NORTH PERTH
WASTEWATER TREATMENT
MASTER PLAN

Prepared for

THE MUNICIPALITY OF NORTH PERTH

GM BluePlan Engineering Limited
May 2015 (Updated Oct 2015)
Our File: 311-031

TABLE OF CONTENTS

LIST OF TABLES

LIST OF FIGURES

APPENDICES

MUNICIPALITY OF NORTH PERTH
WASTEWATER TREATMENT MASTER PLAN

May 2015 (Updated October 2015)

1.0 INTRODUCTION and BACKGROUND

1.1 INTRODUCTION

GM BluePlan Engineering Limited (GM BluePlan), formerly known as Gamsby and Mannerow Limited (G&M), was retained by the Municipality of North Perth (North Perth) to undertake a Wastewater Treatment Master Plan. North Perth has initiated this Wastewater Treatment Master Plan to identify a preferred servicing strategy for wastewater treatment to the year 2030. The primary objectives of this Master Plan are to identify and evaluate long-term wastewater treatment servicing options for North Perth as well as fulfill Phases 1 and 2 of the Municipal Class Environmental Assessment (EA) process.

The North Perth Wastewater Treatment Plant serves the Municipality of North Perth through sewer collection systems in Listowel and Atwood and receives imported wastewater via tanker trucks from the remainder of North Perth and surrounding municipalities. The Wastewater Treatment Master Plan process is intended to provide direction for wastewater infrastructure planning in accordance with the Municipality of North Perth Master Growth Plan. In keeping with North Perth's commitment to corporate and environmental responsibility, the Master Plan will identify and prioritize current plant deficiencies and provide a framework to manage wastewater treatment in order to sustain growth and support capital funding projections within the planning period. Together, these plans will guide North Perth for the provision of sustainable wastewater treatment services to the year 2030.

1.2 BACKGROUND

Wastewater treatment servicing for North Perth is provided by a system consisting of a main sewage pumping station (Highway 23 SPS) for the Town of Listowel, a septage receiving station (SRS) for imported wastewater, and a wastewater treatment plant (WWTP) with lagoons. The plant also receives wastewater from the Village of Atwood located approximately 7 kilometres south of the plant via a single forcemain to the plant headworks. The Highway 23 SPS, the SRS, and the WWTP operate under respective Ministry of the Environment (MOECC) Certificates of Approval (C of A) for each facility. At the time of preparation of this document, the latest C of A's for the Highway 23 SPS, the SRS, and the WWTP are 3141-83ZPFZ dated March 31, 2010, 2060-88HR57 dated September 30, 2010 (Air), and 3087-7K8NZC dated October 10, 2008, respectively. C of A 3087-7K8NZC is a Sewage Works Approval that captures the SRS and the WWTP. The Municipality owns and operates each of these facilities.

See Drawing G01 Study Area in **Appendix A** for a general overview of the study area, along with site plan and process flow diagram of the North Perth Wastewater Treatment Plant.

1.3 MASTER PLANNING AND EA PROCESS

The option exists to conduct this study through the Environmental Assessment or Master Plan processes, as defined by the Municipal Engineers Association Municipal Class EA document. A Master Plan considers a larger overview of a study and assists in identifying and prioritizing projects within an Environmental Assessment while satisfying Phases 1 and 2 of the Class EA process for each project. Municipalities may undertake Servicing Master Plans to define long-term servicing objectives as a supplement to water and wastewater needs identified through their Official Plan development process. A Master Plan integrates land-use planning and the planning of servicing infrastructure with the principles of environmental assessment planning. Official Plans are approved under the Ontario Planning Act and are typically developed through a process which applies principles of EA planning. As such, Official Plans provide a planning and technical basis for undertaking Master Plans and subsequent environmental assessment studies, which established the link between Official Plans, Master plans, and the Municipal Class EA process.

If Master Plans are developed in accordance with Section A.2.7 of the Municipal Class EA, they can address Phases 1 and 2 of the Municipal Class EA process. As a result, a Master Plan can provide the basis for carrying out subsequent project-specific EA's, including the problem and/or opportunity being addressed and the range of alternatives being considered.

The Municipal Class EA document outlines a framework that recognizes the place of Master Planning studies in guiding sound environmental planning at the project-specific level. This approach recognizes there are real benefits in terms of better planning when long range comprehensive studies are undertaken over logical planning units, such as at system level, and proponents who undertake such studies can build on recommendations and conclusions contained in Master Plans.

Section A.2.7 Master Plans of the Municipal Class EA document indicates the following with respect to integration of the EA process and Master Plans for municipal infrastructure.

"Master Plans typically differ from project-specific studies in several key respects. Long range infrastructure planning enables the proponent to comprehensively identify need and establish broader infrastructure options. The combined impact of alternatives is also better understood which may lead to other and better solutions. In addition, the opportunity to integrate with land use planning enables the proponent to look at the full impact of decisions from a variety of perspectives. The following are distinguishing features of Master Plans:

a. *The scope of Master Plans is broad and usually includes an analysis of the system in order to outline a framework for future works and developments. Master Plans are not typically undertaken to address a site-specific problem.*
b. *Master Plans typically recommend a set of works which are distributed geographically throughout the study area and which are to be implemented over an extended period of time. Master Plans provide the context for the implementation of the specific projects which make up the plan and satisfy, as a minimum, Phases 1 and 2 of the Class EA process. Notwithstanding that these works may be implemented as separate projects, collectively these works are part of a larger management system. Master Plan studies in essence conclude with a set of preferred alternatives and, therefore, by their nature, Master Plans will limit the scope of alternatives which can be considered at the implementation stage.*

A.2.7.1 The Master Planning Process
The work undertaken in the preparation of Master Plans should recognize the Planning and Design Process of this Class EA, and should incorporate the key principles of successful environmental assessment planning identified in Section A.1.1. It is imperative that public and agency consultation take place during each phase of the study process, specifically, at the initiation of the Master Plan study so that the scope and purpose of the study is understood, and at the selection of the preferred set of alternatives. At a minimum, the Master Planning process should address the first two phases in the Planning and Design Process of the Class EA."

This assignment is being conducted in accordance with the Master Plan Environmental Assessment process as outlined in the Municipal Class Environmental Assessment (EA) document (Municipal Engineers Association, last amended 2011). The Class EA process includes identifying alternative solutions, evaluation of alternatives, assessment of the potential environmental effects of the proposed improvements, identification of reasonable measures to mitigate any adverse impacts that may result and consultation with the public and review agencies.

North Perth held a Public Information Centre (PIC) on April 1, 2015 from 5:00 pm to 7:00 pm at the North Perth Council Chambers at 330 Wallace Avenue North in Listowel, Ontario. The PIC provided background information on the Master Plan and presented alternatives to wastewater treatment works that are being considered and preferred alternatives based on preliminary evaluations. Representatives from North Perth and GM BluePlan were present at the PIC to answer questions and solicit input from the public. Results from the public consultation process are documented in Appendix G for the public record.

Alternative solutions identified in this document consider individual components of the wastewater treatment system, relationships between components, overall system performance, regulatory compliance, and accommodation of future development plans for North Perth. As the study progresses, each alternative will be refined through a comprehensive screening and evaluation process with direct input from North Perth staff. The Master Plan will ultimately present a prioritized set of preferred solutions to address identified wastewater treatment servicing needs, supported by cost estimates and a proposed implementation schedule.

This Master Plan generally followed the steps listed below.

- Establish a Project Steering Committee (PSC)
- Compile and review background information
- Conduct regular meetings with North Perth and stakeholders to develop list of problems and issues to be addressed with respect to long-term wastewater treatment servicing
- Identify wastewater servicing issues and opportunities in consultation with North Perth, MOECC, operations staff, and other stakeholders as applicable
- Develop evaluation criteria and weighting factors for high-level screening
- Develop evaluation criteria and weighting factors for detailed evaluation
- Analyze system operational data and technical reports
- Document results of evaluation process
- Prepare conceptual designs, prioritized implementation schedule, and budgetary cost estimates for preferred solutions
- Conduct a Public Information Centre (PIC)
- Incorporate feedback
- Document results in the Master Plan document, place on the public record following 30-day review period

2.0 DESCRIPTION OF EXISTING WASTEWATER TREATMENT SYSTEM

The North Perth WWTP receives untreated wastewater from three areas; the Town of Listowel, the Village of Atwood, and imported, hauled in waste via the Septage Receiving Station (SRS). Wastewater from Listowel is conveyed through the Town's sewage collection system to the Highway 23 SPS. Sewage is pumped from that facility through a dedicated forcemain directly to the headworks of the WWTP. The Highway 23 SPS is located on the east side of Highway 23 and on the south side of the Middle Maitland River. Similarly, raw sewage from Atwood is conveyed through the Village's sewage collection system to a sewage pumping station located at the northwest corner of Atwood where it is pumped through a dedicated forcemain to the headworks of the treatment plant. Septage and other industrial wastewater from various sources across North Perth and other municipalities in the region is hauled to the SRS where it is unloaded, stored and introduced into the WWTP influent forcemain through controlled rate metering pumps. The SRS is located on the same property as the WWTP.

The WWTP, located at 6115 North Perth Line 84, includes a septage receiving station, mechanical treatment plant and emergency storage lagoons. The current treatment plant is hydraulically rated for an average daily flow of 9,030 cubic metres (m^3), a maximum day flow of 25,500 m^3 and organically rated for a loading of 8,000 kg per day of BOD_5 and 507 kg per day of Total Kjeldahl Nitrogen (TKN). The main treatment steps in the existing treatment facility in sequence include screening, aerated grit removal, and comminution (grinding) in the "headworks" process, twin anoxic reactors operating in parallel, twin aerobic reactors operating in parallel, secondary clarification, pumps for recirculation of activated sludge (RAS) and mixed liquor (MLSS) within the biological treatment train, twin clarifier WAS pumps, tertiary filtration, effluent disinfection by UV, flow measurement, and effluent discharge to the Middle Maitland River near Highway 23 SPS.

Chemical feed systems at the plant include liquid chlorine (sodium hypochlorite) to prevent biological growth in the filters and coagulant (aluminum sulphate or alum) for phosphorus removal. Excess sludge is partially stabilized in an on-site aerobic sludge digestion basin followed by short-term storage in an adjacent sludge storage basin. The original treatment plant consisted only of 2 large facultative lagoons. The lagoons are currently used for long-term storage of excess sludge, emergency overflows or bypasses, and regular polishing of secondary effluent.

A site layout plan of the treatment plant and a process flow diagram are presented on Drawing G02 "Overall Site Plan" and Drawing P01 "General Process Flow Diagram – Existing System", respectively which are found in **Appendix A**.

A chronology of development of the North Perth wastewater treatment system is summarized in the following table.

Table 1. Chronology of Wastewater Treatment Facility Development

Year	Description of Project
1961	East and West Lagoons, original Highway 23 SPS and 300mm forcemain are constructed. Highway 23 SPS is designed to pump wastewater to lagoons. Lagoon effluent discharges to the Chapman Drain by gravity.
1991	Two forcemains are installed along common route between Highway 23 SPS and lagoons. A 450mm sewage forcemain runs to lagoons and future plant, and a 450mm forcemain runs from future plant to Maitland River adjacent to Highway 23 SPS
1993	New Highway 23 Sewage Pumping Station is built
1994	Mechanical plant is constructed using an extended aeration activated sludge (EAAS) concept, including headworks, aeration, secondary clarifiers, tertiary filtration, and UV disinfection. The West Lagoon is maintained as equalization storage during high flow periods or emergency storage during power outages, as water can drain to lagoon by gravity during a power failure. After observed improvements in effluent quality when using the West Lagoon, the plant began to use the lagoon for polishing during normal operation, which also improved treatment of higher organic loads from the SRS. Use of lagoons allowed the plant to continue operating by gravity to the lagoon until power was restored.
2000	Plant upgrades undertaken, including upgrading the sludge lagoons to aerobic stabilization lagoons. Hydraulic capacity was re-rated from 6,550 m^3/d to 9,030 m^3/d.
2002	Spray liquid fragrant odour control system installed around aerobic digester and sludge holding lagoon.
2006	Construction of Septage Receiving Station
2007	Construction of process modifications to convert plant from EAAS to Biological Nutrient Removal (BNR) process based on anoxic/aerobic (A/O) process.
2007	On-site transformer upgraded from 750 kVA to 1,000 kVA. Overhead service from Hydro One to plant is 44kV, stepped down to 600V at on-site sub-station.
2008	WWTP capacity rerated from 4,910 kg/d to 8,000 kg/d BOD and 507 kg/d TKN. No change in hydraulic capacity which is avg. day 9,030 m^3/d and max. day 25,500 m^3/d.
2008	Large wet industry that had previously directed wastewater to the plant shuts down, increasing the available organic loading capacity of the WWTP for the SRS.
2010	Highway 23 SPS – all 3 pumps and air/vacuum valves on forcemain are replaced, and a new SCADA system is installed.
2010	Biological odour control system is installed at Septage Receiving Station.
2010	Village of Atwood is connected to the North Perth WWTP in mid-2010. Sewage pumping station in Atwood has a forcemain that discharges directly into the headworks at the WWTP.

Year	Description of Project
2011	Two of three effluent pumps and motors are refurbished.
2011	East Clarifier's scraping arms are repaired, interior walls are re-coated, and anodes are installed
2011-14	Vertical turbine Effluent pumps and RAS pumps are rebuilt.
2012	Sand media in Tertiary filter Cell 1 (north cell) is replaced along with other minor repairs. No work done on underdrains, supports, or porous plates.
2012	One aeration blower is rebuilt.
2012	Septage Receiving Station Building expanded to facilitate maintenance
2012	Aerobic sludge digester is reshaped to remove accumulation of sludge, recovering some basin capacity
2013	On-site pumping station pumps replaced
2014	Tertiary filter Cell 2 (south cell) is rebuilt, including underdrains, supports, porous plates, and replacement of media

3.0 PHASE 1 – PROBLEM OR OPPORTUNITY

3.1 PROBLEM STATEMENT

The Problem Statement as approved by the Steering Committee is as follows:

The North Perth Wastewater Treatment Plant serves the Municipality of North Perth through sewer collection systems in Atwood and Listowel and receives hauled in wastewater from the remainder of North Perth and some surrounding Municipalities. The wastewater treatment plant, located at 6115 North Perth Line 84, includes a septage receiving station, mechanical treatment plant and emergency storage lagoons. The current treatment plant is hydraulically rated for an average daily flow of 9,030 cubic metres and organically rated for a loading of 8,000 kg per day of BOD_5.

The Wastewater Treatment Master Plan process is intended to provide direction for wastewater infrastructure planning in accordance with the Municipality of North Perth Official Plan. In keeping with North Perth's commitment to corporate and environmental responsibility, the Master Plan will identify and prioritize current plant deficiencies and provide a framework to manage wastewater treatment in order to sustain growth and support capital funding projections within the planning period. Together, these plans will guide North Perth for the provision of sustainable wastewater treatment services to the year 2030.

3.2 NOTICE OF COMMENCEMENT

The Notice of Commencement as approved by the Steering Committee and published in the Listowel Banner on January 11 and 18, 2012 is as follows:

NORTH PERTH WASTEWATER TREATMENT
MASTER PLAN CLASS ENVIRONMENTAL ASSESSMENT STUDY

The Municipality of North Perth has initiated a Wastewater Treatment Master Plan to identify a preferred servicing strategy for wastewater treatment to the year 2030.

The North Perth Wastewater Treatment Plant serves the Municipality of North Perth through sewer collection systems in Atwood and Listowel and receives hauled in wastewater from the remainder of North Perth and some surrounding municipalities. The Wastewater Treatment Master Plan process is intended to provide direction for wastewater infrastructure planning in accordance with the Municipality of North Perth Master Growth Plan. In keeping with North Perth's commitment to corporate and environmental responsibility, the Master Plan will identify and prioritize current plant deficiencies and provide a framework to manage wastewater treatment in order to sustain growth and support capital funding projections within the planning period. Together, these plans will guide North Perth for the provision of sustainable wastewater treatment services to the year 2030.

The study is being conducted in accordance with the Master Plan Environmental Assessment process as outlined in the Municipal Class Environmental Assessment (EA) document (Municipal Engineers Association, 2011). The Class EA process includes identifying alternative solutions, evaluation of alternatives, assessment of the potential environmental effects of the proposed improvements, identification of reasonable measures to mitigate any adverse impacts that my result and consultation with the public and review agencies. The Municipality of North Perth will be holding Public Information Centres (PIC's) on this project in 2012 to provide background information on the study and present improvements to wastewater treatment works that are being considered. Representatives from North Perth and its consultants will be present at the PIC to answer any questions and solicit input from the public. Separate notices will be issued prior to each PIC providing event time and location.

4.0 PHASE 2 – IDENTIFICATION AND EVALUATION OF ALTERNATIVES

4.1 IDENTIFICATION OF PROJECTS

The objectives of the Master Plan are to identify wastewater treatment servicing issues, develop and evaluate alternatives to address each issue, and to document the master planning process in such a way that fulfills Phases 1 and 2 of the Municipal Class Environmental Assessment (EA) process. The result of this project will be a comprehensive Master Plan document that will outline a strategy for wastewater treatment servicing in North Perth to Year 2030.

Through extensive consultations with the Project Steering Committee as well as North Perth technical and operations staff, a total of sixteen (16) projects were identified with respect to wastewater servicing in the Municipality. Through consultation with North Perth, the identified wastewater treatment projects were categorized into the following priority groups.

Group A Projects – High Priority
1. Treatment Plant Hydraulic Capacity
2. Plant Outfall Location
3. Wastewater Conveyance (Pipelines)
4. Sludge Management
5. Standby Power Supply
6. Headworks

Group B Projects – Moderate Priority
1. Status of Lagoons
2. Septage Receiving Station
3. Highway 23 Sewage Pumping Station
4. Fats, Oils and Grease (FOG) Management
5. Tertiary Filtration
6. Effluent Disinfection

Group C Projects – Low Priority
1. Main Power Supply
2. SCADA System
3. Secondary Clarification
4. Odour Control

It is noted that several of the above issues are inter-related. Alternatives to address one issue may present an opportunity or constraint for other issues. This is discussed below under the evaluation sections for each project and taken into account when assigning scores to each evaluation criterion.

4.2 EVALUATION CRITERIA

The following table summarizes screening-level evaluation criteria along with corresponding weighting factors of relative importance. This set of criteria were used for evaluating an initial long list of alternatives proposed for each identified wastewater treatment issue and used to screen out alternatives that were not viable.

Table 2. Screening Level Evaluation Criteria

Evaluation Criteria	Screening Criteria Weighting Factor	Relative Importance of Each Category
Ability to Address the Problem	3.00	30%
Technical Feasibility	2.00	20%
Relative Cost-Benefit or Life Cycle Cost of Implementation	2.00	20%
Energy Consumption/Ecological Footprint (e.g. GHG emissions)	1.00	10%
Compatibility with Municipal, County, and Provincial Policies, Regulations, and Studies	1.00	10%
Alternative is Well-Established and Proven	1.00	10%
OVERALL SCORE	**10.00**	**100%**

Only viable alternatives extracted from the screening-level evaluation process were carried forward for further assessment under the detailed evaluation process. Available scores for each criterion for screening level evaluation are:

1 : poor
2 : adequate or fair
3 : good

The following table summarizes detailed evaluation criteria.

Table 3. Detailed Evaluation Criteria

Evaluation Criteria
Technical Considerations
Ability to Address the Problem
Technical Feasibility (constructability, geotechnical, groundwater conditions, creek crossings, existing structures and utilities)
Physical space requirements : property, site access, buildings, easements
Availability of site services (road, water, sanitary, power, communications, gas)
Operation and Maintenance Complexity
Alternative is Well-Established and Proven
Approvals Requirements
MOECC Approvals Process
Other Agency Approvals (MVCA, MMAH, Hydro, ESA, DFO, MNR, County, ….)
Municipal Class EA Implications
Compatibility with Official Plan, Zoning, overall development plans for the Municipality
Financial Considerations
Lifecycle Cost (Including design, construction, land acquisition, provision of utilities/services, operating cost, maintenance cost, replacement cost. Suggest use Net Present Value of these costs over 50 year life of facility)
Capital Cost
Operating and Maintenance Costs
Environmental and Social Impacts
Energy Consumption/Ecological Footprint (e.g. GHG emissions)
Impact on natural environment such as woodlands, wildlife, terrestrial vegetation, groundwater, aquatic, air, etc.
Impact on Provincially Significant Wetlands (PSW), Environmentally Sensitive Habitats (ESH)
Social and Cultural Impacts
Compatibility with adjacent land uses, impact on adjacent land uses
Impact on First Nations / Métis
Archaeological/Heritage Sites

Available scores for each criterion for detailed evaluation are applied from 0.0 to 1.0 in increments of 0.25 as follows.

0.00 : poor
0.25 : marginal
0.50 : fair
0.75 : good
1.00 : excellent

Weighting factors for detailed evaluation are project specific and consequently are not indicated in the above table. Not all of the criteria listed in the above table will be applicable to all projects.

5.0 ANALYSIS OF BACKGROUND DATA

Detailed operational data for the North Perth WWTP was obtained from for the period from January 1, 2010 to December 31, 2014 inclusive. Data was compiled from monthly UMIS data tables into a comprehensive spreadsheet for data analysis and graphing. See Appendix A for graphs of the operational data. This section summarizes results of data analysis which was used in part to support recommended alternatives for addressing identified projects.

The following table summarizes effluent quality objectives and limits for the freezing and non-freezing periods, defined as December 1 to March 31, and April 1 to November 30, respectively.

Table 4. Summary of Effluent Quality Criteria

Parameter	Symbol	Objectives (mg/L)	Limits (mg/L)	Limits (kg/d)
Carbonaceous Biochemical Oxygen Demand (5-day)	$CBOD_5$	5 (Apr. 1 to Nov. 30) 10 (Dec. 1 to Mar. 31)	10 (Apr. 1 to Nov. 30) 15 (Dec. 1 to Mar. 31)	90.4 (Apr. 1 to Nov. 30) 135.6 (Dec. 1 to Mar. 31)
Total Suspended Solids	TSS	5 (Apr. 1 to Nov. 30) 10 (Dec. 1 to Mar. 31)	10 (Apr. 1 to Nov. 30) 15 (Dec. 1 to Mar. 31)	90.4 (Apr. 1 to Nov. 30) 135.6 (Dec. 1 to Mar. 31)
Total Ammonia Nitrogen	TAN	1.5 (Apr. 1 to Nov. 30) 2.9 (Dec. 1 to Mar. 31)	2.2 (Apr. 1 to Nov. 30) 3.62 (Dec. 1 to Mar. 31)	20 (Apr. 1 to Nov. 30) 32.8 (Dec. 1 to Mar. 31)
Total Phosphorus	TP	0.22 (Apr. 1 to Nov. 30) 0.58 (Dec. 1 to Mar. 31)	0.36 (Apr. 1 to Nov. 30) 0.73 (Dec. 1 to Mar. 31)	3.28 (Apr. 1 to Nov. 30) 6.56 (Dec. 1 to Mar. 31)
Escherichia Coli	E. Coli	na	200 CFU/100mL	na
Dissolved Oxygen	DO	na	min. 5	na
pH	pH	6.5 to 9.0	6.0 to 9.5	na

Notes:

1. From MOECC Certificate of Approval No. 3087-7K8NZC dated October 10, 2008.

The following table summarizes monitoring requirements stipulated in the C of A for imported sewage to the Septage Receiving Station (SRS), raw sewage to the plant, and final effluent. Raw sewage consists of blended sewage from the Town of Listowel, Village of Atwood, and the SRS. Imported raw sewage is sampled manually inside the SRS building from the main discharge line before it leaves the building and connects into the influent forcemain from the Highway 23 sewage pumping station. Blended (domestic and SRS) raw sewage is sampled with an automatic composite sampler that draws samples at the plant headworks from the influent channel between the influent bar screen and aerated grit channel. Final effluent is sampled with an automatic composite sampler that draws samples from the plant effluent discharge channel in the tertiary filter room between the UV banks and the Parshall flow measurement flume.

Table 5. Summary of Monitoring Requirements

Parameter	Symbol	Sample Type	Frequency
Imported Sewage Monitoring			
Carbonaceous Biochemical Oxygen Demand (5-day)	$CBOD_5$	grab	bi-weekly
Total Suspended Solids	TSS	grab	bi-weekly
Total Kjeldahl Nitrogen	TKN	grab	bi-weekly
Total Phosphorus	TP	grab	bi-weekly
Raw Sewage Monitoring			
Carbonaceous Biochemical Oxygen Demand (5-day)	$CBOD_5$	composite	monthly
Total Suspended Solids	TSS	composite	monthly
Total Kjeldahl Nitrogen	TKN	composite	monthly
Total Phosphorus	TP	composite	monthly
Final Effluent Monitoring			
Carbonaceous Biochemical Oxygen Demand (5-day)	$CBOD_5$	composite	weekly
Total Suspended Solids	TSS	composite	weekly
Total Ammonia Nitrogen	TAN	composite	weekly
Total Phosphorus	TP	composite	weekly
Escherichia Coli	E. Coli	grab	weekly
pH	pH	grab	weekly
Temperature		grab	weekly
Dissolved Oxygen	DO	grab	weekly

Notes:

1. From MOECC Certificate of Approval No. 3087-7K8NZC dated October 10, 2008.

The following table summarizes raw wastewater characteristics for blended wastewater arriving at the plant headworks from Listowel, Atwood, and the Septage Receiving Station for the period from January 1, 2010 to December 31, 2014 inclusive.

Table 6. Summary of Raw Wastewater Characteristics (2010-14)

Parameters	Range (mg/L)	Average ± Std. Dev.
TSS	18 – 6,461	631 ± 649
$CBOD_5$	52 – 6,100	699 ± 646
TKN	17 – 500	82.5 ± 60.0
TP	3.2 – 74.0	14.7 ± 11.1
pH	4.4 – 11.4	7.7 ± 0.6

The following table summarizes effluent quality characteristics for the period from January 1, 2010 to December 31, 2014 inclusive.

Table 7. Summary of Effluent Quality Characteristics (2010-14)

Parameters	Range (mg/L)	Average ± SD
TSS	0.1 – 32.6	6.6 ± 4.9
$CBOD_5$	2 - 20	3.5 ± 2.6
TKN	0.9 – 30.0	3.4 ± 2.6
Total Ammonia N	0.01 – 20.0	0.93 ± 1.52
Un-ionized Ammonia	0.00 – 0.47	0.034 ± 0.050
Nitrate	0.10 – 12.0	2.5 ± 1.7
Nitrite	0.01 – 1.50	0.10 ± 0.16
TP	0.01 – 0.94	0.27 ± 0.15
pH	7.0 – 9.3	8.1 ± 0.39
Alkalinity	94 – 600	330 ± 55
Dissolved Oxygen	1.6 – 15.0	7.7 ± 2.6
E. Coli	0 – 9,200	261 ± 912 (geometric mean)

The following tables provide a high level summary and breakdown of plant flows and loadings based on data from the UMIS monthly records and Annual Reports.

Table 8. Summary of Average Flow Data (2010-14)

Year	Raw Sewage Flow (m^3/d, % of total)				Effluent (m^3/d)	Water Usage in Listowel and Atwood (m^3/d)	Annual Precip. (mm/yr)
	Hwy 23	SRS	Atwood	Total			
2010	4,361 (95%)	225 (5%)	0	4,586	5,304	1,884	877
2011	5,766 (92%)	319 (5%)	153 (3%)	6,238	6,567	2,053	959
2012	4,408 (92%)	250 (5%)	158 (3%)	4,816	5,118	2,065	619
2013	6,655 (94%)	291 (4%)	111 (2%)	7,056	7,953	2,256	1136
2014	6,130 (93%)	266 (4%)	190 (3%)	6,587	6,655	2,079	909
Averages	5,464 (93%)	270 (4%)	153 (3%)	5,887	6,319	2,060	916

Notes:
1. Listowel raw sewage flows are measured at the Highway 23 Sewage Pumping Station.
2. Atwood raw sewage flows are measured at the main sewage pumping station (SPS No. 2).
3. Septage receiving Station (SRS) flows are measured at the SRS prior to direct discharge into the main sewage forcemain.
4. Atwood connected to the North Perth WWTP in mid-2010.
5. Annual average precipitation taken from the nearest Environment Canada weather station "No. 6145504 at Mount Forest, located approximately 30 km northwest of the Town of Listowel

Table 9. Summary of Average Loading Data (2010-14)

Year	Average Raw Sewage Loading - combined flow from Hwy 23, SRS, Atwood (kg/d)				Average SRS Loading (kg/d, % of total)	
	TSS	$CBOD_5$	TKN	TP	$CBOD_5$	TKN
2010	2,933	3,677	402	82	2,210 (60%)	249 (62%)
2011	3,347	3,094	407	69	2,486 (80%)	n/a
2012	3,322	4,088	603	85	2,214 (54%)	204 (34%)
2013	3,524	2,170	310	46	1,397 (64%)	207 (67%)
2014	3,043	2,057	243	54	1,133 (55%)	135 (56%)
Averages	3,234	3,217	393	67	1,888 (59%)	199 (51%)

Notes:
1. SRS Loading calculations for TKN in 2011 not valid and not included in calculations.

There are several key points to make from cursory review of data in the above tables. While hydraulic loading from the SRS represents only about 5% of the total incoming flow, it also represents about 70% of the total influent organic loading to the plant. Sewage flow from Atwood was introduced in the middle of 2010, when the majority of customers who were previously serviced by private on-site septic systems were transferred to the municipal system. Also, effluent flows are typically about 10% greater than influent flows due primarily to capture of rain and snow in the West Lagoon which covers an area of almost 12 hectares and the corresponding need to maintain liquid level without overflowing. A direct correlation between effluent flow and annual precipitation indicates some level of infiltration. There is some correlation between water usage and effluent flows, which is expected.

Treatment plant performance was analyzed further at the level of each major unit process and compared to two sets of design guidelines; MOECC Design Guidelines for Sewage Works (2008) and Metcalf and Eddy (M&E) Wastewater Engineering textbook, 2003, 4th Edition. Comparison of the existing plant to industry standard design guidelines involves selection of an appropriate basis of design for each unit process, as summarized in the following table from MOECC Design Guidelines.

Table 10. MOECC Design Guidelines - Unit Process Design Basis

Unit Process	Design Basis
Sewage Pumping Stations	Design Peak Instantaneous Flow
Screening	Design Peak Instantaneous Flow
Grit Removal	Design Peak Hour Flow, Peak Hour Grit Loading
Aeration (without nitrification)	Average Day BOD-5 Loading (at corresponding Design Avg. Day Flow)
Aeration (with nitrification)	Max. Day TKN Loading (at corresponding Design Max. Day Flow)
Secondary Clarification	Design Peak Hour Flow, Max. Day Solids Loading
Sludge Return	50 to 200% of Design Average Day Flow
Tertiary Filtration	Design Peak Hour Flow
Disinfection	Design Peak Hour Flow
Outfall Sewer or Forcemain	Design Peak Instantaneous Flow
Sludge Treatment (digestion, dewatering)	Max. Month Mass Loading and Flow Rates

Further to the above table, Section 3.8 Reliability and Redundancy in MOECC Design Guidelines states *"Generally, sewage pumping stations and treatment works should be designed so that with the largest flow capacity unit out-of-service, the hydraulic capacity of the remaining units can handle the design peak instantaneous flow."* This is a direct reference to firm capacity and consequently the tables below present theoretical capacity values for total and firm capacity for each treatment step at the plant under average and maximum day design flows.

The following tables summarize design parameters for treatment processes, and a comparison of theoretical installed capacity of each main unit process at the treatment plant with design guidelines from the MOECC and M&E. Details of basis of design calculations are presented in Appendix B.

The Highway 23 SPS uses three submersible sewage pumps to transport raw sewage to the WWTP, with capacities presented in the Table below.

Table 11. Design Guidelines – Highway 23 Sewage Pumping Station

Item Description	Units	Design Value	Measured Value	MOECC Design Guidelines
Pump Rated Capacity	L/s	147.5	--	--
Pump Rated Head	m	30.0	--	--
No. of Pumps	no.	3		--
Firm Pumping Capacity (2 pumps operating)	L/s	295 (peak instantaneous)	295 (at commissioning) 250 (later in 2010)	Provide peak instantaneous flow with largest pump out of service

It is noted that the firm pumping capacity dropped off during the first year of operation, possibly due to excessive downstream losses in the influent forcemain.

Headworks operations are summarized in the following tables:

Table 12. Design Parameters – Headworks Bar-screen

Parameter	Unit	Value
Channel Width	m	2.10
Channel Height	m	0.70
Flow Depth at HWL	m	0.43
Bar Screen Slope	deg.	60
Bar Thickness	mm	12.5
Bar Spacing	mm	50
No. of openings	--	32
Orifice Coefficient	--	0.6
No. of Units	no.	1

Table 13. Design Guidelines – Headworks Bar-screen

Item Description	Units	Average Day Flow 9,030 m^3/d	Peak Day Flow 25,500 m^3/d	MOECC Design Guidelines	Metcalf & Eddy
Calculated Depth of Flow with no blockage with 50% blockage	mm	110 170	210 340	--	--
Calculated Velocity of Flow with no blockage with 50% blockage	m/s	0.61 1.22	0.87 1.74	0.4 – 0.9	0.3 – 0.6 (max 0.9)
Calculated Headloss with no blockage with 50% blockage	mm	10 108	20 215	--	150

Maximum daily design flow of 25,500 m^3 for the plant is equivalent to 295 L/s or firm capacity (i.e. 2 out of 3 pumps operating) at the Highway 23 Sewage Pumping Station. The depth of flow in the approach channel to the bar screen would be approximately 340mm under conditions of maximum day flow with 50% blockage of the bar screen, which is less than the high water level (HWL) depth of 430 mm or 79% of depth at HWL.

The previous table indicates that the existing manual bar screen is sized to handle peak flows with no blockage, and would pass peak day flows with the bar screen 50% blocked although with headloss and approach velocity greater than recommended design guidelines. Under peak flow conditions with 50% blockage, the water level in the approach channel would be below the high water level. Under peak flow conditions with no blockage, approach velocity and headloss through the bar screen are within recommended design guidelines. Operating experience indicates that the channel between the bar screen to grit chamber is undersized and can pass only about 16,000 m^3/d.

Grit removal consists of a single aerated chamber with dimensions of 4.615 m L x 3.600 m W x 2.500 m H, for a total volume of 41.5 m^3. The table below indicates that the existing aerated grit chamber is sized to provide adequate hydraulic retention time (HRT).

Table 14. Design Guidelines – Headworks Aerated Grit Chamber

Hydraulic Retention Time (HRT)	Units	Average Day Flow 9,030 m^3/d	Peak Day Flow 25,500 m^3/d
Actual (2010-14)	min.	6.6	2.3
MOECC Design Guidelines	min.	2 to 5	
Metcalf & Eddy	min.	2 to 5 (3 min. typ.)	

Following the headworks, two anoxic reactor cells operate in parallel, each 16.8m long by 15.0m wide by 6.0m deep for a volume of 1,512 m^3 per cell. The following table summarizes capacity calculations for the anoxic reactors.

Table 15. Design Guidelines – Anoxic Reactors

Item Description	Units	Average Day Flow 9,030 m^3/d	Peak Day Flow 25,500 m^3/d
Total Hydraulic Retention Time (HRT)	hours	8.0	2.8
Firm Hydraulic Retention Time (HRT)	hours	4.0	1.4
MOECC Design Guidelines - HRT	hours	0.5 to 10.0	
Metcalf & Eddy - HRT	hours	1.0 to 3.0	

Calculations in the above table indicate that the existing anoxic reactors are sized to provide hydraulic retention time (HRT) that is within MOECC design guidelines for both total and peak capacity.

As with the anoxic reactors, two aerobic reactors operate in parallel. Each cell is 42.75m long by 15.0m wide by 6.0m deep for a volume of 3847.5 m^3 per cell. The table below compares operating conditions of the existing aerobic reactors to key wastewater design parameters, including HRT and food-to-microorganisms ratio (F:M). Calculations indicate that these values generally average within relevant design guidelines under average and peak design flows for total and firm capacity, although the F:M ratio may be elevated under maximum design flows.

Table 16. Design Guidelines – Aerobic Reactors

Item Description	Units	Average Day Flow 9,030 m^3/d	Peak Day Flow 25,500 m^3/d	MOECC Design Guidelines	Metcalf & Eddy
Average $CBOD_5$ (2010-14)	mg/L	699		--	--
Average MLVSS (2010-14)	mg/L	4,250		--	--
Food : Microorganisms (F:M) Ratio	kg BOD/kg MLVSS-d	0.19	0.55	0.10 to 0.25	--
Total Hydraulic Retention Time (HRT)	hours	20.5	7.2	4 to 12	4 to 12
Firm Hydraulic Retention Time (HRT)	hours	10.2	3.6		

The following table summarizes basis of design values for the total biological process.

Table 17. Design Guidelines – Total Biological Process

Item Description	Units	Average Day Flow 9,030 m^3/d	Peak Day Flow 25,500 m^3/d	MOECC Design Guidelines	Metcalf & Eddy
Average $CBOD_5$ (2010-14)	mg/L	699		--	--
Average MLVSS (2010-14)	mg/L	4,250		--	--
Average RAS Flow (2010-14)	% Q	100 (measured)		25 to 100%	25 to 100%
Average Internal Recycle	% Q	200 (assumed)		100 to 600%	100 to 200%
Food : Microorganisms Ratio	kg BOD/kg MLVSS-d	0.14	0.39	0.10 to 0.25	--
Total Organic Loading Rate	kg BOD/m^3-d	0.59	1.66	0.31 to 0.72	0.3 to 1.6
Firm Organic Loading Rate	kg BOD/m^3-d	1.18	3.32		
Total Hydraulic Retention Time (HRT)	hours	28.5	10.1	5 to 24	5 to 15
Firm Hydraulic Retention Time (HRT)	hours	14.2	5.0		
Total Solids Retention Time (SRT)	days	9.4	3.3	10 to 40	7 to 20
Firm Solids Retention Time (SRT)	days	4.7	1.7		

The existing biological reactors were compared to several key wastewater design parameters, including HRT, solids retention time (SRT), food-to-microorganisms ratio (F:M), organic loading rate, and return flows. Calculations in the table above indicate that these values generally fall within relevant design guidelines under average and peak design flows for total and firm capacity, although the organic loading rate and related F:M ratio may be somewhat elevated under maximum design flows when one train is out of service. Also, the SRT appears to be low. Review of operational data for 2010-14 inclusive indicated an atypically high WAS flow rate of ~ 6%Q which is relatively high and results in a low solids retention time for biomass.

Aeration supply is one of the most important design parameters in a biological sewage treatment process. The following table presents a summary of calculations for aeration requirements and corresponding air supply capability at the plant.

Table 18. Design Guidelines – Aeration Capacity

Item Description	Value	Comments
Oxygen Demand Calculations – Design Values		
Design Average Flow Rate	9,030 m^3/d	
Average Influent CBOD-5	550 mg/L	
Effluent CBOD-5 (conservative)	0 mg/L	
Average Influent Total Nitrogen	55 mg/L	
Effluent TAN (conservative)	1.5 mg/L	C of A Objective non-freezing period
Oxygen Demand Rate for $CBOD_5$	1.2	
Oxygen Demand Rate for Nitrification	4.6	
Filter Backwash Sidestream Flow	1 % Qo	estimated
Filter Backwash Sidestream $CBOD_5$	200 mg/L	estimated
Oxygen Recovery in Anoxic Zone	40%	estimated
Total Actual Oxygen Requirement	5,820 kg O_2/d	
Oxygen Demand Calculations – Measured Values		
Design Average Flow Rate	9,030 m^3/d	
Average Influent CBOD-5	699 mg/L	measured average (2010-14)
Effluent CBOD-5 (conservative)	0 mg/L	
Average Influent Total Nitrogen	82.5 mg/L	measured average (2010-14)
Effluent TAN (conservative)	1.5 mg/L	C of A Objective non-freezing period
Oxygen Demand Rate for $CBOD_5$	1.2	
Oxygen Demand Rate for Nitrification	4.6	
Filter Backwash Sidestream Flow	1 % Qo	estimated
Filter Backwash Sidestream $CBOD_5$	200 mg/L	estimated
Oxygen Recovery in Anoxic Zone	40%	estimated
Total Actual Oxygen Requirement	8,161 kg O_2/d	
Conversion from AOR to SOR		
Conversion Factor : AOR to SOR	0.400	
Total Standard Oxygen Requirement	14,550 kg O_2/day	Design sewage strength
Total Standard Oxygen Requirement	20,403 kg O_2/day	Measured sewage strength
Conversion Air Flow from Mass to Volume		
Oxygen Content in Air	23%	

Item Description	Value	Comments
Density of Air	1.2 kg/m^3	
Oxygen Transfer Efficiency	25%	
Required Standard Air Flow	2,440 sL/s	Design sewage strength
Required Standard Air Flow	3,422 sL/s	Measured sewage strength
Installed Aeration Capacity		
Unit Blower Capacity	1,250 sL/s	
No. of Blowers	3	
% Time Operating	100	
Total Air Supply Capacity	3,750 sL/s	
Firm Air Supply Capacity	2,500 sL/s	
Mixing Requirements		
Aeration Mixing Requirements	0.61 $L/m^2/s$	MOECC Design Guidelines
Aeration Tank Length	42.75m	
Aeration Tank Width	15.00m	
No. of Tanks	2	
Total Aeration Tankage Surface Area	1,282.5 m^2	
Total Aeration Mixing Requirement	2,528 sL/s	
Total Installed Aeration Capacity	3,750 sL/s	
Firm Installed Aeration Capacity	2,500 sL/s	Largest unit out of service
Final Effluent Dissolved Oxygen		
Average Final Effluent Dissolved Oxygen	7.7 mg/L	Measured 2010 - 2014
5^{th} Percentile Final Effluent Dissolved Oxygen	2.3 mg/L	Measured 2010 - 2014
Minimum Final Effluent Dissolved Oxygen	1.6 mg/L	Measured 2010 - 2014
C of A Stipulated Minimum Final Effluent Dissolved Oxygen	5.0 mg/L	

Notes
1. Installed aeration equipment consist of 3 Gardner-Denver multi-stage centrifugal blowers, Model 742, 150 kW, each rated at 1,250 sL/s at 69.64 kPa
2. Design minimum dissolved oxygen (DO) target in the aeration tanks is 2.0 mg/L.

Calculations indicate that the total theoretical aeration capacity at the plant is sufficient to meet average day oxygen requirements for both design and actual sewage strength values, as well as mixing requirements. However, operational data indicates that raw sewage strength is significantly greater than the design basis, with average $CBOD_5$ and TKN measured at 699 mg/L and 83 mg/L, respectively, compared to design basis values of 550 mg/L and 55 mg/L, respectively. Average measured values indicate an increase in concentration of 27% and 51% respectively for incoming $CBOD_5$ and TKN. Although the above theoretical calculations indicate a potential deficit in firm aeration capacity, operational data for the period 2010-14 inclusive indicates consistently very low effluent $CBOD_5$ and total ammonia nitrogen which demonstrates that aeration capacity is sufficient to produce consistently good quality effluent with high rates of carbon assimilation and nitrification. In addition, dissolved oxygen levels in the aeration tank were 2.9 mg/L for the same operational period. Furthermore, it is noted that the plant's Certificate of Approval stipulates a minimum monthly average of 5.0 mg/L dissolved oxygen in the final effluent to reduce impacts to the aquatic ecosystem in the Middle Maitland River. During the period of 2010 to 2014, the plant averaged 7.7 mg/L DO which meets the requirements of their C of A, but DO did occasionally drop as low as 1.6 mg/L. All DO values less than 5 mg/L occurred during October, 2011, and may be the result of a specific process upset. Excluding this month from the data set, the minimum final effluent DO concentration is 5.1 mg/L.

Following biological treatment, the flow is split between two secondary clarifiers, each with a 30.0m diameter, and 4.0m side water depth. Operating conditions and design guidelines are summarized in the table below.

Table 19. Design Guidelines – Secondary Clarifiers

Item Description	Units	Average Day Flow 9,030 m^3/d	Peak Day Flow 25,500 m^3/d	MOECC Design Guidelines	Metcalf & Eddy
Average MLSS (2010-14)	mg/L	5,284			
Average RAS Flow (2010-14)	% Q	100 (measured)			
Total Surface Overflow Rate (SOR)	m^3/m^2-d	6.4	18.0	40	16 to 28 (avg flow) 40 to 64 (peak flow)
Firm Surface Overflow Rate (SOR)	m^3/m^2-d	12.8	36.1		
Total Solids Loading Rate (SLR)	kg/m^2-d	66	187	170	120 to 192 (avg flow) 216 (peak flow)
Firm Solids Loading Rate (SLR)	kg/m^2-d	132	373		

Calculations summarized in the above table indicate that secondary clarification capacity at the plant is adequate in terms of hydraulic and solids loading rates under various operating conditions, with the exception of peak solids loading rate with one clarifier out of service (i.e. operating at 50% capacity).

The following table summarized capacity calculations for the two tertiary filters, each 22.56m long by 4.88m wide with a 280mm deep single media bed.

Table 20. Design Guidelines – Tertiary Filtration

Item Description	Units	Average Day Flow 9,030 m^3/d	Peak Day Flow 25,500 m^3/d	MOECC Design Guidelines	Metcalf & Eddy
Total Filtration Rate (SOR)	L/m^2-s	0.47	1.34	2.1	1.3 to 4.0 (2.0 typ.)
Firm Filtration Rate (SOR)	L/m^2-s	0.95	2.68		
Average Secondary Effluent TSS 95th Percentile Secondary Effluent TSS	mg/L	8.2 (measured 2010-14) 17.2 (measured 2010-14)			
Total Solids Loading Rate (SLR) Average TSS 95% Percentile TSS	mg/m^2-s	3.9 8.2	11.0 23.0	51	--
Firm Solids Loading Rate (SLR) Average TSS 95% Percentile TSS	mg/m^2-s	7.8 16.3	21.9 46.0		

Calculations summarized in the above table indicate that tertiary filtration capacity at the plant is adequate in terms of hydraulic and solids loading rates under various operating conditions, with the exception of peak flow rate with one filter out of service (i.e. operating at 50% capacity). In addition, firm capacity of filtration is shown to be marginally below MOECC design guidelines for peak flow rate coinciding with the peak (95th percentile) secondary effluent TSS concentration, although this operating condition is expected to be a rare occurrence.

Table 21. Design Guidelines – Effluent Disinfection

Item Description	Units	Average Day Flow 9,030 m^3/d	Max. Day Flow 25,500 m^3/d
Lamps per Module	no.	8	
No. of Modules	no.	15	
No. of Banks	no.	2	
Total No. of Lamps	no.	240	
Firm No. of Lamps	no.	120	
Estimated Tertiary Effluent UVT	%	60 to 80 (typ.)	
Average Effluent TSS (2010-14)	mg/L	6.6 (measured)	
Capacity at UV Dose of 16 mW-s/cm^2	Lpm/lamp	450	
Capacity at UV Dose of 16 mW-s/cm^2	MLD	156 (78 firm)	
Capacity at UV Dose of 40 mW-s/cm^2	Lpm/lamp	200	
Capacity at UV Dose of 40 mW-s/cm^2	MLD	69 (35 firm)	

Notes
1. Effluent disinfection by ultraviolet radiation using 2 banks of Trojan UV-3000 equipment.
2. C of A compliance limit for final effluent disinfection is 200 CFU/100mL.
3. Typical minimum UV dose for secondary effluent is 30 mW-s/cm^2, for tertiary effluent 20 mW-s/cm^2.

Calculations summarized in the above table indicate that theoretical firm UV capacity is adequate to achieve effluent disinfection under maximum flow conditions.

Table 22. Design Guidelines – Effluent Discharge

Item Description	Units	Average Day Flow 9,030 m^3/d	Max. Day Flow 25,500 m^3/d
Pump Type	--	Vertical turbine	
Pump Rated Capacity	L/s	148 (12,787 m^3/d)	
Pump Rated Head	m	14.5	
No. of Pumps	no.	3	

Notes
1. Effluent pumping equipment consists of 3 Layne and Bowler vertical turbine pumps, 30kW, each rated at 148 L/s at 14.5m TDH.

Calculations summarized in the above table indicate that theoretical firm capacity of the effluent pumping station is adequate to handle maximum flows.

The sludge management system generally consists of WAS piping from the RAS pumps, a single aerobic digester and a single digested sludge storage basin. A motorized valve is used for flow control to the digester, with flow monitored using a magnetic flow meter. The aerated digester and storage basins are constructed with earthen berms having open-top cells. Decant is sent to the on-site pumping station, where it is pumped to the headworks for treatment through the plant.

Table 23. Design Guidelines – Sludge Management

Item Description	Units	MOECC Value	M&E Value	Actual Value
Aerobic Digester Capacity	m^3	na	na	3,015
Aeration System Capacity (Total)	scmh	na	na	148
Aeration System Capacity (Firm)	scmh	na	na	74
WAS flow to Aerobic Digester	m^3/d	na	na	351 avg 638 peak
Digested Sludge Storage Basin Capacity	m^3	na	na	12,065
Minimum firm capacity air requirement for mixing and oxygen	L/m^3-s	0.5		n/a
Minimum recommended air requirement[1] for aerobically digested sludge	$m^3_{air}/m^3_{sewage}/min$	0.030	0.020 – 0.040	0.049 0.024
Volatile Solids Loading Rate	kg/m^3-d	1.6		1.1 (avg)
Min. recommended Sludge Stabilization Time (Solids Retention Time, SRT)	days	45	45	15
Minimum recommended sludge storage time on-site for non-agricultural source material[2]	days	240		81

Notes
1. MOECC values are from MOECC Design Guidelines for Sewage Works, 2008
2. M&E refers Metcalf and Eddy text “Wastewater Engineering”
3. scmh is standard cubic meters per hour

6.0 EVALUATION OF PROJECTS

GROUP A PROJECTS

6.1 TREATMENT PLANT PERFORMANCE

6.1.1 Background

Hydraulic re-rating of the WWTP represents an opportunity for the Municipality to potentially have the rated hydraulic capacity of the plant increased without implementing major physical plant upgrades. This would improve the plants ability to treat peak flows that typically occur during wet weather events. The re-rating opportunity was created when the treatment plant was converted from extended aeration activated sludge (EAAS) process to a biological nutrient removal (BNR) process in 2007 to handle high organic loadings generated from the Campbell's Soup Plant. The conversion was accomplished within the existing tankage with partition walls constructed within the original aeration tanks to create 2 parallel trains of anoxic and aerobic biological reactors. In 2008, when the Campbell's Soup Plant shut down, additional organic treatment and hydraulic capacity became available in the plant. Plant stress testing in 2009 resulted in re-rating of the organic capacity to the plant from 5,028 kg/d BOD_5 and 507 kg/d TKN to 8,000 kg/d BOD_5 and 507 kg/d TKN.

The following points are noted with respect to re-rating the capacity of a wastewater treatment plant.

- Current rated WWTP hydraulic capacity has a design average day flow of 9,030 m^3/d and a design maximum day flow of 25,500 m^3/d
- Hydraulic re-rating of a WWTP requires MOECC approval
- Must establish need (i.e. high influent flows, consistently excellent quality effluent, reduced loading to the plant, industrial growth, lagoon volume reduction)
- The West Lagoon is currently being used for flow equalization storage, effluent polishing to reduce load on tertiary filters, and flow control in order to meet effluent volume discharge limits during wet weather conditions

The potential for re-rating the plant was assessed using the following methods.

- Preparation of an updated calculation of the uncommitted reserve hydraulic capacity
- Review of plant operational data for compliance with C of A effluent quality criteria (concentration and loading)
- Analysis of plant operational data for treatment plant performance
- Comparison of plant design to MOECC Design Guidelines and textbook design guidelines
- Identification and analysis of trends in sewage flows, raw wastewater characteristics, and final effluent quality

Results of the above assessment methods are discussed as follows.

a) Uncommitted Reserve Hydraulic Capacity

One method for assessing the need for re-rating of treatment plant capacity is to determine the uncommitted reserve hydraulic capacity of the plant using the appropriate MOECC Procedure.

GM BluePlan (formerly G&M) prepared a report on the uncommitted reserve capacity of the WWTP for North Perth in June 2012. The Report was prepared in accordance with the procedure outlined in *MOECC Procedure D-5-1 : Calculating and Reporting on Uncommitted Reserve Capacity at Sewage* *and Water Treatment Plants.* The Report was based on operational data for the 3-year period of 2009 through 2011. At that time, the Report concluded that there is hydraulic treatment capacity for the equivalent of an additional 889 residential lots. The Report also concluded that the uncommitted hydraulic reserve capacity of the wastewater treatment plant is able to meet a projected annual growth rate of 1.33% in the Municipality of North Perth for the next 20 years if additional commitments are not made to industrial / commercial users or waste haulers. In 2010, IBI prepared the North Perth Master Growth Plan which indicated a 1.38% annual growth rate for the Listowel Ward and a 0.29% annual growth rate for the Elma Ward which includes Atwood for the high growth scenario. An update to the Plan was prepared by the IBI Group in 2014.

An updated calculation of the uncommitted reserve capacity is presented as follows:

The North Perth WWTP has a rated capacity of 9,030 m^3/d as indicated in C of A No. 3087-7K8NZC. In order to determine the uncommitted reserve capacity of the WWTP, flow data collected for the most recent 5-year period (from 2010 to 2014 inclusive) was selected since that data is considered representative, it meets MOECC criteria as per Procedure D-5-1, and it shows current trends in total sewage flows arriving at the plant.

As shown in the table below, annual average daily flow over the last five years (2010 – 2014) was 5,872 m^3/d. When subtracted from the plant design flow of 9,030 m^3/d there is a total hydraulic reserve capacity (Cr) of 3,158 m^3/d.

Table 24. Uncommitted Reserve Hydraulic Capacity Data

Year	Estimated Population	Average Day Flow (m^3/d)	Average Day Flow per Capita (m^3/capita/d)
2010	7,579	4,662	0.62
2011	8,084	6,238	0.77
2012	8,186	4,816	0.59
2013	8,291	7,056	0.85
2014	8,396	6,587	0.78
Averages	**8107**	**5,872**	**0.72**

1. Average Day Flow includes measured flows at Highway 23 Sewage Pumping Station, the Septage Receiving Station, and the main Atwood Sewage Pumping Station.
2. Population figures provided by North Perth.
3. Atwood connected to the North Perth system in July 2010.
4. People per unit rate value of 2.56 is from North Perth Master Growth Plan by IBI.

The uncommitted reserve hydraulic capacity of the waste water treatment plant is calculated using the following formula:

$$Cu = Cr - \frac{(L \times F \times P)}{H} - Cc$$

where Cu = Uncommitted hydraulic reserve capacity (m^3/d)
Cr = Hydraulic reserve capacity (m^3/d)
L = Number of unconnected approved lots
P = Existing connected population

H = No. of households or residential connections
F = Average daily flow per capita (m^3/capita/d)
Cc = Committed Industrial / Commercial Capacity not yet realized

The hydraulic reserve capacity of the system is:

$$Cr = 9{,}030 - 5{,}872 = 3{,}158 \text{ m}^3/\text{d}$$

An assumed daily flow commitment to industrial / commercial / institutional (ICI) users that are not yet connected to the system is:

$$Cc = 925 \text{ m}^3/\text{d}$$

The uncommitted reserve capacity of the waste water treatment plant is:

$$Cu = 3{,}158 - \frac{881 \times 0.72 \times 8{,}396}{3{,}043} - 925$$

$$Cu = 3{,}158 - 1{,}750 - 925 = 478 \text{ m}^3/\text{d} \quad (\sim 5\% \text{ of WWTP rated capacity})$$

The uncommitted reserve capacity of 478 m^3/d can service approximately:

$$\text{No. of people serviced} = \frac{478}{0.72} = 662 \text{ people}$$

This is equivalent to:

$$\text{No. of building lots} = \frac{662}{2.56} = 258 \text{ Lots}$$

An average rate of 2.56 persons per household and 881 unconnected approved lots are based on the North Perth Master Growth Plan 2014 update. Reserve capacity for an additional 258 lots is equivalent to meeting a local growth rate of approximately 0.45% per year up to 2031 (at a constant unit density). This is less than the anticipated growth rate of 1.38% as given in the IBI Master Growth Plan Report, 2010. It should also be noted that the 1.38% growth rate is for residential areas only, and does not include non-residential sewage flow from ICI growth that has a significant impact on remaining available capacity in future at the North Perth WWTP.

MOECC typically requires a municipality to freeze building permits when average day flows to a sewage treatment plant exceed 80% of design average day flow. Average measured flows for the past five years are 65% of plant rated hydraulic capacity, which is well below the level that would trigger a municipality to freeze building permits. If a growth rate of 1.38% is applied to the average wastewater flow (2010-14), the average flow to the plant will reach 80% of the rated capacity by approximately 2030. This assumes inflow and infiltration flows to the plant are not addressed. If committed ICI influent flows are included in the total flow estimate, the plant will reach 80% of its rated capacity around 2019, assuming new industrial and commercial connections are implemented before this time.

b) Compliance with C of A Effluent Quality Criteria

Another method for assessing the potential for re-rating of treatment plant capacity is to review recent operational data for compliance with effluent quality criteria stipulated in the Sewage works C of A for the plant. This is one way of determining the plant's ability to handle the current loading of various wastewater constituents.

The following table summarizes the treatment plant's ability to meet influent loading criteria as well as final effluent quality objectives and limits for the period from January 1, 2010 to December 31, 2014 inclusive. Data shown in columns labelled Objectives and Limits indicates frequency of compliance with C of A criteria. Compliance is presented as the number of months out of 12 per year when objectives were met, on average. For example, if the average monthly effluent BOD was less than the MOECC objective in all months except August during 2010, it would be scored "11 of 12". An exception to this is pH which must be maintained within a specified range at all times.

Table 25. Compliance with C of A Effluent Quality Criteria

Parameter	Symbol	Units	Objectives	Limits
Raw Sewage Influent				
Carbonaceous Biochemical Oxygen Demand (5-day) Loading (max 8,000 kg/d)	$CBOD_5$	kg/d	2010 : 12 of 12 2011 : 12 of 12 2012 : 11 of 12 2013 : 12 of 12 2014 : 12 of 12	na
Total Nitrogen Loading (max. 507 kg/d)	TKN	kg/d	2010 : 11 of 12 2011 : 10 of 12 2012 : 5 of 12 2013 : 12 of 12 2014 : 12 of 12	na
Final Effluent				
Carbonaceous Biochemical Oxygen Demand (5-day)	$CBOD_5$	mg/L	2010 : 11 of 12 2011 : 11 of 12 2012 : 9 of 12 2013 : 11 of 12 2014 : 12 of 12	12 of 12 (2010-14)
Total Suspended Solids	TSS	mg/L	2010 : 11 of 12 2011 : 11 of 12 2012 : 6 of 12 2013 : 3 of 12 2014 : 4 of 12	12 of 12 (2010-13) 11 of 12 (2014)
Total Ammonia Nitrogen	TAN	mg/L	2010 : 9 of 12 2011 : 12 of 12 2012 : 11 of 12 2013 : 12 of 12 2014 : 12 of 12	11 of 12 (2010) 12 of 12 (2011-14)
Total Phosphorus	TP	mg/L	2010 : 9 of 12 2011 : 7 of 12 2012 : 6 of 12 2013 : 6 of 12 2014 : 5 of 12	12 of 12 (2010-14)
Carbonaceous Biochemical Oxygen Demand (5-day)	$CBOD_5$	kg/d	na	12 of 12 (2010-14)
Total Suspended Solids	TSS	kg/d	na	12 of 12 (2010-14)
Total Ammonia Nitrogen	TAN	kg/d	na	11 of 12 (2010) 12 of 12 (2011-14)
Total Phosphorus	TP	kg/d	na	12 of 12 (2010-14) Except 2012 : 11 of 12
pH (measured daily)	pH	--	very few high	100% daily
Dissolved Oxygen	DO	mg/L	na	12 of 12 (2010-14)
Escherichia Coli (Geometric Mean)	E. Coli	count/ 100mL	na	11 of 12 (2010) 12 of 12 (2011-13) 11 of 12 (2014)

See Appendix A for graphs indicating raw sewage characteristics, as well as treatment plant compliance with effluent quality criteria in terms of concentrations and loadings as stipulated in the C of A for the period from January 1, 2010 to December 31, 2014.

The above direct comparison of operational data to C of A effluent quality criteria indicates that average monthly loading of sewage influent for $CBOD_5$ and TKN from 2010 to 2014 have been below objectives most of the time except for 2012 when total nitrogen loading to the plant was consistently elevated. The plant consistently met effluent quality compliance limits with very few exceptions. In addition, the plant consistently met effluent quality objectives with the exception of TSS and TP which occasionally exceeded objectives during this 5-year period. Notably, the number of non-compliant months for TSS and TP have generally increased annually since 2012, which could be related to poor filter performance when only one filter was online while the other one was shut down to be re-built.

c) Treatment Plant Performance

Another method for assessing the potential for re-rating of treatment plant capacity is to use recent operational data to calculate treatment plant performance in terms of percent removal of key wastewater parameters listed in the C of A. This is another technique to evaluate the plant's loading capacity.

Table 26. Treatment Plant Performance (2010-2014)

Parameter	Symbol	% Removal	
		Concentration	Loading
Carbonaceous Biochemical Oxygen Demand (5-day)	$CBOD_5$	99.2	98.9
Total Suspended Solids	TSS	98.8	98.6
Total Phosphorus	TP	97.4	96.6
Total Nitrogen	TN	90.7	88.2

<u>Notes</u>

1. Values calculated in the above table are based on monthly averages for the period from January 1, 2010 to December 31, 2014.
2. Concentrations are measured in terms of mg/L and loadings are calculated in terms of kg/day.

Analysis of plant operating data for percent removal of key wastewater constituents indicates a very high level of reduction. In addition, it is emphasized that the plant is achieving a high rate of total nitrogen reduction even though this is not required or stipulated in the C of A. The current C of A only requires nitrification (i.e. conversion of organic and ammonia nitrogen to nitrate), not de-nitrification (reduction of nitrate to nitrogen gas). See Appendix A for graphs indicating treatment plant performance for percent removal of wastewater quality parameters identified in the C of A.

d) Comparison to Design Guidelines

This method for assessing the potential for hydraulic re-rating of treatment plant capacity involves comparison of theoretical capacity of each unit process to industry standard design guidelines. Design guidelines used for this analysis included MOECC Design Guidelines for Sewage Works (2008) and Metcalf and Eddy Wastewater Engineering textbook, 2003, 4th Edition. Details of the analysis are presented above in Section 5.0 Analysis of Background Data, with overall results summarized in the following table. Note that total capacity is maximum physical capacity of the system, whereas the firm capacity is the available capacity when the largest unit is off line.

Table 27. Summary of Comparison to MOECC Design Guidelines

Unit Process	Total	Firm	Comments
Raw Sewage Pumping (Hwy 23 Pumping Station)	yes	no	Two pumps have 18,850 m^3/d capacity, less than design max day capacity of plant at 25,500 m^3/d
Raw Sewage Conveyance (forcemains)	yes	no	300mm AC forcemain cannot convey maximum day flows when main 450mm forcemain is out of service
Headworks – Bar Screen	yes	n/a	Currently only one bar screen in main influent channel
Headworks – Influent Channel	no	n/a	Currently undersized
Headworks – Aerated Grit Chamber	yes	n/a	There is only 1 grit chamber
Anoxic Reactors	yes	yes	
Aerobic Reactors	yes	no	F:M high, HRT low
Total Biological Process	yes	no	F:M, OLR high, SRT low due to high sludge wasting rate
Aeration Supply Capacity	yes	no	Aeration supply (blowers) capacity not sufficient when one blower out of service, actual influent BOD_5 and TKN concentrations are greater than design basis values
Secondary Clarification	yes	no	Solids loading rate high
Tertiary Filtration	yes	no	Hydraulic loading rate high
Effluent Disinfection	yes	yes	
Effluent Pumping	yes	yes	
Sludge Treatment	no	no	Currently undersized
Sludge Storage	no	no	Currently undersized

Notes
1. "yes" indicates that a unit process meets MOECC Design Guidelines. "no" indicates that a unit process does not meet MOECC Design Guidelines.

As indicated in the above table, theoretical design calculations indicate possible capacity constraints in the biological and solids removal processes at the plant. It is noted that the basis of design for the treatment plant is average and peak day design flows of 9,030 m^3/d and 25,500 m^3/d, respectively. In addition, original basis of design values for influent $CBOD_5$ and TKN were 550 mg/L and 55 mg/L, respectively. Plant operating data for 2010-14 indicates average flows of approximately 5,900 m^3/d and a 95th percentile flow of approximately 10,600 m^3/d indicating that hydraulic loading to the plant is not exceeding design values. However, for the same time period, average influent concentrations for CBOD5 and TKN are 699 mg/L and 83 mg/L respectively, which exceed design values by 27% and 51%, respectively. Higher raw sewage strength will constrain treatment plant capacity, particularly in the biological treatment and aeration steps as indicated by the above analysis.

See Appendix B for detailed of Basis of Design Calculations.

e) Analysis of Trends in Plant Operational Data

Table 28. Observed Trends in Treatment Plant Operating Data (2010-14)

Parameter	Average Annual % Change	Comments
Influent		
Flow	+ 8%	Increasing, Atwood connection in mid 2010, moderate growth in Listowel
$CBOD_5$ Loading	- 3%	Decreasing
TKN Loading	- 3%	Decreasing
$CBOD_5$	- 11%	Consistent
TSS	- 8%	Consistent
TKN	- 10%	Decreasing
TP	- 11%	Decreasing
Effluent		
$CBOD_5$	+ 2%	Increasing
TSS	+ 15%	Increasing
TAN	- 18%	Decreasing
TN	- 11%	Decreasing
NO_3	- 11%	Decreasing
TP	+ 4%	Increasing
pH	- 1%	Consistent
E. Coli	+ 8%	Increasing
Alkalinity	- 1%	Decreasing

Notes
1. See graphs in Appendix A for time-based profiles of each of the above parameters for the period from January 1, 2010 to December 31, 2014.

One of the main conclusions from review of trends in key wastewater parameters is that although flows to the plant are increasing, raw sewage strength is exhibiting a gradual decrease. These two trends may be related as flows from approximately 300 predominantly residential connections were added from Atwood, resulting in a relative reduction in blended sewage strength from all sources. Raw sewage strength in 2013 and 2014 was lower than in previous years while incoming flow for those same years was higher. Possible explanations include a change in imported waste stream quality and/or quantity, increased I/I flows due to above average precipitation (snow and rain) in 2013 and 2014.

Overall effluent quality for the above noted time period has been consistent or improving across most effluent quality parameters with the exception of solids (TSS) which has been steadily increasing. Average annual TSS concentrations in 2012 and 2013 were approximately twice as high as 2010 and 2011 values. Conversely, average annual TSS concentrations in secondary effluent have been relatively consistent over the same time period (2010-2014). This indicates possible degradation through the lagoons or performance issues with the secondary clarifiers, alum dosing system or filters.

Reduction of nitrogen species through the plant has shown strong improvements over the above noted time period.

Table 29. Comparison of Design Basis to Operational Data

Parameter	Design Basis	Measured Values (2010-14) (2.)	% Diff.
Design Average Day Flow	9,030 m^3/day	Average = 5,887 m^3/day	- 35%
Design Maximum Day Flow	25,500 m^3/day	95th percentile = 10,600 m^3/day 99.7 percentile = 18,800 m^3/day (1.)	- 58% - 26%
Influent $CBOD_5$	550 mg/L	Average = 699 mg/L	+ 27%
Influent TSS	550 mg/L	Average = 631 mg/L	+ 15%
Influent TKN	55 mg/L	Average = 83 mg/L	+ 51%
Influent Total Ammonia - N	40 mg/L	Average = 60 mg/L (estimated)	+ 50%
Influent TP	5.5 mg/L	Average = 15.0 mg/L	+ 173%
Calculated Loading Values at Design Average Day Flow			
Influent $CBOD_5$	8,000 kg/day (2008 re-rating)	4,115 kg/day	- 49%
Influent TSS	4,767 kg/day	3,715 kg/day	- 22%
Influent TKN	507 kg/day	489 kg/day	+ 4%
Influent Total Ammonia - N	361 kg/day	353 kg/day	- 2%
Influent TP	50 kg/day	88 kg/day	+ 76%

Notes

1. 99.7 percentile is equivalent to 364/365 to calculate the statistical maximum annual day flow for the data set covering the review period indicated.
2. Calculated loadings under Measured Values column are based on average influent flow and concentrations.

Comparison of values for the original basis of design to actual operational data for the period from January 1, 2010 to December 31, 2014 indicates that measured flows are lower than the design basis but raw sewage strength is significantly higher. Calculated values for loading of each wastewater constituent indicates that calculated average loading during the time period indicated is below the basis of design for $CBOD_5$ and TSS, close to design basis for nitrogen, and well above for phosphorus. As noted above, the C of A includes objectives for maximum loading for $CBOD_5$ and TKN, but not the other parameters.

6.1.2 Screening-Level Evaluation

Alternatives to increased rated plant capacity have been be identified and evaluated, through discussions and meetings with the Project Steering Committee. The ‘Do Nothing’ option would involve rerating the plant without any changes to equipment or operations, and the remaining alternatives increase the capacity of the treatment plant.

1. Do Nothing

“Do Nothing” or maintaining the status quo is a default option that must be considered for all projects in accordance with the EA process. This option looks at the feasibility of applying to the MOECC to increase the rated hydraulic capacity of the treatment plant with no process modifications, plant upgrades or expansion. This option is based on applying for plant re-rating strictly as a desk-top exercise without taking any operational or physical measures to reduce incoming flows, improve plant performance, or increase plant capacity.

2. Reduce Inflow / Infiltration to the Collection System

Known or suspected areas of inflow or infiltration (I/I) to the sewage collection system should be addressed to reduce excessive wet weather flows to the treatment plant. A cursory review of daily flow data for January 1, 2010 to December 31, 2014 as summarized in Table 8 indicates a moderate impact from wet weather flows and a modest seasonal flow profile. There is evidence of possible inflow to the Highway 23 SPS during high water levels in Middle Maitland River. The ratio of the 95th percentile flow to the average flow is 1.8 which indicates a peaking factor that is not excessive and compares well with MOECC Maximum Day Peaking Factor of 2.00 for communities with population in the range of 3-10,000 people. Review of graphs of daily and monthly flows indicates moderately higher flows in March and April, however review of recent plant influent flow data does not indicate excessive wet weather flows to the collection system. During investigation of maintenance holes within the floodplain of the Middle Maitland River in June 2015, no infiltration was observed. Further study is required to determine the full extent of inflow and infiltration and its impact on plant hydraulic loading.

3. Implement Water Conservation Measures in Listowel and Atwood

Reducing water consumption at the source results in lower wastewater flows being generated but the loadings to the plant would likely not change. A water conservation program in Listowel and Atwood may reduce flows to the wastewater treatment plant, although the overall impact from this alternative is difficult to predict and may be limited. This alternative does not require any agency approvals or involve construction. A public consultation process and promotional campaign would likely be required.

4. Reduce Imported Waste Flows / Loadings

The Septage Receiving Station (SRS) is being used to a significant extent and may have limited remaining spare capacity. Although the hydraulic loading from the SRS is not significant, the waste strength tends to be very high and consequently contributes significant organic and nutrient loading to the plant. Reducing the type of haulers with access to the SRS or reducing the overall quantity of waste received may reduce the strain on the treatment plant and improve performance.

5. Limit Development in Listowel / Atwood

Limiting development in Listowel and Atwood would reduce the rate of growth in flows delivered to the plant. However, this would not improve current performance of the plant but would increase the uncommitted reserve capacity of the plant going forward. Limiting community growth may be politically difficult to implement.

6. Optimize / Upgrade Treatment Plant

This option involves optimizing existing plant processes and performance or adding additional equipment to improve plant performance. This option may include plant optimization measures such as process adjustments to mixed liquor recycle rates, activated sludge return and wasting rates, and timing of SRS flows to the plant. This option may also include replacement or installation of specific pieces of process equipment such as additional aeration blowers, new fine bubble diffusers or throttling valves at the blower discharge, upgrading the tertiary filters, or replacement of the filters with an alternative technology such as membranes. In addition, the location of alum dosing could be adjusted to improve mixing, and reduce chemical consumption. To improve system monitoring, and to better allow for process optimization, a flow meter at the plant inlet would be beneficial. Approval from MOECC and possibly other agencies may be required to implement this alternative depending on specific measures that are implemented. A Class EA would be required to re-rate the plant through optimization and upgrades.

7. Expand Treatment Plant

This option would involve design and construction of additional treatment capacity that would result in increased plant capacity beyond current rated capacity. This option is intended to capture major plant upgrades or expansion works such as construction of additional treatment tankage. A Municipal Class EA would be required and approvals from several regulatory agencies including MOECC and the Maitland Valley Conservation Authority (MVCA) would be required to implement this alternative.

Table 30 below summarizes results of screening-level evaluation of alternatives for increasing the hydraulic capacity of the existing treatment plant. See Appendix C for the complete screening level evaluation matrix.

6.1.3 Detailed Evaluation

Of the initial list of 7 alternatives for screening, 5 were carried forward for detailed evaluation, consisting of the following.

- Do Nothing
- Reduce Inflow / Infiltration to the Collection System
- Reduce Imported Waste Flows / Loadings
- Optimize / Upgrade Treatment Plant
- Expand Treatment Plant

The potential for rerating the hydraulic capacity of the plant is related to some of the other projects under this Master Plan, including the future status of the Septage Receiving Station (SRS), tertiary filtration, and status of the lagoons. With demonstrated high strength wastewater being hauled to the plant, the potential for rerating plant hydraulic capacity is related to future status of the SRS, although mainly in terms of sewage strength (i.e. organic loading) rather than hydraulic loading. Lab results for effluent quality indicate challenges with the current plant consistently meeting effluent objectives for TSS, which may be addressed through upgrades or modifications to tertiary filtration. The potential exists to use the existing West Lagoon for flow equalization to mitigate impacts from brief periods of high hydraulic loads if balanced and metered appropriately.

The table on the next page summarizes results of detailed evaluation of alternatives for increasing the hydraulic capacity of the existing treatment plant. See Appendix C for the complete detailed evaluation matrix.

Table 30. Screening Evaluation – Treatment Plant Capacity

Evaluation Criteria	1. Do Nothing	2. Reduce Inflow / Infiltration	3. Implement Water Conservation	4. Reduce Imported Waste Flow / Loading	5. Limit Growth in Listowel &/or Atwood	6. Optimize / Upgrade Plant	7. Expand Plant
Ability to Address the Problem	3	6	1	9	6	9	9
Technical Feasibility	6	4	2	6	2	6	4
Relative Cost-Benefit or Life Cycle Cost of Implementation	2	6	3	2	4	6	4
Energy Consumption/Ecological Footprint (e.g. GHG emissions)	2	3	2	2	2	2	2
Compatibility with Municipal, County, and Provincial Policies, Regulations, and Studies	1	2	2	1	1	2	2
Alternative is Well-Established and Proven	3	2	2	1	1	2	3
Overall Score	17	23	19	21	16	27	24
Status	carried forward	carried forward	not carried forward	carried forward	not carried forward	carried forward	carried forward

Table 31. Detailed Evaluation – Treatment Plant Capacity

Evaluation Criteria Categories	1. Do Nothing	2. Reduce Inflow / Infiltration	3. Implement Water Conservation	3. Reduce Imported Waste Flow / Loading	4. Limit Growth in Listowel &/or Atwood	6. Optimize / Upgrade Plant	7. Expand Plant
Technical Considerations	1.58	1.85		2.60		2.83	2.90
Approvals Requirements	2.03	2.20		2.20		2.03	1.48
Financial Considerations	1.03	2.03		0.70		1.35	1.43
Environmental and Social Impacts	1.55	1.80		1.80		1.80	1.70
Overall Score	6.18	7.88		7.30		8.00	7.50
Overall Rank	5	2		4		1	3

Note: Values in the above tables indicate weighted scores for each criterion. A high score and low rank indicate a preferred alternative.

Table 32. Qualitative Evaluation - Treatment Plant Hydraulic Capacity

Alternative	Advantages	Disadvantages	Notes
Do Nothing	• No cost to implement • No approvals required	• Does not address the problem • Will not accommodate future growth • Plant performance may deteriorate as current capacity is reached	• This could include a desktop rerating of plant without any physical modifications to the plant equipment or operating procedures.
Reduce Inflow / Infiltration to the Collection System	• No approvals required • Known or easily identifiable source can be rectified with low capital cost (e.g. manholes on the main trunk sewer located in the Maitland River flood plain near Highway 23 pumping station).	• Limited cost-benefit to identify and eliminate all source of extraneous flow • Although the Listowel sewer system does experience wet weather flow response, it is not considered to be an extremely high contribution to total sewage flows • No known or easily identifiable sources of infiltration can be found based on field investigation in June 2015	• Ongoing maintenance issue that should be addressed regardless of the Master Plan conclusions
Reduce Import Waste Flow / Loading	• No approvals required • Reduction of BOD, nitrogen, FOG loading to plant, improving plant performance	• Lost revenue stream for Municipality • May negatively affect local businesses that rely on North Perth Septage Receiving Station for wastewater disposal	• Improved screening of hauled waste would allow operators to better filter out very high strength wastes that would most impact plant performance; quality monitoring/verification program would be beneficial
Optimize or Upgrade Plant	• Moderate capital cost • Will partially address problem of plant performance and organic capacity • Minimal approvals requirements • Technically feasible • Can be done in stages over time • Takes advantage of robust system already in place	• Potential increase in plant capacity may be limited	• Stress testing of plant following optimization efforts may provide justification for plant hydraulic rerating
Expand Plant Beyond Rated Capacity	• Will adequately address problem of plant performance • Will increase hydraulic and organic capacity • Technically feasible	• Significant capital cost • Formal approvals process required • Schedule C Class EA required	

6.1.4 Summary of Results

Results of detailed evaluation of alternatives indicate that optimizing and upgrading the plant is the recommended solution; however this will have to be validated through a subsequent EA process.

Assessment of the potential for re-rating of treatment plant capacity using methods described in section 6.1.1 indicates limited justification for obtaining MOECC approval based on the status quo (i.e. the “Do Nothing” option). Principal reasons for this assessment include difficulty in consistently meeting effluent quality objectives for TSS and TP, higher raw sewage strength than the original design basis, and an increasing trend in effluent solids concentrations.

Furthermore, although average plant BOD loading from 2010 to 2014 was well below the rated level, nitrogen and phosphorus loading during this period exceeded the design basis. Combined with the inability to consistently achieve effluent objectives for these parameters, it is not advisable to increase the plant rating without upgrading treatment equipment or optimizing processes. Following plant optimizations, it is recommended that stress testing be performed on the plant that could be used to justify a plant rerating using the existing plant infrastructure.

If plant optimization measures are unsuccessful in increasing plant capacity to meet future demands, a third treatment train may be required.

6.2 PLANT OUTFALL LOCATION

6.2.1 Background

Final effluent from the North Perth WWTP is currently discharged via the onsite effluent pumping station and a forcemain that outlets to the Middle Maitland River on the east side of Highway 23 and just north of the Highway 23 sewage pumping station (SPS). The forcemain is a 450mm diameter PVC pipeline, approximately 1.5 km long, and follows the same route as the incoming raw sewage forcemain from Highway 23 SPS.

There may be an opportunity to establish a new plant outfall that discharges directly to the Chapman Drain locally in the vicinity of the plant. The Drain is an “open dry ditch” designed to collect agricultural runoff and passes through the plant property as shown on Drawings G02, G03, and G04 in Appendix E. This alternative offers several advantages including significantly reduced long-term energy costs for effluent pumping. In addition, this would eliminate the need for the existing effluent forcemain from the plant to the Maitland River and make it available for use as a redundant influent sewage forcemain from Highway 23 SPS which would result in significant savings in capital costs if a new raw sewage forcemain had to be constructed. See Section 6.7 Highway 23 SPS below for further discussion on the potential synergies between that project and establishing a new plant outfall. This redundancy would also facilitate shutting down a forcemain for annual maintenance and cleaning and provide additional influent conveyance if needed. The existing influent forcemain has been identified as a critical piece of infrastructure that currently does not have redundancy. It is noted that there is an existing arch culvert on the Chapman Drain in front of the plant that will likely be removed as part of any option for direct discharge.

Existing Plant Discharge Location at Middle Maitland River, east side of Highway 23

It is possible that discharge to the Chapman Drain will require more stringent effluent criteria (dry ditch criteria) and require as a minimum, a comprehensive assimilative capacity assessment along with formal consultation and approvals processes with MOECC and MVCA, as well as a Municipal Class EA. Additionally, it is expected that three seasons of quality and flow monitoring would be required by the MOECC at the outfall location to verify conformance.

The invert elevation of the plant effluent channel downstream of the flow measurement flume is 372.28m, which is marginally higher than the bottom of the Chapman Drain at approximately 372.00m near the plant. However, initial review of key facility elevations indicates that gravity discharge to the Chapman Drain would not be possible under all flow conditions (e.g. regional flood). Consequently, “low-head lift” or pumping of final effluent would still be required, but at a significantly lower energy consumption rate.

A public consultation process would also be required with all land owners within the watershed of the Chapman Drain. Since flow in the Drain will increase if plant effluent were discharged to the Drain, there will also be a corresponding increase in the likelihood of flooding due to the added flow contribution, and this will have to be addressed. Through the Drainage Act, there may also be renegotiation of the existing maintenance cost sharing arrangement with all landowners currently serviced by the Drain. An Engineer’s report is required under Section 65 of the Drainage Act. This report is subject to appeal by the landowners on the drain to the Drainage Tribunal. The Drainage Act would have to be reviewed further to determine issues and considerations to be addressed by adding a continuous point-source discharge to the Chapman Drain. A full-cost comparison between current practice and direct discharge to Chapman Drain should be completed to verify that the potential savings in pumping (i.e. energy) costs outweigh other costs associated with connection to the Chapman Drain under the Drainage Act.

The Chapman Drain discharges to the Middle Maitland River approximately 2 km downstream from the existing plant outfall at the Highway 23 SPS. It would have to be verified with MOECC, MNR, and MVCA that there are no issues regarding minimum base flow within that 2 km reach of the River if plant effluent discharge is required to maintain a minimum base flow.

If more stringent effluent quality criteria for direct discharge to Chapman Drain are required, there may be justification to replace the existing media filters with membrane filtration to polish secondary effluent to a higher quality that may be suitable for that receiver. The existing UV disinfection system may have to be replaced with newer generation UV equipment that delivers a higher dosage to meet potentially higher effluent quality standards in terms of effluent disinfection and E. coli levels. Membranes could be installed in such a way to allow gravity discharge to Chapman Drain. Typically some form of pumping or vacuum is required for membrane filtration.

A cursory desk-top review of assimilative capacity of the Middle Maitland River in the vicinity of the plant outfall was conducted. The current C of A for the treatment plant does not include water quality monitoring requirements for the Middle Maitland River receiving stream. Topographic and regional flood level information was obtained from MVCA. In addition, stream flow and level data were obtained from the Water Survey Canada (WSC) database maintained by Environment Canada. This information was supplemented with in-stream water quality data available from the MOECC Provincial Water Quality Monitoring Network (PWQMN). No water quality or stream flow data was available for the Chapman Drain.

Data from the following monitoring stations were used in the analysis.

<u>EC WSC</u> stream flow monitoring stations on Middle Maitland River:
Listowel 02FE003 (approx. 30 m downstream of WWTP outfall at Highway 23)
Belgrave 02FE008 (approx. 50 km downstream of Highway 23)
Ethel 02FE013 (approx. 20 km downstream of Highway 23)

Only the WSC flow monitoring station at Listowel was used in the analysis since the other stations are located a significant distance downstream from the plant outfall with much larger catchments.

MOECC PWQMN water quality monitoring stations on Middle Maitland River:
Trowbridge Station No. : 0800 5600 902 (approx. 6.5 km downstream of WWTP outfall)
Listowel (at Hwy 23) Station No. : 0800 5601 302 (approx. 30 m downstream of WWTP outfall)
Listowel (Union St.) Station No. : 0800 5604 702 (approx. 1.5 km upstream from WWTP outfall)

Stream flow data from Environment Canada WSC was available for the period from January 1953 to December 2012 inclusive on a mean monthly basis. A summary of stream flow data for the Middle Maitland River at Highway 23, as collected by Environment Canada WSC is presented in Table 33.

Table 33. Summary of Stream Flow Data for WSC Station 02FE003

Parameter	Flow (m^3/sec)	Flow (m^3/day)
Middle Maitland River		
Overall Average Daily Flow	0.985	85,117
Minimum Monthly Average Day Flow (summer 1958)	0.010	864
Minimum Monthly Average Flow (Jan. 1961)	0.014	1,210
5th Percentile of Monthly Average Flow Data	0.040	3,456
0.1 Percentile of Monthly Average Flow Data (1.)	0.017	1,508
North Perth Wastewater Treatment Plant		
Average Day Rated Capacity	0.105	9,030
Average Measured Flow (2009-13)	0.071	6,160
Maximum Day Rate Capacity	0.295	25,500
Maximum Day Measured Flow (2009-13)	0.221	19,058

<u>Notes</u>
1. The 0.1 percentile flow is similar to 1 week out of 20 years or 1/1,040 for the purposes of establishing a rough approximation of a 7Q20 stream flow from the data set.

Typically, the low flow statistic used by the MOECC for continuous discharges to evaluate a stream's assimilative capacity is 7Q20. This is the minimum 7-day average stream flow with a recurrence interval of 20 years. Statistically, this parameter indicates a 5 percent chance of there being inadequate stream flow to meet the minimum acceptable dilution in any given year. Stream flow data from WSC was available on a monthly average day basis, but does not include individual daily stream flow data. Consequently, determination of a 7Q20 flow could not be established directly. Review of flow data in the above table indicates the dilution ratio in the Middle Maitland River for average river flow at average measured plant flow is 14-to-1. The dilution ratio under a rough approximation of a 7Q20 flow is 0.25-to-1, i.e. average measured plant would be approximately 4 times greater than the 7Q20 flow. It is noted however that further study and data analysis would be required to establish a more representative value for the 7Q20 flow in the Middle Maitland River at Highway 23.

Figure 1 shows the time-based flow profile for the Middle Maitland River which exhibits expected seasonal variations within an overall near constant flow rate. The linear trend line is essentially flat indicating no long-term increasing or decreasing trend in average annual flow rate.

It is noted that prior to 1961, there was no flow from the WWTP to the Middle Maitland River. Also, from 1961 to 1994 the lagoon discharged to the Chapman Drain at a rate that fluctuated seasonally. Because the Chapman Drain discharges to the Middle Maitland River downstream of WSC Station 02FE003, this flow is not included in the data shown in Figure 1.

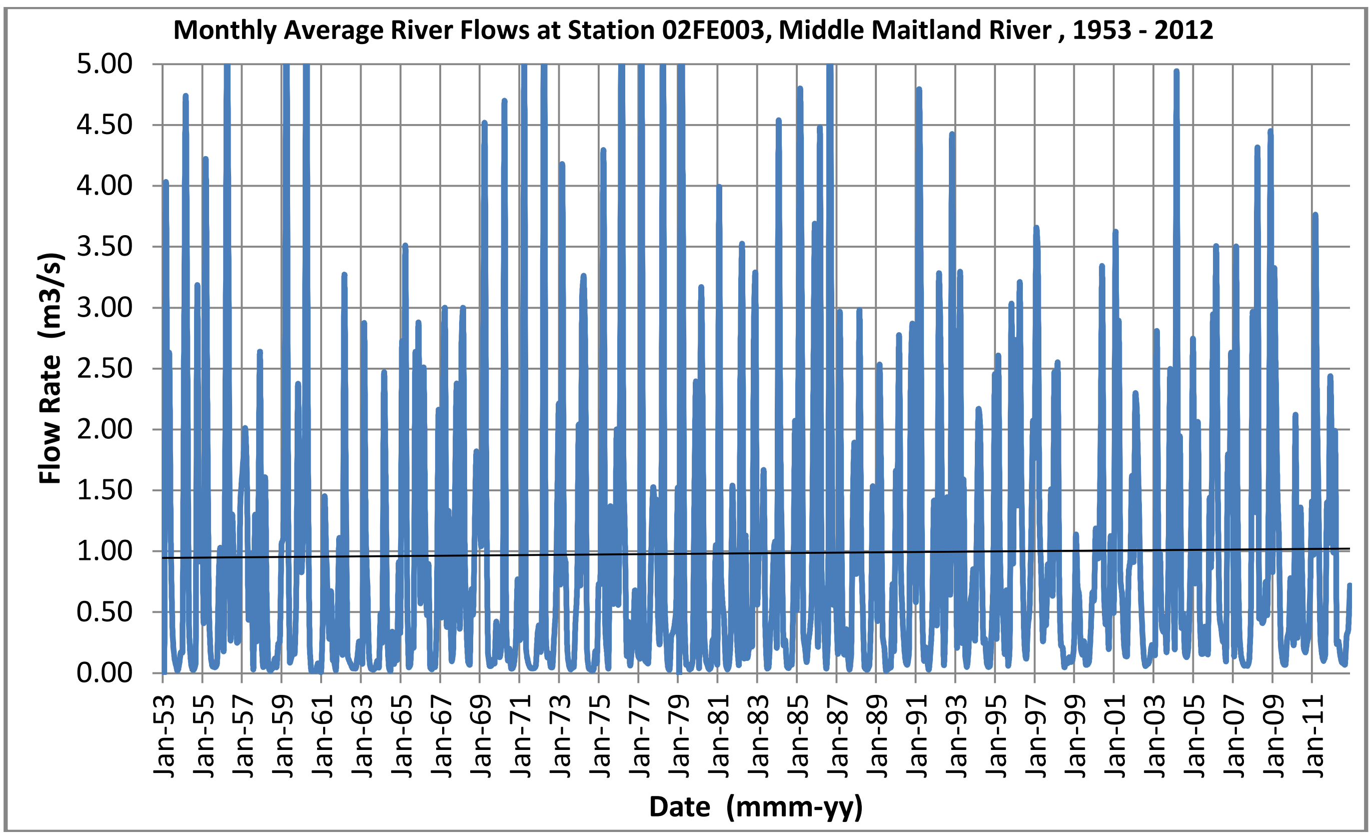


Figure 1. Monthly Average Day Stream Flow - Middle Maitland River at Highway 23

Limited water quality monitoring data from MOECC PWQMN was available for the period from 2002 to 2011 for sampling events on specific dates. Available water quality data for key surface water quality parameters for the 3 above noted monitoring stations are summarized in the following table and compared to the Provincial Water Quality Objectives (PWQO).

Table 34. Summary of PWQMN Water Quality Data

Parameter	Average Concentration (mg/L)			
	PWQO	Listowel (Union St.)	Listowel (Highway 23)	Trowbridge
Number of Data Points	--	1	11	25
Alkalinity	reduce < 25%	nd	280	250
CBOD-5	na	nd	nd	nd
Dissolved Organic Carbon (DOC)	na	3.2	nd	7.1
Conductivity	na	nd	1,030	1,088
pH	6.5 – 8.5	nd	8.36	8.47
Chloride	na	32.8	125.9	119.4
Total Ammonia Nitrogen	na	nd	0.105	0.051
Un-ionized Ammonia	0.020	nd	nd	nd
Nitrate	na	nd	4.5	2.4
Nitrites	na	nd	0.152	0.036
Total Phosphorus	0.030	0.020	0.183	0.082
Total Kjeldahl Nitrogen (TKN)	na	0.33	1.24	1.21
Total Suspended Solids (TSS)	na	486	702	nd
Turbidity	reduce < 10%	4.85	3.56	nd
Temperature	na	nd	14.0	16.5
E. Coli	100 CFU/100mL	nd	nd	nd
Dissolved Oxygen (temperature dependent)	5 - 8	nd	8.7	11.8

Notes
1. PWQMN monitoring station locations :
   Trowbridge (approx. 6.5 km downstream of WWTP outfall)
   Listowel (at Hwy 23) (at WWTP outfall)
   Listowel (Union St.) (approx. 1.5 km upstream from WWTP outfall)
2. There was only one set of samples available for the monitoring station at Union Street in Listowel (December 9, 2003).
3. The monitoring stations at Union Street and Highway 23 have been inactive since 2003.
4. “nd” indicates no data.

The PWQO are widely used to assess surface water quality in Ontario and are part of the consideration for establishing effluent quality objectives for new point source effluent discharges such as wastewater treatment plant outfalls. Parameters measured include Dissolved Organic Carbon (DOC), Total Suspended Solids (TSS), Total Phosphorus (TP), Total Ammonia Nitrogen, Total Kjeldahl Nitrogen (TKN), phosphorus, conductivity, alkalinity, dissolved oxygen (DO), pH, and temperature, as well as various metals. MOECC Procedure B-1-5 Deriving Receiver-Water Based Point-Source Effluent Requirements for Ontario Water is a key guidance document for establishing effluent quality criteria based on assimilative capacity of the receiving stream along with MOECC Guideline F-5 Levels of Treatment for Municipal and Private Sewage Treatment Works Discharging to Surface Waters.

Analysis of historical stream monitoring data indicates possible differences in water quality upstream and downstream of the WWTP in terms of chlorides, phosphorus, and nitrogen, although further site-specific study would be required to draw firm conclusions. It is noted that the total phosphorus (TP) concentrations in the Middle Maitland River at Highway 23 and at Trowbridge are above the PWQO of 0.030 mg/L, which is common for many rivers and streams in Southern Ontario. This makes the River a Policy 2 stream in terms of phosphorus which means that best efforts are required to not further degrade the stream quality with respect to that parameter. If MOECC imposes monitoring requirements for a new receiver, impacts from plant discharge related to phosphorus can be identified through careful selection of representative sampling locations upstream, downstream, and in the immediate vicinity of a new plant outfall.

In terms of nitrogen, the plant is a well-operated BNR plant that achieves high levels of nitrification (low ammonia) and de-nitrification (low nitrites and nitrates) in final effluent, thereby reducing nutrient loading to the receiving stream. The current C of A does not stipulate any effluent quality criteria for NO_3^-, only TAN. In addition, MOECC presently has no Provincial Water Quality Objective (PWQO) for NO_3^- in surface water. However, the Canadian Environmental Quality Guidelines published by the Canadian Council of Ministers of the Environment (CCME) has nitrate guidelines of 10 mg/L for drinking water and 2.9 mg/L for protection of freshwater aquatic life in surface water.

There is currently no monitoring data available for the Chapman Drain in terms of flow, water level, or water quality. If it is decided to pursue the option of direct discharge to Chapman Drain, a detailed assimilative capacity assessment would have to be conducted, including site specific flow and water quality monitoring, possibly over at least a 12 month period to obtain representative data for all 4 seasons specific to the Chapman Drain.

It is also noted that perimeter drains are installed around the anoxic and aeration tanks, the secondary clarifiers, the control building, and the filter building, which currently convey groundwater by gravity to the on-site pumping station to be treated through the plant. Because groundwater should not require treatment prior to discharge to a water body, it may be possible to redirect the perimeter drains to the effluent forcemain or Chapman drain, pending satisfactory quality testing. Although the perimeter drains contribute substantial flow to the plant, it is best practice to discharge ground water directly.

6.2.2 Screening-Level Evaluation

Based on the above considerations along with meetings with the Project Steering Committee, the following alternatives were identified for evaluation.

1. Do Nothing

Do Nothing or maintain the status quo is a default option that must be considered for all projects in accordance with the EA. It is noted that there are no issues or problems reported with the existing effluent pumping station, forcemain, or outfall. The effluent discharge system is currently functioning adequately. Although the existing PVC forcemains are currently 20 years old, they would be expected to have a remaining useable life of 30 to 50 years due to the high level of corrosion resistance in PVC. The pipeline operates under relatively low pressures of approximately 300 kPa at the plant to near zero at the discharge end with little hydraulic transients or cyclical shock loads due to continuous effluent pumping from the plant.

2. Direct Discharge to Chapman Drain

This option involves abandoning in place the existing effluent forcemain and installing an outfall directly to Chapman Drain in the vicinity of the plant. The length of outfall would be approximately 140 metres. As noted above, a gravity outfall to Chapman Drain is not feasible based on relative comparison of elevations in the final effluent channel of the plant to local invert elevations for Chapman Drain. Consequently, a low-head effluent pumping station would be required for this alternative. The existing effluent pumping station could be retrofitted with lower capacity pumps to meet this requirement in a cost effective manner.

