Project Report

October 1, 2024

THE CORPORATION OF THE TOWN OF BRADFORD WEST GWILLIMBURY ENVIRONMENTAL STUDY REPORT ADDENDUM

WATER POLLUTION CONTROL PLANT (WPCP) TERTIARY UPGRADE

2024/10/01	0	Final - For Public and Agency Review	C. Brennen	M. Armstrong	M. Walters	
Date	**Rev.**	**Status**	**Prepared By**	**Checked By**	**Approved By**	**Approved By**
HATCH						**Client**

Executive Summary

Hatch was retained by the Town of Bradford West Gwillimbury (the Town) to undertake an Amendment to the previously completed Schedule ‘C’ Municipal Class Environmental Assessment (Class EA) completed in 2012 for the expansion of the Bradford Water Pollution Control Plant (WPCP) (the Project). The Class EA process was documented in an Environmental Study Report (the ESR).

This ESR Addendum is being undertaken in accordance with the planning and decision-making process for a Schedule ‘C’ Class Environmental Assessment (EA). Due to the time lapsed since the completion of the ESR, and the new technological upgrades, an Addendum is required to document the changes prior to the Project implementation.

The ESR included upgrading the plants’ capacity to 23.3 MLD in order to accommodate an increase in the Towns’ population. The scope of work in the ESR included the construction of a tertiary ballasted flocculation system and completing a Water Conservation and Efficiency Strategy for the water and wastewater flows. The focus of the ESR was on optimizing the existing facilities and complement the optimized facility with additional treatment to achieve the 23.3 MLD goal, rather than constructing new facilities.

This ESR Addendum outlines the proposed changes which include the construction of a new 1,150 m² tertiary treatment facility with a submerged-type membrane system, instead of the ballasted flocculation system assessed in the ESR, in order to meet the more stringent phosphorus loading requirements. In addition, the scope includes:

- Relocation of existing UV treatment systems to the new facility;
- Connection of the tertiary effluent to the existing outfall pipe;
- Construction of new roads to access the building;
- Design and construction of a stormwater drainage system;
- Construction of a new outdoor diesel generator and switch gear; and
- General repairs and rehabilitation including the replacement of the outfall pipe without increasing the WPCP capacity.

As part of this Addendum Report, archaeological, hydrological, geotechnical, and ecological studies were undertaken. Mitigation measures have been updated based on the findings of these studies to meet the standards of the current planning context. It is expected that the construction of upgrades subject to this Addendum will be commenced in 2025.

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Glossary of Terms and Acronyms

ANSI:	Area of Natural and Scientific Interest
BMP:	Best Management Practice
BOD:	Biochemical Oxygen Demand
COSEWIC:	Committee on the Status of Endangered Wildlife in Canada
EA:	Environmental Assessment
EAA:	*Environmental Assessment Act*
ECA:	Environmental Compliance Approval
ESA:	*Endangered Species Act, 2007*
ESC:	Erosion and Sediment Control
ESR:	Environmental Study Report
FWCA:	*Fish and Wildlife Conservation Act, 1996*
OBBA:	Ontario Breeding Bird Atlas
LSRCA:	Lake Simcoe Region Conservation Authority
MBCA:	*Migratory Birds Convention Act, 1994*
MOE/MOEE/MOECC/ MECP:	Ministry of the Environment/Ministry of the Environment and Energy/Ministry of the Environment and Climate Change/ Ministry of the Environment, Conservation and Parks. The Ministry of the Environment was created in 1972 and merged with the Ministry of Energy to form the Ministry of Environment and Energy (MOEE) from 1993 to 1997 and again in 2002. The Ministry of the Environment changed its name to the Ministry of the Environment and Climate Change (MOECC) on June 24, 2014. The Ministry changed its name to Ministry of the Environment, Conservation and Parks (MECP) on June 29, 2018. Thus, the MOE/MOEE/MOECC and MECP are considered to be synonymous for the purposes of this Report.
MLD:	Million Litres per Day
MCM:	Ministry of Citizenship and Multiculturalism
PDR:	Preliminary Design Report

Glossary of Terms and Acronyms

PSW:	Provincially Significant Wetland
SAR:	Species at Risk
SARA:	*Species at Risk Act*
SUE:	Subsurface Utility Engineering
SWH:	Significant Wildlife Habitat
TKN:	Total Kjeldahl Nitrogen
TP:	Total Phosphorus
TSS:	Total Suspended Solids
WPCP:	Water Pollution Control Plant

1. Introduction

In 2022 Hatch Limited (Hatch) was retained by the Corporation of the Town of Bradford West Gwillimbury (the Town) to undertake an Addendum to the previously completed Class Environmental Assessment (Class EA) for the expansion of the Bradford Water Pollution Control Plant (WPCP). The previous EA was completed in 2012.

Due to the time lapsed since the completion of the EA and the changes to the tertiary filtration technology (i.e., from a ballasted flocculation system to a submerged-type membrane system), an Addendum to the 2012 Class EA is required. Enhanced engagement with Indigenous communities will be undertaken to better align with the requirements under the Class EA process.

1.1 Background

The WPCP is located at 225 Dissette Street in Bradford, Ontario (see Figure 1-1). The wastewater generated from Bradford and Bond Head area is treated at the WPCP prior to discharge into the West Holland River, located within the Lake Simcoe watershed.

The WPCP was constructed in 1962 and consisted of a pumping station and a waste stabilization pond. The WPCP has undergone modifications in 1970, 1982, 1997, 1999, 2001 and most recently 2009. The WPCP has a current capacity of 19.4 million litres per day (MLD). It is classified as a Class 4 Treatment Facility and a Class 3 Collection System.

Figure 1-1: Aerial Photo of the Bradford WPCP (Google Earth, 2022)

1.2 Class EA and the Selection of the Preferred Design

The 2011 Town of Bradford West Gwillimbury's Master Servicing Plan Update (C.C. Tantham & Associates Ltd, 2011) identified the need for additional wastewater treatment capacity to meet the servicing requirement to accommodate future growth.

The Town completed the Environmental Assessment process for the expansion in 2012, as documented in a report entitled the Bradford West Gwillimbury Water Pollution Control Plant Environmental Study Report Phases 3 and 4 Final (The ESR) in March 2012 (Ainley & Associates Ltd. and Black & Veatch Canada, 2012).The preferred design identified through the Class EA (2012) outlined the need for several upgrades including upgrades to the tertiary system to reduce the total phosphorus in the effluent. The design included the following:

- Optimize Plants C and D and modify Plant B to obtain a total rated capacity of 23.3 MLD;
- Construct ballasted flocculation process upstream of the existing sand filters;
- Complete a Water Conservation and Efficiency Strategy for the water and wastewater flows within the respective Service Areas; and
- Evaluate and implement changes to improve the management of biosolids that reflect current and future regulatory requirements.

The ESR identified potential impacts to the environment that could result from the expansions' design and identified proposed mitigation measures. The preferred design was presented to the public and Indigenous communities, and the Town had planned to move forward with Project implementation.

1.3 Rationale for Project Change

Considering the lapse in time from the completion of the ESR to the start of construction of the WPCP Tertiary Upgrade project (i.e., implementation), and the proposed changes to the treatment technology, the Project is required to undergo an Addendum to the original ESR from 2012. As part of the Addendum, the planning and decision-making process was reviewed, as well as the current environmental setting to ensure project and mitigation measures still meet the current planning context. The process followed is documented in this ESR Addendum.

While the proposed capacity expansion did not change from 23.3 MLD, the proposed tertiary treatment technology was changed from ballasted flocculation to membrane technology and related piping and building. The proposed changes are summarized in Table 1-1.

The rationale behind the change in technology lies with the current requirements for the Environmental Compliance Approval (ECA) Total Phosphorus (TP) in effluent to be limited to a maximum total of 0.096 mg/L, for a total annual loading of 697.88 kg/year, based on an Annual Average Daily Effluent Loading of 1.912 kg/d. This indicates to the Town that the effluent TP must be limited to 0.08 mg/L to allow for potential future capacity expansions. As a result of this stringent TP limit, it has become necessary for the Town to implement tertiary filtration technology to be consistent with the requirements for an ECA.

The new tertiary filtration will require the construction of a new building, which will extend further into the Lake Simcoe Region Conservation Authority (LSRCA) regulated boundary. The LSRCA advised that the construction of the new building is identified as a major development according to their policies, as it will be greater than 500 m^2. It should be noted that a portion of the existing WPCP is already located within the LRSCA regulated boundary.

Table 1-1: Changes from the Original 2012 Design

Component of Original Design	2012 Design	Proposed Changes
Tertiary Treatment	Monthly average Total Phosphorus (TP) level of 0.08 mg/L or below.	Monthly average TP level of 0.08 mg/L or below
	Ballasted flocculation system.	Submerged-type membrane system.
	Ballasted flocculation building to replace the sand filter buildings.	Construction of a new tertiary membrane building including an area for centralized UV disinfection.
Building	No changes to the outfall.	Connection of tertiary effluent to existing outfall pipe.
	No additional road construction.	Paved access to new building.
	Maintain the same diesel generator and switchgear.	New diesel generator outside the building and switchgear inside the existing switchgear building.

1.4 The Purpose of the Addendum

The ESR identified that all the proposed works would be completed within the existing site. Given the change in the technology and changes to environmental legislation prior to project implementation, there is a need to summarize these changes and share them with review agencies, the public and Indigenous communities prior to project implementation.

As part of the Addendum, previously completed work is summarized, the proposed change to the WPCP described and the impacts and mitigation will be confirmed. Then the Addendum will be shared with Indigenous communities for a 60-day review period, and to Ministry of the Environment, Conservation and Parks (MECP) and the Lake Simcoe Region Conservation Authority (LRSCA) for a 60-day review period. Finally, the Addendum will be distributed to the public and stakeholders for a 30-day review period.

It should be noted that only the items included in this Addendum are available for comment as part of the review. All comments related to the previously completed ESR are outside the scope of this Addendum.

2. Project Description

The proposed changes since the ESR includes the implementation of a new tertiary treatment process to meet future TP discharge limits, which include:

- The construction of a new 1,150 m² tertiary treatment facility including an area for central UV disinfection;
- Connection of the tertiary effluent to the existing outfall pipe;
- The addition of paved access to the new building;
- Decommissioning of the existing tertiary filtration system;
- Relocation of the existing UV systems in Existing Filter Buildings C and D to centralize it in the new membrane building;
- Construction of a new diesel generator outside the building and switchgear inside the existing switchgear building; and
- General repairs and rehabilitation including the replacement of the outfall pipe without increasing the WPCP capacity.

A few alternatives are being considered with regards to drainage to address water quality and water quantity control for the new construction. These are described in further detail in Section 2.2.

2.1 Tertiary Treatment Options

The following tertiary treatment methods were considered for the upgrade:

- Ballasted flocculation, where coagulants for soluble phosphorus, microsand and polymers are used to create weighted flocs that remove phosphorus through a hydrocyclone separator;
- Reactive filtration, where phosphorus and suspended solids are removed by adsorption, rather than coagulation, and filtered out by passing the effluent through a bed of sand;
- Pressurized membrane filtration system, where effluent is passed through a synthetic semi-permeable membrane with pores sized to reject the target particles using pressure; and
- Submerged membrane filtration system, where effluent is passed through a synthetic semi-permeable membrane with pores sized to reject the target particles using a vacuum.

A more detailed summary of these technologies is available in the Preliminary Design Report (Hatch Ltd., 2022).

A weighted evaluation matrix was prepared to assess the tertiary treatment methods. After weighing all the information available from the analysis, the preferred option was identified to be the submerged-type membrane system.

A six-month pilot study was undertaken to confirm the feasibility and performance of tertiary membrane filtration as part of this plant expansion. The pilot study was carried out from November 2021 to July 2022, through different seasons and temperature conditions. It also involved different flow rates and solids inputs and tested the use of alum for phosphorus removal. The study consisted of six phases, with each phase involving four weeks of testing and a period of high flow conditions.

An additional month of pilot study has been completed to test the existing dynasand system as a pre-treatment to the tertiary membrane filtration. A full report of the pilot studies was submitted to the Town for review (under separate cover).

Additionally, the members of the Town's Plant Operations staff are already familiar with the submerged-type membrane system and understand its capabilities. There are many of submerged-type membrane systems in operation, so there are resources available for advice or maintenance as needed. All of these factors contributed to the submerged-type membrane system being selected as the preferred solution.

The position of the new tertiary building is preferred to be located close to the existing outfall, however there is limited footprint available for the new building.

2.2 Drainage

The proposed design to address drainage on-site involves directing runoff from the proposed process building into the existing pond with a sediment forebay and an ultimate outlet to Holland Canal/River system.

The building is designed in accordance with recommendations of LSRCA, during development of the Preliminary Design Report (PDR) (Hatch Ltd., 2022), to ensure all building openings of the Tertiary building are 300 mm above the Regional Flood Line.

3. Description of the Environment

The existing environmental conditions are summarized in the following section.

3.1 Planning Objectives

The following Acts, regulations, guidance documents and plans are applicable to the proposed work.

3.1.1 Federal

3.1.1.1 Migratory Birds Convention Act (1994)

The *Migratory Birds Convention Act* (1994) (MBCA) prohibits the killing, capturing, injuring, taking, or disturbing of migratory birds (including eggs) and the damaging, destroying, removing, or disturbing of nests.

3.1.1.2 Species at Risk Act (2002)

The Species at Risk Act (2002) (SARA) prohibits the killing, harming, harassing, capturing, buying, selling, trading, taking, collecting, or possession of an individual, a part, or a derivative of any wildlife species that is listed as extirpated, endangered or threatened under the Act and damage or destruction of the species' residence.

The *Fish and Wildlife Conservation Act* (1997) (FWCA) prohibits the hunting or trapping of specially protected wildlife as defined by the Act and non-game birds, and limits the hunting and trapping of big game, game mammals, game birds, furbearing mammals, game reptiles, game amphibians, and other wildlife described by the Act to those with a license to do so under the regulations of the Act.

3.1.2 Provincial

3.1.2.1 Endangered Species Act (2007)

The *Endangered Species Act*, (2007) (ESA) prohibits the killing, harming, harassment, capture, taking, possessing, collecting, buying, leasing, or trading of any species that are listed as 'Threatened', 'Endangered' or 'Extirpated'.

3.1.2.2 Greenbelt Plan

The study area has been identified as Protected Countryside under the Greenbelt Plan (2017) during the desktop review.

3.1.2.3 Lake Simcoe Region Conservation Authority - Ontario Regulation 179/06

Ontario Regulation 179/06 regulates work taking place within valley and stream corridors, wetlands and associated areas of interference. Any works undertaken within the regulation limit will require a permit from the LSRCA.

The study area overlaps land regulated by the LSRCA. Ground disturbance and construction of buildings within the regulated area requires a permit before seeking a building permit from the Town. As a result, the project requires approval under O. Reg. 179/06 of the *Conservation Authorities Act* (1990).

Permanent facilities are planned to be constructed within the regulated boundary.

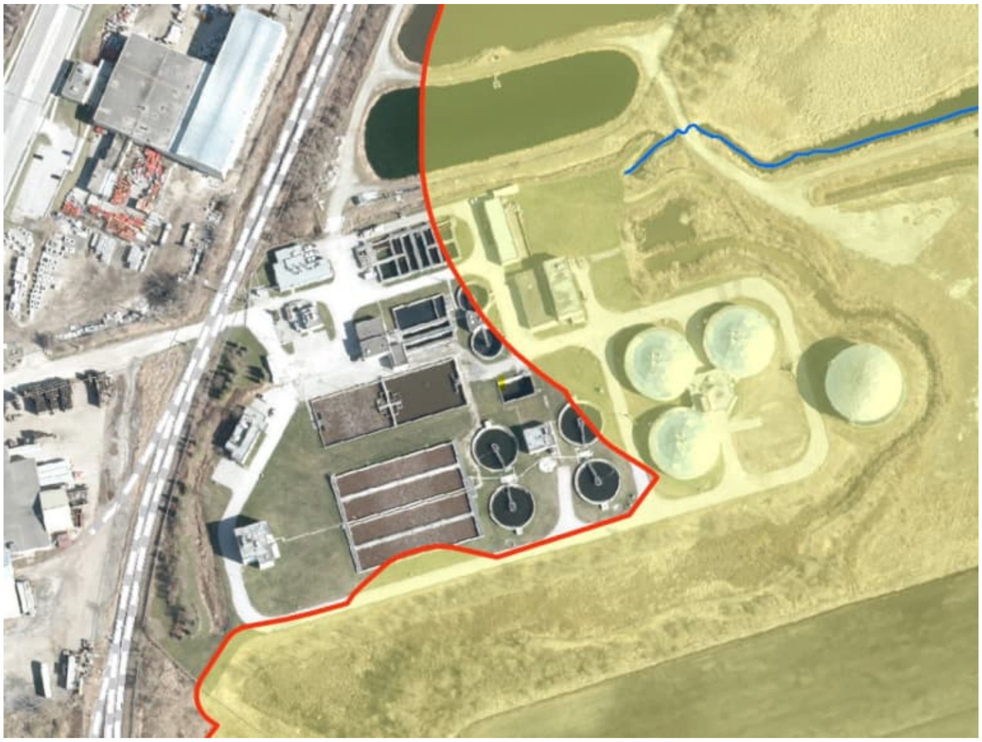


Figure 3-1: A Map of the LSRCA Boundaries on the WPCP Property (LSRCA GIS Services, 2023)

Through discussions with the LSRCA during the development of the Preliminary Design Report (Hatch Ltd., 2022), it was recommended that a Natural Heritage Evaluation Study (NHES) be completed and include the following:

- Tree Inventory/Arborist Report;
- Bat snag survey (only if trees are being removed);
- Vascular plant inventory;
- Compensation plan for tree/vegetation removals;
- Wetland evaluation with updated mapping (including potential impacts to adjacent Cedar Creek Provincially Significant Wetland, as required based on MECP consultation);
- Wetland boundary staking;
- Ecological Land Classification (ELC) survey;
- Species at Risk (SAR) screening based on habitat present within project site;
- Bird screening;

- Design drawings with tree/vegetation removals and tree protection measures, construction staging and erosion and sediment control (ESC) measures;
- Work to be completed and submitted to LSRCA under Ontario Regulation 179/06; and
- Floodplain impact assessment.

The NHES was used to summarize the existing conditions and proposed impacts.

3.1.2.4 Lake Simcoe Protection Plan

The study area is within the *Lake Simcoe Protection Act* (2008) Watershed Boundary and subject to the Lake Simcoe Protection Plan, which was created under the *Lake Simcoe Protection Act* (2008) in 2008. This Plan establishes a “Minimum Vegetation Protection Zone” around key natural heritage features within which development or site alternation is not permitted. As required by LSRCA, an Ecological Offsetting Strategy will be prepared for the disturbance to the wetland and minimum vegetation protection zone (MVPZ) within the study area. Once the final site plan has prepared the offsetting strategy will be prepared based on LSRCA requirements and submitted for review.

3.2 Natural Environment

The following section summarizes the natural environment information from the geotechnical investigation completed by Orbit Engineering Limited, in 2021, and from the NHES completed by LGL Limited (LGL) in 2023 (Appendix A).

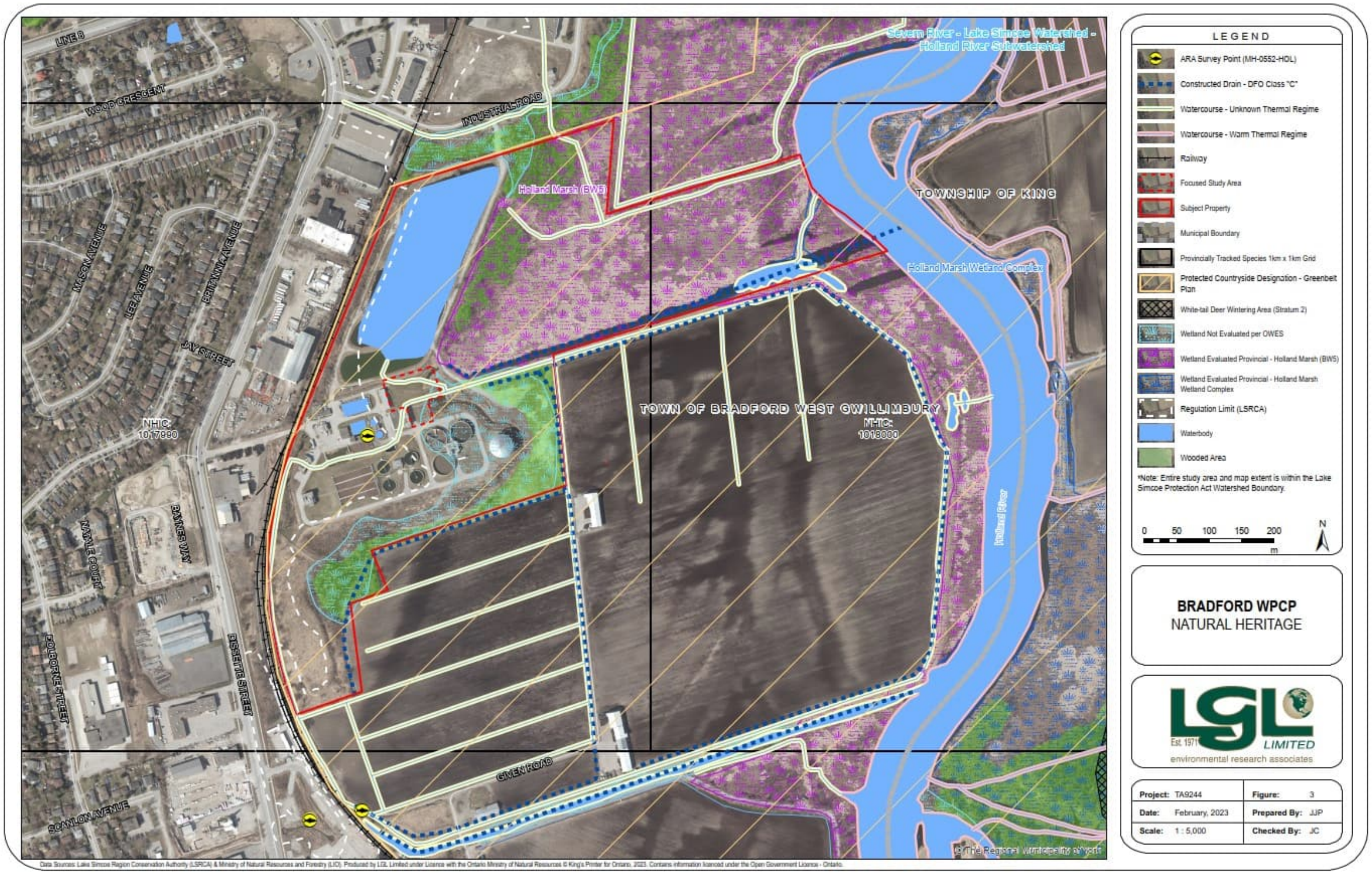
3.2.1 Soil and Terrain

Geotechnical investigation was performed by Orbit Engineering Limited to evaluate the subsurface conditions for the WPCP upgrades. The results of this investigation were presented in a report entitled *Hydrogeological Investigation – Bradford WPCP Tertiary Upgrade 225 Dissette Street, Bradford West Gwillimbury, ON* (Orbit Engineering Ltd., 2021) (under separate cover). Through a combination of field studies and desktop review, Orbit determined the following information. The study area is located within the Simcoe Lowland physiographic region. The physiographic landform in which the site is located on is called the Clay Plains, Peat and Muck. The terrain is generally a low relief plateau with an approximate elevation of 220 m.

Eurofins Laboratories (CALA Member) tested the quality of the soil collected by Orbit in accordance with MECP sampling protocols. All soils on the property meet MECP Table 3 Industrial Commercial Community Use (ICC) Standards for coarse texture soils and the Synthetic Precipitation Leaching Procedure (SPLP) samples also meet O. Reg. 406/19 Table 3.1 ICC Soil Reuse Standards for Table 3 ICC sites. Based on laboratory test results, the excavated soil may be re-used at the same site for grading purposes.

3.2.2 Aquatic Habitat

The Holland Canal/River system flows adjacent to the WPCP (See Figure 3-2). It has been identified as a permanently flowing warmwater fish habitat as per the West Holland River Subwatershed Management Plan. A desktop review included data from a fish sampling station near the study area where a warmwater fish community was sampled. This returned 18 warmwater fish species in proximity to the site (Ministry of Natural Resources and Forestry and ArcGIS Hub, 2023).



Data Sources: Lake Simcoe Region Conservation Authority (LSRCA) & Ministry of Natural Resources and Forestry (LIO). Produced by LGL Limited under Licence with the Ontario Ministry of Natural Resources © King's Printer for Ontario, 2023. Contains information licenced under the Open Government Licence - Ontario.

Figure 3-2: A Map of the Site and Surrounding Natural Areas (LGL, 2022)

A full list of species is included in Appendix A. The flows in the channel consist of runoff from upstream drainage areas, including a confluence with the WPCP outfall. The flows of the outfall are significantly greater in volume than the flows of the tributary.

The West Holland River Subwatershed management plan identified a timing work window of April 1 to June 30 where no in-water work is permitted is required. Additionally, a minimum setback of 15 m from the West Holland River is required.

Based on a review of secondary source information from the MNRF and Fisheries and Oceans Canada (DFO), there are no aquatic species at risk in the study area.

3.2.3 Vegetation

Vegetation communities were delineated by LGL according to Ecological Land Classification for Southern Ontario: First Approximation and its Application (Lee, 1998) using aerial photo interpretation and field surveys on July 12 and September 9, 2022. Vegetation communities within the study area consist of a mixture of wetland and cultural communities. As detailed in Appendix A, a total of five vegetation community types were identified within the study area including:

MAS2-1 Cattail Mineral Shallow Marsh. Tree and shrub cover less than 25 percent, with standing or flowing water up to two meters deep for most of the growing season. Mineral soil, with cattails being the dominant species of vegetation;

OAO Open Aquatic. Open water;

SWT2 Mineral Thicket Swamp. Tree or shrub cover over 25 percent and dominated by hydrophytic shrub and tree species;

CUM1-1 Dry-Moist Old Field Meadow. Tree and shrub cover less than 25 percent. Disturbed community type comprised primarily of non-native and invasive species; and

CUT1 Mineral Cultural Thicket. Tree cover less than 25 percent, shrub cover over 25 percent with mineral soil.

In addition, Manicured Landscapes (M) were identified in the study area. All vegetation communities identified within the study area are considered widespread and common in Ontario.

Several small wetland communities were identified within the study area. The limits of the wetland communities were staked in the field with LSRCA ecology staff on September 9, 2022. The communities were largely dominated by cattail species (*Typha spp.*). It is likely these communities are remnant portions of wetlands that were once connected to the PSW to the east, before being bisected by Given Road.

Culvert vegetation communities within the study area consist of mineral cultural meadow and mineral cultural meadow and mineral cultural thicket. Cultural communities were generally observed along the edge of the watercourse and pond within the study area. These communities contain a large proportion of non-native plant species that are well adapted to persist in areas that are regularly disturbed including species that are adapted to high light conditions and limited soil moisture.

A total of 50 plant species were identified in the study area during the botanical investigation. A list of vascular plants is presented in Appendix A. Of the plants identified, no nationally or provincially tracked species were identified, and no plant species that are considered locally or regionally rare were identified. Additionally, no plant SAR were identified during site visits or the desktop review.

3.2.4 Wildlife

The study area provides modest quality wildlife habitat. Much of the areas has been disturbed by the existing and surrounding land uses, including the existing WPCP. A modest diversity of species is supported by the range of habitats in the study area, including thicket, meadow, aquatic, and anthropogenic habitats. Generally, these habitats are tolerant to human disturbance.

3.2.4.1 Breeding Birds

Breeding Bird Surveys were conducted on the mornings of June 10 and July 8, 2022 in accordance with the Ontario Breeding Bird Atlas (OBBA) Protocol (Cadman M. D., 2007). Twenty-two bird species were documented during targeted breeding bird surveys conducted within the study area. An additional six bird species were documented within the study area as incidental species.

Breeding was confirmed for three species [Canada Geese (*Branta canadensis*), Mallard (*Anas platyrhynchos*) and Wood Duck (*Aix sponsa*)] and breeding was suspected for two species [Common Grackle (*Quiscalus quiscula*) and Red-winged Blackbird (*Agelaius phoeniceus*)]. Further, other migratory bird species are expected to be nesting across the naturalized area. A full list of species encountered during the Breeding Bird surveys can be found in Appendix A.

3.2.4.2 Reptiles and Amphibians

Anuran surveys were performed on May 31 and June 21, 2022, in accordance with the Marsh Monitoring Program (2000). Three amphibian species, the Green Frog (*Rana clamitans*), Northern Leopard Frog (*Lithobates pipiens*) and American Toad (*Anaxyrus americanus*) were confirmed in the study area.

One turtle species, the Painted Turtle (*Chrysemys picta*), was identified in the study area. Additionally, the study area was identified as historic Snapping Turtle (*Chelydra serpentina*) habitat during the desktop review.

3.2.4.3 Mammals

The LGL report recorded incidental observations of Eastern Cottontail (*Sylvilagus floridanus*), and Muskrat (*Ondatra zibethicus*).

3.2.4.4 Species At Risk

Species at Risk (SAR) in the study area were assessed using a combination of a desktop review of wildlife atlases and species occurrence databases, consultation with the Ministry of Environment, Conservation and Parks (MECP), and targeted field surveys.

No plant SAR were encountered during the vegetation and tree inventories.

Two bird SAR were confirmed in incidental observations during the breeding bird surveys including the threatened Barn Swallow (*Hirundo rustica*), and threatened Bank Swallow (*Riparia riparia*). Of the bird species identified, 22 have protection under the *Migratory Bird Convention Act* (MBCA) (1994). A full list of the bird species identified is available in Appendix A.

The study area was identified to have historic Snapping Turtle (*Chelydra serpentina*) habitat during the desktop review. As Snapping Turtles are listed as ‘special concern’ under the Ontario ESA, federal SARA, and Committee on the Status of Endangered Wildlife in Canada (COSEWIC), however they are not afforded habitat protection under either legislation. However, they are protected under the *Fish and Wildlife Conservation Act* (FWCA) as ‘Schedule 4 – Game Reptiles’. The study area is considered to have suitable habitat, though no Snapping Turtles were identified in the study area during the 2022 site investigations.

3.2.5 Designated Natural Areas

3.2.5.1 Areas of Natural and Scientific Interest (ANSIs)

There are no Areas of Natural and Scientific Interest (ANSIs) within the study area.

3.2.5.2 Provincially Significant Wetlands (PSWs)

The Holland Marsh Wetland Complex (BW5) Provincially Significant Wetland (PSW) is located within a portion of the WPCP property and the PSW’s western limit is located immediately north of the study area where the building upgrades are proposed. The PSW is located on the eastern side of the West Holland River within the Township of King, and ranges from approximately 400 m to 805 m from the eastern limits of the WPCP property.

3.2.5.3 Environmentally Sensitive Areas

There are no Environmentally Sensitive Areas within the study area.

3.2.5.4 Significant Valleylands

There are no Significant Valleylands within the study area.

3.2.5.5 Significant Woodlands

There are no Significant Woodlands within the study area.

3.2.5.6 Significant Wildlife Habitat (SWH)

A review of each Significant Wildlife Habitat (SWH) category, as defined in the Significant Wildlife Habitat Criteria Schedule (for Ecoregion 6E) was completed for the study area. The following categories of SWH have the potential to occur within the study area:

- Seasonal Concentration Areas of Reptile Hibernaculum - Not confirmed within the study area, but potential exists;
- Turtle Nesting Areas - Not confirmed within the study area, however potential exists;
- Terrestrial Grayfish – Not confirmed within the study area, however suitable habitat exists;
- Waterfowl Nesting Area – Not confirmed within the study area, however potential suitable habitat exists; and
- Amphibian Movement Corridors – Not confirmed within the study area, however potential exists.

3.3 Cultural Environment Heritage

3.3.1 Archaeological resources

The proposed expansion to the WPCP includes a small segment outside of the existing fence line, however it is still within the WPCP's property. This area has previously been disturbed as part of the lagoon.

During a meeting between the Town and Alderville First Nation on December 8th, 2023, the First Nation requested the archaeological assessment reports from the previous EAs. It was found that a Stage 1 Archaeological Assessment was not completed during the previous EAs. As such, a Stage 1 Archaeological Assessment was conducted by Archaeological Research Associates Ltd. (ARA) in April 2024 as part of this ESR Addendum. The Stage 1 Archaeological Assessment is included in Appendix B.

Results of the Stage 1 Archaeological Assessment determined that the study area lacked any significant archaeological potential. The Assessment confirmed that these lands had been significantly disturbed by historical land modifications. ARA recommended that no further archaeological assessment be required within the study area.

As part of the archaeological assessment, ARA contacted the following Indigenous Communities:

- Alderville First Nation.
- Beausoleil First Nation.
- Chippewas of Georgina Island First Nation.
- Chippewas of Rama First Nation.
- Curve Lake First Nation.

- Hiawatha First Nation.
- Mississauga's of Scugog Island First Nation.
- Huron-Wendat Nation; and
- Métis Nation of Ontario.

Each was offered the opportunity to participate in the field work and were provided the draft Stage 1 Archaeological Assessment report for their review and comments prior to its submittal to the Ministry of Citizenship and Multiculturalism (MCM).

No communities participated in the Stage 1 Archaeological Assessment site review. Two communities (Rama and the Huron-Wendat) provided their histories for inclusion in the report after completing their reviews of the draft report,

3.4 Technical

3.4.1 Utilities

A Subsurface Utility Engineering (SUE) report was prepared as part of the PDR by Multiview. Multiview completed a Quality Level A (QL-A) investigation through a combination of record data analysis, field verification and professional judgement. The SUE Report identified the buried utilities including the effluent wastewater, stormwater, electrical, water and effluent water utilities in the vicinity of the proposed tertiary treatment plant.

3.4.2 Geotechnical

A geotechnical investigation was completed as part of the PDR by Orbit Engineering (under separate cover). Five boreholes were advanced on the site and were completed as monitoring wells. The investigation found that the soil conditions consisted of the following stratigraphy:

- 100 to 300 mm of topsoil in four of the five BH.
- 75 mm pavement, in one of the five boreholes.
- Fill materials in all five boreholes ranging from 0.9 to 2.3 m thick. The fill generally was composed of sandy silt with a trace to some topsoil, rootlets, gravel and clay.
- Clayey silt in two of the boreholes ranging from 2.1 to 4.6 m thick; and
- Sandy silt to Silty Sand Till in all five boreholes at depths ranging from 0.9 to 3.1 m below ground level and extending to the maximum explored depth of 10.3 m.

3.4.3 Hydrogeological

A hydrogeological investigation was completed as part of the PDR by Orbit Engineering (under separate cover). Water levels were measured in the five monitoring wells were measured on September 1 and November 3, 2021. Groundwater elevations ranged from 219.1 to 220.2 m Above Sea Level (mASL) in September, and 219.3 and 220.7 mASL in November. Inferred groundwater flow direction is generally inferred to be north-east towards Lake Simcoe.

4. Consultation Process

As part of the pre-design process, Hatch contacted the LSRCA to discuss the project with them. A proposed preliminary site plan was submitted to LSRCA so they would have an accurate understanding of what is being proposed to be constructed at the site. Representatives from Hatch and Town met with the LSRCA on multiple meetings, January 21, and August 9, 2022, to discuss options and associated requirements. The site plans (existing and proposed) were used as the basis for discussion.

The Addendum was shared with Indigenous Communities for a 60-day review period and will be shared with the MECP and the LSRCA for a 60-day review period. Comments will be discussed with the Town prior to finalization.

The study must follow the requirements of the *Environmental Assessment Act* for consultation pursuant to the Municipal Class EA. Revisions to Schedule C projects, which requires the issuance of a Revised Notice of Filling of Addendum to start the 30-day calendar review period of the ESR Addendum for the public and stakeholders. The Notice of Filing of ESR Addendum will be issued to those on the Project contact list; placed on the Town’s website, in the local newspaper and distributed to those within a 500 m buffer of the study area. The notice will outline how to submit comments and request a Section 16(6) Order within the 30-day review period. In the event that no comments are received, the proponent can then proceed to implementation and construction.

It should be noted that only the items included in the Addendum are subject to review. All other items covered under the original EA but excluded from the Addendum will be not subject to a Section 16(6) Order.

5. Indigenous Community Engagement

It is important for the success of the Project to perform meaningful engagement with the appropriate Indigenous communities as part of the ESR Addendum process. Although the previous ESR concluded that Indigenous communities had "no issues or concerns", the Town reached out to the Indigenous communities to offer to meet and provide access to studies that may be of interest. Indigenous communities as rights holders should have an opportunity to comment on the ESR Addendum and Appendices prior to finalization.

The Town requested the following Indigenous communities for their comments on the ESR Addendum and supporting Appendices on August 31, 2023:

- Williams Treaty First Nation.
    - Hiawatha First Nation.
    - Alderville First Nation.
    - Mississauga's of Scugog Island.
    - Chippewas of Beausoleil First Nation.
    - Chippewas of Georgina Island First Nation.
    - Chippewas of Rama First Nation; and
    - Curve Lake First Nation.
- Huron-Wendat Nation; and
- Metis Nation of Ontario.

On November 11, 2023, the Town followed up with the identified Indigenous communities indicating that the 60-day review period was had reached its end. The Town provided an invitation to the Indigenous communities for an opportunity to discuss the ESR addendum, either virtually or in-person.

Alderville First Nation expressed an interest in participating in a virtual meeting. The meeting between the Town and Alderville First Nation was held virtually on December 8, 2023. Outcomes of this meeting found that records of the 2008 Stage 1 Archaeological Assessment for the study area were not available. To address the missing Assessment, as noted in Section 3.3.1, a Stage 1 Archaeological Assessment was conducted by ARA in April 2024. ARA notified the identified Indigenous communities of the planned Stage 1 property inspection in early April 2024 and provided them with the draft report of the Stage 1 Archaeological Assessment for their comment. Details of the Indigenous Engagement related to the Stage 1 Archaeological Assessment can be found in Section 3.3.1.

Supplementary meeting invitations were sent to the identified Indigenous communities on February 8, 2024. No further meetings were requested by Indigenous Communities.

Details of the Indigenous consultation record and documentation of email correspondence can be found in the Appendix C. Additional outreach was provided to the identified Indigenous communities with final offers to meet and review the draft reports on March 19, 2024, and April 3, 2024. Only the Chippewas of Georgina Island First Nation responded to this outreach, who requested additional copies of the draft Environmental Study Report Addendum and draft Natural Heritage Evaluation Study. These reports were provided to the Chippewas of Georgina Island First Nation on April 3, 2024.

A summary of the consultation activities is provided in Appendix C.

6. Potential Environmental Impacts

6.1 Fisheries and Aquatic Habitats

The construction of the expansion and connection to the outfall pipe has the potential to effect water quality through on-site erosion, which may impact the West Holland River's water quality downstream. To mitigate this, standard ESC (i.e., silt fencing, flow checks, filter socks, etc.) will be implemented and regularly maintained. Additionally, any exposed areas will be re-vegetated immediately once the construction work is completed, preventing sediment from entering the river.

Water temperature may also be affected due to the expansion, however the impacts to the river are negligible due to the warmwater stream community's tolerance to disturbance, and the shade the riparian vegetation provides. It is not anticipated that riparian vegetation adjacent to the river will be impacted by the WPCP expansion or associated water temperature increases. Additionally, no new barriers to fish passage will result from this project.

6.2 Vegetation and Vegetation Communities

Effects to vegetation and vegetation communities may include:

- Displacement of/disturbance to vegetation and vegetation communities; and
- Displacement of/disturbance to rare, threatened or endangered vegetation and vegetation communities.

The proposed expansion to the WPCP will almost entirely be restricted to manicured lands. The overall significance of the removal is considered low. Connection of the tertiary effluent to the existing outfall pipe will result in the removal of a portion of the cultural meadow community. It is anticipated that plant species displaced and/or disturbed within the cultural communities due to the disturbance will re-colonize available lands post-construction. Minor encroachment into the Minimum Vegetation Protection Zone (MVPZ) of the staked wetland boundary will occur. To offset the impacts, an Ecological Offsetting Strategy in accordance with the LSRCA guidelines will be prepared.

No displacement or disturbance to rare plant species or vegetation communities will occur as a result of the proposed WPCP expansion.

6.3 Wildlife and Wildlife Communities

Impacts as a result of the proposed expansion will occur entirely within areas that have been previously disturbed by human activity which consists of low-quality habitat; therefore, it is not anticipated to disturb wildlife or wildlife habitat. Only minor infringement to cultural meadow communities will occur as a result of the expansion of the headwall, and result in very minor disturbance to wildlife and wildlife habitat.

6.4 Species at Risk

Three species at risk have been identified in the study area, however the likelihood of the proposed works having a negative effect on SAR is low as encroachment into suitable habitats will be minimal with potential impacts only associated with the edges of the open aquatic community. There are no negative impacts associated with the proposed tertiary building footprint and only minimal temporary impacts to the open aquatic community anticipated as a result of the connection of the tertiary effluent to the existing outfall pipe.

No impacts to the two avian SAR (Barn Swallow or Bank Swallow) are anticipated as a result of the proposed works. Minor habitat impacts to turtle SAR would include encroachment on possible nesting habitat along riparian cultural meadow and aquatic communities. Vegetation removals in these communities as a result of the headwall replacement and outfall pipe installation may result in impacts to potential nesting habitat.

6.5 Ground Water and Dewatering Rates

Orbit completed a subsurface investigation, hydrogeological assessment, and an analysis of hydraulic conductivity testing and groundwater monitoring data as part of the PDR.

Based on their findings, it is recommended that no long-term dewatering system be implemented, rather a short-term dewatering system should be designed and evaluated by a qualified Engineer and performed by a licenced dewatering contractor. The maximum total dewatering rate is to be approximately 11.4 m^3/day. Fine soil particles must be removed before the water is discharged into the Town sewer system. The highest zone of influence was estimated to be approximately 11.6 m. Orbit recommends an Engineer be retained to assess the impacts of potential land subsidence for the zone of influence during the dewatering process. The estimated rate in the case of the construction of only one pile cap is below the MECP threshold of 50 m^3/day for the Environmental Activity and Sector Registry (EASR) registration.

6.6 Soil Quality

Orbit completed a geotechnical investigation in 2021. This included desktop reviews, site visits, sampling, and laboratory works to determine the soil quality and predict and mitigate potential impacts. The soil generally consisted of surficial topsoil (100 mm-300 mm thick), fill (0.9 m to 2.3 m below the surface at varying thickness), and native soil layers. Laboratory testing determined that the soils may be re-used, with further information regarding the re-use of soils presented in Section 7.6 of this report.

6.7 Surface Water Quality

To minimize potential adverse impacts on water quality during construction, material stockpiles, excavated soils and demolition debris will be not permitted near the outfall channel.

6.8 Air Quality

Material handling issues such as excavation, demolition, loading and hauling, comprise most significant source of dust during construction activities. The required construction activities are not expected to create large quantities of dust. Dust control during these activities can be easily achieved through proper planning and implementation of best construction practices and mitigation measures in keeping with the MECP guidelines.

6.9 Noise

There will be a short-term increase in on-site noise during construction activities. Sound levels at the nearest property are expected to be within the MECP sound level limits.

6.10 Construction Traffic

Traffic will increase during construction from the hours of 7 am to 7 pm weekdays and some weekends. The impact of traffic on the Bradford West Gwillimbury community is expected to be minimal due to the surrounding industrial land use and the proximity to Highway 400, areas which are already prone to traffic from industrial vehicles.

7. Mitigation Measures

The potential environmental impacts associated with implementation of a new tertiary treatment process are anticipated to be negligible. Many of the potential impacts can be mitigated through proper construction practices, good housekeeping practices for storage/stockpiling and equipment fueling/maintenance on site, and the use of ESC measures. Additional mitigation measures for specific valued components are outlined in the following sections.

7.1 Fisheries and Aquatic Habitats

Due to the nature of the project, construction is required near the West Holland River. As a result, the following mitigation measures will be put in place to prevent negative impacts to the aquatic habitat:

- No in-water work between April 1 and June 30 to protect the warmwater fish community, consistent with LSRCA guidelines;
- Utilizing construction fencing to minimize the area of disturbance;
- Installing ESC prior to development, and regularly inspecting and maintaining them;
- Containing all debris/materials associated with the project to prevent them from entering watercourses;
- Re-vegetating riparian areas and/or covering riparian areas with an erosion control blanket as quickly as possible to stabilize the banks and minimize the potential for erosion and sedimentation; and
- Have a third-party fisheries biologist/inspector of ESC be present for the duration of in-water works. When direct work within the watercourse is not being undertaken, inspection of erosion control features should be undertaken weekly by site crew, and more frequently associated with rain events and/or spring snow melt.

7.2 Vegetation and Vegetation Communities

Plantings of trees, shrubs and appropriate seed mixes in areas of disturbed soil due to the proposed works, will provide increased shade and cover to the respective channels.

As many of the plants identified in the site visits were invasive species, special care must be taken to prevent the spread of invasive plant species, both on and off site. Mitigation measures include:

- Sanitizing and inspecting construction vehicles and equipment in accordance with the *Clean Equipment Protocol for Industry* (Halloran, 2013) prior to leaving and moving to the next site.
- Restoring disturbed areas using native seed mix and woody species similar to the those in the surrounding area; and
- Hiring professionals to perform enhancement planting to provide additional buffering and mitigate impacts related to vegetation removals.

Ecological offsetting for the disturbance to the wetland and minimum vegetation protection zone is required by the LSRCA. To comply with the regulations, an Ecological Offsetting Strategy will be prepared and submitted for review once the site plan is finalized.

7.3 Wildlife and Wildlife Habitat

7.3.1 Migratory Birds

To comply with these requirements, the removal, disturbance, or disruption of vegetation should be completed outside of the window of April 1 to August 31, as per the Environment Canada guidelines. If these activities must take place during the timing window, a nest screening survey will be performed by a qualified avian biologist.

7.3.2 Species at Risk

The contractor will be informed of this legislation, and provisions will be included to ensure that the wildlife is not harmed, harassed, or killed. The contractor will have to remain vigilant, move equipment at a slow pace to prevent trampling, and will be instructed not to handle or harass any wildlife species encountered during construction. Erosion control fencing will be simultaneously used to prevent erosion and to section off any wetlands, ditches, and watercourse/pond margins to prohibit entry into the sensitive areas by the contractor.

Should any SAR be encountered during construction, they will be allowed to naturally disperse from the site. In the event that the SAR in question does not disperse from the site, a qualified biologist will be contacted to discuss options for resuming construction.

7.4 Waste Management

All waste materials from construction will be contained and disposed of in accordance with applicable laws, regulations and guidelines.

7.5 Soil Quality

The applicable site condition standard for the property is determined to be Table 3 ICC standards. All soils on the property meet MECP Table 3 ICC Standards for coarse texture soils and the SPLP samples also meet O. Reg. 406/19 Table 3.1 ICC Soil Reuse Standards for Table 3 ICC sites. Based on laboratory test results, the excavated soil may be re-used at the same site for grading purposes. The reuse is still subject to geotechnical considerations. Alternatively, excess soil may be reused at redevelopment sites accepting soil meeting the MECP Table 3 Standards for ICC property uses. Acceptance of this material is at the discretion of the receiving site(s).

During excavations, if any soil is encountered that has unusual stains or odors (e.g., hydrocarbon or solvent odors), or contains rubble, debris, cinders or other visual evidence of impact, this soil should be segregated, and a Qualified Person should be contacted immediately. Such soil should not be removed from the subject site until the results of an assessment are available.

Additionally, all soil management and disposal activities must comply with requirements associated with site alteration agreements, noise and traffic bylaws, and permitting regimes established by the Town and the LSRCA.

7.6 Surface Water Quality

Installation and maintenance of ESC measures as noted in Section 7.1, including controls for materials and soil stockpiles.

7.7 Air Quality

The main impact on air quality that is anticipated for the WPCP is dust. Mitigation measures include:

- Following MECP best practises for construction;
- Spraying down the site and roadways;
- Limiting excavation on windy days;
- Properly washing trucks; and
- Using dust covers on haulage trucks.

The other air quality impact anticipated is vehicle exhaust fumes. Mitigation measures for exhaust include maintaining equipment and emission control devices, as well as limiting idling.

While the appropriate mitigation measures will be implemented during construction, there may be localized residual dust emission around the site.

To prevent air quality impacts associated with construction, vehicle exhaust fumes, emission control devices and equipment must be functional and effective. New or well-maintained heavy equipment and machinery, preferably fitted with muffler/exhaust system baffles and engine covers will be used.

7.8 Noise

Construction activities will be restricted to the hours as prescribed in the Town of Bradford West Gwillimbury noise by-law.

The contractor will be responsible for ensuring that equipment is in sound working order and using noise attenuation devices to be in compliance with MECP requirements both on and off site.

7.9 Construction Traffic

Measures will be put into place during construction to minimize impact from mud and dust on roadways. Construction sequencing will be developed such that operation and maintenance trucks will continue to have access to the site as needed during construction.

7.10 Aesthetic Impacts

The new building will be designed to match the architectural aesthetic of the existing buildings on site.

8. Permits and Approvals

During design, there are several permits and approvals that will be required as outlined below.

Table 8-1: Summary of Permits and Approvals

Permit or Approval Level	Permit or Approval
Provincial	Environmental Compliance Authorization – Sewage
	Electrical Safety Authority review
	LSRCA O.Reg 179/06
Municipal	Town of Bradford West Gwillimbury Building Permit

9. Implementation Schedule

The proposed implementation schedule for the implementation of the new tertiary treatment process is as follows:

- Detailed Design: Q1 2023 to Q4 2024
- Complete Applications for Permits and Approvals: Q4 2024
- Tender: Q4 2024/Q1 2025
- Construction award: Q2 2025
- Substantial Completion: Q4 2027

10. References

Ainley & Associates Ltd. and Black & Veatch Canada. (2012). *Bradford West Gwillimbury Water Pollution Control Plant Environmental Study Report Phases 3 and 4.* Bradford West Gwillimbury.

C.C. Tantham & Associates Ltd. (2011). *The 2011 Town of Bradford West Gwillimbury's Master Servicing Plan Update.* Town of Bradford West Gwillimbury.

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Orbit Engineering Ltd. (2021). *Hydrogeological Investigation – Bradford WPCP Tertiary Upgrade 225 Dissette Street, Bradford West Gwillimbury.*

Carson Brennan
MA:cb

Appendix A

Natural Heritage Evaluation Study

Draft Natural Heritage Evaluation

BRADFORD WATER POLLUTION CONTROL PLANT (WPCP) UPGRADES, TOWN OF BRADFORD WEST GWILLIMBURY

prepared for:

HATCH

prepared by:

LGL LIMITED
Est. 1971
environmental research associates

FEBRUARY 2023
TA9244

LGL Limited, environmental research associates. Head Office: King City, Ontario, Canada 1-905-833-1244 kingcity@lgl.com www.lgl.com

DRAFT NATURAL HERITAGE EVALUATION

BRADFORD WATER POLLUTION CONTROL PLANT (WPCP) UPGRADRES, TOWN OF BRADFORD WEST GWILLIMBURY

Prepared by:

Digital signature

Lisa Catcher, B.Sc.
Senior Botanist, ISA Certified Arborist

Digital signature

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Ecologist

FEBRUARY 2023
LGL PROJECT # TA9244

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APPENDICES

1.0 INTRODUCTION

The Town of Bradford West Gwillimbury is preparing to expand the Bradford Water Pollution Control Plant (WPCP). The expansion of the WPCP will be fully within the existing facility property (subject property). The location of the property is shown in **Figure 1**.

This detailed design study is being conducted by Hatch on behalf of the Town of Bradford West Gwillimbury. LGL Limited (LGL) as a sub-consultant to Hatch, is providing natural heritage services. A Terms of Reference (ToR) was submitted to the Lake Simcoe Region Conservation Authority (LSRCA) for approval in June 2022 and as such, this report serves to satisfy the requirements of the ToR (**Appendix A**). This report summarizes the results of LGL's data collection and analysis conducted in the summer of 2022. The potential effects of this project on natural heritage features, including environmental protection measures, are presented in this report. The impact assessment and mitigation are based on a review of the architectural drawings prepared by Hatch in January 2023.

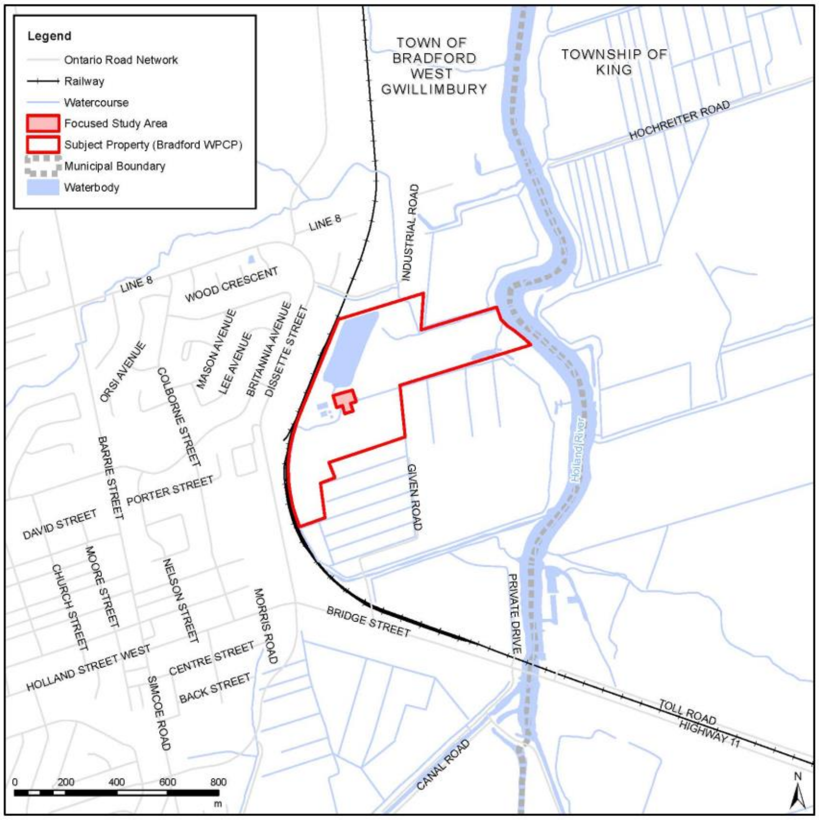


FIGURE 1. KEY PLAN

2.0 IDENTIFICATION OF NATURAL HERITAGE FEATURES AND FUNCTION

The following section describes the key natural heritage and hydrological features located on within and adjacent to the study area. The natural heritage and hydrological features on and adjacent to the study area are delineated in **Figure 2a and 2b**.

2.1 Fish and Fish Habitat

2.1.1 Secondary Source Information

A review of available secondary source information provided by Land Information Ontario (LIO) managed by the Ministry of Northern Development, Mining, Natural Resources and Forestry (MNDMNRF) was undertaken. The watercourse adjacent to the study area is part of the Holland Canal/River system which ultimately flows into Lake Simcoe. The subject tributary channel supports permanently flowing, warmwater fish habitat as per the West Holland River Subwatershed Management Plan. A fish sampling station was identified from secondary source information (GeoHub) near the study area (MH-0552-HOL and AU-0031-HOL) where a warmwater fish community was sampled (see **Table 1**).

TABLE 1.
HISTORIC FISH COLLECTION RECORDS WITHIN PROXIMITY OF THE STUDY AREA

Scientific Name	Common Name	West Holland (MH-0552-HOL and AU-0031-HOL)
Amia calva	Bowfin	x
Chrosomus eos	Northern Redbelly Dace	x
Luxilus cornutus	Common Shiner	x
Notemigonus crysoleucas	Golden Shiner	x
Notropis atherinoides	Emerald Shiner	x
Pimephales notatus	Bluntnose Minnow	x
Pimephales promelas	Fathead Minnow	x
Rhinichthys atratulus	Blacknose Dace	x
Semotilus atromaculatus	Creek Chub	x
Ameiurus nebulosus	Brown Bullhead	x
Esox lucius	Northern Pike	x
Umbra limi	Central Mudminnow	x
Morone chrysops	White Bass	x
Ambloplites rupestris	Rock Bass	x
Lepomis gibbosus	Pumpkinseed	x
Micropterus salmoides	Largemouth Bass	x
Etheostoma nigrum	Johnny Darter	x
Culaea inconstans	Brook Stickleback	x

Note: x = Secondary Source Fish Collection Data, Ministry of Natural Resources and Forestry (Ontario GeoHub, 2023)

2.1.2 Existing Conditions

As noted above, the subject tributary channel adjacent to the study area, is part of the Holland Canal/River system which ultimately flows into Lake Simcoe. The channel was assessed by LGL fisheries staff on June 21, 2022 on a clear day with an air temperature of 29^{o} C. The subject tributary channel which flows west to east along the north edge of the manicured grass area, consists of a defined channel 0.5 – 0.75 m in wetted width. The channel appears to support permanent flow, with a warmwater fish community. The straightened channel is contained within defined banks which have been constructed. The substrates consist of placed rip rap and sand with flows that are moderately fast due to the gradient. The flows in the channel consist of runoff received from the upstream drainage areas. However, at the eastern limit of the manicured grass area, the subject tributary has a confluence with an outfall of the WPCP. The flows of the outfall are significantly greater in volume than the flows of the subject tributary.

The riparian community consists of a narrow band of herbaceous vegetation with a naturalized slope to the north and manicured grass to the south. *Phragmites* (European reed), an invasive species is present along the edges of the wetted channel.

The subject property is located in the Lake Simcoe Region Conservation Authority (LSRCA) watershed, and under the jurisdiction of *Ontario Regulation 179/06*. Any work within the regulated areas of *O.Reg. 179/06* is subject to permitting by the LSRCA. The study area is also under the jurisdiction of the MNDMNRF and Ministry of the Environment, Conservation and Parks (MECP) Aurora District office.

The West Holland River Subwatershed Management Plan completed by LSRCA in 2010 has identified the subject tributary as a warmwater habitat with a timing work window of April 1 to June 30 (no in-water work permitted). A warmwater fish community is generally tolerant to disturbance and as such, a minimum setback of 15 m from either bank is typically applied, in order to provide a buffer to disturbances.

2.1.3 Aquatic Species at Risk

Secondary source information including the Ministry of Natural Resources and Forestry (MNRF) Make a Map: Natural Heritage on-line utility (2023) and the Department of Fisheries and Oceans (DFO) aquatic species at risk mapping (2023) show no aquatic species at risk in the study area.

2.2 Vegetation and Vegetation Communities

The geographical extent, composition, structure, and function of vegetation communities were identified through air photo interpretation and field investigations. Air photos were interpreted to determine the limits and characteristics of vegetation communities. Field investigations of the vegetation communities within the study area, were undertaken on July 12 and September 9, 2022.

Vegetation communities were classified according to the *Ecological Land Classification for Southern Ontario: First Approximation and Its Application* (Lee et al. 1998). The communities were sampled using a plotless method for the purpose of determining general composition and structure of the vegetation. Plant species status were reviewed for Ontario (Oldham 2009), Simcoe County (Riley 1989) and Lake Simcoe Region Conservation Authority (Lake Simcoe Environmental Management Strategy State of the Lake Simcoe Watershed 2003). Vascular plant nomenclature follows Newmaster et al. (1998) with a few exceptions that have been updated to Newmaster et al. (2007).

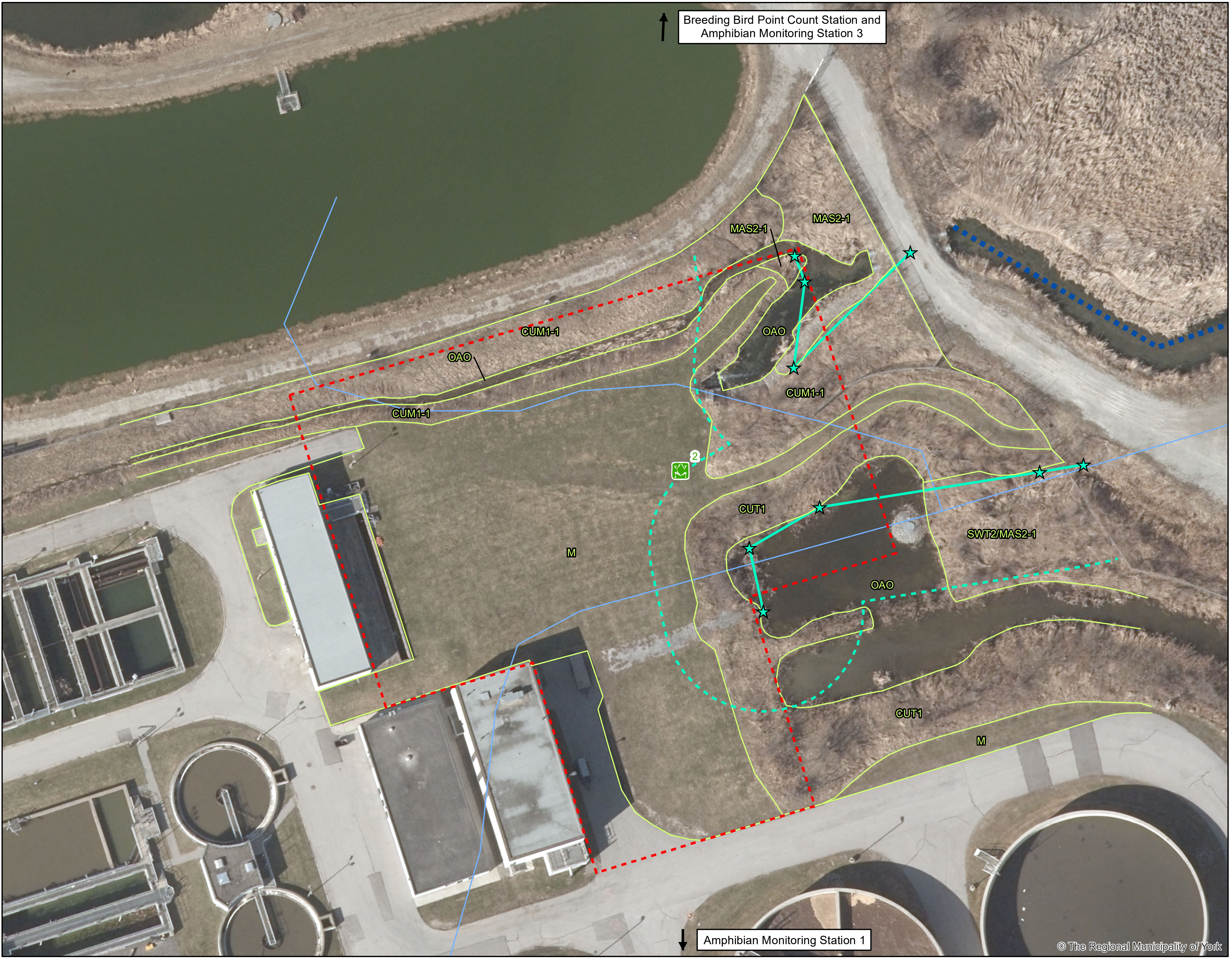
Vegetation communities within the study area consist of a mixture of wetland and cultural communities. A total of five Ecological Land Classification (ELC) vegetation community types were identified within the study area including: Cattail Mineral Shallow Marsh (MAS2-1), Open Aquatic (OAO), Mineral Thicket Swamp (SWT2), Dry-Moist Old Field Meadow (CUM1-1) and Mineral Cultural Thicket (CUT1). All of the vegetation communities identified within the study area are considered widespread and common in Ontario and secure globally. These communities are delineated in **Figures 2a and 2b** and described in **Table 2.**

Wetland Communities

As noted above, several small wetland communities were identified within the study area. The limits of the wetland communities were staked in the field with LSRCA ecology staff on September 9, 2022 (**Figure 3a and 3b**). These communities were largely dominated by cattail species (*Typha* spp.). It is likely these communities are remnant portions of wetlands that was once connected to the PSW to the east before it was bisected by Given Road.

Cultural Vegetation Communities

The cultural vegetation communities within the study area consist of mineral cultural meadow and mineral cultural thicket. The cultural communities were generally observed along the edge of the watercourse and pond within the study area. These communities contain a high proportion of non-native plant species that are well adapted to persist in areas that are regularly disturbed including species that are adapted to high light conditions and limited soil moisture.



LEGEND

🟩	Amphibian Monitoring Station
●	Breeding Bird Point Count Station
★	Wetland Stake Location (September 9, 2022)
—	Staked Wetland (September 9, 2022)
- - -	Minimum Vegetation Protection Zone (MVPZ) (15 m)
■■■	Constructed Drain - DFO Class "C"
—	Watercourse
▭	Focused Study Area

Vegetation Communities

—	Vegetation Community Boundary
CUM1-1	Dry-Moist Old Field Meadow Type
CUT1	Mineral Cultural Thicket Ecosite
M	Manicured
MAS2-1	Cattail Mineral Shallow Marsh Type
OAO	Open Aquatic
SWT2	Mineral Thicket Swamp Ecosite

Data Sources: LGL Limited field surveys & Ministry of Natural Resources and Forestry (LIO). Contains information licenced under the Open Government Licence - Ontario.

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BRADFORD WPCP
EXISTING CONDITIONS

LGL LIMITED
Est. 1971
environmental research associates

Project:	TA9244	**Figure:**	2a
Date:	February, 2023	**Prepared By:**	JJP
Scale:	1 : 550	**Checked By:**	LMC

LEGEND

🟩	Amphibian Monitoring Station
●	Breeding Bird Point Count Station
★	Wetland Stake Location (September 9, 2022)
—	Staked Wetland (September 9, 2022)
- - -	Minimum Vegetation Protection Zone (MVPZ) (15 m)
▪ ▪ ▪	Constructed Drain - DFO Class "C"
—	Watercourse
🟥	Focused Study Area
🟥	Subject Property

Vegetation Communities

—	Vegetation Community Boundary
CUM1-1	Dry-Moist Old Field Meadow Type
CUT1	Mineral Cultural Thicket Ecosite
M	Manicured
MAS2-1	Cattail Mineral Shallow Marsh Type
OAO	Open Aquatic
SWT2	Mineral Thicket Swamp Ecosite

Data Sources: LGL Limited field surveys & Ministry of Natural Resources and Forestry (LIO). Contains information licenced under the Open Government Licence - Ontario.

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BRADFORD WPCP
EXISTING CONDITIONS

LGL
Est. 1971
LIMITED
environmental research associates

Project:	TA9244	**Figure:**	2b
Date:	February, 2023	**Prepared By:**	JJP
Scale:	1 : 1,400	**Checked By:**	LMC

TABLE 2.
SUMMARY OF ECOLOGICAL LAND CLASSIFICATION VEGETATION COMMUNITIES

ELC Code	Vegetation Type	Species Association	Comments
Terrestrial-Cultural			
CUM	CULTURAL MEADOW		
CUM1-1	Dry – Moist Old Field Meadow	**Canopy:** includes Manitoba maple (*Acer negundo*). **Ground Cover:** includes orchard grass (*Dactylis glomerata*), wild carrot (*Daucus carota*), flat-topped busy goldenrod (*Euthamia graminifolia*), variable crown-vetch (*Coronilla varia*) and Canada thistle (*Cirsium arvense*).	• Cultural communities (CU). • Tree cover and shrub cover < 25 % (M). • This community can occur on a wide range of soil moisture regimes (Dry-Moist) (-1). • Pioneer community resulting from, or maintained by, anthropogenic-based influences.
CUT	CULTURAL THICKET		
CUT1	Mineral Cultural Thicket	**Canopy:** includes cottonwood (*Populus deltoides*), staghorn sumac (*Rhus hirta*), red ash (*Fraxinus pennsylvanica*), and guelder rose (*Viburnum opulus*). **Ground Cover:** includes virgin's bower (*Clematis virginiana*), European stinging-nettle (*Urtica dioica* ssp. *dioica*), orchard grass, Canada goldenrod (*Solidago canadensis*).	• Cultural community (CU). • Tree cover <25 %; shrub cover >25% (T). • Mineral soil (1).
Wetland			
MAS	SHALLOW MARSH		
MAS2-1	Cattail Mineral Shallow Marsh	**Ground cover:** includes cattails (*Typha angustifolia* and *T. latifolia*), reed canary grass (*Phalaris arundinacea*), and common water plantain (*Alisma plantago-aquatica*).	• Tree or shrub cover <25% (MA). • Water up to 2 m deep, with standing or flowing water for much of the growing season (S). • Mineral soil (2). • Cattail dominant (-1).
MAS	SHALLOW MARSH/SWAMP THICKET		
MAS2-1/SWT2	Cattail Mineral Shallow Marsh/Mineral Swamp Thicket	**Canopy:** includes willow species (*Salix* spp.), red-osier dogwood (*Cornus sericea* ssp. *sericea*) and Manitoba maple. **Ground Covers:** includes broad-leaved cattail, European reed (*Phargmites australis* ssp. *australis*), lesser duckweed (*Lemna minor*), and Canada goldenrod.	• Tree or shrub cover <25% (MA). • Water up to 2 m deep, with standing or flowing water for much of the growing season (S). • Mineral soil (2). • Cattail dominant (-1). • Tree or shrub cover >25% and dominated by hydrophytic shrub and tree species

TABLE 2.
SUMMARY OF ECOLOGICAL LAND CLASSIFICATION VEGETATION COMMUNITIES

ELC Code	Vegetation Type	Species Association	Comments
			(SW). • Tree cover < 25%, hydrophytic shrubs > 25% (T). • Mineral substrate, flooding duration is short – substrate aerated by early to mid-summer (2).
OTHER			
M*	Manicured grasses and planted shrubs and/or trees	Areas where large expanses of grass/shrubs/trees are maintained and/or planted. Areas where large expanses of grass/shrubs/trees are maintained/retained and/or planted.	

2.2.1 Flora

A total of 50 plant species have been recorded within the study area. One of these plants could only be identified to genus and are not included in the following calculations. Of the 49 plants identified to species, 25 (52%) plant species identified are native to Ontario and 24 (48%) plant species are considered introduced and non-native to Ontario. A list of vascular plants is presented in **Appendix B**. Definitions of the acronyms and species ranks used are described in **Appendix C**.

2.2.2 Locally Rare Flora and Species

Plant species status was reviewed to determine their significance in relation to national, provincial and local status. No nationally or provincially tracked plant species were identified within the study area. In addition, no plants species that are considered locally or regionally rare were identified within the study area.

2.2.3 Species at Risk

No plant species that are regulated under the *Ontario Endangered Species Act* or the *Canada Species at Risk Act* were encountered during LGL's botanical investigation. A review of the MNRF Natural Heritage Information Centre (NHIC (2022)) indicates that there are no historic records of plant species at risk within the subject property.

2.3 Wildlife and Wildlife Habitat

Field investigations were conducted with the purpose of documenting wildlife and wildlife habitat and to characterize the nature, extent, and significance of wildlife usage within the properties. In addition to targeted amphibian and breeding bird surveys, incidental observations of any wildlife species encountered while in the study area were also recorded, including birds heard outside of the five-minute point count.

Methodologies outlined in the Marsh Monitoring Program (2000) were applied to confirm the presence of anuran species, document potential breeding habitat/areas, and confirm the nature, extent and significance of amphibian usage. Three stations were strategically placed throughout the subject property where amphibian breeding habitat was suspected (based on aerial photo interpretation and field review) (**Figures 2a and 2b**). Each survey was conducted during appropriate weather conditions, beginning one half hour after sunset and concluding just prior to midnight. Surveys were completed during periods of peak anuran breeding activity and vocalization. Anuran surveys were conducted on two separate occasions (May 31 and June 21, 2022) during the spring and summer of 2022. Due to the dates of the project start, an early spring (April) visit for amphibian monitoring surveys was not conducted. Weather conditions on May 31, 2022 were 27°C, partially cloudy with 5 km/h winds from the west. Weather conditions on June 21, 2022 were 22°C, clear, with winds of 15 km/h from the northwest.

Breeding bird surveys were completed in the early morning between the hours of sunrise and five hours after sunrise, following the Ontario Breeding Bird Atlas (OBBA) Protocol (Cadman et al. 2007). A point count station was placed strategically at one location within the subject property (**Figure 2b**), in which all bird species observed by sight or sound within the five-minute survey were recorded. Territorial songs, direct observations of breeding bird behaviour, along with presence of bird nests and fledged young were used to record breeding bird evidence (BBE) within the study area. Evidence of bird breeding success was categorized according to the OBBA survey methodology (Cadman et al. 2007) using the following criteria:

Possible Breeding: Species observed in its breeding season in suitable nesting habitat (H).
Singing male present in its breeding season in suitable nesting habitat (S).
Probable Breeding: Permanent territory presumed through registration of territorial song heard on at least two days, one week or more apart, at the same place (T).

Confirmed Breeding: Fledged young or downy young, including young incapable of flight (FY).

Field investigations for breeding bird surveys were conducted on the mornings of June 10 and July 8, 2022. Weather conditions on June 10, 2022, were 14°C, clear, with winds of 14 km/h from the northwest. Weather conditions on July 8, 2022, were 14°C, clear, with winds of 10 km/h from the south.

Secondary source data from the Ministry of Natural Resource and Forestry (Ontario GeoHub and NHIC) was reviewed to screen for wildlife, wildlife habitat and records of species at risk found within the property and its immediate vicinity.

2.3.1 Field Investigations

Wildlife habitat within the focused study area consists of manicured grass, meadow, thicket, wetland (marsh/swamp) communities, as well as open aquatic areas. The manicured grass found within the focused study area is expected to provide limited function as habitat for open country/anthropogenic wildlife species. Trees and shrubs within thicket and meadow communities is expected to provide habitat for a variety of wildlife species. Multiple aquatic habitat types were identified within the lands examined, which may support herpetofauna and amphibian life stages. Based on the habitat types present, species which occupy thicket, meadow, wetlands and open country/anthropogenic communities are expected to be occupy the study area. Similarly, given the operation of the Bradford WPCP adjacent to these habitats, species that are generally tolerant of human influence and disturbance are expected to be present.

Given a general lack of natural heritage features and the disturbed nature of the lands adjacent to those examined, specialized wildlife habitats were not identified within the study area.

2.3.2 Fauna

Thirty-four (34) wildlife species were recorded within the study area during field investigations throughout the 2022 season (see **Table 3**), which consist of three amphibians, one reptile, 28 bird and two mammal species. Targeted amphibian surveys and breeding bird surveys were conducted within the study area in addition to incidental wildlife surveys.

2.3.2.1 Herpetofauna

Anuran breeding evidence was documented for three species during the 2022 surveys. Vocalizing male American Toad (*Anaxyrus americanus*), Green Frog (*Lithobates calamitans*) and Northern Leopard Frog (*Lithobates pipiens*) were noted within the study area, or in the immediate vicinity of the study area. A summary of anuran species and their respective call level codes is presented in **Table 4**. Overall, the aquatic habitats observed throughout the study area displayed evidence of amphibian breeding during field investigations.

TABLE 3.
SUMMARY OF WILDLIFE SPECIES IDENTIFIED WITHIN THE STUDY AREA BY LGL (2022)

Wildlife	Scientific Name	Common Name	Species Status under Legislation/ Local Sensitivity			
			Fed SARA	Prov ESA	Legal Status	Other
Amphibians	*Anaxyrus americanus*	American Toad [x]	-	-	-	-
	Lithobates calamitans	Green Frog [x]	-	-	-	-
	Lithobates pipiens	Northern Leopard Frog [x, y]	-	-	-	-

TABLE 3.
SUMMARY OF WILDLIFE SPECIES IDENTIFIED WITHIN THE STUDY AREA BY LGL (2022)

Wildlife	Scientific Name	Common Name	Species Status under Legislation/ Local Sensitivity			
			Fed SARA	Prov ESA	Legal Status	Other
Birds	*Branta canadensis*	Canada Goose ^{x}	-	-	MBCA	-
	Aix sponsa	Wood Duck $^{x, y}$	-	-	MBCA	-
	Anas platyrhynchos	Mallard ^{x}	-	-	MBCA	-
	Podilymbus podiceps	Pied-billed Grebe ^{y}	-	-	MBCA	-
	Charadrius vociferus	Killdeer ^{x}	-	-	MBCA	-
	Actitis macularius	Spotted Sandpiper $^{x, y}$	-	-	MBCA	-
	Larus argentatus	Herring Gull ^{x}	-	-	MBCA	-
	Ardea herodias	Great Blue Heron ^{y}	-	-	MBCA	-
	Butorides virescens	Green Heron ^{y}	-	-	MBCA	-
	Empidonax traillii	Willow Flycatcher ^{x}	-	-	MBCA	-
	Tyrannus tyrannus	Eastern Kingbird ^{x}	-	-	MBCA	-
	Vireo gilvus	Warbling Vireo $^{x, y}$	-	-	MBCA	-
	Tachycineta bicolor	Tree Swallow ^{y}	-	-	MBCA	-
	Hirundo rustica	Barn Swallow ^{y}	THR	THR	MBCA	-
	Stelgidopteryx serripennis	Northern Rough-winged Swallow $^{x, y}$	-	-	MBCA	-
	Riparia riparia	Bank Swallow ^{y}	THR	THR	MBCA	-
	Turdus migratorius	American Robin $^{x, y}$	-	-	MBCA	-
	Dumetella carolinensis	Gray Catbird $^{x, y}$	-	-	MBCA	-
	Sturnus vulgaris	European Starling ^{x}	-	-	-	-
	Bombycilla cedrorum	Cedar Waxwing ^{x}	-	-	MBCA	-
	Spinus tristis	American Goldfinch ^{x}	-	-	MBCA	-
	Geothlypis trichas	Common Yellowthroat ^{x}	-	-	MBCA	-
	Setophaga petechia	Yellow Warbler ^{x}	-	-	MBCA	-
	Melospiza melodia	Song Sparrow ^{x}	-	-	MBCA	-
	Cardinalis cardinalis	Northern Cardinal ^{x}	-	-	MBCA	-
	Agelaius phoeniceus	Red-winged Blackbird ^{x}	-	-	-	-
	Quiscalus quiscula	Common Grackle ^{x}	-	-	-	-
	Icterus galbula	Baltimore Oriole ^{x}	-	-	MBCA	-
Reptiles	*Chrysemys picta*	Painted Turtle ^{y}	-	-	-	-
Mammals	*Sylvilagus floridanus*	Eastern Cottontail ^{y}	-	-	FWCA(G)	-
	Ondatra zibethicus	Muskrat ^{y}	-	-	FWCA (F)	-

^{x} denotes species was observed during Breeding Bird Point Count Survey.
^{y} denotes species was observed as an incidental species observation or heard outside the five-minute Breeding Bird Point Count Survey.

All acronyms used in this table are defined in **Appendix B** (Acronyms and Definitions Used in Species Lists).

Legislation Referenced in the Table:
SARA – Federal *Species at Risk Act*
ESA – Ontario *Endangered Species Act, 2007*
MBCA – *Migratory Bird Convention Act*
FWCA – *Fish and Wildlife Conservation Act*
Other:
Significant Wildlife Habitat Technical Guide:
SWH – Area Sensitive Species
INT - Interior Species

Mating and breeding habitat was identified within the focused study area, and throughout the Bradford WPCP subject property. **Figures 2a and 2b** identify the locations of each amphibian monitoring station. A singular Green Frog was heard eliciting mating calls from the wetland along the southern limit of the subject property (Station 1) during the May 31, 2022 site visit. American Toad, Green Frog, and Northern Leopard Frog were eliciting mating calls from the wetland and open aquatic communities adjacent to the area of the proposed tertiary building development (Station 2) on May 31, 2022, while only Green Frog was heard vocalizing during the June 21,

TABLE 4.
AMPHIBIAN SPECIES DOCUMENTED WITHIN THE STUDY AREA AND ADJACENT LANDS BY LGL

Station	Scientific Name	Common Name	Species Status under Legislation			Call Level	Habitat
			Canada SARA	Ontario ESA	Legal Status		
1	*Lithobates clamitans*	Green Frog	-	-	-	1	Southern limit of property adjacent to unevaluated wetland and municipal drain
2	*Anaxyrus americanus*	American Toad	-	-	-	1	Wetland adjacent to proposed site development
	Lithobates clamitans	Green Frog	-	-	-	2	
	Lithobates pipiens	Northern Leopard Frog	-	-	-	2	
3	*Lithobates clamitans*	Green Frog	-	-	-	2	Access road between two ponds (open aquatic)
	Lithobates pipiens	Northern Leopard Frog	-	-	-	1	

Call Level Codes – Abundance Count (according to Bird Studies Canada):
Call Level One (1) – Individual males can be counted accurately.
Call Level Two (2) - Frogs can be generally counted but calls overlap thus no exact number can be obtained.
Call Level Three (3) - Calls continuous and overlapping, no reasonable estimate of numbers.
For definitions of species ranks, refer to **Appendix E**

2022 field investigations. At Station 3, adjacent to the three effluent ponds, Green Frog and Northern Leopard Frog were heard vocalizing on the May 31, 2022 visit. Additionally, one deceased Northern Leopard Frog was visually observed during this site visit. Green Frog was also heard vocalizing during the June 21, 2022 field investigations at Station 3.

As noted above, three amphibian species (American Toad, Green Frog and Northern Leopard Frog) were identified by LGL during the 2022 field investigations. Of the amphibian species observed by LGL, none are considered to be species at risk. Additionally, four Painted Turtles (*Chrysemys picta*) were observed as incidental observations during field investigations. Given the aquatic and wetland habitat within the subject property, other amphibian and herpetofauna species are expected to be found within the study area.

2.3.2.2 Birds

Breeding bird surveys were conducted on two mornings (June 10 and July 8) during the 2022 breeding bird season to document breeding bird evidence (BBE) and to characterize the nature, extent and significance of breeding bird usage of the habitats within the study area. Breeding bird survey methodology and breeding bird behaviours used as evidence of breeding success were categorized according to the Breeding Bird Atlas five-year surveys organized by Bird Studies Canada (Cadman et al., 2007). One breeding bird point count station was established which bisects the Bradford WPCP property from north to south (see **Figure 2b**). Wandering transects were also used to record incidental bird species.

Twenty-two bird species were documented during targeted breeding bird surveys conducted within the study area. An additional six bird species were documented within the study area as incidental species, observed either prior to or after the five-minute breeding bird survey. The bird species identified during field investigations are species typically associated with aquatic and anthropogenic habitat types. No species at risk were identified during targeted breeding bird surveys. However, two species at risk, Barn Swallow (*Hirundo rustica*) and Bank Swallow (*Riparia riparia*), were observed foraging and/or flying over/near the study area as incidental observations.

Although no active nests were identified during field investigations, evidence of breeding was documented as several young and juvenile Canada Geese (*Branta canadensis*), Mallard (*Anas platyrhynchos*) and Wood Duck (*Aix sponsa*) were observed utilizing the habitat within the study area. Additionally, mating pairs of Common Grackle (*Quiscalus quiscula*) and Red-winged Blackbird (*Agelaius phoeniceus*) were observed. Other migratory bird species are expected to be nesting across much of the naturalized potions of the focused study area.

2.3.2.3 Mammals

Two mammal species, Eastern Cottontail (*Sylvilagus floridanus*) and Muskrat (*Ondatra zibethicus*) were noted within the study area as incidental observations. A modest assemblage of mammal species which occupy thicket, meadow, aquatic and anthropogenic habitats are expected to occupy the study area, generally, those that are tolerant to human disturbance.

2.3.3 Species at Risk

Twenty-five of the twenty-eight recorded bird species are protected under the *Migratory Birds Convention Act* (MBCA), while three bird species, Common Grackle, European Starling (*Sturnus vulgaris*) and Red-winged Black Bird are not afforded any legislative protection. Eastern Cottontail is afforded protection under ‘Schedule 2 – Game Mammals’ of the Fish and Wildlife Conservation Act (FWCA) while Muskrat is afforded protection under ‘Schedule 1 – Furbearing Species’. Of the 34 wildlife species recorded within the study area, two species, Barn Swallow and Bank Swallow are both regulated as ‘Threatened’ under the Ontario Endangered Species Act, 2007 (ESA) and federal Species at Risk Act (SARA).

A query for rare species was conducted using the NHIC Ontario GeoHub database (MNRF 2022), which identified one additional species at risk, Snapping Turtle (Chelydra serpentina), as occurring within the immediate vicinity of the study area. Snapping Turtle are listed as ‘Special Concern’ under the Ontario ESA, federal SARA and COSEWIC, but are not afforded habitat protection under either legislation. No Snapping Turtles were observed during field investigations, however, given the aquatic and wetland habitats within the focused study area, it is likely that suitable habitat for Snapping Turtle exists.

Each of these wildlife species at risk, their respective legal status, biological requirements, and habitat information are identified below.

Barn Swallow

Barn Swallow is regulated as ‘Threatened’ under the ESA, SARA and COSEWIC. Barn Swallow generally builds mud nests on bridges, walls, ledges and barns (Cadman et al. 2007). Barn Swallow typically forages in open areas such as agricultural lands, meadows or water. Barn Swallow were observed foraging over/near the study area during both the May 31 and June 21, 2022 breeding bird surveys. No potential nesting structures are present within the study area and no nests were observed during field investigations.

Bank Swallow

Bank Swallow is regulated as ‘Threatened’ under the ESA, SARA and COSEWIC. Bank Swallow are found in natural and human-made settings where vertical faces in silt and sand deposits are located (Cadman et al. 2007). They nest in burrows along the banks of rivers and lakes, sand or gravel pits. Three Bank Swallows were observed flying over/near the study area during the May 31, 2022, field investigation. Suitable nesting habitat is not present within the focused study area or within the Bradford WPCP lands, therefore, it is likely that these individuals were exhibiting foraging behaviour only.

Snapping Turtle

Snapping Turtle is provincially listed as ‘Special Concern’ under the Ontario ESA and is listed as ‘Special Concern’ on Schedule 1 of the federal SARA. Habitat protection is not afforded under either legislation. Snapping Turtle are also protected under the FWCA as ‘Schedule 4 – Game Reptiles’. Snapping Turtles prefer shallow waters in swamp/marsh/open aquatic habitats with soft mud and ample leaf litter. During mating season, Snapping Turtles travel over land to find a suitable nesting site, typically gravelly or sandy areas within the riparian zone. These turtles often use man-made structures for nesting sites, including roads (gravel shoulders), dams and aggregate pits. Snapping Turtle was not identified during any of the 2022 field investigations; however, suitable habitat for nesting and life cycles is present within the study area and there is potential for this species to be found within the open aquatic and wetland communities within the study area.

2.3.4 Significant Wildlife Habitat Assessment

The PPS defines **wildlife habitat** as:

> *“areas where plants, animals, and other organisms live, and find adequate amounts of food, water, shelter, and space needed to sustain their populations. Specific wildlife habitats of concern may include areas where species concentrate at a vulnerable point in their annual or life cycle; and areas which are important to migratory or non-migratory species*.”

Significant wildlife habitat is defined by the Province as:

> *“ecologically important in terms of features, functions, representation or amount, and contributing to the quality and diversity of an identifiable geographic area or Natural Heritage System. “*

The following types of significant wildlife habitat have the potential to occur within the study area:

- Seasonal concentration areas;
- Rare vegetation communities or specialized habitats for wildlife;
- Habitats of species of conservation concern, excluding the habitats of endangered and threatened species; and,
- Animal movement corridors.

A review of each Significant Wildlife Habitat (SWH) category, as defined in the Significant Wildlife Habitat Criteria Schedule (for Ecoregion 6E) was completed for the study area. Available secondary sources of information in addition to field data results were used to complete this analysis. An analysis of potential Significant Wildlife Habitat within the subject property is presented in **Appendix D**. A summary of the results is outlined below.

The following Candidate SWH category has been determined to have the potential to be present within the study area:

- **Seasonal Concentration Areas**
    - Reptile Hibernaculum- Not confirmed within the study area, but potential exists.
    - Turtle Nesting Areas- Not confirmed within the study area, however potential exists within the facility.
    - Terrestrial Grayfish – Not confirmed within the study area, however suitable habitat exists.
    - Waterfowl Nesting Area – Not confirmed within the study area, however potential suitable habitat exists.
    - Amphibian Movement Corridors – Not confirmed within the study area, however potential exists.

3.0 DESIGNATED NATURAL AREAS

Designated natural areas include areas that have been identified for protection by the Ontario MNRF, LSRCA, Simcoe County and the Town of Bradford West Gwillimbury. The location of all designated natural areas within the property are presented below. The natural heritage features on and adjacent to the property are delineated in **Figure 3.**

3.1 Provincially Significant Wetlands (PSWs)

The potential occurrence of wetland features was screened through a review of available GIS data layers provided by Land Information Ontario (LIO, MNRF). Three types of wetland features are identified in MNRF data layers: provincially significant wetlands (PSWs), unevaluated wetlands and other wetlands. The status of wetlands is determined through an evaluation according to the Ontario Wetland Evaluation System (OWES). PSWs are those for which an OWES evaluation has resulted in a score sufficient to qualify as a provincially significant feature. Unevaluated wetlands are wetland features that have not undergone an OWES evaluation; while, those presented as evaluated or as ‘other’ wetlands are features where an OWES evaluation has been completed and the resulting score was insufficient to qualify as a provincially significant feature. Evaluated/other wetlands may also be considered locally significant wetlands.

The Holland Marsh (BW5) (PSW) is located within the Bradford WPCP property and is located immediately north of the focused study area where the building upgrades are proposed. The Holland Marsh Wetland Complex (PSW) is located on the eastern side of the Holland River within the Township of King, and ranges from approximately 400 m to 805 m in distance from the eastern limits of the Bradford WPCP property.

3.2 Areas of Natural and Scientific Interest (ANSI)

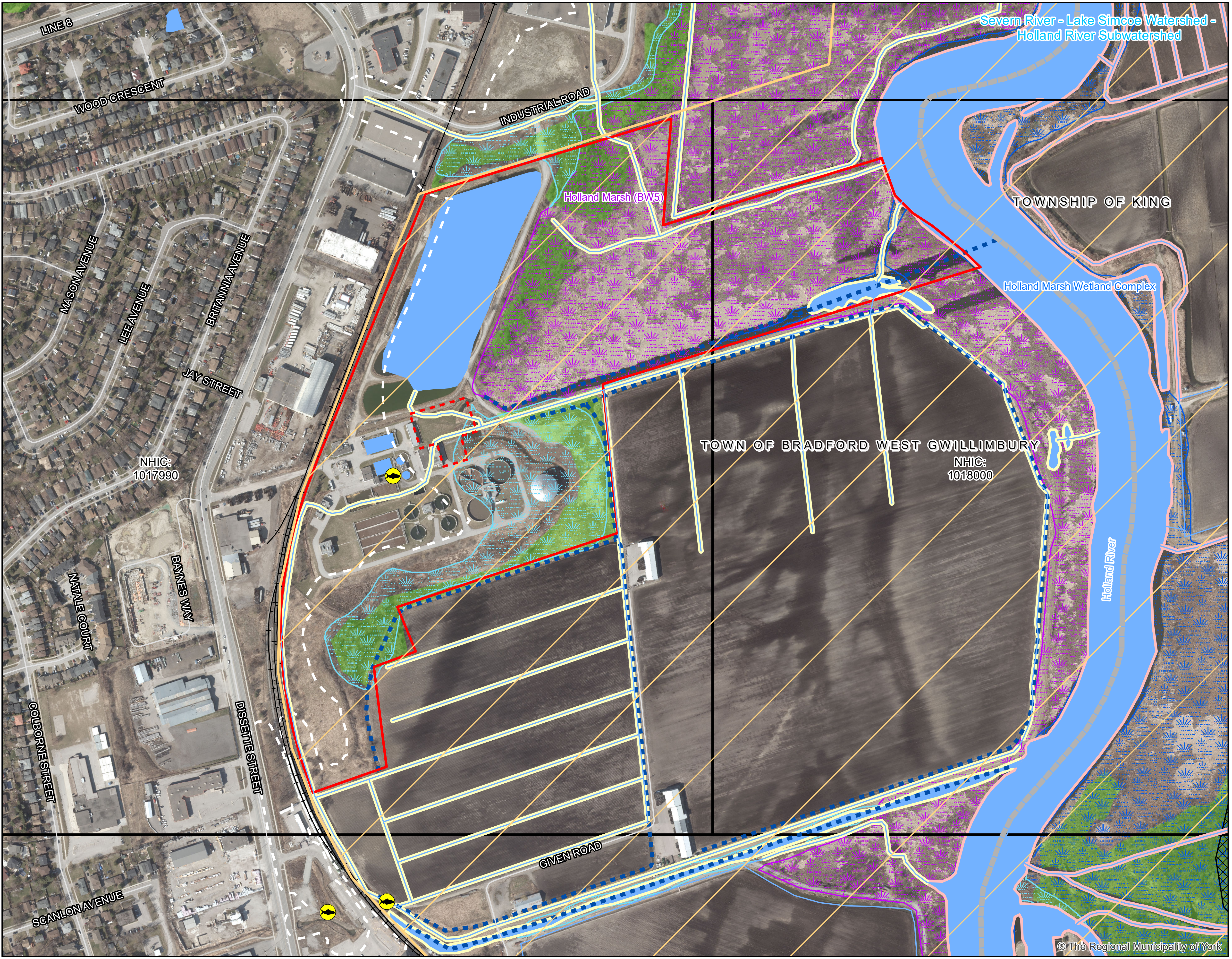
Provincially significant Areas of Natural and Scientific Interest (ANSI) are determined by the MNRF. The agency defines ANSIs as “lands and waters with features that are important for natural heritage protection, appreciation, scientific study or education” (MNRF 2022a). There are no Areas of Natural and Scientific Interest (ANSI) located on the Bradford WPCP property or within 120 m of the property.

3.3 Environmentally Significant Areas (ESAs)

There are no Environmentally Significant Areas (ESA) identified by either the MRNF or LSRCA located on the Bradford WPCP property or within 120 m of the focused study area.

3.4 LSRCA Ontario Regulation 179/06

Ontario Regulation 179/06 regulates work taking place within valley and stream corridors, wetlands, and associated areas of interference. Consequently, any works undertaken within the regulation limit will require a permit from the Lake Simcoe Ontario Conservation Authority. A portion of the Bradford WPCP property lies within the LSRCA Regulation Limit, however, the entire focused study area including the location of the proposed building upgrades is within LSRCA Regulation Limit, thus, subject to *Ontario Regulation 179/06*. Ground disturbance and construction of buildings within regulated areas requires a permit before a Town building permit can be issued. The location of the Bradford WPCP property and the focused study area in relation to the LSRCA regulated area is shown in **Figure 3.**



Data Sources: Lake Simcoe Region Conservation Authority (LSRCA) & Ministry of Natural Resources and Forestry (LIO). Produced by LGL Limited under Licence with the Ontario Ministry of Natural Resources © King's Printer for Ontario, 2023. Contains information licenced under the Open Government Licence - Ontario.

LEGEND

- ARA Survey Point (MH-0552-HOL)
- Constructed Drain - DFO Class "C"
- Watercourse - Unknown Thermal Regime
- Watercourse - Warm Thermal Regime
- Railway
- Focused Study Area
- Subject Property
- Municipal Boundary
- Provincially Tracked Species 1km x 1km Grid
- Protected Countryside Designation - Greenbelt Plan
- White-tail Deer Wintering Area (Stratum 2)
- Wetland Not Evaluated per OWES
- Wetland Evaluated Provincial - Holland Marsh (BW5)
- Wetland Evaluated Provincial - Holland Marsh Wetland Complex
- Regulation Limit (LSRCA)
- Waterbody
- Wooded Area

*Note: Entire study area and map extent is within the Lake Simcoe Protection Act Watershed Boundary.

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BRADFORD WPCP
NATURAL HERITAGE

LGL
Est. 1971
LIMITED
environmental research associates

Project:	TA9244	**Figure:**	3
Date:	February, 2023	**Prepared By:**	JJP
Scale:	1 : 5,000	**Checked By:**	JC

3.5 Greenbelt Plan

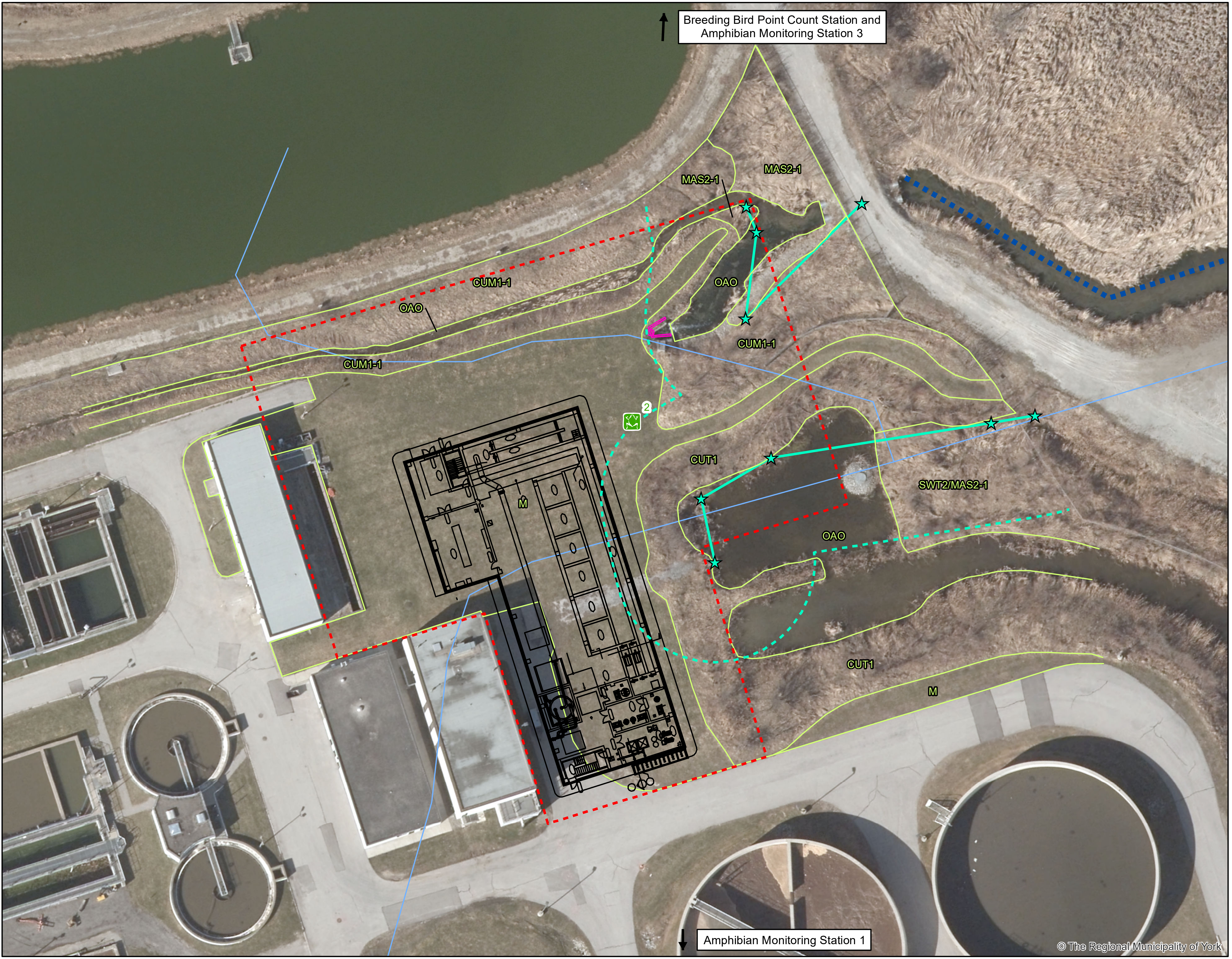
The entire Bradford WPCP property lies within lands designated as Protected Countryside under the Greenbelt Plan (see **Figure 3**). All development and site alteration are subject to polices outlined under the *Greenbelt Plan, 2017.*

4.0 DESCRIPTION OF PROPOSED DEVELOPMENT

The proposed expansion of the Bradford WPCP will include:

- construction of a new 1500 m^2 tertiary facility;
- a new 800 mm diameter outfall pipe is to be installed from the outfall location to the new building, and;
- expansion of the existing headwall at the outfall pipe outlet, to be extended 900 mm toward the south.

The limits of the proposed expansion are presented on **Figure 4**.



LEGEND

🟩	Amphibian Monitoring Station
●	Breeding Bird Point Count Station
★	Wetland Stake Location (September 9, 2022)
━	Staked Wetland (September 9, 2022)
┅	Minimum Vegetation Protection Zone (MVPZ) (15 m)
┅	Constructed Drain - DFO Class "C"
━	Watercourse
┅	Focused Study Area

Proposed Design

━	Proposed Building
━	Proposed Headwall/Outfall

Vegetation Communities

━	Vegetation Community Boundary
CUM1-1	Dry-Moist Old Field Meadow Type
CUT1	Mineral Cultural Thicket Ecosite
M	Manicured
MAS2-1	Cattail Mineral Shallow Marsh Type
OAO	Open Aquatic
SWT2	Mineral Thicket Swamp Ecosite

Data Sources: LGL Limited field surveys & Ministry of Natural Resources and Forestry (LIO). Contains information licenced under the Open Government Licence - Ontario.

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BRADFORD WPCP
IMPACT ASSESSMENT

LGL LIMITED
Est. 1971
environmental research associates

Project:	TA9244	**Figure:**	4
Date:	February, 2023	**Prepared By:**	JJP
Scale:	1 : 550	**Checked By:**	LMC

5.0 ANALYSIS OF NATURAL FEATURES AND POTENTIAL IMPACTS

5.1 Potential Impacts to Fisheries and Aquatic Habitats

5.1.1 Summary of Works and Impacts to Fish Habitat

The new headwall at the outfall pipe outlet will be extended 900 mm toward the south. The expansion of the headwall will take place prior to the new outfall pipe installation. A new 800 mm diameter outfall pipe is to be installed from the outfall location to the new building. The flow will be redirected from the existing tertiary to the new tertiary plant, therefore no effluent will be conveyed in the existing outfall, and all flow will be conveyed to the new one. There is no shutdown anticipated.

5.1.2 Changes to Water Quality and Quantity

The construction associated with the proposed works has the potential to alter water quality through on-site erosion of exposed materials and the subsequent impairment of downstream water quality with sediments and other contaminants. Changes to water quality will be mitigated through the deployment and maintenance of standard erosion and sediment controls (i.e., silt fencing, flow checks, filter socks, etc.) which will prevent sediments from exposed soils upslope from reaching the watercourses. In addition, all exposed areas (i.e., areas stripped of vegetation) will be re-vegetated immediately once work is completed.

5.1.3 Changes to Water Temperature

Warmwater streams are usually considered less sensitive to changes in water temperature than cool or coldwater streams. Riparian vegetation provides shade to the stream channel which mitigates the effects of direct sunlight and is therefore desirable to thermally stressed systems. It is not expected that any riparian vegetation directly adjacent to the watercourses will be negatively affected by the proposed works, or result in changes to the thermal regimes.

5.1.4 Barriers to Fish Passage

No new barriers to fish passage will result from this project.

5.1.5 Restoration/Enhancement/Overall Benefit

Plantings of trees, shrubs and appropriate seed mixes in areas of disturbed soil due to the proposed works, will provide increased shade and cover to the respective channels.

5.2 Potential Impacts to Vegetation and Vegetation Communities

The proposed expansion of the Bradford WPCP has the potential to result in the displacement of and disturbance to vegetation and vegetation communities. Effects on vegetation and vegetation communities may include:

- displacement of/disturbance to vegetation and vegetation communities;
- displacement of/disturbance to rare, threatened or endangered vegetation and vegetation communities.

The following is an evaluation of potential impacts to vegetation and vegetation communities that are expected as a result of the proposed expansion.

5.2.1 Displacement of/Disturbance to Vegetation and Vegetation Communities

The proposed expansion of the Bradford WPCP will almost entirely be restricted to the manicured lands. Overall, the overall significance of the removal of a portion of these lands is considered low. The expansion of the existing headwall will result in the removal of a portion of the cultural meadow community. Cultural vegetation communities typically persist in areas that are regularly disturbed, and as a result, generally contain a high proportion of invasive and non-native plant species that are tolerant of these conditions. It is expected that plant species displaced and / or disturbed within the cultural communities due to the headwall expansion will re-colonize available lands post-construction.

In addition, minor encroachment into the Minimum Vegetation Protection Zone (MVPZ) of the staked wetland boundary will occur. To offset the impacts to the MVPZ an Ecological Offsetting Strategy in accordance with LSRCA guidelines will be prepared. The Ecological Offsetting Strategy is further discussed in **Section 7.0**.

5.2.2 Displacement of/Disturbance to Rare, Threatened or Endangered Vegetation and Vegetation Communities

No historic records of plant species at risk were identified through the screening for species at risk (MECP 20202), and no plant species at risk were identified during LGL's field investigations. In addition, vegetation communities considered rare were identified within the study area. As such, it is anticipated that no displacement or disturbance to rare plant species or vegetation communities will occur as a result of the proposed expansion of the Bradford WPCP.

5.3 Potential Impacts to Wildlife and Wildlife Communities

Impacts based on the proposed tertiary building footprint will occur entirely within areas that have been previously disturbed by human activity (manicured lands) which consists of low quality habitat, therefore, it is not anticipated to disturb wildlife or wildlife habitat. Only minor infringement to cultural meadow communities will occur as a result of the expansion of the headwall. This will likely result in very minor disturbance to wildlife and wildlife habitat. Temporary impacts to open aquatic communities (effluent channel) and riparian habitat/vegetation surrounding the cultural meadow community may occur as a result of the installation of the new outfall pipe and construction of the headwall. Specialized wildlife habitats or other significant natural heritage features are not expected to be impacted as the proposed works are not to be completed within wetland (swamp/marsh) habitat. Disturbances to aquatic habitat and riparian vegetation should be mitigated and avoid disturbance to potential breeding and/or nesting activities by anuran and reptile species. Displacement of species at risk habitat is considered to be minor and temporary in nature (see **Section 6.3.2**). The proposed activities at this site should occur outside of the breeding bird window (see **Section 6.3.1**), to minimize disturbance to birds and other wildlife species utilizing habitats within the study area.

5.3.1 Barrier Effects on Wildlife Passage

No new permanent barriers to wildlife passage will occur as a result of the proposed tertiary building development or headwall expansion. Given the disturbed nature of the lands found within the study area, the site alterations are not expected to have a significant impact on wildlife passage. Corridors within the study area associated with the watercourses/municipal drains via culverts will remain unchanged and will continue to provide linkage to adjacent habitat. No structural culvert works are proposed where passage exists, therefore, existing wildlife passage under existing culverts throughout the study area will remain unchanged.

5.3.2 Disturbance to Wildlife from Noise, Light and Visual Intrusion

Noise, light and visual intrusion may alter wildlife activities and patterns. In human-influenced settings, such as the study area, wildlife has become acclimatized to anthropogenic conditions and only those fauna that are tolerant of human activities remain. Minor edge effect to natural areas (e.g., meadow, wetlands and aquatic communities) may occur as a result of headwall replacement works and will result in an increase in noise and visual intrusion. Given that wildlife is acclimatized to the presence of the existing Bradford WPCP, the tolerance of the wildlife assemblage to human activities and the limited zone of influence of the proposed works, disturbance to wildlife from noise and visual intrusion will have no significant adverse effects.

5.3.3 Potential Impacts to Migratory Birds

Several bird species listed under the *Migratory Birds Convention Act* (MBCA) were identified within the study area. The MBCA prohibits the killing, capturing, injuring, taking or disturbing of migratory birds (including eggs) or the damaging, destroying, removing or disturbing of nests. Mitigation efforts to protect migratory bird species protected under the MBCA are outlined below in **Section 6.3.1**.

5.3.4 Displacement of Rare, Threatened or Endangered Wildlife or Significant Wildlife Habitat

Three species at risk have been identified in the study area; two as being present based on LGL's field investigations, and one species potentially present based on records from the NHIC database (discussed in Section 3.3.3). The likelihood of the proposed works having a negative effect on species at risk is low as encroachment into suitable habitats will be minimal, with potential impacts only associated with the edges of the open aquatic community (effluent channel). There are no negative impacts associated with the proposed tertiary building footprint. Minimal temporary impacts to the open aquatic community are anticipated as a result of the headwall construction and outfall pipe installation.

No impacts to the two avian species at risk, Barn Swallow and Bank Swallow, are anticipated as a result of the proposed works. Foraging activities were observed for both species as they flew over/around the study area; however, suitable habitat is not present within the focused study area to support nesting for either of these species. Additionally, no nests were observed during field investigations, therefore, it is unlikely that disturbance to potential habitat for Barn Swallow or Bank Swallow will result from the proposed works. No impacts to these species are anticipated. No permitting under the ESA is anticipated for either of these species.

Minor habitat impacts to turtle species at risk (Snapping Turtle) would include encroachment on possible nesting habitat along riparian cultural meadow and aquatic communities. Vegetation removals in these communities as a result of the headwall replacement and outfall pipe installation may result in impacts to potential nesting habitat. Open aquatic communities with slower moving flow and aquatic vegetation are noted within the study area and provide suitable aquatic habitat for Snapping Turtle life cycles. Additionally, there is potential for Snapping Turtles from surrounding areas to use habitats within the study area during overland movements from one aquatic area to another. As a result of the relatively small impact footprint, limited negative effects to Snapping Turtle or their habitat is expected. No permitting under the ESA is anticipated for this species.

6.0 MITIGATION MEASURES

Risk to the natural heritage system can be mitigated through a development setback to features, stormwater management and erosion and sediment control measures. The following section includes recommendations and mitigation for the proposed works.

6.1 Aquatic Habitats and Communities

To reduce the potential for negative effects to fish habitat at all watercourses, the following environmental protection measures will be implemented:

- no in-water work will be permitted between April 1 and June 30 to protect the warmwater fish community,
- work areas will be delineated with construction fencing to minimize the area of disturbance;
- best management practices and special provisions will be employed to reduce impacts during construction;
- appropriate sediment control structures will be installed prior to and regularly maintained during construction to prevent entry of sediments into any watercourse, these controls will be dynamic and may evolve with the project if site conditions warrant, these should be regularly inspected;
- all debris/materials associated with construction and demolition will be contained and prevented from entering the watercourses;
- good housekeeping practices related to materials storage/stockpiling, equipment fueling/maintenance, etc. will be implemented during construction;
- disturbed riparian areas will be re-vegetated and/or covered with an erosion control blanket as quickly as possible to stabilize the banks and minimize the potential for erosion and sedimentation; and
- it is strongly recommended that when focused/direct work on or around any watercourses, that a third-party fisheries biologist/inspector of sediment and erosion controls be present for the duration of the works. When direct work within the watercourses is not being undertaken, inspection of erosion control features should be undertaken weekly, and more frequently associated with rain events and/or spring snow melt.

These environmental protection measures will greatly reduce the potential adverse effects to fish and fish habitat resulting from construction activities.

6.2 Vegetation and Vegetation Communities

At a minimum, the protection/mitigation measures outlined below should be implemented to ensure the protection of vegetation and vegetation communities to the extent possible:

- Appropriate erosion and sediment control measures will be implemented pre-construction, maintained during construction and removed post-construction once soil conditions have stabilized;
- Efforts should be made to prevent the spread of invasive plant species during construction both on and off site. Sanitation of construction equipment should be undertaken in accordance with the *Clean Equipment Protocol for Industry* (Halloran, Anderson and Tassie 2013) and at a minimum should include sanitation of construction vehicles and equipment prior to leaving and moving to the next site. A cleaning station should be set up, so vehicles and equipment can be inspected and cleaned regularly.
- Restoration of disturbed areas, as necessary, shall use native and/or non-invasive species for seed mix and woody species plantings similar to the character of the surrounding area; and,
- Enhancement planting should be undertaken and implemented to mitigate impacts related to vegetation removals and provide additional natural buffering to adjacent natural areas. Enhancement planting shall be undertaken by experienced, qualified professionals.

6.3 Wildlife and Wildlife Habitat

6.3.1 Mitigation for Migratory Birds

The *Migratory Birds Convention Act* (MBCA) prohibits the killing, capturing, injuring, taking, or disturbing of migratory birds (including eggs) or the damaging, destroying, removing, or disturbing of nests. Environment Canada provides Nesting Periods when migratory birds are most likely to be nesting, within a respective geographic zone. The Bradford WPCP falls within Environment Canada's Nesting Zone C2 (Nesting Period: end of March – end of August). To comply with the requirements of the MBCA, disturbance, clearing or disruption of vegetation where birds may be nesting should be completed outside the window of April 1 to August 31. In the event that these activities must be undertaken from April 1 to August 31, a nest screening survey will be conducted by a qualified avian biologist. Given that development is proposed within manicured and meadow communities, the potential impact to migratory birds is minimal.

6.3.2 Mitigation for Species at Risk

The *Endangered Species Act, 2007* (ESA) prohibits the killing, harming, harassment, capture, taking, possessing, collecting, buying, leasing, or trading of any species that are listed as ‘Threatened’,‘Endangered’ or ‘Extiprated’. The requirements of the ESA will be met for all species at risk with the potential to be impacted by the proposed works. Provisions shall be included to ensure that the Contractor does not harm, harass, or kill and wildlife species encountered during the construction and to ensure that the Contractor remains vigilant and alert to the wildlife species on the ground. Equipment shall move at a slow pace to permit any wildlife species to leave the area in order to avoid trampling. The Contractor will be instructed not to handle any wildlife species encountered during construction.

The requirements of the ESA will be met for all species at risk impacted by the proposed tertiary building, headwall replacement and outfall pipe installation. At a minimum, the following environmental protection/mitigation measures shall be implemented to ensure the protection of species at risk:

- Erosion control fencing shall be installed along wetlands, ditches, and watercourse/pond margins where construction works are proposed. These measures shall be in place prior to the start of construction. These measures will ensure that these more sensitive features are avoided and to prohibit entry onto or use of these areas by the Contractor; and,
- Should any species at risk (i.e., turtles) be encountered during construction, they should be allowed to naturally disperse from the site. In the event that species at risk (SAR) do not naturally disperse from the active construction site, a qualified biologist will be contacted to discuss options for resuming active construction.

7.0 ECOLOGICAL OFFSETTING

As required by LSRCA, an Ecological Offsetting Strategy will be prepared for the disturbance to the wetland and minimum vegetation protection zone (MVPZ) within the study area. Once the final site plan has prepared the offsetting strategy will be prepared in accordance with LSRCA requirements and submitted for review.

8.0 CONCLUSIONS AND RECOMMENDATIONS

This Natural Heritage Evaluation has been prepared in support of the Bradford WPCP expansion in the Town of Bradford West Gwillimbury. A botanical and wildlife survey, and a preliminary desktop fisheries review have been completed. An assessment of impacts to natural heritage features within the study area was undertaken based on the site plan prepared by Hatch in January 2023. Environmental Protection Measures and are provided in **Section 5.0** to **Section 7.0**, respectively to protect and enhance natural heritage features within the study area, to the extent possible. An ecological offsetting strategy will be prepared for the site, once a site plan is available.

9.0 REFERENCES

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APPENDICES

APPENDIX A

TERMS OF REFERENCE

Lake Simcoe Region
conservation authority

Terms of Reference

Natural Heritage Evaluation (NHE)
Environmental Impact Study (EIS)

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1. **General Information:**

Date: June 9, 2022

Address: Bradford Water Pollution Control Plant, 225 Dissette St, Bradford West Gwilli

Name of consulting firm: LGL Limited

Contact information: Lisa Catcher, lcatcher@lgl.com

2. **Identify all <u>potential</u> natural heritage and hydrologic features in the study area (check all that apply):**

**The LSRCA recognizes that this is a preliminary assessment to determine what studies may be suitable for the property. A site visit may be required to verify the presence/absence of features.*

- ▣ Wetland
- ☐ Woodland
- ☐ Valleyland
- ☐ Grassland or meadow
- ▣ Wildlife habitat
- ☐ Area of natural and scientific interest (ANSI)
- ☐ Sand barren, savannah or tallgrass prairie
- ☐ Alvar
- ▣ Drainage feature/watercourse
- ☐ Kettle lake
- ☐ Seepage area or spring
- ☐ Lake or pond (and their littoral zone)
- ☐ Lake Simcoe shoreline
- ☐ Natural areas abutting Lake Simcoe
- ▣ Habitat of endangered and threatened species
- ▣ Fish habitat

3. **Activities to be undertaken and studies required for a complete NHE/EIS submission**:**

*** Some activities/studies are pre-selected (☒) as they are a minimum requirement for NHE/EIS submissions.*

☒ Consult with the appropriate Municipal and Conservation Authority staff, as required, to establish the required scope of study.

☒ Identify an appropriate study area - generally the area of anticipated disturbance plus 120 m.

☒ Collect and include applicable background information and current environmental mapping for natural heritage and hydrologic features, and the natural heritage system within and surrounding the study area.

☒ Identify and provide detailed descriptions of natural heritage and hydrologic features in the study area, their function, and the broader natural heritage system that they are within. Determine the significance of these natural heritage and hydrologic features under applicable policy.

☒ Evaluate existing vegetation communities using Ecological Land Classification (ELC) for Southern Ontario (Lee et al. 1998. Ecological Land Classification for Southern Ontario: first approximation and its applications. SCSS Field Guide FG-02). Provide a description of ELC communities in the study area and include completed ELC field sheets as an appendix.

☒ Conduct a one -season vegetation inventory in the late spring/summer/fall. Include the inventory categorized by ELC community as an appendix and denote any Species at Risk and/or provincially/locally rare species.

⊡ Conduct three (3) breeding amphibian surveys as per the Marsh Monitoring Program protocol (Bird Studies Canada). Observational salamander surveys may be required if potential habitat exists in the study area. Include completed field sheets as an appendix.

⬒ Conduct two (2) dawn breeding bird surveys between May 24 and July 15, under appropriate conditions, with a minimum of 10 days between surveys, and record all occurrences and breeding behaviors. Point counts, wandering transects or a combination of the two must be used according to features present and site conditions. Include completed field sheets as an appendix. A third survey will be required if suitable grassland bird habitat is present.

☒ Record observations of all wildlife occurrences and behaviours and assess wildlife habitat function.

☒ Screen for Species at Risk (SAR), listed under the *Endangered Species Act, 2007,* based on existing or potential habitat. Additional species-specific surveys may be required if SAR habitat is present (e.g. butternut health assessments, snag surveys, bat acoustic monitoring surveys, evening whip-poor-will surveys, etc.), please contact the Ministry of Environment, Conservation and Parks (MECP) for further direction. Include any relevant correspondence with the MECP as an appendix

☒ Assess for Significant Wildlife Habitat (e.g. turtle nesting or wintering area, reptile hibernaculum, woodland raptor nesting habitat, seeps, springs, etc.) as per the Significant Wildlife Habitat Criteria Schedules for Ecoregion 6E (MNRF, January 2015).

☒ Identify any ecological linkages or movement corridors within the study area. Demonstrate how connectivity within and between natural heritage and hydrologic features will be maintained and, where possible, improved or restored to allow for the effective dispersal and movement of plants and animals.

☒ Provide a general description of the methodology, dates, timing, and locations of completed field surveys.

▣ Confirm the boundaries of any wetland and/or woodland features on the property through a staking exercise with the LSRCA. Boundary points must be surveyed with a high-accuracy GPS device (accurate to within 10 cm). A professional Ontario Land Surveyor (OLS) may be required to attend. Wetland staking exercises must be completed between June 15 and September 30 (exceptions may apply). Note that a site visit fee may apply.

▣ Complete an aquatic habitat assessment for all drainage features/watercourses in the study area, including characterization of hydrologic features (i.e. permanent, intermittent, ephemeral, headwater drainage feature) and suitability as fish habitat. Include a description of instream and riparian cover, bank stability, substrate composition, stream morphology, dimensions and gradient, thermal regime indicators, potential barriers, woody debris distribution, aquatic vegetation, groundwater seepage areas, etc.

☐ Complete a catchment-based water balance for the study area to assess how existing drainage conditions and moisture regimes that support sensitive hydrologic features (e.g. wetland, woodlands, watercourse) may be impacted by the proposed development. Demonstrate how current hydrologic inputs will be maintained post-development. Please note, the water balance assessment may also be a requirement under other provincial policies, therefore the NHE/EIS should coordinate with/summarize the water balance work undertaken by others.

▣ Recommend the dimensions of an appropriate vegetation protection zone (VPZ)/buffer to natural heritage and hydrologic features required to mitigate impacts from the proposed development. Recommendations for restoration/plantings should be provided for all buffers.

☒ Provide a detailed description of the proposed development.

☒ Map the following information separately on current high quality ortho-air photos:
  1) ELC vegetation communities, natural heritage and hydrologic features and their associated VPZs, and the proposed development and anticipated limit of disturbance (e.g. grading limits); and,
  2) ELC vegetation communities, survey locations, other environmental features (e.g. linkages, wildlife corridors, seeps, springs, stick nests, wildlife habitat, rare species, invasive species, etc.), and existing structures and/or trails.

☒ Assess the potential direct, indirect, and cumulative impacts of the proposed development on natural heritage and hydrologic features, the natural heritage system, and related ecological and hydrologic functions.

☒ Develop and provide an appropriate avoidance/mitigation/restoration strategy to address the potential impacts of the proposed development.

☒ Demonstrate how the proposed development is in conformity with all federal, provincial, regional, and municipal natural heritage policies applicable in the Lake Simcoe watershed.

☒ Complete one final report for circulation and approval, prepared by qualified professionals, in an electronic format as well as one (1) hard copy.

4. Additional studies or plans that may be required include:

☐ Landscape/Restoration/Planting Plan
☐ Edge Management Plan
☐ Tree Inventory/Arborist Report/Tree Preservation Plan
☐ Trails Impact Study
▣ Ecological Offsetting Strategy (please refer to LSRCA's Ecological Offsetting Policy)
☐ Environmental Monitoring Plan/Report
☐ Fluvial Geomorphological Assessment
☐ Natural Channel Design

5. Additional notes and/or requirements:

Please note that changes to the study area, the proposed development, and/or policy changes may require additional information/studies.

Please provide current field survey data in the NHE/EIS submission. Field survey data will be considered valid for five (5) years from the date the survey was conducted, except for Species at Risk screenings, which are valid for one (1) year. If outdated field data is provided, additional surveys may be required.

APPENDIX B

VASCULAR PLANT LIST

Appendix B.
Vascular Plant List

Scientific Name	Common Name	GRank	SRank	MNR	COSEWIC	Simcoe	LSRCA	CUM1-1	CUT1	MAS2-1	MAS2-1/SWT	OAO
RANUNCULACEAE	**BUTTERCUP FAMILY**											
Clematis virginiana	virgin's-bower	G5	S5			X		X	X			
URTICACEAE	**NETTLE FAMILY**											
* *Urtica dioica ssp. dioica*	European stinging nettle	G5T?	SE2						X			
POLYGONACEAE	**SMARTWEED FAMILY**											
* *Rumex crispus*	curly-leaf dock	G?	SE5			X	+	X				
SALICACEAE	**WILLOW FAMILY**											
Populus deltoides	cottonwood								X			
Salix exigua	sandbar willow	G5	S5			X		X				
Salix sp.	willow		?								X	
BRASSICACEAE	**MUSTARD FAMILY**											
* *Rorippa nasturtium-aquaticum*	water-cress	G?	SE?					X				
ROSACEAE	**ROSE FAMILY**											
Geum aleppicum	yellow avens	G5	S5			X			X			
FABACEAE	**PEA FAMILY**											
* *Coronilla varia*	variable crown-vetch	G?	SE5			X		X				
* *Lotus corniculatus*	bird's-foot trefoil	G?	SE5			X	+	X				
* *Medicago lupulina*	black medick	G?	SE5			X	+		X			
* *Vicia cracca*	tufted vetch	G?	SE5			X	+	X				
ONAGRACEAE	**EVENING-PRIMROSE FAMILY**											
Oenothera biennis	common evening-primrose	G5	S5			X		X				
CORNACEAE	**DOGWOOD FAMILY**											
Cornus sericea ssp. sericea	red-osier dogwood	G5	S5			X			X		X	
VITACEAE	**GRAPE FAMILY**											
Parthenocissus vitacea	inserted Virginia-creeper	G5	S5			X		X				
ACERACEAE	**MAPLE FAMILY**											
Acer negundo	manitoba maple	G5	S5			X	+	X			X	
ANACARDIACEAE	**SUMAC FAMILY**											
Rhus hirta	staghorn sumac	G5	S5			X			X			
BALSAMINACEAE	**TOUCH-ME-NOT FAMILY**											
Impatiens capensis	spotted touch-me-not	G5	S5			X		X			X	
APIACEAE	**PARSLEY FAMILY**											
* *Daucus carota*	wild carrot	G?	SE5			X	+	X				
ASCLEPIADACEAE	**MILKWEED FAMILY**											
Asclepias syriaca	common milkweed	G5	S5			X			X			

Appendix B.
Vascular Plant List

Scientific Name	Common Name	GRank	SRank	MNR	COSEWIC	Simcoe	LSRCA	CUM1-1	CUT1	MAS2-1	MAS2-1/SWT	OAO
CONVOLVULACEAE	**MORNING-GLORY FAMILY**											
* *Convolvulus arvensis*	field bindweed	G?	SE5				+	X				
LAMIACEAE	**MINT FAMILY**											
* *Glechoma hederacea*	creeping Charlie	G?	SE5			X	+		X			
* *Leonurus cardiaca ssp. cardiaca*	common motherwort	G?T?	SE5			X	+	X	X			
PLANTAGINACEAE	**PLANTAIN FAMILY**											
* *Plantago lanceolata*	ribgrass	G5	SE5			X	+		X			
OLEACEAE	**OLIVE FAMILY**											
Fraxinus pennsylvanica	red ash	G5	S5			X			X			
SCROPHULARIACEAE	**FIGWORT FAMILY**											
* *Linaria vulgaris*	butter-and-eggs	G?	SE5			X	+	X	X			
* *Veronica anagallis-aquatica*	water speedwell	G5	SE5				+	X		X		
CAPRIFOLIACEAE	**HONEYSUCKLE FAMILY**											
* *Viburnum opulus*	guelder rose	G5	SE4			X	+		X			
ASTERACEAE	**ASTER FAMILY**											
Ambrosia artemisiifolia	common ragweed	G5	S5			X	+		X			
* *Arctium minus*	common burdock	G?T?	SE5			X	+	X				
Aster lateriflorus var. lateriflorus	calico aster	G5T5	S5					X				
Bidens frondosa	devil's beggar-ticks	G5	S5			X					X	
* *Centaurea jacea*	brown knapweed	G?	SE5			X	+	X				
* *Cichorium intybus*	chicory	G?	SE5			X	+	X				
* *Cirsium arvense*	Canada thistle	G?	SE5			X	+	X	X			
* *Cirsium vulgare*	bull thistle	G5	SE5			X	+	X				
Conyza canadensis	horseweed	G5	S5			X		X				
Euthamia graminifolia	flat-topped bushy goldenrod	G5	S5					X	X			
Solidago canadensis	canada goldenrod	G5	S5			X		X	X		X	
* *Sonchus arvensis ssp. arvensis*	field sow-thistle	G?T?	SE5			X		X				
Symphyotrichum novae-angliae	New England aster	G5	S5			X		X				
* *Tussilago farfara*	coltsfoot	G?	SE5			X	+	X	X			
ALISMATACEAE	**WATER-PLANTAIN FAMILY**											
Alisma plantago-aquatica	common water-plantain	G5	S5			X				X		
Sagittaria latifolia	broad-leaved arrowhead	G5	S5			X					X	
LEMNACEAE	**DUCKWEED FAMILY**											
Lemna minor	lesser duckweed	G5	S5			X					X	
POACEAE	**GRASS FAMILY**											

Appendix B.
Vascular Plant List

Scientific Name	Common Name	GRank	SRank	MNR	COSEWIC	Simcoe	LSRCA	CUM1-1	CUT1	MAS2-1	MAS2-1/SWT	OAO
* *Dactylis glomerata*	orchard grass	G?	SE5			X	+	X	X			
Phalaris arundinacea	reed canary grass	G5	S5			X	+			X		
* *Phragmites australis ssp. australis*	European reed										X	
TYPHACEAE	**CATTAIL FAMILY**											
Typha angustifolia	narrow-leaved cattail	G5	S5			X	+			X		
Typha latifolia	broad-leaved cattail	G5	S5			X		X		X	X	

x-indicates species presence / *-indicates non-native species

APPENDIX C

SPECIES RANK DEFINITIONS AND ACRONYMS

APPENDIX C
ACRONYMS AND DEFINITIONS USED IN SPECIES LISTS

Species Rank

GRANK	**Global Rank**
Global ranks are assigned by a consensus of the network of Conservation Data Centres, scientific experts, and The Nature Conservatory to designate a rarity rank based on the range-wide status of a species, subspecies or variety. The most important factors considered in assigning global ranks are the total number of known, extant sites world-wide, and the degree to which they are potentially or actively threatened with destruction. Other criteria include the number of known populations considered to be securely protected, the size of the various populations, and the ability of the taxon to persist at its known sites. The taxonomic distinctness of each taxon has also been considered. Hybrids, introduced species, and taxonomically dubious species, subspecies and varieties have not been included.	
Short Form	**Definition**
G1	**Extremely rare;** usually 5 or fewer occurrences in the overall range or very few remaining individuals; or because of some factor(s) making it especially vulnerable to extinction.
G2	**Very rare;** usually between 5 and 20 occurrences in the overall range or with many individuals in fewer occurrences; or because of some factor(s) making it vulnerable to extinction.
G3	**Rare to uncommon**; usually between 20 and 100 occurrences; may have fewer occurrences, but with a large number of individuals in some populations; may be susceptible to large-scale disturbances.
G4	**Common**; usually more than 100 occurrences; usually not susceptible to immediate threats.
G5	**Very common**; demonstrably secure under present conditions.
GH	Historic, no records in the past 20 years.
GU	Status uncertain, often because of low search effort or cryptic nature of the species; more data needed.
GX	Globally extinct. No recent records despite specific searches.
?	Denotes inexact numeric rank (i.e. G4?).
G	A "G" (or "T") followed by a blank space means that the NHIC has not yet obtained the Global Rank from The Nature Conservancy.
G?	Unranked, or, if following a ranking, rank tentatively assigned (e.g. G3?).
Q	Denotes that the taxonomic status of the species, subspecies, or variety is questionable.
T	Denotes that the rank applies to a subspecies or variety.

SRANK	**Provincial Rank**
Provincial (or Sub-national) ranks are used by the Ontario Ministry of Natural Resources Natural Heritage Information Centre (NHIC) to set protection priorities for rare species and natural communities. These ranks are not legal designations. Provincial ranks are assigned in a manner similar to that described for global ranks, but consider only those factors within the political boundaries of Ontario. By comparing the global and provincial ranks, the status, rarity, and the urgency of conservation needs can be ascertained. The NHIC evaluates provincial ranks on a continual basis and produces updated lists at least annually.	
Short Form	**Definition**
S1	**Critically Imperiled** in Ontario because of extreme rarity (often 5 or fewer occurrences) or because of some factor(s) such as very steep declines making it especially vulnerable to extirpation.

SRANK	**Provincial Rank**
Provincial (or Sub-national) ranks are used by the Ontario Ministry of Natural Resources Natural Heritage Information Centre (NHIC) to set protection priorities for rare species and natural communities. These ranks are not legal designations. Provincial ranks are assigned in a manner similar to that described for global ranks, but consider only those factors within the political boundaries of Ontario. By comparing the global and provincial ranks, the status, rarity, and the urgency of conservation needs can be ascertained. The NHIC evaluates provincial ranks on a continual basis and produces updated lists at least annually.	
Short Form	**Definition**
S2	**Imperiled** in Ontario because of rarity due to very restricted range, very few populations (often 20 or fewer occurrences) steep declines or other factors making it very vulnerable to extirpation.
S3	**Vulnerable** in Ontario due to a restricted range, relatively few populations (often 80 or fewer), recent and widespread declines, or other factors making it vulnerable to extirpation.
S4	**Apparently Secure**—Uncommon but not rare; some cause for long-term concern due to declines or other factors.
S5	**Secure**—Common, widespread, and abundant in Ontario.
SX	**Presumed Extirpated** – Species or community is believed to be extirpated from Ontario.
SH	**Possibly Extirpated** – Species or community occurred historically in Ontario and there is some possibility that it may be rediscovered.
SNR	**Unranked**—Conservation status in Ontario not yet assessed
SU	**Unrankable**—Currently unrankable due to lack of information or due to substantially conflicting information about status or trends.
SNA	**Not Applicable** —A conservation status rank is not applicable because the species is not a suitable target for conservation activities.
S#S#	**Range Rank** —A numeric range rank (e.g., S2S3) is used to indicate any range of uncertainty about the status of the species or community. Ranges cannot skip more than one rank (e.g., SU is used rather than S1S4).

COSEWIC	**Committee on the Status of Endangered Wildlife in Canada**
The Committee on the Status of Endangered Wildlife in Canada (COSEWIC) assesses the national status of wild species that are considered to be at risk in Canada.	
Status	**Definition**
Extinct (X)	A wildlife species that no longer exists.
Extirpated (XT)	A wildlife species no longer existing in the wild in Canada, but occurring elsewhere.
Endangered (E)	A wildlife species facing imminent extirpation or extinction.
Threatened (T)	A wildlife species likely to become endangered if limiting factors are not reversed.
Special Concern (SC)	A wildlife species that may become a threatened or an endangered species because of a combination of biological characteristics and identified threats.
Not at Risk (NAR)	A wildlife species that has been evaluated and found to be not at risk of extinction given the current circumstances.
Data Deficient (DD)	A category that applies when the available information is insufficient (a) to resolve a wildlife species' eligibility for assessment or (b) to permit an assessment of the wildlife species' risk of extinction.

COSSARO/OMNR	**Committee on the Status of Species at Risk in Ontario/Ontario Ministry of Natural Resources**
The Committee on the Status of Species at Risk in Ontario (COSSARO)/Ontario Ministry of Natural Resources (OMNR) assesses the provincial status of wild species that are considered to be at risk in Ontario.	
Status	**Definition**
Extinct (EXT)	A species that no longer exists anywhere.
Extirpated (EXP)	A species that no longer exists in the wild in Ontario but still occurs elsewhere.
Endangered (Regulated) (END–R)	A species facing imminent extinction or extirpation in Ontario which has be regulated under Ontario's *Endangered Species Act*.
Endangered (END)	A species facing imminent extinction or extirpation in Ontario which is a candidate for regulation under Ontario's *Endangered Species Act*.
Threatened (THR)	A species that is at risk of becoming endangered in Ontario if limiting factors are not reversed.
Special Concern (SC)	A species with characteristics that make it sensitive to human activities or natural events.
Not at Risk (NAR)	A species that has been evaluated and found to be not at risk.
Data Deficient (DD)	A species for which there is insufficient information for a provincial status recommendation.

Species Status under Federal Legislation

MBCA	**Migratory Birds Convention Act**
The Canada *Migratory Birds Convention Act* provides for the protection of migratory birds in Canada and the United States. The provisions of this Act are implemented through the Migratory Bird Regulations. Bird species that are regulated under the *Migratory Birds Convention Act* are noted in the applicable species lists.	

SARA	**Species at Risk Act**
The Canada *Species at Risk Act* provides a framework for actions across Canada to ensure the survival of wildlife species and the protection of our natural heritage. It sets out how to decide which species are a priority for action and what to do to protect a species. It identifies ways governments, organizations and individuals can work together, and it establishes penalties for a failure to obey the law. Regulated species are listed in Schedules 1, 2 and 3 of the Act.	
Schedule 1 SARA (1)	Species that are currently covered under the Act.
Schedule 2 SARA (2)	Species that are endangered or threatened that have not been re-assessed by COSEWIC for inclusion on Schedule 1.
Schedule 3 SARA (3)	Species that are of special concern that have not yet been re-assessed by COSEWIC for inclusion on Schedule 1.

Species Status under Provincial Legislation

<table>
<tr><td>ESA</td><td colspan="2">Endangered Species Act</td></tr>
<tr><td colspan="3">The Ontario <i>Endangered Species Act</i> provides for the conservation, protection, restoration and propagation of species of fauna and flora of the Province of Ontario that are threatened with extinction. Regulated species are listed in Ontario Regulation 338.</td></tr>
<tr><td>Schedule No.</td><td>Short Form</td><td>Status</td></tr>
<tr><td>Schedule 1
ESA (1)</td><td>EXT</td><td>The species of flora and fauna listed in Schedule 1 are declared to be threatened with extinction.</td></tr>
<tr><td>Schedule 2
ESA (2)</td><td>EXP</td><td>The species of flora and fauna listed in Schedule 2 are declared to be extirpated.</td></tr>
<tr><td>Schedule 3
ESA (3)</td><td>END</td><td>The species of flora and fauna listed in Schedule 3 are declared to be endangered.</td></tr>
<tr><td>Schedule 4
ESA (4)</td><td>THR</td><td>The species of flora and fauna listed in Schedule 4 are declared to be threatened.</td></tr>
<tr><td>Schedule 5
ESA (5)</td><td>SC</td><td>The species of flora and fauna listed in Schedule 5 are declared to be special concern.</td></tr>
</table>

<table>
<tr><td>FWCA</td><td colspan="2">Fish and Wildlife Conservation Act</td></tr>
<tr><td colspan="3">The Ontario <i>Fish and Wildlife Conservation Act</i> outlines the restrictions for hunting, trapping and fishing; handling of live wildlife; sale, purchase and transport of wildlife; and, licences that can be secured under the Act. Under Schedules 1 to 11 of the Act, wildlife are grouped for the purpose of regulating these species. These schedules are further defined below.

Note: where there is a conflict between this Act and the Ontario <i>Endangered Species Act</i>, the provision with the most protection will prevail (s. 2 of the <i>Fish and Wildlife Conservation Act</i>).</td></tr>
<tr><td>Schedule No.</td><td>Short Form</td><td>Status</td></tr>
<tr><td>Schedule 1</td><td>Furbearing – M</td><td>The species of fauna listed in Schedule 1 are declared to be furbearing mammals.</td></tr>
<tr><td>Schedule 2</td><td>Game – M</td><td>The species of fauna listed in Schedule 2 are declared to be game mammals.</td></tr>
<tr><td>Schedule 3</td><td>Game – B</td><td>The species of fauna listed in Schedule 3 are declared to be game birds.</td></tr>
<tr><td>Schedule 4</td><td>Game – R</td><td>The species of fauna listed in Schedule 4 are declared to be game reptiles.</td></tr>
<tr><td>Schedule 5</td><td>Game – A</td><td>The species of fauna listed in Schedule 5 are declared to be game amphibians.</td></tr>
<tr><td>Schedule 6</td><td>Specially Protected – M</td><td>The species of fauna listed in Schedule 6 are declared to be specially protected mammals.</td></tr>
<tr><td>Schedule 7</td><td>Specially Protected – R</td><td>The species of fauna listed in Schedule 7 are declared to be specially protected birds (raptors).</td></tr>
<tr><td>Schedule 8</td><td>Specially Protected – B</td><td>The species of fauna listed in Schedule 8 are declared to be specially protected birds (other than raptors).</td></tr>
<tr><td>Schedule 9</td><td>Specially Protected – R</td><td>The species of fauna listed in Schedule 9 are declared to be specially protected reptiles.</td></tr>
<tr><td>Schedule 10</td><td>Specially Protected – A</td><td>The species of fauna listed in Schedule 10 are declared to be specially protected amphibians.</td></tr>
</table>

<table>
<tr><th>FWCA</th><th colspan="2">Fish and Wildlife Conservation Act</th></tr>
<tr><td colspan="3">The Ontario <i>Fish and Wildlife Conservation Act</i> outlines the restrictions for hunting, trapping and fishing; handling of live wildlife; sale, purchase and transport of wildlife; and, licences that can be secured under the Act. Under Schedules 1 to 11 of the Act, wildlife are grouped for the purpose of regulating these species. These schedules are further defined below.

Note: where there is a conflict between this Act and the Ontario <i>Endangered Species Act</i>, the provision with the most protection will prevail (s. 2 of the <i>Fish and Wildlife Conservation Act</i>).</td></tr>
<tr><td>Schedule No.</td><td>Short Form</td><td>Status</td></tr>
<tr><td>Schedule 11</td><td>Specially Protected – I</td><td>The species of fauna listed in Schedule 11 are declared to be specially protected invertebrates.</td></tr>
</table>

Local Species Status

<table>
<tr><th>BSC</th><th>Bird Studies Canada</th></tr>
<tr><td colspan="2">The Bird Studies Canada <i>Conservation Priorities for the Birds of Southern Ontario</i> (1999), based on work completed by Bird Studies Canada, the Canadian Wildlife Service and the MNR identifies bird species of high conservation priority. This list was prepared to assist municipalities in identifying significant natural heritage features, through using the information regarding the presence of birds of conservation priority in their municipality.

Birds of conservation priority have been noted (BSC) in the appropriate species lists.</td></tr>
</table>

<table>
<tr><th>Local</th></tr>
<tr><td>SWH (Significant Wildlife Habitat)
Indicator species of woodland area-sensitive bird breeding habitat

INT (Interior Forest Species)
Indicator species of interior forest bird breeding habitat</td></tr>
</table>

APPENDIX D

SIGNIFICANT WILDLIFE HABITAT ASSESSMENT

Appendix D. Summary of Significant Wildlife Habitat Assessment (Eco-Region 6E) for Bradford WPCP

Type	Habitat	Candidate ELC	Wildlife Species	Summary of Criteria	ELC Ecosite Criteria Met	Description of Candidate SWH in Study Area
Seasonal Concentration Area	Waterfowl Stopover and Staging Areas (Terrestrial)	CUM1 CUT1 -plus evidence of annual spring flooding from melt water or run-off within these Ecosites	American Black Duck Wood Duck Green-winged Teal Blue-winged Teal Mallard Northern Pintail Northern Shoveler American Wigeon Gadwall	Fields with sheet water from mid-March to May Aggregations of >100 individuals of listed species	**No**	Suitable habitat not observed during site visits
Seasonal Concentration Area	Waterfowl Stopover and Staging Areas (Aquatic)	MAS1 MAS2 MAS3 SAS1 SAM1 SAF1 SWD1 SWD2 SWD3 SWD4 SWD5 SWD6 SWD7	Canada Goose Cackling Goose Snow Goose American Black Duck Northern Pintail Northern Shoveler American Wigeon Gadwall Green-winged Teal Blue- winged Teal Hooded Merganser Common Merganser Lesser Scaup Greater Scaup Long-tailed Duck Surf Scoter White-winged Scoter Black Scoter Ring-necked duck Common Goldeneye Bufflehead Redhead Ruddy Duck Red-breasted Merganser Brant Canvasback Ruddy Duck	• Ponds, marshes, lakes, bays, coastal inlets, and watercourses used during migration • Sewage treatment ponds and storm water ponds not considered SWH unless managed as wetland • Aggregations of >100 individuals of listed species for 7 days	**No**	Suitable habitat not observed within the study area, however, potential habitat within the adjacent PSW
Seasonal Concentration Area	Shorebird Migratory Stopover Area	BBO1 BBO2 BBS1 BBS2 BBT1 BBT2 SDO1 SDS2 SDT1 MAM1-MAM5	Greater Yellowlegs Lesser Yellowlegs Marbled Godwit Hudsonian Godwit Black-bellied Plover American Golden-Plover Semipalmated Plover Solitary Sandpiper Spotted Sandpiper Semipalmated Sandpiper Pectoral Sandpiper White-rumped Sandpiper Baird's Sandpiper Least Sandpiper Purple Sandpiper Stilt Sandpiper Short-billed Dowitcher Red-necked Phalarope Whimbrel Ruddy Turnstone Sanderling Dunlin	• Shorelines of lakes, rivers and wetlands, including beach areas, bars and seasonally flooded, muddy and unvegetated shoreline habitats • Sewage treatment ponds and storm water ponds not considered SWH • Presence of 3 or more listed species for >1000 use days	**No**	Suitable habitat not observed within the study area, however, potential habitat within the adjacent PSW
Seasonal Concentration Area	Raptor Wintering Area	**Forest**: FOD FOM FOC **Upland:** CUM CUT CUS CUW	Rough-legged Hawk Red-tailed Hawk Northern Harrier American Kestrel Snowy Owl **Special Concern:** Short-eared Owl Bald Eagle	Habitat provides a combination of fields and woodlands with roosting, foraging and resting habitats for wintering raptors • Raptor wintering sites (hawk/owl) must be >20 ha **with both forest and upland** • Least disturbed sites, idle/fallow or lightly grazed field/meadow (>15 ha) with adjacent woodlands • Eagle sites have open water, large trees, and snags available for roosting • 1 or more Short-eared Owls or Bald Eagles; or 10+ individuals and 2+ other listed species	**No**	Cultural meadow and thicket communities observed during field investigations are too small and don't meet criteria. No woodlands present.
Seasonal Concentration Area	Bat Hibernacula	CCR1 CCR2 CCA1 CCA2	Big Brown Bat Tri-coloured Bat	• Hibernacula may be found in caves, mine shafts, underground foundations and Karsts • The area of 200 m radius around the hibernaculum entrance is the defining criteria for most development • Mines and buildings not considered SWH	**No**	Suitable habitat not observed during site visits

Type	Habitat	Candidate ELC	Wildlife Species	Summary of Criteria	ELC Ecosite Criteria Met	Description of Candidate SWH in Study Area
Seasonal Concentration Area	Bat Maternity Colonies	FOD FOM SWD SWM	Big Brown Bat Silver-haired Bat	• Maternity colonies can be found in tree cavities, vegetation and often in buildings • Maternity colonies considered SWH are found in mature deciduous or mixed forest stands with >10/ha large diameter (>25 cm DBH) trees • Buildings not considered to be SWH • >10 Big Brown Bats or >5 adult female Silver-haired Bats	**No**	Suitable habitat not observed during site visits
Season Concentration Area	Turtle Wintering Areas	SW, MA, OA, SA series FEO BOO	Midland Painted Turtle **Special Concern:** Northern Map Turtle Snapping Turtle	• For most turtles, wintering areas are in the same general area as their core habitat. Water must be deep enough not to freeze and have soft mud substrates • Over-wintering sites are permanent water bodies, large wetlands, and bogs or fens with adequate dissolved oxygen • Northern Map Turtle: open-water areas such as deeper rivers or streams and lakes with current can also be used as over-wintering habitat • Man-made ponds (e.g., sewage lagoons, storm water ponds) not considered SWH • 5+ Midland Painted Turtles, or 1 or more Northern Map or Snapping Turtles	**No**	Suitable habitat not observed within the study area, however, potential habitat within the adjacent PSW
Seasonal Concentration Area	Reptile Hibernaculum	• For all snakes, habitat may be found in any ecosite other than very wet ones. Talus, Rock Barren, Crevice, Cave, and Alvar sites may be directly related to these habitats. • For Five-Lined Skink: FOD and FOM, FOC1 and FOM3	Eastern Gartersnake Northern Watersnake Northern Red-bellied Snake Northern (Dekay's) Brownsnake Smooth Green Snake Northern Ring-necked Snake Milksnake **Special Concern:** Eastern Ribbonsnake Five-lined skink	• For all snakes, habitat may be found in any ecosite other than very wet ones Talus, Rock Barren, Crevice, Cave, and Alvar sites may be directly related to these habitats • For snakes, hibernation takes place in sites located below frost lines in burrows, rock crevices and other natural or naturalized locations. Features that go below frost line, such as rock piles or slopes, old stone fences, and abandoned crumbling foundations assist in identifying candidate SWH • Five-lined skink prefer mixed forests with rock outcrop openings providing cover rock overlaying granite bedrock with fissures • 5+ snakes of one species; 2+ species; or 1 Special Concern species • Presence of any active hibernaculum for skink is significant.	**Yes**	No candidate habitat observed during site visit. NHIC database: no Reptile Hibernacula reported
Seasonal Concentration Area	Colonial Nesting Bird Breeding Habitat (Bank and Cliff)	CUM1 BLS1 CUT1 BLT1 CUS1 CLO1 BLO1 CLS1 CLT1	Cliff Swallow Northern Rough-winged Swallow	• Eroding banks, sandy hills, pits, steep slopes, rock faces • Does not include man-made structures or active aggregate pits or stockpiles • 8+ pairs in breeding season	**No**	Suitable habitat not observed during site visits
Seasonal Concentration Area	Colonial Nesting Bird Breeding Habitat (Tree/Shrubs)	SWM2 SWM3 SWM5 SWM6 SWD1-SWD7 FET1	Great Blue Heron Black-crowned Night Heron Great Egret Green Heron	• Nests in live or dead standing trees in wetlands, lakes, islands, and peninsulas • Shrubs and occasionally emergent vegetation may also be used • Presence of 5+ nests of Great Blue Heron or other listed species	**No**	Suitable habitat not observed during site visits

Type	Habitat	Candidate ELC	Wildlife Species	Summary of Criteria	ELC Ecosite Criteria Met	Description of Candidate SWH in Study Area
Seasonal Concentration Area	Colonial-Nesting Bird Breeding Habitat (Ground)	MAM1-MAM6 MAS1-MAS3 CUM CUT CUS	Herring Gull Great Black-backed Gull Little Gull Ring-billed Gull Common Tern Caspian Tern Brewer's Blackbird	• Nesting colonies of gulls and terns are on islands or peninsulas associated with open water or in marshy areas • Close proximity to watercourses in open fields or pastures with scattered trees or shrubs (Brewer's Blackbird) • >25 active nests for Herring Gulls or Ring-billed Gulls, >5 active nests for Common Tern or >2 active nests for Caspian Tern. Any active nesting colony of 1 or more Little Gull and Great Black-backed Gull is significant. Presence of 5+ pairs for Brewer's Blackbird.	**No**	Suitable habitat not observed during site visits
Seasonal Concentration Area	Migratory Butterfly Stopover Areas	CUM FOD CUT FOC CUS FOM CUP	Painted Lady Red Admiral **Special Concern**: Monarch	• 10+ ha in size with a combination of field and forest habitat present, within 5 km of Lake Ontario	**No**	Suitable habitat not observed during site visits
Seasonal Concentration Area	Landbird Migratory Stopover Areas	FOC SWC FOM SWM FOD SWD	All migratory songbirds All migrant raptors	• Woodlots of >10 ha, within 5 km of Lake Ontario. Sites may have a variety of habitats: forest, grassland and wetland complexes • >200 birds/day, >35 species, 10+ species on 5+ different dates	**No**	Suitable habitat not observed during site visits
Seasonal Concentration Area	Deer Winter Congregation Areas	FOC SWC FOM SWM FOD SWD	White-tailed Deer	• Woodlots >100 ha in size or, if large woodlots are rare in a planning area, woodlots >50 ha	**No**	Suitable habitat not observed during site visits
Specialized Habitat for Wildlife	Waterfowl Nesting Area	MAS1-MAS3 SAS1 SAM1 SAF1 MAM1-MAM6 SWT1-SWT2 SWD1-SWD4	American Black Duck Northern Pintail Northern Shoveler Gadwall Blue-winged Teal Green-winged Teal Wood Duck Hooded Merganser Mallard	• Extends 120 m from a wetland (> 0.5 ha) or a wetland (>0.5 ha) and any small wetlands (0.5 ha) within 120 m or a cluster of 3 or more small (<0.5 ha) wetlands within 120 m of each individual wetland where waterfowl nesting is known to occur • Adjacency to Provincially Significant Wetlands • 10+ nesting Mallard pairs, 1+ pairs of American Black Ducks, 3+ nesting pairs of all other species	**Yes**	Potential suitable habitat exists within the study area
Specialized Habitat for Wildlife	Bald Eagle and Osprey Nesting, Foraging and Perching habitat	FOD FOM FOC SWD SWM SWC	Osprey **Special Concern**: Bald Eagle	• Nests are associated with lakes, ponds, rivers or wetlands along forested shorelines, islands, or on structures over water • Bald Eagle: 1 active nest and 400-800 m radius around the nest • Osprey: 1 active nest and 300 m radius around the nest or the contiguous woodland stand	**No**	Suitable habitat not observed during site visits
Specialized Habitat for Wildlife	Woodland Raptor Nesting Habitat	All forested Ecosites SWC SWM SWD CUP3	Northern Goshawk Cooper's Hawk Sharp-shinned Hawk Red-shouldered Hawk Barred Owl Broad-winged Hawk	• All natural or conifer plantation woodland/forest stands >30 ha with >10 ha of interior habitat • Stick nests found in a variety of intermediate-aged to mature conifer, deciduous or mixed forests within tops or crotches of trees • 1 or more active nests of any species is considered SWH	**No**	Suitable habitat not observed during site visits
Specialized Habitat for Wildlife	Turtle Nesting Areas	MAS1-3 SAS1 SAM1 SAF1 BOO1 FEO1	Midland Painted Turtle **Special Concern**: Northern Map Turtle Snapping Turtle	• Nesting sites are in exposed mineral soil (sand or gravel) areas adjacent (<100 m) or within the listed ELC ecosites • Nesting areas on the sides of municipal or provincial road embankments and shoulders are not SWH • 5+ nesting Midland Painted Turtles, or 1 or more nesting Northern Map or Snapping Turtles	**Yes**	Potential nesting habitat present, however, turtles not observed during field investigations.
Specialized Habitat for Wildlife	Seeps and Springs	areas where groundwater comes to surface	Wild Turkey Ruffed Grouse Spruce Grouse White-tailed Deer Salamander spp.	• Presence of seeps or springs from groundwater	**No**	Suitable habitat not observed during site visits

Type	Habitat	Candidate ELC	Wildlife Species	Summary of Criteria	ELC Ecosite Criteria Met	Description of Candidate SWH in Study Area
Specialized Habitat for Wildlife	Amphibian Breeding Habitat (Woodland)	FOC FOM FOD SWC SWM SWD	Eastern Newt Blue-spotted Salamander Spotted Salamander Gray Treefrog Spring Peeper Western Chorus Frog Wood Frog	- Presence of a wetland, pond or woodland pool (including vernal pools) >500 m^2 within or adjacent (within 120 m) to a woodland (No minimum size) - Some small wetlands may not be mapped and may be important breeding pools for amphibians - Presence of 1+ of the listed newt/salamander species or 2+ of the listed frog species with at least 20 individuals (adults or eggs masses) - 2 or more of the listed frog species with Call Level Codes of 3	**No**	Suitable habitat not observed during site visits
Specialized Habitat for Wildlife	Amphibian Breeding Habitat (Wetlands)	ELC classes: SW MA FE BO OA SA	Eastern Newt American Toad Spotted Salamander Four-toed Salamander Blue-spotted Salamander Gray Treefrog Western Chorus Frog Northern Leopard Frog Pickerel Frog Green Frog Mink Frog Bullfrog	- Wetlands >500 m^2 supporting high species diversity are significant - Some small or ephemeral habitats may not be identified on MNRF mapping and could be important amphibian breeding habitats - Presence of shrubs and logs increase significance of pond for some amphibian species because of available structure for calling, foraging, escape and concealment from predators - Bullfrogs require permanent water bodies with abundant emergent vegetation - Presence of 1+ of the listed newt/salamander species or 2+ of the listed frog/toad species with at least 20 individuals (adults or eggs masses) - 2 or more of the listed frog/toad species with Call Level Codes of 3 or confirmed Bullfrogs	**No**	Suitable habitat not observed during site visits, however, potential occurs within the adjacent PSW.
Specialized Habitat for Wildlife	Woodland Area-Sensitive Bird Breeding Habitat	FOC FOM FOD SWC SWM SWD	Yellow-bellied Sapsucker Red-breasted Nuthatch Veery Blue-headed Vireo Northern Parula Black-throated Green Warbler Blackburnian Warbler Black-throated Blue Warbler Ovenbird Scarlet Tanager Winter Wren Pileated Woodpecker **Special Concern:** Cerulean Warbler Canada Warbler	- Habitats where interior forest breeding birds are breeding, typically large mature (>60 yrs old) forest stands or woodlots >30 ha. - Interior forest habitat is at least 200 m from forest edge habitat - Presence of nesting or breeding pairs of 3+ of the listed wildlife species or 1+ pairs of Cerulean Warblers or Canada Warblers	**No**	Suitable habitat not observed during site visits
Habitat for Species of Conservation Concern	Marsh Bird Breeding Habitat	MAM1-MAM6 SAS1 SAM1 SAF1 FEO1 BOO1 Green Heron: SW, MA, CUM1	American Bittern Virginia Rail Sora Common Moorhen American Coot Pied-billed Grebe Marsh Wren Sedge Wren Common Loon Sandhill Crane Green Heron Trumpeter Swan **Special Concern:** Black Tern Yellow Rail	- All wetland habitat is to be considered as long as there is shallow water with emergent aquatic vegetation present - For Green Heron, habitat is at the edge of water such as sluggish streams, ponds and marshes sheltered by shrubs and trees. Less frequently, it may be found in upland shrubs or forest a considerable distance from water - Presence of 5+ nesting pairs of Sedge Wren or Marsh Wren **or** breeding by any combination of 4+ listed species - Any wetland with breeding of 1 or more Black Terns, Trumpeter Swan, Green Heron or Yellow Rail	**No**	Suitable habitat not observed during site visits, however, potential occurs within the adjacent PSW.

