

**Site Location of Development**  
**TECHNICAL REVIEW MEMORANDUM**  
*Bureau of Land and Water Quality*

TO: **Fred Todd, Project Manager, LURC**  
FROM: **David A. Waddell -- Division of Watershed Management**  
DATE: **May 5, 2011**  
RE: **Carroll Plt / Kossuth Twp – Bowers Wind Project**

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**APPLICANT:** Champlain Wind, LLC

**Application #:** ???

**Town:** Carroll Plt. and Kossuth Twp.

**Engineer who prepared application:** Stantec / Sewall Corp

**Parcel Size:** ???

**Site Description:** Wooded hillsides and tops with steep slopes.

**Project description:** 27 Wind Power turbines, 4 Meteorological Towers, Substation, 34.5kV Power Line, O+M Building, Access Roads

**Size of new impervious area:** ??? acres

**Size of new developed area:** ??? acres

**Watershed (waterbody):** Baskahegan Lake, Pleasant Lake, Mill Privilege Pond, Dipper Pond, Shaw Lake.

**Watershed type:** sensitive / threatened lakes

**PLANS USED FOR REVIEW:**

Pre-development: Plan Sheet 900 and 901, "Pre Development Drainage Plan," dated March 2011, no revisions.

Post-development: Plan Sheet 902 and 903, "Post Development Drainage Plan," dated March 2011, no revisions.

Erosion and Sediment Control Plans: Plan Sheets in the 500, 600, 700, and 800 series, "Erosion Control Plan," dated 1March 2011, revised 3/1/011.

Note: Other plans may have been reviewed that are not noted here.

**STORMWATER MANAGEMENT**

The applicant is proposing a 27 turbine wind power project in Carroll Plt and Kossuth Twp called Bowers Mountain Wind Project. This project lies within the watersheds of Baskahegan Lake, Pleasant Lake, Mill Privilege Pond, Dipper Pond, and Shaw Lake. This proposed project will create ??? acres of developed area and ??? acres of impervious area. This project has been required to meet the "Stormwater Law" rules and as such must meet the Basic, General, and Flooding Standards. Under the General Standards the applicant is applying the phosphorus methodology to address impacts to Baskahegan Lake, Pleasant Lake, Mill Privilege Pond, Dipper Pond, and Shaw Lake. As such, the applicant is required to use the Phosphorous Methodology outlined in "Phosphorous Control in Lake Watersheds: A Technical Guide to Evaluating New Development" to assess the development.

This project is being reviewed under the 2006 Stormwater Management rules and the design and sizing of the proposed BMPs for this project are based on the "Stormwater Management for Maine" January 2006.

Stormwater quality treatment will be achieved with numerous roadside, ditch turnout, and stone berm level lip spreader buffers.

Stormwater flooding mitigation will be achieved with disconnected impervious area and lengthening of flow paths.

The following comments need to be addressed:

**ENGINEERING**

Please direct me to the project SPCC plan.

**BASIC STANDARDS:**

***Note:*** *As always the applicant's erosion control plan is a good starting point for providing protection during construction. However, based on site and weather conditions during construction, additional erosion and sediment control measures may necessary to stop soil from leaving the site. In addition, other measures may be necessary for winter construction. All areas of instability and erosion must be repaired immediately during construction and need to be maintained until the site is fully stabilized or vegetation is established. Approval of this plan does not authorize discharges from the site.*

