

Proposed Shaffer Mountain Wind Power Project Review of Potential Aquatic Resources Impacts

Prepared by

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Final Report

I. Experience and Qualifications

This evaluation report was principally prepared by Robert Hilliard of Mackin Engineering Company. Mr. Hilliard has a B.S. in Biology from Shippensburg University of Pennsylvania and 20 years' experience in environmental science. His professional expertise includes wetland delineation, permitting, and mitigation design; watershed conservation planning; resource conservation planning; freshwater and coastal wetland ecology; threatened and endangered species assessment; and terrestrial, aquatic, and marine ecological assessment.

The following is a brief summary of Mr. Hilliard's extensive experience in wetland science and aquatic resources permitting:

- *Mon/Fayette Transportation Project Environmental Impact Statement (EIS), PA Route 51 to Pittsburgh Segment, Allegheny County, PA - Client: PA Turnpike Commission* – As lead preparer of the EIS and project manager of all environmental tasks for this multi-billion dollar project, Mr. Hilliard participated in all aspects, including field wetland delineation and stream assessment, threatened and endangered species habitat characterization, terrestrial habitat evaluation, report preparation, public involvement, and agency coordination. He continues to be involved in the natural resource mitigation design for the project, which is ongoing.
- *Canaan Valley Institute Office/Training Facility EIS, Tucker County, WV - Client: Canaan Valley Institute* – Mr. Hilliard managed the preparation of the EIS for this project. This included supervising all environmental data collection and analysis, and reviewing and editing the document. The proposed project included construction of a new office/classroom facility and an access roadway from a major roadway in the vicinity.
- *Categorical Exclusion (CE) Evaluations for Pennsylvania Department of Transportation (PennDOT) Roadway and Bridge Projects* – Mr. Hilliard has served as project manager for more than 10 CE documents on PennDOT projects.

His responsibilities in this role have included wetland delineation, stream assessment, permitting, report preparation, and mitigation design.

- *Wetland Identification and Delineation* – Since joining Mackin, Mr. Hilliard has supervised or performed the identification and delineation of wetlands, and the preparation of Wetlands Identification and Delineation Reports, for more than two dozen projects in Pennsylvania and Maryland. Previous to his work with Mackin, Mr. Hilliard supervised or performed the identification and delineation of wetlands on numerous projects in at least eight states across the eastern US.
- *River Conservation Plans* – Mr. Hilliard supervised the cataloging of natural, historical, recreational, and socio-economic resources for five River Conservation Plans across Pennsylvania. This effort included the identification of threats to these resources; the analysis of problems and opportunities presented by their location and condition; and the development of recommendations to protect and enhance these resources. Mr. Hilliard was also responsible for the public presentation of the completed documents.
- *Watershed Management Plans* – Mr. Hilliard supervised the preparation of Preliminary Assessment Reports for watershed management plans for coldwater streams in Venango and Somerset Counties. For the preliminary assessment phase of these projects, Mr. Hilliard was responsible for developing and managing a work plan to characterize the chemical and aquatic condition of the stream, identify major threats to the stream or the surrounding habitat, and determine whether sufficient public support existed to proceed with a complete watershed management plan. The watershed management projects were managed by Mr. Hilliard under the guidelines established by the Pennsylvania Department of Conservation and Natural Resources' Coldwater Heritage Partnership Program, which focuses on improving habitat in coldwater streams that support, or could potentially support, reproducing trout populations.

II. Review of Available Materials and Site Inspection

Tucker Arensberg asked Mackin Engineering Company to render objective scientific opinions as to whether the proposed Shaffer Mountain Wind Farm project poses a danger to jurisdictional wetlands and other aquatic resources in the project vicinity. To that end, Mackin reviewed readily available background sources (e.g., USGS topographic mapping, Somerset County Soil Survey, Somerset County Natural Heritage Inventory), examined project-specific documents provided by Tucker Arensberg and its clients, and conducted a site visit.

The project-specific documents made available for our review consisted of the following:

- “Wetlands/Waterbody Delineation Report, Shaffer Mountain Wind Project, Phase 1 Development Site, Somerset and Bedford Counties, Pennsylvania”

(January 22, 2007) – prepared by AMEC Earth & Environmental, Inc. for Shaffer Mountain Wind LLC.