This alternative would allow the existing effluent forcemain to be re-purposed as a redundant influent raw sewage forcemain.

3. Direct Discharge to Chapman Drain with Enhanced Treatment

This alternative involves an effluent outfall located at Chapman Drain at the same location as the previous alternative described above. However, this alternative involves plant modifications to produce a higher quality effluent. Plant modifications would generally consists of abandoning the media filters and providing ultra-filtration (UF) membrane polishing of secondary effluent from the clarifiers. Membrane equipment could be installed in a plant addition constructed directly above the existing filter room and at the same finished floor elevation as the main floor of the plant (378.00m). Effluent disinfection by UV and a flow measurement flume would also be installed at main floor level to replace the existing equipment located in the basement. For UF membranes, some form of low-head pumping or vacuum equipment would be required to lift secondary effluent from the basement of the plant and provide sufficient head to drive the liquid across the membranes. This would also provide sufficient head to achieve a gravity outfall to Chapman Drain.

This alternative would allow the existing effluent forcemain to be re-purposed as a redundant influent raw sewage forcemain, and provide higher quality effluent suitable for dry ditch effluent criteria.

4. Discharge to Middle Maitland River at an Alternate Location

This option would involve installing a new effluent forcemain to a new location on the Middle Maitland River. A cursory review of topographic mapping and information from the Maitland Valley Conservation Authority (MVCA) indicates a possible location approximately 1 kilometre downstream of the existing outfall with the pipeline being installed along the lot line between Lots 25 and 26 in Concession 1 of Elma Ward. The forcemain length would be approximately 1,200 metres. A pipeline easement would be required to provide North Perth with right of access to the pipeline and outfall. A service road along the pipeline route may also be considered for access to valve chambers and the outfall at the River.

This alternative would allow the existing effluent forcemain to be re-purposed as a redundant influent raw sewage forcemain, and would not require the more stringent effluent criteria and associated study work required for discharging to the Chapman Drain. However, it would not offer any significant energy savings for the WWTP.

5. Split Discharge to Middle Maitland River and Chapman Drain

This option would involve 2 separate effluent outfalls; one to the Middle Maitland River and one to Chapman Drain. This alternative would reduce long-term pumping costs and provide operational flexibility to discharge a portion of total plant effluent flow to Chapman Drain during high flow periods or allow pipeline maintenance on the existing effluent forcemain. In addition, this alternative could allow the existing effluent forcemain to be re-purposed as a redundant influent raw sewage forcemain if discharge to the River was at an alternate location, as proposed in the previous alternative.

6. Effluent Reuse ("Purple Pipe")

This option requires very specific local circumstances, including primarily large non-potable water users located in the vicinity of the treatment plant. This option is more suited to arid regions with very high water demand, such as the American southwest. These conditions do not currently exist and consequently this option ranked very low in the screening level evaluation and was not considered worthwhile for further evaluation.

7. Sub-surface Effluent Disposal

Feasibility of this option would require very specific site conditions, including a large undeveloped land area, preferably municipally-owned, with highly favourable soil conditions such as coarse grained permeable soils, and be located a safe distance up-gradient of any water supply wells. These conditions do not currently exist and consequently this option ranked very low in the screening level evaluation and was not considered worthwhile for further evaluation.

See Appendix C for the complete screening level evaluation matrix.

6.2.3 Detailed Evaluation

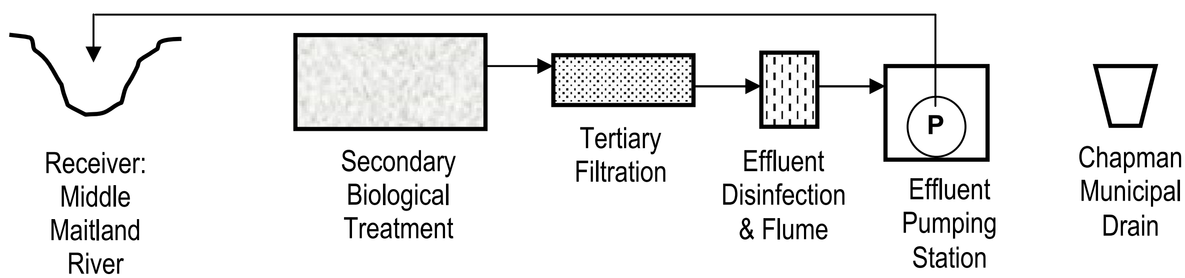
Of the initial list of 7 alternatives for screening, 4 were carried forward for detailed evaluation, consisting of the following.

- Do Nothing
- Direct Discharge to Chapman Drain
- Direct Discharge to Chapman Drain with Enhanced Treatment
- Discharge to Middle Maitland River at Alternate Location

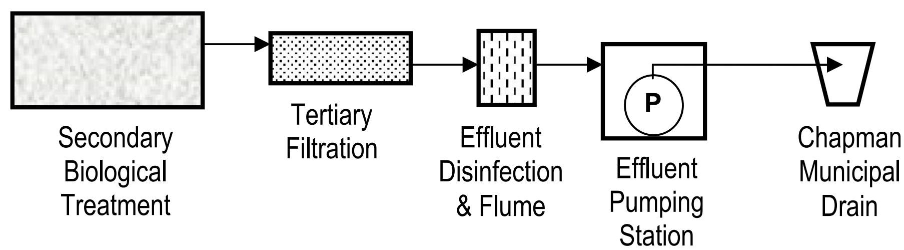
The following Figure presents a simplified process flow diagram for alternative outfall options that passed initial screening. More detail is presented on aerial maps and profiles on Drawings G03 through G06 appended to the back of this document.

Figure 2. Process Flow Diagrams for Alternative Plant Outfall Locations

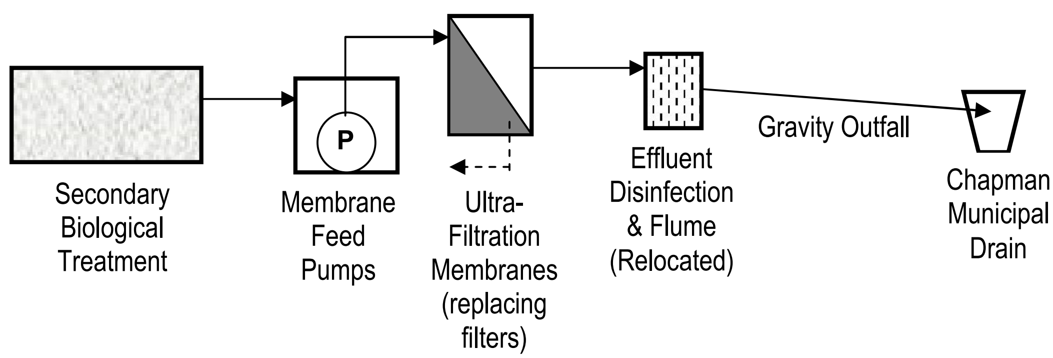
Option 1 – Existing System (Do Nothing)



Option 2 – Direct Discharge to Chapman Drain

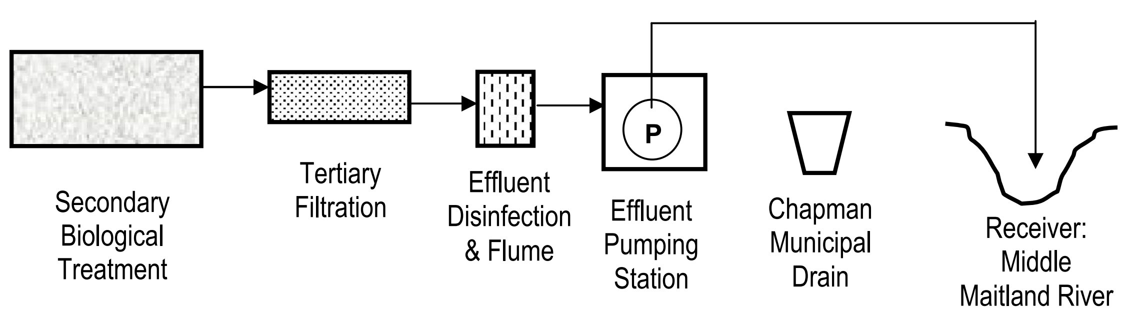


Option 3 - Direct Discharge to Chapman Drain with Enhanced Treatment



Note membrane reject waste stream gets recycled back to the headworks

Option 4 – Discharge to Middle Maitland River at Alternate Location



Assessment of options for an alternative plant outfall location is related to some of the other projects under this Master Plan, including wastewater influent conveyance, Highway 23 SPS, tertiary filtration, and future status of the lagoons. The existing elliptical culvert on the Chapman Drain in front of the plant would be removed as part of any option for direct discharge to Chapman Drain. A new culvert may be installed at a similar location to allow on-site vehicle across the Drain if required.

Table 35. Screening Evaluation – Alternative Plant Outfall Location and Table 36 on the next page summarize results of the screening and detailed evaluations of alternatives for the plant outfall location. See Appendix C for the complete detailed evaluation matrix as well as Drawings G04, G05, and G06 in Appendix E for details.

Table 35. Screening Evaluation – Alternative Plant Outfall Location

Evaluation Criteria	1. Do Nothing (Maintain Ex. Outfall)	2. Direct Discharge to Chapman Drain	3. Direct Discharge to Chapman Drain w/ Enhanced Treatment	4. Maitland River at Alternate Location	5. Split Discharge to River and Drain	6. Effluent Reuse ("Purple Pipe")	7. Sub-surface Effluent Disposal
Ability to Address the Problem	6	9	9	9	3	6	3
Technical Feasibility	6	6	4	4	4	2	2
Relative Cost-Benefit or Life Cycle Cost of Implementation	6	6	4	2	4	2	2
Energy Consumption/Ecological Footprint (e.g. GHG emissions)	2	3	3	2	2	2	2
Compatibility with Municipal, County, and Provincial Policies, Regulations, and Studies	3	1	2	2	1	1	1
Alternative is Well-Established and Proven	3	1	1	2	3	1	1
Overall Score	26	22	23	21	17	14	11
Status	carried forward	carried forward	carried forward	carried forward	not carried forward	not carried forward	not carried forward

Table 36. Detailed Evaluation – Alternative Plant Outfall Location

Evaluation Criteria Categories	1. Do Nothing (Maintain Ex. Outfall)	2. Direct Discharge to Chapman Drain	3. Direct Discharge to Chapman Drain w/ Enhanced Treatment	4. Maitland River at Alternate Location	5. Split Discharge to River and Drain	6. Effluent Reuse ("Purple Pipe")	7. Sub-surface Effluent Disposal
Technical Considerations	2.83	2.95	2.55	2.50			
Approvals Requirements	2.20	0.93	1.28	1.83			
Financial Considerations	2.08	1.78	1.48	1.35			
Environmental and Social Impacts	1.85	1.90	2.00	1.23			
Overall Score	8.95	7.55	7.30	6.90			
Overall Rank	1	2	3	4			

Notes: Values in the above tables indicate weighted scores for each criterion. A high score and low rank indicate a preferred alternative.

Table 37. Qualitative Evaluation - Alternative Outfall Locations

Alternative	Advantages	Disadvantages	Notes
Do Nothing (Maintain existing outfall)	• No cost to implement • No approvals required • No additional environmental studies required to verify a new receiving body • Can be implemented immediately	• Does not provide opportunity to re-purpose the existing outfall pipe as a backup raw sewage influent pipe • Long-term energy costs to pump effluent a long distance to existing outfall (same as status quo)	• Although this does not address redundancy requirements directly, it would combined with recommendations under Section 6.8: Wastewater Conveyance
Direct Discharge to Chapman Drain	• Long-term energy savings to discharge to a local receiver located on plant property • Opportunity to re-purpose the existing outfall pipe as a backup raw sewage influent pipe • Very little onsite work required, reduced construction cost	• Project would require an EA and a formal approvals process with MOECC, MVCA • More stringent effluent quality criteria may be imposed by MOECC • Enhanced treatment may be required • Drainage Act considerations • Cost sharing arrangement with existing landowners • Hydraulic assessment to verify Drain capacity	• Consider retrofitting the existing onsite effluent pumping station for alternate purpose • May be able to produce satisfactory effluent quality by re-building existing sand filters
Direct Discharge to Chapman Drain with Enhanced Treatment	• Long-term energy savings to discharge to a local receiver located on plant property • Opportunity to re-purpose the existing outfall pipe as a backup raw sewage influent pipe • Justifies upgrading filters and UV systems that are at the end of their service life • Provides higher quality effluent to meet future objectives	• Project would require an EA and a formal approvals process with MOECC, MVCA • More stringent effluent quality criteria may be imposed by MOECC • Capital cost for enhanced secondary effluent polishing (tertiary treatment) • Drainage Act considerations • Cost sharing arrangement with existing landowners • Hydraulic assessment to verify Drain capacity	• Consider retrofitting the existing onsite effluent pumping station for alternate purpose (ie. membrane feed, sludge transfer etc.)
Discharge to River at Alternate Location	• Long-term energy savings to pump to River through new shorter forcemain of larger diameter • Opportunity to re-purpose the existing outfall pipe as a backup raw sewage influent pipe	• Project would require an EA and a formal approvals process with MOECC, MVCA • More stringent effluent quality criteria may be imposed by MOECC • Enhanced treatment may be required	

6.2.4 Summary of Results

Results of detailed evaluation of alternatives indicate that the 'Do Nothing' option is preferable, and the existing effluent discharge forcemain should be maintained. The is the lowest risk alternative that is preapproved by the MOECC, and does not potentially require improved effluent quality, as does the Chapman Drain outfall alternative. Effluent pipeline redundancy can be achieved with a new influent/effluent forcemain from Highway 23 SPS to the WWTP, as discussed in Section 6.8: Wastewater Conveyance.

Additionally, it is recommended that the small quantity of flow collected by the perimeter drains be redirected and pumped to the effluent forcemain. A Permit to Take Water for the ground water collected from the perimeter drains is not required, as the volume is presumed to be less than 50,000 litres per day.

6.3 WASTEWATER CONVEYANCE (PIPELINES)

6.3.1 Background

This project relates to three (3) wastewater conveyance pipelines; the historical 300mm diameter by 1550m long asbestos cement (AC) raw sewage forcemain (currently not in regular service) from Highway 23 SPS to the lagoons, the 450mm diameter by 1450m long PVC raw sewage forcemain from Highway 23 SPS to the treatment plant headworks, and the 450mm diameter by 1500m long PVC effluent forcemain from the treatment plant to the outfall at the Middle Maitland River just east of Highway 23 adjacent to the SPS. All 3 pipelines follow the same route within a common easement that runs from Highway 23 SPS to the WWTP. A facility evaluation and risk assessment conducted by GM BluePlan for the Highway 23 SPS included recommendations for the related pipelines as follows:

- Raw sewage forcemain capacity for peak flows is limited due to accumulation of solids
- Critical infrastructure such as raw sewage forcemains should have redundancy
- Existing 300mm forcemain viability to be confirmed
- Develop maintenance program to keep forcemain clean and flushed
- Investigate alternatives to establish redundant influent and effluent forcemains
- Assess feasibility of establishing a single redundant forcemain configured for emergency influent/effluent (i.e. bi-directional) pumping
- Investigate abandoned forcemain and integrate for emergency use
- Install swab launch/retrieval and cleaning facilities/ports on forcemains
- Install pressure gauges and data loggers at existing combination air/vacuum valve chambers for monitoring
- Consider "ice pigging" of pipelines. Ice pigging eliminates risk of other materials such as foam swabs becoming lodged in the pipeline, which are not easily accessible to remove. The influent forcemain conveys raw unscreened sewage and therefore is susceptible to clogging and expected to require cleaning much more than the effluent forcemain which conveys relatively clean effluent water.
- Access to the pipelines is problematic due to its location through agricultural lands with no direct vehicular access and very few access chambers. Access is also restricted because no redundant pipes are available.

As noted above under the section related to the Highway 23 SPS, station flow testing indicated that the forcemain performance is limiting the station capacity, which is less than predicted with 2 pumps operating and significantly less than predicted with all 3 pumps operating. A principal cause of this was determined to be solids build up in the forcemain. Consequently, plant operators have implemented operational changes such as operating the pumps at 100% speed weekly to partially scour the pipeline clean and increase the minimum VFD speed of the pumps. It is noted that implementation of the recommended alternative for a new plant outfall to Chapman Drain under Project No. 2 above will be directly related to the recommended alternative under this project.

6.3.2 Screening-Level Evaluation

Based on the above as well as discussions and meetings with the Project Steering Committee, the following alternatives were identified for evaluation.

1. Do Nothing

The Do Nothing alternative is a default approach where no work would be performed on rehabilitating, repairing, or replacing the main wastewater pipelines.

2. Rehabilitate Existing 450mm Sewage Forcemain

This option involves rehabilitating the existing 450mm sewage forcemain to improve its hydraulic capacity, clean the inside of the pipe, remove accumulated solids, and possibly extend its service life. This alternative would also include upgrades or replacement of existing valves (air/vacuum, isolation, drain) and valve chambers along the pipeline route. It is noted that the logistics of this alternative would be challenging as it is currently the only in-service raw sewage forcemain between the main pumping station for Listowel and the treatment plant.

3. Rehabilitate Existing 300mm Sewage Forcemain

This alternative would be technically similar to the previous option to rehabilitate the 450mm forcemain. The principal difference would be that the objective of this alternative would be to return this currently abandoned pipeline to active service to provide temporary service and allow maintenance on the 450mm forcemain.

4. Rehabilitate Both Sewage Forcemains

This option would be a combination of the previous 2 alternatives, consisting of rehabilitation of both existing influent sewage forcemains. This alternative would provide a moderate degree of flexibility if the abandoned 300mm pipeline is rehabilitated first, thereby allowing temporary use of that smaller pipeline while the larger one is subsequently rehabilitated.

5. Construct New Sewage Forcemain

This alternative would involve construction of a new forcemain parallel to the existing forcemains and potential within the existing right-of-way if there is sufficient space. This option would involve significant capital cost but would result in a backup or redundant forcemain in the event of failure or major maintenance work on the existing pipeline.

The table below summarizes results of screening-level evaluation of alternatives for wastewater conveyance (pipelines). See Appendix C for the complete screening level evaluation matrix.

6.3.3 Detailed Evaluation

Of the initial list of 5 alternatives for screening, 4 were carried forward for detailed evaluation, consisting of the following.

- Do Nothing
- Rehabilitate Both Sewage Forcemains
- Construct New Sewage Forcemain

The option to rehabilitate the existing 300mm asbestos cement forcemain was not carried forward, as pressure testing in the pipe revealed multiple leaks, indicating poor structural integrity. The table on the next page summarizes results of detailed evaluation of alternatives for wastewater conveyance (pipelines). Furthermore, the alternative to only rehabilitate the influent forcemain was not carried forward, as it would only address part of the problem. It would make more sense to rehabilitate both influent and effluent forcemains. See Appendix C for the complete detailed evaluation matrix.

Table 38. Screening Evaluation – Wastewater Conveyance (Pipelines)

Evaluation Criteria	1. Do Nothing (i.e. Maintain Ex. Pipelines)	2. Rehab. Ex. 450mm Influent Sewage Forcemain	3. Rehab. Historical 300mm Forcemain	4. Rehab. Both Sewage Forcemains	5. Construct New Influent Sewage Forcemain
Ability to Address the Problem	3.00	6.00	6.00	9.00	9.00
Technical Feasibility	6.00	2.00	2.00	4.00	6.00
Relative Cost-Benefit or Life Cycle Cost of Implementation	2.00	4.00	4.00	6.00	4.00
Energy Consumption/Ecological Footprint (e.g. GHG emissions)	2.00	2.00	1.00	2.00	2.00
Compatibility with Municipal, County, and Provincial Policies, Regulations, and Studies	2.00	2.00	2.00	2.00	2.00
Alternative is Well-Established and Proven	1.00	2.00	1.00	3.00	3.00
Overall Score	16	18	16	26	26
Status	carried forward	not carried forward	not carried forward	carried forward	carried forward

Table 39. Detailed Evaluation – Wastewater Conveyance (Pipelines)

Evaluation Criteria Categories	1. Do Nothing (i.e. Maintain Ex. Pipelines)	2. Rehab. Ex. 450mm Influent Sewage Forcemain	3. Rehab. Historical 300mm Forcemain	4. Rehab. Both Sewage Forcemains	5. Construct New Influent Sewage Forcemain
Technical Considerations	2.35			2.75	3.10
Approvals Requirements	2.03			2.20	2.03
Financial Considerations	1.30			1.73	1.78
Environmental and Social Impacts	1.05			1.45	1.35
Overall Score	6.73			8.13	8.25
Overall Rank	3			2	1

Notes 1. Values in the above tables indicate weighted scores for each criterion. A high score and low rank indicate a preferred alternative.

Table 40. Qualitative Evaluation - Wastewater Conveyance (Pipelines)

Alternative	Advantages	Disadvantages	Notes
Do Nothing (Maintain existing Pipelines)	• No cost to implement • No approvals required	• Does not address problem of lack of redundancy of critical pipeline infrastructure	Direct discharge to the Chapman drain would justify this option (see Section 6.2)
Rehabilitate Both Existing 450mm Influent Sewage Forcemain and Historical 300mm Sewage Forcemain	• No approvals required • Not difficult to implement since staging the rehabilitation work the work would not impact operation of the existing in-service forcemain • Would result in a redundant forcemain available, although with limited hydraulic capacity • Can be implemented largely using trenchless methods, limited impact on surface works and farmland during rehabilitation	• Moderate cost • Serviceability of the aged AC pipeline not known • Fittings for AC pipelines are difficult to source, material becoming obsolete	The 450mm effluent forcemain could be re-purposed as a full capacity redundant sewage forcemain if a new plant effluent outfall is established (see Project No. 2)
Construct New Influent Sewage Forcemain	• Would result in a redundant forcemain available with full capacity • Can be implemented largely using trenchless methods, limited impact on surface works and farmland during rehabilitation	• High capital costs • MOECC Approval required • Impact on land owners along pipeline route • Public consultation may be required	• Not needed if direct discharge to Chapman drain is implemented

6.3.4 Summary of Results

Results of detailed evaluation of alternatives indicate that constructing a new 450mm redundant influent forcemain is the recommended alternative to maintain long-term viability and redundancy for wastewater conveyance. As part of this upgrade, the existing 450mm influent forcemain would be rehabilitated to improve flow capacity.

6.4 SLUDGE MANAGEMENT

6.4.1 Background

The North Perth WWTP was originally operated as a facultative lagoon system with pre-aeration in an aerobic cell, with sludge settling to the bottom of the lagoons, and gradually being broken down via natural biological processes over time. In 2000, after a mechanical treatment plant was put into service, the former unused aeration cell for the lagoons was converted into an aerated sludge digester and sludge storage basin.

In 2007, the plant was upgraded to a biological nutrient removal (BNR) process in place of the previous Extended Aeration Activated Sludge system to improve nitrogen and phosphorus removal. As a result, the quality and quantity of sludge changed.

The existing sludge management system consists of one aerated sludge digestion basin, one sludge storage basin, a blower building with two blowers and a motor control centre, a fine bubble air diffuser system, a sludge transfer station, a sludge loading station, a decant chamber with an adjustable weir gate, a WAS line, a flow meter and a motorized plug valve, in addition to the required control systems.

WAS from the secondary clarifiers is pumped into the aerated sludge digestion basin where it is aerobically digested by the fine bubble air diffuser system. Sludge thickening occurs by turning off the air diffusers, allowing the sludge to settle, and then lowering the weir gate to allow supernatant to flow to the on-site wastewater pumping station for treatment through the plant. Sludge is transferred by gravity from the digester to the adjacent storage basin and controlled by a valve located in the separating berm. During times of high flow, supernatant from the storage basin can be decanted into the East Lagoon to ensure adequate storage space is available for sludge. Digested sludge is loaded onto tanker trucks from the sludge storage basin for off-site disposal (land application).

Aerated Sludge Digestion Basin and Sludge Storage Basin

Operating parameters of the sludge management system are summarized in the following tables.

Table 41. Sludge Production, 2010-14

Process Stream	Flow Rate, m^3/d			Total Suspended Solids, %		
	Minimum	Average	Maximum	Minimum	Average	Maximum
WAS	0	351	1,067	0.33%	1.11%	3.14%
Supernatant to East Lagoon	--	11	--	--	0.10%	--
Digested Sludge Removed	--	72	--	0.20%	2.71%	4.30%

Table 42. Sludge Quality

Constituent	Average Value	Typical Values[1]
Total Suspended Solids in WAS	1.11%	
Total Solids in Digested Sludge (TS), %	2.71%	2 – 5%
Volatile Solids in Digested Sludge, % of TS	75.1%	30 – 60%
Total Ammonia–N, % of TS	1.21%	--
Total Kjeldahl Nitrogen (% of TS)	0.42%	1.6 – 3.0%
E. Coli (CFU/g)	12,022	--

Notes:
1. Average values are based on monthly digested sludge samples collected by North Perth from Mar-Aug, 2011 and Mar – Nov, 2013
2. Typical values are based on 'Digested Primary Sludge' values in Table 14.4 and Table 14-6 from Metcalf & Eddy

Table 43. Plant Organic Loading

Parameter	Design	Actual
Organic Loading Rate	8,000 kgBOD$_5$/day (rated capacity)	3,850 kgBOD$_5$/day (avg) 9,900 kgBOD$_5$/day (95th percentile) 31,800 kgBOD$_5$/day (peak)

Using the digested sludge production rates stated in the Plant's Annual Report to the MOECC between 2006 and 2013 and the actual available storage volume of ~12,000 m^3, the equivalent on-site storage time is ~160 days. This storage capacity is based on average BOD loading. If it is assumed that BOD loading is directly proportional to sludge production, it can be estimated that digested sludge volume at the rated capacity of 8,000 kgBOD$_5$/day will be approximately 150 m^3/day. In this case, the available on-site storage time is reduced to 80 days. Note that this is a conservative estimate of digested sludge production, as this assumes that the current solids reduction in the poorly operating digester is not improved. There is some potential for reduction in digested sludge production rate if the digester is optimized, or completely replaced.

Overall, the existing sludge storage facility has limited capacity to handle the current sludge loading rate, and is able to provide storage for ~160 days rather than the MOECC recommended 240 day sludge storage capacity as described in Nutrient Management Act Regulation 267/03 for non-agricultural source materials (NASM). At the rated organic plant capacity, the sludge storage time available is further reduced to 80 days, which is only 1/3 of the recommended storage time. Overall, the existing sludge management system has limited storage volume for digested sludge, and underperforms in terms of digestion and solids volume reduction.

Operations staff have also noted problems with improper air distribution and digestion which leads to sludge with poor settling characteristics. This in turn requires longer settling times and corresponding less aeration time which increases the potential for odour generation while decanting with the blowers off.

The decant water from the sludge storage basin is currently being directed to the East Lagoon. This is a not a sustainable approach, because the East Lagoon may eventually be decommissioned. A means of directing the decant liquid to an alternate location, such as the on-site wastewater pumping station may be preferable. Furthermore, the weir control valve chamber that controls the flow of decant from the digester to the influent pump station has no redundancy. In the case where the East Lagoon is decommissioned, this valve chamber will be a critical flow path, and redundancy should be incorporated.

In the past, sludge management facilities have also been a source of odour, leading to complaints from neighbours, although recent operational changes with timing of decanting the digester supernatant (ex. 4am blower shutdown) seem to have addressed this issue.

6.4.2 Screening-Level Evaluation

The following alternatives were considered for screening-level evaluation.

1. Do Nothing

Maintain the existing sludge management facility consisting of the earthen aerated sludge basin and storage basin, and maintain the current aeration/decant schedule for the aerobic digestion stage.

2. Rehabilitate Existing Sludge Management System

Rehabilitate the existing aerated sludge basin by replacing, cleaning or repairing plugged aeration diffusers to improve digestion efficiency. Continue hauling the sludge offsite for land application as Class B fertilizer. Redirect the storage basin decant from the East Lagoon to the on-site pumping station.

3. New, Higher Efficiency Aerobic Digester

Install new, higher efficiency aerobic digester with process configuration to optimize oxygen transfer, and decanting efficiency. Add additional sludge storage capacity to accommodate current and anticipated future sludge generation.

4. Sludge Thickening or Dewatering with Centrifuge

Thicken sludge with centrifuge prior to storage to reduce storage volume requirements. Continue hauling sludge offsite for land application as Class B fertilizer. Add third aeration blower for redundancy. The most typical centrifuge design for this type of application is the solid-bowl centrifuge.

5. Sludge Thickening or Dewatering with Gravity Belt Filter or Drum Style Thickener

Thicken sludge with gravity belt filter prior to storage to reduce storage volume requirements. Continue hauling sludge offsite for land application as Class B fertilizer. Belt filter presses require polymer addition in order to achieve solids thickening, so a chemical addition system would be included in this alternative.

6. Plant Operated Alkaline Stabilization

Install dewatering and alkaline stabilization equipment to process stored sludge on-site to replace the existing sludge facility, and generate a Class A biosolids product with higher net value. A storage facility for the finished product would also be constructed. The alkaline stabilization process generally consists of high-temperature (~ 60C) high pH reactor vessel that is thoroughly mixed to destroy all pathogens and render the sludge stabilized. Raising the pH would be accomplished with chemical addition of an alkaline product such as potassium hydroxide (KOH) or lime and heat would be supplied by a natural gas-fired boiler.

7. Third Party Operated Alkaline Stabilization

Send sludge from the existing storage basin to a new privately owned and operated alkaline stabilization facility (ASF) which would generate a high value liquid, pathogen-free fertilizer, considered a Class A biosolid. In addition to treating plant sludge, the ASF would also gradually process the sludge stored in the East Lagoon, as well as other third party sources of dewatered or liquid sludge. After the existing liquid is removed from the East Lagoon, it could be divided into smaller cells to be used to store incoming sludge to be processed, and finished stabilized product waiting to be shipped offsite. These storage cells would be covered to prevent release of odours and to protect the final pathogen-free product.

Table 44 summarizes results of screening-level evaluation of alternatives for sludge management. See Appendix C for the complete screening level evaluation matrix.

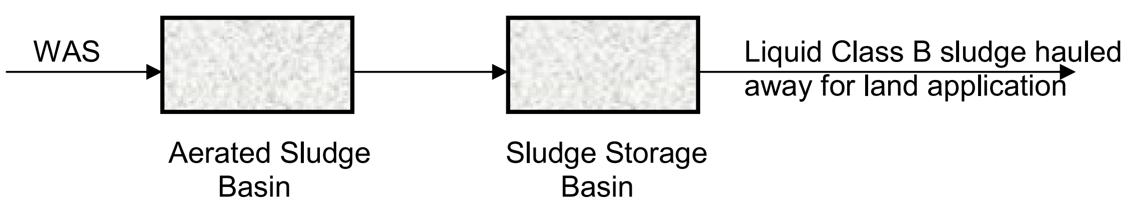
6.4.3 Detailed Evaluation

The option for rehabilitating the existing sludge management system was not carried forward, as this will not accommodate future plant loads, and provides only an interim solution.

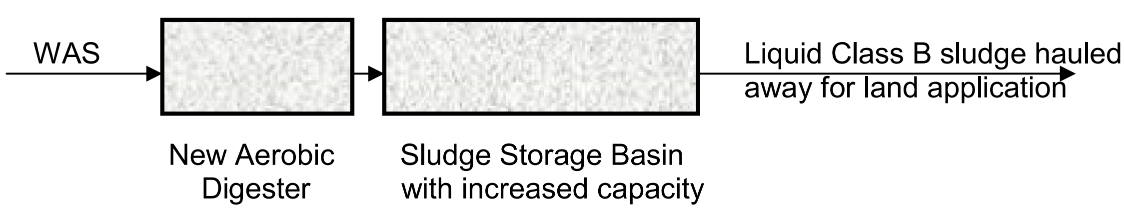
The following Figure presents process flow schematics for each of the short-listed alternatives.

Figure 3: Process Flow Diagrams for Sludge Management Alternatives

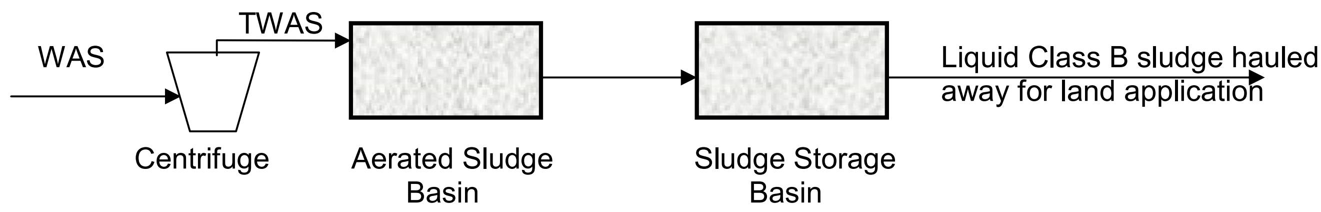
Option 1: Do Nothing



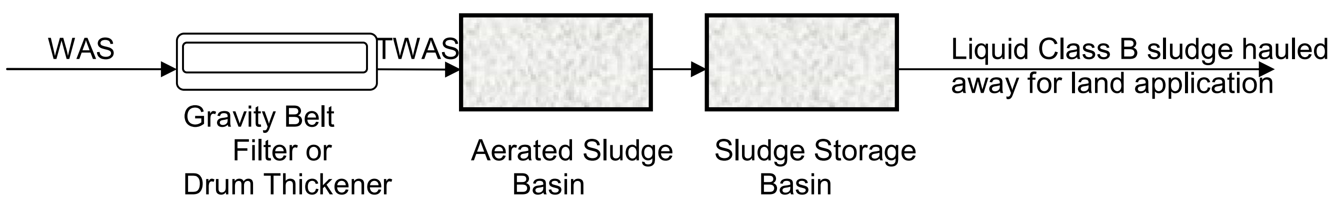
Option 3: New, Higher Efficiency Aerobic Digester



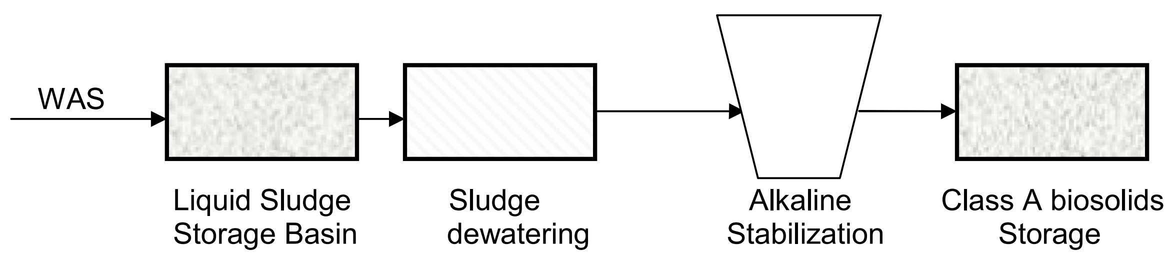
Option 4: Sludge Thickening with Centrifuge



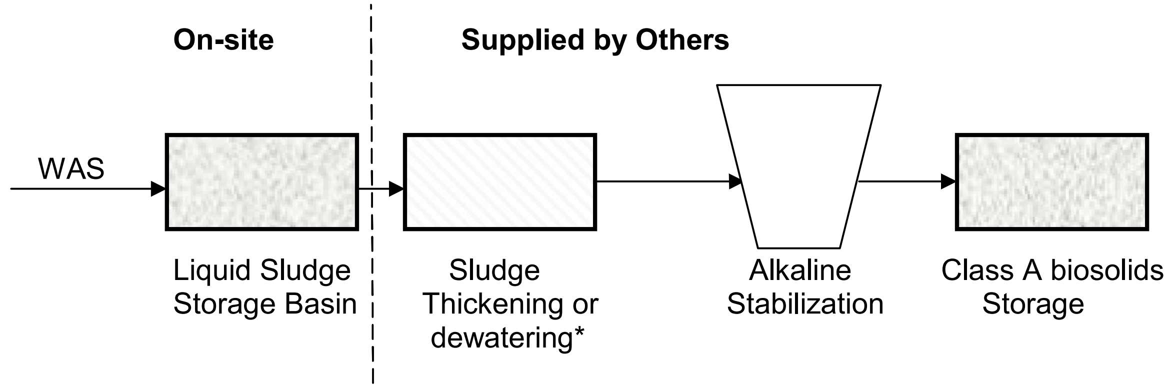
Option 5: Sludge Thickening with Gravity Belt Filter or Drum Thickener



Option 6: Plant Operated Alkaline Stabilization



Option 7: Third Party Operated Alkaline Stabilization



*Sludge thickening could occur at the WWTP to reduce the sludge volume sent to the Alkaline Stabilization system, and reduce sludge processing costs for North Perth

Table 44. Screening Evaluation – Sludge Management

Evaluation Criteria	1. Do Nothing	2. Rehabilitate Existing Sludge Management System	3. New, Higher Efficiency Aerobic Digester	4. Sludge Thickening with Centrifuge	5. Sludge Thickening with Gravity Belt Filter or Drum Thickener	6. Plant Operated Alkaline Stabilization	7. Third Party Operated Alkaline Stabilization
Ability to Address the Problem	3		9	9	9	9	9
Technical Feasibility	6		6	4	4	4	6
Relative Cost-Benefit or Life Cycle Cost of Implementation	6		4	4	4	4	6
Energy Consumption/Ecological Footprint (e.g. GHG emissions)	3		2	1	2	1	3
Compatibility with Municipal, County, and Provincial Policies, Regulations, and Studies	1		3	3	3	2	2
Alternative is Well-Established and Proven	1		3	3	3	2	3
Overall Score	20		27	24	25	22	29
Status	carried forward	not carried forward	carried forward	carried forward	carried forward	carried forward	carried forward

Table 45: Detailed Evaluation – Sludge Management

Evaluation Criteria Categories	1. Do Nothing	2. Rehabilitate Existing Sludge Management System	3. New, Higher Efficiency Aerobic Digester	4. Sludge Thickening with Centrifuge	5. Sludge Thickening with Gravity Belt Filter or Drum Thickener	6. Plant Operated Alkaline Stabilization	7. Third Party Operated Alkaline Stabilization
Technical Considerations	2.00		3.50	2.83	2,90	3.10	3.68
Approvals Requirements	0.40		1.10	1.10	1.10	0.83	0.83
Financial Considerations	1.88		1.50	1.25	1.44	1.00	2.38
Environmental and Social Impacts	2.00		1.43	1.43	1.65	1.55	2.00
Overall Score	6.28		7.53	6.60	7.09	6.48	8.88
Overall Rank	6		2	4	3	5	1

Notes - Values in the above tables indicate weighted scores for each criterion. A high score and low rank indicate a preferred alternative.

Table 46. Qualitative Evaluation – Sludge Management

Alternative	Advantages	Disadvantages	Notes
Do Nothing	• No cost to implement • Operators are familiar with maintenance requirements	• Does not address existing storage deficiency • Does not address deficiencies in the aerated sludge basin	• Upgrades are required to meeting MOECC storage guidelines
New, Higher Efficiency Aerobic Digester	• Improved sludge treatment efficiency to allow for increased throughput • Would be sized to handle future growth • Opportunity to improve truck loading port • Operators are familiar with technology • Low operational complexity	• Larger footprint area required; need to determine appropriate location. • No overall improvement to the environment (by eliminating land application of Class B biosolids)	• It would be possible to extend existing storage basin or create a second storage cell for redundancy • Maintaining the existing sludge handling facility would provide redundancy and security for the municipality should a privately owned Alkaline Stabilization Facility fail
Sludge Thickening with Centrifuge	• Better sludge thickening performance than belt filter press or drum thickener • Reduces volume of sludge to be stored and land applied • Reduces treatment cost to offsite Alkaline Stabilization Facility if implemented	• High operating cost related to energy consumption • High capital cost • Polymer addition required; cost and safety protocol to be considered • Treatment of sidestreams that are re-directed back through plant	• Need to consider optimal location for equipment
Sludge Thickening with Belt Filter Press or Drum Thickener	• Lower capital and operating cost than centrifuge • Reduces volume of sludge to be stored and land applied • Reduces treatment cost to offsite Alkaline Stabilization Facility if implemented	• Higher capital cost • Polymer addition required; cost and safety protocol to be considered • Treatment of sidestreams that are re-directed back through plant	• Need to consider optimal location for equipment
Plant Operated Alkaline Stabilization	• Plant has greater control of solids management and is not reliant on a private operator • Higher quality, Class A biosolids product generated with fewer limitation on land application, reducing final product storage requirements • Smaller footprint than aerobic digestion	• Increased operational complexity, including greater chemical handling • New technology for operators to learn • Plant must cover capital cost of equipment	

Alternative	Advantages	Disadvantages	Notes
Third Party Operated Alkaline Stabilization	• There is no need to increase storage onsite, because it can simply be transported to adjacent alkaline stabilization facility • WAS does not have to be stabilized (i.e. no need for aerobic digestion) • There are fewer restrictions on the quality of the sludge leaving the plant, as it will not be directly land applied, and will undergo further treatment, which is outside of North Perth's responsibility. • The Private Operator of Alkaline Stabilization facility will include sludge dewatering in their scope, and will cover the cost of conveyance of sludge from the East Lagoon to their treatment facility • Private operator will cover the cost of new infrastructure to treat sludge. • Low cost remediation of the East Lagoon reduces liability to the Municipality • Economic development in favour of North Perth • Provide augmented process and stability to the SRS • Eliminates pathogenic land applied Class B Biosolids • Provides low cost fertilizer source for area farmers • Improves overall environmental impact of municipal biosolids	• Alkaline stabilization technology is relatively new, and the oldest full scale installation from one potential proponent is less than 10 years old. • Storage and transfer pumping of WAS from plant to off-site ASF required • Investment required by North Perth to extend services to Alkaline Stabilization Facility • Public acceptance a consideration • Reliant on ability of third party operator to secure additional sludge contracts to make their investment economically feasible	• Potential to use existing sludge storage basin to store both WWTP generated sludge and third party generated liquid waste. May also use East Lagoon for storage of offsite materials in the short term, until offsite storage facilities can be constructed. • WAS thickening may be advantageous to reduce volume sent to off-site facility and consequently reduce volume-based charges to the municipality

6.4.4 Summary of Results

The preferred strategy for sludge management at the plant is to store waste activated sludge (WAS) temporarily on-site for transfer to a third party owned Alkaline Stabilization Facility (ASF) for processing into a Class A Biosolids product. The proposed location for that facility is adjacent to the East Lagoon.

This alternative allows the Municipality to increase the solids processing capacity of the plant without expanding the existing sludge management system. As a secondary benefit, the ASF would also remove and treat sludge stored in the East Lagoon. From a financial standpoint, a large capital investment would not be required by the Municipality, as the third party operator would cover the capital cost of the treatment facility construction, and conversion of the East Lagoon to the required storage cells. The cost to the Municipality would in the form of unit sludge processing fees and extending services to the Alkaline Stabilization Facility.

From an operating perspective, all new sludge processing operations and associated odour control would be conducted by the third party operator and therefore not increase the operational effort or complexity for municipal operators of the existing treatment plant.

Regarding odour control, there are several areas within this proposed sludge management scenario that are expected to generate odours. The alkaline stabilization process generates ammonia as a by-product, which needs to be contained and treated. To manage odours, the alkaline stabilization process will occur inside a sealed building that is ventilated to an odour control system, such as a biofilter or wet scrubber. Outside storage piles of sludge and fertilizer product could be sealed with a membrane system. Odour control for the new sludge processing facility, including storage, would be provided the third party operator.

As a further consideration, the ASF does not require the sludge from the plant to be aerobically digested prior to alkaline stabilization. Therefore, it would be possible to discontinue use of the aeration basin, and use it for additional sludge storage.

The feasibility of the Third party owned ASF is the private operator's ability to secure sludge contracts from outside sources to make the facility economically viable. Because the plant is currently experiencing significant issues with their sludge management system, if such sludge contracts cannot be secured in the near future, it is recommended that a new, higher efficiency aerobic digester be installed (Alternative 3). This may also include installation of a sludge thickener upstream of the aerobic sludge digester to improve performance, and reduce storage requirements.

6.5 STANDBY POWER SUPPLY

6.5.1 Background

The North Perth WWTP is currently not equipped with a source of standby or emergency power in the event of loss of main line power from the Hydro One grid. The plant has an interruptible power supply (UPS) consisting of a rechargeable battery power pack for the SCADA system. Plant operators report that UPS power lasts for approximately 40 minutes and additional capacity is needed. It is noted that there is currently no means of backup power for any process equipment or building services at the plant. Extended power outages could risk loss of biology in secondary treatment tanks, especially during winter months.

During a power outage at present, the main pump station has stand-by power allowing continuous flow delivery to the plant where the flow runs through the plant by gravity to the lagoons. There is no stand-by power available for grit removal, biological nutrient removal, disinfection or effluent pumping. As a result, an extended power outage could lead to death or dormancy of microorganisms involved in secondary treatment, which could take weeks to re-establish upon return of power. The plant would also be unable to discharge any effluent during the extent of the outage, as disinfection and final pumping is would not be available. If the East Lagoon is decommissioned and can no longer be used for emergency storage purposes, the only alternative at the existing plant would be to send raw sewage to the West Lagoon, compromising its role as a polishing step. Overall, successful plant operation will be difficult to maintain under power failure conditions if the East Lagoon is decommissioned.

The typical form of providing a source of backup power at municipal wastewater treatment plants is with an internal combustion engine-driven generator fuelled by either diesel fuel or natural gas. Generator sets can be indoors or outdoors. Natural gas is available at the plant property and the plant currently has a small diameter service line from Perth Road 84.

Advantages of providing backup power at the plant include the ability to maintain operation of critical equipment (minimal aeration to sustain biomass, limited lighting, SCADA equipment, minimal heating in winter) and to implement peak shaving using standby power (see Section 6.10 below on Main Power Supply). If standby power is provided, plant power needs will be prioritized to establish the capacity of the generator. It is expected that standby power will be required to abandon use of the west lagoon since the west lagoon is currently used as emergency off-line storage during prolonged power outages.

6.5.2 Screening-Level Evaluation

Based on the above considerations and discussions with the Project Steering Committee, the following alternatives were identified for evaluation.

1. Do Nothing

Do Nothing or maintain the status quo is a default option which means that no backup power would be provided at the plant. This option requires the lagoons to stay in place, there by maintaining or increasing the level of risk and environmental liability borne by North Perth from the lagoons. In addition, prolonged outages result in biology loss leading to re-seeding the plant (takes two weeks or more). It is noted that main line power supply to the plant has historically been dependable and that power outages typically have been infrequent and of short duration.

2. Implement Operational Adaptations

This option involves plant operational modifications and adaptations that plant operators implement during main line power outages. As with the 'Do Nothing' alternative, this option requires the lagoons to stay in place, leading to the same increased risk and liability described above. Since the plant has never had backup power, operators have become accustomed to implementing operational adaptations in the event of a main line power failure. Since these measures have become well developed and established, it is expected that this Option has limited potential for further improvements to a point where backup power would be considered unnecessary. One of the key adaptation practices in the event of main line power failure is temporary off-line storage of raw sewage in the East Lagoon. It is note that Highway 23 Sewage Pumping Station and the main Atwood Sewage Pumping Station are equipped with backup power and therefore raw sewage would continue to arrive at the plant as it normally does even if main line power is out of service.

3. Provide Standby Power for Critical Equipment

This alternative involves installing a relatively small capacity standby power unit to support operation of critical equipment during a main line power outage. A treatment system-wide assessment and prioritization of critical equipment would have to be conducted to determine loads and corresponding capacity of standby power equipment. At noted above, critical equipment may include a combination of minimal aeration to sustain biomass, limited lighting, and SCADA equipment, and minimal heating in winter. A standby generator under this alternative would be sized for average day design flow and possibly to account for temporary storage in the East Lagoon until main line power was restored. This would avoid sizing the generator to include effluent disinfection and effluent pumping. This generator could be a packaged outdoor pad-mounted system that comes complete with noise attenuation and integral double-walled fuel tank. It is noted that an Air Approval from MOECC would likely be required to implement this alternative.

4. Provide Standby Power for All Plant Loads

This alternative would involve installing a standby power generator larger than one that would be required for the previous option. Capital costs to install a generator sized to handle all plant loads would be higher and an Air Approval from MOECC would be required to implement this alternative.

5. Provide Standby Power for SCADA System

This alternative would involve installing a small-capacity standby power generator dedicated to maintaining operation of the SCADA controls and monitoring system along with critical process instrumentation. A generator for this alternative could be a packaged outdoor pad-mounted system that comes complete with noise attenuation and integral double-walled fuel tank. Depending on the size of unit required, an Air Approval from MOECC may be required to implement this alternative.

The table below summarizes results of screening-level evaluation of alternatives for providing standby power to the plant. See Appendix C for the complete screening level evaluation matrix.

6.5.3 Detailed Evaluation

Of the initial list of 5 alternatives for screening, 3 were carried forward for detailed evaluation, consisting of the following.

- Do Nothing
- Provide Standby Power for Critical Equipment
- Provide Standby Power for All Plant Loads

The table on the next page summarizes results of detailed evaluation of alternatives for providing standby power to the plant. See Appendix C for the complete detailed evaluation matrix.

Table 47. Screening Evaluation – Standby Power Supply

Evaluation Criteria	1. Do Nothing (i.e. No Backup Power)	2. Implement Operational Adaptations	3. Standby Power for Critical Equipment	4. Standby Power for All Loads	5. Standby Power for SCADA Only
Ability to Address the Problem	3	6	6	9	3
Technical Feasibility	6	4	6	6	6
Relative Cost-Benefit or Life Cycle Cost of Implementation	2	2	6	4	4
Energy Consumption/Ecological Footprint (e.g. GHG emissions)	2	2	2	3	2
Compatibility with Municipal, County, and Provincial Policies, Regulations, and Studies	2	2	2	3	3
Alternative is Well-Established and Proven	1	2	2	3	2
Overall Score	16	18	24	28	20
Status	carried forward	not carried forward	carried forward	carried forward	not carried forward

Table 48. Detailed Evaluation – Standby Power Supply

Evaluation Criteria Categories	1. Do Nothing (i.e. No Backup Power)	2. Implement Operational Adaptations	3. Standby Power for Critical Equipment	3. Standby Power for All Loads	5. Standby Power for SCADA Only
Technical Considerations	2.55		3.48	4.03	
Approvals Requirements	1.18		1.28	1.05	
Financial Considerations	2.05		1.53	1.65	
Environmental and Social Impacts	1.15		1.65	2.00	
Overall Score	6.93		7.93	8.73	
Overall Rank	3		2	1	

Notes

1. Values in the above tables indicate weighted scores for each criterion. A high score and low rank indicate a preferred alternative.

Table 49. Qualitative Evaluation – Standby Power Supply

Alternative	Advantages	Disadvantages	Notes
Do Nothing (No Backup Power)	• No cost to implement • No approvals required	• Does not address problem of no backup power for plant • Risk of impaired plant performance • Risk of major environmental discharge during a prolonged power outage • Risk of loss of system control and data • Most modern WWTP's have backup power • Prolonged power outage could result in loss of biomass requiring plant re-seeding which could take weeks	• Requires that lagoons stay in place thereby maintaining or increasing the level of risk and environmental liability borne by North Perth
Standby Power for Critical Equipment	• Significant reduction in risk to plant performance, environment, data security • Well established strategy	• Moderate cost • Air/Noise Approval required from MOECC • Moderate effort to implement	• Requires that lagoons stay in place thereby maintaining or increasing the level of risk and environmental liability borne by North Perth
Standby Power for All Plant Loads	• No loss of plant performance, environment, data security • Well established strategy • Typical for most modern WWTP's	• Higher cost • Air/Noise Approval required from MOECC • Moderate effort to implement	• Lowest environmental impact

6.5.4 Summary of Results

Results of detailed evaluation of alternatives indicate that providing standby power for all plant loads is the recommended alternative along with a secondary recommendation to provide standby power for critical equipment and services as a minimum.

6.6 HEADWORKS

6.6.1 Background

Raw sewage from Listowel, Atwood, and the Septage Receiving Station enters the plant in the influent channel in front of an inclined manual bar screen. The bar screen is manually scraped to remove large solids and debris. Bar screen spacing is 50mm. Following the bar screen, flow enters an aerated grit removal system consisting of an aerated grit hopper tank, an air lift pump and a screw grit classifier. The pump discharges grit to the screw classifier, and liquid flows back into the grit tank. Screened grit is collected in a mobile container that is periodically and manually emptied, with the grit sent to landfill. Following grit removal, wastewater flows through two (2) comminutor units operating in parallel for particle size reduction.

Before upgrades were completed on the Septage Receiving Station, hauled septage was delivered directly to the headworks area through a secondary process train consisting of a second manual bar screen and smaller settling area before being combined with the main sewage stream.

Historically, high influent flows (approaching the maximum daily flow) required an operator to manually operate the bypass gate around the grit chamber to allow excess flows around that area of the headworks. Operators have addressed this problem by removing the upper portion of the bypass gate so flows that cause water to build up around the inlet area will overflow into the bypass channel and around the grit chamber. This remedy is intended to force the denser grit-laden flow (typically inorganic) into the grit chamber and allow lighter suspended solids (typically organic) to overflow to the bypass channel.

Manual Bar Screen

Aerated Grit Chamber

There are several potential areas of improvement at the headworks of the plant:

- Although the screw classifier is sized for the peak flow of 25,500 m^3/d, the grit chamber is undersized to handle peak flow events, and currently overflows into a by-pass channel if flows exceed approximately 8,000 m^3/d. During this high flow scenario, grit removal efficiency is reduced and some grit passes to the biological treatment stage and could increase wear on downstream mechanical equipment.
- The manual course bar screen is labour intensive, and could be replaced with a more automated system. Bar screen spacing in both the main channel and bypass channel (former septage receiving area) is 50mm which is relatively coarse. Consequently, only very large objects are caught in the existing screen, and the equipment life would improve if the screen type was changed from a coarse screen to a fine screen along with an automated solids removal mechanism.
- There is no redundancy in the existing bar screen and grit removal system.
- Winter maintenance of the headworks equipment is difficult because it is located outdoors. There is also a greater potential for odour release because equipment is uncovered.
- Grit classifier equipment is aging and difficult to operate and maintain, especially during winter months due to its outdoor location.
- Currently, air supply to grit removal facilities is from a branch line off of the main supply line to the aeration tanks. The option exists to provide a dedicated blower for headworks use.
- Odour control system could be added if headworks are enclosed

6.6.2 Screening-Level Evaluation

Typical preliminary treatment steps that can be found at headworks of municipal wastewater treatment plants include screening, grit removal, grit classification, and grinding. Upgrades to headworks may involve various combinations of these treatment steps. The existing headworks at the North Perth plant is located outdoors in open channels and tankage. There are advantages to enclosing the headworks in a heated insulated structure or building. Finally, there is potential to add redundancy to the screening and grit removal processes, each of which currently use a single operating train and are undersized for peak flow. In addition, if either of these units is shut down for maintenance or repair, that treatment process is by-passed, increasing the potential for wear of downstream mechanical equipment.

The following is a selected list of alternatives for headworks upgrades.

<u>Do Nothing</u>
Continue operating the manual bar screen, and single train grit tank. If water builds up in the inlet area, water will flow over the weir into the influent channel, by-passing the grit tank.

<u>A – Equipment Upgrades</u>
Replace manual bar screen with automated fine to medium size screening system, and provide winterization enclosure for the new bar screen. Note that the automated bar screen will have a higher profile than the existing system, with a large portion of the equipment located above water level. Therefore, due to the potential for freezing of the equipment in the winter when cold air passes across the equipment, this equipment would have to be enclosed in a heated insulated enclosure. Also, replace the aging grit classifier with a newer model, or potentially a more automated system.

<u>B – Repurpose decommissioned equipment for redundancy</u>
Repurpose decommissioned manual bar screen for redundancy. The decommissioned bar screen is approximately 1.5 times the area of the active bar screen, so would provide the needed capacity. However, the condition of the decommissioned bar screen would need to be assessed to determine the feasibility of re-commissioning. This alternative would also involve converting the unused dry pump pit into a second grit settling chamber, which would also discharge to the single grit classifier. In this way, there would be no expansions to the existing structure, and only existing areas would be used.

<u>C – New grit removal train for redundancy</u>
Construct a second grit tank to handle peak flows. In comparison to Alternative B above, this upgrade would involve construction of two identically sized grit channels and grit tanks for redundancy in order to ensure proper flow splitting. This alternative would require greater modifications to the existing structure. A by-pass channel would be constructed between the two grit removal process trains, so either train could overflow into the by-pass channel.

<u>D – Enclose Headworks</u>
Enclose entire headworks area within in heated and ventilated building. This would allow for easier operation and maintenance and would allow any odours to be captured. If this alternative is selected, it would be unnecessary to provide a separate winterization enclosure around the automated bar screen as described in Alternative A above.

Alternative combinations of upgrades were selected for evaluation and are shown in Table 50. See Appendix C for the complete screening level evaluation matrix.

6.6.3 Detailed Evaluation

It was decided that Options 3, 4, 5, 7 and 8 would not be carried forward. Option B and all alternatives that contained this option were removed, because it would be difficult to repurpose the abandoned grit tank and bar screen as the flow split would not be even and it is likely that the bar screen would have to be replaced rather than be reused in its existing state.

The table on the next page summarizes results of detailed evaluation of alternatives for headworks upgrades. See Appendix C for the complete detailed evaluation matrix.

Table 50. Screening Evaluation – Headworks Upgrades

Evaluation Criteria	1. Do Nothing	2. Implement A	3. Implement B	4. Implement C	5. Implement A and B	6. Implement A and C	7. Implement A and D	8. Implement A, B, and D	9. Implement A, C and D
Ability to Address the Problem	3	3	3	3	6	6	6	9	9
Technical Feasibility	4	6	2	4	2	4	6	2	4
Relative Cost-Benefit or Life Cycle Cost of Implementation	4	6	2	2	2	2	4	2	2
Energy Consumption/Ecological Footprint (e.g. GHG emissions)	3	3	2	2	2	2	2	1	1
Compatibility with Municipal, County, and Provincial Policies, Regulations, and Studies	2	2	2	2	2	3	2	2	3
Alternative is Well-Established and Proven	3	3	1	2	1	2	3	1	2
Overall Score	19	23	12	15	15	19	23	17	21
Status	carried forward	carried forward	not carried forward	not carried forward	not carried forward	not carried forward	carried forward	not carried forward	carried forward

Table 51. Detailed Evaluation – Headworks Upgrades

Evaluation Criteria	1. Do Nothing	2. Implement A	3. Implement B	4. Implement C	5. Implement A and B	6. Implement A and C	7. Implement A and D	8. Implement A, B, and D	9. Implement A, C and D
Technical Considerations	2.20	2.35					3.25		3.25
Approvals Requirements	0.88	1.00					0.81		0.56
Financial Considerations	2.25	2.25					2.00		1.50
Environmental and Social Impacts	1.25	1.55					1.30		1.55
Overall Score	6.58	7.15					7.36		6.86
Overall Rank	4	2					1		3

Notes

Values in the above tables indicate weighted scores for each criterion. A high score and low rank indicate a preferred alternative.

Table 52. Qualitative Evaluation - Headworks

Alternative	Advantages	Disadvantages	Notes
Do Nothing (Maintain Existing System)	• Lowest capital cost option • No additional electrical power requirements • No changes required to C of A	• Manual screen is more labour intensive, resulting in more person-hours for maintenance • Grit equipment is not sized for peak flow • Bar screen captures only large solids due to bar spacing	• Provides no improvement to plant performance or equipment protection and efficiency
Implement Option A	• Reduces labour requirements for screen maintenance • Low to moderate capital cost, with reduced operating costs • Improved grit removal performance	• Does not address lack of redundancy in grit removal system • Because the screen will rotate in the air, there is a greater potential for freezing and the entire bar screen must be housed in a heated insulated enclosure that allows for easy operator access.	• Space required will depend on type of screen and classifier selected, but vertical height will be a key consideration for screen
Implement Options A and D	• All advantages of Option A alone, with added protection for equipment to extend life • Improves operator comfort during winter months • Protects and improves equipment performance and efficiency • Odour controls can be added	• Higher capital cost • Building ventilation required, increasing energy costs • Grit chamber undersized for peak flows	• Ventilation during cold weather months can be reduced to reduce heat losses, conserve energy, and reduce operating costs • Long term savings available
Implement Options A, C, and D	• Will be hydraulically sized for peak flow for enhanced grit removal during all flow conditions • Facilitates winter operation • Protects and improves equipment performance and efficiency • Odour controls can be added	• Highest capital cost • Largest space requirements	• Second grit tank would be sized to equal the capacity of the existing grit tank to better balance flows • Long term savings available

A Replace Manual Bar Screen with Automated Fine Bar Screen with winterization enclosure, and replace grit classifier
B Repurpose decommissioned manual bar screen for redundancy, and increased peak flow capacity for grit separation
C Construct second grit channel and tank to handle peak flows
D Enclose Headworks to facilitate winter maintenance and allow for odour capture and treatment

6.6.4 Summary of Results

The preferred solution is to replace the manual bar screen with an automated fine bar screen to reduce operation and maintenance requirements of the system and improve bulk solids removal. In addition, the existing grit classifier would be replaced with a newer model, or more automated system to improve performance. The entire headworks area would be enclosed within a building to prevent freezing in the automated screen, and grit classifier, and to increase operator comfort during winter months. Although the existing grit chamber is undersized for peak flow, the current system configuration allows the influent to overflow into the by-pass chamber with no operator intervention. The liquid overflow stream will already contain a lower concentration of grit as some grit will have already settled out at that point. However, during higher flow conditions, the settling rate of grit will be reduced due to higher velocities. As a result, the existing system is considered adequate although not ideal.

In addition, upgrades to grit removal could include a dedicated blower for the headworks operations rather than a branch line from the main aeration header which could be left in place as a backup air supply.

GROUP B PROJECTS

6.7 STATUS OF LAGOONS

6.7.1 Background

The original North Perth (Listowel at the time) WWTP was constructed in 1961 and consisted of an earthen berm aeration cell followed by two facultative lagoons for stabilization and biological treatment of wastewater with effluent discharge to the Chapman Drain. A mechanical biological secondary treatment plant was constructed and put into service in 1994 in conjunction with an upgraded main sewage pumping station and new influent and effluent forcemains for discharge of plant effluent to the Middle Maitland River. In 2000, upgrades were implemented to the sludge management system at the plant that included converting the former aeration cell to an aerobic stabilization pond (digester) followed by a stabilized sludge storage basin.

Under normal operating conditions, the West Lagoon is currently being used for equalization storage and polishing of effluent from the secondary clarifiers prior to filtration, disinfection and final discharge. The West Lagoon is used to temporarily store clarifier effluent during periods of high flow and high phosphorus or solids levels to ensure plant discharge limits are achieved. The West Lagoon also reduces tertiary filter maintenance by reducing the fat, oil and grease load to the filters, reducing plugging, and improving capacity. Clarifier effluent flow can be split between the West Lagoon and the tertiary filters to achieve the required effluent levels using a piping valve located in a chamber at the clarifier discharge. During periods of low flow and low solids or phosphorus levels, effluent from the West Lagoon can be directed to the tertiary filters for blending with clarifier effluent prior to plant discharge. This strategy allows the plant to maintain a relatively constant level within the West Lagoon, and provides both loading and flow buffering that increases operational flexibility.

The East Lagoon is considered inactive, although it is occasionally used on an as-required basis to store emergency overflow from the sludge storage basin, headworks, aerobic reactors, and sludge storage basin. The East Lagoon also receives plant overflows via gravity flow during power outages. In 2013, it was reported that raw sewage from the plant was discharged to the East Lagoon on one occasion, during a period of high influent flows, at a time when one secondary clarifier was offline for maintenance. Emergency flows directed to the East Lagoon are decanted back to the headworks of the plant with temporary pumping to avoid the lagoon from becoming overfilled.

In their current state, the East Lagoon contains approximately 60,000 to 80,000 cubic meters of partially digested sludge, while the West Lagoon contains mostly water made up of rainfall and secondary effluent from the clarifiers. The two lagoons are separated by an earthen berm with flow control structures and associated interconnecting piping, which was left in place after the original lagoon treatment system was converted to the mechanical WWTP in 1994.

North Perth WWTP - East and West Lagoons

GM BluePlan conducted a sludge quantity survey of the lagoons in May 2012 to determine the existing condition of the lagoons, which is summarized in the table below.

Table 53: Condition of East and West Lagoons in May, 2012

Parameter	East Lagoon			West Lagoon		
Sludge Quantity						
Total Area of Lagoon, m^2	~172,000			~119,000		
Total Volume of Lagoon, m^3	~480,000			~322,000		
Estimated Sludge Volume, m^3	60,000 – 80,000			Negligible		
Sludge Quality from Lagoons	**Min**	**Avg**	**Max**	**Min**	**Avg**	**Max**
BOD_5 (mg/L)	130	447	660	n/a	n/a	n/a
COD (mg/L)	23,000	23,333	24,000	n/a	n/a	n/a
Total Solids (%)	2.00%	2.03%	2.10%	n/a	n/a	n/a
Volatile Solids (% of total solids)	62%	64%	65%	n/a	n/a	n/a
Total Ammonia Nitrogen (μg/g)	ND	ND	ND	n/a	n/a	n/a
Total Kjeldahl Nitrogen (μg/g)	750	818	890	n/a	n/a	n/a
Total Phosphorus (mg/L)	330	360	390	n/a	n/a	n/a
Liquid Quality from Lagoons						
BOD_5 (mg/L)	14			No data		

Parameter	East Lagoon	West Lagoon
COD (mg/L)	280	No data
Total Suspended Solids (mg/L)	110	No data
Volatile Suspended Solids (mg/L)	95	No data
Total Ammonia Nitrogen (mg/L)	8	No data
Total Kjeldahl Nitrogen (mg/L)	24	No data
Total Phosphorus (mg/L)	Not detected	No data

Overall, the primary issues related to the lagoons that could be addressed are as follows:

- The earthen berm and interconnecting piping between the East and West Lagoons are regularly maintained and in good working condition, making the potential for cross contamination low.

- The outlet structure of the West Lagoon is closely monitored by WWTP staff to reduce debris from reaching downstream equipment such as the tertiary filters

- If excess sludge continues to accumulate in the East Lagoon, it will eventually need to be removed, as it may lead to odour issues if insufficient surface liquid is present above the sludge. Liability to North Perth increases with the addition of sludge to the East Lagoon.

- The Plant currently relies on effluent polishing in the West Lagoon to reduce loading on tertiary filters, and to produce high quality effluent The Certificate of Approval indicates the West Lagoon is to be used 'for temporary storage of secondary effluent under special circumstances or emergency wet weather overflows, to be discharged through the filters and disinfection system, or when deemed necessary, to be returned to the anoxic zones of the aeration tanks for further treatment'. Operator staff currently utilize the West Lagoon as required to improve effluent quality. Operator staff noted that peak flow rates from the clarifiers cannot be fully conveyed to the West Lagoon.

6.7.2 Screening-Level Evaluation

The following potential lagoon upgrade alternatives were developed for evaluation:

1. Do Nothing

Maintain the existing lagoon operation, using the West Lagoon to polish secondary effluent and equalize wet weather flows, and using the East Lagoon to accept emergency overflows from various areas of the plant as indicated in on Drawing P01 - General Process Flow Diagram – Existing System, in Appendix E.

2. Lagoon Upgrade Scenario A

The first upgrade scenario would use the West Lagoon during special circumstances and emergency conditions, and upgrade tertiary filters to maintain required effluent quality and handle peak flows, . meeting the conditions of the existing C of A. In addition, a screening system would be added to the West Lagoon outlet to automatically trap debris and algae, and the structures connecting the East and West Lagoons would be reviewed to prevent contamination from the East to the West Lagoon. Finally, plant flows under emergency conditions would continue to be directed to the East Lagoon. Sludge in the East Lagoon would be cleaned out when necessary.

3. Lagoon Upgrade Scenario B

The second upgrade scenario would use the West Lagoon for flow equalization during emergency wet weather flows and under special circumstances. The C of A should be updated to clarify the West Lagoon's use for normal daily operation. Finally, emergency plant flows would no longer be sent to the

East Lagoon but instead be redirected through the plant. The East Lagoon would be decommissioned by dewatering as much liquid as possible at a controlled rate back through the plant, and then sending the remaining solids to landfill or land applied, depending on quality. Finally, the berms around the exterior the East Lagoon would be removed, and the land would be reclaimed.

4. Lagoon Upgrade Scenario C

The third upgrade scenario is the same as Scenario B, with the exception of the method of managing the East Lagoon. The East Lagoon would be decommissioned by dewatering as much liquid as possible, and then allowing the remaining solids to air dry, forming a stabilized compost type material over time. Finally, the berms around the exterior the East Lagoon would be removed, and the land would be reclaimed.

5. Lagoon Upgrade Scenario D

The final upgrade scenario is also the same as Scenario B, with the exception of the method of managing the East Lagoon. The East Lagoon would be cleaned, decanting liquid through the plant and transferring sludge to a third-party owned biosolids processing facility to produce a value-added product that could be land applied as fertilizer. As capacity within the East Lagoon is recovered, the lagoon could be divided into smaller cells to be used for temporary biosolids storage. These cells may need to be covered to control odours. Any portions of the East Lagoon not required for solids storage can continue being used for emergency overflow storage. Continued use of the East Lagoon for emergency storage would also provide a contingency plan for managing WAS in case of shutdown of the third-party owned processing facility. This alternative would also include the opportunity for the WWTP to send all of the sludge generated at the plant to the same third-party owned facility, thereby addressing the current operating issues with the sludge management system.

6.7.3 Detailed Evaluation

During preliminary screening it was decided that Scenario C would not be carried forward, which involved allowing dewatered sludge in the East Lagoon to air dry. There is a very high potential for odour generation from the solids material as it dries, and due to the large area of the lagoon, this odour would be very difficult and expensive to capture and treat. In addition, the period of drying could take a significant length of time before the land could be repurposed.

The table on the next page summarizes results of detailed evaluation of alternatives for status of lagoons. See **Appendix D** for the complete detailed evaluation matrix.

Table 54. Screening Evaluation – Status of Lagoons

Evaluation Criteria	1. Do Nothing	2. Scenario A	3. Scenario B	4. Scenario C	5. Scenario D
Ability to Address the Problem	3	6	9	6	9
Technical Feasibility	6	6	6	2	4
Relative Cost-Benefit or Life Cycle Cost of Implementation	6	6	4	6	6
Energy Consumption/Ecological Footprint (e.g. GHG emissions)	2	2	1	3	2
Compatibility with Municipal, County, and Provincial Policies, Regulations, and Studies	1	3	2	2	3
Alternative is Well-Established and Proven	3	3	3	2	3
Overall Score	21	26	25	21	27
Status	carried forward	carried forward	carried forward	not carried forward	carried forward

Table 55. Detailed Evaluation – Status of Lagoons

Evaluation Criteria Categories	1. Do Nothing	2. Scenario A	3. Scenario B	4. Scenario C	5. Scenario D
Technical Considerations	2.25	3.45	3.58		3.53
Approvals Requirements	1.15	1.13	1.05		1.05
Financial Considerations	2.13	1.75	1.38		2.00
Environmental and Social Impacts	1.50	1.70	1.68		1.88
Overall Score	7.03	8.03	7.68		8.45
Overall Rank	4	2	3		1

Notes

1. Values in the above tables indicate weighted scores for each criterion. A high score and low rank indicate a preferred alternative.

Table 56. Qualitative Evaluation – Status of Lagoons

Alternative	Advantages	Disadvantages	Notes
Do Nothing	• No capital cost to implement	• Does not meet conditions of existing C of A, and therefore an amendment is required • There is a risk of the East Lagoon contaminating the West Lagoon, which will eventually be released to the Maitland River. • This approach is not sustainable in the long term, because the East Lagoon will eventually reach capacity.	•
Scenario A	• Meets requirements of existing C of A • Maintains emergency overflow storage in East Lagoon, improving plant security • Lower cost to leave material in East Lagoon, compared to removing it.	• Secondary effluent polishing capacity is limited by capacity of tertiary filtration during normal operation. • Higher capital equipment expenditure to upgrade tertiary filters. However, filter upgrades may already be required. • Land under East Lagoon would not be utilized. • If the East Lagoon is not decommissioned, there will always be some risk of contamination of the West Lagoon, even if connection structures are improved.	• East Lagoon cleaning would be required eventually, once it reaches its capacity
Scenario B	• Back-up treatment for secondary effluent is available in the West Lagoon to better ensure effluent discharge compliance is met. • East Lagoon land is reclaimed, adding value, and room for possible plant expansion or sale of property.	• Moderate capital cost • Requires MOECC approval and amendment of the C of A • Higher disposal cost for sludge in East Lagoon to be sent to landfill • Higher energy cost to dewater sludge prior to landfilling	• Temporary sludge dewatering would need to be incorporated into design

Scenario D	• Back-up treatment for secondary effluent is available in the West Lagoon to better ensure effluent discharge compliance is met. • Potentially lower cost to send sludge in East Lagoon to third party facility compared to landfill, as dewatering is may not be required. • Maintaining East Lagoon reduces risk of relying on a Third Party facility for biosolids management • Eliminates liability to municipality	• Moderate capital cost • Requires MOECC approval and amendment of the C of A • Is reliant on third party for treatment; rate of treatment outside of North Perth's control	• Final cost would depend on potential agreement with third party facility

Notes:

Scenario A Use West Lagoon for emergencies/special circumstances only, upgrade filters for improved performance and flow capacity, upgrade interconnecting structure, discontinue sending waste to East Lagoon, and leave material in lagoon

Scenario B Use West Lagoon for emergencies/special circumstances, dewater East Lagoon and send wet sludge to landfill

Scenario C Use West Lagoon for normal operation, dewater East Lagoon and allow sludge to air dry before reclaiming land (*this alternative was not carried forward*)

Scenario D Use West Lagoon for emergencies/special circumstances, send liquid sludge from East Lagoon to third party biosolids treatment facility for processing, convert portion of East Lagoon to storage facility and maintain remainder of lagoon as emergency overflow storage.

6.7.4 Summary of Results

The preferred alternative for management of the lagoons is to upgrade the West Lagoon to allow it to function better during use for wet weather flow equalization and under special circumstances. It is also recommended that the East Lagoon be slowly dewatered by redirecting the liquid through the plant, and sending the remaining sludge offsite be treated by a third party facility. This recommendation ties in with the recommendation for sludge management, which also recommends that a privately funded and operated sludge management facility be built on the municipally-owned land adjacent to the East Lagoon to treat sludge generated during normal treatment. A major advantage of this strategy is that it addresses ultimate disposition of the large volume of accumulated sludge in the East Lagoon in addition to the future sludge generated during normal plant operation.

In the case that a third-party facility does not become available within a reasonable distance of the wastewater plant, it would be preferable to maintain the existing operating strategy of the two lagoons, with some minor operational upgrades (Scenario A).

As part of the overall sludge and lagoon management strategy, which are interrelated, a portion of the East Lagoon could be converted into a storage facility for sludge.

6.8 SEPTAGE RECEIVING STATION

6.8.1 Background

The North Perth Septage Receiving Station (SRS) was put into service in 2006. The facility consists of a control building that houses a rock trap, grinding and screening equipment, process piping, valves and instrumentation, as well as a 600m^3 in ground equalization tank equipped with a submersible mixer, recirculation pump, and duplex transfer pumps. Pumps operate on variable frequency drives (VFD’s). The facility is also equipped with an electronic card reading system for automated monitoring for billing and control of imported waste streams. It is noted that the North Perth wastewater treatment plant acts as a regional centre for processing high strength wastes in addition to local septage. Further details on Septage Management in North Perth can be found in **Appendix H**.

The overall objective of constructing the SRS was to reduce shock loading to the plant by storing high-strength hauled waste off-line temporarily, then metering it into the plant at a controlled rate. There is only 1 truck unloading connection i.e. only 1 truck can unload at once. However, recent operating experience indicates that due to high use of the facility, the plant continues to experience occasional shock loads, although not as pronounced as before the facility was put into service.

Septage Receiving Station

The average flow from the SRS for the latest 3-year period is 290 m^3/d or approximately 5% of the total plant hydraulic loading. However, daily flows often exceed 350 m^3 which can impose shock loading to the plant even at metered flow rates. Due to the high strength of imported waste at the SRS, its contribution in terms of organic loading is approximately 70% of total influent carbon ($CBOD_5$) and nitrogen (TKN) load to the plant. The original 20-year design flow for the facility is noted as 479 m^3/d (G&M Final Design Brief, October 2005). North Perth has indicated a willingness to continue operation of SRS, and noted MOECC support of same. Recent experience in the municipal wastewater treatment industry in south-western Ontario indicates that fewer plants are willing to receive imported waste, resulting in increased importance of the Listowel facility being available as an approved receiver for high strength hauled liquid waste.

The SRS is currently being utilized close to its maximum potential in terms of the ability of the treatment plant to adequately handle metered high strength waste stream from the facility. Alternatives have been developed that consider the cost-benefit of continued operation, maintenance, upgrades and expansion of the septage receiving station. Continued operation and future expansion of the septage receiving station would be assisted by the continued availability of the West Lagoon to provide a process buffer to absorb shock loading. North Perth noted that plant upsets can usually be traced back to a specific load of high strength hauled in wastewater. Consequently, alternatives were considered that include additional septage receiving tankage to segregate high strength waste and minimize process upsets.

Septage Receiving Station – Grinding and Screening Equipment

Options for SRS upgrades include providing additional storage, installation of a dedicated forcemain from the SRS directly to the plant headworks, additional grit removal equipment, and provision of enhanced preliminary treatment. Additional storage could involve construction of a second equalization tank similar to the existing one and instituting a source separation protocol to direct low strength wastes to one tank and high strength wastes to the other tank which would provide operators with a greater degree of control over loadings to the plant.

6.8.2 Screening-Level Evaluation

Based on the above considerations and discussions with the Project Steering Committee, the following alternatives were identified for evaluation.

1. Do Nothing

Do Nothing or maintain the status quo is a default option that must be considered for all projects in accordance with the EA. The plant meets effluent criteria under current SRS flow conditions.

2. Optimize Station Operations

Operation of the existing facility could be optimized to reduce the impact of shock loading on the plant. Operating experience has shown that a significant quantity of grit is captured in the equalization tank which is problematic to remove. Improved methods of grit capture and removal should be investigated, which may include installing a circular shroud around the sump of the septage storage tank to prevent grit from clogging the pumps. Finally, this alternative would include installing a new forcemain from the Septage Receiving Tank that could be directed to either the headworks or the biosolids management facility. This would allow for reduction of high strength waste loading to the plant by treating directly in the solids sidestream. Note that this approach is feasible if the recommended Biosolids management strategy is implemented with a third party operated OMRC.

3. Control Imported Waste Stream Quantity and Quality

The existing facility includes an electronic card lock system to track imported waste sources and quantities. This source control method could be developed further classify hauled in wastewater generators to ensure that the facility does not accept waste that is beyond the capability of the system to handle. This option may also include classifying the type of imported waste and directing it to be discharged to either the SRS, plant headworks, or directly to a new Alkaline Stabilization Facility, depending on the quantity and characteristics of the hauled waste. This may help to direct the waste to the most appropriate step in the overall treatment train. In addition, the quantity of waste that can be received will be limited to avoid overloading the plant.

4. <u>Increase Station Capacity</u>

The facility is being used at close to its potential and evidence exists to suggest that there is demand for additional septage capacity due in part to a general reduction in septage receiving at other municipal plants. Within this alternative, options to increase SRS capacity would include additional equalization storage primarily, but may also include additional grinding and screening capacity. It is expected that any increase in station capacity would have to be met with a corresponding increase in odour control equipment capacity. The main source of odours at the existing facility is the vent pipes for the equalization tank. Winterization of odour control equipment would also have to be considered.

A facility with increased capacity may consist of two equalization tanks that operate separately for high and low strength classification of waste along with separate forcemains directly from the SRS to the plant headworks rather than the current direct connection to the incoming 450mm forcemain.

5. <u>Provide Preliminary Treatment</u>

This option involves providing additional treatment beyond the current rock trap, grinding, screening, and flow equalization. This may include enhanced screening or pre-aeration to reduce the downstream impact on the main treatment plant.

The table below summarizes results of screening-level evaluation of alternatives for the future status of the Septage Receiving Station. See Appendix C for the complete screening level evaluation matrix.

6.8.3 Detailed Evaluation

Of the initial list of 5 alternatives for screening, 4 were carried forward for detailed evaluation, consisting of the following.

- Do Nothing
- Optimize Station Operations
- Control Imported Waste Stream Quantity and Quality
- Increase Station Capacity

The table on the next page summarizes results of detailed evaluation of alternatives for the future status of the Septage Receiving Station. See Appendix C for the complete detailed evaluation matrix.

Table 57. Screening Evaluation – Septage Receiving Station

Evaluation Criteria	1. Do Nothing (i.e. Maintain Ex. System)	2. Optimize Station Operations	3. Control Imported Waste Stream Quantity and Quality	4. Increase Station Capacity	5. Provide Preliminary Treatment
Ability to Address the Problem	3	9	6	6	6
Technical Feasibility	6	4	4	4	2
Relative Cost-Benefit or Life Cycle Cost of Implementation	4	6	6	4	2
Energy Consumption/Ecological Footprint (e.g. GHG emissions)	2	2	3	2	1
Compatibility with Municipal, County, and Provincial Policies, Regulations, and Studies	1	2	1	2	2
Alternative is Well-Established and Proven	2	3	1	3	1
Overall Score	18	26	21	21	14
Status	carried forward	carried forward	carried forward	carried forward	not carried forward

Table 58. Detailed Evaluation – Septage Receiving Station

Evaluation Criteria Categories	1. Do Nothing (i.e. Maintain Ex. System)	2. Optimize Station Operations	3. Control Imported Waste Stream Quantity and Quality	4. Increase Station Capacity	5. Provide Preliminary Treatment
Technical Considerations	2.58	3.53	2.58	3.18	
Approvals Requirements	2.03	2.20	2.20	1.83	
Financial Considerations	1.60	1.80	1.35	1.80	
Environmental and Social Impacts	1.33	1.50	1.80	1.53	
Overall Score	7.53	9.03	7.93	8.33	
Overall Rank	4	1	3	2	

Notes

1. Values in the above tables indicate weighted scores for each criterion. A high score and low rank indicate a preferred alternative.

Table 59. Qualitative Evaluation - Septage Receiving Station

Alternative	Advantages	Disadvantages	Notes
Do Nothing (Maintain existing system)	• No cost to implement • No approvals required	• Does not address problem of lack of capacity • Treatment plant experiences shock loading due to lack of equalization capacity of the existing SRS	
Optimize Station Operations	• Low capital cost to implement • No approvals required • Reduces load on plant by redirecting high strength waste to sidestream • Moderate potential of addressing the problem of shock loadings to the treatment plant	• Limited potential to increase imported wastewater volumes to SRS	
Control Imported Waste Stream Quantity and Quality	• Low capital cost to implement • No approvals required	• May result in reduction in revenue generation	• Practical methods of monitoring quality need to be determined
Increase Station Storage Capacity	• High probability of addressing the problem of shock loadings to the treatment plant • Opportunity for separation at-source of different types of waste streams, directing some to the plant, others directly to a future sludge stabilization process • Improved treatment plant performance • Potential for increased Revenue	• Moderate to high capital cost to implement • MOECC Approval required	

6.8.4 Summary of Results

Results of detailed evaluation of alternatives indicate that optimizing the operation of the Septage Receiving Station is the preferred alternative to meet desired objectives of the facility. The installation of a separate forcemain capable of sending hauled waste directly to a new biosolids facility has potential to significantly reduce loading to the WWTP, and delay future capacity upgrades to the WWTP. Increasing capacity of the Septage Receiving Station may also be considered in the longterm, depending on future needs. Because the primary purpose of the Septage Receiving Station is to generate revenue for the Municipality, a more detailed cost-benefit analysis is recommended prior to increasing capacity to better quantify the potential increased revenue from greater hauled wastewater, and ensure it will offset the cost of Septage Receiving Station upgrades, as well as potential wastewater treatment plant upgrades required to handle the increased loading. Tipping fee adjustments may be required to economical justify Septage Receiving Station expansion.

6.9 HIGHWAY 23 SEWAGE PUMPING STATION

6.9.1 Background

The Highway 23 Sewage Pumping Station (SPS) is the main station for Listowel that receives all sewage flows as well as flows from the former Campbell's' Soup factory (currently Erie Meats) which is located adjacent to the pumping station. A facility evaluation and risk assessment was conducted by GM BluePlan in 2008 which indicated the following deficiencies to be addressed.

- Solids management and screening options to be evaluated including grinding and automatic screening.
- Duty Forcemain Failure – Redundant forcemain recommended due to its critical nature, forcemain failure contingency plan
- Station does not meet current TSSA standards for fuel storage and delivery
- Station does not meet current NFPA and Ontario Electrical Code standards for classified areas in dry well.
- Wet well air supply – install new fans with explosion proof motors
- Pump room ventilation – extend duct work to base of dry pit and install new fan
- Corrosion of metal components – Clean wet well grating, replace corroded access hatch components, provide access hatch locking mechanism and install secondary fall protection measures
- Fuel Storage / Transfer – Level monitor, low level alarming and re-fill notification in fuel tank
- Flow Metering – Calibrate flume flow meter and reconfigure as per manufacturer's recommendations (i.e. sensor in stilling well).
- Sump Pump Failure – Backup sump pump discharging into common header.

Pumps in Dry Well of Hwy 23 Pump Station

Hwy 23 Pump Station Exterior

The station is equipped with 3 KSB Dry Pit Submersible Sewage Pumps, Model KRTK 200-401/806XNG-D which are driven by 75 kW motors operating at 1200 rpm. Each pump is rated at 147.5 L/s at 30m head. Station capacity was assessed during a pumping test conducted with GM BluePlan 2010 which indicated that the actual current firm capacity of the plant (with 2 of 3 pumps running) is 250 L/s although the station had originally been able to produce a firm capacity flow of 295 L/s. Analysis of flow test results indicates that the main cause of this capacity reduction is the accumulation of debris in the forcemain. Based on review of the forcemain profile, it is suspected that the majority of solids accumulation is in the upstream sections of the pipeline, i.e. near the station. Issues related to the forcemain are discussed further in Section 6.8.

6.9.2 Screening-Level Evaluation

Based on the above considerations and discussions with the Project Steering Committee, the following alternatives were identified for evaluation.

1. Do Nothing

The Do Nothing option for this project would consist of continuing to operate and maintain the Highway 23 Sewage Pumping Station (SPS) in its current state with no physical or operational changes.

2. Install Screening / Grinding Equipment

This alternative involves installation of mechanical screening or grinding equipment at the incoming 900mm sewer where it enters the wet well. Operating experience indicates that accumulation of large debris in the wet well and occasional clogging of pumps indicates that upstream removal of these solids would improve station operation.

3. Optimize Station Operation

Operational modifications may be available to allow the station to perform more efficiently and reduce operating and maintenance costs, energy costs, and minimize build-up of solids in the sewage forcemain to the treatment plant. The 3 pumps were replaced in 2010 with new dry-pit submersible pumps operating on variable frequency drives (VFD's). Pump tests indicated that station capacity is less than predicted with 2 pumps operating and significantly less than predicted with all 3 pumps operating. A principal cause of this was determined to be solids build up in the forcemain. Consequently, plant operators have implemented operational changes such as periodically operating the pumps at 100% speed to increase flow velocity in the forcemain and partially scour the pipeline clean. Pumps are controlled by wet well liquid level, which may be adjusted to improve pump cycling as well.

4. Enhanced Sewer Use Bylaw Enforcement

North Perth has Sewer Use Bylaw 49-PW-2003 that governs the discharge of wastewater to the municipal sewage collection system. This is a mechanism that can be used to control the quantity and nature of liquid wastes discharges to the sewer system which may reduce the amount of unsuitable or dangerous materials from being accepted. Implementing this alternative would require increased monitoring and control by municipal public works staff and possibly installation of dedicated sewage monitoring stations at strategic locations in the collection system such as at large industrial customers.

5. Implement Station Upgrades

This alternative would involve station upgrades and modifications to bring the station into compliance with TSSA, NFPA, and electrical code requirements as well as other station upgrades described above under Background. Upgrades considered under this alternative could include upgrades as recommended in Alternative 2.

6. Increase Station Capacity

This alternative would involve replacing existing pumps with larger pumps to increase rated station capacity. Operating experience suggests that station hydraulic capacity has not been an issue in terms of station operation and maintenance.

The table below summarizes results of screening-level evaluation of alternatives for the long-term status of the Highway 23 Sewage Pumping Station. See Appendix C for the complete screening level evaluation matrix.

6.9.3 Detailed Evaluation

Of the initial list of 6 alternatives for screening, 3 were carried forward for detailed evaluation, consisting of the following.

- Do Nothing
- Install Screening / Grinding Equipment
- Implement Station Upgrades

The table on the next page summarizes results of detailed evaluation of alternatives for the long-term status of the Highway 23 Sewage Pumping Station. See Appendix C for the complete detailed evaluation matrix.

Table 60. Screening Evaluation – Highway 23 Sewage Pumping Station

Evaluation Criteria	1. Do Nothing (i.e. Maintain Ex. Station)	2. Install Screening / Grinding Equipment	3. Optimize Station Operation	4. Enhanced Sewer Use Bylaw Enforcement	5. Implement Station Upgrades	6. Increase Station Capacity
Ability to Address the Problem	3	9	6	3	9	6
Technical Feasibility	6	4	4	4	4	6
Relative Cost-Benefit or Life Cycle Cost of Implementation	2	6	4	6	6	4
Energy Consumption/Ecological Footprint (e.g. GHG emissions)	1	2	3	2	2	2
Compatibility with Municipal, County, and Provincial Policies, Regulations, and Studies	2	2	2	3	3	2
Alternative is Well-Established and Proven	2	2	2	1	2	3
Overall Score	16	25	21	19	26	23
Status	carried forward	carried forward	not carried forward	not carried forward	carried forward	not carried forward

Table 61. Detailed Evaluation – Highway 23 Sewage Pumping Station

Evaluation Criteria Categories	1. Do Nothing (i.e. Maintain Ex. Station)	2. Install Screening / Grinding Equipment	3. Optimize Station Operation	4. Enhanced Sewer Use Bylaw Enforcement	5. Implement Station Upgrades	6. Increase Station Capacity
Technical Considerations	2.60	3.18			2.85	
Approvals Requirements	1.80	1.65			1.80	
Financial Considerations	1.55	1.53			2.18	
Environmental and Social Impacts	1.23	1.58			1.50	
Overall Score	7.18	7.93			8.33	
Overall Rank	3	2			1	

Notes 1. Values in the above tables indicate weighted scores for each criterion. A high score and low rank indicate a preferred alternative.

Table 62. Qualitative Evaluation - Highway 23 Sewage Pumping Station

Alternative	Advantages	Disadvantages	Notes
Do Nothing (Maintain existing Station)	• No capital cost to implement • No approvals required	• Does not address identified deficiencies at the station	
Install Screening / Grinding Equipment	• No approvals required • Would reduce downstream operational problems, including clogging of pumps and obstruction of forcemain • Reduction of solids accumulation downstream would improve hydraulic performance of the station	• Moderate capital cost to implement	• Will likely trigger further regulatory approvals
Implement Station Upgrades	• Would bring the station into compliance with TSSA, NFPA, and Ontario Electrical Code safety standards • No MOECC approvals required	• Moderate capital cost to implement	• This work is required regardless of whether screening is installed

6.9.4 Summary of Results

Results of detailed evaluation of alternatives indicate that installing screening / grinding equipment as well as other station upgrades for regulatory compliance are the recommend alternatives. In terms of screening / grinding equipment, the basic difference between these 2 processes is that screening physically captures and removes large solids from the incoming waste stream, whereas grinding creates smaller size solids but those solids are returned to the flow stream. Consequently, screening may be a more appropriate solution.

As a maintenance item, it is recommended that leaking influent sewers and manholes especially those located within Maitland River flood plain be identified and sealed or repaired. See Project 6.1 Hydraulic Treatment Capacity above for further discussion on this item.

6.10 FATS, OILS AND GREASE (FOG) MANAGEMENT

6.10.1 Background

The North Perth WWTP accepts both municipal sewage and imported industrial waste, both of which often contain fats, oils and grease (FOG). The presence of FOG is the suspected cause of reduced performance of the tertiary filters. Currently, there are no processes in place at the plant to remove FOG other than manual scum collection from the surface of the secondary clarifiers which is labour intensive and has limited effectiveness. As noted above, the clarifiers are currently not equipped with surface skimming mechanisms.

The original filter system included a floating vortex skimmer pump that collected scum from the surface of the filter vessels. However, this pump was not effective and has been out of service for several years.

6.10.2 Screening-Level Evaluation

An initial list of potential solutions for FOG management is described below for screening. Note that all options excluding ‘Do Nothing’ could also include improved quality control of incoming septage to reduce FOG loading at the source.

1. <u>Do Nothing</u>

Continue current maintenance practice of manually removing scum from clarifiers on a regular basis.

2. <u>New Skimmer Pump</u>

Install a new skimmer pump in filter tank to remove FOG. This will replace the pump that was previously used but has been taken out of service due to poor operation.

3. <u>Clarifier Skimming Arm</u>

Upgrade clarifier to include a skimming arm mechanism. The bridge on each existing clarifier would need to be retrofitted to allow it to rotate with the skimmer arm. A scum collection outlet trough would also need to be added to capture and remove skimmed material.

4. <u>Bio-augmentation</u>

Implement bio-augmentation with fat degrading microorganisms after the clarifier outlet to prevent contamination of the WAS line with inappropriate bacteria. Additional aeration equipment may be required to support the microbiology.

5. Dispersed Air Flotation

Install a dispersed air floatation system upstream of the tertiary filters for improved removal of FOG and other suspended solids. Separated solids would be sent to the sludge aeration basin for stabilization.

6. Flotation Tank with Skimmer at Headworks

Install flotation tank(s) with a skimming mechanism at the headworks, operating parallel to the grit tank(s). This option removes FOG before it enters the biological treatment stage.

Table 63 summarizes results of screening-level evaluation of alternatives for FOG management. See Appendix C for the complete screening level evaluation matrix.

6.10.3 Detailed Evaluation

Dispersed air flotation and air scouring alternatives were screened out due to high capital and operating costs as well as larger space requirements.

The table on the next page summarizes results of detailed evaluation of alternatives for FOG Management. See Appendix C for the complete detailed evaluation matrix.

Table 63. Screening Level Evaluation –FOG Management

Evaluation Criteria	1. Do Nothing	2. New Skimmer Pump	3. Clarifier Skimming Arm	4. Bio-augmentation	5. Dispersed Air Flotation	6. Flotation Tank at Headworks
Ability to Address the Problem	3	6	6	6	9	9
Technical Feasibility	6	6	6	2	2	4
Relative Cost-Benefit or Life Cycle Cost of Implementation	4	4	4	4	2	4
Energy Consumption/Ecological Footprint (e.g. GHG emissions)	3	2	2	3	1	2
Compatibility with Municipal, County, and Provincial Policies, Regulations, and Studies	1	3	3	2	3	3
Alternative is Well-Established and Proven	3	1	3	1	2	3
Overall Score	20	22	24	18	19	25
Status	carried forward	carried forward	carried forward	not carried forward	not carried forward	carried forward

Table 64. Detailed Decision Matrix –FOG Management

Evaluation Criteria Categories	1. Do Nothing	2. New Skimmer Pump	3. Clarifier Skimming Arm	4. Bio-augmentation	5. Dispersed Air Flotation	6. Flotation Tank at Headworks
Technical Considerations	2.25	2.30	3.05			3.43
Approvals Requirements	1.10	1.10	1.10			1.10
Financial Considerations	1.95	1.95	1.93			1.93
Environmental and Social Impacts	1.90	1.68	1.88			1.65
Overall Score	7.20	7.03	7.95			8.10
Overall Rank	3	4	2			1

Note: Values in the above tables indicate weighted scores for each criterion. A high score and low rank indicate a preferred alternative.