Type	Habitat	Candidate ELC	Wildlife Species	Summary of Criteria	ELC Ecosite Criteria Met	Description of Candidate SWH in Study Area
Habitat for Species of Conservation Concern	Open Country Breeding Bird Habitat	CUM1 CUM2	Upland Sandpiper Grasshopper Sparrow Vesper Sparrow Northern Harrier Savannah Sparrow **Special Concern:** Short-eared Owl	• Large grassland areas, includes natural and cultural fields and meadows) >30 ha • Grasslands Not Class 1 or 2 agricultural lands, and not being actively used for farming (i.e. No row cropping or intensive hay or livestock pasturing in the last 5 years) • Grassland sites considered significant should have a history of longevity, either abandoned fields, mature hayfields and pasturelands that are 5+ years old • Presence of nesting or breeding of 2+ listed species, or 1+ pairs of Short-eared Owls	**No**	Suitable habitat not observed during site visits, cultural meadow community is too small.
Habitat for Species of Conservation Concern	Shrub/Early Successional Breeding Bird Habitat	CUT1 CUT2 CUS1 CUS2 CUW1 CUW2	Indicator Spp: Brown Thrasher Clay-coloured Sparrow Common Spp. Field Sparrow Black-billed Cuckoo Eastern Towhee Willow Flycatcher **Special Concern:** Yellow-breasted Chat **Special Concern:** Golden-winged Warbler	• Large field areas succeeding to shrub and thicket habitats >10 ha in size • Shrub land or early successional fields, not class 1 or 2 agricultural lands, Not being actively farmed (i.e. No row-cropping, haying or live-stock pasturing in the last 5 years) • Shrub thicket habitats (>10 ha) are most likely to support multiple species • Shrub and thicket habitat sites considered SWH should have a history of longevity, either abandoned fields or pasturelands. • Presence of 1+ indicator or Species Concern species, and 2+ common species	**No**	Suitable habitat not observed during site visits
Habitat for Species of Conservation Concern	Terrestrial Crayfish	MAM1-MAM6 MAS1-MAS3 SWD SWT SWM	Chimney or Digger Crayfish; (*Fallicambarus fodiens*) Devil Crayfish or Meadow Crayfish; (*Cambarus Diogenes*)	• Wet meadow and edges of shallow marshes (No minimum size) • Presence of 1 or more individuals of species listed or their chimneys (burrows) in suitable meadow marsh, swamp or moist terrestrial sites	**Yes**	No chimneys observed during LGL's field investigations.
Habitat for Species of Conservation Concern	Special Concern and Rare Wildlife Species	All special concern and Provincially Rare plant and animal species	All plant and animal element occurrences (EO) within a 1 or 10 km grid.	• When an element occurrence is identified within a 1 or 10 km grid for a Special Concern or provincially Rare species; linking candidate habitat on the site needs to be completed to ELC Ecosites	**No**	Suitable habitat not observed during site visits
Animal Movement Corridors	Amphibian Movement Corridors	All ecosites associated with water	Eastern Newt American Toad Spotted Salamander Four-toed Salamander Blue-spotted Salamander Gray Treefrog Western Chorus Frog Northern Leopard Frog Pickerel Frog Green Front Mink Frog Bullfrog	• Movement corridors must be determined when Amphibian Breeding Habitat (Wetland) is confirmed as SWH	**Yes**	Potential suitable habitat within and adjacent to the study area
Animal Movement Corridors	Deer Movement Corridors	All forested ecosites	White-tailed deer	• Movement corridor must be determined when Deer Wintering Habitat is confirmed as SWH • Corridors should be at least 200m wide with gaps • <20m and if following riparian area with at least 15m of vegetation on both sides of waterway • Corridors that lead to a deer wintering habitat should be unbroken by roads and residential areas.	**No**	Suitable habitat not observed during site visits

Appendix B

Stage 1 Archaeological Assessment

Stage 1 Archaeological Assessment
Bradford Water Pollution Control Plant
Town of Bradford West Gwillimbury
Part of Lot 17, Concession 7
Geographic Township of West Gwillimbury
Simcoe County, Ontario

Prepared for
Hatch Ltd.
2800 Speakman Drive
Mississauga, ON L5K 1B1
Tel: (905) 855-7600

Licensed under
C. Ramsoomair
MCM Licence #P1106
PIF #P1106-0043-2024
ARA File #2024-0004

31/07/2024

Original Report

EXECUTIVE SUMMARY

Under a contract awarded in January 2024, Archaeological Research Associates Ltd. carried out a Stage 1 assessment of lands to be impacted by tertiary treatment system upgrades and underground pipe connection to existing outfalls within the Bradford Water Pollution Control Plant (WPCP) at 225 Dissette Street, in the Town of Bradford, Ontario. The assessment was carried out in support of an Environmental Assessment Amendment in accordance with the *Environmental Assessment Act*. This report documents the background research and potential modelling involved in the investigation and presents conclusions and recommendations pertaining to archaeological concerns.

The Stage 1 assessment was conducted in April 2024 under Project Information Form #P1106-0043-2024. The investigation encompassed the entire study area. Legal permission to enter and conduct all necessary fieldwork activities within the assessed lands was granted by the Town. At the time of assessment, the study area consisted of the Bradford WPCP, including biosolid holding tanks and associated infrastructural facilities, roadways, and landscaped areas.

The Stage 1 assessment determined that the study area comprised areas of no archaeological potential. The inspection confirmed that all of these lands had been extensively disturbed by past land alterations. It is recommended that no further assessment be required within the study area.

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ABBREVIATIONS

ARA – Archaeological Research Associates Ltd.
CIF – Contract Information Form
MCM – Ministry of Citizenship and Multiculturalism
PIF – Project Information Form
S&Gs – Standards and Guidelines for Consultant Archaeologists

PERSONNEL

Project Director: P.J. Racher (#P007)
Operations Manager: C.E. Gohm (#R187)
Project Archaeologist: C. Ramsoomair (#P1106)
Field Director: C. Ramsoomair
Assistant Field Director: K. Crotty
Cartographer: M. Johnson, K. Crotty
Report Writer: C. Albani (#R1239)
Editor: C. Ramsoomair

ENGAGED GROUPS

Alderville First Nation
Contact: J. Kapyrka
Field Representative: None

Beausoleil First Nation
Contact: L. Montour
Field Representative: None

Chippewas of Georgina Island First Nation
Contacts: N. Charles, J.L. Porte
Field Representative: None

Chippewas of Rama First Nation
Contacts: B. Benson, B. Cousineau
Field Representative: None

Curve Lake First Nation
Contact: L. Taylor, D. Paauw
Field Representative: None

Hiawatha First Nation
Contacts: T. Cowie, M. McGonigle
Field Representative: None

Huron-Wendat Nation
Contacts: M.-S. Gendron, D. Lesage
Field Representatives: None

Métis Nation of Ontario
Contacts: General Consultation
Field Representative: None

Mississauga of Scugog Island First Nation
Contacts: General Consultation
Field Representative: None

1.0 PROJECT CONTEXT

1.1 Development Context

Under a contract awarded in January 2024, Archaeological Research Associates Ltd. (ARA) carried out a Stage 1 assessment of lands to be impacted by tertiary treatment system upgrades and underground pipe connection to existing outfalls within the Bradford Water Pollution Control Plant (WPCP) at 225 Dissette Street, in the Town of Bradford, Ontario. The assessment was carried out in support of an Environmental Assessment Amendment in accordance with the *Environmental Assessment Act*. This report documents the background research and potential modelling involved in the investigation and presents conclusions and recommendations pertaining to archaeological concerns.

The study area consists of an irregularly shaped parcel of land with an area of 6.80 ha (Map 1). This parcel is generally bounded by the Metrolinx Barrie rail line to the west, water-holding ponds to the north, wetlands to the east, and forest and agricultural fields to the south. In legal terms, the study area falls on part of Lots 17, Concession 7, in the Geographic Township of West Gwillimbury, now Town of Bradford West Gwillimbury, Simcoe County. The Crown obtained these lands from certain Anishinaabe peoples as part of the Nottawasaga Purchase (Treaty 18) in 1818.

The Stage 1 assessment was conducted in April 2024 under PIF #P1106-0043-2024. The investigation encompassed the entire study area. As set out in Section 1.0 of the 2011 Standards and Guidelines for Consultant Archaeologists (S&Gs), the investigation was carried out to achieve the following objectives:

- Provide information about geography, history and current land conditions;
- Determine whether any previous archaeological fieldwork has been completed;
- Evaluate in detail the study area’s archaeological potential; and
- Recommend appropriate strategies for Stage 2 assessment, if necessary.

The Ministry of Citizenship and Multiculturalism (MCM) is asked to review the results and recommendations presented herein and enter the report into the Ontario Public Register of Archaeological Reports. A Record of Indigenous Engagement is included in the project report package in accordance with the requirements set out in Section 7.6.2 of the 2011 *S&Gs*.

1.2 Historical Context

After a century of archaeological work in southern Ontario, scholarly understanding of the historical usage of the area has become very well-developed. With occupation beginning in the Palaeo period approximately 11,000 years ago, the greater vicinity of the study area comprises a complex chronology of Pre-Contact and Euro-Canadian histories. Section 1.2.1 summarizes the region’s settlement history, whereas Section 1.2.2 documents past and present land uses. Five previous archaeological reports containing relevant background information were obtained during the research component of the study. These reports are summarized in Section 1.3.3, and the references (including title, author and PIF number) appear in Section 6.0.

1.2.1 Settlement History

1.2.1.1 Pre-Contact

The Pre-Contact history of the region is lengthy and rich, and a variety of Indigenous groups inhabited the landscape. Archaeologists generally divide this vibrant history into three main periods: Palaeo, Archaic and Woodland. Each of these periods comprise a range of discrete sub-periods characterized by identifiable trends in material culture and settlement patterns, which are used to interpret past lifeways. The principal characteristics of these sub-periods are summarized in Table 1.

Table 1: Pre-Contact Settlement History
(Wright 1972; Ellis and Ferris 1990; Warrick 2000; Munson and Jamieson 2013)

Sub-Period	Timeframe	Characteristics
Early Palaeo	9000–8400 BC	Gainey, Barnes and Crowfield traditions; Small bands; Mobile hunters and gatherers; Utilization of seasonal resources and large territories; Fluted points
Late Palaeo	8400–7500 BC	Holcombe, Hi-Lo and Lanceolate biface traditions; Continuing mobility; Campsite/Way-Station sites; Smaller territories are utilized; Non-fluted points
Early Archaic	7500–6000 BC	Side-Notched, Corner-Notched (Nettling, Thebes) and Bifurcate traditions; Growing diversity of stone tool types; Heavy woodworking tools appear (e.g., ground stone axes and chisels)
Middle Archaic	6000–2500 BC	Stemmed (Kirk, Stanly/Neville), Brewerton Side- and Corner-Notched traditions; Reliance on local resources; Populations increasing; More ritual activities; Fully ground and polished tools; Net-sinkers common; Earliest copper tools
Late Archaic	2500–900 BC	Narrow Point (Lamoka), Broad Point (Genesee) and Small Point (Crawford Knoll) traditions; Less mobility; Use of fish-weirs; True cemeteries appear; Stone pipes emerge; Long-distance trade (marine shells and galena)
Early Woodland	900–400 BC	Meadowood tradition; Crude cord-roughened ceramics emerge; Meadowood cache blades and side-notched points; Bands of up to 35 people
Middle Woodland	400 BC–AD 600	Local Saugeen-like tradition; Others argue for Point Peninsula tradition; Ceramics continue but many are undecorated; Seasonal settlements and resource utilization; Each watershed may have had a unique tradition; Regional patterns poorly understood at this time
Middle/Late Woodland Transition	AD 600–900	Princess Point tradition; Cord roughening, impressed lines and punctate designs on pottery; Adoption of maize horticulture at the western end of Lake Ontario; Oval houses and 'incipient' longhouses; First palisades; Villages with 75 people
Late Woodland (Early)	AD 900–1300	Glen Meyer tradition; Settled village-life based on agriculture; Small villages (0.4 ha) with 75–200 people and 4–5 longhouses; Semi-permanent settlements
Late Woodland (Middle)	AD 1300–1400	Uren and Middleport traditions; Classic longhouses emerge; Larger villages (1.2 ha) with up to 600 people; More permanent settlements (30 years)
Late Woodland (Late)	AD 1400–1600	Huron-Petun tradition; Globular-shaped ceramic vessels, ceramic pipes, bone/antler awls and beads, ground stone celts and adzes, chipped stone tools, and even rare copper objects; Large villages (often with palisades), temporary hunting and fishing camps, cabin sites and small hamlets; Territorial contraction in early 16th century; Fur trade begins ca. 1580; European trade goods appear

Although Iroquoian-speaking populations tended to leave a much more obvious mark on the archaeological record and are therefore emphasized in the Late Woodland entries above, it must be understood that Algonquian-speaking populations also represented a significant presence in southern Ontario. Due to the sustainability of their lifeways, archaeological evidence directly associated with the Anishinaabeg remains elusive, particularly when compared to sites associated with the more sedentary agriculturalists. Many artifact scatters in southern Ontario were likely camps, chipping stations or processing areas associated with the more mobile Anishinaabeg, utilized during their travels along the local drainage basins while making use of seasonal resources. This part of southern Ontario represents the ancestral territory of various Indigenous groups, each with their own land use and settlement pattern tendencies.

1.2.1.2 Post-Contact

The arrival of European explorers and traders at the beginning of the 17th century triggered widespread shifts in Indigenous lifeways and set the stage for the ensuing Euro-Canadian settlement process. Documentation for this period is abundant, ranging from the first sketches of Upper Canada and the written accounts of early explorers to detailed township maps and lengthy histories. The Post-Contact period can be effectively discussed in terms of major historical events; the principal characteristics associated with these events are summarized in Table 2.

Table 2: Post-Contact Settlement History
(Smith 1846; Coyne 1895; Hunter 1909a, 1909b; Lajeunesse 1960; Cumming 1975; Ellis and Ferris 1990; Surtees 1994; AO 2023)

Historical Event	Timeframe	Characteristics
Early Exploration	Early 17th century	Brûlé explores southern Ontario in 1610/11; Champlain travels through in 1613 and 1615/1616, making contact with a number of Indigenous groups (including the Algonquin, Huron-Wendat and other First Nations); European trade goods become increasingly common and begin to put pressure on traditional industries
Increased Contact and Conflict	Mid- to late 17th century	Conflicts between various First Nations during the Beaver Wars result in numerous population shifts; European explorers continue to document the area, and many Indigenous groups trade directly with the French and English; 'The Great Peace of Montreal' treaty established between roughly 39 different First Nations and New France in 1701
Fur Trade Development	Early to mid-18th century	Growth and spread of the fur trade; Peace between the French and English with the Treaty of Utrecht in 1713; Ethnogenesis of the Métis; Hostilities between French and British lead to the Seven Years' War in 1754; French surrender in 1760
British Control	Mid- to late 18th century	*Royal Proclamation* of 1763 recognizes the title of the First Nations to the land; Numerous treaties subsequently arranged by the Crown; First land cession under the new protocols is the Seneca surrender of the west side of the Niagara River in 1764; The Niagara Purchase (Treaty 381) in 1781 included this area
Loyalist Influx	Late 18th century	United Empire Loyalist influx during and after the American Revolutionary War (1775–1783); British develop interior communication routes and acquire additional lands; Between the Lakes Purchase completed with the Mississaugas in 1784 and confirmed in 1792 (Treaty 3); *Constitutional Act* of 1791 creates Upper and Lower Canada
County Development	Late 18th to mid-19th century	Nominally became part of Kent County in 1792 and Simcoe County in 1798; Additional land cessions included the Penetanguishene Purchase (Treaty 5) in 1798, Lake Simcoe Purchase (Treaty 16) in 1815 and Nottawasaga Purchase (Treaty 18) in 1818; All townships surveyed by the mid-1830s; Townships ceded to Waterloo County in 1837 and York County in 1838; Simcoe County independent after the abolition of the district system in 1849 9
Township Formation	Late 18th to early 19th century	First settlers included Scottish refugees from the Red River Colony beginning ca. 1816; Scotch Settlement established in the southwest; West Gwillimbury surveyed by G. and S. Lount in 1819; First settlers to cross the Holland River included J. Wallace, L. Algeo and R. Armstrong in 1819; Other early arrivals included groups of Irish Palatines in 1826 and 1831; A corduroy road was completed across the Holland Marsh in 1825

Historical Event	Timeframe	Characteristics
Township Development	Mid-19th to early 20th century	Population reached 2,702 by 1842; Settled mainly by Irish, Scotch, Canadians and Americans; 16,278 ha taken up by 1846, with 5,774 ha under cultivation; Traversed by the Ontario, Simcoe & Huron Railway/Northern Railway (1853); Prominent communities at Bradford, Bond Head and Middletown; Smaller communities at Browns Corners, Cookstown, Coulson's Corners, Deerhurst, Gilford and Newtown Robinson

1.2.1.3 Bradford

The first major European settlement of the Bradford West Gwillimbury area dates to 1819, when members of Lord Selkirk's Red River Settlement relocated to the area of Holland's Landing, in what is historically known as "The Scotch Settlement". After William Milloy established a tavern in the area in 1829, the community adopted the name Milloy's Tavern, and later Edmanson's Corner. In 1840, the town would be formally named Bradford, after the English hometown of Joel Flesher Robinson, the owner of the local general store (Mika and Mika 1977: 37). In 1991, the town of Bradford was amalgamated with the municipal township of West Gwillimbury to form Bradford West Gwillimbury in the newly reorganized Simcoe County (Rayburn 1997: 41).

The Town of Bradford constructed its first wastewater treatment facility in 1962 to service 1,500 people. This facility was expanded with Plant A, the most northern of the plants, in 1970 to service 5,500 residents. From north to south, Plants B, C and D were added in 1982, 1997 and 2009, respectively. The expansion in 2009 represented the last major update to the Bradford WPCP (Town of Bradford West Gwillimbury, n.d.).

1.2.2 Oral Traditions

The study area occupies lands that fall within the treaty, traditional and/or ancestral territories of numerous First Nations. Indeed, this area was used and shared by many Indigenous groups over the millennia; each with their own traditions as to how they arrived, how they lived, and the major events that punctuated their time there. Amongst these communities, Curve Lake First Nation, Chippewas of Rama First Nation, and the Huron-Wendat were able to provide a traditional oral historical narrative. It is hoped that other such accounts can be incorporated into studies like this as they become available. It should be noted that a given oral history does not necessarily reflect the views of other groups or the consultant archaeologist. The Curve Lake and Chippewas of Rama First Nation oral histories are reproduced in Table 3-Table 5, respectively.

Table 3: Curve Lake First Nation Oral History
(Provided by Curve Lake First Nation)

Michi Saagiig Historical/Background context
The traditional homelands of the Michi Saagiig (Mississauga Anishinaabeg) encompass a vast area of what is now known as southern Ontario. The Michi Saagiig are known as "the people of the big river mouths" and were also known as the "Salmon People" who occupied and fished the north shore of Lake Ontario where the various tributaries emptied into the lake. Their territories extended north into and beyond the Kawarthas as winter hunting grounds on which they would break off into smaller social groups for the season, hunting and trapping on these lands, then returning to the lakeshore in spring for the summer months. The Michi Saagiig were a highly mobile people, travelling vast distances to procure subsistence for their people. They were also known as the "Peacekeepers" among Indigenous nations. The Michi Saagiig homelands were located directly between

Michi Saagiig Historical/Background context

two very powerful Confederacies: The Three Fires Confederacy to the north and the Haudenosaunee Confederacy to the south. The Michi Saagiig were the negotiators, the messengers, the diplomats, and they successfully mediated peace throughout this area of Ontario for countless generations.

Michi Saagiig oral histories speak to their people being in this area of Ontario for thousands of years. These stories recount the "Old Ones" who spoke an ancient Algonquian dialect. The histories explain that the current Ojibwa phonology is the 5th transformation of this language, demonstrating a linguistic connection that spans back into deep time. The Michi Saagiig of today are the descendants of the ancient peoples who lived in Ontario during the Archaic and Paleo-Indian periods. They are the original inhabitants of southern Ontario, and they are still here today.

The traditional territories of the Michi Saagiig span from Gananoque in the east, all along the north shore of Lake Ontario, west to the north shore of Lake Erie at Long Point. The territory spreads as far north as the tributaries that flow into these lakes, from Bancroft and north of the Haliburton highlands. This also includes all the tributaries that flow from the height of land north of Toronto like the Oak Ridges Moraine, and all of the rivers that flow into Lake Ontario (the Rideau, the Salmon, the Ganaraska, the Moira, the Trent, the Don, the Rouge, the Etobicoke, the Humber, and the Credit, as well as Wilmot and 16 Mile Creeks) through Burlington Bay and the Niagara region including the Welland and Niagara Rivers, and beyond. The western side of the Michi Saagiig Nation was located around the Grand River which was used as a portage route as the Niagara portage was too dangerous. The Michi Saagiig would portage from present-day Burlington to the Grand River and travel south to the open water on Lake Erie.

Michi Saagiig oral histories also speak to the occurrence of people coming into their territories sometime between 500-1000 A.D. seeking to establish villages and a corn growing economy – these newcomers included peoples that would later be known as the Huron-Wendat, Neutral, Petun/Tobacco Nations. The Michi Saagiig made Treaties with these newcomers and granted them permission to stay with the understanding that they were visitors in these lands. Wampum was made to record these contracts, ceremonies would have bound each nation to their respective responsibilities within the political relationship, and these contracts would have been renewed annually (see Gitiga Migizi and Kapyrka 2015). These visitors were extremely successful as their corn economy grew as well as their populations. However, it was understood by all nations involved that this area of Ontario were the homeland territories of the Michi Saagiig.

The Odawa Nation worked with the Michi Saagiig to meet with the Huron-Wendat, the Petun, and Neutral Nations to continue the amicable political and economic relationship that existed – a symbiotic relationship that was mainly policed and enforced by the Odawa people.

Problems arose for the Michi Saagiig in the 1600s when the European way of life was introduced into southern Ontario. Also, around the same time, the Haudenosaunee were given firearms by the colonial governments in New York and Albany which ultimately made an expansion possible for them into Michi Saagiig territories. There began skirmishes with the various nations living in Ontario at the time. The Haudenosaunee engaged in fighting with the Huron-Wendat and between that and the onslaught of European diseases, the Iroquoian speaking peoples in Ontario were decimated.

The onset of colonial settlement and missionary involvement severely disrupted the original relationships between these Indigenous nations. Disease and warfare had a devastating impact upon the Indigenous peoples of Ontario, especially the large sedentary villages, which mostly included Iroquoian speaking peoples. The Michi Saagiig were largely able to avoid the devastation caused by these processes by retreating to their wintering grounds to the north, essentially waiting for the smoke to clear.

Michi Saagiig Elder Gitiga Migizi (2017) recounts:

"We weren't affected as much as the larger villages because we learned to paddle away for several years until everything settled down. And we came back and tried to bury the bones of the Huron but it was overwhelming, it was all over, there were bones all over – that is our story.

There is a misnomer here, that this area of Ontario is not our traditional territory and that we came in here after the Huron-Wendat left or were defeated, but that is not true. That is a big misconception of our history that needs to be corrected. We are the traditional people, we are the ones that signed treaties with the Crown. We are recognized as the ones who signed these treaties and we are the ones to be dealt with officially in any matters concerning territory in southern Ontario.

We had peacemakers go to the Haudenosaunee and live amongst them in order to change their ways. We had also diplomatically dealt with some of the strong chiefs to the north and tried to make peace as much as possible. So we are very important in terms of keeping the balance of relationships in harmony.

Some of the old leaders recognized that it became increasingly difficult to keep the peace after the Europeans introduced guns. But we still continued to meet, and we still continued to have some wampum, which doesn't mean we negated our

Michi Saagiig Historical/Background context

territory or gave up our territory – we did not do that. We still consider ourselves a sovereign nation despite legal challenges against that. We still view ourselves as a nation and the government must negotiate from that basis."

Often times, southern Ontario is described as being "vacant" after the dispersal of the Huron-Wendat peoples in 1649 (who fled east to Quebec and south to the United States). This is misleading as these territories remained the homelands of the Michi Saagiig Nation.

The Michi Saagiig participated in eighteen treaties from 1781 to 1923 to allow the growing number of European settlers to establish in Ontario. Pressures from increased settlement forced the Michi Saagiig to slowly move into small family groups around the present day communities: Curve Lake First Nation, Hiawatha First Nation, Alderville First Nation, Scugog Island First Nation, New Credit First Nation, and Mississauga First Nation.

The Michi Saagiig have been in Ontario for thousands of years, and they remain here to this day.

This historical context was prepared by Gitiga Migizi, a respected Elder and Knowledge Keeper of the Michi Saagiig Nation.

Publication reference:

Gitiga Migizi and Julie Kapyrka
2015 Before, During, and After: Mississauga Presence in the Kawarthas. In Peterborough Archaeology, Dirk Verhulst, editor, pp.127-136. Peterborough, Ontario: Peterborough Chapter of the Ontario Archaeological Society.

Table 4: Chippewas of Rama First Nation Oral History

(Provided by Chippewas of Rama First Nation)

Chippewas of Rama First Nation Historical/Background context

The Chippewas of Rama First Nation are an Anishinaabe (Ojibway) community located at Rama First Nation, ON. Our history began with a great migration from the East Coast of Canada into the Great Lakes region. Throughout a period of several hundred years, our direct ancestors again migrated to the north and eastern shores of Lake Huron and Georgian Bay. Our Elders say that we made room in our territory for our allies, the Huron-Wendat Nation, during their times of war with the Haudenosaunee. Following the dispersal of the Huron-Wendat Nation from the region in the mid-1600s, our stories say that we again migrated to our territories in what today is known as Muskoka and Simcoe County. Several major battles with the Haundenosaunee culminated in peace being agreed between the Anishinaabe and the Haudenosaunee, after which the Haudenosaunee agreed to leave the region and remain in southern Ontario. Thus, since the early 18th century, much of central Ontario into the lower parts of northern Ontario has been Anishinaabe territory.

The more recent history of Rama First Nation begins with the creation of the "Coldwater Narrows" reserve, one of the first reserves in Canada. The Crown intended to relocate our ancestors to the Coldwater reserve and ultimately assimilate our ancestors into Euro-Canadian culture. Underlying the attempts to assimilate our ancestors were the plans to take possession of our vast hunting and harvesting territories. Feeling the impacts of increasingly widespread settlement, many of our ancestors moved to the Coldwater reserve in the early 1830s. Our ancestors built homes, mills, and farmsteads along the old portage route which ran through the reserve, connecting Lake Simcoe to Georgian Bay (this route is now called "Highway 12"). After a short period of approximately six years, the Crown had a change of plans. Frustrated at our ancestors continued exploiting of hunting territories (spanning roughly from Newmarket to the south, Kawartha Lakes to the east, Meaford to the west, and Lake Nipissing to the north), as well as unsuccessful assimilation attempts, the Crown reneged on the promise of reserve land. Three of our Chiefs, including Chief Yellowhead, went to York under the impression they were signing documents affirming their ownership of land and buildings. The Chiefs were misled, and inadvertently allegedly surrendered the Coldwater reserve back to the Crown.

Our ancestors, then known as the Chippewas of Lakes Simcoe and Huron, were left landless. Earlier treaties, such as Treaty 16 and Treaty 18, had already resulted in nearly 2,000,000 acres being allegedly surrendered to the Crown. The Chippewas made the decision to split into three groups. The first followed Chief Snake to Snake Island and Georgina Island (today known as the Chippewas of Georgina Island). The second group followed Chief Aissance to Beausoleil Island, and later to Christian Island (Beausoleil First Nation). The third group, led by Chief Yellowhead, moved to the Narrows between Lakes Simcoe and Couchiching and eventually, Rama (Chippewas of Rama First Nation).

A series of purchases, using Rama's own funds, resulted in Yellowhead purchasing approximately 1,600 acres of abandoned farmland in Rama Township. This land makes up the core of the Rama Reserve today, and we have called it home since the early 1840's. Our ancestors began developing our community, clearing fields for farming and building homes. They continued to hunt and harvest in their traditional territories, especially within the Muskoka region, up until the early 1920's. In 1923, the

Chippewas of Rama First Nation Historical/Background context
Williams Treaties were signed, surrendering 12,000,000 acres of previously unceded land to the Crown. Once again, our ancestors were misled, and they were informed that in surrendering the land, they gave up their right to access their seasonal traditional hunting and harvesting territories. With accessing territories difficult, our ancestors turned to other ways to survive. Many men guided tourists around their former family hunting territories in Muskoka, showing them places to fish and hunt. Others worked in lumber camps and mills. Our grandmothers made crafts such as porcupine quill baskets and black ash baskets, and sold them to tourists visiting Simcoe and Muskoka. The children were forced into Indian Day School, and some were taken away to Residential Schools. Church on the reserve began to indoctrinate our ancestors. Our community, along with every other First Nation in Canada, entered a dark period of attempted genocide at the hands of Canada and the Crown. Somehow, our ancestors persevered, and they kept our culture, language, and community alive. Today, our community has grown into a bustling place, and is home to approximately 1,100 people. We are a proud and progressive First Nations community.

Table 5: Huron-Wendat Nation Oral History
(Provided by Huron-Wendat First Nation)

Huron-Wendat First Nation Historical/Background context
As an ancient people, traditionally, the Huron-Wendat, a great Iroquoian civilization of farmers and fishermen-hunter-gatherers and also the masters of trade and diplomacy, represented several thousand individuals. They lived in a territory stretching from the Gaspé Peninsula in the Gulf of Saint Lawrence and up along the Saint Lawrence Valley on both sides of the Saint Lawrence River all the way to the Great Lakes. Huronia, included in Wendake South, represents a part of the ancestral territory of the Huron-Wendat Nation in Ontario. It extends from Lake Nipissing in the North to Lake Ontario in the South and Île-Perrot in the East to around Owen Sound in the West. This territory is today marked by several hundred archaeological sites, listed to date, testifying to this strong occupation of the territory by the Nation. It is an invaluable heritage for the Huron-Wendat Nation and the largest archaeological heritage related to a First Nation in Canada. According to our own traditions and customs, the Huron-Wendat are intimately linked to the Saint Lawrence River and its estuary, which is the main route of its activities and way of life. The Huron-Wendat formed alliances and traded goods with other First Nations among the networks that stretched across the continent. Today, the population of the Huron-Wendat Nation is composed of more than 4000 members distributed on-reserve and off-reserve. The Huron-Wendat Nation band council (CNHW) is headquartered in Wendake, the oldest First Nations community in Canada, located on the outskirts of Quebec City (20 km north of the city) on the banks of the Saint Charles River. There is only one Huron-Wendat community, whose ancestral territory is called the Nionwentsïo, which translates to "our beautiful land" in the Wendat language. The Huron-Wendat Nation is also the only authority that have the authority and rights to protect and take care of her ancestral sites in Wendake South.

1.2.3 Past and Present Land Use

1.2.3.1 Overview

During Pre-Contact and Early Contact times, the vicinity of the study area would have comprised a mixture of coniferous trees, deciduous trees and open areas. Indigenous communities actively utilized the land and its resources well into Post-Contact times, and they would have managed the landscape to varying degrees (e.g., establishing clearings for campsites, plant cultivation, etc.). During the late 18th to early 19th century, Euro-Canadian settlers arrived in the area and began to clear the forests for agricultural and settlement purposes. The study area was located north of the historical limits of Bradford. The land use at the time of assessment can be classified as a water treatment facility.

1.2.3.2 Mapping and Imagery Analysis

In order to gain a general understanding of the study area's past land uses, two historical settlement maps, one topographic map, three aerial images, aerial photographs and three as-built technical drawings were examined during the research component of the study. Specifically, the following resources were consulted:

- *Hogg's Map of the County of Simcoe* (1871) (OHCMP 2024);
- *Illustrated Historical Atlas of the County of York and the Township of West Gwillimbury & Town of Bradford in the County of Simcoe, Ont.* (1878) (MU 2001);
- A topographic map from 1928 (OCUL 2024);
- Aerial Images from 1954-2009 (U of T 2024; GE 2024a; GE 2024b);
- Aerial Photography from 1980 and 2009 (Courtesy of Town of Bradford West Gwillimbury); and
- As-Builts technical drawings from 1972, 1998 and 2010 (Proctor & Redfern Limited 1972, Ainley Maple 1998, AECOM 2010).

The limits of the study area are shown on georeferenced versions of the consulted historical resources in Map 2–Map 7. The aerial photographs and the as-built technical drawings are shown unaltered in Appendix A to Appendix E.

On Hogg's *Map of the County of Simcoe* (1871), no owner or structure was indicated within the vicinity of the study area. A rail line under the ownership of the Northern Railway is illustrated abutting the west boundary of the study area (Map 2). The *Illustrated Historical Atlas of the County of York* (1878) shows the study area within a parcel of land owned by John E. Dissette, with the eastern half of the study area illustrated as wetlands and the Holland River situated further east (Map 3).

The topographic map from 1928 suggests that the study area comprised cleared lands in the west half, and forested lands throughout the east. The rail line adjacent to the west boundary of the study area is now labelled as being under the ownership of Canadian National Rail (CNR), and Holland River is illustrated to the east of the study area, labelled under its former name of Schomberg River. One wooden (black) structure is depicted to the west of the CNR rail line (Map 4). Aerial imagery from 1954 roughly reflects the topographic map, with the study area comprised of cleared fields in the west and a forest in the east, with both surrounded by agricultural fields. An access road is visible within the northern edge of the study area (Map 5).

When Plant A was constructed in the northwest of the study area, Proctor & Redfern Limited completed a plant layout, yard piping and site grading diagram in 1972. The associated as-built drawings reveal the various subsurface utilities and grading that were involved in the construction (Appendix A). The location of Plant A of the WPCP can be seen in an aerial photograph from 1980, provided by the Town of Bradford West Gwillimbury (Appendix B). Similar as-builts were completed by Ainley Maple in 1998 following the addition of Plant C, which shows the various water mains and conduits for effluence that connected WPCP Plants A-C and their associated facilities (Appendix C). The layout of this facility can be seen in an aerial image from 2005, where the Plants A-C were limited to the northwest of the study area and the southeast being used as a stockpile area (Map 6).

By 2009, construction had begun on the current facility including Plant D and several biosolids storage tanks (Map 7). The Town of Bradford West Gwillimbury provided more information about this expansion in an undated aerial photograph. The construction activities involved expanding the WPCP to the south and east which was surrounded by wide ditching. Facilities were built at the original grade, and soil was built up to its present grade around these structures, resulting in the disturbance of the entire study area (Appendix D). The Process Yard Piping as-built diagrams from 2010 document the extensive subsurface sanitary sewers and other utilities that connect the plants with the biosolid storage tanks and other facilities (Appendix E).

1.3 Archaeological Context

The Stage 1 assessment (property inspection) was conducted on April 19, 2024, under PIF #P1106-0043-2024. ARA utilized a Samsung Galaxy S23 with a built-in GPS/GNSS receiver during the investigation (UTM17/NAD83). The limits of the study area were confirmed using project-specific GIS data translated into GPS points for reference in the field, in combination with aerial imagery showing physical features in relation to the subject lands.

The archaeological context of any given study area must be informed by 1) the condition of the property as found (Section 1.3.1), 2) a summary of registered or known archaeological sites located within a minimum 1 km radius (Section 1.3.2) and 3) descriptions of previous archaeological fieldwork carried out within the limits of, or immediately adjacent to the property (Section 1.3.3).

1.3.1 Condition of the Property

The study area lies within the Great Lakes–St. Lawrence forest region, which is a transitional zone between the southern deciduous forest and the northern boreal forest. This forest extends along the St. Lawrence River across central Ontario to Lake Huron and west of Lake Superior along the border with Minnesota, and its southern portion extends into the more populated areas of Ontario. This forest is dominated by hardwoods, featuring species such as maple, oak, yellow birch, white and red pine. Coniferous trees such as white pine, red pine, hemlock and white cedar commonly mix with deciduous broad-leaved species, such as yellow birch, sugar and red maples, basswood and red oak (MNRF 2024).

In terms of local physiography, the subject lands fall along the edge of the Schomberg Clay Plains in the west, and the Simcoe Lowlands in the east. The Schomberg Clay Plains is comprised of deep deposits of stratified clay and silt located near Schomberg, Newmarket and north of Lake Scugog, all of which have been grouped together to describe the various topographic basins along the northern slopes of the Oak Ridges Moraine. Near Schomberg and Newmarket, the surface under the clay is that of a drumlinized till plain. Although all of the smaller drumlins were covered, many of the larger ones were not completely buried. The average depth of the clay is 4.58 m, but deep deposits are also known (Chapman and Putnam 1984:176–177).

The Simcoe Lowlands consist of an approximately 284,899-ha area bordering Georgian Bay and Lake Simcoe. Specifically, the study area lies within the eastern part of the region (the Lake

Simcoe basin), which was once flooded by glacial Lake Algonquin and is bordered by shore cliffs, beaches and boulder terraces. Along the northern and western shores of the lake, the Lake Simcoe basin comprises a narrow boulder terrace mostly confined by a low bluff cut by the highest stage of Lake Algonquin, and to the south and east, there are broader plains (Chapman and Putnam 1984:177–182).

According to the Ontario Soil Survey, the study area consists primarily of Bondhead Sandy Loam (Bl), Lyons Loam (Ll) and Granby Sandy Loam (Gsl) (Hoffman et al. 1962). The characteristics of these soil types are summarized in Table 6.

Table 6: Soil Types

Soil Type	Group	Drainage	Topography
Bondhead Loam	Grey-Brown Podzolic	Good	Smooth, moderately to steeply sloping
Lyons Loam	Grey-Brown Podzolic	Good	Smooth, moderately to steeply sloping
Granby Sandy Loam	Dark Grey Gleisolic	Poor	Level

The subject lands fall within the West Holland River drainage basin, which is under the jurisdiction of the Lake Simcoe Region Conservation Authority (LSRCA 2016). Specifically, the site is located 700 m west of Holland River, and is located on the western edge of Holland Marsh, with the eastern half of the property classified as wetlands (BW5).

At the time of assessment, the study area consisted of the Bradford WPCP, including biosolid holding tanks and associated infrastructural facilities, roadways, and landscaped areas. No unusual physical features were encountered that affected the results of the Stage 1 assessment.

1.3.2 Registered or Known Archaeological Sites

The Ontario Archaeological Sites Database and the Ontario Public Register of Archaeological Reports were consulted to determine whether any registered or known archaeological resources occur within a 1 km radius of the study area. The available search facility found four sites within a 1 km radius (the facility returns sites in a rectangular area, rather than a radius, potentially resulting in returns beyond the specified distance). No unregistered sites were identified within a 1 km radius of the study area. The sites are summarized in Table 7.

Table 7: Registered or Known Archaeological Sites

Borden No. / ID No.	Site Name / Identifier	Time Period	Affinity	Site Type	Distance from Study Area
BaGv-62	Belfry	Other	Iroquoian and Euro-Canadian	Iroquoian campsite; Euro-Canadian homestead	301 m – 1 km
BaGv-83	William Robinson Jr	Post-Contact	Euro-Canadian	Homestead	> 1 km
BaGv-113	Wheatfield	Woodland	Indigenous	Unknown	> 1 km
BaGv-150	William Robinson Jr. II	Post-Contact	Euro-Canadian	Farmstead	> 1 km

None of these previously identified sites are located within 300 m of the subject lands; accordingly, they have no potential to traverse the study area and represent more distant archaeological resources.

1.3.3 Previous Archaeological Work

To inform the assessment process, a review of available archaeological management plans and/or other archaeological potential mapping was undertaken. Specifically, Simcoe County's *Archaeological Management Plan* was examined for information that could influence the choice of fieldwork techniques or recommendations. The associated mapping indicates that the entire study area has archaeological potential (Map 8).

Reports documenting assessments conducted within the subject lands and assessments that resulted in the discovery of sites within adjacent lands were also sought during the research component of the study. In order to ensure that all relevant past work was identified, an investigation was launched to identify reports involving assessments within 50 m of the study area. The investigation determined that there are five available reports documenting previous archaeological fieldwork within the specified distance (Map 9). The relevant results and recommendations are summarized below as required by Section 7.5.8 Standards 4–5 of the 2011 *S&Gs*.

1.3.3.1 Bradford GO Station Improvements (Stage 1-2)

In October 2016, a Stage 1-2 assessment was conducted for the Bradford GO station under PIF # P094-0197-2016 (ASI 2016). The assessment area included two layover tracks which overlapped a small portion of the southwestern limit of the current study area. The assessment determined that all assessed portions of the current study area were comprised of disturbed soils and did not require further assessment (ASI 2016a).

1.3.3.2 GO Rail Network Electrification TPAP (Stage 1)

In October 2016, a Stage 1 assessment was conducted along the GO Barrie corridor for the GO Rail Network Electrification Transit Project Assessment Process (TPAP) under PIF #P057-0834-2016 (ASI 2016b). The assessment area overlapped the western edge of the current study area. The assessment determined that all assessed portions of the current study area were comprised of disturbed soils and did not require further assessment. As no property inspection was conducted for the overlapping areas, these areas have been photo-documented and re-evaluated for archaeological potential as part of the current assessment to confirm current conditions.

1.3.3.3 Barrie Rail Corridor Expansion (Stage 1)

In October 2017, a Stage 1 assessment was conducted along the GO Barrie corridor under PIF #P057-0837-2016 (ASI 2017). The assessment area overlapped the western edge of the current study area. The assessment determined that all assessed portions of the current study area were comprised of disturbed soils and did not require further assessment. As no property inspection was conducted for the overlapping areas, these areas have been photo-documented and re-evaluated for archaeological potential as part of the current assessment to confirm current conditions.

1.3.3.4 Metrolinx OnCorr Priority Works (Stage 1)

In 2021, a Stage 1 assessment was carried out under PIF #P383-0247-2021 for various sections of Metrolinx rail corridors and a 25-metre buffer, as part of a due diligence project for sections that are to be included in the Public-Private Partnerships package for the OnCorr Project (ASI 2021). The assessed area overlaps a section along the western edge of the study area. The investigation identified a small area of archaeological potential in the southwest, which was recommended for pedestrian survey at 5 m intervals. The remainder of the overlapped area was determined to be disturbed, and no further assessment was recommended. As no property inspection was conducted for the overlapping areas, these areas have been photo-documented and re-evaluated for archaeological potential as part of the current assessment to confirm current conditions.

1.3.3.5 Metrolinx OnCorr Non-Priority Work Barrie Corridor (Stage 1)

In 2019, a Stage 1 assessment was carried out for sections of Metrolinx rail corridors as part of the Metrolinx OnCorr Non-Priority Due Diligence Project under PIF #P383-0183-2019 (ASI 2022). The investigation overlapped a section of the rail corridor along the western limit of the study area. The assessed lands of the current study area were primarily previously assessed and did not require further assessment. A small portion in the far south was recommended for test pit survey at intervals of 5 m. As no property inspection was conducted for the overlapping areas, these areas have been photo-documented and re-evaluated for archaeological potential as part of the current assessment to confirm current conditions.

2.0 STAGE 1 BACKGROUND STUDY

2.1 Background

The Stage 1 assessment involved background research to document the geography, history, previous archaeological fieldwork and current land condition of the study area. This desktop examination included research from archival sources, archaeological publications and online databases. It also included the analysis of a variety of historical maps and aerial imagery. The results of the research conducted for the background study are summarized below.

With occupation beginning approximately 11,000 years ago, the greater vicinity of the study area comprises a complex chronology of Pre-Contact and Post-Contact histories (Section 1.2.1). Artifacts associated with Palaeo, Archaic, Woodland and Early Contact traditions are well-attested in Simcoe County, and Euro-Canadian archaeological sites dating to pre-1900 and post-1900 contexts are likewise common. The presence of four previously identified sites in the surrounding area demonstrates the desirability of this locality for early settlement (Section 1.3.2). The investigation confirmed that none of these sites fall within the subject lands. Background research identified multiple areas of previous assessment within the study area (Section 1.3.3).

The natural environment of the study area would have been attractive to both Indigenous and Euro-Canadian populations as a result of proximity to Holland River. The areas of Bondhead and Lyons Loam would have been ideal for agriculture, and the diverse local vegetation would also have encouraged settlement throughout Ontario’s lengthy history, as well as proximity to the major transportation corridor of the Northern Railway.

In summary, the background study included an up-to-date listing of sites from the Ontario Archaeological Sites Database (within at least a 1 km radius), the consideration of previous local archaeological fieldwork (within at least a 50 m radius), the analysis of historical maps (at the most detailed scale available) and the study of aerial imagery. ARA, therefore, confirms that the standards for background research set out in Section 1.1 of the 2011 *S&Gs* were met.

2.2 Field Methods (Property Inspection)

In order to gain first-hand knowledge of the geography, topography and current condition of the study area, a property inspection was conducted on April 19, 2024. Environmental conditions were ideal during the inspection, with clear skies, bright lighting, and a temperature of 12 °C. ARA, therefore, confirms that fieldwork was carried out under weather and lighting conditions that met the requirements set out in Section 1.2 Standard 2 of the 2011 S&Gs.

The study area was subjected to systematic inspection, beginning in the southwest and continuing in a roughly clockwise manner, and included all grounds within the limits of the study area. The inspection confirmed that all surficial features of archaeological potential were present where they were previously identified and did not result in the identification of any additional features of archaeological potential not visible on mapping (e.g., relic water channels, patches of well-drained soils, etc.).

The inspection determined that past construction activities disturbed the entire study area. No natural features (e.g., permanently wet lands, sloped lands, overgrown vegetation, heavier soils than expected, etc.) or significant built features (e.g., heritage structures, landscapes, plaques, monuments, cemeteries, etc.) that would affect assessment strategies were identified.

2.3 Analysis and Conclusions

In addition to relevant historical sources and the results of past archaeological assessments, the archaeological potential of a property can be assessed using its soils, hydrology and landforms as considerations. Section 1.3.1 of the 2011 S&Gs recognizes the following features or characteristics as indicators of archaeological potential: previously identified sites, water sources (past and present), elevated topography, pockets of well-drained sandy soil, distinctive land formations, resource areas, areas of Euro-Canadian settlement, early transportation routes, listed or designated properties, historic landmarks or sites, and areas that local histories or informants have identified with possible sites, events, activities or occupations.

The Stage 1 assessment resulted in the identification of several features of archaeological potential in the vicinity of the study area (Map 10). The closest and most relevant indicators of archaeological potential (i.e., those that would affect survey interval requirements) include one primary water source (Holland Marsh) and proximity to one historical community (Bradford). Background research did not identify any features indicating that the study area has the potential for deeply buried archaeological resources.

Although proximity to a feature of archaeological potential is a significant factor in the potential modelling process, current land conditions must also be considered. Section 1.3.2 of the 2011 S&Gs emphasizes that 1) quarrying, 2) major landscaping involving grading below topsoil, 3) building footprints and 4) sewage/infrastructure development can result in the removal of archaeological potential, and Section 2.1 states that 1) permanently wet areas, 2) exposed bedrock and 3) steep slopes (> 20°) in areas unlikely to contain pictographs or petroglyphs can also be evaluated as having no or low archaeological potential. Areas previously assessed were not subject to a property inspection. These areas have since been photo-documented and re-evaluated for archaeological potential as part of the current assessment to confirm current conditions.

The Simcoe County *Archaeological Management Plan* indicates that the study area retains archaeological potential (Map 8). However, this modelling was not the result of a property-specific assessment and, therefore, does not fully account for land-use history and current conditions. ARA’s visual inspection, coupled with the analysis of historical sources and digital environmental data, determined that the entire study area has no archaeological potential.

Specifically, deep land alterations have resulted in the removal of archaeological potential as seen with indicators of deep disturbance such as the established buildings, storage tanks, ditched areas, berms with culverts, landscaped lawns, driveways and underground utilities (Image 1–Image 22). Further confirmation of disturbance was documented with the aerial imagery in Section 1.2.3.2. Past earth-moving/construction activities associated with the gradual construction of the Bradford WPCP deeply and extensively impacted the lands within the study area, causing significant soil disturbance and severe damage to the integrity of any previous archaeological resources. This disturbance included areas previously recommended for Stage 2 archaeological assessment in the far southwest of the study area.

In summary, the Stage 1 assessment determined that the entirety of the study area comprised areas of no archaeological potential due to deep disturbance associated with prior construction of the Bradford WPCP. The potential modelling results are presented in Map 11. The study area is depicted as a layer in this map.

3.0 RECOMMENDATIONS

The Stage 1 assessment determined that the study area comprised areas of no archaeological potential. The inspection confirmed that all of these lands had been extensively disturbed by past land alterations. It is recommended that no further assessment be required within the study area.

4.0 ADVICE ON COMPLIANCE WITH LEGISLATION

Section 7.5.9 of the 2011 *S&Gs* requires that the following information be provided for the benefit of the proponent and approval authority in the land use planning and development process:

- This report is submitted to the Minister of Citizenship and Multiculturalism as a condition of licensing in accordance with Part VI of the *Ontario Heritage Act*, R.S.O. 1990, c 0.18. The report is reviewed to ensure that it complies with the standards and guidelines that are issued by the Minister, and that the archaeological fieldwork and report recommendations ensure the conservation, protection and preservation of the cultural heritage of Ontario. When all matters relating to archaeological sites within the project area of a development proposal have been addressed to the satisfaction of the MCM, a letter will be issued by the ministry stating that there are no further concerns with regard to alterations to archaeological sites by the proposed development.
- It is an offence under Sections 48 and 69 of the *Ontario Heritage Act* for any party other than a licensed archaeologist to make any alteration to a known archaeological site or to remove any artifact or other physical evidence of past human use or activity from the site, until such time as a licensed archaeologist has completed archaeological fieldwork on the site, submitted a report to the Minister stating that the site has no further cultural heritage value or interest, and the report has been filed in the Ontario Public Register of Archaeology Reports referred to in Section 65.1 of the *Ontario Heritage Act*.
- Should previously undocumented archaeological resources be discovered, they may be a new archaeological site and therefore subject to Section 48 (1) of the *Ontario Heritage Act*. The proponent or person discovering the archaeological resources must cease alteration of the site immediately and engage a licensed consultant archaeologist to carry out archaeological fieldwork, in compliance with Section 48 (1) of the *Ontario Heritage Act*.
- The *Funeral, Burial and Cremation Services Act*, 2002, S.O. 2002, c.33 requires that any person discovering human remains must notify the police or coroner and the Registrar at the Ministry of Public and Business Service Delivery.

5.0 IMAGES

Image 1: Disturbed Lands
(April 19, 2024; Facing Northwest)

Image 2: Disturbed Lands
(April 19, 2024; Facing Southeast)

Image 3: Disturbed Lands
(April 19, 2024; Facing Northeast)

Image 4: Disturbed Lands
(April 19, 2024; Facing Southeast)

Image 5: Disturbed Lands
(April 19, 2024; Facing Southwest)

Image 6: Disturbed Lands
(April 19, 2024; Facing Northwest)

Image 7: Disturbed Lands
(April 19, 2024; Facing Northwest)

Image 8: Disturbed Lands
(April 19, 2024; Facing Southeast)

Image 9: Disturbed Lands
(April 19, 2024; Facing South)

Image 10: Disturbed Lands
(April 19, 2024; Facing East)

Image 11: Disturbed Lands
(April 19, 2024; Facing West)

Image 12: Disturbed Lands
(April 19, 2024; Facing East)

Image 13: Disturbed Lands
(April 19, 2024; Facing Northwest)

Image 14: Disturbed Lands
(April 19, 2024; Facing East)

Image 15: Disturbed Lands
(April 19, 2024; Facing Northeast)

Image 16: Disturbed Lands
(April 19, 2024; Facing Southwest)

Image 17: Disturbed Lands
(April 19, 2024; Facing Southwest)

Image 18: Disturbed Lands
(April 19, 2024; Facing Southeast)

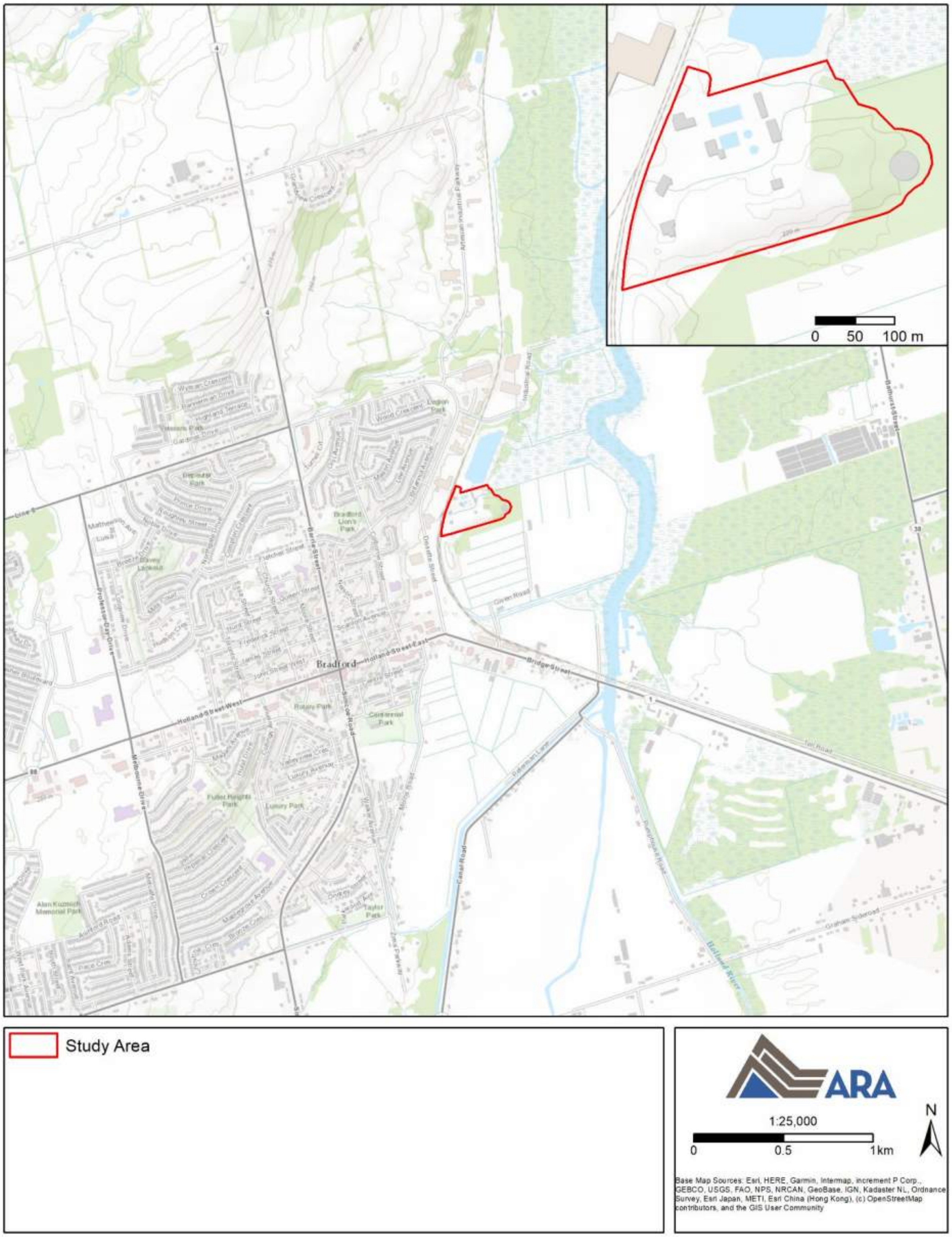
Image 19: Disturbed Lands
(April 19, 2024; Facing Northeast)

Image 20: Disturbed Lands
(April 19, 2024; Facing East)

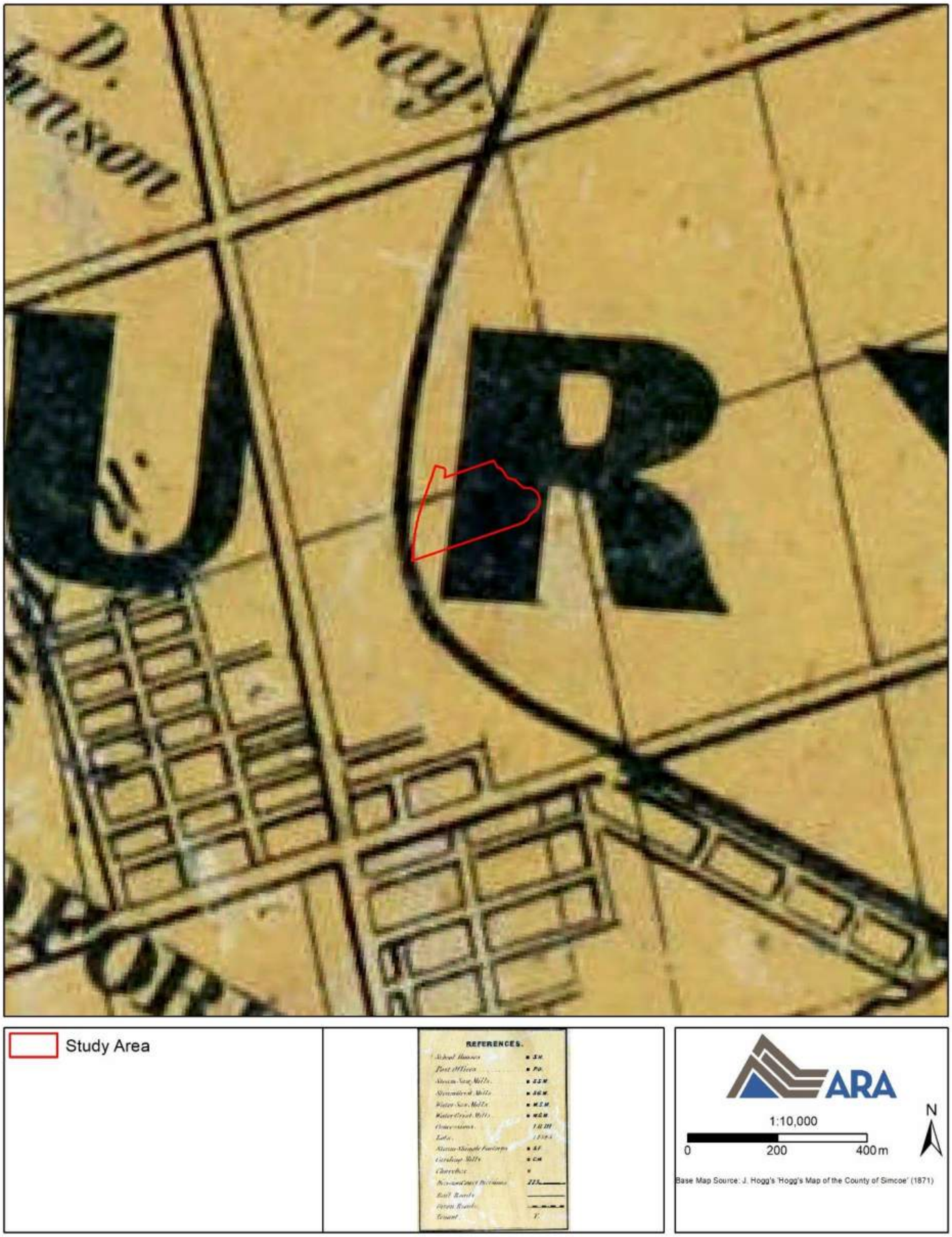
Image 21: Disturbed Lands
(April 19, 2024; Facing Southwest)

Image 22: Disturbed Lands
(April 19, 2024; Facing Northeast)

6.0 MAPS

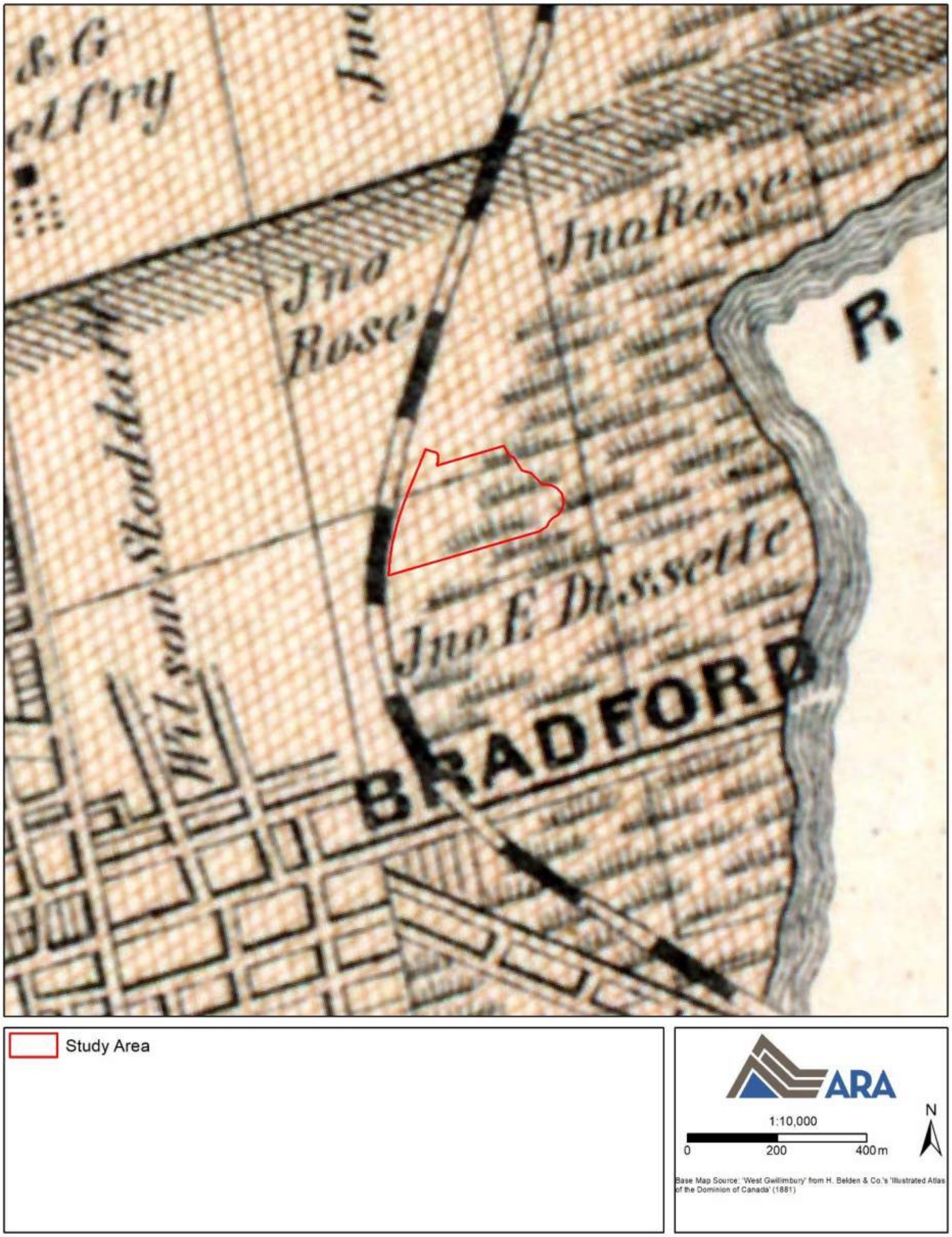


Map 1: Location of the Study Area
(Produced under licence using ArcGIS® software by Esri, © Esri)



Base Map Source: J. Hogg's 'Hogg's Map of the County of Simcoe' (1871)

Map 2: *Hogg's Map of the County of Simcoe* (1871)
(Produced under licence using ArcGIS® software by Esri, © Esri; OHCMP 2019)



Base Map Source: 'West Gwillimbury' from H. Belden & Co.'s 'Illustrated Atlas of the Dominion of Canada' (1881)

Map 3: ***Illustrated Historical Atlas of the County of York and the Township of West Gwillimbury & Town of Bradford in the County of Simcoe, Ontario*** **(1878)**
(Produced under licence using ArcGIS® software by Esri, © Esri; MU 2001)

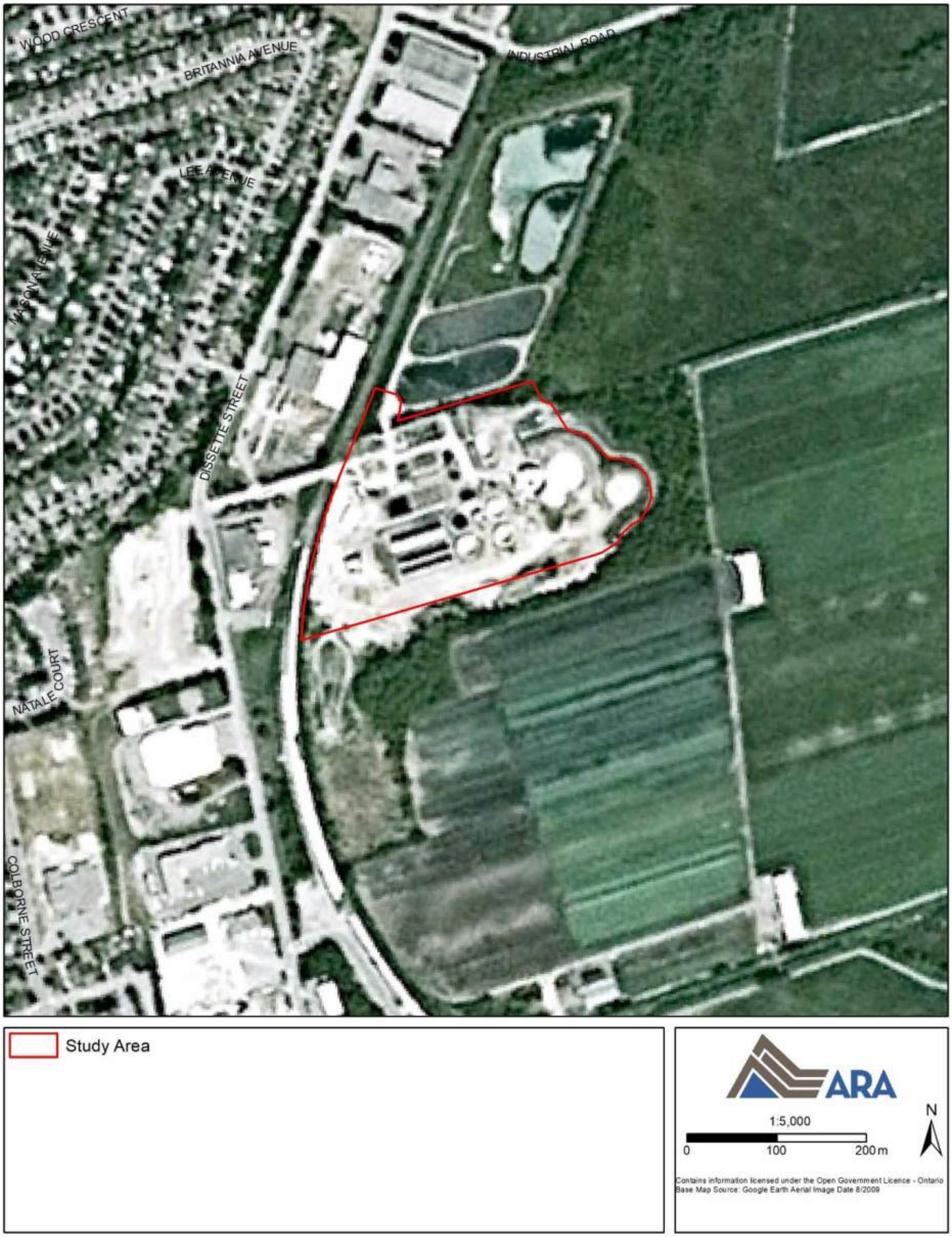
Map 4: Topographic Map (1928)
(Produced under licence using ArcGIS® software by Esri, © Esri; AO 2024)

Contains information licensed under the Open Government Licence - Ontario
Base Map Source: Aerial Images [T441.793 and T442.793] (1954)

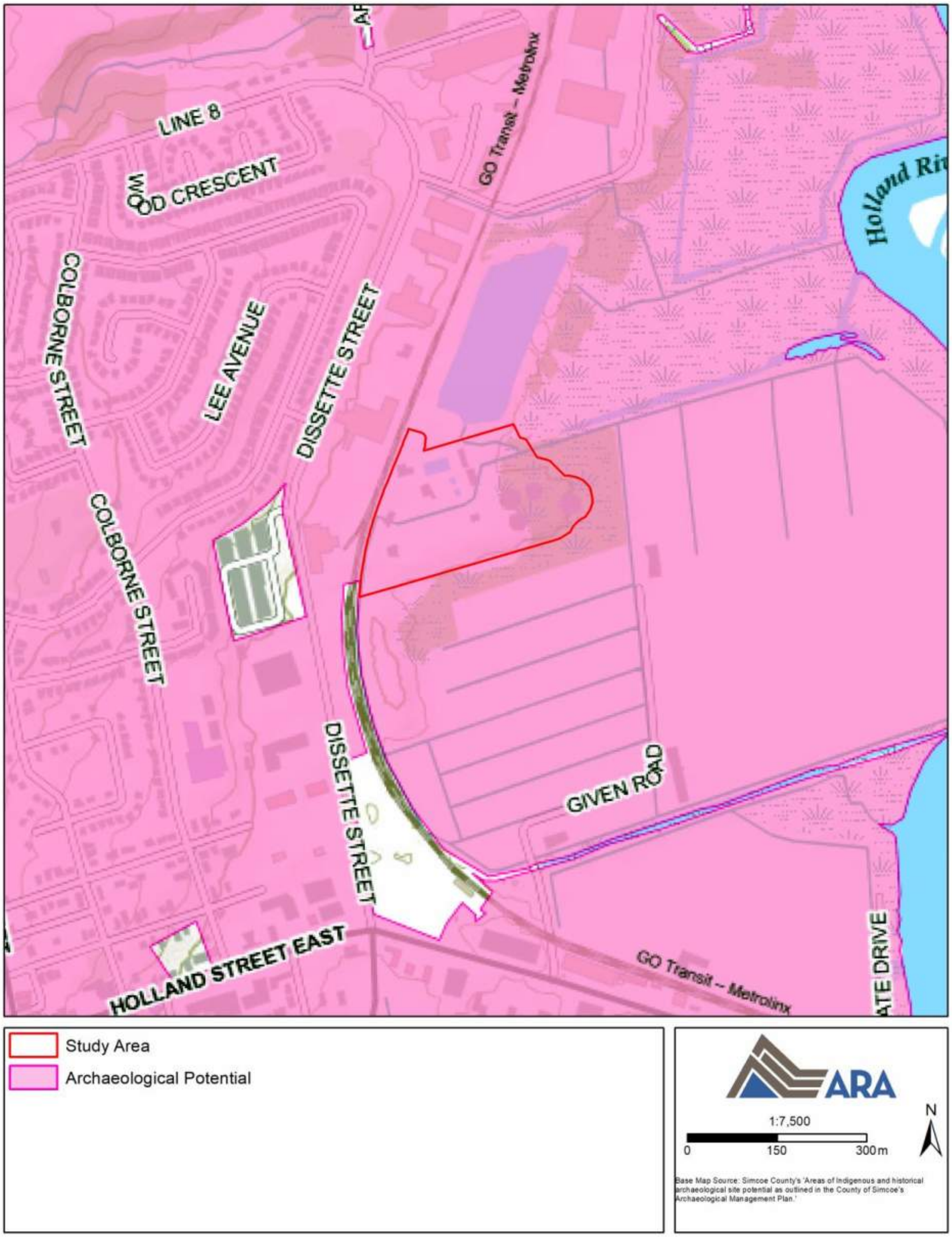
Map 5: Aerial Image (1954)
(Produced under licence using ArcGIS® software by Esri, © Esri; BU 2024)

Contains information licensed under the Open Government Licence - Ontario
Base Map Source: Google Earth Aerial Image Date 12/2005

Map 6: Aerial Image (2005)
(Produced under licence using ArcGIS® software by Esri, © Esri; GE 2024a)



Map 7: Aerial Image (2009)
(Produced under licence using ArcGIS® software by Esri, © Esri; GE 2024b)

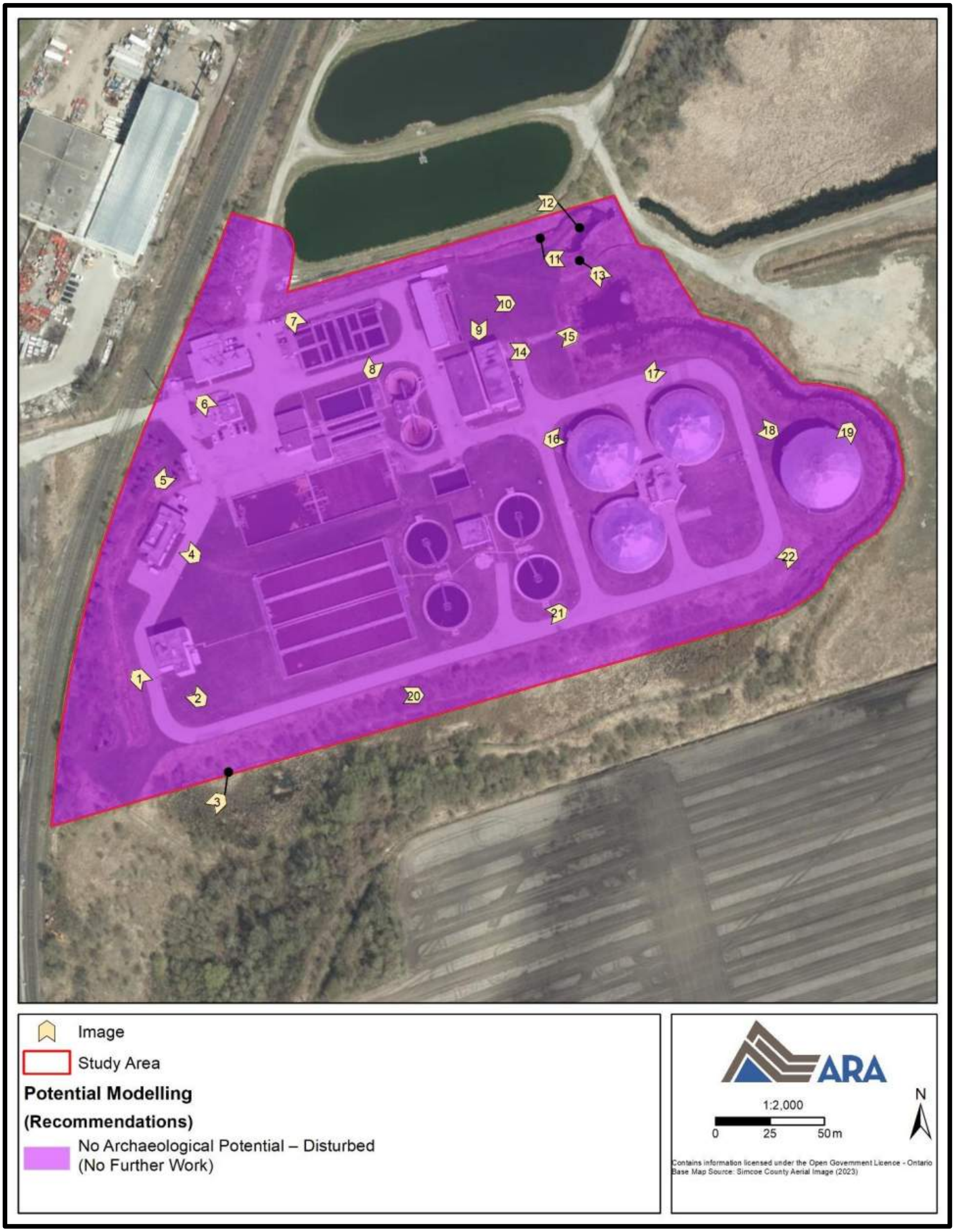


Base Map Source: Simcoe County's 'Areas of Indigenous and historical archaeological site potential as outlined in the County of Simcoe's Archaeological Management Plan.'

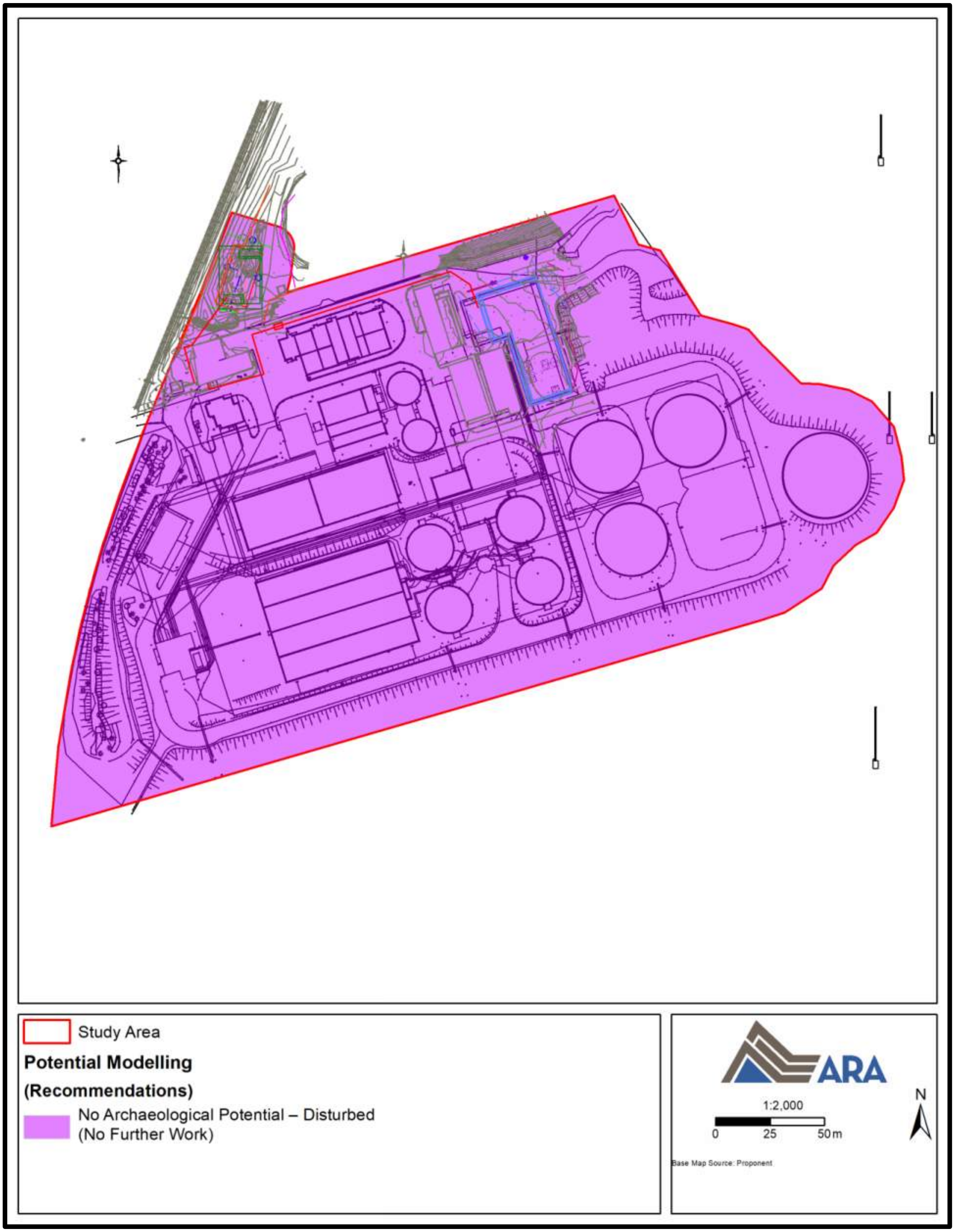
Map 8: Simcoe County's *Archaeological Management Plan*
(Produced under licence using ArcGIS® software by Esri, © Esri; OCUL 2024; Simcoe County 2024)

Map 9: Previous Assessments
(Produced under licence using ArcGIS® software by Esri, © Esri)

Map 10: Features of Potential
(Produced under licence using ArcGIS® software by Esri, © Esri)



Map 11: Recommendations (Aerial Image)
(Produced under licence using ArcGIS® software by Esri, © Esri)



Map 12: Recommendations (Development Plan)
(Produced under licence using ArcGIS® software by Esri, © Esri)

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Ontario Historical County Maps Project (OHCMP)
2024 *The Ontario Historical County Maps Project*. Accessed online at: http://maps.library.utoronto.ca/hgis/countymaps/maps.html.

Proctor & Redfern Limited (PRL)
1972 Plant Layout, Yard Piping & Site Grading. *Schomberg River – Pollution Control Centre.* Drawing. B-69195-G2. PRL.

Rayburn, A.
1997 *Place Names of Ontario.* University of Toronto Press.

Smith, W.H.
1846 *Smith's Canadian Gazetteer: Comprising Statistical and General Information Respecting all Parts of the Upper Province, or Canada West*. Toronto: H. & W. Rowsell.

Surtees, R.J.
1994 Land Cessions, 1763–1830. In *Aboriginal Ontario: Historical Perspectives on the First Nations*, edited by E.S. Rogers and D.B. Smith, pp. 92–121. Toronto: Dundurn Press.

Town of Bradford West Gwillimbury
n.d. *Community Services Department – Waste Water.* On file at the Bradford WPCP.

University of Toronto Map Library (U of T)
2024 *1954 Air Photos of Southern Ontario*. Map and Data Library. Accessed online at: https://mdl.library.utoronto.ca/collections/air-photos/1954-air-photos-southern-ontario/index.

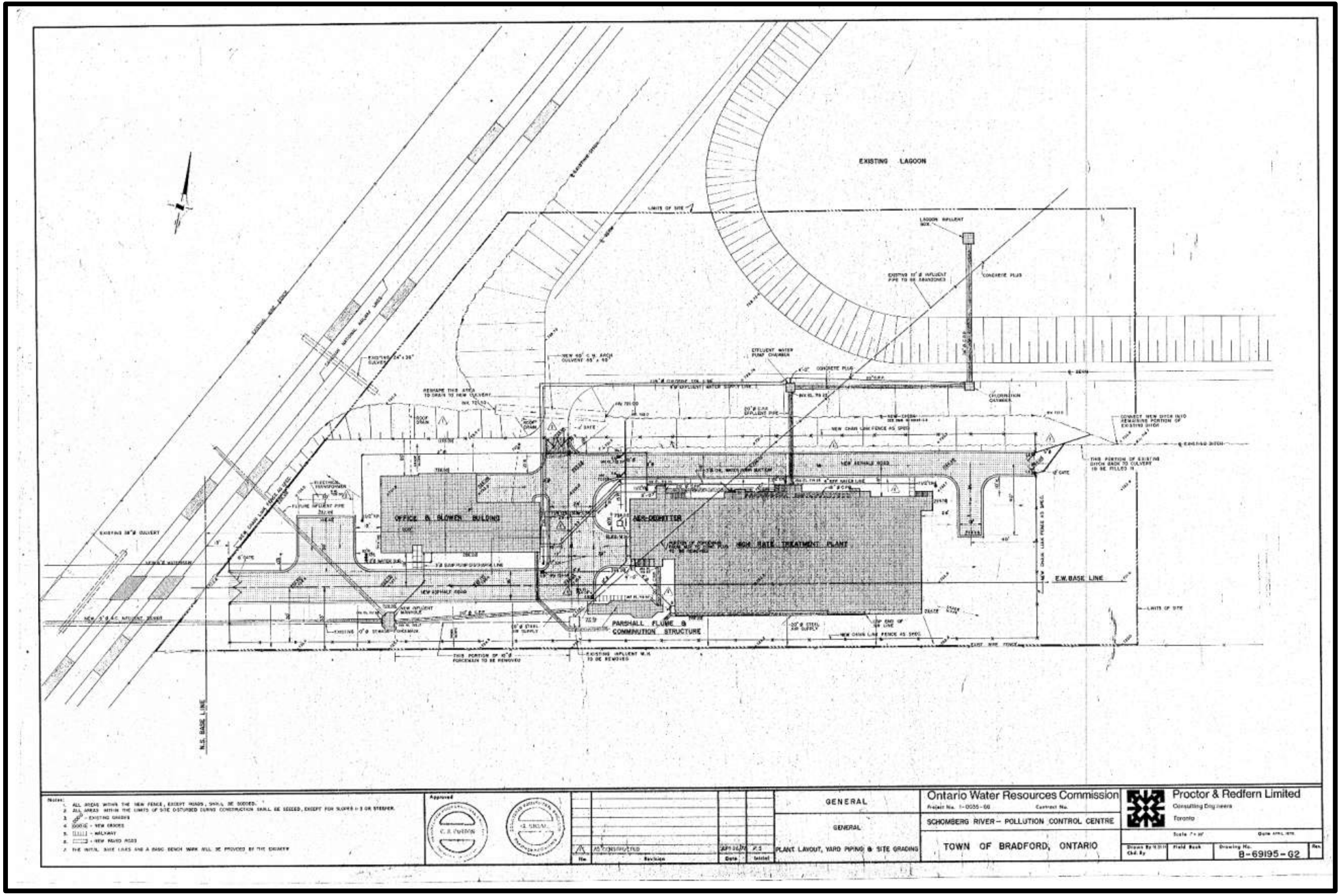
Warrick, G.
2000 The Precontact Iroquoian Occupation of Southern Ontario. *Journal of World Prehistory* 14(4):415–456.

Wright, J.V.
1972 *Ontario Prehistory: An Eleven-Thousand-Year Archaeological Outline*. Archaeological Survey of Canada, National Museum of Man. Ottawa: National Museums of Canada.

APPENDICES

Appendix A: As-Built Diagrams (ca. 1970)

(Courtesy of Hatch)

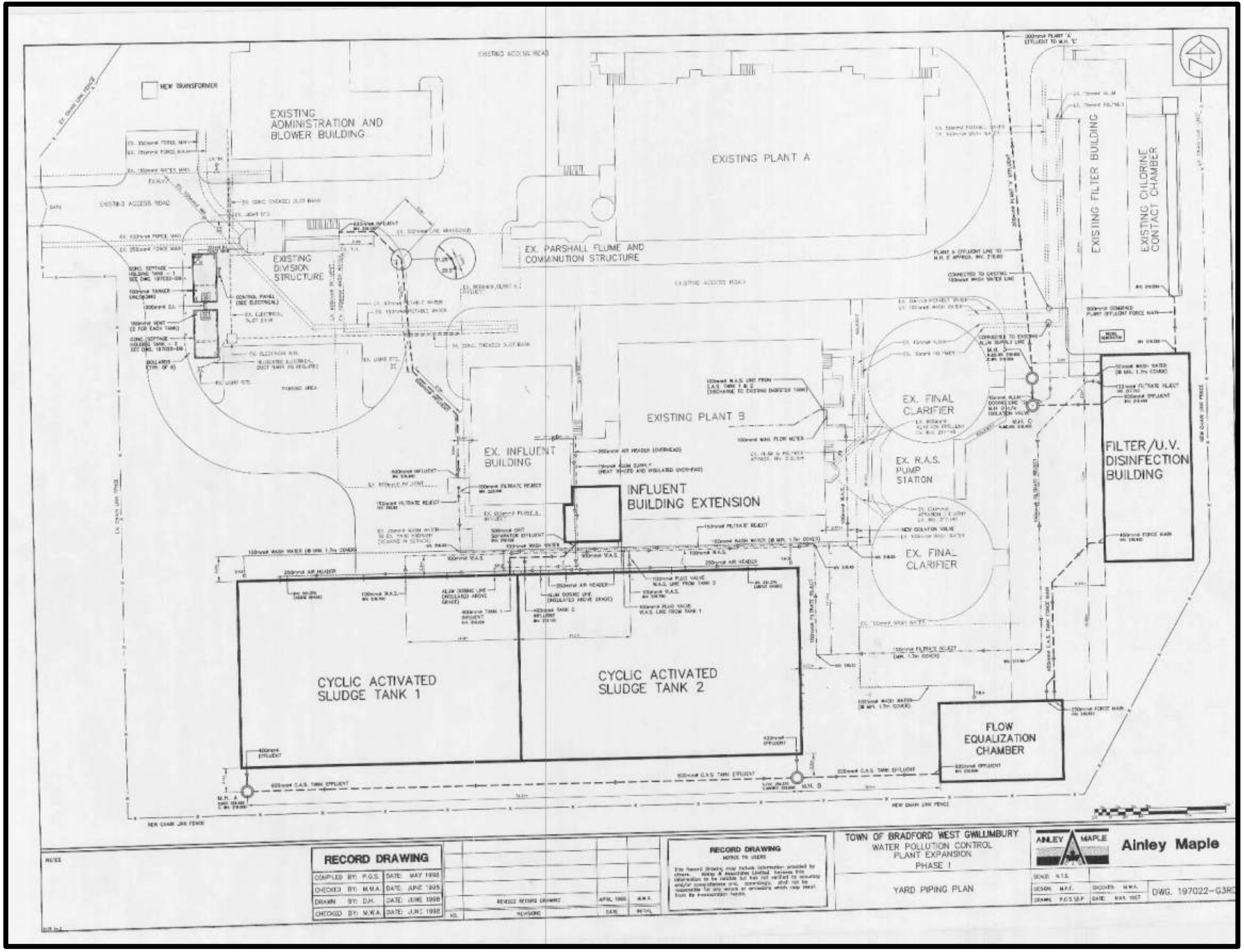


Appendix B: Bradford WPCP Aerial Image (ca. 1980)

(Courtesy of Town of Bradford West Gwillimbury)

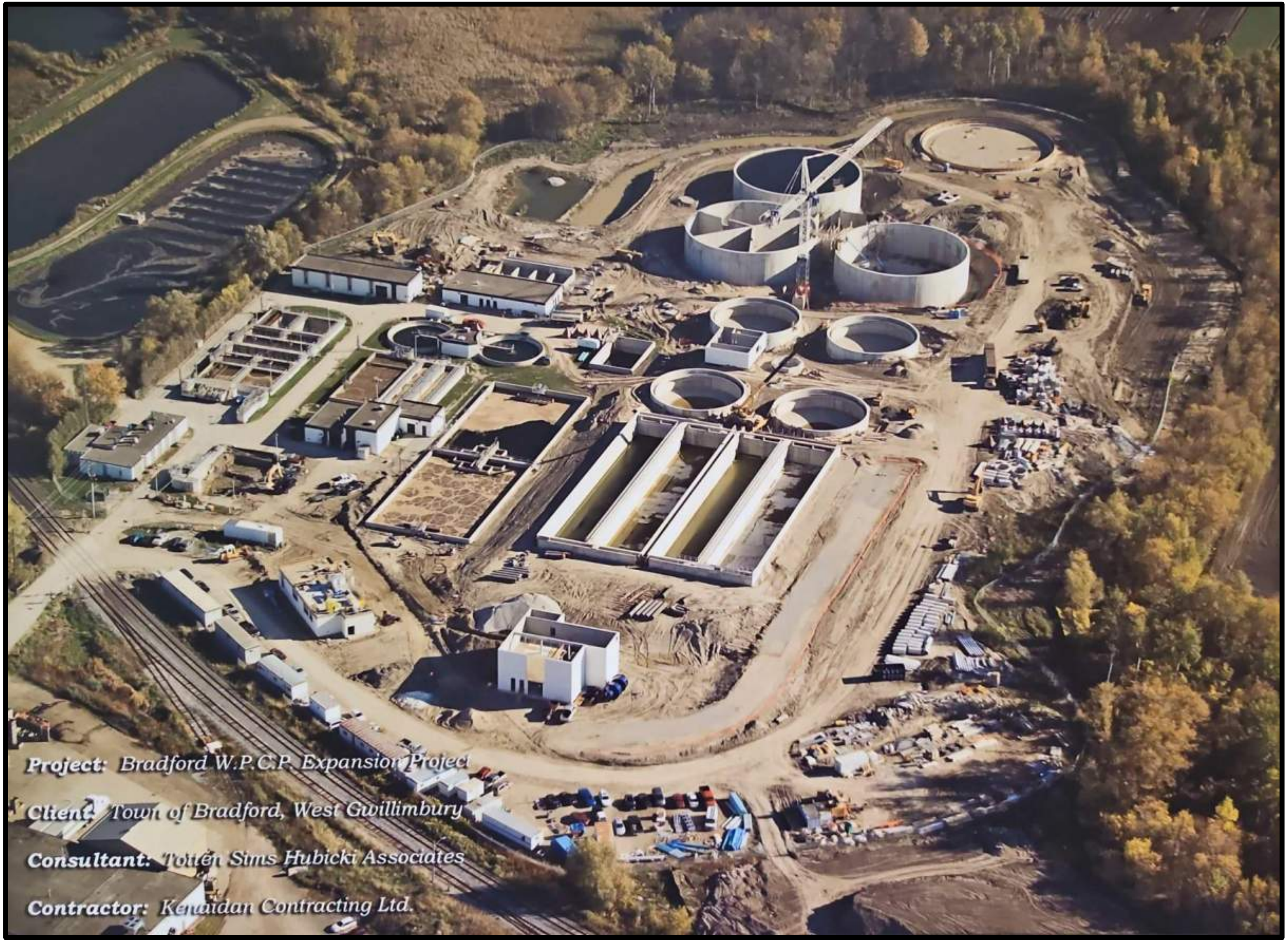
Appendix C: As-Built Diagram (1998)

(Courtesy of Hatch)



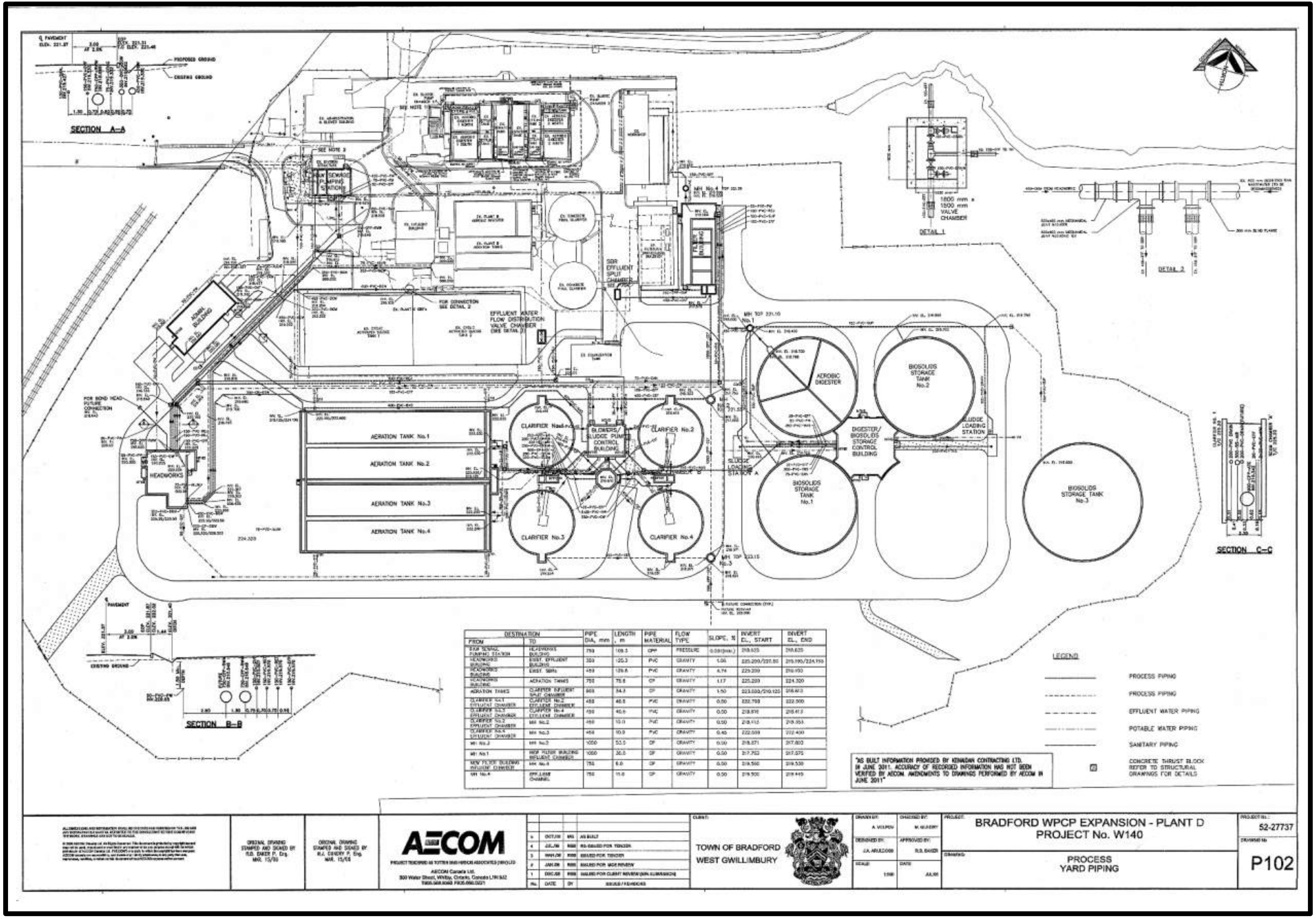
Appendix D: Recent Aerial Image (ca. 2009)

(Courtesy of Town of Bradford West Gwillimbury)



Appendix E: As-Built Diagrams (2010)

(Courtesy of Hatch)



Stage 1 Archaeological Assessment
Bradford Water Pollution Control Plant
Town of Bradford West Gwillimbury
Part of Lot 17, Concession 7
Geographic Township of West Gwillimbury
Simcoe County, Ontario

Prepared for
Hatch Ltd.
2800 Speakman Drive
Mississauga, ON L5K 1B1
Tel: (905) 855-7600

Licensed under
C. Ramsoomair
MCM Licence #P1106
PIF #P1106-0043-2024
ARA File #2024-0004

31/07/2024

Record of Indigenous Engagement

TABLE OF CONTENTS

ROIE TABLES

ROIE APPENDICES

1.0 RECORD OF INDIGENOUS ENGAGEMENT

1.1 Summary of Events

The identification of Indigenous engagement contacts was based on knowledge about treaty areas and traditional territories. Subsequent to approval from the proponent, the following groups were contacted to determine whether they had an interest in participating in the project:

- Alderville First Nation (AFN);
- Beausoleil First Nation (BFN);
- Chippewas of Georgina Island First Nation (CGIFN);
- Chippewas of Rama First Nation (CRFN);
- Curve Lake First Nation (CLFN);
- Hiawatha First Nation (HFN);
- Huron-Wendat Nation (HWN);
- Métis Nation of Ontario (MNO); and
- Mississaugas of Scugog Island First Nation (MSIFN).

Archaeological Research Associates Ltd. (ARA) engaged with each of these groups over the course of the investigation. In keeping with the requirements set out in Section 7.6.2 of the 2011 *Standards and Guidelines for Consultant Archaeologists*, a description of ARA's involvement in the process is summarized below. The 2011 *Engaging Aboriginal Communities in Archaeology* draft technical bulletin was also consulted for guidance.

ARA's involvement in the engagement process consisted of the circulation of an invitation to participate, conversations with the coordinators regarding the scheduling of fieldwork, on-site discussions with the field representatives and the distribution of the draft report for review and comment. A summary of engagement events appears in RoIE Table 1. No representatives were available to participate during fieldwork. It is ARA's understanding that each representative concurred with the strategies, methods and results of the investigation. Emails documenting critical information arising from the engagement process that affected fieldwork decisions, documentation, recommendations and/or the licensee's ability to comply with the conditions of their licence are reproduced in RoIE Appendix A–RoIE Appendix C.

RoIE Table 1: Summary of Engagement Events

Group	Date	Engagement Event	Nature
AFN *Contact:* *J. Kapyrka*	12-Mar-24	Project introduction and invitation to participate circulated.	Email
	25-Mar-24	Follow up made regarding project notification.	Email
	01-Apr-24	Follow up made regarding project notification. No answer; voicemail left.	Phone
	02-Apr-24	J. Kapyrka confirmed AFN's interest in the project.	Email
	09-Apr-24	Deployment details circulated for the following week.	Email
	17-Jun-24	Circulation of the draft report for review and comment.	Email
	02-Jul-24	Follow up inquiry made regarding status of report review.	Email
	05-Jul-24	J. Kapyrka replied that AFN would not be able to review the report at this time.	Email
	31-Jul-24	Revised report circulated.	Email

Group	Date	Engagement Event	Nature
BFN *Contact:* *L. Montour*	12-Mar-24	Project introduction and invitation to participate circulated.	Email
	25-Mar-24	Follow up made regarding project notification.	Email
	01-Apr-24	Follow up made regarding project notification. No answer; voicemail left.	Phone
	09-Apr-24	Deployment details circulated for the following week.	Email
	17-Jun-24	Circulation of the draft report for review and comment.	Email
	02-Jul-24	Follow up inquiry made regarding status of report review.	Email
	05-Jul-24	Follow up inquiry made regarding status of report review. No answer; voicemail left.	Phone
	31-Jul-24	Revised report circulated.	Email
	-	No comments received.	Email
CGIFN *Contacts:* *N. Charles,* *J. Porte*	12-Mar-24	Project introduction and invitation to participate circulated.	Email
	25-Mar-24	Follow up made regarding project notification.	Email
	01-Apr-24	Follow up made regarding project notification. No answer; voicemail left.	Phone
	09-Apr-24	Deployment details circulated for the following week.	Email
	17-Jun-24	Circulation of the draft report for review and comment.	Email
	02-Jul-24	Follow up inquiry made regarding status of report review.	Email
	05-Jul-24	Follow up inquiry made regarding status of report review. No answer; voicemail left.	Phone
	31-Jul-24	Revised report circulated.	Email
	-	No comments received.	Email
CRFN *Contacts:* *B. Benson,* *B. Cousineau*	12-Mar-24	Project introduction and invitation to participate circulated.	Email
	25-Mar-24	Follow up made regarding project notification.	Email
	01-Apr-24	Follow up made regarding project notification. No answer; voicemail left.	Phone
	23-Apr-24	C. Hopkins confirmed receipt of the project notification.	Email
	09-Apr-24	Deployment details circulated for the following week.	Email
	17-Jun-24	Circulation of the draft report for review and comment.	Email
	02-Jul-24	Follow up inquiry made regarding status of report review. B. Cousineau replied that CRFN had reviewed the report and had no questions or comments, but requested that CRFN's history be included in the report. C. Ramsoomair confirmed that it would be added.	Email
	31-Jul-24	Revised report circulated.	Email
CLFN *Contacts:* *L. Taylor,* *D. Paauw*	12-Mar-24	Project introduction and invitation to participate circulated.	Email
	25-Mar-24	Follow up made regarding project notification.	Email
	01-Apr-24	Follow up made regarding project notification. No answer; voicemail left.	Phone
	09-Apr-24	Deployment details circulated for the following week.	Email
	17-Jun-24	Circulation of the draft report for review and comment.	Email
	28-Jun-24	D. Paauw replied that CLFN had reviewed the report and had no questions or comments.	Email
	31-Jul-24	Revised report circulated.	Email
HFN *Contacts:* *T. Cowie,* *M. McGonigle*	12-Mar-24	Project introduction and invitation to participate circulated.	Email
	25-Mar-24	Follow up made regarding project notification.	Email
	01-Apr-24	Follow up made regarding project notification. No answer; voicemail left.	Phone
	09-Apr-24	Deployment details circulated for the following week.	Email
	17-Jun-24	Circulation of the draft report for review and comment.	Email
	02-Jul-24	Follow up inquiry made regarding status of report review.	Email
	05-Jul-24	Follow up inquiry made regarding status of report review. No answer; voicemail left.	Phone
	31-Jul-24	Revised report circulated.	Email
	-	No comments received.	Email
HWN	12-Mar-24	Project introduction and invitation to participate circulated.	Email

Group	Date	Engagement Event	Nature
Contacts: *M.-S. Gendron,* *D. Lesage*	25-Mar-24	Follow up made regarding project notification.	Email
	01-Apr-24	Follow up made regarding project notification. No answer; voicemail left.	Phone
	09-Apr-24	Deployment details circulated for the following week.	Email
	10-Apr-24	M.-S. Gendron confirmed HWN's interest in the project.	Email
	17-Jun-24	Circulation of the draft report for review and comment. M.-S. Gendron replied that HWN would provide comments by 15-Jul-24.	Email
	16-Jul-24	Follow up made regarding status of report review via email, as HWN archaeology team is in on an Ontario visit July 15-17. M.-S. Gendron replied that HWN had reviewed the report and had no questions or comments, but did want to see their oral history (provided as an attachment) included in the report.	Email
	31-Jul-24	M. DeVries provided a revised report with the HWN oral history included.	Email
MNO *Contact:* *General Consultation*	12-Mar-24	Project introduction and invitation to participate circulated.	Email
	25-Mar-24	Follow up made regarding project notification.	Email
	-	MNO has requested no follow up phone calls.	-
	09-Apr-24	Deployment details circulated for the following week.	Email
	17-Jun-24	Circulation of the draft report for review and comment.	Email
	02-Jul-24	Follow up inquiry made regarding status of report review.	Email
	-	MNO has requested no follow up phone calls.	-
	31-Jul-24	Revised report circulated.	Email
	-	No comments received.	Email
MSIFN *Contact:* *General Consultation*	12-Mar-24	Project introduction and invitation to participate circulated.	Email
	25-Mar-24	Follow up made regarding project notification.	Email
	-	MSIFN has asked that consultation requests only be submitted via email.	-
	09-Apr-24	Deployment details circulated for the following week.	Email
	17-Jun-24	Circulation of the draft report for review and comment.	Email
	02-Jul-24	Follow up inquiry made regarding status of report review.	Email
	-	MSIFN has asked that report review requests only be submitted via email.	-
	31-Jul-24	Revised report circulated.	Email
	-	No comments received.	Email

ROIE APPENDICES

RoIE Appendix A: CLFN Correspondence

Government Services Building
22 Winookeeda Street
Curve Lake, Ontario K0L1R0

CURVE LAKE
FIRST NATION

Phone: 705.657.8045
Fax: 705.657.8708
www.curvelakefirstnation.ca

June 28, 2024

Craig Ramsoomair (P1106)
ARA Heritage
50 Nebo Road, Unit 1
Hamilton, Ontario
L8W 2E3

Aaniin Craig,

Re: Stage 1 Archaeological Assessment Bradford Water Pollution Control Plant, Town of Bradford-West Gwillimbury, Part of Lot 17, Concession 7, Geographic Township of West Gwillimbury, Former Simcoe County, Ontario.

Thank you for consulting with Curve Lake First Nation regarding your project located in the Town of Bradford-West Gwillimbury. I have reviewed the report focusing attention to potential impacts on Indigenous cultural resources and/or ancestral remains as outlined in the *Curve Lake First Nation Archaeological Protocol*. Consequently, Curve Lake First Nation concurs with your recommendations and conclusions as follows:

> The Stage 1 assessment determined that the study area comprised areas of no archaeological potential. The inspection confirmed that all of these lands had been extensively disturbed by past land alterations. It is recommended that no further assessment be required within the study area.

Curve Lake First Nation has no further concerns. We ask that should Indigenous cultural material and/or ancestral remains be uncovered during construction that in addition to the information provided in *Section 4.0 Advice on Compliance with Legislation* of the archaeological assessment report, please notify the closest Michi Saagiig First Nation as outlined in the section entitled *Curve Lake First Nation and Michi Saagig Requirements* (p. 5) of the *Curve Lake First Nation Archaeological Protocol*.

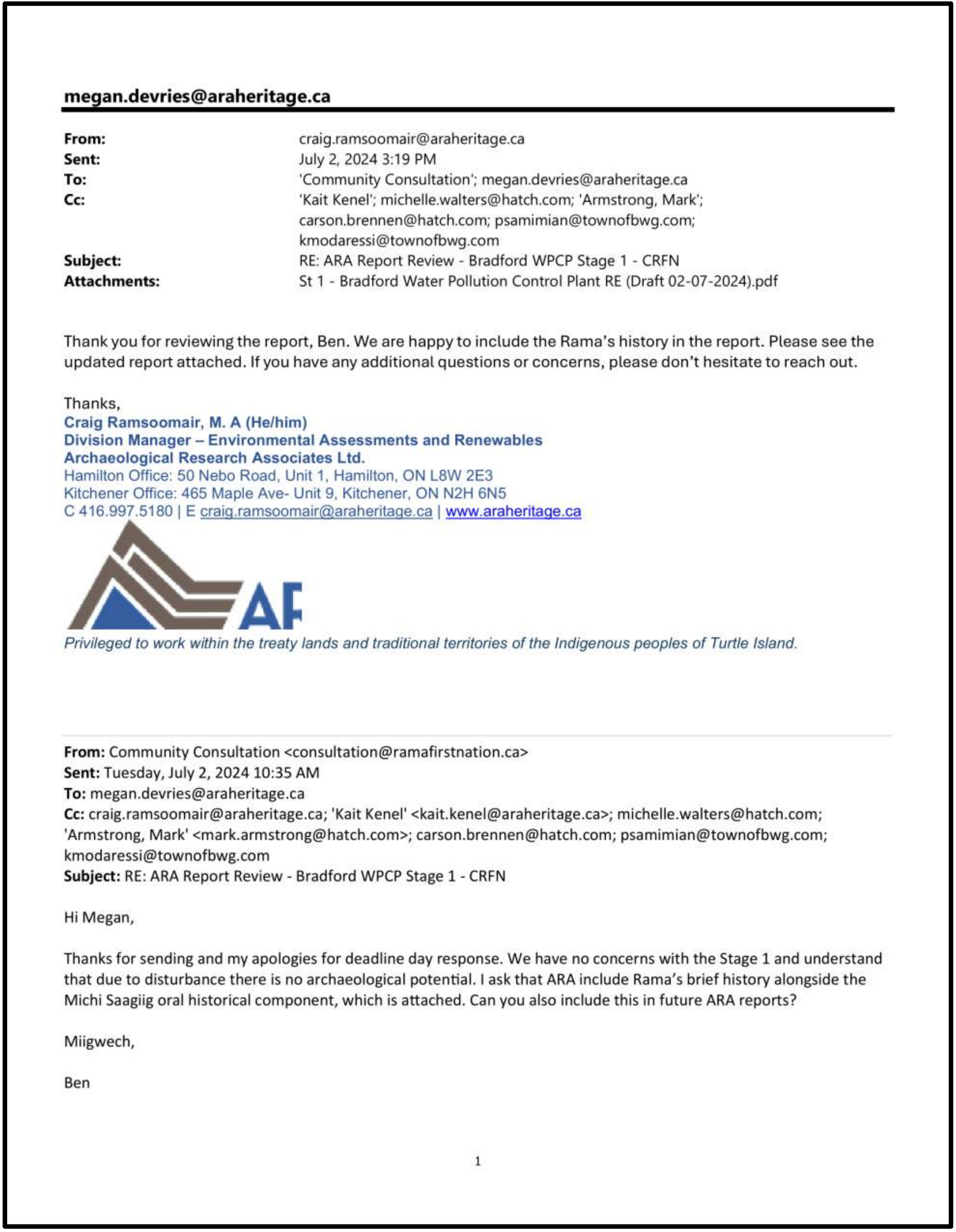
Miigwech,

Derek Paauw

Derek Paauw
Archaeology Program Administrator
Curve Lake First Nation

1 of 1 | Page

RoIE Appendix B: CRFN Correspondence



megan.devries@araheritage.ca

From: craig.ramsoomair@araheritage.ca
Sent: July 2, 2024 3:19 PM
To: 'Community Consultation'; megan.devries@araheritage.ca
Cc: 'Kait Kenel'; michelle.walters@hatch.com; 'Armstrong, Mark'; carson.brennen@hatch.com; psamimian@townofbwg.com; kmodaressi@townofbwg.com
Subject: RE: ARA Report Review - Bradford WPCP Stage 1 - CRFN
Attachments: St 1 - Bradford Water Pollution Control Plant RE (Draft 02-07-2024).pdf

Thank you for reviewing the report, Ben. We are happy to include the Rama's history in the report. Please see the updated report attached. If you have any additional questions or concerns, please don't hesitate to reach out.

Thanks,
Craig Ramsoomair, M. A (He/him)
Division Manager – Environmental Assessments and Renewables
Archaeological Research Associates Ltd.
Hamilton Office: 50 Nebo Road, Unit 1, Hamilton, ON L8W 2E3
Kitchener Office: 465 Maple Ave- Unit 9, Kitchener, ON N2H 6N5
C 416.997.5180 | E craig.ramsoomair@araheritage.ca | www.araheritage.ca

Privileged to work within the treaty lands and traditional territories of the Indigenous peoples of Turtle Island.

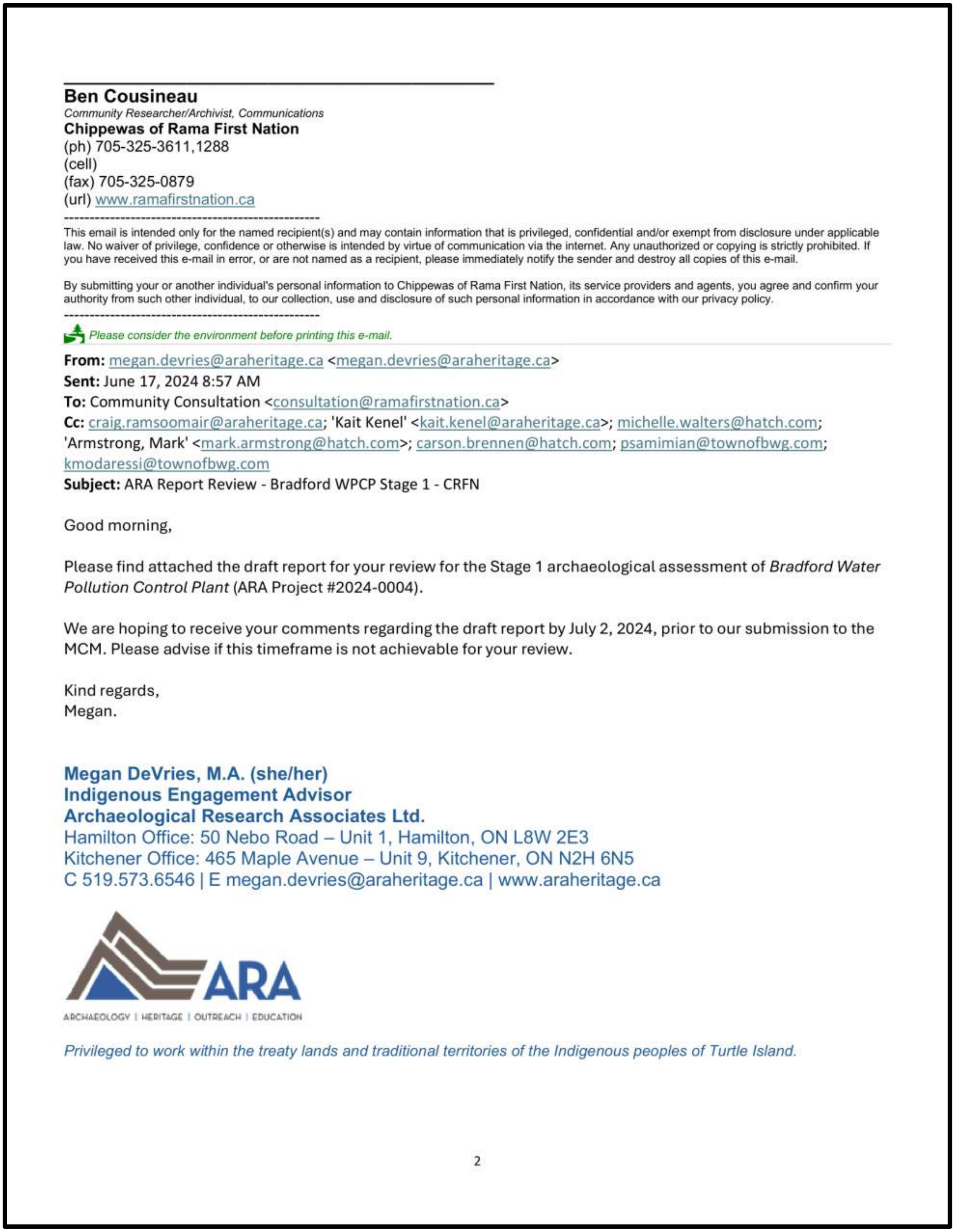
From: Community Consultation <consultation@ramafirstnation.ca>
Sent: Tuesday, July 2, 2024 10:35 AM
To: megan.devries@araheritage.ca
Cc: craig.ramsoomair@araheritage.ca; 'Kait Kenel' <kait.kenel@araheritage.ca>; michelle.walters@hatch.com; 'Armstrong, Mark' <mark.armstrong@hatch.com>; carson.brennen@hatch.com; psamimian@townofbwg.com; kmodaressi@townofbwg.com
Subject: RE: ARA Report Review - Bradford WPCP Stage 1 - CRFN

Hi Megan,

Thanks for sending and my apologies for deadline day response. We have no concerns with the Stage 1 and understand that due to disturbance there is no archaeological potential. I ask that ARA include Rama's brief history alongside the Michi Saagiig oral historical component, which is attached. Can you also include this in future ARA reports?

Miigwech,

Ben



Ben Cousineau
Community Researcher/Archivist, Communications
Chippewas of Rama First Nation
(ph) 705-325-3611,1288
(cell)
(fax) 705-325-0879
(url) www.ramafirstnation.ca

From: megan.devries@araheritage.ca <megan.devries@araheritage.ca>
Sent: June 17, 2024 8:57 AM
To: Community Consultation <consultation@ramafirstnation.ca>
Cc: craig.ramsoomair@araheritage.ca; 'Kait Kenel' <kait.kenel@araheritage.ca>; michelle.walters@hatch.com; 'Armstrong, Mark' <mark.armstrong@hatch.com>; carson.brennen@hatch.com; psamimian@townofbwg.com; kmodaressi@townofbwg.com
Subject: ARA Report Review - Bradford WPCP Stage 1 - CRFN

Good morning,

Please find attached the draft report for your review for the Stage 1 archaeological assessment of *Bradford Water Pollution Control Plant* (ARA Project #2024-0004).

We are hoping to receive your comments regarding the draft report by July 2, 2024, prior to our submission to the MCM. Please advise if this timeframe is not achievable for your review.

Kind regards,
Megan.

Megan DeVries, M.A. (she/her)
Indigenous Engagement Advisor
Archaeological Research Associates Ltd.
Hamilton Office: 50 Nebo Road – Unit 1, Hamilton, ON L8W 2E3
Kitchener Office: 465 Maple Avenue – Unit 9, Kitchener, ON N2H 6N5
C 519.573.6546 | E megan.devries@araheritage.ca | www.araheritage.ca

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2

RoIE Appendix C: HWN Correspondence

megan.devries@araheritage.ca

From: megan.devries@araheritage.ca
Sent: July 31, 2024 1:48 PM
To: 'Marie-Sophie Gendron'
Cc: 'craig.ramsoomair@araheritage.ca'; 'Kait Kenel'; 'michelle.walters@hatch.com'; 'Armstrong, Mark'; 'carson.brennen@hatch.com'; 'psamimian@townofbwg.com'; 'kmodaressi@townofbwg.com'
Subject: RE: ARA Report Review - Bradford WPCP Stage 1 - HWN
Attachments: St 1 - Bradford Water Pollution Control Plant RE (Draft 30-07-2024).pdf

Hello Marie-Sophie!

Thank you for your comments on the report. We have included the *History of the Nation Huronne-Wendat* as requested. Please see attached.

Have a lovely week!
Megan.

Megan DeVries, M.A. (she/her)
Indigenous Engagement Advisor
Archaeological Research Associates Ltd.
Hamilton Office: 50 Nebo Road – Unit 1, Hamilton, ON L8W 2E3
Kitchener Office: 465 Maple Avenue – Unit 9, Kitchener, ON N2H 6N5
C 519.573.6546 | E megan.devries@araheritage.ca | www.araheritage.ca

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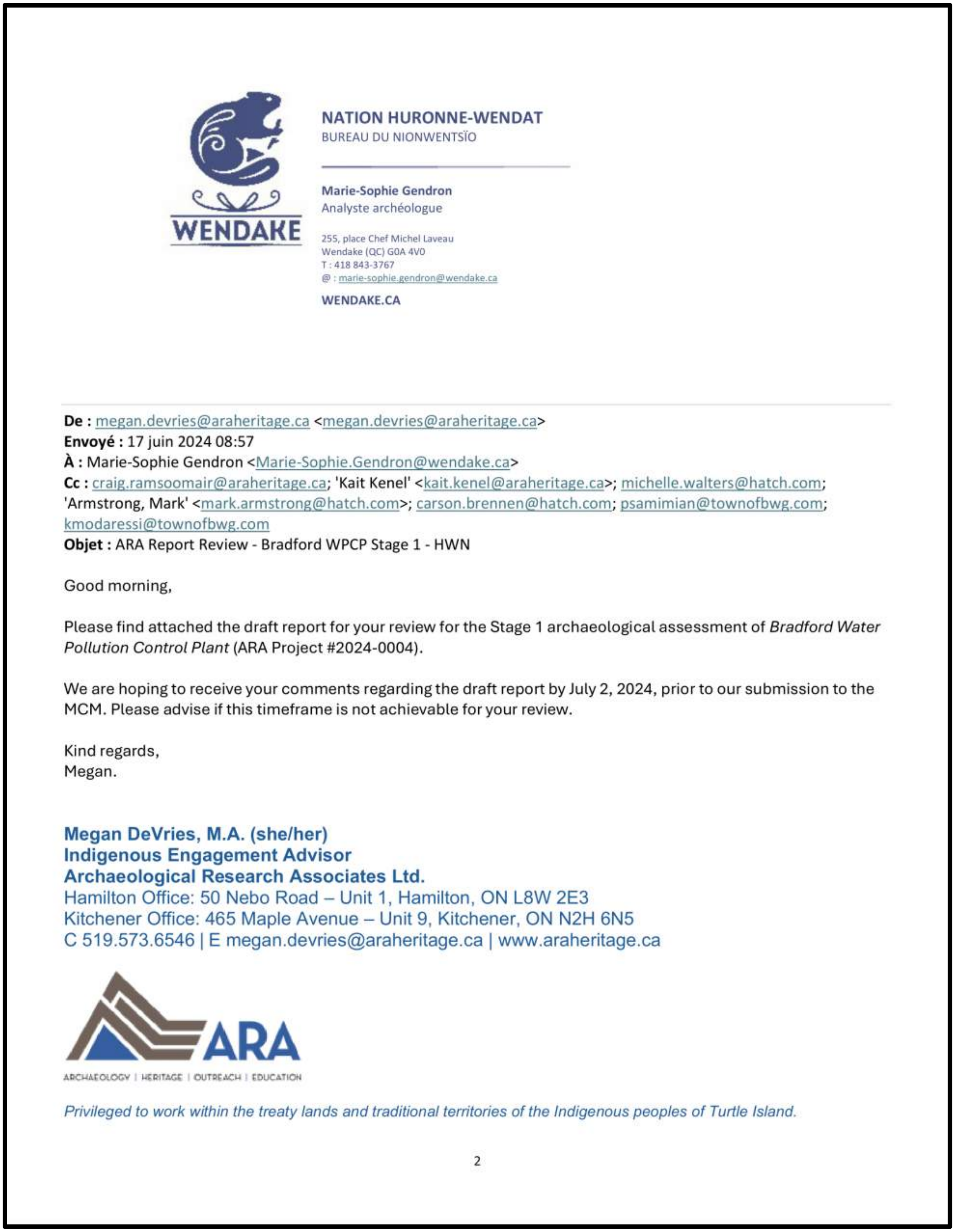
From: Marie-Sophie Gendron <Marie-Sophie.Gendron@wendake.ca>
Sent: Tuesday, July 16, 2024 11:25 AM
To: megan.devries@araheritage.ca
Cc: craig.ramsoomair@araheritage.ca; 'Kait Kenel' <kait.kenel@araheritage.ca>; michelle.walters@hatch.com; 'Armstrong, Mark' <mark.armstrong@hatch.com>; carson.brennen@hatch.com; psamimian@townofbwg.com; kmodaressi@townofbwg.com
Subject: RE: ARA Report Review - Bradford WPCP Stage 1 - HWN

Kwe Megan,

Please find attached a letter for the Stage 1 AA report for Bradford Water Pollution Control Plant.

Tiawenhk,
Marie-Sophie

1



WENDAKE

NATION HURONNE-WENDAT
BUREAU DU NIONWENTSÏO

Marie-Sophie Gendron
Analyste archéologue

255, place Chef Michel Laveau
Wendake (QC) G0A 4V0
T : 418 843-3767
@ : marie-sophie.gendron@wendake.ca

WENDAKE.CA

De : megan.devries@araheritage.ca <megan.devries@araheritage.ca>
Envoyé : 17 juin 2024 08:57
À : Marie-Sophie Gendron <Marie-Sophie.Gendron@wendake.ca>
Cc : craig.ramsoomair@araheritage.ca; 'Kait Kenel' <kait.kenel@araheritage.ca>; michelle.walters@hatch.com; 'Armstrong, Mark' <mark.armstrong@hatch.com>; carson.brennen@hatch.com; psamimian@townofbwg.com; kmodaressi@townofbwg.com
Objet : ARA Report Review - Bradford WPCP Stage 1 - HWN

Good morning,

Please find attached the draft report for your review for the Stage 1 archaeological assessment of *Bradford Water Pollution Control Plant* (ARA Project #2024-0004).

We are hoping to receive your comments regarding the draft report by July 2, 2024, prior to our submission to the MCM. Please advise if this timeframe is not achievable for your review.

Kind regards,
Megan.

Megan DeVries, M.A. (she/her)
Indigenous Engagement Advisor
Archaeological Research Associates Ltd.
Hamilton Office: 50 Nebo Road – Unit 1, Hamilton, ON L8W 2E3
Kitchener Office: 465 Maple Avenue – Unit 9, Kitchener, ON N2H 6N5
C 519.573.6546 | E megan.devries@araheritage.ca | www.araheritage.ca

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2

Ministry of Citizenship and Multiculturalism (MCM)

Archaeology Program Unit
Heritage Branch
Citizenship, Inclusion and Heritage Division
5th Floor, 400 University Ave.
Toronto ON M7A 2R9
Tel.: (705) 571-0035
Email: Teresa.Tremblay@ontario.ca

Ministère des Affaires civiques et du Multiculturalisme (MCM)

Unité des programme d'archéologie
Direction du patrimoine
Division de la citoyenneté, de l'inclusion et du patrimoine
5e étage, 400 ave. University
Toronto ON M7A 2R9
Tél. : (705) 571-0035
Email: Teresa.Tremblay@ontario.ca

Aug 15, 2024

Craig Ramsoomair (P1106)
Archaeological Research Associates Ltd.
33 Lawrence Guelph ON N1E5Y4

RE: Entry into the Ontario Public Register of Archaeological Reports: Archaeological Assessment Report Entitled, "Stage 1 Archaeological Assessment: Bradford Water Pollution Control Plant, Town of Bradford West Gwillimbury, Part of Lot 17, Concession 7, Geographic Township of West Gwillimbury Former Simcoe County, Ontario ", Dated Jul 31, 2024, Filed with MCM on N/A, MCM Project Information Form Number P1106-0043-2024, MCM File Number 0021379

Dear Mr. Ramsoomair:

The above-mentioned report, which has been submitted to this ministry as a condition of licensing in accordance with Part VI of the *Ontario Heritage Act*, R.S.O. 1990, c 0.18, has been entered into the Ontario Public Register of Archaeological Reports without technical review.[1]

Please note that the ministry makes no representation or warranty as to the completeness, accuracy or quality of reports in the register.

Should you require further information, please do not hesitate to send your inquiry to Archaeology@Ontario.ca

cc. Archaeology Licensing Officer
Mark Armstrong,Hatch
Michelle Walters,Hatch
Peyman Samimian,Town of Bradford West Gwillimbury

---

[1] *In no way will the ministry be liable for any harm, damages, costs, expenses, losses, claims or actions that may result: (a) if the Report(s) or its recommendations are discovered to be inaccurate, incomplete, misleading or fraudulent; or (b) from the issuance of this letter. Further measures may need to be taken in the event that additional artifacts or archaeological sites are identified or the Report(s) is otherwise found to be inaccurate, incomplete, misleading or fraudulent.*

Appendix C

Consultation Record

Contact List

Indigenous Community	Contact Name	Address	Phone	Email	Initial Letter 31-Aug-23	Accessed Kiteworks	Followup Email 2-Oct-23	Followup Email 11/17/2023
Alderville First Nation	Chief Taynar Simpson Dr. Julie Kapyrka Consultation Coordinator	11696 Second Line Rd. Roseneath, ON K0K 2X0	(905) 352-2662	consultation@alderville.ca; tsimpson@alderville.ca; jkapyrka@alderville.ca	Yes	No	Yes	Yes
Hiawatha First Nation	Tom Cowie and Sean Davidson (Lands/Resource Consultation)	431 Hiawatha Line Hiawatha, Ontario K9J 0E6 Canada	(705) 295-4421 Ext. 216 & Ext. 215	tcowie@hiawathafn.ca; sdavison@hiawathafn.ca	Yes	Yes	Yes	Yes
Scugog Island First Nation	Chief Kelly LaRocca; Colleen Kennedy (First Nation Manager)	22521 Island Road Port Perry, ON L9L 1B6	(905) 985-3337	consultation@scugogfirstnation.com; ckennedy@scugogfirstnation.com	Yes	No	Yes	Yes
Georgina Island First Nation	Sylvia Mccue (Lands Manager) James Porte (Consultation Worker)	R.R.#2 Box N-13 Sutton West, Ontario L0E 1R0	(705) 437-3614 Consulation: (705)-437-1337 ext. 4226	sylvia.mccue@georginaisland.com; jl.porte@georgina.island.com	Yes	No	Yes	Yes
Curve Lake First Nation	Paige Williams (Consultation Worker)	22 Winookeedaa Road Curve Lake, Ontario K0L1R0	(705) 657-8045 Ext. 222	paigew@curvelake.ca	Yes	No	Yes	Yes
Metis Nation of Ontario	Linda Norheim (Director of Lands, Resources & Consultations)	Suite 1100, 11th Floor 66 Slater Street Ottawa, ON, K1P 5H1	(416) 433-1315	consultations@metisnation.org; LindaN@metisnation.org	Yes	Yes	Yes	Yes
Huron-Wendat	Stephanie B Nadeau	255, place Chef Michel Laveau Wendake (Quebec) G0A 4V0	(418) 843-3767	stephanieb.nadeau@wendake.ca	Yes	No	Yes	Yes
Beausoleil First Nation	Anthony Lewis (Lands and Resource Manager)	11 O'Gemaa Miikaan Christian Island, ON, L9M 0A9	(705) 247-2051	alewis@chimnissing.ca; lands@chimnissing.ca	Yes	No	Yes	Yes
Chippewas of Rama First Nation	Ben Benson (Consultation Worker)	5884 Rama Road Rama, ON L3V 6H6	(705) 325-3611 Ext. 1633	consultation@ramafirstnation.ca	Yes	No	Yes	Yes
Williams Treaties First Nations	Karry Sandy-McKenzie	8 Creswick Court Barrie, ON L4M 2J7		k.a.sandy-mckenzie@rogers.com; inquiries@williamstreatiesfirstnations.ca	Yes	No	Yes	Yes

Engagement Milestones

Date	To (Community)	From (Person)	Details of Email/Phone Call	Notes
8/31/2023	All	Accellion	Today we are pleased to provide you with the following reports for the Town of Bradford Water Pollution Control Plant Upgrade Project: • Draft Environmental Study Report Addendum; and • Draft Natural Heritage Evaluation Study. We are inviting you to review and provide feedback on the reports prior to the formal regulatory review.	Reports were attached along with a specific letter for each community
10/2/2023	All	Madalyn Murray	Good morning, I am reaching out to you on behalf of the Project team for the Town of Bradford Water Pollution Control Plant Upgrade Project. You should have received an email from Accellion@hatch.com on August 31, 2023 containing the Draft Environmental Study Report Addendum and the Draft Natural Heritage Evaluation Study. We are inviting you to review and provide feedback on the reports prior to the formal regulatory review. I am following up today to see if you have had a chance to review the report yet and if you’d had any trouble downloading it from the accellion software. If there are any questions or support that I can provide, please feel free to reach out. Thank you,	Cc'd Mark Armstrong, Oya Koc, Payman, and kmodaressi@townofbwg.com

Engagement Milestones

Date	To (Community)	From (Person)	Details of Email/Phone Call	Notes
11/17/2023	All (except Hiawatha and Alderville)	Mark Armstrong	I am reaching out to you on behalf of the Project team for the Draft Reports on the Town of Bradford's Water Pollution Control Plant Upgrade. You should have received an email from Accellion@hatch.com on August 31, 2023 containing the Draft Environmental Study Report Addendum and the Draft Natural Heritage Evaluation Study. We followed up on October 2, 2023 to confirm whether you had a chance to review the report yet and if you'd had any trouble downloading it from the Accellion software. We have reached the end of the 60-day review period. We would like to extend an invitation for either an online or in-person meeting to discuss the Draft Reports on the Town of Bradford's Water Pollution Control Plant Upgrade and gain your feedback on the reports prior to the formal regulatory review with the Ministry of Environment, Conservation and Parks. Our project team has the following dates and times available: December 1 afternoon December 6 afternoon December 7 morning December 8 morning or afternoon December 11 afternoon December 12 morning or afternoon December 13 morning December 15 morning or afternoon	Cc'd Oya Koc, Michelle Walters, Peyman, kmodaressi@townofbwg.com. Carson, Kathleen Wood

Engagement Milestones

Date	To (Community)	From (Person)	Details of Email/Phone Call	Notes
11/17/2023	Hiawatha	Mark Armstrong	Following up on your question. The Town's wastewater collection system is separated such that stormwater is not collected with sanitary sewer flows. As a result, the Water Pollution Control Plant is not subject to peak flows during significant rainfalls as is seen by facilities that treat flows from combined sewer systems, which may require bypasses of untreated wastewater during significant rain events. That being said, if the facility receives more wastewater than it has the capacity to treat, the facility has the ability to direct a portion of the untreated waste water to the existing storage lagoons. This allows for it to be stored until capacity is available for it to be brought back into the facility and treated later. In addition, the proposed tertiary filtration system and the subsequent UV treatment system have the capacity to treat the Peak Hourly Flow that the facility is rated for. If the membrane system needs to be bypassed, the UV system can still be used for disinfection. Please let us know if you have any further questions or concerns with respect to your question. I've noted in your response to Madelyn below that you were finishing up your review. Were there any other questions or concerns from your review? We have reached the end of the 60-day review period. We would like to extend an invitation for either an online or in-person	Cc'd Oya Koc, Michelle Walters, Peyman, kmodaressi@townofbwg.com. Carson, Kathleen Wood

Date	To (Community)	From (Person)	Details of Email/Phone Call	Notes
11/17/2023	Alderville	Mark Armstrong	Thank you for the updated contact information. As you noted in your response, please forward any additional correspondence at your earliest convenience. We have reached the end of the 60-day review period. We would like to extend an invitation for either an online or in-person meeting to discuss the Draft Reports on the Town of Bradford's Water Pollution Control Plant Upgrade and gain your feedback on the reports prior to the formal regulatory review with the Ministry of Environment, Conservation and Parks. Our project team has the following dates and times available: December 1 afternoon December 6 afternoon December 7 morning December 8 morning or afternoon December 11 afternoon December 12 morning or afternoon December 13 morning December 15 morning or afternoon Please let us know at your earliest convenience whether you wish to meet, whether online or in person, and your preferred date and time.	Cc'd Oya Koc, Michelle Walters, Peyman, kmodaressi@townofbwg.com. Carson, Kathleen Wood
2/8/2024	Hiawatha	Carson Brennen	Phone call to invite Hiawatha to meeting for the opportunity to review and provide feedback on the draft reports prior to the formal regulatory review with the Ministry of Environment, Conservation and Parks. No answer, left voicemail with Tom Cowie	
2/8/2024	Scugog	Carson Brennen	Phone call to invite Scugog to meeting for the opportunity to review and provide feedback on the draft reports prior to the formal regulatory review with the Ministry of Environment, Conservation and Parks. Consultation department is currently vacant. Colleen Kennedy (First Nation Manager) is handling consultation inqueries. ckennedy@scugogfirstnation.com	

Engagement Milestones

Date	To (Community)	From (Person)	Details of Email/Phone Call	Notes
2/8/2024	Georgina Island	Carson Brennen	Phone call to invite Georgina Island to meeting for the opportunity to review and provide feedback on the draft reports prior to the formal regulatory review with the Ministry of Environment, Conservation and Parks. No answer, left voicemail. Natasha Charles is consultation contact.	
2/8/2024	Curve Lake	Carson Brennen	Phone call to invite Curve Lake to meeting for the opportunity to review and provide feedback on the draft reports prior to the formal regulatory review with the Ministry of Environment, Conservation and Parks. Paige Williams is contact for consultation. paigew@curvelake.ca.	Paige Williams availability: Friday, February 23rd – all day Monday, February 26th – afternoon Tuesday, February 27th – morning Wednesday, February 28th – morning Monday, March 1st – all day
2/8/2024	MNO	Carson Brennen	Phone call to invite MNO to meeting for the opportunity to review and provide feedback on the draft reports prior to the formal regulatory review with the Ministry of Environment, Conservation and Parks. Spoke with Linda Norheim. Stated that if the MNO has not responded, then you can assume no additional consultation is required	Send email to joand@metisnation.org to confirm receipts of original emails
2/8/2024	Huron-Wendat	Carson Brennen	Phone call to invite Huron-Wendat to meeting for the opportunity to review and provide feedback on the draft reports prior to the formal regulatory review with the Ministry of Environment, Conservation and Parks. No anwser, left voicemail.	
2/8/2024	Beausoleil	Carson Brennen	Phone call to invite Beausoleil to meeting for the opportunity to review and provide feedback on the draft reports prior to the formal regulatory review with the Ministry of Environment, Conservation and Parks. Spoke with Caleb.	Consulation email: BFNConsultation@chimnissing.ca
2/8/2024	Rama	Carson Brennen	Phone call to invite Rama to meeting for the opportunity to review and provide feedback on the draft reports prior to the formal regulatory review with the Ministry of Environment, Conservation and Parks. No anwser, left voicemail.	
2/22/2024	Georgina Island	Carson Brennen	Phone call to invite Georgina Island to meeting for the opportunity to review and provide feedback on the draft reports prior to the formal regulatory review with the Ministry of Environment, Conservation and Parks. Spoke with Sylvia Mccue (Lands Manager) who informed us that James Porte is responsible for consultation.	James Porte (Consultation Worker) jl.porte@georgina.island.com 705-437-1337 ext.4226

Engagement Milestones

Date	To (Community)	From (Person)	Details of Email/Phone Call	Notes
2/22/2024	Georgina Island	Carson Brennen	Phone call to invite Georgina Island to meeting for the opportunity to review and provide feedback on the draft reports prior to the formal regulatory review with the Ministry of Environment, Conservation and Parks. Spoke with James Porte. James requested Hatch to resend the Draft Environmental Study Report Addendum and the Draft Natural Heritage Evaluation Study.	Action: Email James the Draft Environmental Study Report Addendum and the Draft Natural Heritage Evalutation Study. James will review the documents and has requested Hatch to reach out again the week of 2/26/2024 to schedule a meeting.
2/27/2024	Curve Lake	Carson Brennen	Good afternoon Paige Williams, We would like to extend an invitation for an online meeting to discuss the Draft Reports on the Town of Bradford's Water Pollution Control Plant Upgrade and gain your feedback on the reports prior to the formal regulatory review with the Ministry of Environment, Conservation and Parks. Our project team is available to meet on March 1st, 10am. Please let us know at your earliest convenience whether you wish to meet on March 1st at 10am. If you are not available at this time, please let us know and we will provide alternative dates. Thank you.	Sent to paigew@curvelake.ca CC'd mark.armstrong@hatch.com; psamimian@townofbwg.com; kmodaressi@townofbwg.com; michelle.walters@hatch.com; oya.koc@hatch.com
3/11/2024	Alderville	Carson Brennen	Hello Chief Simpson and Dr. Kapryka, Please find attached a copy of the Minutes from our meeting on December 8th, 2023. This meeting was in regard to the Town of Bradford-West Gwillimbury's Bradford Water Pollution Control Plant Tertiary Upgrade Environmental Assessment amendment. Please review and provide any comments. If you have any additional questions, please reach out to us. Thank you.	Attached: PDF copy of the meeting Minutes with Alderville on 12/8/2023 CC'd: mark.armstrong@hatch.com; psamimian@townofbwg.com; kmodaressi@townofbwg.com; michelle.walters@hatch.com; oya.koc@hatch.com

Engagement Milestones

Date	To (Community)	From (Person)	Details of Email/Phone Call	Notes
3/12/2024	All	Megan DeVries (ARA Heritage)	Good morning! Archaeological Research Associates Ltd. (ARA) has been contracted by Hatch for the Stage 1 archaeological assessment to be carried out support of an Environmental Assessment amendment for the Bradford Water Pollution Control Plant. Please see the attached letter for specific information about the project and our upcoming assessment. Fieldwork for this project has not yet been scheduled, but is anticipated to begin as soon as possible pending appropriate field conditions Any necessary agreements for this project will be executed directly with our client. Please forward participation agreements to Peyman Samimian at psamimian@townofbwg.com for review and execution. We welcome your participation on this project! Megan.	Attached: PDF copy of the Stage 1 Assessment Notice CC'd: craig.ramsoomair@araheritage.ca; kait.kenel@araheritage.ca; mark.armstrong@hatch.com; psamimian@townofbwg.com
3/19/2024	Georgina Island	Carson Brennen	Hello Mr. Porte, We would like to extend an invitation for an online meeting to discuss the Draft Reports on the Town of Bradford's Water Pollution Control Plant Upgrade and gain your feedback on the reports prior to the formal regulatory review with the Ministry of Environment, Conservation and Parks. Attached is the requested Draft Environmental Study Report Addendum and the Draft Natural Heritage Evaluation Study. Please take an opportunity to review these documents and advise us if the Chippewas of Georgina Island First Nation are available for a meeting. If you have any additional questions, please reach out to us. Thank you.	Sent to: jl.porte@georgina.island.com CC'd: mark.armstrong@hatch.com; psamimian@townofbwg.com; kmodaressi@townofbwg.com; michelle.walters@hatch.com; oya.koc@hatch.com Attached: Draft Environmental Study Report Addendum and the Draft Natural Heritage Evaluation Study
3/22/2024	Georgina Island	Carson Brennen	Phone call to invite Georgina Island and to follow up on email sent 3/19/2024 with attached Draft Environmental Study Report Addendum and the Draft Natural Heritage Evaluation Study. No answer, left message.	Left message with James Porte (705) 437-1337

Engagement Milestones

Date	To (Community)	From (Person)	Details of Email/Phone Call	Notes
3/25/2024	All	Megan DeVries (ARA Heritage)	Good morning! I wanted to follow up on this project notification. If you have any questions, comments, or concerns, please reach out at any time. Kind regards, Megan.	CC'd: craig.ramsoomair@araheritage.ca; kait.kenel@araheritage.ca; mark.armstrong@hatch.com; psamimian@townofbwg.com
4/2/2024	Alderville	Megan DeVries (ARA Heritage)	Hi Julie! Hope all is well! We are looking at the completing the Stage 1 property inspection late next week; we will be sending a deployment email shortly once we have the details confirmed. Are you interested in sending a representative to that? We would be happy to have someone join us, if so! Best, Megan.	CC'd: craig.ramsoomair@araheritage.ca; kait.kenel@araheritage.ca; mark.armstrong@hatch.com; psamimian@townofbwg.com
4/3/2024	Georgina Island	Carson Brennen	Carson returned James' call to inform him that the Study Report Addendum and the Draft Natural Heritage Evaluation Study had been emailed to him again.	
4/3/2024	Georgina Island	Carson Brennen	Heritage Evaluation Study attached Contents of Email: Hello Mr. Porte, We would like to extend an invitation for an online meeting to discuss the Draft Reports on the Town of Bradford's Water Pollution Control Plant Upgrade and gain your feedback on the reports prior to the formal regulatory review with the Ministry of	Sent to: jl.porte@georgina.island.com CC'd: mark.armstrong@hatch.com; psamimian@townofbwg.com; kmodaressi@townofbwg.com; michelle.walters@hatch.com; oya.koc@hatch.com Attached: Draft Environmental Study Report Addendum and the Draft Natural Heritage Evaluation Study
6/17/2024	All	Megan DeVries (ARA Heritage)	Good morning, Please find attached the draft report for your review for the Stage 1 archaeological assessment of Bradford Water Pollution Control Plant (ARA Project #2024-0004). We are hoping to receive your comments regarding the draft report by July 2, 2024, prior to our submission to the MCM. Please advise if this timeframe is not achievable for your review. Kind regards, Megan.	CC'd: mark.armstrong@hatch.com; psamimian@townofbwg.com; kmodaressi@townofbwg.com; michelle.walters@hatch.com; oya.koc@hatch.com Attached: Draft Stage 1 Archaeological Assessment

Engagement Milestones

Date	To (Community)	From (Person)	Details of Email/Phone Call	Notes
7/2/2024	All	Megan DeVries (ARA Heritage)	Hello, I hope all is well! I am writing to check in on this report review. If we could receive your comments by Friday, July 5, that would be wonderful! Thank you, Megan.	CC'd: mark.armstrong@hatch.com; psamimian@townofbwg.com; kmodaressi@townofbwg.com; michelle.walters@hatch.com; oya.koc@hatch.com
7/9/2024	All	Megan DeVries (ARA Heritage)	Hello, As a quick update to the previous e-mail, we will be waiting until July 15th to submit the report to MCM if you are still interested in providing comments on the report draft (re-attached for convenience). All the best	CC'd: mark.armstrong@hatch.com; psamimian@townofbwg.com; kmodaressi@townofbwg.com; michelle.walters@hatch.com; oya.koc@hatch.com Attached: Draft Stage 1 Archaeological Assessment
7/31/2024	All	Megan DeVries (ARA Heritage)	Good afternoon, Please find attached the revised report for your records. Sincerely, Megan.	CC'd: mark.armstrong@hatch.com; psamimian@townofbwg.com; kmodaressi@townofbwg.com; michelle.walters@hatch.com; oya.koc@hatch.com Attached: Revised Stage 1 Archaeological Assessment

Community Responses

Date	From (Community)	From (Person)	Contact Information	Details of Email	Follow Up Required	Status	Notes
10/2/2023	Hiawatha	Tom Cowie	tcowie@hiawathafn.ca	Could not access reports	Yes	Completed	Sent reports by email on October 2, 2023.
10/2/2023	Hiawatha	Tom Cowie	tcowie@hiawathafn.ca	Aaniin Madalyn, The only concern that comes to mind ii the effluent waste water being dismissed would we consistent with the conditions of the day. If the facility can handle a large significant rainfall and waste use without having to bleed excess off without treating into the River. We have seen this before a facility bleeding off into the local river untreated water being at capacity due to conditions. Those wetlands may also be a part of the recharge areas for storm waters. I will finish reviewing and if I have any questions or concerns I will not hesitate to contact your office. Have a great week. Gichi manaadendamowin	No	Completed	
10/3/2023	Alderville	Dr. Julie Kapyrka	jkapyrka@alderville.ca	Could not access reports, will be issuing a more formal correspondance in regards to the consultation process	Yes	Completed	Have yet to receive formal correspondance. Followed up on October 19, 2023.
10/12/2023	Rama	Ben Benson	consultation@ramafirstnation.ca	Aaniin, Thank you for the follow up. If I remember correctly, I believe I did have some trouble accessing the files. Can you re-send them? Miigwech, -BB	Yes	Completed	Sent reports by email on October 17, 2023.
10/22/2023	Alderville	Dr. Julie Kapyrka	jkapyrka@alderville.ca	Aaniin Madalyn, Thank you for your e-mail and for following up – it is greatly appreciated. I have attached some updated contact information. We will be responding with more formal correspondence in the coming days. Miigwech. All the best,	No	Completed	Contact information updated

Community Responses

Date	From (Community)	From (Person)	Contact Information	Details of Email	Follow Up Required	Status	Notes
11/1/2023	Rama	Ben Benson	consultation@ramafirstnation.ca	Aaniin, Thank you for making those files accessible. We have no comments or concerns to provide. Miigwech, -BB	No	Completed	
11/17/2023	Hiawatha	Tom Cowie	tcowie@hiawathafn.ca	Aaniin Mark, Chi miigwech for the update and I am satisfied with the answers given. I have no more concerns or questions at this moment. Have a great weekend.	No	Completed	
11/20/2023	Alderville	Dr. Julie Kapyrka	jkapyrka@alderville.ca	Aaniin Mark, Thank you for your e-mail. I would be available Dec 8 at 11:30am – virtually please. Please send a calendar invite and link at your earliest convenience. Miigwech. All the best,	Yes	Completed	Virtual meeting invitation sent to Dr. Julie Kapyrka for December 8th, 2023
4/3/2024	Georgina Island	James L. Porte	Jl.porte@georgina.island.ca	James called and left a voicemail requesting Hatch to resend the Study Report Addendum and the Draft Natural Heritage Evaluation Study.	Yes	Completed	Carson (Hatch)returned James' call to inform him that the Study Report Addendum and the Draft Natural Heritage Evaluation Study had been emailed to him again.

