Wind Generation Feasibility Study

For

Sac & Fox Tribe of the Mississippi in Iowa Meskwaki Nation

by

Wind Utility Consulting, PC

March 19, 2013

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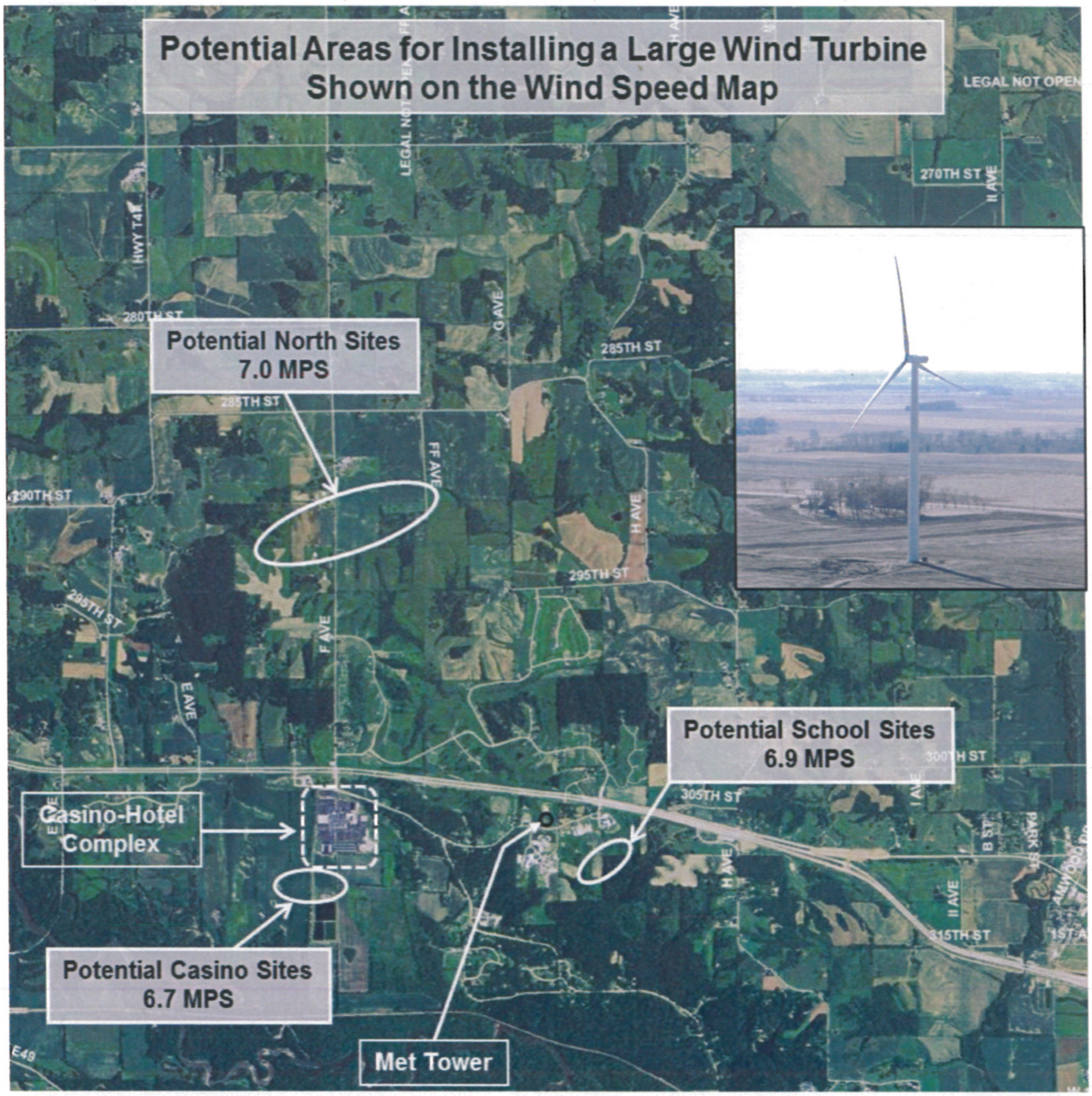
APPENDICES

OVERVIEW AND EXECUTIVE SUMMARY

Wind Utility Consulting, PC ("Consultants") has evaluated the financial feasibility of installing a large wind turbine for Meskwaki Casino and hotel complex ("Meskwaki") for the purpose of reducing its purchases of electricity. The GE 1.6 MW wind turbine with a 100-meter rotor blade diameter and an 80-meter hub height was determined to likely be the most economic option for Meskwaki at this time. Figure 1 shows three potential areas where this wind turbine could be installed. The picture inset is of a similar turbine with slightly shorter blades that was recently installed near Grand Junction, Iowa.

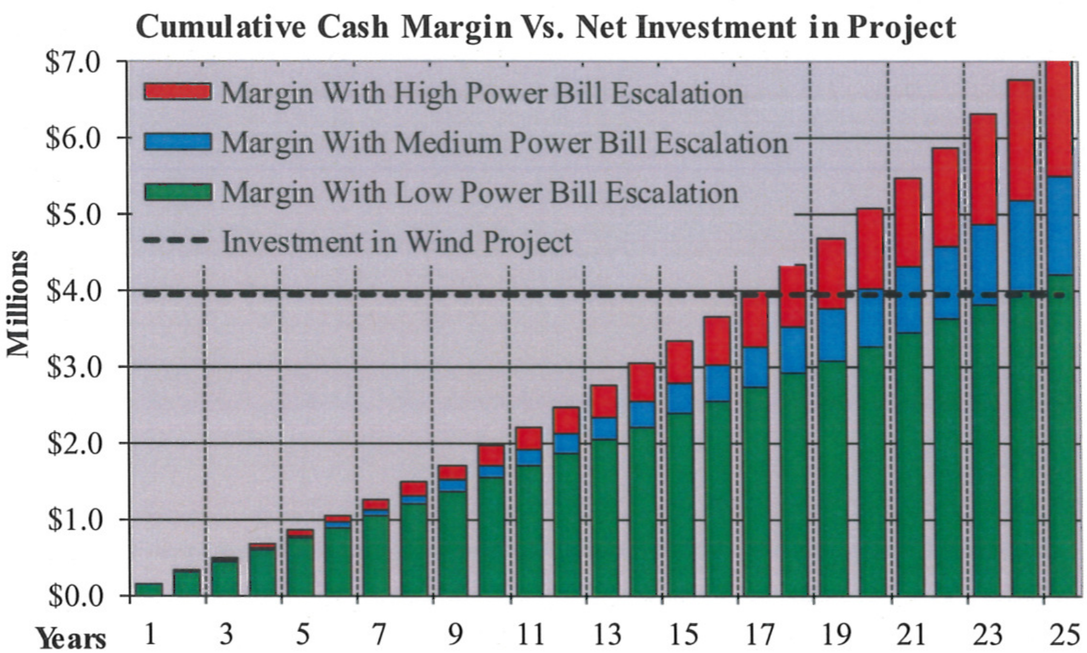
FIGURE 1



The proposed wind turbine is estimated to cost $3.7 to $4.0 million installed, depending upon the location and would stand 427' tall. Based on a comprehensive analysis of the wind speed data from Meskwaki's meteorological test tower, the 80-meter hub height wind speed is estimated to average between 15.0 mph to 15.7 mph. At these average wind speeds, the turbine would typically generate 5.7 to 6.1 million kWh annually, which would supply roughly 42% of the casino's needs, or 28% of the combined needs of the casino, hotel, and power plant. This would reduce Meskwaki's electricity purchases from the TIP Rural Electric Cooperative by about $255,000 per year. Although these power bill savings should generally increase in the future as electricity prices rise, there is considerable uncertainty in the longer-term savings. Therefore, three power bill savings escalation scenarios were evaluated for this feasibility study; 3%, 4%, and 5% annually. This range of rate escalation was based on the judgment of the Consultants. The operating cost for the wind turbine will initially be about $100,000 annually, with gradual escalation over time due to inflation. Initially the operating cash margin will be about $150,000 per year. This margin will increase as the power bill savings escalate over time.

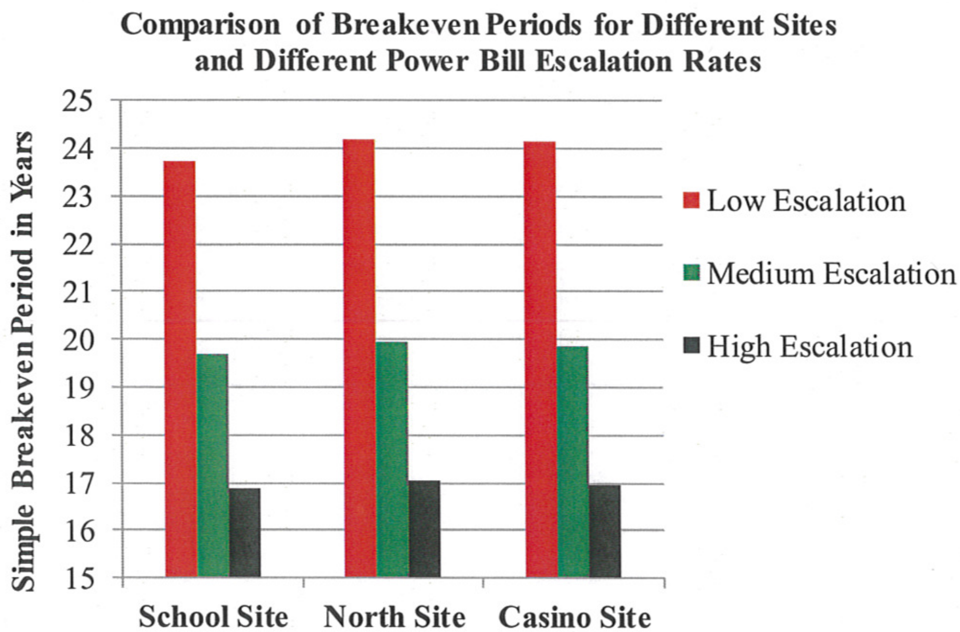
Figure 2 illustrates how this operating cash margin accumulates over time for the three different power bill savings escalation scenarios. The green bars show that for the low power bill escalation rate scenario, the accumulated margin eventually escalates up to the black dotted line, which is the total project cost for installing the wind turbine near the Meskwaki School. The bars cross the line on the 24th year of operation, meaning that the project achieves a simple break-even payback period after 24 years of operation if electric rates go up 3% per year. If electric rates increase at 4% per year, the break-even period drops to 20 years. The red bars show the break-even period drops even more to 17 years with 5% rate escalation.

FIGURE 2



The financial analysis for the three potential sites revealed that the simple payback was about the same. The site with the highest wind speed and highest kWh production was the north site. However, the additional power bill savings from the higher production were offset by the higher up-front capital cost and the extra $6,000 per year that would be paid to the local landowners for the land and wind easement lease. Likewise, the casino site had the lowest wind speed and production, but it also would have the lowest up-front cost. Figure 3 shows how the simple break-even payback period changes for the three different sites and the three power bill escalation rates.

FIGURE 3



There is always some degree of uncertainty in any feasibility study that looks 25 years into the future. The uncertainty associated with five key assumptions has been evaluated, and the change in the break-even period is typically plus or minus 1 to 2 years for most of the key assumptions. However, the assumption having the largest impact on the break-even period is the escalation rate for the power bill savings, as illustrated in Figure 3 above.

Generally, investors have accepted simple paybacks of up to 10 to 15 years for large wind turbines. Paybacks longer than that are not attractive because of the potential negative impact of the many uncertainties in the future. Since the paybacks found in this analysis are longer than that, most investors would not look favorably on this project, unless they were trying to help the environment, or make a public statement about their care for the environment.

Appendix 1 contains some maps of Iowa showing the land elevation, land cover types, and a wind speed map with the location of the large wind turbines in Iowa. Appendix 2 shows technical and statistical details of the Consultants' comprehensive analysis of the meteorological test tower data. Appendix 3 contains a 20-year financial pro forma analysis of the wind project.

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Andrew T. Coil
Wind Utility Consulting, PC

ANALYSIS OF MET TOWER DATA

The economics of wind generation projects depend primarily on these two key factors: 1) the wind resource or wind speed at the site of the turbine, and 2) the value of the electricity produced by the wind turbine.

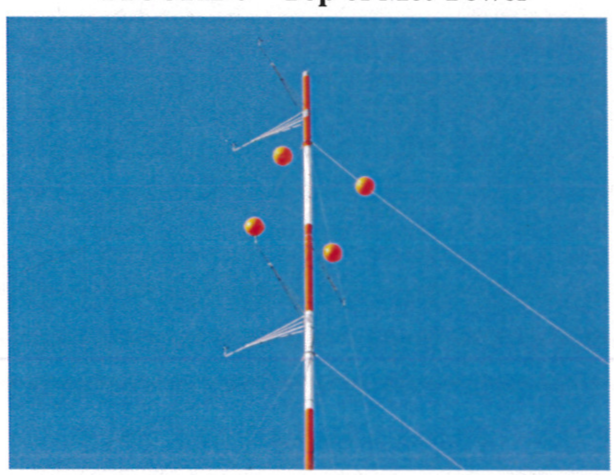
The wind resource assessment is based on an analysis of wind speed data from a meteorological test tower ("met tower") installed by Multiband Engineering and Wireless, Midwest, Inc ("Multiband") in August of 2010. The met tower location is shown in Figure 4 below.

FIGURE 4 – Aerial Photo Showing Met Tower Location

Figure 5 shows the base of the met tower with its logger. Figure 6 shows the top of the met tower with 4 booms, each with an anemometer. The orange balls visually mark the guy wires.

FIGURE 5 – Base of Met Tower

FIGURE 6 – Top of Met Tower



The anemometers on the met tower measure the wind speed at 58.5 meters (192'), 48.5 meters (159'), and 38.5 meters (126') above ground level. Two wind vanes measure the direction of the wind at 52 meters (171') and 37 meters (121'). A temperature sensor on the tower provides data that helps determine if the anemometers are iced over and not measuring the wind speed.

Multiband provided the Consultants with 19 months of usable data from the met tower. The Consultants then cleaned up the data by: 1) removing "zero" wind speed data caused by anemometers that were frozen, and 2) adjusting for anemometers that were directly downwind from the tubular met tower, which shields the anemometer from the wind.

Table 1 presents the monthly average wind speeds starting with the data from the top-level anemometers that have 58.5 meter heights. This data has been cleaned up, adjusted to represent the long-term average, and then finally extrapolated to an 80-meter height, which represents the hub height of a large wind turbine. The monthly wind speeds in Column F are the Consultants' best estimates of the wind speeds at the met tower location. The Consultants project the long-term average wind speed to be 6.93 meters per second ("mps") at an 80-meter height at the met tower location. This is 15.5 mps at 262' high. The last column of the table shows monthly wind speeds the Consultants derived from the Iowa Energy Center's ("IEC") wind resource database. The Consultants have found the IEC data to be fairly accurate for all but the hilly areas of northeastern Iowa. The IEC derived average is 7.10 mps, which is only 2.4% higher than the wind speed derived from the met tower data. This is surprisingly close for comparing different wind speed estimates, and it provides a measure of comfort in the validity of the met tower data.

The notes at the bottom of Table 1 provide some additional details on the derivation of the wind speed estimates.

Appendix 2 shows more details from the met tower data analysis.

TABLE 1

Summary of Meskwaki Met Tower Wind Speed Data						
Month	Years of Data	Average Wind speed 58.5 meters in MPS	Average Wind speed 80 meters in MPS	LTA Multipliers 80 Meters % of Normal	LTA Wind Speed 80 Meters in MPS	Estimates Based on IEC Database 80 Meters in MPS
Column A	B	C	D	E	F	G
January	2	6.421	7.141	100.8%	7.199	7.202
February	2	6.673	7.420	95.9%	7.117	7.136
March	2	6.553	7.287	100.0%	7.288	7.537
April	2	7.004	7.789	94.7%	7.380	7.883
May	2	6.689	7.439	94.2%	7.011	6.914
June	2	6.008	6.682	89.6%	5.988	6.020
July	2	4.871	5.417	107.9%	5.846	6.663
August	2	4.884	5.432	110.5%	6.000	5.818
September	2	5.654	6.288	106.7%	6.712	7.041
October	1	6.519	7.249	106.3%	7.705	7.729
November	0	-	-	96.1%	7.166	7.455
December	1	6.174	6.865	113.0%	7.755	7.802
Averages …………		6.132	6.819	101.3%	**6.931**	7.100

Notes:

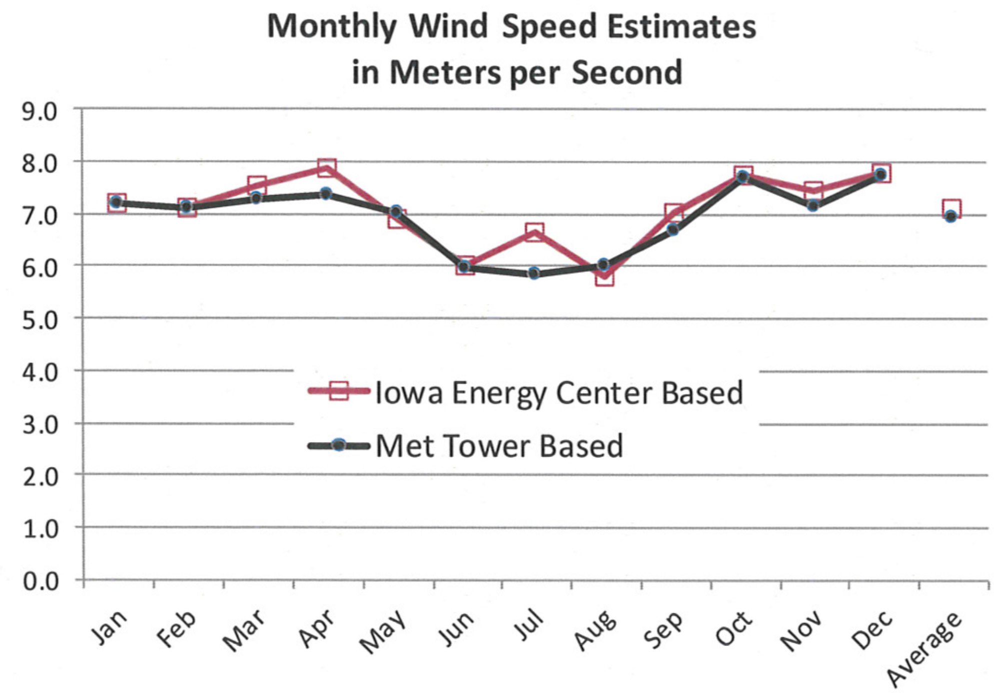
- Column C represents the average of the two anemometers mounted at the 58.5 meter height after the data has been adjusted for icing and tower shadowing.

- Column D are the column C wind speeds adjusted upwards by a factor of 1.1121, which represents a wind shear exponent of 0.285. To add some level of conservatism, this exponent was adjusted downward from the value of 0.31 which was derived from the met tower data.

- Column E data are monthly wind speed Long Term Adjustment ("LTA") factors derived from the Marshalltown airport wind speed data that was collected concurrently with the met tower data. They indicate whether the airport wind speeds for the met tower period of measurement were faster or slower than the most recent 10-year period average at the airport. A factor over 100% indicates the winds were slower than normal during the measurements.
- Column F is column D times Column F and it is the Consultant's best estimate of the long-term wind speed at the met tower location at 80 meters high. The estimate for November is Column E times Column G.

Figure 7 illustrates the monthly met tower wind speed estimates, based on the met tower data and on the IEC data. This data was shown previously in Columns F and G in Table 1. Although there are some differences between the monthly estimates, the two averages for the year shown by the last data points are fairly close, with only a 0.17 mps difference, which is 2.4%.

FIGURE 7



The wind rose chart in Figure 8 depicts the amount of time during the year that the wind blows from different directions. North is at the top at zero degrees. Figure 9 shows the directions where the most wind-generated power could be produced by a wind turbine. It takes into account how fast the wind blows from the various directions.

FIGURE 8

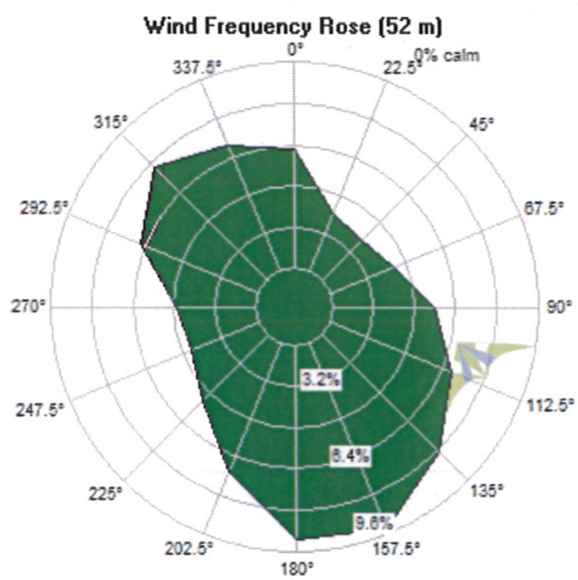
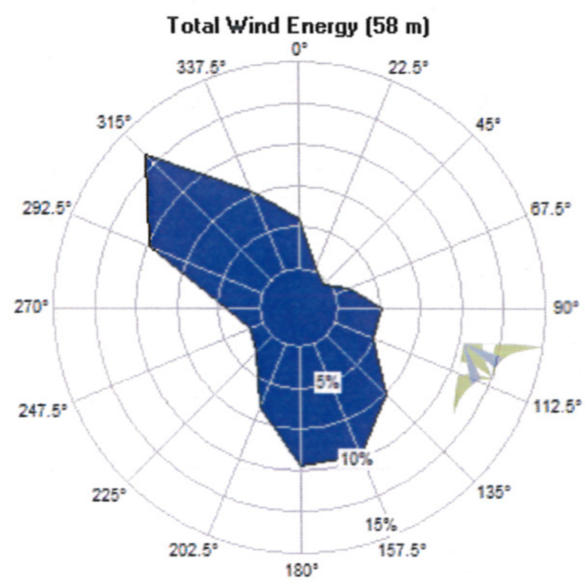
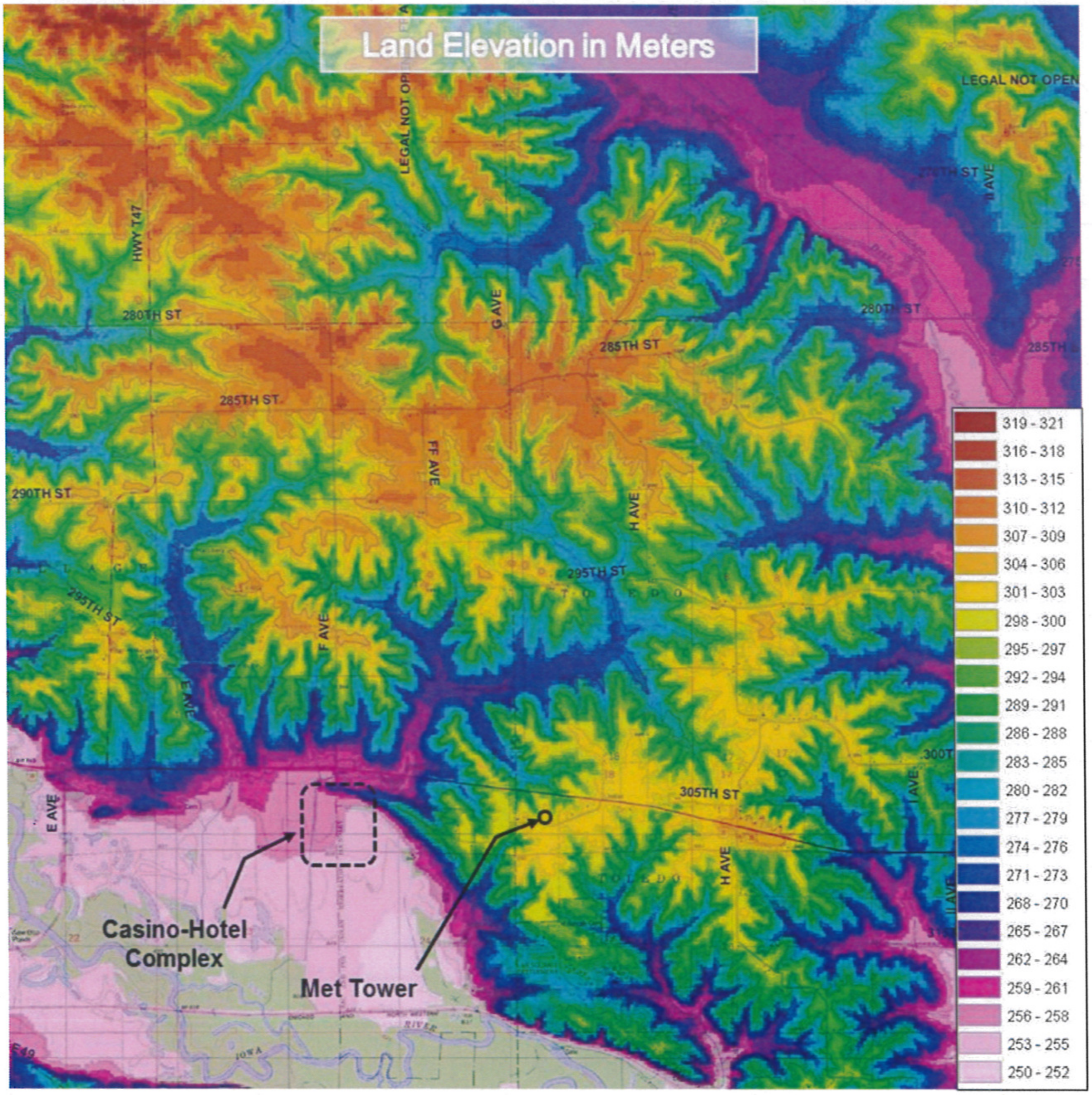


FIGURE 9



Based on using this long-term adjusted median wind speed estimate of 6.931 mps (15.5 mps) at the met tower site, a high-spatial resolution wind speed map was developed for the Meskwaki area using the ReSoft program called "Wind Farm". Development of this map requires high-spatial resolution elevation data and types of ground cover. The elevation data around the Meskwaki facilities is shown in Figure 10. This data was used in the Wind Farm program.

