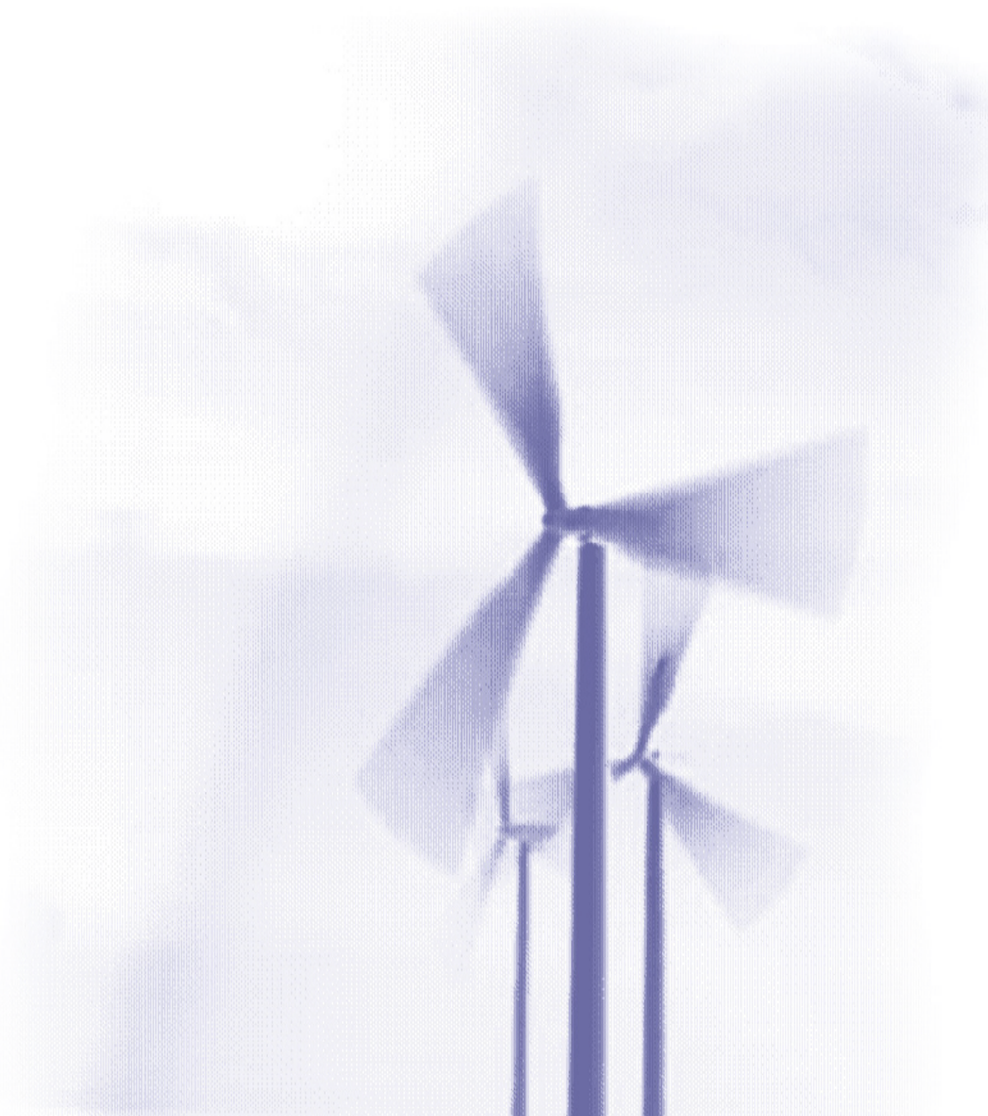
Prepared for:	**James P. LaMountain**
	Huguenot Farms
	Holland, MA
Subject Property:	**160-180 Mashapaug Rd.**
	Parcel 10.a.6
	Holland, MA
Date:	**8/20/09**



Wind Energy Appraisal

Contents

1. Overview

This appraisal was performed to provide an initial evaluation of the potential to utilize wind energy to produce electricity at the subject location. It was undertaken at the request of the owners of the property.

The report provides an initial assessment of the suitability of the proposed site for one or more wind turbines. It is designed to provide the owner with enough basic information about the potential of a wind turbine at the site to allow them to make an educated decision as to the potential value of wind on the site, and as to whether or not further study, in the form of a full feasibility study, is warranted for this site.

While the report uses typical energy output values (kWHrs/yr) for various size wind turbines, it does not promote specific machines unless noted. It presents the various sizes of turbines as a guide to the owner in order to gauge the potential revenue/savings of various sized turbine investments. While the report does depict a range of the potential value of the wind resource, it does not get into the detailed cost of various sized machines, nor does it present a complete cash flow analysis, both of which are usually covered in complete feasibility studies.

The appraisal uses published wind maps in order to determine its potential value as a wind power site. In many cases this information alone will be enough for the owner to make a decision. In other cases, especially if the winds are marginal, or if outside financing requires it, a more refined approach using powerful computer modeling or actual wind data collection efforts may be required. Computer modeling is often included in feasibility studies. If actual data collection is required, this process is typically initiated after the complete feasibility study is performed. In this manner the owner makes incrementally larger investments only when and if the previous work warrants it.

The report will also attempt to spotlight any broad "fatal flaws" which might preclude the owner from moving forward in considering this type of wind power project. While it takes a broad look at the zoning process, it does not get into the details of micro-siting or the permitting process. Again, these are typically found in the domain of a full feasibility study.

The appraisal concludes with some excellent consumer information published by many sources which the owner should find of value in considering this sort of energy project.

