

April 13, 2018

Nathaniel Drucker  
Business Development Associate  
Invenergy LLC  
2580 West Main Street  
Littleton, CO 80120

**Re: Updated Desktop Review of Known and Potential Cultural and Paleontological Resources at the Proposed Ekola Flats Wind Project (Confidential)**

Dear Mr. Drucker:

Blanton & Associates, Inc. (B&A) previously conducted a desktop-level analysis of known and potential cultural and paleontological resources for the proposed Ekola Flats Wind Project in May 2017. This report provides an update to the May 2017 report, based on updated project boundaries that you provided in March 2018. The proposed Ekola Flats Project is to be located northwest of the town of Medicine Bow in Carbon County, Wyoming (**Figure 1** – attached). A summary of the applicable regulatory programs and results of this analysis are presented below.

**Cultural Resources Regulations and Potential Applicability**

Certain state and federal laws exist to protect cultural resources on private and public land in Wyoming. The following laws may apply to projects located on federal, state, or private lands depending on funding source and permitting requirements:

- The Wyoming Antiquities Act of 1935 §36-1-114 through §36-1-116 (as amended) prohibits any excavation on any prehistoric ruins, pictographs, hieroglyphics or any other ancient markings, writing, or archeological and paleontological deposits on any state land in Wyoming without first obtaining a permit from the State Board of Land Commissioners.
- Section 106 of the National Historic Preservation Act (NHPA) of 1966, as amended through 2000; this act requires federal agencies to take into account the effects of their activities and programs on historic properties. When a federal agency funds, licenses, or permits an activity that may affect cultural resources, the agency must consult with the State Historic Preservation Office in cooperation with the Advisory Council on Historic Preservation (ACHP) in Washington, D.C. to comply with Section 106 of the NHPA. The NHPA will only apply to the project if there is a federal nexus, which has not yet been triggered by this project. Impacts to National Register of Historic Places (NRHP) eligible cultural resources must be avoided in areas under U.S. Army Corps of Engineers jurisdiction (in or immediately adjacent to waters of the U.S.) to ensure compliance with

General Conditions 20 and 21 for Nationwide Permits 12 and 14, if applicable, and eliminate the need for preconstruction notification or U.S. Army Corps of Engineers consultation with the Wyoming Historical Commission under the NHPA.

- Unlike most states, Wyoming has no specific unmarked human burial protection legislation. What little legal precedent exists, deals with archeological resources on state and federal lands. The law protects prehistoric ruins, relics and archeological and paleontological deposits, which could include prehistoric human burials. The State Board of Land Commissioners has responsibility for issuing excavation permits, as well as for developing and implementing regulations. Most violations are misdemeanors with fines from \$25 to \$200 and jail up to six months. The 1997 amendment added penalties from \$500- 10,000 for anyone convicted of removing archeological and paleontological deposits for commercial gain.

### **Wyoming State Lands Review Process**

Portions of the proposed project may be built on land administered by the Wyoming Office of State Lands and Investments (WOSLI). These lands are owned by the State of Wyoming and are intended for development that can generate revenue for the State. Prior to any ground-disturbing activities on WOSLI land, the State requires that an archeological records search be conducted no less than 60 days prior to construction. The results of this in-person review of the State's archeological records, along with recommendations concerning fieldwork, are submitted to the WOSLI for review. The purpose of this review is for the WOSLI archeologist to understand the type of archeological resources that have been previously discovered in the area as well as the type and number of cultural resource surveys that may have been conducted there.

After a review (lasting up to 30 days), the WOSLI archeologist will provide recommendations regarding whether an archeological survey in the study area will be required. If no survey is required by the WOSLI, the project may proceed without additional consultation with the WOSLI (unless otherwise stated by the WOSLI). In most cases, the WOSLI requires an archeological survey. The survey typically includes a 100% physical inspection of the project area on state land by professional archeologists. The results of the archeological survey are then incorporated into a report. The report would contain a thorough documentation of the archeological sites in the project area and recommendations regarding the eligibility of any of the sites for the NRHP. For the purposes of this report, the project area need not be the entire parcel of WOSLI but can be defined as areas where excavation will occur (i.e., the project footprint). This report is submitted to the WOSLI for review. If the WOSLI archeologist concurs with the findings of the report, it is sent to the Wyoming State Historic Preservation Office (SHPO) for final review. These reviews may take 60 days or more, not including the time to conduct the survey and prepare the reports. Based on the results of the review, the SHPO may require additional work, such as excavations or avoidance measures, be conducted before construction can proceed. Excavations can be lengthy and expensive.

