



**DRAFT**

**Construction Plan Report**

In support of an application for a  
**Renewable Energy Approval (REA)**  
Pursuant to Ontario Regulation 359/09

For the

**Penn Energy – Roseplain**

**SOLAR ENERGY FACILITY**

FIT Contract No. F-001557- SPV-130-505

FIT Application No. FIT-F7TMB91



In the

**Town of Uxbridge, The Regional Municipality of Durham  
ONTARIO, CANADA**

May 21, 2012

***(Revised November 5, 2012)***



*Printed on 100% recycled paper*

**A note regarding REA application requirements and additional Project Information:**

This document is one component of a series of reports and other related documents that, collectively, constitute a complete Renewable Energy Approval (REA) application package which will be submitted to the Ministry of the Environment (MOE) for review and approval. As such, this report is intended to compliment the other documents and may reference and/or rely upon information contained in them; therefore, the contents herein should not be considered independently.

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**Notice:**  
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## 1.0 INTRODUCTION

Penn Energy Renewables, Ltd. (Penn) has executed a FIT contract with the Ontario Power Authority (OPA) for the construction of a 6.5 MW, ground-mounted, Class 3 solar energy facility located southwest of the populated center of the Town of Uxbridge, within Regional Municipality of Durham, Ontario. The subject lands are located in part of Lot 22 Concession 3, in the Town of Uxbridge. The proposed Renewable Energy Generation Facility (REGF) would consist of a collection of solar photovoltaic (PV) modules (each approximately 1.00 m x 1.67 m or 1.00 m x 2.00 m in dimension) that are grouped into arrays tilted and facing south. These stationary arrays are strung together forming a series of rows oriented east to west. The Environmental Protection Act (EPA) administered by the Ministry of the Environment (MOE) regulates Renewable Energy Approvals (REAs) under Part V.0.1 of the act, pursuant to Ontario Regulation 359/09. A proponent of a renewable energy project is required to submit numerous reports as part of an REA application; one of which is a Construction Plan Report (CPR).

According to the MOE's publication "Technical Guide to Renewable Energy Approvals Chapter 5: Guidance for preparing the Construction Plan Report"...

*The purpose of the Construction Plan Report is to describe in sufficient detail project activities related to the construction phase so that all potential negative environmental effects may be identified. The report must describe mitigation measures in respect of negative environmental effects of the construction or installation.*

This report begins with a summary of the construction stages and general timing of each. It continues by detailing specific tasks and attributes of each stage, potential negative environmental effects due to construction/installation activities, and any proposed mitigation or monitoring. Much of this information is taken from other reports prepared for this REA application, for example, the *Natural Heritage Assessment and Environmental Impact Study Report* by Niblett Environmental Associates, Inc. (**NHA/EIS**), the *Archaeological Assessment (Stages 1 and 2) Report* by Northeastern Archaeological Associates (**AA**) and the *Water Assessment Report* by Niblett Environmental Associates, Inc. (**WA**).

## 2.0 DESCRIPTION OF CONSTRUCTION PROCESS

The primary stages (with approximate timing) of REGF construction are **Site Preparation** (3 months), **Facility and Equipment Installation** (4 months), **Interconnection/Testing/Commissioning** (1 month) and **Close-out** (2 weeks). Since these stages will overlap significantly, the anticipated total duration is approximately 6 months – anticipated to commence in Spring 2013. The entire REGF will likely be constructed and installed in one continuous phase, unless interrupted by winter weather.



## 2.1 Site Preparation

Surveyor layout and staking; temporary power; water well; erosion and sediment controls; clearing/grubbing; topsoil stockpiling; rough grading; temporary parking and staging areas; internal lanes and roadway access connections; perimeter fencing.

Materials Brought On Site: Utility poles and low-voltage conductor; erosion/sediment control materials (fencing, fabric, straw bales, etc.); gravel/aggregate to provide necessary bearing capacity for lanes, parking and staging areas; chain-link fencing and barbed-wire. Portable toilets, an office trailer and refuse/recycling dumpster(s) will also be utilized throughout construction.

Construction Equipment Utilized: Typical earth-moving equipment (grader, bulldozer, backhoe, front-loader, dump truck, water storage tank/truck, etc.); light-duty trucks and similar vehicles.

