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Petawawa Net Zero Facility
Surface Water Assessment Report

February 7, 2023

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1 Introduction

The Petawawa Net Zero project (Project) will transform the Petawawa Water Pollution Control Plant (WPCP) into a Resource Recovery Facility by upgrading its anaerobic digesters to digest an organic slurry along with wastewater solids and generate electricity with Combined Heat and Power (CHP) for the purpose of making the WWTP Net Zero in terms of energy use.

The modifications to the WPCP include:

- Improving the anaerobic digesters so they are compliant with an order from the Technical Standards and Safety Authority
- Modifying the digesters so they can accept an organic slurry;
- Construction of concrete pads for placement of equipment;
- Addition of biogas cleaning and conditioning equipment; and
- Installation of a CHP with a nameplate capacity of 200 kW to generate electricity and heat.

This Surface Water Assessment Report has been written in accordance with the guidelines provided by the Ministry of the Environment, Conservation and Parks (MECP) entitled: "Additional reports that may be required as part of an REA application". This report is required to satisfy part of the requirements for a Renewable Energy Approval (REA) under Ontario Regulation 359/09 (O. Reg 359/09).

A Surface Water Assessment Report is required for Class 3 anaerobic digestion facilities and must be completed by a licensed professional engineer or professional geoscientist (or by someone under supervision of such professionals). The report must include:

- Plans, specifications and descriptions of the surface water features at the project location and any surface water features that will receive a direct discharge of treated sewage as part of engaging in the project.
- An assessment of the suitability of the facility for the handling, storage and processing of biomass, source separated organics, farm materials, and digestate material, taking into account:
    - The design of the facility, including features that will be implemented to control the expected production of leachate;
    - The flow of surface water and erosion and sedimentation resulting from the flow of surface water;
    - The surface water features within 300 metres of the location where biomass, source separated organics or farm material will be handled, stored or processed;
    - Any surface water features that will receive a direct discharge of treated sewage from the facility and the surface water features of the project location;
    - The ability to identify negative environmental effects of leachate production on the surface water by monitoring; and
    - The feasibility of contingency plans that can be implemented to control negative environmental effects on surface water resulting from the production of leachate in a quantity greater than expected or with a quality worse than expected.

2 Description of Surface Water Features

The Project will be integrated into the Petawawa WPCP, located at 560 Abbie Lane, Petawawa, County of Renfrew, K8H 2E6. The WPCP site has been developed, and redeveloped over decades as the WPCP has been upgraded and expanded to treat sewage from the Town of Petawawa and Garrison Petawawa. Currently, the components of the WPCP are located within a fenced 2.5 hectares area. Figure 1 is a satellite image of the site, a site plan showing the surrounding land uses is shown in Figure 2, and Figure 3 shows the Net Zero components. Surface water features are set out in Figure 4 and include the Ottawa River, three drainage swales (DF1-3 in Figure 3), an unnamed stream and wetlands. It is important to note that none of the surface water features described in this section will receive a direct discharge of effluent. Any process streams from the Net Zero facility will be discharged to the headworks of the WPCP and treated along with sewage before discharge into the Ottawa River

No wetlands are present within the fenced area of the WPCP. The wetlands outside of the fenced area are not designated as Provincially Significant Wetlands by provincial mapping, although the wetlands present are more extensive than indicated by provincial mapping. No rare vegetation communities or plant species were observed within or adjacent to the wetlands. No species at risk were observed at the Project location or within 120m of it. More information on the wetland features can be found in the Natural Heritage Site Investigation Report on Pages 17-19.

The unnamed watercourse is a small permanent tributary of the Ottawa River. It does not flow through the Project location (i.e. within the fenced area) but rather flows north of it. The watercourse enters the property from the northwest, joining with the wetland area west of Abbie Lane. The watercourse flows east, across Abbie Lane via a culvert (twin 1.25 m corrugated steel pipe). The watercourse then flows through another culvert (0.7 m corrugated plastic pipe) before flowing east into the wetland and the northeast property boundary before exiting the property. The watercourse then flows north through private property and meets the Ottawa River. More information on the watercourse can be found in the Natural Heritage Site Investigation Report on Pages 19-20.