Please note that the State of Wyoming requires an additional background review of all State Lands that may be impacted by construction within 60 days or less of construction. This review is to ensure that no additional cultural resources have been recorded within the project area since the initial database review.

**Results of Desktop Analysis for Cultural Resources**

This section presents results of B&A’s background research to document previously recorded cultural resources within the project area and a one-buffer around the project area. **Figure 2** shows the project area, the one-mile buffer, and previously recorded cultural resources.

Although cultural resources on private land are not protected in Wyoming, except as described above, B&A reviewed online resources to determine if any known archeological sites or NRHP properties exist within the project area. No NRHP properties are located within the project area or buffer. There are no restrictions on the use, treatment, transfer, or disposition of private properties listed on the NRHP unless a project that may affect the listed property is undertaken, funded, licensed, or permitted by state or federal agencies, in which case the ACHP or SHPO would determine if the project would affect the listed property.

Similarly, B&A reviewed state digital site files available online for all previously recorded cultural resources in the project area and buffer. This review found that ten previously documented sites are located within the project area (**Table 1, Figure 2**). These include sites CR4541 and CR6503, which are remnants of historic road systems. These linear sites were both determined to be ineligible for listing on the NRHP and officially do not warrant avoidance. Of the remaining previously documented sites located within the project area, three (CR7262, CR8855, and CR8859) have been determined to be eligible for listing on the NRHP and one (CR5358) is of unknown eligibility. These sites should be avoided by impacts or consultation with the SHPO may be required. The remaining four sites were determined to be ineligible for listing on the NRHP and do not warrant avoidance.

The online cultural resources database for Wyoming only contains very brief descriptions of archeological sites. **Table 1** contains a summary of those sites within the project area and the one-mile buffer and provides the description information available in the online cultural resources database.

**Table 1. Previously Recorded Cultural Resources Sites in the Project Vicinity**

Site ID	Site Name	NRHP Status	General Age	Site Type	Features
CR910	None	Not Eligible/ SHPO Concur	Prehistoric	Open campsite	None or other
CR911	None	Not Eligible/ SHPO Concur	Prehistoric	Open campsite	None or other
CR1191	LINCOLN HIGHWAY	Contrib/Eligible SHPO Concur	Historic	Transportation – Road	None or other
CR2249	None	Not Eligible/ SHPO Concur	Prehistoric	Lithic scatter	None or other
CR3432	None	Eligible/SHPO Concur	Prehistoric	Open campsite	None or other
CR4541	None	Not Eligible/ SHPO Concur	Historic	Transportation	None or other

**Table 1. Previously Recorded Cultural Resources Sites in the Project Vicinity**

Site ID	Site Name	NRHP Status	General Age	Site Type	Features
CR5358	None	Unknown	Prehistoric	Stone rings	Stone rings
CR6443	None	Eligible/ SHPO Concur	Prehistoric	Lithic scatter	None or other
CR6503	CA-2022	Not Eligible/ SHPO Concur	Historic	Historic Debris	None or other
CR6524	None	Eligible/ SHPO Concur	Prehistoric	Open campsite	None or other
CR6525	None	Not Eligible/ SHPO Concur	Prehistoric	Lithic scatter	None or other
CR7262	ACREWAPA- WY12 PWL	Eligible (SHPO Concurrence)	Historic	Historic Transmission Line/Power Line	None or other
CR8035	CMM-ADR-05	Not Eligible/ SHPO Concur	Historic	Transportation – Road	None or other
CR8036	CMM-ADR-09	Eligible (SHPO Concurrence)	Historic	Historic – Ranching – Corral/Fence	None or other
CR8037	None	Not Eligible/ SHPO Concur	Prehistoric	Lithic scatter	None or other
CR8039	CMM-NG-04	Not Eligible/ SHPO Concur	Historic	Historic Canal	None or other
CR8855	None	Eligible/ SHPO Concur	Prehistoric	Open campsite	None or other
CR8856	None	Not Eligible/ SHPO Concur	Prehistoric	Open campsite	None or other
CR8857	None	Not Eligible/ SHPO Concur	Prehistoric	Lithic scatter	None or other
CR8858	None	Eligible/ SHPO Concur	Prehistoric	Open campsite	None or other
CR8859	None	Not Eligible/ SHPO Concur	Prehistoric	Lithic scatter	None or other

All sites listed as “eligible” or “eligibility unknown” in **Table 1** that are located on State or Federal lands will require additional investigations prior to any impacts from construction.