Timing and Operational Plans: Approximately three months overall; the surveying and utility installation will occur in the first month, while all erosion and sediment controls are installed; any necessary clearing and grubbing will coincide with stockpiling of topsoil and rough grading which should take about 6-8 weeks; then (during the last few weeks) internal lanes, road access, perimeter fencing and temporary parking/staging areas will be constructed.

Temporary Land Uses: Much of the REGF Project Location will encounter changes and various uses during this stage. Some will be permanent (rough grading and construction of internal lanes/road connections) while others will only be temporary (e.g., staging areas and erosion/sediment controls).

Materials Generated at/Transported from Project Location: None anticipated other than waste from clearing and grubbing; rough grading is designed to balance cut and fill materials; topsoil will be retained for reapplication, landscaping and re-seeding; standard construction waste will be disposed of according to applicable regulations and standard practice.

### 2.1.1 Potential Negative Environmental Effects of Site Preparation

Stormwater Runoff Impacts: As detailed in the NHA, the site has been historically cleared with active crops and woodlots. Although some grading is anticipated to smooth contours of the site, the Solar Farm will generally follow the existing topography. There is no planned import or export of fill or other material to or from the site. The anticipated grading is not expected to significantly increase the rate and/or flow of stormwater discharge from the site and may, in fact, increase stormwater infiltration by slightly reducing the average pitch of the site. Impact will be limited to potential sediment runoff prior to the land being restabilized which can be mitigated through use of sediment controls and Best Management Practices.

Dust and Noise Emissions: Dust and noise emissions due to typical construction activities are unavoidable, but no negative environmental effects are anticipated – especially since stock mufflers will be utilized on construction equipment and machinery.



Destruction of Vegetation and Habitat: The majority of the project location is already cleared, a small section of degraded woodland and hedgerows will be removed in the western portion of the site. The site will be re-seeded where necessary or landscaped prior to close-out of construction. Noise from grading may disrupt local wildlife, however, grading is expected to be minimal as the majority of the project installation will follow existing grades.

Impacts on Water Bodies: None. No water bodies exist within the project location.

Impacts Related to Water Taking: None. An existing well is located on this property. Penn anticipates using this well to provide water to the REGF. During the Site Preparation phase of the construction, water from the well will be utilized primarily for dust control and, to a lesser extent, for other construction-related water needs during the construction of the project. During the construction phase of the project, Penn anticipates that it would utilize not more than 7,600 liters of water per day on any day. According to a Hydrogeological Impact Statement prepared by Levac Robichaud Leclerc Associates Ltd, dated January 2012,. "the proposed water taking operation described above is expected to have no significant impacts on the local hydrogeological regime, including interference with neighbouring wells (dug or drilled), and land uses as well as any local surface water features."

Fuel Spills: Spills from construction equipment/machinery are a potential threat to the environment, but this can be mitigated through monitoring and spill response as detailed below.

Impacts on Archaeological Resources: None. The AA (as confirmed by the Ministry of Tourism and Culture) did not result in the recovery of any archaeological material which might suggest the presence of a cultural resource on this development property.

## **2.1.2 Proposed Mitigation/Monitoring Plan for Site Preparation**

### Modifications of Construction Activities:

- Clearly delineate the limits/perimeter of the area to be cleared to prevent the loss of vegetation not intended for removal. Workers to be instructed on the importance of avoiding entrance into the demarcated area;
- Implement and maintain a 30m Vegetation Protection Zone (VPZ) from the outermost tree trunks/feature for the areas identified in the NHA. Daily visual monitoring of work area to ensure VPZ is maintained;
- Ensure no work or project activities are conducted within any of the designated VPZs or designated significant wildlife habitat for species of conservation concern;
- No clearing of vegetation between May 1<sup>st</sup> and July 31<sup>st</sup>. If clearing needs to occur in this time period, have a qualified Bird Biologist conduct area searches for nesting birds within woodlot to be removed (WO04 and hedgerows);
- Silt fences shall be installed and maintained around such Vegetation Protection Zones
- Establish a clearly delineated 5 m allowance outside of the perimeter fence;
- Implement dust suppression when needed such as wetting gravel or topsoil piles and limiting vehicle speeds on gravel or dirt roads;
- The internal lanes will be left as a farm lane (i.e. unpaved, gravel or dirt road) to allow rainwater to infiltrate the soil;