Table 65. Qualitative Evaluation - FOG Management

Alternative	Advantages	Disadvantages	Notes
Do Nothing	• No capital cost to implement	• Filter maintenance will remain high to avoid plugging • Difficult and ineffective to operate current FOG management strategy of manual removal from the clarifiers • West Lagoon required to stay in place	• Filters are not designed to handle current loading; therefore doing nothing will have an overall negative impact on final effluent quality and plant performance and is not recommended.
New skimmer pump	• Lower cost alternative • Would theoretically reduces FOG loading on the tertiary filters • Operators are already familiar with technology and general maintenance requirements	• Has not worked well in the past • Is only a feasible option if the existing sand filter system is not replaced, which is unlikely	• If this alternative is to be considered, different styles of skimmer pumps will need to be reviewed and possibly tested to ensure compatibility with application
Clarifier skimming arm	• Reduces FOG loading on the tertiary filters • Well established technology • Low capital cost	• Draining clarifier required to retrofit existing clarifier unit to incorporate the skimming arm	• More detailed evaluation of existing clarifier set-up required to confirm feasibility • Instead of, or in addition to the clarifier skimming arm, it may be possible to install a grease baffle at the discharge of the aeration tank to remove FOG upstream of the clarifier
Flotation Tank at Headworks	• Reduces FOG and scum loading on all treatment processes downstream of the headworks, protecting secondary biological processes from contamination • Can be combined with grit removal technology	• Greater operational complexity • Highest cost	• If a redundant grit chamber will be built at the headworks, the flotation tank could be incorporated into this design

6.10.4 Summary of Results

Overall, the most feasible alternative that addresses the FOG accumulation in the tertiary filters is installing a flotation tank with skimming mechanism at the headworks. This will protect all downstream processes from FOG contamination. The flotation tanks can be incorporated into the grit tank upgrades that have been previously recommended in Section 6.9 ‘Headworks’.

6.11 TERTIARY FILTRATION

6.11.1 Background

Secondary effluent undergoes tertiary treatment to remove any remaining total suspended solids and phosphorus through two automatic travelling bridge style sand filters prior to UV disinfection and final effluent discharge. Secondary effluent from the clarifiers can be directed through the West Lagoon to provide equalization storage or solids and phosphorus reduction before reaching the tertiary filters. It is also possible to by-pass or blend secondary effluent with effluent from the West Lagoon if needed before flow is directed to the filters. The two filter beds are operated in parallel with one bed able to treat the average day flow, and two beds required to treat the peak flow. Key filter parameters are summarized in the table below:

Table 66. Filtration Equipment Capacity

Parameter	Design Basis	Actual[3]	Limits[5]
Effluent Phosphorus Concentration at Average Daily Flow[1], and Peak Daily Flow[2]	0.3 mg/L	0.27 mg/L (average) 0.94 mg/L (maximum)	0.36 mg/L (Apr 1 to Nov 30) 0.73 mg/L (Dec 1 to Mar 31)
Effluent Suspended Solids Concentration at Average Daily Flow, and Peak Daily Flow	5 mg/L	6.6 mg/L (average) 32.6 mg/L (maximum)	10 mg/L (Apr 1 to Nov 30) 15 mg/L (Dec 1 to Mar 31)
Effluent $CBOD_5$ at Average Daily Flow, and Peak Daily Flow	5 mg/L	3.5 mg/L (average) 20.0 mg/L (maximum)	10 mg/L (Apr 1 to Nov 30) 15 mg/L (Dec 1 to Mar 31)
Filter Media Bed Area	110 m^2 x 2 filters	--	--
Solids Loading Rate	51 mg/m^2*s	4.18 mg/m^2*s (average flow, average solids concentration) 30.9 mg/m^2*s (average flow, peak solids concentration) 87.1 mg/m^2*s (peak flow, peak solids concentration)	--
Surface Overflow Rate	4.54 m/hr	<u>Demand</u> 1.71 m/hr (average flow through 2 filter beds) 3.42 m/hr (average flow through 1 filter bed)	--

Parameter	Design Basis	Actual[3]	Limits[5]
		4.83 m/hr (peak flow through 2 filter beds) Current Filter Capacity[4] 2.65 m/hr (with two beds in operation)	

Notes:

1. Average daily flow is 9030 m^3/d
2. Peak daily flow is 25,500 m^3/d
3. Actual data is based on daily measured quality of final effluent from 2010 to 2014
4. Current filter capacity is based on observed performance from operator. It is thought that the actual capacity is lower than the rated capacity, partially because the filter media has been fouled with FOG (fats, oils and grease).
5. Source: MOECC Certificate of Approval No. 3087-7K8NZC, October 10, 2008

Active Sand Filter

Sand Filter Shut Down for Maintenance

Although the filters are designed to handle the peak daily flow and average solids loading rate, the system is no longer operating at its rated capacity. Also, the filters are not designed to handle peak solids loading rate which would lead to a high backwash frequency and lower removal efficiency. In addition, the peak effluent concentrations for phosphorus, total suspended solids and $CBOD_5$ exceed the design basis level, as well as MOECC objectives stated in the existing Certificate of Approval. In addition to the hydraulic limitation of the system, one suspected cause of reduced performance is the accumulation of floating debris as well as fats, oils and grease (FOG) from the West Lagoon and/or the secondary clarifiers. FOG management is addressed in Section 6.15 Fats, Oil, and Grease (FOG) Management.

Plant operators have reported various operating and maintenance issues with the filters for several years. In order to improve performance, system pressure head was increased by 100mm and cleaning of the washwater collection tube holes in the washwater hood was incorporated into the regular maintenance schedule. These measures have brought the flow capacity up to 14,000m^3/day, which is well above the design average flow rate of 9,030m^3/day. Peak flows above 14,000m^3/day currently bypass the tertiary filters, and are sent directly to the UV disinfection process from the West Lagoon. Although solids concentrations in filter effluent occasionally exceed C of A objectives, average solids levels are in compliance.

Loading on the filters is primarily related to the high strength hauled in waste from the septage receiving station, and could be reduced by limiting hauled in waste volume or improving quality control procedures.

Reduced filter performance could also be due to aging equipment and limitations of depth filtration technology itself, as well as the system being undersized. Therefore, it would be beneficial to review alternative filter types that could potentially replace the sand filters and improve performance. Note that the filters were rebuilt in 2014, including replacement of the pumps, motors and media, which may increase the usable life of the filters and delay upgrades.

6.11.2 Screening-Level Evaluation

The list of alternatives below outlines ways to improve filter performance, excluding discussion of FOG reduction:

1. Do Nothing

Continue operation of existing filters and maintain operation of West Lagoon for polishing.

2. New Wash Pumps and Filter Media

Replace wash water and backwash pumps to handle higher pressure head through filter bed at the required volume, replace under-drain, and replace sand filter media with fresh, un-fouled material.

3. Mixed Media Depth Filtration System

Convert sand filtration system with mixed media depth filtration system to increase solids removal efficiency. Alternate media materials include anthracite and garnet, which could be combined with sand to provide a broader range of solids removal.

4. Cloth Media Disk Filter

Replace sand filtration system with a textile-type media filter with an automated backwash system to increase solids removal efficiency.

5. Membrane Ultrafiltration

Replace sand filtration system an ultrafiltration (UF) membrane system with automated backwash to increase solids removal efficiency. Ultrafiltration is a much higher level of filtration on the filtration spectrum with typical pore size ratings in the sub-micron range. To reduce the solids load on the membrane and to reduce blinding, improved quality control measures for hauled in waste should be implemented.

6.11.3 Detailed Evaluation

The alternative to convert the sand filtration system to a mixed media depth filtration system was not carried forward, as this option would not provide significant benefit in comparison with simply replacing the media with the existing sand type. The table on the next page summarizes results of detailed evaluation of alternatives for tertiary filtration. See Appendix C for the complete detailed evaluation matrix.

Table 67. Screening Level Evaluation – Tertiary Filtration

Evaluation Criteria	1. Do Nothing	2. New Wash Pumps and Filter Media	3 Mixed Media Depth Filter	4. Cloth Media Disk Filter	5. Membrane Ultrafiltration
Ability to Address the Problem	3	6	6	9	9
Technical Feasibility	6	6	4	4	4
Relative Cost-Benefit or Life Cycle Cost of Implementation	6	6	4	4	2
Energy Consumption/Ecological Footprint (e.g. GHG emissions)	2	2	2	2	1
Compatibility with Municipal, County, and Provincial Policies, Regulations, and Studies	1	3	3	3	3
Alternative is Well-Established and Proven	1	3	3	3	3
Overall Score	19	26	22	25	22
Status	carried forward	carried forward	not carried forward	carried forward	carried forward

Table 68: Detailed Decision Matrix – Tertiary Filtration

Evaluation Criteria Categories	1. Do Nothing	2. New Wash Pumps and Filter Media	3 Mixed Media Depth Filter	4. Cloth Media Disk Filter	5. Membrane Ultrafiltration
Technical Considerations	1.73	3.68		3.75	3.45
Approvals Requirements	0.80	1.20		1.10	1.10
Financial Considerations	2.15	2.60		1.40	0.70
Environmental and Social Impacts	0.85	1.50		1.28	1.25
Overall Score	5.53	8.98		7.53	6.50
Overall Rank	4	1		2	3

Note: Values in the above tables indicate weighted scores for each criterion. A high score and low rank indicate a preferred alternative.

Table 69. Qualitative Evaluation - Tertiary Filtration

Alternative	Advantages	Disadvantages	Notes
Do Nothing	• No capital cost to implement • Operators are familiar with existing filter operation	• Difficult to meet effluent quality criteria without use of West Lagoon as a polishing stage • Existing filter is undersized for peak flows • May require reduced hauled in wastewater	• This option is included for comparison purposes only, and is not recommended, as it does not address project objectives • Will require continued use of the west lagoon
New Wash Pumps and Filter Media	• Operators are familiar with existing filter operation • Low cost to implement • No additional space required • Lower potential for fouling compared to membrane technology	• Potential increase in capacity is unknown	• Will require continued use of west lagoon
Cloth Media Disk Filter	• Lower pressure drop across filter compared to membrane filter, saving energy • Increased organic and potentially hydraulic performance	• Moderate capital cost • Lowest solids removal performance • Requires frequent downtime for high-pressure cleaning, in addition to regular backwash cycle; would need to have redundant units	• Pilot testing may be required • Several cloth types are available
Membrane Ultrafiltration	• Higher removal efficiency than cloth media disk filter • Meets organic and hydraulic rated capacity	• Highest capital cost • Higher pressure drop across membrane leading to higher operating costs • More prone to fouling with high solids loading • Increased operational complexity	• Pilot testing may be required • Due to higher potential for fouling, would need to ensure FOG is removed prior to secondary effluent entering the filter • Depending on the membrane selected, some bacteria and other microorganisms could be removed, reducing or removing the need for final UV disinfection. Alternatively, UV system could be used as back-up only, and be normally by-passed.

6.11.4 Summary of Results

Overall, it is recommended that the existing sand filter be upgraded by replacing the wash pumps, filter media and the under-drain system to remove any debris, and improve performance. Higher treatment performance will be critical in the future if final effluent will be discharged to Chapman Drain, which is often dry, leading to zero dilution of effluent prior to discharge. Even if it is decided to keep the existing effluent discharge configuration, improving the tertiary filtration step of the treatment train will allow the plant to better handle peak flows and solids loadings, and could also address any potential future increases in effluent criteria for the Middle Maitland River.

6.12 EFFLUENT DISINFECTION

6.12.1 Background

The final stage of treatment at the North Perth WWTP is effluent disinfection using an ultraviolet (UV) light irradiation system. Florescent lights emitting radiation at a wavelength of 254 nanometres are used to inactivate microorganisms, with a target effluent E. coli concentration of 200 organisms per 100 millilitres. The existing system consists of two banks of UV lamps each bank containing 15 UV modules, and each module containing 8 lamps for a total of 240 lamps. Each bank is capable of treating 50% of the current peak wastewater flow of 25,500 m^3/day. Space is available for addition of a third bank if required in future.

It is critical that lamps remain submerged during operation to prevent damage to the lamps; therefore a constant water level is maintained by an Automatic Level Controller.

The existing UV equipment was installed with the original construction of the mechanical plant in the early 1990’s and is therefore aging and spare parts may become difficult to source. Newer generation equipment using latest technology will be more efficient in terms of energy use and be more effective as a disinfectant. Also, the level control valve is prone to leakage during low flow conditions which could trigger system shutdown if the lamps become exposed. Note that the UV equipment was rebuilt in 2012 and the lamps were replaced, potentially extending the equipment life, and delaying upgrade requirements.

UV Disinfection System at North Perth WWTP

6.12.2 Screening-Level Evaluation

An initial list of screening alternatives considered for effluent disinfection is provided below:

1. Do Nothing

This default alternative would be to maintain operation of the existing UV system.

2. New UV System

Install a new generation UV system using updated, higher efficiency technology.

3. New Level Control Device

Replace the existing level control valve to prevent system shutdown and potential damage to lamps, and keep existing UV system.

4. New UV System and Level Control Device

Replace the existing control valve and replace the UV system with a new generation system.

5. Liquid Chlorine

Replace the UV system with a liquid chlorine disinfection system.

6. Gas Chlorine

Replace the UV system with a gas chlorine disinfection system.

7. Ozone

Replace the UV system with an ozone disinfection system.

8. Hydrogen Peroxide

Replace the UV system with a hydrogen peroxide disinfection system.

Table 70 summarizes results of screening-level evaluation of alternatives for effluent disinfection. See Appendix C for the complete screening level evaluation matrix.

6.12.3 Detailed Evaluation

Alternatives 6, 7 and 8 were not carried forward as they each introduce a new chemical to the plant which would require new infrastructure and increase operational complexity. Alternative 5, liquid chlorine, was carried forward because the plant already uses a sodium hypochlorite liquid injection system to prevent algae blooms in the tertiary filter beds and capital investment and operator learning curve would be lower.

The table on the next page summarizes results of detailed evaluation of alternatives for effluent disinfection. See Appendix C for the complete detailed evaluation matrix.

Table 70. Screening Evaluation – Effluent Disinfection

Evaluation Criteria	1. Do Nothing	2. New UV System	3. New Level Control Device	4. New UV and Level Control	5. Liquid Chlorine	6. Gas Chlorine	7. Ozone	8. Hydrogen Peroxide
Ability to Address the Problem	6	9	6	9	6	6	9	9
Technical Feasibility	6	6	4	6	4	4	2	2
Relative Cost-Benefit or Life Cycle Cost of Implementation	2	6	4	6	4	4	2	2
Energy Consumption/Ecological Footprint (e.g. GHG emissions)	2	2	3	2	1	1	1	2
Compatibility with Municipal, County, and Provincial Policies, Regulations, and Studies	2	2	2	2	2	2	2	2
Alternative is Well-Established and Proven	3	3	2	3	3	3	1	1
Overall Score	21	28	21	28	20	17	17	18
Status	carried forward	carried forward	carried forward	carried forward	carried forward	not carried forward	not carried forward	not carried forward

Table 71. Detailed Evaluation – Effluent Disinfection

Evaluation Criteria Categories	1. Do Nothing	2. New UV System	3. New Level Control Device	4. New UV and Level Control	5. Liquid Chlorine	6. Gas Chlorine	7. Ozone	8. Hydrogen Peroxide
Technical Considerations	2.58	3.53	2.58	3.53	2.28			
Approvals Requirements	2.03	2.20	2.20	2.20	1.68			
Financial Considerations	1.80	1.90	2.30	1.90	1.15			
Environmental and Social Impacts	1.20	1.43	1.80	1.58	1.28			
Overall Score	7.60	9.05	8.88	9.20	6.38			
Overall Rank	4	2	3	1	5			

Notes
Values in the above tables indicate weighted scores for each criterion. A high score and low rank indicate a preferred alternative.

Table 72. Qualitative Evaluation - Effluent Disinfection

Alternative	Advantages	Disadvantages	Notes
Do Nothing (Maintain Existing UV System)	• No cost to implement • No introduction of toxic chemicals to effluent • Shorter contact time than chlorine disinfection	• Risk damage to existing bulbs due to malfunctioning level control valve • Limited life remaining on existing equipment; high probability of failure in short term • Disinfection efficiency affected by wastewater quality (reduced UV transmittance with high TSS)	• Currently two banks of UV modules installed with no redundancy
Install new UV system	• No toxic chemicals introduced into the effluent • Reduced O&M costs due to higher efficiency bulbs, and overall system operation • Operators are familiar with this technology • Increased system efficiency and improved effluent quality to meet standard levels with better consistency • May include level controller in package	• Moderate capital cost • Disinfection efficiency affected by wastewater quality (reduced UV transmittance with high TSS)	• Potential to add redundancy when installing new unit to avoid sending by-pass to lagoons during maintenance
Replace Level Control Device Only	• Minimal cost • No introduction of toxic chemicals to effluent • Shorter contact time than chlorine disinfection	• Would keep in use older UV equipment that has a lower efficiency, higher O&M cost • Disinfection efficiency affected by wastewater quality (reduced UV transmittance with high TSS)	• Current level control valve is leaking, introducing potential for lamps to dry out, causing damage
Install New UV System and New Level Control	• Technology is well established and reliable • Reduced O&M costs due to higher efficiency bulbs, and overall system operation • Operators are familiar with this technology • Increased system efficiency and improved effluent quality to meet standard levels with better consistency	• Moderate capital cost	
Refurbish existing chemical disinfection system with liquid chlorine	• Technology is well established and reliable • Potential to reuse existing equipment, reducing capital cost	• Moderate capital cost, as de-chlorination system would also be required • Safety concerns during storage and handling of chlorine • Limited removal of protozoa • Effectively limited by pH of effluent • Longest contact time	• Need to confirm capacity of existing system, as it may not be sized for peak flows, and thus cannot be refurbished

6.12.4 Summary of Results

Overall, the preferred alternative is to replace the existing UV system with a newer UV system and replace the existing level control device. This solution allows the plant to continue to receive the environmental and safety benefits of a UV system compared to a chemical addition system, while improving operating efficiency and saving energy.

GROUP C PROJECTS

6.13 MAIN POWER SUPPLY

6.13.1 Background

The existing power supply to the WWTP property is from the local Hydro One grid and is a 3-phase 44 kilovolt (kV) service that is stepped down to 600V at the on-site transformer sub-station. The source of power to the property is from the Bruce Power generating station located on the shore of Lake Huron just north of Kincardine with transmission lines that pass through the Palmerston Transformer Station. There is a junction with another transmission line originating from Bruce Power that passes through the Wingham Transformer Station. The junction is located near Highway 23 and North Perth Line 87 at the north edge of the Town of Listowel.

Power supply can be switched to the Wingham supply route in the event of a disruption upstream of the junction. This feature contributes to the reliability of power supply to the plant, and the close proximity of the interconnection between the 2 transmission lines reduces the likelihood and duration of main line power outages. The interconnection was used during the major blackout in August 2003, but this was an operational decision by Hydro One and is not by definition a redundant connection to the grid.

Key issues to be addressed for main line power supply to the North Perth WWTP include:

- Evaluate and optimize plant power demands especially during equipment start up.
- Establish need for expansion to service additional equipment.
- Evaluate existing and future power needs including potential power demand changes from any changes to the plant in this Master Plan
- Evaluate existing transformer station
- Energy management

Main Power Supply Transformer

6.13.2 Screening-Level Evaluation

Based on the above considerations and discussions with the Project Steering Committee, the following alternatives were identified for evaluation.

1. Do Nothing

Do Nothing in this case involves maintaining the existing on-site transformer and sub-station with no upgrades and without establishing a new power service from the local Hydro One grid.

2. Implement Energy Management

This alternative would consist of implementing energy conservation measures throughout the plant to reduce overall energy consumption. For municipal wastewater treatment plants, the largest energy user is typical aeration equipment (blowers). Other measures may include enhanced equipment maintenance and bearing lubrication on large motors and mechanical equipment, reducing heating requirements of building spaces with insulation and sealing the building envelope, energy efficient lighting and heating fixtures, and retrofitting of large motors with variable frequency drive (VFD's). Equipping large motors with variable frequency drives could reduce peak in-rush current during start-up of such equipment by gradually ramping motors up to speed and reducing the peak demand on the system. It is noted however that most large motors are already equipped with VFD's and consequently the potential for further energy savings are considered limited. Automated controls could also be installed to avoid simultaneous start-up of several large loads by using timers and staggered start up sequencing.

3. Replace Existing Transformer

The existing transformer was re-rated from 750 kVA to 1,000 kVA in 2007 with addition of air cooling equipment. It is unlikely that the existing transformer could be further re-rated to a higher capacity. Consequently, this option consists of replacing the existing transformer with a larger capacity unit.

4. Install Generator for Peak Shaving

Under this alternative, it is proposed to install a standby engine-driven power generator that could also be used during times of high power demand to reduce the peak load (i.e. peak shaving) on the main line Hydro service from the grid. This option is distinct from options noted above under the Standby Power Supply project which are dedicated for emergency power supply in the event of a main line power outage.

5. Provide New Hydro Service

This alternative is based on providing an entirely new Hydro service from the local grid at Perth Line 84 at the front of the property into the site and installation of a new sub-station including pad-mounted transformer compatible with the new Hydro service to the WWTP.

The table below summarizes results of screening-level evaluation of alternatives for main power supply to the plant. See Appendix C for the complete screening level evaluation matrix.

6.13.3 Detailed Evaluation

Of the initial list of 5 alternatives for screening, 4 were carried forward for detailed evaluation, consisting of the following.

- Do Nothing
- Implement Energy Management
- Install Standby Power for Peak Shaving
- Provide New Hydro Service

The table on the next page summarizes results of detailed evaluation of alternatives for main power supply to the plant. See Appendix C for the complete detailed evaluation matrix.

Table 73. Screening Evaluation – Main Power Supply

Evaluation Criteria	1. Do Nothing (i.e. Maintain Ex. System)	2. Energy Management	3. Replace Ex. Transformer	4. Install Generator for Peak Shaving	5. Provide New Hydro Service
Ability to Address the Problem	6	6	6	9	9
Technical Feasibility	6	6	4	4	4
Relative Cost-Benefit or Life Cycle Cost of Implementation	2	6	4	6	4
Energy Consumption/Ecological Footprint (e.g. GHG emissions)	2	3	3	2	1
Compatibility with Municipal, County, and Provincial Policies, Regulations, and Studies	2	2	2	2	2
Alternative is Well-Established and Proven	3	3	2	3	3
Overall Score	21	26	21	26	23
Status	carried forward	carried forward	not carried forward	carried forward	carried forward

Table 74. Detailed Evaluation – Main Power Supply

Evaluation Criteria Categories	1. Do Nothing (i.e. Maintain Ex. System)	2. Energy Management	3. Replace Ex. Transformer	4. Install Generator for Peak Shaving	5. Provide New Hydro Service
Technical Considerations	3.15	2.90		2.90	3.83
Approvals Requirements	1.60	1.60		1.40	1.50
Financial Considerations	1.93	1.80		1.53	1.45
Environmental and Social Impacts	1.58	1.58		1.58	1.50
Overall Score	8.25	8.38		7.40	8.28
Overall Rank	3	1		4	2

Notes

1. Values in the above tables indicate weighted scores for each criterion. A high score and low rank indicate a preferred alternative.

Table 75. Qualitative Evaluation - Main Power Supply

Alternative	Advantages	Disadvantages	Notes
Do nothing (Maintain Existing System)	• No cost to implement • No approvals required	• Does not address problem of limited power supply to accommodate future plant expansion • Stress on transformer during major equipment start up, particularly when all 3 blowers are operating	• Heavy use may shorten life cycle
Implement Energy Management	• Low capital cost • Can reduce peak power demands • Reduce stress on current Hydro service and transformer	• May be somewhat complex implementation procedure • Potential power savings are limited	
Install Generator for Peak Shaving	• Moderate reduction in peak power demands is achievable •	• Moderate capital cost if standby gen-set is installed under Section 6.5 • May be somewhat complex implementation procedure • Air/Noise Approval required from MOECC	
Provide New Hydro Service	• Directly addresses problem of limited power supply to accommodate future plant expansion • Well – established long-term solution	• High capital cost • Long process involving Hydro One	• There may be an opportunity to partner with an outside Alkaline Stabilization Facility (if constructed) to share hydro capacity from a new service for that facility

6.13.4 Summary of Results

Results of detailed evaluation of alternatives indicate that energy management is the preferred short-term alternative with installation of a new Hydro service a recommended long-term alternative for upgrading the main power supply to the site. In the short term, it is also recommended to install new insulators and a new air gap switch for the transformer.

6.14 SCADA SYSTEM

6.14.1 Background

The existing WWTP is equipped with a Supervisory Control and Data Acquisition (SCADA) system for process monitoring and control. The following issues with respect to the existing SCADA system have been identified.

- Lack of adequate backup power supply
- Secondary data storage needs
- Data security

It is noted that Highway 23 SPS, the Septage Receiving Station, and the treatment plant are all serviced with new fibre optic cable providing a high quality communications platform.

6.14.2 Screening-Level Evaluation

Based on the identified needs, the following alternatives were identified for evaluation.

1. <u>Do Nothing</u>

The Do Nothing alternative represents maintaining the existing SCADA system with no upgrades or replacement.

2. <u>Provide Secondary Data Storage</u>

This alternative consists of providing an independent off-site storage of all plant data and records so that this information is preserved in the event that the main system at the plant fails. A secondary location may be at the public works building adjacent to the water tower. This will provide a secure backup of critical information about the wastewater treatment system, including operational data, lab results, reports, as built drawings, data from on-line instrumentation, and all SCADA information. Plant operations staff have indicated that they prefer to not consolidate plant data storage with the Town mainframe. It may be possible to operate the WWTP SCADA through stand-by power at the Public Works building to maintain SCADA operation during a power outage.

3. <u>Improve System Security</u>

This alternative would involve installing SCADA system software that will safeguard all plant data from corruption or external viruses and other electronic threats to the system.

4. <u>Provide New Generation SCADA System</u>

This alternative is the most comprehensive and would involve complete replacement of the existing SCADA system with a new generation system along with additional monitoring and control capabilities.

The table on the second next page summarizes results of screening-level evaluation of alternatives for the SCADA system. See Appendix C for the complete screening level evaluation matrix.

6.14.3 Detailed Evaluation

Of the initial list of 4 alternatives for screening, 3 were carried forward for detailed evaluation, consisting of the following.

- Do Nothing
- Provide Secondary Data Storage
- Provide New Generation SCADA System

The table on the next page summarizes results of detailed evaluation of alternatives for the SCADA system. See Appendix C for the complete detailed evaluation matrix.

Table 76. Screening Evaluation – SCADA System

Evaluation Criteria	1. Do Nothing (i.e. Maintain Ex. System)	2. Provide Secondary Data Storage	3. Improve System Security	4. Provide New Generation SCADA System
Ability to Address the Problem	3	9	3	9
Technical Feasibility	6	4	4	6
Relative Cost-Benefit or Life Cycle Cost of Implementation	4	6	6	4
Energy Consumption/Ecological Footprint (e.g. GHG emissions)	2	2	2	3
Compatibility with Municipal, County, and Provincial Policies, Regulations, and Studies	2	2	2	2
Alternative is Well-Established and Proven	2	3	3	3
Overall Score	19	26	20	27
Status	carried forward	carried forward	not carried forward	carried forward

Table 77. Detailed Evaluation – SCADA System

Evaluation Criteria Categories	1. Do Nothing (i.e. Maintain Ex. System)	2. Provide Secondary Data Storage	3. Improve System Security	4. Provide New Generation SCADA System
Technical Considerations	3.30	3.88		4.65
Approvals Requirements	na	na		na
Financial Considerations	2.73	2.63		2.33
Environmental and Social Impacts	1.05	1.18		1.05
Overall Score	7.08	7.68		8.03
Overall Rank	3	2		1

Notes

Values in the above tables indicate weighted scores for each criterion. A high score and low rank indicate a preferred alternative.

Table 78. Qualitative Evaluation - SCADA System

Alternative	Advantages	Disadvantages	Notes
Do Nothing (Maintain Existing System)	• No cost to implement • Existing SCADA system generally functions adequately	• Does not address problems of data storage, data security, redundancy • Future system maintenance and IT support may become obsolete at some point in the future	
Provide Secondary Data Storage	• Low capital cost • Addresses data storage and security needs • Back-up Power is available at the Public Works building	• System would continue to be based on an older generation platform • Spare parts for hardware repairs may become difficult to source in future	
Provide New Generation SCADA System	• Addresses data storage and security needs • Well established strategy • System would to be based on a new generation platform • Spare parts for hardware upgrades/repairs would be readily available	• Moderate capital cost	• Installation of a flow meter for the on-site effluent pumping station and integration of flow data is recommended as part of any SCADA system upgrades

6.14.4 Summary of Results

Results of detailed evaluation of alternatives indicate that providing a new generation SCADA system is the recommended alternative for long-term monitoring and control of plant processes.

6.15 SECONDARY CLARIFICATION

6.15.1 Background

The plant is equipped with 2 equivalent circular clarifiers, each 30 metres in diameter with a side water depth of 4.0 metres. Following biological nutrient removal in the anoxic/aeration reactors, wastewater flows into two secondary clarifiers where suspended solids are settled and either returned to the head of the anoxic tanks system as returned activated sludge (RAS), or sent to the aerated sludge basin as waste activated sludge (WAS). Clarified effluent overflows from the clarifier outlet weirs and flows into the tertiary treatment filters. At this point, the plant staff have the option to send the effluent to the west lagoon either in whole or blended in part for polishing depending on the suspended solids, ammonia or phosphorus levels.

The existing clarifiers are equipped with sludge collection mechanisms at the bottom of the tanks but are not equipped with skimming mechanisms. Currently, any floating scum that collects on the surface of the clarifiers is manually removed to prevent clogging the tertiary filters. Refer to Section 6.15 Fats, Oil, and Grease (FOG) Management for potential alternatives to handle scum accumulation.

Secondary Clarifier (One of Two)

From a hydraulic perspective, the flow to each clarifier is not evenly distributed, as the distance to the first clarifier is shorter than the distance to the second clarifier, resulting in uneven flow distribution. There is no space available for a valve chamber at the mid-point between the two clarifiers because the plant administration building is located here. Because there are no flow meters measuring flow into or out of each clarifier, the level of flow imbalance is not known but suspected to represent a marginal difference. Plant operators identified this as a concern based on the difference in scum accumulation between the two clarifiers.

6.15.2 Screening-Level Evaluation

Alternatives to address uneven flow distribution are described below:

1. Do Nothing

Maintain the existing flow configuration and do not monitor or control flow into each clarifier.

2. Flow Monitoring Only

Monitor liquid flow at the splitter box at the outlet of the aerobic reactors to determine the level of flow splitting that is occurring. This will not address the flow imbalance but may allow for troubleshooting any problems occurring with the clarifiers attributed to flow splitting.

3. Install Flow Balancing Device

Install a pivoting flow control arm at the outlet of the splitter box that can be manually adjusted to balance the flows to each clarifier. Once the arm is set, it should not require readjustment under normal operating conditions as the difference in flow is due to a difference in pipe distance to each clarifier which will not change. It may also be possible to control flow splitting based on output from ultrasonic level sensors at the clarifier surface.

6.15.3 Detailed Evaluation

The option to monitor flow only was screened out, because ongoing flow measurement would provide little value. It may still be beneficial to take a few measurements of the flow using a portable flow meter to determine the difference in flow going to each clarifier which should not change with time or total flow rate. Imbalanced flows to the clarifiers are not having a large impact on total plant operation, and cost and complexity to address the problem may not be warranted.

The table on the next page summarizes results of detailed evaluation of alternatives for secondary clarification. See Appendix C for the complete detailed evaluation matrix.

Table 79. Screening Level Evaluation – Secondary Clarification

Evaluation Criteria	1. Do Nothing	2. Flow Monitoring Only	3. Install Flow Balancing Device
Ability to Address the Problem	3	3	9
Technical Feasibility	6	4	4
Relative Cost-Benefit or Life Cycle Cost of Implementation	6	6	4
Energy Consumption/Ecological Footprint (e.g. GHG emissions)	3	3	3
Compatibility with Municipal, County, and Provincial Policies, Regulations, and Studies	3	3	3
Alternative is Well-Established and Proven	3	3	3
Overall Score	24	22	26
Status	carried forward	not carried forward	carried forward

Table 80. Detailed Decision Matrix – Secondary Clarification

Evaluation Criteria Categories	1. Do Nothing	2. Flow Monitoring Only	3. Install Flow Balancing Device
Technical Considerations	3.75		4.38
Approvals Requirements	0.20		0.20
Financial Considerations	3.00		2.50
Environmental and Social Impacts	1.90		1.90
Overall Score	8.85		8.98
Overall Rank	2		1

Note: Values in the above tables indicate weighted scores for each criterion. A high score and low rank indicate a preferred alternative.

Table 81. Qualitative Evaluation - Secondary Clarification

Alternative	Advantages	Disadvantages	Notes
Do Nothing	• No cost to implement • No additional operational requirements	• Maximum treatment capacity cannot be achieved if each clarifier cannot operate at the same maximum capacity level	• The difference in flow to each clarifier is not known. If it is only slight, it will not make a significant difference to overall plant performance.
Install Flow Balancing Device	• Greater efficiency of clarifier operation by ensuring flows are as closely matched as possible • Manual adjustment could be used, saving cost, as the control device would not require adjustment after initial set-up	• It is possible that the level of control that could be obtained using a flow balancing device is not significantly better than the existing variance in the flow rates to each clarifier • Moderate cost to implement	• Would need to identify manufacturer of an applicable control device • Clarifiers are already oversized

6.15.4 Summary of Results

Based on the evaluation above, the preferred alternative is to Do Nothing at this time since the flow imbalance is believed to be marginal and not impacting on overall treatment plant performance, based on current effluent criteria.

6.16 ODOUR CONTROL

6.16.1 Background

At most municipal wastewater treatment plants, areas that have the highest potential for odour generation are 1) influent pumping station, 2) headworks, and 3) sludge or biosolids handling and processing. At the influent pumping station and various headworks processes such as the bar screen and grit screw conveyor, raw sewage is agitated, increasing the release of odorous compounds, primarily hydrogen sulfide, from the water to air phase. During sludge processing operations such as aerobic digestion, odorous by-products are formed as a result of the microbial digestion of sludge. These by-products can include organic and inorganic sulphur compounds, ammonia, amines and organic fatty acids, and will vary based on the type of sludge process used. Alkaline stabilization of sludge can also generate large amounts of ammonia along with other volatile compounds.

Because the North Perth WWTP uses a number of uncovered processes, there is potential for odour generation, which could lead to complaints by surrounding residents or businesses. MOECC odour guidelines recommend maintaining a maximum odour concentration of 1 odour unit (OU) at the nearest sensitive receptor.

Currently, odour control measures are in place for the sludge management area (operational procedures), and the septage receiving station (biofilter). A deodorant spray system was previously used for the sludge management area which uses a chemical masking agent to reduce foul odour detection. Installed in 2002, this system consists of a metering pump and a series of spray nozzles mounted two metres above grade along the perimeter of the aerated sludge basin and sludge storage basin. It is noted that this system is not currently operational.

Odours from the septage receiving station are captured from the equalization tank and ventilated through a modular, organic media biofilter. The biofilter media supports a varied population of microorganisms that utilize odourous compounds such as hydrogen sulfide and organic sulphur compounds as their food source, thereby reducing odours.

As part of the annual report generated for the Ministry of Environment, a summary of complaints received between 2006 and 2013 is presented in the table below.

Table 82. Summary of Odour Complaints Received from 2006 to 2013

Year	Number of Odour Complaints	Source and/or Cause of Odour Release
2006	1	No cause documented.
2007	3	Complaints occurred during sludge hauling when the sludge holding cell was disturbed due to mixing and pumping.
2008	2	Odours are likely from Septage Receiving Station as biofilter is not yet in place.
2009	4	Odours are likely from Septage Receiving Station as biofilter is not yet in place.
2010	2	No cause documented. Biofilter at Septage receiving facility was installed this year, which has greatly reduced odours originating from this area, so it is most likely the complaints were a result of odour from the sludge management area.
2011	3	Complaints occurred during sludge digester start-up, when the prevailing winds were directed towards neighbouring residents.
2012	0	--
2013	1	As a result of a power failure, the start/stop times for the digester blowers defaulted. After the start/stop times were reset, there were no further complaints.

After the biofilter was installed at the septage receiving station, all subsequent complaints can be attributed to process upsets in the sludge management system. Generally, greater levels of odourous compounds are generated when organic material is deprived of oxygen. Therefore, during normal operating conditions when the sludge basin is properly aerated odour levels will be reduced. However, because aeration causes mixing and agitation of the sludge, this will cause many of the odourous compounds that are present to be released. The peak period of odour release would occur when the blowers are turned on after a period of sludge settling prior to decant, when anaerobic conditions are present. Once the blowers are turned on, agitation of the sludge blanket releases odours to the environment. The sludge storage basin is not aerated; therefore, there is greater potential here for anaerobic conditions to develop even under normal operating conditions. When the sludge is hauled away there is a risk for odour release as some disturbance to the sludge can occur, volatilizing dissolved hydrogen sulfide gas and other odorants.

6.16.2 Screening-Level Evaluation

Odour control requirements will vary based on the final unit processes that are installed at the plant as part of future upgrades. Based on the existing equipment, the three areas that likely generate the most odour are: the septage receiving station, headworks (manual bar screen and grit removal system), and the sludge aeration and storage basins. Based on complaints received, the primary odour source is currently the sludge aeration and storage basins. Depending on the type of sludge management upgrades implemented, odour control requirements may change. There is also potential that the septage receiving station capacity may increase, which would also require increasing the ventilation rate, and adding further modules to the existing biofilter. Proposed odour control alternatives are described below.

1. Do Nothing

Continue operating existing chemical masking system and biofilter odour control units.

2. Odour Reduction

Reduce odours at their source by adding oxidizing agents at the headworks to prevent formation of hydrogen sulfide, and optimize aeration of the sludge basin. Maintain the masking agent system for the sludge management area as some odours could still be present.

3. Treat Sludge Odours Only for Onsite Treatment

Cover the sludge aeration and storage basins, and ventilate captured air to an odour control system. Do not treat odours from the headworks area. Currently, there are no odour controls for the digester in place. Odours are released when no one is around (4am). If digester upgrades are selected, odour control could be included. If Headworks building is selected, odour control could be included there also. With expected population growth in Listowel, odour control may become a necessity in any event.

4. Treat Sludge and Headworks Odours for Onsite Treatment

Cover the sludge aeration and storage basins enclose all headworks processes, and ventilate both areas to a single odour control system.

6.16.3 Detailed Evaluation

The option to reduce odours at their source has also been eliminated, because the plant is already taking measures to prevent odour complaints by optimizing aeration of the sludge basin.

The table on the next page summarizes results of detailed evaluation of alternatives for odour control. See Appendix C for the complete detailed evaluation matrix.

Table 83. Screening Level Evaluation – Odour Control

Evaluation Criteria	1. Do Nothing	2. Reduce Odours	3. Treat Sludge Odours Only, Onsite Treatment	4. Treat Sludge and Headworks Odours, Onsite Treatment
Ability to Address the Problem	6	3	9	9
Technical Feasibility	6	4	4	2
Relative Cost-Benefit or Life Cycle Cost of Implementation	6	4	4	2
Energy Consumption/Ecological Footprint (e.g. GHG emissions)	3	1	2	2
Compatibility with Municipal, County, and Provincial Policies, Regulations, and Studies	2	2	3	3
Alternative is Well-Established and Proven	3	1	3	3
Overall Score	26	15	25	21
Status	carried forward	not carried forward	carried forward	carried forward

Table 84. Detailed Decision Matrix – Odour Control

Evaluation Criteria Categories	1. Do Nothing	2. Reduce Odours	3. Treat Sludge Odours Only, Onsite Treatment	4. Treat Sludge and Headworks Odours, Onsite Treatment
Technical Considerations	2.93		3.30	2.80
Approvals Requirements	1.50		1.13	0.55
Financial Considerations	2.40		1.30	0.65
Environmental and Social Impacts	1.53		2.20	1.98
Overall Score	8.35		7.93	5.98
Overall Rank	1		2	3

Note: Values in the above tables indicate weighted scores for each criterion. A high score and low rank indicate a preferred alternative.

Table 85. Qualitative Evaluation - Odour Control

Alternative	Advantages	Disadvantages	Notes
1. Do Nothing	• No capital cost to implement • Sludge process will not be covered, allowing for easier access during maintenance • Current odour complaints are minimal, so the cost of implementing odour control measures may be greater than the benefit.	• Ministry of Environment guideline of <1 OU (odour unit) at the property line may be exceeded after restarting the aeration blowers, even if there are no complaints	• This is a more feasible option if there are no modifications to the sludge management facility. Based on current odour levels, the existing system is working relatively well, with few complaints linked specifically to process upsets. • Odour impacts are likely to increase as the municipality grows
3. Treat Sludge Odours Only, On-site Treatment	• Odour is much better controlled, by ventilating, treating and dispersing through a stack, reducing the chance of odour complaints. • North Perth is in control of the odour abatement operation, and can decide what technology to use • Reduced chemical costs, compared to masking agent system or oxidizing agent addition • Addresses compliance issues	• It may be difficult and expensive to cover the existing aeration and storage basins. • North Perth is responsible for maintenance and ensuring odour treatment equipment is working effectively, and fugitive emissions from plant are controlled to avoid complaints	• Final treatment strategy can be better determined if odour study is conducted.
4. Treat Sludge and Headworks Odours, Onsite Treatment	• More comprehensive system that could address any future odours generated at headworks, even if levels are low presently	• Highest capital and operating cost • Headworks area is not currently a significant source of odour • Largest system footprint of all considered alternatives. Exact size will depend on type of treatment selected, with biological treatment having a larger footprint, and activated carbon having a smaller footprint.	• This can be integrated into Option D in Section 6.6

6.16.4 Summary of Results

The preferred option is to Do Nothing in the interim, as odour complaints only occur during process upsets, and the cost is much greater than the benefit. However, after plant upgrades are completed, an odour study should be completed to determine the extent of odour emissions from new treatment processes. Based on the outcome of this study, the need for, and extent of odour control measures required can be more accurately determined. Areas that may require odour control in the future include a new headworks and/or sludge thickening/dewatering building, as well as sludge digestion and storage areas.

Although upgrades to the odour control system at the Septage Receiving Station are not addressed in the evaluation above, this is a separate item that would need to be addressed if the capacity of the station is increased or if odour concentration increases due to higher strength waste in the future. As a maintenance item, it is also recommended that the organic biofilter media in the Septage Receiving Station odour control biofilter be replaced, as the media breaks down over time, and increases pressure loss through the system, reducing airflow sent to exhaust. The biofilter unit should also be properly winterized to allow for biofilter operation during cold weather, reducing corrosion inside the septage receiving equalization tank.

If an offsite sludge treatment facility is constructed, odours will likely be generated from this area and will need to be mitigated. Refer to Section 6.4 for further discussion on this topic.

Overall, once the final plan for plant upgrades is determined, odour control requirements will need to be confirmed.

7.0 SUMMARY OF MASTER PLAN RESULTS

The following is an overall description of the recommended alternatives for each project in the context of addressing identified wastewater treatment servicing needs.

Hydraulic treatment capacity can be addressed with plant upgrades and optimizing, including optimizing operations of the Septage Receiving Station to improve flow equalization, and upgrading of tertiary filtration and effluent disinfection with newer generation equipment. Constructing a second influent forcemain from Highway 23 SPS to the treatment plant would address risk and redundancy issues associated with the existing single forcemain as well as reduce long-term energy costs for pumping. Allowing development of a private off-site alkaline stabilization facility adjacent to the East Lagoon would address the long-term status of the lagoons as well as address the need for additional sludge management capacity for stabilization and storage.

Providing standby power for all equipment will address plant operations and mitigate risks associated with prolonged power outages and will improve SCADA system security. Adding another Hydro service to the plant can be accomplished through a cost-sharing arrangement with the recommended private sludge management facility which will require its own independent Hydro service. Proposed upgrades to Highway 23 sewage pumping station are directly related to recommendations for wastewater conveyance with both projects contributing to improved reliability of these critical pieces of infrastructure. Installation of screening/grinding equipment at the Highway 23 pumping station supports the recommendation for an automated fine bar screen at the plant headworks.

Control of debris and FOG which is impairing performance of the filters and UV equipment will be addressed with installation of improved grit removal and floatation and skimming equipment at the headworks along with upgrades to flow control structures at the West Lagoon.

See Drawing P02 General Process Flow Diagram – Proposed System appended at the back of this document for a schematic representation of proposed projects described above.

As noted above in several places, there is a high degree of inter-dependence between projects, with evaluation results for several projects affecting the results of other projects. Recommended solutions for one project may create an opportunity or a constraint with respect to the recommended alternative for other projects. Consequently, the evaluation of each project described above in Section 6.0 was done holistically with consideration of how alternatives for each project may affect alternatives for other projects. The following Figure and Table present the primary relationships among each of the projects.

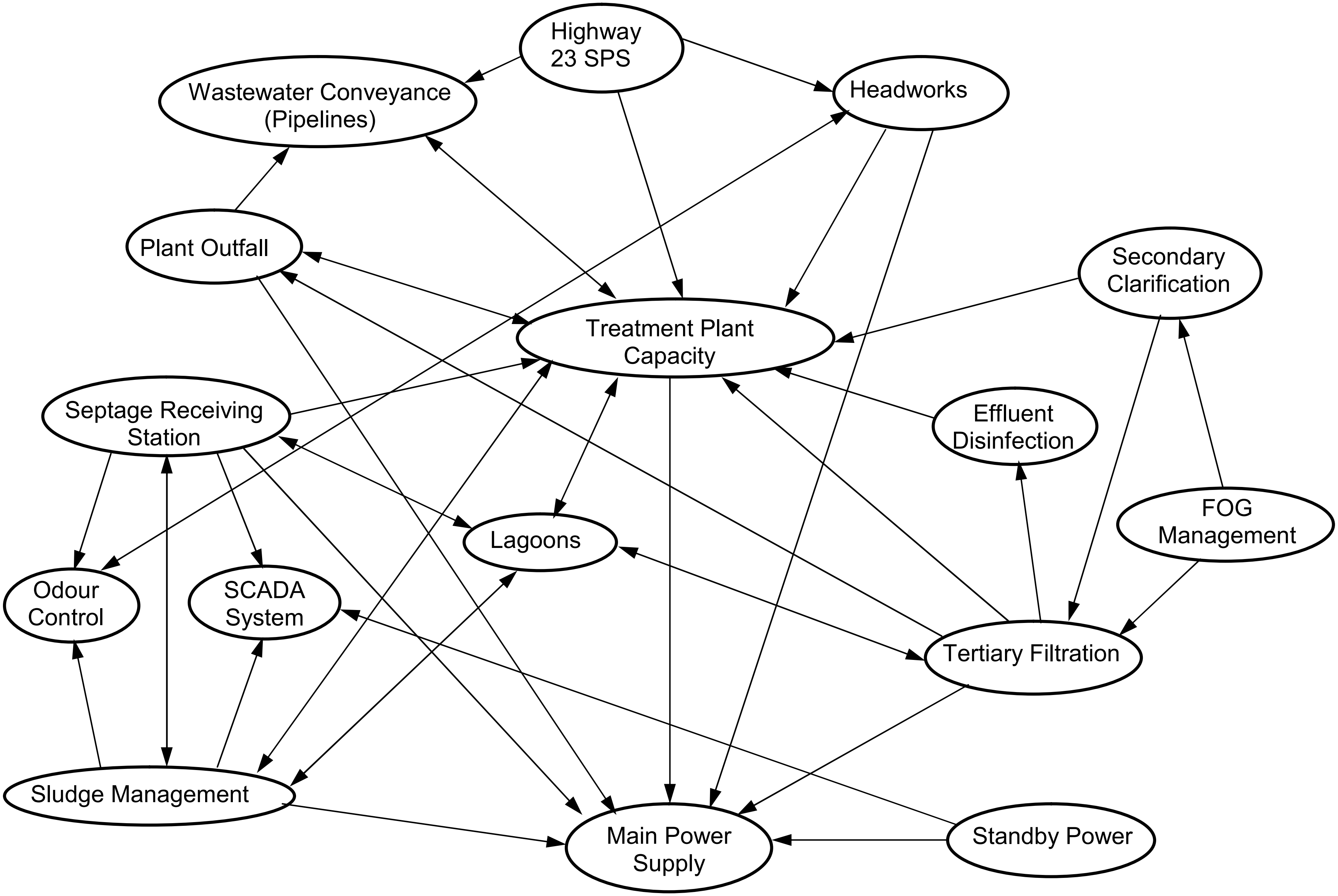


Figure 4. Diagram of Project Connections

Table 86. Relationships between Projects

	Project Description	Projects that are Impacted	Explanation
Group A Projects			
1.	Treatment Plant Capacity	Filters	Increase in sludge volume
		Sludge Management	Increase in sludge volume
		Plant Outfall Location	
		Status of Lagoons	
		Wastewater Conveyance (Pipelines)	Increase in WWTP hydraulic capacity may require increased influent forcemain hydraulic capacity
		Main Power Supply	
2.	Plant Outfall Location	Hydraulic Treatment Capacity	There may be a maximum allowable discharge rate from the plant based on assimilative organic capacity and hydraulic capacity for direct discharge to Chapman Drain
		Wastewater Conveyance (Pipelines) and Filters	If the existing effluent forcemain continues service in its current function, that pipeline would not be available as a potential redundant influent forcemain from Highway 23 SPS
		Main Power Supply	Reduced plant power consumption for effluent discharge may provide spare capacity for other uses (e.g. headworks, aeration, sludge management)
3.	Wastewater Conveyance (Pipelines)	Hydraulic Treatment Capacity	Increased conveyance capacity to the plant may require corresponding increase in treatment hydraulic capacity
		Plant Outfall Location	Flow levels may dictate feasibility of Chapman Drain discharge
4.	Sludge Management	Status of Lagoons	Size and use of lagoons may diminish if a more robust sludge management system is implemented
		Septage Receiving Station	Some imported waste streams may be well suited to direct discharge to an alkaline stabilization process (e.g. Lystek). High loading from SRS contributes to increased sludge production
		Main Power Supply	A more robust sludge management system will likely require more power than the existing system
		SCADA System	Sludge management system upgrades would involve some level of automated monitoring and control, and provide seamless full quality treatment during power outage

	Project Description	Projects that are Impacted	Explanation
		Odour Control	A primary source of odour from sewage treatment plants is the sludge management system
5.	Standby Power Supply	Main Power Supply	Standby power could be configured to provide peak shaving, thereby reducing the overall size of incoming power supply
		SCADA System	Standby power could be configured to maintain power to the SCADA system during mainline power outages as a critical component of the treatment plant operation
6.	Headworks	Hydraulic Treatment Capacity	An increase in firm capacity of the headworks would contribute to an increase in overall hydraulic treatment capacity
		Main Power Supply	Headworks upgrades or addition of new equipment (e.g. mechanical bar screen) will result in increased power requirements at the plant
Group B Projects			
1.	Status of Lagoons	Hydraulic Treatment Capacity	If lagoons are used for flow equalization, this may mitigate the need to increase rated hydraulic capacity of the plant
		Sludge Management	Land area currently occupied by lagoons could in part be used for additional sludge management processes
2.	Septage Receiving Station	Hydraulic Treatment Capacity	Increased flows through the SRS will consume available hydraulic treatment capacity at the plant, although to a minimal level
		Sludge Management	The SRS is a source of high strength waste with metals content which impacts on the quality and quantity of biosolids from the plant
		SCADA System	Additional monitoring and control of SRS flows and loading may be required to mitigate impacts on the treatment plant
		Odour Control	The SRS has an odour control system (Biorem) in place which may have to be upgraded or expanded if the SRS is expanded
3.	Highway 23 Sewage Pumping Station	Hydraulic Treatment Capacity	Increased pumping capacity to the plant may require corresponding increase in treatment hydraulic capacity
		Wastewater Conveyance (Pipelines)	Pumping station capacity and flow rates directly affect pipeline conveyance from the station to the plant Implementation of screening/grinding at the SPS may reduce conveyance restrictions and build-up of deposits in forcemain
		Headworks	Pumping station capacity and flow rates directly affect hydraulic capacity of the headworks. In addition, if the pumping station is upgraded with screening or grinding, this will impact process selection for the headworks.

	Project Description	Projects that are Impacted	Explanation
4.	Fat, Oil, and Grease (FOG) Management	Secondary Clarification	The existing secondary clarifiers are not equipped with a skimming mechanism.
		Tertiary Filtration	Presence of FOG has been identified as an operational issue with the filters.
5.	Tertiary Filtration	Hydraulic Treatment Capacity	An increase in firm capacity of tertiary filtration would contribute to an increase in overall hydraulic treatment capacity
		Plant Outfall Location	A new method of tertiary filtration may provide an opportunity for gravity discharge to the Chapman Drain
		Main Power Supply	A new method of tertiary filtration may change overall plant power consumption
		Effluent Disinfection	A higher performing tertiary filtration step would improve efficacy of UV effluent disinfection which is the subsequent downstream treatment step
6.	Effluent Disinfection	Hydraulic Treatment Capacity	An increase in firm capacity of effluent disinfection would contribute to an increase in overall hydraulic treatment capacity
		Plant Outfall Location	Quality required in effluent would vary based on outfall location
Group C Projects			
1.	Main Power Supply	All	
2.	SCADA System	All	
3.	Secondary Clarification	Hydraulic Treatment Capacity	An increase in firm capacity of secondary clarification would contribute to an increase in overall hydraulic treatment capacity
		Tertiary Filtration	Improved secondary clarification performance or increased capacity directly affects tertiary filtration which is the subsequent downstream treatment step
4.	Odour Control	Headworks	May require odour control in future
		Septage Receiving Station	May require upgrades to existing odour control if station capacity is increased
		Sludge Management	Will likely require odour control

8.0 EA and APPROVALS IMPLICATIONS

The following table indicates the expected project schedule classification under the Ontario Environmental Assessment Act (EAA) with specific references to the Municipal Class EA (MCEA) document which lists typical wastewater projects in Appendix 1. Text in the right-hand column are direct excerpts from the EA document.

Table 87. Expected Municipal Class EA Schedule

	Project Description	Expected MCEA Schedule	MCEA Document References (Appendix 1. Project Schedules)
Group A Projects			
1.	Treatment Plant Capacity	B	Schedule B 9. Increase sewage treatment plant capacity beyond existing rated capacity through improvements to operations and maintenance activities only but without construction of works to expand, modify or retrofit the plant or the outfall to the receiving water body where there is an increase to total mass loading to the receiving water body as identified in the Certificate of Approval.
2.	Plant Outfall Location	n/a	Do nothing option recommended
3.	Wastewater Conveyance (Pipelines)	A+	Schedule A+ 1. Establish, extend, or enlarge a sewage collection system and all necessary works to connect the system to an existing sewage or natural drainage outlet, provided all such facilities are in either an existing road allowance or an existing utility corridor, including the use of Trenchless Technology for water crossings.
4.	Sludge Management	A or B	Schedule A 7. Dispose of, utilize, or manage biosolids on an interim basis (e.g. further treatment in drying beds, composting, temporary holding at transfer stations), at: a) An existing sewage treatment plant where the biosolids is generated, or b) An existing landfill site, incinerator or organic soil conditioning site, where the biosolids is to be utilized or disposed of. Schedule B 6. Establish biosolids management facility at: a) A sewage treatment plant where the biosolids were not generated, or b) An existing landfill site, incinerator or organic soil conditioning site, where the biosolids are not to be disposed of or utilized.
5.	Standby Power Supply	A	Schedule A 19. Installation or replacement of standby power equipment where new equipment is located in a new building or structure.
6.	Headworks	A	Schedule A 4. Expand / refurbish / upgrade sewage treatment plant including outfall up to existing rated capacity where no land acquisition is required.

	Project Description	Expected MCEA Schedule	MCEA Document References (Appendix 1. Project Schedules)
Group B Projects			
1.	Status of Lagoons	A or A+	Schedule A 5. Provide additional treatment facilities in existing lagoons, such as aeration, chemical addition, post treatment, including expanding lagoon capacity up to existing rated capacity, provided no land acquisition nor additional lagoon cells are required. 6. Expansion of the buffer zone between a lagoon facility or land treatment area and adjacent uses where the buffer zone is entirely on the proponent's land. Schedule A+ 6. Retire a water facility which would have been planned under Schedule B or C of the Municipal Class EA for its establishment (See Glossary definition of Retirement).
2.	Septage Receiving Station	A+	Schedule A+ 3. Increase pumping station capacity by adding or replacing equipment and appurtenances, where new equipment is located in an existing building or structure and where its existing rated capacity is exceeded. No item listed for "Expansion of sewage flow equalization tankage ……"
3.	Highway 23 Sewage Pumping Station	A	Schedule A 1. Normal or emergency operational activities (see Glossary definition for Operation). Such activities may include, but are not limited to, the following: • repairs, cleaning, renovations or replacement of sewage treatment facilities, pumping plant equipment or outfalls.
4.	Fat, Oil, and grease (FOG) Management	A	Schedule A 1. Normal or emergency operational activities (see Glossary definition for Operation). Such activities may include, but are not limited to, the following: modify, repair, reconstruct existing facilities to provide operational maintenance or other improvements such as reducing odour, insulating of buildings to reduce noise levels and conserve energy, landscaping. 5. Install chemical or other process equipment for operational or maintenance purposes in existing sewage collection system or existing sewage treatment facility.
5.	Tertiary Filtration	A	Schedule A 3. Expand / refurbish / upgrade sewage treatment plant including outfall up to existing rated capacity where no land acquisition is required.

	Project Description	Expected MCEA Schedule	MCEA Document References (Appendix 1. Project Schedules)
6.	Effluent Disinfection	A	Schedule A 3. Expand / refurbish / upgrade sewage treatment plant including outfall up to existing rated capacity where no land acquisition is required.
Group C Projects			
1.	Main Power Supply	A	Schedule A 3. Expand / refurbish / upgrade sewage treatment plant including outfall up to existing rated capacity where no land acquisition is required.
2.	SCADA System	A	Schedule A 3. Expand / refurbish / upgrade sewage treatment plant including outfall up to existing rated capacity where no land acquisition is required.
3.	Secondary Clarification	A	Schedule A 3. Expand / refurbish / upgrade sewage treatment plant including outfall up to existing rated capacity where no land acquisition is required.
4.	Odour Control	A	Schedule A 1. Normal or emergency operational activities (see Glossary definition for Operation). Such activities may include, but are not limited to, the following: • modify, repair, reconstruct existing facilities to provide operational maintenance or other improvements such as reducing odour, insulating of buildings to reduce noise levels and conserve energy, landscaping.

The following table identifies approval agencies that may be relevant to each project. Approvals agency contacts will be confirmed during the EA or approvals process for each project.

Table 88. Relevant Approval Agencies

	Project Description	Relevant Approvals Agencies
Group A Projects		
1.	Treatment Plant Performance	MOECC-D, MOECC-A, MVCA, EC, MMAH, NP-Building, NP-Planning
2.	Plant Outfall Location	none
3.	Wastewater Conveyance (Pipelines)	NP Roads, MTO, NP Official Plan/Zoning
4.	Sludge Management	MOECC-D, MOECC-A, NP-Building, NP-Planning
5.	Standby Power Supply	H-One, ESA, NP-Planning
6.	Headworks	MOECC-D, MOECC-A, NP-Building
Group B Projects		
1.	Status of Lagoons	MOECC-D, MOECC-A
2.	Septage Receiving Station	MOECC-D, MOECC-A, NP-Planning
3.	Highway 23 Sewage Pumping Station	MOECC-D, MOECC-A
4.	Fat, Oil, and Grease (FOG) Management	none
5.	Tertiary Filtration	MOECC-D, MOECC-A,
6.	Effluent Disinfection	MOECC-D, MOECC-A
Group C Projects		
1.	Main Power Supply	H-One, ESA
2.	SCADA System	none
3.	Secondary Clarification	none
4.	Odour Control	MOECC-D, MOECC-A, MMAH

Notes:
MOECC-D: Ministry of the Environment (Drinking Water Compliance Office - London)
MOECC-A: Ministry of the Environment (Toronto Approvals)
MVCA: Maitland Valley Conservation Authority
MMAH: Ministry of Municipal Affairs and Housing (MMAH) – OBC Building Permit (administered by North Perth)
NP-Planning: North Perth Planning Department (Site Plan Approval)
NP-Building: North Perth Building Department (Building Permit)
NP-Roads: North Perth Roads Department
PC: Perth County
MNR: Ministry of Natural Resources (endangered aquatic species)
EC: Environment Canada
DFO: Department of Fisheries and Ocean (Federal, endangered aquatic species)
TC: Transport Canada (Navigable {Waters} Protection Act)
H-One: Hydro One
ESA: Electrical Safety Authority
MTO: Ministry of Transportation of Ontario

In addition to the above regulatory framework for each project, the overall Master Plan was assessed with respect to the Clean water Act and related Source Protection Plans. The Clean Water Act was established to protect existing and future sources of municipal drinking water. Municipal drinking water supply wells located in the general vicinity of the Master Plan study area include 3 wells in Listowel, 2 in Atwood, one in Molesworth, and one in Gowanstown. Each community is located in the municipality of North Perth with Listowel being located immediately north-east of the study area, and Atwood, Molesworth, and Gowanstown each located approximately 7km south, 10km west, and 7km north of the study area, respectively. The Town of Listowel has 3 deep drilled wells for drinking water supply that are located within the settlement area of Listowel.

With reference to the Ausable Bayfield Maitland Valley Wellhead Protection Areas map published by the Government of Ontario in 2009, all areas where work is recommended as part of the Master Plan fall outside of each wellhead protection area identified. The capture zones for the Listowel municipal wells are located outside of the Master Plan study area and extend to the east which is away from the study area. The capture zones for the other municipal wells in the vicinity also extend to the east. There are no known water intakes on the Middle Maitland River within the study area that are used as a source of drinking water. Reliable high quality groundwater is readily available in the region for drinking water supply. Consequently, none of the proposed projects are expected to impact Source Protection Plans or Well Head Protection Areas.

9.0 ANTICIPATED TIMELINES

The following chart illustrates a proposed timeline for implementation of each project. As indicated, this is a long-term time horizon of 20 years and is intended as a general guide for master planning purposes.

Table 89. Anticipated Maximum Timelines for Project Implementation

Project Description	Proposed Timeline in Years from Start of Project															Comments
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	
1. Treatment Plant Performance / Plant Optimization																Maintenance Activity
2. Plant Outfall Location																Maintain existing outfall; refer to project 3. Wastewater Conveyance for works related to forcemains
3. Wastewater Conveyance																To occur in conjunction with headworks upgrades
4. Sludge Management																Assumes that East Lagoon can be utilized for temporary storage
5. Standby Power Supply																
6. Headworks																
7. Lagoons																Could occur in 10 to 20 years or later
8. Septage Receiving Station																Timing could be delayed if additional restrictions are placed on accepting imported waste
9. Highway 23 Sewage Pumping Station																
10. FOG Management																Part of headworks upgrades; timing will overlap
11. Tertiary Filtration																Currently near completion as maintenance activity
12. Effluent Disinfection																
13. Main Power Supply																New hydro service can be advanced as opportunity presents (could be >15 years); Implement peak shaving with back-up generator in interim
14. SCADA System																
15. Secondary Clarification																Maintenance activity
16. Odour Control																To be installed in conjunction with sludge and/or headworks upgrades as required

10.0 BUDGET ESTIMATES

The following table presents a high-level estimate of costs to implement each project for budgeting purposes. It is noted that a grant application was made by North Perth to the Federal Government through the Small Communities Fund (SCF) in late 2014 to cover a portion of the capital investment listed below. At time of writing, grant funding had not yet been awarded.

Table 90. Budget Estimates for Project Implementation

#	Description of Project	Description of Recommended Alternative	Budget Estimates ($2015)
1	Treatment Plant Performance	Plant Optimization – operational changes only, no capital cost	--
2	Plant Outfall Location	Maintain existing outfall	--
3	Wastewater Conveyance (Pipelines)	New 450mm forcemain	$1,693,000
4	Sludge Management	Sludge thickening/dewatering, storage and conveyance to third party ORMC	$2,900,000
5	Standby Power Supply	Standby Power for All Loads	$926,000
6	Headworks	New Mechanical bar screen and grit classifier with building around headworks for winterization	$3,826,000
7	Status of Lagoons	Mixing/distribution system for East Lagoon and minor upgrades to West Lagoon	$535,000
8	Septage Receiving Station	Optimize Operations at Septage Receiving Station including new forcemain	$836,000
9	Highway 23 Sewage Pumping Station	Screening/grinding Equipment for Highway 23 Pump Station and upgrades to meet regulatory compliance	$900,000
10	Fat, Oil, and Grease (FOG) Management	Install flotation tank at headworks	Included in item 6
11	Tertiary Filtration	New wash pump, media and underdrain	$125,000
12	Effluent Disinfection	Replace UV system and level controller, and install flow measurement flume	$478,000
13	Main Power Supply	Upgrades to existing substation	$300,000
14	SCADA System	Upgrade SCADA system	$100,000
15	Secondary Clarification	Install flow balancing device	$85,000
16	Odour Control	Allowance for future odour control that may be required based on outcome of future odour study following plant upgrades to headworks and sludge management	$500,000
		TOTAL	**$13,204,000**

Notes:
1. The above costs are estimates for high level budgeting purposes only.
2. HST is not included in the above estimates.
3. Estimates include engineering costs and contingency allowance (15% of construction costs and 15% of total project costs, respectively)
4. Estimates are derived from preliminary information prior to public input or design calculations.
5. Values are expressed in 2015 dollars with no factor included for inflation.
6. See an itemized breakdown of the budget estimate for each project in **Appendix E**.

11.0 ACRONYMS AND ABBREVIATIONS

The following is a reference list of acronyms and abbreviations used in this document.

ASF:	Alkaline Stabilization Facility
BNR:	Biological Nutrient Removal
BOD_5:	Biological Oxygen Demand (5-day test)
CAV:	Combination Air Vacuum (valve)
$CBOD_5$:	Carbonaceous Biological Oxygen Demand (5-day test)
C of A:	Ontario Ministry of Environment Certificate of Approval
DO:	Dissolved oxygen
DOC:	Dissolved organic carbon
EA:	Environmental Assessment
EAAS:	Extended Aeration Activated Sludge
ESH:	Environmentally Sensitive Habitat
FOG:	Fats, Oils and Grease
GHG:	Greenhouse gas
HWL:	High water level
HRT:	Hydraulic Retention Time
MLSS:	Mixed liquor suspended solids
MLVSS:	Mixed liquor volatile suspended solids
MOECC:	Ontario Ministry of Environment and Climate Change
MVCA:	Maitland Valley Conservation Authority
ND:	Non-detect
NFPA:	National Fire Protection Association
OLR	Organic Loading Rate
PIC:	Public Information Centre
PSC:	Project Steering Committee
PSW:	Provincially Significant Wetlands
PWQO:	Provincial Water Quality Objectives
RAS:	Return Activated Sludge
SCADA:	Supervisory Control and Data Acquisition
SCMH:	Standard cubic metres per hour
SLR:	Solids Loading Rate
SOR:	Surface Overflow Rate
SPS	Sewage Pumping Station
SRS	Septage Receiving Station
SRT:	Solids Retention Time
TAN:	Total Ammonia Nitrogen
TKN:	Total Kjeldahl Nitrogen
TP:	Total Phosphorus
TS:	Total Solids
TSS:	Total Suspended Solids
TSSA:	Technical Standards and Safety Authority
UMIS:	Utilities Management Information System
UV:	Ultraviolet
WAS:	Waste Activated Sludge
WWTP:	Wastewater Treatment Plant

REFERENCES

1. MOECC Certificate of Approval for Sewage Works 3141-83ZPFZ dated March 31, 2010 for Highway 23 SPS
2. MOECC Certificate of Approval for Sewage Works (Air) 2060-88HR57 dated September 30, 2010 for the Septage Receiving Station
3. MOECC Certificate of Approval for Sewage Works 3087-7K8NZC dated October 10, 2008, for the WWTP
4. North Perth Master Growth Plan, March 2014, IBI Group
5. Operating and Maintenance Manual North Perth WWTP, Oct. 2007, by Gamsby and Mannerow Limited
6. Water Pollution Control Plant - Operating and Maintenance Manual, August 2005 by Municipality of North Perth
7. MOECC Design Guidelines for Sewage Works (2008)
8. Wastewater Engineering textbook, 2003, 4th Edition, Metcalf and Eddy
9. Municipal Class Environmental Assessment, 2011, Municipal Engineers Association
10. Report on Uncommitted Reserve Capacity for the North Perth Wastewater Treatment Plant, June 2012, by Gamsby and Mannerow Limited
11. 20 Year Plan for Wastewater Treatment, Jan. 2004, by Gamsby and Mannerow Limited

We trust this Report to be sufficient for your purposes at this time.

Respectfully submitted,

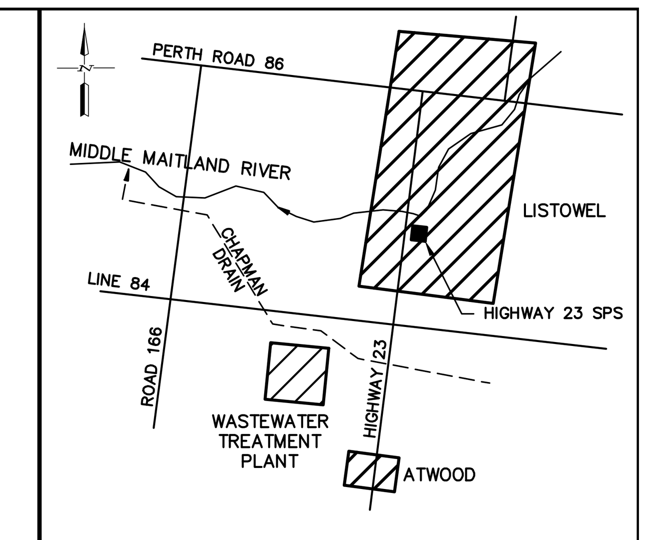
GM BLUEPLAN ENGINEERING LIMITED
Per:

Dave Hicknell, C.E.T.
Senior Project Manager

Per:

Grant Parkinson, P. Eng.
Project Engineer

APPENDIX A
CONCEPTUAL DRAWINGS

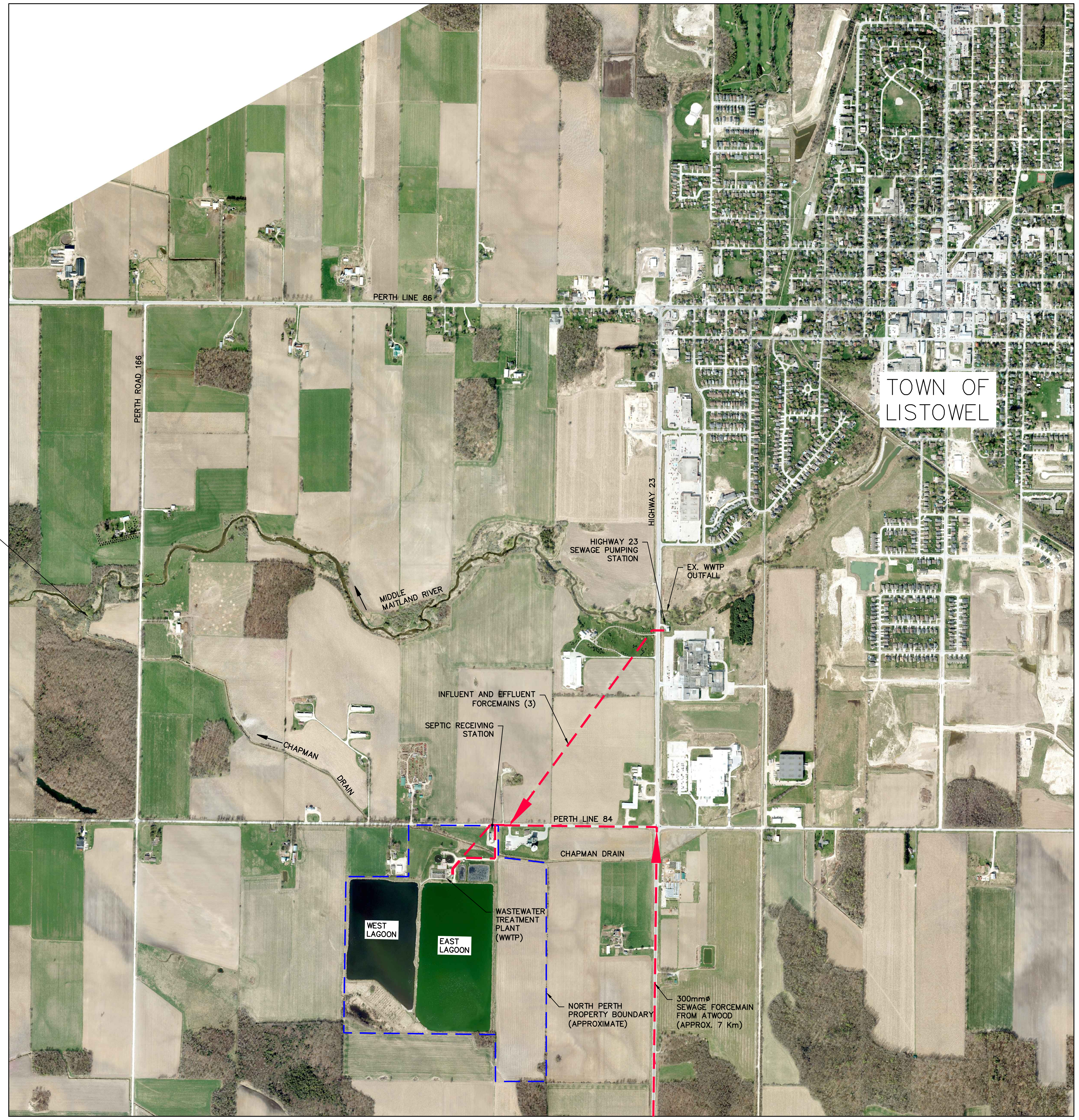


KEY PLAN
NOT TO SCALE

NOTES :

1. AERIAL PHOTOGRAPHY AND CONTOURS USED IN PREPARATION OF THIS DRAWING WERE PROVIDED BY MAITLAND VALLEY CONSERVATION AUTHORITY.
2. CONTOUR ELEVATIONS ARE SHOWN IN METRES ABOVE SEA LEVEL (MASL) AT A CONTOUR INTERVAL OF 0.1 METRES.
3. ALL DIMENSIONS AND PIPELINE DIAMETERS ARE IN MILLIMETRES UNLESS OTHERWISE NOTED.
4. ON-SITE EFFLUENT WATER DISTRIBUTION SYSTEM NOT SHOWN FOR CLARITY.
5. PROPERTY BOUNDARIES AT TREATMENT PLANT AS SHOWN ARE APPROXIMATE. REFER TO TOWN PROPERTY PLANS FOR ACTUAL BOUNDARIES.

CHAPMAN DRAIN CONNECTS TO RIVER



150 0 100 200 400
1:10000 (m)

BENCH MARKS :

THE POSITION OF POLE LINES, CONDUITS, WATERMAINS, SEWERS AND OTHER UNDERGROUND AND OVERGROUND UTILITIES AND STRUCTURES IS NOT NECESSARILY SHOWN ON THE CONTRACT DRAWINGS, AND, WHERE SHOWN, THE ACCURACY OF THE POSITION OF SUCH UTILITIES AND STRUCTURES IS NOT GUARANTEED.

BEFORE STARTING WORK, THE CONTRACTOR SHALL INFORM HIMSELF OF THE EXACT LOCATION OF ALL SUCH UTILITIES AND STRUCTURES, AND SHALL ASSUME ALL LIABILITY FOR ANY DAMAGE TO THEM.

ONLY DRAWINGS INCLUDING A PROFESSIONAL ENGINEERS STAMP BEARING A SIGNATURE AND DATE ARE TO BE CONSIDERED VALID AND TRUE.

NO.	MM/DD/YY	REVISION DESCRIPTION	CH'KD
2	APRIL 2015	ISSUED FOR PUBLIC REVIEW	GAP
1	JUNE 2014	ISSUED FOR MUNICIPALITY REVIEW	GAP

GM BluePlan ENGINEERING
GUELPH | OWEN SOUND | LISTOWEL | KITCHENER | EXETER | HAMILTON | GTA
650 WOODLAWN ROAD WEST, BLOCK C, UNIT 2, GUELPH, ON N1K 1B8
TEL. 519-824-8150 www.gmblueplan.ca

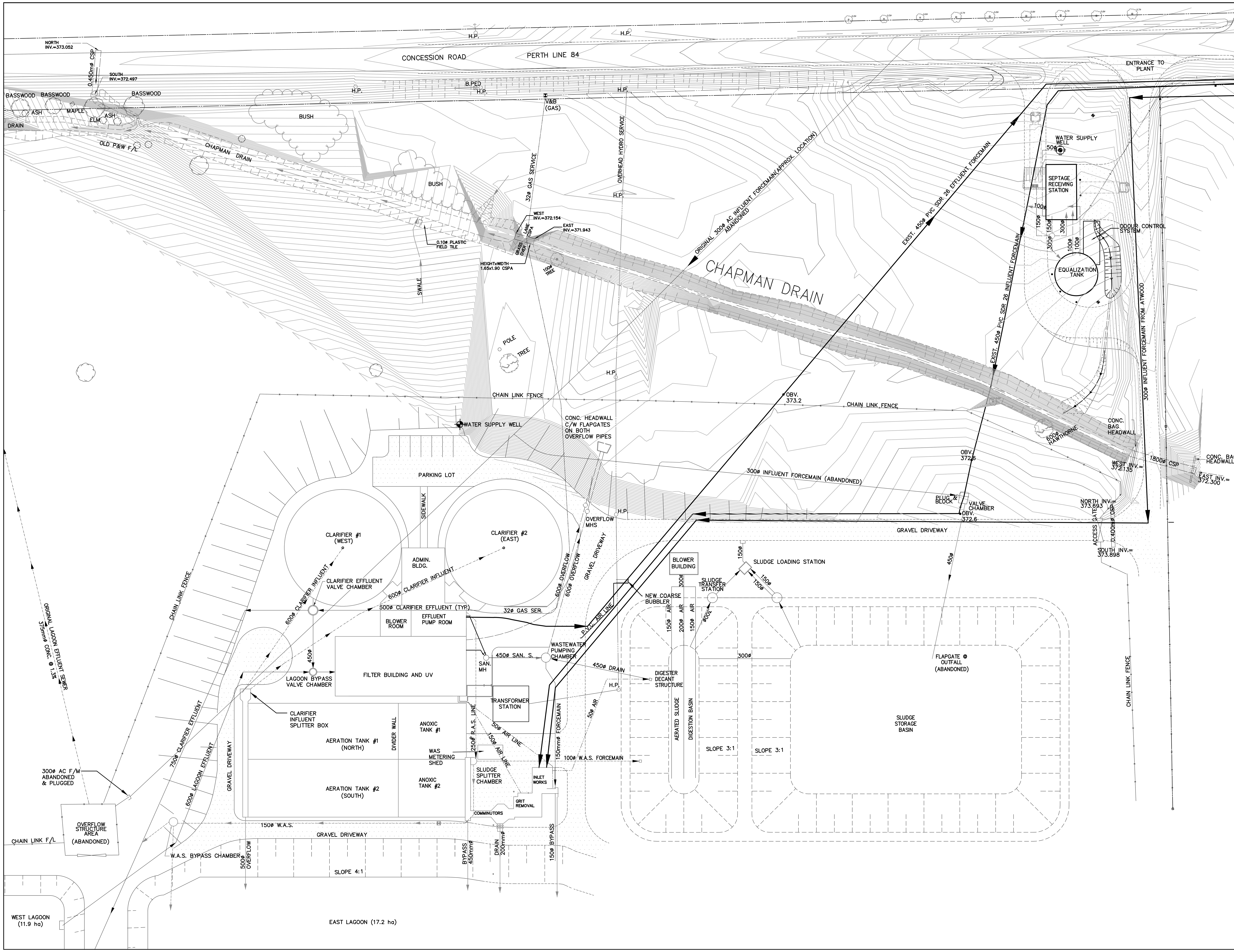
MUNICIPALITY OF NORTH PERTH

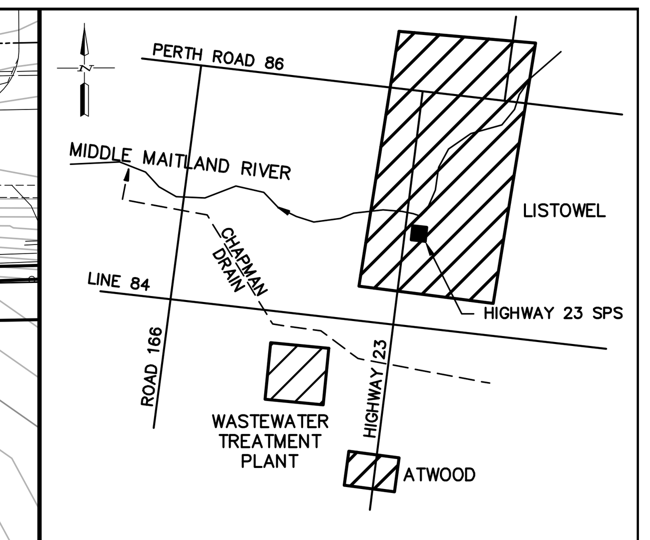
WASTEWATER TREATMENT MASTER PLAN

AERIAL MAP

STUDY AREA

DRAWN BY :	APPROVED BY :	PROJECT NO. :	DRAWING NO. :
S.G.	GAP	311-031	G01
DESIGNED BY :	DATE :	SCALE :	
GAP	APRIL 2015	1:10000	





KEY PLAN
NOT TO SCALE

NOTES :

1. AERIAL PHOTOGRAPHY AND CONTOURS USED IN PREPARATION OF THIS DRAWING WERE PROVIDED BY MAITLAND VALLEY CONSERVATION AUTHORITY.
2. CONTOUR ELEVATIONS ARE SHOWN IN METRES ABOVE SEA LEVEL (MASL) AT A CONTOUR INTERVAL OF 0.1 METRES.
3. ALL DIMENSIONS AND PIPELINE DIAMETERS ARE IN MILLIMETRES UNLESS OTHERWISE NOTED.
4. ON-SITE EFFLUENT WATER DISTRIBUTION SYSTEM NOT SHOWN FOR CLARITY.

BENCH MARKS :

THE POSITION OF POLE LINES, CONDUITS, WATERMAINS, SEWERS AND OTHER UNDERGROUND AND OVERGROUND UTILITIES AND STRUCTURES IS NOT NECESSARILY SHOWN ON THE CONTRACT DRAWINGS, AND, WHERE SHOWN, THE ACCURACY OF THE POSITION OF SUCH UTILITIES AND STRUCTURES IS NOT GUARANTEED.

BEFORE STARTING WORK, THE CONTRACTOR SHALL INFORM HIMSELF OF THE EXACT LOCATION OF ALL SUCH UTILITIES AND STRUCTURES, AND SHALL ASSUME ALL LIABILITY FOR ANY DAMAGE TO THEM.

ONLY DRAWINGS INCLUDING A PROFESSIONAL ENGINEERS STAMP BEARING A SIGNATURE AND DATE ARE TO BE CONSIDERED VALID AND TRUE.

NO.	MM/DD/YY	REVISION DESCRIPTION	CH'KD
2	APRIL 2015	ISSUED FOR PUBLIC REVIEW	GAP
1	JUNE 2014	ISSUED FOR MUNICIPALITY REVIEW	GAP

GM BluePlan ENGINEERING

GUELPH | OWEN SOUND | LISTOWEL | KITCHENER | EXETER | HAMILTON | GTA
650 WOODLAWN ROAD WEST, BLOCK C, UNIT 2, GUELPH, ON N1K 1B8
TEL. 519-824-8150 www.gmblueplan.ca

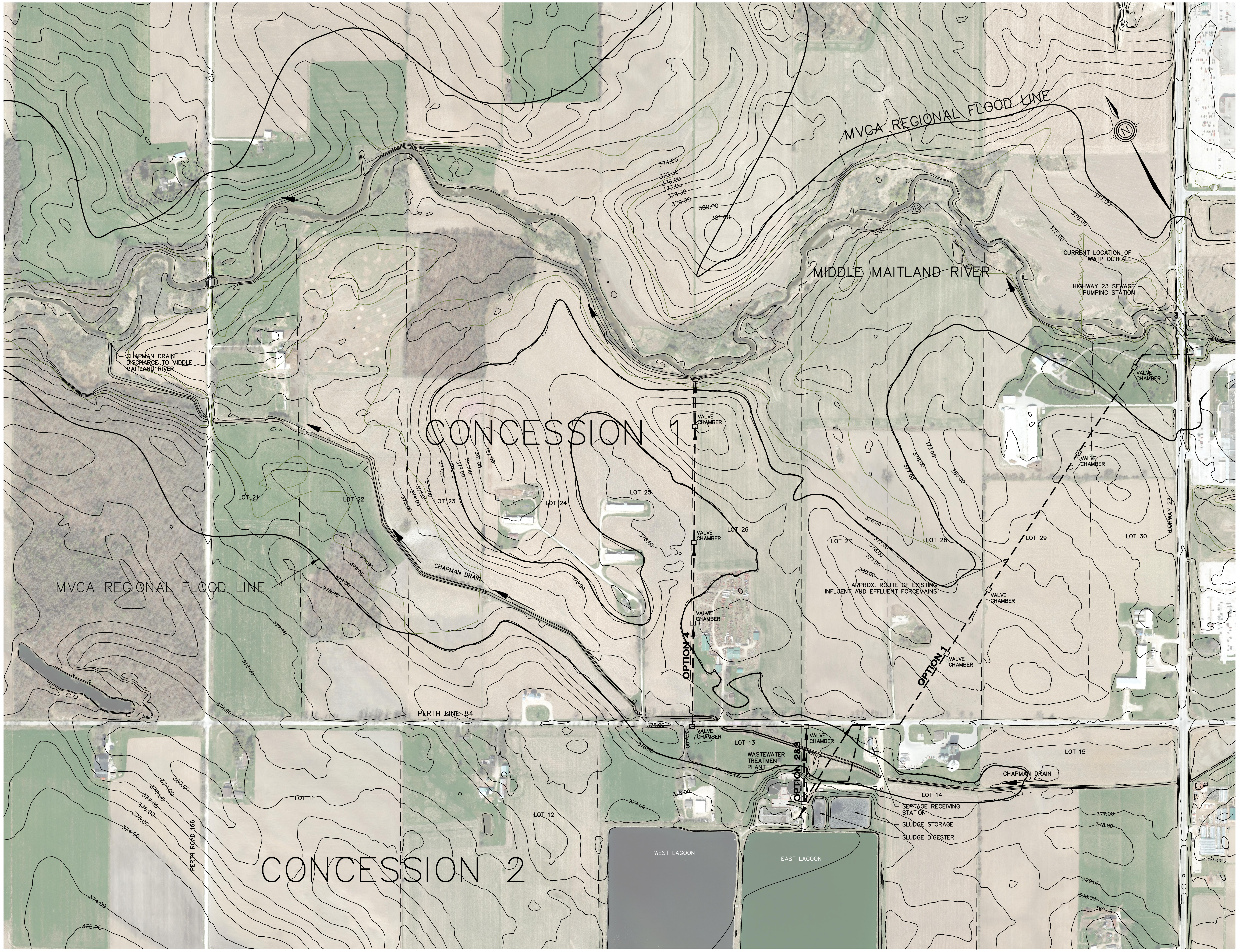
MUNICIPALITY OF NORTH PERTH

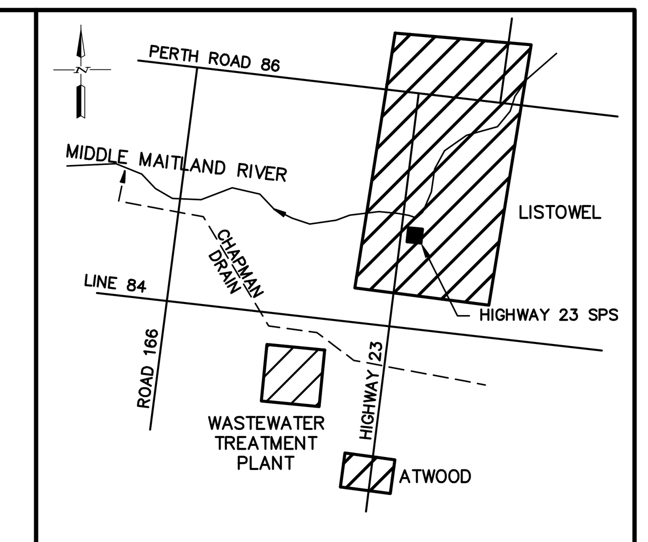
WASTEWATER TREATMENT MASTER PLAN

WWTP OUTFALL ALTERNATIVES

OVERALL SITE PLAN

DRAWN BY :	APPROVED BY :	PROJECT NO. :	DRAWING NO. :
RM	GAP	311-031	G02
DESIGNED BY :	DATE :	SCALE :	
GAP	APRIL 2015	1:500	





KEY PLAN
NOT TO SCALE

NOTES :

1. AERIAL PHOTOGRAPHY AND CONTOURS USED IN PREPARATION OF THIS DRAWING WERE PROVIDED BY MAITLAND VALLEY CONSERVATION AUTHORITY (MVCA).
2. CONTOUR ELEVATIONS ARE SHOWN IN METRES ABOVE SEA LEVEL (MASL) AT CONTOUR INTERVAL OF 1-METRE.
3. REGIONAL FLOOD LINES ARE BASED ON INFORMATION PROVIDED BY MVCA.
4. PIPELINE LOCATIONS SHOWN ARE APPROXIMATE.

50 20 0 50 100 150
1:4000 (m)

BENCH MARKS :

THE POSITION OF POLE LINES, CONDUITS, WATERMAINS, SEWERS AND OTHER UNDERGROUND AND OVERGROUND UTILITIES AND STRUCTURES IS NOT NECESSARILY SHOWN ON THE CONTRACT DRAWINGS, AND, WHERE SHOWN, THE ACCURACY OF THE POSITION OF SUCH UTILITIES AND STRUCTURES IS NOT GUARANTEED.

BEFORE STARTING WORK, THE CONTRACTOR SHALL INFORM HIMSELF OF THE EXACT LOCATION OF ALL SUCH UTILITIES AND STRUCTURES, AND SHALL ASSUME ALL LIABILITY FOR ANY DAMAGE TO THEM.

ONLY DRAWINGS INCLUDING A PROFESSIONAL ENGINEERS STAMP BEARING A SIGNATURE AND DATE ARE TO BE CONSIDERED VALID AND TRUE.

NO.	MM/DD/YY	REVISION DESCRIPTION	CH'KD
2	APRIL 2015	ISSUED FOR PUBLIC REVIEW	GAP
1	JUNE 2014	ISSUED FOR MUNICIPALITY REVIEW	GAP

GM BluePlan ENGINEERING

GUELPH | OWEN SOUND | LISTOWEL | KITCHENER | EXETER | HAMILTON | GTA
650 WOODLAWN ROAD WEST, BLOCK C, UNIT 2, GUELPH, ON N1K 1B8
TEL. 519-824-8150 www.gmblueplan.ca

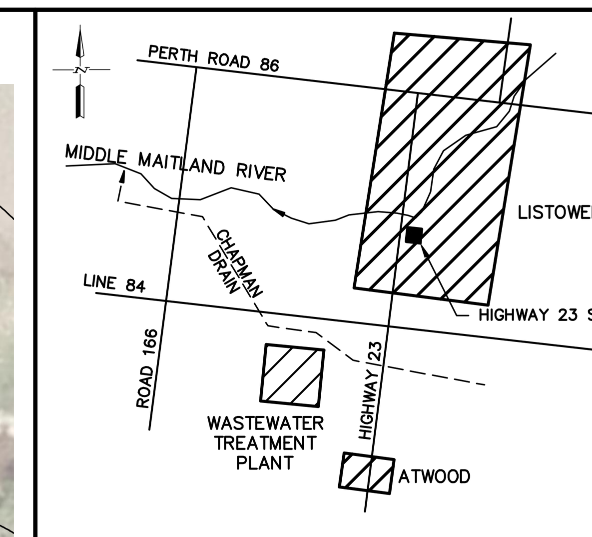
MUNICIPALITY OF NORTH PERTH

WASTEWATER TREATMENT MASTER PLAN

WWTP OUTFALL ALTERNATIVES

MIDDLE MAITLAND RIVER

DRAWN BY :	APPROVED BY :	PROJECT NO. :	DRAWING NO. :
RM	GAP	311-031	G03
DESIGNED BY :	DATE :	SCALE :	
GAP	APRIL 2015	1:4000	



KEY PLAN
NOT TO SCALE

NOTES :

1. AERIAL PHOTOGRAPHY AND CONTOURS USED IN PREPARATION OF THIS DRAWING WERE PROVIDED BY MAITLAND VALLEY CONSERVATION AUTHORITY (MVCA).
2. CONTOUR ELEVATIONS ARE SHOWN IN METRES ABOVE SEA LEVEL (MASL) AT A CONTOUR INTERVAL OF 1–METRE.
3. PIPELINE LOCATIONS SHOWN ARE APPROXIMATE.
4. PIPELINE DIAMETERS ARE SHOWN IN MILLIMETRES.

15 0 25 50
1:1250(m)

BENCH MARKS :

THE POSITION OF POLE LINES, CONDUITS, WATERMAINS, SEWERS AND OTHER UNDERGROUND AND OVERGROUND UTILITIES AND STRUCTURES IS NOT NECESSARILY SHOWN ON THE CONTRACT DRAWINGS, AND, WHERE SHOWN, THE ACCURACY OF THE POSITION OF SUCH UTILITIES AND STRUCTURES IS NOT GUARANTEED.

BEFORE STARTING WORK, THE CONTRACTOR SHALL INFORM HIMSELF OF THE EXACT LOCATION OF ALL SUCH UTILITIES AND STRUCTURES, AND SHALL ASSUME ALL LIABILITY FOR ANY DAMAGE TO THEM.

ONLY DRAWINGS INCLUDING A PROFESSIONAL ENGINEERS STAMP BEARING A SIGNATURE AND DATE ARE TO BE CONSIDERED VALID AND TRUE.