2. The Site

The proposed site consists of an approximate 76 acre parcel of land located on Mashapaug Rd. in Holland, Massachusetts. An assessors' map is attached for reference.

General observations:

1. *The site is a largely wooded parcel, appearing to encompass a hilltop of approximately 920' in altitude.*
2. *The site would appear to offer several potential wind turbine locations, depending on the size of the turbine selected.*
3. *There would appear to be enough land to allow a turbine to be placed in locations distant enough from neighboring homes.*
4. *It has been reported that a cell phone tower is being located on the premises. The interaction between cell phone towers and wind turbines is not fully understood at this time by the industry and should be further investigated.*

Composite image from Google Earth and Assessors map. Circles indicate potential 700' 'clear zones' for wind turbine placement (750 kW turbines)

3. The Wind Resource

The site was located using Doppler radar data from *Firstlook's* wind estimates in order to estimate the potential wind resource.

Average wind speeds will vary according to the height above ground. Because the power output of a wind turbine varies as the cube of the wind speed, a small amount of increased speed results in a substantial increase in power generation. Therefore, even a 10% variation of a 6 m/s wind speed could result in plus or minus .6 m/s – with a correspondingly larger effect on output.

The estimated wind speed at this location at a few common rotor heights is:

Hub Height		**Wind Speed m/s (mph)**	
Meters (m)	**Feet (ft)**	**Meters/Sec (m/s)**	**Miles/Hr (mph)**
50	164	5.95	13.2
65*	213	6.28	14.0
80	262	6.60	14.7

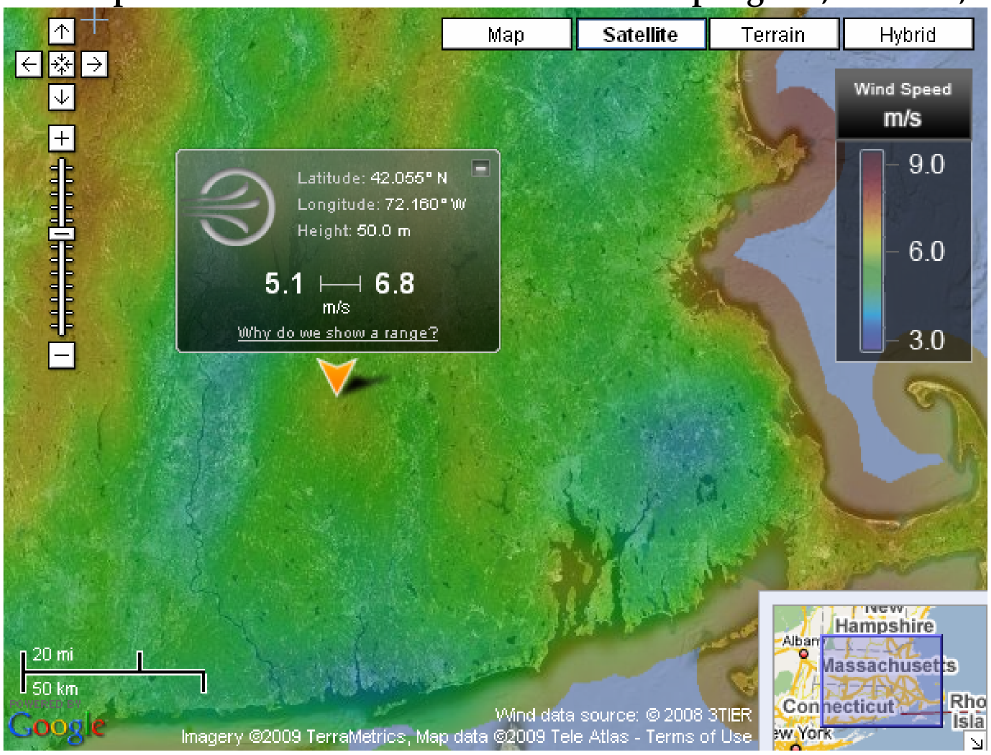
Table 1 – see attached maps. *Extrapolated

This site is considered to be in an area of good wind of a commercial nature, but not exceptional. The existence of a ridgeline and hilltop location appear favorable, however it is likely that the site is on the side of the hill that is shadowed from the prevailing winds. Google Earth elevations place potential sites at within 50' of the top of the hillside. Therefore a taller tower is advised (65m).