1. Laydown areas are proposed for the project. These areas may be necessary during decommissioning or upgrades at a later date. After construction use these areas could be covered in a layer of erosion control mix with a minimum of 4 inches in thickness.
2. Through out the project there are three types of level spreaders used on the project to return concentrated flow back into sheet flow: typical level spreaders, ditch turnouts, and stone bermed level lip spreaders. Details are provided for ditch turnouts and stone bermed level lip spreaders. For the typical level spreaders please provide a detail and information on sizing. The peak flow rate to a level spreader due to runoff from a 10-year 24 hour storm must be less than 0.25 cubic feet per second (0.25 cfs) per foot of level spreader lip. The maximum drainage area to the spreader is typically 0.10 acres per foot length of the level spreader. Level spreaders should also be sited so that flow from the level spreader will remain in sheet flow until entering a natural or man made receiving channel.
3. Loam stock piles are called for but no detail of the stock pile was provided. Locations of the stock pile should be identified.
4. The rip rap slope protection detail should have the fabric keyed at the top of the embankment.
5. It is somewhat standard that the type of lining and the depth of the ditch determined by the application of Manning's equation and the velocity in the ditch line at that location for the 10 year / 24 hour storm event. The ditch lining details proposed for the project call for stone lining on slopes greater than 8% and geotextile and vegetation for slopes less than 8%. Is that determination left to the contractor to determine or will it slopes and ditch lining types be located for the contractor by the applicant's agent?? In places where grass lining is called for down gradient of stone lining, the transition zone between linings where flow loses velocity may succumb to erosion. A reinforced turf mat may work but it is standard for stone lining to be continued to a stable collection area. The detail for stone ditch protection states that the riprap will be 6 inch in size. Please direct me to the sizing calculations. Typically the sizing is based on the flow rate anticipated in the ditchline and is stated as a d50. Does this sizing hold for all of the riprap lining for this project?
6. Plan Sheet C-4 Silt Fence Detail: Notes do not limit silt fencing to ¼ acre of drainage for each 100 feet of fencing. The detail also does not require fencing be installed along the contour. Please correct.
7. In some locations on the E+S plan, silt fencing is shown at the top of the ditch slope. I'm not sure why. Please review. Example: 500, DP, at Sta 21+00 to 23+00.
8. It is typical for filter barriers such as silt fencing, hay bale barriers, and erosion control mix barriers (wood waste berms) to be installed along the contour. The location sheets show the location of the fencing at the down gradient toe of any disturbance. As discussed on other projects notations on the plan sheets indicating that location line is for reference and fencing needs to be installed along the contour may be sufficient. Please consider a small detail for reference showing how the silt fencing is installed in staggered line along the toe of a slope. This detail can then be referenced in the notation.
9. Provide a detail for the appropriate discharge of foundation and pit dewatering discharge.
10. I was unable to find the collection of erosion control measures used for crossings on the proposed powerline. Typically in the case of powerlines, a "tool box" approach to erosion control is appropriate. The toolbox should address the type of crossings anticipated and the appropriate locations for erosion controls. David Rocque may have some more specific requirements for the "tool box" like the use of rock sandwiches.

**Proposed Condition:** Due to the level of disturbance, steep slopes, and its close proximity to on site water resources, an independent third party site inspector reviewing erosion and sedimentation control is suggested for this project. The applicant will retain the services of an approved site inspector to inspect

the erosion and sedimentation controls on the site. Inspections shall consist of weekly visits to the site to inspect erosion and sedimentation controls from initial ground disturbance to final stabilization. If necessary, the inspecting engineer will interpret the erosion and sedimentation control plans and notes for the contractor. Once the site has reached final stabilization, the inspector will notify the department in writing within 14 days to state that the construction has been completed. Accompanying the engineer's notification must be a log of the engineer's inspections giving the date of each inspection, the time of each inspection, and the items inspected on each visit.

**GENERAL STANDARDS**

For Project:

**Phosphorus to Baskahegan Lake (Carroll Plantation)**

Per Acre Phosphorus Budget (PAPB):	0.078 lbs / acre / yr
Project Acreage (eligible for allocation)(A):	211.46 acres
Project Phosphorus Budget (PPB):	16.494 lbs / yr

Total Phosphorous Mitigation Credit (SEC + STC):	0.00 lbs / yr
Total Pre-treatment Phosphorus Export (Pre-PPE):	34.841 lbs / yr
Total Post-treatment Phosphorous Export (Post-PPE):	16.505 lbs / yr

Project Phosphorus Export:	16.505 lbs / yr
Level of Control:	not adequate

(Note: the above table is subject to change with response to comments.)

**Phosphorus to Baskahegan Lake (Kossuth Township)**

Per Acre Phosphorus Budget (PAPB):	0.095 lbs / acre / yr
Project Acreage (eligible for allocation)(A):	111.85 acres
Project Phosphorus Budget (PPB):	10.626 lbs / yr

Total Phosphorous Mitigation Credit (SEC + STC):	0.00 lbs / yr
Total Pre-treatment Phosphorus Export (Pre-PPE):	19.892 lbs / yr
Total Post-treatment Phosphorous Export (Post-PPE):	10.141 lbs / yr

Project Phosphorus Export:	10.141 lbs / yr
Level of Control:	adequate

(Note: the above table is subject to change with response to comments.)

**Phosphorus to Pleasant Lake (Carroll Plantation)**

Per Acre Phosphorus Budget (PAPB):	0.063 lbs / acre / yr
Project Acreage (eligible for allocation)(A):	271.51 acres
Project Phosphorus Budget (PPB):	5.585 lbs / yr

Total Phosphorous Mitigation Credit (SEC + STC):	0.00 lbs / yr
Total Pre-treatment Phosphorus Export (Pre-PPE):	16.692 lbs / yr
Total Post-treatment Phosphorous Export (Post-PPE):	5.5738 lbs / yr

Project Phosphorus Export:	5.5738 lbs / yr
Level of Control:	adequate

(Note: the above table is subject to change with response to comments.)

