ENVIRONMENTAL ASSESSMENT REGISTRATION

Argentia Wind Farm

EA File No.

Prepared for:
Department of Environment
Environmental Assessment Division
St. John's NL

and

Natural Resources Canada
Ottawa, ON

Prepared by

Wind Project Inc.

November 2005

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Attachments

1.0 NAME OF THE UNDERTAKING

Argentia Wind Farm

2.0 PROPONENT

2.1 Name of Corporate Body

Wind Project Inc. (WPI)

2.2 Address

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2.4 Principal Contact Person for Purposes of Environmental Registration

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2.5 Corporate Information

The Proponents

Wind Project Inc. Inc. (WPI)

The following provides information related to the two principles of WPI, Frank Weber and Helge Wittholz.

Frank Weber holds a degree in Mechanical Engineering from the University of Rostock, Germany, and has been involved in all technical aspects of wind turbine design for the last 11 years. His research experience includes work for the University of Utah / NREL and for the DLR (German Aerospace Research Establishment). His position as Senior Engineer for one of the leading wind turbine manufacturers in Germany ended in 2000, when Frank decided to immigrate to Canada and start his own business.

Frank Weber has the following experience that is directly related to the project:

Wind Resource Assessment, Micro Siting, Power Production Estimation
- Argentia, Newfoundland (30 MW)
- Bonavista, Newfoundland (40 MW)
- Stephenville, Newfoundland (5-10 MW)
- Six Nation Indian Reserve, Brantford, Ont.
- Goulds, NL, Anemos, 10 to 20MW wind farm

Wind Turbine Design
- Nordex N80/90 (2500/2300 kW) design load calculation. Measurement campaign for the N80 prototype installation at Wilhelmshaven, Germany. Analysis of loading, modal behaviour, supervisory control, feedback system and power output related to environmental impact (wind speeds, wind directions, transients, manual controls).
- Design of Nordex N50 (800 kW), component design
- Re-Design of Nordex N43 / MK2 (600 kW), component design
- Design of Nordex N60/62 (1300 kW), component design, load calculations

Helge Wittholz has a career that spans more than three decades in the aerospace industry. For the last 8 years Helge has been working in the Canadian Wind Energy industry, from setting up and operating the only blade manufacturing company, to the planning and installation of a wind turbine in the 600 kW class.

After obtaining his degree in Automotive and Aerospace Engineering in Germany, Helge worked as a Structural Designer, Program Manager, and Business Manager.

Helge Wittholz has the following experience directly related to the project:

- **Aviation safety requirements** (obstacle lighting)
  Researched US supplier base and FAA standards for Germany Wind Turbine Service Company (W.T.S.) in 2001.

- **Project Management**
  Planned the installation of 600 kW Turbines for cold weather application in Tiverton, Ontario and Green Bay, Wisconsin.
  This work included: Site selection
  Wind measurement

Equipment selection
Tender preparation and contracting
Installation
Commissioning and
Maintenance

The 600 kW Turbine in Tiverton was installed in 1995 and the two 600 kW Turbines in Green Bay were installed in 1997. The maintenance was provided for a period of 5 years.

3.0 THE UNDERTAKING

3.1 Nature of the Undertaking

It is proposed to construct and operate a wind farm consisting of fourteen (14) to seventeen (17) wind turbine generators (WTG) with a total capacity of approximately 25.5 MW to 42 MW near Argentia, within the municipal boundaries of the Town of Placentia, NL, on land owned by the Argentia Management Authority (AMA). The proposed WTG's feature a conical tubular steel tower with a hub height of 64.7 to 80 meters and a three-bladed rotor with a diameter of 70.5 to 90 meters. The rated electrical power generation capacity from a single turbine will be between 1.5 MW to 3.0 MW.

The proposed power generation will be connected to the grid to supplement the existing power generation from thermal generating plants and hydro. The power will be sold to Newfoundland Power or Newfoundland and Labrador Hydro for distribution and resale to customers.

Construction of the project will include

- 5.5 to 11m meter wide gravel roads at the wind farm and 5.5m wide roads accessing the wind farm from the public road.
- Underground power cables for 25 kV feeder and communication lines to connect the individual turbines with the wind farm substation.
- Wind farm substation includes step-up transformer (25kV to 69kV) and switch gears.
- Above ground 69kV power and telephone lines from the wind farm substation to the interconnection point, the NF Power station near Freshwater.
- Foundation for each WTG and crane pad (gravel).
- Transformers (690V to 25kV) mounted on a concrete pad beside each WTG or inside the turbine
- Wind turbines, 14 to 17 each.
- Permanent Met tower, 65m-80m height

For details, please refer to Attachment A, (wind farm layout lay-out).

3.2 Purpose, Rational and Need for the Undertaking

3.2.1 Global Trends

Globaly, wind electricity is the fastest growing energy source with installed capacity growing at an annual rate in excess of 30%. During 2002, more than 7,000 MW of new capacity equivalent to US $7.0 billion investment were installed. On the basis of recent trends, it is feasible that wind power will grow at an average annual rate of 25% supplying 12% of the world's electricity demand by the year 2020. This would bring the global wind power capacity to 1.2 million MW with an output of 3,000 TWh creating 1.79 million jobs and an annual capital investment to US $75.2 billion by 2020.

The cost per unit of wind electricity has already been reduced dramatically as manufacturing and other costs have fallen. Further reductions are expected as the size and quantity of turbines continue to grow, thus making wind energy increasingly attractive when compared with other energy sources. Unlike electricity from fossil fuels, prices for wind electricity are stable while the cost of dwindling fossil fuels will increase further.

Environmental benefits, such as a zero carbon dioxide emission, are important benefits from wind electricity. If the costs of environmental damage by burning fossil fuels for electricity were considered, then wind electricity would further benefit.

3.2.2 Newfoundland Opportunities

While Newfoundland has one of the best wind resources in Canada if not in the world, no large-scale installations of WTG have occurred so far. The combination of about 65% Hydro Power on the island, providing large storage capacity, and intermittent Wind Power, may allow to provide up to 30% of the Provinces total electricity supply from wind power.

A growing supply of wind power could gradually reduce the amount of bunker oil being burned at the Holyrood thermal power station. Contrary to fluctuating oil prices, the cost of wind electricity does not change significantly over the 25-year life span of a wind farm. Therefore, by adding wind electricity to the energy mix of Newfoundland, electricity generation costs will be stabilized and pollution will be reduced.

It is further interesting to note the involvement of large oil companies such as Shell, Suncor and Transalta in the wind electricity generation business. These companies have realized that carbon fossil fuels are a dwindling resource and need to be replaced by renewable energy sources in the future. Currently wind electricity generation is being recognized as the lowest renewable source that is readily available. Since the Newfoundland wind resource is one of the best in North

America, the Province has the opportunity to become a leader in low cost renewable energy, providing pollution free renewable electricity to its residents.

