

**GREENFIELD SOUTH POWER CORPORATION**

**GREEN ELECTRON POWER PROJECT**

**EXECUTIVE SUMMARY**

## GENERAL INFORMATION AND CONTACTS

The Green Electron Power Project involves the construction and operation of a single new, clean, natural gas fuelled, electricity generating plant in St. Clair Township Ontario at one of two sites being considered near the intersection of Oil Springs Line and Greenfield Road (the “East Site” and the “West Site”). After evaluating both candidate sites the proponent will proceed to develop only the one site, the proponent has selected on the basis of the most favourable potential.

The proposed facility will use combined cycle technology (i.e. gas turbine, heat recovery boiler and steam turbine) and will have a net capacity of about 300 megawatts (MW). Natural gas will be provided from one of the existing nearby pipelines and the electricity produced by the facility will be fed into a nearby 230,000 Volt electrical transmission circuit of Hydro One Networks Inc.

The project is part of Ontario’s plan to replace all of its coal fired electricity generation with new, clean natural gas fueled generation so as to improve air quality and hence improve the health of its citizens.

Name of the project: Green Electron Power Project

Name of the proponent: Greenfield South Power Corporation  
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To date the proponent has carried out consultation with the public, various governmental agencies and First Nations and has received responses about the project from the following:

St. Clair Township – Staff  
Lambton County – Staff  
St. Clair Township – Mayor, Deputy Mayor and Councillors  
St. Clair Region Conservation Authority  
Ontario Ministry of the Environment  
Ontario Ministry of  
Infrastructure Walpole Island  
First Nation Aamjiwnaang First  
Nation  
Canadian Environmental Assessment Agency  
Canada Food Inspection Agency  
Aboriginal Affairs and Northern Development Canada  
Members of the public attending two Open House events

The project is subject to the environmental assessment requirements of Ontario (O.Reg 116/01) for electricity projects under the Environmental Assessment Act (Ontario).

The project is also regulated in terms of zoning and site plan by St. Clair Township under the Planning Act (Ontario).

The project will also be regulated in terms of air emissions and noise, as well as waste water and stormwater discharge (if required) under the Environmental Protection Act (Ontario) by way of a single Environmental Compliance Approval for all aspects regulated under the Act.

The project will be regulated by the Conservation Authorities Act (Ontario) in terms of impact on flooding, erosion and other water shed protection issues.

The project may need a Permit to Take Water (PTTW) under the Ontario Water Resources Act or may need to obtain an amendment to the PTTW of another service provider who may supply water to the project

The Canadian Environmental Assessment Agency has informed the proponent that no regional study has been or is being conducted in the area where the project is to be carried out.

## **PROJECT INFORMATION**

The Green Electron Power Project involves the construction and operation of a new, clean, natural gas fuelled, electricity generating plant of approximately 300 megawatts (MW) capacity which will facilitate the replacement of coal-fired power generation in Ontario. Under the contract with the Ontario Power Authority, the power plant will likely operate about 25% of the year, during times of higher electricity demand which occur typically between morning and evening on summer and winter business days, but this may vary depending on variations in the spot market prices for electricity and natural gas.

The relevant provisions in the regulation under CEAA, 2012 which describe the project are:

“construction, operation, decommissioning and abandonment of... ..a fossil fuel-fired electrical generating station, with a production capacity of 200 MW or more”

as per item 2(a) of the Schedule of Physical Activities forming part of the Regulation Designating Physical Activities SOR/2012-147.

The buildings and large structures associated with the project include the construction and operation of a single natural gas fuelled power plant of about 300 megawatts (MW) capacity, having a footprint of about 2 hectares, that includes two large buildings to house the electrical power generators and other related equipment, a heat recovery steam generator including flue gas stack, a cooling tower, a parts storage building, electrical transformers, an electrical switchyard, as well as connections to an existing nearby power line, to a nearby existing natural gas line and to a potable water line about 1 km away. The buildings have a ground floor area of about 3000 m<sup>2</sup> and a maximum height of about 25 m, the heat recovery steam generator has a footprint of about 400 m<sup>2</sup> and an height of about 33 m, the stack is about 6 m in diameter and about 43 m tall, the cooling tower (including its water pumphouse) has a footprint of about 1400 m<sup>2</sup> and a height of about 11 m.,

The plant will be electrically interconnected to the Ontario electrical transmission grid with an existing nearby 230,000 Volt transmission circuit of Hydro One. The plant will receive natural gas from an existing nearby gas pipeline of one of several potential service providers.

