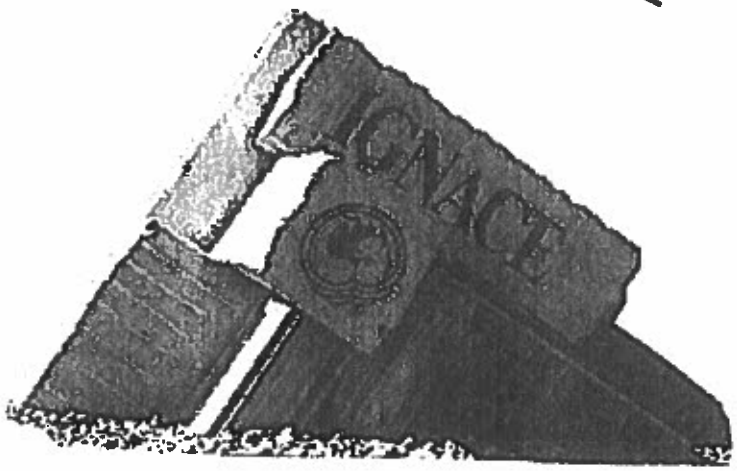
The Township



# of Ignace

Drinking Water System Financial Plan

July 16, 2016

The Corporation of the Township
Drinking Water System Financial Plan

Table of Contents

1. Executive Summary

The financial plan contained herein has been prepared in accordance with Ontario Regulation 453/07, which is a regulation pursuant to the Safe Drinking Water Act, 2002. The Regulation requires that a long-term financial plan be done that demonstrates a water system will be "financially viable." The financial plan therefore must project revenues and expenditures, as well as financing arrangements and capital investments, over the term in order to determine whether or not there will be enough money to maintain the water system.

This financial plan is the second plan for the Ignace water system, and covers six years starting with 2016. Production and consumption of water are not forecasted to vary over the term. Due to inflationary pressures that are expected to increase operating expenses, service fees charged to users will need to be raised to cover operating expenses. No capital investments are projected for the period, and no new debt will be incurred to finance the water system. After paying operating expenses and interest charges, revenues will have generated enough cash to start accumulating a significant surplus. Although the surplus will not be sufficient to fund amortization, the Township considers the water system to be financially viable.

The financial plan consists of projections that are based on assumptions. It is not an audited document that can be relied upon. It can be expected that actual results will vary from the plan, particularly for years further out in the future.

The financial plan is a living document. It will be reviewed on annual basis. It may need to be updated as new conditions and/or information affecting the water system arise. As well, the plan will be improved by adding features to increase the usefulness and accuracy of the plan's projections.

2. Introduction

Readers of the financial plan should be aware of some background information that will help them to understand the context in which the plan was developed.

Legislative Requirements

The Safe Drinking Water Act, 2002 stipulates that the owners of any municipal drinking water system must obtain a municipal drinking water license. The licensing process replaces previous processes that covered the various elements of a drinking water system and consolidates those elements into one process. There are five elements to a municipal drinking water license:

1. A Drinking Water Works Permit to establish or alter a drinking water system.

2. An Operational Plan. Operational plans are based on the Drinking Water Quality Management Standard (DWQMS). The operational plan includes the operating authority's Quality Management System (QMS)
3. An Accredited Operating Authority. A third party audit of an operating authority's QMS is the basis for accreditation.
4. A Permit to take Water.
5. A Financial Plan that meets the requirements set out in O. Reg. 453/07.

The Township contracts Northern Waterworks Inc. (NWI) to operate its drinking water system and is the Operating Authority for the system. On behalf of the Township, NWI manages the licensing process. The Township received its first municipal drinking water license on August 23, 2011. Per O. Reg. 453/07, the Township had six months to prepare its first financial plan for the drinking water system and completed its initial drinking water system financial plan on February 23, 2012. This plan was revised on April 12, 2012. The Township is in the process of having its municipal drinking water license renewed on August 23, 2016. This second edition of the drinking water system financial plan will be an integral part of the pending municipal drinking water license.

An important requirement of O. Reg. 453/07 is the financial plan must be available to the public at no charge and posted on a municipality's website.

Financial Viability

While "financially viable" is a key term in O. Reg. 453/07, there is no definition for it in the Regulation. Section 2 of the Regulation refers a definition of "financial plans" in subsection 30 (1) (b) of the Safe Drinking Water Act, 2002, which in turn refers to the Sustainable Water and Sewage Systems Act for specification. The latter was repealed on December 31, 2012. The result is that while there are some discussion papers and other material from the Provincial Government that deal with financial viability and associated concepts like "full cost accounting" and "full cost recovery", there are no legislative or regulatory provisions spelling out what is required for a water system to be financially viable.

