

Environmental Assessment of the Deerfield Wind Project

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I. Introduction

Arrowwood Environmental was retained by VERA to conduct an environmental assessment of the proposed Deerfield Wind Project in Searsburg and Readsboro, Vermont. As part of this assessment, the existing natural resource conditions on the site were identified, mapped and evaluated. A report was prepared under separate cover detailing the findings of the existing conditions study (*Existing Natural Resource Conditions at the Proposed Deerfield Wind Project*, Arrowwood Environmental, January 31, 2006).

Under section 248 of Title 30, a proposed project must demonstrate, among other things, that there will be no undue adverse effect on the “natural environment” with due consideration being given to the environmental criteria of Act 250 (subsection (b)(5) of section 248). The “natural environment” resources assessed for the proposed project encompass those found within Vermont’s Act 250. This report specifically addresses potential impacts of the Deerfield Wind Project (Project) under the following Act 250 criteria: 1(A) Headwaters, 1(D) Floodways, 1(E) Streams, 1(F) Shorelines, 1(G) Wetlands, 8 Rare and Irreplaceable Natural Areas, and 8(A) Wildlife and Endangered Species. Outstanding Water Resources (10 VSA sec 1424) were also addressed.

II. Background

As detailed in Arrowwood’s Existing Natural Resources Conditions Report prepared as part of the U.S. Forest Service’s review process, initial assessments of the Project area began in the summer of 2003 and continued into the fall of 2005. Field inventories were conducted by Jeff Parsons and Michael Lew-Smith of Arrowwood Environmental. The study area consisted of the ridgelines for two Project areas, the Eastern and Western Project Areas, as well as potential access routes.

The Eastern Project Area would continue along the same ridge as the existing Searsburg Wind Power facility (**Exhibit DFLD-MLS-4c**). Access would be obtained from the existing facility. This Project Area includes the construction of 10-15 wind turbines and approximately 1.5 miles of access roads.

The Western Project Area sits directly northwest of the existing facility on the west side of Route 8 (**Exhibit DFLD-MLS-4a and 4b**). This area would consist of 10-15 wind turbines. The length of access road needed for the Western Project Area is dependent upon the access route used. The Western Project Area has two possible access options: the Putnam Road access route and the southern access route. The Putnam Road access route is the preferred access route, but an environmental assessment has been conducted on both of these potential routes.

The environmental assessment process started with a remote assessment of the entire Project area. This remote assessment consisted of gathering data on the environmental features of the Project area. Digital orthophotos, topographic maps, Vermont Significant Wetlands Inventory Maps, Vermont Hydrology Dataset (for surface waters), rare, threatened and endangered species maps from the Vermont Non-Game and Natural Heritage Program, and wildlife habitat maps (such as mapped deer yards) from the Vermont Fish and Wildlife Department were all reviewed. These maps were compiled digitally and used in the assessment of the different environmental aspects of the Project as described below.

Fieldwork was generally conducted during summer and fall field seasons, with some wildlife related fieldwork conducted during the winter with snow cover. Initial assessments consisted of walking the proposed Project area and an approximate 100-foot radius from proposed disturbance areas. More detailed assessments were made in areas where resources were present (wetlands, streams, wildlife habitat etc.). Resources were mapped using sub-meter GPS technology.

III. Criterion 1(A): Headwaters

Act 250 defines headwaters as lands which meet any of the following criteria:

- i)* headwaters or watersheds characterized by steep slopes and shallow soils; or
- ii)* drainage areas of 20 square miles or less; or
- iii)* above 1,500 feet elevation; or
- iv)* watersheds of public water supplies designated by the Vermont Department of Health; or
- v)* areas supplying significant amounts of recharge waters to aquifers.

Headwater Resources in the Project Area

The proposed Project meets the first three criteria for establishing headwaters:

- Most of the soil types present within the study area are mapped as steep (8-60%) slopes. These soils are very deep or moderately deep to bedrock and well drained.
- The proposed Project is located within a drainage area less than or equal to 20 square miles.

- The entire Project area is above 1,500 feet in elevation.

The proposed Project does not meet the last two criteria:

- The study area is not within a watershed that supplies public water.
- There is no evidence of significant aquifer recharge occurring within the study area.

Potential Impacts

The proposed Project is not expected to have a negative impact on headwater resources. Appropriate erosion control measures during construction and for the overall layout of the Project will minimize the detachment and transport of sediment to sensitive water resource areas. A detailed Erosion Prevention and Sediment Control Plan (EPSCP) for the construction phase of the Project will be developed in conjunction with the Stormwater Construction Permit. In addition, post construction permanent control features will be designed for the Stormwater Operational Permit.

Primary features of the erosion and sediment control measures include, but are not limited to the following: clearly defined construction areas and phased construction to restrict and minimize the amount of open soil at any given time, diversion structures to manage upslope runoff onto the construction site, maintenance of stream and wetland buffers, prompt stabilization and revegetation of final grade areas, and employment of an Environmental Specialist to conduct frequent inspections of the work area.

Primary features of the stormwater management system include, but are not limited to the following: frequently placed cross drains on access routes to maintain the hydrology of the headwater resources, roadside ditches (lined with grass in low slope areas or rock in high slope areas) with check dams to slow water velocities, and multiple detention ponds with grass lined swale outlets for water quality maintenance.

The features of the EPSC Plan and stormwater management system are discussed in greater detail in the prefiled direct testimony of the Project's civil engineer, Jason Krzanowski.

IV. Criterion 1(D): Floodways

Under 10 V.S.A. § 6001(6) a floodway is defined as "the channel of a watercourse which is expected to flood on an average of at least once every 100 years and the adjacent land areas which are required to carry and discharge the flood of the watercourse, as determined by the secretary of natural resources with full consideration given to upstream impoundments and flood control projects." Section 6001(7) defines the floodway fringe

as the area that is "outside of a floodway and is flooded with an average frequency of once or more in each 100 years."

In general, in order to meet the standards for limited impact on floodways, any development must meet the following criteria: (i) the development... within a floodway will not restrict or divert the flow of flood waters, and endanger the health, safety and welfare of the public or of riparian owners during flooding; and (ii) the development ... within a floodway fringe will not significantly increase the peak discharge of the river or stream within or downstream from the area of development and endanger the health, safety, or welfare of the public or riparian owners during flooding.

Floodways in the Project Area

Floodway data was obtained from the Federal Emergency Management Agency (FEMA) Flood Insurance Rate Maps. For this region, paper maps were consulted as digital maps are not yet available. There are no floodways within the study area.

Potential Impacts

There are no floodways within or directly adjacent to the Project area. There will be no impacts to floodways from the proposed Project.

V. Criteria 1(E): Streams and 1(F): Shorelines

Streams under Act 250 are defined as "a current of water which is above an elevation of 1,500 feet above sea level or which flows at any time at a rate of less than 1.5 cubic feet per second". Under 10 V.S.A. § 6086 (a)(1)(E) a development on or adjacent to the banks of a stream must, "whenever feasible, maintain the natural condition of the stream, and will not endanger the health, safety or welfare of the public or of adjoining landowners."

