

**A vascular plant inventory of the
proposed wind turbine array,
Ardness to Beaver Mountain, Nova Scotia
with notes on plant communities
and breeding birds**



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for

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METHODS

Screening pre-existing records for rare vascular plants

Lisa Fulton consulted the Atlantic Canada Conservation Data Centre (AC CDC) in February 2007 to determine what rare species were known from the area of the study site and what other rare species might be found there. As recommended by the Nova Scotia Department of Natural Resources, the AC CDC provided a list of all rare species records found within 100 km of the site, along with distance of each record from a central point in the proposed development area. I summarized the vascular plant results by species, listing the closest known record to the Dalhousie Mountain site. I then evaluated the habitat requirements of each species.

Vascular Plant Inventory

Fieldwork was conducted by Sean Blaney and David Mazerolle. We visited the study site on June 20, 21, 22 and July 1, 2007, spending 49.9 person hours and covering 93.8 km on foot. We recorded tracks taken in the field by GPS units set to record position approximately every 15 seconds while moving (the “more often” track recording setting on a Garmin GPS 76Cx unit).

We had pre-programmed the proposed turbine sites into our GPS units before fieldwork and we visited each turbine site, taking photographs, recording notes on species composition, stand age of forested sites and any obvious disturbance history of the plant community present. We concentrated search effort on the turbine sites but covered different or interesting habitats when these were noted. The linear corridors necessary for the development (roads and powerlines) had not been fully determined at the time of our site visit, although in many cases our tracks followed roads or straight lines between turbines that will likely be locations for the necessary linear corridors.

We compiled a full vascular plant list for the site as a whole, with estimates of species' relative abundance as follows: rare – seen in small numbers in 4 or fewer locations; uncommon – seen in small numbers in approximately 5 to 8 locations, potentially in larger numbers at one or two of the locations; fairly common – seen in small numbers in approximately 8 to 12 locations, potentially in larger numbers at several of the locations; common – seen at more than 12 (estimated) locations. These categories are not intended to represent precise descriptions of abundance but do provide some measure of relative abundance.

For plant species tracked by the Atlantic Canada Conservation Data Centre (those ranked S1, S2, S3 or S3S4 in Nova Scotia, for which all locations are databased), we recorded GPS locations along with habitat descriptions and more detailed estimates of local abundance.

Breeding Bird Inventory

Although not part of the work we were hired to complete, Sean Blaney made some effort to record bird species by listening for birds and occasionally attempting to attract birds into view using pishing. He recorded breeding evidence using the codes of the Maritimes Breeding Bird Atlas (<http://www.mba-aom.ca/english/mbbaguide.pdf>, and listed below). Bird breeding evidence will be entered online into the Maritimes Breeding Bird Atlas.

Results and Discussion

I. Site Coverage

We spent 49.9 person hours on foot on the site and covered 93.8 km on foot. Figure 1 maps the tracks covered on foot during the site visits by Sean Blaney and David Mazerolle.

No site inventory is ever entirely complete, but we visited all turbine sites, walked extensively between turbines and visited the full diversity of habitats within those areas. We are confident that the turbine sites are relatively thoroughly covered for vascular plants, especially for native species, and that there is a low probability of significant numbers of additional rare vascular plant species occurring within the proposed turbine development footprints.

II. Plant Communities

Descriptions of the plant communities at the proposed turbine sites, along with notes on how turbine placement could be improved relative to impacts on the site's natural heritage values, are given in Table 1. Turbine site numbers correspond to those mapped in Figure 1, and geocoordinates of turbine sites and significant species are communities are given in Table XX.

In cases where forest may be impacted by turbine construction, one has to consider the potential impacts of turbine construction in the context of a working landscape in which substantial clearcutting and other forest harvesting is already taking place, meaning that mature forest may not remain as such into the future, independent of the addition of wind turbines. That said, however, there are many forest areas on site that are high quality examples of their community types where avoiding impacts would be beneficial.

The development footprints for the following 25 turbine sites present very little concern relative to natural heritage values because they were entirely within old fields (including those regenerating to forest), recent clearcuts (20 years ago or less) or other clearings such as logging roads and log landing areas: Turbines 2, 3, 7, unnumbered - adjacent to 13, 14, 15, 16, 18, 20, 21, 22, 24, 26, 28, 30, 38, 45, 47, 52, 61, 64, 65, 67, 69, 75.

The turbine sites having the highest priority for revised siting or careful restriction of impacts within the 75m radius development footprint are those where wetlands occur within the development footprint or where the development footprint is entirely within mature forest.

Wetlands or streams were noted within the 75m radius development footprint of the following 19 turbine sites: Turbines 8, 11, 25, 31, 36, 39, 40, 42, 43, 44, 48, 49, 51, 58, 60, 66, 70, 71, 74. As noted in Table 1, a few of these sites are entirely unsuitable for turbine construction, while turbine construction may be possible in others if impacts to wetlands and watercourses are avoided.

The development footprint of the following 17 turbine sites (turbines 1, 27, 41, 35, 48, 59, 62, 19, 50, 23, 72, 32, 68, 36, 53, 10, 51) are entirely or almost entirely within mature forest (estimated age 75+ years). In almost all cases these are deciduous, sugar maple-dominated stands of a type that is typical of the Cobequid Mountain region of northern mainland Nova Scotia. These areas do not represent a rare community, but do provide some high quality examples of the community type. If the turbines can be placed in less mature stands, project impacts on natural heritage values would be significantly reduced. In many cases tracks taken between turbine sites also went through extensive, high quality examples of sugar maple-dominated uplands. As with the turbine sites, limiting the extent of new powerline and access road construction in mature forest will help reduce overall impacts on the natural heritage value of the site.

The development footprints for turbines 4, 5, 33, 34, 37, 54, 55, 56 (eight turbines) are situated entirely or almost entirely within intermediate aged forest (estimated at 50-75 years old). Although reducing impacts in these sites would be a slightly lower priority than in the mature forest sites, shifting turbine footprints into sites entirely within less-mature communities would also be desirable from the perspective of maintaining natural heritage values.

The development footprints for turbines 6, 9, 13, 17, 29, 46, 57, 63, 73 (nine turbines) are partly within mature or intermediate-aged forest and partly within other less mature and less significant habitats. Restricting development impacts to the less-mature portions of the currently proposed development footprints would also be helpful in limiting impacts to the natural heritage values of the site. The proximity of less significant habitats to the currently proposed development footprints should make minor site adjustments away from more mature forest relatively easy in many cases.

Two uncommon and significant communities were found. The area between turbine sites 2 and 53, had a fairly extensive rich seepage area under sugar maple and yellow birch forest occurred. This community type is uncommon but not rare provincially and the example at this site was a good one of its type, being mature and containing the rare species Broad-Lipped Twayblade (*Listera convallarioides*). No turbines were proposed for this area, but it should be a high priority to avoid in the placement of powerline or access road corridors. The ridge top southwest of turbine 59 supported a forest with a warmer microclimate and richer soils than other forests on site. Ironwood and white ash were common in this area and a number of plants, including the S3S4 Braun's Holly-Fern, that were rare on the site were present. Reducing impacts in this area would be relatively easy by moving any development corridors southward away from the west-facing slope.

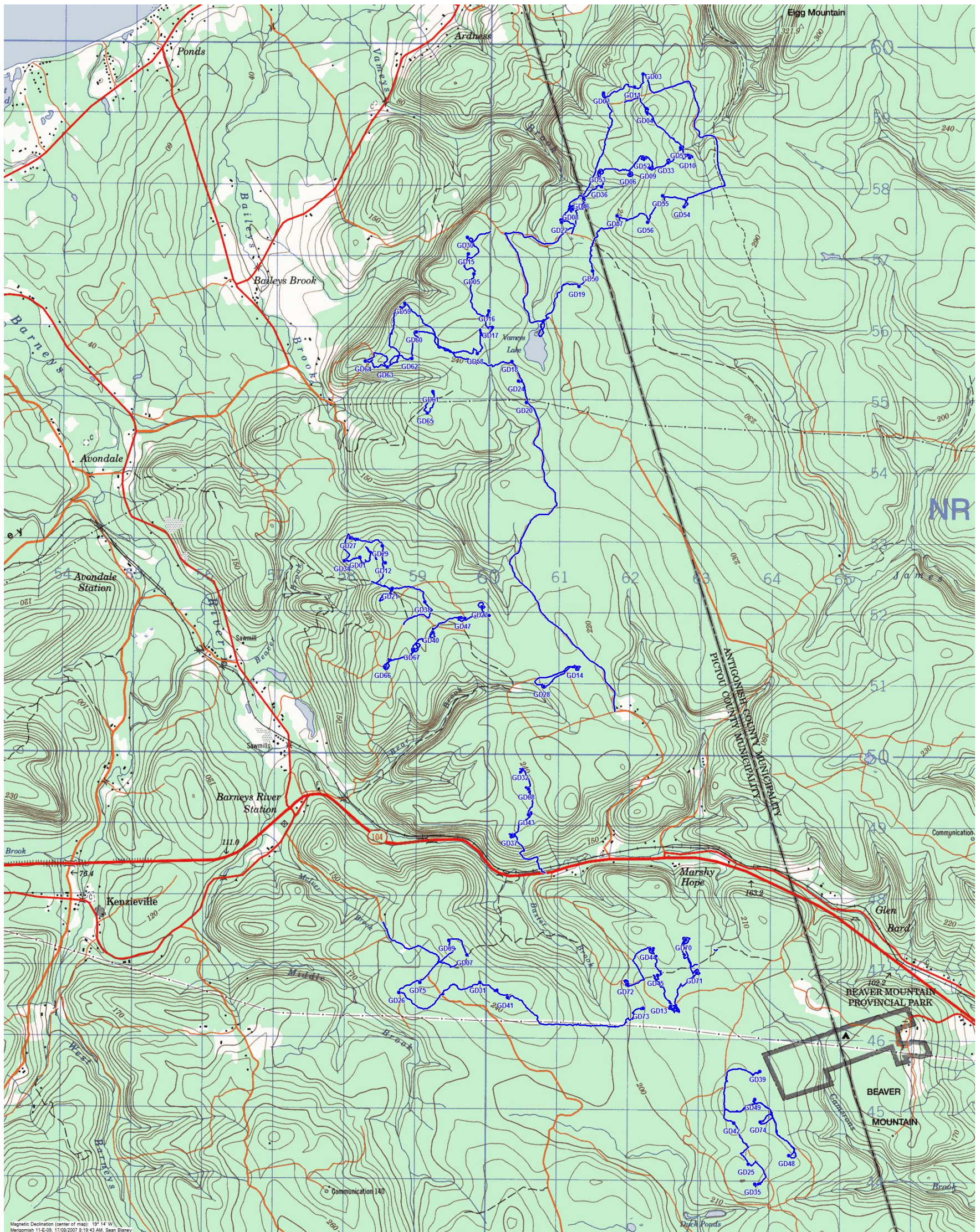


Figure 1. Map of on-foot site coverage on the June 18-20, 2007 survey, with proposed turbine locations. The both pale blue and dark blue lines are tracks recorded by GPS while on foot.

Table 1. Community descriptions of proposed turbine sites. Sites match those mapped in Figure 1. Cover value percentages in are absolute values, whereas tree species composition percentages are relative to the total tree cover (i.e. 85% of the 35% tree cover at turbine 1 was balsam fir). Composition and percentage cover values for the shrub and herbaceous layers were recorded but are not given here.