FIGURE 10



Ground cover data is presented in Figure 11. The orange and yellow areas have crops or pasture, the brown areas are wetland areas, while the green areas represent grasslands or trees. Tree and shrub cover reduces the wind speeds to some extent, even at typical wind turbine hub heights. The data shown in Figure 11 was converted into a surface roughness factor used by the Wind Farm program.

FIGURE 11

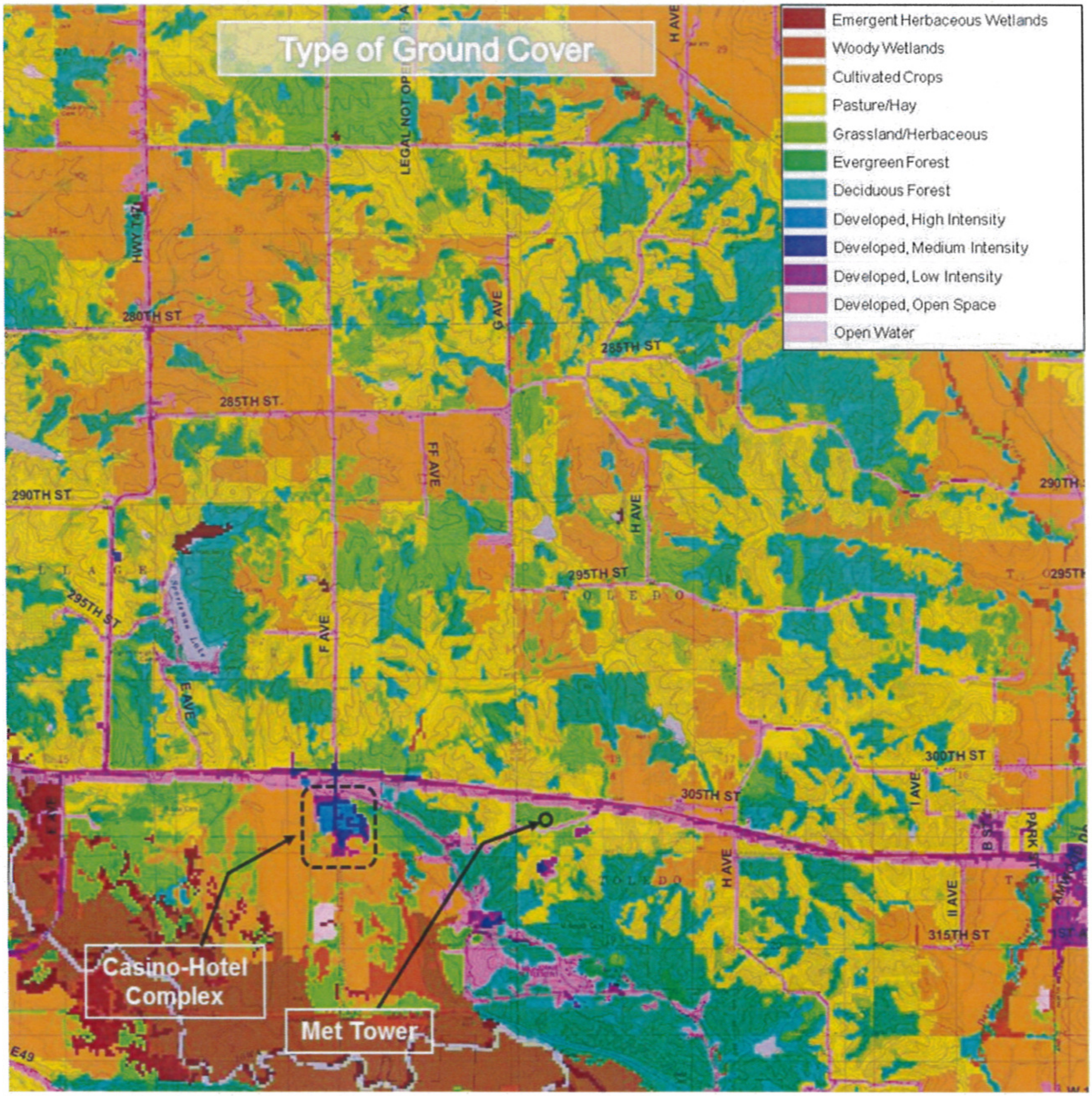
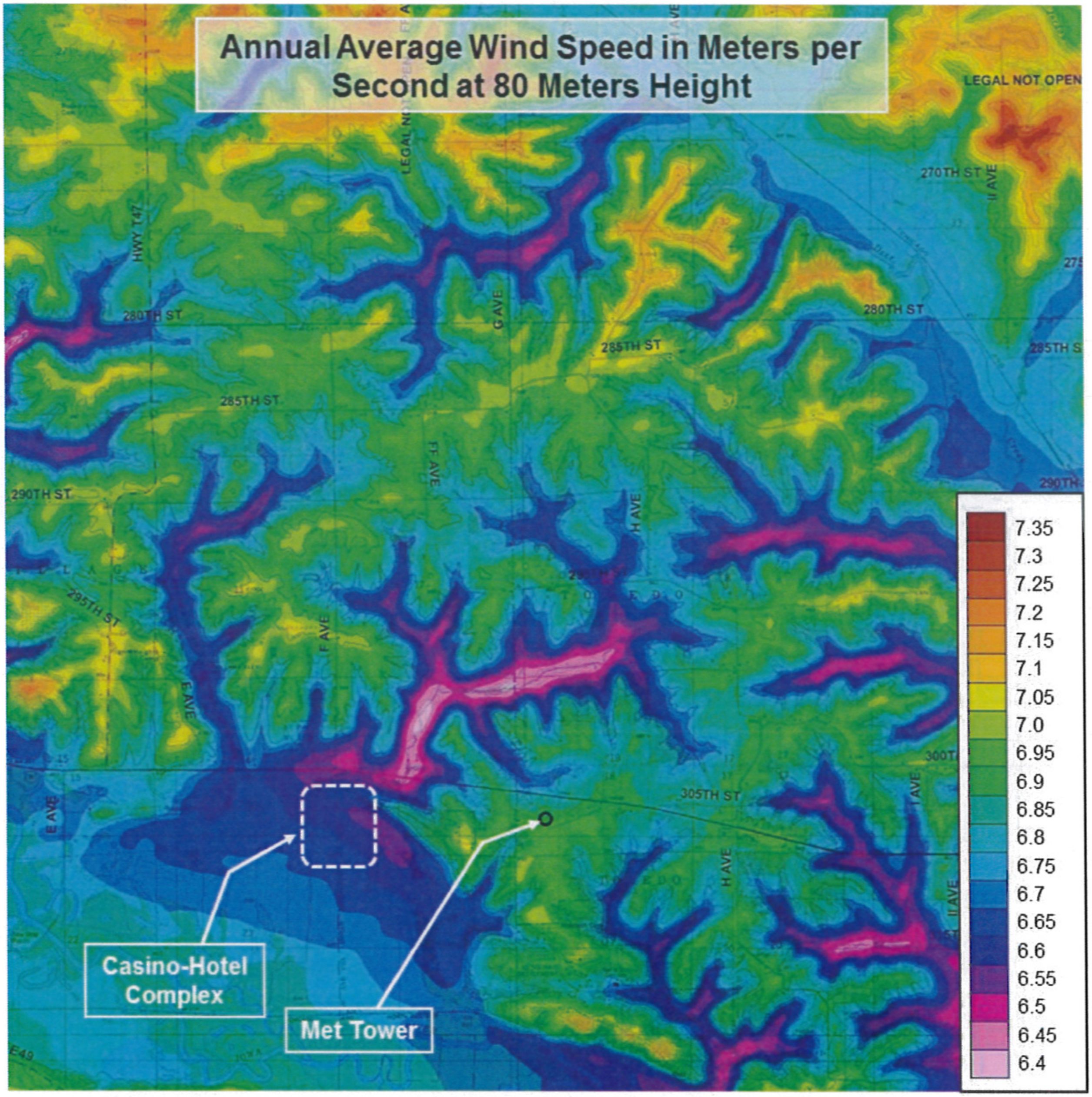


Figure 12 is the resulting high-spatial resolution wind speed map produced by the Wind Farm program. It is based on the 6.931 mps wind speed estimate at the met tower site, and all of the elevation and ground cover data shown in the previous two figures.

FIGURE 12



As the map indicates, the windiest areas are in the rural areas on high ground and away from the tree cover and drainage areas. Wind turbines are most productive and generally more profitable in these windier areas.

POTENTIAL WIND TURBINE SITES AND ENERGY PRODUCTION

Based on the Consultants' evaluation and discussions with the staff at Meskwaki, three sites were evaluated for the installation of a large wind turbine. Figure 13 is the wind speed map with the three potential sites identified that are east of the school, south of the casino, and on privately owned farmland 1.5 miles north of the casino.

FIGURE 13

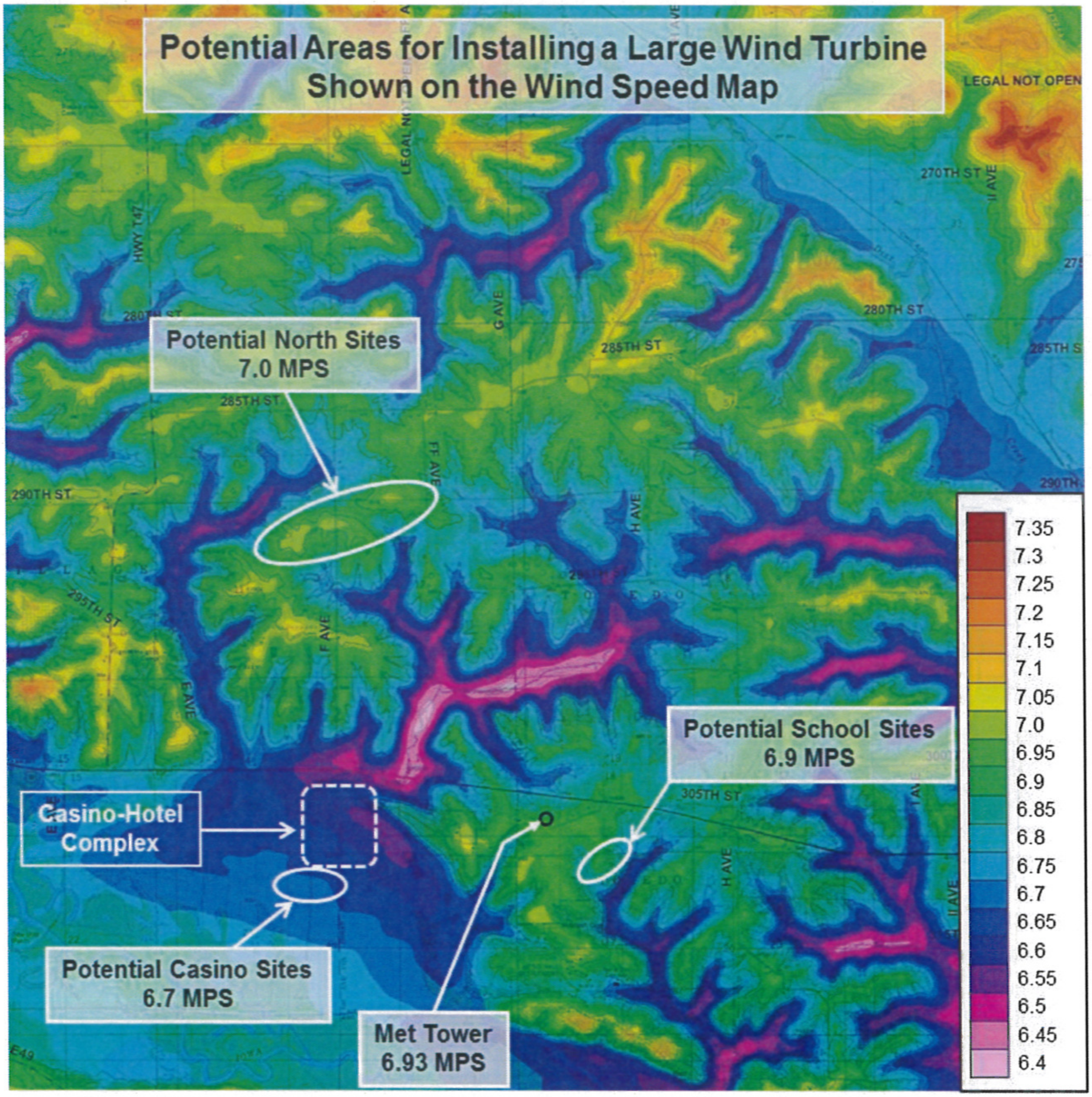
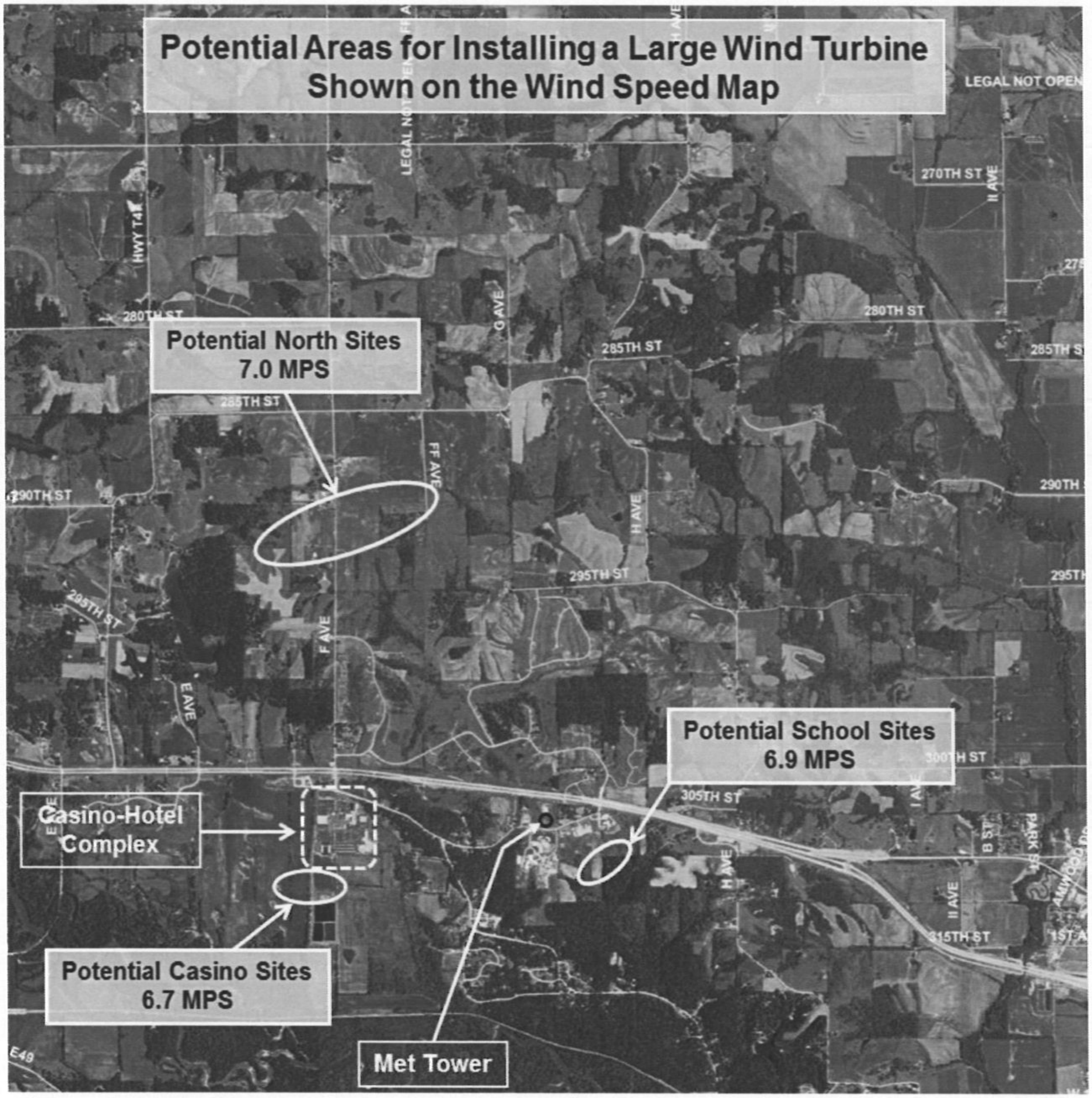


Figure 14 is an aerial photograph of the same identical area and the same three potential sites.

FIGURE 14



The Consultants recommend that a wind turbine be set back from property lines and roads by the "fall-down" height, which is about 430' for the wind turbine model evaluated in this feasibility study. Furthermore, the Consultants recommend a setback minimum of 1,500 feet from homes and businesses.

Each of the three sites was also evaluated for the noise levels and shadow flicker they might cause for nearby residents.

Evaluation of Potential Sites for Noise

Figure 15 depicts the calculated sound levels for a large 1.6 megawatt ("MW") wind turbine installed east of the tribal school. The Consultants consider a noise level of 45 dBA to be acceptable in quiet areas. Residents in areas with more background noise, such as that caused by traffic on a major highway like Highway 30, would quite likely accept even higher noise levels. People in commercial areas or schools also accept higher noise levels, again because of the higher background noise levels. The Consultants would anticipate the residents living along the Meskwaki Road (Reservation Highway 1) southwest of the potential turbine site would possibly notice the turbine's noise more often than anyone else. They would hear the "swoosh" of the blades on days with light winds when their windows facing the turbine are open. However, they would likely not hear the "swoosh" on windier days when the sound of the wind blowing through the branches and leaves of the nearby trees would mask the noise from the wind turbine. Based on the noise contours shown in Figure 15, a wind turbine installed nearby should not cause noise levels that would be objectionable.

FIGURE 15

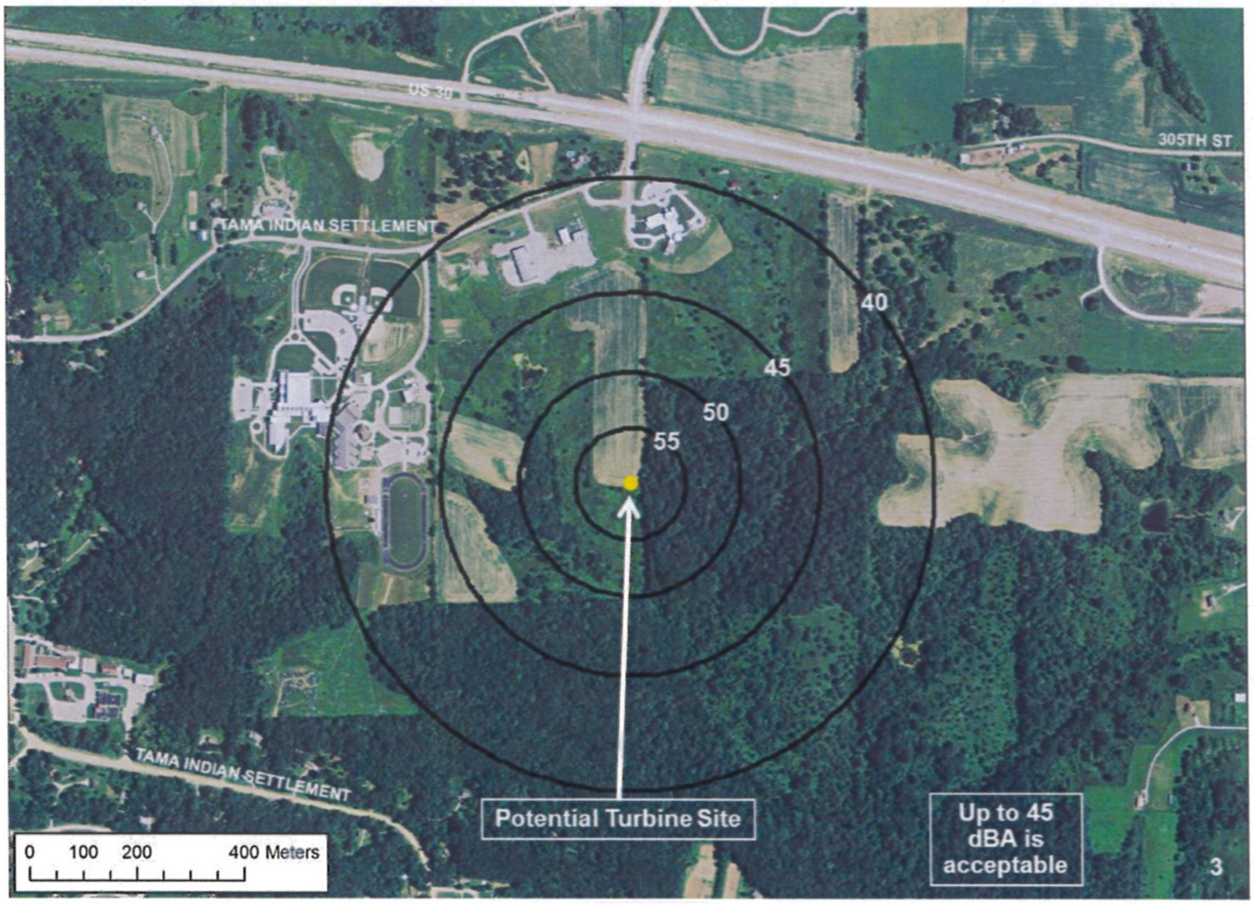


Figure 16 shows the noise contours for a wind turbine installed near the casino. The nearest home is about 3,700 feet east of the potential turbine site by the casino. Although the casino and hotel are closer, the higher ambient noise levels in those facilities would more than mask any noise from the turbines. The camper sites south of the casino are about 1700' feet from the turbine site shown. The turbine noise level of about 40 dBA would be noticeable there on several days of the year, especially when the wind is blowing from the southwest and the campers' windows are open. The turbine could be moved further south and west if this is deemed to be a potential problem.