Under Act 250 (10V.S.A. § 6086 (a)(1)(F)) a shoreline is defined as "the land adjacent to the waters of lakes, ponds, reservoirs and rivers." Development within a shoreline is only granted if the development is necessarily located on a shoreline in order to fulfill the purpose of the development and the development will meet the following criteria: (i) retain the shoreline and the waters in their natural condition; (ii) allow continued access to the water and the recreational opportunities provided by the waters; (iii) retain or provide vegetation which will screen the development of subdivision from the waters; and (iv) stabilize the bank from erosion, as necessary, with vegetation cover.

Streams and Shoreline Resources in the Project Area

Stream and surface water data for the proposed Project area was initially obtained from remote sources. The streams and water bodies from the Vermont Hydrography Dataset, a 1:5000 scale digital map of Vermont surface water provided by VCGI, was examined

against digital orthophoto and topographic base maps. Fieldwork was used to identify streams that did not appear on the Vermont Hydrography Dataset. Stream locations identified during fieldwork were mapped.

The proposed Project involves four stream crossings. Table 1 lists each stream with a brief description and the potential impact from the proposed development. The stream number presented in the table refers to the stream number shown on the attached map.

Table 1. Summary Information for Streams within the Proposed Deerfield Wind Project Area			
Stream	Description	Proximity to Disturbance	Impact
1	Intermittent stream, 1-2' wide, soil/pebble/rock substrate, diffuse in places	0	One road crossing
2	Ephemeral stream, 1-2' wide, muck substrate, diffuse in places	0	One road crossing
3	Intermittent stream. 1' wide, rock substrate	0	One road crossing
4	Intermittent stream, 1.5-4' wide, sand, gravel and silt substrate, diffuse in places	0	One road crossing
5	Intermittent stream, underground in places, 1-2' wide, silt and gravel substrate	250'	Avoided
6	Intermittent stream, 1-2' wide, gravel substrate, somewhat diffuse	250'	Avoided
7	Perennial stream, 3-4' wide, rock and sand substrate	150'	Avoided
8	Ephemeral stream, 1-2' wide, silt and gravel substrate	195'	Avoided
9	Ephemeral stream, 1-2' wide, silt and gravel substrate	45'	Avoided
10	Ephemeral stream, .5-1' wide, silt and cobble substrate	1300'	Avoided
11	Intermediate stream, .5-1' wide, rock and cobble substrate	1300'	Avoided
14	Perennial stream, 2-4' wide, gravel and rock substrate	200'	Avoided
15	Ephemeral, diffuse, organic substrate (detritus)	200'	Avoided

No part of the proposed project occurs on the shorelines of ponds, lakes, reservoirs, or rivers.

Potential Impacts

The Project has been designed to avoid surface water resources to the greatest extent practicable. In locations where streams are disturbed, appropriate erosion prevention and sediment control measures will be implemented to prevent erosion and sediment discharge to water resources. A general outline of these measures is listed in the Headwaters section of the present report and presented in more detail in the prefiled direct testimony of the Project's civil engineer, Jason Krzanowski.

Specific stream crossing designs, however, have not been developed at this time. Arrowwood Environmental plans to work closely with the project's civil engineer and the Vermont Department of Environmental Conservation to design the stream crossings so that natural stream flow is maintained and erosion prevented. Through this process, undue adverse impacts to the streams in the project area will be avoided. The Project will be designed to comply with the Vermont Department of Environmental Conservation's Regulatory Requirements for Stream Crossing Structures. It is anticipated that either small wooden bridges or open bottom culverts will be utilized in the crossing locations. Traditional pipe culverts will be avoided to the extent possible.

There are no shorelines of ponds, lakes, reservoirs, or rivers within the project area. No impact to these resources is therefore expected.

VI. Criterion 1(G): Wetlands

10 V.S.A. § 6086 (a)(1)(G) reviews a project's impacts to wetlands under the Vermont Wetland Rules. The Vermont Wetland Rules protect "significant" wetlands and wetland buffer zones in the State. "Significant" wetlands are those classified as Class I or Class II. Class I wetlands have each been specifically determined by the Water Resources Board to be exceptional and irreplaceable wetlands and as such are afforded the highest level of protection. The Vermont Wetland Rules classifies most palustrine wetlands mapped on the National Wetlands Inventory (NWI) maps as Class II wetlands. Any wetland that is contiguous to a Class II wetland, even though it may not be on the NWI map, is also considered a Class II wetland. Class III wetlands are those wetlands that do not occur on the NWI maps, are not contiguous to mapped Class II wetlands or those designated by the Water Resources Board as Class II wetlands. These wetlands are not considered "significant" under the Vermont Wetland Rules and are not under the jurisdiction of the Vermont Agency of Natural Resources. Class III wetlands, however, may fall under the jurisdiction of the Army Corps of Engineers pursuant to Section 404 of the Clean Water Act.

Wetland Resources in the Project Area

Wetlands were field-delineated within the Project area using the methods put forth in the 1987 US Army Corps of Engineers Wetland Delineation Manual. Wetland boundary flags were hung in the field and surveyed using a Trimble GeoXT global positioning system (GPS) unit. This GPS data was post-processed to achieve sub-meter accuracy.

No Class I or Class II wetlands were found to exist with the Project area. Eleven Class III wetlands have been identified and mapped in the Project area: five of these wetlands occur in the Eastern Project Area, three wetlands occur along the Putnam Road access route and three wetlands along the southern access route. These wetland locations are illustrated on the attached map and are summarized in Table 2. A brief description of each wetland including class, type and potential impact is presented below.

Table 2. Summary of Wetlands Delineated within the Proposed Deerfield Wind Project Area					
Wetland	Type	Class	Size (acres)	Impact	Distance to Disturbance
A	Spruce-Fir-Tamarack Swamp	III	0.14	NA	25'
B	Spruce-Fir-Tamarack Swamp	III	0.19	NA	25'
C	Spruce-Fir-Tamarack Swamp	III	0.50	NA	55'
D	Seepage	III	0.03	NA	290'
E	Seepage	III	0.04	NA	125'
F	Seepage	III	0.01	402 ft ²	0
G	Red Maple-Black Ash Swamp	III	> 0.50	NA	450'
H	Seepage	III	0.13	NA	140'
J	Seepage	III	0.02	NA	1300'
R	Seepage	III	0.04	NA	1300'
S	Old field	III	0.04	NA	1200'

There are three very similar examples of Spruce-Fir-Tamarack Swamps in the Eastern Project Area. These wetlands are shown on the attached **Exhibit DFLD-MLS-4c**

(Wetlands A, B and C). They are all relatively small wetlands and show characteristics of the Seep community. They sit in small topographic bowls that collect water from the surrounding uplands. They may also have groundwater inputs. All three wetlands drain into small streams to the northeast or southwest. Hummocks and hollows from peat moss form a varied micro-topography. Standing water in the hollows is common. The soils consist of deep (>4') organic peats. With the exception of the herbaceous layer, overall species composition of these small wetlands is similar to that of the surrounding upland forests. Both canopy cover and short shrub abundance is lower in the swamps. The herbaceous layer is dominated by hydrophytic plants such as a gynandrous sedge (*Carex gynandra*), goldthread (*Coptis trifolia*), and three-seeded sedge (*Carex trisperma*).