- “Application for Individual NPDES Permit for Stormwater Discharges Associated With Constructon [sic] Activities for the Shaffer Mountain Wind Energy Site, Somerset and Bedford Counties, Pennsylvania” (April 4, 2007) – prepared by AMEC Earth & Environmental, Inc.
- “Shaffer Mountain Wind Farm, Somerset and Bedford Counties, PA, Erosion and Sediment Control Plans for Access Roads and Substation Pad” (April 03, 2007) – prepared by AMEC Earth & Environmental, Inc. for Gamesa Energy USA Shaffer Mountain.
- “Shaffer Mountain Wind Farm, Somerset and Bedford Counties, PA, Post Construction Stormwater Management Plans for Access Roads and Substation Pad” (April 03, 2007) – prepared by AMEC Earth & Environmental, Inc. for Gamesa Energy USA Shaffer Mountain.
- “May 11, 2007 Meeting Summary for the Proposed Shaffer Mountain Wind Farm in Somerset and Bedford Counties, Pennsylvania” (May 21, 2007) – prepared by AMEC Earth & Environmental and submitted to Keith Largent, Erosion Control Specialist, Somerset Conservation District.
- “E&SPC Plan Technical Deficiencies – Shaffer Mountain Wind, LLC, Shaffer Mountain Wind Farm, Wind Turbine Project, Ogle & Shade Townships, Somerset County, Napier Township, Bedford County, NPDES Individual Permit Application PAI – 0556-07-001” (June 8, 2007) – technical deficiencies letter signed by Keith Largent, District Technician, Somerset Conservation District.

The site visit was conducted on June 16, 2007. Due to a limited amount of time available for field reconnaissance – and the absence of mapping to indicate the location of delineated wetlands – the site visit did not encompass all wetland and waterway locations for the project. Rather, it consisted of a cursory inspection of the proposed alignments of roadways C (northern portion only), D, E (western portion), and G (northern portion), along with the proposed turbine locations within each; and the proposed “Staging Area” and its associated roadway. In total, approximately half of the proposed turbine locations were viewed in the field.

III. Findings and Conclusions

For the purpose of clarity, the findings and conclusions of Mackin’s wetland analysis are categorized as follows: Methodology, Reporting Procedures, and Anticipated Impacts.

A. Methodology

The methodologies described for delineating wetlands and waterways in the “Wetlands/Waterbody Delineation Report, Shaffer Mountain Wind Project, Phase 1 Development Site, Somerset and Bedford Counties, Pennsylvania” (January 22, 2007) prepared by AMEC Earth & Environmental, Inc. for Shaffer Mountain Wind LLC [hereafter referred to as the wetland report], are consistent with professional practice in the field. The references cited for these methodologies are appropriate to current regulatory requirements.

The field observation of delineated wetland and watercourse boundaries was, as noted above, limited. However, of the wetlands observed in the field, the delineated boundaries appeared to be appropriately placed. No significant areas of wetland were observed without delineation flagging in place.

B. Reporting Procedures

Wetland report

The wetland report is presented in a format generally accepted within the field of wetland science. However, there were several pieces of information that were not included in the report that are critical to the analysis of potential effects on aquatic resources.

One omission from the wetland report is any reference to the Pennsylvania Chapter 93 Water Quality Standards stream classifications for waterways within the project study area. This information is vital to the analysis of potential impacts to aquatic resources because much of the proposed project is located within either the Clear Shade Creek and Piney Run exceptional value watersheds or Cub Run and Beaverdam Run high quality coldwater fisheries (Table 1). Streams with these classifications qualify for special protection under Chapter 93 and special protection is given to wetlands located within exceptional value watersheds under Pennsylvania Chapter 105 Dam Safety and Waterway Management. Further, the inclusion of the Pennsylvania Fish and Boat Commission (PFBC) classification of each of these waterways would have also been appropriate since it would have shown that each of the major streams within the project area supports wild trout production and that Piney Run – which is essentially located in the middle of the proposed area of disturbance for the project – is designated as a Wilderness Trout Stream. As it stands, there is no reference in the wetland report to any special protection afforded these waterways due to their outstanding water quality and natural character.

Another component missing from the wetland report is a clear discussion of impacts to aquatic resources from the proposed project. While this type of discussion is not always included in a wetland identification and delineation report, this particular report mentions efforts to avoid some aquatic resources and possible impacts to others, while not disclosing the impacts to the remaining resources at all. As a result, the reviewer is left to speculate as to whether some resources will be affected by the project or not.

For example, on page 22 of the wetland report, Section 3.2.1.11, "Cable Corridor West of where Easy Camp Road Crosses Piney Run," describes an emergent marsh/wet meadow identified in the text as Wetland/Waterbody Series KK. The concluding sentence of this section states, "In order to avoid disturbance to this area Shaffer Mountain LLC plans to cross these wetland/waterbodies through a single overhead cable." However, the very next section (3.2.1.12), which describes a headwater wetland identified as Wetland/Waterbody LL, has no discussion whatsoever of impacts or avoidance.