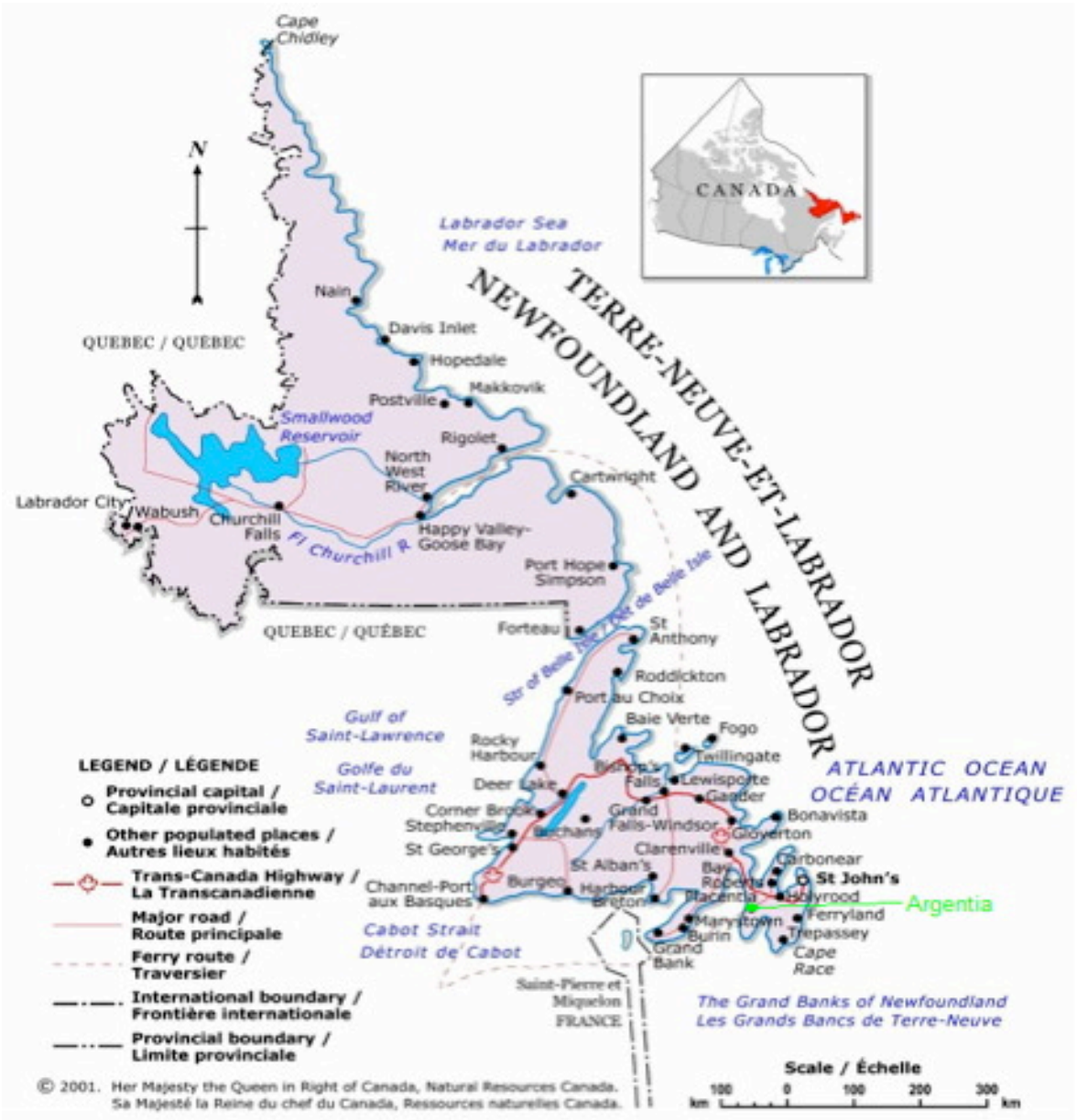
Holyrood Thermal Generation Station, 490 MW capacity

4.0 DESCRIPTION OF THE UNDERTAKING

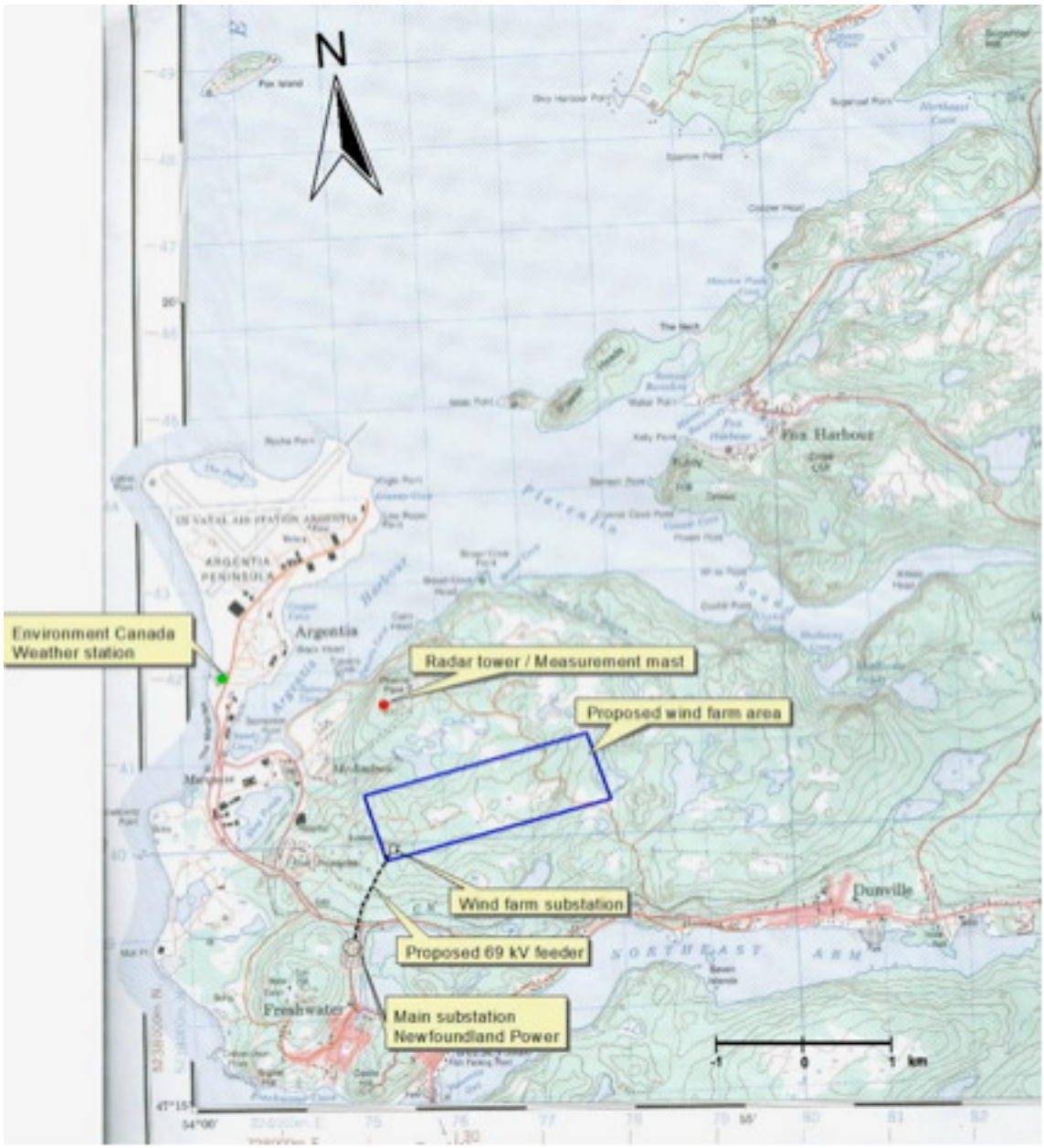
4.1 Geographic Location

The site for the proposed Wind Farm is located near Argentia, Newfoundland also known as the Argentia Backlands.

Map 1 Location of wind farm near Argentia (circled green) in the Province of Newfoundland and Labrador, Canada



Map 2 Area of the site (circled blue) located about 1.5 km from the outskirts of the Town of Freshwater. The wind farm experiences sea surface inflow from all directions except east (see Map 1). The prevailing winds are westerly.



The selected site is owned by the Argentia Management Authority. WPI has signed a lease option agreement with the AMA for the purpose of installing a minimum of fifteen 1.5 megawatt or nine 3.0 megawatt turbines and a substation.
The right of way to access to wind farm and for the power cables is included in the lease option.