Community Responses

Date	From (Community)	From (Person)	Contact Information	Details of Email	Follow Up Required	Status	Notes
4/3/2024	Alderville	Dr. Julie Kapyrka	jkapyrka@alderville.ca	Thanks Megan! Please let us know if this progresses to fieldwork. All the best,	Yes	Completed	Megan DeVries (ARA Heritage) responded informing Dr. Kapryka that the Stage 1 property inspection will take place next week. Megan then asked Dr. Kapryka if they plan on sending a representative.
7/5/2024	Alderville	Dr. Julie Kapyrka	jkapyrka@alderville.ca	Aaniin Megan, Apologies, I do not have the time. Miiwgech,	Yes	Completed	Craig Ramsoomair (ARA Heritage) responded: Hi Julie, Thanks for letting us know. What timeline would you need to be able to review the Stage 1 report? We will be waiting until at least July 15th for other comments before moving forward with the draft report so please let us know! Thanks,

Community Responses

Date	From (Community)	From (Person)	Contact Information	Details of Email	Follow Up Required	Status	Notes
6/28/2024	Curve Lake	Derek Paauw	APAdmin@curvelake.ca	Aaniin Megan, Thank you for engaging with Curve Lake First Nation on the Stage 1 archaeological assessment report for the Bradford Water Pollution Control Plant in the Town of Bradford-West Gwillimbury. Curve Lake First Nation agrees with Mr. Ramsoomair's recommendations and has no further concerns. I have attached a consultation letter to this email. Curve Lake First Nation wishes to thank ARA for their continued efforts to engage our community regarding archaeological matters within the shared traditional territories of the Michi Saagig. Miigwech, Derek	Yes	Completed	Megan DeVries (ARA Heritage) responded informing in 2 emails. 1st Email (8/2/2024): Thank you, Derek! Best, Megan. 2nd Email (8/31/2024): Hi Derek, We have made a few minor (non-substantive) additional revisions to this report. Please find attached for your records. Cheers, Megan.
7/2/2024	Rama	Ben Cousineau	consultation@ramafirstnation.ca	Hi Megan, Thanks for sending and my apologies for deadline day response. We have no concerns with the Stage 1 and understand that due to disturbance there is no archaeological potential. I ask that ARA include Rama's brief history alongside the Michi Saagiig oral historical component, which is attached. Can you also include this in future ARA reports? Miigwech, Ben	Yes	Completed	Craig Ramsoomair (ARA Heritage) responded: Thank you for reviewing the report, Ben. We are happy to include the Rama's history in the report. Please see the updated report attached. If you have any additional questions or concerns, please don't hesitate to reach out.

Community Responses

Date	From (Community)	From (Person)	Contact Information	Details of Email	Follow Up Required	Status	Notes
7/16/2024	Huron-Wendat	Marie-Sophie	marie-sophie.gendron@wendake.ca	Kwe Megan, Please find attached a letter for the Stage 1 AA report for Bradford Water Pollution Control Plant. Tiawenhk, Marie-Sophie	Yes	Completed	Hello Marie-Sophie! Thank you for your comments on the report. We have included the History of the Nation Huronne-Wendat as requested. Please see attached. Have a lovely week! Megan.

ARA
ARCHAEOLOGY | HERITAGE | OUTREACH | EDUCATION

March 12, 2024

Alderville First Nation
11696 Second Line Road
Alderville, ON K0K 2X0

RE: Project Notification – Stage 1 Archaeological Assessment, Bradford Water Pollution Control Plant, Bradford, ON

Dear Dr. Julie Kapyrka,

Archaeological Research Associates Ltd. (ARA) has been contracted by Hatch for the Stage 1 archaeological assessment to be conducted in support of an Environmental Assessment amendment for the Bradford Water Pollution Control Plant. The study area is approximately 32.71 ha (80.82 ac) in size and on part of Lot 17-18, Concession 7, in the Geographic Township of West Gwillimbury, County of Simcoe (see Map 1).

Preliminary analysis indicates that the project lands may have the potential for archaeological resources. Specifically, the study area is within 1 km of one (1) registered archaeological site, traversed by two tributaries of the Holland River, Holland Marsh Wetland Complex, and Holland Marsh. The study area is also nudging Holland River to the east.

The Stage 1 assessment will consist of comprehensive background research into the study area. This is accomplished through an examination of the archaeology, history, geography, and current land conditions in the vicinity of the project lands. This stage also generates an inventory of known archaeological sites within 1 km and previous archaeological fieldwork results within 50 m of the study area, which are used to assist in predicting zones of archaeological potential. The results of ARA's background research as well as the analysis and evaluation of the study area's archaeological potential, will form appropriate recommendations (i.e., no further work in areas of no archaeological potential and Stage 2 archaeological assessment for any areas of archaeological potential).

Fieldwork for this project has not yet been scheduled but it is set to begin as soon as possible pending appropriate field conditions. ARA has assumed that the Stage 1 property inspection will be completed in 1 day with 1 Field Director.

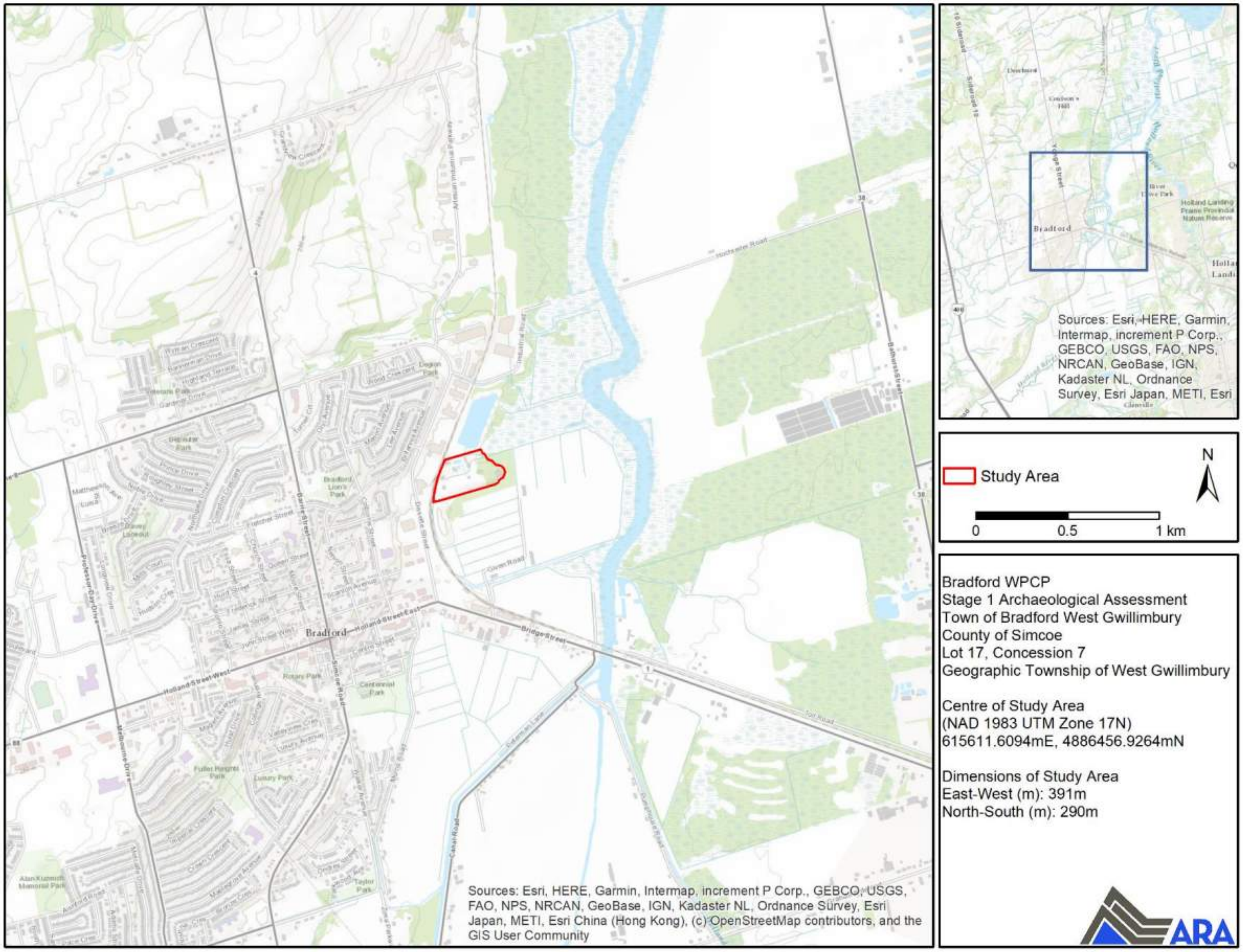
Agreements for this project will be executed directly with our client. Please forward agreements to Peyman Samimian at psamimian@townofbwg.com for signing.

We welcome your contribution to the project and are always happy to address any concerns that may arise. If you would like to participate in this project, please contact Megan DeVries at megan.devries@araheritage.ca or 519-573-6546 to confirm.

Best,

Paul Racher, MA, CAHP, RPA
Principal - Archaeological Research Associates Ltd.
Hamilton Office: 205 Cannon St East, Hamilton, ON, L8L 2A9
Kitchener Office: 465 Maple Ave – Unit 9, Kitchener, ON N2H 6N5

Map 1: Location of Stage 1 Assessment – Bradford Water Pollution Control Plant, Bradford, ON



Sources: Esri, HERE, Garmin, Intermap, increment P Corp., GEBCO, USGS, FAO, NPS, NRCAN, GeoBase, IGN, Kadaster NL, Ordnance Survey, Esri Japan, METI, Esri China (Hong Kong), (c) OpenStreetMap contributors, and the GIS User Community

Sources: Esri, HERE, Garmin, Intermap, increment P Corp., GEBCO, USGS, FAO, NPS, NRCAN, GeoBase, IGN, Kadaster NL, Ordnance Survey, Esri Japan, METI, Esri

□ Study Area

Bradford WPCP
Stage 1 Archaeological Assessment
Town of Bradford West Gwillimbury
County of Simcoe
Lot 17, Concession 7
Geographic Township of West Gwillimbury

Centre of Study Area
(NAD 1983 UTM Zone 17N)
615611.6094mE, 4886456.9264mN

Dimensions of Study Area
East-West (m): 391m
North-South (m): 290m

ARCHAEOLOGY | HERITAGE | OUTREACH | EDUCATION

March 12, 2024

Beausoleil First Nation
11 O’Gemaa Miikaan
Christian Island, ON L9M 0A9

RE: Project Notification – Stage 1 Archaeological Assessment, Bradford Water Pollution Control Plant, Bradford, ON

Dear Lua Montour,

Archaeological Research Associates Ltd. (ARA) has been contracted by Hatch for the Stage 1 archaeological assessment to be conducted in support of an Environmental Assessment amendment for the Bradford Water Pollution Control Plant. The study area is approximately 32.71 ha (80.82 ac) in size and on part of Lot 17-18, Concession 7, in the Geographic Township of West Gwillimbury, County of Simcoe (see Map 1).

Preliminary analysis indicates that the project lands may have the potential for archaeological resources. Specifically, the study area is within 1 km of one (1) registered archaeological site, traversed by two tributaries of the Holland River, Holland Marsh Wetland Complex, and Holland Marsh. The study area is also nudging Holland River to the east.

The Stage 1 assessment will consist of comprehensive background research into the study area. This is accomplished through an examination of the archaeology, history, geography, and current land conditions in the vicinity of the project lands. This stage also generates an inventory of known archaeological sites within 1 km and previous archaeological fieldwork results within 50 m of the study area, which are used to assist in predicting zones of archaeological potential. The results of ARA’s background research as well as the analysis and evaluation of the study area’s archaeological potential, will form appropriate recommendations (i.e., no further work in areas of no archaeological potential and Stage 2 archaeological assessment for any areas of archaeological potential).

Fieldwork for this project has not yet been scheduled but it is set to begin as soon as possible pending appropriate field conditions. ARA has assumed that the Stage 1 property inspection will be completed in 1 day with 1 Field Director.

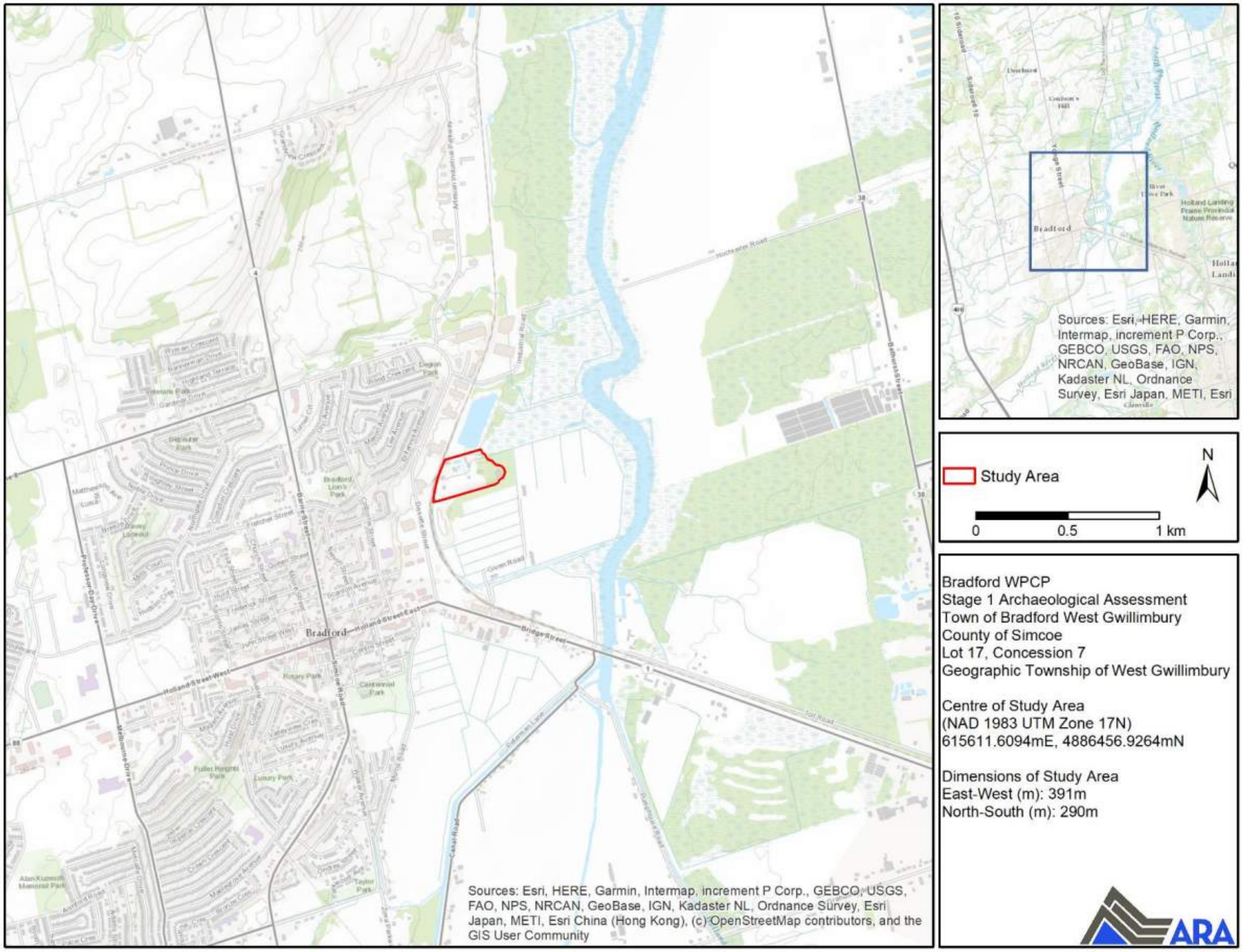
Agreements for this project will be executed directly with our client. Please forward agreements to Peyman Samimian at psamimian@townofbwg.com for signing.

We welcome your contribution to the project and are always happy to address any concerns that may arise. If you would like to participate in this project, please contact Megan DeVries at megan.devries@araheritage.ca or 519-573-6546 to confirm.

Best,

Paul Racher, MA, CAHP, RPA
Principal - Archaeological Research Associates Ltd.
Hamilton Office: 205 Cannon St East, Hamilton, ON, L8L 2A9
Kitchener Office: 465 Maple Ave – Unit 9, Kitchener, ON N2H 6N5

Map 1: Location of Stage 1 Assessment – Bradford Water Pollution Control Plant, Bradford, ON



Sources: Esri, HERE, Garmin, Intermap, increment P Corp., GEBCO, USGS, FAO, NPS, NRCAN, GeoBase, IGN, Kadaster NL, Ordnance Survey, Esri Japan, METI, Esri

Sources: Esri, HERE, Garmin, Intermap, increment P Corp., GEBCO, USGS, FAO, NPS, NRCAN, GeoBase, IGN, Kadaster NL, Ordnance Survey, Esri Japan, METI, Esri China (Hong Kong), (c) OpenStreetMap contributors, and the GIS User Community

Bradford WPCP
Stage 1 Archaeological Assessment
Town of Bradford West Gwillimbury
County of Simcoe
Lot 17, Concession 7
Geographic Township of West Gwillimbury

Centre of Study Area
(NAD 1983 UTM Zone 17N)
615611.6094mE, 4886456.9264mN

Dimensions of Study Area
East-West (m): 391m
North-South (m): 290m

ARCHAEOLOGY | HERITAGE | OUTREACH | EDUCATION

March 12, 2024

Chippewas of Georgina Island First Nation
RR#2 Box N-13
Sutton West, ON L0E 1R0

RE: Project Notification – Stage 1 Archaeological Assessment, Bradford Water Pollution Control Plant, Bradford, ON

Dear Natasha Charles and J.L. Porte,

Archaeological Research Associates Ltd. (ARA) has been contracted by Hatch for the Stage 1 archaeological assessment to be conducted in support of an Environmental Assessment amendment for the Bradford Water Pollution Control Plant. The study area is approximately 32.71 ha (80.82 ac) in size and on part of Lot 17-18, Concession 7, in the Geographic Township of West Gwillimbury, County of Simcoe (see Map 1).

Preliminary analysis indicates that the project lands may have the potential for archaeological resources. Specifically, the study area is within 1 km of one (1) registered archaeological site, traversed by two tributaries of the Holland River, Holland Marsh Wetland Complex, and Holland Marsh. The study area is also nudging Holland River to the east.

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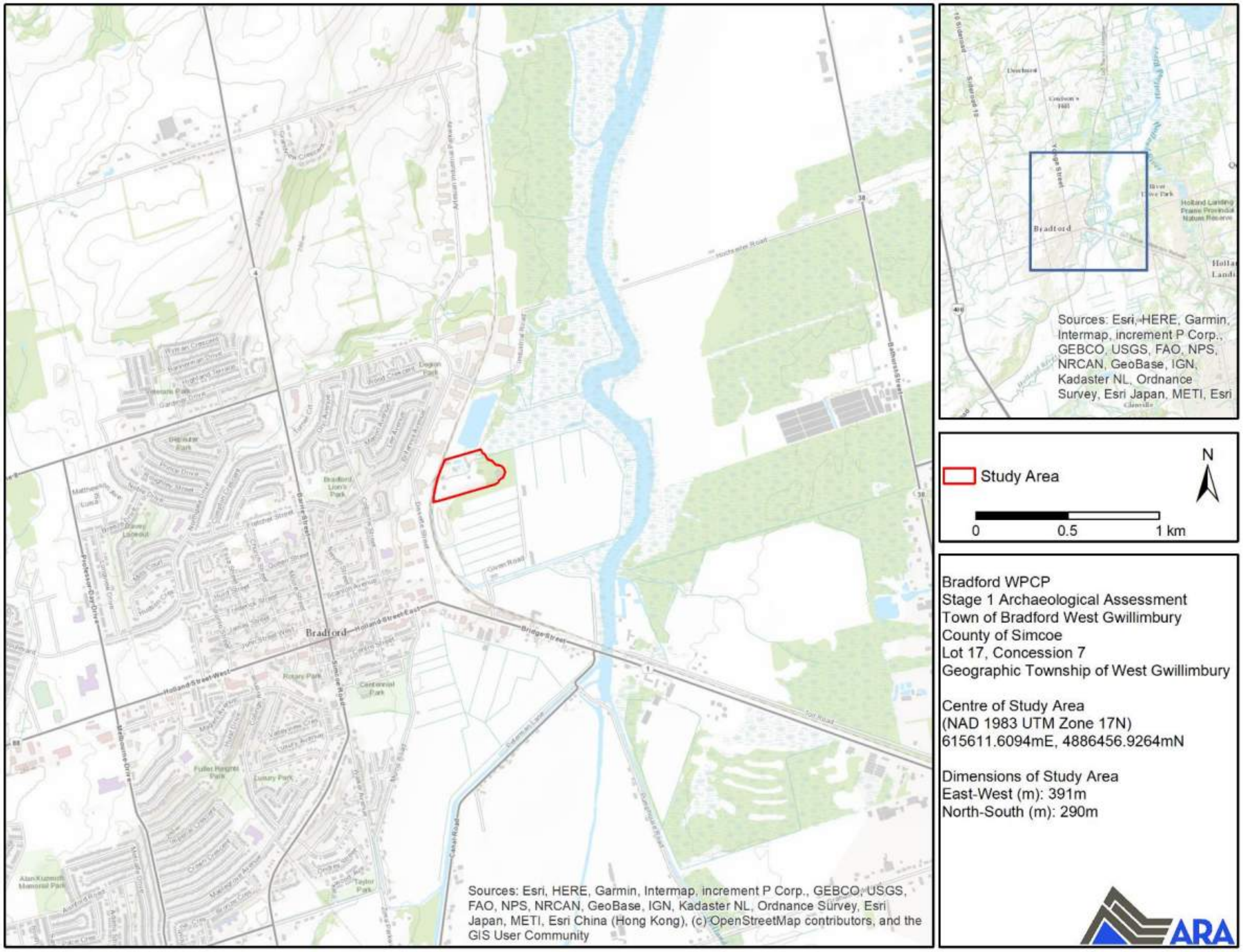
Paul Racher, MA, CAHP, RPA
Principal - Archaeological Research Associates Ltd.
Hamilton Office: 205 Cannon St East, Hamilton, ON, L8L 2A9
Kitchener Office: 465 Maple Ave – Unit 9, Kitchener, ON N2H 6N5

Map 1: Location of Stage 1 Assessment – Bradford Water Pollution Control Plant, Bradford, ON



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Bradford WPCP
Stage 1 Archaeological Assessment
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County of Simcoe
Lot 17, Concession 7
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Dimensions of Study Area
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North-South (m): 290m

ARA
ARCHAEOLOGY | HERITAGE | OUTREACH | EDUCATION

March 12, 2024

Curve Lake First Nation
22 Winookeedaa Road
Curve Lake, ON K0L 1R0

RE: Project Notification – Stage 1 Archaeological Assessment, Bradford Water Pollution Control Plant, Bradford, ON

Dear Lois Taylor,

Archaeological Research Associates Ltd. (ARA) has been contracted by Hatch for the Stage 1 archaeological assessment to be conducted in support of an Environmental Assessment amendment for the Bradford Water Pollution Control Plant. The study area is approximately 32.71 ha (80.82 ac) in size and on part of Lot 17-18, Concession 7, in the Geographic Township of West Gwillimbury, County of Simcoe (see Map 1).

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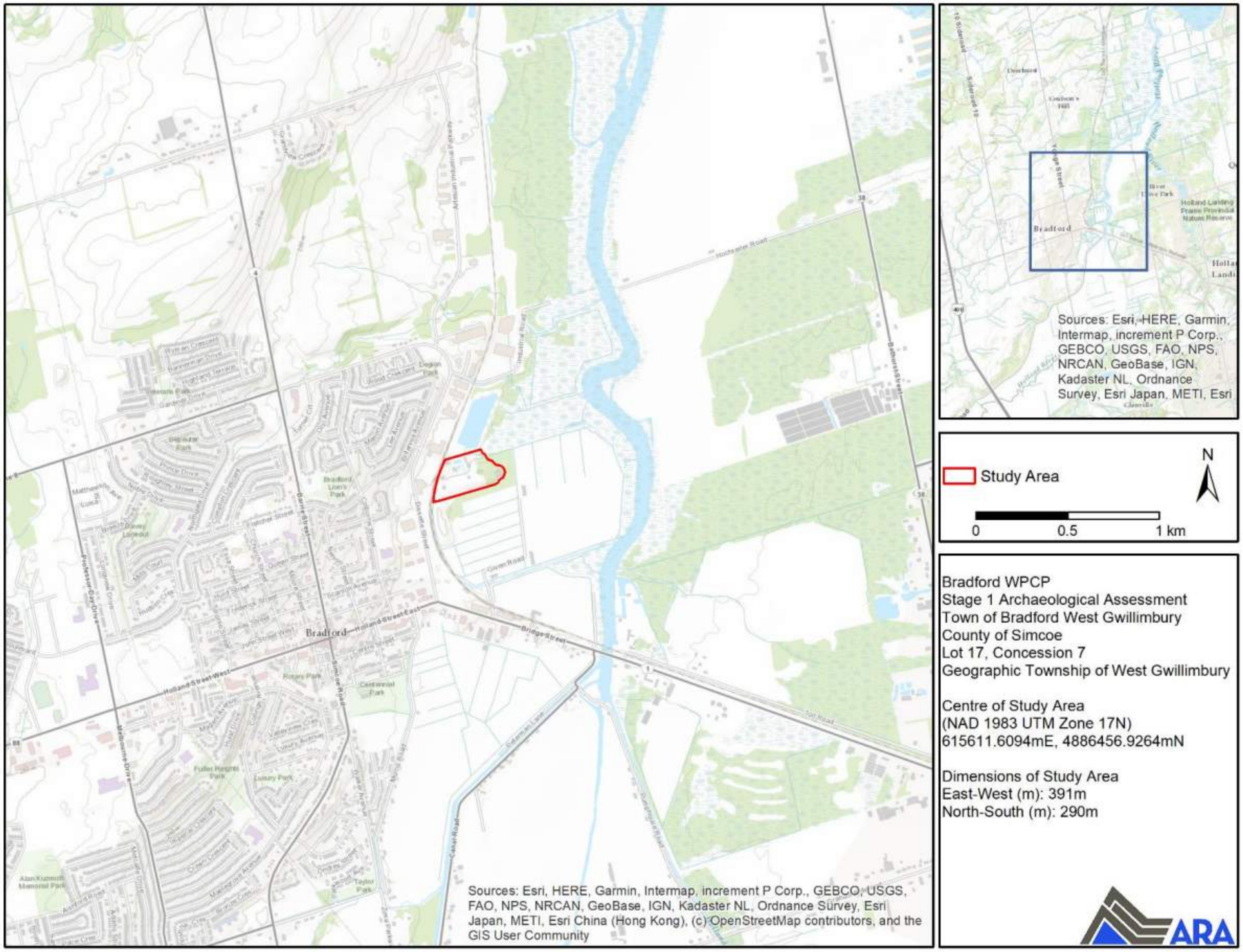

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ARA

ARCHAEOLOGY | HERITAGE | OUTREACH | EDUCATION

March 12, 2024

Chippewas of Rama First Nation
5884 Rama Road, Suite 200
Rama, ON L3V 6H6

RE: Project Notification – Stage 1 Archaeological Assessment, Bradford Water Pollution Control Plant, Bradford, ON

Dear Ben Benson and Ben Cousineau,

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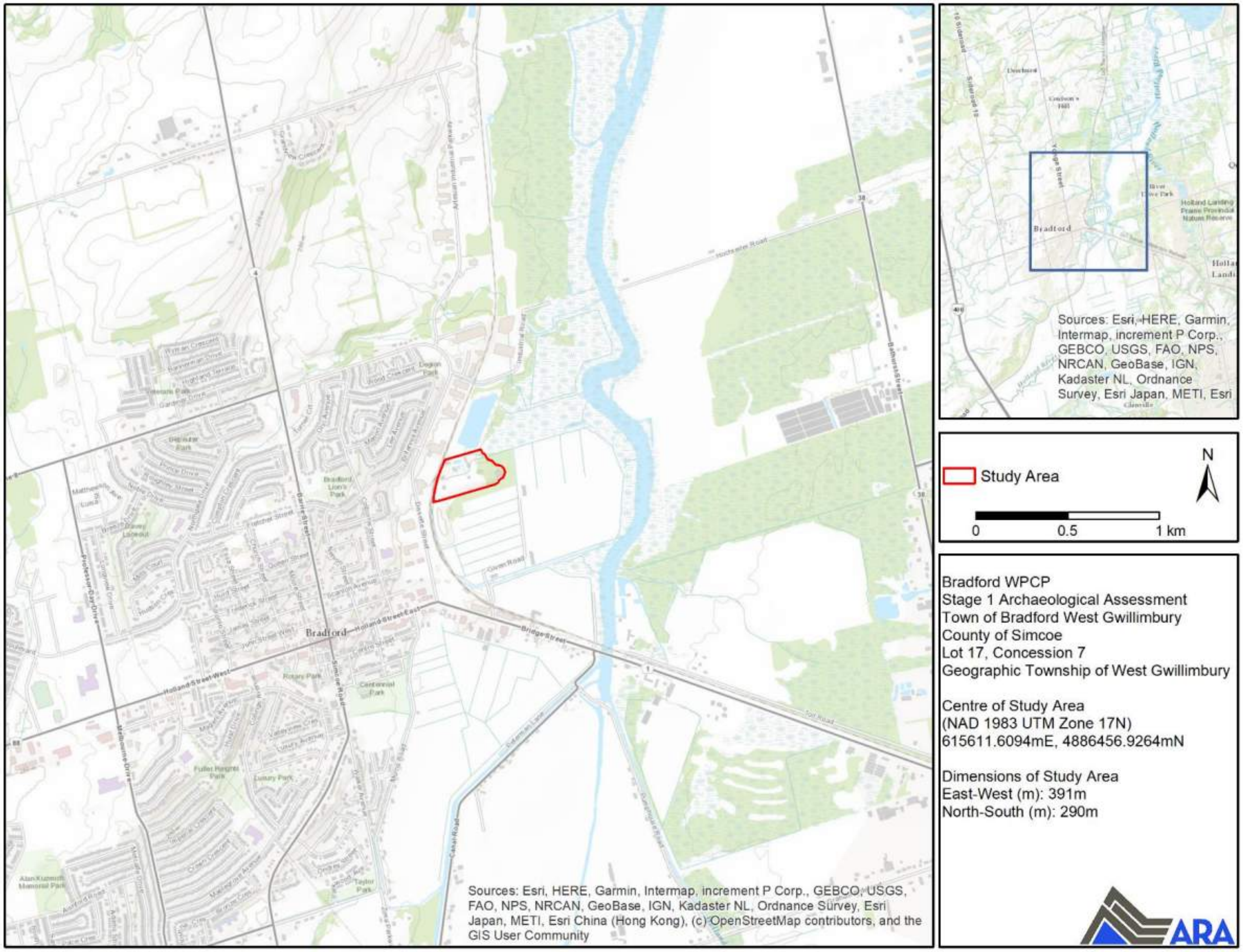

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ARCHAEOLOGY | HERITAGE | OUTREACH | EDUCATION

March 12, 2024

Hiawatha First Nation
431 Hiawatha Line
Hiawatha, ON K9J 0E6

RE: Project Notification – Stage 1 Archaeological Assessment, Bradford Water Pollution Control Plant, Bradford, ON

Dear Tom Cowie and Mandy McGonigle,

Archaeological Research Associates Ltd. (ARA) has been contracted by Hatch for the Stage 1 archaeological assessment to be conducted in support of an Environmental Assessment amendment for the Bradford Water Pollution Control Plant. The study area is approximately 32.71 ha (80.82 ac) in size and on part of Lot 17-18, Concession 7, in the Geographic Township of West Gwillimbury, County of Simcoe (see Map 1).

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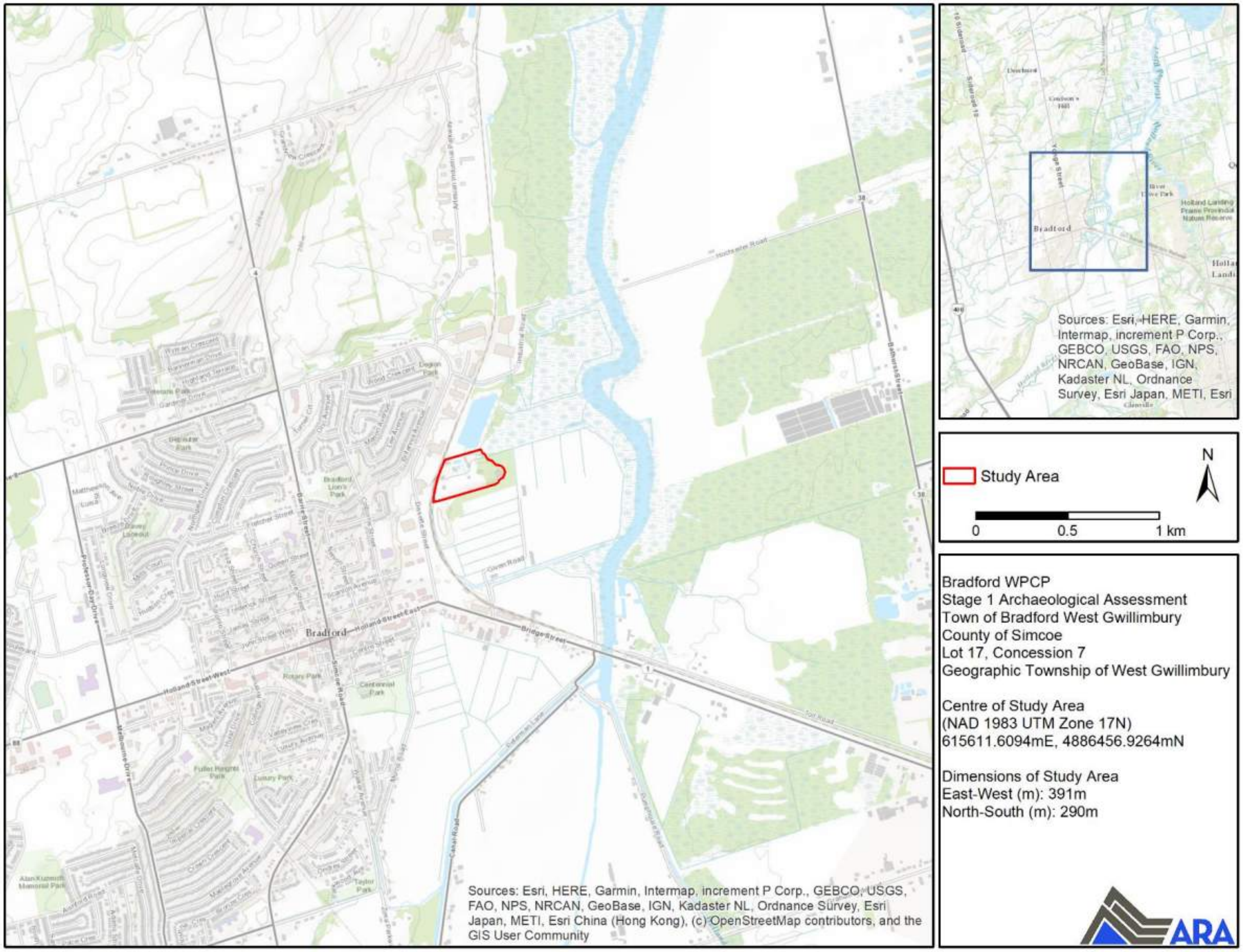

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ARA

ARCHAEOLOGY | HERITAGE | OUTREACH | EDUCATION

March 12, 2024

Huron-Wendat Nation
255 Place Chef Michel Laveau
Wendake, QC G0A 4V0

RE: Project Notification – Stage 1 Archaeological Assessment, Bradford Water Pollution Control Plant, Bradford, ON

Dear Marie-Sophie Gendron and Dominique Lesage,

Archaeological Research Associates Ltd. (ARA) has been contracted by Hatch for the Stage 1 archaeological assessment to be conducted in support of an Environmental Assessment amendment for the Bradford Water Pollution Control Plant. The study area is approximately 32.71 ha (80.82 ac) in size and on part of Lot 17-18, Concession 7, in the Geographic Township of West Gwillimbury, County of Simcoe (see Map 1).

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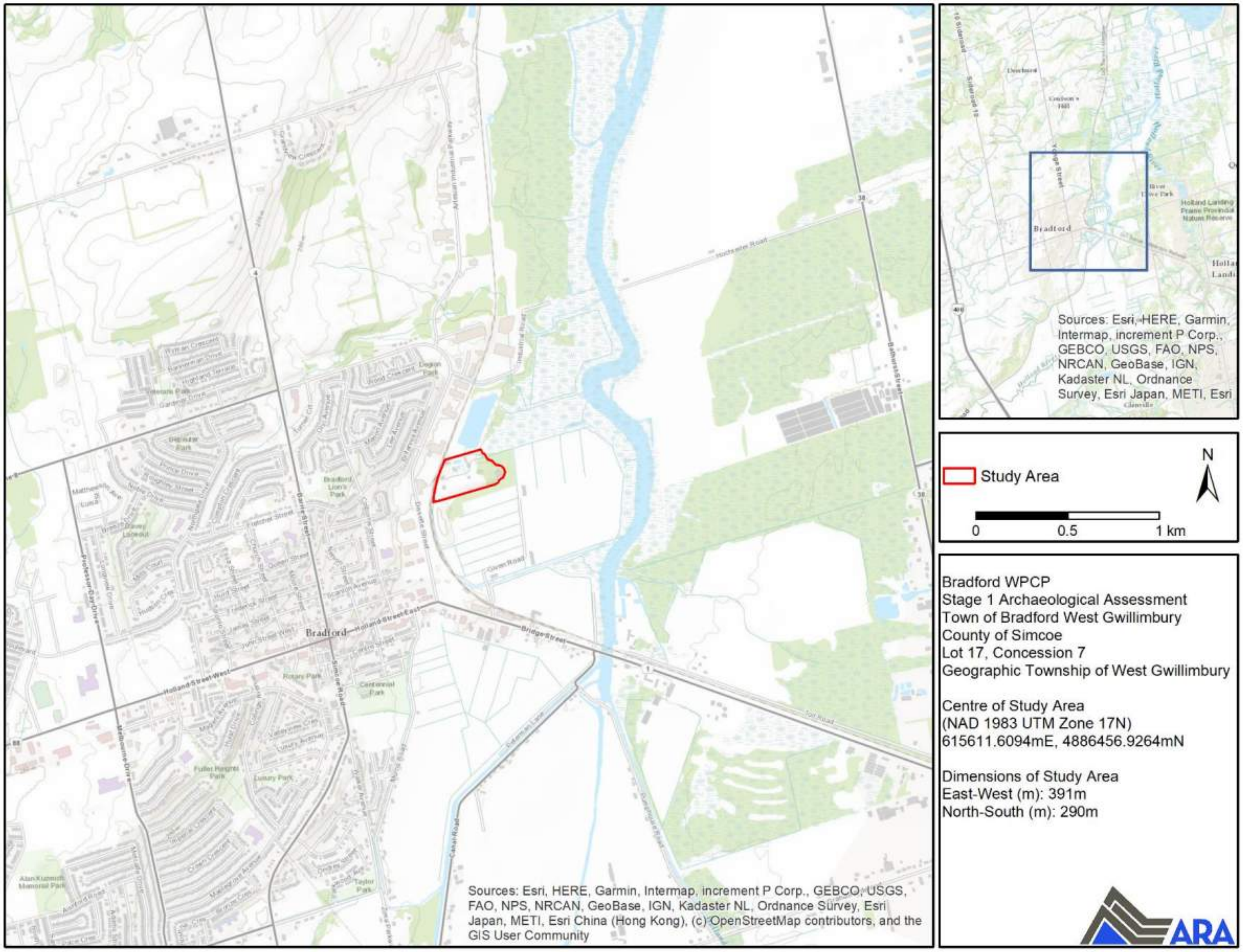

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ARA

ARCHAEOLOGY | HERITAGE | OUTREACH | EDUCATION

March 12, 2024

Mississaugas of Scugog Island First Nation
22521 Island Road
Port Perry, ON L9L 1B6

RE: Project Notification – Stage 1 Archaeological Assessment, Bradford Water Pollution Control Plant, Bradford, ON

Dear Mississaugas of Scugog Island First Nation,

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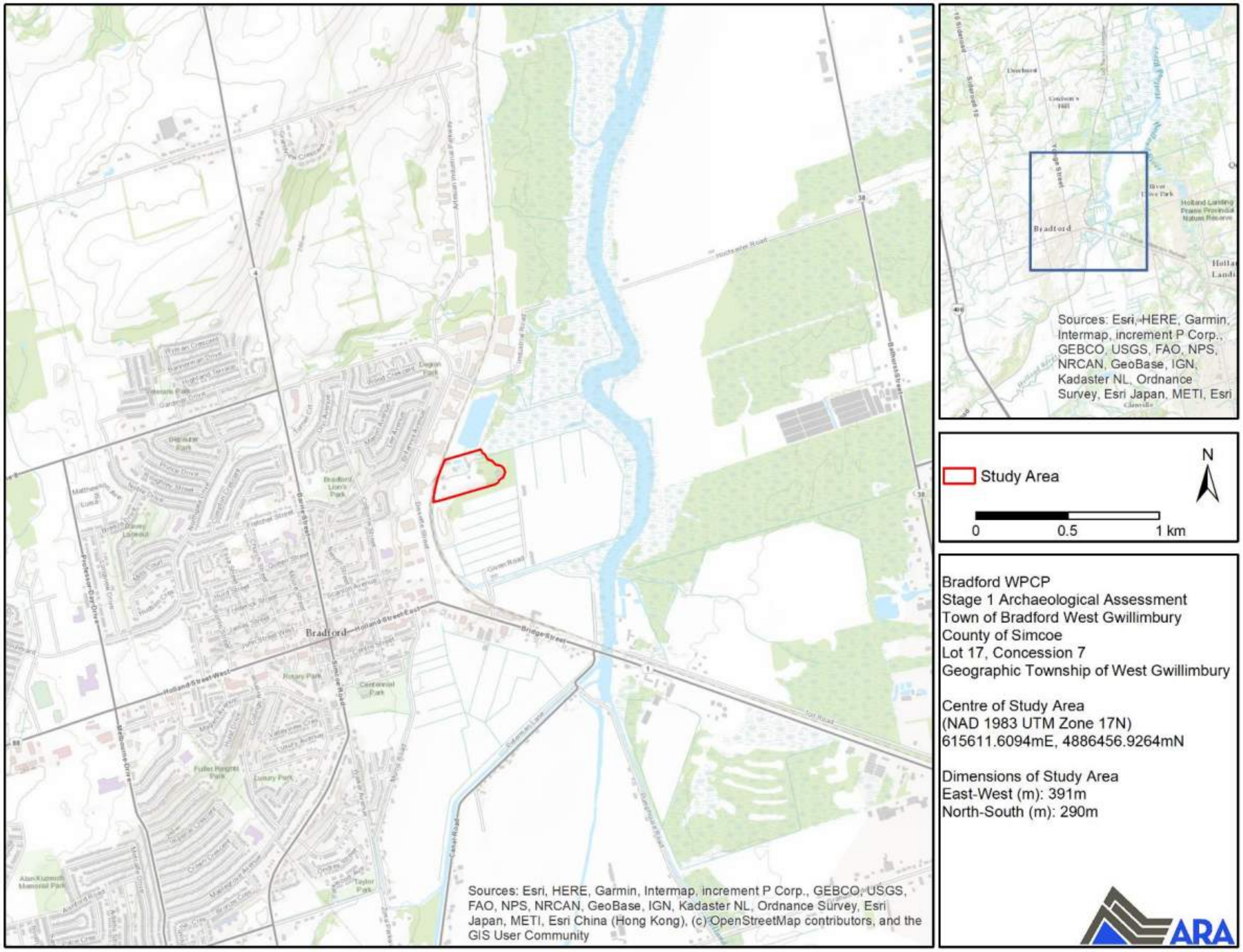

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ARCHAEOLOGY | HERITAGE | OUTREACH | EDUCATION

March 12, 2024

Métis Nation of Ontario
Suite 1100, 11th Floor, 66 Slater Street
Ottawa, ON K1P 5H1

RE: Project Notification – Stage 1 Archaeological Assessment, Bradford Water Pollution Control Plant, Bradford, ON

Dear Métis Nation of Ontario,

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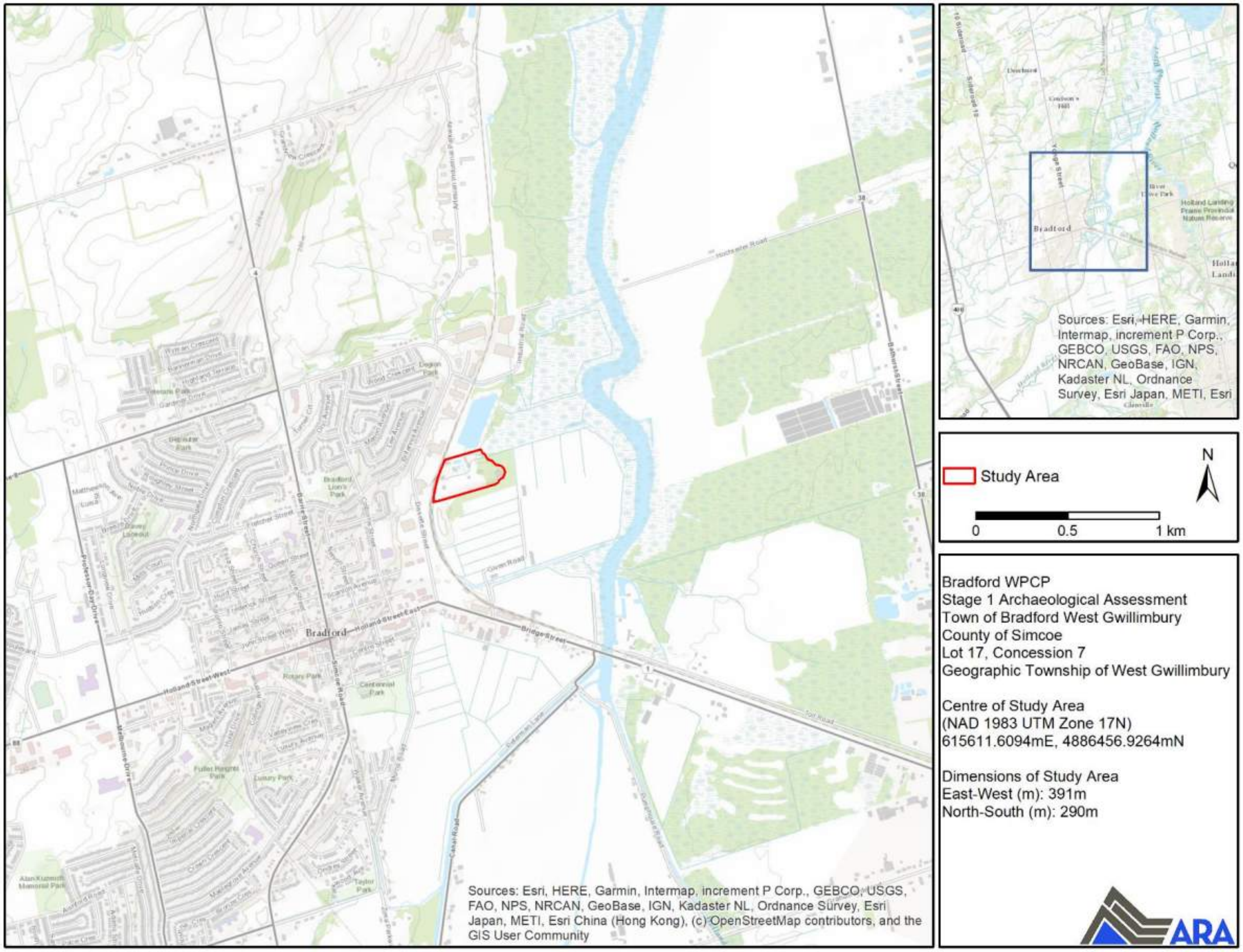

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Minutes of Meeting

H-362455

March 11, 2024

Town of Bradford-West Gwillimbury Bradford Water Pollution Control Plant Tertiary Upgrade

Distribution

Those present +
Taynar Simpson, Alderville First Nation
Oya Koc, Hatch

Alderville First Nation Meeting

Meeting Date: December 8, 2023

Location: Teams

Present:

Dr. Julie Kapyrka, Alderville First Nation (AFN)
Peyman Samimian, Town of Bradford-West Gwillimbury (Town)
Katy Modaressi, (Town)
Mark Armstrong, (Hatch)
Michelle Walters, (Hatch)
Carson Brennen, (Hatch)

Purpose: Follow Up to Draft Report on the Town of Bradford's Water Pollution Control Plant (WPCP) with Alderville First Nation

Opening Remarks: Hatch opened the meeting by welcoming participants and gave an opportunity for attendees to introduce themselves. A land acknowledgement was then provided, and Alderville First Nation (AFN) was asked if they had any comments on the EA addendum or the proposed Project.

Dr. Kapryka (JK) (AFN) Noted that AFN **w**as not able to review documents and would prefer an overview of the project. There was a recent computer hack at AFN and JK requested that all future documents be sent over in either PDF or hard copy form.

Mark Armstrong (MA) (Hatch): Provided general overview of Project, proposed works and documents. Also gave background information to the project and the site location. MA detailed that there was an EA completed just over 10 years ago, which concerned additional upgrades to the tertiary treatment system. The original 2012 EA called for ballasted flocculation treatment. MA explained that the Town preferred a solution that would offer greater discharge protection to Lake Simcoe and therefore are pursuing a membrane technology. This technology would not expand the existing site and would improve discharge into the Holland River.

JK (AFN) Asked about the monitoring plan.

Katy Modaressi (KM) (Town) Detailed that the results of an 8 month pilot study, which used the same conditions and technology, were submitted as part of the email package. KM expanded on the importance of incidence reporting and highlighted the breadth of operational experience the Town has with this technology, as staff were trained at the Keswick Wastewater Treatment Plant (WWTP). KM then discussed how plans aim to increase capacity by over 30% to ensure it meets future demands and potential changes. KM also made clear that City officials and regulators can examine the facility whenever they want, as dictated by regulatory guidelines.

MA (Hatch) Stated that after completion of the tertiary plant, it will be part of the WPCP's monitoring plan to track that it is below the targets.

JK (AFN) Inquired about concerning overflow events, such as Peterborough's.

KM (Town) Confirmed that the Town is obligated to have overflow plans. In the case of the Town WPCP, the facility will keep its original storage pond. The storage pond would bypass the emergency overflow to the River. Originally named in the Environmental Compliance Approval (ECA) as a storage pond, but in actuality, it is not an operational storage pond and meant for emergency situations and processes.

Michelle Walters (MW) (Hatch) Added that the storage pond has not been used in the past 8 years.

KM Noted that that the storage pond is regularly tested for safety.

MA (Hatch) Noted that the Town has a more modern wastewater collection system than other municipalities, such as Peterborough's. The Town has a separate sewage and stormwater collection systems. Peterborough may have combined sewers, which is why there may be overflows. MA provided additional context through an overview of the engineering design.

JK (AFN) Inquired about the expansion of the facility's footprint and if archaeology studies will be required for construction.

KM (Town) Noted that the facility's footprint would not be expanded and confirmed compliance with LSRCA regulation limits. KM then detailed how the Town is working with LSRCA for flood management requirements and storm water management. The Town has regular meetings and communications with LSRCA. The Town has modified elevations in accordance with LSRCA requirements. KM also noted that no trees would be removed, but some grasses or smaller plants could be affected.

MA (Hatch) Noted that the original EA noted no archaeological potential and will confirm if a Stage 2 Archeological Assessment was completed.

KJ (AFN) Requested a copy of the Stage 1 Archeological Study.

ACTION: Provide Dr. Kapryka (AFN) with the Stage 1 Archeological Assessment (Stage 1 AA).

POST MEETING NOTE: Further review of the original EA, as well as Town and MTCS records found that no Stage 1 AA was completed. The Town has engaged ARA to complete a Stage 1 AA.

JK (AFN) Asked whether there will be any additional anticipated future upgrades or expansions to the Facility.

KM (Town) Confirmed that there will be no additional expansion of the facility. KM then explained that the area is targeted by the Province to grow. The current population of the Town is approximately 42,880, however this figure is expected to double by 2051. Based on what future development will look like, and if responsible water use is practiced, then the facility will be able to support the anticipated population growth. The facility must meet regulatory requirements, even if population growth is a factor.

MA (Hatch) Outlined next steps. The EA will follow a submission to the MECP for comments and then a public posting for stakeholder comments. The Proponent would appreciate if Alderville provided written comments.

JK (AFN) For purposes of alignment, JK is interested to see the responses from other First Nations. JK's experience is based in archaeology and will require input from other specialists. JK also has concerns as to why the Huron-Wendat are involved and asked if the Proponent spoke with the Chippewas of Georgina Island First Nation.

KM (Town) Noted that the Town has opened discussions with other First Nations, although few First Nations have accepted meetings.

MA Clarified that the Huron-Wendat were identified by MECP.

JK (AFN) Encouraged the Proponent to follow up with the Chippewas of Georgina Island First Nation, as MECP will require evidence of engagement. Consultation departments are underfunded and difficult to meet with proponents and experience consultation fatigue. JK suggested that other First Nation's may prefer a synopsis of other First Nation concerns to make it easier to understand.

ACTION: Follow up with the Chippewas of Georgina Island First Nations and identified First Nations.

From: megan.devries@araheritage.ca
Sent on: Tuesday, March 12, 2024 9:08:56 AM
To: Community Consultation
CC: craig.ramsoomair@araheritage.ca; Kait Kenel; Armstrong, Mark; psamimian@townofbwg.com
Subject: ARA Project Notification - Bradford WPCP Stage 1 - CRFN
Attachments: ARA Project Notification - Stage 1 Bradford WPCP - CRFN.pdf (493.69 KB)

Good morning!

Archaeological Research Associates Ltd. (ARA) has been contracted by Hatch for the Stage 1 archaeological assessment to be carried out support of an Environmental Assessment amendment for the Bradford Water Pollution Control Plant. Please see the attached letter for specific information about the project and our upcoming assessment. Fieldwork for this project has not yet been scheduled, but is anticipated to begin as soon as possible pending appropriate field conditions

Any necessary agreements for this project will be executed directly with our client. Please forward participation agreements to Peyman Samimian at psamimian@townofbwg.com for review and execution.

We welcome your participation on this project!
Megan.

Megan DeVries, M.A. (she/her)
Indigenous Engagement Advisor
Archaeological Research Associates Ltd.
Hamilton Office: 205 Cannon St East, Hamilton, ON L8L 2A9
Kitchener Office: 465 Maple Ave – Unit 9, Kitchener, ON N2H 6N5
C 519.573.6546 | E megan.devries@araheritage.ca | www.araheritage.ca

ARCHAEOLOGY | HERITAGE | OUTREACH | EDUCATION

Privileged to work within the treaty lands and traditional territories of the Indigenous peoples of Turtle Island.

From: megan.devries@araheritage.ca
Sent on: Tuesday, March 12, 2024 9:08:04 AM
To: Consultation
CC: craig.ramsoomair@araheritage.ca; Kait Kenel; Armstrong, Mark; psamimian@townofbwg.com
Subject: ARA Project Notification - Bradford WPCP Stage 1 - MSIFN
Attachments: ARA Project Notification - Stage 1 Bradford WPCP - MSIFN.pdf (493.76 KB)

Good morning!

Archaeological Research Associates Ltd. (ARA) has been contracted by Hatch for the Stage 1 archaeological assessment to be carried out support of an Environmental Assessment amendment for the Bradford Water Pollution Control Plant. Please see the attached letter for specific information about the project and our upcoming assessment. Fieldwork for this project has not yet been scheduled, but is anticipated to begin as soon as possible pending appropriate field conditions

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We welcome your participation on this project!
Megan.

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Indigenous Engagement Advisor
Archaeological Research Associates Ltd.
Hamilton Office: 205 Cannon St East, Hamilton, ON L8L 2A9
Kitchener Office: 465 Maple Ave – Unit 9, Kitchener, ON N2H 6N5
C 519.573.6546 | E megan.devries@araheritage.ca | www.araheritage.ca

ARA
ARCHAEOLOGY | HERITAGE | OUTREACH | EDUCATION

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From: megan.devries@araheritage.ca
Sent on: Tuesday, March 12, 2024 9:08:53 AM
To: Marie-Sophie Gendron; Dominique Lesage
CC: craig.ramsoomair@araheritage.ca; Kait Kenel; Armstrong, Mark; psamimian@townofbwg.com
Subject: ARA Project Notification - Bradford WPCP Stage 1 - HWN
Attachments: ARA Project Notification - Stage 1 Bradford WPCP - HWN.pdf (495.31 KB)

Good morning!

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ARA
ARCHAEOLOGY | HERITAGE | OUTREACH | EDUCATION

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From: megan.devries@araheritage.ca
Sent on: Tuesday, March 12, 2024 9:09:08 AM
To: Julie Kapyrka
CC: craig.ramsoomair@araheritage.ca; Kait Kenel; Armstrong, Mark; psamimian@townofbwg.com
Subject: ARA Project Notification - Bradford WPCP Stage 1 - AFN
Attachments: ARA Project Notification - Stage 1 Bradford WPCP - AFN.pdf (493.69 KB)

Good morning!

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C 519.573.6546 | E megan.devries@araheritage.ca | www.araheritage.ca

ARA
ARCHAEOLOGY | HERITAGE | OUTREACH | EDUCATION

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From: megan.devries@araheritage.ca
Sent on: Tuesday, March 12, 2024 9:08:54 AM
To: Tom Cowie; Mandy McGonigle
CC: craig.ramsoomair@araheritage.ca; Kait Kenel; Armstrong, Mark; psamimian@townofbwg.com
Subject: ARA Project Notification - Bradford WPCP Stage 1 - HFN
Attachments: ARA Project Notification - Stage 1 Bradford WPCP - HFN.pdf (493.69 KB)

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ARA
ARCHAEOLOGY | HERITAGE | OUTREACH | EDUCATION

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From: megan.devries@araheritage.ca
Sent on: Tuesday, March 12, 2024 9:08:57 AM
To: Consultation Lead
CC: craig.ramsoomair@araheritage.ca; Kait Kenel; Armstrong, Mark; psamimian@townofbwg.com
Subject: ARA Project Notification - Bradford WPCP Stage 1 - CLFN
Attachments: ARA Project Notification - Stage 1 Bradford WPCP - CLFN.pdf (493.7 KB)

Good morning!

Archaeological Research Associates Ltd. (ARA) has been contracted by Hatch for the Stage 1 archaeological assessment to be carried out support of an Environmental Assessment amendment for the Bradford Water Pollution Control Plant. Please see the attached letter for specific information about the project and our upcoming assessment. Fieldwork for this project has not yet been scheduled, but is anticipated to begin as soon as possible pending appropriate field conditions

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Indigenous Engagement Advisor
Archaeological Research Associates Ltd.
Hamilton Office: 205 Cannon St East, Hamilton, ON L8L 2A9
Kitchener Office: 465 Maple Ave – Unit 9, Kitchener, ON N2H 6N5
C 519.573.6546 | E megan.devries@araheritage.ca | www.araheritage.ca

ARA
ARCHAEOLOGY | HERITAGE | OUTREACH | EDUCATION

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From: megan.devries@araheritage.ca
Sent on: Tuesday, March 12, 2024 9:09:00 AM
To: Lua - Consultation Liason (BFN)
CC: craig.ramsoomair@araheritage.ca; Kait Kenel; Armstrong, Mark; psamimian@townofbwg.com
Subject: ARA Project Notification - Bradford WPCP Stage 1 - BFN
Attachments: ARA Project Notification - Stage 1 Bradford WPCP - BFN.pdf (493.73 KB)

Good morning!

Archaeological Research Associates Ltd. (ARA) has been contracted by Hatch for the Stage 1 archaeological assessment to be carried out support of an Environmental Assessment amendment for the Bradford Water Pollution Control Plant. Please see the attached letter for specific information about the project and our upcoming assessment. Fieldwork for this project has not yet been scheduled, but is anticipated to begin as soon as possible pending appropriate field conditions

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We welcome your participation on this project!
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Indigenous Engagement Advisor
Archaeological Research Associates Ltd.
Hamilton Office: 205 Cannon St East, Hamilton, ON L8L 2A9
Kitchener Office: 465 Maple Ave – Unit 9, Kitchener, ON N2H 6N5
C 519.573.6546 | E megan.devries@araheritage.ca | www.araheritage.ca

ARCHAEOLOGY | HERITAGE | OUTREACH | EDUCATION

Privileged to work within the treaty lands and traditional territories of the Indigenous peoples of Turtle Island.

From: megan.devries@araheritage.ca
Sent on: Tuesday, March 12, 2024 9:08:51 AM
To: consultations@metisnation.org
CC: craig.ramsoomair@araheritage.ca; Kait Kenel; Armstrong, Mark; psamimian@townofbwg.com
Subject: ARA Project Notification - Bradford WPCP Stage 1 - MNO
Attachments: ARA Project Notification - Stage 1 Bradford WPCP - MNO.pdf (494.25 KB)

Good morning!

Archaeological Research Associates Ltd. (ARA) has been contracted by Hatch for the Stage 1 archaeological assessment to be carried out support of an Environmental Assessment amendment for the Bradford Water Pollution Control Plant. Please see the attached letter for specific information about the project and our upcoming assessment. Fieldwork for this project has not yet been scheduled, but is anticipated to begin as soon as possible pending appropriate field conditions

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We welcome your participation on this project!
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Hamilton Office: 205 Cannon St East, Hamilton, ON L8L 2A9
Kitchener Office: 465 Maple Ave – Unit 9, Kitchener, ON N2H 6N5
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ARA
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From: megan.devries@araheritage.ca
Sent on: Tuesday, March 12, 2024 9:08:59 AM
To: Natasha.charles@georginaisland.com; JL Porte
CC: craig.ramsoomair@araheritage.ca; Kait Kenel; Armstrong, Mark; psamimian@townofbwg.com
Subject: ARA Project Notification - Bradford WPCP Stage 1 - CGIFN
Attachments: ARA Project Notification - Stage 1 Bradford WPCP - CGIFN.pdf (494.15 KB)

Good morning!

Archaeological Research Associates Ltd. (ARA) has been contracted by Hatch for the Stage 1 archaeological assessment to be carried out support of an Environmental Assessment amendment for the Bradford Water Pollution Control Plant. Please see the attached letter for specific information about the project and our upcoming assessment. Fieldwork for this project has not yet been scheduled, but is anticipated to begin as soon as possible pending appropriate field conditions

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We welcome your participation on this project!
Megan.

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Hamilton Office: 205 Cannon St East, Hamilton, ON L8L 2A9
Kitchener Office: 465 Maple Ave – Unit 9, Kitchener, ON N2H 6N5
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ARA
ARCHAEOLOGY | HERITAGE | OUTREACH | EDUCATION

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255, place Chef Michel Laveau
Wendake (QC) G0A 4V0
T : 418 843-3767
@ : marie-sophie.gendron@wendake.ca

WENDAKE.CA

De : megan.devries@araheritage.ca <megan.devries@araheritage.ca>
Envoyé : 17 juin 2024 08:57
À : Marie-Sophie Gendron <Marie-Sophie.Gendron@wendake.ca>
Cc : craig.ramsoomair@araheritage.ca; 'Kait Kenel' <kait.kenel@araheritage.ca>; michelle.walters@hatch.com; 'Armstrong, Mark' <mark.armstrong@hatch.com>; carson.brennen@hatch.com; psamimian@townofbwg.com; kmodaressi@townofbwg.com
Objet : ARA Report Review - Bradford WPCP Stage 1 - HWN

Good morning,

Please find attached the draft report for your review for the Stage 1 archaeological assessment of *Bradford Water Pollution Control Plant* (ARA Project #2024-0004).

We are hoping to receive your comments regarding the draft report by July 2, 2024, prior to our submission to the MCM. Please advise if this timeframe is not achievable for your review.

Kind regards,
Megan.

Megan DeVries, M.A. (she/her)
Indigenous Engagement Advisor
Archaeological Research Associates Ltd.
Hamilton Office: 50 Nebo Road – Unit 1, Hamilton, ON L8W 2E3
Kitchener Office: 465 Maple Avenue – Unit 9, Kitchener, ON N2H 6N5
C 519.573.6546 | E megan.devries@araheritage.ca | www.araheritage.ca

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ARCHAEOLOGY | HERITAGE | OUTREACH | EDUCATION

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From: megan.devries@araheritage.ca <megan.devries@araheritage.ca>
Sent: Monday, June 17, 2024 8:57 AM
To: 'Julie Kapyrka' <jkapyrka@alderville.ca>
Cc: 'craig.ramsoomair@araheritage.ca' <craig.ramsoomair@araheritage.ca>; 'Kait Kenel' <kait.kenel@araheritage.ca>; 'michelle.walters@hatch.com' <michelle.walters@hatch.com>; 'Armstrong, Mark' <mark.armstrong@hatch.com>; 'carson.brennen@hatch.com' <carson.brennen@hatch.com>; 'psamimian@townofbwg.com' <psamimian@townofbwg.com>; 'kmodaressi@townofbwg.com' <kmodaressi@townofbwg.com>
Subject: ARA Report Review - Bradford WPCP Stage 1 - AFN

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Kind regards,
Megan.

Megan DeVries, M.A. (she/her)
Indigenous Engagement Advisor
Archaeological Research Associates Ltd.
Hamilton Office: 50 Nebo Road – Unit 1, Hamilton, ON L8W 2E3
Kitchener Office: 465 Maple Avenue – Unit 9, Kitchener, ON N2H 6N5
C 519.573.6546 | E megan.devries@araheritage.ca | www.araheritage.ca

ARCHAEOLOGY | HERITAGE | OUTREACH | EDUCATION

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ARA
ARCHAEOLOGY | HERITAGE | OUTREACH | EDUCATION

Privileged to work within the treaty lands and traditional territories of the Indigenous peoples of Turtle Island.

From: Archaeological Program Admin <APAdmin@curvelake.ca>
Sent: Friday, June 28, 2024 1:59 PM
To: megan.devries@araheritage.ca
Subject: ARA Report Review - Bradford WPCP Stage 1 - CLFN

Aaniin Megan,

Thank you for engaging with Curve Lake First Nation on the Stage 1 archaeological assessment report for the Bradford Water Pollution Control Plant in the Town of Bradford-West Gwillimbury. Curve Lake First Nation agrees with Mr. Ramsoomair's recommendations and has no further concerns. I have attached a consultation letter to this email.

Curve Lake First Nation wishes to thank ARA for their continued efforts to engage our community regarding archaeological matters within the shared traditional territories of the Michi Saagig.

Miigwech,

Derek

Derek Paauw
Archaeology Program Administrator
Curve Lake First Nation Government Services Building
22 Winookeeda Road, Curve Lake, ON K0L 1R0
P: 705.657.8045 ext. 237 C:705.957.9549 F: 705.657.8708
W: www.curvelakefirstnation.ca
E: APAdmin@curvelake.ca

From: megan.devries@araheritage.ca <megan.devries@araheritage.ca>
Sent: Monday, June 17, 2024 8:57 AM
To: Archaeological Program Admin <APAdmin@curvelake.ca>
Cc: craig.ramsoomair@araheritage.ca; 'Kait Kenel' <kait.kenel@araheritage.ca>; michelle.walters@hatch.com; 'Armstrong, Mark' <mark.armstrong@hatch.com>; carson.brennen@hatch.com; psamimian@townofbwg.com; kmodaressi@townofbwg.com
Subject: [EXTERNAL]ARA Report Review - Bradford WPCP Stage 1 - CLFN

Good morning,

Please find attached the draft report for your review for the Stage 1 archaeological assessment of *Bradford Water Pollution Control Plant* (ARA Project #2024-0004).

ARCHAEOLOGY | HERITAGE | OUTREACH | EDUCATION

Privileged to work within the treaty lands and traditional territories of the Indigenous peoples of Turtle Island.

From: Community Consultation <consultation@ramafirstnation.ca>
Sent: Tuesday, July 2, 2024 10:35 AM
To: megan.devries@araheritage.ca
Cc: craig.ramsoomair@araheritage.ca; 'Kait Kenel' <kait.kenel@araheritage.ca>; michelle.walters@hatch.com; 'Armstrong, Mark' <mark.armstrong@hatch.com>; carson.brennen@hatch.com; psamimian@townofbwg.com; kmodaressi@townofbwg.com
Subject: RE: ARA Report Review - Bradford WPCP Stage 1 - CRFN

Hi Megan,

Thanks for sending and my apologies for deadline day response. We have no concerns with the Stage 1 and understand that due to disturbance there is no archaeological potential. I ask that ARA include Rama's brief history alongside the Michi Saagiig oral historical component, which is attached. Can you also include this in future ARA reports?

Miigwech,

Ben

Ben Cousineau
Community Researcher/Archivist, Communications
Chippewas of Rama First Nation
(ph) 705-325-3611,1288
(cell)
(fax) 705-325-0879
(url) www.ramafirstnation.ca

From: megan.devries@araheritage.ca <megan.devries@araheritage.ca>
Sent: June 17, 2024 8:57 AM
To: Community Consultation <consultation@ramafirstnation.ca>
Cc: craig.ramsoomair@araheritage.ca; 'Kait Kenel' <kait.kenel@araheritage.ca>; michelle.walters@hatch.com; 'Armstrong, Mark' <mark.armstrong@hatch.com>; carson.brennen@hatch.com; psamimian@townofbwg.com; kmodaressi@townofbwg.com
Subject: ARA Report Review - Bradford WPCP Stage 1 - CRFN

Good morning,

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Kind regards,
Megan.

Megan DeVries, M.A. (she/her)

ARCHAEOLOGY | HERITAGE | OUTREACH | EDUCATION

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From: megan.devries@araheritage.ca <megan.devries@araheritage.ca>
Sent: Tuesday, July 2, 2024 10:12 AM
To: 'Consultation' <consultation@scugogfirstnation.com>
Cc: craig.ramsoomair@araheritage.ca; 'Kait Kenel' <kait.kenel@araheritage.ca>; michelle.walters@hatch.com; 'Armstrong, Mark' <mark.armstrong@hatch.com>; carson.brennen@hatch.com; psamimian@townofbwg.com; kmodaressi@townofbwg.com
Subject: RE: ARA Report Review - Bradford WPCP Stage 1 - MSIFN

Hello,

I hope all is well! I am writing to check in on this report review. If we could receive your comments by Friday, July 5, that would be wonderful!

Thank you,
Megan.

Megan DeVries, M.A. (she/her)
Indigenous Engagement Advisor
Archaeological Research Associates Ltd.
Hamilton Office: 50 Nebo Road – Unit 1, Hamilton, ON L8W 2E3
Kitchener Office: 465 Maple Avenue – Unit 9, Kitchener, ON N2H 6N5
C 519.573.6546 | E megan.devries@araheritage.ca | www.araheritage.ca

ARCHAEOLOGY | HERITAGE | OUTREACH | EDUCATION

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From: megan.devries@araheritage.ca <megan.devries@araheritage.ca>
Sent: Monday, June 17, 2024 8:56 AM
To: 'Consultation' <consultation@scugogfirstnation.com>
Cc: 'craig.ramsoomair@araheritage.ca' <craig.ramsoomair@araheritage.ca>; 'Kait Kenel' <kait.kenel@araheritage.ca>; 'michelle.walters@hatch.com' <michelle.walters@hatch.com>; 'Armstrong, Mark' <mark.armstrong@hatch.com>; 'carson.brennen@hatch.com' <carson.brennen@hatch.com>; 'psamimian@townofbwg.com' <psamimian@townofbwg.com>; 'kmodaressi@townofbwg.com' <kmodaressi@townofbwg.com>
Subject: ARA Report Review - Bradford WPCP Stage 1 - MSIFN

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ARCHAEOLOGY | HERITAGE | OUTREACH | EDUCATION

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From: megan.devries@araheritage.ca <megan.devries@araheritage.ca>
Sent: Tuesday, July 2, 2024 10:13 AM
To: 'Tom Cowie' <tcowie@hiawathafn.ca>; 'Mandy McGonigle' <mmcgonigle@hiawathafn.ca>
Cc: craig.ramsoomair@araheritage.ca; 'Kait Kenel' <kait.kenel@araheritage.ca>; michelle.walters@hatch.com; 'Armstrong, Mark' <mark.armstrong@hatch.com>; carson.brennen@hatch.com; psamimian@townofbwg.com; kmodaressi@townofbwg.com
Subject: RE: ARA Report Review - Bradford WPCP Stage 1 - HFN

Hi Mandy,

I hope all is well! I am writing to check in on this report review. If we could receive your comments by Friday, July 5, that would be wonderful!

Thank you,
Megan.

Megan DeVries, M.A. (she/her)
Indigenous Engagement Advisor
Archaeological Research Associates Ltd.
Hamilton Office: 50 Nebo Road – Unit 1, Hamilton, ON L8W 2E3
Kitchener Office: 465 Maple Avenue – Unit 9, Kitchener, ON N2H 6N5
C 519.573.6546 | E megan.devries@araheritage.ca | www.araheritage.ca

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From: megan.devries@araheritage.ca <megan.devries@araheritage.ca>
Sent: Monday, June 17, 2024 8:57 AM
To: 'Tom Cowie' <tcowie@hiawathafn.ca>; 'Mandy McGonigle' <mmcgonigle@hiawathafn.ca>
Cc: 'craig.ramsoomair@araheritage.ca' <craig.ramsoomair@araheritage.ca>; 'Kait Kenel' <kait.kenel@araheritage.ca>; 'michelle.walters@hatch.com' <michelle.walters@hatch.com>; 'Armstrong, Mark' <mark.armstrong@hatch.com>; 'carson.brennen@hatch.com' <carson.brennen@hatch.com>; 'psamimian@townofbwg.com' <psamimian@townofbwg.com>; 'kmodaressi@townofbwg.com' <kmodaressi@townofbwg.com>
Subject: ARA Report Review - Bradford WPCP Stage 1 - HFN

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Hamilton Office: 50 Nebo Road – Unit 1, Hamilton, ON L8W 2E3
Kitchener Office: 465 Maple Avenue – Unit 9, Kitchener, ON N2H 6N5
C 519.573.6546 | E megan.devries@araheritage.ca | www.araheritage.ca

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Privileged to work within the treaty lands and traditional territories of the Indigenous peoples of Turtle Island.

From: Julie Kapyrka <jkapyrka@alderville.ca>
Sent: Friday, July 5, 2024 10:16 AM
To: megan.devries@araheritage.ca
Cc: craig.ramsoomair@araheritage.ca; 'Kait Kenel' <kait.kenel@araheritage.ca>; michelle.walters@hatch.com; 'Armstrong, Mark' <mark.armstrong@hatch.com>; carson.brennen@hatch.com; psamimian@townofbwg.com; kmodaressi@townofbwg.com
Subject: RE: ARA Report Review - Bradford WPCP Stage 1 - AFN

Aaniin Megan,

Apologies, I do not have the time.

Miiwgech,

Dr. Julie Kapyrka
Consultation Coordinator

Alderville First Nation

Administration Office
11696 Second Line Rd.
Roseneath, ON K0K 2X0
Office: 905-352-2662
jkapyrka@alderville.ca

From: megan.devries@araheritage.ca <megan.devries@araheritage.ca>
Sent: Tuesday, July 2, 2024 10:13 AM
To: Julie Kapyrka <jkapyrka@alderville.ca>
Cc: craig.ramsoomair@araheritage.ca; 'Kait Kenel' <kait.kenel@araheritage.ca>; michelle.walters@hatch.com; 'Armstrong, Mark' <mark.armstrong@hatch.com>; carson.brennen@hatch.com; psamimian@townofbwg.com; kmodaressi@townofbwg.com
Subject: RE: ARA Report Review - Bradford WPCP Stage 1 - AFN

Hi Julie,

I hope all is well! I am writing to check in on this report review. If we could receive your comments by Friday, July 5, that would be wonderful!

Thank you,
Megan.

Megan DeVries, M.A. (she/her)
Indigenous Engagement Advisor
Archaeological Research Associates Ltd.
Hamilton Office: 50 Nebo Road – Unit 1, Hamilton, ON L8W 2E3
Kitchener Office: 465 Maple Avenue – Unit 9, Kitchener, ON N2H 6N5
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From: megan.devries@araheritage.ca <megan.devries@araheritage.ca>
Sent: Tuesday, July 2, 2024 10:13 AM
To: 'Natasha Charles' <natasha.charles@georginaisland.com>; 'JL Porte' <jl.porte@georginaisland.com>
Cc: craig.ramsoomair@araheritage.ca; 'Kait Kenel' <kait.kenel@araheritage.ca>; michelle.walters@hatch.com; 'Armstrong, Mark' <mark.armstrong@hatch.com>; carson.brennen@hatch.com; psamimian@townofbwg.com; kmodaressi@townofbwg.com
Subject: RE: ARA Report Review - Bradford WPCP Stage 1 - CGIFN

Hi J.L.,

I hope all is well! I am writing to check in on this report review. If we could receive your comments by Friday, July 5, that would be wonderful!

Thank you,
Megan.

Megan DeVries, M.A. (she/her)
Indigenous Engagement Advisor
Archaeological Research Associates Ltd.
Hamilton Office: 50 Nebo Road – Unit 1, Hamilton, ON L8W 2E3
Kitchener Office: 465 Maple Avenue – Unit 9, Kitchener, ON N2H 6N5
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From: megan.devries@araheritage.ca <megan.devries@araheritage.ca>
Sent: Monday, June 17, 2024 8:57 AM
To: 'Natasha Charles' <natasha.charles@georginaisland.com>; 'JL Porte' <jl.porte@georginaisland.com>
Cc: 'craig.ramsoomair@araheritage.ca' <craig.ramsoomair@araheritage.ca>; 'Kait Kenel' <kait.kenel@araheritage.ca>; 'michelle.walters@hatch.com' <michelle.walters@hatch.com>; 'Armstrong, Mark' <mark.armstrong@hatch.com>; 'carson.brennen@hatch.com' <carson.brennen@hatch.com>; 'psamimian@townofbwg.com' <psamimian@townofbwg.com>; 'kmodaressi@townofbwg.com' <kmodaressi@townofbwg.com>
Subject: ARA Report Review - Bradford WPCP Stage 1 - CGIFN

Good morning,

Please find attached the draft report for your review for the Stage 1 archaeological assessment of *Bradford Water Pollution Control Plant* (ARA Project #2024-0004).

We are hoping to receive your comments regarding the draft report by July 2, 2024, prior to our submission to the MCM. Please advise if this timeframe is not achievable for your review.

Kind regards,
Megan.

Megan DeVries, M.A. (she/her)
Indigenous Engagement Advisor
Archaeological Research Associates Ltd.
Hamilton Office: 50 Nebo Road – Unit 1, Hamilton, ON L8W 2E3
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From: megan.devries@araheritage.ca <megan.devries@araheritage.ca>
Sent: Tuesday, July 2, 2024 10:13 AM
To: consultations@metisnation.org
Cc: craig.ramsoomair@araheritage.ca; 'Kait Kenel' <kait.kenel@araheritage.ca>; michelle.walters@hatch.com; 'Armstrong, Mark' <mark.armstrong@hatch.com>; carson.brennen@hatch.com; psamimian@townofbwg.com; kmodaressi@townofbwg.com
Subject: RE: ARA Report Review - Bradford WPCP Stage 1 - MNO

Hello,

I hope all is well! I am writing to check in on this report review. If we could receive your comments by Friday, July 5, that would be wonderful!

Thank you,
Megan.

Megan DeVries, M.A. (she/her)
Indigenous Engagement Advisor
Archaeological Research Associates Ltd.
Hamilton Office: 50 Nebo Road – Unit 1, Hamilton, ON L8W 2E3
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C 519.573.6546 | E megan.devries@araheritage.ca | www.araheritage.ca

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From: megan.devries@araheritage.ca <megan.devries@araheritage.ca>
Sent: Monday, June 17, 2024 8:57 AM
To: 'consultations@metisnation.org' <consultations@metisnation.org>
Cc: 'craig.ramsoomair@araheritage.ca' <craig.ramsoomair@araheritage.ca>; 'Kait Kenel' <kait.kenel@araheritage.ca>; 'michelle.walters@hatch.com' <michelle.walters@hatch.com>; 'Armstrong, Mark' <mark.armstrong@hatch.com>; 'carson.brennen@hatch.com' <carson.brennen@hatch.com>; 'psamimian@townofbwg.com' <psamimian@townofbwg.com>; 'kmodaressi@townofbwg.com' <kmodaressi@townofbwg.com>
Subject: ARA Report Review - Bradford WPCP Stage 1 - MNO

Good morning,

Please find attached the draft report for your review for the Stage 1 archaeological assessment of *Bradford Water Pollution Control Plant* (ARA Project #2024-0004).

We are hoping to receive your comments regarding the draft report by July 2, 2024, prior to our submission to the MCM. Please advise if this timeframe is not achievable for your review.

Kind regards,
Megan.

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From: megan.devries@araheritage.ca <megan.devries@araheritage.ca>
Sent: Tuesday, July 2, 2024 10:13 AM
To: 'Lua - Consultation Liason (BFN)' <bfnconsultation@chimnissing.ca>
Cc: craig.ramsoomair@araheritage.ca; 'Kait Kenel' <kait.kenel@araheritage.ca>; michelle.walters@hatch.com; 'Armstrong, Mark' <mark.armstrong@hatch.com>; carson.brennen@hatch.com; psamimian@townofbwg.com; kmodaressi@townofbwg.com
Subject: RE: ARA Report Review - Bradford WPCP Stage 1 - BFN

Hi Lua,

I hope all is well! I am writing to check in on this report review. If we could receive your comments by Friday, July 5, that would be wonderful!

Thank you,
Megan.

Megan DeVries, M.A. (she/her)
Indigenous Engagement Advisor
Archaeological Research Associates Ltd.
Hamilton Office: 50 Nebo Road – Unit 1, Hamilton, ON L8W 2E3
Kitchener Office: 465 Maple Avenue – Unit 9, Kitchener, ON N2H 6N5
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From: megan.devries@araheritage.ca <megan.devries@araheritage.ca>
Sent: Monday, June 17, 2024 8:57 AM
To: 'Lua - Consultation Liason (BFN)' <bfnconsultation@chimnissing.ca>
Cc: 'craig.ramsoomair@araheritage.ca' <craig.ramsoomair@araheritage.ca>; 'Kait Kenel' <kait.kenel@araheritage.ca>; 'michelle.walters@hatch.com' <michelle.walters@hatch.com>; 'Armstrong, Mark' <mark.armstrong@hatch.com>; 'carson.brennen@hatch.com' <carson.brennen@hatch.com>; 'psamimian@townofbwg.com' <psamimian@townofbwg.com>; 'kmodaressi@townofbwg.com' <kmodaressi@townofbwg.com>
Subject: ARA Report Review - Bradford WPCP Stage 1 - BFN

Good morning,

Please find attached the draft report for your review for the Stage 1 archaeological assessment of *Bradford Water Pollution Control Plant* (ARA Project #2024-0004).

We are hoping to receive your comments regarding the draft report by July 2, 2024, prior to our submission to the MCM. Please advise if this timeframe is not achievable for your review.

Kind regards,
Megan.

From: megan.devries@araheritage.ca
Sent on: Wednesday, July 31, 2024 1:55:15 PM
To: craig.ramsoomair@araheritage.ca; Lua - Consultation Liason (BFN)
CC: Kait Kenel; Walters, Michelle; Armstrong, Mark; Brennen, Carson; psamimian@townofbwg.com; kmodaressi@townofbwg.com
Subject: RE: ARA Report Review - Bradford WPCP Stage 1 - BFN
Attachments: St 1 - Bradford Water Pollution Control Plant RE (Draft 30-07-2024).pdf (8.12 MB)

Good afternoon,

Please find attached the revised report for your records.

Sincerely,
Megan.

Megan DeVries, M.A. (she/her)
Indigenous Engagement Advisor
Archaeological Research Associates Ltd.
Hamilton Office: 50 Nebo Road – Unit 1, Hamilton, ON L8W 2E3
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From: craig.ramsoomair@araheritage.ca <craig.ramsoomair@araheritage.ca>
Sent: Tuesday, July 9, 2024 2:57 PM
To: megan.devries@araheritage.ca; 'Lua - Consultation Liason (BFN)' <bfnconsultation@chimnissing.ca>
Cc: 'Kait Kenel' <kait.kenel@araheritage.ca>; michelle.walters@hatch.com; 'Armstrong, Mark' <mark.armstrong@hatch.com>; carson.brennen@hatch.com; psamimian@townofbwg.com; kmodaressi@townofbwg.com
Subject: RE: ARA Report Review - Bradford WPCP Stage 1 - BFN

Hello,

As a quick update to the previous e-mail, we will be waiting until July 15th to submit the report to MCM if you are still interested in providing comments on the report draft (re-attached for convenience).

All the best,
Craig Ramsoomair, M. A (He/him)
Division Manager – Environmental Assessments and Renewables
Archaeological Research Associates Ltd.
Hamilton Office: 50 Nebo Road, Unit 1, Hamilton, ON L8W 2E3
Kitchener Office: 465 Maple Ave- Unit 9, Kitchener, ON N2H 6N5
C 416.997.5180 | E craig.ramsoomair@araheritage.ca | www.araheritage.ca

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Privileged to work within the treaty lands and traditional territories of the Indigenous peoples of Turtle Island.

From: megan.devries@araheritage.ca
Sent on: Wednesday, July 31, 2024 1:55:15 PM
To: Archaeological Program Admin
CC: craig.ramsoomair@araheritage.ca; kait.kenel@araheritage.ca; Walters, Michelle; Armstrong, Mark; Brennen, Carson; psamimian@townofbwg.com; kmodaressi@townofbwg.com
Subject: RE: ARA Report Review - Bradford WPCP Stage 1 - CLFN
Attachments: St 1 - Bradford Water Pollution Control Plant RE (Draft 30-07-2024).pdf (8.12 MB)

Hi Derek,

We have made a few minor (non-substantive) additional revisions to this report. Please find attached for your records.

Cheers,
Megan.

Megan DeVries, M.A. (she/her)
Indigenous Engagement Advisor
Archaeological Research Associates Ltd.
Hamilton Office: 50 Nebo Road – Unit 1, Hamilton, ON L8W 2E3
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Privileged to work within the treaty lands and traditional territories of the Indigenous peoples of Turtle Island.

From: megan.devries@araheritage.ca <megan.devries@araheritage.ca>
Sent: Tuesday, July 2, 2024 8:26 AM
To: 'Archaeological Program Admin' <APAdmin@curvelake.ca>
Cc: 'craig.ramsoomair@araheritage.ca' <craig.ramsoomair@araheritage.ca>; 'kait.kenel@araheritage.ca' <kait.kenel@araheritage.ca>; 'michelle.walters@hatch.com' <michelle.walters@hatch.com>; 'Armstrong, Mark' <mark.armstrong@hatch.com>; 'carson.brennen@hatch.com' <carson.brennen@hatch.com>; 'psamimian@townofbwg.com' <psamimian@townofbwg.com>; 'kmodaressi@townofbwg.com' <kmodaressi@townofbwg.com>
Subject: RE: ARA Report Review - Bradford WPCP Stage 1 - CLFN

Thank you, Derek!

Best,
Megan.

Megan DeVries, M.A. (she/her)
Indigenous Engagement Advisor
Archaeological Research Associates Ltd.
Hamilton Office: 50 Nebo Road – Unit 1, Hamilton, ON L8W 2E3
Kitchener Office: 465 Maple Avenue – Unit 9, Kitchener, ON N2H 6N5
C 519.573.6546 | E megan.devries@araheritage.ca | www.araheritage.ca

We are hoping to receive your comments regarding the draft report by July 2, 2024, prior to our submission to the MCM. Please advise if this timeframe is not achievable for your review.

Kind regards,
Megan.

Megan DeVries, M.A. (she/her)
Indigenous Engagement Advisor
Archaeological Research Associates Ltd.
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From: megan.devries@araheritage.ca
Sent on: Wednesday, July 31, 2024 1:55:08 PM
To: craig.ramsoomair@araheritage.ca; Community Consultation
CC: Kait Kenel; Walters, Michelle; Armstrong, Mark; Brennen, Carson; psamimian@townofbwg.com; kmodaressi@townofbwg.com
Subject: RE: ARA Report Review - Bradford WPCP Stage 1 - CRFN
Attachments: St 1 - Bradford Water Pollution Control Plant RE (Draft 30-07-2024).pdf (8.12 MB)

Hi Ben,

We have made a few minor (non-substantive) additional revisions to this report. Please find attached for your records.

Cheers,
Megan.

Megan DeVries, M.A. (she/her)
Indigenous Engagement Advisor
Archaeological Research Associates Ltd.
Hamilton Office: 50 Nebo Road – Unit 1, Hamilton, ON L8W 2E3
Kitchener Office: 465 Maple Avenue – Unit 9, Kitchener, ON N2H 6N5
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From: craig.ramsoomair@araheritage.ca <craig.ramsoomair@araheritage.ca>
Sent: Tuesday, July 2, 2024 3:19 PM
To: 'Community Consultation' <consultation@ramafirstnation.ca>; megan.devries@araheritage.ca
Cc: 'Kait Kenel' <kait.kenel@araheritage.ca>; michelle.walters@hatch.com; 'Armstrong, Mark' <mark.armstrong@hatch.com>; carson.brennen@hatch.com; psamimian@townofbwg.com; kmodaressi@townofbwg.com
Subject: RE: ARA Report Review - Bradford WPCP Stage 1 - CRFN

Thank you for reviewing the report, Ben. We are happy to include the Rama's history in the report. Please see the updated report attached. If you have any additional questions or concerns, please don't hesitate to reach out.

Thanks,
Craig Ramsoomair, M. A (He/him)
Division Manager – Environmental Assessments and Renewables
Archaeological Research Associates Ltd.
Hamilton Office: 50 Nebo Road, Unit 1, Hamilton, ON L8W 2E3
Kitchener Office: 465 Maple Ave- Unit 9, Kitchener, ON N2H 6N5
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From: megan.devries@araheritage.ca
Sent on: Wednesday, July 31, 2024 1:55:05 PM
To: craig.ramsoomair@araheritage.ca; Consultation
CC: Kait Kenel; Walters, Michelle; Armstrong, Mark; Brennen, Carson; psamimian@townofbwg.com; kmodaressi@townofbwg.com
Subject: RE: ARA Report Review - Bradford WPCP Stage 1 - MSIFN
Attachments: St 1 - Bradford Water Pollution Control Plant RE (Draft 30-07-2024).pdf (8.12 MB)

Good afternoon,

Please find attached the revised report for your records.

Sincerely,
Megan.

Megan DeVries, M.A. (she/her)
Indigenous Engagement Advisor
Archaeological Research Associates Ltd.
Hamilton Office: 50 Nebo Road – Unit 1, Hamilton, ON L8W 2E3
Kitchener Office: 465 Maple Avenue – Unit 9, Kitchener, ON N2H 6N5
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From: craig.ramsoomair@araheritage.ca <craig.ramsoomair@araheritage.ca>
Sent: Tuesday, July 9, 2024 2:57 PM
To: megan.devries@araheritage.ca; 'Consultation' <consultation@scugogfirstnation.com>
Cc: 'Kait Kenel' <kait.kenel@araheritage.ca>; michelle.walters@hatch.com; 'Armstrong, Mark' <mark.armstrong@hatch.com>; carson.brennen@hatch.com; psamimian@townofbwg.com; kmodaressi@townofbwg.com
Subject: RE: ARA Report Review - Bradford WPCP Stage 1 - MSIFN

Hello,

As a quick update to the previous e-mail, we will be waiting until July 15th to submit the report to MCM if you are still interested in providing comments on the report draft (re-attached for convenience).

All the best,
Craig Ramsoomair, M. A (He/him)
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From: megan.devries@araheritage.ca
Sent on: Wednesday, July 31, 2024 2:02:42 PM
To: craig.ramsoomair@araheritage.ca; Tom Cowie; Mandy McGonigle
CC: Kait Kenel; Walters, Michelle; Armstrong, Mark; Brennen, Carson; psamimian@townofbwg.com; kmodaressi@townofbwg.com
Subject: RE: ARA Report Review - Bradford WPCP Stage 1 - HFN
Attachments: St 1 - Bradford Water Pollution Control Plant RE (Draft 30-07-2024).pdf (8.12 MB)

Good afternoon,

Please find attached the revised report for your records.

Sincerely,
Megan.

Megan DeVries, M.A. (she/her)
Indigenous Engagement Advisor
Archaeological Research Associates Ltd.
Hamilton Office: 50 Nebo Road – Unit 1, Hamilton, ON L8W 2E3
Kitchener Office: 465 Maple Avenue – Unit 9, Kitchener, ON N2H 6N5
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From: craig.ramsoomair@araheritage.ca <craig.ramsoomair@araheritage.ca>
Sent: Tuesday, July 9, 2024 2:58 PM
To: megan.devries@araheritage.ca; 'Tom Cowie' <tcowie@hiawathafn.ca>; 'Mandy McGonigle' <mmcgonigle@hiawathafn.ca>
Cc: 'Kait Kenel' <kait.kenel@araheritage.ca>; michelle.walters@hatch.com; 'Armstrong, Mark' <mark.armstrong@hatch.com>; carson.brennen@hatch.com; psamimian@townofbwg.com; kmodaressi@townofbwg.com
Subject: RE: ARA Report Review - Bradford WPCP Stage 1 - HFN

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All the best,
Craig Ramsoomair, M. A (He/him)
Division Manager – Environmental Assessments and Renewables
Archaeological Research Associates Ltd.
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From: megan.devries@araheritage.ca
Sent on: Wednesday, July 31, 2024 1:55:15 PM
To: craig.ramsoomair@araheritage.ca; Julie Kapyrka
CC: Kait Kenel; Walters, Michelle; Armstrong, Mark; Brennen, Carson; psamimian@townofbwg.com; kmodaressi@townofbwg.com
Subject: RE: ARA Report Review - Bradford WPCP Stage 1 - AFN
Attachments: St 1 - Bradford Water Pollution Control Plant RE (Draft 30-07-2024).pdf (8.12 MB)

Hello Julie,

Please find attached the revised report for your records.

Sincerely,
Megan.

Megan DeVries, M.A. (she/her)
Indigenous Engagement Advisor
Archaeological Research Associates Ltd.
Hamilton Office: 50 Nebo Road – Unit 1, Hamilton, ON L8W 2E3
Kitchener Office: 465 Maple Avenue – Unit 9, Kitchener, ON N2H 6N5
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From: craig.ramsoomair@araheritage.ca <craig.ramsoomair@araheritage.ca>
Sent: Tuesday, July 9, 2024 2:46 PM
To: 'Julie Kapyrka' <jkapyrka@alderville.ca>; megan.devries@araheritage.ca
Cc: 'Kait Kenel' <kait.kenel@araheritage.ca>; michelle.walters@hatch.com; 'Armstrong, Mark' <mark.armstrong@hatch.com>; carson.brennen@hatch.com; psamimian@townofbwg.com; kmodaressi@townofbwg.com
Subject: RE: ARA Report Review - Bradford WPCP Stage 1 - AFN

Hi Julie,

Thanks for letting us know. What timeline would you need to be able to review the Stage 1 report? We will be waiting until at least July 15th for other comments before moving forward with the draft report so please let us know!

Thanks,
Craig Ramsoomair, M. A (He/him)
Division Manager – Environmental Assessments and Renewables
Archaeological Research Associates Ltd.
Hamilton Office: 50 Nebo Road, Unit 1, Hamilton, ON L8W 2E3
Kitchener Office: 465 Maple Ave- Unit 9, Kitchener, ON N2H 6N5
C 416.997.5180 | E craig.ramsoomair@araheritage.ca | www.araheritage.ca

From: megan.devries@araheritage.ca
Sent on: Wednesday, July 31, 2024 1:55:08 PM
To: craig.ramsoomair@araheritage.ca; Natasha Charles; JL Porte
CC: Kait Kenel; Walters, Michelle; Armstrong, Mark; Brennen, Carson; psamimian@townofbwg.com; kmodaressi@townofbwg.com
Subject: RE: ARA Report Review - Bradford WPCP Stage 1 - CGIFN
Attachments: St 1 - Bradford Water Pollution Control Plant RE (Draft 30-07-2024).pdf (8.12 MB)

Good afternoon,

Please find attached the revised report for your records.

Sincerely,
Megan.

Megan DeVries, M.A. (she/her)
Indigenous Engagement Advisor
Archaeological Research Associates Ltd.
Hamilton Office: 50 Nebo Road – Unit 1, Hamilton, ON L8W 2E3
Kitchener Office: 465 Maple Avenue – Unit 9, Kitchener, ON N2H 6N5
C 519.573.6546 | E megan.devries@araheritage.ca | www.araheritage.ca

ARA
ARCHAEOLOGY | HERITAGE | OUTREACH | EDUCATION

Privileged to work within the treaty lands and traditional territories of the Indigenous peoples of Turtle Island.

From: craig.ramsoomair@araheritage.ca <craig.ramsoomair@araheritage.ca>
Sent: Tuesday, July 9, 2024 2:59 PM
To: megan.devries@araheritage.ca; 'Natasha Charles' <natasha.charles@georginaisland.com>; 'JL Porte' <jl.porte@georginaisland.com>
Cc: 'Kait Kenel' <kait.kenel@araheritage.ca>; michelle.walters@hatch.com; 'Armstrong, Mark' <mark.armstrong@hatch.com>; carson.brennen@hatch.com; psamimian@townofbwg.com; kmodaressi@townofbwg.com
Subject: RE: ARA Report Review - Bradford WPCP Stage 1 - CGIFN

Hello,

As a quick update to the previous e-mail, we will be waiting until July 15th to submit the report to MCM if you are still interested in providing comments on the report draft (re-attached for convenience).

All the best,
Craig Ramsoomair, M. A (He/him)
Division Manager – Environmental Assessments and Renewables
Archaeological Research Associates Ltd.
Hamilton Office: 50 Nebo Road, Unit 1, Hamilton, ON L8W 2E3
Kitchener Office: 465 Maple Ave- Unit 9, Kitchener, ON N2H 6N5
C 416.997.5180 | E craig.ramsoomair@araheritage.ca | www.araheritage.ca

From: megan.devries@araheritage.ca
Sent on: Wednesday, July 31, 2024 1:55:08 PM
To: craig.ramsoomair@araheritage.ca; consultations@metisnation.org
CC: Kait Kenel; Walters, Michelle; Armstrong, Mark; Brennen, Carson; psamimian@townofbwg.com; kmodaressi@townofbwg.com
Subject: RE: ARA Report Review - Bradford WPCP Stage 1 - MNO
Attachments: St 1 - Bradford Water Pollution Control Plant RE (Draft 30-07-2024).pdf (8.12 MB)

Good afternoon,

Please find attached the revised report for your records.

Sincerely,
Megan.

Megan DeVries, M.A. (she/her)
Indigenous Engagement Advisor
Archaeological Research Associates Ltd.
Hamilton Office: 50 Nebo Road – Unit 1, Hamilton, ON L8W 2E3
Kitchener Office: 465 Maple Avenue – Unit 9, Kitchener, ON N2H 6N5
C 519.573.6546 | E megan.devries@araheritage.ca | www.araheritage.ca

ARA
ARCHAEOLOGY | HERITAGE | OUTREACH | EDUCATION

Privileged to work within the treaty lands and traditional territories of the Indigenous peoples of Turtle Island.

From: craig.ramsoomair@araheritage.ca <craig.ramsoomair@araheritage.ca>
Sent: Tuesday, July 9, 2024 2:59 PM
To: megan.devries@araheritage.ca; consultations@metisnation.org
Cc: 'Kait Kenel' <kait.kenel@araheritage.ca>; michelle.walters@hatch.com; 'Armstrong, Mark' <mark.armstrong@hatch.com>; carson.brennen@hatch.com; psamimian@townofbwg.com; kmodaressi@townofbwg.com
Subject: RE: ARA Report Review - Bradford WPCP Stage 1 - MNO

Hello,

As a quick update to the previous e-mail, we will be waiting until July 15th to submit the report to MCM if you are still interested in providing comments on the report draft (re-attached for convenience).

All the best,
Craig Ramsoomair, M. A (He/him)
Division Manager – Environmental Assessments and Renewables
Archaeological Research Associates Ltd.
Hamilton Office: 50 Nebo Road, Unit 1, Hamilton, ON L8W 2E3
Kitchener Office: 465 Maple Ave- Unit 9, Kitchener, ON N2H 6N5
C 416.997.5180 | E craig.ramsoomair@araheritage.ca | www.araheritage.ca

From: megan.devries@araheritage.ca
Sent on: Wednesday, July 31, 2024 1:48:19 PM
To: Marie-Sophie Gendron
CC: craig.ramsoomair@araheritage.ca; Kait Kenel; Walters, Michelle; Armstrong, Mark; Brennen, Carson; psamimian@townofbwg.com; kmodaressi@townofbwg.com
Subject: RE: ARA Report Review - Bradford WPCP Stage 1 - HWN
Attachments: St 1 - Bradford Water Pollution Control Plant RE (Draft 30-07-2024).pdf (8.12 MB)

Hello Marie-Sophie!

Thank you for your comments on the report. We have included the *History of the Nation Huronne-Wendat* as requested. Please see attached.

Have a lovely week!
Megan.

Megan DeVries, M.A. (she/her)
Indigenous Engagement Advisor
Archaeological Research Associates Ltd.
Hamilton Office: 50 Nebo Road – Unit 1, Hamilton, ON L8W 2E3
Kitchener Office: 465 Maple Avenue – Unit 9, Kitchener, ON N2H 6N5
C 519.573.6546 | E megan.devries@araheritage.ca | www.araheritage.ca

ARA
ARCHAEOLOGY | HERITAGE | OUTREACH | EDUCATION

Privileged to work within the treaty lands and traditional territories of the Indigenous peoples of Turtle Island.

From: Marie-Sophie Gendron <Marie-Sophie.Gendron@wendake.ca>
Sent: Tuesday, July 16, 2024 11:25 AM
To: megan.devries@araheritage.ca
Cc: craig.ramsoomair@araheritage.ca; 'Kait Kenel' <kait.kenel@araheritage.ca>; michelle.walters@hatch.com; 'Armstrong, Mark' <mark.armstrong@hatch.com>; carson.brennen@hatch.com; psamimian@townofbwg.com; kmodaressi@townofbwg.com
Subject: RE: ARA Report Review - Bradford WPCP Stage 1 - HWN

Kwe Megan,

Please find attached a letter for the Stage 1 AA report for Bradford Water Pollution Control Plant.

Tiawenhk,
Marie-Sophie

NATION HURONNE-WENDAT
BUREAU DU NIONWENTSÏO

Marie-Sophie Gendron
Analyste archéologue

Bradford
West
Gwillimbury

August 30, 2023

Karry Sandy-McKenzie
Williams Treaties First Nations
8 Creswick Court
Barrie, ON
L4M 2J7

RE: Town of Bradford Water Pollution Control Plant ESR Addendum – Draft Reports for Review

Dear Ms. Sandy-McKenzie,

We are reaching out to you regarding the upcoming addendum to the approved Bradford West Gwillimbury Water Pollution Control Plant Environmental Study Report - 2012 (ESR). This addendum is required due to the time lapse since the completion of the ESR and to address the replacement of the ESR's proposed tertiary treatment technology from Ballasted Flocculation to Membrane Filtration System. The change and benefits of the membrane technology over the ESR's proposed technology is elaborated in further details in the draft Environmental Study Report Addendum.

The Town of Bradford is dedicated to undertaking meaningful engagement and consultation throughout the ESR addendum process. Today we are pleased to provide you with the following reports:

- Draft Environmental Study Report Addendum; and
- Draft Natural Heritage Evaluation Study.

We are inviting you to review and provide feedback on the reports prior to the formal regulatory review and will notify you when the draft reports are formally posted for comment within the 30-day regulatory requirement period.

Due to the size of the Draft Reports, we will be utilizing Accellion which is a secure file transfer system for you to access the Draft Reports. You will receive an email from accellion@hatch.com with a link to download the documents for your review.

We appreciate your time and look forward to your feedback. Please contact me with any questions regarding the documentation or if you would like to meet to discuss the Project.

Respectfully,

Katy Modaressi, Ph.D., P.Eng., Manager, Capital Projects
KModaressi@townofbwg.com
905-775-5366 ext. 2102

cc. Ministry of Environment Conservation and Parks
Peter Loukes, Town of BWG Director of Development and Engineering
Peyman Samimian, Town of BWG Senior Project Manager, Capital
Oya Koç, Hatch Regional Director, Western Canada

August 30, 2023

Lands and Resource Manager
Scugog Island First Nation
22521 Island Rd,
Port Perry, ON
L9L 1B6

RE: Town of Bradford Water Pollution Control Plant ESR Addendum – Draft Reports for Review

To Whom it May Concern,

We are reaching out to you regarding the upcoming addendum to the approved Bradford West Gwillimbury Water Pollution Control Plant Environmental Study Report - 2012 (ESR). This addendum is required due to the time lapse since the completion of the ESR and to address the replacement of the ESR's proposed tertiary treatment technology from Ballasted Flocculation to Membrane Filtration System. The change and benefits of the membrane technology over the ESR's proposed technology is elaborated in further details in the draft Environmental Study Report Addendum.

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We appreciate your time and look forward to your feedback. Please contact me with any questions regarding the documentation or if you would like to meet to discuss the Project.

Respectfully,

Katy Modaressi, Ph.D., P.Eng., Manager, Capital Projects
KModaressi@townofbwg.com
905-775-5366 ext. 2102

cc. Chief Kelly LaRocca
Ministry of Environment Conservation and Parks
Peter Loukes, Town of BWG Director of Development and Engineering
Peyman Samimian, Town of BWG Senior Project Manager, Capital
Oya Koç, Hatch Regional Director, Western Canada

Bradford
West
Gwillimbury

August 30, 2023

Ben Benson
Consultation Advisor
Rama First Nation
5884 Rama Road, Suite 200,
Rama, ON,
L3V 6H6

RE: Town of Bradford Water Pollution Control Plant ESR Addendum – Draft Reports for Review

Dear Mr. Benson,

We are reaching out to you regarding the upcoming addendum to the approved Bradford West Gwillimbury Water Pollution Control Plant Environmental Study Report - 2012 (ESR). This addendum is required due to the time lapse since the completion of the ESR and to address the replacement of the ESR's proposed tertiary treatment technology from Ballasted Flocculation to Membrane Filtration System. The change and benefits of the membrane technology over the ESR's proposed technology is elaborated in further details in the draft Environmental Study Report Addendum.

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We appreciate your time and look forward to your feedback. Please contact me with any questions regarding the documentation or if you would like to meet to discuss the Project.

Respectfully,

Katy Modaressi, Ph.D., P.Eng., Manager, Capital Projects
KModaressi@townofbwg.com
905-775-5366 ext. 2102

cc. Chief Ted Williams
Ministry of Environment Conservation and Parks
Peter Loukes, Town of BWG Director of Development and Engineering
Peyman Samimian, Town of BWG Senior Project Manager, Capital
Oya Koç, Hatch Regional Director, Western Canada

Bradford West Gwillimbury

August 30, 2023

Consultation Department
Métis Nation of Ontario
64 Cedar Pointe Drive, Unit 1401 and 1402
Barrie, Ontario, Canada, L4N 5R7

RE: Town of Bradford Water Pollution Control Plant ESR Addendum – Draft Reports for Review

To Whom it May Concern,

We are reaching out to you regarding the upcoming addendum to the approved Bradford West Gwillimbury Water Pollution Control Plant Environmental Study Report - 2012 (ESR). This addendum is required due to the time lapse since the completion of the ESR and to address the replacement of the ESR's proposed tertiary treatment technology from Ballasted Flocculation to Membrane Filtration System. The change and benefits of the membrane technology over the ESR's proposed technology is elaborated in further details in the draft Environmental Study Report Addendum.

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We appreciate your time and look forward to your feedback. Please contact me with any questions regarding the documentation or if you would like to meet to discuss the Project.

Respectfully,

Katy Modaressi, Ph.D., P.Eng., Manager, Capital Projects
KModaressi@townofbwg.com
905-775-5366 ext. 2102

cc. President Margaret Froh
Ministry of Environment Conservation and Parks
Peter Loukes, Town of BWG Director of Development and Engineering
Peyman Samimian, Town of BWG Senior Project Manager, Capital
Oya Koç, Hatch Regional Director, Western Canada

Bradford
West
Gwillimbury

August 30, 2023

Louis Lesage
Director of the Nionwentsio Office
Huron-Wendat Nation
255 Place Chef Michel Laveau
Wendake, Quebec
G0A 4V0 Canada

RE: Town of Bradford Water Pollution Control Plant ESR Addendum – Draft Reports for Review

Dear Mr. Lesage,

We are reaching out to you regarding the upcoming addendum to the approved Bradford West Gwillimbury Water Pollution Control Plant Environmental Study Report - 2012 (ESR). This addendum is required due to the time lapse since the completion of the ESR and to address the replacement of the ESR's proposed tertiary treatment technology from Ballasted Flocculation to Membrane Filtration System. The change and benefits of the membrane technology over the ESR's proposed technology is elaborated in further details in the draft Environmental Study Report Addendum.

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- Draft Natural Heritage Evaluation Study.

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Due to the size of the Draft Reports, we will be utilizing Accellion which is a secure file transfer system for you to access the Draft Reports. You will receive an email from accellion@hatch.com with a link to download the documents for your review.

We appreciate your time and look forward to your feedback. Please contact me with any questions regarding the documentation or if you would like to meet to discuss the Project.

Respectfully,

Katy Modaressi, Ph.D., P.Eng., Manager, Capital Projects
KModaressi@townofbwg.com
905-775-5366 ext. 2102

cc. Grand Chief Remy Vincent
Ministry of Environment Conservation and Parks
Peter Loukes, Town of BWG Director of Development and Engineering
Peyman Samimian, Town of BWG Senior Project Manager, Capital
Oya Koç, Hatch Regional Director, Western Canada

Bradford
West
Gwillimbury

August 30, 2023

Tom Cowie and Sean Davison
Lands and Resource Consultation Advisors
Hiawatha First Nation
123 Paudash Street
Hiawatha, ON
K9J 0E6

RE: Town of Bradford Water Pollution Control Plant ESR Addendum – Draft Reports for Review

Dear Mr. Cowie and Mr. Davison,

We are reaching out to you regarding the upcoming addendum to the approved Bradford West Gwillimbury Water Pollution Control Plant Environmental Study Report - 2012 (ESR). This addendum is required due to the time lapse since the completion of the ESR and to address the replacement of the ESR's proposed tertiary treatment technology from Ballasted Flocculation to Membrane Filtration System. The change and benefits of the membrane technology over the ESR's proposed technology is elaborated in further details in the draft Environmental Study Report Addendum.

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- Draft Natural Heritage Evaluation Study.

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Due to the size of the Draft Reports, we will be utilizing Accellion which is a secure file transfer system for you to access the Draft Reports. You will receive an email from accellion@hatch.com with a link to download the documents for your review.

We appreciate your time and look forward to your feedback. Please contact me with any questions regarding the documentation or if you would like to meet to discuss the Project.

Respectfully,

Katy Modaressi, Ph.D., P.Eng., Manager, Capital Projects
KModaressi@townofbwg.com
905-775-5366 ext. 2102

cc. Chief Laurie Carr
Ministry of Environment Conservation and Parks
Peter Loukes, Town of BWG Director of Development and Engineering
Peyman Samimian, Town of BWG Senior Project Manager, Capital
Oya Koç, Hatch Regional Director, Western Canada

Bradford
West
Gwillimbury

August 30, 2023

Sylvia McCue
Lands Manager
Georgina Island First Nation
R.R.#2 Box N-13
Sutton West, Ontario
L0E 1R0

RE: Town of Bradford Water Pollution Control Plant ESR Addendum – Draft Reports for Review

Dear Sylvia McCue,

We are reaching out to you regarding the upcoming addendum to the approved Bradford West Gwillimbury Water Pollution Control Plant Environmental Study Report - 2012 (ESR). This addendum is required due to the time lapse since the completion of the ESR and to address the replacement of the ESR's proposed tertiary treatment technology from Ballasted Flocculation to Membrane Filtration System. The change and benefits of the membrane technology over the ESR's proposed technology is elaborated in further details in the draft Environmental Study Report Addendum.

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- Draft Natural Heritage Evaluation Study.

We are inviting you to review and provide feedback on the reports prior to the formal regulatory review and will notify you when the draft reports are formally posted for comment within the 30-day regulatory requirement period.

Due to the size of the Draft Reports, we will be utilizing Accellion which is a secure file transfer system for you to access the Draft Reports. You will receive an email from accellion@hatch.com with a link to download the documents for your review.

We appreciate your time and look forward to your feedback. Please contact me with any questions regarding the documentation or if you would like to meet to discuss the Project.

Respectfully,

Katy Modaressi, Ph.D., P.Eng., Manager, Capital Projects
KModaressi@townofbwg.com
905-775-5366 ext. 2102

cc. Chief Donna Big Canoe
Ministry of Environment Conservation and Parks
Peter Loukes, Town of BWG Director of Development and Engineering
Peyman Samimian, Town of BWG Senior Project Manager, Capital
Oya Koç, Hatch Regional Director, Western Canada

From:	Brennen, Carson
Sent on:	Monday, March 11, 2024 2:39:38 PM
To:	Julie Kapyrka; Taynar Simpson
CC:	Armstrong, Mark; Peyman Samimian; kmodaressi@townofbwg.com; Koc, Oya; Walters, Michelle
Subject:	RE: Follow Up to Draft Reports on the Town of Bradford's Water Pollution Control Plant Upgrade - Meeting Minutes
Attachments:	Town of Bradford WPCP Upgrade - Meeting Minutes from Alderville FN Report.pdf (79.51 KB)

Hello Chief Simpson and Dr. Kapryka,

Please find attached a copy of the Minutes from our meeting on December 8th, 2023.

This meeting was in regard to the Town of Bradford-West Gwillimbury's Bradford Water Pollution Control Plant Tertiary Upgrade Environmental Assessment amendment.

Please review and provide any comments.

If you have any additional questions, please reach out to us.

Thank you.

Carson Brennen
Analyst - Community Engagement and Social Performance

Tel: +1 416-860-5627
2699 Speakman Drive, Mississauga
Ontario Canada L5K 2R7
HATCH

-----Original Appointment-----
From: Armstrong, Mark <mark.armstrong@hatch.com>
Sent: Thursday, November 23, 2023 9:01 AM
To: Julie Kapyrka; Taynar Simpson; psamimian@townofbwg.com; kmodaressi@townofbwg.com; Koc, Oya; Brennen, Carson; Walters, Michelle
Subject: Follow Up to Draft Reports on the Town of Bradford's Water Pollution Control Plant Upgrade
When: Friday, December 8, 2023 11:30 AM-12:30 PM (UTC-05:00) Eastern Time (US & Canada).
Where: Microsoft Teams Meeting

Meeting to discuss the Draft Reports on the Town of Bradford's Water Pollution Control Plant Upgrade and gain your feedback on the reports prior to the formal regulatory review with the Ministry of Environment, Conservation and Parks.

Regards

Mark

Microsoft Teams meeting

Join on your computer, mobile app or room device
Click here to join the meeting

Meeting ID: 228 529 096 156
Passcode: H57oaP
Download Teams | Join on the web

Or call in (audio only)

+1 289-326-2805,,894435095#   Canada, Clarkson

Phone Conference ID: 894 435 095#
Find a local number | Reset PIN

Learn More | Help | Meeting options

From: Julie Kapyrka <jkapyrka@alderville.ca>
Sent: Wednesday, November 22, 2023 12:12 PM
To: Armstrong, Mark <mark.armstrong@hatch.com>; Taynar Simpson <tsimpson@alderville.ca>
Cc: psamimian@townofbwg.com; kmodaressi@townofbwg.com; Wood, Kathleen <kathleen.wood@hatch.com>; Koc, Oya <oya.koc@hatch.com>; Walters, Michelle <michelle.walters@hatch.com>; Wood, Kathleen <kathleen.wood@hatch.com>; Brennen, Carson <carson.brennen@hatch.com>
Subject: RE: Follow Up to Draft Reports on the Town of Bradford's Water Pollution Control Plant Upgrade

Yes – that works.

Miigwech,

Dr. Julie Kapyrka
Consultation Coordinator

Alderville First Nation

Administration Office
11696 Second Line Rd.
Roseneath, ON K0K 2X0
Office: 905-352-2662
jkapyrka@alderville.ca

From: Armstrong, Mark <mark.armstrong@hatch.com>
Sent: Monday, November 20, 2023 2:40 PM
To: Julie Kapyrka <jkapyrka@alderville.ca>; Taynar Simpson <tsimpson@alderville.ca>
Cc: psamimian@townofbwg.com; kmodaressi@townofbwg.com; Wood, Kathleen <kathleen.wood@hatch.com>; Koc, Oya <oya.koc@hatch.com>; Walters, Michelle <michelle.walters@hatch.com>; Wood, Kathleen <kathleen.wood@hatch.com>; Brennen, Carson <carson.brennen@hatch.com>
Subject: RE: Follow Up to Draft Reports on the Town of Bradford's Water Pollution Control Plant Upgrade

Dr Kapyrka,

Thank you for your response. I wanted to confirm whether an hour duration starting at 11:30 would work with your schedule prior to sending out the Teams meeting invite.

Regards

Mark

Mark Armstrong, M.E.Sc., P.Eng., PMP
Director, Project Development / Environment and Sustainability
Tel: +1 905 940 5487 / Cell: +1 416 737 3242
Mississauga

From: Julie Kapyrka <jkapyrka@alderville.ca>
Sent: Monday, November 20, 2023 10:01 AM
To: Armstrong, Mark <mark.armstrong@hatch.com>; Taynar Simpson <tsimpson@alderville.ca>
Cc: psamimian@townofbwg.com; kmodaressi@townofbwg.com; Wood, Kathleen <kathleen.wood@hatch.com>; Koc, Oya <oya.koc@hatch.com>; Walters, Michelle <michelle.walters@hatch.com>; Wood, Kathleen <kathleen.wood@hatch.com>; Brennen, Carson <carson.brennen@hatch.com>
Subject: RE: Follow Up to Draft Reports on the Town of Bradford's Water Pollution Control Plant Upgrade

Aaniin Mark,

Thank you for your e-mail.
I would be available Dec 8 at 11:30am – virtually please.
Please send a calendar invite and link at your earliest convenience.

Miigwech.
All the best,

Dr. Julie Kapyrka
Consultation Coordinator

Alderville First Nation

Administration Office
11696 Second Line Rd.
Roseneath, ON K0K 2X0
Office: 905-352-2662
jkapyrka@alderville.ca

From: Armstrong, Mark <mark.armstrong@hatch.com>
Sent: Friday, November 17, 2023 4:33 PM
To: Julie Kapyrka <jkapyrka@alderville.ca>; Taynar Simpson <tsimpson@alderville.ca>
Cc: psamimian@townofbwg.com; kmodaressi@townofbwg.com; Wood, Kathleen <kathleen.wood@hatch.com>; Koc, Oya <oya.koc@hatch.com>; Walters, Michelle <michelle.walters@hatch.com>; Wood, Kathleen <kathleen.wood@hatch.com>; Brennen, Carson <carson.brennen@hatch.com>
Subject: RE: Follow Up to Draft Reports on the Town of Bradford's Water Pollution Control Plant Upgrade

Good afternoon Dr. Kapyrka,

Thank you for the updated contact information.

As you noted in your response, please forward any additional correspondence at your earliest convenience.

We have reached the end of the 60-day review period. We would like to extend an invitation for either an online or in-person meeting to discuss the Draft Reports on the Town of Bradford's Water Pollution Control Plant Upgrade and gain your feedback on the reports prior to the formal regulatory review with the Ministry of Environment, Conservation and Parks.

Our project team has the following dates and times available:
December 1 afternoon
December 6 afternoon
December 7 morning
December 8 morning or afternoon
December 11 afternoon
December 12 morning or afternoon
December 13 morning
December 15 morning or afternoon

Please let us know at your earliest convenience whether you wish to meet, whether online or in person, and your preferred date and time.

Thank you,

Mark

Mark Armstrong, M.E.Sc., P.Eng., PMP
Director, Project Development / Environment and Sustainability
Tel: +1 905 940 5487 / Cell: +1 416 737 3242
Mississauga

From: Julie Kapyrka <jkapyrka@alderville.ca>
Sent: Sunday, October 22, 2023 4:41 PM
To: Murray, Madalyn <madalyn.murray@hatch.com>; Taynar Simpson <tsimpson@alderville.ca>
Cc: Koc, Oya <oya.koc@hatch.com>; Armstrong, Mark <mark.armstrong@hatch.com>; psamimian@townofbwg.com; kmodaressi@townofbwg.com; Wood, Kathleen <kathleen.wood@hatch.com>
Subject: RE: Follow Up to Draft Reports on the Town of Bradford's Water Pollution Control Plant Upgrade

Aaniin Madalyn,

Thank you for your e-mail and for following up – it is greatly appreciated.
I have attached some updated contact information.

We will be responding with more formal correspondence in the coming days.

Miigwech.
All the best,

Dr. Julie Kapyrka
Consultation Coordinator

Alderville First Nation

Administration Office
11696 Second Line Rd.
Roseneath, ON K0K 2X0
Office: 905-352-2662
jkapyrka@alderville.ca

From: Murray, Madalyn <madalyn.murray@hatch.com>
Sent: Thursday, October 19, 2023 2:53 PM
To: Julie Kapyrka <jkapyrka@alderville.ca>; Dave Mowat <dmowat@alderville.ca>
Cc: Koc, Oya <oya.koc@hatch.com>; Armstrong, Mark <mark.armstrong@hatch.com>; psamimian@townofbwg.com; kmodaressi@townofbwg.com; Wood, Kathleen <kathleen.wood@hatch.com>
Subject: RE: Follow Up to Draft Reports on the Town of Bradford's Water Pollution Control Plant Upgrade

Good afternoon Dr. Kapyrka,

I hope you are doing well. I wanted to follow up on your email from October 3 in regards to the Bradford WPCP Upgrade Project. We have yet to receive any further correspondence or direction from yourself or another representative from your community and I wanted to ensure that we have not missed any emails you may have sent.

Thank you,

Madalyn Murray (any pronouns)
Analyst, Community Engagement and Social Performance

(289) 813-4220
2699 Speakman Drive, Mississauga
Ontario Canada L5K 2R7

HATCH

From: Murray, Madalyn
Sent: Wednesday, October 4, 2023 10:28 AM
To: Julie Kapyrka <jkapyrka@alderville.ca>; Dave Mowat <dmowat@alderville.ca>
Cc: Koc, Oya <oya.koc@hatch.com>; Armstrong, Mark <mark.armstrong@hatch.com>; psamimian@townofbwg.com; kmodaressi@townofbwg.com; Wood, Kathleen <kathleen.wood@hatch.com>
Subject: RE: Follow Up to Draft Reports on the Town of Bradford's Water Pollution Control Plant Upgrade

Morning Dr. Kapyrka,

Thank you so much for following up. I have attached the introductory letter that was included. I will wait for your guidance on consultation protocols before providing the reports. Please let me know if you would like a copy of them now as well or if you have any other questions.

Thank you,

Madalyn Murray (any pronouns)
Analyst, Community Engagement and Social Performance

Vacation Notice: Oct. 6-16 inclusive

(289) 813-4220
2699 Speakman Drive, Mississauga
Ontario Canada L5K 2R7

HATCH

From: Julie Kapyrka <jkapyrka@alderville.ca>
Sent: Tuesday, October 3, 2023 4:30 PM
To: Murray, Madalyn <madalyn.murray@hatch.com>; Dave Mowat <dmowat@alderville.ca>
Cc: Koc, Oya <oya.koc@hatch.com>; Armstrong, Mark <mark.armstrong@hatch.com>; psamimian@townofbwg.com; kmodaressi@townofbwg.com
Subject: RE: Follow Up to Draft Reports on the Town of Bradford's Water Pollution Control Plant Upgrade

Aaniin Madalyn,

Thank you for your e-mail. Unfortunately, I did not open up that email as I was not familiar with the individual or the project.

Please be advised that we will be issuing more formal correspondence in the coming days – in terms of how we begin the process of engagement. If you have sent any introductory information prior, please send it along.

Miigwech.
All the best,

Dr. Julie Kapyrka
Consultation Coordinator

Alderville First Nation

Administration Office
11696 Second Line Rd.
Roseneath, ON K0K 2X0
Office: 905-352-2662
jkapyrka@alderville.ca

From: Murray, Madalyn <madalyn.murray@hatch.com>
Sent: Monday, October 2, 2023 11:24 AM
To: Julie Kapyrka <jkapyrka@alderville.ca>; Dave Mowat <dmowat@alderville.ca>
Cc: Koc, Oya <oya.koc@hatch.com>; Armstrong, Mark <mark.armstrong@hatch.com>; psamimian@townofbwg.com; kmodaressi@townofbwg.com
Subject: Follow Up to Draft Reports on the Town of Bradford's Water Pollution Control Plant Upgrade

Good morning,

From: Brennen, Carson
Sent on: Tuesday, March 19, 2024 2:25:08 PM
To: jl.porte@georgina.island.com
CC: Armstrong, Mark; Walters, Michelle; Koc, Oya; Peyman Samimian; kmodaressi@townofbwg.com
Subject: Draft Reports on the Town of Bradford's Water Pollution Control Plant Upgrade
Attachments: Bradford Waste Pollution Control Plant EIS - February 2023.pdf (11.76 MB), H362455-0000-840-066-0001.pdf (4.18 MB)

Hello Mr. Porte,

We would like to extend an invitation for an online meeting to discuss the Draft Reports on the Town of Bradford's Water Pollution Control Plant Upgrade and gain your feedback on the reports prior to the formal regulatory review with the Ministry of Environment, Conservation and Parks.

Attached is the requested Draft Environmental Study Report Addendum and the Draft Natural Heritage Evaluation Study.

Please take an opportunity to review these documents and advise us if the Chippewas of Georgina Island First Nation are available for a meeting.

If you have any additional questions, please reach out to us.

Thank you.

Carson Brennen
Analyst - Community Engagement and Social Performance

Tel: +1 416-860-5627
2699 Speakman Drive, Mississauga
Ontario Canada L5K 2R7
HATCH

From: Brennen, Carson
Sent on: Wednesday, April 3, 2024 8:49:23 AM
To: jl.porte@georgina.island.com
CC: Armstrong, Mark; Walters, Michelle; Koc, Oya; Peyman Samimian; kmodaressi@townofbwg.com
Subject: Draft Reports on the Town of Bradford's Water Pollution Control Plant Upgrade
Attachments: Bradford Waste Pollution Control Plant EIS - February 2023.pdf (11.76 MB), H362455-0000-840-066-0001.pdf (4.18 MB)

Hello Mr. Porte,

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Please take an opportunity to review these documents and advise us if the Chippewas of Georgina Island First Nation are available for a meeting.

If you have any additional questions, please reach out to us.

Thank you.

Carson Brennen
Analyst - Community Engagement and Social Performance

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Ontario Canada L5K 2R7
HATCH

I am reaching out to you on behalf of the Project team for the Town of Bradford Water Pollution Control Plant Upgrade Project. You should have received an email from Accellion@hatch.com on August 31, 2023 containing the Draft Environmental Study Report Addendum and the Draft Natural Heritage Evaluation Study. We are inviting you to review and provide feedback on the reports prior to the formal regulatory review.

I am following up today to see if you have had a chance to review the report yet and if you'd had any trouble downloading it from the accellion software. If there are any questions or support that I can provide, please feel free to reach out.

Thank you,

Madalyn Murray (any pronouns)
Analyst, Community Engagement and Social Performance

Vacation Notice: Oct. 6-16 inclusive

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Ontario Canada L5K 2R7

HATCH

Appendix D

Preliminary Design Report



Bradford West Gwillimbury

Bradford Water Pollution Control Plant Expansion

Preliminary Design Report

July 2012

Submitted by
Contact Name: Joe Mullan, P.Eng.
Company Name: Ainley & Associates Limited
Address: 280 Pretty River Parkway
City, Province: Collingwood, Ontario
Postal Code: L9Y 4J5
Phone: (705) 445-3451
Fax: (705) 445-0968

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Preliminary Design Report

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List of Figures (See Appendix E)

Appendices

Abbreviations

ADF	-	Average Daily Flow
BOD_5	-	5 day Biochemical Oxygen Demand
$CBOD_5$	-	5 day Carbonaceous Biochemical Oxygen Demand
cfu/100mL	-	colony forming units per one hundred millilitres
Class EA	-	Class Environmental Assessment
CofA	-	Certificate of Approval
°C	-	degrees Celsius
E. coli	-	Escherichia coli
ESR	-	Environmental Study Report
F/M	-	Food-to-Microorganism ratio
L/s	-	litres per second
m	-	metres
m^2	-	square metres
m^3	-	cubic metres
m^3/day	-	cubic metres per day
Max	-	Maximum
mg/L	-	milligrams per litre
Min	-	Minimum
MLSS	-	Mixed Liquor Suspended Solids
MMF	-	Maximum Month Flow
MOE	-	Ministry of the Environment
mm	-	millimetres
O_2	-	Oxygen
OPSS	-	Ontario Provincial Standard Specifications
PDF	-	Peak Day Flow
PHF	-	Peak Hourly Flow
PF	-	Peak Flow

Q - flow
Q_{AIR} - air flow rate
RAS - Return Activated Sludge
SVI - Sludge Volume Index
SWD - surface water depth
t - detention time
TKN - Total Kjeldahl Nitrogen
TP - Total Phosphorus
TSS - Total Suspended Solids
UV - Ultraviolet
V - volume
WAS - Waste Activated Sludge
WPCP - Water Pollution Control Plant

1.0 Background Review

The Bradford Water Pollution Control Plant (WPCP) consists of the following:

- Raw sewage pumping station
- Septage receiving station
- Headworks
- Plant A (utilized only for aerobic digestion of biosolids produced by Plants B)
- Plant B (extended aeration process for secondary treatment)
- Plant C (sequencing batch reactor process for secondary treatment)
- Plant D (extended aeration process for secondary treatment)
- Chemical phosphorus removal system
- Continuous contact sand filters for tertiary treatment
- Ultraviolet irradiation for disinfection
- Aerobic digesters
- Biosolids holding tanks
- Biosolids holding lagoon.

The lagoon also serves as an equalization pond to balance excessive raw water flows into the plant.

The plant is owned and operated by the Town of Bradford West Gwillimbury and provides treatment for wastewater generated from the community of Bradford. It is located within Bradford adjacent to the Holland River. The existing capacity of the Bradford WPCP is 17,400 m^3/d (ADF), per C of A No. 6664-7ZGKXG (see Appendix A). The current facility is at approximately 40% of its rated capacity.

To accommodate planned growth as set out in the Town's Official Plan and amendments (generally the Bradford Urban Area, the Highway 400/County Road 88 Area and the Bond Head Settlement Area), the Town undertook an update to its Master Servicing Plan. This update was completed in 2011 and documented in a report entitled "Water Supply and Wastewater Servicing Plan Update, Town of Bradford West Gwillimbury, Class Environmental Assessment, Final Study Report" (C.C. Tatham & Associates Ltd., March 31, 2011). The Study, which satisfied Phases 1 and 2 of the Class Environmental Assessment process, identified the need for additional wastewater treatment capacity and recommended that the existing WPCP be expanded.

The Town also undertook Phases 3 and 4 of the Environmental Assessment process, which was also completed in 2011 and documented in a report entitled, "Bradford West Gwillimbury Environmental Study Report – Phases 3 and 4" (Ainley & Associates Limited and Black & Veatch Canada Limited, September 2011). The Study made the following recommendations:

- Rerate the existing plant performance, with no additional capital works, as an interim phase in order to obtain an immediate capacity increase from 17,400 m^3/d to 19,400 m^3/d

- Replace or upgrade influent pumps to provide a firm capacity of 55,000 m^3/d and bypass residual peak instantaneous flows to equalization lagoon
- Rerate existing screens to 34,000 m^3/d, install 46,000 m^3/d screen in bypass channel, construct new external bypass pipe or channel, and install standby grit classifier
- Upgrade the secondary treatment processes to increase their capacity to 23,300 m^3/d
- Install a facility to thicken waste activated sludge such that 240 days of winter storage is available at design flows
- Install a larger equalization basin and a ballasted flocculation system to improve phosphorus removal upstream of the existing sand filters
- Fund the capital works through Development Charges.

In addition, the Town will undertake to improve the existing water conservation and reuse program.

2.0 Purpose

A complementary document entitled, "Bradford Water Pollution Control Plant, Plant Rerating Report" (Ainley & Associates Limited and Black & Veatch Canada, October 2011) addresses Recommendation 1 above, to obtain an immediate capacity increase to 19,400 m^3/d with no additional capital works.

The purpose of this Preliminary Design Report is to expand on the ESR with respect to Recommendations 2, 3, 4, 5, and 6 above, to increase the rated capacity of the WPCP to 23,300 m^3/d.

The Preliminary Design Report will reiterate the design criteria, address property requirements, discuss geotechnical data, outline the design of the WPCP upgrades for additional capacity, comment on construction and staging, provide preliminary opinions of cost and discuss review agency approvals.

3.0 Related Studies

The following studies contain additional information related to this project:

- Bradford West Gwillimbury Environmental Study Report – Phases 3 and 4 (Ainley & Associates Ltd. and Black & Veatch Ltd., January 2012)
- Bradford Air Quality Impacts Assessment Report (Ainley & Associates Ltd. and Black & Veatch Ltd., January 2012)
- Bradford WPCP Class EA, Receiving Water Assimilation Study, (Hutchinson Environmental Sciences Ltd. January 2012)
- Bradford Water Pollution Control Plant, Plant Rerating Report (Ainley & Associates Ltd. and Black & Veatch Ltd., October 2011)
- Bradford Water Pollution Control Plant, Existing and Future Plant Optimization Report (Ainley & Associates Ltd. and Black & Veatch Ltd., April 2011)

- Water Supply and Wastewater Servicing Plan Update, Town of Bradford West Gwillimbury, Class Environmental Assessment, Final Study Report (C.C. Tatham & Associates Ltd., March 2011)
- Bradford WPCP: Flow and Water Quality Data, January 2007 to December 2010
- Benthic-Invertebrate Study (Azimuth Environmental Consulting Inc., 2010)
- Certificate of Approval Number 6664-7ZGKXG (MOE, January 2010)
- Stress Testing Report for Plants B and C (Totten Simms Hubicki Ltd., January 2008)
- Drawings for Plant D Expansion – Stamped Tender Set (Totten Sims Hubicki Ltd., July 2006)
- Design Report for Plant D Expansion - Vol. 1 & 2 (Totten Sims Hubicki Ltd., June 2006)
- Certificate of Approval for Plants B, C and D (MOE, May 2006)
- Bradford Water Pollution Control Plant Expansion Predesign Report (Totten Sims Hubicki Ltd, November 2005)
- Environmental Study Report, Bradford Water Pollution Control Plant Expansion (R.J. Burnside & Associates Ltd., February 2005)
- Technical Memorandum: Evaluation of the Secondary Treatment Capacity at the Bradford WPCP (XCG, August 2004)
- Benthic-Invertebrate Study (Tarandus Associates Limited, 2004)
- Geotechnical Investigation, Plant C Expansion (Terraprobe Limited, October 1995).

4.0 Summary of Public and Review Agency Consultation

A Phase 3 Public Information Centre (PIC) was held on June 22, 2011 to present the overall Recommended Solution and to obtain public and Review Agency input. In addition, all applicable review agencies were advised of the Class environmental assessment progress at appropriate milestones, and their comments were addressed to their satisfaction through follow-up correspondence. Technical issues raised by MOE Central Region in their November 29, 2011 letter were addressed in a January 18, 2012 response letter. A copy of the PIC Material and related correspondence is included in the ESR.

5.0 Location

The Bradford WPCP is located within an industrial-zoned area in Bradford in Lots 17 and 18, Concession 7 (225 Dissette Street) near the Holland River. The site is shown in Figure 1.

6.0 Property Requirements

All proposed upgrades/optimization of the Bradford WPCP will be located within the existing property boundaries owned by the Town and will have no to minimal impacts to the site's existing grading plan and stormwater management strategy.

Nevertheless, during detailed design the stormwater management requirements will need to be assessed/updated based on the proposed expansion and appropriate modifications/upgrades made to the existing stormwater management controls already in place.

7.0 Geotechnical

A geotechnical investigation was undertaken by Terraprobe Limited in October 1995 at the site of the proposed Plant C expansion. A total of six boreholes were drilled to determine the soil and groundwater conditions in the area. The soil conditions at the boreholes were found to be SANDY SILT to SILTY SAND FILL over NATIVE SILT followed by SANDY SILT TILL. Groundwater was found at depths ranging from 1.8 to 4.5 m. This soil was considered suitable for the support of various structures on conventional spread footings and/or concrete tank pads. However, it was recommended that all deleterious material be removed from the footings area prior to pouring concrete. Also, the native silt soils at the site were deemed to be suitable for support of sewers and other related piping but it was recommended that the thrust blocks be cast against undisturbed native ground. It was recommended that the building foundations and tanks be extended to a depth of 1.5 to 6 m below existing grade and therefore, the recommended safe side slope configuration for temporary unbraced excavations was 1 ½ to 1 (horizontal to vertical). Additional consideration was given to deep excavations in close proximity to existing foundations and structures so that there was minimal loss of ground support. Excavated soils at the site were deemed to be difficult to place and recompact as backfill and therefore it was recommended to import OPSS Granular 'B' type material for backfilling structures. It was recommended that any soft, loose or disturbed soils encountered as a result of groundwater seepage or construction traffic be excavated and replaced with suitably compacted sand fill.

A further geotechnical investigation was undertaken by Terraprobe in December 2003, in support of the February 2005 ESR (Burnside). A total of six boreholes were drilled to determine the soil and groundwater conditions in the area. The investigation found varying depths of fill throughout the site ranging from 1.8 to 4.7 m below the existing grade. Buildings constructed as slab-on-grade would require greater than the conventional 1.2 m depth for footings and the removal of all fill material below the slab. At the location of the aerobic digesters and biosolids storage tanks, the depth of fill was approximately 4m below grade. This condition required relatively deep foundations and/or the use of engineered fill as the full depth of the fill had to be excavated and filled below the tank slabs. The bearing capacities ranged from 100 to 250 kPa with the lower value located in the northern edge of the site. However, it was recommended that most of the tanks be founded at an elevation with a minimum bearing capacity of 150 kPa. Therefore the existing capacities were deemed to be suitable. The water table was measured at 2 to 3 m below grade but varied seasonally. The structures were therefore designed for hydrostatic pressure and uplift assuming the water table was at grade. For deeper/larger span structures, this may have resulted in heavier (thicker) bases/walls or alternatively, pressure relief valves may have been installed where appropriate.

Based on previous geotechnical assessments, the soil conditions at the plant site are considered to be acceptable for optimization of the existing facilities and additional phosphorus polishing facilities in the same vicinity. Nevertheless, further geotechnical investigations will be required during detailed design.

Copies of the Geotechnical Reports are included in Appendix B.

8.0 Facility Condition Assessment

A detailed condition assessment of all existing structural, electrical and mechanical elements must be undertaken as part of the detailed design. Specific concerns include:

- Check classifications for electrical devices (e.g. everything in the Headworks should be explosion-proof)
- Check raw sewage pumps for wear of impellers and volute
- Check Wet Well for grit build up, corrosion and structural cracks
- Check raw sewage pump VFDs to see if they will provide enough power for upsized sewage pumps
- Check VFDs and MCCs for issues including corrosion inside and major current fluctuations
- Check odour control in Headworks
- Investigate structural integrity of Plant B and C
- Check condition of Plant B blowers
- Investigate "new" cracks in the existing equalization tank to determine if they were caused by Plant D construction and to confirm structural integrity of the tank.

9.0 Utility Relocates

The applicable utility authorities will be contacted during detailed design. Some relatively minor relocation/ replacement/modification of utilities (underground wiring and panels) is expected since an equalization/ballasted flocculation facility (in the same location as Plant A), the thickening waste activated sludge facility and, potentially, a new Plant D clarifier splitter chamber will be the only new structures. The extent of utility relocates will be investigated more fully during detailed design.

10.0 Air Quality Impacts Assessment

Screen3 air quality impacts modelling was undertaken as a component of the Environmental Study Report. The analysis demonstrated low impacts on air quality. However, more rigorous air dispersion modelling of the facility will be required during detailed design as part of the ECA process.

11.0 Design Basis

11.1 Design Criteria

11.1.1 Total Plant

Wastewater enters the Bradford WPCP through four raw influent wastewater pumps that will be upgraded or replaced to provide a firm capacity of 53,400 m^3/d. At the WPCP Headworks, there are two 10 mm mechanically cleaned bar screens with a total capacity of 48,800 m^3/d, and a standby manually cleaned screen. The existing screens will be rerated and the manual screen will be replaced with an additional mechanically cleaned bar screen to provide an overall firm capacity of 68,000 m^3/d.

The secondary treatment system consists of three operating process trains, Plant B (extended aeration process), Plant C (sequencing batch reactors (SBR) process) and Plant D (extended aeration process). Plant A will be demolished. It no longer treats sewage but it is currently used for storage and transfer of digested sludge from Plant B.

Plant B, C, and D will be upgraded, and expanded to provide a total ADF capacity of 23,300 m^3/d.

Additional installations to upgrade the overall process include:

- WAS from all Plants will be diverted to a common facility to thicken waste activated sludge. The existing effluent EQ tank for Plant C will be converted to a WAS holding tank to accept WAS from Plant B, C, and D. This tank will then feed the new thickening waste activated sludge system
- Install a larger equalization basin and a ballasted flocculation system to improve phosphorus removal upstream of existing sand filters.

More details on all plant processes are available in Section 8.3 of this report.

The design population and flows for the WPCP capacity increase were determined by the Town as part of the Master Servicing Study. A review of 2007 to 2010 historical effluent flows undertaken as part of the Phase 3 and 4 ESR confirmed that the annual average per capita and extraneous flow allowances assumed in the Master Servicing Study were sufficiently conservative. In addition, based on the historical flows, design maximum month, peak day and peak hourly flows were developed in the Phase 3 and 4 ESR, as well as design raw influent characteristics. Flows in excess of peak day flow will be diverted to the equalization lagoon prior to being pumped to the Headworks. The plant design population and flows are summarized in Table 1 (a):

Table 1(a): Design Population and Flows

Description	Population or Flow
Residential Population	47,400
Employment Equivalent Population	30,000

ADF	Total Plant	23,300 m^3/d
	Plant B	3,075 m^3/d
	Plant C	6,333 m^3/d
	Plant D	14,437 m^3/d
MMF (1.2 x ADF)	Total Plant	28,000 m^3/d
	Plant B	3,075 m^3/d
	Plant C	7,600 m^3/d
	Plant D	17,300 m^3/d
PDF (2.29 x ADF) (maximum flow to treatment units)	Total Plant	53,400 m^3/d
	Plant B	3,075 m^3/d
	Plant C	14,516 m^3/d
	Plant D	35,809 m^3/d
PHF (2.78 x ADF) (with lagoon for flow balancing)	Total Plant	64,770 m^3/d

The influent design criteria for the overall plant is summarized in Table 1 (b):

Table 1(b): Design Influent Criteria (Total Plant)

Influent Parameter	Concentration (mg/L)	Load (kg/d)
Annual Average BOD_5 (1)	200	4,440
Annual Average TSS - raw	180	4,194
Annual Average TSS – chemical sludge	218	5,079
Annual Average TP	4.2	98
Annual Average TKN	32	746
Maximum Month BOD_5 (1)	212	5,928
Maximum Month TSS - raw	207	5,788

Influent Parameter	Concentration (mg/L)	Load (kg/d)
Maximum Month TSS – chemical sludge	250	6,990
Maximum Month TP	4.9	137
Maximum Month TKN	34.7	970

(1) CBOD/BOD ratio of 0.92

Further to the above design criteria, the Phase 3 and 4 ESR also established the following design criteria for the individual secondary treatment plants (B, C and D) at the plant.

11.1.2 Plant B (Base Loaded)

Plant B, with a rated capacity of 3,075 m^3/d, has two extended aeration basins and two circular secondary settling clarifiers. This plant also has one two-stage digester. It is proposed to convert the existing digester into an additional aeration basin and to replace the coarse bubble diffusers in those tanks with fine bubble diffusers.

Table 2(a): Design Flows (Plant B)

Description	Flow
ADF	3,075 m^3/d
MMF	3,075 m^3/d
PDF	3,075 m^3/d

Table 2(b): Design Influent Criteria (Plant B)

Influent Parameter	Concentration (mg/L)	Load (kg/d)
Annual Average BOD_5 (1)	200	615
Annual Average TSS - raw	180	554
Annual Average TSS – chemical sludge	218	670
Annual Average TP	4.2	13
Annual Average TKN	32	98

Influent Parameter	Concentration (mg/L)	Load (kg/d)
Maximum Month BOD_5 (1)	212	652
Maximum Month TSS - raw	207	636
Maximum Month TSS – chemical sludge	250	769
Maximum Month TP	4.9	15
Maximum Month TKN	34.7	107

(1) CBOD/BOD ratio of 0.92

11.1.3 Plant C

Plant C, will be upgraded to a capacity of 6,333 m^3/d. It has two sequencing batch reactors with automated control of the cyclic sequence consisting of anoxic fill, aeration, settle and decant modes. Each reactor includes a selector zone, covering approximately 6% of the total surface area and aeration to the main reactor zone is provided through fine bubble diffusers. A coarse bubble aeration system provides aeration to the front end selector zones. Each reactor has a variable speed effluent decanter, and two surface skimmers.

Table 3(a): Design Flows (Plant C)

Description	Flow
ADF	6,333 m^3/d
MMF	7,600 m^3/d
PDF	14,516 m^3/d

Table 3(b): Design Influent Criteria (Plant C)

Influent Parameter	Concentration (mg/L)	Load (kg/d)
Annual Average BOD_5 (1)	200	1,267
Annual Average TSS - raw	180	1,140
Annual Average TSS – chemical sludge	218	1,381

Influent Parameter	Concentration (mg/L)	Load (kg/d)
Annual Average TP	4.2	27
Annual Average TKN	32	203
Maximum Month BOD_5 (1)	212	1,611
Maximum Month TSS - raw	207	1,573
Maximum Month TSS – chemical sludge	250	1,900
Maximum Month TP	4.9	37
Maximum Month TKN	34.7	264

(1) CBOD/BOD ratio of 0.92

11.1.4 Plant D

Plant D will be upgraded to a capacity of 14,437 m^3/d. It has an aerated inlet channel, four aeration basins, an effluent channel and four circular secondary settling clarifiers. Aeration is provided through fine bubble diffusers. Upgrades will include aeration in the effluent channel to ensure MLSS suspension, motorized valves on some diffuser drop legs for Dissolved Oxygen (DO) control, and provision to chlorinate return activated sludge to control SVI.

Table 4(a): Design Flows (Plant D)

Description	Flow
ADF	14,437 m^3/d
MMF	17,300 m^3/d
PDF	35,809 m^3/d

Table 4(b): Design Influent Criteria (Plant D)

Influent Parameter	Concentration (mg/L)	Load (kg/d)
Annual Average BOD_5 (1)	200	2,887
Annual Average TSS - raw	180	2,599

Influent Parameter	Concentration (mg/L)	Load (kg/d)
Annual Average TSS – chemical sludge	218	3,147
Annual Average TP	4.2	61
Annual Average TKN	32	462
Maximum Month BOD_5 (1)	212	3,668
Maximum Month TSS - raw	207	3,581
Maximum Month TSS – chemical sludge	250	4,325
Maximum Month TP	4.9	85
Maximum Month TKN	34.7	600

(1) CBOD/BOD ratio of 0.92

The design influent flows and raw influent characteristics should be reviewed and updated prior to proceeding with detailed design.

Effluent criteria were also developed in the Phase 3 and 4 ESR, as summarized in Table 5:

Table 5: Design Effluent Criteria

Effluent Parameter	Objective Limit		Compliance Limit	
	Concentration	Load	Concentration	Load
$CBOD_5$	5 mg/L	--	10 mg/L	--
TSS	5 mg/L	--	10 mg/L	--
TP	0.08 mg/L	680 kg/yr	0.082 mg/L	698 kg/yr
Ammonia Nitrogen (NH_3-N)				
- Apr 1 to Oct 31	0.6 mg/L	--	0.8 mg/L	--
- Nov 1 to Mar 31	2.0 mg/L	--	2.5 mg/L	--
E. Coli (geometric mean)	50 cfu/100mL	--	100 cfu/100mL	--
pH	Maintain between 6.0 and 9.5 inclusive at all times		Maintain between 6.0 and 9.5 inclusive at all times	

11.2 Site Layout

The existing conditions are shown on Figure 2. The proposed expanded facility is shown on Figure 3.

11.3 Process Units

11.3.1 General

The following provides a summary of the process elements of the existing facility as well as an overview of the proposed upgrades and expansion. The existing and proposed process flow schematics are provided in Figures 4 and 5 respectively.