While the Provincial Government has not taken any legislative or regulatory steps to require that water systems are financially viable, most commentators agree that the objective is to have revenues from the water system cover the total expenses of the system. That means the system demonstrates both "full cost accounting," i.e., all of the water system costs are accounted for in the financial records, and "full cost recovery," i.e., the revenues from the water system are sufficient to cover all of the costs.

It follows that a financially viable system should be generating enough operating income to fund the replacement of the system's assets. Funding the replacement cost is sometimes equated to covering the amortization. O. Reg. 453/07 and other Provincial rules do not provide any direction on these matters.

Township Drinking Water System Description

The system is comprised of two subsystems: the treatment and distribution systems. The treatment system starts with the water source and ends with the treatment plant. The distribution system gets the water to Township users.

The source is Michelle Lake (a.k.a. Kekwanzik Lake) that is located in the northern portion of the Township. Water from the Lake is gravity-fed to the raw water pump station that pumps the water to the treatment facility. The treatment facility is a Class II membrane design water treatment plant having an approved capacity of 2,730 cubic metres per day. A multiple barrier treatment approach using coagulation, flocculation, membrane filtration, primary disinfection and secondary disinfection ensures consistently safe and clean drinking water.

The distribution system consists of over 24 km of subterranean water lines within the Township. There are 140 water valves that control the flow through the lines. There are approximately 142 fire hydrants that provide water for fire fighting as well as other purposes such as water line flushing. There are approximately 590 residential and 56 commercial and institutional water user accounts. There are 39 metered users, of which only 4 are residential.

Major Assumptions in the Financial Plan

There are several major assumptions used in the plan. The first and second are that there will be no changes in production or consumption during the six-year term. The third and fourth are that there will be no new capital projects undertaken or new debt borrowed during the period.

3. Financial Operating Plan

The financial operating plan includes all of the costs of operating the Ignace drinking water system on an ongoing basis and includes operating expenses, debt servicing (interest charges), amortization of capital assets and capital investments. The plan was developed using historical financial information as the basis to make operating cost projections. Future interest charges on servicing debt can be accurately calculated. Future capital needs, water production and assumption forecasts and inflation vary in their degree of reliability.

Operating Costs

The main operating expense of the drinking water system is contract payments made to the operating authority, NWI, to run the water treatment system. As shown on Schedule 4.1, there are fifteen expense lines for the NWI contract. One is a set amount the Township pays to NWI to provide "supervision" of the distribution system. Inflation rates for the six-year period are variable depending on the expense. The Township and NWI

are in a "cost plus" contract, which means that the Township has to pay an administrative fee calculated as a percentage of total expenses. The administrative fee percentage is 12%. The contract with NWI expires in June 2018. This drinking water system financial plan assumes that the contract with NWI will be renewed and in force to the end of the plan's six year period under the same terms in the current contract.

A major operating expense is major equipment replacement that is shown on Schedule 4.2. These items are treated as operating rather than capital expenses, since they are existing asset replacements and not asset additions.

All of the operating expenses including those noted above are provided on Schedule 4. One significant expense is a waterline survey. The Township is required by the Provincial Government to survey the 2 km route over Crown land of the waterline from the water treatment plant (WTP) to the raw water pump house (RWPS) and on to the lakeshore, and then acquire an easement for the portion on an existing road right-of-way and purchase the other portion including the site of the RWPS. The forecasted cost of $60,000 is allocated to the three year period from 2016 to 2018. Descriptions of the other costs on provided on Schedule 4.

Debt Servicing

At the start of 2016, the Township was indebted in the amount of $1.85 million for the water system. This debt was incurred from the construction of a new water treatment plant and related infrastructure in 2009 that cost approximately $16.8 million. The Township will be making payments that total $131,536 per year for the next 21 years.

Council decided that taxpayers would be responsible to pay 15% of these payments that amounts to $19,730 per year. The rationale is that all residents in Ignace, whether or not they have water service in their residences, derive benefit from living in a community with safe drinking water. Therefore, in this financial plan only 85% of the debt payments are included. The remaining 15% is paid by the taxpayer during the plan's term.