Turbine#	Stand Age	Tree Composition	% Tree Cover	Community Description	Notes on Turbine Placement
1	85	sugar maple 100%	90%	mature deciduous forest	
2	30	balsam fir 50%, red maple 30%, white spruce 10%, (yellow birch, white birch) 20%	40%	old field regeneration - mixed forest, conifers dominant	
3	40-50	balsam fir 40%, white birch 30%, yellow birch 20%, red maple 10%, (gray birch)	70%	old field regeneration - mixed forest	
4	50	sugar maple 80%, beech 20%, yellow birch 2%	75%	intermediate to mature deciduous forest; area is centered on old road and small clearing	
5	70-100	yellow birch 20%, sugar maple 20%, red maple 20%, balsam fir 20%, white spruce 20%	70%	intermediate-mature mixed forest, probably older regenerating old field	site would be better located ~100m southwest in younger old field regeneration
6	85-100, some 125+	sugar maple 70%, yellow birch 15%, red maple 2%, beech 15%	50%	area is centered on road; half is in mature mesic deciduous forest; half is in very recent clearcut (spruce planting in progress)	avoiding impacts to the mature deciduous forest would be desirable
7	20-30	sugar maple, Norway spruce, balsam fir	50% (avg)	open logging road; plantation to north & young, selectively cut sugar maple to east	
8	15-20	red maple 30%, balsam fir 15%, yellow birch 10%, sugar maple 10%, black spruce 15%, gray birch 10%, white birch 5%, pin cherry 5%	45%	selectively cut, young, mixed and deciduous forest; over half of tree cover is under 10 years old; some swampy spots	should avoid impacts in wetland
9	50; several trees >100	yellow birch 50%, red maple 30%, sugar maple 10%, black spruce 10%	35%	intermediate aged deciduous forest between two clearcut blocks (one recent, the other possibly 5-10 years old); about half of area is in clearcut	avoiding impacts to the mature deciduous forest would be desirable
10	±65	sugar maple 94%, yellow birch 3%, beech 3%	90%	mature deciduous forest	
11	30-45	balsam fir 50%, sugar maple 30%, white birch 10%, (yellow birch, red maple, beech) 10%	65-75%	old field regeneration - mixed forest, conifers dominant	impacts should avoid the small stream 20m north of point
13	35-40; trees left in selective cut >100	red + Norway spruce 45%, sugar maple 35%, yellow birch 10%, balsam fir 10%	75%	N third of area in spruce plantation; third of area in young deciduous forest; rest is road, landing and selectively cut mature deciduous forest S of road	avoiding impacts to the mature deciduous forest would be desirable
Adjacent to 13	40	red pine 60%, sugar maple 35%, balsam fir 5%	35%	mostly selectively cut (very recent, in thin strips) red pine plantation; also includes roadside	
14	10	red spruce 25%, red maple 15%, trembling aspen 20%, balsam fir 25%, sugar maple 5%, gray birch 5%, black spruce 5%	15%	regenerating recent mixed forest clearcut	
15	30	white spruce 30%, balsam fir 30%, white birch 20%, red maple 10%, yellow birch 10%	45%	regenerating old field - open mixed forest	
16	7	sugar maple 80%, yellow birch 20%, (beech)	5-10%	recent deciduous clearcut	

Turbine#	Stand Age	Tree Composition	% Tree Cover	Community Description	Notes on Turbine Placement
17	12	sugar maple 90%, yellow birch 10%	10% (avg)	old logging road & deciduous clearcut with marginal incursion into mature deciduous forest	it would be best to relocate site or manage impacts to avoid the mature forest within ~50m of point
18	15	sugar maple 70%, yellow birch 20%, beech 10%	50%	open log landing area in regenerating deciduous forest clearcut	
19	80-100	sugar maple 90%, yellow birch 10%, (white birch, white spruce)	95%	mature deciduous forest	
20	20	yellow birch 40%, trembling aspen 20%, red maple 20%, (pin cherry, balsam fir, sugar maple) 10%	65%	regenerating deciduous clearcut	
21	2	yellow birch 80%, sugar maple 20%	<10%	recent deciduous clearcut	
22	5 to 10	gray birch 25%, red maple 25%, pin cherry 25%, balsam fir 25%	5%	regenerating recent clearcut	
23	75-100	sugar maple 100%, (yellow birch, balsam fir)	95%	mature deciduous forest	
24	15	balsam fir 90%, yellow birch 10%	95%	dense regenerating clearcut	
25	25	red spruce, balsam fir, yellow birch, sugar maple	75%	small open wetland within young plantation	site would be better located in young plantation to S of this point (higher ground & not wetland)
26	20	balsam fir 90%, (red maple, gray birch, white birch) 10%	55%	regenerating old field	
27	75-125	sugar maple 100% (beech, yellow birch); subcanopy of beech, sugar maple, striped maple	90%	mature deciduous forest	site would be better located in clearcut ~100m north of this site
28	0	spruce (snags) 40%, red maple 60%	2%	very recent clearcut	
29	70	sugar maple 80%, beech 20%; subcanopy of beech, sugar maple	85%	mature deciduous forest & some clearcut	site would be better located in cutover areas to east (cut boundary within 20m) or to west (within 150m)
30	30	white spruce 40%, balsam fir 20%, yellow birch 20%, sugar maple 10%, (gray birch, beech) 10%	50%	regenerating old field - open mixed forest	
31	80 & 25	sugar maple 100%	85%	mature deciduous forest; young forest & recent deciduous clearcut to the north	locating site to northwest of here would seem better (higher ground and cut over)
32	>75	sugar maple 90%, yellow birch 5%, white ash 3%, mountain maple 2%	90%	mature deciduous forest; area adjacent to old road	
33	65	sugar maple 80%, beech 10%, yellow birch 10%	70%	area centered on road; mature sugar maple forest on well-drained soil; bordered to the W by clearcut	
34	60	sugar maple 90%, beech 10%	85%	intermediate aged deciduous	
35	100	sugar maple 100%; beech, sugar maple subcanopy	85%	mature deciduous forest	
36	100-125	sugar maple 35%, black spruce 15%, yellow birch 25%, red maple 25%	70%	very mature deciduous forest; small brook runs through with some seepy areas as well; small river lines the W edge of area	should avoid impacts in wetland and watercourses
37	50-75	sugar maple 85%, beech 10%, yellow birch 5%	100%	mature deciduous forest	
38	15	Norway spruce 40%, balsam fir 30%, sugar maple 20%, yellow birch 10%	40%	young plantation	

Turbine#	Stand Age	Tree Composition	% Tree Cover	Community Description	Notes on Turbine Placement
39	25	balsam fir 60%, red maple 20%, sugar maple 10%, (white birch, yellow birch) 10%	50-60% (avg)	alder swamp & open wetland at edge of young forest	site should be moved to northeast away from wetland
40	25-30	sugar maple 75%, red + Norway spruce 20%, balsam fir 2%, red maple 2%, yellow birch 1%, red pine 1%	80%	mesic to moist young deciduous forest; one quarter of area is in spruce plantation; one fifth of area is in marsh (seepy streambed)	should avoid impacts in wetland
41	70-85	sugar maple 100%	90%	mature deciduous forest	site would be better located in clearcut ~100m north of this site
42	25	Norway spruce 40%, balsam fir 30%, yellow birch 20%, sugar maple 10%	60% (avg)	plantation & logging road & small open wetland	presence of small wetland and seasonal stream near point means site should likely be moved, probably to northeast
43	45-50	sugar maple 85%, yellow birch 5%, beech 5%, striped maple 5%	90%	~70% of area is intermediate aged deciduous forest; rest is several wet and swampy areas (brook and seepy areas)	should avoid impacts in wetland
44	50-75	sugar maple 40%, red maple 30%, beech 15%, yellow birch 10%, spruce 10%	80%	mostly intermediate-mature deciduous forest; some areas of mixed forest; some wet areas	should avoid impacts in wetland
45	15-20	red + Norway spruce 80%, balsam fir 10%, sugar maple 10%	90%	area is centered on road, almost completely in spruce plantation	
46	±50	sugar maple 65%, yellow birch 10%, red maple 25%, striped maple 5%	75%	mature deciduous forest; north third of area is in a recent cut	avoiding impacts to the mature deciduous forest would be desirable
47	25	red + Norway spruce 80%, sugar maple 5%, mountain maple 5%, balsam fir 5%, yellow birch 5%	80%	three quarters in dry spruce plantation; north end is in recent clearcut	
48	100+	sugar maple 70%, yellow birch 20%, beech 10%; beech, sugar maple subcanopy	85%	mature deciduous forest	site is located in small, seasonal stream valley & should be moved to the south into adjacent cutover, away from stream buffer
49	25	balsam fir 90%, (red maple, yellow birch, white spruce) 10%	50-60% (avg)	regenerating old field at margin of small open wetland	site should be moved uphill to the south to avoid wetland
50	75-95	sugar maple 90%, (yellow birch, balsam fir) 10%	90%	mature deciduous forest	
51	±75	sugar maple 70%, yellow birch 25%, beech 5%	70%	mature to very mature deciduous forest; area centered on stream running down gully; recent clearcut in N section; recent selective cutting along brook	should avoid impacts to stream
52	0-3	sugar maple 50%, yellow birch 50% (very mature trees within clearcut)	20%	half or area is in very recent deciduous forest clearcut; half in older clearcut (~3 years ago); some large trees left along border of cut blocks	
53	75	sugar maple 99%, beech 1%	75%	mature sugar maple forest on well drained sloping ground; NE edge of area is in very recent clearcut with no regrowth	
54	60	sugar maple 100%	85%	intermediate-mature deciduous forest	
55	60-75	sugar maple 90%, (yellow birch, beech) 10%	90%	intermediate-mature deciduous forest	
56	65-70	balsam fir 40%, red spruce 30%, white birch 20%, (yellow birch, red maple) 10%	75%	intermediate-mature mixed forest, conifers dominant	
57	40-80	sugar maple 90%, (yellow birch, red maple) 10%; beech, sugar maple, yellow birch subcanopy	90%	young deciduous forest to northeast, mature deciduous forest elsewhere	avoiding impacts to the mature deciduous forest would be desirable

Turbine#	Stand Age	Tree Composition	% Tree Cover	Community Description	Notes on Turbine Placement
58	15	balsam fir 30%, yellow birch 20%, sugar maple 20%, white spruce 10%, gray birch 10%, red maple 10% (all trees young & borderline sapling/tree)	~0% mature tree cover	regenerating deciduous clearcut with extensive seepage wetland	site would be better moved to north or south away from groundwater seepage wetland
59	100	sugar maple 100%	90%	mature deciduous forest	large existing clearing at lookout site to west would be a better site (though distance to cabin may be issue); if site has to be within the area of mature forest it would be good to have as much of the footprint as possible within the existing roadway to the south of this point
60	60-75	balsam fir 20%, red &/or black spruce 20%, red maple 20%, yellow birch 20%, white spruce 10%, sugar maple 10%	75%	mixed forest swamp with stream; site is unsuitable because it is in a wetland; younger forest to south would be more suitable	
61	45	balsam fir 50%, red maple 20%, white spruce 20%, white birch 10%	60-70%	old field regeneration - mixed forest, conifers dominant	
62	90	sugar maple 30%, balsam fir 30%, white spruce 30%, yellow birch 10%	75% (avg)	mature deciduous forest to north & dying, heavily wind blown coniferous stand to south	
63	10 & 60-70	white spruce, balsam fir, white birch	25% (avg)	old field on top of ridge, with intermediate aged coniferous forest down steep slope	moving site slightly to N to restrict impacts to cleared area would be best
64	10 to 15	Norway spruce, balsam fir, white birch, gray birch, pin cherry, (largetooth aspen); (all trees young & marginal sapling/tree)	70%	plantation in old field	
65	40	balsam fir 40%, white spruce 30%, red maple 30%, (trembling aspen, white birch) 10%	55-60%	old field regeneration - mixed forest, conifers dominant	
66	5 to 20	red + Norway spruce 65%, mountain maple 5%, yellow birch 5%, gray birch 5%, red maple 10%, balsam fir 10%	65%	half of area is in spruce plantation; other half is in recent cut with mixed regeneration; area includes open, marshy area	should avoid impacts in wetland
67	25-30	red + Norway spruce 80%, balsam fir 15%, red maple 3%, sugar maple 2%	95%	spruce plantation; area centered on end of old road	
68	75-100	sugar maple 85%, yellow birch 10%, black spruce (snags) 2%, white ash 2%	85%	mature sugar maple forest; one fifth of area is overgrown road	
69	20	balsam fir 100%	85%	regenerating old field	
70	25-30	red maple 20%, red spruce 15%, sugar maple 20%, yellow birch 20%, beech 20%, black spruce 5%	50%	N half of area is young deciduous forest; S end is mixed forest swamp with standing water	should avoid impacts in wetland
71	25	red + Norway spruce 70%, sugar maple 25%, balsam fir 3%, red maple 2%	65%	most of area is in spruce plantation; one quarter of area half has recently been cut in thin strips; one quarter is occupied by several small clearings moist to wet clearings	should avoid impacts in wetland
72	75-100	sugar maple 75%, yellow birch 15%, beech 10%	90%	mature deciduous forest on sloping ground; -richer seepage gullies on all sides; roadside included in S end	
73	100+ to north, 35 to south	sugar maple 90%, yellow birch 10%	70% (avg)	mature deciduous forest & young deciduous forest	point falls on fairly wide logging road; would be best located to south to exclude old forest from footprint

Turbine#	Stand Age	Tree Composition	% Tree Cover	Community Description	Notes on Turbine Placement
74	40-50	black spruce, white birch, speckled alder	30%	mixed forest swamp (semi-open)	site is unsuitable because it is in a wetland; plantation area within 50m to north would be better
75	40-50	balsam fir, yellow birch, red spruce	70%	regenerating old field	

III. Vascular Plants

Table 2 lists the 379 vascular plant taxa (310 native or potentially native, 69 exotic) identified during fieldwork, with estimates of their abundance within the site and their provincial status under both the S-rank system used continent-wide by all conservation data centres and the National General Status ranks, which have been developed by each province and territory. Both sets of ranks for Nova Scotia were developed through the consensus of the NS Flora Ranking Committee, led through the cooperation of NS Department of Natural Resources (NS DNR) and Atlantic Canada Conservation Data Centre. The ranks reflect the best understanding of plant status at the time of ranking, but are subject to revision as new information becomes available.