4.2 Physical Features

4.2.1 Major physical features of the Wind Farm

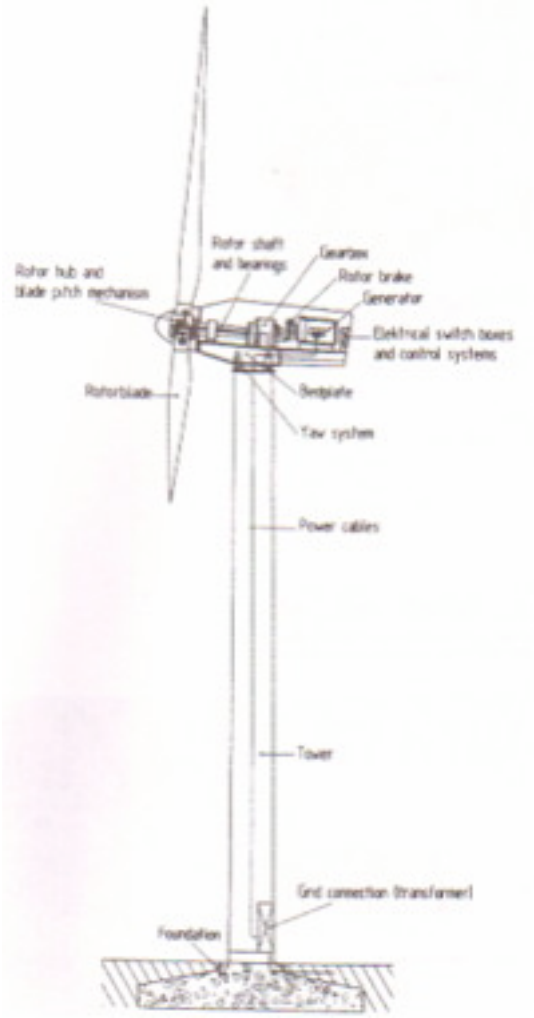
4.2.1.1 Type of Wind Turbine Generator (WTG)

WTG's under consideration for the project vary in capacity between 1.5 MW and 3.0 MW, in hub height between 64.7m to 80m and in rotor diameter between 70.5m and 90m.

The final selection of a suitable WTG depends on the life cycle cost of the proposed wind farm and the suitability for the location. Issues such as availability of large cranes, effect of the turbine type on the grid and operating history in similar high wind regimes will be considered.

4.2.1.2 Technical Description of a Wind Turbine Generator

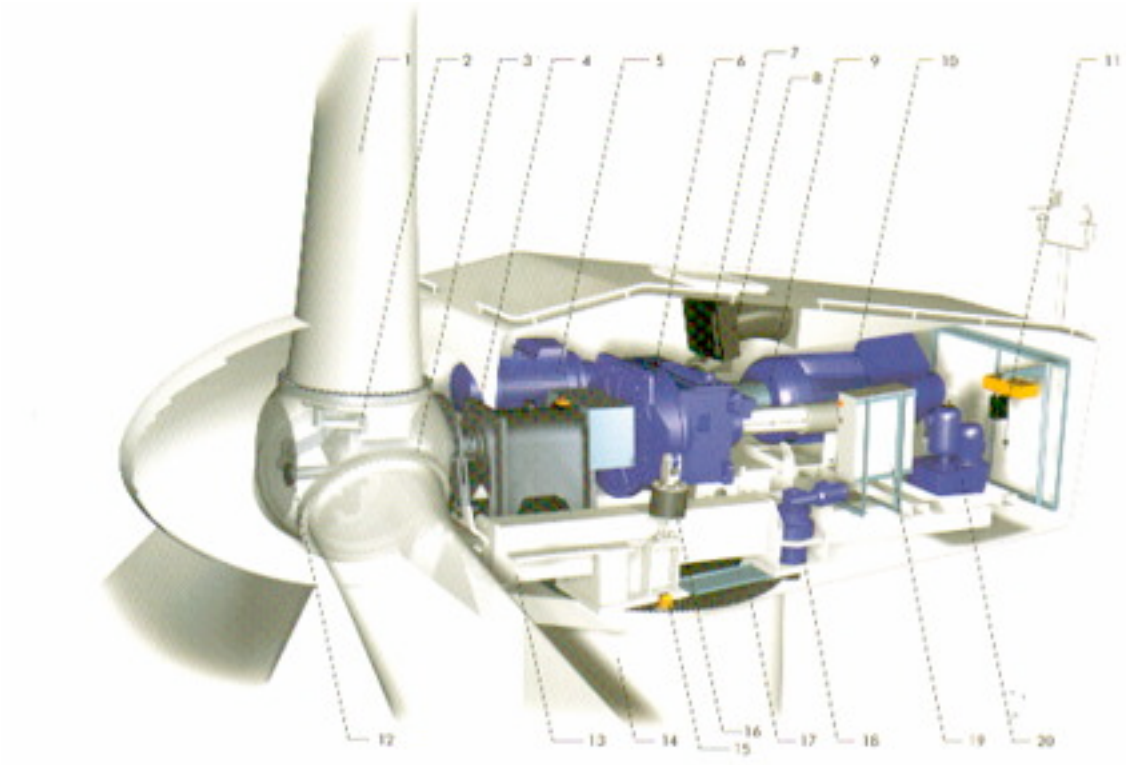
The selected WTG type is a Horizontal Axis Wind Turbine.



The main components are the foundation, tower and nacelle including the rotor. The foundation design is dependent on soil tests to be performed at the site. A standard gravity foundation made of concrete reinforced steel will be used. The diameter will be approximately 15m and the depth 3.0m depending on the WTG selected and the local soil conditions. The conical steel tower will be made in 3 sections for ease of transportation and installation.

A typical nacelle contains the following key components of the WTG:

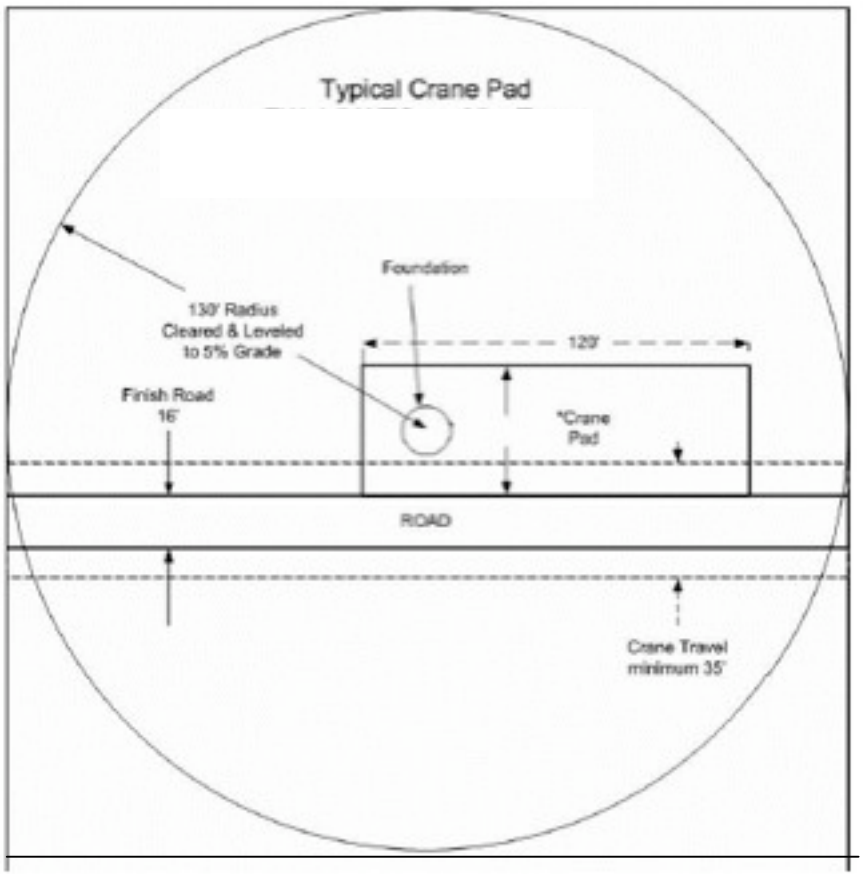
1. *Blade*
2. *Rotor hub (including blade pitching mechanism), connecting the rotor blades to the Main Rotor shaft*
3. *Blade bearing*
4. *Main rotor shaft connecting the rotor with the gearbox*
5. *Secondary generator*
6. *Gearbox, increasing the rotor speed from 16 – 28 rpm to a generator speed of 1200 – 1800 rpm.*
7. *Disc break*
8. *Oil cooler for cooling the gearbox oil*
9. *Cardan shaft*
10. *Primary generator, converting the mechanical energy into electrical energy*
11. *Service crane*
12. *Pitch cylinder*
13. *Main frame, being the base for all nacelle components*
14. *Tower*
15. *Yaw Drive, turning the rotor into the wind*
16. *Gear tie rod*
17. *Yaw ring*
18. *Yaw gears*
19. *Top control unit*
20. *Hydraulic System for braking the rotor*



4.2.2 Area affected by the Wind Farm

The area selected for the wind farm is located in the Argentia Backland near Argentia, Newfoundland. WPI has signed a lease option agreement with the Argentia Management Authority for 15 acres, required for the foundations, crane pads and the substation. The total affected area is about 200 hectares in size.

