felony-level criminal penalties, civil penalties, and forfeiture of property. A federal agency may not conduct or sponsor, and a person is not required to respond to, a collection of information unless it displays a valid OMB control number. Public reporting for this collection of information is estimated to average three hours per response, including the time for reviewing instructions, searching existing data sources, gathering and maintaining the data needed, and completing and reviewing the collection of information. Send comments regarding this burden estimate or any other aspect of this collection of information, including suggestions for reducing this burden, to the Departmental Consulting Archeologist; NPS; 1849 C Street, NW (2275); Washington, DC 20240-0001.

Christopher A. Cojeen Archaeology
Principal Investigator Research
Cojeen Archaeological Services, LLC History

ARPA Permit Application, Part 11:

a) The project entails the placement of 21 turbine pads, 27,122 linear feet of access roads, and 17,907 linear feet of (underground) collector lines in portions of Sections 13, 24 and 25 T29N R2E (maps attached). A 10-acre lay-down yard is also planned. A records search of known archaeological resources near or within the boundaries of the proposed project area would be preformed prior to a field survey. Historic homesteads may be located on older aerial photographs. This records search would determine whether cultural resources are known to exist in the study area, and to provide a limited general cultural resource summary based on a regional synthesis of known sites.

During the course of an archaeological survey, Cojeen Archeological Services, LLC (CAS) personnel will examine ground surface for evidence of cultural resources, with shovel tests concentrated 600 ft. either side of Chilocco Creek, which has the greatest potential for prehistoric resources. Surface visibility, as well as topographical and hydrological factors in the field will determine the extent of shovel testing.

Once CAS locates any cultural resources we will establish the horizontal and vertical extent of the material, in order to delineate the boundaries of the site. If the site is not found to contain significant archaeological materials or features, no avoidance will be recommended. If the site has potential for additional research, avoidance will be recommended. Per BIA request, no artifacts will be collected.

Upon completion of fieldwork, a report of acceptable quality will be presented for the client to submit to the appropriate agencies for their review.

The investigations documented in the final report will address the surface expression of any cultural resources located in the proposed project area. The primary goals of this survey would be to identify both prehistoric and historic archaeological sites within the project area, and to provide recommendations concerning the avoidance of these sites from proposed activities if necessary. By strict definition, cultural resources are any evidence of human use or occupation, however for an archaeological study this term is restricted to cultural remains that are at least 45 years of age.

b) CAS maintains vehicles and all equipment necessary for field investigations in Norman, Oklahoma. Office and office staff (Thomas Lindsey, B.A.) are located in Norman, Oklahoma. Additional field personnel include Meghan Dudley (M.A.-lacks thesis) and Aaron Varela, B.A.

c) Under the direction of Christopher A. Cojeen, Principal Investigator, CAS has conducted thousands of archaeological investigations in Oklahoma since 1982. During this time, we have worked on BLM, BIA, Forest Service, Bureau of Reclamation, U. S. Army Corps of Engineers, and State lands throughout Oklahoma.

d) Vitas of supervisory personnel are attached.

e) Per BIA request, no collection of artifacts will occur. Artifacts will be recorded/left in the field.

VITA

CHRISTOPHER A. COJEEN

Principal Investigator, Cojeen Archaeological Services, LLC

Address: P.O. Box 1186
Norman, Oklahoma 73070
(405) 360-9996
email: cojeenarch@sbcglobal.net

EDUCATION

Western Michigan University: 1978-1981. M.A. 1982 (Anthropology--emphasis North American Archaeology; thesis: Eastern Wyoming).
Michigan State University: 1974-1978. B.S. 1978 (Anthropology/Geography).

PROFESSIONAL SOCIETIES

Register of Professional Archaeologists (RPA)
Plains Anthropological Society

EXPERIENCE

Mr. Cojeen has over 35 years of field, laboratory and analysis experience at cultural resource sites throughout the U.S. and abroad, including:

> Alaska, Arkansas, California, Colorado, Florida, Hawaii, Kansas, Michigan, Nebraska, Oklahoma, Texas, Wyoming, West Germany, Wales, Isle of Man

From August 1982 to present, Mr. Cojeen has served as Principal Investigator/archaeological consultant/owner of an independent cultural resource management consulting business (Cojeen Archaeological Services, LLC). Responsible for all aspects of fieldwork and report preparation for over 2,000 energy related and other Section 106 undertakings.

* Prepared 30 years of reports for submission to State and Federal agencies, as well as working as Principal Investigator for the Cherokee Nation for 20 years

* Participated in archaeological investigations prior to development projects in numerous regions of the Unites States

* Development of cultural resource management overviews for numerous oil and gas field areas in Oklahoma

* Designed and completed testing and mitigation projects prior to development activities, including both prehistoric and historic excavations.

James Munkres, M.A.

(702) 769-4804 ▪ jwmunkres@gmail.com
118 S. Berry ▪ Norman, Oklahoma ▪ 73069

NHPA ▪ NEPA

Experience Summary

Over 13 years of supervised and supervisory experience in the identification and excavation of archaeological sites; the recovery, curation, and analysis of human skeletal remains; conducting and reporting on research and analysis in compliance with NAGPRA; monitoring of construction activities in the vicinity of Historic Properties; participating in government-to-government consultation as a Tribal representative on matters related to the NHPA, NAGPRA, NEPA, ARPA, and AIRFA; NHPA Sections 106 and 110 compliance review; the presentation of invited lectures on matters related to Section 106 of the NHPA, Forensic Archaeology, and the methods and goals of Cultural Resource Management; and participation in professional conferences related to fields of Archaeology and Historic Preservation.

Education

M.A. Anthropology, University of Nevada–Las Vegas, Las Vegas, Nevada, May 2009
B.A. Anthropology, University of Oklahoma, Norman, Oklahoma, May 2000
A.A. Sociology, Rose State College, Midwest City, Oklahoma, May 1997

Professional Employment

Archaeologist: Cojeen Archaeological Services, LLC, Oklahoma and Surrounding States
October 2013 through Present
Services include assistance with the development of agreement documents concerning NHPA, NEPA, ARPA, NAGPRA, and AIRFA; the review and analysis of cultural material and human skeletal remains associated with processes conducted pursuant to NAGPRA; project management and planning; supervised and unsupervised pedestrian and reconnaissance cultural resource surveys typically under hazardous or difficult circumstances; drafting of reports documenting the conduct and results of cultural resource identification efforts; recording prehistoric and historic archaeological sites; and supervised conduct of excavation of NRHP-eligible archaeological sites.

Archaeologist: Osage Nation Historic Preservation Office, Pawhuska, Oklahoma
May 2009 through October 2013
Duties included participation in key government-to-government consultations concerning NHPA, NEPA, ARPA, NAGPRA, and AIRFA; research into site exploitation related to collection of items and human skeletal remains subject to the provisions of NAGPRA; evaluation and analysis of material collections and human skeletal remains associated with NAGPRA processes and reviews; development of agreement documents concerning NHPA, NEPA, ARPA, NAGPRA, and AIRFA; review of notification letters, supporting documentation, and identification and mitigation efforts performed pursuant to the provisions of the NHPA; and assisting with the general management and improvement of the Osage Nation Historic Preservation Office.

Graduate Assistant: Department of Anthropology, University of Nevada–Las Vegas, Las Vegas, Nevada
May 2006 through May 2009

Duties included classroom lecture preparation and presentation; laboratory section preparation and presentation; student evaluation; and curation of human remains, including the inventory, preliminary analysis, and overall improvement of the curatorial status of human skeletal remains while working in the Anthropology Department's Human Remains and Osteological Laboratory.

Archaeologist: Self-Employed, Oklahoma and Surrounding States
May 2000 through October 2003
Duties included supervised and unsupervised pedestrian and reconnaissance cultural resource surveys that were largely supplemented by subsurface testing; project management and planning; unsupervised management of multi-week cultural resource identification efforts, typically under hazardous or difficult circumstances; drafting of reports documenting the conduct and results of cultural resource identification efforts; recording prehistoric and historic archaeological sites; the recovery of human remains from a discrete burial in a primary context; and supervised conduct of excavation of NRHP-eligible archaeological sites.

Continuing Education Topics

NAGPRA, Native American Cultural Property Law, Section 106, National Register of Historic Places, Traditional Cultural Places, Agreement Documents through the National Preservation Institute, the Advisory Council on Historic Preservation, and the Oklahoma State Historic Preservation Office

Areas of Expertise

Section 106 and 110 of the National Historic Preservation Act, Agreement Development, Native American Graves Protection and Repatriation Act, Preparation and Presentation of Presentations and Lectures, Archaeological Standards and Methods, Cultural Reconnaissance Survey, Project Management and Logistics, Archaeological and Biological Taphonomy, Osteological Methods, Curation, and Reports, Relevant Federal Structures and Operations

Areas of Familiarity

National Environmental Policy Act, Ground-Penetrating Radar, Budget Development, and the Archaeological Resources Protection Act

Professional Organizations and Memberships

Society for American Archaeology, Oklahoma Historical Society, Arkansas Archeological Society, Missouri Archaeological Society

Additional information available upon request.

VITA

Amy Camden Cojeen

Cojeen Archaeological Services, LLC

920 McNamee
Norman, OK 73069
405-360-9996

Experience

1995-Present Cojeen Archaeological Services, Norman, OK
Archeological Field Supervisor, Research,
Crew Management.

Phase I, Phase II and Phase III mitigation and excavations
Historic records research
Laboratory analysis
Assisted in organizing and planning volunteer surveys and
Excavation including Paleo-Indian site 34LT287, Oklahoma

Field Director:
Blue Canyon Wind Farm, Caddo County, Oklahoma
Limited Testing at Archeological Sites 34DL300 and 34DL301, Delaware County, Oklahoma
Limited Testing at Archeological Sites 34MR003 and 34MR050, Murray County, Oklahoma
Limited Testing at Archeological Site 34GR197, Greer County, Oklahoma

Education

1997 University of Oklahoma, BA in Anthropology

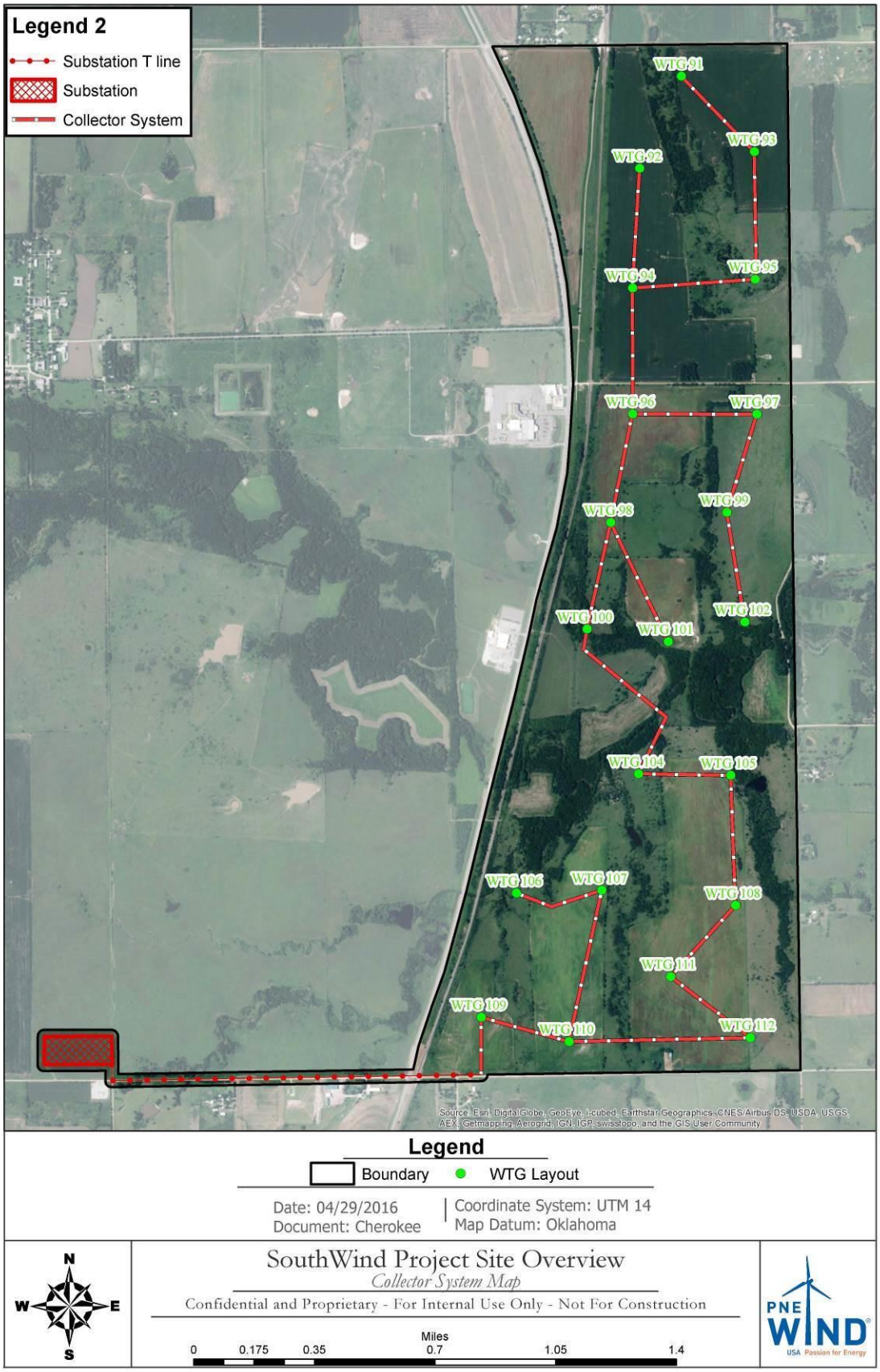
July 1992 Field School, Iowa Department of Transportation
Under the direction of Mark Anderson, excavated a historic farmstead and prehistoric rock shelter site in Iowa

Selected Reports

Report on the Archeological Survey of Portions of the Burlington Northern Santa Fe Railway Company Proposed Oklahoma State Line to Brinks, Oklahoma Capacity Improvement Project, Alfalfa and Woods Counties, Oklahoma

Report on the Archeological Study of the Proposed Phase II of the Blue Canyon Windpower, L.L.C. Blue Canyon Wind Farm, Kiowa County, Oklahoma

Report on the Archeological Survey of the Cholla Petroleum, Inc. Proposed Wells Located on Brazos River Authority Administered Lands at Possum Kingdom Lake, Palo Pinto County, Texas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WTG 111
WTG 112
Source: Esri, DigitalGlobe, GeoEye, i-cubed, Earthstar Geographics, CNES/Airbus DS, USDA, USGS, AEX, Getmapping, Aerogrid, IGN, IGP, swisstopo, and the GIS User Community
Legend
Boundary
WTG Layout
Date: 04/29/2016
Document: Cherokee
Coordinate System: UTM 14
Map Datum: Oklahoma
N
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SouthWind Project Site Overview
Collector System Map
Confidential and Proprietary - For Internal Use Only - Not For Construction
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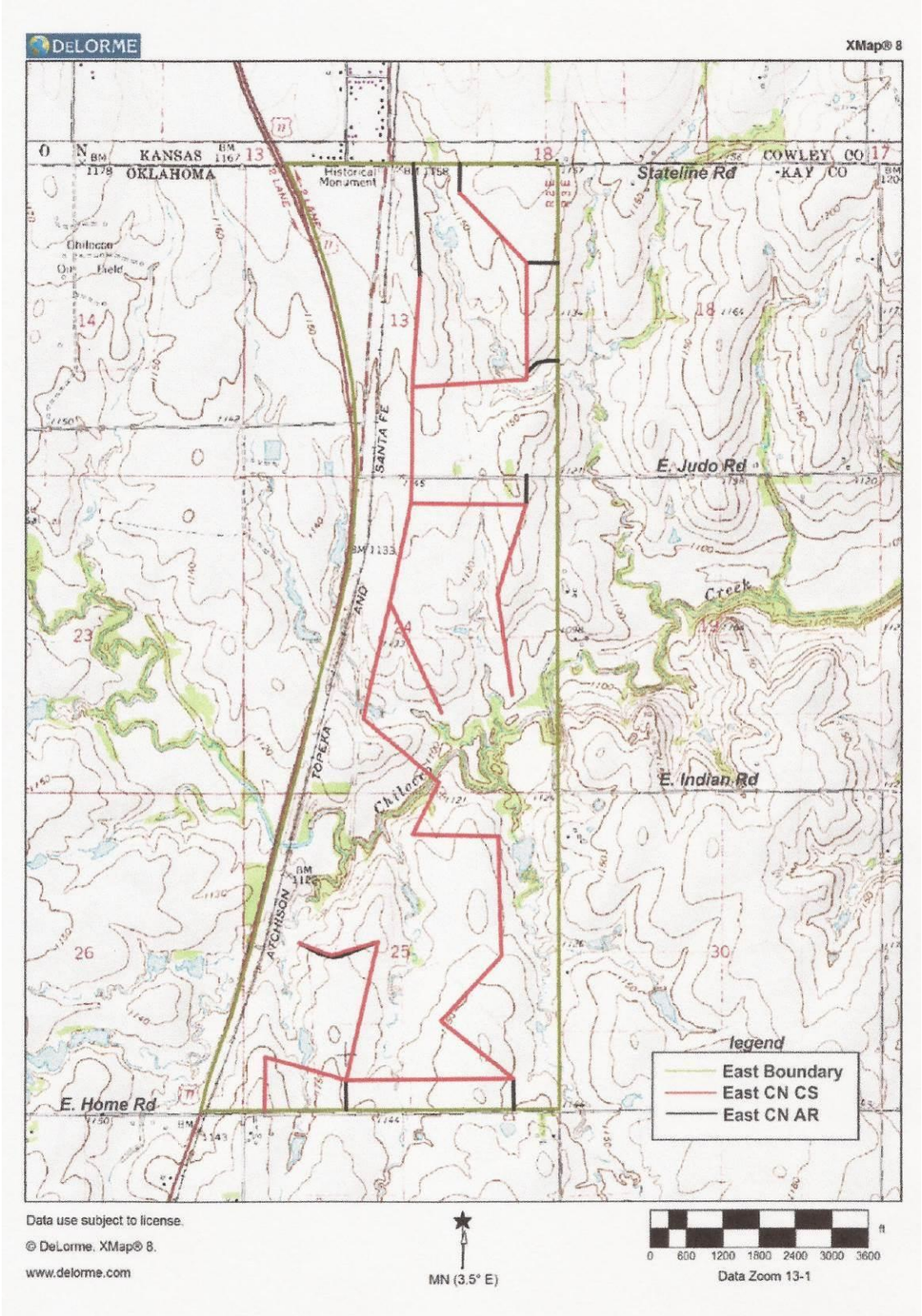
PNE WIND
USA Passion for Energy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OKLAHOMA
COWLEY CO
KAY CO
Stateline Rd
E. Judo Rd
E. Indian Rd
E. Home Rd
Historical Monument
SANTA FE
TOPEKA AND
ATCHISON
Chilocco
Creek
Legend
East Boundary
East CN CS
East CN AR
Data use subject to license.
© DeLorme. XMap® 8.
www.delorme.com
MN (3.5° E)
0 600 1200 1800 2400 3000 3600 ft
Data Zoom 13-1

UNITED STATES
DEPARTMENT OF THE INTERIOR
BUREAU OF INDIAN AFFAIRS
CHEROKEE NATION

OWNERS CONSENT TO RIGHT OF ENTRY

ACCESS DATES: June 15, 2016 and July 14, 2016

Owner: United States of America in Trust for Cherokee Nation

Grantor: Cherokee Nation

Legal Description. Township 29 North, Range 2 East, I B.&M., Kay County, Oklahoma
Section 13
Section 24 All that part lying East of RR ROW.
Section 25 All that part lying East of RR ROW.
Section 26 All that part lying East of RR ROW.

Purpose of Right of Entry. Section 106 Survey. Access is WALK IN only.

The undersigned authorized owner of said described land hereby consents the Right of Entry upon said USA in Trust Indian Lands to:

Christopher Cojeen, Principal Investigator
Cojeen Archeological Services, LLC
920 McNamee Street
PO Box 1186
Norman, OK 73070
Phone: 405-360-9996
Cell Phone: 405-412-6580
cojeenarch@sbcglobal.net

James Munkres, Archeologist
Cojeen Archeological Services, LLC
Cell Phone: 702-769-4804

Amy Cojeen, Archeological Field Supervisor
Cojeen Archeological Services, LLC
Cell Phone: 405-229-3112

Authorized representatives of:
Andy Zalay, Senior Developer
PNE WIND USA, Inc.
150 North Michigan Avenue, Suite 1500
Chicago, Illinois 60601.
Andy.zalay@pnewind.com,
Phone: 312-873-2241, Mobile: 312-465-0745, Fax· 312-873-2256.

Other terms or comments: **Right of Entry is for the aforementioned purpose and any other use will be treated as trespass.**

Authorized Owner/Representative:

Ginger Reeves, Realty Director, Cherokee Nation

SUBSCRIBED and sworn to before me this 19th day of May, 2016.

MARSHEA HALTERMAN NOTARY # 04006116 EXP. 07/08/16 PUBLIC OF OKLAHOMA

Marshea Halterman, Notary Public

My commission expires. 7-8-2016
My Commission No: 04006116

APPENDIX D
SITE FORMS

Oklahoma
Archeological Site Survey Form

Site 34KA528
County KAY

Complete All Sections

1. Site Number and Name
Site Name

(derived from owners' name, etc.)

Project No Locality 10

(temporary number or name assigned during project)

2. Locational Information

U.T.M. Reference

Zone	Northing	Easting
14S	4095496	0675193

Legal Description

SE/NE/SE of Section 13 Township 29N Range 2E

U.S.G.S. Quad Name
Newkirk

Quad Date (revised)
1968 (1976 photoinspected)

Other Locational References (i.e., benchmarks, road intersections, bridges, etc. please give distance and bearing to site)

Approximately 0.3 miles north-northwest of the intersection of Juno Road and North La Cann Road

3. Owner(s) of Property
Name(s)
Cherokee Nation
Street and Number
17675 S. Muskogee Ave.

City and Town
Tahlequah

State
OK

Zip Code
74464

4. Site Surveyed By:
Name
Cojeen Archaeological Services, LLC

Reported by: (if different)
Name

Date Recorded
7/6/2016

Time spent at site and time of day
4 hours, p.m.

5. Cultural Affiliation

Cultural Periods

☐ Unassigned Prehistoric				☐ Village Farming/Mississippian
☐ Paleoindian	☐ Early	☐ Middle	☐ Late	☐ Plains Village
☐ Archaic	☐ Early	☐ Middle	☐ Late	☒ Protohistoric/Historic Indian
☐ Woodland	☐ Eastern	☐ Plains		☐ Historic non-Indian

Archeological Cultures, Phases, etc. Represented

_____

How was cultural affiliation determined (diagnostic artifacts, radiocarbon dates, etc.)

_____

---

6. Historic Phase Identification (Ethnic) ___

Circle appropriate group

1. Choctaw	11. Pawnee	21. Creek
2. Cherokee	12. Arapaho	22. Dakotas
3. Sauc-Fox	13. Ottawa	23. Chickasaw
4. Pottawatomie	14. Wichita	24. 12 &17
5. Seminole	15. Quapaw	25. Missouri-Otos
6. Comanche	16. Osage	26. Iowa
7. Apache	17. Cheyenne	27. Anglo-American
8. Kiowa	18. Caddo	28. French
9. Kiowa-Apache	19. Shawnee	29. Spanish
10. Kickapoo	20. Delaware	30. Other _____

How was historic identification determined?

_____

---

7. Historic Site Range 5

0. Missing data; unknown	5. 1890-1929
1. pre-1800	6. 1930-1950
2. 1800-1830	7. 1800-1900
3. 1830-1859	8. 1800-present
4. 1860-1889	9. 1900-present

8. Inferred Site Type (can be more than one category)

- ☐ open habitation w/o mounds
- ☐ open habitation with mounds
- ☐ earth mound (not midden mound)
- ☐ mound complex
- ☐ stone mound/rock piles
- ☐ burned rock concentrations
- ☐ non-mound earthworks
- ☐ rock shelter
- ☐ cave
- ☐ quarry/workshop
- ☐ petroglyph - pictograph
- ☐ isolated burials (<2)
- ☐ cemetery (>2)
- ☐ specialized activity sites
- ☐ rock alignments (tipi rings, etc.)
- ☐ historic farmstead
- ☒ historic mill/industrial
- ☐ historic fort
- ☐ dugout
- ☐ historic trash dump

---

9. Midden At Site

- ☒ don't know
- ☐ absent
- ☐ present, earth
- ☐ present shell
- ☐ present, rock

---

10. Materials Collected

Type	Number	Type	Number
☐ ceramics	____	☐ scrapers (unshafted)	____
☐ projectile points/ base fragments	____	☐ debitage (flakes, cores, chunks)	____
☐ hafted scrapers	____	☐ ground/pecked/battered stone	____
☐ drills	____	☐ worked bone/shell	____
☐ bifaces/frags.	____	☐ human bone	____
☐ unifaces	____	☐ faunal remains	____
☐ perforators/ gravers	____	☐ floral remains	____
☐ spokeshaves	____	☐ other prehistoric	____
		☒ historic (describe)	47

Total Items 47

Briefly describe diagnostic artifacts including type names. Attach outline drawings.

Collected material included eight clinkers, one undecorated stoneware fragment, 7 rusted metal fragments, and 31 clear glass fragments.

Materials observed but not collected
Approximately 4 fragments of unidentified rusted metal fragments

Name and address of other collections from site

11. Artifact Repository

Name of institution where artifacts are to be stored

Photos

☐ black and white ____ no. of pictures

☒ color 8 no. of pictures

Name and address of institution where photos are filed

CAS, P.O. Box 1186, Norman, OK 73072

12. Evidence of Recent Vandalism Observed:

☒ no ☐ yes

13. Site Condition: 5

1. apparently undisturbed
2. <25% disturbed
3. 26-50% disturbed
4. 51-75% disturbed
5. 76-99% disturbed
6. totally destroyed
7. disturbed, % unknown

14. Major Land Use

☐ cultivated field ☐ modern cemetery ☐ commercial
☒ pasture ☐ mining ☐ military
☐ woods, forest ☐ inundated ☐ logging/fire break
☐ road/trail ☐ industrial ☒ scrub/secondary growth/old field
☐ ditch/dike/barrow pit ☐ residential ☐ modern dump
☐ landfill ☐ recreation

Other

15. Amount of Ground Surface Visible

1. <10%	3. 26-50%	5. 76-90%
2. 11-25%	4. 51-75%	6. 91-100%

Survey Conditions (wet, dry, sunny, ground coverage, etc.):
warm, dry, no impediments to survey

---

16. Physiographic Division: 4

1. High Plains	6. Sandstone Hills
2. Gypsum Hills	7. Prairie Plains
3. Wichita Mtns.	8. Ozark Plateau
4. Red Bed Plains	9. Ouachita Mtns.
5. Arbuckle Mtns.	10. Red River Plains

---

17. Landform Type: 4

1. Floodplain	4. Dissected Uplands
2. Terrace	5. Undissected Uplands
3. Hillside-Valley Wall	

---

18. Locality Type (specific site setting): 1

1. Level	5. Mesa
2. Knoll-Low Land	6. Slope
3. Blowout	7. Bluff Crest
4. Ridge-Upland	8. Bluff Base

---

19. Soils (if known)
Agra-Foraker complex, 3 to 5 percent slopes

---

20. 1120 Elevation amsl ~0 Slope (degrees) south Slope (facing direction)

---

21. Natural Vegetation: 2

1. short grasses	6. mesquite
2. mixed grasses	7. juniper-pinion
3. tall grasses	8. oak-hickory forest
4. cross-timber	9. oak-pine
5. shin-oak	10. loblolly pine forest

---

22. Site Area 5000 (square meters)
Basis for area estimate: GPS

1. taped	3. guessed	5. alidade/transit
2. paced	4. range finder	

Confident of site boundaries ☒ yes ☐ no

---

23. Description of Site:

Give physical description of site and its setting, including dimensions, features, nature of materials and artifacts concentrations. Include copy of U.S.G.S. topographic map with site location and boundaries marked.