FIGURE 16

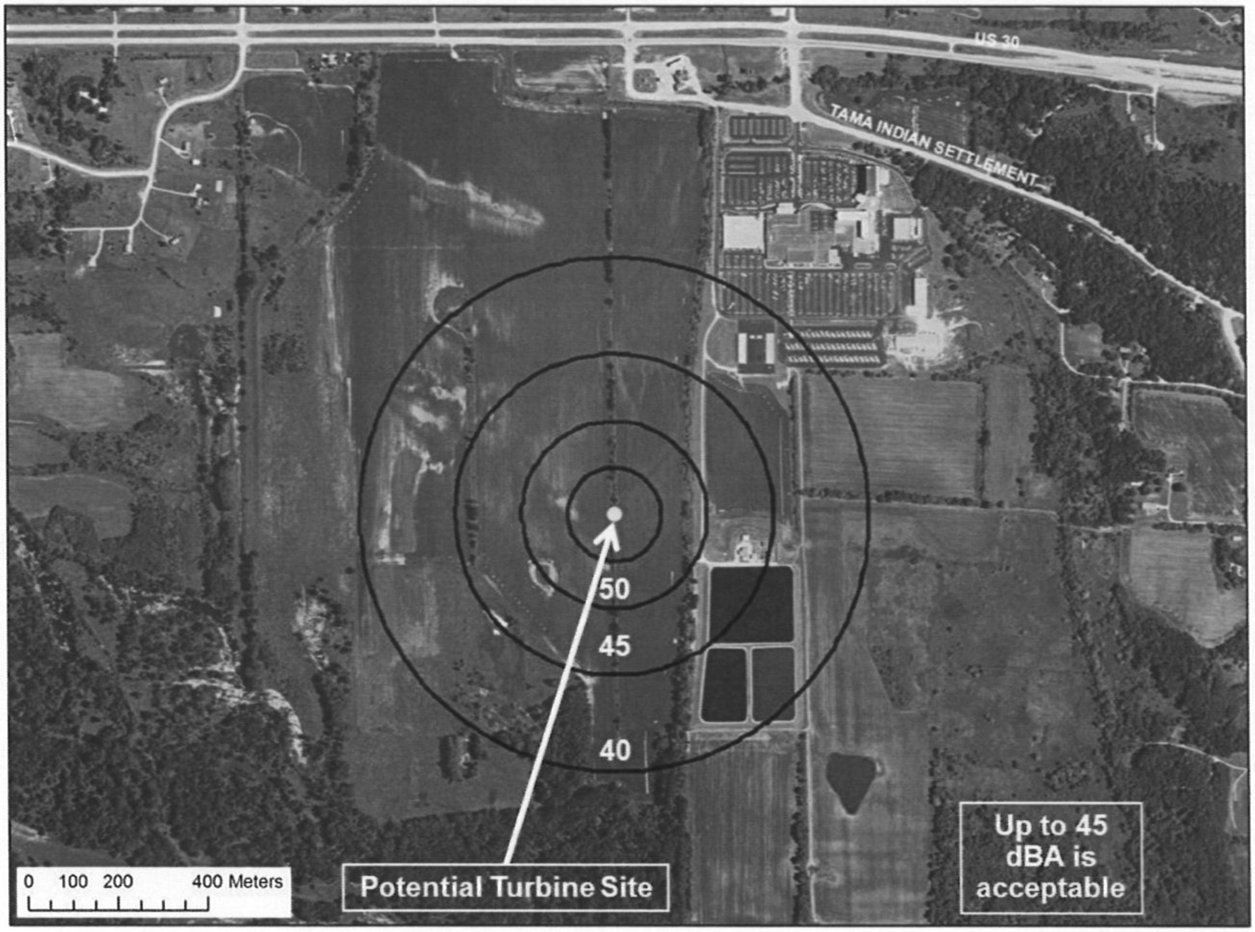
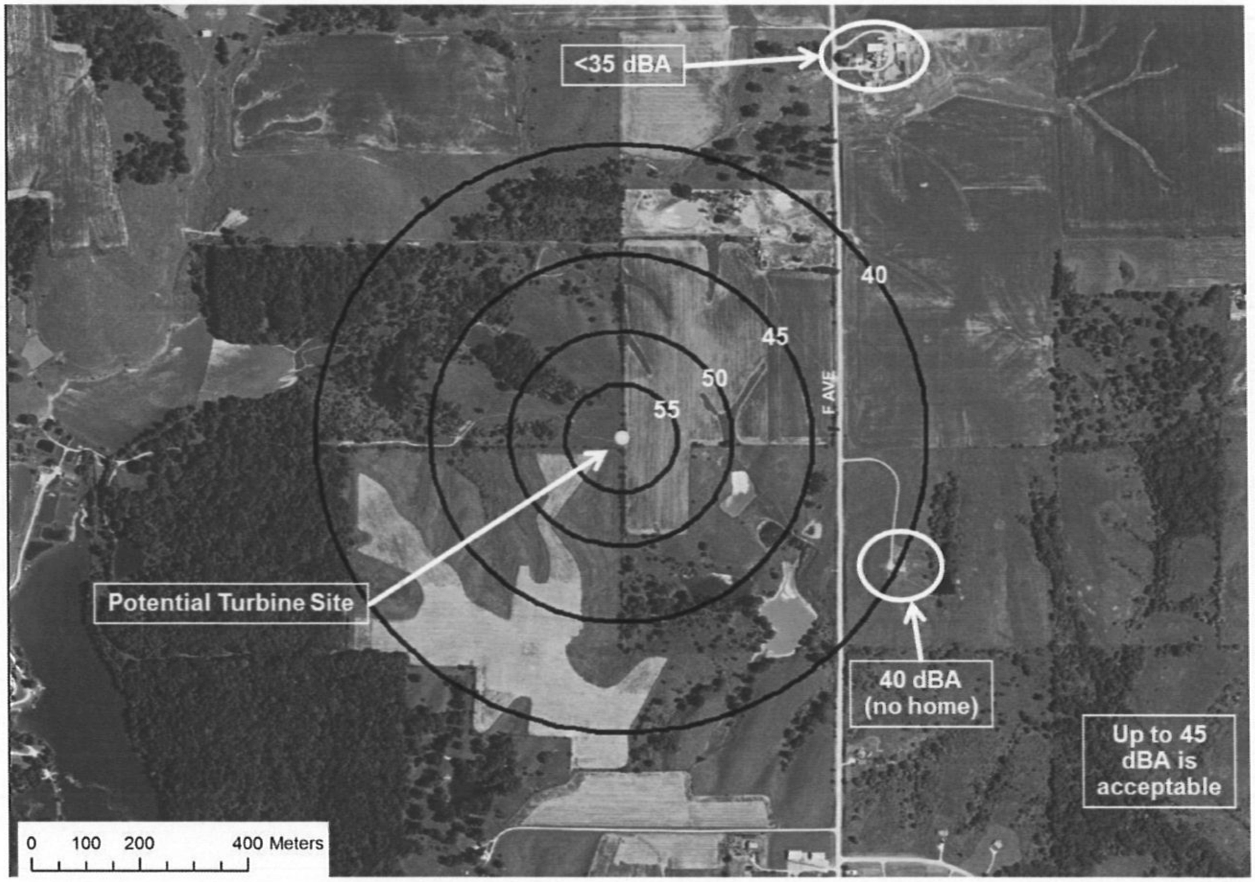


Figure 17 illustrates the noise contour levels for a turbine installed at the North Site. The closest resident has noise levels of less than 35 dBA, which would not be objectionable. However, even at a distance of 2,700 feet the residents will still be able to faintly hear the turbines on many days, especially if the wind is from the southwest. Nevertheless, the noise levels should be acceptable for a turbine at this site.

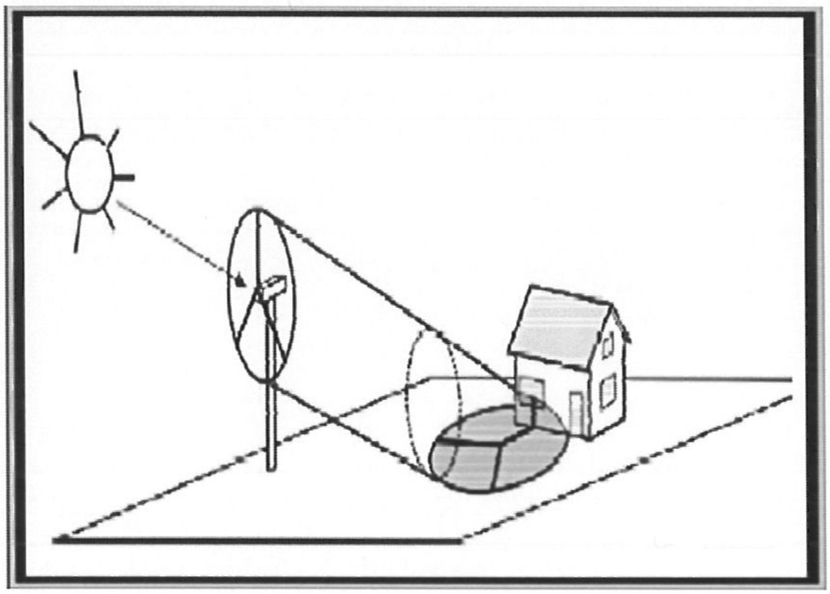
FIGURE 17



Evaluation of Potential Sites for Shadow Flicker

Another consideration for siting a wind turbine is shadow flicker. Shadow flicker is caused when a wind turbine blade passes between the sun and the window of a home or business. As each blade rotates, it can cast a shadow on the window for a brief instant, which can be distracting to occupants in rooms facing the sun. Figure 18 illustrates a turbine blade casting a shadow on a window. The flickering shadows from the rotating blades can last from 45 minutes to less than 1 minute per day, depending upon the day of the year and the position of the window with respect to the wind turbine. The typical duration might be 15 to 20 minutes per day. Shadow flicker occurs seasonally and can be predicted fairly accurately. Shadow flicker does not occur when the sun is obscured by clouds or fog, or when wind turbines are not operating, or when the blades are at a 90° angle to the receptor.

FIGURE 18



The Consultants consider a calculated shadow flicker level of 100 hours per year to be the maximum acceptable levels if the shadows do actually hit the windows. The calculated level is based on never having clouds, and always having enough wind for the blades to rotate. A calculated level of 100 hours will result in an actual level of about 50 hours per year or less, considering the typical cloud cover in Iowa.

Figure 19 shows the estimated level of shadow flicker for a wind turbine installed east of the school. Shadow flicker should not be a problem for a turbine installed by the school.

FIGURE 19

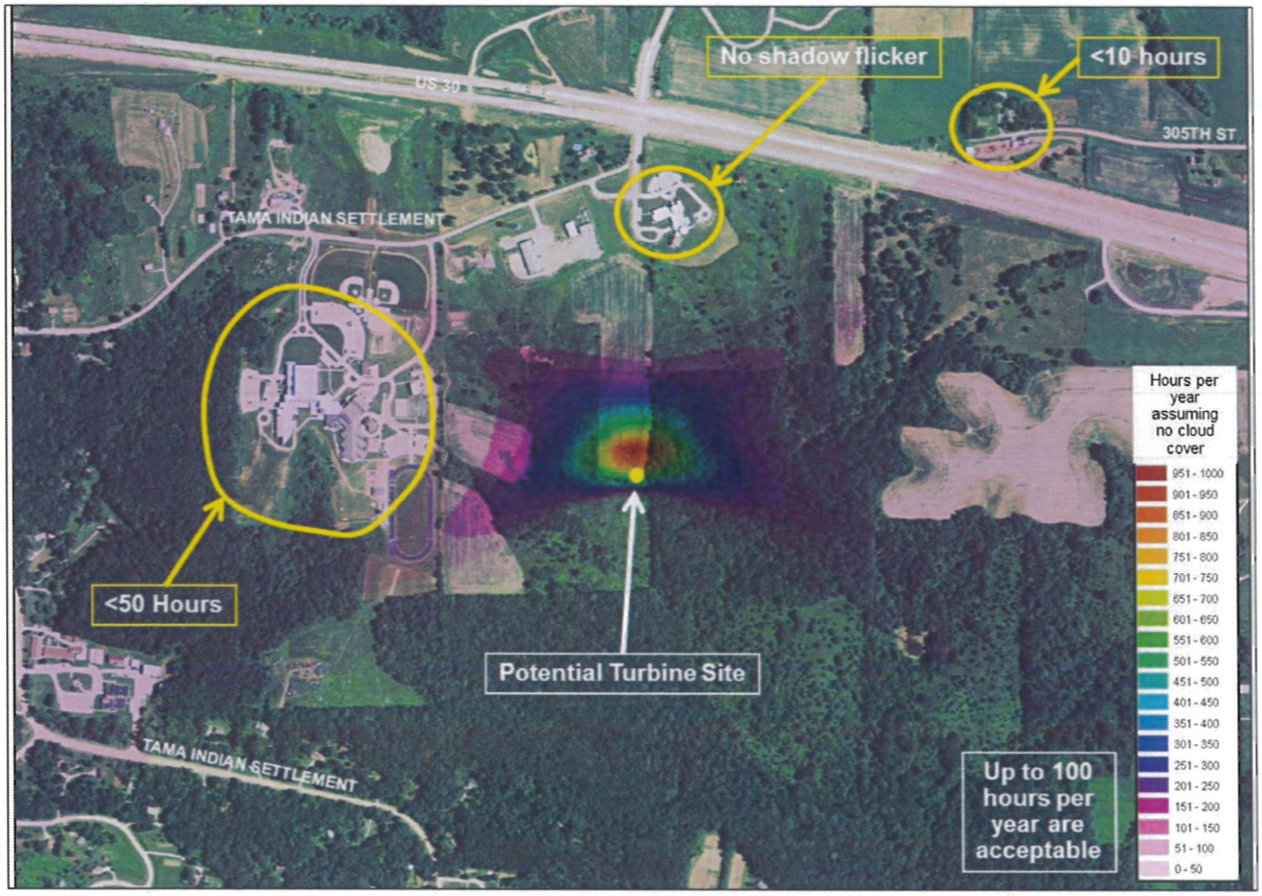
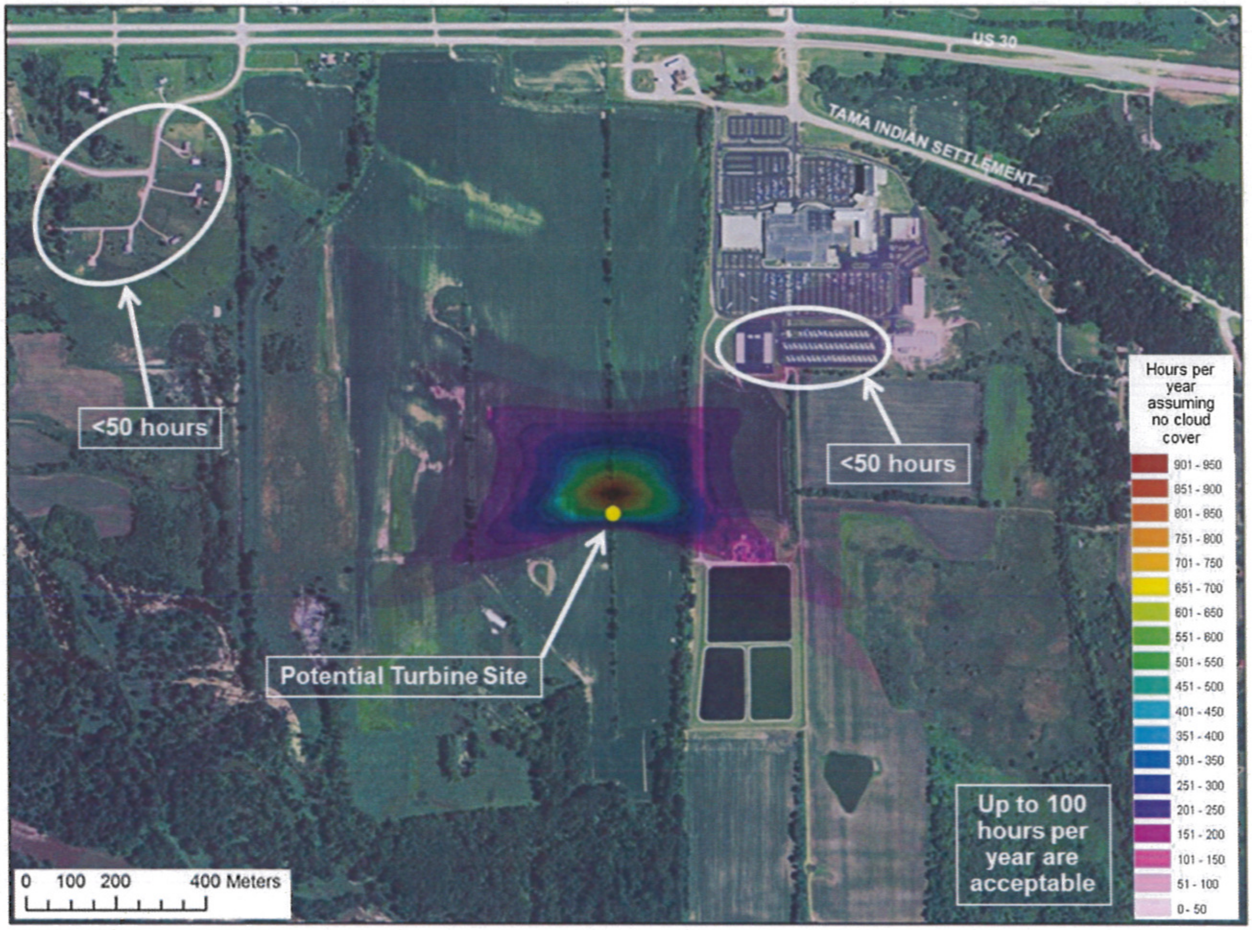


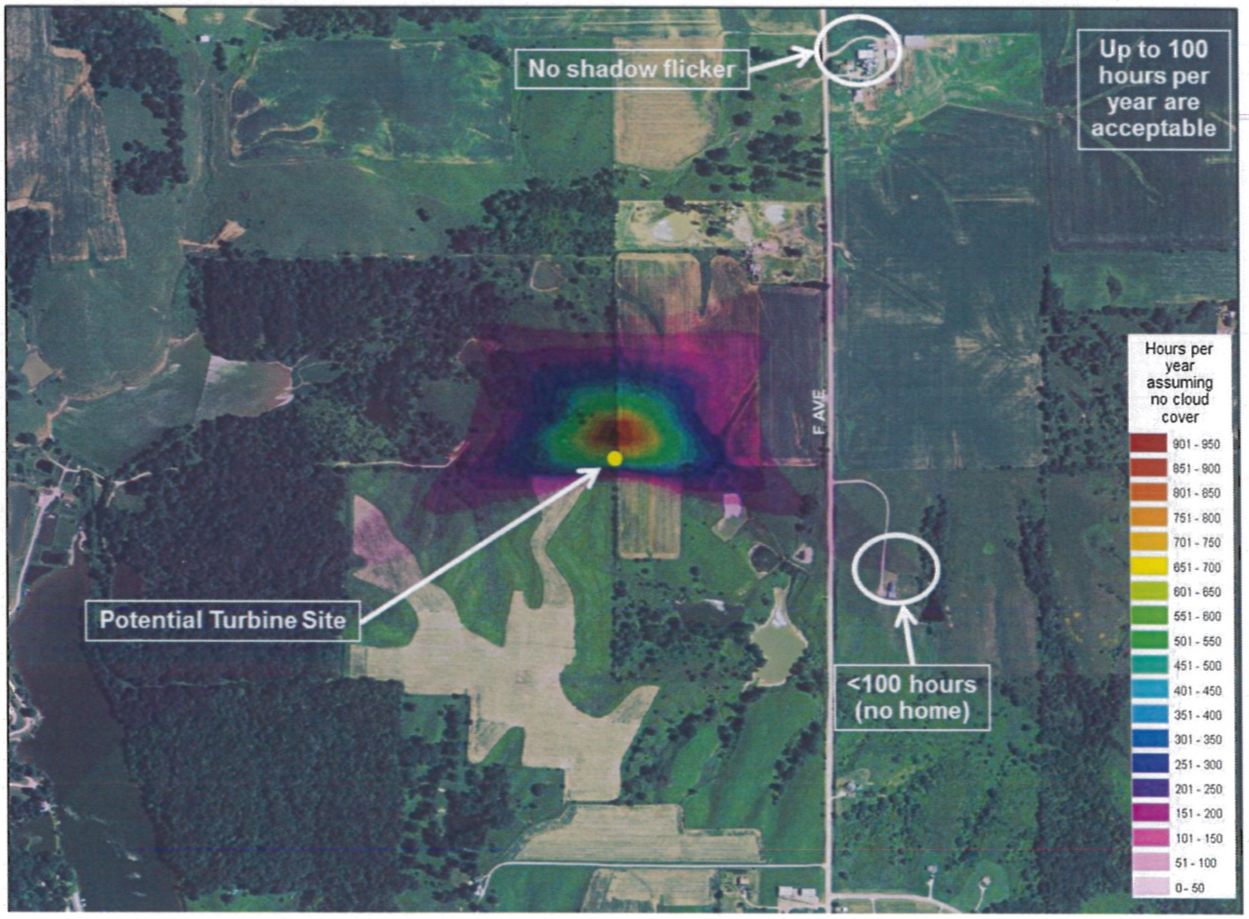
Figure 20 portrays the calculated shadow flicker levels for a turbine south of the casino. Based on this evaluation, the shadow flicker levels should be acceptable to the residents to the east and northwest of the potential turbine site. Occasional shadow flicker would be noticeable in the camper area in late November through early January, but only during the late afternoon period. This would likely not be an issue.

FIGURE 20



The calculated shadow flicker for the north site turbine location is displayed in Figure 21. There would be no shadow flicker for the nearest home, which is northeast of the potential turbine site. If someone builds a home southeast of the turbine site (where there is a storage building) some day in the future, the shadow flicker would be under the 100-hour limit the Consultants recommend. Therefore, the north site should not have a problem with shadow flicker issues.

FIGURE 21



<u>Other Impacts from Large Turbines</u>

Another consideration for siting is the impact on birds and bats. Large wind turbines in agricultural production areas in Iowa typically kill about 3 birds per year, and maybe twice that many bats per year. Since none of the species typically found are endangered or threatened, bird and bat mortality has not been an issue for wind turbines in Iowa. The potential sites evaluated for Meskwaki would most likely kill more birds and bats than for other wind turbines in Iowa, because there are more trees in the vicinity. The Consultants would only be concerned if there was a nearby colony of Indiana Bats, since they are an endangered species. During summer they roost under the peeling bark of dead and dying trees, and they eat a variety of flying insects found along rivers or lakes and in uplands. Indiana bats usually do not hibernate in Iowa. This is one potential impact that needs to be evaluated if the tribe is interested in considering a large wind turbine.

CONNECTING TO THE GRID

To utilize a wind turbine's energy production with the given laws and regulations in Iowa, the wind turbine must be connected behind the meter, so that any wind turbine generation reduces the flow of electric power from the utility. This slows the meter down and saves the customer money. If the wind turbine generates more power than the customer needs, the excess power simply and automatically flows backwards through the utility meter into the utility's grid, and the power is used by nearby electric customers.

The casino and hotel complex buy electric power primarily from the TIP rural electric cooperative through 10 different services and metering points. The three services providing power to the casino, the hotel, and the power plant collectively account for 97% of the electricity purchases from TIP. All three of these services are located adjacent to each other by three large pad-mounted utility transformers, and just outside of the southwest corner of the power plant in a fenced-in area. Therefore, underground high voltage electric cables would be installed from this location to the wind turbine. Figure 22 illustrates possible routes for underground electric cables for a wind turbine installed by the school, or a wind turbine installed north of the casino complex.

FIGURE 22

Figure 23 is a simplified one-line diagram showing the electric service equipment located southwest of the power plant building. The left side of Figure 23 shows the equipment today and the three utility-owned electric meters for the three large electric services. The right side of Figure 23 shows the same service equipment, along with some new equipment (shown in red) for connecting a large wind turbine. The right side shows that the metering points would be combined into one new primary voltage metering point about 50' south of the existing meters. The utility would then sell all power for the casino, hotel and power plant through one new meter. Meskwaki would purchase the three existing meters and some of the utility's existing equipment.

FIGURE 23

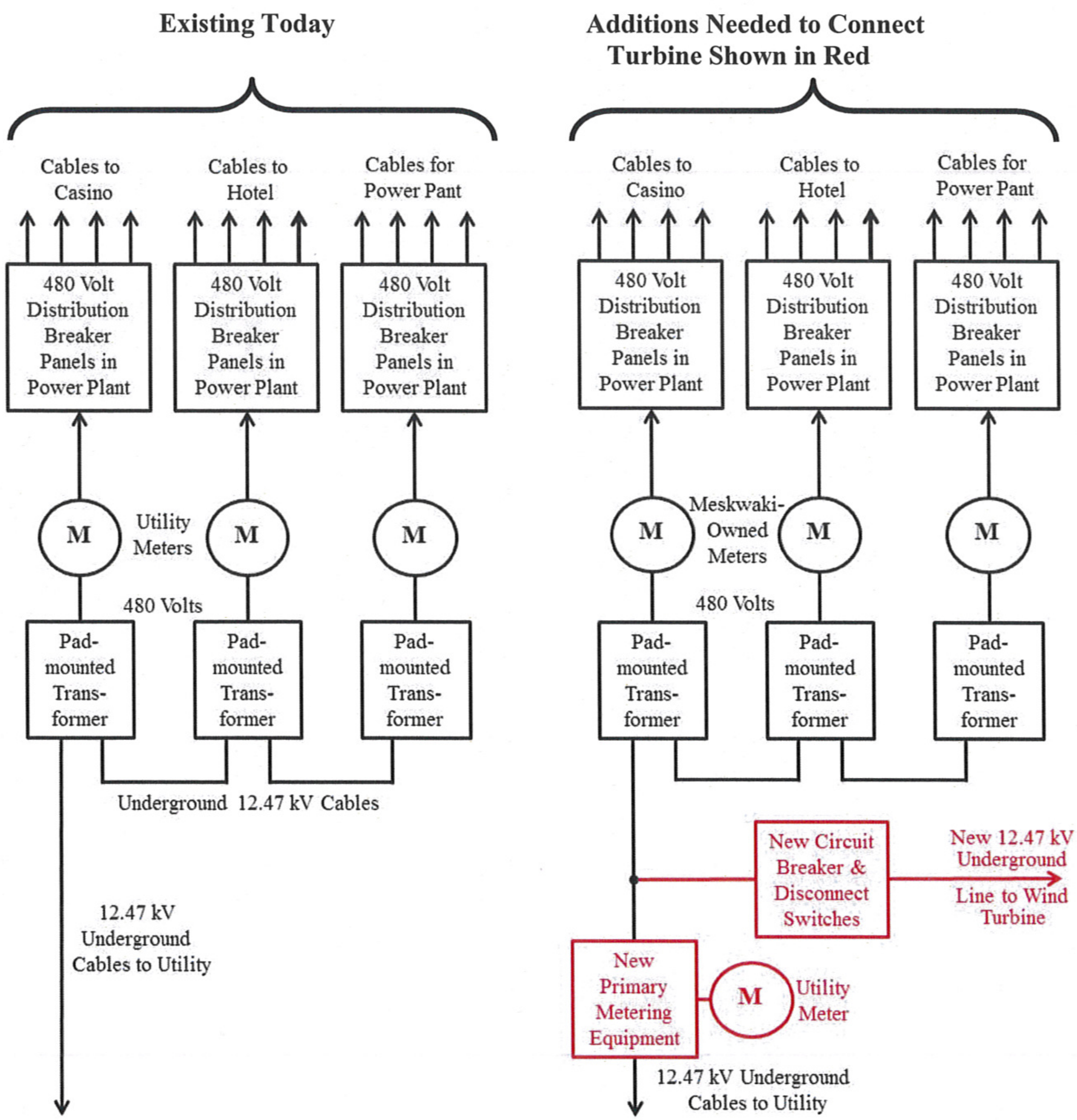


Figure 24 shows the three pad-mounted transformers and TIP's electric services by the power plant building.