All wastewater is currently treated at Plant B, C, and D. Plant A no longer treats sewage but it is currently used for storage and transfer of digested sludge from Plant B. Plant A will be demolished when the plant is expanded.

Raw influent flows through the inlet structure (adjacent to Plant B) to the raw sewage pumping station. Excess flow can be diverted to an emergency sewage overflow pond and then reintroduced by pump into the influent when peak flows decrease. Septage is received at a two cell (43.8 m^3 each) below grade concrete septage holding tank upstream of the Inlet Structure and is gradually blended with the raw influent via two submersible grinder pumps (one duty; one standby) each rated at 2.55 L/s @ 10 m TDH. The influent is pumped from the Raw Sewage Pumping Station to the Headworks (adjacent to Plant D) where it receives screening, grit removal and alum dosing (for phosphorus removal) prior to distribution to Plants B, C and D for secondary treatment via flow splitting chamber and valves. Plant A, now decommissioned, originally also provided secondary treatment but the tanks are not currently in use.

Plants B and D are extended aeration processes with secondary clarifiers for settling, while Plant C is an SBR. Downstream of Plant C is an equalization chamber to equalize flow to the filters from Plant C.

Plants B, C, and D all discharge to continuous contact sand filters. More alum is added upstream of the filters to enhance phosphorus removal. The filter effluent subsequently receives ultraviolet disinfection prior to discharge via gravity or pumps to the final effluent chamber and outfall. Filter reject is returned to the Headworks.

Waste sludge from Plants C and D is conveyed to the digesters constructed in 2009, where it receives aerobic digestion prior to decanting and transfer to the biosolids storage tanks, also constructed in 2009. Decanted supernatant flows to the filter reject well where it is pumped, together with the filter reject, back to the Headworks. Plant B currently has its own aerobic digesters which transfer sludge to the lagoons via the former Plant A. The lagoons are comprised of two 10,000 m^3 cells, centre and south, complete with sludge transfer piping, air piping and coarse bubble diffusers in south cell, decant chamber and decant return pumping station.

The following sections provide a description of the proposed upgrades and Table 6 below summarizes this information. Design calculations including tank dimensions and equipment sizing for critical processes are included in Appendices C and D.

Table 6: Summary of Process Units – Existing vs. Proposed Upgrade

Process Unit	Qty	Existing		Qty	Proposed Upgrade	
		Capacity of Each Unit	Firm Capacity with Largest Unit Offline (if applicable)		Capacity of Each Unit	Firm Capacity with Largest Unit Offline (if applicable)
Sewage Pumps	4	188 L/s at 10m 16,243 m^3/d Max speed	564 L/s at 10m 48,729 m^3/d Max speed	4	206 L/s at 11m 17,800 m^3/d ~97% speed	618 L/s at 11m 53,400 m^3/d ~97% speed
Bar Screens	2	24,400 m^3/d	24,400 m^3/d 2 units need to operate OR excess flow bypasses to manual barscreen	2 1	34,000 m^3/d rerate existing units & add 1 wider unit 46,000 m^3/d	68,000 m^3/d
Vortex Grit Removal All Units Running	2	22,400 m^3/d	22,400 m^3/d 44,800 m^3/d temp. portion of peak flow bypasses	2	22,400 m^3/d	22,400 m^3/d 44,800 m^3/d temp. portion of peak flow bypasses
Grit Classifier	1	N/A	N/A	2	Add redundant unit	Add redundant unit
Plant B	ADF MMF PDF	3,075 m^3/d 3,075 m^3/d 3,075 m^3/d	N/A N/A N/A	ADF MMF PDF	3,075 m^3/d 3,075 m^3/d 3,075 m^3/d	N/A N/A N/A
Plant C	ADF MMF PDF	4,325 m^3/d 5,190 m^3/d 13,800 m^3/d	N/A N/A N/A	ADF MMF PDF	6,333 m^3/d 7,600 m^3/d 14,516 m^3/d	N/A N/A N/A

Process Unit	Qty	Existing		Qty	Proposed Upgrade	
		Capacity of Each Unit	Firm Capacity with Largest Unit Offline (if applicable)		Capacity of Each Unit	Firm Capacity with Largest Unit Offline (if applicable)
Plant D	ADF	10,000 m^3/d	N/A	ADF	14,437 m^3/d	N/A
	MMF	12,615 m^3/d	N/A	MMF	17,300 m^3/d	N/A
	PDF	31,925 m^3/d	N/A	PDF	35,809 m^3/d	N/A
Chemical Phosphorus Removal						
Spare Pumps (not connected)	3	118.8 L/hr	237.6 L/hr	TBD	Add 360 L/hr	TBD
Plant B&C Day Tank	2	5,000 L	N/A	2	5,000 L	N/A
Plant B&C Bulk Tk	1	25,000 L	N/A	2	25,000 L	N/A
Plant B, C & D Pumps	2	60 L/hr	60 L/hr		Extra Capacity above is common to Plant D	TBD
Plant D Day Tank	2	7,500 L	N/A			N/A
New Secondary Effluent Equalization Tank	0	N/A	N/A	1	1,700 m^3	N/A
Ballasted Flocculation Facility (Tertiary Phosphorus Removal)	0	N/A	N/A	2	64,800 m^3/d	64,800 m^3/d

Process Unit	Qty	Existing		Qty	Proposed Upgrade	
		Capacity of Each Unit	Firm Capacity with Largest Unit Offline (if applicable)		Capacity of Each Unit	Firm Capacity with Largest Unit Offline (if applicable)
Tertiary Filters Filtration Rate (Max=3.3 L/(m^2. s)) Solids Loading Rate (Max=83mg/(m^2 . s))	8	27.9 m^2	195.3 m^2 2.89 43.4	8	27.9 m^2	195.3 m^2 3.16 47.5
UV Systems	2	31,811 m^3/d	63,622 m^3/d with 1 of 2 banks offline in either or both units	2	31,811 m^3/d	63,622 m^3/d with 1 of 2 banks offline in either or both units
TWAS (Daily ADF sludge production = 513 m^3/day at 1%) (Daily MMF sludge production = 616 m^3/day at 1%) All Units Running	0	N/A	N/A	2	60 m^3/hr 480 m^3/day at 8 hrs/day 616 m^3/day at 10.3 hrs/day	60 m^3/hr 480 m^3/day at 8 hrs/day 616 m^3/day at 10.3 hrs/day 616 m^3/day at 5.1 hrs/day
1st Stage Digester Volume * Min. Volume Req'd based on Loading is 2503 m^3	2	2,165 m^3	4,330 m^3 *Firm Capacity is N/A	2	2,165 m^3	4,330 m^3 *Firm Capacity is N/A

Process Unit	Qty	Existing		Qty	Proposed Upgrade	
		Capacity of Each Unit	Firm Capacity with Largest Unit Offline (if applicable)		Capacity of Each Unit	Firm Capacity with Largest Unit Offline (if applicable)
2nd Stage Digester	2	1,085 m^3	2,170 m^3 *Firm Capacity is N/A	2	1,085 m^3	2,170 m^3 *Firm Capacity is N/A
All Digesters Total Volume SRT at 3% Solids (@ MMF) * Min. SRT Req'd is 45 days		N/A N/A	6500 m^3 N/A		N/A N/A	6500 m^3 46 Days * The excess SRT of 1 Day can be added to Sludge Storage Volume below

Process Unit	Qty	Existing		Qty	Proposed Upgrade	
		Capacity of Each Unit	Firm Capacity with Largest Unit Offline (if applicable)		Capacity of Each Unit	Firm Capacity with Largest Unit Offline (if applicable)
Biosolids Storage						
Volume	3		25,520 m^3	3		25,520 m^3
Scenario 1: SRT at 3% Solids & MMF Conditions			Not Calculated			182.3 Days
Add Excess Digester (1 day) and Aeration (15 days**) SRT			Not Calculated			198.3 Days
Scenario 1: SRT at 3% Solids & ADF Conditions			Not Calculated			238 Days
Scenario 2: SRT at 4% Solids & MMF Conditions			Not Calculated			264 Days
*Note: 240 days of biosolids storage is recommended but not required			*Firm Capacity is N/A			*Firm Capacity is N/A
**Note: Refer to Appendix C for 15 days aeration SRT calculations						

11.3.2 Raw Sewage Pumping Station

Existing Pumps and Wet Wells

The raw sewage pumping station consists of an inlet chamber, two wet wells and a dry well. The inlet chamber receives raw sewage from the inlet structure, which it distributes into the two wet wells. The two wet wells are inter-connected by a 900 mm diameter square opening equipped with a slide gate. Each wet well can be isolated from the inlet structure with slide gates.

The dry well houses four variable frequency raw sewage dry pit submersible ITT Flygt pumps, each with a capacity of 188 L/s @ 10 m TDH. A 44,000 m^3 bypass lagoon is available to temporarily store excess wastewater when short-term flow rates exceed the design peak day flow rate.

The influent flow pump rate is automatically controlled based on level in the two wet wells. Currently one pump is capable of transferring influent wastewater to the Headworks.

The Plant has the ability to deliberately send the flow from the wet-well to the bypass lagoon by closing the weir and letting flow build up in the wet wells and overflow to the lagoons. In addition, instantaneous peak flows exceeding the design peak day flow rate will be diverted to the storage lagoons, also bypassing screens and grit removal, and returned during lower flow periods.

There is a 150 mm overflow pipe from the Headworks (grit classifier wash water and decant), which drains solely to influent wet well #2. Therefore if wet well #2 is taken out of service, drainage from the Headworks is compromised, limiting plant redundancy.

Proposed Works

Wet well sizing will be confirmed during detailed design. However, since the pumps are variable speed and emergency storage is available, the wet well size is not critical, hence no expansion is anticipated.

The overall capacity of the raw sewage pumps will need to be increased such that the firm capacity with the largest pump out of service matches or exceeds the peak day flow rate of 53,400 m^3/d (618 L/s). According to Xylem (ITT), just impellers and motors can be upgraded, on the existing pumps, but the cost savings are less than $2,000 per pump compared to replacing the pump unit. Note that in either case, the pump stands and piping can be re-used allowing for easy installation. At this stage we have considered upgrading or replacing all 4 pumps, such that the existing piping, valves, and stands remain intact. The impellers are 2 sizes larger, the motors are 1 size larger, and a vendor quote for new units is included in Appendix D. A preliminary calculation of the system curve indicates that 3 operating replacement units, with VFD control at 54 Hz, will deliver 618 L/s at 11 m TDH for a firm capacity of 53,400 m^3/d, and this can be seen on the included vendor pump curves.

The grit classifier overflow drain pipe will be modified such that the wash water and decant can be diverted to both wet wells. The raw sewage sampling point will also be relocated.

Possible issues with incoming power fluctuations and the variable frequency drives for the pumps must be investigated during detailed design. The condition of the pump impellers should be checked to see if there are any wear/cavitation/corrosion issues that could carry over to the expansion and upgrade phase.

11.3.3 Headworks

Screening

An inlet chamber receives raw sewage from the pumping station and distributes it into three screen channels. There are two existing 10-mm mechanically cleaned bar screens, each having a peak flow rate capacity of 24,400 m^3/d, for a total peak flow capacity of 48,800 m^3/d. One manual bar rack provides emergency screening and was installed for future requirements when the flow increases. The manual bar screen rack is also used during maintenance periods and unusually high flows to the plant.

Grit Removal

The grit removal system removes inorganic particles (primarily sand, silt and grit) from the raw sewage. The fluidized grit in the grit well is gravity discharged to the grit classifier. The grit classifier and dewatering screw separate the grit from the slurry in a dried form, and return the organics back to the influent wet well for further treatment. Grit contained in the slurry is separated by a flow induced vortex action. Separated grit is removed by the auger screw from the classifier bin's bottom, discharged into a storage bin and disposed to landfill. An adjustable apex is provided in the cyclone unit for optimizing grit removal under various flow and grit loading rates.

There are two 3.0 m diameter vortex grit removal units for a total capacity of 44,800 m^3/d. Figure 6 shows a view of the existing units.

Flow Splitter

There is a flow splitting chamber with three sluice gates, feed pipes and magnetic flow meters for distribution and flow control of screened and degritted sewage to Plants B, C and D.

Odour Control System

The Headworks is equipped with a biological odour control system, complete with ductwork, exhaust fan, outdoor packaged biological process unit and exhaust stack, designed to treat 850 L/s of process air from the Headworks Building. There have been issues with lines freezing on this unit and these lines must be properly insulated. A Screen 3 Modelling Report for Air Quality Impacts, included in the Phase 3 and 4 Report, confirms that the odour impacts from the Headworks are adequately controlled.

Proposed Works

Peak flow rates to the Headworks will be limited to peak day flow (53,400 m^3/d).

Based on a proposal by ENV Treatment Systems (dated March 22, 2011), assuming a 30% screen blinding factor, the existing screens could be re-rated to provide a capacity of 34,000 m^3/d each. Installing a new screen in the existing manual bar rack channel will provide additional capacity of 46,000 m^3/d, and a new by-pass channel with manual bar screen can be constructed within the existing building east of existing channels. Therefore the total installed screening capacity for the existing and the proposed new screen at 30% screen blinding will be 114,000 m^3/d. The total firm screening capacity (largest unit out of service) will be 68,000 m^3/d. Figure 6 shows a view of the existing and proposed modifications.

A second grit classifier unit will be installed to provide redundancy. Figure 7 shows a view of existing and proposed modifications for these units.

Modifications will be made to the flow splitter to ensure that flow to Plant B is restricted (base loaded) to 3,075 m^3/d at all times and that the balance of flow is split appropriately to Plants C and D. The flow will be divided as per Table 7.

Table 7: Flow Split Between Plants

Description	Plant B	Plant C	Plant D
ADF	3,075 m^3/d	6,333 m^3/d	14,437 m^3/d
MMF	3,075 m^3/d	7,600 m^3/d	17,300 m^3/d
PDF	3,075 m^3/d	14,516 m^3/d	35,809 m^3/d

Ideally, grit removal would be designed for peak instantaneous flow (in this case 53,400 m^3/d due to flow balancing in the emergency sewage overflow lagoon). However a temporary bypass of the grit removal units is not detrimental to plant performance and there are space limitations in the building. Therefore no additional grit removal capacity will be provided.

The existing and proposed Headworks conceptual plans are provided in Figures 6 and 7 respectively.

11.3.4 Plant A

Existing Tanks

Plant A has been decommissioned, however the digester system continues to be used for further stabilization and sludge storage. It consists of two parallel digester trains, each comprising four aerated cells in series with a combined volume 1,473 m^3 per train, equipped with coarse bubble diffusers and followed by one decant tank and one sludge pump chamber in each train.

Proposed Works

All Plant A blowers, diffusers, pumps and piping are to be removed and disposed of offsite. The concrete tanks are to be demolished and the rubble removed from the site. A quote for demolition has been included in Appendix D.

A new secondary effluent equalization tank and Ballasted Flocculation System will be constructed in the location of the demolished Plant A to receive secondary effluent from Plants B, C and D. This facility will provide tertiary phosphorus removal in addition to the upgrade of existing coagulation systems. Please refer to Section 8.3.9 and 8.3.10 for details.

11.3.5 Plant B

Existing Aeration Tanks and Clarifiers

Plant B, with a rated capacity of 3,075 m^3/d, has two extended aeration basins and two circular secondary settling clarifiers. Each aeration basin is 25 m x 4.8 m x 4.95 m SWD (594 m^3 each; 1,188 m^3 total) and each clarifier has a diameter of 15.24 m with a 4.27 m SWD (182 m^2 surface area each; 365 m^2 total). Aeration is provided through an air filtration module and fine pore dome diffusers.

There are two positive displacement 30 kW blowers with a capacity of 1,148 m^3/hr (319 L/s) each for the aeration basins. In addition, there are four positive displacement blowers capable of supplying air to the Inlet Structure, Plant B aeration basins, Plant B digesters and the south cell of the sludge storage lagoon, consisting of three 112.5 kW blowers with a capacity of 5,530 m^3/hr (1,536 L/s) each and one 75 kW blower with a capacity of 4,500 m^3/hr (1,250 L/s).

There are two horizontal centrifugal return activated sludge pumps, with a total capacity of 112 L/s @ 11.6 m TDH, along with one positive displacement progressive cavity scum pump rated at 3.0 L/s @ 17.6 m TDH.

Existing Digester and Biosolids Storage

Plant B also has one two-stage digester, 25 m x 11.5 m x 5.4 m SWD, with a total capacity of 1, 549 m^3, including 1,233 m^3 in Cell 1 and 316 m^3 in Cell 2. Aeration is provided through coarse bubble diffusers. Digested sludge is conveyed to the lagoon via Plant A.

Proposed Works

Influent flow to Plant B will be limited to 3,075 m^3/d to prevent overloading the clarifiers (modified flow splitting operations).

- It is proposed to convert the existing digester into an additional aeration basin and to replace the coarse bubble diffusers in those tanks with fine bubble diffusers.
- Obsolete equipment currently not in use will be removed and disposed of.
- Based on confirmation of compatibility and condition, one of the larger or both smaller existing blowers will be relocated to Plant C to optimize aeration capacity for both plants. Appropriate modifications to the influent and effluent channels will also be completed.
- The Plant B effluent will be re-directed to the new secondary effluent equalization tank, which will be constructed in the current Plant A location.
- The waste activated sludge pipe will be re-directed to discharge into the old Plant C equalization tank, which will be converted into a waste activated sludge holding facility.
- Modifications will be made to allow for transferring Plant D waste activated sludge to Plant B as a nitrifying seed to ensure nitrification year-round.

11.3.6 Plant C

Existing Sequencing Batch Reactors

Plant C, with a rated capacity of 4,325 m^3/d, has two 36 m x 23 m x 5.5 m deep sequencing batch reactors with automated control of the cyclic sequence consisting of anoxic fill, aeration, settle and decant modes. Each reactor includes a 225 m^3 selector zone, covering approximately 6% of the total surface area. Aeration to the main reactor zone is provided through fine pore diffusers. A coarse bubble aeration system provides aeration to the front-end selector zones. Each reactor has a variable speed effluent decanter rated at 282 L/s (maximum), and two surface skimmers.

There are two constant speed and one variable speed rotary positive displacement air blowers, each with a capacity of 354 L/s @ 62.1 kPa, and each capable of providing air to either reactor.

There are two submersible return activated sludge pumps each rated at 8.5 L/s @ 4 m TDH, for transferring sludge from the cyclic activated sludge portion of the reactor to the front end selector zone, as well as two submersible waste activated sludge pumps each rated at 8.5 L/s @ 8.1 m TDH, for wasting excess sludge to the aerobic digester for Plant D.

Existing Effluent Equalization Tank

There is one 10 m x 16 m x 5.5 m deep Plant C effluent equalization tank, to collect decant flow from the reactors and provide an equalized flow to the tertiary filters. The equalization tank is equipped with two submersible pumps (one with variable speed drive), each rated at 141 L/s @ 5 m TDH to pump equalized flow to the filter splitter chamber.

Proposed Works

Plant C will be upgraded to a capacity of 6,333 m^3/d as described in the Existing and Future Plant Optimization Report

- The effluent flow equalization chamber for Plant C will be converted to a waste activated sludge holding tank, capable of receiving WAS from Plants B, C and D. The two submersible pumps will be relocated into the new equalization chamber and replaced with sludge transfer pumps discharging to the new thickening waste activated sludge facility
- The Plant C effluent discharged from the decanters in each reactor will be re-directed to the new secondary effluent equalization tank, which will be constructed in the current Plant A location.
- The waste activated sludge from Plant C reactors will continue to share piping with Plant D, such that combined WAS from both Plants will be re-directed to discharge into the converted waste activated sludge holding facility
- One of the larger or both of the smaller Plant B aeration blowers (pending confirmation of compatibility and condition) will be relocated to provide additional Plant C aeration capacity.

11.3.7 Plant D

Existing Aeration Tanks and Clarifiers

Plant D, with a rated capacity of 10,000 m^3/d, has an aerated inlet channel, four aeration basins, a non-aerated aeration effluent channel and four circular secondary settling clarifiers. Each aeration basin is 60 m x 11 m x 4.0 m SWD (2,640 m^3 each; 10,560 m^3 total) and each clarifier has a diameter of 21.3 m with a 4.0 m SWD (356 m^2 surface area each; 1,425 m^2 total). Aeration is provided through fine bubble diffusers.

There are four air blowers, each with a capacity of 900 L/s @ 70 kPa for the aeration basins.

There are six activated sludge pumps, each rated at 4,500 m^3/d (52.1 L/s) @ 8 m TDH, for activated sludge return to the inlet channel of the aeration tanks and for waste activated sludge discharge to the aerobic digester, along with two scum pumps, each rated at 30 L/h @ 6.75 m TDH, also discharging to the aerobic digester.

Flow Splitter Chamber for Plant D Clarifiers

Activated sludge from the four aeration tanks is split between four clarifiers via the existing flow splitter chamber. This unit currently has issues with plugging and there is an uneven hydraulic gradient that results in varied flow to each clarifier. Figure 8A shows the existing flow splitter.

Proposed Works

Plant D will be upgraded to a capacity of 14,437 m^3/d as described in the Existing and Future Plant Optimization Report

Aeration diffusers will be provided in the aeration effluent channel to ensure MLSS stays in suspension.

Motorized valves will be installed on some aeration diffuser drop legs to provide Dissolved Oxygen (DO) control of aeration. A quote for these valves is provided in Appendix D.

Provision will be made to chlorinate the Plant D return activated sludge recycle to control SVI. A new chlorine tank and dosing system will be located in the new TWAS facility.

The Plant D effluent will be re-directed to the new secondary effluent equalization tank, which will be constructed in the current Plant A location.

The waste activated sludge pipe will be re-directed to discharge into the old Plant C equalization tank, which will be converted into a waste activated sludge holding facility.

The existing flow splitter chamber configuration can lead to sludge build-up, as well as rust and H_2S build-up and uneven flow distribution to the clarifiers. The flow splitter chamber will be modified as per Figure 8B or replaced with a structure similar to the one illustrated in Figure 8C, such that the flow is streamlined and there is an open-grate construction. In the case of Figure 8B (Option 1), these modifications will temporarily shut down Plant D, but the interior splitter walls and weir gates can be pre-fabricated of Stainless Steel such that the structure is lowered into place, fastened, and sealed to the existing concrete walls and floor. This would significantly minimize Plant D downtime during the installation. In Figure 8C (Option 2), plant downtime during construction is also minimized since a new structure is built beside the existing structure, such that new piping is tied into existing clarifier influent pipes one at a time. The new splitter is linked into the existing overflow system by overflowing s into the existing splitter chamber.

11.3.8 Chemical Phosphorus Removal System

Existing Chemical Phosphorus Removal System

Alum is dosed on a continuous basis into the individual pipes conveying degritted wastewater to Plants B, C and D. There is a second injection point upstream of the filters.

There are two chemical metering pumps, each capable of dosing alum at 0 –60 L/h to Plant B, Cand D along with two 5,000 L capacity and two 7,500 L day tanks and one 25,000 L bulk storage tank for storing alum.

In addition, there are three chemical metering pumps available, each having a capacity of 0 –118.8 L/h, which are stored as spares and are used to transfer alum from the bulk to day tanks.

Proposed Works

It is proposed to add approximately 360 L/hr chemical metering pump capacity to the existing units, and to increase the alum storage by at least 25,000 L.

11.3.9 New Secondary Effluent Equalization Tank

Proposed Works

A new 1,890 m^3 flow equalization chamber will be constructed in the location of the demolished Plant A to receive secondary effluent from Plants B, C and (optionally) D. The equalization tank will be equipped with a combination of existing effluent pumps (transferred from the existing flow equalization tank) and new pumps such that the total firm discharge capacity (with the largest pump out of service) is 53,400 m^3/d (309 L/s) to the new ballasted flocculation facility.

11.3.10 New Ballasted Flocculation Facility for Tertiary Phosphorus Removal

Proposed Works

A new ballasted flocculation facility capable of treating flows up to 53,400 m^3/d (peak day flow) will be constructed adjacent to the new flow equalization chamber. This facility will provide tertiary phosphorus removal in addition to the upgrade of existing coagulation systems. Peak day flow will be the peak flow discharging to the facility after flow balancing in the equalization tank.

For the purpose of this Pre-Design Report an Actiflo system is assumed. The proposed Ballasted Flocculation Facility concept plan is provided in Figure 9. Specific design information is provided in Appendix D. Note that the design information provided is for one unit. Two units are proposed. Once the ballasted flocculation facility is selected during detailed design, the design parameters will be confirmed.

11.3.11 Tertiary Filters and Ultraviolet Disinfection

Existing Filters

Flow control chambers receive secondary effluent from Plant B, C, and D. The flow is then divided between the upper and lower filter buildings. In each building there are four continuously backwashed, upflow, deep bed granular media filter cells, with each filter cell having a filtration area of 28 m^2 (combined filtration area of 112 m^2 for all four filter cells in each building).

Each filter building contains two submersible pumps (one standby), each pump rated at 14 L/s @ 12.0 m TDH to pump filter reject to the flow splitting chamber in the Headworks building. One set of pumps (for the upper building) also pumps decanted supernatant from the aerobic digester and biosolids storage tanks to the Headworks.

Ultraviolet Disinfection Systems

The upper and lower filter buildings each contain one UV channel having two banks of lamps, each consisting of 20 modules with 8 lamps per modules. Each UV system is designed for a 31,811 m^3/d peak flow rate (63,622 m^3/d total). The UV system in the upper building discharges by gravity through a 750 mm diameter sewer to the final effluent channel. There are three submersible effluent pumps (one standby) in the lower building, each rated at 177 L/s @ 5.3 m TDH, to pump disinfected effluent from the UV channel to the final effluent channel.

Proposed Works

No modifications, additions or replacement of the tertiary filter and disinfection systems are proposed.

11.3.12 New Thickening Waste Activated Sludge (TWAS) Facility

Proposed Works

A new thickening waste activated sludge facility will be constructed immediately north of the Plant D east clarifiers. This facility will receive pre-thickened WAS from the WAS storage tank (the existing Plant C equalization tank) at a concentration of 1% dry solids. An ALDRUM Mega Duo system (two drum filters with two flocculation reactors) is initially proposed, with a capacity of 60 m^3/hr each. This will provide unit redundancy. Although each unit has 78% (not 100%) capacity, sludge thickening is not a critical process and, if preferred, one filter can simply be operated longer (about 10 hours) to provide 100% capacity when a unit is out of service.

Two positive displacement pumps (one duty; one standby) will convey the thickened sludge to the digesters.

The thickening facility will be designed to increase the WAS concentration to at least 3% (more typically 4 – 8%). The facility will include two drum filters (one duty; one standby) and a polymer dosing and flocculation system. The proposed TWAS Facility concept plan is provided in Figure 10. Manufacturer's information is provided in Appendix D.

11.3.13 Aerobic Biosolids Digesters and Storage

Existing Digester and Biosolids Storage

There is currently a total of 4,495 m^3 of digester capacity in Plants A and B and 20,000 m^3 of sludge storage volume in the lagoon cells. As described previously, Plant A is to be demolished and the Plant B digesters are to be converted to aeration tanks. .

There is one circular 33.0 m diameter by 7.6 m deep two-stage aerobic digester with two Stage 1 cells of 2,165 m^3 each and two Stage 2 cells of 1,085 m^3 each, equipped with a coarse bubble aeration and mixing system. Waste activated sludge from Plants C and D are conveyed to this digester.

There are two circular 33.0 m diameter by 7.6 m deep biosolids storage tanks and one 36.6 m diameter by 11.9 m deep biosolids storage tank to store digested biosolids from Plants C and D.

There are two Stage 1 Digester mixing pumps and blowers, and two Stage 2 Digester mixing pumps and blowers. Sludge is transferred to the biosolids storage tanks using two digester sludge transfer pumps (one standby), each rated at 14.0 L/s @ 9.5 m TDH.

There are two chopper style mixing pumps, each rated for 363 L/s using a pumped hydraulic mixing system to provide mixing contents in the two smaller biosolids tanks.

There are two chopper style mixing pumps, each rated for 327 L/s using a pumped hydraulic mixing system to provide mixing contents in the largest biosolids tank. One of these pumps is equipped with a VFD and is also used as a truck-filling pump.

Proposed Works

With the addition of the new thickening waste activated sludge facility, the existing biosolids digestion and storage systems constructed in 2009 will have sufficient capacity for the new rated capacity of the plant; therefore no additional tanks or equipment are proposed. The Plant B digesters will be converted to aeration tanks and Plant B waste activated sludge will be re-directed to the common WAS storage tank. The use of the lagoons for biosolids storage will be discontinued.

Piping modifications will be undertaken to improve digester blower flexibility to service each digester from multiple blowers.

The decanting system will be modified such that supernatant is returned directly to the Headworks to allow for increased decant rates.

11.4 Building and Site Services

The existing building and site services are for the most part suitable for the proposed expansion. None of the buildings will require expansion as part of the proposed works. It is anticipated that hydro (3,000 kVA transformer) and standby power (900 kW diesel generator set complete with 2,270 L double-walled steel tank with spill containment) will be sufficient to accommodate the additional loading (to be confirmed during detailed design).

Insulation for the diesel generator will be provided.

12.0 Design Calculations

12.1 Hydraulic Calculations

A preliminary review indicates that the additional flows and structures will not create, and in the case of the screens, will resolve hydraulic issues at the WPCP. However, detailed hydraulic calculations must be carried out during detailed design in order to confirm this.

12.2 Process Calculations

Process design calculations have been completed for the proposed plant expansion, and are for the most part included as Appendix C. Reference has been made in Appendix C to manufacturer's information (included in Appendix D) where appropriate.

13.0 Preselected Equipment

For this Bradford WPCP expansion, it is recommended that the following pieces of major equipment be preselected:

- Raw Water Sewage Pumps
- Screens
- Grit Classifier
- Aeration Blowers
- Aeration Diffusers
- Ballasted Flocculation System
- Sludge Thickening System
- Polymer Dosing System
- Aeration Valves for Plant D to provide Dissolved Oxygen (DO) control

Copies of budgetary proposals and product information can be found in Appendix D for the following:

- Veolia Water Solutions and Technologies – ballasted flocculation system (Actiflo package high rate clarifier)
- Alfa Laval – ALDRUM sludge thickening system
- XYLEM (ITT) – Flygt raw water sewage pumps
- WTP – ENV bar screen, screw converyor, washer compactor and grit classifier
- PSI – DresserRoots aeration blowers
- C&M – EDI aeration diffusers
- Metcon – polymer dosing system
- Bray – aeration valves for Plant D to provide dissolved oxygen (DO) control.

14.0 Construction Considerations

14.1 Geotechnical

Contractors will be cautioned, in the Contract Documents, of the site conditions so that construction methods and equipment are appropriately selected, based on their expertise. The 1995 and 2003 geotechnical reports will be made available to the Tenderers, with appropriate disclaimers.

14.2 Public Safety and Site Security

The proposed expansion will occur inside the existing fenced site. The Contractor will be required to ensure that proper signage and site fencing are installed as per Ministry of Labour guidelines.

An established truck route should be selected by the Town, and construction times should be limited in accordance with Town by-laws, to mitigate impacts on the local community.

14.3 Maintaining Flow During Construction

The existing WPCP must remain in operation during the construction of the new facility.

The majority of the new construction can be carried out independently of the existing plant, the primary exceptions being where work is required on the three secondary treatment processes (Plants B, C and D). In these cases, the Contractor will be required to carefully coordinate his work so as to have no more than one plant out of operation at a time, and to minimize the time any of the plants are out of service. The contractor will be required to provide a detailed plan outlining the steps to be taken prior reducing or discontinuing flow to any part of the WPCP.

14.4 Environmental Considerations

The Holland River is not far from the site and appropriate measures will be taken to ensure environmental impacts on the river are mitigated.

The actual construction work should have very little effect on the immediate environment. However, a site drainage scheme will be required during construction and shall be considered as an item in the Form of Tender in the Contract Documents. This will indicate measures to be taken to minimize the migration of silt from the site during construction.

15.0 Review Agency Approvals

The following submissions are to be made at or near the end of detailed design (unless otherwise indicated) once sufficient information has been prepared for agency review purposes:

- MOE Certificate of Approval (Wastewater)
- MOE Certificate of Approval (Air), including an air/odour assessment and noise attenuation study in support of the C of A

- Site Plant Approval from the Town and County
- Building Permit from the Town (to be submitted by the Contractor prior to start of construction).

16.0 Opinion of Project Cost

The opinion of capital cost for the proposed upgrades to the WPCP (including engineering and contingencies) is in the order of $20 million as summarized in Table 6 (Table 15.1 reproduced from the ESR). The opinion of cost is in 2011 dollars and is an order-of-magnitude estimate, hence an additional allowance of 50% should be considered for budgeting purposes.

Table 8: Opinion of Project Capital Cost

Description	Opinion of Cost
General Site Works	$600,000
Upgrades to the Raw Sewage Pumping Station	$300,000
Upgrades to Headworks	$900,000
Demolition of Plant A	$300,000
Upgrades to Plant B	$1,000,000
Upgrades to Plant C	$700,000
Upgrades to Plant D Aeration	$200,000
New secondary effluent equalization tank and Ballasted Flocculation Facility	$13,000,000
New Thickening Waste Activated Sludge Facility	$3,000,000
TOTAL OPINION OF CAPITAL COST	**$20,000,000**

17.0 Summary

The proposed work is summarized as follows:

Table 9: Summary of Proposed Works

Structure	Proposed Works

Structure	Proposed Works
Administration Building	No changes.
Septage Receiving Station	No changes.
Original Inlet Structure	No changes.
Emergency Sewage Overflow Pond	No changes.
Raw Sewage Pumping Station	Replace/upgraderaw sewage pumps with larger pumps. Modify classifier drain line to drain to either wet well. Change sample point. Check impeller wear on sewage pumps. Review VFD issues. Check incoming power surges.
Headworks Building	Re-rate existing screens. Install third screen. Install second grit classifier. Modify flow splitter box. Review odour control system.
Plant A	Remove and dispose of all piping and equipment. Demolish structures and remove rubble.
Plant B	Convert digester into aeration basin. Remove digester blowers and diffusers. Re-locate one large or two small existing aeration blowers to Workshop (for additional Plant C aeration). Redirect clarifier effluent to new flow equalization tank. Redirect WAS to old flow equalization tank (to be converted into WAS holding tank).

Structure	Proposed Works
Plant C	Convert flow equalization tank into a WAS holding tank. Redirect decanted effluent to new flow equalization tank. Redirect WAS to converted WAS holding tank. Redirect pump discharge from converted WAS holding tank to new thickening waste activated sludge facility. Augment blower capacity with re-located aeration blower(s) from Plant B.
Plant D	Install diffusers in aeration effluent channel. Install motorized valves on some aeration diffuser drop legs to control DO. Provide chlorination to RAS recycle. Modify or replace flow splitter chamber. Redirect clarifier effluent to new flow equalization tank. Redirect WAS to old flow equalization tank (to be converted into WAS holding tank). Provision will be made to optionally discharge WAS to Plant B to act as a nitrifying agent.
Chemical Phosphorus Removal System	Provide additional alum metering pump with total capacity of 360 L/hr. Provide a minimum 25,000 L additional alum storage.
New Flow Equalization Tank	Construct new flow equalization tank to accept effluent from Plants B, C and D, complete with submersible pumps to discharge balanced flow to the new ballasted flocculation facility.
New Ballasted Flocculation Facility	Construct a new ballasted flocculation facility.
Tertiary Filters and Ultraviolet Disinfection	No changes.
Final Effluent Chamber and Outfall	No changes.
Workshop Building	Install re-located aeration blowers from Plant B and Plant D (to augment Plant C aeration capacity).

Structure	Proposed Works
New Thickening Waste Activated Sludge Facility	Construct a new thickening waste activated sludge facility.
Digesters and Biosolids Storage Tanks (Constructed in 2009)	Modify digester blower piping for improved flexibility. Re-route supernatant decant to Headworks.
Sludge Storage Lagoon	No changes – will no longer be in use.
Hydro	No changes (to be confirmed during detailed design).
Standby Power	Provide insulation for diesel generator. No other changes (to be confirmed during detailed design).

In addition, the following activities must be undertaken to determine if additional works are required:

- Check classifications for electrical devices
- Check raw sewage pumps for impeller and volute wear
- Check Raw Sewage Pumping Station wet well for grit build up, corrosion and structural cracks
- Check for raw sewage pump VFDs to see if they will provide enough power for upsized sewage pumps
- Check VFDs and MCCs for issues including corrosion inside and major current fluctuations
- Check odour control in Headworks
- Investigate structural integrity of Plant B
- Check condition of Plant B blowers
- Investigate "new cracks in the existing equalization tank to confirm structural integrity
- Check RAS and WAS pump capacity in Plants B, C and D (see Appendix C).

Bradford West Gwillimbury
Bradford Water Pollution Control Plant Expansion
Preliminary Design Report
Draft – February 2012

Appendix A

Certificates of Approval

Certificate of Approval No. 6664-72GKXG (January 13, 2010)

Certificate of Approval No. 9408-75FP7B (January 13, 2010)

RECEIVED
JAN 22 2010
BWG ENGINEERING DEPT.

Ontario

Ministry of the Environment
Ministère de l'Environnement

AMENDED CERTIFICATE OF APPROVAL
MUNICIPAL AND PRIVATE SEWAGE WORKS
NUMBER 6664-7ZGKXG
Issue Date: January 13, 2010

The Corporation of the Town of Bradford West Gwillimbury
31, Barrie Street
Post Office Box, No. 419
Bradford, Ontario
L3Z 2A9

Site Location: Bradford Water Pollution Control Plant
225 Dissette St
Bradford West Gwillimbury, County Of Simcoe
L3Z 2B6

You have applied in accordance with Section 53 of the Ontario Water Resources Act for approval of:

alterations and extensions to the existing municipal sewage treatment works, located in Lots 17 and 18, Concession 7 (NAD27: UTM Zone 17: 615532 m E, 4886294 m N), for the treatment and disposal of sewage, to a *Rated Capacity* of 17,400 m^3/d and consisting of the following *works* :

PROPOSED WORKS

Raw Sewage Pumping Station

- an inlet chamber receiving raw sewage from the existing inlet structure and distributing into two (2) wet wells;
- a dry well to be equipped with four (4) dry pit submersible non-clog pumps with variable frequency drives (one standby), each rated at 188 L/s at 10 m TDH;

Headworks Building

- an inlet chamber receiving raw sewage from pumping station and distributing into three screen channels;
- two (2) mechanically cleaned bar screens, relocated from existing influent building, each having a *peak flow rate* of 24,400 m^3/d and one (1) manual bar screen, complete with a screw conveyer and screenings wash compactor;

- two (2) 3.0 m diameter vortex grit chambers, each having a *peak flow rate* of 24,400 m^3/d, complete with grit dewatering screw;
- a flow splitting chamber with three (3) sluice gates, three (3) feed pipes and three (3) magnetic flowmeters for distribution and flow control of screened and degritted sewage to the secondary plant D and the existing secondary plants B and C;
- a biological odour control system designed to treat 850 L/s of process air from the Headworks Building, including ductwork, exhaust fan, an outdoor packaged biological process unit and exhaust stack;

<u>Secondary Plant D</u> ***<u>(Average Daily Flow</u>*** **<u>10,000 m3/d)</u>**

Aeration Tanks

- an aerated inlet channel and four (4) 60 m x 11 m x 4.0 m SWD aeration tanks with a combined aeration volume of 10,560 m^3 and equipped with fine bubble aeration systems;

Air Blowers

- four (4) air blowers (two standby), each with 900 L/s capacity at 70 kPa;

Clarifiers

- a clarifier influent control chamber and four (4) 21.3 m dia. x 4.0 m SWD clarifiers, with sludge collector mechanisms and scum skimmers;

Activated Sludge and Scum Pumps

- six (6) activated sludge pumps (two standby), each rated at 4,500 m^3/d at 8 m TDH, with electric valve operators for activated sludge return to the inlet channel of the aeration tanks and for waste activated sludge discharge to the aerobic digester;
- two (2) scum pumps, each rated at 30 L/h at 6.75 m TDH, with discharge to the aerobic digester;

<u>Tertiary Filters</u>

- a flow chamber to split effluent from secondary plant C to the existing filter building and the proposed filter flow control chamber;
- a filter flow control chamber and interconnecting piping between the proposed and existing filter buildings for flow balancing;
- four (4) continuously backwashed, upflow, deep-bed granular media filters, each having a filtration area of 28 m^2;
- continuous backwash system consisting of air compressors, air receiver tank, air filter and air dryer

unit, air supply lines, air lift pipes, reject water piping and a reject water collection chamber;

- two (2) submersible pumps (one standby) each rated at 14.0 L/s at 12.0 m TDH pumping filter reject water and supernatant from aerobic digesters and biosolids storage tanks to the flow splitting chamber in the headworks building;

UV Disinfection System

- one (1) UV channel having two (2) banks of lamps, each consisting of 20 modules with 8 lamps per module (total of 320 lamps), providing a UV dosage of 28,360 mJ/s/cm^2 (after 8,760 hours of operation and at 65 percent UV transmission), designed for a 31,811 m^3/d peak flow rate, complete with automatic level controller and discharges directly through a 750 mm dia. sewer to the final effluent channel;

Phosphorus Removal System

- two (2) 7,500 L capacity storage tanks for storing a chemical solution (of either an aluminum salt or an iron salt) with two (2) transfer pumps and piping to the existing day tanks;
- two (2) chemical metering pumps (one standby), each having a capacity range of 0 – 60 L/h, and injecting chemical on 750 mm sewer main to plant D at Headworks building;

Aerobic Digester

- one (1) 33.0 m dia x 7.6 m depth two-stage aerobic digester, with two (2) stage 1 cells of 2,165 m^3 volume each and two (2) stage 2 cells of 1,085 m^3 volume each, equipped with coarse bubble aeration system and mixing system;
- two (2) stage 1 mixing pumps, two (2) stage 2 mixing pumps, two (2) stage 1 air blowers and two (2) stage 2 air blowers for the aeration and mixing system for the aerobic digester;
- two (2) digester sludge transfer pumps (one standby) each rated at 14.0 L/s at 9.5 m TDH;
- two (2) 33.0 m dia x 7.6 m depth biosolids storage tanks;
- two (2) chopper style mixing pumps, each rated for 363 L/s using a pumped hydraulic mixing system to provide mixing of contents in the biosolids tanks;
- one (1) 36.6 m dia x 11.9 m depth biosolids storage tank;
- two (2) chopper style mixing pumps, each rated for 327 L/s using a pumped hydraulic mixing system to provide mixing of contents, and one equipped with VFD as truck filling pump;

EXISTING WORKS

Inlet Structure

- an inlet concrete structure connected with sewage forcemains and a 900 mm sewer from service area, 32 mm force main from Septage receiving station and a 100 mm force main from sludge storage lagoon, with a 2.8 m long rectangular overflow weir which controls bypass to the equalization pond;

Secondary Plant B *(Average Daily Flow* 3,075 m3/d)

Aeration Tanks

- two (2) aeration tanks, each 25 m by 4.8 m by 4.95 m SWD, with a total combined working volume of 1,134 m^3;
- aeration through an air filtration module and fine pore dome diffusers;
- two (2) 30 kW positive displacement blowers, each with 319 L/s capacity;

Clarifiers

- two (2) circular clarifiers, each 15.24 m dia. and 4.27 m SWD, with a total combined surface area of 364 m^2, and with influent well, sludge collector mechanism, scum skimmer and effluent launder in each clarifier;
- two (2) variable speed horizontal centrifugal return activated sludge (RAS) pumps, with a total capacity of 112 L/s at 11.6 m TDH;
- one (1) positive displacement progressive cavity scum pump rated at 3.0 L/s at 17.6 m TDH;
- one (1) electric valve operator on the waste activated sludge (WAS) pipe to Digester No. 3;

Secondary Plant C *(Average Daily Flow* 4,325 m3/d)

Sequencing Batch Reactors

- two (2) 36 m x 23 m x 5.5 m depth sequencing batch reactors with automated control of the cyclic sequence consisting of anoxic fill, aeration, settle and decant modes;
- a fine pore diffused aeration system consisting of six (6) 150 mm dia. air supply drop pipes (three per tank), twelve (12) 150 mm dia. lateral pipes with diffusers to provide a total Standard Oxygen Requirement of 5,743 kg/d at standard conditions (tap water, 20 degrees Celsius and 101.3 kilopascals);
- a coarse bubble aeration system consisting of individually controlled 50 mm dia. supply pipes providing aeration to the front end selector zones;
- two (2) variable speed effluent decanters (one per cell) each rated at 282 L/s (maximum), and two (2) surface skimmers;

Air Blowers

- three (3) variable speed rotary positive displacement air blowers and appurtenances, each blower having a capacity of 354 L/s at a discharge pressure of 62.1 kPa located inside the existing workshop area, together with a common discharge header and air supply lines to the SBR fine pore aeration system;

Activated Sludge Pumps

- two (2) submersible return activated sludge pumps each rated at 8.5 L/s at 4 m TDH, for transferring sludge from the cyclic activated sludge tanks to the front end of the tanks;
- two (2) submersible waste activated sludge pumps each rated at 8.5 L/s at 8.1 m TDH, for wasting excess sludge to aerobic digester at Plant D;

Effluent Equalization Tank

- one (1) 10 m x 16 m x 5.5 m depth equalization tank, to collect decant flow from the sequencing batch reactors and providing an equalized flow to the tertiary filters, and equipped with two (2) submersible pumps each rated at 141 L/s at 5 m TDH and one variable speed drive;

Tertiary Filters

- four (4) continuously backwashed, upflow, deep-bed granular media filters, each having a filtration area of 28 m^2;
- continuous backwash system consisting of air compressors, air receiver tank, air supply lines, air lift pipes, reject water piping and a reject water collection chamber;
- two (2) submersible pumps (one standby) each rated at 14.0 L/s at 12.0 m TDH pumping filter reject water to the flow splitting chamber in the headworks building;

UV Disinfection System

- one (1) UV channel having two (2) banks of lamps, each consisting of 20 modules with 8 lamps per module (total of 320 lamps), providing a UV dosage of 28,360 mJ/s/cm^2 (after 8760 hours of operation and at 65 percent UV transmission), designed for a 31,811 m^3/d peak flow rate, complete with automatic level controller;

Effluent Pumps

- three (3) submersible pumps (one standby), each rated at 177 L/s at 5.3 m TDH, pumping disinfected effluent from the existing UV channel to the final effluent channel;

Final Effluent Chamber and Outfall

- a final effluent chamber to combine disinfected effluent from the existing and proposed UV channels, with pipe and outfall for discharge to West Holland River;

Septage Holding Tank

- a two-cell below grade concrete tank, with each cell having 43.8 m^3 of storage volume, interconnected by a 300 mm dia. pipe, located southwest of the existing inlet structure, for receiving septage from trucks and to discharge to the flow diversion structure during the low flow period, the tank being equipped with two (2) submersible grinder pumps (one duty, one standby) each rated at 2.55 L/s at 10 m TDH;

Phosphorus Removal System

- three (3) chemical metering pumps, each capable of dosing liquid aluminum sulphate at 0 to 118.8 L/h located inside the chemical storage room of the influent building;
- two (2) 5,000 L capacity day tanks and one (1) 25,000 L storage tank for storing a chemical solution (of either an aluminum salt or an iron salt);
- three (3) positive displacement diaphragm-type metering pumps, each capable of dosing polyelectrolyte at rates up to 60 L/h;
- two (2) polymer solution tanks, each with an approximate volume of 2.7 m^3;
- chemical feed lines to the influent channel ahead of the aeration tanks and to the filter influent;

Aerobic Digesters

- two (2) parallel digester trains (Digesters No. 1 and No. 2) in Plant A, each comprising four (4) aerated cells in series with a combined volume of 1,473 m^3 per train, equipped with coarse bubble diffusers and followed by one (1) existing decant tank and one (1) existing sludge pump chamber in each train;
- one two-stage digester (Digester No. 3) in Plant B, 25 m x 11.5 m x 5.4 m SWD, with a gross liquid sludge capacity of about 1,549 m^3, including 1,233 m^3 in Cell 1 and 316 m^3 in Cell 2;
- two (2) submersible pumps, each rated at 20 L/s at 11.6 m TDH to transfer digested sludge from Digester No. 3 to Digesters No. 1 and No. 2;
- two (2) sludge transfer pumps, each with 25 L/s, to transfer combined digested sludge from Digesters No. 1 and No. 2 to the sludge storage lagoon;
- one (1) 1,500 mm dia. decant pump chamber containing one (1) 20 L/s submersible pump to return decant from the south cell of the sludge storage lagoon to the inlet structure of the plant;

Sludge Storage Lagoon

- a lagoon with a berm at the centre, parallel to the long side, providing two (2) cells (centre and south) of approximately 10,000 m^3 each;
- 150 mm dia. piping for waste activated sludge transfer into each of the two storage lagoon cells

complete with valves, lagoon inlet structure and associated appurtenances;

- air piping main supply header ranging from 150 mm to 300 mm dia., supplying air from the blowers located inside the blower building;
- 100 mm dia. air piping complete with coarse bubble diffusers in the south cell;
- one (1) 2.8 m by 2.2 m by 3 m decant stop log chamber in each channel in the south cell, fitted with stop logs, 300 mm dia. outlet pipe, complete with a catwalk and discharging into decant pumping station;
- one (1) 1,800 mm dia. by 5 m submersible decant pump station, equipped with one pump rated at 6.3 L/s at 9.6 m TDH, pumping decant from the south cell to the inlet structure of the plant through a 100 mm dia. forcemain;

Emergency Sewage Overflow Pond

- one (1) 44,000 m^3 lagoon cell, adjacent to the two cells of the lagoon used for sludge storage, used for equalization of peak sewage inflows to be returned to the inlet structure for treatment;

Blower Building

- four (4) positive displacement blowers for air supply to the inlet works, Plant B, Digesters No. 1-3, and the south cell of the sludge storage lagoon, three of 112 kW with 1,537 L/s capacity and one of 75 kW with 1,250 L/s capacity;

Standby Power

- one (1) 900 kW diesel engine power generator set to provide standby power for the entire *Works* , complete with a 2.27 m^3 capacity double-walled steel tank with spill containment facilities;

Miscellaneous

- all other controls, electrical equipment, instrumentation, piping, pumps, valves and appurtenances, existing or proposed, essential for the proper operation of the aforementioned sewage works;

all in accordance with the following submitted supporting documents:

1. Reports, plans and specifications prepared by the consulting engineers Ainley and Associates Limited, R.J. Burnside & Associates Limited and Proctor & Redfern Limited;
2. Application for Approval of Municipal and Private Sewage Works dated May 18, 2004 and covering letter submitted by Michael Pearce, P.Eng. of R.J. Burnside & Associates Ltd., dated May 17, 2004;
3. "Application for Amendment to Certificate of Approval No. - Bradford Water Pollution Control Plant; The Corporation of the Town of Bradford West Gwillimbury" with drawings, prepared by R.J. Burnside & Associates Ltd., dated May 2004;

4. "Technical Memorandum - Bradford West Gwillimbury WWTP Flow Evaluation", prepared by XCG Consultants Ltd. for R.J. Burnside & Associates Ltd., dated April 15, 2004;
5. Letter with attachments dated June 28, 2004 from Michael Pearce of R.J. Burnside & Associates Ltd. to Andre Schnell of the Ontario Ministry of the Environment (MOE);
6. Facsimile dated August 23, 2004 from Stephen Walker of R.J. Burnside & Associates Ltd. to Andre Schnell of MOE;
7. Application for Approval of Municipal and Private Sewage Works dated November 23, 2005 submitted by Michael Gundry of Totten Sims Hubicki including Environmental Study Report and Pre-Design Report and preliminary drawings;
8. Updated application dated February 13, 2006 submitted by Michael Gundry of Totten Sims Hubicki including final plans and specifications;
9. Updated engineering plans submitted by Totten Sims Hubicki dated May 18, 2006;
10. Application for Approval of Municipal and Private Sewage Works dated March 25, 2008 submitted by Michael Gundry of Totten Sims Hubicki for Headworks Odour Control;
11. Application for Approval of Municipal and Private Sewage Works dated November 25, 2009 submitted by Michael Gundry of AECOM Canada for Plant D aeration tanks and clarifiers resizing and additional technical information submitted by Antony Aruldoss of AECOM Canada on January 5, 2010.

For the purpose of this Certificate of Approval and the terms and conditions specified below, the following definitions apply:

"*Act* " means the Ontario Water Resources Act, R.S.O. 1990, Chapter 0.40, as amended;

"*Average Daily Flow* " means the cumulative total sewage flow to the sewage works during a calendar year divided by the number of days during which sewage was flowing to the sewage works that year;

"*BOD5* " (also known as $TBOD_5$) means five day biochemical oxygen demand measured in an unfiltered sample and includes carbonaceous and nitrogenous oxygen demand;

"*By-pass* " means any discharge from the *Works* that does not undergo any treatment or only receives partial treatment before it is discharged to the environment;

"*CBOD5* " means five day carbonaceous (nitrification inhibited) biochemical oxygen demand measured in an unfiltered sample;

"*Certificate* " means this entire certificate of approval document, issued in accordance with Section 53 of the *Act* , and includes any schedules;

"*Daily Concentration* " means the concentration of a contaminant in the effluent discharged over any single day, as measured by a composite or grab sample, whichever is required;

"*Director* " means any *Ministry* employee appointed by the Minister pursuant to section 5 of the *Act* ;

"*District Manager* " means the District Manager of the Barrie District Office of the Ministry;

"*E. Coli* " refers to the thermally tolerant forms of Escherichia that can survive at 44.5 degrees Celsius;

"*Existing Works* " means those portions of the sewage works previously constructed and existing on-site on the date of issuance of this *Certificate* ;

"*Geometric Mean Density* " is the nth root of the product of multiplication of the results of n number of samples over the period specified;

"*Ministry* " means the Ontario Ministry of the Environment;

"*Monthly Average Concentration* " means the arithmetic mean of all *Daily Concentrations* of a contaminant in the effluent sampled or measured, or both, during a calendar month;

"*Monthly Average Daily Flow* " means the cumulative total sewage flow to the sewage works during a calendar month divided by the number of days during which sewage was flowing to the sewage works that month;

"*Monthly Average Loading* " means the value obtained by multiplying the *Monthly Average Concentration* of a contaminant by the *Monthly Average Daily Flow* over the same calendar month:

"*Owner* " means The Corporation of the Town of Bradford West Gwillimbury and includes its successors and assignees;

"*Peak Flow Rate* " means the maximum rate of sewage flow for which the plant or process unit was designed;

"*Proposed Works* " means the sewage works described in the *Owner* 's application, this *Certificate* and in the supporting documentation referred to herein, to the extent approved by this *Certificate* ;

"*Rated Capacity* " means the *Average Daily Flow* for which the *Works* are approved to handle;

"*Regional Director* " means the Regional Director of the Southwestern Region of the Ministry;

"*Substantial Completion* " has the same meaning as "*substantial performance* " in the Construction Lien Act; and

"*Works* " means the sewage works described in the *Owner* 's application, this *Certificate* and in the supporting documentation referred to herein, to the extent approved by this *Certificate* and includes both *Existing Works* and *Proposed Works* .

You are hereby notified that this approval is issued to you subject to the terms and conditions outlined below:

TERMS AND CONDITIONS

1. GENERAL PROVISIONS

(1) The *Owner* shall ensure that any person authorized to carry out work on or operate any aspect of the *Works* is notified of this *Certificate* and the conditions herein and shall take all reasonable measures to ensure any such person complies with the same.

(2) Except as otherwise provided by these Conditions, the *Owner* shall design, build, install, operate and maintain the *Works* in accordance with the description given in this *Certificate* , the application for approval of the works and the submitted supporting documents and plans and specifications as listed in this *Certificate* .

(3) Where there is a conflict between a provision of any submitted document referred to in this *Certificate* and the Conditions of this *Certificate* , the Conditions in this *Certificate* shall take precedence, and where there is a conflict between the listed submitted documents, the document bearing the most recent date shall prevail.

(4) Where there is a conflict between the listed submitted documents, and the application, the application shall take precedence unless it is clear that the purpose of the document was to amend the application.

(5) The requirements of this *Certificate* are severable. If any requirement of this *Certificate* , or the application of any requirement of this *Certificate* to any circumstance, is held invalid or unenforceable, the application of such requirement to other circumstances and the remainder of this certificate shall not be affected thereby.

(6) The approval granted by this *Certificate* is based upon a review of the *Works* in the context of its effect on the environment, its process performance and general principles of wastewater engineering. The review did not include a consideration of the architectural, mechanical, electrical or structural components and minor details of the *Works* except to the extent necessary to review the *Works* .

2. EXPIRY OF APPROVAL

The approval issued by this *Certificate* will cease to apply to those parts of the *Works* which have not been constructed within five (5) years of the date of this *Certificate* .

3. CHANGE OF OWNER

(1) The *Owner* shall notify the *District Manager* and the *Director* , in writing, of any of the following changes within 30 days of the change occurring:

(a) change of *Owner* ;

(b) change of address of the *Owner* ;

(c) change of partners where the *Owner* is or at any time becomes a partnership, and a copy of the most recent declaration filed under the Business Names Act, R.S.O. 1990, c.B17 shall be included in the notification to the *District Manager* ;

(d) change of name of the corporation where the *Owner* is or at any time becomes a corporation, and a copy of the most current information filed under the Corporations Information Act, R.S.O. 1990, c. C39 shall be included in the notification to the *District Manager* ;

(2) In the event of any change in ownership of the *Works* , other than a change to a successor municipality, the *Owner* shall notify in writing the succeeding owner of the existence of this *Certificate* , and a copy of such notice shall be forwarded to the *District Manager* and the *Director* .

4. UPON THE SUBSTANTIAL COMPLETION OF THE WORKS

(1) Upon the *Substantial Completion* of the *Works* , the Owner shall prepare a statement, certified by a Professional Engineer, that the works are constructed in accordance with this *Certificate* , and upon request, shall make the written statement available for inspection by Ministry personnel.

(2) Within one year of the *Substantial Completion* of Plant D extension, a set of as-built drawings showing the works "as constructed" shall be prepared. These drawings shall be kept up to date through revisions undertaken from time to time and a copy shall be retained at the *Works* for the operational life of the *Works* .

5. BY-PASSES

(1) Any *By-pass* of sewage from any portion of the *Works* is prohibited, except where:

(a) it is necessary to avoid loss of life, personal injury, danger to public health or severe property damage;

(b) the *District Manager* agrees that it is necessary for the purpose of carrying out essential maintenance and the *District Manager* has given prior written acknowledgment of the *by-pass* ; or

(c) the *Regional Director* has given prior written acknowledgment of the *By-pass* .

(2) The *Owner* shall collect at least one (1) grab sample of the *By-pass* and have it analyzed for the parameters outlined in Condition 7 using the protocols in Condition 9.

(3) The *Owner* shall maintain a logbook of all *By-pass* events which shall include, at a minimum, the time, location, duration, quantity of *By-pass* , the authority for *By-pass* pursuant to subsection (1), and the reasons for the occurrence.

(4) The *Owner* shall, in the event of a *By-pass* event pursuant to subsection (1), disinfect the by-passed effluent prior to it reaching the receiver such that the receiver is not negatively impacted.

6. EFFLUENT OBJECTIVES

(1) The *Owner* shall use best efforts to design, construct and operate the *Works* with the objective that the concentrations of the materials named below as effluent parameters are not exceeded in the effluent from the *Works* .

Table 1 - Effluent Objectives

Effluent Parameter	Concentration Objective (milligrams per litre unless otherwise indicated)
CBOD5	5.0
Total Suspended Solids	5.0
Total Phosphorus	0.10
E. Coli	50 organisms per 100 millilitres
Total Ammonia Nitrogen	0.6 (April 1 to October 31) 2.0 (November 1 to March 31)

(2) The *Owner* shall use best efforts to:

(a) maintain the pH of the effluent from the *Works* within the range of 6.5 - 9.0, inclusive, at all times;

(b) operate the works within the *Rated Capacity* of the *Works* ;

(c) ensure that the effluent from the *Works* is essentially free of floating and settleable solids and does not contain oil or any other substance in amounts sufficient to create a visible film or sheen or foam or discolouration on the receiving waters.

(3) The *Owner* shall include in all reports submitted in accordance with Conditions 9 and 10 a summary of the efforts made and results achieved under this Condition.

7. EFFLUENT LIMITS

(1) The *Owner* shall design and construct the *proposed works* and operate and maintain the *Works*

such that the concentrations and waste loadings of the materials named below as effluent parameters are not exceeded in the effluent from the *Works* .

Table 2 - Effluent Limits

Effluent Parameter Column 1	Average Concentration (milligrams per litre unless otherwise indicated) Column 2	Average Waste Loading (kilograms per day unless otherwise indicated) Column 3
CBOD5	10	174
Total Suspended Solids	10	174
Total Phosphorus	0.11	2.046
Total Ammonia Nitrogen	0.8 (April 1 to October 31) 2.5 (November 1 to March 31)	-
pH of the effluent maintained between 6.0 to 9.5, inclusive, at all times		

* the non-compliance value of total ammonia nitrogen is based on a combination of temperature and pH conditions such that the un-ionized ammonia in the effluent discharge does not exceed 0.1 mg/L

(2) For the purposes of determining compliance with and enforcing subsection (1):

(a) The *Monthly Average Concentration* of a parameter named in Column 1 of subsection (1) shall not exceed the corresponding maximum concentration set out in Column 2 of subsection (1).

(b) The *Monthly Average Loading* of a parameter named in Column 1 of subsection (1) shall not exceed the corresponding maximum waste loading set out in Column 3 of subsection (1).

(c) The pH of the effluent shall be maintained within the limits outlined in subsection (1), at all times.

(3) Notwithstanding subsection (1), the *Owner* shall operate and maintain the *Works* such that the effluent is continuously disinfected so that the monthly *Geometric Mean Density* of *E. Coli* does not exceed 100 organisms per 100 millilitres of effluent discharged from the *works* .

(4) Paragraph (a), (b) and (c) of subsection (2) shall apply upon commissioning of operation of the Plant D extension.

(5) The effluent limit set out in subsection (3) shall apply upon commissioning of operation of the Plant D extension.

8. OPERATION AND MAINTENANCE

(1) The *Owner* shall exercise due diligence in ensuring that, at all times, the *Works* and the related

equipment and appurtenances used to achieve compliance with this *Certificate* are properly operated and maintained. Proper operation and maintenance shall include effective performance, adequate funding, adequate operator staffing and training, including training in all procedures and other requirements of this *Certificate* and the *Act* and regulations, adequate laboratory facilities, process controls and alarms and the use of process chemicals and other substances used in the *Works* .

(2) The *Owner* shall update the operations manual within six (6) months of commissioning of operation of Plant D extension, that includes, but not necessarily limited to, the following information:

(a) operating procedures for routine operation of the *Works* ;

(b) inspection programs, including frequency of inspection, for the *Works* and the methods or tests employed to detect when maintenance is necessary;

(c) repair and maintenance programs, including the frequency of repair and maintenance for the *Works* ;

(d) procedures for the inspection and calibration of monitoring equipment;

(e) a spill prevention control and countermeasures plan, consisting of contingency plans and procedures for dealing with equipment breakdowns, potential spills and any other abnormal situations, including notification of the *District Manager* ; and

(f) procedures for receiving, responding and recording public complaints, including recording any followup actions taken.

(3) The *Owner* shall maintain the operations manual current and retain a copy at the location of the *Works* for the operational life of the *Works* . Upon request, the *Owner* shall make the manual available to *Ministry* staff.

(4) The *Owner* shall provide for the overall operation of the *Works* with an operator who holds a licence that is applicable to that type of facility and that is of the same class as or higher than the class of the facility in accordance with Ontario Regulation 129/04.

9. EFFLUENT MONITORING AND RECORDING

The *Owner* shall, upon commencement of operation of the *Works* , carry out the following monitoring program:

(1) All samples and measurements taken for the purposes of this *Certificate* are to be taken at a time and in a location characteristic of the quality and quantity of the effluent stream over the time period being monitored.

(2) For the purposes of this condition, the following definitions apply:

(a) Weekly means once each week;
(b) Monthly means once every month;

(3) Samples shall be collected at the following sampling points, at the frequency specified, by means of the specified sample type and analyzed for each parameter listed and all results recorded:

Table 3 - Raw Sewage Monitoring

Parameters	Sample Type	Minimum Frequency
BOD5	composite	monthly
Total Suspended Solids	composite	monthly
Total Phosphorus	composite	monthly
Total Kjeldahl Nitrogen	composite	monthly

Table 4 - Final Effluent Monitoring

Parameters	Sample Type	Minimum Frequency
CBOD5	composite	weekly
Total Suspended Solids	composite	weekly
Total Phosphorus	composite	weekly
Total Ammonia Nitrogen	composite	weekly
E. Coli	grab	weekly
pH	grab	weekly
Temperature	grab	weekly
Unionized Ammonia	calculated	weekly

(4) The methods and protocols for sampling, analysis and recording shall conform, in order of precedence, to the methods and protocols specified in the following:

(a) the Ministry's Procedure F-10-1, "Procedures for Sampling and Analysis Requirements for Municipal and Private Sewage Treatment Works (Liquid Waste Streams Only), as amended from time to time by more recently published editions;

(b) the Ministry's publication "Protocol for the Sampling and Analysis of Industrial/Municipal Wastewater" (January 1999), ISBN 0-7778-1880-9, as amended from time to time by more recently published editions;

(c) the publication "Standard Methods for the Examination of Water and Wastewater" (20th edition), as amended from time to time by more recently published editions.

(5) The temperature and pH of the effluent from the *Works* shall be determined in the field at the time of sampling for Total Ammonia Nitrogen. The concentration of un-ionized ammonia shall be

calculated using the total ammonia concentration, pH and temperature using the methodology stipulated in "Ontario's Provincial Water Quality Objectives" dated July 1994, as amended, for ammonia (un-ionized).

(6) The measurement frequencies specified in subsection (2) in respect to any parameter are minimum requirements which may, after 12 months of monitoring in accordance with this Condition, be modified by the *District Manager* in writing from time to time.

(7) The *Owner* shall install and maintain (a) continuous flow measuring device(s), to measure the flowrate of the effluent from the *Works* with an accuracy to within plus or minus 15 per cent (+/-15%) of the actual flowrate for the entire design range of the flow measuring device, and record the flowrate at a daily frequency.

10. REPORTING

(1) One week prior to the start up of the operation of the Plant D extension, the *Owner* shall notify the *District Manager* (in writing) of the pending start up date.

(2) Ten (10) days prior to the date of a planned *By-pass* being conducted pursuant to Condition 5 and as soon as possible for an unplanned *By-pass* , the *Owner* shall notify the *District Manager* (in writing) of the pending start date, in addition to an assessment of the potential adverse effects on the environment and the duration of the *By-pass* .

(3) The *Owner* shall report to the *District Manager* or designate, any exceedence of any parameter specified in Condition 7 orally, as soon as reasonably possible, and in writing within seven (7) days of the exceedence.

(4) In addition to the obligations under Part X of the Environmental Protection Act, the *Owner* shall, within 10 working days of the occurrence of any reportable spill as defined in Ontario Regulation 675/98, bypass or loss of any product, by-product, intermediate product, oil, solvent, waste material or any other polluting substance into the environment, submit a full written report of the occurrence to the *District Manager* describing the cause and discovery of the spill or loss, clean-up and recovery measures taken, preventative measures to be taken and schedule of implementation.

(5) The *Owner* shall, upon request, make all manuals, plans, records, data, procedures and supporting documentation available to *Ministry* staff.

(6) The *Owner* shall prepare, and submit to the *District Manager*, a performance report, on an annual basis, within ninety (90) days following the end of the period being reported upon. The first such report shall cover the first annual period following the commencement of operation of the *Works* and subsequent reports shall be submitted to cover successive annual periods following thereafter. The reports shall contain, but shall not be limited to, the following information:

(a) a summary and interpretation of all monitoring data and a comparison to the effluent limits outlined in Condition 7, including an overview of the success and adequacy of the *Works* ;

(b) a description of any operating problems encountered and corrective actions taken;

(c) a summary of all maintenance carried out on any major structure, equipment, apparatus, mechanism or thing forming part of the *Works* ;

(d) a summary of any effluent quality assurance or control measures undertaken in the reporting period;

(e) a summary of the calibration and maintenance carried out on all effluent monitoring equipment; and

(f) a description of efforts made and results achieved in meeting the Effluent Objectives of Condition 6.

(g) a tabulation of the volume of septage received during the reporting period and an outline of anticipated volumes to be received in the next reporting period;

(h) a tabulation of the volume of sludge generated in the reporting period, an outline of anticipated volumes to be generated in the next reporting period and a summary of the locations to where the sludge was disposed;

(i) a summary of any complaints received during the reporting period and any steps taken to address the complaints;

(j) a summary of all *By-pass* , spill or abnormal discharge events; and

(k) any other information the *District Manager* requires from time to time.

The reasons for the imposition of these terms and conditions are as follows:

1. Condition 1 is imposed to ensure that the *Works* are built and operated in the manner in which they were described for review and upon which approval was granted. This condition is also included to emphasize the precedence of Conditions in the *Certificate* and the practice that the Approval is based on the most current document, if several conflicting documents are submitted for review. The condition also advises the Owners their responsibility to notify any person they authorized to carry out work pursuant to this *Certificate* the existence of this *Certificate* .

2. Condition 2 is included to ensure that, when the *Works* are constructed, the *Works* will meet the standards that apply at the time of construction to ensure the ongoing protection of the environment.

3. Condition 3 is included to ensure that the *Ministry* records are kept accurate and current with respect to the approved works and to ensure that subsequent owners of the *Works* are made aware of the

Certificate and continue to operate the *Works* in compliance with it.

4. Condition 4 is included to ensure that the *Works* are constructed in accordance with the approval and that record drawings of the *Works* "as constructed" are maintained for future references.

5. Condition 5 is included to indicate that by-passes of untreated sewage to the receiving watercourse is prohibited, save in certain limited circumstances where the failure to *By-pass* could result in greater injury to the public interest than the *By-pass* itself where a *By-pass* will not violate the approved effluent requirements, or where the *By-pass* can be limited or otherwise mitigated by handling it in accordance with an approved contingency plan. The notification and documentation requirements allow the *Ministry* to take action in an informed manner and will ensure the *Owner* is aware of the extent and frequency of *By-pass* events.

6. Condition 6 is imposed to establish non-enforceable effluent quality objectives which the *Owner* is obligated to use best efforts to strive towards on an ongoing basis. These objectives are to be used as a mechanism to trigger corrective action proactively and voluntarily before environmental impairment occurs and before the compliance limits of Condition 6 are exceeded..

7. Condition 7 is imposed to ensure that the effluent discharged from the *Works* to the West Holland River meets the *Ministry* 's effluent quality requirements thus minimizing environmental impact on the receiver and to protect water quality, fish and other aquatic life in the receiving water body.

8. Condition 8 is included to require that the *Works* be properly operated, maintained, funded, staffed and equipped such that the environment is protected and deterioration, loss, injury or damage to any person or property is prevented. As well, the inclusion of a comprehensive operations manual governing all significant areas of operation, maintenance and repair is prepared, implemented and kept up-to-date by the owner and made available to the *Ministry* . Such a manual is an integral part of the operation of the *Works* . Its compilation and use should assist the *Owner* in staff training, in proper plant operation and in identifying and planning for contingencies during possible abnormal conditions. The manual will also act as a benchmark for *Ministry* staff when reviewing the *Owner'* s operation of the work.

9. Condition 9 is included to enable the *Owner* to evaluate and demonstrate the performance of the *Works* , on a continual basis, so that the *Works* are properly operated and maintained at a level which is consistent with the design objectives and effluent limits specified in the *Certificate* and that the *Works* does not cause any impairment to the receiving watercourse.

10. Condition 10 is included to provide a performance record for future references, to ensure that the *Ministry* is made aware of problems as they arise, and to provide a compliance record for all the terms and conditions outlined in this *Certificate,* so that the *Ministry* can work with the *Owner* in resolving any problems in a timely manner.

This Certificate of Approval revokes and replaces Certificate(s) of Approval No. 6598-7FRRPR issued on June 27, 2008.

In accordance with Section 100 of the Ontario Water Resources Act, R.S.O. 1990, Chapter 0.40, as amended, you may by written notice served upon me and the Environmental Review Tribunal within 15 days after receipt of this Notice, require a hearing by the Tribunal. Section 101 of the Ontario Water Resources Act, R.S.O. 1990, Chapter 0.40, provides that the Notice requiring the hearing shall state:

1. The portions of the approval or each term or condition in the approval in respect of which the hearing is required, and;
2. The grounds on which you intend to rely at the hearing in relation to each portion appealed.

The Notice should also include:

3. The name of the appellant;
4. The address of the appellant;
5. The Certificate of Approval number;
6. The date of the Certificate of Approval;
7. The name of the Director;
8. The municipality within which the works are located;

And the Notice should be signed and dated by the appellant.

This Notice must be served upon:

The Secretary*
Environmental Review Tribunal
655 Bay Street, 15th Floor
Toronto, Ontario
M5G 1E5

AND

The Director
Section 53, *Ontario Water Resources Act*
Ministry of the Environment
2 St. Clair Avenue West, Floor 12A
Toronto, Ontario
M4V 1L5

*** Further information on the Environmental Review Tribunal's requirements for an appeal can be obtained directly from the Tribunal at: Tel: (416) 314-4600, Fax: (416) 314-4506 or www.ert.gov.on.ca**

The above noted sewage works are approved under Section 53 of the Ontario Water Resources Act.

DATED AT TORONTO this 13th day of January, 2010

Mansoor Mahmood, P.Eng.
Director
Section 53, *Ontario Water Resources Act*

FL/

c: District Manager, MOE Barrie
Michael Grundy, P. Eng., AECOM Canada Ltd.
Water Standards Section, MOE Standards Development Branch

Ontario

RECEIVED
JUL 15 2009

Ministry of the Environment
Ministère de l'Environnement

AMENDED CERTIFICATE OF APPROVAL

AIR
NUMBER 9408-7SFP7B
Issue Date: June 24, 2009

The Corporation of the Town of Bradford West Gwillimbury
31 Barrie St
Post Office Box, No. 419
Bradford, Ontario
L3Z 2A9

Site Location:
Bradford Water Pollution Control Plant
225 Dissette St
Bradford West Gwillimbury Town, County Of Simcoe

You have applied in accordance with Section 9 of the Environmental Protection Act for approval of:

- one (1) standby diesel generator set, having a rating of 900 kilowatts, to provide power during emergency situations, exhausting to the atmosphere at a maximum volumetric flow rate of 3.67 actual cubic metres per second at an approximate temperature of 524 degrees Celsius, through a stack having an exit diameter of 0.86 metre, extending 3.05 metres above grade;
- one (1) biological odour control system (biofilter), to control emissions from a headworks building, having overall dimensions of 6.1 metres length, 2.4 metres width and 2.1 metres height and 1.07 metres of biodagene bed height, complete with humidification/irrigation systems, exhausting into the atmosphere at a total nominal volumetric flow rate of 0.85 cubic metre per second, through three (3) stacks, each having an exit diameter of 0.15 metre, extending 2.84 metres above grade;

all in accordance with the Application for Approval (Air) submitted by The Corporation of the Town of Bradford West Gwillimbury, dated March 20, 2008, and signed by Gord Miokovic, Town Engineer; the letter (e-mail) from Michael Gundry, P.Eng. (AECOM) dated May 27, 2009, and all information and documentation associated with the application.

For the purpose of this Certificate of Approval and the terms and conditions specified below, the following definitions apply:

1. "Act" means the Environmental Protection Act, R.S.O. 1990, c. E.19;

2. "Approved Atmospheric Dispersion Model" means the atmospheric dispersion model as defined by s.6 of O. Reg. 419/05;

3. "Certificate" means this Certificate of Approval, issued in accordance with Section 9 of the Act;

4. "Company" means The Corporation of the Town of Bradford West Gwillimbury;

5. "District Manager" means the District Manager of the appropriate local district office of the Ministry, where the Facility is geographically located;

6. "Equipment" means the biofilter system described in the Company's application, this Certificate and in the supporting documentation submitted with the application, to the extent approved by this Certificate;

7. "Facility" means the entire operation located on the property where the Company is located;

8. "Manual" means a document or a set of documents that provide written instructions to staff of the Company;

9. "Ministry" means the ministry of the government of Ontario responsible for the Act and includes all officials, employees or other persons acting on its behalf;

10. "O. Reg. 419/05" means the Ontario Regulation 419/05, Air Pollution – Local Air Quality;

11. "Point of Impingement" means any point outside the facility in the natural environment and as defined by s.2 of O. Reg. 419/05;

12. "Publication NPC-205" means the Ministry Publication NPC-205, "Sound Level Limits for Stationary Sources in Class 1 & 2 Areas (Urban)", October, 1995 as amended;

13. "Sensitive Receptor" means any location where there are human activities such as residence, nursing home, day-care facility, school, parkland, recreational facility, play ground, commercial plazas, office buildings or any other receptors that may be identified by the District Manager to be a sensitive receptor.

You are hereby notified that this approval is issued to you subject to the terms and conditions outlined below:

TERMS AND CONDITIONS

OPERATION AND MAINTENANCE

1. The Company shall ensure that the Equipment is properly operated and maintained at all times. The Company shall:

(1) prepare, before commencement of operation of the Equipment, and update, as necessary, a Manual outlining the operating procedures and a maintenance program for the Equipment, including:

    (a) routine operating and maintenance procedures in accordance with good engineering practices and as recommended by the Equipment suppliers;

    (b) emergency procedures;

    (c) procedures for any record keeping activities relating to operation and maintenance of the Equipment; and

    (d) all appropriate measures to minimize noise and odorous emissions from all potential sources;

    (e) most effective fugitive odour control measures to minimize fugitive odour emissions from all potential sources;

(2) implement the recommendations of the Manual.

RECORD RETENTION

2. The Company shall retain, for a minimum of two (2) years from the date of their creation, all records and information related to or resulting from the recording activities required by this Certificate, and make these records available for review by staff of the Ministry upon request. The Company shall retain:

    (1) all records on the maintenance, repair and inspection of the Equipment; and

    (2) all records of any environmental complaints; including:

        (a) a description, time and date of each incident to which the complaint relates;

        (b) wind direction at the time of the incident to which the complaint relates; and

        (c) a description of the measures taken to address the cause of the incident to which the complaint relates and to prevent a similar occurrence in the future.

NOTIFICATION OF COMPLAINTS

3. The Company shall notify the District Manager, in writing, of each environmental complaint within two (2) business days of the complaint. The notification shall include:

    (1) a description of the nature of the complaint; and

    (2) the time and date of the incident to which the complaint relates;

(3) the wind direction and other weather conditions at the time of the incident; and

(4) the name(s) of Company personnel responsible for handling the incident.

NOISE

4. The Company shall, at all times, ensure that the noise emissions from the Facility comply with the limits set out in Ministry Publication NPC-205.

MONITORING

5. The Company shall install, conduct and maintain a program to monitor and record the Equipment maintenance parameters in accordance with good engineering practices and as recommended by the Equipment suppliers;

ODOUR PERFORMANCE LIMIT

6. The company shall ensure that the 10-minute average concentration of odour at the most impacted Sensitive Receptor, resulting from the operation of the Facility, calculated in accordance with Schedule "A", shall not exceed 1 odour unit.

SCHEDULE "A"

Procedure to calculate and record the 10-minute average concentration of odour at the Point of Impingement and at the most impacted Sensitive Receptor

(a) Calculate and record one-hour average concentration of odour at the Point of Impingement and at the most impacted Sensitive Receptor, employing the Approved Atmospheric Dispersion Model that employs at least five (5) years of hourly local meteorological data and that can provide results reported as individual one-hour average odour concentrations.

(b) Convert and record each of the one-hour average concentrations predicted over the five (5) years of hourly local meteorological data at the Point of Impingement and at the most impacted Sensitive Receptor to 10-minute average concentrations using the one-hour average to 10-minute average conversion described below.

(c) Record and present the 10-minute average concentrations predicted to occur over a five (5) year period at the Point of Impingement and at the most impacted Sensitive Receptor in a histogram. The histogram shall identify all predicted 10-minute average odour concentration occurrences in terms of frequency, identifying the number of occurrences over the entire range of predicted odour concentration in increments of not more than 1/10 of one odour unit. The maximum 10-minute average concentration of odour at the Sensitive Receptor will be considered to be the maximum odour concentration at the most impacted Sensitive Receptor that occurs and is represented in the histogram, disregarding outlying data points on the histogram as agreed to by the Director.

One-hour Average To 10-minute average conversion

Use the following formula to convert and record one-hour average concentrations predicted by the approved atmospheric dispersion model to 10-minute average concentrations:

$$X_{10min} = X_{60min} \times 1.65$$

where X_{10min} = 10-minute average concentration

X_{60min} = one-hour average concentration

The reasons for the imposition of these terms and conditions are as follows:

1. Condition No. 1 is included to emphasize that the Equipment must be maintained and operated according to a procedure that will result in compliance with the Act, the Regulations and this Certificate.

2. Condition No. 2 is included to require the Company to keep records and to provide information to staff of the Ministry so that compliance with the Act, the Regulations and this Certificate can be verified.

3. Condition No. 3 is included to require the Company to notify staff of the Ministry so as to assist the Ministry with the review of the site's compliance.

4. Conditions Nos. 4, 5 and 6 are included to provide the minimum performance requirements considered necessary to prevent an adverse effect resulting from the operation of the Facility.

This Certificate of Approval revokes and replaces Certificate(s) of Approval No. 3142-55LPAD issued on December 21, 2001

In accordance with Section 139 of the Environmental Protection Act, R.S.O. 1990, Chapter E-19, as amended, you may by written notice served upon me and the Environmental Review Tribunal within 15 days after receipt of this Notice, require a hearing by the Tribunal. Section 142 of the Environmental Protection Act, provides that the Notice requiring the hearing shall state:

1. The portions of the approval or each term or condition in the approval in respect of which the hearing is required, and;
2. The grounds on which you intend to rely at the hearing in relation to each portion appealed.

The Notice should also include:

3. The name of the appellant;
4. The address of the appellant;
5. The Certificate of Approval number;
6. The date of the Certificate of Approval;
7. The name of the Director;
8. The municipality within which the works are located;

And the Notice should be signed and dated by the appellant.

This Notice must be served upon:

The Secretary*
Environmental Review Tribunal
655 Bay Street, 15th Floor
Toronto, Ontario
M5G 1E5

AND

The Director
Section 9, *Environmental Protection Act*
Ministry of the Environment
2 St. Clair Avenue West, Floor 12A
Toronto, Ontario
M4V 1L5

*** Further information on the Environmental Review Tribunal's requirements for an appeal can be obtained directly from the Tribunal at: Tel: (416) 314-4600, Fax: (416) 314-4506 or www.ert.gov.on.ca**

The above noted works are approved under Section 9 of the Environmental Protection Act.

DATED AT TORONTO this 24th day of June, 2009

Victor Low, P.Eng.
Director
Section 9, *Environmental Protection Act*

JK/
c: District Manager, MOE Barrie
Michael Gundry, Totten Sims Hubicki Associates Limited

Bradford West Gwillimbury
Bradford Water Pollution Control Plant Expansion
Preliminary Design Report
Draft – February 2012

Appendix B

Geotechnical Investigations

Certificate of Approval No. 6664-72GKXG
(January 13, 2010)

Certificate of Approval No. 9408-75FP7B
(January 13, 2010)

Consulting Geotechnical Engineers & Hydrogeologists
Construction & Materials Inspection & Testing

GEOTECHNICAL INVESTIGATION
WATER POLLUTION CONTROL PLANT UPGRADE
TOWN OF BRADFORD WEST GWILLIMBURY
BRADFORD, ONTARIO

PREPARED FOR:

The Corporation of the Town of Bradford West Gwillimbury
P.O. Box 160
11th Line, West of 10th Sideroad
Bradford, Ontario
L3Z 2A8

OUR FILE NO. 95582
OCTOBER 1995

DISTRIBUTION:

3 cc: The Corporation of the Town of Bradford West Gwillimbury
2 cc: Terraprobe Limited

Table of Contents

October 31, 1995 Our File No. 95582

The Corporation of the Town of Bradford West Gwillimbury
P.O. Box 160
11th Line, West of 10th Sideroad
Bradford, Ontario
L3Z 2A8

Attention: Ms. Juanita Dempster Evans,
Clerk Administrator

RE: GEOTECHNICAL INVESTIGATION
WATER POLLUTION CONTROL PLANT UPGRADE
TOWN OF BRADFORD WEST GWILLIMBURY
BRADFORD, ONTARIO

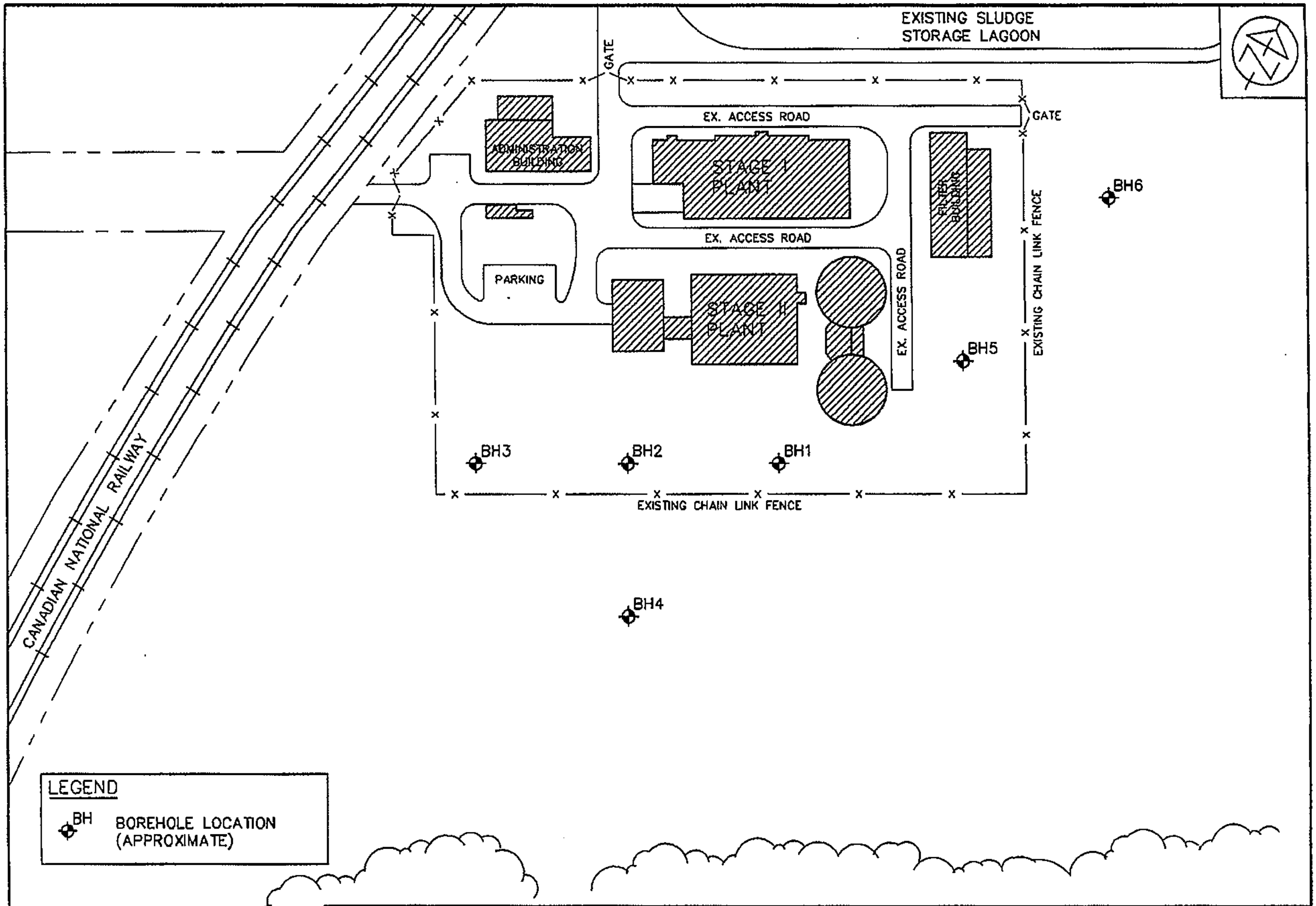
Dear Sir;

We are pleased to present our report on the subsurface investigation carried out at the above site. The purpose of the investigation was to determine the subsurface conditions in the vicinity of the proposed expansion to within the existing sewage treatment plant. Based on these findings, geotechnical recommendations are provided regarding the design of foundations, buried utilities, excavations, and general earthworks. Comments are also provided on the anticipated construction conditions.

1. SITE AND PROJECT DESCRIPTION

The site is located near the Holland River in the north-east part of the Town of Bradford, Ontario on the east side of Dissette Street (see Figure 1).

The exact nature of the proposed expansion was not provided to Terraprobe for this investigation. However, it was suggested by Ainley Maple that the soil and ground water conditions be confirmed to the south and east of the existing facility at six locations. It is our understanding that new structures will be similar to the existing tanks founded at depths in the



AINLEY MAPLE

TOWN OF BRADFORD WEST GWILLIMBURY

WATER POLLUTION CONTROL PLANT EXPANSION

BOREHOLE LOCATIONS

SCALE: 1:1000 (APPROX.)

DATE: SEPT. 1995

195203–BH1

REVISED: MARCH/96

order of 4 to 5 m below existing ground surface.

2. FIELD PROCEDURE

A field investigation of the site was conducted on October 18, 1995 when six (6) exploratory boreholes were drilled across the site. The approximate location of the boreholes, as shown of Figure 2, are as suggested by Ainley Maple. The depth of the boreholes ranged from 6.6 to 8.1 m.

The boreholes were advanced using a bombardier mounted CME 55 power auger equipped with conventional soil sampling and testing tools. Samples were obtained and Standard Penetration Tests were conducted throughout each borehole at 0.75 to 1.5 m intervals. The samples were stored in plastic containers and transported to our laboratory for detailed examination and testing. All of the soil samples were tested for water contents. Select samples are being tested for pH, sulfate, chloride and resistivity and will be reported under separate cover with discussion associated with soil and ground water aggressiveness towards concrete and outlet iron pipe. No problems are anticipated.

Standpipe type piezometers were installed in all 6 boreholes to permit monitoring of shallow ground water levels. The standpipes were comprised of 12 mm I.D. CPVC tubing which was saw slotted near its base, as shown on the Borehole Logs.

The field work was supervised throughout by a soil engineer who staked the locations, cleared services with OCWA personnel, directed the drilling and sampling operations, logged the samples and installed and monitored the standpipes. The ground surface elevations at the borehole locations were surveyed by Terraprobe and referenced to the top of the existing clarifiers understood to be at geodetic elevation 222.35 m.

3. SUBSURFACE CONDITIONS

Details of the subsurface conditions encountered at the site, are summarized below and are also presented on the accompanying Borehole Logs. It should be noted that the soil conditions are confirmed at the borehole locations only and may vary at other locations, particularly with respect to the depth and nature of the fill materials.

In summary, the boreholes generally encountered SANDY SILT to SILTY SAND FILL over NATIVE SILT followed by SANDY SILT TILL.

The earth fill consisted primarily of a brown, sandy silt to silt. Standard Penetration Test results in the sand fill indicates a loose to compact condition with 'N' values of 6 to 32 blows per 0.3 m of penetration. Water contents of the sand fill mostly ranged between 12 and 15 percent by weight. The depth of sand fill found at the ground surface in each borehole is summarized as follows;

Boreholes	**Ground Elev. (m)**	**Fill Depth/Elev. (m)**
1	221.1	2.1 / 219.0
2	221.2	1.5 / 219.7
3	221.2	1.8 / 219.4
4	219.9	0.0
5	220.6	2.4 / 218.2
6	220.8	1.1 / 219.7

In Boreholes 3 and 5 beneath the silt fill black a organic stained layer was encountered.

Beneath the fill and from the ground surface in Borehole 4, brown native silt was encountered in Boreholes 1 to 5. The silt deposit extended to depths of 3 to 5.5 m below existing grades. Water contents were measured from the borehole samples and results were generally between 13 and 22 percent by weight with an average of about 20 percent. The majority of this strata is considered below the static water table for this site.

Based on the results of the Standard Penetration Test, the native silt was generally considered to be in a compact state, with 'N' values ranging from 6 to 37 blows per 0.3 m of penetration.

Beneath the fill and native silt in all the boreholes was a sandy silt till. This strata was encountered at depths of 2.0 to 5.5 m below existing grade. Moisture contents varied from 8 to 11 percent.

Standard Penetration test values (N) generally increased from a compact to very dense consistency with depth (i.e. 'N' values from 10 to greater than 70 blows per 0.3 m of penetration).

All the boreholes were dry or free of standing water at the time of backfilling on the day of drilling. The static water levels in the boreholes were measured during a return visit on October 23, 1995 as summarized below;

Boreholes	Depth of Water Level / Elevation (m)
1	3.2 / 217.9
2	4.0 / 217.2
3	2.9 / 218.3
4	3.2 / 216.7
5	4.5 / 216.0
6	1.8 / 219.0

It should be noted that the ground water levels are subject to seasonal fluctuations. Also, the general wetness of the samples and seepage observations suggest that the water table is near Elevation 219.0 which is higher then that measured October 23, 1995 in the standpipe piezometers. Actual seepage volumes or rates are low given the relatively impermeable nature of the silt soils.

4. ENVIRONMENTAL AUDIT

4.1 Site and Project Description

This audit covers the existing water pollution control plant (WPCP) site.

The purpose of the evaluation was to assess the environmental state of the study area and to assess the likelihood of impact on the soil and ground water at the site by past uses as would affect work under Bill 208, Section 18a, of the Occupational Health and Safety Act.

The environmental audit comprised of a;

1) review of historical aerial photographs
2) title search
3) contact with Town Planning staff and MOEE
4) a review of potential presence of the substances designated under Section 18A of the Occupational Health and Safety Act in the Study Area.

It is proposed to construct an expansion to the south and/or east of the existing WPCP site.

Excavation depths are not expected to exceed 7 m.

The site is surrounded by wet low land areas which extend towards the Holland River approximately 600 m to the east.

Earth fill materials are placed around the existing structures. Treed and wet flat land areas are located immediately to the north, east and south. Industrial facilities are located along Dissette Street adjacent to a railway line that borders the west side of the subject property.

A geotechnical investigation has been carried out for the site in conjunction with this Environmental Audit. Six (6) boreholes were advanced on the site to determine shallow soil conditions in order to provide geotechnical recommendations for the expansion.

4.2 Previous Land Use and Site Conditions

The site assessment included the obtaining of historical aerial photography of the area and the assessment of past land uses in the area and the surrounding area. A review was also completed of the land registry and select land titles documents for the Study Area dating back to about 1900. The local Ministry of Environment and Energy, and the Planning Department of the Town of Bradford West Gwillimbury were contacted to discuss past and present land uses, in the Study Area that might create potential environmental contamination.

Soil samples obtained during the geotechnical investigation by Terraprobe Limited were examined to assess whether any contamination was evident. No evidence was detected.

4.3 Aerial Photography

The photo's for 1954 indicate that the Study Area was undeveloped and/or agricultural in use.

Aerial photographs taken in 1971 show the existence of the WPCP and a sewage lagoon to the north. Area land uses are primarily the same as in the 1954 photo with the exception of additional clearing of land in agricultural production. The Town of Bradford has also shown further expansion.

The most recent photographs for this area were taken in 1978. Land use in the 1978 photograph east of Dissette Street is much the same as that shown in 1971. However, considerable residential development has occurred to the west and industrial development along Dissette Street.

4.4 Land Registry and Titles Documents

Documents from the land registry were reviewed back to 1869. Only private individuals are recorded as owning the property until December 13, 1960 when the lands were granted to the Ontario Water Resources Commission by William H. Weston et aux of Toronto, in Trust.

4.5 Review with Government Agencies

Individuals from the Planning Department of the Town of Bradford West Gwillimbury and the local Ministry of Environment and Energy (MOEE), were contacted to discuss any past land uses in the area of the Study Area that might be possible sources of contamination. The potential contamination was reviewed within the content of Bill 208, the Occupational Health and Safety Act, for workmen conducting the construction of the plant expansion.

Section 18a of Bill 208 refers to eleven (11) substances designated under the OHSA as follows;

Arcylonitile
benzene
lead
silica
arsenic
isocyanate
mercury
vinyl chloride
asbestos
coke over emissions
ethylene oxide

Mr. Bob Young of the MOEE (Barrie Office) was contacted regarding sources of contamination on the site. The local MOEE office reported that they are not aware of any contamination on the site.

A local historian, Mr. George Jackson was contacted as suggested by the Town Planning staff. He indicated that a landfill site was in operation until about 1965 near the corner of Dissette Street and Industrial Parkway. This would be greater than 500 m from the subject property and not considered to be of concern for this particular site development.

Mr. Eric Hodgins, Town Planner was also not aware of any specific site contamination occurances.

4.7 Site Testing

The borehole investigation conducted on the site was completed October 18, 1995. Six (6) boreholes were advanced to depths of 6.6 to 8.1 m. The borehole investigation indicated virtually no environmental impacts relevant to workmen safety during the proposed expansion construction. Subsoils are primarily clean appearing silt fills or native silts.

No deleterious materials, discolouration or odours were observed in the samples taken from the boreholes. Some organic staining was noted at the bottom of the fill in Boreholes 3 and 5. Sampling in the boreholes showed no visible contamination, and no explosive gas readings were recorded in the soil samples returned to our laboratory.

Based on our background research of the property and the field testing conducted on the site, we conclude that the study did not reveal any significant environmental hazardous constraints to construction. The study is intended to be a preliminary evaluation (i.e. Phase I Audit) and therefore should not be perceived as a certification that no contamination is present in the study area.

5. DISCUSSION AND RECOMMENDATIONS

The following discussion and recommendations are based on the factual data obtained from this investigation, and are intended for use by the design engineer only. Contractors bidding on, or conducting work associated with this project should make their own assessment of the factual data to assess their effect on proposed construction methods and scheduling.

5.1 Foundations

The undisturbed native compact silt or sandy silt till encountered at the site is considered suitable for the support of various structures on conventional spread footings and/or concrete tank pads.

The following summarizes suggested minimum founding depths.

Borehole No.	Maximum Allowable Bearing Pressure (kPa)	Approximate Founding Depth / Elevation of Lower (m)
1	100	2.4 / 218.7
2	100	1.8 / 219.4
3	100	2.1 / 219.1
4	100	1.0 / 218.9
5	100	3.0 / 217.6
6	100	1.4 / 219.4

The minimum foundation widths to be used in conjunction with the above recommended soil bearing pressure should be 0.5 m for continuous footings, and 0.8 m for individual footings. The above recommended bearing capacities are based on estimated total settlements of 25 mm. Higher bearing pressures are available at depth if required.

All exterior foundations, or foundations in unheated areas should be provided with a minimum soil cover of 1.2 m or equivalent insulation, for frost protection.

Prior to pouring concrete for the footings, the footing areas should be cleaned of all deleterious material such as topsoil, fill, softened, disturbed or caved materials, as well as any standing water. It is recommended that the foundations be inspected by Terraprobe in order to confirm the exposed soil conditions and recommended bearing capacities. If construction proceeds during freezing weather conditions, adequate temporary frost protection for the footing bases and concrete must be provided.

The native silt soils can be easily disturbed. A concrete skim coat/mud slab is recommended immediately after excavation to minimize disturbance.

5.2 Concrete Slab-on-Grade

Conventional concrete slab-on-grade can be placed on the existing native silt or till deposits. The modulus of subgrade reaction is estimated as about 15 mN/m^3 (75 kcf).

5.3 Excavations

It is anticipated that excavations for proposed building foundations, and tanks will extend to depths of about 1.5 to 6 m below existing grades. Based on the findings in the boreholes, the anticipated conditions consist of loose to compact fill soils, over compact to dense native silt and sandy silt. A ground water level was measured at depths of about 1.8 to 4.5m and considered to be near elevation 219.0 for the majority of the site.

The recommended safe side slope configuration for temporary unbraced excavations through the soils (i.e. silt fill and native silt and sandy silt) encountered at the site, is 1½ to 1 (horiz. to vert.). Alternatively, the excavations may be supported by close shoring or trench boxes. It is noted that some sloughing of the excavation walls may occur locally.

Where workmen must enter unsupported trench excavations carried deeper than 1.2 m, the trench excavations should be inspected and certified by a geotechnical engineer, or suitably sloped and/or braced in accordance with the Occupational Health and Safety Act. The Occupational Health and Safety Act recognizes four (4) broad classifications of soils, which are summarized as follows;

Type 1 Soil

a. is hard, solid, only able to be penetrated by a small sharp object with difficulty;
b. can only be excavated by mechanical equipment;
c. shows no sign of visible cracks after excavation
d. exhibits a dry, shiny appearance after excavation; and
e. possesses a low moisture content and a high degree of internal strength.

Type 2 Soil

a. cracks or crumbles;

b. can be penetrated by small sharp objects easily;

c. can be excavated by hand tools with moderate difficulty;

d. exhibits signs of surface cracking

e. exhibits a damp appearance after excavation; and

f. possesses a low to medium moisture content and a medium degree of internal strength.

Type 3 Soil

a. is loose, soft, sandy or previously excavated;

b. can be excavated with hand tools easily;

c. will run easily into a well defined conical pile if dry;

d. will flow or shift unless supported if wet; and

e. possesses almost no internal strength.

Type 4 Soil

a. is wet or muddy;

b. will run easily or flow unless completed supported immediately after excavation;

c. exerts substantial fluid pressure upon its supporting system; and

d. possesses almost no internal strength.

The fill and native soils at the site can generally be classified as Type 3 soil.

It is expected that temporary open cut excavations will extend below the water table. Accordingly, minor seepage if it occurs, can be controlled by pumping from local filtered sumps at the base of the excavation. Should deeper excavations or foundations become necessary (i.e. deeper than 7 m). then further investigation should be carried out to confirm whether water bearing sand layers are within or beneath the encountered till.

Additional consideration should be given to deep excavations in close proximity to existing foundations and structures, so that there is minimal loss of ground support. Temporary shoring and/or underpinning may be required in areas where excavations must intersect an imaginary line extending down from existing footings at an inclination of about 60° to the horizontal.

5.4 Backfill

Based on our experience with silty soils of similar gradation, the water contents of the fill and native sand soils encountered in the boreholes are generally above a suitable range for efficient compaction. The measured water contents of the fill and native silt soils were generally greater than 5 percent above the estimated optimum water content for Standard Proctor compaction.

Generally, soils can be efficiently compacted at water contents up to about 3 percent wetter than optimum. Therefore, excavated soils for proposed structures will be difficult to place and recompact. These soils may be used in general landscaped areas where settlement is not considered as critical. It is recommended that an imported OPSS Granular 'B' type material be considered for backfilling structures.

Fill materials placed as wall backfill or beneath settlement sensitive areas such as floor slabs and pavement structures should be compacted to a minimum of 95 percent Standard Proctor Maximum Dry Density (SPMDD), in lifts not exceeding 150 mm.

The topsoil materials encountered at the site should not be reused as backfill in settlement sensitive areas, such as beneath pavements or floor slabs. This material may be stockpiled and reused for landscaping purposes.

Should construction be conducted during the winter season, it is imperative to ensure that frozen material is not utilized as trench backfill.

It is recommended that inspection and testing be carried out during construction confirm trench backfill quality, thickness and to ensure adequate compaction.

5.5 Lateral Earth Pressures

The boreholes indicate primarily silt type soils at the site, for the most part in a compact condition. Ground water was found at depths of about 1.8 to 4.5 m.

For design of buried rigid concrete walls, the following design parameters are recommended;

soil unit weight	γ	18.5 kN/m^3
angle	ϕ'	Sand (imported) 33° Native silt 30°
coefficient of lateral earth pressure	k_o	Sand (imported) 0.46 Native silt 0.50

The recommended design angle of friction between concrete and the sand soil is 24°.

For design of temporary shoring systems, the following design parameters are recommended;

soil unit weight	γ	18.5 kN/m^3
angle	ϕ'	Sand (imported) 33° Native silt 30°
coefficient of lateral earth pressure	k_o	Sand (imported) 0.46 Native silt 0.33

5.6 Pipe Bedding

The native silt soils at the site are suitable for support of sewers and other related piping. The granular bedding for stabilizing wet bases, and providing a bedding medium should consist of well graded, free draining material such as Granular 'A'.

Any soft, loose, or disturbed soils, encountered as the result of ground water seepage or construction traffic should be sub-excavated and replaced with suitably compacted sand fill. Granular 'A' bedding material should be placed in thin lifts and compacted to a minimum of 95 percent SPMDD.

5.7 Thrust Blocks and Pipe Restraints

It is recommended that thrust blocks be cast against undisturbed native ground. The maximum bearing pressure for design of thrust blocks is recommended as 150 kPa against the undisturbed native soil where there is soil cover over the block equal to the height of the block. The ultimate angle of friction between the thrust block and the soil may be taken as 33°. The following design parameters are recommended for the design of restrained joints;

Ultimate friction angle between plastic pipe and compacted bedding	24°
Ultimate friction angle between concrete pipe and compacted bedding	33°
Maximum bearing of thrust pressure of pipe normal to bedding against native soil	150 kPa

We trust that the foregoing information is sufficient for your present requirements. If you have any questions, or if we can be of further assistance, please do not hesitate to contact us.

Sincerely,
TERRAPROBE LIMITED

REGISTERED PROFESSIONAL ENGINEER
Oct 31/95
K. R. JOHNSON
PROVINCE OF ONTARIO

Kirk R. Johnson. P. Eng.
Associate

KRJ/db

Encl: Borehole Logs 1 to 6
Figures 1 and 2

BOREHOLE LOGS

TERRAPROBE LIMITED.

Terraprobe Limited

ABBREVIATIONS, TERMINOLOGY, AND GENERAL INFORMATION

Sampling Method

SS - split spoon
ST - Shelby tube
AS - auger sample
RC - rock core

Penetration Resistance

Standard Penetration Resistance ('N' values) is defined as the number of blows by a hammer of 63.5 kg. mass (140 lbs.) falling freely for a distance of 0.76 m (30 inches) required to advance a standard 50 mm (2 inch) diameter split spoon sampler for a distance of 0.3 m (12 inches).

Dynamic Cone Penetration Resistance is defined as the number of blows by a hammer of 63.5 kg. mass (140 lbs.) falling freely for a distance of 0.76 m (30 inches) required to advance a conical steel point of 50 mm diameter and with 60 degree sides on 'A' size drill rods for a distance of 0.3 m (12 inches).

Soil Description

Cohesionless Soils

Relative Density	'N' Value
very loose	< 4
loose	4 - 10
compact	10 - 30
dense	30 - 50
very dense	> 50

Cohesive Soils

Consistency	Undrained Shear Strength (kPa)	'N'
very soft	< 12	< 2
soft	12 - 25	2 - 4
firm	25 - 50	4 - 8
stiff	50 - 100	8 - 16
very stiff	100 - 200	16 - 32
hard	> 200	> 32

Soil Composition

	% by weight
'trace' (eg. trace silt)	< 10
'some' (eg. some gravel)	10 - 20
adjective (eg. sandy)	20 - 35
'and' (eg. sand and gravel)	35 - 50

General Information

The recommendations provided in this report are based on the factual information obtained from the boreholes and on the general information provided for the proposed project.

Site investigation by means of boreholes and/or test pits identifies subsurface conditions at the location and time of sampling only. Ground conditions at locations away from the boreholes and test pits may vary.

Recommendations are made by interpretation of this factual data for specific conditions such as size, configuration and location of the proposed project. Changes in project conditions should be reviewed by the geotechnical consultant as they may affect the recommendations provided.

In order to identify possible changes in ground conditions between the sample locations and their effect on the project, it is recommended that site inspections be carried out during construction by qualified geotechnical personnel.

FORM TO-SL-003

Terraprobe

LOG OF BOREHOLE 1

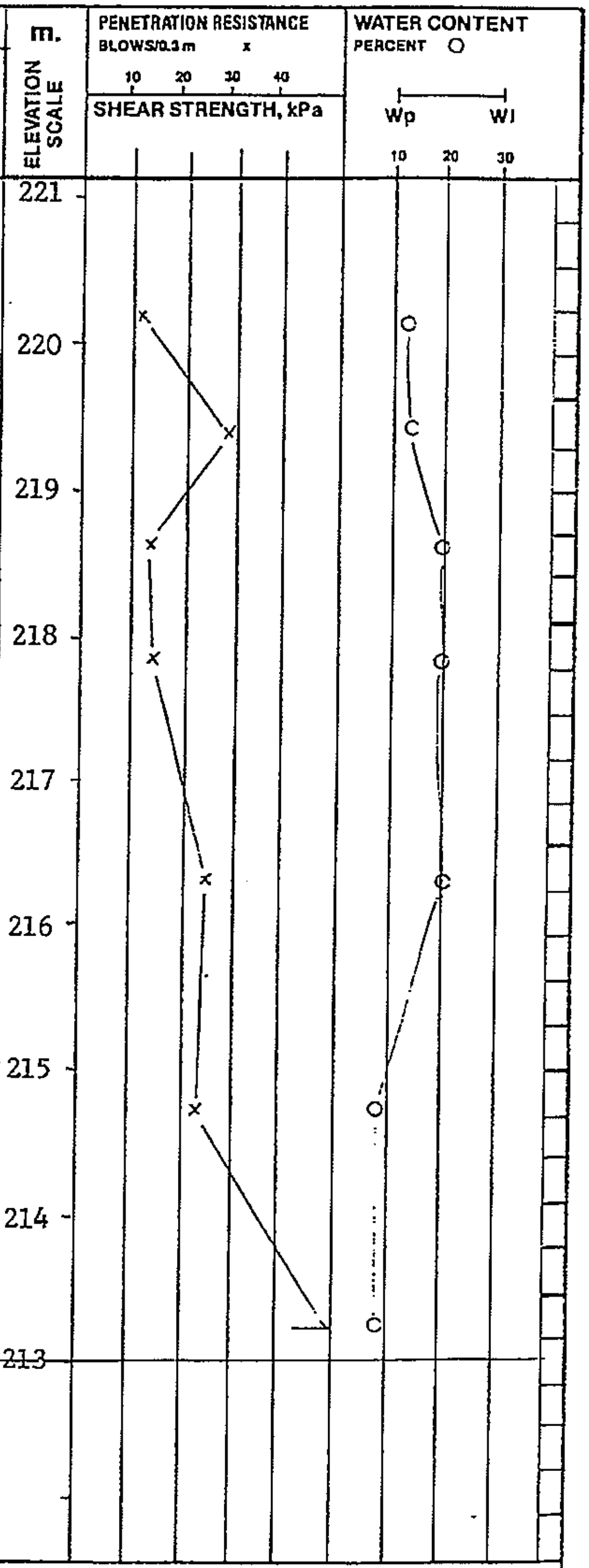
PROJECT: WPCP Expansion
LOCATION: Bradford, Ontario
CLIENT: Town of Bradford West Gwillimbury
DATE: October 18, 1995
EQUIPMENT: CME 55 Crawler
ELEVATION DATUM: Geodetic
FILE: 95582

STRATIGRAPHY

ELEV. DEPTH m.	DESCRIPTION
221.1	Ground Surface
0.0	TOPSOIL - 100mm Brown Compact Moist SILT, some sand (FILL)
219.0 2.1	Grey Compact Moist to Wet SILT, trace sand, trace clay
215.6 5.5	Grey Compact becoming very Dense Moist SANDY SILT, some gravel (TILL)
213.0 8.1	End of Borehole

SAMPLES

NUMBER	TYPE	'N' VALUES
1	SS	12
2	SS	29
3	SS	13
4	SS	14
5	SS	24
6	SS	22
7	SS	72



NOTES:
1. Seepage / wet sample at 2.3m depth.
2. Water level measured October 23, 1995 at 3.2m (Elev. 217.9).

Terraprobe

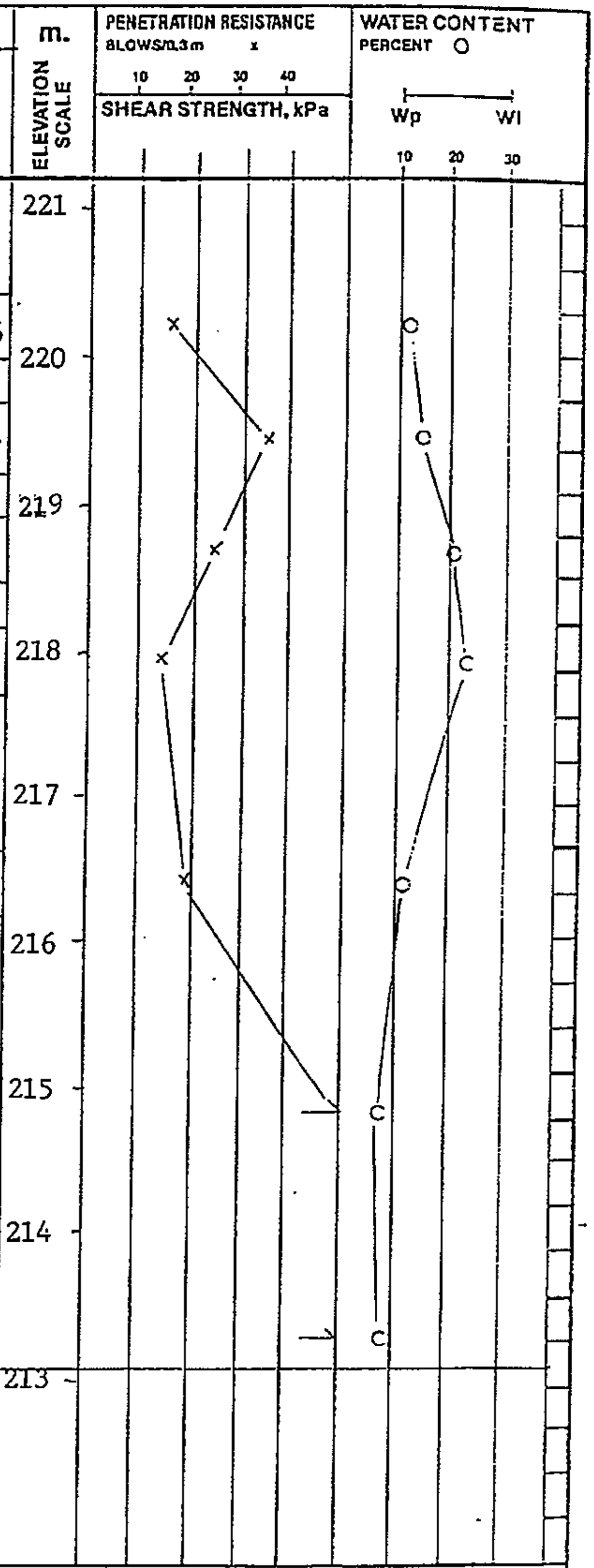
LOG OF BOREHOLE 2

PROJECT: WPCP Expansion
LOCATION: Bradford, Ontario
CLIENT: Town of Bradford West Gwillimbury

DATE: October 18, 1995
EQUIPMENT: CME 55 Crawler
ELEVATION DATUM: Geodetic
FILE: 95582

ELEV. DEPTH m.	DESCRIPTION
221.2	Ground Surface
0.0	TOPSOIL - 125mm Brown Compact Moist SILT, some sand (FILL)
219.7 1.5	Brown Compact Moist SILT, trace sand, trace clay
216.9 4.3	Grey Compact becoming very Dense SANDY SILT, some gravel (TILL)
213.1 8.1	End of Borehole

NUMBER	TYPE	'N' VALUES
1	SS	16
2	SS	37
3	SS	24
4	SS	14
5	SS	19
6	SS	80/9"
7	SS	78/9"



NOTES:
1. Wet / seepage pockets at 2.3m depth.
2. Water level measured October 23, 1995 at 4.0m (Elev. 217.2).

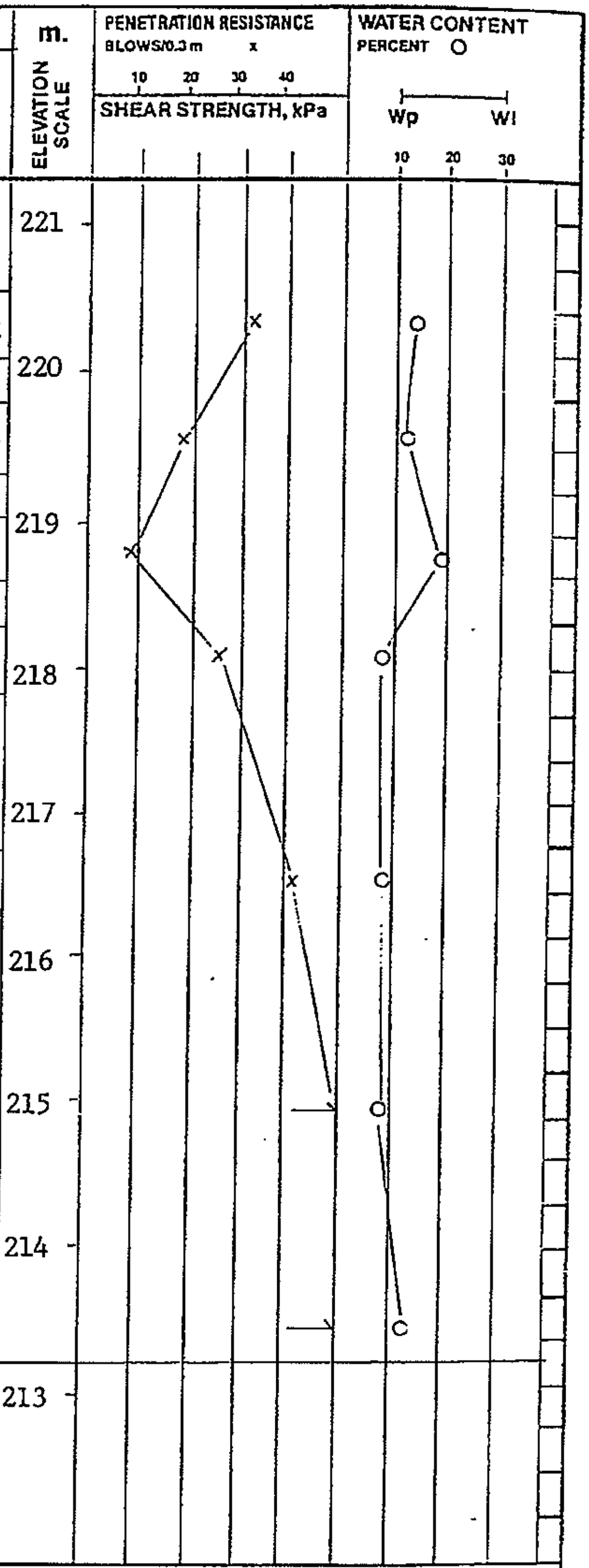
Terraprobe

LOG OF BOREHOLE 3

PROJECT: WPCP Expansion
LOCATION: Bradford, Ontario
CLIENT: Town of Bradford West Gwillimbury

DATE: October 18, 1995
EQUIPMENT: CME 55 Crawler
ELEVATION DATUM: Geodetic
FILE: 95582

STRATIGRAPHY		SAMPLES		
ELEV. DEPTH m.	DESCRIPTION	NUMBER	TYPE	'N' VALUES
221.2	Ground Surface			
0.0	TOPSOIL - 150mm Brown Compact Moist to Wet SANDY SILT, trace gravel (FILL)			
		1	SS	32
219.4	organic stained	2	SS	18
1.8	Grey Loose Moist SILT, trace sand, mottled			
218.2		3	SS	9
3.0	Grey Compact becoming very Dense Moist SANDY SILT, some gravel (TILL)	4	SS	26
		5	SS	42
		6	SS	71/11"
213.1		7	SS	73/9"
8.1	End of Borehole			



NOTES:
1. Minor seepage at 2.3m depth.
2. Water level measured on October 23, 1995 at 2.9m (elev. 218.3).

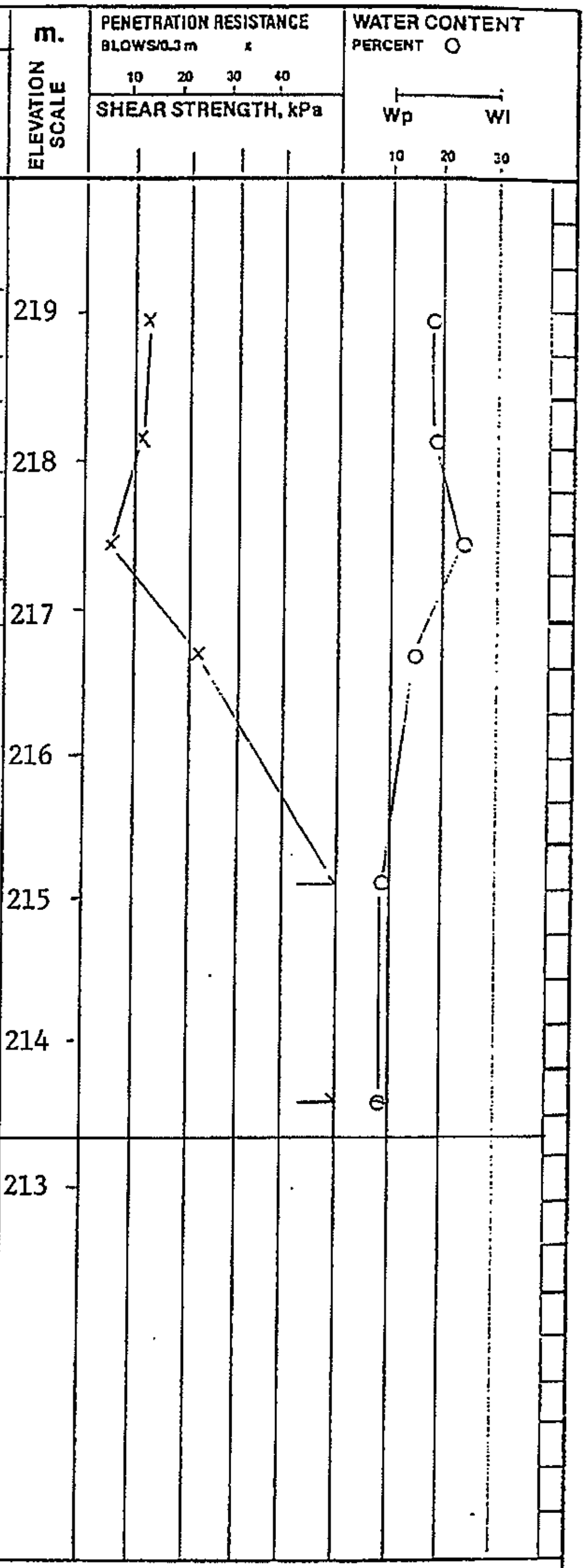
FORM TO.SL.101

Terraprobe

LOG OF BOREHOLE 4

PROJECT: WPCP Expansion
LOCATION: Bradford, Ontario
CLIENT: Town of Bradford West Gwillimbury
DATE: October 18, 1995
EQUIPMENT: CME 55 Crawler
ELEVATION DATUM: Geodetic
FILE: 95582

STRATIGRAPHY		SAMPLES		
ELEV. DEPTH m.	DESCRIPTION	NUMBER	TYPE	'N' VALUES
219.9	Ground Surface			
0.0	TOPSOIL 250mm			
0.2	Brown Compact to Loose Moist to Wet SILT, mottled fine sand seams, trace clay	1	SS	12
		2	SS	11
		3	SS	6
216.5		4	SS	21
3.4	Grey Compact becoming very Dense Moist SANDY SILT, some gravel (TILL)	5	SS	50/6"
213.3		6	SS	50/6"
6.6	End of Borehole			



NOTES:
1. Wet pockets / seepage at 0.7m depth.
2. Water level measured on October 23, 1995 at 3.2m (Elev. 216.7).

Terraprobe

LOG OF BOREHOLE 5

PROJECT: WPCP Expansion
LOCATION: Bradford, Ontario
CLIENT: Town of Bradford West Gwillimbury

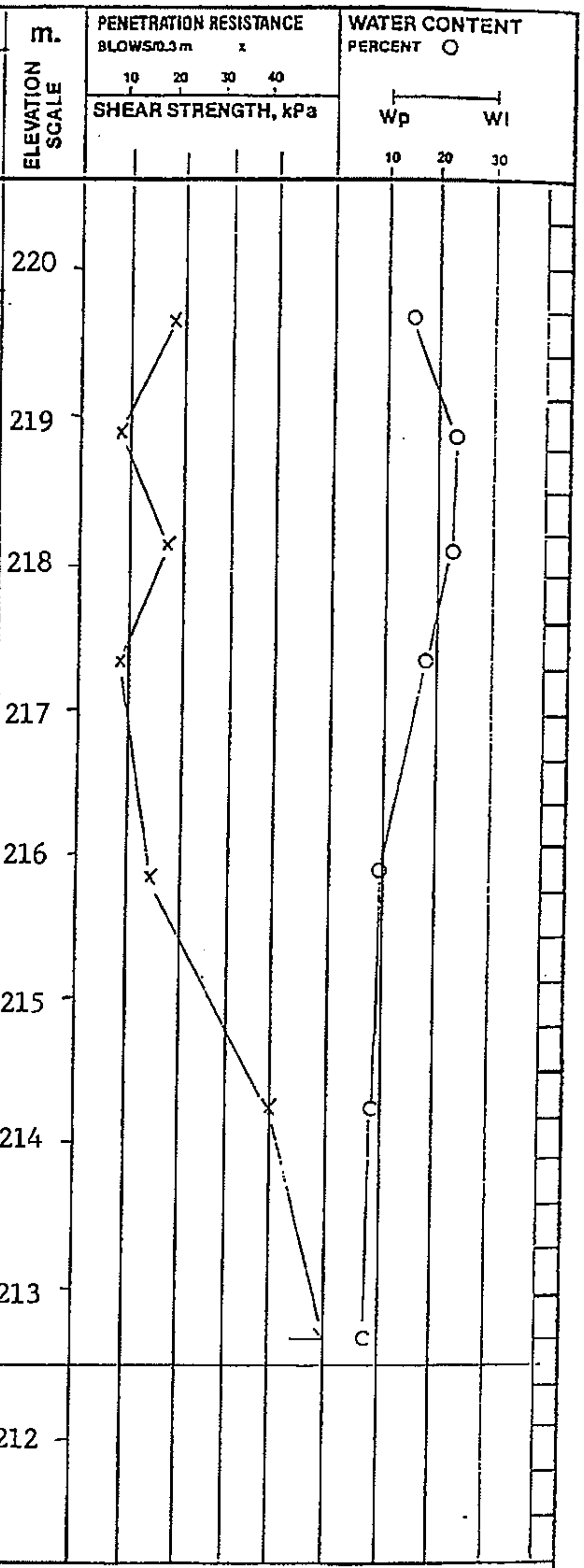
DATE: October 18, 1995
EQUIPMENT: CME 55 Crawler
ELEVATION DATUM: Geodetic
FILE: 95582

STRATIGRAPHY

ELEV. DEPTH m.	DESCRIPTION
220.6	Ground Surface
0.0	TOPSOIL - 125mm Brown Compact Moist SANDY SILT, some sand pockets (FILL) organic stained
218.2 2.4	Brown Compact Wet SILTY FINE SAND
217.6 3.0	Grey Loose Wet SILT, trace sand and clay
216.6 4.0	Grey Compact becoming very Dense Moist SANDY SILT, some gravel (TILL)
212.5 8.1	End of Borehole

SAMPLES

NUMBER	TYPE	'N' VALUES
1	SS	18
2	SS	9
3	SS	17
4	SS	9
5	SS	15
6	SS	40
7	SS	65/10"



NOTES:
1. Minor seepage noted at 2.3m depth.
2. Water level measured on October 23, 1995 at 4.5m (Elev. 216.0).

Terraprobe

LOG OF BOREHOLE 6

PROJECT: WPCP Expansion
LOCATION: Bradford, Ontario
CLIENT: Town of Bradford West Gwillimbury

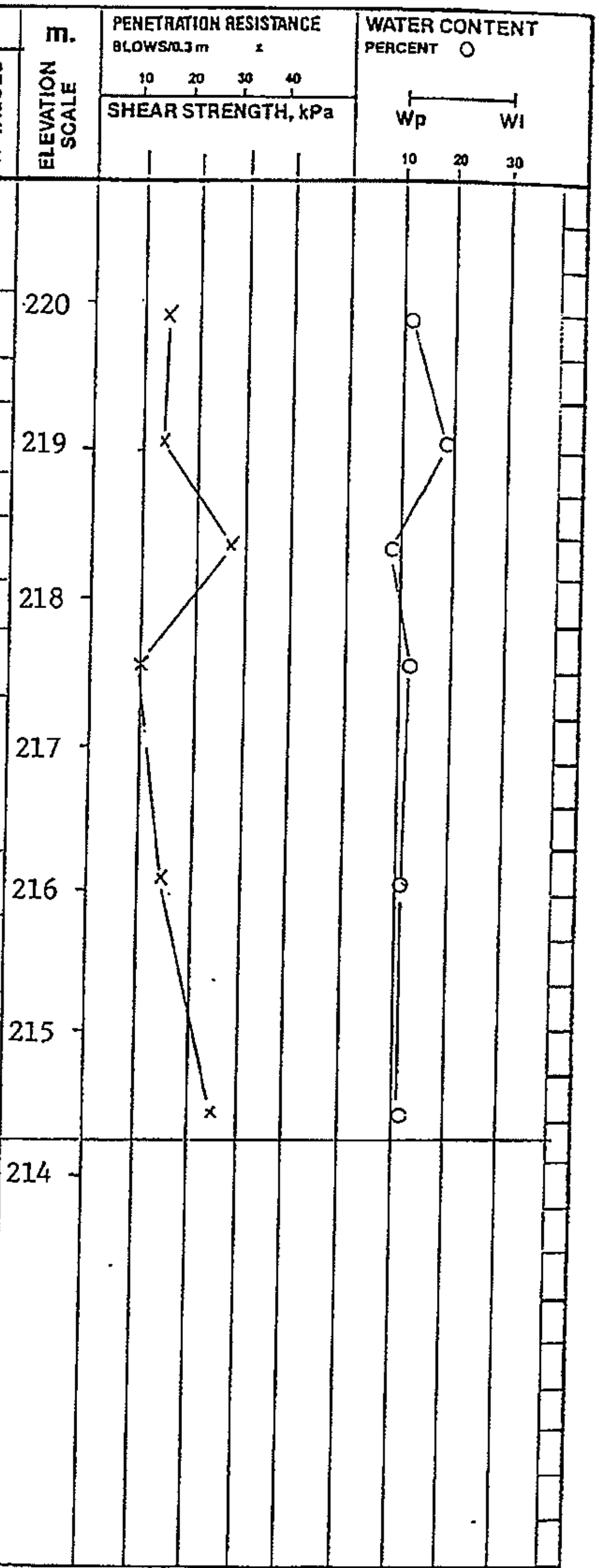
DATE: October 18, 1995
EQUIPMENT: CME 55 Crawler
ELEVATION DATUM: Geodetic
FILE: 95582

STRATIGRAPHY

ELEV. DEPTH m.	DESCRIPTION
220.8	Ground Surface
0.0	TOPSOIL - 75mm Brown Compact Moist SILTY SAND (FILL)
219.7 1.1	Brown Compact Wet SAND, fine
218.8 2.0	Brown Compact Moist SANDY SILT, some gravel (TILL)
214.2 6.6	End of Borehole

SAMPLES

NUMBER	TYPE	'N' VALUES
1	SS	14
2	SS	13
3	SS	28
4	SS	10
5	SS	14
6	SS	26



NOTES:
1. Minor seepage at 1.5m and 2.3m depths.
2. Water level measured on October 23, 1995 at 1.8m (Elev. 219.0).

FORM TO:SL-101

FIGURES

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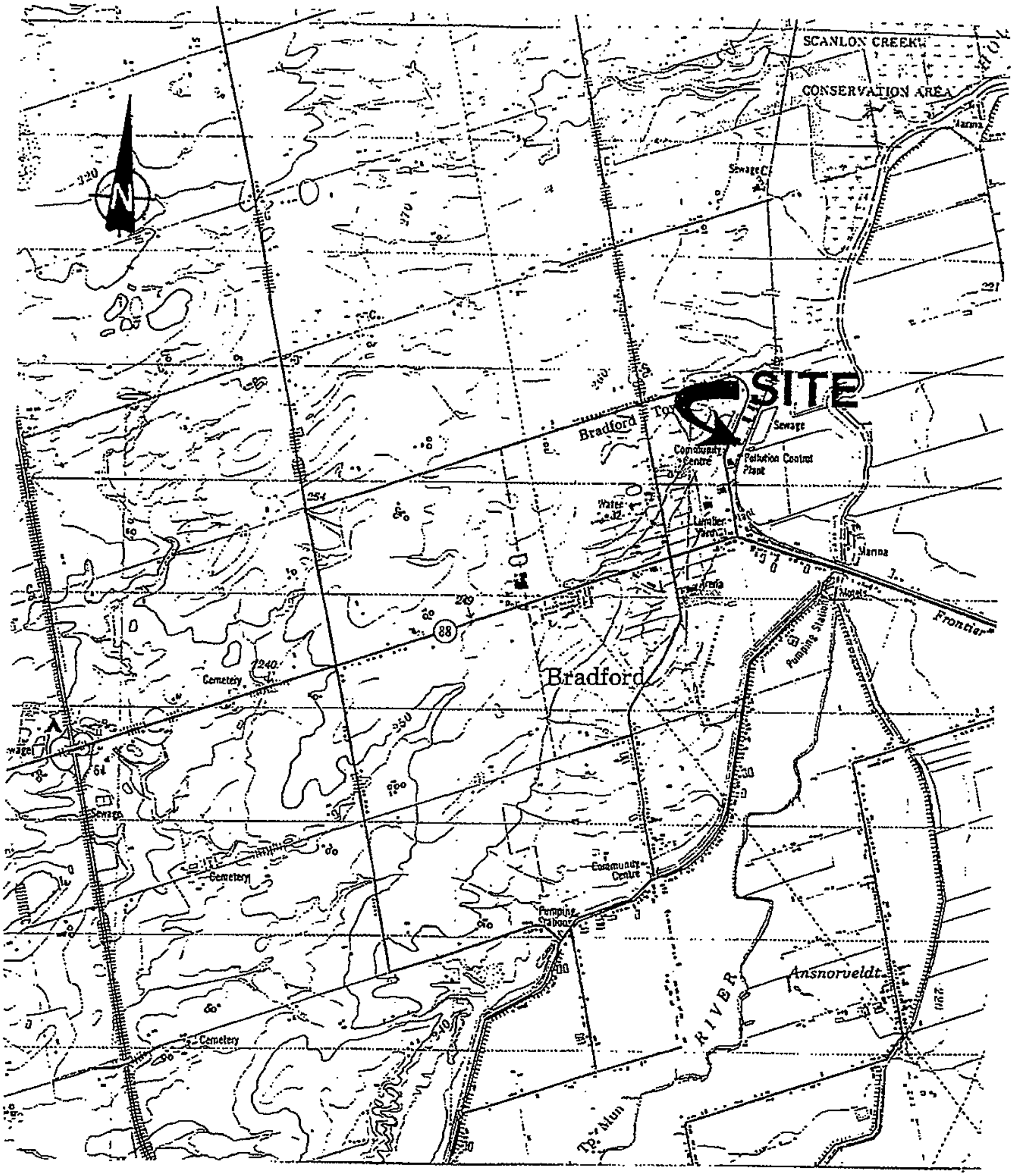
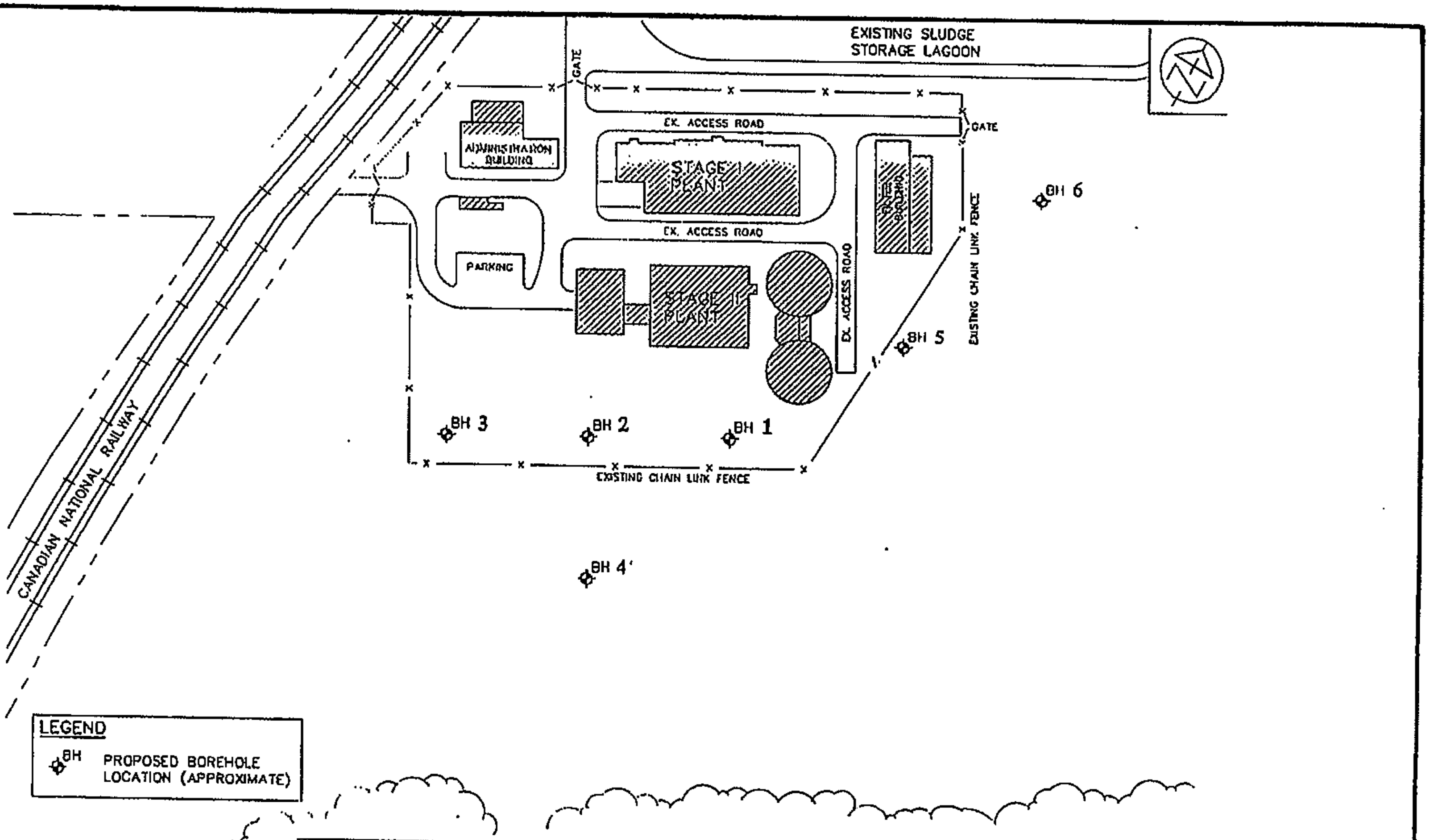


SITE LOCATION PLAN

TERRAPROBE LIMITED

Job no. 95582
Scale 1:50000
Date October 1995

FIGURE 1



AINLEY MAPLE

TOWN OF BRADFORD WEST GWILLIMBURY
WATER POLLUTION CONTROL PLANT EXPANSION

BOREHOLE LOCATIONS

SCALE: 1:1000 (APPROX.)
DATE: SEPT. 1995
195203–BH1

REVISED: SEPT. 13/95

BOREHOLE LOCATION PLAN

TERRAPROBE LIMITED

Job no. 95582
Scale reduced
Date October 1995

FIGURE 2

Terraprobe

Consulting Geotechnical & Environmental Engineering
Construction Materials Engineering, Inspection & Testing

GEOTECHNICAL INVESTIGATION
PROPOSED WATER POLLUTION CONTROL PLANT EXPANSION
TOWN OF BRADFORD-WEST GWILLIMBURY
BRADFORD, ONTARIO

Prepared for: Town of Bradford West Gwillimbury
% R.J. Burnside & Associates Ltd.
16775 Yonge Street, Suite 200
P.O. Box 60
Newmarket, Ontario
L3Y 8J4

Attention: Mr. Steve Walker

File No. 3-03-0190
January 16, 2004

Distribution:

3 cc: Town of Bradford West Gwillimbury
% R.J. Burnside & Associates Ltd.
2 cc: Terraprobe Limited

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1. INTRODUCTION

Terraprobe Limited is pleased to present the results of our subsurface investigation carried out at the existing Water Pollution Control Plant (WPCP) site in Bradford, Ontario. Authorization to carried out the geotechnical investigation on this property was provided by R.J. Burnside and Associates Ltd., on behalf of the Town of Bradford-West Gwillimbury on November 3, 2003.

The purpose of the investigation was to determine the soil and groundwater conditions in the area of the proposed expansion at the facility to provide geotechnical recommendations for tank/building foundations, slab-on-grade floors, excavation and backfill, temporary groundwater dewatering issues and general construction constraints.

The site is located at the existing WPCP in Bradford, Ontario on the east side of Dissette Street, just north of Jay Street as shown on Figure 1. A number of existing tank and building structures are presently located on the subject property. It is our understanding that the initial structures on this site used conventional foundations for support of the structural elements.

Initial reports of the site conditions included in the proposal request suggested that " over the past number of years, there has been placement of a considerable amount of loose fill in the area south of the existing treatment plant".

It is our understanding that the proposed expansion plans for the facility include the following;

- new connection sewers
- proposed grit removal facility
- new proposed aeration tanks
- proposed new clarifier
- proposed chemical storage/blower building
- new aerobic digester tank

Boreholes were located to provide general site coverage as mutually agreed upon with R.J. Burnside and Associates Ltd.

It is our understanding that future tanks and services will be constructed to similar depths as existing, which are up to 5m below the top of existing tanks (elev. 222.24).

2. FIELD PROCEDURES

Terraprobe visited the site to locate and stake six (6) borehole locations south of the existing WPCP. Terraprobe then proceeded with arranging for service clearances with local utilities prior to advancing the boreholes.

A crawler-mounted drill rig was then mobilized to the site on December 8 and 9, 2003 to complete the advancement of the boreholes. The boreholes were advanced to approximately 11.1m depth.

Standard Penetration testing was carried out at regular 0.75 to 1.5m intervals in each borehole.

Slotted standpipe type piezometers were installed in the boreholes upon completion. The ground surface elevation in each borehole was determined by Terraprobe and referenced to geodetic datum. The benchmark used was the northwest corner of the top of the existing tank structure which is understood to be elevation 222.24m.

A return visit to the site was made on December 15, 2003 to measure static water levels in the installed standpipes.

All soil samples obtained in this investigation were returned to our laboratory for further evaluation and testing. In particular, moisture contents were determined for all soil samples.

3. SUBSURFACE CONDITIONS

The details of the subsurface conditions encountered in each borehole are presented on the attached Borehole Logs. It should be noted that these conditions are confirmed at the borehole locations only and could vary between and beyond these locations particularly with respect to the depth of fill. It should be noted that the changes in stratigraphy indicated on the borehole logs have been inferred from non-continuous sampling. In this regard, these changes in stratigraphy should be taken as approximate and/or gradual in nature rather than exact plains of geologic change.

In general, the boreholes all encountered a similar type of stratigraphy. Surficial fills with organic layers were encountered underlain by a native silty sand to sandy silt till deposit, in which the boreholes were all terminated. Standard Penetration test values indicated loose becoming very dense with depth conditions in native soils.

3.1 Fill

Some sandy silt fill materials being in a dense to very loose condition were encountered in Boreholes 1 to 6. The fill extended to depths of 1.8 to 4.7m below existing grade or elevation 217.9 to 219.9m. The fill matrix included wood, brick, asphalt, metal wire and topsoil pockets/layers as described on the Borehole Logs. Moisture contents in the deposit typically varied between 5 to 29% by weight.

Unusual odours were noted in Borehole 3 within the fill at a depth of about 1.0m during drilling. We recommend that this be further evaluated/investigated prior to construction in order to determine the chemical nature of the fill soils and whether there will be restrictions on disposal options when excavation is conducted.

3.2 Silty Sand to Sandy Silt Till

A significant loose to very dense silty sand to sandy silt glacial till deposit with trace to some gravel was encountered in all of the boreholes underlying the surficial fill layer. This deposit extended down to termination elevation between 209.7 to 211.5m and exhibited Standard Penetration values ranging between 7 and greater than 50 blows per 0.3m of penetration. Moisture contents in this deposit typically varied between 8 and 36% by weight.

3.3 Groundwater

The groundwater levels in each borehole were documented, from slotted standpipes installed in each borehole, during a return visit to the site on December 15, 2003. The following is a summary of the levels measured.

Borehole Number	Ground Surface Elevation (m)	Static Water Levels	
		Depth (m)	Elevation (m)
1	222.1	3.1	219.0
2	222.3	2.3	220.0
3	222.4	3.4	219.0
4	222.4	3.5	218.9
5	222.6	4.0	218.6
6	220.8	1.2	219.6

Generally, in most cases wet conditions were encountered in the boreholes during advancement at depths of about 2 to 3m below ground surface near the fill/native interface.

A gradual fall in water level is indicated towards the southeast and northwest from a high water level at Boreholes 2 and 6. This also generally mirrors the fill/native soil interface topography.

We anticipate that the water levels on this site could vary seasonally and with precipitation events.

4. DISCUSSION AND RECOMMENDATIONS

The following discussion and recommendations are provided for use by the design engineers only. Contractors bidding on this project or developing construction schedules should provide their own interpretation of the data and/or provide their own investigation if they feel it is warranted.

It is our understanding that the initial plant features at this site were constructed on conventional spread or strip footings and/or as tanks.

The base of the new tanks are proposed at depths corresponding to approximately 5m below the top of existing tanks (elev. 222.2m ±) or to elevation 217.2m ±.

4.1 Foundations

The undisturbed native compact to very dense silty sand to sandy silt till encountered at the site is considered suitable for the support of various structures on spread or strip footings and/or concrete tank pads.

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The following summarizes suggested minimum founding depths:

Borehole Number	Ground Surface Elevation (m)	Maximum Allowable Design Bearing Pressure (kPa)	Approximate Founding Level	
			Min. Depth (m)	Max. Elevation (m)
1	222.1	250	2.8	219.3
2	222.3	150 250	2.5 3.2	219.8 219.1
3	222.4	250	4.2	218.2
4	222.4	100 250	3.8 9.0	218.6 213.4
5	222.6	150 250	4.8 10.0	217.8 212.6
6	220.8	100 250	2.0 4.0	218.8 216.8

The minimum foundation widths to be used in conjunction with the above recommended soil bearing pressure should be 0.5m for continuous footings and 0.8m for individual footings. The above recommended bearing capacities are based on estimated total settlements of 25mm.

All exterior foundations, or foundations in unheated areas should be provided with a minimum soil cover of 1.2m or equivalent insulation for frost protection.

Prior to placing concrete for the footings, founding areas should be cleaned of all deleterious materials such as topsoil, fill, softened, disturbed or caved soils as well as any standing water. It is recommended that the foundations be inspected by Terraprobe in order to confirm the exposed soil conditions and recommended bearing capacities. If construction proceeds during freezing weather conditions, adequate temporary frost protection for the footing bases and concrete must be provided.

The native sandy silt soils can be easily disturbed. A concrete skim coat/mud slab should be considered immediately following excavation and inspection in order to minimize disturbance.

4.2 Concrete Slab-on-Grade Floors

Conventional concrete slabs-on-grade floors may be placed on the native sandy silt soils or on new, clean fills compacted uniformly to a minimum of 95% of Standard Proctor Maximum Dry Density (SPMDD).

4.3 Excavations

It is anticipated that excavations for proposed foundations, and underground services will extend to depths up to 6m below existing grades or to approximate elevation 217.2m. Based on the findings in the boreholes, the anticipated conditions consist of local fill over loose to dense sands and silts. Groundwater levels were measured at depths ranging between 1.2 and 4.0m or elevations ranging from 218.6 to 220.0m.

The recommended safe side slope configuration for temporary unbraced excavations through the soils encountered at the site, is 1.5:1 (horizontal to vertical). Alternatively the excavations may be supported by close shoring or trench boxes.

It is noted that some sloughing of the excavation wall may occur locally.

Where workmen must enter unsupported trench excavations carried deeper than 1.2m, the trench excavations should be inspected and certified by a geotechnical engineer, or suitably sloped and/or braced in accordance with the Occupational Health and Safety Act. The Occupational Health and Safety Act recognizes four (4) broad classifications of soils. The fill and native soils at the site can generally be classified as Type 3 soil, requiring that excavations be sloped at 1:1 (horizontal to vertical) from the excavation base to the surface.

It is expected that temporary open cut excavations may extend below the water table for some in ground structures. It is anticipated that excavations can be carried out with only minor seepage entering from surrounding sandy silt soils. Perimeter ditches, wider trenches/excavations and sump pumping is anticipated to be adequate in these cases.

Excavations carried deeper below the water table may require more positive dewatering where water bearing sand layers are found within the till. The water table should be lowered a minimum of 0.5m below the proposed excavation base. Based on the current excavation plan to 217.2m, sump pumping should be an acceptable dewatering measure. However, the significance of wet sand seams should be further verified with test pits at the time of contract tendering in order to confirm actual water ingress conditions.

Additional consideration should be given to deep excavations in close proximity to existing foundations and structures, so that there is minimal loss of ground support. Temporary shoring and/or underpinning may be required in areas where excavations intersect an imaginary line extending down from existing footings at an inclination of about 60° to the horizontal.

4.4 Backfill

The topsoil, and mixed fills are not suitable for compacted backfill. These materials which are excavated can be used for general site regrading in areas where post construction settlement is not a concern. Imported clean sand fill should be considered for backfilling new structures and raising interior grade. Excavated native till soils may also be suitable for recompaction on site depending on their excavated moisture contents.

Fill materials placed beneath settlement sensitive structures such as floor slabs and pavement structures should be compacted to a minimum of 95% of Standard Proctor Maximum Dry Density in thin lifts not exceeding 150mm.

Should construction be conducted during the winter season, it is imperative to ensure that frozen material is not utilized as backfill.

It is recommended that inspection and testing be carried out during construction to confirm trench backfill quality, thickness and to ensure adequate compaction.

4.5 Lateral Earth Pressures

The boreholes indicate primarily sandy silt type soils at the site, for the most part in a compact to dense condition. Groundwater was found at depths of about 1.2 to 4.0m below grade.

For design of buried rigid concrete walls the following design parameters are recommended for native sandy silt or for imported sand type material.

soil unit weight	γ	20 kN/m^3	
angle	φ	Native Sandy Silt	30°
		Sand (imported)	33°
coefficient of lateral earth pressure (at rest)	K_o	Native Sandy Silt	0.5
		Sand (imported)	0.46

The recommended design angle of friction between concrete and the sand soil is 24°.

For design of temporary shoring systems, the following design parameters are recommended;

soil unit weight	γ	20 kN/m^3	
angle	φ	Native Sandy Silt	30°
		Sand (imported)	33°
coefficient of lateral earth pressure	K_a	Native Sandy Silt	0.33
		Sand (imported)	0.46

The above parameters can be used assuming the backfill is free draining and that no hydrostatic pressures develop against the concrete walls. Higher lateral earth pressures will develop if drainage does not occur.

The structures should also be designed to resist hydrostatic uplift pressure based on a seasonally high ground water table and empty tanks. Seasonal fluctuation in the water table at this site has not been determined by Terraprobe but may be available from the existing maintenance records. The high seasonal level may be higher than what has been measured in this investigation. It is recommended that if records are not available that document seasonal fluctuations that a level either at ground surface be used or a level corresponding to a positive outlet elevation (i.e., discharge ditch or the like) be used for design against uplift.