34KA528 is approximately 250 feet × 250 feet (1.4 acres) in size and is located at 14S E0675193 N4095496 (UTM CONUS NAD83) in the SE/NE/SE Section 13 T29N R2E. The site is located approximately 0.3 miles north-northwest of the intersection of Juno Road and North La Cann Road, Kay County, Oklahoma. The locality consists of two very low linear rock alignments and one limestone stone well or cistern. Rusty metal fragments were observed in the vicinity of the first, and larger, of the two linear rock alignments. A road trace runs from the north-central portion of the site for approximately 400 feet to the east. Three positive shovel tests yielded a total of 47 artifacts, including clinkers, clear bottle and window glass, round-head nails, and two horseshoe fragments. The features and artifacts suggest a twentieth-century farmstead, with possible landscape stabilization features and a structure that is now no longer present. The site is located on a gently sloping (~5°), south-facing, upland pasture. Surface visibility in the farmstead area was very low (<10 percent) and vegetation consisted of low mixed prairie grasses and sparse immature hardwoods and brush.

The first of the two very low rock alignments consists of a single course of very roughly-cut limestone blocks approximately 1 ft^3 in size. The alignment is roughly oriented east-west and is approximately 40 feet in length. The western terminus of the alignment is located at 14S E0675179 N4095493 (UTM CONUS NAD83). The eastern terminus of the alignment is located at 14S E0675193 N4095496 (UTM CONUS NAD83). The alignment is located in the southwestern portion of the site area. A shovel test excavated approximately 10 feet to the north of the center of the alignment yielded eight clinkers, eight shards of clear pane and bottle glass, two horseshoe metal fragments, and one sherd of undecorated stoneware. The second of the two very low rock alignments consists of approximately eight thin (~6"), short (12") blocks of cut limestone. These were roughly flush with the ground surface. The alignment was approximately eight feet in length, roughly oriented north-south, appears to be associated with the narrow road trace, and is located at 14S E0675190 N4095526 (UTM CONUS NAD83). Shovel tests excavated in the vicinity of the second alignment yielded no cultural material. The alignment is located in the north-central portion of the site. The limestone stone well or cistern consists of several courses of small 8"×5"×6" rough-cut limestone blocks partially capped by a large (3´×3´×1.5´) limestone block. The large limestone block, a tree growing adjacent to the feature, and wood debris and leaves observed inside the well or cistern, obscure the bottom of the feature. The well or cistern is approximately 3 feet in diameter and is located at 14S E0675194 N4095512 (UTM CONUS NAD83). The well or cistern is located in the central portion of the site.

The locality is not apparent on GLO plat maps completed in 1872 and 1907 and aerial photographs taken in 1938, 1954, and 1966.

NRHP eligibility of this site has not been assessed. Three features, including a well or cistern, were observed and artifacts were recovered from three shovel tests. The site may be potentially eligible under criteria A, B, or D. The proposed project has been redesigned in order to avoid the

resource.

24. Drainage: 1

1. Arkansas	7. Illinois	13. Poteau
2. Beaver-N. Canadian	8. Kiamichi	14. Red
3. Canadian	9. Little River (McCurtain Co.)	15. Salt Fork Arkansas
4. Caney	10. Muddy Boggy	16. Salt Fork Red
5. Cimarron	11. Neosho	17. Verdigris
6. Deep Fork	12. North Fork Red	18. Washita

---

25. Nearest Natural Source of Water: 2

1. Permanent stream/creek	5. River
2. Intermittent stream	6. Slough or oxbow lake
3. Permanent spring	7. Relic stream channel (if observable)
4. Intermittent spring/seep/bog	8. Also consider wells if site is historic

---

26. Distance to Water (in 10's of meters): 6

---

27. Investigation Type: 1

1. Reconnaissance (survey)	3. Excavated
2. Intensive (survey and testing)	4. Volunteered report

---

28. Significance Status:

- ☐ National Register Property
- ☐ Eligible for National Register
- ☐ Nominated to National Register by SHPO
- ☐ Considered eligible but not nominated by SHPO
- ☐ Inventory Site
- ☒ National Register status not assessed

---

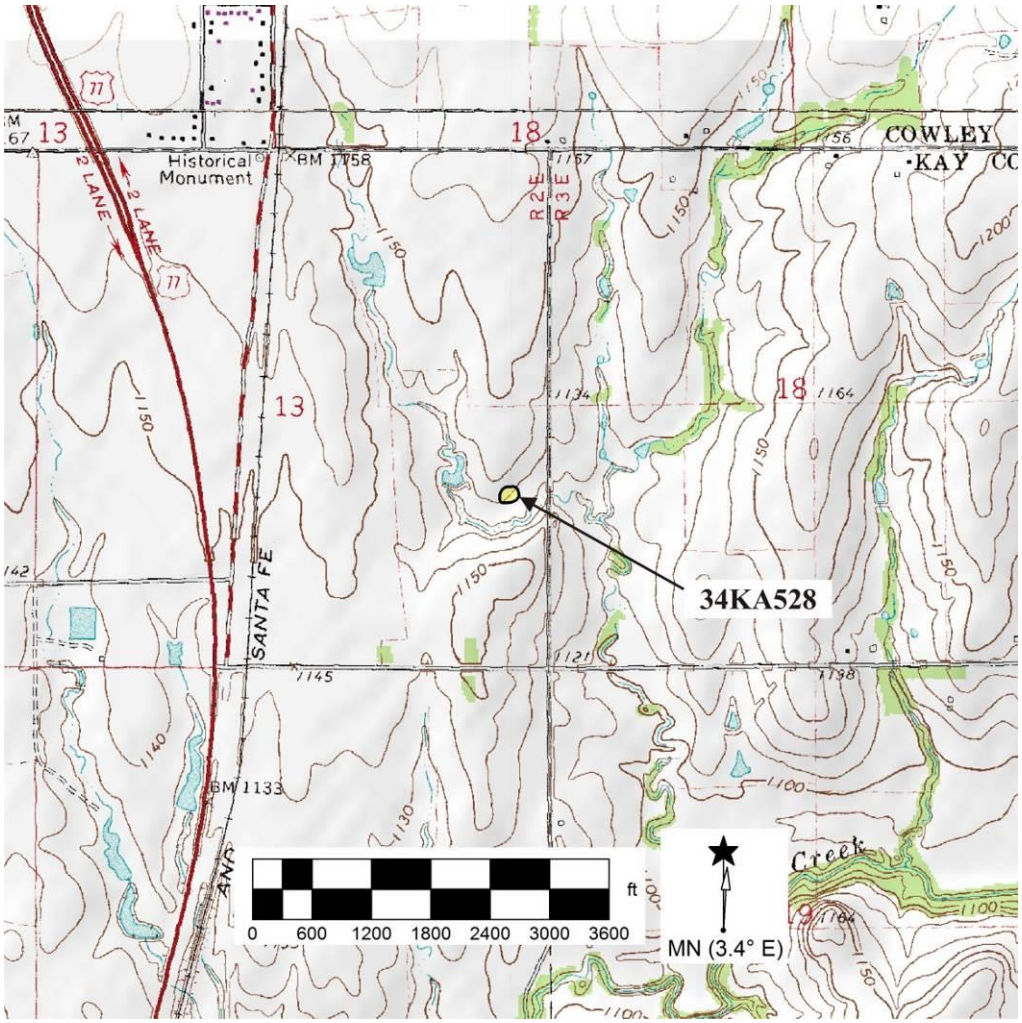
29. Discuss the Potential Significance of the Site

NRHP eligibility of this site has not been assessed. The site may be potentially eligible under criteria A, B, or D.

---

30. Published or Forthcoming Reports on the Site

Report on the Class III Archeological Survey of the PNE Wind, USA Proposed Cherokee East Addition to the Chilocco Wind Farm,
Kay County, Oklahoma


34KA528
Historical Monument
BM 1133
SANTA FE
2 LANE
COWLEY
KAY
R2E
R3E
0 600 1200 1800 2400 3000 3600 ft
MN (3.4° E)

HISTORIC PRESERVATION RESOURCE IDENTIFICATION FORM

PLEASE ENTER ALL DATA IN UPPERCASE

1. PROPERTY NAME: CHEROKEE CHECK DAM
2. RESOURCE NAME: SAME
3. ADDRESS: 1.75 MILES EAST OF CHILOCCO INDIAN AGRICULTURAL SCHOOL
4. CITY: NEWKIRK 4. VICINITY: V
6. COUNTY NAME: KAY
7. LOT: 8. BLOCK: 9. PLAT NAME:
10. SECTION: 24, NW/SE/NE 11. TOWNSHIP: 29 N 12. RANGE: 2 E
13. LATITUDE (NORTH): (ENTER AS: "dd.dddddd") 36.9798472°
14. LONGITUDE (WEST): (ENTER AS: "-dd.dddddd") -97.0344222°
15. UTM ZONE: 14 16. NORTHINGS: 4094442 17. EASTINGS: 674966
18. RESOURCE TYPE: STRUCTURE
19. HISTORIC FUNCTION: WATER-RELATED
20. CURRENT FUNCTION: WATER-RELATED
21. AREA OF SIGNIFICANCE, PRIMARY: AGRICULTURE
22. AREA OF SIGNIFICANCE, SECONDARY: CONSERVATION
23. DESCRIPTION OF SIGNIFICANCE: THIS SITE HAS LIMITED RESEARCH POTENTIAL AND WOULD NOT APPEAR ELIGIBLE FOR INCLUSTION ON THE NRHP.
24. DOCUMENTATION RESOURCE:
25. NAME OF PREPARER: COJEEN ARCHAEOLOGICAL SERVICES
59. SURVEY PROJECT: YES 26. PROJECT NAME: PNE WIND USA CHILOCCO CHEROKEE EAST
27. DATE OF PREPARATION: JULY, 2016 28. PHOTOGRAPHS YES
29. YEAR: 2016

30. ARCHITECT/BUILDER:

31. YEAR BUILT:

32. ORIGINAL SITE: YES

33. DATE MOVED:

34. FROM WHERE:

35. ACCESSIBLE: YES

36. ARCHITECTURAL STYLE: NO STYLE

37. OTHER ARCHITECTURAL STYLE:

38. FOUNDATION MATERIAL: LIMESTONE

39. ROOF TYPE:

40. ROOF MATERIAL: NO DATA

41. WALL MATERIAL, PRIMARY: LIMESTONE

42. WALL MATERIAL, SECONDARY: CONCRETE

43. WINDOW TYPE: NONE

44. WINDOW MATERIAL:

45. DOOR TYPE: NONE

46. DOOR MATERIAL:

47. EXTERIOR FEATURES: NONE

48. INTERIOR FEATURES: UNKNOWN

49. DECORATIVE DETAILS: NONE

50. CONDITION OF RESOURCE: FAIR (SOMEWHAT IN NEED OF MAINTENANCE)

51. DESCRIPTION OF RESOURCE: THIS IS AN EROSION-CONTROL FACILITY (CHECK DAM) CONSISTING OF A 143 FOOT LONG, 2.5 FOOT IDE, 2 FOOT HIGH ROUGH-CUT LIMESTONE AND COARSE AGGREGATE MORTAR WALL WITH TWO 2 FOOT BY 2 FOOT BUTTRESSES ON EITHER SIDE OF THE COURSE OF AN UNNAMED TRIBUTARY OF CHILOCCO CREEK.

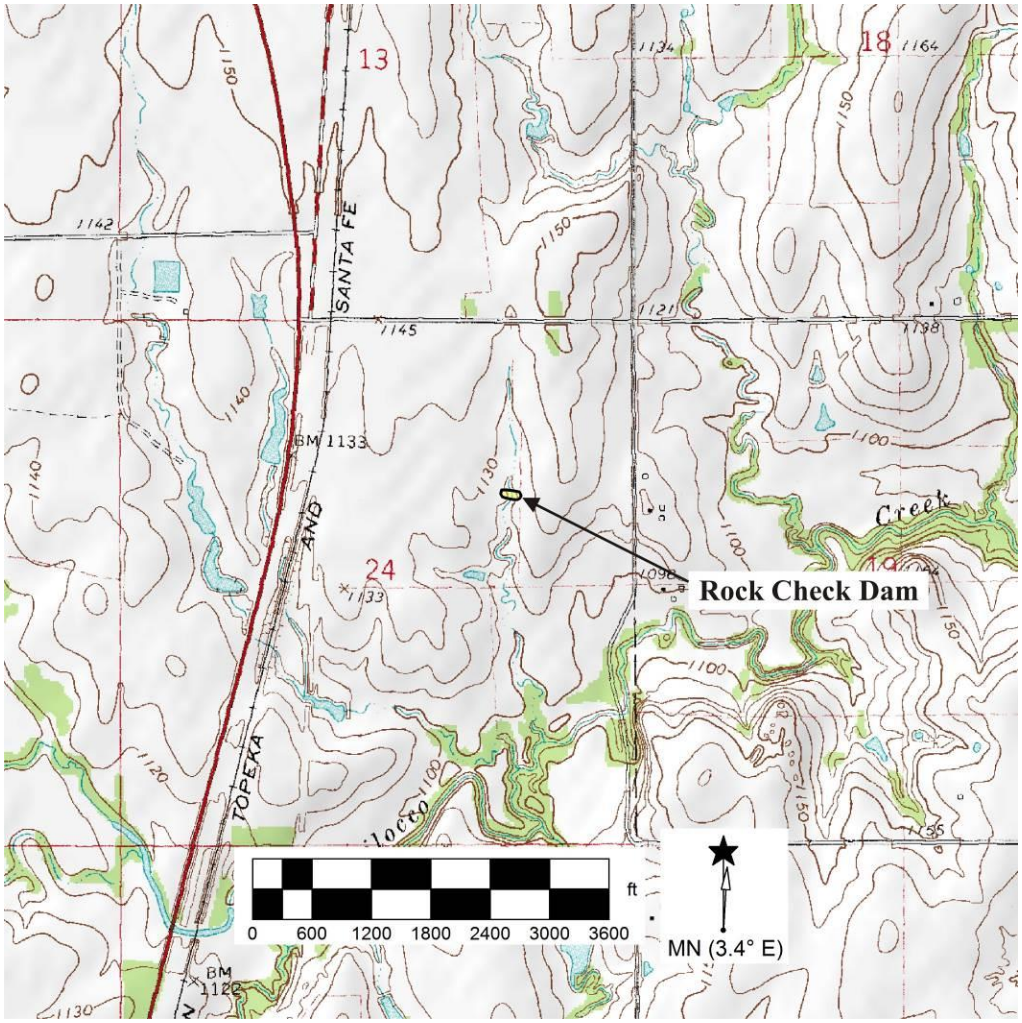
52. COMMENTS: NONE

53. ATTACH LOCATION MAP

54. LISTED ON NATIONAL REGISTER: NO

55. NATIONAL REGISTER ENTRY:

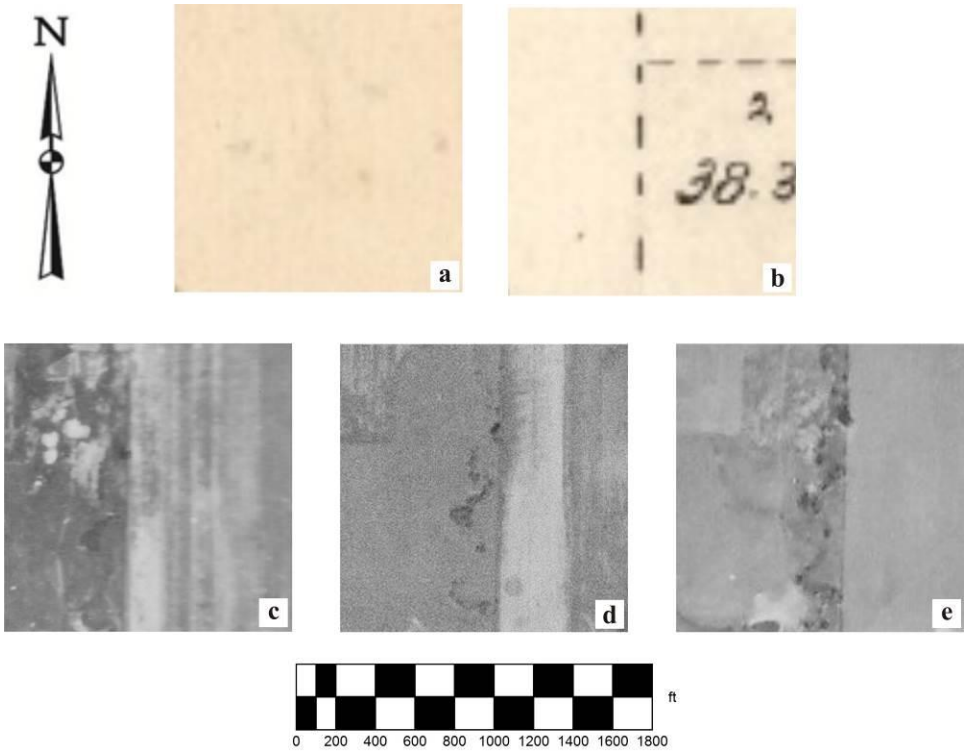
56. CONTINUATION THE STRUCTURE CROSSES A BROAD SHALLOW DRAW THAT FLOWS INTO CHILOCCO CREEK APPROXIMATELY 0.5 MILES TO THE SOUTH. VEGETATION CONSISTS OF DENSE MIXED MATURE HARDWOODS AND A LOW SPARSE UNDERSTORY. NO STRUCTURES APPEAR IN THE VICINITY OF THE SITE ON THE 1907 GLO MAP. THE WALL IS ALSO NOT VISIBLE ON EITHER A 1954 AERIAL PHOTOGRAPH OF THE AREA OR A 1977 AERIAL PHOTOGRAPH OF THE AREA.


Rock Check Dam
SANTA FE
TOPEKA AND
BM 1133
BM 1128
13
24
18
0 600 1200 1800 2400 3000 3600 ft
MN (3.4° E)

Rock Check Dam facing northwest.

Central portion of the check dam facing northeast.

Rock check dam facing east from the western terminus of the dam.



GLO maps and aerial photographs of the Rock Check Dam: (a) 1872; (b) 1907; (c) 1938; (d) 1954; and (e) 1966.

Oklahoma
Archeological Site Survey Form

Site 34KA529
County KAY

Complete All Sections

1. Site Number and Name
Site Name

(derived from owners' name, etc.)

Project No Locality 12

(temporary number or name assigned during project)

2. Locational Information

U.T.M. Reference

Zone	Northing	Easting
14S	4093535	0674731

Legal Description

SE/NE/SW of Section 24 Township 29N Range 2E

U.S.G.S. Quad Name
Newkirk

Quad Date (revised)
1968 (1976 photoinspected)

Other Locational References (i.e., benchmarks, road intersections, bridges, etc. please give distance and bearing to site)

Approximately 0.4 miles west of the intersection of East Indian Road and North La Cann Road

3. Owner(s) of Property
Name(s)

Cherokee Nation
Street and Number

17675 S. Muskogee Ave.

City and Town: Tahlequah
State: OK
Zip Code: 74464

4. Site Surveyed By:
Name
Cojeen Archaeological Services, LLC

Reported by: (if different)
Name

Date Recorded
7/6/2016

Time spent at site and time of day
4 hours, p.m.

5. Cultural Affiliation

Cultural Periods

☒ Unassigned Prehistoric				☐ Village Farming/Mississippian
☐ Paleoindian	☐ Early	☐ Middle	☐ Late	☐ Plains Village
☐ Archaic	☐ Early	☐ Middle	☐ Late	☐ Protohistoric/Historic Indian
☐ Woodland	☐ Eastern	☐ Plains		☐ Historic non-Indian

Archeological Cultures, Phases, etc. Represented

_____

How was cultural affiliation determined (diagnostic artifacts, radiocarbon dates, etc.)

_____

---

6. Historic Phase Identification (Ethnic) ___

Circle appropriate group

1. Choctaw	11. Pawnee	21. Creek
2. Cherokee	12. Arapaho	22. Dakotas
3. Sauc-Fox	13. Ottawa	23. Chickasaw
4. Pottawatomie	14. Wichita	24. 12 &17
5. Seminole	15. Quapaw	25. Missouri-Otos
6. Comanche	16. Osage	26. Iowa
7. Apache	17. Cheyenne	27. Anglo-American
8. Kiowa	18. Caddo	28. French
9. Kiowa-Apache	19. Shawnee	29. Spanish
10. Kickapoo	20. Delaware	30. Other _____

How was historic identification determined?

_____

---

7. Historic Site Range 5

0. Missing data; unknown	5. 1890-1929
1. pre-1800	6. 1930-1950
2. 1800-1830	7. 1800-1900
3. 1830-1859	8. 1800-present
4. 1860-1889	9. 1900-present

8. Inferred Site Type (can be more than one category)

- ☒ open habitation w/o mounds
- ☐ open habitation with mounds
- ☐ earth mound (not midden mound)
- ☐ mound complex
- ☐ stone mound/rock piles
- ☐ burned rock concentrations
- ☐ non-mound earthworks
- ☐ rock shelter
- ☐ cave
- ☐ quarry/workshop
- ☐ petroglyph - pictograph
- ☐ isolated burials (<2)
- ☐ cemetery (>2)
- ☐ specialized activity sites
- ☐ rock alignments (tipi rings, etc.)
- ☐ historic farmstead
- ☐ historic mill/industrial
- ☐ historic fort
- ☐ dugout
- ☐ historic trash dump

---

9. Midden At Site

- ☒ don't know
- ☐ absent
- ☐ present, earth
- ☐ present shell
- ☐ present, rock

---

10. Materials Collected

Type	Number	Type	Number
☐ ceramics		☒ scrapers (unshafted)	1
☐ projectile points/ base fragments		☒ debitage (flakes, cores, chunks)	5
☐ hafted scrapers		☐ ground/pecked/battered stone	
☐ drills		☐ worked bone/shell	
☐ bifaces/frags.		☐ human bone	
☐ unifaces		☐ faunal remains	
☐ perforators/ gravers		☐ floral remains	
☐ spokeshaves		☐ other prehistoric	
		☐ historic (describe)	

Total Items 6

Briefly describe diagnostic artifacts including type names. Attach outline drawings.

Collected material included 5 chert flakes (three thinning flakes, one heat-treated oolitic chert, and two larger flakes from tool manufacture) and one expedient flake tool of heat-treated oolitic chert.

Materials observed but not collected
None

Name and address of other collections from site

11. Artifact Repository

Name of institution where artifacts are to be stored

Photos

☐ black and white ____ no. of pictures
☐ color ____ no. of pictures

Name and address of institution where photos are filed

CAS, P.O. Box 1186, Norman, OK 73072

12. Evidence of Recent Vandalism Observed:

☒ no ☐ yes

13. Site Condition: 7

1. apparently undisturbed
2. <25% disturbed
3. 26-50% disturbed
4. 51-75% disturbed
5. 76-99% disturbed
6. totally destroyed
7. disturbed, % unknown

14. Major Land Use

☒ cultivated field
☐ pasture
☐ woods, forest
☐ road/trail
☐ ditch/dike/barrow pit
☐ landfill
☐ modern cemetery
☐ mining
☐ inundated
☐ industrial
☐ residential
☐ recreation
☐ commercial
☐ military
☐ logging/fire break
☐ scrub/secondary growth/old field
☐ modern dump

Other

15. Amount of Ground Surface Visible

1. <10%	3. 26-50%	5. 76-90%
2. 11-25%	4. 51-75%	6. 91-100%

Survey Conditions (wet, dry, sunny, ground coverage, etc.):
warm, dry, no impediments to survey

---

16. Physiographic Division: 4

1. High Plains	6. Sandstone Hills
2. Gypsum Hills	7. Prairie Plains
3. Wichita Mtns.	8. Ozark Plateau
4. Red Bed Plains	9. Ouachita Mtns.
5. Arbuckle Mtns.	10. Red River Plains

---

17. Landform Type: 1

1. Floodplain	4. Dissected Uplands
2. Terrace	5. Undissected Uplands
3. Hillside-Valley Wall	

---

18. Locality Type (specific site setting): 1

1. Level	5. Mesa
2. Knoll-Low Land	6. Slope
3. Blowout	7. Bluff Crest
4. Ridge-Upland	8. Bluff Base

---

19. Soils (if known)

Port silt loam, 0 to 1 percent slopes, occasionally flooded

---

20. 1100 Elevation amsl ~0 Slope (degrees) southeast Slope (facing direction)

---

21. Natural Vegetation: 2

1. short grasses	6. mesquite
2. mixed grasses	7. juniper-pinion
3. tall grasses	8. oak-hickory forest
4. cross-timber	9. oak-pine
5. shin-oak	10. loblolly pine forest

---

22. Site Area 6400 (square meters)

Basis for area estimate: GPS

1. taped	3. guessed	5. alidade/transit
2. paced	4. range finder	

Confident of site boundaries ☒ yes ☐ no

---

23. Description of Site:

Give physical description of site and its setting, including dimensions, features, nature of materials and artifacts concentrations. Include copy of U.S.G.S. topographic map with site location and boundaries marked.

34KA529 is approximately 6400 m2 in size and is located at 14S E0674731 N4093535 (UTM CONUS NAD83) in the SE/NE/SW Section 24 T29N R2E approximately 0.4 miles west of the intersection of East Indian Road and North La Cann Road. The locality consists of a very sparse surface prehistoric lithic scatter consisting of 5 chert flakes (three thinning flakes, one heat-treated oolitic chert, and two larger flakes from tool manufacture) and one expedient flake tool of heat-treated oolitic chert. The artifacts were observed in a maturing corn field with very good visibility (50-75%). Nine shovel tests were excavated in the vicinity of the scatter. None yielded additional cultural material. The soils from those tests revealed an initial layer of very black silty clay loam or silty loam over very dark brown silty clay. The site is located on an upper floodplain of Chilocco Creek.

The vicinity of 34KA529 on GLO plat maps completed in 1872 and 1907 appears to have been unaffected by any specific form of land use. Aerial photographs taken in 1938, 1954, and 1966 (Figure 51) indicate that the area has been under cultivation since 1938.

The site is bisected by a proposed collector line.

Based on the sparse nature of the findings at 34KA529, further excavation would not likely recover significant scientific information. This site does not appear to meet criteria for inclusion on the NRHP.