There are three seepage wetlands located within the Project area. These are shown on the attached map (Wetlands D, E **Exhibit DFLD-MLS-4c** and Wetland F on **Exhibit DFLD-MLS-4a**). These seeps are non-treed wetlands that are the sites of groundwater discharge. Wetlands D and E are found on the eastern slope of the Eastern Project Area and form the headwaters of a small brook which drains northeast. Standing water collects seasonally in these small wetlands. Wetland F is a small (approximately 400 sq ft.) seepage wetland located near Route 8. During wet periods, a small flow out of this wetland enters the ditch along Route 8. This flow does not form a distinct channel. The vegetation in these seeps is dominated by herbs such as manna grass (*Glyceria melicaria*), rough sedge (*Carex scabrata*), sensitive fern (*Onoclea sensibilis*) and bladder sedge (*Carex intumescens*). The soils in these wetlands consist of a thin horizon of organic soil over a mineral soil or a gravel hardpan.

Wetland G is a Red Maple-Black Ash Swamp. This swamp is located approximately 450' north of the Putnam Road Access route near Route 8. It consists of a red maple (*Acer rubrum*) and yellow birch (*Betula alleghaniensis*) canopy and a shrub layer comprised of red maple. The herbaceous layer is dominated by ferns such as cinnamon fern (*Osmunda cinnamomea*). Scattered hummocks of peat moss are also common. This wetland receives surface water from Stream 14 and may also be ground water fed. The soils consist of 18" of hemic peat over rock.

Wetland S is an Old Field type wetland that is situated next to Route 8. The disturbed soils, shape of the wetland, location and surrounding topography suggest that this wetland may have been the site of historic disturbance such as gravel mining. The vegetation consists of dense growth of meadowsweet (*Spiraea alba*) and sedges such as bristle sedge (*Carex gynandra*). The soils are gleyed coarse sandy loams.

Table 3 illustrates the functions and values that each of the above wetlands likely performs on the landscape. These functions and values were determined using the Vermont Wetland Evaluation Form and based on field work and remote mapping work.

**Table 3 Functions and Values of Wetlands Within or Near
the Proposed Deerfield Wind Project Area**

Wetland	Flood	WQ	Wild	Eros	Sed	Rec	Edu	Veg	Fish	Open	RTE
A	-	X	-	-	X	-	-	-	-	-	-
B	-	X	-	X	X	-	-	-	-	-	-
C	-	X	-	-	X	-	-	-	-	-	-
D	-	-	X	-	-	-	-	-	-	-	-
E	-	-	X	-	-	-	-	-	-	-	-
F	-	-	-	-	-	-	-	-	-	-	-
G	X	X	-	X	X	-	-	-	-	-	-
H	-	X	-	X	X	-	-	-	-	-	-
J	-	-	X	-	-	-	-	-	-	-	-
R	-	-	-	-	-	-	-	-	-	-	-
S	-	-	-	-	-	-	-	-	-	-	-

- Flood:** Flood control
- WQ:** Water Quality (Nutrient removal)
- Wild:** Wildlife
- Eros:** Erosion control
- Sed:** Sediment retention
- Rec:** Recreation
- Edu:** Education
- Veg:** Hydrophytic vegetation
- Fish:** Fisheries
- Open:** Aesthetics and Open Space
- RTE:** Rare, Threatened and Endangered Species

Potential Impacts

The proposed project has been designed to avoid impacts to all of the wetlands within the project area except for one, Wetland F. As a result of the project, Wetland F will be directly impacted. This wetland is a small (approximately 400 sq ft.) seepage wetland. This wetland would be filled as part of the construction of the access road to the Western

Project Area. According to the Project engineer, the placement of the access road cannot be moved to avoid this wetland due to the clearances and turning radii required for the construction vehicles. As can be seen from Table 3, this wetland is not significant for any functions and values according to the Vermont Wetland Evaluation Form.

The proposed Project has been designed to avoid Class III wetland resources to the extent practicable. With the exception of Wetland F, a minimum of 25' buffer zones will be maintained around all wetland resources in the Project area. The proposed Project will therefore result in minimal impacts to the Class III wetland resources; these impacts are not unduly adverse.

VII. Criterion 8: Rare and Irreplaceable Natural Areas

The definition and delineation of a "rare and irreplaceable natural area" is not by specific regulation or standards in Vermont. The Vermont Nongame and Natural Heritage Program maintains a list and map of significant natural communities and fragile areas which could be considered rare and irreplaceable natural areas. The Vermont Department of Forest, Parks and Recreation also keeps a list of state natural areas. The Environmental Board has previously established that a bog, sandplain community, wetland or arctic-alpine community may constitute a rare and irreplaceable natural area under certain circumstances. Outside of these preexisting lists, however, the definition of what constitutes a "rare and irreplaceable natural area" is a matter of professional judgment. At a minimum, to be considered under this criterion, a site should possess unique geologic, hydrologic or ecological features, harbor rare elements, or be an uncommon or rare natural community.

Natural Area Resources in the Project Area

The Vermont Forests, Parks and Recreation database on natural areas was consulted as part of the inventory process. No part of the Project area contains a state listed natural area. In addition, the Nongame and Natural Heritage Program has no listings of significant natural communities within the Project area. A field inventory for significant natural communities and rare and irreplaceable natural areas was conducted in the proposed Project area. No significant natural communities or sites that could be considered rare and irreplaceable natural areas were discovered during this inventory.

Four natural communities were identified within the Project area and are described in Table 4 below. Community classifications in Table 4 are based on the state classification put forth in Wetland, Woodland and Wildland: A Guide to the Natural Communities of Vermont (Thompson and Sorenson, 2000). The state ranking system is used to assigned relative rarity ranks to each natural community in the state. The rank is based on a 1-5 scale, with one denoting the rarest communities and 5 the most common. The ranks are assigned by the Vermont Nongame and Natural Heritage Program. Explanations of the S3, S4, and S5 ranks (those present within the study area) are as follows:

S3: High quality examples of these communities are uncommon in the state, but not rare. The community is restricted in distribution for reasons of climate, geology, soils or other physical factors, or many examples have been severely altered.

S4: Widespread in the state, but the number of high quality examples is low or the total acreage occupied by the community type is relatively small.

S5: Common and widespread in the state, with high quality examples easily found.

Table 4. Natural Communities Occurring within the Proposed Deerfield Wind Project Area		
Natural Community Type	State Rank	Comments
Northern Hardwood Forest	S5	High elevation type; common throughout study area
Montane Yellow Birch-Red Spruce Forest	S3	Common in Eastern Project Area
Spruce-Fir-Tamarack Swamp	S3	Three small examples in Eastern Project Area
Seep	S4	Two small examples in Eastern Project Area

Potential Impacts

Since no rare and irreplaceable natural areas are located within the proposed Project areas, no impacts are expected.

