Project Description Report:
Waterloo WWTP Cogeneration Facility

Prepared for
Region of Waterloo

December 2016
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Alternate formats of this document are available upon request. Please contact Pam Law at PLaw@RegionofWaterloo.ca, 519-575-4095, or 519-575-4608 to request an alternate format.
SECTION 1

Introduction

1.1 Purpose

The purpose of this draft Project Description Report (PDR) is to outline the proposed Biogas Facility (herein referred to as the Cogeneration Facility) to be located at the Waterloo Wastewater Treatment Plant (WWTP) in the City of Waterloo (City) as required in the Renewable Energy Approval (REA) process as set out in Ontario Regulations 359/09 and 521/10. The proposed Cogeneration Facility will have an electrical capacity of 600 kW.

The WWTP is owned by the Region of Waterloo (Region) and currently operated by the Ontario Clean Water Agency (OCWA) pursuant to ECA 9354-8J4PUE (sewage) and ECA 4605-8QMJJA (air) issued by the Ministry of Environment and Climate Change (MOECC).

1.2 Approvals Required

The project is to be constructed pursuant to the saveONenergy program. A placeholder application has been submitted and approved by the local distribution company (LDC), Waterloo North Hydro Inc., securing the Project under the saveONenergy program.

In addition to the REA required, the following approvals will be required prior to REA approval:

- Natural Heritage Assessment reports approved by the Ministry of Natural Resources and Forestry (MNRF); and
- Archaeological Resource Assessment and Cultural Self-Assessment reports approved by the Ministry of Tourism, Culture and Sport (MTCS).

The MTCS provided archaeological approval November 30, 2016. Approval from the MNRF is expected by early 2017.

As part of the detailed design phase, approvals from the following agencies will be required: Waterloo North Hydro Inc., Hydro One Limited, CLEAResult, Electrical Safety Authority (ESA) and Technical Standards and Safety Authority (TSSA). The Grand River Conservation Authority (GRCA) and local municipalities will also have to approve the project prior to construction. Any necessary updates to Environmental Compliance Approvals (ECAs) will be completed.

No federal government approvals are required.

1.3 Project Location

The project will be located within the existing WWTP property boundary at 340 University Avenue East in the City of Waterloo. The location and surrounding area is depicted in Figure 1. Figure 2 provides a preliminary site plan.

1.4 Property Ownership and Facility Operation

The property is owned by the Region. The Region may choose to have the WWTP operator also operate the Cogeneration Facility or may have third parties such as equipment manufacturers operate the facility.
1.5 Consulting Team

The team retained by the Region of Waterloo is led by CH2M HILL Canada Limited (CH2M) with support from Riepma Consultants Inc. (Riepma), CIMA and Eramosa Engineering Inc. (Eramosa).

Contact information is as follows:

<table>
<thead>
<tr>
<th>Name</th>
<th>Title</th>
<th>Firm</th>
</tr>
</thead>
<tbody>
<tr>
<td>Pam Law, P.Eng.</td>
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1.6 Site Description

Figure 1 depicts the approximate location of the proposed cogeneration unit. Figure 1 also identifies all of the land uses within 300 metres (m) of the proposed cogeneration unit. The nearest receptor is a home on Dale Crescent located 175 m from the cogeneration unit.

1.7 Surrounding Land Uses

Lands immediately surrounding the WWTP are all open space uses. To the north and east is a four lane highway (Ontario Highway 85). To the west, beyond the open space, is a residential community. To the south is a municipal road (University Avenue).

1.8 Land Use History

The subject property has been used as a WWTP for many years. The WWTP was originally constructed in 1962 and is currently being upgraded. This is considered to be a heavy industrial public use.
SECTION 2

Project Information

2.1 Input

It is estimated that the anaerobic digesters at the existing WWTP produce 4,000 to 7,000 cubic metres (m$^3$) of biogas daily. Historically, the biogas was used for sludge heating by burning the biogas in dual-fired boilers (biogas/ fuel oil). New boilers were installed which have the potential to burn biogas and natural gas to heat sludge and digester buildings. Biogas can also be burned via the on-site waste gas burner.