24. Drainage: 1

1. Arkansas	7. Illinois	13. Poteau
2. Beaver-N. Canadian	8. Kiamichi	14. Red
3. Canadian	9. Little River (McCurtain Co.)	15. Salt Fork Arkansas
4. Caney	10. Muddy Boggy	16. Salt Fork Red
5. Cimarron	11. Neosho	17. Verdigris
6. Deep Fork	12. North Fork Red	18. Washita

25. Nearest Natural Source of Water: 1

1. Permanent stream/creek	5. River
2. Intermittent stream	6. Slough or oxbow lake
3. Permanent spring	7. Relic stream channel (if observable)
4. Intermittent spring/seep/bog	8. Also consider wells if site is historic

26. Distance to Water (in 10's of meters): 1

27. Investigation Type: 1

1. Reconnaissance (survey)	3. Excavated
2. Intensive (survey and testing)	4. Volunteered report

28. Significance Status:

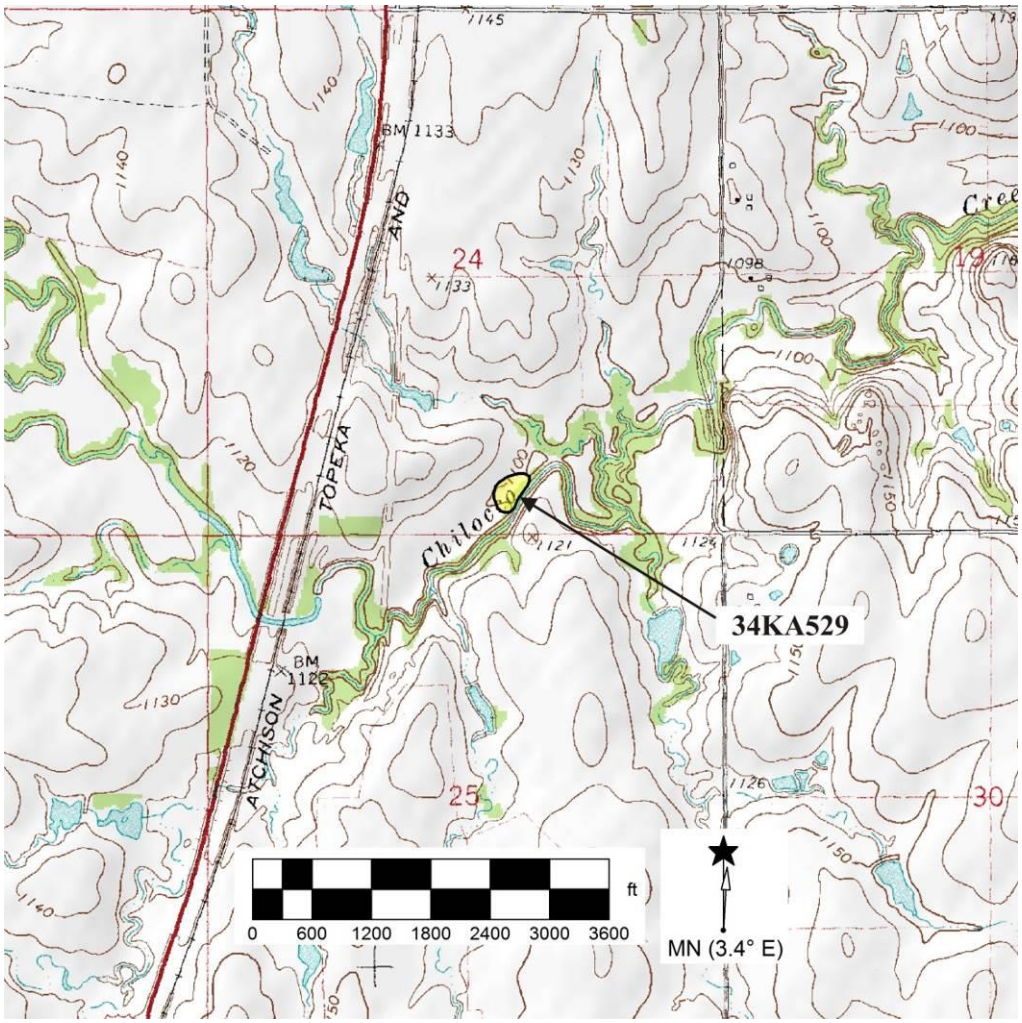
- ☐ National Register Property
- ☐ Eligible for National Register
- ☐ Nominated to National Register by SHPO
- ☐ Considered eligible but not nominated by SHPO
- ☒ Inventory Site
- ☐ National Register status not assessed

30. Discuss the Potential Significance of the Site

This site has limited research potential and would not appear eligible for inclusion on the NRHP.

30. Published or Forthcoming Reports on the Site

Report on the Class III Archeological Survey of the PNE Wind, USA Proposed Cherokee East Addition to the Chilocco Wind Farm, Kay County, Oklahoma. Cojeen Archaeological Services, LLC.


34KA529
BM 1133
BM 1126
ATCHISON TOPEKA AND
24
25
30
19
0 600 1200 1800 2400 3000 3600 ft
MN (3.4° E)

Christopher A. Cojeen
Principal Investigator
Cojeen Archaeological Services, LLC
cojeenarch@sbcglobal.net

Archaeology
Research
History

Arthur Roden
PNE Wind, USA
150 N. Michigan Ave., Ste. 1500
Chicago, Illinois 60601
Mark Randall

March 16, 2017

Re: Clarification, Redesigned Turbine Locations WTG95 and WTG99, Cherokee East Addition to the Chilocco Wind Farm, Kay County, Oklahoma

Dear Mr. Roden:

This letter is to affirm that during the Class III Archeological Survey of the PNE Wind, USA Proposed Cherokee East Addition to the Chilocco Wind Farm, Kay County, Oklahoma conducted in June and July of 2016, the redesigned footprint locations of turbine locations WTG95 (represented by the graphic [Figure 5] on page 7 of the report) and WTG99 (represented by the graphic [Figure 13] on page 15 of the report) were archeologically examined. Both the red (original footprint) and green (redesigned footprint) of each location as indicated on the maps was archeologically examined, utilizing pedestrian transects augmented by shovel testing during the survey. I have attached Figures 5 and 13 from the report for reference.

Christopher Cojeen
Cojeen Archaeological Services, LLC

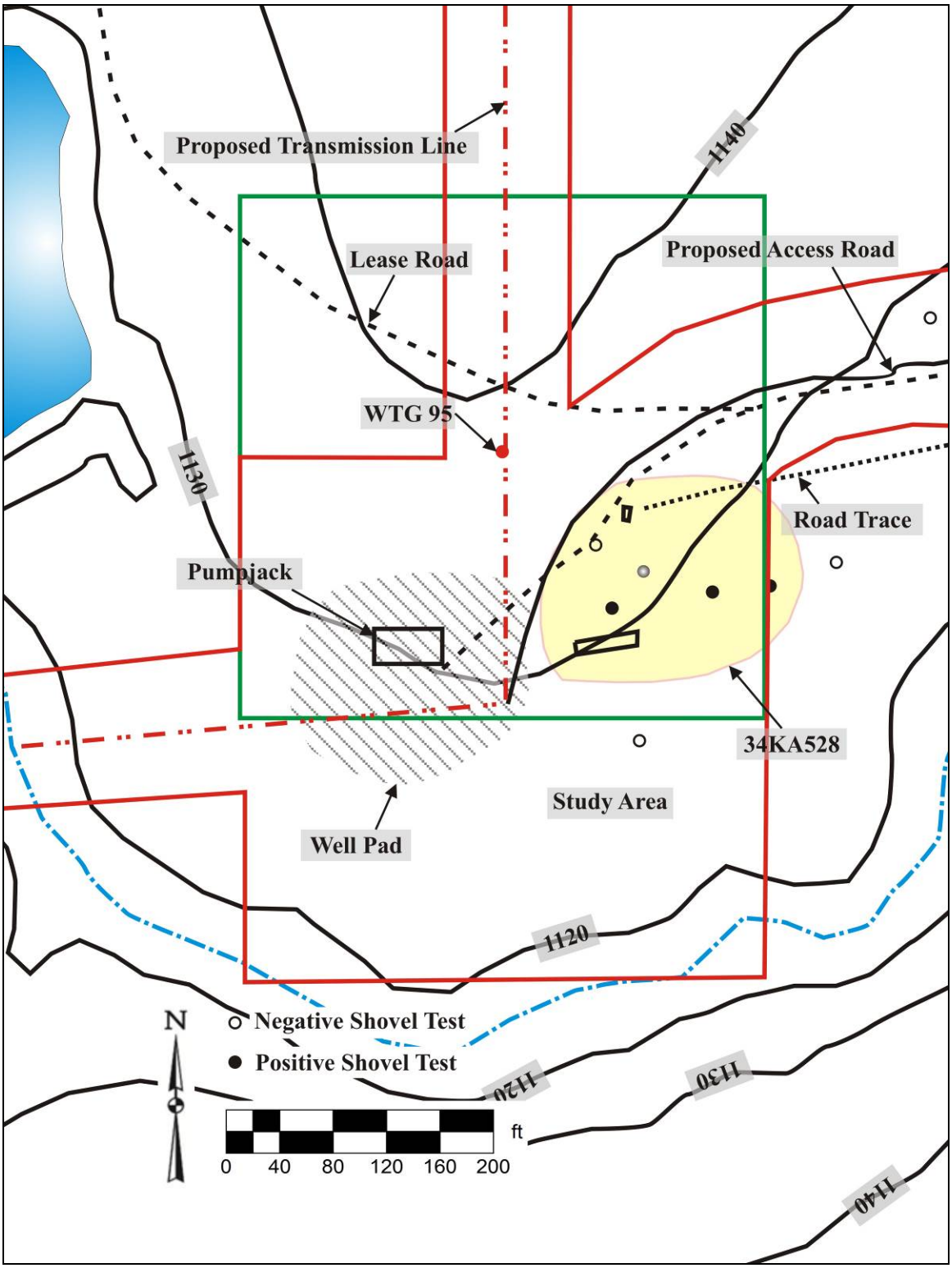


Figure 5. Sketch map of the turbine location at WTG 95 (redesigned turbine footprint in green).

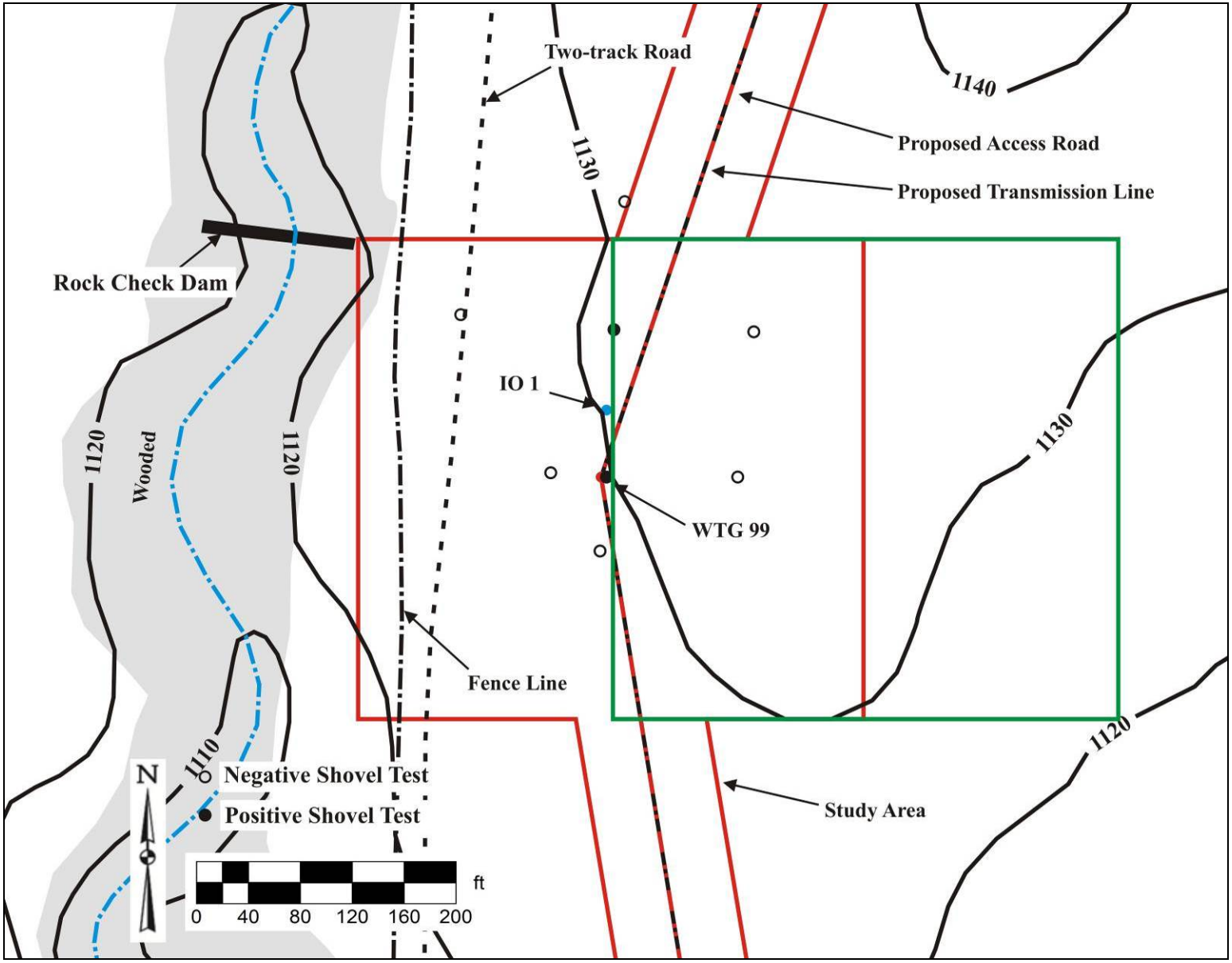


Figure 13. Sketch map of the turbine location at WTG 99 (redesigned turbine footprint in green).

Appendix R

Water Resources

Redacted for Confidentiality

D. Arthur Roden Lead Developer	Phone (312) 873-2240	Main (312) 882-2687	Fax (312) 873-2242	E-Mail arthur.roden@pnewind.com

PNE WIND USA, INC. 150 North Michigan Avenue, Suite 1500 | Chicago, IL 60601

Via Electronic Mail

May 31, 2017

Mr. Tom Nystrom
USEPA Region 6
1445 Ross Avenue, Suite 1200
Dallas, TX 75202-2733

Dear Mr. Nystrom:

Thank you for taking my call this morning regarding fulfilling the requirements for a Water Quality Certification in conjunction with our Nationwide Permit activity with the U.S Army Corps of Engineers (USACE) Tulsa District. As you recall, PNE Wind USA's Chilocco Wind Farm Project is located on tribal land in Kay County, Oklahoma. Per the guidance you provided during the call, below is a list of the tribal contacts for the project:

Ms. Sara Hill, Esq.
Secretary of Natural Resources
Cherokee Nation
(918) 822-2304
sarah-hill@cherokee.org

Mr. Ken Bellmard
Director of Development Affairs
Kaw Nation
(580) 269-2552
kbellmard@bellmardlaw.com

Ms. Melanie Harader
Tribal Council Second Member
Otoe-Missouria Tribe
(580) 723-4466
mharader@omtribe.org

Attached please find a brief description of the project and its impacts on Waters of the U.S. Also attached is a map of the project showing infrastructure and areas where waters of the U.S are impacted.

PNE Wind and its tribal partners, have worked diligently with the USACE to avoid and minimize impacts to Waters of the US and the Tulsa District has issued an authorization for the project under Nationwide Permit #51. We appreciate EPA's commitment to processing this request for Water Quality Certification per Section 401 of the Clean Water Act as quickly as possible.

Should you have any questions or need any additional information, please do not hesitate to contact me.

Sincerely,

Arthur Roden
Lead Developer
PNE Wind USA, Inc

Enclosures:
Project Work Description
Chilocco Wind Farm Project Map
Typical Construction Details

CC:
Ron Flax-Davidson, PNE
Mark Randall, PNE
Andy Zalay, PNE
Bryan Noblitt, USACE
Sara Hill, Cherokee Nation
Ken Bellmard, Kaw Nation
Melanie Harader, Otoe-Missouria Tribe

Project and Work Description

Chilocco Wind Farm is a 200MW wind farm project in Kay County, Oklahoma. The Project will encompass approximately 6,000 acres of tribal trust land owned by the Cherokee Nation, Kaw Nation, and the Otoe-Missouria Tribe.

The proposed Project will involve the construction and operation of various wind farm features, associated structures, and infrastructure necessary to support these facilities. These constructed features will include: access roads including crane paths, turbine pads, underground power transmission lines, and a project substation. Those activities with associated permanent and temporary wetland impacts, are described below and in the attached construction details:

Access Roads (Permanent impacts) .1544 acres

The Project will include approximately 22 miles of permanent gravel access roads. The minimum full surfaced travel-way width would be approximately 16 feet; overall permanent surface disturbance will be approximately 40 feet wide around turbine pads. The access roads will be crowned in the center with the surface sloped at a minimum 2%. The road surface will consist of six inches of compacted ODOT Type A & B aggregate.

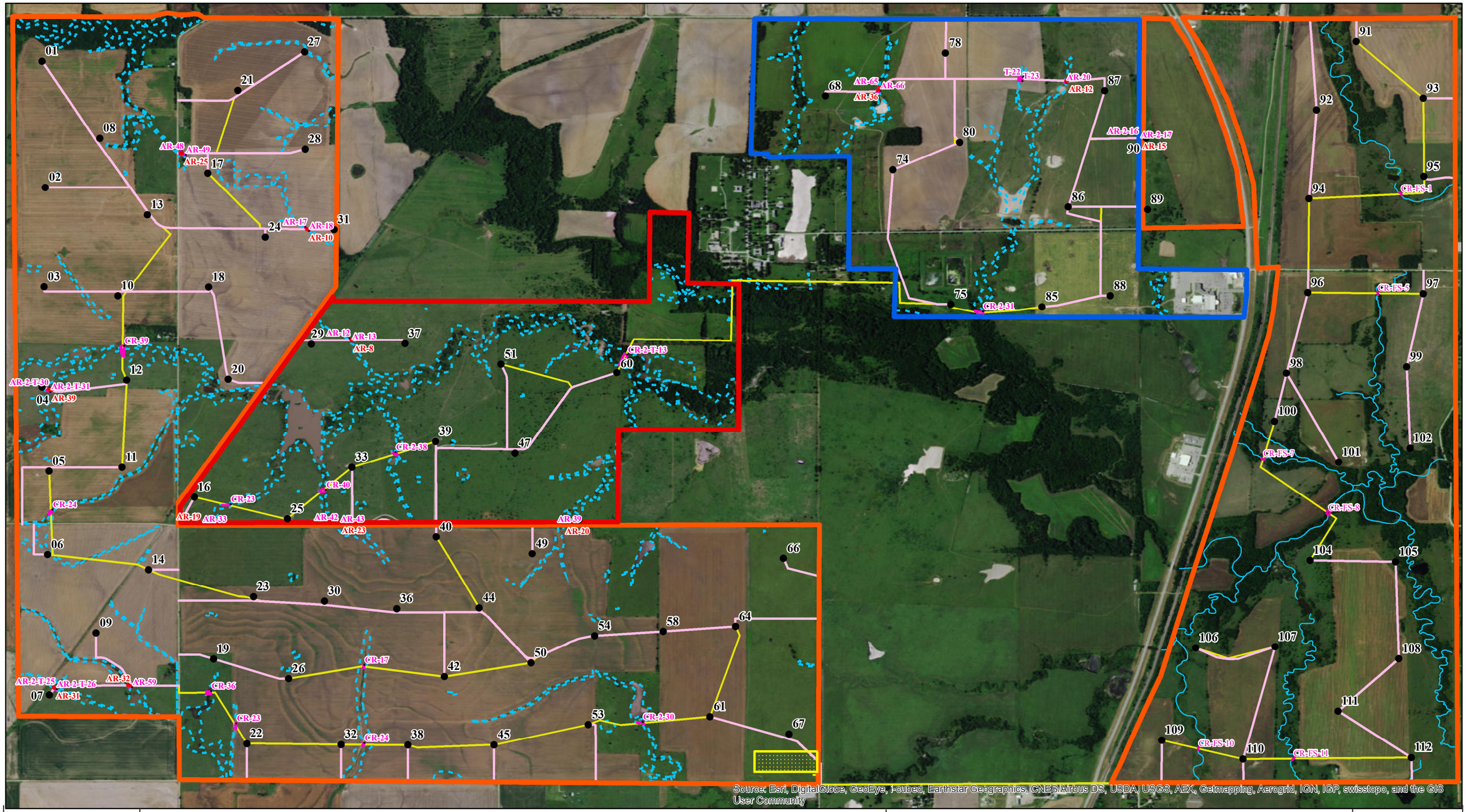
Access roads will be constructed in compliance with all applicable codes, and in accordance with landowner easement agreements. Access roads will be constructed to withstand the expected weights of the vehicles transporting turbine components and the lifting equipment that will be used during construction. Drainages shall be installed as required to prevent storm water runoff from adjacent slopes above roads to carry runoff from the road service to a natural drainage outlet. Rock Filter dams and other erosion controls will be installed throughout the construction process to minimize any potential adverse effects. All road construction areas will be re-vegetated consistent with an approved Project SWPPP.

Electrical Collection System (Temporary Impacts) 3.455 Acres

A system of approximately 30 miles of 34.5kV underground electrical collector cables will transmit electricity from each turbine to the collector substation. Underground electrical and communications cables would be placed in approximately two to four-foot wide trenches along the length of each

turbine string corridor. Wherever possible, underground electrical collection cables will be co-located with access roads. Trenches for electrical cables will be installed using conventional excavation and backfilling procedures or using a “plow” method to excavate a narrow trench and install the cable in one complete process. Directional boring will also be deployed when appropriate; typically at crossings of Chilocco Creek.

Trenches would be excavated to below frost line depth of approximately four feet. The cable installation depth may be adjusted to shallower depths depending on soil management practices in the agricultural areas or the nature and depth of bedrock, if present. Installed cable depth would conform to all applicable codes. Trenches will be re-vegetated concurrently with re-vegetation of other disturbed areas, and consistent with the approved Project SWPPP.



Source: Esri, DigitalGlobe, GeoEye, Earthstar Geographics, CNES/Airbus DS, USDA, USGS, AEX, Getmapping, Aerogrid, IGN, IGP, swisstopo, and the GIS User Community

N
W E
S

- Turbine
- Kaw Nation
- Otoe Nation
- Cherokee Nation
- Substation
- Proposed Turbine Pad
- Permanent Wetland Impacts
- Temporary Wetland Impacts
- Proposed Access Roads (AR)
- Access Roads Permament Corridor
- Proposed Collector Run (CR)
- Collector Runs Temporary Corridor
- Waterways

0 0.3 0.6 1.2 1.8 2.4 Miles

Chilocco Project Site Overview

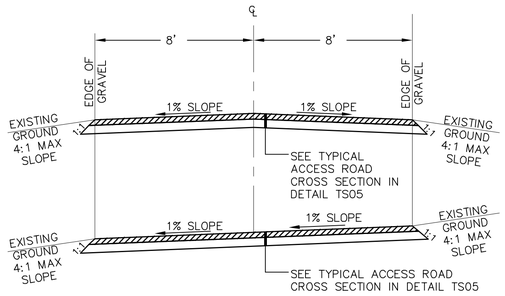
Wetland Impact Map

Confidential and Proprietary - For Internal Use Only - Not For Construction

Date: 05/31/2017
Document: Chilocco

Coordinate System: UTM 14
Map Datum: NAD 83

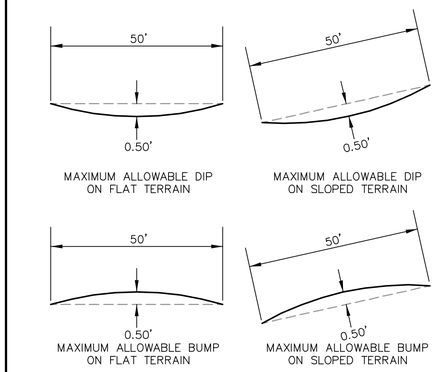
PNE WIND
USA Passion for Energy



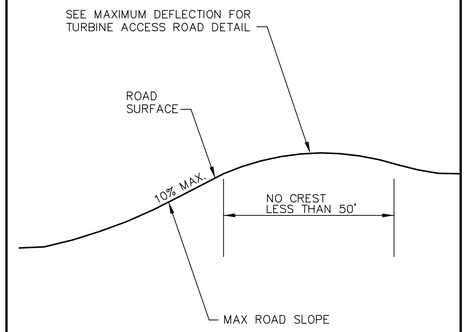
NOTES:

1. CONTRACTOR SHALL CONSTRUCT CROSS-SLOPE ROAD SECTION WHERE ACCESS ROADS ARE CONSTRUCTED ON A SIDE SLOPE, AND WHERE OTHERWISE NOTED ON PLANS, TO ENSURE THAT ROADS AND SHOULDERS REMAIN WELL DRAINED AT ALL TIMES.
2. ROADS TO GENERALLY FOLLOW EXISTING CONTOURS EXCEPT IF GRADES EXCEED TURBINE DELIVERY VEHICLE CAPABILITIES, IF THIS OCCURS GENERAL CONTRACTOR MAY PROVIDE ASSIST VEHICLE OR MODIFY GRADE

	TYPICAL TURBINE ACCESS ROAD	LAST REVISED: 11/4/13 RD01-A



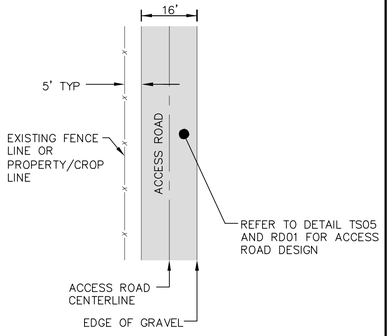
	MAXIMUM DEFLECTION FOR TURBINE ACCESS ROAD	LAST REVISED: 11/4/13 RD02



NOTES:

1. ROAD SLOPE SHALL NOT EXCEED 10% WITHOUT OWNER APPROVAL

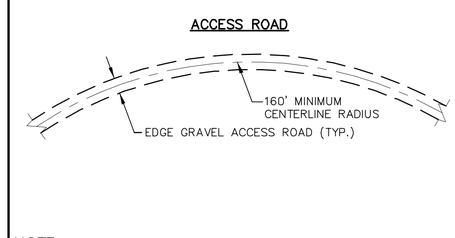
	MAXIMUM VERT. SLOPE FOR TURBINE ACCESS ROAD/CRANE TRAVEL PATH	LAST REVISED: 11/4/13 RD03



NOTE:

1. COMPACTED SHOULDER SHALL BE RETURNED TO NATIVE CONDITION FOLLOWING TURBINE GENERATOR CONSTRUCTION.
2. THE ACCESS ROAD MAY NEED TO BE CONSTRUCTED FARTHER FROM THE PROPERTY LINE IF OBSTRUCTIONS SUCH AS TREES FOLLOW THE PROPERTY LINE.