Definitions of provincial (subnational) ranks (S-ranks):

- S1 Extremely rare throughout its range in the province (typically 5 or fewer occurrences or very few remaining individuals). May be especially vulnerable to extirpation.
- S2 Rare throughout its range in the province (usually 6 to 20 occurrences or few remaining individuals). May be vulnerable to extirpation due to rarity or other factors.
- S3 Uncommon throughout its range in the province (usually 21 to 100 occurrences), or found only in a restricted range, even if abundant in at some locations.
- S4 Usually widespread, fairly common throughout its range in the province (usually 100+ occurrences), and apparently secure, but the element is of long-term concern.
- S5 Demonstrably widespread, abundant, and secure throughout its range in the province, and essentially ineradicable under present conditions (100+ occurrences).
- S#S# Numeric range rank: A range between two consecutive numeric ranks. Denotes range of uncertainty about the exact rarity of the Element (e.g., S1S2).
- SE Exotic: An exotic species established in the province (e.g., Purple Loosetrife or Coltsfoot); may be native in nearby regions.
- ? Is used as a qualifier indicating uncertainty: for numeric ranks, denotes inexactness, e.g., SE? denotes uncertainty of exotic status. (The ? qualifies the character immediately preceding it in the SRANK).

Definitions of National General Status Ranks (from *Wild Species: the General Status Program in Canada*, Lisa Twolan and Simon Nadeau, 2004, Canadian Wildlife Service, Ottawa)

- *Extirpated*: species that have disappeared from (or are no longer present in) a given geographic area but which occur in other areas
- *Extinct*: species that are extirpated worldwide (i.e., they no longer exist anywhere)
- *At Risk*: species for which a formal detailed risk assessment (COSEWIC assessment or provincial or territorial equivalent) has been completed, and which have been determined to be at risk of extirpation or extinction (i.e., Endangered) or are likely

- to become at risk of extirpation or extinction if limiting factors are not reversed (i.e., Threatened)
- *May Be At Risk*: species that may be at risk of extirpation or extinction and are, therefore, candidates for a detailed risk assessment by COSEWIC or the provincial or territorial equivalent
 - *Sensitive*: species that are believed to not be at risk of extirpation or extinction but which may require special attention or protection to prevent them from becoming at risk
 - *Secure*: species that are believed to not belong in the categories At Risk, May Be At Risk, Extirpated, Extinct, Accidental, or Exotic. This category includes some species that show a declining trend in numbers in Canada but which remain relatively widespread or abundant. In such instances, the decline will be highlighted by an asterisk and an associated comment.
 - *Undetermined*: species for which insufficient data, information, or knowledge is available with which to reliably evaluate their general status
 - *Not Assessed*: species that are known or believed to be present in the geographic area in Canada to which the general status rank applies but which have not yet been assessed
 - *Exotic*: species that have been moved beyond their natural range as a result of human activity. In the *Wild Species 2005* report, exotic species have been purposefully excluded from all other categories.
 - *Accidental*: species occurring infrequently and unpredictably outside their usual range

Table 2. Vascular plants recorded in the study area, with abundance estimates and provincial status ranks. Site Status codes and provincial S-ranks are defined above. Taxonomy follows Kartesz (1999) – *Synthesis of the North American Flora*, CD-ROM. Status ranks in square brackets refer to an indefinite identification for which all potential species have the same rank.

Species / Family Name	Family / Species Common Name	Site Status	NS General Status Rank	NS S-rank	Note
LYCOPODIACEAE	Clubmoss Family				
<i>Huperzia lucidula</i>	Shining Fir-Clubmoss	c	Secure	S5	
<i>Lycopodiella inundata</i>	Bog Clubmoss	r	Secure	S5	
<i>Lycopodium annotinum</i>	Stiff Clubmoss	u	Secure	S5	
<i>Lycopodium clavatum</i>	Running Pine	f	Secure	S5	
<i>Lycopodium dendroideum</i>	Treelike Clubmoss	c	Secure	S4?	
<i>Lycopodium digitatum</i>	Fan Club-Moss	u	Secure	S5	
<i>Lycopodium hickeyi</i>	Hickey's Clubmoss	r	Undetermined	S2?	ID probable only
<i>Lycopodium lagopus</i>	One-Cone Gound-Pine	r	Secure	S4	
<i>Lycopodium obscurum</i>	Tree Clubmoss	r	Secure	S5	
EQUISETACEAE	Horsetail Family				
<i>Equisetum arvense</i>	Field Horsetail	c	Secure	S5	
<i>Equisetum sylvaticum</i>	Woodland Horsetail	c	Secure	S5	
OPHIOGLOSSACEAE	Adder's-Tongue Family				
<i>Botrychium matricariifolium</i>	Chamomile Grape-Fern	r	Secure	S4	

Species / Family Name	Family / Species Common Name	Site Status	NS General Status Rank	NS S-rank	Note
<i>Botrychium virginianum</i>	Rattlesnake Fern	r	Secure	S4	
OSMUNDACEAE	Flowering Fern Family				
<i>Osmunda cinnamomea</i>	Cinnamon Fern	c	Secure	S5	
<i>Osmunda claytoniana</i>	Interrupted Fern	c	Secure	S5	
<i>Osmunda regalis</i>	Royal Fern	r	Secure	S5	
DENNSTAEDTIACEAE	Hay-Scented Fern Family				
<i>Dennstaedtia punctilobula</i>	Eastern Hay-Scented Fern	c	Secure	S5	
<i>Pteridium aquilinum</i>	Bracken Fern	c	Secure	S5	
THELYPTERIDACEAE	Marsh-Fern Family				
<i>Phegopteris connectilis</i>	Northern Beech Fern	c	Secure	S5	
<i>Thelypteris noveboracensis</i>	New York Fern	c	Secure	S5	
<i>Thelypteris palustris</i>	Marsh Fern	u	Secure	S5	
DRYOPTERIDACEAE	Wood-Fern Family				
<i>Athyrium filix-femina</i>	Lady-Fern	c	Secure	S5	
<i>Deparia acrostichoides</i>	Silvery Spleenwort	f	Secure	S4	
<i>Dryopteris campyloptera</i>	Mountain Wood-Fern	c	Secure	S5	
<i>Dryopteris carthusiana</i>	Spinulose Shield Fern	u	Secure	S5	
<i>Dryopteris cristata</i>	Crested Shield-Fern	u	Secure	S5	
<i>Dryopteris intermedia</i>	Evergreen Woodfern	c	Secure	S5	
<i>Dryopteris marginalis</i>	Marginal Wood-Fern	r	Secure	S5	
<i>Gymnocarpium dryopteris</i>	Northern Oak Fern	c	Secure	S5	
<i>Matteuccia struthiopteris</i>	Ostrich Fern	f	Secure	S5	
<i>Onoclea sensibilis</i>	Sensitive Fern	c	Secure	S5	
<i>Polystichum acrostichoides</i>	Christmas Fern	f	Secure	S5	
<i>Polystichum braunii</i>	Braun's Holly-Fern	r	Secure	S3S4	
TAXACEAE	Yew Family				
<i>Taxus canadensis</i>	Canadian Yew	r	Secure	S5	
PINACEAE	Pine Family				
<i>Abies balsamea</i>	Balsam Fir	c	Secure	S5	
<i>Larix laricina</i>	American Larch	f	Secure	S5	
<i>Picea abies</i>	Norway Spruce	c	Exotic	SE	planted
<i>Picea glauca</i>	White Spruce	c	Secure	S5	
<i>Picea mariana</i>	Black Spruce	u	Secure	S5	
<i>Picea rubens</i>	Red Spruce	f	Secure	S5	
<i>Pinus resinosa</i>	Red Pine	r	Secure	S4S5	planted
<i>Pinus strobus</i>	Eastern White Pine	r	Secure	S5	
RANUNCULACEAE	Buttercup Family				
<i>Actaea pachypoda</i>	White Baneberry	r	Secure	S4	
<i>Actaea rubra</i>	Red Baneberry	u	Secure	S5	
<i>Coptis trifolia</i>	Goldthread	c	Secure	S5	
<i>Ranunculus abortivus</i>	Kidney-Leaved Buttercup	u	Secure	S4S5	
<i>Ranunculus acris</i>	Tall Butter-Cup	f	Exotic	SE	
<i>Ranunculus recurvatus</i>	Hooked Crowfoot	u	Secure	S4	
<i>Ranunculus repens</i>	Creeping Butter-Cup	c	Exotic	SE	
<i>Thalictrum pubescens</i>	Tall Meadow-Rue	c	Secure	S5	
FUMARIACEAE	Fumitory Family				
<i>Dicentra cucullaria</i>	Dutchman's Breeches	u	Secure	S4	
CANNABACEAE	Cannabis Family				
<i>Cannabis sativa</i>	Marijuana	r	[Not ranked]	SE	planted

Species / Family Name	Family / Species Common Name	Site Status	NS General Status Rank	NS S-rank	Note
MYRICACEAE	Bayberry Family				
<i>Morella pensylvanica</i>	Northern Bayberry	r	Secure	S5	
<i>Myrica gale</i>	Sweet Bayberry	r	Secure	S5	
FAGACEAE	Beech Family				
<i>Fagus grandifolia</i>	American Beech	c	Secure	S5	
<i>Quercus rubra</i>	Northern Red Oak	r	Secure	S5	
BETULACEAE	Birch Family				
<i>Alnus incana ssp. rugosa</i>	Speckled Alder	f	Secure	S5	
<i>Alnus viridis ssp. crispa</i>	Green Alder	f	Secure	S5	
<i>Betula alleghaniensis</i>	Yellow Birch	c	Secure	S5	
<i>Betula papyrifera var. cordifolia</i>	Heart-Leaved Paper Birch	f	Secure	S5	
<i>Betula papyrifera var. papyrifera</i>	Paper Birch	c	Secure	S5	
<i>Betula populifolia</i>	Gray Birch	c	Secure	S5	
<i>Betula x caerulea</i>	a hybrid Birch [<i>B. papyrifera</i> x <i>populifolia</i>]	r	[Not ranked]	HYB	
<i>Corylus cornuta</i>	Beaked Hazelnut	c	Secure	S5	
<i>Ostrya virginiana</i>	Eastern Hop-Hornbeam	r	Secure	S5	
CHENOPODIACEAE	Goosefoot Family				
<i>Chenopodium album</i>	White Goosefoot	r	Exotic	SE	
PORTULACACEAE	Purslane Family				
<i>Claytonia caroliniana</i>	Carolina Spring-Beauty	f	Secure	S4	
CARYOPHYLLACEAE	Pink Family				
<i>Cerastium fontanum</i>	Common Mouse-Ear Chickweed	f	Exotic	SE	
<i>Moehringia lateriflora</i>	Grove Sandwort	r	Secure	S5	
<i>Stellaria borealis</i>	Northern Stitchwort	r	Secure	S4	
<i>Stellaria graminea</i>	Little Starwort	f	Exotic	SE	
POLYGONACEAE	Smartweed Family				
<i>Polygonum cilinode</i>	Fringed Black Bindweed	c	Secure	S5	
<i>Polygonum hydropiper</i>	Marshpepper Smartweed	r	Exotic	SE	
<i>Polygonum sagittatum</i>	Arrow-Leaved Tearthumb	f	Secure	S5	
<i>Rumex acetosa</i>	Garden Sorrel	r	Exotic	SE	
<i>Rumex acetosella</i>	Sheep Sorrel	f	Exotic	SE	
<i>Rumex crispus</i>	Curly Dock	r	Exotic	SE	ID probable only
<i>Rumex obtusifolius</i>	Bitter Dock	r	Exotic	SE	
ELATINACEAE	Waterwort Family				
<i>Elatine minima</i>	Small Water-Wort	r	Secure	S4S5	
CLUSIACEAE	St. John's-wort Family				
<i>Hypericum boreale</i>	Northern St. John's-Wort	u	Secure	S5	ID probable only
<i>Hypericum canadense</i>	Canadian St. John's-Wort	r	Secure	S5	
<i>Hypericum ellipticum</i>	Pale St. John's-Wort	r	Secure	S5	
<i>Hypericum perforatum</i>	A St. John's-Wort	c	Exotic	SE	
<i>Triadenum fraseri</i>	Marsh St. John's-Wort	r	Secure	S5	
DROSERACEAE	Sundew Family				
<i>Drosera rotundifolia</i>	Roundleaf Sundew	r	Secure	S5	
CISTACEAE	Rockrose Family				
<i>Lechea intermedia</i>	Narrowleaf Pinweed	r	Secure	S4	
VIOLACEAE	Violet Family				

