

MEMORANDUM

TO: Khlaire Parré

FROM: Leah Deveau

DATE: April 15, 2013

RE: Additional Information on the Oak Ridges Moraine

Below is additional information on the Oak Ridges Moraine as it relates to development of the Sumac Ridge Wind Project. This memo provides greater detail on the topography of landforms and describes how the project may impact landforms including mitigation measures. The memo also describes the percentage of developed area and the dimension of any land rendered impervious as a result of the project.

Detail on the topography of landforms and a description of how the Project may impact landforms including mitigation measures, percentage of developed area and the dimensions of any land rendered impervious as a result of the project.

NRSI has reviewed both the Oak Ridges Moraine Conservation Plan (ORMCP) (2001) and the ORMCP Technical Paper 4 – Landform Conservation policies. The ORMCP (2001) document outlines the identification of Category 1 and 2 Landform Conservation Areas and requirements for lands within these areas. The ORMCP Technical Paper 4 provides specific requirements for applications within the Oak Ridges Moraine (ORM) planning area as a whole. The following information outlines the requirements for landform identification and protection based on the reviewed documents. NRSI has identified The Sumac Ridge Wind Project to be a minor development according to the definitions presented in the ORMCP (2001) and the ORMCP Technical Paper 4.

NRSI has assessed the location of Landform Conservation Areas within the Oak Ridges Moraine (ORM) Plan Area. Both Category 1 (complex landform) and Category 2 (moderately complex landform) were identified within the Sumac Ridge Wind Project area.

The ORMCP defines Category 1 (complex landform) Landform Conservation Areas as:

- Land areas within the ORM that are dominated by steeply sloping or complex landform patterns. They have been identified in the ORMCP as areas having 50% or more of the land surface comprised of:

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1. lands with slopes in excess of 10%;
 2. land with distinctive landform features such as ravines, kames and kettles; and/or
 3. land with a high diversity of land slope classes.

The ORMCP (2001) defines Category 2 (moderately complex landform) Landform Conservation Areas as:

- Land areas within the ORM that have significant portions of their land surface dominated by complex landform patterns. They have been identified by the province as areas having 20% to 50% of the land surface comprised of:
 1. Lands with slopes in excess of 10%;
 2. Land with distinctive landform features such as ravines, kames, and kettles; and/or
 3. Land with a diversity of land slope classes

Section 30(5) and (6) of the ORMCP (2001) provide direction on how landform conservation principles are to be applied on the ORM for planning, design and construction practices. The ORMCP Section 30(5) states:

“An application for development or site alteration with respect to land in a landform conservation area (Category 1) shall identify planning design and construction practices that will keep disturbance to the landform character to a minimum, including,

(a) maintaining significant landform features such as steep slopes, kames, kettles, ravines, and ridges in their natural undisturbed form

(b) limiting the portion of the net developable area of the site that is disturbed to not more than 25 per cent of the total area of the site, and

(c) limiting the portion of the net developable area of the site that has impervious surfaces to not more than 15 per cent of the total area of the site.”

- The disturbed area within Category 1 is 0.06 ha and represents less than 1 per cent of the total subject land within the Category 1 landform conservation area, which is much less than the maximum allowable area of 25 per cent.
- Approximately 120 m of the access road along the southern border of the project area is within the Category 1 Landform Conservation Area (see ‘Oak Ridges Moraine Landform Conservation Areas with Project Locations’ map accompanying this document). The impervious surfaces on the site within Category 1 landform conservation area have been calculated according to the ORMCP Technical Paper 4 Section 5.7 and is 0.06 ha, which is 0.0076% of the project area within the Landform Conservation Area. This is significantly less than the 15% maximum allowable.

- The use of porous surfaces along this section of the access road will reduce the area of impervious surfaces.

The ORMPC Section 30 (6) states:

“An application for development or site alteration with respect to land in a landform conservation area (Category 2) shall identify planning, design and construction practices that will keep disturbance to landform character to a minimum, including

- (a) Maintaining significant landform features such as steep slopes, kames, kettles, ravines and ridges in their natural undisturbed form;*
- (b) Limiting the portion of the net developable area of the site that is disturbed to not more than 50 per cent of the total area of the site; and*
- (c) Limiting the portion of the net developable area of the site that has impervious surfaces to not more than 20 per cent of the total area of the site.”*

- Portions of the project area are within the landform conservation area (Category 2); however, no construction or operation has been identified for these areas. No impervious surfaces have been identified within this area.