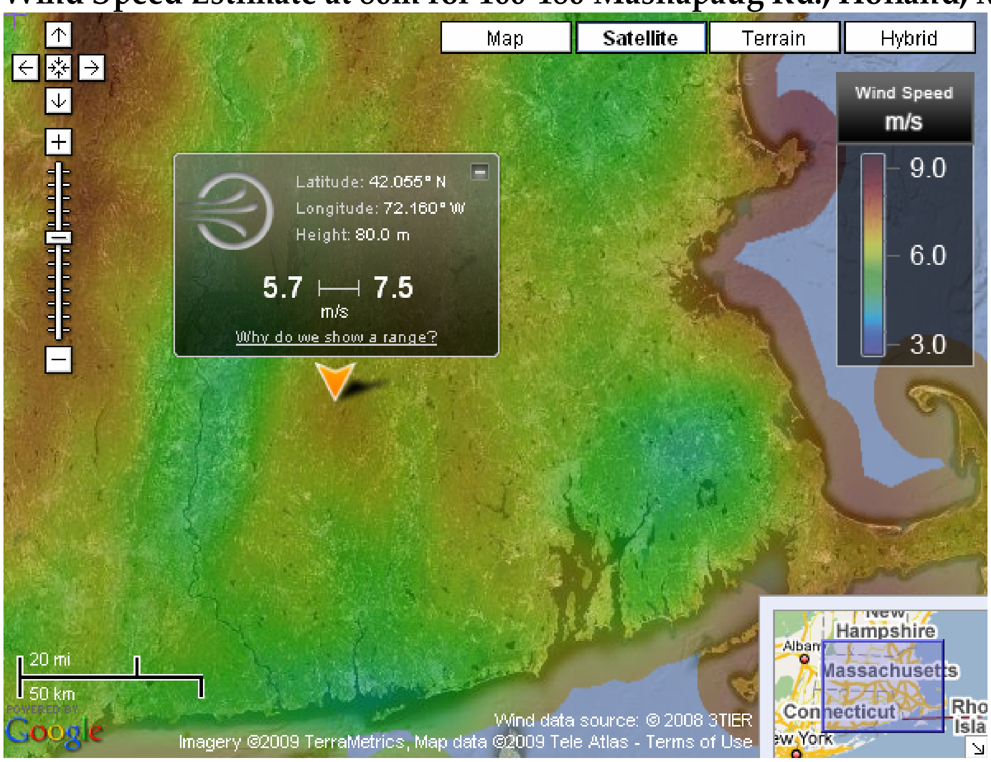
However, wind is a fickle resource, and its actual measurements can vary greatly between sites that are just hundreds of yards apart. A micro-siting map should be consulted and implemented as part of any further study, especially given the local terrain and the topography at the site.

In cases of good, yet nominal wind, such as this site exhibits, a meteorological tower (met tower) may be required by lenders in order to finance the project. Such a study would cost between $30-40,000 and would take one year of data collection time. Some lenders allow the use of a micro-siting map instead, and allow the margin of error to be carried within the operating proforma for the project.

Wind Speed Estimate at 50m for 160-180 Mashapaug Rd., Holland, MA



Wind Speed Estimate at 80m for 160-180 Mashapaug Rd., Holland, MA



4. Potential Energy Production

The energy production from any wind turbine is a function of the swept area of the turbine's blades, the size and efficiency of the mechanical system, and the aerodynamic efficiency of the blades. These factors combine to determine values for an individual machine's 'capacity factor' (the percent of time the machine can be thought of as running at its full rated output over the course of the year). When multiplied by the number of hours in a year (8,760), this allows us to produce an 'energy curve' for individual machines, which shows the overall energy output in KWHrs/yr at given annual average wind speeds.

While various machines will operate at slightly better or worse capacity factors, in general they will fall within a range of values which can be used to illustrate the amount of power from various standard size turbines. This allows the owner to see how much electricity could be produced by different sized machines at various heights.

The following table represents the potential energy output of a range of mid-scale machines that are typical for commercial/industrial applications:

Hub Height	Wind Speed m/s	Turbine Size*	Output - KwHrs/yr
50 meter	5.95	225kW	389,825
	5.95	750kW	1,223,000
	5.95	1500kW	3,296,000
65 meter	6.28	225kW	441,921
	6.28	750kW	1,387,500
	6.28	1500kW	3,684,200
80 meter	6.60	225kW	492,143
	6.60	750kW	1,548,000
	6.60	1500kW	4,052,600

Table 2 (Norwin 225 kW, Norwin 750kW, GE 1.5mW xle)

Note: the wind speeds and turbine output values represented in this report should be taken as estimates and should in no way be interpreted as a guarantee of the average annual wind speed or the average annual output of any specific turbine at this site.

5. Use of the Power and Configurations of the Application

It is important for the land owner to understand how the interconnection of a wind generator can affect the economics of the installation so that the proper sized unit can be installed. The economics of wind power are maximized by several factors:

- The swept area of the rotor. Generally, larger machines benefit from economies of scale, and produce more power per installed dollar.

- The installed cost, which includes permitting and engineering costs related to regulatory issues and public resistance through the zoning laws. Many projects which propose the largest turbines are the hardest (and costliest) to get approved, simply because of resistance from the neighbors or a restrictive zoning law.

- How the turbine is connected to the load use and how excess power is conserved, sold or wasted. The most popular types of service configurations include:

  - **Behind the Meter** – the turbine generator is simply used to service the on-site load, and displaces electricity drawn from the grid. The turbine is carefully sized so that there is little excess power produced, because any such power is wasted. This is typically found in areas where the following options are not available.

  - **Merchant Power** – where the power is generated for sale to the 'grid' and sold at a wholesale rate. This is typically done on larger wind farms, rather than servicing local point loads. In New England, this rate is about $.06 per KWHr, which is the ISO's 'avoided cost'.

  - **Net Metering** – the most popular and profitable approach. In net metering, the turbine is connected 'behind the meter' but the power company regulations allow excess power to 'run the meter backward' (or the site is dual-metered). This typically results in the highest financial benefit, since the full retail cost for delivered power from the power company is displaced by power from the turbine.

    In July 2008, net metering in MA was significantly expanded to establish three separate categories of net-metering facilities. The order instituting rulemaking *was issued in March 2009 and proposed rules have been issued. "Class I" facilities are generally defined as systems up to 60 kW in capacity. "Class II" facilities are generally defined as systems greater than 60 kW and up to one megawatt (mW) in capacity that generate electricity from agricultural products, solar energy or wind energy. In class II projects the energy cost, transmission, transition and distribution charges are used to determine the rate. "Class III" facilities are generally defined as systems greater than 1 mW and up to 2 mW in capacity that generate electricity from agricultural products, solar energy or wind energy. For class III facilities, only the energy cost, transmission and transition charges (not distribution) are used to compute the rate earned.*

NOTE: a 'project', or 'system' is defined as the cumulative size of the name-plate ratings of the generators involved. Thus, two (2) 750kW wind turbines would be classified as a 'class 3' facility.