- Temporary sediment and erosion control measures will be installed in conjunction with any grading of the site and are anticipated to be maintained while the site becomes stabilized. An erosion and sediment control plan will be prepared for the construction phase of the development. It is anticipated that this plan will employ a number of measures which may include, but not be limited to: silt fencing, mud mats and straw bale flow check dams to be utilized in temporary swales. The combination of these temporary measures should minimize the potential for sediment to be transported off the site during construction; and
- Ensure that properly operating mufflers (i.e. standard OEM, or similar) are used on all project machinery and vehicles to minimize noise impacts.

#### Additional Modifications of Construction Activities - Raptor Wintering Area

If Raptor Wintering Area is confirmed is confirmed and deemed significant by 2013 surveys, the following shall also be implemented:

- during construction if raptors hunting in construction zone limit disturbances in that area;
- do not disturb or flush raptors if perched on equipment or feeding on prey on ground. Allow them to leave on their own.
- if raptor found injured, report incident to site supervisor and contact MNR or rehabilitation centre
- if clearing of forest or fields is to occur during the winter period and raptors are on site, seek advice from environmental inspector as to timing or areas to be retained.

#### Treatment Technologies:

- Fueling and maintenance activities would occur within an area where sediment erosion control measures and all precautions have been made to prevent oil, grease, antifreeze or other materials from inadvertently entering the ground or the surface water flow. Storage and disposal of petroleum, oil and lubricants, and equipment fuelling is not allowed within 120m of any significant natural feature, watercourse or waterbody as identified in the NHA; and
- Monitor area for leakage, in the unlikely event of spillage halt all construction activities and corrective measures must be implemented. Any spills must be immediately reported to the MOE Spills Action Centre (1.800. 268.6060).

#### Scheduling and Operational Changes:

- Conduct construction activities during daylight hours whenever possible to minimize light impacts to wildlife.

**Environmental Effects Monitoring Plan:** See Design and Operation Plan.

## **2.2 Facility and Equipment Installation**

PV array foundations (piles/screw-posts), racking and modules; low-voltage wiring and combiner/collection cabling; trenching for conductors; collection house/transformer foundation pads; placement



of collection houses; inverters and mid-size transformers; final connections of collection equipment; overhead structures; high-voltage conductors to substation; permanent power (120-240v).

Materials Brought On Site: Metal posts and racking materials for assembly of PV arrays; PV modules and associated wiring; combiner/collection accessories (cables, connectors, etc.); stone and conduit for trenches; stone and concrete for building/transformer foundations; pre-fabricated collection houses (including pre-installed inverters, control equipment and accessories); mid-size transformers; wood or steel poles and high-voltage conductors; related wiring, cables, controls, switches, disconnects, etc.

Construction Equipment Utilized: Typical light-duty construction equipment; specialized machines for installation of PV array foundations (similar to a Bobcat); delivery and staging vehicles (medium and large trucks, fork lift, etc.); bucket truck; concrete truck; small- to medium-sized grading/compacting equipment; hand tools.

Timing and Operational Plans: Numerous tasks and trades will be concurrently underway throughout this 4-month stage. Because of the large number of modular, repetitive components, installation can be progressively staggered (e.g. the panel installation following the racking installers who can be right behind the foundation crew.) Additionally, other components can be erected at the same time: low- and high-voltage conductors, collection houses, transformers, etc.

Temporary Land Uses: In addition to the construction office trailer, dumpster and parking areas, the primary temporary use of land will be for staging of materials, equipment and related supplies.

Materials Generated at/Transported from Project Location: No materials requiring export from the site will be generated other than standard construction waste, which will be disposed of according to applicable regulations and standard practice.

### **2.2.1 Potential Negative Environmental Effects of Facility and Equipment Installation**

Stormwater Runoff Impacts: None. Although the solar panels are themselves impervious, the design and placement of the solar panels promotes the flow of rainwater to the ground surface beneath and surrounding the panels. Grasses and/or alternative species of groundcover will be planted in these areas. As a result, runoff from these solar panels will travel predominantly along the surface of the ground, maintaining the opportunity to infiltrate in a manner similar to pre-development conditions. Limited impervious surfaces (e.g., inverter, transformer and substation pads) will be constructed for this development. The site access lanes and a small parking area would be constructed of gravel and would, as a consequence, maintain some level of stormwater infiltration.