The interest portion of the debt payments appears on the statement of revenue and expenses. Added to that is interest charges on bank indebtedness or interest income on cash.

Amortization of Capital Assets

At the start of 2016, the net book value of the water system capital assets was approximately $15.98 million. Annual amortization for each year of the plan varies slightly during the six year period. It reduces the net book value of the capital assets by that amount every year.

The plan does not generate enough surpluses to cover the amortization of the capital assets. This is completely understandable given that the opening 2016 net book value of the water system capital assets is approximately $15.98 million, most of which is due to

the 2009 construction of $16.8 million water plant. Senior Government funding covered 85% of the cost of the new water plant. With its own financial means, the Township could not have constructed the new plant, and likewise, is unable to fund the significant amortization of this multi-million dollar asset.

4. Funding Plan

Funding for the plan is generated by revenues or debt. Revenues consist of a number of user fees and charges. Over the six-year term of this plan annual increases for revenues are projected. Obtaining funding through debt is not envisioned during the term.

5. Financial Plan (Refer to Schedules)

The Financial Plan consists of the following schedules, in their order of appearance, that describe the operating and funding elements of the plan as outlined above, and then tie together all of these elements:

1. (a) Income Statement and (b) Balance Sheet
2. Income Statement and Balance Sheet Schedules
3. Water Revenues
4. Water Expenses (also schedules 4.1 & 4.2)
5. Capital Assets
6. Debt

6. Conclusion

The Financial Plan indicates that the Ignace Drinking Water System is financially viable in that it generates sufficient operating income to cover operating expenses and interest expenses. It does not generate enough operating income to cover the amortization of the Water System's capital assets. Covering amortization is seen as a way to provide for the future replacement of the capital assets. This is beyond the capacity of the Township, just as the initial acquisition of the assets was. Senior Governments need to significantly help in the future as they have in the past.

Township of Ignace
Drinking Water System Financial Plan - 2016 to 2021

20-Jul-16

		2015	2016	2017	2018	2019	2020	2021
1a. INCOME STATEMENT								
Revenue	Sch. #3		544,828	544,828	555,724	566,839	578,176	589,740
Operating Expenses	Sch. #4		436,028	440,683	450,722	441,107	451,850	462,971
Operating Income			108,800	104,145	105,002	125,732	126,326	126,769
Interest Expense (Revenue)	Sch. #2		72,399	70,982	69,741	68,415	66,002	63,457
Surplus (Deficit)			36,401	33,163	35,261	57,317	60,324	63,312
Amortization	Sch. #5		359,334	359,106	359,043	358,627	358,387	358,387
1b. BALANCE SHEET								
Cash			0	0	0	0	0	0
Capital Assets - NBV	Sch. #5	15,975,196	15,615,862	15,256,756	14,897,713	14,539,086	14,180,699	13,822,312
Total Assets		15,975,196	15,615,862	15,256,756	14,897,713	14,539,086	14,180,699	13,822,312
Bank Indebtedness **	Sch. #2	169,822	181,319	198,046	214,752	211,564	207,622	203,040
Long Term Debt	Sch. #6	1,559,631	1,511,733	1,461,843	1,409,876	1,355,747	1,299,365	1,240,635
Total Liabilities		1,729,453	1,693,052	1,659,889	1,624,628	1,567,311	1,506,987	1,443,675
Invsmt in C. Assets		15,975,196	15,615,862	15,256,756	14,897,713	14,539,086	14,180,699	13,822,312
Surplus (Deficit) **	Sch. #2	(1,729,453)	(1,693,052)	(1,659,889)	(1,624,628)	(1,567,311)	(1,506,987)	(1,443,675)
Total Equity		14,245,743	13,922,810	13,596,867	13,273,085	12,971,775	12,673,712	12,378,637
Total Liab. & Equity		15,975,196	15,615,862	15,256,756	14,897,713	14,539,086	14,180,699	13,822,312

Observations:
No Cash is being generated.
Capital Assets are declining by the amount of the Amortization.

Bank Indebtedness is first increasing since there is not enough cash being generated through operating income to fully make the debt payments and cover the interest on Bank Indebtedness, but positive cash flow starts in 2019.
Long Term Debt is being paid.
Total Liabilities are going down since there is positive operating income.

Invsmt in Capital Assets is declining by the amount of the Amortization.
The Deficit is going down since there is positive operating income
Total Equity is declining since although there is positive operating income, it is not sufficient to cover amortization. If that were the case the cash position would be better - generate cash for future asset replacement.