VIII. Criterion 8 (A): Wildlife Habitat and Endangered Species

This Criterion considers if a project will "destroy or significantly imperil necessary wildlife habitat or endangered species." If such impacts are expected, it would need to be demonstrated that: 1) the recreation, economic, social, and cultural benefits to the development do not outweigh the economic, environmental or recreational costs to the public from the destruction of the habitat or species; 2) all feasible and reasonable means of preventing or lessening the impact to the habitat or species have not been applied; and 3) an acceptable alternative site is not available to fill the purpose of the development. [V.S.A. § 6086(a)(8)(A)]

A. Wildlife Resources in the Project Area

A.1 Birds

No field inventories for specific bird species was undertaken by Arrowwood Environmental during the environmental assessment process. Breeding bird surveys and avian risk assessments of the project area, however, have been conducted by Curry and Kerlingner, LLC. For the results of these studies please refer to **Exhibit DFLD-PK-2** (Phase 1 Avian Risk Assessment for the Deerfield Wind Project); **Exhibit DFLD-PK-3** (Breeding Bird Survey for the Searsburg/Readsboro Expansion Wind Project); **Exhibit DFLD-PK-4** (Supplement to Phase I Avian Risk Assessment and Breeding Bird Study); and **Exhibit DFLD-PK-5** (Bicknell's Thrush Report).

A.2 Mammals

Eastern small-footed bat (*Myotis leibii*): The eastern small-footed bat is known to hibernate in caves in New Hampshire and Vermont. The closest known hibernacula is in Manchester, Vermont. This bat prefers to hibernate in caves and abandoned mines. Its summer habitat includes roost sites on rocky cliffs, mines and buildings. Unlike the Indiana bat, the summer habitat of this species is usually within 25 miles of the hibernacula. There are no known hibernacula within the Project area. A remote inventory indicates that there are no rock outcrops within the Project area, but a few suitable sites within a 3-mile radius of the Project were identified (see Bat Habitat Assessment and Mapping Report, Arrowwood Environmental, May 2005).

Some of these potential sites were explored in the field by biologists from the Vermont Department of Fish and Wildlife and the Green Mountain National Forest (GMNF) and recordings of bat echolocation calls were made. Analysis of these calls revealed that two bat species were present, the Big Brown Bat (*Eptesicus fuscus*) and possibly the Red Bat (*Lasiurus borealis*) on the night that the recordings were made. Given, however, that this data is from only one field visit, a definitive determination on whether the small-footed bat is found in the Project area cannot be made. However, a report on this field work by Joe Torres of the USFS suggests that if this species is found within the Project area, it is not present in very high numbers and it is not likely to be affected by the Project. This is due to the lack of suitable habitat within the Project area and the results of the field survey.

Given that this species is not likely present within the Project area or within a 3 mile radius, this species is not likely to be affected by the proposed development.

Indiana bat (*Myotis sodalis*): The Indiana bat is a federally listed Endangered Species. This species requires limestone caves or mines for hibernacula. Most of the significant hibernacula in the region have been located for this species. During the summer, the Indiana Bats form maternity colonies which require trees with exfoliating bark for roosting sites. In this region, these trees usually consist of shagbark hickory (*Carya ovata*) or American elm (*Ulmus americana*). A wide variety of large dying tree species may also be used if they have suitable exfoliating bark. These maternity colonies usually

forage in floodplain forests, pastures, open wetlands and other upland hardwood forests. The ideal habitat for this species in the summer consists of a diverse landscape with 20%-60% forested cover and the remaining area open as wetlands, agricultural fields, or early successional habitats. Most of the Indiana bats in the State are found at the lower elevations. Most maternity colonies have been found at lower elevations because higher elevations tend to be wetter, cooler and have more temperature variation that is unsuitable for the Indiana bat. The closest known maternity colonies are in Skinner Hollow in Manchester, Vermont.

A remote inventory of the Project area and 3-mile radius was undertaken to determine the possible presence of suitable habitat in the area. There is no suitable hibernacula within the Project area or the immediate vicinity. While there may be individual roost trees that may be suitable for this species, it is unlikely that maternity colonies exist within the Project area. The lowest elevation present within the Project area is approximately 2200 ft., with most of the development impact occurring above 2800 ft. In addition, the habitat diversity within the Project area and the surrounding vicinity is 90%-100% forested.

Occurrence of this species in or within a 3-mile radius of the Project area is unlikely. Impact to Indiana bat populations from this proposed development is therefore unlikely.

White-tailed Deer (*Odocoileus virginianus*): Sign of white-tailed deer has been documented in scattered locations throughout the Project area but is more scarce in the higher elevations (above 2700 ft.). There are no state mapped deer yards in the Project area. A field inventory focused on locating possible deer yards was undertaken in 2004. This study included a 300 ft radius of turbine locations and proposed access roads. No deer yards were recorded during this inventory.

Construction of the Project may eliminate some areas currently used by this species. This is a result of the clearing of forested land for the placement of access roads and the wind turbines. However, the most critical habitat for this species is the over-wintering habitat (conifer stands). No over-wintering habitat exists within the Project area. Overall impact on this species from the proposed development will therefore not be significant.

Potential Impacts

The potential for negative impacts to white-tailed deer is limited to summer range for the species and is not significant in quality of habitat or acreage.

Moose (*Alces alces*): Evidence of moose presence as scat, browse, tracks and sitings have been documented within and around the Project area. The two most important areas for moose habitat appear to be the Montane forest in the Eastern Project Area and the clearcut area (Stand A on attached map) in the Western Project Area. Both of these areas contained moose sign including moose browse, moose scats, and trails. Both of these areas also contained significant amounts of understory growth such as hobblebush, beech and fir. Other moose habitat has been noted in a conifer forest along the southern access

route, and in wetlands outside of the Project area. Each of these habitats is discussed below.

The moose habitat within the Eastern Project Area is located in the vicinity of proposed Turbine #1E. The mature spruce-fir forest with the greatest sign of use (i.e. moose scat and browse) is located approximately 285-300 feet to the southeast of the proposed tower site. The limits of clearing would extend from the tower out about 210 feet. A treed buffer of about 75-100 feet would remain in place. As a result, there could be a very slight displacement of over-wintering moose due to the presence of the wind turbines and maintenance personnel.

Moose also utilize the food present in the clearcut along the Western Project Area (*See Exhibit DFLD-MLS-4b*). This stand is the site of a hardwood forest clearcut which was conducted in the late 1980s. It currently consists of dense hardwood (mainly beech) regeneration. The moose utilization observed within this stand is primarily summer and fall use. Given that only a small area of this stand will be impacted by the proposed wind development, this use will most likely continue after construction of the wind project.

Moose sign was observed within the red-spruce-eastern hemlock natural community located near the Western Project Area. This area is shown on **Exhibit DFLD-MLS-4b**. Moose may use this community for shelter during the winter months. Field investigation in 2006 has revealed only extremely limited use by this habitat by over-wintering moose. This area would only be impacted if the southern access route is developed. One of the advantages of employing the Putnam Road access route instead of the southern route is that impact to this conifer stand would be avoided.