Dust and Noise Emissions: Dust and noise emissions due to typical construction activities are unavoidable, but no negative environmental effects are anticipated – especially since stock mufflers will be utilized on construction equipment and machinery.

Destruction of Vegetation and Habitat: None beyond the Site Preparation phase.



Impacts on Water Bodies: None.

Impacts Related to Water Taking: None. An existing supply well exists on the property. Penn anticipates using a well to provide water to the REGF. Penn anticipates that the well located by the existing house on the eastern edge of the property will be the primary well that Penn will utilize. During the Facility and Equipment Installation phase of the construction, water from the well will be utilized primarily for dust control and, to a lesser extent, for other construction-related water needs during the construction of the project. During the construction phase of the project, Penn anticipates that it would utilize not more than 7,600 liters of water per day on any day. A hydrogeological report by Levac Robichaud Leclerc Associates Ltd., dated January 2012, confirms such taking would have “no significant impacts on the local hydrogeological regime.”

Fuel Spills: Spills from construction equipment/machinery are a potential threat to the environment, but this can be mitigated (see below for specific recommendations). Penn anticipates selecting a primary transformer for the grid-tie substation that utilizes biodegradable transformer oil(s), such as, by way of example, vegetable-based FR-3. Such transformer oils are non-toxic and readily biodegradable. They are less volatile than petroleum-based oils and have higher flash points for improved safety. They are known to quickly and thoroughly degrade in both soil and aquatic environments.

Impacts on Archaeological Resources: None. The AA (as confirmed by the Ministry of Tourism and Culture) did not result in the recovery of any archaeological material which might suggest the presence of a cultural resource on this development property.

## 2.2.2 Proposed Mitigation/Monitoring Plan for Facility and Equipment Installation

### Modifications of Construction Activities:

- Clearly delineate the limits/perimeter of the area to be cleared to prevent the loss of vegetation not intended for removal. Workers to be instructed on the importance of avoiding entrance into the demarcated area;
- Maintain the 30m Vegetation Protection Zone (VPZ) from the outermost tree trunks/feature for the areas identified in the NHA. Daily visual monitoring of work area to ensure VPZ is maintained;
- Ensure no work or project activities are conducted within any of the designated VPZs or designated significant wildlife habitat for species of conservation concern;
- Silt fences shall be inspected and maintained (i.e. holes repaired) throughout the construction phase around the Vegetation Protection Zones
- Implement dust suppression when needed such as wetting gravel or topsoil piles and limiting vehicle speeds on gravel or dirt roads;
- The internal lanes will be left as a farm lane (i.e. unpaved, gravel or dirt road) to allow rainwater to infiltrate the soil; and
- Ensure that properly operating mufflers (i.e. standard OEM, or similar) are used on all project machinery and vehicles to minimize noise impacts.



#### Additional Modifications of Construction Activities - Raptor Wintering Area

If Raptor Wintering Area is confirmed is confirmed and deemed significant by 2013 surveys, the following shall also be implemented:

- during construction if raptors hunting in construction zone, limit disturbances in that area;
- -do not disturb or flush raptors if perched on equipment or feeding on prey on ground. Allow them to leave on their own; and
- if raptor found injured, report incident to site supervisor and contact MNR or rehabilitation centre.

#### Treatment Technologies:

- Fueling and maintenance activities would occur within an area where sediment erosion control measures and all precautions have been made to prevent oil, grease, antifreeze or other materials from inadvertently entering the ground or the surface water flow. Storage and disposal of petroleum, oil and lubricants, and equipment fuelling is not allowed within 120m of any significant natural feature, watercourse or waterbody as identified in the NHA and;
- Monitor area for leakage, in the unlikely event of spillage halt all construction activities and corrective measures must be implemented. Any spills must be immediately reported to the MOE Spills Action Centre (1.800. 268.6060)

#### Scheduling and Operational Changes:

- None.