*The state's investor-owned utilities must offer net metering. Municipal utilities are not obligated to offer net metering, but they may do so voluntarily. (There are no electric cooperatives in Massachusetts.) The aggregate capacity of net metering is limited to 1% of each utility's peak load.**

Net metering can take the form of 'physical' or 'virtual' metering. In physical net metering, the wires actually run through the facilities and their meters. With virtual net metering, the generator is hooked up directly to the grid and its output metered. The power output is handled more as a billing exercise, where the customer could 'assign' the excess power to other meters within the local distribution company's service area. These meters could presumably be owned by the turbine owner, or could be friends or other neighbors, with whom some financial arrangements could be made for the sale of excess power.

In July of 2009 the MA DPU issued final rules and regulations for net-metering. The energy bill also includes a 'neighborhood net metering' provision. A 'neighborhood' may include both residential as well as commercial meters, as long as there are at least 10 residential meters. A 'Host Customer' decides to assign the excess capacity to a designated 'neighborhood'.

The above is mentioned to illustrate the fact that when judging the desired size of a wind turbine, it is not simply a matter of 'how big of a machine will fit on the land'.

Rather, it becomes a balancing act between trying to find the right sized machine for the site which balances all concerns. For instance, smaller mid-scale turbines (65 kW – 400 kW) may ultimately be more cost effective if they are easier to permit (because of their smaller size and usually lower towers) than a larger machine, even if all of the power could be absorbed behind the meter.

Findings: *The property consists of approximately 76 acres of residential/agricultural zoned land. The highest and best use of this land as a wind power facility would be to try to get the project in place as a 'neighborhood net-metering' facility, selling power to a collective of neighbors. This is a relatively new (July 2009) designation from the MA Department of Public Utilties, and allows the 'host site' to erect mid to large scale turbines and net meter the excess power used to a collective of designated neighbors. In order to maximize the retail value of the power assigned, the host facility should attempt to get the highest available rate assigned for its own use.*

Current rates for Residential service from National Grid indicate a rate of $.14 per kW used, without basic service included. Of this, $.0255/kWhr is considered the 'distribution charge'. For projects of less than 1mW in size, the full $.14/kW rate could be considered as achievable. For a larger class III facility (a 1.5mW machine, or (2) 750kW machines for instance), a rate of $11.45 would be achievable.

6. Potential Savings/Value

It is suggested that the developer/owner attempt to sell the power produced by the wind turbine under the Neighborhood Net Metering regulations of MA. Therefore this report will assume a value of $.14 or $11.45/kW hour, depending on whether a class II or class III sized project is installed (respectively).

However, there are other valuable considerations for wind generated electricity. The value of *Renewable Energy Credits (RECs)* or *'Green Tags'* as they are often called, should not be overlooked. *In the New England ISO market, RECs are currently trading at around $.03/kWhr*, and this value is expected to stay strong for the next 5-10 years, since the region does not have much 'green' power generation. RECs generally have a life of 10 years, and can be sold to many companies looking to 'buy' their way into being green through the purchase of these vehicles from many power brokers. *The sale of RECs would bring the effective rate of power produced by the turbine to about $.17 – 14.45/kWh, depending on the class size chosen.*

Another consideration, which is relatively new to the New England market, is the sale of production capacity on the Forward Energy Market auctions through ISO New England. Although this is something that the owner should look into as a viable cash flow, it will not be considered part of the economics of this report, since the values varies depending on the auction price.

Other valuable considerations which affect the effective rate of produced power from a Wind system in Massachusetts are:

- **The Small Wind Systems Tax Credit**
  Description: Under present law, a federal-level investment tax credit (ITC) is available to help consumers purchase small wind turbines for home, farm, or business use. Owners of small wind systems with 100 kilowatts (kW) of capacity and less can receive a credit for 30% of the total installed cost of the system, not to exceed $4,000. For turbines used for homes, the credit is additionally limited to the lesser of $4,000 or $1,000 per kW of capacity.

  Current Status: The ITC, written into law through the Emergency Economic Stabilization Act of 2008, is available for equipment installed from October 3, 2008 through December 31, 2016.

- **The Production Tax Credit (PTC) Extension**
  In October 2008, Congress acted to provide a one-year extension of the Production Tax Credit through December 31, 2009

Description: Under present law, an income tax credit of 2.1 cents/kilowatt-hour is allowed for the production of electricity from utility-scale wind turbines. This incentive, the renewable energy Production Tax Credit (PTC), was created under the Energy Policy Act of 1992 (at the value of 1.5 cents/kilowatt-hour, which has since been adjusted annually for inflation).

- **Renewable Energy Grant**: The *American Recovery and Reinvestment Act of 2009* (H.R. 1), enacted in February 2009, created a renewable energy grant program that will be administered by the U.S. Department of Treasury. This cash grant may be taken in lieu of the federal business energy investment tax credit (ITC). In July 2009 the Department of Treasury issued documents detailing guidelines for the grants, terms and conditions, and a sample application.

  Grants are available to eligible property* placed in service in 2009 or 2010, or placed in service by the specified credit termination date,** if construction began in 2009 or 2010. The guidelines include a "safe harbor" provision that sets the beginning of construction at the point where the the applicant has incurred or paid at least 5% of the total cost of the property, excluding land and certain preliminary planning activities. There are two categories of eligible projects that are related to wind:

  - **Small Wind Turbines.** The grant is equal to 30% of the basis of the property for small wind turbines. Eligible small wind property includes wind turbines up to 100 kW in capacity.