There also appears to be important moose habitat in the area around the Western Project Area outside of the actual development area. At lower elevations on both the western and eastern sides of the ridge, there are many beaver influenced wetlands that likely serve as important moose habitat. These are shown on **Exhibits DFLD-MLS-4a** and **4b**. These areas have not been assessed in the field. Given the distance to these wetlands (1500 feet at the closest), it is not likely that this moose habitat will be affected by the proposed development.

In general, the affects of the proposed development on moose habitat will likely be localized and minor. As mentioned above, there may be a slight displacement of over-wintering moose in the Eastern Project Area. In other areas, a small increase in woody moose browse may actually result from the tower clearings. Moose will also benefit from the plowed gravel roads, with low traffic volume, during winter. Moose will likely utilize these snow-free corridors for movements on the landscape. Overall, the affect of the proposed development on moose habitat will be minimal.

Potential Impacts

Impacts to moose are limited in extent and the quality of the habitat. The higher elevation habitat located along the eastern project ridge is currently utilized by moose.

However, the best habitat (as evidenced by the presence of moose scat and browse) is located further than 250 feet away from the project area (and clearing). Jeff Wallin has demonstrated with his remote camera assessment that moose continue to utilize wooded areas within 300 feet of rotating wind turbines. The area of moose habitat use in the western habitat is very limited. In addition, at this point, the southern access road is not a preferred option.

Black Bear (*Ursus americanus*): Wildlife corridors and beech stands used by black bear within and around the Project area are discussed in separate reports by Jeff Wallin. A description of wetlands potentially used by black bear in and around the Project area is presented below.

Black bear are known to use both forested wetlands and seepage wetlands as food sources during different times of the year. Seepage wetlands are commonly used by bear during the spring months because of the early growth of sedges and other vegetation in these habitats. Forested wetlands are often used by bears if the appropriate vegetation is present. Spotted touch-me-not, skunk cabbage, and sedges are the preferred food for black bear in these habitats.

There are several wetlands near proposed Turbine #4E in the Eastern Project Area. Wetlands A, B, and C are forested wetlands dominated by coniferous forest cover. These wetlands could potentially be utilized by black bear during the spring and summer months. However, field investigation of these wetlands revealed that potential bear food is limited in these wetlands. There is no skunk cabbage present, only scattered stems of sedges, and little to no spotted-touch-me-not.

The seepage wetlands (wetlands D and E on the attached map) are dominated by scattered manna grass and scattered sedges and do not provide a concentrated food source. These wetlands are also very small areas (less than 1/10th of an acre). The seeps will be buffered by approximately 300-600 feet of intact forest between turbine clearings.

Black bear could potentially utilize these seeps for feeding during the spring and summer seasons. Given the forested buffer distances of 300-600 feet that will remain after construction of the turbines, black bear use of the seepages should continue. The limited road access and relatively wild lands that will remain around the seepages suggest that, if bear currently use these seepages, their long-term use should not be disrupted.

There may, however, be short-term disruption of use. During the construction process, noise and the presence of people and construction equipment may temporarily displace black bear and inhibit their use of these seepages.

In the valley below the Western Project ridge, there is a series of beaver influenced wetlands (see **Exhibits DFLD-MLS-4a** and **4b**). These wetlands were not field assessed and their use by bear is not known. Given that the proposed development is greater than 1500 feet from these wetlands it is unlikely that the proposed wind development would impact potential bear use in these wetlands.

Potential Impacts

The potential impacts of the project upon bear use of area wetlands is likely to be minimal. There is no direct evidence that wetlands in the area of construction and operation of the turbine strings are utilized by black bear. The quality of the wetland resource, in terms of the species present, suggests that the wetlands in close proximity to the turbines, for the most part, do not provide quality food resources. Other wetlands remain adequately buffered with 300 -1500 feet of forested buffer. Only a few small seeps are within 500 feet of the project area. As Jeff Wallin's remote camera work has demonstrated, black bear will continue to utilize wetland habitat within at least 300 feet of operating wind turbines, if not closer.

Other Mammals: The different habitats present within the Project area suggest that a wide variety of animals are present. The fisher, bobcat, coyote, and red and gray fox are all likely present at or near the proposed Project area. These predators inhabit both hardwood and coniferous forest in southern Vermont. The fox and coyote are more likely found in managed forests and near the presence of humans, clearings and roads. The fisher is more likely associated with the wetlands and deeper woods of the Project while the bobcat likely inhabits all the areas associated with the Project.

The Eastern cottontail, snowshoe hare, Eastern chipmunk, gray squirrel, red squirrel and flying squirrels are likely inhabitants of the Project area or the immediate vicinity. A wide variety of moles, voles, mice, shrews, and weasels likely inhabit the area as well.

The cottontail rabbit, chipmunk, gray squirrel and flying squirrel are more generally distributed throughout the hardwood forest, while the red squirrel and snowshoe hare are more closely associated with the coniferous forests found within the project area. The snow shoe hare might also be found within clearcut areas such as those within the western expansion area. A small amount of habitat for the snow shoe hare, cottontail rabbit, gray squirrel, and red squirrel will probably be lost as a result of the clearing associated with the wind turbine and access road construction.

Moles, voles, mice, shrews, and weasels are likely distributed throughout the project area and a small loss of habitat for these species will occur in areas permanently cleared for the project.

Although not within the Project area, the extensive beaver wetlands near the Western Project Area likely provide habitat for mink, river otter, and American beaver. These areas are over 1500 feet from any of the proposed development. Beaver are believed to utilize available habitat within approximately 300-500 feet of streams and waterways they occupy. Except for long range movements, the river otter and mink are similarly likely to be found within a distance of 500-750 feet of waterways and are not found within the study area.

Project Impact

There were no specific critical or necessary habitat elements for any of the above mentioned species identified at or near the Project area (within a ¼ mile). As documented in Jeff Wallin's reports, many of these species have been photographed in close proximity to operating wind turbines and are not likely to be displaced by such activity. The proposed wind project would not have an undue adverse impact on these species.

A.3 Reptiles and Amphibians

Field inventories focusing on reptiles or amphibians were not conducted by Arrowwood Environmental. However, based on incidental sightings and habitat, a list of species likely present within the Project area is presented below.

The most likely reptile present within the Project area is the common garter snake. The northern red-bellied snake, the ribbon snake, and the secretive northern ringneck snake may also be present. Other species are likely present in the lower elevation wetlands surrounding the Western Project Area. As mentioned above, these areas are over 1500 feet from any of the proposed development and impact to these wetlands is unlikely.

Amphibian populations within the Project area are likely limited by the lack of extensive wetlands. Some species, however, may be found in streams or smaller wetlands like those found in the Project area. These include the red-spotted newt, northern dusky salamander, the redback salamander, the northern spring salamander, and the northern two-lined salamander. The eastern American toad, gray treefrog and the wood frog are also likely present.

In wetlands at lower elevations (especially those around the Western Project Area) many other species are likely present. These include the northern spring peeper, bullfrog, green frog, northern leopard frog, pickerel frog, spotted salamander and Jefferson salamander.