Township of Ignace
Drinking Water System Financial Plan - 2016 to 2021

20-Jul-16

2. Income Statement and Balance Sheet Schedules

		2015	2016	2017	2018	2019	2020	2021
Bank Indebtedness								
Operating Income			108,800	104,145	105,002	125,732	126,326	126,769
Debt Payments			(111,806)	(111,806)	(111,806)	(111,806)	(111,806)	(111,806)
Overdraft Interest			(8,491)	(9,066)	(9,902)	(10,738)	(10,578)	(10,381)
Previous Balance		(169,822)	(169,822)	(181,319)	(198,046)	(214,752)	(211,564)	(207,622)
		(169,822)	(181,319)	(198,046)	(214,752)	(211,564)	(207,622)	(203,040)
Interest Expense								
Long Term Debt	Sch. #6		63,908	61,916	59,839	57,677	55,424	53,076
Bank Indebtedness			8,491	9,066	9,902	10,738	10,578	10,381
			72,399	70,982	69,741	68,415	66,002	63,457
Surplus (Deficit)								
Operating		(169,822)	36,401	33,163	35,261	57,317	60,324	63,312
Opening - net debt		(1,559,631)	(1,729,453)	(1,693,052)	(1,659,889)	(1,624,628)	(1,567,311)	(1,506,987)
		(1,729,453)	(1,693,052)	(1,659,889)	(1,624,628)	(1,567,311)	(1,506,987)	(1,443,675)

Township of Ignace
Drinking Water System Financial Plan - 2016 to 2021

20-Jul-16

3. WATER REVENUES

	2015	2016 (1)	2017 (2)	2018 (3)	2019 (3)	2020 (3)	2021 (3)
Direct Residential Charges	18,522	21,300	21,300	21,726	22,161	22,604	23,056
Flat Rate Charges	393,792	452,861	452,861	461,918	471,156	480,579	490,191
Direct Commercial Charges	55,564	63,899	63,899	65,177	66,481	67,811	69,167
Water Turn On/Off Charges	5,885	6,768	6,768	6,903	7,041	7,182	7,326
TOTAL	473,763	544,828	544,828	555,724	566,839	578,176	589,740
Rate Increase		15.0%	0.0%	2.0%	2.0%	2.0%	2.0%

(1) A 15% rate increase took effect on Jan. 1/16.
(2) No increase is planned for 2017.
(3) A modest increase of 2% is planned for the last 4 years of the six year period.

Township of Ignace
Drinking Water System Financial Plan - 2016 to 2021

20-Jul-16

4. WATER EXPENSES

		2016	2017	2018	2019	2020	2021
Insurance Charges		19,476	20,450	21,473	22,547	23,674	24,858
Write-offs - water		5,000	5,100	5,202	5,306	5,412	5,520
Water Operator Contract - NWI	(1)	283,733	291,408	299,347	307,560	316,057	324,852
Eq. Replacement - Major	(2)	50,000	50,000	50,000	50,000	50,000	50,000
Eq. Replacement - Minor	(3)	5,000	5,000	5,000	5,000	5,000	5,000
Building Maintenance	(4)	7,500	2,500	2,550	2,601	2,653	2,706
Utilities Maintenance	(5)	20,000	20,400	20,808	21,224	21,648	22,081
Services from Public Works	(6)	25,319	25,825	26,342	26,869	27,406	27,954
Waterline Survey, Easement & Land Acq.	(7)	20,000	20,000	20,000			
TOTAL		436,028	440,683	450,722	441,107	451,850	462,971

(1) See Schedule #4.1 for this Item.
(2) See Schedule #4.2 for this item.
(3) Line for small components that need replacement.
(4) In 2016 snow guards for the WTP roof; after that general provision.
(5) Provision for repairing and replacing curb stops, valves and hydrants.
(6) Represents time spent by public works crews on the water distribution system.
(7) Line from WTP to RWPS has to be surveyed for an easement along existing roads and acquisition of access road and RWPS site.