  - **Qualified Facilities.** The grant is equal to 30% of the basis of the property for qualified facilities that produce electricity. ***Qualified facilities include wind energy facilities***, closed-loop biomass facilities, open-loop biomass facilities, geothermal energy facilities, landfill gas facilities, trash facilities, qualified hydropower facilities, and marine and hydrokinetic renewable energy facilities.

- **Local Property Tax Exemption for Residential, Commercial, and Industrial Installations of Solar, Wind, and Hydroelectric Energy Systems**
  Solar and wind energy systems and devices installed for supplying the energy needs of a residence or business are eligible for an exemption from local property tax. This exemption, which is good for 20 years from the date of system installation, applies only to the value of the renewable energy equipment reflected on the property tax bill, not the full amount of the bill.

- **State Corporate Income Tax Deduction for Purchases of Solar and Wind Energy Systems and Equipment**
  Businesses that purchase a solar or wind energy system are allowed to deduct from net income, for state tax purposes, any costs incurred from buying, installing, and operating the unit, provided the installation is located in

Massachusetts and is used exclusively in the trade or business of the corporation. The exemption is in effect for the length of the system's depreciation period. M.G.L. c. 63, sec. 38H(f)

- **State Corporate Excise Tax Exemption for Purchases of Solar and Wind Energy Systems and Equipment**
  Businesses that purchase a solar or wind energy system are allowed to deduct from net income, for state excise tax purposes, any costs incurred from buying, installing, and operating the unit, provided the installation is located in Massachusetts and is used exclusively in the trade or business of the corporation. The exemption is in effect for the length of the system's depreciation period. M.G.L. c. 63, sec. 38H

- **Rapid Depreciation**
  Double-declining balance, five-year depreciation schedule (I.R.C. Subtitle A, Ch. 1, Subch. B, Part VI, Sec. 168 (1994) (accelerated cost recovery system)) is another federal policy that encourages wind development by allowing the cost of wind equipment to be depreciated faster.

Production Output:

Although the various incentives and programs shown above will affect the overall financial pro-forma of any ownership model in a positive fashion, it is beyond the scope of this appraisal to provide such a proforma for any specific machines. Instead the report appraises the value of the potential wind site using the simple effective rate of power mentioned above, *which is $.17 or $14.45/kWh, depending on the class (size) of the facility built.* Using these prices, Table 2 in section 4 can be re-displayed to show the typical value of the electricity produced by the representative turbines at this site as follows:

Hub Height	Wind Speed m/s	Turbine Size*	Output - KwHrs/yr	Suitability	Revenue/Savings ($/yr)
50 meter	5.95	225kW	389,825	Y	$66,270
	5.95	750kW	1,223,000	Y	$207,910
	5.95	1500kW	3,296,000	Y	$476,272
65 meter	6.28	225kW	441,921	Y	$75,127
	6.28	750kW	1,387,500	Y	$235,875
	6.28	1500kW	3,684,200	Y	$532,367
80 meter	6.60	225kW	492,143	Y	$83,664
	6.60	750kW	1,548,000	Y	$263,160
	6.60	1500kW	4,052,600	Y	$585,601

Table 3 (Norwin 225 kw, Norwin 750 kW, GE 1.5xle)

Typical Installed Costs of Systems:

Given the estimated production value of the site, we may now compare this to the estimated costs of today's wind turbines in order to gauge a relative economic return on the investments. The table below lists a range of installed wind turbine costs that are being experienced in the region. Two cost values are provided – a Hi and a Low value – due to the many variables regarding this site that would factor into a final price (foundation design, soil geotechnics, power interconnection methods, etc.). A full feasibility study would answer many of these issues in order to help tighten up the cost estimate.

Typ. Turbine Size	Value Type	Typ. Installed Cost*	Simple Payback (yrs) w/out Fed. 30% grant	Simple ROI (%) w/out Fed 30% grant	Simple Payback (yrs) WITH Fed. 30% grant	Simple ROI (%) WITH Fed. 30% grant
250 kW	Low	$750,000	10.0	10.0	7.0	14.3
250 kW	High	$950,000	12.6	7.9	8.9	11.3
750 kW	Low	$1,800,000	7.6	13.1	5.3	18.7
750 kW	High	$2,200,000	9.3	10.7	6.5	15.3
1500 kW	Low	$3,800,000	7.1	14.0	5.0	20.0
1500 kW	High	$4,400,000	8.3	12.1	5.8	17.3

Table 4

Notes to Table 4:

- These prices are representative only, and are NOT a quotation.
- IMPORTANT NOTE TO PAYBACK: This table indicates economic potential with and without the new Federal ITP, PTC or Cash Grant economic incentives. Whether these incentives can be used or not will depend on the legal status of the developers's organization and should be verified by the owner's tax advisor. If available, the Federal 30% cash grant program would return 30% of the project cost as a cash grant in the first year.
- Simple payback and simple ROI are useful only for comparison between machines. Does not include costs of O&M, service, financing, grants, tax credits, etc. A more complete proforma is usually included in full feasibility studies.
- It is important to note that the actual production of wind generated electricity will vary from year to year, therefore the use of the following tables can be used only as an approximation

7. Concerns

The following concerns are offered as issues that should be investigated more thoroughly in a full feasibility study before any wind project is undertaken.

Town of Holland Zoning Bylaws – A review of the Zoning Bylaws of the town of Holland as published online as of 8/23/08 indicates that the town does not yet have any specific regulations on the permitting of wind turbines. There is a typical 35 foot height restriction for most construction, and section 6.5 (attached in Section 10 of this report) defines a Wireless Communications Facility Overlay. In some towns without special Wind turbine zoning regulations, the regulations pertaining to cell towers or other wireless communications towers are used.