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<i>Viola blanda</i>	Smooth White Violet	c	Secure	S5	
<i>Viola cucullata</i>	Marsh Blue Violet	c	Secure	S5	
<i>Viola lanceolata</i>	Lance-Leaf Violet	r	Secure	S5	
<i>Viola macloskeyi</i>	Smooth White Violet	c	Secure	S5	
<i>Viola renifolia</i>	Kidney-Leaf White Violet	r	Secure	S4	
<i>Viola sororia</i>	Woolly Blue Violet	u	Secure	S5	
SALICACEAE	Willow Family				
<i>Populus grandidentata</i>	Large-Tooth Aspen	f	Secure	S5	
<i>Populus tremuloides</i>	Quaking Aspen	c	Secure	S5	
<i>Salix bebbiana</i>	Bebb's Willow	c	Secure	S5	
<i>Salix discolor</i>	Pussy Willow	c	Secure	S5	
<i>Salix eriocephala</i>	Heart-Leaved Willow	f	Secure	S5	
<i>Salix humilis</i>	Prairie Willow	f	Secure	S5	
<i>Salix lucida</i>	Shining Willow	u	Secure	S5	
<i>Salix pyrifolia</i>	Balsam Willow	u	Secure	S5	
BRASSICACEAE	Mustard Family				
<i>Barbarea vulgaris</i>	Yellow Rocket	r	Exotic	SE	
<i>Cardamine diphylla</i>	Two-Leaf Toothwort	u	Secure	S4	
<i>Cardamine pensylvanica</i>	Pennsylvania Bitter-Cress	u	Secure	S5	
ERICACEAE	Heath Family				
<i>Chamaedaphne calyculata</i>	Leatherleaf	r	Secure	S5	
<i>Gaultheria hispidula</i>	Creeping Snowberry	u	Secure	S5	
<i>Kalmia angustifolia</i>	Sheep-Laurel	f	Secure	S5	
<i>Ledum groenlandicum</i>	Common Labrador Tea	u	Secure	S5	
<i>Rhododendron canadense</i>	Rhodora	u	Secure	S5	
<i>Vaccinium angustifolium</i>	Late Lowbush Blueberry	c	Secure	S5	
<i>Vaccinium macrocarpon</i>	Large Cranberry	r	Secure	S5	
<i>Vaccinium myrtilloides</i>	Velvetleaf Blueberry	f	Secure	S5	
PYROLACEAE	Pyrola Family				
<i>Moneses uniflora</i>	One-Flower Wintergreen	r	Secure	S5	
<i>Orthilia secunda</i>	One-Side Wintergreen	r	Secure	S5	
<i>Pyrola americana</i>	American Wintergreen	r	Secure	S5	
<i>Pyrola elliptica</i>	Shinleaf	f	Secure	S5	
MONOTROPACEAE	Indian Pipe Family				
<i>Monotropa uniflora</i>	Indian-Pipe	u	Secure	S5	
PRIMULACEAE	Primrose Family				
<i>Lysimachia terrestris</i>	Swamp Loosestrife	f	Secure	S5	
<i>Trientalis borealis</i>	Northern Starflower	c	Secure	S5	
GROSSULARIACEAE	Gooseberry Family				
<i>Ribes glandulosum</i>	Skunk Currant	f	Secure	S5	
<i>Ribes hirtellum</i>	Smooth Gooseberry	u	Secure	S5	
<i>Ribes lacustre</i>	Bristly Black Currant	r	Secure	S5	
<i>Ribes triste</i>	Swamp Red Currant	r	Secure	S4	
CRASSULACEAE	Stonecrop Family				
<i>Hylotelephium telephium</i>	Witch's-Moneybags	r	Exotic	SE	
SAXIFRAGACEAE	Saxifrage Family				
<i>Chrysosplenium americanum</i>	American Golden-Saxifrage	f	Secure	S5	
ROSACEAE	Rose Family				
<i>Agrimonia striata</i>	Woodland Agrimony	u	Secure	S5	ID probable only

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<i>Amelanchier sp.</i>	Serviceberry species	c	[Secure]		coppery leaves - A. interior &/or laevis
<i>Comarum palustre</i>	Marsh Cinquefoil	r	Secure	S5	
<i>Fragaria virginiana</i>	Virginia Strawberry	c	Secure	S5	
<i>Geum macrophyllum</i>	Large-Leaved Avens	c	Secure	S5	
<i>Geum rivale</i>	Purple Avens	u	Secure	S5	ID probable only
<i>Malus pumila</i>	Common Apple	r	Exotic	SE	
<i>Potentilla argentea</i>	Silvery Cinquefoil	r	Exotic	SE	
<i>Potentilla norvegica ssp. monspeliensis</i>	Norwegian Cinquefoil	c	Secure	S5	
<i>Potentilla recta</i>	Sulphur Cinquefoil	r	Exotic	SE	
<i>Potentilla simplex</i>	Old-Field Cinquefoil	c	Secure	S5	
<i>Prunus pensylvanica</i>	Fire Cherry	f	Secure	S5	
<i>Prunus virginiana</i>	Choke Cherry	f	Secure	S5	
<i>Rosa virginiana</i>	Virginia Rose	u	Secure	S5	
<i>Rubus allegheniensis</i>	Allegheny Blackberry	u	Secure	S5	
<i>Rubus canadensis</i>	Smooth Blackberry	c	Secure	S5	
<i>Rubus idaeus</i>	Red Raspberry	c	Secure	S5	
<i>Rubus pubescens</i>	Dwarf Red Raspberry	c	Secure	S5	
<i>Rubus setosus</i>	Small Bristleberry	r	Secure	S4?	
<i>Rubus vermontanus</i>	Green Mountain Blackberry	r	Undetermined	SR	moderately heavy, somewhat broad-based prickles, trailing, lvs. Mostly 5-leaflets, newest growth glandular but eglandular and glabrous below
<i>Sibbaldiopsis tridentata</i>	Three-Toothed Cinquefoil	r	Secure	S5	
<i>Sorbus americana</i>	American Mountain-Ash	f	Secure	S5	
<i>Spiraea alba var. latifolia</i>	Northern Meadow-Sweet	c	Secure	S5	
<i>Spiraea tomentosa</i>	Hardhack Spiraea	f	Secure	S5	
FABACEAE	Bean Family				
<i>Lathyrus palustris</i>	Vetchling Peavine	r	Secure	S5	
<i>Lotus corniculatus</i>	Birds-Foot Trefoil	r	Exotic	SE	
<i>Medicago lupulina</i>	Black Medic	r	Exotic	SE	
<i>Melilotus albus</i>	White Sweet Clover	r	Exotic	SE	
<i>Trifolium aureum</i>	Yellow Clover	r	Exotic	SE	
<i>Trifolium campestre</i>	Low Hop Clover	u	Exotic	SE	
<i>Trifolium hybridum</i>	Alsike Clover	f	Exotic	SE	
<i>Trifolium pratense</i>	Red Clover	c	Exotic	SE	
<i>Trifolium repens</i>	White Clover	c	Exotic	SE	
<i>Vicia cracca</i>	Tufted Vetch	c	Exotic	SE	
<i>Vicia tetrasperma</i>	Lentil Vetch	r	Exotic	SE	
ONAGRACEAE	Evening-Primrose Family				
<i>Chamerion angustifolium</i>	Fireweed	c	Secure	S5	
<i>Circaea alpina</i>	Small Enchanter's Nightshade	u	Secure	S5	
<i>Epilobium ciliatum</i>	Hairy Willow-Herb	c	Secure	S5	
<i>Epilobium palustre</i>	Marsh Willow-Herb	r	Secure	S5	
<i>Oenothera perennis</i>	Small Sundrops	f	Secure	S5	
<i>Oenothera sp.</i>	Evening-Primrose species	c	[Secure]		<i>O. biennis</i> or <i>parviflora</i>
CORNACEAE	Dogwood Family				

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<i>Cornus alternifolia</i>	Alternate-Leaf Dogwood	f	Secure	S5	
<i>Cornus canadensis</i>	Dwarf Dogwood	c	Secure	S5	
AQUIFOLIACEAE	Holly Family				
<i>Ilex verticillata</i>	Black Holly	r	Secure	S5	
<i>Nemopanthus mucronatus</i>	Mountain Holly	r	Secure	S5	
ACERACEAE	Maple Family				
<i>Acer pensylvanicum</i>	Striped Maple	c	Secure	S5	
<i>Acer rubrum</i>	Red Maple	c	Secure	S5	
<i>Acer saccharum</i>	Sugar Maple	c	Secure	S5	
<i>Acer spicatum</i>	Mountain Maple	c	Secure	S5	
OXALIDACEAE	Wood-Sorrel Family				
<i>Oxalis montana</i>	White Wood-Sorrel	c	Secure	S5	
<i>Oxalis stricta</i>	Upright Yellow Wood-Sorrel	c	Secure	S5	
GERANIACEAE	Geranium Family				
<i>Geranium robertianum</i>	Herb-Robert	r	Secure	S4S5	
BALSAMINACEAE	Touch-Me-Not Family				
<i>Impatiens capensis</i>	Spotted Jewel-Weed	c	Secure	S5	
ARALIACEAE	Sarsaparilla Family				
<i>Aralia hispida</i>	Bristly Sarsaparilla	r	Secure	S5	
<i>Aralia nudicaulis</i>	Wild Sarsaparilla	c	Secure	S5	
<i>Panax trifolius</i>	Dwarf Ginseng	f	Secure	S3	
APIACEAE	Carrot Family				
<i>Daucus carota</i>	Wild Carrot	u	Exotic	SE	
<i>Hydrocotyle americana</i>	American Water-Pennywort	r	Secure	S5	
<i>Osmorhiza berteroi</i>	Chilean Sweet Cicely	r	Secure	S4	ID probable only
<i>Sium suave</i>	Hemlock Water-Parasit	r	Secure	S5	
APOCYNACEAE	Dogbane Family				
<i>Apocynum androsaemifolium</i>	Spreading Dogbane	u	Secure	S5	
BORAGINACEAE	Borage Family				
<i>Myosotis laxa</i>	Small Forget-Me-Not	r	Secure	S5	
LAMIACEAE	Mint Family				
<i>Galeopsis tetrahit</i>	Brittle-Stem Hempnettle	c	Exotic	SE	ID refers to the species in the broad sense
<i>Lycopus americanus</i>	American Bugleweed	r	Secure	S5	
<i>Lycopus uniflorus</i>	Northern Bugleweed	c	Secure	S5	
<i>Mentha arvensis</i>	Corn Mint	r	Secure	S5	
<i>Prunella vulgaris</i>	Self-Heal	c	Secure	S5	
<i>Scutellaria galericulata</i>	Hooded Skullcap	r	Secure	S5	
<i>Scutellaria lateriflora</i>	Mad Dog Skullcap	u	Secure	S5	
PLANTAGINACEAE	Plantain Family				
<i>Plantago lanceolata</i>	English Plantain	r	Exotic	SE	
<i>Plantago major</i>	Nipple-Seed Plantain	c	Exotic	SE	
OLEACEAE	Olive Family				
<i>Fraxinus americana</i>	White Ash	f	Secure	S5	
SCROPHULARIACEAE	Snapdragon Family				
<i>Chelone glabra</i>	White Turtlehead	f	Secure	S5	
<i>Linaria vulgaris</i>	Butter-And-Eggs	r	Exotic	SE	
<i>Mimulus ringens</i>	Square-Stem Monkeyflower	r	Secure	S4S5	
<i>Verbascum thapsus</i>	Great Mullein	r	Exotic	SE	