**Phosphorus to Pleasant Lake (Kossuth Township)**

Per Acre Phosphorus Budget (PAPB):	0.065 lbs / acre / yr
Project Acreage (eligible for allocation)(A):	49.94 acres

Project Phosphorus Budget (PPB):	3.246 lbs / yr
Total Phosphorous Mitigation Credit (SEC + STC):	0.00 lbs / yr
Total Pre-treatment Phosphorus Export (Pre-PPE):	5.9892 lbs / yr
Total Post-treatment Phosphorous Export (Post-PPE):	2.958 lbs / yr
Project Phosphorus Export:	2.958 lbs / yr
Level of Control:	adequate

(Note: the above table is subject to change with response to comments.)

**Phosphorus to Mill Privilege Pond**

Per Acre Phosphorus Budget (PAPB):	0.049 lbs / acre / yr
Project Acreage (eligible for allocation)(A):	103.25 acres
Project Phosphorus Budget (PPB):	4.651 lbs / yr
Total Phosphorous Mitigation Credit (SEC + STC):	0.00 lbs / yr
Total Pre-treatment Phosphorus Export (Pre-PPE):	11.399 lbs / yr
Total Post-treatment Phosphorous Export (Post-PPE):	4.620 lbs / yr
Project Phosphorus Export:	4.620 lbs / yr
Level of Control:	adequate

(Note: the above table is subject to change with response to comments.)

**Phosphorus to Dipper Pond**

Per Acre Phosphorus Budget (PAPB):	0.052 lbs / acre / yr
Project Acreage (eligible for allocation)(A):	51.38 acres
Project Phosphorus Budget (PPB):	0.4037 lbs / yr
Total Phosphorous Mitigation Credit (SEC + STC):	0.00 lbs / yr
Total Pre-treatment Phosphorus Export (Pre-PPE):	1.0435 lbs / yr
Total Post-treatment Phosphorous Export (Post-PPE):	0.4031 lbs / yr
Project Phosphorus Export:	0.4031 lbs / yr
Level of Control:	adequate

(Note: the above table is subject to change with response to comments.)

**Phosphorus to Shaw Lake**

Per Acre Phosphorus Budget (PAPB):	0.055 lbs / acre / yr
Project Acreage (eligible for allocation)(A):	39.21 acres
Project Phosphorus Budget (PPB):	2.157 lbs / yr
Total Phosphorous Mitigation Credit (SEC + STC):	0.00 lbs / yr
Total Pre-treatment Phosphorus Export (Pre-PPE):	4.0558 lbs / yr
Total Post-treatment Phosphorous Export (Post-PPE):	1.833 lbs / yr
Project Phosphorus Export:	22.057 lbs / yr
Level of Control:	adequate

(Note: the above table is subject to change with response to comments.)

**General Comments:**

11. Diversion berms are called for in some areas. Please provide a detail.

12. The ditch lines does not show any diversions that divert flow into cross culverts. This could be done in a standard culvert crossing detail without showing it on the proposed contour plans. However, without a detail it is assumed that flow in the ditchlines is not being directed into the cross culvert and continues down the fall line of the ditch.
13. In general the level spreader buffers are shown with straight sides and do not follow the fall line of the contours or cross them perpendicularly. This results in the treatment areas not being the areas protected by the buffer plan.

Road Specific:

14. 402, O+M Road, Sta 6+00 to 12+00, please review this area. Flow does not appear to enter the buffer in sheet flow. The road is super elevated to the left and diverts flows to a culvert at Sta 5+65.
15. 402, O+M Road, Sta 12+65 level spreader discharges onto the laydown area.
16. 402, O+M Road, Sta 12+65 to 15+00, does the road ditch to road right go to the level spreader? It appears to divert past the LS.
17. 402, Substation, Is the substation pad underdrained or does it infiltrate?? Identify if the surfacing material is the same as outlined in the agreement between CMP and MDEP.
18. 500, DP, Sta 10+00, LS on road right collapses to road please relocate.
19. 500, PMT 14, Sta 5+25 BL35 is in a bad location for treatment. Contours concentrate flow.
20. 500, DP, Sta 18+75. Is BL30 in the right location???
21. 500, PMT, Sta 0+00 to 5+25, what function does the BMB serve in this location??
22. 500, DP, Sta 14+00 to 17+00, what function does the BMB serve in this location??
23. 500, DP, Sta 38+50, BL 27 appears to collect more flow than noted in the calculations. Appears to be DHA, Sta 51+00 to 53 +50 of the next road segment.
24. 501, BHA, Sta 4+00, The cross culvert goes to a ditch that takes the flow off site. The calculations say that treatment is provided for 4+00 to 6+00.
25. 501, BM, Sta 1178+00 to 1182+50, This section of road overlaps with BHA 34+40 to 38+50 and is counted twice in the calculations.
26. 501, BM, Sta 1177+00 to 1178+00 goes to BL13 not RB17 as stated in the calculations.
27. 600, BM, Sta 1023+75 to 1027+00 trans, left side drains to LS at 1023+75. Counted for treatment but should get no treatment.
28. 600, BM, Turbine 4, Buffer is consistently over 40%. This is too steep for treatment.
29. 600, BM, Sta 1040+25 to 1041+75 right side of the road goes to LS above B5 not to BL1.
30. 600, BM, Sta 1052+00 to 1059+50, This stretch is a cut section on the backslope with a long run to get to any water resources. Level spreaders may cause problems. Consider a rock sandwich here.
31. 600, BM, Sta 1059+50, culvert apron is shown but there is no culvert.
32. 600, BM, Sta 1061+75, BL@ a long buffer needs to have berm of erosion control mix at 150' down the buffer to ensure flow stays in sheet flow.
33. 601, BM, Sta 1065+75, show diversion to BL3.
34. 601, BM, Sta 1082+75 This LS sits in a saddle. Please address.
35. 601, BM, Sta 1097+75 LS collapses to the road. Please address.
36. 602, BM, Sta 1139+50 BL36 does not follow any contour at all. Buffer collapses to the road ditch. Please address.
37. 701, SP, Sta 3029+00, BL20's orientation is wrong.
38. 801, DH, Sta 102+00 to 106+25, Should be extended to 106+75 and the subsequent section shortened by the same.
39. My review relies heavily on the contour information provided with the application. It is understood due to the nature of the project that during construction changes may be necessary to accommodate inaccuracies in the contour information, soils, or to accommodate infrastructure needs. Small changes in the locations of drainage / treatment structures to improve the treatment provided can be approved through the third party inspector. A cover letter outlining the changes should be submitted to the Commission for the project file at the end of construction. For changes that go beyond the scope above consider the following condition:

**Proposed Condition:** The applicant will retain the services of a professional engineer to provide "as-built" plans that detail any portions of the project that significantly deviate from the approved plans. Any changes in layout, grading, stormwater system, impervious area, or other changes that affect the

stormwater quality need to be located and addressed as to how these changes have been treated and meet the general standard. Significant changes in the proposed project may trigger the need for an amendment of the approved department order. This requirement is for the portion of the project constructed as common property. The applicant's agent will notify the department in writing within 14 days of final acceptance of the project to state that the project has been completed. Accompanying the engineer's notification must be updated project plan sheets (if necessary), a report on the changes in treatment and how they meet standard (if necessary), and a copy of the Notice of Termination (NOT) for the project.

**Proposed Condition:** The applicant will retain the services of a professional engineer to inspect the construction and stabilization of the stone bermed level spreaders and ditch turnouts to be built on the site. Inspections shall consist of weekly visits to the site to inspect each level spreaders /turnout construction, stone berm material and placement, settling basin from initial ground disturbance to final stabilization of the level spreader. If necessary, the inspecting engineer will interpret the stone bermed level lip spreader's location and construction plan for the contractor. Once the stone bermed level lip spreaders are constructed and stabilized, the inspecting engineer will notify the department in writing within 14 days to state that the level lips have been completed. Accompanying the engineer's notification must be a log of the engineer's inspections giving the date of each inspection, the time of each inspection, the items inspected on each visit, and include any testing data or sieve analysis data of the berm media.

### **FLOODING STANDARDS**

The applicant has provided evidence in the form of a Hydro-cad model that shows the project meets the flooding standard requirement of maintaining the preconstruction peak flows for the 2, 10, and 25 year, 24 hour storm at the property boundary.

40. No culvert sizing schedule was found, nor was there any individual ID for culverts on the project except for road stationing. Please direct me to the calculations used for structure sizing of the proposed drainage features like ditch lines, culverts and level spreaders.

### **MAINTENANCE:**

NOTE: The applicant and contractor will be responsible for the maintenance of all proposed stormwater management structures, i.e. ponds, swales, culverts and discharge outlets during construction.

Thereafter, each stormwater management structure should be cleaned and cleared of debris yearly at a minimum. Sweeping of all pavements is recommended on an annual basis. The DEP may request to inspect the site at a future date.

### **DESIGN REVIEW RESPONSIBILITY**

This review only ensures that the proposed plan is meeting the minimum standards set by the department for erosion control management and for stormwater management. It does not guarantee that the design is appropriate for the level of work suggested and for the functionality of the facility.