4.6 Pipe Bedding

The native sandy silt soils are suitable for support of sewers and other related piping. A granular bedding for stabilizing wet bases, should consist of well graded materials such as OPSS Granular 'A'.

Any soft, loose, or disturbed soils, encountered as the result of ground water seepage or construction traffic should be sub-excavated and replaced with suitably compacted sand fill. Granular 'A' bedding material should be placed in thin lifts and compacted to a minimum of 95% of Standard Proctor Maximum Dry

Density. The trench base exposed should be carefully monitored and inspected by a geotechnical engineer. Localized organic deposits or fills will require further sub-excavation.

4.7 Thrust Blocks and Pipe Restraints

It is recommended that thrust blocks be cast against undisturbed native ground. The maximum bearing pressure for design of thrust blocks is recommended as 150 kPa against undisturbed native soil where there is soil cover over the block equal to the height of the block. The ultimate angle of friction between the thrust block and the soil may be taken as 33°. The following design parameters are recommended for the design of restrained joints;

Ultimate friction angle between plastic pipe and compacted bedding	24°
Ultimate friction angle between concrete pipe and compacted bedding	33°
Maximum bearing of thrust pressure of pipe normal to bedding against native soil	150 kPa

We trust that the foregoing information is sufficient for your present requirement. If you have any questions, or if we can be of further assistance, please do not hesitate to contact the undersigned.

Sincerely,

Terraprobe Limited

Blair E. Goss, P. Eng.

Kirk R. Johnson, P. Geo, P. Eng.
Associate

BEG/lc
Barrie Office

BOREHOLES

Terraprobe Limited

Terraprobe

ABBREVIATIONS, TERMINOLOGY, GENERAL INFORMATION

BOREHOLE LOGS

SAMPLING METHOD

SS	split spoon
ST	Shelby tube
AS	auger sample
WS	wash sample
RC	rock core
WH	weight of hammer
PH	pressure, hydraulic

PENETRATION RESISTANCE

Standard Penetration Test (SPT) resistance ('N' values) is defined as the number of blows by a hammer weighing 63.6 kg (140 lb.) falling freely for a distance of 0.76 m (30 in.) required to advance a standard 50 mm (2 in.) diameter split spoon sampler for a distance of 0.3 m (12 in.).

Dynamic Cone Test (DCT) resistance is defined as the number of blows by a hammer weighing 63.6 kg (140 lb.) falling freely for a distance of 0.76 m (30 in.) required to advance a conical steel point of 50 mm (2 in.) diameter and with 60° sides on 'A' size drill rods for a distance of 0.3 m (12 in.).

SOIL DESCRIPTION - COHESIONLESS SOILS

Relative Density	'N' value
very loose	< 4
loose	4 - 10
compact	10 - 30
dense	30 - 50
very dense	> 50

SOIL DESCRIPTION - COHESIVE SOILS

Consistency	Undrained Shear Strength, kPa	'N' value
very soft	< 12	< 2
soft	12 - 25	2 - 4
firm	25 - 50	4 - 8
stiff	50 - 100	8 - 16
very stiff	100 - 200	16 - 32
hard	> 200	> 32

SOIL COMPOSITION

	% by weight
'trace' (e.g. trace silt)	< 10
'some' (e.g. some gravel)	10 - 20
adjective (e.g. sandy)	20 - 35
'and' (e.g. sand and gravel)	35 - 50

TESTS, SYMBOLS

MH	mechanical sieve and hydrometer analysis
w, w_c	water content
w_l	liquid limit
w_p	plastic limit
I_p	plasticity index
k	coefficient of permeability
γ	soil unit weight, bulk
ϕ'	angle of internal friction
c'	cohesion shear strength
C_c	compression index

GENERAL INFORMATION, LIMITATIONS

The conclusions and recommendations provided in this report are based on the factual information obtained from the boreholes and/or test pits. Subsurface conditions between the test holes may vary.

The engineering interpretation and report recommendations are given only for the specific project detailed within, and only for the original client. Any third party decision, reliance, or use of this report is the sole and exclusive responsibility of such third party. The number and siting of boreholes and/or test pits may not be sufficient to determine all factors required for different purposes.

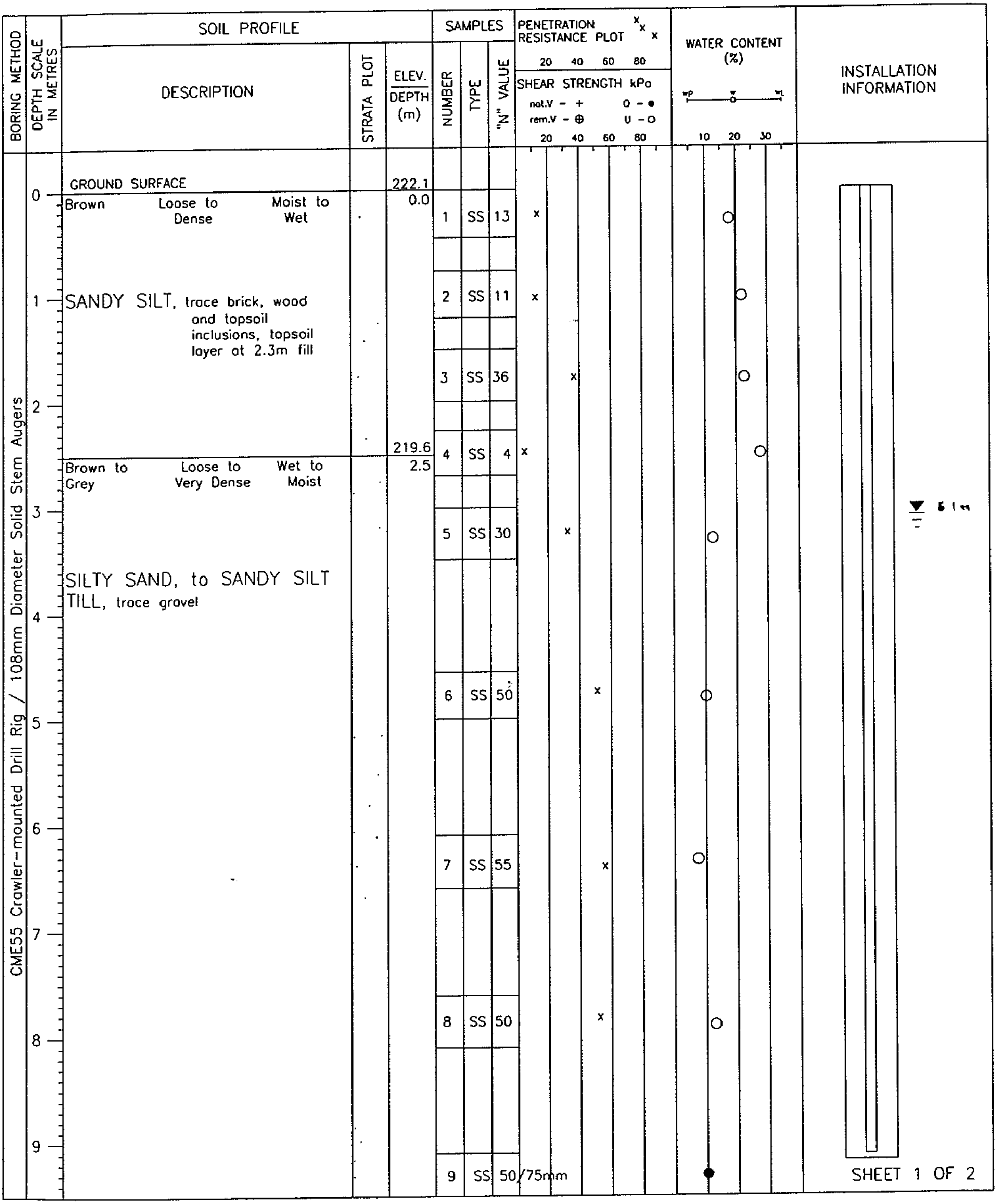
It is recommended Terraprobe be retained to review the project final design and to provide construction inspection and testing.

Terraprobe

LOG OF BOREHOLE ..1..

PROJECT NAME: Bradford WPCP Exponsion
CLIENT: Town of Bradford West Gwillimbury
LOCATION: Newmarket, Ontario

PROJECT No.: 3-03-0190
BORING DATE: December 8, 2003
ELEVATION DATUM: Geodetic



DESCRIPTION	ELEV. DEPTH (m)	NUMBER	TYPE	"N" VALUE
GROUND SURFACE	222.1			
Brown Loose to Dense Moist to Wet SANDY SILT, trace brick, wood and topsoil inclusions, topsoil layer at 2.3m fill	0.0	1	SS	13
		2	SS	11
		3	SS	36
	219.6	4	SS	4
Brown to Grey Loose to Very Dense Wet to Moist SILTY SAND, to SANDY SILT TILL, trace gravel	2.5	5	SS	30
		6	SS	50
		7	SS	55
		8	SS	50
		9	SS	50/75mm

SHEET 1 OF 2

Terraprobe

LOG OF BOREHOLE ..1..

PROJECT NAME: Bradford WPCP Expansion
CLIENT: Town of Bradford West Gwillimbury
LOCATION: Newmarket, Ontario

PROJECT No.: 3-03-0190
BORING DATE: December 8, 2003
ELEVATION DATUM: Geodetic

BORING METHOD	DEPTH SCALE IN METRES	SOIL PROFILE DESCRIPTION	STRATA PLOT	ELEV. DEPTH (m)	SAMPLES NUMBER	TYPE	"N" VALUE	PENETRATION RESISTANCE PLOT 20 40 60 80 SHEAR STRENGTH kPa nat.V – + Q – ● rem.V – ⊕ U – O 20 40 60 80	WATER CONTENT (%) P W L 10 20 30	INSTALLATION INFORMATION
CME55 Crawler-mounted Drill Rig / 108mm Diameter Solid Stem Augers		Continued								
	10	Brown to Grey, Loose to Very Dense, Wet to Moist SILTY SAND, to SANDY SILT TILL, trace gravel								
	11			211.0	10	SS	50/100mm		O	
		End of Borehole		11.1						1. Borehole remained open upon completion of drilling. 2. Water level on December 15, 2003 measured at 3.1m (elev. 219.0m).
	12									
	13									
	14									
	15									
	16									
	17									
	18									
	19									

SHEET 2 OF 2

Terraprobe

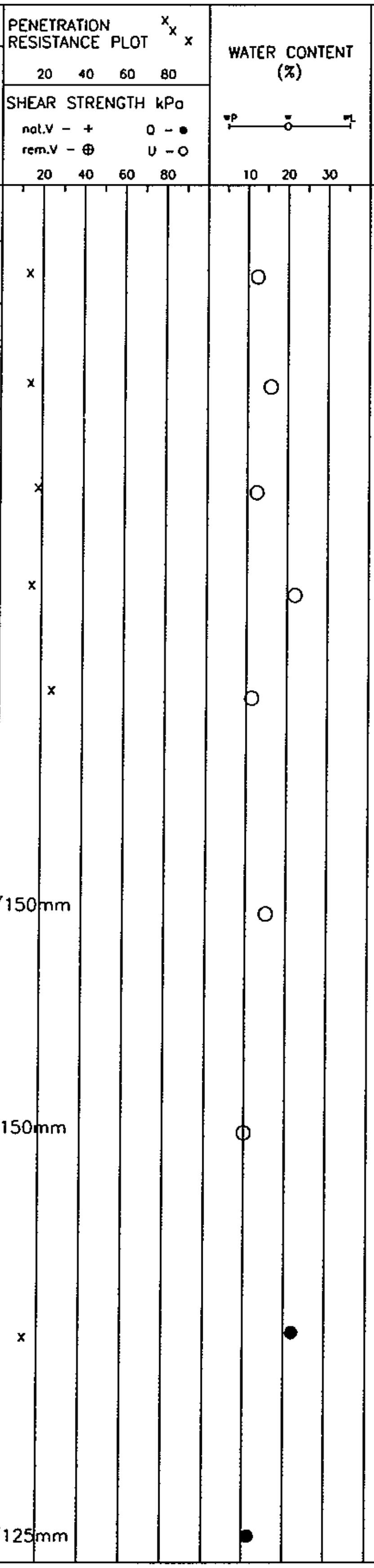
LOG OF BOREHOLE ..2..

PROJECT NAME: Bradford WPCP Expansion
CLIENT: Town of Bradford West Gwillimbury
LOCATION: Newmarket, Ontario

PROJECT No.: 3-03-0190
BORING DATE: December 8, 2003
ELEVATION DATUM: Geodetic

BORING METHOD: CME55 Crawler-mounted Drill Rig / 108mm Diameter Solid Stem Augers

DEPTH SCALE IN METRES	SOIL PROFILE DESCRIPTION	STRATA PLOT	ELEV. DEPTH (m)	SAMPLES NUMBER	TYPE	"N" VALUE	INSTALLATION INFORMATION
	GROUND SURFACE		222.3				
0	Brown to Black, Compact, Moist to Wet SANDY SILT, some topsoil, with topsoil layers, fill		0.0	1	SS	14	
1				2	SS	16	
2				3	SS	19	2.3m
	Grey, Compact to Very Dense, Wet to Moist SILTY SAND, to SANDY SILT TILL, trace gravel, with sandy seams		219.9 2.4	4	SS	17	
3				5	SS	25	
4							
5				6	SS	50/150mm	
6				7	SS	50/150mm	
7							
8				8	SS	14	
9				9	SS	50/125mm	



SHEET 1 OF 2

Terraprobe

LOG OF BOREHOLE ..2..

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PROJECT No.: 3-03-0190
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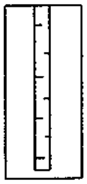
BORING METHOD	DEPTH SCALE IN METRES	SOIL PROFILE DESCRIPTION	STRATA PLOT	ELEV. DEPTH (m)	SAMPLES NUMBER	SAMPLES TYPE	SAMPLES "N" VALUE	PENETRATION RESISTANCE PLOT 20 40 60 80 / SHEAR STRENGTH kPa nat.V - + Q - ● rem.V - ⊕ U - O 20 40 60 80	WATER CONTENT (%) P W L 10 20 30	INSTALLATION INFORMATION
CME55 Crawler-mounted Drill Rig / 108mm Diameter Solid Stem Augers		Continued								
	10	Grey Compact to Very Dense Wet to Moist SILTY SAND, to SANDY SILT TILL, trace gravel, with sandy seams		211.2	10	SS	60/75mm		○	
	11	End of Borehole		11.1						1. Borehole remained open upon completion of drilling. 2. Water level on December 15, 2003 measured at 2.3m (el. 220.0m).
	12									
	13									
	14									
	15									
	16									
	17									
	18									
	19									



SHEET 2 OF 2

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CLIENT: Town of Bradford West Gwillimbury
LOCATION: Newmarket, Ontario

PROJECT No.: 3-03-0190
BORING DATE: December 8, 2003
ELEVATION DATUM: Geodetic

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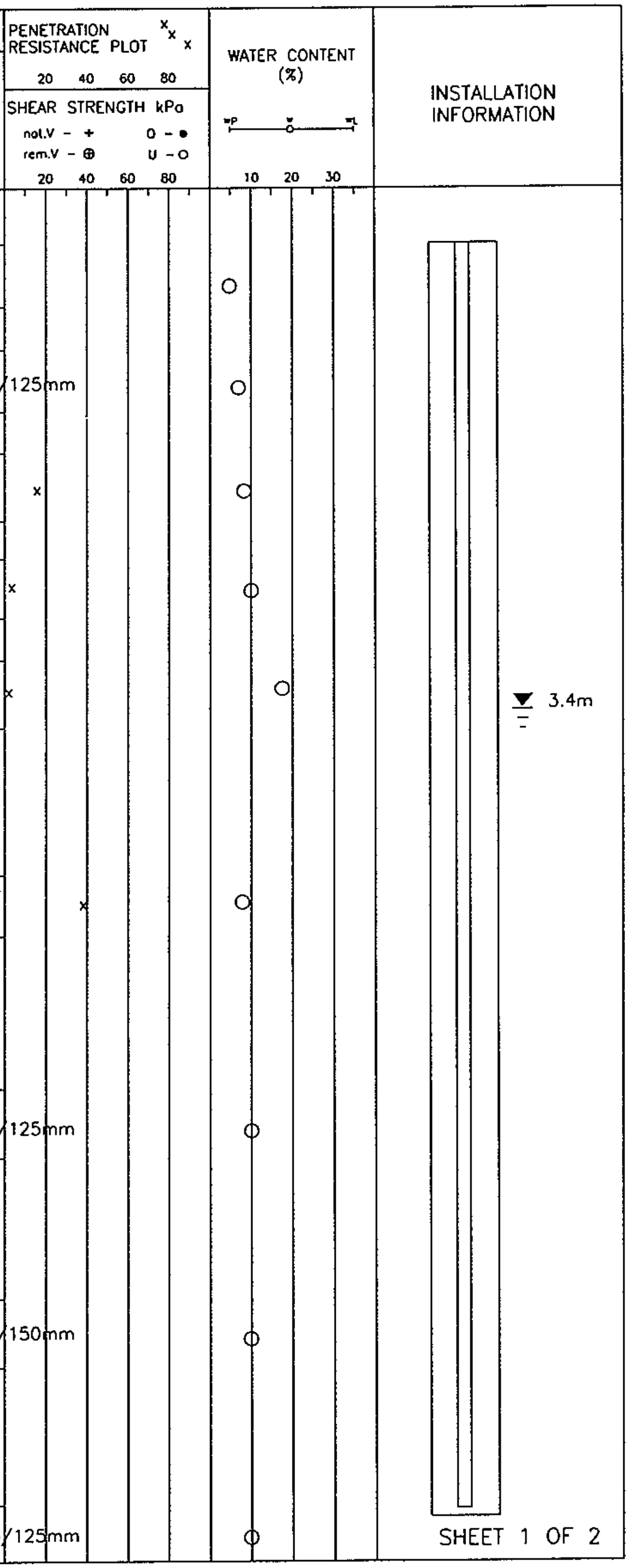
CME55 Crawler-mounted Drill Rig / 108mm Diameter Solid Stem Augers		GROUND SURFACE		222.4			
	0	Brown Dense to Very Loose Moist to Wet SANDY SILT, trace gravel, trace wood, some topsoil, with topsoil layers, unusual odour at 1.0m, fill		0.0	1	AS	
	1				2	SS	50/125mm
					3	SS	16
	2				4	SS	4
	3				5	SS	2
	4	Grey Compact to Very Dense Wet to Moist SANDY SILT, trace gravel, to till		218.4 4.0			
	5				6	SS	37
	6				7	SS	50/125mm
	7						
	8				8	SS	43/150mm
	9				9	SS	50/125mm



SHEET 1 OF 2

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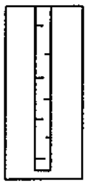
BORING DATE: December 8, 2004
ELEVATION DATUM: Geodetic

BORING METHOD	DEPTH SCALE IN METRES	SOIL PROFILE DESCRIPTION	STRATA PLOT	ELEV. / DEPTH (m)	SAMPLES NUMBER	SAMPLES TYPE	SAMPLES "N" VALUE	PENETRATION RESISTANCE PLOT 20 40 60 80 SHEAR STRENGTH kPa nat.V – + O – ● rem.V – ⊕ U – O 20 40 60 80	WATER CONTENT (%) W_P W W_L 10 20 30	INSTALLATION INFORMATION
CME55 Crawler-mounted Drill Rig / 108mm Diameter Solid Stem Augers		Continued								
	10 11	Grey Compact to Very Dense Wet to Moist SANDY SILT, trace gravel, to till		211.3	10	SS	65	x	O	
	12 13 14 15 16 17 18 19	End of Borehole		11.1						1. Borehole caved at 10.5m upon completion of drilling. 2. Water level on December 15, 2003 measured at 3.4m (elev. 219.[illegible]m)

SHEET 2 OF 2

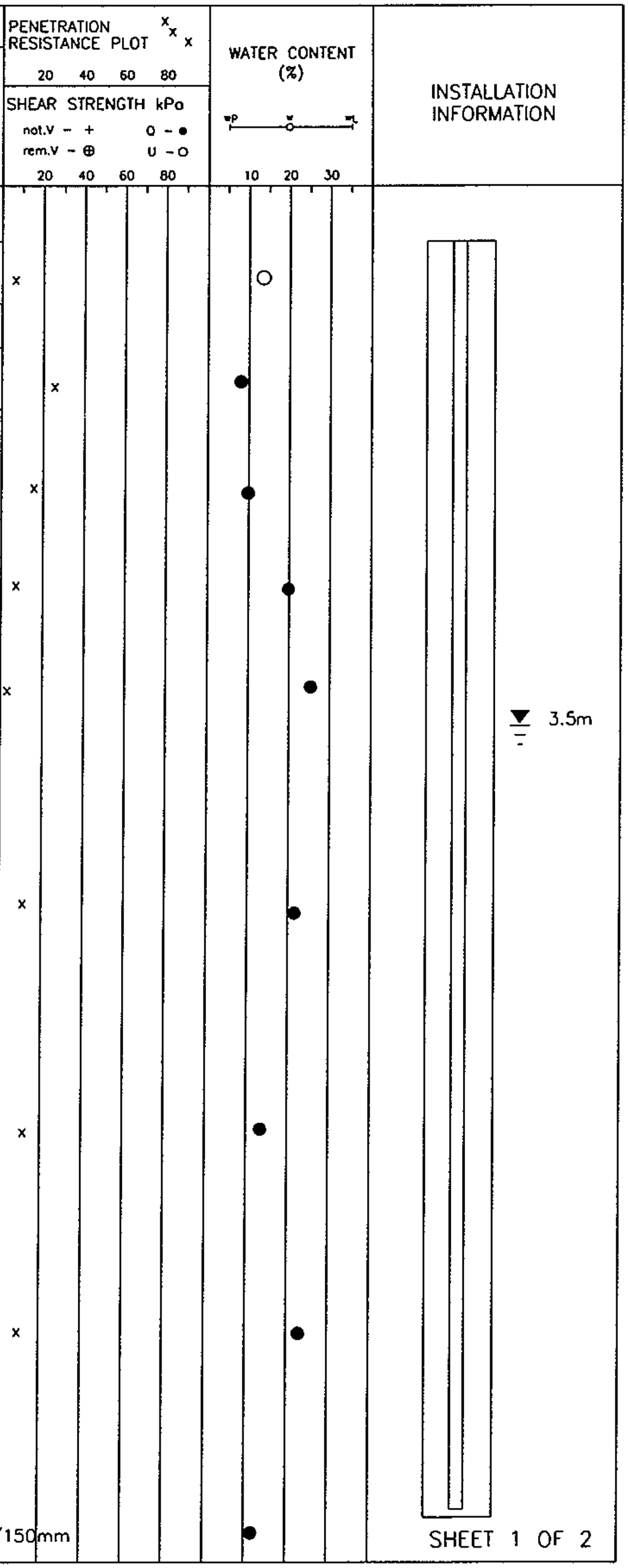
Terraprobe

LOG OF BOREHOLE ..4..

PROJECT NAME: Bradford WPCP Expansion
PROJECT No.: 3-03-0190
CLIENT: Town of Bradford West Gwillimbury
BORING DATE: December 8, 2003
LOCATION: Newmarket, Ontario
ELEVATION DATUM: Geodetic

BORING METHOD: CME55 Crawler-mounted Drill Rig / 108mm Diameter Solid Stem Augers

SOIL PROFILE DESCRIPTION	ELEV. DEPTH (m)	SAMPLES NUMBER	TYPE	"N" VALUE
GROUND SURFACE	222.4			
Brown Compact to Loose Moist to Wet SANDY SILT, trace asphalt, some organics, with topsoil layering, fill	0.0	1	SS	8
		2	SS	25
		3	SS	17
		4	SS	6
		5	SS	4
Grey Loose to Very Dense Wet SANDY SILT, trace gravel, to till	218.8 3.6			
		6	SS	12
		7	SS	13
		8	SS	9
		9	SS	50/150mm



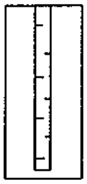
SHEET 1 OF 2

Terraprobe

LOG OF BOREHOLE ..4..

PROJECT NAME: Bradford WPCP Expansion
CLIENT: Town of Bradford West Gwillimbury
LOCATION: Newmarket, Ontario

PROJECT No.: 3-03-0190
BORING DATE: December 8, 2003
ELEVATION DATUM: Geodetic

BORING METHOD	DEPTH SCALE IN METRES	SOIL PROFILE DESCRIPTION	STRATA PLOT	ELEV. DEPTH (m)	SAMPLES NUMBER	SAMPLES TYPE	SAMPLES "N" VALUE	PENETRATION RESISTANCE PLOT 20 40 60 80 / SHEAR STRENGTH kPa nat.V – + rem.V – ⊕ Q – ● U – O 20 40 60 80	WATER CONTENT (%) wP w wL 10 20 30	INSTALLATION INFORMATION
CME55 Crawler-mounted Drill Rig / 108mm Diameter Solid Stem Augers	10	Continued		222.4						
		Grey Loose to Very Dense Wet SANDY SILT, trace gravel, to till		211.6	10	SS	57/300mm		O (10)	
	11	End of Borehole		11.1						1. Borehole caved at 7.6m upon completion of drilling. 2. Water level on December 15, 2003 measured at 3.5m (elev. 218.9m).
	12									
	13									
	14									
	15									
	16									
	17									
	18									
	19									

SHEET 2 OF 2

Terraprobe

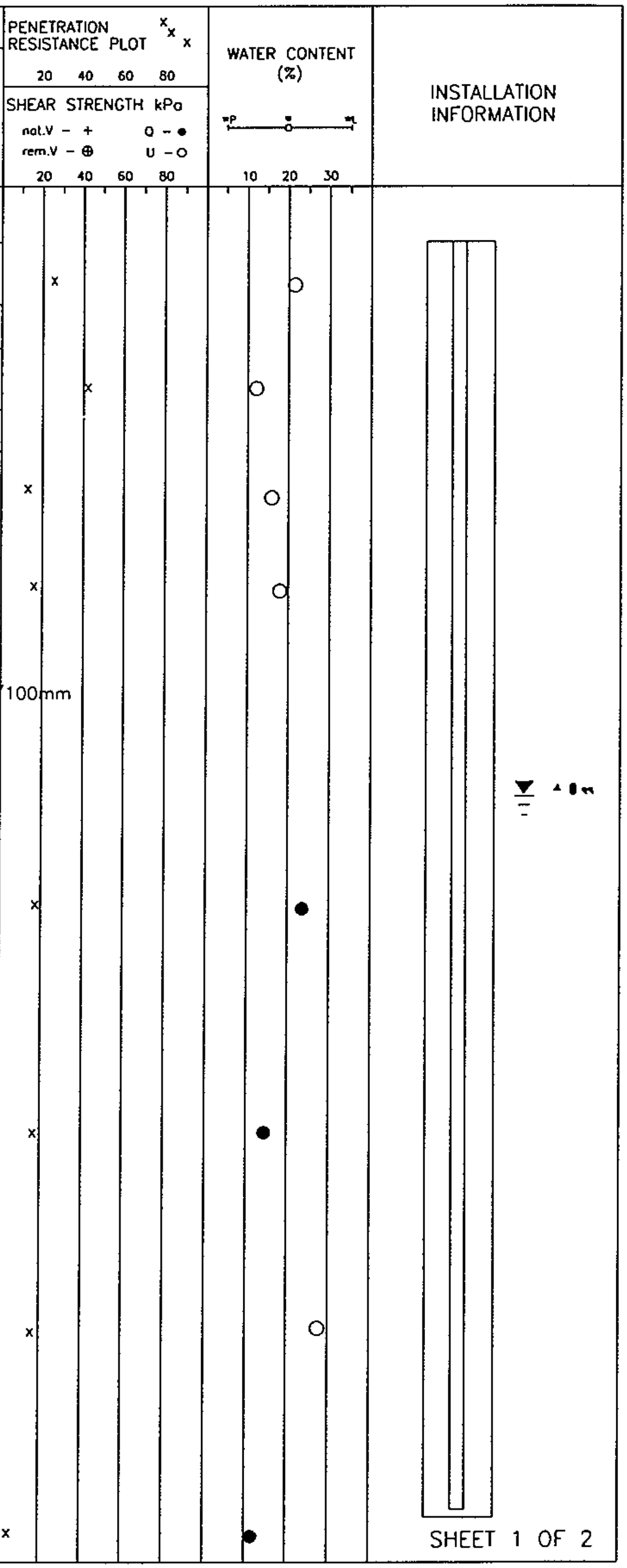
LOG OF BOREHOLE ..5..

PROJECT NAME: Bradford WPCP Expansion
CLIENT: Town of Bradford West Gwillimbury
LOCATION: Newmarket, Ontario

PROJECT No.: 3-03-0190
BORING DATE: December 9, 2003
ELEVATION DATUM: Geodetic

BORING METHOD: CME55 Crawler-mounted Drill Rig / 108mm Diameter Solid Stem Augers

DEPTH SCALE IN METRES	SOIL PROFILE DESCRIPTION	STRATA PLOT	ELEV. DEPTH (m)	SAMPLES NUMBER	TYPE	"N" VALUE
	GROUND SURFACE		222.6			
0	Brown Dense to Loose Moist to Wet SANDY SILT, some wood, some topsoil, with topsoil layers, metal wire below 3.5m, fill		0.0	1	SS	28
1				2	SS	41
2				3	SS	11
				4	SS	16
3				5	SS	32/100mm
4			217.9			
5	Grey Loose to Very Dense Wet to Moist SANDY SILT, to SILTY SAND		4.7	6	SS	19
6				7	SS	19
7						
8				8	SS	17
9				9	SS	7



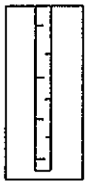
SHEET 1 OF 2

Terraprobe

LOG OF BOREHOLE ..5..

PROJECT NAME: Bradford WPCP Exponsion
CLIENT: Town of Bradford West Gwillimbury
LOCATION: Newmarket, Ontario

PROJECT No.: 3-03-0190
BORING DATE: December 5, 2003
ELEVATION DATUM: Geodetic

BORING METHOD	DEPTH SCALE IN METRES	SOIL PROFILE DESCRIPTION	STRATA PLOT	ELEV. DEPTH (m)	SAMPLES NUMBER	TYPE	"N" VALUE	PENETRATION RESISTANCE PLOT 20 40 60 80 SHEAR STRENGTH kPa nat.V – + Q – ● rem.V – ⊕ U – ○ 20 40 60 80	WATER CONTENT (%) wP —o— wL 10 20 30	INSTALLATION INFORMATION
CME55 Crawler-mounted Drill Rig / 108mm Diameter Solid Stem Augers		Continued								
	10	Grey Loose to Very Dense Wet to Moist SANDY SILT, to SILTY SAND		211.5	10	SS	68	x	O	
	11	End of Borehole		11.1						1. Borehole caved at 8.2m upon completion of drilling. 2. Water level on December 15, 2003 measured at 4.0m (elev. 218.6m).
	12									
	13									
	14									
	15									
	16									
	17									
	18									
	19									

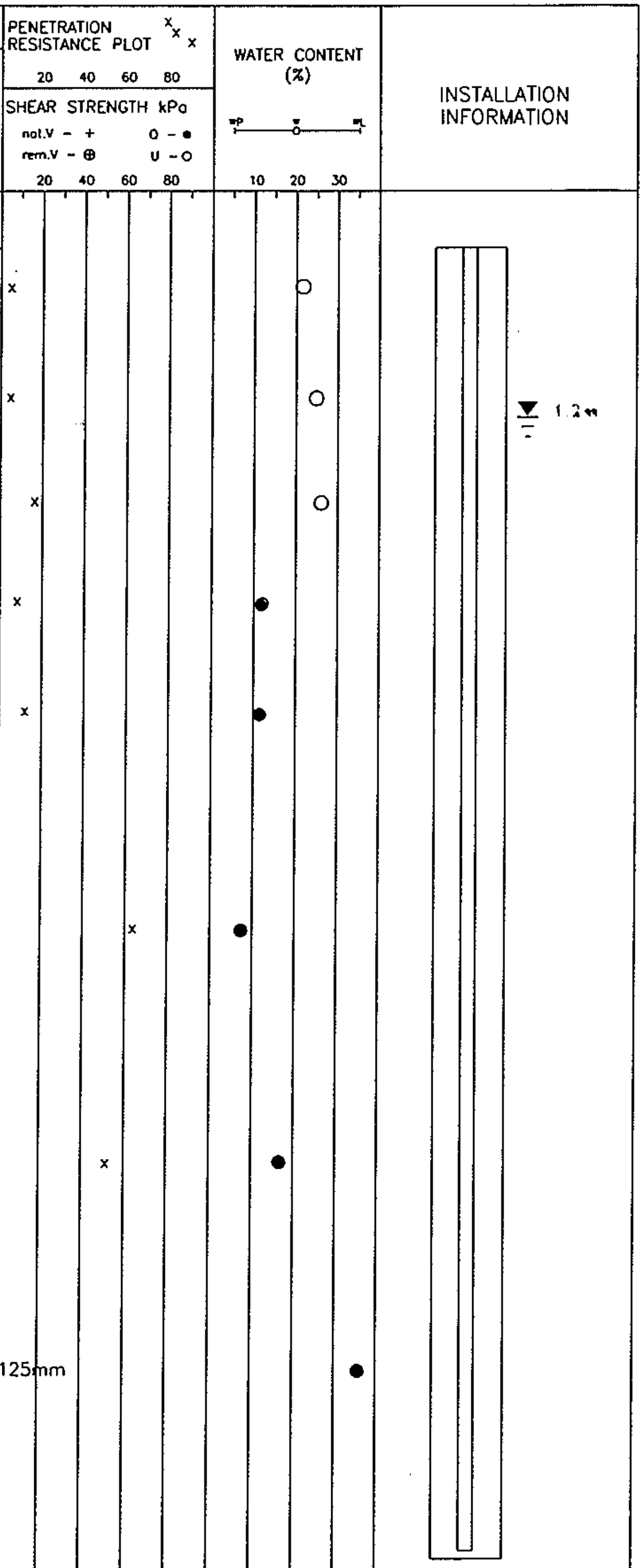
SHEET 2 OF 2

Terraprobe

LOG OF BOREHOLE ..6..

PROJECT NAME: Bradford WPCP Expansion
PROJECT No.: 3-03-0190
CLIENT: Town of Bradford West Gwillimbury
BORING DATE: December 9, 2003
LOCATION: Newmarket, Ontario
ELEVATION DATUM: Geodetic

BORING METHOD	DEPTH SCALE IN METRES	SOIL PROFILE DESCRIPTION	STRATA PLOT	ELEV. DEPTH (m)	SAMPLES NUMBER	SAMPLES TYPE	SAMPLES "N" VALUE
CME55 Crawler-mounted Drill Rig / 108mm Diameter Solid Stem Augers		GROUND SURFACE		220.8			
	0	Brown Very Loose to Compact Moist to Wet SANDY SILT, trace wood, with topsoil inclusions and layers, fill		0.0	1	SS	3
	1				2	SS	6
				219.0	3	SS	16
	2	Brown to Grey Loose to Very Dense Wet to Moist SILTY SAND, to SANDY SILT TILL, trace gravel		1.8			
					4	SS	9
	3				5	SS	13
	4						
	5				6	SS	65
	6				7	SS	52
	7						
	8				8	SS	50/125mm
	9				9	SS	58



SHEET 1 OF 2

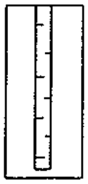
Terraprobe

LOG OF BOREHOLE ..6..

PROJECT NAME: Bradford WPCP Expansion
CLIENT: Town of Brodford West Gwillimbury
LOCATION: Newmarket, Ontorio

PROJECT No.: 3-03-0190
BORING DATE: December 9, 2003
ELEVATION DATUM: Geodetic

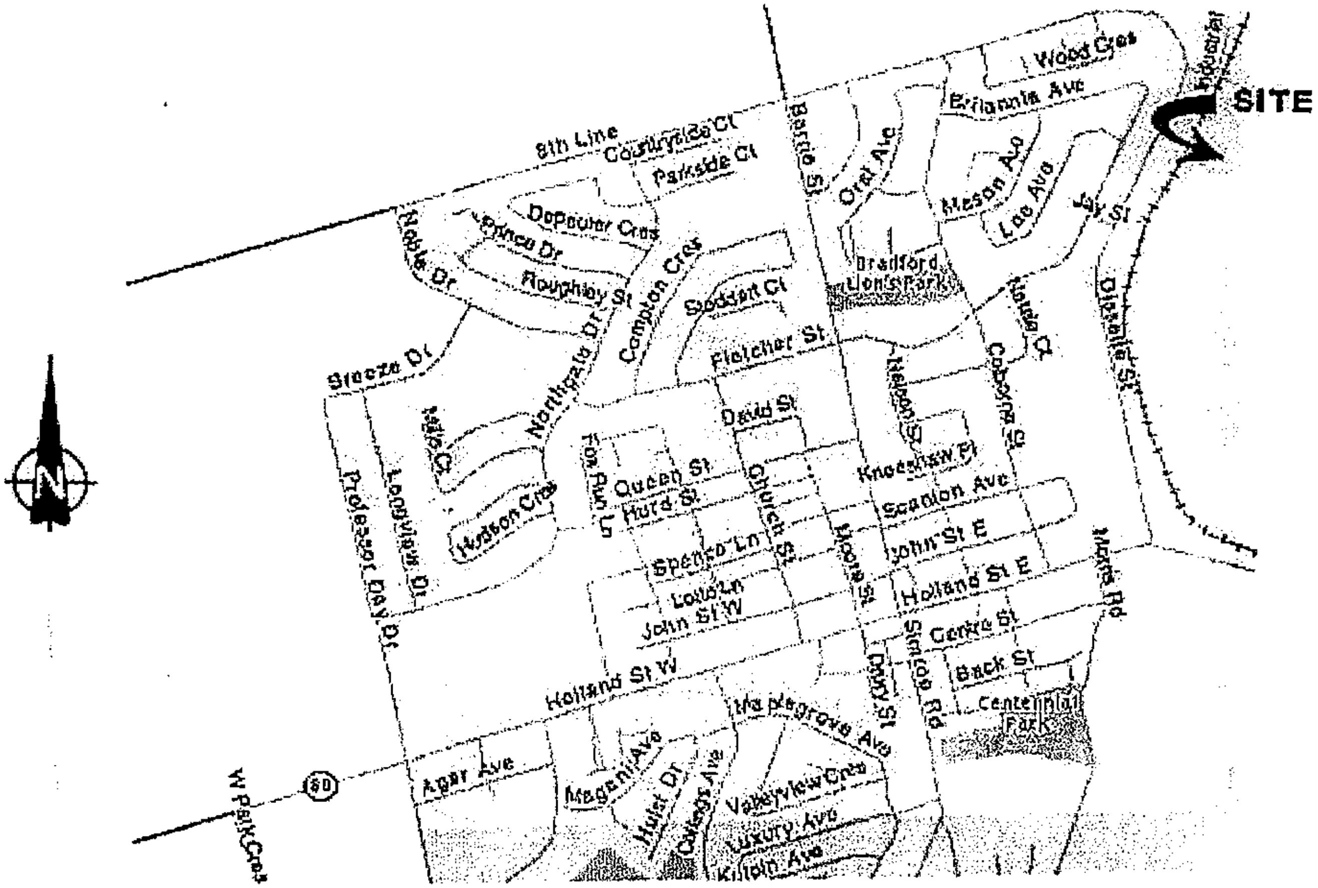
BORING METHOD	DEPTH SCALE IN METRES	SOIL PROFILE DESCRIPTION	STRATA PLOT	ELEV. / DEPTH (m)	SAMPLES NUMBER	SAMPLES TYPE	SAMPLES "N" VALUE	PENETRATION RESISTANCE PLOT 20 40 60 80 / SHEAR STRENGTH kPa nat.V - + Q - ● rem.V - ⊕ U - O 20 40 60 80	WATER CONTENT (%) 10 20 30	INSTALLATION INFORMATION
CME55 Crawler-mounted Drill Rig / 108mm Diameter Solid Stem Augers		Continued								
	10 – 11	Brown to Grey Loose to Very Dense Wet to Moist SILTY SAND, to SANDY SILT, trace gravel		209.7	10	SS	60/150mm		O	
	11 – 19	End of Borehole		11.1						1. Borehole remained open upon completion of drilling. 2. Water level on December 15, 2003 measured at 1.2m (elev. 219.6m).



SHEET 2 OF 2

FIGURES

Terraprobe Limited



January 2004

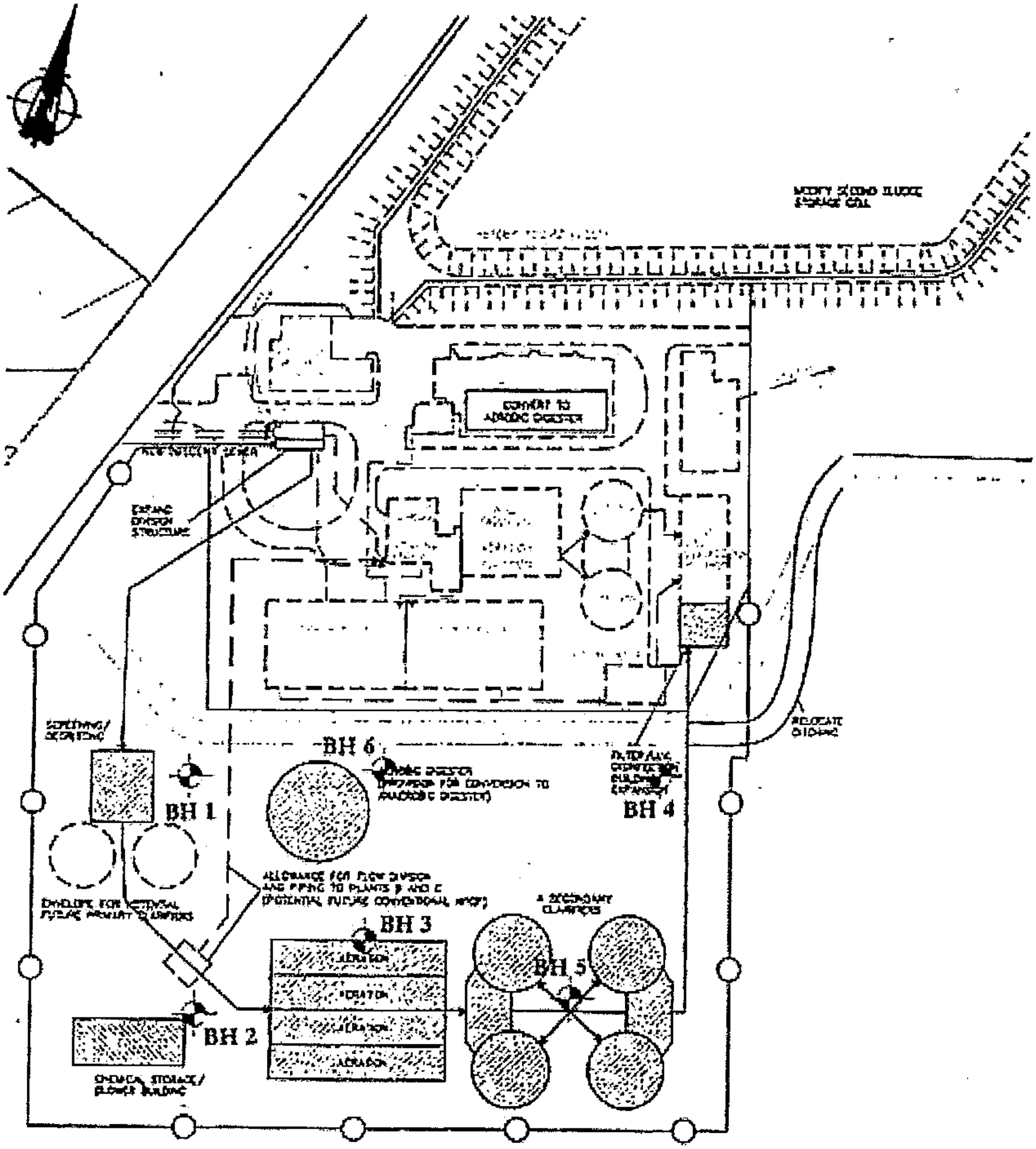
SITE LOCATION PLAN

3-03-0190

Terraprobe

Bradford, Ontario

FIGURE 1



January 2004

BOREHOLE LOCATION PLAN

3-03-0190

Terraprobe

FIGURE 2

Bradford West Gwillimbury
Bradford Water Pollution Control Plant Expansion
Preliminary Design Report
Draft – February 2012

Appendix C

Design Calculations

1.0 HYDRAULIC CALCULATIONS

Hydraulic calculations will be carried out as part of final design. This will include raw sewage pump selection (to deliver a firm capacity of 53,400 m^3/d (618 L/s) to the screens, as well as internal transfer pumps, RAS and WAS pumps, etc. General firm capacity requirements are identified in the main report and/or in the calculations below.

2.0 PROCESS CALCULATIONS

2.1 SEPTAGE RECEIVING, INLET STRUCTURE, EMERGENCY SEWAGE OVERFLOW LAGOON, RAW SEWAGE PUMPING STATION AND HEADWORKS

See general requirements as described in the main report.

2.2 PLANT B

2.2.1 DESIGN PARAMETERS

Plant B is an extended aeration train; however, since aerobic digestion is available to provide full stabilization, the basis of design is for a conventional activated sludge system because BOD does not have to be fully oxidized in the aeration tanks. The design parameters were established in the Class Environmental Assessment Phase 3 and 4 Report.

For enhanced reliability, ADF has been taken to be the average daily flow during the highest flow month (MMF).

Design ADF	3,075 m^3/d
Design MMF	3,075 m^3/d
Design PDF	3,075 m^3/d
Design PHF	3,075 m^3/d
Influent TSS (Average in Max. Month)	207 mg/L (636 kg/d)
Influent BOD_5 (Average in Max. Month)	212 mg/L (652 kg/d)
Influent TP (Average in Max. Month)	4.9 mg/L (15 kg/d)
Influent TKN (Average in Max. Month)	34.7 mg/L (107 kg/d)
Influent TKN (Peak daily)	34.7 mg/L (107 kg/d)
Effluent TSS	5 mg/L (15.38 kg/d)

Effluent BOD_5	5 mg/L (15.38 kg/d)
Effluent TP	0.08 mg/L (0.25 kg/d)
Effluent TAN (April 1 to October 31)	0.6 mg/L (1.85 kg/d)
Effluent TAN (November 1 to March 31)	2.0 mg/L (6.15 kg/d)

2.2.2 AERATION TANKS

MOE Design Guidelines

Organic Loading Rate (Conventional Activated Sludge with nitrification)	0.31 – 0.72 kg $BOD_5/(m^3.d)$
Hydraulic Retention Time @ ADF	6 hours
MLSS	3,000 – 5,000 mg/L
F/Mv	0.05 – 0.25 d-1
Solids Retention Time (SRT)	10 days
Oxygen Demand	1.0 kg /kg BOD5 (average @ ADF) + 4.6 kg / kg TKN (peak daily @ PDF)
Return Sludge Rate	50 – 200% of ADF

Check Aeration Tank Capacity

Existing Aeration Tanks 1&2

Length	25 m
Effective Depth (SWD)	4.95 m
Width	4.8 m
Effective Volume (each tank)	594 m^3

Existing Aerobic Digester (Converted to Aeration Tank 3)

Length	25 m
Effective Depth (SWD)	5.4 m
Width	11.5 m

Effective Volume 1,553 m^3

Total Effective Volume (all tanks) 2,741 m^3

Check Organic Loading Rate

Organic Loading Rate (in kg $BOD_5/m^3/d$) $\frac{652}{2,741}$ = 0.238

Therefore, the organic loading rate is not excessive.

Check Hydraulic Retention Time

Retention Time @ MMF $\frac{2,741 \text{x } 24 \text{ hr/d}}{3,075}$ = 21.4 hr

Hydraulic retention time exceeds the recommended minimum of 6 hours.

Check F/Mv Ratio

Assume MLSS range of 3,000 – 5,000 mg/L per MOE Guidelines.

Assume MLVSS is 60% of MLSS.

F (BOD_5 maximum month daily load) 652 kg/d

Mv (MLVSS x Volume) @ MLSS = 3,000 mg/L $\frac{0.6 \text{ x } 3,000 \text{ x } 2,741}{1,000}$ = 4,934 kg

F/Mv @ MLSS = 3,000 mg/L 652 / 4,934 = 0.132 d^{-1}

Mv (MLVSS x Volume) @ MLSS = 5,000 mg/L $\frac{0.6 \text{ x } 5,000 \text{ x } 2,741}{1,000}$ = 8,223 kg

F/Mv @ MLSS = 5,000 mg/L 652 / 8,223 = 0.079 d^{-1}

The F/Mv ratio is within the recommended range of 0.05 – 0.25 d^{-1} for the recommended MLSS range of 3,000 – 5,000 mg/L.

Check Sludge Age

Assume Low MLSS of 3,000 mg/L (worst cast)

Sludge Age $\frac{\text{MLSS x V}}{\text{WAS } + \text{TSS}_{\text{Eff}}}$

MLSS	3,000 mg/L (3.000 kg/m^3)		
V	2,741 m^3		
WAS (per MOE guidelines)	120 g/m^3 treated sewage (0.12 kg/m^3)		
Therefore, WAS	0.12 x 3,075	=	369 kg
TSS_{Eff}	15.38 kg		
Therefore, Sludge Age	$\frac{2{,}741 \text{ x } 3.000}{369 + 15.38}$	=	21.4 d

This is greater than the minimum recommended sludge age of 10 days.

Therefore, the existing Plant B aeration tanks (with digester converted into a third aeration tank) have sufficient capacity to meet the recommended MOE parameters.

Check Blower Capacity

Existing Blowers

There are six existing positive displacement blowers, two with a capacity of 319 L/s each, three with a capacity of 1,536 L/s each and one with a capacity of 1,250 L/s.

Biological O_2 Requirement

O_2 Required (1.0 x 652) + (4.6 x 107) = 1,144 kg

However, a correction factor should be applied and is derived as follows (based on WPCF MOP No. 8):

$$\text{Correction Factor} = \frac{AOR}{SOR} = \frac{[(\text{Beta x Csc}) - \text{Co}]}{\text{Cs}} \text{ x Alpha x Theta}^{(T-20)}$$

Where:

AOR = Actual oxygen rate
SOR = Standard oxygen rate
Alpha = 0.67 (assumed typical – check with pre-selected supplier in final design)
Beta = 0.9 (assumed typical – check with pre-selected supplier in final design)
Theta = Temperature correction constant = 1.024
Cs = Clear water saturation level = 9.17 mg/L
Csc = Saturation correction factor = 10.45 mg/L
Co = Dissolved oxygen level = 2 mg/L
T = Operating temperature of wastewater = 12°C
(Assuming winter conditions)

Therefore,

$$\frac{AOR}{SOR} = \frac{[(0.9 \text{ x } 10.45) - 2.0] \text{ x } 0.67 \text{ x } 1.024^{(12\text{-}20)}}{9.17} = 0.45$$

Therefore total O_2 Required $\frac{1,144}{0.45}$ = 2,542 kg/d

The existing (and proposed) aeration diffusers are fine bubble. Typical oxygen transfer efficiency for Sanitaire, EDI and others is 20.9% based on the depth available.

Therefore, O_2 Required $\frac{2,542}{0.209}$ = 12,163 kg/d

Standard air has 0.3 kg/m^3 oxygen.

Therefore Air Flow Required $\frac{12,163 \text{ x } 1000}{0.3 \text{ x } 24 \text{ x } 3600}$ = 469 L/s

Mixing O_2 Requirement

Air Flow Required for Mixing 0.61 L/(m^2 .s) (for fine bubble)

Hence, Air Flow Required for Mixing 0.61 x [(2 x 25 x 4.8) + (25 x 11)] m^3 = 314 L/s

Therefore, the biological requirement governs, i.e. the airflow required is 469 L/s.

The existing aeration capacity for Plant B considerably exceeds MOE recommendations. It is proposed to upgrade/relocate the aeration blowers throughout the plant such that the blower capacity is sufficient with the largest blower out of service for each plant (B, C and D). See **Section 2.12 Aeration Blower Upgrades/Relocates** for more details.

2.2.3 CLARIFIERS

MOE Design Guidelines

Surface Overflow Rate	37 m^3/m^2/d @ PHF (for activated sludge with chemical addition to mixed liquor for phosphorus removal)
Weir Loading Rate	250 m^3/m/d @ PHF (since flow to each clarifier is less than 4,000 m^3/d)
Solids Loading Rate	170 kg/m^2/d @ (PDF + 200% ADF) and 5,000 mg/L maximum MLSS under aeration

Check Clarifier Size

Existing Clarifiers 1 & 2

Each clarifier is circular with a diameter of 15.24 m and SWD of 4.27 m, for a total surface area of 365 m^2 and total volume of 1,559 m^3:

Check Surface Overflow Rate

Surface Overflow Rate	$\frac{3,075}{365}$	=	8.4 $m^3/m^2/d$

This is well within MOE guidelines, hence okay.

Check Weir Loading Rate

Weir Length	3.1416 x 15.24 x 2	=	95.8 m
Weir Loading Rate	$\frac{3,075}{95.8}$	=	32.1 $m^3/m/d$

This is well within MOE guidelines, hence okay.

Check Solids Loading Rate

Total Solids to Clarifiers	$\frac{[3,075 + (2 \times 3,075)] \times 5,000}{1,000}$	=	46,125 kg/d
Clarifier Solids Loading	$\frac{46,125}{365}$	=	126 $kg/m^2/d$

This is well within MOE Guidelines, hence okay.

Check RAS Pumps

There are two centrifugal RAS pumps, with a total capacity of 112 L/s @ 11.6 m TDH. This represents 315% of ADF. The objective is that one pump operating alone can discharge 200% ADF (i.e. firm capacity), and with lower system losses at 200% of ADF, this may be achievable. This must be confirmed during final design.

2.2.4 SUMMARY

- The aeration basins (including converted digester) have sufficient capacity.
- The clarifiers have sufficient capacity.
- There is ample existing blower capacity but overall blower upgrades for the Plants B, C and D are proposed (see **Section 2.12 Aeration Blower Upgrades/Relocates** for more details).
- The existing RAS pump capacity must be confirmed during final design.

2.3 PLANT C

2.3.1 DESIGN PARAMETERS

Plant C is an SBR train. As with Plant B, since aerobic digestion is available to provide full stabilization, the basis of design is for a conventional activated sludge system because BOD does not have to be fully oxidized in the aeration tanks. The design parameters were established in the Class Environmental Assessment Phase 3 and 4 Report.

For enhanced reliability, ADF is taken to be the average daily flow during the highest flow month (MMF).

Design ADF	6,333 m^3/d
Design MMF	7,600 m^3/d
Design PDF	14,516 m^3/d
Design PHF	14,516 m^3/d (due to flow balancing)
Influent TSS (Average in Max. Month)	207 mg/L (1,573 kg/d)
Influent BOD_5 (Average in Max. Month)	212 mg/L (1,611 kg/d)
Influent TP (Average in Max. Month)	4.9 mg/L (37 kg/d)
Influent TKN (Average in Max. Month)	34.7 mg/L (264 kg/d)
Influent TKN (Peak daily)	34.7 mg/L (504 kg/d)
Effluent TSS	5 mg/L (38.00kg/d)
Effluent BOD_5	5 mg/L (38.00 kg/d)
Effluent TP	0.08 mg/L (0.61 kg/d)
Effluent TAN (April 1 to October 31)	0.6 mg/L (4.56 kg/d)
Effluent TAN (November 1 to March 31)	2.0 mg/L (15.20 kg/d)

Per MOE Guidelines, it is recommended that the SBR parameters meet the same requirements as an activated sludge plant with respect to aeration and settling; in this case a conventional activated sludge plant.

2.3.2 EFFECTIVE "AERATION" CAPACITY

MOE Design Guidelines

Organic Loading Rate (Conventional activated sludge with nitrification)	0.31 – 0.72 kg $BOD_5/(m^3.d)$

Hydraulic Retention Time @ ADF	6 hours
MLSS	3,000 – 5,000 mg/L
F/Mv	0.05 – 0.25 d^{-1}
Solids Retention Time (SRT)	10 days
Oxygen Demand	1.0 kg /kg BOD_5 (average @ ADF) + 4.6 kg /kg TKN (peak daily @ PDF)
Return Sludge Rate	50 – 200% of ADF

The MOE guidelines note, for SBRs, that the organic loading rate should not exceed 0.24 kg $BOD_5/(m^3.d)$ and that the F/Mv range should be restricted to 0.05 to 0.10. However, since full BOD oxidation is not required in the SBRs due to the downstream digesters, the conventional activated sludge design basis is more applicable in this case.

Check "Aeration" Size

Existing Reactors 1 & 2

Length	36 m
Top Water Level (TWL)	4.95 m (proposed)
Bottom Water Level (BWL)	3.73 m (proposed)
Width	23 m
Effective Volume (each tank)	3,088 m^3 (based on BWL – worst case)
Total Effective Volume (all tanks)	6,177 m^3 (based on BWL – worst case)

Check Effective Organic Loading Rate

Organic Loading Rate (in kg $BOD_5/m^3/d$) $\frac{1,611}{6,177} = 0.261$

Therefore, the organic loading rate is not excessive.

Check Effective Hydraulic Retention Time

Retention Time @ MMF $\frac{6,177 \text{ x } 24 \text{ hr/d}}{7,600} = 19.5 \text{ hr}$

The effective hydraulic retention time exceeds the recommended minimum of 6 hours.

Check F/Mv Ratio

Assume MLSS range of 3,000 – 5,000 mg/L per MOE Guidelines.

Assume MLVSS is 60% of MLSS.

F (BOD_5 maximum month daily load) 1,611 kg/d

Mv (MLVSS x Volume) @ MLSS = 3,000 mg/L $\frac{0.6 \text{ x } 3,000 \text{ x } 6,177}{1,000}$ = 11,119 kg

F/Mv 1,611 / 11,119 = 0.145 d^{-1}

Mv (MLVSS x Volume) @ MLSS = 5,000 mg/L $\frac{0.6 \text{ x } 5,000 \text{ x } 6,177}{1,000}$ = 18,531 kg

F/Mv 1,611 / 20,865 = 0.087 d^{-1}

The F/Mv ratio is within the recommended range of 0.05 – 0.25 d^{-1} for the recommended MLSS range of 3,000 – 5,000 mg/L.

Check Sludge Age

Assume low MLSS of 3,000 mg/L.

Sludge Age $\frac{\text{MLSS x V}}{\text{WAS} + \text{TSS}_{\text{Eff}}}$

MLSS 3,000 mg/L (3.000 kg/m^3)

V 6,177 m^3

WAS (per MOE guidelines) 120 g/m^3 treated sewage (0.12 kg/m^3)

Therefore, WAS 0.12 x 7,600 = 912 kg

TSS_{Eff} 38.00 kg

Therefore, Sludge Age $\frac{6,177 \text{ x } 3.000}{912 + 38}$ = 19.5 d

This is greater than the minimum recommended sludge age of 10 days.

Therefore, the existing Plant C reactors have sufficient capacity with respect to satisfying the recommended MOE parameters for "aeration" capacity.

Check Blower Capacity

Existing Blowers

There are three existing blowers (one is a standby) with a capacity of 354 L/s @ 62.1 kPa each for the "aeration" basins.

Biological O_2 Requirement

O_2 Required (1.0 x 1,611) + (4.6 x 504) = 3,929 kg

However, a correction factor should be applied and is derived as follows (based on WPCF MOP No. 8):

$$\text{Correction Factor} = \frac{AOR}{SOR} = \frac{[(Beta \times Csc) - Co]}{Cs} \times Alpha \times Theta^{(T-20)}$$

Where:

AOR = Actual oxygen rate
SOR = Standard oxygen rate
Alpha = 0.67 (assumed typical – check with pre-selected supplier in final design)
Beta = 0.9 (assumed typical – check with pre-selected supplier in final design)
Theta = Temperature correction constant = 1.024
Cs = Clear water saturation level = 9.17 mg/L
Csc = Saturation correction factor = 10.45 mg/L
Co = Dissolved oxygen level = 2 mg/L
T = Operating temperature of wastewater = 12°C
(Assuming winter conditions)

Therefore,

$$\frac{AOR}{SOR} = \frac{[(0.9 \times 10.45) - 2.0]}{9.17} \times 0.67 \times 1.024^{(12-20)} = 0.45$$

$$\text{Therefore total } O_2 \text{ Required} \quad \frac{3,929}{0.45} = 8,732 \text{ kg/d}$$

The existing aeration diffusers are fine bubble. Typical oxygen transfer efficiency for Sanitaire, EDI and others is 20.9% based on the depth available.

$$\text{Therefore, } O_2 \text{ Required} \quad \frac{8,732}{0.209} = 41,780 \text{ kg/d}$$

Standard air has 0.3 kg/m^3 oxygen.

$$\text{Therefore Air Flow Required} \quad \frac{41,780 \times 1000}{0.3 \times 24 \times 3600} = 1,612 \text{ L/s}$$

Mixing 0_2 Requirement

Air Flow Required for Mixing	0.61 L/(m^2.s) (for fine bubble)

Mixing requirement is for one reactor at a time.

Hence, Air Flow Required for Mixing 0.61 x 36 x 23 = 505 L/s

Therefore, the biological requirement governs, i.e. the airflow required is 1,612 L/s.

The existing aeration capacity for Plant C does not meet MOE recommendations for the re-rated capacity. It is proposed to upgrade/relocate aeration blowers throughout the plant such that the blower capacity is sufficient with the largest blower out of service for each plant (B, C and D). See **Section 2.12 Aeration Blower Upgrades/Relocates** for more details.

2.3.3 EFFECTIVE "CLARIFIER" CAPACITY

MOE Design Guidelines

Surface Overflow Rate	37 m^3/m^2/d @ PHF (for activated sludge with chemical addition to mixed liquor for phosphorus removal)
Weir Loading Rate	Not applicable. Reactors use proprietary decanters
Solids Loading Rate	170 kg/m^2/d @ (PDF + 200% ADF) and 5,000 mg/L maximum MLSS under aeration

Check "Clarifier" Size

Existing Reactor 1 & 2

Each reactor is 36 m x 23 m x 4.6 m average depth, for a total surface area of 1,656 m^2:

Check Effective Surface Overflow Rate

Surface Overflow Rate $\frac{14{,}516}{1{,}656}$ = 8.8 m^3/m^2/d

This is well within MOE guidelines, hence okay.

Check Solids Loading Rate

Total Solids to Clarifiers $\frac{[14{,}516 + (2 \times 7{,}600)] \times 5{,}000}{1{,}000}$ = 148,580 kg/d

Clarifier Solids Loading $\frac{148,580}{1,656}$ = 89.9 kg/m^2/d

This is well within MOE guidelines, hence okay.

Check Reactor Cycle Times

Assume normal operation is six 4-hour cycles per day, with filling occurring during half (2 hours) of the cycle.

Available Decant Volume 36 m x 23 m x (4.95 m – 3.73 m) = 1,010.2 m^3.

Maximum Flow Rate $\frac{1,010.2 \text{ m}^3}{2 \quad \text{hr}}$ = 505.1 m^3/hr (12,122 m^3/d)

Therefore, the 4-hour cycle time is adequate for flows up to 12,122 m^3/d.

For peak day flow of 14,516 m^3/d (604.8 m^3/hr), with filling occurring during half the cycle, the cycle time must be reduced to accommodate.

Fill Time During Peak Day Flow $\frac{1,010.2 \text{ m}^3}{604.8 \text{ m}^3\text{/hr}}$ = 1.67 hr

Therefore, the total cycle time when flow exceeds 12,122 m^3/d should be reduced to 3.34 hrs.

Check Decant Rate

Each reactor is equipped with a proprietary decanter, each with a maximum decant capacity of 16.92 m^3/min (1,015 m^3/hr). As calculated above, the maximum required decant rate will be 1,010.2 m^3 in 1.67 hrs during peak day flow events, or 605 m^3/hr. Therefore the decanter capacity is sufficient.

Check RAS Pumps

There are two RAS pumps (one is standby), each rated at 8.5 L/s @ 4 m TDH. One pump (firm capacity) should be capable of discharging 200% ADF, or 15,100 m^3/d (175 L/s). Additional pumps will be required to achieve this. The number and capacity of the pumps will be determined during final design.

2.3.4 SUMMARY

- The SBR “aeration” capacity is sufficient.
- The SBR “clarifier” capacity is sufficient.
- There is insufficient existing blower capacity for the Plant C re-rating, but overall blower upgrades for the Plants B, C and D are proposed (see **Section 2.12 Aeration Blower Upgrades/Relocates** for more details).

- Additional RAS pumps will be required (number and capacity to be determined during final design).

2.4 PLANT D

2.4.1 DESIGN PARAMETERS

Plant D is an extended aeration train. The design parameters were established in the Class Environmental Assessment Phase 3 and 4 Report.

For enhanced reliability, ADF is taken to be the average daily flow during the highest flow month (MMF).

Design ADF	14,437 m^3/d
Design MMF	17,300 m^3/d
Design PDF	35,809 m^3/d
Design PHF	35,809 m^3/d (due to flow balancing)
Influent TSS (Average in Max. Month)	207 mg/L (3,581 kg/d)
Influent BOD_5 (Average in Max. Month)	212 mg/L (3,668 kg/d)
Influent TP (Average in Max. Month)	4.9 mg/L (85 kg/d)
Influent TKN (Average in Max. Month)	34.7 mg/L (600 kg/d)
Influent TKN (Peak daily)	34.7 mg/L (1,243 kg/d)
Effluent TSS	5 mg/L (86.50kg/d)
Effluent BOD_5	5 mg/L (86.50 kg/d)
Effluent TP	0.08 mg/L (1.38 kg/d)
Effluent TAN (April 1 to October 31)	0.6 mg/L (10.38 kg/d)
Effluent TAN (November 1 to March 31)	2.0 mg/L (34.60 kg/d)

2.4.2 AERATION TANKS

MOE Design Guidelines

Organic Loading Rate (Conventional Activated Sludge with nitrification)	0.31 – 0.72 kg $BOD_5/(m^3.d)$

Hydraulic Retention Time @ ADF	6 hours
MLSS	3,000 – 5,000 mg/L
F/Mv	0.05 – 0.25 d-1
Solids Retention Time (SRT)	10 days
Oxygen Demand	1.0 kg /kg BOD5 (average @ ADF) + 4.6 kg / kg TKN (peak daily @ PDF)
Return Sludge Rate	50 – 200% of ADF

Check Aeration Tank Capacity

Existing Aeration Tanks 1, 2, 3 & 4

Length	60 m
Effective Depth (SWD)	4 m
Width	11 m
Effective Volume (each tank)	2,640 m^3
Total Effective Volume (all tanks)	10,560 m^3

Check Organic Loading Rate

Organic Loading Rate (in kg $BOD_5/m^3/d$)

$$\frac{3{,}668}{10{,}560} = 0.347$$

The organic loading rate is within the recommended range of 0.31 – 0.72 kg/(m^3.d).

Check Hydraulic Retention Time

Retention Time @ MMF

$$\frac{10{,}560 \times 24 \text{ hr/d}}{17{,}300} = 14.6 \text{ hr}$$

Hydraulic retention time exceeds the recommended minimum of 6 hours.

Check F/Mv Ratio

Assume MLSS range of 3,000 – 5,000 mg/L per MOE Guidelines.

Assume MLVSS is 60% of MLSS.

F (BOD_5 maximum month daily load) 3,668 kg/d

Mv (MLVSS x Volume) @ MLSS = 3,000 mg/L

$$\frac{0.6 \times 3{,}000 \times 10{,}560}{1{,}000} = 19{,}008 \text{ kg}$$

F/Mv 3,668 / 19,008 = 0.193 d^{-1}

Mv (MLVSS x Volume)
@ MLSS = 5,000 mg/L

$$\frac{0.6 \times 5,000 \times 10,560}{1,000} = 31,680 \text{ kg}$$

F/Mv 3,668 / 31,680 = 0.116 d^{-1}

The F/Mv ratio is within the recommended range of 0.05 – 0.25 d^{-1} for the full recommended MLSS range of 3,000 – 5,000 mg/L.

Check Sludge Age

Assume low MLSS of 3,000 mg/L

Sludge Age

$$\frac{\text{MLSS} \times \text{V}}{\text{WAS} + \text{TSS}_{\text{Eff}}}$$

MLSS 3,000 mg/L (3.000 kg/m^3)

V 10,560 m^3

WAS (per MOE guidelines) 120 g/m^3 treated sewage (0.12 kg/m^3)

Therefore, WAS 0.12 x 17,300 = 2,076 kg

TSS_{Eff} 86.50 kg

Therefore, Sludge Age

$$\frac{10,560 \times 3.000}{2,076 + 86.50} = 14.6 \text{ d}$$

Sludge age exceeds the minimum recommended sludge age of 10 days.

Therefore, Plant D has sufficient capacity with respect to satisfying the recommended MOE parameters for "aeration" capacity.

Check Blower Capacity

Existing Blowers

There are four existing blowers with a capacity of 900 L/s @ 70 kPa each for the aeration basins.

Biological 0_2 Requirement

O_2 Required (1.0 x 3,668) + (4.6 x 1,243) = 9,386 kg

However, a correction factor should be applied and is derived as follows (based on WPCF MOP No. 8):

$$\text{Correction Factor} = \frac{AOR}{SOR} = \frac{[(\text{Beta} \times \text{Csc}) - \text{Co}]}{\text{Cs}} \times \text{Alpha} \times \text{Theta}^{(T-20)}$$

Where:

AOR = Actual oxygen rate
SOR = Standard oxygen rate
Alpha = 0.67 (assumed typical – check with pre-selected supplier in final design)
Beta = 0.9 (assumed typical – check with pre-selected supplier in final design)
Theta = Temperature correction constant = 1.024
Cs = Clear water saturation level = 9.17 mg/L
Csc = Saturation correction factor = 10.45 mg/L
Co = Dissolved oxygen level = 2 mg/L
T = Operating temperature of wastewater (Assuming winter conditions) = 12°C

Therefore,

$$\frac{AOR}{SOR} = \frac{[(0.9 \times 10.45) - 2.0]}{9.17} \times 0.67 \times 1.024^{(12-20)} = 0.45$$

Therefore total O_2 Required $\frac{9{,}386}{0.45}$ = 20,857 kg/d

The existing aeration diffusers are fine bubble. Typical oxygen transfer efficiency for Sanitaire, EDI and others is 20.9% based on the depth available.

Therefore, O_2 Required $\frac{20{,}857}{0.209}$ = 99,796 kg/d

Standard air has 0.3 kg/m^3 oxygen.

Therefore Air Flow Required $\frac{99{,}796 \times 1000}{0.3 \times 24 \times 3600}$ = 3,850 L/s

Mixing 0_2 Requirement

Air Flow Required for Mixing 0.61 L/(m^2.s) (for fine bubble)

Hence, Air Flow Required for Mixing 0.61 x 4 x 60 x 11 = 1,610 L/s

Therefore, the biological requirement governs, i.e. the airflow required is 3,850 L/s.

The existing aeration capacity for Plant D does not meet MOE recommendations for the re-rated capacity. It is proposed to upgrade/reallocate the aeration blowers throughout the plant such that the blower capacity is sufficient with the largest blower out of service for each plant (B, C and D). See **Section 2.12 Aeration Blower Upgrades/Relocates** for more details.

2.4.3 CLARIFIERS

MOE Design Guidelines

Surface Overflow Rate	37 $m^3/m^2/d$ @ PHF (for activated sludge with chemical addition to mixed liquor for phosphorus removal)
Weir Loading Rate	375 $m^3/m/d$ @ PHF (since PHF to each clarifier exceeds 4,000 m^3/d)
Solids Loading Rate	170 $kg/m^2/d$ @ (PDF + 200% ADF) and 5,000 mg/L maximum MLSS under aeration

Existing Clarifiers 1, 2, 3 & 4

Each clarifier is circular with a diameter of 21.3 m and SWD of 4.00 m, for a total surface area of 1,425 m^2 and total volume of 5,701m^3:

Check Surface Overflow Rate

Surface Overflow Rate $\frac{35,809}{1,425}$ = 25.1 $m^3/m^2/d$

This is well within MOE guidelines, hence okay.

Check Weir Loading Rate

Weir Length 3.1416 x 21.3 x 4 = 267.7 m

Weir Loading Rate $\frac{35,809}{267.7}$ = 133.8 $m^3/m/d$

This is well within MOE guidelines, hence okay.

Check Solids Loading Rate

Total Solids to Clarifiers $\frac{[35,809 + (2 \times 17,300)] \times 5,000}{1,000}$ = 352,045 kg/d

Clarifier Solids Loading $\frac{352,045}{1,425}$ = 247 $kg/m^2/d$

This exceeds MOE guidelines. However, the solids loading rate can be kept within MOE guidelines by a combination of operating at a lower MLSS and reducing the return sludge rate.

Check RAS/WAS Pumps

There are six centrifugal RAS/WAS pumps, each rated at 52.1 L/s @ 8 m TDH. Five pumps operating together (firm capacity) should be capable of discharging 200% ADF, or 34,600 m^3/d (400 L/s). Additional pumps will be required to achieve this. The number and capacity of the pumps will be determined during final design.

2.4.4 SUMMARY

- The aeration capacity is sufficient.
- The clarifiers have sufficient capacity.
- There is an apparent deficiency in the existing blower capacity for the Plant D re-rating based on MOE guidelines; however it is clarified in **Section 12** that the existing blowers are adequate (See **Section 2.12 Aeration Blower Upgrades/Relocates** for more details).
- Additional RAS pumps will be required (number and capacity to be determined during final design).

2.5 CHEMICAL PHOSPHORUS REMOVAL SYSTEM

2.5.1 DESIGN PARAMETERS

The existing chemical phosphorus removal system consists of:

- three chemical (alum) metering pumps, each with a capacity up to 118 L/hr
- two chemical (alum) metering pumps, each with a capacity up to 60 L/hr
- one 25,000 L storage tank, two 7,500 L storage tanks and two 5,000 L storage tanks

The design parameters were established in the Class Environmental Assessment Phase 3 and 4 Report.

For enhanced reliability, ADF is taken to be the average daily flow during the highest flow month (MMF).

Design ADF	23,300 m^3/d
Design MMF	28,000 m^3/d
Design PDF	53,400 m^3/d
Design PHF	53,400 m^3/d (due to flow balancing)

MOE Guidelines indicate a typical alum dosing requirement of 110 – 225 mg/L and a minimum on-site storage capacity of 10 days.

2.5.2 Check Alum Dosing Capacity

Firm Alum Dosing Capacity (largest pump out of service)	356 L/hr (8,544 L/d)

Commercial grade liquid alum contains 0.65 kg dry alum per L.

Therefore, Dry Alum Capacity	8,544 x 0.65	=	5,554 kg/d
Dosing Capacity at PHF	$\frac{5,554 \times 1000}{53,400}$	=	104 mg/L

Therefore, the existing chemical pumps are undersized for design peak flows. The firm capacity should be approximately doubled to provide additional reliability.

2.5.3 Check Alum Storage Capacity

Assume an average alum dose requirement of 170 mg/L. Therefore, at design MMF:

Liquid Alum Requirement	$\frac{170 \times 28,000}{1,000 \times 0.65}$	=	7,323 L/d
10-day Storage Requirement	7,323 L/d x 10 d	=	73,230 L/d

Therefore, the existing storage capacity of 50,000 L does not meet the MOE recommended minimum. Furthermore, a greater storage capacity may be warranted due to the location. A 30-day alum storage capacity is not unusual. Alum storage requirements will be finalized during final design.

2.6 NEW FLOW EQUALIZATION TANK / CONVERTED WAS STORAGE TANK

2.6.1 EXISTING FLOW EQUALIZATION TANK

There is one existing 10 m x 16 m x 5.5 m deep flow equalization tank to collect effluent flow from Plants B and C and provide equalized flow to the tertiary filter splitter box. The equalization tank is equipped with two submersible pumps (one variable speed; one constant speed), each rated at 141 L/s @ 5 m TDH.

2.6.2 PROPOSED WORKS

Convert Existing Flow Equalization Tank Into WAS Storage

The existing flow equalization tank will be converted into a WAS storage tank upstream of the new sludge thickening facility and will be used to pre-thicken WAS to a concentration of 1% solids. Decant equipment will also be provided.

New Flow Equalization Tank

The new flow equalization tank will be outfitted with the transferred WAS pumps variable speed pumps and augmented with additional submersible pumps such that, together the pumps, will be capable of discharging effluent from the equalization tank at the total peak day flow rate of 53,400 m^3/d (618 L/s) with the largest pump out of service (firm capacity). Therefore the pumps will be able to match the flows discharged from Plants B and D, hence only nominal volume needs to be provided for these flows.

The greatest Plant C volume that must be decanted from one reactor during any one cycle is 1,010 m^3 at peak day flow (see **Section 2.3.3 Effective "Clarifier" Capacity** under **Check Reactor Cycle Times**), and the decanter can discharge this volume in 60 minutes (16.92 m^3/min capacity). As a worst case condition, assume enough flow equalization volume to accommodate the decanters from both reactors discharging their full volume simultaneously.

The peak day flow into Plant C is 14,516 m^3/d, or 605 m^3 in 60 minutes, and the submersible pumps in the equalization chamber will be designed to pump peak day flow from all three plants.

Therefore, the balancing storage required is 1,415 m^3 (1,010 x 2, minus 605). To be conservative, allow nominal balancing volume for Plant B and Plant D influent to account for pump stop/starts (20%). Therefore, provide a 1,700 m^3 flow equalization tank.

2.7 NEW BALLASTED FLOCCULATION SYSTEM

An Actiflo™ ballasted flocculation system is initially proposed. The actual system will be confirmed during final design. Preliminary details of the Actiflo™ system are provided in Appendix D, however a peak flow capacity of 53,400 m^3/d (peak day flow) will be confirmed. Note that there will be two Actiflo™ units.

2.8 TERTIARY FILTERS

2.8.1 DESIGN PARAMETERS

The tertiary filters are deep bed DynaSand continuous contact filters. They are located in two separate buildings constructed at different elevations; however they both receive secondary influent from Plants B, C & D via a splitter chamber

The design parameters were established in the Class Environmental Assessment Phase 3 and 4 Report.

For enhanced reliability, ADF is taken to be the average daily flow during the highest flow month (MMF).

Design ADF	23,300 m^3/d
Design MMF	28,000 m^3/d
Design PDF	53,400 m^3/d
Design PHF	53,400 m^3/d (due to flow balancing)

Influent TSS @ PHF after secondary treatment 15 mg/L (801 kg/d)

2.8.2 FILTERS

MOE Design Guidelines

Maximum Filtration Rate @ Peak Hour Flow	3.3 L//(m^2.s)
Maximum Solids Loading @ Peak Hour Flow	83 mg/(m^2.s)

Check Filter Capacity

There are two filter buildings. In each filter building, there are four filter cells with six filter modules in each. Each filter module has a surface area of 4.65 m^2. Therefore the total filter area is 223.2 m^2. With one cell out of service, the total area is 195.3 m^2.

Check Filtration Rate

Peak flow to the filters is 53,400 m^3/d (618 L/s).

Filtration Rate $\frac{618}{195.3}$ = 3.16 L//(m^2.s)

This is less than the MOE maximum rate, hence okay.

Check Solids Loading Rate

TSS to the filters is 15 mg/L (801 kg/d @ PHF, or 9,271 mg/s)

Solids Loading Rate $\frac{9,271}{195.3}$ = 47.5 mg/(m^2.s)

This is less than the MOE maximum rate, hence okay.

Therefore, the existing filters have sufficient capacity for the design peak flow.

2.9 ULTRAVIOLET DISINFECTION

The upper and lower filter buildings each contain one UV channel having two banks of lamps, each consisting of 20 modules with 8 lamps per module. Each UV system is designed for 31,811 m^3/d peak flow rate (63,622 m^3/d total), which exceeds the peak flow that will be experienced by the units (53,400 m^3/d total). Therefore, the existing UV units have sufficient capacity for the design peak flow.

2.10 NEW THICKENING WASTE ACTIVATED SLUDGE FACILITY (TWAS)

A new thickening waste activated sludge facility will be constructed to receive WAS from the WAS storage tank (the existing Plant C SBR effluent equalization tank) that has been pre-thickened via decanting to 1% solids.

The raw sewage characteristics are generally within the typical range indicated in Table 16-1 of the MOE Guidelines and as such, the values summarized in the table are considered to be accurate for design purposes. Conservatively assuming a primary sedimentation and conventional activated sludge process with phosphorus removal (even though there is no primary sedimentation), the undigested (WAS) dry solids produced are 220 g per m^3 of treated sewage or 220 g/m^3 (0.22 kg/m^3). Therefore:

Average Dry Solids into TWAS Facility $0.220 \times 28,000 \text{ m}^3\text{/d} = 6,160 \text{ kg/d}$

Average Solids Concentration into TWAS Facility 1% (from TWAS facility)

Average Solids Flow into Thickener $\dfrac{6,160 \text{ kg/d}}{0.01 \times 1,000 \text{ kg/m}^3} = 616 \text{ m}^3\text{/d}$

Based on operating 8 hours per day for 7 days per week, the required capacity is 77 m^3/hr. An ALDRUM Mega Duo system (two drum filters with two flocculation reactors) is initially proposed, with a capacity of 60 m^3/hr each. This will provide unit redundancy. Although each unit has 78% (not 100%) capacity, sludge thickening is not a critical process and, if preferred, one filter can simply be operated longer (about 10 hours) to provide 100% capacity.

The thickening facility will be designed to increase the WAS concentration to at least 3% (more typically 4 – 8%). The facility will include two drum filters (one duty; one standby) and a polymer dosing and flocculation system. Specific design information is provided in Appendix D.

2.11 AEROBIC BIOSOLIDS DIGESTERS AND STORAGE

2.11.1 DESIGN PARAMETERS

There is one circular two-stage digester with two Stage 1 cells of 2,165 m^3 each and two Stage 2 cells of 1,085 m^3 each.

There are three circular biosolids storage tanks with a combined volume of 25,520 m^3.

There is a dedicated mixing pump and blower for each digester, a dedicated 363 L/s mixing pump for each of the two smaller biosolids tanks, and two 327 L/s mixing pumps for the largest biosolids tank.

The design parameters were established in the Class Environmental Assessment Phase 3 and 4 Report. For enhanced reliability, ADF is taken to be the average daily flow during the highest flow month (MMF).

Design ADF	23,300 m^3/d
Design MMF	28,000 m^3/d
Design PDF	53,400 m^3/d
Design PHF	53,400 m^3/d (due to flow balancing)

2.11.2 MOE DESIGN GUIDELINES

The raw sewage characteristics are generally within the typical range indicated in Table 16-1 of the MOE Guidelines and as such, the values summarized in the table are considered to be accurate for design purposes.

WAS	220 g/m^3 (0.220 kg/m^3) g/m^3 = g of dry solids per m^3 of treated sewage (Table 16-1 – for CAS with sedimentation + TP removal)
WAS Volatile Solids	60% (Table 16-1 – for CAS with sed. + TP removal)
Dry Solids in Biosolids Holding Tank	150 g/m^3 (0.150 kg/m^3) g/m^3 = g of dry solids per m^3 of treated sewage (Table 16-1 – for CAS with sedimentation + TP removal)
Maximum Loading to 1st Stage Digester	1.6 kg/(m^3.d) volatile solids
1st Stage Digester	2/3 total digester volume
2nd Stage Digester	1/3 total digester volume
Total SRT (including aeration tanks)	45 days
Aeration for Digesters and Storage (if aeration used for mixing)	0.5 L/(m^3.s)
Biosolids Storage Capacity	240 days ("encouraged")

Check Digesters

Check Size Based on Loading

WAS in 0.220 x 28,000 = 6,160 kg/d

WAS Volatile Solids 0.60 x 6,160 = 3,696 kg/d

Minimum Volume Stage 1 Digester	$\frac{3,696}{1.6}$	=	2,310 m^3

The actual Stage 1 Digester volume is 4,330 m^3 (2 x 2,165), hence there is ample capacity with respect to loading.

Check Size Based on SRT

The calculated SRT for Plants B, C and D were 21.4, 19.5 and 14.6 days respectively. Allow for the worst case 14.6 days SRT in the aeration basins.

SRT in Digester:

Average Dry Solids out of Digester	0.150 x 28,000	=	4,200 kg/d
Average Solids Concentration in Digester	3% (from TWAS facility)		
Average Solids Flow out of Digester	$\frac{4,200 \text{ kg/d}}{0.03 \times 1,000 \text{ kg/m}^3}$	=	140 m^3/d
Total Volume of Digesters		=	6,500 m^3
SRT in Digesters	$\frac{6,500}{140}$	=	46.4 days
SRT in Aeration + Digesters	14.6 + 46.4	=	61.0 days

The SRT exceeds the minimum SRT of 45 days, hence okay.

Check Biosolids Storage

Average Solids Flow out of Digester	*Calculated above*	=	140 m^3/d
Total Biosolids Storage Capacity	$\frac{25,520 \text{ m}^3}{140 \text{ m}^3\text{/d}}$	=	182.3 days
Excess Capacity in Digesters / SBR's / Aeration Tanks	61.0 day – 45.0 days	=	16.0 days
Total Biosolids Storage Capacity	182.3 + 16.0	=	198.3 days

The Province has recently removed its requirement of 240 days biosolids storage but continues to encourage plants to meet this standard. While the biosolids storage capacity is less than the "encouraged" minimum of 240 days, this assumes a dry solids concentration of 3% in the biosolids tank and does not take into account further thickening through decanting. Note also that based on annual average (more appropriate for biosolids storage than maximum monthly), the average sludge production will be approximately 15% less. Therefore, biosolids storage capacity is considered sufficient. Refer to Table 6 in main report for scenarios taking these into account.

Check Mixing Capacity

There are two Stage 1 Digester mixing pumps and blowers, and two Stage 2 Digester mixing pumps and blowers.

There are two chopper style mixing pumps, each rated for 363 L/s to provide mixing of contents in the two smaller biosolids tanks.

There are two chopper style mixing pumps, each rated for 327 L/s to provide mixing of contents in the largest biosolids tank.

The existing digester and biosolids mixing equipment provides adequate mixing and it is not proposed to increase the digester or biosolids capacity. Therefore no upsizing or replacement of the mixing equipment is required. There will be piping modifications to allow greater mixing flexibility.

2.12 AERATION BLOWER UPGRADES / RELOCATES

Sections 2.2.2, **2.3.2** and **2.4.2** established aeration blower requirements for Plants B, C and D based on MOE Guidelines. The MOE Guidelines recommend air capacity sufficient to fully nitrify based on the peak daily TKN concentration and the peak daily flow. This is a theoretical condition that will not occur, since the wastewater is dilute at peak flows (due to inflow and infiltration) and the corresponding TKN concentration will therefore be lower. Since compliance is based on monthly averages, a TKN loading based on maximum monthly average at maximum monthly flow (as used for BOD_5 loading) is considered sufficiently conservative. This condition is compared with the MOE condition in Table A (the MOE condition is Scenario 1).

Under Scenario 2, which is considered to be a more realistic portrayal of worst case conditions, both Plants B and D have sufficient firm aeration blower capacity for the overall plant re-rating. Plant C is slightly (10%) deficient in total capacity (no redundancy), again recognizing that even the Scenario 2 design conditions are very conservative.

Based on this further analysis, the following aeration blower upgrades/relocates are proposed:

- No modifications to Plant D blowers required.
- Re-locate either the two smaller blowers or one of the larger blowers from Plant B to Plant C (Plant B has significant excess blower capacity).

Table A – Air Requirement Summary

PARAMETER	PLANT B	PLANT C	PLANT D
Scenario 1: 1.0 kg /kg BOD$_5$ (average* @ ADF*) + 4.6 kg /kg TKN (peak daily @ PDF)			
ADF = MMF	3,075 m^3/d	7,600 m^3/d	17,300 m^3/d
PDF	3,075 m^3/d	14,516 m^3/d	35,809 m^3/d
Average BOD$_5$ @ ADF	212 mg/L	212 mg/L	212 mg/L
	652 kg/d	1,611 kg/d	3,668 kg/d
Peak Daily TKN** @ PDF	34.7 mg/L	34.7 mg/L	34.7 mg/L
	107 kg/d	504 kg/d	1,243 kg/d
O$_2$ Demand	1,144 kg/d	3,929 kg/d	9,386 kg/d
$\frac{AOR}{SOR}$ Correction Factor	0.45	0.45	0.45
Oxygen Transfer Efficiency	20.9%	20.9%	20.9%
O$_2$ in Air	0.3 kg/m^3	0.3 kg/m^3	0.3 kg/m^3
Air Requirement	40,553 m^3/d (469 L/s)	139,252 m^3/d (1,612 L/s)	332,660 m^3/d (3,850 L/s)
Existing Blower Capacity	6,496 L/s	1,062 L/s	3,600 L/s
Ex. Blower Firm Capacity	4,960 L/s	708 L/s	2,700 L/s
Scenario 2: 1.0 kg /kg BOD$_5$ (average* @ ADF*) + 4.6 kg /kg TKN (average* @ ADF*)			
ADF = MMF	3,075 m^3/d	7,600 m^3/d	17,300 m^3/d
Average BOD$_5$ @ ADF	212 mg/L	212 mg/L	212 mg/L
	652 kg/d	1,611 kg/d	3,668 kg/d
Average Daily TKN @ ADF	34.7 mg/L	34.7 mg/L	34.7 mg/L
	107 kg/d	264 kg/d	600 kg/d
O$_2$ Demand	1,470 kg/d	2,825 kg/d	6,428 kg/d
$\frac{AOR}{SOR}$ Correction Factor	0.45	0.45	0.45
Oxygen Transfer Efficiency	20.9%	20.9%	20.9%
O$_2$ in Air	0.3 kg/m^3	0.3 kg/m^3	0.3 kg/m^3
Air Requirement	102,083 m^3/d (1,182 L/s)	100,138 m^3/d (1,159 L/s)	227,822 m^3/d (2,637 L/s)
Existing Blower Capacity	6,496 L/s	1,062 L/s	3,600 L/s
Ex. Blower Firm Capacity	4,960 L/s	708 L/s	2,700 L/s

* *Average concentration and ADF equal maximum month averages*

** *Peak Daily TKN equal to maximum month average TKN is assumed*

Bradford West Gwillimbury
Bradford Water Pollution Control Plant Expansion
Preliminary Design Report
Draft – February 2012

Appendix D

Manufacturers' Information

- *Actiflo Ballasted Flocculation System (Tertiary Phosphorus Removal)*
- *Alfa Laval ALDRUM Mega Duo System (Sludge Thickening)*
- *Priestly - Demo Quote (Demo of Plant A)*
- *WTP Bar Screen & Dewatering Press & Grit Classifier (Headworks Upgrade)*
- *Dresser Roots Blower (Additional Air for Plant B)*
- *Neuros Turbo Blower (Additional Air for Plant C)*
- *ITT Sewage Pumps (For Increased Sewage Flow)*
- *EDI Fine Bubble Aeration Diffuser System (New Grid for Plant B)*
- *Metcon - Polymer Skid and storage system (Sludge Thickening)*
- *Bray Valves (Plant D Aeration Control)*

BLACK & VEATCH
50 MINTHORN BLVD, SUITE 103
MARKHAM, ONTARIO, L3T 7X8

BUDGETARY PROPOSAL
ACTIFLO® TECHNOLOGY

TOWN OF BRADFORD
BRADFORD WPCP EXPANSION, TERTIARY TREATMENT

MAY 4TH, 2011

PREPARED BY:

GAÉTAN BOURDAGES
PROCESS ENGINEER

CARLYLE KHAN
REGIONAL MANAGER

PROPRIETARY NOTICE
This proposal is confidential and contains proprietary information.
It is not to be disclosed to a third party without the written consent of Veolia Water Solutions and Technologies Canada.

EXECUTIVE SUMMARY

Veolia Water Solutions and Technologies Canada Inc. (VWS Canada) please to provide the following budgetary estimate for the installation of an ACTIFLO® Ballasted Clarification system to treat secondary effluent prior to the filtration process at the Bradford Water Pollution Control Plant (WPCP), and an Escalator® Fine Screen and Rotopac® Screw Washer Compactorfor the effective removal of Algae in front of the proposed Equilization (EQ) Tank, thus protecting both the EQ Tank and Actifo® system.

This proposal is for a supply only offering with all the equipment required for reliable operation of the treatment system.

Key parameters used of the proposed are summarized in the following table.

Parameter	Unit	Influent
Flow (ave/peak)	MLD	64,8
TSS	mg/L	20
P_{Total}	mg/L	TBD[1]

The proposed system consists of the supply of two (2) ACTIFLO® units. Also included in this scope of supply are an automatic polymer make-up unit and its dosing pumps skid, coagulant dosing skid, related instrumentation, a control cabinet with PLC and HMI. Commissioning and start-up are also included.

The total **budget price** based on a normal schedule is **$ 1.86 M**

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[1] To be determined / confirmed by B&V

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List of Appendices

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SECTION 1. INTRODUCTION

VWS Canada has prepared this budgetary proposal to upgrade the existing Bradford WPCP using our ACTIFLO® technology. Up front of the proposed Actiflo® technology, VWS Canada recommends an Escalator® Fine Screen and Rotopac® Screw Washer Compactor.

This proposal provides the details of the technical design, our scope of supply, a budgetary cost estimate and approximate schedule.

The design is based on influent parameters provided by Black & Veatch (B&V) shown in the design basis (see SECTION 2. Design Basis).

SECTION 2. DESIGN BASIS

VWS Canada's process solution is designed specifically to meet the needs of the Bradford WPCP based on the wastewater characteristics provided by B&V in various email correspondences and discussions. The parameters of concern and influent values, as we understand them, are listed in Table 1 and Table 2 below:

Table 1. Influent Design Parameters

Parameter	Units	Value
Flow (Hourly peak)	MLD	68.4
Flow (Daily peak)	MLD	53.4
TSS	mg/L	20
P_{Total}	mg/L	TBD

Table 2. Effluent Design Parameters

Parameter	Units	Value
TSS	mg/L	10 – 15
P_{Total}	mg/L	TBD

At this time, no process guarantee is provided, nor is implied. Further influent evaluation and lab work may provide better understanding of the operating conditions of the system and therefore its performance.

SECTION 3. PROPOSED ESCALATOR SCREEN / ROTOPAC WASHER COMPACTOR

At the request of B&V, VWS Canada recommends an Escalator® Fine Screen and Rotopac® Screw Washer Compactor to address any algae carryover. This section outlines the details of the equipment supply required.

3.1. ONE (1) ESCALATOR® FINE SCREEN, MODEL ESH6-48-AA

Screen type	Traveling perforated panels
Peak flow capacity	64.8 MLD
Perforation diameter size	0.236 inch (6 mm)
Channel width	1400 mm
Channel depth (invert to operating floor)	2000 mm
Installation angle	60 degrees
Lift from channel invert to discharge point	3064 mm
Discharge above operating floor	1064 mm
Channel invert recess	150 mm
Downstream water depth at peak flow	872 mm

- Note: downstream water depth is based on the assumed presence of a level controller such as a weir plate.

Fine screen head loss at peak flow	178 mm (Clean Water)
Fine screen head loss at peak flow	368 mm (50% clogging)

- Construction in AISI 304SS, unless specified otherwise;
- Equipment to be rated for Class 1 Division 2 Group D explosion-proof classified area.

Each including:

- Structural frame, guides, outlet chute and covers;

- Filter elements belt with shafts and sprockets, c/w single-speed motor and gear drive;
- Zinc coated extra-strong carbon steel chain;
- Rotating cleaning brush with carbon steel shaft, c/w motor and gear drive;
- Filter elements washing system, c/w spray nozzles, solenoid and manual valves, NEMA-7 enclosure;
- High water level start float switch, NEMA-4X enclosure, intrinsically safe barrier;
- Differential level control system, ultrasonic type, NEMA-7 enclosure;
- Main control panel with Relays, 4X FG enclosure;
- Local control station, 2-buttons, NEMA-7 enclosure;
- Fasteners & anchors in stainless steel AISI 304.

Gross shipping weight 2,200 kg each

3.2. ONE (1) ROTOPAC® SCREW WASHER COMPACTOR, MODEL RPW-202-AI

Type	High efficiency washer and compactor
Material handling	Screenings from municipal wastewater sewage
Solids loading capacity	Up to 2 m³/h
Installation angle	Inclined at 5-15˚ (to be confirmed)
Discharge height	1370 mm
Solids volume reduction	Up to 60%
Dryness	Up to 50%
Organics reduction	Up to 90%

- Construction in AISI 304 stainless steel, unless specified otherwise;
- Equipment to be rated for Class 1 Division 2 Group D explosion-proof classified area;

Each including:

- Trough, hopper and floor mounted support;
- Shafted high abrasion resistant steel screw and bearings box, c/w motor and gear drive;

  - Solids washing system and dewatering zone washing system;
  - Set of solenoid and manual valves for washing systems, NEMA-7 enclosure;
  - Local control station, 3-buttons, NEMA-7 enclosure;
  - Fasteners & anchors in stainless steel AISI 304.

Gross shipping weight 800 kg each

Budget Price for Escalator® Fine Screen, model ESH6-48-AA and Rotopac® Screw Washer Compactor, model RPW-202-AI, includes:

- Factory Start-Up Service
- Freight charges to Bradford site
- Units will be shipped within 14 weeks (Ex-Factory) after receipt of approved documents and drawings in Montreal
- **WARRANTY PERIOD**: The period will be for 12 months from the date of Start Up of the equipment, 18 months maximum from the date of shipment (ex-works).

SECTION 4. PROPOSED TREATMENT CHAIN

4.1. PROCESS OVERVIEW

ACTIFLO® is a high-rate settling process that combines the advantages of ballasted flocculation and lamella clarification. The microsand provides a surface area that enhances flocculation and acts as a ballast or weight. The resulting floc settles very fast, allowing for compact clarifier designs with high overflow rates and short detention times. The use of microsand also permits the unit to perform well under dramatically changing influent conditions without impacting final effluent quality.

4.2. PROCESS DESCRIPTION

The ACTIFLO® system proposed is designed to treat effluent of the secondary treatment. The design characteristics of the raw water and treated water effluent are shown in section 3.3 of this proposal.

Raw water is pumped into the coagulation tank of the ACTIFLO® system where a coagulant, such as alum, ferric chloride, or ferric sulphate, is added to destabilize the suspended solids and colloidal matter in the influent stream. This addition may be done in the pipe feeding the ACTILO® units prior an inline mixer. Rapid mixing in the first basin optimizes the reaction. The water then overflows into the injection tank where polymeric flocculent and microsand are added to initiate floc formation. These serve as a "seed" for floc formation and development in the next process step. Mixture of floc and microsand then flows in the maturation tank where mixer provides ideal conditions for bridging between the microsand and the destabilized suspended solids. From this tank, the fully formed ballasted floc enters a settling tank equipped with a lamella, which provides the rapid and effective removal of the microsand/sludge floc. The clarified water exits the system via a series of collection trough or weirs. The clarified water is monitored for turbidity. Coagulant may be dosed also at the clarified water to improve filters performances.

The sand-sludge mixture settles to the bottom of the clarifier. Scrapers force the sludge collected at the bottom of the clarifier into a center cone from which it is continuously withdraw and pumped to hydrocyclone where sludge and microsand are separated by centrifugal force. After separation, the higher density microsand is discharged from the bottom of the hydrocyclone and re-injected into the process for re-use. The lighter density sludge is discharged from the top of the hydrocyclone and directed to the sludge management facilities.

The rate of coagulant and polymer addition is paced off the total flow to the treatment.

4.3. DESIGN PARAMETERS

A summary of the design used in the ACTIFLO® process is given in the table below:

Table 3. ACTIFLO® Process Design

Item	Unit	Value
Application		
Tertiary treatment		
Design Capacity		
Total design flow	MLD	64.8
Total maximum flow	MLD	64.8
Number of train(s)	---	2
Capacity per train	MLD	64.8
Redundancy	%	100
ACTIFLO® Parameters @ Design Flow		
Coagulation HRT	min	2
Injection HRT	min	2
Maturation tank HRT	min	7.3
Overflow rate	m/h	60
Microsand Recirculation Circuit		
No. of pump(s) per train	---	1 duty No stand-by
Pump capacity	m^3/h	162

4.4. CHEMICAL SELECTION AND CONSUMPTION

No chemical consumption can be provided at this time as the $P_{(Total)}$ concentration of the combined influent and ACTIFLO effluent characteristics are unknown. Coagulant selection and consumption are required to estimate OPEX for any treatment technology.

SECTION 5. SCOPE OF SUPPLY

5.1. SUPPLIED ITEMS

The scope of supply for the process includes the following items:

ACTIFLO Train

- Two (2) concrete ACTIFLO train, each including:
    - One (1) Inlet control valve, pneumatic butterfly modulating
    - One (1) coagulation mixer c/w 304SS wetted parts
    - One (1) injection mixer c/w 304SS wetted parts
    - One (1) maturation mixer c/w 304SS wetted parts
    - One (1) set of tank baffles of 304SS
    - One (1) galvanized steel scraper mechanism for the settling tank
    - One (1) complete microsand recirculation line including
        - Two (2) microsand recirculation pumps
        - Two (2) hydrocyclones
        - Two (2) microsand recirculation pipes, galvanized steel
        - Two (2) sets of isolation valves, eccentric plug valve
    - One (1) set of polystyrene lamellas
    - One (1) set of lamellas support, galvanized steel
    - One (1) set of 304SS water collection troughs
    - One (1) drain valve for coagulation tank, eccentric plug valve
    - One (1) partial drain valve for clarifier, butterfly valve, lever operated
    - One (1) clarifier inlet baffle wall, galvanized steel
    - One (1) lamella cleaning system including
        - One (1) grid perforated pipe: PVC sh80
        - One (1) drop pipe to feed this grid: 304SS
        - One (1) actuated (On-Off) butterfly valve

    - One (1) set of supports
    - One (1) common air blower

- Microsand for startup

Chemical Equipment
The scope of supply for chemical equipment is the following:

- Two (2) coagulant metering pumps (1 running, 1 standby) for coagulation
- Two (2) coagulant metering pumps (1 running, 1 standby) for post coagulation
- Two (2) coagulant pumps skids, PVC valves and piping
- Two (2) polymer metering pumps (1 running, 1 standby)
- One (1) polymer pumps skid, PVC valves and piping
- One (1) automatic make-up system

5.1.1. Electrical Equipment

One (1) PLC Based Control panel will be supplied, as specified below, to control the ACTIFLO® process based on operator set points. The Control Panel will be completely tested and programmed for the required functionality. One (1) labeled panel will be comprised of the following major components:

- NEMA 12 Steel Panel with back panel
- Programming Control Processor (SLC5/04)
- PanelView 600 Touchscreen Operator interface

Panel design is based on control of only the equipment included in VWS Canada's scope of supply only. If control of additional equipment beyond VWS Canada's scope of supply is required, please contact VWS Canada for a price adder. The PLC Control Panel will include the necessary input/output to support the I/O needed by the panel (i.e. door mounted pushbuttons, power fail alarm(s), etc)

5.1.2. Process Instrumentation

The scope of supply for chemical equipment is the following:

- Two (2) influent magnetic flowmeters
- One (1) influent water turbidimeter
- Two (2) clarified water turbidimeters
- Two (2) coagulated water pH meters
- Two (2) high level switches
- Two (2) sand recycle circuit, pressure transmitters

5.1.3. Services

A) VWS Canada is responsible for process design and equipment procurement required for ACTIFLO® process. The system will be designed and supplied in accordance to VWS Canada's standard Plans and Specifications as described herein. VWS Canada's scope of work does not include any engineering selection, procurement, installation or operation of any equipment materials other services not specifically defined in this process.

B) Process and Design Engineering – VWS Canada will perform engineering in accordance with our standard Plans end Specifications and those applicable national code, standards and / or regulation (except as otherwise noted) in effect at the time of this submittal. Additionally, VWS Canada will provide all necessary design installation and operating information for equipment within its stated scope of supply. VWS Canada is not responsible for the design, selection, installation, operation or maintenance of any materials, equipment or services supplied by others.

C) VWS Canada will provide process engineering and design support for the system as follows:

1 Equipment specifications for all equipment supplied by VWS Canada.

2 Technical instruction for operation and start-up of the system

3 Equipment location drawings

4 Equipment installation plans

5 Project Specific O&M manuals

D) The equipment scope of supply of VWS Canada shall include the equipment as shown in the ACTIFLO® Scope of Supply.

E) VWS Canada will provide the services necessary to start-up, test and operate the system as describe in the following table.

Table 4 Field Activities

Activity	Day(s) on site	Employee(s)	Trip(s)
Coordination	1	2	1
Mechanical supervision	2	1	2
Commissioning			
Mechanical	4	1	1
Control	13	1	2
Process	10	1	2
Training	2	1	0

5.2. ITEMS NOT SUPPLIED BY VWS CANADA

The following items are beyond this scope of supply and are to be addressed by the Client:

1. Obtain certificate of authorization, necessary construction permits and licenses, construction drawings (including interconnecting piping drawings), field office space, telephone service, and temporary electrical service.
2. Inline mixer after coagulant injection.
3. Grating, handrail and stair.
4. Spare parts.
5. All labor, material and utilities required for the installation of supplied equipment.
6. Civil work.
7. Delivery.
8. Piping between ACTIFLO® and other equipment.
9. Agitators and rake mechanism will be supported by concrete slab.
10. Anchors: The contractor shall anchor the unit at site. The anchors are not part of VWS Canada's supply.
11. All labor, materials, supplies and utilities as required for start-up, and performance testing including laboratory facilities and analytical work.
12. All other necessary equipment and services not otherwise listed as specifically supplied by VWS Canada.
13. Supply and install all electrical power and conduit to the ACTIFLO® main control panel plus interconnection between the ACTIFLO® main control panel and ancillary equipment as required, including wire, cable, junction boxes, fittings, conduit, etc.
14. Performance tests.

5.3. CLARIFICATIONS

VWS Canada has used the following preliminary list of assumptions and constraints in developing the scope and pricing for the proposed project:

- No provision to comply NSF standards.

- No provision to comply “Explosion Proof” standards
- VWS Canada’s specifications for electrical, mechanical, civil and structural construction and coatings apply.
- Site is open shop.
- All freight, taxes, bonds, and builders’ risk insurance are excluded.
- Estimates have been prepared assuming that Veolia’s Standard Terms and Conditions apply.

5.4. MOTOR LIST

The next table presents a preliminary motor list of the ACTILFO® unit

Table 5 ACTIFLO® Motors List

Application	Number of Units per Train	Installed Power (hp)	Hrs per Day in Operation
Mechanical mixer - Coagulation basin	1	10	24
Mechanical mixer - Injection basin	1	10	24
Mechanical mixer - Maturation basin	1	15	24
Mechanical rake - Clarifier basin	1	1	24
Microsand Recirculation Pump	2	25	24
Lamella Cleaning - Blower	1	10	0,1

SECTION 6. ESTIMATED COST AND SCHEDULE

6.1. BUDGETARY COST

The **estimated budgetary cost** for this proposal is outlined below.

• **Escalator® Fine Screen and Rotopac® Screw Washer Compactor**	**$ 160,000.**
• **ACTIFLO® system**	**$ 1 700 000.**

This budgetary, non-binding estimate of probable cost is presented for project planning and evaluation purposes only and is not a firm offer.

6.2. TERMS OF PAYMENT

The terms of payment are as follows:

- 30 percent on submittal of shop drawings
- 70 percent on the delivery of equipment to the site

All payment terms are net 30 days from the date of invoice.

6.3. SCHEDULE

The projected schedule is shown in Table 7 below.

Table 6. Schedule

ITEM	TIMELINE	CONDITIONS
Shop drawings	4 weeks	Submission within designated timeline following receipt of a contract executed by all parties
Equipment	20 weeks	Delivery after receipt of written approval of shop drawings
Installation	12 weeks	To be confirmed in Purchase Order
Operation and Maintenance manuals	90 days	Submission within timeline designated after receipt of approved shop drawings

Once the B&V Team has had the chance to review this proposal, we would welcome the opportunity to review the proposal and overall project with the Team.

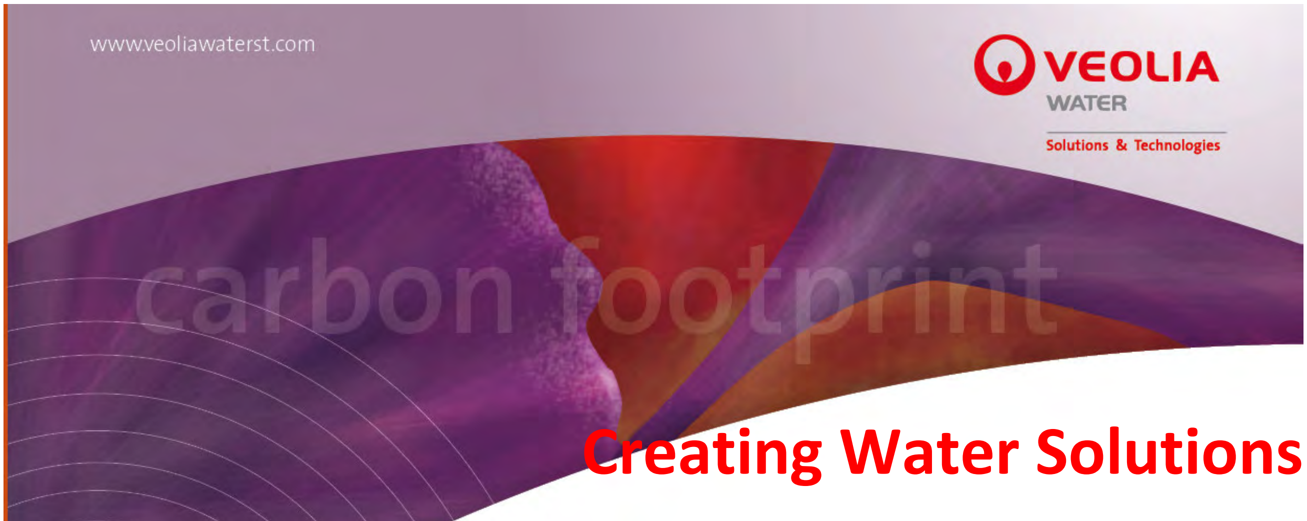
Should you have any questions or concerns before that, please do not hesitate to contact me directly at either by phone at (905) 286-4846 or by email at carlyle.khan@veoliawater.com.

Regards,

Veolia Water Solutions & Technologies Canada Inc.

Carlyle Khan, B.A.S.
Regional Manager
Greater Golden Horseshoe Area & Atlantic Provinces

Appendix A
CARBON FOOTPRINT



Creating Water Solutions

Resource efficiency and sustainability are driving changes in many businesses, and Veolia Water Solutions & Technologies (VWS) is committed to staying at the leading edge of sustainable offerings. VWS actively pursues a strategy to deliver environmentally conscious and innovative water technologies and solutions, meeting the diverse needs of both municipalities and industry.

We offer our customers integrated water solutions which include resource-efficient technology to improve operations, reduce costs, decrease dependency on limited resources, and comply with current and anticipated regulations. Veolia's annual R&D budget is estimated at 150 Million € with a focus for the Water division on delivering neutral or positive energy solutions, migrating toward green chemicals and water-footprint-efficient technologies with high recovery rates.

Our carbon footprint reduction program drives innovation, accelerates adoption and development of clean technologies for water treatment, and offers our customers sustainable solutions.

VWS has implemented this program corporate-wide and has established procedures, systems, and key performance indicators which ensure continuous development of innovative technologies designed to meet our customers' environmental goals.

VWS is benchmarking its technologies and solutions by performing total carbon cost analysis over the lifetime of the installations: Direct and indirect GHG emissions expressed in CO2-eq are taken into account in line with the IPCC Scope 1, 2 and 3 boundary conditions.

The CO2-eq metric is utilized as the benchmark to measure innovation made toward the development of carbon efficient integrated solutions. This metric demonstrates value to our customers by justifying an investment in a best-in-class solution not just because it is reducing the operating costs over the lifetime of the installation but because it is also minimizing the financial risk of a direct and indirect carbon contribution: investing in a carbon efficient solution makes our customers less vulnerable against hydrocarbon scarcity, tensions on energy prices, and government regulations and taxation.

VWS works with its customers to perform such financial analysis by evaluating the direct and indirect economic impact of CO2 reduction.

By committing to the innovative development of environmentally conscious water technologies and solutions worldwide, VWS will continue to maximize the financial benefits for every customer.

Jean-Michel Herrewyn
VWS - Chairman & Chief Executive Officer

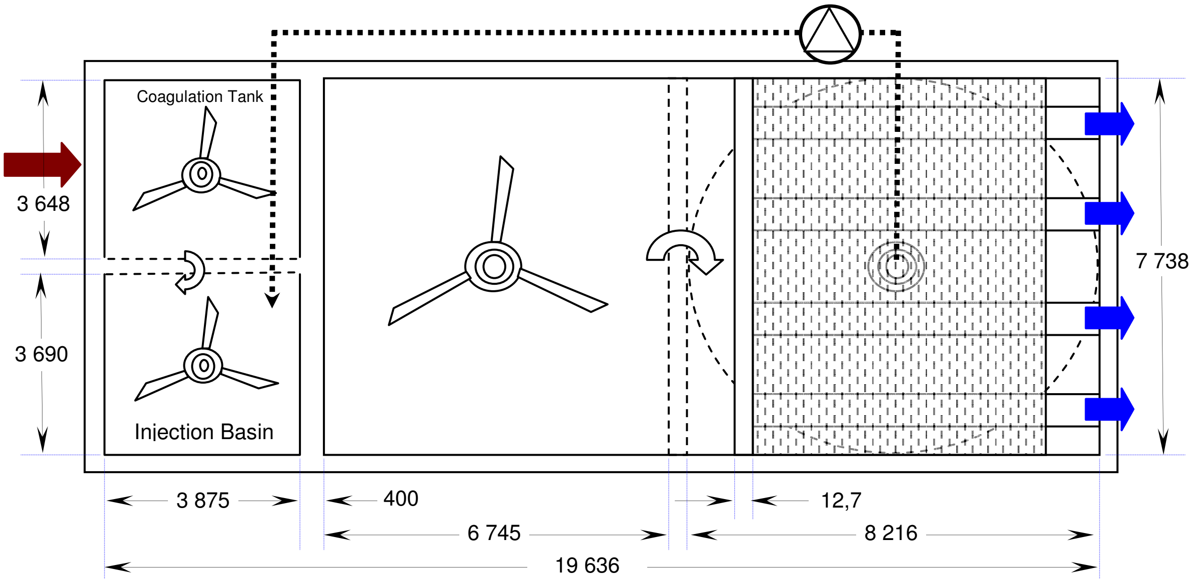
ACTIFLO© SKETCH

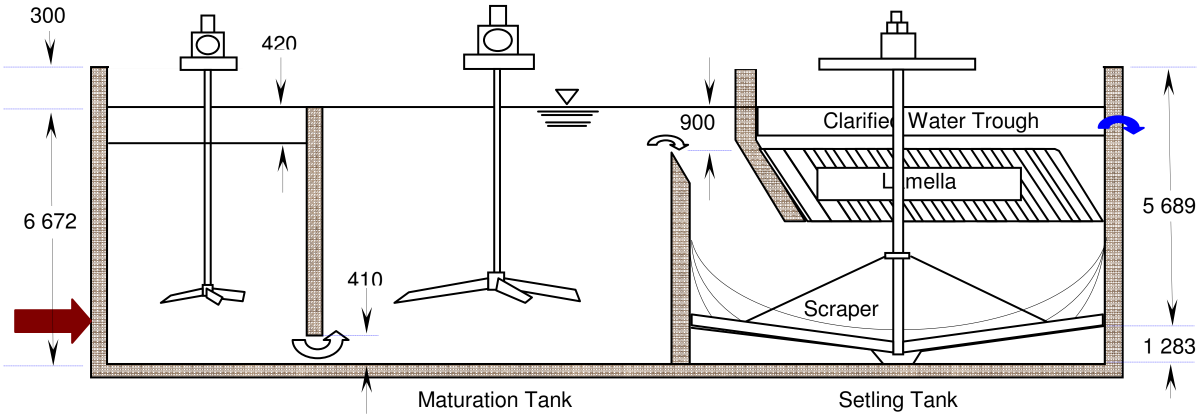
Project:	TOWN OF BRADFORD, BRADFORD WPCP	Project No:	10TO43
Scenario:	TERTIARY TREATMENT	Revision:	A

Desing Parameters:

Nominal Flowrate:	64,8	MLD
Maximum Flowrate	64,8	MLD

Unit Capacity:	64,8	MLD
Redundancy:	100,0	%
Number of unit(s):	2	
Rise Rate:	60	m/h





Note: Dimensions in mm

David Wolanski

From: Edwards, Brian R. [EdwardsB@bv.com]
Sent: January 18, 2012 3:05 PM
To: Mike Ainley
Subject: FW: Bradford WWTP Upgrades

pic30113.gif 61298898-R02.pdf 61298554-R02.pdf 61298565-R01.tif pic15907.gif DOC003.PDF

From: Marc Hunt [mailto:marc.hunt@alfalaval.com]
Sent: May 4, 2011 4:09 PM
To: Edwards, Brian R.
Cc: Holakoo, Ladan; Niriella, Dhananjaya P.; Anup Jagadeesh
Subject: Re: Bradford WWTP Upgrades

Hi Brian:

If we consider 1/3 of what was supplied to Waterloo we can look at a single MEGA RDT as shown below (Waterloo have ordered 3). Very rough budget would be $177 KCAD which would include all controls motors, vfds flocc reactor and some startup services. It does not include a service platform, feed or discharge pumps or polymer system.

Experience with this unit is that it will easily thicken WAS from 0.9%ww to 4-5%ww TWAS at about 20 lps which represents about 650 kg/hr ds.

Please let me know if I can provide further details or if you would like to speak on the details.

Next size smaller unit is a MAXI RDT and it will handle 11 lps which represents about 360 kg/hr ds.

I look forward to working with you and your team

Best Regards
Marc Hunt

(Embedded image moved to file: pic15907.gif)

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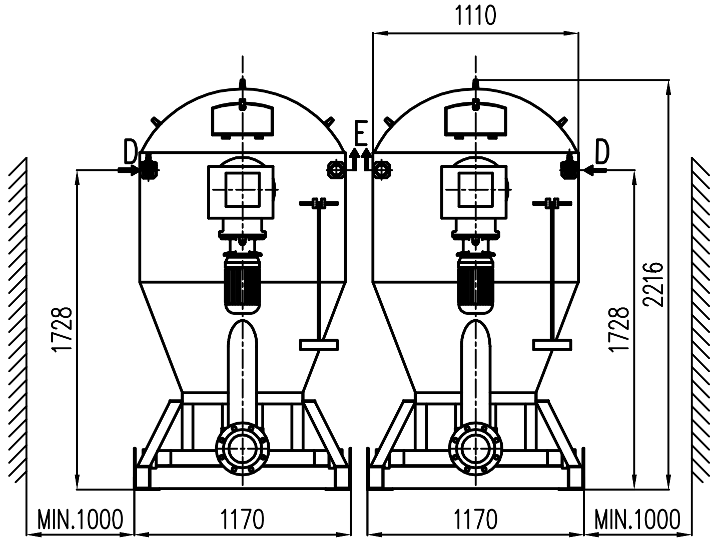
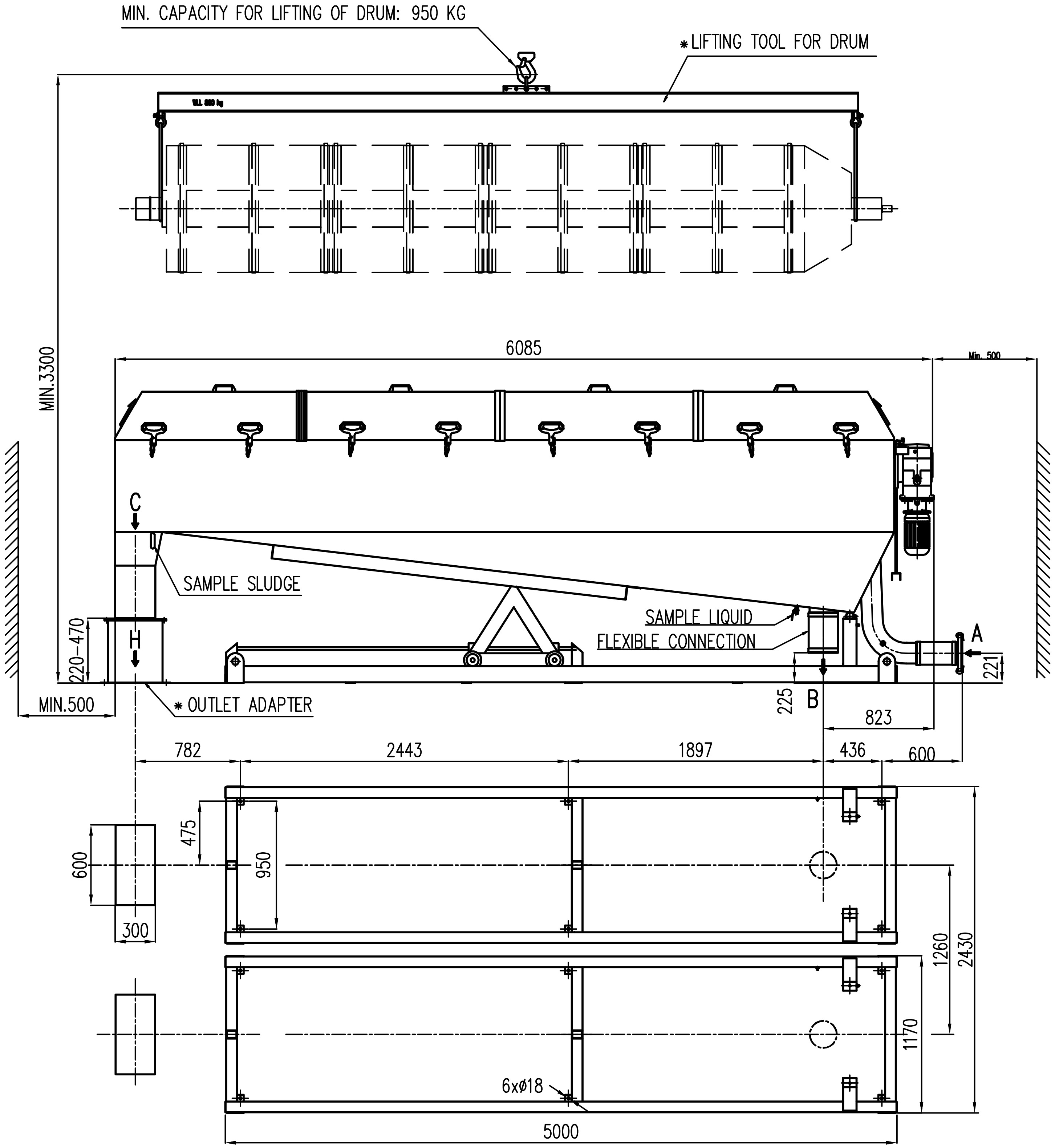
www.alfalaval.ca - alfacan.info@alfalaval.com

MAX. WEIGHT, FULL: 4500 KG. FOR EACH MEGA
MAX. WEIGHT, EMPTY: 2000 KG. FOR EACH MEGA





CONNECTIONS

		ISO	ANSI
A	FEED INLET	FLANGE DN150/PN16	FLANGE 6" 150 LBS
B	LIQUID OUTLET	PIPE Ø204	PIPE Ø204
C	SOLIDS OUTLET	RECTANGULAR 300x600	RECTANGULAR 300x650
D	FLUSH WATER INLET	1" ISO	1" NPT
E	VENTILATION HOLE	PIPE Ø63	PIPE Ø63
H	OUTLET ADAPTER	RECTANGULAR 350x660	RECTANGULAR 400x660

ALL CONNECTIONS MUST BE FLEXIBLE

*OPTIONAL EQUIPMENT

Rev. No.	Revision text	Date	Drawn	Checked	Appr.
02	Connection to ANSI added	23.01.2007	PLE	JHD	JHD
01	FLUSHVALVE CHANGED AND BEAN WIEGHT	10.01.2006	PLE	JHP	JHP

Title
DIMENSIONED DRAWING
ALDRUM MEGA DUO

Proj. No
Proj. Type
Proj. Name

Dimensions Without Tolerances: ISO 2768–M or ISO 13920–B
Size A1
Location Alfa Laval Copenhagen A/S – Denmark
Date 30.08.2002
Drawn LAN
ISO Method E
Scale 1:20
Checked FMI
Approved FMI
Sheet
Drawing No 61237519
Rev. 02

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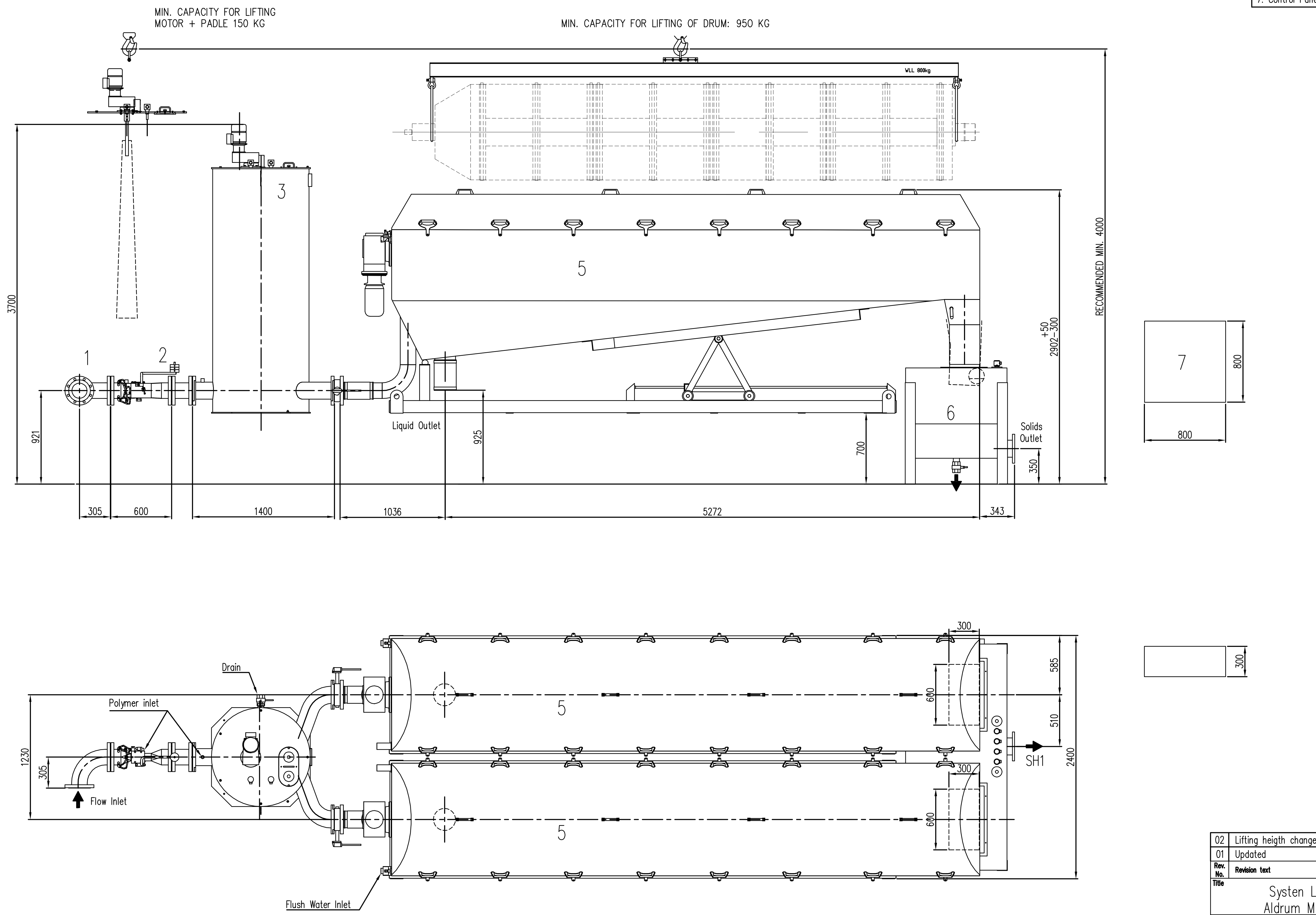
BASICS:	WEIGHT
1. Tube Bend 90°	15 KG
2. Mixing Valve (MV)	16 KG
3. Flocculation Reactor (FR)	350 KG (Empty) 2100 KG (Full)
5. Drum Thickener for each Mega (DT)	2000 KG (Empty) 4500 KG (Full)
6. Sludge Hopper (SH)	300 KG (Empty) 1800 KG (Full)
7. Control Panel	150 KG

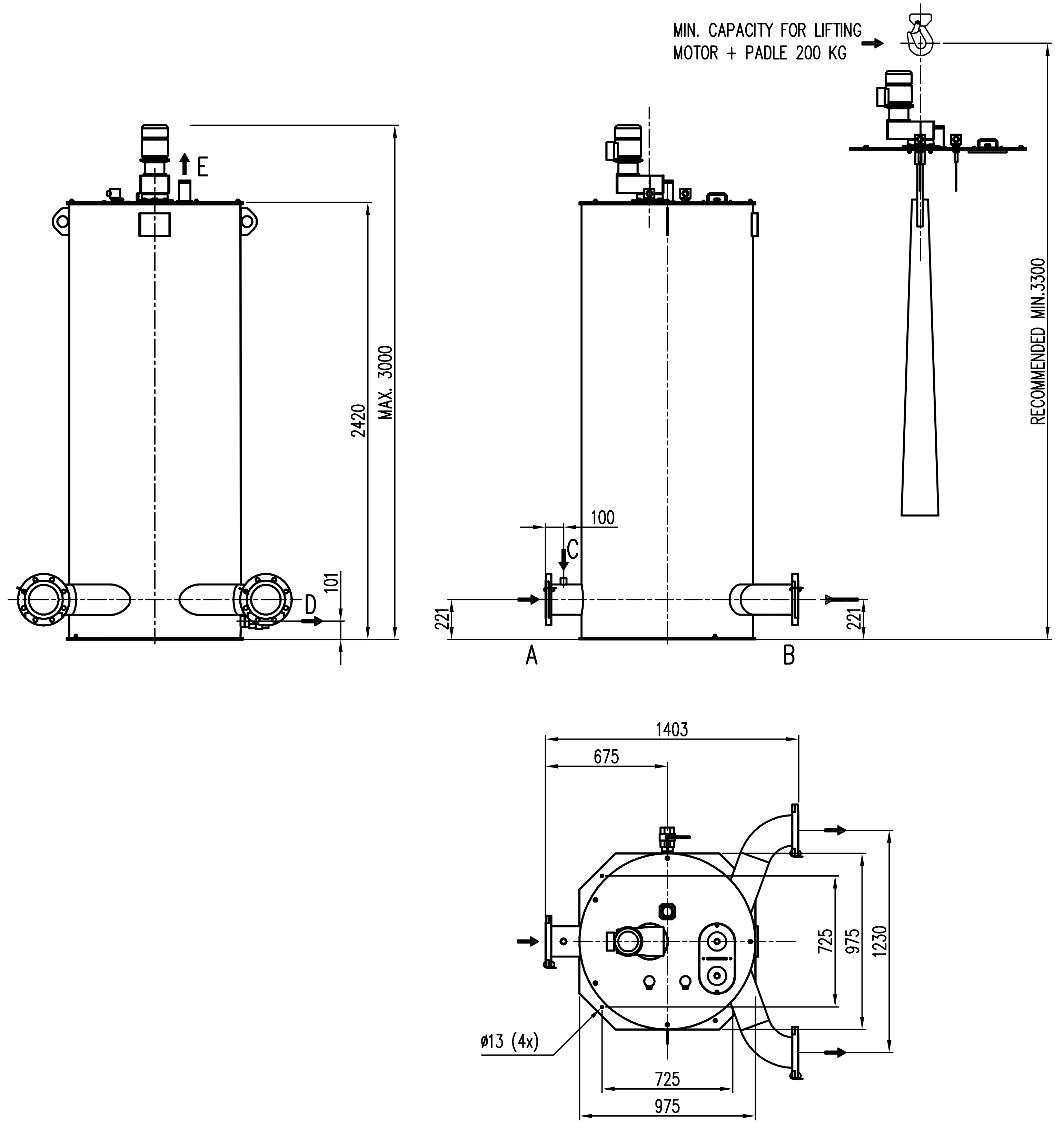


02	Lifting heigth changed	19.03.2007	PLE	JHD	JHD
01	Updated	29.01.2007	PLE	JHD	JHD
Rev. No.	Revision text	Date	Drawn	Checked	Appr.

Title
Systen Lay-out
Aldrum Mega Duo

Proj. No
Proj. Type Mega Duo
Proj. Name
Dimensions Without Tolerances: ISO 2768-M or ISO 13920-B
Size A1
Date 19.06.2006
Drawn PLE
ISO Method E
Scale 1:20
Checked JHP
Approved JHP
Sheet
Location Alfa Laval Copenhagen A/S - Denmark
Drawing No 61298898
Rev. 02

O:\PT\05 Drawings\6129\61298898-R02.dwg, DKSOPLE



CONNECTIONS

		DIMENSION / ISO TYPE	DIMENSION / ANSI TYPE
A	FEED INLET	DN150/PN16/FLANGE	6" ANSI FLANGE 150lbs
B	SLUDGE OUTLET	DN150/PN16/FLANGE	6" ANSI FLANGE 150lbs
C	POLYMER INLET	ISO 228-G3/4	3/4" NPT
D	DRAIN OUTLET	ISO 228-G2	2" NPT
E	VENTILATION	Ø63,5	2 1/2"

MAX. WEIGHT, FULL: 2100 KG

MAX. WEIGHT, EMPTY: 350 KG

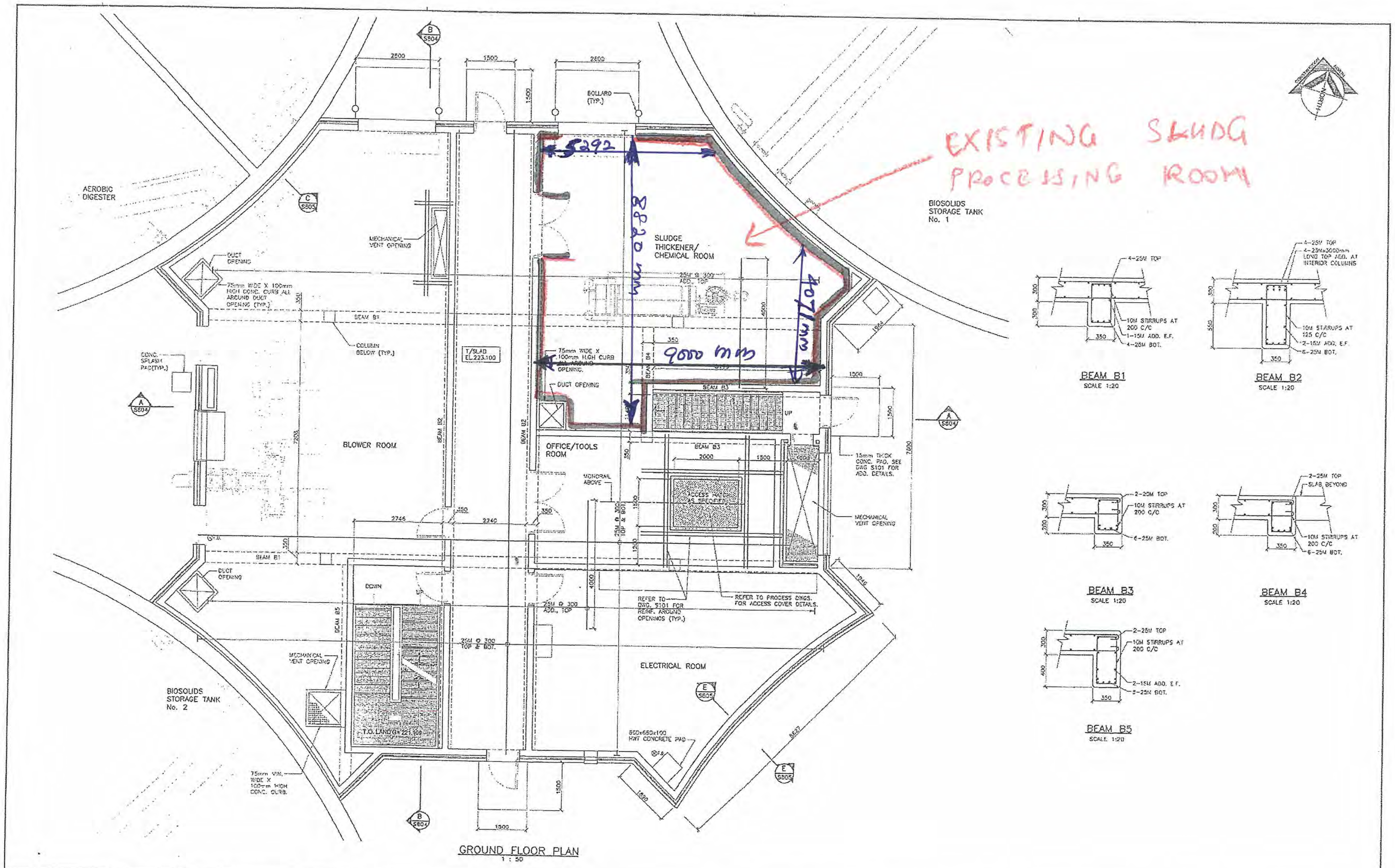
Rev.	Revision text	Date	Drawn	Checked	Appr.
02	Lifting heigth changed and updated	01.05.2007	PLE	JHD	JHD
1	Connections table updated.	05.10.2004	MWR	JHP	JHP

Title
DIMENSION DRAWING
FLOCCULATION REACTOR

Proj. No
Proj. Type MEGA DUO
Proj. Name STAND ALONE

Dimensions Without Tolerances: ISO 2768-M or ISO 13920-B
Size A2
Date 07.06.2004
Drawn MWR
ISO Method E
Scale 1:20
Checked JHP
Approved JHP
Sheet

Location
Alfa Laval Copenhagen A/S - Denmark
Drawing No 6129 8554
Rev. 02



GROUND FLOOR PLAN

1 : 50

R. B. BAKER

R. C. GILLESPIE

TSH
engineers
architects
planners
Totten Sims Hubicki Associates (1997) Limited

300 Water Street
Whitby, Ontario
L1N 9J2
TEL: 905-668-9363
FAX: 905-668-0221
E-mail tsh@tsh.ca
www.tsh.ca

No.	DATE	BY	ISSUES / REVISIONS
3	MAR/06	RBB	ISSUED FOR TENDER
2	JAN/06	RBB	ISSUED FOR MOE REVIEW
1	DEC.08/05	RBB	ISSUED FOR CLIENT REVIEW (90% SUBMISSION)

CLIENT:
TOWN OF BRADFORD
WEST GWILLIMBURY

DRAWN BY: D. RICHMOND	CHECKED BY: N.D. LeBLANC
DESIGNED BY: R.GILLESPIE	APPROVED BY: R.B.BAKER
SCALE: AS NOTED	DATE: DEC./05

PROJECT:
BRADFORD WPCP EXPANSION - PLANT D
PROJECT No. W140

DRAWING:
STRUCTURAL
AEROBIC DIGESTERS
GROUND FLOOR PLAN

PROJECT No.: 52-27737

DRAWING No.: S803

3200 Lloydtown-Aurora Rd.
Kettleby, Ontario
L0G 1J0

PRIESTLY
DEMOLITION INC

tel. 905.841.3735
800.263.2076
fax. 905.841.6282
info@priestly.ca
www.priestly.ca

Demolition • Hazardous material abatement • Asset recovery & salvage • Brownfield remediation

May 16, 2011

Black & Veatch
50 Minthorn Blvd, Suite 103
Markham, Ontario L3T 7X8

Phone: (905) 747 -8506 ext 14 Cell: (416) 525-2587 E-Mail:edwardsb@bv.com

Attn: Brian R. Edwards

Re: Demolition of Plant A – Bradford WWTP – 225 Dissette Street, Bradford

We are pleased to submit our budget quotation to provide demolition services as requested. The following proposal includes the removal and disposal as required for the above noted project and is outlined as follows:

SCOPE OF WORK:

- Remove and dispose of existing plant A buildings.
- Remove and dispose of existing footings and foundations.
- Slope excavation area.
- Provide fast fence for duration of demolition.

Budget Price: $120,000.00 H.S.T.

EXCLUSIONS:

- H.S.T.
- Removal & disposal of hazardous materials. / Designated substance survey, (required for demolition)
- Making good / disconnection of services / permits / shoring / bracing / layouts /
- Cleaning of tank / pumping of liquids / sludge /

Thank you for the opportunity to provide you with the above proposal. We look forward to working together for a safe and successful project.

Best Regards,

Alan Casey
Priestly Demolition Inc.

P10-05-47

env
TREATMENT SYSTEMS INC.
70 High Street, Etobicoke, Ontario, Canada M8Y 3N9
Tel: (416) 503-7639 Fax: (416) 503-8925 E-mail: envinc@interlog.com

BUDGET ESTIMATE

TO Black & Veatch
103-50 Minthorn Blvd
Markham, ON L3T 7X8
ATTN. Brian Edwards, P.Eng.
TEL. 905-747-8506 x 14
REF. Bradford-West Gwillimbury
WWTP Expansion

OUR REF. 949
DATE 13 May 2011
ORDER SHIPPED BY 16 weeks after approval
SHOP DRAWINGS 3 – 4 weeks ARO
FREIGHT Included to jobsite
TAXES Not included

We are pleased to offer the following estimate for supply of:

QTY	DESCRIPTION	AMOUNT
	BYPASS CHANNEL MECHANICAL BAR SCREEN	
1	WTP Equipment Corp. model SL100 Mechanical Bar Screen for installation by others into existing 990 mm W x 1160 mm D bypass channel, as per Scope of Supply dated 29 March 2011.	$ 89,860.00
	OPTIONAL ADDERS	
1	Bar Screen Auto Lubrication	$ 4,500.00
1	Level Controller option 1 – Milltronics Multiranger ultrasonic	$ 3,200.00
1	Level Controller option 2 – NEMA 7 float switch	$ 700.00
	SCREENINGS CONVEYING SYSTEM	
LOT	WTP Equipment Corp. model CPW20 Screenings Washing Dewatering Press, 3000 mm nominal conveying length, and model C20 Screenings Conveyor, 6900 mm nominal conveying length, as per Scope of Supply dated 29 March 2011.	$ 103,800.00
	OPTIONAL ADDER	
1	Screenings Bagger	$ 2,800.00
	GRIT CLASSIFIER	
1	Mabarex model 228x3048 Grit Classifier, c/w: shafted carbon steel conveyor screw 228 mm diameter x 3048mm long 6 mm flights with hard facing on the leading edge and the outer 25mm of the face; constant speed gear reducer and Class 1, Division 1 motor; 304SS hopper tank & u-trough 4.7 mm th. and 304SS supports, 6 mm th; sectional, bolted FRP sheet covers over hopper tank and u-trough.	$ 56,100.00

Yours Truly,

EPikovnik
Edward M. Pikovnik, P.Eng.
Sales Manager

This estimate is in Canadian dollars and is valid for 90 days from the date shown.

WTP EQUIPMENT CORP. E-mail: wtpcorp@interlog.com
83 Nuggett Court, Brampton, Ontario, Canada L6T 5H2 (905) 799-3403 Fax. (905) 799-6638

SCOPE OF SUPPLY

MECHANICAL BAR SCREEN

Town of Bradford West Gwillimbury WWTP
Headworks Expansion
WTP Ref. 949
29 March 2011

We propose to supply one (1) model SL100 Mechanical Bar Screen as described below and as generally shown on drawing no PA1001.

APPLICATION

Front-cleaned, front-return mechanically cleaned reciprocating bar screen for wastewater screening having a stationary, rake-cleaned bar rack with 10 mm (3/8") slot size (clear opening).

ADVANTAGES

- High capacity heavy duty rake scoops and lifts screenings and grit from the foot of the bar rack;
- Rake articulates (swings out backwards) at discharge to allow efficient screenings discharge into receiving conveyor;
- Rake provides full depth bar rack cleaning whereby the entire slot depth between bar rack flatbars is cleaned on each pass of the rake;
- Chain & sprocket drive system located above maximum water level – only rake arm is submerged during cleaning operation;
- Components are heavy duty industry standard and easily available – no proprietary drive mechanisms;
- Efficient screening operation in vertical installations.

PERFORMANCE	Flow rate per screen	m^3/d	23,000	46,000
		MGD	6.1	12.2
		l/s	266	532
	Screen blinding	%	30	30
	Upstream depth	mm	450	736
	Estimated headloss	mm	90	136
	Downstream depth	mm	360	600
	Freeboard	mm	710	424
	Channel upstream velocity	m/s	0.60	0.73
	Channel downstream velocity	m/s	0.75	0.90

DIMENSIONS	CHANNEL	990 mm W x 1160 mm D (existing bypass channel) Frame recesses are required in channel sidewalls to minimize headloss.
	BAR RACK	990 mm W x 1100 mm H
	FLOW DEPTH	Maximum design depth of flow 450 mm.
	DISCHARGE	Chute clearance is 990 mm above the operating floor; 2150 mm above the channel invert.
	INCLINATION	Screen inclination is 75E to horizontal.

WEIGHTS

Total estimated machine operating weight is < 1000 kg.

GEARMOTOR

AGMA II class, shaft-mounted helical gear reducer, SEW Eurodrive model FA57-GAM143, 110:1 ratio, 5310 in-lb torque rating, 1.500" hollowbore c/w US Motors direct coupled, constant speed, 0.56 kW (3/4 HP), 1.15 SF, 575VAC/3/60, 1800 rpm, CSA approved, class F insulation, 143-TC, energy efficient TEXP motor and Stearns or equal brake approved for Class 1, Division 1, Group D hazardous environment; gearmotor SF = 3 based on design loading, nameplate SF 1.8; nominal rake speed is 5.6 m/min. (18 fpm); cycle time (without pause) is 1 minute.

DRIVE SYSTEM

No moving parts other than the rake are submerged under design conditions. The fully submersible carriage-mounted rake is driven by two (2) minimum 10 kN (2,400 lb.) ANSI rated load conveyor roller chains, each running over two (2) shaft-mounted sprockets, and includes: four (4) replaceable, non-corrosive rollers to run on screen frame guide tracks. Solid steel drive shaft, supported by two (2) flange mounted bearings, connects to conveyor chain and sprocket system through two (2) minimum 8.8 kN (1,980 lb.) ANSI rated load drive chains and sprockets. One driven sprocket is provided with a Tsubaki, or equal, power-lock for chain alignment. Lubrication points not easily accessible are provided with non-metallic extensions terminating 1200 mm (4') above the operating floor.

BAR RACK

Removable bar rack of welded rectangular flatbars, provided with: (1) top mounting bracket; (2) side seals; horizontal support(s); invert anchor plate.

CLEANING RAKE

Spring loaded, replaceable L-shaped rake of 10 mm (3/8") thick plate steel provided with individual teeth to clean the front and full side depth of the bar rack bars over the full bar rack width. Screenings unload from the rake onto a rear mounted discharge chute by a pivoting rake scraper having a replaceable 10 mm (3/8") thick UHMW-PE blade. Rake automatically swings out behind the deadplate to discharge screenings onto the chute with a minimum 4" (100 mm) horizontal clearance between the deadplate apex and rake tip to eliminate hang-up of screenings on the deadplate.

FRAMEWORK

Self-supporting structural screen frame of steel plate is provided with: interior guide tracks for the carrying and return trajectories of the rake; horizontal cross bracing; deadplate extending from the bar rack to a discharge chute; two (2) floor anchor plates.

MATERIALS OF CONSTRUCTION

Framework &	minimum 6 mm (1/4") thick 304 stainless steel
Deadplate	4.8 mm (3/16") thick 304 stainless steel
Discharge chute	3 mm (1/8") th. 304 stainless steel
Bar Rack	6 x 38 mm (1/4" x 1.5") 304 stainless steel flatbars
Rake, carriage & scraper	304 stainless steel
Drive shaft	304 stainless steel
Drive mounting plates	A-36 carbon steel, epoxy coated
Chains & sprockets	carbon steel, hardened
Anchors & assembly hardware	stainless steel (Imperial)

FINISHING

Non-stainless fabricated steel components are finish painted with chemical resistant self-priming epoxy. Drive unit is provided with manufacturer's standard finish for washdown/severe duty application.

OVERLOAD PROTECTION

Drive system overload protection provided by a Tsubaki, Electromatic, or equal, Current Sensing Relay - drive motor power will be shut off and warning initiated upon overload.

Mechanical torque overload assembly provided on drive unit c/w one (1) NEMA 7 inductive sensor - drive motor power will be shut off and warning initiated upon overload.

LIMIT SWITCHES

Mounted on the screen framework are: one (1) NEMA 7 Reverse Enable limit switch; one (1) NEMA 7 Rake Pause inductive switch.

