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MEMORANDUM

24 September 2013

TO: K. Rudzki
Senior Project Evaluator
Environmental Approvals Branch
Toronto

FROM: B. W. Metcalfe
Senior Environmental Officer
Water Resources Unit, Surface Water Group
Technical Support Section
Eastern Region

RE: REA Application - Sumac Ridge Wind Project Water Report
and Environmental Impact Study
Sumac Ridge Wind Project
801 Ballyduff Road, Pontypool, City of Kawartha Lakes



I have reviewed the "Draft" Report titled, "Sumac Ridge Wind Project Water Report and Environmental Impact Study", dated March 2012, prepared by Natural Resource Solutions Inc. (NRSI) for 'wpc Canada', the applicant. The following comments are offered relative to surface water impact concerns.

Project Undertaking

The proposed project undertaking includes the installation of five (5) operational wind turbines for the development of a wind energy generating facility with a maximum contact nameplate capacity of 11.5 MW. In addition to the wind turbines associated infrastructure designs, including the placement of access roads, buried cables and construction of a new 44 kV overhead or below ground electrical connection have also been reviewed for potential impacts on natural features.

Project Site Location

The Sumac Ridge Wind Project occupies an area that is located in the City of Kawartha Lakes, in the former Township of Manvers, and is bordered by Highway 7A to the north, Ballyduff Road to the south, agricultural and wooded areas to the east of Highway 35 and agricultural land to the west of Pitt Road. The Sumac Ridge Wind project area lies within the **Oak Ridges Moraine**.

Oak Ridges Moraine

In addition to O. Reg. 359/09 sections 37 and 38, sections 43, 44, 45 and 46 apply to a person who is constructing, installing or expanding a renewable energy generation facility as part of a

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renewable energy project at a project location that is in the portion of the Oak Ridges Moraine Conservation Area that is subject to the Oak Ridges Moraine Conservation Plan O. Reg. 359/09, s.42(1); O. Reg. 521/10, s.25.

Water Report

The Water Report has been prepared to satisfy the reporting requirements of Sections 29, 30 and 31 of Ontario Regulation 359/09.

Surface Water Regime – Aquatic Features

At a minimum, natural features within approximately 300 m of the project location were reviewed by the applicant. The focus of the site investigation was on the natural features which include surface water bodies within 120 m of the project location, including turbine locations and all associated supporting infrastructure.

The project area is located between the main Pigeon River and one of its main tributaries, Fleetwood Creek. The majority of the project area contains watercourses that flow east into Fleetwood Creek, while the north part of the project appears to drain west into the main Pigeon River, which outlets into Pigeon Lake. Both the Pigeon River and Fleetwood Creek support "cold-water" habitat fisheries via relatively constant supplies of groundwater fed by the coarse - textured deposits within the **Oak Ridges Moraine** complex.

Lakes and Ponds

The applicant's review of available background information determined the following:

- That no lakes are present within the Sumac Ridge Wind Project area.
- Confirmed with the Peterborough District Office of MNR that there are no lake trout lakes present within 300 m of the project area.
- There is one pond located within 120 m of the project area. The pond is located to the south of the above ground electrical line along Gray Road, approximately 630 metres east of Highway 35. It is an on-line pond that has been created artificially through the construction of an extensive earthen berm that impounds water behind it.

Permanent or Intermittent Streams

The applicant's review has identified four (4) intermittent (fed by a seasonally high groundwater table) or ephemeral (less permanent flows fed by melt water and storm events) watercourses within 120 m of the project location. There are two main intermittent tributaries of the Pigeon River that are located within the project area. The tributaries flow west and southwest respectively, merge at Hwy 35 and Gray Road, and continue west towards the Pigeon River.

Seepage Areas

The applicant's review of available records provided no information relating to specific seepage areas within the project area. The applicant identified there was seepage from the bottom of the

large earthen berm at the downstream end of the on-line pond, presumably due to pressure driving through the base of the berm. The applicant identified there are extensive seepage areas located outside of the project area to the east and southeast through the Fleetwood Kames system.

Municipal Drains

The applicant's review identified there are no records of municipal drains within 120 m of the project location.

Water Crossings

The applicant identified that significant water crossings or work in and around water is not required for this project.

Potential Construction Phase Impacts

Of concern are the potential impacts to surface water quality of area surface water features proximate to the project site from project construction activities.