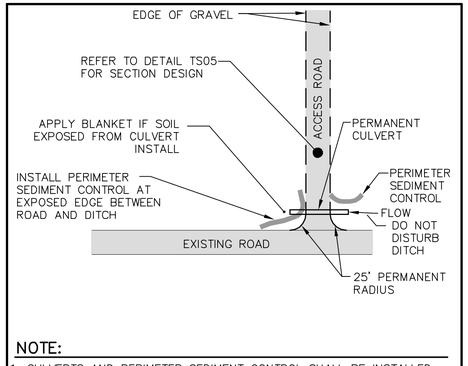
	TURBINE ACCESS ROAD ALONG FENCE/PROPERTY/CROP LINE	LAST REVISED: 11/4/13 RD04



NOTE:

1. SOME RADII MAY REQUIRE ADDITIONAL SOIL COMPACTION OR GRAVEL OUTSIDE OF THE WIDTH SHOWN ABOVE TO ACCOMMODATE TRACTORS OR TRAILERS TRACKING OFF THE ACCESS ROAD.

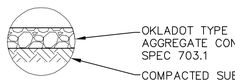
	MINIMUM RADIUS FOR TURBINE ACCESS ROAD	LAST REVISED: 11/4/13 RD05



NOTE:

1. CULVERTS AND PERIMETER SEDIMENT CONTROL SHALL BE INSTALLED AND MAINTAINED AT INTERSECTIONS WHERE THE ACCESS ROAD IS CROSSING AN EXISTING COUNTY DITCH.

	TURBINE ACCESS ROAD TYPICAL INTERSECTION	LAST REVISED: 10/21/13 RD07

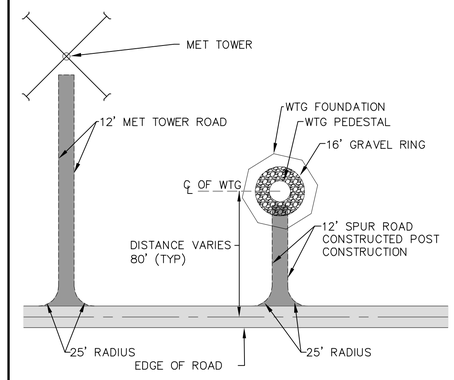


ACCESS ROAD SECTION

NOTES:

1. STRUCTURAL SECTIONS SHOWN ARE THE MINIMUM THICKNESS REQUIREMENTS DURING NORMAL FIELD CONDITIONS. THE SECTIONS MAY NEED TO BE INCREASED BASED ON ACTUAL FIELD CONDITIONS AT THE TIME OF CONSTRUCTION. CONDITIONS INCLUDE, BUT ARE NOT LIMITED TO, CONSTRUCTION DURING UNUSUALLY WET PERIODS, OR IN LOW/WET AREAS.
2. CONTRACTOR SHALL SUBMIT GRADATIONS TO ENGINEER FOR APPROVAL.

	TYPICAL STRUCTURAL CROSS SECTIONS	LAST REVISED: 11/4/13 TS05



	PERMANENT SPUR AND MET TOWER ROAD (TYPICAL)	LAST REVISED: 11/4/13 TS02

Westwood

Phone (952) 937-5150 7699 Anagram Drive
Fax (952) 937-5822 Eden Prairie, MN 55344
Toll Free (888) 937-5150 westwoodps.com
Westwood Professional Services, Inc.

Designed: DJF
Checked: DDB
Drawn: DJF
As-Built Drawing:

Revisions:

#	DATE	DESCRIPTION
.	.	.

Prepared for:

WANZEK
a MasTec company

2028 2nd Avenue NW
West Fargo, ND 58078

Chilocco Wind Project

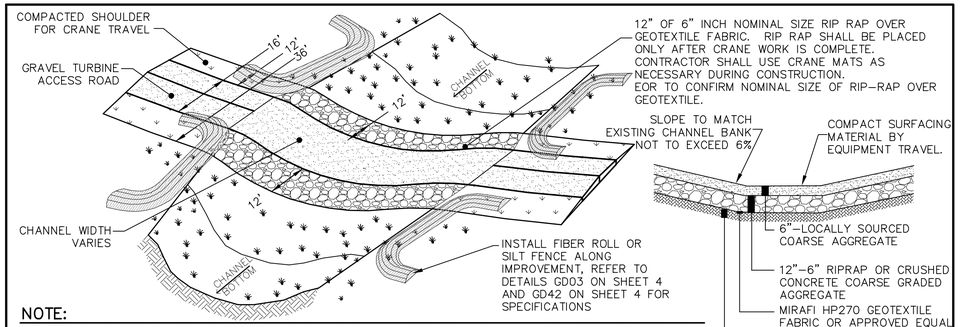
Kay County, Oklahoma

Construction Details

Permitting Plans
Not For Construction

Date: 12/01/2016
Sheet: 2 OF 11

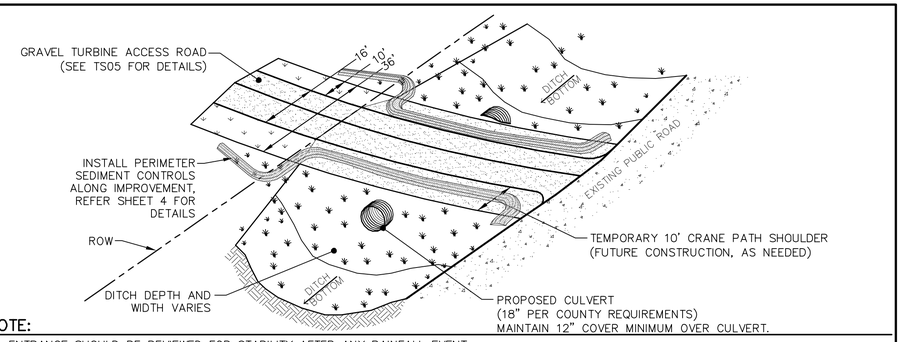
00106.38DTF01.dwg



NOTE:

1. CHANNEL SLOPES TO BE MODIFIED TEMPORARILY DURING CONSTRUCTION TO ALLOW FOR ADEQUATE TURBINE COMPONENT DELIVERY AND RESTORE TO ORIGINAL CONDITIONS UPON SITE RESTORATION.
2. CROSSINGS SHALL HAVE THE TOP-MOST SURFACE LAYER A MINIMUM OF 2.5 INCHES BELOW THE STREAM CHANNEL BOTTOM.
3. THE ACCESS ROAD SHALL CROSS THE DITCH AT 90° ANGLE.
4. THE TOP BED OF THE ROCK CHANNEL CROSSING SHALL CONFORM TO THE EXISTING DITCH CROSS SECTIONAL SLOPES.
5. MATERIAL THICKNESSES SHOWN ARE MINIMUMS. IT MAY BE NECESSARY TO FIELD ADJUST THICKNESSES TO ACHIEVE SUFFICIENT BEARING CAPACITIES AS ARE NECESSARY FOR ANTICIPATED ROAD USE.
6. GRAVEL BAG BERMS MAY BE NECESSARY IF FLOWS AND DRAINAGE AREAS REQUIRE. SEE DETAIL RD13 FOR GRAVEL BAG BERM INSTALLATION.

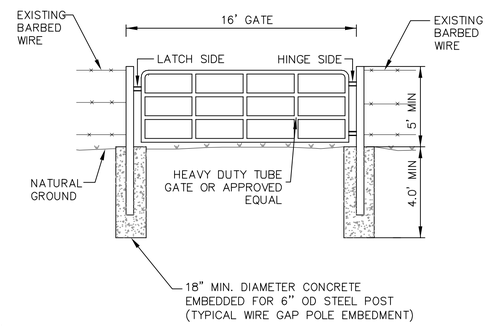
	MINOR CROSSING – PERMANENT TURBINE ACCESS ROAD LOW WATER CROSSING	LAST REVISED: 3/29/12 RD11



NOTE:

1. ENTRANCE SHOULD BE REVIEWED FOR STABILITY AFTER ANY RAINFALL EVENT.
2. MATERIAL THICKNESSES SHOWN ARE MINIMUMS. IT MAY BE NECESSARY TO FIELD ADJUST THICKNESSES TO ACHIEVE SUFFICIENT BEARING CAPACITIES AS ARE NECESSARY FOR ANTICIPATED ROAD USE.
3. ROCK CHECK DAMS MAY BE NECESSARY IF FLOWS AND DRAINAGE AREAS REQUIRE. SEE DETAIL GD18.
4. CULVERT INSTALLATION SHALL CONFORM WITH MANUFACTURERS RECOMMENDATION FOR INSTALLATION. CULVERT TO BE SUMPED 2.5" BELOW EXISTING FLOW LINE.
5. RESTORE DISTURBED AREA TO NATIVE CONDITIONS IN ACCORDANCE WITH THE SWPPP.

	TURBINE ACCESS ROAD ENTRANCE CULVERT CROSSING	LAST REVISED: 10/21/13 RD16-C



NOTE:

1. SUPPORTS MUST BE PLACED IN EXISTING FENCE LINE & EXISTING FENCE ATTACHED TO NEW SUPPORTS PRIOR TO CUTTING OF EXISTING FENCE
2. ALL FITTINGS, HARDWARE AND OTHER APPURTENANCES SHALL BE FABRICATED AND FITTED IN ACCORDANCE WITH THE MANUFACTURES RECOMMENDATIONS.
3. ALL DIRECT BURIED POSTS SHALL BE BACKFILLED WITH TWO BAGS OF UNMIXED, NO WATER ADDED, QUICKRETE®, OR APPROVED EQUAL, FOLLOWED BY NATIVE SOIL.

	GATE TYPE A – SINGLE GATE	LAST REVISED: 11/4/13 GA01

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Designed: DJF
Checked: DDB
Drawn: DJF
As-Built Drawing:

Revisions:

#	DATE	DESCRIPTION
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Prepared for:

WANZEK
a MasTec company

2028 2nd Avenue NW
West Fargo, ND 58078

Chilocco Wind Project

Kay County, Oklahoma

Construction Details

Permitting Plans
Not For Construction

Date: 12/01/2016
Sheet: 3 OF 11

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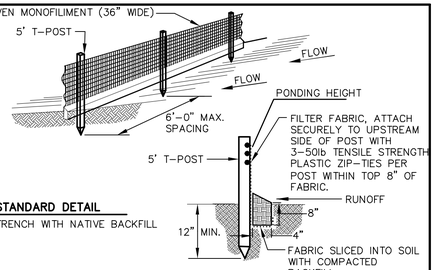


STANDARD DETAIL

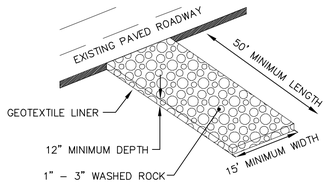
TRENCH WITH NATIVE BACKFILL

NOTE:

1. INSPECT AND REPAIR FENCE AFTER EACH STORM EVENT AND REMOVE SEDIMENT WHEN ACCUMULATED TO 1/3 THE HEIGHT OF THE FABRIC OR MORE.
2. REMOVED SEDIMENT SHALL BE DEPOSITED TO AN AREA THAT WILL NOT CONTRIBUTE SEDIMENT OFF-SITE AND CAN BE PERMANENTLY STABILIZED.
3. SILT FENCE SHALL BE PLACED ON SLOPE CONTOURS TO MAXIMIZE PONDING EFFICIENCY.
4. ALL ENDS OF THE SILT FENCE SHALL BE WRAPPED UPSLOPE SO THE ELEVATION OF THE BOTTOM OF FABRIC IS HIGHER THAN "PONDING HEIGHT".

	SILT FENCE	LAST REVISED: 11/4/13 GD03

****ACCESS ROADS SHALL BE CONSTRUCTED FROM PUBLIC ROADS WHERE THE CONSTRUCTION DELIVERY TRAFFIC WILL TRAVEL ON THE CONSTRUCTED ACCESS ROAD. SEDIMENT TRACKING ONTO PUBLIC PAVED ROADS IS NOT ANTICIPATED. IF SEDIMENT TRACKING DOES OCCUR, THE SEDIMENT SHALL BE REMOVED AND A ROCK CONSTRUCTION ENTRANCE CONSTRUCTED****

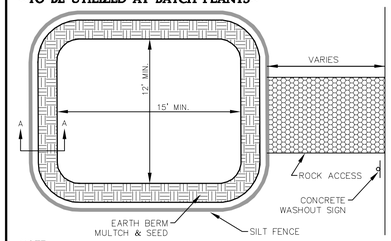


NOTE:

ROCK CONSTRUCTION ENTRANCE SHOULD BE A MINIMUM THICKNESS OF 1.0' AND CONTAIN MAXIMUM SIDE SLOPES OF 4:1. ROCK ENTRANCE SHOULD BE INSPECTED AND MAINTAINED REGULARLY. ROCK ENTRANCE LENGTH MAY NEED TO BE EXTENDED IN CLAY SOILS.

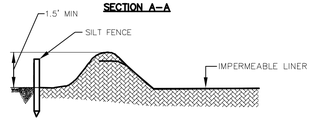
	ROCK CONSTRUCTION ENTRANCE	LAST REVISED: 11/4/13 GD05

****TO BE UTILIZED AT BATCH PLANTS****

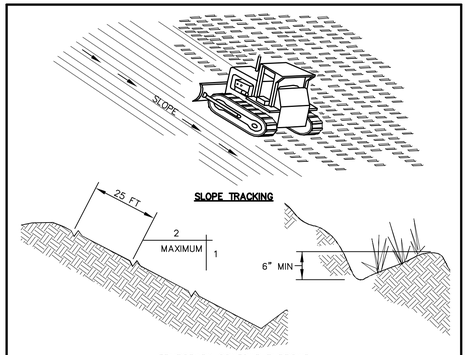


NOTE:
CONCRETE WASHOUT AREAS WILL HAVE AN IMPERMEABLE LINER TO PREVENT CONCRETE WASHOUT WATER FROM INFILTRATING/CONTACTING WITH SOIL. IMPERMEABLE LINER INCLUDES 10 MIL POLYLINER OR COMPACTED CLAY LINER. WASHOUT SYSTEMS CAN BE USED AS ALTERNATE WASHOUT AREAS.

SECTION A-A



	CONCRETE WASHOUT AREA	LAST REVISED: 11/4/13 GD08

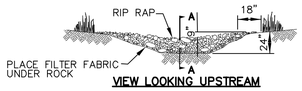


NOTE:

1. GROOVES WILL CATCH SEED, FERTILIZER, MULCH, RAINFALL AND DECREASE RUNOFF RATE.
2. USE SLOPE TRACKING FOR SLOPES 4:1 AND 50 FEET LONG OR STEEPER/LONGER.
3. USE TEMPORARY CONTOUR FURROWS FOR SLOPES 3:1 AND 75 FEET LONG OR STEEPER/LONGER.

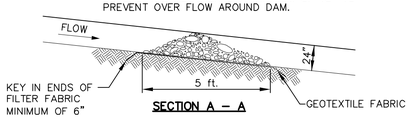
	SURFACE ROUGHENING FOR ALL SLOPES GREATER THAN 4:1	LAST REVISED: 11/4/13 GD09

ROCK CHECK SHALL BE USED WHERE NEEDED AS A FILTER MEDIA, OR WHERE EROSION CONTROL BLANKETS AND/OR MULCH BERMS DO NOT PROVIDE ADEQUATE EROSION AND SEDIMENT CONTROL.



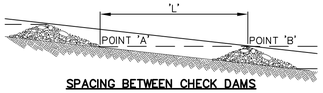
VIEW LOOKING UPSTREAM

KEY STONE INTO THE DITCH BANKS AND EXTEND IT BEYOND THE ABUTMENTS A MINIMUM OF 18" TO PREVENT OVER FLOW AROUND DAM.



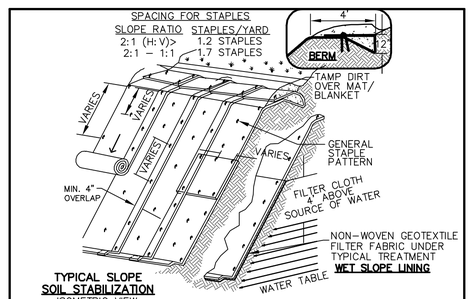
SECTION A - A

'L' = THE DISTANCE SUCH THAT POINTS 'A' AND 'B' ARE OF EQUAL ELEVATION.



SPACING BETWEEN CHECK DAMS

	TEMPORARY ROCK CHECK DAM	LAST REVISED: 11/4/13 GD18



TYPICAL SLOPE SOIL STABILIZATION
ISOMETRIC VIEW

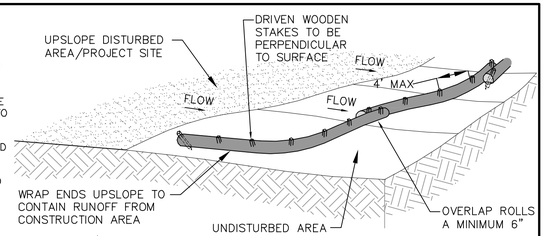
NOTE:

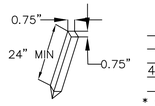
1. REFER TO THE CHILOCCO WIND PROJECT SWPPP FOR IMPLEMENTATION REQUIREMENTS.
2. MATS/BLANKETS SHOULD BE INSTALLED VERTICALLY DOWNSLOPE.
3. SLOPE SURFACE SHALL BE FREE OF ROCKS, CLODS, STICK AND GRASS.
4. MATS/BLANKETS SHALL HAVE GOOD SOIL CONTACT.
5. LAY BLANKETS LOOSELY AND STAKE OR STAPLE TO MAINTAIN DIRECT CONTACT WITH THE SOIL.
6. DO NOT STRETCH.
7. BLANKET TYPE AND WEIGHT MUST BE CHOOSEN BASED ON SITE CONDITIONS, TxDOT PERFORMANCE FACTORS AND MANUFACTURERS RECOMMENDATIONS.
8. STAPLE LENGTHS SHALL CONFORM TO MANUFACTURERS RECOMMENDATIONS.

	TYPICAL SLOPE STABILIZATION - TEMPORARY EROSION BLANKETS TURF REINFORCEMENT MATS FOR SLOPES	LAST REVISED: 11/4/13 GD21

NOTES:

1. FIBER ROLLS SHALL BE INSTALLED PRIOR TO UPSLOPE DISTURBANCE ACTIVITIES COMMENCE.
2. FIBER ROLLS SHALL BE PREFABRICATED AND MADE FROM WEED FREE RICE STRAW, FLAX, OR A SIMILAR AGRICULTURAL MATERIAL BOUND INTO A TIGHT TUBULAR ROLL BY NETTING. USE A 6" OR 12" DIA. ROLL.
3. TRENCHES SHALL BE CREATED ALONG THE SLOPE OF THE PERIMETER. THE TRENCH DEPTH SHOULD BE 1/4 TO 1/3 OF THE THICKNESS OF THE ROLL, AND THE WIDTH SHOULD EQUAL THE ROLL DIAMETER, IN ORDER TO PROVIDE AREA TO BACKFILL THE TRENCH.
4. STAKE FIBER ROLLS INTO THE TRENCH. DRIVE STAKES AT THE END OF EACH FIBER ROLL AND SPACED 4 FEET MAXIMUM ON CENTER. USE WOOD STAKES WITH NOMINAL CLASSIFICATION OF 0.75 IN BY 0.75 IN. AND A MINIMUM LENGTH OF 24 IN.
5. ROLLS SHALL BE INSTALLED PERPENDICULAR TO WATER MOVEMENT, AND PARALLEL TO THE SLOPE CONTOUR.
6. TURN THE ENDS OF THE FIBER ROLLS UP SLOPE TO PREVENT RUNOFF FROM GOING AROUND THE ROLL. THE UPSLOPE POINT SHOULD BE A MINIMUM 6" HIGHER IN ELEVATION THAN THE LOW POINT.
7. IF MORE THAN ONE FIBER ROLL IS PLACED IN A ROW, THE ROLLS SHOULD BE OVERLAPPED A MINIMUM OF 6 INCHES, NOT ABUTTED.
8. FIBER ROLLS ENCASED WITH PLASTIC NETTING ARE USED FOR A TEMPORARY APPLICATION ONLY AND SHOULD BE REMOVED FOLLOWING STABILIZATION. FIBER ROLLS USED IN A PERMANENT APPLICATION SHALL BE ENCASED WITH A BIODEGRADABLE MATERIAL AND MAY BE LEFT IN.
9. TEMPORARY INSTALLATIONS SHOULD ONLY BE REMOVED WHEN UP GRADIENT AREAS ARE STABILIZED PER GENERAL PERMIT REQUIREMENTS, AND/OR POLLUTANT SOURCES NO LONGER PRESENT A HAZARD. BUT, THEY SHOULD ALSO BE REMOVED BEFORE VEGETATION BECOMES TOO MATURE SO THAT THE REMOVAL PROCESS DOES NOT DISTURB MORE SOIL AND VEGETATION THAN IS NECESSARY
10. FIBER ROLLS MUST BE INSPECTED IN ACCORDANCE WITH GENERAL PERMIT REQUIREMENTS FOR THE ASSOCIATED PROJECT TYPE AND RISK LEVEL. IT IS RECOMMENDED THAT AT A MINIMUM, THE BMPS BE INSPECTED WEEKLY, PRIOR TO FORECASTED RAIN EVENTS, DAILY DURING EXTENDED RAIN EVENTS, AND AFTER THE CONCLUSION OF RAIN EVENTS.





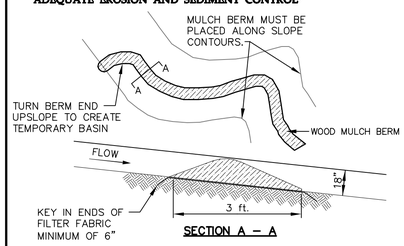
SLOPE (H:V)	MAX SPACING FT.
< 4:1	20
4:1 - 2:1	15
> 2:1	10

* A CLOSER SPACING IS MORE EFFECTIVE

12. REPAIR OR REPLACE SPLIT, TORN, UNRAVELING, OR SLUMPING FIBER ROLLS.
13. SEDIMENT THAT ACCUMULATES UPSLOPE OF THE BMP SHOULD BE PERIODICALLY REMOVED IN ORDER TO MAINTAIN BMP EFFECTIVENESS. SEDIMENT SHOULD BE REMOVED WHEN SEDIMENT ACCUMULATION REACHES ONE-THIRD THE DESIGNATED SEDIMENT STORAGE DEPTH.
14. RILLS OR GULLIES MAY BEGIN TO FORM FOLLOWING MAJOR STORM EVENTS WHERE RUNOFF HAS OVERTOPPED THE FIBER ROLLS. THESE RILLS OR GULLIES SHOULD BE PROMPTLY REPAIRED.

	TYPICAL FIBER ROLLS FOR PERIMETER CONTROL OF CONSTRUCTION AREA LIMIT	LAST REVISED: 09/09/13 GD42

WOOD MULCH BERM SHALL BE USED WHERE NEEDED AS A FILTER MEDIA, OR WHERE EROSION CONTROL BLANKETS DO NOT PROVIDE ADEQUATE EROSION AND SEDIMENT CONTROL



SECTION A - A

NOTE:

1. REFER TO THE CHILOCCO WIND PROJECT SWPPP FOR IMPLEMENTATION AND INSTALLATION REQUIREMENTS.
2. WOOD MULCH SHALL BE SHREDDED AND NOT CHIPPED.
3. MULCH SHALL BE COMPOSED OF CLEARED VEGETATION FROM THE PROJECT SITE.
4. THE WOOD MULCH BERM SHALL REMAIN IN PLACE THROUGHOUT CONSTRUCTION ACTIVITIES. THE BERM MAY REMAIN IN PLACE FOLLOWING FINAL STABILIZATION.
5. ROUTINELY INSPECT AND MAINTAIN BERM IN A FUNCTIONAL CONDITION AT ALL TIMES. INSTALL ADDITIONAL BERM MATERIAL AS DIRECTED. REMOVE SEDIMENT AFTER IT HAS REACHED 1/3 THE HEIGHT OF THE BERM.

	WOOD MULCH BERM	LAST REVISED: 11/4/13 GD24

NOTE - PERIMETER SEDIMENT CONTROL OPTIONS SHALL CONSIST OF SILT FENCE, FIBER LOGS (BIOROLLS), WOOD MULCH BERMS, OR TOPSOIL BERMS TO BE UTILIZED AND INSTALLED PER THE CONTRACTOR'S DISCRETION.

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Sheet: 4 OF 11

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ROAD DESIGN PARAMETERS

1. THE ROAD SECTION HAS BEEN DESIGNED TO ACCOMMODATE WIND TURBINE COMPONENT DELIVERY DURING CONSTRUCTION AND LIGHT DUTY TRUCKS FOR LOW VOLUME USE IN NORMAL OPERATING CONDITIONS. THE ROAD DESIGN SPECIFIED IS NOT INTENDED FOR ALL WEATHER USE FOR HEAVY DUTY, HIGH VOLUME, CONSTRUCTION LOADS.
2. ROAD MAINTENANCE CAN BE EXPECTED OVER THE LIFE OF THE PERMANENT FACILITY.
3. CONTRACTOR SHALL CONFIRM ROAD SECTIONS REQUIRED FOR TURBINE COMPONENT DELIVERY WITH THE FINAL GEOTECHNICAL REPORT.

PRODUCTS

1. AGGREGATE ROAD BASE AND TOP COURSE SHALL CONSIST OF LOCALLY SOURCED AGGREGATE.
2. ROAD SHOULDERS AND CRANE PADS SHALL CONSIST OF COMPACTED NATIVE SOILS.
3. CULVERTS: OKLAHOMA ACCESS ROAD CULVERTS SHALL MEET THE MINIMUM SPECIFICATIONS SET FORTH BY THE TEXAS DEPARTMENT OF TRANSPORTATION AND/OR KAY COUNTY. ALL CULVERTS SHALL BE MANUFACTURED OF STEEL AS REQUIRED BY KAY COUNTY.

EXECUTION

1. CLEARING AND GRUBBING
   A. THE CONTRACTOR SHALL BE REQUIRED TO GRUB/MULCH ALL TREES, STUMPS, BRUSH, AND DEBRIS WITHIN THE GRADING AREAS SHOWN ON THE PLANS. THE CONTRACTOR IS TO REMOVE ONLY THOSE TREES WHICH ARE DESIGNATED BY THE OWNER'S REPRESENTATIVE FOR REMOVAL, AND SHALL EXERCISE EXTREME CARE AROUND EXISTING TREES TO BE SAVED.
2. TOPSOIL STRIPPING
   A. TOPSOIL SHALL BE STRIPPED FROM ALL ROADWAY AND FOUNDATION AREAS THROUGH THE ROOT ZONE. TOPSOIL SHALL NOT BE STRIPPED OUTSIDE OF THE DESIGNATED DISTURBANCE AREAS.
   B. ANY TOPSOIL, THAT HAS BEEN STRIPPED, SHALL BE RE-SPREAD OR STOCKPILED WITHIN GRADING AREAS AND/OR USED AS FILL OUTSIDE OF THE DISTURBANCE AREAS, AS DIRECTED BY THE ENGINEER. ALL TOPSOIL SHALL BE REDISTRIBUTED TO THE LAND OWNER'S PROPERTY OF WHERE IT ORIGINATED FROM.
3. EMBANKMENT CONSTRUCTION.
   A. EMBANKMENT CONSTRUCTION SHALL CONSIST OF THE PLACING OF SUITABLE FILL MATERIAL, AFTER TOPSOIL STRIPPING, ABOVE THE EXISTING GRADE. GENERALLY, EMBANKMENTS SHALL HAVE COMPACTED SUPPORT SLOPES OF FOUR FOOT HORIZONTAL TO ONE FOOT VERTICAL, WITH SOME LOCATIONS THROUGHOUT THE PROJECT WITH SLOPES OF TWO FEET HORIZONTAL TO ONE FOOT VERTICAL. THE MATERIAL FOR EMBANKMENT CONSTRUCTION SHALL BE OBTAINED FROM THE ACCESS ROAD/TURBINE EXCAVATION (SEE GEOTECHNICAL REPORT FOR RESTRICTIONS), OR ANY SUITABLE, APPROVED SOIL OBTAINED ONSITE/OFFSITE BY CONTRACTOR, AS DIRECTED OR APPROVED BY THE ENGINEER. THIS MATERIAL SHALL BE PLACED IN LIFTS NOT TO EXCEED 8".
   B. SIDE SLOPES GREATER THAN 4:1 WILL NOT BE PERMITTED, UNLESS OTHERWISE NOTED ON THE PLAN.