The drainage features are constructed features and determined not suitable for fish habitat during the Natural Heritage Site Investigation (pg. 20 of the site investigation report). Drainage feature 1 (DF1) is a roadside swale along the south side of Abbie Lane that discharges into the unnamed watercourse. Drainage feature 2 (DF2) is a drainage swale along the southern boundary of the Project location that directs drainage east toward the Ottawa River. The feature becomes indistinguishable at the eastern edge of the property and flow towards the Ottawa River likely occurs as sheet flow during high rain events or spring freshet. Drainage feature 3 (DF3) directs drainage east where it converges with DF2. More information on the Drainage features can be found in the Natural Heritage Site Investigation Report on Pages 20-21.

Figure 1: Satellite image showing the Petawawa Water Pollution Control Plant.

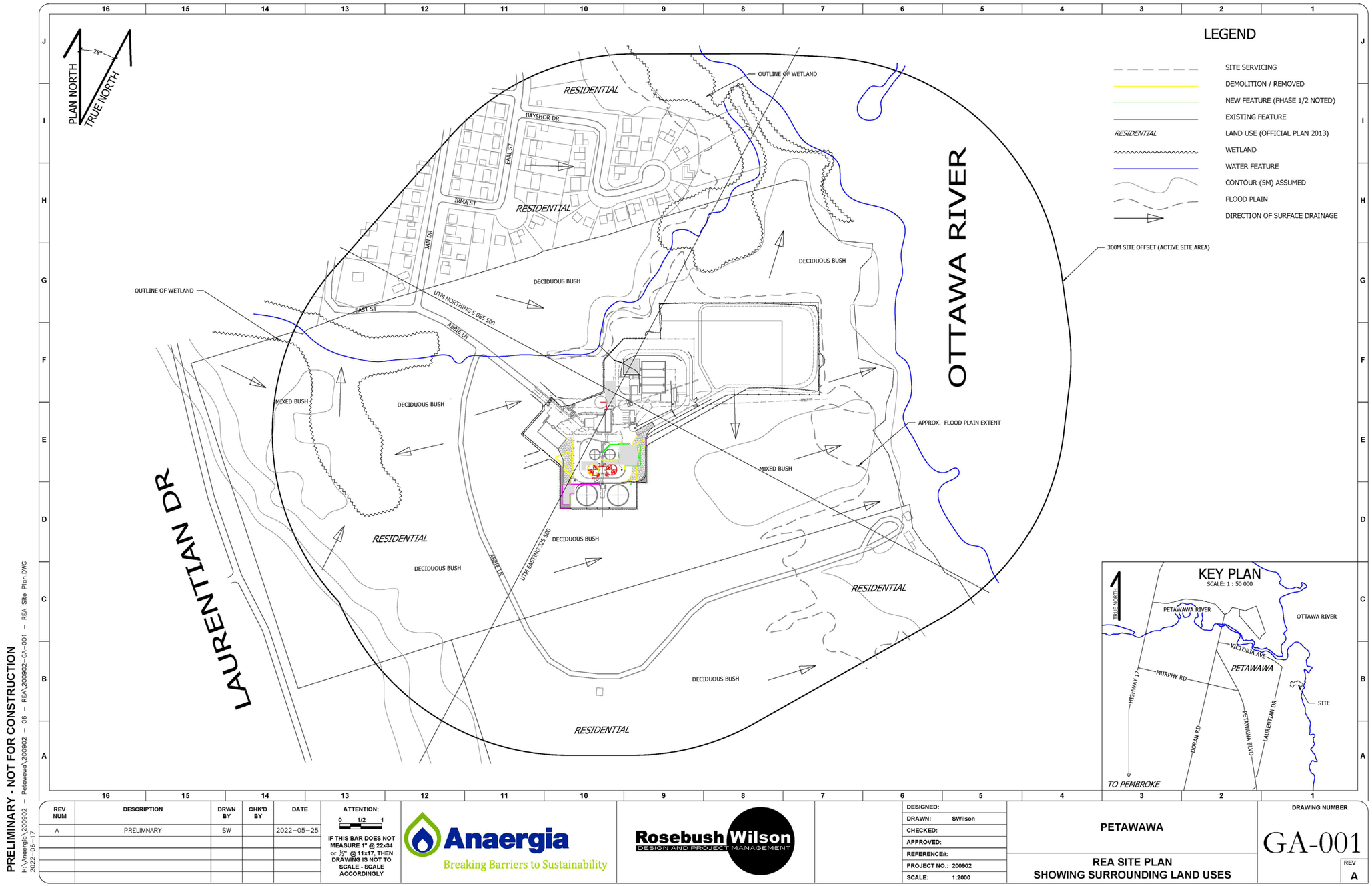

Figure 2: Site plan showing surrounding land uses.