FIGURE 24

Figure 25 is a view of distribution breaker panel switchgear inside the power plant. There would be essentially no changes to any of this equipment if a wind turbine is installed.

FIGURE 25

Figure 26 is a picture of a 1,750 kVA wind turbine step-up transformer that would be located adjacent to the wind turbine, and would step up the wind turbine generator voltage level of 690 volts to 12.47 kV. An underground 12.47 kV line would then take the wind-generated power back to the casino-hotel complex. Note that this underground line could not be tapped to supply power to other Meskwaki-owned buildings without the approval of the electric utility, because the utility has the exclusive right by law to sell electricity at retail to all of the Meskwaki facilities.

FIGURE 26

USING WIND TURBINE PRODUCTION

Energy Usage and Wind Turbine Production

The wind energy produced will depend primarily upon the swept area of the turbine blades and the height of the tower. Based on the Consultants' experience, a General Electric ("GE") 1.6 megawatt ("MW") turbine with a 100-meter (329') rotor diameter mounted on an 80-meter (262') tall tower was evaluated for installation at Meskwaki. This name brand turbine is based on a proven line of turbines from GE, and is designed for relatively low wind speed areas like Meskwaki has. There are several companies, including GE, and many wind service technicians living in Iowa that can service this wind turbine. GE has been pricing their turbines competitively in the market and this turbine would be one of the more economical options for Meskwaki. This GE model can also be used with a taller 96-meter tower. The shorter 80-meter tower height was used in the analysis, because the taller tower would require a larger crane. This would be much more expensive to use at a site with only one wind turbine, since the cost of mobilizing a very large crane is typically over $100,000. There are fewer cranes of this size in the Midwest, so getting a crane to come to the site that only has one turbine might be difficult and more expensive. There are many more cranes available for erecting turbines on 80-meter towers and their availability is greater.

Figure 27 is a pictorial drawing of this turbine from GE's technical specification manual, and Table 2 below shows the key features of this wind turbine.

FIGURE 27

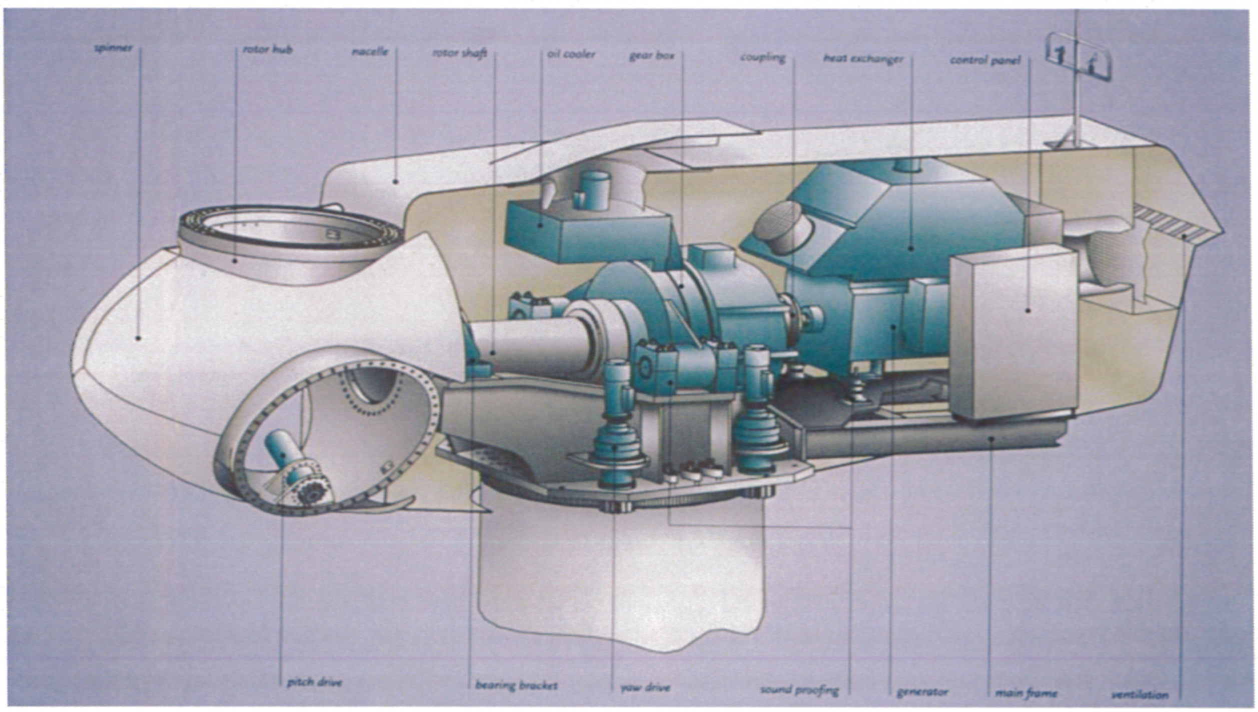


TABLE 2

Key Features of the GE 1.6 MW 100-Meter Rotor Diameter Wind Turbine	
1700 kW rated power	Designed for wind class III
100-meter rotor, with an 80-meter or 96-meter tubular tower	Design life of 20 years
Active yaw control and full-span blade pitch control power regulation with distributed drive train design	Operates from -22° F to 104° F (Cold Weather Package)
Multi-stage planetary/helical design gearbox	Rotor Speed is 7-15 rpm Maximum blade tip speed is 170 mph
Variable speed wound rotor doubly fed induction 3-phase generator with AC-DC-AC power converter connected to rotor to deliver 60 Hz	Cutout wind speed is 56 mph 10-minute avg. Extreme wind speed is 82 mph for 10 minutes Survival wind speed is 117 mph for 3 seconds (Based on Cold Weather Package)
Over-speed control by independent electric full-span pitch control for each blade and mechanical brake on the high speed shaft	The GE 1.6 wind turbine design is certified worldwide.
Foundation design will be a pad and pedestal design	Yaw rate is 0.5 ° per second, or 12 minutes for 360 ° of yaw rotation

As discussed previously, 97% of Meskwaki's energy purchases are for the three electric services for the Casino, hotel and power plant. Figure 28 illustrates the monthly kWh usage for those three electric services based on the usage over the last 2 years. For comparison purposes, the monthly kWh generation from the GE 1.6 turbine is also shown in the graph by the green bars.

FIGURE 28

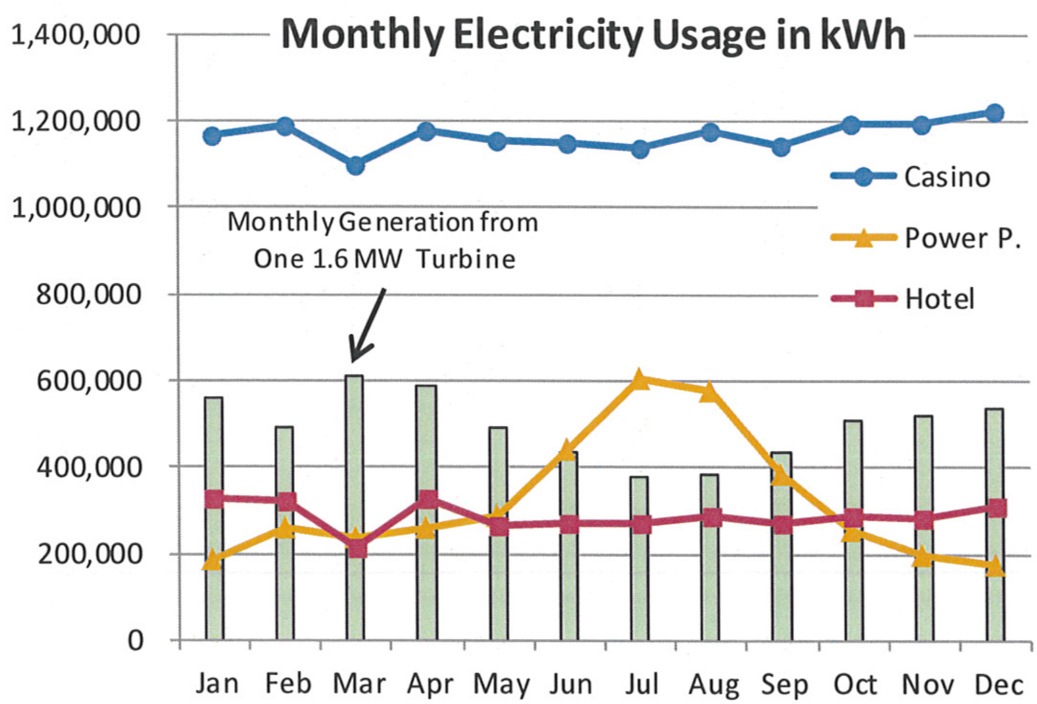


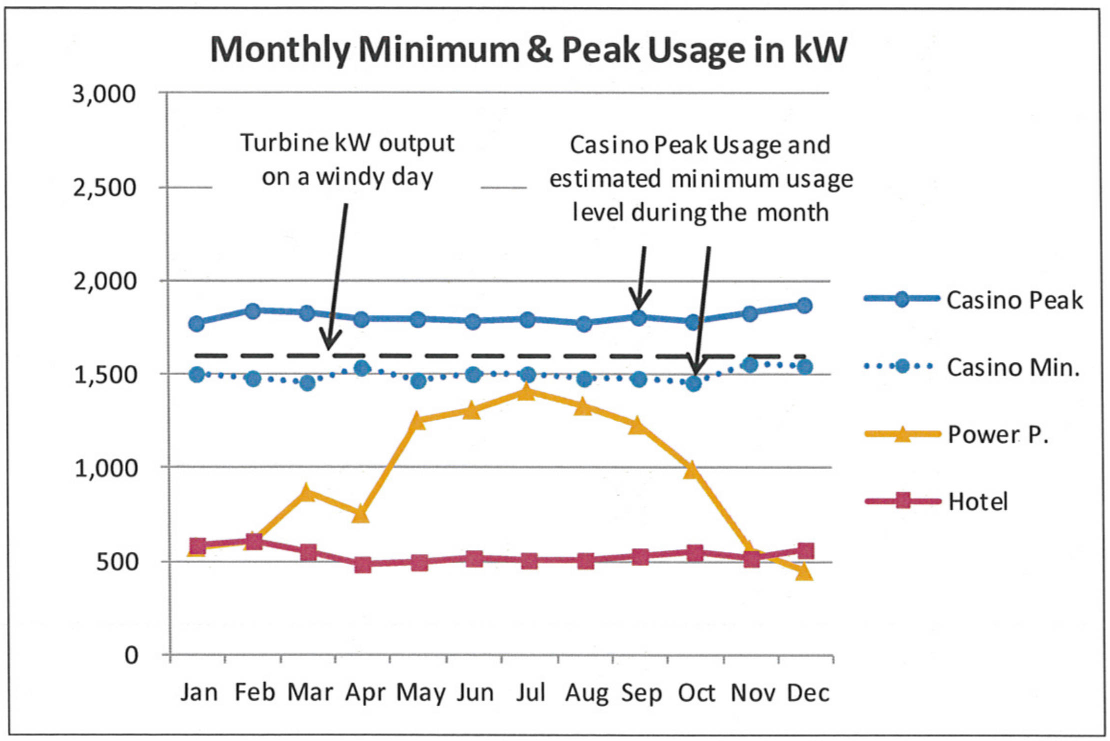
Table 3 illustrates the comparison of the annual usage of the three facilities and the annual kWh generation of the wind turbine if it was installed at the school site. The estimated annual production from a wind turbine at the school site is 5,942,000 kWh per year, which is 42% of what the Casino uses during a year. The turbine would produce 154% of what the power plant uses during a year, and 173% of the hotel's usage. Based on this table, one turbine would generate too much if it was used exclusively for the power plant or hotel. However, it would only provide about 28% of the annual electricity needs for the total casino-hotel complex.

TABLE 3

Annual kWh Wind Generation Compared to Each Facility Usage		
One Turbine	5,942,000	100%
Casino	14,004,000	42%
Power Plant	3,867,000	154%
Hotel	3,443,000	173%
All Three	21,314,000	28%

Another key factor in sizing a wind turbine to a facility's usage level is comparing the minimum level of usage at a facility with the maximum output of a wind turbine. The top blue line in Figure 29 depicts the peak usage level of the casino as measured by the utility's meter. For example, in January the highest level of usage was at a rate of about 1,800 kW. The minimum that month was estimated by the Consultants to be 1,500 kW. If the wind turbine were only connected behind the casino's electric service, then during windy periods with minimum loads the wind turbine would generate up to 100 kW more than the casino would need. During those brief times, the extra 100 kW would flow back through the casino meter to the utility. Even though the wind turbine would only generate 42% of the casino's needs over the course of a year, there will be a few times when the turbine generates more than the casino needs.

FIGURE 29



The Consultants simulated the amount of wind generation over the course of a year and compared it to the estimated hourly use of power for the casino. This comparison showed that 99.5% of the wind turbine's output would be used directly by the casino, and only 0.5% would be in excess of the casino's needs. This is predicated on the turbine only being connected behind the meter for the casino. If the wind turbine is connected as shown in Figure 23 where the casino, hotel and power plant services are connected together behind one new utility meter, then there would never be a time when the wind turbine would generate more power than used by the three facilities. This arrangement was assumed in this feasibility study. If all three facilities were combined and two wind turbines were installed, the Consultants estimated that 88% of the two wind turbines' output would be fully utilized by the three facilities. Then 12% of the two wind turbines' output would be in excess of the combined needs and would flow back into the utility's grid. Having excess wind generation does not cause the utility any problems. However, a contract would be needed to specify the power purchase rate the utility would pay Meskwaki for any excess generation flowing back to the grid. If the utility would let Meskwaki "bank" any excess wind generation for credit against power purchased later, then the utility provides what is called "net metering" service. Since TIP does not provide this service, any excess wind generation must be sold back to the utility.

Three different potential sites were considered in the previous section of the report. Since each site has slightly different wind speeds, each site would have different energy production. Table 4 shows a comparison of the hub height wind speed estimates and the predicted average annual wind generation for the three potential sites.

TABLE 4

Comparison of Wind Speeds and Energy Production for Three Sites

	Average Wind Speed			Average Annual Production	Difference in Production	
	In Meters per Second	In Miles per Hours	Difference in %	kWh	kWh	%
Casino Site	6.70	14.99	-2.9%	5,683,000	(259,000)	-4.4%
School Site	6.90	15.43	Reference	5,942,000	Reference	Reference
North Site	7.00	15.66	1.4%	6,069,000	127,000	2.1%

As expected, the casino site has the lowest wind speed and energy production due to the lower elevation of the site. Note that a 2.9% reduction in wind speed results in a 4.4% reduction in annual energy production. Likewise, the site north of the casino is on higher ground and would produce 2.1% more energy than the school site.

The wind speeds and production estimates shown in Table 4 are based on the 50/50 probability wind speed estimates. Since the future average wind speed is not exactly known, there is some uncertainty in the projected kWh production estimates.

POWER BILL SAVINGS

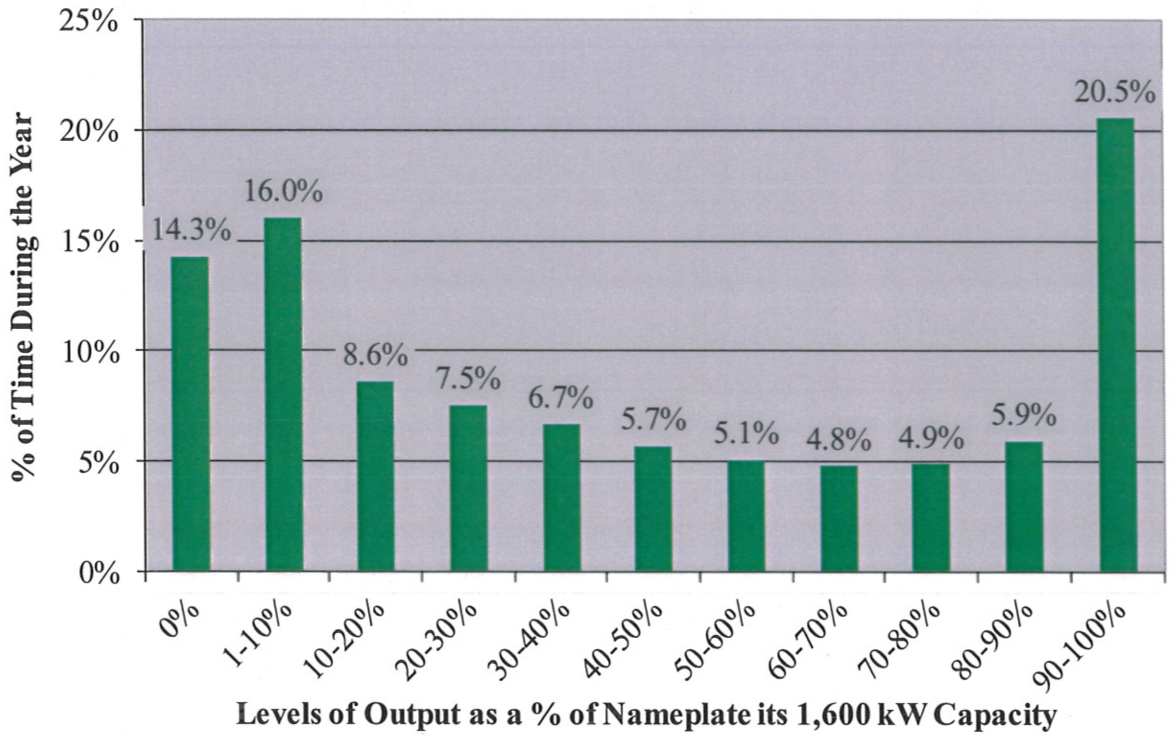
Meskwaki has a relatively low rate for the electricity it purchases for the casino hotel complex. Power bills for large users generally have three major components. The first component is the energy component of the bill, which is based on the number of kWh used each month.

Every kWh generated by a wind turbine directly reduces the number of kWh purchased from the utility, which proportionately reduces the energy charge. Of course, if a wind turbine generates more power than is used by the customer at that instant, then the excess flows backwards through the meter into the utility's system. The utility meter will record this excess. If the local utility provides a "net metering" option, then this excess would be carried forward to the next monthly power bill to offset any purchases from the utility. However, TIP does not provide this net metering option, so the excess must be sold back to the utility at an "avoided cost" based price. This would be done on a monthly basis.

The second component is the demand charge, and it is based on the highest rate of kWh usage in any 15-minute period during the month. Since the demand charge is based on the customer's peak usage during the month, the addition of a wind turbine will only reduce the demand charge if it is generating power during the customer's 15-minute peak period. The output of a wind turbine varies continually, and at times the wind turbine does not produce any power because of low wind speeds. Figure 30 shows the estimated amount of time during a year that the GE wind turbine would generate various levels of power.

FIGURE 30

Projected Percentage of Time During the Year That the Wind Turbine is Various Levels of Output

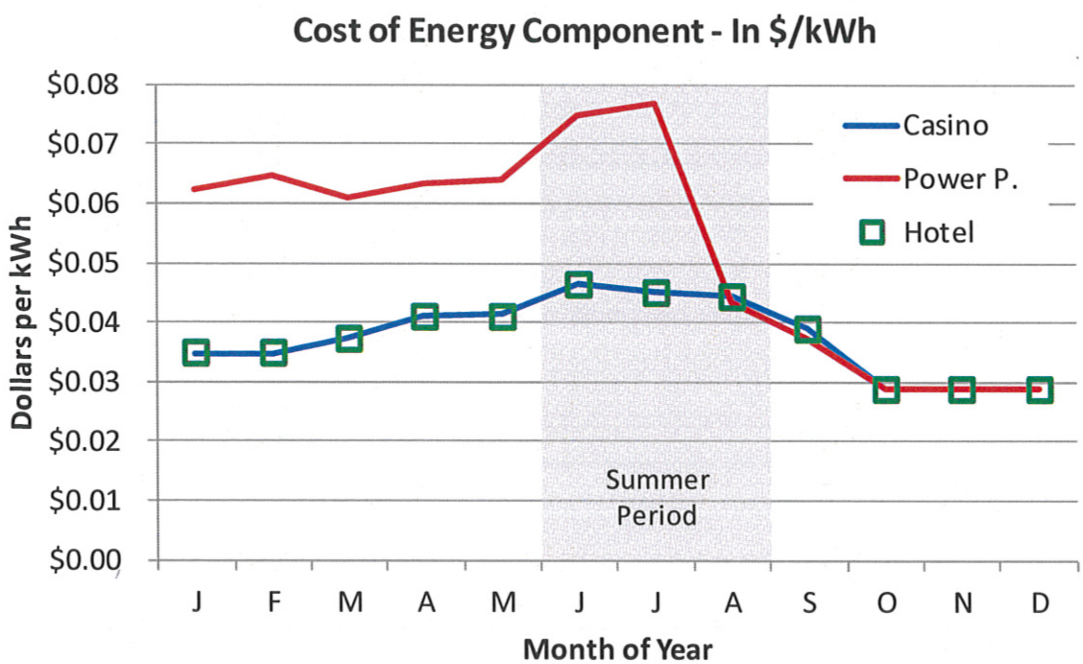


The graph indicates that 14% of the time during the year, the wind turbine will not generate any power at all. During some of those hours the blades may be turning, but because the wind speed is too low, there will be no power generated. Likewise, the turbine will be near full output 20% of the time. The data in the graph indicates that the wind turbine will be generating 800 kW or more (or half of its 1,600 kW capability) for 41% of the time. Because of this variability, there is never any certainty that the wind turbine will be generating power during the customer's peak demand period, or if it is generating, it may not be very much. Therefore, in most cases, a wind turbine will provide little demand charge savings over the course of a year. The proposed GE wind turbine would occasionally reduce the monthly demand charges. This is discussed in more detail later.

The third component is a customer service charge that is the same each month. It is $750 per month for each of these 3 services, or $2,250 per month in total. A wind turbine will not reduce that part of the power bill. However, combining the three services into one service could reduce the fixed charges by 2/3, or $1,500 per month, which is $18,000 annually.

The TIP electric rates and power bills from the last 2 years were analyzed by the Consultants to determine how much a wind turbine would reduce Meskwaki's power bills. Figure 31 shows the first component of the electric bill, which is the energy cost per kWh by month for the period of October 2011 through September 2012. The energy rates for the casino, hotel and power plant are now all identical. The rate varies from month to month because of a monthly energy adjustment clause that reflects TIP's wholesale cost of buying power, which is in turn affected by the regional market price of power. The rates shown are the weighted average of the summer and winter rates. Generally, energy rates are higher in the summer period as the graph shows.

FIGURE 31



The average annual cost of the energy component of the power bills is about $0.038 per kWh.

Figure 32 illustrates the second component of the electric bill, which is the demand charge rate in $ per kW-month for the same 12-month period. The demand charge rates for the casino, hotel and power plant are now all identical, as was the energy charge rate. The rate increases for the 3 summer months to $14.58 per kW, and then drops back to $11.10 per kW for the other 9 months. These rates reflect a lower demand charge rate that Meskwaki receives, because it has agreed to run its back-up diesel electric generators during the utility's peak load periods. These rates generally don't vary from month to month like the energy charge rates. The average demand charge rate over the year is about $12.00 per kW-month.

