

Attachment D
Addendum to Ice Throw Risk Assessment

Westwood

April 13, 2022

ADDENDUM TO ICE THROW RISK ASSESSMENT

Grover Hill Wind Farm

Paulding County, Ohio

APRIL 2022

PREPARED FOR:



PREPARED BY:

Westwood

Addendum to Ice Throw Risk Assessment

Grover Hill Wind Farm

Paulding County, Ohio

Prepared For:

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Project Number: 0015695.00

Date: April 13, 2022

Report Update

Westwood Professional Services bears no responsibility to update this report for any changes occurring subsequent to the final issuance of this report.

Revision History

Revision No.	Revision Purpose	Date	Revised By
0	Draft for review	4/16/2021	J. Haley
1	Update for 4 turbine moves	4/23/2022	J. Fine

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1.0 Introduction

This document serves as an addendum to the original ice throw risk assessment performed by Westwood Professional Services on April 21, 2021 and included in the site permit application submitted on May 21, 2021.

Recent changes to the proposed turbine layout resulted in the relocation of turbines T26, T31, T34, T43. Westwood conducted supplemental analysis to determine if the modified layout meets compliance with setback regulations detailed in the original assessment.

The following is a summary of the supplemental analysis.

2.0 Wind Turbine Locations

The candidate turbine is the same model assumed in the prior study, namely the Vestas V162 as detailed below.

Rated Power: 6 MW
Rotor Diameter: 162 m (532 ft)
Hub Height: 119 m (390 ft)
Cut-in Wind Speed: 3 m/s (6.7 mph)
Cut-out Wind Speed: 24 m/s (53.7 mph)
Nominal RPM: 10.9 rpm
Tip Speed: 92.5 m/s (207 mph)

The table below details the differences in locations and the distances between the original and the modified locations.

Table 1: Coordinates of Modified Turbine Positions

UTM Zone 16, NAD83m Meters						
Original Turbine Locations			Modified Turbine Locations			Shift Dist (m)
Easting (m)	Northing (m)	ID	Easting (m)	Northing (m)	New ID	
711657	4545215	T-26	711657	4545299	T-26a	84
711098	4542888	T-31	711090	4542864	T-31a	25
712830	4543215	T-34	712912	4543222	T-34a	82
711811	4541743	T-43	711809	4541788	T-43a	45

3.0 Conclusions and Recommendations

The regulations for the state of Ohio require that:

- The risk of ice throw be reported at the property boundary and public road that are nearest to a wind turbine.
- The probability of a 1-kg fragment of ice landing beyond the statutory property line setback (turbine blade length plus 1,125 ft which equals 1,391 ft or 424 m) for each turbine location is less than one per cent per year.

The results of the Monte Carlo simulations from the original assessment are valid, and no additional modeling is required. To demonstrate compliance, GIS mapping tools were used to determine if the modified turbine locations increased the risk originally found. None of the modified turbine locations are placed closer to property boundaries or public roads than were analyzed prior to the layout shifts. Therefore, it is determined that the following conclusions are still accurate and considered valid for the updated layout. No further analysis is required.

- The results are based on the assumption that the wind turbine is in operation during an icing event. The estimated probabilities are calculated for a 0.5 kg and a 1-kg ice fragment landing in a 1 m² area of ground as a function of distance and all directions from the turbine.
- It is unlikely that an ice fragment would travel farther than approximately 320 meters (1,050 ft). Therefore, the probability of a 1-kg fragment of ice being thrown a distance of 1,391 ft is zero, which is less than the compliance criteria of one percent per year as per the Ohio state regulations.
- For the largest turbine being considered for the project (Vestas V162-6.0-119), the distance to the nearest public road is 222 m (727 ft). The nearest public road is Township Highway T18 running east-west which is south of turbine T38. The probability of a 1-kg ice fragment landing on the public road is 0.0003 % or once in 333,333 years.
- The nearest participating property boundary is the boundary between land parcels 130-P and 143-P, which is 6 m (19.3 ft) north of turbine T25. The probability of a 1-kg ice fragment landing at that location is 0.0116% or once in 8,621 years.
- The nearest non-participating property boundary is the boundary between land parcels 73-P and 94-NP, which is 425 m (1,394 ft) southwest of turbine T13. The probability of a 1-kg ice fragment landing at that location is zero since it is beyond the maximum throw distance of 320 m (1,050 ft).
- There are no buildings that are within the potential strike zone of ice-throw fragments. The maximum throw distance of a 1-kg ice fragment is approximately 320 m (1,050 ft) and the probability that the fragment throw distance would be greater than the statutory property line setback of 1,391 ft is less than one percent per year (in fact it is zero) which is in compliance with the Ohio state regulation requirement.

**This foregoing document was electronically filed with the Public Utilities
Commission of Ohio Docketing Information System on**

5/26/2022 3:10:59 PM

in

Case No(s). 20-0417-EL-BGN

Summary: Application - Part 6 of 7 Attachment D – Ice Throw Assessment
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