STORM WATER DESIGN PARAMETERS

1. IF NEEDED CULVERTS WILL BE SIZED BASED ON OBSERVATIONS OF EXISTING UPSTREAM/DOWNSTREAM CULVERT SIZES. ALL CULVERTS SHALL BE INSTALLED PER KAY COUNTY STANDARD SPECIFICATIONS AND SHALL BE MANUFACTURED OF STEEL. ALL TEMPORARY PORTIONS OF THE INSTALLED CULVERTS SHALL BE REMOVED UPON COMPLETION OF THE PROJECT.
2. PROPOSED CULVERTS ARE DESIGNED TO HANDLE NUISANCE FLOWS ONLY. IT IS EXPECTED THAT CULVERTS WILL BE OVERTOPPED DURING SOME STORMS AND MAINTENANCE WILL BE REQUIRED THROUGH THE LIFE OF THE PROJECT.
3. WHEN INSTALLING DRAINAGE CULVERTS THE CONTRACTOR SHALL USE JUDGMENT IN SETTING THE FLOW LINE ELEVATIONS AND CULVERT LONGITUDINAL SLOPE. TYPICALLY THE FLOW LINE ELEVATIONS AND LONGITUDINAL SLOPE OF THE CULVERT SHOULD MATCH THE NATURAL GROUND ELEVATIONS AND SLOPE TO ENSURE POSITIVE DRAINAGE. WHEN POSSIBLE, ALL CULVERTS SHOULD BE PLACED AT A MINIMUM 0.5% GRADE.
4. ANTICIPATED CULVERT CROSSINGS ARE SHOWN ON THE CONSTRUCTION PLAN, ADDITIONAL CULVERTS MAY NEED TO BE INSTALLED IN AREAS WHERE CONCENTRATED FLOW IS EXPECTED DUE TO CONSTRUCTION ACTIVITIES.
5. LOW WATER CROSSINGS MAY BE USED IN LIEU OF CULVERTS WHERE APPROVED.

STORMWATER POLLUTION PREVENTION PLAN (SWPPP):

1. THE CONTRACTOR SHALL PROVIDE EROSION CONTROL MEASURES AS PLANNED AND SPECIFIED FOLLOWING BEST MANAGEMENT PRACTICES AS OUTLINED BY THE OKLAHOMA DEPARTMENT OF ENVIRONMENTAL QUALITY AND BEING IN CONFORMANCE WITH THE OKLAHOMA POLLUTANT DISCHARGE ELIMINATION SYSTEM (OPDES) GENERAL STORMWATER PERMIT.
2. REFER TO THE STORMWATER POLLUTION PREVENTION PLAN (SWPPP) FOR THE PROJECT , PREPARED BY WESTWOOD PROFESSIONAL SERVICES, FOR EROSION CONTROL AND RESTORATION SPECIFICATIONS, SEDIMENT AND EROSION CONTROL PROCEDURES, LOCATIONS OF BMPs, DETAILS, AND INSPECTION INFORMATION.
3. ALL PASTURES AND DRAINAGE SWALES DISTURBED DURING CONSTRUCTION ACTIVITIES AND NOT COVERED BY ROAD SURFACING MATERIALS, SHALL BE SEEDED IN ACCORDANCE WITH THE SWPP PLAN.
4. TEMPORARY EROSION CONTROL SHALL BE THE RESPONSIBILITY OF THE CONTRACTOR. THE TEMPORARY EROSION CONTROL PLAN SHALL BE IN ACCORDANCE WITH THE STORMWATER POLLUTION PREVENTION PLAN ON FILE. IT IS THE CONTRACTOR'S/OPERATOR'S RESPONSIBILITY TO MAINTAIN COMPLIANCE.

TESTING:

1. TESTING SHALL BE PERFORMED BY A DESIGNATED INDEPENDENT TESTING AGENCY.
2. SUBMIT ONE SET OF TESTING AND INSPECTION RECORDS SPECIFIED TO THE CIVIL ENGINEER OF RECORD.

DEFINITIONS:

1. PROOF ROLLING:
   SHALL BE PERFORMED IN THE PRESENCE OF THE GEOTECHNICAL ENGINEER OR QUALIFIED GEOTECHNICAL REPRESENTATIVE USING A FULLY LOADED TANDEM AXLE DUMP TRUCK OR WATER TRUCK WITH A MINIMUM GROSS WEIGHT OF 25 TONS OR A FULLY LOADED BELLY DUMP WITH AN EQUIVALENT AXLE LOADING. PROOF-ROLLING ACCEPTANCE STANDARDS INCLUDE NO RUTTING GREATER THAN 1.5 INCHES, AND NO "PUMPING" OF THE SOIL BEHIND THE LOADED TRUCK.
2. SIEVE ANALYSIS:
   SHALL BE CONDUCTED IN ACCORDANCE WITH AASHTO T27
3. PROCTORS:
   SHALL BE DETERMINED IN ACCORDANCE WITH AASHTO T99
4. ATTERBERG LIMITS:
   SHALL BE DETERMINED IN ACCORDANCE WITH AASHTO T89 AND T90
5. MOISTURE DENSITY (NUCLEAR DENSITY):
   SHALL BE DONE IN ACCORDANCE WITH AASHTO T310
6. DYNAMIC CONE PENETROMETER (DCP) TESTING:
   SHALL BE DONE IN ACCORDANCE WITH ASTM D6951-03

REQUIREMENTS:

1. FILL MATERIAL:
   A. SOILS USED AS FILL MATERIAL SHALL BE TESTED FOR GRAIN SIZE ANALYSIS, MOISTURE CONTENT, ATTERBERG LIMITS ON FINES CONTENT, AND PROCTOR TESTS.
   B. IN ROADWAY CUT AREAS, OR WHERE EMBANKMENT CONSTRUCTION REQUIRES LESS THAN 12 INCHES OF FILL PLACEMENT, COMPACT TO A MINIMUM OF 95 PERCENT OF THE MATERIAL'S STANDARD PROCTOR MAXIMUM DRY DENSITY. THE SCARIFICATION DEPTH SHALL BE ADJUSTED SUCH THAT THE COMBINED THICKNESS OF THE EMBANKMENT FILL MATERIAL AND SCARIFICATION DEPTH SHALL BE 12 INCHES OR GREATER.
2. COMPACTED SUBGRADE:
   A. THE ENTIRE SUBGRADE SHALL BE PROOF-ROLLED PRIOR TO THE PLACEMENT OF THE AGGREGATE BASE TO IDENTIFY AREAS OF UNSTABLE SUBGRADE.
3. AGGREGATE BASE:
   A. AGGREGATE BASE SHALL BE PROOF-ROLLED OVER THE ENTIRE LENGTH. IF PROOF ROLLING DETERMINES THAT THE ROAD IS UNSTABLE, ADDITIONAL AGGREGATE SHALL BE ADDED UNTIL THE UNSTABLE SECTION IS ABLE TO PASS A PROOF ROLL.
   B. PROVIDE 1 DCP TEST FOR EVERY 1,000 L.F. OF ROAD LENGTH. ROAD BASE SHALL BE COMPACTED TO ACHIEVE A PENETRATION INDEX VALUE LESS THEN OR EQUAL TO 10 MM/BLOW.
   C. PROVIDE 1 SIEVE ANALYSIS (PROJECT MAX OF 20) PER 2500 CY OF ROAD BASE PLACED.

GENERAL NOTES:

1. THE GROUND SURFACE CONTOURS AND ELEVATIONS HAVE BEEN PROJECTED FROM 10-METER USGS PUBLIC DATA. AS SUCH, THE ACCURACY OF THE ELEVATIONS AND CONTOURS IS NOT AS HIGH AS INFORMATION GATHERED USING CONVENTIONAL FIELD SURVEYING PROCEDURES. THE CONTRACTOR WILL FIND THAT GROUND ELEVATIONS DETERMINED DURING FIELD STAKING WILL VARY FROM THE GROUND ELEVATIONS SHOWN ON THE DRAWINGS. WHERE MAJOR DISCREPANCIES ARE FOUND, THE OWNER AND ENGINEER SHALL BE CONTACTED AND NOTIFIED.
2. WHERE SECTION OR SUBSECTION MONUMENTS ARE ENCOUNTERED, THE OWNER SHALL BE NOTIFIED BEFORE SUCH MONUMENTS ARE REMOVED. THE CONTRACTOR SHALL PROTECT AND CAREFULLY PRESERVE ALL PROPERTY MARKERS AND MONUMENTS UNTIL THE OWNER, AN AUTHORIZED SURVEYOR OR AGENT HAS WITNESSED OR OTHERWISE REFERENCED THEIR LOCATION. THE CONTRACTOR IS RESPONSIBLE FOR REPLACING DAMAGED PROPERTY MARKERS AND MONUMENTS.
3. EFFORTS SHALL BE MADE TO MINIMIZE SOIL DISTURBANCE TO AREAS OUTSIDE OF THE ROAD GRADING LIMITS, CRANE PATHS, AND TURBINE SITES. TYPICAL DISTURBANCE SHALL BE LIMITED TO 10 LF FROM THE EDGE OF PROPOSED GRADING.
4. THE CONTRACTOR SHALL MAKE ALL EFFORTS TO KEEP ACTIVITIES WITHIN THE ERECTION AREAS SHOWN ON THE PLANS BUT IT IS UNDERSTOOD THAT SOME ACTIVITIES THAT WILL NOT REQUIRE GRADING OR SOIL DISTURBANCE MAY EXTEND BEYOND THE DEFINED LIMITS. DURING THE ERECTION OF THE ROTOR, TRUCKS AND/OR FORKLIFTS MAY EXTEND BEYOND THESE LIMITS.
5. IF LOCALIZED LOW POINTS ARE ENCOUNTERED DURING TOPSOIL STRIPPING, MASSAGE SURROUNDING AREA TO MAINTAIN POSITIVE DIRECTION OF DRAINAGE TO MINIMIZE PONDING OF STORMWATER DURING RAINFALL EVENTS.
6. ANY FACILITIES REMOVED TO ALLOW FOR CONSTRUCTION (MAILBOXES, SIGNS, FENCES, ETC.) SHALL BE REPLACED BY THE CONTRACTOR IN A CONDITION AS GOOD AS EXISTING.
7. THE CONTRACTOR IS RESPONSIBLE FOR MAINTAINING DRAINAGE THROUGHOUT THE CONSTRUCTION OF THIS PROJECT. CONSTRUCTION ACTIVITIES SHALL NOT BLOCK THE NATURAL OR MANMADE CREEKS OR DRAINAGE SWALES CAUSING RAINWATER TO POND. DEPENDING ON FIELD CONDITIONS, ADDITIONAL CULVERTS IN EXCESS OF THOSE ON THE PLANS MAY BE REQUIRED.
8. WHILE BUILDING THE ROADS AND EXCAVATING THE TURBINE FOUNDATIONS, EXCESS SOIL WILL RESULT. THE CONTRACTOR SHALL DISPOSE OF THIS EXCESS SOIL IN AN APPROVED MANNER. THE CONTRACTOR SHALL AVOID CAUSING RIDGES OR MOUNDS THAT WOULD MAKE IT DIFFICULT FOR STORM WATER RUNOFF TO DRAIN. THE FINAL SURFACE OF THE DISTURBED TOPSOIL SHALL BE SMOOTH AND FOLLOW THE NATURAL CONTOUR OF THE LAND.
9. THE CONTRACTOR SHALL NOTIFY OKLAHOMA 811 AT LEAST 48 HOURS BEFORE EXCAVATION ACTIVITIES COMMENCE.
10. TURBINE SETBACKS ARE NOT IDENTIFIED ON THE CONSTRUCTION PLANS. IT SHALL BE THE RESPONSIBILITY OF THE OWNER TO ENSURE THAT ALL TURBINE SETBACKS MEET PROJECT REQUIREMENTS.
11. WETLAND INFORMATION SHOWN ON THE PLAN WAS PROVIDED BY US FISH AND WILDLIFE SERVICE NWI MAPS. PRIOR TO IMPACTING ANY WETLANDS, THE GENERAL CONTRACTOR SHALL VERIFY WITH THE OWNER AND THE ENGINEER THAT ALL WETLAND PERMITS HAVE BEEN SUBMITTED AND APPROVED.
12. CULTURAL RESOURCE REPORTS HAVE NOT BEEN PROVIDED. THE GENERAL CONTRACTOR SHALL VERIFY WITH THE OWNER THAT THE SITE IS CLEAR OF CULTURAL SITES PRIOR TO CONSTRUCTION.
13. CONTRACTOR SHALL MAINTAIN THROUGH ACCESS FOR ALL EXISTING OIL AND GAS ROADS THAT ARE IMPACTED BY THE PROPOSED CONSTRUCTION. THIS MAY REQUIRE ADDITIONAL GRADE TRANSITIONS NOT DETAILED IN THIS PLAN SET.

TABLE 3: TESTING SCHEDULE SUMMARY

LOCATION	TEST	FREQUENCY
STRUCTURAL FILL	GRAIN SIZE ANALYSIS, MOISTURE CONTENT, ATTERBERG LIMITS ON FINES CONTENT, AND PROCTOR	1 PER MAJOR SOIL TYPE
COMPACTED SUBGRADE	PROOF-ROLL	ENTIRE LENGTH
	DCP (NOT REQUIRED UNLESS PROOF ROLL FAILS)	2 PER 1000 FT
AGGREGATE BASE	PROOF-ROLL	ENTIRE AREA
	SIEVE ANALYSIS, LL, PL, AND LA ABRASION	1 PER 2,500 CY
	DCP TEST	1 PER 1,000 LF OF ROAD

Westwood

Phone (952) 937-5150 7699 Anagram Drive
Fax (952) 937-5822 Eden Prairie, MN 55344
Toll Free (888) 937-5150 westwoodps.com
Westwood Professional Services, Inc.

Designed: DJF
Checked: DDB
Drawn: DJF
As-Built Drawing:

Revisions:

#	DATE	DESCRIPTION

Prepared for:

WANZEK
a MasTec company

2028 2nd Avenue NW
West Fargo, ND 58078

Chilocco Wind Project
Kay County, Oklahoma

Construction Notes

Permitting Plans
Not For Construction

Date: 12/01/2016
Sheet: 5 OF 11

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DEPARTMENT OF THE ARMY
CORPS OF ENGINEERS, TULSA DISTRICT
1645 SOUTH 101ST EAST AVENUE
TULSA, OKLAHOMA 74128-4609

May 26, 2017

Regulatory Office

Mr. Frank M. Kraatz
Chilocco Wind Farm, LLC
150 N. Michigan Ave., Suite 1500
Chicago, IL 60601-7570

Dear Mr. Kraatz:

Please reference your letter of January 26, 2017, regarding the Chilocco Wind Farm within Sections 13-17, 20-29, Township 29 North, Range 2 East, in Kay County, Oklahoma at Latitude N36.995238 and Longitude W97.089106. We have reviewed the submitted data to determine whether a Department of the Army permit will be required pursuant to Section 404 of the Clean Water Act.

Your proposed permanent and temporary impacts to Chilocco Creek, its unnamed tributaries, and its wetlands associated with your project shall comply with the scope of the Nationwide Permit (NWP-51) for Land Based Renewable Energy Generation Facilities, provided you comply with the conditions therein. However, the U.S. Environmental Protection Agency (EPA) has denied Section 401 Water Quality Certification (WQC) for all NWP's within Indian Country.

In accordance with 33 CFR 330.4(c)(5), we will not require or process an individual permit for your proposed activity solely on the basis that the 401 WQC was denied on this NWP. Therefore, your request is denied without prejudice until the EPA issues an individual 401 WQC for your proposal or waives its right to do so.

In instances where an agency has denied the WQC for a NWP, the applicant must obtain an individual 401 WQC from the appropriate agency (EPA) by submitting an application or letter of request. If the EPA fails to respond to your request for authorization within 60 days, we may deem a waiver of the WQC has occurred. The responsibility for obtaining the WQC rests with you. The EPA can be contacted by writing to the USEPA Region 6, 1445 Ross Avenue, Dallas, TX 75202-2733, or by telephoning 214-665-2200.

Upon receipt of your individual 401 WQC, or waiver of such certification, the proposed work will be authorized under the enclosed NWP, at which point you may proceed with the project. We will require compliance with the General Conditions of the NWP.

Also, enclosed is a self-addressed, "Permittee Construction Schedule" form to be completed and returned. If the WQC is issued and construction would be initiated prior to 30 days from receipt of this letter, you should return the completed form as soon as possible. If you prefer, you may telephone the individual listed below to inform this office regarding the construction start date.

Following completion of your proposed activity, you must complete and return the enclosed self-addressed, "Permittee Compliance Certification" form. This is the certification referred to in General Condition Number 30 of the NWP.

The NWP is scheduled to expire on March 18, 2022. It is incumbent on you to remain informed of changes to the NWPs. The U.S. Army Corps of Engineers will issue a public notice announcing the changes as they occur. Furthermore, if you commence, or are under contract to commence, this activity before the date the NWP is modified or revoked, you will have 12 months from the date of the modification or revocation to complete the activity under the present terms and conditions of this NWP.

The Nationwide Permit verification for this project is based on the proposed impacts to aquatic resources. No approved jurisdictional determination (AJD) is necessary unless jurisdictional questions arise. Should jurisdictional questions arise, you may request an AJD. Only an AJD, which may be appealed, may make a definitive, official determination that there are, or that there are not, jurisdictional aquatic resources on a parcel. Unless an AJD has been issued which identified applicable aquatic resources to be non-jurisdictional, undertaking any activity in reliance on any form of Corps permit authorization constitutes agreement that all aquatic resources in the review area, affected in any way by that activity, will be treated as jurisdictional.

If you desire to complete a "Customer Service Survey" on your experience with the Corps Regulatory Program, you are invited to visit http://corpsmapu.usace.army.mil/cm_apex/f?p=regulatory_survey on the internet at your convenience and submit your comments.

Your project has been assigned Identification Number SWT-2013-570. Please refer to this number during future correspondence. If you cannot comply with the conditions listed in the enclosed permit, contact Bryan Noblitt at 918-669-4904.

Sincerely,

for Michael Ware
Acting Chief, Regulatory Office

Enclosures

cc:
Ms. Bill Honker, Water Quality Protection Division Environmental Protection Agency
DOD Siting Clearinghouse

Appendix U

Energy Assessment - Chilocco Wind Farm

REDACTED FOR CONFIDENTIALITY

Evaluation and Recommendation
By
Cimmaron Power Ventures
of
Chilocco Wind Project, Kaw County, Oklahoma
February 1, 2013

Overview:

Cimarron Power Ventures, LLC (CPV) was engaged by Cherokee Nation Businesses, LLC (CNB), on January 24, 2013 to review the major project agreements governing the proposed development of Phase 1 of the Chilocco Wind Project ("CWP" or "Phase 1") proposed by PNE Wind USA ("PNE"), a subsidiary of PNE Wind AG, a German company active in the wind energy development industry. Phase 1 is one of six coordinated but independent wind projects, totaling 600MW, being developed by PNE in the area of the Chilocco Indian School lands. Phase 1 is located on that portion of the former Chilocco Indian School lands owned by, held in trust on behalf of, or nominated for trust status by, the Cherokee Nation (CN).

The major project agreements for CWP were sent to CPV by CNB on January 23, 2013. CPV was asked to offer an opinion about Phase 1 based on the project agreements, interviews with PNE and other industry experts, and to independently determine and advise the CN and the CNB as to, among other things, if the project provided appropriate value to CN and if the perceived urgency to proceed with Phase 1 is in fact justified.

This review, while focused on Phase 1, was expanded to include CWP Phase 2, an equal sized project being developed on an adjacent property controlled by the Kaw, Pawnee, Ponca and Otoe-Missouri tribes. Phase 1 and Phase 2 will generate 153.6 MW. PNE, although prepared to develop Phase 2 independently, would prefer to achieve certain efficiencies by financing, developing, constructing and selling the combined Phase 1 and 2 projects together.

Summary Conclusions:

1. **The current estimated value of the CWP transaction to the CN from the Wind Resource Lease ("WRL" or "Lease") and the Wind Development**

Agreement ("WDA" or "Development Agreement") is reasonable and likely above the standard compensation for wind lease agreements. CPV canvassed [need to have a few examples of this or citations in the Appendix] industry experts and found that such wind leases range from 4% to 6% of escalating gross revenues paid over the life of the lease. Some will start at 4% and escalate over the lease term to 6%. The WRL, which is subject to a "most favored nation" clause (cannot be changed unless all land owners benefit), stays at 4% but has an escalating minimum payment that is relatively high compared to projected revenues. CPV developed a summary model that compared the estimated actual gross revenues and determined that the indexed increasing base is attractive. What makes the CN income above standard is the Development Agreement that provides for payments at the commissioning of operations date for Phase 1 ("COD") based on fixed payments per MW and a 5% carried interest for CN of the net proceeds from the sale of the project. The current interpretation of the project documents and CPV's estimates of the components of compensation provide for the following estimated income for CN.

Chilocco Wind Project Compensation to CN		**Current**
Cash Payment (estimated Year 1)		-
WDA COD Payments		**$2,000,000**
WDA Project Sales Share		
Gross Project Sales		$15,000,000
Less: COD Payment		($2,000,000)
Less: PNE Expense Reimbursement		($2,000,000)
Net Proceeds to Distribute		$11,000,000
Project Sales Share	**5.0%**	**$550,000**
Total Cash Payments (estimated Year 1)		**$ 2,550,000**
Net Improvement		
% Improvement		
PV of WRL Lease Payments (20 year minimum)		**$ 3,663,080**
Total Present Value to CN from CWP Transaction		**$ 6,213,080**

2. **CN should make a serious effort to negotiate a restart of the development with PNE.** PNE and its German parent company is an experienced and well capitalized developer of such projects and has demonstrated a strong commitment to the CWP by spending significant

funds (approximately $1M for direct third party expenses and another $1M in indirect staff expense) without any controlling agreements in place. PNE also has advanced the project by having the EPC and environmental permitting contracts ready to proceed and a power purchase agreement ("PPA") signed for the projects. PNE has arranged an investor group for the purchase of the projects when completed. CN has no assurance that subsequent developers would provide the same level of economic benefits to the tribe as are now included in the agreements. A decision to return to the concept of developing the site directly by CN may generate much more return but would require a significant amount of upfront capital, on the order of $2-$3 million to develop the project.

3. **While time is of the essence in taking actions on Engineering and Environmental Permits and executing the Phase 1 project documents, options have been developed by CPV for key deadlines previously considered a problem.** Because the project lost credibility in December 2012 with an urgent deadline for the execution of the project agreements that now seems to have not been required, CPV's review focused on the many deadlines that affect this project that are both within and outside of the developers control. Below are the key findings related to the schedule for the project:

    a. The primary driver for the urgency to final the Phase 1 documents relates to the value gained by the projects, and ultimately CN, by financing and developing Phase 1 and 2 together, and getting these projects substantially if not completely done in 2013 so that the Production Tax Credit ("PTC") applicable to wind energy projects, which expires on December 31, 2013, could be received by the project. The investor group buying the project will more highly value the project with the PTC's.
    b. According to PNE, the rushed December 2012 deadline in which PNE asked that the project documents be signed by December 24, 2012, was driven by PNE's attempt to wire before the end of 2012 the $1.2 M in funds to be deposited with OGE as the 50% down payment required by OGE to start work on a 12 month project to design, engineer and construct the electrical substation interconnection facility required for exporting power from Phase 1 to the electrical transmission grid. The agreement to develop this facility, known as a Generator Interconnection Agreement (GIA), was previously acquired by CNB from Southwest Power Pool (SPP), working in cooperation with OGE. PNE had mistakenly interpreted the December 31, 2013 "In Use" date listed in the

GIA as an absolute deadline. PNE therefore believed that in order to get Phase 1 on line during 2013 and to capture the PTC, OGE's work under the GIA had to begin. To get OGE started, this payment needed to be made, and in order to make the payment to OGE, the project agreements needed to be executed. PNE believed that the approval of the Tribal Council Resolution on December 11, 2012 was the final hurdle following their presentation to CN officials in April, 2012, as no objections or changes to Phase 1 project concept or the project agreements had been proposed. A conference call to finalize these agreements on December 14, 2012 was set up but rescheduled to December 18, 2012. Issues were raised in the December 18, 2012 call and then the letter from Chief Baker was received by PNE on December 20, 2012, indicating that CN was not prepared to proceed with the project. PNE had set a financial closing on Phase 2 on December 18, 2012 and had cancelled this financing expecting that Phase 1 documents were to be signed shortly. When this did not occur and a response was not received to their reply to Chief Baker's letter, which PNE sent on December 21, 2012, they assumed that Phase I was lost or indefinitely deferred and they once again rescheduled the financing close for Phase 2 to February 15, 2013. By not closing Phase 2 or getting Phase 1 signed up by the years end, PNE lost its original investor for the combined project and has during January replaced their investor for the Phase 2, February 15 financial closing.

c. PNE is keenly aware of the efficiencies and benefits of developing both Phase 1 and Phase 2 together as a single project, and as a single financing package in a joint closing. According to PNE, if Phase 1 and Phase 2 could be closed in a single transaction, they could again change their equity investor to a group who will pay a premium for a larger project and could reschedule the financial close to March 21, 2013. They do not however wish to cancel another financial closing for Phase 2 unless they have some significant evidence that CN is willing to proceed with Phase 1. Ideally from PNE's perspective this would require the parties to agree and sign the PNE agreements prior to February 15, 2013. If this is not possible, then the signing of the EPC and Environmental Permitting contracts already matched by PNE and funded by the DOE grant would be enough evidence that Phase 1 is likely to proceed. If either of these actions occur, PNE would again reschedule their financial closing.
d. CPV has engaged with SPP and OGE to address the other scheduling deadlines that PNE believed had complicated Phase 1's development, operations and sale due to the delays in starting the project. PNE mistakenly reported that the February 1, 2013 registration deadline for

Phase 1 as a market participant in the SPP was absolute, and that Phase 1 would have to wait a year for economic access to the regional electrical transmission system. This delay meant Phase 1 would likely not be able to be on line until August, 2014. This would have radically affected the value of a Phase 1 development and sale. CPV took the initiative and has now confirmed in writing with SPP and OGE, and verbally confirmed with PNE's Washington based counsel, who PNE made available to CPV, that in fact so long as another market participant such as the utility purchaser of the energy from Phase 1 or 2 nominates Phase 1 as a new generation resource, that Phase 1 will have equal economic access to SPP's regional transmission system.