NO.	MM/DD/YY	REVISION DESCRIPTION	CH'KD
2	APRIL 2015	ISSUED FOR PUBLIC REVIEW	GAP
1	JUNE 2014	ISSUED FOR MUNICIPALITY REVIEW	GAP

GM BluePlan ENGINEERING
GUELPH | OWEN SOUND | LISTOWEL | KITCHENER | EXETER | HAMILTON | GTA
650 WOODLAWN ROAD WEST, BLOCK C, UNIT 2, GUELPH, ON N1K 1B8
TEL. 519-824-8150 www.gmblueplan.ca

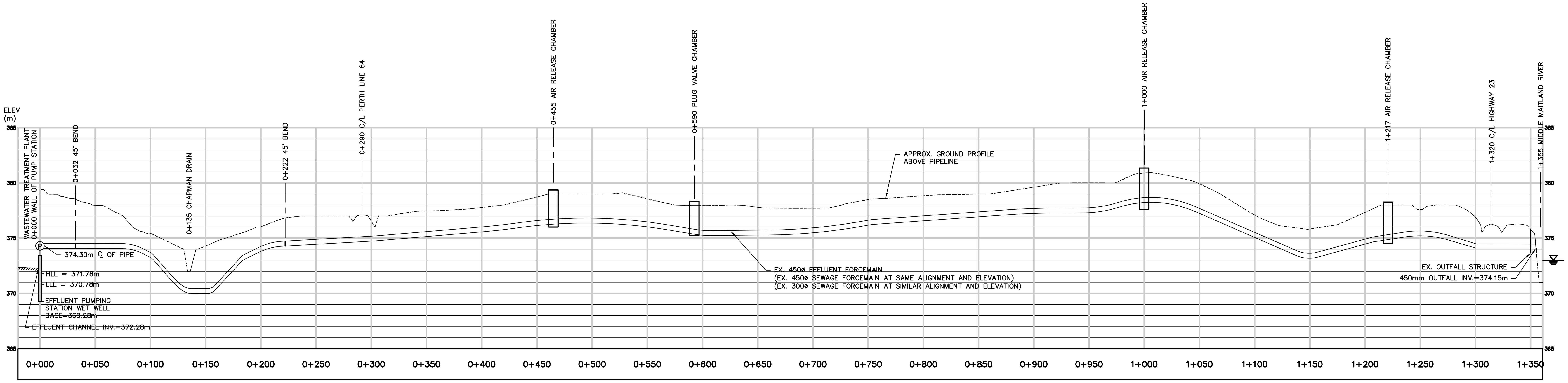
MUNICIPALITY OF NORTH PERTH

WASTEWATER TREATMENT MASTER PLAN

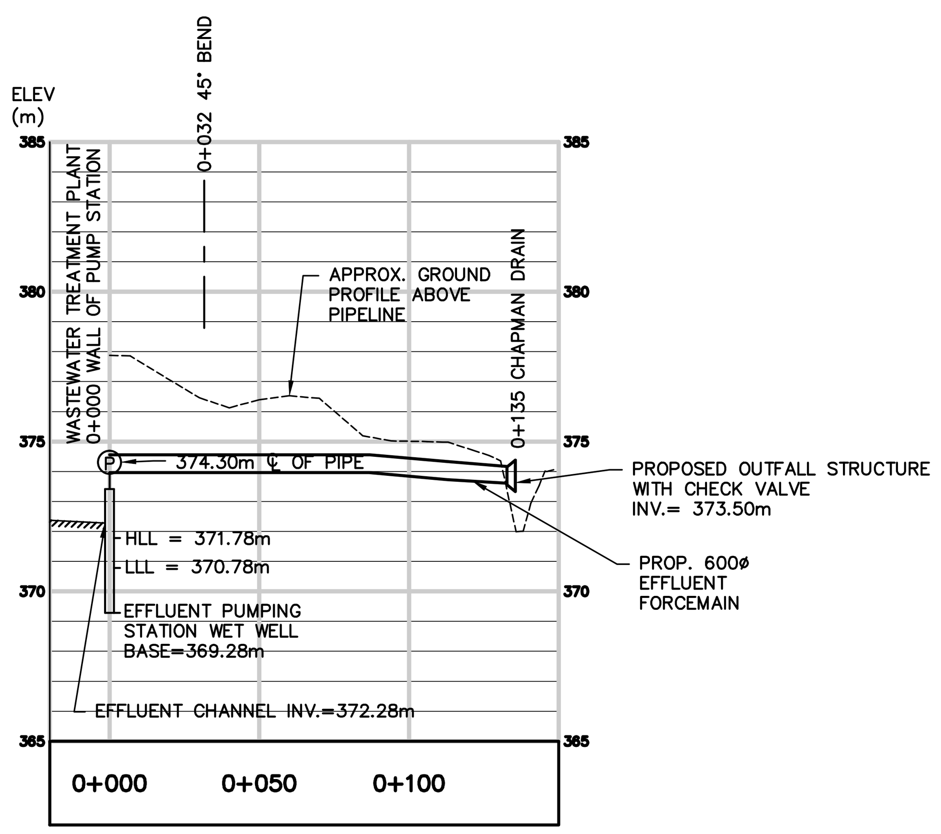
WWTP OUTFALL ALTERNATIVES

CHAPMAN DRAIN

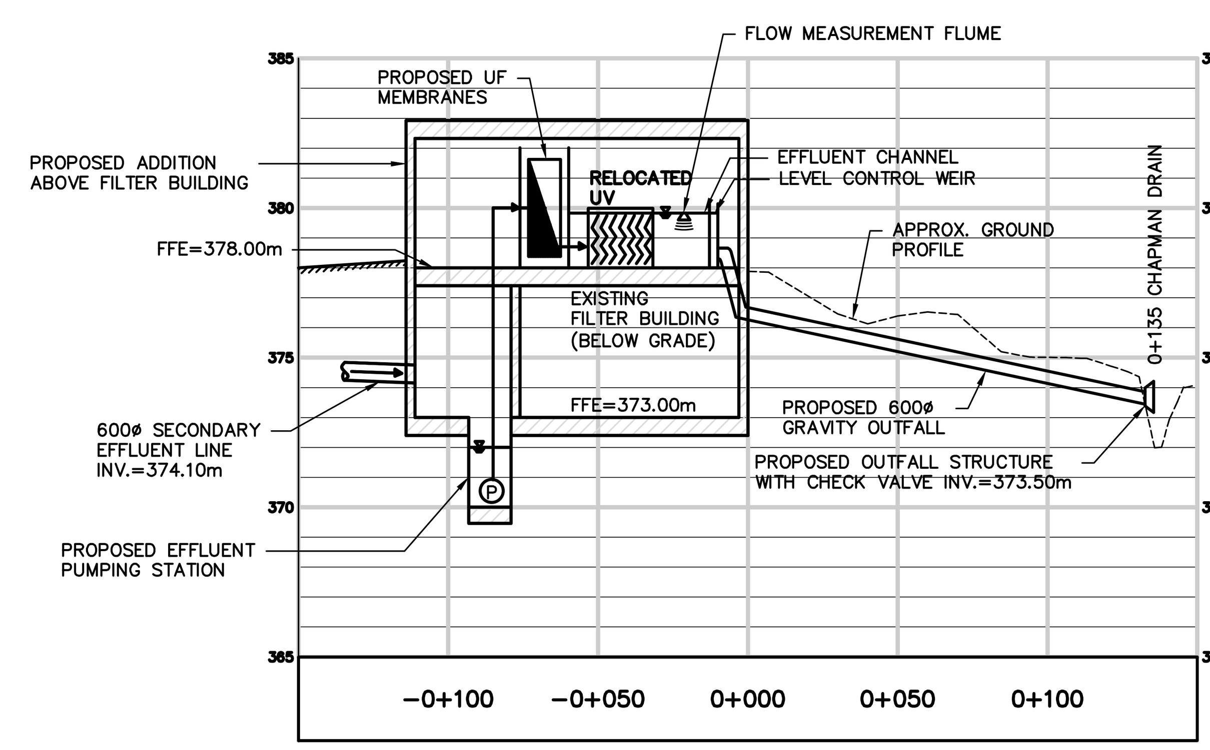
DRAWN BY :	APPROVED BY :	PROJECT NO. :	DRAWING NO. :
RM	GAP	311-031	G04
DESIGNED BY :	DATE :	SCALE :	
GAP	APRIL 2015	1:1250	



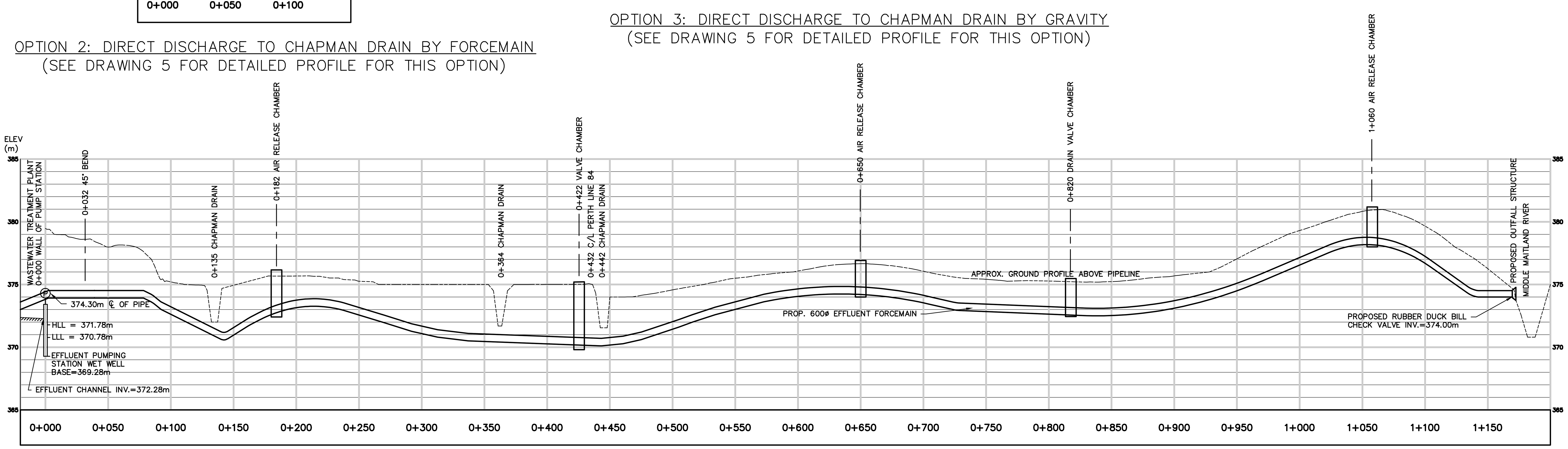
OPTION 1: EXISTING EFFLUENT FORCEMAIN (SEE NOTE 5)



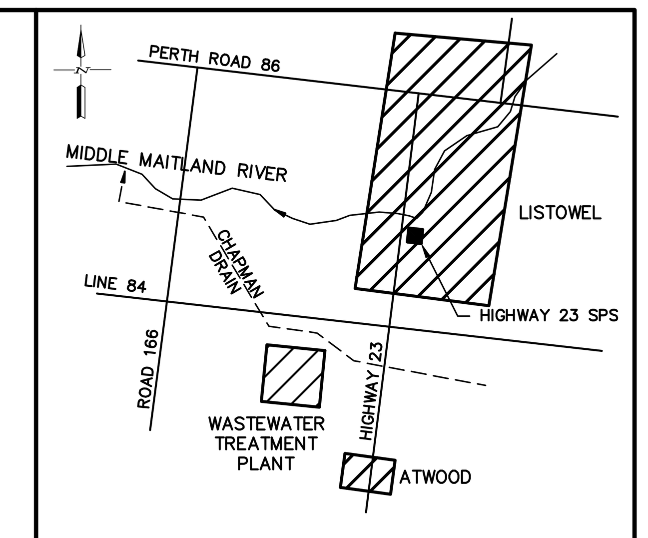
OPTION 2: DIRECT DISCHARGE TO CHAPMAN DRAIN BY FORCEMAIN
(SEE DRAWING 5 FOR DETAILED PROFILE FOR THIS OPTION)



OPTION 3: DIRECT DISCHARGE TO CHAPMAN DRAIN BY GRAVITY
(SEE DRAWING 5 FOR DETAILED PROFILE FOR THIS OPTION)



OPTION 4: DISCHARGE TO ALTERNATE LOCATION ON MIDDLE MAITLAND RIVER



KEY PLAN
NOT TO SCALE

NOTES :

1. AERIAL PHOTOGRAPHY AND CONTOURS USED IN PREPARATION OF THIS DRAWING WERE PROVIDED BY MAITLAND VALLEY CONSERVATION AUTHORITY (MVCA).
2. ELEVATIONS ARE SHOWN IN METRES ABOVE SEA LEVEL (MASL).
3. PIPELINE LOCATIONS SHOWN ARE APPROXIMATE.
4. PIPELINE DIAMETERS ARE SHOWN IN MILLIMETRES.
5. REFER TO AS CONSTRUCTED DRAWINGS FOR DETAILS OF EXISTING EFFLUENT FORCEMAIN (BURNSIDE, 1991).
6. OPTION 1 EXISTING FORCEMAIN – BOTH 450mm PIPELINES PASS THROUGH EACH CHAMBER. THE 300mm PIPELINE DOES NOT PASS THROUGH THE CHAMBERS.

H = 1:2000 (m)

V = 1:200 (m)

BENCH MARKS :

NO.	MM/DD/YY	REVISION DESCRIPTION	CH'KD
2	APRIL 2015	ISSUED FOR PUBLIC REVIEW	GAP
1	JUNE 2014	ISSUED FOR MUNICIPALITY REVIEW	GAP

GM BluePlan ENGINEERING
GUELPH | OWEN SOUND | LISTOWEL | KITCHENER | EXETER | HAMILTON | GTA
650 WOODLAWN ROAD WEST, BLOCK C, UNIT 2, GUELPH, ON N1K 1B8
TEL. 519-824-8150 www.gmblueplan.ca

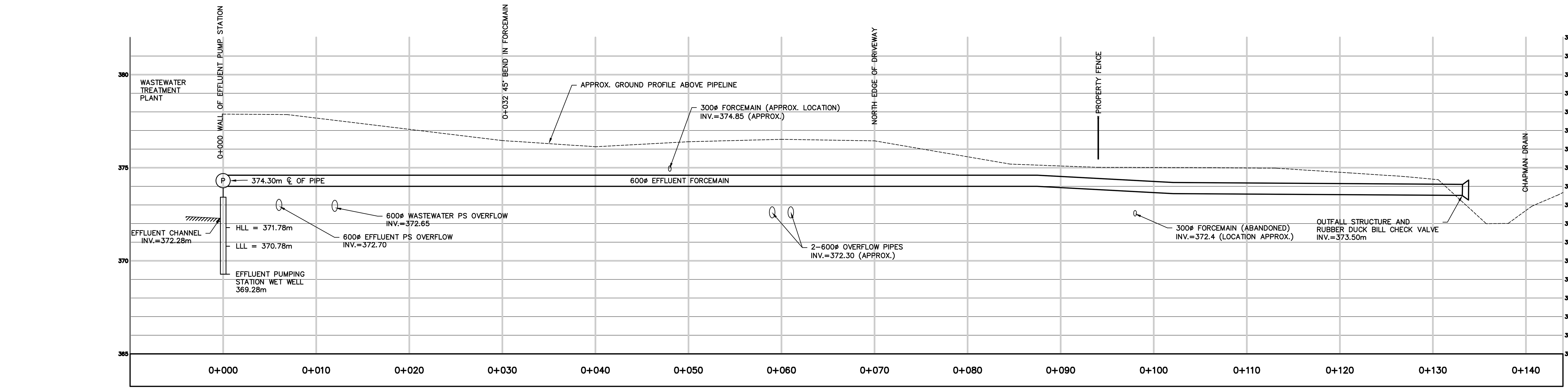
MUNICIPALITY OF NORTH PERTH

WASTEWATER TREATMENT MASTER PLAN

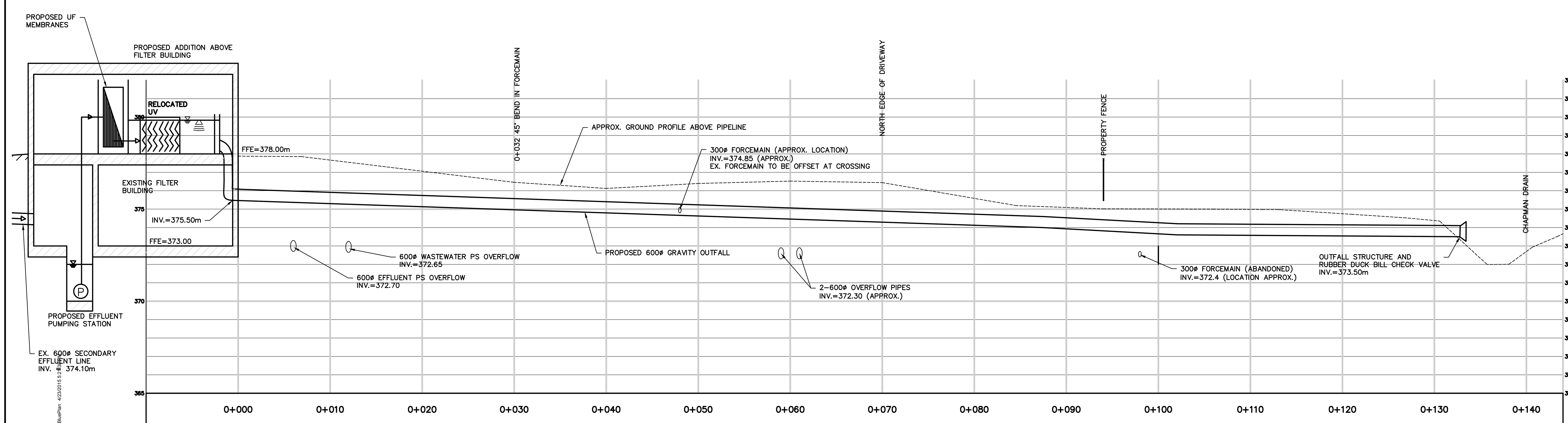
WWTP OUTFALL ALTERNATIVES

OUTFALL PROFILES

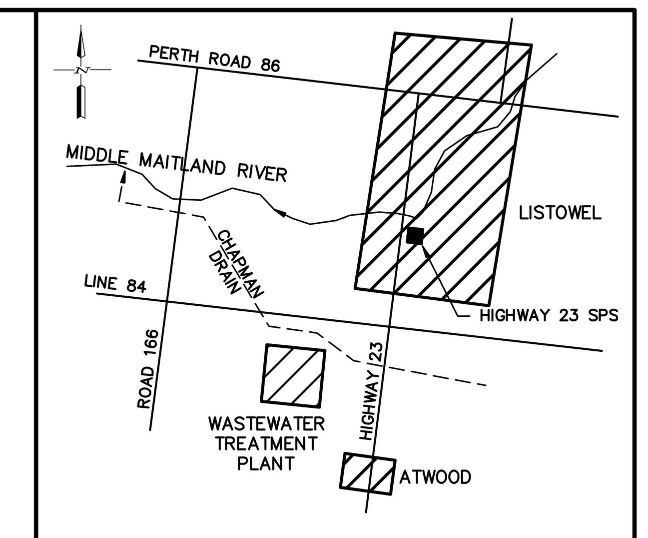
DRAWN BY :	APPROVED BY :	PROJECT NO. :	DRAWING NO. :
MJB	GAP	311-031	G05
DESIGNED BY :	DATE :	SCALE :	
GAP	APRIL 2015	AS SHOWN	



OPTION 2: DIRECT DISCHARGE TO CHAPMAN DRAIN (FORCEMAIN)



OPTION 3: DIRECT DISCHARGE TO CHAPMAN DRAIN (GRAVITY)



KEY PLAN
NOT TO SCALE

NOTES :

1. AERIAL PHOTOGRAPHY AND CONTOURS USED IN PREPARATION OF THIS DRAWING WERE PROVIDED BY MAITLAND VALLEY CONSERVATION AUTHORITY (MVCA).
2. ELEVATIONS ARE SHOWN IN METRES ABOVE SEA LEVEL (MASL).
3. PIPELINE LOCATIONS SHOWN ARE APPROXIMATE.
4. PIPELINE DIAMETERS ARE SHOWN IN MILLIMETRES.

H = 1:250 (m)
V = 1:125 (m)

BENCH MARKS :

THE POSITION OF POLE LINES, CONDUITS, WATERMAINS, SEWERS AND OTHER UNDERGROUND AND OVERGROUND UTILITIES AND STRUCTURES IS NOT NECESSARILY SHOWN ON THE CONTRACT DRAWINGS, AND, WHERE SHOWN, THE ACCURACY OF THE POSITION OF SUCH UTILITIES AND STRUCTURES IS NOT GUARANTEED.

BEFORE STARTING WORK, THE CONTRACTOR SHALL INFORM HIMSELF OF THE EXACT LOCATION OF ALL SUCH UTILITIES AND STRUCTURES, AND SHALL ASSUME ALL LIABILITY FOR ANY DAMAGE TO THEM.

ONLY DRAWINGS INCLUDING A PROFESSIONAL ENGINEERS STAMP BEARING A SIGNATURE AND DATE ARE TO BE CONSIDERED VALID AND TRUE.

NO.	MM/DD/YY	REVISION DESCRIPTION	CH'KD
2	APRIL 2015	ISSUED FOR PUBLIC REVIEW	GAP
1	JUNE 2014	ISSUED FOR MUNICIPALITY REVIEW	GAP

GM BluePlan ENGINEERING

GUELPH | OWEN SOUND | LISTOWEL | KITCHENER | EXETER | HAMILTON | GTA
650 WOODLAWN ROAD WEST, BLOCK C, UNIT 2, GUELPH, ON N1K 1B8
TEL. 519-824-8150 www.gmblueplan.ca

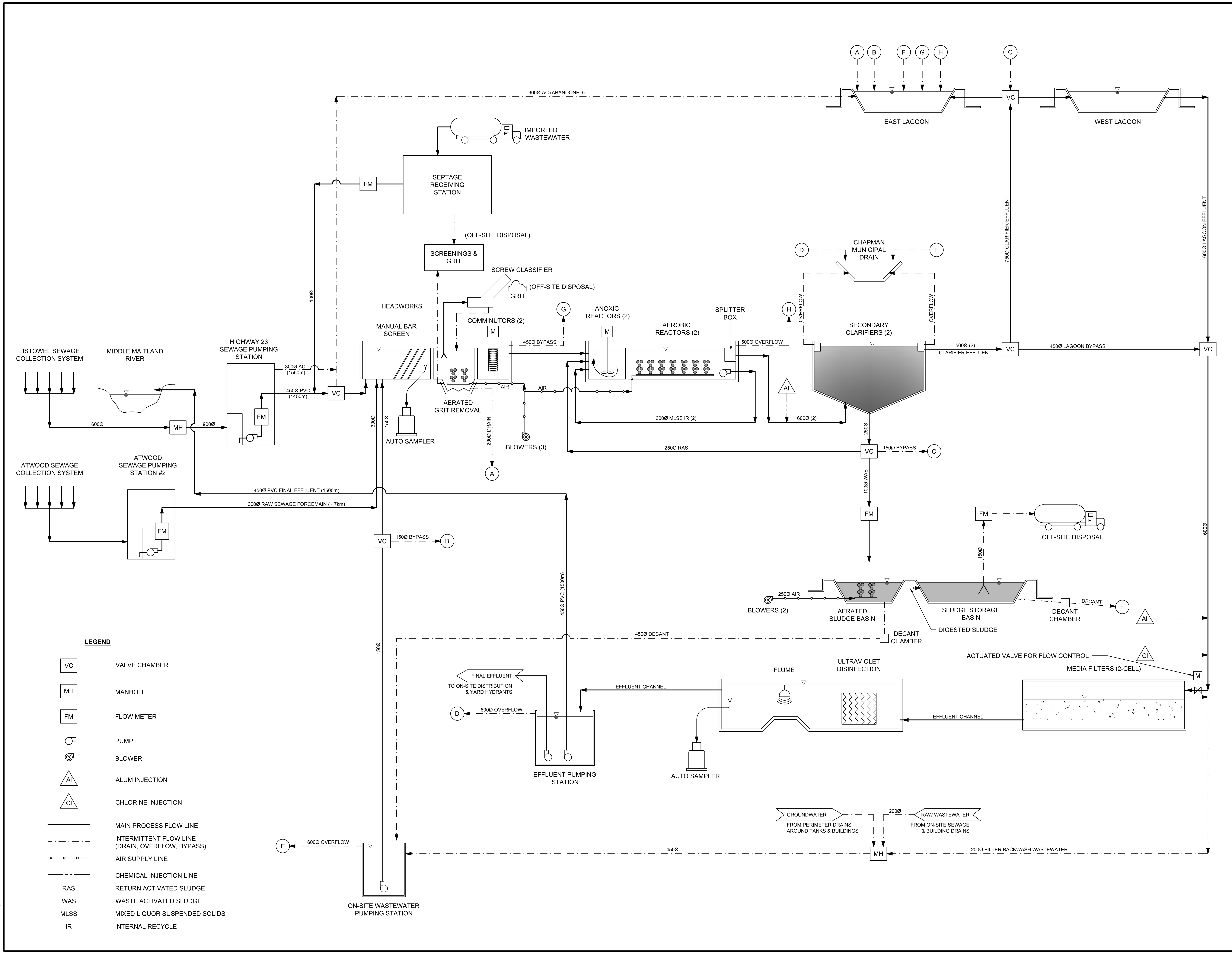
MUNICIPALITY OF NORTH PERTH

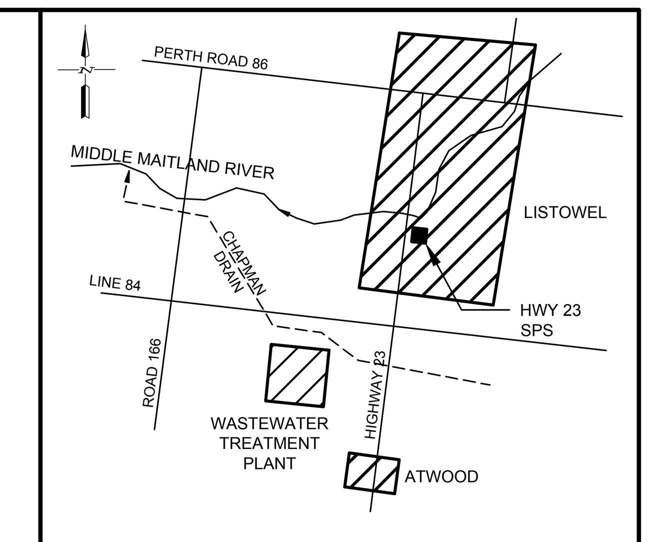
WASTEWATER TREATMENT MASTER PLAN

WWTP OUTFALL ALTERNATIVES

OUTFALL PROFILES OPTIONS 2 AND 3

DRAWN BY :	APPROVED BY :	PROJECT NO. :	DRAWING NO. :
MJB	GAP	311-031	G06
DESIGNED BY :	DATE :	SCALE :	
GAP	APRIL 2015	AS SHOWN	





KEY PLAN
NOT TO SCALE

NOTES :
1. PIPE DIAMETERS ARE SHOWN IN MILLIMETRES.

BENCH MARKS :

THE POSITION OF POLE LINES, CONDUITS, WATERMAINS, SEWERS AND OTHER UNDERGROUND AND OVERGROUND UTILITIES AND STRUCTURES IS NOT NECESSARILY SHOWN ON THE CONTRACT DRAWINGS, AND, WHERE SHOWN, THE ACCURACY OF THE POSITION OF SUCH UTILITIES AND STRUCTURES IS NOT GUARANTEED.

BEFORE STARTING WORK, THE CONTRACTOR SHALL INFORM HIMSELF OF THE EXACT LOCATION OF ALL SUCH UTILITIES AND STRUCTURES, AND SHALL ASSUME ALL LIABILITY FOR ANY DAMAGE TO THEM.

NO.	DATE	REVISION DESCRIPTION	CH'KD
4	AUG 2015	ISSUED FOR FINAL MASTER PLAN	GAP
3	APRIL 2015	ISSUED FOR PUBLIC REVIEW	GAP
2	DEC 2014	ISSUED FOR MOECC REVIEW	GAP
1	JUNE 20/14	ISSUED FOR MUNICIPALITY REVIEW	GAP

GM BluePlan ENGINEERING
GUELPH | OWEN SOUND | LISTOWEL | KITCHENER | EXETER | HAMILTON | GTA
650 WOODLAWN ROAD WEST, BLOCK C, UNIT 2, GUELPH, ON N1K 1B8
TEL. 519-824-8150 www.gmblueplan.ca

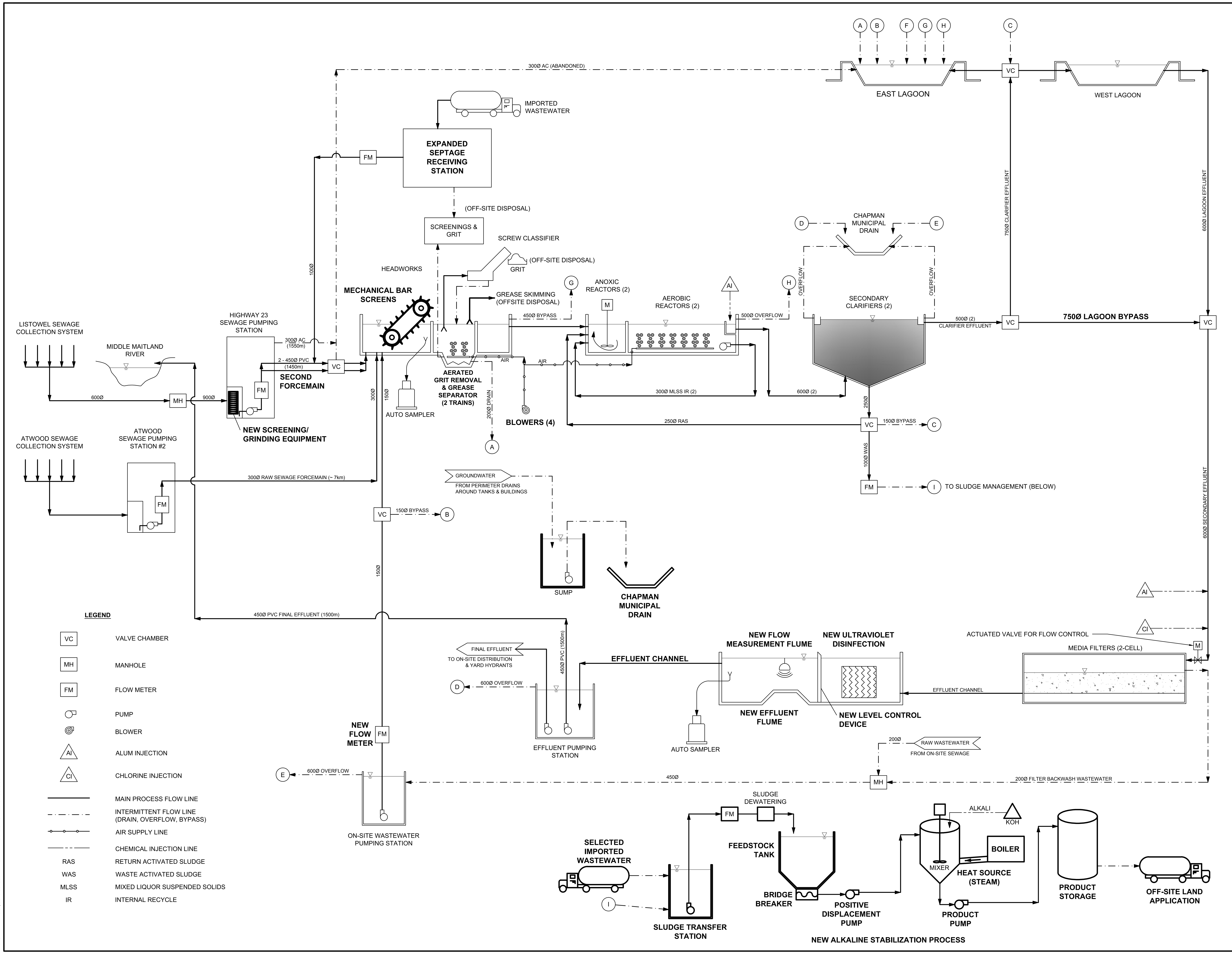
MUNICIPALITY OF NORTH PERTH

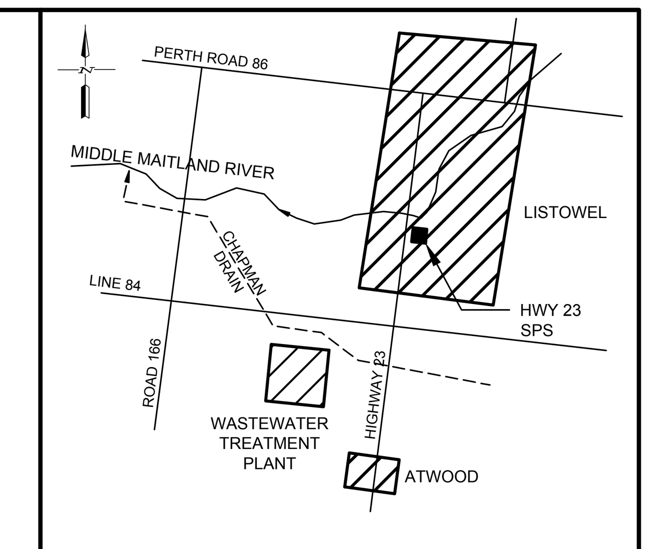
WASTEWATER TREATMENT MASTER PLAN

WASTEWATER TREATMENT PLANT

GENERAL PROCESS FLOW DIAGRAM EXISTING SYSTEM

DRAWN BY :	APPROVED BY :	PROJECT NO. :	DRAWING NO. :
PRM	GAP	311-031	P01
DESIGNED BY :	DATE :	SCALE :	
GAP	AUGUST 2015	N.T.S.	





KEY PLAN
NOT TO SCALE

NOTES :
1. PIPE DIAMETERS ARE SHOWN IN MILLIMETRES.
2. PROPOSED EQUIPMENT ARE SHOWN IN BOLD.
3. CLARIFIERS TO BE UPGRADED WITH MECHANICAL SKIMMING MECHANISM.

BENCH MARKS :

THE POSITION OF POLE LINES, CONDUITS, WATERMAINS, SEWERS AND OTHER UNDERGROUND AND OVERGROUND UTILITIES AND STRUCTURES IS NOT NECESSARILY SHOWN ON THE CONTRACT DRAWINGS, AND, WHERE SHOWN, THE ACCURACY OF THE POSITION OF SUCH UTILITIES AND STRUCTURES IS NOT GUARANTEED.

BEFORE STARTING WORK, THE CONTRACTOR SHALL INFORM HIMSELF OF THE EXACT LOCATION OF ALL SUCH UTILITIES AND STRUCTURES, AND SHALL ASSUME ALL LIABILITY FOR ANY DAMAGE TO THEM.

NO.	DATE	REVISION DESCRIPTION	CHKD
4	AUG 2015	ISSUED FOR FINAL MASTER PLAN	GAP
3	APRIL 2015	ISSUED FOR PUBLIC REVIEW	GAP
2	DEC 2014	ISSUED FOR MOECC REVIEW	GAP
1	JUNE 2014	ISSUED FOR MUNICIPALITY REVIEW	GAP

GM BluePlan ENGINEERING

GUELPH | OWEN SOUND | LISTOWEL | KITCHENER | EXETER | HAMILTON | GTA
650 WOODLAWN ROAD WEST, BLOCK C, UNIT 2, GUELPH, ON N1K 1B8
TEL 519-824-8150 www.gmblueplan.ca

MUNICIPALITY OF NORTH PERTH

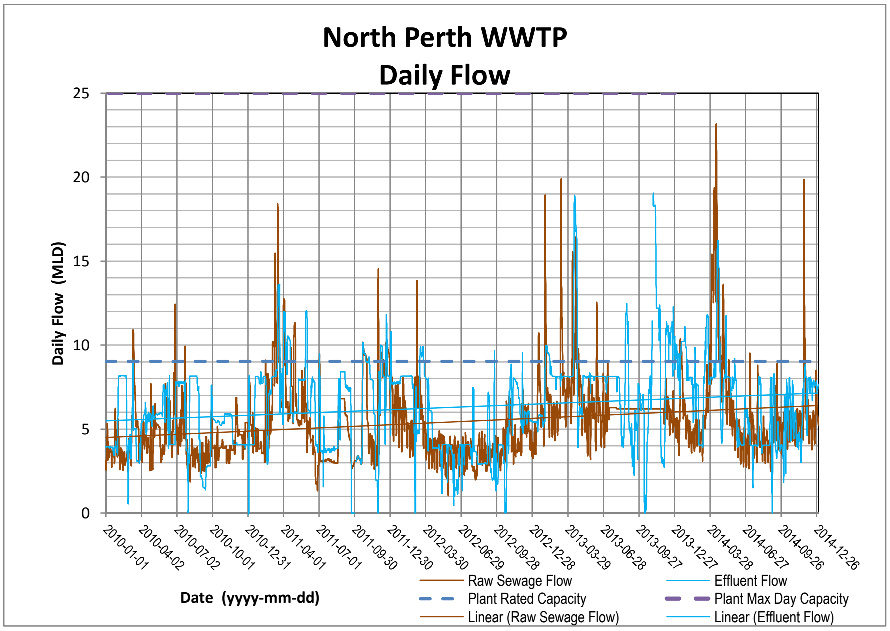
WASTEWATER TREATMENT MASTER PLAN

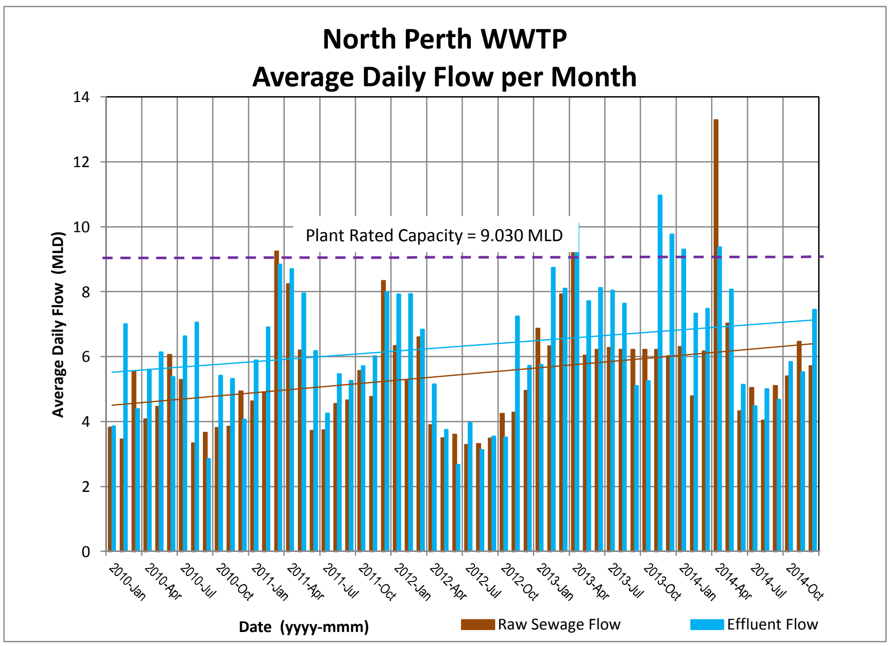
WASTEWATER TREATMENT PLANT

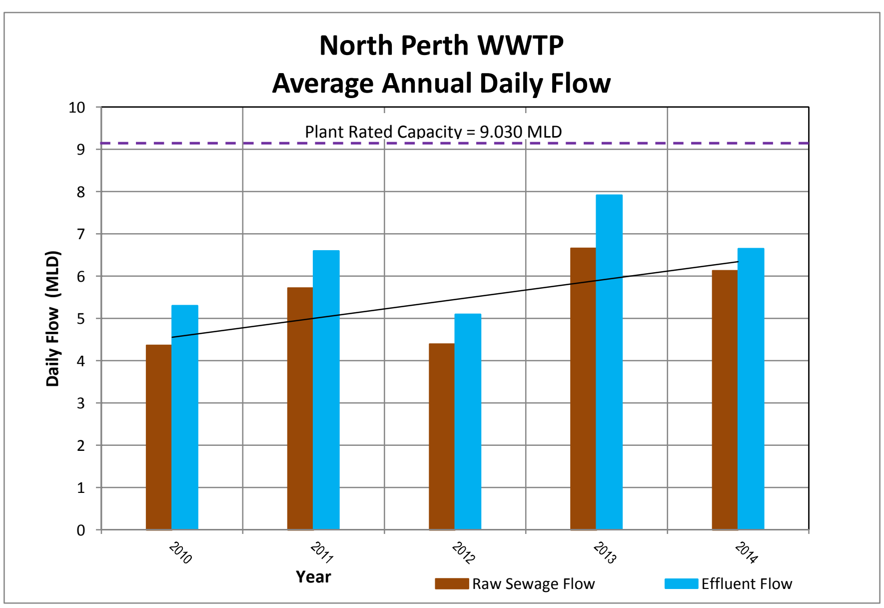
GENERAL PROCESS FLOW DIAGRAM PROPOSED SYSTEM

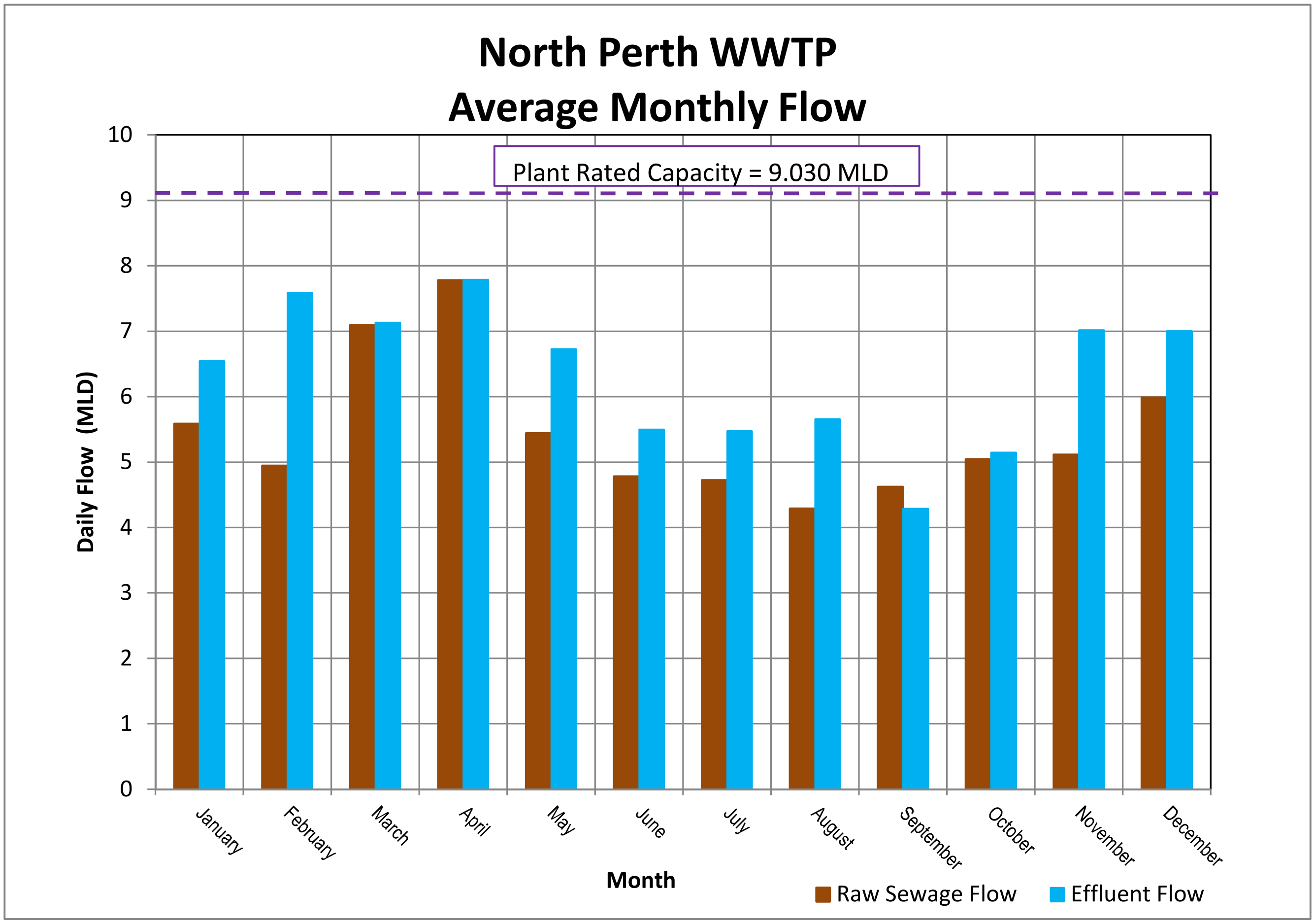
DRAWN BY :	APPROVED BY :	PROJECT NO. :	DRAWING NO. :
PRM	GAP	311-031	P02
DESIGNED BY : GAP	DATE : AUGUST 2015	SCALE : N.T.S.	

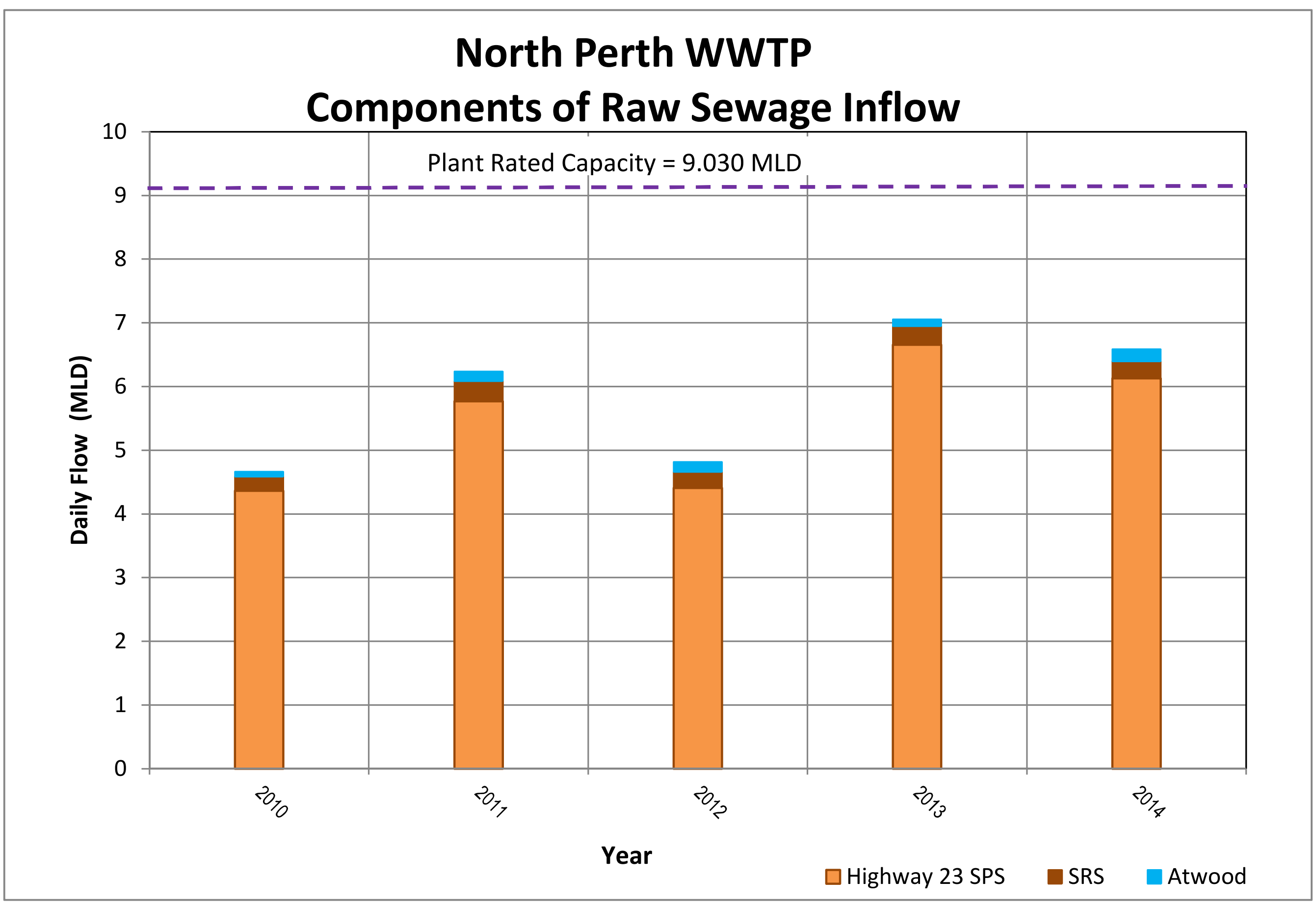
APPENDIX B
GRAPHS FOR TREATMENT PLANT OPERATIONAL DATA

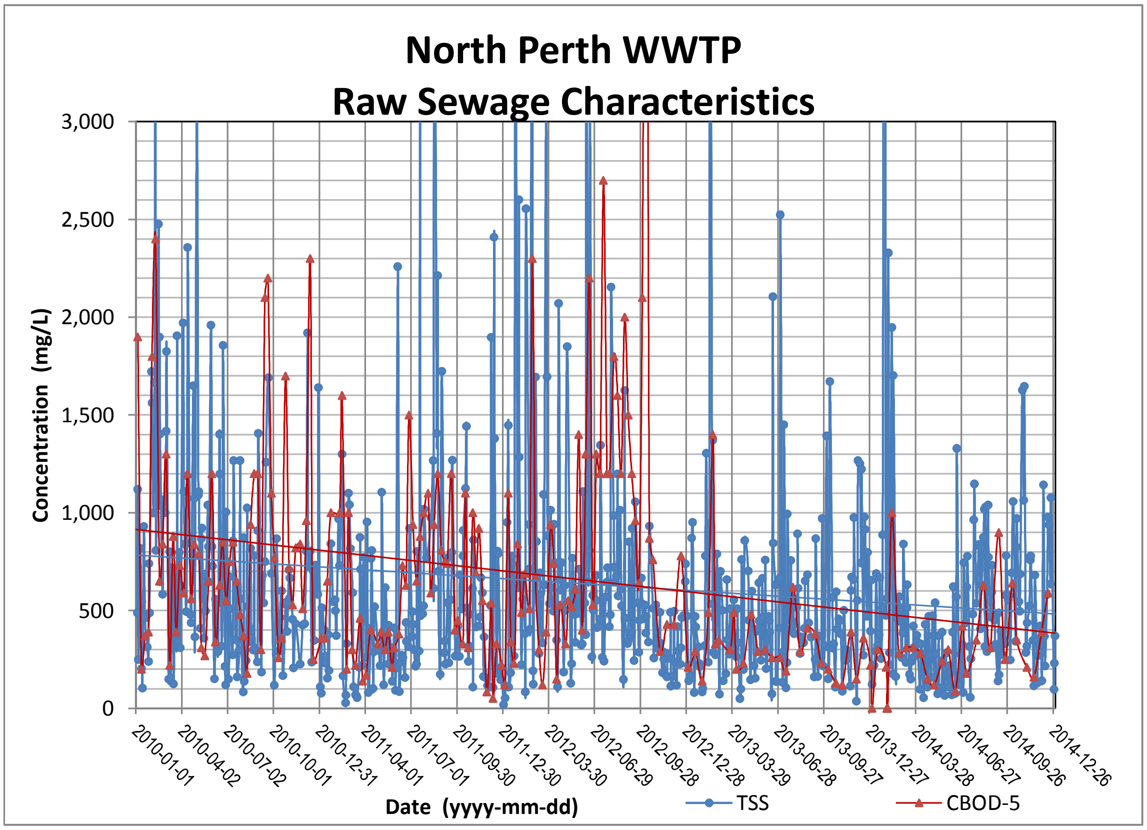

North Perth WWTP
Daily Flow
Daily Flow (MLD)
Date (yyyy-mm-dd)
Raw Sewage Flow
Plant Rated Capacity
Linear (Raw Sewage Flow)
Effluent Flow
Plant Max Day Capacity
Linear (Effluent Flow)


North Perth WWTP
Average Daily Flow per Month
Plant Rated Capacity = 9.030 MLD
Average Daily Flow (MLD)
Date (yyyy-mmm)
Raw Sewage Flow
Effluent Flow

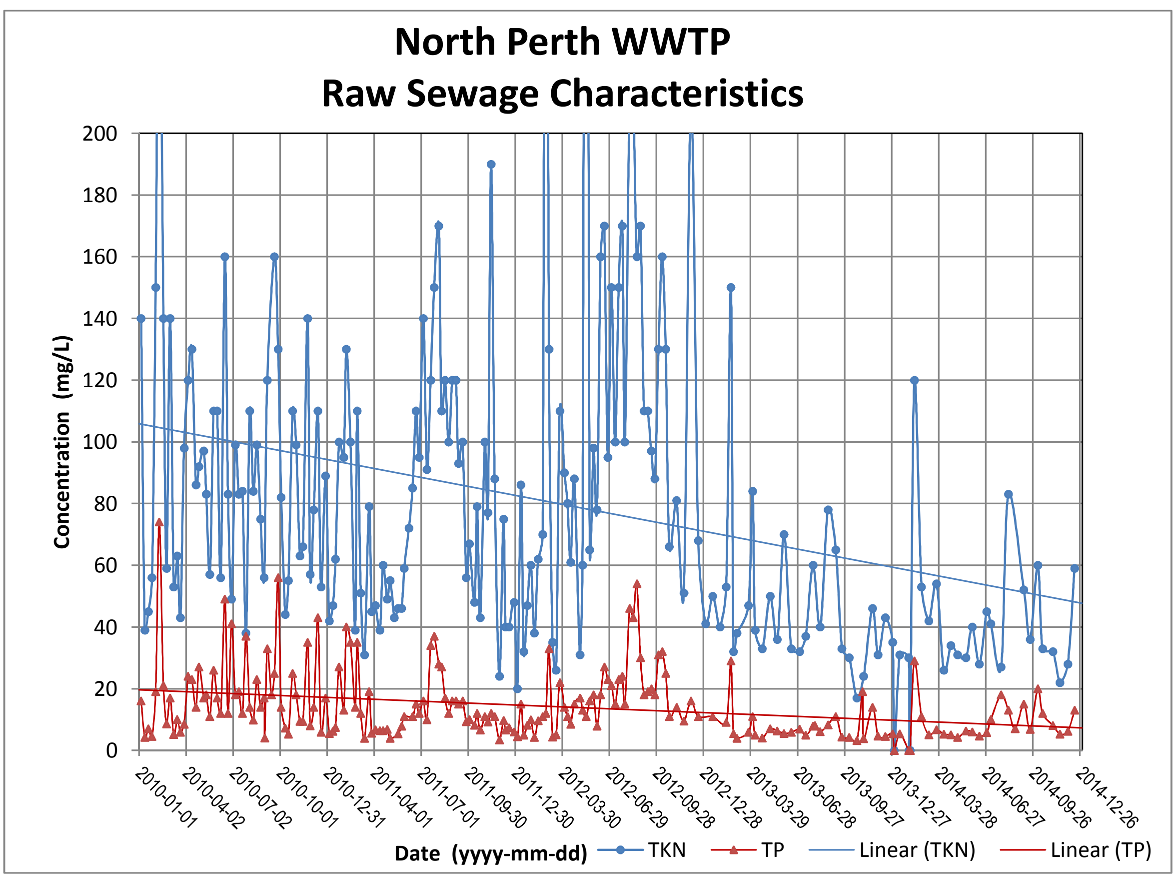

North Perth WWTP
Average Annual Daily Flow
Plant Rated Capacity = 9.030 MLD
Daily Flow (MLD)
Year
Raw Sewage Flow
Effluent Flow


North Perth WWTP
Average Monthly Flow
Plant Rated Capacity = 9.030 MLD
Daily Flow (MLD)
10
9
8
7
6
5
4
3
2
1
0
January
February
March
April
May
June
July
August
September
October
November
December
Month
Raw Sewage Flow
Effluent Flow

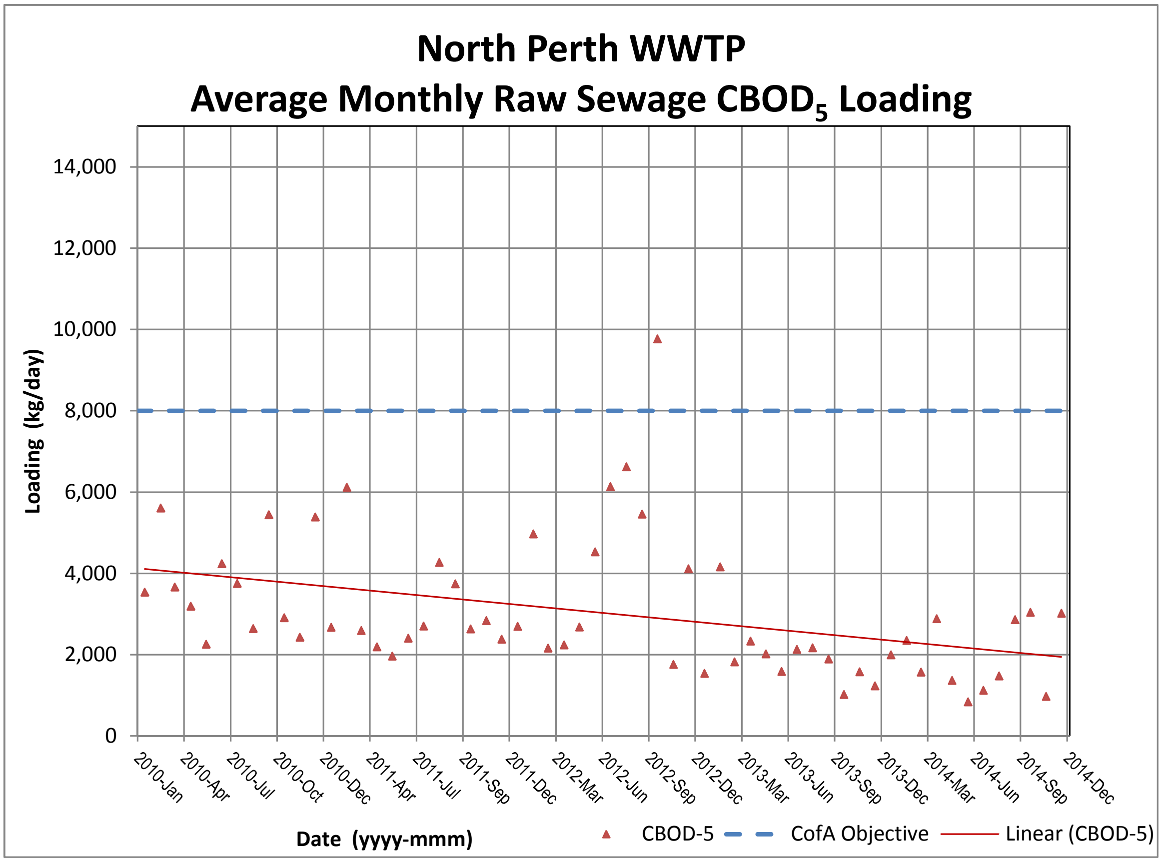

North Perth WWTP
Components of Raw Sewage Inflow
Plant Rated Capacity = 9.030 MLD
Daily Flow (MLD)
10
9
8
7
6
5
4
3
2
1
0
2010
2011
2012
2013
2014
Year
Highway 23 SPS
SRS
Atwood

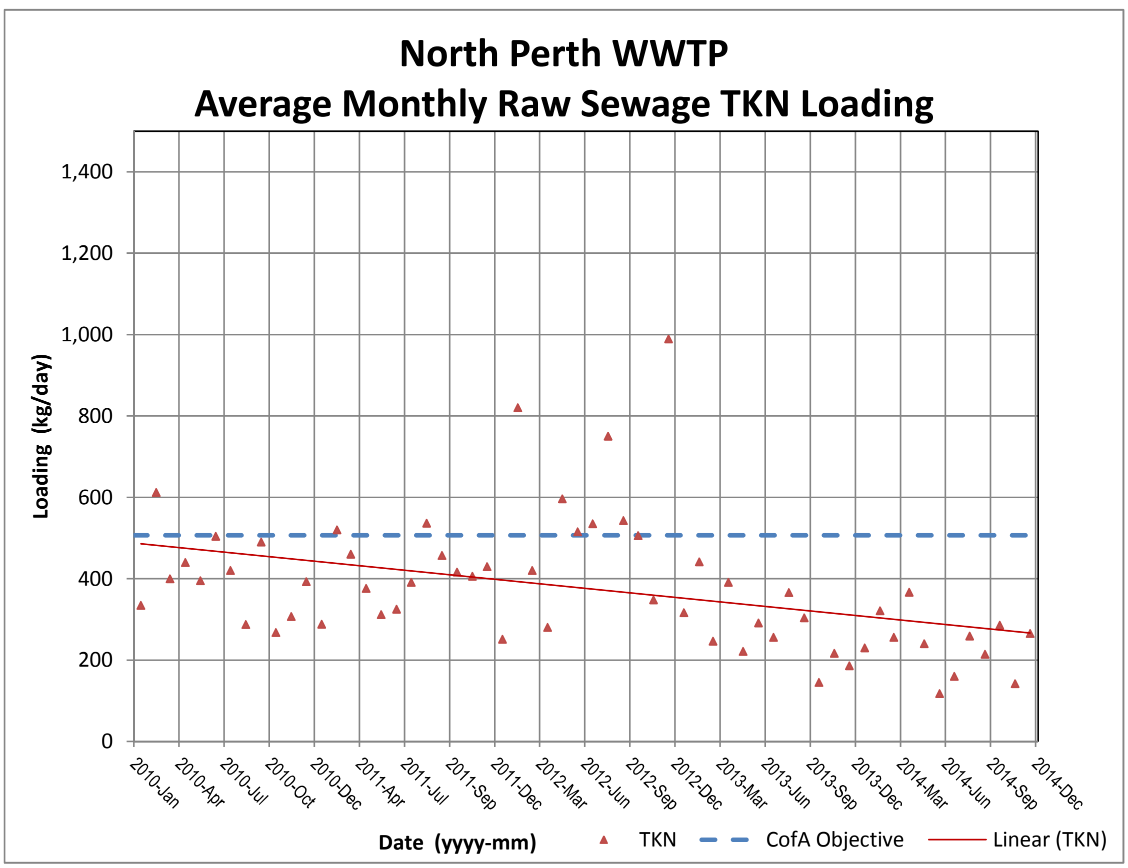


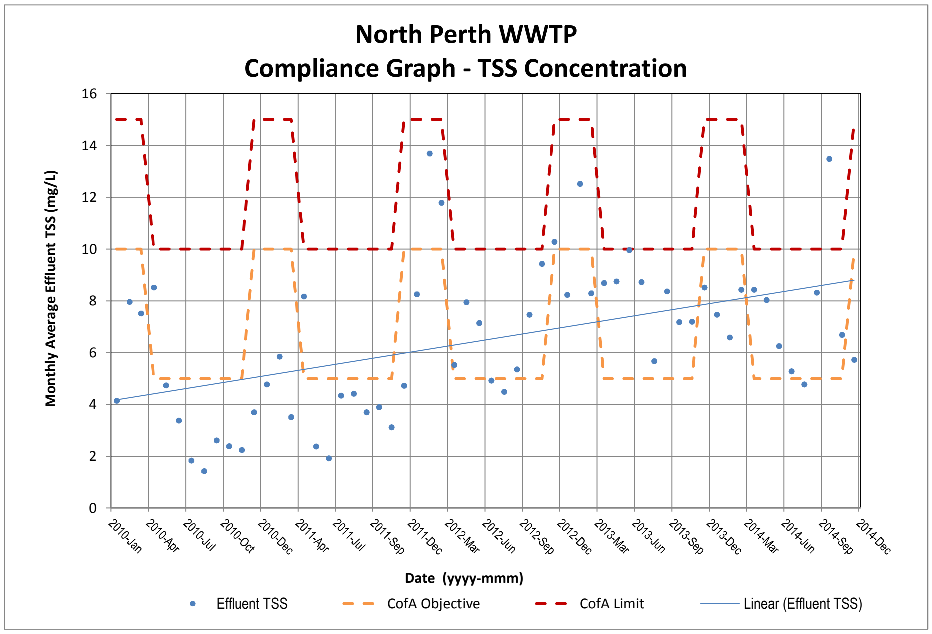
North Perth WWTP
Raw Sewage Characteristics
Concentration (mg/L)
3,000
2,500
2,000
1,500
1,000
500
0
2010-01-01
2010-04-02
2010-07-02
2010-10-01
2010-12-31
2011-04-01
2011-07-01
2011-09-30
2011-12-30
2012-03-30
2012-06-29
2012-09-28
2012-12-28
2013-03-29
2013-06-28
2013-09-27
2013-12-27
2014-03-28
2014-06-27
2014-09-26
2014-12-26
Date (yyyy-mm-dd)
TSS
CBOD-5

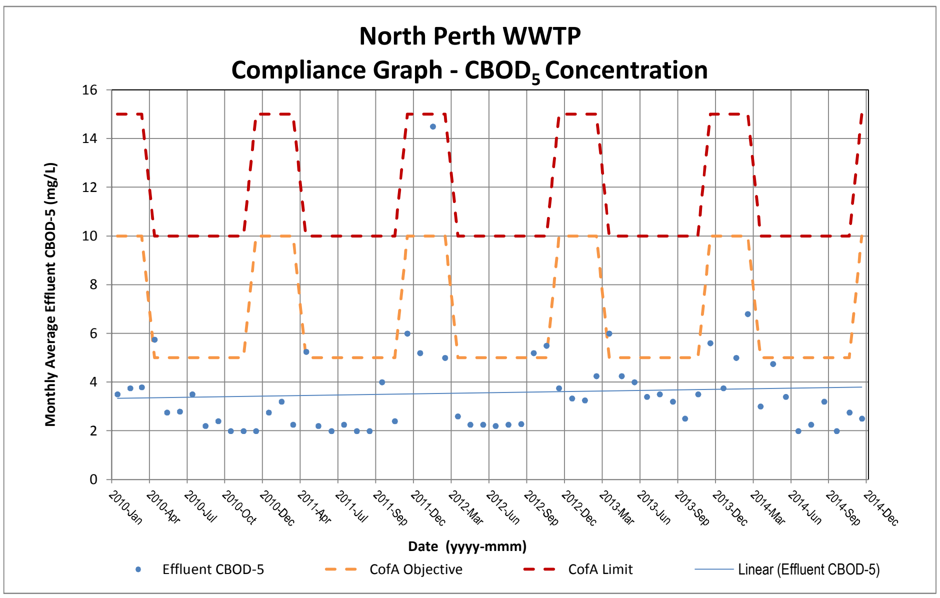


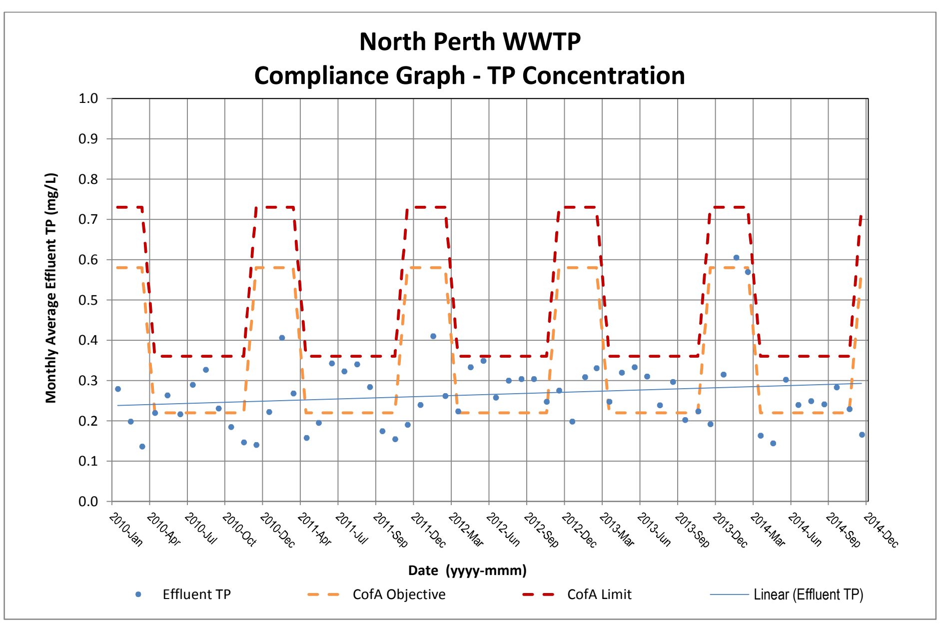
North Perth WWTP
Raw Sewage Characteristics
Concentration (mg/L)
200
180
160
140
120
100
80
60
40
20
0
2010-01-01
2010-04-02
2010-07-02
2010-10-01
2010-12-31
2011-04-01
2011-07-01
2011-09-30
2011-12-30
2012-03-30
2012-06-29
2012-09-28
2012-12-28
2013-03-29
2013-06-28
2013-09-27
2013-12-27
2014-03-28
2014-06-27
2014-09-26
2014-12-26
Date (yyyy-mm-dd)
TKN
TP
Linear (TKN)
Linear (TP)

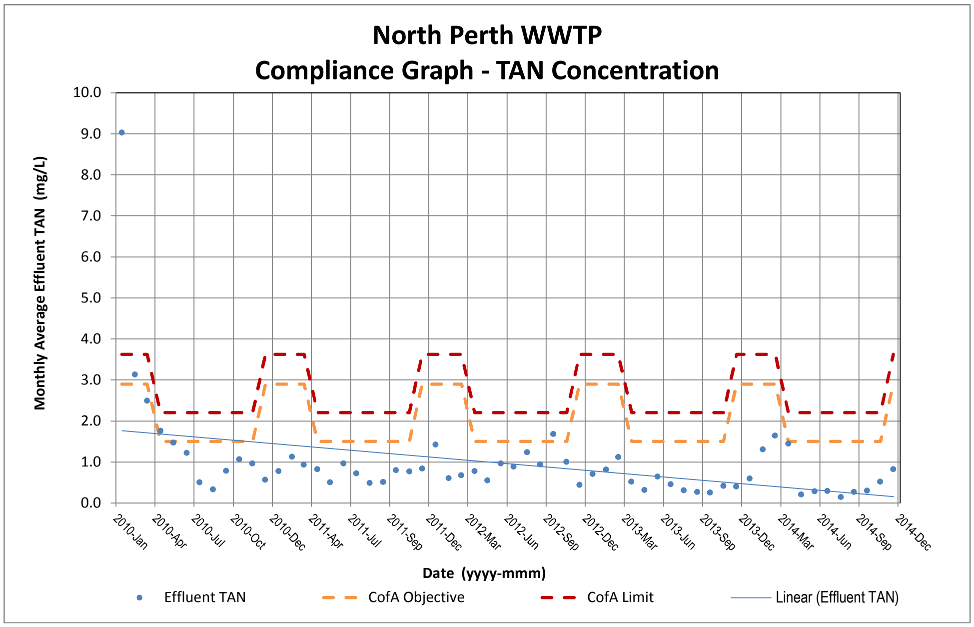

North Perth WWTP
Average Monthly Raw Sewage CBOD5 Loading
Loading (kg/day)
14,000
12,000
10,000
8,000
6,000
4,000
2,000
0
2010-Jan
2010-Apr
2010-Jul
2010-Oct
2010-Dec
2011-Apr
2011-Jul
2011-Sep
2011-Dec
2012-Mar
2012-Jun
2012-Sep
2012-Dec
2013-Mar
2013-Jun
2013-Sep
2013-Dec
2014-Mar
2014-Jun
2014-Sep
2014-Dec
Date (yyyy-mmm)
CBOD-5
CofA Objective
Linear (CBOD-5)

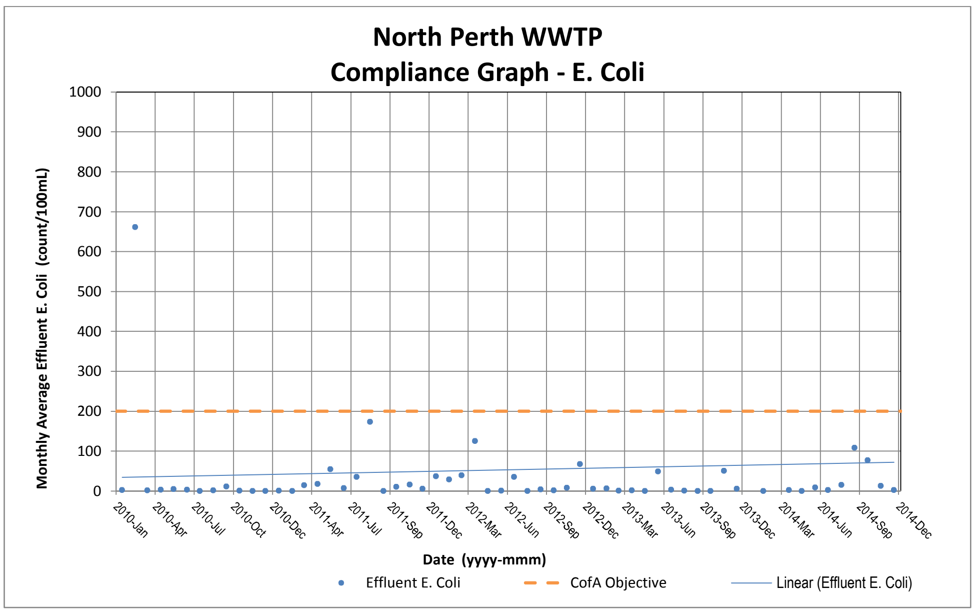

North Perth WWTP
Average Monthly Raw Sewage TKN Loading
Loading (kg/day)
1,400
1,200
1,000
800
600
400
200
0
2010-Jan
2010-Apr
2010-Jul
2010-Oct
2010-Dec
2011-Apr
2011-Jul
2011-Sep
2011-Dec
2012-Mar
2012-Jun
2012-Sep
2012-Dec
2013-Mar
2013-Jun
2013-Sep
2013-Dec
2014-Mar
2014-Jun
2014-Sep
2014-Dec
Date (yyyy-mm)
TKN
CofA Objective
Linear (TKN)

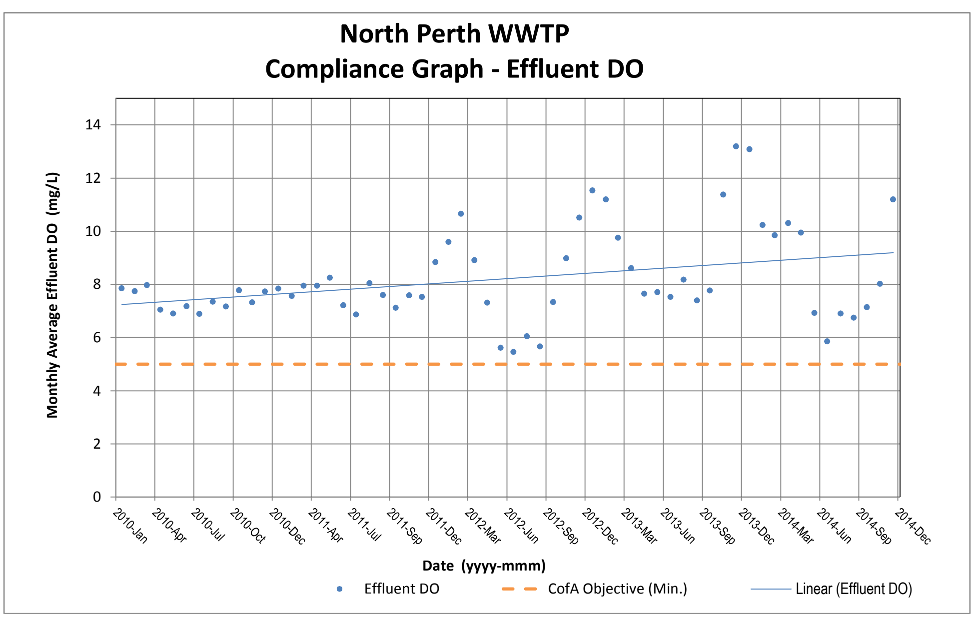

North Perth WWTP
Compliance Graph - TSS Concentration
Monthly Average Effluent TSS (mg/L)
Date (yyyy-mmm)
Effluent TSS
CofA Objective
CofA Limit
Linear (Effluent TSS)

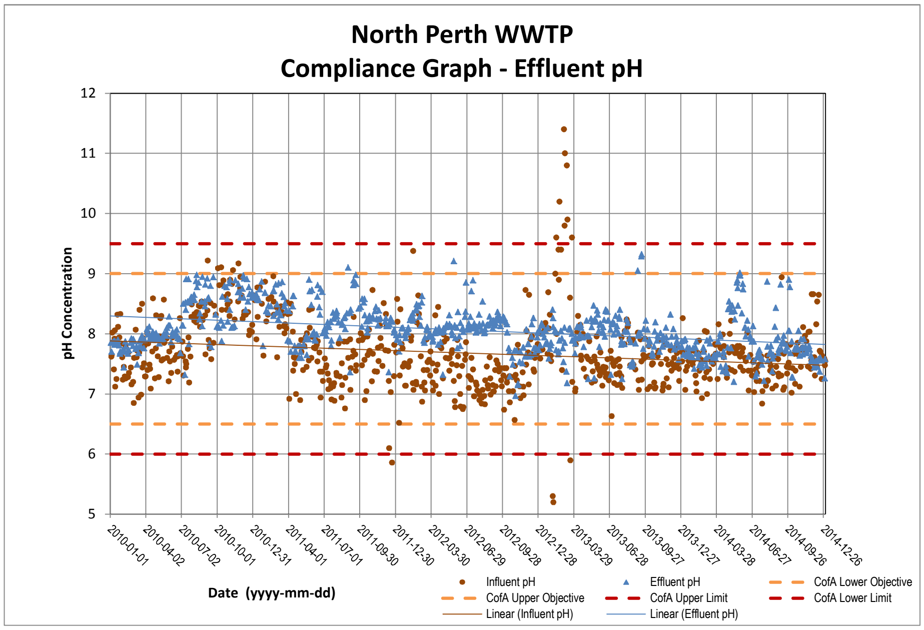

North Perth WWTP
Compliance Graph - CBOD5 Concentration
Monthly Average Effluent CBOD-5 (mg/L)
Date (yyyy-mmm)
Effluent CBOD-5
CofA Objective
CofA Limit
Linear (Effluent CBOD-5)

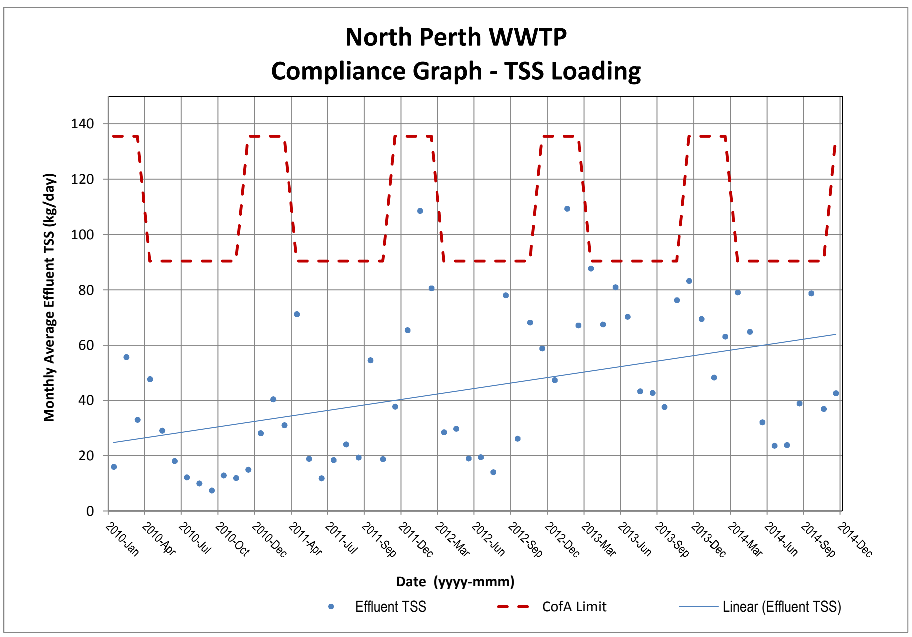

North Perth WWTP
Compliance Graph - TP Concentration
Monthly Average Effluent TP (mg/L)
Date (yyyy-mmm)
Effluent TP
CofA Objective
CofA Limit
Linear (Effluent TP)

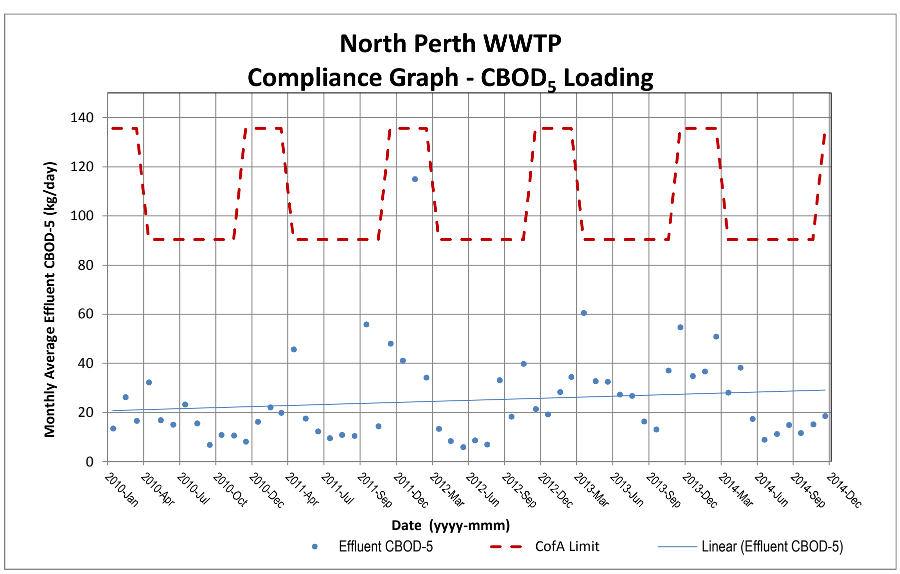

North Perth WWTP
Compliance Graph - TAN Concentration
Monthly Average Effluent TAN (mg/L)
Date (yyyy-mmm)
Effluent TAN
CofA Objective
CofA Limit
Linear (Effluent TAN)

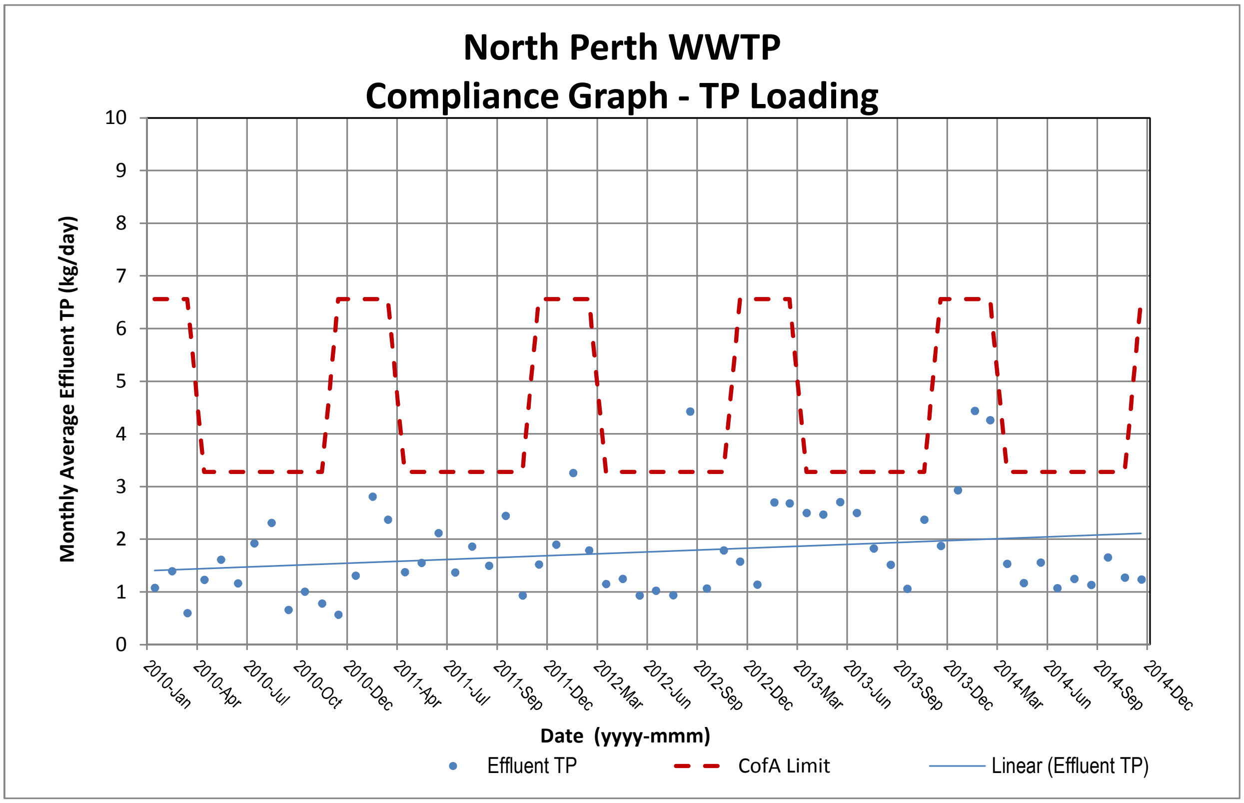

North Perth WWTP
Compliance Graph - E. Coli
Monthly Average Effluent E. Coli (count/100mL)
Date (yyyy-mmm)
Effluent E. Coli
CofA Objective
Linear (Effluent E. Coli)

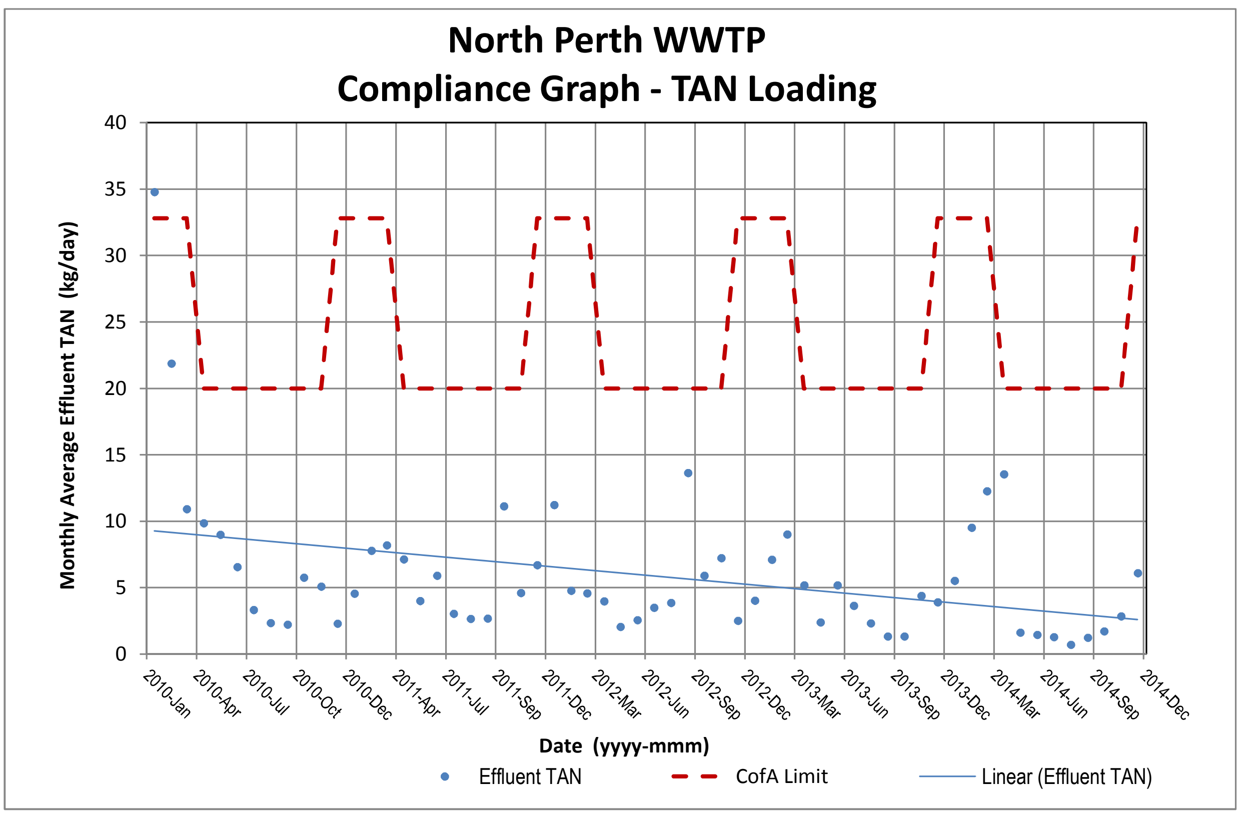

North Perth WWTP
Compliance Graph - Effluent DO
Monthly Average Effluent DO (mg/L)
Date (yyyy-mmm)
Effluent DO
CofA Objective (Min.)
Linear (Effluent DO)

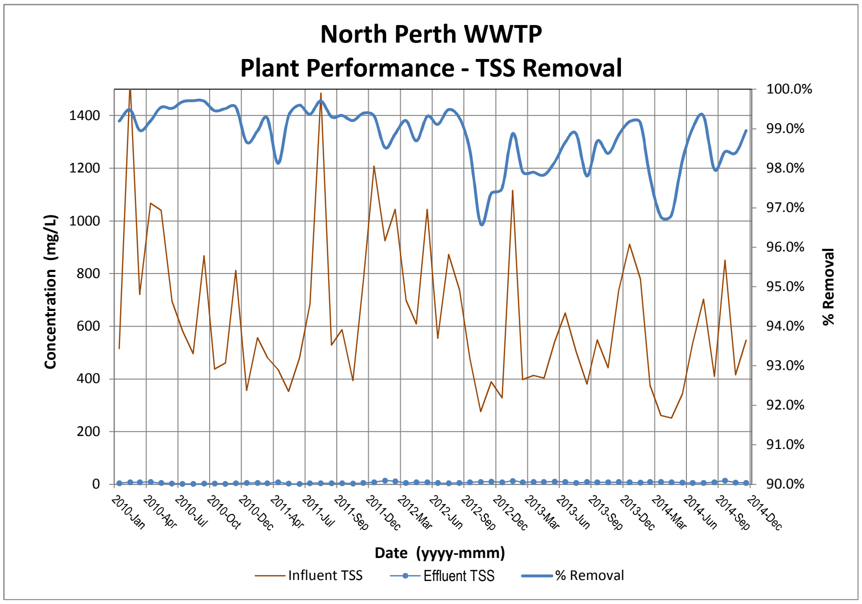

North Perth WWTP
Compliance Graph - Effluent pH
pH Concentration
Date (yyyy-mm-dd)
Influent pH
Effluent pH
CofA Lower Objective
CofA Upper Objective
CofA Upper Limit
CofA Lower Limit
Linear (Influent pH)
Linear (Effluent pH)

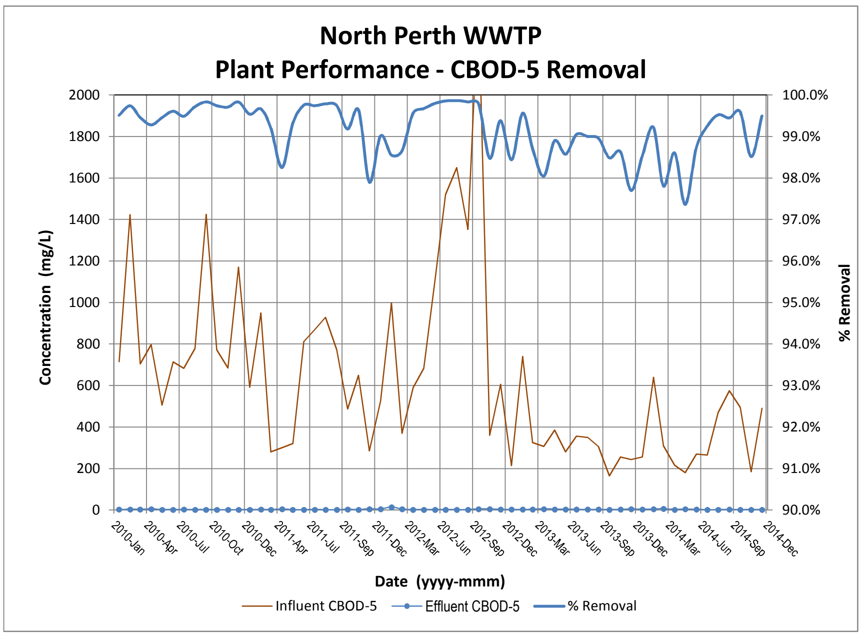

North Perth WWTP
Compliance Graph - TSS Loading
Monthly Average Effluent TSS (kg/day)
Date (yyyy-mmm)
Effluent TSS
CofA Limit
Linear (Effluent TSS)

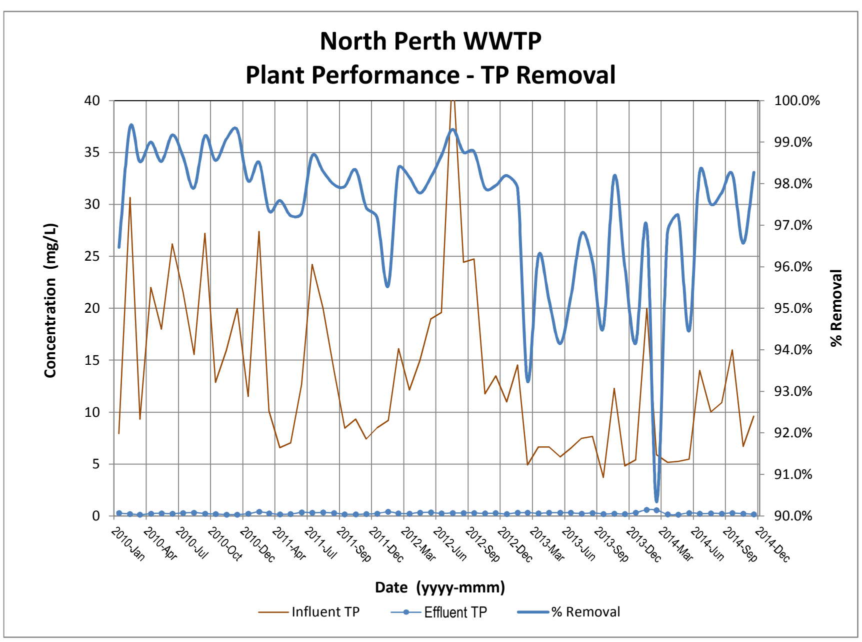

North Perth WWTP
Compliance Graph - CBOD5 Loading
Monthly Average Effluent CBOD-5 (kg/day)
Date (yyyy-mmm)
Effluent CBOD-5
CofA Limit
Linear (Effluent CBOD-5)

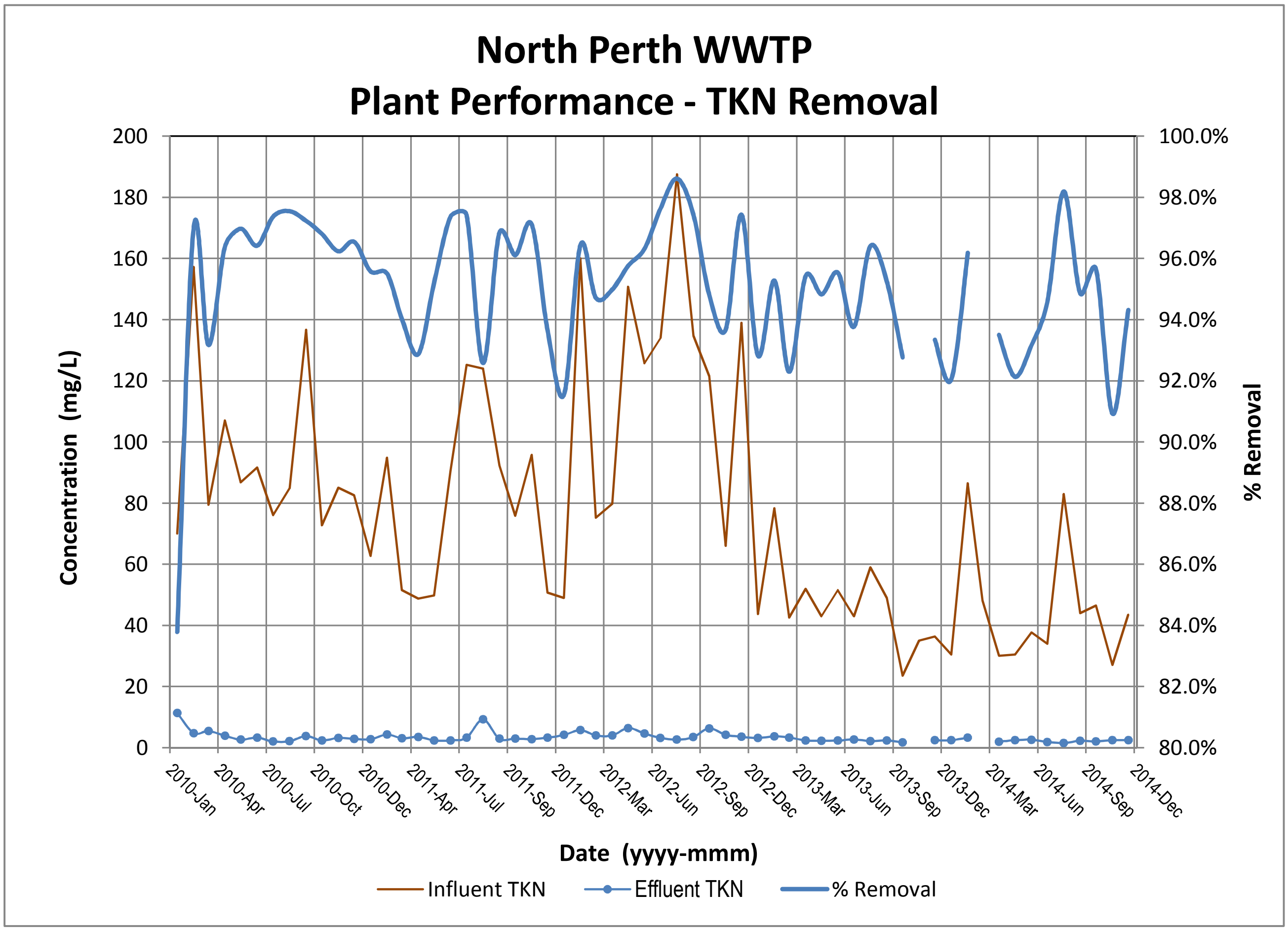

North Perth WWTP
Compliance Graph - TP Loading
Monthly Average Effluent TP (kg/day)
Date (yyyy-mmm)
Effluent TP
CofA Limit
Linear (Effluent TP)