**Environmental Effects Monitoring Plan:** See Design and Operation Plan.

## **2.3 Interconnection/Testing/Commissioning**

Grid-tie substation (main 44 kV transformer, switchgear, disconnects, meter, etc.); foundation pads for various equipment and a maintenance building; placement of pre-fab maintenance building; overhead structure(s); 44 kV conductor to existing LDC distribution line; LDC coordination; system testing, calibration and troubleshooting; commissioning.

Materials Brought On Site: 44kV transformer, switchgear, disconnects, meter and related equipment; pre-fabricated maintenance building; wood or steel poles and high-voltage interconnection conductor; fencing and gates, tele-protection communication equipment and mounting pole; site lighting and security system.

Construction Equipment Utilized: Small- to medium-sized grading/compacting equipment; delivery and staging vehicles (medium and large trucks, fork lift, etc.); bucket truck; concrete truck; typical light-duty construction equipment; small crane; hand tools.



Timing and Operational Plans: Much of this work can be executed in parallel with the previous stage (Facility and Equipment Installation); of course the testing and commissioning require almost all construction and installation activities to have been completed. Overall, these activities may last approximately one month;

Temporary Land Uses: Only a relatively small area will be used temporarily for tasks in this stage; they will be primarily for staging of the equipment and supplies as well as crew parking.

Materials Generated at/Transported from Project Location: No materials requiring export from the site will be generated other than standard construction waste, which will be disposed of according to applicable regulations and standard practice.

### **2.3.1 Potential Negative Environmental Effects of Interconnection/Testing/Commissioning**

Stormwater Runoff Impacts: None.

Dust and Noise Emissions: Dust and noise emissions due to typical construction activities are unavoidable, but no negative environmental effects are anticipated – especially since stock mufflers will be utilized on construction equipment and machinery.

Destruction of Vegetation and Habitat: None.

Impacts on Water Bodies: None.

Impacts Related to Water Taking: None. During the Interconnection/Testing/Commissioning phase of the construction, Penn anticipates that it will perform the initial cleaning of the modules. The duration of the module cleaning scope of work is approximately one week. It is anticipated that the module cleaning process will use not more than 30,240 liters of water per day on any day. . A hydrogeological report by Levac Robichaud Leclerc Associates Ltd., dated January 2012, confirms such taking would have “no significant impacts on the local hydrogeological regime.”

Fuel Spills: Spills from construction equipment/machinery are a potential threat to the environment, but this can be mitigated (see below for specific recommendations). Penn anticipates selecting a primary transformer for the grid-tie substation that utilizes biodegradable transformer oil(s), such as, by way of example, vegetable-based FR-3. Such transformer oils are non-toxic and readily biodegradable. They are less volatile than petroleum-based oils and have higher flash points for improved safety. They are known to quickly and thoroughly degrade in both soil and aquatic environments.

Impacts on Archaeological Resources: None. The AA (as confirmed by the Ministry of Tourism and Culture) did not result in the recovery of any archaeological material which might suggest the presence of a cultural resource on this development property.

### **2.3.2 Proposed Mitigation/Monitoring Plan for Interconnection/Testing/Commissioning**

Modifications of Construction Activities:



- Sediment fencing and the VPZ will be maintained throughout the construction phase; and
- Implement and maintain a 30m Vegetation Protection Zone (VPZ) from the outermost tree trunks/feature for the areas identified in the NHA. Daily visual monitoring of work area to ensure VPZ is maintained;
- Ensure no work or project activities are conducted within any of the designated VPZs or designated significant wildlife habitat for species of conservation concern; and
- Ensure that properly operating mufflers (i.e. standard OEM, or similar) are used on all project machinery and vehicles to minimize noise impacts.

#### Additional Modifications of Construction Activities - Raptor Wintering Area

If Raptor Wintering Area is confirmed is confirmed and deemed significant by 2013 surveys, the following shall also be implemented:

- during construction if raptors hunting in construction zone, limit disturbances in that area;
- do not disturb or flush raptors if perched on equipment or feeding on prey on ground. Allow them to leave on their own; and
- if raptor found injured, report incident to site supervisor and contact MNR or rehabilitation centre.