Four-toed salamander (*Hemidactylium scutatum*): The Four-toed salamander warrants specific discussion because of all the reptiles and amphibians listed as rare, threatened or endangered, this species is the most likely to occur within the project area. This secretive species can occur in hardwood forests where it hides under rotting logs, leaf litter and stones. However, it requires hummocks of Sphagnum moss in which to lay its eggs. It is most commonly found in wet forested swamps and woodlands with an abundance of Sphagnum moss. It eats insects, spiders and earthworms. The closest known location for this species is in Woodford State Park, approximately 2 miles from the Project area.

The three conifer swamps in the Eastern Project Area (Wetlands A, B and C on **Exhibit DFLD-MLS-4c**) are the most likely habitats for this species within the Project area. However, there may be lack of suitable aquatic habitat for the larval stage of this species because the standing water present in these wetlands (and their drainages) appears to be somewhat ephemeral. The Project as proposed represents a modification which involved moving the location of a tower (Turbine #4E) to avoid impacts to these wetlands. No

cutting, dredging or filling of these wetlands will occur under the current design. Clearing for the tower area will occur approximately 25 feet to Wetland A at its closest point.

Additional discussion of wildlife habitat and likely impact is given in the Existing Natural Resource Conditions at the Proposed Deerfield Wind Project (Arrowwood Environmental, January 31, 2006) (Exhibit DLFD-MLS-2).

Potential Impacts

There were no “necessary wildlife habitats” for any of the above mentioned species identified at or near the Project area (within a ¼ mile). In addition, there is no evidence that the proposed wind project would present an undue adverse impact these species.

B. Endangered Species Resources in the Project Area

The Vermont Nongame and Natural Heritage Program maintains a database on all known locations of rare, threatened and endangered species in the state. There are no known locations of rare, threatened and endangered species within the proposed Project area. A field inventory for rare, threatened and endangered plant species was conducted, with the exception of the Putnam Road access route and the Transmission collector line. No threatened or endangered species were found during this inventory.

In addition to listed threatened and endangered species, the Vermont Nongame and Natural Heritage Program (NNHP) maintains a list of all species that are rare or uncommon in the state. These species are ranked S1 (very rare), S2 (rare) or S3 (uncommon). While tracked by the Natural Heritage program, these species are not protected under the Vermont Endangered Species Law (10 V.S.A. Chap. 123). Avoiding impacts to these species, however, is usually recommended. No species tracked by the NNHP were discovered during the field inventory.

An inventory of the proposed Putnam Road access route and the Transmission collector line for rare plants will be conducted during the 2006 field season.

Potential Impacts

No threatened or endangered species were found during the inventory of the proposed turbine locations. If any rare element populations are found during the 2006 inventory of the Putnam Road access route, steps will be taken to protect the population.

IX. Outstanding Resource Waters

The Water Resources Panel of the Natural Resources Board under 10 V.S.A. ' 1424a has the authority to designate certain waters as Outstanding Resource Waters. Where the Panel designates such waters because of their water quality values, their existing quality shall, at a minimum, be protected and maintained.

Outstanding Resource Waters in the Project Area

There are no Outstanding Resource Waters within the project area. In addition, the criteria of 10 V.S.A. ' 1424a(d) were considered with respect to the Project. The surface waters present in the Project area do not appear to meet the criteria for listing as ORW waters.

Potential Impacts

There will be no impact on Outstanding Resource Waters from the proposed development.



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Environmental Assessment of the Deerfield Wind Project: Supplemental Assessment of the Putnam Road Access Route, the Proposed Transmission Line Corridor and the Existing Wind Facility Access Road January 3, 2007

Introduction

On September 3-5th, 2006, Arrowwood Environmental (AE) conducted an environmental assessment of three areas that were not assessed in the report Environmental Assessment of the Deerfield Wind Project (Arrowwood Environmental, August 2006). This supplemental survey area includes: 1) the proposed Putnam Road Access Route; 2) the proposed transmission line corridor; and 3) the proposed widening of the existing Searsburg wind facility's access road. Each of these areas is shown on the attached map. This environmental assessment consisted of an inventory for rare, threatened or endangered plant species and an assessment and delineation of wetlands in these three areas.

Rare, Threatened and Endangered Plant Species

The proposed Putnam Road Access Route; the proposed transmission line corridor; and the proposed widening of the existing Searsburg wind facility's access road were inventoried for rare, threatened or endangered plant species. A complete list of species found during this inventory is present in Appendix A. No state or federally listed threatened or endangered species were found during this inventory. In addition, using the species ranks developed by the Vermont Non-Game and Natural Heritage Program, no rare or uncommon species were found during this inventory.

Wetlands

A total of six Class III wetlands were mapped during this supplemental inventory. Four of these wetlands are located along the proposed transmission line corridor and two along the existing wind facility access road. There were no wetlands identified along the Putnam Road access route. Each wetland is described below and shown on the attached map.

Wetland W: This Class III wetland is a seepage-type wetland that is located on a steep slope. It is characterized by a small amount of ground water discharge which forms shallow peat soils and supports hydrophytic vegetation. Typical vegetation at this site consists of rough goldenrod (*Solidago rugosa*), delicate-stemmed sedge (*Carex leptalea*), umbellate aster (*Aster umbellatus*) and New York fern (*Thelypteris noveborascensis*). The outlet to this wetland does not form a distinct channel but presumably drains into Stream 10 during high flow periods (See map 3 of 3 in the

attachment). According to the State of Vermont wetlands functions and values criteria, this wetland is not significant for any of the functions or values stated on the Vermont Wetland Evaluation Form.

Potential Impact: The proposed power line corridor will pass over Wetland W. It is recommended that this wetland be avoided to the extent possible when designing the pole placement for the transmission line. Since this wetland does not contain any woody vegetation, no vegetation will be cut for the maintenance of the corridor.

Wetlands X and Y: These two Class III wetlands are similar, nearly connected wetlands that occur along the banks of Stream 10 (See map 3 of 3 in the attachment). These are both stream-side seepage wetlands that lack woody vegetation and are dominated by slender manna grass (*Glyceria melicaria*), spotted touch-me-not (*Impatiens capensis*) and sensitive fern (*Onoclea sensibilis*). The soils are saturated and consist of a thick layer of organic (peat) soils intermixed with lenses of fine sand and gravel. According to the State of Vermont wetlands functions and values criteria, these wetlands may be significant for erosion control and sediment retention.

Potential Impact: The proposed transmission line corridor would pass over Wetland X. It is recommended that this wetland be avoided to the extent possible when designing the pole placement for the transmission line. Since this wetland does not contain any woody vegetation, no vegetation will be cut for the maintenance of the corridor. If poles are not placed in this wetland, the presence of the transmission corridor over this wetland will not affect the functions described above.