Cost Inflation (other than NWI) ***

Insurance Charges	5.0%	5.0%	5.0%	5.0%	5.0%
Write-offs - water	2.0%	2.0%	2.0%	2.0%	2.0%
Building Maintenance	2.0%	2.0%	2.0%	2.0%	2.0%
Utilities Maintenance	2.0%	2.0%	2.0%	2.0%	2.0%
Services from Public Works	2.0%	2.0%	2.0%	2.0%	2.0%
Waterline Survey, Easement & Land Acq.	2.0%	2.0%	2.0%	2.0%	2.0%

*** Amounts in table above are inflated by the percentages shown.

Township of Ignace
Drinking Water System Financial Plan - 2016 to 2021

20-Jul-16

4.1 Water Operator Contract - NWI

		2016 NWI Budget	2017	2018	2019	2020	2021
Automotive		1,095	1,117	1,139	1,162	1,185	1,209
Chemicals		15,500	15,965	16,444	16,937	17,445	17,968
Dues, Fees and Licenses		4,157	4,178	4,199	4,220	4,241	4,262
Electricity		61,481	64,555	67,783	71,172	74,731	78,468
Eq. Repair & Maintenance		15,650	15,963	16,282	16,608	16,940	17,279
Fuel (Vehicles)		1,708	1,725	1,742	1,759	1,777	1,795
Heating (not Incl. RWPS electricity)		5,980	6,100	6,222	6,346	6,473	6,602
Insurance		6,848	6,985	7,125	7,268	7,413	7,561
Laboratory Analysis (Accredited)		8,911	9,178	9,453	9,737	10,029	10,330
Materials and Supplies		6,584	6,650	6,717	6,784	6,852	6,921
Telephone and Communications		5,000	5,050	5,101	5,152	5,204	5,256
Travel		745	760	775	791	807	823
Wages and Benefits		114,317	116,603	118,935	121,314	123,740	126,215
Administration Fee (12%)	12.00%	29,757	30,579	31,430	32,310	33,220	34,163
		277,733	285,408	293,347	301,560	310,057	318,852
Supervision of Water Dist. System		6,000	6,000	6,000	6,000	6,000	6,000
		283,733	291,408	299,347	307,560	316,057	324,852

Cost Inflation	2017	2018	2019	2020	2021
Automotive	2.00%	2.00%	2.00%	2.00%	2.00%
Chemicals	3.00%	3.00%	3.00%	3.00%	3.00%
Dues, Fees and Licenses	0.50%	0.50%	0.50%	0.50%	0.50%
Electricity	5.00%	5.00%	5.00%	5.00%	5.00%
Eq. Repair and Replacement	2.00%	2.00%	2.00%	2.00%	2.00%
Fuel (Vehicles)	1.00%	1.00%	1.00%	1.00%	1.00%
Heating (not Incl. RWPS electricity)	2.00%	2.00%	2.00%	2.00%	2.00%
Insurance	2.00%	2.00%	2.00%	2.00%	2.00%
Laboratory Analysis (Accredited)	3.00%	3.00%	3.00%	3.00%	3.00%
Materials and Supplies	1.00%	1.00%	1.00%	1.00%	1.00%
Telephone and Communications	1.00%	1.00%	1.00%	1.00%	1.00%
Travel	2.00%	2.00%	2.00%	2.00%	2.00%
Wages and Benefits	2.00%	2.00%	2.00%	2.00%	2.00%

Costs are increased by varying rates annually as shown in the table.

4.2 Equipment Replacement

		2016	2017	2018	2019	2020	2021	Total
Membrane filter banks	(1)	30,000	30,000	30,000	30,000			120,000
SCADA upgrades	(2)		25,000	15,000				40,000
Diesel generator load testing, inspection and servicing			5,000			5,000		10,000
WTP/RWPS communication system		5,500						5,500
Valve actuators						7,750	7,750	15,500
Filter effluent chlorine residual analyzer		6,000						6,000
Permeate pump (P-35)						5,000		5,000
Decant tank submersible pump							8,000	8,000
Contingency/Reserve	(3)	15,000	15,000	15,000	15,000	15,000	15,000	90,000
		56,500	75,000	60,000	45,000	32,750	30,750	300,000
Average per year								50,000

(1) There are four banks or "trains" of membrane filters in the Water Treatment Plant (WTP) that require replacement.
(2) SCADA (Supervisory Control and Data Acquisition) is the computer software that controls and monitors the WTP.
(3) Provision to deal with unexpected needs and future acquisitions such as the replacement of PLCs in 2025 expected to cost $80,000.