FIGURE 32

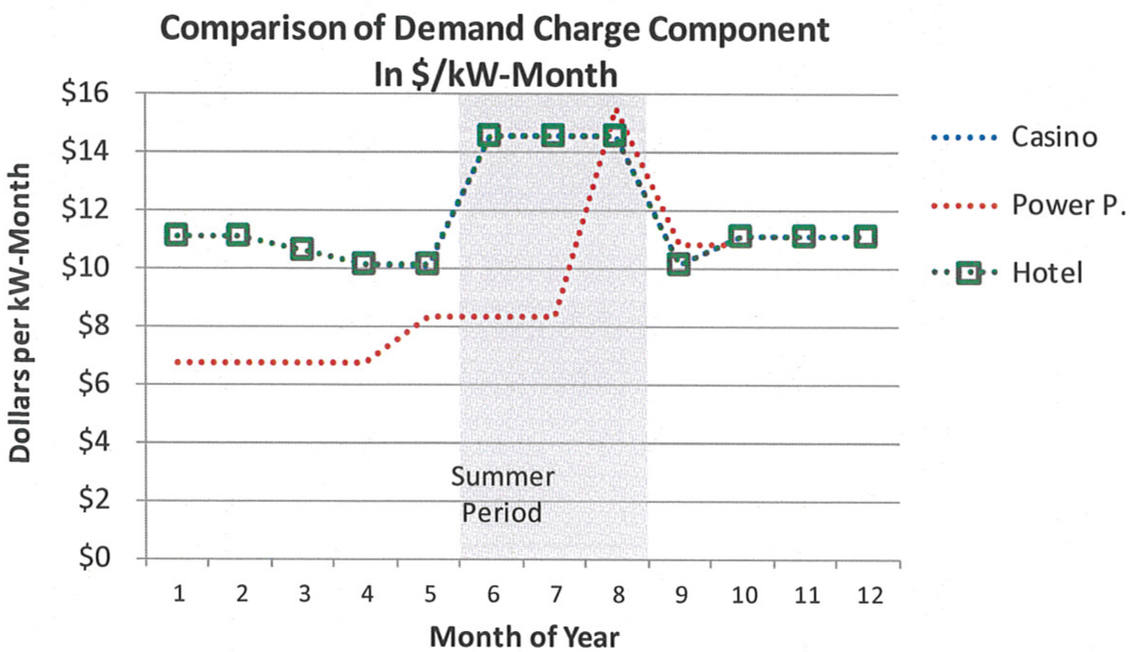


Table 5 shows an estimate of the energy cost component savings if one of the proposed wind turbines is added. The table shows that one wind turbine would save Meskwaki about $220,000 in energy charges per year.

TABLE 5

Projected Energy Charge Savings with a GE 1.6-100 Wind Turbine

Column >	A	B	C	D	E
	kWh Usage	Energy Rate	Energy Charge with No Turbine	Turbine Generation	Energy Charge Savings
Month	kWh	$ / kWh	$	kWh	$
January	1,679,000	$0.0347	$ 58,261	560,000	$ 19,432
February	1,771,000	$0.0348	$ 61,631	491,000	$ 17,087
March	1,554,000	$0.0375	$ 58,275	610,000	$ 22,875
April	1,765,000	$0.0412	$ 72,718	587,000	$ 24,184
May	1,704,000	$0.0413	$ 70,375	492,000	$ 20,320
June	1,854,000	$0.0464	$ 86,026	434,000	$ 20,138
July	2,015,000	$0.0452	$ 91,078	380,000	$ 17,176
August	2,048,000	$0.0446	$ 91,341	385,000	$ 17,171
September	1,799,000	$0.0391	$ 70,341	433,000	$ 16,930
October	1,738,000	$0.0288	$ 50,054	511,000	$ 14,717
November	1,679,000	$0.0289	$ 48,523	519,000	$ 14,999
December	1,707,000	$0.0289	$ 49,332	540,000	$ 15,606
Totals / Average	21,313,000	$0.0379	$ 807,955	5,942,000	$ 220,635

Percentage Savings in Energy Charges = 27.3%

Notes:

-- Column A represents the total kWh used by the casino, hotel and power plant, assuming the three electric services would be combined into one.

-- Column B is a rough estimate of the monthly energy rates. They will vary each month and will depend upon a number of factors which are very difficult to predict.

-- Column C is Column A x Column B

-- Column D is the estimated monthly kWh generation for a turbine at the school site. It is the same data as shown by the blue bars in Figure 28.

-- Column E is Column B x Column D.

Table 6 shows the estimated demand charge savings. The demand charge savings are created by two different factors. The first factor emanates from simply combining the 3 electric services for the casino, hotel, and power plant into one electric service with one meter. This savings comes from taking advantage of a small amount of timing differences in when the monthly peaks occur for the three services. This timing difference is estimated to average 3%, but it will vary from month to month. This 3% savings is about $14,000 per year. The cost for making these changes has been estimated to be $100,000. The second savings in the demand charge is from the addition of the wind turbine. It is estimated to be only $2,400 per year, which is a 0.5% savings.

TABLE 6

Projected Demand Charge Savings with Combining Services & Adding a GE 1.6-100 Wind Turbine

Column >	A	B	C	D	E	F	G
	Current Peak Demands with 3 Meters	Current Demand Charge Rates	Current Demand Charges	Demand Savings by Combining Services Under One Meter		Demand Savings by Adding a Wind Turbine	
Month	kW	$/kW-Month	$	kW	$	kW	$
January	2,935	$11.10	$ 32,581	88	$ 977	19	$ 205
February	3,061	$11.10	$ 33,979	92	$ 1,019	19	$ 205
March	3,255	$11.10	$ 36,127	98	$ 1,084	19	$ 205
April	3,032	$11.10	$ 33,660	91	$ 1,010	19	$ 211
May	3,537	$11.10	$ 39,262	106	$ 1,178	19	$ 211
June	3,617	$14.58	$ 52,734	109	$ 1,582	19	$ 277
July	3,715	$14.58	$ 54,171	111	$ 1,625	7	$ 104
August	3,619	$14.58	$ 52,764	109	$ 1,583	7	$ 104
September	3,558	$11.10	$ 39,491	107	$ 1,185	19	$ 211
October	3,338	$11.10	$ 37,054	100	$ 1,112	19	$ 211
November	2,913	$11.10	$ 32,330	87	$ 970	19	$ 205
December	2,894	$11.10	$ 32,119	87	$ 964	19	$ 205
Totals / Avg.	39,474	$12.07	$ 476,270	1,184	$ 14,288	202	$ 2,354
Percentage Savings in Demand Charges =					**3.0%**		**0.5%**

Notes:

-- Column A represents the total Kw peak demands for the casino, hotel and power plant, as individual electric services as they are today.

-- Column B is a rough estimate of the monthly demand charge rates. The rate in the summer is higher than the other months.

-- Column C are the current demand charges paid by Meskwaki. It is Column A x Column B

-- Column D represents the estimated savings in peak demands that are obtained by simply combining the three services under one meter. This 3% savings does **not** include savings from adding a wind turbine.

-- Column E are the dollar savings, and is Column B x Column D

-- Column F is the estimated average kW savings in the monthly kW peak demands for a turbine at the school site. The savings will vary from 0 to perhaps 100 kW for any specific month.

-- Column G are the dollar savings, and is Column B x Column F

TABLE 7

Table 7 at right summarizes the estimated savings in power bills from adding the proposed wind turbine. The savings will initially total $255,000 annually, which is about 19.5% of the combined power bills of the three services. These bill savings average $0.043 per kWh generated by the wind turbine. These savings are expected to increase as power bills increase over time due to inflation.

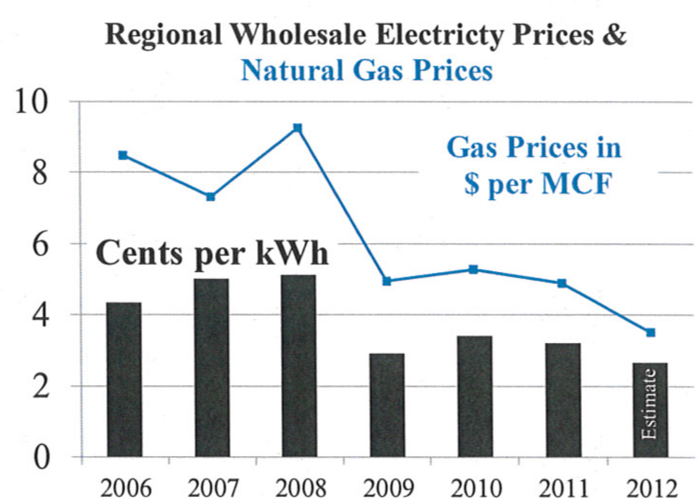
TABLE 7

Summary of Power Bill Savings from Adding a Wind Turbine		
Energy Charge Savings	$	220,635
Demand Charge Savings		
From combining 3 serives into 1	$	14,288
From wind turbine generation	$	2,354
Fixed Charge Savings	$	18,000
Total Initial Power Bill Savings	**$**	**255,276**
Annual kWh Generated by Turbine		5,941,800
Average Savings per kWh generated		**$0.0430**

Power costs are expected to escalate in the future due to a number of reasons. However, wholesale grid prices are stable right now. Therefore, Meskwaki's electric rates will also not increase very much for a couple of years. Assuming a growing economy, electric rates should escalate thereafter. The rate of escalation will depend upon a number of factors; such as the general inflation rate, the rate of growth in electricity usage in the Midwest, the cost of natural gas, the demand / supply balance of electric generation capacity, and the impact of recent tightening regulation on power plant emissions. These factors should tend to increase the cost of electricity over time, which generally increases the power bill savings from adding a wind turbine.

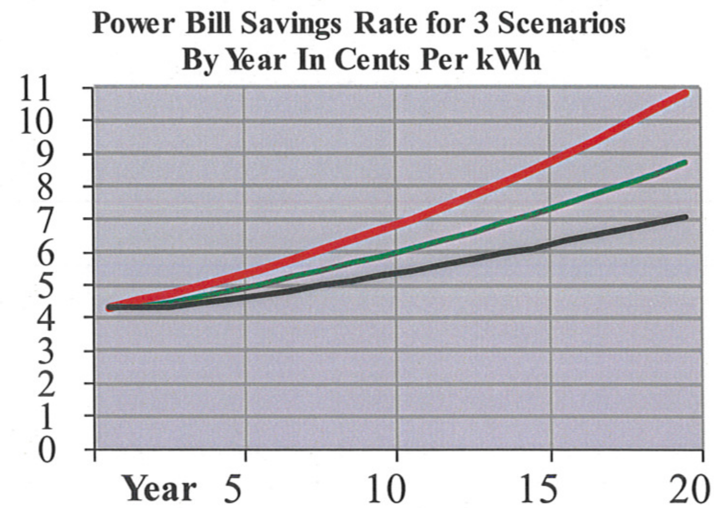
The current recession and the dramatic drop in natural gas prices have significantly reduced the Midwest grid power prices. Figure 33 illustrates the Midwest Independent System Operator ("MISO") annual average electricity prices for the upper Midwest regional area grid that includes the Alliant/CIPCO area. This graph shows that grid electricity prices fell an astounding 44% in 2009. Three factors contributed to this decline. The most important factor was the reduction in electricity usage due to the recession. The second factor was the decline in natural gas prices. During the hours when natural gas is used to generate electricity for the regional grid, the wholesale cost of natural gas determines the electricity prices, since these natural gas generators create the market clearing prices. The blue line in Figure 33 depicts the price of natural gas that was used for generating electricity. There has been a dramatic decline in natural gas prices used for generating electricity since 2008, and the current price is now about $3 per MCF. This decline is

FIGURE 33



due to the abundance of new natural gas provided by the use of horizontal well hydraulic fracturing technology in shale deposits. Although natural gas prices may recover a little as the economy picks up, experts are predicting that the abundance of these newly tapped reserves will keep natural gas prices relatively low for many years in the future. These low natural gas prices will also put a cap on the price of wholesale electricity. A third factor that is helping to keep whole electricity prices low is the ever increasing supply of wind generation. Any new wholesale power generator tends to make prices go down a little, due to the laws of supply and demand. Since wind turbines are rarely turned off, their generation tends to lower the wholesale prices.

FIGURE 34



An improving economy will gradually raise the cost of grid electricity prices. However, the abundance of natural gas and the increasing supply of wind generation should limit future electricity prices for Meskwaki for at least two or three years. Electricity prices will eventually go up because of a number of other factors, but the Consultants believe the increases will be modest. Because it is so difficult to project market-based electricity costs, the Consultants have developed three scenarios of future electricity purchase rates that are shown in Figure 34. These scenarios were based on the judgment of the Consultants. In all three scenarios, the price per kWh starts at 4.3¢ per kWh for 2014. In the "High" scenario with the red line, the price increases by 5% per year starting in 2015. The "Medium" scenario with the green line increases 4% annually starting one year later in 2016. This medium escalation rate is used in the reference case evaluation. The "Low" scenario stays flat at 4.3¢ for 2014 through 2016, and then starts escalating at 3% per year.

The power bill savings estimates shown in Figure 34 are based on the 50/50 probability wind speed estimates. Since the exact average wind speed is not known, there is some uncertainty in the projected kWh production estimates.

CAPITAL AND OPERATING COST ESTIMATES

Table 8 depicts a preliminary capital cost estimate for installing one GE 1.6-100 turbine at the school site. The total project cost is $3.95 million, or about $2,470 per kW of wind generating capacity. This estimate is based on direct ownership and financing by Meskwaki.

The interconnection cost is based on not having any real-time communication equipment with the utility, which saves $75,000.

TABLE 8

Total Cost of Wind Generation Project	
$ 2,375,000	Wind Turbine Delivered to Site
$621,000	Foundation, Unloading, Erection, Roads
$489,000	Electrical Interconnection
$ 193,000	Soft Costs (Interest, Engineering, Legal)
$ 276,000	Contingencies at 7.5%
$ 3,954,000	Total Capital Cost
These estimates are based on installation at the school site.	

The capital cost would vary between the three sites, primarily due to the length and cost of installing the 12.47 kV underground electrical cables. For example, underground installation costs are more expensive for the school site because the cable is routed along 305th Street, where there are many other underground utility services for homes that need to be worked around. Installation costs in the rural area going to the north site were estimated to be 33% less per mile.

Table 9 depicts the total project cost for the installation of one turbine at the three sites. The north site only costs about 1.5% more than the school site, again due to the lower underground cable installation cost. The casino site is the least expensive, since it is so close to the interconnection point.

TABLE 9

Comparison of Total Project Costs for the Three Different Wind Turbine Installation Sites

		Difference	
	Cost	Dollars	Percent
School Site	$ 3,954,000	Reference	Reference
North Site	$ 4,015,000	$ 61,000	1.5%
Casino Site	$ 3,700,000	$ (254,000)	-6.4%

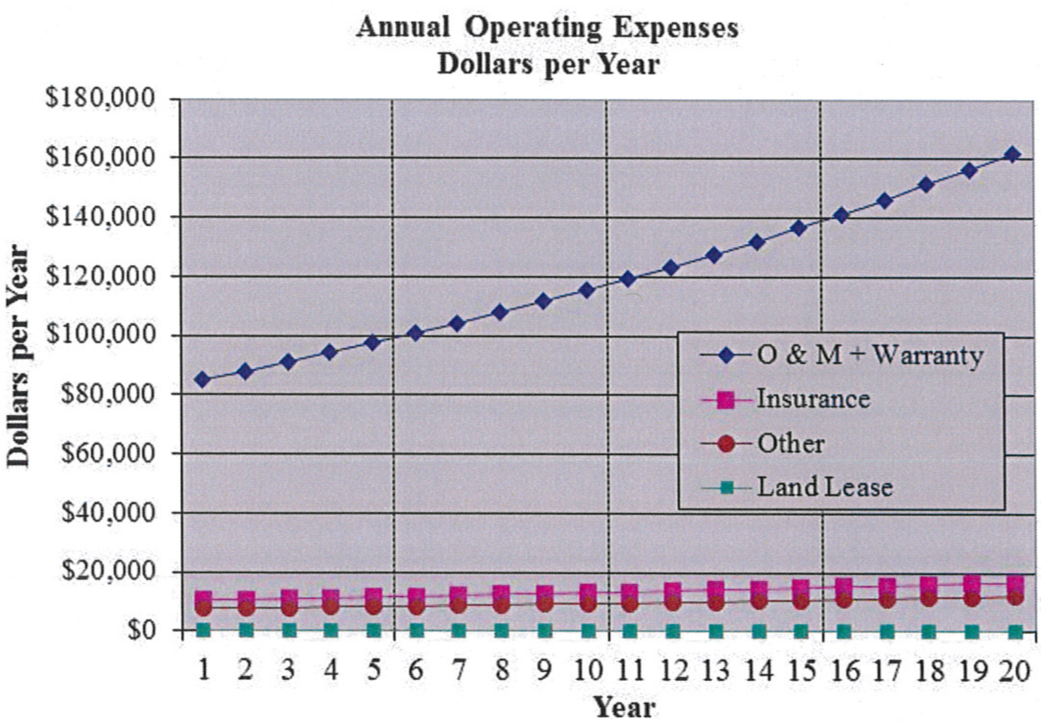
Table 10 summarizes the expected operating and management expenditures for a single wind turbine installed at Meskwaki. These costs are based on having a third party provide the maintenance, warranty and operating services for the wind turbine under a comprehensive long-term contract. It was assumed that Meskwaki staff would provide some modest amount of operating assistance for simple tasks to minimize the travel and labor cost of an outside contractor making a trip to Meskwaki. Also, it was assumed that Meskwaki's staff would handle overall project management for the operation of the project. Modest labor and management costs for any part-time employees are included in the second line item in the table.

TABLE 10

Initial Operating, Management and Miscellaneous Expenses		
Maintenance Service Contract (Incl. Warranty Services)	$	80,000
Local Operation Labor, Professional Services & Mgmnt.	$	10,000
Property, Business Interruption, & Liability Insurance	$	10,500
Property Taxes	$	-
Miscellaneous, Decommisioning Escrow	$	2,500
Total	**$**	**103,000**
The General Inflation Escalator is 2.5% and O&M Escalator is 3.5%		

Most of these operating costs will escalate over time. Figure 35 shows a projection of these operating expenses over 20 years. All of the above capital and operating costs are used in the financial analysis in the following section.

FIGURE 35

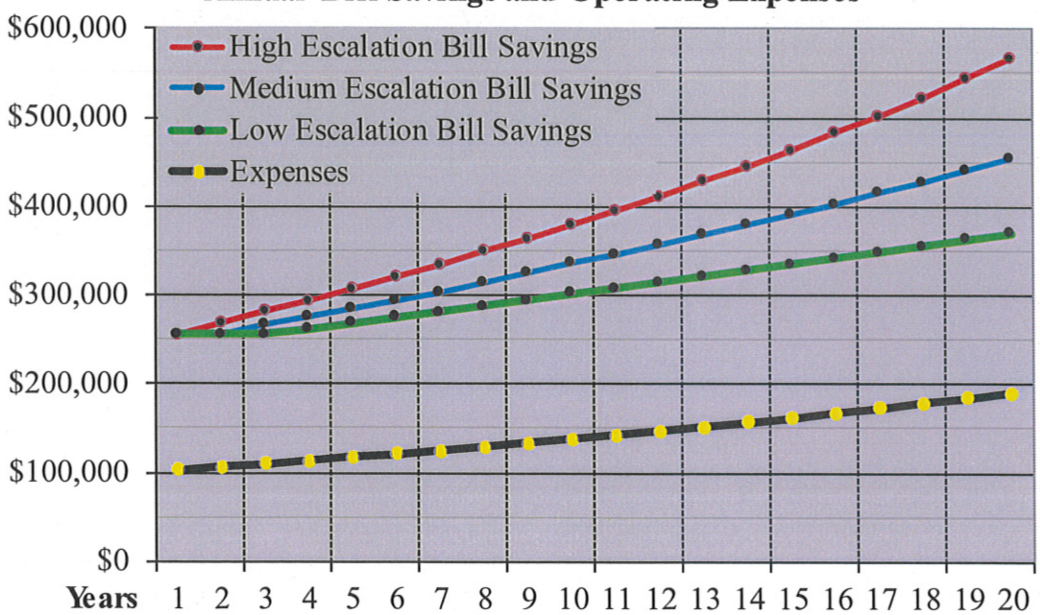


FINANCIAL ANALYSIS

Based on the capital and operating costs shown in the previous tables and graphs, long-term financial projections were made for operating costs, power bill savings, and the net margin from the wind project. A simple break-even for the project is achieved when the accumulated margins finally exceed either the total project cost of $3.7 to $4.0 million, depending upon the site used. These financial projections are shown in Appendix 3. Figure 36 illustrates the power bill savings for the three escalation rates shown in Figure 34 above, and the projected operating expenses. These are based on installing the wind turbine at the school site.

FIGURE 36

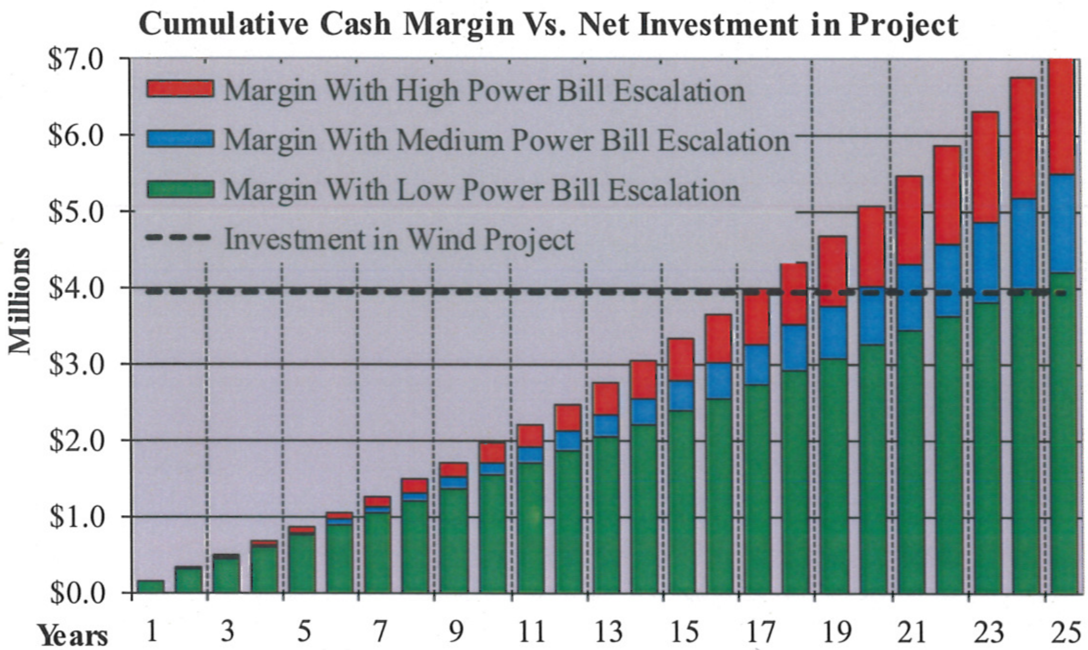
Annual Bill Savings and Operating Expenses



Note that the annual bill savings are greater than the operating expenses for the wind turbine. Therefore the project has a positive operating margin for all three escalation rates. If the accumulated operating margins over the years eventually exceed Meskwaki's investment, then the wind project attains a simple break-even.

Figure 37 depicts the accumulated cash operating margins by year for the wind project for the three different power bill escalation rates. The green bars show that for the "low power bill escalation rate" scenario, the accumulated margin grows to $4.2 million over a 25-year period. Since this is more than the $3.95 million cost of the project (black dashed line), the project does achieve a simple break-even. In the 24th year, the green bars exceed the black dashed line, so the project has a 24-year simple payback. This simple payback does not consider any time value or cost of money on project debt. If the cost of money is considered, then years to become debt free would be a little longer than the simple payback, depending upon the interest rate.

FIGURE 37



Under the "medium power bill escalation" scenario, the accumulated power bill savings are shown by the top blue bars. Under this scenario the project has a simple payback of 20 years. The top red bars represent the accumulated margins under a "high power bill escalation" rate. Under this scenario, the project achieves a break-even period of 17 years.