The power plant design is based on the well established and successful technology used for natural gas combined cycle power generation throughout the world. Combined cycle power generation starts with a gas turbine driven generator, which consists of a single large turbine turning an electrical generator. The exhaust gases from the gas turbine are then passed through a heat recovery steam generator (HRSG) to make steam. This steam is then piped to

a large steam turbine that turns another electrical generator. The low pressure steam exhausting from the steam turbine is next condensed with the aid of a cooling tower and the resulting water is recycled to the HRSG to make steam again. The thermal efficiency of the plant will be about 48% which is much higher than for coal fired facilities or simple cycle natural gas facilities.

The power plant will utilize one GE 7FA gas turbine generator set fuelled by natural gas. The gas turbine will be equipped with dry low NO<sub>x</sub> burner technology which has been selected to reduce emissions of nitrogen oxides (NO<sub>x</sub>). With dry low NO<sub>x</sub> burner technology, the use of selective catalytic reduction (SCR) technology is not required or recommended.

The power plant design is based on the use of a water-tube, heat recovery steam generator (HRSG) equipped with a supplementary natural gas duct burner. The power plant will utilize one Fuji steam turbine generator set. The unit is "packaged" with all accessories so as to reduce site installation time.

The electricity will be generated at about 18,000 Volts by the gas turbine generator and at 13,800 Volts by the steam turbine generator. This power will flow through separate generator step up transformers to both feed the power plant's internal loads and to be exported to the Hydro One transmission system at 230,000 Volts via the facility's high voltage switchyard.

The plant building will be a braced steel structure (i.e. columns and beams) enclosed with pre-finished metal siding. The building design includes advanced acoustical suppression design features with turbines enclosed within buildings along with noise suppression building insulation and muffling/silencing features.

The developed area for the facility on the East site represents less than 10% of the entire property and the developed area for the facility on the West site represents less than 25% of the entire property to be severed from Ontario Power Generation's property.

Building supply water will be from the municipal supply line running along Oil Springs Line. Water for process cooling will be supplied by lateral lines from either the existing large diameter municipal line on Greenfield Road to the west or from the industrial water system of CF Industries to the south/west.

Process waste water consisting of cooling tower blowdown will either be discharged to a local waste water treatment plant for treatment or be treated on site and then discharged to an existing outfall canal to the St. Clair River. The project activities will include the construction of the facility and the interconnection with a nearby 230,000 Volt electrical transmission line (adjacent to each site), a nearby high pressure natural gas pipeline (on the East Site or adjacent to the West Site), as well as water supply and waste water disposal.

This will be followed by operation and maintenance of the facility for at least 20 years. Decommissioning of the facility will occur once it is no longer feasible to operate.

Atmospheric emissions during the construction and decommissioning phases will include reciprocating engine exhausts from construction machinery and demolition machinery, which will be abated by properly functioning emissions control features.

Atmospheric emissions during operations include nitrogen oxides (NO<sub>x</sub>), carbon dioxide (CO<sub>2</sub>), carbon monoxide (CO), and very small amounts of volatile organic compounds (VOCs) and unburned hydrocarbons that are typical for clean burning natural gas fuelled equipment. All air emissions will be in accordance with an Environmental Compliance Approval to be issued by the Ontario Ministry of the Environment (MOE) for the project under the Environmental Protection Act (Ontario) which will only be issued after sophisticated computer modeling shows that all emissions criteria are met. Abatement measures in place during the operations phase include the use of dry low NO<sub>x</sub> burners on the gas turbine and a stack height in excess of that required to meet emissions standards at critical receptors in the area surrounding the plant.

Process wastewater consisting primarily of cooling tower blowdown (containing elevated concentrations of naturally occurring minerals, as well as sulphates and residual chlorine from water treatment to maintain pH control and control microbial growth) will either be discharged to the municipal wastewater treatment facility in Courtright or be first treated on the project site to meet regulatory limits and then discharged under an MOE compliance approval permit to an existing outfall discharge canal to the St. Clair river operated by CF Industries.