On-line Pond (PRT2):

No encroachment into the artificial on-line pond is planned. The applicant has identified that indirect impacts to the on-line pond may occur associated with the installation of the above ground electrical lines along Gray Road. Exposed soils in the area of Gray Road may allow for sediment-laden water during runoff periods to enter the pond. The applicant has stated that these types of impacts can be fully mitigated (ref. Section 9, Water Report and EIS).

Permanent, Intermittent or Ephemeral Streams:

There are two general drainage areas in the project area. The applicant identified the construction phase of the project will result in approximately 6 ha of impervious cover in the two (2) drainage areas. There will be potential permanent impervious cover, and temporary potential impervious cover that will be removed following the construction phase.

The west drainage area drains through ephemeral and intermittent streams and associated sampling stations PRT1, PRT2, PRT3 and PRT4. The impervious cover within this noted watershed during the construction phase is approximately 4ha of the noted total 6 ha area. This impervious cover within the vicinity of turbines 1 and 3 may result in some additional sediment-laden runoff, and an increase in volume of water reaching the wetland habitat downgradient of these turbines. The applicant identified that this area does not provide direct fish habitat and effectively attenuates sediment-laden runoff by the natural topography, and therefore no measureable impact to the downstream water quality is anticipated.

The new access road from Hwy 7A south to turbines 1 and 3 may result in some additional volume of runoff from the increase in impervious cover; however, much of this runoff would be directed adjacent to the road and the increase in runoff to PRT4 at any given time is anticipated to be marginal only. The applicant noted that the potential increase in runoff, however, is more significant because of the relatively steep slope, and as such presents a risk of increased erosion and associated sediment load to downstream reaches (i.e., PRT1).

PRT1

No encroachment into PRT1 is planned and therefore no direct impacts are anticipated. The applicant has determined that indirect impacts would result from the new access adjacent to PRT1 from Gray Road to the switching station including impervious cover, vegetation removal and exposing soils, which could lead to entrainment of sediment in runoff periods. Also the construction of the above ground electrical line, and switching station at Hwy 35 and Gray Road, may involve some vegetation removal and indirect impacts. The applicant has stated that these types of impact can be fully mitigated (ref. Section 9 Water Report and EIS).

PRT3

Potential construction phase impacts would involve direct impact through the construction of the access road to Turbine 1 through the path of runoff flow to the wetland. Indirect impacts may occur through vegetation removal to create the access road to Turbine 1, which would increase sediment inputs and sun exposure (i.e., thermal impact), while decreasing nutrient uptake.

Additional impacts may result from construction of the crane pad to Turbine 1 and the associated crane lay down area, which would require vegetation removal and therefore result in potential increases in sediment input to the wetland and watercourse downstream. The applicant stated that these types of impact can be fully mitigated (ref. Section 9, Water Report and EIS).

PRT4

The access road to Turbines 1 and 3 will directly encroach across the path of runoff to the feature; however the down slope feature at this location is actively ploughed through as part of the row crop operations. Construction of the access road may further disturb soils and increase sediment input into the watercourse. The applicant has stated that these types of impact can be fully mitigated (ref. Section 9, Water Report and EIS).

Potential Operational Phase and Long-term Impacts

On-line Pond (PRT2):

No operational phase impacts to the surface water regime of concern are anticipated for the on-line pond.

Permanent or Intermittent Streams:

Potential impacts to the aquatic habitat from the project are anticipated to be mostly related to the effects of the impervious cover that disrupt the normal hydrologic cycle. The potential area of impervious cover resulting from the project is approximately 6 ha in two different drainage areas. The impervious cover is distinguished between the temporary construction-related impervious cover, and the permanent cover required for the operational phase. The west drainage area drains through ephemeral and intermittent streams and associated sampling stations PRT1, PRT2, PRT3 and PRT4. The impervious cover within this noted watershed is approximately two thirds (4 ha) of the total 6 ha area. The impervious cover from the project is approximately 0.8% of this drainage area.

The potential long-term impact from the impervious cover in the west drainage area is expected to be somewhat mitigated by the natural topography in the vicinity of Turbines 1 and 3, but is anticipated to be exacerbated by the high slope along the access road in the vicinity of PRT4.

The applicant assessed that if the increase in impervious cover results in increased sediment load downstream, the impact is again mitigated by topography and thick vegetation in the drainage course approaching PRT1. The gentle slope and thick vegetation is anticipated to attenuate and slow the release of runoff, and may be able to accommodate the expected nominal (if any) increase in peak discharge.