OHIO RIVER BASIN (Drainage List T)		
Stream Name	DEP Classification	PFBC Trout Waters
Clear Shade Creek <ul style="list-style-type: none"> Basin, Source to Windber Reservoir 	EV	Approved Trout Water, Supports Wild Trout Production
Cub Run	HQ-CWF	Approved Trout Water, Supports Wild Trout Production
Piney Run <ul style="list-style-type: none"> Basin, Source to T816 	EV	Approved Trout Water, Supports Wild Trout Production, Wilderness Trout Stream
Beaverdam Run <ul style="list-style-type: none"> Basin, Source to RM 1.93 	HQ-CWF	Approved Trout Water, Supports Wild Trout Production
Dark Shade Creek <ul style="list-style-type: none"> Basin, Source to Laurel Run 	CWF	
Shingle Run	CWF (headwater for Dark Shade)	
Little Dark Shade Creek	CWF (trib to Dark Shade)	
SUSQUEHANNA RIVER BASIN (Drainage List N)		
Stream Name	DEP Classification	PFBC Trout Stocked
Dunning Creek (main stem)	WWF	
Rocklick Creek	WWF	
Bentz Run	WWF (trib to Shawnee Branch)	

Table 1 - Project Area Streams and their classifications

In addition, the area south of the intersection of Roman Road and Mount Carmel Road is indicated on Figure 5 of the wetland report as “Proposed Laydown Area.” While there is no further description or detailed mapping provided for this area, it appears to directly impact Piney Run, a designated exceptional value stream and Wilderness Trout Stream.

Although there is a broad statement under Section 4.0, "Summary and Conclusions," that “Shaffer Mountain LLC plans to avoid impacts to all of the wetland/waterbody areas addressed in this report...,” this statement seems contradicted in the preceding paragraph, which states, “One area of concern is the width of the existing roads, where a stream or storm water drainage runs beneath the road through a culvert.... Due to the configuration of these areas, expanding the width of the road over these crossings may result in a disturbance and require a permit.”

There are also vague statements under several resource descriptions (e.g., Sections 3.2.2.3 through 3.2.2.7) that “REC is responsible for the existing transmission line corridors and is handling transmission line upgrades in these areas under their current operations.” This suggests that another entity may have impacts to wetlands within the project area, but that the referenced “upgrades” may be attributable to the proposed Shaffer Mountain Wind Farm project. If this is the case, Pennsylvania regulation is clear that *all* aquatic resource impacts attributable to a proposed project must be evaluated as a single and complete project. That is, Gamesa/Shaffer Mountain LLC would be responsible for addressing impacts to aquatic resources that resulted from the installation of their facility whether the impacts were physically carried out by them or not.

The wetland report raises a second issue related to single and complete projects as well. In the Introduction, the report states that “The project will be developed in two phases with the initial phase (Phase 1) being developed in the northern portion of the project area.... Shaffer Mountain Wind LLC is evaluating the potential for later development of up to an additional 60 MW in the southern portion of the project area.” Once again, Pennsylvania regulation is clear that *all* aquatic resource impacts attributable to a proposed project – whether at present or in the future – must be evaluated as a single and complete project at the time of initial project submission.

The reference to a second phase makes the issue of completeness uncertain. If it is correct that the project as currently proposed in both the wetland report and the National Pollutant Discharge Elimination System (NPDES) permit application is only Phase 1 of a two-phase project, then both the report and the application, along with their associated plans, are incomplete.

NPDES Permit Application

Mackin also reviewed the NPDES permit application for any indication of potential impacts to aquatic resources from the proposed project. As with the wetland report, there were several missing pieces of information that rendered an accurate assessment of proposed impacts to wetlands and waterways impossible.

First, wetland boundaries were omitted from the “Shaffer Mountain Wind Farm, Somerset and Bedford Counties, PA, Erosion and Sediment Control Plans for Access Roads and Substation Pad” (April 03, 2007) [hereafter referred to as ESCP] and the “Shaffer Mountain Wind Farm, Somerset and Bedford Counties, PA, Post Construction Stormwater Management Plans for Access Roads and Substation Pad” (April 03, 2007) [hereafter referred to as SWMP]. These omissions were noted not just by Mackin but also by the Somerset County Conservation District in its ESCP technical deficiencies letter dated June 8, 2007: “There is some indication that wetlands exist within the project area. The plan narrative illustrations identify a couple of them. However, no wetland report or study has been provided. Situated in a EV/High Quality watershed as this project is, upland wetlands may exist. Please provide documentation that this and other water resources, surface or otherwise have been adequately assessed and documented.” Based upon this comment, it appears the wetland report was not provided to the Somerset County Conservation District as part of the NPDES application as it should have been.