Preparation of the site and construction will occur once all necessary permits are issued – expected by spring 2013. Construction including grading, excavation, building erection and equipment installation is expected to take about 21 months. Commissioning will then take about 3 months. Operation will occur over at least 20 years, and finally decommissioning will take about 9 months.

## PROJECT LOCATION

The candidate project sites are located at:

	West Site	East Site
Latitude:	42° 47' 37" N	42° 47' 6" N
Longitude:	82° 27' 27" W	82° 25' 40" W

The Location Figure below shows the two sites in the context of natural and manmade features in the area. The East Site is part of the east half of Lot 26, Concession 2 and the West Site is part of Lots 13 and 14, Front Concession; both in Moore (now St. Clair Township), County of Lambton, Ontario.

The closest residence to either site is about 500 m from the proposed development area of the East project site as can be seen in the location figure.

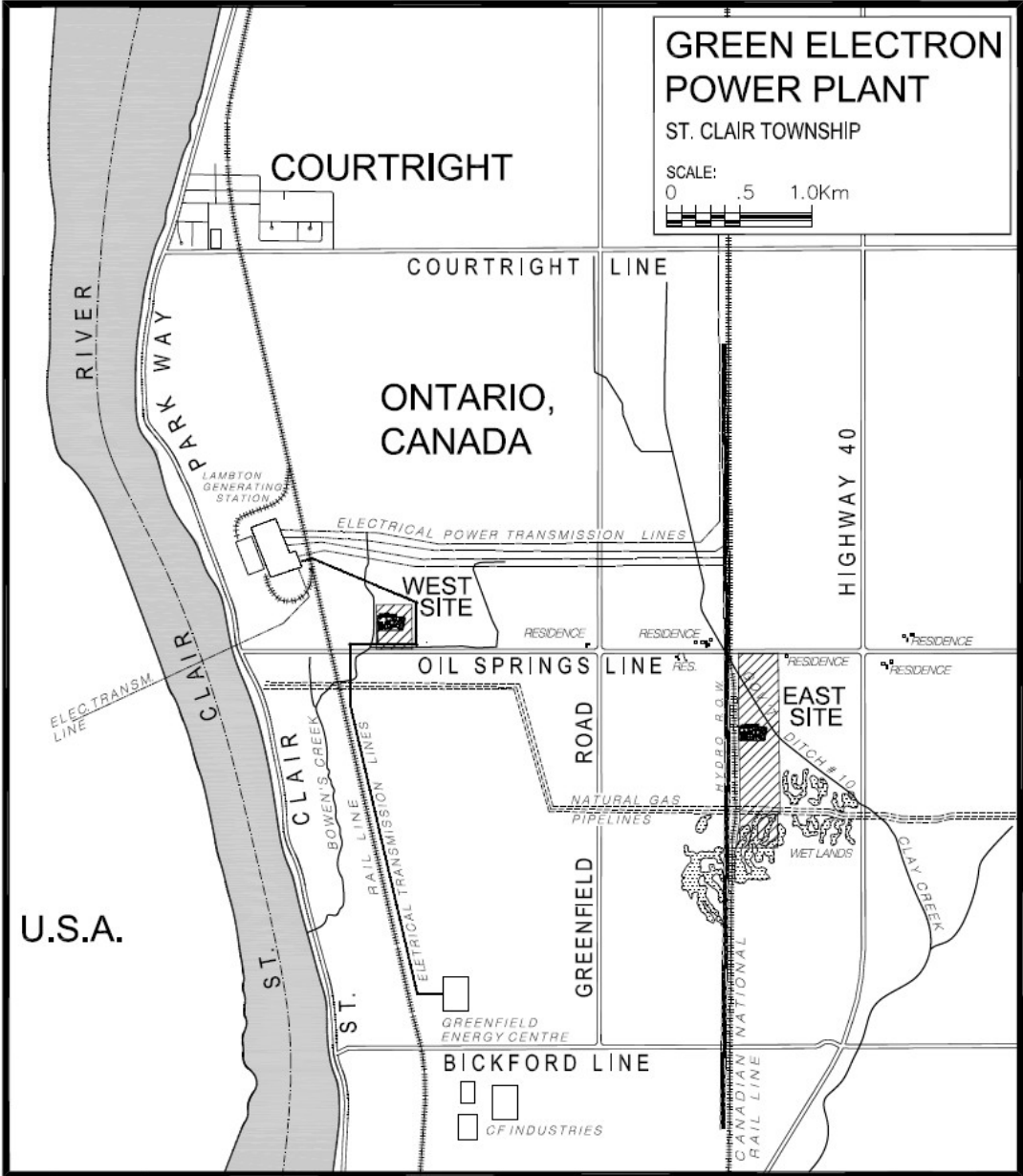
The project is within the potential traditional territory of eight First Nations in southwestern Ontario. However, the project sites are not on any land subject to a land claim by any First Nation, and there is no evidence that either site is currently being used for traditional purposes by any First Nation or other aboriginal peoples. The two nearest First Nations are: Aamjiwnaang First Nation (20 km to the north of the project) and Walpole Island First Nation (20 km south of the project).