The Wind Farm is comprised of the individual WTG, adjacent levelled space for cranes, access roads and a transformer station. The power cables and communication lines from each WTG to the transformer station are buried in a trench underground or run above ground, while the feeder line between the wind farm substation and the interconnection point at Freshwater will be above ground.



By selecting a site at the Argentia Backlands, away from housings, the proponents ensured that no adverse effect from noise and shadow impact can be expected. Certifications of modern WTG restrict the noise level to around 45 dB(A) at a distance of about 220m. At the proposed wind farm, the closest house is 1.5 km away from any WTG, more than 6.8 times the required distance.

It is further interesting to note that the noise level increases with the wind speed. At wind speeds exceeding 10m/s, the noise of a wind turbine will be masked by the ambient noise.

Noise sources of WTG's are composed of aerodynamic noises and mechanical noises in particular those generated by the main gearbox. Optimized rotor blade tip design and sound proofing the nacelle cover have drastically reduced the noise levels of modern WTG. For details, please refer to the attached "Wind Farm Layout Document".

The visual impact of a modern 3 blades WTG using a conical tower is being considered by the general public as quite pleasing. The WTG is painted in an off white colour that blends in with the landscape. The slow rpm of the rotor (16 – 28 rpm) provides a restful impression and the WTG's should fit very nicely into the landscape.

Impact on radio and television transmitters has been taken into consideration and the WTG will be installed at a sufficient distance from the local transmitter stations to avoid any adverse effect. Aviation Safety requirement (obstacle lighting) will be met as and if required by the Department of Transport and NAV Canada. Applications to DOT and NAV Canada will be submitted shortly.

4.2.3 Physical and Biological Environment within the Area

Vegetation

Argentia region is located within the Southern Barrens sub-region of the Maritime Barrens Eco-region (Damman 1983). This eco-region is characterized by extensive barren areas consisting of dwarf shrub heaths, bogs and shallow fens.

Habitat was assessed by using the 400' contour line to delimit the boundaries of the proposed wind farm. Analysis using aerial photographs and GIS (Figure 1) showed barrens (48.3%) and woodland (46.3%) to be dominant within the zone (Table 1). This is consistent with the findings of Alexander *et al*. (1996) for the general backlands area.

Habitat Type	Area (Ha)	%
Barrens	137.21	48.3
Woodland	131.51	46.3
Bogs	10.74	3.8
Exposed Rocks	4.06	1.4
Pond	0.51	0.2
Total Area	284.03	100.0

Table 1. Estimated area of habitat types within the proposed Argentia wind farm as delimited by the 450' contour line.

A field visit to the proposed site in June 2005 showed a variety of common plant species in the area. These include the heath land species: *Kalmia angustifloria*, Empetrum nigrum,

Rhododendron canadense and *Vaccinium angustiflori*; and the forest species *Abies balsamea, Picea mariana* and Larix laricina (Jon Joy and Brenda Taylor personal observations). These observations are in agreement with those made in the Argentia area by Penney and Stokes (1998). It is noted that no rare or endangered plant species have been found in the Argentia area (Penney and Stokes, 1998).

Figure 1. Habitat classification of the proposed Argentia wind farm site based on 1995 aerial photographs.

Common Name	Species Name	Common Name	Species Name
Bog Myrtle	Myrica gale	Balsam Fir	Abies balsamea
Newfoundland dwarf Birch	Betula michauxii	Black Spruce	Picea mariana
Meadow Sweet	Spiraea latifola	Red Raspberry	Rubus idaeus
Leather Leaf	Chamaedaphne calyculata	Crackerberry	Cornus canadensis
Swamp Birch	Betula pumila	New York Aster	Aster novae-belgii
Blackberry	Rubus spp.	Starflower	Trientalis borealis
Dwarf huckleberry	Gaylussacia dumosa	Corn-lily	Clintonia borealis
Bog Aster	Aster nemoralis	Indian Pipe	Monotropa uniflora
Labrador Tea	Ledum groenlandicum	Flat Topped White Aster	Aster umbellatus
Sheep Laurel	Kalmia augustifolia	Wild Lily of the valley	Maianthemum canadense
Blueberry	Vaccinium augustifolium	TwinFlower	Linnaea borealis
Mountain Alder	Alnus crispa	Bullhead- Lily	Nuphar variegatum
Larger Blue Flag	Iris versicolor	Rough-stemmed Goldenrod	Solidago rugosa
Shrubby Cinquefoil	Potentilla fruticosa	Black Knapweed	Centaurea nigra
Northeastern Rose	Rosa nitida	Pearly Everlasting	Anaphalis margaritacea
Canadian Burnet	Sanguisorba canadensis	White Spruce	Picea glauca
Tamarack	Larix liricina	Ladies-Thumb	Polygonum persicaria
Pitcher-Plant	Sarracenia purpurea	Ox-eye Daisy	Chrysanthemum leucanthemum
Cotton Grass	Eriophorum spp.	Eyebright	Euphrasia americana
Common Juniper	Juniperus communis	Yarrow	Achillea millefolium
Partridgeberry	Vaccinium vitis-idaea	Red Clover	Trifolium pratense
Northern Wild Raisin	Viburnum cassinoides	Common Evening-Primrose	Oenothera biennis
White Birch	Betula papyrifera	Fall Dandilion	Leontodon autumnalis
Crowberry	Empetrum nigrum	American Mountain Ash	Sorbus americana
Creeping Snowberry	Gaultheria hispidula	Skunk Current	Ribes glandulosum

Table 2. Terrestrial plant species identified in the Argentia area (Penney and Stokes, 1998).

Geology

Coastal hills are a prominent feature in the Argentia area with steep slopes rising to elevations of 125 – 150m (Alexander *et al*., 1996). Rock outcrops are common in the area and soils are generally shallow, achieving their greatest depth on the lower slope of hillsides and in valley bottoms. Over half of the Argentia backland area is estimated to consist of imperfectly drained mineral soils or poorly drained organic soils (Alexander *et*

al., 1996). Veneers of glacial till overlie bedrock and organic deposits are found in bogs and fens (Ullah, 1992). The Argentia area bedrock is part of the late proterozoic, Gibbett Hill Formation, comprised of mafic and felsic volcanic and volcanic clastic rocks (Ullah, 1992).

Climate

Argentia lies in the South Eastern Barrens sub-region of the Maritime Barrens (Damman, 1983). Summers in this region are typically cool, consisting of frequent fog and strong southerly winds. It has an annual precipitation of 1500-2000 mm (Banfield, 1981), with heaviest rainfalls during southerly air-streams, especially over hills inland. Winters are relatively mild with less than half precipitation falling as snow. Freezing rain is frequent during late winter (Banfield, 1981).

Resources and Land Use

Local activities in the area of the proposed wind farm are limited due to its topography to recreational activities such as hiking, blueberry picking and hunting. It is felt that turbine construction in the proposed area will have a negligible impact on natural resource exploitation within the area.

Mammals

Species abundant in the Argentia area include moose (*Alces alces*), meadow vole (*Microtus pennsyvanicus*), snowshoe hare (*Lepus americanus*), mink (*Mustela vison*), red fox (*Vulpes vulpes*), red squirrel (*Tamiasciurus hudsonicus*) and masked shrew (*Sorex cinereus*). Otter (*Lutra canadensis*), Beaver (*Castor canadensis*) and muskrat (*Ondatra zibethicus*) may also be seen in the area (Anon, 2002; Griffiths, 1998; Rowe, 1997). No endangered wildlife species have been recorded in the Argentia area (Penney and Stokes, 1998).

Fish

There is a small landlocked pond (0.2ha) located in the boundaries of the farm as defined by the 400' contour line (Figure 1). The aerial photograph covering this pond indicates that it is shallow. It is not known if any fish species are present in this pond.

Birds

The most comprehensive listing of birds for the Argentia area was made by Tuck in 1948 (Table 3). A list of bird species compiled for the Demonstration Plant Project Registration by the Voisey's Bay Nickel Company does not provide any information on species of land birds in the backlands area (Anon, 2002). None of the species listed by Tuck (1948) are considered rare (MacTavish *et al*., 2003).