Archeological sites in this region tend to be located along the edges of natural waterways and atop ridge lines. The majority of the project area has had very low impacts from mineral exploration, ranching, or other human-related impacts. The undisturbed nature of most of the project area significantly increases the probability of intact archeological sites being present.

Historic archeological sites (i.e., scatters of glass, structural debris) may exist within the proposed project area. However, such sites would not be protected under local, state, or federal regulations (assuming no federal nexus). Generally, to be recorded and evaluated as archeological sites, historic resources must contain artifact scatters and/or features indicative of occupation and abandonment prior to 40 to 50 years ago. The region likely contains architecture over 50 years of age representing the remains of historic homesteads and farmsteads; however, such structures are not likely to be disturbed directly by the project and these structures, if NRHP eligible, are also afforded no regulatory protection under state or federal regulations (assuming no federal nexus). Cemeteries are not typically considered eligible for inclusion in

the NRHP, but may be considered eligible if the cemetery derives its primary significance from graves of people who were of transcendent importance, or from age, or from distinctive design features, or from association with historic events. No known cemeteries were found in the project area, based on review of existing data. However, there is no complete database of burial sites or cemeteries for the State of Wyoming. Such places may exist in the project area.

### **Regulation of Paleontological Resources**

Paleontological resources are recognized as nonrenewable scientific resources and are afforded protection by federal and state statutes and policies. The Paleontological Resources Preservation Act (PRPA) (16 U.S.C. § 470aaa-11) defines paleontological resources as “any fossilized remains, traces, or imprints of organisms preserved in or on the earth’s crust, that are of paleontological interest and that provide information about the history of life on earth. Paleontological resources do not include any materials associated with an archaeological resource or any cultural item.”

The definition of a significant paleontological resource from the U.S. Bureau of Land Management (BLM) Instruction Memorandum (IM) 2009-011 is as follows:

Significant Paleontological Resource (syn. Significant Fossil Resource) – Any paleontological resource that is considered to be of scientific interest, including most vertebrate fossil remains and traces, and certain rare or unusual invertebrate and plant fossils. A significant paleontological resource is considered to be scientifically important because it is a rare or previously unknown species, it is of high quality and well-preserved, it preserves a previously unknown anatomical or other characteristic, provides new information about the history of life on earth, or has identified educational or recreational value. Paleontological resources that may be considered to not have paleontological significance include those that lack provenience or context, lack physical integrity because of decay or natural erosion, or that are overly redundant or are otherwise not useful for research. Vertebrate fossil remains and traces include bone, scales, scutes, skin impressions, burrows, tracks, tail drag marks, vertebrate coprolites (feces), gastroliths (stomach stones), or other physical evidence of past vertebrate life or activities.

### ***Federal Regulations***

Federal protection for paleontological resources applies to federally owned or managed lands. Federal legislative protection for paleontological resources began with the Antiquities Act of 1906 (P.L. 59-209; 16 U.S.C. § 431 et seq.; 34 Stat. 225), which requires protection of historic landmarks, historic and prehistoric structures, and other objects of historic or scientific interest on federal land. The Antiquities Act of 1906 forbids the disturbance of any object of antiquity on federal land without a permit issued by the responsible managing agency. This act also establishes criminal sanctions for unauthorized appropriation or destruction of antiquities. The Federal Highways Act of 1958 clarified that the Antiquities Act applied to paleontological resources and authorized the use of funds appropriated under the Federal-Aid Highways

Act of 1956 to be used for paleontological salvage in compliance with the Antiquities Act and any applicable state laws.