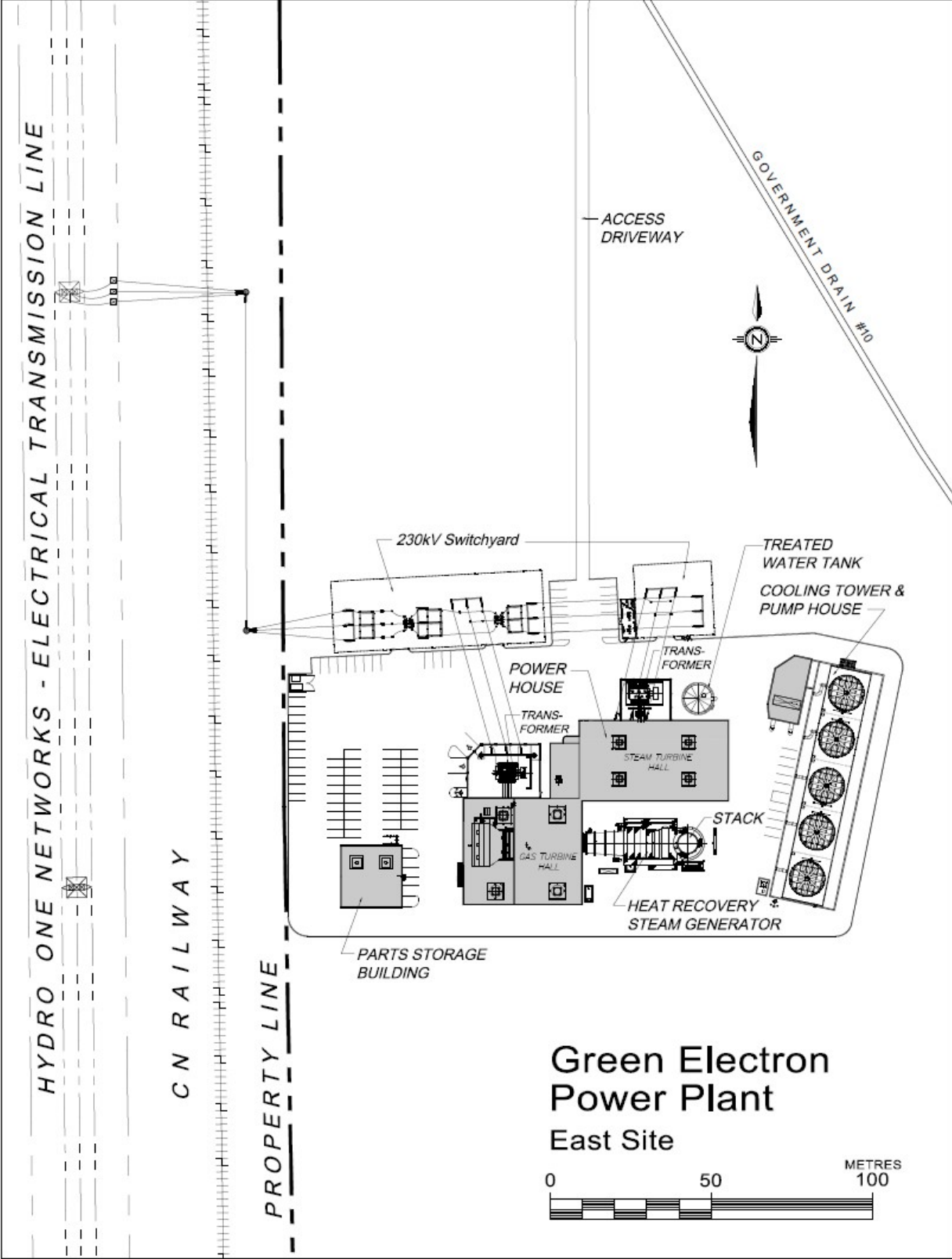
The project is not on or near any federal lands and the closest federal lands are about 20 km from either project site.