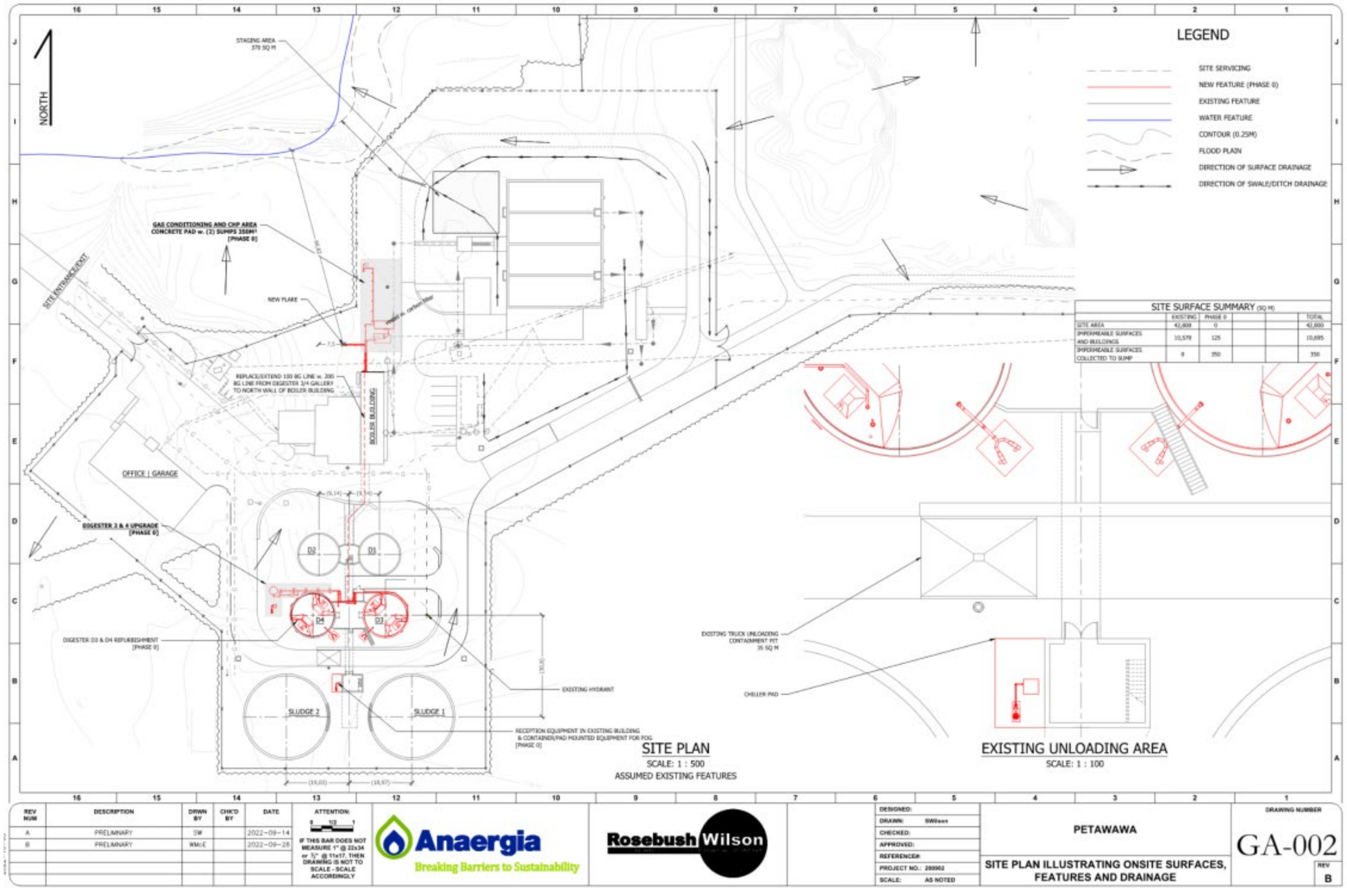

Figure 3: Site plan showing layout of Net Zero components