The ORMCP Technical Paper 4 outlines requirements for the application of landform conservation policies for the review of planning applications. Section 5.4 for minor development states:

“Minor development applications need to be accompanied by information that can be derived from Ontario Base Mapping (OBM), existing mapping products and air photographs. The proponent would also be encouraged to identify

- Prominent landform features known to exist on site;*
- Areas of steeply sloping land (15% or greater slope);*
- Areas that are relatively flat or gently sloped; and*
- Location of all known key natural heritage features, hydrologically sensitive features and earth science ANSIs.”*

The following indicates how the above requirements have been, or will be addressed:

- Existing mapping products and aerial photography was used to produce Project report mapping. The Landform Conservation Areas were digitized by georeferencing the ORM official plan Schedule 9 - Landform Conservation Area map. Slope analysis was using 5m interval contours from the Land Information Ontario database.
- Other than areas of steep slopes, no prominent landform features are known to exist on the site (e.g. kames, kettles, ravines, or ridges). Turbine 4 is completely outside of the steep slope area. A small corner of the laydown area for Turbine 5

- is within the steep slopes as they have been mapped using the above data. Areas of steeply sloping land (15% or greater slope) as well as areas of relatively flat or gentle slopes (0-2% slope) exist within the Oak Ridges Moraine planning area. Turbines 4 and 5 of the Sumac Ridge Wind Project are within the Oak Ridges Moraine planning area. Turbine 4 is located on gently sloping land (greater than 2%). Turbine 5 is located within an area of steep slopes (greater than 15%).
- The concrete foundation, crane pads and crane laydown area of Turbine 5 are all outside of the steep slopes; however, the northeast corner of the laydown area is just within the area of steep slopes. According to the Draft Construction Plan Report for the Sumac Ridge Wind Project (ORTECH 2011) the laydown area will measure 50 m by 100 m and will be restored to predevelopment conditions following construction. Due to the temporary nature of the laydown area and based on an understanding of turbine construction, NRSI does not anticipate there to be any alteration of the steep slopes in vicinity of Turbine 5.
 - The location of all known key natural features, hydrologically sensitive features and earth science ANSIs was previously provided on Figure 4 Significant Natural Features with Project Locations in the NRSI Sumac Ridge Wind Project Environmental Impact Study Report, dated April 2012 (2012b).

Section 5.5 of the ORMCP Technical Paper 4 (minor developments) states:

“Applications for minor developments will be required to:

- *Identify areas on site that can be used for construction and site alteration that will have minimal impact on landform character and not be located in either a key natural heritage feature or a hydrologically sensitive feature;*
- *Identify areas of the subject lands within an earth science area of natural and scientific interest where an earth science heritage evaluation is required in accordance with Section 30(12) of the ORMCP.”*
- The construction and site alteration footprint has previously been provided through various maps and figures included with the NRSI reports (NRSI 2012a and b) and the Construction Plan Report (ORTECH 2012).
- There are no portions of the subject lands within an earth science ANSI.

Section 5.6 of the ORMCP Technical Paper 4 (minor developments) states:

“Minor development will include a development strategy that:

- *Identifies the approximate location of all proposed buildings, roads and related structures; and*

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- *Identifies the proposed building envelope, which includes buildings, roads and structures, and adjacent area required for the movement of construction equipment. (Note: This will be assumed to represent the total area of disturbance to the land form character)."*
 - Location of all proposed buildings, roads and related structures have been provided in several maps and figures and is also provided on the map 'Oak Ridge Moraine Landform Conservation Areas with Project Locations' provided with this document. This addresses the second point under Section 5.6 as well. The total area of disturbed land within the Landform Conservation Areas has been identified above.
 - The Sumac Ridge Wind Project Water Report and Environmental Impact Study (NRSI 2012a), Sumac Ridge Wind Project Environmental Impact Study Report (NRSI 2012b), and the Draft Construction Plan Report for Sumac Ridge Wind Project (ORTECH 2012), address Section 7 – Landform Conservation – Planning Design and Construction Techniques of the ORMCP Technical Paper 4 regarding techniques to preserve landform character and minimize impacts to prominent landform features, key natural heritage features, hydrologically sensitive features and earth science ANSIs.

A description of how the project design adheres to watershed plans developed by the local municipality or conservation authority.

There are two watersheds within the Sumac Ridge Wind Project area: Pigeon River and Fleetwood Creek. According to The Oak Ridges Moraine Foundation report series for measuring the success of the Oak Ridges Moraine Project, watershed plans for these two watersheds have not yet been initiated (ORMF 2011). This information was confirmed through personal communication with Alexander Shulyarenko, a Water Quality Specialist at the Kawartha Conservation Authority on November 22, 2012. As no such plan exists, the project design does not adhere to a watershed plan.

The watersheds on either side of the Pigeon River and Fleetwood Creek watersheds have not had Watershed Plans. However, East Cross Creek, to the west of the Pigeon River watershed has a Watershed Plan underway. The broad goals of the East Cross Creek watershed are as follows (East Cross Creek Subwatershed Management Plan 2012):

- Abundant Groundwater (Quantity)
 - Providing continuous supply of baseflow to streams
 - Providing sustainable commercial and residential opportunities
 - Overall objective is to maintain natural groundwater flow conditions
- High Quality Groundwater
 - Providing safe drinking water
 - Providing clean water to streams to maintain ecological functions