In addition to the Antiquities Act, other federal statutes protect fossils. The Historic Sites Act of 1935 (P.L. 74-292; 49 Stat. 666; 16 U.S.C. § 461 et seq.) declares it national policy to preserve objects of historical significance for public use and gives the Secretary of the Interior broad powers to execute this policy, including criminal sanctions. The National Environmental Policy Act (NEPA) (P.L. 91-190; 31 Stat. 852; 42 U.S.C. §§ 4321-4327) requires that important natural aspects of the nation's heritage be considered in assessing the environmental consequences of any proposed project. The Federal Land Policy and Management Act (FLPMA) (P.L. 94-579; 90 Stat. 2743; U.S.C. § 1701-1782) requires that public lands be managed in a manner that protects the quality of their scientific value. The PRPA regulates who may collect fossils on public lands and where such fossils must be curated. The PRPA requests appropriate plans for the inventory, monitoring, and mitigation of impact to paleontological resources in accordance with applicable agency laws, regulations, and policies.

### ***State Regulations***

The collection and removal of paleontological resources is regulated on state-owned land in Wyoming, and is outlined in The Rules and Regulations Board of Land Commissioners, Chapter 11 (Reference Number: 060.0002.11.10301998). According to the document, fossils are defined as, “any remains, trace or imprints, of a plant or animal that has been preserved in rock or unconsolidated sediments, excluding fossil fuels and lime-stones or other calcareous rocks comprised of invertebrate fossils.” All fossils and paleontological deposits on state lands are the property of the State of Wyoming and removal of specimens from these lands shall not be allowed unless authorized by the Board of Land Commissioners. State paleontological regulations only discuss the removal of fossils from state lands, and do not address the avoidance of fossils.

### ***Regulations on Private Land***

There are no regulations on private lands for fossils. The landowner owns fossils found on private land.

### **Paleontological Resources in the Project Area**

Paleontological resources were investigated for the project area by searching for known paleontological sites in the University of Wyoming (UW) Fossil Vertebrate database in the vicinity of the project area, and by inferring common paleontological occurrences in the rock formations intersected by the project area and also by inferring paleontological resources based on the BLM Potential Fossil Yield Classification (PFYC). The PFYC system includes five classification levels ranging from a score of 1 (very low potential for a geologic unit to have recognizable fossil remains) to a score of 5 (very high potential for a geologic unit to produce vertebrate fossil or scientifically significant invertebrate or plant fossils).

According to the USGS Digital Geologic Map of Wyoming,<sup>1</sup> the project area intersects fifteen geologic formations that span the Mesozoic and early Cenozoic Eras. These include the Chugwater Formation, Cloverly Formation, Ferris Formation, Frontier Formation, Goose Egg Formation, Lewis Shale, Medicine Bow Formation, Mesaverde Formation, Mowry Shales, Niobrara Formation, Steele Shale, Wind River Formation, Sundance Formation, Tensleep Sandstone Formation, and Amsden Formation. **Figure 3** shows the geologic formations in the project area and buffer. The UW Fossil Vertebrate database lists seven fossil localities located in the project area and one locality located in the one-mile buffer. These fossil localities are shown on **Figure 3** and described in **Table 2**. The following paragraphs describe the major geologic formations found in the project area.

**Table 2. Fossil Localities in the Project Vicinity**

<b>Locality ID</b>	<b>Geologic Formation</b>	<b>Locality Description</b>
V-96012	Steele Shale	Ant hill beneath some thickly bedded fine grained sandstones. A few shark teeth were found.
V-96014	Frontier Formation	Shark teeth collected along about 20 ft of the same stratigraphic level. This bed is a quite friable thin-bedded medium-to-fine grained grey sandstone.
V-96015	Frontier Formation	This locality is full of shark teeth, located on an ant hill on Oil Springs Anticline.
V-96016	Frontier Formation	Incredible amounts of shark and ray teeth along a continuous bed of fine sand. This location is at Oil Springs Anticline. Also possible crocodile teeth, though few and in poor shape.
V-96025	Mesaverde Formation	Surface material collected for screen washing. Very rich in dinosaur bones, some large pieces still in situ, and need to be collected. Shark tooth fragment found on surface. Bed extends for several meters.
V-96026	Lewis Shale	3 poorly preserved yet whole shark teeth, white in color, found on anthill. Several anthills in the area, most with at least 1 tooth.
V-96027	Lewis Shale	Several shark teeth discovered in several anthills at base of the formation. Teeth highly weathered with a few in fairly good condition. Located in vegetated area below a sandstone ridge.
V-96049	Frontier Formation	A great number of shark and ray teeth found on the middle to south part of the Oil Springs Anticline, both in sandstone and carbonaceous shales.