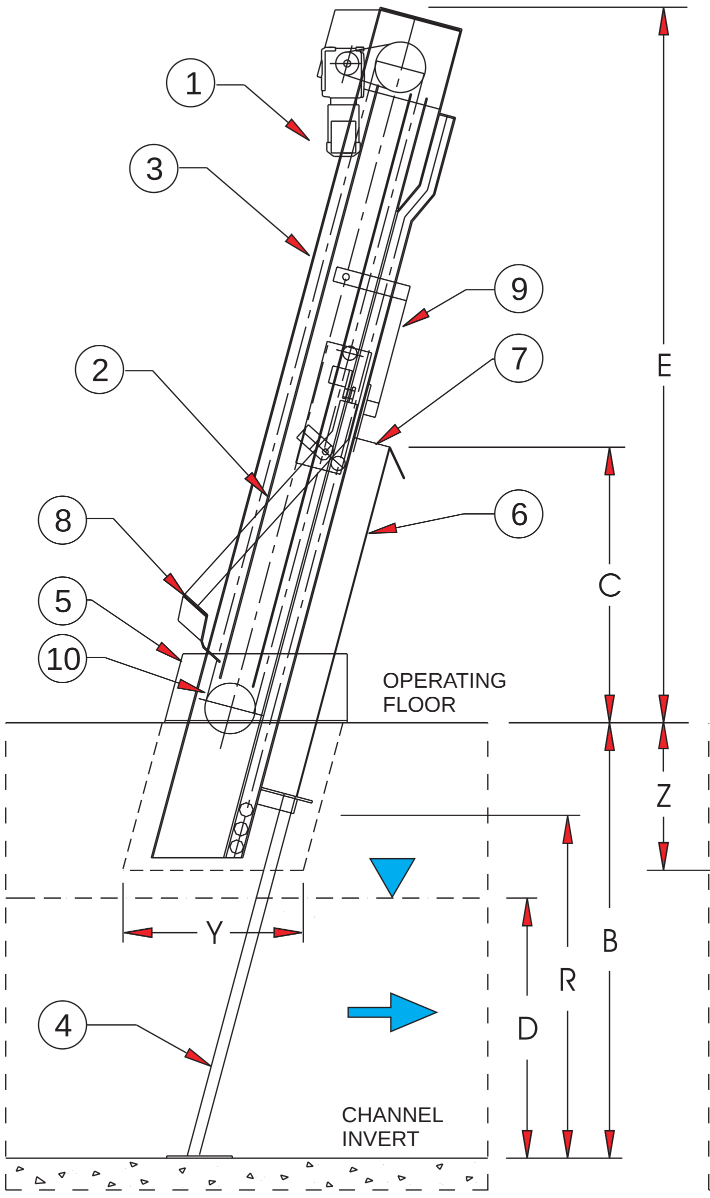
CONTROL SYSTEM

One (1) 575VAC/3/60 **REMOTE** NEMA 4X (corrosion-proof) control enclosure of 304 SS, c/w: (1) "E-STOP" pushbutton; (1) ea. "SYSTEM ON", "RUN FORWARD", "MOTOR OVERLOAD" & "TORQUE OVERLOAD" indicator lights; variable "PAUSE" timer w/ provision for timer override due to an external high level signal; contacts for remote control

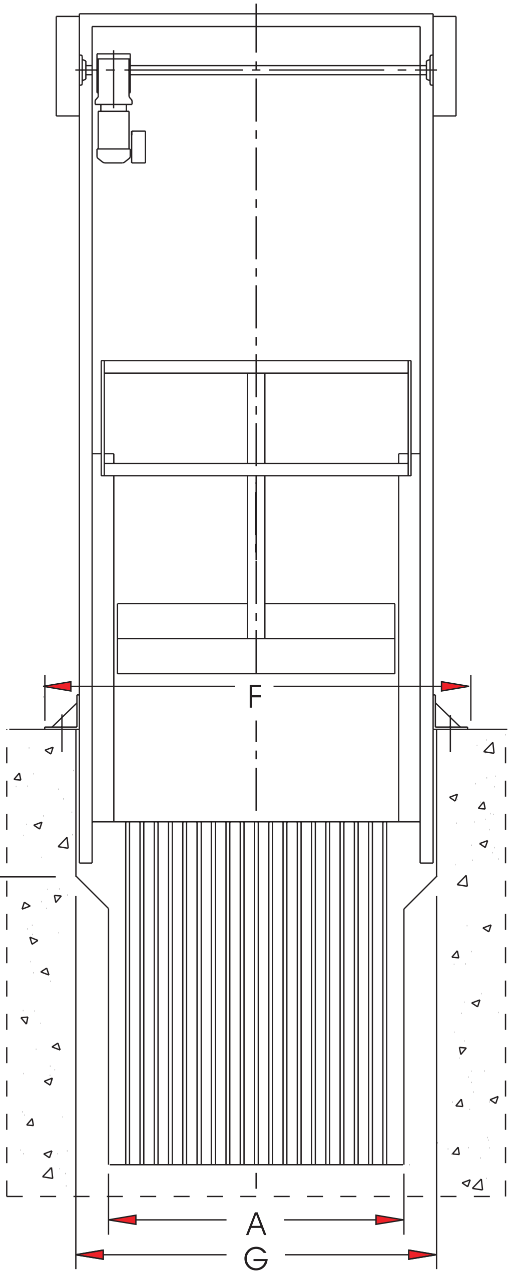
	in A (automatic) mode; 600 VAC disconnect switch; reversing IEC motor starter with thermal overload protection; fused control power transformer. One (1) **LOCAL** 120VAC/1/60 cast AL pushbutton station for Class 1, Division 1, Group D hazardous environment, c/w: (1) ea. "H-O-A" and “FOR.-OFF-(momentary) REV.” selector switch; (1) ea. "RESET" & "E-STOP" pushbuttons; "SYSTEM ON" (white) indicator light.
MANUALS	Installation and O&M Manuals and drawings are included.
EXCLUSIONS	The following are not included and are to be supplied by others as required: equipment off-loading from carrier & installation; concrete work; field applied coatings; wiring & conduit between controls, sensors/ switches, motors and mains; process/ drain/ feed/ piping & fittings; discharge collection bins/ extension chutes; fences, handrails, gratings, walkways, railings, channel coverings, etc.; permits/ certificates/ reviews; appurtenances for field testing; vibration & performance testing (if required); local disconnects and electrical controls other than as specifically included above; spare parts..

OPTIONAL ADDERS

BAR SCREEN AUTO LUBRICATION	120VAC/3/60 NEMA 7 Chain Lubrication System is provided to continuously lubricate conveyor chains during operation, c/w: 4 L lubricant storage reservoir; 6 mm 304 SS interconnecting piping; dual stainless steel lubricant applicators. Conveyor chain sprocket bearings are each provided with an automatic lubricant dispenser suitable for Class 1, Division 2, Group D environment, c/w: user controlled operation; status monitor/operation indicator; refillable lubricant reservoir.
LEVEL CONTROLLER	To provide for continuous operation in response to high water level in automatic mode: OPTION 1 - One (1) Milltronics Multiranger Plus, or equal, ultrasonic level controller is included, c/w: two (2) NEMA 7 transducers each with 6 m (20') cable and 304 SS mounting bracket; NEMA 4 processor in polycarbonate enclosure; provided loose for installation by others. OPTION 2 - One (1) Flygt model ENM-10 or equal NEMA 7 float switch c/w 304 SS mounting bracket and 6 m (20') cable is provided loose for installation by others.



SIDE VIEW



FRONT VIEW

MODEL	SL100
BAR RACK SLOT WIDTH	10 mm (3/8”)
INCLINATION (to horizontal)	75°
POWER SUPPLY	575VAC/3/60
MOTOR SIZE	0.56 kW (3/4 HP)

DESIGN DATA

Z	WALL RECESS DEPTH	590 mm
Y	WALL RECESS LENGTH	700 mm
R	BAR RACK HEIGHT	1100 mm
G	WALL RECESS WIDTH	1290 mm
F	MAXIMUM WIDTH	2090 mm
E	MAXIMUM HEIGHT	2740 mm
D	DEPTH OF FLOW	450 mm
C	DISCHARGE HEIGHT	990 mm
B	CHANNEL DEPTH	1160 mm
A	CHANNEL WIDTH	990 mm

DIMENSIONS

10	LOWER SPROCKET	
9	SCRAPER ASSEMBLY	304 SS / UHMW
8	RAKE HEAD	304 SS
7	DISCHARGE CHUTE	304 SS
6	DEAD PLATE	304 SS
5	FLOOR ANCHOR PLATE	304 SS
4	BAR RACK	304 SS
3	FRAME ASSEMBLY	304 SS
2	RAKE ASSEMBLY	304 SS
1	DRIVE UNIT	

COMPONENT LIST

WTP EQUIPMENT CORP.

MECHANICAL BAR SCREEN GENERAL ARRANGEMENT

ALL RIGHTS OF THE OWNER OF THIS WORK ARE RESERVED FOR ALL COUNTRIES.	DATE: 3 / 2011	REF: 949
	SCALE: NTS	DWG:PA1001H

WTP EQUIPMENT CORP. E-mail: wtpcorp@interlog.com
83 Nuggett Court, Brampton, Ontario, Canada L6T 5H2 (905) 799-3403 Fax. (905) 799-6638

SCOPE OF SUPPLY

SCREENINGS CONVEYING SYSTEM

Town of Bradford West Gwillimbury WWTP
Headworks Expansion
WTP Ref. 949
29 March 2011

We propose to supply as described below:

one (1) model C20 Screenings Screw Conveyor,
one (1) model CPW20 Screenings Washing Dewatering Press, and
associated control system.

SCREENINGS SCREW CONVEYOR

PERFORMANCE	APPLICATION	To convey screenings of nominal density 1000 kg/m^3 (62 lb/ft ^{3}).
	CAPACITY	2 m^3/h at 30% loading, 14 rpm.
	INLET	Three (3) inlet chutes provided.
	LENGTH	Total conveying length is 6900 mm (22.6') or as required.
	INCLINATION	2-20° from horizontal, as required.

ADVANTAGES

- Fully enclosed screenings washing, compacting and transport system for safety & containment;
- Drive unit located at low end (pushing drive) to eliminate constriction at discharge;
- U-shaped housing for easy internal access for inspection & maintenance;
- Shaftless screw eliminates maintenance intensive internal shaft and/or bearings which impede material transport;
- Optional discharge bagger available to enclose processed screenings for ease of handling and disposal.

WEIGHT Total estimated shipping weight is < 350 kg.

DRIVE UNIT AGMA II class, hollow-shaft, flange-mounted helical gearmotor, SEW model KAF67-AM or equal, c/w: direct coupled, 0.75 kW (1 HP), 575VAC/3/60, 1800 rpm, class F insulation, NEMA design B, 1.15 SF, continuous duty rated, TEXP motor for severe duty, Class 1, Division 1, Group D hazardous environment; reducer design SF>2; nominal output speed 14 rpm. A packed glandbox drive shaft seal is provided at the screw drive end.

SCREW & HOUSING Shaftless screw, 215 mm (8.5") O.D., 100 % pitch, of steel flatbars, 88 mm (3.5”) flight width x min. 10 mm (3/8”) outer thickness. U-trough, according to CEMA 300 standards, 254 mm (10") inside width, c/w: flanged drive end plate; bolted sectional, removable covers; drive end straight pipe drain connection; drive end view port; replaceable UHMW-PE sheet wear liner; floor supports at 3 m (10') max. interval; top side inlet chutes w/ open front side to receive screenings from bar screens over bypassed existing conveyor; direct discharge.

SCREENINGS WASHING DEWATERING PRESS

PERFORMANCE

APPLICATION	To convey, wash and dewater screenings of nominal density 1000 kg/m^3 (62 lb/ft ^{3}).
CAPACITY	2 m^3/h at 30% loading, 14 rpm.
INLET	one (1) inlet chute provided.
LENGTH	Total conveying length is 3000 mm (9.8') or as required.
INCLINATION	2-25° from horizontal, as required.

ADVANTAGES

- Fully enclosed screenings washing, compacting and transport system for safety & containment;
- Drive unit located at low end (pushing drive) to eliminate constriction at discharge;
- U-shaped housing for easy internal access for inspection & maintenance;
- Shaftless screw eliminates maintenance intensive internal shaft and/or bearings which impede material transport;
- Optional discharge bagger available to enclose processed screenings for ease of handling and disposal.

WEIGHT

Total estimated shipping weight is < 300 kg.

DRIVE UNIT

AGMA II class, hollow-shaft, flange-mounted helical gearmotor, SEW model KAF67-AM or equal, c/w: direct coupled, 0.75 kW (1 HP), 575VAC/3/60, 1800 rpm, class F insulation, NEMA design B, 1.15 SF, continuous duty rated, TEXP motor for severe duty, Class 1, Division 1, Group D hazardous environment; reducer design SF>2; nominal output speed 14 rpm. A packed glandbox drive shaft seal is provided at the screw drive end.

SCREW & HOUSING

Shaftless screw, 215 mm (8.5") O.D., 100 % pitch, of steel flatbars, 88 mm (3.5”) flight width x min. 10 mm (3/8”) outer thickness. U-trough, according to CEMA 300 standards, 254 mm (10") inside width, c/w: flanged drive end plate; bolted sectional, removable covers; drive end straight pipe drain connection; replaceable UHMW-PE sheet wear liner; floor supports at 3 m (10') max. interval; (3) top side inlet chutes w/ flanged connection; strainer assembly; straight pipe discharge tube; inlet drainage screen, drain pan and screw-mounted replaceable screen cleaner.

SPRAY WASH

Spray wash system provided to wash screenings at inlet chutes and strainer consisting of: stainless steel spray header assembly at strainer; bronze spray nozzles; three (3) manually adjustable non-metallic ball valves; (1) 1/2" (13 mm) bronze, NEMA 7, 120VAC/1/60, N.C. electric solenoid valve (shipped loose). Wash water 0.95 - 1.9 L/s (15 - 30 gpm) @ 275 kPa (40 psi) typically required.

CONTROL SYSTEM

PANELS

One (1) **REMOTE** 575VAC/3/60 NEMA 4X (corrosion-proof) control enclosure of 304 SS provided c/w: (1) press spray wash "H-O-A" selector switch; (2) ea. "RESET" & "E-STOP" pushbuttons; (2) ea. "SYSTEM ON", “RUN FORWARD” & "OVERLOAD TRIP" indicator lights; variable "OFF DELAY” timer; contacts for remote control in A (automatic) mode; door interlocked 600VAC disconnect switch; (2) reversing IEC motor starters with thermal overload protection; fused control power transformer.

Each conveyor and press are provided with one (1) **LOCAL** 120VAC/1/60 cast AL pushbutton station for Class 1, Division 1 Group D hazardous environment, c/w: (1) ea. screw "H-O-A" and “FOR.-OFF-(momentary) REV.” selector switch; (1) ea. "RESET" & "E-STOP" pushbuttons; "SYSTEM ON" (white) indicator light.

OVERLOAD PROTECTION

Drive system overload protection provided by Current Sensing Relay, Electromatic or equal - drive motor power will be shut off and warning initiated upon overload.

GENERAL

MATERIALS OF CONSTRUCTION	Housing, strainer, discharge & chute(s)	1/8" (3 mm) th. 304 stainless steel
	Cover	14 ga. (2 mm) 304 stainless steel
	Supports	1/4" (6 mm) th. 304 stainless steel
	Drive shaft assembly	carbon steel shafting. painted
	Screw	hardened cold rolled alloy steel, painted
	Anchors & assembly hardware	stainless steel (Imperial)

FINISHING

Non-stainless fabricated steel components are finish painted with chemical resistant self-priming epoxy. Drive unit is provided with manufacturer's standard finish for washdown/ severe duty application.

MANUALS

Installation and O&M Manuals and drawings are included.

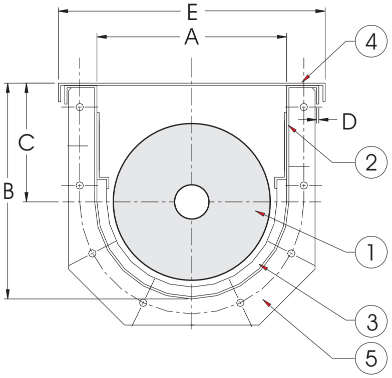
EXCLUSIONS

The following are not included and are to be supplied by others as required: equipment off-loading from carrier & installation; wiring & conduit between controls, sensors/ switches, motors and mains; process/ drain/ feed/ piping & fittings; discharge collection bins/extension chutes; fences, handrails, gratings, walkways, etc.; permits/ certificates/ reviews; electrical controls other than as specifically included above; spare parts; performance & vibration testing (if required).

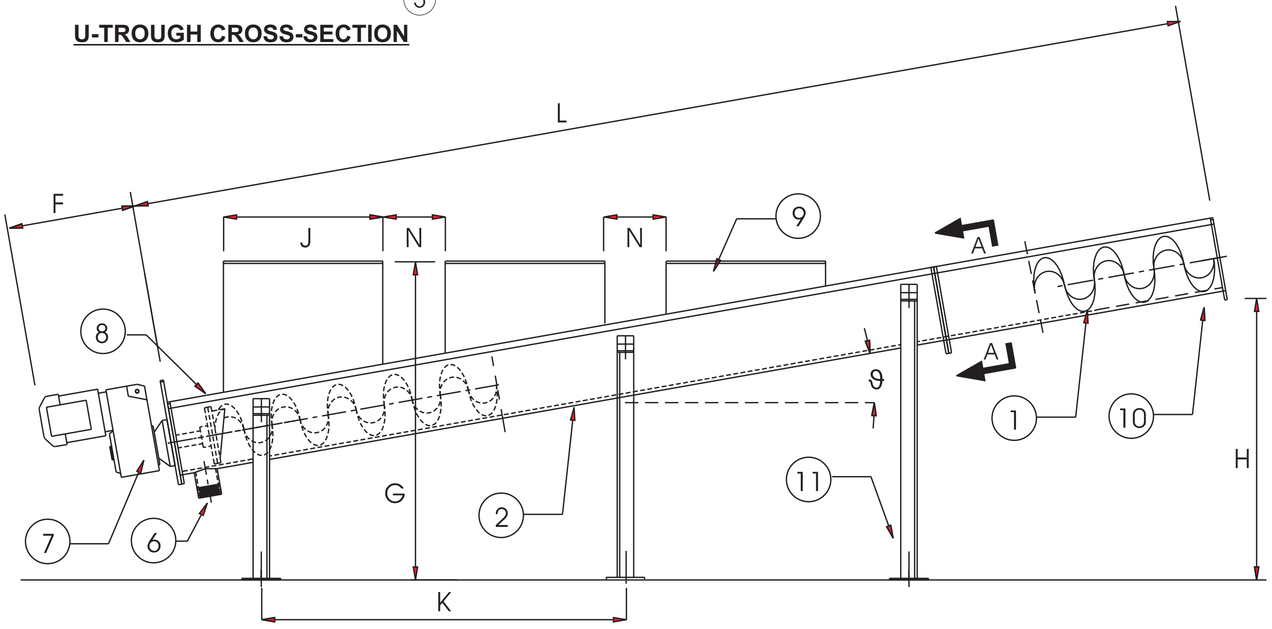
OPTIONAL ADDER

SCREENINGS BAGGER

Discharge Bagger, located on dewatering press discharge tube, consisting of a compressed magazine of continuous polyethylene tubing stored in a cylindrical non-corrosive housing; one (1) loaded and one (1) spare magazine are included.



U-TROUGH CROSS-SECTION



MODEL	C20
CONVEYED MATERIAL	SCREENINGS
CONVEYING CAPACITY	$2\ m^3/h$
SCREW O.D.	215 mm (8-1/2“)
MOTOR SIZE	0.75 kW (1 HP)

DESIGN DATA

N	INLET SEPARATION	TBA
L	CONVEYING LENGTH	6100 mm (20’)
K	SUPPORT SEPARATION	< 3660 mm (12’)
J	INLET LENGTH	990 mm
θ	INCLINATION	10 -25°
H	DISCHARGE HEIGHT	TBA
G	INLET HEIGHT	990 mm
F	DRIVE LENGTH	500 mm (1’-8“)
E	OVERALL WIDTH	340 mm (13-3/8“)
D	TROUGH THICKNESS	3 mm (1/8“)
C	DROP	156 mm (6-1/8“)
B	TROUGH HEIGHT	286 mm (11-1/4“)
A	TROUGH WIDTH	254 mm (10“)

DIMENSIONS

11	FLOOR SUPPORT, 6 mm (1/4“) 304 SS
10	DIRECT DISCHARGE
9	INLET CHUTE, 304 SS, W/ OPEN FRONT FACE TO RECEIVE SCREENINGS OVER BYPASSED EXISTING CONVEYOR.
8	HINGED VIEW PORT, 304 SS
7	GEARMOTOR
6	DRAIN PIPE (OPTIONAL), 50 mm (2“)
5	TROUGH SECTION FLANGE, 304 SS
4	BOLTED TROUGH COVER, 304 SS
3	TROUGH WEAR LINER, UHMW-PE
2	U-TROUGH, 304 SS
1	SHAFTLESS SCREW, ALLOY STEEL

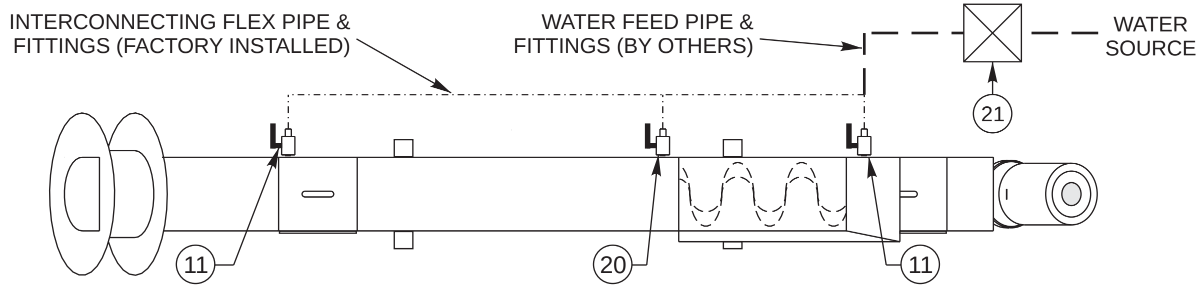
COMPONENT LIST

WTP EQUIPMENT CORP.

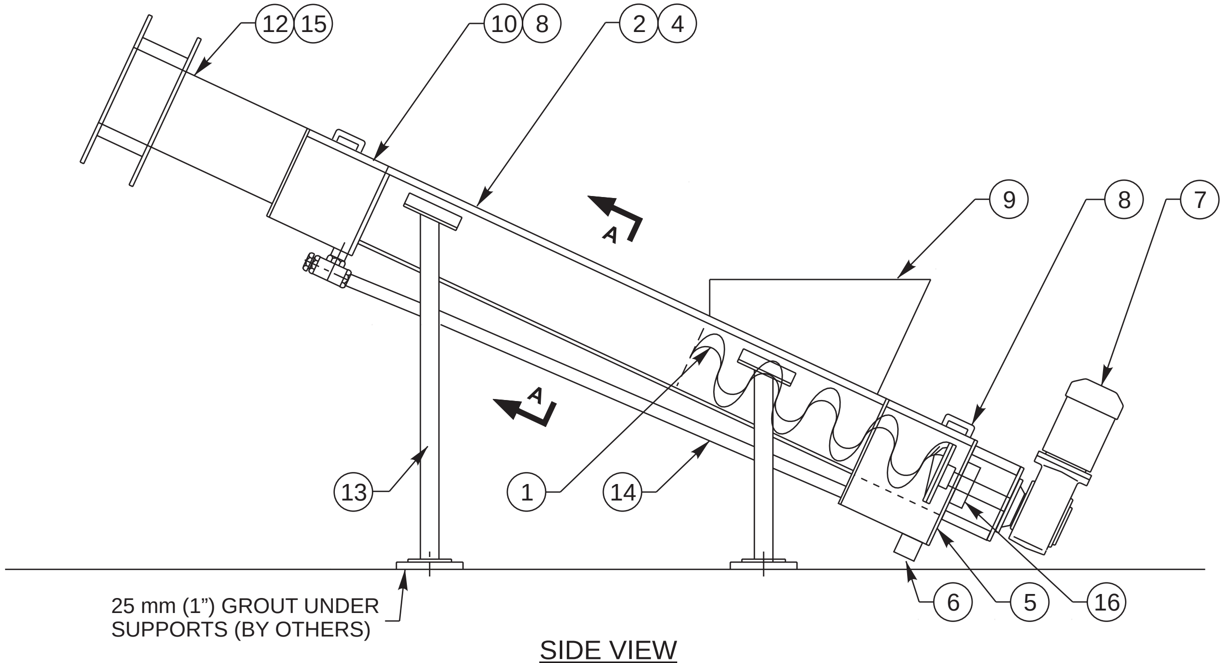
SCALE: NTS
DWG. #: PA1008 D
DATE: 3 / 2011

SHAFTLESS SCREW CONVEYOR
GENERAL ARRANGEMENT

REF #: 949 BRADFORD



PLAN VIEW



SIDE VIEW

NOTE:
1. CONNECT DRAIN OUTLET ⑥ TO EXTERNAL DRAIN. MINIMIZE DRAIN PIPING BENDS TO REDUCE CHANCE OF PLUGGING. PROVIDE DRAIN CLEAN-OUTS AT BENDS. MAINTAIN DRAIN DIAMETER - DO NOT USE SPIGOTS OR REDUCE PIPING DIAMETER AS PLUGGING MAY OCCUR.
2. CONNECT SPRAY WASH FEED PIPING THROUGH SOLENOID VALVE AS SHOWN.
3. DRAWING IS NTS - DO NOT SCALE.

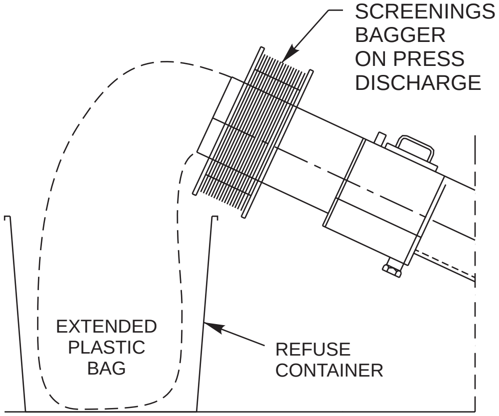
21	SOLENOID VALVE, N.C., 120VAC/1/60
20	INLET CHUTE SPRAY WASHER
16	DRIVE MOUNT & GLAND BOX SHAFT SEAL
15	SCREENINGS BAGGER (OPTION)
14	FLEXIBLE DRAIN PIPE, PVC
13	FLOOR SUPPORT, 6 mm (1/4") 304 SS
12	SCREENINGS DISCHARGE, 304 SS
11	SPRAY WASH INLET W/ MANUAL VALVE
10	DEWATERING STRAINER SECTION, 304 SS
9	INLET CHUTE, 304 SS
8	HINGED VIEW PORT, 304 SS
7	GEARMOTOR
6	DRAIN PIPE, 304 SS
5	INLET WASHER & DRAIN PAN 304 SS
4	BOLTED TROUGH COVER, 304 SS
3	TROUGH WEAR LINER
2	U-TROUGH, 304 SS
1	SHAFTLESS SCREW, ALLOY STEEL

COMPONENT LIST

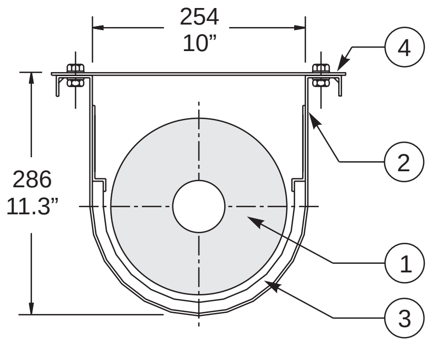
WTP EQUIPMENT CORP.

SCALE:NTS | DATE: 3 / 2011
DWG. #: PA1007W-1
REF: 949 BRADFORD

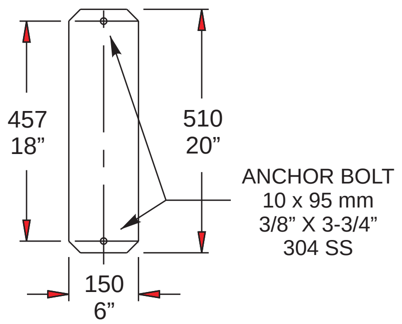
SCREENINGS WASHING DEWATERING PRESS
TYPICAL ARRANGEMENT



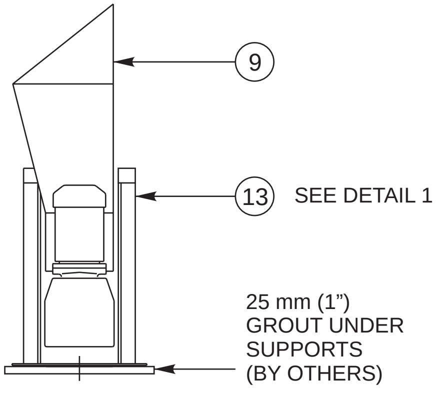
OPTIONAL SCREENINGS BAGGER



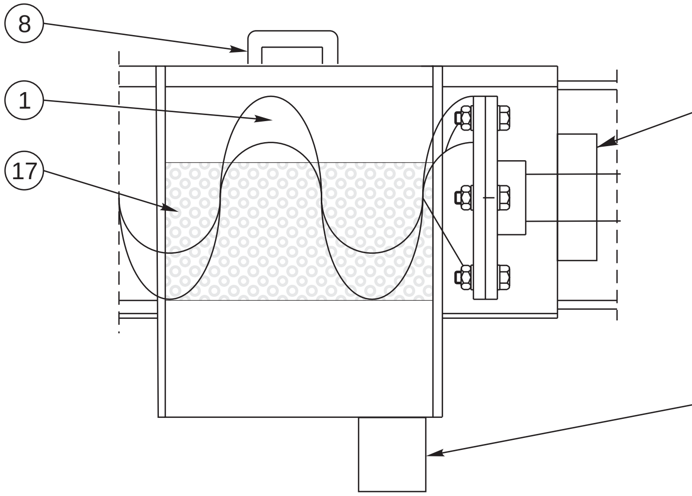
U-TROUGH CROSS-SECTION A-A
WITH UHMW-PE SHEET LINER



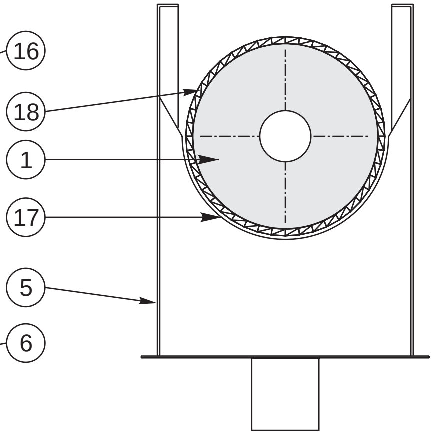
DETAIL 1



CPW20 SUPPORT FOOTPLATE



INLET WASHER SIDE SECTION



INLET WASHER CROSS-SECTION B-B

CONVEYING CAPACITY	1.25 m^3/h (45 ft^3/h)
SCREW O.D.	215 mm (8-1/2“)
MOTOR SIZE (MIN,)	0.75 kW (1.0 HP)

DESIGN DATA

18	SCREW MOUNTED WEARSHOE
17	PERFORATED DRAIN SCREEN, 304SS
16	DRIVE MOUNT & GLAND BOX SHAFT SEAL
13	FLOOR SUPPORT, 6 mm (1/4“) 304 SS
9	INLET CHUTE C/W BACKSPLASH, 304 SS
8	BOLTED ACCESS COVER, 304 SS
6	DRAIN PIPE, 304 SS
5	INLET WASHER & DRAIN PAN, 304 SS
4	BOLTED TROUGH COVER, 304 SS
3	TROUGH WEAR LINER
2	U-TROUGH, 304 SS
1	SHAFTLESS SCREW, ALLOY STEEL

COMPONENT LIST

WTP EQUIPMENT CORP.

SCALE:NTS
DATE: 3 / 2011
DWG. #: PA1007W-2
REF: 949 BRADFORD

SCREENINGS WASHING DEWATERING PRESS
MODEL CPW20
DETAILS

PSI Prolew Inc.
3770A Laird Road, Unit 1
Mississauga, Ontario, Canada   L5L 0A7
Tel.: (905) 820-6330   Fax: (905) 820-6338
www.psiprolew.com

DRESSER ROOTS   Scot Pump A Division of Ardox Corporation   CRANE
ROPER PUMPS   Kinney Vacuum   DELTECH   yamada

To:	Black & Veatch	Date:	June 8,2011
Attn:	Brian Edwards	Email :	brian@psiprolew.com
Quote Ref. :	Q11T213BG	From :	Brian Gabany
Tel:	905-747-8506 ext.14		
Email:	edwardsb@bv.com	Page:	1

Dear Brian:

Further to your request, we are pleased to provide you with the following proposal for your consideration:

(1) only Roots Bare Shaft Blower Model 1016 RAS-J right shaft /bottom discharge with pressure lube system ,water cooled oil cooler (for direct drive) ,also 150HP motor (bare shaft) 444-5T frame TEFC NEMA Premium 1800rpm 575v/3/60.(VFD not supplied)

Price complete as described above ----------------------------- $ 57,702.00 lot

Start Up	N/A	**FOB**	Mississauga, Ontario
Delivery	10-12 weeks	**Terms**	Net 30 days, OAC
Taxes	Extra	**Validity**	30 days

We trust you will find this quotation to your satisfaction and will favour us with this important order.

Regards,
Brian Gabany

ENV TREATMENT SYSTEMS INC.
70 High Street, Etobicoke, Ontario, Canada M8Y 3N9
Tel: (416) 503-7639 Fax: (416) 503-8925 E-mail: envinc@interlog.com

QUOTATION

TO	Black and Veatch	**OUR REF.**	2010-63
ATTENTION	Brian Edwards, P.Eng., Tel: 905-747-8506	**DATE**	5 May 2011
PROJECT	Bradford WPCP	**ORDER SHIPPED BY**	16 - 20 weeks on approval
		SHOP DRAWINGS	4 - 6 weeks ARO
	Turbo Blower(s)	**FREIGHT**	Included to jobsite
		TAXES	Not included

We are pleased to offer the following quotation for the supply of:

No.	Item Name	Qty	Unit Price	Total Price
1	Neuros Turbo Blower(s) – 150 HP, Model NX150-C060, Design Capacity per Blower 2985 SFM, Design Discharge Pressure 8 PSIG	1	$ 138,940.00	$ 138,940.00
			Total	**$ 138,940.00 CDN**

Scope of Supply

1. **Standard Neuros Turbo Blower Package (*Included*)**
   Blower Core with Permanent Magnet Synchronous Motor
   1. High Performance Variable Speed Drive & Inverter – Specifically Tuned for High Speed Motor
   2. Local Control Panel for Control and Monitoring, A-B MicroLogix PLC based
   3. Remote Control capability via Ethernet, LAN or Hard wiring
   4. Built in Sound Enclosure to below 80 dBA silence level
   5. Blow off Valve to blow off air flow during start sequence
   6. Blow off Silencer to silence air flow during start sequence
   7. Temperature Sensors for motor, bearing, inlet and discharge air flow
   8. Pressure Sensors for discharge conditions
   9. Pressure Sensor and alert for air filter condition
   10. Built in Flow Calculation
   11. Built in Speed Measurement
   12. Internal Expansion Joint
   13. Internal vibration and dynamic effect Absorption Mounts
   14. Optional Built in vibration sensor, transmitter and display
   15. Electric Line Reactor to maintain a high power factor
   16. Built in Air Filter to within ten micron filtration
   17. Discharge Duct attached to Turbo Blower

2. **Optional Computers and Software (*Not included unless specified*)**
   A. Master Control Panel to operate multi-blowers
      1. Complete standard computer system, built with its own state of the art technology microprocessor in a self contained enclosure.
      2. MCP operates based on input and output signals to control on line blowers and other flow

equipment based on DO or other operating parameter.

3. Standard Ship Loose Accessories (*Included)*

1. Discharge Check Valve
2. Discharge Butterfly Valve
3. Discharge Duct Expansion Joint

4. Standard Documentation (*Included)*

A. Submittal Information: PDF Electronic File
  1. Bill of Material
  2. Installation Drawings
  3. Electrical and Control Drawings
  4. Operation and Maintenance Manual
  5. Commissioning Instructions

B. Standard Tests

1. Standard Blower Package Functional Acceptance Test	*Included*
2. PTC-10 Factory Performance Test	*Available for additional cost*
3. Optional Functional tests with Plant LC	*Available for additional cost*
4. Operational Aeration System Control functional system test	*Available for additional cost*
5. Factory witnessed testing or additional tests	*Available for additional cost*

5. Spare Parts (*on site)*

A. One set of spares
  1. One (1) set of Air Filter Elements

6. Quality Assurance and Control and Product Certification

A. Neuros Quality Assurance program is ISO 9001 certified
B. Neuros Turbo Blower is UL / CSA certified

7. Warranty

A. Standard Warranty (*Included)*

Comprehensive non pro-rated One (1) year from commissioning date or Eighteen (18) months from delivery, whichever occurs first. Warranty will begin upon successful completion of start-up and certification for full-scale operation by APG-Neuros, or Eighteen (18) months after shipment, whichever occurs first. Under no circumstances will the warranty begin upon “beneficial use”, completion of the project, or acceptance of the equipment as determined by the Engineer or End User.

8. Technical and Spares Support

Technical service personnel as required to support start-up and technical services is available at additional cost.

9. Items Not Included

Installation, main starters, anchor bolts, interconnecting pipe, Electrical & Control Items outside Blower Package, fittings, bolts, nuts, gaskets, wiring valves, taxes and duties, or any other items not specifically listed above.

I trust the information contained within this equipment quotation meets your current needs. Should you require further detail, please do not hesitate to contact this office.

Yours truly,

Ed Pikovnik

Edward M. Pikovnik, P.Eng.
Sales Manager

ENV TREATMENT SYSTEMS INC - TERMS & CONDITIONS OF SALE

VALIDITY	All prices are quoted firm for acceptance within 30 days of the above date, subject to the following Terms and Conditions of Sale.
EXCLUSIONS	The following are specifically excluded from this quotation: off-loading & installation; civil work, foundations, grout, sealants; field applied preparations/coatings; anchor bolts; pipe & fittings; interconnecting wiring & conduit; coverings/gratings, fences, handrails, walkways, etc.; permits/certificates/reviews; service, electrical controls and spare parts other than as specifically included in our Scope of Supply.
TERMS	90% Net 30 days upon shipment from the point of manufacture, 10% upon start-up not to exceed 45 days after delivery, subject to credit approval. Retainers are not allowed. Interest will be charged on past due accounts. Payment terms are independent of, and are not contingent upon, third party contracts or commitments. ENV Treatment Systems Inc. shall in no way be liable for claims, expenditures or losses arising from operational delays or work stoppages or damage to property caused by defective equipment, or for consequential or incidental damages of any nature whatsoever. Holdbacks and back-charges are specifically not accepted by the Seller unless agreed upon prior to acceptance of a Purchase Order. Liquidated charges resulting from holdbacks or back-charges by the Purchaser will be recoverable by the Seller.
DELIVERY	Schedules, as noted herein, are estimated based on current conditions - we do not assume any liability for delay caused by unavailability of materials beyond our reasonable control nor by delays caused by events beyond our direct control.
ESCALATION	This quotation is based upon raw material price and availability at the time of issue of this proposal. Subsequent quotations are subject to revision based upon any change in raw material price and/or availability that is outside of our control. Pricing is subject to escalation for shipments to the point of delivery after 120 days of our receipt of a Purchase Order. Shipments delayed through no fault of our own beyond this period will be charged a minimum escalation amount of 1.5 % per month to the invoiced amount.

QA INTERNATIONAL BS EN ISO 9001:2000 UKAS QUALITY MANAGEMENT

High Efficiency Turbo Blower with Air Bearing

Clean, Compact, Energy-Saving & More ...

APG Neuros

Leader of Turbo Machinery - Development
Creating Clear and Clean Environment

Company Overview
APG-Neuros

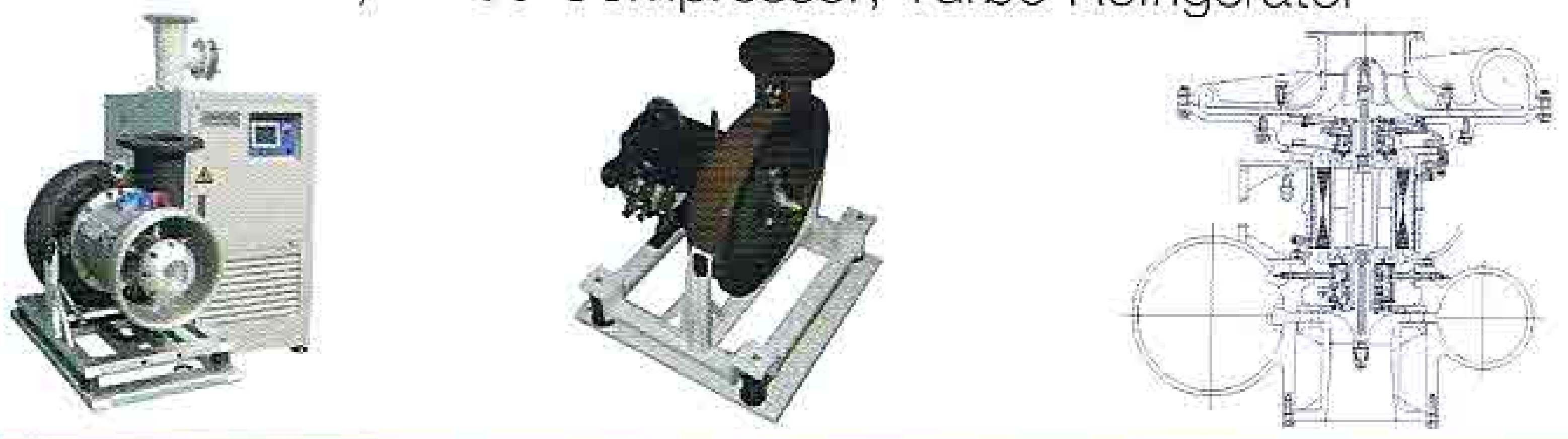
- Name: APG-Neuros
- Business: Design, Manufacturing, Service, Sales
- Product: Turbo machinery and Waste Water Control System
- Address:
  160, Banker Road, Plattsburgh, New York 12901
  Telephone : 518 324-4150 • Toll free : 1 877 717-4150
  Will be located at exit 28 of highway 15 • Michèle-Bohec, Blainville, Québec
  Telephone : 450 939-0799 • Toll Free : 1 866 592-9482
- Homepage: www.APG-Neuros.com

Field of Business

Technology

Air Conditioning

Turbo Blower, Turbo Compressor, Turbo Refrigerator

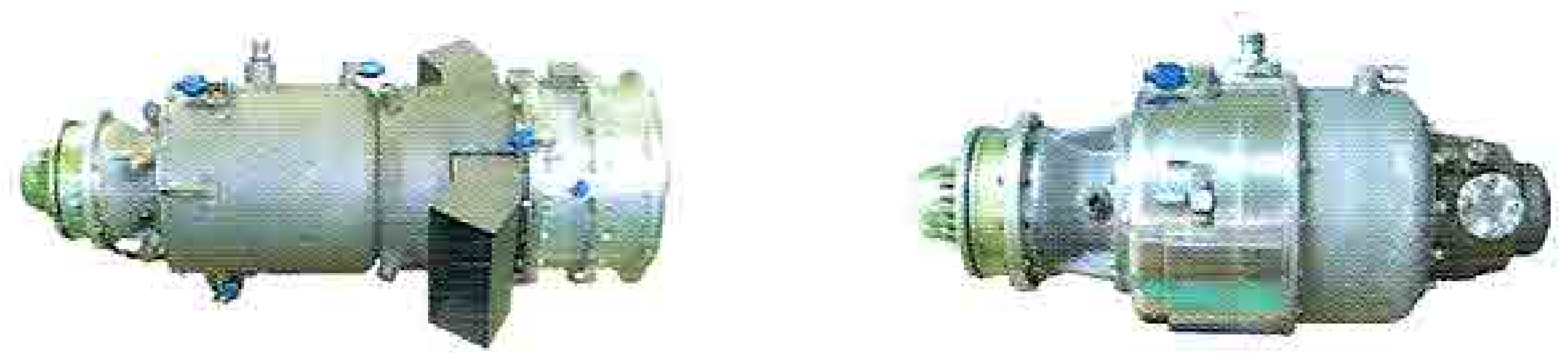


Energy/ Environment

Micro Gas Turbine

Aero Engines

Gas Turbine Engine for UAV



Development Projects

- Turbo pump design for rocket launch vehicle and turbo compressor
- Gas Turbine Engine maintenance and performance simulation S/W
- Turbo Charger performance test for ships
- Propulsion system for UAV
- Test equipment for turbojet and turboprop engines
- Motor and controller for Smart UAV Power System
- Rotor spin test

Technology

- High Efficiency Centrifugal / Axial Flow Compressor Design
- Radial / Axial Flow Turbine Design
- Oil-free Bump Foil Air Bearings
- High Efficiency Permanent Magnet Synchronous Motor Design and Manufacturing
- High Speed Flexible Coupling
- High-precision Flux Measurement / Venturi / Orifice / Nozzle / Belmouth
- Low Emission Diesel / Natural Gas Combuster
- Air Cycle Turbo Refrigeration
- Precision Electronic Control (Flux Control / Velocity Control)
- Gas Ejector (Jet Pump)
- Design and Integration of Complete Aeration Control System

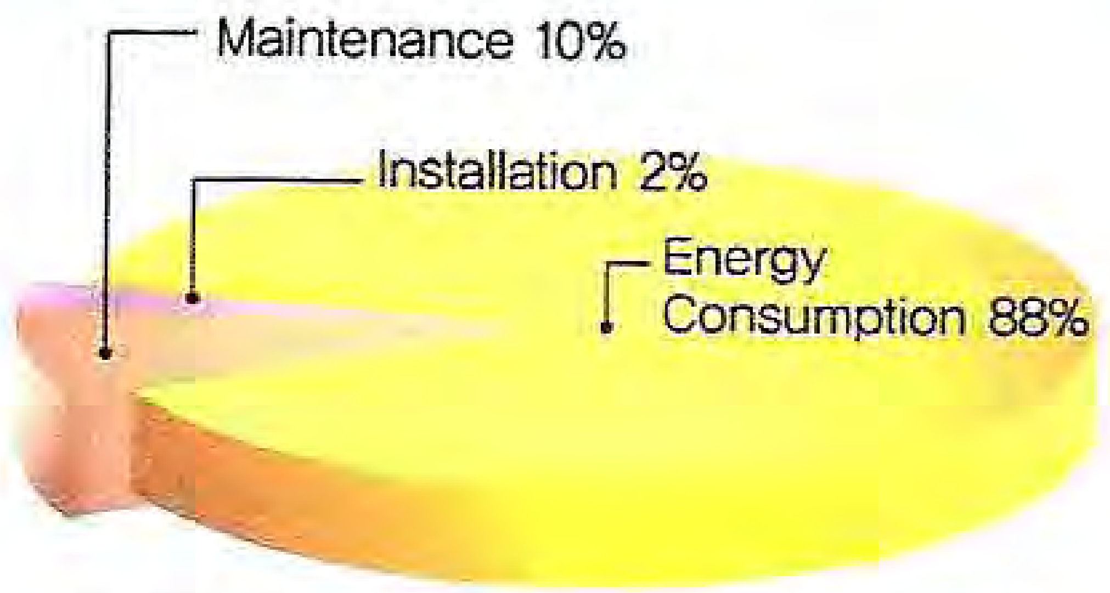
Features and Benefits

Introduction

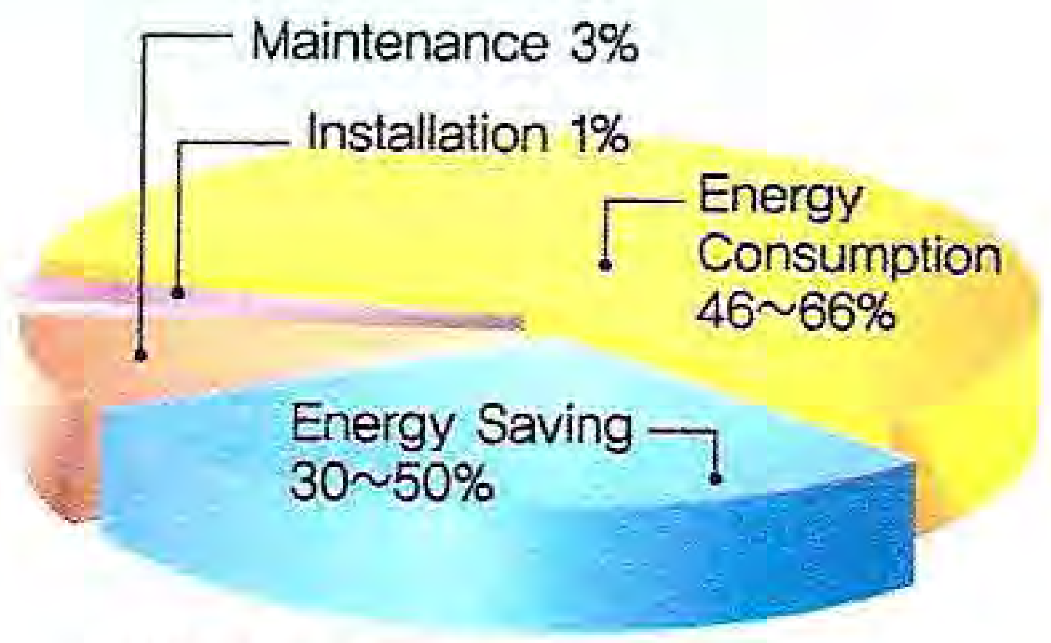
The Neuros Turbo Blower is a "Plug and Play" product that offers high-efficiency in a compact size made possible by combining the latest design technologies of Aeronautic Compressor, Bump Foil Air Bearing and High Speed Permanent Magnet Synchronous Motors (PMSM) with built in Variable Speed Drive and Programmable Logic Controller. Neuros Turbo Blowers can attain flow rates up to 8500 CFM and a discharge pressure up to 42 PSIG with motor horsepower range from 30 to 300 HP. We also offer the "Dual Core" models NX400 (400 HP) and NX600 (600 HP) models that combine two cores within the same enclosure unit to provide flow rates range between 3000 and 17,000 SCFM while maintaining a small footprint compared to conventional technologies with similar flow rates.

1 Energy Efficiency, operating cost savings

- The Neuros Turbo Blower is the most efficient in its class through the use of advanced technologies in aerodynamics, high speed permanent magnet motors and Bump-Foil air bearings along with intelligent use of drive & control technologies.
- Operating cost savings up to 40% are possible when compared to conventional blower, drive and control technologies.



[PD Blower Operating Cost]



[NX Series Operating Cost]

2 Low Noise, Low Vibration

- Neuros' clever enclosure design effectively controls sound propagation and reduces noise levels to 80dB(A).
- Non-contact air bearing having low vibration eliminates need for heavy foundations.
- Patent technology of Noise Trapping System.

3 Reliable, Easy to Install, Outdoor Application

- Extensive testing has proved out the Neuros product reliability in hot environments, vibration, air bearing endurance and impeller spin tests.
- Blower packages are significantly more compact than conventional technologies and simpler to install.
- Outdoor installation package is available.

4 Maintenance

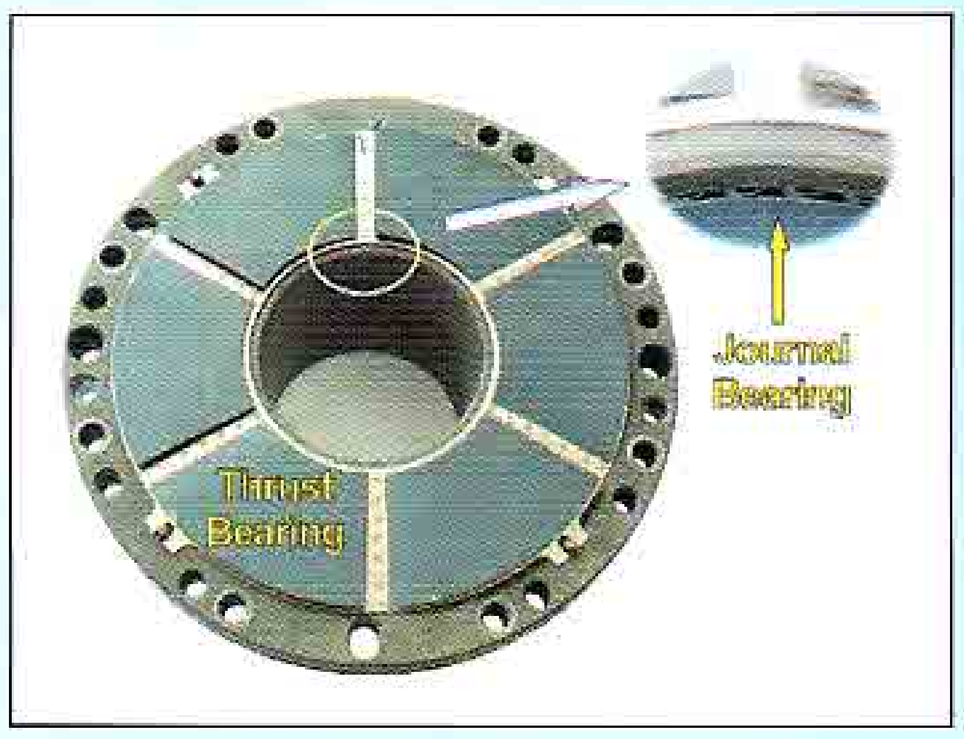
- Regular maintenance involves periodic cleaning or replacing of inlet air filter only, as required.
- Reading operating parameters from user-friendly touchscreen control panel.

5 High Efficiency Impeller Design and Manufacturing

- Ten years of experience designing impellers in aerospace industry.
- Designed with in-house software and 3-D Computational Fluid Dynamics.
- 5-axis machining of solid forging provides higher integrity, tighter manufacturing tolerances, larger diameters and lower speeds all resulting in higher efficiency.
- Production technology permits design of impeller with both axial and radial compression.

6 Oil-free, Non-contact Air Bearing

- No lubricating oil or associated maintenance.
- No contact - Less noise and vibration from rotor during operation.
- 25,000 cycle start-stop endurance test, equivalent to more than twenty years life time in typical operation.
- Patent (air Foil Bearing): No. 10-0604132.

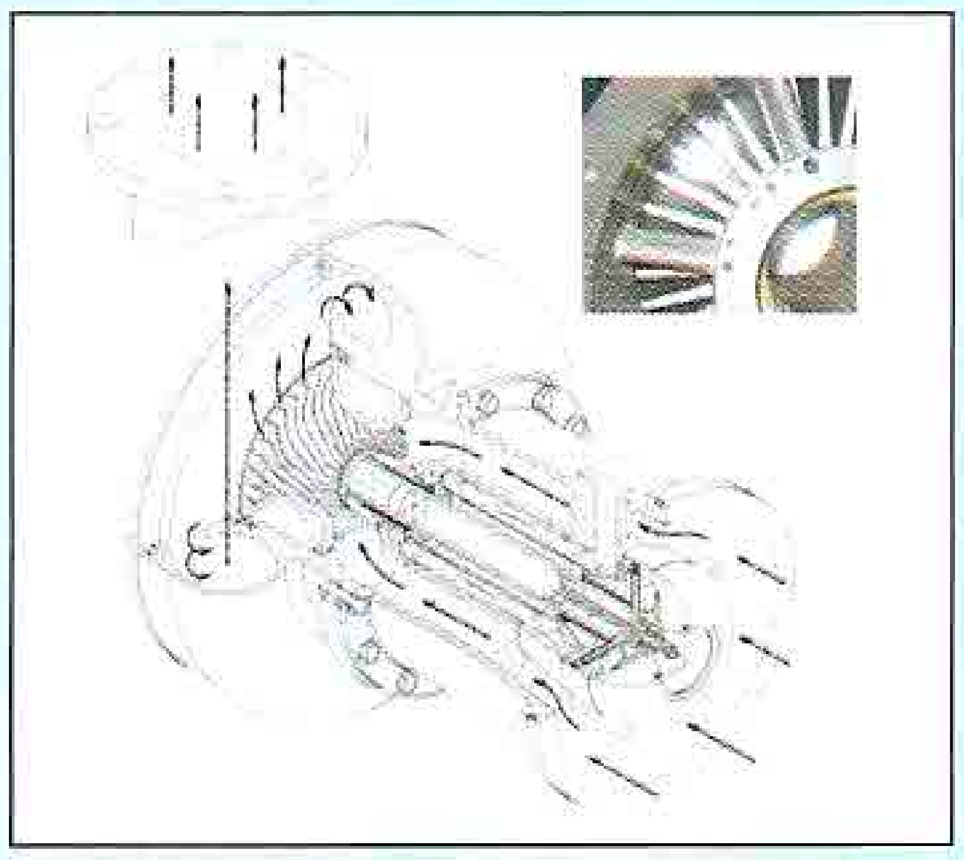


7 Permanent Magnet Synchronous Motor (PMSM)

- Very High Efficiency and power factor.
- Maintains efficiency and power factor in partial load conditions.
- Driven by sinusoidal PWM algorithm lowers motor heat rejection and minimizes cooling requirements.
- High precision motor speed control.

8 Cooling

- Blower core and motor cooled with blower inlet air.
- VFD and control systems cooled by inlet air.
- No heat rejection to blower room.
- Integrated Glycol cooling system in NX200 and NX300 models for higher performance and durability. No external water supply required.
- No auxiliary exhaust systems. (No additional power consumption).
- Patent (Efficient Motor Cooling): No. 10-0572849.



9 Alternate Arrangement Option

- The specially tuned controls and variable frequency drive integrated in our packagd can be built into a separate cabinet and located up to 600 feet away from mechanical section for high ambient temperature or toxic gas environments.

10 Control, Monitoring, Diagnostics

- Integrated Programmable Logic Controller (PLC) makes it possible to run the blower in constant pressure, flow or DO control mode.
- PLC options: Allen Bradley, CIMON, Siemens, GE and Modicon available to suit customer control system.
- Communication protocols include Ethernet, Profibus, Modbus and hard wiring.
- User friendly control, monitoring and diagnostics on touch screen panel to view all process paramaters and blower conditions.

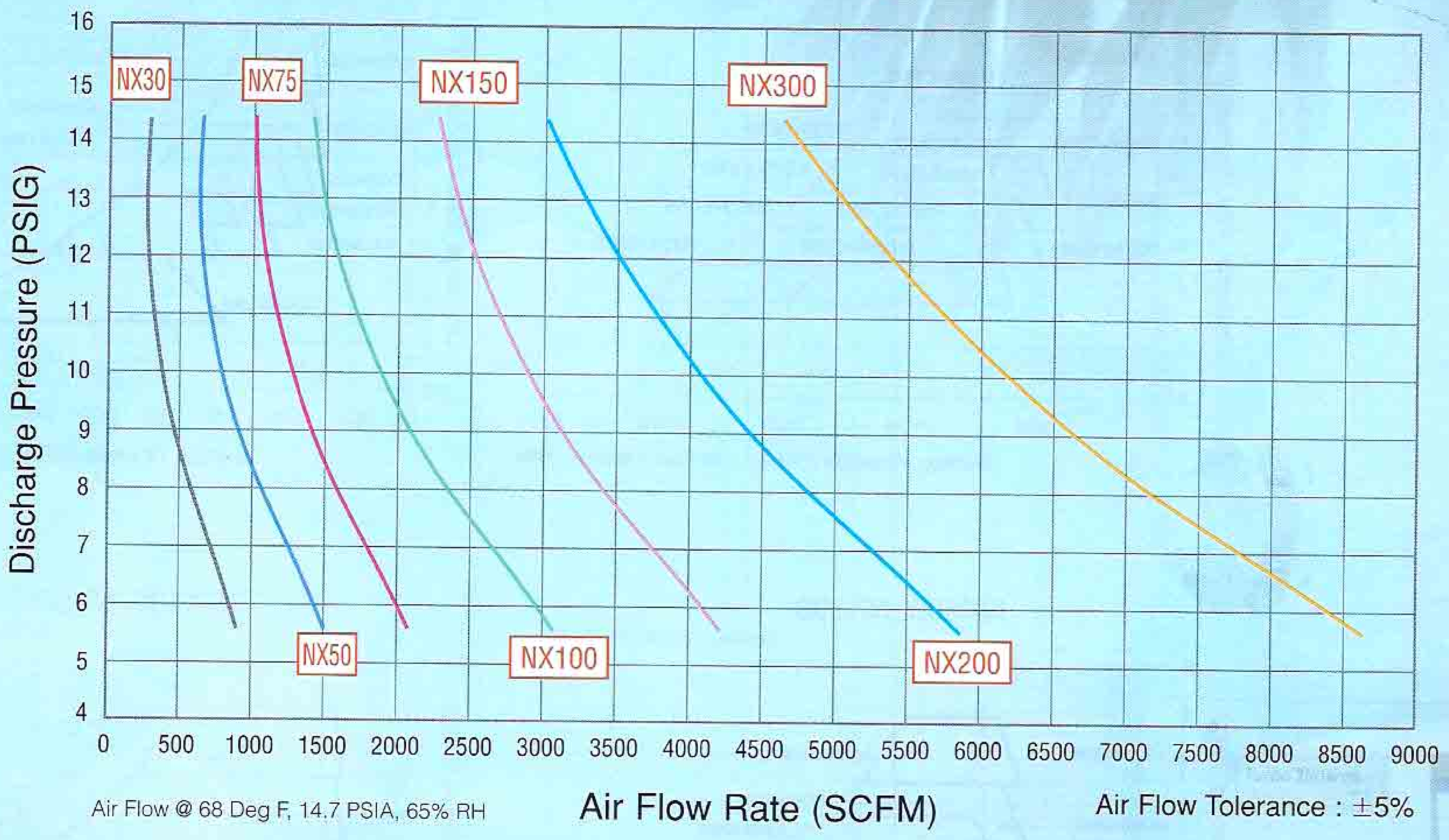
MODEL: NX 100-C080 SITE: Local MODE: Auto Speed

Turbo Blower

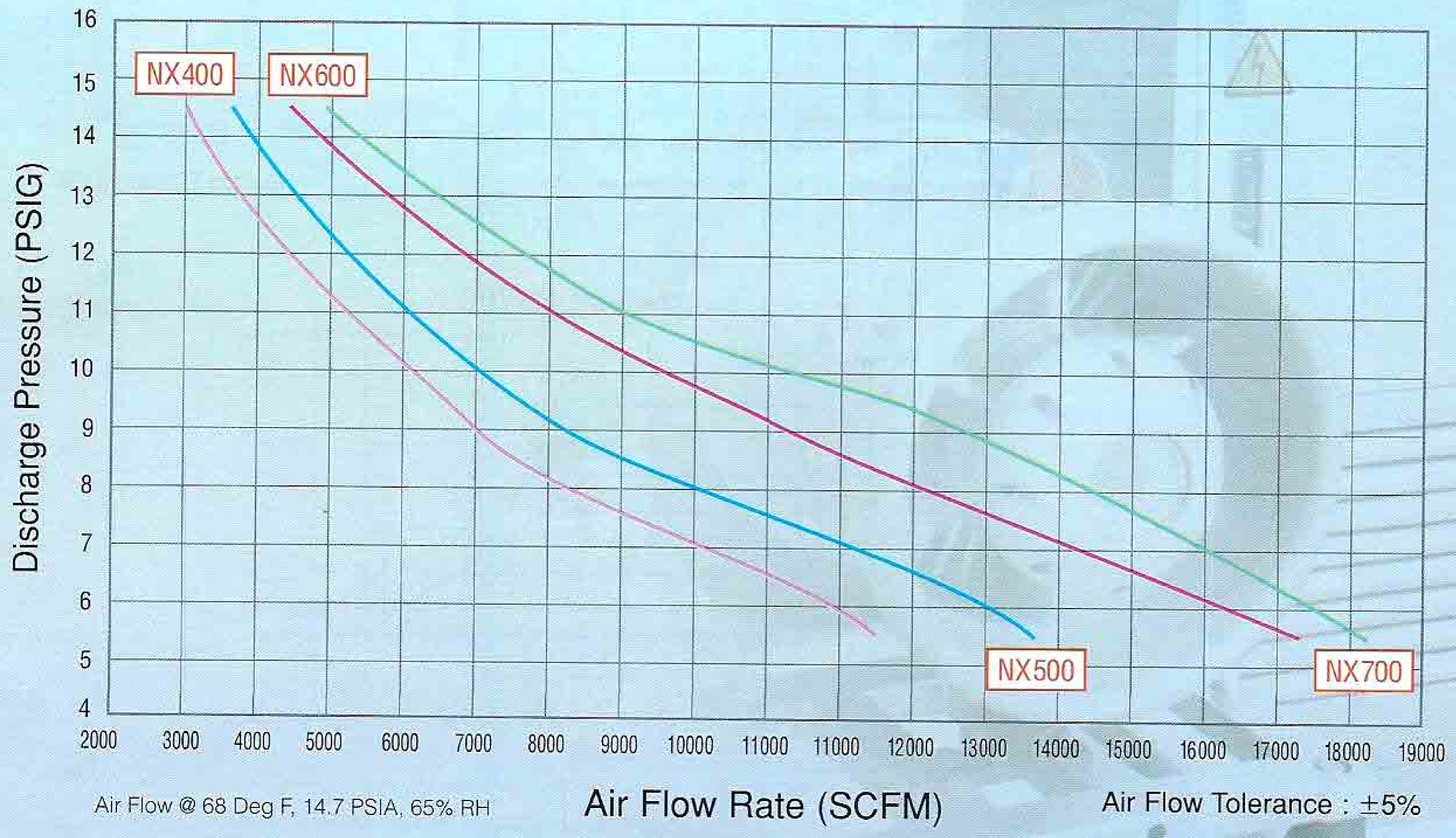
Oil-free, High-efficiency

Performance Characteristics of NX Series

Standard Air Flow Rate of NX Serie Single Core Turbo Blower



Standard Air Flow Rate of NX Serie Dual Core Turbo Blower

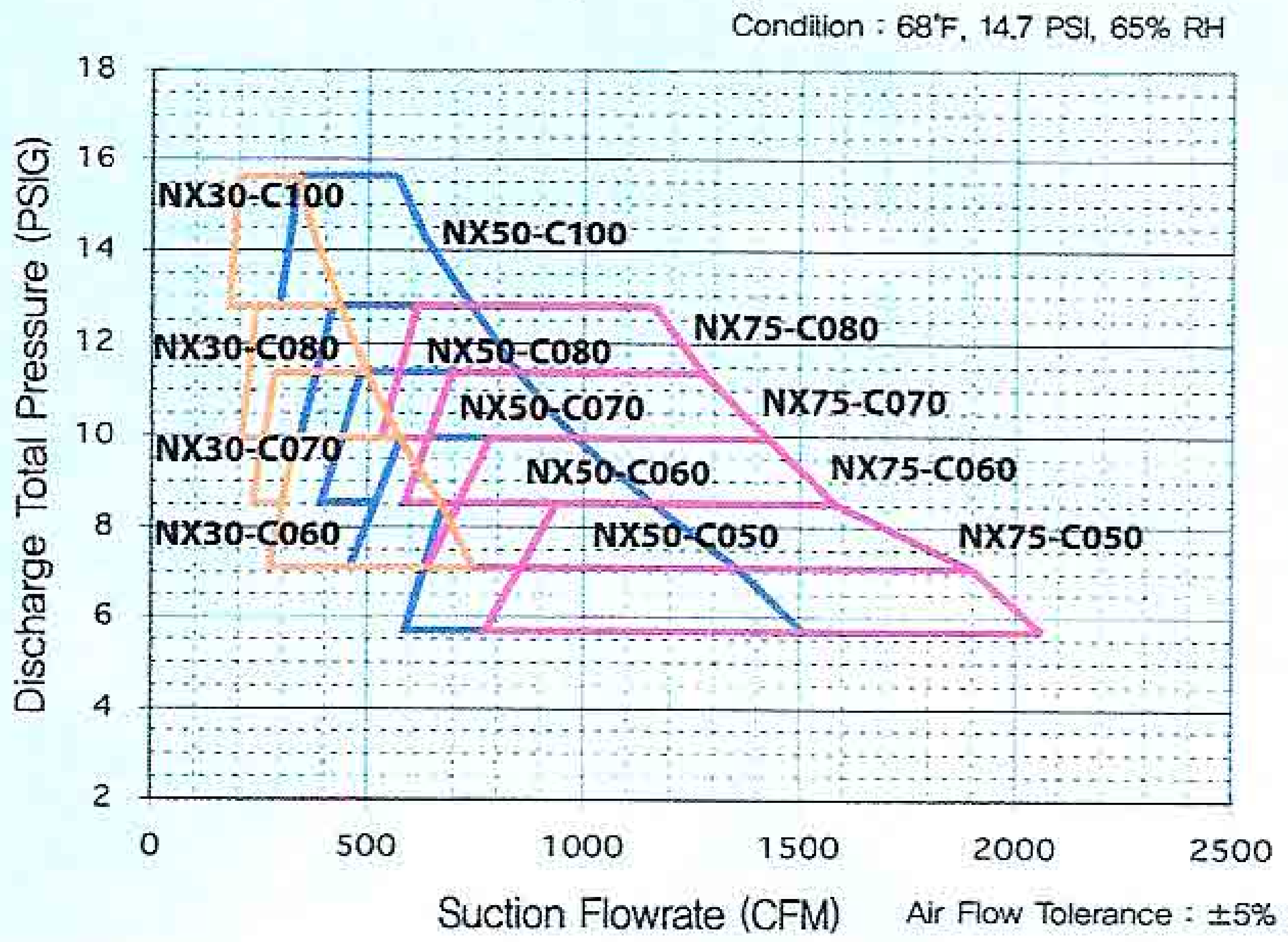


APG–Neuros

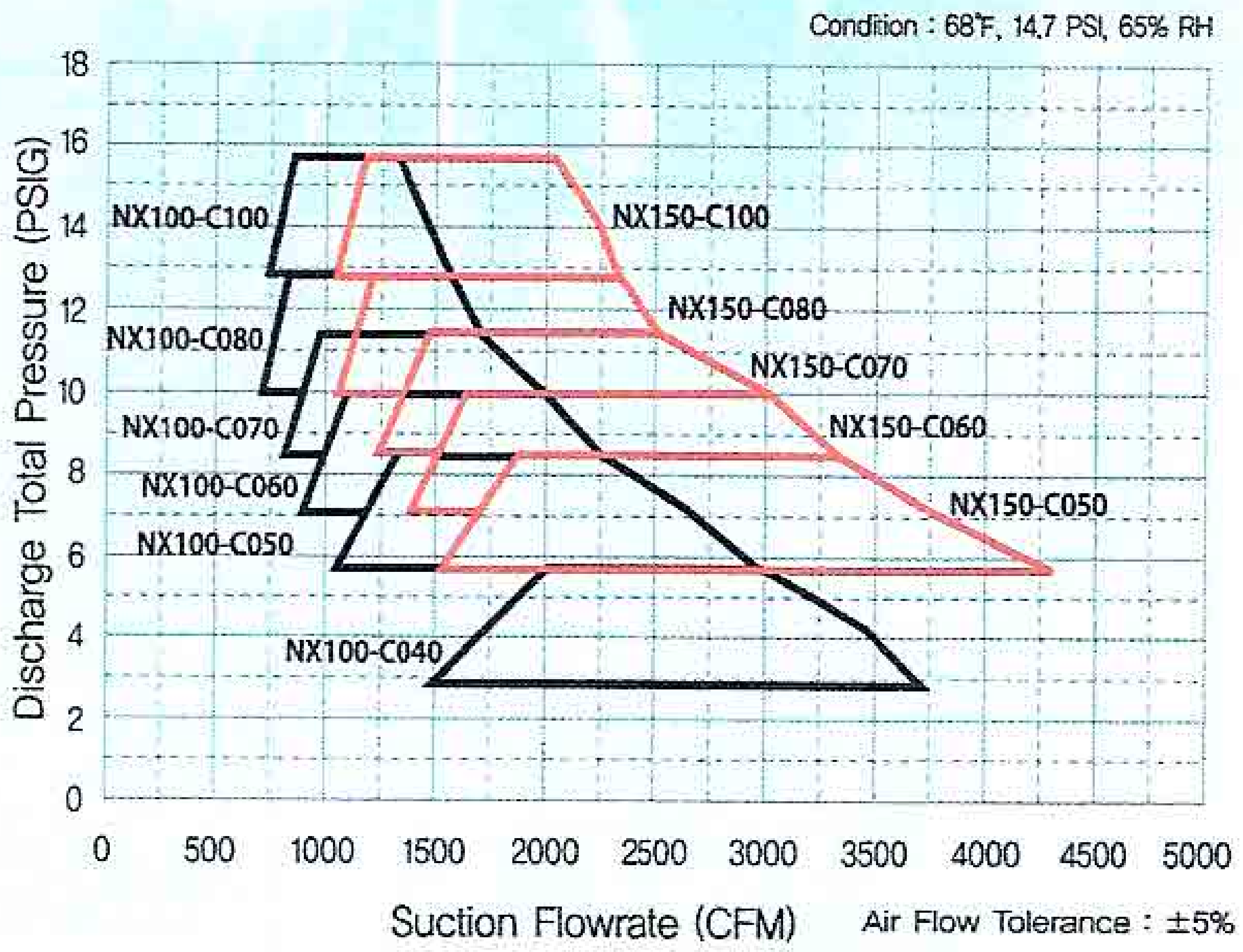
Clean Environment and Energy Saving Oriented Company

Model Selection

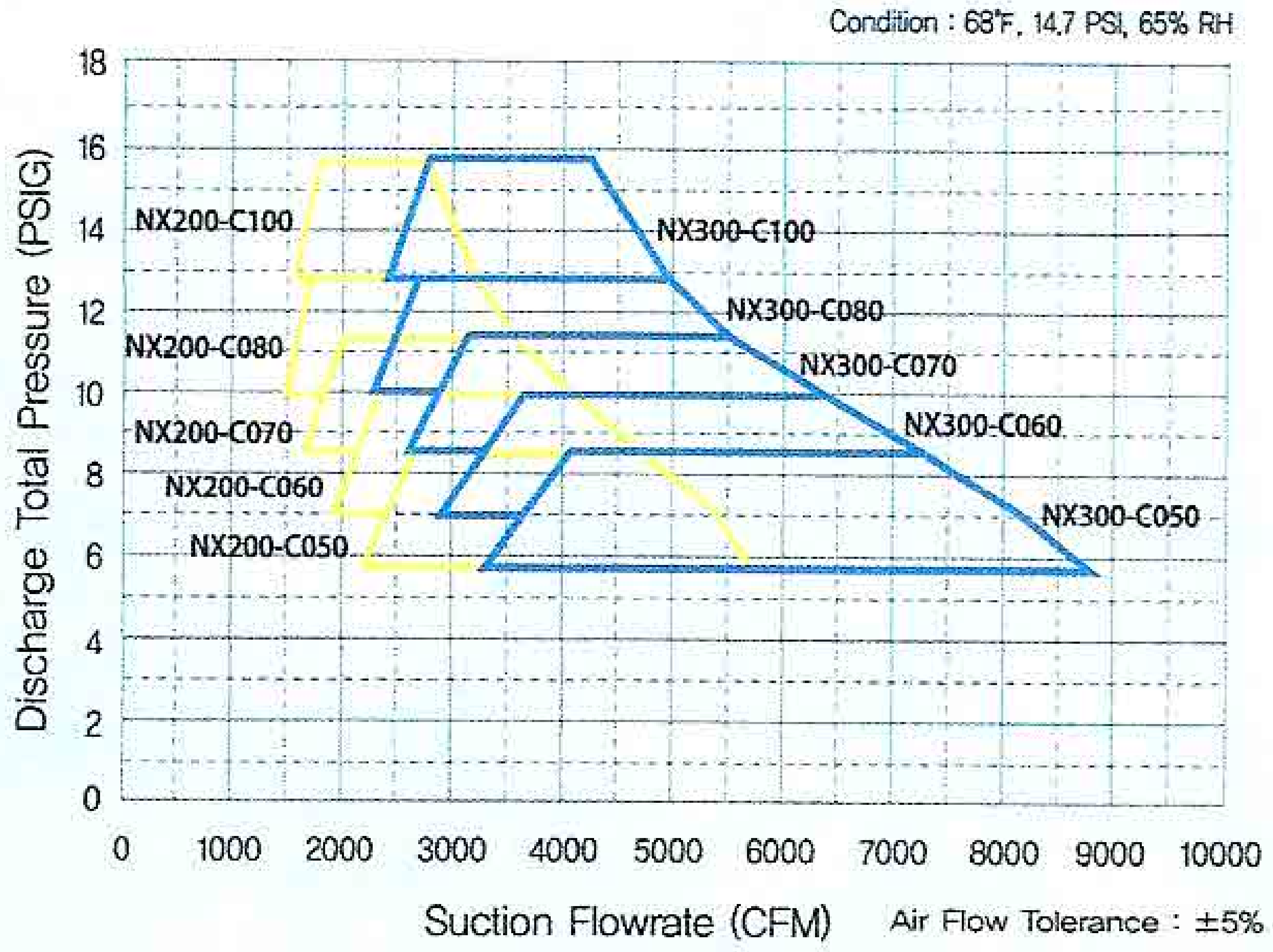
NX30, NX50, NX75



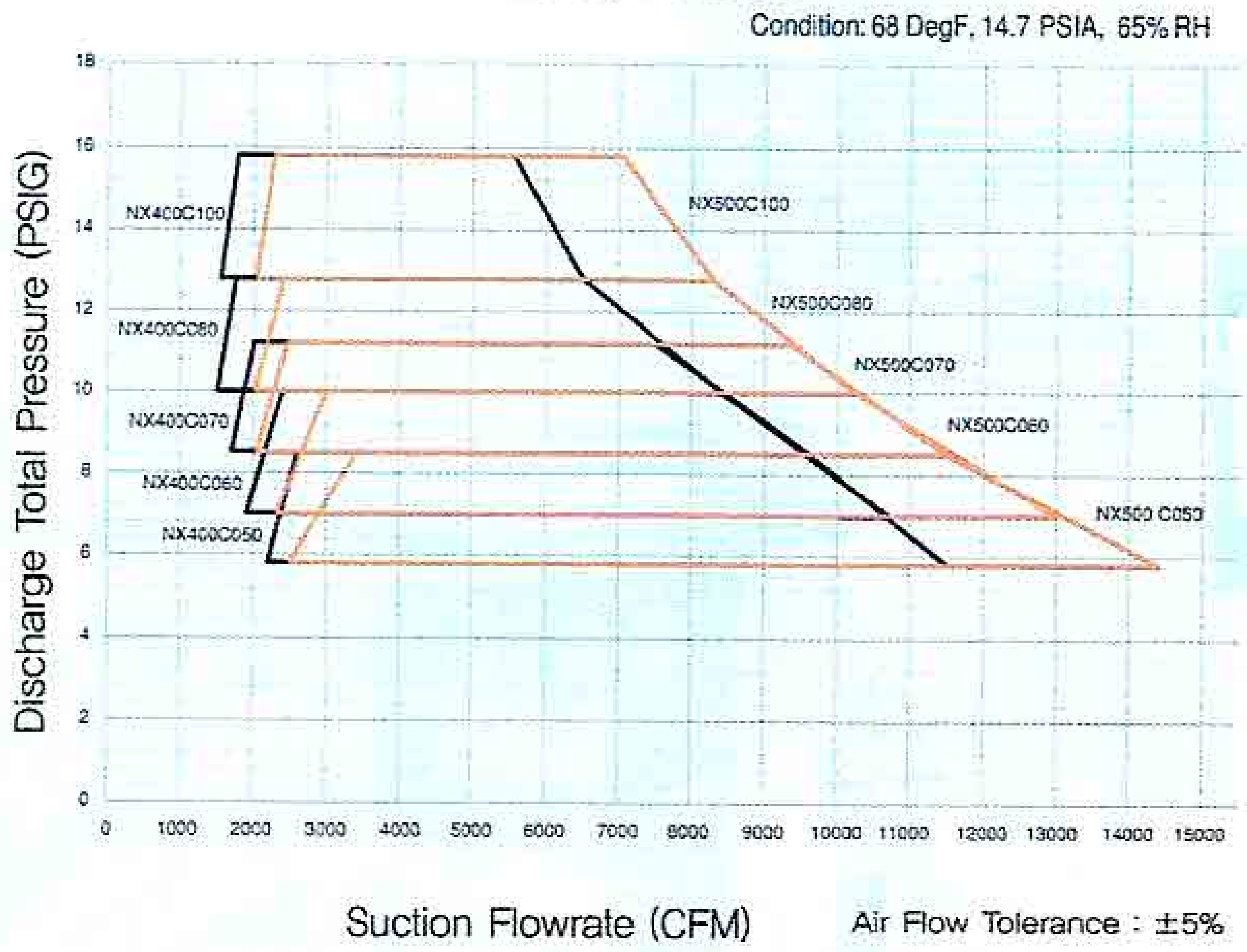
NX100, NX150



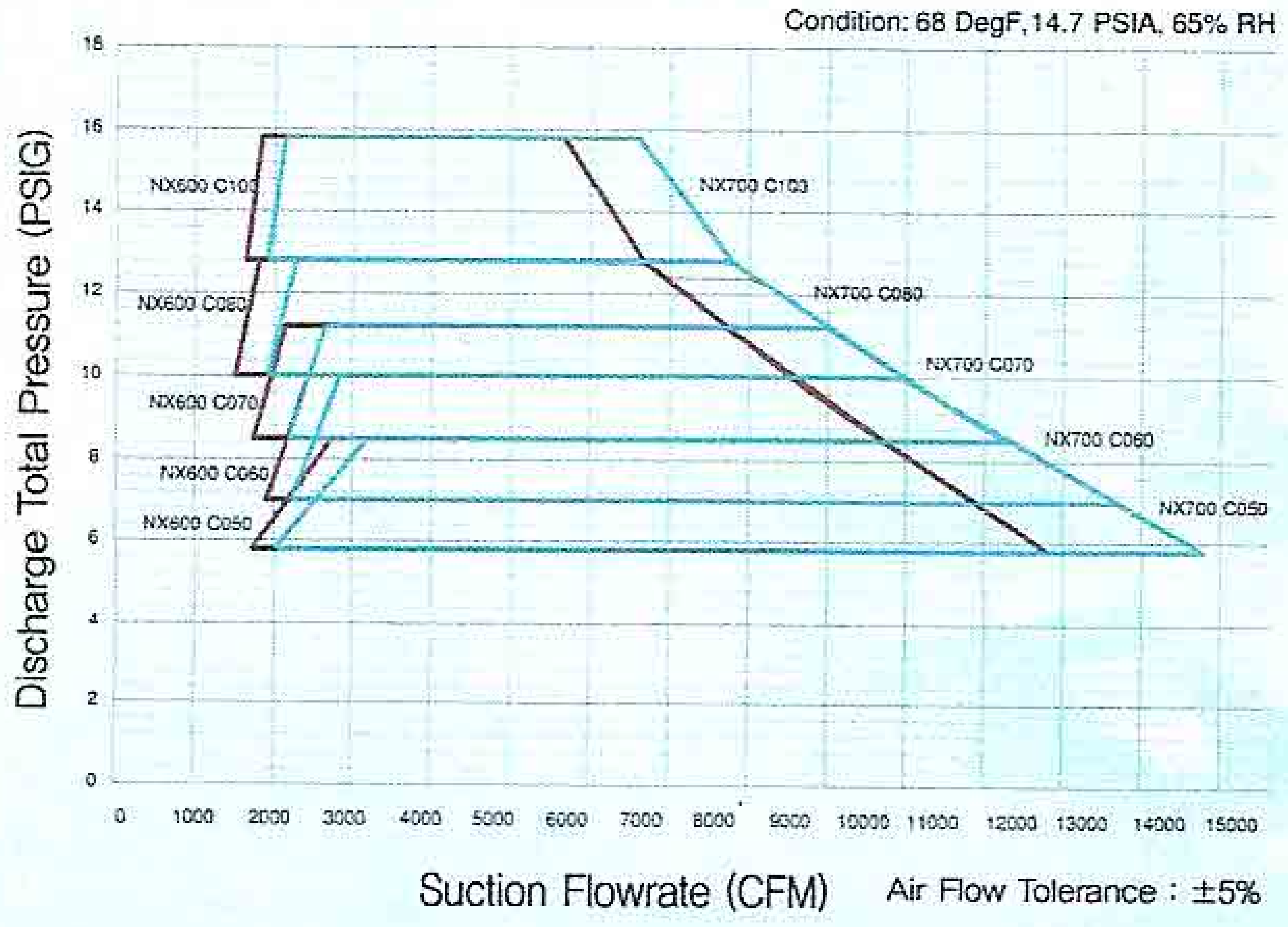
NX200, NX300



NX400, NX500



NX600, NX700

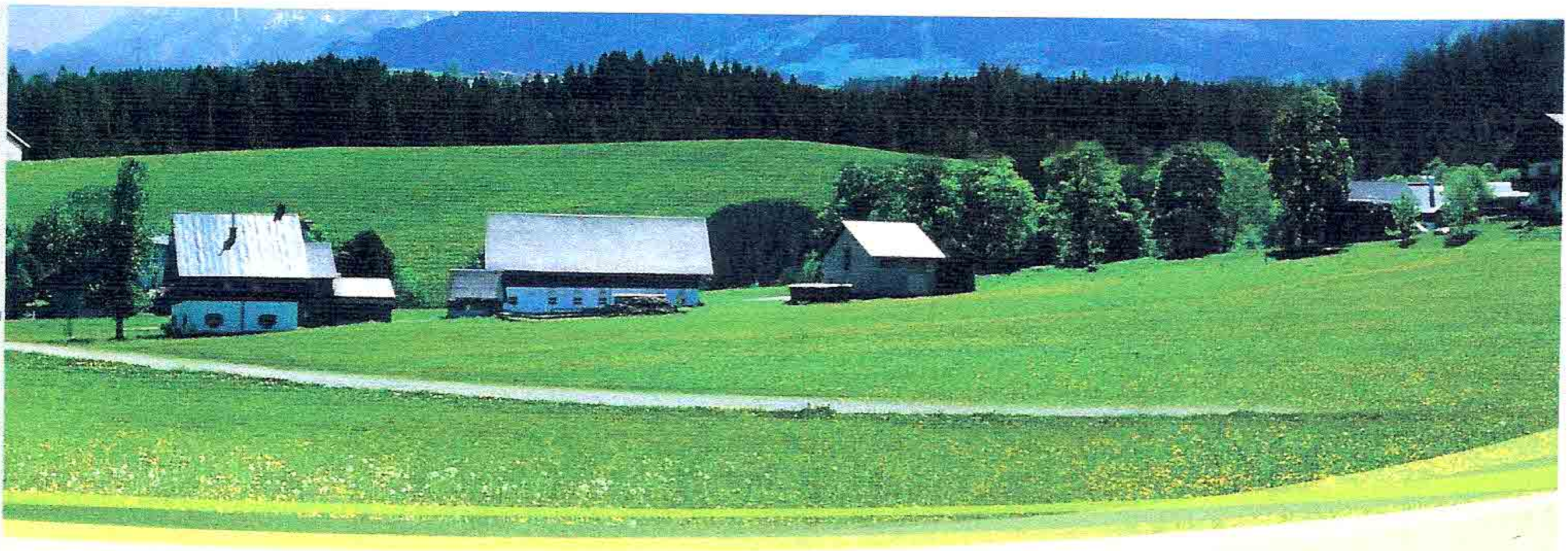


Technical Data

Design pressure range	4.4-14.5 psig (0.3 - 1.0 bar)
Design suction flow rate	670-7293 SCFM at 8.5 psi (0.59 bar)
Reference design condition	68F, 14.7 psia, 65% RH
Turndown ratio	100-45 %
Operating speed range	17,000 ~ 47,000 rpm
Motor kW (HP) rating	22/37/55/75/112/150/223 kW (30-300 HP)
Casing design pressure	284 psig (19.6 bar) – Scroll
Casing design temperature	300°C (572 F) – Scroll
Vibration	<0.039 in/Sec
Inlet configuration	Louver or Flange
Impeller	Single Stage / Centrifugal
Air Seals	Labyrinth
Discharge configuration	Vertical/Horizontal ANSI 150 lb Flange
Lubrication	Not required
Bearings	Bump Foil Air Bearing
Motor	Permanent Magnet Synchronous Motor type
Motor starter	Inverter type – Variable frequency drive
Input power	380-480V, 3 Ø, 50/60 Hz
Noise level	75 – 80 dB(A)
Control panel	PLC & Touch Screen (Allen Bradley, CIMON, Siemens, Modicon)
Control algorithm	Auto Speed/Flow/Pressure Mode/DO
Network communicatioin	Ethernet IP/ Modbus/ Profibus/ Hard Wiring
Enclosure cooling	Filtered Air cooled
Motor/ VFD cooling	Air (50-150 HP)/ Glycol fully enclosed (200-300 HP)

Material of Construction

Blower casing	ASTM 356.0 (Al Alloy)/ Cast Iron
Impeller	Forged aluminum alloy (Al 7075)
Diffuser vanes	Vaneless Type
Shaft	Ti Alloy (Ti-6Al-04V)
Air bearings	Ni-base Super Alloy (X-750)
Motor Case	ASTM 356.0 (Al Alloy)
Electrical enclosure	Powder coated steel
Blower enclosure	Powder coated steel with sound dampening material
Bloser enclosure skid	Structural steel construction with fork lift access ports
Enclosure finish	Powder coating



Benefits

Savings

- Energy savings up to 40% compared to conventional technologies.
- Maintenance costs savings with minimum maintenance.
- Significant space and installation cost savings with compact blower package design.
- Product is recognized by energy efficiency and accreditation agencies for energy credit and rebates.

Environment

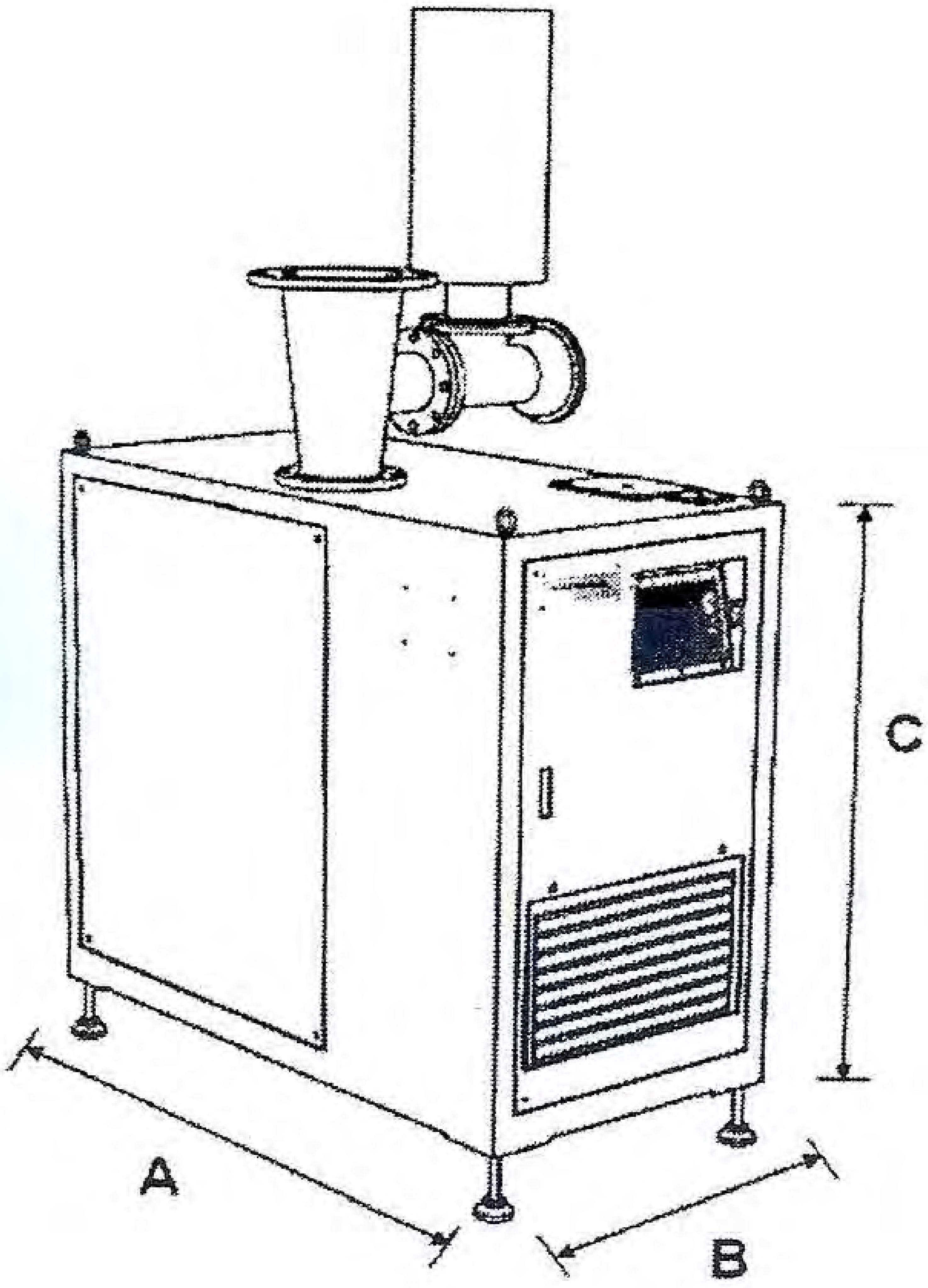
- Low noise and vibration for better working environment.
- Lower emissions, power savings, no oil to change, no disposable items, uses washable and re-usable air filters.

Typical Applications

- Aeration for municipal industrial waste water treatment.
- Pneumatic conveying of powders and materials in cement, wood chips, coal, limestone and plastic industries.
- Pneumatic conveying and blending for petrochemical industry.
- Oxidization in power plant desulfurization process.
- Cooling air for power plant generators.
- Combustion Air, in power generation plants.
- Air knife application in steel industry.
- Atomization.

Neuros Turbo Blower is on a different level

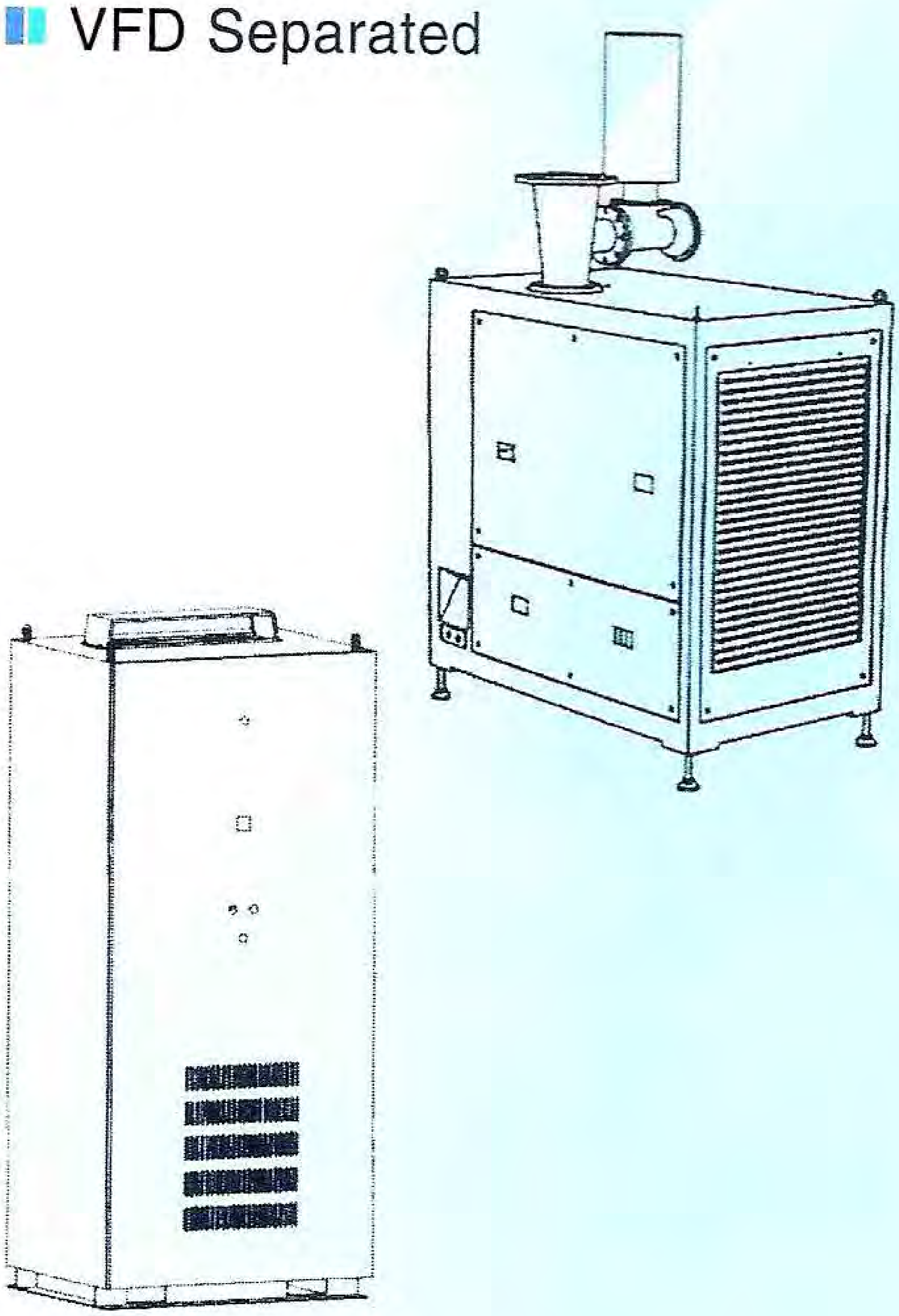
Standard



Unit: inch

	NX50-NX100	NX150	NX200	NX300	NX500-600
A	61	69	83	83	119
B	30	30	39	55	74
C	53	53	65	80	85

VFD Separated



- VFD cabinet dimensions can be changed per application requirements.
- VFD cabinet can be installed up to 650 feet from blower.
- Dimensions do not include mounting feet height.

160, E
New Y
Telepl
Toll fr

highway 15
uébec

ENV TREATMENT SYSTEMS INC.

70 High Street, Etobicoke, Ontario, M8Y 3N9
T: 416-503-7639 F: 416-503-8925 envinc@interlog.com

PROPOSAL

Proposal to ....AINLEY AND ASSOCIATES LTD.

To the attention of....................David Wolanski

Project ....Bradford WWTP Headworks

Date 2012-02-09

Station......................................Replacement Headworks Pumps

Xylem Quotation No. 12-30-0888

Xylem Representative ....Frank Ferrie

xylem

Xylem Quotation No...... 12-30-0888
Date............................ 9/02/2012
Project........................ Bradford WWTP Headworks

Xylem hereinafter called the Company of the Vendor, proposes to furnish the Purchaser the Equipment covered by this proposal, as follows:

Replacement Headworks Pumps

Item#	Qty	Description
1.1	4	3202.180-YYYY FLYGT MODEL N-3202 SUBMERSIBLE PUMP 600 VOLT 3/60 45HP/34KW 1175 RPM LT IMP 616 VOL 12" 20M S3X16+4X1.5MM2 C/W FLS DRILLED FOR ANSI FLANGE AND SUCTION ELBOW FLUSH VALVE READY
1.2	1	GL-9571 FREIGHT CHARGES
1.3	1	GL-9140 SERVICE LABOUR

Total Price	**$ 169,700.00**
Total Price of Quotation:	**$ 169,700.00**

Taxes	All taxes extra and not included in the above prices.
Terms of delivery	FOB CDN ORIGIN, PREPAID/CHARGED BACK DELIVERY 9-10 WEEKS
Terms of payment	30 DAYS FROM INVOICE DATE
Validity	This Quote is valid for thirty (30) days.
Comments and Exceptions	This proposal is in accordance with our interpretation of the plans and specifications provided to us. All equipment offered is subject to the engineers/customers acceptance, and we reserve the right to withdraw our offer if such acceptance is not granted. Should any changes be made regarding the quantities and/or construction of the equipment offered, extra charges will apply accordingly. Comments and Exceptions are part of this proposal and must be observed.

Sincerely,

Frank Ferrie
Sales Representative
416-679-1199
Frank.Ferrie@xyleminc.com

Xylem Quotation No...... 12-30-0888
Date............................ 9/02/2012
Project........................ Bradford WWTP Headworks

General Conditions of Sale or Rental

1. ITT Water & Wastewater, a division of ITT Industries of Canada Ltd. ("the Company") will fill orders pursuant to the following General Conditions of Sale or Rental, which General Conditions will apply, notwithstanding all other terms and conditions, whether written or not, notwithstanding those set out on Buyer's Purchase Order.

2. Payment is due thirty (30) days following date of full or partial shipment, on approved credit. Interest on past due payments will be calculated at a rate of eighteen per cent (18%) per annum (1.5% per month) on the overdue balance. Buyer pays all taxes as well as additional charges resulting from modifications or errors in Buyer's design drawings. Shipping is FOB Company's factory. This Order is not subject to hold back.

3. Company will not be responsible for losses or delays arising from force majeure events or for consequential or indirect damages, however caused. In all cases, the liability of Company for damages arising directly from late delivery shall be limited to five percent (5%) of contract value, regardless of cause. A claim for damages arising from delay will not exist until the presentation to the Company of independently verified actual damages directly resulting from the delay.

4. Company guarantees products manufactured by Company to the original user against defects in material and workmanship under normal operating conditions which comply with written Company operating instructions. Various products are guaranteed for the following periods:

BS, DS, CS and HS Flygt pumps are guaranteed for the lesser of six months following installation or twelve months from shipment by Company.

All other Company products are guaranteed for the lesser of twelve (12) months following installation or eighteen (18) months from date of shipment.

Repairs carried out by Company service personnel are guaranteed for a period of ninety (90) days following date of repair, applicable only to those parts repaired or replaced.

Replacement parts shipped separately and not installed by Company are guaranteed for a period of thirty (30) days following shipment.

This guarantee will not apply to products or parts which have been subjected to accidents, negligence, abuse, or use, installation, service, storage, handling or treatment in a manner contrary to the written instructions of Company or to products on which the identification plates have been modified or removed. The Company must receive written notice of all claims during the guarantee period. The Company will, at its sole discretion, decide whether to repair or replace defective goods. Buyer will pay all other charges, including, but not limited to, shipping, handling and installation and removal charges. Company does not guarantee any equipment as fit for a particular purpose and does not provide any guarantee of plans and designs supplied by Buyer, or of parts or components provided by others. Company guarantees only that equipment manufactured and conforming to plans and specifications provided by the Buyer will conform to those plans and specifications and not to any particular performance standard.

This guarantee is in place and in lieu of all guarantees or warranties whether provided in law or otherwise, of merchantability and/or fitness for any particular purpose. The obligation of the Company to repair or replace all defective parts is the sole recourse of the Buyer and the value of the liability incurred thereby shall be limited to the lesser of the cost of the repair or the replacement of the part in question.

5. The Company will defend all claims or allegations that the goods violate any Canadian copyright, trademark, or other intellectual property rights, provided that the Company is promptly advised of such claims, that the Buyer assists the Company as requested in such defense (in the preparation of the necessary documentation) and goods have been paid for in full. The liability of the Company shall not extend to goods manufactured to Buyer's plans and/or specifications, for which the Buyer will indemnify the Company for all costs or damages resulting from a violation of a patent or other similar claim.

6. The cumulative liability of the Company from all causes and as set out herein shall not exceed the total value of the sale or rental.

7. In the event that any part or portion of this contract is ruled invalid or unenforceable by competent authority, such provision shall be severed from the contract without affecting the validity or enforceability of the balance.

8. The sale or rental is governed by the laws of Canada and the province to which the goods are shipped, unless the shipping destination is outside Canada in which case the laws of Quebec shall apply.

9. Company shall retain title to the goods until payment in full, Buyer shall not sell or transfer the goods to a third party before Company has received full payment for the goods in question. Buyer acknowledges receipt and agrees to these general conditions and has had the opportunity to consult counsel in connection herewith. Buyer agrees and represents that the goods sold pursuant to these General Conditions will not be installed or used in a nuclear facility.

10. The use of a variable speed drive without proper sizing, harmonics, filtering, protection etc... could result in damages to the motor or to other equipment on this system. Using variable speed drive control without the express written agreement of the Company will void all warranties.

11. Ce contrat est rédigé en Anglais à la demande expresse des parties aux présentes. This contract has been prepared in English at the specific request of the parties hereto.

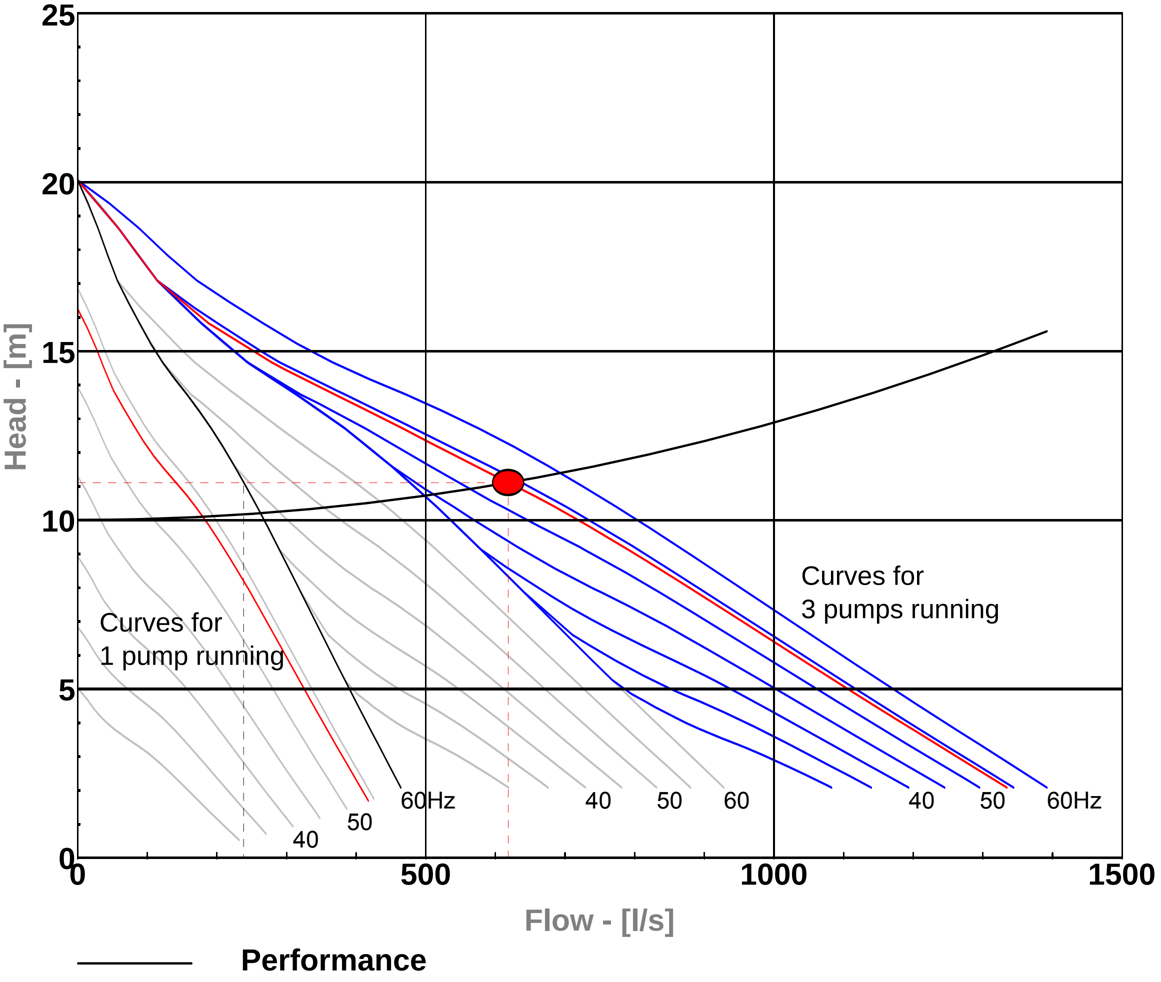
This quotation is hereby accepted on ____________________ day of ____________________________________ 20___________.

by____________________________________ ____________________________________
Name of the Customer Signature of the Customer

VFD-Analysis - Performance

Project: Bradford Headworks

Owner: Dave Wolanski P.Eng.



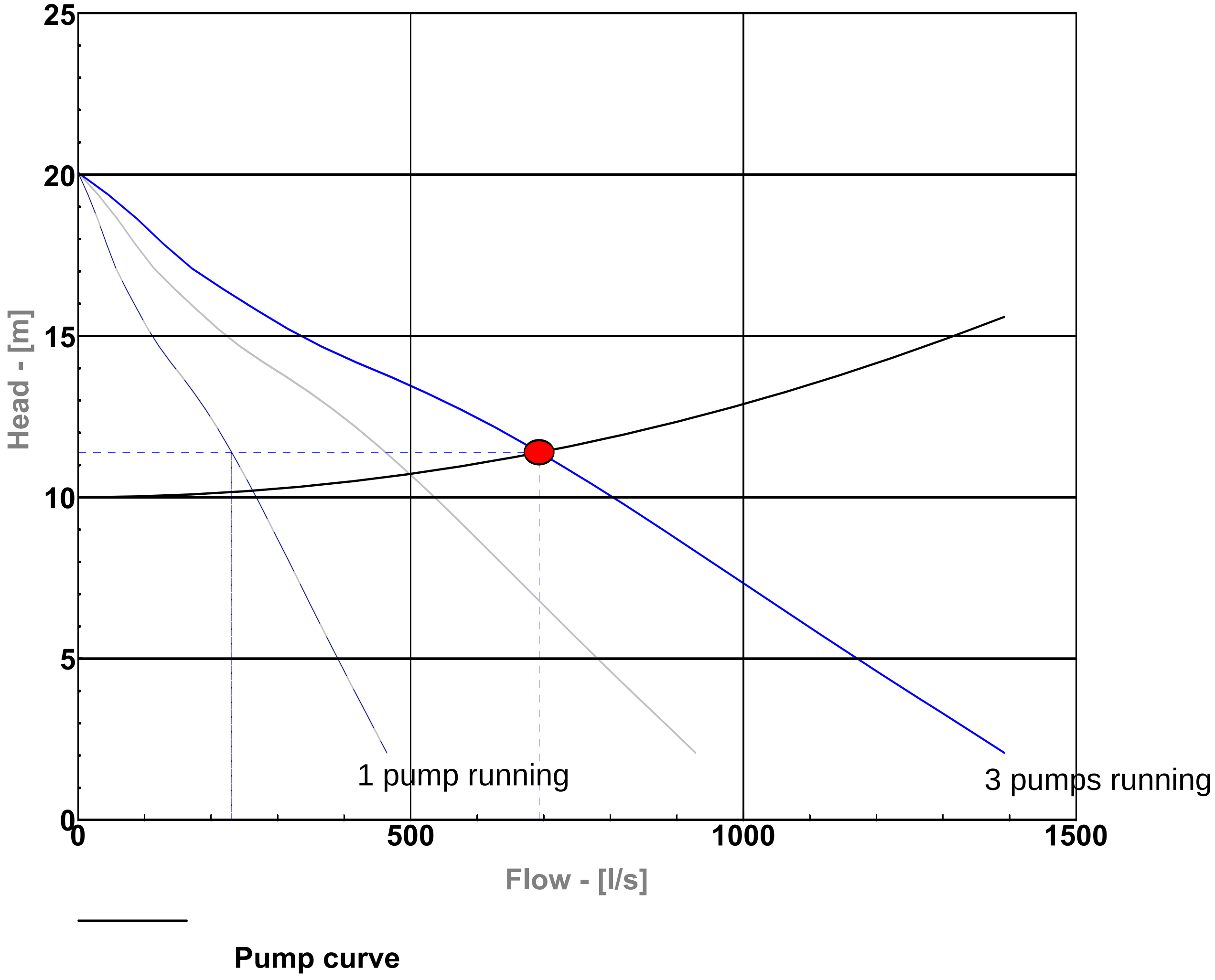
Pump: N 3202 63-616-00-6010
PRODUCT DATA
Imp.diam.: 328 mm
Rat. pow.: 34 kW
Vanes: 2
Throughlet: 0 mm

Connection: Parallel
VFD connection: Separate
No of pumps: 3
Frequency: 54 Hz
Flow: 618.4 l/s
Head: 11.1 m
Pow cons.: 101.4 kW
Efficiency: 66.4 %
Spec. energy: 0.046 kWh/m³

Duty Analysis - Duty conditions

Project: Bradford Headworks

Owner: Dave Wolanski P.Eng.



3 NT 3202 63-616-00-6010

PRODUCT DATA

Rat. pow.: 34 kW

Imp.diam.: 328 mm

Vanes: 2

Throughlet: 0 mm

DUTY CONDITIONS
Frequency: 60 Hz
No. of Pumps: 3
Flow: 693.1 l/s
Head: 11.4 m
Hydraulic power: 97.7 kW
Hydraulic eff: 79.2 %
Spec. energy: 0.0436 kWh/m3
NPSH-req.: 6.5 m

C&M
Environmental Technologies Inc.

274 Burton Ave., Suite 3206
Barrie, ON L4N 5W4 Canada

P.O. Box 122
Midhurst, ON L0L 1X0

Tel: 705-725-9377
Toll Free: 1-800-570-8779

Fax: 705-725-8279
www.cmeti.com

Wednesday, April 27, 2011

SENT VIA EMAIL: holakool@bv.com

Number of Pages: Eighteen (18)

Attention: Ladan Holakoo
Tel: 905-747-8506

Black & Veatch
50 Minthorn Blvd
Suite 501
Markham, ON L3T 7X8

Reference: C & M Proposal # 11-0770-03 – Bradford WWTP
EDI Fine Bubble Aeration System

Ladan,

As the local representative in Ontario for Environmental Dynamics Inc. (EDI), C & M is pleased to provide you with a preliminary budgetary quotation for the upgrade of the existing aerobic digester basin to a fine bubble aeration system at the Bradford WWTP. Please note that the calculations have been based on the peak SOR provided. The scope of supply starts at the top of the drop pipes.

Preliminary Budget Pricing is $32,200.00 CAD.

Pricing listed above is specific to the quantities mentioned. A revised proposal including changes to pricing and delivery times may be required if the scope of work changes.

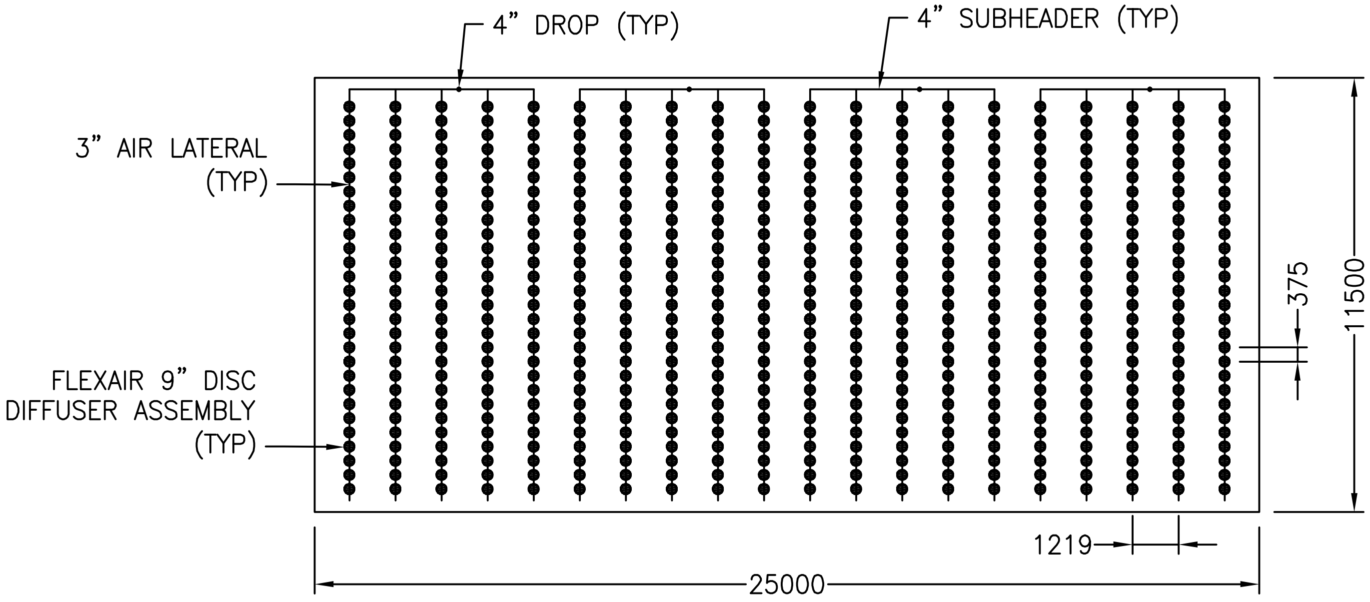
Attached you will find a layout drawing, a design brief containing calculations, along with a product specification sheet for the EDI FlexAir ISM Disc with Integral Saddle Mount and the general brochure from EDI.

If you have any questions or concerns, please do not hesitate to contact me directly.

Yours truly,

C & M ENVIRONMENTAL TECHNOLOGIES INC.

Tonia Van Dyk
Tel: 705-725-9377 x 225
Fax: 705-725-8279
Email: tvandyk@cmeti.com



NOTES:

1. SIDE WATER DEPTH IS 5.345 M
   DIFFUSER DEPTH IS 5.045 M

2. TOTAL= 560 FLEXAIR 9" DISC
   DIFFUSER ASSEMBLIES.

3. 1 OF 1 BASIN SHOWN.

TITLE
BRADFORD, ON
DESCRIPTION:
EDI FLEXAIR® AERATION-MIXING SYSTEM

PROJECT ID:	SHEET NO:	DWG NO:
	1 OF 1	49362

FOR: ELM
BY: TSP
DATE 4/25/11
SCALE 1:200

ENVIRONMENTAL DYNAMICS INC.
5601 PARIS ROAD
COLUMBIA, MISSOURI 65202
PHONE: 573-474-9456
FAX: 573-474-6988
WWW.WASTEWATER.COM

REV.	DATE

FINE BUBBLE DESIGN BRIEF - FLEXAIR® DISC DIFFUSER

EDI™ FlexAir® AERATION SYSTEM FOR AEROBIC TREATMENT

Environmental Dynamics Inc.
5601 Paris Road, Columbia, Missouri 65202
ph. 573-474-9456 fax 573-474-6988
email edi@wastewater.com http://www.wastewater.com

DB - Peak SOR

Date: April 22, 2011

Project:
1 of 1 Basin
Bradford, ON

Customer:

DESIGN CALCULATIONS			English Units		Metric Units	
(1)	Type Waste and Process -					
(2)	Design Flow		**0.00**	MGD	**0**	m^3/d
(3)	BOD Raw Waste	a) concentration	**0**	mg/L	**0**	mg/L
		b) weight/d	**0**	lb/d	**0**	kg/d
(4)	Primary Treatment (% BOD Removal)		**0.0**	%	**0.0**	%
(5)	% BOD for biological process (100% - Item 4)		**100.0**	%	**100.0**	%
(6)	ALPHA = Ratio of oxygen transfer in waste to transfer in tap water		**1.00**	Alpha	**1.00**	Alpha
	BETA = Ratio of solubility of oxygen in wastewater to solubility in tap water		**1.00**	Beta	**1.00**	Beta
(7)	Site Elevation		**0**	ft	**0**	m
(8)	Operating ambient pressure, winter		**14.70**	psia	**1013.36**	millibar
	Operating ambient pressure, summer		**14.70**	psia	**1013.36**	millibar
(9)	Dissolved O_2 level in the aeration basin		**0.00**	mg/L	**0.00**	mg/L
(10)	Temperature of waste in aeration basin:					
	Winter Temperature		**68.0**	ºF	**20.0**	ºC
	Summer Temperature		**68.0**	ºF	**20.0**	ºC
(11)	Design BOD removal		**100.0**	%	**100.0**	%
(12)	Carbonaceous BOD to the aeration basin (Item 3b) x (Item 5)		**0.0**	lb/d	**0.0**	kg/d
(13)	Oxygen per unit of carbonaceous BOD removed		**0.00**	lb/lb	**0.00**	kg/kg
(14)	Carbonaceous oxygen requirements for aeration at field conditions (Item 11)x(Item 12)x(Item 13)		**0.0**	lb O_2/d	**0.0**	kg O_2/d
(15)	Ammonia to aeration basin	a) concentration	**0.0**	mg/L	**0.0**	mg/L
		b) weight/d	**0.0**	lb/d	**0.0**	kg/d
(16)	Oxygen requirements for ammonia (Item 15b) x (4.6#O_2/#NH_4-N)		**0.0**	lb O_2/d	**0.0**	kg O_2/d
(17)	Total oxygen requirements, SOR (Item 14 + Item 16) / 24		**227.1**	lb O_2/h	**103.0**	kg O_2/h
(18)	Air supply for each EDI FlexAir™ disc diffuser		**1.30**	scfm	**2.06**	m^3_N/h
					2.21	m^3_S/h

	DB - Peak SOR			
(19) Active surface area per disc diffuser	**59**	in^2	**381**	cm^2
(20) Air release depth of diffusers	**16.55**	ft	**5.05**	m
(21) Tank floor surface area	**3095**	ft^2	**288**	m^2
(22) % Oxygen transfer, SOTE	**30.8**	%	**30.8**	%
(23) lb oxygen per h per disc, SOTR	**0.42**	lb O_2/h/unit	**0.19**	kg O_2/h/unit
(24) Winter surface saturation, Csmt	**9.09**	mg/L	**9.09**	mg/L
Summer surface saturation, Csmt	**9.09**	mg/L	**9.09**	mg/L
(25) Effective depth correction factor	**0.40**		**0.40**	
(26) Standard condition aerated O2 saturation in the tank, C^*_{20}=9.09*(29.92+0.8828*Item20*Item 25)/29.92	**10.87**	mg/L	**10.87**	mg/L
(27) Theta value=	**1.024**		**1.024**	
(28) AOR/SOR=ALPHA[BETA(C^*_{20})(C_{smt}/9.09)(P_{site}/P_{sc})- (Item 9)](THETA)^$^{(\text{Item 10-20})}$/(C*20)				
Winter AOR/SOR	**1.000**		**1.000**	
Summer AOR/SOR	**1.000**		**1.000**	
(29) Number of EDI FlexAir™ disc membranes required for oxygen demand (Item 17) / [(Item 23) x (Item 28)]	**544**	units	**543**	units
(30) Air requirements for oxygenation (Item 18) x (Item 29)	**706**	scfm	**1118**	m^3_N/h
			1199	m^3_S/h
(31) Assumed Mixing Design Criteria (air requirements)	**0.12**	$scfm/ft^2$	**2.05**	$m^3_N/h/m^2$
(32) Air requirements for mixing (Item 31) x (Item 21)	**371**	scfm	**588**	m^3_N/h
			631	m^3_S/h
(33) Number of disc membranes for mixing and/or proper distribution	**560**	units	**560**	units
(34) Airflow per disc (mixing only)	**0.66**	scfm per unit	**1.05**	m^3_N/h per unit
			1.13	m^3_S/h per unit
(35) Design diffuser air fluxrate based on oxygenation or mixing requirements, use the larger.	**3.17**	scfm per ft^2	**54.1**	$m^3_N/h/m^2$
			58.0	$m^3_S/h/m^2$
(36) Diffuser Density: (Area of Tank/Area of Diffusers) ratio [floor area/(# diffusers x active diffuser area)]	**13.49**		**13.49**	
(37) Estimated system operating pressure:				
(a) Static liquid head	**16.55**	ft	**5.05**	m
(b) Pressure loss at blower building and header (estimated)	**1.50**	ft	**0.46**	m
(c) Pressure loss lateral piping (estimated)	**0.50**	ft	**0.15**	m
(d) Pressure loss though FlexAir™ disc (estimated)	**1.50**	ft	**0.46**	m
(f) Normal compressor operating pressure (a+b+c+d)	**20.05**	ft	**6.11**	m
(38) Normal operating pressure (estimated)	**8.69**	psig	**599.56**	millibar
(39) Design over-pressure APPROXIMATE	**0.50**	psig	**34.48**	millibar
(40) Recommended blower design pressure	**9.19**	psig	**634.04**	millibar

Notes:

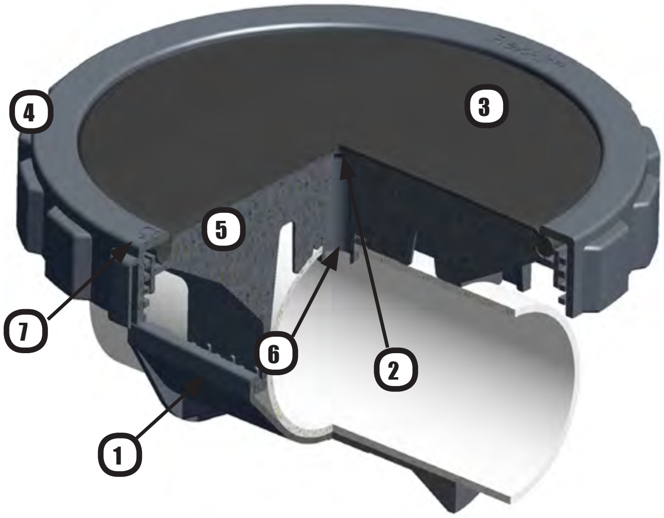
PRODUCT SPECIFICATION SHEET

EDI FlexAir® ISM Disc

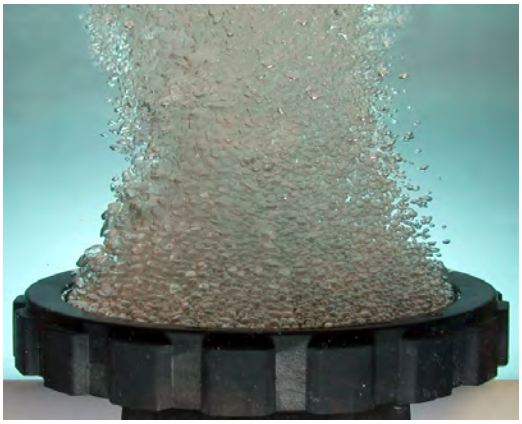
With Integral Saddle Mount

FlexAir Disc diffuser incorporates EDI's advanced technologies for superior aeration performance, flexibility, and reliability.

- Precision die cut openings for high oxygen transfer, uniform air release, and low operating pressure
- High capacity membrane option available for maximum airflow and low operating pressure
- Advanced technology premium quality membrane materials available in EPDM and special polymer blends
- Full 9 inch (230 mm) of active area
- Triple check valve design prevents entry of liquid/solids into piping. Ideal for on / off applications
- Resistant to fouling and plugging for low maintenance
- Rugged, heavy-duty construction – withstands over 200 lb (90.7kg) edge load without failure
- Glass fiber reinforced polypropylene construction for maximum chemical, temperature, and UV resistance
- Integrated Saddle Mount provides ease of installation and maintenance
- KlicLoc™ retainer for positive mechanical lock
- Available in 3 inch, 4 inch, 90 mm, and 110 mm pipe sizes for design flexibility
- Mounts on any pipe material (PVC, ABS, CPVC, SS, etc.).
- Standard units IN STOCK for immediate shipment



1. KlicLoc™ Retainer
2. Primary Check Valve Feature
3. Flexible Membrane Media
4. Membrane Retainer Ring
5. Diffuser Body
6. Air Inlet Orifice
7. EZSeal™



PRODUCT SPECIFICATION SHEET

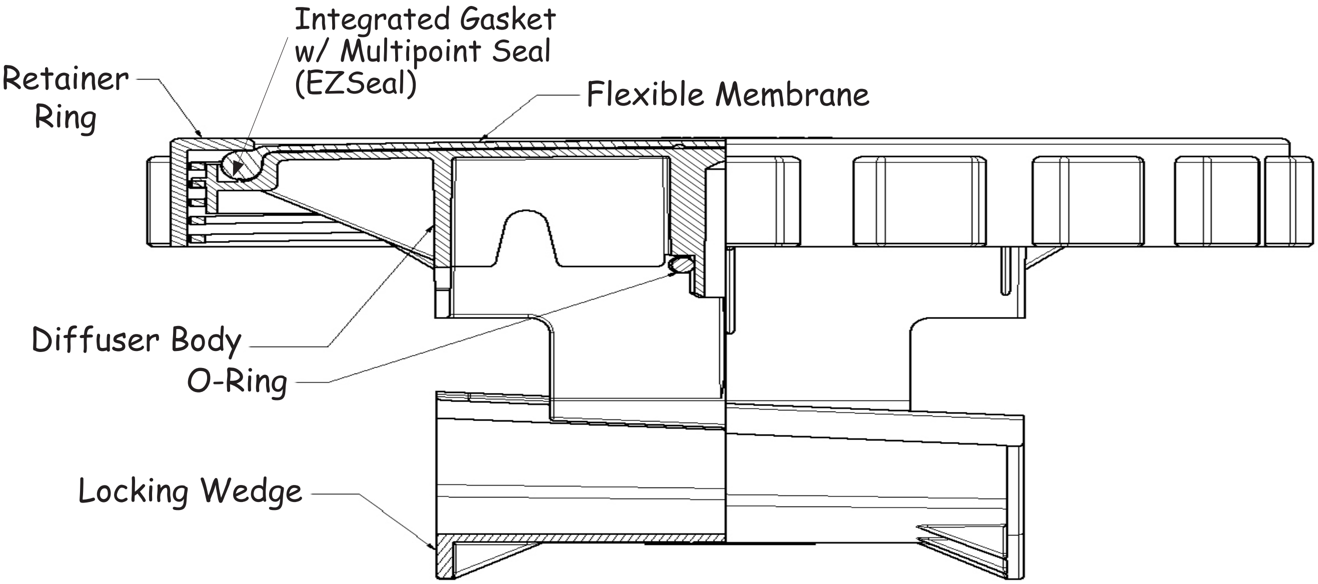
The FlexAir® disc diffuser provides unmatched mechanical strength, operating flexibility and oxygen transfer efficiency. The innovative Integral Saddle Mount provides maximum mechanical integrity – up to 1.5 times the strength of conventional solvent welded mounting systems.

The FlexAir disc diffuser is provided with premium quality membrane materials that are engineered by the EDI Membrane Technologies division. EDI's proprietary membrane materials are engineered for superior product life. Multiple membrane perforations are available to optimize the performance of the diffuser for maximum operating efficiency, air handling capacity, or operating pressure. An integral triple check valve feature prevents the backflow of liquid into the diffuser and piping.

The FlexAir disc diffuser is ideally suited for on/off applications and requires minimal maintenance for long-term performance.

The diffuser assembly and Integral Saddle Mount is available in glass-fiber reinforced polypropylene for maximum performance. This material option offers greater mechanical and temperature capabilities than conventional PVC or CPVC products. The Integral Saddle Mount is compatible with any pipe material and is available in 3 inch, 4 inch, 90 mm and 100mm diameter sizes. This flexibility allows the air conveyance system to be sized to match project objectives with minimum pressure loss.

The Integral Saddle Mount features an air inlet port that inserts into the pipe and the KlicLocTM retainer positively locks the assembly to the lateral piping. Once installed, the assembly can withstand an external perimeter load in excess of 200 lb (90.7 kg) without failure.



Diffuser Type	Design Airflow		Overall Diameter		Active Surface Area		Dry Weight		Net Operating Buoyancy	
	scfm	m^3_N/h	in	mm	ft^2	m^2	lb	kg	lb	kg
9" Micro	0-6.0	0-9.5	10.9	277	0.41	0.038	1.9	0.85	1.3	0.59
9" High Cap	0-10.0	0-16	10.9	277	0.41	0.038	1.9	0.85	1.3	0.59

- Optimum oxygen transfer efficiency is achieved when operating in the middle to low end of the airflow range. The approximate operating pressure of the diffuser at the mid-range is 13 - 16 inches H_2O (3.2 - 4.0kPa).
- Operating the unit at the high end of the range will result in reduced performance and increased operating pressure. Use the maximum airflow value for short term operations such as peak loads or system maintenance.

Leadership
through
Innovation

Environmental Dynamics Inc.

Environmental Dynamics Inc.

About EDI

EDI has grown to be the leading independent provider of aeration solutions and lagoon biological wastewater treatment systems in the world. EDI's revenue growth has outpaced the industry and is a direct reflection of the Company's ability to deliver solutions of the highest economic value for its customers. Today, EDI supports design engineers, OEM accounts, contractors, design-build organizations, and end users in over 75 countries.

EDI uses a unique business approach to deliver maximum value. By combining customer-centric business solutions and a leadership position in aeration technology, EDI is uniquely able to engineer and deliver cost effective solutions focused on the specific needs of the customer. The following four principles guide EDI's service to the industry:

INNOVATION — Support the needs of traditional and non-traditional clients with innovative business and technical solutions. Special programs and services available to EDI's customers include:

- Value Added Services program that links customers to a wealth of application know-how, leading edge technologies, and project specific design support.
- Focused engineered solutions ensure effluent compliance with project-specific life cycle cost accountability.
- Quick-ship capabilities for standard diffuser products or replacement parts keeps plants online and at optimum operating efficiency.

DEDICATION — EDI employees have been delivering high value solutions since 1975. More than 4,000 successful projects demonstrate EDI dedication and clear focus to the water and wastewater industry.

TECHNOLOGY LEADERSHIP — Technology is a critical component in EDI's vertically integrated design and manufacturing capabilities. Over 25 hardware and process patents and a division that focuses on membrane materials are examples of EDI's basic and applied R&D efforts and commitment to technology leadership.

FUTURE FOCUS — EDI will continue to expand its business programs and technology leadership to provide EDI clients with a competitive advantage over their peers. EDI will support the short term and long-term needs of customers beginning with solutions development to operations and maintenance support for the life of the project.

Cost Effective Aeration Solutions

Through Product Innovation

Aeration is a fundamental component of biological wastewater treatment. Without aeration, aerobic biological treatment would not function.

Wastewater system designers are confronted with an unlimited number of biological process options and application requirements. The design objectives and requirements for an aeration system are equally complex and only when objectives and solutions are properly matched will the overall objectives for the system be met.

EDI has a demonstrated ability to deliver high value, cost effective aeration solutions for even the most challenging applications. By investing in critical determinant technologies and product development while applying strengths in manufacturing, EDI is able to focus on customer needs and offer high value, customized solutions for each application.

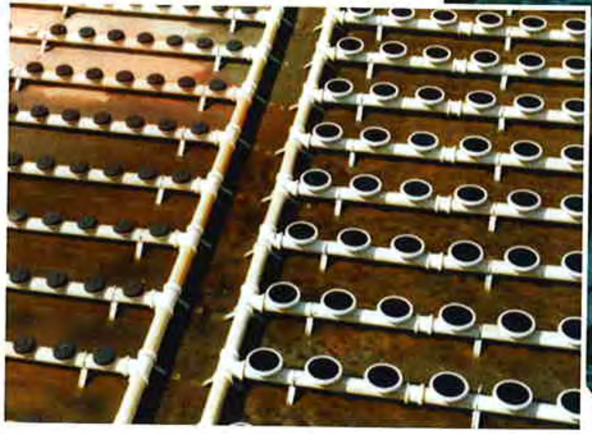
ENGINEERED AERATION PRODUCTS DIVISION

EDI aeration specialists are experts in biological treatment and aeration system design. Our experts work with design engineers and end users one-on-one to carefully evaluate application needs and project objectives.

Process performance, capital and operating cost, plus system reliability and maintenance are key variables. EDI's aeration specialists select from a full spectrum of diffuser platforms and system configurations to develop cost effective aeration solutions that deliver life cycle cost accountability for each project.

MEMBRANE TECHNOLOGY DIVISION

The EDI Membrane Technology Division develops membrane materials for EDI FlexAir™ diffusers. Each material is engineered for optimal chemical compatibility and service life in each wastewater type. EDI proprietary engineered polymeric compounds are performing in a wide spectrum of wastewaters including petrochemical, refining, pulp and paper, food processing, animal processing, and domestic wastewater.

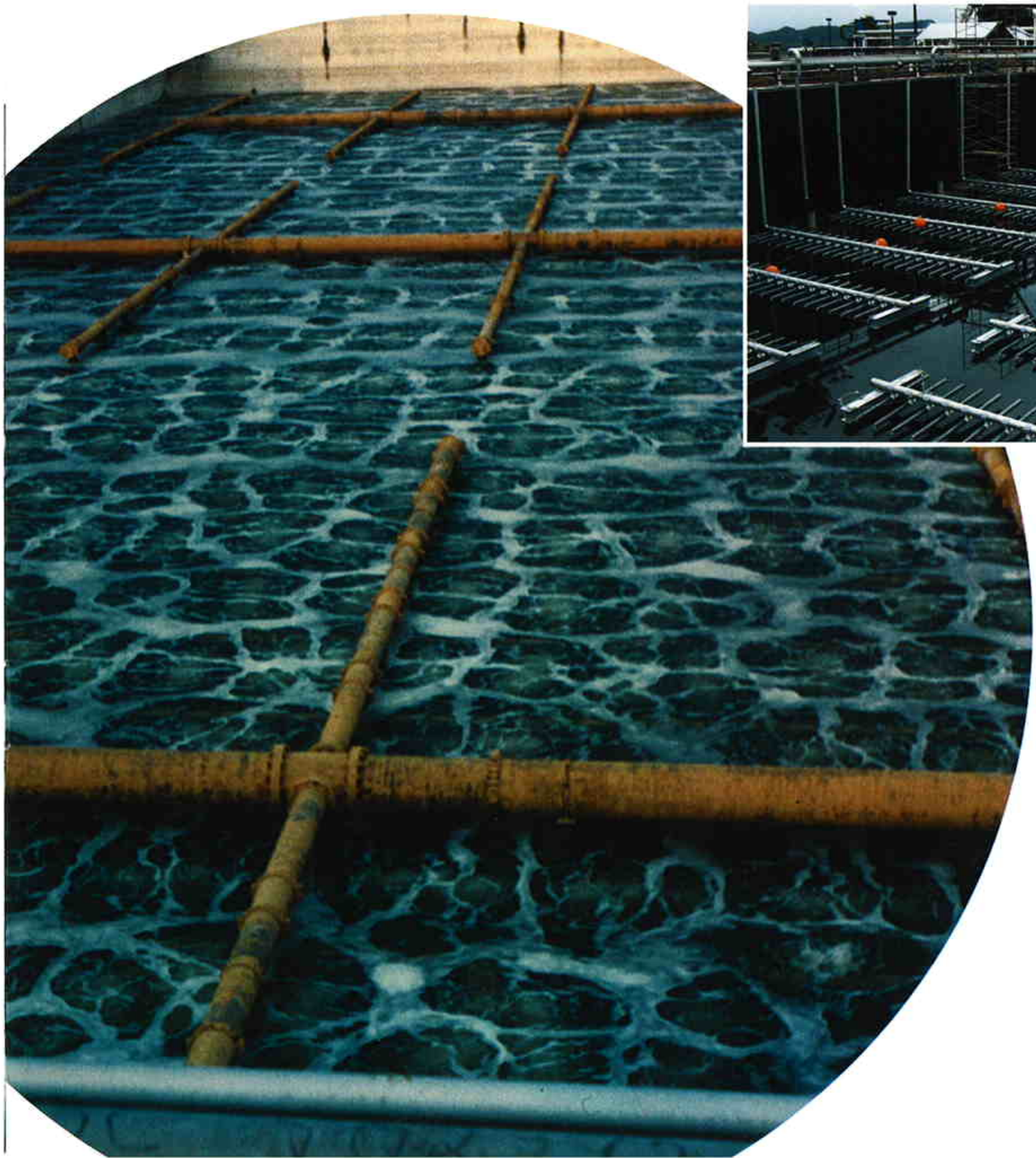


DIFFUSER *EXPRESS*® DIVISION

Diffuser *Express* maintains a large inventory of standard diffusers for incremental system enhancements and upgrades plus diffuser replacement parts to maintain system performance. Diffuser *Express* serves the entire industry with an economical source of advanced technology products and replacement parts. Components supplied by Diffuser *Express* are typically shipped from inventory upon receipt of equipment order.

Technical Support

The EDI website portal at www.waste-water.com features detailed information on EDI's full line of products and services. Proprietary aeration and biological process system design tools used by EDI's application specialists are accessible via the DESIGN TOOLS tab on the HOME page. These design tools provide design engineers and end users with a valuable resource to optimize the design and operation of biological wastewater treatment facilities.



Advanced Biological Treatment Lagoons

Through Innovative Design

Stabilization lagoons are an economical option for wastewater treatment. Where land and topography allow, conventional lagoon systems are a preferred solution for basic secondary biological treatment. EDI has demonstrated leadership in lagoon technology and has developed multiple innovations to improve performance capabilities and economics of lagoon based systems. Today, over 1,000 lagoon systems worldwide utilize EDI process and equipment technology for optimal performance with energy efficiency.

PARTIAL AND COMPLETE MIX LAGOONS — EDI aerated lagoon systems provide exceptional process performance and operating efficiency and are fully maintainable in a lagoon environment. When basic secondary biological treatment performance is required, EDI lagoon systems remain the superior economic and process choice.

ADVANCED LAGOON BIOLOGICAL TREATMENT SOLUTIONS — Cold weather nitrification, nutrient removal, and advanced wastewater treatment standards require capabilities beyond basic lagoon technologies. New EDI technologies and processes are available to meet more stringent effluent standards and maintain the simple operation and favorable economics of lagoon-based systems. EDI Advanced Treatment Lagoon Activated Sludge (ATLAS™) systems utilize innovative process designs, lagoon configurations, and products to deliver traditional lagoon economics with advanced wastewater treatment performance.

EDI's unique patented or proprietary technologies coupled with vast lagoon-based experience assures superior treatment performance and economical operation. Innovative lagoon solutions accommodate small flows as well as major treatment facilities. Economical solids management options available with EDI ATLAS systems are particularly well suit-

ed for facilities with limited financial or staffing resources. EDI ATLAS systems are ideal for performance upgrades of existing lagoon systems and also provide optimal benefits for green-field projects.

Service Excellence

Through Organizational Innovation

The costs of owning and operating a wastewater treatment plant are significant. The management of all cost factors including initial equipment cost, installation costs, power consumption, and maintenance are critical to delivering attractive, high value wastewater treatment solutions for each client.

The EDI organization and the following business programs are structured to support clients on a partnership basis throughout the life of the project.

APPLICATION SUPPORT — EDI aeration specialists work one-on-one with customers to develop economical biological process and aeration solutions. Specialists are available for long-term operation support and to help plants manage the dynamic conditions that occur during facility operation.

CUSTOMER SERVICE — EDI is uniquely positioned to support the large number of wastewater treatment plants located throughout the world (approximately 20,000 facilities in the USA alone). EDI's Diffuser *Express* Division, Regional Service Centers, and network of representatives and Market Partners support the aeration equipment needs of EDI and non-EDI systems with superior quality products. Diffuser *Express* maintains a large inventory of key system components for quick delivery. For immediate access, view the Diffuser *Express* online catalog at www.diffuserexpress.com or a local EDI Market Partner.

CONTRACT SERVICES — Professional, efficient, and cost effective contract services are available directly from EDI. The contract services available from EDI include:

- Install total aeration

and biological treatment systems

- Refurbish existing aeration equipment or systems
- Supervision of aeration system installations
- Long-term maintenance contracts of diffused aeration systems
- Subcontractor installation services of EDI systems on new contracts

GLOBAL MANUFACTURING — EDI maintains major manufacturing capabilities in several key countries. The EDI Corporate USA Headquarters is the largest dedicated diffuser manufacturing facility in the world. EDI's manufacturing capabilities and supply chain management programs allow EDI to effectively deliver quality systems to our customers around the globe.

Partnering

Excellence Through Business Partnering Innovation

EDI offers a series of innovative programs for our business partners. These programs function as a bridge between industry groups and fosters a cooperative relationship between EDI and its partners. By working together with shared common goals, EDI partners benefit with more focused, cost effective solutions. EDI partners also benefit professionally with increased technology transfer and more effective use of their technical resources.

VALUE ADDED SERVICES — EDI offers a wide range of services to support engineers, contractors, and end users develop solutions for their aeration and wastewater treatment applications.

Online Process Design Tools are accessible on EDI's website at www.wastewater.com. This service provides access to proprietary design tools developed by EDI for aeration and biological system design.

Aeration and Biological Process Support from EDI experts. Direct assistance from an EDI application specialist is available on request.

KEY ACCOUNT PROGRAM — EDI builds key account teams with major industry design build firms and integrated system suppliers to deliver engineered aeration and biological systems for superior process performance and life cycle cost accountability. Joint marketing programs are used to promote the combined capabilities of key account / EDI business teams. Special pricing discounts ensure maximum competitive position of EDI key account partners.

MARKET PARTNER PROGRAM — EDI Market Partners and Representatives are an integral component of the

EDI marketing group. EDI's network of Market Partners provides full marketing support and service for aeration hardware and biological wastewater treatment plants around the globe. Find your local EDI Market Partner or Representative through through EDI's website at www.wastewater.com.

TECHNOLOGY SHARING — The University of Missouri (MU) and EDI are partners in a wastewater technology transfer program. Attendees of the MU ENTECH Training Program work closely with industry experts including academia and leading equipment manufacturers.

Environmental Dynamics Incorporated
5601 Paris Road, Columbia, Missouri 65202 • Phone: 573-474-9456
Fax: 573-474-6988 • EDI@wastewater.com •
www.wastewater.com

C&M
Environmental Technologies Inc.

Supplier of Water & Wastewater Treatment Equipment

Wastewater Treatment

Headworks
- Bar Screens
- Grit Removal / Classification / Washers
- Screenings Washer / Compactor
- Shaftless Screw Conveyors
- Live Bottom Bins

Sedimentation
- Chain and Flight Collectors
- Circular Clarifiers and Thickeners
- COP - Clarifier Optimization Products

Aeration
- Fine & Coarse Bubble Diffusers
- Fine Bubble Membrane Replacements
- Surface Mechanical Aeration
- Fixed Grid Aeration Systems
- Lagoon Aeration Systems
- Trickling Filters
- IFAS Systems

Sludge handling / Dewatering
- Rotary Drum Filters
- Dissolved Air Flotation
- Shaftless Conveyors
- Live Bottom Bins
- Silos

Anaerobic Digestion
- Digester Covers - Fixed & Floating
- Mechanical Draft Tube Mixers
- Biogas Storage Gasholders
- Heat Exchangers

Filtration
- Continuous Backwashing Filters
- Sand & Multi-Media Filters
- Drum & Disc Filters
- Tertiary Filters
- Ultra Filtration Membrane Systems

Disinfection
- UV Disinfection
- Tablet Chlorination / De-chlorination

Package Plants / Processes
- MBR - Membrane Bio Reactors
- EA - Extended Aeration
- USBF - Upflow Sludge Blanket Filtration
- STM Aerator - Combined Fixed & Suspended Growth
- Aerobic Residential Systems

Slide and Sluice Gates

Water Treatment

Aerators
- Forced Draft Aerators
- Induced Draft Aerators
- Natural Draft Cascades Aerators
- Pressure Aerator

Pressure Filters
- Mixed Media Filters
- Activated Carbon Filters
- Greensand Filters
- Vertical and Horizontal Configurations

Flocculators
- Horizontal / Vertical
- Paddle / Turbine

Sedimentation
- Solids CONTACT CLARIFIER™
- Circular Clarifier Mechanisms
- Rectangular Chain & Flight Collectors
- Bridge Collectors
- Submersible Sediment Removal Systems
- Tube Settlers

Filtration
- Ultra Filtration Systems
- Coated Media Filters
- Monolythic Floor Filter Systems, Underflow Drains, Strainers

Disinfection
- UV Disinfection
- Tablet Chlorination / De-chlorination

Package Plants
- Conventional Water Treatment
- Membrane Ultra Filtration Systems

Residual Handling
- Gravity Thickeners
- Backwash Clarifiers
- Vacuum Drum Filters

Softening
- Solids Contact Clarifier

ION Exchange

C & M Environmental Technologies Inc., Barrie, Ontario

Tel: 705.725.9377 • Fax: 705.725.8279 • Email: info@cmeti.com • Website: www.cmeti.com

metcon
SALES & ENGINEERING LTD.

May 18, 2011

Black & Veatch Consulting Engineers
50 Minthorn Blvd, Suite 103
Markham, ON
L3T 7X8

Attention: Dhananjaya Niriella

RE: Polymer Feed System for Bradford – Schomberg STP
METCON BUDGETARY QUOTE: S21-006825-DH/PR 2

Dear Dhananjaya Niriella,
Metcon Sales and Engineering Limited is pleased to submit a budgetary quotation for the supply of the equipment described herein:

Item 1: Polymer Feed System

Quantity One (1) ProMinent Polymer System as supplied by Metcon Sales & Engineering Limited and comprising of:

Customer Supplied Information

1. Polymer System for Liquid Polymer;
2. Neat Polymer Flow rate : up to 2 kg/hr;
3. Solution concentration required: 0.5 %;
4. Calculated Prepared Solution at 0.5 % and 2 kg/hr : 400 L/h

Equipment offered: ProMix-S – 60 x 2 – 0.71 DA:

Prominent ProMix 60x2 – 0.71 DA is a complete polymer preparation system for hydrating, activating and feeding equipment for liquid, concentrated polymer in emulsion or dispersion form. The equipment includes a mixing chamber with a built in agitator. The unit is delivered with a system for preparation water including valves, flow meter, a low flow switch and a control cabinet along with a Peristaltic pump, for the pumping the neat polymer into the mixing chamber. The standard operating pressure of the system is 100 psi g.

The ProMinent ProMix polymer make down system is equipped with a special 3-zone High Energy Mixing and Hydration unit that has motor driven agitator(s). This mixing unit features 3 distinct zones or chambers that are designed for the appropriate residence time and feature a unique agitator blade design for each zone. Each chamber and blades are designed to carry out the function of spreading the polymer, hydrating it and mixing it with the preparation water in an efficient and effective manner.

The mixing unit also features the injection valve for the polymer from the top and is designed for a very easy removal and re-installation. This design enables easy cleaning and maintenance. The entire system is designed for easy assembly/disassembly.

The **ProMix 60x2 – 0.71 DA** is designed for a maximum capacity of ***0.71 USGPH (2.68 LPH)*** concentrated polymer (product as supplied) with a maximum preparation water flow of ***120 USGPH (450 LPH)***.

The major components of the ProMix-S Liquid Polymer System are as under:

<u>Mechanical</u>

- **Neat Polymer Pump**
  - ProMinent Delta series, solenoid, diaphragm metering pump: DLTa1608PVT
  - Mounted on the back panel of the ProMix skid
  - Maximum Flow 0.71 USGPH (2.68 LPH);
  - Max. Operating Pressure : up to 100 psig.
  - Neat Polymer Pump side equipped with a suitable PVC Calibration Column.

- **3-zone High Energy Mixing Unit:**
  - Motorized mixing unit, with 3-zones, separated by baffels,
  - Motor: ½ HP, 1ph/120 VAC/60 Hz, TEFC Motor
  - Each zone having a specially designed mixing element,
  - PVC mixing chamber, volume: 7 L, designed for operating pressure up to 100 psig,
  - Injection of liquid polymer from the top

- **Primary Dilution Water Components:**
  - ¾" NPT connection for water inlet
  - Solenoid Valve
    - Brass Body, NBR Seal, NPT; 10-150psig Pressure Range
  - Flow Control Valve
    - PVC construction; Manual globe valve, ½" , typical
  - Rotometer
    - 1 usgpm, PVC rotameter,
    - PVC end fittings, NPT connections, Equipped with reed switch for contact of flow.

- **Secondary Dilution Water Components**
  - Flow Control Valve
    - PVC construction; Manual globe valve, ½" , typical
  - Rotometer

        - 1 usgpm, pvc rotameter,
        - PVC end fittings, NPT connections, Equipped with reed switch for contact of flow.
    - Pressure Gauge, 2.5" dial, SS,

- **Solution Components**
    - Static Mixer
        - 6 Element
        - PVC Construction, Sch 40
- **Discharge** at 3/4" NPT, PVC elbow
- **Drain :**Ball Valve, ½" NPT connection, drains off the mixing unit; PVC construction, EPDM seals/seat

Electrical

- Electrical Control Panel
    - Nema 4X Polycarbonate Enclosure
    - ProMinent Aegis series controller – with interactive menu for easy operation
    - Power Supply – 120V / 1ph / 60 Hz.
    - Current Load – 15amp (max rated)
    - Hand – Off – Auto Mode switch on the panel door
        - In Auto mode accepts a 4-20mA signal from the customer to control the Potentiometer for the Peristaltic Pump.
    - CSA Special Inspection

General Notes:

- Electrical Control Panel will be with CSA Special Inspection
- ProMix is built to PFC standards in Sch. 80 PVC, socket welded and tested to 150 psig, the unit does not have any other special registrations like TSSA, NSF, etc.
- The unit will be hydrostatic tested as per PFC standard test protocol prior to shipping
- Start up and Training are not included in the quote, but are quoted as an adder at Section 3.
- ProMinent Fluid Controls Scope ends at the connection points of the ProMix Liquid Polymer System. A Pressure Regulating valve may be required at the water inlet, esp. if water supply pressure is higher than 90 psig.
- Spare Parts price can be provided if requested.
- Maximum Chamber pressure – 100 psig

1. Maximum Viscosity – 2000cPs

Metcon Services :
O and M Manuals as Required
Shop Drawings as Required
Qty One (1) Day of Startup, Commissioning and Training

TOTAL BUDGETARY PRICE FOR ITEM 1…….......………………..………………$22,300.00

All applicable Taxes: Extra
Freight to site: Included
Start-up, Commissioning and Training: As noted. Please contact Metcon for pricing if extra service is required. “Minimum 14 days notice required for scheduling field service visits”

Delivery: Submittals of Drawings for approval approximately ___6-8___weeks after receipt and acceptance by Metcon of Customer's Purchaser Order.