Land Area/Siting Locations – Being comprised of 76 acres, the site appears to offer a number of potential wind turbine site locations. Two of these locations are indicated on the diagram show in Section 2 of this report. The circles indicate an approximate 500′ diameter 'clear zone' which would accommodate a 250′ tall wind turbine (typical of a 750′ turbine on a 50m tower). If possible, a taller, 65m tower should be used to gain some of the height lost to being on the slope of the hill and not at the very top. If a larger turbine is desired, these machines can approach 350-400 feet in height, requiring a clear zone of 700-800′ in diameter. In general, the final location selected should be as close to the top of the hill as possible.

An additional concern is the location of residential properties that abut the subject property. Depending on the specific locations of any turbines, neighboring residences should usually not be located within approximately 600′ of the property, where both noise and flicker (the moving shadow of the blades when the turbine is located between a house and the sun's position) would need to be demonstrated not to be a nuisance. Flicker studies and balloon tests may be required by the bylaw.

Transmission Lines – The potential sites appear to lie at the innermost areas of the site, requiring access roads and short power lines to connect to Mashapaug Road.

The power lines at Mashapaug Road should be verified with the utility company in order to ascertain whether the lines could accommodate the potential power to be delivered. Three phase power lines are typically required. An 'interconnect study' is typically undertaken for this purpose, and can cost between $3,000 – 8,000.

General Noise Issues - Noise considerations generally take two forms, state regulatory compliance and nuisance levels at nearby residences:

A. *Regulatory compliance:* Massachusetts state regulations do not allow a rise of 10 dB or greater above background levels at a property boundary (Massachusetts Air Pollution Control Regulations, Regulation 310 CMR 7.10). In most cases modern turbines are quiet enough to meet these criteria easily. Mid-scale turbines, while slightly noisier due to increased tip speeds, are also normally masked by the sound of the rushing wind.

B. *Human annoyance:* Aside from Massachusetts regulations, residences must also be taken into consideration. Any eventual wind turbine would need to be sited such that it would be inaudible or minimally audible at the nearest residences.

Specific Environmental Permitting - The site must adhere to any rules and regulations pertaining to wetlands and other environmentally sensitive issues.

Access to the Site – The site is located off Mashapaug Road, which is a rural road. This may present some difficulty in delivering and installing a large (1.5mW) turbine at the site and should be examined carefully. Mid-scale machines, such as a 750kW device, present less of a problem, while 225kW machines are typically delivered in container trucks or standard flatbeds. Typically, a Route Survey is conducted for the specific turbine selected. Interior access roads to the property site locations will need to be constructed.

General Airspace Issues- The form "7460-1 - Notice Of Proposed Construction or Alteration" must be filed with the Federal Aeronautics Commission (FAA) before construction of any structure over 200 feet (i.e. all utility-scale wind turbines). The corresponding form for the Massachusetts Aeronautics Commission (MAC form E10, Request for Airspace Review) must also be filed.

While the response of the FAA or DOD cannot be predicted, most sites that are not within about 3-5 miles of a public or military airport are not considered a hazard to air traffic. At this preliminary stage, we simply examine fatal flaws by considering the distance to public and other runways. The FAA requires that any structure over 200' be lit. All utility-scale wind power installations are lit. Mid-scale machines are lit on a case-by-case basis.

Specific Airspace Issues – Only the Southbridge airport, at 7 miles distant, appears to be close enough to cause any concern to this site.

8. Conclusions/Next Step

The subject property has enough wind and other favorable factors to be considered a commercially viable site for a commercial mid-scale turbine. The electricity should be generated for neighborhood net-metering purposes and sold at an estimated rate of between $.144 and $0.17/kWhr, depending on the size of facility implemented.

Next steps:

At this point a more complete engineering and permitting *Feasibility Study* would appear warranted.

The information expressed in this Appraisal has been collected and presented in such a manner as to 'roll into' such a Feasibility Study. It can be thought of as a 'first phase' of the next detailed study. In this fashion the owner only incurs further expense for the next level of work if they know that the site is of value as a wind turbine site and it warrants further investigation.

A Comprehensive Feasibility Study will conduct in-depth investigation into permitting issues, and net metering availability, and refine other costs and implementation issues. It would contain a complete project proforma financial analysis, and specifics as to the actual turbines suited for the project. This type of study is needed to 'set the stage' to allow both the permitting and financing process to begin, should the owner decide to proceed after Feasibility Study review. The cost for a Feasibility Study is approximately $11,000-13,000. Interconnection studies could cost between $3,000 to $8,000.

With the results of these studies, and assuming that no obstacles have been uncovered, the work of permitting the site could begin. The engineering and legal work involved on a site of this size would typically amount to $40-80,000 in order to gain permits.

On the other hand, various grants are available to owners wishing to put up wind turbines, ranging from 10-40% of some installations. DMS offers a grant writing service that will conduct a search of applicable grants and make application to such granting authorities on behalf of the owner, should this service be desired. The typical cost of such a service is between $3,000 to $5,000.

9. Our Background

Brian D. Kuhn

Developers Marketing Services
PO Box 6006
Plymouth, MA 02360
508-746-4458 (o)
508-364-9489 ©
brian.kuhn@DevelopersMarketingServices.com

Professional Bio:

Brian Kuhn is the Principal of *Developers Marketing Services* of Plymouth, MA, which offers consulting services and project development expertise in the Renewable Energy and Real Estate industries. His current business activities include the formation of, *Aeronautica Windpower*, a venture for establishing a wind turbine manufacturing facility in Massachusetts.