The proposed installation will intercept the biogas flow to the boilers and flare and redirect it to a reciprocating engine generator. There is sufficient biogas to run a 600 kW engine. Should the digester produce more gas than the engine can use, surplus gas will be directed to the new boilers and then the existing flare. As a result, flaring will be significantly reduced.

The electrical power produced by the generator will be consumed within the WWTP, thereby offsetting power purchases to operate the plant. No power will be exported from the site. The heat produced by the engine will be used to heat incoming sludge to the digesters and heat the digester buildings when required (mainly in the winter months). Since the engines are less thermally efficient than the boilers (the total energy produced by the engines is divided between both electrical and thermal energy instead of the boilers’ exclusively thermal energy production), supplemental natural gas will be required to offset the reduction in thermal energy production by the engines that is needed to meet the plant’s current boiler heating demands.

2.2 Facility Components

The main components of the Cogeneration Facility are as follows:

- One (1) gas conditioning system;
- One (1) 600 kW generator package (including natural gas blending equipment); and
- Two (2) heat exchangers.

Biogas storage is not recommended for the Cogeneration Facility. It is anticipated that the WWTP will produce enough biogas to operate the engine at minimum capacity. Fluctuations in biogas quantities will be buffered by blending with natural gas. Figure 2 illustrates the footprint of each of these items.

2.3 Construction

Construction is expected to commence March 2018 and commissioning complete by April 2020. Construction will be designed to minimize disruption to the existing operation of the plant. The generator and the gas conditioning systems are containerized and will be delivered to site and placed on a poured concrete foundation. Trenching will be required to connect all heating, gas and electrical lines. The existing building between the two digesters will be expanded to accommodate new heat exchangers and the existing switchgear will be modified to accommodate the new generator.
The Construction Plan Report describes Project activities undertaken during the construction phase and mitigation measures for potential negative environmental effects. The report includes sections discussing:

- Construction activities;
- Materials brought on site;
- Construction equipment used;
- Timing and operational plans;
- Temporary uses of land;
- Temporary water takings;
- Materials/waste generated; and
- Potential negative environmental effects.

A high-level summary of these sections has been provided herein. Reference to the Construction Plan Report should be made for further details.

2.3.1 Construction Activities

No decommissioning of major equipment is required in preparation for the Cogeneration Facility equipment. Site preparation is expected to be minimal since no natural habitat is present within the existing Project Location. Shallow excavations for the expansion of the Digester Control Building and footings to support containerized equipment will be required. No new buildings will be constructed; however, the Digester Control Building will be expanded. Equipment manufacturers will test and inspect installed equipment. The Technical Standards Safety Authority (TSSA) and Electrical Safety Authority (ESA) will inspect and approve the equipment.

2.3.2 Materials Brought on Site

Where required, engineered fill will be brought on site. Concrete will be brought on site for the foundations beneath the generator and gas conditioning system.

2.3.3 Construction Equipment Used

Conventional construction equipment will be used for this Project. A list of equipment is included in the Construction Plan Report. Examples include excavators, cement trucks, mobile cranes.

2.3.4 Timing and Operational Plans

Construction is expected to commence March 2018 and commissioning complete by April 2020. The exact sequencing and duration of activities will be developed during the design phase. Care will be taken to accommodate ongoing construction projects at the WWTP.

2.3.5 Temporary Uses of Land

Mobile site trailers for equipment storage and administrative offices are the only anticipated construction activities that will require temporary changes to land.
2.3.6 Temporary Water Takings
Due to shallow excavations, it is not anticipated that geotechnical issues will arise. However, if a geotechnical investigation recommends that more than 50,000 L/d of water will need to be pumped, a Permit to Take Water (PTTW) from the MOECC will be obtained by the Region.

2.3.7 Materials/Waste Generated
Due to the containerized approach of the Cogeneration Facility, it is not expected that there will be significant materials or waste generated during construction. The Construction Plan Report outlines approaches for managing waste that is generated.