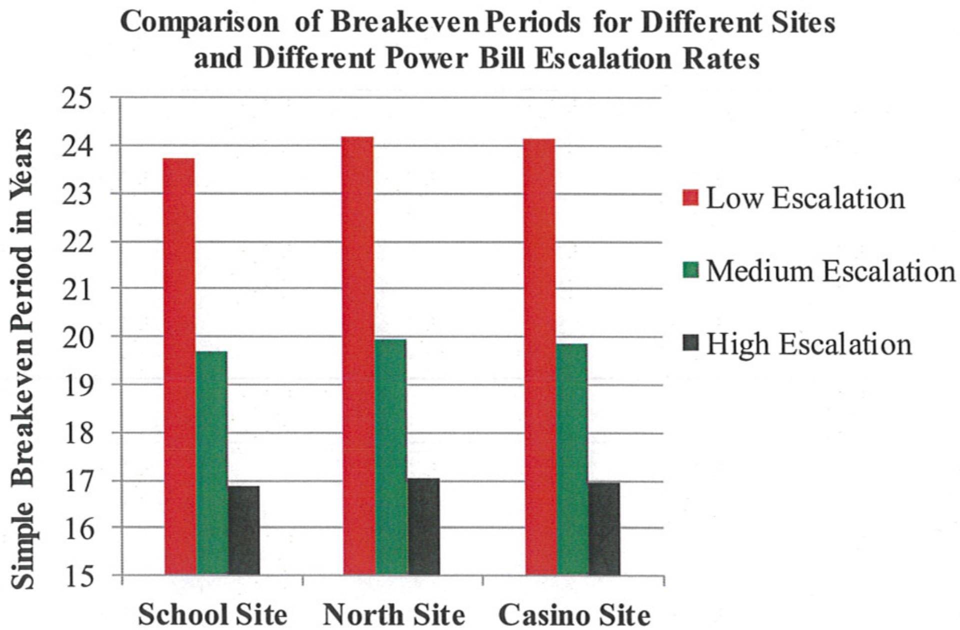
These resulting break-even periods are based on the 50/50 probability wind speed estimates, so there is some uncertainty in the break-even period projections.

In summary, the results of this break-even analysis for a turbine at the school site are:

1) 24 years break-even for low power bill escalation rates
2) 20 years break-even for medium power bill escalation rates
3) 17 years break-even for high power bill escalation rates

A similar break-even analysis was done for installing a turbine at the north site and at the casino. Figure 38 compares the break-even analysis results for all three sites and all three power bill escalation rates.

FIGURE 38



The graph indicates that there is less than a 1-year difference in the break-even period between the 3 sites, given the same power bill escalation rates. Therefore, it doesn't really make much difference which site is used from a payback perspective. The casino site has the lowest up-front capital cost. However, these up-front savings are slowly lost over time compared to the other sites, because of the lower kWh production.

These simple payback periods have a corresponding Internal Rate of Return ("IRR") on the investment. Table 11 portrays the equivalent IRRs for some of the various payback periods shown in the graph above. Since the IRR depends upon the length of the period in years, the IRR is shown for a 20-year period and a 25-year period. A large wind turbine should have a useful life of 25 years or potentially more.

TABLE 11

IRR for Various Breakeven Periods

Breakeven Period	IRR at ….	
	20 Years	25 Years
17.0	2.0%	4.2%
20.0	0.0%	2.2%
24.2	-1.9%	0.3%

Although the results of this break-even period analysis appear to be definitive, there is some uncertainty in the results, because the starting assumptions are not known with certainty. The next section of the report evaluates the potential impacts of some of those uncertainties.

RISK AND UNCERTAINTY ANALYSIS

The primary uncertainties in this wind generation feasibility study are:

1) Changes in the annual power bill savings rate over time
2) The mean annual wind speed
3) The long-term changes in the mean annual wind speed due to climate change
4) The amount of money spent on major equipment repair and replacement ("R&R")
5) The total capital cost of the wind turbine project

The impact of each of these uncertainties is discussed below.

1) Changes in the Annual Power Bill Savings Rate over Time

The first uncertainty in the above list has the biggest impact on the break-even period. Three different power bill escalation rates were evaluated in the previous section of the report, and changes in the escalation rates cause the break-even period to vary from 17 years to 24 years. This 7-year difference is substantial.

2) Mean Annual Wind Speed

The amount of kWh generated by the wind turbine was based on the mean annual wind speed estimate of 6.931 mps (15.5 mph) at an 80-meter hub height. The Consultants project that this estimate has a 50% / 50% of being higher or lower than the true actual long-term average wind speed. Although this estimate was based on two years of actual wind speed measurements near the school site, there is uncertainty in this estimate because it is only based on two years of data. If the met tower had been operating for a longer period of time, the average wind speed would most likely be a better prediction of the wind speed. A statistical analysis of the met tower data was made to determine wind speeds that represented different degrees of certainty that the calculated average was reflective of the true average. These probabilities ranged from being 99% sure that a specific wind speed was at least as high as the true accurate average down to a 1% certainty. For example the 90% (P-90) certainty prediction was a lower wind speed, which would give a very conservative (low) kWh production estimate, whereas the P-10 prediction gave much higher production estimates. For financing purposes, bankers use the P-75 or P-90 predictions to make their financial projections conservative. Based on the Consultants' experience, the probability calculations derived from the met tower were adjusted by 30% to make the P75 and higher wind speed estimates a little slower and thus more conservative. This 25% adjustment was made because there were only 2 years of data recorded.

By taking into account the uncertainty in the wind speed measurements, the break even analysis was performed again using the P-90, P-75 and P25 wind speed estimates. The results are summarized as follows:

1) Using a conservative P-90 wind speed estimate adds 3 years for high-rate escalation to 6 years for low-rate escalation to the simple paybacks for all of the different power bill escalation rates compared to the P-50 estimates.
2) Using a little less conservative P-75 estimate adds 1-2 years to the break-even periods, depending upon the rate escalation.
3) Using the optimistic P-25 reduces the break-even period by about 1 year.

Another area of uncertainty involves the adjustment made in the wind speed data to reflect the true long-term average wind speed. This adjustment was shown in column E of Table 1. The adjustments were made, because there was uncertainty about whether the wind speed measurements at the met tower were made during a period of time that had "normal" wind speeds. Or did the period of measurement have higher or lower winds than the long-term average? The Consultants used long-term wind speed measurements from the Marshalltown airport to try to answer that question. However, the wind speeds at Marshalltown were a little different than they were at Tama, and the accuracy of those Marshalltown anemometers is unknown. The Consultants recognize that these adjustments add to the uncertainty in the long-term average wind speed estimates. However, they do not know how much uncertainty is involved.

3) The Long-Term Changes in Mean Annual Wind Speed Due to Climate Change

The average annual wind speeds appear to be changing over time in parts of the Midwest. Research climatologists at Iowa State University have concluded that the wind speeds at the height of corn tassels have declined by over 10 percent during the last 15 years, due to changes in the climate. Although they did not study changes at typical wind turbine hub heights, the key researcher suspects a similar downward trend may also exist. The Consultants have seen evidence of a general downward trend in the wind speeds recorded by the National Weather Service in the five locations in and adjacent to Iowa where they have had anemometers for many years.

To account for the real possibility that the long-term wind speed will decline as the earth warms and the climate changes, the Consultants have assumed that the wind speeds will decline a little over time. The net result is that the kWh production was reduced by 10% in total over a 20-year period, or about 0.5% per year. This 10% reduction in production only takes about a 5% reduction in wind speed, which is less than the Iowa State University climatologists have found. Therefore, the impacts of climate change could reduce the wind generation production even more than assumed in this feasibility study.

The impact of climate change on wind speeds is summarized as follows:

1) If there is no reduction in wind speeds due to climate change, the simple paybacks will be reduced by 1 to 2 years, depending upon the rate escalation.

2) If climate change is twice as much as assumed in the reference case, then the simple payback will increase by 1 to 2 years.

Based on this analysis, the impact of climate change on the simple payback will be about ± 1 to 2 years.

It should be noted that the production estimates were also reduced another 2.5% in total over 20 years to reflect the higher maintenance requirements as the wind turbine ages.

4) The Amount of Money Spent on Major Equipment Repair and Replacement

Over the course of 20 years, the Consultants would assume that the wind turbine would require $750,000 of major equipment repairs and replacements ("R&R"). However, the long-term cost of these R&R expenditures is uncertain, since this model of wind turbine (or any large wind turbine model) has not been in service for 20 years. Although the Consultants believe this cost estimate is a little conservative, the cost could certainly be higher or lower.

Because Meskwaki would likely only install 1 turbine, it was assumed that it would purchase a long-term warranty from the manufacturer to cover these R&R costs. Therefore, the risk from unforeseen major repairs is eliminated in this feasibility study. If Meskwaki chose to shoulder those R&R cost risks rather than purchase a long-term warranty, then the impact of variations in the long-term R&R costs would probably have a ± 2-year impact on the simple payback.

5) The Total Capital Cost of the Wind Turbine Project

The total project cost estimates range from $3.70 million for the casino site up to $4.01 million for the north site. The actual cost of the project will depend upon the competitiveness of the turbine market and the availability of construction contractors to do the work. The turbine supply market is very competitive right now due to the slow market. Therefore turbine costs will likely not get much lower. Nevertheless, a ± $300,000 (about ±8%) variation in the project cost was evaluated to determine the impact on the simple payback.

1) If the cost increases by $300,000 the simple payback increases by 1 year.
2) If the cost decreases by the same $300,000, the simple payback drops by 1 to 2 years.

Summary of Risks and Uncertainties

The uncertainty associated with five key assumptions has been evaluated, and the change in the break-even period is typically 1 to 2 years. Even though one could imagine a combination of pessimistic scenarios for these five key assumptions, it is unlikely they would all occur simultaneously. The Consultants typically find that their initial assumptions turn out to be a combination of being too high and too low, which tends to prevent the most pessimistic and optimistic scenarios from actually occurring. Therefore, the Consultants believe the uncertainties in these break-even estimates lie in the 1- to 2-year range. Again, the assumption having the largest impact on the break-even period is the escalation rate for the power bill savings. Figure 38 vividly illustrated that the simple payback could vary as much as 7 years for this key variable.

CONCLUSIONS FROM FEASIBILITY STUDY

This study determined that the simple paybacks were in the 17- to 24-year range, plus and minus a few years for various uncertainties. These results were predicated on a number of assumptions and the judgment of the Consultants, all of which adds some measure of uncertainty. This range of simple paybacks indicates that the project is likely not financially attractive for Meskwaki.

This result is not surprising to the Consultants, since Meskwaki is not taking advantage of any federal or state tax benefits. If this same identical proposed wind project was owned by a tax-paying entity, it would be able to use the 30% federal investment tax credit ("ITC"), <u>or</u> the 2.2¢ per kWh 10-year federal production tax credit ("PTC"). Either of these are equivalent to at least 30% of the capital cost of the project, which would be about $1,200,000. This incentive alone would be enough to reduce the simple payback for a turbine at the school site from 19.7 years down to 14.9 years, or a reduction of about 4 years. Furthermore, if Meskwaki paid income taxes, it could depreciate the wind turbine over 6 years and reduce its income tax obligations. Likewise, the state provides a 10-year production tax credit of 1.5 ¢ per kWh, that would total $875,000 over the 10-year period. However, to qualify for the Iowa tax credit, the wind power must be sold to a third party.

Nearly all wind projects having one or a few large wind turbines take advantage of the above tax credits. The Consultants are aware of a couple of other recent projects that sold their power for about the same 4¢ rate that Meskwaki will save on their power bill. All of these other recent projects utilized both the federal and state incentives and they will likely achieve a simple payback of 10 to 15 years.

Meskwaki could partner with a tax-paying entity that could use the tax credits as other projects have done. This partnership would last from 6 to 10 years, until the tax benefits are gone and then Meskwaki would buy out the other partner for a modest fee. One drawback of having a partner is that Meskwaki would be bound by legal agreements to operate the project in a manner that ensures that the tax credits are received in full. The legal, accounting, auditing, and administrative cost of having agreements over the 6 years might be $250,000, so these savings would reduce the value of the tax benefits.

Generally, investors or local owners have accepted simple paybacks of up to 10 to 15 years for large wind turbines. Paybacks longer than that are not attractive, because of the potential negative impact of the many uncertainties in the future. Since the paybacks found in this analysis are longer than that, most investors would not look favorably on this project, unless they were trying to help the environment, or make a public statement about their care for the environment.

Thomas A. Wind
Andrew Coil
Wind Utility Consulting, PC
March 19, 2013

APPENDIX 1

Iowa Maps Showing:

Land Elevation

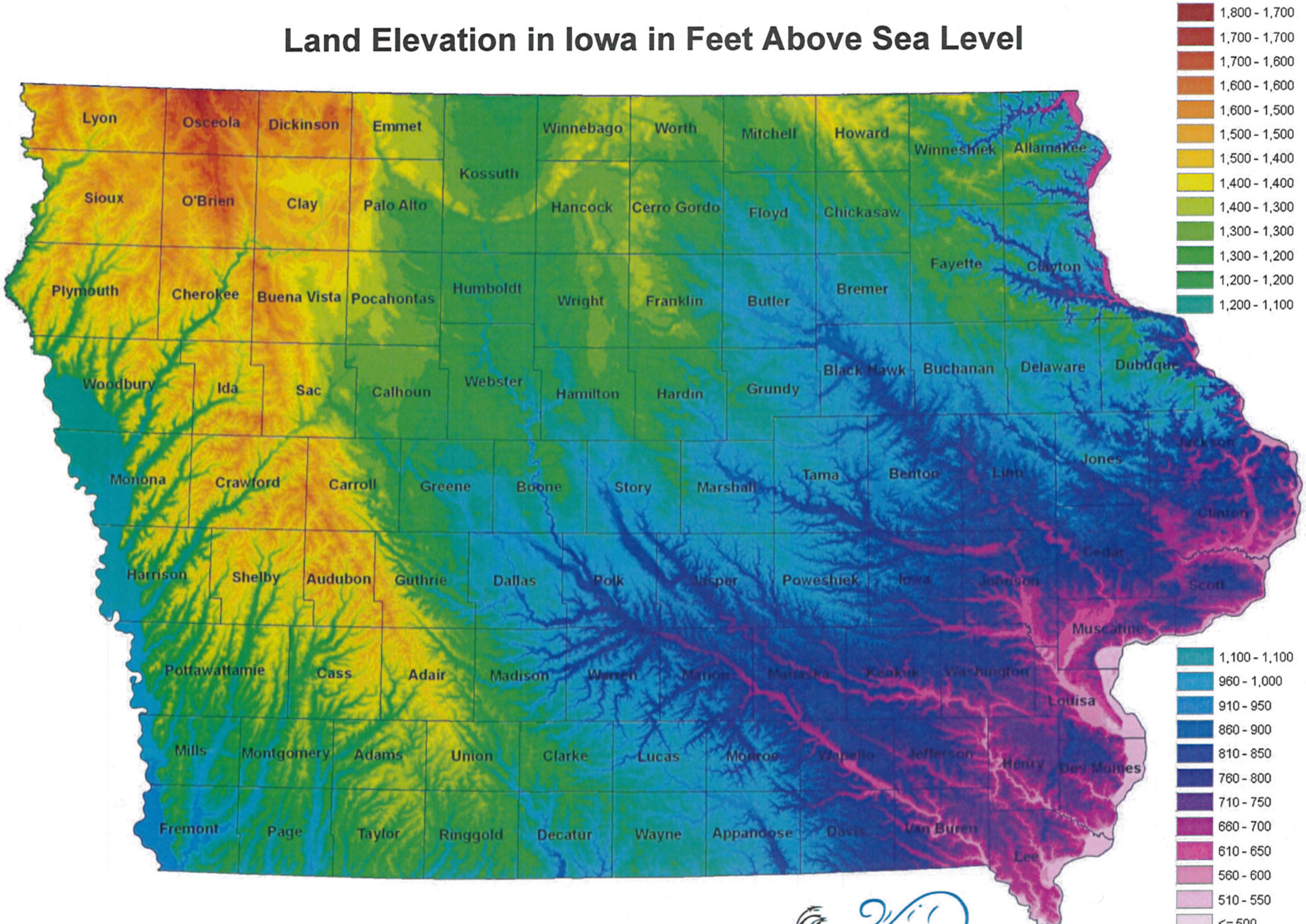
Land Cover Types

Wind Speed

And

Large Wind Turbine Locations

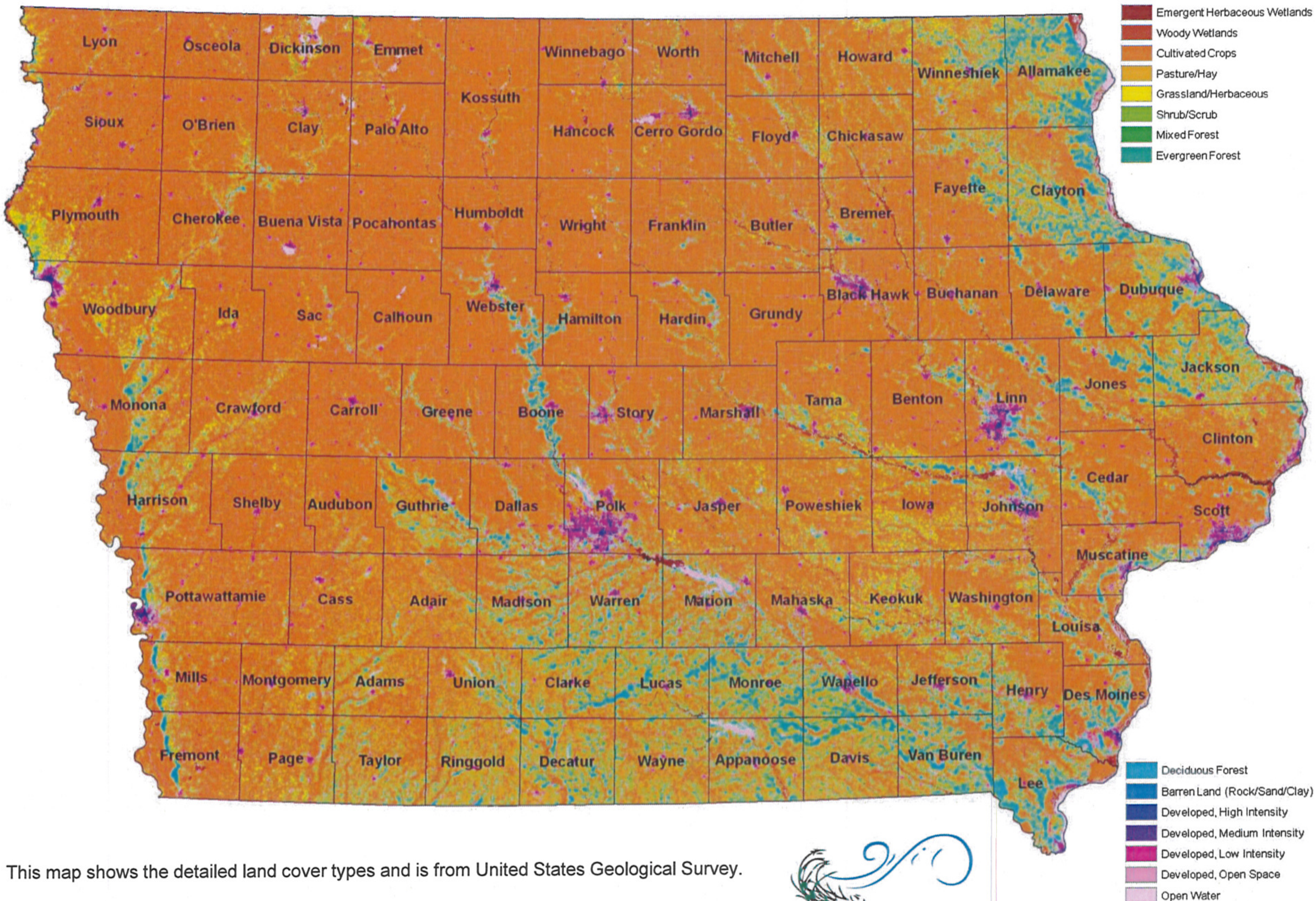
Land Elevation in Iowa in Feet Above Sea Level



Map produced by Wind Utility Consulting, PC using 200-meter resolution digital elevation data.

Wind Utility Consulting, PC January 2012
Andrew T. Coil

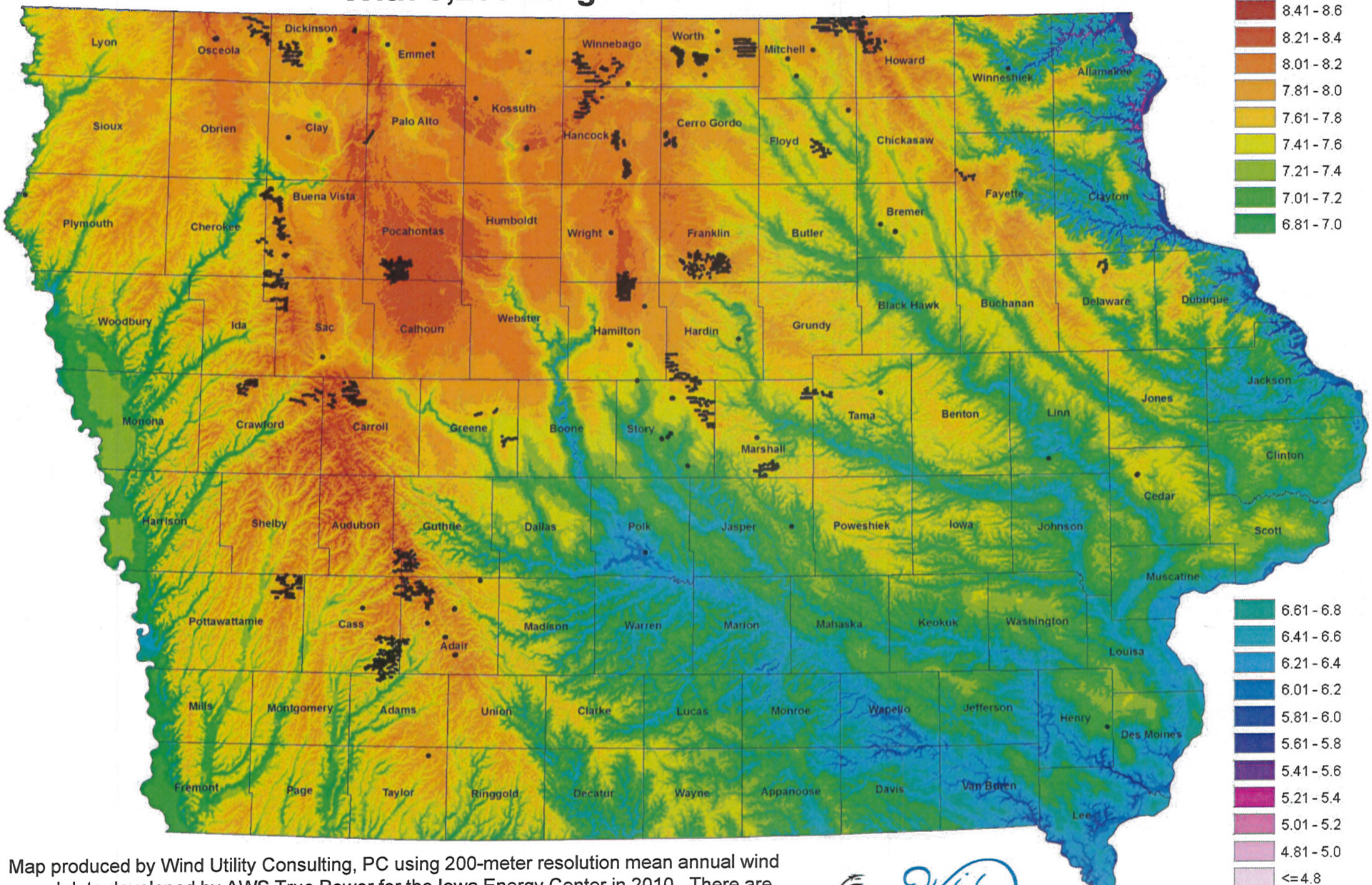
Land Cover Types in Iowa



This map shows the detailed land cover types and is from United States Geological Survey.

Wind Utility Consulting, PC January 2012. Andrew T. Coil

Mean Annual Wind Speed in Meters per Second at an 80-Meter Height With 3,200 Large Wind Turbines in Iowa



Map produced by Wind Utility Consulting, PC using 200-meter resolution mean annual wind speed data developed by AWS True Power for the Iowa Energy Center in 2010. There are approximately 3,200 large wind turbines plotted on the map. Single large turbines have larger black dots so they can more easily be seen on the map.