Brian holds a *Bachelor of Science* degree in '*Renewable Energy Systems and Business*', from the University of Massachusetts, in Amherst, MA ('77), where he studied under Professor *William Heronemus*, a noted naval architect and world renowned primary investigator for off-shore wind systems. He was a member of a small team of engineers that designed and built the first *UMass Solar Habitat and Wind Furnace* for the Department of Energy. This wind turbine introduced many innovations, including the use of a 3 bladed, variable pitch rotor and the use of a monopole tower – features that are now standard in today's modern wind turbine designs. The *Wind Furnace* turbine is currently heading to a new home at the Smithsonian Institute in Washington.

Mr. Kuhn offers the perspective of over 30 years of product and service development. As *National Solar Specialist* for *Rheem Manufacturing* in the early '80s, he taught hundreds of distributors and dealers across the country how to design and install solar hot water systems. He has had several articles published about solar and wind power. He is a member of the *National Association of Home Builders* and the *Northeast Sustainable Energy Association*. He is also a past member of the *National Association of Realtors*, and is licensed as a real estate broker involved in land procurement and development projects across the Northeast.

Mr. Kuhn currently serves as Chairman for the *Plymouth Energy Committee* (PEC), a volunteer advisory group which reports to the Board of Selectmen of Plymouth, Massachusetts. Brian is the principal author of '*Plymouth 2020*', a plan which calls for virtually all of Plymouth's Municipal electricity to be produced by renewable sources in time for the town's 400th anniversary.

10. Supplemental Information

For more background information

This report assumes that the reader has some familiarity with wind power technology. If the reader is interested in a 'primer' for the industry, or wants an introduction to these areas, we suggest using the UMass Renewable Energy Labs (RERL's) Community Wind Fact Sheets, which are available on the web at: http://www.ceere.org/rerl/about_wind/.

Additional information on wind turbine technology and general information can be found at:

- American Wind Energy Association, www.awea.org
- Danish Wind Industry Association, www.windpower.org

Use of this report

This report is considered proprietary to the owner, and is intended to be used in consultation with the owner as they develop plans to utilize the wind resource.

Parcel Map

Section 6.5 of the Holland Zoning Bylaws (Wireless Communications Overlay)

SECTION 6.5 Wireless Communications Facilities cont.

6.52 Purpose:

The purpose of the Wireless Communications Facilities Overlay district is to establish a district in which wireless communications facilities may be permitted with minimal impact upon the public health, safety and general welfare. This bylaw has been created to (a) protect the general public from hazards associated with wireless communications facilities (b) minimize visual impacts from wireless communication facilities (c) prevent an adverse impact on local property values or the rural and residential character or Holland and (d) promote shared use of existing facilities and structures to reduce the need for new facilities. This section does not apply to satellite dishes and antennas for residential use.

Definition Delineation. The Wireless Communications Facilities Overlay District (WCFOD) shall include all land in the Town of Holland with the following exceptions:

Residential
Special Conservancy

Underlying Zoning Requirements. The Wireless Communications Facilities Overlay District shall be construed as an overlay district with regard to said locations. All requirements of the underlying zoning district shall remain in full force and effect, except as may be specifically provided herein.

6.53 Special Permit Requirements

a. A wireless communications facility may be erected on land located in the Wireless Communications Facilities Overlay District upon the issuance of a Special Permit by the Planning Board pursuant to Section VIII of this Bylaw.
b. No wireless communications facilities shall be erected or installed except in compliance with the provisions of this Section. Any proposed modification to an existing wireless communications facility including but not limited to extension in the height, addition of antennas or panels, or construction of a new or replacement facility shall be subject to these provisions and shall require a new application. The Planning Board may at its discretion, waive any application requirements for modifications to existing facilities.
c. New towers shall be considered only upon finding by the Planning Board that existing or approved towers cannot accommodate the equipment planned for the proposed tower. The applicant shall demonstrate that there is not an existing, approved or proposed wireless communications facility which can accommodate the equipment planned for the applicant's tower.

6.54 Siting, Design and Construction Guidelines

a. To the extent feasible, all service providers shall co-locate on a single tower. Wireless communications facilities shall be designed to accommodate the maximum number of users technologically practical. The intent of this requirement is to reduce the number of towers which will be required within the community. New towers shall be considered only upon a finding by the Planning Board that existing or approved towers cannot adequately fulfill the applicant's service requirements or accommodate the wireless communications equipment contemplated by the applicant.
b. All towers shall be designed to be constructed to the minimum height necessary to accommodate anticipated and future use. No wireless communications facility shall exceed 190 feet in height as measured from the ground level at the base of the tower.
c. All wireless communications facilities shall be sited in such a manner that the view of

facility from adjacent abutters, residential neighbors and other areas of town shall be as limited as possible. Owners of wireless communications facilities shall endeavor to install said facilities in a manner that blends in and does not contrast with the tower and/or landscape where it is located. The Planning Board may impose reasonable conditions to ensure this result, including painting and lighting standards.

d. Lattice style towers and/or any tower requiring guy wires shall not be permitted. Facilities requiring the construction of a tower shall be located on stealth monopoles.

e. The setback of a tower from the property line of the lot on which it is located shall be at least equal to the height of the pre-engineered fault measured at the finished grade of the tower base. No wireless communications facility shall be located within 300 feet of an existing residential building and 750 feet from any historic district.

f. All towers shall be pre-engineered to fail at a pre-determined height enabling the structure to collapse upon itself in the event of a catastrophic failure.