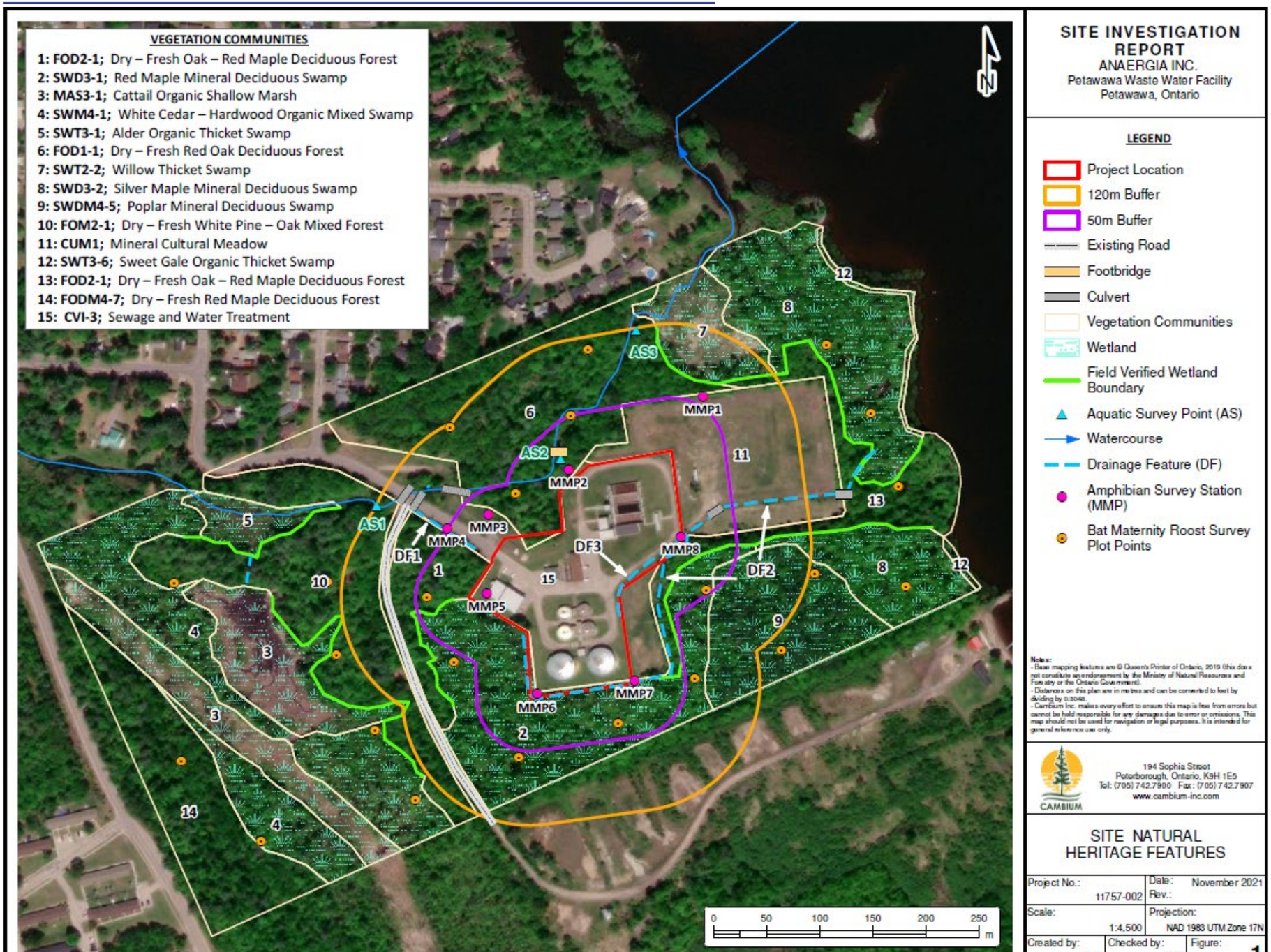

Figure 4: Site plan showing surface water features.