2.3.8 Potential Negative Environmental Effects
The following potential negative environmental effects are described within the Construction Plan Report:

- Dust and noise emissions;
- Lighting;
- Vegetation and habitat;
- Impacts to water resources;
- Impacts on cultural heritage and archaeological resources; and
- Impacts on local roads and traffic.

In addition to these effects being described within the Construction Plan Report, they are summarized in the Environmental Effects Section of this PDR.

2.4 Design and Operation
The purpose of the Design and Operations Plan Report is to outline the site plan, equipment, how the facility will be operated and environmental effects monitored and mitigated in addition to an emergencies and communications plan. The report includes plans discussing:

- Facility design;
- Facility operation;
- Environmental effects, mitigation and monitoring; and
- Emergency response and communications planning.

2.4.1 Facility Design Plan
The Facility Design Plan provides details on the technical elements of the facility so that the environmental impact of the facility can be evaluated. A description of each piece of major equipment, its location onsite and technical requirements are described.
2.4.1.1 Gas Conditioning System

The purpose of gas conditioning systems is to remove moisture, siloxanes and hydrogen sulphide (H₂S) from the biogas prior to it entering the engine. In order to mitigate negative downstream effects on the processes, it is desired that that biogas have the following parameters:

- Less than 0.15% v/v H₂S;
- 60-80% moisture content or less; and
- Less than 10 mg total siloxanes/ Nm³ methane.

The biogas at the Waterloo WWWTP contains low enough concentrations of H₂S that pretreatment of the biogas for the removal of H₂S is not required. The gas conditioning system will be containerized and consist of the following major equipment:

- Gas compressor to raise biogas (digester gas) pressure to overcome headloss of the gas conditioning system and allow for direct feeding into the engine;
- Condensing heat exchanger cooled by chilled water to remove moisture; and
- Activated carbon to remove siloxanes.

2.4.1.2 600 kW Generator Package

The generator package will be the main component of the Cogeneration Facility, tying into the gas conditioning system. The vendor for the internal combustion generator package has not been selected yet, however vendor packages typically contain similar components. Typical components include:

- Gas engine generator;
- Natural gas fuel blending system;
- Exhaust system;
- Fuel system;
- Heat recovery system;
- Lubricating oil system;
- Switchgear; and
- Control system.

The generator package will be located in close proximity to the Boiler Building, central to the digester system (biogas tie-ins) and the Energy Centre (electrical tie-in).

The engine can only operate between 60% and 100% its capacity. A 100 kW buffer between the engine electrical output and the plant’s electrical consumption will be maintained at all times. Subsequently, if there is not enough electrical demand at the plant, the engine will need to be turned down and accept less biogas as fuel. If the plant’s electrical demand is high, natural gas may be used to supplement biogas to maximize electrical output from the engine.

2.4.1.3 Heat Exchangers

Two heat exchangers will be installed, utilizing the heat generated by the generator package to pre-heat the recirculated boiler return water. This water is then used to heat the sludge before it is transferred to the anaerobic digesters. The existing Digester Control Building between the two digesters will be expanded to accommodate the new heat exchangers.
2.4.2 Facility Operational Plan

The Facility Operational Plan outlines commissioning and operation activities. The operation of the Cogeneration Facility is currently known at a conceptual design level. As detailed design progresses, operational approaches will be fine-tuned and elaborated.

2.4.2.1 Consumables and Waste Products

The Cogeneration Facility is anticipated to consume the following:

- Gas Conditioning System: activated carbon or proprietary media;
- 600 kW Generator Package: lubricant oil, engine cooling fluid; and
- Heat Exchangers: heat transfer medium like glycol, potential conditioning chemicals for anti-corrosion, descaling, etc.

The Cogeneration Facility is anticipated to produce the following waste products:

- Gas Conditioning System: spent activated carbon or proprietary media.
- 600 kW Generator Package: used lubricant oil, engine cooling fluid.

2.4.2.2 Maintenance

A preventative maintenance schedule will be developed based on supplier maintenance recommendations. Preventative maintenance will not affect the WWTP function as biogas can be utilized in the existing boilers to heat sludge and buildings when necessary. This would also be the case for emergency maintenance procedures.