Equipment approximately __6-8*_wks after receipt of approved drawings (if drawings required)

* Lead time quoted for the submittals of drawings and delivery of equipment may vary based on the shop and project Engineering loading at the time of Order. Please notify the undersigned if partial delivery is acceptable

Payment Terms: 25% with drawings submittal, 75% Net 30days
See following page for detailed Terms and Conditions.

If you require any further assistance, please do not hesitate to contact the undersigned.

Yours truly,

METCON SALES AND ENGINEERING LIMITED

Prabal Ray

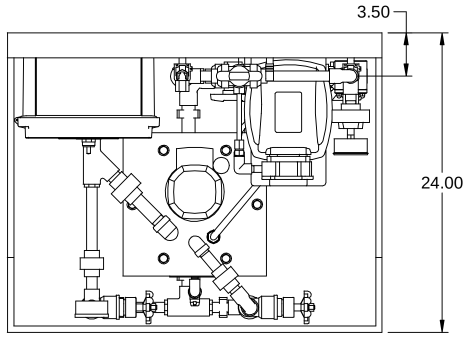
Prabal Ray
Inside Sales Supervisor
Phone: 905-738-2355 ext. 235
Fax: 905-738-5520
prabalr@metconeng.com
www.metconeng.com

C.C Dave Howes
Regional Sales Rep

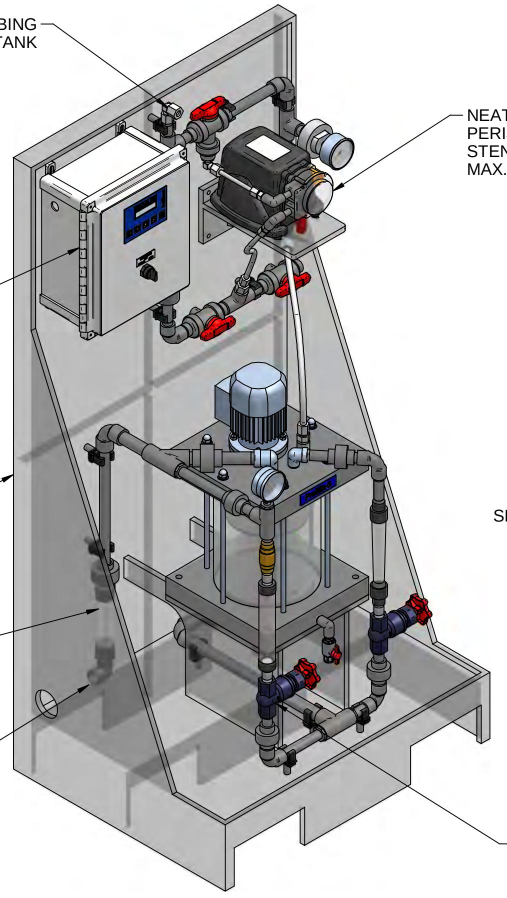
Terms and Conditions, Rev 5 dated July 14, 2010

1) Taxes, HST Extra unless, otherwise stated, exempt or shown in our quote.
2) Equipment is shipped FOB Concord, Ontario
3) Freight, Unloading and Storage:
Freight: is extra unless otherwise stated in our quote.
Unloading and all Equipment necessary for unloading are not supplied by Metcon.
Storage and all equipment and material necessary for proper storage are not supplied by Metcon.
4) Warranty: Warranty on Parts and Labour, F.O.B. Concord Ontario, for 12 months after Start- up or 18 months after Delivery whichever comes first. Metcon Sales and Engineering Limited warrants to the purchaser that, at the time of Shipment, the products shall be free from any defects in material or workmanship and will conform to the specifications as agreed upon at the time the order is placed. At Metcon option, it will credit, repair or replace (without charge to the purchaser) such products or components which are defective or non conforming with the Specifications set out herein, provided the purchaser notifies the company of the defect or non-conformity within the specified warranty period. This warranty shall not apply to any defect or non conformity which is solely attributable to Installation and Operation not as per the manufacturers recommended instructions, a defect or non-conformity which is caused in shipment, transit or installation, or which is caused by misuse or abuse in storage, use or operation, as the case may be, it being agreed between the parties that this warranty shall apply solely to defective workmanship or material. Metcon Sales and Engineering Limited reserves the right to inspect the products prior to warranty replacement, repair or crediting. Warranty is specified by the manufacturer. Metcon will not be responsible for any warranty claims beyond those of standard corporate policies.
5 a) Consequential Damages: Metcon Sales and Engineering Limited shall not be liable for any claims for any special, indirect or consequential damages arising out or related in whatsoever way to a defect in material or workmanship of the Products, Spare Parts or non-standard monitoring equipment.
5 b) Liquidated Damages: On this or any purchase orders, contracts, or agreements Metcon enters into, Metcon will not be held responsible for, does not accept or pay, Liquidated damages that my be assessed, inferred, or passed on, on other or by other parties, for any reason."
6) Installation and Erection: All field erection of Equipment, skids and other supply; **All** interconnecting piping and wiring; All bolts, conduits, piping and other hardware necessary for installation; All tools, special tools, hardware, and equipment necessary for installation; is not supplied by Metcon Sales and Engineering Ltd, and is to be supplied by others.
7) Video and/or Audio Recording: In light of the potential risks to all parties associated with the use of video and/or audio recording for training, Metcon Sales and Engineering prohibits Metcon Sales and Engineering personnel or its agents from participating in video and/or recordings at any time.
8) Start Up, Commissioning and Training: Including all costs associated with Travel and leaving expenses, are Extra unless otherwise stated in our quote.
9) Acknowledgement Letter: Prior to accepting, processing and proceeding with an order: our Terms and Conditions, and scope of supply will be confirmed to the customer in the form of an Acknowledgement Letter. The customer must sign and return this letter to Metcon.
10) Cancellations: Subject to a 25% fee. If applicable, Subject to the Approval of shop drawings by the Engineer.
11) Returning Goods: Certain items, cannot be returned for credit such as chemicals, buffers and probes or units that have been away from the factory for over 90 days. Metcon cannot accept returns without an Return Merchandise Authorization Number(RMA). Upon inspection of returned goods, Metcon will issue a credit on account, Metcon does not return Money.
12) Delivery Date is subject to acceptance of customers Purchase order by Metcon, receipt of signed Acknowledgment Letter at Metcon, and receipt of approved shop drawings (if applicable), and as stated in our quote.
13) Back Charges: Metcon does not accept any back charges, which may result from late deliveries, field installations, wrong information, etc.
14) Terms: as per our Quote.
First time customers have to prepay their order
Metcon accepts Visa and Master card payments on goods under $3000.00
All Visa and Master Card payments over $1000.00 will be subject to a 3% surcharge.
All American Express payments are subject to a 5% surcharge.
Metcon minimum order amount$100.00.
15) Quotation Validity: 30 days from above quotation date
Metcon Terms and conditions are subject to change, without notice.

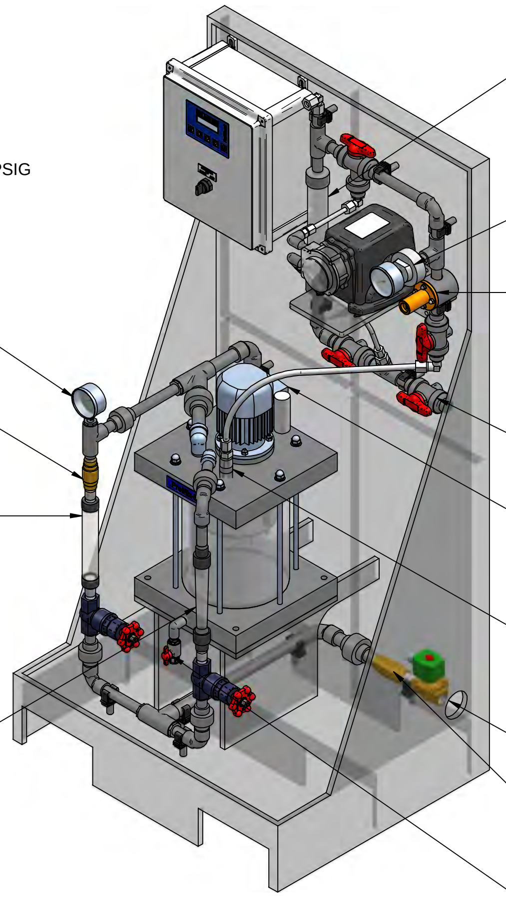
DWG No	REV
7746603-200	A



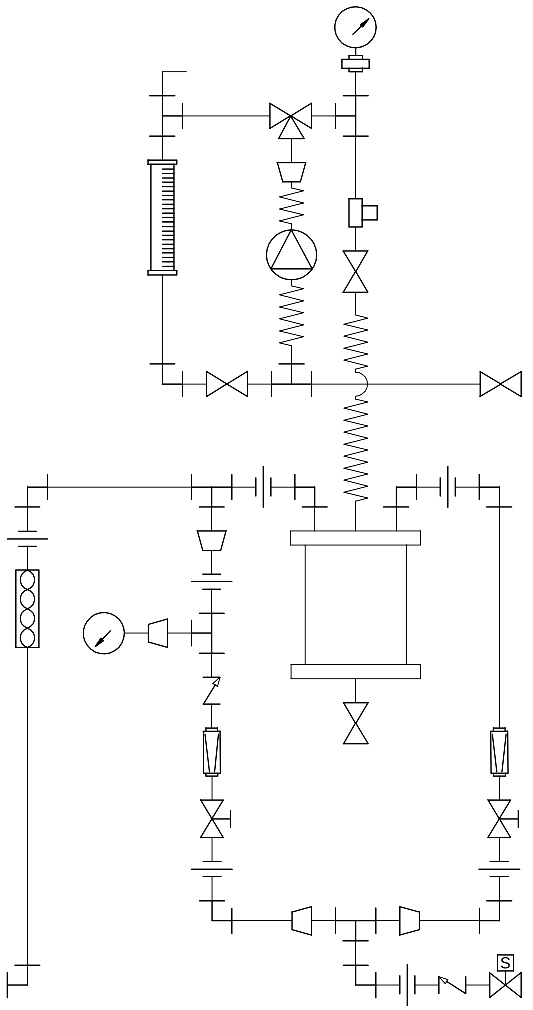
PLAN VIEW



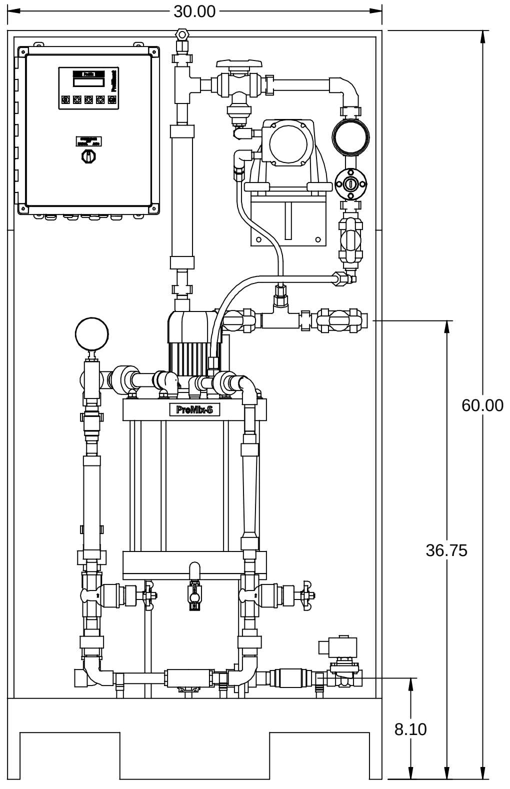
LEFT ISOMETRIC VIEW



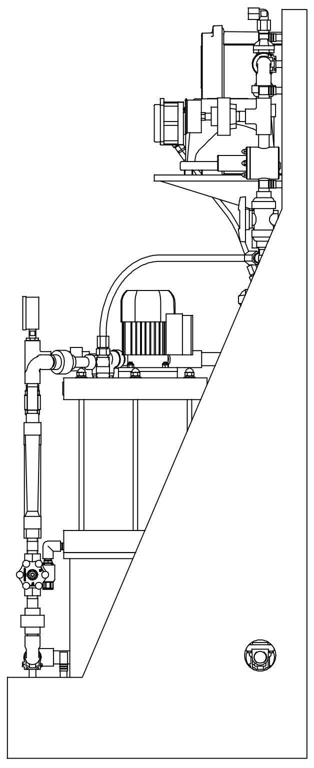
RIGHT ISOMETRIC VIEW



PIPING SCHEMATIC



FRONT VIEW



SIDE VIEW

NOTES:

1. ALL PIPING AND FITTINGS SHALL BE 1/2" AND 3/4" SCH. 80 PVC SOCKET WELD WITH VITON SEALS AS REQUIRED BY COMPONENTS.
2. EMULSION POLYMER BLENDING SYSTEM WITH THREE ZONE PVC MIXING CHAMBER.
3. REQUIRED INCOMING POWER:

   120VAC, 60HZ, 1 PHASE, 20 AMP CURRENT RATING AT 120 VAC

4. ALL DIMENSIONS ARE IN INCHES AND ARE SHOWN FOR REFERENCE ONLY.

REV	DATE	DESCRIPTION	BY	APPD	REVD
A	10/22/10	REVISED POLYMER INLET	GJS		
0	07/26/10	FIRST ISSUE	GJS		

REVISIONS

CUSTOMER PROMINENT FLUID CONTROLS INC.
(PROMIX S SYSTEM)

JOB No 7746603
PURCHASE ORDER No N\A

TITLE
PROMIX S_60X2-0.71TA SYSTEM SKID
GENERAL ARRANGEMENT

ENGINEERS SEAL

pfc ProMinent

ProMinent®
THE PROMINENT GROUP OF COMPANIES

PITTSBURGH, PA USA
WWW.PROMINENT.US

PROMINENT FLUID CONTROLS LTD.
490 SOUTHGATE DRIVE.
GUELPH, ONTARIO, CANADA
N1H 6J3
TEL. 519 836 5692 FAX. 519 836 5226

PROMINENT FLUID CONTROLS INC.
RIDC PARK WEST
136 INDUSTRY DRIVE,
PITTSBURGH P.A., USA. 15275
TEL. 412 787 2484 FAX. 412 787 0704

DESIGNED	GJS	APPROVED	
DRAWN	GJS	SCALE	N.T.S.
CHECKED	JMS	DATE	07/26/10

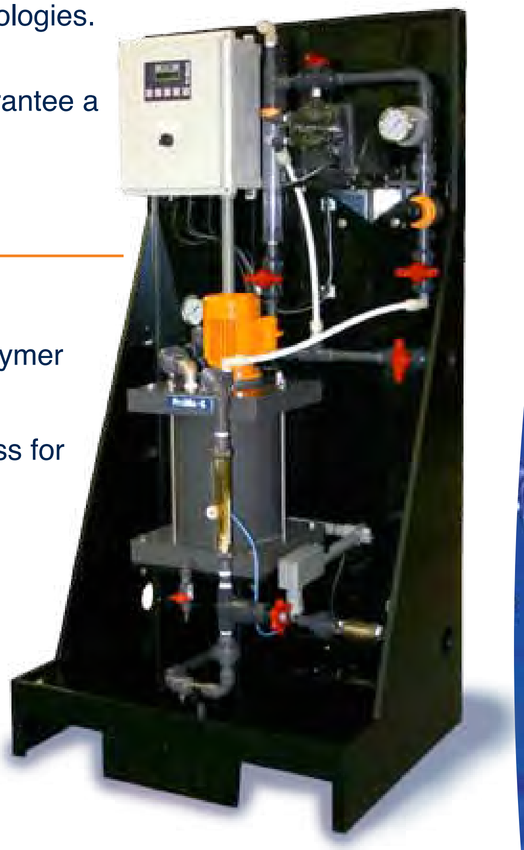
MAXIMUM TESTING PRESSURE =	150 PSI
MAXIMUM OPERATING PRESSURE =	100 PSI
CHEMICAL SERVICE = POLYMER	

DWG No	REV	PAGE
7746603-200	A	1/1

ProMix-S Polymer Blending System

New ProMinent Polymer Design!

The **ProMix** is a pre-engineered polymer mixing system made for the water and wastewater markets. Designed as an in-line unit, the **ProMix** can be customized to meet most liquid polymer applications utilizing tubing pump technologies. The unique mixing chamber allows for complete makedown of the neat or diluted polymer to guarantee a problem-free injection.



Features and benefits

- Open design for easy maintenance
- True multi-zone mixing regime for proper polymer activation
- Unique injection check valve with easy access for cleaning
- System protection against loss of water flow
- Precise activated polymer solution delivery
- Customize controls to meet your application
- LCD display with touchpad control
- 4-20mA input to pace pump
- Remote start/stop
- General alarm contacts

Applications

- Emulsion or Dispersion polymer activation
- Coagulant or Solution polymer feed
- Water and Wastewater treatment
- Clarification
- Sludge Dewatering

Specifications

- Water Inlet: 3/4” FNPT
- Polymer Inlet: 1/2” NPT (female)
- Product Outlet: 3/4” FNPT
- Max. Chamber Pressure: 150 PSIG
- Max. Operating Pressure: 100 PSIG
- Power Supply: 120 VAC, 1 Phase, 60Hz
- Current Load: 20 Amp
- Drain Connection: 1/4”

ProMinent®

Visit our XTRANET <www.prominentxtranet.com> to:

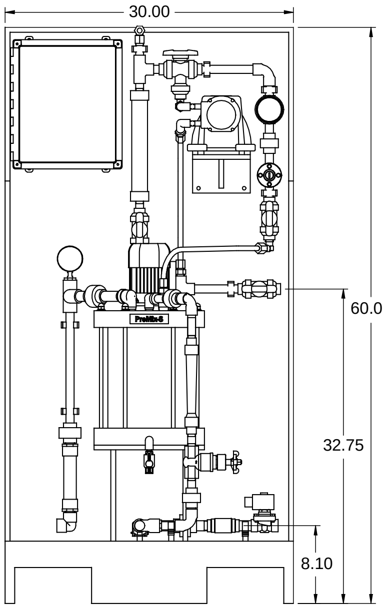
- sign up for our electronic newsletter
- download literature and manuals
- validate your product warranty

ProMix-S Polymer Blending System

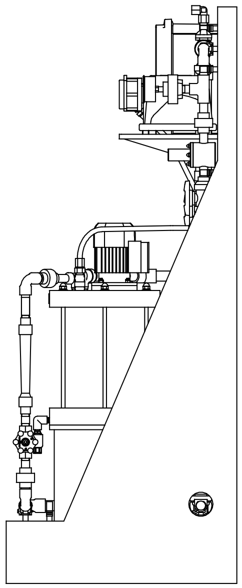
Capacity data

ProMix-S Series P/N	Model Number	Primary Dilution (gph)	Primary Rotameter (gpm)	Secondary Dilution (gph)	Secondary Rotameter (gpm)	Peristaltic Pump (gph)
7746602	60-0.21TA	60	1	-	-	0.21
7746603	60x2-0.71TA	60	1	60	1	0.71
7746604	180x2-0.71TA	180	3	120	2	0.71
7746605	180x2-1.67TA	180	3	120	2	1.67
7746606	300x2-2.50TA	300	5	300	5	2.50
7746607	300x2-3.54TA	300	5	300	5	3.54

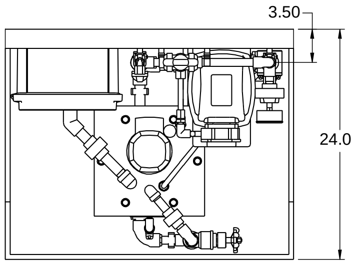
Dimensional Drawings



FRONT VIEW



SIDE VIEW



PLAN VIEW

ProMinent®

ProMinent Fluid Controls, Inc. (US)
136 Industry Drive
Pittsburgh, PA 15275-1014
Tel: (412) 787-2484
Fax: (412) 787-0704
eMail: sales@prominent.us
www.prominent.us

ProMinent Fluid Controls Ltd. (Canada)
490 Southgate Drive
Guelph, ON N1G 4P5
Tel: 1-888-709-9933 | (519) 836-5692
Fax: (519) 836-5226
eMail: sales@prominent.ca
www.prominent.ca

Bray SALES ONTARIO
A Division of Bray Controls Canada Corporation

6350 Tomken Road, Unit 3
Mississauga, Ontario L5T-1Y3
Tel: 905-564-2429 Fax: 905-564-2425
www.bray.ca

QUOTE

Date	Quote #
05/04/11	AAAQ5962

Quoted To: Black & Veatch Canada
Dhana Niriella
50 Minthorn Blvd. Suite 501
Markham, ON L3T 7X8
Canada

Phone: (905) 747-8506
Fax: (905) 747-0974
E-mail: nirielladp@bv.com

Terms	Rep	P.O. Number	Ship Via
	Daniel Yip		Yours

Delivery quoted is after receipt of order and is subject to prior sale

Ln #	Qty	Description	Unit Price	Ext. Price	Delivery
1	**16**	**S31 valve assembly**	$1,184.81	$18,956.96	3wks
2		**310400-11010120** 4 in. BRAY SERIES 31 BUTTERFLY VALVE LUG TYPE, FULL RATED, CAST IRON A 126 CLASS B BODY, ALUMINIUM BRONZE DISC, 416SS SHAFT, EPDM SEAT,			
3		**700051-113D0536** ELECTRIC (ON/OFF) ACTUATOR,120VAC, NEMA4,500IN-LBS,30S, IR			
4		**7070B1-22600536** S70 ADAPTER KIT-70B1			
5		**700006-22980536** AUX SW KIT,1 OPEN & CLOSE,10A			
6		**700006-22950536** S70 HEATER ASSEMBLY			

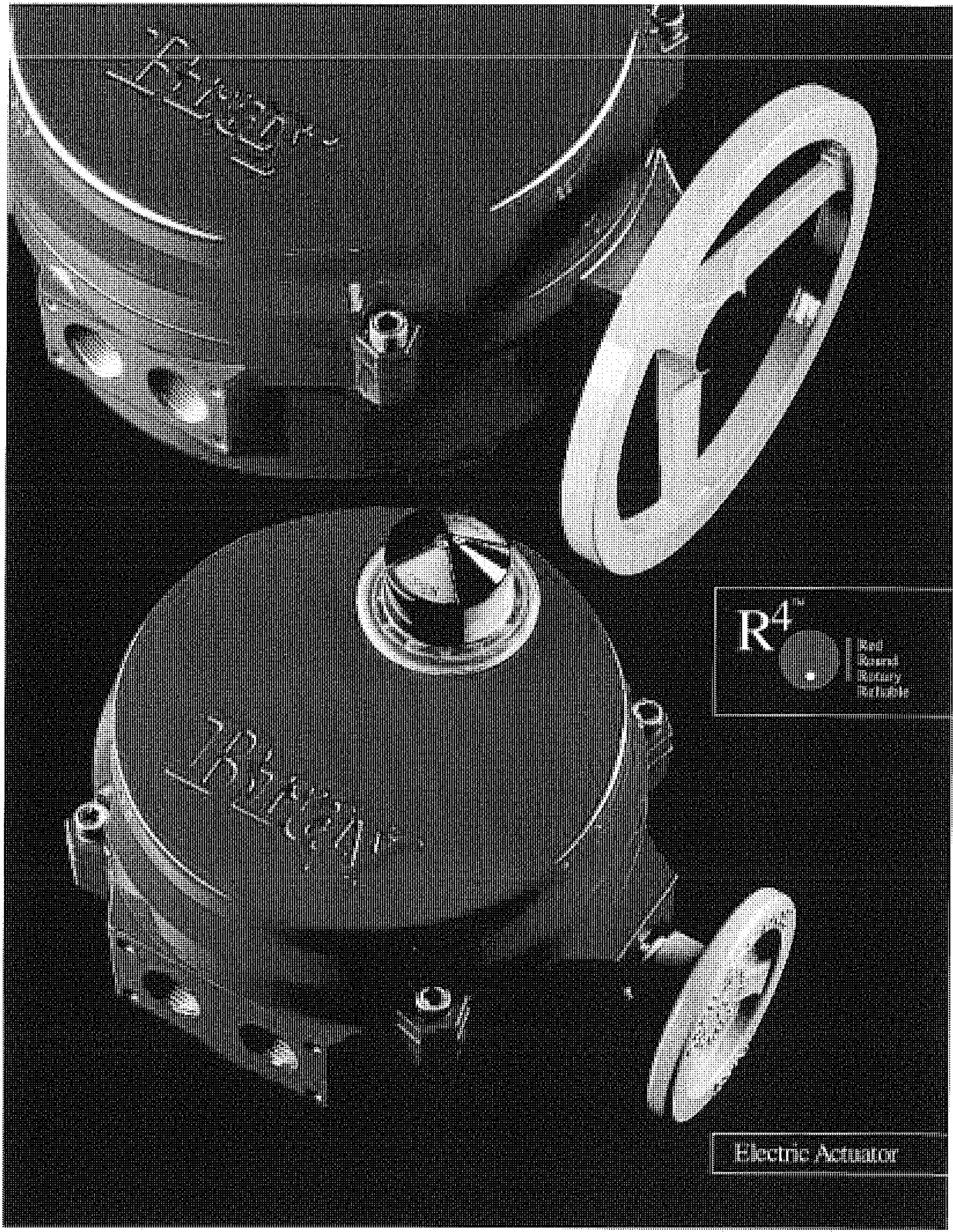
SubTotal	$18,956.96
Taxes Extra	
Total	**$18,956.96**

Notes:

Prices are valid for 30 days

F.O.B. St-Laurent, QC >>>COLLECT<<<

CONDITIONS OF SALES AS PER THE BRAY CONTROLS CANADA LTD. SALES POLICY CONDITIONS OF SALES ATTACHED



R^4™

Red
Round
Rotary
Reliable

Electric Actuator

RUGGED ELECTRIC ACTUATOR FOR ROTARY VALVES

300 TO 6,500 LB-IN OUTPUT TORQUE

Bray Controls' years of proven success in electric actuation, combined with innovative engineering, has produced the R4.™ The R4 features on-off or modulating control. This red, round electric actuator for rotary valves delivers highly reliable service.

R4™
Red
Round
Rotary
Reliable

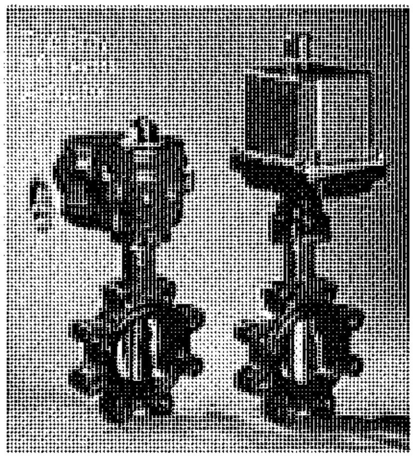
Bray's unique, customer–friendly designed Control Center has many advantages over present industry standards including:

- **UL, CSA and CE certification of most units**
- **Ease of customer field wiring directly to the terminal strip without interference from other components**
- **Simple and unique manual override handwheel system**
- **Lowest profile and lightest weight actuator on the market**
- **Simple finger or screw driver adjustment of travel limit cams without interference from other components**
- **Highly visible valve status display**
- **Externally adjustable travel stops**
- **Captive housing screws**

Additionally, components not requiring customer access are protected underneath the Power Center cover plate.

LOW PROFILE, COMPACT, HIGH TORQUE DESIGN

The R^4 is by far the most compact, lowest profile design of any electric actuator delivering comparable torque output. Thorough research and many years of field experience have gone into the development of this state-of-the-art actuator – *the product of the future*. This design offers the advantages of greatly reduced space requirements, lighter weight and ease of installation and maintenance when compared to other electric actuators. When mounted directly to Bray valves, the R^4 is especially compact.



The R^4 compared to a typical actuator, both mounted to 4" Bray valves.

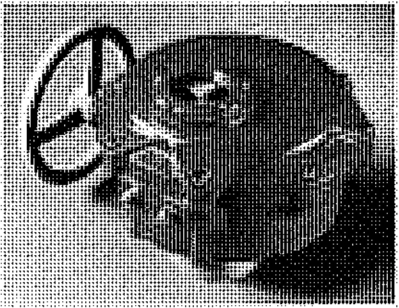
DIRECT MOUNTING OF THE R^4 ON BRAY VALVES

Bray actuators mount directly to Bray valves without using any external linkage. Field installation is simple and misalignment is minimized. For sanitary processing and outdoor applications, the Bray direct mounting system reduces the possibility of contamination buildup or corrosion between the valve and actuator. The mounting pattern complies with ISO 5211 and VDI/VDE 3845 (NAMUR recommendations). The R^4 can be mounted and operated in any position. Standard rotation is 90° reversible. Bray can provide linkages for mounting the R^4 to other devices requiring 90° rotation. Please consult the Bray factory for further information.

EXTERIOR FEATURES

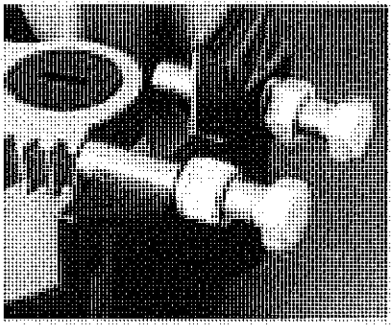
EXPLOSION PROOF ENCLOSURE

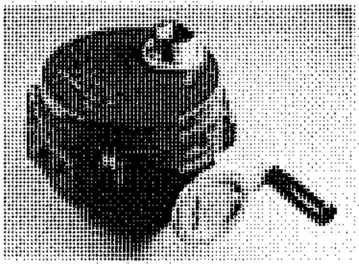
The R^4 waterproof/explosion proof unit is UL NEMA 4,4x,7&9 listed and certified to specifications for hazardous locations. This rugged, heavy duty housing contains precision machined bores and flanges to meet flame path requirements. The valve position indicator is viewed from behind a sodium glass explosion proof window. This unit is currently available with 800 to 2,000 lb-in. output torque, continuous or intermittent duty.



MECHANICAL TRAVEL STOPS

Stainless steel mechanical travel stops permit precise field adjustment of actuator movement to specific degrees of rotation. The travel stops are located outside the base for easy readjustment without removing the cover. Stainless steel lock nuts with O-ring seals hold the travel stops securely in place. The travel stops are normally set at the factory to allow 0° and 90° travel.





R^4 manual override handwheel with optional spinner.

ENCLOSURE (A)

The R^4 waterproof unit is UL NEMA 4, 4x listed. Die-cast aluminum cover and base are high-quality polyester powder coated for exceptional corrosion, wear, impact and ultra-violet resistance. Potential leak paths are eliminated since the indicator shaft does not protrude through the enclosure.

MANUAL OVERRIDE (B)

A manual override handwheel is standard on all models to rotate the valve without electrical power. A yellow caution stripe around the handwheel hub indicates the handwheel is engaged for manual operation.

CAPTIVE COVER BOLTS (C)

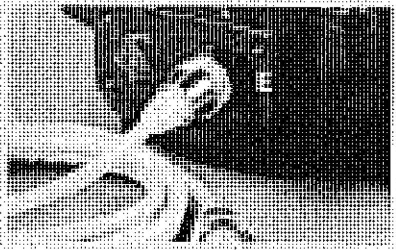
The cover is attached to the base by stainless steel bolts. When the cover is removed the bolts are held captive in the cover. This prevents time consuming problems caused from lost or misplaced bolts.

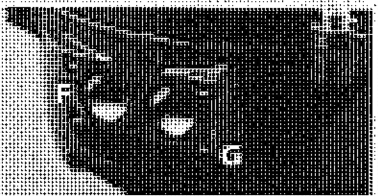
VALVE STATUS DISPLAY (D)

The R^4 features a highly visible valve status display. Prominently labeled and color coded—yellow for open, red for closed—the display indicates valve position through the full range of travel. The display can be seen from almost any angle. Made of high impact, heat and chemical resistant clear polycarbonate, this display withstands caustic washdown and offers excellent corrosion protection.

ELECTRICAL CABLE CONNECTIONS (E) (Optional)

A multi-pin, watertight cable receptacle offers full compatibility with today's industrial wiring systems. Factory pre-wiring prevents errors and allows quick–connect field installation. Cordsets with connection/flying leads or extension cords with connections on both ends can plug directly into the receptacle.





CONDUIT ENTRIES (F)

The R^4 features two conduit connections in either NPT or metric threads. One entry is for power, one for control wiring.

PILOT DRILLED HOLES FOR LOCAL CONTROL STATION MOUNTING (G)

The conduit entry panel has four holes which may be easily tapped for the installation of optional local Control Station.

CLEAN AND EASY ACCESS TO ALL FIELD WIRING AND ADJUSTMENTS

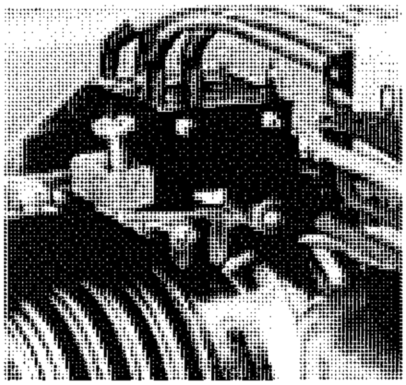
Bray has specifically engineered the R^4 Control Center for customer–friendly convenience. Designed like a junction box, the R^4 offers by far the easiest access to terminal block wiring, cam adjustments and switch installation. Accessories are easily added, either before installation or after installation. Therefore, the time required for field start-up and adjustment is greatly reduced, and maintenance can be performed with assured ease and safety.

Bray's unique design, modular system of components and accessories, and innovative features combine to best meet today's industrial requirements.

R^4™

TORQUE LIMITING SWITCHING SYSTEM (Optional)

The torque limiting switching system consists of two SPDT mechanical switches and two factory calibrated adjusting screws. The green screw adjusts the torque limit in the open direction, and the red screw adjusts the torque limit in the closed direction. The switches independently respond to predetermined loads in both the open and closed travel directions by sensing the movement of the worm shaft, and interrupting the electrical power to the motor. The switches operate at any point of actuator travel.



Torque Limit Switches shown with mounting bracket sectioned for clarity.

R^4 APPLICATIONS

The R^4 is the ideal choice for process control applications involving:

- Automation and computer systems
- Butterfly, ball, plug and other rotary valves
- Dampers, switches, safety and flow-control devices
- Machine and fixture indexing
- Hostile environments demanding excellent moisture, chemical and corrosion resistance
- Long service life and rugged reliability

INDUSTRIES

Bray's R^4 Electric Actuators are used in a wide range of industries world wide, including:
Chemical, Pharmaceutical, Petroleum Refining and Oilfield, Microelectronics, Pulp and Paper, Water and Waste Water Treatment, Brewing, Food Processing, Beverages, Power, Marine, Mining, Textile and HVAC.

CONTROL CENTER FEATURES

TRAVEL LIMIT SPDT SWITCHES

(A) Bray has provided two SPDT switches as standard. These durable, high quality switches are mechanically isolated and electrically independent. The dedicated circuits eliminate any voltage crossover between the switches. This switch combination is used for both open and closed positions of the valve and requires only one cam for each direction of valve travel. Bray's design provides synchronicity between motor control and position display. Switches are easily accessible without interference from other components. Each switch is marked with open or close labels and the cams are color coded, green for open and red for close, eliminating the possibility of making wrong adjustments of travel limits or field wiring errors.

AUXILIARY SWITCHES (Optional)

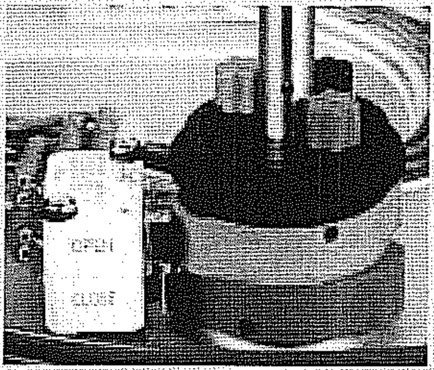
Independent dry-contact SPDT switches are available to indicate travel position to remote customer control systems.

AUTOMATIC POWER CUTOUT SWITCH (B)

The R^4 is supplied with a SPDT mechanical switch which cuts power to the motor when the handwheel is engaged for manual operation. This switch also functions as a safety emergency shutdown device that immediately stops the actuator motor even if electrical power is still being applied to the motor.

CERTIFICATIONS / APPROVALS

Bray has gained UL, CSA and CE certifications on most intermittent and continuous duty actuators. These certifications insure that the R^4 has been designed to the highest quality requirements and most stringent safety standards worldwide. Substantial resources have been invested to assure our customers that the R^4 is the best actuator on the market and will remain so.



CAMS / CAM ADJUSTMENT (C)

Bray's patented cam design is an outstanding feature of the R^4. Cams for each switch are *infinitely* adjustable by finger touch or screwdriver with no special tools needed. The adjustment knobs rotate the specially formed cams.

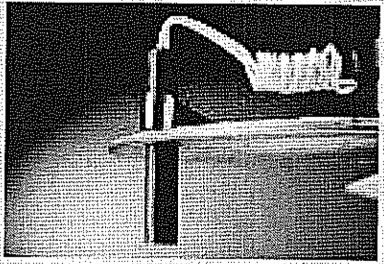
Each cam is color coded – the red adjustment knob controls the red cam (close position), and the green knob controls the green cam (open position). Standard factory setting allows 90° travel between open and closed positions.

TERMINAL BLOCK (D)

The actuator switches are pre-wired to a terminal block. The block has been designed for ease of customer wiring without interference from other components and features clearly marked terminal numbers. The block has been placed near the two conduit entries with ample room for running wire leads. A wiring diagram is included inside the cover for easy reference. The ground wire screw (**E**) is plated green and positioned for easy access. With some optional features Bray installs a second terminal block for Bray factory wiring and customer field wiring of additional limit switches.

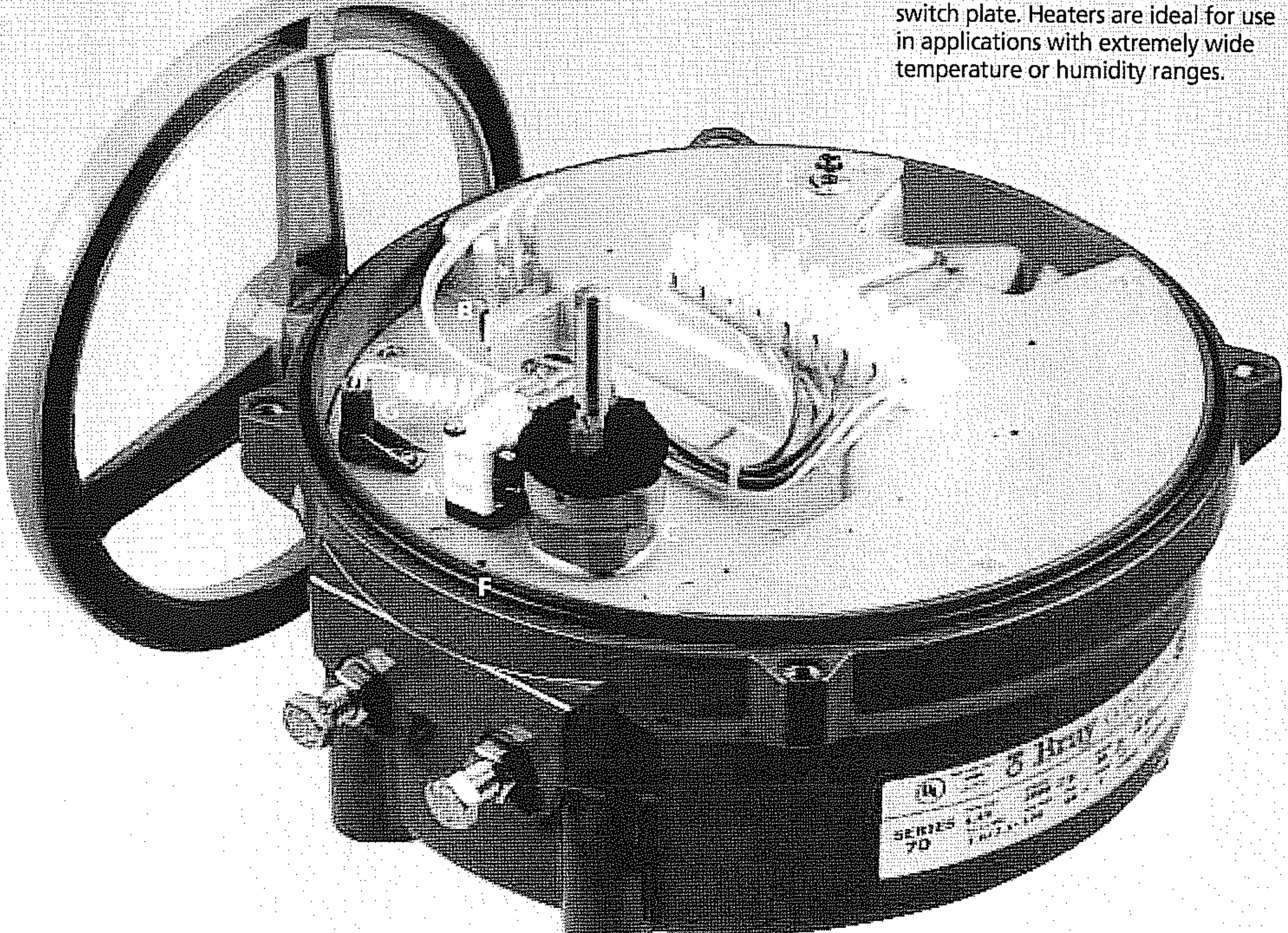
O-RING SEAL FOR WATERTIGHT ENCLOSURE (F)

The large seal between the cover and base provides a waterproof seal and prevents internal corrosion. The Bray R^4 O-ring seal is the best design for watertight enclosures and is far superior to commonly used gaskets.



HEATER (G) (Optional)

Pre-wired to the terminal block, a self-regulating heater prevents condensation from collecting inside the actuator, which could cause damage to the electrical components. The heater is mounted below the switch plate. Heaters are ideal for use in applications with extremely wide temperature or humidity ranges.

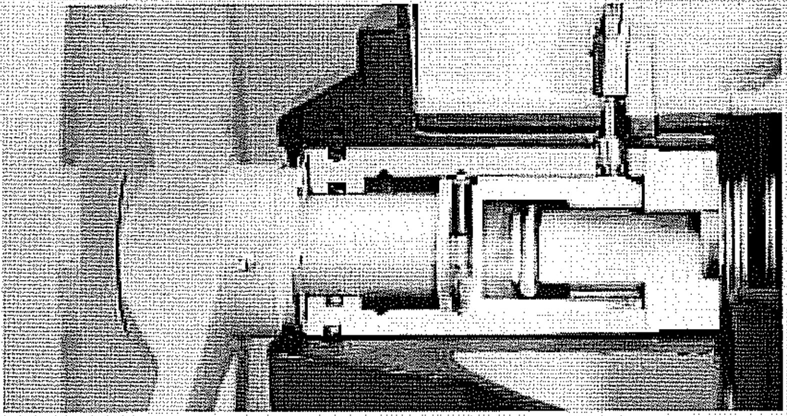


Bray designed the R^4 to completely separate the Control Center from the Power Center. The Power Center, located in the actuator base, consists of motor, gear train, capacitor, output drive and heater. This design protects the power drive system as each component has been engineered to require no customer servicing. The Power Center components have been uniquely configured to maintain the extremely low profile of the R^4.

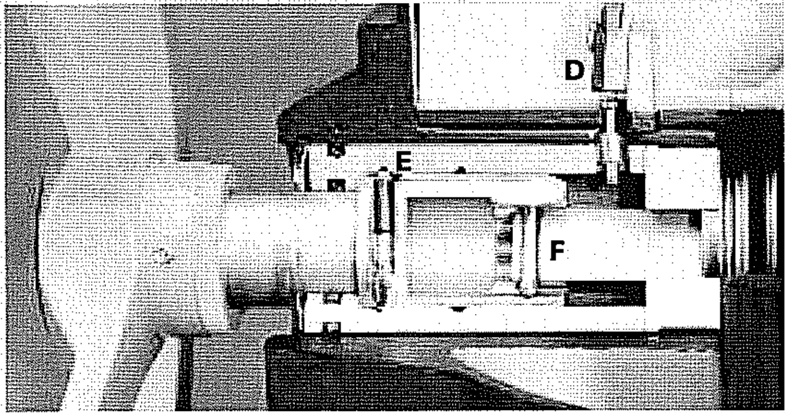
R^4™

POWER CENTER FEATURES

MOTOR (A), CAPACITOR (B), SPUR GEAR TRAIN (C) AND WORM GEAR (H) The R^4 has a 120 or 220 VAC single phase permanent split-capacitor reversible induction motor. The motor features a built-in thermal overload protector of a bi-metallic strip in the windings set at 275°F (135°C) with automatic reset. The heavy-duty spur gear train is composed of precision cut, multi-staged gears and shafts. The gears and shafts are heat treated high alloy steel and will withstand locked rotor conditions. The spur gear train is permanently lubricated at the factory. This gear train drives the worm shaft which in turn drives the segmented worm gear output shaft.



Above photograph is a sectional view of the manual override assembly with override disengaged. Photograph below shows manual override engaged.



MANUAL OVERRIDE HANDWHEEL ASSEMBLY

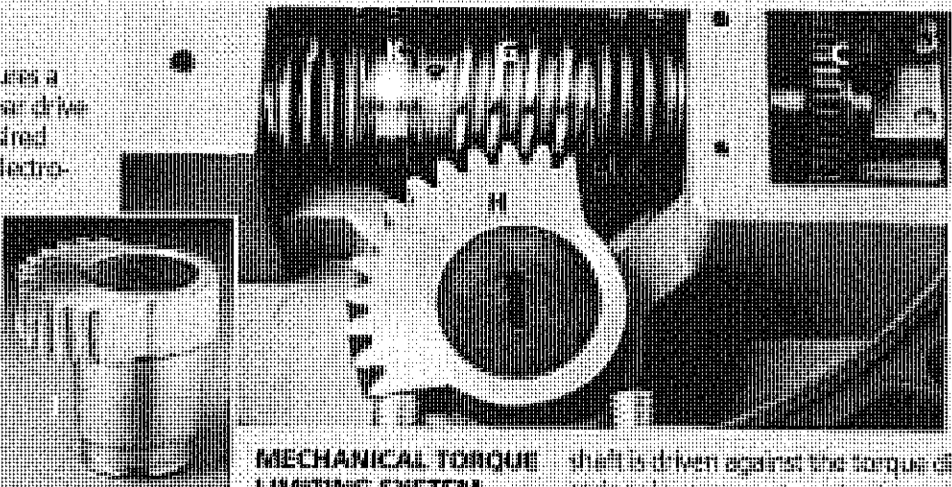
- **Pull to engage for manual operation.**
- **Rotate handwheel to position valve.**
- **Push to disengage for power operation.**

A simple pull engages the handwheel for manual operation. The Bray manual override system ensures positive and fast manual operation without the use of extra tools or levers. When the handwheel is engaged, the electrical power to the motor is cut off by means of the Automatic Power Cutout Switch (**D**). When engaged, the manual override shaft is held in position by a Ball Detent (**E**). The Ball Detent also holds the shaft in position when the handwheel is pushed in to disengage the override. The Drive Pin (**F**) engages and disengages the manual override shaft from the worm and segmented worm gear output shaft. When the handwheel is pushed or pulled, the drive pin smoothly engages the worm shaft.

SELF-LOCKING OUTPUT DRIVE ASSEMBLY

The output drive assembly features a self-locking worm and worm gear drive which holds the valve in the desired position without the need for electro-mechanical braking systems.

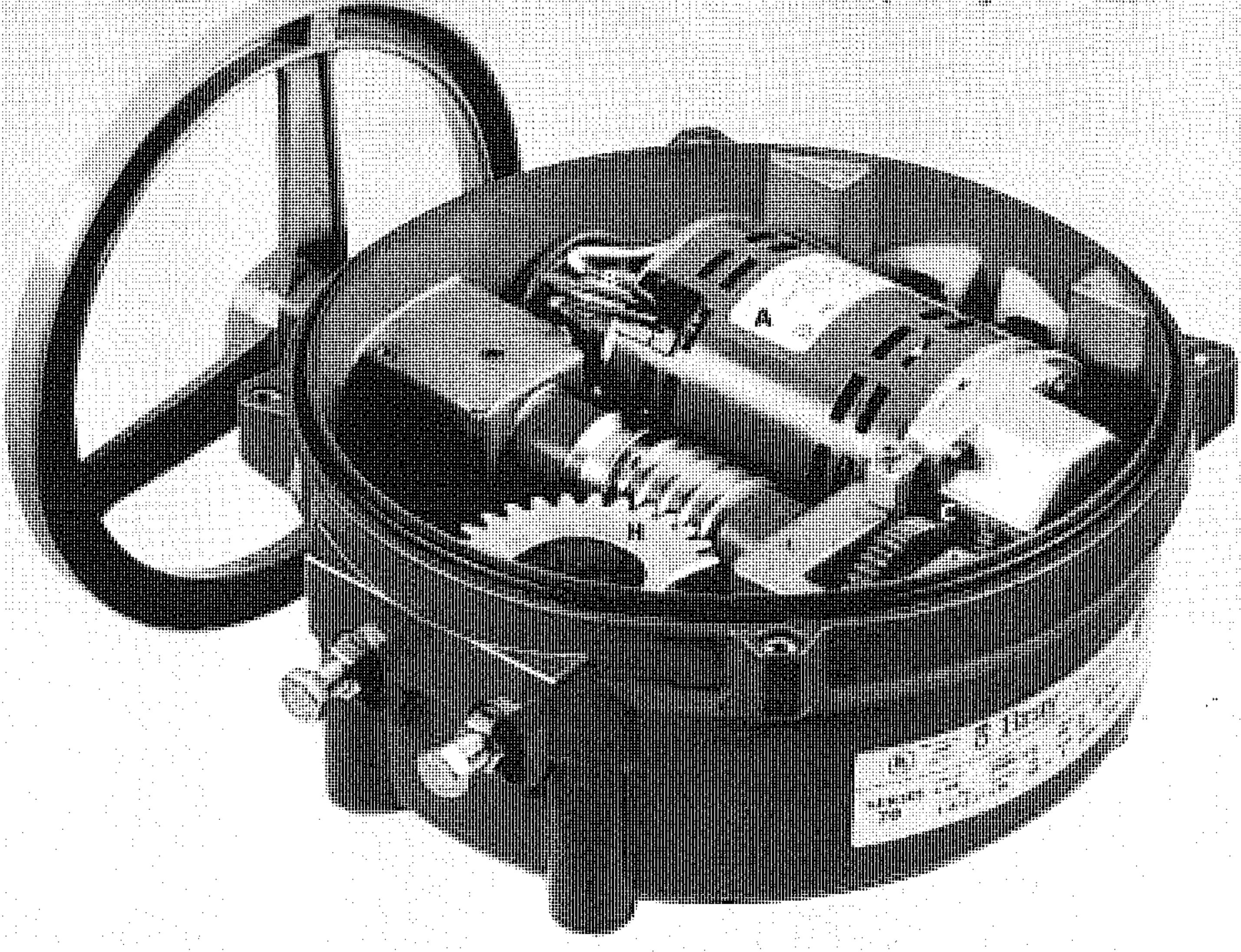
The worm shaft directly drives the worm gear. The Worm (**G**) is made of chrome moly steel and the segmented Worm Gear (H) is a precision machined aluminum bronze casting. The worm gear and Output Shaft (I) are one part. The output shaft is the driving member that positions the valve. The worm gear drives the valve status display shaft which operates the infinitely adjustable cams to limit the electrical travel of the actuator.



MECHANICAL TORQUE LIMITING SYSTEM

(Optional)

The mechanical torque limiting system consists of a Worm Shaft, a Worm (G), a set of Torque Disc Springs (J) and a Shaft Groove (K) for torque limiting switches. The torque disc springs, located on each side of the worm, resist the linear movement of the worm shaft. The worm shaft is driven against the torque disc springs in response to output torque. The shaft groove actuates the torque limiting switches, located above in the Control Center, to start and stop the motor. (Please refer to the Control Center section on page 4 for description of the Torque Limiting Switching System). The precisely controlled movement of this system is the main torque limiting element of the IQ.



MODULATING ACTUATOR FOR PRECISION CONTROL OF VALVE POSITION

The Bray R^4 Electric Actuator can be equipped with a Servo for precise control of valve position. The Servo consists of a microprocessor controlled circuit board and a feedback potentiometer assembly, which both fit entirely within the standard R^4 actuator housing. The circuit board has terminal blocks for customer field wiring, and other terminals for internal connections to the actuator components. The feedback potentiometer is driven by a gearset connected to the actuator output drive. Also available are Servos capable of serial bus communication, such as DeviceNet.

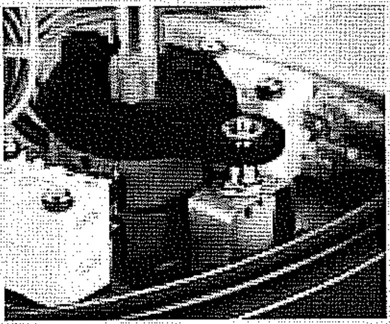
R4™

Red
Round
Rotary
Reliable

COMMAND CENTER OPTIONS

SERVO PLUS II OPERATION

The Servo Plus II can be configured by the factory or the customer to accept several types of input signals, such as 4-20 mADC, 0-10 VDC, 0-5 VDC or potentiometer control. Each terminal connection and indicator is clearly labeled to simplify field wiring and operation. The input signal electronically represents the *desired* actuator position, and the internal feedback potentiometer signal electronically represents the *actual* actuator position. The microprocessor constantly compares the two signals, and if a difference is detected, drives the actuator in the proper direction until the signals are equal. When a balance is reached, the microprocessor turns off the actuator motor. The worm gear then mechanically holds the valve in the desired position until the input signal is changed again.



Feedback Potentiometer Gear

SPEED CONTROL

Adjustments are configurable for both open and closed speed control of the actuator motor. In addition, an approach control circuit senses when the actuator is about to reach the desired valve position, and pulses the motor to avoid overshooting the setpoint.

POTENTIOMETER CALIBRATION

Calibration of the feedback potentiometer is done through a unique gear arrangement that is easily accessible and eliminates the need of any special tools. A simple adjustment of Bray's patented cam drive aligns the potentiometer gear as easily as a travel cam.

SERVO PLUS II FEATURES / SPECIFICATIONS

Note: Servo is available for modulating service – continuous duty actuators only.

Note: "Standard" is the way the Servo is set at the factory.
"Configurable" means the customer, or the factory, can modify the Servo with the Configuration Tool Software and cable.

POWER INPUT:	85-265 VAC, 50/60 Hz (power must match motor)
POWER CONSUMPTION:	2 Watts (not including actuator power)
INPUT SIGNAL:	Standard: 4-20 mADC into 250 Ohm Configurable: 0-10 VDC, 2-10 VDC, 135 Ohm or greater potentiometer
CALIBRATION:	Single Button Autocalibration, Load Factory Defaults
INDICATORS:	Power: Green LED Status: Flashing Red / Green LED Motor: Red LED (Close), Green LED (Open)
CONTROL MODES:	Standard: Full Range Configurable: Split Range 0-50%, Split Range 50-100%, Reverse Acting
FAIL POSITION : (Loss of Input Signal)	Standard: Fail Closed Configurable: Any position between 0%-100%, including Fail in Last Position, Fail Open or Fail Closed
CONTROL CHARACTERISTIC:	Linear
DUTY CYCLE:	100%
INTERNAL FEEDBACK:	10k Ohm Potentiometer, gear driven
RETRANSMISSION OUTPUT:	Standard: 4-20 mADC Configurable: 0-20 mADC, 0-10 VDC, 2-10 VDC Power Feedback Output is designed to drive an isolated 200 – 1k Ohm resistive load.
SPEED CONTROL:	Standard: Speed Control is Disabled Configurable: Bidirectional – Independent Open and Close adjustment for On Time, Off Time, Speed Control Starting Position and Speed Control Stop Position

FEEDBACK POTENTIOMETER

The feedback potentiometer gear has an over–torque shift engagement which operates if the limits of the active region of the potentiometer are exceeded. This situation can occur when the manual override handwheel is turned past 90° or below 0° travel. The potentiometer gear always remains engaged with the drive gear, but shifts on its shaft to prevent damage and maintain proper alignment.

VOLTAGE SPIKE PROTECTION

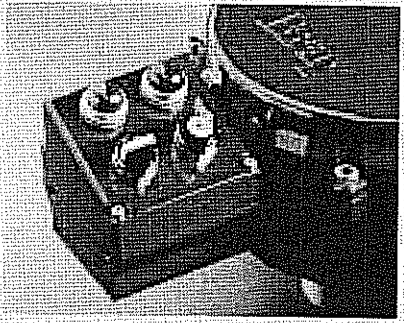
Voltage spikes that can damage electrical equipment are very common in industrial locations. Large voltage spikes can be caused by switching power loads, such as large motor drives, at the customer location. The output stage TRIACs of the Servo are protected against damage from voltage spikes by a special combination of

- limit switch circuitry
- metal oxide varistor (MOV) for transient voltage suppression
- zero crossing detection

DEVICENET SERVO

Bray also offers the Series 70 with the most advanced serial bus communication Servo on the market. The Bray **DeviceNet Servo** is fully ODVA (Open DeviceNet Vendor Association) compliant. Benefits include greatly simplified field wiring and installation, advanced control and diagnostics in real-time from a remote location, and full network integration. Please contact your Bray representative for more information.

CONTROL STATION (Optional)

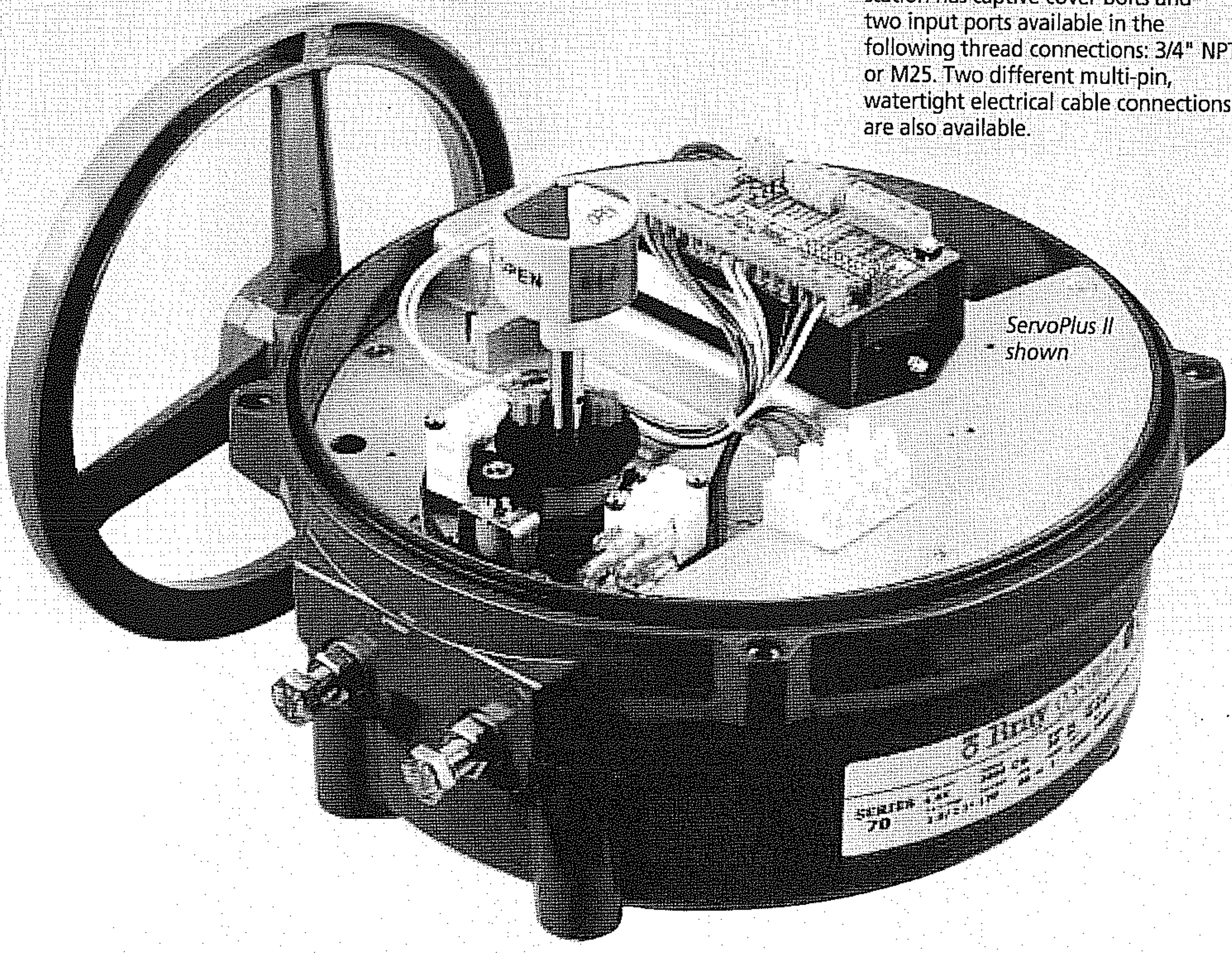


Control Station

Bray has designed a manual local electrical control station that flush mounts directly to the R^4. The Control Station features:

- a local–off–remote control switch
- an open–stop–close switch
- two lights which locally indicate open and closed valve position

The cover plate can be rotated in any 90° increment, allowing the customer to operate and view the station with ease. The enclosure is aluminum and weatherproof (NEMA 4, 4X, IP 65). Additionally, the control station has captive cover bolts and two input ports available in the following thread connections: 3/4" NPT or M25. Two different multi-pin, watertight electrical cable connections are also available.



ServoPlus II shown

WATERPROOF ENCLOSURE

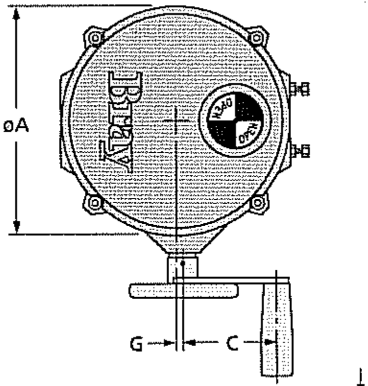
Actuator Series	A	B	C	D	E	F	G	H	J	K (UNC) xB.C.	M (UNC) xB.C.	N	P	Q	Weight lbs [kgs]
S70-003 S70-005	7.5 [191]	5.6 [142]	3.0 [76]	5.1 [130]	1.9 [48]	1.94 [49.3]	.19 [4.8]	1/2 ‡	2.0 [51]	5/16-18 x ø2.76	—	.75 [19]	.51 [13]	1.75 [44]	12 [6]
S70-008 S70-012 S70-020	10.1 [257]	7.8 [198]	3.7 [94]	6.5 [165]	2.5 [64]	2.69 [68.3]	.56 [14.2]	3/4 ‡	2.6 [66]	5/16-18 x ø2.76	1/2-13 x ø4.92	1.18 [30]	.87 [22]	2.20 [56]	28 [13]
S70-030 S70-050 S70-065	12.1 [307]	9.5 [241]	5.6 [142]	7.2 [183]	2.9 [74]	3.19 [81]	.56 [14.2]	3/4 ‡	3.1 [79]	1/2-13 x ø4.92	3/4-10 x ø6.50	See Detail A			48 [22]

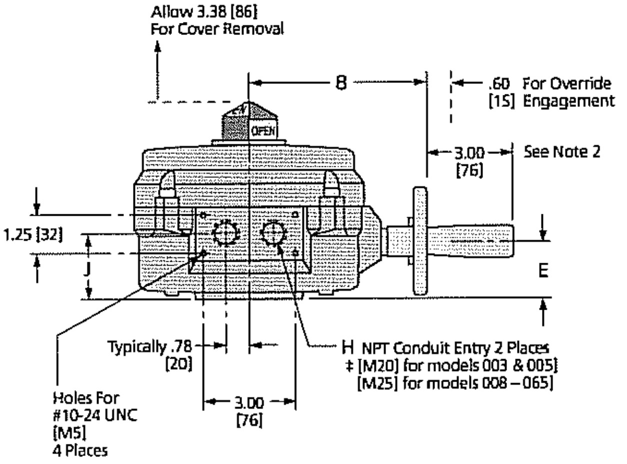
WATERPROOF / EXPLOSION PROOF ENCLOSURE

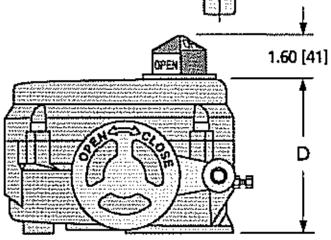
Actuator Series	A	B	C	D	E	F	G	H	J	K (UNC) xB.C.	M (UNC) xB.C.	N	P	Q	Weight lbs [kgs]
S70-708 S70-712 S70-720	12.5 [317]	8.0 [203]	3.7 [94]	7.2 [183]	2.5 [64]	2.69 [68.3]	.56 [14.2]	3/4 ‡	2.6 [66]	5/16-18 x ø2.76	1/2-13 x ø4.92	1.18 [30]	.87 [22]	2.20 [56]	34 [16]

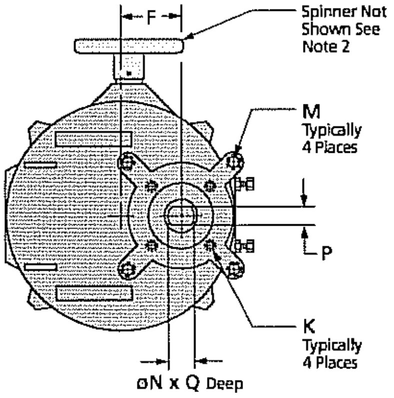
Notes:

1) Dimensions are in Inches, [Millimeters in brackets].
2) Handwheel Spinner shown in drawing is available as an option.
3) K & M Dimensions are also available in M8, M12, and M16.
4) N Dimension is also available with Double Square (Star) drive.

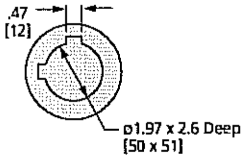




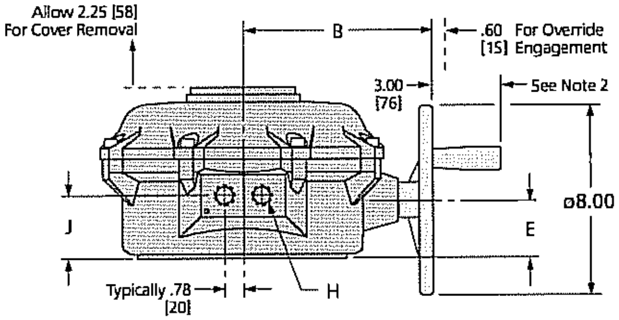


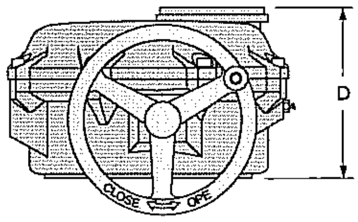


Detail A
(Series 70-030, 050, 065 Only)



WATERPROOF / EXPLOSION PROOF ENCLOSURE





Actuator Series	Torque Output lb/in [Nm]	Single Phase Motors Current Rating (Amps) At All Speeds (locked rotor)			Speed For 90° Operation In Seconds / Total Gear Ratio						Rim Pull lbs [kgs]	Bray Valve Sizes For Direct Mounting
					On-Off Intermittent‡			Modulating Continuous‡		Manual Override		
		VAC	Hz	Amps	Optional Speeds		Standard Speeds	Optional Speeds				
S70-003	300	120	50/60	0.8		8 sec.	15 sec.	30 sec.	60 sec.		11.4	2" through 6"
	[34]	220	50/60	0.5		1,392:1	2,413:1	5,070:1	11,200:1	30:1	[5]	
S70-005	500	120	50/60	1.4			15 sec.	30 sec.	60 sec.		19.0	2" through 6"
	[57]	220	50/60	0.6			2,413:1	5,070:1	11,200:1	30:1	[9]	
S70-008	800	120	50/60	2.1	6 sec.	10 sec.	15 sec.	30 sec.			13.0	2" through 12"
S70-708	[90]	220	50/60	0.9	681:1	1,080:1	1,640:1	3,340:1		30:1	[6]	
S70-012	1200	120	50/60	2.1		10 sec.	15 sec.	30 sec.			20.0	2" through 12"
S70-712	[136]	220	50/60	0.9		1,080:1	1,640:1	3,340:1		30:1	[9]	
S70-020	2000	120	50/60	2.1			15 sec.	30 sec.			33.0	2" through 12"
S70-720	[226]	220	50/60	0.9			1,640:1	3,340:1		30:1	[15]	
S70-030	3000	120	50/60	3.0			18 sec.	30 sec.			33.0	8" through 20"
	[339]	220	50/60	1.4			2,080:1	3,340:1		30:1	[15]	
S70-050	5000	120	50/60	3.0			18 sec.	30 sec.			55.0	8" through 20"
	[565]	220	50/60	1.4			2,080:1	3,340:1		30:1	[25]	
S70-065	6500	120	50/60	3.0				30 sec.			72.0	8" through 20"
	[734]	220	50/60	1.4				3,340:1		30:1	[33]	

‡ The duty cycle for intermittent on-off operation is 25%. The continuous duty actuator with Servo is rated for 100% modulating operation.

Waterproof (NEMA 4, 4x) 120 VAC intermittent and continuous duty single phase units are UL and CSA certified. 120 & 220 VAC intermittent and continuous duty single phase units conform to CE standards and have been certified by an independent lab. Waterproof/Explosion proof (NEMA 4, 4x, 7, 9) 120 VAC intermittent and continuous duty single phase units are UL certified. Each Series 70 actuator carries all applicable agency markings.

12 VDC, 24 VDC available as an option, please consult your Bray representative or the factory.

3 Phase Motors

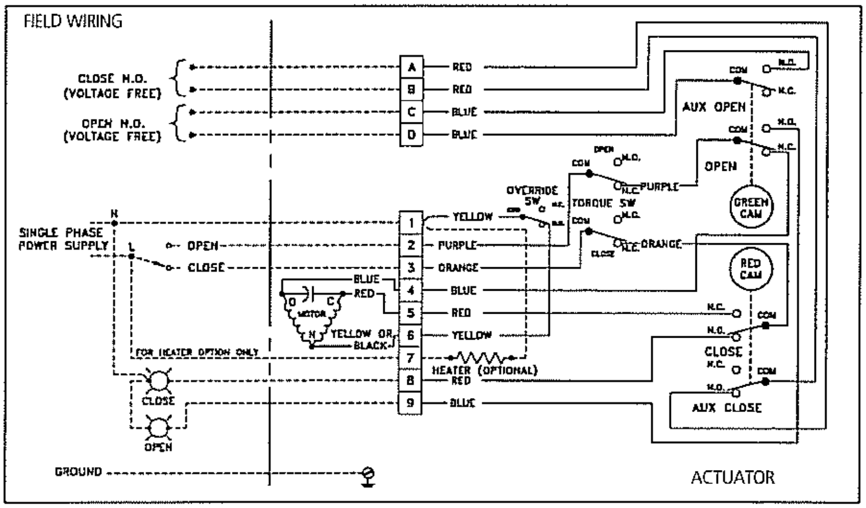
208, 230, 415, 460 and 480 V, 50/60 Hz motors are available. Size 008, 708, 012, 712, 020, 720, 030, 050 and 065 units are available with 3 Phase Motors.

TYPICAL WIRING DIAGRAMS

ON–OFF

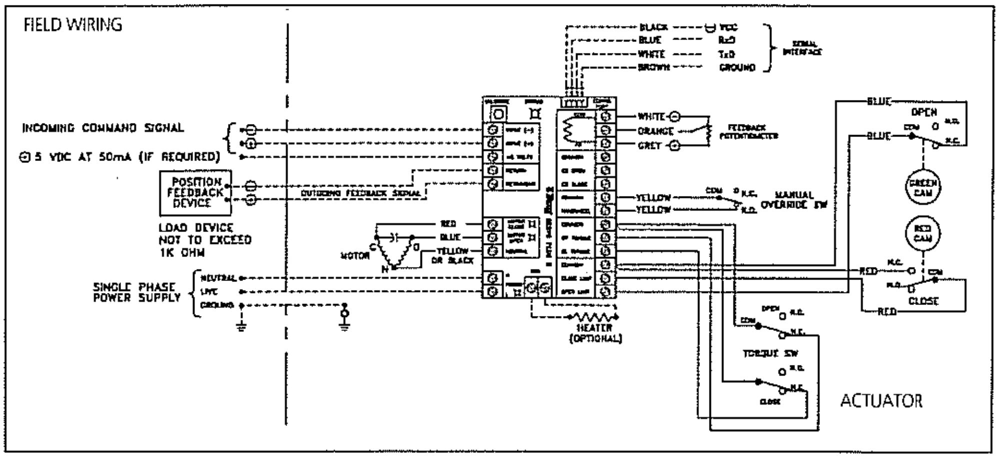
With Optional Torque Limit Switches, Auxilliary Limit Swithes and Heater

Wiring Diagrams are
for reference only
Do Not Use for Field Wiring



MODULATING–Servo Plus II

With Optional Torque Limit Switches and Heater



Notes:

1) Actuators are shown in closed position.
2) Manual Override is not engaged.
3) Actuators are shown with optional Torque Switches, Auxilliary Travel Switches (Not shown on Modulating Unit Diagram) and Heater
4) All switches are Single Pole, Double Throw.
5) Terminal block accepts field wiring from 12-22 AWG, 14-22 AWG for Servo.
6) Modulating Unit: Position Feedback Output is designed to drive an isolated 200-1k Ohm resistive load.

SPECIFICATIONS

The electric actuator shall be compact and low-profile to greatly reduce space requirements. The actuator shall feature ease of access to field wiring and adjustment. The actuator shall be built to withstand line vibration and shock without failure and shall bolt directly to Bray valve mounting flanges without using brackets.

MOTOR A single phase permanent split-capacitor reversible motor with voltages of 120 and 220 VAC 50/60 Hz shall be standard. Motor insulation shall be Class F or better. The motor shall contain a built-in UL approved automatic reset thermal overload protector set at 275°F (135°C) embedded in motor windings. A variety of 3-Phase 50/60 Hz and DC motors shall be available upon request.

DUTY CYCLE The duty cycle for intermittent on-off operation shall be 25%. The continuous duty actuator with Servo shall be rated for 100% modulating operation.

SPUR GEAR TRAIN SYSTEM The actuator shall have a self-locking gear train consisting of a worm and worm gear output drive mechanism. The spur gear train shall have precision cut multi-staged gears which will withstand locked rotor conditions. The spur gear train shall be permanently lubricated at the factory. The gear train shall drive a chrome-moly steel worm which drives the composite aluminum bronze segmented worm gear/output shaft.

WIRING Actuator switches shall be pre-wired to a terminal block for ease of access and all internal wiring shall range from 12-22 AWG.

SWITCHES All travel switches shall be Single Pole, Double Throw, Form C type, 10A at 125/250 VAC, 1/2 A at 125 VDC, UL listed and CSA approved. Travel Limit switches shall limit actuator in both the open and closed position of valve travel.

CAMS Cams for each travel limit switch shall be infinitely adjustable by finger touch or screw driver, as provided by Bray's patented design.

CONDUIT ENTRIES All units shall have 2 conduit entries. Conduit entries for models 003 and 005 shall be either 1/2" NPT or M 20. Conduit entries for models 008 – 065 shall be either 3/4" NPT or M 25.

MECHANICAL TRAVEL STOPS Mechanical stainless steel travel stops shall be located outside the actuator for ease of adjustment and contain stainless steel lock nuts to hold the travel stops in place. O-rings provide waterproof seals. The travel stops shall limit the actuator movement to specific degrees of rotation.

MANUAL OVERRIDE All units shall be equipped with an aluminum manual override handwheel to rotate the valve without electrical power. The override assembly shall ensure positive and fast manual operation without the use of extra tools or levers.

EMERGENCY SHUT-OFF An automatic power cutout switch shall be provided to cut power to the motor when actuator handwheel is engaged for manual operation. This switch shall function as a safety emergency shutdown device.

ENCLOSURE The die-cast aluminum enclosure shall be certified to UL, CSA & CE waterproof standards (NEMA 4, 4X, IP 65). Cover shall be polyester powder coated for exceptional corrosion, wear, impact and UV resistance. The enclosure shall have captive cover bolts, therefore preventing time consuming problems due to lost or misplaced bolts. A UL listed waterproof / explosion proof enclosure (NEMA 4, 4X, 7, 9) shall be available.

VALVE STATUS DISPLAY The actuator shall have a highly visible clear polycarbonate display prominently labeled and color coded to indicate valve position throughout the full range of travel.

TEMPERATURE RATING Actuators shall be designed for temperature ranges of -40°F (-40°C) to +150°F (65°C).

OPTIONAL EQUIPMENT

The actuator shall be designed to include any of the following accessories as an option.

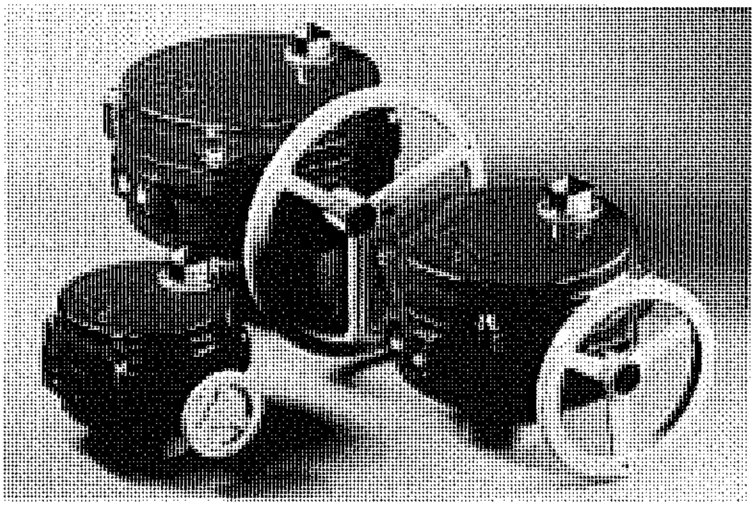
TORQUE LIMITING SYSTEM with 2 SPDT mechanical switches and 2 factory calibrated adjusting screws – the green adjusts the limit in the open direction, the red adjusts the limit in the closed direction. The worm shaft shall be driven against the torque disc springs in response to the output torque. The switches contact the worm shaft groove in response to predetermined loads and interrupt the electrical power to the motor. Switches shall operate at any point of actuator travel.

HEATER with self-regulating temperature control to prevent condensation buildup. The heater shall be pre-wired to the terminal block. Rated output is 15 W at 120 or 220 VAC.

SERVO A microprocessor controlled Servo shall be available for precise modulating control of valve position in response to an analog input signal. The Servo shall have an analog output signal proportional to actual valve position as standard. This analog signal shall be configurable to either current or voltage output. The Servo shall have a specially engaged potentiometer gear which prevents damage due to over rotation. The Servo shall have voltage spike protection on all input terminals. Adjustments shall be provided for both open and closed Speed Control of the actuator. Input Signals: 4-20 mADC into 250 Ohm, 0-10 VDC, 0-5 VDC, 135 Ohm or greater potentiometer. 10k Ohm Potentiometer shall be used for internal feedback.

DeviceNet Servos shall be available.

CONTROL STATION for manual local electrical operation of the actuator. The Control Station shall flush mount to the actuator and feature a local / off / remote control switch, an open–stop–close switch, and two lights which locally indicate open and closed valve position. The enclosure shall be aluminum and waterproof (NEMA 4, 4X, IP 65).



The Bray R4™ Electric Actuator – Series 70-005, 065 and 020.

DISTRIBUTOR

United States patent number 5,305,781. Other patents applied for worldwide.

Bray® CONTROLS
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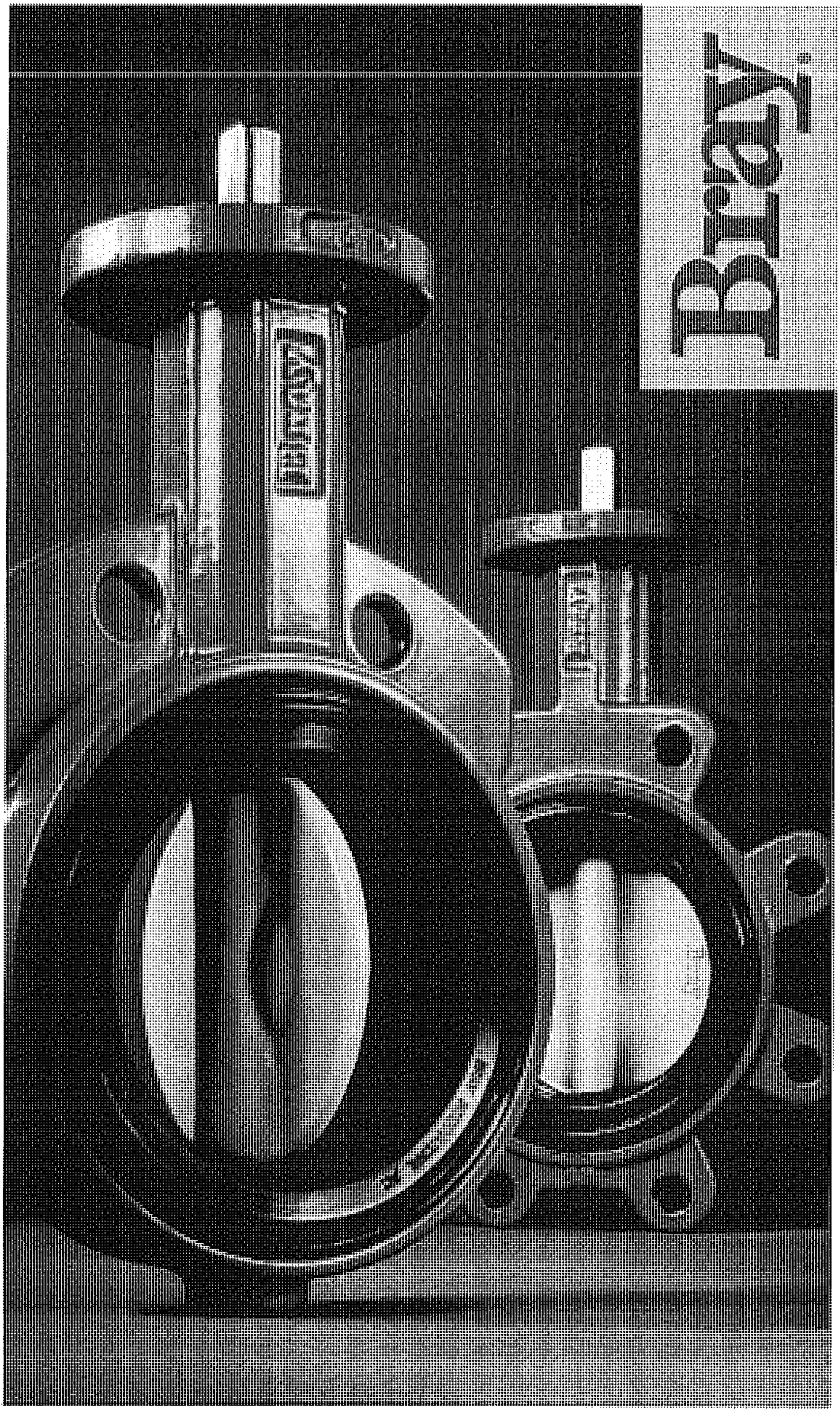
Bray

SERIES 30/31 Wafer/Lug

2" - 20" (50mm-500mm)

BUTTERFLY VALVES

RESILIENT SEATED



CELEBRATING
20
YEARS

The
High
Performance
Company

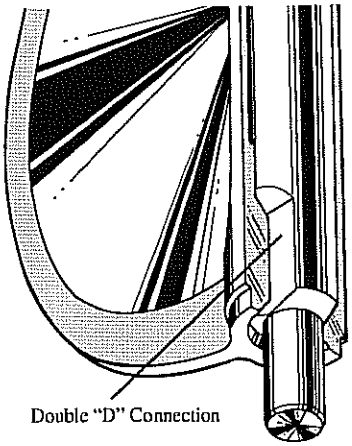
SERIES 30

2"-20" (50mm-500mm)

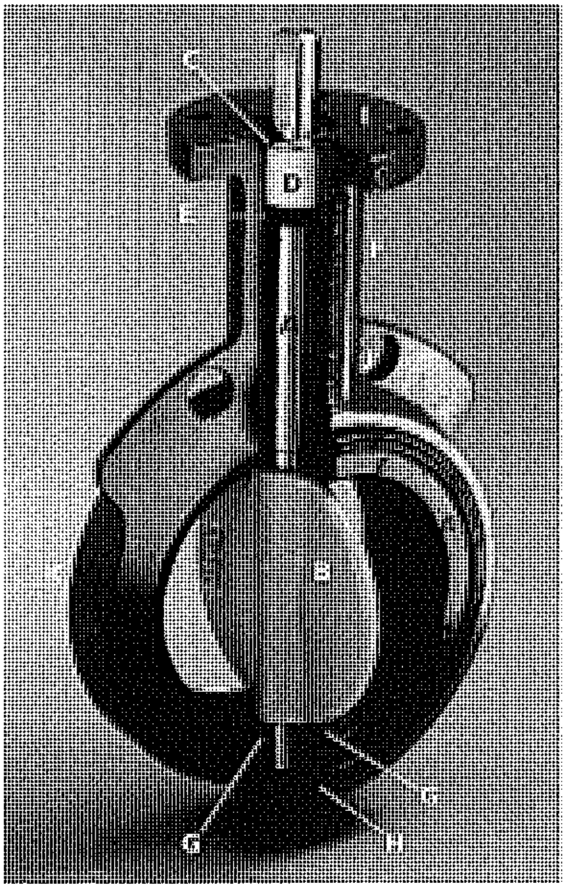
Bray® Controls is proud to offer a high quality line of butterfly valves to meet the requirements of today's market. Combining years of field application experience, research and development, Bray has designed many unique features in the Series 30/31 not previously available. The results are longer service life, greater reliability, ease of parts replacement and interchangeability of components.

DISC AND STEM CONNECTION

(A) Features a high-strength through stem design. The close tolerance, double "D" connection that drives the valve disc is an exclusive feature of the Bray valve.
It eliminates stem retention components being exposed to the line media, such as disc screws and taper pins, which commonly result in leak paths, corrosion, and vibration failures. Disc screws or taper pins, due to wear and corrosion, often require difficult machining for disassembly. Disassembly of the Bray stem is just a matter of pulling the stem out of the disc. Without fasteners obstructing the line flow, the Series 30/31 C_V values are higher than many other valves, turbulence is reduced, and pressure recovery is increased. The stem ends and top mounting flange are standardized for interchangeability with Bray actuators.



DISC (B) Casting is spherically machined and hand polished to provide a bubble-tight shut off, minimum torque, and longer seat life. The disc O.D. clearance is designed to work with all standard piping.



STEM BUSHING (D)

Non-corrosive, heavy duty acetal bushing absorbs actuator side thrusts.

STEM SEAL (E)

Double "U" cup seal design is self-adjusting and gives positive sealing in both directions. Prevents external substances from entering the stem bore.

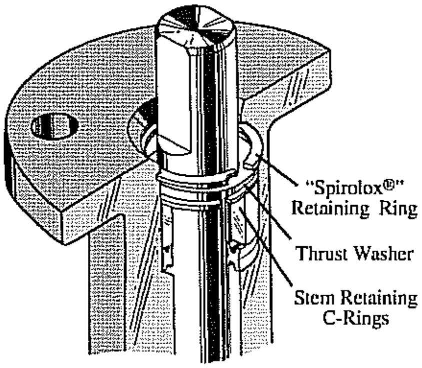
NECK (F) Extended neck length allows for 2" of piping insulation and is easily accessible for mounting actuators.

PRIMARY AND SECONDARY SEALS (G)

The Primary Seal is achieved by an interference fit of the molded seat flat with the disc hub. The Secondary Seal is created because the stem diameter is greater than the diameter of the seat stem hole. These seals prevent line media from coming in contact with the stem or body.

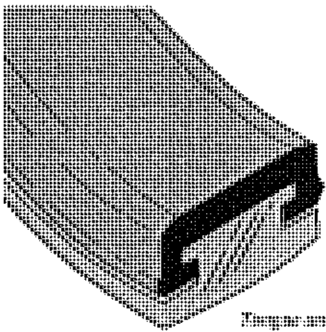
STEM RETAINING ASSEMBLY (C)

The stem is retained in the body by means of a unique Stainless Steel "Spirolox®" retaining ring, a thrust washer and two C-rings, manufactured from brass as standard, stainless steel upon request. The retaining ring may be easily removed with a standard hand tool. The stem retaining assembly prevents unintentional removal of the stem during field service.



BRAY UNIQUE SEAT DESIGN (H)

One of the valve's key elements is Bray's unique *tongue and groove* seat design. This resilient seat features lower torque than many valves on the market today and provides complete isolation of flowing media from the body. The tongue-and-groove seat to body retention method is superior to traditional designs, making field replacement simple and fast. The seat is specifically designed to seal with slip-on or weld-neck flanges. The seat features a molded O-ring which eliminates the use of flange gaskets. An important maintenance feature is



Tongue and Groove Design

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*"Spirolox®" designation is a registered trademark of Kaydon Ring and Seal, Inc.

that all resilient seats for Bray butterfly valves Series 20, 21, 30, 31 and 34 are completely interchangeable.

ACTUATOR MOUNTING FLANGE AND STEM CONNECTION (I)
Universally designed to ISO 5211 for direct mounting of Bray® power actuators and manual operators.

FLANGE LOCATING HOLES (J)
Provide quick and proper alignment during installation.

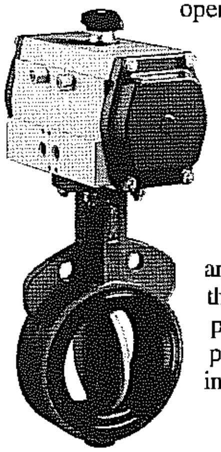
BODY (K) One-piece wafer or lug style. Polyester coating for excellent corrosion resistance. Bray valve bodies meet ANSI 150 pressure ratings for hydrostatic shell test requirements.

DESIGN FEATURES

Bray's Series 30 valve is a wafer version with flange locating holes, and the Series 31 is the companion lug version for dead-end service and other flange requirements. All Bray valves are tested to 110% of full pressure rating before shipment.

A major design advantage of Bray valve product lines is international compatibility. The same valve is compatible with most world flange standards –ANSI Class 125/150, BS 10 Tables D and E, BS 4504 NP 10/16, DIN ND 10/16, AS 2129 and JIS10. In addition the valves are designed to comply with ISO 5752 face-to-face and ISO 5211 actuator mounting flanges. Therefore, one valve design can be used in many different world markets.

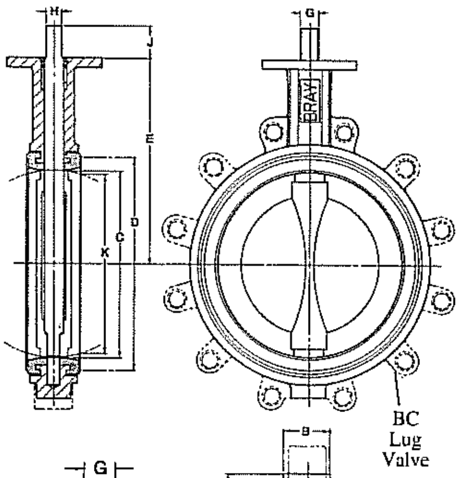
Due to a modular concept of design, all Bray® handles, manual gear operators and pneumatic and electric actuators mount directly to Bray valves. No brackets or adapters are required.

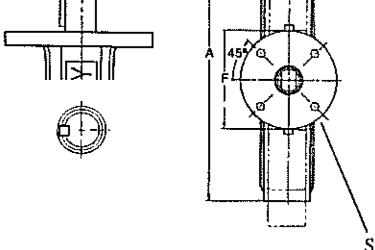


Bray interchangeability and compatibility offers you the best in uniformity of product line and low-cost performance in the industry today.

POLYESTER COATING CORROSION PROTECTION Bray's standard product offers valve bodies with a polyester coating, providing excellent corrosion and wear resistance to the valve's surface. The Bray polyester coating is a hard, gloss red finish.
Chemical Resistance – resists a broad range of chemicals including: dilute aqueous acids and alkalies, petroleum solvents, alcohols, greases and oils. Offers outstanding resistance to humidity and water.
Weatherability – outdoor tested resistant to ultra-violet radiation.
Abrasion Resistance – excellent resistance to abrasion.
Impact Resistance – withstands impact without chipping or cracking.

NYLON 11 COATING
Optionally available for valve bodies where outstanding protection and performance is needed. A thermoplastic produced from a vegetable base, this coating is inert to fungus growth and molds. Nylon 11 is *USDA Approved*, as well as certified to ANSI/NSF 61 for water service.
Corrosion Resistance – superior resistance to a broad range of chemical environments. Salt spray tested in excess of 2,000 hours and seawater immersion tested for over 10 years without corrosion to metal substrates.
Nylon 11 features a very low coefficient of friction and excellent resistance to impact and ultra-violet radiation.





See chart for Actuator Mounting Flange Drilling.

DIMENSIONS SERIES 30 Wafer

Valve Size		A	B	C	D	E	F	Mounting Flange Drlg.			G	H	J	K
ins	mm							BC	No. Holes	Hole Dia.				
2	50	3.69	1.62	2.00	2.84	5.50	3.54	2.76	4	.39	.55	.39	1.25	1.32
2 ½	65	4.19	1.75	2.50	3.34	6.00	3.54	2.76	4	.39	.55	.39	1.25	1.91
3	80	4.88	1.75	3.00	4.03	6.25	3.54	2.76	4	.39	.55	.39	1.25	2.55
4	100	6.06	2.00	4.00	5.16	7.00	3.54	2.76	4	.39	.63	.43	1.25	3.57
5	125	7.06	2.12	5.00	6.16	7.50	3.54	2.76	4	.39	.75	.51	1.25	4.63
6	150	8.12	2.12	5.75	7.02	8.00	3.54	2.76	4	.39	.75	.51	1.25	5.45
8	200	10.50	2.50	7.75	9.47	9.50	5.91	4.92	4	.57	.87	.63	1.25	7.45
10	250	12.75	2.50	9.75	11.47	10.75	5.91	4.92	4	.57	1.18	.87	2.00	9.53
12	300	14.88	3.00	11.75	13.47	12.25	5.91	4.92	4	.57	1.18	.87	2.00	11.47

SERIES 31 Lug

Lug Bolting Data		
BC	No. Holes	Threads UNC-2B
4.75	4	5/8-11
5.50	4	5/8-11
6.00	4	5/8-11
7.50	8	5/8-11
8.50	8	3/4-10
9.50	8	3/4-10
11.75	8	3/4-10
14.25	12	7/8-9
17.00	12	7/8-9

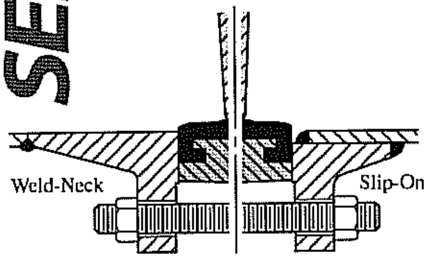
Valve Size		A	B	C	D	E	F	Mounting Flange Drlg.			G	J	KEY SIZE	K
ins	mm							BC	No. Holes	Hole Dia.				
14	350	17.05	3.00	13.25	15.28	13.62	5.91	4.92	4	.57	1.38	2.00	.39x.39	13.04
16	400	19.21	4.00	15.25	17.41	14.75	5.91	4.92	4	.57	1.38	2.00	.39x.39	14.85
18	450	21.12	4.25	17.25	19.47	16.00	8.27	6.50	4	.81	1.97	2.50	.39x.47	16.85
20	500	23.25	5.00	19.25	21.59	17.25	8.27	6.50	4	.81	1.97	2.50	.39x.47	18.73

Lug Bolting Data		
BC	No. Holes	Threads UNC-2B
18.75	12	1-8
21.25	16	1-8
22.75	16	1 1/8-7
25.00	20	1 1/8-7

SELECTION DATA

FLANGE REQUIREMENTS

Bray valves are designed for installation between ANSI Class 125/150 lb. weld-neck or slip-on flanges, BS 10 Tables D & E, BS 4504 NP 10/16, DIN ND 10/16, AS 2129 and JIS 10, either flat faced or raised faced. While weld-neck flanges are recommended, Bray has specifically designed its valve seat to work with slip-on flanges, thus eliminating common failures of other butterfly valve designs. When using raised face flanges be sure to properly align valve and flange. Type C stub-end flanges are not recommended.



PRESSURE RATINGS*

For bi-directional bubble-tight shut off, disc in closed position:

Inches	mm	psig	bar
2-12	50-300	175	12
14-20	350-500	150	10

For Dead-end Service Applications:

With *downstream flanges installed* or with *vulcanized seats,* the dead-end pressure ratings are equal to valve bi-directional ratings as stated above. With no downstream flanges or with seats that are not vulcanized, the dead-end pressure rating for 2"-12" valves is 75 psi (5 bar) for 14"-20" valves, 50 psi (3.5 bar).

*Pressure Ratings are based on standard disc diameters. For low pressure application, Bray offers a standard reduced disc diameter to decrease seating torqoes and to extend seat life, thus increasing the valve's performance and reducing actuator costs for the customer.

VELOCITY LIMITS

For On/Off Services:
Fluids – 30 ft / sec (9m / s)
Gases – 175 ft / sec (54m / s)

C_V VALUES–VALVE SIZING COEFFICIENT

Valve Size		Disc Position (degrees)								
ins	mm	90°	80°	70°	60°	50°	40°	30°	20°	10°
2	50	144	114	84	61	43	27	16	7	1
2 1/2	65	282	223	163	107	67	43	24	11	1.5
3	80	461	364	267	154	96	61	35	15	2
4	100	841	701	496	274	171	109	62	27	3
5	125	1376	1146	775	428	268	170	98	43	5
6	150	1850	1542	1025	567	354	225	129	56	6
8	200	3316	2842	1862	1081	680	421	241	102	12
10	250	5430	4525	2948	1710	1076	667	382	162	19
12	300	8077	6731	4393	2563	1594	1005	555	235	27
14	350	10538	8874	5939	3384	2149	1320	756	299	34
16	400	13966	11761	7867	4483	2847	1749	1001	397	45
18	450	17214	14496	10065	5736	3643	2237	1281	507	58
20	500	22339	18812	12535	7144	4536	2786	1595	632	72

C_V is defined as the volume of water in U.S.G.P.M. that will flow through a given restriction or valve opening with a pressure drop of one (1) p.s.i. at room temperature. Recommended control angles are between 25°–70° open. Preferred angle for control valve sizing is 60°–65° open.

EXPECTED SEATING/UNSEATING TORQUES (Lb.-Ins.)

Valve Size		Full-Rated Pressure Valves				Reduced Disc Diameter
		ΔP (PSI)				ΔP (PSI)
ins	mm	50	100	150	175	50
2	50	125	130	135	140	125
2 1/2	65	195	205	215	220	195
3	80	260	275	290	297	260
4	100	400	425	450	462	267
5	125	615	670	725	755	410
6	150	783	871	953	1003	537
8	200	1475	1650	1825	1915	983
10	250	2240	2520	2800	2940	1493
12	300	3420	3870	4320	4545	2280
14	350	4950	5700	6450	—	3300
16	400	6400	7700	9000	—	4267
18	450	7850	9850	11850	—	5267
20	500	10300	12900	15500	—	6867

Valve Torque Rating – Bray has classified valve torque ratings according to 3 types: non-corrosive lubricating service, general service, and severe service. Torques listed above are for general services. Consult Bray for torque information corresponding to specific applications.

TO USE TORQUE CHART, NOTE THE FOLLOWING:

1) For Bray valves, Series 20, 21, 30, 31 and 34.
2) Review Technical Bulletin No. 1001, Expected Seating/Unseating Torques, for explanation of the 3 service classes and their related seating/unseating torque values for given pressure differentials of Full-Rated and Reduced Disc Diameter valves.
3) Dynamic Torque values are not considered. See Technical Bulletin No. 1002 for evaluation of Dynamic Torque values vs. Seating/Unseating Torque values.
4) Do not apply a safety factor to above torque values when determining actuator output torque requirement.
5) For 3 way assemblies where one valve is opening and other is closing, multiply torque by 1.5 factor.

SPECIFICATIONS

RECOMMENDED SPECIFICATIONS FOR BRAY SERIES 30/31 SHALL BE:

- Polyester coated, cast iron, wafer or lug bodies.
- With flange locating holes that meet ANSI Class 125/150 (or BS 10 Tables D & E, BS 4504 NP 10/16, DIN ND 10/16, AS 2129 and JIS 10) drillings.
- Through-stem direct drive double "D" design requiring no disc screws or pins to connect stem to disc with no possible leak paths in disc/stem connection.
- Stem mechanically retained in body neck and no part of stem or body exposed to line media.
- Tongue-and-groove seat design with primary hub seal and a molded O-ring suitable for weld-neck and slip-on flanges. Seat totally encapsulates the body with no flange gaskets required.
- Spherically machined, hand polished disc edge and hub for minimum torque and maximum sealing capability.
- Equipped with non-corrosive bushing and self-adjusting stem seal.
- Bi-directional and tested to 110% of full rating.
- Bi-directional pressure ratings:
  2"-12" valves: 175 psi, 14"-20" valves: 150 psi
  Lug bodies for dead end service
  With downstream flanges or vulcanized seats, pressure ratings are equal to bi-directional ratings as stated above.
  With no downstream flanges or non-vulcanized seats: 2"-12" valves: 75 psi, 14"-20" valves: 50 psi
- No field adjustment necessary to maintain optimum field performance.
- The valve shall be Bray Series 30 wafer / 31 lug or equal.

WEIGHTS

Valve Size		Series 30	Series 31
ins	mm		
2	50	5.5	7.0
2 ½	65	7.0	8.0
3	80	7.5	9.0
4	100	11.5	15.0
5	125	14.0	20.0
6	150	17.0	23.0
8	200	34.0	42.0
10	250	49.0	66.0
12	300	67.0	88.0
14	350	95.0	114.0
16	400	135.0	166.0
18	450	200.0	226.0
20	500	260.0	305.0

Weights are in lbs.

MATERIALS SELECTION

2"–20" (50mm-500mm)

BODY:

- Cast Iron ASTM A126 Class B
- Ductile Iron ASTM A536
- Cast Steel ASTM A216 WCB
- Aluminum ASTM B26

SEAT:

- Buna-N – Food Grade
- EPDM – Food Grade
- FKM*
- White Buna-N – Food Grade

STEM:

- Coated Carbon Steel
- 416 Stainless Steel ASTM A582 Type 416
- 304 Stainless Steel ASTM A276 Type 304
- 316 Stainless Steel ASTM A276 Type 316
- Monel

DISC:

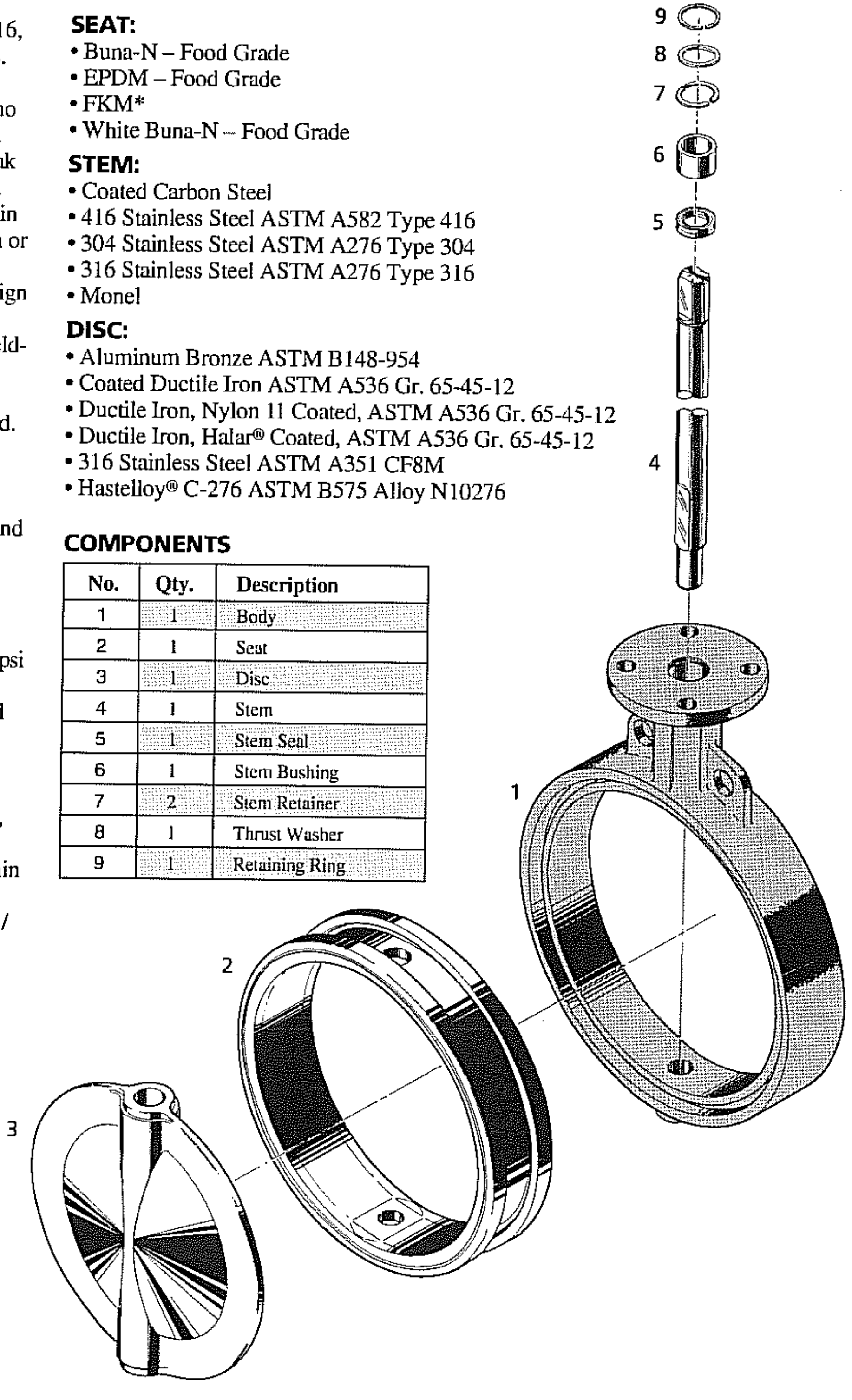
- Aluminum Bronze ASTM B148-954
- Coated Ductile Iron ASTM A536 Gr. 65-45-12
- Ductile Iron, Nylon 11 Coated, ASTM A536 Gr. 65-45-12
- Ductile Iron, Halar® Coated, ASTM A536 Gr. 65-45-12
- 316 Stainless Steel ASTM A351 CF8M
- Hastelloy® C-276 ASTM B575 Alloy N10276

COMPONENTS

No.	Qty.	Description
1	1	Body
2	1	Seat
3	1	Disc
4	1	Stem
5	1	Stem Seal
6	1	Stem Bushing
7	2	Stem Retainer
8	1	Thrust Washer
9	1	Retaining Ring

TEMPERATURE RANGE OF SEATS

Type	Maximum	Minimum
EPDM	+250°F(121°C)	-40°F(-40°C)
Buna-N	+212°F(100°C)	0°F(-18°C)
FKM*	+400°F(204°C)	0°F(-18°C)



*FKM is the ASTM D1418 designation for Fluorinated Hydrocarbon Elastomers (also called Fluoroelastomers).

Hastelloy® is a registered trademark of Haynes International, Inc.
Halar® is a registered trademark of Ausimont U.S.A., Inc.

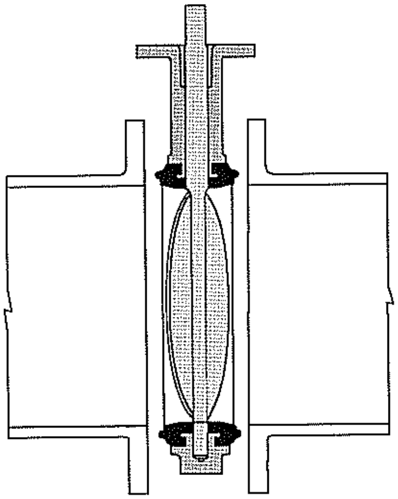
ASSEMBLY

INSTALLATION

Position the disc in the partially open position, maintaining the disc within the body face-to-face. Place the body between the flanges and install flange bolts. *Do not use flange gaskets.* Before tightening flange bolts, carefully open the disc to the full open position to ensure proper alignment and clearance of the disc O.D. with the adjacent pipe I.D. Leave disc in the full open position and tighten flange bolts per required specification. Once bolts are tightened, carefully rotate disc to closed position to ensure disc O.D. clearance.

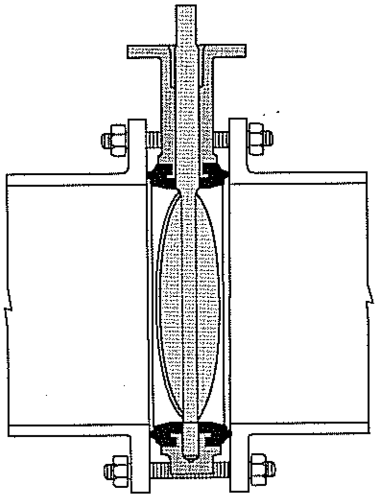
MAINTENANCE AND REPAIR

The many Bray features minimize wear and maintenance requirements. No routine lubrication is required. All components – stem, disc, seat, bushing, stem seal, etc., are field replaceable, no adjustment is needed. If components require replacement, remove the valve from the line by placing the disc near the closed position, spread the flanges, support the valve, then remove the flange bolts. No valve maintenance, including removal of manual or power actuators, should be performed until the piping system is completely depressurized.

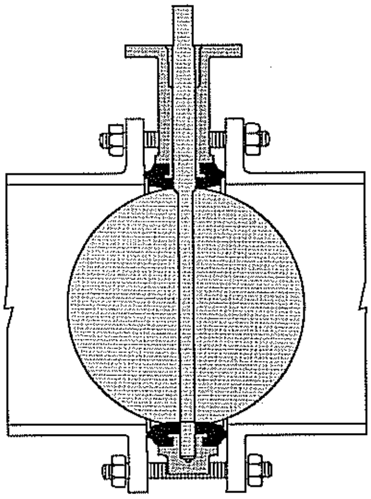


Disc in the Near Closed Position

United States patent number 5,152,501.
Other patents issued and applied for worldwide.



Disc in the Partially Open Position



Disc in the Full Open Position

DISASSEMBLY

Remove the handle, gear operator, or actuator from actuator mounting flange. Remove "Spirolox®" retaining ring. Remove stem with its thrust washer and two C-ring stem retainers. Remove bushing and seal. Remove the disc from the seat, protecting disc edge at all times. Push the seat into an oval shape, then remove the seat from the body.

ASSEMBLY

Push the valve seat into an oval and push it into the body with seat stem holes aligned to body stem holes. Push stem into the stem hole of body. For aid in inserting disc, slightly protrude stem beyond the I.D. of the top of the seat. Install a light coating of foodgrade silicone oil (for silicone free applications use soap and water) on the I.D. of seat. Insert the disc into the seat by lining up the disc hole with the stem hole of the seat. Note: the broached double "D" flats in the disc must be toward the bottom of valve body. (Take special care when lining disc up with stem.) With a downward pressure and rotating the stem back and forth, push the stem until the stem touches the bottom of the body stem hole. Make certain that when pushing the stem through disc bottom, the broached flats of stem and disc are aligned. After the stem has engaged the disc, but before the stem is firmly seated in the body, replace the stem seal and bushing. Install the two C-ring stem retainers in the groove in the stem and thrust washer on top of the C-rings. Seat the stem firmly in the body and install the "Spirolox®" retaining ring back into position.

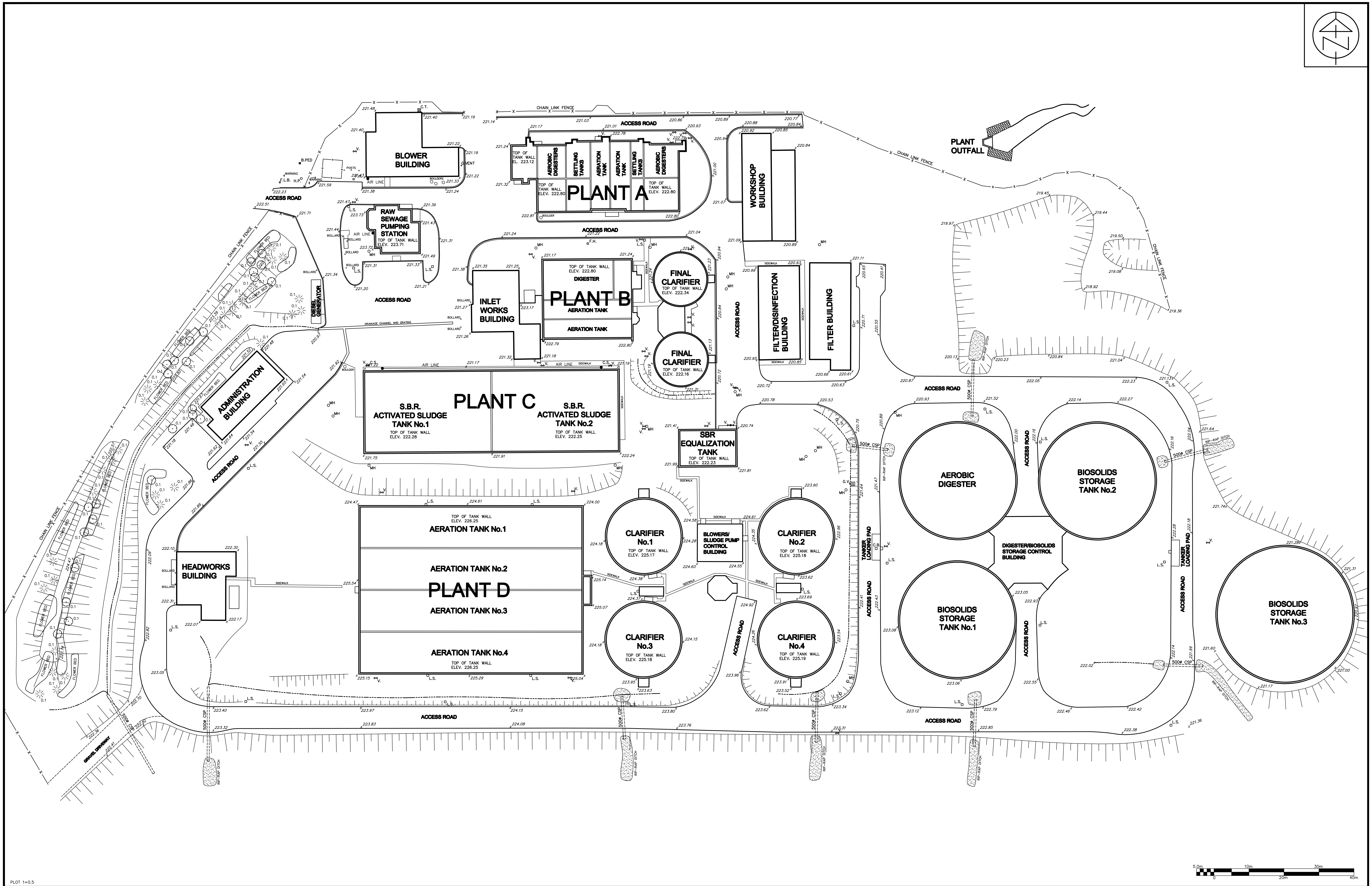
DISTRIBUTOR

Bray® CONTROLS
A Division of BRAY INTERNATIONAL, Inc.
13333 Westland East Blvd. Houston, Texas 77041
281.894.5454 FAX 281.894.9499 www.bray.com

Bradford West Gwillimbury
Bradford Water Pollution Control Plant Expansion
Preliminary Design Report
Draft – February 2012

Appendix E

Figures (Drawings)



PLOT 1=0.5

NOTES

CONTRACT DRAWINGS:
Contractor must verify all dimensions and be responsible for same. Any discrepancies must be reported to the Engineer before commencing work. Drawings are not to be scaled.

Ainley & Associates Limited claims copyright to this drawing and it may not be used for any purpose other than that stipulated in the contract between the owner/client and the Engineer without the express written consent of Ainley & Associates Limited.

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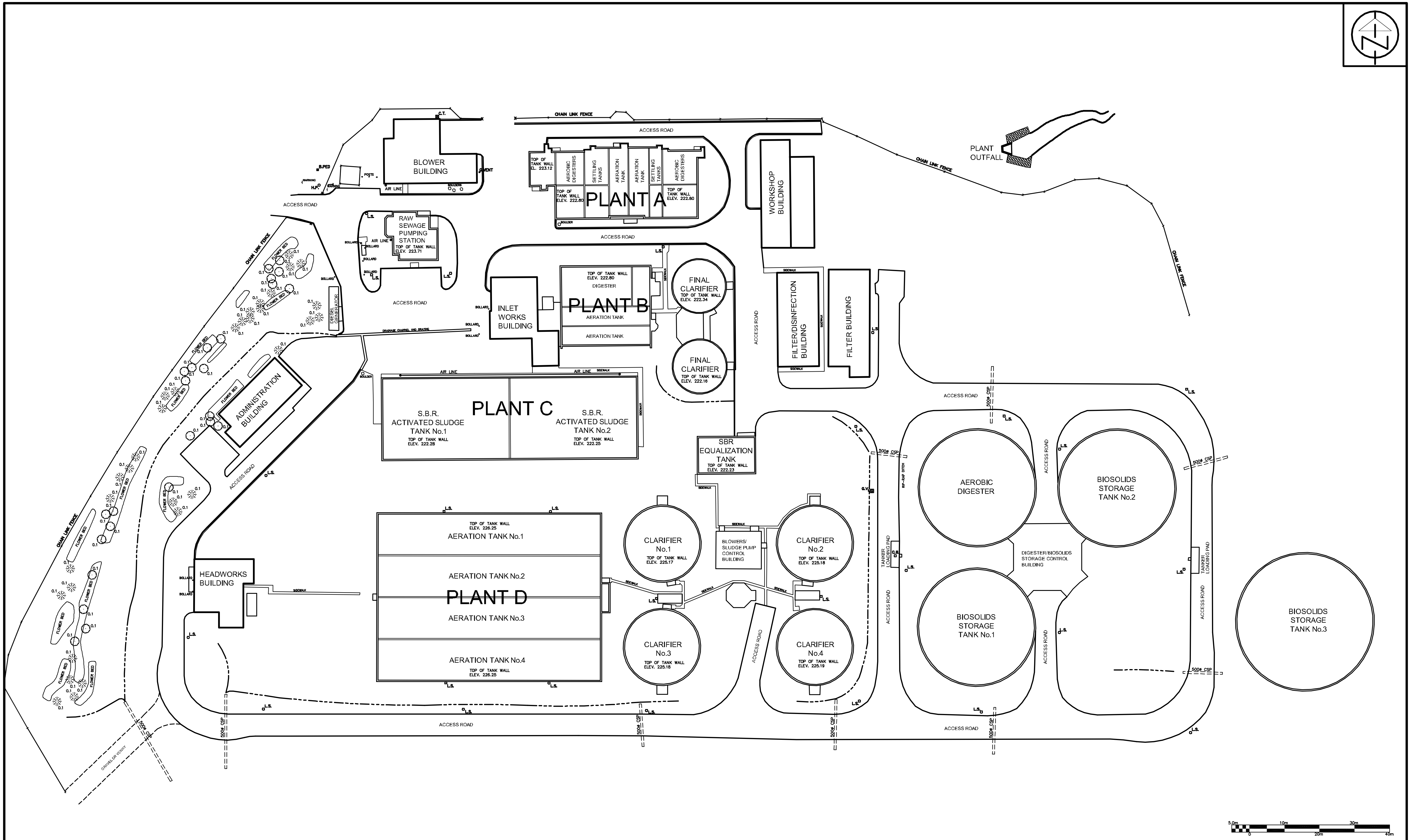
DESIGN: R.M.
DRAWN: P.C.S./D.E.
CHECKED: M.W.A.
DATE: JUNE 2011

TOWN OF BRADFORD
WEST GWILLIMBURY
WATER POLLUTION CONTROL PLANT

SITE PLAN
EXISTING CONDITIONS

Ainley GROUP
CONSULTING ENGINEERS PLANNERS

CONTRACT No.
DWG. 110060–FIGURE 1



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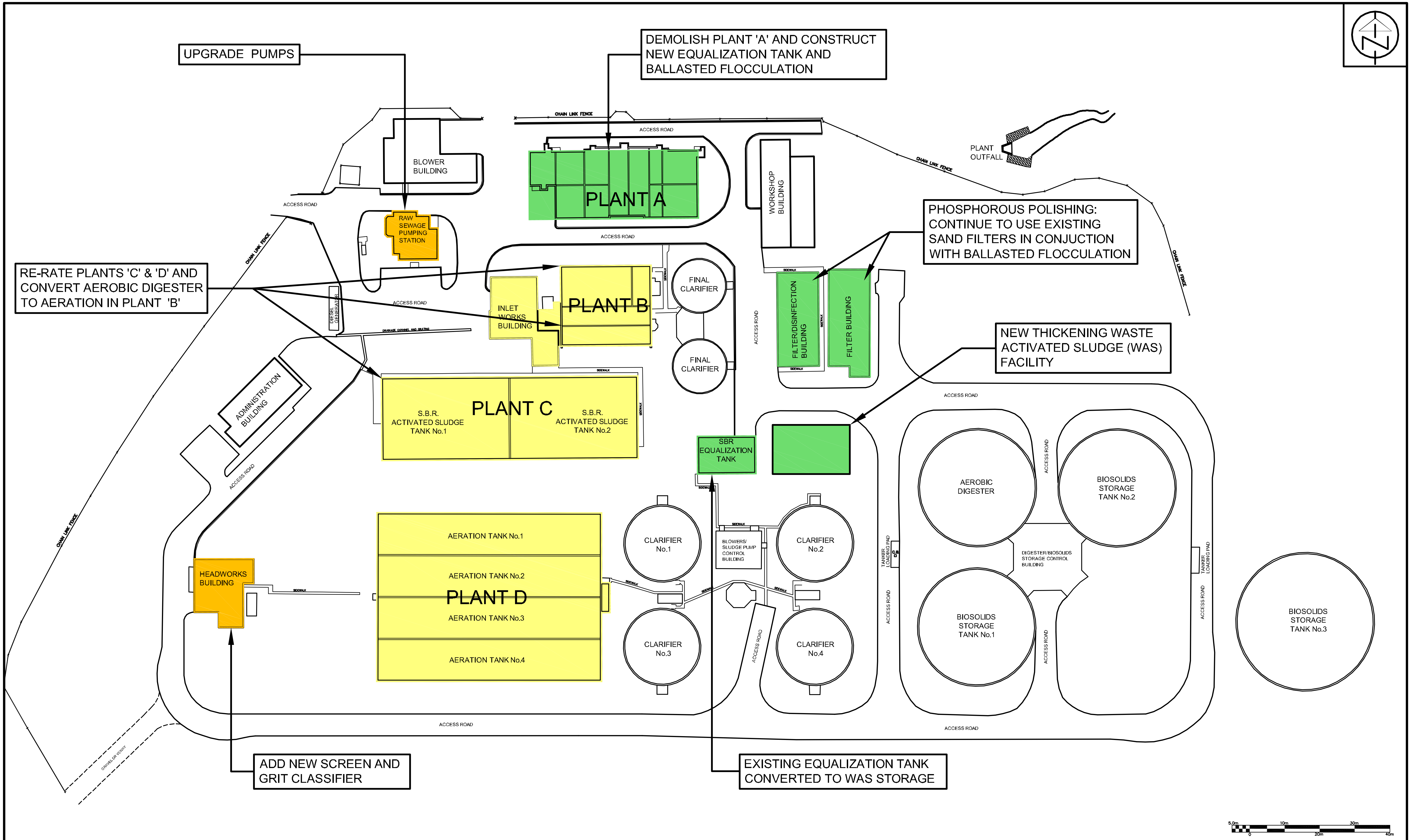
PLANNERS

TOWN OF BRADFORD WEST GWILLIMBURY
WATER POLLUTION CONTROL PLANT
EXISTING SITE LAYOUT

SCALE: 1:1000
DATE: SEPT. 2011
DWG. 110060–Fig2



UPGRADE PUMPS

DEMOLISH PLANT 'A' AND CONSTRUCT NEW EQUALIZATION TANK AND BALLASTED FLOCCULATION

PHOSPHOROUS POLISHING: CONTINUE TO USE EXISTING SAND FILTERS IN CONJUCTION WITH BALLASTED FLOCCULATION

RE-RATE PLANTS 'C' & 'D' AND CONVERT AEROBIC DIGESTER TO AERATION IN PLANT 'B'

NEW THICKENING WASTE ACTIVATED SLUDGE (WAS) FACILITY

ADD NEW SCREEN AND GRIT CLASSIFIER

EXISTING EQUALIZATION TANK CONVERTED TO WAS STORAGE

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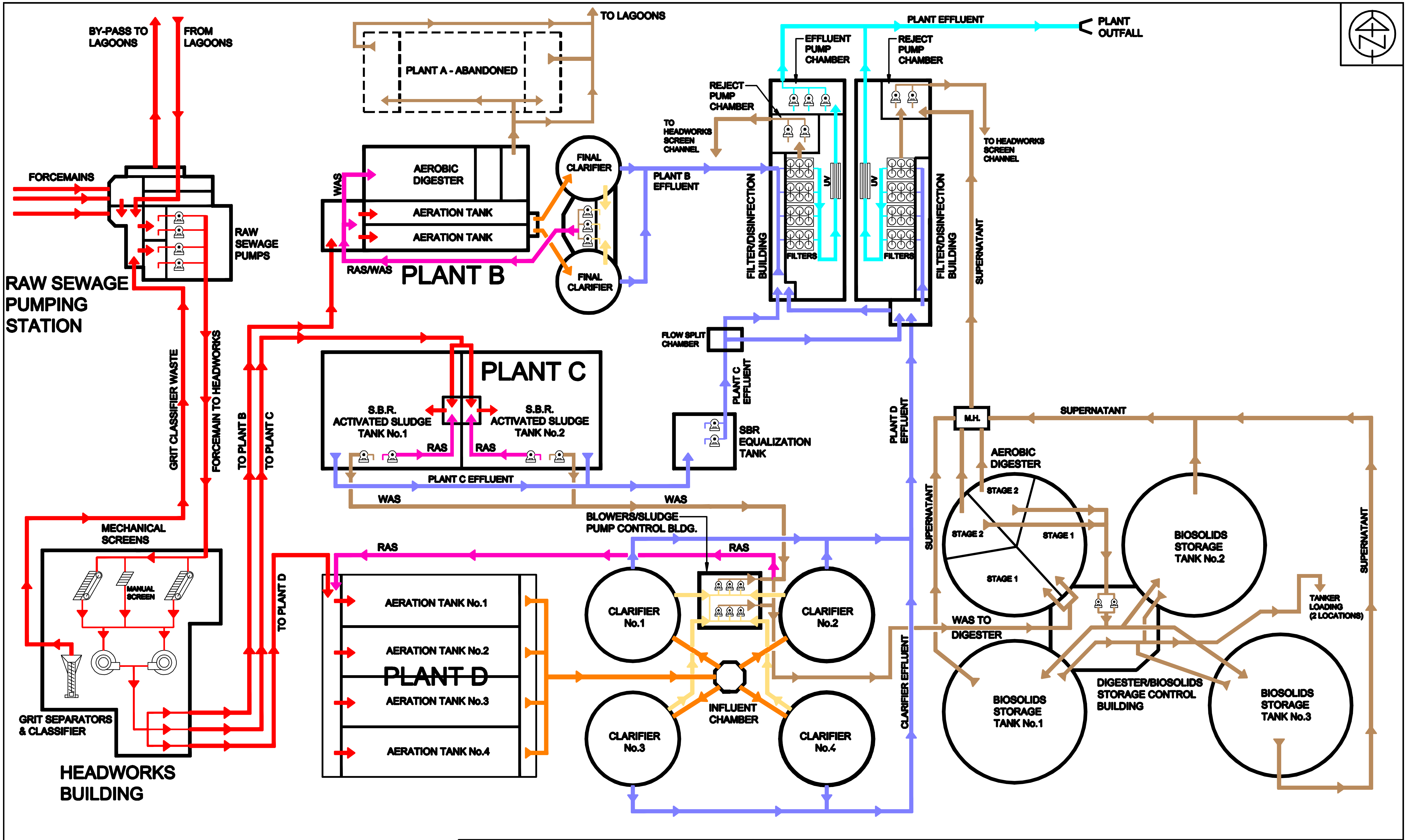
Ainley CONSULTING ENGINEERS PLANNERS

TOWN OF BRADFORD WEST GWILLIMBURY
WATER POLLUTION CONTROL PLANT
PROPOSED SITE LAYOUT

SCALE: 1:1000
DATE: SEPT. 2011
DWG. 110060–Fig3



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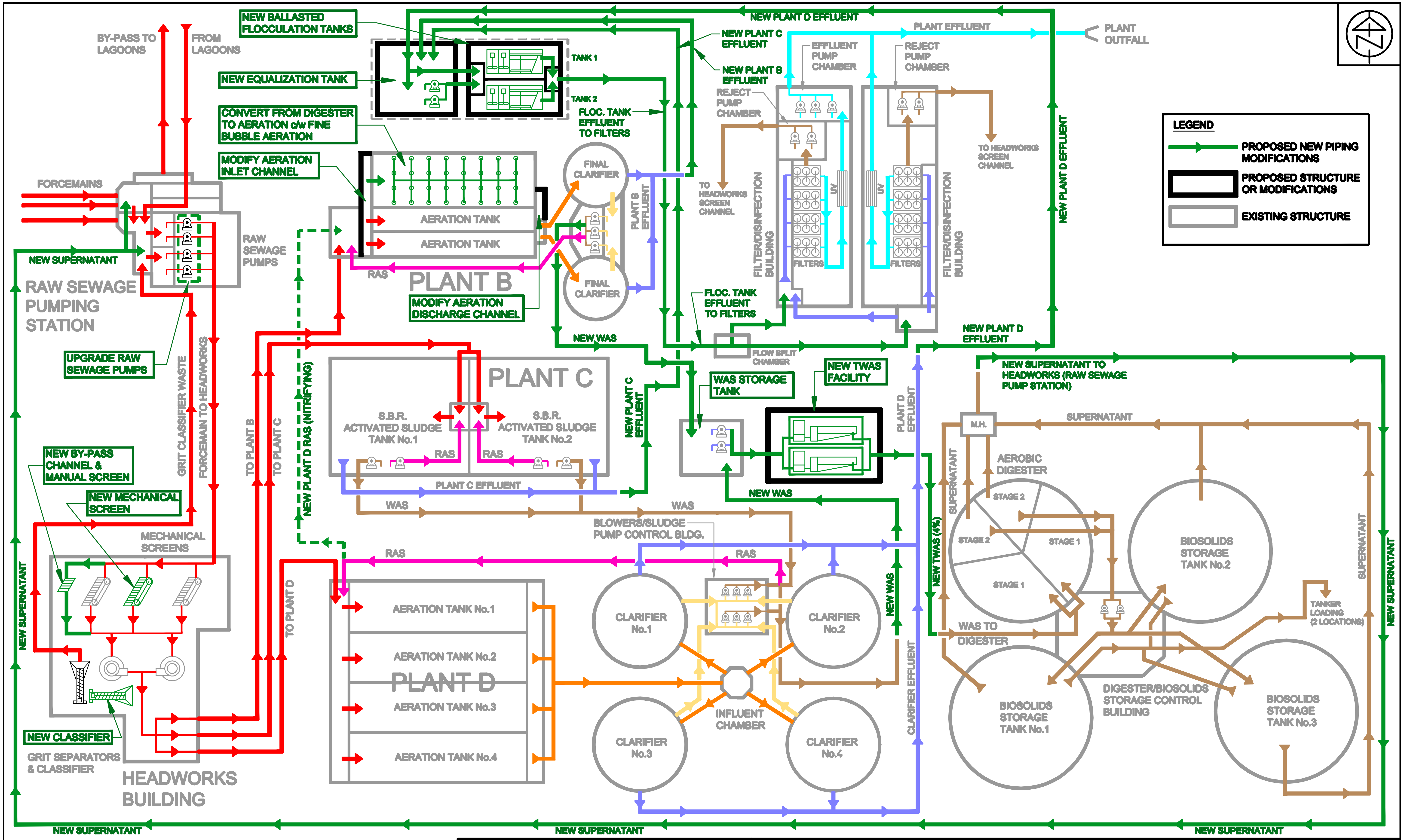
BRADFORD WEST GWILLIMBURY
BRAFORD WATER POLLUTION CONTROL
PLANT EXPANSION

SIMPLIFIED FLOW SCHEMATIC–EXISTING CONDITIONS

SCALE: N.T.S.
DATE: JAN. 30, 2012
DWG. 110060–Fig.4



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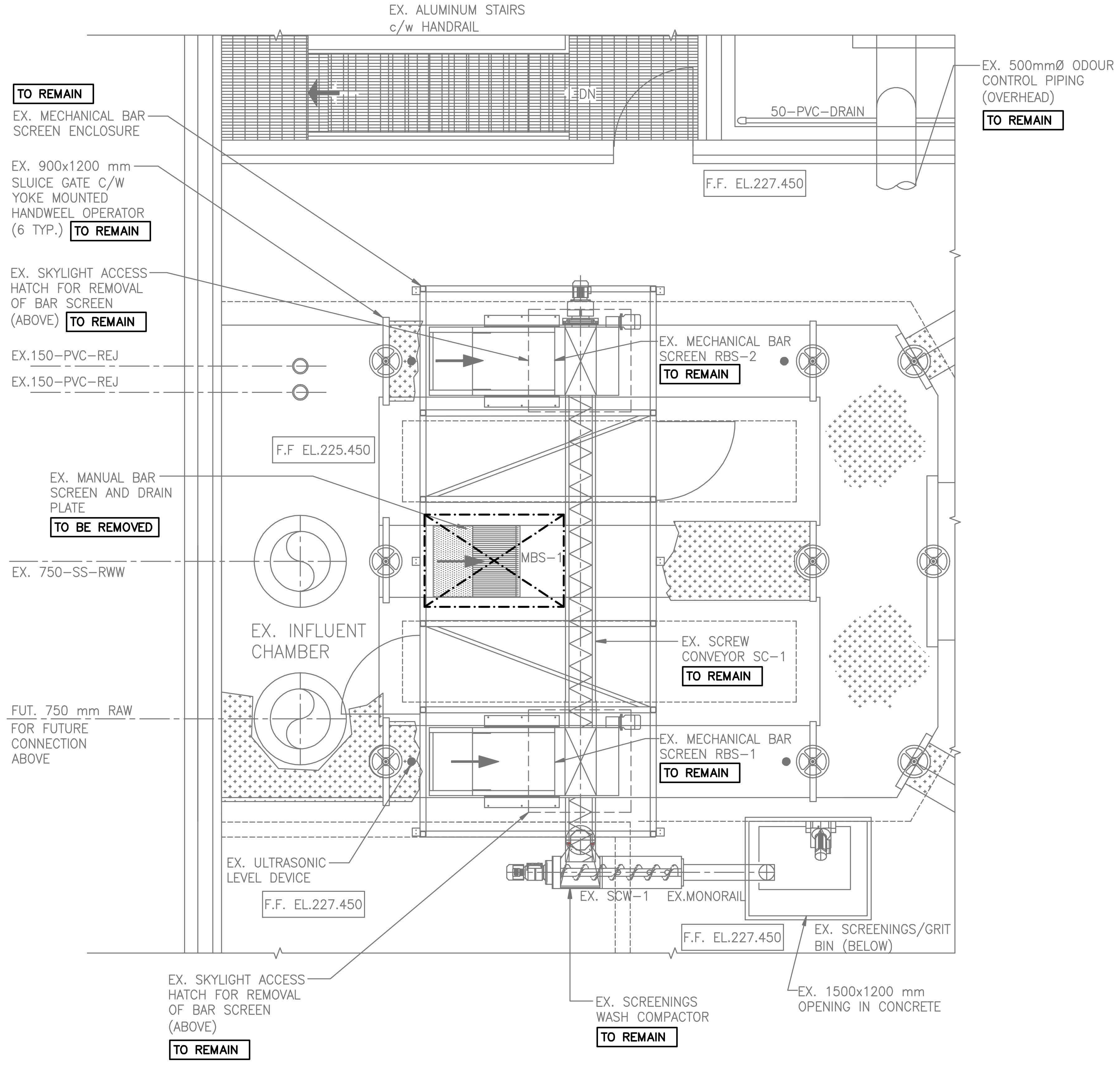
BRADFORD WEST GWILLIMBURY
BRAFORD WATER POLLUTION CONTROL
PLANT EXPANSION

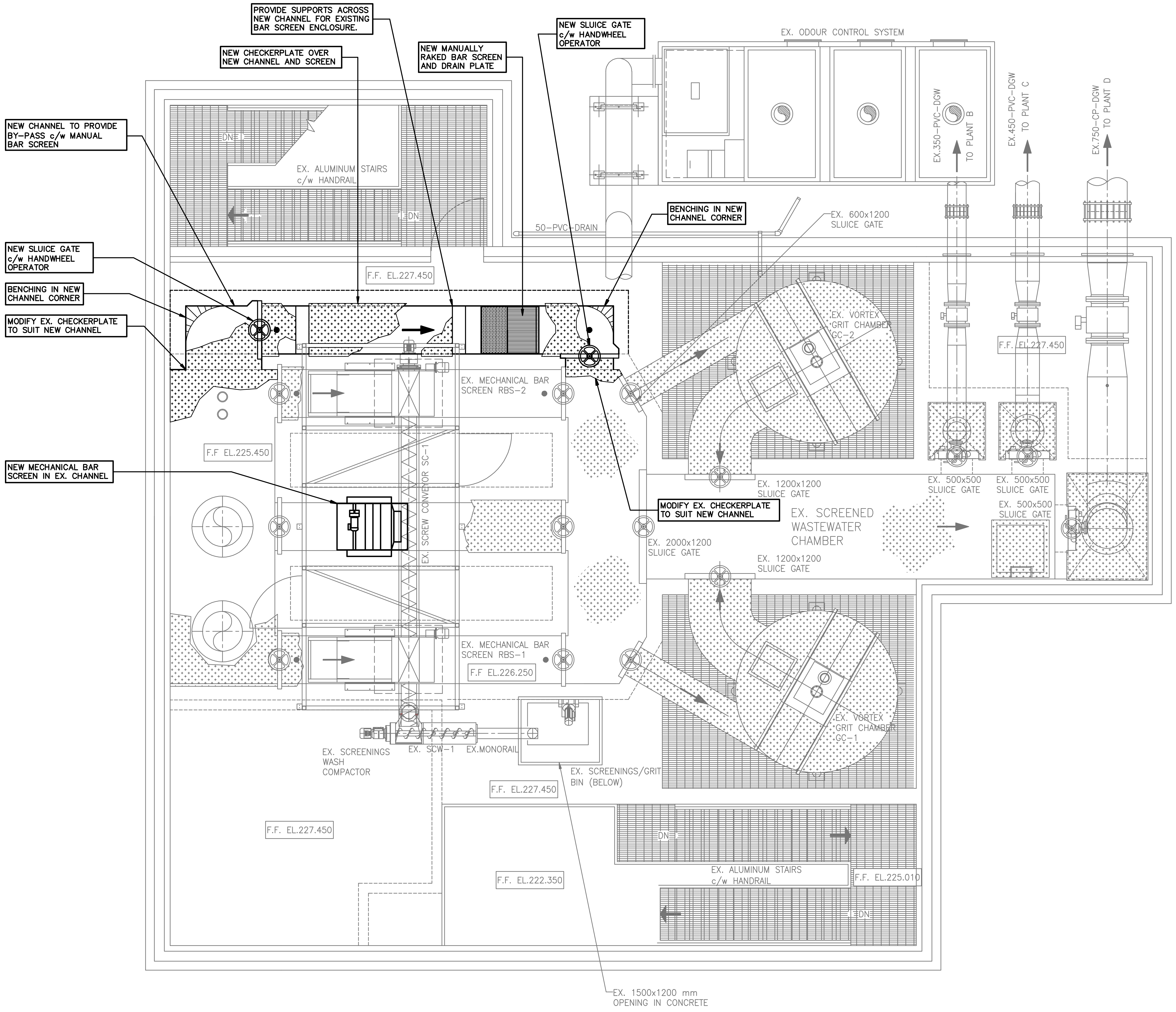
SIMPLIFIED FLOW SCHEMATIC–PROPOSED EXPANSION

SCALE: N.T.S.
DATE: JAN. 30, 2012
DWG. 110060–Fig.5



UPPER FLOOR PLAN EXISTING CONDITIONS

1 Px



UPPER FLOOR PLAN PROPOSED MODIFICATIONS

2 Px

0.5m 0 1m 2m 3m 4m

PLOT 1=50

NOTES

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DRAWN: D.E.
CHECKED: M.W.A./B.R.E.
DATE: JAN.30/2012

BRADFORD WEST GWILLIMBURY
BRADFORD WATER POLLUTION CONTROL
PLANT EXPANSION

EXISTING HEADWORKS AND
PROPOSED MODIFICATIONS
UPPER FLOOR PLAN

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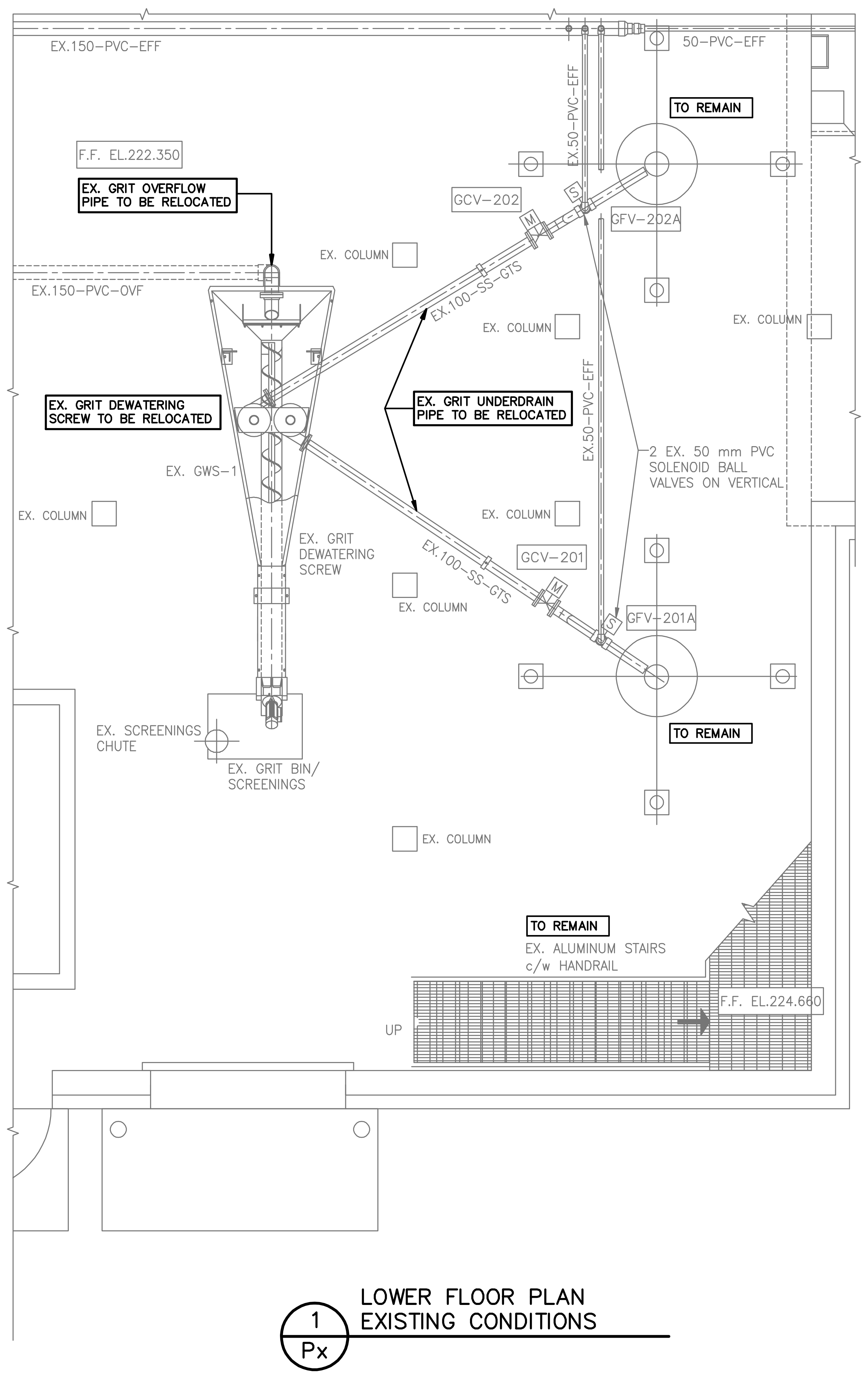
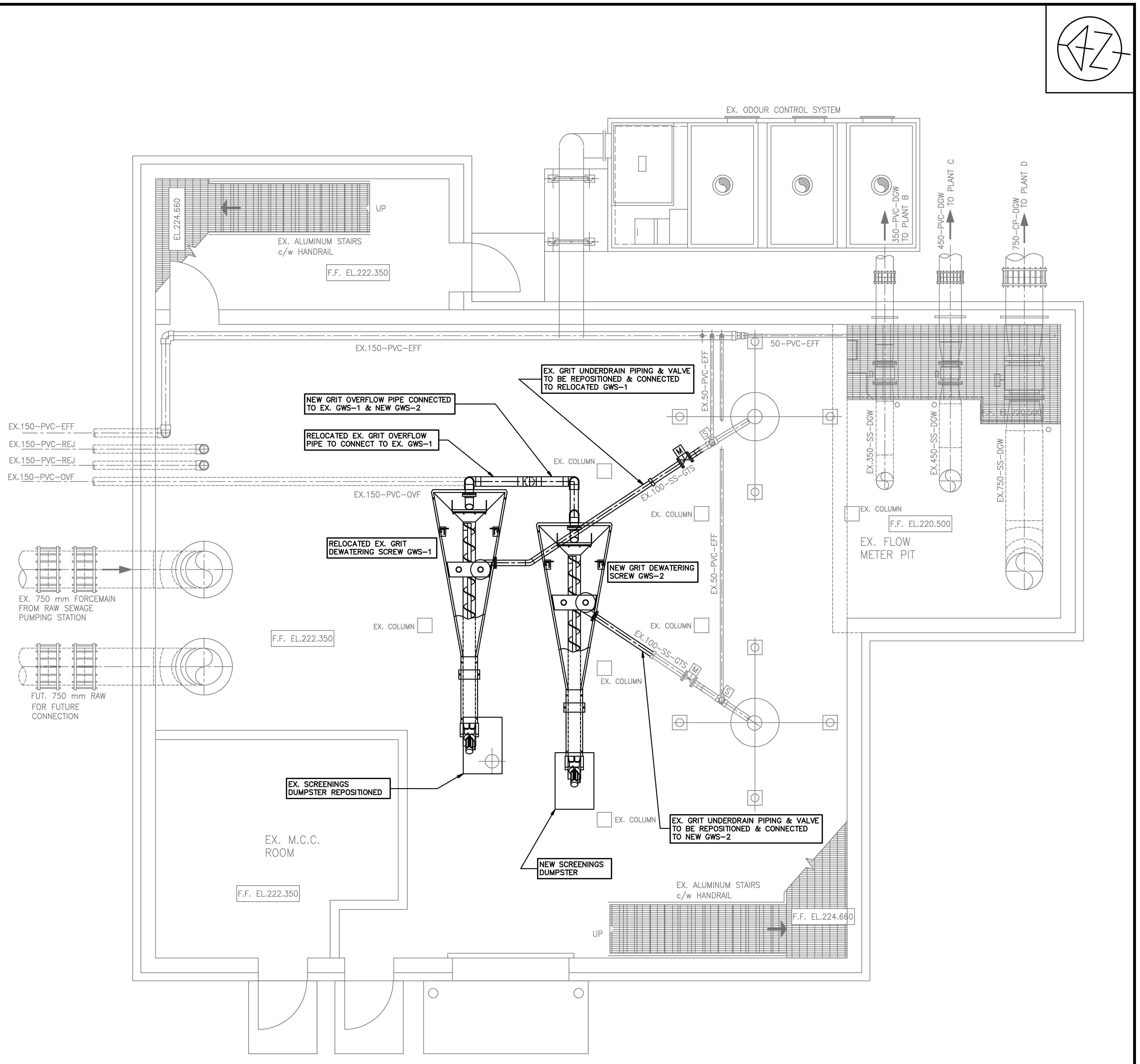
CONTRACT No.
DWG. 110060–FIGURE 6



LOWER FLOOR PLAN
EXISTING CONDITIONS

1
Px



LOWER FLOOR PLAN
PROPOSED MODIFICATIONS

2
Px

0.5m 0 1m 2m 3m 4m

PLOT 1=50

NOTES

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DESIGN: B.R.E.
DRAWN: D.E.
CHECKED: M.W.A./ B.R.E.
DATE: JAN.30/2012

BRADFORD WEST GWILLIMBURY
BRADFORD WATER POLLUTION CONTROL PLANT EXPANSION

EXISTING HEADWORKS AND PROPOSED MODIFICATIONS LOWER FLOOR PLAN

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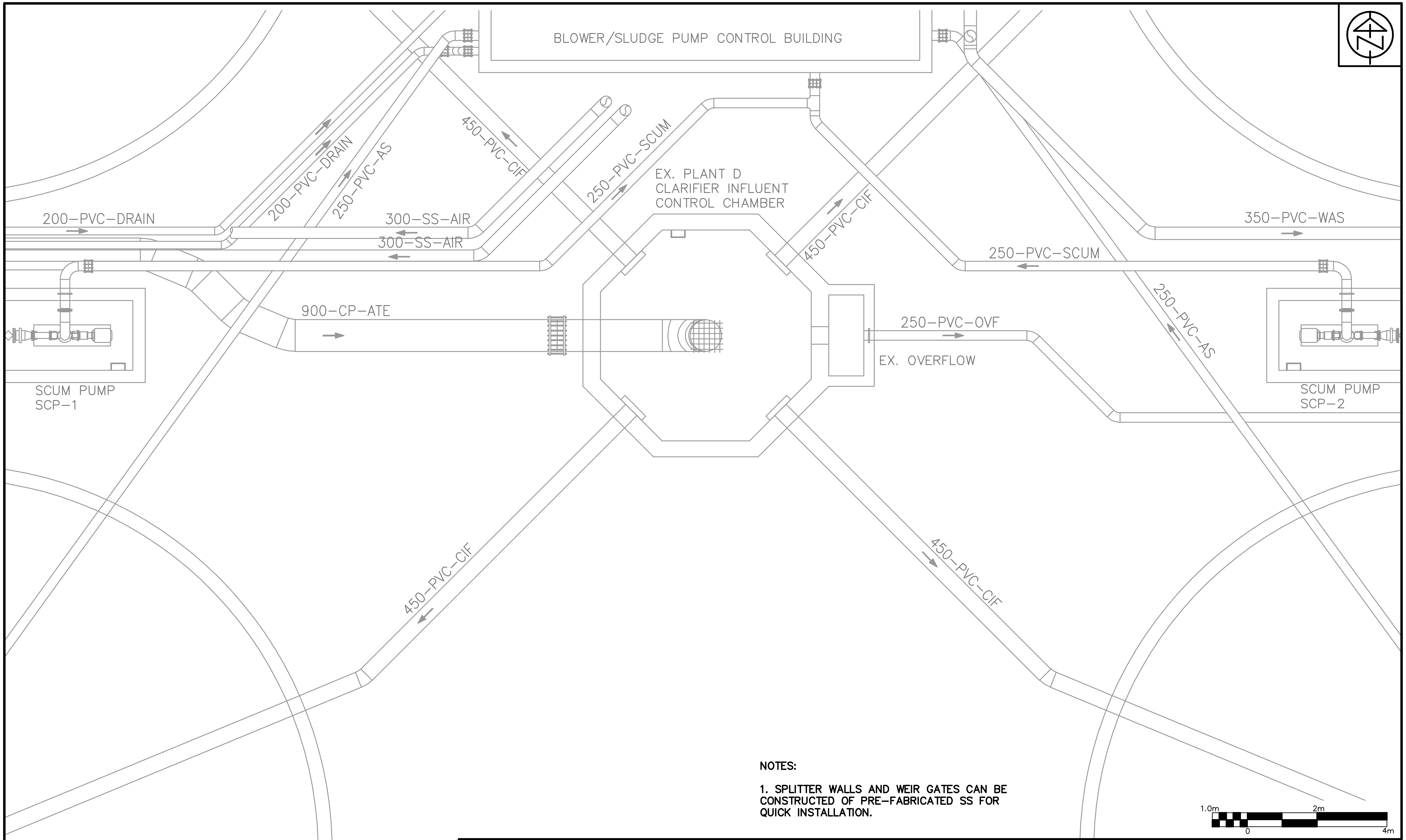
CONTRACT No.
DWG. 110060–FIGURE 7



NOTES:

1. SPLITTER WALLS AND WEIR GATES CAN BE CONSTRUCTED OF PRE-FABRICATED SS FOR QUICK INSTALLATION.

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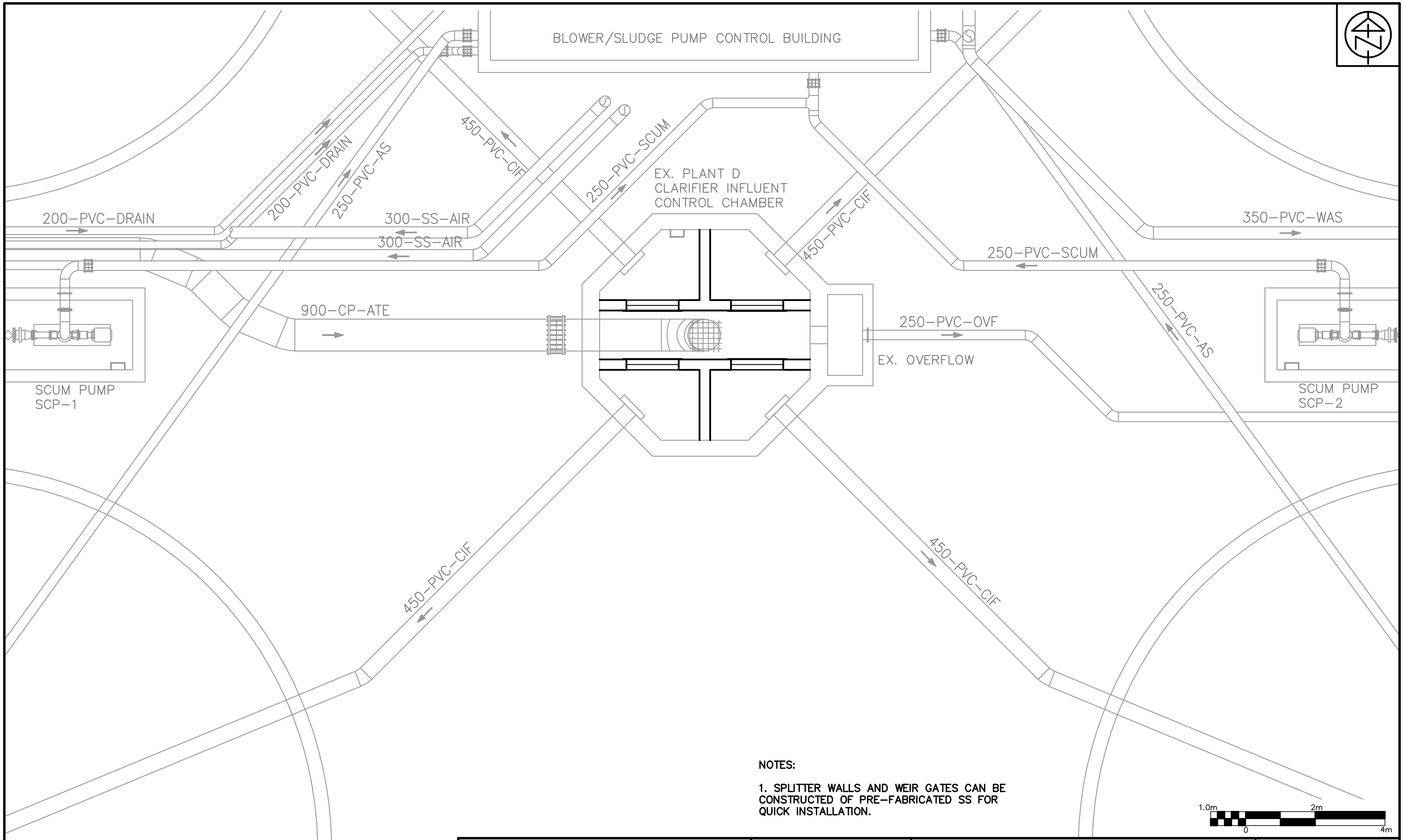
BRADFORD WEST GWILLIMBURY
BRAFORD WATER POLLUTION CONTROL
PLANT EXPANSION

PLANT D CLARIFIER INFLUENT CONTROL CHAMBER EXISTING

SCALE: 1:100
DATE: JAN. 2012
DWG. 110060-Fig.8A



NOTES:

1. SPLITTER WALLS AND WEIR GATES CAN BE CONSTRUCTED OF PRE–FABRICATED SS FOR QUICK INSTALLATION.

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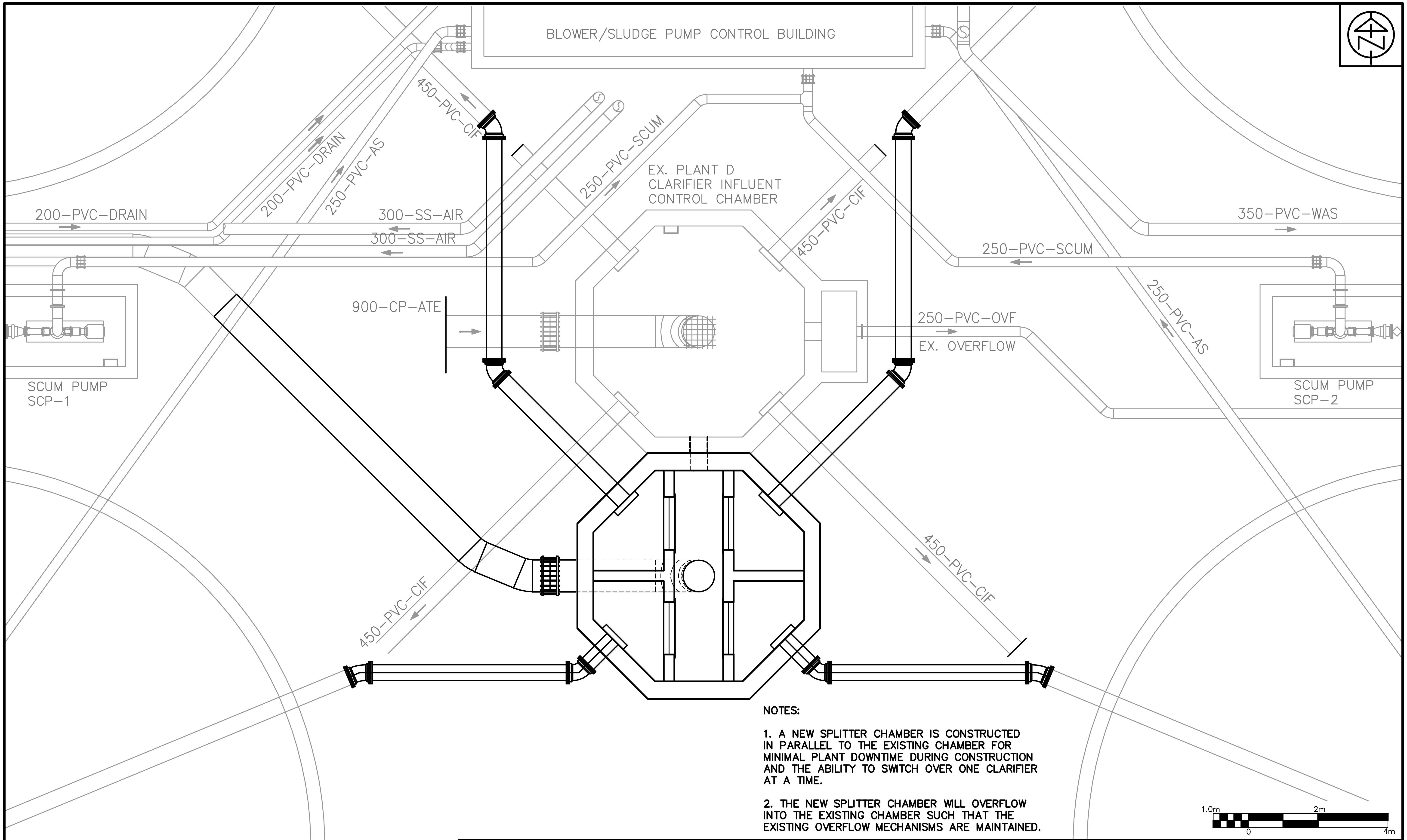
BRADFORD WEST GWILLIMBURY
BRAFORD WATER POLLUTION CONTROL
PLANT EXPANSION

PLANT D CLARIFIER INFLUENT CONTROL CHAMBER
OPTION 1 PROPOSED MODIFICATIONS

SCALE: 1:100
DATE: JAN. 2012
DWG. 110060–Fig.8B



NOTES:

1. A NEW SPLITTER CHAMBER IS CONSTRUCTED IN PARALLEL TO THE EXISTING CHAMBER FOR MINIMAL PLANT DOWNTIME DURING CONSTRUCTION AND THE ABILITY TO SWITCH OVER ONE CLARIFIER AT A TIME.