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<i>Veronica americana</i>	American Speedwell	u	Secure	S5	
<i>Veronica officinalis</i>	Gypsy-Weed	c	Exotic	S5SE	
<i>Veronica peregrina</i>	Purslane Speedwell	r	Exotic	SE?	
<i>Veronica scutellata</i>	Marsh-Speedwell	r	Secure	S5	
<i>Veronica serpyllifolia</i> ssp. <i>serpyllifolia</i>	Thyme-Leaved Speedwell	f	Exotic	SE	
CAMPANULACEAE	Bellflower Family				
<i>Lobelia dortmanna</i>	Water Lobelia	r	Secure	S5	
RUBIACEAE	Bedstraw Family				
<i>Galium asprellum</i>	Rough Bedstraw	c	Secure	S5	
<i>Galium mollugo</i>	Great Hedge Bedstraw	c	Exotic	SE	
<i>Galium palustre</i>	Marsh Bedstraw	c	Secure	S5	
<i>Galium trifidum</i>	Small Bedstraw	u	Secure	S5	
<i>Galium triflorum</i>	Sweet-Scent Bedstraw	c	Secure	S5	
<i>Mitchella repens</i>	Partridge-Berry	f	Secure	S5	
CAPRIFOLIACEAE	Honeysuckle Family				
<i>Diervilla lonicera</i>	Northern Bush-Honeysuckle	f	Secure	S5	
<i>Linnaea borealis</i>	Twinflower	f	Secure	S5	
<i>Lonicera canadensis</i>	American Fly-Honeysuckle	c	Secure	S5	
<i>Sambucus racemosa</i>	Red Elderberry	c	Secure	S5	
<i>Viburnum lantanoides</i>	Alderleaf Viburnum	f	Secure	S5	
<i>Viburnum nudum</i> var. <i>cassinoides</i>	Wild Raisin Possum-Haw Viburnum	f	Secure	S5	
ASTERACEAE	Aster Family				
<i>Achillea millefolium</i>	Common Yarrow	f	Secure	S5	
<i>Anaphalis margaritacea</i>	Pearly Everlasting	c	Secure	S5	
<i>Antennaria</i> sp.	Pussytoes species	f	[Secure]		A. neglecta / howellii
<i>Arctium minus</i>	Lesser Burdock	r	Exotic	SE	
<i>Artemisia vulgaris</i>	Common Wormwood	r	Exotic	SE	
<i>Bidens frondosa</i>	Devil's Beggar-Ticks	u	Secure	S5	
<i>Centaurea nigra</i>	Black Starthistle	u	Exotic	SE	
<i>Cirsium arvense</i>	Creeping Thistle	r	Exotic	SE	
<i>Conyza canadensis</i>	Canada Horseweed	f	Secure	S5	
<i>Doellingeria umbellata</i>	Parasol White-Top	c	Secure	S5	
<i>Erigeron strigosus</i>	Daisy Fleabane	c	Secure	S5	
<i>Eupatorium maculatum</i>	Spotted Joe-Pye Weed	f	Secure	S5	
<i>Eupatorium perfoliatum</i>	Common Boneset	u	Secure	S5	
<i>Euthamia graminifolia</i>	Flat-Top Fragrant-Golden-Rod	c	Secure	S5	
<i>Gnaphalium uliginosum</i>	Low Cudweed	u	Exotic	SE	
<i>Hieracium x floribundum</i>	Smoothish Hawkweed	f	Exotic	SE	
<i>Hieracium aurantiacum</i>	Orange Hawkweed	c	Exotic	SE	
<i>Hieracium caespitosum</i>	Meadow Hawkweed	c	Exotic	SE	ID probable only
<i>Hieracium canadense</i>	Canada Hawkweed	r	Secure	S4S5	
<i>Hieracium lachenalii</i>	Common Hawkweed	c	Exotic	SE	
<i>Hieracium pilosella</i>	Mouseear	f	Exotic	SE	
<i>Hieracium piloselloides</i>	Tall Hawkweed	u	Exotic	SE	
<i>Hieracium scabrum</i>	Rough Hawkweed	u	Secure	S5	

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<i>Hieracium tridentatum</i>	Three-Tooth Hawkweed	r	[Exotic]	SE	An introduced European species, sometimes classified within <i>H. umbellatum</i>
<i>Hieracium x flagellare</i>	Whiplash Hawkweed	c	Exotic	SE	ID probable only
<i>Hieracium x floribundum</i>	Smoothish Hawkweed	c	Exotic	SE	
<i>Lactuca biennis</i>	Tall Blue Lettuce	f	Secure	S5	
<i>Lactuca canadensis</i>	Canada Lettuce	r	Secure	S5	
<i>Leontodon autumnalis</i>	Autumn Hawkbit	f	Exotic	SE	
<i>Leucanthemum vulgare</i>	Oxeye Daisy	c	Exotic	SE	
<i>Matricaria discoidea</i>	Pineapple-Weed Chamomile	f	Exotic	SE	
<i>Oclemena acuminata</i>	Whorled Aster	c	Secure	S5	
<i>Packera schweinitziana</i>	Robbins Squaw-Weed	u	Secure	S4S5	
<i>Prenanthes altissima</i>	Tall Rattlesnake-root	c	Secure	S4S5	
<i>Prenanthes trifoliolata</i>	Three-Leaved Rattlesnake-root	r	Secure	S5	
<i>Senecio jacobaea</i>	Tansy Ragwort	u	Exotic	SE	
<i>Solidago bicolor</i>	White Goldenrod	f	Secure	S5	
<i>Solidago canadensis</i>	Canada Goldenrod	c	Secure	S5	
<i>Solidago flexicaulis</i>	Broad-Leaved Goldenrod	f	Secure	S5	
<i>Solidago gigantea</i>	Smooth Goldenrod	r	Secure	S5	
<i>Solidago juncea</i>	Early Goldenrod	u	Secure	S5	
<i>Solidago puberula</i>	Downy Goldenrod	c	Secure	S5	
<i>Solidago rugosa</i>	Rough-Leaf Goldenrod	c	Secure	S5	
<i>Solidago uliginosa</i>	Bog Goldenrod	u	Secure	S5	
<i>Sonchus arvensis</i>	Field Sowthistle	r	Exotic	SE	
<i>Symphyotrichum cordifolium</i>	Heart-Leaf Aster	u	Secure	S4S5	
<i>Symphyotrichum lanceolatum</i>	White Panicked American-Aster	r	Secure	S4S5	
<i>Symphyotrichum lateriflorum</i>	Farewell-Summer	c	Secure	S5	
<i>Symphyotrichum novi-belgii</i>	New Belgium American-Aster	r	Secure	S5	
<i>Symphyotrichum puniceum</i>	Swamp Aster	c	Secure	S5	
<i>Taraxacum officinale</i>	Common Dandelion	c	Exotic	SE	
<i>Tussilago farfara</i>	Colt's Foot	f	Exotic	SE	
ARACEAE	Arum Family				
<i>Arisaema triphyllum</i>	Swamp Jack-In-The-Pulpit	r	Secure	S4S5	
<i>Calla palustris</i>	Wild Calla	r	Secure	S4	
ERIOCAULACEAE	Pipewort Family				
<i>Eriocaulon aquaticum</i>	Seven-Angled Pipewort	r	Secure	S5	
JUNCACEAE	Rush Family				
<i>Juncus articulatus</i>	Jointed Rush	r	Secure	S5	
<i>Juncus bufonius</i>	Toad Rush	u	Secure	S5	
<i>Juncus effusus</i>	Soft Rush	c	Secure	S5	
<i>Juncus filiformis</i>	Thread Rush	r	Secure	S5	
<i>Juncus militaris</i>	Bayonet Rush	r	Secure	S5	
<i>Juncus tenuis</i>	Slender Rush	c	Secure	S5	
<i>Luzula acuminata</i>	Hairy Woodrush	u	Secure	S5	
<i>Luzula multiflora</i>	Common Woodrush	c	Secure	S5	
CYPERACEAE	Sedge Family				
<i>Carex arctata</i>	Black Sedge	c	Secure	S5	

Species / Family Name	Family / Species Common Name	Site Status	NS General Status Rank	NS S-rank	Note
<i>Carex bromoides</i>	Brome-Like Sedge	f	Secure	S3	
<i>Carex brumescens</i> ssp. <i>sphaerostachya</i>	Brownish Sedge	c	Secure	S5	
<i>Carex canescens</i>	Hoary Sedge	u	Secure	S5	
<i>Carex communis</i>	Fibrous-Root Sedge	c	Secure	S5	
<i>Carex crawfordii</i>	Crawford Sedge	f	Secure	S5	
<i>Carex crinita</i>	Fringed Sedge	r	Secure	S4S5	
<i>Carex debilis</i>	White-Edge Sedge	c	Secure	S5	
<i>Carex deflexa</i>	Short-Stemmed Sedge	r	Secure	S4	ID questionable - may have been <i>C. novae-angliae</i>
<i>Carex deweyana</i>	Short-Scale Sedge	f	Secure	S4	
<i>Carex disperma</i>	Softleaf Sedge	u	Secure	S5	
<i>Carex echinata</i>	Little Prickly Sedge	f	Secure	S5	
<i>Carex flava</i>	Yellow Sedge	u	Secure	S5	
<i>Carex foenea</i>	Dry-Spike Sedge	r	Secure	S3?	
<i>Carex gracillima</i>	Graceful Sedge	u	Secure	S4S5	
<i>Carex gynandra</i>	A Sedge	c	Secure	S5	
<i>Carex interior</i>	Inland Sedge	u	Secure	S4S5	
<i>Carex intumescens</i>	Bladder Sedge	c	Secure	S5	
<i>Carex lasiocarpa</i>	Slender Sedge	r	Secure	S5	
<i>Carex leptalea</i>	Bristly-Stalk Sedge	c	Secure	S5	
<i>Carex leptonevia</i>	Finely-Nerved Sedge	c	Secure	S5	
<i>Carex lucorum</i>	A Sedge	r	Secure	S4	or possibly <i>C. pennsylvanicum</i>
<i>Carex lurida</i>	Shallow Sedge	r	Secure	S5	
<i>Carex magellanica</i> ssp. <i>irrigua</i>	A Sedge	r	Secure	S5	
<i>Carex nigra</i>	Black Sedge	u	Secure	S5	
<i>Carex novae-angliae</i>	New England Sedge	c	Secure	S5	
<i>Carex pallescens</i>	Pale Sedge	f	Secure	S5	
<i>Carex panicea</i>	A Sedge	R	Exotic	SE	
<i>Carex pedunculata</i>	Longstalk Sedge	R	Secure	S4	
<i>Carex projecta</i>	Necklace Sedge	C	Secure	S4S5	
<i>Carex scabrata</i>	Rough Sedge	F	Secure	S5	
<i>Carex scoparia</i>	Pointed Broom Sedge	C	Secure	S5	
<i>Carex stipata</i>	Stalk-Grain Sedge	C	Secure	S5	
<i>Carex stricta</i>	Tussock Sedge	R	Secure	S5	
<i>Carex tonsa</i>	Shaved Sedge	R	Secure	S5	probably var. <i>rugosperma</i>
<i>Carex torta</i>	Twisted Sedge	U	Secure	S5	
<i>Carex trisperma</i> var. <i>trisperma</i>	Three-Seed Sedge	U	Secure	S5	
<i>Carex utriculata</i>	Bear Sedge	R	Secure	S5	
<i>Carex vesicaria</i>	Inflated Sedge	R	Secure	S4S5	
<i>Dulichium arundinaceum</i>	Three-Way Sedge	R	Secure	S5	
<i>Eleocharis obtusa</i>	Blunt Spike-Rush	R	Secure	S4S5	
<i>Eleocharis palustris</i>	Creeping Spike-Rush	R	Secure	S5	
<i>Eleocharis tenuis</i>	Slender Spike-Rush	U	Secure	S5	
<i>Eriophorum vaginatum</i> var. <i>spissum</i>	Sheathed Cottongrass	R	Secure	S5	
<i>Scirpus atrocinctus</i>	Black-Girdle Bulrush	F	Secure	S5	
<i>Scirpus cyperinus</i>	Cottongrass Bulrush	C	Secure	S5	