The *Chugwater* and *Goose Egg Formations* in general are not very fossiliferous, but do have lenses with high numbers of trackways, and some bones and teeth have been recovered from these unit. The BLM PFYC specifies the Chugwater Formation and Goose Egg Formation as having moderate fossil yielding potential (score of 3).

The *Cloverly Formation* is Cretaceous in age, was deposited in a terrestrial environment, and is a highly fossiliferous unit in Wyoming. The BLM PFYC for the Cloverly Formation in the State of Wyoming has scored the Cloverly Formation as a 5 (high). No known UW localities within the Cloverly Formation are documented in the project area, or within a two-mile radius of the area. UW fossil vertebrate localities collected from the Cloverly Formation in other parts of the state have yielded the fossils bones of dinosaurs

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<sup>1</sup> Green, G. N. and P. H. Drouillard. 1994. The Digital Geologic Map of Wyoming in ARC/INFO Format: U.S. Geological Survey Open-File Report 94-0425.

(nodosaurids and ankylosaurids), crocodiles, turtles, and one mammal. Based on the formation and BLM PFYC, there is potential for the unit to yield fossil material similar to those in the UW collection.

The ***Ferris Formation*** is a Late Cretaceous (~66 Ma) to Paleocene (66-63 Ma), fluvial-deltaic geological formation in southern Wyoming. It contains a variety of trace and body fossils, preserved in sandy fluvial channel deposits and overbank units. Dinosaur remains are fragmentary, but include Triceratops, Tyrannosaurus, dromaeosaurids, Paronychodon, Ricardoestesia, Edmontosaurus, Edmontonia, Ankylosaurus, and Pachycephalosaurus.<sup>2</sup> This formation has a PFYC of 5.

The ***Frontier Formation*** is a sedimentary geological formation whose strata date back to the Late Cretaceous. It occurs in many sedimentary basins and uplifted areas. The formation is described as thick, lenticular, grey sandstone, gray shale, carbonaceous shale, and bentonite. Dinosaur remains are among the fossils that have been recovered from the formation. This formation has a PFYC of 3 and is from the Cretaceous. Four UW fossil localities are located in the Frontier Formation within the project area (**Figure 3**).

***Lewis Shale*** preserves fossils dating back to the Cretaceous period. It is described as a dark-gray shale, fossiliferous, with veins and seams of gypsum, and concretions of iron oxide. It is of marine origin and is a host formation for commercial oil deposits. This shale dates to the Cretaceous and has a PFYC of 3. Two UW fossil localities are located in the Lewis Shale within the project area (**Figure 3**).

The ***Medicine Bow*** and ***Mesaverde Formations*** are brown and gray sandstone and shale; thin coal and carbonaceous shale beds and contains. Dinosaur remains are among the fossils that have been recovered from these formations. These formations have a PFYC of 3 and date to the Cretaceous. There is one UW fossil locality from the Mesaverde Formation located within the buffer around the project area (**Figure 3**).

The ***Mowry Shale***, ***Niobrara Formation***, and ***Steele Shale*** are summarized together because they represent marine units of the Cody Shale Formation from the Late Cretaceous. The Mowry and the Steele Shale are designated the PFYC class 3 (moderate), and the Niobrara is considered to have a higher fossil yield potential with a BLM PFYC score of 5. There are no documented UW Fossil localities from the Mowry Shale or Niobrara Formation in the project area, but there is one UW fossil locality from the Steele Shale located within the project area (**Figure 3**). The Mowry Shale is known for containing abundant fish scales, and occasional fish skeletons, and the UW Fossil Vertebrate Collections contains scales from several fish species, as well as bones and a complete skeleton from at least two ichthyosaur (Mesozoic marine reptile) groups. Common fossils recovered from the Niobrara Formation include shark teeth and fish remains. Bones and a partial skeleton of two mosasaurs (Mesozoic marine reptile) were collected from UW fossil sites in the Niobrara Formation from other parts of Wyoming. Shark, fish, crocodile teeth, and marine reptiles are also collected from Steele Shale units of Wyoming. From other Steele Shale units in Wyoming, the UW Fossil Vertebrate Collection houses remains of shark teeth, ray teeth, crocodile scutes, and fish