2. THE NEW SPLITTER CHAMBER WILL OVERFLOW INTO THE EXISTING CHAMBER SUCH THAT THE EXISTING OVERFLOW MECHANISMS ARE MAINTAINED.

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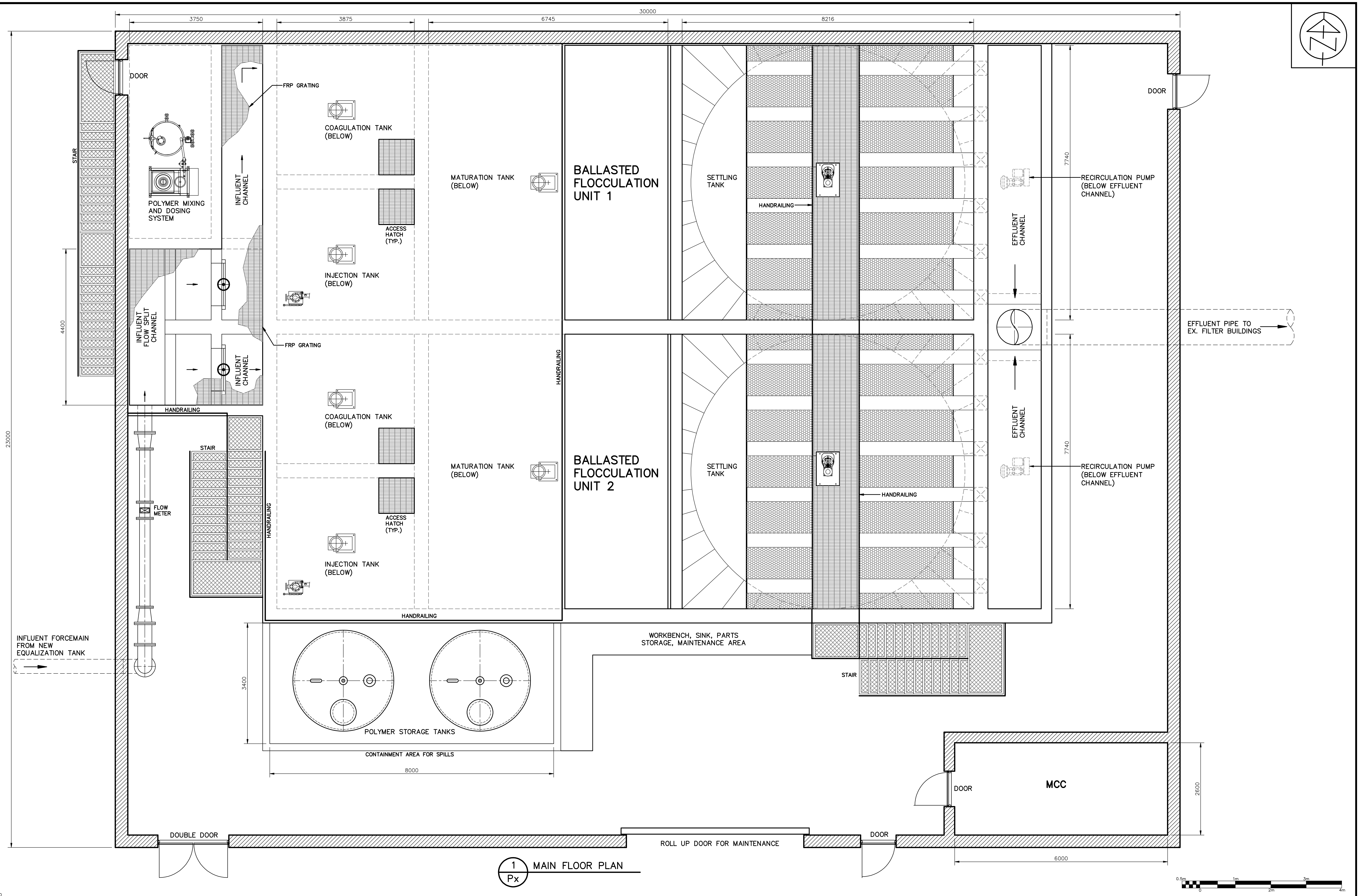
BRADFORD WEST GWILLIMBURY
BRAFORD WATER POLLUTION CONTROL
PLANT EXPANSION

PLANT D CLARIFIER INFLUENT CONTROL CHAMBER
OPTION 2 PROPOSED MODIFICATIONS

SCALE: 1:100
DATE: JAN. 2012
DWG. 110060–Fig.8C



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CHECKED: M.W.A./B.R.E.
DATE: JAN.30/2012

BRADFORD WEST GWILLIMBURY
BRADFORD WATER POLLUTION CONTROL
PLANT EXPANSION

NEW BALLASTED FLOCCULATION
FACILITY
PLAN VIEW

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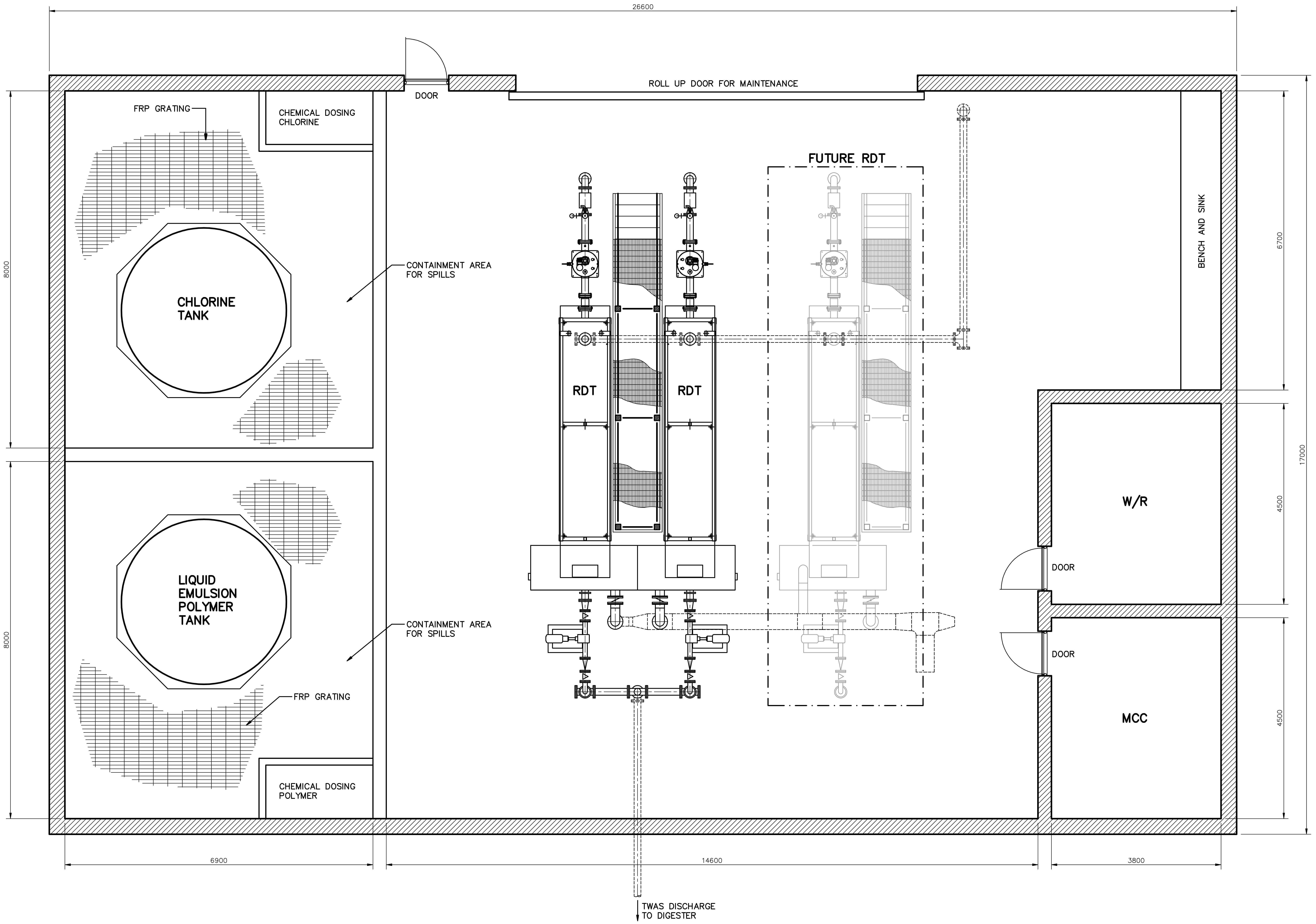
CONTRACT No.
DWG. 110060–FIGURE 9



1 Px MAIN FLOOR PLAN

0.5m 0 1m 2m 3m 4m

PLOT 1=50

NOTES

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DATE: JAN.30/2012

BRADFORD WEST GWILLIMBURY
BRADFORD WATER POLLUTION CONTROL PLANT EXPANSION

NEW THICKENING WASTE ACTIVATED SLUDGE (TWAS) FACILITY
PLAN VIEW

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Ainley GROUP CONSULTING ENGINEERS PLANNERS

CONTRACT No.
DWG. 110060–FIGURE 10

Appendix E

Environmental Study Report (2012)



Bradford West Gwillimbury
Water Pollution Control Plant
Environmental Study Report
Phases 3 and 4

Final - March 2012

Submitted by
Contact Name: Joe Mullan, P. Eng.
Company Name: Ainley & Associates Limited
Address: 280 Pretty River Parkway
City, Province: Collingwood, Ontario
Postal Code: L9Y 4J5
Phone: (705) 445-3451
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  Certificate of Approval No. 9408-75FP7B – June 24, 2009
E Bradford WPCP Existing and Future Plant Optimization Report – April 18, 2011
F Lake Simcoe Phosphorus Reduction Strategy
G Bradford WPCP Class EA Receiving Water Assimilation Study – June 2011
H Air Quality Impacts Assessment Report
I Public Information Centre
J Rerating Study
K Notice of Completion and Related Correspondence

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Amendment No. 16 to the Official Plan of the Town of Bradford West Gwillimbury – Date of revision, April 9, 2009

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Abbreviations and Acronyms

°C	degrees Celsius
ADF	Average Day Flow
B&V	Black & Veatch Canada
BAF	Biologically Aerated Filter
bioP	biological phosphorus removal
BNR	Biological Nutrient Removal

BOD5	Biological Oxygen Demand (in five days)
CAS	Conventional Activated Sludge
CBOD5	Carbonaceous Biological Oxygen Demand (in five days)
Class EA	Municipal Class Environmental Assessment
cm	centimetre
cm/s	centimetre per second
CofA	Certificate of Approval
DAF	Dissolved Air Flotation
dB	decibel
DO	Dissolved Oxygen
Dwg.	Drawing
EA	Municipal Class Environmental Assessment
EBR	Ontario Environmental Bill of Rights Registry
E. coli	Escherichia coli
EPA	United States Environmental Protection Agency
ESR	Environmental Study Report
F/M ratio	food to microorganism ratio
GE	General Electric
HESL	Hutchinson Environmental Sciences Ltd.
HRT	Hydraulic Retention Time
Hwy	Highway
I/I	Inflow and Infiltration
ICI	Industrial, Commercial and Institutional
IFAS	Integrated fixed-film activated sludge
kg	kilogram
kg/day	kilogram per day
kg/year	kilogram per year
L	litre
L x W x H	Length times width times height
L/c/d	Litres per capita per day
lmh	Litres per square metre per hour
LOT	Limit of Technology
LSEMS	Lake Simcoe Environmental Management Strategy
LSPP	Lake Simcoe Protection Plan
m	metre
m/s	metres per second
m2	square metre
m3	cubic metre
m3/day	cubic metre per day
Max.	Maximum
MEA	Municipal Engineer’s Association
mg/L	milligram per litre
mL	millilitre
ML/d	Megalitres per day
MLD	Megalitres per day / Million litres per day
MLSS	Mixed Liquor Suspended Solids
MLVSS	Mixed liquor volatile suspended solids
MOE	Ontario Ministry of the Environment

n/a	not applicable
NH3	un-ionized Ammonia
NH3 + NH4	Ammonia
NHIC	Natural Heritage Information Centre
NMS	Nutrient Management Strategy
No.	Number
NPV	Net Present Value
O&M	Operations and Maintenance
OMB	Ontario Municipal Board
OP	Official Plan
OPA#1	Official Plan Amendment Number 1
O.Reg.	Ontario Regulation
o/s	out of service
P	phosphorus
PAO	Phosphorus Accumulating Organisms
PF	Peak Flow
PIC	Public Information Centre
ppu	persons per unit
PRS	Phosphorus Reduction Strategy
PWQO	Ontario Provincial Water Quality Objectives
Q	Flow
RAS	Return Activated Sludge
SBR	Sequencing Batch Reactor
SLR	Solids Loading Rate
SOR	Surface Overflow Rate
SPR	Shoreline Protection Regulation
SRT	Solids Retention Time
TAL	Technology Achievable Limit
TKN	Total Kjeldahl Nitrogen
Town	Town of Bradford West Gwillimbury
TP	Total Phosphorus
TSS	Total Suspended Solids
UV	Ultraviolet
VFA	Volatile fatty acid
VSS	Volatile Suspended Solids
WAS	Waste Activated Sludge
WCES	Water Conservation and Efficiency Strategy
WEFTEC	Water Environment Federation Technical Exhibition and Conference
WERF	Water Environment Research Foundation
WPCP	Water Pollution Control Plant
WQT	Water Quality Trading feasibility study

EXECUTIVE SUMMARY

Background

To accommodate planned growth, the Town of Bradford West Gwillimbury completed a Master Servicing Plan Update to satisfy the requirements of Phases 1 and 2 of the Class Environmental Assessment planning process. The Master Plan Update was documented in a Report entitled "Water Supply and Wastewater Servicing Master Plan Update, Town of Bradford West Gwillimbury, Class Environmental Assessment, Final Study Report" (C. C. Tatham & Associates Ltd, March 31, 2011). The Study identified the need for additional wastewater treatment capacity and recommended that the existing WPCP be expanded. The Town retained the team of Ainley & Associates Limited and Black & Veatch Canada (Ainley/B&V) in January 2011, to undertake Phases 3 and 4 of the Class EA planning process and to document the planning in an Environmental Study Report.

Class EA - Phase 1

The Town issued a Notice of Study Commencement on May 21, 2008, which advised the public that the Town was investigating "…alternative solutions for water supply and wastewater treatment to accommodate the short-term and 25-year projected population growth….".

Phase 1 included determination of the socio-economic and natural environments of the Study Area. The Town's existing sewage collection system and water pollution control plant were described in general detail. The servicing requirements were outlined and were presented in Table 5 of the Servicing Master Plan Update. The future average day and peak flows were determined to be 23,300 m3/d and 53,400 m3/d respectively (Table 12 of the Servicing Master Plan Update).

The Problem Statement was defined as part of the Phase 1 Class EA as follows:

"A Master Servicing Study for water supply and wastewater treatment capacity was completed in January 2003, and an Addendum to the Water Servicing Study was completed in September 2003. The resulting master servicing plans need to be updated to accommodate the planned growth as set out in the Town's Official Plan and amendments. The preferred water supply and wastewater treatment solutions will need to comply with all regulations, meet environmental protection and sustainability objectives, and be cost-effective."

Class EA – Phase 2

Phase 2 consisted of identifying possible alternatives to address the problem statement and the selection of the Preferred Alternative. The evaluation determined an expansion of the Bradford WPCP with effluent discharge to the Holland River to be the best alternative.

Class EA - Phase 3

At the commencement of Phase 3, the Town published a Notice to advise the public and the review agencies of its intent to complete the Class EA planning process (continuing on from the Servicing Master Plan Update). The Notice was published on March 31, 2011 and again on April 7, 2011 in the Bradford Times.

The MOE's Phosphorus Reduction Strategy (PRS), June 2010, identified a new baseline phosphorus compliance load of 698 kg/year for the Bradford WPCP to be achieved by 2015 or by the next plant expansion. The requirement for further incremental reductions will be re-evaluated by the Province in 2015 during the first review of the PRS.

It should be noted that the June 2010 PRS (discussed in Section 6.0) qualified the requirement for future incremental TP loading reductions by stating that a re-evaluation will be completed in 2015. As such, the requirement for staged decreases in TP loading from the Bradford WPCP has not been addressed in this ESR. In addition, the need to include and assess the option of water quality trading was considered to be unnecessary at this time and therefore, the option of water quality trading has not been considered in this ESR.

Hutchinson Environmental Sciences Ltd. Completed an Assimilation Study of the West Holland River and determined that the aquatic habitat and surface water quality of the River at Bradford are degraded. Total phosphorus concentrations in the river exceed the PWQO most of the time and ammonia concentrations are elevated though do meet the PWQO for unionized ammonia. Some metal concentrations consistently exceed PWQOs and turbidity (suspended solids) in the river is high, indicating large algal productivity, and benthic invertebrate communities upstream and downstream of the outfall are indicative of degraded water quality. During low flow, the current (17 MLD) and proposed (23.3 MLD) effluent flow is higher than the river discharge. Therefore, the West Holland River generally does not have a large assimilative capacity. It is proposed to treat the effluent to stringent water quality levels in order to reduce the impact on the River.

The major conclusions of the Assimilation Study are as follows:

1. For all scenarios, the extent of the mixing zone that exceeds the PWQO of unionized ammonia is limited to one side of the river and does not exceed a length of 110 m. Therefore the effluent plume does not represent a barrier to movement of aquatic life.

2. The effluent is diluting total phosphorus concentrations in the river.

3. The effluent meets the requirement of non-lethal toxicity.

These results demonstrate that the proposed effluent from an expanded Bradford West Gwillimbury WPCP will meet the requirements for a mixing zone and for non-lethality and that the effluent can be discharged to the River.

Black & Veatch completed an assessment of the potential to optimize the existing plant. In summary, the existing WPCP can be expanded to a meet the proposed future flow rate of 23.3 MLD through optimization of specific existing treatment processes coupled with the addition of a tertiary phosphorus removal facility. In general the summarized recommendations are as follows:

- Replace or upgrade influent pumps for peak flows
- Re-rate existing screens and install an additional screen and new by-pass channel
- Re-rate activated sludge systems in plants B, C and D and provide required blower capacity
- Provide ballasted flocculation tertiary treatment facility including larger equalization basin
- Install a thickened waste activated sludge facility

A Phase 3 Public Information Centre was held on June 22, 2011 for the purpose of identifying Alternatives to increase the WPCP capacity and to present the Town's Recommended Alternative. Only one major comment was received as a result of the PIC. A letter dated July 8, 2011 was received from Cassels Brock (Lawyer) on behalf of their client, Tsam lands. A concern was expressed that the Tsam lands may not be included in the capacity increase. The Town responded, stating that the Tsam lands were indeed included in the population projection outlined in the Servicing Master Plan Update.

The Steering Committee determined that the following recommendations regarding the proposed capacity increase for the Bradford WPCP would be proposed for public and review agency comment:

1. The Town intends to optimize the existing plant performance, with no additional capital works as an interim phase in order to obtain an immediate capacity increase.
2. Identified upgrades will be undertaken by the Town to increase the capacity of the secondary treatment process to handle a flow rate of 23.3 MLD.
3. The Town will install a facility to thicken waste activated sludge to 4%.
4. The Town will install a larger equalization basin and a ballasted flocculation system to improve phosphorus removal.
5. The budget capital cost estimate for the proposed works is $20 million, which is to be funded through Development Charges. In addition to the above-mentioned recommendations, the Town will undertake to improve its existing water conservation and reuse program.

The Town further requested that the Consulting Team determine the current optimized capacity of the WPCP assuming no capital works were undertaken. A Re-rating Study was completed which concluded that the overall plant capacity could be increased from the currently approved rating of 17.4 MLD to 19.4 MLD by simply upgrading the alum pumping capacity. It is the Town's intention to apply for a re-rated Certificate of Approval prior to proceeding with any major capital works.

Principal Environmental Impacts of the Project and Proposed Mitigating Measures

Due to the fact that the proposed capital works are not major and will not require any land acquisition (all works can be completed within the confines of the existing site), the environmental impacts are related to construction and can be mitigated as outlined in Section 13.

Public's Principal Concerns

Based on comments received as a result of the initial Notice and the PIC, the public does not have any concerns with the proposed works. A summary of all comments received during the Class EA planning process was prepared and is included in Section 16.0.

The Public was given the opportunity to provide comment throughout the Class EA planning process.

As a result of the publication of the initial Notice and the PIC, the Town received some responses from review agencies, mainly asking to be kept informed. The Lake Simcoe Conservation Authority requested pre-consultation and the Ministry of the Environment outlined its "general comments" on the Class EA process.

Project Implementation

It is the Town's intention to apply to the MOE for a re-rating of the plant capacity from the current 17.4 MLD to 19.4 MLD as outlined in this ESR. Assuming the re-rating is approved by the MOE, the Town will, in the future, expand the plant capacity from 19.4 MLD to 23.3 MLD as one stage. The decision to undertake the expansion in one stage (one construction contract) was based on the following considerations:

- If sub-components of the expansion were to be completed on their own (such as the upgrade to the tertiary treatment facility), no additional capacity above 19.4 MLD would be gained; and
- If the Project is broken into three or four sub-components and completed over a number of years the combined total cost of these smaller contracts would most likely be greater than if the works were completed as one contract.

Phase 4

The Notice of Completion, initiating the 30-day public review of the Draft ESR, was published in the January 19 and 26, 2012 issues of the Bradford West Gwillimbury Times.

A copy of the Draft ESR was sent to the Ministry of the Environment, Central Region, Technical Support Section on January 18, 2012 under cover of letter which responded to previous MOE comments.

As a result of the publication of the Notice of completion, the Town received comments from Chippewas of Rama First Nation, (letter dated January 20, 2012), Don Boswell, Senior Claims Analyst, Ontario Research Team, Specific Claims Branch (email dated January 26, 2012) and the MOE (letter dated February 23, 2012).

The Chippewas of Rama First Nation wanted to make sure that Ms. Karry Sandy-McKenzie was included in the Contact list. It is noted that Ms. Sandy-McKenzie was included in the Contact List throughout the Class EA planning process.

Mr. Boswell suggested that additional web sites might need to be researched in order to advise First Nations groups of the Town's intention. The following First Nations groups were identified as a result of the additional research:

- Saugeen First Nation (located west of Owen Sound)
- Chippewas of Nawash First Nation (located on the Bruce Peninsula)
- Wasauksing First Nation (located near Parry Sound)

These three first Nation groups were deemed to be remote from Bradford West Gwillimbury and therefore, they were not added to the Contact List.

The MOE expressed addition comment on the proposed effluent concentration for CBOD as it relates to the DO level in the receiving West Holland River. The MOE also provided additional comment on the Air Quality Impacts Assessment Report. A response letter was provided to the MOE (dated March 23, 2012). In summary, the Town committed to:

- Prepare a work plan (for MOE review and comment) to assess current DO levels in the West Holland River and to model the proposed increase in effluent flow (23.3 MLD) as part of the final design for the future plant expansion,
- Revise the effluent CBOD limit depending on the results of the DO assessment,
- Undertake additional dispersion modeling and an assessment of compliance with O. Reg. 419/05 as part of the final design of the proposed expansion to 23.3 MLD, and
- Identify specific air quality mitigation measures as part of the additional dispersion modeling.

The ESR was finalized on March 23, 2012.

1.0 Introduction

The Town of Bradford West Gwillimbury (BWG) completed Phases 1 and 2 of a Class Environmental Assessment planning process culminating in the documentation of a Servicing Master Plan Update (Final Study Report) dated March 31, 2011 (C. C. Tatham & Associates Ltd.). That “Study Report” identified water and wastewater servicing requirements to address future growth associated with three Official Plan Amendments (OPA 9, 15 and 16). With respect to wastewater treatment, the Servicing Master Plan Update recommended an expansion of the Bradford WPCP to a capacity of 23,300 m3/d taking into account the maximum phosphorus load of 698 kg/year. A copy of the Servicing Master Plan Update is included in Appendix A.

In order to complete the Class EA planning process for the expansion/upgrade of the Town’s wastewater treatment capacity, the Town undertook an Expression of Interest/Request for Proposal process to retain a Consulting Engineering Team. The Team of Ainley Group (Ainley) and Black & Veatch Canada (B & V) was awarded the assignment in January 2011.

2.0 Steering Committee

A Steering Committee was formed from members of Town staff and the Consulting Engineering Team (see list below) for the purpose of directing the progress of the Phase 3 and 4 Class EA planning process and to facilitate the decision making process. Steering Committee meetings were held on a regular basis and copies of all meeting minutes are included in Appendix B. In addition, a Workshop meeting was held with Town Operating Staff and a copy of the minutes is also included in Appendix B. A copy of notes prepared from an April 26, 2011 meeting with the MOE is also included in Appendix B.

On June 7, 2011, a presentation was made to Town Council by members of the Steering Committee. A copy of the presentation is included in Appendix B.

The list of Steering Committee Members is as follows:

Debbie Korolnek - Director of Engineering, Bradford West Gwillimbury
Jon Morton - Project Manager, Bradford West Gwillimbury
Brad Sullivan - Chief Plant Operator, Bradford West Gwillimbury
Rick Way - Senior Plant Operator, Bradford West Gwillimbury
David Latarius - Engineering Assistant, Bradford West Gwillimbury
Richard Waite - Project Director, Black& Veatch Canada
Joe Mullan - Project Manager, Ainley Group
Brian Edwards - Assistant Project Manager, Black & Veatch Canada
Reid Mitchell - Ainley Group

3.0 Initial Notification

An initial Notice was prepared and published in the local newspaper on March 31, 2011 and April 7, 2011. The purpose of the Notice was to advise the public and the Review Agencies of the Town's intent to continue with the Class EA planning process and to provide notification of an upcoming Public Information Centre. A copy of the Notice, the Communication List and all related correspondence is included in Appendix C. A summary of the correspondence received as a result of the Initial Notice is as follows:

- Alderville Fist Nation letter dated April 1, 2011 – minimal potential impact, wants to be kept informed
- MOE letter dated April 4, 2011 – General Comments
- Chippewas of RAMA First Nation letter dated April 4, 2011 – direct all future correspondence to Karry Sandy-McKenzie
- Email dated April 4, 2011 from Rob Baldwin of the Lake Simcoe Conservation Authority – requesting information and wanting to attend working group sessions
- Email dated April 20, 2011 from Enbridge – wants to be advised when design is underway in order to protect buried plant
- Email dated April 28, 2011 from R. Baldwin of LSRCA – wants pre-consultation
- Ministry of Aboriginal Affairs letter dated May 20, 2011 – provides suggested First Nations contacts.

4.0 Class Environmental Assessment Planning Process

Ontario Municipalities are subject to the requirements of the Environmental Assessment Act (EAA) for public works projects. The Municipal Engineer's Association's (MEA) "Municipal Class Environmental Assessment" document (October 2000, as amended in 2007) provides municipalities with a phased procedure, approved under the EAA, to plan most municipal works projects. These are usually limited in scale with a predictable set of environmental impacts and mitigation measures. As noted in the MEA Document, the "Key Principles of successful environmental assessment planning" are:

- Consultation
- Reasonable range of alternatives
- Consideration of effects on all aspects of environment
- Systematic evaluation
- Clear documentation
- Traceable decision-making.

The MEA procedure for the BWG WPCP Class EA is a Schedule C planning process, involving five Phases.

- Phase 1 – Problem or Opportunity
- Phase 2 – Alternative Solutions
- Phase 3 – Alternative Design Concepts for Preferred Solution
- Phase 4 – Environmental Study Report
- Phase 5 – Implementation

The Town completed phases 1 and 2 and the planning was documented in the Town's "Water Supply and Wastewater Servicing Master Plan Update (Final Study Report) dated March 31, 2011.

The team of Ainley/Black & Veatch was retained to complete and document Phases 3 and 4 of the Class EA planning process and this ESR provides that documentation. The implementation Phase will be undertaken as necessary by the Town.

5.0 Background Information and Reports

5.1 Water Supply and Wastewater Servicing Master Plan Update, Final Study Report, March 31, 2011

The Water Supply and Wastewater Servicing Master Plan Update (Master Plan Update), provides documentation of the Problem Statement, the Study Area and the identification, assessment and selection of the Preferred Phase 2 Solution regarding wastewater treatment.

The Problem Statement is outlined in Clause 2.1 of the Master Plan Update and is reprinted as follows:

"A Master Servicing Study for water supply and wastewater treatment capacity was completed in January 2003, and an Addendum to the Water Servicing Study was completed in September 2003. The resulting master servicing plans need to be updated to accommodate the planned growth as set out in the Town's Official Plan and amendments. The preferred water supply and wastewater treatment solutions will need to comply with all regulations, meet environmental protection and sustainability objectives, and be cost-effective."

The "Study Area" is defined in Clause 2.2 and on Figure 1 of the Master Plan Update. In general, there are three designated areas within the Town that require municipal wastewater servicing. They are: the Bradford Urban Area, the Highway 400/County Road 88 Area and the Bond Head Settlement Area.

Following publication of a Notice dated October 20, 2008, a Public Information Centre (PIC) was held on November 5, 2008 to present the Recommended Alternatives for water supply and storage and for wastewater treatment. Public comments were summarized in Table 20 of the Servicing Master Plan Update. With respect to wastewater treatment, the following comments are noted:

- WPCP should provide anaerobic treatment to denitrify to reduce nitrate loadings to the Holland River and the Lake
- Include expansion of water conservation programs and encourage incentives for water reduction etc.
- Concerned about internal phosphorus loadings from the West and East Holland Rivers from late fall to early spring, and the impact of the WPCP effluent.
- Interested in effluent dilution and assimilative capacity in the West Holland River when water is pumped out for irrigation in the Holland Marsh.
- Early consultation with MOE.

A Notice of Study Completion was issued on July 15, 2010.

The Preferred Wastewater Solution (related to the existing WPCP) is summarized in the Executive Summary of the Master Plan Update as follows:

"Expansion of the Bradford WPCP to a capacity of 23,300 m3/day.

The required capacity of the expansion assumes that BWG continues to inspect, maintain and upgrade its sanitary sewage collection system such that the current low inflow and infiltration rates are maintained or improved.

The design of the WPCP expansion will consider:

- ***The actual capacity of the WPCP's secondary treatment units, established from stress test results.***
- ***Modifications to the secondary biological treatment process and the sludge treatment and management approach to minimize space utilization, energy usage and costs, and to optimize overall process performance.***
- ***Significant improvements to the tertiary treatment process to comply with an effluent phosphorus concentration of 0.08 mg/L, which would result in a maximum phosphorus load of 698 kg/year at design flows. The design effluent criterion for phosphorus will be confirmed during Phase 3 of the Class EA.***

If required, BWG will consider achieving further reductions in phosphorus loadings by offsetting with other sources of phosphorus and by participating in a water quality trading program, if available."

5.2 Assimilative Capacity Study and Benthic Invertebrate Studies

5.2.1 Desktop Assimilative Capacity Study – 2005

A desktop study was conducted by R.J. Burnside & Associates Limited in February 2005 to assess the capacity of the Holland River at Bradford to assimilate the discharge from the proposed expanded Bradford WPCP and establish effluent discharge criteria.

The study reviewed historical flow and water quality data to determine background concentrations for the parameters of interest and established the maximum acceptable WPCP discharge concentrations for key wastewater contaminants on a monthly basis.

The desktop study concluded the following:

- The West Holland River is MOE Policy 2 with respect to Total Phosphorus and therefore has no remaining assimilative capacity for this parameter all year round. Regardless of the concentration of phosphorus in the WPCP effluent, the PWQO criterion cannot be met downstream. A monthly average TP concentration of 0.11 mg/L or less would be required in the WPCP effluent to meet these MOE requirements. Relative to the C of A compliance limit of 0.14 mg/l, this represents a small but significant reduction.
- The West Holland River is usually MOE Policy 1 with respect to un-ionized ammonia for the whole year except for July. The downstream average in-stream un-ionized ammonia must be maintained at or below 0.02 mg/l for every month except for July where it should be below the historical 75th percentile concentration of 0.045 mg/l. The total ammonia limit of 0.3 mg/l is therefore suggested to meet the PWQO in the summer. A limit of 2.1 mg/l is suggested in the winter.
- The West Holland River is usually MOE Policy 1 with respect to E. coli except for the months of July and November. A year round compliance limit of 123 organisms/100ml (or less) is recommended to ensure consistent compliance with the PWQOs and MOE policies.
- A monthly maximum average TP concentration of 0.11 mg/l would result in a maximum daily loading to Lake Simcoe of 1.914 kg/day (based on a design flow of 17,400 m3/day) which is higher than the current loading allotment specified by the Certificate of Approval but lower than the total daily allotment (cap) of 2.046 kg/day currently allocated to Bradford WPCP.
- For the purposes of phosphorus impact on surface water and compliance with the MOE policies, there is no limitation on phosphorus flow rate as long as the concentration limit of

0.11 mg/l is met. However, the loading limit to Lake Simcoe effectively places a flow rate limit on the WPCP discharge and at higher flow rates than currently proposed, other water quality parameters become limiting to flow.

- A low flow analysis of the West Holland River shows that flows are lowest in June, July and September, with 7Q20 flows ranging from 0.15 m3/s in September to 1.02 m3/s in April.
- From an assimilative capacity perspective, the critical water quality parameters are TP and un-ionized ammonia. Significant reductions in the effluent limits would be required to comply with MOE Policies and Objectives (0.11 mg/l for TP and 0.3 mg/l for total ammonia)
- Basic pH sensitivity analysis shows that the maximum allowable total ammonia in the effluent can be increased substantially if the after-mixing pH in the River is lowered relative to historical levels. For example, if the after-mixing pH were reduced consistently below 7.5, the WPCP ammonia limit for compliance with the MOE policies increases from 0.3 mg/l to 1.4 mg/l. It is recommended that a more detailed assessment of expected after-mixing river pH be performed to confirm appropriate ammonia criteria prior to detailed design. This would need to consider the future pH of the effluent, which may be impacted by future changes in the supply of potable water. Currently all potable water distributed within the Town is derived from groundwater. A new water transmission main from the Town of Innisfil will be constructed to provide the Town with potable (lake-based) water, which will be “softer” and less alkaline than the groundwater currently used in the Town.
- The resulting effluent criteria, as proposed by R. J. Burnside & Associates Limited in 2005, is summarized in the Table below.

Table 5-1 Effluent Criteria as prescribed by the 2005 Desktop Assimilative Capacity Study

Parameter	Existing Non-Compliance Criteria on C of A (ADF = 8,870 m3/day)	Effluent Criteria to meet MOE Policies (ADF = 8,870 m3/day)	Effluent Criteria to meet MOE Policies (ADF = 17,400 m3/day)
Total Phosphorus	0.14 mg/L (1.24 kg/d)	0.11 mg/L (0.96 kg/d)	0.11 mg/L (1.94 kg/d)
Total (Ammonia + Ammonium) Nitrogen	2.0 mg/L (April – Oct) 4.5 mg/L (Nov – March)	0.3 mg/L (April – Oct) 3.4 mg/L (Nov – March)	0.3 mg/L (April – Oct) 2.1 mg/L (Nov – March)
E.coli.	200 organisms/100ml	145 organisms/100ml	123 organisms/100ml
In addition, un-ionized ammonia levels shall not exceed 0.1 mg/L in the effluent			

5.2.2 Benthic-invertebrate Study – 2004

In 2004, a benthic-invertebrate study, to monitor potential environmental impacts of the WPCP outfall on the receiving West Holland River, was initiated by Tarandus Associates Limited. A total of six sites were sampled and studied (three upstream and three downstream of the WPCP). The BioMAP WQI for the data suggests that the water quality is impaired at all six sampling locations including the “control” station located 1.75 km upstream of the WPCP discharge. The results of the other benthic metrics including richness, EPT index (total number of mayflies, stoneflies and caddisflies found at a given location), taxon dominance and Hilsenhoff Biotic Index also indicate degraded water quality throughout the study area. These do not, however, show any spatial trends in water quality and therefore show no correlation between the water quality and the operation of the WPCP. It is suggested that the main sources of water quality impairment is organic in nature, not surprisingly since the river flows through one of Ontario's largest intensive agricultural operations.

5.2.3 Benthic-invertebrate Study - 2010

A benthic invertebrate study was conducted by Azimuth Environmental Consulting Inc. on the West Holland River wastewater effluent discharge area at the WPCP in 2010. The same six sites as in the 2004 report were sampled and studied. The study concluded that the results indicated no apparent trend between the benthic invertebrate communities upstream and downstream of the River WPCP outfall, which would indicate that in general the treated effluent discharge does not appear to be adversely impacting on the water quality. However, the results also indicate that the River contains generally poor water quality and substantial organic pollution within the study area as well as a low range of biodiversity and community complexity. These conditions are likely to be attributed to a combination of the surrounding urban and agricultural land-use practices as well as the natural characteristics of the River.

5.3 Outfall Studies

With respect to the hydraulic capacity of the existing outfall pipe and channel, no background information was available. The outfall is considered to be comprised of a 600 mm dia. High Density Polyethylene pipe (about 54 m long) from the plant's final effluent channel followed by an existing channel that drains to the West Holland River. Based on a review of various internal diameters for a 600 mm pipe, the maximum water level in the final plant channel will vary from 220.68 m up to 221.127 m. This is based on the design peak flow rate of 53.4 MLD and a maximum flood elevation in the channel of 219.91 m. The existing top wall of the plant's final effluent channel is approximately 221.5 m. Therefore, the existing outfall pipe appears to be suitably sized to handle the design peak flow rate.

It is noted that Certificate of Approval # 6664-7ZGKXG describes the "Final Effluent Chamber and Outfall" as "a final effluent chamber to combine disinfected effluent from the existing and proposed UV channels, with pipe and outfall for discharge to West Holland River". This indicates that the mixing zone, for assimilation assessment, is the point where the outfall meets the river.

5.4 Geotechnical Report, October 1995

A geotechnical investigation was undertaken, by Terraprobe Limited in October 1995 at the site of the proposed Plant C expansion. A total of six boreholes were drilled to determine the soil and groundwater conditions in the area. The soil conditions at the boreholes were found to be SANDY SILT to SILTY SAND FILL over NATIVE SILT followed by SANDY SILT TILL. Groundwater was found at depths ranging from 1.8 to 4.5 m. This soil was considered suitable for the support of various structures on conventional spread footings and/or concrete tank pads. However, it was recommended that all deleterious material be removed from the footings area prior to pouring concrete. Also, the native silt soils at the site were deemed to be suitable for support of sewers and other related piping but it was recommended that the thrust blocks be cast against undisturbed native ground. It was recommended that the building foundations and tanks be extended to a depth of 1.5 to 6 m below existing grade and therefore, the recommended safe side slope configuration for temporary unbraced excavations was 1 ½ to 1 (horizontal to vertical). Additional consideration was given to deep excavations in close proximity to existing foundations and structures so that there was minimal loss of ground support. Excavated soils at the site were deemed to be difficult to place and recompact as backfill and therefore it was recommended to import OPSS Granular 'B' type material for backfilling structures. It was recommended that any soft, loose or disturbed soils encountered as a result of groundwater seepage or construction traffic be excavated and replaced with suitably compacted sand fill.

A further geotechnical investigation was undertaken, by Terraprobe in December 2003, in support of the February 2005 ESR (Burnside). A total of six boreholes were drilled to determine the soil and groundwater conditions in the area. The investigation found varying depths of fill throughout the site ranging from 1.8 to 4.7 m below the existing grade. Buildings constructed as slab on grade would require greater than the conventional 1.2 m depth for footings and the removal of all fill material below the slab. At the location of the aerobic digesters and biosolids storage tanks, the depth of fill was approximately 4m below grade. This condition required relatively deep foundations and/or the use of engineered fill as the full depth of the fill had to be excavated and filled below the tank slabs. The bearing capacities ranged from 100 to 250 kPa with the lower value located in the northern edge of the site. However, it was recommended that most of the tanks be founded at an elevation with a minimum bearing capacity of 150 kPa. Therefore the existing capacities were deemed to be suitable. The water table was measured at 2 to 3 m below grade but varied seasonally. The structures were therefore designed for hydrostatic pressure and uplift assuming the water table was at grade. For deeper/larger span structures, this may have resulted in heavier (thicker) bases/walls or alternatively, pressure relief valves may have been installed where appropriate.

Based on previous geotechnical assessments, the soil conditions at the plant site are considered to be acceptable for either a plant expansion or optimization of the existing facilities.

5.5 Stormwater Management Assessment, Feb 2005

As part of the February 2005 ESR (Environmental Study Report, Bradford Water Pollution Control Plant WPCP Expansion), impacts on the Regional Floodplain and Provincially Significant Wetlands were identified (Clause 10.2 of the 2005 ESR). In summary, the following points were noted:

- The WPCP, including the suggested 2005 expansion, is located just within the limit of the Regional storm floodplain.
- Given the large expanse of the Holland River floodplain at the location of the WPCP, it is not expected that the minimal loss of floodplain storage would have a noticeable effect on the Regional Flood levels.

In addition, storm drainage was assessed as part of the 2005 ESR (Clause 10.7 of the 2005 ESR). A summary of the points made is as follows:

- Erosion and sediment control measures, meeting Town and LSRCA standards are to be installed, inspected and maintained during construction.
- De-watering operations are to include sediment traps or filter bags as required to reduce sediment load to the surrounding areas.
- Stabilization of exposed soils is to take place as soon as possible following completion of the construction.
- Any disturbance of the existing ditch outfall area is to be stabilized with suitable native shrub species, as outlined in the LSRCA requirements.

- Existing storm drainage characteristics of the adjacent properties (upstream and downstream) are to be maintained.
- Final design details are to address measures to control possible oil, gas or fuel spills during construction.

All of these observations and recommendations are applicable to either an expansion of the existing plant or to optimization of the existing treatment facilities.

5.6 Stress Testing Report for Plants B and C, Jan 2008

TSH (now AECOM) was retained by the Town in 2006 to complete stress testing of Plants B and C for the purpose of re-rating the capacities of those two facilities. The Report titled "Stress Testing of Plants B and C" was provided to the Town under cover of a letter dated January 10, 2008. The Report notes that during the preparation of the February 2005 Environmental Study Report for Plant D, the capacity of Plant B was reduced by the MOE from 4544 m3/d to 3075 m3/d to account for future nitrification requirements and clarifier capacity. The Report also notes the rated capacity of Plant C as 4325 m3/d.

The Report assumed that the effluent loading requirements, as outlined in the Certificate of Approval, would be retained in the future.

TSH developed an industry standard BioWin process computer model for both Plants B and C. Higher than normal flows were directed to each of the two plants during various periods between July 2006 and June 2007. According to the Report, the model "correlated very well with the actual plant operation and therefore is a useful tool in predicting future plant performance."

The stress testing indicated that, with various modifications, Plant B could be re-rated to 4544 m3/d and Plant C could be re-rated to 6015 m3/d. Coupled with the rated capacity of Plant D, the overall plant capacity would be 20559 m3/d. Allowing for the robustness of future Plant D (under construction in 2008), the TSH Report concluded that the entire facility could be re-rated to 22560 m3/d or higher.

The Report also concluded the following:

- Plant B experienced issues with respect to establishing nitrification during certain periods of stress testing as a result of blower breakdown
- Removal of sludge from the secondary clarifier in Plant B resulted in denitrification occurring within the clarifier during the summer period, resulting in impairment of effluent quality
- With mechanical improvements, the proposed effluent limits can be met by not relying on blending for either Plant B or C.

A summary of the facility modifications as recommended by TSH is as follows:

- Upgrade the influent flow measuring and monitoring for both Plants B and C
- Install an automatic flow splitting device for Plants B and C influent
- Provide new blowers for Plant B
- Upgrade the return sludge pumps for Plant B
- Expand the equalization tank in Plant C
- Upgrade the equalization tank pumps for Plant C.

The conclusions and recommendations of the Report were considered during the 2011 Optimization Assessment, which was undertaken as part of this Class EA planning process. The results of the most recent assessment are identified in Clause 5.14 of this ESR.

5.7 Record Drawings

Record Drawings were available for Plant C (Ainley Group File 197022 dated June 1998) and for Plant B (Proctor & Redfern File 77119 dated October 1983). In addition, Record Drawings related to the Main Sewage Pump Station Extension (Proctor & Redfern File 77119 dated March 1984) were also reviewed. These Record Drawings were used to confirm facility sizes for optimization assessment.

The Town provided "As Tendered" Drawings for Plant D, printed July 2006 for Class EA purposes.

5.8 Historical Flow Data

The Town provided the historical flow and population data for the years 2007 to 2010. It is assumed that wastewater flow rates for future growth of industrial, commercial, institutional and residential will remain proportionate to current flow levels. It is noted that although the historical flow data provides both influent and effluent flow information, the Town advised that the influent flow data is not accurate. Therefore, for the purposes of this Class EA, all historical flows are effluent flows.

The Town provided the serviced populations.

Table 5-2 below lists estimated annual historical average daily effluent flows per capita.

Table 5-2 Annual Average Daily Flows per Capita

Year	Serviced Population	Average Daily Flow (ADF) m3/d	Peak Day Flow (PDF) m3/d	Peak Factor	Actual per Capita flows (L/c/d)
2007	19,060	5827	9646	1.66	306
2008	21,218	6768	16014	2.37	319
2009	22,000	7227	17185	2.38	329
2010	23,293	7107	12384	1.74	305

5.9 Proposed Design Flows

The design criterion for the capacity increase was determined by the Town as part of the Master Servicing Study. The design criteria are summarized in Table 5.3 (overleaf).

Based on the design criteria, average day flows and peak flows were determined for the proposed growth. Tables 5.4 and 5.5 (overleaf) outline the design flows.

In summary, the design flow rates to service a residential population of 47,400 persons and an employment equivalent population of 30,000 are as follows:

- Average Day Flow = 23,250 m^3/d
- Peak Flow = 53,400 m^3/d

Town of Bradford West Gwillimbury
Bradford WPCP EA

Table 5.3 - Design Criteria

Water Consumption	**Average Day**		**Peaking Factor**
Residential	250	L/c/day	Harmon
Extraneous	90	L/c/day	2.5
Existing Industrial, Com and Inst in Bradford Urban Area	5	m^3/net ha/day	2
Future Industrial and Com in Hwy 400 Area	8	m^3/net ha/day	2

Table 5.4 - Average Day Flows

	Residential		**Employment**			**Extraneous**	**Total**
	Population	**Avg Day Flows (m^3/d)**	**Population**	**Area (ha)**	**Avg Day Flows (m^3/d)**	**m^3/d**	**m^3/d**
Bradford Urban Area	38,800	9,700	15,000	378	1,890	4,227	15,817
Interphase Industrial				21	168	55	223
Bond Head Area	4,400	1,100				396	1,496
Highway 400 Employment			15,000	405	3,240	1,041	4,281
Total	**43,200**	**10,800**	**30,000**	**804**	**5,298**	**5,719**	**21,817**
Allowance for Intensification and Infilling	4,200	1,050				378	1,428
Total	**47,400**	**11,850**	**30,000**	**804**	**5,298**	**6,097**	**23,245**
						SAY	**23,250**

Table 5.5 - Peak Flows (m^3/d)

	Harmon	**Residential**	**Employment**	**Extraneous**	**Total**
Bradford Urban Area	2.37	22,976	3,780	10,568	37,324
Interphase Industrial			336	138	474
Bond Head Area	3.30	3,626		990	4,616
Highway 400 Employment			6,480	2,603	9,083
Total	2.32	**25,101**	**10,596**	**14,298**	**49,995**
Allowance for Intensification and Infilling		2,436		945	3,381
Total		**27,537**	**10,596**	**15,243**	**53,376**
				SAY	**53,400**

Note: The total peak flow from all areas is not the sum of the individual peak flows. It was recalculated with a residential peaking factor of 2.32 to account for the total population. S:\110060\Working File\Bradford WPCP Data\Tables 5.3, 5.4 and 5.5.xls

5.10 Historical Raw Wastewater Concentrations

The historical raw wastewater concentrations, shown in Table 5-6 below, for 5-day Carbonaceous Biochemical Oxygen Demand (CBOD5), Total Suspended Solids (TSS), Total Phosphorus (TP) and Total Kjeldahl Nitrogen (TKN) are based on the Town's SCADA Reports.

Table 5-6 Historical Raw Wastewater Data

Year/Parameter	CBOD5 mg/L	TSS mg/L	TP mg/L	TKN mg/L
2007	171	181	4.2	32
2008	173	171	3.6	29
2009	155	179	4.2	30
2010	183	135	4.2	34

Historical influent data from January 2007 through December 2010 was evaluated to develop the raw influent wastewater characteristics. An influent composite sample is taken once per week and does not include any side-streams (except return from the grit classifier). The influent flow meter readings are inaccurate at current flows, therefore the effluent flow is used for Ministry of Environment reporting purposes.

The annual average flows, concentrations, loads and peaking factors for 2007 through 2010 are presented in Table 5-7. Outlier sample values were eliminated from the data set. Furthermore, the raw influent Total Suspended Solids (TSS) data in 2010 shows periods of very low TSS, which are inconsistent with the influent carbonaceous biochemical oxygen demand (CBOD5), total Kjeldahl nitrogen (TKN) and total phosphorus (TP). Therefore, 2010 data are presented but have not been considered in developing the influent wastewater characteristics.

Table 5-7 Historical Average Flows, Loads and Peaking Factors (2007 through 2010)

	2007	2008	2009	2010
Effluent Flow				
Average (AA)	5827	6772	7227	7107
Max Month (MM)	6491	8807	8778	7832
Peak Day (PD)	9646	16014	17185	12384
PD/AA	1.7	2.4	2.4	1.7
MM/AA	1.11	1.30	1.21	1.10
$CBOD_5$				
Average concentration	171	173	155	183
Average Load	994	1174	1118	1303
Max Month Load	1198	1587	1536	1794
Peak Day Load	1340	1833	1914	2411
MM/AA	1.20	1.35	1.37	1.38
PD/MM	1.12	1.16	1.25	1.34
TSS				
Average concentration	181	171	179	135
Average Load	1056	1159	1293	959
Max Month Load	1444	1586	1681	2090
Peak Day Load	1840	1955	1917	2879
MM/AA	1.37	1.37	1.30	2.18
PD/MM	1.27	1.23	1.14	1.38
TKN				
Average concentration	32	29	30	34
Average Load	186	195	214	244
Max Month Load	208	247	280	300
Peak Day Load	251	318	365	348
MM/AA	1.11	1.27	1.31	1.23
PD/MM	1.21	1.29	1.30	1.16
TP				
Average concentration	4.2	3.6	4.2	4.2
Average Load	24	24	31	30
Max Month Load	29	30	43	35
Peak Day Load	37	42	60	44
MM/AA	1.17	1.22	1.39	1.16
PD/MM	1.31	1.42	1.41	1.25

Design raw influent wastewater characteristics were then developed based on the historical plant data from 2007 through 2009.

Table 5-7 presents the design annual average (AA), maximum month (MM), and peak day (PD) flows and loads for the raw influent wastewater. Based on the historical trend of the influent wastewater, it appears that the maximum month flow and the maximum month load could occur simultaneously (see Figure 5-1). Therefore, the maximum month concentrations are calculated based on the maximum month flow and the capacity of the plant has been evaluated based on the maximum month flow and loads.

The plant measures influent CBOD5, however the MOE recommends that BOD5 is used “for the assessment of raw sewage and primary effluents in estimating design parameters such as organic loadings and process air requirements of the secondary treatment process[1]”. Therefore influent BOD was estimated based on a typical CBOD/BOD ratio of 0.92. A VSS/TSS ratio of 0.85 was assumed for the raw influent solids.

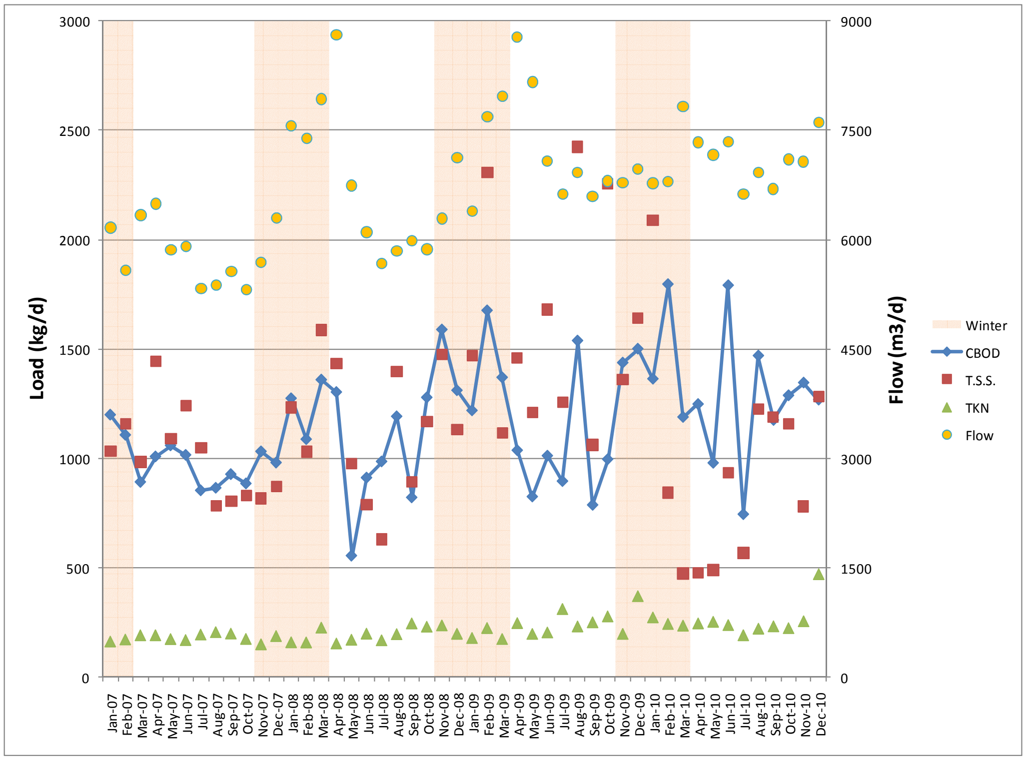

Figure 5-1 Historical Flows and Influent Loads illustrating coincident load and flow peaks during freezing period

The addition of alum for phosphorous removal generates a significant amount of chemical sludge that has to be accounted for in the design. The chemical sludge generated was estimated on a stoichiometric basis. The influent TSS in the table that follows was adjusted to account for the chemical sludge from alum addition.

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[1] MOE Design Guidelines for Sewage Works, 2008, Page 8-10

Table 5-8 Design Raw Influent Characteristics

Parameter	Peaking Factor	MLD	mg/L	kg/day
Annual Average				
Flow	----	23.3	----	----
BOD_5 (1)	----	----	200	4,660
TSS – raw (2)	----	----	180	4,194
TSS – (chemical sludge)			218	5,079
TKN (3)	----	----	32.0	746
TP	----	----	4.2	98
Maximum Month (4)				
Flow	1.20	28.0	----	----
BOD_5 (1)	1.33	----	212	5,928
TSS – raw (2)	1.38	----	207	5,788
TSS – (chemical sludge)			250	6,990
TKN (3)	1.23	----	34.7	970
TP	1.23	----	4.9	137
Peak Day (5)				
Flow	2.29	53.4	----	----
Peak Hourly (6)				
Flow	2.78	64.77	----	----

Note:
(1) CBOD/BOD ratio of 0.92.
(2) TSS data from 2010 was ignored.
(3) Total Kjeldahl Nitrogen (TKN)
(4) Maximum month peaking factors represent MM/AA.
(5) Peak day flow factor represents PD/AA.
(6) Peak hourly flow factor represent the PH/AA. Peak hour is based on all 4 influent operating simultaneously at maximum capacity)

5.11 Historical Effluent Quality Data

Historically, the existing Bradford WPCP has performed well with respect to meeting effluent concentration criteria. A tabulation of effluent parameters for CBOD5, TSS, TP, TKN, Total Ammonia Nitrogen and E. coli is shown below.

Table 5-9 Historical Effluent Data

	CBOD5 (mg/L)	TSS (mg/L)	TP (mg/L)	TKN (mg/L)	NH3 + NH4 (mg/L)	E. coli
Effluent Objective	5	5	0.08		0.6 (apr–oct) 2.0 (nov-mar)	< 50
Effluent Limit	10	10	0.082		0.8 (apr–oct) 2.5 (nov-mar)	<100
2007 – Annual Average	3	3	0.09	2.72	1.44	4
2008 – Annual Average	3	2	0.08	1.75	0.64	36
2009 – Annual Average	2	3	0.08	0.97	0.34	7
2010 – Annual Average	2	2	0.06	1.29	0.39	8

The pH is consistently between 6.0 and 9.5.

With respect to actual loadings, Table 5-10 shows a comparison of effluent criteria against recorded loadings.

Table 5-10 Historical Effluent Loadings

Parameter – Limit	2007 Average	2008 Average	2009 Average	2010 Average
ADF m^3/d – 17,400	5,827	6,768	7,227	7,107
TP – 0.11 mg/L, 2.046 kg/d	0.53 kg/d	0.49kg/d	0.47 kg/d	0.33 kg/d
Total Ammonia Nitrogen – 0.8 or 2.5 mg/L	1.44 mg/l	0.64 mg/l	0.34 mg/l	0.39 mg/l
CBOD – 10 mg/L, 174 kg/d	18.38 kg/d	17.26 kg/d	14.12 kg/d	14.45 kg/d
TSS – 10 mg/L, 174 kg/d	19.38 kg/d	12.55 kg/d	14.57 kg/d	14.15 kg/d

Based on average daily flows and TP loadings, the historical annual total phosphorus loadings for 2007 to 2010 are as follows:

2007 = 0.53 x 365 = 193 kg

2008 = 0.49 x 366 = 179 kg

2009 = 0.47 x 365 = 172 kg

2010 = 0.33 x 365 = 120 kg

5.12 Current Certificate of Approval

The current Certificate of Approval was also referenced with respect to existing effluent requirements. A copy of Amended Certificate of Approval No. 6664-7ZGKXG is included in Appendix D. In addition, Certificate of Approval No. 9408-7SFP7B was issued for Air. A copy is also included in Appendix D.

5.13 Recently Completed Studies

In order to evaluate all of the options to increase the capacity of the BWG WPCP, it was necessary to complete two additional studies. An Optimization Study was completed in order to determine if optimization is a feasible solution. The findings are summarized in Section 5.14.

In addition, an Assimilation Study was undertaken to assess the impact of the proposed effluent loadings on the West Holland River. The findings are summarized in Section 8

5.14 Optimization of Existing Plant Processes

5.14.1 Report Summary

As part of the Class EA Assignment, an assessment of the feasibility of optimizing operation of the existing plant was undertaken. An Optimization Report was prepared and copy is included in Appendix E. In summary, it has been concluded that through the completion of relatively minor modifications, the capacity of the Bradford WPCP can be re-rated from 17.4 MLD to 23.3 MLD. This option will be evaluated with other options described hereinafter. The recommendations for plant optimization are outlined in the Report and are reiterated as follows:

Table 5-11 Recommendations for Plant Optimization

Unit Process	Existing Capacity	Upgrades
Influent Pumps	4 x 181 L/s, each pump rated for 16.2 MLD for an installed capacity of 64.8 MLD and a firm capacity of 48.6 MLD	• Replace two influent pumps to 23,000 m^3/d units to provide firm capacity of 55,000 m^3/d • Bypass residual peak instantaneous flows to equalization lagoon
Headworks Screening	2 x 24,400 m^3/d mechanically cleaned screens	• Rerate existing screens to 34,000 m^3/d. • Install 46,000 m^3/d screen in bypass channel • Construct new external bypass pipe or channel • Install standby grit classifer
Grit Removal	2 x 24,400 m^3/d vortex units	• No improvement – bypass at higher flows
Activated Sludge Systems	Plants B, C & D = 17,400 m^3/d	• Rerate existing tankage at 23,300 m^3/d • Install additional blowers as needed

Unit Process	Existing Capacity	Upgrades
		• Chlorine dosing system for filamentous control
Digester Supernatant	Filter reject pump capacity is insufficient to handle digester supernatant	• Redirect (pump) digester supernatant to the headworks instead of to the filter reject system
Tertiary Phosphorus Removal	None	• Install larger equalization basin upstream of existing sand filter • Install ballasted flocculation system
Filtration and UV Disinfection	Existing Capacity = 63,600 m^3/d	• No improvements – sufficient capacity
Sludge Stabilization		• Install thickening technology to thicken WAS to 4% by adding new TWAS facility building with duty and standby RDT and polymer system

5.14.2 Recommendations for Reliability

In order to ensure that Optimization is viable, the Optimization Report identifies recommendations for reliability:

Plant B

The recommendations for Plant B reliability are:

- Base Load Plant B to prevent peak day flow event overloading clarifiers. This will require operation of the automatic gate and flow meter at the existing influent flow splitter
- Divert more flow to Plant D at peak flow when all Plant D clarifiers are in operation
- If Plant D is operating reliably for nitrification then consider sending Plant D WAS to Plant B as a nitrifying seed to ensure nitrification year-round
- Convert Plant B digester capacity to aeration capacity for additional treatment at lower MLSS in Plant B
- Install additional blower for Plant B, replace coarse bubble diffusers with fine bubble diffusers in converted aerobic digester
- Modify influent and effluent channels to suit.

Plant C

The recommendations for Plant C reliability are:

- Upgrade or expand aeration blower capacity for Plant C
- Supply provision for chlorination Plant C recycle (control Sludge Volume Index)
- Increase SBR decant equalization working volume from existing capacity (597 m^3) to approximately 1,890 m^3.

Plant D

The recommendations for Plant D reliability are:

- Install motorized valves on some aeration diffuser drop legs to provide DO control of aeration
- Install aeration in the combined mixed liquor channel at the end of the aeration basins to ensure MLSS stays in suspension
- Fix the octagon MLSS Flow splitter to clarifiers
- Supply provision for chlorinating Plant D RAS recycle (control Sludge Volume Index)

On Site Pump Station and Headworks

The recommendations for pump station and headworks reliability are:

- Replace two existing influent pumps with larger units, each capable of pumping 23,000 m^3/d to ensure adequate firm capacity for the peak day flow
- Headworks screen equipment is undersized for the peak day flow of 53.4 MLD and undersized for the instantaneous nameplate peak capacity of the influent pumps
- Install additional screen in the bypass channel and rerate the existing two screens and/or install a replacement bypass channel
- Grit classifier wash water and decant drains to a single influent wet well limiting plant redundancy – flow must be diverted to both raw influent wet wells
- Provide additional standby grit classifier for flexibility and security.

Other Recommendations

The following additional recommendations were noted during the assessment of the existing plant:

- Demolish Plant A to free up space for the new equalization tank and the new prefiltration facility
- Repair leaks in the existing air supply piping
- Repair the existing biofilter in the headworks (currently susceptible to freezing)

5.14.3 Recommendations for Biosolids Processing

The Optimization Study provides the following recommendations with respect to treatment of biosolids:

- Convert Plant B aerobic digester to aeration basin
- Provide capability to transfer sludge from Plant B to other locations for treatment or storage
- Reuse the existing SBR equalization tank for dilute WAS storage prior to thickening
- Install a biosolids thickening centrifuge or gravity belt thickener or rotating drum thickener
- Construct a new TWAS facility near the existing aerobic digesters and biosolids storage tanks.

5.14.4 Recommendations for Tertiary Treatment Upgrade

The Optimization Study considered several options to improve tertiary treatment and short-listed two alternatives – Ballasted Flocculation and Tertiary Clarifiers. Ballasted Flocculation is the recommended solution.

6.0 Provincial Requirements

6.1 General

The Lake Simcoe Protection Act became law in December 2008. The act required the Province to establish a protection plan for Lake Simcoe and surrounding area. The Lake Simcoe Protection Plan (LSPP) took effect on June 2, 2009. The purpose of the plan is to provide direction that will help protect and restore the ecological health of the Lake Simcoe watershed as important decisions are made, including decisions about new development. The LSPP also outlines a number of proposed actions to be undertaken by both the public and private sectors. In the near-term, the plan focuses on the issues most critical to the health of the lake, including improving water quality through reducing the amount of nutrients, primarily phosphorus, entering the lake. Recommendations included in the LSPP were to develop a phosphorus reduction strategy, study the feasibility of water quality trading to help reduce phosphorus loading to the Lake, and to develop a regulation to protect the shorelines of Lake Simcoe.

In 2009 the Province filed interim Regulation 60/08 (amended to O. Reg. 130/09), titled, "Lake Simcoe Protection" under the Ontario Water Resources Act. The Regulation contained measures to protect Lake Simcoe and to reduce phosphorus loadings to the lake in the short term until the Province could implement long term measures under the Lake Simcoe Protection Act and the associated Lake Simcoe Protection Plan. As a result of the legislation, the BWG WPCP will have to meet more stringent permit limits, in particular for total phosphorus (TP).

Section 2(1) of Regulation 60/08 assigned individual limits to the total amount of phosphorus that can be discharged from each of 15 wastewater treatment plants located in the Lake Simcoe Basin. With respect to the BWG WPCP, the interim annual TP loading for the period from April 1, 2008 to March 31, 2010 was 361 kg/year.

6.2 Phosphorus Reduction Strategy

As a result of the issuance of the Phosphorus Reduction Strategy, the annual TP loading limit was revised. The "Lake Simcoe Protection Plan" (LSPP) contains measures to protect Lake Simcoe and to reduce phosphorus loadings to the lake, including the Phosphorus Reduction Strategy (PRS), Water Quality Trading Feasibility Study (WQT) and the Shoreline Protection Regulation.

Basically, the PRS has decreased the annual loading of TP from the BWG WPCP from the 747kg/year (Current Certificate of Approval) to 698 kg/year. The Province's intent is to reduce loadings of phosphorus to Lake Simcoe. Lake Simcoe is a sensitive water body that is currently suffering from nutrient enrichment. It was the subject of an intensive remedial program (the Lake Simcoe Environmental Management Strategy, "LSEMS"), which has now been superseded by the Lake Simcoe Protection Plan. A copy of the June 2010 Phosphorus Reduction Strategy is included in Appendix F.

6.3 Water Quality Trading Feasibility Study

The WQT feasibility study looked at different means to implement a WQT program to determine if it is feasible for the Lake Simcoe Watershed. Water Quality Trading is a market based way to control pollutants by trading them as commodities, with a net overall reduction as the goal. In the Lake Simcoe Watershed, the main pollutant that was investigated for trading is phosphorus. As part of the feasibility study, a number of items were considered including; if a there is a market for trading (demand is greater than supply); other successful programs and past studies of the watershed to determine if the phosphorus could be quantified.

The WQT feasibility study concludes that WQT is feasible for the Lake Simcoe Watershed. However, based on the comments received during the February 17, 2010 to April 3, 2010 public review period, the MOE will determine whether to proceed with implementing a WQT Program. If they decide to implement a program, the specifics of how it will operate will be determined at that time. The feasibility study did make recommendations for the MOE to consider. One of these recommendations includes establishing a central "clearinghouse" where all credits are sold and all credits are purchased. This would make the process more transparent and accountable and would prevent private deals between two parties. However, the specifics as to how the clearinghouse would be created and managed as well as any specifics on how credits will be sold and subsequently purchased will be determined as part of the program implementation. The MOE has indicated that, if water quality trading is a future option, the details of such a program will be provided prior to 2015.

The ESR is based on the assumption that water quality trading will not be in place for the next plant expansion.

6.4 Shoreline Protection Regulation

The Shoreline Protection Regulation (SPR) generally prohibits the removal of natural vegetation in existing naturally vegetated areas within shoreline buffer areas and shoreline natural areas, which may be areas within 15m of the lake or 30m of a stream. The intent is to leave these areas undisturbed, i.e. no removal, pruning, cutting or grubbing. Some exceptions are proposed but, in these cases, compensation will be required elsewhere to achieve "no net loss" of natural vegetation.

The regulation requires establishment of a vegetated riparian area at the time other works or activities are undertaken along the shore of a lake or a stream and applies within 15m to works such as erosion control, boathouse or dock construction or new landscaping. It would require that works within 15m revegetate to a distance of 5m from shoreline (15m is the "trigger", 5m is the "requirement") to mitigate past activities, and it would appear to be triggered by a building permit application.

The regulation prohibits significant shoreline alteration such new or expanded dredging into shoreline, new or expanded lagoons, and new or expanded channels between pond/lagoon and lake (i.e. this would prevent future Big Bay Point developments). The regulation says that developments transitioned by O. Reg. 219/09 "may be exempt"; however, we believe the proper wording should be "are exempt".

The regulation prohibits fertilizer use but appears to focus on "residential/aesthetic" uses as it exempts agriculture and allows municipal sports applications if need is demonstrated via soil testing. There is a total prohibition of fertilizer use within 5m of shoreline, and fertilizer must be phosphorus free within 30m. The prohibition could include compost, manure etc.

The regulation would prohibit new septic system or subsurface sewage works within 100m of shoreline or any permanent stream. Some exemptions would apply (agriculture, replacement of old system) but there does not appear to be an exemption for new cases even where advanced sewage treatment precedes disposal to a tile field that is used for disposal only, not treatment. This part of the regulation would be regulated under the Ontario Building Code.

The regulation would prohibit wetland interference, including:

- Activities that would change wetland boundary or wetland hydrology
- Removal of vegetation from wetland, or natural vegetation within 30m of wetland (vegetation removal would not change wetland classification)

There are some exceptions and exemptions; however the regulation even defines wetland drainage as a form of site alteration.

Implementation by and large would be through adding regulations to existing permits (Building Permits, Dock Permits) or the Public Lands Act. Voluntary compliance is encouraged; alternatively municipalities may be required to put in place bylaws consistent with regulation.

It was concluded that the Shoreline Protection Regulation does not have any significance with respect to the capacity increase of the Bradford West Gwillimbury WPCP.

6.5 Water Conservation and Efficiency Strategy

Prior to June 2014, the Town is required to address the requirements of the Province's Water Conservation and Efficiency Strategy. This includes commitment to the completion of a Water Conservation and Efficiency Strategy (WCES), to assess historical water/wastewater conditions and implement a strategy for water efficiency. The Water Conservation and Efficiency Strategy should be completed in conjunction with detailed design, prior to the proposed plant expansion. It is noted that the Lake Simcoe Protection Plan (LSPP) requires that a WCES be completed with implementation beginning by June 2, 2014. The WCES should span the full planning horizon. The WCES should :

- Provide targets for conservation, efficiency, inflow and infiltration reduction to the WPCP
- Provide timelines for achieving the targets, as well as strategies, tactics, programs and initiatives to be used, including the cost to implement these
- Assess methods of achieving conservation measures such as improved management practices, the use of flow restricting devices and other hardware
- Encourage water conservation incentives, education and demand monitoring in an attempt to reduce water consumption
- Aggressively reduce wet weather peak inflow and infiltration rates into the collection system through enhanced system monitoring (flow measurement), system inspections and regular maintenance
- Develop a strict Sewer Use Bylaw along with regular monitoring program
- Assess the feasibility of non-potable effluent reuse/recycling complete with practices and technologies associated with water reuse/recycling
- Consider the potential impacts of climate change.

In addition, the WCES is to include a program for the reduction of inflow and infiltration from the WPCP collection system. This program shall include reduction priorities, targets, timelines, tactics and initiatives, and the associated costs to implement these.

The WCES is also to include an implementation plan for the proposed initiatives. It shall also include a monitoring and reporting plan to assess the effectiveness of the initiatives as well as the achievement of water conservation and/or efficiency targets.

The Town must commit to consult with the public, relevant government agencies and the Ministry of the Environment's Central Regional Office on its proposed WCES.

The WCES shall include a review of best in class water conservation and efficiency programs, initiatives, strategies and tactics adopted by other jurisdictions. The review shall include an analysis of best in class tactics/strategies used by other jurisdictions throughout the world. This review shall be made public and shall form part of the consultation process for the WCES, as required above.

In conclusion, the Town of Bradford West Gwillimbury is required to address the requirements of the Water Conservation and Efficiency Strategy prior to June 2, 2014.

PHASE 3 REPORT

7.0 Existing Wastewater Treatment Plant

The Bradford WPCP is located east of Dissette Street (# 225 Dissette), south of Jay Street. Based on a review of the Master Plan Update - Final Study Report, the WPCP is comprised of four plant "trains" which are described as follows:

- Plant A – no longer in use (abandoned)
- Plant B - extended aeration activated sludge facility - rated capacity of 3,075 m^3/d.
- Plant C - added in 1998 - sequencing batch reactor activated sludge facility - rated capacity of 4,325 m^3/d
- Plant D - added in the fall of 2009 - comprised of Plants D1 and D2, each rated at 5,000 m^3/d.
- Total Rated Capacity = 17,400 m^3/d.
- Peak Flow Capacity = 40,800 m^3/d.

It is noted that Plant D was designed for an ADF of 12,000 m^3/d and a peak flow rate of 30,840 m3/d to ensure process robustness.

A complete description of the existing WPCP is included in Clause 6.2.2 of the Master Plan Update (Appendix A).

8.0 Effluent Discharge Criteria to West Holland River

8.1 West Holland River Aquatic Baseline Review

8.1.1 General

In order to determine the impact of an increase in treated effluent flow being added to the West Holland River, Hutchinson Environmental Sciences Limited (HESL) was retained to undertake an assimilation assessment. A copy of the HESL Report "Receiving Water Assimilation Study, June 2011" is included in Appendix G. In order to complete the assimilation assessment, HESL determined that an aquatic baseline review was needed.

The objectives of the West Holland River Aquatic Baseline Review were to:

- Summarize the existing aquatic conditions in the West Holland River to provide baseline conditions that future water quality in the river – potentially affected by the Bradford WPCP - will be compared to; and,
- Discuss the current water quality in the West Holland River as it relates to aquatic habitat, water quality standards and the Lake Simcoe Phosphorus Reduction Strategy.

In addition to the studies summarized in Section 5.2 the following sources were consulted: West Holland River Subwatershed Plan (Lake Simcoe Region Conservation Authority 2010), Estimate of Phosphorus Loadings to Lake Simcoe (The Louis Berger Group 2010) and Environmental Study Report, Bradford WPCP Expansion (Burnside & Associates 2005) as well as data recently collected by the Provincial Water Quality Monitoring Network. This section presents a summary of the detailed baseline review, which is included in the HESL Assimilation Study as Appendix C "Site Visit Technical Memorandum".

8.1.2 Physical Setting

The West Holland River flows northerly and joins with the East Holland River north of Bradford, before discharging into Lake Simcoe at Cooks Bay, further to the north. The West Holland River subwatershed is approximately 350 km^2 in area. Topography in the West Holland River subwatershed is relatively flat, with the West Holland River flowing through low lying and flat polders for approximately 15 km. The BWG-WPCP, discharges through a 650 m long channel into the lower portion of the West Holland River.

The West Holland River subwatershed is largely a low-lying, agricultural watershed, including intensive agriculture conducted in polders (wetlands that were drained and converted to agricultural use). The West Holland River subwatershed also includes appreciable urbanized land areas. Run-off from agricultural land and urban areas, as well as storm sewer discharge from urban areas, carries sediment, nutrients and contaminants into the West Holland River.

Tributaries in the southern and central portions of the subwatershed (i.e., at and downstream of the Bradford WPCP) run through silt and clay glacial till. When eroded during spring runoff or rainfall events, silt and clay easily stay suspended in moving surface water and can travel long distances in the West Holland River. Tributaries, canals and overland flow contribute appreciable eroded agricultural soils to the West Holland River. Most eroded soils have nutrients adsorbed to them (e.g., phosphorus and nitrogen) that contribute to nutrient loading in the West Holland River; agricultural soil is especially nutrient rich due to its organic nature and fertilizer input.

The combination of natural physical settings and land use in the West Holland River watershed has led to degraded water quality and aquatic habitat of the West Holland River, as described in the sections below.

8.1.3 Hydrology

While there is currently no ongoing flow monitoring on the West Holland River, data are available from the Lake Simcoe Region Conservation Authority station at Highway 11 until 1991, as summarized in Burnside and Associates (2005). West Holland River Flow follows patterns typical for south Ontario streams, with maximum flows during spring freshet, minimum flows during summer and low flow during winter. Due to irrigation and drainage requirements of the upstream agricultural operations in the Holland Marsh, however, the flows are heavily modified. Burnside (2005) provided a 7Q20 estimate of 0.15 m^3/s.

8.1.4 Water Quality

Data collected at the Provincial Water Quality Monitoring Network Station ca. 1.3 km upstream of the BWG-WPCP indicate that the West Holland River water quality is degraded. Forty-seven of 49 water samples contained phosphorus concentrations greater than the PWQO of 0.03 mg/L and several metals concentrations (aluminum, cadmium, zinc, iron, cobalt, lead) exceeded PWQOs frequently. Concentrations of nitrogen species were elevated but the samples did not exceed the PWQO of 0.02 mg/L for un-ionized ammonia. Dissolved oxygen concentrations were below the PWQO for cold water biota during the summer months. High turbidity values suggest that many of the metals, as well as phosphorus, are present in particulate form on soil particles from urban and agricultural runoff in the watershed. High turbidity in the river also indicates that there may be appreciable algal productivity in the river in the later summer and early fall.

8.1.5 Aquatic Habitat

Vegetation in some riparian areas of the subwatershed's watercourses has been removed to accommodate development, agricultural and other activities, leaving the watercourse banks vulnerable to erosion once the stabilizing influence of the roots of vegetation is removed. Other habitat stressors identified in the West Holland River watershed are barriers to fish movement, such as dams, culverts and stormwater retention structures, bank hardening and stabilization and invasive species.

Slow flow and enriched nutrient status of the West Holland River produces thick riverbed sediments and a robust community of emergent aquatic plants. On the other hand, turbidity and algal growth in the water column tend to limit light penetration into the water column and the growth of submerged aquatic plants.

Monitoring of fish communities by the LSRCA from 2005 to 2007 showed that warm water species are present in the West Holland River at and downstream of Bradford. Cold water fish species are present in some of the tributaries feeding into the West Holland River at and downstream of Bradford.

Benthic invertebrate communities have been assessed on several occasions in the areas up and downstream of the Bradford WPCP. The results of the studies consistently indicated that there is degraded water quality and habitat in the West Holland River near Bradford, and that there is no significant difference above and below the point of discharge of the effluent.

8.1.6 Summary

Overall, the aquatic habitat and surface water quality of the West Holland River at Bradford and downstream are degraded. The water is nutrient rich, turbid, oxygen poor in summer and regularly exceeds PWQOs for several metals. This is the result of naturally nutrient-rich soils in the area and highly modified watershed, river channel and hydrology from urban development and agricultural operations. There are emergent aquatic vegetation communities as well as warm- and coldwater fish communities, but the benthic invertebrate communities consistently indicate degraded habitat quality up- and downstream of the WPCP. Therefore, the West Holland River generally does not have a large assimilative capacity.

8.2 Proposed Effluent Criteria

Proposed effluent criteria have been determined based on the current C. of A. and on the TP limits established by the PRS. Furthermore, the effect of plant effluent on the West Holland River receiving waters after expansion was investigated by conservative mixing modelling and using the proposed effluent compliance criteria. The results of the modelling showed that the Bradford WPCP discharge after expansion to 23.3 ML/d would meet all MOE requirements for a mixing zone in the West Holland River. The WPCP effluent is non-lethal but will continue to produce a small volume mixing zone in the West Holland River in which un-ionized ammonia concentrations exceed the PWQO. In terms of Total Phosphorus concentrations, it will have a diluting effect on the nutrient-rich West Holland River. The details of the assimilation assessment are outlined in the HESL Report (Appendix G).

The proposed effluent criteria for a plant expansion to 23.3 MLD are shown in Table 8-1 below.

Table 8-1 Effluent Criteria for 23.3 MLD Plant Expansion

Parameter	Objective Limit	Compliance Limit
Total Phosphorus (TP) mass loading	680kg/year	698kg/year
Total Phosphorus (TP)	0.08mg/L	0.082mg/L
CBOD5	5mg/L	10mg/L
Total Suspended Solids (TSS)	5mg/L	10mg/L
Total Ammonia Nitrogen	0.6 (April 1 to Oct 31) 2.0 (Nov 1 to Mar 31)	0.8 mg/L (Apr 1 to Oct 31) 2.5 mg/L (Nov 1 to Mar 31)
E. coli	50 organisms per 100 millilitres	100 organisms per 100 millilitres
PH	Maintain between 6.0 and 9.5 inclusive at all times	Maintain between 6.0 and 9.5 inclusive at all times

8.3 Regulatory Context: Effluent Toxicity and Mixing Zones

A common concern for WWTP discharges to surface water is potential for effluent toxicity from the un-ionized fraction of ammonia (NH_3). This un-ionized fraction of ammonia increases with temperature and pH of the water and can have negative effects on aquatic life, such as fish and invertebrates. For the purpose of regulating surface water quality, chronic (long-term) effects and acute (immediate) effects are distinguished.

The Ontario Ministry of the Environment (MOE) requires that all effluent discharging to surface waters be non-acutely lethal at the end of the pipe. This generally requires an effluent concentration of 0.2 mg/L or less of un-ionized ammonia (NH_3), as a conservative estimate of the lethal threshold[2]. The proposed total ammonia compliance limits for the BWG WPCP effluent in summer (0.8 mg/L) and winter (2.5 mg/L) meet the requirement of non-lethality (Table 8.1, and Table 8.2)) at the "end-of-pipe". This is true if pH and temperature of the effluent or the river itself are used for calculating the proportion of un-ionized ammonia. In reality, the pH and temperature will lie in between effluent and river levels at the point of initial mixing; and accordingly, the un-ionized ammonia values will lie in between the river and effluent values as indicated in Table 8.2.

Table 8.2. Un-ionized Ammonia Concentrations in BWG WPCP Effluent Compared to Provincial Requirements. .

Season	Total Ammonia Compliance Limit	Effluent/ River pH (75th percentile)	Effluent/River Temperature (75th percentile)	Un-ionized Ammonia in Effluent/River	Meets lethal threshold (0.2 mg/L)?	Meets PWQO (0.02 mg/L)?
Summer (Apr-Oct)	0.8 mg/L	7.6 / 8	21.4°C / 21.2°C	0.014 mg/L / 0.03 mg/L	Yes / Yes	Yes / No
Winter (Nov-Mar)	2.5 mg/L	7.6 / 7.9	16.2°C / 6.4°C	0.03 mg/L / 0.03 mg/L	Yes / Yes	No / No

Beyond the requirement for non-lethal effluent, the MOE manages surface water quality through the Ontario Provincial Water Quality Objectives (PWQO, MOE 1994). These are a set of narrative and numeric criteria which the MOE use to ensure that surface waters are of a quality suitable for aquatic life and recreation. Waters which are below the PWQO are considered safe for the long-term survival of the most sensitive life stage of the most sensitive aquatic species expected in Ontario waters. The PWQO for un-ionized ammonia is 0.02 mg/L. In winter, the PWQO is exceeded at the end of pipe under both effluent and river conditions (Table 8.2). Under the high-pH and high temperature conditions often encountered in summer in West Holland River, the PWQO of 0.02 mg/L will be exceeded where the Bradford WPCP effluent meets the river. High river temperatures and higher river pH will drive the un-ionized proportion of ammonia over the PWQO despite the dilution effect at the point of initial mixing.

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[2] *The MOE does not provide formal documented guidance on what levels of un-ionized ammonia are considered acutely toxic. We therefore consulted EPA (2009) which recommends 5 mg/L ammonia nitrogen as a criterion for acute toxicity at pH 8 and 25°C or, that the average not exceed 4.5 mg/L over any 4 day period. Total ammonia concentrations of 5 and 4.5 mg/L correspond to un-ionized concentrations of 0.27 and 0.24 mg/L respectively at pH 8 and 25°C. USEPA. 2009. DRAFT 2009 UPDATE AQUATIC LIFE AMBIENT WATER QUALITY CRITERIA FOR AMMONIA – FRESHWATER EPA 822-D-09-001. December 2009.*
Environment Canada (2009) provide a median LC50 of 0.481 mg/L unionized ammonia (NH_3) for rainbow trout and 1.16 mg/L for the most sensitive daphnid species tested. An effluent concentration of 0.2 mg/L or less would therefore assure no acute toxicity to test organisms. Environment Canada/Health Canada (2001) Canadian Environmental Protection Act. Ammonia in the Aquatic Environment – Priority Substances List Assessment Report. February 2001. TD195.A44P74 2000

Although the PWQO represents a desirable water quality standard, the MOE also recognize the concept of mixing zones for assimilation of waste water discharges. A mixing zone is "an area of water contiguous to a point source … where the water quality does not comply with one or more of the Provincial Water Quality Objectives" (MOE 1994).The mixing zone recognizes that the cost of treating all effluent streams to PWQO level may not be feasible and that residual waste may be diluted and assimilated in the aquatic environment with no adverse effect. Mixing zones are allowed, however, subject to several conditions:

- Mixing zones are not an allowable substitute for reasonable or practical effluent treatment. For the BWG WPCP this requirement will be met through the use of technology that permits treatment to high quality effluent.
- Water quality must not be acutely lethal at any point in a mixing zone. This is assured by the proposed effluent that meets the lethal threshold of 0.2 mg/L for un-ionized ammonia prior to discharge.
- Mixing zones should be as small as possible. This condition is met at the BWG WPCP through a highly treated effluent and relatively quick dilution at the outlet as shown by the modeling exercise below.
- The mixing zone must not form a barrier to the passage of aquatic life. In practice, this means that it should not permanently occupy the entire width or depth of the receiving water. This condition is met for the BWG WPCP, as shown by the modeling below.
- The mixing zone should not prevent any beneficial uses of the water. In practice this is generally interpreted as a requirement that the mixing zone not interact with a swimming area. There is no swimming area close to the outfall.

8.4 Dispersion Analysis

Existing information on the West Holland River near Bradford was summarized and the dispersion of effluent from the upgraded plant in the West Holland River was modeled. In this section, the approach and results of the hydrodynamic modelling of the effluent plume behaviour are summarized and implications for West Holland River water quality within the current regulatory context are discussed. A thorough background review on the West Holland River including flow characteristics, water and habitat quality and aquatic biota as well as the detailed methodology and results of effluent mixing modeling are provided in the HESL Report (Appendix G).

The main objective of the modelling exercise was to estimate the size and location of the effluent plume where the PWQO for un-ionized ammonia (NH3) will be exceeded and thus assess if the above listed requirements for mixing zones will be met by the effluent of the proposed expanded WPCP. Total phosphorus (TP) was also modelled in order to display by how much West Holland River will be diluted for this parameter. The modelled effluent quality corresponds to the proposed compliance limits, e.g., 0.8 mg/L total ammonia for summer, 2.5 mg/L total ammonia for winter and 0.082 mg/L total phosphorus.

Three scenarios were developed that represent a range of seasonal conditions. The worst-case scenario for an ammonia-enriched effluent is represented by warm summer conditions (75th percentile temperature) and low flow (September 7Q20; 0.15 m^3/s) in the West Holland River. High temperatures promote a high ratio of un-ionized ammonia and low flow limits the amount of water available for effluent dilution. Winter low flow conditions (January 7Q20; 0.52 m^3/s) were modeled because during winter, biological assimilation of ammonia is inhibited by low temperature and low flow limits mixing. An average summer scenario was constructed in order to describe the mixing zone under average summer flows (summer average flow; 0.91 m^3/s).

Dispersion modeling was based on available water quality and quantity information as summarized in the baseline review and channel morphometry data collected during a field visit. A conservative approach was taken to modeling, e.g., input parameters for the model were chosen to represent conditions favouring the occurrence of un-ionized ammonia. Modeling was carried out using a standard professional near-field mixing modeling tool (CORMIX(R)).

For both summer flow scenarios, the discharge is described as a shoreline-attached jet and plume that are strongly deflected by the river flow and attached to the bottom due to shallow discharge depth. The plume remains attached to the shore and flows parallel to the main flow, while spreading laterally. The PWQO for unionized ammonia is met at ca. 110 m downstream from the outlet for the summer average flow and at ca 80 m distance from the outlet for the summer low flow scenario. These points are shown as dotted yellow lines on the figures. The plume exceeding PWQO is larger for the average scenario, because higher river velocities carry the plume faster downstream than under the low flow scenario.

The winter scenario resulted in the same flow classification as the summer scenarios: a shoreline-attached deflected plume. The winter plume, however, spreads laterally much more quickly and reaches the right bank ca. 20 m downstream of the outlet (Figure 7.2). This is caused by a much larger temperature difference between effluent and river water in winter as opposed to similar temperatures in summer. In winter, the warm effluent floats on top of the cold river water and spreads laterally until it reaches the other bank. Ammonia PWQO is met ca. 8 m downstream of the discharge location under the winter low flow scenario.

Total phosphorus concentrations in the effluent after the expansion will be lower than the West Holland River most of the time. The effluent will therefore have a diluting effect on West Holland River. The total phosphorus concentrations will be diluted by ca. 30 % under the summer low flow scenario, by ca. 20 % under the summer average flow scenario (Figure 7.1) and by ca. 25% under the winter scenario.

The major conclusions of the dispersion analysis are as follows:

1. For all scenarios, the extent of the mixing zone that exceeds the PWQO of un-ionized ammonia is limited to one side of the river and does not exceed a length of 110 m. Therefore the effluent plume does not represent a barrier to movement of aquatic life. In the winter scenario, although the plume extends across the width of the river, it only occupies the upper 0.5 m of the water column and so does not represent a barrier to the movement of aquatic life.
2. Total phosphorus concentrations in the river are being diluted by the effluent.

These results demonstrate that the effluent of the expanded Bradford West Gwillimbury WPCP will meet the requirements for a mixing zone. The assimilative capacity of the West Holland River, however, is limited due to impaired water quality, low flow velocities and relatively small flow compared to effluent flow. This means that the West Holland River may not have the capacity to assimilate increased effluent volumes of the same quality from any future expansions beyond the currently proposed one, in particular in terms of ammonia. Any future expansion would require explicit modelling of the proposed flows and effluent qualities.

9.0 Summary of Design Basis for Capacity Increase

9.1 General

The influent wastewater characteristics were reviewed in detail and, in combination with the flow projections developed in Section 5.9, this information was used to develop loading projections. These influent characteristics, flow and loading projections were used to assess the feasibility and extent of optimization of the existing plant and to consider other methods of providing additional treatment capacity.

9.2 Wastewater Treatment Plant Loading Rates

The primary constituents of concern for the BWPCP are: BOD5, TSS, TP and total Kjeldahl nitrogen (TKN). Table 9-1 lists the influent concentrations and loadings of these parameters at the BWPCP, averaged over the years 2007-2010.

Table 9-1 Influent Characteristics (2007-2010 Average)

Constituent	Concentration (mg/L)	Flow (m^3/d)		Average Loading (kg/d)
		Average	Peak Daily	
CBOD5	170.5	6,733*	17,185 (recorded in 2009)	1148
TSS	166.5			1121
TP	4.0			26.9
TKN	31.3			210

* Average effluent flow rate.

Projected loading rates were developed for the proposed expansion to 23.3 MLD average daily flow. The influent criteria for this future expansion are summarized in Table 9-2. It is noted that the plant designs for secondary treatment are based on maximum month loading conditions. Other processes in the plant are generally sized based on peak hydraulic conditions.

It is recognized that at the present time, the serviced area of the Town is mixed residential with some light commercial and industry. Depending on future industrial growth, the historical raw wastewater concentrations for both TKN and TP may change. It is proposed, therefore, to increase the concentrations slightly for preliminary design purposes to allow for some future flexibility with respect to industrial and commercial wastewater servicing. It is proposed to use slightly higher concentrations for design purposes as follows:

Table 9-2 Influent Flow and Loading Criteria for Expansion to 23.3 MLD

Parameter	Peaking Factor	MLD	mg/L	Kg/day
Annual Average				
Flow	----	23.3	----	----
BOD_5	----	----	200	4,660
TSS (raw)	----	----	180	4,194
TSS with Chem. Sludge	----	----	218	5,079
TKN	----	----	32.0	746
TP	----	----	4.2	98
Maximum Month(1)				
Flow	1.2	28.0	----	----
BOD_5	1.33	----	212	5,928
TSS (raw)	1.38	----	207	5,788
TSS with Chem. Sludge			250	6,990
TKN	1.23	----	34.7	970
TP	1.23	----	4.9	137

Notes:

1. Evaluation of historical data shows that the maximum month load and flow could occur simultaneously.
2. Peak day flow factor represents PD/AA. Peak day load factor represents PD/MM and applies to the full max month load used under winter design conditions.

10.0 Wastewater Secondary Treatment Alternatives

10.1 General

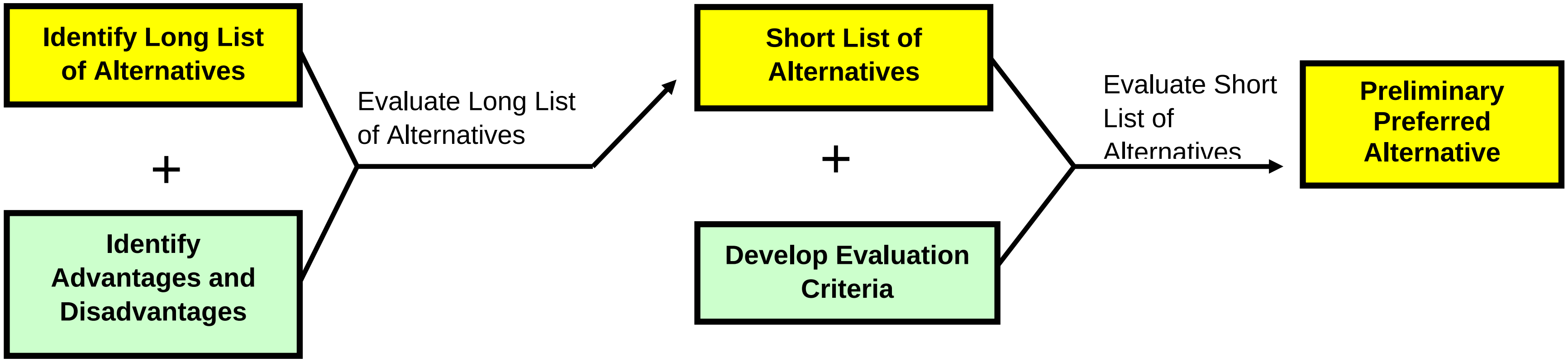
This section includes a description and evaluation of the wastewater secondary treatment alternatives.

10.2 Evaluation Approach for Wastewater Treatment Processes

A wide range of wastewater treatment processes was considered for expanding the BWG WPCP. These alternatives are differentiated in terms of the predominant treatment characteristics. The process undertaken to select the preferred wastewater treatment alternatives was based on the following approach as outlined in Figure 10-1:

- Identify feasible treatment alternatives (long list) that could possibly be constructed at the existing site
- Summarize the advantages and disadvantages of each alternative
- Develop a short list of alternatives based on analysis of the long list
- Develop evaluation criteria to evaluate the short list of alternatives
- Apply the evaluation criteria to each short-listed alternative
- Select the preferred alternative.

Figure 10-1 Planning Process to Select Preferred Biological Treatment Alternative



10.3 Long List Evaluation

10.3.1 General

The current BWG WPCP capacity includes three treatment trains (Plants B, C, and D) with different capacities and capabilities. Some possible alternatives for the incremental expansion and upgrade of the treatment facilities include:

1. Re-rating of the Existing Extended Aeration Process with upgrades to plant B
2. Expand Plant D and retain Plants B and C to provide additional volume and capacity;
3. Expand the Existing Extended Aeration Process (Plant D)
4. Enhance the existing capacity by converting Plant D to Integrated Fixed-film Activated Sludge (IFAS) Process
5. Enhance the existing capacity by converting either Plant D or C to Membrane Bioreactor
6. Improve water conservation, reuse in accordance with the MOE's Water Conservation and Efficiency Strategy.

10.3.2 Alternative 1 - Re-rating of the Existing Extended Aeration Process

The capacities listed in the Certificate of Approval for Plants B, C and D are 3,075 m^3/d, 4,325 m3/d and 10,000 m^3/d, respectively. Several studies have been conducted to assess optimization of the WPCP. As discussed in Section 5.14, it was found that by base loading Plant B to 3,075 m3/day, a re-rated capacity for Plant C and D of 6,333 and 14,437 m^3/d, respectively can be achieved. This results in a total optimized plant capacity of 23,845 m^3/d.

This alternative would allow for the best use of infrastructure and is the most cost effective alternative having a minimal capital cost. It is consistent with current operating practices and would have the least environmental impact and the shortest schedule due to the minimal construction required. In addition, this alternative will allow for immediate additional capacity for allocation.

10.3.3 Alternative 2 - Add Primary Clarifiers to Plant D

It would be possible to significantly increase the capacity of the existing treatment trains by adding primary clarifiers upstream of the aeration basins. The primary clarifiers would remove approximately 60% of the influent total suspended solids and about 30% of the BOD, which would reduce the load to the aeration basins and allow more flow to be treated in the existing volume. If primary clarifiers are added, the 23,300 m^3/d capacity could easily be met, although it will be necessary to assess the capability of the existing aeration blowers for meeting the overall oxygen demand for the additional flow. Future expansions beyond 23,300 m^3/d may require additional secondary clarifiers to be constructed.

In addition to lower aeration basin loadings and a corresponding reduction in aeration energy requirements, incorporating primary clarifiers also provides an opportunity for significant reduction in total chemical usage for phosphorus removal through two mechanisms. First, adding chemicals to multiple locations through the process has been shown to result in significant reductions in overall chemical consumption. Second, a portion of the spent chemicals from a new tertiary chemical phosphorus removal process can be returned to the primary clarifiers via the backwash water, and has been shown at some facilities to improve solids removal and phosphorus removal in the primary clarifiers, even without direct addition of chemicals at the clarifiers themselves.

A disadvantage of adding primary clarifiers at this time is that some changes to the solids handling system may be needed to accommodate primary sludge. It also would be necessary to cover and provide odour control for the primary clarifiers.

The existing aerobic digesters were designed to facilitate future conversion to anaerobic digestion. Although it is possible to operate aerobic digesters with a combination of primary sludge and waste activated sludge, the plant would be expending considerable aeration energy to stabilize the raw primary sludge. Conversion to anaerobic digestion would eliminate the need for this air and would allow the plant to generate biogas, which could be used as fuel for heating and other uses around the plant. This, however, would result in a significant change to the existing operation, and the 23,300 m^3/d capacity is not out of range for cost-effective operation of an extended aeration process with aerobic digestion. Therefore, maintaining the existing extended aeration system and aerobic digestion process until the next expansion beyond 23,300 m^3/d may be more attractive to the Town.

10.3.4 Alternative 3 - Expansion of Existing Extended Aeration Process (Plant D)

A further alternative is to provide additional aeration basin volume to achieve the proposed 23,300 m^3/d capacity. This could add an additional treatment train to Plant D, similar in size to the existing Plant D basins. Considering the relatively small overall increase in total capacity, adding some additional volume is likely the simplest approach if the full 23,300 m^3/d capacity is not able to be achieved through re-rating alone because it would be consistent with the current operation. This alternative would have a significant capital cost and would have more environmental impact due to the additional construction required.

10.3.5 Alternative 4 - Enhancement of Existing Capacity by Converting to an IFAS Process

An additional alternative for achieving the capacity increase without adding more basin volume would be to convert the existing activated sludge process to operation as an integrated fixed-film activated sludge process (IFAS). Free-floating plastic media would be added to the aeration basins to provide area for bacteria to grow, thus increasing the effective solids inventory in the basins but without increasing the overall mixed liquor suspending solids (MLSS) concentrations. The media are retained in the aeration basins by media retention sieves. By avoiding an increase in MLSS, the capacity of the secondary clarifiers is enhanced. By converting Plant D for operation as an IFAS process, it was determined that there should provide enough capacity should be provided to meet the total requirement without modifying Plants B and C.

This alternative would be the best use of existing infrastructure and would save space by not requiring additional construction. This is also a resilient and reliable process. The disadvantages include the use of smaller screens and a significant change in process, which would require significant operator training.

10.3.6 Alternative 5 - Enhancement of Existing Capacity by Converting to a Membrane Bioreactor (MBR) Process

An MBR process could be implemented with or without primary clarifiers. Instead of using secondary clarifiers and filters, the membranes would provide solids separation. Fine screens would be incorporated downstream from the existing headworks to keep debris from accumulating in the MBR process. MBRs are commonly designed at an MLSS concentration of 8,000 to 10,000 mg/L, which allows for smaller aeration basins or re-rating of existing basins. Apart from the use of membranes for solids separation, the MBR would function the same way as an activated sludge system. Very good phosphorus removal to very low concentrations is possible by simply adding chemicals to the MLSS just before the membranes, and experience thus far shows that effluent TP concentrations of less than 0.05 mg/L can be achieved. If the Town were to pursue an MBR method of treatment, the most cost-effective option is likely to upgrade either Plant B or C to an MBR, thus effectively doubling its capacity. The MBR effluent flow could bypass the filters and go straight to disinfection, eliminating the potential need to expand the filters at this time. By operating the remaining treatment trains as extended aeration activated sludge basins with secondary clarifiers, the total cost of membranes and total energy costs for the plant operation would be minimized.

Although MBRs produce a high quality effluent in a reduced aeration basin volume, one disadvantage is that they consume more energy than traditional activated sludge processes because of the need for scour air to keep the membranes clean. The MBR manufacturers have been working to optimize air scour requirements and methodologies, and the energy requirement is being improved. Another disadvantage would be the use of a completely new process which would require significant operator training.

In addition to increasing the capacity rating of the activated sludge process, some improvements are needed to the headworks and disinfection facilities as well as tertiary phosphorus removal.

10.3.7 Alternative 6 – Improve Water Conservation and Reuse

The requirements of the Provincial Water Conservation and Efficiency Strategy (WCES) are described in Section 6.0. The Town is required to meet the Province’s requirements by June 2014. On its own, this Alternative will not provide the capacity increase that the Town is looking for. However, it must be considered as a complimentary solution to the selected treatment process Alternative.

10.4 Screening of Alternatives

Table 10-1 provides a summary of the advantages and disadvantages of the secondary wastewater treatment alternatives.

Table 10-1: Advantages and Disadvantages of Wastewater Treatment Processes

Alternatives	Advantages	Disadvantage
Alternative 1 - Rerate Plants B, C and D with modification to B.	• Best use of the existing infrastructure • Consistence with current operation • The most cost effective alternative • Minimum environmental impact due to minimized construction • Minimal capital cost • Reduced schedule	• Need additional basin volume for next expansion
Alternative 2 - New Primaries to D	• Increase the capacity of the existing basins • Reduction in aeration energy requirements significant reduction in total chemical usage for phosphorous removal • Conversion of aerobic digestion to anaerobic digestion which would save energy and produce biogas	• Significant change to solids handling system • Require covers for primary clarifiers for odor control
Alternative 3 - New Aeration to D	• Simple approach, constant with current operation • Ease of next plat's expansion	• Significant capital cost • More environmental impact
Alternative 4 - Convert Plant D to IFAS	• Saves space • Best use of existing infrastructure • Resilient process	• Requires smaller screens • New process • Requires operator training
Alternative 5 - Convert either Plant B or C to MBR	• Best use of existing infrastructure • Similar to activated sludge process except for the solids separation • No need for tertiary filter with membranes	• High energy consumption • Requires installation of fine screens • New process • Requires operator training
Alternative 6 – Improve Water Conservation and Reuse	• Meets Provincial requirements of WCES • May reduce water demand and raw wastewater flow	• Not a complete solution to provide required capacity increase

10.5 Short List Evaluation

10.5.1 Description

Based on an evaluation of the advantages and disadvantages of each secondary treatment alternative the following alternatives were short-listed for more in depth evaluation:

- **Alternative 1** – Optimize Plants C and D and upgrade Plant B to obtain a total rated capacity of 23,300 m^3/d
- **Alternative 2** – Expand Plant D and retain Plants B and C to obtain a total capacity of 23,300 m^3/d
- **Alternative 6** – Improve water conservation, reuse in accordance with the MOE's "Water Conservation and Efficiency Strategy"

10.5.2 Evaluation Criteria

The evaluation used is not based on a numerical ranking system. To ensure statistical validity, such an approach would have to strictly adhere to statistical methods that are often difficult to apply in a multi-faceted issue such as a Municipal Class EA. Instead, a descriptive or qualitative evaluation is used to consider the suitability of alternative solutions and design concepts. In this respect, the trade-offs that have been made between alternatives are described in the text of the report and these trade-offs form the rationale for:

1. the identification of the preferred alternative,
2. an advantage or
3. accepting a disadvantage to address a higher priority consideration.

Evaluation criteria were developed to evaluate the short listed alternatives. The purpose of the evaluation was to select the alternative that offers the greatest potential to solve the identified wastewater servicing problem.

The evaluation criteria address a wide range of technical, environmental, social, and financial concerns. An increasing level of detail was used to evaluate the short listed alternatives, and a qualitative rating scale was established for each criterion (i.e., high, medium and low). A "High" rating is most preferred and a "Low" rating is the least preferred as shown in Table 10-2. Table 10-3 lists the evaluation criteria used in the Short List Evaluation and the descriptions along with the definition for each rating.

Table 10-2 Criterion Table

○	Minimal impact
⭘	Moderate impact
●	High impact

Table 10-3 Evaluation Criteria for Short List of Alternatives

Criterion	Criterion Description	Criterion Measure Guidelines	
Natural Environment			
Water Quality	Potential to impact the receiving water quality	○ ⭘ ●	Minimal impact Moderate impact High impact
Aquatic Systems	Potential to impact aquatic systems	○ ⭘ ●	Minimal impact Moderate impact High impact
Land Requirement	Land area requirement for biological process	○ ⭘ ●	Minimal land required Moderate land required Large land required
Groundwater Resources	Potential to impact groundwater resources	○ ⭘ ●	Minimal or no impact Moderate impact High impact
Floodplain	Potential to impact floodplains	○ ⭘ ●	Minimal or no impact High impact Minimal or no impact
Technical			
Reliability	Reliable operation with minimal maintenance requirements and ability to meet effluent quality objectives	○ ⭘ ●	Very reliable Moderately reliable Not reliable
Ease of Implementation/Integration	Can be easily implemented on a technical, regulatory and practical basis	○ ⭘ ●	Very easy Moderately easy Not easy
Ease of Operation	Process is easily operated	○ ⭘	Very easy Moderately easy

Criterion	Criterion Description	Criterion Measure Guidelines	
		●	Not easy
Ease of Expansion	Process is easily expanded	○	Very easy
		⭘	Moderately easy
		●	Not easy
Future TP Limit	Ability to meet current and future MOE requirements	○	High
		⭘	Moderate
		●	Low
Social Environment			
Noise	Potential to produce noise during construction and/or operation	○	Minimal potential
		⭘	Moderate potential
		●	High potential
Air Quality	Potential to produce air quality impacts during construction and/or operation	○	Minimal potential
		⭘	Moderate potential
		●	High potential
Immediate Benefit	Potential for increasing allocated capacity	○	Minimal or no impact
		⭘	Moderate impact
		●	High impact
Visual/Aesthetic	Potential for visual impact to the area	○	Minimal or no impact
		⭘	Moderate impact
		●	High impact
Community Health and Safety	Potential impacts to community health and safety	○	Little or no risk
		⭘	Moderate risk
		●	High risk
Economic			
Capital Cost	Opinion of probable capital cost	○	Low cost
		⭘	Moderate cost

Criterion	Criterion Description	Criterion Measure Guidelines	
		●	High cost
Operating/ Maintenance Cost	Opinion of probable operating and maintenance cost	○ ◉ ●	Low cost Moderate cost High cost

10.5.3 Short List Evaluation

The short-listed secondary treatment Alternatives 1 and 2 were evaluated based on the criteria in Table 10-3. Summaries of the evaluations are provided in Table 10-4. Alternative 6 was not evaluated as a stand alone solution. Alternative 6 will be complimentary to the selected solution.

Table 10-4 Evaluation of Short List of Biological Process Alternatives

Criterion	Optimization	Expand Plant D
Natural Environment		
Water Quality	○	○
Aquatic Systems	○	○
Land Requirement	○	◉
Groundwater Resources	○	○
Floodplain	○	◉
Technical		
Reliability	○	○
Ease of Implementation	○	◉
Ease of Expansion	○	◉
Ease of operation	○	○
Future TP Limit	○	○
Social and Environmental Impacts		
Noise	○	○
Air Quality	○	○
Visual/Aesthetic	○	◉
Community Health and Safety	○	○
Immediate Benefit	○	●
Economic		
Capital Cost	○	●
Operating/Maintenance Cost	○	○

10.6 Selection of the Recommended Alternative

Based on the evaluation, Alternative 1 was selected as the Recommended Alternative for expansion of the secondary treatment process. Alternative 6 will also be included in the overall solution. The primary factors for the selection of Alternative 1 are:

- Less land required
- Provides immediate benefit
- Less capital cost.

10.7 Selection of the Preferred Alternative

Based on the fact that no major public or review agency comments were received as a result of the June 22, 2011 PIC, the Steering Committee selected the Preferred Alternative (Combination of Alternative 1 and 6) in accordance with the Recommended Solution as outlined in Section 10.6.

11.0 Biosolids Treatment Alternatives

11.1 General

Currently biosolids treatment process for all three plants is provided by aerobic digestion for stabilization and destruction of VSS. Plants B, C and D stabilize WAS in new aerobic digester tanks that were constructed with the recent expansion. Pre-thickening of WAS is not performed, WAS is fed to the digesters at relatively dilute concentration (less than 1% total solids). During digestion, biosolids are thickened decanting a supernatant or clarified liquor to the head of the plant and the digested sludge is then stored during the winter months in new biosolids storage tanks that were also constructed with the last plant expansion. Final disposal of stabilized biosolids is through agricultural land application.

MOE guidelines recommend 45 days of sludge retention time (SRT) including both the digester process and the SRT of the activated sludge process. Plant B digester tankage is presently not used. However if re-instated the total digester volume for Plant B is 1,549 m^3, which, on an annual average basis would provide 31 days of sludge retention time for WAS produced at 3,075 m^3/d based loaded capacity. The available 6,500 m^3 total digester volume for plant C and D will only provide 23-24 days retention time for WAS produced. Therefore, digester capacity is limited at 23,300 m^3/d future design flow.

This section includes a description and evaluation of the treatment alternatives of WAS to produce biosolids.

11.2 Identification and Evaluation of Alternatives

11.2.1 Identification of Alternatives

Two possible alternatives for the treatment of WAS for the expansion of the biosolids treatment processes are available to produce biosolids for land application. They are:

1. Construct a new Thicken Waste Activated Sludge (TWAS) Facility and thicken WAS to approximately 3% thus increasing existing aerobic digester capacity and biosolids storage
2. Convert to anaerobic digestion process

11.2.2 Alternative 1 – Thicken Waste Activated Sludge

This alternative will see the decommissioning of Plant B's aerobic digester and with the demolishing of Plant A, will eliminate biosolids storage for Plant B. Construction of a new TWAS facility near the existing aerobic digester for Plant C and D will increase the WAS concentration to 3% providing the minimum number of days of SRT and adequate biosolids storage capacity to achieve a minimum 240 days of winter storage. This facility will include two rotating drum filters (duty and standby), utilization of an obsolete EQ tank for pre-thickening storage, polymer dosing system, and new building. All WAS from plant B, C, and D will be diverted to this new unit process.

Advantages:

- Consistent with the current biosolids treatment process of aerobic digestion
- Utilizes existing infrastructure minimize capital cost thus the most economical process from a capital investment perspective given the size of the wastewater treatment plant
- Least amount of constructability issues or complexity as the facility can be constructed while minimizing the impact to existing operations
- Lowest operating and maintenance cost compared to anaerobic digestion at this size of a wastewater treatment plant.

Disadvantages:

- Does not provide for future sustainable energy recovery of biogases
- Does not provide for the recovery of TP

11.2.3 Alternative 2 – Convert to Anaerobic Digestion

Anaerobic mesophilic (35ºC temperature) digestion is a very common process for digesting primary sludge and a mixture of primary and secondary sludge, but is not as common for digestion of waste activated sludge only. Anaerobic digestion is more common in larger wastewater treatment plants and active digestion results in volatile solids reduction and gas production. Conversion of the existing aerobic digestion process would require decommissioning of Plant B's aerobic digester and with the demolishing of Plant A, will eliminate biosolids storage for Plant B. Major retrofits to the primary and secondary digesters are required and major supporting infrastructure would also need to be constructed for gas collection/storage, energy recovery, etc. In addition, a WAS thickening facility is also required in order to ensure that the MOE guidelines of 15 days of nominal hydraulic retention time (HRT) is achieved in the primary digesters.

Advantages:

- Eliminates the need for aeration blowers compared with aerobic digestion.
- Provides for a sustainable energy resource while saving money by allowing gas generated to be an energy source (e.g. heating, power production, supplemental gas for dryer systems)
- Substantial savings on energy costs and lower costs for large wastewater treatment plants
- Greater VSS destruction (although not substantially greater for WAS digestion)
- Potential for phosphorus recovery from centrate (as an add-on technology)

Disadvantages:

- Initial capital cost are very high in comparison
- Sensitive to adverse effects from lower temperatures in winter (heating is required)
- Increased potential for odours and corrosive gases
- New process that will require additional training for operations and maintenance staff
- Higher potential for foaming issues
- Potential for struvite formation
- Still requires prethickening of sludge.

11.3 Recommendation of Alternative

Based on a comparative evaluation of the advantages and disadvantages of the two alternatives the recommended alternative is to thicken the waste activated sludge in order to make use of the existing digester capacity and biosolids storage volume. This selection was made for following reasons:

- Lowest capital cost
- Best use of existing infrastructure
- Least impact to existing plant operation
- Least complexity of operation
- Lowest construction complexity and installation.

11.4 Selection of Recommended Alternative

Based on the evaluation of the advantages and disadvantages of the two alternatives the Recommended Alternative is to thicken the waste activated sludge in order to make use of the existing digester capacity. This selection was made for the following reasons:

- Lowest capital cost
- Least impact to existing plant operation
- Least complexity of operation.

11.5 Selection of the Preferred Alternative

Based on the fact that no major public or review agency comments were received as a result if the June 22, 2011 PIC, the Steering Committee selected Alternative 1 as the Preferred Solution in accordance with the Recommended Solution as outlined in Section 11.4.

12.0 Wastewater Tertiary Treatment Alternatives

12.1 General

This section includes a description and evaluation of the tertiary treatment alternatives.

12.2 Long List Evaluation

12.2.1 General

Possible alternatives for the tertiary treatment options include:

1. Ballasted Flocculation using Actiflo or Densadeg ahead of existing sand filters
2. Adsorption using CoMag or BluePRO in series with ferric chloride
3. Enhanced Filtration using membranes
4. Enhanced Pre-filtration using Flocculation and DAF or Flocculation and Lamella Clarifiers

12.2.2 Ballasted Flocculation using Actiflo or Densadeg Ahead of Existing Sand Filters

Chemical Flocculation and clarification, such as Actiflo® or DensaDeg® followed by sand filtration has been used to meet low phosphorus limits and has been successfully implemented at a number of plants across the US and Canada. Polishing with filters would be needed to ensure that low phosphorus limits are met.

The Actiflo® process is comprised of coagulation, sand and polymer injection, floc maturation, lamella clarification and sand recovery. The microsand acts as a seed for floc formation. The microsand ballasted flocs display unique settling characteristics, which allow clarifier designs with very high overflow rates and short retention times.

The DensaDeg® Process is similar to Actiflo in many ways but relies on the use of recycled, previously settled sludge to assist with floc formation and to increase the mass of the settling flocs.

Both processes were successfully pilot tested in 2000 at the Regional plant in New Tecumseth with the goal of achieving a total phosphorus limit (design objective) of 0.07 mg/L.

Both these technologies have small footprints, are reliable options and are easy to operate. They also both allow for rapid response to chemical changes. The disadvantages of this option include the clogging of the effluent filters due to the binding of the sand from polymer overuse, the additional preventative maintenance required to the pumps and the need to monitor sand levels closely. This option will also produce dilute sludge and will require screening of secondary effluent.

12.2.3 Adsoption using CoMag or BluePRO in series with ferric chloride

The Blue Water TechnologiesBluePro® process consists of treating secondary effluent in a reactor where FeCl3 is added before the liquid is passed to a continuously backwashing filter similar. The FeCl3 coats the media granules and a precipitation/adsorption process removes the phosphorus from the liquid to very low levels. During on-going filter backwash the iron phosphate coating is partially removed and recycled back to the activated sludge plant where a considerable reduction in phosphorus takes place.

The CoMagTM process is a "magneto-chemical" process that incorporates the use of finely divided magnetic ballast to bind the precipitated phosphorus and other fine particles. Magnetite provided a magnetic ballast seed that when mixed with alum and polymer increases both flocculation and settling rates which reduce the tanks sizes significantly. The floc particles are attracted to a magnet and magnetic separation is used for polishing the effluent rather than sand filtration or membrane systems. The magnetite is separated and recycled. The footprint is smaller than that of filters and phosphorus removal to 0.05 mg/L has been achieved.

12.2.4 Enhanced Filtration using membranes

Tertiary Membranes – Several municipal WWTPs in North America (e.g., Ashland WWTP) have had successful experience using tertiary membranes to achieve very low effluent TP concentrations. The membrane system consists of hollow strands of porous plastic fibres. Clean water is collected inside the hollow fiber. Chemical addition facilities would be provided upstream from the membranes.

Membrane Bioreactors (MBR) – The MBR process uses membranes to provide solids separation. MBRs are commonly designed at an MLSS concentration of 8,000 to 10,000 mg/L, which allows for smaller aeration basins. Apart from the use of membranes for solids separation, the MBR would function the same way as an activated sludge system. Experience this far shows that effluent TP concentrations of less than 0.05 mg/L is possible by simply adding chemicals to the MLSS just before the membranes. It is also possible to operate for biological phosphorus removal with chemical trim.

12.2.5 Enhanced Pre-filtration using Flocculation and DAF or Flocculation and Lamella Clarifiers

The Parkson DynaSand D2 process consists of chemical addition and two continuously backwashing filters in series, similar to the BluePro process. With D2 alternative coagulants can be used and there may or may not be adsorption (in addition to precipitation), depending on the coagulant used. A lamella settler is provided for solids separation from the backwash water.

12.3 Screening of Alternatives

Table 12-1 provides a summary of the advantages and disadvantages of the tertiary treatment alternatives.

Table 12-1 Advantages and Disadvantages of the Tertiary Treatment Alternatives.

Process	Advantages	Disadvantages
Alternative # 1 **Ballasted Flocculation** • Actiflo + Dynasand • Densadeg + Dynasand	• Small foot print • Reliable option • Ease of operation • Rapid response to chemical changes • Proprietary technology • Actiflo was piloted at Innisfil	• Overuse of polymer may bind the sand and clog the effluent filters • Dilute sludge • Sand pumps require preventative maintenance • Sand levels most be monitored • Require screening of secondary effluent
Alternative # 2 **Adsorption** • CoMag + Dynasand • Add coagulant + BluePro	• Blue Pro is a proven technology and was piloted at Innisfil • Relatively smaller footprint than other Alternatives	• Require ferric chloride as coagulant • Comag is a new technology with little experience
Alternative # 3 **Enhanced Filtration** • Double Dynasand • Membrane filtration • Tube settlers + Upflow adsorption clarifier + Downflow dual media filtration	• Proven technologies • Membranes are flexible to flow and loads • Membranes and Dynasand were piloted at Innisfil • Membranes are recognized by MOE as the limit of technology for 0.05 mg/L TP on Lake Simcoe	• Require ferric chloride as coagulant • Expensive option
Alternative # 4 **Enhanced Pre-Filtration** • Flocculation + Dissolved Air Floatation • Flocculation + Tertiary Clarifiers or Lamella Clarifiers	• Popular technology • Flexible to flow and load fluctuation	• Expensive option

12.4 Short List Evaluation

12.4.1 Description

Based on an evaluation of the advantages and disadvantages of each tertiary treatment alternative the following alternative treatment processes were short-listed for more in depth evaluation:

- **Alternative # 1** – Ballasted flocculation using Actiflo ahead of existing sand filters
- **Alternative # 4** – Enhanced filtration using Lamella Clarifiers

12.4.2 Short List Evaluation

The short-listed tertiary treatment alternatives were evaluated based on the criteria in Table 10-3. Summaries of the evaluations are provided in Table 12-2.

Table 12-2 Evaluation of Tertiary Wastewater Treatment Processes Shortlist

Criterion	Ballasted Flocculation	Lamella Clarifiers
Natural Environment		
Water Quality	○	○
Aquatic Systems	○	○
Land Requirement	○	○
Groundwater Resources	○	○
Floodplain	○	○
Technical		
Reliability	○	○
Ease of Implementation	○	⭘
Ease of Expansion	○	⭘
Ease of Operation	⭘	○
Social and Environmental Impacts		
Noise	○	○
Air Quality	○	○
Visual/Aesthetic	○	○
Community Health and Safety	○	○
Economic		
Capital Cost	⭘	⭘
Operating/Maintenance Cost	○	○

12.5 Selection of the Recommended Alternative

Based on the evaluation of the two alternatives, Ballasted Flocculation was selected as the Recommended Alternative. Although it may be slightly more difficult to operate than Enhanced Pre-Filtration, it is easier to integrate into the existing plant and is easier to expand. Ballasted Flocculation is also considered a better choice to meet future, reduced TP limits.

12.6 Selection of the Preferred Alternative

Based on the fact that no major public or review agency comments were received as a result of the June 22, 2011 PIC, the Steering Committee selected the Preferred Alternative in accordance with the Recommended Alternative as outlined in Section 12.5.

13.0 Impact of Recommended Alternative on the Environment and Mitigating Measures

The preferred solution does not significantly impact environmental features within and surrounding the study area. Any potential impact will be identified, addressed, monitored, and mitigated as required.

13.1 Truck Traffic

During construction, vehicular traffic to and from the project area will increase as construction equipment is delivered and removed, and construction materials are delivered. To mitigate these impacts, construction times will be limited in accordance with local by-laws. The need for a traffic impact study will be assessed during final design but it is considered that the long-term impacts will be minimal.

In order to mitigate the impacts to the local community, an established truck route should be selected by the Town.

13.2 Noise, Dust and Mud

Potential sources of noise, dust, and vibration include truck traffic and regular construction activities. These impacts can be mitigated as follows:

- Ensuring all vehicles and construction equipment are equipped with effective muffling devices and are operated in a fashion so as to minimize noise in the project area
- Enforcing the local noise by-law for all construction activities
- Restricting all truck traffic, excavation equipment, and other activity that potentially generates significant noise levels to normal working hours
- Excavated soil and rock material should be used on-site as much as possible in order to minimize truck haulage to off-site disposal areas
- Dust control agent can be applied as necessary.

13.3 Fuel Spills

During the refuelling of construction equipment, spills could occur with the potential of contaminating surface water and groundwater. Mitigation measures include:

- Preparing a contingency plan for cleaning up fuel spills
- Only allowing designated areas that are no closer than 15 m to any watercourse for refuelling construction equipment
- Providing spill containment for on-site storage tanks

13.4 Continuity of Operation

As the continuing operation of the BWPCP is of utmost importance, careful consideration will be given during the design and construction scheduling to avoid impacts on the plant operation. Since there are three separate “trains” it may be possible to work on one plant (B, C or D) while the other two are in operation. The construction of the equalization tank will not be an operational issue but the addition of the ballasted flocculation tertiary treatment units may require some flow diversion.

13.5 Vegetation and Loss of Tree Cover

The construction will encounter some shrubbery, bushes, and trees, which will need to be removed. Protective fencing will be placed around all trees that are designated to remain, in order to clearly define the construction work area.

Vegetated lands disturbed during construction will either be replanted with natural wild grasses and saplings of trees indigenous to the area (save for areas that require clearing for the BWPCP expansion) or trees will be planted in other areas of the site such as along the property boundaries.

13.6 Noise Assessment

It is considered that the proposed new equipment (pumps, blowers, tertiary treatment and sludge thickening) will not add any appreciable noise to the existing environment. However, it is recognized that in order to determine the need for and extent of any mitigation measures, a noise assessment may be required as part of final design. At that time, a more detailed knowledge of equipment requirements will be available, which will result in a more reliable and useful noise assessment. At this time (Class EA stage), the impact of additional noise is considered to be minimal and easily mitigated.

13.7 Odour Assessment

A preliminary odour screening assessment was recently completed and the results are provided in Appendix H. In summary, there are no odour impacts that cannot be mitigated, as a result of the proposed capital works to expand the plant to a capacity of 23.3 MLD.

At the present time and based on the preliminary proposed works, the only suggested mitigation measure is the addition of a carbon filter unit at the future thickened waste activated sludge (TWAS) facility. Additional mitigation measures may be identified as part of the future additional dispersion modeling that will be required as part of the final design of the plant expansion to 23.3 MLD.

14.0 Stormwater Management Assessment

The proposed upgrades will not impact the existing site drainage in any way. There is sufficient grade around the site to accommodate the new building/tanks. The previously completed stormwater assessment is considered to be adequate for the proposed works.

15.0 Opinion of Cost

A budget cost estimate was prepared as part of the Class EA planning process for the recommended works. The estimate is in $2011 and includes an allowance for engineering & contingencies.

The capital cost is to be funded 100% by Development Charges. The capital cost estimate is a planning level estimate, based on conceptual design prepared for Class EA planning purposes. The estimate is accurate to within +50% and –30%.

Table 15-1 – Estimated Capital Cost

Description	Estimated Capital Cost
General site works	$600,000
Upgrades to onsite pump station	$300,000
Upgrades to headworks	$900,000
Demolition of Plant A	$300,000
Upgrades to Plant B	$1,000,000
Upgrades to Plant C	$700,000
Upgrades to Plant D Aeration	$200,00
New equalization tank and ballasted flocculation facility	$13,000,000
New water activated sludge thickening facility	$3,000,000
Total Estimated Capital Cost	**$20,000,000**

16.0 Phase 3 Public Information Centre – Public's Principal Concerns

A Phase 3 Public Information Centre was held on June 22, 2011 to present the overall Recommended Solution and to obtain public and Review Agency input. A copy of the PIC Material and related correspondence is included in Appendix I. A summary of the verbal and written comments received is as follows:

- Letter dated July 8, 2011 from Cassels Brock Lawyers representing the Tsam Lands and requesting clarification of the service area. A response letter was provided by the Town dated July 12, 2011.
- Verbal inquiry regarding nitrification

Copies of the PIC Notice, Communication Plan, PIC Displays, sign-in sheet, letters and a memo outlining the comments received are included in Appendix I.

A summary of all comments received as a result of the Class EA is provided in Table 16-1.

TABLE 16-1 Summary of Comments

FROM/DATE	NATURE OF COMMENT	ADDRESSED THROUGH CLASS EA
Alderville First Nation April 1, 2011	- Minimal impact to First Nations rights - Keep us informed	- Notices were sent
MOE – April 4, 2010	- Address noted issues	- See Section 18.0
Chippewas of Rama First Nation – April 4, 2010	- Direct all future correspondence to Karry Sandy-McKenzie	- Future Notices were sent to Ms. Sandy-McKenzie
Enbridge Gas – April 20, 2010	- Send copies of plans during final design to determine conflict with gas plant	- No action required at this time
LSRCA – April 4, 2010	- Wants representation on "Working Group"	- Invited to PIC and was offered opportunity to meet to discuss the Project
LSRCA – April 28, 2010	- Suggests some pre-consultation	- Was invited to June 13, 2011 Steering Committee meeting

FROM/DATE	NATURE OF COMMENT	ADDRESSED THROUGH CLASS EA
		(did not attend) - Was invited to June 22, 2011 PIC (did not attend) - Was informed that PIC Information is on the Town's Web Site
Ministry of Aboriginal Affairs – May 20, 2011	- Suggests appropriate First Nations Contacts	- Contacts were added to Communication Plan
Unidentified PIC attendee – June 22, 2011	- Does nitrification occur? - What is retention time in the Plant?	- Plant is design for nitrification to meet ammonia limit - Retention time is not relevant to Class EA
Cassels Brock – July 8, 2011	- Do the "Tsam Lands" have capacity in the current plant?	- Town letter dated July 12, 2011 responded that wastewater treatment capacity is currently available for the Tsam Lands.
Hiawatha First Nation – June 7, 2011	- Minimal impact to First Nations rights - Keep us informed	- Notices were sent
Cassles Brock – July 18, 2011	- Wanted clarification on Tsam Lands	- Town email dated July 18, 2011 confirms that there is sufficient capacity in the existing plant to accommodate the Tsam Lands
Curve Lake First Nation – July 6, 2011	- Not currently aware of any issues - Contact Karry Sandy-McKenzie	- Ms. Sandy-McKenzie was added to Contact List - Town letter dated July 27, 2011 to Karry Sandy-McKenzie noted Web Site location for PIC information

17.0 First Nations Consultation

Based on a review of the responses received, no issues or concerns were raised by the Aboriginal Communities. The list of First Nation Groups that were consulted is included in the Communication Plan in Appendix I.

18.0 Design Considerations Resulting from Public and Agency Consultation

There are no design issues that need to be considered as a result of public consultation.

With respect to the MOE letter dated April 4, 2011, the following points are noted in response to the Ministry's concerns.

18.1 Ecosystem Protection and Restoration

All of the proposed works will be constructed within the limits of the developed area of the WPCP property. The existing wet land within and adjacent to the WPCP property will not be developed in any way. As such, the form and function of the wet land ecosystem will be maintained with no impact. Mitigation measures have been identified and described in Section 13 of this ESR.

No natural heritage features have been identified since all proposed works are within the currently developed area of the WPCP property. The effluent outfall will not be changed in any way and it has been proven that the additional effluent flow will meet Provincial requirements for discharge to the West Holland River. The MNR and the DFO were contacted as part of the Class EA process and neither of those agencies had any comment on the proposed undertaking.

The level of growth is consistent with the Town's OP and all policies related to ecosystem protection are considered to have been addressed due to the fact that the proposed works are within a currently developed area of the existing WPCP property.

18.2 Surface Water and Groundwater

It is recognized that approval under Section 53 of the OWRA will be required. An assimilative capacity assessment of the West Holland River was completed as part of the Class EA planning process, based on assumed effluent criteria. That Report will be used when the Town applies for a Certificate of Approval. The proposed effluent criteria was presented to the MOE Central Region during the Class EA process. The Town recognizes the TP loading requirement of 698 kg/year and the selection of the proposed works was based on that requirement. Biosolids ("residue") treatment needs were assessed and addressed as part of the Class EA process.

There are no water supply wells in the immediate area of the WPCP. The locations of the municipal wells are far removed from the WPCP site. There will not be any water takings required for the construction and operation of the expanded plant. No existing wells will be impacted or abandoned. The groundwater conditions are described in the Geotechnical Reports that have been reviewed as part of the Class EA process.

A Contingency Plan for dealing with potential adverse effects on surface water (e.g. fuel spills) will be prepared prior to construction.

The impacts to groundwater-dependant natural features will be minimal considering the fact that the groundwater table is 2 m below grade. Water taking for construction purposes will be minimal (excavation dewatering) and the discharge impact can be mitigated. There will be no significant impacts to the groundwater. The need for a Permit to Take Water will be assessed during final design but at this time, the need for such a Permit is considered to be low.

18.3 Air Quality, Dust and Noise

A screening of potential sources of air pollution from the proposed works has been completed and the results are provided in Appendix H of this ESR. In summary, there are no odour impacts that cannot be mitigated, as a result of the proposed capital works to expand the plant to a capacity of 23.3 MLD.

The effects of dust, generated as a result of construction, will be mitigated as outlined in Section 13 of this ESR.

As noted in Section 13.6, the proposed works include pump and blower replacements, to be installed in existing buildings. As such, the effect on the noise level in the area of the WPCP will be minimal. The Town acknowledges that a noise assessment will be required as part of the final design process.

18.4 Servicing and Facilities

The need for a revised Certificate of Approval for both wastewater and air is recognized.

The Ministry's references are noted.

18.5 Waste Materials and Spills

The requirement for disposal of waste that is generated during construction is noted.

The requirements for removal of soil from the site will be reviewed during final design but at this time, it is suggested that all excavated material will be reused within the WPCP site.

All underground pipes within the WPCP are owned by the Town. There are no underground storage tanks proposed.

18.6 Mitigation and Monitoring

The requirements mitigation and monitoring are noted.

18.7 Planning and Policy

The requirements of Planning and Policy are noted.

18.8 Class EA Process

The ESR provides:

- Clear and complete documentation of the planning process
- Documentation of the consultation process including public consultation efforts
- Identification of concerns and how they were addressed
- Copies of comments submitted and responses
- Identification of potential environmental impacts and proposed mitigation measures
- A list of permits/approvals that will be needed prior to construction.

18.9 Aboriginal Peoples Consultation

The Ministry of Aboriginal Affairs and the Department of Indian and Northern Affairs were contacted throughout the Class EA planning process in addition to numerous other First Nations contacts. All comments received as a result of the consultation process have been identified in this ESR.

19.0 Summary of Preferred Alternative

A summary of the Preferred Alternative is as follows:

- Apply to the to the Ministry of the Environment for a revised Certificate of Approval with a total WPCP capacity of 19.4 MLD in conjunction with increasing the capacity of the alum pumps;
- Optimize Plants C and D and modify Plant B to obtain a total rated capacity of 23.3 MLD;
- Increase existing aerobic digester capacity by adding thickening of Waste Activated Sludge (WAS);
- Construct ballasted flocculation process upstream of the existing sand filters;
- Complete a Water Conservation and Efficiency Strategy (WCES) for the water and waste water flows within the respective Service Areas. The WCES is also to be completed in accordance with the requirements of the Lake Simcoe Protection Plan (LSPP).

20.0 Re-rating Study

An assessment of the plant's interim capacity was recently completed to determine what level of capacity increase would be reasonable, assuming no major capital works were undertaken at the WPCP. A copy of the Re-rating Study is included in Appendix J. The Study concludes that the overall capacity of the WPCP can be increased from the currently approved rating of 17.4 MLD to 19.4 MLD by simply upgrading the capacity of the alum pumps. This 2 MLD capacity increase is currently available in the Plant D train.

It is the Town's intent to apply to the Ministry of the Environment for a revised Certificate of Approval based on the Re-rating Study. This will allow the Town to allocate additional wastewater treatment capacity to new development within future growth areas, prior to undertaking any major capital works.

21.0 Monitoring Requirements

After expansion of the BWG WPCP and following acceptance testing, the Town will assume full-time operation of the system. The Town intends to continue monitoring users discharging into the sewer system to ensure that they do not impact plant operation. The Town will also ensure that it complies with applicable environmental regulations. For compliance with the MOE CofAs, the Town will put in place a monitoring program that satisfies both the provincial requirements and the plant's operational needs. The BWG WPCP has a wastewater laboratory that will continue to provide the necessary information to plant operations for process control, plant effluent quality, and solids quality monitoring to ensure that the plant complies with provincial and municipal requirements. Samplers will be provided to monitor raw and treated wastewater. An annual report will be prepared to document the plant's performance. The Town will monitor effluent quality, as required by the MOE's CofA.

The Town will continue to monitor flows in the collection system in an attempt to locate areas of excessively high inflow/infiltration (high wet weather flows). The Town will continue to rehabilitate the collection system as necessary.

In addition, the Town should review and upgrade its Sewer Use By-Law to limit wastewater flows and parameters from commercial and industrial sources. Such sources should be monitored.

22.0 Permits and Approvals

The following submissions are to be made during detailed design once sufficient information has been prepared for agency review purposes.

The MOE Certificates of Approval that will be required include:

- C of A (wastewater) – required for all works, to be submitted near completion of design.
- C of A (air) – required for emergency power system and for various parts of the Bradford WPCP expansion and requires an air assessment/noise attenuation study in support of the C of A, to be submitted near completion of design.

Other approvals and permits include:

- Site Plan Approval – required for all works, to be submitted to the Town and County near completion of design.
- Building Permit – to be submitted to the Town (by Contractor) during start of construction.

23.0 Implementation Schedule

Key milestones of the preliminary schedule are as follows:

- Posting of ESR for 30-day review – January 19 to February 17, 2012
- Apply to the MOE for a rerating of the WPCP to 19.4 MLD
- Completion and implementation of Water Conservation and Efficiency Strategy
- Completion of preliminary design to expand the WPCP rating from 19.4 MLD to 23.3 MLD
- Apply to the MOE for a rerating of the WPCP to 23.3 MLD
- Completion of detailed design and approvals for 23.3 MLD Plant
- Award of contract for construction
- Completion of Construction

Based on the finding of the Re-rating Study, it is the Town's intention to apply to the MOE for a re-rating of the plant capacity from the current 17.4 MLD to 19.4 MLD. Assuming the re-rating is approved by the MOE, the Town will, in the future, expand the plant capacity from 19.4 MLD to 23.3 MLD as one stage. The decision to undertake the expansion in one stage (one construction contract) was based on the following considerations:

- If sub-components of the expansion were to be completed on their own (such as the upgrade to the tertiary treatment facility), no additional capacity above 19.4 MLD would be gained; and
- If the Project is broken into three or four sub-components and completed over a number of years the combined total cost of these smaller contracts would most likely be greater than if the works were completed as one contract.

PHASE 4 REPORT

24.0 Notice of Completion

The Notice of Completion was published in the local newspapers on Thursday January 19 and Thursday January 26, 2012. The Notice was sent to residents within a 1km radius of the BWG WPCP. A copy of the Notice and mailing lists are included in Appendix K. The Notice was added to the Town's web site.

Prior to the publication of the Notice of Completion, a Draft version of the ESR was reviewed by the MOE. The Draft ESR was sent to the Ministry on October 25, 2011. The Ministry's comments on the Draft ESR were provided in a letter dated November 29, 2011. A copy of the MOE's letter is included in Appendix K. All applicable Ministry comments have been addressed in the ESR.

In addition, the proposed effluent criteria for a re-rating of the plant to a capacity of 19.4 MLD, was provided to the MOE Environmental Approvals and Assessment Branch for comment. A copy of the email is provided in Appendix K.

As a result of the publication of the Notice of completion, the Town received comments from Chippewas of Rama First Nation, (letter dated January 20, 2012), Don Boswell, Senior Claims Analyst, Ontario Research Team, Specific Claims Branch (email dated January 26, 2012) and the MOE (letter dated February 23, 2012). Copies of these three items of correspondence are included in Appendix K.

The Chippewas of Rama First Nation wanted to make sure that Ms. Karry Sandy-McKenzie was included in the Contact list. It is noted that Ms. Sandy-McKenzie was included in the Contact List.

Mr. Boswell suggested that additional web sites might need to be researched in order to advise First Nations groups of the Town's intention. The following First Nations groups were identified as a result of the additional research:

- Saugeen First Nation (located west of Owen Sound)
- Chippewas of Nawash First Nation (located on the Bruce Peninsula)
- Wasauksing First Nation (located near Parry Sound)

These three first Nation groups were deemed to be remote from Bradford West Gwillimbury and therefore, they were not added to the Contact List.

The MOE expressed addition comment on the proposed effluent concentration for CBOD as it relates to the DO level in the receiving West Holland River. The MOE also provided additional comment on the Air Quality Impacts Assessment Report. A response letter was provided to the MOE (dated March 23, 2012) and a copy is included in Appendix K. In summary, the Town committed to:

- Prepare a work plan (for MOE review and comment) to assess current DO levels in the West Holland River and to model the proposed increase in effluent flow (23.3 MLD) as part of the final design for the future plant expansion,
- Revise the effluent CBOD limit depending on the results of the DO assessment,
- Undertake additional dispersion modeling and an assessment of compliance with O. Reg. 419/05 as part of the final design of the proposed expansion to 23.3 MLD, and
- Identify specific air quality mitigation measures as part of the additional dispersion modeling.

25.0 Recommendations and Conclusions

Considering all of the information provided in this ESR, it is recommended that the Town:

- Proceed with the planning and implementation of a Water Conservation and Efficiency Strategy in conformance with the Lake Simcoe Protection Plan;
- Consider continuing with its existing program of investigating the sanitary sewer system in order to monitor and possibly reduce wet weather flows to the plant;
- Make application to the MOE for an Environmental Compliance Approval (ECA) to allow an interim capacity increase (re-rating to 19.4 MLD) based on optimization of the existing WPCP facilities with no additional capital works;
- Consider the timing for the design of the necessary works as outlined in this ESR, to increase the capacity of the WPCP to 23,300 m^3/d including obtaining all applicable approvals;
- Prepare a work plan to assess current DO levels in the West Holland River and discuss the work plan with the MOE prior to initiation of the Assessment;
- Undertake the work plan to assess the impact on DO levels in the West Holland River based on the proposed flow increase to 23.3 MLD including computer modelling and reassess effluent CBOD limits based on the results of the DO modelling;
- Undertake additional air quality impact assessment dispersion modelling based on the proposed plant expansion to 23.3 MLD complete with an assessment of compliance with O. Reg. 419/05;
- Make application to the MOE for an ECA to increase the capacity of the WPCP to 23.3 MLD based on the final design;
- Complete the construction of the works that are identified in this ESR when deemed necessary for future growth; and
- Implement any mitigation measures associated with both the construction and the operation of the expanded plant.

In conclusion, this ESR provides sufficient documentation of the Class EA planning process that was followed by the Town of the Bradford West Gwillimbury to support an interim capacity increase from 17.4 MLD to 19.4 MLD without any capital works. The ESR also provides documentation of the planning process to support a future capacity increase from 19.4 MLD to 23.3 MLD based on future assessments (DO in the West Holland River and additional Air Quality) and on the completion of a future final design of the proposed expansion facilities.

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