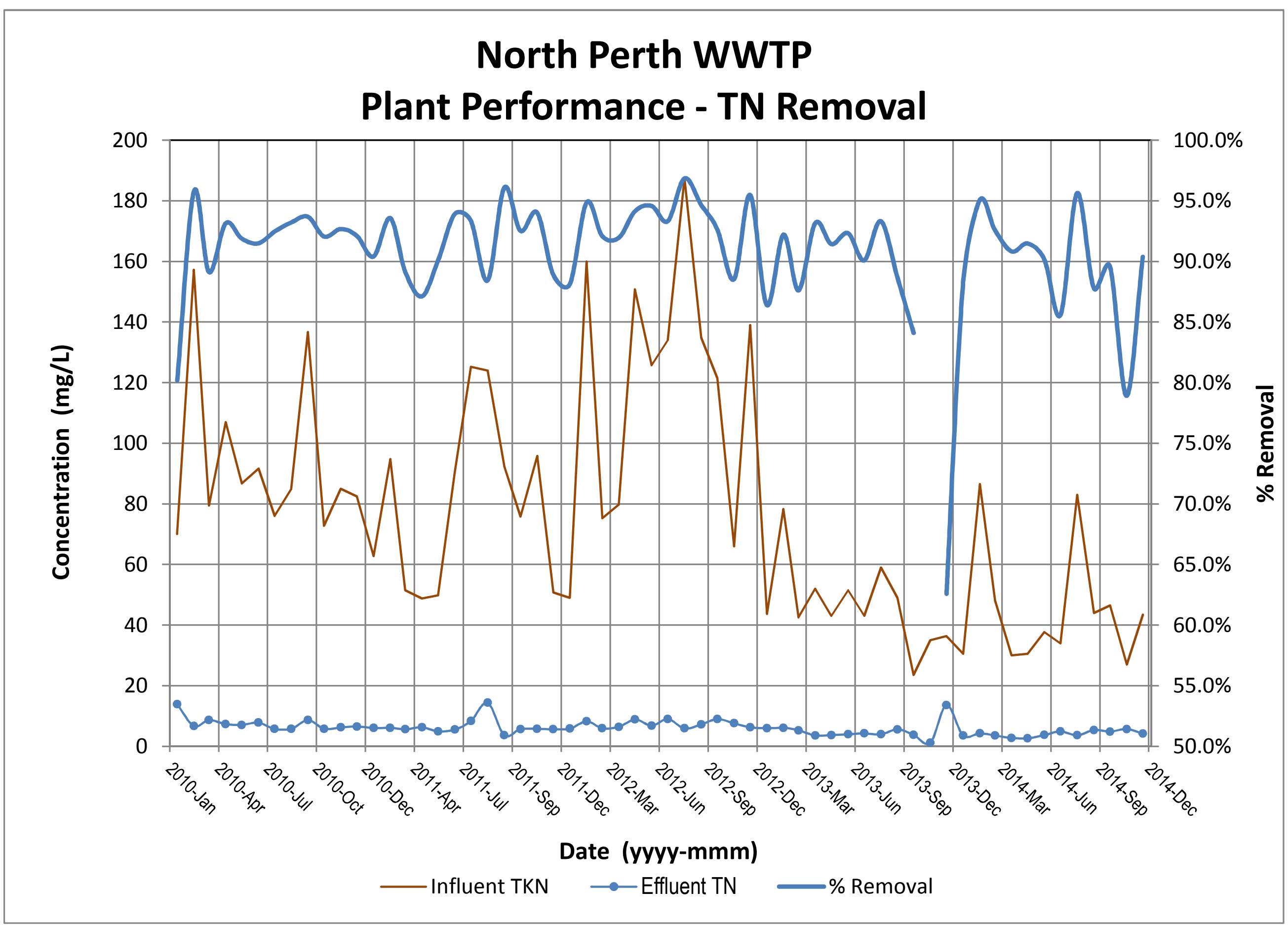

North Perth WWTP
Compliance Graph - TAN Loading
Monthly Average Effluent TAN (kg/day)
Date (yyyy-mmm)
Effluent TAN
CofA Limit
Linear (Effluent TAN)

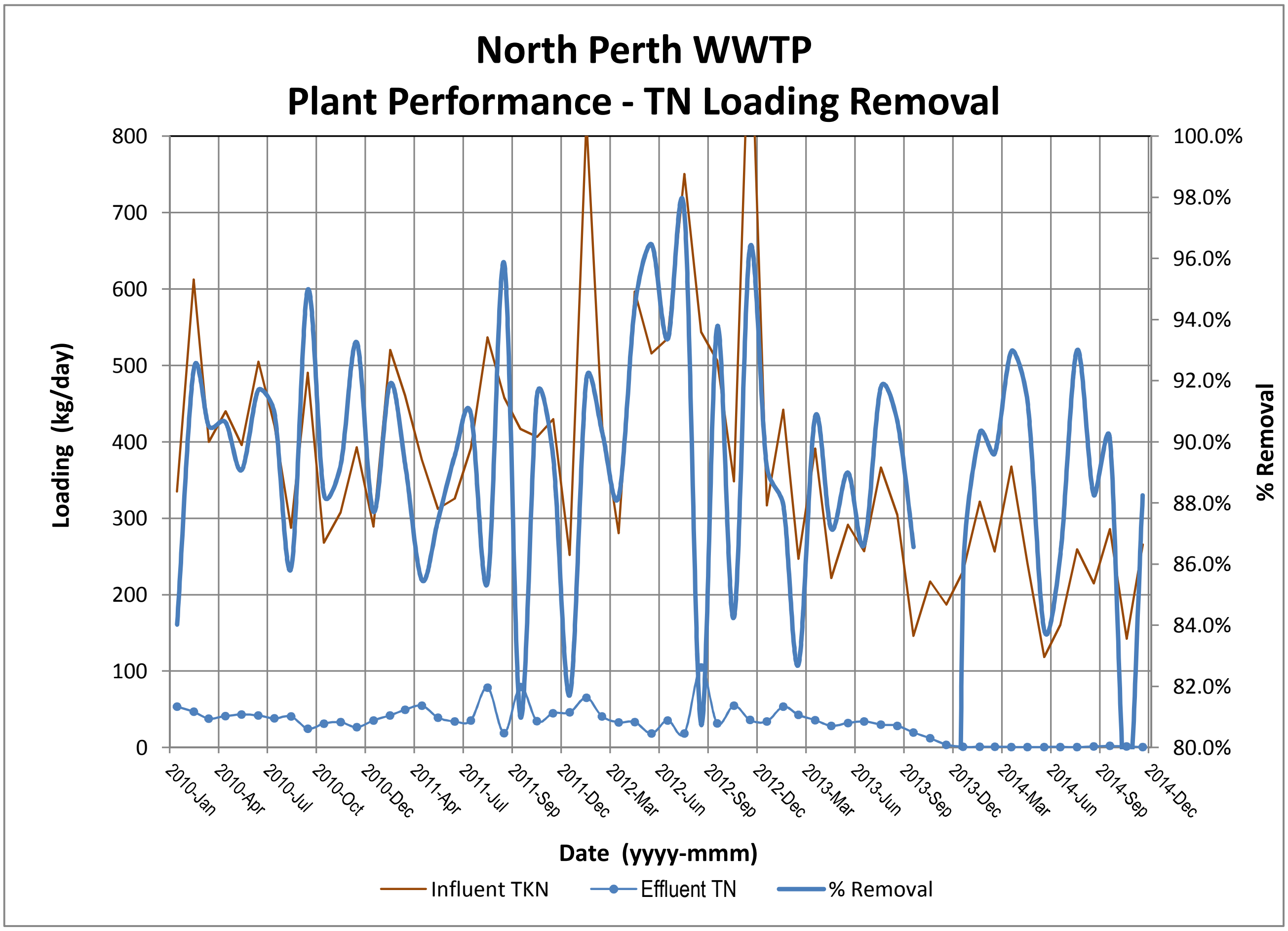

North Perth WWTP
Plant Performance - TSS Removal
Concentration (mg/L)
% Removal
Date (yyyy-mmm)
Influent TSS
Effluent TSS
% Removal

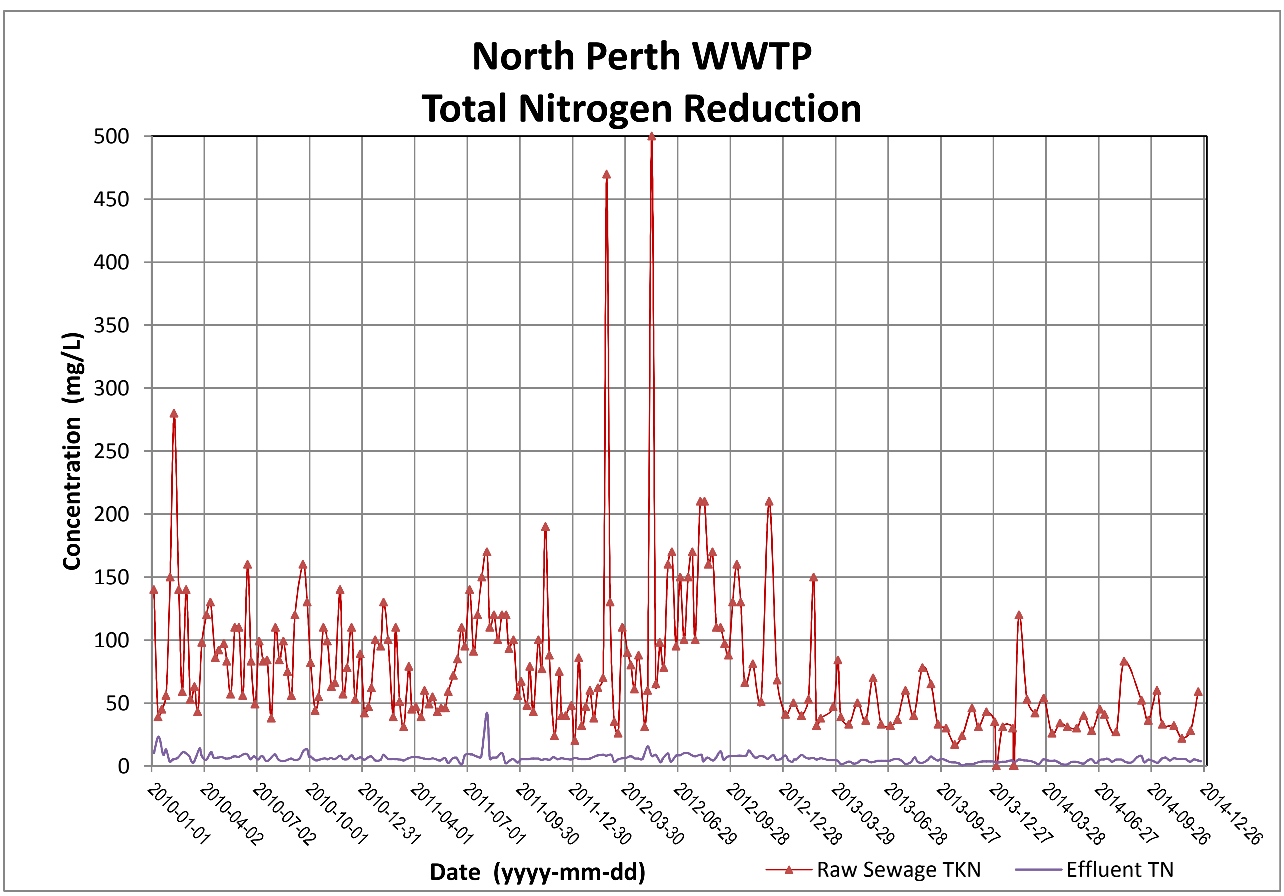

North Perth WWTP
Plant Performance - CBOD-5 Removal
Concentration (mg/L)
% Removal
Date (yyyy-mmm)
Influent CBOD-5
Effluent CBOD-5
% Removal


North Perth WWTP
Plant Performance - TP Removal
Concentration (mg/L)
% Removal
Date (yyyy-mmm)
Influent TP
Effluent TP
% Removal


North Perth WWTP
Plant Performance - TKN Removal
Concentration (mg/L)
% Removal
Date (yyyy-mmm)
Influent TKN
Effluent TKN
% Removal


North Perth WWTP
Plant Performance - TN Removal
Concentration (mg/L)
% Removal
Date (yyyy-mmm)
Influent TKN
Effluent TN
% Removal


North Perth WWTP
Plant Performance - TN Loading Removal
Loading (kg/day)
% Removal
Date (yyyy-mmm)
Influent TKN
Effluent TN
% Removal


North Perth WWTP
Total Nitrogen Reduction
Concentration (mg/L)
Date (yyyy-mm-dd)
Raw Sewage TKN
Effluent TN

APPENDIX C
BASIS OF DESIGN CALCULATIONS

MUNICIPALITY OF NORTH PERTH
WASTEWATER TREATMENT MASTER PLAN
BASIS OF DESIGN CALCULATIONS

Design Basis Comparison :

1. MOE Design Guidelines for Sewage Works, 2008
2. Metcalf and Eddy Wastewater Engineering, 2003, 4th Edition

Process Description	Operating Condition	Design Guideline References MOE	Design Guideline References Metcalf & Eddy	Channel Dimensions (m) Width	Channel Dimensions (m) Height	Selected Depth of Flow (m) Clean	Selected Depth of Flow (m) 50% Blocked	Bar Screen Dimensions (mm) Slope (°)	Bar Screen Dimensions (mm) Thickness	Bar Screen Dimensions (mm) Spacing	No. of Openings	Orifice Coef.	Orifice Flow (L/s)	No. of Channels	Clean Total Cap (L/s)	50% Blocked Total Cap (L/s)	Flow Vel (m/s)	Clean H/L (m)	50% Blocked H/L (m)
Bar Screen	HWL in Approach Channel	0.4 - 0.9 m/s	0.3 - 0.6 m/s (0.9 max)	2.1	0.7	0.43	0.68	60	12.5	50	32	0.6	847	1	847	846	1.23	0.040	0.433
Bar Screen	WWTP Rated Cap. (9.030 MLD)	0.4 - 0.9 m/s	0.3 - 0.6 m/s (0.9 max)	2.1	0.7	0.11	0.17	60	12.5	50	32	0.6	105	1	105	106	0.61	0.010	0.108
Bar Screen	Average Day Flow (2010-14)	0.4 - 0.9 m/s	0.3 - 0.6 m/s (0.9 max)	2.1	0.7	0.08	0.13	60	12.5	50	32	0.6	62	1	62	68	0.51	0.007	0.076
Bar Screen	WWTP Peak Cap. (25.5 MLD)	0.4 - 0.9 m/s	0.3 - 0.6 m/s (0.9 max)	2.1	0.7	0.21	0.34	60	12.5	50	32	0.6	295	1	295	294	0.87	0.020	0.215
Bar Screen	Peak Day Flow (2010-14)	0.4 - 0.9 m/s	0.3 - 0.6 m/s (0.9 max)	2.1	0.7	0.20	0.32	60	12.5	50	32	0.6	265	1	265	268	0.84	0.018	0.200

1. M&E recommends maximum headloss through bar screens of 150mm.

Process Description	Operating Condition	Design Guideline References MOE	Design Guideline References Metcalf & Eddy	Channel Dimensions (m) Length	Channel Dimensions (m) Width	Channel Dimensions (m) Flow Depth	Upstream Inv. (m)	Downstream Inv. (m)	Slope (%)	Wetted Per (m)	Area (sq. m.)	Hyd. Rad (m)	Manning Coef.	Hyd. Cap. (L/s)	No. of Channels	Total Cap (L/s)	Comments
Inlet Channel	HWL in Approach Channel	na	na	6.7	2.1	0.43	380.30	380.24	0.0090	2.96	0.903	0.305	0.013	2,979	1	2,979	Manning's Equation
Inlet Channel	WWTP Rated Cap. (9.030 MLD)	na	na	6.7	2.1	0.052	380.30	380.24	0.0090	2.204	0.1092	0.050	0.013	107	1	107	Manning's Equation
Inlet Channel	Average Day Flow (2010-14)	na	na	6.7	2.1	0.039	380.30	380.24	0.0090	2.178	0.0819	0.038	0.013	67	1	67	Manning's Equation
Inlet Channel	WWTP Peak Cap. (25.5 MLD)	na	na	6.7	2.1	0.10	380.30	380.24	0.0090	2.29	0.204	0.089	0.013	295	1	295	Manning's Equation
Inlet Channel	Peak Day Flow (2010-14)	na	na	6.7	2.1	0.09	380.30	380.24	0.0090	2.28	0.191	0.084	0.013	266	1	266	Manning's Equation

Process Description	Operating Condition	Design Guideline References MOE	Design Guideline References Metcalf & Eddy	Channel Dimensions (m) Length	Channel Dimensions (m) Width	Channel Dimensions (m) Depth	Upstream Inv. (m)	Downstream Inv. (m)	Slope (%)	Wetted Per (m)	Area (sq. m.)	Hyd. Rad (m)	Manning Coef.	Hyd. Cap. (L/s)	No. of Channels	Total Cap (L/s)	Comments
Grit Chamber Effluent Channel	assumed depth of flow in channel	na	na	4.5	0.9	0.3	379.76	379.73	0.0067	1.5	0.27	0.180	0.013	541	1	541	Manning's Equation
Grit Chamber Bypass Channel	assumed depth of flow in channel	na	na	5.8	1.2	0.2	380.24	380.17	0.0120	1.6	0.24	0.150	0.013	572	1	572	Manning's Equation
Grit Chamber Bypass Channel	assumed depth of flow in channel	na	na	5.8	1.2	0.2	380.17	380.10	0.0120	1.6	0.24	0.150	0.013	572	1	572	Manning's Equation

Grit Removal - Retention Time

Process Description	Operating Condition	Design Guideline References MOE	Design Guideline References Metcalf & Eddy	Chamber Dimensions (m) Length	Chamber Dimensions (m) Width	Chamber Dimensions (m) Depth	Volume (cu.m.)	Flow Rate (MLD)	HRT (min.)	Comments
Aerated Grit Chamber	WWTP Rated Cap. (9.030 MLD)	2 - 5 minutes	2 - 5 (3 min. typ)	4.615	3.600	2.500	41.5	9.030	6.6	grit chamber footprint is relatively square, ideally should have L:W ratio of 2:1 to 5:1
Aerated Grit Chamber	Average Day Flow (2010-14)	2 - 5 minutes	2 - 5 (3 min. typ)	4.615	3.600	2.500	41.5	5.997	10.0	HRT calculatons will be slightly high due to chamber benching
Aerated Grit Chamber	WWTP Peak Cap. (25.5 MLD)	2 - 5 minutes	2 - 5 (3 min. typ)	4.615	3.600	2.500	41.5	25.500	2.3	
Aerated Grit Chamber	Peak Day Flow (2010-14)	2 - 5 minutes	2 - 5 (3 min. typ)	4.615	3.600	2.500	41.5	22.853	2.6	

Grit Removal - Aeration

Process Description	Operating Condition	Design Guideline References MOE	Design Guideline References Metcalf & Eddy	Chamber Length	Calc'd Air Req'd (L/s) MOE	Calc'd Air Req'd (L/s) M & E	Ratio AOR/SOR	Req'd Air (L/s) MOE	Req'd Air (L/s) M & E	% Firm Capacity Req'd MOE	% Firm Capacity Req'd M & E	Comments
Aerated Grit Chamber	WWTP Rated Cap. (9.030 MLD)	4.7 - 12.4 L/m-s	3.3 - 8.3 L/m-s	4.615	40.2	26.8	0.4	361	241	4%	3%	
Aerated Grit Chamber	Average Day Flow (2010-14)	4.7 - 12.4 L/m-s	3.3 - 8.3 L/m-s	4.615								
Aerated Grit Chamber	WWTP Peak Cap. (25.5 MLD)	4.7 - 12.4 L/m-s	3.3 - 8.3 L/m-s	4.615								
Aerated Grit Chamber	Peak Day Flow (2010-14)	4.7 - 12.4 L/m-s	3.3 - 8.3 L/m-s	4.615								

Process Description	Operating Condition	Design Guideline References MOE	Design Guideline References Metcalf & Eddy	Comminutor Cap (cu.m./d)	Comments
Comminution	continuous under all conditions	na	na	25,500	Napier Reid Model 25A
	2nd unit starts on ligh level in channel				

Process Description	Operating Condition	Design Guideline References MOE	Design Guideline References Metcalf & Eddy	Reactor Dimensions (m) Length	Reactor Dimensions (m) Width	Reactor Dimensions (m) Depth	Volume (cu.m.)	Cells	Power (kW)	RAS Flow (% Q)	Estimated MLSS Flow (% Q)	Flow Rate (MLD)	Organic Loading (kg BOD/m3-d)	Total HRT (hours)	Firm HRT (hours)	Comments

Anoxic Reactors (2)	WWTP Rated Cap. (9.030 MLD)	F:M = 0.10 - 0.25	na	16.80	15.0	6.0	1512	2	5	96%	200%	9.030	2.09	8.0	4.0	References:
Anoxic Reactors (2)	Average Day Flow (2010-14)	HRT = 0.5-10 hrs	HRT = 1-3 hrs	16.80	15.0	6.0	1512	2	5	96%	200%	5.997	1.39	12.1	6.1	MOE Table 12-4
Anoxic Reactors (2)	WWTP Peak Cap. (25.5 MLD)	SRT = 10 - 40d	SRT = 7 - 10d	16.80	15.0	6.0	1512	2	5	96%	200%	25.500	5.90	2.8	1.4	M&E Table 8-22
Anoxic Reactors (2)	Peak Day Flow (2010-14)	Q-RAS = 25-100%	Q-RAS = 50-100%	16.80	15.0	6.0	1512	2	5	96%	200%	22.853	5.28	3.2	1.6	
		Q-IR = 100-600%	Q-IR = 100-200%													

		Design Guideline References		Reactor Dimensions (m)			Volume	No. of	MLVSS	RAS Flow	Estimated MLSS Flow	Flow Rate	F:M	Organic Loading	Total HRT	Firm HRT	Total SRT	Firm HRT	
Process Description	Operating Condition	MOE	Metcalf & Eddy	Length	Width	Depth	(cu.m.)	Cells	(mg/L)	(% Q)	(% Q)	(MLD)	kg BOD/kg MLVSS-d	(kg BOD/m3-d)	(hours)	(hours)	(days)	(days)	Comments
Aerobic Reactors (2)	WWTP Rated Cap. (9.030 MLD)	F:M = 0.10 - 0.25	na	42.75	15.0	6.0	3847.5	2	4,250	96%	200%	9.030	0.1930	0.82	20.5	10.2	5.4	2.7	References:
Aerobic Reactors (2)	Average Day Flow (2010-14)	HRT = 4-12 hrs	HRT = 4-12 hrs	42.75	15.0	6.0	3847.5	2	4,250	96%	200%	5.997	0.1282	0.54	30.8	15.4	8.2	4.1	MOE Table 12-4
Aerobic Reactors (2)	WWTP Peak Cap. (25.5 MLD)	SRT = 10 - 40d	SRT = 7 - 20d	42.75	15.0	6.0	3847.5	2	4,250	96%	200%	25.500	0.5452	2.32	7.2	3.6	1.9	1.0	M&E Table 8-22
Aerobic Reactors (2)	Peak Day Flow (2010-14)	Q-RAS = 25-100%	Q-RAS = 50-100%	42.75	15.0	6.0	3847.5	2	4,250	96%	200%	22.853	0.4886	2.08	8.1	4.0	2.1	1.1	
		Q-IR = 100-600%	Q-IR = 100-200%																

		Design Guideline References		Reactor Dimensions (m)			Volume	No. of	MLVSS	RAS Flow	Estimated MLSS Flow	Flow Rate	F:M	Organic Loading	Total HRT	Firm HRT	Total SRT	Firm HRT	
Process Description	Operating Condition	MOE	Metcalf & Eddy	Length	Width	Depth	(cu.m.)	Cells	(mg/L)	(% Q)	(% Q)	(MLD)	kg BOD/kg MLVSS-d	(kg BOD/m3-d)	(hours)	(hours)	(days)	(days)	Comments
Total Biological Process	WWTP Rated Cap. (9.030 MLD)	F:M = 0.10 - 0.25	na	59.55	15.0	6.0	5359.5	2	4,250	96%	200%	9.030	0.1386	0.59	28.5	14.2	9.4	4.7	References:
Total Biological Process	Average Day Flow (2010-14)	HRT = 5-24 hrs	HRT = 5-15 hrs	59.55	15.0	6.0	5359.5	2	4,250	96%	200%	5.997	0.0920	0.39	42.9	21.4	14.1	7.1	MOE Table 12-1, 12-4
Total Biological Process	WWTP Peak Cap. (25.5 MLD)	SRT = 10 - 40d	SRT = 7 - 10d	59.55	15.0	6.0	5359.5	2	4,250	96%	200%	25.500	0.3914	1.66	10.1	5.0	3.3	1.7	M&E Table 8-22
Total Biological Process	Peak Day Flow (2010-14)	Q-RAS = 25-100%	Q-RAS = 50-100%	59.55	15.0	6.0	5359.5	2	4,250	96%	200%	22.853	0.3507	1.49	11.3	5.6	3.7	1.9	
		Q-IR = 100-600%	Q-IR = 100-200%																
		0.31-0.72 kgBOD/m3-d	na																

		Design Guideline References		Clarifier Dimensions (m)		No. of	MLSS	RAS Flow	Flow Rate	Total SOR	Firm SOR	Total SLR	Firm SLR	
Process Description	Operating Condition	MOE	Metcalf & Eddy	Diameter	SWD	Cells	(mg/L)	(% Q)	(MLD)	m3/m2-d	m3/m2-d	kg/m2-d	kg/m2-d	Comments
Secondary Clarifiers (2)	WWTP Rated Cap. (9.030 MLD)	SOR : 40 m3/m2-d	SOR : 16-28 m3/m2-d (avg)	30.0	4.0	2.0	5,284	96%	9.030	6.4	12.8	66	132	References:
Secondary Clarifiers (2)	Average Day Flow (2010-14)	SLR : 170 kg/m2-d	SOR : 40-64 m3/m2-d (pk)	30.0	4.0	2.0	5,284	96%	5.997	4.2	8.5	44	88	MOE Table 13-1
Secondary Clarifiers (2)	WWTP Peak Cap. (25.5 MLD)		SLR : 120-192 kg/m2-d (avg	30.0	4.0	2.0	5,284	96%	25.500	18.0	36.1	187	373	M&E Table 8-7
Secondary Clarifiers (2)	Peak Day Flow (2010-14)		SLR : 216 kg/m2-d (peak)	30.0	4.0	2.0	5,284	96%	22.853	16.2	32.3	167	334	

		Design Guideline References		Filter Bed Dimensions (m)			No. of	Average Secondary TSS	Max. (95%) Secondary TSS	Flow Rate	Total Filtration Rate	Firm Filtration Rate	Total Avg. Solids Loading	Firm Avg. Solids Loading	Total Pk. Solids Loading	Firm Pk. Solids Loading	
Process Description	Operating Condition	MOE	Metcalf & Eddy	Length	Width	Depth	Cells	(mg/L)	(mg/L)	(MLD)	L/m2-s	L/m2-s	mg/m2-s	mg/m2-s	mg/m2-s	mg/m2-s	Comments
Effluent Filtration	WWTP Rated Cap. (9.030 MLD)	FR : 2.1 L/m2-s	FR : 1.3 - 4.0 L/m2-s	22.56	4.88	0.28	2	8.2	17.2	9.030	0.47	0.95	3.88	7.77	8.15	16.29	References:
Effluent Filtration	Average Day Flow (2010-14)	SLR = 51 mg/m2-s	FR : 2 L/m2-s (typ.)	22.56	4.88	0.28	2	8.2	17.2	5.997	0.32	0.63	2.58	5.16	5.41	10.82	MOE Section 15.2.4
Effluent Filtration	WWTP Peak Cap. (25.5 MLD)		SLR : na	22.56	4.88	0.28	2	8.2	17.2	25.500	1.34	2.68	10.97	21.94	23.00	46.00	M&E Table 11-8
Effluent Filtration	Peak Day Flow (2010-14)			22.56	4.88	0.28	2	8.2	17.2	22.853	1.20	2.40	9.83	19.66	20.61	41.23	Filters are classified as shallow bed
Filters rated at 4.54 m/hr (1.26 L/m2-s)																	single media filters

		Design Guideline References		Lamp	No. of	No. of	Total No. of	Firm No. of	UV Dose	Rated Flow per Lamp	Total Cap.	Firm Cap.	
Process Description	Operating Condition	MOE	Metcalf & Eddy	per Module	Modules	Banks	Lamps	Lamps	(mJ/sq.cm.)	(Lpm/lamp)	(MLD)	(MLD)	Comments
Effluent Disinfection	WWTP Peak Cap. (25.5 MLD)	min. dose 30 mJ/cm2	typ. dose 50-140 mJ.cm2	8	15	2	240	120	16	450	156	78	
(Trojan UV 3000)		for sec. effluent		8	15	2	240	120	40	200	69	35	
		min. dose 20 mJ/cm2											
		for tertiary effluent											

		Plant Operating Data 2009-2013		Rated Capacity			Pumping Capacity		
		Average	95th Percentile	Flow	TDH	No. of	Total	Firm	
Process Description	Operating Condition	(MLD)	(MLD)	(L/s)	(m)	Pumps	(MLD)	(MLD)	Comments
Effluent Pumping	WWTP Rated Cap. (9.030 MLD)	6.3	10.8	148	14.5	3	38	26	
	WWTP Peak Cap. (25.5 MLD)			148	14.5	3	38	26	

Effluent Pumps : 3 Layne and Bowler VTP each rated at 147.5 L/s at 14.5 m TDH

APPENDIX D
EVALUATION MATRICES

THE MUNICIPALITY OF NORTH PERTH
WASTEWATER TREATMENT MASTER PLAN

SCREENING-LEVEL EVALUATION MATRIX : TREATMENT PLANT PERFORMANCE

Evaluation Criteria	Screening Criteria Weighting Factor	Relative Importance of Each Category	1. Do Nothing		2. Reduce Collection System Inflow / Infiltration		3. Implement Water Conservation Measures		4. Reduce Imported Waste Flows / Loading		5. Limit Growth in Listowel and/or Atwood		6. Optimization or Upgrade Treatment Plant		7. Expand Treatment Plant Beyond Ex. Rated Capacity	
			Score	Weighted Score	Score	Weighted Score	Score	Weighted Score	Score	Weighted Score	Score	Weighted Score	Score	Weighted Score	Score	Weighted Score
Ability to Address the Problem	3.00	30%	1	3.00	2	6.00	1	3.00	3	9.00	2	6.00	3	9.00	3	9.00
Technical Feasibility	2.00	20%	3	6.00	2	4.00	2	4.00	3	6.00	1	2.00	3	6.00	2	4.00
Relative Cost-Benefit or Life Cycle Cost of Implementation	2.00	20%	1	2.00	3	6.00	3	6.00	1	2.00	2	4.00	3	6.00	2	4.00
Energy Consumption/Ecological Footprint (e.g. GHG emissions)	1.00	10%	2	2.00	3	3.00	2	2.00	2	2.00	2	2.00	2	2.00	2	2.00
Compatibility with Municipal, County, and Provincial Policies, Regulations, and Studies	1.00	10%	1	1.00	2	2.00	2	2.00	1	1.00	1	1.00	2	2.00	2	2.00
Alternative is Well-Established and Proven	1.00	10%	3	3.00	2	2.00	2	2.00	1	1.00	1	1.00	2	2.00	3	3.00
OVERALL SCORE	***10.00***	***100%***	***17.00***		***23.00***		***19.00***		***21.00***		***16.00***		***27.00***		***24.00***	

LIST OF ALTERNATIVES	Overall Score	Overall Ranking	Status
1. Do Nothing	17.00	6	carried forward
2. Reduce Collection System Inflow / Infiltration	23.00	3	carried forward
3. Implement Water Conservation Measures	19.00	5	not carried forward
4. Reduce Imported Waste Flows / Loading	21.00	4	carried forward
5. Limit Growth in Listowel and/or Atwood	16.00	7	not carried forward
6. Optimization or Upgrade Treatment Plant	27.00	1	carried forward
7. Expand Treatment Plant Beyond Ex. Rated Capacity	24.00	2	carried forward

DETAILED EVALUATION MATRIX : TREATMENT PLANT PERFORMANCE

Evaluation Criteria	Screening Criteria Weighting Factor	Relative Importance of Each Category	1. Do Nothing		2. Reduce Collection System Inflow / Infiltration		3. Implement Water Conservation Measures		4. Reduce Imported Waste Flows / Loading		5. Limit Growth in Listowel and/or Atwood		6. Optimization or Upgrade Treatment Plant		7. Expand Treatment Plant Beyond Ex. Rated Capacity	
Technical Considerations			Score	Weighted Score	Score	Weighted Score	Score	Weighted Score	Score	Weighted Score	Score	Weighted Score	Score	Weighted Score	Score	Weighted Score
Ability to Address the Problem	1.20		0.25	0.30	0.25	0.30		0.00	0.25	0.30		0.00	1	1.20	1	1.20
Technical Feasibility (constructability, geotechnical, groundwater conditions, creek crossings, existing structures and utilities)	0.70		1	0.70	0.25	0.18		0.00	1	0.70		0.00	0.5	0.35	0.75	0.53
Physical space requirements : property, site access, buildings, easements	0.60		0.25	0.15	1	0.60		0.00	1	0.60		0.00	0.75	0.45	0.75	0.45
Availability of site services (road, water, sanitary, power, communications, gas)	0.40		0.5	0.20	1	0.40		0.00	1	0.40		0.00	0.75	0.30	0.5	0.20
Operation and Maintenance Complexity	0.30		0.5	0.15	0.75	0.23		0.00	1	0.30		0.00	0.75	0.23	0.75	0.23
Alternative is Well-Established and Proven	0.30		0.25	0.08	0.5	0.15		0.00	1	0.30		0.00	1	0.30	1	0.30
Total: Technical Considerations	*3.50*	*35%*	*2.75*	*1.58*	*3.75*	*1.85*	*0*	*0.00*	*5.25*	*2.60*	*0*	*0.00*	*4.75*	*2.83*	*4.75*	*2.90*
Approvals Requirements																
MOE Approvals Process	0.70		0.75	0.53	1	0.70		0.00	1	0.70		0.00	0.75	0.53	0.5	0.35
Other Agency Approvals (MVCA, MMAH, Hydro, ESA, DFO, MNR, County, ….)	0.70		1	0.70	1	0.70		0.00	1	0.70		0.00	1	0.70	0.75	0.53
Municipal Class EA Implications	0.40		1	0.40	1	0.40		0.00	1	0.40		0.00	1	0.40	0.75	0.30
Compatibility with Official Plan, Zoning, overall development plans for the Municipality	0.40		1	0.40	1	0.40		0.00	1	0.40		0.00	1	0.40	0.75	0.30
Total: Approvals Requirements	*2.20*	*22%*	*3.75*	*2.03*	*4*	*2.20*	*0*	*0.00*	*4*	*2.20*	*0*	*0.00*	*3.75*	*2.03*	*2.75*	*1.48*
Financial Considerations																
Lifecycle Cost (Including design, construction, land acquisition, provision of utilities/services, operating cost, maintenance cost, replacement cost. Suggest use Net Present Value of these costs over 50 year life of facility)	1.00		0.25	0.25	1	1.00		0.00	0	0.00		0.00	0.75	0.75	1	1.00
Capital Cost	0.70		0.75	0.53	0.75	0.53		0.00	1	0.70		0.00	0.5	0.35	0.25	0.18
Operating and Maintenance Costs	0.50		0.5	0.25	1	0.50		0.00	0	0.00		0.00	0.5	0.25	0.5	0.25
Total: Financial Considerations	*2.20*	*22%*	*1.5*	*1.03*	*2.75*	*2.03*	*0*	*0.00*	*1*	*0.70*	*0*	*0.00*	*1.75*	*1.35*	*1.75*	*1.43*
Environmental and Social Impacts																
Energy Consumption/Ecological Footprint (e.g. GHG emissions)	0.60		0.5	0.30	0.75	0.45		0.00	0.75	0.45		0.00	0.75	0.45	0.75	0.45
Impact on natural environment such as woodlands, wildlife, terrestrial vegetation, groundwater, aquatic, air, etc.	0.40		0.5	0.20	1	0.40		0.00	1	0.40		0.00	0.75	0.30	0.75	0.30
Impact on Provincially Significant Wetlands (PSW), Environmentally Sensitive Habitats (ESH)	0.40		1	0.40	1	0.40		0.00	1	0.40		0.00	1	0.40	0.75	0.30
Public Acceptance	0.20		1	0.20	0.25	0.05		0.00	0.25	0.05		0.00	0.75	0.15	0.75	0.15
Compatibility with adjacent land uses, impact on adjacent land uses	0.20		0.75	0.15	1	0.20		0.00	1	0.20		0.00	1	0.20	1	0.20
First Nations/Aboriginal Peoples	0.20		1	0.20	1	0.20		0.00	1	0.20		0.00	1	0.20	1	0.20
Archaeological/Heritage Sites	0.10		1	0.10	1	0.10		0.00	1	0.10		0.00	1	0.10	1	0.10
Total: Environmental and Social Impacts	*2.10*	*21%*	*5.75*	*1.55*	*6*	*1.80*	*0*	*0.00*	*6*	*1.80*	*0*	*0.00*	*6.25*	*1.80*	*6*	*1.70*
OVERALL SCORE	***10.00***	***100%***	***6.18***		***7.88***		***0.00***		***7.30***		***0.00***		***8.00***		***7.50***	

LIST OF ALTERNATIVES	Overall Score	Overall Ranking
1. Do Nothing	6.18	5
2. Reduce Collection System Inflow / Infiltration	7.88	2
6. Optimization or Upgrade Treatment Plant	8.00	1
7. Expand Treatment Plant Beyond Ex. Rated Capacity	7.50	3
4. Reduce Imported Waste Flows / Loading	7.30	4

THE MUNICIPALITY OF NORTH PERTH
WASTEWATER TREATMENT MASTER PLAN

SCREENING-LEVEL EVALUATION MATRIX : PLANT OUTFALL LOCATION ALTERNATIVES

Evaluation Criteria	Screening Criteria Weighting Factor	Relative Importance of Each Category	1. Do Nothing (Maintain Ex. Outfall)		2. Direct Discharge to Chapman Drain		3. Direct Discharge to Chapman Drain with Enhanced Treatment		4. Maitland River at Alternative Location		5. Split Discharge to River and Chapman Drain		6. Effluent Reuse (i.e. "Purple Pipe")		7. Sub-surface Effluent Disposal	
			Score	Weighted Score	Score	Weighted Score	Score	Weighted Score	Score	Weighted Score	Score	Weighted Score	Score	Weighted Score	Score	Weighted Score
Ability to Address the Problem	3.00	30%	2	6.00	3	9.00	3	9.00	3	9.00	1	3.00	2	6.00	1	3.00
Technical Feasibility	2.00	20%	3	6.00	2	4.00	2	4.00	2	4.00	2	4.00	1	2.00	1	2.00
Relative Cost-Benefit or Life Cycle Cost of Implementation	2.00	20%	3	6.00	2	4.00	2	4.00	1	2.00	2	4.00	1	2.00	1	2.00
Energy Consumption/Ecological Footprint (e.g. GHG emissions)	1.00	10%	2	2.00	3	3.00	3	3.00	2	2.00	2	2.00	2	2.00	2	2.00
Compatibility with Municipal, County, and Provincial Policies, Regulations, and Studies	1.00	10%	3	3.00	1	1.00	2	2.00	2	2.00	1	1.00	1	1.00	1	1.00
Alternative is Well-Established and Proven	1.00	10%	3	3.00	1	1.00	1	1.00	2	2.00	3	3.00	1	1.00	1	1.00
OVERALL SCORE	***10.00***	***100%***	***26.00***		***22.00***		***23.00***		***21.00***		***17.00***		***14.00***		***11.00***	

LIST OF ALTERNATIVES	Overall Score	Overall Ranking	Status
1. Do Nothing (Maintain Ex. Outfall)	26.00	1	carried forward
2. Direct Discharge to Chapman Drain	22.00	3	carried forward
3. Direct Discharge to Chapman Drain with Enhanced Treatment	23.00	2	carried forward
4. Maitland River at Alternative Location	21.00	4	carried forward
5. Split Discharge to River and Chapman Drain	17.00	5	not carried forward
6. Effluent Reuse (i.e. "Purple Pipe")	14.00	6	not carried forward
7. Sub-surface Effluent Disposal	11.00	7	not carried forward

DETAILED EVALUATION MATRIX : PLANT OUTFALL LOCATION ALTERNATIVES

Evaluation Criteria	Screening Criteria Weighting Factor	Relative Importance of Each Category	1. Do Nothing (Maintain Ex. Outfall)		2. Direct Discharge to Chapman Drain		3. Direct Discharge to Chapman Drain with Enhanced Treatment		4. Maitland River at Alternative Location		5. Split Discharge to River and Chapman Drain		6. Effluent Reuse (i.e. "Purple Pipe")		7. Sub-surface Effluent Disposal	
Technical Considerations			Score	Weighted Score	Score	Weighted Score	Score	Weighted Score	Score	Weighted Score		Weighted Score		Weighted Score	Score	Weighted Score
Ability to Address the Problem	1.20		0.5	0.60	1	1.20	1	1.20	1	1.20		0.00		0.00		0.00
Technical Feasibility (constructability, geotechnical, groundwater conditions, creek crossings, existing structures and utilities)	0.70		1	0.70	0.75	0.53	0.5	0.35	0.75	0.53		0.00		0.00		0.00
Physical space requirements : property, site access, buildings, easements	0.60		1	0.60	0.75	0.45	0.5	0.30	0.5	0.30		0.00		0.00		0.00
Availability of site services (road, water, sanitary, power, communications, gas)	0.40		1	0.40	1	0.40	0.75	0.30	0.25	0.10		0.00		0.00		0.00
Operation and Maintenance Complexity	0.30		0.75	0.23	0.75	0.23	0.5	0.15	0.5	0.15		0.00		0.00		0.00
Alternative is Well-Established and Proven	0.30		1	0.30	0.5	0.15	0.5	0.15	0.75	0.23		0.00		0.00		0.00
Total: Technical Considerations	*3.50*	*35%*	*5.25*	*2.83*	*4.75*	*2.95*	*3.75*	*2.45*	*3.75*	*2.50*	*0*	*0.00*	*0*	*0.00*	*0*	*0.00*
Approvals Requirements																
MOE Approvals Process	0.70		1	0.70	0.25	0.18	0.5	0.35	0.75	0.53		0.00		0.00		0.00
Other Agency Approvals (MVCA, MMAH, Hydro, ESA, DFO, MNR, County, ….)	0.70		1	0.70	0.5	0.35	0.5	0.35	1	0.70		0.00		0.00		0.00
Municipal Class EA Implications	0.40		1	0.40	0.25	0.10	0.25	0.10	1	0.40		0.00		0.00		0.00
Compatibility with Official Plan, Zoning, overall development plans for the Municipality	0.40		1	0.40	0.75	0.30	0.75	0.30	0.5	0.20		0.00		0.00		0.00
Total: Approvals Requirements	*2.20*	*22%*	*4*	*2.20*	*1.75*	*0.93*	*2*	*1.10*	*3.25*	*1.83*	*0*	*0.00*	*0*	*0.00*	*0*	*0.00*
Financial Considerations																
Lifecycle Cost (Including design, construction, land acquisition, provision of utilities/services, operating cost, maintenance cost, replacement cost. Suggest use Net Present Value of these costs over 50 year life of facility)	1.00		1	1.00	0.75	0.75	0.75	0.75	0.75	0.75		0.00		0.00		0.00
Capital Cost	0.70		1	0.70	0.75	0.53	0.5	0.35	0.5	0.35		0.00		0.00		0.00
Operating and Maintenance Costs	0.50		0.75	0.38	1	0.50	0.75	0.38	0.5	0.25		0.00		0.00		0.00
Total: Financial Considerations	*2.20*	*22%*	*2.75*	*2.08*	*2.5*	*1.78*	*2*	*1.48*	*1.75*	*1.35*	*0*	*0.00*	*0*	*0.00*	*0*	*0.00*
Environmental and Social Impacts																
Energy Consumption/Ecological Footprint (e.g. GHG emissions)	0.60		0.75	0.45	1	0.60	1	0.60	0.5	0.30		0.00		0.00		0.00
Impact on natural environment such as woodlands, wildlife, terrestrial vegetation, groundwater, aquatic, air, etc.	0.40		0.75	0.30	1	0.40	1	0.40	0.5	0.20		0.00		0.00		0.00
Impact on Provincially Significant Wetlands (PSW), Environmentally Sensitive Habitats (ESH)	0.40		1	0.40	1	0.40	1	0.40	0.75	0.30		0.00		0.00		0.00
Public Acceptance	0.20		1	0.20	0.25	0.05	0.75	0.15	0.25	0.05		0.00		0.00		0.00
Compatibility with adjacent land uses, impact on adjacent land uses	0.20		1	0.20	0.75	0.15	0.75	0.15	0.75	0.15		0.00		0.00		0.00
First Nations/Aboriginal Peoples	0.20		1	0.20	1	0.20	1	0.20	0.75	0.15		0.00		0.00		0.00
Archaeological/Heritage Sites	0.10		1	0.10	1	0.10	1	0.10	0.75	0.08		0.00		0.00		0.00
Total: Environmental and Social Impacts	*2.10*	*21%*	*6.5*	*1.85*	*6*	*1.90*	*6.5*	*2.00*	*4.25*	*1.23*	*0*	*0.00*	*0*	*0.00*	*0*	*0.00*
OVERALL SCORE	***10.00***	***100%***	***8.95***		***7.55***		***7.03***		***6.90***		***0.00***		***0.00***		***0.00***	

LIST OF ALTERNATIVES	Overall Score	Overall Ranking
1. Do Nothing (Maintain Ex. Outfall)	8.95	1
2. Direct Discharge to Chapman Drain	7.55	2
3. Direct Discharge to Chapman Drain with Enhanced Treatment	7.03	3
4. Maitland River at Alternative Location	6.90	4

THE MUNICIPALITY OF NORTH PERTH
WASTEWATER TREATMENT MASTER PLAN

SCREENING-LEVEL EVALUATION MATRIX : STATUS OF LAGOONS

Evaluation Criteria	Screening Criteria Weighting Factor	Relative Importance of Each Category	1. Do Nothing		2. Scenario A		3. Scenario B		4. Scenario C		5. Scenario D	
			Score	Weighted Score	Score	Weighted Score	Score	Weighted Score	Score	Weighted Score	Score	Weighted Score
Ability to Address the Problem	3.00	30%	1	3.00	2	6.00	3	9.00	2	6.00	3	9.00
Technical Feasibility	2.00	20%	3	6.00	3	6.00	3	6.00	1	2.00	2	4.00
Relative Cost-Benefit or Life Cycle Cost of Implementation	2.00	20%	3	6.00	3	6.00	2	4.00	3	6.00	3	6.00
Energy Consumption/Ecological Footprint (e.g. GHG emissions)	1.00	10%	2	2.00	2	2.00	1	1.00	3	3.00	2	2.00
Compatibility with Municipal, County, and Provincial Policies, Regulations, and Studies	1.00	10%	1	1.00	3	3.00	2	2.00	2	2.00	3	3.00
Alternative is Well-Established and Proven	1.00	10%	3	3.00	3	3.00	3	3.00	2	2.00	3	3.00
OVERALL SCORE	***10.00***	***100%***	***21.00***		***26.00***		***25.00***		***21.00***		***27.00***	

LIST OF ALTERNATIVES	Overall Score	Overall Ranking	Status
1. Do Nothing	21.00	4	Carried forward
2. Scenario A	26.00	2	Carried forward
3. Scenario B	25.00	3	Carried forward
4. Scenario C	21.00	4	Not carried forward
5. Scenario D	27.00	1	Carried forward

DETAILED EVALUATION MATRIX : STATUS OF LAGOONS

Evaluation Criteria	Screening Criteria Weighting Factor	Relative Importance of Each Category	1. Do Nothing		2. Scenario A		3. Scenario B		4. Scenario C		5. Scenario D	
Technical Considerations			Score	Weighted Score	Score	Weighted Score	Score	Weighted Score	Score	Weighted Score	Score	Weighted Score
Ability to Address the Problem	1.20		0	0.00	0.75	0.90	1	1.20		0.00	1	1.20
Technical Feasibility (constructability, geotechnical, groundwater conditions, creek crossings, existing structures and utilities)	0.70		1	0.70	1	0.70	0.75	0.53		0.00	1	0.70
Physical space requirements : property, site access, buildings, easements	0.60		0.5	0.30	0.75	0.45	1	0.60		0.00	1	0.60
Availability of site services (road, water, sanitary, power, communications, gas)	0.20		1	0.20	1	0.20	1	0.20		0.00	1	0.20
Operation and Maintenance Complexity	0.30		0.5	0.15	1	0.30	0.5	0.15		0.00	0.5	0.15
Alternative is Well-Established and Proven	0.90		1	0.90	1	0.90	1	0.90		0.00	0.75	0.68
Total: Technical Considerations	*3.90*	*39%*	*4*	*2.25*	*5.5*	*3.45*	*5.25*	*3.58*	*0*	*0.00*	*5.25*	*3.53*
Approvals Requirements												
MOE Approvals Process	0.70		0.5	0.35	0.75	0.53	0.5	0.35		0.00	0.5	0.35
Other Agency Approvals (MVCA, MMAH, Hydro, ESA, DFO, MNR, County, ….)	0.00			0.00		0.00		0.00		0.00		0.00
Municipal Class EA Implications	0.40		1	0.40	1	0.40	0.75	0.30		0.00	0.75	0.30
Compatibility with Official Plan, Zoning, overall development plans for the Municipality	0.40		1	0.40	0.5	0.20	1	0.40		0.00	1	0.40
Total: Approvals Requirements	*1.50*	*15%*	*2.5*	*1.15*	*2.25*	*1.13*	*2.25*	*1.05*	*0*	*0.00*	*2.25*	*1.05*
Financial Considerations												
Lifecycle Cost (Including design, construction, land acquisition, provision of utilities/services, operating cost, maintenance cost, replacement cost. Suggest use Net Present Value of these costs over 50 year life of facility)	1.00		0.75	0.75	0.75	0.75	0.5	0.50		0.00	0.75	0.75
Capital Cost	1.00		1	1.00	0.5	0.50	0.75	0.75		0.00	0.75	0.75
Operating and Maintenance Costs	0.50		0.75	0.38	1	0.50	0.25	0.13		0.00	1	0.50
Total: Financial Considerations	*2.50*	*25%*	*2.5*	*2.13*	*2.25*	*1.75*	*1.5*	*1.38*	*0*	*0.00*	*2.5*	*2.00*
Environmental and Social Impacts												
Energy Consumption/Ecological Footprint (e.g. GHG emissions)	0.90		1	0.90	1	0.90	0.75	0.68		0.00	0.75	0.68
Impact on natural environment such as woodlands, wildlife, terrestrial vegetation, groundwater, aquatic, air, etc.	0.80		0.25	0.20	0.5	0.40	0.75	0.60		0.00	1	0.80
Impact on Provincially Significant Wetlands (PSW), Environmentally Sensitive Habitats (ESH)	0.00			0.00		0.00		0.00		0.00		0.00
Public Acceptance	0.40		1	0.40	1	0.40	1	0.40		0.00	1	0.40
Compatibility with adjacent land uses, impact on adjacent land uses	0.00			0.00		0.00		0.00		0.00		0.00
First Nations/Aboriginal Peoples	0.00			0.00		0.00		0.00		0.00		0.00
Archaeological/Heritage Sites	0.00			0.00		0.00		0.00		0.00		0.00
Total: Environmental and Social Impacts	*2.10*	*21%*	*2.25*	*1.50*	*2.5*	*1.70*	*2.5*	*1.68*	*0*	*0.00*	*2.75*	*1.88*
OVERALL SCORE	***10.00***	***100%***	***7.03***		***8.03***		***7.68***		***0.00***		***8.45***	

LIST OF ALTERNATIVES	Overall Score	Overall Ranking
1. Do Nothing	7.03	4
2. Scenario A	8.03	2
3. Scenario B	7.68	3
5. Scenario D	8.45	1

THE MUNICIPALITY OF NORTH PERTH
WASTEWATER TREATMENT MASTER PLAN

SCREENING-LEVEL EVALUATION MATRIX : SLUDGE MANAGEMENT

Evaluation Criteria	Screening Criteria Weighting Factor	Relative Importance of Each Category	1. Do Nothing		2. Rehabilitate Existing Sludge Management System		3. New, Higher Efficiency Aerobic Digester		4. Sludge Thickening with Centrifuge		5. Sludge Thickening with Gravity Belt Filter or Drum		6. Plant Operated Alkaline Stabilization		7. Third Party Operated Alkaline Stabilization	
			Score	Weighted Score	Score	Weighted Score	Score	Weighted Score	Score	Weighted Score	Score	Weighted Score	Score	Weighted Score	Score	Weighted Score
Ability to Address the Problem	3.00	30%	1	3	1	3	3	9	3	9	3	9	3	9	3	9
Technical Feasibility	2.00	20%	3	6	3	6	3	6	2	4	2	4	2	4	3	6
Relative Cost-Benefit or Life Cycle Cost of Implementation	2.00	20%	3	6	1	2	2	4	2	4	2	4	2	4	3	6
Energy Consumption/Ecological Footprint (e.g. GHG emissions)	1.00	10%	3	3	3	3	2	2	1	1	2	2	1	1	3	3
Compatibility with Municipal, County, and Provincial Policies, Regulations, and Studies	1.00	10%	1	1	1	1	3	3	3	3	3	3	2	2	2	2
Alternative is Well-Established and Proven	1.00	10%	1	1	2	2	3	3	3	3	3	3	2	2	3	3
OVERALL SCORE	***10.00***	***100%***	***20.00***		***17.00***		***27.00***		***24.00***		***25.00***		***22.00***		***29.00***	

LIST OF ALTERNATIVES	Overall Score	Overall Ranking	Status
1. Do Nothing	20.00	6	Carried forward
3. New, Higher Efficiency Aerobic Digester	27.00	2	Not carried forward
4. Sludge Thickening with Centrifuge	24.00	4	Carried forward
5. Sludge Thickening with Gravity Belt Filter or Drum	25.00	3	Carried forward
6. Plant Operated Alkaline Stabilization	22.00	5	Carried forward
7. Third Party Operated Alkaline Stabilization	29.00	1	Carried forward

DETAILED EVALUATION MATRIX : SLUDGE MANAGEMENT

Evaluation Criteria	Screening Criteria Weighting Factor	Relative Importance of Each Category	1. Do Nothing		2. Rehabilitate Existing Sludge Management System		3. New, Higher Efficiency Aerobic Digester		4. Sludge Thickening with Centrifuge		5. Sludge Thickening with Gravity Belt Filter or Drum		6. Plant Operated Alkaline Stabilization		7. Third Party Operated Alkaline Stabilization	
Technical Considerations			Score	Weighted Score	Score	Weighted Score	Score	Weighted Score	Score	Weighted Score	Score	Weighted Score	Score	Weighted Score	Score	Weighted Score
Ability to Address the Problem	1.30		0	0.00		0.00	1	1.30	0.5	0.65	0.5	0.65	1	1.30	1	1.30
Technical Feasibility (constructability, geotechnical, groundwater conditions, creek crossings, existing structures and utilities)	0.70		1	0.70		0.00	1	0.70	0.75	0.53	0.75	0.53	0.75	0.53	1	0.70
Physical space requirements : property, site access, buildings, easements	0.60		1	0.60		0.00	0.5	0.30	1	0.60	1	0.60	0.75	0.45	1	0.60
Availability of site services (road, water, sanitary, power, communications, gas)	0.10		1	0.10		0.00	0.75	0.08	0.75	0.08	0.75	0.08	0.75	0.08	1	0.10
Operation and Maintenance Complexity	0.30		0.5	0.15		0.00	0.75	0.23	0.25	0.08	0.5	0.15	0.25	0.08	1	0.30
Alternative is Well-Established and Proven	0.90		0.5	0.45		0.00	1	0.90	1	0.90	1	0.90	0.75	0.68	0.75	0.68
Total: Technical Considerations	*3.90*	*39%*	*4*	*2.00*	*0*	*0.00*	*5*	*3.50*	*4.25*	*2.83*	*4.5*	*2.90*	*4.25*	*3.10*	*5.75*	*3.68*
Approvals Requirements																
MOE Approvals Process	0.70		0	0.00		0.00	1	0.70	1	0.70	1	0.70	0.75	0.53	0.75	0.53
Other Agency Approvals (MVCA, MMAH, Hydro, ESA, DFO, MNR, County, ….)	0.00			0.00		0.00		0.00		0.00		0.00		0.00		0.00
Municipal Class EA Implications	0.40		1	0.40		0.00	1	0.40	1	0.40	1	0.40	0.75	0.30	0.75	0.30
Compatibility with Official Plan, Zoning, overall development plans for the Municipality	0.40			0.00		0.00		0.00		0.00		0.00		0.00		0.00
Total: Approvals Requirements	*1.50*	*15%*	*1*	*0.40*	*0*	*0.00*	*2*	*1.10*	*2*	*1.10*	*2*	*1.10*	*1.5*	*0.83*	*1.5*	*0.83*
Financial Considerations																
Lifecycle Cost (Including design, construction, land acquisition, provision of utilities/services, operating cost, maintenance cost, replacement cost. Suggest use Net Present Value of these costs over 50 year life of facility)	1.00		0.75	0.75		0.00	0.75	0.75	0.5	0.50	0.5	0.50	0.25	0.25	1	1.00
Capital Cost	0.75		1	0.75		0.00	0.5	0.38	0.75	0.56	0.75	0.56	0.25	0.19	1	0.75
Operating and Maintenance Costs	0.75		0.5	0.38		0.00	0.5	0.38	0.25	0.19	0.5	0.38	0.75	0.56	0.75	0.56
Total: Financial Considerations	*2.50*	*25%*	*2.25*	*1.88*	*0*	*0.00*	*1.75*	*1.50*	*1.5*	*1.25*	*1.75*	*1.44*	*1.25*	*1.00*	*2.75*	*2.31*
Environmental and Social Impacts																
Energy Consumption/Ecological Footprint (e.g. GHG emissions)	0.90		1	0.90		0.00	0.25	0.23	0.25	0.23	0.5	0.45	0.5	0.45	1	0.90
Impact on natural environment such as woodlands, wildlife, terrestrial vegetation, groundwater, aquatic, air, etc.	0.80		1	0.80		0.00	1	0.80	1	0.80	1	0.80	1	0.80	1	0.80
Impact on Provincially Significant Wetlands (PSW), Environmentally Sensitive Habitats (ESH)	0.00			0.00		0.00		0.00		0.00		0.00		0.00		0.00
Public Acceptance	0.40		0.75	0.30		0.00	1	0.40	1	0.40	1	0.40	0.75	0.30	0.75	0.30
Compatibility with adjacent land uses, impact on adjacent land uses	0.00			0.00		0.00		0.00		0.00		0.00		0.00		0.00
First Nations/Aboriginal Peoples	0.00			0.00		0.00		0.00		0.00		0.00		0.00		0.00
Archaeological/Heritage Sites	0.00			0.00		0.00		0.00		0.00		0.00		0.00		0.00
Total: Environmental and Social Impacts	*2.10*	*21%*	*2.75*	*2.00*	*0*	*0.00*	*2.25*	*1.43*	*2.25*	*1.43*	*2.5*	*1.65*	*2.25*	*1.55*	*2.75*	*2.00*
OVERALL SCORE	***10.00***	***100%***	***6.28***		***0.00***		***7.53***		***6.60***		***7.09***		***6.48***		***8.81***	

LIST OF ALTERNATIVES	Overall Score	Overall Ranking
1. Do Nothing	6.28	6
3. New, Higher Efficiency Aerobic Digester	7.53	2
4. Sludge Thickening with Centrifuge	6.60	4
5. Sludge Thickening with Gravity Belt Filter or Drum	7.09	3
6. Plant Operated Alkaline Stabilization	6.48	5
7. Third Party Operated Alkaline Stabilization	8.81	1

THE MUNICIPALITY OF NORTH PERTH
WASTEWATER TREATMENT MASTER PLAN

SCREENING-LEVEL EVALUATION MATRIX : STANDBY POWER SUPPLY

Evaluation Criteria	Screening Criteria Weighting Factor	Relative Importance of Each Category	1. Do Nothing (No Backup Power)		2. Implement Operational Adaptations		3. Standby Power for Critical Equipment		4. Standby Power for All Plant Loads		5. Stand-by power for SCADA only	
			Score	Weighted Score	Score	Weighted Score	Score	Weighted Score	Score	Weighted Score	Score	Weighted Score
Ability to Address the Problem	3.00	30%	1	3.00	2	6.00	2	6.00	3	9.00	1	3.00
Technical Feasibility	2.00	20%	3	6.00	2	4.00	3	6.00	3	6.00	3	6.00
Relative Cost-Benefit or Life Cycle Cost of Implementation	2.00	20%	1	2.00	1	2.00	3	6.00	2	4.00	2	4.00
Energy Consumption/Ecological Footprint (e.g. GHG emissions)	1.00	10%	2	2.00	2	2.00	2	2.00	3	3.00	2	2.00
Compatibility with Municipal, County, and Provincial Policies, Regulations, and Studies	1.00	10%	2	2.00	2	2.00	2	2.00	3	3.00	3	3.00
Alternative is Well-Established and Proven	1.00	10%	1	1.00	2	2.00	2	2.00	3	3.00	2	2.00
OVERALL SCORE	***10.00***	***100%***	***16.00***		***18.00***		***24.00***		***28.00***		***20.00***	

LIST OF ALTERNATIVES	Overall Score	Overall Ranking	Status
1. Do Nothing(No Backup Power)	16.00	5	carried forward
2. Implement Operational Adaptations	18.00	4	not carried forward
3. Standby Power for Critical Equipment	24.00	2	carried forward
4. Standby Power for All Plant Loads	28.00	1	carried forward
5. Stand-by power for SCADA only	20.00	3	not carried forward

DETAILED EVALUATION MATRIX : STANDBY POWER SUPPLY

Evaluation Criteria	Screening Criteria Weighting Factor	Relative Importance of Each Category	1. Do Nothing (No Backup Power)		2. Implement Operational Adaptations		3. Standby Power for Critical Equipment		4. Standby Power for All Plant Loads		5. Stand-by power for SCADA only	
Technical Considerations			Score	Weighted Score	Score	Weighted Score	Score	Weighted Score	Score	Weighted Score	Score	Weighted Score
Ability to Address the Problem	1.60		0.25	0.40		0.00	0.75	1.20	1	1.60		0.00
Technical Feasibility (constructability, geotechnical, groundwater conditions, creek crossings, existing structures and utilities)	1.00		1	1.00		0.00	0.75	0.75	1	1.00		0.00
Physical space requirements : property, site access, buildings, easements	0.60		1	0.60		0.00	1	0.60	1	0.60		0.00
Availability of site services (road, water, sanitary, power, communications, gas)	0.40		1	0.40		0.00	1	0.40	0.75	0.30		0.00
Operation and Maintenance Complexity	0.30		0.25	0.08		0.00	0.75	0.23	0.75	0.23		0.00
Alternative is Well-Established and Proven	0.30		0.25	0.08		0.00	1	0.30	1	0.30		0.00
Total: Technical Considerations	*4.20*	*42%*	*3.75*	*2.55*	*0*	*0.00*	*5.25*	*3.48*	*5.5*	*4.03*	*0*	*0.00*
Approvals Requirements												
MOE Approvals Process	0.90		0.75	0.68		0.00	0.75	0.68	0.5	0.45		0.00
Other Agency Approvals (MVCA, MMAH, Hydro, ESA, DFO, MNR, County, ….)	0.00			0.00		0.00		0.00		0.00		0.00
Municipal Class EA Implications	0.20		1	0.20		0.00	1	0.20	1	0.20		0.00
Compatibility with Official Plan, Zoning, overall development plans for the Municipality	0.40		0.75	0.30		0.00	1	0.40	1	0.40		0.00
Total: Approvals Requirements	*1.50*	*15%*	*2.5*	*1.18*	*0*	*0.00*	*2.75*	*1.28*	*2.5*	*1.05*	*0*	*0.00*
Financial Considerations												
Lifecycle Cost (Including design, construction, land acquisition, provision of utilities/services, operating cost, maintenance cost, replacement cost. Suggest use Net Present Value of these costs over 50 year life of facility)	1.00		1	1.00		0.00	0.75	0.75	0.75	0.75		0.00
Capital Cost	0.80		1	0.80		0.00	0.5	0.40	0.5	0.40		0.00
Operating and Maintenance Costs	0.50		0.5	0.25		0.00	0.75	0.38	1	0.50		0.00
Total: Financial Considerations	*2.30*	*23%*	*2.5*	*2.05*	*0*	*0.00*	*2*	*1.53*	*2.25*	*1.65*	*0*	*0.00*
Environmental and Social Impacts												
Energy Consumption/Ecological Footprint (e.g. GHG emissions)	0.80		0.75	0.60		0.00	1	0.80	1	0.80		0.00
Impact on natural environment such as woodlands, wildlife, terrestrial vegetation, groundwater, aquatic, air, etc.	0.70		0.25	0.18		0.00	0.5	0.35	1	0.70		0.00
Impact on Provincially Significant Wetlands (PSW), Environmentally Sensitive Habitats (ESH)	0.00			0.00		0.00		0.00		0.00		0.00
Public Acceptance	0.50		0.75	0.38		0.00	1	0.50	1	0.50		0.00
Compatibility with adjacent land uses, impact on adjacent land uses	0.00			0.00		0.00		0.00		0.00		0.00
First Nations/Aboriginal Peoples	0.00			0.00		0.00		0.00		0.00		0.00
Archaeological/Heritage Sites	0.00			0.00		0.00		0.00		0.00		0.00
Total: Environmental and Social Impacts	*2.00*	*20%*	*1.75*	*1.15*	*0*	*0.00*	*2.5*	*1.65*	*3*	*2.00*	*0*	*0.00*
OVERALL SCORE	***10.00***	***100%***	***6.93***		***0.00***		***7.93***		***8.73***		***0.00***	

LIST OF ALTERNATIVES	Overall Score	Overall Ranking
1. Do Nothing(No Backup Power)	6.93	3
3. Standby Power for Critical Equipment	7.93	2
4. Standby Power for All Plant Loads	8.73	1

THE MUNICIPALITY OF NORTH PERTH
WASTEWATER TREATMENT MASTER PLAN

SCREENING-LEVEL EVALUATION MATRIX : SEPTAGE RECEIVING STATION

Evaluation Criteria	Screening Criteria Weighting Factor	Relative Importance of Each Category	1. Do Nothing (Maintain Ex. System)		2. Optimize Station Operations		3. Control Imported Waste Stream Quantity and Quality		4. Increase Station Storage Capacity		5. Provide Preliminary Treatment	
			Score	Weighted Score	Score	Weighted Score	Score	Weighted Score	Score	Weighted Score	Score	Weighted Score
Ability to Address the Problem	3.00	30%	1	3.00	3	9.00	2	6.00	2	6.00	2	6.00
Technical Feasibility	2.00	20%	3	6.00	2	4.00	2	4.00	2	4.00	1	2.00
Relative Cost-Benefit or Life Cycle Cost of Implementation	2.00	20%	2	4.00	3	6.00	3	6.00	2	4.00	1	2.00
Energy Consumption/Ecological Footprint (e.g. GHG emissions)	1.00	10%	2	2.00	2	2.00	3	3.00	2	2.00	1	1.00
Compatibility with Municipal, County, and Provincial Policies, Regulations, and Studies	1.00	10%	1	1.00	2	2.00	1	1.00	2	2.00	2	2.00
Alternative is Well-Established and Proven	1.00	10%	2	2.00	3	3.00	1	1.00	3	3.00	1	1.00
OVERALL SCORE	***10.00***	***100%***	***18.00***		***26.00***		***21.00***		***21.00***		***14.00***	

LIST OF ALTERNATIVES	Overall Score	Overall Ranking	Status
1. Do Nothing(Maintain Ex. System)	18.00	4	carried forward
2. Optimize Station Operations	26.00	1	carried forward
3. Control Imported Waste Stream Quantity and Quality	21.00	2	carried forward
4. Increase Station Storage Capacity	21.00	2	carried forward
5. Provide Preliminary Treatment	14.00	5	not carried forward

DETAILED EVALUATION MATRIX : SEPTAGE RECEIVING STATION

Evaluation Criteria	Screening Criteria Weighting Factor	Relative Importance of Each Category	1. Do Nothing (Maintain Ex. System)		2. Optimize Station Operations		3. Control Imported Waste Stream Quantity and Quality		4. Increase Station Storage Capacity		5. Provide Preliminary Treatment	
Technical Considerations			Score	Weighted Score	Score	Weighted Score	Score	Weighted Score	Score	Weighted Score	Score	Weighted Score
Ability to Address the Problem	1.40		0.25	0.35	1	1.40	0.5	0.70	0.75	1.05		0.00
Technical Feasibility (constructability, geotechnical, groundwater conditions, creek crossings, existing structures and utilities)	0.70		1	0.70	1	0.70	0.5	0.35	1	0.70		0.00
Physical space requirements : property, site access, buildings, easements	0.60		1	0.60	1	0.60	1	0.60	1	0.60		0.00
Availability of site services (road, water, sanitary, power, communications, gas)	0.40		1	0.40	0.75	0.30	1	0.40	0.75	0.30		0.00
Operation and Maintenance Complexity	0.30		0.75	0.23	0.75	0.23	1	0.30	0.75	0.23		0.00
Alternative is Well-Established and Proven	0.30		1	0.30	1	0.30	0.75	0.23	1	0.30		0.00
Total: Technical Considerations	*3.70*	*37%*	*5*	*2.58*	*5.5*	*3.53*	*4.75*	*2.58*	*5.25*	*3.18*	*0*	*0.00*
Approvals Requirements												
MOE Approvals Process	0.70		0.75	0.53	1	0.70	1	0.70	0.75	0.53		0.00
Other Agency Approvals (MVCA, MMAH, Hydro, ESA, DFO, MNR, County, ….)	0.70		1	0.70	1	0.70	1	0.70	1	0.70		0.00
Municipal Class EA Implications	0.40		1	0.40	1	0.40	1	0.40	0.75	0.30		0.00
Compatibility with Official Plan, Zoning, overall development plans for the Municipality	0.40		1	0.40	1	0.40	1	0.40	0.75	0.30		0.00
Total: Approvals Requirements	*2.20*	*22%*	*3.75*	*2.03*	*4*	*2.20*	*4*	*2.20*	*3.25*	*1.83*	*0*	*0.00*
Financial Considerations												
Lifecycle Cost (Including design, construction, land acquisition, provision of utilities/services, operating cost, maintenance cost, replacement cost. Suggest use Net Present Value of these costs over 50 year life of facility)	1.00		0.75	0.75	1	1.00	0.5	0.50	1	1.00		0.00
Capital Cost	0.60		1	0.60	0.5	0.30	1	0.60	0.5	0.30		0.00
Operating and Maintenance Costs	0.50		0.5	0.25	1	0.50	0.5	0.25	1	0.50		0.00
Total: Financial Considerations	*2.10*	*21%*	*2.25*	*1.60*	*2.5*	*1.80*	*2*	*1.35*	*2.5*	*1.80*	*0*	*0.00*
Environmental and Social Impacts												
Energy Consumption/Ecological Footprint (e.g. GHG emissions)	0.70		0.5	0.35	0.75	0.53	1	0.70	0.75	0.53		0.00
Impact on natural environment such as woodlands, wildlife, terrestrial vegetation, groundwater, aquatic, air, etc.	0.50		0.75	0.38	0.75	0.38	1	0.50	1	0.50		0.00
Impact on Provincially Significant Wetlands (PSW), Environmentally Sensitive Habitats (ESH)	0.10			0.00		0.00		0.00		0.00		0.00
Public Acceptance	0.30		1	0.30	1	0.30	1	0.30	1	0.30		0.00
Compatibility with adjacent land uses, impact on adjacent land uses	0.40		0.75	0.30	0.75	0.30	0.75	0.30	0.5	0.20		0.00
First Nations/Aboriginal Peoples	0.00			0.00		0.00		0.00		0.00		0.00
Archaeological/Heritage Sites	0.00			0.00		0.00		0.00		0.00		0.00
Total: Environmental and Social Impacts	*2.00*	*20%*	*3*	*1.33*	*3.25*	*1.50*	*3.75*	*1.80*	*3.25*	*1.53*	*0*	*0.00*
OVERALL SCORE	***10.00***	***100%***	***7.53***		***9.03***		***7.93***		***8.33***		***0.00***	

LIST OF ALTERNATIVES	Overall Score	Overall Ranking
1. Do Nothing(Maintain Ex. System)	7.53	4
2. Optimize Station Operations	9.03	1
3. Control Imported Waste Stream Quantity and Quality	7.93	3
4. Increase Station Storage Capacity	8.33	2

THE MUNICIPALITY OF NORTH PERTH
WASTEWATER TREATMENT MASTER PLAN

SCREENING-LEVEL EVALUATION MATRIX : HIGHWAY 23 SEWAGE PUMPING STATION

Evaluation Criteria	Screening Criteria Weighting Factor	Relative Importance of Each Category	1. Do Nothing (Maintain Ex. Station)		2. Install Screening / Grinding Equipment		3. Optimize Station Operation		4. Enhanced Sewer Use Bylaw Enforcement	
			Score	Weighted Score	Score	Weighted Score	Score	Weighted Score	Score	Weighted Score
Ability to Address the Problem	3.00	30%	1	3.00	3	9.00	2	6.00	1	3.00
Technical Feasibility	2.00	20%	3	6.00	2	4.00	2	4.00	2	4.00
Relative Cost-Benefit or Life Cycle Cost of Implementation	2.00	20%	1	2.00	3	6.00	2	4.00	3	6.00
Energy Consumption/Ecological Footprint (e.g. GHG emissions)	1.00	10%	1	1.00	2	2.00	3	3.00	2	2.00
Compatibility with Municipal, County, and Provincial Policies, Regulations, and Studies	1.00	10%	2	2.00	2	2.00	2	2.00	3	3.00
Alternative is Well-Established and Proven	1.00	10%	2	2.00	2	2.00	2	2.00	1	1.00
OVERALL SCORE	***10.00***	***100%***	***16.00***		***25.00***		***21.00***		***19.00***	

LIST OF ALTERNATIVES	Overall Score	Overall Ranking	Status
1. Do Nothing(Maintain Ex. Station)	16.00	6	carried forward
2. Install Screening / Grinding Equipment	25.00	2	carried forward
3. Optimize Station Operation	21.00	4	not carried forward
4. Enhanced Sewer Use Bylaw Enforcement	19.00	5	not carried forward
5. Implement Station Upgrades	26.00	1	carried forward
6. Increase Station Capacity	23.00	3	not carried forward

DETAILED EVALUATION MATRIX : HIGHWAY 23 SEWAGE PUMPING STATION

Evaluation Criteria	Screening Criteria Weighting Factor	Relative Importance of Each Category	1. Do Nothing (Maintain Ex. Station)		2. Install Screening / Grinding Equipment		3. Optimize Station Operation		4. Enhanced Sewer Use Bylaw Enforcement	
Technical Considerations			Score	Weighted Score	Score	Weighted Score	Score	Weighted Score	Score	Weighted Score
Ability to Address the Problem	1.70		0.25	0.43	0.75	1.28		0.00		0.00
Technical Feasibility (constructability, geotechnical, groundwater conditions, creek crossings, existing structures and utilities)	0.80		1	0.80	0.75	0.60		0.00		0.00
Physical space requirements : property, site access, buildings, easements	0.60		1	0.60	0.75	0.45		0.00		0.00
Availability of site services (road, water, sanitary, power, communications, gas)	0.40		1	0.40	1	0.40		0.00		0.00
Operation and Maintenance Complexity	0.30		0.75	0.23	0.75	0.23		0.00		0.00
Alternative is Well-Established and Proven	0.30		0.5	0.15	0.75	0.23		0.00		0.00
Total: Technical Considerations	*4.10*	*41%*	*4.5*	*2.60*	*4.75*	*3.18*	*0*	*0.00*	*0*	*0.00*
Approvals Requirements										
MOE Approvals Process	0.70		1	0.70	1	0.70		0.00		0.00
Other Agency Approvals (MVCA, MMAH, Hydro, ESA, DFO, MNR, County, ….)	0.30		1	0.30	0.5	0.15		0.00		0.00
Municipal Class EA Implications	0.40		1	0.40	1	0.40		0.00		0.00
Compatibility with Official Plan, Zoning, overall development plans for the Municipality	0.40		1	0.40	1	0.40		0.00		0.00
Total: Approvals Requirements	*1.80*	*18%*	*4*	*1.80*	*3.5*	*1.65*	*0*	*0.00*	*0*	*0.00*
Financial Considerations										
Lifecycle Cost (Including design, construction, land acquisition, provision of utilities/services, operating cost, maintenance cost, replacement cost. Suggest use Net Present Value of these costs over 50 year life of facility)	1.00		0.5	0.50	0.75	0.75		0.00		0.00
Capital Cost	0.80		1	0.80	0.5	0.40		0.00		0.00
Operating and Maintenance Costs	0.50		0.5	0.25	0.75	0.38		0.00		0.00
Total: Financial Considerations	*2.30*	*23%*	*2*	*1.55*	*2*	*1.53*	*0*	*0.00*	*0*	*0.00*
Environmental and Social Impacts										
Energy Consumption/Ecological Footprint (e.g. GHG emissions)	0.90		0.5	0.45	0.75	0.68		0.00		0.00
Impact on natural environment such as woodlands, wildlife, terrestrial vegetation, groundwater, aquatic, air, etc.	0.50		0.75	0.38	1	0.50		0.00		0.00
Impact on Provincially Significant Wetlands (PSW), Environmentally Sensitive Habitats (ESH)	0.00			0.00		0.00		0.00		0.00
Public Acceptance	0.30		1	0.30	1	0.30		0.00		0.00
Compatibility with adjacent land uses, impact on adjacent land uses	0.10		1	0.10	1	0.10		0.00		0.00
First Nations/Aboriginal Peoples	0.00			0.00		0.00		0.00		0.00
Archaeological/Heritage Sites	0.00			0.00		0.00		0.00		0.00
Total: Environmental and Social Impacts	*1.80*	*18%*	*3.25*	*1.23*	*3.75*	*1.58*	*0*	*0.00*	*0*	*0.00*
OVERALL SCORE	***10.00***	***100%***	***7.18***		***7.93***		***0.00***		***0.00***	

LIST OF ALTERNATIVES	Overall Score	Overall Ranking
1. Do Nothing(Maintain Ex. Station)	7.18	3
2. Install Screening / Grinding Equipment	7.93	2
5. Implement Station Upgrades	8.33	1

THE MUNICIPALITY OF NORTH PERTH
WASTEWATER TREATMENT MASTER PLAN

SCREENING-LEVEL EVALUATION MATRIX : WASTEWATER CONVEYANCE (PIPELINES)

Evaluation Criteria	Screening Criteria Weighting Factor	Relative Importance of Each Category	1. Do Nothing (Maintain Ex. Pipelines)		2. Rehabilitate Ex. 450mm Influent Forcemain		3. Rehabilitate Historical 300mm Forcemain		4. Rehabilitate Both Ex. 450mm Influent forcemain and historical 300mm forcemain		5. Construct New Influent Sewage Forcemain	
			Score	Weighted Score	Score	Weighted Score	Score	Weighted Score	Score	Weighted Score	Score	Weighted Score
Ability to Address the Problem	3.00	30%	1	3.00	2	6.00	2	6.00	3	9.00	3	9.00
Technical Feasibility	2.00	20%	3	6.00	1	2.00	1	2.00	2	4.00	3	6.00
Relative Cost-Benefit or Life Cycle Cost of Implementation	2.00	20%	1	2.00	2	4.00	2	4.00	3	6.00	2	4.00
Energy Consumption/Ecological Footprint (e.g. GHG emissions)	1.00	10%	2	2.00	2	2.00	1	1.00	2	2.00	2	2.00
Compatibility with Municipal, County, and Provincial Policies, Regulations, and Studies	1.00	10%	2	2.00	2	2.00	2	2.00	2	2.00	2	2.00
Alternative is Well-Established and Proven	1.00	10%	1	1.00	2	2.00	1	1.00	3	3.00	3	3.00
OVERALL SCORE	***10.00***	***100%***	***16.00***		***18.00***		***16.00***		***26.00***		***26.00***	

LIST OF ALTERNATIVES	Overall Score	Overall Ranking	Status
1. Do Nothing(Maintain Ex. Pipelines)	16.00	4	carried forward
2. Rehabilitate Ex. 450mm Influent Forcemain	18.00	3	not carried forward
3. Rehabilitate Historical 300mm Forcemain	16.00	4	not carried forward
4. Rehabilitate Both Ex. 450mm Influent forcemain and historical 3(	26.00	1	carried forward
5. Construct New Influent Sewage Forcemain	26.00	1	carried forward

DETAILED EVALUATION MATRIX : WASTEWATER CONVEYANCE (PIPELINES)

Evaluation Criteria	Screening Criteria Weighting Factor	Relative Importance of Each Category	1. Do Nothing (Maintain Ex. Pipelines)		2. Rehabilitate Ex. 450mm Influent Forcemain		3. Rehabilitate Historical 300mm Forcemain		4. Rehabilitate Both Ex. 450mm Influent forcemain and historical 300mm forcemain		5. Construct New Influent Sewage Forcemain	
Technical Considerations			Score	Weighted Score	Score	Weighted Score	Score	Weighted Score	Score	Weighted Score	Score	Weighted Score
Ability to Address the Problem	1.40		0.25	0.35		0.00	0.5	0.70	0.75	1.05	1	1.40
Technical Feasibility (constructability, geotechnical, groundwater conditions, creek crossings, existing structures and utilities)	0.70		1	0.70		0.00	0.5	0.35	0.5	0.35	0.5	0.35
Physical space requirements : property, site access, buildings, easements	0.60		1	0.60		0.00	1	0.60	1	0.60	1	0.60
Availability of site services (road, water, sanitary, power, communications, gas)	0.40		1	0.40		0.00	0.75	0.30	0.75	0.30	0.75	0.30
Operation and Maintenance Complexity	0.30		0.75	0.23		0.00	0.75	0.23	0.75	0.23	0.75	0.23
Alternative is Well-Established and Proven	0.30		0.25	0.08		0.00	0.75	0.23	0.75	0.23	0.75	0.23
Total: Technical Considerations	*3.70*	*37%*	*4.25*	*2.35*	*0*	*0.00*	*4.25*	*2.40*	*4.5*	*2.75*	*4.75*	*3.10*
Approvals Requirements												
MOE Approvals Process	0.70		0.75	0.53		0.00	1	0.70	1	0.70	0.75	0.53
Other Agency Approvals (MVCA, MMAH, Hydro, ESA, DFO, MNR, County, ….)	0.70		1	0.70		0.00	1	0.70	1	0.70	1	0.70
Municipal Class EA Implications	0.40		1	0.40		0.00	1	0.40	1	0.40	1	0.40
Compatibility with Official Plan, Zoning, overall development plans for the Municipality	0.40		1	0.40		0.00	1	0.40	1	0.40	1	0.40
Total: Approvals Requirements	*2.20*	*22%*	*3.75*	*2.03*	*0*	*0.00*	*4*	*2.20*	*4*	*2.20*	*3.75*	*2.03*
Financial Considerations												
Lifecycle Cost (Including design, construction, land acquisition, provision of utilities/services, operating cost, maintenance cost, replacement cost. Suggest use Net Present Value of these costs over 50 year life of facility)	1.00		0.25	0.25		0.00	1	1.00	0.75	0.75	1	1.00
Capital Cost	0.80		1	0.80		0.00	0.75	0.60	0.75	0.60	0.5	0.40
Operating and Maintenance Costs	0.50		0.5	0.25		0.00	0.75	0.38	0.75	0.38	0.75	0.38
Total: Financial Considerations	*2.30*	*23%*	*1.75*	*1.30*	*0*	*0.00*	*2.5*	*1.98*	*2.25*	*1.73*	*2.25*	*1.78*
Environmental and Social Impacts												
Energy Consumption/Ecological Footprint (e.g. GHG emissions)	0.80		0.25	0.20		0.00	0.75	0.60	0.75	0.60	0.75	0.60
Impact on natural environment such as woodlands, wildlife, terrestrial vegetation, groundwater, aquatic, air, etc.	0.60		0.75	0.45		0.00	0.75	0.45	0.75	0.45	0.75	0.45
Impact on Provincially Significant Wetlands (PSW), Environmentally Sensitive Habitats (ESH)	0.00			0.00		0.00		0.00		0.00		0.00
Public Acceptance	0.30		1	0.30		0.00	1	0.30	1	0.30	0.75	0.23
Compatibility with adjacent land uses, impact on adjacent land uses	0.10		1	0.10		0.00	1	0.10	1	0.10	0.75	0.08
First Nations/Aboriginal Peoples	0.00			0.00		0.00		0.00		0.00		0.00
Archaeological/Heritage Sites	0.00			0.00		0.00		0.00		0.00		0.00
Total: Environmental and Social Impacts	*1.80*	*18%*	*3*	*1.05*	*0*	*0.00*	*3.5*	*1.45*	*3.5*	*1.45*	*3*	*1.35*
OVERALL SCORE	***10.00***	***100%***	***6.73***		***0.00***		***8.03***		***8.13***		***8.25***	

LIST OF ALTERNATIVES	Overall Score	Overall Ranking
1. Do Nothing(Maintain Ex. Pipelines)	6.73	4
3. Rehabilitate Historical 300mm Forcemain	8.03	3
4. Rehabilitate Both Ex. 450mm Influent forcemain and historical 3(	8.13	2
5. Construct New Influent Sewage Forcemain	8.25	1

THE MUNICIPALITY OF NORTH PERTH
WASTEWATER TREATMENT MASTER PLAN

SCREENING-LEVEL EVALUATION MATRIX : HEADWORKS UPGRADES

Upgrade Opportunities

A Equipment Upgrades: Replace Manual Bar Screen with Automated Fine Bar Screen with winterization enclosure AND replace grit classifier
B Repurpose decommissioned manual bar screen and aerated grit chamber for redundancy, and increased peak flow capacity for grit separation
C Construct second grit tank to handle peak flows
D Enclose Headworks to facilitate winter maintenance and allow for odour capture and treatment

Evaluation Criteria	Screening Criteria Weighting Factor	Relative Importance of Each Category	1. Do Nothing		2. Implement A		3. Implement B		4. Implement C		5. Implement A and B		6. Implement A and C	
			Score	Weighted Score	Score	Weighted Score	Score	Weighted Score	Score	Weighted Score	Score	Weighted Score	Score	Weighted Score
Ability to Address the Problem	3.00	30%	1	3	1	3	1	3	1	3	2	6	2	6
Technical Feasibility	2.00	20%	2	4	3	6	1	2	2	4	1	2	2	4
Relative Cost-Benefit or Life Cycle Cost of Implementation	2.00	20%	2	4	3	6	1	2	1	2	1	2	1	2
Energy Consumption/Ecological Footprint (e.g. GHG emissions)	1.00	10%	3	3	3	3	2	2	2	2	2	2	2	2
Compatibility with Municipal, County, and Provincial Policies, Regulations, and Studies	1.00	10%	2	2	2	2	2	2	2	2	2	2	3	3
Alternative is Well-Established and Proven	1.00	10%	3	3	3	3	1	1	2	2	1	1	2	2
OVERALL SCORE	*10.00*	*100%*	*19.00*		*23.00*		*12.00*		*15.00*		*15.00*		*19.00*	

LIST OF ALTERNATIVES	Overall Score	Ranking	Status
1. Do Nothing	19.00	4	carried forward
2. Implement A	23.00	1	carried forward
3. Implement B	12.00	9	not carried forward
4. Implement C	15.00	7	not carried forward
5. Implement A and B	15.00	7	not carried forward
6. Implement A and C	19.00	4	not carried forward
7. Implement A and D	23.00	1	carried forward
8. Implement A, B and D	17.00	6	not carried forward
9. Implement A, C and D	21.00	3	carried forward

DETAILED EVALUATION MATRIX : HEADWORKS UPGRADES

Evaluation Criteria	Screening Criteria Weighting Factor	Relative Importance of Each Category	1. Do Nothing		2. Implement A		3. Implement B		4. Implement C		5. Implement A and B		6. Implement A and C	
Technical Considerations			Score	Weighted Score	Score	Weighted Score	Score	Weighted Score	Score	Weighted Score	Score	Weighted Score	Score	Weighted Score
Ability to Address the Problem	1.80		0.25	0.45	0.25	0.45		0.00		0.00		0.00		0.00
Technical Feasibility (constructability, geotechnical, groundwater conditions, creek crossings, existing structures and utilities)	0.80		0.75	0.60	0.75	0.60		0.00		0.00		0.00		0.00
Physical space requirements : property, site access, buildings, easements	0.60		1	0.60	0.75	0.45		0.00		0.00		0.00		0.00
Availability of site services (road, water, sanitary, power, communications, gas)	0.10		1	0.10	1	0.10		0.00		0.00		0.00		0.00
Operation and Maintenance Complexity	0.60		0.5	0.30	0.75	0.45		0.00		0.00		0.00		0.00
Alternative is Well-Established and Proven	0.30		0.5	0.15	1	0.30		0.00		0.00		0.00		0.00
Total: Technical Considerations	*4.20*	*42%*	*4*	*2.20*	*4.5*	*2.35*	*0*	*0.00*	*0*	*0.00*	*0*	*0.00*	*0*	*0.00*
Approvals Requirements														
MOE Approvals Process	0.50		0.75	0.38	1	0.50		0.00		0.00		0.00		0.00
Other Agency Approvals (MVCA, MMAH, Hydro, ESA, DFO, MNR, County, ….)	0.25		1	0.25	1	0.25		0.00		0.00		0.00		0.00
Municipal Class EA Implications	0.25		1	0.25	1	0.25		0.00		0.00		0.00		0.00
Compatibility with Official Plan, Zoning, overall development plans for the Municipality	0.00			0.00		0.00		0.00		0.00		0.00		0.00
Total: Approvals Requirements	*1.00*	*10%*	*2.75*	*0.88*	*3*	*1.00*	*0*	*0.00*	*0*	*0.00*	*0*	*0.00*	*0*	*0.00*
Financial Considerations														
Lifecycle Cost (Including design, construction, land acquisition, provision of utilities/services, operating cost, maintenance cost, replacement cost. Suggest use Net Present Value of these costs over 50 year life of facility)	1.00		0.75	0.75	1	0.75		0.00		0.00		0.00		0.00
Capital Cost	1.00		1	1.00	0.75	0.75		0.00		0.00		0.00		0.00
Operating and Maintenance Costs	1.00		0.5	0.50	0.75	0.75		0.00		0.00		0.00		0.00
Total: Financial Considerations	*3.00*	*30%*	*2.25*	*2.25*	*2.5*	*2.25*	*0*	*0.00*	*0*	*0.00*	*0*	*0.00*	*0*	*0.00*
Environmental and Social Impacts														
Energy Consumption/Ecological Footprint (e.g. GHG emissions)	1.00		0.75	0.75	0.75	0.75		0.00		0.00		0.00		0.00
Impact on natural environment such as woodlands, wildlife, terrestrial vegetation, groundwater, aquatic, air, etc.	0.60		0.5	0.30	1	0.60		0.00		0.00		0.00		0.00
Impact on Provincially Significant Wetlands (PSW), Environmentally Sensitive Habitats (ESH)	0.00			0.00		0.00		0.00		0.00		0.00		
Public Acceptance	0.20		1	0.20	1	0.20		0.00		0.00		0.00		0.00
Compatibility with adjacent land uses, impact on adjacent land uses	0.00			0.00		0.00		0.00		0.00		0.00		0.00
First Nations/Aboriginal Peoples	0.00			0.00		0.00		0.00		0.00		0.00		
Archaeological/Heritage Sites	0.00			0.00		0.00		0.00		0.00		0.00		
Total: Environmental and Social Impacts	*1.80*	*18%*	*2.25*	*1.25*	*2.75*	*1.55*	*0*	*0.00*	*0*	*0.00*	*0*	*0.00*	*0*	*0.00*
OVERALL SCORE	*10.00*	*100%*	*6.58*		*7.15*		*0.00*		*0.00*		*0.00*		*0.00*	

LIST OF ALTERNATIVES	Overall Score	Overall Ranking
1. Do Nothing	6.58	4
2. Implement A	7.15	2
6. Implement A and C	7.36	1

THE MUNICIPALITY OF NORTH PERTH
WASTEWATER TREATMENT MASTER PLAN

SCREENING-LEVEL EVALUATION MATRIX : MAIN POWER SUPPLY

Evaluation Criteria	Screening Criteria Weighting Factor	Relative Importance of Each Category	1. Do Nothing (Maintain Ex. System)		2. Energy Management		3. Replace Existing Transformer		4. Install Power Generator for Peak Shaving		5. Provide New Hydro Service	
			Score	Weighted Score	Score	Weighted Score	Score	Weighted Score	Score	Weighted Score	Score	Weighted Score
Ability to Address the Problem	3.00	30%	2	6.00	2	6.00	2	6.00	3	9.00	3	9.00
Technical Feasibility	2.00	20%	3	6.00	3	6.00	2	4.00	2	4.00	2	4.00
Relative Cost-Benefit or Life Cycle Cost of Implementation	2.00	20%	1	2.00	3	6.00	2	4.00	3	6.00	2	4.00
Energy Consumption/Ecological Footprint (e.g. GHG emissions)	1.00	10%	2	2.00	3	3.00	3	3.00	2	2.00	1	1.00
Compatibility with Municipal, County, and Provincial Policies, Regulations, and Studies	1.00	10%	2	2.00	2	2.00	2	2.00	2	2.00	2	2.00
Alternative is Well-Established and Proven	1.00	10%	3	3.00	3	3.00	2	2.00	3	3.00	3	3.00
OVERALL SCORE	***10.00***	***100%***	***21.00***		***26.00***		***21.00***		***26.00***		***23.00***	

LIST OF ALTERNATIVES	Overall Score	Overall Ranking	Status
1. Do Nothing(Maintain Ex. System)	21.00	4	carried forward
2. Energy Management	26.00	1	carried forward
3. Replace Existing Transformer	21.00	4	not carried forward
4. Install Power Generator for Peak Shaving	26.00	1	carried forward
5. Provide NewHydro Service	23.00	3	carried forward