The applicant has also assessed that **there may also be some loss in deeper infiltration to groundwater**, which contributes to cold water fish habitat assuming it discharges somewhere at lower elevation. The applicant has stated that these impacts can be fully mitigated through use of porous surface materials for project components, and through simple strategic grading.

PRT1

The applicant has determined there will be no encroachment into the watercourse or its respective riparian habitats, and therefore direct impact to the water quality of the downgradient surface water regime. The switching station area and access road will result in a small increase in the amount of impervious cover within the watershed, which is expected to amount to an associated incremental impact to water quality and quantity.

PRT3

There will be no encroachment of the crane pad for Turbine 1 and therefore no direct impact to the wetted area where surface drainage occurs. There may be an increase in impervious cover caused by Turbine 1 and the associated crane pad. Increasing the impervious cover may increase the volume of water reaching the wetland in runoff periods, and **decrease the localized infiltration and slow release of groundwater (which may discharge elsewhere)**. It is recognized that surficial infiltration into the upper soil layer is still very important in attenuating peak flow, and performing other water quality/quantity benefits associated with an uninterrupted hydrologic cycle (i.e., low impact development). The applicant has stated that these impacts can be easily mitigated through the use of porous surface materials.

Additional operational phase impacts may include the disruption of water and sediment movement across the new access road. There would also be a loss of vegetation and the associated water quality benefits, via the new access road to Turbine 1 and the associated crane pad.

PRT4

The applicant has identified that significant water crossings or work in and around water is not required for this project. However, a new culvert will be required to facilitate drainage across the access road to Turbines 1 and 3 during periods of runoff. Operational phase impacts may include increased sedimentation downstream via improper culvert size and installation, which may cause erosion and/or road washouts. The applicant has stated that these impacts can be fully mitigated.

Aquifer

The applicant has identified that potential operational phase and long-term impacts to the aquifer may occur due to an increase in impervious cover in the vicinity of Turbines 4 and 5, **which has been identified to be an important groundwater recharge area**. The amount of impervious cover past a threshold of approximately 10% (range of 8 – 15%) in a given drainage area, results in the degradation of fish communities, and tends to eliminate the potential habitat to sustain salmonids. The potential area of impervious cover over this infiltration area is approximately 2 ha. While this represents a small fraction of the adjacent drainage area of Fleetwood Creek, **this area has been identified as having “High Aquifer Vulnerability”**, indicating the presence of highly porous surficial deposits in this part of the moraine. These areas are of vital importance in maintaining groundwater discharge to Fleetwood Creek. Brook Trout are highly dependent on groundwater discharge for spawning, and are also dependent on groundwater discharge to maintain cold water temperatures through the hot summer months. Therefore, it has been assessed the potential impacts may be a reduction in infiltration and an increase in runoff to the receiving water body downstream (outside the project area), and an associated decrease in water quality and negative change to water quantity.

The applicant has stated that these impacts may be mitigated through the use of porous materials for the access roads and other project components. Deeper infiltration may however be impacted by the compacted sand layer for the access roads.

The project is identified to be located within the **Oakridges Moraine** and this project area has been identified as having **“High Aquifer Vulnerability”**, indicating the presence of highly porous surficial deposits in this part of the moraine.

- The surface water reviewer does not have the expertise to provide relevant comment on the hydrogeological component presented in this section of the Report. It is the reviewer's recommendation that the project submission should be reviewed by an MOE Regional Hydrogeologist to address any potential groundwater impact concerns associated with the project construction activities.

Construction Phase Mitigation Measures

The main potential construction-related impact is to the risk of erosion and sediment movement into aquatic habitats. A conceptual erosion and sediment control (ESC) plan will be prepared by wpd Canada's Construction Contractor, in accordance with the guidance provided in the Erosion & Sediment Control Guideline for Urban Construction (GGHACA 2006). Incorporated into this plan will be a variety of mitigation measures that will help minimize soil erosion and off-site transport from the construction area into adjacent water bodies to be protected.

- The general mitigation measures included are outlined in Section 9.1 of the Water Report and EIS are acceptable to the reviewer.