Wind Utility Consulting, PC March 2013
Andrew T. Coil

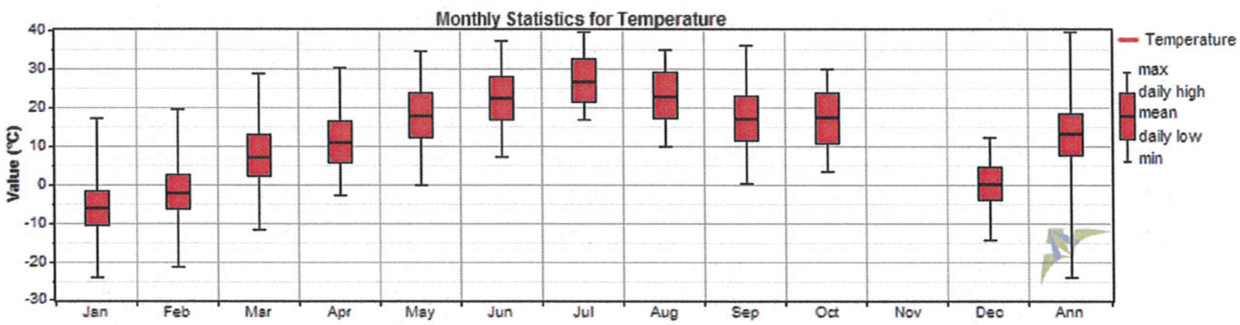
APPENDIX 2

Detailed Met Tower Data Statistical Reports

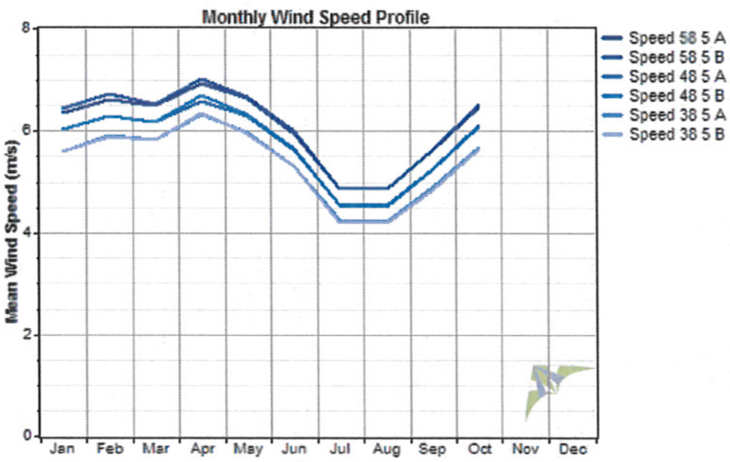
Data Set Properties

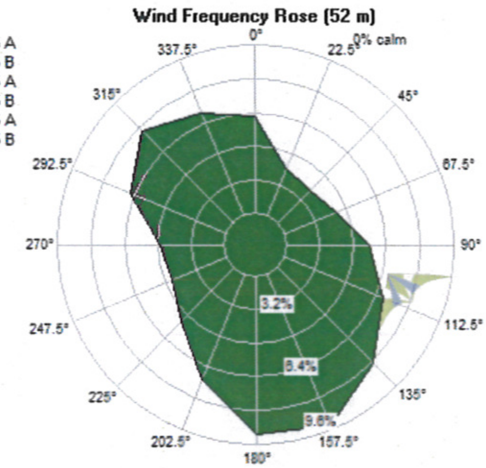
Report Created: 3/7/2013 10:20 using Windographer 2.4.4
Filter Settings: <Unflagged data>

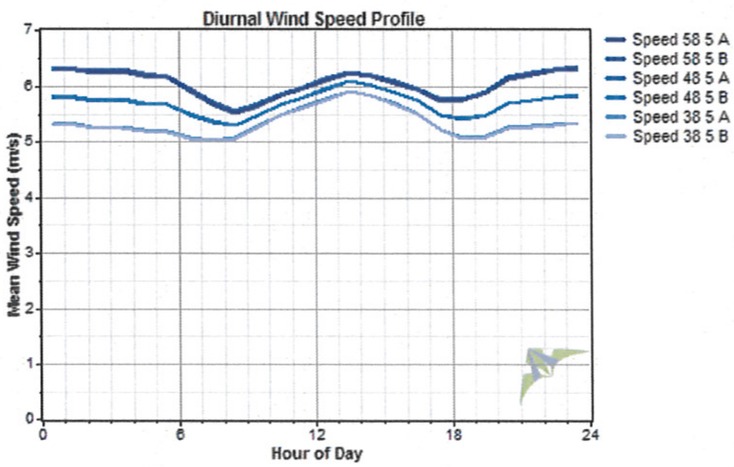
Variable	Value
Latitude	N 41° 59' 45.000"
Longitude	E 92° 38' 46.000"
Elevation	302 m
Start date	1/1/2011 00:00
End date	9/24/2012 06:00
Duration	21 months
Length of time step	10 minutes
Calm threshold	0 m/s
Mean temperature	13.1 °C
Mean pressure	97.76 kPa
Mean air density	1.192 kg/m³
Power density at 50m	187 W/m²
Wind power class	1 (Poor)
Power law exponent	0.28
Surface roughness	1.31 m
Roughness class	4.14
Roughness description	Suburban

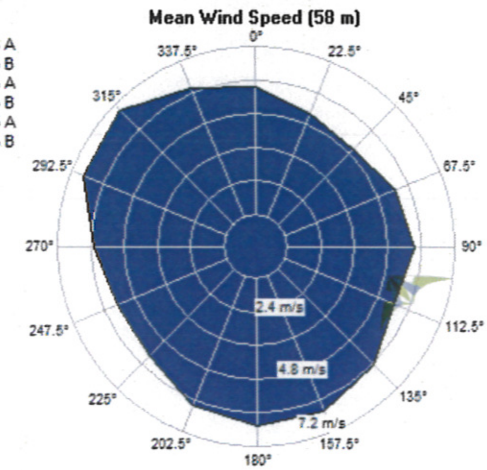


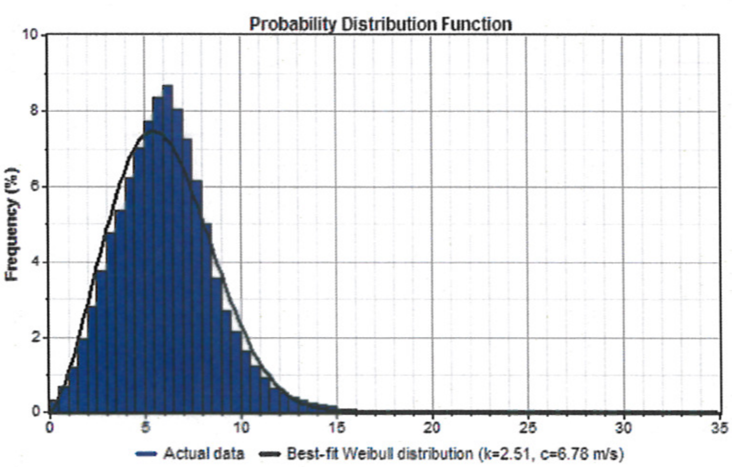
Wind Speed and Direction

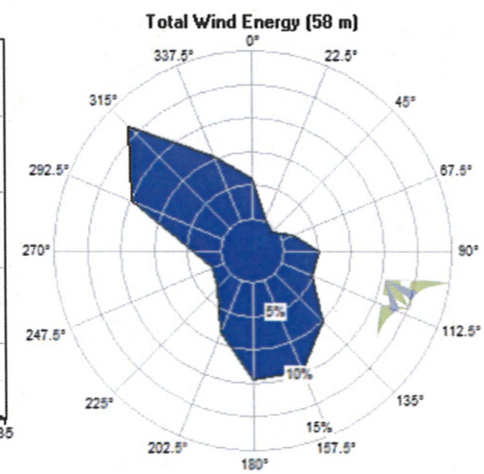




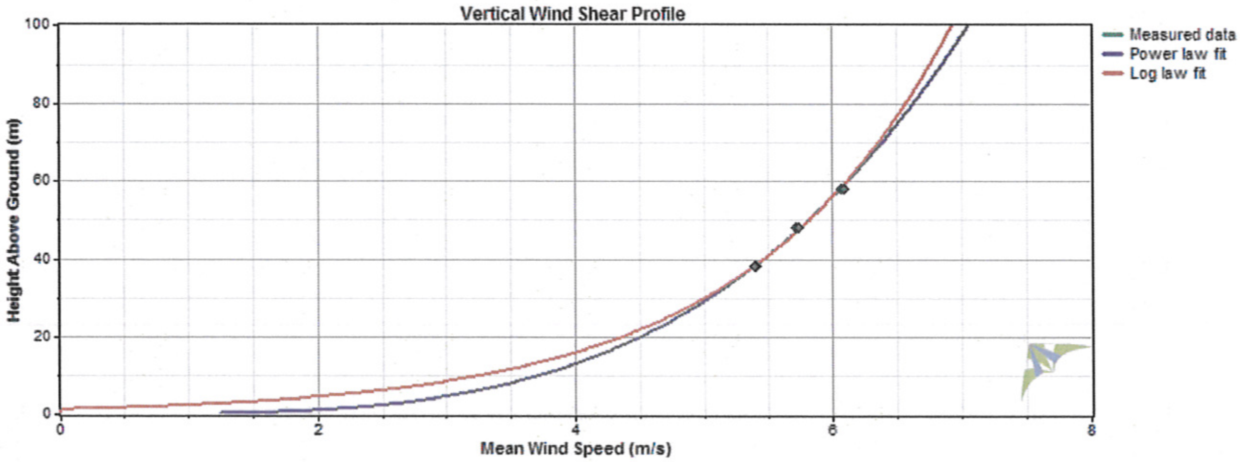


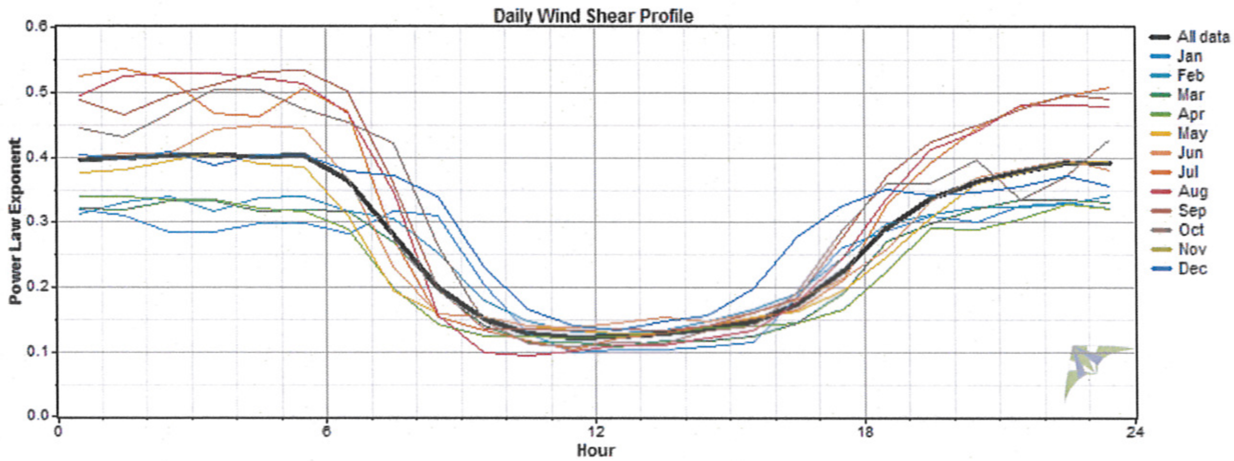


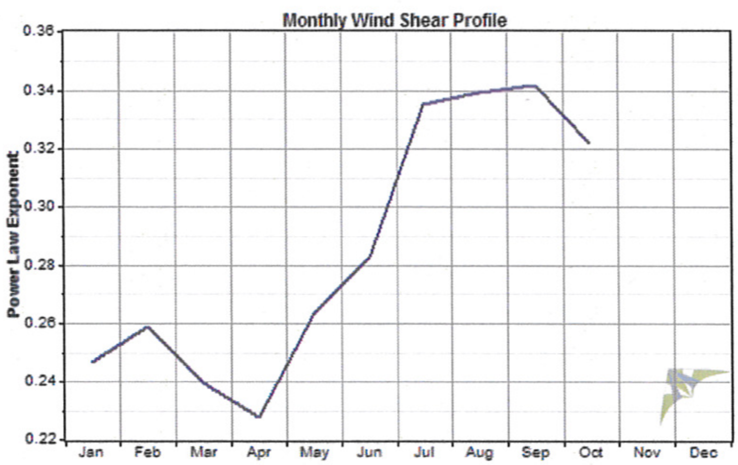


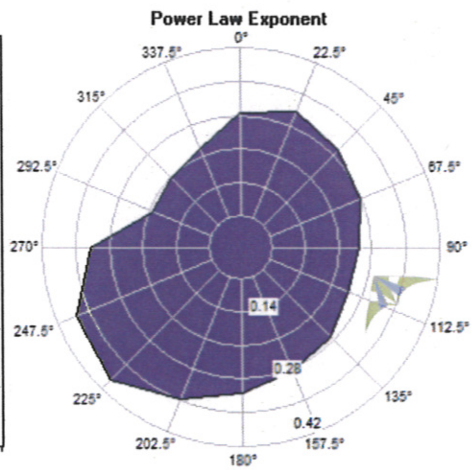


Wind Shear

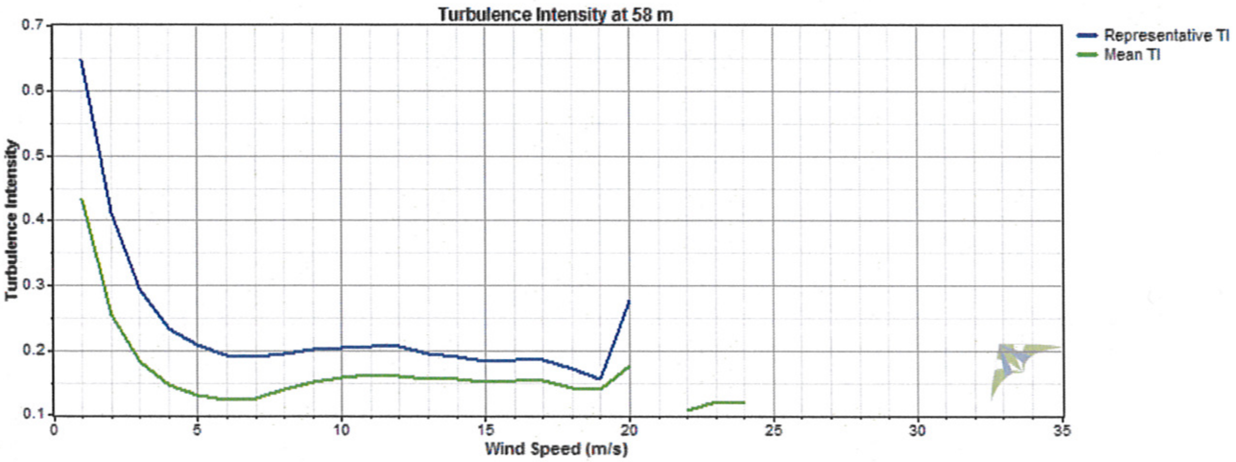

Vertical Wind Shear Profile
Height Above Ground (m)
Mean Wind Speed (m/s)
Measured data
Power law fit
Log law fit
0
20
40
60
80
100
0
2
4
6
8

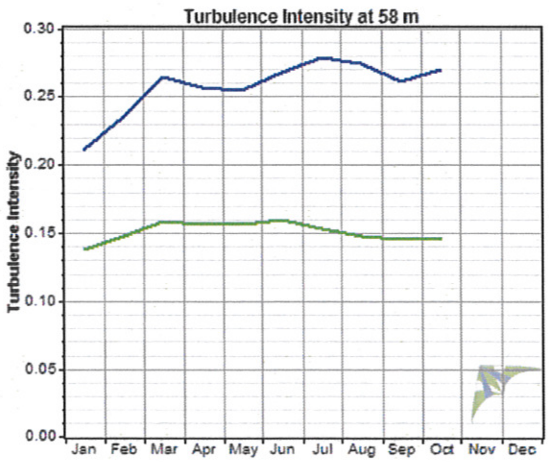

Daily Wind Shear Profile
Power Law Exponent
Hour
All data
Jan
Feb
Mar
Apr
May
Jun
Jul
Aug
Sep
Oct
Nov
Dec
0.0
0.1
0.2
0.3
0.4
0.5
0.6
0
6
12
18
24

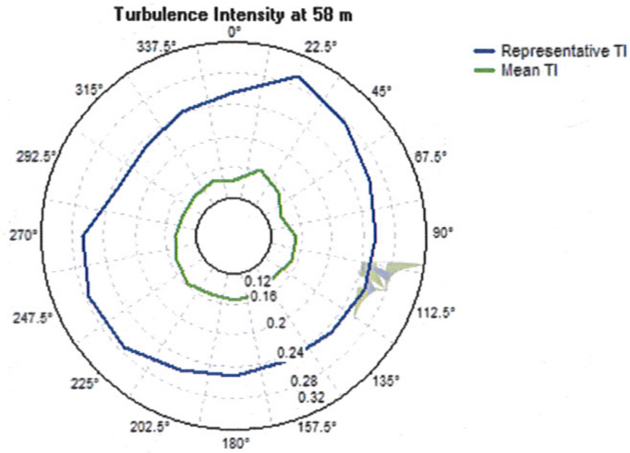

Monthly Wind Shear Profile
Power Law Exponent
0.22
0.24
0.26
0.28
0.30
0.32
0.34
0.36
Jan
Feb
Mar
Apr
May
Jun
Jul
Aug
Sep
Oct
Nov
Dec

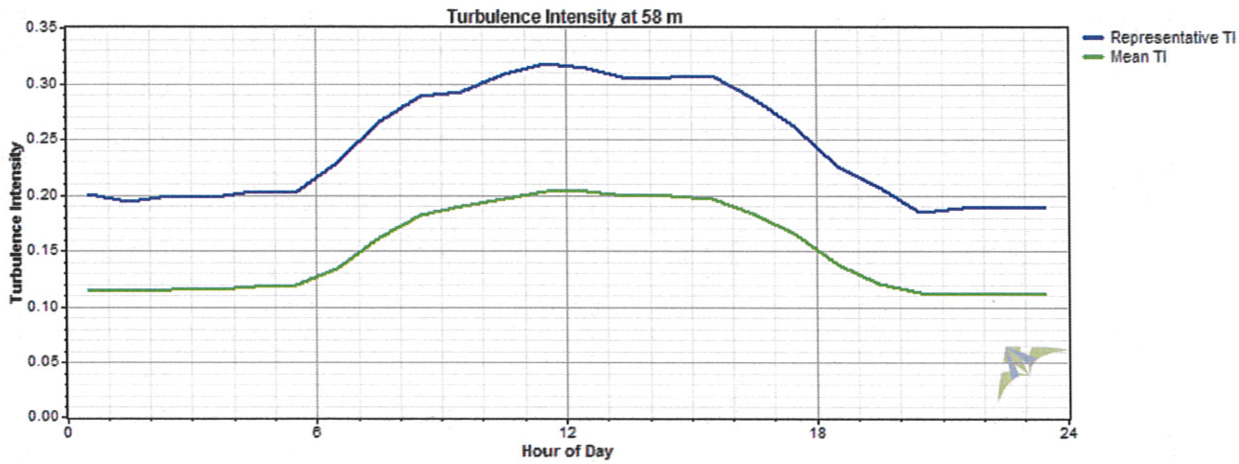

Power Law Exponent
0°
22.5°
45°
67.5°
90°
112.5°
135°
157.5°
180°
202.5°
225°
247.5°
270°
292.5°
315°
337.5°
0.14
0.28
0.42

Turbulence Intensity









Data Column Properties

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2	Speed 58 5 A SD	m/s	58 m	91,044	80,565	88.49	0.852	0.000	7.000	0.487
3	Speed 58 5 A Max	m/s	58 m	91,044	80,565	88.49	8.17	0.40	47.80	3.54
4	Speed 58 5 A Min	m/s	58 m	91,044	80,565	88.49	3.90	0.40	24.40	1.79
5	Speed 58 5 B	m/s	58 m	91,044	80,418	88.33	6.06	0.40	35.10	2.54
6	Speed 58 5 B SD	m/s	58 m	91,044	80,418	88.33	0.852	0.000	7.000	0.487
7	Speed 58 5 B Max	m/s	58 m	91,044	80,418	88.33	8.20	0.40	48.50	3.54
8	Speed 58 5 B Min	m/s	58 m	91,044	80,418	88.33	3.93	0.40	25.20	1.80
9	Speed 48 5 A	m/s	48 m	91,044	80,573	88.50	5.69	0.40	33.80	2.44
10	Speed 48 5 A SD	m/s	48 m	91,044	80,573	88.50	0.860	0.000	7.300	0.482
11	Speed 48 5 A Max	m/s	48 m	91,044	80,573	88.50	7.88	0.40	46.20	3.50
12	Speed 48 5 A Min	m/s	48 m	91,044	80,573	88.50	3.56	0.40	21.80	1.66
13	Direction 52 m	°	52 m	91,044	80,327	88.23	196.3	0.0	359.0	99.0
14	Direction 52 m SD	°	52 m	91,044	80,327	88.23	9.3	0.0	112.0	7.0
15	Direction 52 m Max	°	52 m	91,044	80,327	88.23	0	0	0	0
16	Direction 52 m Min	°	52 m	91,044	80,327	88.23	0	0	0	0
17	Direction 37 m	°	37 m	91,044	80,326	88.23	193.9	0.0	359.0	99.0
18	Direction 37 m SD	°	37 m	91,044	80,326	88.23	10.3	0.0	117.0	6.9
19	Direction 37 m Max	°	37 m	91,044	80,326	88.23	0	0	0	0
20	Direction 37 m Min	°	37 m	91,044	80,326	88.23	0	0	0	0
21	Temperature	°C		91,044	81,324	89.32	13.13	-24.20	39.50	12.31
22	Temperature SD	?C		91,044	81,324	89.32	0.104	0.000	2.100	0.084
23	Temperature Max	?C		91,044	81,324	89.32	13.36	-24.10	39.90	12.36
24	Temperature Min	?C		91,044	81,324	89.32	12.99	-24.40	39.30	12.29
25	voltmeter	volts		91,044	81,324	89.32	13.81	13.00	15.20	0.42
26	voltmeter SD	volts		91,044	81,324	89.32	0.004	0.000	0.900	0.023
27	voltmeter Max	volts		91,044	81,324	89.32	13.83	13.10	15.30	0.42
28	voltmeter Min	volts		91,044	81,324	89.32	13.79	12.50	15.20	0.42
29	Speed 48 5 B	m/s	48 m	91,044	80,848	88.80	5.70	0.40	33.80	2.44
30	Speed 48 5 B SD	m/s	48 m	91,044	80,848	88.80	0.852	0.000	7.300	0.482
31	Speed 48 5 B Max	m/s	48 m	91,044	80,848	88.80	7.87	0.40	46.60	3.50
32	Speed 48 5 B Min	m/s	48 m	91,044	80,848	88.80	3.60	0.40	21.40	1.65
33	Speed 38 5 A	m/s	38 m	91,044	81,111	89.09	5.35	0.40	32.30	2.37
34	Speed 38 5 A SD	m/s	38 m	91,044	81,111	89.09	0.859	0.000	7.300	0.476
35	Speed 38 5 A Max	m/s	38 m	91,044	81,111	89.09	7.56	0.40	46.60	3.46
36	Speed 38 5 A Min	m/s	38 m	91,044	81,111	89.09	3.25	0.40	19.10	1.54
37	Speed 38 5 B	m/s	38 m	91,044	81,201	89.19	5.33	0.40	32.70	2.39
38	Speed 38 5 B SD	m/s	38 m	91,044	81,201	89.19	0.856	0.000	7.300	0.477
39	Speed 38 5 B Max	m/s	38 m	91,044	81,201	89.19	7.54	0.40	46.20	3.48
40	Speed 38 5 B Min	m/s	38 m	91,044	81,201	89.19	3.24	0.40	19.90	1.55
41	Air Density	kg/m^3		91,044	91,044	100.00	1.192	1.089	1.368	0.050
42	Speed 58 5 A TI			91,044	80,565	88.49	0.150	0.000	1.000	0.083
43	Speed 58 5 B TI			91,044	80,418	88.33	0.150	0.000	1.429	0.085
44	Speed 48 5 A TI			91,044	80,573	88.50	0.160	0.000	1.091	0.085
45	Speed 48 5 B TI			91,044	80,848	88.80	0.157	0.000	1.100	0.083
46	Speed 38 5 A TI			91,044	81,111	89.09	0.169	0.000	1.100	0.084
47	Speed 38 5 B TI			91,044	81,201	89.19	0.169	0.000	2.077	0.086
48	Speed 58 5 A WPD	W/m^2		91,044	80,565	88.49	206	0	24,237	305
49	Speed 58 5 B WPD	W/m^2		91,044	80,418	88.33	210	0	25,085	312
50	Speed 48 5 A WPD	W/m^2		91,044	80,573	88.50	177	0	22,399	277
51	Speed 48 5 B WPD	W/m^2		91,044	80,848	88.80	179	0	22,399	280
52	Speed 38 5 A WPD	W/m^2		91,044	81,111	89.09	152	0	19,548	247
53	Speed 38 5 B WPD	W/m^2		91,044	81,201	89.19	152	0	20,283	252