Wetland Z: This narrow Class III wetland is situated between an old field and a Red Spruce-Northern Hardwood Forest. It forms the headwaters of a small drainage that empties into a roadside ditch along Rte 8 (See map 3 of 3 in the attachment). It is dominated by the low shrub meadowsweet (*Spiraea alba*) as well as umbellate aster, rough goldenrod, and gynandrous sedge (*Carex gynandrous*). The soils consist of a 13" thick horizon of organic soil (peat) over dense silt loams. According to the State of Vermont wetlands functions and values criteria, this wetland is not significant for any of the functions or values stated on the Vermont Wetland Evaluation Form.

Potential Impact: The proposed power line corridor will pass over Wetland Z. It is recommended that this wetland be avoided to the extent possible when designing the pole placement for the transmission line. Since this wetland contains only short shrubs and herbaceous vegetation, no vegetation will be cut for the maintenance of the corridor.

Wetland AA: This Class III wetland is a seepage type wetland along Sleepy Hollow Road across from the current substation entrance. It is dominated by herbaceous vegetation such as sensitive fern, umbellate aster, purple stemmed aster (*Aster puniceus*) and spotted touch-me-not. The eastern boundary of this wetland (outside of the immediate project area) was not delineated due to lack of landowner permission. There is an ephemeral or intermittent stream associated with this wetland that originates in a roadside ditch to the east of the wetland. According to the State of Vermont wetlands functions and values criteria, this wetland is not significant for any of the functions or values stated on the Vermont Wetland Evaluation Form.

Potential Impact: Impacts to this wetland will be avoided during the widening of the existing road. The wetland is approximately 15 feet from the edge of the existing road. Upon widening, the wetland will be approximately 13 feet from the road. The proposed impacts will have no significant impact on the nature of this wetland.

Wetland BB: This wetland is located along the current road to the existing wind turbines. It is an emergent marsh wetland dominated by cattails (*Typha latifolia*), rush (*Juncus effusus*), bladder sedge

(*Carex lurida*), and wool-grass (*Scirpus cyperinus*). Open, standing water is common among the tussocks of vegetation and standing dead trees. The existing road is directly adjacent to the western side of this wetland. It appears that some portion of this wetland was filled during the construction of the existing road. This wetland forms the headwaters of a small stream which drains to the southeast (See map 3 of 3 in the attachment). According to the State of Vermont wetlands functions and values criteria, this wetland is not significant for any of the functions or values stated on the Vermont Wetland Evaluation Form.

Potential Impacts: No impacts to this wetland will occur as a result of the widening of the existing road. Upgrades to the road will be focused on the western side of the road, away from the wetland. The proposed impacts will not have a significant impact on the nature of this wetland.

Table 1 summarizes the wetland information and proposed impacts to the wetlands identified in the supplemental survey area.

Table 1. Summary of Wetlands Delineated within the Supplemental Survey Area					
Wetland	Type	Class	Size (acres)	Impact	Distance to Disturbance
W	Seepage	III	0.14	NA	0' ¹
X	Seepage	III	0.19	NA	0' ¹
Y	Seepage	III	0.50	NA	0' ¹
Z	Shallow Emergent Marsh	III	0.03	NA	0' ¹
AA	Seepage	III	0.04 ³	NA	13'
BB	Shallow Emergent Marsh	III	0.01	NA	0' ²

¹ Each of these wetlands occurs under the proposed transmission line. As long as utility pole placement avoids the wetlands, direct impacts will be avoided.

² The existing road is directly bordering wetland BB. The proposed development requires upgrades to this existing road, but no new wetland impacts.

³ The entire area of wetland AA was not delineated. The size shown in the table represents only that portion of the wetland that was delineated.

Table 2 summarizes the functions and values of each of the wetlands delineated in the supplemental survey area. Functions and values assessments were based on the State of Vermont's Wetland Evaluation Form.

Table 2. Functions and Values of Wetlands within the Supplemental Survey Area											
Wetland	Flood	WQ	Wild	Eros	Sed	Rec	Edu	Veg	Fish	Open	RTE
W	-	-	-	-	-	-	-	-	-	-	-
X	-	-	-	X	X	-	-	-	-	-	-
Y	-	-	-	X	X	-	-	-	-	-	-
Z	-	-	-	-	-	-	-	-	-	-	-
AA	-	-	-	-	-	-	-	-	-	-	-
BB	-	-	-	-	-	-	-	-	-	-	-

- | | |
|---|---|
| Flood: Flood control | Edu: Education |
| WQ: Water Quality (Nutrient removal) | Veg: Hydrophytic vegetation |
| Wild: Wildlife | Fish: Fisheries |
| Eros: Erosion control | Open: Aesthetics and Open Space |
| Sed: Sediment retention | RTE: Rare, Threatened and Endangered Species |
| Rec: Recreation | |

Summary

No rare, threatened or endangered plants were discovered in the supplemental survey area. A total of six wetlands were delineated in the supplemental survey area. Two of the six wetlands occur along the existing wind facility road. The proposed road upgrades have been designed to avoid direct impacts to these wetlands. Four of the six wetlands are located along the proposed transmission line corridor. Actual pole placement along the transmission line has not yet been determined. Given the size and location of these wetlands, however, it is likely that direct impacts to each of these wetlands can be avoided. If poles are not placed within the wetlands along this route, undue, adverse impacts to the wetland resources in the supplemental survey area will have been avoided.

Appendix A: List of Plant Species Recorded During Inventory of the Supplemental Survey Area