Township of Ignace
Drinking Water System Financial Plan - 2016 to 2021

20-Jul-16

5. CAPITAL ASSETS	2015	2016	2017	2018	2019	2020	2021
Buildings - O. NBV	10,003,875	9,778,538	9,553,201	9,327,864	9,102,527	8,877,190	8,651,853
Amortization	(225,337)	(225,337)	(225,337)	(225,337)	(225,337)	(225,337)	(225,337)
Buildings - C. NBV	9,778,538	9,553,201	9,327,864	9,102,527	8,877,190	8,651,853	8,426,516
Hydrants - O. NBV	22,533	20,060	18,306	16,719	15,191	13,918	12,785
Amortization	(2,473)	(1,754)	(1,587)	(1,528)	(1,273)	(1,133)	(1,133)
Hydrants - C. NBV	20,060	18,306	16,719	15,191	13,918	12,785	11,652
Water lines - O. NBV	6,275,321	6,144,483	6,013,645	5,882,807	5,751,969	5,621,131	5,490,293
Amortization	(130,838)	(130,838)	(130,838)	(130,838)	(130,838)	(130,838)	(130,838)
Water lines - C. NBV	6,144,483	6,013,645	5,882,807	5,751,969	5,621,131	5,490,293	5,359,455
Water valves - O. NBV	33,802	32,115	30,710	29,366	28,026	26,847	25,768
Amortization	(1,687)	(1,405)	(1,344)	(1,340)	(1,179)	(1,079)	(1,079)
Water valves - C. NBV	32,115	30,710	29,366	28,026	26,847	25,768	24,689
O. NBV	16,335,531	15,975,196	15,615,862	15,256,756	14,897,713	14,539,086	14,180,699
Amortization	(360,335)	(359,334)	(359,106)	(359,043)	(358,627)	(358,387)	(358,387)
C. NBV	15,975,196	15,615,862	15,256,756	14,897,713	14,539,086	14,180,699	13,822,312

No capital additions are anticpated during the six year period.

6. Debt

	Water Plant (1)	Water Plant (2)	
Water Plant - A	1,121,149.58		
Water Plant - B		917,500.00	
Water Meters			
Total Debt	1,121,149.58	917,500.00	2,038,649.58
Interest Rate - Annual			
Interest Rate - Semi-Annual	2.21%	1.89%	
Term - Years			
Term - Half Years	50	50	
Annual Payments			
Semi-Annual Payment	37,271.62	28,496.42	
Semi-Annual Payment	37,271.62	28,496.42	
Total Payments	74,543.24	56,992.83	131,536.07
Total Payments	1,863,581.00	1,424,820.76	
Total Interest	742,431.42	507,320.76	1,249,752.18

(1) These arrangements made with creditor Infrastructure Ontario in 2011.
(2) These arrangements made with creditor Infrastructure Ontario in 2012.

Allocation of Debt Payment between Taxpayer and Water User

Total Payment		131,536	
	%		
Tax Payor	15.0%	19,730	(1)
Water User	85.0%	111,806	(1)
		131,536	

(1) A portion of the capital cost, i.e., debt payment for water plant, is charged to the taxpayer, since all taxpayers derive some benefit from residing in a community with municipal drinking water.

(2) If a water metering project is undertaken, water users will bear the cost alone.

Taxpayers do not pay for any of the operating costs of the water system.

Interest Expense and Debt Balance

	Debt Balance	Interest Exp.
2016	1,511,733	63,908
2017	1,461,843	61,916
2018	1,409,876	59,839
2019	1,355,747	57,677
2020	1,299,365	55,424
2021	1,240,635	53,076

The above figures are for the water user alone, i.e., 85% of the totals.

Debt Balances are as of December 31st.

Ontario

MUNICIPAL DRINKING WATER LICENCE

Licence Number: 227-101
Issue Number: 3

Pursuant to the *Safe Drinking Water Act*, 2002, S.O. 2002, c. 32, and the regulations made thereunder and subject to the limitations thereof, this municipal drinking water licence is issued under Part V of the *Safe Drinking Water Act*, 2002, S.O. 2002, c. 32 to:

The Corporation of the Township of Ignace

34 Main St.
P.O. Box 248
Ignace, ON
P0T 1T0

For the following municipal residential drinking water system:

Ignace Drinking Water System

This municipal drinking water licence includes the following:

Schedule	Description
Schedule A	Drinking Water System Information
Schedule B	General Conditions
Schedule C	System-Specific Conditions
Schedule D	Conditions for Relief from Regulatory Requirements
Schedule E	Pathogen Log Removal/Inactivation Credits