Both sites are municipally zoned M3 (Heavy industrial) by the current St. Clair Township Zoning By-law. This zoning designation allows electricity generating facilities. The proponent has separate conditional purchase agreements with the respective current owners of both the East Site and the West Site

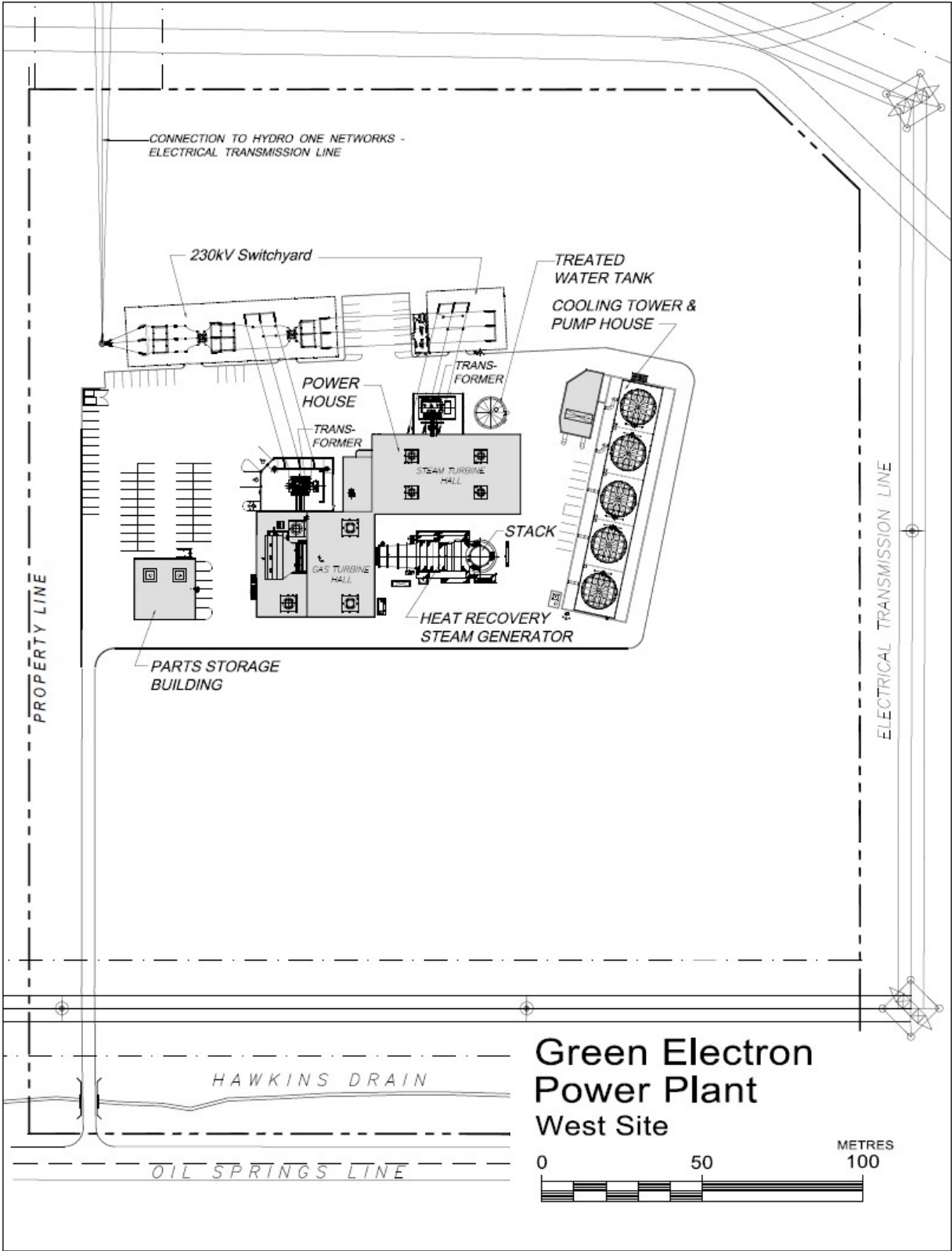
The East Site has no dwellings or buildings and is currently used as crop land. The West Site is without buildings and is currently vacant. Neither site has any current water use. The East Site is subject to the fill regulation requirements of St. Clair Region Conservation Authority (SCRCA). The lands around the East Site are currently used for agriculture, as well as a railway line and high pressure gas pipelines. The lands around the West site are currently used for coal-fired power generation by Ontario Power Generation (and accessory uses), agriculture, electricity transmission by Hydro One Networks Inc., mature new growth woodlot, and high pressure gas pipelines. There are no applicable local resource management plans or conservation plans, however the existing zoning by-law of St. Clair Township protects mature woodlots as well as drainage areas, and the SCRCA protects areas within their regulated line. The project will not require any removal of mature woodlot and any filling or structures to be located within the regulated line of the SCRCA will meet the conservation authority's permit requirements with respect to flood and erosion impacts.