PNE also believed that, because the GIA had been earlier suspended and the December 31, 2013 deadline for "in use" contained in the GIA was absolute, that the Phase 1 interconnect facility could not be completed in time for the Phase 1 projects December, 2013 in service date. PNE was willing to proceed with Phase 1, recognizing that the GIA process would have to be restarted, which would result in costly delays in allowing full export of power from Phase 1 to its customers. Alternatively, Phase 1 would have to have limited operations by exporting its power through the Phase 2 interconnection facilities. Either action would have also radically reduced the value of Phase 1 in the eyes of investors. Again, CPV engaged directly with SPP and OGE, and confirmed that lifting the earlier suspension of the GIA would supersede the December 31, 2013 deadline, and that while there may be a month or two delay in the completion of the interconnect, that the GIA remains valid and the export of Phase 1 power through Phase 2 interconnect facility until Phase 1s interconnect is available should not significantly affect Phase 1 value. Through this work CPV has now re-established Phase 1 as a viable and valuable project that can be completed in 2013 and qualify for the PTC.

4. **CPV has identified a mechanism through the existing project documents to potentially increase the first year cash payments to CN by 100%.** This significant value increase depends on combining Phase 1 and Phase 2 projects and written confirmations by the parties on the interpretation of the contracts. The details of this will be discussed further with CN.

Chilocco Wind Project Compensation to CN	**Current**	**CPV Proposed**

Cash Payment (estimated Year 1)		-	-
WDA COD Payment		**$2,000,000**	**$4,000,000**
WDA Project Sales Share			
Gross Project Sales		$15,000,000	$30,000,000
Less: COD Payment		($2,000,000)	($4,000,000)
Less: PNE Expense Reimbursement		($2,000,000)	($2,000,000)
Net Proceeds to Distribute		$11,000,000	$24,000,000
Project Sales Share	**5.0%**	**$550,000**	**$1,200,000**
Total Cash Payments (estimated Year 1)		**$ 2,550,000**	**$5,200,000**
	Net Improvement		**$2,650,000**
	% Improvement		**103.9%**
PV of WRL Lease Payments (20 year minimum)		**$ 3,663,080**	**$3,663,080**
Total Present Value to CN from CWP Transaction		**$ 6,213,080**	**$8,863,080**

5. **The concerns expressed by Chief Baker can and should be addressed in the revised project agreements.** Additional language on the sequencing of the BIA and Trust Land approvals should be added. The Sovereignty issue also should be addressed in a manner that is acceptable to CN and still allows for financing. Such solutions are believed to be feasible and neither should create a fatal flaw to the agreements.

6. **If CN agrees to the approach outlined below under Next Steps, the CWP, PNE and CN would benefit in several significant ways, primarily due to the accelerated development of the Phase 1 project, which will provide upfront payments and recurring earnings to be made to CNB sooner than if Phase 1 is further delayed.** If Phase 1 is agreed to by the parties, Phase 2's February 15 scheduled closing will be set aside in favor of a joint closing on March 21. PNE believes that it can develop both projects so as to achieve commercial operations on or before December 31, 2013 and subsequently the significant payments accruing to the CN based on COD payments and receipt the 5% carried interest in net sale proceeds of Phase 1 from the sale of the projects to the investors.

Next Steps:

1. CPV, in cooperation with CN and CNB, should immediately engage PNE in a final set of negotiations, based on extensive discussions over the last week,

to improve and modify the terms of the Wind Resource Lease (WRL) and Wind Development Agreement (WDA). These changes will improve the economic returns and address the prior concerns on the BIA approval sequence and the Sovereignty issues. Ideally, these actions should occur prior to February 15, 2013.

2. If CN is working toward but unable to sign the revised agreements by February 15th, and as an expression of good-faith of CN's willingness to enter into the Phase 1 agreements, CNB should be directed prior to February 15 to execute the EPC contract ($250,000) and the Environmental Permitting contract ($200,000). These project requirements are funded by existing DOE grants that are dedicated to this purpose. PNE has said this would provide PNE with the assurance that Phase 1 will advance, and allows them to gain the permission of their board to cancel again the financial closing for Phase 2 now scheduled for February 15, 2013. In the absence of an agreement with PNE it is possible that they could withdraw their expenditures as a match of the DOE grant, which would lose the funding. This approach, even without PNE agreements, will provide valuable engineering and permitting to CNB in the event it decides in the future to pursue the project apart from PNE.
3. CPV should immediately pursue OGE and SPP on the extension of the in use deadline stated in Appendix B of the GIA.
4. When the amended and restated agreements are approved by CN, they should be executed prior to March 21, 2013 to facilitate the Phase 1 and Phase 2 financial closing scheduled for that date.
5. CNB should be authorized, considering CPV's review and input, to renegotiate existing agreements or contract with new subcontractors to complete the environmental and permit-related work for Phase 1 at less cost than budgeted. Monies saved can then be used for other purposes related to the Phase 1 project including providing additional contracts to CNB for environmental monitoring and related project work.

6. This development schedule would qualify both Phase 1 and Phase 2 for the Production Tax Credit (PTC), which has been recently extended by Congress until December 31, 2013. The PTC is a significant financial benefit to the investor group, which directly impacts the valuation of the 5% payment to the CNB upon the sale of the Phase 1 and 2 projects to PNE's investor group. This is a significant benefit to the investor group and one of the key determinants of making Phase 1 financeable and profitable for

investors (indeed any wind energy project, all of which are dependent on the PTC for financial viability). By delaying the development of Phase 1 to a later date when the PTC may no longer be available, the project economics most likely would no longer support development of a Phase 1 project.

7. A March 21st closing of Phases 1 and 2 would ensure that CNB's existing Generating Interconnection Agreement (GIA) with Southwest Power Pool (SPP) and the attendant investment of $220,000 remains intact. The GIA authorizes the construction of Interconnection Facilities to connect Phase 1's electrical output with the regional electric grid; Oklahoma Gas & Electric (OGE) will design and build the Interconnection Facilities covered under the GIA. These facilities are a significant requirement for connecting Phase 1 wind generation to OGE's transmission system, and onward to SPP's regional transmission network.

   PNE's development plans for Phase 1 after the December 2012 closing was missed were based on the assumption that Phase 1 would have no immediately available, dedicated Interconnection Facilities due to schedule slippages. PNE's in-house planners were of the impression the GIA would terminate by operation of SPP rules governing GIAs before the facilities covered by the GIA could be built. PNE's plan therefore was for Phase 1 energy sales to initially rely on surplus capacity in Phase 2's Interconnection Facilities to export power to customers until such time as the Phase 1 Interconnection Facilities could be built, a process requiring 12-18 months. CPV interceded with both OGE and SPP to demonstrate that the CNB's GIA is in fact viable and can be used to support Phase 1 requirements. Although the cost of this Interconnection Facility has not been included in PNE's current March 21st financing documents, which have already been assembled to support the combined Phase 1 and 2 financial closing, it can be corrected post-closing. PNE has agreed to pay for the design, engineering and construction of these facilities as part of their overall Phase 1 project costs.

8. An additional impetus to proceed now with Phase 1 is SPP's February 1, 2013 cutoff for including new generation sources like Phase 1 in its regional marketing system. This cutoff was required to allow SPP to plan the implementation of SPP's new Integrated Marketing (IM) scheme, which is scheduled to go live on March 1, 2014.

As background, the output of Phase 2 has been pre-sold by PNE to a utility or similar customer(s) under a Power Purchase Agreement (PPA). As a result, Phase 2 is already listed with SPP as a 'new generation source' by the utility purchaser, who is an Existing Market Participant (EMP) under SPP rules. This designation allows power from Phase 2 to be exported over SPP's regional transmission system at favorable rates. Without registration of the facility with a SPP-registered EMP, transmission rates for power exported from the project would have been at a significantly higher tariff. In addition, due to the self-imposed "freeze" by SPP in approving new generating projects, new projects would not be able to apply for more favorable transmission rates until June, 2014 at the earliest.

By moving forward in conjunction with Phase 2, the power output from Phase 1 would be sold under a PPA to the same utility purchaser(s) as power from Phase 2. The purchaser, a qualified EMP under SPP rules, has until June 15, 2013 to include additional new generation resources in its asset list, thereby qualifying Phase 1 for the more favorable transmission rates available to Phase 2.

9. Finally, PNE has demonstrated its long-term commitment to this project, placing its own funds at substantial risk and without imposing any funding requirements by CNB.

In summary, CPV believes that if CNB can quickly agree to a deal on Phase 1, that PNE can develop and construct both Phase 1 and 2 at the same time, thereby achieving substantial economies of scale for PNE and the ultimate buyers and offtakers of the power from Phases 1 and 2. CPV believes the CN should benefit as well.

It should be noted that CPV has canvassed the wind energy market to evaluate the value of the offer made by PNE, and found the offer to be above average as it is. However, as a result of the economies of scale and the value to PNE for future business by doing a large project with CN, CPV believes it can negotiate an improvement in the payout over that currently offered by PNE. CPV would expect to generate an increase in current year payments to CNB in the range of $2M to $4M.

Process Required For Moving Forward:

Failure to close on February 15th will force PNE to close on the Phase 2 project alone, leaving Phase 1 behind. However, PNE has agreed that there are two paths forward, either of which need to be completed by February 15, 2013:

1. either finalize and sign off on the major project agreements, or
2. CNB must commit the DOE grant funds to Phase 1 project development, after which the project agreements would have to be finalized before the March 21, 2013 closing for Phase 1 and Phase 2.

PNE has suggested a significant revision in the way the DOE grant funds would be spent, which on the surface CPV concurs in. These changes provide for a more efficient use of the limited DOE grant funds for outside vendors, provides for a qualified consultant to oversee the project so that CNB's interests are protected, and a provides a strong presence for CNB staff in reviewing and approving project-related engineering and design factors, and environmental studies both for permitting purposes and long term site monitoring.

Reasons Not to Delay:

If CNB elects not to participate in Phase 1 at this time, delays in later developing the project will range from one year to three years and be costly for CNB to implement. These delays are due to the:

1. Collective time lost from missing the March 21 financing and having to essentially redevelop the project;
2. Costly advance deposits and long lead times required for ordering and delivery of wind turbines from the manufacturer;
3. Having to apply for, wait in the queue and pay for a new GIA;
4. Incurring at least a one year delay in being registered with SPP as a new generating source by a SPP EMP:
5. Potential loss of the PTC if it is not reauthorized by Congress; and
6. Potentially losing the current developer and having to restart the development process, including having to pay for project development from tribal funds.

The CPV Review Process:

CPV has reviewed the three major project documents between the various parties including the Wind Energy Evaluation Lease (WEEL), the Wind Resource Lease (WRL), the Wind Development Agreement (WDA) and the Interconnection Agreement (summary and full versions) between CNB and SPP. CPV also

participated in conference calls involving Ms. Marguerite McKinney and Ms. Carol Wyatt of CNB , Mr. Andre De Rosa of PNE regarding the project, calls with SPP and OGE regarding the GIA and with Andrea Chambers of Foley & Lardner, LP, PNE's attorney who helped with SPP matters.

CPV was asked to come to some quick conclusions in the interest of time. As such there may be some dated information, inconsistencies or inaccuracies in the information that would have been corrected in a review that had the luxury of more time. CPV is however satisfied that it has obtained enough information to draw the general conclusions outlined herein.

CPV Review of Project Documents and Deal Terms:

A comprehensive outline of the Chilocco Wind Phase 1 Project and the agreements reviewed follows this discussion. The Project Agreements reviewed by CPV include: the Wind Energy Evaluation Lease (WEEL), Wind Resource Lease (WRL) and Wind Development Agreement (WDA). These documents are the major agreements establishing the project structure between PNE and its affiliates and subsidiaries and CN and CNB. A summary of the primary terms and conditions of each agreement are provided below.

Wind Energy Evaluation Lease (WEEL):

For good and valuable consideration of $500 plus payment of $50 per quarter for each meteorological and wind measurement installation, PNE's wholly-owned subsidiary, Chilocco Wind Park, LLC (the Company), will acquire from CN an exclusive and irrevocable lease for the Chilocco property for the sole purpose and use of the property by the Company to evaluate the wind energy potential of the property. The WEEL's provisions include:

1. The term of the WEEL is 3 years from date of signature
2. Allows development and installation of wind evaluation structures (data collection/met towers), allowing necessary and related activities supporting installation of the wind tower monitoring station(s) including erection, construction, and operating and maintenance activities as required to install and operate the wind towers,

3. Company has the non-exclusive right of egress and ingress along existing access routes, or to be built access routes as required, to install and operate the wind towers and collect wind data,
4. The Company may undertake any activities to facilitate the above, either by the Company or by Companies contractors.
5. Restrictions on Land Use:
    a. Obstructions to the free flow of wind during the term of the agreement are prohibited for a prescribed distance from any wind tower,
    b. The CN reserves the right to use the property for any purpose except those that obstruct the Company use of the property for the intended purpose.
6. Company has the option, exercisable at its discretion, during the 3 year period following the WEEL agreement, to enter into a Wind Resource Lease (WRL), subject to the following intent of the parties:
    a. The Parties will enter into a WRL for the purpose of installing energy resource development facilities
    b. The WRL will be limited to the property defined in the WEEL
    c. The WRL Option is subject to the Company's due diligence
    d. The WRL may be terminated by either party
    e. The Parties agree the WRL will be the direct result of wind data collected from the activities authorized under the WEEL
    f. The company may request an extension of the WRL for 3 additional years to allow BIA to approve the lease process.
7. Ownership of the collected wind data is exclusive to the Company until such time as the WRL is entered into, is approved by the BIA and BIA's approval is completed within the effective term of the WRL.
8. Assignment of the WEEL is only permissible to wholly owned subsidiaries of the Company or to others with the written consent of the other party.
9. The tribe shall restrict any activities on the land that may interfere with collection of wind data, but is otherwise free to pursue other ordinary agricultural, ranching, mineral development, oil and gas drilling and production activities, hunting, archeological or similar activities.
10. Covenant for Benefit of Company's Lenders:
    a. No cancellation or modification of the WEEL without the prior written consent of the Company's lenders.
    b. Lenders will have the right to act or do or perform under the WEEL as required of the Company to prevent a default and/or forfeiture of any of the Company's rights or obligations under the WEEL.
11. Governing law shall be the provisions of 25 USC Section 415, 25 CFR § 162 and any other applicable federal law including the Regulatory-Mandated

Provisions of 25 CFR § 162.513(b). To the extent no federal law governs the immediate issue, or a federal court determines it has no jurisdiction, the Parties agree to be governed by Oklahoma law, and specifically agree that the WEEL shall not be governed by tribal law.

Wind Resource Lease (WRL):

The WRL includes the same Parties as the WEEL. The WRL is for the purpose of granting the Company an exclusive and irrevocable lease to develop the wind energy resources of the Chilocco property. Key Provisions of the WRL include:

1. The Company will pay to CN:
    a. An installation payment of $2,000 per wind turbine at the start of construction or actual construction-related damages, whichever is greater [note: the value of this payment based on 48 wind turbines is $96,000]
    b. Minimum Payment of $5,000 per year per nameplate rated megawatt installed on the property, indexed to inflation [note: at 76.8 MW, this payment = $384,000/yr.]
    c. Operation Payment: paid quarterly, the greater of one-fourth the Minimum Payment or four percent [note the agreement says 'four percent' but numerically lists '3%'] of gross operating proceeds for the quarter
    d. Overhead Transmission Payment: $3/foot of actual transmission line length on the property, plus $250 per transmission line structure [not able to accurately estimate the value of this payment at this time]
    e. Permanent Tower Payment of $750 per quarter per meteorological tower or similar wind measurement equipment [$3,000/yr per met tower]
    f. Project Payment of the greater of $15 per acre of the property or 0.5 percent of the Gross Operating Proceeds of the project, adjusted for inflation.
2. Allowed Activities Under the Lease:
    a. Constructing, installing, using, replacing, relocating and removing from time to time, and maintaining and operating, wind energy conversion systems including all equipment necessary including towers, turbines, foundations, pads and similar
    b. Constructing, installing, using, replacing, relocating and removing from time to time, and maintaining and operating underground and

overhead electrical transmission and communications lines, poles, anchors, support structures, underground cables, interconnection facilities and equipment and any related or ancillary facilities or improvements and associated roads for access and for installation and repair, maintenance and operation purposes

c. The non-exclusive right of ingress to and egress from the Conversion Facilities and Transmission Facilities (whether located on the Property, on adjacent property, or elsewhere in the Project) over and across the Property by means of roads and lanes thereon if existing, or otherwise by such route or routes as Company may construct from time to time

d. Undertaking any other activities, whether accomplished by Company or a third party authorized by Company, that Company reasonably determines are necessary, useful or appropriate to accomplish any of the foregoing.

3. Any obstruction to the free flow of the wind is prohibited throughout the entire Property
4. The WRL gives the Company the exclusive right to convert all of the wind resources of the Property.
5. The Windpower Facilities are expected to operate in conjunction with other Windpower Facilities developed by the Company on other nearby properties (collectively, the "Project").
6. A resource development plan that describes the type and location of any improvements Company plans to install, and a schedule showing the tentative commencement and completion dates for those improvements, shall be submitted with this WRL pursuant to 25 CFR § 162.563(g)
7. The Company shall undertake the following under this WRL:
    a. Commence installation of energy facilities within two (2) years after the WRL Date [or other period designated in the WRL] and consistent with the timeframe contained in the resource development plan;
    b. Provide Tribe and BIA with an explanation as to good cause for any delay, the anticipated date of installation of facilities, and evidence of progress toward commencement of installation, if installation does not occur, or is not expected to be completed, within the time period specified immediately above;
    c. Maintain all on-site electrical generation equipment and facilities and related infrastructure in accordance with the design standards in the resource development plan; and

d. Repair, place into service, or remove from the site within 30 days any idle, improperly functioning, or abandoned equipment or facilities that have been inoperative for any continuous period of 3 months (unless the equipment or facilities were idle as a result of planned suspension of operations, for example, for grid operations or during bird migration season).

8. WRL Term. The term of this WRL is for an initial term ("Initial Term") commencing on the WRL Date and continuing until the later of:
    a. twenty (20) years after the first day of the first full month following the Commercial Operation Date, or
    b. twenty (20) years after the WRL Date.
    c. Unless earlier terminated, Company may elect to extend the Initial Term for one additional 20-year term
9. Assignment. Neither Tribe nor Company shall assign its rights or obligations to this WRL hereunder, in whole or in part, without the prior written notice to the other Party and the approval of the BIA pursuant to 25 CFR § 162.572(a); provided, however, that Company shall have the right to assign the WRL to the Company's wholly owned subsidiaries without notification or approval.
10. Ownership of Windpower Facilities.
    a. The tribe shall have no ownership or other interest in any Windpower Facilities installed on the Property, and
    b. The Company may remove any or all Windpower Facilities at any time during the Term and
    c. Shall remove any and all Windpower Facilities upon the expiration of the WRL Term, at Company's expense and with the Property to be restored as close as possible to its condition before installation of the Windpower Facilities, unless otherwise agreed in writing by the Parties
11. Section 16.10. Dispute Resolution; Limited Waiver Of Sovereign Immunity.
    a. So that Tribe and Company will be sure that it and/or they may enforce the terms and conditions of this WRL or resolve any dispute arising between the Parties, each of the Parties hereby covenants and agrees that each of them may sue or be sued to enforce or interpret the terms, covenants and conditions of this WRL or to enforce the obligations or rights of the Parties in accordance with the terms and conditions set forth in this Section.
    b. Informal Resolution. Any disagreement or dispute arising between the Parties under this WRL shall be resolved, whenever possible, by meeting and conferring.

c. Forum. Any controversy, dispute or claim arising out of or relating to this WRL, any modification or extension hereof, or any breach hereof shall be brought in any United States District Court or United States Court of Federal Claims, as applicable, in which the controversy may be heard or, if required, pursuant to 25 C.F.R. Parts 162 and 2, with rights of appeal to the appropriate federal court. If for any reason such United States District Court does not have or declines jurisdiction over the subject matter of the action, such controversy, dispute or claim shall be settled by binding arbitration as provided in Section 16.10.3 below. For such purpose, each of the Parties and the BIA hereby irrevocably submits to the non-exclusive jurisdiction of such courts and/or arbitrators.

d. Arbitration. In the event that each Party so agrees in writing or in the event the federal courts do not have or decline jurisdiction, any controversy, dispute or claim arising out of or relating to this WRL, any modification or extension hereof, or any breach hereof (including the question whether any particular matter is arbitrable hereunder) shall be settled by binding arbitration in accordance with the Center for Public Resources Rules for Non-Administered Arbitration of Business Disputes. The arbitration shall be governed by the United States Arbitration Act, 9 U.S.C. §§ 1 -- 16, and judgment upon the award rendered by the arbitrators may be entered by any court having jurisdiction thereof. If for any reason such United States District Court does not have or declines jurisdiction over the subject matter of the action, the Parties consent to the jurisdiction of the state courts of the State of Oklahoma solely for the purpose of compelling or enforcing arbitration with rights of appeal to the appropriate courts. If for any reason both the federal courts and the state courts do not have or decline jurisdiction over the subject matter of the action, the Parties consent to the jurisdiction of the Court of Indian Offenses under 25 C.F.R. Part 11 (or its successor court) solely for purposes of compelling or enforcing arbitration with rights of appeal to the appropriate courts.

e. Section 16.10.4. Limited Waiver of Sovereign Immunity. Tribe hereby specifically, expressly, and irrevocably waives its sovereign immunity and that of its agencies, officers and agents as to Company and its successors and assigns hereunder and any

disputes arising under this WRL. Without limiting the generality of the foregoing, Tribe irrevocably:

i. Waives any claim of sovereign immunity as to actions at law and in equity (including without limitation specific performance) and enforcement proceedings brought by Company to interpret or enforce the WRL or any other agreements by and among the Parties and actions to enforce the dispute resolution provisions of this Section;

ii. Waives the jurisdiction and procedures of any Tribal Courts in favor of any United States District Court in which the controversy may be heard (or if such District Court does not have subject matter jurisdiction over a particular action, binding arbitration as provided in Section 16.10.3 above) with all rights of appeal in appropriate federal or state courts or Court of Indian Offenses or courts of competent jurisdiction for actions brought by or against Company to interpret or enforce this WRL or any other agreements by and among such Parties including appeals from or enforcement of any arbitration decisions; and

iii. Waives any rights or obligations (for itself and for any other Party) to exhaust any tribal court, tribal administrative or other tribal procedures or remedies prior to involving Federal or State court jurisdiction, Court of Indian Offenses jurisdiction, binding arbitration or any Federal agency jurisdiction, with respect to the enforcement of this WRL or any other agreements by and between the Parties, including appeals from or enforcement of any arbitration decisions.

iv. Tribe further irrevocably consents to service of process out of such aforementioned courts by the mailing of copies thereof by certified or registered mail, postage prepaid, to Tribe at the address set forth in Section 30 hereof. Tribe hereby irrevocably agrees that any final judgment of any arbitration or court proceeding relating to or arising under this WRL shall be conclusive and may be enforced in any other jurisdictions by suit on the judgment or by any other method provided by law.

v. Nothing contained in this WRL shall be construed as waiving sovereign immunity in any suit for payment of damages from lands or funds held in trust for Tribe by the United States. Nothing contained in this WRL shall be construed as waiving

sovereign immunity in any suit by any party other than Company or its successors or assigns.

vi. The provisions of this Section 16.10 shall survive any termination of this WRL

12. Assignment; Cure; Company's Lenders; Assignees. Subject to the provisions set forth above, Company shall have the right, without need for Tribe's consent, to do any of the following, conditionally or unconditionally, with respect to all or any portion of this WRL: sell, assign, encumber, transfer, or grant easements to any or all of its rights and interests, including without limitation the right to grant to any utility the right to construct, operate and maintain electric transmission, interconnection and switching facilities on the Property pursuant to any standard form of easement or other agreement used or proposed by the utility, including, without limitation, a perpetual easement, provided no such transfer shall exceed the rights granted to Company under this WRL.
13. Covenants for Benefit of Company's Lenders. Company and Tribe expressly agree between themselves and for the benefit of any such Company's lenders as follows:
    a. Company and Tribe will not modify or cancel this WRL without the prior written consent of Company's lenders, which consent shall not be unreasonably withheld or delayed.
    b. Company's lenders shall have the right to do any act or thing required to be performed by Company under this WRL, and any such act or thing performed by Company's lenders shall be as effective to prevent a default under this WRL and/or a forfeiture of any of Company's rights under this WRL as if done by Company itself.
    c. No default which requires the giving of notice to Company shall be effective unless a like notice is given to all of Company's lenders. If Tribe shall become entitled to terminate this WRL due to an uncured default by Company, Tribe will not terminate this WRL unless it has first given written notice of such uncured default and of its intent to terminate this WRL to each of Company's lenders

Wind Development Agreement (WDA): Asset Purchase and Sale Agreement (PSA)

Parties to the WDA: Cherokee Chilocco Wind Farm, LLC (Buyer, a wholly-owned subsidiary of PNE), PNE Wind USA, Inc. and CNB, LLC (Seller)

1. Development Fees To Be Paid to Seller by Buyer:
    a. $1 million upon Commercial Operation of any plant capable of producing less than 50 MW of electrical energy per hour
    b. $1 million additional upon Commercial Operation of any plant capable of producing more than 50 MW of electrical energy per hour
    c. An additional $25,000 per MW for any capacity in excess of 76.8 MW.
    d. Effective at Closing of the WDA, Seller will be granted five percent passive ownership interest in Buyer
    e. Rent will be payable equal to three percent (3%) of annual gross revenues generated by the Chilocco Project [note: the WRL cites four percent]
2. Covenants of Buyer, Seller and PNE
    a. Cooperation
    b. Non-Interference and Non-Compete
    c. Transfer of Buyer's Interconnection Agreement (IA)
    d. Procurements of Permits
    e. Indian preference for labor
    f. DOE Grant – seller to fill role of buyer for matching funds
3. The SPP Interconnection Deposit made by Seller will be provided to Buyer if Buyer's IA is not entered into with SPP [CPV has no knowledge of the value of this deposit]
4. Governing Law: as the WDA/PSA agreement is currently with CNB, Oklahoma law governs.