Proposed Bird Monitoring Protocol

A bird monitoring protocol has been designed for the Argentia site by the Canadian

Wildlife Service in consultation with Natural Resources Canada (Holly Hogan, CWS, Pers. Comm.).

To cover both migratory and breeding seasons, the bird surveys will be conducted during the spring/summer (May1 – July 7) and fall (August 15 – October 31). Twenty point count stations will be randomly selected within the wind farm boundaries and will be stratified according to habitat type. Surveys will commence at dawn and will be carried out every third day. Each point station will have a radius of 100 metres and will be surveyed for ten minutes during each visit. All bird sighting, vocalizations and flying heights (if applicable) will be recorded by species during that period.

Common Name	Species Name	Common Name	Species Name
Merlin	*Falco columbarius*	Myrtle Warbler	*Dendroica coronata*
Willow Ptarmigan	*Lagopus lagopus*	Black-Throated Green Warbler	*Dendroica virens*
Snowy Owl	*Nyctea scandiaca*	Black-Poll Warbler	*Dendroica striata*
Short-eared Owl	*Asio flammeus*	Palm Warbler	*Dendroica palmarum*
Northern Flicker	*Colaptes auratus*	Oven-Bird	*Seiurus aurocapillus*
Hairy Woodpecker	*Dendrocopos villosus*	Northern Water-Thrush	*Seiurus noveboracensis*
Downy Woodpecker	*Dendrocopos pubescens*	Mourning Warbler	*Oporornis philadelphia*
Yellow-Bellied Flycatcher	*Empidonax flaviventris*	Common Yellow-Throat	*Geothlypis trichas*
Northern Horned Lark	*Eremophila alpestris*	Wilson's Warbler	*Wilsonia pusilla*
Tree Swallow	*Tachycineta bicolor*	American Redstart	*Setophaga ruticilla*
Gray Jay	*Perisoreus canadensis*	House Sparrow	*Passer domesticus*
Northern Raven	*Corvus corax*	Rusty Blackbird	*Euphagus carolinus*
American Crow	*Corvus brachyrhynchos*	Pine Grosbeak	*Pinicola enucleator*
Boreal Chickadee	*Parus hudsonicus*	Common Redpoll	*Acanthis flammea*
Red-Breasted Nuthatch	*Sitta canadensis*	Pine Siskin	*Spinus pinus*
Brown Creeper	*Certhia familiaris*	Red Crossbill	*Loxia curvirostra*
Winter Wren	*Troglodytes troglodytes*	White-Winged Crossbill	*Loxia leucoptera*
American Robin	*Turdus migratorius*	Savannah Sparrow	*Passerculus sandwichensis*
Swainson's Thrush	*Catharus ustulatus*	Slate-Colored Junco	*Junco hyemalis*
Golden-Crowned Kinglet	*Regulus satrapa*	White-Throated Sparrow	*Zonotrichia albicollis*
Ruby-Crowned Kinglet	*Regulus calendula*	Fox Sparrow	*Passerella iliaca*
American Pipit	*Anthus spinoletta*	Lincoln's Sparrow	*Melospiza lincolnii*
Black and White Warbler	*Mniotilta varia*	Swamp Sparrow	*Melospiza georgiano*
Yellow Warbler	*Dendroica petechia*	Snow Bunting	*Piectrophenax nivalis*
Magnolia Warbler	*Dendroica magnolia*		

Table 3. Land birds identified in the Argentia area during the 1940's (Tuck, 1948).

Observers

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Jonathan Joy, M.Sc. Instructor, Fish and Wildlife Technician Program, College of the North Atlantic, Bonavista Campus, Box 670, Bonavista, NL. A0C 1B0

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4.3 Construction

4.3.1 Construction Period

The construction period will last 12 to 15 months after all permits, the power purchase agreement (PPA), and the financing have been obtained. Furthermore, the severe winter weather conditions have to be taken into account. The preferred season for the construction of the wind farm is from May to November. Anticipating that all mandatory milestones for the implementation of the project have been achieved, contracts for the civil works and WTG's will be awarded by autumn of 2006. Civil works at the site would start at that time to be completed by spring of 2007 followed by the installation of turbines.

4.3.2 Construction Activities Affecting Physical Environment

The activities at the site will start with the installation of a 50m tubular meteorological tower and a survey to determine the exact locations of access roads, turbine foundations, and trenches for power and communication lines, wind farm substation and above ground feeder lines between the substation station and the interconnection near Freshwater. Furthermore, geotechnical soil tests will be conducted to determine the conditions at the site. This will be followed by the construction of gravel access roads, and excavation for foundations and trenches once a power purchase agreement has been obtained.

The next step will be the building of the steel re-enforced concrete foundations for the WTG, construction of the wind farm substation, the installation of the power and communication lines and back filling.

The actual erection of a WTG will only take about 3 to 5 days requiring large cranes and special transport trucks.

During the construction period, it is anticipated that there will be a 20' office container and two 40' storage containers at the site. These containers will be removed after the completion of the construction activities.

4.3.3. Potential Source of Pollutants During Construction

During the construction period, potential sources of pollution are from human waste and construction equipment leaking oil, fuel and coolants into the soil.

4.3.4 Mitigation Measures

All normal precautionary measures and standard construction practices will be implemented to minimize disturbances to the site.

This will include measures to control run offs and soil erosion, dust emission; noise levels, avoiding oil, fuel and coolant spills.

Furthermore, the project proponents will only allow construction and craning equipment in good repair on site. Emergency response spill kits will be stored at the site in order to contain any spill of hazardous fluids. Waste collection bins and self contained toilets will be installed. To ensure the compliance with all the mitigation measures, a Site Supervisor will be appointed.

4.3.5 Potential Resource Conflicts

The use of the construction site for recreational land use will be restricted during the actual construction period for safety and liability reasons.

4.4 Operation

4.4.1 Description of the Operation

Wind Turbines convert wind energy into electricity and start generating at wind speeds from 3.5 to 4.0 m/s. At 12 to 14 m/s, they produce their name plate capacity until they shut down when wind speeds reach 25 m/s. At these wind speeds the blades are feathered into the wind and the rotor is stopped. All turbines are monitored by an off site control center. Automatic notification will be given to the control center in the case of malfunction via modem.

Scheduled maintenance is performed twice a year.

4.4.2 Estimated Period of Operation

The expected period of operation for a modern WTG is 25 years after which it can be expected that technological advance will make the turbine obsolete. Upgrading the turbines or replacing them are options to be considered.

4.4.3 Potential Source of Pollutants During Operation and Mitigation Measures

WTG's do not pollute the atmosphere with carbon dioxide, sulphur or hydrocarbons, nor do they create problems at the end of their useful life with regards to the disposal of radioactive waste. Potential sources of pollutants are restricted to fluids used in a WTG. These are:

Hydraulic Oil
Gearbox Oil
Coolant with Anti-freeze
Transformer Oil

In case of a leak, these fluids are contained inside of the turbine and can be removed safely. The transformer is installed on a concrete slab with a lip designed to contain any oil spill or inside of the turbine.

4.4.4 Potential Causes of Resource Conflicts

During the operation of the Wind Farm, no potential causes of resource conflicts are foreseen. The WTG require only a small amount of land and the use for recreational activities will not be restricted. On the contrary, it can be expected that the Wind Farm becomes a tourist attraction.

4.4.5 Project Decommissioning

The advantage of a wind farm for electric power generation lies in the ease of decommissioning. The entire turbine can be removed within a few days with the help of cranes and trucks. The only remaining components of a wind farm would be the service roads and the foundation. Since the foundation is level with the surface of the ground and the service roads may be used for recreational activities, the impact would be negligible.

5.0 OCCUPATIONS

5.1 Construction Phase

During the construction period a number of trades and equipment will be at the site.

During the excavation phase heavy earth moving equipment and graders will be used. This will be followed by the pouring of the steel re-enforced concrete foundation requiring ironworkers and cement trucks.

The actual erection of the WTG will involve heavy transport trucks for the nacelle, tower sections and the rotor blades. One large 800to lead crane and a smaller trailing crane will be utilized to lift the components.