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- Overall objective is to protect groundwater from contamination
 - Natural Flow Regime (Surface Water Quantity)
 - Supporting healthy aquatic resources
 - Reducing risk to human life and property
 - Providing sustainable commercial, residential and recreational use opportunities
 - Overall objectives are to maintain surface water flow conditions and to protect people from natural hazards
 - High Quality Surface Water
 - Supporting healthy aquatic resources
 - Providing sustainable commercial, residential and recreational use opportunities
 - Contributing to the health of the Scugog River
 - Overall objectives are to protect surface waters from contamination, enhance the quality of urban runoff, and enhance the quality of agricultural runoff
 - Healthy Aquatic Resources
 - Supporting productive aquatic habitats, species and communities
 - Providing sustainable commercial and recreational opportunities
 - Overall objectives are to maintain native aquatic species and communities and enhance in-stream riparian habitat conditions

Based on information provided in the NRSI Sumac Ridge Wind Project Water Report and Environmental Impact Study (2012), the NRSI Sumac Ridge Wind Project Environmental Impact Study (2012), and the ORTECH Environmental Draft Construction Plan Report for Sumac Ridge Wind Project (2012), the above goals and objectives have been met.

A description showing how planning, design and construction practices ensure that no buildings or other site alterations impede the movement of plants and animals among key natural features, hydrologically sensitive features and adjacent land within Natural Core Areas and Natural Linkage Areas defined in the Oak Ridges Moraine Conservation Plan.

The ORMCP (2001) defines hydrologically sensitive features as (Section 26(1)):

1. Permanent and intermittent streams;
2. Wetlands;
3. Kettle lakes; and
4. Seepage areas and springs

These features were mapped by NRSI and provided on Figure 1 of the Sumac Ridge Wind Project Water Report and Environmental Impact Study dated March 2012 (NRSI 2012b). No impediment of plant and animal movement is anticipated during construction among hydrologically sensitive features. See Sections 8.1 (pg. 27 to 29), 8.2 (pg. 30 to 33), 9.1 (pg. 34 – 37), and 9.2 (pg. 37-39) as well as Table 5 (pg. 39) and Table 6 (pg. 43) (NRSI 2012b)

The ORMCP (2001) defines key natural features as:

1. Wetlands;
2. Significant portions of habitat of endangered, rare, and threatened species;
3. Fish habitat;
4. Areas of Natural and Scientific Interest (life science);
5. Significant Valley Lands;
6. Significant Woodlands;
7. Significant Wildlife Habitat; and
8. Sand barrens, savannahs, and tallgrass prairies.

The planning, design and construction practices for the Sumac Ridge Wind Project are not anticipated to impede the movement of plants and animals among key natural features, hydrologically sensitive features and adjacent land within Natural Core Areas and Natural Linkage Areas as defined by the ORMCP (2001).

Section 7 (pg. 22-136) in the Sumac Ridge Wind Report Project Environmental Impact Study Report, dated April 2012 (NRSI 2012b), identifies the presence of significant natural features within and in vicinity to the Sumac Ridge Wind Project area. Section 7.3 (pg. 128) specifically addresses the presence of significant natural features in the ORMCP Area.

NRSI confirmed that 2 significant woodlands within the boundaries of the ORM are within 120 m of the Sumac Ridge Wind Project Location. Potential negative impacts and proposed mitigation measures are outlined in Table 10 (pg. 24-127) (NRSI 2012b)

No significant sand barrens, savannahs, tallgrass prairies, southern wetlands, significant wildlife habitat or Life Science ANSIs were identified within the ORMCP Area within the Sumac Wind Project area.

The Sumac Ridge Wind Project area is not located within a Natural Core Area or Natural Linkage Area as defined by the ORMCP (2001).

A description of consultation with local municipalities and conservation authorities with additional experience interpreting the Oak Ridges Moraine Conservation Plan Act as it relates to the project location.

The Project Team engaged various agencies with regards to permitting the portion of the Project located on the Oak Ridges Moraine including the Ministry of Natural Resources. Inquiries were made with the City of Kawartha Lakes and Kawartha Conservation Authority. These agencies referred the Project Team back to the Oak Ridges Moraine Policy Area and the Oak Ridges Moraine Conservation Plan which was used in support of the Natural Heritage Assessment, Waterbodies Assessment and other associated reports prepared for the Renewable Energy Approval submission package.

Additional information regarding the Oak Ridges Moraine and the Sumac Ridge Wind Project.

In addition to the materials provided above, the areas of project development located on the ORM do not contain any protected features identified in O.Reg 359/09. Specifically there are no identified: southern wetlands, sand barrens, savannahs, tallgrass prairies, ANSIs, seepage areas, lake trout lakes, rapid infiltration basins or kettle lakes. The project components are setback 30m or more from any permanent or intermittent streams.

As is noted in the City of Kawartha Lakes Oak Ridges Moraine Policy Area, the locations for Turbines 4 and 5 are located on areas of High Aquifer Vulnerability. Field analysis of this area presented in the *Sumac Ridge Wind Project: Water Report and Environmental Impact Study* (NRSI 2012), which found that potential for impacts related to construction of turbine foundations and other components was minimal and that impacts resulting from potential contamination due to accidental spills can be mitigated and impacts to the aquifer are not predicted.