#### Treatment Technologies:

- Fueling and maintenance activities would occur within an area where sediment erosion control measures and all precautions have been made to prevent oil, grease, antifreeze or other materials from inadvertently entering the ground or the surface water flow. Storage and disposal of petroleum, oil and lubricants, and equipment fuelling is not allowed within 120m of any significant natural feature, watercourse of waterbody as identified in the NHA; and
- Monitor area for leakage, in the unlikely event of spillage halt all construction activities and corrective measures must be implemented. Any spills must be immediately reported to the MOE Spills Action Centre (1.800. 268.6060)

#### Scheduling and Operational Changes:

- None.

**Environmental Effects Monitoring Plan:** See Design and Operation Plan.

## 2.4 Close-out

Removal of temporary services and facilities (e.g. portable toilets, office trailer and refuse/recycling dumpsters); topsoil replacement and final grading; landscaping and re-seeding;

Materials Brought On Site: Sod/seed mix for turf grass and various plants for the perimeter landscaping.

Construction Equipment Utilized: Medium and/or large trucks, fork lift, etc. to remove temporary facilities; small- to medium-sized landscaping equipment; bucket truck; concrete truck; typical light-duty construction equipment; small crane; hand tools.



Timing and Operational Plans: approximately two weeks

Temporary Land Uses: none

Materials Generated at/Transported from Project Location: Portable toilets, an office trailer and refuse/recycling dumpster(s)

#### **2.4.1 Potential Negative Environmental Effects of Close-out**

Stormwater Runoff Impacts: None.

Dust and Noise Emissions: Dust and noise emissions due to typical construction activities are unavoidable, but no negative environmental effects are anticipated – especially since stock mufflers will be utilized on construction equipment and machinery.

Destruction of Vegetation and Habitat: None.

Impacts on Water Bodies: None.

Impacts Related to Water Taking: None. During the Close-out phase of the Construction, Penn will utilize water to help establish the landscaping and seeded areas of the site. Penn anticipates that it would utilize not more than 37,800 liters per day of water during the period in which it is establishing the seeded and landscaped areas. After the seeded and landscaped areas are established, the primary use of water will be for module cleaning. Averaged over the course of a year, this usage is expected to be less than 1,000 liters per day. A hydrogeological report by Levac Robichaud Leclerc Associates Ltd., dated January 2012, confirms such taking would have “no significant impacts on the local hydrogeological regime.”

Fuel Spills: Spills from construction equipment/machinery are a potential threat to the environment, but this can be mitigated (see below for specific recommendations).

Impacts on Archaeological Resources: : None. The AA (as confirmed by the Ministry of Tourism and Culture) did not result in the recovery of any archaeological material which might suggest the presence of a cultural resource on this development property.

#### **2.4.2 Proposed Mitigation/Monitoring Plan for Close-out**

Modifications of Construction Activities:

- Sediment fencing and the VPZ will be maintained throughout the construction phase; and
- Implement and maintain a 30m Vegetation Protection Zone (VPZ) from the outermost tree trunks/feature for the areas identified in the NHA. Daily visual monitoring of work area to ensure VPZ is maintained;
- Ensure no work or project activities are conducted within any of the designated VPZs or designated significant wildlife habitat for species of conservation concern; and
- Ensure that properly operating mufflers (i.e. standard OEM, or similar) are used on all project machinery and vehicles to minimize noise impacts.



Additional Modifications of Construction Activities - Raptor Wintering Area

If Raptor Wintering Area is confirmed is confirmed and deemed significant by 2013 surveys, the following shall also be implemented:

- during construction if raptors hunting in construction zone, limit disturbances in that area;
- do not disturb or flush raptors if perched on equipment or feeding on prey on ground. Allow them to leave on their own; and
- if raptor found injured, report incident to site supervisor and contact MNR or rehabilitation centre.

Treatment Technologies:

- Fueling and maintenance activities would occur within an area where sediment erosion control measures and all precautions have been made to prevent oil, grease, antifreeze or other materials from inadvertently entering the ground or the surface water flow. Storage and disposal of petroleum, oil and lubricants, and equipment fuelling is not allowed within 120m of any significant natural feature, watercourse or waterbody as identified in the NHA; and
- Monitor area for leakage, in the unlikely event of spillage halt all construction activities and corrective measures must be implemented. Any spills must be immediately reported to the MOE Spills Action Centre (1.800. 268.6060).

Scheduling and Operational Changes:

- None.

**Environmental Effects Monitoring Plan:** See Design and Operation Plan.