The project does not involve the construction, operation, decommissioning or abandonment of any marine terminal; does not take place within the waters or lands administered by a Canada Port Authority under the *Canada Marine Act* and its regulations; and will not require access to, use or occupation of, or the exploration, development and production of lands and resources currently used for traditional purposes by Aboriginal peoples since there is no evidence that either site is currently used for traditional purposes by Aboriginal peoples.









## **FEDERAL INVOLVEMENT**

The project has no proposed or anticipated federal financial support and will not use any federal lands (nor any granting of interest i.e., easement, right of way, or transfer of ownership), and there will be no federal licenses or permits required.

## **ENVIRONMENTAL EFFECTS**

Both sites are current or former crop lands located in the Carolinian Forest Region, and lie in the watershed of the St. Clair River. Due to the relatively clean nature of the air emissions of the project, the limited physical footprint of the project and the predominantly agricultural land use, the species that may be adversely affected is expected to be very small. Based on the habitat present in the Project footprint area as determined by an ecological study for the project completed by qualified biologists, the only species at risk which may potentially be found present in limited areas are the Butler's Garter Snake, Eastern Fox Snake and Blanding's Turtle in the case of the East site and the Butler's Garter Snake, Blanding's Turtle, Blue/Golden-winged Warbler and Eastern Meadowlark in the case of the West site. These potentially present species will require mitigation measures to prevent disturbance should they actually be encountered.

Good mitigation measures will be able to reduce any impact of the project on air quality, water quality and wildlife species (including migratory birds) to insignificant levels. Manmade drainage ditches that connect to creeks leading to the St. Clair River and as have been used historically for field drainage in the region of the sites are on the property in the case of the East Site or adjacent to the property in the case of the West Site. No discharge will be made to these ditches and the development footprint is designed to be away from these features to minimize any potential impacts.

The project will have a positive effect on air quality and climate change since this project supports the Ontario Government's initiative to retire all coal fired electricity generation in the province, and coal fired electricity generation emits about twice the amount greenhouse gases per unit of electricity as does natural gas fired electricity generation. Likewise the impact on air quality of the project will be net positive since the proposed high efficiency natural gas generation facility will emit only about 9.1% of the nitrogen oxides (NO<sub>x</sub>), 0.035% of the sulphur dioxide (SO<sub>2</sub>) and none of the mercury that would be generated by a coal fired facility producing the same amount of electricity.

The project will include noise mitigation features such as inlet air silencing on the gas turbine and exhaust silencing on the exhaust stack such that the strict night time noise criteria under regulations of the MOE and Environmental Protection Act will be met.