DATED at TORONTO this 2nd day of August, 2016

Signature

A. Ahmed

Aziz Ahmed, P.Eng.
Director
Part V, *Safe Drinking Water Act*, 2002

Schedule A: Drinking Water System Information

System Owner	**The Corporation of the Township of Ignace**
Licence Number	**227-101**
Drinking Water System Name	**Ignace Drinking Water System**
Schedule A Issue Date	**August 2, 2016**

The following information is applicable to the above drinking water system and forms part of this licence:

Licence

Licence Issue Date	August 2, 2016
Licence Expiry Date	August 1, 2021
Application for Licence Renewal Date	February 1, 2021

Drinking Water Works Permit

Drinking Water System Name	Permit Number	Issue Date
Ignace Drinking Water System	227-201	August 2, 2016

Permits to Take Water

Water Taking Location	Permit Number	Issue Date
Michel (Kekwanzik) Lake	3337-7YELLH	April 12, 2009

Financial Plans

The Financial Plan Number for the Financial Plan required to be developed for this drinking water system in accordance with O. Reg. 453/07 shall be:	227-301
Alternately, if one Financial Plan is developed for all drinking water systems owned by the owner, the Financial Plan Number shall be:	227-301A

Accredited Operating Authority

Drinking Water System or Operational Subsystems	Accredited Operating Authority	Operational Plan No.	Operating Authority No.
Ignace Drinking Water system	Northern Waterworks Inc.	227-401	227-OA1

Schedule B: General Conditions

System Owner	**The Corporation of the Township of Ignace**
Licence Number	**227-101**
Drinking Water System Name	**Ignace Drinking Water System**
Schedule B Issue Date	**August 2, 2016**

1.0 Definitions

1.1 Words and phrases not defined in this licence and the associated drinking water works permit shall be given the same meaning as those set out in the SDWA and any regulations made in accordance with that act, unless the context requires otherwise.

1.2 In this licence and the associated drinking water works permit:

"**adverse effect**", "**contaminant**" and "**natural environment**" shall have the same meanings as in the EPA;

"**alteration**" may include the following in respect of this drinking water system:

(a) An addition to the system,
(b) A modification of the system,
(c) A replacement of part of the system, and
(d) An extension of the system;

"**compound of concern**" means a contaminant that, based on generally available information, may be emitted from a component of the drinking water system to the atmosphere in a quantity that is significant either in comparison to the relevant point of impingement limit or if a point of impingement limit is not available for the compound, then based on generally available toxicological information, the compound has the potential to cause an adverse effect as defined by the EPA at a point of impingement;

"**Director**" means a Director appointed pursuant to section 6 of the SDWA for the purposes of Part V of the SDWA;

"**drinking water works permit**" means the drinking water works permit for the drinking water system, as identified in Schedule A of this licence and as amended from time to time;

"**emission summary table**" means the table that was prepared by a Professional Engineer in accordance with O. Reg. 419/05 and the procedure document listing the appropriate point of impingement concentrations of each compound of concern emitted from a component of the drinking water system and providing comparison to the corresponding point of impingement limit;

"**EPA**" means the *Environmental Protection Act*, R.S.O. 1990, c. E.19;

"**financial plan**" means the financial plan required by O. Reg. 453/07;

"**licence**" means this municipal drinking water licence for the municipal drinking water system identified in Schedule A of this licence;

"**operational plan**" means an operational plan developed in accordance with the Director's Directions – Minimum Requirements for Operational Plans made under the authority of subsection 15(1) of the SDWA;

"**owner**" means the owner of the drinking water system as identified in Schedule A of this licence;

"**permit to take water**" means the permit to take water that is associated with the taking of water for purposes of the operation of the drinking water system, as identified in Schedule A of this licence and as amended from time to time;

"**point of impingement**" means any point in the natural environment that is not on the same property as the source of the contaminant and as defined by section 2 of O. Reg. 419/05;

"**point of impingement limit**" means the appropriate standard from Schedule 1, 2 or 3 of O. Reg. 419/05 and if a standard is not provided for a compound of concern, the appropriate criteria listed in the Ministry of the Environment and Climate Change publication titled "Summary of Standards and Guidelines to support Ontario Regulation 419: Air Pollution – Local Air Quality (including Schedule 6 of O. Reg. 419 on Upper Risk Thresholds)", dated February 2008, as amended;

"**procedure document**" means the Ministry of the Environment and Climate Change procedure titled "Procedure for Preparing an Emission Summary and Dispersion Modelling Report" dated July 2005, as amended;

"**Professional Engineer**" means a Professional Engineer who has been licenced to practice in the Province of Ontario;