2.4.2.3 Monitoring

The quantity of sludge into the digesters and biogas from the digesters will be continuously monitored. The quality of the sludge and biogas will be periodically analyzed to optimize the gas composition for combustion in the engine.

2.4.3 Emergency Response and Communications Plans

The purpose of the Emergency Response and Communications Plan is to develop a plan to manage emergencies with regard to the Cogeneration Facility and provide channels for communication to the public, municipalities, relevant Ministries of Ontario Government and other organizations. The Emergency Response and Communications Plan developed in the Design and Operations Report is high-level. The plan will be updated to be more functional prior to the construction phase of the Project. The functional plan will cover all phases of the Project from construction, through design and operation and decommissioning.
2.4.3.1 Emergency Response

Responses to emergency scenarios will be developed in line with the Environmental Protection Act. Of importance, a procedure for responding to spills will be developed. The functional plan will also include a chain of communications to contact relevant stakeholders based on the emergency scenario. Potential stakeholders include:

- Public;
- Region of Waterloo;
- City of Waterloo;
- Ministry of Environment and Climate Change; and
- Ministry of Natural Resources and Forestry.

2.4.3.2 Non-Emergency Communications

The Region has implemented a webpage dedicated to the REA process. The REA process mandates that the PDR and draft REA reports be posted on the webpage for public review prior to public consultation. The Region has an existing protocol to receive, log and address complaints received from the public or any other stakeholders, as does OCWA, the current operator of the Waterloo WWTP. The functional plan will further detail this protocol and any other emergency and non-emergency communication approaches. The functional plan will also indicate how potential stakeholders will be provided with notification of project changes, results of ongoing project monitoring and other relevant matters.

2.5 Decommissioning

The Cogeneration Facility will be located at the WWTP. The Region’s Wastewater Treatment Master Plan, prepared in 2007, indicated that the Region’s intent is to have the WWTP provide wastewater treatment for the sewershed long-term, upgrading as appropriate to accommodate increased flows and technology advancements. It is likely that the Cogeneration Facility will continue to function at the WWTP, maintained by equipment replacements and upgrades, so long as it is the most efficient and economical use of biogas at the WWTP.

The purpose of the Decommissioning Plan Report is to describe potential activities to retire the elements of the Cogeneration Facility, restoring the land and managing the excess materials and waste.

Decommissioning of the Cogeneration Facility could include reuse or disposal of the facility components. Some components could be used at other WWTPs due to their containerized nature, repurposed for another use, sold or disposed of.

The Decommissioning Plan Report includes an overview of:

- Procedures for dismantling and demolishing;
- Site restoration;
- Managing excess materials and waste; and
- Decommissioning notification.

As part of the REA approval, the Director often imposes a condition in which the Decommissioning Plan Report must be updated six months prior to actual decommissioning. As such, decommissioning approaches will be refined and details developed at that time.
SECTION 3

Environmental Effects

As prescribed by the REA process, a Cultural Heritage Self-Assessment, Archaeological Assessment, Natural Heritage Assessment (NHA), Water Assessment (WA), Emission Summary Dispersion Modelling (ESDM), Noise Study and Odour study were conducted. Results of these studies and assessments are presented in the herein.

3.1 Cultural Heritage

A Cultural Heritage Self-Assessment was completed as part of the REA process. The Region, the City, the Ministry of Tourism, Culture and Sport (MTCS) and the Ontario Heritage Corporation all confirm that this property nor any properties in the vicinity are designated or proposed to be designated for protection.

3.2 Archaeology

An Archeological Resource Assessment was conducted and it was determined that the location of the Cogeneration Facility does not contain evidence for archeological potential. The area has previously been disturbed which would have resulted in deep subsurface alteration that would have removed any extant archeological potential. As a result, no further archeological assessments are recommended.

3.3 Natural Heritage

A Natural Heritage Assessment (NHA) has been completed to evaluate the natural features located within 120 m of the Cogeneration Facility with consideration of activities involved in the construction, operation and decommissioning of the facility. Figure 3 outlines the 120 m buffer from the Cogeneration Facility. Further details are available in the NHA Report.