The project will not have any emissions to ground water. The project's process waste water will be of low toxicity (primarily elevated hardness, and sulphates and residual disinfection chlorine) and will either be treated at the local sewage treatment plant or will be treated to reduce chlorine, suspended particulate solids and temperature on the project site and then discharged via an existing industrial discharge canal to the St. Clair River. Due to the very large flow in the St. Clair River, i.e., at about 240,000 times the treated wastewater discharge flow rate from the project, the residual mineral hardness and sulphates in the treated waste water will be readily assimilated by the river and therefore there will be no significant impact on the river's water quality. The municipal sewage treatment facility has confirmed that the project's wastewater will meet their quality criteria for acceptance and treatment.

The project's emissions to the air and to surface waters have been assessed through technical studies and these emissions will not significantly affect aquatic resources (including fish, fish habitat and aquatic species) due to the limited and reduced emissions to the air from clean burning natural gas and to the low toxicity of the project's wastewater, and as a result of its treatment either on the project site or at the local municipal sewage treatment plant.

The project will not require the removal of any mature woodlot or any wetland feature. The small 2 hectare footprint of the project also means that impact as to any lost crop, wild shrub and wild grass communities will be very small. The project's small footprint and its use of existing, low quality, extensively disturbed land habitat means that any impact of the project on wildlife will be insignificant.

Detailed pre-existing ecology and potential impact studies for the project found no species at risk at either site in September 2012. Based on the types and qualities of available habitats now on the areas to be developed on the project sites a moderate to low potential for future findings for those catalogued potentially present species at risk was assessed for the East and the West site. The East site was assessed to have a low likelihood of presence of Blanding's Turtle and moderate likelihood of presence of Butler's Garter Snake and Eastern Fox Snake. The West site was assessed to have a moderate likelihood of presence of the Butler's Garter Snake and Eastern Meadowlark, as well as a low to moderate likelihood of presence of Blue/Golden Winged Warbler and the Blanding's Turtle. The proponent will take appropriate mitigation measures to check for the eventual presence of these species at risk and if found will take appropriate additional protection and mitigation measures as set out in the ecological impact studies.

Since the project facilitates the replacement of coal fired electricity generation with clean natural gas fired generation the project will have a beneficial effect on human health and life. An independent study for the Province of Ontario found that the replacement of coal plants would annually prevent 660 premature deaths, 1,090 emergency room visits and 331,000 minor illnesses.

Ecological assessment studies of the sites have found there are no existing fish habitats present. No changes are expected to off-site fish and fish habitat as defined in the Fisheries Act since the only discharges to the natural environment from the project will be treated and will be of low toxicity, will meet MOE regulatory limits and will be quickly assimilated thus meeting all applicable regulatory limits designed to prevent harm to fish and fish habitat.

Ecological assessment studies of both the sites have found that there are no aquatic species at risk present on the sites and no project changes are expected to cause off-site impact to any aquatic species as defined in the Species at Risk Act. The only discharges to the natural aquatic environment from the project will be wastewater, appropriately treated, of low toxicity, will be quickly assimilated and will meet all applicable regulatory limits designed to prevent harm to aquatic species, including any species identified by the Act as being at risk.

Ecological assessment studies for both sites have shown that no changes are expected to migratory birds as defined in the Migratory Birds Convention Act since neither of the sites was found to contain significant habitat for migratory birds and the studies have provided mitigation measures providing for any removal of vegetation to be done outside of the nesting season.

No material changes to the environment are expected to occur, as a result of carrying out the

project, on federal lands, in a province other than the province in which the project is proposed to be carried out, or outside of Canada. The closest federal lands to the project consist of the Sarnia Harbour lands, the Blue Water Bridge lands, the Aamjiwnaang First Nation lands (each located about 20 km north of the project) and the Walpole Island First Nation lands (located about 20 km south of the project), at which distance the project will have no significant environmental impacts. The nearest interprovincial boundary is over 500 km away from the project, and the nearest Canadian border (on the St. Clair River) is about 3.5 km from the East site and 1.3 km from the West site. No significant changes to the environment are expected beyond 500 m from the project.