Chilocco Wind: Project History and Summary

1. Chilocco Wind began as a tribal project sponsored by CNB but high costs forced it to turn to the development community
2. PNE emerged from a number of companies as offering the best deal to the CN
3. An agreement with PNE and CNB was signed in 2010
4. CNB approached the US Department of Energy (DOE) who provided a 60/40 matching grant, with DOE providing $990,500.
    a. CNB has DOE's approval to count PNE project development expenditures towards CNB's contribution requirement.
    b. PNE has agreed to pay CN's percentage of the matching funds going forward

    c. CN has used DOE and PNE funds to move to this point with little out of pocket expenditures
5. PNE/CNB have made significant strides toward bringing the project to a viable condition, including PNE gathering wind resource data for the past two years with the agreement of CNB (PNE has done so without benefit of the WEEL), conducting environmental studies, and developing major project documents.
6. CNB has its own signed Generator Interconnection Agreement (GIA) with Southwest Power Pool (SPP), implemented through Oklahoma Gas & Electric (OGE):
    a. CNB's GIA (GEN-2008-072) was initiated in 2008, progressing through a feasibility study, Preliminary Interconnect Study, Definitive Interconnect Study and Facilities Study. The GIA was executed on September 6, 2011 by SPP, OGE and CNB, but is currently listed as suspended per SPP's website (CNB says the GIA is active and not suspended).
    b. CNB's GIA original expiration date was extended to December 2013 by actions taken by PNE
    c. To maintain CNB's GIA, the process must be reinitiated in the near term by directing OGE to proceed with final design and engineering leading to construction of the GIA facilities. To do so, CNB (or PNE) must pay to OGE ten percent (10%) of the required $2.9 million in electrical upgrades and facilities as a security deposit, or the GIA will terminate
    d. If the GIA terminates, all of the $220,000 in funds expended by CNB in development of the GIA will be lost
    e. SPP and OGE have limited to no ability to extend the GIA further due to strict rules mandated by the Federal Energy Regulatory Commission (FERC) governing GIA applications and processing.
    f. Further extension of CNB's GIA would likely precipitate lawsuits from other generating projects in the GIA application queue over perceived favoritism in violation of Open Access Transmission rules promulgated by SPP, approved by FERC and implemented by OGE.
7. PNE is proceeding to develop up to 600 MW of wind generation in the Chilocco area with CN's participation (600 MW) or without CN's participation (525MW)
8. PNE has a large land resource (tribal and non-tribal) under contract to support its full 600 MW development in the Chilocco area
9. Phase 2 of PNE's 600 MW Project involves the Kaw, Otoe-Missouri, Pawnee and Ponca tribes

a. PNE will begin Phase 2 development on lands adjoining CN's within the next 2-3 months
b. PNE has a separate GIA in place with SPP/OGE for the Phase 2 project
c. PNE has a separate GIA application pending with SPP for Phase 4 of the project

10. Issues surfaced by CN in executing the Chilocco Phase 1 project documents with PNE include:
    a. minor wording as to the parties involved, including BIA as a required signatory, and
    b. limited waivers of tribal sovereign immunity to provide physical access to the wind generators as required by project lenders
        i. Per PNE, the four Phase 2 tribes have all signed off on essentially the same agreements and specifically the same limited waiver of immunity as required by project lenders
        ii. Conversations with PNE note the language of the sovereign immunity waiver were developed by Bank of America in order to fund casino developments on tribal lands and have been used extensively in Indian Country
        iii. CN's tribal council will need to address the immunity waiver in order for PNE to implement the Phase 1 project
11. PNE's Typical Deal Structure:
    a. PNE is a developer who sells their projects to investors when the project achieves its Commercial Operations Date (COD)
    b. PNE may or may not operate the project, depending on the needs and wants of the individual investor group
12. Chilocco CN deal overview:
    a. 76.8 MW nameplate electrical output using 48 GE 1.6MW turbines
    b. Offtakers/buyers for the power have been identified
    c. Project revenues are based on pricing of $25-$35/MWhr, escalating, for a 40 year term
    d. Chilocco is a good wind resource, with a National Renewable Energy Lab assessment of Class 3/Class 4 Wind Density
    e. PNE plans on installing oversized diameter wind turbines to create a 36 - 40 percent capacity factor, which is 4% higher than typical.
    f. Phase 1 Cost Estimates:
        i. $1.5 – 2.0 million/MW installed cost
        ii. $115 - $153 million total Phase 1 installed cost
        iii. Financing (assumed): 30 year term, 5 percent interest rate, 20 percent equity

iv. Fixed O&M: $40/kw-yr
v. Major Repair & Maintenance Fund: approximately $40/kw-yr

g. PNE's estimated costs of developing Phase 1 will total about $900,000 - $1,100,000. Future expenses would include:
   i. The required 10 percent GIA deposit of $290,000, up to the full $2.9 million cost
   ii. Completion of environmental studies, and filing and processing an Environmental Assessment (this EA is also intended to be used for transferring some of CN's Chilocco lands into trust status)
   iii. Other development activities leading to start of construction

h. Tax Credits:
   i. Production Tax Credits (PTC) for wind generation were recently extended to December 31, 2013
   ii. Qualifying Phase 1 for the PTC, which escalates, would be attractive to investors as the current PTC is $22.5/MWh sold
   iii. PNE financials are currently structured without the PTC but would be significantly enhanced with the PTC

i. Safe harbor provisions are available for claiming the PTC if 5% of the Phase 1 project capital costs are expended by December 31st , 2013.

j. At the point of sale to investors at COD, PNE would pay CN:
   i. $2 million
   ii. After deducting PNE expenses (estimated at about $1,000,000) and the $2 million paid to CN, CN would earn 5% of the remaining sales proceeds when the project is sold to investors (this value cannot currently be estimated)
   iii. An overriding royalty of 4% of escalated gross revenues per year with a guaranteed annual escalation factor of 2.25 percent for the 40 year life of the ground lease, or a minimum annual payment of $3,500/MW of installed capacity
   iv. Valuing item (ii) above at -0-, CN would realize nearly $13 million over a 30 year period
   v. PNE's agreement with Phase 2 tribal participants only includes item (iii) above

13. Possible Phase 1 Development Option Without CN's GIA: If CNB's GIA terminates, the energy from Phase 1 (CN's project) could be routed through Phase 2's electrical transmission interconnection when available (eg, when current flow from Phase 2 requires less than 100 percent of transformer capacity, Phase 1 power may be exported and sold – otherwise, it would be shut in):

a. The Phase 1 Project would suffer an estimated $2-$3 million revenue reduction from not selling its full output for the first year or two, but
b. Tax credits realized by investors from the PTC (currently $22.50/MWhr) would offset lost revenues until a new GIA is available for exporting Phase 1 energy
c. This step would preserve the PTC for Phase 1 of the project, which is highly attractive to investors

14. PNE background:
    a. German company recently taken public
    b. Actively developing 3.2 giga-watts (GW) of wind (one Gigawatt = one billion watts)
    c. Pipeline of 2 GW of wind projects
    d. 10 GW of wind projects built in the European Union
    e. 8 GW of wind projects built in the North Sea (includes a large project in offshore Scotland)
    f. Two US projects: Chilocco and Belle Fourche (30 MW) in Rapid City, North Dakota; actively ramping up US presence
15. PNE Business Model:
    a. Develop, sell, operate (if requested)
    b. Uses own funds to develop projects
    c. Sells the project after COD to investors/hedge funds
        i. Chilocco Phase 2 has already been placed with investors as of December, 2012
        ii. The same investors, according to PNE, are interested in acquiring Phase 1 if the development agreements can be signed and the project timely implemented
16. Reasons to favor working with PNE:
    a. Direct access to wind turbines manufacturers (GE in particular) – developers asking for less that 200 MW won't get access to turbine manufacturers due to high demand conditions
    b. PNE is currently buying $400-$500 million/year in turbines
    c. PNE will be spending multiple-billions on turbines beginning next year to buildout their North Sea projects
17. Other Phase 1 Project Benefits:
    a. Chilocco Phase 1 will require 18 employees: initially, 3 high level technical people from GE and 15 tribal members ($80k/yr average salary), with all jobs transitioning to tribal members within 3 years
    b. Benefits of involving Phase 1 with the rest of PNE's Chilocco-area projects includes spreading costs proportionately (wind data collection, geotechnical and environmental studies, etc.)

c. CN has a better financial offer from PNE as the other tribal entities in Phase 2 only receive the land lease payments.

18. Phase 1 Planning Considerations:
    a. Due to adoption of SPP's Integrated Marketplace (IM), SPP will not consider any new modeling inputs for new generation after March 2013 – if missed, any new proposed generation can't be considered until SPP's IM goes live in August, 2014.
    b. SPP's March 2013 planning cycle cutoff would allow Phase 1 to be brought online in 2016 or earlier; failure to move forward with Phase 1 would delay implementation until 2017 at the very earliest.

CIMARRON POWER VENTURES

Document and Deal Term Review Process

Chilocco Wind Farm Project

The CPV Review Process:

CPV has reviewed the three major project documents between the various parties including the Wind Energy Evaluation Lease (WEEL), the Wind Resource Lease (WRL), the Wind Development Agreement (WDA) and the Interconnection Agreement (summary and full versions) between CNB and SPP. CPV also participated in conference calls involving Ms. Marguerite McKinney and Ms. Carol Wyatt of CNB , Mr. Andre De Rosa of PNE regarding the project, calls with SPP and OGE regarding the GIA and with Andrea Chambers of Foley & Lardner, LP, PNE's attorney who helped with SPP matters.

CPV was asked to come to some quick conclusions in the interest of time. As such there may be some dated information, inconsistencies or inaccuracies in the information that would have been corrected in a review that had the luxury of more time. CPV is however satisfied that it has obtained enough information to draw the general conclusions outlined herein.

CPV Review of Project Documents and Deal Terms:

A comprehensive outline of the Chilocco Wind Phase 1 Project and the agreements reviewed follows this discussion. The Project Agreements reviewed by CPV include: the Wind Energy Evaluation Lease (WEEL), Wind Resource Lease (WRL) and Wind Development Agreement (WDA). These documents are the major agreements establishing the project structure between PNE and its affiliates and subsidiaries and CN and CNB. A summary of the primary terms and conditions of each agreement are provided below.

Wind Energy Evaluation Lease (WEEL):

For good and valuable consideration of $500 plus payment of $50 per quarter for each meteorological and wind measurement installation, PNE's wholly-owned subsidiary, Chilocco Wind Park, LLC (the Company), will acquire from CN an exclusive and irrevocable lease for the Chilocco property for the sole purpose and use of the property by the Company to evaluate the wind energy potential of the property. The WEEL's provisions include:

1. The term of the WEEL is 3 years from date of signature
2. Allows development and installation of wind evaluation structures (data collection/met towers), allowing necessary and related activities supporting installation of the wind tower monitoring station(s) including erection, construction, and operating and maintenance activities as required to install and operate the wind towers,
3. Company has the non-exclusive right of egress and ingress along existing access routes, or to be built access routes as required, to install and operate the wind towers and collect wind data,
4. The Company may undertake any activities to facilitate the above, either by the Company or by Companies contractors.
5. Restrictions on Land Use:

   a. Obstructions to the free flow of wind during the term of the agreement are prohibited for a prescribed distance from any wind tower,
   b. The CN reserves the right to use the property for any purpose except those that obstruct the Company use of the property for the intended purpose.
6. Company has the option, exercisable at its discretion, during the 3 year period following the WEEL agreement, to enter into a Wind Resource Lease (WRL), subject to the following intent of the parties:
   a. The Parties will enter into a WRL for the purpose of installing energy resource development facilities
   b. The WRL will be limited to the property defined in the WEEL
   c. The WRL Option is subject to the Company's due diligence
   d. The WRL may be terminated by either party
   e. The Parties agree the WRL will be the direct result of wind data collected from the activities authorized under the WEEL
   f. The company may request an extension of the WRL for 3 additional years to allow BIA to approve the lease process.
7. Ownership of the collected wind data is exclusive to the Company until such time as the WRL is entered into, is approved by the BIA and BIA's approval is completed within the effective term of the WRL.
8. Assignment of the WEEL is only permissible to wholly owned subsidiaries of the Company or to others with the written consent of the other party.
9. The tribe shall restrict any activities on the land that may interfere with collection of wind data, but is otherwise free to pursue other ordinary agricultural, ranching, mineral development, oil and gas drilling and production activities, hunting, archeological or similar activities.
10. Covenant for Benefit of Company's Lenders:
    a. No cancellation or modification of the WEEL without the prior written consent of the Company's lenders.
    b. Lenders will have the right to act or do or perform under the WEEL as required of the Company to prevent a default and/or forfeiture of any of the Company's rights or obligations under the WEEL.
11. Governing law shall be the provisions of 25 USC Section 415, 25 CFR § 162 and any other applicable federal law including the Regulatory-Mandated Provisions of 25 CFR § 162.513(b). To the extent no federal law governs the immediate issue, or a federal court determines it has no jurisdiction, the Parties agree to be governed by Oklahoma law, and specifically agree that the WEEL shall not be governed by tribal law.

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The WRL includes the same Parties as the WEEL. The WRL is for the purpose of granting the Company an exclusive and irrevocable lease to develop the wind energy resources of the Chilocco property. Key Provisions of the WRL include:

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   a. An installation payment of $2,000 per wind turbine at the start of construction or actual construction-related damages, whichever is greater [note: the value of this payment based on 48 wind turbines is $96,000]
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   c. Operation Payment: paid quarterly, the greater of one-fourth the Minimum Payment or four percent [note the agreement says 'four percent' but numerically lists '3%'] of gross operating proceeds for the quarter
   d. Overhead Transmission Payment: $3/foot of actual transmission line length on the property, plus $250 per transmission line structure [not able to accurately estimate the value of this payment at this time]
   e. Permanent Tower Payment of $750 per quarter per meteorological tower or similar wind measurement equipment [$3,000/yr per met tower]
   f. Project Payment of the greater of $15 per acre of the property or 0.5 percent of the Gross Operating Proceeds of the project, adjusted for inflation.
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   a. Constructing, installing, using, replacing, relocating and removing from time to time, and maintaining and operating, wind energy conversion systems including all equipment necessary including towers, turbines, foundations, pads and similar
   b. Constructing, installing, using, replacing, relocating and removing from time to time, and maintaining and operating underground and overhead electrical transmission and communications lines, poles, anchors, support structures, underground cables, interconnection facilities and equipment and any related or ancillary facilities or improvements and associated roads for access and for installation and repair, maintenance and operation purposes
   c. The non-exclusive right of ingress to and egress from the Conversion Facilities and Transmission Facilities (whether located on the Property, on adjacent property, or elsewhere in the Project) over and across the Property by means of roads and lanes thereon if existing, or otherwise by such route or routes as Company may construct from time to time
   d. Undertaking any other activities, whether accomplished by Company or a third party authorized by Company, that Company reasonably determines are necessary, useful or appropriate to accomplish any of the foregoing.
3. Any obstruction to the free flow of the wind is prohibited throughout the entire Property
4. The WRL gives the Company the exclusive right to convert all of the wind resources of the Property.
5. The Windpower Facilities are expected to operate in conjunction with other Windpower Facilities developed by the Company on other nearby properties (collectively, the "Project").
6. A resource development plan that describes the type and location of any improvements Company plans to install, and a schedule showing the tentative commencement and completion dates for those improvements, shall be submitted with this WRL pursuant to 25 CFR § 162.563(g)
7. The Company shall undertake the following under this WRL:

a. Commence installation of energy facilities within two (2) years after the WRL Date [or other period designated in the WRL] and consistent with the timeframe contained in the resource development plan;
b. Provide Tribe and BIA with an explanation as to good cause for any delay, the anticipated date of installation of facilities, and evidence of progress toward commencement of installation, if installation does not occur, or is not expected to be completed, within the time period specified immediately above;
c. Maintain all on-site electrical generation equipment and facilities and related infrastructure in accordance with the design standards in the resource development plan; and
d. Repair, place into service, or remove from the site within 30 days any idle, improperly functioning, or abandoned equipment or facilities that have been inoperative for any continuous period of 3 months (unless the equipment or facilities were idle as a result of planned suspension of operations, for example, for grid operations or during bird migration season).

8. WRL Term. The term of this WRL is for an initial term ("Initial Term") commencing on the WRL Date and continuing until the later of:
    a. twenty (20) years after the first day of the first full month following the Commercial Operation Date, or
    b. twenty (20) years after the WRL Date.
    c. Unless earlier terminated, Company may elect to extend the Initial Term for one additional 20-year term
9. Assignment. Neither Tribe nor Company shall assign its rights or obligations to this WRL hereunder, in whole or in part, without the prior written notice to the other Party and the approval of the BIA pursuant to 25 CFR § 162.572(a); provided, however, that Company shall have the right to assign the WRL to the Company's wholly owned subsidiaries without notification or approval.
10. Ownership of Windpower Facilities.
    a. The tribe shall have no ownership or other interest in any Windpower Facilities installed on the Property, and
    b. The Company may remove any or all Windpower Facilities at any time during the Term and
    c. Shall remove any and all Windpower Facilities upon the expiration of the WRL Term, at Company's expense and with the Property to be restored as close as possible to its condition before installation of the Windpower Facilities, unless otherwise agreed in writing by the Parties
11. Section 16.10. Dispute Resolution; Limited Waiver Of Sovereign Immunity.
    a. So that Tribe and Company will be sure that it and/or they may enforce the terms and conditions of this WRL or resolve any dispute arising between the Parties, each of the Parties hereby covenants and agrees that each of them may sue or be sued to enforce or interpret the terms, covenants and conditions of this WRL or to enforce the obligations or rights of the Parties in accordance with the terms and conditions set forth in this Section.

b. Informal Resolution. Any disagreement or dispute arising between the Parties under this WRL shall be resolved, whenever possible, by meeting and conferring.

c. Forum. Any controversy, dispute or claim arising out of or relating to this WRL, any modification or extension hereof, or any breach hereof shall be brought in any United States District Court or United States Court of Federal Claims, as applicable, in which the controversy may be heard or, if required, pursuant to 25 C.F.R. Parts 162 and 2, with rights of appeal to the appropriate federal court. If for any reason such United States District Court does not have or declines jurisdiction over the subject matter of the action, such controversy, dispute or claim shall be settled by binding arbitration as provided in Section 16.10.3 below. For such purpose, each of the Parties and the BIA hereby irrevocably submits to the non-exclusive jurisdiction of such courts and/or arbitrators.

d. Arbitration. In the event that each Party so agrees in writing or in the event the federal courts do not have or decline jurisdiction, any controversy, dispute or claim arising out of or relating to this WRL, any modification or extension hereof, or any breach hereof (including the question whether any particular matter is arbitrable hereunder) shall be settled by binding arbitration in accordance with the Center for Public Resources Rules for Non-Administered Arbitration of Business Disputes. The arbitration shall be governed by the United States Arbitration Act, 9 U.S.C. §§ 1 -- 16, and judgment upon the award rendered by the arbitrators may be entered by any court having jurisdiction thereof. If for any reason such United States District Court does not have or declines jurisdiction over the subject matter of the action, the Parties consent to the jurisdiction of the state courts of the State of Oklahoma solely for the purpose of compelling or enforcing arbitration with rights of appeal to the appropriate courts. If for any reason both the federal courts and the state courts do not have or decline jurisdiction over the subject matter of the action, the Parties consent to the jurisdiction of the Court of Indian Offenses under 25 C.F.R. Part 11 (or its successor court) solely for purposes of compelling or enforcing arbitration with rights of appeal to the appropriate courts.

e. Section 16.10.4. Limited Waiver of Sovereign Immunity. Tribe hereby specifically, expressly, and irrevocably waives its sovereign immunity and that of its agencies, officers and agents as to Company and its successors and assigns hereunder and any disputes arising under this WRL. Without limiting the generality of the foregoing, Tribe irrevocably:

   i. Waives any claim of sovereign immunity as to actions at law and in equity (including without limitation specific performance) and enforcement proceedings brought by Company to interpret or enforce the WRL or any other agreements by and among the Parties and actions to enforce the dispute resolution provisions of this Section;

   ii. Waives the jurisdiction and procedures of any Tribal Courts in favor of any United States District Court in which the controversy may be heard (or if such District Court does not have subject matter jurisdiction over a

particular action, binding arbitration as provided in Section 16.10.3 above) with all rights of appeal in appropriate federal or state courts or Court of Indian Offenses or courts of competent jurisdiction for actions brought by or against Company to interpret or enforce this WRL or any other agreements by and among such Parties including appeals from or enforcement of any arbitration decisions; and

iii. Waives any rights or obligations (for itself and for any other Party) to exhaust any tribal court, tribal administrative or other tribal procedures or remedies prior to involving Federal or State court jurisdiction, Court of Indian Offenses jurisdiction, binding arbitration or any Federal agency jurisdiction, with respect to the enforcement of this WRL or any other agreements by and between the Parties, including appeals from or enforcement of any arbitration decisions.

iv. Tribe further irrevocably consents to service of process out of such aforementioned courts by the mailing of copies thereof by certified or registered mail, postage prepaid, to Tribe at the address set forth in Section 30 hereof. Tribe hereby irrevocably agrees that any final judgment of any arbitration or court proceeding relating to or arising under this WRL shall be conclusive and may be enforced in any other jurisdictions by suit on the judgment or by any other method provided by law.

v. Nothing contained in this WRL shall be construed as waiving sovereign immunity in any suit for payment of damages from lands or funds held in trust for Tribe by the United States. Nothing contained in this WRL shall be construed as waiving sovereign immunity in any suit by any party other than Company or its successors or assigns.

vi. The provisions of this Section 16.10 shall survive any termination of this WRL

12. Assignment; Cure; Company's Lenders; Assignees. Subject to the provisions set forth above, Company shall have the right, without need for Tribe's consent, to do any of the following, conditionally or unconditionally, with respect to all or any portion of this WRL: sell, assign, encumber, transfer, or grant easements to any or all of its rights and interests, including without limitation the right to grant to any utility the right to construct, operate and maintain electric transmission, interconnection and switching facilities on the Property pursuant to any standard form of easement or other agreement used or proposed by the utility, including, without limitation, a perpetual easement, provided no such transfer shall exceed the rights granted to Company under this WRL.
13. Covenants for Benefit of Company's Lenders. Company and Tribe expressly agree between themselves and for the benefit of any such Company's lenders as follows:
    a. Company and Tribe will not modify or cancel this WRL without the prior written consent of Company's lenders, which consent shall not be unreasonably withheld or delayed.
    b. Company's lenders shall have the right to do any act or thing required to be performed by Company under this WRL, and any such act or thing performed by Company's lenders shall be as effective to prevent a default under this

WRL and/or a forfeiture of any of Company's rights under this WRL as if done by Company itself.

c. No default which requires the giving of notice to Company shall be effective unless a like notice is given to all of Company's lenders. If Tribe shall become entitled to terminate this WRL due to an uncured default by Company, Tribe will not terminate this WRL unless it has first given written notice of such uncured default and of its intent to terminate this WRL to each of Company's lenders

Wind Development Agreement (WDA): Asset Purchase and Sale Agreement (PSA)

Parties to the WDA: Cherokee Chilocco Wind Farm, LLC (Buyer, a wholly-owned subsidiary of PNE), PNE Wind USA, Inc. and CNB, LLC (Seller)

1. Development Fees To Be Paid to Seller by Buyer:
    a. $1 million upon Commercial Operation of any plant capable of producing less than 50 MW of electrical energy per hour
    b. $1 million additional upon Commercial Operation of any plant capable of producing more than 50 MW of electrical energy per hour
    c. An additional $25,000 per MW for any capacity in excess of 76.8 MW.
    d. Effective at Closing of the WDA, Seller will be granted five percent passive ownership interest in Buyer
    e. Rent will be payable equal to three percent (3%) of annual gross revenues generated by the Chilocco Project [note: the WRL cites four percent]
2. Covenants of Buyer, Seller and PNE
    a. Cooperation
    b. Non-Interference and Non-Compete
    c. Transfer of Buyer's Interconnection Agreement (IA)
    d. Procurements of Permits
    e. Indian preference for labor
    f. DOE Grant – seller to fill role of buyer for matching funds
3. The SPP Interconnection Deposit made by Seller will be provided to Buyer if Buyer's IA is not entered into with SPP [CPV has no knowledge of the value of this deposit]
4. Governing Law: as the WDA/PSA agreement is currently with CNB, Oklahoma law governs.

Chilocco Wind Farm Transaction Summary (PPA with Option to Purchase)

October 22, 2015

A. The Project

The Chilocco Wind Farm Project ("CWF") is sited on tribal trust land in rural Oklahoma around the closed Chilocco Indian School, in Kay County, a few miles south of the Kansas Border. Two of the six tribes holding land around the school have agreed to wind leases that will allow for 20 turbine locations, totaling 48MW of wind generation capacity. The project benefits from strong wind resources in North Central Oklahoma. PNE Wind USA, a German based company experienced in wind was selected to develop the CWF in 2010. The project has benefited from approximately $1.57M in grants from the Department of Interior and the Department of Energy. PNE has invested to date approximately $5M in the project. The Project is fully qualified for the federal production tax credit ("PTC") and has a generation interconnection agreement ("GIA") with Western Farmers Electric Cooperative.

B. Transaction Advantages

1. Federally subsidized wind farms are an opportunity that will not be around much longer. The PTC subsidy will either expire this year or if renewed will likely expire the following year eliminating the 2.3 cent/kWh tax credit which funds nearly 60% of the project through the tax equity. This subsidy allows these projects to be economically viable at a power sales rate that is half of what it would have to be without such a subsidy. The ability to compete for 25 years at low cost rates, due to the low capital investment as a result of the tax incentive, makes such projects highly profitable ventures.

2. The advent of the Integrated Market in the Southwest Power Pool ("SPP IM") in early 2014 provides the certainty of selling the power into the Integrated Market, which takes renewable generation first, at rates that are forecasted to be higher than the purchase price for the power generated by CWF. In time the buyer of the power through the power purchase agreement ("PPA") may find opportunities to resell the power raising the margins even higher. The power from the Chilocco Wind Farm is expected to be available in December, 2016.

3. The $83.3M project cost is funded by GE contributing $48M as "tax equity" and a bank providing "back levered" funding of $27M. The balance of $8.3M would be owner equity ("Investor" or "Seller"). The leveraged returns on this equity are high.

C. Deal Structure

1. A taxable investor ("Investor") provides the cash equity for the CWF project in the amount of $8,358,000. The Investor may choose to finance this contribution in which case terms have been assumed (10 year am and term, 6%). The recourse of this loan will depend on the credit strength of the PPA and the lock box and cash sweep arrangements.

2. A buyer of the energy generated by CWF ("Buyer") agrees to a 20 year PPA with a 10 year option to extend power purchase agreement for the output of the CWF at a price of $27.75/MWh, escalating at 2.5% per year. It is proposed, that a "lockbox" and "cash sweep" arrangement would be included in the PPA as security of the payment for the energy received from the Buyer.

3. A separate instrument with a mutually agreed to escrow bank ("Bank") would be entered into to provide for the following:
    a. All revenue derived by the Buyer's use, consumption, resell or trade of the energy received from the Seller shall be deposited into an escrow account ("Account") at the Bank.
    b. The Market Participant handling the physical and financial reconciliation of the power for the Buyer generated by the CWF would be a party to the escrow agreement to insure that all funds are deposited into the Account.

4. The Bank under the escrow agreement would be instructed and obligated to distribute the funds received into the Account in the following manner:
    a. First for the payment of monthly payments ("Monthly Payments") of the required amount as provided under the PPA.
    b. Secondly, 75% of the remaining cash funds shall be withheld until the Account reaches a $1,000,000 cash balance ("Cash Reserve"). The Cash Reserve shall be made available as security for the payment of the Monthly Payments. If the Buyer is not in default under the PPA then the Cash Reserve shall be reduced to $500,000 at the beginning of year 6 of the PPA term. The Cash Reserve shall be eliminated at the conclusion of year 10 of the PPA if the Buyer is not in default under the PPA.
    c. All remaining funds shall be distributed to the Buyer.

5. The Buyer shall agree to establish a letter of credit from an A rated bank in the amount of $500,000 ("LC") to fund any shortfalls between the Monthly Payments under the PPA and the balance of Account including any accrued Cash Reserve. The LC amount is based on that amount necessary to fund the shortfall between the lowest estimated Brattle Group SPP IM forecasted payment, discounted by 10% and the PPA rate. At current forecasts a $500,000 LC balance would cover the shortfall in revenue and PPA payments for approximately three years. Once the Cash Reserve fund reaches $1,000,000 the LC would be released.