DETAILED EVALUATION MATRIX : MAIN POWER SUPPLY

Evaluation Criteria	Screening Criteria Weighting Factor	Relative Importance of Each Category	1. Do Nothing (Maintain Ex. System)		2. Energy Management		3. Replace Existing Transformer		4. Install Power Generator for Peak Shaving		5. Provide New Hydro Service	
Technical Considerations			Score	Weighted Score	Score	Weighted Score	Score	Weighted Score	Score	Weighted Score	Score	Weighted Score
Ability to Address the Problem	1.70		0.5	0.85	0.75	1.28		0.00	0.75	1.28	1	1.70
Technical Feasibility (constructability, geotechnical, groundwater conditions, creek crossings, existing structures and utilities)	1.00		1	1.00	0.75	0.75		0.00	0.25	0.25	0.75	0.75
Physical space requirements : property, site access, buildings, easements	0.60		1	0.60	1	0.60		0.00	0.75	0.45	0.75	0.45
Availability of site services (road, water, sanitary, power, communications, gas)	0.40		1	0.40	1	0.40		0.00	1	0.40	1	0.40
Operation and Maintenance Complexity	0.30		0.75	0.23	0.75	0.23		0.00	0.75	0.23	0.75	0.23
Alternative is Well-Established and Proven	0.30		0.25	0.08	0.5	0.15		0.00	1	0.30	1	0.30
Total: Technical Considerations	*4.30*	*43%*	*4.5*	*3.15*	*4.75*	*3.40*	*0*	*0.00*	*4.5*	*2.90*	*5.25*	*3.83*
Approvals Requirements												
MOE Approvals Process	0.80		1	0.80	1	0.80		0.00	0.75	0.60	1	0.80
Other Agency Approvals (MVCA, MMAH, Hydro, ESA, DFO, MNR, County, ….)	0.00			0.00		0.00		0.00		0.00		0.00
Municipal Class EA Implications	0.40		1	0.40	1	0.40		0.00	1	0.40	1	0.40
Compatibility with Official Plan, Zoning, overall development plans for the Municipality	0.40		1	0.40	1	0.40		0.00	1	0.40	0.75	0.30
Total: Approvals Requirements	*1.60*	*16%*	*3*	*1.60*	*3*	*1.60*	*0*	*0.00*	*2.75*	*1.40*	*2.75*	*1.50*
Financial Considerations												
Lifecycle Cost (Including design, construction, land acquisition, provision of utilities/services, operating cost, maintenance cost, replacement cost. Suggest use Net Present Value of these costs over 50 year life of facility)	1.00		0.75	0.75	0.75	0.75		0.00	0.75	0.75	0.75	0.75
Capital Cost	0.80		1	0.80	1	0.80		0.00	0.5	0.40	0.25	0.20
Operating and Maintenance Costs	0.50		0.75	0.38	0.5	0.25		0.00	0.75	0.38	1	0.50
Total: Financial Considerations	*2.30*	*23%*	*2.5*	*1.93*	*2.25*	*1.80*	*0*	*0.00*	*2*	*1.53*	*2*	*1.45*
Environmental and Social Impacts												
Energy Consumption/Ecological Footprint (e.g. GHG emissions)	0.90		0.75	0.68	0.75	0.68		0.00	0.75	0.68	0.75	0.68
Impact on natural environment such as woodlands, wildlife, terrestrial vegetation, groundwater, aquatic, air, etc.	0.60		1	0.60	1	0.60		0.00	1	0.60	1	0.60
Impact on Provincially Significant Wetlands (PSW), Environmentally Sensitive Habitats (ESH)	0.00			0.00		0.00		0.00		0.00		0.00
Public Acceptance	0.30		1	0.30	1	0.30		0.00	1	0.30	0.75	0.23
Compatibility with adjacent land uses, impact on adjacent land uses	0.00			0.00		0.00		0.00		0.00		0.00
First Nations/Aboriginal Peoples	0.00			0.00		0.00		0.00		0.00		0.00
Archaeological/Heritage Sites	0.00			0.00		0.00		0.00		0.00		0.00
Total: Environmental and Social Impacts	*1.80*	*18%*	*2.75*	*1.58*	*2.75*	*1.58*	*0*	*0.00*	*2.75*	*1.58*	*2.5*	*1.50*
OVERALL SCORE	***10.00***	***100%***	***8.25***		***8.38***		***0.00***		***7.40***		***8.28***	

LIST OF ALTERNATIVES	Overall Score	Overall Ranking
1. Do Nothing(Maintain Ex. System)	8.25	3
2. Energy Management	8.38	1
4. Install Power Generator for Peak Shaving	7.40	4
5. Provide NewHydro Service	8.28	2

THE MUNICIPALITY OF NORTH PERTH
WASTEWATER TREATMENT MASTER PLAN

SCREENING-LEVEL EVALUATION MATRIX : SCADA SYSTEM

Evaluation Criteria	Screening Criteria Weighting Factor	Relative Importance of Each Category	1. Do Nothing (Maintain Ex. System)		2. Provide Secondary Data Storage		3. Improve System Security		4. Provide New Generation SCADA System	
			Score	Weighted Score	Score	Weighted Score	Score	Weighted Score	Score	Weighted Score
Ability to Address the Problem	3.00	30%	1	3.00	3	9.00	1	3.00	3	9.00
Technical Feasibility	2.00	20%	3	6.00	2	4.00	2	4.00	3	6.00
Relative Cost-Benefit or Life Cycle Cost of Implementation	2.00	20%	2	4.00	3	6.00	3	6.00	2	4.00
Energy Consumption/Ecological Footprint (e.g. GHG emissions)	1.00	10%	2	2.00	2	2.00	2	2.00	3	3.00
Compatibility with Municipal, County, and Provincial Policies, Regulations, and Studies	1.00	10%	2	2.00	2	2.00	2	2.00	2	2.00
Alternative is Well-Established and Proven	1.00	10%	2	2.00	3	3.00	3	3.00	3	3.00
OVERALL SCORE	***10.00***	***100%***	***19.00***		***26.00***		***20.00***		***27.00***	

LIST OF ALTERNATIVES	Overall Score	Overall Ranking	Status
1. Do Nothing(Maintain Ex. System)	19.00	4	carried forward
2. Provide Secondary Data Storage	26.00	2	carried forward
3. Improve System Security	20.00	3	not carried forward
4. Provide New Generation SCADA System	27.00	1	carried forward

DETAILED EVALUATION MATRIX : SCADA SYSTEM

Evaluation Criteria	Screening Criteria Weighting Factor	Relative Importance of Each Category	1. Do Nothing (Maintain Ex. System)		2. Provide Secondary Data Storage		3. Improve System Security		4. Provide New Generation SCADA System	
Technical Considerations			Score	Weighted Score	Score	Weighted Score	Score	Weighted Score	Score	Weighted Score
Ability to Address the Problem	2.00		0.25	0.50	0.5	1.00		0.00	1	2.00
Technical Feasibility (constructability, geotechnical, groundwater conditions, creek crossings, existing structures and utilities)	1.50		1	1.50	1	1.50		0.00	0.75	1.13
Physical space requirements : property, site access, buildings, easements	0.60		1	0.60	1	0.60		0.00	1	0.60
Availability of site services (road, water, sanitary, power, communications, gas)	0.40		1	0.40	1	0.40		0.00	1	0.40
Operation and Maintenance Complexity	0.30		0.75	0.23	0.75	0.23		0.00	0.75	0.23
Alternative is Well-Established and Proven	0.30		0.25	0.08	0.5	0.15		0.00	1	0.30
Total: Technical Considerations	*5.10*	*51%*	*4.25*	*3.30*	*4.75*	*3.88*	*0*	*0.00*	*5.5*	*4.65*
Approvals Requirements										
MOE Approvals Process	0.00			0.00		0.00		0.00		0.00
Other Agency Approvals (MVCA, MMAH, Hydro, ESA, DFO, MNR, County, ...)	0.00			0.00		0.00		0.00		0.00
Municipal Class EA Implications	0.00			0.00		0.00		0.00		0.00
Compatibility with Official Plan, Zoning, overall development plans for the Municipality	0.00			0.00		0.00		0.00		0.00
Total: Approvals Requirements	*0.00*	*0%*	*0*	*0.00*	*0*	*0.00*	*0*	*0.00*	*0*	*0.00*
Financial Considerations										
Lifecycle Cost (Including design, construction, land acquisition, provision of utilities/services, operating cost, maintenance cost, replacement cost. Suggest use Net Present Value of these costs over 50 year life of facility)	1.50		0.75	1.13	0.75	1.13		0.00	0.75	1.13
Capital Cost	1.20		1	1.20	0.75	0.90		0.00	0.5	0.60
Operating and Maintenance Costs	0.80		0.5	0.40	0.75	0.60		0.00	0.75	0.60
Total: Financial Considerations	*3.50*	*35%*	*2.25*	*2.73*	*2.25*	*2.63*	*0*	*0.00*	*2*	*2.33*
Environmental and Social Impacts										
Energy Consumption/Ecological Footprint (e.g. GHG emissions)	0.90		0.75	0.68	0.75	0.68		0.00	0.75	0.68
Impact on natural environment such as woodlands, wildlife, terrestrial vegetation, groundwater, aquatic, air, etc.	0.00			0.00		0.00		0.00		0.00
Impact on Provincially Significant Wetlands (PSW), Environmentally Sensitive Habitats (ESH)	0.00			0.00		0.00		0.00		0.00
Public Acceptance	0.50		0.75	0.38	1	0.50		0.00	0.75	0.38
Compatibility with adjacent land uses, impact on adjacent land uses	0.00			0.00		0.00		0.00		0.00
First Nations/Aboriginal Peoples	0.00			0.00		0.00		0.00		0.00
Archaeological/Heritage Sites	0.00			0.00		0.00		0.00		0.00
Total: Environmental and Social Impacts	*1.40*	*14%*	*1.5*	*1.05*	*1.75*	*1.18*	*0*	*0.00*	*1.5*	*1.05*
OVERALL SCORE	***10.00***	***100%***	***7.08***		***7.68***		***0.00***		***8.03***	

LIST OF ALTERNATIVES	Overall Score	Overall Ranking
1. Do Nothing(Maintain Ex. System)	7.08	3
2. Provide Secondary Data Storage	7.68	2
4. Provide New Generation SCADA System	8.03	1

THE MUNICIPALITY OF NORTH PERTH
WASTEWATER TREATMENT MASTER PLAN

SCREENING-LEVEL EVALUATION MATRIX : SECONDARY CLARIFIERS

Evaluation Criteria	Screening Criteria Weighting Factor	Relative Importance of Each Category	1. Do Nothing (Maintain Ex. System)		2. Flow Monitoring Only		3. Install Flow Balancing Device	
			Score	Weighted Score	Score	Weighted Score	Score	Weighted Score
Ability to Address the Problem	3.00	30%	1	3	1	3	3	9
Technical Feasibility	2.00	20%	3	6	2	4	2	4
Relative Cost-Benefit or Life Cycle Cost of Implementation	2.00	20%	3	6	3	6	2	4
Energy Consumption/Ecological Footprint (e.g. GHG emissions)	1.00	10%	3	3	3	3	3	3
Compatibility with Municipal, County, and Provincial Policies, Regulations, and Studies	1.00	10%	3	3	3	3	3	3
Alternative is Well-Established and Proven	1.00	10%	3	3	3	3	3	3
OVERALL SCORE	***10.00***	***100%***	***24.00***		***22.00***		***26.00***	

LIST OF ALTERNATIVES	Overall Score	Overall Ranking	Status
1. Do Nothing(Maintain Ex. System)	24.00	2	Carried forward
2. Flow Monitoring Only	22.00	3	Not carried forward
3. Install Flow Balancing Device	26.00	1	Carried forward

DETAILED EVALUATION MATRIX : SECONDARY CLARIFIERS

Evaluation Criteria	Screening Criteria Weighting Factor	Relative Importance of Each Category	1. Do Nothing (Maintain Ex. System)		2. Flow Monitoring Only		3. Install Flow Balancing Device	
Technical Considerations			Score	Weighted Score	Score	Weighted Score	Score	Weighted Score
Ability to Address the Problem	1.40		0.25	0.35		0.00	1	1.40
Technical Feasibility (constructability, geotechnical, groundwater conditions, creek crossings, existing structures and utilities)	0.80		1	0.80		0.00	0.75	0.60
Physical space requirements : property, site access, buildings, easements	1.00		1	1.00		0.00	1	1.00
Availability of site services (road, water, sanitary, power, communications, gas)	0.40		1	0.40		0.00	1	0.40
Operation and Maintenance Complexity	0.40		0.75	0.30		0.00	0.75	0.30
Alternative is Well-Established and Proven	0.90		1	0.90		0.00	0.75	0.68
Total: Technical Considerations	*4.90*	*49%*	*5*	*3.75*	*0*	*0.00*	*5.25*	*4.38*
Approvals Requirements								
MOE Approvals Process	0.10		1	0.10		0.00	1	0.10
Other Agency Approvals (MVCA, MMAH, Hydro, ESA, DFO, MNR, County, ….)	0.00			0.00		0.00		0.00
Municipal Class EA Implications	0.10		1	0.10		0.00	1	0.10
Compatibility with Official Plan, Zoning, overall development plans for the Municipality	0.00			0.00		0.00		0.00
Total: Approvals Requirements	*0.20*	*2%*	*2*	*0.20*	*0*	*0.00*	*2*	*0.20*
Financial Considerations								
Lifecycle Cost (Including design, construction, land acquisition, provision of utilities/services, operating cost, maintenance cost, replacement cost. Suggest use Net Present Value of these costs over 50 year life of facility)	1.00		1	1.00		0.00	0.75	0.75
Capital Cost	1.00		1	1.00		0.00	0.75	0.75
Operating and Maintenance Costs	1.00		1	1.00		0.00	1	1.00
Total: Financial Considerations	*3.00*	*30%*	*3*	*3.00*	*0*	*0.00*	*2.5*	*2.50*
Environmental and Social Impacts								
Energy Consumption/Ecological Footprint (e.g. GHG emissions)	1.00		1	1.00		0.00	1	1.00
Impact on natural environment such as woodlands, wildlife, terrestrial vegetation, groundwater, aquatic, air, etc.	0.60		1	0.60		0.00	1	0.60
Impact on Provincially Significant Wetlands (PSW), Environmentally Sensitive Habitats (ESH)	0.00			0.00		0.00		0.00
Public Acceptance	0.30		1	0.30		0.00	1	0.30
Compatibility with adjacent land uses, impact on adjacent land uses	0.00			0.00		0.00		0.00
First Nations/Aboriginal Peoples	0.00			0.00		0.00		0.00
Archaeological/Heritage Sites	0.00			0.00		0.00		0.00
Total: Environmental and Social Impacts	*1.90*	*19%*	*3*	*1.90*	*0*	*0.00*	*3*	*1.90*
OVERALL SCORE	***10.00***	***100%***	***8.85***		***0.00***		***8.98***	

LIST OF ALTERNATIVES	Overall Score	Overall Ranking
1. Do Nothing(Maintain Ex. System)	8.85	2
3. Install Flow Balancing Device	8.98	1

THE MUNICIPALITY OF NORTH PERTH
WASTEWATER TREATMENT MASTER PLAN

SCREENING-LEVEL EVALUATION MATRIX : ODOUR CONTROL

Evaluation Criteria	Screening Criteria Weighting Factor	Relative Importance of Each Category	1. Do Nothing (Maintain Ex. System)		2. Reduce Odours		3. Treat Sludge Odours Only, On-site Treatment		4. Treat Sludge and Headworks Odours, On-site Treatment	
			Score	Weighted Score	Score	Weighted Score	Score	Weighted Score	Score	Weighted Score
Ability to Address the Problem	3.00	30%	2	6	1	3	3	9	3	9
Technical Feasibility	2.00	20%	3	6	2	4	2	4	1	2
Relative Cost-Benefit or Life Cycle Cost of Implementation	2.00	20%	3	6	2	4	2	4	1	2
Energy Consumption/Ecological Footprint (e.g. GHG emissions)	1.00	10%	3	3	1	1	2	2	2	2
Compatibility with Municipal, County, and Provincial Policies, Regulations, and Studies	1.00	10%	2	2	2	2	3	3	3	3
Alternative is Well-Established and Proven	1.00	10%	3	3	1	1	3	3	3	3
OVERALL SCORE	***10.00***	***100%***	***26.00***		***15.00***		***25.00***		***21.00***	

LIST OF ALTERNATIVES	Overall Score	Overall Ranking	Status
1. Do Nothing(Maintain Ex. System)	26.00	1	Carried forward
2. Reduce Odours	15.00	4	Not carried forward
3. Treat Sludge Odours Only, On-site Treatment	25.00	2	Carried forward
4. Treat Sludge and Headworks Odours, On-site Treatment	21.00	3	Carried forward

DETAILED EVALUATION MATRIX : ODOUR CONTROL

Evaluation Criteria	Screening Criteria Weighting Factor	Relative Importance of Each Category	1. Do Nothing (Maintain Ex. System)		2. Reduce Odours		3. Treat Sludge Odours Only, On-site Treatment		4. Treat Sludge and Headworks Odours, On-site Treatment	
Technical Considerations			Score	Weighted Score	Score	Weighted Score	Score	Weighted Score	Score	Weighted Score
Ability to Address the Problem	1.40		0.5	0.70		0.00	1	1.40	1	1.40
Technical Feasibility (constructability, geotechnical, groundwater conditions, creek crossings, existing structures and utilities)	0.70		1	0.70		0.00	0.75	0.53	0.5	0.35
Physical space requirements : property, site access, buildings, easements	0.60		1	0.60		0.00	0.75	0.45	0.5	0.30
Availability of site services (road, water, sanitary, power, communications, gas)	0.40		1	0.40		0.00	1	0.40	0.75	0.30
Operation and Maintenance Complexity	0.30		1	0.30		0.00	0.75	0.23	0.5	0.15
Alternative is Well-Established and Proven	0.30		0.75	0.23		0.00	1	0.30	1	0.30
Total: Technical Considerations	*3.70*	*37%*	*5.25*	*2.93*	*0*	*0.00*	*5.25*	*3.30*	*4.25*	*2.80*
Approvals Requirements										
MOE Approvals Process	0.80		1	0.80		0.00	0.75	0.60	0.25	0.20
Other Agency Approvals (MVCA, MMAH, Hydro, ESA, DFO, MNR, County, ….)	0.00			0.00		0.00		0.00		0.00
Municipal Class EA Implications	0.70		1	0.70		0.00	0.75	0.53	0.5	0.35
Compatibility with Official Plan, Zoning, overall development plans for the Municipality	0.00			0.00		0.00		0.00		0.00
Total: Approvals Requirements	*1.50*	*15%*	*2*	*1.50*	*0*	*0.00*	*1.5*	*1.13*	*0.75*	*0.55*
Financial Considerations										
Lifecycle Cost (Including design, construction, land acquisition, provision of utilities/services, operating cost, maintenance cost, replacement cost. Suggest use Net Present Value of these costs over 50 year life of facility)	1.00		1	1.00		0.00	0.5	0.50	0.25	0.25
Capital Cost	0.80		1	0.80		0.00	0.5	0.40	0.25	0.20
Operating and Maintenance Costs	0.80		0.75	0.60		0.00	0.5	0.40	0.25	0.20
Total: Financial Considerations	*2.60*	*26%*	*2.75*	*2.40*	*0*	*0.00*	*1.5*	*1.30*	*0.75*	*0.65*
Environmental and Social Impacts										
Energy Consumption/Ecological Footprint (e.g. GHG emissions)	0.90		0.5	0.45		0.00	1	0.90	0.75	0.68
Impact on natural environment such as woodlands, wildlife, terrestrial vegetation, groundwater, aquatic, air, etc.	0.60		0.75	0.45		0.00	1	0.60	1	0.60
Impact on Provincially Significant Wetlands (PSW), Environmentally Sensitive Habitats (ESH)	0.00			0.00		0.00		0.00		0.00
Public Acceptance	0.30		0.75	0.23		0.00	1	0.30	1	0.30
Compatibility with adjacent land uses, impact on adjacent land uses	0.40		1	0.40		0.00	1	0.40	1	0.40
First Nations/Aboriginal Peoples	0.00			0.00		0.00		0.00		0.00
Archaeological/Heritage Sites	0.00			0.00		0.00		0.00		0.00
Total: Environmental and Social Impacts	*2.20*	*22%*	*3*	*1.53*	*0*	*0.00*	*4*	*2.20*	*3.75*	*1.98*
OVERALL SCORE	***10.00***	***100%***	***8.35***		***0.00***		***7.93***		***5.98***	

LIST OF ALTERNATIVES	Overall Score	Overall Ranking
1. Do Nothing(Maintain Ex. System)	8.35	1
3. Treat Sludge Odours Only, On-site Treatment	7.93	2
4. Treat Sludge and Headworks Odours, On-site Treatment	5.98	3

THE MUNICIPALITY OF NORTH PERTH
WASTEWATER TREATMENT MASTER PLAN

SCREENING-LEVEL EVALUATION MATRIX : TERTIARY FILTRATION

Evaluation Criteria	Screening Criteria Weighting Factor	Relative Importance of Each Category	1. Do Nothing (Maintain Ex. System)		2. New wash pumps and filter media		3. Mixed media depth filtration system		4. Cloth Media Disk Filter		5. Membrane Ultrafiltration	
			Score	Weighted Score	Score	Weighted Score	Score	Weighted Score	Score	Weighted Score	Score	Weighted Score
Ability to Address the Problem	3.00	30%	1	3.00	2	6.00	2	6.00	3	9.00	3	9.00
Technical Feasibility	2.00	20%	3	6.00	3	6.00	2	4.00	2	4.00	2	4.00
Relative Cost-Benefit or Life Cycle Cost of Implementation	2.00	20%	3	6.00	3	6.00	2	4.00	2	4.00	1	2.00
Energy Consumption/Ecological Footprint (e.g. GHG emissions)	1.00	10%	2	2.00	2	2.00	2	2.00	2	2.00	1	1.00
Compatibility with Municipal, County, and Provincial Policies, Regulations, and Studies	1.00	10%	1	1.00	3	3.00	3	3.00	3	3.00	3	3.00
Alternative is Well-Established and Proven	1.00	10%	1	1.00	3	3.00	3	3.00	3	3.00	3	3.00
OVERALL SCORE	***10.00***	***100%***	***19.00***		***26.00***		***22.00***		***25.00***		***22.00***	

LIST OF ALTERNATIVES	Overall Score	Overall Ranking	Status
1. Do Nothing(Maintain Ex. System)	19.00	5	Carried forward
2. New wash pumps and filter media	26.00	1	Carried forward
3. Mixed media depth filtration system	22.00	3	Not carried forward
4. Cloth Media Disk Filter	25.00	2	Carried forward
5. Membrane Ultrafiltration	22.00	3	Carried forward

DETAILED EVALUATION MATRIX : TERTIARY FILTRATION

Evaluation Criteria	Screening Criteria Weighting Factor	Relative Importance of Each Category	1. Do Nothing (Maintain Ex. System)		2. New wash pumps and filter media		3. Mixed media depth filtration system		4. Cloth Media Disk Filter		5. Membrane Ultrafiltration	
Technical Considerations			Score	Weighted Score	Score	Weighted Score	Score	Weighted Score	Score	Weighted Score	Score	Weighted Score
Ability to Address the Problem	1.50		0	0.00	0.75	1.13		0.00	1	1.50	1	1.50
Technical Feasibility (constructability, geotechnical, groundwater conditions, creek crossings, existing structures and utilities)	0.70		1	0.70	1	0.70		0.00	0.75	0.53	0.5	0.35
Physical space requirements : property, site access, buildings, easements	0.70		0.75	0.53	0.75	0.53		0.00	1	0.70	1	0.70
Availability of site services (road, water, sanitary, power, communications, gas)	0.20		1	0.20	1	0.20		0.00	1	0.20	0.75	0.15
Operation and Maintenance Complexity	0.30		0.25	0.08	0.75	0.23		0.00	0.5	0.15	0.25	0.08
Alternative is Well-Established and Proven	0.90		0.25	0.23	1	0.90		0.00	0.75	0.68	0.75	0.68
Total: Technical Considerations	*4.30*	*43%*	*3.25*	*1.73*	*5.25*	*3.68*	*0*	*0.00*	*5*	*3.75*	*4.25*	*3.45*
Approvals Requirements												
MOE Approvals Process	0.80		0.5	0.40	1	0.80		0.00	1	0.80	1	0.80
Other Agency Approvals (MVCA, MMAH, Hydro, ESA, DFO, MNR, County, ….)	0.00			0.00		0.00		0.00		0.00		0.00
Municipal Class EA Implications	0.40		1	0.40	1	0.40		0.00	0.75	0.30	0.75	0.30
Compatibility with Official Plan, Zoning, overall development plans for the Municipality	0.00			0.00		0.00		0.00		0.00		0.00
Total: Approvals Requirements	*1.20*	*12%*	*1.5*	*0.80*	*2*	*1.20*	*0*	*0.00*	*1.75*	*1.10*	*1.75*	*1.10*
Financial Considerations												
Lifecycle Cost (Including design, construction, land acquisition, provision of utilities/services, operating cost, maintenance cost, replacement cost. Suggest use Net Present Value of these costs over 50 year life of facility)	1.00		0.75	0.75	1	1.00		0.00	0.5	0.50	0.25	0.25
Capital Cost	1.00		1	1.00	1	1.00		0.00	0.5	0.50	0.25	0.25
Operating and Maintenance Costs	0.80		0.5	0.40	0.75	0.60		0.00	0.5	0.40	0.25	0.20
Total: Financial Considerations	*2.80*	*28%*	*2.25*	*2.15*	*2.75*	*2.60*	*0*	*0.00*	*1.5*	*1.40*	*0.75*	*0.70*
Environmental and Social Impacts												
Energy Consumption/Ecological Footprint (e.g. GHG emissions)	0.90		0.5	0.45	1	0.90		0.00	0.75	0.68	0.5	0.45
Impact on natural environment such as woodlands, wildlife, terrestrial vegetation, groundwater, aquatic, air, etc.	0.80		0.5	0.40	0.75	0.60		0.00	0.75	0.60	1	0.80
Impact on Provincially Significant Wetlands (PSW), Environmentally Sensitive Habitats (ESH)	0.00			0.00		0.00		0.00		0.00		0.00
Public Acceptance	0.00			0.00		0.00		0.00		0.00		0.00
Compatibility with adjacent land uses, impact on adjacent land uses	0.00			0.00		0.00		0.00		0.00		0.00
First Nations/Aboriginal Peoples	0.00			0.00		0.00		0.00		0.00		0.00
Archaeological/Heritage Sites	0.00			0.00		0.00		0.00		0.00		0.00
Total: Environmental and Social Impacts	*1.70*	*17%*	*1*	*0.85*	*1.75*	*1.50*	*0*	*0.00*	*1.5*	*1.28*	*1.5*	*1.25*
OVERALL SCORE	***10.00***	***100%***	***5.53***		***8.98***		***0.00***		***7.53***		***6.50***	

LIST OF ALTERNATIVES	Overall Score	Overall Ranking
1. Do Nothing(Maintain Ex. System)	5.53	4
2. New wash pumps and filter media	8.98	1
4. Cloth Media Disk Filter	7.53	2
5. Membrane Ultrafiltration	6.50	3

THE MUNICIPALITY OF NORTH PERTH
WASTEWATER TREATMENT MASTER PLAN

SCREENING-LEVEL EVALUATION MATRIX : FOG MANAGEMENT

Evaluation Criteria	Screening Criteria Weighting Factor	Relative Importance of Each Category	1. Do Nothing (Maintain Ex. System)		2. New Skimmer Pump		3. Clarifier Skimming Arm		4. Bioaugmentation		5. Dispersed Air Flotation		6. Flotation Tank at Headworks	
			Score	Weighted Score	Score	Weighted Score	Score	Weighted Score	Score	Weighted Score	Score	Weighted Score	Score	Weighted Score
Ability to Address the Problem	3.00	30%	1	3.00	2	6.00	2	6.00	2	6.00	3	9.00	3	9.00
Technical Feasibility	2.00	20%	3	6.00	3	6.00	3	6.00	1	2.00	1	2.00	2	4.00
Relative Cost-Benefit or Life Cycle Cost of Implementation	2.00	20%	2	4.00	2	4.00	2	4.00	2	4.00	1	2.00	2	4.00
Energy Consumption/Ecological Footprint (e.g. GHG emissions)	1.00	10%	3	3.00	2	2.00	2	2.00	3	3.00	1	1.00	2	2.00
Compatibility with Municipal, County, and Provincial Policies, Regulations, and Studies	1.00	10%	1	1.00	3	3.00	3	3.00	2	2.00	3	3.00	3	3.00
Alternative is Well-Established and Proven	1.00	10%	3	3.00	1	1.00	3	3.00	1	1.00	2	2.00	3	3.00
OVERALL SCORE	***10.00***	***100%***	***20.00***		***22.00***		***24.00***		***18.00***		***19.00***		***25.00***	

LIST OF ALTERNATIVES	Overall Score	Overall Ranking	Status
1. Do Nothing(Maintain Ex. System)	20.00	4	Carried forward
2. New Skimmer Pump	22.00	3	Carried forward
3. Clarifier Skimming Arm	24.00	2	Carried forward
4. Bioaugmentation	18.00	6	Not carried forward
5. Dispersed Air Flotation	19.00	5	Not carried forward
6. Flotation Tank at Headworks	25.00	1	Carried forward

DETAILED EVALUATION MATRIX : FOG MANAGEMENT

Evaluation Criteria	Screening Criteria Weighting Factor	Relative Importance of Each Category	1. Do Nothing (Maintain Ex. System)		2. New Skimmer Pump		3. Clarifier Skimming Arm		4. Bioaugmentation		5. Dispersed Air Flotation		6. Flotation Tank at Headworks	
Technical Considerations			Score	Weighted Score	Score	Weighted Score	Score	Weighted Score	Score	Weighted Score	Score	Weighted Score	Score	Weighted Score
Ability to Address the Problem	1.20		0.25	0.30	0.25	0.30	0.5	0.60		0.00		0.00	1	1.20
Technical Feasibility (constructability, geotechnical, groundwater conditions, creek crossings, existing structures and utilities)	0.70		1	0.70	0.75	0.53	0.75	0.53		0.00		0.00	0.75	0.53
Physical space requirements : property, site access, buildings, easements	0.60		1	0.60	1	0.60	1	0.60		0.00		0.00	0.75	0.45
Availability of site services (road, water, sanitary, power, communications, gas)	0.20		1	0.20	1	0.20	1	0.20		0.00		0.00	1	0.20
Operation and Maintenance Complexity	0.30		0.75	0.23	0.75	0.23	0.75	0.23		0.00		0.00	0.5	0.15
Alternative is Well-Established and Proven	0.90		0.25	0.23	0.5	0.45	1	0.90		0.00		0.00	1	0.90
Total: Technical Considerations	*3.90*	*39%*	*4.25*	*2.25*	*4.25*	*2.30*	*5*	*3.05*	*0*	*0.00*	*0*	*0.00*	*5*	*3.43*
Approvals Requirements														
MOE Approvals Process	0.70		1	0.70	1	0.70	1	0.70		0.00		0.00	1	0.70
Other Agency Approvals (MVCA, MMAH, Hydro, ESA, DFO, MNR, County, ….)	0.00			0.00		0.00		0.00		0.00		0.00		0.00
Municipal Class EA Implications	0.40		1	0.40	1	0.40	1	0.40		0.00		0.00	1	0.40
Compatibility with Official Plan, Zoning, overall development plans for the Municipality	0.00			0.00		0.00		0.00		0.00		0.00		0.00
Total: Approvals Requirements	*1.10*	*11%*	*2*	*1.10*	*2*	*1.10*	*2*	*1.10*	*0*	*0.00*	*0*	*0.00*	*2*	*1.10*
Financial Considerations														
Lifecycle Cost (Including design, construction, land acquisition, provision of utilities/services, operating cost, maintenance cost, replacement cost. Suggest use Net Present Value of these costs over 50 year life of facility)	1.00		0.5	0.50	0.5	0.50	0.5	0.50		0.00		0.00	1	1.00
Capital Cost	1.00		1	1.00	1	1.00	0.75	0.75		0.00		0.00	0.25	0.25
Operating and Maintenance Costs	0.90		0.5	0.45	0.5	0.45	0.75	0.68		0.00		0.00	0.75	0.68
Total: Financial Considerations	*2.90*	*29%*	*2*	*1.95*	*2*	*1.95*	*2*	*1.93*	*0*	*0.00*	*0*	*0.00*	*2*	*1.93*
Environmental and Social Impacts														
Energy Consumption/Ecological Footprint (e.g. GHG emissions)	0.90		1	0.90	0.75	0.68	0.75	0.68		0.00		0.00	0.5	0.45
Impact on natural environment such as woodlands, wildlife, terrestrial vegetation, groundwater, aquatic, air, etc.	0.80		0.75	0.60	0.75	0.60	1	0.80		0.00		0.00	1	0.80
Impact on Provincially Significant Wetlands (PSW), Environmentally Sensitive Habitats (ESH)	0.00			0.00		0.00		0.00		0.00		0.00		0.00
Public Acceptance	0.40		1	0.40	1	0.40	1	0.40		0.00		0.00	1	0.40
Compatibility with adjacent land uses, impact on adjacent land uses	0.00			0.00		0.00		0.00		0.00		0.00		0.00
First Nations/Aboriginal Peoples	0.00			0.00		0.00		0.00		0.00		0.00		0.00
Archaeological/Heritage Sites	0.00			0.00		0.00		0.00		0.00		0.00		0.00
Total: Environmental and Social Impacts	*2.10*	*21%*	*2.75*	*1.90*	*2.5*	*1.68*	*2.75*	*1.88*	*0*	*0.00*	*0*	*0.00*	*2.5*	*1.65*
OVERALL SCORE	***10.00***	***100%***	***7.20***		***7.03***		***7.95***		***0.00***		***0.00***		***8.10***	

LIST OF ALTERNATIVES	Overall Score	Overall Ranking
1. Do Nothing(Maintain Ex. System)	7.20	3
2. New Skimmer Pump	7.03	4
3. Clarifier Skimming Arm	7.95	2

THE MUNICIPALITY OF NORTH PERTH
WASTEWATER TREATMENT MASTER PLAN

SCREENING-LEVEL EVALUATION MATRIX : EFFLUENT DISINFECTION

Evaluation Criteria	Screening Criteria Weighting Factor	Relative Importance of Each Category	1. Do Nothing (Maintain Ex. System)		2. Install New Generation UV System		3. Replace Level Control Device		4. Install New Generation UV System and Level Control		5. Chemical Disinfection using Chlorine Liquid		6. Chemical Disinfection using Chlorine Gas		7. Chemical Disinfection using Ozone		8. Chemical Disinfection using Hydrogen Peroxide	
			Score	Weighted Score	Score	Weighted Score	Score	Weighted Score	Score	Weighted Score	Score	Weighted Score	Score	Weighted Score	Score	Weighted Score	Score	Weighted Score
Ability to Address the Problem	3.00	30%	2	6	3	9	2	6	3	9	2	6	2	6	3	9	3	9
Technical Feasibility	2.00	20%	3	6	3	6	2	4	3	6	2	4	1	2	1	2	1	2
Relative Cost-Benefit or Life Cycle Cost of Implementation	2.00	20%	1	2	3	6	2	4	3	6	2	4	2	4	1	2	1	2
Energy Consumption/Ecological Footprint (e.g. GHG emissions)	1.00	10%	2	2	2	2	3	3	2	2	1	1	1	1	1	1	2	2
Compatibility with Municipal, County, and Provincial Policies, Regulations, and Studies	1.00	10%	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2
Alternative is Well-Established and Proven	1.00	10%	3	3	3	3	2	2	3	3	3	3	2	2	1	1	1	1
OVERALL SCORE	***10.00***	***100%***	***21.00***		***28.00***		***21.00***		***28.00***		***20.00***		***17.00***		***17.00***		***18.00***	

LIST OF ALTERNATIVES	Overall Score	Overall Ranking	Status
1. Do Nothing(Maintain Ex. System)	21.00	3	Carried forward
2. Install New Generation UV System	28.00	1	Carried forward
3. Replace Level Control Device	21.00	3	Carried forward
4. Install New Generation UV System and Level Control	28.00	1	Carried forward
5. Chemical Disinfection using Chlorine Liquid	20.00	5	Carried forward
6. Chemical Disinfection using Chlorine Gas	17.00	7	Not carried forward
7. Chemical Disinfection using Ozone	17.00	7	Not carried forward
8. Chemical Disinfection using Hydrogen Peroxide	18.00	6	Not carried forward

DETAILED EVALUATION MATRIX : EFFLUENT DISINFECTION

Evaluation Criteria	Screening Criteria Weighting Factor	Relative Importance of Each Category	1. Do Nothing (Maintain Ex. System)		2. Install New Generation UV System		3. Replace Level Control Device		4. Install New Generation UV System and Level Control		5. Chemical Disinfection using Chlorine Liquid		6. Chemical Disinfection using Chlorine Gas		7. Chemical Disinfection using Ozone		8. Chemical Disinfection using Hydrogen Peroxide	
Technical Considerations			Score	Weighted Score	Score	Weighted Score	Score	Weighted Score	Score	Weighted Score	Score	Weighted Score	Score	Weighted Score	Score	Weighted Score	Score	Weighted Score
Ability to Address the Problem	1.40		0.25	0.35	1	1.40	0.5	0.70	1	1.40	0.75	1.05		0.00		0.00		0.00
Technical Feasibility (constructability, geotechnical, groundwater conditions, creek crossings, existing structures and utilities)	0.70		1	0.70	1	0.70	0.5	0.35	1	0.70	0.5	0.35		0.00		0.00		0.00
Physical space requirements : property, site access, buildings, easements	0.60		1	0.60	1	0.60	1	0.60	1	0.60	0.5	0.30		0.00		0.00		0.00
Availability of site services (road, water, sanitary, power, communications, gas)	0.40		1	0.40	0.75	0.30	1	0.40	0.75	0.30	0.5	0.20		0.00		0.00		0.00
Operation and Maintenance Complexity	0.30		0.75	0.23	0.75	0.23	1	0.30	0.75	0.23	0.5	0.15		0.00		0.00		0.00
Alternative is Well-Established and Proven	0.30		1	0.30	1	0.30	0.75	0.23	1	0.30	0.75	0.23		0.00		0.00		0.00
Total: Technical Considerations	*3.70*	*37%*	*5*	*2.58*	*5.5*	*3.53*	*4.75*	*2.58*	*5.5*	*3.53*	*3.5*	*2.28*	*0*	*0.00*	*0*	*0.00*	*0*	*0.00*
Approvals Requirements																		
MOE Approvals Process	0.70		0.75	0.53	1	0.70	1	0.70	1	0.70	0.75	0.53		0.00		0.00		0.00
Other Agency Approvals (MVCA, MMAH, Hydro, ESA, DFO, MNR, County, ….)	0.70		1	0.70	1	0.70	1	0.70	1	0.70	0.5	0.35		0.00		0.00		0.00
Municipal Class EA Implications	0.40		1	0.40	1	0.40	1	0.40	1	0.40	1	0.40		0.00		0.00		0.00
Compatibility with Official Plan, Zoning, overall development plans for the Municipality	0.40		1	0.40	1	0.40	1	0.40	1	0.40	1	0.40		0.00		0.00		0.00
Total: Approvals Requirements	*2.20*	*22%*	*3.75*	*2.03*	*4*	*2.20*	*4*	*2.20*	*4*	*2.20*	*3.25*	*1.68*	*0*	*0.00*	*0*	*0.00*	*0*	*0.00*
Financial Considerations																		
Lifecycle Cost (Including design, construction, land acquisition, provision of utilities/services, operating cost, maintenance cost, replacement cost. Suggest use Net Present Value of these costs over 50 year life of facility)	1.00		0.75	0.75	1	1.00	1	1.00	1	1.00	0.5	0.50		0.00		0.00		0.00
Capital Cost	0.80		1	0.80	0.5	0.40	1	0.80	0.5	0.40	0.5	0.40		0.00		0.00		0.00
Operating and Maintenance Costs	0.50		0.5	0.25	1	0.50	1	0.50	1	0.50	0.5	0.25		0.00		0.00		0.00
Total: Financial Considerations	*2.30*	*23%*	*2.25*	*1.80*	*2.5*	*1.90*	*3*	*2.30*	*2.5*	*1.90*	*1.5*	*1.15*	*0*	*0.00*	*0*	*0.00*	*0*	*0.00*
Environmental and Social Impacts																		
Energy Consumption/Ecological Footprint (e.g. GHG emissions)	0.90		0.5	0.45	0.75	0.68	1	0.90	0.75	0.68	0.75	0.68		0.00		0.00		0.00
Impact on natural environment such as woodlands, wildlife, terrestrial vegetation, groundwater, aquatic, air, etc.	0.60		0.75	0.45	0.75	0.45	1	0.60	1	0.60	0.75	0.45		0.00		0.00		0.00
Impact on Provincially Significant Wetlands (PSW), Environmentally Sensitive Habitats (ESH)	0.00			0.00		0.00		0.00		0.00		0.00		0.00		0.00		0.00
Public Acceptance	0.30		1	0.30	1	0.30	1	0.30	1	0.30	0.5	0.15		0.00		0.00		0.00
Compatibility with adjacent land uses, impact on adjacent land uses	0.00			0.00		0.00		0.00		0.00		0.00		0.00		0.00		0.00
First Nations/Aboriginal Peoples	0.00			0.00		0.00		0.00		0.00		0.00		0.00		0.00		0.00
Archaeological/Heritage Sites	0.00			0.00		0.00		0.00		0.00		0.00		0.00		0.00		0.00
Total: Environmental and Social Impacts	*1.80*	*18%*	*2.25*	*1.20*	*2.5*	*1.43*	*3*	*1.80*	*2.75*	*1.58*	*2*	*1.28*	*0*	*0.00*	*0*	*0.00*	*0*	*0.00*
OVERALL SCORE	***10.00***	***100%***	***7.60***		***9.05***		***8.88***		***9.20***		***6.38***		***0.00***		***0.00***		***0.00***	

LIST OF ALTERNATIVES	Overall Score	Overall Ranking
1. Do Nothing(Maintain Ex. System)	7.60	4
2. Install New Generation UV System	9.05	2
3. Replace Level Control Device	8.88	3
4. Install New Generation UV System and Level Control	9.20	1
5. Chemical Disinfection using Chlorine Liquid	6.38	5

APPENDIX E
BUDGET ESTIMATES

North Perth Wastewater Treatment Master Plan
Budget Estimates for Full-Scale Implementation of Preliminary Preferred Alternatives
GM BluePlan Project No. 311031

Item No.	Description of Project in Master Plan	Description of Recommended Alternative	Budget Estimates ($2015)
1	Treatment Plant Performance	Plant Optimization - operational changes only, no capital cost	$0
2	Plant Outfall Location	Maintain existing outfall	$0
3	Wastewater Conveyance (Pipelines)	New 450mm forcemain	$1,693,000
4	Sludge Management	Sludge thickening/dewatering, storage and conveyance to third party ORMC	$2,900,000
5	Standby Power Supply	Standby Power for All Loads	$926,000
6	Headworks	New Mechanical bar screen and grit classifier with building around headworks for winterization, redundant grit tanks	$3,826,000
7	Status of Lagoons	Process sludge in East Lagoon through ORMC, minor upgrades to West Lagoon	$535,000
8	Septage Receiving Station	Optimize Septage Receiving Station including new forcemain	$836,000
9	Highway 23 Sewage Pumping Station	Screening/grinding Equipment for Highway 23 Pump Station and upgrades to meet regulatory compliance	$900,000
10	Fat, Oil, and Grease (FOG) Management	Install flotation tank at headworks	Included in Item 6
11	Tertiary Filtration	New wash pump, media and underdrain	$125,000
12	Effluent Disinfection	Replace UV system and level controller, and install flow measurement flume	$478,000
13	Main Power Supply	Upgrades to existing substation	$300,000
14	SCADA System	Upgrade SCADA system	$100,000
15	Secondary Clarification	Install flow balancing device	$85,000
16	Odour Control	Allowance for future odour control as may be required based on outcome of future odour study following plant upgrades to headworks and/or sludge mangement	$500,000
		TOTAL	**$13,204,000**

1. The above costs are estimates for high level budgeting purposes only.
2. HST is not included in estimate.
3. Estimates include engineering costs and contingency allowance (15% of construction costs and 15% of total project costs, respectively)
4. Estimate is derived from preliminary information prior to design calculations.

North Perth WWTP Master Plan
Budget Estimates for Full-Scale Implementation
GM BluePlan Project No. 311031

WASTEWATER CONVEYANCE (PIPELINES)
New Influent Forcemain

Description	Qty.	Unit of Measure	Unit Cost ($2015)	Total Cost ($2015)
GENERAL				
Mobilization and demobilization, bonding, insurance, submittals, commissioning (5% of construction sub-total)	100%	L.S.	61,000.0(	61,000.00
General Sub-Tota				**$ 61,000.00**
SITE WORKS				
General Siteworks Allowance - topsoil stripping, clearing, stockpiling, area grading, drainage	100%	L.S.	35,000.0(	35,000.00
Excavation - incl. disposal of excess	1,000	cu.m.	18.0(	18,000.00
Site Works Sub-Tota				**$ 53,000.00**
STRUCTURAL AND BUILDINGS				
Structural and Buildings Sub-Tota				**$ -**
MECHANICAL AND PROCESS EQUIPMENT				
Repairs as required to existing forcemains, includes swabbing	100%	L.S.	35,000.0(	35,000.00
Valve chambers, pre-cast with isolation valves for interconnections	2	ea	40,000.0(	80,000.00
New 450mm forcemain	1450	m	725.0(	1,051,250.00
Mechanical and Process Equipment Sub-Tota				**$ 1,166,250.00**
ELECTRICAL AND INSTRUMENTATION				
Wiring	0%	L.S.	0.0(	0.00
Instrumentation	0%	L.S.	0.0(	0.00
Control Panel	0%	L.S.	0.0(	0.00
(				**$ -**
CONSTRUCTION SUB-TOTAI				**$ 1,280,250.00**
ENGINEERING SERVICES				
Preliminary and detailed design, approvals, tendering, contract administration, site inspection, materials testing, testing and commissioning	100%	L.S.	192,000.0(	192,000.00
ENGINEERING SERVICES SUB-TOTAI				**$ 192,000.00**
SUB-TOTAL				**$ 1,472,250.00**
CONTINGENCY ALLOWANCE (15%)				**$ 221,000.00**
TOTAL ESTIMATED COST ($2015CAD)				**$ 1,693,250.00**
Total rounded				**$ 1,693,000.00**

AVAILABLE INFORMATION

1. The above costs do not include HST.

North Perth WWTP Master Plan
Budget Estimates for Full-Scale Implementation
GM BluePlan Project No. 311031

SLUDGE MANAGEMENT

Convert sludge storage basin to temperary WAS storage, dewater portion of east lagoon for final product

Item No.	Description	Qty.	Unit of Measure	Unit Cost ($2015)	Total Cost ($2015)
GENERAL					
1	Mobilization and demobilization, bonding, insurance, submittals, commissioning (5% of construction sub-total)	100%	L.S.	101,000.0(	101,000.00
	General Sub-Tota				**$ 101,000.00**
SITE WORKS					
2	General Siteworks Allowance - topsoil stripping, clearing, stockpiling, area grading, drainage	100%	L.S.	50,000.0(	50,000.00
3	Earth Moving/dewater/berming E. Lagoon for Final Product Storage- incl. disposal of excess	12,000	cu.m.	35.0(	420,000.00
	Site Works Sub-Tota				**$ 470,000.00**
STRUCTURAL AND BUILDINGS					
4	WAS storage Blower building	30	sq.m.	1,650.0(	49,500.00
5	Blower building - concrete	28.8	cu.m.	1,350.0(	38,880.00
	Structural and Buildings Sub-Tota				**$ 88,380.00**
MECHANICAL AND PROCESS EQUIPMENT (price includes installation)					
	Yard Piping, direct WAS forcemain to E. Lagoon (assume 150mm, existing is 100mm)	70	m	350.0(	24,500.00
	Yard Piping, existing sludge storage basin to new Lystek Centre	50	m	350.0(	17,500.00
12	Rotary drum thickener	100%	L.S.	422,558.0(	422,558.00
	New course bubble diffusers for WAS storage aeration	100%	L.S.	130,000.0(	130,000.00
	WAS Storage aeration blowers	2	each	40,000.0(	80,000.00
14	WAS pumps, each rated for ~600m3/day, 80psi (two to pump to storage lagoon, two to pump from lagoon to Lystek centre)	4	each	30,000.0(	120,000.00
	Miscellaneous cost sharing with Lystek (ex. power supply, odour control	1	L.S.	500,000.0(	500,000.00
	Mechanical and Process Equipment Sub-Tota				**$ 1,294,558.00**
ELECTRICAL AND INSTRUMENTATION					
16	Electrical - for WAS pumps and blowers, thickener	100%	L.S.	75,000.0(	75,000.00
17	Instrumentation - for WAS pumps and blowers, thickener	100%	L.S.	50,000.0(	50,000.00
18	Controls - for WAS pumps and blowers, thickener	100%	L.S.	50,000.0(	50,000.00
	Electrical and Instrumentation Sub-Tota				**$ 175,000.00**
	CONSTRUCTION SUB-TOTAI				**$ 2,128,938.00**
ENGINEERING SERVICES					
19	Preliminary and detailed design, approvals, tendering, contract administration, site inspection, materials testing, testing and commissioning (10% of construction sub-total)	100%	L.S.	319,000.0(	319,000.00
20	SCADA system programming	100%	L.S.	75,000.0(	75,000.00
	ENGINEERING SERVICES SUB-TOTAI				**$ 394,000.00**
	SUB-TOTAL				**$ 2,522,938.00**
	CONTINGENCY ALLOWANCE (15%)				**$ 378,000.00**
	TOTAL ESTIMATED COST ($2015CAD)				**$ 2,900,938.00**
	Total Rounded				**$ 2,900,000.00**

AVAILABLE INFORMATION

1. The above costs do not include HST.

August 2015

North Perth WWTP Master Plan
Budget Estimates for Full-Scale Implementation
GM BluePlan Project No. 311031

STANDBY POWER SUPPLY
Standby Power to Critical Equipment

	Description	Qty.	Unit of Measure	Unit Cost ($2015)	Total Cost ($2015)
GENERAL					
	Mobilization and demobilization, bonding, insurance, submittals, commissioning (5% of construction sub-total)	100%	L.S.	33,000.0	33,000.00
				General Sub-Tota	**$ 33,000.00**
SITE WORKS					
	General Siteworks Allowance - topsoil stripping, clearing, stockpiling, area grading, drainage	100%	L.S.	40,000.0	40,000.00
				Site Works Sub-Tota	**$ 40,000.00**
STRUCTURAL AND BUILDINGS					
			cu.m.		0.00
				Structural and Buildings Sub-Tota	**$ -**
MECHANICAL AND PROCESS EQUIPMENT					
					0.00
				Mechanical and Process Equipment Sub-Tota	**$ -**
ELECTRICAL AND INSTRUMENTATION					
	Diesel backup generator, with fuel and exhaust system	100%	L.S.	627,000.0	627,000.00
	Wiring, instrumentation and control panel	100%	L.S.	70,000.0	70,000.00
				Electrical and Instrumentation Sub-Tota	**$ 627,000.00**
				CONSTRUCTION SUB-TOTAI	**$ 700,000.00**
ENGINEERING SERVICES					
	Preliminary and detailed design, approvals, tendering, contract administration, site inspection, materials testing, testing and commissioning	100%	L.S.	105,000.0	105,000.00
				ENGINEERING SERVICES SUB-TOTAI	**$ 105,000.00**
				SUB-TOTAL	**$ 805,000.00**
				CONTINGENCY ALLOWANCE (15%)	**$ 121,000.00**
				TOTAL ESTIMATED COST ($2015CAD)	**$ 926,000.00**
				Total rounded	**$ 926,000.00**

AVAILABLE INFORMATION

1. The above costs do not include HST.

North Perth WWTP Master Plan
Budget Estimates for Full-Scale Implementation
GM BluePlan Project No. 311031

HEADWORKS

	Description	Qty.	Unit of Measure	Unit Cost ($2015)	Total Cost ($2015)
GENERAL					
	Mobilization and demobilization, bonding, insurance, submittals, commissioning (5% of construction sub-total)	100%	L.S.	138,000.0(	138,000.00
				General Sub-Tota	**$ 138,000.00**
SITE WORKS					
	Decommissioning of existing grit classifier and manual bar screen	100%	L.S.	80,000.0(	80,000.00
	Grading within and around new building envelope	100%	L.S.	100,000.0(	100,000.00
				Site Works Sub-Tota	**$ 180,000.00**
STRUCTURAL AND BUILDINGS					
	New building around headworks	210	sq.m.	2,500.0(	525,000.00
	Concrete work	100%	L.S.	650,000.0(	650,000.00
				Structural and Buildings Sub-Tota	**$ 1,175,000.00**
MECHANICAL AND PROCESS EQUIPMENT					
	Mechanical bar screen with washer / compactor	100%	L.S.	400,000.0(	400,000.00
	New Automated Grit Classifier	100%	L.S.	400,000.0(	400,000.00
	Traveling bridge with grit pump and air lance for grease removal	100%	L.S.	400,000.0(	400,000.00
				Mechanical and Process Equipment Sub-Tota	**$ 1,200,000.00**
ELECTRICAL AND INSTRUMENTATION					
	Wiring	100%	L.S.	50,000.0(	50,000.00
	Instrumentation	100%	L.S.	50,000.0(	50,000.00
	Control Panel	100%	L.S.	100,000.0(	100,000.00
				Electrical and Instrumentation Sub-Tota	**$ 200,000.00**
				CONSTRUCTION SUB-TOTAI	**$ 2,893,000.00**
ENGINEERING SERVICES					
	Preliminary and detailed design, approvals, tendering, contract administration, site inspection, materials testing, testing and commissioning	100%	L.S.	434,000.0(	434,000.00
				ENGINEERING SERVICES SUB-TOTAI	**$ 434,000.00**
				SUB-TOTAL	**$ 3,327,000.00**
				CONTINGENCY ALLOWANCE (15%)	**$ 499,000.00**
				TOTAL ESTIMATED COST ($2015CAD)	**$ 3,826,000.00**
				Total Rounded	**$ 3,826,000.00**

AVAILABLE INFORMATION

1. The above costs do not include HST.

North Perth WWTP Master Plan
Budget Estimates for Full-Scale Implementation
GM BluePlan Project No. 311031

STATUS OF LAGOONS

Desludge East Lagoon by sending solids to offsite ORMC

	Description	Qty.	Unit of Measure	Unit Cost ($2015)	Total Cost ($2015)
GENERAL					
	Mobilization and demobilization, bonding, insurance, submittals, commissioning (5% of construction sub-total)	100%	L.S.	19,000.0(	19,000.00
				General Sub-Tota	**$ 19,000.00**
SITE WORKS					
	General Siteworks Allowance - topsoil stripping, clearing, stockpiling, area grading, drainage, landscaping	100%	L.S.	60,000.0(	60,000.00
	Sludge Removal - Lystek quote	0	cu.m	5.0(	0.00
				Site Works Sub-Tota	**$ 60,000.00**
STRUCTURAL AND BUILDINGS					
	Upgrade lagoon outlet structure for West Lagoon to better collect debris	1	L.S.	100,000.0(	100,000.00
				Structural and Buildings Sub-Tota	**$ 100,000.00**
MECHANICAL AND PROCESS EQUIPMENT					
	Lagoon Master - sludge distribution device/horizontal aerator	2	ea	55,000.0(	110,000.00
	Distribution Piping	100%	L.S.	75,000.0(	75,000.00
				Mechanical and Process Equipment Sub-Tota	**$ 185,000.00**
ELECTRICAL AND INSTRUMENTATION					
	Wiring	100%	L.S.	30,000.0(	30,000.00
	Instrumentation (included in Lagoon master quote)	0%	L.S.	0.0(	0.00
	Control Panel	100%	L.S.	10,000.0(	10,000.00
				Electrical and Instrumentation Sub-Tota	**$ 40,000.00**
				CONSTRUCTION SUB-TOTAI	**$ 404,000.00**
ENGINEERING SERVICES					
	Preliminary and detailed design, approvals, tendering, contract administration, site inspection, materials testing, testing and commissioning	100%	L.S.	61,000.0(	61,000.00
				ENGINEERING SERVICES SUB-TOTAI	**$ 61,000.00**
				SUB-TOTAL	**$ 465,000.00**
				CONTINGENCY ALLOWANCE (15%)	**$ 70,000.00**
				TOTAL ESTIMATED COST ($2015CAD)	**$ 535,000.00**
				Total rounded	**$ 535,000.00**

AVAILABLE INFORMATION

1. The above costs do not include HST.

North Perth WWTP Master Plan
Budget Estimates for Full-Scale Implementation
GM BluePlan Project No. 311031

SEPTAGE RECEIVING STATION
Optimize Station

	Description	Qty.	Unit of Measure	Unit Cost ($2015)	Total Cost ($2015)
GENERAL					
	Mobilization and demobilization, bonding, insurance, submittals, commissioning (5% of construction sub-total)	100%	L.S.	30,000.0	30,000.00
				General Sub-Tota	**$ 30,000.00**
SITE WORKS					
	General Siteworks Allowance - topsoil stripping, clearing, stockpiling, area grading, drainage	100%	L.S.	50,000.0	50,000.00
	Excavation - incl. disposal of excess	400	cu.m.	100.0	40,000.00
				Site Works Sub-Tota	**$ 90,000.00**
STRUCTURAL AND BUILDINGS					
				Structural and Buildings Sub-Tota	**$ -**
MECHANICAL AND PROCESS EQUIPMENT					
	New forcemain to WAS storage & headworks with valving	100%	L.S.	500,000.0	500,000.00
				Mechanical and Process Equipment Sub-Tota	**$ 500,000.00**
ELECTRICAL AND INSTRUMENTATION					
	Wiring	100%	L.S.	5,000.0	5,000.00
	Instrumentation	100%	L.S.	5,000.0	5,000.00
	Control Panel	100%	L.S.	2,500.0	2,500.00
				Electrical and Instrumentation Sub-Tota	**$ 12,500.00**
				CONSTRUCTION SUB-TOTAL	**$ 632,500.00**
ENGINEERING SERVICES					
	Preliminary and detailed design, approvals, tendering, contract administration, site inspection, materials testing, testing and commissioning	100%	L.S.	95,000.0	95,000.00
				ENGINEERING SERVICES SUB-TOTAL	**$ 95,000.00**
				SUB-TOTAL	**$ 727,500.00**
				CONTINGENCY ALLOWANCE (15%)	**$ 109,000.00**
				TOTAL ESTIMATED COST ($2015CAD)	**$ 836,500.00**
				Total rounded	**$ 836,000.00**

AVAILABLE INFORMATION

1. The above costs do not include HST.

North Perth WWTP Master Plan
Budget Estimates for Full-Scale Implementation
GM BluePlan Project No. 311031

HIGHWAY 23 SEWAGE PUMPING STATION
Install Screening / Grinding Equipment

	Description	Qty.	Unit of Measure	Unit Cost ($2015)	Total Cost ($2015)
GENERAL					
	Mobilization and demobilization, bonding, insurance, submittals, commissioning (5% of construction sub-total)	100%	L.S.	32,000.0	32,000.00
				General Sub-Tota	**$ 32,000.00**
SITE WORKS					
				Site Works Sub-Tota	**$ -**
STRUCTURAL AND BUILDINGS					
				Structural and Buildings Sub-Tota	**$ -**
MECHANICAL AND PROCESS EQUIPMENT					
	Mechanical screen for grit removal or grinder	100%	L.S.	350,000.0	350,000.00
	New ventilation fan/ducting	100%	L.S.	120,000.0	120,000.00
	Updates to fuel storage/delivery system	100%	L.S.	130,000.0	130,000.00
				Mechanical and Process Equipment Sub-Tota	**$ 600,000.00**
ELECTRICAL AND INSTRUMENTATION					
	Wiring	100%	L.S.	15,000.0	15,000.00
	Instrumentation	100%	L.S.	15,000.0	15,000.00
	Control Panel	100%	L.S.	15,000.0	15,000.00
				Electrical and Instrumentation Sub-Tota	**$ 45,000.00**
				CONSTRUCTION SUB-TOTAI	**$ 677,000.00**
ENGINEERING SERVICES					
	Preliminary and detailed design, approvals, tendering, contract administration, site inspection, materials testing, testing and commissioning	100%	L.S.	102,000.0	102,000.00
				ENGINEERING SERVICES SUB-TOTAI	**$ 102,000.00**
				SUB-TOTAL	**$ 779,000.00**
				CONTINGENCY ALLOWANCE (15%)	**$ 117,000.00**
				TOTAL ESTIMATED COST ($2015CAD)	**$ 896,000.00**
				Total rounded	**$ 900,000.00**

AVAILABLE INFORMATION

1. The above costs do not include HST.

North Perth WWTP Master Plan
Budget Estimates for Full-Scale Implementation
GM BluePlan Project No. 311031

TERTIARY FILTRATION
Refurbish existing sand filters

	Description	Qty.	Unit of Measure	Unit Cost ($2015)	Total Cost ($2015)
GENERAL					
	Mobilization and demobilization, bonding, insurance, submittals, commissioning (5% of construction sub-total)	100%	L.S.	5,000.0(	5,000.00
				General Sub-Tota	**$ 5,000.00**
SITE WORKS					
					0.00
				Site Works Sub-Tota	**$ -**
STRUCTURAL AND BUILDINGS					
					0.00
					0.00
					0.00
				Structural and Buildings Sub-Tota	**$ -**
MECHANICAL AND PROCESS EQUIPMENT					
	Replace sand media	100%	L.S.	30,000.0(	30,000.00
	Rebuild/repair underdrains	100%	L.S.	20,000.0(	20,000.00
	Replace backwash pumps	100%	L.S.	40,000.0(	40,000.00
					0.00
				Mechanical and Process Equipment Sub-Tota	**$ 90,000.00**
ELECTRICAL AND INSTRUMENTATION					
	Wiring	0%	L.S.	10,000.0(	0.00
	Instrumentation	0%	L.S.	15,000.0(	0.00
	Control Panel	0%	L.S.	15,000.0(	0.00
				Electrical and Instrumentation Sub-Tota	**$ -**
				CONSTRUCTION SUB-TOTAI	**$ 95,000.00**
ENGINEERING SERVICES					
	Preliminary and detailed design, approvals, tendering, contract administration, site inspection, materials testing, testing and commissioning	100%	L.S.	14,000.0(	14,000.00
				ENGINEERING SERVICES SUB-TOTAI	**$ 14,000.00**
				SUB-TOTAL	**$ 109,000.00**
				CONTINGENCY ALLOWANCE (15%)	**$ 16,000.00**
				TOTAL ESTIMATED COST ($2015CAD)	**$ 125,000.00**
				Total rounded	**$ 125,000.00**

AVAILABLE INFORMATION

1. The above costs do not include HST.

North Perth WWTP Master Plan
Budget Estimates for Full-Scale Implementation
GM BluePlan Project No. 311031

EFFLUENT DISINFECTION
New UV and level control

Description	Qty.	Unit of Measure	Unit Cost ($2015)	Total Cost ($2015)
GENERAL				
Mobilization and demobilization, bonding, insurance, submittals, commissioning (5% of construction sub-total)	100%	L.S.	17,000.0(	17,000.00
			General Sub-Tota	**$ 17,000.00**
SITE WORKS				
			Site Works Sub-Tota	**$ -**
STRUCTURAL AND BUILDINGS				
			Structural and Buildings Sub-Tota	**$ -**
MECHANICAL AND PROCESS EQUIPMENT				
New UV System (2 banks, total of 30 UV modules), 25,500m3/day total capacity, includes level controller	100%	L.S.	181,700.0(	181,700.00
Estimated installation cost	100%	L.S.	100,000.0(	100,000.00
Flow measurement flume	100%	L.S.	8,000.0(	8,000.00
			Mechanical and Process Equipment Sub-Tota	**$ 289,700.00**
ELECTRICAL AND INSTRUMENTATION				
Wiring	100%	L.S.	25,000.0(	25,000.00
Instrumentation	100%	L.S.	10,000.0(	10,000.00
Control Panel	100%	L.S.	20,000.0(	20,000.00
			Electrical and Instrumentation Sub-Tota	**$ 55,000.00**
			CONSTRUCTION SUB-TOTAI	**$ 361,700.00**
ENGINEERING SERVICES				
Preliminary and detailed design, approvals, tendering, contract administration, site inspection, materials testing, testing and commissioning	100%	L.S.	54,000.0(	54,000.00
			ENGINEERING SERVICES SUB-TOTAI	**$ 54,000.00**
			SUB-TOTAL	**$ 415,700.00**
			CONTINGENCY ALLOWANCE (15%)	**$ 62,000.00**
			TOTAL ESTIMATED COST ($2015CAD)	**$ 477,700.00**
			Total Rounded	**$ 478,000.00**

AVAILABLE INFORMATION

1. The above costs do not include HST.

North Perth WWTP Master Plan
Budget Estimates for Full-Scale Implementation
GM BluePlan Project No. 311031

MAIN POWER SUPPLY
Upgrades to substation

	Description	Qty.	Unit of Measure	Unit Cost ($2015)	Total Cost ($2015)
GENERAL					
	Mobilization and demobilization, bonding, insurance, submittals, commissioning (5% of construction sub-total)	100%	L.S.	11,000.0	11,000.00
				General Sub-Tota	**$ 11,000.00**
SITE WORKS					
				Site Works Sub-Tota	**$ -**
STRUCTURAL AND BUILDINGS					
				Structural and Buildings Sub-Tota	**$ -**
MECHANICAL AND PROCESS EQUIPMENT					
	New insulators and air gap switch for transformer	100%	L.S.	215,000.0	215,000.00
				Mechanical and Process Equipment Sub-Tota	**$ 215,000.00**
ELECTRICAL AND INSTRUMENTATION					
	Wiring	0%	L.S.	30,000.0	0.00
				Electrical and Instrumentation Sub-Tota	**$ -**
				CONSTRUCTION SUB-TOTAI	**$ 226,000.00**
ENGINEERING SERVICES					
	Preliminary and detailed design, approvals, tendering, contract administration, site inspection, materials testing, testing and commissioning	100%	L.S.	34,000.0	34,000.00
				ENGINEERING SERVICES SUB-TOTAI	**$ 34,000.00**
				SUB-TOTAL	**$ 260,000.00**
				CONTINGENCY ALLOWANCE (15%)	**$ 39,000.00**
				TOTAL ESTIMATED COST ($2015CAD)	**$ 299,000.00**
				Total Rounded	**$ 300,000.00**

AVAILABLE INFORMATION

1. The above costs do not include HST.

North Perth WWTP Master Plan
Budget Estimates for Full-Scale Implementation
GM BluePlan Project No. 311031

SCADA SYSTEM
Provide New Generation SCADA System

	Description	Qty.	Unit of Measure	Unit Cost ($2015)	Total Cost ($2015)
GENERAL					
	Mobilization and demobilization, bonding, insurance, submittals, commissioning (5% of construction sub-total)	100%	L.S.	4,000.0(	4,000.00
				General Sub-Tota	**$ 4,000.00**
SITE WORKS					
				Site Works Sub-Tota	**$ -**
STRUCTURAL AND BUILDINGS					
				Structural and Buildings Sub-Tota	**$ -**
MECHANICAL AND PROCESS EQUIPMENT					
				Mechanical and Process Equipment Sub-Tota	**$ -**
ELECTRICAL AND INSTRUMENTATION					
	Replace SCADA	100%	L.S.	70,000.0(	70,000.00
				Electrical and Instrumentation Sub-Tota	**$ 70,000.00**
				CONSTRUCTION SUB-TOTAI	**$ 74,000.00**
ENGINEERING SERVICES					
	Preliminary and detailed design, approvals, tendering, contract administration, site inspection, materials testing, testing and commissioning	100%	L.S.	11,000.0(	11,000.00
	SCADA system programming	100%	L.S.	50,000.0(	50,000.00
				ENGINEERING SERVICES SUB-TOTAI	**$ 11,000.00**
				SUB-TOTAL	**$ 85,000.00**
				CONTINGENCY ALLOWANCE (15%)	**$ 13,000.00**
				TOTAL ESTIMATED COST ($2015CAD)	**$ 98,000.00**
				Total rounded	**$ 100,000.00**

AVAILABLE INFORMATION

1. The above costs do not include HST.

North Perth WWTP Master Plan
Budget Estimates for Full-Scale Implementation
GM BluePlan Project No. 311031

SECONDARY CLARIFIERS
Install flow balancing device at outlet of aeration tanks

	Description	Qty.	Unit of Measure	Unit Cost ($2015)	Total Cost ($2015)
GENERAL					
	Mobilization and demobilization, bonding, insurance, submittals, commissioning (5% of construction sub-total)	100%	L.S.	3,000.00	3,000.00
				General Sub-Total	**$ 3,000.00**
SITE WORKS					
				Site Works Sub-Total	**$ -**
STRUCTURAL AND BUILDINGS					
				Structural and Buildings Sub-Total	**$ -**
MECHANICAL AND PROCESS EQUIPMENT					
	Flow splitting device	100%	L.S.	60000	60000
				Mechanical and Process Equipment Sub-Total	**$ 60,000.00**
ELECTRICAL AND INSTRUMENTATION					
				Electrical and Instrumentation Sub-Total	**$ -**
				CONSTRUCTION SUB-TOTAL	**$ 63,000.00**
ENGINEERING SERVICES					
	Preliminary and detailed design, approvals, tendering, contract administration, site inspection, materials testing, testing and commissioning	100%	L.S.	9,000.00	9,000.00
				ENGINEERING SERVICES SUB-TOTAL	**$ 9,000.00**
				SUB-TOTAL	**$ 72,000.00**
				CONTINGENCY ALLOWANCE (15%)	**$ 11,000.00**
				TOTAL ESTIMATED COST ($2015CAD)	**$ 83,000.00**
				Total Rounded	**$85,000**

AVAILABLE INFORMATION

1. The above costs do not include HST.

APPENDIX F
MINISTRY OF ENVIRONMENT AND CLIMATE CHANGE CERTIFICATE OF APPROVAL

Ministry of the Environment
Ministère de l'Environnement

AMENDED CERTIFICATE OF APPROVAL
MUNICIPAL AND PRIVATE SEWAGE WORKS
NUMBER 3087-7K8NZC
Issue Date: October 10, 2008

The Corporation of the Municipality of North Perth
330 Wallace Ave N
North Perth, Ontario
N4W 1L3

Site Location: Listowel Sewage Treatment Plant
Lot 13, 14, Concession 2, Elma
North Perth, County of Perth

You have applied in accordance with Section 53 of the Ontario Water Resources Act for approval of:

The municipal sewage works at the North Perth Wastewater Treatment Plant for the treatment and disposal of sewage, having a *Rated Capacity* of 9,030 m^3/d and consisting of the following *Existing Works*::

***Imported Wastewater* Receiving Facility**

- *imported wastewater* unloading area with concrete spill containment basin and drainage pipes to the equalization tank;
- *imported wastewater* receiving station, equipped with a grinder, a screening/washing unit and a clear wastewater bypass pump rated at 33 L/s at 4.9 m TDH, and discharge pipes to the equalization tank;
- one (1) 12 m diameter, 600 m^3 covered equalization tank for *imported wastewater*, equipped with a 4 hp propeller mixer and a 5 hp hydroejector mixing pump, two (2) submersible transfer/circulation pumps (one standby), each rated at 14 L/s at 15.6 m TDH (total dynamic head) discharging to the 450 mm diameter influent forcemain to the inlet works;

Inlet Works

- one (1) manually raked bar screen;
- one (1) aerated grit tank with a volume of approx. 47 m^3, equipped with aerators, grit air lift pumps and a grit classifier;
- two (2) comminutors, each with a *Peak Flow Rate* of 25,500 m^3/d;

Aeration Tanks

- two (2) 60 m x 15 m x 6 m SWD (side water depth) aeration tanks with a divider wall near the inlet end of each tank to create an anoxic zone of approx. 1,485 m^3 and an aerobic zone of approx. 3,915 m^3 to form two anoxic/oxic biological nutrient removal treatment trains;
- two (2) 15 hp submersible mixers, one in each anoxic zone;
- fine bubble membrane aeration system in the aeration zone;
- two (2) 231 L/s capacity submersible pumps, one in each aeration zone and equipped with VFDs (variable frequency drive) for internal recirculation of two to three times the average daily flow of mixed liquor from the aeration zones to the anoxic zones;

Air Blowers

- three (3) air blowers (one standby) in the basement of the administration building, each having a capacity of 2,500 L/s for air supply to the aeration tanks and the inlet works;

Secondary Clarifiers

- two (2) 30 m diameter x 4 m SWD circular secondary clarifiers;
- three (3) return activated sludge pumps, (one standby) located in the basement of the administration building, each pump rated at 104 L/s;

Temporary Effluent Storage/Emergency Wet Weather Overflow Cell

- the west cell of the lagoon retrofitted for temporary storage of secondary effluent under special circumstances or emergency wet weather overflows, to be discharged through the filters and disinfection system, or when deemed necessary, to be returned to the anoxic zones of the aeration tanks for further treatment;

Effluent Filtration

- two (2) 4.88 m x 22.56 m automatic backwash gravity sand filters located in the filter/disinfection building, each with a *Peak Flow Rate* of 12,500 m^3/d;
- a backwash pump rated at 16.86 L/s, a wash water pump rated at 16.86 L/s and a skimmer pump rated at 3.15 L/s for each filter;

Effluent Disinfection

- an ultraviolet radiation disinfection system comprising of two (2) banks of UV lamps, with a *Peak Flow Rate* of 25,500 m^3/d;

Parshall Flume

- a Parshall flume located immediately downstream of the ultraviolet radiation disinfection system to measure plant effluent flow;

Effluent Pumping Station

- an effluent pumping station located in the basement of the administration building with three (3) vertical turbine pumps (one standby), each pump rated at 148 L/s at 13.8 m TDH and equipped with VFD, pumping treated effluent through a 450 mm diameter, approx. 1,400 m long forcemain to discharge to the Middle Maitland River;

Sludge Digestion Facilities

- an earth bermed aerobic digester with a working volume of approx. 6,000 m^3, together with two positive displacement blowers (one standby), each with a capacity of 1,132 L/s, located in an adjacent small building, delivering air through tubular diffusers located on the floor of the digester;
- two (2) pumps rated at 19 L/s utilized to transfer sludge between cells and for loading a sludge haulage vehicle;

Phosphorus Removal Facilities

- a 27,300 L capacity chemical storage tank and four (4) chemical metering pumps, each capable of delivering up to 20 L/h of alum to precipitate phosphorus;

Digested Sludge Storage Cell

- the east cell of the lagoon for temporary storage of aerobically digested sludge (transferred from the sludge storage cell through the existing gravity transfer facility) over the winter months as an emergency contingency measure;

Administration Building

- an administration building housing office, lunchroom, laboratory, electrical control room, washroom/lockers and maintenance garage;

Miscellaneous

- all other controls, electrical equipment, instrumentation, piping, pumps, valves and appurtenances essential for the proper operation of the aforementioned sewage works;

all in accordance with the following submitted supporting documents:

1. Application for Approval and design submissions made by Azurix North America, Thorburn Penny and R. J. Burnside and Associates Ltd., Consulting Engineers.
2. Application for Approval and design submission made by R. J. Burnside & Associates Limited, Consulting Engineers;
3. Application for Approval of Municipal and Private Sewage Works submitted by Gamsby and Mannerow Limited dated October 4, 2005, including final design brief, final plans and specifications for the Hauled Sewage Receiving Facility and additional technical design information for the Aeration System Upgrade submitted by Gamsby and Mannerow dated November 29, 2005, December 22, 2005 and January 12, 2006;
4. Application for Approval of Municipal and Private Sewage Works submitted by Gamsby and Mannerow Limited dated July 10, 2006, including final design brief, final plans and specifications for the Process Modifications;
5. Application for Approval of Municipal and Private Sewage Works submitted by Matthew Ash of the Municipality of North Perth dated September 17, 2008 for modification of composition of influent sources, including brief for requested amendment and plant influent and effluent monitoring results;
6. Additional technical information submitted by Andrew Lugowski of Conestoga Rovers & Associates via email dated October 9, 2008.

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 TBOD5) 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 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 London 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;

"*Imported Wastewater*" means wastewater that is generated off-site and transported to the *works* for treatment and includes hauled sewage and other processed or partially processed waste that is predominantly organic in composition that is suitable for treatment or disposal in a municipal sewage treatment works;

"*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 Municipality of North Perth 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;

“*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; 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* .

You are hereby notified that this approval is issued to you subject to the terms and conditions outlined below:

TERMS AND CONDITIONS

1. <u>GENERAL PROVISIONS</u>

(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. <u>CHANGE OF OWNER</u>

(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*.

3. RECORD DRAWINGS

(1) 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*.

4. 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 6 using the protocols in Condition 8.

(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.

5. OPERATION 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 (April 1 to November 30) 10 (December 1 to March 31)
Total Suspended Solids	5 (April 1 to November 30) 10 (December 1 to March 31)
Total Phosphorus	0.22 (April 1 to November 30) 0.58 (December 1 to March 31)
Total Ammonia Nitrogen	1.5 (April 1 to November 30) 2.9 (December 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) operate the *Works* such that the *Monthly Average Loading* of the combined influent sewage from all sources to the *Works* does not exceed the BOD5 amount of 8,000 kg/d or TKN amount of 507 kg/d;

(d) 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.

(4) The *Owner* shall include in all reports submitted in accordance with Condition 9 a summary of the efforts made and results achieved under this Condition.

6. <u>EFFLUENT LIMITS</u>

(1) The *Owner* shall 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 3 - Effluent Limits		
Effluent Parameter	**Average Concentration** (milligrams per litre unless otherwise indicated)	**Average Waste Loading** (kilograms per day unless otherwise indicated)
Column 1	Column 2	Column 3
CBOD5	10 (April 1 to November 30) 15 (December 1 to March 31)	90.4 (April 1 to November 30) 135.6 (December 1 to March 31)
Total Suspended Solids	10 (April 1 to November 30) 15 (December 1 to March 31)	90.4 (April 1 to November 30) 135.6 (December 1 to March 31)
Total Phosphorus	0.36 (April 1 to November 30) 0.73 (December 1 to March 31)	3.28 (April 1 to November 30) 6.56 (December 1 to March 31)
Total Ammonia Nitrogen	2.2 (April 1 to November 30) 3.62 (December 1 to March 31)	20.0 (April 1 to November 30) 32.8 (December 1 to March 31)
pH of the effluent maintained between 6.0 to 9.5, inclusive, at all times		

(2) For the purposes of determining compliance with and enforcing subsection (1):

(a) *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 200 organisms per 100 millilitres of effluent discharged from the *works*.

(4) The *Owner* shall operate and maintain the *Works* such that the *Monthly Average Concentration* of Dissolved Oxygen is not less than 5.0 mg/L in the effluent discharged from the *Works*.

(5) The effluent limit set out in subsections (2), (3) and (4) shall apply upon the issuance of this *certificate*.

7. <u>OPERATION AND MAINTENANCE</u>

(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 prepare an operations manual within six (6) months of *Substantial Completion* of the *Proposed Works*, 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 follow-up 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.

8. <u>MONITORING AND RECORDING</u>

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) Bi-weekly means once every two weeks;
(c) 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 4 - Raw Sewage Monitoring		
Parameters	**Sample Type**	**Frequency**
CBOD5	Composite	Monthly
Total Suspended Solids	Composite	Monthly
Total Phosphorus	Composite	Monthly
Total Kjeldahl Nitrogen	Composite	Monthly

Table 5 - Final Effluent Monitoring		
Parameters	**Sample Type**	**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
Dissolved Oxygen	Grab	Weekly

Table 6 - *Imported Wastewater* Monitoring - outlet of Equalization Tank		
Parameters	**Sample Type**	**Frequency**
CBOD5	Grab	Bi-weekly
Total Suspended Solids	Grab	Bi-weekly
Total Phosphorus	Grab	Bi-weekly
Total Kjeldahl Nitrogen	Grab	Bi-weekly

(4) Not withstanding subsection (3), the *Owner* shall carry out flow monitoring, sampling and analyses of the wastewater from major non-municipal sources on a regular basis to ensure that their actual flow and wastewater loadings are generally consistent with the objective overall influent loadings listed in Subsection 3(c) of Condition 5.

(5) 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;

(6) 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).

(7) 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.

(8) 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.

(9) The *Owner* shall install and maintain a continuous flow measuring device or alternatively document the pump time to determine the flow rate and volume of the *imported wastewater* received at the *Works* for co-treatment and record the flowrate and volume at a daily frequency.

9. <u>REPORTING</u>

(1) Ten (10) days prior to the date of a planned *By-pass* being conducted pursuant to Condition 4 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*.

(2) The *Owner* shall report to the *District Manager* or designate, any exceedance of any parameter specified in Condition 6 orally, as soon as reasonably possible, and in writing within seven (7) days of the exceedance.

(3) In addition to the obligations under Part X of the <u>Environmental Protection Act</u>, 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.

(4) The *Owner* shall, upon request, make all manuals, plans, records, data, procedures and supporting documentation available to *Ministry* staff.

(5) 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 6, including an overview of the success and adequacy of the *Works*;

(b) a summary of the quantity and quality of different types of *imported wastewater* co-treated at the *works* and an overview of the success and adequacy of the co-treatment;

(c) a description of any operating problems encountered and corrective actions taken;

(d) a summary of all maintenance carried out on any major structure, equipment, apparatus, mechanism or thing forming part of the *Works*;

(e) a summary of any effluent quality assurance or control measures undertaken in the reporting period;

(f) a summary of the calibration and maintenance carried out on all effluent monitoring equipment; and

(g) a description of efforts made and results achieved in meeting the Effluent Objectives of Condition 5;

(h) a tabulation of the quantities and characteristics of the sewage from all difference sources in the reporting period on a monthly basis and an outline of any changes in the anticipated quantities and characteristics of the sewage from all difference sources in the next reporting period;

(i) 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;

(j) a summary of any complaints received during the reporting period and any steps taken to address the complaints;

(k) a summary of all *By-pass*, spill or abnormal discharge events; and

(l) 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 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.

3. Condition 3 is included to ensure that record drawings of the *Works* “as constructed” are maintained for future references.

4. Condition 4 is included to indicate that by-passes of untreated sewage to the receiving Maitland River 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.

5. Condition 5 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.

6. Condition 6 is imposed to ensure that the effluent discharged from the *Works* to the Maitland 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.

7. Condition 7 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 *Works*.

8. Condition 8 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 river.

9. Condition 9 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. 5809-6SSLAE issued on September 7, 2006.

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	<u>AND</u>	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 10th day of October, 2008

Mansoor Mahmood, P.Eng.
Director
Section 53, *Ontario Water Resources Act*

FL/
c: District Manager, MOE London - District
Andrew Lugowski, Conestoga-Rovers & Associates
Manager, Water Standards, MOE Standards Development Branch

APPENDIX G
PUBLIC CONSULTATION

311031 North Perth Wastewater Master Plan
Municipal Class EA - Master Stakeholder Tracking

Mr/Ms.	Last Name	First Name	Title	Agency	Address 1	Address 2	City	Prov	Postal Code	Phone	email	Notes
Federal Agencies												
Ms.	Eddy	Sarah	Senior Habitat Biologist	Fisheries and Ocians Canada - Fish Habitat Management Ontario - Great Lakes Area - District Office	867 Lakeshore Road		Burlington	ON	L7R 4A6	905-336-4535	Sara.Eddy@dfo-mpo.gc.ca	Email sent Feb 20/15 - currently on mat leave until March 2015. Forwarded email to Brent Valere, Brent.Valere@dfo-mpo.gc.ca. Notice of Study Completion emailed May 19, 2015. No reply rec'd.
Mr.	Dobos	Rob	Manager	Environment Canada - Environmental Assessment and Federal Programs	867 Lakeshore Road	Box 5050	Burlington	ON	L7R 4A6	905-336-4953	rob.dobos@ec.gc.ca	Notice of PIC 1 emailed Feb 20, 2015. Notice of Study Completion emailed May 19, 2015. No reply rec'd.
Ms.	Puvananathan	Anjala	Director, Ontario Region	Canadian Environmental Assessment Agency - Ontario Regional Office	55 St. Clair Avenue East	9th Floor	Toronto	ON	M4T 1M2	416-952-1575	anjala.puvananathan@ceaa-acee.gc.ca	Notice of PIC 1 emailed Feb 20, 2015; received emailed letter on Feb 20, 2015 summarizing scenarios where CEAA review is required. REMOVE FROM CONTACT LIST.
Ms.	Mousseau	Monique	Manager	Transport Canada - Environmental Affairs, Programs Branch, Ontario Region	4900 Yonge St	Suite 300	Toronto	ON		416-952-0482	moussem@tc.gc.ca	Notice of PIC 1 Email returned undeliverable, February 20, 2015. Notice of Study Completion emailed May 19, 2015. Email returned undeliverable.
			Re: Environmental Assessment Coordination, Environmental and Natural Resources	Aboriginal Affairs and Northern Development Canada - Environmental Assessment Coordination Environment Unit	25 St. Clair Ave E	8th Floor	Toronto	ON	M4T 1M2		EACoordination_ON@aandc-aadnc.gc.ca	Notice of Study Commencement Mailed on May 24, 2012 - no confirmation of receipt; Formerly 'Indian and Northern Affairs Canada' at time of original notification. Notice of PIC 1 email received February 20, 2015 10:13 am. Notice of Study Completion emailed May 19, 2015. No reply rec'd.
				Transport Canada - Environmental Management Programs - Ontario Region	330 Sparks St		Ottawa	ON	K1A 0N5	1-866-995-9737	questions@tc.gc.ca	Notice of Study Commencement Mailed on May 24, 2012 - no confirmation of receipt (CONTACT INFO OUT OF DATE)
				Canadian Environmental Assessment Agency	160 Elgin St	22nd Floor, Place Bell	Ottawa	ON	K1A 0H3	613-957-0700	info@ceaa-acee.gc.ca	Notice of Study Commencement Mailed on May 24, 2012 (not directed to specific person) - no confirmation of receipt (CONTACT INFO OUT OF DATE)
				Department of Fisheries and Oceans - Habitat Management and Enhancement Division	520 Exmouth St		Sarnia	ON	N7T 8B1	1-866-290-3731	info@dfo-mpo.gc.ca	Notice of Study Commencement Mailed on May 24, 2012 - no confirmation of receipt - REMOVE FROM LIST
				Industry Canada	C.D. Howe Building 235 Queen St		Ottawa	ON	K1A 0H5	1-800-328-6189		Notice of Study Commencement Mailed on May 24, 2012 - no confirmation of receipt
				Canadian Environmental Protection Agency	240 Sparks St	1st Floor W	Ottawa	ON	K1A 1A1	613-995-7599	eprc-rpec@eprc-rpec.gc.ca	Notice of Study Commencement Mailed on May 24, 2012 - no confirmation of receipt - REMOVE FROM LIST
Provincial Agencies												
Mr.	Troje	Corwin	Manager (Acting)	Ministry of Aboriginal Affairs - consultation Unit, Aboriginal Relations and Ministry Partnerships Division, Ministry of Aboriginal Affairs	160 Bloor St E.	9th Floor	Toronto	ON	M7A 2E6	416-325-4044	corwin.troje@ontario.ca, , MAA.EA.REVIEW@ontario.ca	Notice of PIC 1 emailed Feb 20, 2015. Notice of Study Completion emailed May 19, 2015. No reply rec'd.
Ms.	Neumann	Carol	Rural Planner - Environmental & Land Use Policy	Ministry of Agriculture, Food and Rural Affairs - Food Safety and Environmental Policy Branch	6484 Wellington Road 7	Unit 10	Elora	ON	N0B 1S0	519-846-3393	carol.neumann@ontario.ca	Notice of PIC 1 emailed Feb 20, 2015. Notice of vacation until feb 23, 2015. Notice of Study Completion emailed May 19, 2015.
Mr.	Cooper	David	Manager - Environmental & Land Use Policy	Ministry of Agriculture, Food and Rural Affairs - Food Safety and Environmental Policy Branch	1 Stone Rd W	3rd Floor	Guelph	ON	N1G 4Y2	1-888-466-2372	about.omafra@ontario.ca	Notice of Study Commencement Mailed on May 24, 2012 - no confirmation of receipt. Notice of PIC 1 emailed Feb 20, 2015. Notice of receipt received. Notice of Study Completion emailed May 19, 2015. No reply rec'd.
Mr.	Romanyshyn	Steve	Director - Strategic Policy Branch	Ministry of Economic Development and Innovation	900 Bay St	6th Floor, Hearst Block	Toronto	ON	M7A 2E1	416-325-8554	Steve.romanyshyn@ontario.ca	Notice of PIC 1 emailed Feb 20, 2015. Response received from Michael Helfinger on Mar 23, 2015 - REMOVE FROM CONTACT LIST
Dr.	Klassen	Miriam	Perth County Medical Officer of Health	Ontario Public Health Units	653 West Gore St		Stratford	ON	N5A 1L4	519-271-7600		Notice of Study Commencement Mailed on May 24, 2012 - no confirmation of receipt, Notice of PIC 1 mailed Feb 20, 2015. Notice of Study Completion mailed May 19, 2015.
Mr.	Amalfa	Tony	Manager	Ministry of Health and Long-Term Care, Environmental Health Policy & Programs	393 University Ave	21st Floor	Toronto	ON	M7A 2S1	416-327-7634	tony.amalfa@ontario.ca	Notice of PIC 1 emailed Feb 20, 2015. Notice of Study Completion emailed May 19, 2015. Automatic reply rec'd May 20, 2015.
Mr.	Theoharis	Andrew	Manager (Acting) - Growth Policy	Ministry of Infrastructure - Ontario Growth Secretariat	777 Bay St	4th Floor, Suite 425	Toronto	ON	M5G 2L5	416-325-5794	andrew.theoharis@ontario.ca	S

Ms.	Young	Penny	Heritage Planner - Culture Services Unit	Ministry of Tourism, Culture and Sport - Programs and Services Branch	401 Bay Street	Suite 1700	Toronto	ON	M7A 0A7	416-212-4019	penny.young@ontario.ca	Notice of PIC 1 emailed Feb 20, 2015. Notice of Study Completion emailed May 19, 2015. No reply rec'd.
Mr.	Muller	Joe	Heritage Planner - Culture Services Unit	Ministry of Tourism, Culture and Sport - Programs and Services Branch	401 Bay Street	Suite 1700	Toronto	ON	M7A 0A7	416-314-7145	Joseph.muller@ontario.ca	Notice of PIC 1 emailed Feb 20, 2015. Notice of Study Completion emailed May 19, 2015. No reply rec'd.
Mr.	Stack	Chris	Manager	Ministry of Citizenship and Immigration, Tourism, Culture and Sport - West Region	2575 King Street	2nd Floor	Kitchener	ON	N2P 2E9	519-650-3421	Chris.Stack@ontario.ca	Notice of PIC 1 emailed Feb 20, 2015. Notice of Study Completion emailed May 19, 2015. No reply rec'd.
Mr.	Aggerholm	Bob	Environmental Planner	Ministry of Environment and Climate Change - Technical Support Section, London Office	733 Exeter Road		London	ON	N6E 1L3	519-873-5012	bob.aggerholm@ontario.ca	Notice of Study Commencement Mailed on May 24, 2012 - no confirmation of receipt, Notice of PIC 1 mailed Feb 20, 2015 - reply received Feb 20 indicating interest, requesting PIC board files, and the opportunity to review finalized draft of MP before council adoption. Identified new primary contact for EA as Craig Newton as of April 13 - information added in separate entry below
Mr.	Newton	Craig	Regional Planner / EA Coordinator	Ministry of Environment and Climate Change, London Office	733 Exeter Road		London	ON	N6E 1L3	519-873-5000	craig.newton@ontario.ca	Use as primary MOECC contact for EA after April 13 (see note above). Phone call on April 22 to confirm review requirements for Master Plan report by MOECC prior to adoption by council.
Mr.	Miller	Jim	Water Inspector	Ministry of Environment and Climate Change - Drinking Water Management Division, London Office	3232 White Oak Rd	3rd Floor	London	ON	N6E 1L8	519-873-5092	jim.w.miller@ontario.ca	New primary contact from MOECC as of Nov 2014. Notice of Study Completion emailed May 19, 2015. No reply rec'd.
Mr.	Doyle	Victor	Manager - Planning Innovation Section	Ministry of Municipal Affairs and Housing - Provincial Planning Policy Branch	777 Bay St	14th Floor	Toronto	ON	M5G 2E5	416-585-6109	Victor.doyle@ontario.ca	Notice of Study Commencement Mailed on May 24, 2012 (not directed to specific person) - no confirmation of receipt, Notice of PIC 1 emailed Feb 20, 2015. Notice of Study Completion emailed May 19, 2015. No reply rec'd.
Mr.	Curtis	Bruce	Manager - Community Planning and Development	Ministry of Municipal Affairs and Housing - Western Municipal Services Office	659 Exeter Road	2nd Floor	London	ON	N6E 1L3	519-873-4026	Bruce.curtis@ontario.ca	Notice of PIC 1 emailed Feb 20, 2015. Notice of Study Completion emailed May 19, 2015. No reply rec'd.
Mr.	Stone	Mike	District Planner	Ministry of Natural Resources - Guelph District	1 Stone Rd W		Guelph	ON	N1G 4Y2	519-826-4912	Mike.stone@ontario.ca	Notice of PIC email sent Feb 20, 2015. Returned as undeliverable. Notice of Study Completion emailed May 19, 2015. No reply rec'd.
Ms.	McClintock	Heather	Head - Maintenance Standards	Ministry of Transportation - Design and Contract Standards Office	301 St. Paul St	2nd Floor, North	St. Catherines	ON	L2R 7R4	905-704-2964	Heather.McClintock@ontario.ca	Notice of PIC 1 emailed Feb 20, 2015. Notice of Study Completion emailed May 19, 2015. No reply rec'd.
Mr.	Bentley	Kevin	Manager, Engineering Office	Ministry of Transportation - West (Southwestern) Region	659 Exeter Rd		London	ON	N6E 1L3	519-873-4373	kevin.bentley@ontario.ca	Notice of PIC 1 emailed Feb 20, 2015. Letter received Mar 26, 2015 to indicate MTO - West Region office to be kept informed of project, and any works near Hwy 23 requires permits as specified in letter. ***Also copy Chris Dixon, Corridor anagement Planner and Domenic Calvo, Corridor Management Section on future correspondance with this MTO office, Chris.Dixon@ontario.ca, Domenic.Calvo@ontario.ca. Notice of Study Completion emailed May 19, 2015. Read receipt rec'd May 19, 2015. Chris Dixon read receipt rec'd June 25, 2015. Domenic Calvo read receipt rec'd June 26, 2015.
Mr.	DeMille	Matt	Land Use Specialist	Ontario Federation of Anglers and Hunters	4601 Guthrie Dr	P.O. Box 2800	Peterborough	ON	K9J 8L5	905-748-6324		Notice of Study Commencement Mailed on May 24, 2012 - no confirmation of receipt, Notice of PIC 1 mailed Feb 20, 2015. Notice of completion mailied May 19, 2015. No confirmation of receipt.
Ms.	Wagner	Teresa		Ministry of Tourism, Culture and Sport - Programs and Services Branch	401 Bay Street	Suite 1700	Toronto	ON	M7A 0A7			Notice of Study Commencement Mailed on May 24, 2012 - no confirmation of receipt - CONTACT OUT OF DATE
				Ministry of Economic Development and Trade - Attn: Communications and Public Affairs Branch	900 Bay St	8th Floor, Hearst Block	Toronto	ON	M7A 2E1	1-866-668-4249	info@edt.gov.on.ca	Notice of Study Commencement Mailed on May 24, 2012 - no confirmation of receipt - CONTACT OUT OF DATE
				Ministry of Public Infrastructure and Renewal - Ministry of Finance	33 King St W		Oshawa	ON	L1H 8H5			Notice of Study Commencement Mailed on May 24, 2012 - no confirmation of receipt - CONTACT OUT OF DATE
The Honorable	Duncan	Dwight	Minister of Finance	Ministry of Finance	7 Queen's Park Crescent	7th Floor	Toronto	ON	M7A 1Y7	1-866-668-8297		Notice of Study Commencement Mailed on May 24, 2012 - no confirmation of receipt (REMOVE FROM LIST)
Ms.	Levecque	Heather	Manager, Consultation Unit - Aboriginal and Ministry Relations Division	Ministry of Aboriginal Affairs	160 Bloor St E	Suite 400	Toronto	ON	M7A 2E6			Notice of Study Commencement Mailed on May 24, 2012 - no confirmation of receipt (CONTACT INFO OUT OF DATE)
Mr.	McClure	Kevin	Planner	Ministry of Municipal Affairs and Housing - Community Planning and Development, Exeter Road Complex	659 Exeter Road	2nd Floor	London	ON	N6E 1L3			Notice of Study Commencement Mailed on May 24, 2012 - no confirmation of receipt (CONTACT INFO OUT OF DATE)

Ms.	Fleischhauer	Andrea	District Planner	Ministry of Natural Resources - Aylmer District	615 John Street North		Aylmer	ON	N5H 2S8			Notice of Study Commencement Mailed on May 24, 2012 - no confirmation of receipt (INCORRECT REGIONAL OFFICE)
Mr.	Slivar	Bob	Senior Environmental Officer	Ministry of Environment and Climate Change - London District Office	733 Exeter Road		London	ON	N6E 1L3			Notice of Study Commencement Mailed on May 24, 2012 - no confirmation of receipt
Mr.	Gignac	Phil	Corridor Control Officer	Ministry of Transportation	1450 7th Avenue East	P.O. Box 520	Owen Sound	ON	N4K 2Z7			Notice of Study Commencement Mailed on May 24, 2012 - no confirmation of receipt (INCORRECT CONTACT)
Mr.	Secord	David	Planner	Ministry of Transportation - Corridor Management Section - West Region	659 Exeter Rd		London	ON	N6E 1L3			Notice of Study Commencement Mailed on May 24, 2012 - no confirmation of receipt (INCORRECT CONTACT)
				Ministry of Agriculture and Food Field Services, South Region	667 Exeter Rd		London	ON	N6E 1L3			Notice of Study Commencement Mailed on May 24, 2012 - no confirmation of receipt - CONTACT OUT OF DATE
Local Agencies												
Ms.	McLean	Sandy	Acting Facilities Manager	Corporation of the County of Perth - Public Works Department	1 Huron St		Stratford	ON	N5A 5S4	519-271-0531 x320		Notice of PIC 1 mailed Feb 20, 2015. Notice of Study Completion mailed May 19, 2015. No confirmation of receipt.
Mr.	Rothwell	Allan	Director of Planning and Development	Corporation of the County of Perth - Planning & Development Department	1 Huron St	1st Level	Stratford	ON	N5A 5S4	519-271-0531 x410		Notice of PIC 1 mailed Feb 20, 2015. Notice of Study Completion mailed May 19, 2015. No confirmation of receipt.
Mr.	Schellenberger	Gary	MP		544 Huron St		Stratford	ON	N5A 5T9	519-273-1400	schelg1@parl.gc.ca	Notice of Study Commencement Mailed on May 24, 2012 - no confirmation of receipt, Notice of PIC 1 mailed Feb 20, 2015. Notice of Study Completion emailed May 19, 2015. No confirmation of receipt.
Mr.	Pettapiece	Randy	MPP		55 Lorne Ave E		Stratford	ON	N5A 6S4	519-272-0660	randy.pettapiececo@pc.ola.org	Notice of Study Commencement Mailed on May 24, 2012 - no confirmation of receipt. Notice of PIC emailed feb 20, 2015 - confirmation of receipt received Feb 20 by Lindsay Rennick, Constituency Assistant. Notice of Study Completion emailed May 19, 2015. Confirmation of receipt received May 20 by Lindsay Rennick, Constituency Assistant
Mr.	Smith	Edward	Fire Chief	North Perth Fire Department	620 Wallace Ave S.		Listowel	ON	N4W 1Y4	519-291-6825		Notice of PIC 1 mailed Feb 20, 2015. Notice of Study Completion mailed May 19, 2015. No confirmation of receipt.
Mr.	Hanly	Dave	Director of Planning and Developmer	Corporation of the County of Perth - Planning & Development Department	1 Huron St	1st Level	Stratford	ON	N5A 5S4			Notice of Study Commencement Mailed on May 24, 2012 - no confirmation of receipt (CONTACT INFO OUT OF DATE)
Conservation Authorities												
Ms.	Walter	Brandi	Environmental Planner	Maitland Valley Conservation Authority	1093 Marietta St	P.O. Box 127	Wroxeter	ON	N0G 2X0	519-335-3557	maitland@mvca.on.ca, bwalter@mvca.on.ca	Notice of Study Commencement Mailed on May 24, 2012 (not sent to specific individual) - no confirmation of receipt. Notice of Study Completion emailed May 19, 2015. Confirmation received through emails back and forth.
Utilities												
Mr.	Kloostra	Walter	Manager - Transmission Lines Sustainment Investment Planning	Hydro One Networking	483 Bay Street	15th Floor, North Tower	Toronto	ON	M5G 2P5	416-345-5114	w.d.kloostra@HydroOne.com	Notice of PIC emailed Feb 20/2015, on vacation until Mar 2/2015. Notice of Study Completion emailed May 19, 2015. Read receipt rec'd May 19, 2015.
Mr.	Metcalfe	Barry	Senior Sales Account Manager	Wightman Communications	100 Elora St N	Box 70	Clifford	ON	N0G 1M0	519-327-8012		Notice of Study Commencement Mailed on May 24, 2012 - no confirmation of receipt, Notice of PIC 1 mailed Feb 20, 2015. Notice of Study Completion mailed May 19, 2015. No confirmation of receipt.
Mr.	Roberts	Bryan	Construction Growth Representative	Union Gas Limited		P.O. Box 553 Station A	London	ON	N6A 4P1			Notice of Study Commencement Mailed on May 24, 2012 - no confirmation of receipt, Notice of PIC 1 mailed Feb 20, 2015. Notice of Study Completion mailed May 19, 2015. No confirmation of receipt.