Since the nearest First Nation is about 20 km away from the project, no materially adverse effects are expected on Aboriginal peoples as a result of any changes to the environment that may be caused by the project, including materially adverse effects on health and socio-economic conditions, physical and cultural heritage. There is no evidence of any current use of the project lands and resources for traditional purposes by any First Nations or other Aboriginal peoples, given that the East Site is used for growing wheat and the West Site is vacant but protected within a 1.8 m high barbed wire security fence. Archaeological and heritage site assessment studies have been performed for both the East and the West sites and there is not any structure, site or thing on or near the proposed project site(s) that is known to be of historical, archaeological, paleontological or architectural significance.

## **ENGAGEMENT OF ABORIGINAL COMMUNITIES**

The potentially affected and interested Aboriginal groups include:

Walpole Island First Nation  
Aamjiwnaang First Nation  
Chippewa's of Kettle & Stony Point First Nation  
Chippewa's of the Thames First Nation  
Munsee-Delaware First Nation  
Caldwell First Nation  
Moravian of the Thames First Nation  
Oneida Nation of the Thames

The above list was arrived at through consultation with the Ministry of the Environment and the proponent has contacted each of these First Nations through telephone calls and two letters providing information on the project, seeking direct person to person consultative meetings and asking for any comments or concerns that they may have in relation to the project.

Neither the east or the West site is on First nation lands. Both sites are on lands previously ceded by the Walpole Island First Nation. A small portion of the East Site property (but not any of the area proposed for the power plant) is the source of a non-title claim that has been made by the Walpole Island First Nation for monetary compensation only (i.e. not for any return of lands or any provision of replacement lands) alleging improper behaviour by the Crown in disposing of the lands historically ceded by treaty and failure to provide all of the monetary proceeds of disposal to the Walpole Island First Nation. Canada has made a settlement offer to the Walpole Island First Nation in 2012 regarding that compensation claim.

During a meeting with the Chief of the Walpole Island First Nation and their consultation representatives it was indicated that they will review the project in accordance with their

protocol. At a follow-up meeting with additional leaders of this First Nation discussion focussed on participation by their peoples in the project through training and job opportunities.

During a telephone discussion with the Chief of the Aamjiwnaang First Nation it was indicated that they had not decided whether to comment on the project but likely would.

During a telephone discussion with the Chief of the Moravian of the Thames First Nation it was indicated that the project was not in their traditional territory and so no comment would be provided.

### **STAKEHOLDER CONSULTATION (NON-ABORIGINAL)**

Stakeholder consultation (non-aboriginal) to date is summarized in the table below:

Stakeholder Key Comments Received as of October 17, 2012	
Stakeholder	Key Comments Received To Date
St. Clair Township	Their zoning by-law allows for power generation on either the east or west site. Minor variances for the East site have been granted. Sewage capacity at Courtright WPCP is likely available for process blowdown
Lambton County	No objections
St. Clair Region Conservation Authority	The East site would require analysis of storm water flows to confirm flood and erosion related design features and permit requirements for fill placement
Ontario Ministry of the Environment	Extensive suggestions and comments on the Environmental Screening and Review of the project
Ontario Ministry of Infrastructure (OMI)	Details of environmental assessment needed if OMI administered lands are to be impacted.
Aboriginal Affairs and Northern Development Canada	No concerns or comments at this time.
Canada Food Inspection Agency	If any ash trees are to be removed the material is not to be transported outside of the affected zone for the emerald ash borer.
Lambton Area Water Supply System	Extra capacity is available but approval by the board of LAWSS is needed
CF Industries	Water and treated waste water discharge capacity is available for the project at their Courtright facility

Local residents	Most local residents attending the open houses were supportive of jobs and economic benefits with a small number (about 17%) expressing concern about construction impacts such as noise, traffic, dust, influx of workers, etc.
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**FURTHER REFERENCE**

Information supporting this executive summary of the Project Description can be found in a series of detailed reports prepared for the project under the environmental assessment process for electricity projects required by Ontario Regulation 116/01 of the Environmental Assessment Act, Ontario. These reports include air quality impact studies, archaeological studies, acoustic studies, ecological studies as well as reports on stakeholder consultations, and can be found online at <http://www.greenelectron.ca/electron.php?page=reports>.