During the construction phase, the number of people working at the site will be up to 20 people. The following trades will be used:

Heavy Equipment Operators	Electricians
Concrete Workers	Labourers
Iron Workers	Millwrights
Truck Drivers	Engineers
Crane Operators	Control Technicians
Line Workers	Site Supervisor

5.2 Operational Phase

During the operational phase the activities at the site will be limited to scheduled and un-scheduled maintenance.

The scheduled maintenance will be performed twice per year and require two service technicians 1 to 2 days per turbine.

Un-scheduled maintenance may include as little work as re-setting a circuit breaker to replacing a major component requiring the cranes and large trucks.

It is the intention of the proponents to establish a service facility in the vicinity of Placentia including an office for monitoring the WTG's, storage of spare parts, consumables and tools as well as a small workshop for repairs. The project will generate a minimum of two permanent jobs and up to four additional temporary jobs. It is the intention to hire local people and have them trained to maintain the wind farm.

6.0 APPROVAL OF THE UNDERTAKING

The following is a list of permits, approvals, and authorizations required for the undertaking:

PERMIT	AUTHORITY
Building and Accessibility Exemption Registration.	Municipal Council
Environmental Permit.	Department of Environment (NL)
Building Permits	Municipal Council
Highway Access Permit.	Department of Works, Services and Transportation
Tall Structures Obstruction Clearance.	Transport Canada, NAV Canada
Electrical Permit • Application for permit to install or repair electrical equipment or inspection of work.	Customer Services / Operations

7.0 PUBLIC AND FIRST NATION CONSULTATION

The proponent has met with the elected officials of Placentia on a regular basis since 2003. During these meetings, briefings on the planned wind farm were provided, followed by a question and answer period. Minutes of these meetings are on file.
A public consultation meeting was held on the 28th of February 2005. The public was informed by an ad in the local news paper "The Charter' in addition, the local Chamber, the Mayor, Councillors, and other interested groups received invitations through the Argentia Management Authority. The following are the minutes of the public meeting:

Public consultation meeting

Pearce Peak, Argentia/Placentia Wind Farm, NL
February 28, 2005, 18:30 To 21:30

Location: Legion Hall, Placentia

Purpose of the meeting: Inform the public about the planned installation of a 22.5 MW wind farm on Pearce Peak consisting of 15 ea. 1.5 MW WTG

Presentation provided by: Wind Project Inc.'s two principles, Frank Weber and Helge Wittholz, using a 37 slides Power Point Presentation named Argentia presentation 28 02 2005 (1). Critical topics like noise, bird mortality and ice throw were addressed. A large turning model of a 1.5 MW turbine was displayed for demonstration purposes.

Attendance: Approx. 25 people from Placentia, the Mayor Fred Whelan, the board and members of the AMA management board, the representative of the local chamber of commerce, representatives of the local newspaper and TV station.

The 1.0 hours of presentation was followed by a lively question and answer period. Most questions were related to issues like job creation, are we going to pay more for our electricity, if wind electricity is competitive with electricity generated at Holyrood, why are we not getting green electricity now, interference with wild life, how wind power plays into the current electricity supply, electromagnetic impact, is there a connection between the developments at Lower Churchill Falls and wind farm development?

There was not a single negative comment about wind turbines at the Argentia Backlands; on the contrary, people from the audience asked how they could assist in making the project happen.

Harvey Brenton offered to place information regarding the project on the AMA web site and provide WPI' s address for people that might have additional questions.

In all, we felt that the audience was very supportive and there was no opposition raised.

Consultations with First Nations do not apply, since there is no recognized First Nation in the vicinity of the planned wind farm. The only recognized First Nation in Newfoundland is located in Conne River, on the South Central Coast of Newfoundland, about 250km to the south.
Source: NL Government, Labrador and Aboriginal Affairs, St. Johns, Tel. 709 729 4776

8.0 SCHEDULE

The schedule for the construction and operation of the project is dependant on getting all required permits, agreements including a PPA and financing in a timely manner. One to two years lead time will be required for the equipment purchase after the PPA is in place. A tentative schedule is follows.

Tentative Schedule

Phase	Activity	2005				2006				2007				Comments
		I	II	III	IV	I	II	III	IV	I	II	III	IV	
1	**Planning & Negotiations**													
	Community Consultation													ongoing
	Land Lease													Lease option obtained
	Wind Assessment													completed
	Micro Siting													complete
	Environmental Assess.													pending
	Permitting													
	Feasibility Study													75% complete
	Power Purchase Agreement													pending
	Tender Preparation													
	Financing													
	Wind Farm Design													
2	**Implementation**													
	Contract Awards													
	Site Works (roads, trenches, foundation)													
	Substation at wind farm, feeder line													
	Modify NF transformer station													
	Turbine Installation													
	Commissioning													
3	**Operation**													ongoing

9.0 FUNDING

Creststreet Capital Corp., a Toronto based company is being considered for arranging the required funding for the project. The company has a track record to arrange for the financing of wind farms as well as oil and gas projects.

10. REFERENCES

Erich Hau, Wind Turbines, Fundamentals, Technologies, Applications, Economics

J. R. Salmon, P.G. Stalker, Zephyr North, May 1, 1999
Wind Resource Assessment for selected sites in Southeast Newfoundland (for Natural Resources Canada).

Wind Force 12, a blueprint to achieve 12% of the world's electricity from wind power by 2020. Prepared by BTI for the European Wind Energy Association (EWEA) and Green peace, 27th of May 2003 (http://www.ewea.org).

Wind Vision for Canada, 10,000 MW by 2010 by the Canadian Wind Energy Association. (CanWEA), June 2001 (www.canwea.ca).

Jonathan Joy (M.Sc.) Coordinating Instructor, Fish and Wildlife Technician Program, College of the North Atlantic, Bonavista Campus, prepared chapter 4.2.3 (Physical and Biological Environment within the Area). Jon has been working in the area since 1989 and made many field trips to proposed site.
His qualifications are documented in Attachment B, Jon Joy's CV.