As part of the NHA, a Records Review was conducted to gather information about the area and identify natural features. The Records Review revealed the presence of wetland and wooded areas within 120 m of the Cogeneration Facility. No natural vegetation is located within the WWTP property bounds. Vegetation communities do exist however, within the 120 m buffer area. Site reconnaissance confirmed the Records Review and subsequently wooded and wetland areas were brought forward to the Evaluation of Significance (EOS) Report as part of the NHA. Figure 4 outlines the ecological land classification within the 120 m buffer.

Significant wildlife habitats identified include: Amphibian Breeding Habitat, Amphibian Movement Corridors, Turtle Wintering Areas, Colonially Nesting Bird Breeding Habitat (Ground) and the Eastern Wood-Pewee. These natural features were brought forward to the Environmental Impact Statement (EIS) as part of the NHA. The EIS evaluated potential direct and indirect effects on natural features and recommended mitigation strategies. The effects and mitigation strategies relating to the operation of the Cogeneration Facility have been included in the Environmental Effects Summary Section of this PDR.
3.4 Water Bodies

A Water Assessment (WA) was completed to identify water bodies within 120 m and evaluate the potential negative environmental effects and recommend mitigation strategies for construction, operation and decommissioning phases. Figure 5 depicts the water bodies located within 120 m of the Cogeneration Facility – Laurel Creek and its tributaries. Potential negative environmental effects and recommended mitigation strategies related to the operation of the Cogeneration Facility have been included in the Environmental Effects Summary Section of this PDR.

3.5 Emission, Noise and Odour Receptors

ESDM, Noise Study and Odour Study reports were prepared in support of the REA application.

3.5.1 Emissions

The Cogeneration Facility is expected to emit products of combustion such as nitrogen oxides and sulfur dioxide. The impact of contaminant emissions was modelled using the U.S. Environmental Protection Agency (EPA) AERMOD atmospheric dispersion model and compared to applicable Schedule 3 Standards of MOECC O.Reg. 419/05. The modelling scenario assumed operating conditions for the Project that result in the highest concentration of each significant contaminant at a point of impingement (POI) that the Project is capable of. The ESDM report demonstrates that the Project can operate in compliance with the MOECC O.Reg. 419/05. Further details are available in the ESDM Report.

3.5.2 Noise

The Noise Study identified noise sources from the Cogeneration Facility and other existing noise sources. These sources included: heat recovery units, rooftop HVACs, biofilter exhaust fans, wall-mounted exhaust fans, process air pipes, digester mixers, and transformers.

The five (5) nearest residential houses were identified as being representative of the most impacted sensitive points of reception (PORs) in the vicinity of the facility. Figure 6 illustrates the location of these PORs. The proposed Project’s major noise sources are limited to the Cogeneration Facility exhaust stack and the combined heat and power (CHP) system air-born casing noise. Representative sound data were provided from potential vendor design specification details. Noise control measures will be incorporated into the design of the Cogeneration Facility to meet the design condition of overall sound pressure level of 65 dB(A) measure at 10 meters from the CHP Unit.

The assessment concluded the predicted noise levels from the standalone Project and from the combined operation of the Project and the existing sources will comply with MOECC noise level limits at the identified PORs. The Cogeneration Facility is not a significant source of vibration. This Noise Study Report demonstrates that with the addition of the Cogeneration Facility, the Waterloo WWTP will continue to operate in compliance with the MOECC noise guidelines. Further details are available in the Noise Study Report.
3.5.3 Odour

The proposed Cogeneration Facility is not expected to increase odour emissions from the WWTP during normal operation as biogas pretreatment and high combustion temperatures are sufficient to mitigate potential odour emissions. Considering the worst-case of incomplete combustion, the total reduced sulfur (TRS) emissions from the Cogeneration Facility only account for 0.45% of plant-wide TRS emissions. No negative environmental effects with respect to odour are expected from the operation of the Cogeneration Facility.