Species / Family Name	Family / Species Common Name	Site Status	NS General Status Rank	NS S-rank	Note
<i>Scirpus hattorianus</i>	Bulrush	F	Secure	S5	
<i>Scirpus microcarpus</i>	Small-Fruit Bulrush	C	Secure	S5	
POACEAE	Grass Family				
<i>Agrostis capillaris</i>	Colonial Bentgrass	C	Exotic	SE	ID probable only
<i>Agrostis gigantea</i>	Black Bentgrass	U	Exotic	SE	
<i>Anthoxanthum odoratum</i>	Sweet Vernal Grass	C	Exotic	SE	
<i>Brachyelytrum septentrionale</i>	Bearded Short-Husk	C	Secure	S4S5	
<i>Bromus ciliatus</i>	Fringed Brome	U	Secure	S4S5	
<i>Calamagrostis canadensis</i>	Blue-Joint Reedgrass	C	Secure	S5	
<i>Cinna latifolia</i>	Slender Wood Reedgrass	C	Secure	S5	
<i>Dactylis glomerata</i>	Orchard Grass	R	Exotic	SE	
<i>Danthonia compressa</i>	Flattened Oatgrass	C	Secure	S4	
<i>Danthonia spicata</i>	Poverty Oat-Grass	C	Secure	S5	
<i>Dichanthelium acuminatum</i>	Panic Grass	C	Secure	S5	
<i>Dichanthelium boreale</i>	Northern Witchgrass	R	Secure	S5	
<i>Elymus repens</i>	Quackgrass	R	Exotic	SE	
<i>Festuca filiformis</i>	Hair Fescue	F	Exotic	SE	
<i>Festuca heteromalla</i>	Spreading Fescue	R	Exotic	SE	ID probable only
<i>Glyceria borealis</i>	Small Floating Manna-Grass	R	Secure	S5	
<i>Glyceria canadensis</i>	Canada Manna-Grass	R	Secure	S5	ID probable only
<i>Glyceria laxa</i>	Northern Mannagrass	R	Secure	S4?	possibly just <i>G. canadensis</i>
<i>Glyceria melicaria</i>	Slender Manna Grass	F	Secure	S4	
<i>Milium effusum</i> var. <i>cisatlanticum</i>	Tall Millet-Grass	F	Secure	S3	
<i>Muhlenbergia uniflora</i>	Fall Dropseed Muhly	R	Secure	S5	
<i>Phalaris arundinacea</i>	Reed Canary Grass	R	Secure	S5	
<i>Phleum pratense</i>	Meadow Timothy	U	Exotic	SE	
<i>Poa alsodes</i>	Grove Meadow Grass	C	Secure	S4	
<i>Poa annua</i>	Annual Bluegrass	C	Exotic	SE	
<i>Poa compressa</i>	Canada Bluegrass	C	Exotic	SE	
<i>Poa palustris</i>	Fowl Bluegrass	C	Secure	S5	
<i>Poa pratensis</i>	Kentucky Bluegrass	C	Secure	S5	
<i>Poa saltuensis</i>	Drooping Bluegrass	C	Secure	S4S5	
SPARGANIACEAE	Bur-Reed Family				
<i>Sparganium americanum</i>	American Bur-Reed	R	Secure	S5	
TYPHACEAE	Cattail Family				
<i>Typha latifolia</i>	Broad-Leaf Cattail	F	Secure	S5	
LILIACEAE	Lily Family				
<i>Clintonia borealis</i>	Clinton Lily	C	Secure	S5	
<i>Erythronium americanum</i>	Yellow Trout-Lily	C	Secure	S4S5	
<i>Maianthemum canadense</i>	Wild Lily-of-The-Valley	C	Secure	S5	
<i>Maianthemum racemosum</i>	Solomon's-Plume	F	Secure	S4S5	
<i>Maianthemum trifolium</i>	Three-Leaf Solomon's-Plume	U	Secure	S4S5	
<i>Medeola virginiana</i>	Indian Cucumber-Root	F	Secure	S5	
<i>Polygonatum pubescens</i>	Downy Solomon's-Seal	F	Secure	S4S5	
<i>Streptopus amplexifolius</i>	Clasping Twisted-Stalk	R	Secure	S4S5	
<i>Streptopus lanceolatus</i>	Rosy Twistedstalk	C	Secure	S5	
<i>Trillium cernuum</i>	Nodding Trillium	F	Secure	S4	
<i>Trillium erectum</i>	Ill-Scent Trillium	R	Secure	S3	

Species / Family Name	Family / Species Common Name	Site Status	NS General Status Rank	NS S-rank	Note
<i>Trillium undulatum</i>	Painted Trillium	F	Secure	S5	
IRIDACEAE	Iris Family				
<i>Iris versicolor</i>	Blueflag	C	Secure	S5	
<i>Sisyrinchium montanum</i>	Strict Blue-Eyed-Grass	F	Secure	S5	
ORCHIDACEAE	Orchid Family				
<i>Corallorhiza maculata</i>	Spotted Coralroot	R	Secure	S4	
<i>Cypripedium acaule</i>	Pink Lady's-Slipper	F	Secure	S5	
<i>Listera convallarioides</i>	Broad-Leaved Twayblade	R	Secure	S3	
<i>Platanthera clavellata</i>	Small Green Woodland Orchid	R	Secure	S5	
<i>Platanthera psycodes</i>	Small Purple-Fringe Orchis	R	Secure	S4	

III. Rare vascular plants

a) Screening pre-existing records for rare vascular plants

Appendix 1 lists the xx rare species identified as having some potential for occurrence on the site. These species were considered species to watch for during field survey efforts. Appendix 2 lists the xxx species considered very unlikely to occur based on habitat. XX of the XX pre-identified potential rare plant species were found on the site (Table 4).

b) Rare plants observed in the field

Seven rare plant species tracked by the Atlantic Canada Conservation Data Centre (S-ranks of S1 to S3S4) were found on the site. They are listed below, with their status on the site and within Nova Scotia described in detail. None of these rare species have General Status ranks of *May be at Risk* or *Sensitive* but two (Hickey's Clubmoss and Pennsylvania Sedge) have General Status ranks of *Undetermined*, which make them of concern to NS DNR. The remaining seven species are ranked *Secure* in Nova Scotia under the National General Status of Wildlife process and are thus of limited concern to NS DNR. Figures 2 to 4 map rare species locations, with Figure 2 mapping species of all rare species and significant communities except for Tall Millet Grass (*Milium effusum* var. *cisatlanticum*, Figure 3) and Dwarf Ginseng (*Panax trifolius*, Figure 4).

i) Species of concern to Nova Scotia Department of Natural Resources, mapped in Figure 2.

Pennsylvania Sedge - *Carex pennsylvanica* (S1S2, Undetermined)

I have not yet confirmed the identification of this sedge (vs. the similar but non-rare sedge *Carex lucorum*), but I suspect the plants are the rarer species. This is the rarest species found in the project area, being represented in Nova Scotia and the Maritimes by only a single definitively identified specimen from Bridgewater collected over 100 years ago. Pending confirmation of the identification, sites for this species should be a very high priority for conservation on site.

Hickey's Clubmoss - *Lycopodium hickeyi* (S2?, Undetermined)

This species was only recently separated from similar clubmosses in the tree-like Clubmoss group and as such is still poorly known in the province. It is likely widespread

but uncommon and may prove to be too common to be tracked by the AC CDC when its status is more fully understood. Small numbers were found at the edge of a dense young conifer stand near turbine 12 and a good population was found in young conifer forest regenerated from old field at the turbine 65 location.

ii) Marginally rare species, tracked by Atlantic Canada Conservation Data Centre but of limited concern to Nova Scotia Department of Natural Resources, mapped in Figures 2, 3 (Tall Millet Grass) and 4 (Dwarf Ginseng).

Dry-Spike Sedge - *Carex foenea* (S3?, Secure)

One clump of this species occurred on the recently disturbed margin of a gravelly roadway 210m northeast of turbine site 64. It is far more common to find Dry-Spike Sedge in human-disturbed habitats such as logging roads and clearcuts than in natural habitats, and as such the species is minimally threatened province-wide. The species is uncommon in Nova Scotia but occurs throughout the province. The number of records of the species is undoubtedly somewhat limited because of its similarity to other relatives in *Carex* section *Ovales*.

Brome-Like Sedge - *Carex bromoides* (S3, Secure)

This species was seen in two locations on site (in a young plantation southwest of turbine 12 and in a deciduous forest clearing between turbines 31 and 41). It has recently been found to be widespread and locally abundant in floodplain habitats in rich river and stream valleys in northern Nova Scotia and may be removed from the AC CDC tracking list in the future.

Broad-Leaved Twayblade - *Listera convallarioides* (S3, Secure)

This species was seen in a single spot, with large numbers of plants present in a rich, seepage depression within sugar maple forest where Silvery Glade-Fern (*Deparia acrostichoides*) was dominant and the only locations on site for the uncommon Rattlesnake Fern (*Botrychium virginianum*) and Daisy-Leaved Grape-Fern (*Botrychium matricariifolium*). Broad-lipped Twayblade is locally quite common in seepy, shaded sites along Cape Breton Highland rivers but is rare on the mainland of Nova Scotia where it is known primarily from rich, seepy sites in sugar maple forest. No turbines are proposed near this site but it should be avoided in placing powerline and access road corridors.

Tall Millet-Grass - *Milium effusum* var. *cisatlanticum* (S3, Secure)

Plants were seen in many locations, sometimes in large numbers, widely scattered around the site in richer, moist deciduous forest and in disturbed forest edges. This grass species is uncommon to locally common in richer, higher elevation sugar maple forests in the Cape Split area, the Cobequid Mountains and in Cape Breton but is very rare in lowland deciduous forests in Nova Scotia.

Dwarf Ginseng - *Panax trifolius* (S3, Secure)

Dwarf Ginseng was widely but uncommonly scattered around the site (Figure 4), with most sites having relatively small numbers of individuals. Recent 2007 fieldwork by Sean Blaney and the AC CDC in Cobequid Mountain sites between Portapique and Marshy Hope has found this species to be widespread and locally abundant in deciduous forests. If this level of abundance (which is not known in other regions of the Maritimes) is general across the eastern part of the Cobequid Mountains, this species' S-rank should be revised to S4. Dwarf Ginseng occurrences observed on site are mapped in Figure XX, but these undoubtedly under-represent the total distribution of the species in the study area.

Braun's Holly-Fern - *Polystichum braunii* (S3S4, Secure)

A single, very large plant was found 290m west of turbine site 60 in a seepy opening in rich sugar maple – yellow birch – ironwood – spruce forest on a ridge top. This species is locally common in Cape Breton and the Blomidon area and widespread but uncommon in cool ravines and steep slopes throughout the northern mainland of Nova Scotia, and may also warrant rank revision to S4.

Table 3. Rare species and community locations and notes. Rare plant and significant community sites are mapped in Figures 3 and 4 under the numbers given in the ‘Map#’ column. The species or communities with start and end points, the end point is mapped under the number followed by an ‘a’.

Species	Map#	Species / Community Common Name	S-rank	General Status Rank	Numbers / Abundance	Habitat	Latitude - start	Longitude - start	Latitude - end	Longitude - end
	01	sugar maple - white ash - ironwood forest on bedrock ridge					45.656805	-62.2463408	45.65423	-62.2477339
	02	rich seepage area in sugar maple forest			within ~40m radius		45.680238	-62.2083434		
<i>Carex bromoides</i>	03	Brome-Like Sedge	S3	Secure	rare; a few clumps	~10 year old deciduous cutover planted to Norway spruce; unusual habitat for the species	45.62276	-62.2506036		
<i>Carex bromoides</i>	04	Brome-Like Sedge	S3	Secure	common	around margins of cabin clearing in sugar maple forest	45.570778	-62.2291305		
<i>Carex foenea</i>	05	Dry-Spike Sedge	S3?	Secure	1 clump	margins of recently disturbed gravelly roadbed	45.651733	-62.2501087		
<i>Carex pensylvanica</i>	06	Pennsylvania Sedge	S1S2	Undetermined	a few small patches	intermediate-mature sugar maple	45.625355	-62.2524493		
<i>Carex pensylvanica</i>	07	Pennsylvania Sedge	S1S2	Undetermined	one patch	intermediate-mature sugar maple	45.625398	-62.2558539		
<i>Listera convallarioides</i>	08	Broad-Leaved Twayblade	S3	Secure	locally common - 100s of plants over 40m radius	rich seepage area in sugar maple forest	45.680238	-62.2083434		
<i>Lycopodium hickeyi</i>	09	Hickey's Clubmoss	S2?	Undetermined	rare; a few plants	margin of dense, young balsam fir stand	45.62364	-62.2495484		
<i>Lycopodium hickeyi</i>	10	Hickey's Clubmoss	S2?	Undetermined	good population; locally common	balsam fir-dominated regeneration from old field	45.644211	-62.2413777		
<i>Milium effusum var. cisatlanticum</i>	11	Tall Millet-Grass	S3	Secure	~40 (~10m away from this pt)	see community description table	45.61957	-62.23163		
<i>Milium effusum var. cisatlanticum</i>	12	Tall Millet-Grass	S3	Secure	35+ (10m W of this pt)	see community description table	45.61634	-62.24045		
<i>Milium effusum var. cisatlanticum</i>	13	Tall Millet-Grass	S3	Secure	~75	see community description table	45.57215	-62.2057632		
<i>Milium effusum var. cisatlanticum</i>	14	Tall Millet-Grass	S3	Secure	~50	see community description table	45.609616	-62.2209142		
<i>Milium effusum var. cisatlanticum</i>	15	Tall Millet-Grass	S3	Secure	100+	see community description table	45.590728	-62.225794		