311031 North Perth Wastewater Master Plan
Municipal Class EA - First Nations and Metis Communication Log - Updated October 16, 2015

Mr/Ms.	Last Name	First Name	Title	Agency	Address 1	Address 2	City	Prov	Postal Code	Phone	email	Notes
Chief	Bressette	Thomas		Chippewas of Kettle and Stony Point	Kettle Point 44	RR 2	Forest	ON	N0N 1J0	519-786-2125	toni.george@kettlepoint.org Thomas.bressette@kettlepoint.org	Notice of Completion emailed June 3, 2015. Toni.George email address does not work. Read receipt rec'd for Thomas.bressette email June 3, 2015. Follow-up call on July 10, 2015, identified Suzanne Bressette as main contact, who was off sick today. Spoke with Suzanne on July 13, 9:40am; she is just returning from 3 weeks off sick, and will look into status of project, and call back later this week. No call back received as of July 30, so follow-up call made to Sue B. on July 30, 2015. Spoke with Sue, and she indicated she should be able to finish review by next Tuesday, Aug 4. Sent follow-up email on July 30, so she would have information easily accessible. Delivery receipt received on Sunday, Aug 2. Follow-up phone call on Aug 6 to check on status of review, and she indicated she was reading it now, and should have comments back by Monday, August 10, 2015. Follow-up email sent Tuesday, August 11, 2015 and no response received. Followed up again by email on Sept 14, and received delivery receipt. Left voice message on Sept 24 to follow-up on status of comments. Phone call not returned. Follow-up call on Oct 1, 2015; spoke with Sue, and she indicated that a response letter has been mailed out, and she will email a copy to GMBP this afternoon. Letter received via email on October 1, 2015 at 3:53pm.
Chief	Miskokomon	Joe		Chippewas of the Thames First Nation	Chippewas of the Thames 42	RR 1	Muncey	ON	N0L 1Y0	519-289-5555	chief@cottfn.com	Notice of Completion emailed June 3, 2015. Read receipt rec'd June 3, 2015. Follow-up call on July 10, 2015, instructed to contact Rolanda at Consultation Office (519-289-2662x209), left message for Rolanda with receptionist; she should return on Monday, July 13. Left second voice message for Rolanda on July 13 at 9:45am with further details of inquiry. Call not returned as of July 30, 2015
Chief	Plain	Chris		Aamjiwnaang First Nation	Sarnia 45	978 Tashmoo Avenue	Sarnia	ON	N7T 7H5	519-336-8410	aamjiwnaang.chief@gmail.com SRedmond@aamjiwnaang.ca	Notice of Completion emailed June 3, 2015. aamjiwnaan.chief email address does not work. Read receipt rec'd for shelley.redmond email June 3, 2015. Called to follow-up on July 10, 2015, and redirected to Sharilyn Johnston, who advised that Class EAs go through a review process by their Environmental Committee, and she would check on status of review. Sent Sharilyn email to confirm details of project for her reference, and read receipt received July 13. No response received as of July 30, so email follow-up sent on July 30. Read receipt received from Sharilyn for July 30 email on July 31. Follow-up phone call on Aug 6 to check status of review; Sharilyn indicated that committee had met recently, and she would check list of projects reviewed to see if this project was on the list. She will follow-up by phone call or email in the next day or so. Email received from Sharilyn on Aug 6, indicating that our Master Plan Study has not yet been through committee review, but is scheduled to be reviewed at the next meeting on August 18, 2015. Received email from Christine Rogers (Environmental Consultant Worker with Aamjiwnaang FN) indicating that Master Plan will not be reviewed until Sept 1 Environment Committee meeting, and response would be provided shortly after. Followed-up on status of review by email on Sept 14, 2015. Called on Sept 24, and left message with Christine's assistant; she is in meeting currently, but should be available to discuss tomorrow. Follow-up call on October 1, 2015, and spoke with Christine. She indicated that Environmental Committee had reviewed, and did not have any concerns, but they were just waiting on Sharilyn Johnston to review their notes. Christine will follow-up with Sharilyn, and indicated on Oct 1 that Sharilyn will complete her review by Monday, Oct 5. No response received by Oct 9, so follow-up call made. Spoke with Sharilyn on Oct 9, and she indicated that she had not yet completed her review but would aim for next week (Oct 13-17). Email received from Christine Rogers on Oct 16, 2015 indicating that Sharilyn didn't have any further concerns regarding this project.
Chief	Miskokomon	Daniel		Bkejwanong Territory Walpole Island First Nation	Walpole Island 46	117 Tahgahoning Rd. RR3	Wallaceburg	ON	N8A 4K9	519-627-1481	drskoke@wifn.org Alicia.blackeagle@wifn.org	Notice of Completion emailed June 3, 2015. Read receipt rec'd from alicia.blackeagle June 3, 2015. Read receipt rec'd from Dan Miskokomon June 9, 2015. Left voicemail (follow-up) for Alicia Blackeagle on July 13, 2015. Call not returned as of July 30, 2015. Follow-up email sent on July 30 to inquire if any comments were being prepared. Read receipt received on July 30, 2015.
Mr.	Linklater	Jake	Case Manager	Saugeen Ojibway Nation	Saugeen Ojibway Nation Environment Office	RR 5	Wiarton	ON	N0H 2T0	519-534-5507		Mailed Notice of Study Completion and letter June 2, 2015. No confirmation of receipt. Called to follow-up on July 8, 2015 and given email to send notification to Doran Ritchie, Land Use Planning, x226: d.richie@saugeenojibwaynation.ca, Notice sent July 8 but no read receipt received. Follow-up voice message left on July 13, 2015. Call not returned as of July 30, 2015. Follow-up email sent to Doran Richie on July 30 in inquiry of status of comments, if applicable.

Chief	Roote	Vernon		Chippewas of Saugeen	RR 1	6493 Hwy 21	Southampton	ON	N0H 2L0	519-797-2781	vroote@saugeenfirstnation.ca dcarter@saugeenfirstnation.ca	Notice of Completion emailed June 3, 2015. Read receipt rec'd from Vern Roote June 3, 2015. Left message with Chief's office on July 13, 2015. Call not returned as of July 30, 2015
Chief	Chegahno	Arlene		Chippewas of Nawash Unceded First Nation	135 Lakeshore Boulevard	RR 5	Wairton	ON	N0H 2T0	519-534-1689	reception.admin@nawash.ca council.arlene@nawash.ca	Notice of Completion emailed June 3, 2015. No reply rec'd. Called and left message for Chief Chegahno on July 8, 2015 (in council meeting during call). Follow-up email left on July 30, 2015.
Chief	Doxtator	Sheri		Oneida Nation of the Thames	Oneida 41	RR 2	Southwold	ON	N0L 2G0	519-652-3244	Sheri.Doxtator@oneida.on.ca	Notice of Completion emailed June 3, 2015. Read receipt rec'd June 3, 2015. Left follow-up message with Administration Office on July 13, 2015. Call not returned as of July 30, 2015.
Chief	LaForme	Bryan		Mississaugas of the New Credit First Nation	New Credit (Part) 40A	2789 Mississauga Rd., RR 6	Hagersville	ON	N0A 1H0	905-768-1133	bryanlaforme@newcreditfirstnation.com	Notice of Completion emailed June 3, 2015. Read receipt rec'd June 3, 2015. Follow-up call on July 13, 2015, and redirected to Carla Campbell, Biodiversity Team, 905-768-5686. Left voice message. Call not returned as of July 30, 2015
Mr.	Alibhai	Aly	Director of Lands, Resources and Consultation	Metis Nation of Ontario	75 Sherbourne St	Suite 222	Toronto	ON	M5A 2P9	416-977-9881	alya@metisnation.org	Mr. Alibhai has replaced Melanie Paradis - follow-up email sent Dec 12, 2014 with Notice of Study Commencement attached; 'Read' receipt received Dec 15, 2014, Notice of PIC 1 emailed Feb 20, 2015. Notice of Completion emailed May 19, 2015. Read receipt rec'd May 19, 2015. Left follow-up voicemail on May 21, 2015. Call not returned as of July 30, 2015.
Ms.	Paradis	Melanie	Director of Lands, Resources and Consultation	Metis Nation of Ontario	75 Sherbourne St	Suite 222	Toronto	ON	M5A 2P9	416-977-9881		Notice of Study Commencement Mailed on May 24, 2012 - no confirmation of receipt. *Old contact - do not use going forward (use Aly Alibhai)*
Mr.	Couture	Peter	Great Lakes Metis Council President	Great Lakes Metis Council	380 9th St E		Owen Sound	ON	N4K 1P1	519-370-0435		Notice of Study Commencement Mailed on May 24, 2012 - no confirmation of receipt, Notice of PIC 1 mailed Feb 20, 2015. Notice of Study Completion mailed May 19, 2015. Left follow-up voicemail May 20, 2015. Call not returned as of July 30, 2015.
Mr.	Barty	Alden	Consultation Assessment Coordinator - Lands, Resources	Metis Nation of Ontario	355 Cranston Cresc.	P.O. Box 4	Midland	ON	L4R 4K6	705-526-6335 x210	aldenb@metisnation.org	Notice of Study Commencement Mailed on May 24, 2012 - no confirmation of receipt; follow-up email sent Dec 12, 2014 with Notice of Study Commencement attached; No reply received, Notice of PIC 1 emailed Feb 20, 2015. Notice of Study Completion emailed May 19, 2015. Left follow-up voicemail May 20, 2015. Call not returned as of July 30, 2015.

Laura Verhaeghe - GM BluePlan

From:	Christine Rogers <crogers@aamjiwnaang.ca>
Sent:	Friday, October 16, 2015 11:58 AM
To:	Laura Verhaeghe - GM BluePlan
Cc:	Sharilyn Johnston
Subject:	RE: North Perth Wastewater Master Plan Class EA Study Final Report

Hi Laura,
I just spoke with Sharilyn about this project. Sharilyn didn't have any further concerns on this project.

Christine.

From: Laura Verhaeghe - GM BluePlan [mailto:Laura.Verhaeghe@gmblueplan.ca]
Sent: October-01-15 4:36 PM
To: Christine Rogers <crogers@aamjiwnaang.ca>
Cc: Sharilyn Johnston <sjohnston@aamjiwnaang.ca>; Mark Hackett <mhackett@northperth.ca>
Subject: RE: North Perth Wastewater Master Plan Class EA Study Final Report

Hi Christine,

Thank you for the update.

Laura Verhaeghe, P.Eng.
Project Manager

GM BluePlan Engineering Limited
650 Woodlawn Road West, Block C, Unit 2 | Guelph ON N1K 1B8
t: 519.824.8150 | c: 226.500.4771
laura.verhaeghe@gmblueplan.ca | www.gmblueplan.ca

From: Christine Rogers [mailto:crogers@aamjiwnaang.ca]
Sent: Thursday, October 01, 2015 4:34 PM
To: Laura Verhaeghe - GM BluePlan
Cc: Sharilyn Johnston
Subject: RE: North Perth Wastewater Master Plan Class EA Study Final Report

Hi Laura,
Sharilyn is going to review this project in greater detail over the next couple of days and get back you on Monday.

Christine.

From: Laura Verhaeghe - GM BluePlan [mailto:Laura.Verhaeghe@gmblueplan.ca]
Sent: September-14-15 8:24 AM
To: Christine Rogers <crogers@aamjiwnaang.ca>
Cc: Sharilyn Johnston <sjohnston@aamjiwnaang.ca>
Subject: RE: North Perth Wastewater Master Plan Class EA Study Final Report

Hello Christine,

I wanted to follow-up on the status of your Environment Committee's review of the Municipality of North Perth Wastewater Treatment Master Plan. You mention in your email below that the review meeting was to take place on September 1, with a follow-up shortly afterwards.

Thank you,

Laura Verhaeghe, P.Eng.
Project Manager

GM BluePlan Engineering Limited
650 Woodlawn Road West, Block C, Unit 2 | Guelph ON N1K 1B8
t: 519.824.8150 | c: 226.500.4771
laura.verhaeghe@gmblueplan.ca | www.gmblueplan.ca

From: Christine Rogers [mailto:crogers@aamjiwnaang.ca]
Sent: Wednesday, August 19, 2015 11:16 AM
To: Laura Verhaeghe - GM BluePlan
Cc: Sharilyn Johnston
Subject: RE: North Perth Wastewater Master Plan Class EA Study Final Report

Hi Laura,
Can I have an emailed copy of the information that was sent to our Chief. I do not have this information. Once the information has been received I will provide it to our Environment Committee, who will provide a response for you, shortly after their next meeting which is taking place on September 1st.

Sincerely,

Christine Rogers
Environment Consultation Worker
Aamjiwnaang First Nation
978 Tashmoo Avenue
Sarnia, ON N7T7H5
Phone: 519-336-8410
crogers@aamjiwnaang.ca
www.aamjiwnaangenvironment.ca
www.facebook.com/AamjiwnaangEnvironment

From: Sharilyn Johnston
Sent: August-06-15 2:54 PM
To: Christine Rogers <crogers@aamjiwnaang.ca>
Subject: FW: North Perth Wastewater Master Plan Class EA Study Final Report

Hi Christine,

Just checking if this consultation request went to committee yet and what the response was. The consultant Laura Verhagehe has called me two times looking for an update and I don't have one specifically related to the masterplan from the committee.

Sharilyn Johnston
Environment Coordinator,
Aamjiwnaang First Nation
978 Tashmoo Ave.,
Sarnia, ON N7T 7H5
(519) 336-8410
(519) 330-1245
sjohnston@aamjiwnaang.ca

From: Sharilyn Johnston
Sent: July-31-15 9:38 AM
To: Christine Rogers <crogers@aamjiwnaang.ca>
Subject: Fwd: North Perth Wastewater Master Plan Class EA Study Final Report

Sent from my Samsung device

-------- Original message --------
From: Laura Verhaeghe - GM BluePlan <Laura.Verhaeghe@gmblueplan.ca>
Date: 07-30-2015 10:17 AM (GMT-05:00)
To: Sharilyn Johnston <sjohnston@aamjiwnaang.ca>
Subject: RE: North Perth Wastewater Master Plan Class EA Study Final Report

Good Morning Sherilyn,

We spoke earlier this month regarding the status of review of the North Perth Wastewater Treatment Master Plan that was originally sent to Aamjiwnaang First Nation on June 3, 2015. You had mentioned over the phone that your Environmental Committee was likely in the process of reviewing the project. Could you please comment on the status of this review, and provide an estimated timeframe when we will receive feedback?

Thank you,

Laura Verhaeghe, P.Eng.

Project Manager

GM BluePlan Engineering Limited

650 Woodlawn Road West, Block C, Unit 2 | Guelph ON N1K 1B8

t: 519.824.8150 | c: 226.500.4771

laura.verhaeghe@gmblueplan.ca | www.gmblueplan.ca

From: Laura Verhaeghe - GM BluePlan
Sent: Friday, July 10, 2015 4:11 PM
To: 'sjohnston@aamjiwnaang.ca'
Subject: FW: North Perth Wastewater Master Plan Class EA Study Final Report

Hi Sherilynn,

We just spoke over the phone. Would you be able to follow-up on the status of your Environmental Committee's review of the North Perth Wastewater Treatment Class EA, as described in the attached Notice of Completion? Our original email is below.

Thank you, and have a great weekend.

Laura Verhaeghe, P.Eng.

Project Manager

GM BluePlan Engineering Limited

650 Woodlawn Road West, Block C, Unit 2 | Guelph ON N1K 1B8

t: 519.824.8150 | c: 226.500.4771

laura.verhaeghe@gmblueplan.ca | www.gmblueplan.ca

From: Suzanne Potts - GM BluePlan
Sent: Wednesday, June 03, 2015 9:31 AM
To: aamjiwnaang.chief@gmail.com; SRedmond@aamjiwnaang.ca
Cc: Laura Verhaeghe - GM BluePlan
Subject: North Perth Wastewater Master Plan Class EA Study Final Report

Dear Chief Chris Plain,

As noted in the attached Notice of Completion, the Municipality of North Perth has completed a Wastewater Treatment Master Plan to identify a preferred servicing strategy for wastewater treatment to the year 2030. Details for obtaining the Master Plan for your review can be found in the Notice of Completion.

In order to identify the potential for any of the projects proposed in the Master Plan to affect First Nation treaty rights or have any other adverse impacts on First Nations, we are notifying you of this project. The majority of the projects proposed will occur within the existing North Perth Wastewater Treatment Plant site, or would be considered 'pre-approved' Schedule A Class EA activities, but we wanted to ensure you were aware of this study to identify any additional concerns we may not have considered. Please provide any comments or concerns to the email address below. If you have no concerns with this project, we would much appreciate if you could provide confirmation of receipt of this Notice to the same address.

Laura.Verhaeghe@gmblueplan.ca

Note that the Public Review Period listed in the Notice of Completion expires on June 18; however, we would like to give you additional time to review the information, so this deadline does not apply to your comments. We appreciate your time and input.

Best Regards,

Suzanne Potts

Administrative Assistant

GM BluePlan Engineering Limited

650 Woodlawn Road West, Block C, Unit 2 | Guelph ON N1K 1B8

t: 519.824.8150

suzanne.potts@gmblueplan.ca | www.gmblueplan.ca

Laura Verhaeghe - GM BluePlan

From:	Sharilyn Johnston <sjohnston@aamjiwnaang.ca>
Sent:	Thursday, August 06, 2015 3:17 PM
To:	Laura Verhaeghe - GM BluePlan
Subject:	FW: North Perth Wastewater Master Plan Class EA Study Final Report

Hi Laura,
The information has not made it to our Environmental Committee. It will be included in the August 18th meeting.

Sharilyn Johnston
Environment Coordinator,
Aamjiwnaang First Nation
978 Tashmoo Ave.,
Sarnia, ON N7T 7H5
(519) 336-8410
(519) 330-1245
sjohnston@aamjiwnaang.ca

From: Christine Rogers
Sent: August-06-15 3:15 PM
To: Sharilyn Johnston <sjohnston@aamjiwnaang.ca>
Subject: RE: North Perth Wastewater Master Plan Class EA Study Final Report

Packages were made when I received it on July 31, 2015, so it didn't go into this package. It will have to go to the next meeting on August 18th.

From: Sharilyn Johnston
Sent: July-31-15 9:38 AM
To: Christine Rogers <crogers@aamjiwnaang.ca>
Subject: Fwd: North Perth Wastewater Master Plan Class EA Study Final Report

Sent from my Samsung device

-------- Original message --------
From: Laura Verhaeghe - GM BluePlan <Laura.Verhaeghe@gmblueplan.ca>
Date: 07-30-2015 10:17 AM (GMT-05:00)
To: Sharilyn Johnston <sjohnston@aamjiwnaang.ca>
Subject: RE: North Perth Wastewater Master Plan Class EA Study Final Report

Good Morning Sherilyn,

We spoke earlier this month regarding the status of review of the North Perth Wastewater Treatment Master Plan that was originally sent to Aamjiwnaang First Nation on June 3, 2015. You had mentioned over the phone that your Environmental Committee was likely in the process of reviewing the project. Could you please comment on the status of this review, and provide an estimated timeframe when we will receive feedback?

Thank you,

Laura Verhaeghe, P.Eng.

Project Manager

GM BluePlan Engineering Limited

650 Woodlawn Road West, Block C, Unit 2 | Guelph ON N1K 1B8

t: 519.824.8150 | c: 226.500.4771

laura.verhaeghe@gmblueplan.ca | www.gmblueplan.ca

From: Laura Verhaeghe - GM BluePlan
Sent: Friday, July 10, 2015 4:11 PM
To: 'sjohnston@aamjiwnaang.ca'
Subject: FW: North Perth Wastewater Master Plan Class EA Study Final Report

Hi Sherilynn,

We just spoke over the phone. Would you be able to follow-up on the status of your Environmental Committee's review of the North Perth Wastewater Treatment Class EA, as described in the attached Notice of Completion? Our original email is below.

Thank you, and have a great weekend.

Laura Verhaeghe, P.Eng.

Project Manager

GM BluePlan Engineering Limited

650 Woodlawn Road West, Block C, Unit 2 | Guelph ON N1K 1B8

t: 519.824.8150 | c: 226.500.4771

laura.verhaeghe@gmblueplan.ca | www.gmblueplan.ca

From: Suzanne Potts - GM BluePlan
Sent: Wednesday, June 03, 2015 9:31 AM
To: aamjiwnaang.chief@gmail.com; SRedmond@aamjiwnaang.ca
Cc: Laura Verhaeghe - GM BluePlan
Subject: North Perth Wastewater Master Plan Class EA Study Final Report

Dear Chief Chris Plain,

As noted in the attached Notice of Completion, the Municipality of North Perth has completed a Wastewater Treatment Master Plan to identify a preferred servicing strategy for wastewater treatment to the year 2030. Details for obtaining the Master Plan for your review can be found in the Notice of Completion.

In order to identify the potential for any of the projects proposed in the Master Plan to affect First Nation treaty rights or have any other adverse impacts on First Nations, we are notifying you of this project. The majority of the projects proposed will occur within the existing North Perth Wastewater Treatment Plant site, or would be considered 'pre-approved' Schedule A Class EA activities, but we wanted to ensure you were aware of this study to identify any additional concerns we may not have considered. Please provide any comments or concerns to the email address below. If you have no concerns with this project, we would much appreciate if you could provide confirmation of receipt of this Notice to the same address.

Laura.Verhaeghe@gmblueplan.ca

Note that the Public Review Period listed in the Notice of Completion expires on June 18; however, we would like to give you additional time to review the information, so this deadline does not apply to your comments. We appreciate your time and input.

Best Regards,

Suzanne Potts

Administrative Assistant

GM BluePlan Engineering Limited

650 Woodlawn Road West, Block C, Unit 2 | Guelph ON N1K 1B8

t: 519.824.8150

suzanne.potts@gmblueplan.ca | www.gmblueplan.ca

Chippewas of Kettle & Stony Point First Nation
6247 Indian Lane
Kettle & Stonv Point FN. Ontario. Canada NON 1J1

September 28, 2015

Municipality of North Perth
330 Wallace Ave. N.
Listowel, Ontario
N4W 1L3
ATT: Mark Hackett, Manager of Environmental Services

Dear Mr. Hackett:

RE: The Municipality of North Perth. and Wastewater Treatment Master Plan on Kettle and Stony Point First Nation Traditional Territory.

I'd like to take the opportunity to introduce myself as the Consultation Coordinator for Chippewas of Kettle and Stony Point First Nation ("Kettle & Stony Point"). Kettle & Stony Point have asserted it's Aboriginal and Treaty Rights, and Aboriginal Title in their traditional territory ("Traditional Territory") since time immemorial. These constitutionally entrenched rights and title to our Traditional Territory have been legally recognized by the provincial and federal Crowns, as signatories to the Huron Tract Treaty #29.

We are aware that the Municipality of North Perth. is either engaged, or is interested in engaging in an activity that may have an impact on Kettle & Stony Point's Traditional Territory. Please be advised that Kettle & Stony Point has not surrendered, relinquished, extinguished, or conveyed, its interests, rights, and/or title to any of the assets, land, water, surface and subsurface resources, and all other natural resources.

We acknowledge that industry does not have a court-imposed duty to consult with First Nations; however, it is our expectation that if the Municipality of North Perth is either engaging, or is interested in engaging, an activity in Kettle & Stony Point's Traditional Territory, it will have an interest in becoming involved in consultation and accommodation efforts with our First Nation.

Consequently, if the Municipality of North Perth. is prepared to engage in meaningful consultations to understand, address and accommodate our concerns, then Kettle & Stony Point will welcome your participation as a sign of good faith and cooperation and we will respond in kind.

At present time, the First Nation does not have any additional comments or concerns with the activity / project you are proposing in our Traditional Territory. Therefore, on behalf of the Kettle & Stony Point First Nation, we thank you for providing information to our First Nation and reserve the right to initiate meaningful consultation discussions should the need arise.

In the event the scope of the project changes and/or amendments are made, please ensure that the First Nation receives notification. Thank you in advance for your cooperation in this regard.

Sincerely,

Suzanne Bressette

K. Suzanne Bressette
Chippewas of Kettle and Stony Point First Nation

Laura Verhaeghe - GM BluePlan

From:	Laura Verhaeghe - GM BluePlan
Sent:	Thursday, July 30, 2015 11:16 AM
To:	'sue.bressette@kettlepoint.org'
Subject:	311031 Notice of Completion: North Perth Wastewater Treatment Class Environmental Assessment - follow-up
Attachments:	311031 Notice of Completion - Final.pdf

Hello Sue,

Per our conversation this morning, I wanted to follow-up on the status of your review of our Notice of Completion for the North Perth Wastewater Treatment Master Plan Class EA. Could you please indicate if you have any comments or questions regarding this Class EA, or require further information?

Thank you in advance for your response.

Sincerely,

Laura Verhaeghe, P.Eng.
Project Manager

GM BluePlan Engineering Limited
650 Woodlawn Road West, Block C, Unit 2 | Guelph ON N1K 1B8
t: 519.824.8150 | c: 226.500.4771
laura.verhaeghe@gmblueplan.ca | www.gmblueplan.ca

Laura Verhaeghe - GM BluePlan

From:	Suzanne Potts - GM BluePlan
Sent:	Wednesday, June 03, 2015 9:21 AM
To:	toni.george@kettlepoint.org; thomas.bressette@kettlepoint.org
Cc:	Laura Verhaeghe - GM BluePlan
Subject:	North Perth Wastewater Master Plan Class EA Study Final Report
Attachments:	311031 Notice of Completion - Final.pdf

Dear Chief Bressette,

As noted in the attached Notice of Completion, the Municipality of North Perth has completed a Wastewater Treatment Master Plan to identify a preferred servicing strategy for wastewater treatment to the year 2030. Details for obtaining the Master Plan for your review can be found in the Notice of Completion.

In order to identify the potential for any of the projects proposed in the Master Plan to affect First Nation treaty rights or have any other adverse impacts on First Nations, we are notifying you of this project. The majority of the projects proposed will occur within the existing North Perth Wastewater Treatment Plant site, or would be considered 'pre-approved' Schedule A Class EA activities, but we wanted to ensure you were aware of this study to identify any additional concerns we may not have considered. Please provide any comments or concerns to the email address below. If you have no concerns with this project, we would much appreciate if you could provide confirmation of receipt of this Notice to the same address.

Laura.Verhaeghe@gmblueplan.ca

Note that the Public Review Period listed in the Notice of Completion expires on June 18; however, we would like to give you additional time to review the information, so this deadline does not apply to your comments. We appreciate your time and input.

Best Regards,

Suzanne Potts
Administrative Assistant

GM BluePlan Engineering Limited
650 Woodlawn Road West, Block C, Unit 2 | Guelph ON N1K 1B8
t: 519.824.8150
suzanne.potts@gmblueplan.ca | www.gmblueplan.ca

Laura Verhaeghe - GM BluePlan

From: Laura Verhaeghe - GM BluePlan
Sent: Thursday, July 30, 2015 10:52 AM
To: 'council.arlene@nawash.ca'
Cc: 'reception.admin@nawash.ca'
Subject: FW: North Perth Wastewater Master Plan Class EA Study Final Report
Attachments: 311031 Notice of Completion - Final.pdf

Dear Chief Chegahno,

This email is to follow-up on a voice message that was left for you by our office on July 8, regarding the attached Notice of Completion forwarded to you in the email below in relation to the North Perth Wastewater Master Plan Class Environmental Assessment.

Could you please indicate whether you plan on providing comments on this project? The 30 day public review period closed on June 18, but I want to ensure Chippewas of Nawash First Nation has had a chance to comment if you wish to do so. Please let me know if you require further information.

Thank you in advance for your response.

Laura Verhaeghe, P.Eng.
Project Manager

GM BluePlan Engineering Limited
650 Woodlawn Road West, Block C, Unit 2 | Guelph ON N1K 1B8
t: 519.824.8150 | c: 226.500.4771
laura.verhaeghe@gmblueplan.ca | www.gmblueplan.ca

From: Suzanne Potts - GM BluePlan
Sent: Wednesday, June 03, 2015 9:35 AM
To: reception.admin@nawash.ca; council.arlene@nawash.ca
Cc: Laura Verhaeghe - GM BluePlan
Subject: North Perth Wastewater Master Plan Class EA Study Final Report

Dear Chief Arlene Chegahno,

As noted in the attached Notice of Completion, the Municipality of North Perth has completed a Wastewater Treatment Master Plan to identify a preferred servicing strategy for wastewater treatment to the year 2030. Details for obtaining the Master Plan for your review can be found in the Notice of Completion.

In order to identify the potential for any of the projects proposed in the Master Plan to affect First Nation treaty rights or have any other adverse impacts on First Nations, we are notifying you of this project. The majority of the projects proposed will occur within the existing North Perth Wastewater Treatment Plant site, or would be considered 'pre-approved' Schedule A Class EA activities, but we wanted to ensure you were aware of this study to identify any additional concerns we may not have considered. Please provide any comments or concerns to the email address

Laura Verhaeghe - GM BluePlan

From:	Suzanne Potts - GM BluePlan
Sent:	Wednesday, June 03, 2015 9:35 AM
To:	reception.admin@nawash.ca; council.arlene@nawash.ca
Cc:	Laura Verhaeghe - GM BluePlan
Subject:	North Perth Wastewater Master Plan Class EA Study Final Report
Attachments:	311031 Notice of Completion - Final.pdf

Dear Chief Arlene Chegahno,

As noted in the attached Notice of Completion, the Municipality of North Perth has completed a Wastewater Treatment Master Plan to identify a preferred servicing strategy for wastewater treatment to the year 2030. Details for obtaining the Master Plan for your review can be found in the Notice of Completion.

In order to identify the potential for any of the projects proposed in the Master Plan to affect First Nation treaty rights or have any other adverse impacts on First Nations, we are notifying you of this project. The majority of the projects proposed will occur within the existing North Perth Wastewater Treatment Plant site, or would be considered 'pre-approved' Schedule A Class EA activities, but we wanted to ensure you were aware of this study to identify any additional concerns we may not have considered. Please provide any comments or concerns to the email address below. If you have no concerns with this project, we would much appreciate if you could provide confirmation of receipt of this Notice to the same address.

Laura.Verhaeghe@gmblueplan.ca

Note that the Public Review Period listed in the Notice of Completion expires on June 18; however, we would like to give you additional time to review the information, so this deadline does not apply to your comments. We appreciate your time and input.

Best Regards,

Suzanne Potts
Administrative Assistant

GM BluePlan Engineering Limited
650 Woodlawn Road West, Block C, Unit 2 | Guelph ON N1K 1B8
t: 519.824.8150
suzanne.potts@gmblueplan.ca | www.gmblueplan.ca

below. If you have no concerns with this project, we would much appreciate if you could provide confirmation of receipt of this Notice to the same address.

Laura.Verhaeghe@gmblueplan.ca

Note that the Public Review Period listed in the Notice of Completion expires on June 18; however, we would like to give you additional time to review the information, so this deadline does not apply to your comments. We appreciate your time and input.

Best Regards,

Suzanne Potts
Administrative Assistant

GM BluePlan Engineering Limited
650 Woodlawn Road West, Block C, Unit 2 | Guelph ON N1K 1B8
t: 519.824.8150
suzanne.potts@gmblueplan.ca | www.gmblueplan.ca

Laura Verhaeghe - GM BluePlan

From:	Laura Verhaeghe - GM BluePlan
Sent:	Thursday, July 30, 2015 10:24 AM
To:	'alicia.blackeagle@wifn.org'
Subject:	FW: North Perth Wastewater Master Plan Class EA Study Final Report
Attachments:	311031 Notice of Completion - Final.pdf

Hello Alicia,

I left a voice message with you on July 13 to follow-up on the Notice of Completion for the North Perth Wastewater Master Plan Class Environmental Assessment. Could you please indicate whether you plan on providing comments on this project? The 30 day public review period closed on June 18, but I want to ensure Walpole Island First Nation has had a chance to comment if you wish to do so. Please let me know if you require further information.

Thank you,

Laura Verhaeghe, P.Eng.
Project Manager

GM BluePlan Engineering Limited
650 Woodlawn Road West, Block C, Unit 2 | Guelph ON N1K 1B8
t: 519.824.8150 | c: 226.500.4771
laura.verhaeghe@gmblueplan.ca | www.gmblueplan.ca

From: Suzanne Potts - GM BluePlan
Sent: Wednesday, June 03, 2015 9:32 AM
To: drskoke@wifn.org; alicia.blackeagle@wifn.org
Cc: Laura Verhaeghe - GM BluePlan
Subject: North Perth Wastewater Master Plan Class EA Study Final Report

Dear Chief Daniel Miskokomon,

As noted in the attached Notice of Completion, the Municipality of North Perth has completed a Wastewater Treatment Master Plan to identify a preferred servicing strategy for wastewater treatment to the year 2030. Details for obtaining the Master Plan for your review can be found in the Notice of Completion.

In order to identify the potential for any of the projects proposed in the Master Plan to affect First Nation treaty rights or have any other adverse impacts on First Nations, we are notifying you of this project. The majority of the projects proposed will occur within the existing North Perth Wastewater Treatment Plant site, or would be considered 'pre-approved' Schedule A Class EA activities, but we wanted to ensure you were aware of this study to identify any additional concerns we may not have considered. Please provide any comments or concerns to the email address below. If you have no concerns with this project, we would much appreciate if you could provide confirmation of receipt of this Notice to the same address.

Laura.Verhaeghe@gmblueplan.ca

Note that the Public Review Period listed in the Notice of Completion expires on June 18; however, we would like to give you additional time to review the information, so this deadline does not apply to your comments. We appreciate your time and input.

Best Regards,

Suzanne Potts
Administrative Assistant

GM BluePlan Engineering Limited
650 Woodlawn Road West, Block C, Unit 2 | Guelph ON N1K 1B8
t: 519.824.8150
suzanne.potts@gmblueplan.ca | www.gmblueplan.ca

GM BluePlan ENGINEERING

Laura Verhaeghe - GM BluePlan

From:	Suzanne Potts - GM BluePlan
Sent:	Wednesday, June 03, 2015 9:32 AM
To:	drskoke@wifn.org; alicia.blackeagle@wifn.org
Cc:	Laura Verhaeghe - GM BluePlan
Subject:	North Perth Wastewater Master Plan Class EA Study Final Report
Attachments:	311031 Notice of Completion - Final.pdf

Dear Chief Daniel Miskokomon,

As noted in the attached Notice of Completion, the Municipality of North Perth has completed a Wastewater Treatment Master Plan to identify a preferred servicing strategy for wastewater treatment to the year 2030. Details for obtaining the Master Plan for your review can be found in the Notice of Completion.

In order to identify the potential for any of the projects proposed in the Master Plan to affect First Nation treaty rights or have any other adverse impacts on First Nations, we are notifying you of this project. The majority of the projects proposed will occur within the existing North Perth Wastewater Treatment Plant site, or would be considered 'pre-approved' Schedule A Class EA activities, but we wanted to ensure you were aware of this study to identify any additional concerns we may not have considered. Please provide any comments or concerns to the email address below. If you have no concerns with this project, we would much appreciate if you could provide confirmation of receipt of this Notice to the same address.

Laura.Verhaeghe@gmblueplan.ca

Note that the Public Review Period listed in the Notice of Completion expires on June 18; however, we would like to give you additional time to review the information, so this deadline does not apply to your comments. We appreciate your time and input.

Best Regards,

Suzanne Potts
Administrative Assistant

GM BluePlan Engineering Limited
650 Woodlawn Road West, Block C, Unit 2 | Guelph ON N1K 1B8
t: 519.824.8150
suzanne.potts@gmblueplan.ca | www.gmblueplan.ca

Laura Verhaeghe - GM BluePlan

From:	Suzanne Potts - GM BluePlan
Sent:	Wednesday, June 03, 2015 9:35 AM
To:	Sheri.Doxtator@oneida.on.ca
Cc:	Laura Verhaeghe - GM BluePlan
Subject:	North Perth Wastewater Master Plan Class EA Study Final Report
Attachments:	311031 Notice of Completion - Final.pdf

Dear Chief Sheri Doxtator,

As noted in the attached Notice of Completion, the Municipality of North Perth has completed a Wastewater Treatment Master Plan to identify a preferred servicing strategy for wastewater treatment to the year 2030. Details for obtaining the Master Plan for your review can be found in the Notice of Completion.

In order to identify the potential for any of the projects proposed in the Master Plan to affect First Nation treaty rights or have any other adverse impacts on First Nations, we are notifying you of this project. The majority of the projects proposed will occur within the existing North Perth Wastewater Treatment Plant site, or would be considered 'pre-approved' Schedule A Class EA activities, but we wanted to ensure you were aware of this study to identify any additional concerns we may not have considered. Please provide any comments or concerns to the email address below. If you have no concerns with this project, we would much appreciate if you could provide confirmation of receipt of this Notice to the same address.

Laura.Verhaeghe@gmblueplan.ca

Note that the Public Review Period listed in the Notice of Completion expires on June 18; however, we would like to give you additional time to review the information, so this deadline does not apply to your comments. We appreciate your time and input.

Best Regards,

Suzanne Potts
Administrative Assistant

GM BluePlan Engineering Limited
650 Woodlawn Road West, Block C, Unit 2 | Guelph ON N1K 1B8
t: 519.824.8150
suzanne.potts@gmblueplan.ca | www.gmblueplan.ca

Laura Verhaeghe - GM BluePlan

From:	Suzanne Potts - GM BluePlan
Sent:	Wednesday, June 03, 2015 9:36 AM
To:	bryanlaforme@newcreditfirstnation.com
Cc:	Laura Verhaeghe - GM BluePlan
Subject:	North Perth Wastewater Master Plan Class EA Study Final Report
Attachments:	311031 Notice of Completion - Final.pdf

Dear Chief Bryan LaForme,

As noted in the attached Notice of Completion, the Municipality of North Perth has completed a Wastewater Treatment Master Plan to identify a preferred servicing strategy for wastewater treatment to the year 2030. Details for obtaining the Master Plan for your review can be found in the Notice of Completion.

In order to identify the potential for any of the projects proposed in the Master Plan to affect First Nation treaty rights or have any other adverse impacts on First Nations, we are notifying you of this project. The majority of the projects proposed will occur within the existing North Perth Wastewater Treatment Plant site, or would be considered 'pre-approved' Schedule A Class EA activities, but we wanted to ensure you were aware of this study to identify any additional concerns we may not have considered. Please provide any comments or concerns to the email address below. If you have no concerns with this project, we would much appreciate if you could provide confirmation of receipt of this Notice to the same address.

Laura.Verhaeghe@gmblueplan.ca

Note that the Public Review Period listed in the Notice of Completion expires on June 18; however, we would like to give you additional time to review the information, so this deadline does not apply to your comments. We appreciate your time and input.

Best Regards,

Suzanne Potts
Administrative Assistant

GM BluePlan Engineering Limited
650 Woodlawn Road West, Block C, Unit 2 | Guelph ON N1K 1B8
t: 519.824.8150
suzanne.potts@gmblueplan.ca | www.gmblueplan.ca

GM BluePlan ENGINEERING

Laura Verhaeghe - GM BluePlan

From:	Suzanne Potts - GM BluePlan
Sent:	Wednesday, June 03, 2015 9:28 AM
To:	chief@cottfn.com
Cc:	Laura Verhaeghe - GM BluePlan
Subject:	North Perth Wastewater Master Plan Class EA Study Final Report
Attachments:	311031 Notice of Completion - Final.pdf

Dear Chief Joe Miskokomon,

As noted in the attached Notice of Completion, the Municipality of North Perth has completed a Wastewater Treatment Master Plan to identify a preferred servicing strategy for wastewater treatment to the year 2030. Details for obtaining the Master Plan for your review can be found in the Notice of Completion.

In order to identify the potential for any of the projects proposed in the Master Plan to affect First Nation treaty rights or have any other adverse impacts on First Nations, we are notifying you of this project. The majority of the projects proposed will occur within the existing North Perth Wastewater Treatment Plant site, or would be considered 'pre-approved' Schedule A Class EA activities, but we wanted to ensure you were aware of this study to identify any additional concerns we may not have considered. Please provide any comments or concerns to the email address below. If you have no concerns with this project, we would much appreciate if you could provide confirmation of receipt of this Notice to the same address.

Laura.Verhaeghe@gmblueplan.ca

Note that the Public Review Period listed in the Notice of Completion expires on June 18; however, we would like to give you additional time to review the information, so this deadline does not apply to your comments. We appreciate your time and input.

Best Regards,

Suzanne Potts
Administrative Assistant

GM BluePlan Engineering Limited
650 Woodlawn Road West, Block C, Unit 2 | Guelph ON N1K 1B8
t: 519.824.8150
suzanne.potts@gmblueplan.ca | www.gmblueplan.ca

Laura Verhaeghe - GM BluePlan

From:	Laura Verhaeghe - GM BluePlan
Sent:	Thursday, July 30, 2015 10:42 AM
To:	'd.richie@saugeenojibwaynation.ca'
Subject:	FW: Notice of Study Completion, North Perth Wastewater Master Plan Class EA Study
Attachments:	311031 Notice of Completion - Final.pdf

Good Morning Doran,

I left a follow-up voice message with you on July 13, regarding the attached Notice of Completion forwarded to you in the email below in relation to the North Perth Wastewater Master Plan Class Environmental Assessment.

Could you please indicate whether you plan on providing comments on this project? The 30 day public review period closed on June 18, but I want to ensure Saugeen Ojibway First Nation has had a chance to comment if you wish to do so. Please let me know if you require further information.

Thank you in advance for your response.

Sincerely,

Laura Verhaeghe, P.Eng.
Project Manager

GM BluePlan Engineering Limited
650 Woodlawn Road West, Block C, Unit 2 | Guelph ON N1K 1B8
t: 519.824.8150 | c: 226.500.4771
laura.verhaeghe@gmblueplan.ca | www.gmblueplan.ca

From: Suzanne Potts - GM BluePlan
Sent: Wednesday, July 08, 2015 3:06 PM
To: d.ritchie@saugeenojibwaynation.ca
Cc: Laura Verhaeghe - GM BluePlan
Subject: Notice of Study Completion, North Perth Wastewater Master Plan Class EA Study

Dear Mr. Linklater,

As noted in the attached Notice of Completion, the Municipality of North Perth has completed a Wastewater Treatment Master Plan to identify a preferred servicing strategy for wastewater treatment to the year 2030. Details for obtaining the Master Plan for your review can be found in the Notice of Completion.

In order to identify the potential for any of the projects proposed in the Master Plan to affect First Nation treaty rights or have any other adverse impacts on First Nations, we are notifying you of this project. The majority of the projects proposed will occur within the existing North Perth Wastewater Treatment Plant site, or would be considered 'pre-approved' Schedule A Class EA activities, but we wanted to ensure you were aware of this study to identify any additional concerns we may not have considered. Please provide any comments or concerns to the email address below. If you have no concerns with this project, we would much appreciate if you could provide confirmation of receipt of this Notice to the same address.

Laura.Verhaeghe@gmblueplan.ca

Note that the Public Review Period listed in the Notice of Completion expires on June 18; however, we would like to give you additional time to review the information, so this deadline does not apply to your comments. We appreciate your time and input.

Best Regards,

Suzanne Potts
Administrative Assistant

GM BluePlan Engineering Limited
650 Woodlawn Road West, Block C, Unit 2 | Guelph ON N1K 1B8
t: 519.824.8150
suzanne.potts@gmblueplan.ca | www.gmblueplan.ca

Laura Verhaeghe - GM BluePlan

From:	Suzanne Potts - GM BluePlan
Sent:	Wednesday, June 03, 2015 9:33 AM
To:	vroote@saugeenfirstnation.ca; dcarter@saugeenfirstnation.ca
Cc:	Laura Verhaeghe - GM BluePlan
Subject:	North Perth Wastewater Master Plan Class EA Study Final Report
Attachments:	311031 Notice of Completion - Final.pdf

Dear Chief Vernon Roote,

As noted in the attached Notice of Completion, the Municipality of North Perth has completed a Wastewater Treatment Master Plan to identify a preferred servicing strategy for wastewater treatment to the year 2030. Details for obtaining the Master Plan for your review can be found in the Notice of Completion.

In order to identify the potential for any of the projects proposed in the Master Plan to affect First Nation treaty rights or have any other adverse impacts on First Nations, we are notifying you of this project. The majority of the projects proposed will occur within the existing North Perth Wastewater Treatment Plant site, or would be considered 'pre-approved' Schedule A Class EA activities, but we wanted to ensure you were aware of this study to identify any additional concerns we may not have considered. Please provide any comments or concerns to the email address below. If you have no concerns with this project, we would much appreciate if you could provide confirmation of receipt of this Notice to the same address.

Laura.Verhaeghe@gmblueplan.ca

Note that the Public Review Period listed in the Notice of Completion expires on June 18; however, we would like to give you additional time to review the information, so this deadline does not apply to your comments. We appreciate your time and input.

Best Regards,

Suzanne Potts
Administrative Assistant

GM BluePlan Engineering Limited
650 Woodlawn Road West, Block C, Unit 2 | Guelph ON N1K 1B8
t: 519.824.8150
suzanne.potts@gmblueplan.ca | www.gmblueplan.ca

PEOPLE | ENGINEERING | ENVIRONMENTS

June 2, 2015
Our File: 311031

Saugeen Ojibway Nation
Jake Linklater, Case Manager
Saugeen Ojibway Nation Environment Office
RR 5
Wiarton ON N0H 2T0

Re: Municipality of North Perth Wastewater Master Plan
Class EA Study - Notice of Completion

Dear Mr. Linklater,

As noted in the attached Notice of Completion, the Municipality of North Perth has completed a Wastewater Treatment Master Plan to identify a preferred servicing strategy for wastewater treatment to the year 2030. Details for obtaining the Master Plan for your review can be found in the Notice of Completion.

In order to identify the potential for any of the projects proposed in the Master Plan to affect First Nation treaty rights or have any other adverse impacts on First Nations, we are notifying you of this project. The majority of the projects proposed will occur within the existing North Perth Wastewater Treatment Plant site, or would be considered 'pre-approved' Schedule A Class EA activities, but we wanted to ensure you were aware of this study to identify any additional concerns we may not have considered. Please provide any comments or concerns to the address below. If you have no concerns with this project, we would much appreciate if you could provide confirmation of receipt of this Notice to the same address.

GM BluePlan Engineering Limited
650 Woodlawn Rd. W., Block C, Unit 2
Guelph, ON N1K 1B8
Tel: 519-824-8150
Fax: 519-824-8089
Laura.Verhaeghe@gmblueplan.ca

Note that the Public Review Period listed in the Notice of Completion expires on June 18; however, we would like to give you additional time to review the information, so this deadline does not apply to your comments.

We appreciate your time and input.

Yours truly,

GM BLUEPLAN ENGINEERING LIMITED
Per:

Laura Verhaeghe, P.Eng.

Laura Verhaeghe - GM BluePlan

From:	Suzanne Potts - GM BluePlan
Sent:	Tuesday, May 19, 2015 2:00 PM
To:	alya@metisnation.org
Subject:	Re: Notice of Study Completion, North Perth Wastewater Master Plan Class EA Study
Attachments:	311031 Notice of Completion - Final.pdf

Dear Mr. Alibhai,

On behalf of the Municipality of North Perth, please find attached the Notice of Study Completion for the North Perth Wastewater Master Plan Class Environmental Assessment Study. Please direct any comments or questions to the contacts enclosed.

Thank you,

Suzanne Potts
Administrative Assistant

GM BluePlan Engineering Limited
650 Woodlawn Road West, Block C, Unit 2 | Guelph ON N1K 1B8
t: 519.824.8150
suzanne.potts@gmblueplan.ca | www.gmblueplan.ca

MUNICIPALITY OF NORTH PERTH
NOTICE OF COMMENCEMENT

Gamsby and Mannerow
ENGINEERS

NORTH PERTH WASTEWATER TREATMENT MASTER PLAN CLASS ENVIRONMENTAL ASSESSMENT STUDY

The Municipality of North Perth has initiated a Wastewater Treatment Master Plan to identify a preferred servicing strategy for wastewater treatment to the year 2030.

The North Perth Wastewater Treatment Plant serves the Municipality of North Perth through sewer collection systems in Atwood and Listowel and receives hauled in wastewater from the remainder of North Perth and some surrounding municipalities. The Wastewater Treatment Master Plan process is intended to provide direction for wastewater infrastructure planning in accordance with the Municipality of North Perth Master Growth Plan. In keeping with North Perth's commitment to corporate and environmental responsibility, the Master Plan will identify and prioritize current plant deficiencies and provide a framework to manage wastewater treatment in order to sustain growth and support capital funding projections within the planning period. Together, these plans will guide North Perth for the provision of sustainable wastewater treatment services to the year 2030.

The study is being conducted in accordance with the Master Plan Environmental Assessment process as outlined in the Municipal Class Environmental Assessment (EA) document (Municipal Engineers Association, 2011). The Class EA process includes identifying alternative solutions, evaluation of alternatives, assessment of the potential environmental effects of the proposed improvements, identification of reasonable measures to mitigate any adverse impacts that my result and consultation with the public and review agencies. The Municipality of North Perth will be holding Public Information Centres (PICs) on this project in 2012 to provide background information on the study and present improvements to wastewater treatment works that are being considered. Representatives from North Perth and its consultants will be present at the PIC to answer any questions and solicit input from the public. Separate notices will be issued prior to each PIC providing event time and location.

For further information regarding the North Perth Wastewater Treatment Master Planning process, or to be added to the mailing list, please contact one of the following:

Mark Hackett
Manager of Environmental Services
Municipality of North Perth
330 Wallace Avenue North
Listowel, ON N4W 1L3
Tel: 519-292-2069
Fax: 519-291-1804
Email: mhackett@northperth.ca

Dave Hicknell, C.E.T.
Project Manager
Gamsby and Mannerow Limited
975 Wallace Avenue North
Listowel, ON N4W 1M6
Tel: 519-291-9339
Fax: 519-291-5172
Email: dhicknell@gamsby.com

This notice issued January 11, 2012.

MUNICIPALITY OF NORTH PERTH NOTICE OF PUBLIC INFORMATION CENTRE

NORTH PERTH WASTEWATER TREATMENT MASTER PLAN CLASS ENVIRONMENTAL ASSESSMENT STUDY

The Municipality of North Perth initiated a Wastewater Treatment Master Plan on January 11, 2012 to identify a preferred servicing strategy for wastewater treatment to the year 2030.

The North Perth Wastewater Treatment Plant serves the Municipality of North Perth through sanitary sewer collection systems in Atwood and Listowel and receives hauled in wastewater from the remainder of North Perth and some surrounding municipalities. The Wastewater Treatment Master Plan process is intended to provide direction for wastewater infrastructure planning in accordance with the Municipality of North Perth Master Growth Plan and Municipal Engineers Association (MEA) Class Environmental Assessment (EA) process. In keeping with North Perth's commitment to corporate and environmental responsibility, the Master Plan will identify and prioritize current plant deficiencies and provide a framework to manage wastewater treatment in order to sustain growth and support capital funding projections within the planning period. Together, these plans will guide North Perth towards ensuring the provision of sustainable wastewater treatment services to the year 2030.

The Process

The study is being conducted under Approach 1 of the Master Planning process outlined in the MEA Class EA document (2011). Under this approach, the study will satisfy the requirements for Schedule A and A+ projects and will provide the strategy and foundation to be used for future individual studies that will fulfill the requirements for any Schedule B or C projects. The study will satisfy Phases 1 and 2 of the Class EA process including identification of alternative solutions, evaluation of alternatives, assessment of the potential environmental effects of the proposed improvements, identification of reasonable measures to mitigate any adverse impacts that may result and consultation with the public and review agencies.

Public Consultation

The Municipality wishes to ensure that anyone interested in this study has the opportunity to be involved and provide input. A Public Information Centre (PIC) will be held on **April 1, 2015** to provide background information on the study and present improvements to wastewater treatment works that are being considered. Representatives from North Perth and its consultants will be present at the PIC to answer any questions, and solicit input from the public.

The Public Information Centre is scheduled for:

Date: April 1, 2015
Time: 5:00 pm to 7:00 pm
Location: North Perth Council Chambers
330 Wallace Avenue North
Listowel, ON N4W 1L3

For further information regarding the North Perth Wastewater Treatment Master Planning process, or to be added to the mailing list, please contact one of the following:

Mark Hackett
Manager of Environmental Services
Municipality of North Perth
330 Wallace Avenue North
Listowel, ON N4W 1L3
Tel: 519-292-2069
Fax: 519-291-1804
Email: mhackett@northperth.ca

Dave Hicknell, C.E.T.
Project Manager
GM BluePlan Engineering Limited
650 Woodlawn Rd. W., Block C, Unit 2
Guelph, ON N1K 1B8
Tel: 519-824-8150
Fax: 519-824-8089
Email: Dave.Hicknell@gmblueplan.ca

This notice issued March 4, 2015.

April 24, 2015
Our File: 311031

<ADDRESS>

Attention: <NAME>
<TITLE>

Re: North Perth Wastewater Treatment Master Plan Class Environmental Assessment Study

Dear ________________:

The Municipality of North Perth initiated a Wastewater Treatment Master Plan on January 11, 2012 to identify a preferred servicing strategy for wastewater treatment to the year 2030.

The North Perth Wastewater Treatment Plant serves the Municipality of North Perth through sewer collection systems in Atwood and Listowel and receives hauled in wastewater from the remainder of North Perth and some surrounding municipalities. The Wastewater Treatment Master Plan process is intended to provide direction for wastewater infrastructure planning in accordance with the Municipality of North Perth Master Growth Plan. In keeping with North Perth's commitment to corporate and environmental responsibility, the Master Plan will identify and prioritize current plant deficiencies and provide a framework to manage wastewater treatment in order to sustain growth and support capital funding projections within the planning period. Together, these plans will guide North Perth for the provision of sustainable wastewater treatment services to the year 2030.

The study is being conducted under Approach 1 of the Master Planning process outlined in the MEA Class EA document (2011). Under this approach, the study will satisfy the requirements for Schedule A and A+ projects and will provide the strategy and foundation to be used for future individual studies that will fulfill the requirements for any Schedule B or C projects. The study will satisfy Phases 1 and 2 of the Class EA process including identification of alternative solutions, evaluation of alternatives, assessment of the potential environmental effects of the proposed improvements, identification of reasonable measures to mitigate any adverse impacts that may result and consultation with the public and review agencies.

The Municipality of North Perth wishes to ensure that if your agency has an interest in this study, you have the opportunity to be involved and to provide input. A Public Information Centre will be held on **April 1, 2015** to provide information and receive feedback from the public.

The Public Information Centre is scheduled for:

Date: April 1, 2015
Time: 5:00 pm to 7:00 pm
Location: North Perth Council Chambers
330 Wallace Avenue North
Listowel, ON N4W 1L3

If you would like us to provide you with any information prior to this meeting, or have any relevant information, concerns and/or comments related to this study, please contact one of the Project Team members below.

Even if the project will not impact the mandate, policies or program of your agency, we would appreciate a confirmation of your acknowledgement of this letter to the undersigned, dated and signed in the area provided below or, if more convenient, please send an email to Dave.Hicknell@gmblueplan.ca.

At the conclusion of the study, anticipated in mid-2015, a Notice of Completion will be issued.

In order to meet scheduled project milestones, we would appreciate your reply no later than Friday, March 27, 2015.

Sincerely,

Dave Hicknell, C.E.T.
GM BluePlan Engineering

Dave Hicknell, C.E.T.
Project Manager
GM BluePlan Engineering Limited
650 Woodlawn Road West, Block C, Unit 2
Guelph, Ontario N1K 1B8
Tel: (519) 824-8150
Fax: (519) 824-8089
email: Dave.Hicknell@gmblueplan.ca

Mark Hackett
Manager of Environmental Services
Municipality of North Perth
330 Wallace Avenue North
Listowel, ON N4W 1L3
Tel: (519) 292-2069
Fax: (519) 291-1804
Email: mhackett@northperth.ca

Thank you for contacting us. However, this project does not relate to this agency's mandate, policies and programs. Our agency will not be providing input or participating in this study.

Date:

Agency:

Per:

Canadian Environmental Assessment Agency
Agence canadienne d'évaluation environnementale

55 St. Clair Avenue East,
Room 907
Toronto ON M4T 1M2

55, avenue St. Clair Est,
pièce 907
Toronto ON M4T 1M2

February 20, 2015

Sent by email

Dave Hicknell
GM BluePlan Engineering Ltd.
650 Woodlawn Rd. W., Block C, Unit 2
Guelph, ON N1K1B8
dave.hicknell@gmblueplan.ca

Dear Mr. Hicknell:

Re: Information on the *Canadian Environmental Assessment Act, 2012*

Thank you for your correspondence of February 17, 2015 regarding the North Perth wastewater treatment plan.

As part of the Government of Canada's plan for Responsible Resource Development which seeks to modernize the regulatory system for project reviews, the *Canadian Environmental Assessment Act, 2012* (CEAA 2012) came into force on July 6, 2012. CEAA 2012 focuses federal environmental reviews on projects that have the potential to cause significant adverse environmental effects in areas of federal jurisdiction.

The CEAA 2012 applies to projects described in the *Regulations Designating Physical Activities* (the Regulations). Based on the information provided, your project does not appear to be described in the Regulations. **Kindly review the Regulations to confirm applicability to the proposed project.**

If your project is in a federally designated wildlife area or migratory bird sanctuary please check section 1 of the Regulations, which details the designated projects specific to those locations.

For more information on CEAA 2012, please access the following links on the Canadian Environmental Assessment Agency's (the Agency) website:

Overview of CEAA 2012
http://www.ceaa.gc.ca/default.asp?lang=En&n=16254939-1

Regulations Designating Physical Activities, and
Prescribed Information for a Description of a Designated Project Regulations
http://www.ceaa.gc.ca/default.asp?lang=En&n=9EC7CAD2-1

.../2

If it appears that CEAA 2012 may apply to your proposed project, you must provide the Agency with a description of the proposed project. Please see the link below to the Agency's guide to preparing a project description.

Guide to Preparing a Description of a Designated Project
http://www.ceaa.gc.ca/63D3D025-2236-49C9-A169-DD89A36DA0E6/Guide_to_Preparing_a_Description_of_a_Designated_Project_under_CEAA_2012.pdf

If you believe the project is not subject to a federal environmental assessment, and do not submit a project description, **we kindly request that you remove the Agency from your distribution list**. If you have questions, please get in touch with our office through the switchboard at 416-952-1576.

Sincerely,

Anjala Puvananathan
Director, Ontario Region
Canadian Environmental Assessment Agency

February 17, 2015
Our File: 311031

Ministry of Economic Development and Innovation
900 Bay St
6th Floor, Hearst Block
Toronto, ON
M7A 2E1
Steve.romanyshyn@ontario.ca

Attention: Mr. Steve Romanyshyn
Director - Strategic Policy Branch

Re: North Perth Wastewater Treatment Master Plan Class Environmental Assessment Study

Dear Mr. Romanyshyn,

The Municipality of North Perth initiated a Wastewater Treatment Master Plan on January 11, 2012 to identify a preferred servicing strategy for wastewater treatment to the year 2030.

The North Perth Wastewater Treatment Plant serves the Municipality of North Perth through sewer collection systems in Atwood and Listowel and receives hauled in wastewater from the remainder of North Perth and some surrounding municipalities. The Wastewater Treatment Master Plan process is intended to provide direction for wastewater infrastructure planning in accordance with the Municipality of North Perth Master Growth Plan. In keeping with North Perth's commitment to corporate and environmental responsibility, the Master Plan will identify and prioritize current plant deficiencies and provide a framework to manage wastewater treatment in order to sustain growth and support capital funding projections within the planning period. Together, these plans will guide North Perth for the provision of sustainable wastewater treatment services to the year 2030.

The study is being conducted under Approach 1 of the Master Planning process outlined in the MEA Class EA document (2011). Under this approach, the study will satisfy the requirements for Schedule A and A+ projects and will provide the strategy and foundation to be used for future individual studies that will fulfill the requirements for any Schedule B or C projects. The study will satisfy Phases 1 and 2 of the Class EA process including identification of alternative solutions, evaluation of alternatives, assessment of the potential environmental effects of the proposed improvements, identification of reasonable measures to mitigate any adverse impacts that may result and consultation with the public and review agencies.

The Municipality of North Perth wishes to ensure that if your agency has an interest in this study, you have the opportunity to be involved and to provide input. A Public Information Centre will be held on **April 1, 2015** to provide information and receive feedback from the public.

The Public Information Centre is scheduled for:

Date: April 1, 2015
Time: 5:00 pm to 7:00 pm
Location: North Perth Council Chambers
330 Wallace Avenue North
Listowel, ON N4W 1L3

If you would like us to provide you with any information prior to this meeting, or have any relevant information, concerns and/or comments related to this study, please contact one of the Project Team members below.

Even if the project will not impact the mandate, policies or program of your agency, we would appreciate a confirmation of your acknowledgement of this letter to the undersigned, dated and signed in the area provided below or, if more convenient, please send an email to Dave.Hicknell@gmblueplan.ca.

At the conclusion of the study, anticipated in mid-2015, a Notice of Completion will be issued.

In order to meet scheduled project milestones, we would appreciate your reply no later than Friday, March 27, 2015.

Sincerely,

Dave Hicknell, C.E.T.
GM BluePlan Engineering

Dave Hicknell, C.E.T.
Project Manager
GM BluePlan Engineering Limited
650 Woodlawn Road West, Block C, Unit 2
Guelph, Ontario N1K 1B8
Tel: (519) 824-8150
Fax: (519) 824-8089
email: Dave.Hicknell@gmblueplan.ca

Mark Hackett
Manager of Environmental Services
Municipality of North Perth
330 Wallace Avenue North
Listowel, ON N4W 1L3
Tel: (519) 292-2069
Fax: (519) 291-1804
Email: mhackett@northperth.ca

Thank you for contacting us. However, this project does not relate to this agency's mandate, policies and programs. Our agency will not be providing input or participating in this study.

Date: March 23, 2015

Agency: Ministry of Economic Development, Employment and Infrastructure/Ministry of Research and Innovation

Per: Michael Helfinger, Senior Policy Advisor, Strategic Policy Branch

Ministry of Transportation

Engineering Office
Corridor Management Section
West Region

659 Exeter Road
London, Ontario N6E 1L3
Telephone: (519) 873-4598
Facsimile: (519) 873-4228

Ministère des Transports

Bureau du génie
Section de gestion des couloirs routiers
Région de l'Ouest

659, chemin Exeter
London (Ontario) N6E 1L3
Téléphone: (519) 873-4598
Télécopieur: (519) 873-4228

Ontario

March 26, 2015

Mark Hackett email: mhackett@northperth.ca
Manager of Environmental Services
Municipality of North Perth
330 Wallace Avenue North
Listowel, ON
N4W 1L3

Dave Hicknell, C.E.T. email: Dave.Hicknell@gmblueplan.ca
Project Manager
GM Blueplan Engineering Limited
650 Woodlawn Rd. W., Block C, Unit 2
Guelph, ON
N1K 1B8

RE: North Perth Wastewater Treatment Master Plan
Class Environmental Assessment Study – Notice of Public Information Centre
Perth County
Municipality of North Perth, Highway 23

The Ministry of Transportation (MTO) is in receipt of a North Perth Wastewater Treatment Master Plan Class Environmental Assessment Study – Notice of Public Information Centre. The study area includes a portion of Highway 23.

Construction activities adjacent to and/or within the highway right-of-way are subject to MTO review and approval prior to construction.

1. Under the *Public Transportation and Highway Improvement Act*, Ministry of Transportation permits are required for all grading/construction located within 45 m of the Highway 23 highway (property) limits and within 180 m of the intersection of Highway 23 and any municipal road.

2. Under the *Public Transportation and Highway Improvement Act*, Ministry of Transportation permits are required for all visible signs proposed to be located within 400 m of the Highway 23 highway (property) limits.

…/2

3. Under the *Public Transportation and Highway Improvement Act*, Ministry of Transportation permits are required for all access points to Highway 23.

4. Under the *Public Transportation and Highway Improvement Act*, Ministry of Transportation permits are required for all encroachments proposed to be located, both above and below ground within the Highway 23 highway (property) limits.

In order to accommodate the issuance of permits we will require the submission of site plans, site servicing plans and grading plans for our review. We retain the right to request additional documentation such as a stormwater management report and illumination plans if, after our review of the site plan, we feel it is necessary.

We would like to be kept informed of the study progress. Please place this office on your mailing list.

Regards,

Chris Dixon
Corridor Management Planner
Corridor Management Section
MTO - West Region, London

c. Domenic Calvo, Corridor Management Section, MTO

Laura Verhaeghe - GM BluePlan

From:	Aggerholm, Bob (MOECC) <Bob.Aggerholm@ontario.ca>
Sent:	Friday, February 20, 2015 1:29 PM
To:	Laura Verhaeghe - GM BluePlan
Cc:	Newton, Craig (MOECC)
Subject:	RE: North Perth Wastewater Master Plan Study
Attachments:	EA Coordinators_map_Dec12_2014.pdf

Hello Laura,

Craig Newton is based in the London Office. I've attached out temporary contact list.

Bob Aggerholm
Environmental Planner / Regional EA Coordinator
Ministry of the Environment and Climate Change
Southwestern Region
733 Exeter Road
London, Ontario N6E 1L3
Voice and Voicemail Direct: (519) 873-5012
Office Switchboard (automated attendant): (519) 873-5000
Office Fax: (519) 873-5020
E-mail Direct: bob.aggerholm@ontario.ca

From: Laura Verhaeghe - GM BluePlan [mailto:Laura.Verhaeghe@gmblueplan.ca]
Sent: February 20, 2015 12:07 PM
To: Aggerholm, Bob (MOECC)
Cc: Suzanne Potts - GM BluePlan; Dave Hicknell - GM BluePlan; Miller, Jim (MOECC); Abernethy, Scott (MOECC); Newton, Craig (MOECC); Matthew Ballaban - GM BluePlan
Subject: RE: North Perth Wastewater Master Plan Study

Bob,

Please find attached our PIC boards for the North Perth Wastewater Master Plan Study, as requested. We will add Craig Newton to our contact list for this project, and direct correspondence to him after April 13. Could you please confirm that Craig is based out of the same office as yourself?

Thank you,

Laura Verhaeghe, P.Eng.
Project Manager

GM BluePlan Engineering Limited
650 Woodlawn Road West, Block C, Unit 2 | Guelph ON N1K 1B8
t: 519.824.8150 | c: 226.500.4771
laura.verhaeghe@gmblueplan.ca | www.gmblueplan.ca

From: Aggerholm, Bob (MOECC) [mailto:Bob.Aggerholm@ontario.ca]
Sent: Friday, February 20, 2015 11:48 AM
To: Suzanne Potts - GM BluePlan; Dave Hicknell - GM BluePlan
Cc: Miller, Jim (MOECC); Abernethy, Scott (MOECC); Newton, Craig (MOECC)
Subject: RE: North Perth Wastewater Master Plan Study

Hello Dave,

We received your notices regarding the North Perth Wastewater Master Plan.

As you know MOECC has an interest in this project.

Please provide me with a copy of your PIC PowerPoints (when they are available). E-mail is fine.

Also, we wish to review a finalized draft before Council adoption.

After April 13, please direct any correspondence, e-mail or request for information to my colleague Craig Newton. Craig will be handling this file.

Thanks,

Bob Aggerholm
Environmental Planner / Regional EA Coordinator
Ministry of the Environment and Climate Change
Southwestern Region
733 Exeter Road
London, Ontario N6E 1L3
Voice and Voicemail Direct: (519) 873-5012
Office Switchboard (automated attendant): (519) 873-5000
Office Fax: (519) 873-5020

E-mail Direct: bob.aggerholm@ontario.ca

From: Suzanne Potts - GM BluePlan [mailto:Suzanne.Potts@gmblueplan.ca]
Sent: February 20, 2015 11:04 AM
To: Aggerholm, Bob (MOECC)
Cc: Laura Verhaeghe - GM BluePlan
Subject: North Perth Wastewater Master Plan Study

Dear Mr. Aggerholm,

On behalf of the Regional Municipality of North Perth, please find attached a letter and Notice of Public Information Centre in regards to the North Perth Wastewater Master Plan Study. If you have any questions or concerns, please see the contact information on the attached letter.

Best Regards,

Suzanne Potts
Administrative Assistant

GM BluePlan Engineering Limited
650 Woodlawn Road West, Block C, Unit 2 | Guelph ON N1K 1B8
t: 519.824.8150
suzanne.potts@gmblueplan.ca | www.gmblueplan.ca

TEMPORARY AND UNTIL FURTHER NOTICE
Ministry of the Environment and Climate Change, Southwestern Region

---

Geographic Areas of Responsibility of the
Regional Planner / Regional EA Coordinator position **for issues relating to:**

- a) **Class Environmental Assessment (EA) projects**
- b) **Requests by the Province for MOE's input on *Planning Act* matters (i.e. MOE's position on new development applications and municipal land use policies)**

Mailing Address:

Ministry of the Environment
Southwest Region
733 Exeter Road
London Ontario
N6E 1L3

Telephone (switchboard)

519-873-5000
1-800-265-7672

Fax: 519-873-5020

London, Middlesex, Chatham-Kent, Essex, Lambton
Craig Newton
Voice: 519-873-5014
E-mail: craig.newton@ontario.ca

Huron, Perth, Oxford, Pelee Island, Elgin, Bruce, Grey
Bob Aggerholm
Voice: 519-873-5012
E-mail: bob.aggerholm@ontario.ca

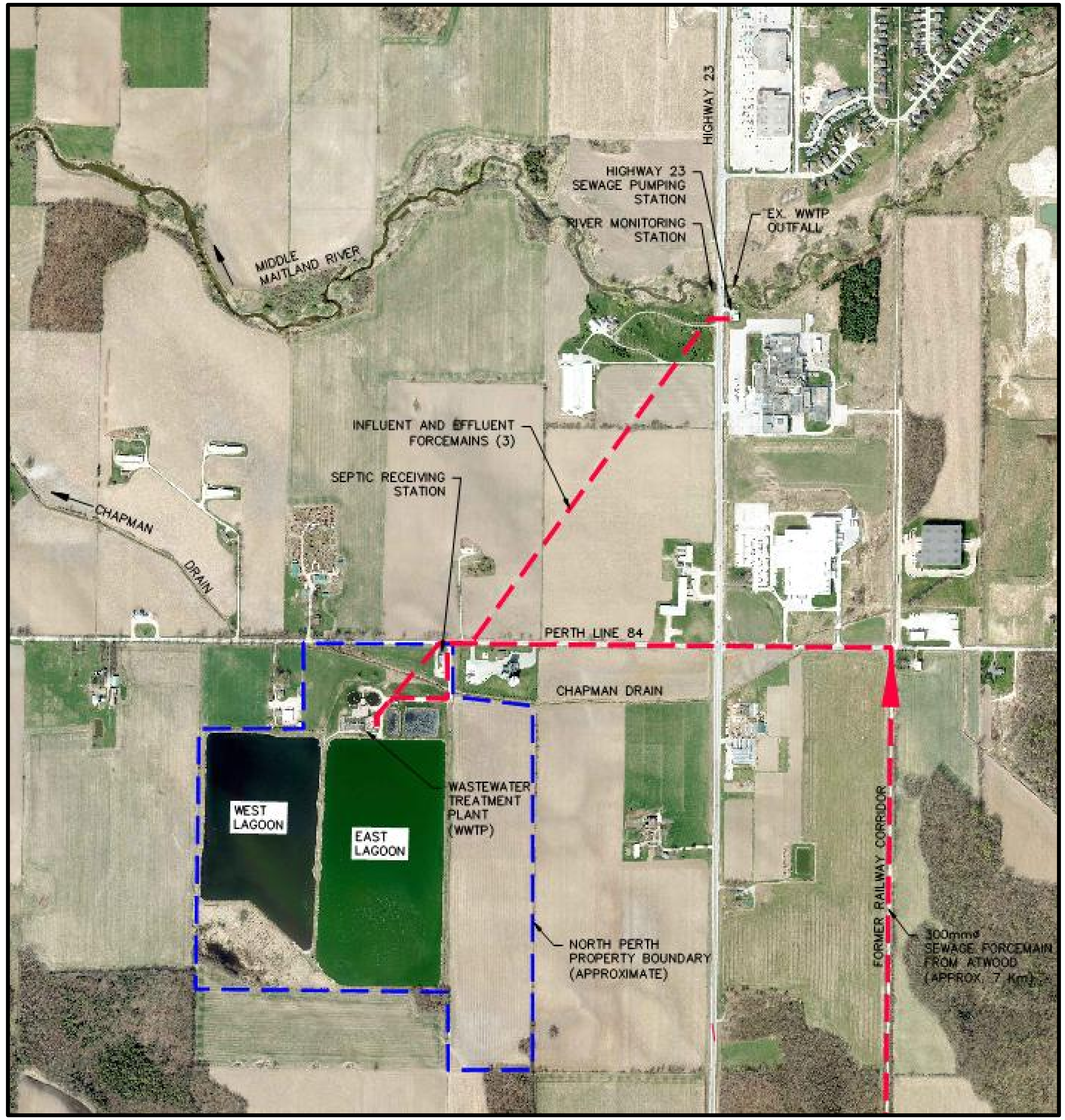
Bill Armstrong has retired from the Ministry.
Bob Aggerholm will retire in early 2015.
ed. December 2014

North Perth Wastewater Treatment Master Plan
Class Environmental Assessment Study

Project Description

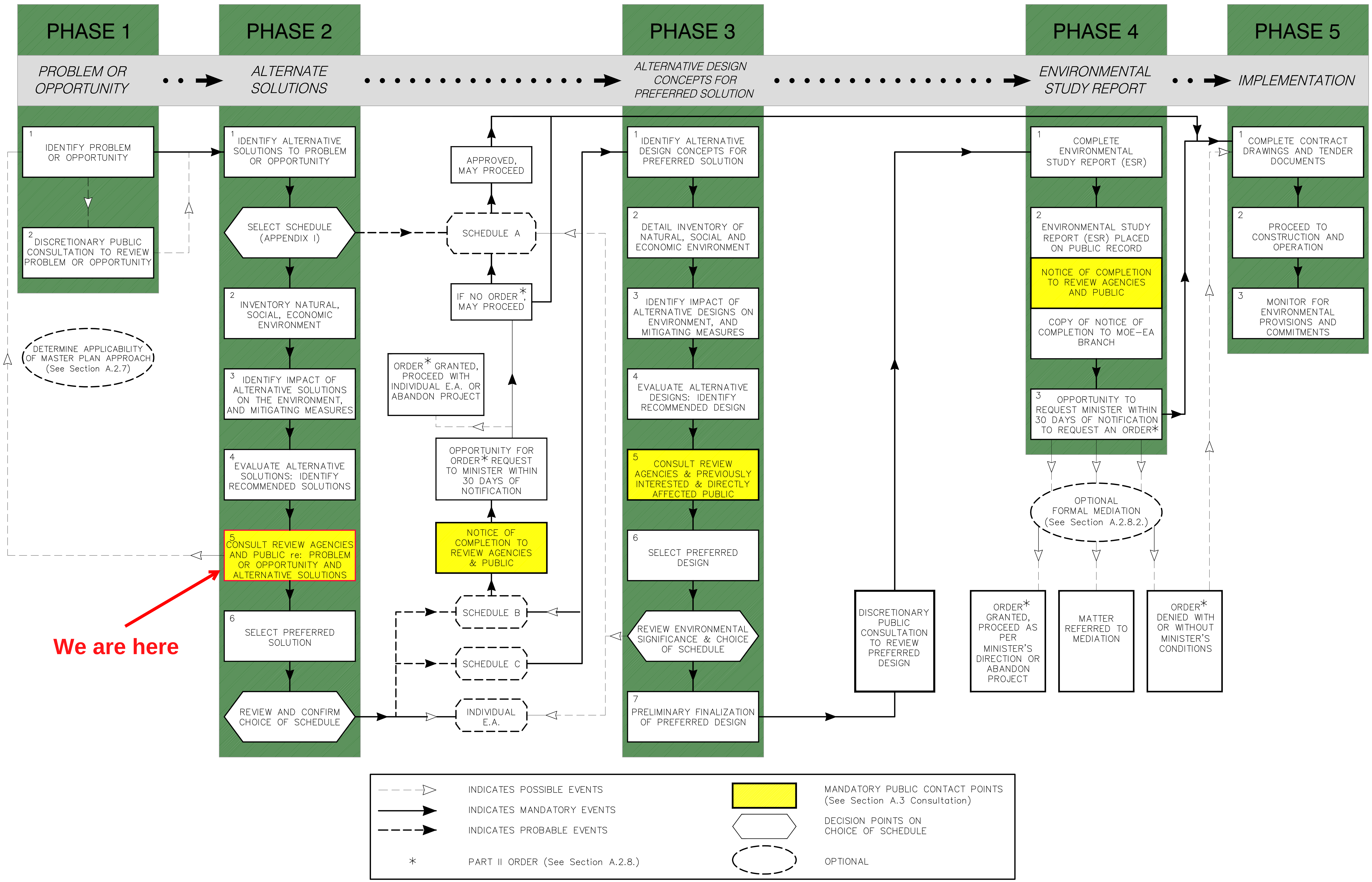
- North Perth Wastewater Treatment Plant (WWTP) serves the Municipality of North Perth through sewer collection systems in Atwood and Listowel, and receives hauled-in wastewater from the remainder of North Perth and surrounding municipalities
- WWTP is located at 6115 North Perth Line 84 and includes:
  - ➢ Septage Receiving Station
  - ➢ Mechanical Treatment Plant
  - ➢ Emergency Storage Lagoons
- Rated Hydraulic Capacity → 9,030 m^3/day
- Rated Organic Capacity → 8,000 kg/day (BOD_5)
- Goals of Wastewater Treatment Master Plan:
  - ➢ Provide direction for sustainable wastewater infrastructure planning in accordance with North Perth Master Growth Plan
  - ➢ Identify and prioritize current plant deficiencies and opportunities for improvement
  - ➢ Provide an implementation plan and capital budget projections to manage wastewater treatment to 2030

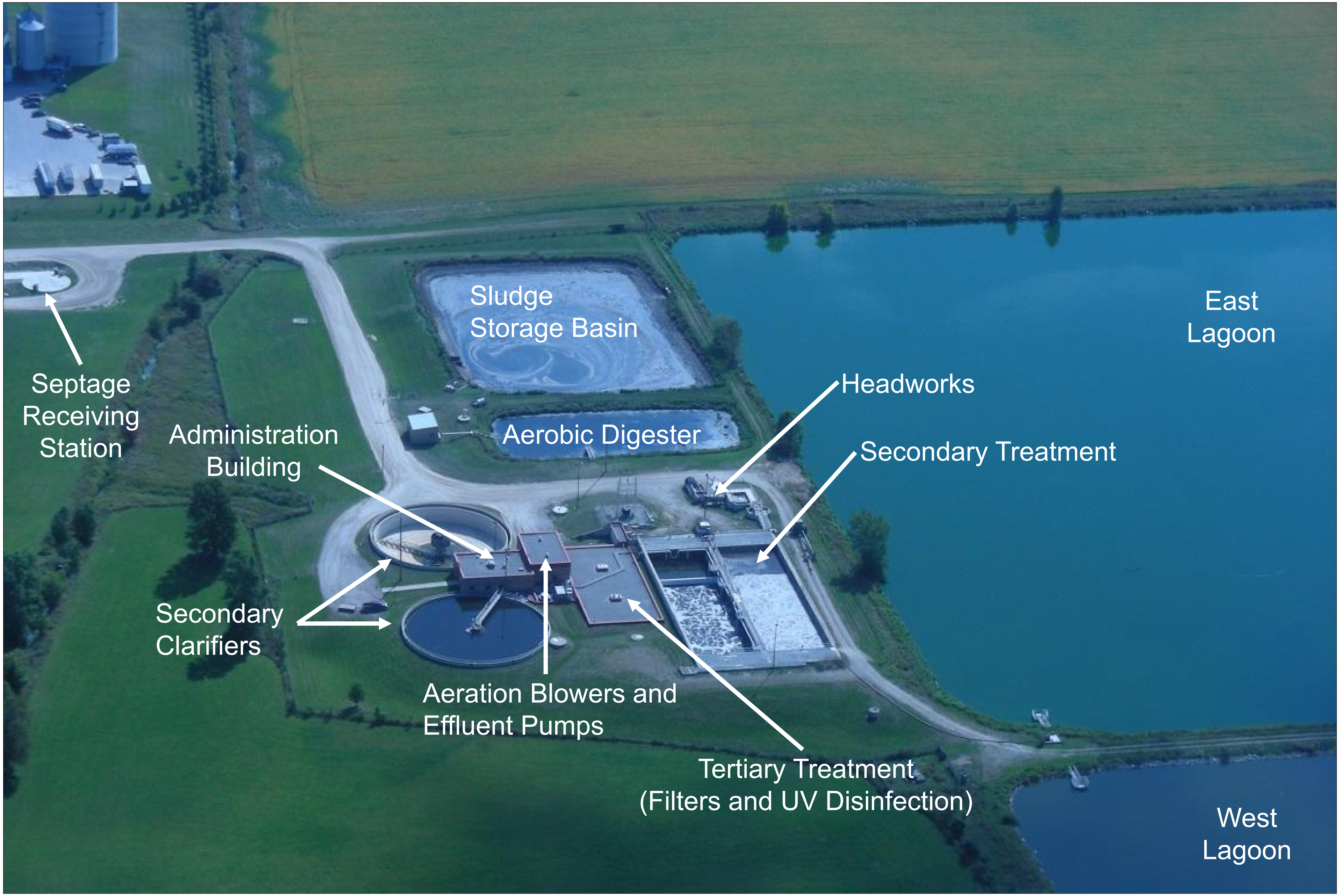
Study Area Map



MUNICIPAL CLASS EA PLANNING AND DESIGN PROCESS

NOTE: This flow chart is to be read in conjunction with Part A of the Municipal Class EA




Sludge
Storage Basin
East
Lagoon
Headworks
Septage
Receiving
Station
Administration
Building
Aerobic Digester
Secondary Treatment
Secondary
Clarifiers
Aeration Blowers and
Effluent Pumps
Tertiary Treatment
(Filters and UV Disinfection)
West
Lagoon

North Perth Wastewater Treatment Master Plan
Class Environmental Assessment Study

Treatment Plant Capacity

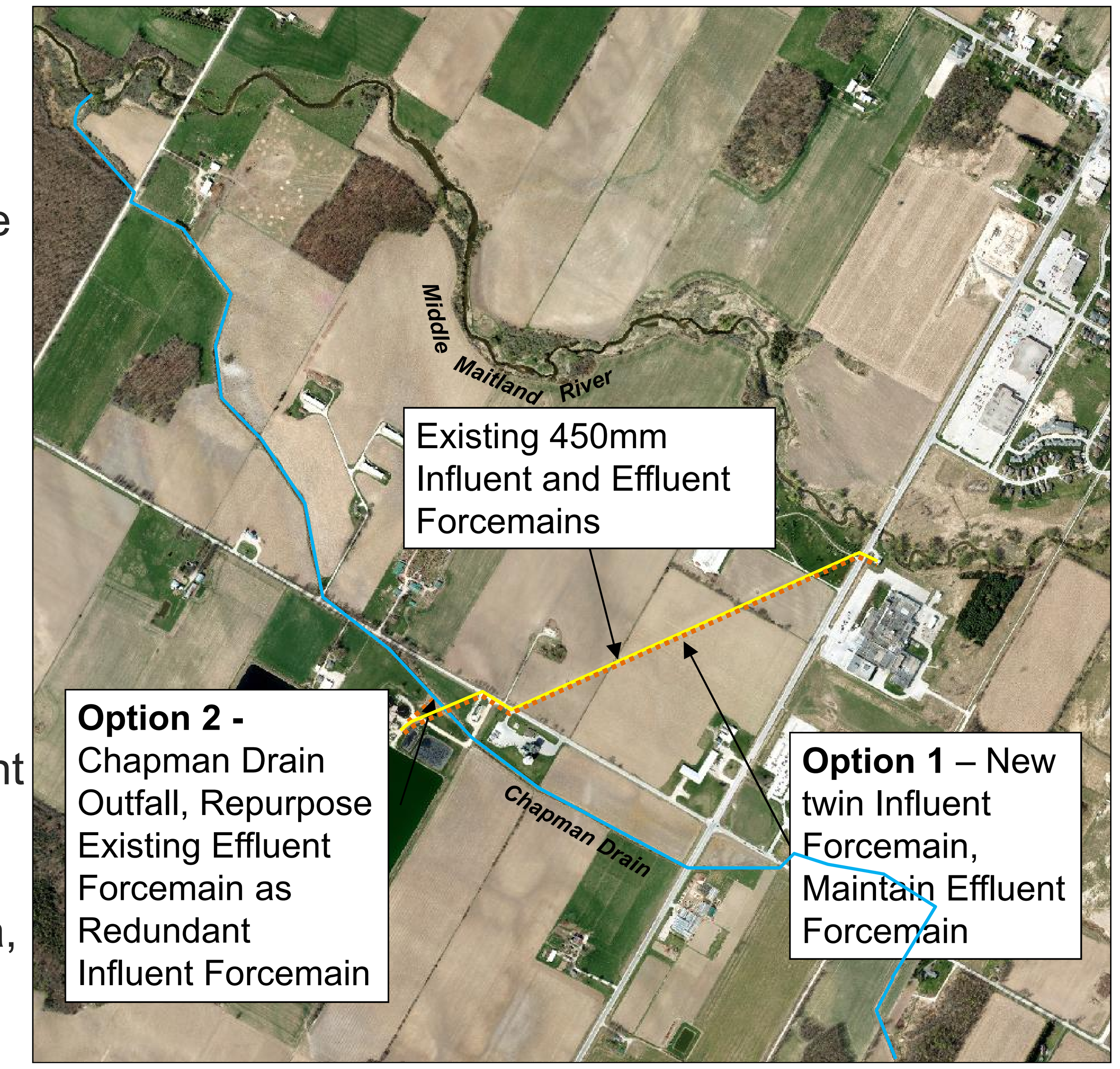
Description
- An increase in plant hydraulic capacity may be required to meet population growth projections to 2030
- Difficulty meeting quality objectives for Total Suspended Solids and Phosphorus
- Aeration blower upgrades required to meet rated organic treatment capacity
- Wet weather flows can impact plant hydraulics

Proposed Work
- Optimize treatment processes to improve Total Suspended Solids and phosphorus removal
- Increase aeration capacity with high efficiency blower equipment and install redundant blower
- Complete inflow and infiltration study

Wastewater Conveyance / Plant Outfall Location

Description
- Existing forcemain is becoming plugged with grease and debris, reducing capacity
- Failure of forcemain could result in release of sewage into environment
- Existing effluent forcemain discharges to Middle Maitland river near Hwy 23

Proposed Work
- **Option 1**: Construct Second Forcemain → more reliable, same effluent quality criteria at plant, clean existing forcemain
- **Option 2:** New Outfall to Chapman Drain → reduced energy consumption for effluent pumping station, repurpose existing effluent forcemain as second influent forcemain, possible stricter effluent criteria, assimilation capacity study required for Chapman Drain



Lagoons Upgrades

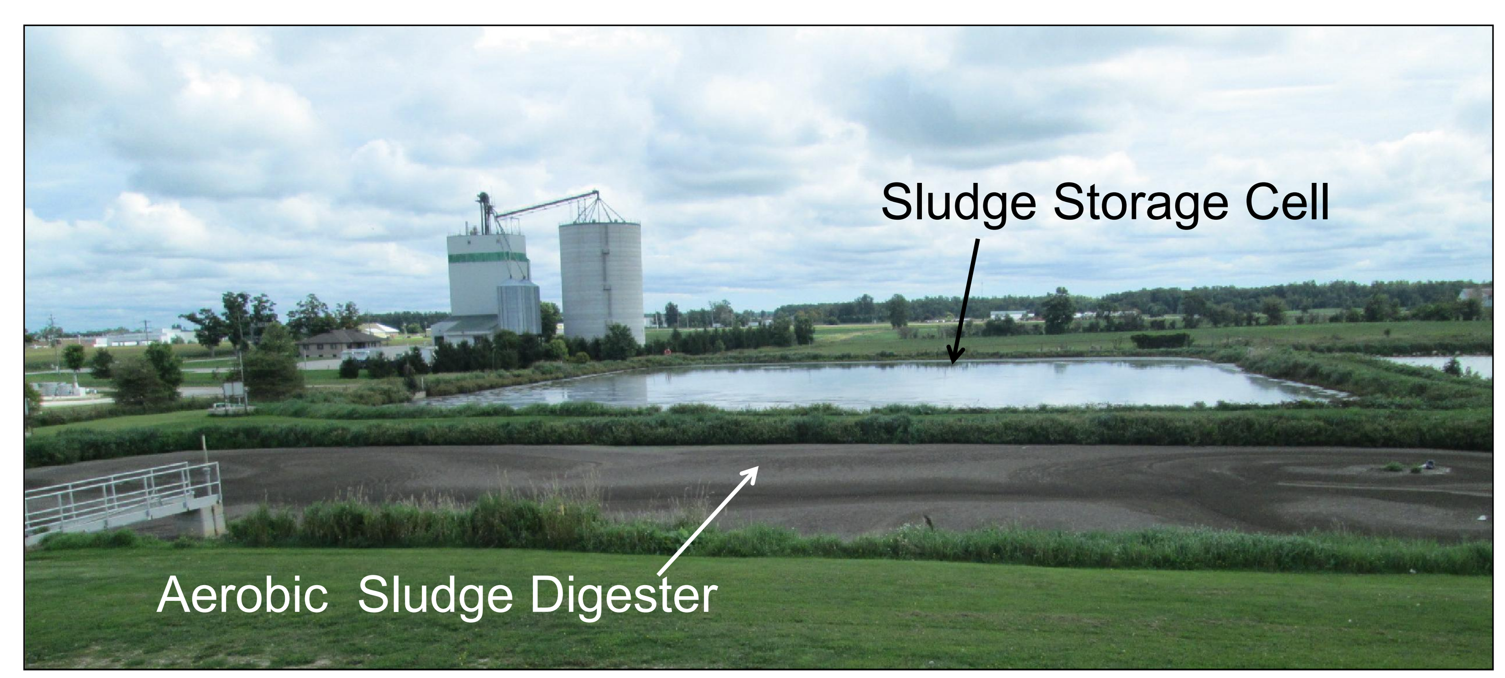
Description
- East lagoon is full of accumulated sludge
- West lagoon is used as wet weather flow buffer and effluent polishing
- Old flow distribution chambers and piping between lagoons in need of repair

Proposed Work
- Decommission portion of east lagoon
- Upgrade flow distribution chambers, and potentially add redundancy
- Decommission old abandoned structures

Sludge Management

Description
- Aerobic digester at end of useful life
- Sludge storage volume does not meet MOECC guidelines
- No redundancy in digester and storage basin
- Sludge operations produce nuisance odours

Proposed Work
- Construct two new concrete lined aerobic digesters
- Optimize sludge management and operation
- Expand sludge storage for additional capacity



North Perth Wastewater Treatment Master Plan
Class Environmental Assessment Study

Power Supply

Description

- Existing main power supply and substation nearing capacity
- WWTP not equipped with emergency standby power
- Prolonged power failure could compromise effluent quality

Proposed Work

- Optimize energy management and install high efficiency equipment to maximize capacity of existing power system and substation
- Complete upgrades to existing substation to extend useful life
- Install emergency standby power generator to ensure continued operation during power outages

Septage Receiving Station

Description

- Accepts hauled wastewater from municipal, commercial and industrial sources within and outside North Perth
- Equalization tank is undersized to adequately gradually meter high strength wastewater into WWTP

Proposed Work

- Increase capacity of station
- Construct second wastewater storage tank

Equalization Tank

Highway 23 Sewage Pumping Station

Description

- Failure of pump station would result in spill of raw sewage into Middle Maitland River

Proposed Work

- Install screening/grinding equipment to improve pump reliability, reduce clogging and minimize risks associated with manual cleaning by staff.
- Upgrade HVAC equipment
- Upgrade fuel storage/delivery equipment

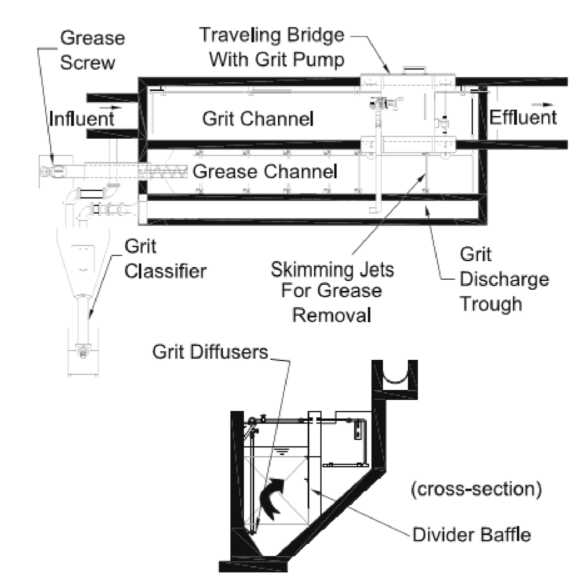
Headworks Facility

Description

- The existing facility is 21 years old, exposed to the elements and nearing the end of its useful service life
- Manual course bar screen is labour intensive, and ineffective at capturing debris
- No redundancy
- Excessive grease in plant influent causes performance issues downstream

Proposed Work

- Enclose headworks facility within building
- Construct flow splitting chamber, twin inlet channels and second grit chamber
- Install automatically raked fine screens
- Replace undersized grit classifier
- Remove fats, oils and grease at headworks



North Perth Wastewater Treatment Master Plan
Class Environmental Assessment Study

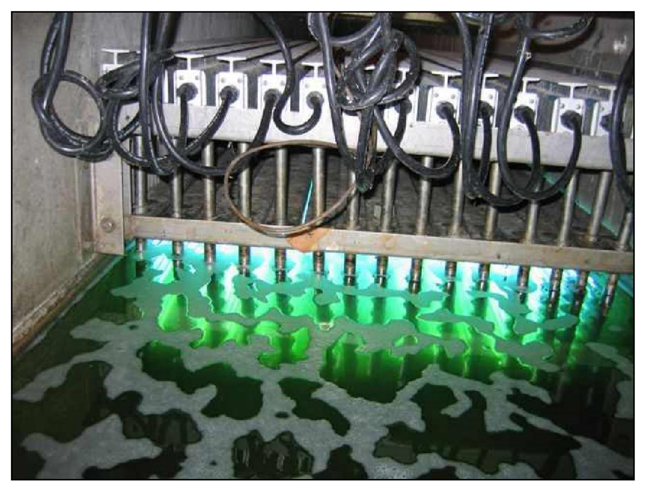
Tertiary Treatment (Filters and UV Disinfection)

Description

- Existing filters cannot handle peak flow capacity
- Filters near end of useful life
- UV disinfection equipment at end of useful life

Proposed Work

- Rebuild tertiary filters to restore original flow capacity
- Upgrade equipment for improved performance, operation and reliability
- Install new UV disinfection equipment



SCADA System

Description

- Existing SCADA has limited secondary data storage and security

Proposed Work

- New generation SCADA with additional monitoring and control capabilities, and increased data security

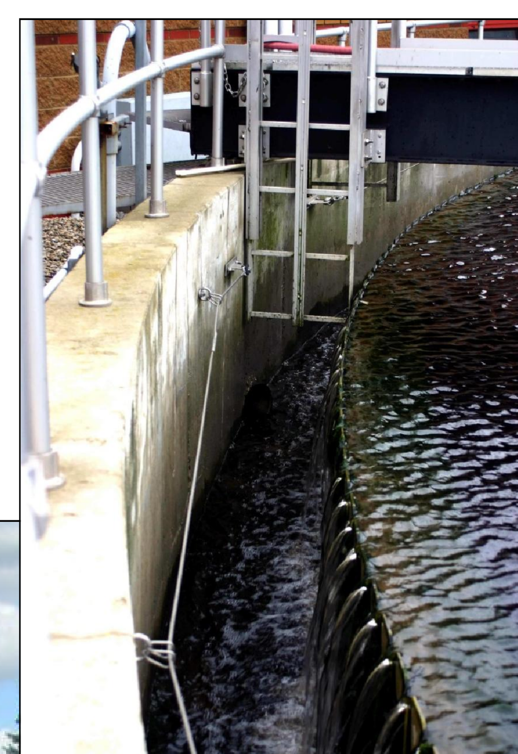
Secondary Clarification

Description

- Flow to each clarifier is not evenly distributed

Proposed Work

- Install flow balancing baffle at outlet of aeration tanks



Odour Control

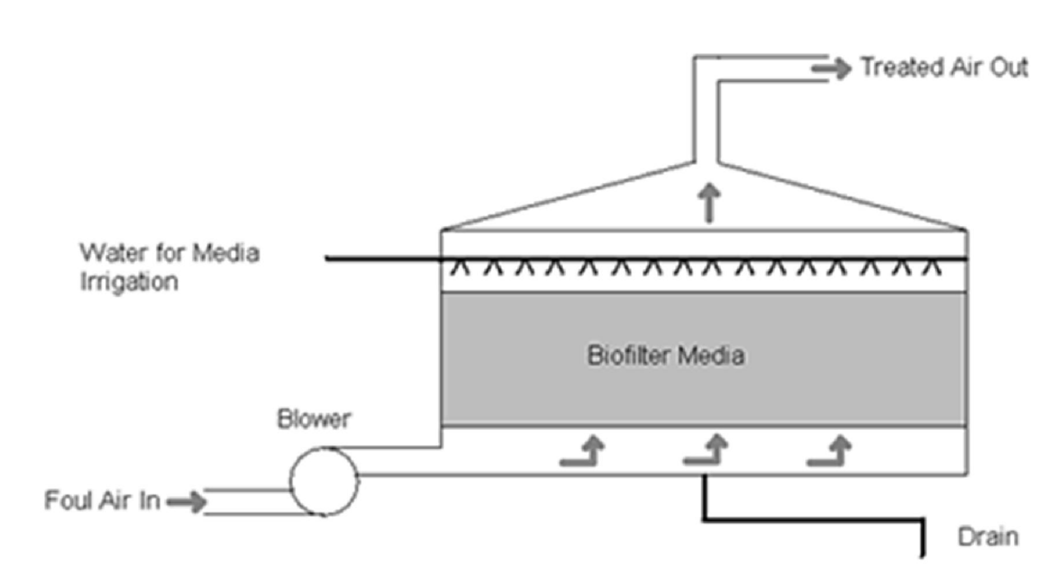
Description

- Biofilter odour control for septage receiving building required upgrades
- Sludge digestion can generate nuisance odours

Proposed Work

- Complete odour study upon completion of plant upgrades to determine extent of odour control measures (ex. headworks building, sludge area)
- Replace media in existing SRS biofilters

Biofilter Schematic



North Perth Wastewater Treatment Master Plan
Class Environmental Assessment Study

Project Sequence

1. Master Plan Class EA Commencement
2. Funding Application
3. **Public Information Centre** ← We are here
4. Funding Decisions Announced
5. Master Plan Class EA Finalized
6. Detailed Design
7. Construction

Budget Estimate

Item	Description	Cost ($ million)
1	Treatment Plant Capacity	$ 1.0
2	Wastewater Conveyance / Plant Outfall Location a) *New influent forcemain* b) *Repurpose existing effluent forcemain, new outfall to Chapman Drain*	 $ 2.5 $ 1.4
3	Lagoon Upgrades	$ 1.5
4	Sludge Management	$ 4.0
5	Power Supply	$ 1.0
6	Septage Receiving Station	$ 2.1
7	Highway 23 Sewage Pumping Station	$ 0.9
8	Headworks / Fats, Oils and Grease Management	$ 3.0
9	Tertiary Treatment (Filters and UV Disinfection)	$ 0.5
10	SCADA System	$ 0.1
11	Secondary Clarification	$ 0.1
12	Odour Control (allowance)	$ 0.5
	Total (with Opt 2a) **Total (with Opt 2b)**	**$ 17.4** **$ 16.1**

NORTH PERTH WASTEWATER TREATMENT
MASTER PLAN CLASS ENVIRONMENTAL ASSESSMENT STUDY

PUBLIC INFORMATION MEETING – SIGN-IN SHEET

April 1, 2015

Name & Affiliation (Resident, Business, Association)	Mailing Address & Postal Code	Email	Phone Number
Wayne Eickenberger Wightman Telecom	100 Flora St N. Clifford, ON	weichenberger@ wightman.ca	519-327-9305
John Kerr GM BluePlan Eng. Ltd	975 Wallace Ave. N. Listowel. ON N4W 1M6	john.kerr@gmblueplan.ca	519.291.9339.
Jamie Morgan North Perth	North Perth		
Heather Brewer Resident	165 Victoria Ave N Listowel N4W 1S7	hbrewer@wightman.ca	519-291-9088
Jim & Geri Winger.	7852, Rd 164 RR2 Listowel N4W 3G7.		519. 291. 2860.