Emissions from existing operations will be unaffected and are not Project related. These emissions have been assessed and approved by the MOECC, and therefore no further odour assessment was completed for this Project. Further details are available in the Odour Study Report. Any public complaints will be responded to in accordance with the Project’s Emergency Response and Communications Plan.

3.6 Environmental Effects Summary

Potential negative environmental effects for this Project are based on the following reports developed in support of the REA application:

- Cultural Heritage Self-Assessment Report;
- Archeological Assessment Report;
- Natural Heritage Assessment Report;
- Water Assessment Report;
- Emissions Summary and Dispersion (ESDM) Report;
- Noise Study Report; and
- Odour Study Report.

Please refer to these reports for more details.

Table 1 (from the Construction Plan Report) provides an overview of the potential negative effects that may occur during the construction (and decommissioning) of the Cogeneration Facility along with mitigation strategies and monitoring metrics.

Table 2 (from the Design and Operations Report) provides an overview of the potential negative effects that may occur during the operation of the Cogeneration Facility along with performance objectives, mitigation strategies, monitoring plan and contingency measures. The performance objectives represent how successful mitigation will be measured. Contingency measures will be put in place if the performance objective is not being met.

It should be noted that there are no anticipated negative emission or odour impacts. The WWTP is expected to operate within its existing ECA requirements and as such, emissions and odour have not been included in Table 2.
### Table 1. Construction – Potential Negative Environmental Effects

<table>
<thead>
<tr>
<th>Potential Negative Environmental Effects</th>
<th>Mitigation Strategy</th>
<th>Effectiveness Monitoring of Mitigation</th>
</tr>
</thead>
<tbody>
<tr>
<td>Generation of dust onsite and potential offsite migration of dust</td>
<td>• Erosion and sedimentation controls as outlined herein will be implemented in addition to the implementation of a dust suppression program – water or dust suppressants as needed.</td>
<td>Monitoring of sediment control measures to limit dust generation.</td>
</tr>
<tr>
<td>Potential offsite movement of soil from cleared areas and stockpiles through erosion processes</td>
<td>• Consult available guidance documents for Best Management Practices. &lt;br&gt; • To minimize land disturbance, the construction envelope will be clearly demarcated and kept as small as possible. Construction workers will be briefed on the sensitivity of areas outside of the construction envelope. &lt;br&gt; • Minimize changes in land contours and natural drainage. &lt;br&gt; • Minimize areas of impervious surfaces. &lt;br&gt; • Minimize vehicle traffic on exposed soils, avoid compacting or other hardening of natural ground surface. Avoid the movement of heavy machinery on areas with sensitive slopes. &lt;br&gt; • Control access and movement of equipment. &lt;br&gt; • Implement temporary erosion and sediment control measures and runoff conveyance structure as appropriate (silt fence, straw bales, vegetative buffers, etc.). Maintain these measures until the site has stabilized. &lt;br&gt; • In particular, silt fencing between the construction and the cattail marsh and between the construction and the south side of the WWTP. &lt;br&gt; • Store any stockpiled materials at least 30 m away from watercourse. Stockpiled material will be covered to prevent erosion prior to transport. &lt;br&gt; • Check that erosion control tools are in good repair and properly functioning prior to conducting daily work and reinstall or repair as required prior to commencing daily construction activities. &lt;br&gt; • At no time shall muddy water or debris be allowed to discharge from the site into the adjacent natural features. &lt;br&gt; • All areas are to be re-established immediately after completion of the works.</td>
<td>Monitoring of sediment control measures to minimize erosion and sediment runoff.</td>
</tr>
</tbody>
</table>
### Table 1. Construction – Potential Negative Environmental Effects