Appendix 3

20-Year Financial Pro Forma Analysis

Using a GE 1.6 MW 100-Meter Rotor Diameter Wind Turbine
On an 80-Meter Hub Height Tower
Installed at the School Site

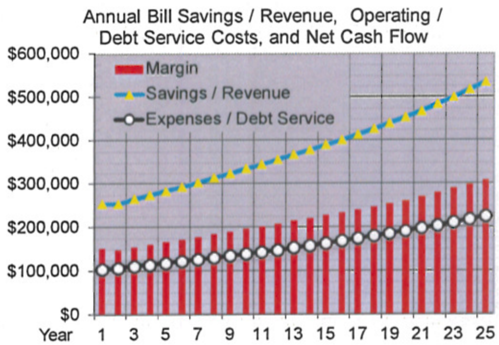
Annual Cash Flow Projections

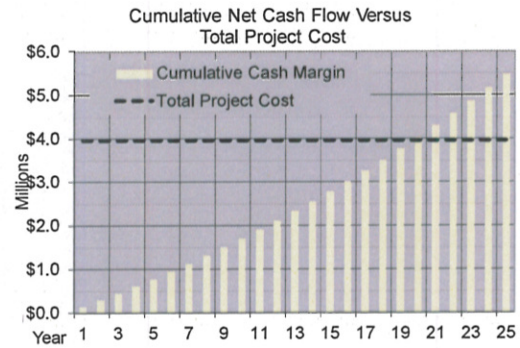
Cash Flow Analysis Based on Using the School Site with a Medium Power Bill Escalation Rate

Key Study Assumptions		
Medium Power Bill Escalation Rate Used in this Analysis		
Wind Speed Probability Scenario Used is	P-50	
Climate Change Impacts on Wind Speed Used >	Normal	
General Inflation Rate		2.5%
O&M Escalator Rate		3.5%
Tax-Exempt Bond Interest Rate		N / A
Tax-Exempt Bond Term in Years		N / A
Cash Investment from Meskwaki	$	3,954,000

Summary of Results	
Project Cost Simple Breakeven in Years (Accumulated Savings exceeds the Project Cost)	19.7
Average Debt Service Coverage Ratio	N/A
Minimum Debt Service Coverage Ratio	N/A

Summary of Operating Costs and Net Cash Margins	Average Annual Cost: Years 1-10	Years 11-20	All 20 Years
Annual Operating Cost	$ 119,565	$ 165,302	$ 142,433
Annual Debt Service	$ -	$ -	$ -
Total Annual Cost	$ 119,565	$ 165,302	$ 142,433
Mean Annual Mwh Output	5,844	5,426	5,635
Operating Cost per kWh	$0.0205	$0.0305	$0.0253
Total Annual Cost per kWh	$0.0205	$0.0305	$0.0253
Average Power Bill Savings Rate, $/kWh	$0.0498	$0.0735	$0.0616
Average Net Margin From Operations	$ 171,038	$ 232,254	$ 201,646
Cumulative Net Margin End of Period	$ 1,710,378	$ 4,032,915	$ 4,032,915





			Year 1 2014	Year 2 2015	Year 3 2016	Year 4 2017	Year 5 2018	Year 6 2019	Year 7 2020	Year 8 2021	Year 9 2022	Year 10 2023
ENERGY PRODUCTION												
Gross Energy Production, Adjustments made for climate change		kWh	6,785,852	6,785,852	6,785,852	6,745,951	6,706,050	6,666,149	6,626,248	6,586,348	6,546,447	6,506,546
Average Wind Turbine Availability		%	95.00%	95.00%	95.00%	95.00%	95.00%	95.00%	95.00%	95.00%	95.00%	95.00%
Gross to Net Production Factor		%	87.56%	87.56%	87.56%	87.56%	87.56%	87.56%	87.56%	87.56%	87.56%	87.56%
Projected Net Energy Generated	100.0%	kWh	**5,941,800**	**5,941,800**	**5,941,800**	**5,906,863**	**5,871,925**	**5,836,987**	**5,802,049**	**5,767,112**	**5,732,174**	**5,697,236**
							100.0%					
Energy Used & Sold												
Meskwaki Electricity Usage Growth Rate			0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%
Meskwaki Total Electricity Used			21,314,087	21,314,087	21,314,087	21,314,087	21,314,087	21,314,087	21,314,087	21,314,087	21,314,087	21,314,087
% of Wind Energy Used for Meskwaki Facilities	100.0%	100.0%	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%
Energy Used for Meskwaki Facilities		kWh	5,941,800	5,941,800	5,941,800	5,906,863	5,871,925	5,836,987	5,802,049	5,767,112	5,732,174	5,697,236
Natural Gas Replaced by Electricity?	No	kWh	0	0	0	0	0	0	0	0	0	0
Balance of Energy Sold to Utility		kWh	0	0	0	0	0	0	0	0	0	0
Wind Generation as a Percentage of Total Meskwaki Usage			27.9%	27.9%	27.9%	27.7%	27.5%	27.4%	27.2%	27.1%	26.9%	26.7%
SAVINGS, REVENUES, & INCENTIVE PAYMENTS												
Power Bill Savings from Energy Used on Site												
Average Power Bill Savings including Demand & Fixed Charges		$ / kWh	$0.0430	$0.0430	$0.0447	$0.0465	$0.0484	$0.0503	$0.0523	$0.0544	$0.0566	$0.0588
Power Bill Savings		$	$ 255,497	$ 255,497	$ 265,717	$ 274,721	$ 284,020	$ 293,623	$ 303,540	$ 313,781	$ 324,355	$ 335,274
Natural Gas Bill Savings (None)		$	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
Revenue from Excess Sales to Utility												
Buyback Rate for Excess Energy Sales	3.0%	$ / kWh	$0.0290	$0.0299	$0.0308	$0.0317	$0.0326	$0.0336	$0.0346	$0.0357	$0.0367	$0.0378
Revenue from Sale of Energy to Utility		$	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
Total Bill Savings, Sales Revenue & Incentives		$	**$ 255,497**	**$ 255,497**	**$ 265,717**	**$ 274,721**	**$ 284,020**	**$ 293,623**	**$ 303,540**	**$ 313,781**	**$ 324,355**	**$ 335,274**

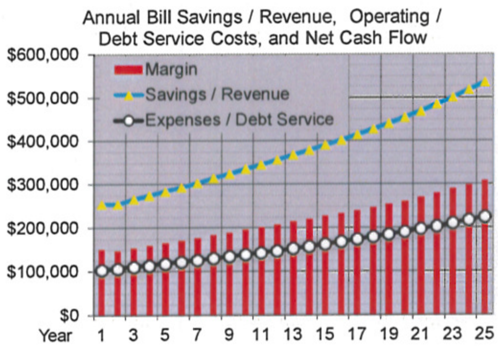
Annual Cash Flow Projections

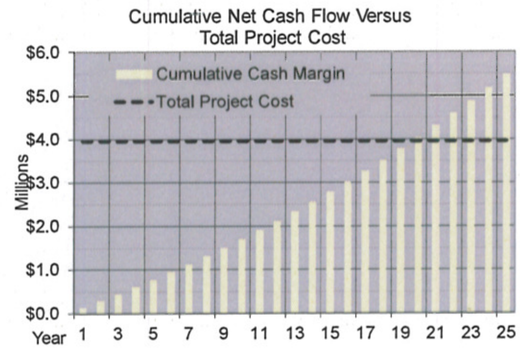
Cash Flow Analysis Based on Using the School Site with a Medium Power Bill Escalation Rate

Key Study Assumptions	
Medium Power Bill Escalation Rate Used in this Analysis	
Wind Speed Probability Scenario Used is	P-50
Climate Change Impacts on Wind Speed Used >	Normal
General Inflation Rate	2.5%
O&M Escalator Rate	3.5%
Tax-Exempt Bond Interest Rate	N / A
Tax-Exempt Bond Term in Years	N / A
Cash Investment from Meskwaki	$ 3,954,000

Summary of Results	
Project Cost Simple Breakeven in Years (Accumulated Savings exceeds the Project Cost)	19.7
Average Debt Service Coverage Ratio	N/A
Minimum Debt Service Coverage Ratio	N/A

Summary of Operating Costs and Net Cash Margins	Average Annual Cost		
	Years 1-10	Years 11-20	All 20 Years
Annual Operating Cost	$ 119,565	$ 165,302	$ 142,433
Annual Debt Service	$ -	$ -	$ -
Total Annual Cost	$ 119,565	$ 165,302	$ 142,433
Mean Annual Mwh Output	5,844	5,426	5,635
Operating Cost per kWh	$0.0205	$0.0305	$0.0253
Total Annual Cost per kWh	$0.0205	$0.0305	$0.0253
Average Power Bill Savings Rate, $/kWh	$0.0498	$0.0735	$0.0616
Average Net Margin From Operations	$ 171,038	$ 232,254	$ 201,646
Cumulative Net Margin End of Period	$ 1,710,378	$ 4,032,915	$ 4,032,915





			Year 1 2014	Year 2 2015	Year 3 2016	Year 4 2017	Year 5 2018	Year 6 2019	Year 7 2020	Year 8 2021	Year 9 2022	Year 10 2023
EXPENSES & DEBT SERVICE												
Operating Expenses												
Maintenance / Warranty Service Contract		$	$ 80,000	$ 82,800	$ 85,698	$ 88,697	$ 91,802	$ 95,015	$ 98,340	$ 101,782	$ 105,345	$ 109,032
Parts and Supplies (Included above)			$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
Local Operation Labor		$	$ 5,000	$ 5,125	$ 5,253	$ 5,384	$ 5,519	$ 5,657	$ 5,798	$ 5,943	$ 6,092	$ 6,244
Property, Business Interruption & Liability Insurance		$	$ 10,452	$ 10,713	$ 10,981	$ 11,255	$ 11,537	$ 11,825	$ 12,121	$ 12,424	$ 12,734	$ 13,053
Professional Services / Management		$	$ 5,000	$ 5,125	$ 5,253	$ 5,384	$ 5,519	$ 5,657	$ 5,798	$ 5,943	$ 6,092	$ 6,244
Miscellaneous / Unanticipated Expenses / Other		$	$ 2,500	$ 2,563	$ 2,627	$ 2,692	$ 2,760	$ 2,829	$ 2,899	$ 2,972	$ 3,046	$ 3,122
Land Lease, Total Dollars	$ -	$	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
Property Taxes	$ -	$	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
Total Operating Expenses		$	**$ 102,952**	**$ 106,326**	**$ 109,812**	**$ 113,414**	**$ 117,136**	**$ 120,983**	**$ 124,957**	**$ 129,065**	**$ 133,309**	**$ 137,695**
Debt Service												
Beginning of Year Loan Balance		$	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
Principal Portion of Commercial Loan Payment		$	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
Interest Portion of Commercial Loan Payment		$	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
Total Commercial Loan Payments		$	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
End of Year Loan Balance		$	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
Total Loan Payments		$	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
Cash Available to Cover Service Debt		$	$ 152,546	$ 149,172	$ 155,906	$ 161,307	$ 166,884	$ 172,641	$ 178,583	$ 184,716	$ 191,046	$ 197,578
Debt Service Coverage Ratio												
Total Operating Costs & Loan Payments		$	**$ 102,952**	**$ 106,326**	**$ 109,812**	**$ 113,414**	**$ 117,136**	**$ 120,983**	**$ 124,957**	**$ 129,065**	**$ 133,309**	**$ 137,695**
NET MARGIN, PAYBACK & RETURN ON INVESTMENT												
Net Margin Available from Operations		$	$ 152,546	$ 149,172	$ 155,906	$ 161,307	$ 166,884	$ 172,641	$ 178,583	$ 184,716	$ 191,046	$ 197,578
Cumulative Net Margin from Operations		$	$ 152,546	$ 301,718	$ 457,623	$ 618,930	$ 785,814	$ 958,455	$ 1,137,038	$ 1,321,754	$ 1,512,800	$ 1,710,378
Years Until Cum. Margin Exceeds Project Cost	20	$ 3,954,000	1	1	1	1	1	1	1	1	1	1
Yrs. Until Cum. Margin Exceeds Meskwaki Invest.	20	$ 3,954,000	1	1	1	1	1	1	1	1	1	1
Net Margin for Internal Rate of Return Calculation		$ (3,954,000)	$ 152,546	$ 149,172	$ 155,906	$ 161,307	$ 166,884	$ 172,641	$ 178,583	$ 184,716	$ 191,046	$ 197,578
Percentage Internal Rate of Return on Net Cash Investment by Year			-96.1%	-78.6%	-60.8%	-47.2%	-37.0%	-29.4%	-23.6%	-19.0%	-15.4%	-12.5%

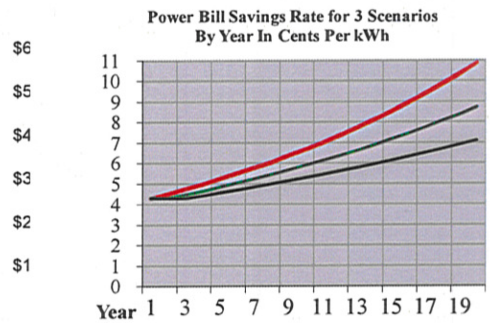
Annual Cash Flow Projections

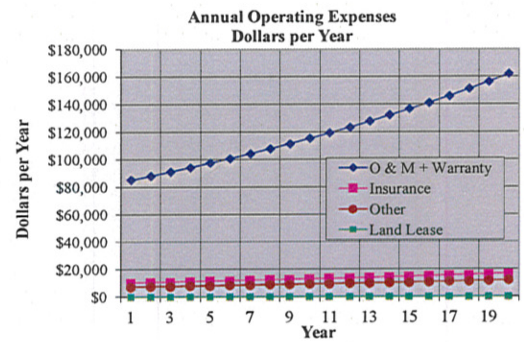
Cash Flow Analysis Based on Using the School Site with a Medium Power Bill Escalation Rate

Key Study Assumptions	
Medium Power Bill Escalation Rate Used in this Analysis	
Wind Speed Probability Scenario Used is	P-50
Climate Change Impacts on Wind Speed Used >	Normal
General Inflation Rate	2.5%
O&M Escalator Rate	3.5%
Tax-Exempt Bond Interest Rate	N / A
Tax-Exempt Bond Term in Years	N / A
Cash Investment from Meskwaki	$ 3,954,000

Total Cost of Wind Generation Project	
$ 2,375,000	GE 1.6-100 Wind Turbine Delivered to Site
$ 621,000	Foundation, Unloading, Erection, Roads
$ 489,000	Electrical Interconnection
$ 193,000	Soft Costs (Interest, Engineering, Legal)
$ 276,000	Contingencies at 7.5%
$ 3,954,000	Total Capital Cost
$ -	Spare Parts, Warranty, Other
$ -	Financial Reserves
$ 3,954,000	Total Wind Project Cost

Sources of Capital		
$ -	0.0%	Treasury Grant
$ -	0.0%	Grants & Gifts
$ 3,954,000	100.0%	Meskwaki Net Investment
$ -	0.0%	Outside Investor's Equity
$ -	0.0%	Commercial Loan
$ -	0.0%	Other Loans
$ 3,954,000	100.0%	Total Wind Project Cost





			Year 11 2024	Year 12 2025	Year 13 2026	Year 14 2027	Year 15 2028	Year 16 2029	Year 17 2030	Year 18 2031	Year 19 2032	Year 20 2033
ENERGY PRODUCTION												
Gross Energy Production, Adjustments made for climate change		kWh	6,466,645	6,426,744	6,386,844	6,346,943	6,307,042	6,267,141	6,227,240	6,187,339	6,147,439	6,107,538
Average Wind Turbine Availability		%	94.75%	94.50%	94.25%	94.00%	93.75%	93.50%	93.25%	93.00%	92.75%	92.50%
Gross to Net Production Factor		%	87.33%	87.10%	86.87%	86.64%	86.41%	86.18%	85.95%	85.72%	85.49%	85.26%
Projected Net Energy Generated	100.0%	kWh	**5,647,397**	**5,597,743**	**5,548,272**	**5,498,985**	**5,449,882**	**5,400,963**	**5,352,228**	**5,303,676**	**5,255,309**	**5,207,125**
Energy Used & Sold												
Meskwaki Electricity Usage Growth Rate			0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%
Meskwaki Total Electricity Used			21,314,087	21,314,087	21,314,087	21,314,087	21,314,087	21,314,087	21,314,087	21,314,087	21,314,087	21,314,087
% of Wind Energy Used for Meskwaki Facilities	100.0%	100.0%	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%
Energy Used for Meskwaki Facilities		kWh	5,647,397	5,597,743	5,548,272	5,498,985	5,449,882	5,400,963	5,352,228	5,303,676	5,255,309	5,207,125
Natural Gas Replaced by Electricity?	No	kWh	0	0	0	0	0	0	0	0	0	0
Balance of Energy Sold to Utility		kWh	0	0	0	0	0	0	0	0	0	0
Wind Generation as a Percentage of Total Meskwaki Usage			26.5%	26.3%	26.0%	25.8%	25.6%	25.3%	25.1%	24.9%	24.7%	24.4%
SAVINGS, REVENUES, & INCENTIVE PAYMENTS												
Power Bill Savings from Energy Used on Site												
Average Power Bill Savings including Demand & Fixed Charges		$ / kWh	$0.0612	$0.0637	$0.0662	$0.0688	$0.0716	$0.0745	$0.0774	$0.0805	$0.0838	$0.0871
Power Bill Savings		$	$ 345,634	$ 356,299	$ 367,276	$ 378,574	$ 390,202	$ 402,167	$ 414,480	$ 427,148	$ 440,183	$ 453,593
Natural Gas Bill Savings (None)		$	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
Revenue from Excess Sales to Utility												
Buyback Rate for Excess Energy Sales	3.0%	$ / kWh	$0.0390	$0.0401	$0.0413	$0.0426	$0.0439	$0.0452	$0.0465	$0.0479	$0.0494	$0.0509
Revenue from Sale of Energy to Utility		$	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
Total Bill Savings, Sales Revenue & Incentives		$	**$ 345,634**	**$ 356,299**	**$ 367,276**	**$ 378,574**	**$ 390,202**	**$ 402,167**	**$ 414,480**	**$ 427,148**	**$ 440,183**	**$ 453,593**

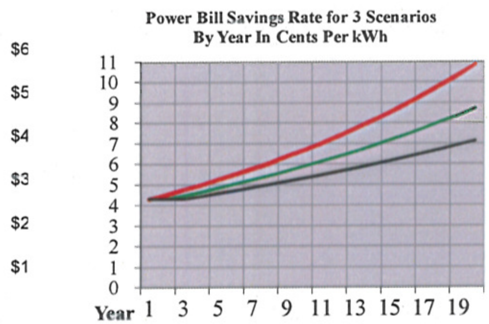
Annual Cash Flow Projections

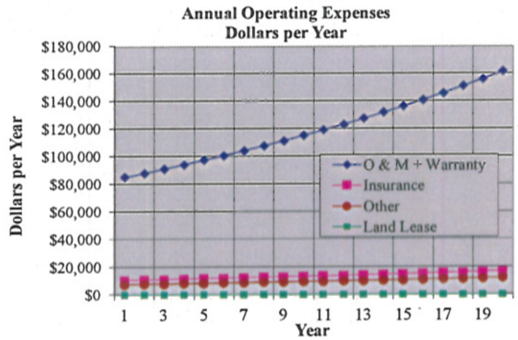
Cash Flow Analysis Based on Using the School Site with a Medium Power Bill Escalation Rate

Key Study Assumptions	
Medium Power Bill Escalation Rate Used in this Analysis	
Wind Speed Probability Scenario Used is	P-50
Climate Change Impacts on Wind Speed Used >	Normal
General Inflation Rate	2.5%
O&M Escalator Rate	3.5%
Tax-Exempt Bond Interest Rate	N / A
Tax-Exempt Bond Term in Years	N / A
Cash Investment from Meskwaki	$ 3,954,000

Total Cost of Wind Generation Project	
$ 2,375,000	GE 1.6-100 Wind Turbine Delivered to Site
$ 621,000	Foundation, Unloading, Erection, Roads
$ 489,000	Electrical Interconnection
$ 193,000	Soft Costs (Interest, Engineering, Legal)
$ 276,000	Contingencies at 7.5%
$ 3,954,000	Total Capital Cost
$ -	Spare Parts, Warranty, Other
$ -	Financial Reserves
$ 3,954,000	Total Wind Project Cost

Sources of Capital		
$ -	0.0%	Treasury Grant
$ -	0.0%	Grants & Gifts
$ 3,954,000	100.0%	Meskwaki Net Investment
$ -	0.0%	Outside Investor's Equity
$ -	0.0%	Commercial Loan
$ -	0.0%	Other Loans
$ 3,954,000	100.0%	Total Wind Project Cost





			Year 11 2024	Year 12 2025	Year 13 2026	Year 14 2027	Year 15 2028	Year 16 2029	Year 17 2030	Year 18 2031	Year 19 2032	Year 20 2033
EXPENSES & DEBT SERVICE												
Operating Expenses												
Maintenance / Warranty Service Contract		$	$ 112,848	$ 116,798	$ 120,885	$ 125,116	$ 129,496	$ 134,028	$ 138,719	$ 143,574	$ 148,599	$ 153,800
Parts and Supplies (Included above)			$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
Local Operation Labor		$	$ 6,400	$ 6,560	$ 6,724	$ 6,893	$ 7,065	$ 7,241	$ 7,423	$ 7,608	$ 7,798	$ 7,993
Property, Business Interruption & Liability Insurance		$	$ 13,379	$ 13,714	$ 14,056	$ 14,408	$ 14,768	$ 15,137	$ 15,516	$ 15,904	$ 16,301	$ 16,709
Professional Services / Management		$	$ 6,400	$ 6,560	$ 6,724	$ 6,893	$ 7,065	$ 7,241	$ 7,423	$ 7,608	$ 7,798	$ 7,993
Miscellaneous / Unanticipated Expenses / Other		$	$ 3,200	$ 3,280	$ 3,362	$ 3,446	$ 3,532	$ 3,621	$ 3,711	$ 3,804	$ 3,899	$ 3,997
Land Lease, Total Dollars	$ -	$	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
Property Taxes	$ -	$	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
Total Operating Expenses		$	**$ 142,228**	**$ 146,912**	**$ 151,753**	**$ 156,756**	**$ 161,926**	**$ 167,269**	**$ 172,791**	**$ 178,498**	**$ 184,396**	**$ 190,492**
Debt Service												
Beginning of Year Loan Balance		$	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
Principal Portion of Commercial Loan Payment		$	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
Interest Portion of Commercial Loan Payment		$	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
Total Commercial Loan Payments		$	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
End of Year Loan Balance		$	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
Total Loan Payments		$	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
Cash Available to Cover Service Debt		$	$ 203,406	$ 209,387	$ 215,523	$ 221,819	$ 228,276	$ 234,898	$ 241,689	$ 248,651	$ 255,787	$ 263,101
Debt Service Coverage Ratio												
Total Operating Costs & Loan Payments		$	**$ 142,228**	**$ 146,912**	**$ 151,753**	**$ 156,756**	**$ 161,926**	**$ 167,269**	**$ 172,791**	**$ 178,498**	**$ 184,396**	**$ 190,492**
NET MARGIN, PAYBACK & RETURN ON INVESTMENT												
Net Margin Available from Operations		$	$ 203,406	$ 209,387	$ 215,523	$ 221,819	$ 228,276	$ 234,898	$ 241,689	$ 248,651	$ 255,787	$ 263,101
Cumulative Net Margin from Operations		$	$ 1,913,785	$ 2,123,172	$ 2,338,695	$ 2,560,513	$ 2,788,789	$ 3,023,687	$ 3,265,376	$ 3,514,026	$ 3,769,814	$ 4,032,915
Years Until Cum. Margin Exceeds Project Cost	20	$ 3,954,000	1	1	1	1	1	1	1	1	1	0
Yrs. Until Cum. Margin Exceeds Meskwaki Invest.	20	$ 3,954,000	1	1	1	1	1	1	1	1	1	0
Net Margin for Internal Rate of Return Calculation		$ (3,954,000)	$ 203,406	$ 209,387	$ 215,523	$ 221,819	$ 228,276	$ 234,898	$ 241,689	$ 248,651	$ 255,787	$ 263,101
Percentage Internal Rate of Return on Net Cash Investment by Year			-10.1%	-8.1%	-6.4%	-5.0%	-3.8%	-2.8%	-1.9%	-1.1%	-0.4%	0.2%