NORTH PERTH WASTEWATER TREATMENT
MASTER PLAN CLASS ENVIRONMENTAL ASSESSMENT STUDY

PUBLIC INFORMATION MEETING - COMMENT SHEET

April 1, 2015

We welcome your input…
Your comments and opinions are important to us.
Please take some time to give us your feedback by answering the questions below and sharing your viewpoint.
Please print legibly.

Name:	BREWER	HEATHER	
	Last Name	First Name	Initial
Address:	165 VICTORIA AVE		
	Street		Apt. No.
	LISTOWEL	ON	N4W 1S7
	City	Province	Postal Code
	519-291-9088		hbrewer@wightman.ca
	Home Telephone	Business Telephone	Email

Would you like to be placed on a mailing list to receive future notifications regarding this project?
Please indicate Yes or No. ☐ Yes ☐ No

Please answer 'Yes' or 'No' to the following questions:

Did the Public Meeting help you understand more about the Project? ☑ Yes ☐ No
Were your questions answered to your satisfaction? ☑ Yes ☐ No

Please provide any comments:

Please provide further description of item No 1 on costs (Treatment Plant Capacity $1 million)

Please let me know where/~~[illegible]~~ or how to obtain electronic copy of Master Plan Report

Please leave your comments on your departure or mail, fax, or email them to:

Mr. Mark Hackett
Manager of Environmental Services
Municipality of North Perth
330 Wallace Avenue North
Listowel, ON N4W 1L3
Phone: 519-292-2069
Fax: 519-291-1804
E-mail: mhackett@northperth.ca

Mr. Dave Hicknell, C.E.T.
Project Manager
GM BluePlan Engineering
650 Woodlawn Road West, Block C, Unit 2
Guelph, ON N1K 1B8
Phone: 519-824-8150
Fax: 519-824-8089
E-mail: Dave.Hicknell@gmblueplan.ca

Laura Verhaeghe - GM BluePlan

From:	Laura Verhaeghe - GM BluePlan
Sent:	Monday, April 13, 2015 4:55 PM
To:	'hbrewer@wightman.ca'
Cc:	Dave Hicknell - GM BluePlan; Matthew Ballaban - GM BluePlan; Matt Ash - GM BluePlan; Grant Parkinson - GM BluePlan; 'Mark Hackett'
Subject:	North Perth Wastewater Master Plan PIC Question
Attachments:	311031 PIC Comment sheet_HB.pdf

Tracking:

Recipient	Delivery	Read
'hbrewer@wightman.ca'		
Dave Hicknell - GM BluePlan	Delivered: 4/13/2015 4:55 PM	Read: 4/13/2015 5:43 PM
Matthew Ballaban - GM BluePlan	Delivered: 4/13/2015 4:55 PM	
Matt Ash - GM BluePlan	Delivered: 4/13/2015 4:55 PM	
Grant Parkinson - GM BluePlan	Delivered: 4/13/2015 4:55 PM	
'Mark Hackett'		

Ms. Brewer,

Thank you for your input at the North Perth Wastewater Master Plan PIC on April 1. We have documented your attached comment sheet.

In response to your questions, an increase in plant hydraulic rated capacity may be required to meet population growth projections to 2030 based on North Perth's Master Growth Plan. To address this potential need, the Wastewater Master Plan recommends reduction of inflow and infiltration, and optimization of plant operations. The budget estimate of $1.0 million includes these measures. An electronic copy of the Draft Master Plan Report is currently available on the Municipality of North Perth's
website: http://www.northperth.ca/en/municipalservices/resources/311031_North_Perth_WWTP_Master_Plan_Draft_Oct_22_2014.pdf. Once the Notice of Completion is filed with the MOECC, the final Master Plan document will be available at the North Perth municipal office and on the website for public review.

Best Regards,

Laura Verhaeghe, P.Eng.
Project Manager

GM BluePlan Engineering Limited
650 Woodlawn Road West, Block C, Unit 2 | Guelph ON N1K 1B8
t: 519.824.8150 | c: 226.500.4771

Ministry of Tourism, Culture and Sport
Culture Services Unit
Programs and Services Branch
401 Bay Street, Suite 1700
Toronto ON M7A 0A7
Tel. 416 212-7420
Fax: 416 314-7175

Ministère du Tourisme, de la Culture et du Sport
Unité des services culturels
Direction des programmes et des services
401, rue Bay, Bureau 1700
Toronto ON M7A 0A7
Tél. : 416 212-7420
Téléc. : 416 314-7175

Ontario

June 18, 2015 (EMAIL ONLY)

Dave Hicknell, C.E.T.
Project Manager
GM BluePlan Engineering Limited
650 Woodlawn Rd. W., Block C, Unit 2
Guelph, ON
N1K 1B8
E: Dave.Hicknell@gmblueplan.ca

MTCS File #: 31EA013
Proponent: Municipality of North Perth
Subject: North Perth Wastewater Treatment Master Plan Class Environmental Assessment Study

Dear Dave Hicknell:

Thank you for the information provided regarding the above noted master plan. With respect to this undertaking, it is the mandate of Ministry of Tourism, Culture and Sport (MTCS), under the Ontario Heritage Act (OHA), to conserve, protect and preserve Ontario's cultural heritage, including:

- Archaeological resources (land and marine);
- Built heritage (including bridges and monuments); and,
- Cultural heritage landscapes.

Under the EA process, a determination of the project's potential impact on these cultural heritage resources is required.

Archaeology

Activities associated with the Master Plan may have the potential to impact archaeological resources and therefore, prior to any development or land impacts please review MTCS's *Criteria for Evaluating Archaeological Potential* for your undertaking. The hiring of an archaeologist to conduct an archaeological assessment by an archaeologist licensed under the Ontario Heritage Act will be necessary for areas with archaeological potential. In addition, MTCS archaeological sites data are available at *archaeologysites@ontario.ca*. Archaeological assessment reports must conform to the Ministry of Tourism and Culture's Standards and Guidelines for Consultant Archaeologists. The licensed archaeologist is to submit all completed archaeological assessment reports to the MTCS for review.

Built Heritage and Cultural Heritage Landscapes

The MTCS *"Criteria for Evaluating Potential for Built Heritage Resources and Cultural Heritage Landscapes* checklist determines whether your EA project may impact these cultural heritage resources. If your EA project may impact known or potential cultural heritage resources, MTCS recommends that a Heritage Impact Assessment (HIA) be prepared by a qualified consultant. An HIA demonstrates how cultural heritage resources are recommended to be conserved in the context of redevelopment or site alteration.

MTCS has *Info Sheet #5: Heritage Impact Assessments and Conservation Plans* which outlines the scope of HIAs. Please send completed HIAs to MTCS and the local municipality for review, and make it available to local heritage organizations with an interest.

Environmental Assessment Reporting

All technical heritage studies and their recommendations are to be addressed and incorporated into EA projects. Please advise MTCS whether any technical heritage studies will be completed for your EA project, and provide them to MTCS before issuing a Notice of Completion. If your screening has identified no known or potential cultural heritage resources, or no impacts to these resources, please include the completed checklists and supporting documentation in the EA report or file.

Thank-you for circulating MTCS on this project: please continue to do so through the EA process, and contact me for any questions or clarification.

Sincerely,

Penny Young

Penny M. Young, M.A. | **Heritage Planner**
Ministry of Tourism, Culture and Sport
Culture Division | Programs and Services Branch | Culture Services Unit

401 Bay Street, Suite 1700
Toronto, Ontario M7A 0A7

Penny.Young@Ontario.ca | Tel. 416.212.7420 | Fax. 416.314.7175

cc: Mark Hackett, Manager of Environmental Services, Municipality of North Perth

It is the sole responsibility of proponents to ensure that any information and documentation submitted as part of their EA report or file is accurate. MTCS makes no representation or warranty as to the completeness, accuracy or quality of the any checklists, reports or supporting documentation submitted as part of the EA process, and in no way shall MTCS be liable for any harm, damages, costs, expenses, losses, claims or actions that may result if any checklists, reports or supporting documents are discovered to be inaccurate, incomplete, misleading or fraudulent.

Please notify MTCS if archaeological resources are impacted by EA project work. All activities impacting archaeological resources must cease immediately, and a licensed archaeologist is required to carry out an archaeological assessment in accordance with the Ontario Heritage Act and the Standards and Guidelines for Consultant Archaeologists.

Ontario

Ministry of Tourism, Culture and Sport

Programs & Services Branch
401 Bay Street, Suite 1700
Toronto ON M7A 0A7

Criteria for Evaluating Potential for Built Heritage Resources and Cultural Heritage Landscapes

A Checklist for the Non-Specialist

The **purpose of the checklist** is to determine:

- if a property(ies) or project area:
  - is a recognized heritage property
  - may be of cultural heritage value
- it includes all areas that may be impacted by project activities, including – but not limited to:
  - the main project area
  - temporary storage
  - staging and working areas
  - temporary roads and detours

Processes covered under this checklist, such as:

- *Planning Act*
- *Environmental Assessment Act*
- *Aggregates Resources Act*
- *Ontario Heritage Act* – Standards and Guidelines for Conservation of Provincial Heritage Properties

Cultural Heritage Evaluation Report (CHER)

If you are not sure how to answer one or more of the questions on the checklist, you may want to hire a qualified person(s) (see page 5 for definitions) to undertake a cultural heritage evaluation report (CHER).

The CHER will help you:

- identify, evaluate and protect cultural heritage resources on your property or project area
- reduce potential delays and risks to a project

Other checklists

Please use a separate checklist for your project, if:

- you are seeking a Renewable Energy Approval under Ontario Regulation 359/09 – separate checklist
- your Parent Class EA document has an approved screening criteria (as referenced in Question 1)

Please refer to the Instructions pages for more detailed information and when completing this form.

Project or Property Name
North Perth Wastewater Treatment Master Plan

Project or Property Location (upper and lower or single tier municipality)
Listowel, ON

Proponent Name
Municipality of North Perth

Proponent Contact Information
Mark Hackett, 519-292-2069, mhackett@northperth.ca

Screening Questions

	Yes	No
1. Is there a pre-approved screening checklist, methodology or process in place?	☐	☑

If Yes, please follow the pre-approved screening checklist, methodology or process.

If No, continue to Question 2.

Part A: Screening for known (or recognized) Cultural Heritage Value

	Yes	No
2. Has the property (or project area) been evaluated before and found **not** to be of cultural heritage value?	☐	☑

If Yes, do **not** complete the rest of the checklist.

The proponent, property owner and/or approval authority will:

- summarize the previous evaluation and
- add this checklist to the project file, with the appropriate documents that demonstrate a cultural heritage evaluation was undertaken

The summary and appropriate documentation may be:

- submitted as part of a report requirement
- maintained by the property owner, proponent or approval authority

If No, continue to Question 3.

	Yes	No
3. Is the property (or project area):		
a. identified, designated or otherwise protected under the *Ontario Heritage Act* as being of cultural heritage value?	☐	☑
b. a National Historic Site (or part of)?	☐	☑
c. designated under the *Heritage Railway Stations Protection Act*?	☐	☑
d. designated under the *Heritage Lighthouse Protection Act*?	☐	☑
e. identified as a Federal Heritage Building by the Federal Heritage Buildings Review Office (FHBRO)?	☐	☑
f. located within a United Nations Educational, Scientific and Cultural Organization (UNESCO) World Heritage Site?	☐	☑

If Yes to any of the above questions, you need to hire a qualified person(s) to undertake:

- a Cultural Heritage Evaluation Report, if a Statement of Cultural Heritage Value has not previously been prepared or the statement needs to be updated

If a Statement of Cultural Heritage Value has been prepared previously and if alterations or development are proposed, you need to hire a qualified person(s) to undertake:

- a Heritage Impact Assessment (HIA) – the report will assess and avoid, eliminate or mitigate impacts

If No, continue to Question 4.

Part B: Screening for Potential Cultural Heritage Value

		Yes	No
4.	Does the property (or project area) contain a parcel of land that:		
a.	is the subject of a municipal, provincial or federal commemorative or interpretive plaque?	☐	☑
b.	has or is adjacent to a known burial site and/or cemetery?	☐	☑
c.	is in a Canadian Heritage River watershed?	☐	☑
d.	contains buildings or structures that are 40 or more years old?	☐	☑

Part C: Other Considerations

		Yes	No
5.	Is there local or Aboriginal knowledge or accessible documentation suggesting that the property (or project area):		
a.	is considered a landmark in the local community or contains any structures or sites that are important in defining the character of the area?	☐	☑
b.	has a special association with a community, person or historical event?	☐	☑
c.	contains or is part of a cultural heritage landscape?	☐	☑

If Yes to one or more of the above questions (Part B and C), there is potential for cultural heritage resources on the property or within the project area.

You need to hire a qualified person(s) to undertake:

- a Cultural Heritage Evaluation Report (CHER)

If the property is determined to be of cultural heritage value and alterations or development is proposed, you need to hire a qualified person(s) to undertake:

- a Heritage Impact Assessment (HIA) – the report will assess and avoid, eliminate or mitigate impacts

If No to all of the above questions, there is low potential for built heritage or cultural heritage landscape on the property.

The proponent, property owner and/or approval authority will:

- summarize the conclusion
- add this checklist with the appropriate documentation to the project file

The summary and appropriate documentation may be:

- submitted as part of a report requirement e.g. under the *Environmental Assessment Act, Planning Act* processes
- maintained by the property owner, proponent or approval authority

Instructions

Please have the following available, when requesting information related to the screening questions below:

- a clear map showing the location and boundary of the property or project area
  - large scale and small scale showing nearby township names for context purposes
- the municipal addresses of all properties within the project area
- the lot(s), concession(s), and parcel number(s) of all properties within a project area

For more information, see the Ministry of Tourism, Culture and Sport's Ontario Heritage Toolkit or Standards and Guidelines for Conservation of Provincial Heritage Properties.

In this context, the following definitions apply:

- **qualified person(s)** means individuals – professional engineers, architects, archaeologists, etc. – having relevant, recent experience in the conservation of cultural heritage resources.
- **proponent** means a person, agency, group or organization that carries out or proposes to carry out an undertaking or is the owner or person having charge, management or control of an undertaking.

1. Is there a pre-approved screening checklist, methodology or process in place?

An existing checklist, methodology or process may already be in place for identifying potential cultural heritage resources, including:

- one endorsed by a municipality
- an environmental assessment process e.g. screening checklist for municipal bridges
- one that is approved by the Ministry of Tourism, Culture and Sport (MTCS) under the Ontario government's Standards & Guidelines for Conservation of Provincial Heritage Properties [s.B.2.]

Part A: Screening for known (or recognized) Cultural Heritage Value

2. Has the property (or project area) been evaluated before and found not to be of cultural heritage value?

Respond 'yes' to this question, if all of the following are true:

A property can be considered not to be of cultural heritage value if:

- a Cultural Heritage Evaluation Report (CHER) - or equivalent - has been prepared for the property with the advice of a qualified person and it has been determined not to be of cultural heritage value and/or
- the municipal heritage committee has evaluated the property for its cultural heritage value or interest and determined that the property is not of cultural heritage value or interest

A property may need to be re-evaluated, if:

- there is evidence that its heritage attributes may have changed
- new information is available
- the existing Statement of Cultural Heritage Value does not provide the information necessary to manage the property
- the evaluation took place after 2005 and did not use the criteria in Regulations 9/06 and 10/06

Note: Ontario government ministries and public bodies [prescribed under Regulation 157/10] may continue to use their existing evaluation processes, until the evaluation process required under section B.2 of the Standards & Guidelines for Conservation of Provincial Heritage Properties has been developed and approved by MTCS.

To determine if your property or project area has been evaluated, contact:

- the approval authority
- the proponent
- the Ministry of Tourism, Culture and Sport

3a. Is the property (or project area) identified, designated or otherwise protected under the *Ontario Heritage Act* as being of cultural heritage value e.g.:

i. designated under the *Ontario Heritage Act*

- individual designation (Part IV)
- part of a heritage conservation district (Part V)

Individual Designation – Part IV

A property that is designated:

- by a municipal by-law as being of cultural heritage value or interest [s.29 of the *Ontario Heritage Act*]
- by order of the Minister of Tourism, Culture and Sport as being of cultural heritage value or interest of provincial significance [s.34.5]. **Note**: To date, no properties have been designated by the Minister.

Heritage Conservation District – Part V

A property or project area that is located within an area designated by a municipal by-law as a heritage conservation district [s. 41 of the *Ontario Heritage Act*].

For more information on Parts IV and V, contact:

- municipal clerk
- Ontario Heritage Trust
- local land registry office (for a title search)

---

ii. subject of an agreement, covenant or easement entered into under Parts II or IV of the *Ontario Heritage Act*

An agreement, covenant or easement is usually between the owner of a property and a conservation body or level of government. It is usually registered on title.

The primary purpose of the agreement is to:

- preserve, conserve, and maintain a cultural heritage resource
- prevent its destruction, demolition or loss

For more information, contact:

- Ontario Heritage Trust - for an agreement, covenant or easement [clause 10 (1) (c) of the *Ontario Heritage Act*]
- municipal clerk – for a property that is the subject of an easement or a covenant [s.37 of the *Ontario Heritage Act*]
- local land registry office (for a title search)

---

iii. listed on a register of heritage properties maintained by the municipality

Municipal registers are the official lists - or record - of cultural heritage properties identified as being important to the community.

Registers include:

- all properties that are designated under the *Ontario Heritage Act* (Part IV or V)
- properties that have not been formally designated, but have been identified as having cultural heritage value or interest to the community

For more information, contact:

- municipal clerk
- municipal heritage planning staff
- municipal heritage committee

---

iv. subject to a notice of:

- intention to designate (under Part IV of the *Ontario Heritage Act*)
- a Heritage Conservation District study area bylaw (under Part V of the *Ontario Heritage Act*)

A property that is subject to a **notice of intention to designate** as a property of cultural heritage value or interest and the notice is in accordance with:

- section 29 of the *Ontario Heritage Act*
- section 34.6 of the *Ontario Heritage Act.* **Note**: To date, the only applicable property is Meldrum Bay Inn, Manitoulin Island. [s.34.6]

An area designated by a municipal by-law made under section 40.1 of the *Ontario Heritage Act* as a **heritage conservation district study area**.

For more information, contact:

- municipal clerk – for a property that is the subject of notice of intention [s. 29 and s. 40.1]
- Ontario Heritage Trust

---

v. included in the Ministry of Tourism, Culture and Sport's list of provincial heritage properties

Provincial heritage properties are properties the Government of Ontario owns or controls that have cultural heritage value or interest.

The Ministry of Tourism, Culture and Sport (MTCS) maintains a list of all provincial heritage properties based on information provided by ministries and prescribed public bodies. As they are identified, MTCS adds properties to the list of provincial heritage properties.

For more information, contact the MTCS Registrar at registrar@mtc.gov.on.ca.

3b. Is the property (or project area) a National Historic Site (or part of)?

National Historic Sites are properties or districts of national historic significance that are designated by the Federal Minister of the Environment, under the *Canada National Parks Act*, based on the advice of the Historic Sites and Monuments Board of Canada.

For more information, see the National Historic Sites website.

3c. Is the property (or project area) designated under the *Heritage Railway Stations Protection Act*?

The *Heritage Railway Stations Protection Act* protects heritage railway stations that are owned by a railway company under federal jurisdiction. Designated railway stations that pass from federal ownership may continue to have cultural heritage value.

For more information, see the Directory of Designated Heritage Railway Stations.

3d. Is the property (or project area) designated under the *Heritage Lighthouse Protection Act*?

The *Heritage Lighthouse Protection Act* helps preserve historically significant Canadian lighthouses. The Act sets up a public nomination process and includes heritage building conservation standards for lighthouses which are officially designated.

For more information, see the Heritage Lighthouses of Canada website.

3e. Is the property (or project area) identified as a Federal Heritage Building by the Federal Heritage Buildings Review Office?

The role of the Federal Heritage Buildings Review Office (FHBRO) is to help the federal government protect the heritage buildings it owns. The policy applies to all federal government departments that administer real property, but not to federal Crown Corporations.

For more information, contact the Federal Heritage Buildings Review Office.

See a directory of all federal heritage designations.

3f. Is the property (or project area) located within a United Nations Educational, Scientific and Cultural Organization (UNESCO) World Heritage Site?

A UNESCO World Heritage Site is a place listed by UNESCO as having outstanding universal value to humanity under the Convention Concerning the Protection of the World Cultural and Natural Heritage. In order to retain the status of a World Heritage Site, each site must maintain its character defining features.

Currently, the Rideau Canal is the only World Heritage Site in Ontario.

For more information, see Parks Canada – World Heritage Site website.

Part B: Screening for potential Cultural Heritage Value

4a. Does the property (or project area) contain a parcel of land that has a municipal, provincial or federal commemorative or interpretive plaque?

Heritage resources are often recognized with formal plaques or markers.

Plaques are prepared by:

- municipalities
- provincial ministries or agencies
- federal ministries or agencies
- local non-government or non-profit organizations

For more information, contact:

- municipal heritage committees or local heritage organizations – for information on the location of plaques in their community
- Ontario Historical Society's Heritage directory – for a list of historical societies and heritage organizations
- Ontario Heritage Trust – for a list of plaques commemorating Ontario's history
- Historic Sites and Monuments Board of Canada – for a list of plaques commemorating Canada's history

4b. Does the property (or project area) contain a parcel of land that has or is adjacent to a known burial site and/or cemetery?

For more information on known cemeteries and/or burial sites, see:

- Cemeteries Regulations, Ontario Ministry of Consumer Services – for a database of registered cemeteries
- Ontario Genealogical Society (OGS) – to locate records of Ontario cemeteries, both currently and no longer in existence; cairns, family plots and burial registers
- Canadian County Atlas Digital Project – to locate early cemeteries

In this context, adjacent means contiguous or as otherwise defined in a municipal official plan.

4c. Does the property (or project area) contain a parcel of land that is in a Canadian Heritage River watershed?

The Canadian Heritage River System is a national river conservation program that promotes, protects and enhances the best examples of Canada's river heritage.

Canadian Heritage Rivers must have, and maintain, outstanding natural, cultural and/or recreational values, and a high level of public support.

For more information, contact the Canadian Heritage River System.

If you have questions regarding the boundaries of a watershed, please contact:

- your conservation authority
- municipal staff

4d. Does the property (or project area) contain a parcel of land that contains buildings or structures that are 40 or more years old?

A 40 year 'rule of thumb' is typically used to indicate the potential of a site to be of cultural heritage value. The approximate age of buildings and/or structures may be estimated based on:

- history of the development of the area
- fire insurance maps
- architectural style
- building methods

Property owners may have information on the age of any buildings or structures on their property. The municipality, local land registry office or library may also have background information on the property.

Note: 40+ year old buildings or structure do not necessarily hold cultural heritage value or interest; their age simply indicates a higher potential.

A building or structure can include:

- residential structure
- farm building or outbuilding
- industrial, commercial, or institutional building
- remnant or ruin
- engineering work such as a bridge, canal, dams, etc.

For more information on researching the age of buildings or properties, see the Ontario Heritage Tool Kit Guide Heritage Property Evaluation.

Part C: Other Considerations

5a. Is there local or Aboriginal knowledge or accessible documentation suggesting that the property (or project area) is considered a landmark in the local community or contains any structures or sites that are important to defining the character of the area?

Local or Aboriginal knowledge may reveal that the project location is situated on a parcel of land that has potential landmarks or defining structures and sites, for instance:

- buildings or landscape features accessible to the public or readily noticeable and widely known
- complexes of buildings
- monuments
- ruins

5b. Is there local or Aboriginal knowledge or accessible documentation suggesting that the property (or project area) has a special association with a community, person or historical event?

Local or Aboriginal knowledge may reveal that the project location is situated on a parcel of land that has a special association with a community, person or event of historic interest, for instance:

- Aboriginal sacred site
- traditional-use area
- battlefield
- birthplace of an individual of importance to the community

5c. Is there local or Aboriginal knowledge or accessible documentation suggesting that the property (or project area) contains or is part of a cultural heritage landscape?

Landscapes (which may include a combination of archaeological resources, built heritage resources and landscape elements) may be of cultural heritage value or interest to a community.

For example, an Aboriginal trail, historic road or rail corridor may have been established as a key transportation or trade route and may have been important to the early settlement of an area. Parks, designed gardens or unique landforms such as waterfalls, rock faces, caverns, or mounds are areas that may have connections to a particular event, group or belief.

For more information on Questions 5.a., 5.b. and 5.c., contact:

- Elders in Aboriginal Communities or community researchers who may have information on potential cultural heritage resources. Please note that Aboriginal traditional knowledge may be considered sensitive.
- municipal heritage committees or local heritage organizations
- Ontario Historical Society's "Heritage Directory" - for a list of historical societies and heritage organizations in the province

An internet search may find helpful resources, including:

- historical maps
- historical walking tours
- municipal heritage management plans
- cultural heritage landscape studies
- municipal cultural plans

Information specific to trails may be obtained through Ontario Trails.

Laura Verhaeghe - GM BluePlan

From: Brandi Walter <bwalter@mvca.on.ca>
Sent: Tuesday, June 23, 2015 10:23 AM
To: Laura Verhaeghe - GM BluePlan
Subject: RE: Notice of Study Completion, North Perth Wastewater Master Plan Class EA Study

Hi Laura,

I have read the document and have no comments.

Kind Regards,

Brandi Walter
Environmental Planner/ Regulations Technician
Maitland Valley Conservation Authority
519-335-3557 ext. 237 Fax519-335-3516
bwalter@mvca.on.ca

From: Laura Verhaeghe - GM BluePlan [mailto:Laura.Verhaeghe@gmblueplan.ca]
Sent: Friday, June 19, 2015 2:49 PM
To: Brandi Walter
Subject: RE: Notice of Study Completion, North Perth Wastewater Master Plan Class EA Study

Hello Brandi,

The 30 day public review period for the North Perth Wastewater Master Plan ended yesterday, June 18. Based on your request for the study documentation earlier this week, I would anticipate you are currently reviewing and may have comments. When do you anticipate you will have comment ready?

Thank you,

Laura Verhaeghe, P.Eng.
Project Manager

GM BluePlan Engineering Limited
650 Woodlawn Road West, Block C, Unit 2 | Guelph ON N1K 1B8
t: 519.824.8150 | c: 226.500.4771
laura.verhaeghe@gmblueplan.ca | www.gmblueplan.ca

From: Brandi Walter [mailto:bwalter@mvca.on.ca]
Sent: Tuesday, June 16, 2015 12:11 PM
To: Suzanne Potts - GM BluePlan
Subject: RE: Notice of Study Completion, North Perth Wastewater Master Plan Class EA Study
Importance: High

Hi Susanne,

The .pdf's on the Municipality's website do not work. Any chance you can send me the documents today?

Brandi Walter
Environmental Planner/ Regulations Technician
Maitland Valley Conservation Authority
519-335-3557 ext. 237 Fax519-335-3516
bwalter@mvca.on.ca

From: Suzanne Potts - GM BluePlan [mailto:Suzanne.Potts@gmblueplan.ca]
Sent: Tuesday, May 19, 2015 2:21 PM
To: maitland@mvca.on.ca; bwalter@mvca.on.ca
Subject: Re: Notice of Study Completion, North Perth Wastewater Master Plan Class EA Study

Dear Ms. Walter,

On behalf of the Municipality of North Perth, please find attached the Notice of Study Completion for the North Perth Wastewater Master Plan Class Environmental Assessment Study. Please direct any comments or questions to the contacts enclosed.

Thank you,

Suzanne Potts
Administrative Assistant

GM BluePlan Engineering Limited
650 Woodlawn Road West, Block C, Unit 2 | Guelph ON N1K 1B8
t: 519.824.8150
suzanne.potts@gmblueplan.ca | www.gmblueplan.ca

Laura Verhaeghe - GM BluePlan

From:	Aggerholm, Bob (MOECC) <Bob.Aggerholm@ontario.ca>
Sent:	Friday, February 20, 2015 1:29 PM
To:	Laura Verhaeghe - GM BluePlan
Cc:	Newton, Craig (MOECC)
Subject:	RE: North Perth Wastewater Master Plan Study
Attachments:	EA Coordinators_map_Dec12_2014.pdf

Hello Laura,

Craig Newton is based in the London Office. I've attached out temporary contact list.

Bob Aggerholm
Environmental Planner / Regional EA Coordinator
Ministry of the Environment and Climate Change
Southwestern Region
733 Exeter Road
London, Ontario N6E 1L3
Voice and Voicemail Direct: (519) 873-5012
Office Switchboard (automated attendant): (519) 873-5000
Office Fax: (519) 873-5020
E-mail Direct: bob.aggerholm@ontario.ca

From: Laura Verhaeghe - GM BluePlan [mailto:Laura.Verhaeghe@gmblueplan.ca]
Sent: February 20, 2015 12:07 PM
To: Aggerholm, Bob (MOECC)
Cc: Suzanne Potts - GM BluePlan; Dave Hicknell - GM BluePlan; Miller, Jim (MOECC); Abernethy, Scott (MOECC); Newton, Craig (MOECC); Matthew Ballaban - GM BluePlan
Subject: RE: North Perth Wastewater Master Plan Study

Bob,

Please find attached our PIC boards for the North Perth Wastewater Master Plan Study, as requested. We will add Craig Newton to our contact list for this project, and direct correspondence to him after April 13. Could you please confirm that Craig is based out of the same office as yourself?

Thank you,

Laura Verhaeghe, P.Eng.
Project Manager

GM BluePlan Engineering Limited
650 Woodlawn Road West, Block C, Unit 2 | Guelph ON N1K 1B8
t: 519.824.8150 | c: 226.500.4771
laura.verhaeghe@gmblueplan.ca | www.gmblueplan.ca

From: Aggerholm, Bob (MOECC) [mailto:Bob.Aggerholm@ontario.ca]
Sent: Friday, February 20, 2015 11:48 AM
To: Suzanne Potts - GM BluePlan; Dave Hicknell - GM BluePlan
Cc: Miller, Jim (MOECC); Abernethy, Scott (MOECC); Newton, Craig (MOECC)
Subject: RE: North Perth Wastewater Master Plan Study

Hello Dave,

We received your notices regarding the North Perth Wastewater Master Plan.

As you know MOECC has an interest in this project.

Please provide me with a copy of your PIC PowerPoints (when they are available). E-mail is fine.

Also, we wish to review a finalized draft before Council adoption.

After April 13, please direct any correspondence, e-mail or request for information to my colleague Craig Newton. Craig will be handling this file.

Thanks,

Bob Aggerholm
Environmental Planner / Regional EA Coordinator
Ministry of the Environment and Climate Change
Southwestern Region
733 Exeter Road
London, Ontario N6E 1L3
Voice and Voicemail Direct: (519) 873-5012
Office Switchboard (automated attendant): (519) 873-5000
Office Fax: (519) 873-5020

E-mail Direct: bob.aggerholm@ontario.ca

From: Suzanne Potts - GM BluePlan [mailto:Suzanne.Potts@gmblueplan.ca]
Sent: February 20, 2015 11:04 AM
To: Aggerholm, Bob (MOECC)
Cc: Laura Verhaeghe - GM BluePlan
Subject: North Perth Wastewater Master Plan Study

Dear Mr. Aggerholm,

On behalf of the Regional Municipality of North Perth, please find attached a letter and Notice of Public Information Centre in regards to the North Perth Wastewater Master Plan Study. If you have any questions or concerns, please see the contact information on the attached letter.

Best Regards,

Suzanne Potts
Administrative Assistant

GM BluePlan Engineering Limited
650 Woodlawn Road West, Block C, Unit 2 | Guelph ON N1K 1B8
t: 519.824.8150
suzanne.potts@gmblueplan.ca | www.gmblueplan.ca

Laura Verhaeghe - GM BluePlan

From:	O'Leary, Emilee (MOECC) <Emilee.OLeary@ontario.ca>
Sent:	Thursday, June 18, 2015 12:48 PM
To:	Laura Verhaeghe - GM BluePlan
Cc:	Dave Hicknell - GM BluePlan; Matt Ash - GM BluePlan; Matthew Ballaban - GM BluePlan; Grant Parkinson - GM BluePlan; mhackett@northperth.ca
Subject:	North Perth Wastewater Master Plan Class EA Study Final Report
Importance:	High

Hi Laura,

The ministry is aware that you have requested comments on the North Perth Wastewater Master Plan Final Report by today (June 18, 2015). The ministry is still in the process of reviewing the Master Plan and ***does*** have comments, but is not able to provide them to you by the end of the day. Per our previous phone discussion at the beginning of June, you advised that proponent/consultant will not move forward until all comments from the MOECC were addressed. Additionally, as per our discussion below, additional First Nations Consultation is still required to be completed.

I apologize for any inconvenience this may cause, and will aim to provide these to you early next week.

If you could kindly acknowledge receipt of this email, that would be much appreciated.

Regards,

Emilee

Emilee O'Leary | Environmental Planner/Environmental Assessment Coordinator
Technical Support Section, Southwest Region, Ministry of the Environment and Climate Change
733 Exeter Road, London Ontario, N6E1L3
Phone: 519-873-5012 | emilee.oleary@ontario.ca

From: Laura Verhaeghe - GM BluePlan [mailto:Laura.Verhaeghe@gmblueplan.ca]
Sent: June 2, 2015 9:36 AM
To: O'Leary, Emilee (MOECC)
Cc: Dave Hicknell - GM BluePlan; Matt Ash - GM BluePlan; Matthew Ballaban - GM BluePlan; Grant Parkinson - GM BluePlan; mhackett@northperth.ca; Newton, Craig (MOECC)
Subject: RE: Aboriginal Consultation - North Perth Wastewater Master Plan Class EA Study Final Report

Emilee,

Thank you for the information. We will be in touch with the First Nations groups listed in your email below.

Best Regards,

Laura Verhaeghe, P.Eng.
Project Manager

GM BluePlan Engineering Limited
650 Woodlawn Road West, Block C, Unit 2 | Guelph ON N1K 1B8
t: 519.824.8150 | c: 226.500.4771
laura.verhaeghe@gmblueplan.ca | www.gmblueplan.ca

From: O'Leary, Emilee (MOECC) [mailto:Emilee.OLeary@ontario.ca]
Sent: Tuesday, June 02, 2015 9:26 AM
To: Laura Verhaeghe - GM BluePlan
Cc: Dave Hicknell - GM BluePlan; Matt Ash - GM BluePlan; Matthew Ballaban - GM BluePlan; Grant Parkinson - GM BluePlan; mhackett@northperth.ca; Newton, Craig (MOECC)
Subject: Aboriginal Consultation - North Perth Wastewater Master Plan Class EA Study Final Report

Dear Laura,

I am the new MOECC Environmental Planner/Environmental Assessment Coordinator, replacing Bob Aggerholm. I have taken over carriage of this file from Craig Newton. The MOECC's Aboriginal Affairs Branch have conducted a preliminary review of the North Perth Wastewater Treatment Master plan, and have identified the following communities that have or may have constitutionally protected aboriginal or treaty rights that may be adversely impacted by the project or any future project as a result of the study:

Chippewas of Kettle and Stony Point Kettle Point 44 RR 2 Forest ON N0N 1J0 Phone: (519) 786-2125 Fax: (519) 786-2108	Chief Thomas Bressette Toni.george@kettlepoint.org Thomas.bressette@kettlepoint.org
Chippewas of the Thames First Nation Chippewas of the Thames 42 RR 1 Muncey ON N0L 1Y0	Chief Joe Miskokomon chief@cottfn.com

Phone: (519) 289-5555 Fax: (519) 289-2230	
Aamjiwnaang First Nation Sarnia 45 978 Tashmoo Avenue Sarnia ON N7T 7H5 Phone: (519) 336-8410 Fax: (519) 336-0382	Chief Chris Plain Aamjiwnaang.chief@gmail.com SRedmond@aamjiwnaang.ca
Bkejwanong Territory Walpole Island First Nation Walpole Island 46 117 Tahgahoning Rd, RR 3 Wallaceburg ON N8A 4K9 Phone: (519) 627-1481 Fax: (519) 627-0440	Chief Daniel Miskokomon drskoke@wifn.org Alicia.blackeagle@wifn.org
Saugeen Ojibway Nation Jake Linklater, Case Manager Saugeen Ojibway Nation Environment Office RR 5 Wiarton ON N0H 2T0 Phone: (519) 534-5507 Fax: (519) 534-5525 Chippewas of Saugeen RR 1, 6493 Hwy 21 Southampton ON N0H 2L0 Phone: (519) 797-2781 Fax: (519) 797-2978 Chippewas of Nawash Unceded First Nation 135 Lakeshore Boulevard RR 5 Wiarton ON N0H 2T0 Phone: (519) 534-1689 Fax: (519) 534-2130	 Chief Vernon Roote vroote@saugeenfirstnation.ca dcarter@saugeenfirstnation.ca Chief Arlene Chegahno Reception.admin@nawash.ca Council.arlene@nawash.ca
Oneida Nation of the Thames Oneida 41 RR 2 Southwold ON N0L 2G0	Chief Sheri Doxtator Sheri.Doxtator@oneida.on.ca

Phone: (519) 652-3244 Fax: (519) 652-9287	
Mississaugas of the New Credit First Nation New Credit (Part) 40A 2789 Mississauga Rd., RR 6 Hagersville ON N0A 1H0 Phone: (905) 768-1133 Fax: (905) 768-1225	Chief Bryan LaForme bryanlaforme@newcreditfirstnation.com

Accordingly, additional consultation must be conducted for these communities to ensure that the communities are made aware of the project and are afforded ample opportunity to provide comments on the Master Plan document. This will likely extend beyond the 30-day calendar day review period ending June 18, 2015.

Proponents have an important and direct role in the consultation process, including a responsibility to conduct adequate consultation with First Nation and Métis communities as part of the environmental assessment process. You should note that, in addition to requiring interest-based consultation, the Crown has a duty to consult Aboriginal communities where a project may adversely impact Aboriginal or treaty rights. The Crown delegates the procedural aspects of consultation to the proponent. The Municipality of North Perth must contact the Director, Environmental Approvals Branch if this project may adversely affect an Aboriginal or treaty right. The Ministry will then determine whether the Crown has a duty to consult.

Information and resources to assist the Municipality of North Perth and GM BluePlan Engineering Limited in fulfilling consultation requirements are provided as an attachment.

The Ministry will continue to undertake a review of the Master Plan document. Should you have any further questions please contact myself or Craig Newton, as I am out of office beginning June 3, 2015 and returning June 15, 2015.

Thank you,

Emilee

Emilee O'Leary | Environmental Planner/Environmental Assessment Coordinator
Technical Support Section, Southwest Region, Ministry of the Environment and Climate Change
733 Exeter Road, London Ontario, N6E1L3
Phone: 519-873-5012 | emilee.oleary@ontario.ca

From: Laura Verhaeghe - GM BluePlan [mailto:Laura.Verhaeghe@gmblueplan.ca]
Sent: May 21, 2015 12:02 PM
To: Newton, Craig (MOECC)
Cc: O'Leary, Emilee (MOECC); Dave Hicknell - GM BluePlan; Matt Ash - GM BluePlan; Matthew Ballaban - GM BluePlan; Grant Parkinson - GM BluePlan
Subject: RE: North Perth Wastewater Master Plan Class EA Study - Final Report

Craig,

Thank you for confirming your receipt of the North Perth Wastewater Master Plan. We are preparing two additional memory sticks with the report and appendices, which will be sent out this afternoon to your attention.

Regarding First Nations Consultation, we had contacted Ministry of Aboriginal Affairs to determine consultation requirements, but did not receive a response. We then conducted a search of the Listowel area using the ATRIS system through the Government of Canada website, but there were no First Nations identified in the Listowel area. Therefore, we only contacted Metis organizations, which cover the entire province. It is possible that we have misinterpreted the results of the ATRIS search. If you are able to provide a list of any additional Aboriginal groups that would require consultation for this project, that would be very helpful, so we can conduct any additional consultation that may be necessary.

Thank you,

Laura Verhaeghe, P.Eng.
Project Manager

GM BluePlan Engineering Limited
650 Woodlawn Road West, Block C, Unit 2 | Guelph ON N1K 1B8
t: 519.824.8150 | c: 226.500.4771
laura.verhaeghe@gmblueplan.ca | www.gmblueplan.ca

From: Newton, Craig (MOECC) [mailto:Craig.Newton@ontario.ca]
Sent: Thursday, May 21, 2015 11:11 AM
To: Laura Verhaeghe - GM BluePlan
Cc: O'Leary, Emilee (MOECC)
Subject: RE: North Perth Wastewater Master Plan Class EA Study - Final Report

Laura:

This e-mail acknowledges this ministry's receipt of one hard copy and two memory sticks containing the above noted Master Plan and appendicies (as I previously requested), with thanks.

After undertaking a very cursory review of the document this morning, it has become evident to me that in retrospect MOECC needs two more memory sticks containing the above noted Master Plan and appendicies to facilitate MOECC's review of this document (inter MOECC office /department review).   Please forward two more memory sticks containing the Master Plan and appendicies to my attention at your earliest possible convenience.

Also, was there no other First Nations consultation undertaken with respect to this Master Plan other than that wish is listed in the AppendiX G? Was there no consultation with local First Nations? Please forward the complete First Nations consultation log along with the additional two memory sticks for this ministry's review and comment.

Thanks in advance.

Yours truly,

Craig Newton
Regional Environmental Planner / Regional EA Coordinator
Ministry of the Environment & Climate Change
Southwestern Region
733 Exeter Road
London, Ontario
N6E 1L3

(519) 873-5014

From: Laura Verhaeghe - GM BluePlan [mailto:Laura.Verhaeghe@gmblueplan.ca]
Sent: May-13-15 4:28 PM
To: Newton, Craig (MOECC)
Cc: Dave Hicknell - GM BluePlan; Mark Hackett; Kriss Snell (ksnell@northperth.ca) (ksnell@northperth.ca); Matt Ash - GM BluePlan; Matthew Ballaban - GM BluePlan; Grant Parkinson - GM BluePlan; Miller, Jim (MOECC)
Subject: North Perth Wastewater Master Plan Class EA Study - Final Report

Good Afternoon Craig,

We spoke over the phone a few weeks ago regarding the North Perth Wastewater Master Plan. The report is now ready for review by the MOECC. The hard copy documents are being compiled, and should arrive at your office next week. To facilitate your review, I have uploaded the electronic files to the FTP site below. Also included on the FTP site are meeting minutes from GMBP and North Perth's meeting with the MOECC last October, outlining action items.

For Internet Explorer\Windows Explorer
ftp://311031.gamsby.com:gc6dqdue2s@ftp.gamsby.com

For an FTP Client, ie. Total Commander, Filezilla, etc.
Host Name: ftp.gamsby.com
User Name: 311031.gamsby.com
Password: gc6dqdue2s

Note that we are also releasing the Notice of Completion next week to begin the 30 Day Public Review Period. However, the report recommendations will not be adopted by council until after any comments from the MOECC are addressed. I have included a copy of the Notice of Completion on the FTP site for your reference.

Please let me know if you have any questions, or have trouble accessing the files.

Best Regards,

Laura Verhaeghe, P.Eng.
Project Manager

GM BluePlan Engineering Limited
650 Woodlawn Road West, Block C, Unit 2 | Guelph ON N1K 1B8
t: 519.824.8150 | c: 226.500.4771
laura.verhaeghe@gmblueplan.ca | www.gmblueplan.ca

GM BluePlan ENGINEERING

Laura Verhaeghe - GM BluePlan

From: O'Leary, Emilee (MOECC) <Emilee.OLeary@ontario.ca>
Sent: Friday, June 26, 2015 12:34 PM
To: Laura Verhaeghe - GM BluePlan
Cc: Abernethy, Scott (MOECC); Clubb, Tom (MOECC); LeGrow, Marie (MOECC); McLean, Kevin (MOECC); mhackett@northperth.ca
Subject: MOECC comments on North Perth Wastewater Treatment Master Plan
Attachments: MOECC Comments on North Perth Wastewater Treatment Master Plan.pdf

Dear Ms. Verhaeghne:

Re: Class EA Master Plan for North Perth Wastewater Treatment

Attached please find the Ministry of the Environment and Climate Change's comments on GM BluePlan's May 2015 final report entitled "North Perth Wastewater Treatment Master Plant."

Please note that this serves as the ministry's formal correspondence and will only be delivered via this email.

Please kindly acknowledge receipt.

Thank you,

Emilee O'Leary | Environmental Planner/Environmental Assessment Coordinator
Technical Support Section, Southwest Region, Ministry of the Environment and Climate Change
733 Exeter Road, London Ontario, N6E1L3
Phone: 519-873-5012 | emilee.oleary@ontario.ca

Ministry of the Environment and Climate Change

733 Exeter Road
London ON N6E 1L3
Tel': 519 873-5000
Fax: 519 873-5020

Ministère de l'Environnement et de l'Action en matière de changement climatique

733, rue Exeter
London ON N6E 1L3
Tél.: 519 873-5000
Fax: 519 873-5020

Ontario

September 24, 2015

GM BluePlan Engineering Ltd.
650 Woodlawn Road West, Block C, Unit 2
Guelph ON N1K 1B8

Attention: Ms. Laura Verhaeghe, P. Eng. (BY EMAIL ONLY)
Project Manager

Re: North Perth Wastewater Treatment Master Plan, Notice of Completion and Final Report
Response to GM BluePlan Engineering Ltd.'s letter of September 10, 2015

Dear Ms. Verhaeghe:

Thank you for GM BluePlan Engineering Ltd.'s (GM BluePlan) letter of September 10, 2015 on behalf of the proponent, the Municipality of North Perth, in response to the Ministry of the Environment and Climate Change's (MOECC) letter of September 2, 2015 pertaining to the final May 2015 report entitled "**North Perth Wastewater Treatment Master Plan.**"

The MOECC has reviewed GM BluePlan's September 10, 2015 letter and offers in response the following comments for both yours and the Municipality of North Perth's due consideration:

Evaluation of Projects

The MOECC understands that the proponent will be implementing a long term biosolids management project of either a Lystek Alkaline Stabilization Facility (ASF) or a new higher efficiency aerobic digestion system to replace the current system. In the interim, the proponent is considering other solutions such as hauling to an offsite treatment facility or temporary storage/treatment in the East Lagoon. The MOECC would like to be kept abreast of the status of the biosolids management project both in the interim and the long-term. Please send updates to:

Mr. Tom Clubb
Supervisor – London Office
Water Compliance Unit, Safe Drinking Water Branch, MOECC
3232 White Oak Road, 3rd floor
London ON, N6E 1L8
tom.clubb@ontario.ca

Please also copy the Regional Environmental Assessment Coordinator at the MOECC's Southwest Regional Office (myself) on any updates sent to Mr. Clubb.

Should the proponent proceed with the implementation of the preferred alternative (Lystek ASF), the proponent has committed to preparing detailed contingency plans for both the temporary and permanent shutdown of the ASF. The MOECC would like to review and comment on the contingency plans as they proceed. This would be sent to both Mr. Clubb and the Regional Environmental Assessment Coordinator at the MOECC's Southwest Regional Office.

Aboriginal Consultation

The MOECC notes that copies of all cover emails and/or letters that were sent out to the Aboriginal communities/organizations with respect to the Notice of Completion will be added as part of Appendix G of the updated Master Plan report.

The MOECC notes that further follow up with the Chippewas of Kettle and Stony Point and Aamjiwnaang First Nations is underway. Follow up communication with these communities will be added to the Consultation Log in the Master Plan report Appendix G once received. Are there any updates to provide with respect to this follow up communication?

Updates to the Master Plan Report

Please inform me when an updated version of the Master Plan report is posted on the Municipality of North Perth's website.

Finally, should you have any questions with respect to this ministry's comments as presented herein, please feel free to approach me and I will do my best to answer them as best I can. Thank you in advance for your response to this ministry's queries as posed herein.

Yours truly,

Emilee O'Leary
Regional Environmental Planner / Regional EA Coordinator
Ministry of Environment & Climate Change
733 Exeter Road
London ON, N6E 1L3
(519) 873-5012 | emilee.oleary@ontario.ca

CC: Mr. Tom Clubb, Supervisor, MOECC, Safe Drinking Water Branch
Mr. Kriss Snell, Chief Administrative Officer, Municipality of North Perth
Mr. Mark Hackett, Manager of Environmental Services, Municipality of North Perth
Mr. Matt Ash, GM BluePlan Engineering
Mr. Dave Hicknell, GM BluePlan Engineering
Mr. Matthew Ballaban, GM BluePlan Engineering
Mr. Grant Parkinson, GM BluePlan Engineering

September 10, 2015
Our File: 311031

Emilee O'Leary
Regional Environmental Planner / Regional EA Coordinator
Ministry of Environment and Climate Change
733 Exeter Road
London, ON N6E 1L3

Re: Response to MOECC Comments Re: North Perth Wastewater Treatment Master Plan, Notice of Completion and Final Report

Dear Ms. O'Leary,

This letter is in response to your letter to GM BluePlan Engineering Ltd. dated September 2, 2015 regarding the North Perth Wastewater Treatment Master Plan Report. We address each of your comments below:

1. **Evaluation of Projects**
   a. If a contract between Lystek International and the Municipality of North Perth were to be established in the future, it would include terms that ensure protection of the Municipality, both technically and financially. For example, the Lystek biosolids processing facility could be positioned and constructed in such a way that in the event of default, retirement or cessation of the Lystek partnership, the Municipality would assume ownership of a properly functioning biosolids treatment and handling facility capable of performing sustained treatment of municipal wastewater reaching the WWTP. Lystek could also provide a performance guarantee in the form of a bond to secure the value of the project, and any costs related to transferring ownership, contracting a third party operator, or decommissioning the facility and transitioning to an alternate solution.
   b. Should the Municipality proceed with implementation of a Lystek ASF, the Municipality is committed to preparing a detailed contingency plan for both temporary and permanent shutdown of the Lystek ASF, as requested by the MOECC.
   c. Prior to implementation of a long term biosolids management facility (be it Lystek ASF or aerobic digestion), the Municipality is considering interim solutions to supplement biosolids processing through the existing aerobic digester, if required. Such interim solutions could include hauling to an offsite treatment facility, or temporary storage/treatment in the East Lagoon.

2. **Aboriginal Consultation**
   a. Copies of all cover emails and/or letters sent out to Aboriginal communities/organizations with respect to the Notice of Completion will be added to Appendix G of the updated Master Plan report.
   b. Further follow-up will be undertaken with respect to comments on the Class EA Master Plan from Chippewas of Kettle and Stony Point and Aamjiwnaang First Nations. A summary of comments received and/or concerns raised will be added to the Consultation Log in the Master Plan report Appendix G, once they are received.

3. **Updates to the Master Plan Report**
   a. The timelines, budget estimates and other related sections in the Master Plan report have been updated to correspond with the revised project recommendations.
   b. All correspondence to date will be included in the updated Master Plan report that is posted to the Municipality of North Perth's website.

Yours truly,

GM BLUEPLAN ENGINEERING LIMITED
Per:

Laura Verhaeghe, P.Eng.

CC: Mr. Scott Abernethy, Surface Water Evaluator, MOECC, Southwest Region
Mr. Tom Clubb, Supervisor, MOECC, Safe Drinking Water Branch
Ms. Marie LeGrow, Manager (A), MOECC, Source Protection Programs Branch
Mr. Kevin McLean, Senior Advisor, MOECC, Aboriginal Affairs Branch
Mr. Kriss Snell, Chief Administrative Officer, Municipality of North Perth
Mr. Mark Hackett, Manager of Environmental Services, Municipality of North Perth
Mr. Matt Ash, GM BluePlan Engineering
Mr. Dave Hicknell, GM BluePlan Engineering
Mr. Matthew Ballaban, GM BluePlan Engineering
Mr. Grant Parkinson, GM BluePlan Engineering

Ministry of the Environment and Climate Change

733 Exeter Road
London ON N6E 1L3
Tel': 519 873-5000
Fax: 519 873-5020

Ministère de l'Environnement et de l'Action en matière de changement climatique

733, rue Exeter
London ON N6E 1L3
Tél.: 519 873-5000
Fax: 519 873-5020

September 2, 2015

GM BluePlan Engineering Ltd.
650 Woodlawn Road West, Block C, Unit 2
Guelph ON N1K 1B8

Attention: Ms. Laura Verhaeghe, P. Eng. (BY EMAIL ONLY)
Project Manager

Re: North Perth Wastewater Treatment Master Plan, Notice of Completion and Final Report
Response to GM BluePlan Engineering Ltd.'s letter of August 13, 2015

Dear Ms. Verhaeghe:

Thank you for GM BluePlan Engineering Ltd.'s (GM BluePlan) letter of August 13, 2015 on behalf of the proponent, the Municipality of North Perth, in response to the Ministry of the Environment and Climate Change's (MOECC) letter of June 26, 2015 pertaining to the final May 2015 report entitled "**North Perth Wastewater Treatment Master Plan."**

The MOECC has reviewed GM BluePlan's August 13, 2015 letter and offers in response the following comments for both yours and the Municipality of North Perth's due consideration:

Evaluation of Projects

With respect to the Sludge Management Project, it is understood that while Lystek International has not to date secured sufficient external biosolids disposal contracts in order to make the investment in an Alkaline Stabilization Facility (ASF) (as referred to in the Master Plan report) / Organic Materials Recovery Centre (OMRC) (as referred to in GM BluePlan's August 13, 2015 letter) economically viable, both Lystek International and the proponent are of the opinion there is a realistic potential to secure the required contracts within three years. Accordingly, the preferred alternative for this project remains valid.

As a note, the proponent should keep in mind the timeframes associated with subsequent approvals that may be needed by the third party for this facility (e.g. Environmental Compliance Approvals, Planning Act submissions etc.) and their potential appeal processes, as this may impact the proponent's anticipated project timeframes.

The consultant's response states that if the OMRC project is undertaken by Lystek, a detailed contract would be put in place between Lystek and North Perth to ensure protection of the Municipality. Please elaborate on this statement and provide more information about how the Municipality would be protected.

Should the preferred alternative be implemented, the consultant's response states the following two contingency plans in the event that the third party ASF shut down unexpectedly:

- The East Lagoon would be utilized for emergency sludge storage
- The liquid sludge would be hauled for short periods to another ASF approximately 1 hour from Listowel at a reduced tipping fee prearranged with the third party owner/operator

These contingency plans are appropriate for temporary shut-down of the third party ASF and will need to be assessed, planned and documented in more detail should the preferred alternative be implemented. Please confirm that the proponent agrees to make this commitment.

Contingency plans in the event of permanent shut-down of the third party ASF during operation of the facility will also need to be developed should the preferred alternative be implemented. Please confirm that the proponent agrees to make this commitment.

The consultant's response states that if a Lystek OMRC is still not viable after three years, the Municipality will continue with design and construction of a new higher efficiency aerobic digestion system to replace the system now in place. Until such time that one of these alternatives is implemented, it is assumed that the Municipality will maintain the existing sludge management facility and the current aeration/decant schedule for the aerobic digestion stage. Has the proponent considered any other interim solutions to address the issues and/or improve the performance of the sludge management system while it waits for a permanent solution to be implemented?

Aboriginal Consultation

The ministry notes from the Aboriginal Consultation Log that the proponent, with the assistance of its consultant, has provided all First Nations and Metis organizations identified by the MOECC with the Notice of Completion, and subsequently followed up with the community contacts by telephone. The proponent and consultant have provided a reasonable period of time for initial response from the communities/organizations.

Please include copies of all cover emails and/or letters that were sent out to the Aboriginal communities/organizations with respect to the Notice of Completion as part of Appendix G of the updated Master Plan report.

Comments from the Chippewas of Kettle and Stony Point and Aamjiwnaang First Nations are still pending. As such please follow up with these two communities to confirm whether they have comments to provide, and ensure that any comments received are considered/addressed. Please document your follow-up communications in the Consultation Log and include a summary of any concerns raised (or confirmation of no concerns), and a description of how any concerns were considered/addressed by the proponent. Please include the updated Consultation Log in the updated Master Plan report.

Aboriginal consultation cannot be considered complete for this Master Plan Class EA process until this outstanding matter is addressed to the ministry's satisfaction.

Updates to the Master Plan Report

The MOECC acknowledges the updates to the preferred solutions for the following projects within the Master Plan: Plant Outfall Location, Wastewater Conveyance, Headworks and Status of Lagoons. In review, the Plant Outfall Location project will no longer be implemented (i.e. no direct discharge to the Chapman Drain) and as such the preferred solution for the Wastewater Conveyance project (i.e. construction of a new influent forcemain) will be pursued. The Headworks project preferred solution now involves implementing alternative C along with alternatives A and D. Lastly, the preferred solution for the Status of Lagoons project remains the same with the exception that the East Lagoon be maintained as emergency overflow storage instead of decommissioned and land reclaimed. The consultant has informed the MOECC that the report has been updated to reflect the changes in the preferred solutions. Please ensure all relevant sections of the report have been updated accordingly (including any updates to project timelines and budget estimates).

The MOECC has requested that additional documentation/information be added to the updated Master Plan report. As such, please do not circulate any updated reports until all stakeholder and agency concerns related to this Master Plan Class EA process have been adequately addressed and reflected in an updated report where applicable. Please inform me if the additional documentation requested by MOECC cannot be reflected in the updated Master Plan Report.

Other

The MOECC is satisfied with the consultant's responses with respect to all other comments not mentioned herein.

Finally, should you have any questions with respect to this ministry's comments as presented herein, please feel free to approach me and I will do my best to answer them as best I can. Thank you in advance for your response to this ministry's queries as posed herein.

Yours truly,

Emilee O'Leary

Emilee O'Leary
Regional Environmental Planner / Regional EA Coordinator
Ministry of Environment & Climate Change
733 Exeter Road
London ON, N6E 1L3
(519) 873-5012 | emilee.oleary@ontario.ca

CC: Mr. Scott Abernethy, Surface Water Evaluator, MOECC, Southwest Region
Mr. Tom Clubb, Supervisor, MOECC, Safe Drinking Water Branch
Ms. Marie LeGrow, Manager (A), MOECC, Source Protection Programs Branch
Mr. Kriss Snell, Chief Administrative Officer, Municipality of North Perth
Mr. Mark Hackett, Manager of Environmental Services, Municipality of North Perth
Mr. Matt Ash, GM BluePlan Engineering
Mr. Dave Hicknell, GM BluePlan Engineering
Mr. Matthew Ballaban, GM BluePlan Engineering
Mr. Grant Parkinson, GM BluePlan Engineering

PEOPLE | ENGINEERING | ENVIRONMENTS

August 13, 2015
Our File: 311031

Emilee O'Leary
Regional Environmental Planner / Regional EA Coordinator
Ministry of Environment and Climate Change
733 Exeter Road
London, ON N6E 1L3

Re: Response to MOECC Comments Re: North Perth Wastewater Treatment Master Plan, Notice of Completion and Final Report

Dear Ms. O'Leary,

This letter is in response to your letter to GM BluePlan Engineering Ltd. dated June 26, 2015 regarding the North Perth Wastewater Treatment Master Plan Report. We address each of your comments below:

1. **Surface Water**
   a. We acknowledge that a separate Class EA would be required to increase the wastewater treatment plant's rated capacity. As part of that Class EA, more weight would be given to water resource assessment criteria, and an assimilative capacity study would be completed for the effluent receiver, as applicable.
   b. If the option for an effluent outfall to Chapman Drain is pursued, an assimilative capacity study for that receiver would be required. However upon further review and consultation with agencies and others, we have modified our recommendation regarding plant outfall, as discussed in section 6 below. We now recommend maintaining the existing outfall to the Middle Maitland River, and constructing a new influent forcemain from the main pumping station to the Plant to create redundancy in the forcemain system. As such, the outfall to receiving water body will not change.
   c. Fats, oils and grease management have been upgraded from a low priority to a medium priority project in the revised Master Plan Report.
   d. The Municipality of North Perth will collect water quality data from the Middle Maitland River as necessary to support an assimilative capacity study, if an increase to WWTP Rated Capacity is pursued.
   e. We acknowledge that reducing I&I in the sanitary collection system is consistent with MOECC's Policy F-5-5. Further inspection of manholes within the Middle Maitland floodplain, conducted after the Master Plan Report was released, indicated that minimal or no inflow is occurring through manholes within the flood plain.
   f. Since installation in 1991, the perimeter drains around the WWTP structures have been conveying groundwater to the effluent pumping station. The flow from the perimeter drains has not been enough to meter, so the exact volume being discharged is unknown; however, based on effluent pumping station cycling frequency, we estimate that quantities would be well under the 50,000 L/day that would require a Permit to Take Water.

2. **Evaluation of Projects**
   a. As noted in 1.b. above, the Chapman Drain Outfall option is no longer being recommended.
   b. The revised Master Plan no longer recommends fully decommissioning the East Lagoon. All or a portion of the East Lagoon is recommended to be maintained to provide emergency overflow storage.
   c. Discussions have been on-going with Lystek International regarding their potential construction of an Organic Materials Recovery Centre (OMRC) adjacent to the North Perth WWTP that could also accept and

treat the sludge from the WWTP. At this time, Lystek has not secured sufficient external biosolids disposal contracts to make the investment in an OMRC economically viable. However, there is a realistic potential that the required biosolids contracts could be secured within the next three years, and Lystek remains very interested in this opportunity, so this still remains a viable option for biosolids management. If a Lystek OMRC is still not viable after three years, the Municipality will continue with design and construction of a new higher efficiency aerobic digestion system to replace the system now in place. If the OMRC project is undertaken by Lystek, a detailed contract would be put in place between Lystek and North Perth to ensure protection of the Municipality.

d. Although alkaline stabilization is relatively new compared to conventional technologies such as aerobic digestion, the Lystek technology specifically has been used successfully in Ontario for the past 13 years, so is a well understood technology. Even so, if a third party Alkaline Stabilization Facility were to treat sludge from the WWTP, a portion of the East Lagoon would be maintained for emergency sludge storage. This would reduce North Perth's reliance on the third party facility if they were to shut down unexpectedly. An alternative contingency plan would involve hauling the liquid sludge for short periods to another Alkaline Stabilization Facility approximately 1 hour from Listowel at a reduced tipping fee prearranged with the Third Party Owner/Operator.

3. Source Water Protection

a. With reference to the Ausable Bayfield Maitland Valley Wellhead Protection Areas map published by the Government of Ontario in 2009, all areas where work is recommended as part of the Master Plan fall outside of any wellhead protection areas identified.

4. Consultation

a. All comments received from the public and agency stakeholders are documented in Appendix G of the report. Note that further communications have occurred since the Master Plan Report was first issued. As such, an updated version of Appendix G is attached for your reference.

5. Aboriginal Consultation

a. All First Nations and Métis groups identified by the MOECC have been contacted, and confirmation of receipt of the Notice of Completion and link to the Master Plan Report by each group has been received. Multiple follow-up calls were made to each group to elicit comments with no comments being received to date. Comments are still pending from Chippewas of Kettle and Stony Point, and Aamjiwnaang First Nations. A detailed log of communications can be found in the revised Appendix G, attached.

6. Updates to the Master Plan Report

The following project recommendations have been updated since the original North Perth Wastewater Treatment Master Plan Report was issued in May, 2015:

a. **Plant Outfall Location and Wastewater Conveyance (Pipelines):** A new plant outfall to the Chapman Drain was initially recommended to allow repurposing of the existing effluent forcemain as a redundant influent forcemain. However, due to potential difficulty and cost to obtain approval to discharge effluent to the Chapman Drain, as well as the potential for implementation of more stringent effluent criteria, it is now recommended to maintain the existing outfall to the Middle Maitland River at Highway 23, and construct a new redundant influent forcemain adjacent to the existing influent forcemain.

b. **Headworks:** The Master Plan recommendations originally included a new automated screen, and grit classifier, as well as a climate controlled building around the entire headworks process. We are maintaining these initial recommendations, but now also recommend adding a second grit removal process train to handle peak flows, and reduce potential for grit carryover into the secondary treatment process.

c. **Status of Lagoons:** Previously, it was recommended that the sludge in the East Lagoon be gradually processed through the Third Party owned/operated ORMC, and then be fully decommissioned and the land reclaimed. It is still recommended that the East Lagoon sludge be processed through the Third Party ORMC, but we now recommend that the East Lagoon be maintained as emergency overflow storage in the long term. Continued use of the East Lagoon for emergency storage would also provide a contingency plan for managing WAS in case of shutdown of the OMRC.

Yours truly,

GM BLUEPLAN ENGINEERING LIMITED
Per:

Laura Verhaeghe, P.Eng.

CC: Mr. Scott Abernethy, Surface Water Evaluator, MOECC, Southwest Region
Mr. Tom Clubb, Supervisor, MOECC, Safe Drinking Water Branch
Ms. Marie LeGrow, Manager (A), MOECC, Source Protection Programs Branch
Mr. Kevin McLean, Senior Advisor, MOECC, Aboriginal Affairs Branch
Mr. Kriss Snell, Chief Administrative Officer, Municipality of North Perth
Mr. Mark Hackett, Manager of Environmental Services, Municipality of North Perth
Mr. Matt Ash, GM BluePlan Engineering
Mr. Dave Hicknell, GM BluePlan Engineering
Mr. Matthew Ballaban, GM BluePlan Engineering
Mr. Grant Parkinson, GM BluePlan Engineering

Ministry of the Environment and Climate Change

733 Exeter Road
London ON N6E 1L3
Tel': 519 873-5000
Fax: 519 873-5020

Ministère de l'Environnement et de l'Action en matière de changement climatique

733, rue Exeter
London ON N6E 1L3
Tél.: 519 873-5000
Fax: 519 873-5020

Ontario

June 26, 2015

GM BluePlan Engineering Ltd.
650 Woodlawn Road West, Block C, Unit 2
Guelph ON N1K 1B8

Attention: Ms. Laura Verhaeghe, P. Eng. (BY EMAIL ONLY)
Project Manager

Re: North Perth Wastewater Treatment Master Plan, Notice of Completion and Final Report

Dear Ms. Verhaeghe:

This letter acknowledges receipt of the above noted Notice of Completion, and provides the Ministry of the Environment and Climate Change's (MOECC) comments on GM BluePlan Engineering Ltd.'s May 2015 final report entitled "**North Perth Wastewater Treatment Master Plan"** prepared for the Municipality of North Perth.

The ministry's comments on the Class Environmental Assessment (EA) Master Plan for both GM BluePlan Engineering Ltd.'s (consultant) and the Municipality of North Perth's (proponent) due consideration and response are as follows:

Surface Water

Page 9 of the report lists detailed evaluation criteria for the assessment of alternatives but water resource impacts as a criterion is given low weight in decision-making as it is buried or lumped with many other disparate criteria under "environmental and social impacts". The preferred alternative for the first project in the Master Plan is to increase the wastewater treatment plant's rated capacity by optimizing and upgrading the plant through process adjustments, equipment replacement, new installations and improved system monitoring without a major physical expansion. A separate Class EA would be conducted for this and MOECC recommends that this Class EA give more weight to water resource assessment criteria and include an assimilative capacity study.

Page 7 of the report notes that the Class EA process includes an assessment of potential environmental effects, but Section 6.2.1 of the report (Plant Outfall Location project) includes only a desk-top assessment of the assimilative capacity of the Middle Maitland River and it contains no recent information on water quality or on stream flow of Chapman Drain as a potential receiver of treated effluent from the North Perth wastewater treatment plant. The report rightly notes that a detailed assimilative capacity study would be needed in the future as a basis for the MOECC to approve a discharge to the Chapman Drain, which is identified as the preferred receiver among discharge alternatives.

The MOECC concurs that an assimilative capacity study may lead to more stringent effluent limits which would trigger the need for improved wastewater treatment (tertiary ultrafiltration is identified). Later in the report (Section 6.10), the presence of fats, oil, grease (FOG) in the influent raw sewage is identified as a negative effect on the performance of a tertiary filtration system (including ultrafiltration) and other components of the treatment works. A FOG skimmer system could be installed but it is currently identified as a low priority project.

As noted on page 37 of the report, the current Environmental Compliance Approval (formerly Certificate of Approval) for the wastewater treatment facility does not include receiving water monitoring requirements. The MOECC recommends the municipality begin a monitoring program to characterize the Chapman Drain and/or the Middle Maitland. The MOECC's southwest regional office can review a monitoring design and provide input. This program would provide the municipality with necessary water resource information for an assimilative capacity study. A study acceptable to MOECC's southwest regional office is the environmental basis for an engineering approval of an increased rate capacity or a switch in outfall to a different (smaller) receiver. The budget estimates for these two projects are over one million dollars each so monitoring costs are relatively small compared to this.

Page 35 of the report recommends as a maintenance item that manholes and sewers at the downstream end of the Listowel sewer system should be flood-proofed to reduce inflows. Such efforts to reduce inflow/infiltration in the collection system would be a beneficial step to show some conformance with MOECC's Policy F-5-5.

Page 40 of the report notes that perimeter drains convey groundwater to the wastewater treatment plant. The MOECC concurs that this water should be directly discharged if its water quality is satisfactory. Additionally, per the November 17, 2014 meeting minutes, MOECC asked that the volume of groundwater collected by the perimeter drains by investigated and the need for a Permit to Take Water be confirmed. Was this completed?

Evaluation of Projects

A direct discharge to Chapman Drain is the preferred alternative for the Plant Outfall Location project and a direct discharge with enhanced treatment ranked second. There was not a significant difference in overall scores in the detailed evaluation (page 45) so these two alternatives could be considered equivalent. Increase capital costs for an enhanced treatment system is the only identified disadvantage specific to that alternative. Enhanced treatment would justify upgrading filters and UV systems which are near the end of their service life anyway. Enhanced treatment is logical if the discharge is switched to a receiver with little or no dilution potential compared to that provided by the current receiver.

Both the #1 and #2 preferred alternatives for the Status of Lagoon project involve decommissioning the East Lagoon, which would result in the lagoon no longer being available for emergency overflows in the event of a power failure. Accordingly, the provision of full back-up power is recommended as a priority project for the proponent.

For the Sludge Management project, alkaline stabilization of sludge scored higher in technical feasibility when operated by a third party but the qualitative evaluation on page 61/62 characterizes the technology as relatively new and suggests that full scale installations do not have a long-term track record yet. The preferred alternative for alkaline stabilization is to rely on a third party operator but this outcome is not under municipal control, it depends on an unknown private partner which makes it more uncertain. Accordingly, the MOECC is interested in further details regarding this project.

Section 6.4.4 suggests that an interested third party has already been secured to construct and operate an Alkaline Stabilization Facility (ASF). Per the November 17, 2014 meeting minutes, Lystek International is identified. Please provide an update with respect to discussions with this third party – are they still interested in constructing an ASF? If not, how does the municipality plan to attract other third parties? Is an Official Plan amendment required for the construction and operation of the ASF facility in the proposed location? Table 89 shows three years for project implementation of the sludge management project. Does this mean the proponent expects that a third party ASF will be operational and available for use by the municipality within three years? The secondary alternative is a higher efficiency aerobic digester which would be installed should the third party owned ASF not secure contracts “in the near future” to make the facility feasible. What timeframe constitutes the “near future” (i.e. how much time will the municipality allow the third party to secure contracts before implementing the secondary alternative)? How has the municipality considered other situations that may warrant the implementation of the secondary alternative (e.g. if the approval process for the ASF is delayed past the proponent’s three year project implementation maximum timeline (Table 89); if a contract with a third party is secured but the third party is unable to construct for financial reasons or shuts down permanently during operation etc.)?

Source Water Protection

The Clean Water Act aims to protect existing and future sources of municipal drinking water. As such, it is important to consider potential source protection implications when undertaking a Class EA project. Class EA projects may include activities that, if located in a vulnerable area, they may be considered a drinking water risk and be subject to policies in a Source Protection Plan (SPP).

The report does include any assessment of potential impacts on the drinking water system in North Perth, particularly the nearby settlement communities of Listowel and Atwood. The MOECC notes that the existing wastewater treatment facility, sewage pumping station and conveyance pipelines appear to be outside of any known vulnerable areas in the Maitland Valley source protection area.

For your information, the ministry’s Source Protection Programs Branch recognizes that the implications of source protection planning are a relatively new consideration and as such is developing mechanisms to ensure that proponents of Class EA projects with the potential to impact sources of drinking water will be made aware of this potential early in the process, in addition to forthcoming changes to the Municipal Class EA Parent document itself. Proponents of class EA projects that are in drinking water vulnerable areas will be encouraged to include source water protection assessments and provide documentation that there are no policies that apply in the relevant SPP and there is no risk from the project to the drinking water system during their undertaking. This is of the utmost importance given that projects will often require further approvals from the MOECC and these approvals could be impacted where there are policies prohibiting or restricting the uses in these vulnerable areas.

Consultation

Appendix G of the report contains information on public consultation, including a sign-in sheet for the Public Information Meeting, 1 comment sheet and a response to the comment. Were any other concerns raised/comments received from stakeholders (the public and/or agencies)? If so, how were those concerns resolved?

Aboriginal Consultation

The proponent was required to complete consultation on this Class EA Master Plan study as per the requirements of the *Municipal Engineers Association Municipal Class Environmental Assessment* and the *Code of Practice – Consultation in Ontario's Environmental Assessment Process.* The MOECC was informed by the consultant in an email dated May 21, 2015 to Mr. Craig Newton that only Metis organizations were contacted for consultation on the Master Plan. No First Nation communities have been contacted about the Master Plan as of June 1, 2015.

Accordingly, the MOECC's Aboriginal Affairs Branch (AAB) has determined that the Aboriginal consultation undertaken by the proponent on this Class EA Master Plan is insufficient and does not yet satisfy the Crown's delegated consultation expectations. As such, the Crown's duty to consult may not yet have been met.

The following communities were identified by MOECC on June 2, 2015 as having or potentially having aboriginal or treaty rights that may be adversely impacted by the project or any future projects as a result of the study:

- Mississaugas of the New Credit First Nation
- Chippewas of Kettle and Stony Point
- Bkejwanong Territory (Walpole Island)
- Oneida Nation of the Thames
- Chippewas of Nawash Unceded First Nation (Cape Croker)
- Chippewas of Saugeen
- Aamjiwnaang First Nation
- Chippewas of the Thames First Nation

In an email dated June 2, 2015, the MOECC directed the consultant to notify the identified communities about the project and completed Master Plan, and allow adequate time for the communities to identify their concerns.

As the Master Plan is now complete, it is recommended that the consultant follow up to any letters or electronic notification by phone. Should any community identify the need for additional time to review and assess the information provided, it is recommended that the consultant be reasonable in its assessment of additional time requirements and grant any extensions for review where appropriate. Should any concerns be identified, the consultant should address them working with the community that identified them.

The consultant/proponent should keep detailed documentation of the consultation completed. In general the consultation record should:

- Summarize the nature of any comments and questions received from First Nation and/or Métis communities

- Describe your response to those comments and how their concerns were considered
- Include a communication log indicating the dates and times of all communications
- Document activities in relation to consultation

It is often helpful to create a table to document all of this information. For example, the table may have the following headings:

- **First Nation and/or Métis Communities contacted**: identify the specific Aboriginal communities (including specific community member) that the proponent sent notices to or communicated with.
- **Date of communication**
- T**ype of notice/communication:** (e.g. list the specific EA notices that were sent, meetings/phone calls with First Nations, emails), including a brief summary of any additional project information that was sent as part of the communication.
- **Purpose**: It would be helpful for the consultation log to indicate the purpose of any phone calls, emails or meetings with Aboriginal communities.
- **Summary of responses received**: the consultation log should provide a summary of the responses received from notifications, including any nil responses. This section should also summarize the details of any discussions with First Nation and/or Métis communities including whether any concerns were raised and how they were addressed.

Finally, should you have any questions with respect to this ministry's comments as presented herein, please feel free to approach me and I will do my best to answer them as best I can. Thank you in advance for your response to this ministry's queries as posed herein.

Yours truly,

Emilee O'Leary
Regional Environmental Planner / Regional EA Coordinator
Ministry of Environment & Climate Change
733 Exeter Road
London ON, N6E 1L3
(519) 873-5012 | emilee.oleary@ontario.ca

CC: Mr. Scott Abernethy, Surface Water Evaluator, MOECC, Southwest Region
Mr. Tom Clubb, Supervisor, MOECC, Safe Drinking Water Branch
Ms. Marie LeGrow, Manager (A), MOECC, Source Protection Programs Branch
Mr. Kevin McLean, Senior Advisor, MOECC, Aboriginal Affairs Branch
Mr. Mark Hackett, Manager of Environmental Services, Municipality of North Perth

APPENDIX H
SEPTAGE MANAGEMENT PLAN

Prepared By:

Municipality Of North Perth

Septage Management Plan

GMBP File: 311031

May 7, 2015

GUELPH | OWEN SOUND | LISTOWEL | KITCHENER | EXETER | HAMILTON | GTA

650 WOODLAWN RD. W., BLOCK C, UNIT 2, GUELPH ON N1K 1B8 P: 519-824-8150
WWW.GMBLUEPLAN.CA

TABLE OF CONTENTS

SEPTAGE MANAGEMENT PLAN

MUNICIPALITY OF NORTH PERTH

MAY 7, 2015

GMBP FILE: 311031

1. INTRODUCTION

This Septage Management Plan summarizes current and future requirements for transporting and treating hauled sewage (septage) in the Municipality of North Perth, in accordance with the Provincial Policy Statement (PPS) as published by the Ontario Ministry of Municipal Affairs and Housing (2014).

As noted in the PPS, section 1.6.6.6, "…planning authorities may allow lot creation only if there is confirmation of sufficient *reserve sewage system capacity*…within *municipal sewage services* or *private communal sewage services...*The determination of sufficient *reserve sewage system capacity* shall include treatment capacity for hauled sewage from *private communal sewage services* and *individual on-site sewage services*."

Hauled Sewage, informally referred to as 'Septage', is defined in O. Reg. 347 'General Waste Regulation' as "domestic waste that is human body waste, toilet or other bathroom waste, waste from other showers or tubs, liquid or water borne culinary or sink waste or laundry waste…" that is not being conveyed by a sewer to a wastewater treatment plant subject to an environmental compliance approval. As per Division B of Ontario Regulation 332/12 (Building Code), other sources of human body waste from permanent and portable privies are also classified as hauled sewage, if the waste is not fully disposed of at the site where it is produced. Hauled sewage excludes wastewater from food processing and organic waste processing operations, as well as grease trap waste from restaurants. Throughout this document, 'septage' and 'hauled sewage' will be used interchangeably.

In accordance with the PPS, hauled sewage must be treated at an MOE approved facility, such as a municipal sewage treatment plant or a dedicated septage treatment facility, and cannot be directly land applied. As such, North Perth must ensure treatment capacity exists to treat all hauled sewage, as defined above, produced within their boundaries before new lot creation within North Perth can be approved.

2. SEPTAGE GENERATION

North Perth is a primarily rural municipality in Perth County, consisting of the Town of Listowel, the villages of Gowanstown, Trowbridge, Atwood, and Monkton, and the Hamlets of Kurtzville, Molesworth, Britton, Newry, and Donegal. The North Perth Wastewater Treatment Plant (WWTP) services the Town of Listowel, and the Village of Atwood via sewage forcemains. The remaining settlement areas do not have wastewater service connections, and use decentralized treatment such as individual on-site or private communal septic systems. Periodically, septic tanks must be emptied, and the septage hauled offsite for treatment. Hauled Sewage in North Perth is also generated by portable privies, such as those used on construction sites.

The estimated un-serviced population of North Perth's villages and hamlets as of 2011 is 4547 (approximately 1793 un-serviced units), per the North Perth Master Growth Plan Update (2014). Using a rate of 0.29% (high scenario growth rate for the Elma Ward from Table 14 in the North Perth Master Growth Plan (2011), the estimated un-serviced population in 2031 is 4818.

Based on a typical septage production rate of 200 grams of solids per person per day, and estimated septage total solids concentration of 65 g/L, the estimated septage production rates for North Perth are **5044 m^3/year (2011)** and **5345 m^3/year (2031)** for existing and future conditions respectively (MOE Design Guidelines for Sewage Works, Table

22-2 ‘Mass Loadings and Concentrations in Typical Residential Wastewater, and “Decentralized Systems Technology Fact Sheet – Septage Treatment/Disposal published by EPA in Sept 1999). This equates to a total daily flow increase of less than 1 m^3/day by 2031.

3. EXISTING SEPTAGE TREATMENT AND DISPOSAL

3.1 Septage Receiving Station at North Perth Wastewater Treatment Plant

The North Perth Septage Receiving Station (SRS) was put into service in 2006, and accepts septage from septic tanks and portable privy waste from construction sites, as well as industrial high strength wastewaters. Industrial wastewater sources include pet food, dairy, brewery, and animal rendering wastewaters, and composting leachate. The North Perth Septage Receiving Station and Wastewater Treatment Facility is the only treatment facility within North Perth that is able to receive and treat hauled sewage.

The SRS, shown in Figures 1, 2, 3 and 4, consists of a control building that houses a rock trap, grinding and screening equipment, process piping, valves and instrumentation. Adjacent to the building is a 600m^3 in-ground storage tank equipped with a submersible mixer, recirculation pump, and duplex transfer pumps. The headspace of the storage tank is ventilated to a nearby biofilter odour control system. The SRS facility is equipped with a truck unloading bay with an electronic card reading system for automated monitoring for billing and control of imported waste streams. It is noted that the North Perth wastewater treatment plant acts as a regional centre for processing high strength wastes and receives much of its material from outside of the Municipality of North Perth, and well as outside of Perth County.

Figure 1. Septage Receiving Station – Equalization Tank and Biofilter Odour Control Units

Figure 2. Septage Receiving Station - Sewage Hauler Unloading Bay and Metering Station

Figure 3. Septage Receiving Station - Interior of Equalization Tank

Figure 4. Septage Receiving Station – Grinding/Screening Equipment

The overall objective of constructing the SRS was to reduce shock loading to the plant by storing high-strength hauled waste off-line temporarily, then metering it into the plant at a controlled rate. There is only 1 truck unloading connection (i.e. only 1 truck can unload at once). However, recent operating experience indicates that due to high use of the facility, the plant continues to experience occasional shock loads, although not as pronounced as before the facility was put into service.

The primary objective of this study is to verify that the SRS is capable of handling all hauled sewage generated within North Perth. As such, any impacts to the plant caused by the introduction of hauled industrial wastewater, or septage from outside the Municipality of North Perth will not be considered.

It is expected that some or all of the septage generated by unserviced residents and businesses within North Perth will be hauled to the SRS. Licensed sewage haulers (excluding industrial waste haulers) that brought hauled sewage to the SRS in 2014 are listed in **Table 1**.

Upon review of the Municipality of North Perth's records presented in **Table 1**, only approximately 4% of the septage brought to the plant in 2014 originated in North Perth. In fact, the vast majority of the hauled sewage originated outside of the County of Perth. It should be noted that the exact origin of some of the hauler's loads is uncertain, as often private sewage haulers will transport hauled sewage to the WWTP from a variety of sources both in and out of the municipality, sometimes including industrial wastewater. Therefore, it is possible that some of the hauled sewage with the hauler based in Perth County actually originated within North Perth. For conservative evaluation purposes, it will be assumed that all the hauled sewage collected by haulers based in Perth County is from North Perth. This value of 7426 m^3/year is relatively close to the estimated septage production in North Perth of 5044 m^3/year in 2011. It is reasonable that the estimated number of 5044 m^3/year is lower than the recorded values, as the 7426 m^3/year likely includes septage from outside of North Perth.

Table 1 –Licensed Septage Haulers, and Annual Volumes Discharged to North Perth SRS, 2014

Company Name	Volume of Septage Discharge at North Perth SRS in 2014			
	Origin of Septage			Total, m^3/yr
	North Perth, m^3/yr	Perth County (excluding North Perth), m^3/yr	Outside of Perth County, m^3/yr	
Organic Resource (ORMI)	--	--	28,658	28,658
S&S Liquid Disposal Trucking	2,007	--	--	2,007
Morris Gerber Excavation	--	3,922	--	3,922
Campbell's Garage and Sanitation	--	--	1,996	1,996
Larry Epworth & Sons	--	--	453	453
C & P Portable Toilets	--	--	654	654
J.J. McLelland & Son	--	--	1,031	1,031
The Septic Guy	--	--	898	898
D.J. Kuepfer and Family Inc.	--	979	--	979
Weber Septic Service	--	--	2,455	2,455
H T Dale Septic Service	--	--	265	265
J & R Septic Service	--	--	168	168
JTC Group Ltd	--	--	143	143
Gibson Welding	--	--	4,248	4,248
Porta Plus Portables	--	--	10	10
Terry Hunter Septic Tank Pumping	--	--	78	78
DVLCC #22	--	--	138	138
Township of Perth East	--	518	--	518
TOTAL	**2007**	**5,419**	**41,195**	**48,621***
Percentage of Total Septage	**4%**	**11%**	**85%**	

*Value excludes all industrial wastewater flows into the Septage Receiving Station. Total flow with industrial wastewater included is ~97,300 m^3/yr.

The overall impact of the Septage Receiving Station flows on WWTP influent flow and $CBOD_5$ is summarized in **Table 2** on the following page.

Table 2: Summary of Influent Streams to North Perth WWTP

Parameter	Hauled Sewage from North Perth or Perth County	Hauled Sewage from outside of Perth County	Hauled Industrial Wastewater	Total Hauled Waste from SRS	Combined Influent to WWTP[2]
Flow, m^3/d	20[1]	113[1]	133[1]	267	5872
% of Total Influent Flow	0.37%	2.07%	2.44%	4.89%	--
$CBOD_5$, kg/d	201	1113	689	2002	3377
% of Total Influent $CBOD_5$	5.94%	32.95%	20.39%	59.28%	--

1. Values based on data from 2014 only, which was available at time of report. All other values are average values from 2010 to 2014.
2. Includes flows from Septage Receiving Station, Highway 23 Pumping Station and Atwood Pumping Station

As indicated in Table 2, the $CBOD_5$ loading to the plant that originates from hauled sewage sourced in North Perth or Perth County is approximately 6% of the total influent $CBOD_5$ to the plant. Flow from hauled sewage in North Perth or Perth County is an even smaller percentage of total influent flow to the plant.

GM BluePlan performed an uncommitted reserve capacity analysis as part of the North Perth Wastewater Masterplan (2015). The uncommitted reserve capacity of the North Perth WWTP was calculated as 478 m3/d, which includes all committed residential, industrial, commercial, and institutional connections that have not yet been connected, as well as all the current industrial wastewater flows from the SRS. Even under these conditions, the increase in the amount of septage generated within North Perth is expected to grow by <1 m^3/day by 2031, which is well within the available uncommitted reserve capacity.

4. RECOMMENDED SEPTAGE MANAGEMENT STRATEGY

To continue achieving the required effluent quality as stipulated in the Certificate of Approval for the WWTP, the plant should follow the recommendations presented in North Perth's Wastewater Master Plan prepared by GM BluePlan Engineering in 2015. However, because the majority of the imported wastewater North Perth is accepting would be considered 'voluntary' or 'optional', the plant could simply reduce the quantity of industrial wastewater accepted to meet their CofA requirements, while still continuing to accept all septage/hauled waste generated within North Perth in agreement with the PPS.

Overall, North Perth currently has capacity at their WWTP to treat all the septage generated within their jurisdiction to 2031, and meets the requirements of this element of the Provincial Policy Statement without any upgrades to treatment processes.

5. FINANCIAL STRATEGIES

The Municipality of North Perth charges a fee for unloading imported wastewater at the Septage Receiving Station. A formula is used to calculate the fee based on septage quality parameters including suspended solids, biological oxygen demand (BOD), nitrogen, oils and grease and phosphorus. This strategy requires haulers to pay more to dispose of higher strength waste. The current rate system is working well, and there are no plans to modify it in the foreseeable future.