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<sup>2</sup> Wroblewski, A. F. 1995. First report of changes in lower vertebrate faunas across the Cretaceous-Tertiary boundary, western Hanna Basin, Wyoming. *Journal of Vertebrate Paleontology*.



scales. There is potential to find similar specimens as outlined above in the project area for all three of these Cody Formation members.

The ***Wind River Formation*** is an early Eocene terrestrial formation that lies unconformably on the Cody Formation units, and it has a high potential for fossil yields (BLM PFYC designates the Wind River Formation as a 5). There are no known UW Wind River localities in the project area, or within a two-mile radius of the project area; however, UW holds over 1000 fossil specimens from other Wind River Formation localities collected in the state. Common fossil collected from the Wind River Formation include the bones and teeth of extinct mammals, turtles, crocodiles, and birds. Gar scales are also occasionally collected from the formation. Where the project area intersects the Wind River Formation, there is potential to find similar fossils.

Many fossils are found in the ***Sundance Formation***, which was deposited when a large shallow sea-way covered the region. No known localities are documented from the Sundance Formation in the project area (or within a two-mile radius of the project area) in the UW Fossil Vertebrate Collections. However, the Sundance Formation is recognized as having higher fossil yield potential (a score of 5 on the BLM PFYC), and UW Fossil Vertebrate collections contains a number of fossils from the Sundance Formation of Wyoming. These fossils include the bones or large marine reptiles, including species belonging to the ichthyosaur and plesiosaurs groups. UW also has several pterodactyl and dinosaur track ways originating from the Sundance Formation in Wyoming, and these fossils may be encountered in the project area. In addition to vertebrate fossils, the Sundance Formation is highly fossiliferous in invertebrate fossil material, particularly fossilized cephalopods (Belemnites, Ammonites), fossilized oyster (*Gryphaea*), fossilized echinoderms, and many others.

***Tensleep Sandstone*** and ***Amsden Formations*** are geological formations of Pennsylvanian to very early Permian age in Wyoming. These formations are known for the preservations of trackways but lack fossil remains. These formations have a PFYC of 2.

The project area also intersects alluvium and gravel deposited by recent rivers over the past 12,000 years. The BLM PFYC does not classify alluvium; however, there are several UW Fossil Localities (not in the project area, nor within a 2-mile radius) that yielded mammoth and other Quaternary megafauna fossils that lived in Wyoming in the past 20,000 years. There is some potential for the alluvium and gravels intersecting the project area to also produce these types of fossils.

## **Summary**

The majority of the project area has been undisturbed by farming or other development. The project area has a moderate potential for intact cultural resources; however, no field surveys are necessary to comply with state or federal regulations, except possibly at permitted crossings of waters of the U.S. If Nationwide Permits 12 or 14 are used, as expected for the project, a cultural resources field survey is recommended at each jurisdictional crossing to confirm that no potentially NRHP-eligible resources are present, or if present to allow avoidance measures to be taken via micrositing project features. Such action ensures no federal

nexus that would trigger the application of the NHPA. Furthermore, if Invenenergy decides to construct on land administered by the WOSLI, an archeological records review and coordination with the WOSLI and SHPO would be required.

Paleontological resources are afforded protection by federal and state statutes and policies as discussed above. The project area intersects fifteen geologic formations that span the Mesozoic and early Cenozoic Eras and have the potential to contain a variety of fossil types. The UW Fossil Vertebrate database lists seven fossil localities located in the project area and one locality located in the one-mile buffer.

Please let me know if you have any questions.

Sincerely,



Mark Willis  
Blanton & Associates, Inc.

*Attachments:*

*Figure 1 Project Location*

*Figure 2 Previously Recorded Cultural Resources*

*Figure 3 Geologic Formations, Potential Fossil Yield Classifications, and Fossil Localities*