Attachment A

Wind Farm Layout
for
Argentia, Newfoundland & Labrador, Canada

99 Mill Street
Milton, Ontario
Canada L9T 1R8
Tel.: 1 905 876-2245
Fax : 1 905-875-2944
Email: mail@windproject.com

November, 2005

Revision list

Revsion date	Description
07.11.05	First issue

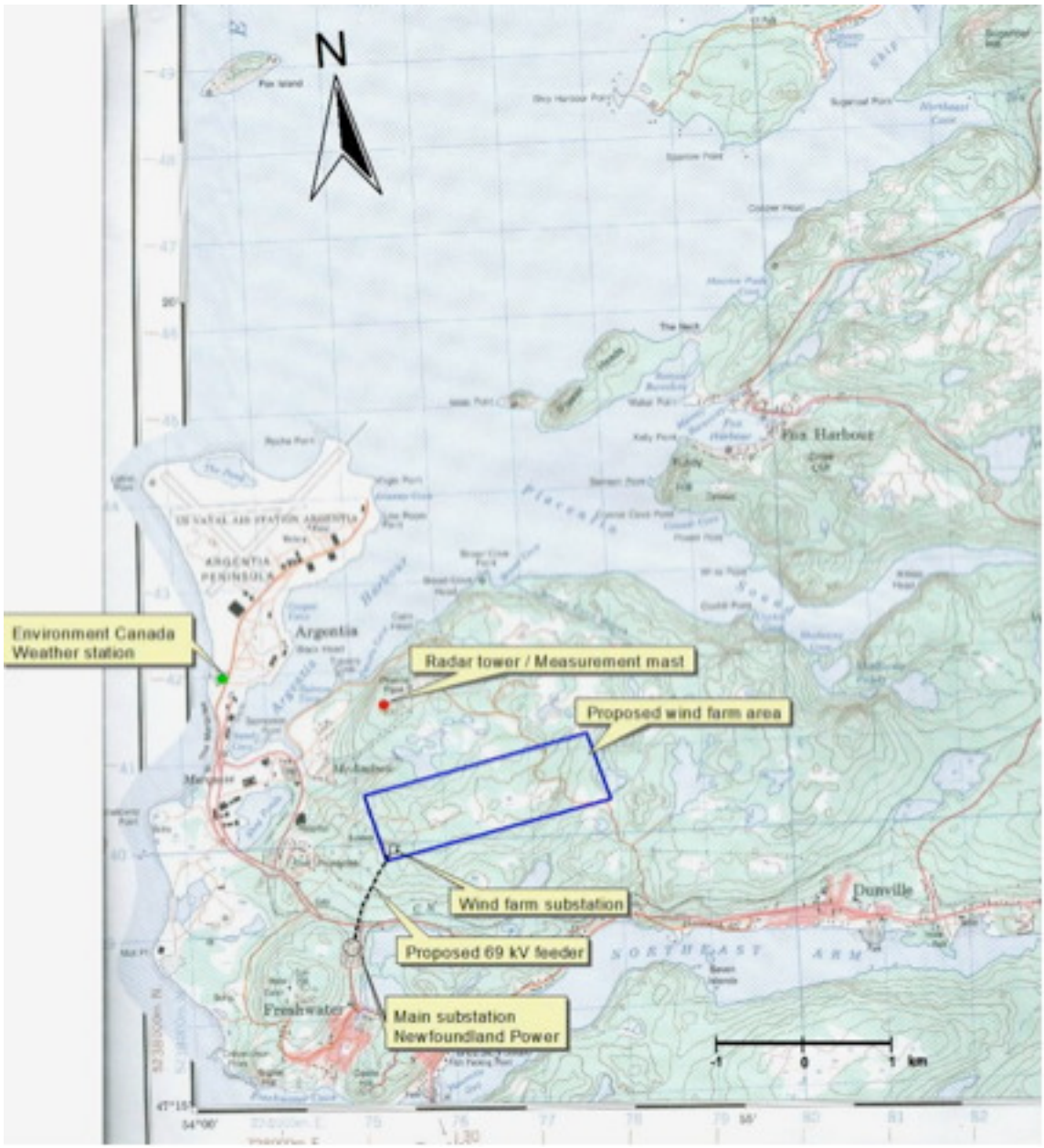
Table of Contents

1 Introduction

This document contains three layout proposals (Alternative 1, 2 and 3) for the envisaged wind farm to be constructed on a plateau to the south-east of Pearce Peak, Argentia. Each layout is designed for a specific wind turbine type: GE1.5se, V80 1.8 MW (or similar) and V90, respectively. These wind turbine types differ (besides other parameters) in rotor diameter, which requires different spacing between the individual turbines in the wind farm.
The project status is such, that for various technical and commercial reasons the final turbine type has not yet been selected.

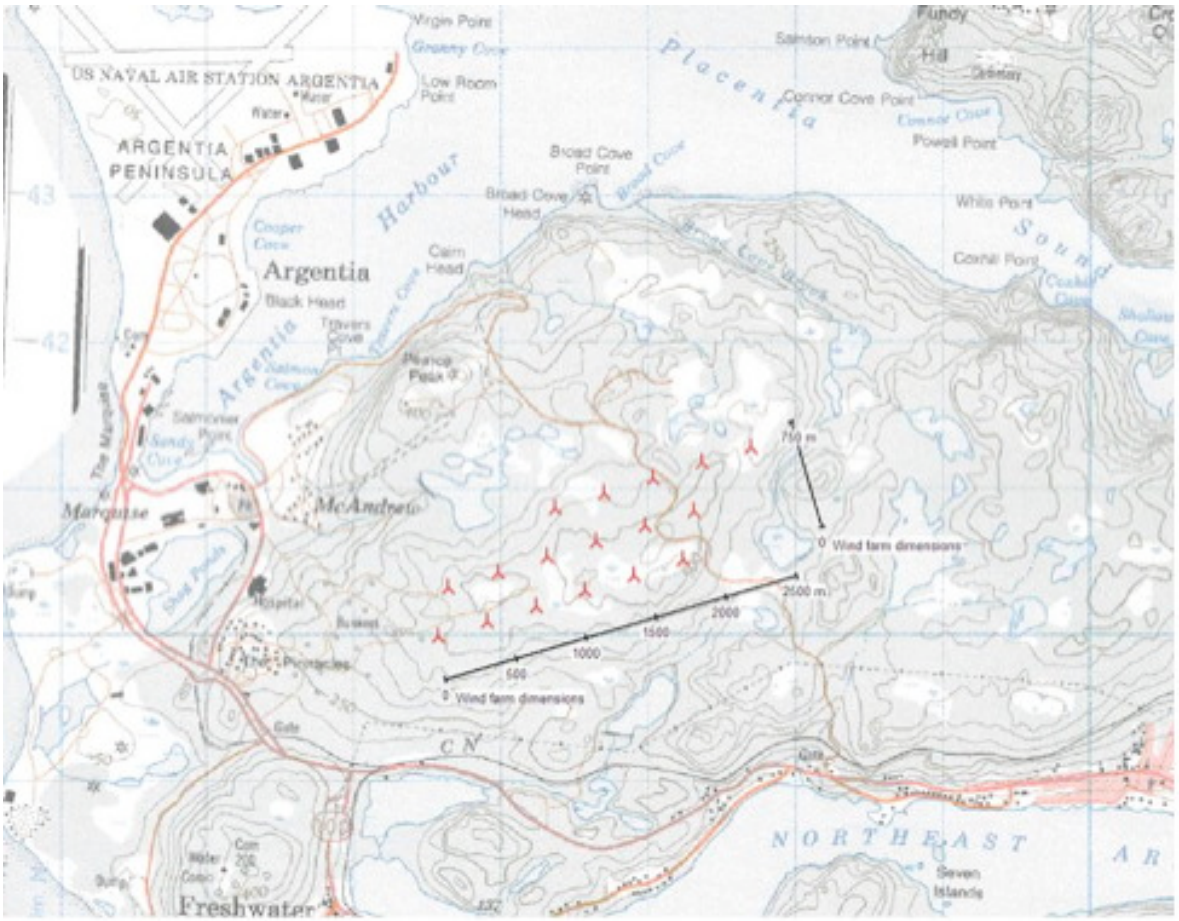
2 Layout proposals

The proposed wind farm is situated on a local plateau to the south-east of Perace Peak. The wind farm border is marked by means of a blue line in the map below.