Accidental Spills and Release of Contaminants

The applicant has determined that accidental spills are of great concern throughout the project area for their effects on surface water and biota as well as on groundwater which feeds cold-water streams. The area around Turbines 4 and 5 are identified to be of greatest concern due

to the SLR findings of coarser and more permeable soils in this general location. In Figure 1 of the Water Report and EIS the applicant has demarcated a **general area of high groundwater susceptibility where an accidental spill must be avoided at all cost.**

Spills shall be avoided and/or minimized through the application of preventative and mitigation measures in the event of an accidental spill or release. The applicant will develop a project Emergency Response Plan (ERP) which is to be prepared prior to construction activities by wpd Canada or its Construction Contractor in consultation with the local municipality.

- The summary of recommended mitigation measures to protect the area surface water regime of concern through the respective project phases as detailed in Table 5 of the Water Report and EIS are acceptable to the reviewer.

Environmental Effects Monitoring Plan – Design and Operations Report

An Environmental Effects Monitoring Plan (EEMP) is proposed by the applicant in respect of any negative environmental effects that may result from engaging in the Project.

The monitoring proposed in Table 7 of the Water Report and EIS is for the purpose of verification that mitigation measures are functioning as designed to meet performance objectives. If monitoring shows that performance objectives are not being met, the contingency measures documented in Table 7 will be used to ensure that remedial action is undertaken as necessary to meet the performance objectives.


- The summary of environmental effects monitoring requirements with respect to water bodies to be protected for the Sumac Ridge Wind Project area recommended mitigation measures to protect the area surface water regime of concern through the respective project phases as detailed in Table 7 of the Water Report and EIS are acceptable to the reviewer.

Summary and Recommendations

Excluding the on-line pond, there were no lakes or other open water habitats observed within 120 m of the proposed project components. There are four intermittent or ephemeral flowing watercourse within 120 m of the Sumac Ridge Wind Project location. The majority of the project area contains watercourses that flow east into Fleetwood Creek, while the north part of the project appears to drain west into the main Pigeon River, which outlets into Pigeon Lake. Both the Pigeon River and Fleetwood Creek support "cold-water" habitat fisheries via relatively constant supplies of groundwater fed by the coarse - textured deposits within the Oak Ridges Moraine complex. The presence of brook trout at relatively high densities just down slope in Fleetwood Creek, indicates prevalent groundwater discharge nearby, which may be fed through infiltration in this area of the Oak Ridges Moraine. The project site is within an area identified by MNR as "High Aquifer Vulnerability". Therefore, these areas are important to maintaining groundwater quality and quantity, which is essential to brook trout survival in the recipient surface watercourses.

- The applicant has noted that despite the lack of surface water features in the south half of the project area, much of the area is very important to fish habitat indirectly because of its groundwater recharge function. Impacts in the area of important groundwater recharge (high aquifer vulnerability) will be mitigated via grading to reduce runoff, and the use of porous surfaces to minimize the effects of increased impervious surface.

- The proposed project is located in the **Oakridges Moraine** and there have been a number of groundwater/hydrogeological concerns that have been identified by the applicant associated with the project construction. The reviewer recommends the proposed project should be reviewed by an MOE Regional Hydrogeologist to address any potential groundwater impact concerns associated with the project construction activities.
- There was no mention by the applicant made relative to groundwater takings associated with the construction activities associated with the project. This potential groundwater taking concern should be verified/confirmed prior to the commencement of construction activities (e.g., construction excavations of footings, pads etc.).
- Extra effort will be required by the applicant to ensure that the construction activities for the project do not create surface runoff vectors for sediment – laden runoff to enter the downgradient surface water features and cause potential adverse impact to surface water quality of the identified sensitive cold-water surface waters to be protected.
- No formal stormwater management plan has been provided or referred to in the report for the proposed project and this should be provided by the applicant.
- The applicant has stated that construction activities types of impact can be fully mitigated (ref. Section 9, Water Report and EIS). Current construction best management practices (BMPs) are required to be adhered to by the applicant for the purpose of protecting the water quality of the area susceptible surface water regime. These mitigations and BMPs must be put in place as necessary and confirmed to be functioning as required well before the project construction activities commence.



Bruce Metcalfe
BWM/gl

c: B. Metcalfe (App2013\app0713.mem) 8422-9ATLMR \ X-ref. 4277-9ATLL3
File SW KL KL 05 18, Sumac Ridge Wind Project, City of Kawartha Lakes
File SW 11 02 07 02 FL, Fleetwood Creek, Trent River Basin

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