A second item that appears to be missing from the NPDES Permit Application is a detailed set of plans showing the exact limits of earth disturbance. There are several plan sheets in the ESCP on which the outer limit of earth disturbance shown does not vary as the proposed roadway passes over sloped areas. This is a physical impossibility since cutting a roadway into the hillside will result in either cut slopes or fill slopes that vary as they tie into existing topography. Similarly, proposed sediment basins are shown to be roughly equivalent in size on the plan sheets while the Sediment Trap Design Table (ES-18) indicates that the actual basin sizes vary by as much as 40 feet in length and 15 feet in width.

Once again, this deficiency was also noted by the Somerset County Conservation District in its June 8 letter: “Proposed contours/grades of all earth disturbance, access roads specifically per this comment need to be shown on the *plan drawings* [author’s emphasis].” Without a true depiction of proposed earth disturbance limits, it is not possible to assess impacts of the project upon existing natural resources accurately.

Finally, there are several features and proposed improvements indicated in the wetland report that are not shown in the ESCP. This includes the “Proposed Laydown Area” described above, improvements to the existing roadway between Segment E and Segment H (near the “staging area”), and the proposed new substation. Each of these locations is located immediately adjacent to aquatic resources. Their presence in the wetland report but absence from the ESCP calls into question the reliability of both documents.

C. Anticipated Impacts

Although it is not possible, in the absence of mapping clearly delineating aquatic resource boundaries and exact earth disturbance limits, to render an accurate accounting of impacts, it is possible to infer with some certainty the location and types of impacts that may occur. The following sections attempt to identify impacts to aquatic resources from the proposed project based upon the information provided.

1. Direct Impacts to Wetlands and Streams

A review of the disturbance limits shown in the ESCP indicates several areas where direct impacts (i.e., fill placement or excavation) to aquatic resources are likely.

One of these areas is along the existing power line right-of-way at the extreme southern part of the proposed project. If, as indicated in the wetland report narrative, this transmission line will be widened to accommodate new lines from the Shaffer Mountain Wind Farm, as many as eleven wetland complexes (named in the wetland report as Series M through W) located immediately adjacent to the existing line would likely be impacted.

Another likely wetland impact site is along Road D (as identified in the ESCP), where one of the proposed turbine locations appears to encroach upon a headwater wetland identified in the wetland report as Wetland/Waterbody LL. Based upon the ESCP mapping, it appears that the eastern limit of turbine site B22 will infringe upon the wetland boundary.

It appears that the roadway within Segment F (as identified in the ESCP) will also encroach upon an existing wetland. This wetland is described in the report as a forested depressional wetland located only a few feet from the bank of the main channel of Piney Run, which would indicate that it is an exceptional value wetland. The apparent impact would occur as a result of roadway construction between turbines A35 and B5.

Also, as described above, it is unclear whether the “Proposed Laydown Area,” improvements to the existing roadway between Segment E and Segment H, and the proposed new substation will be constructed. If they are to be constructed, it appears that each of these areas will encroach upon existing wetlands. Other wetland locations where direct impacts from the proposed project appear possible, but the mapping is insufficient for a determination, include Series C, E, F, J, and II.

2. Indirect Impacts to Wetlands and Streams

There are at least two locations within the proposed project area where indirect impacts – effects to the hydraulic forces or hydrologic regime of a resource – to wetlands appear not only likely, but unavoidable under the current design. For example, Series II, a headwater tributary to the exceptional value and Wilderness Trout Stream Piney Run, currently begins at roughly 2600 feet in elevation. As described in the wetland report, this tributary contains flowing water and a substrate composed of mixed sand and small to large cobble. As a headwater drainage, this tributary currently receives surface flow from the ridge above it, which extends up to approximately 2640 feet in elevation. However, roadway Segment G (as identified in the ESCP) is proposed to pass immediately upslope of the headwater tributary (perhaps, as noted above, close enough to have direct impacts as well), effectively intercepting this stream's surface water supply. As shown on sheet ES-11 of the ESCP, clean water that currently enters Series II from upslope would be intercepted by a drainage channel on the upslope side of the roadway

and conveyed approximately 400 feet to the north or 350 feet to the south of the existing headwater. Based upon the limited contour detail provided on the ESCP sheet, it appears that the relocated flow would, at a minimum, permanently bypass the upper reaches of Series II for several hundred feet.