<table>
<thead>
<tr>
<th>Potential Negative Environmental Effects</th>
<th>Mitigation Strategy</th>
<th>Effectiveness Monitoring of Mitigation</th>
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</thead>
</table>
| Changes to surface water quality in neighbouring watercourse (indirectly affects amphibians) | • Locate staging areas away from the edge of the WWTP to limit risk of impacts to natural features and surface water quality from accidental spills.  
• Monitor local water levels to prevent negative effects.  
• Implement sedimentation and erosion control strategies as previously listed. | Monitor silt fencing to so that sedimentation does not migrate to adjacent natural features. |
| Disruption to Brewer’s Blackbird and Eastern Wood Pewee breeding habitat | • During the breeding bird season (April 5 - August 28), a qualified avian biologist will be contacted to conduct a breeding bird survey to determine the presence of breeding birds within the cultural area along Laurel Creek and in the forests.  
• If Brewer’s Blackbird and/or an Eastern Wood Pewee is nesting in the area, a nest search will be conducted by an experienced nest searcher and completed a maximum of 3 days before any activity may occur in that location.  
• If evidence of nesting is observed for Eastern Wood Pewee or Brewer’s Blackbird (i.e., visual or auditory) within the 120m boundary of the Project Location consultation should occur with the MNRF immediately and construction activities may be temporarily suspended. | Breeding bird survey to be conducted every 3-4 days prior to and during construction. |
| Potential spill and offsite release | • Consult available guidance documents for Best Management Practices.  
• Direct contractor to provide machinery arriving on-site in a clean, washed condition and maintained free of fluid leaks.  
• All materials and equipment used for the Project shall be operated and stored in a manner that prevents any deleterious substance from entering adjacent watercourses. Prevent spillage of stored chemicals, gasoline, fuel or other petroleum products into the adjacent watercourses.  
• A solid waste management program will be implemented for typical debris handling and disposal; all waste generated will be disposed according to applicable regulations.  
• Direct contractor to have absorbent materials available on-site in the event that a spill of deleterious substances should occur. All spills and leaks of deleterious substances must be immediately contained and cleaned up in accordance with regulatory requirements and reported immediately to the Ontario Spills Action Centre at 1-800-268-6060.  
• Comply with the requirements of Workplace Hazardous Materials Information System (WHMIS) regarding use, handling, storage and disposal of hazardous materials and regarding labelling and the provision of material safety data sheets acceptable to Labour Canada. | Monitor all equipment for leaks and proper operation. |
### Table 2. Operation – Potential Negative Environmental Effects

<table>
<thead>
<tr>
<th>Potential Negative Effect</th>
<th>Performance Objective</th>
<th>Mitigation Strategy</th>
<th>Monitoring Plan and Contingency Measures</th>
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<tbody>
<tr>
<td>Generation of dust onsite and potential offsite migration of dust/</td>
<td>Dust and soil movement levels reduced to pre-construction levels.</td>
<td>- Dust and soil movement is anticipated to be reduced once construction is complete. Disturbed areas will be re-established.</td>
<td>If dust and soil movement continues to be an issue, further erosion and sedimentation controls will be investigated and implemented.</td>
</tr>
<tr>
<td>Potential offsite movement of soil from cleared areas and stockpiles through erosion processes</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Increase in noise</td>
<td>Meet overall sound pressure level of 65 dB(A) measure at 10 meters from the CHP Unit.</td>
<td>- Noise control measures will be incorporated into the design of the Cogeneration Facility to meet the performance objective.</td>
<td>Once in operation, if the CHP unit is not meeting the performance objective, an evaluation will be conducted. Contingency measures may include adding additional noise attenuation strategies.</td>
</tr>
<tr>
<td>Increase in light</td>
<td>Minimize disturbance to natural heritage features</td>
<td>- If lighting is added, it will be located and directed away from the surrounding wooded features to minimize impacts on birds. Direct upward light should be eliminated, spill light minimized and all lighting sources should illuminate only non-reflective surfaces (City of Toronto Green Development Standard, 2007).</td>
<td>If natural heritage features are found to be negatively impacted by any installed lighting at the Cogeneration Facility, alternative lighting will be evaluated.</td>
</tr>
<tr>
<td>Potential spill and offsite release</td>
<td>Infrequent spills and successful implementation of Contingency Plan in the event of a spill.</td>
<td>- Consult available guidance documents for Best Management Practices.</td>
<td>If spills are occurring frequently and/or not being adequately responded to, the manner in which materials are stored and the response process will be re-evaluated.</td>
</tr>
</tbody>
</table>
### Table 2. Operation – Potential Negative Environmental Effects