3 Assessment of Facility Suitability

The facility is suitable for the Project because it takes advantage of exiting WPCP to treat any effluent from the Net Zero project, no leachate will be produced because organic processing takes place in closed tanks, there is no organics storage onsite, and new construction has a minimal impact on the total impervious area of the site.

The Petawawa WPCP operates under ECA # A-500-3113268754. It is a secondary treatment plant consisting of primary treatment and secondary treatment via a Xylem ICEASTM Sequencing Batch Reactor (SBR) activated sludge system with four SBRs in parallel. Effluent from the SBR basins is disinfected by a UV system before being discharged into the Ottawa River. The Petawawa WPCP has a nominal design flow of 8,730 m^3/d and a peak design flow of 17,460 m^3/d. The main source of effluent requiring treatment from the Net Zero facility is decant from digestate storage. Minor streams include those from the biogas treatment systems. The decant stream is an existing stream at the WPCP; however, the decant loading is expected to increase as a result of the Net Zero project. An assessment of the suitability of the WPCP to treat the decant stream is set out in the Effluent Management Report, which determined the WPCP is capable of treating decant from digestate storage. Operationally, the decant is done manually, so decant can be stopped if it has a negative impact on the WPCP liquid treatment train.

The organic slurry will be added directly to the anaerobic digesters from tanker trucks via a direct connection. The slurry will be added within a 24-hour period, so there is no storage onsite. The anaerobic digesters are covered and sealed from the atmosphere, as well as the digestate storage tanks. Therefore, no leachate is expected from exposure of organic materials to rain or snowmelt.

The Project will be integrated into the WPCP site, which has a total impervious area of 10,570 m^2. Existing stormwater management includes three drainage swales that are described in Section 2 of this report. Additional impervious area will be created by the Project due to the addition of three (3) concrete pads and equipment to the site. The largest of the three pads is located at the Northern portion of the fenced area for the CHP unit and biogas conditioning equipment, the second pad is located to the west of the digesters for the system that removes H_2S from the biogas and the third is located to the west of the unloading area. The additional impervious area is 475 m^2, which is small relative to existing 10,570 m^2 of impervious area (buildings and driveways). Therefore, because of the minor change to impervious area, no impact to surface water drainage is expected and no monitoring of surface water is required.

4 Spill Prevention and Mitigation

Unintentional spills from the Net Zero facility are a hazard to surface water that will be mitigated by design and operationally. Operationally, spills will be prevented and mitigated by only loading organic slurry to the digesters during operating hours of the facility when slurry loading can be supervised by operations staff. Therefore, if a spill occurs due to equipment malfunction, it can be corrected quickly by shutting equipment down and/or closing valves. Also, the organic slurry loading area will be located in an existing building located to the south of the digesters (shown in Figure 3), which has a sump that can return any spill or wash water to the headworks of the plant. The area where trucks will park to unload has an existing containment pit as well.

The Lastly, the WPCP is an established facility that has an Emergency Response Plan and is operated by licensed and experienced staff that are trained in spills response.

The greatest hazard from a spill is where the organic slurry is loaded into the digesters, which is located between the sludge storage tanks and the digesters. In the event that a spill occurs, it can be directed into the sump located at the loading area. If the spill cannot be directed toward the sump, it would flow toward the drainage swales to the south and east of the slurry loading area. Offsite migration of the spill can be prevented by blocking the culverts located at the eastern portion of DF2. Cleanup of the spill can be done using a vacuum truck or other suitable equipment for cleaning up spilled organic slurry.

5 Report Summary

The Petawawa Net Zero Project will add equipment to the Petawawa WPCP so the WPCP can co-digest an organic slurry with wastewater solids and produce energy with a CHP unit. Surface water will not be affected by implementation of the project because effluent from the Net Zero Facility will be treated by the WPCP and there is only a minor change in impervious area of the site. Spill prevention is accomplished operationally and by design, and in the event of a spill, plant staff will mitigate it by preventing the spill from reaching waterways and cleaning it up.

Respectfully submitted,

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