Species	Map#	Species / Community Common Name	S-rank	General Status Rank	Numbers / Abundance	Habitat	Latitude - start	Longitude - start	Latitude - end	Longitude - end
<i>Milium effusum</i> var. <i>cisatlanticum</i>	16	Tall Millet-Grass	S3	Secure	75-100	see community description table	45.671459	-62.2128405		
<i>Milium effusum</i> var. <i>cisatlanticum</i>	17	Tall Millet-Grass	S3	Secure	150+	sugar maple forest	45.674869	-62.2065777		
<i>Milium effusum</i> var. <i>cisatlanticum</i>	18	Tall Millet-Grass	S3	Secure	50	see community description table	45.676346	-62.1946918		
<i>Milium effusum</i> var. <i>cisatlanticum</i>	19	Tall Millet-Grass	S3	Secure	70+	sugar maple forest	45.677078	-62.1948562		
<i>Milium effusum</i> var. <i>cisatlanticum</i>	20	Tall Millet-Grass	S3	Secure	locally fairly common	edge of clearcut	45.625616	-62.2505121		
<i>Milium effusum</i> var. <i>cisatlanticum</i>	21	Tall Millet-Grass	S3	Secure	rare - 2 plants	mature sugar maple	45.625701	-62.2561249		
<i>Milium effusum</i> var. <i>cisatlanticum</i>	22	Tall Millet-Grass	S3	Secure	small patches	mature sugar maple	45.628199	-62.254168		
<i>Milium effusum</i> var. <i>cisatlanticum</i>	23	Tall Millet-Grass	S3	Secure	small patches	mature sugar maple	45.628212	-62.2551961		
<i>Milium effusum</i> var. <i>cisatlanticum</i>	24	Tall Millet-Grass	S3	Secure	small patches	mature sugar maple	45.628116	-62.2544977		
<i>Milium effusum</i> var. <i>cisatlanticum</i>	25	Tall Millet-Grass	S3	Secure	over 3m x 1m, many stems	mature sugar maple	45.627555	-62.2496973		
<i>Milium effusum</i> var. <i>cisatlanticum</i>	26	Tall Millet-Grass	S3	Secure	well scattered over all of cut area sampled	recently clearcut deciduous forest	45.621859	-62.2477684		
<i>Milium effusum</i> var. <i>cisatlanticum</i>	27	Tall Millet-Grass	S3	Secure	fairly common over this stretch	recently clearcut deciduous forest	45.620609	-62.2493912	45.621969	-62.2469915
<i>Milium effusum</i> var. <i>cisatlanticum</i>	28	Tall Millet-Grass	S3	Secure	rare - 1 plant	seepy streambed in mature sugar maple	45.567015	-62.2058572		
<i>Milium effusum</i> var. <i>cisatlanticum</i>	29	Tall Millet-Grass	S3	Secure	numerous small patches	mature sugar maple forest	45.567332	-62.2219271		
<i>Milium effusum</i> var. <i>cisatlanticum</i>	30	Tall Millet-Grass	S3	Secure	a few small patches	mature sugar maple forest	45.568243	-62.2230815		
<i>Milium effusum</i> var. <i>cisatlanticum</i>	31	Tall Millet-Grass	S3	Secure	a few small patches	mature sugar maple forest	45.569083	-62.2241985		
<i>Milium effusum</i> var. <i>cisatlanticum</i>	32	Tall Millet-Grass	S3	Secure	a few small patches	mature sugar maple forest	45.569465	-62.2245407		
<i>Milium effusum</i> var. <i>cisatlanticum</i>	33	Tall Millet-Grass	S3	Secure	a few small patches	mature sugar maple forest	45.569711	-62.2251745		
<i>Milium effusum</i> var. <i>cisatlanticum</i>	34	Tall Millet-Grass	S3	Secure	fairly common	mature sugar maple forest	45.570306	-62.2275831		

Species	Map#	Species / Community Common Name	S-rank	General Status Rank	Numbers / Abundance	Habitat	Latitude - start	Longitude - start	Latitude - end	Longitude - end
<i>Milium effusum var. cisatlanticum</i>	35	Tall Millet-Grass	S3	Secure	common	around margins of cabin clearing in sugar maple forest	45.570778	-62.2291305		
<i>Milium effusum var. cisatlanticum</i>	36	Tall Millet-Grass	S3	Secure	small patch	recently clearcut deciduous forest	45.571688	-62.23705		
<i>Milium effusum var. cisatlanticum</i>	37	Tall Millet-Grass	S3	Secure	only a few	very mature sugar maple forest	45.546455	-62.1814137		
<i>Milium effusum var. cisatlanticum</i>	38	Tall Millet-Grass	S3	Secure	one patch	sugar maple forest	45.65437	-62.2316117		
<i>Milium effusum var. cisatlanticum</i>	39	Tall Millet-Grass	S3	Secure	large population in this area	sugar maple - white ash - ironwood forest on bedrock ridge	45.656947	-62.2470537		
<i>Panax trifolius</i>	40	Dwarf Ginseng	S3	Secure	6	see community description table	45.613982	-62.244004		
<i>Panax trifolius</i>	41	Dwarf Ginseng	S3	Secure	6 (~30m away from this pt)	see community description table	45.57215	-62.2057632		
<i>Panax trifolius</i>	42	Dwarf Ginseng	S3	Secure	5	see community description table	45.576268	-62.2012667		
<i>Panax trifolius</i>	43	Dwarf Ginseng	S3	Secure	30	see community description table	45.676305	-62.2024717		
<i>Panax trifolius</i>	44	Dwarf Ginseng	S3	Secure	8	see community description table	45.67658	-62.2020687		
<i>Panax trifolius</i>	45	Dwarf Ginseng	S3	Secure	7	see community description table	45.675229	-62.2004756		
<i>Panax trifolius</i>	46	Dwarf Ginseng	S3	Secure	15	see community description table	45.675084	-62.2007547		
<i>Panax trifolius</i>	47	Dwarf Ginseng	S3	Secure	200+	see community description table	45.675822	-62.197752		
<i>Panax trifolius</i>	48	Dwarf Ginseng	S3	Secure	20	see community description table	45.676346	-62.1946918		
<i>Panax trifolius</i>	49	Dwarf Ginseng	S3	Secure	50+	see community description table	45.676651	-62.1943798		
<i>Panax trifolius</i>	50	Dwarf Ginseng	S3	Secure	11	sugar maple forest	45.676927	-62.1943888		
<i>Panax trifolius</i>	51	Dwarf Ginseng	S3	Secure	30+	see community description table	45.677831	-62.1950711		
<i>Panax trifolius</i>	52	Dwarf Ginseng	S3	Secure	500+ seen, probably well over 1000 present	sugar maple forest	45.680076	-62.1984489	45.681891	-62.2005592
<i>Panax trifolius</i>	53	Dwarf Ginseng	S3	Secure	rare - 1 plant	seepy streambed in mature sugar maple margin of powerline clearing and sugar maple forest	45.566801	-62.2060341		
<i>Panax trifolius</i>	54	Dwarf Ginseng	S3	Secure	rare - 3 patches	mature sugar maple forest	45.566434	-62.2154494		
<i>Panax trifolius</i>	55	Dwarf Ginseng	S3	Secure	rare	mature sugar maple forest	45.570306	-62.2275831		
<i>Panax trifolius</i>	56	Dwarf Ginseng	S3	Secure	rare	around margins of cabin clearing in sugar maple forest	45.570778	-62.2291305		
<i>Panax trifolius</i>	57	Dwarf Ginseng	S3	Secure	rare - 1	recently clearcut deciduous forest	45.550554	-62.1755631		
<i>Panax trifolius</i>	58	Dwarf Ginseng	S3	Secure	rare	mature sugar maple forest	45.659869	-62.2170345		

Species	Map#	Species / Community Common Name	S- rank	General Status Rank	Numbers / Abundance	Habitat	Latitude - start	Longitude - start	Latitude - end	Longitude - end
<i>Panax trifolius</i>	59	Dwarf Ginseng	S3	Secure	rare	mature sugar maple forest	45.660539	-62.215972		
<i>Panax trifolius</i>	60	Dwarf Ginseng	S3	Secure	rare	mature sugar maple forest	45.660397	-62.2135607		
<i>Panax trifolius</i>	61	Dwarf Ginseng	S3	Secure	rare	mature sugar maple forest	45.671536	-62.1977121		
<i>Polystichum braunii</i>	62	Braun's Holly- Fern	S3S4	Secure	rare - 1 large clump	sugar maple - white ash - ironwood - white spruce forest on bedrock ridge	45.65423	-62.2477339		

IV. Breeding Birds

Table 4 lists the 60 bird species recorded within or around the site, along with the breeding evidence obtained for each in each of the four 10km breeding bird atlas topographic grid squares in which the turbine project falls. The list in Table 4 should not be considered a comprehensive list of the breeding birds of the site because birds were not the primary focus of the fieldwork. Four significant species based on General Status or S-ranks were found: Gray Jay, Boreal Chickadee and Olive-sided Flycatcher have General Status ranks of Sensitive because of significant recent declines, although they are still common breeding birds in Nova Scotia. Common Goldeneye is a rare breeding bird in Nova Scotia, with an S2B rank for the breeding population. I saw four Common Goldeneyes on Varney Lake, which is a suitable breeding habitat, but saw no further evidence of breeding on site. I found three different groups of Gray Jays on the site in coniferous forest, two of which were family groups with fledged young. Boreal Chickadees were widely present in coniferous forest on site and I heard single Olive-sided Flycatchers singing from near turbines 25 and 63.

Table 4. Birds observed on or near site with breeding evidence obtained by 10km breeding bird atlas square. Species are listed alphabetically by common name. Breeding evidence codes are as follows: Possible – H = observed in suitable habitat, S = singing male in suitable habitat. Probable – P = pair observed in suitable habitat, D = territorial or breeding display between two adult birds, A = agitated behaviour observed. Confirmed - NB = nest building, AE = adult entering/leaving presumed nest site, FY = fledged young, NY = nest with young.

Species	Avondale	Varneys Lk	Marshy Hope	Barney R Stn	Maximum Breeding Evidence	S-rank	General Status Rank
Alder Flycatcher	S	S	S		S	S5B	Secure
American Goldfinch	S		H		S	S5	Secure
American Redstart	S	S	S		S	S5B	Secure
American Robin	P	A	H		A	S5B	Secure
Belted Kingfisher	AE		H		AE	S5B	Secure
Black-and-white Warbler	S	S	S		S	S5B	Secure
Black-backed Woodpecker	NY				NY	S4	Secure
Blackburnian Warbler	S	S		S	S	S4S5B	Secure
Black-capped Chickadee	P	S	H		P	S5	Secure
Black-throated Blue Warbler	S	P			P	S4B	Secure
Black-throated Green Warbler	P	D	D		D	S5B	Secure
Blue Jay	P	P	H		P	S5	Secure
Blue-headed Vireo	S	D	AE		AE	S5B	Secure
Boreal Chickadee	CF	P	H		CF	S4	Sensitive
Brown Creeper		S			S	S5	Secure

Species	Avondale	Varneys Lk	Marshy Hope	Barney R Stn	Maximum Breeding Evidence	S-rank	General Status Rank
Canada Warbler		S			S	S4B	Secure
Cape May Warbler		S			S	S4B	Secure
Cedar Waxwing	H	NB			NB	S5B	Secure
Chestnut-sided Warbler	S	S	S		S	S5B	Secure
Common Goldeneye		P			H	S2B,S4N	Secure
Common Grackle	FS	H			FS	S5B	Secure
Common Raven		H			H	S5	Secure
Common Yellowthroat	A	S	P		A	S5B	Secure
Dark-eyed Junco	A	S	A		A	S5	Secure
Eastern Wood-Pewee	S				S	S4B	Secure
European Starling			H		H	SE	Secure
Golden-crowned Kinglet		S	S		S	S5B	Secure
Gray Catbird	S				S	S5B	Secure
Gray Jay	FY	P	FY		FY	S4	Sensitive
Hairy Woodpecker	H		H		H	S5	Secure
Hermit Thrush	S	A	NY		NY	S5B	Secure
Least Flycatcher	D	H	S		D	S5B	Secure
Lincoln's Sparrow	S	S			S	S5B	Secure
Magnolia Warbler	S		S		S	S5B	Secure
Mourning Dove		S			S	S5B	Secure
Mourning Warbler	S	S	S		S	S5B	Secure
Nashville Warbler	S	S			S	S5B	Secure
Northern Flicker	H				H	S5B	Secure
Northern Parula	S	S	S		S	S5B	Secure
Northern Waterthrush			S		S	S5B	Secure
Olive-sided Flycatcher	S	S			S	S4B	Sensitive
Ovenbird	D	A	A		D	S5B	Secure
Pileated Woodpecker	S		old holes		S	S5	Secure
Purple Finch	S	S			S	S5B	Secure
Red-breasted Nuthatch		H			H	S5	Secure
Red-eyed Vireo	P	S	S		P	S5B	Secure
Red-tailed Hawk	H	H			H	S5B	Secure
Rose-breasted Grosbeak				S	S	S4B	Secure
Ruby-crowned Kinglet	S	S	S		S	S5B	Secure
Ruby-throated Hummingbird		H			H	S5B	Secure
Ruffed Grouse		FY	FY		FY	S5	Secure
Song Sparrow		P	A		A	S5B	Secure
Swainson's Thrush	S	S	S		S	S5B	Secure
Swamp Sparrow		A			A	S5B	Secure
White-breasted Nuthatch	S				S	S4	Secure

Species	Avondale	Varneys Lk	Marshy Hope	Barney R Stn	Maximum Breeding Evidence	S-rank	General Status Rank
White-throated Sparrow	AE	CF	S		AE	S5B,SZN	Secure
Winter Wren		S			S	S5B	Secure
Yellow-bellied Flycatcher	S	S	S		S	S5B	Secure
Yellow-bellied Sapsucker	H	S			S	S5B	Secure
Yellow-rumped Warbler	S	S	D		D	S5B	Secure