A similar condition exists where Segment D passes upslope (and perhaps directly impacts) wetland Series LL. At this location, some of the water approaching the roadway from upslope would be directed approximately 600 feet to the north and discharged into an adjacent headwater drainage. This design would not only permanently reduce the amount of water available to wetland Series LL, but would also permanently increase the surface flow of water into the adjacent tributary (known locally as Berkeybile Run) to Beaverdam Run, a High Quality Coldwater Fishery. This increase in surface water volume would change the hydraulic characteristics of the stream flow, risking increased channelization, bank erosion, and sediment loading in this currently stable tributary.

3. Sedimentation Impacts to Wetlands and Streams

In addition to the direct and indirect impacts described above, high potential exists throughout the project area for impacts to the exceptional value and high quality coldwater fishery aquatic resources. While questions remain about the effectiveness of some of the proposed sediment control measures (such as the ability to maintain a vegetated grass buffer adjacent to roadways in an area that is densely wooded – and therefore shaded – and has poor existing soil conditions), the proposed roadway alignment itself seems to invite aquatic resource degradation from sedimentation.

Specifically, roadway Segments A, C, E, and H are proposed to traverse extremely steep slopes. Segment A would climb approximately 130 feet in elevation within a horizontal distance of 2400 feet, Segment C would climb approximately 110 feet within a distance of 1800 feet, Segment E would climb approximately 120 feet within a distance of 1900 feet, and Segment H would climb approximately 65 feet within a distance of 1100 feet. Each of these roads would then be left in a finished condition of compacted soil covered with gravel.

However, during the site reconnaissance, virtually every road in the vicinity with a slope approximating these proposed segments showed evidence of washed gravel, gully/washout formation, and downslope sediment deposition. In effect, the project's roadways will be conduits for – and sources of – sediment flow that will directly or indirectly be deposited into the receiving aquatic resources. Given the thin, weak soil conditions within the project area, the shallow depth to bedrock (as shown in the ESCP boring logs), and the steep slopes upon which these new roadways are proposed, there is every reason to believe that the exceptional value and high quality coldwater fishery streams in the project area will receive sediment degradation from the construction of the project's roads.

IV. Regulatory Implications

Based upon an understanding of the existing conditions within the project area and the limits of disturbance of the proposed project as described above, there are several regulatory steps that appear to be indicated. Foremost among these, as the Somerset County Conservation District stated in their June 8 letter to Shaffer Mountain Wind LLC, the current ESCP and NPDES permit application are deficient. Substantial additional detail must be supplied before the proposed project can be considered. Specifically, proposed contours and grading details for all earth disturbance should be provided, and wetlands and streams should be clearly identified with perimeter boundaries on these drawings to determine the extent of project impacts.

If aquatic resources will be impacted as a result of the proposed project, as it seems they will, an individual Pennsylvania Chapter 105/US Section 404 joint permit application will be required. This permit application will require a detailed alternatives analysis, including the analysis of off-site alternatives for the proposed project. A valid NPDES permit cannot be issued to the applicant until a Chapter 105/US Section 404 permit approval is received.

Due to its designation as a Wilderness Trout Stream, any permit request within the Piney Run watershed should receive careful scrutiny from the PFBC as a reviewing agency. As defined by the PFBC: "Wilderness trout stream management is based upon the provision of a wild trout fishing experience in a remote, natural and unspoiled environment where man's disruptive activities are minimized. Established in 1969, this option was designed to protect and promote native (brook trout) fisheries, the ecological requirements necessary for natural reproduction of trout and wilderness aesthetics. The superior quality of these watersheds is considered an important part of the overall angling experience on wilderness trout streams. Therefore, all stream sections included in this program qualify for the Exceptional Value (EV) special protected water use classification, which represents the highest protection status provided by the Department of Environmental Protection (DEP)." It appears the current project design will have unavoidable sedimentation impacts to Piney Run. Recent research indicates that the small sediment particles (< 0.063 mm) commonly associated with unpaved forest roads like those proposed for this project are the size that impacts wild trout reproduction.¹ Therefore, the proposed project may permanently alter the very condition that allows Piney Run to achieve this designation.

¹ Kaller, M., K. J. Hartman, and T. Angradi (2001). Experimental determination of benthic macroinvertebrate metric sensitivity to fine sediment in Appalachian streams. Proceedings of the Southeastern Association of Fish and Wildlife Agencies 55:000-000.