6. While the Buyer may use the power generated by the PPA in a variety of ways, the back stop is to resell any excess or all of the power into the SPP IM, which has a "must buy" condition on wind generated energy. Based on the base case from a Brattle Group forecast of rates for the SPP IM the Buyer would gross approximately $14M in trading profits over the course of the initial 10 years of the PPA. After paying expenses and transaction fees the net cash income would be $9.7M.

7. The Buyer would have the option to purchase 90% the CWF project at the end of 10 years from the Investor/Seller for an amount determined by a fair market valuation. A 6 X EBITDA value would be $27M based on estimates. Therefore, appraised value would likely be $25-35M. A purchase by the Buyer in year 10 for a total price of $30M would be funded by a $10M cash payment and the assumption of or refinancing of the $20M remaining balance of the back levered debt.

8. The Investor or its affiliate or subcontractor would be paid a fee by the Buyer to manage the overall transaction and coordinate, if needed, the SPP market participant as well as identifying opportunities for higher value resales of power.

D. Buyer Returns

1. The Buyer would receive a portion of the CWF project contingency fee savings, if any is available, at the completion of CWF. This is currently estimated at $1M.

2. The Buyer realizes profits on the sale of the power acquired at the PPA rate. The SPP IM is the likely buyer of any or all excess power not otherwise used or sold. If the SPP IM is the buyer of the power gross amount of revenue is estimated, using the base case of the Brattle Group forecast, for the first 10 years at $14.3M. The net amount, after removing legal expense and transaction management and trading expenses, would be an estimated $9.7M.

3. Based on a fair market value purchase of the plant by the Buyer for $30M in year 10 ($10M cash, assuming $20M in debt) then the IRR on the remaining term of 20 years for the Buyer based on before tax cash flows would be in the mid 30% range. The $10M cash purchase price in year 10 will be approximately equal to the accrued net trading earnings made by the Buyer over the first 10 years of the PPA term.

E. Investor Returns

1. The Investor would receive a portion of the contingency fee savings, if any is available, at the completion of CWF. This is currently estimated at $1M.

2. The Investor would be paid a transaction management fee by the Buyer during the first 10 years of the PPA in the amount of $4.6M. A portion of these funds could be pledged as additional security for an $8.3M investor loan, should the Investor choose to finance its contribution.

3. If the Investor chooses to borrow its equity contribution the bank equity loan would be amortized during the first 10 years so that when 90% of CWF is sold to the Buyer the Investor would realize a cash payment of $10M on the sale of the 90% to CWF.

4. The Investor will have an efficient tax advantage from the accelerated depreciation and the interest deductions for the back levered financing and, if any, the equity loan interest charges. All of the cash flow for the first 10 years of the project, either $14M or $25M including the gain on the sale of the project would be tax sheltered.

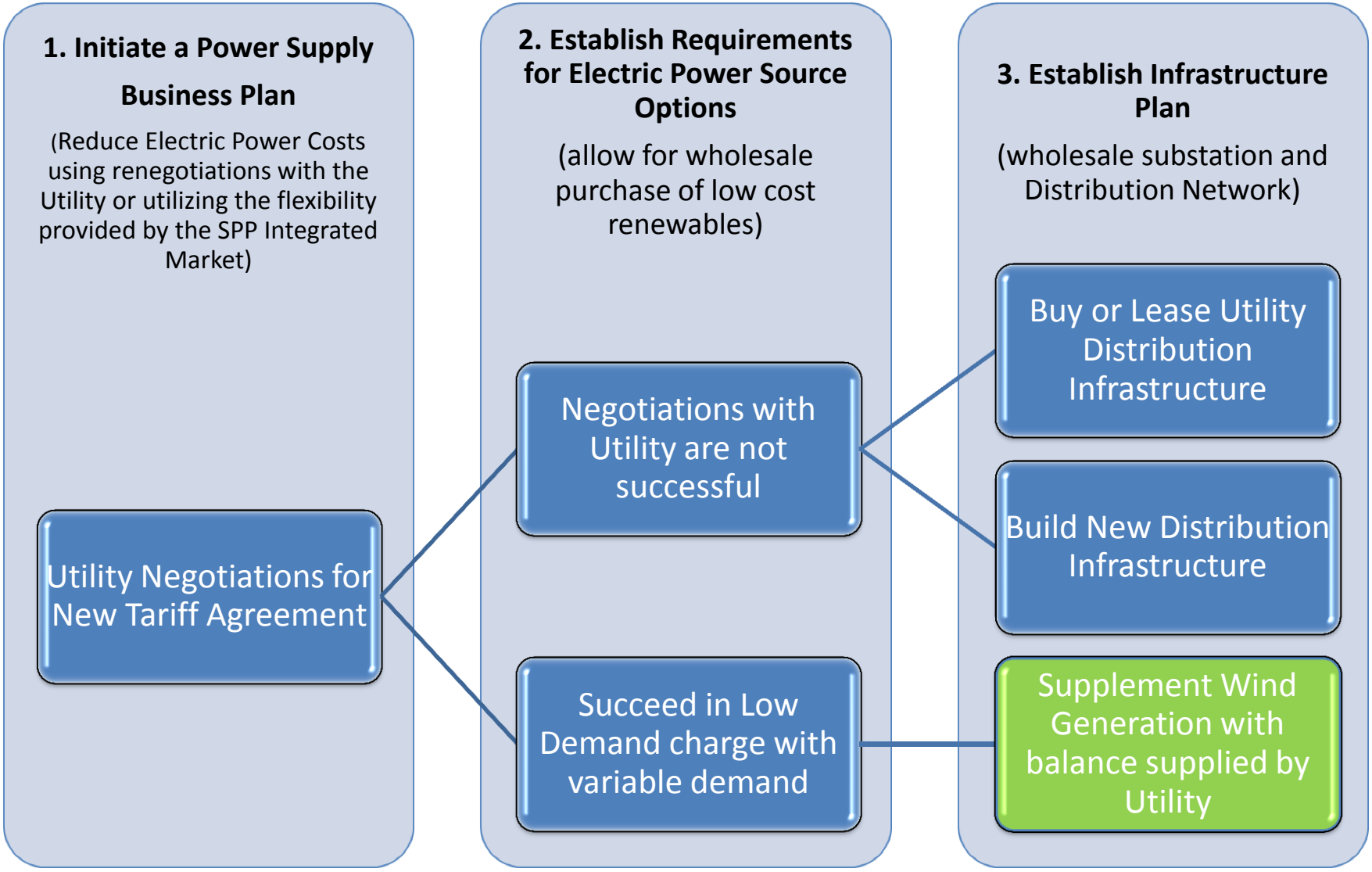
5. If the Investor makes a cash contribution to equity of $8.3M then the Investor's IRR is estimated at approximately 20%, after tax, with a total after tax return of $25.3M and an 8% net present value of $8.1M. If the Investor chooses to finance its equity contribution then there would be no IRR due to no initial cost but will receive an estimated after tax return of $14.5M and an 8% net present value of $9.1M.

6. The Investor would continue to have a 10% interest in the project that is estimated to generate initially $350,000 to $1M over the next 15 years.

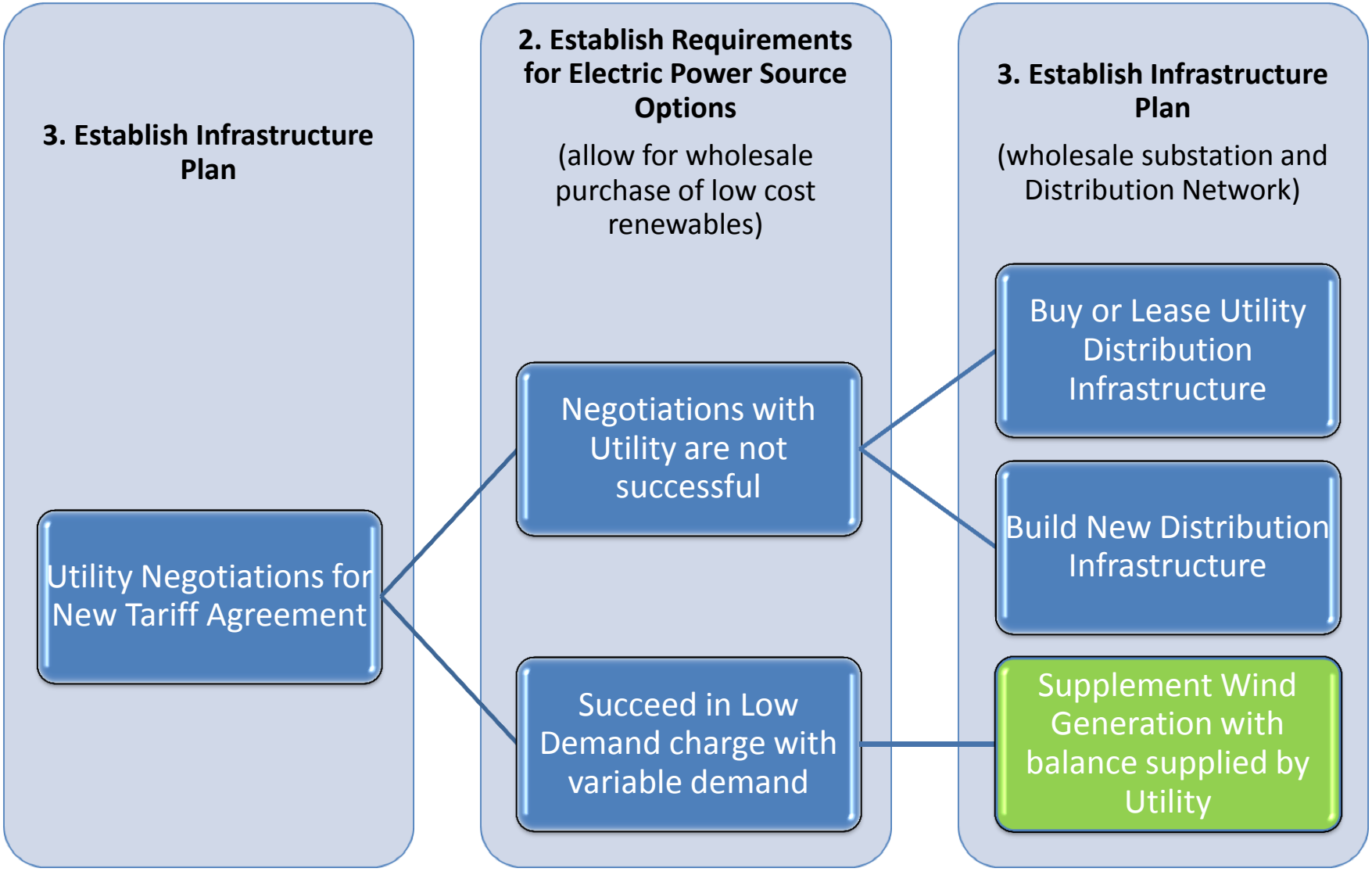
Electric Power Source Options

Walters Power International

Decision Tree of Power Source Plan



Decision Tree of Power Source Plan



Department of Energy Grant for Chilocco Wind Farm: Project Summary and Update

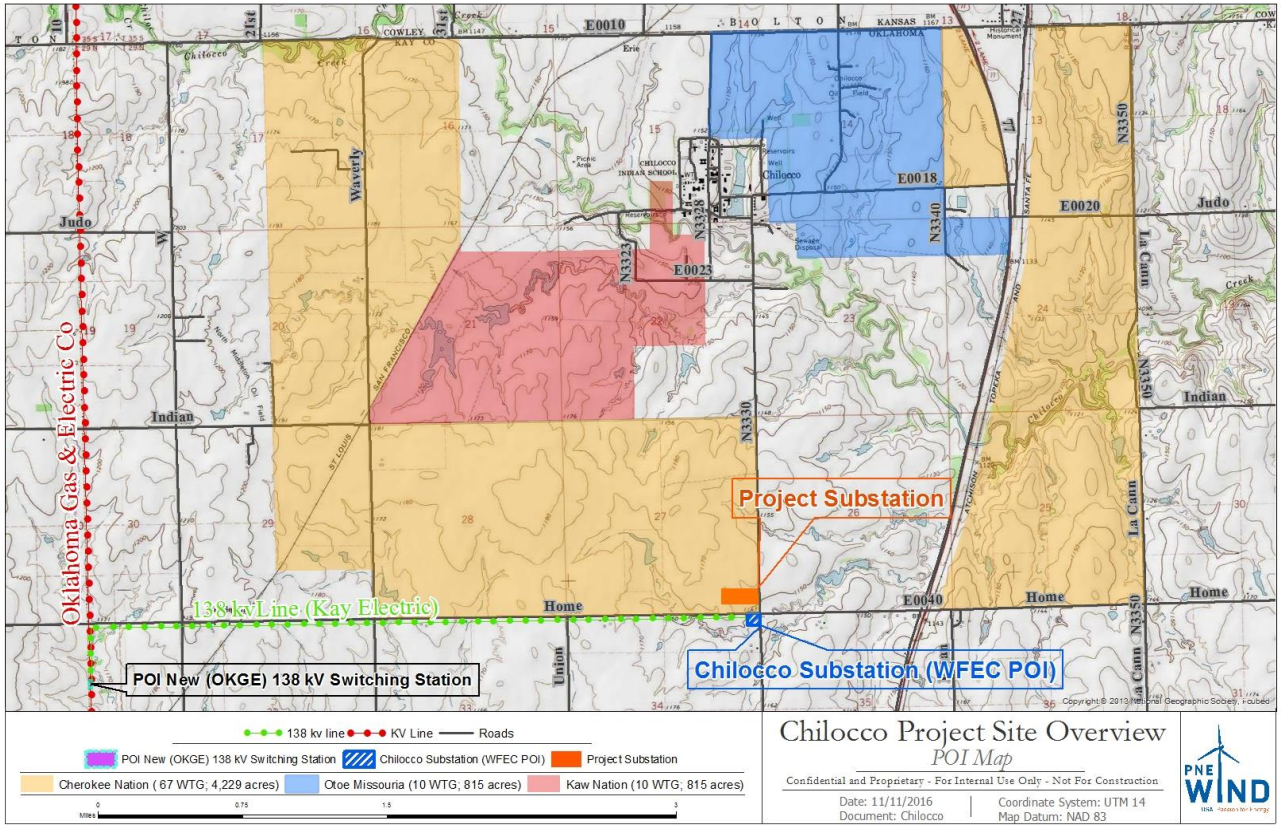
Presentation to DOE: Lizana Pierce, DOE Project Manager

Jami Alley, Principal Engineer/ Team Lease

December 16, 2016

OUTLINE OF PRESENTATION

1.0 Chilocco Wind Farm Project on Tribal Lands Update
2.0 Why DOE Grant?
3.0 Kaw Matching Funds
4.0 Path Forward



1.0 CHILOCCO WIND FARM ON TRIBAL LANDS

CHEROKEE PARCELS

Cherokee Resolution Approving *Wind Resource Lease* 17 Oct, 2016

Sixty-Seven (67) x 2.3MW Wind turbine generators on 4,229 acres

(154.1 megawatts)

OTOE–MISSOURIA TRIBE PARCEL

Ten (10) x 2.3MW Wind turbine generators on 815.3 acres

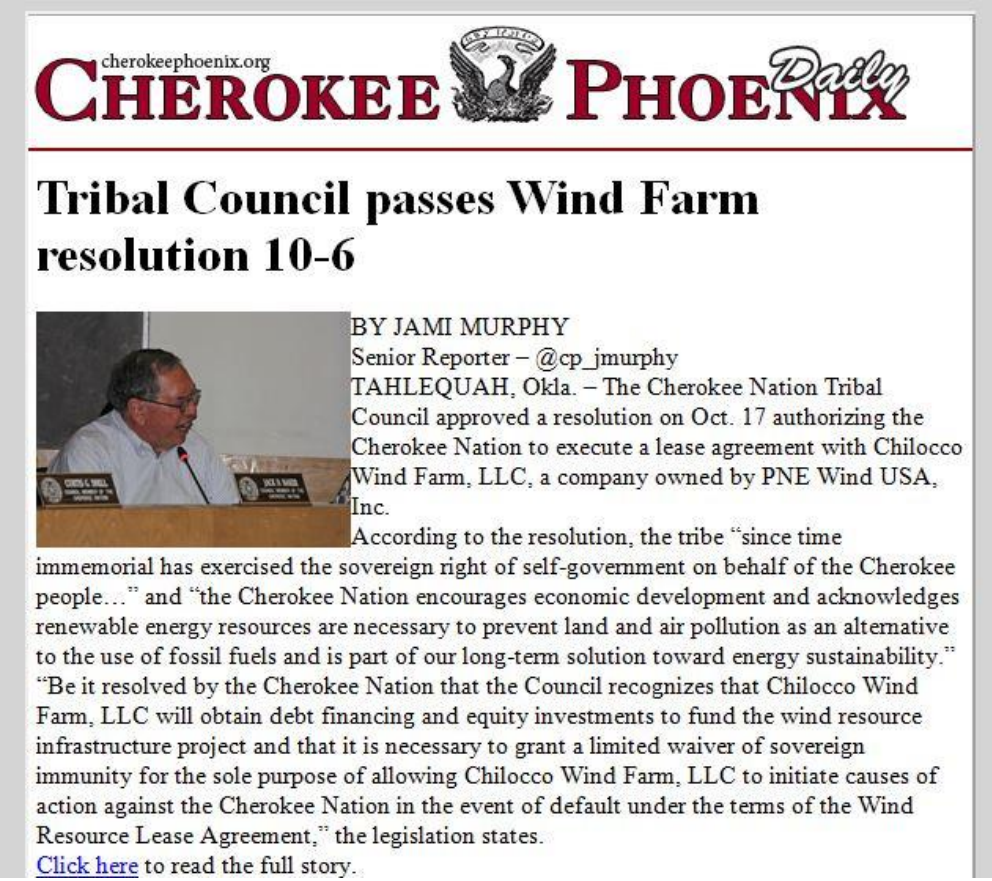
(23.0 megawatts)

KAW NATION PARCELS

Ten (10) x 2.3MW Wind turbine generators on 815 acres

(23.0 megawatts)

200.1 Combined Megawatts



cherokeephoenix.org

CHEROKEE PHOENIX Daily

Tribal Council passes Wind Farm resolution 10-6

BY JAMI MURPHY
Senior Reporter – @cp_jmurphy

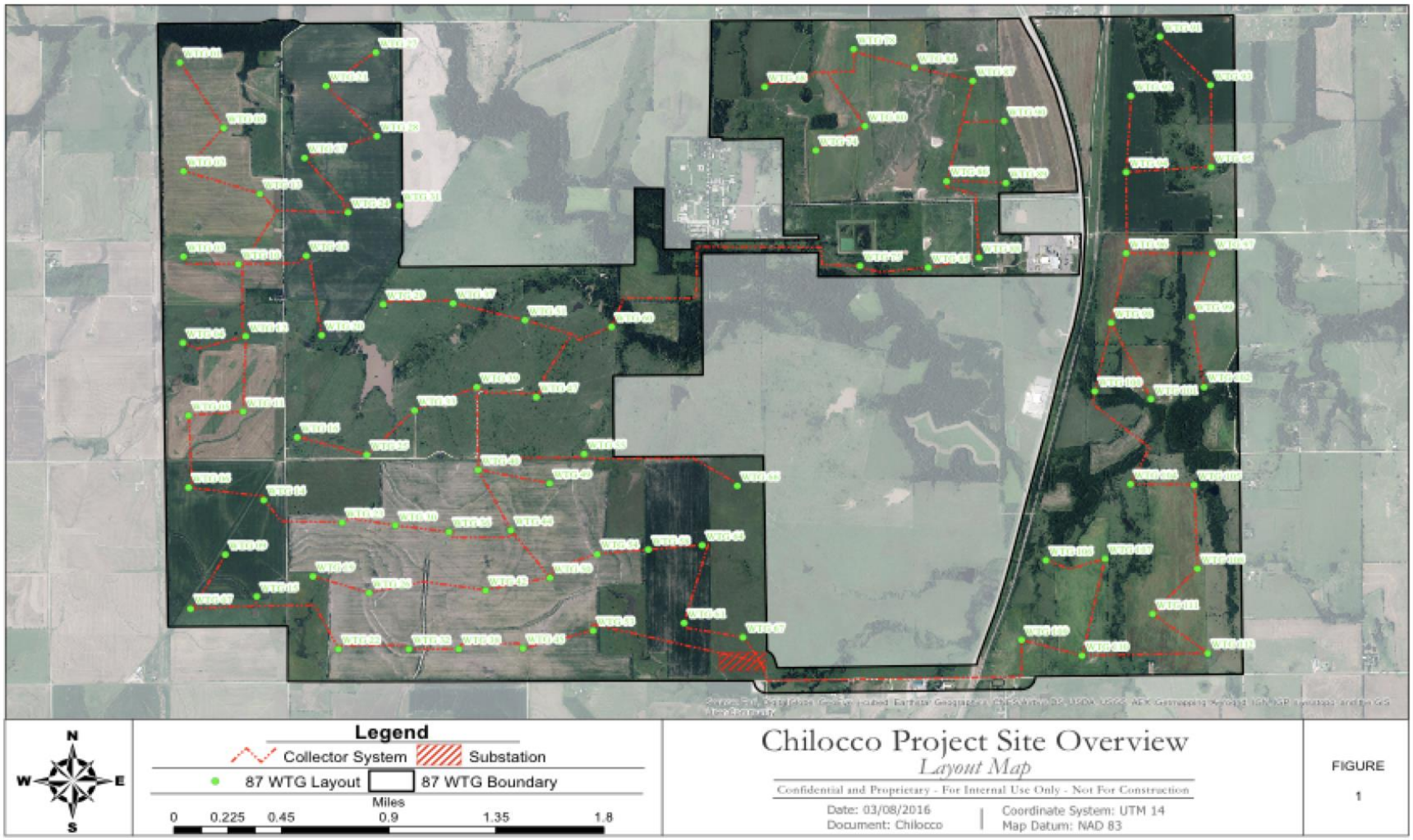
TAHLEQUAH, Okla. – The Cherokee Nation Tribal Council approved a resolution on Oct. 17 authorizing the Cherokee Nation to execute a lease agreement with Chilocco Wind Farm, LLC, a company owned by PNE Wind USA, Inc.

According to the resolution, the tribe "since time immemorial has exercised the sovereign right of self-government on behalf of the Cherokee people…" and "the Cherokee Nation encourages economic development and acknowledges renewable energy resources are necessary to prevent land and air pollution as an alternative to the use of fossil fuels and is part of our long-term solution toward energy sustainability."

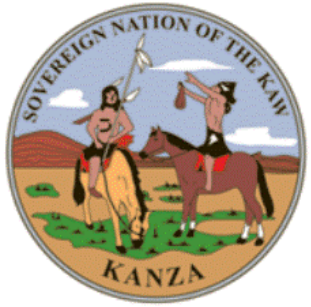
"Be it resolved by the Cherokee Nation that the Council recognizes that Chilocco Wind Farm, LLC will obtain debt financing and equity investments to fund the wind resource infrastructure project and that it is necessary to grant a limited waiver of sovereign immunity for the sole purpose of allowing Chilocco Wind Farm, LLC to initiate causes of action against the Cherokee Nation in the event of default under the terms of the Wind Resource Lease Agreement," the legislation states.

Click here to read the full story.

1.0 CHILOCCO WIND FARM ON TRIBAL LANDS



2.0 WHY DOE GRANT ?



- **$428K was originally part of a larger $990,520 grant allocated to the Cherokee Nation in 2010 for this Project. Since that time the grant funds have been novated to the Kaw Nation for what is now the evolution of same Project.**
- **Additional predevelopment works are required before the Project can obtain commercial financing in 2017.**
- **Project has full support of all three participating tribes.**
- **Grant funds were originally supposed to be disbursed for works relating to this Project in 2013.**

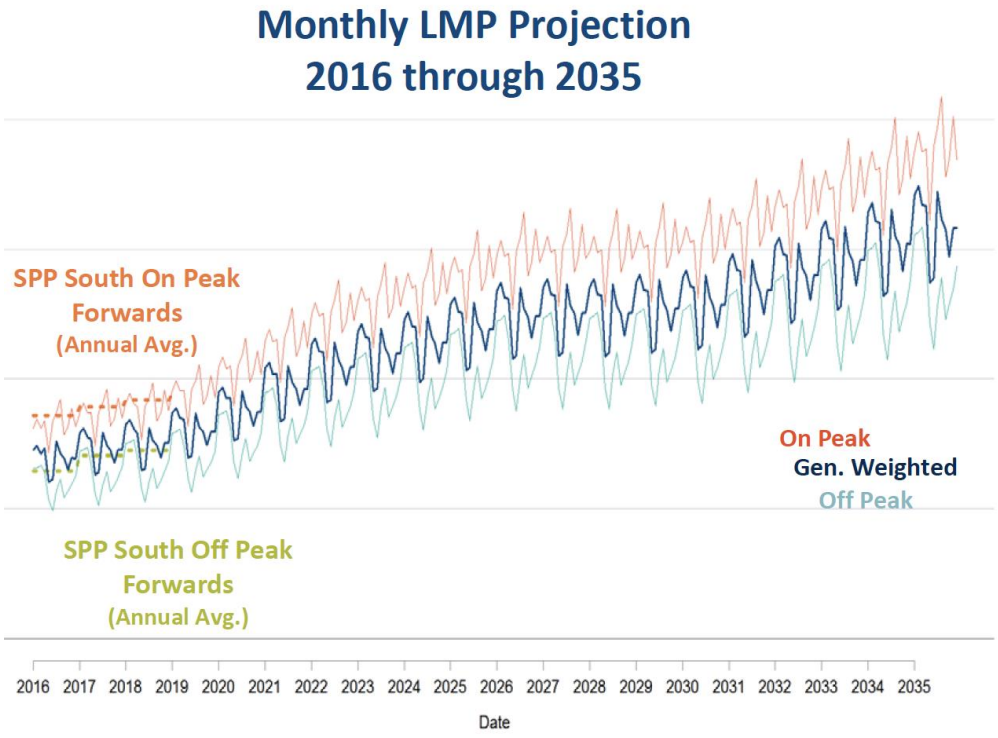
3.0 KAW MATCHING FUNDS

Large Ticket Matching:

1. $45k for Storm Water Pollution Prevention Plan.
2. $460k Qualifying works for Production Tax Credit qualification.
3. $69.5k Legal invoicing for negotiation of equipment and maintenance contracts.
4. $43.7k Power Marketing Study for Project.
5. $39.9k Archaeological services

TOTAL: $658k

- **DOE Grant requires matching funds for eligible disbursements.**
- **PNE through Chilocco Wind Farm has expended in excess of $3M since the conclusion of the "sister grant" in July 2013**



4.0 PATH FORWARD

- PNE to provide DOE with matching funds documentation.
- DOE confirms matching eligibility
- Grant funds disbursed relative to invoicing submitted to DOE.

Purpose and Basis of Cost	Cost
Southwest Power Pool Integrated Marketing Forecast;	$ 100,000.00
Legal and Regulatory Review, Tribal Utilities, et al.;	$ 12,000.00
Power Purchase Agreement (s), Hedge and Swap Contracts and Subordinate Power Purchase Agreement (s);	$ 63,000.00
Economic Pro Forma Analysis of Trading Options;	$ 53,000.00
Geotechnical Engineering; and	$ 150,000.00
Grant Compliance and Administration.	$ 50,000.00
TOTAL COST	**$ 428,000.00**