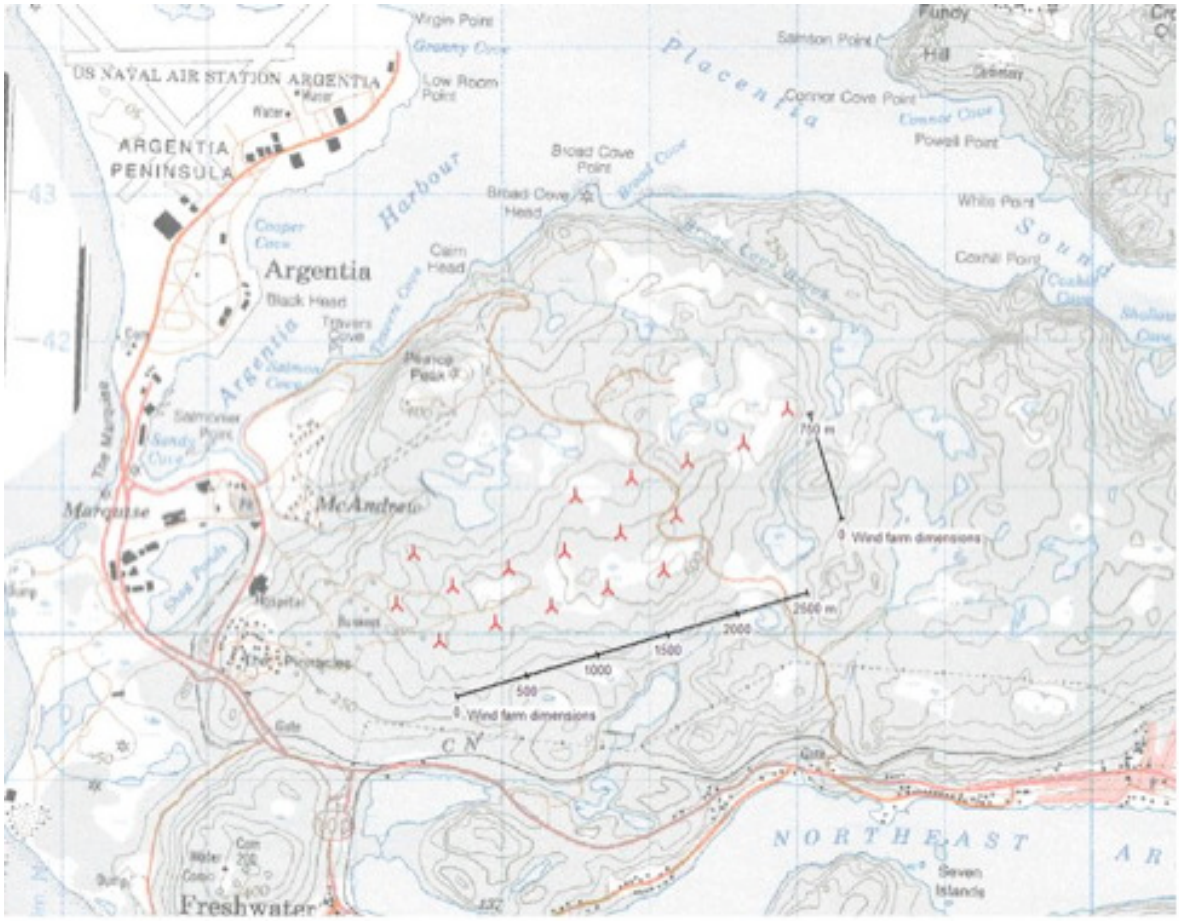
2.1 Alternative 1

17 x GE1.5se (1.5 MW); Rotor diameter *70.0 m*; Hub height *65.0 m*; Wind farm capacity: *25.5 MW*



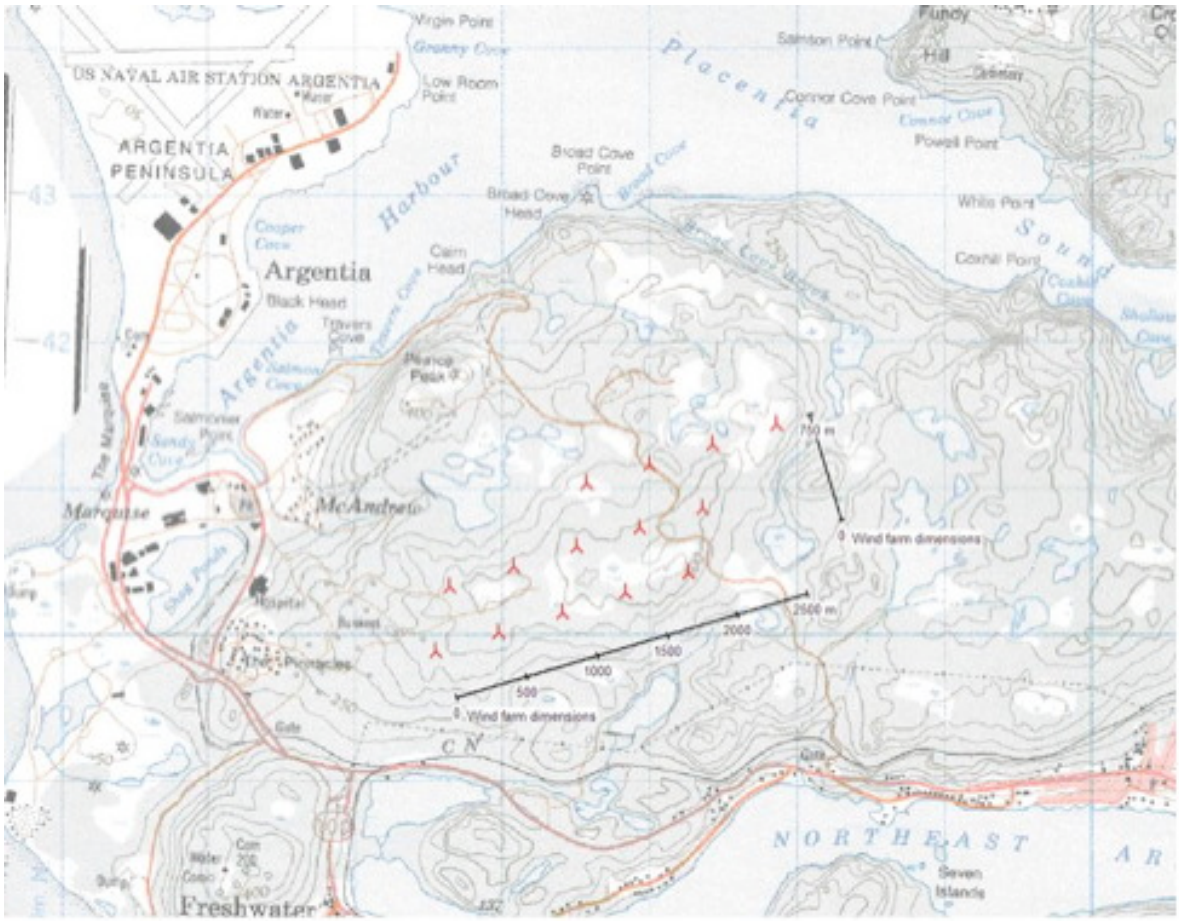
2.2 Alternative 2 and 3

17 x V80 (1.8 MW); Rotor diameter *80.0 m*; Hub height *67.0 m*; Wind farm capacity: *30.6 MW* **or**



2.3 Alternative 4

14 x V90 (3.0 MW); Rotor diameter 9*0.0 m*; Hub height *65.0 m*; Wind farm capacity: *42.0 MW*



2.6 Rendering of wind farm

View from Pearce Peak at the proposed wind farm consisting of 17 wind turbines type V80 (12 turbines are visible within the limits of this rendering). The rotor center of each turbine is located at 67m above ground.

Attachment B

Box 142,
Bonavista, NL
A0C 1B0

Telephone: 709 468 1707
Fax: 709 468 2004
Email: Jon.Joy@cna.nl.ca

Jonathan Bruce Joy

Experience

Jan 1993 – Present College of the North Atlantic Bonavista, NL

Instructor, Fish and Wildlife Technician Program

- Instruct natural resource management courses.
- Coordinate the instruction of law enforcement courses.
- Coordinate the instruction of short courses offered by Coast Guard etc.
- Course/Program Development.
- Development of distributed learning courses (WebCt).

Feb 1996 – Present College of the North Atlantic Bonavista, NL

Instructor, Firearm Safety/Hunter Education Program

- Instruct Canadian Firearm Safety Course.
- Instruct Atlantic Provinces Hunter Education Course.

Feb 1992 - Oct 1992 Eastern College Bonavista, NL

Program Development Officer: Natural Resources Technician Program

- Form an advisory committee.
- Develop program curriculum.
- Develop training modules.
- Identify program budgetary requirements.

May 1985– May 1989 Dept. Agric and Fisheries for Scotland Shetland

British Sea Fishery Officer

- Enforce EC and U.K. fishery legislation.
- Assist fishermen in oil related gear loss compensation claims
- Collect biological data on fish species.

Education

Jan 1987 - Dec 1988 Aberdeen University Aberdeen, Scotland

Master of Science Degree

- Fishery Biology of Ommastrephid Squid in Shetland Waters.
- Part time research degree.

Oct 1980 - June 1984 Edinburgh University Edinburgh, Scotland

Bachelor of Science Degree (Honors)

- B.Sc. in Ecological Science.
- Honors in Fish and Wildlife Management.

Additional Training

Canadian Aquatic Biomonitoring Network training, Wolfville, NS. 2003

Electrofishing Certification Course, Lindsay, Ontario. 2004.

Ground search and rescue.

Wilderness survival.

Small craft safety (red cross).

Marine radio telephone.

Canadian Firearms Safety Course (restricted and non restricted).

Hunter education.

Animal care seminar (Memorial University).

Pleasure craft operator's certificate.

Quality awareness seminar.

Stress management seminar.

WHMIS.

Additional Education

Biol7531 Biological Oceanography (MUN)

Phys3300 Introduction to Physical Oceanography (MUN)

ED2710 Course Organization and Development in Post-Secondary Education (MUN).

Other

Conduct Breeding Bird Surveys for the Canadian Wildlife Service. 2002, 2003, 2004