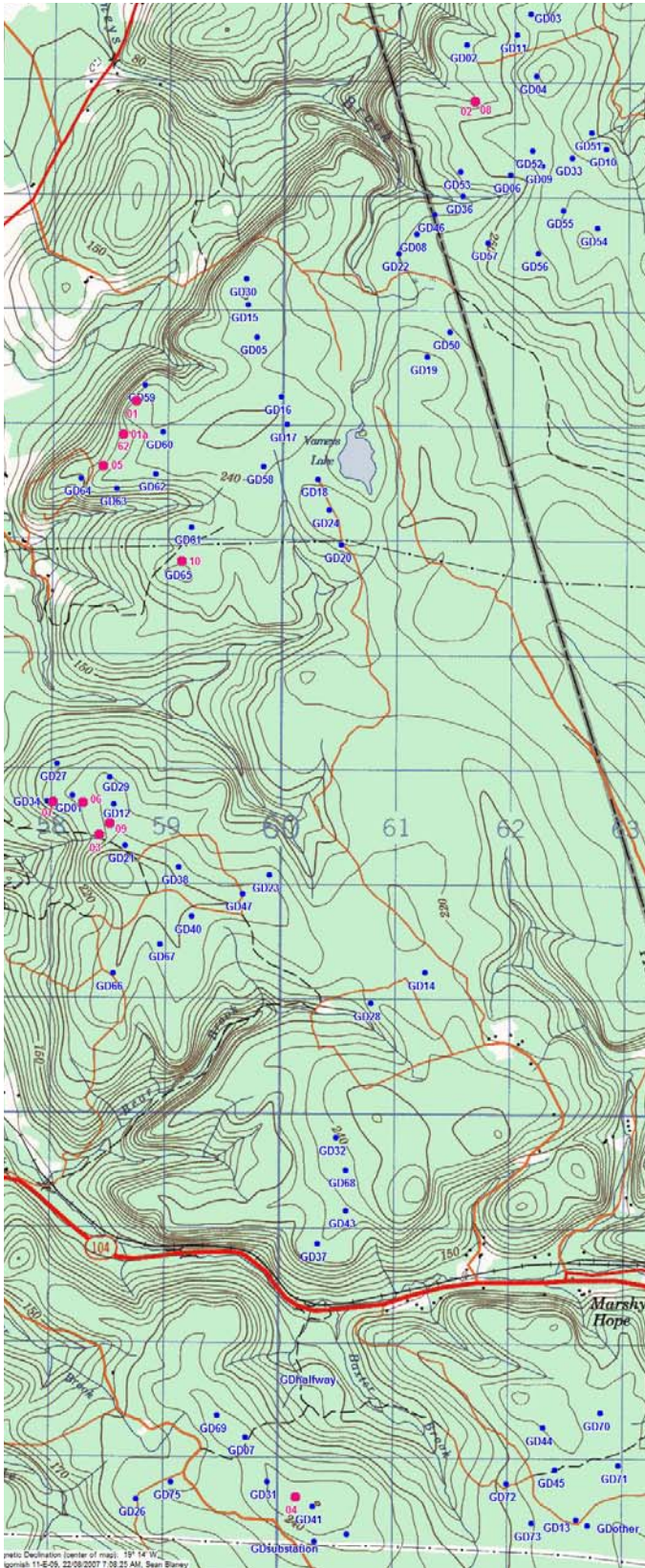


Figure 2. Locations of rare plant species, in relation to proposed turbine sites, Tall Millet Grass and Dwarf Ginseng excepted. Blue dots are proposed turbine locations, pink dots are rare plant or significant community sites. No rare species or significant communities were noted in portions of proposed development site not pictured here. Numbers correspond to Table 3.

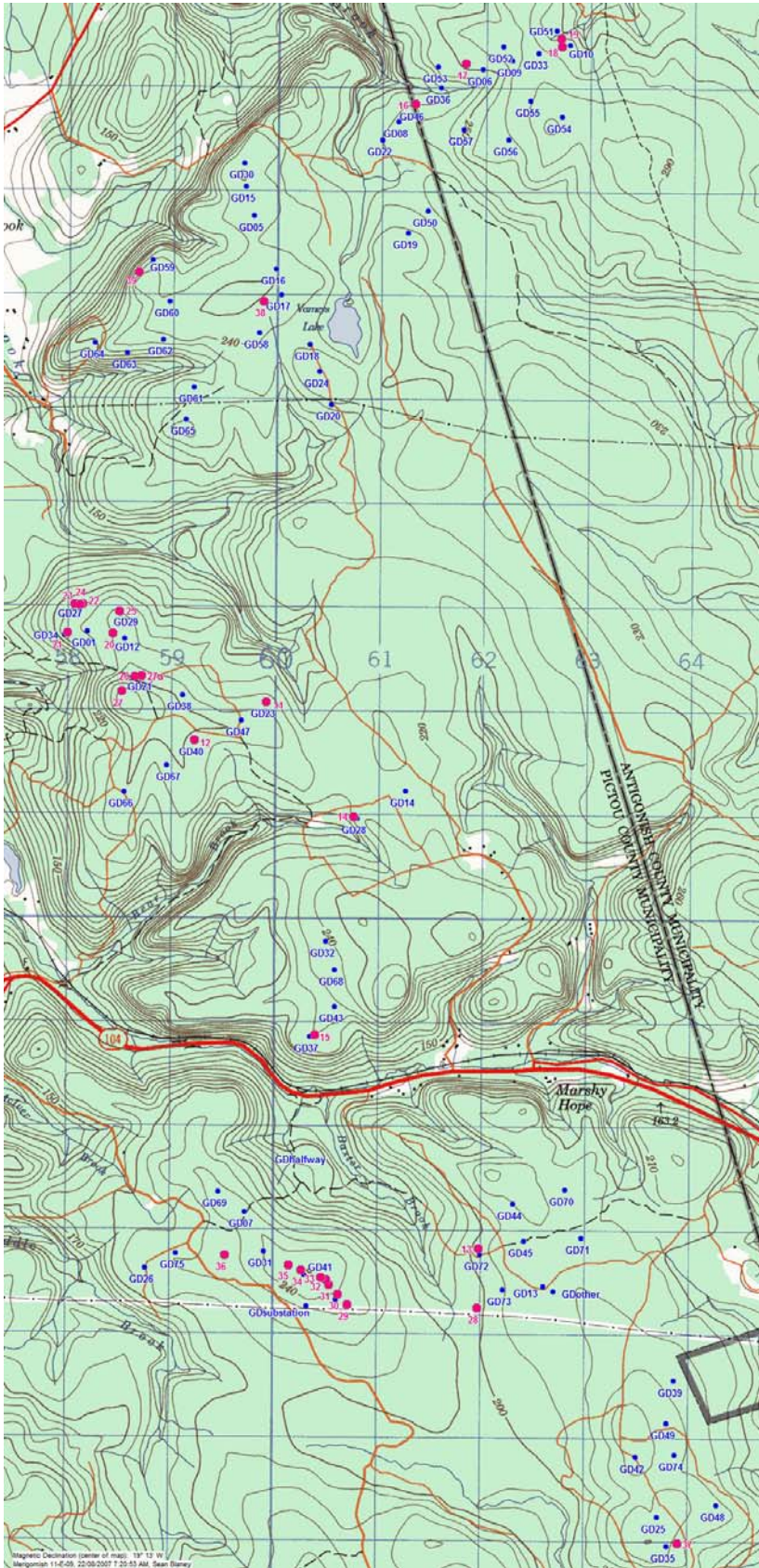


Figure 3. Tall Millet Grass (*Milium effusum* var. *cisatlanticum*) locations in relation to proposed turbine sites. Blue dots are proposed turbine sites and pink dots are plant locations. Numbers correspond to Table 3.

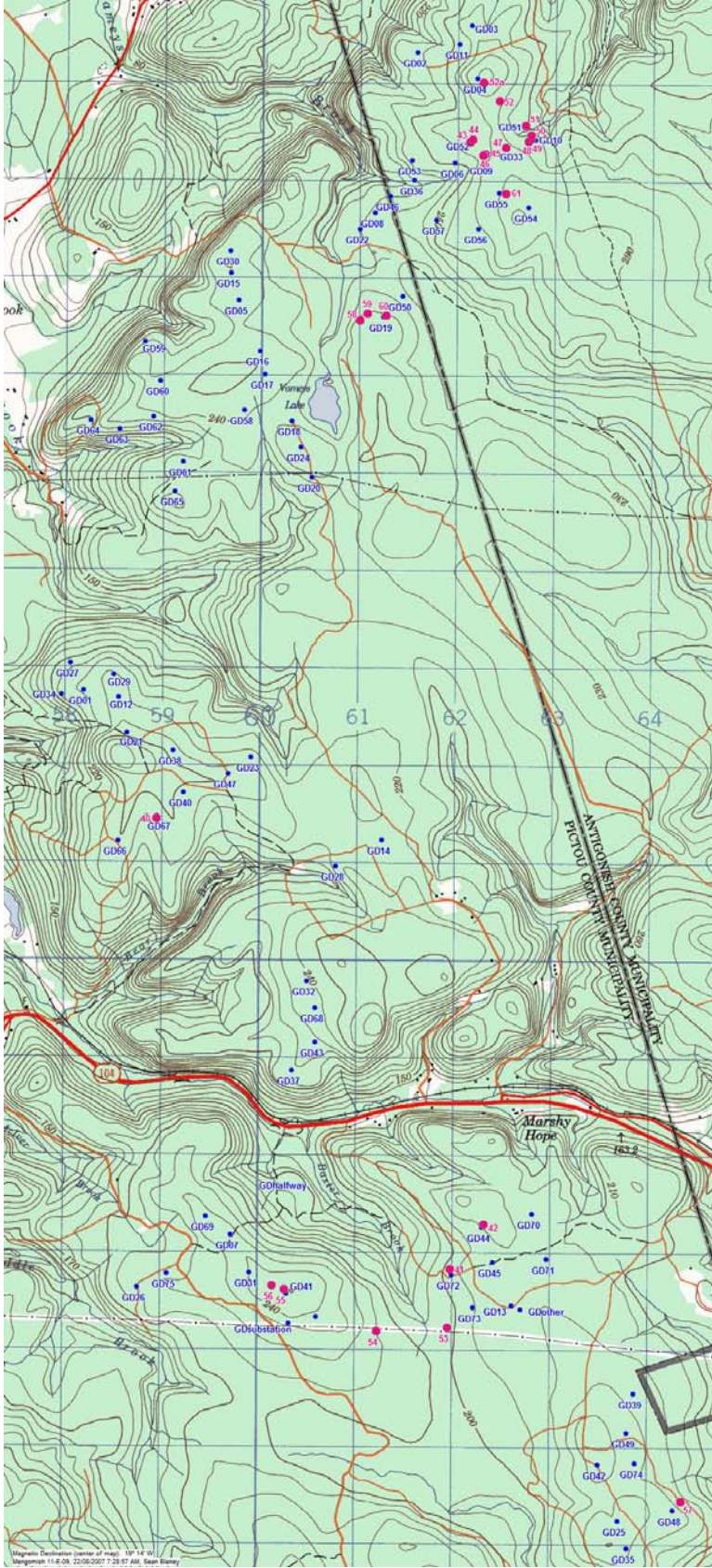


Figure 4. Dwarf Ginseng (*Panax trifolius*) locations in relation to proposed turbine locations plant species locations in relation to proposed development footprint. Pink dots are locations of Dwarf Ginseng and blue dots are proposed turbine locations. Numbers correspond to Table 3.

Appendix 1. Plant species rare in Nova Scotia and occurring within 100 km of the proposed development in AC CDC records that were identified as potentially occurring on the site. Species are listed alphabetically, along with Nova Scotia S-rank, General Status rank and distance to the nearest known record.

Species	Common Name	S-rank	GS Rank	Distance
<i>Ageratina altissima</i>	White Snakeroot	S1	Sensitive	82 km +/-10 km

EXAMPLE DATA ONLY – REAL DATA NEEDS TO BE ADDED

Appendix 2. Plant species rare in Nova Scotia and occurring within 100 km of the proposed development in AC CDC records but which were identified as very unlikely to occur on the site based on habitat needs. Species are listed alphabetically with Nova Scotia S-rank and General Status rank, along with preferred habitat type.

Species	Common Name	S-rank	GS Rank	Habitat	Distance
<i>Myriophyllum farwellii</i>	Farwell's Water-Milfoil	S2	Sensitive	acidic lakes & ponds	39 km +/-0.1 km

EXAMPLE DATA ONLY – REAL DATA NEEDS TO BE ADDED