NAME	COMMON NAME	FAMILY
<i>Acer pensylvanicum</i>	Striped Maple	Aceraceae
<i>Acer rubrum</i>	Red Maple	Aceraceae
<i>Acer saccharum</i>	Sugar Maple	Aceraceae
<i>Acer spicatum</i>	Mountain Maple	Aceraceae
<i>Daucus carota</i>	Queen-Anne's-lace	Apiaceae
<i>Hydrocotyle americana</i>	Pennywort	Apiaceae
<i>Nemopanthus mucronata</i>	Mountain Holly	Aquifoliaceae
<i>Arisaema triphyllum</i>	Jack-in-the-pulpit	Araceae
<i>Ambrosia artemisiifolia</i>	Common Ragweed	Asteraceae
<i>Aster acuminatus</i>	Acuminate Aster	Asteraceae
<i>Aster lateriflorus</i>	Calico Aster	Asteraceae
<i>Aster puniceus</i>	Purple Stemmed Aster	Asteraceae
<i>Aster umbellatus</i>	Umbellate Aster	Asteraceae
<i>Bidens vulgata</i>	Common Beggar's-ticks	Asteraceae
<i>Chrysanthemum leucanthemum</i>	Ox-eye Daisy	Asteraceae
<i>Eupatorium maculatum</i>	Common Joe-pye Weed	Asteraceae
<i>Euthamia graminifolia</i>	Grass-leaved Goldenrod	Asteraceae
<i>Hieracium aurantiacum</i>	Orange Hawkweed	Asteraceae
<i>Hieracium sp.</i>	Hawkweed	Asteraceae
<i>Lactuca biennis</i>	Blue lettuce	Asteraceae
<i>Solidago canadensis</i>	Canada Goldenrod	Asteraceae
<i>Solidago rugosa</i>	Rough-stemmed Goldenrod	Asteraceae
<i>Sonchus sp.</i>	Sow-thistle	Asteraceae
<i>Taraxacum officinale</i>	Common Dandelion	Asteraceae
<i>Tussilago farfara</i>	Coltsfoot	Asteraceae
<i>Impatiens capensis</i>	Orange Jewelweed	Balsaminaceae
<i>Betula alleghaniensis</i>	Yellow Birch	Betulaceae
<i>Betula papyrifera</i>	Paper Birch	Betulaceae
<i>Lobelia inflata</i>	Indian-tobacco	Campanulaceae
<i>Viburnum cassinoides</i>	Norther Wild Raisin	Caprifoliaceae
<i>Viburnum lantanoides</i>	Hobblebush	Caprifoliaceae
<i>Silene latifolia</i>	Common White Campion	Caryophyllaceae
<i>Hypericum perforatum</i>	Common St. John's-wort	Clusiaceae
<i>Cornus canadensis</i>	Bunchberry	Cornaceae
<i>Cornus foemina</i>	Gray Dogwood	Cornaceae
<i>Carex debilis</i>	Feeble Woodland Sedge	Cyperaceae
<i>Carex gynandra</i>	Gynandrous Sedge	Cyperaceae
<i>Carex intumescens</i>	Bladder Sedge	Cyperaceae
<i>Carex leptalea</i>	Delicate-stemmed Sedge	Cyperaceae
<i>Carex lurida</i>	Garish Sedge	Cyperaceae
<i>Carex scoparia</i>	Pointed Broom Sedge	Cyperaceae
<i>Scirpus atrovirens sens. lat.</i>	Black-green Bulrush	Cyperaceae
<i>Dennstaedtia punctilobula</i>	Hay-scented Fern	Dennstaedtiaceae
<i>Athyrium filix-femina</i>	Lady Fern	Dryopteridaceae
<i>Dryopteris campyloptera</i>	Mountain Wood Fern	Dryopteridaceae
<i>Dryopteris carthusiana</i>	Spinulose wood Fern	Dryopteridaceae
<i>Onoclea sensibilis</i>	Sensitive Fern	Dryopteridaceae
<i>Equisetum arvense</i>	Common Horsetail	Equisetaceae
<i>Vaccinium angustifolium</i>	Lower Lowbush Blueberry	Ericaceae
<i>Vaccinium myrtilloides</i>	Velvet-leaf Blueberry	Ericaceae

NAME	COMMON NAME	FAMILY
<i>Trifolium pratense</i>	Red Clover	Fabaceae
<i>Fagus grandifolia</i>	American Beech	Fagaceae
<i>Quercus rubra</i>	Northern Red Oak	Fagaceae
<i>Gentiana linearis</i>	Narrow-leaved Gentian	Gentianaceae
<i>Juncus articulatus</i>	Articulate Rush	Juncaceae
<i>Juncus effusus</i>	Common Rush	Juncaceae
<i>Juncus tenuis</i>	Path Rush	Juncaceae
<i>Ajuga reptans</i>	Carpet Bugleweed	Lamiaceae
<i>Galeopsis tetrahit</i>	Common Hemp-nettle	Lamiaceae
<i>Smilacina racemosa</i>	Common False Solomon's-seal	Liliaceae
<i>Uvularia sessilifolia</i>	Common Bellwort	Liliaceae
<i>Lycopodium dendroideum</i>	Tree Clubmoss	Lycopodiaceae
<i>Lycopodium lucidulum</i>	Shining Clubmoss	Lycopodiaceae
<i>Lycopodium tristachyum</i>	Blue Ground Cedar	Lycopodiaceae
<i>Monotropa uniflora</i>	Indian Pipes	Monotropaceae
<i>Fraxinus pennsylvanica</i>	Green Ash	Oleaceae
<i>Oenothera biennis</i>	Common Evening-primrose	Onagraceae
<i>Epifagus virginiana</i>	Beech Drops	Orobanchaceae
<i>Osmunda cinnamomea</i>	Cinnamon Fern	Osmundaceae
<i>Osmunda regalis</i>	Royal Fern	Osmundaceae
<i>Oxalis acetosella</i>	Common Wood-Sorrel	Oxalidaceae
<i>Abies balsamea</i>	Balsam Fir	Pinaceae
<i>Picea glauca</i>	White Spruce	Pinaceae
<i>Plantago major</i>	Broad-leaved Plantain	Plantaginaceae
<i>Agrostis capillaris</i>	Rhode Island Bent	Poaceae
<i>Agrostis perennans</i>	Upland Bentgrass	Poaceae
<i>Bromus ciliatus</i>	Fringed Brome	Poaceae
<i>Calamagrostis canadensis</i>	Common Bluejoint Grass	Poaceae
<i>Cinna latifolia</i>	Drooping woodreed	Poaceae
<i>Dactylis glomerata</i>	Orchard Grass	Poaceae
<i>Danthonia compressa</i>	Northern Oatgrass	Poaceae
<i>Elytrigia repens</i>	Quackgrass	Poaceae
<i>Glyceria grandis</i>	Great Mannagrass	Poaceae
<i>Glyceria melicaria</i>	Slender Mannagrass	Poaceae
<i>Glyceria striata</i>	Fowl Mannagrass	Poaceae
<i>Lolium perenne</i>	Perennial Ryegrass	Poaceae
<i>Phleum pratense</i>	Timothy	Poaceae
<i>Polygonum sagittatum</i>	Arrow-leaved Tearthumb	Polygonaceae
<i>Rumex crispus</i>	Curly Dock	Polygonaceae
<i>Rumex sp.</i>	Dock	Polygonaceae
<i>Trientalis borealis</i>	Starflower	Primulaceae
<i>Ranunculus acris</i>	Common Buttercup	Ranunculaceae
<i>Fragaria vesca</i>	Wood Strawberry	Rosaceae
<i>Potentilla simplex</i>	Common Cinquefoil	Rosaceae
<i>Prunus serotina</i>	Black Cherry	Rosaceae
<i>Pyrus malus</i>	Apple	Rosaceae
<i>Rubus allegheniensis</i>	Common Blackberry	Rosaceae
<i>Rubus idaeus</i>	Red Raspberry	Rosaceae
<i>Sorbus americana</i>	American Mountain Ash	Rosaceae
<i>Spiraea alba</i>	Meadow-sweet	Rosaceae
<i>Spiraea tomentosa</i>	Steeplebush	Rosaceae
<i>Galium mollugo</i>	European Bedstraw	Rubiaceae
<i>Mitchella repens</i>	Partridge Berry	Rubiaceae
<i>Populus tremuloides</i>	Quaking Aspen	Salicaceae
<i>Salix sp</i>	Willow	Salicaceae

NAME	COMMON NAME	FAMILY
<i>Tiarella cordifolia</i>	Foam Flower	Saxifragaceae
<i>Chelone glabra</i>	Turtlehead	Scrophulariaceae
<i>Phegopteris connectilis</i>	Narrow beach Fern	Thelypteridaceae
<i>Thelypteris noveboracensis</i>	New York Fern	Thelypteridaceae