g. Fencing shall be provided to control access to wireless communications facilities and shall be compatible with the scenic character of the town and of abutting properties. Fencing shall not be constructed of barbed or razor wire. A landscape buffer of evergreen shrubs or trees shall be provided at the time of installation on the outside of the fenced area. The shrub or tree planting shall mature to a height greater than the fence height and be planted at a height of at least four feet. At maturity, the landscape plantings much for a dense visual barrier throughout the year. All landscape plantings must be continually maintained.

h. There shall be no signs associated with a wireless communications facility except: a sign identifying the facility, the owner and operator and an emergency telephone number where the owner can be reached on a 24 hour basis; a no trespassing sign; a sign displaying the FCC registration number; and any signs required to warn of danger. All signs shall comply with the requirements of the Holland Zoning Bylaw.

i. Night lighting of towers shall be prohibited. Tower lighting shall be limited to that needed for emergencies. Lighting of buildings and the ground may be provided to ensure a safe and secure facility. All lighting shall be shielded to prevent undue impact on surrounding properties.

j. There shall be a minimum of one parking space for each facility, to be used in connection with the maintenance of the site, and not to be used for the permanent storage of vehicles or other equipment.

k. To the extent feasible, all network interconnections from the communications site shall be via land lines.

l. Existing on-site vegetation shall be preserved to the maximum extent practicable. Clearing of land shall be performed in a manner which will maximize preservation of natural beauty and conservation of natural resources and which will minimize marring and scarring of the landscape or silting of streams or wetlands.

m. Grading or construction which will result in final slopes of fifteen percent or greater on fifty percent or note of lot area or on thirty thousand square feet of more of a single lot, even if less than half the lot area, shall be allowed only upon demonstration that adequate provisions have been made to protect against erosion, soil instability, uncontrolled surface water runoff, or environmental degradation. All such slopes exceeding fifteen percent which result from site grading or construction activities shall either be covered with topsoil to a depth of four inches and planted with vegetative cover sufficient to prevent erosion or be retained by a wall constructed of masonry, reinforced concrete or treated pile or timber.

6.55 Application Requirements

For the application to be considered complete, the following information must be submitted:

a. A site plan prepared by a professional engineer at a scale of 1:40 which complies with all requirements of Section 6.54 of this bylaw and which shows the following: tower location, tower height, accessory buildings and/or housings for switching equipment, topography of the lot on which the proposed tower will be constructed, underlying zoning districts, fencing and landscaping, access and parking, lighting, limits of clearing, site boundaries, abutters and utilities.

b. A plan outlining the return of the site to pre-existing condition shall be submitted as part of the application. A bond, in the an amount the applicant estimates will be required to recondition the site shall be required. The Planning Board must approve the amount of the bond and any terms and conditions of its release. Said bond shall be held by the town and released at such time as the Planning Board determines that the condition of the bond agreement have been satisfied.

c. A color photograph or rendition of the proposed wireless communications facilities including, but not limited to, the proposed tower with its antenna and/or panels. A rendition shall also be prepared illustrating a view of the proposed wireless communications facilities from the nearest street or streets.

d. A description of the wireless communications facilities including, but not limited to, the height of any towers and antennas, access roads and power supplies, the type, size and number of transmitters and a technical report which demonstrates that the maximum height of the installation is the minimum feasible to provide the intended service.

e. A description of the capacity of the tower including the number and type of panels, antenna and/or transmitter receivers that it can accommodate and the basis for these calculations.

f. A description of the special design features utilized to minimize the visual impact of the proposed wireless communications facilities.

g. A certification that the applicant possess all necessary licenses to operate such a facility and has complied with all federal and state requirements to provide the proposed service.

h. Within thirty days after filing the application for any new tower or extension in height thereto, the applicant shall arrange to fly a balloon at the maximum height of the proposed installation on a weekend day between the hours of noon and 3 PM. The balloon shall be of a size and color that can be seen from every direction for a distance of one mile. The applicant shall be responsible for posting the date and location of the balloon as a legal advertisement at least 14 days but not more than 21 days before the flight in at least two different issues of a newspaper with a general circulation in the Town of Holland.

i. Proof of ownership of the proposed site or proof of a contract or lease with the owner of the site establishing the applicant's right to construct a wireless communications facility on the site. The application must be singed by the owner of the property and the company proposing to erect the facility.

6.56 Compliance

a. Failure to comply with the provisions of this section or a Special Permit granted under this section shall be grounds for a non-renewal of a Special Permit.

b. Certification demonstrating continuing compliance with the standards of the Federal Communication Commission, Federal Aviation Administration, the American National Standards Institute and the regulations of the Massachusetts Department of Public Health; certification of the operator's possession of all necessary licenses to operate such a facility; and certification that the wireless communications facility is still in use shall be filed with the Building Inspector on an annual basis by the Special Permit holder.

SECTION 6.5 Wireless Communications Facilities cont.

6.57 Conditions

a. Any Special Permit granted or renewed under this section shall expire five years after the date of the decision of the Planning Board granting the Special Permit, unless sooner renewed.

b. For wireless communications facilities located on town property, the operator must execute an agreement with the Town whereby the operator indemnifies and holds the Town harmless against any claims for injury or damage resulting from or arising out of the use of occupancy of the Town owned property by the Operator.

c. Providers of wireless communications services shall report to the Building Inspector any cessation in the use or operation of any wireless communications facility that exceeds 30 days and such facilities shall be removed at the owner's expense within one year of cessation of use or operation.

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PO Box 6006
Plymouth, MA 02362
888-800-2381 (v&f)
www.DevelopersMarketingServices.com