<table>
<thead>
<tr>
<th>Potential Negative Effect</th>
<th>Performance Objective</th>
<th>Mitigation Strategy</th>
<th>Monitoring Plan and Contingency Measures</th>
</tr>
</thead>
</table>
| Potential spill and offsite release (cont’d)    | See above              | • All materials and equipment used for the Project shall be operated and stored in a manner that prevents any deleterious substance from entering adjacent watercourses. Prevent spillage of stored chemicals, gasoline, fuel or other petroleum products into the adjacent watercourses.  
• A solid waste management program will be implemented for typical debris handling and disposal; all waste generated will be disposed according to applicable regulations.  
• Have absorbent materials available onsite in the event that a spill of deleterious substances should occur. All spills and leaks of deleterious substances must be immediately contained and cleaned up in accordance with regulatory requirements and reported immediately to the Ontario Spills Action Centre at 1-800-268-6060.  
• Comply with the requirements of Workplace Hazardous Materials Information System (WHMIS) regarding use, handling, storage and disposal of hazardous materials and regarding labelling and the provision of material safety data sheets acceptable to Labour Canada. | See above |


4.1 Provincial Policy Statement 2014

Section 1.6.11.2 of the Provincial Policy Statement (PPS) states that “planning authorities should promote renewable energy systems and alternative energy systems, where feasible, in accordance with provincial and federal requirements.” The proposed Cogeneration Facility is a renewable energy system as it uses biogas produced from wastewater treatment to generate electricity and heat. The policies of the PPS are supportive of initiatives such as the proposed Cogeneration Facility.

4.2 Region of Waterloo Official Plan

The site location is identified as being within the Built Up Area in the Region of Waterloo Official Plan. Section 5.3 of the Official Plan indicates that the Region will optimize operations at their existing WWTPs. As well, Section 3.4 promotes alternative/ renewable energy systems in appropriate locations and Section 3.D.2 states that the Region will use energy conservation techniques in Regional facilities where ever feasible.

The proposed Cogeneration Facility at this location implements existing regional policy.

4.3 City of Waterloo Official Plan

The site location is designated as Open Space in the City of Waterloo Official Plan. Municipal facilities such as the WWTP are permitted within the Open Space designation (section 10.5.1 (3)). Section 8.5 (9) states that renewable energy systems are permitted in all land use designation and will be developed in accord with provincial and federal regulations.

The proposed Cogeneration Facility conforms with the City’s official plan policy and will be developed in accordance with provincial requirements.

4.4 City of Waterloo Zoning Bylaw

The subject lands are zoned G Green Zone in the City of Waterloo zoning bylaw 1108. A WWTP is a permitted use within this zone.
SECTION 5

Public Health and Safety

Appropriate processes and procedures will be employed to prioritize the safety of the public and the workers on site. Normal construction safety practices will be employed and the work will be performed by licensed and experienced contractors. An emergency and contingency plan will be in place for the construction period. The Cogeneration Facility will be inspected, tested and commissioned before it goes into full operation.
Figures
Notes:
1. Aerial Photograph - December 2014 Data set is copyrighted by First Base Solutions Inc. and licensed to CH2M HILL.

Figure 1
Location of Waterloo Cogeneration Facility and Nearest Receptor

Region of Waterloo
Region of Waterloo, Ontario
Figure 2
Cogeneration Facility Site Plan Layout
Waterloo WWTP Combined Heat and Power (CHP) Detailed Engineering Study Draft (January 2016) - Modified
Regional Municipality of Waterloo, Ontario
Figure 3
Project Location with 120 m Buffer
Waterloo WWTP
Region of Waterloo, Ontario
Figure 5
Project Location with 120 m Buffer and Identification of Water Bodies within Buffer
Waterloo WWTP
Region of Waterloo, Ontario

Notes:
1. Aerial Photograph – December 2014; data set is copyrighted by First Base Solutions Inc. and licensed to CH2M HILL.
Figure 6
Waterloo WWTP Noise Points of Reception Map
Regional Municipality of Waterloo, Ontario