"**provincial officer**" means a provincial officer appointed pursuant to section 8 of the SDWA;

"**publication NPC-300**" means the Ministry of the Environment and Climate Change publication titled "Environmental Noise Guideline: Stationary and Transportation Sources – Approval and Planning" dated August 2013, as amended;

"**SDWA**" means the *Safe Drinking Water* Act, 2002, S.O. 2002, c. 32;

"**sensitive populations**" means any one or a combination of the following locations where the health effects of nitrogen oxides emissions from emergency generators shall be considered using the point of impingement limit instead of the Ministry of the Environment and Climate Change screening level for emergency generators:

(a) health care units (e.g., hospitals and nursing homes),
(b) primary/junior public schools,
(c) day-care facilities, and
(d) playgrounds;

"**subsystem**" has the same meaning as in Ontario Regulation 128/04 (Certification of Drinking Water System Operators and Water Quality Analysts);

"**surface water**" means water bodies (lakes, wetlands, ponds - including dug-outs), water courses (rivers, streams, water-filled drainage ditches), infiltration trenches, and areas of seasonal wetlands;

2.0 Applicability

2.1 In addition to any other requirements, the drinking water system identified above shall be established, altered and operated in accordance with the conditions of the drinking water works permit and this licence.

3.0 Licence Expiry

3.1 This licence expires on the date identified as the licence expiry date in Schedule A of this licence.

4.0 Licence Renewal

4.1 Any application to renew this licence shall be made on or before the date identified as the application for licence renewal date set out in Schedule A of this licence.

5.0 Compliance

5.1 The owner and operating authority shall ensure that any person authorized to carry out work on or to operate any aspect of the drinking water system has been informed of the SDWA, all applicable regulations made in accordance with that act, the drinking water works permit and this licence and shall take all reasonable measures to ensure any such person complies with the same.

6.0 Licence and Drinking Water Works Permit Availability

6.1 At least one copy of this licence and the drinking water works permit shall be stored in such a manner that they are readily viewable by all persons involved in the operation of the drinking water system.

7.0 Permit to Take Water and Drinking Water Works Permit

7.1 A permit to take water identified in Schedule A of this licence is the applicable permit on the date identified as the Schedule A Issue Date.

7.2 A drinking water works permit identified in Schedule A of this licence is the applicable permit on the date identified as the Schedule A Issue Date.

8.0 Financial Plan

8.1 For every financial plan prepared in accordance with subsections 2(1) and 3(1) of O. Reg. 453/07, the owner of the drinking water system shall:

8.1.1 Ensure that the financial plan contains on the front page of the financial plan, the appropriate financial plan number as set out in Schedule A of this licence; and

8.1.2 Submit a copy of the financial plan to the Ministry of Municipal Affairs and Housing within three (3) months of receiving approval by a resolution of municipal council or the governing body of the owner.

9.0 Interpretation

9.1 Where there is a conflict between the provisions of this licence and any other document, the following hierarchy shall be used to determine the provision that takes precedence:

9.1.1 The SDWA;

9.1.2 A condition imposed in this licence that explicitly overrides a prescribed regulatory requirement;

9.1.3 A condition imposed in the drinking water works permit that explicitly overrides a prescribed regulatory requirement;

9.1.4 Any regulation made under the SDWA;

9.1.5 Any provision of this licence that does not explicitly override a prescribed regulatory requirement;

9.1.6 Any provision of the drinking water works permit that does not explicitly override a prescribed regulatory requirement;

9.1.7 Any application documents listed in this licence, or the drinking water works permit from the most recent to the earliest; and

9.1.8 All other documents listed in this licence, or the drinking water works permit from the most recent to the earliest.

9.2 If any requirement of this licence or the drinking water works permit is found to be invalid by a court of competent jurisdiction, the remaining requirements of this licence and the drinking water works permit shall continue to apply.

9.3 The issuance of and compliance with the conditions of this licence and the drinking water works permit does not:

9.3.1 Relieve any person of any obligation to comply with any provision of any applicable statute, regulation or other legal requirement, including the *Environmental Assessment Act*, R.S.O. 1990, c. E.18; and

9.3.2 Limit in any way the authority of the appointed Directors and provincial officers of the Ministry of the Environment and Climate Change to require certain steps be taken or to require the owner to furnish any further information related to compliance with the conditions of this licence or the drinking water works permit.

9.4 For greater certainty, nothing in this licence or the drinking water works permit shall be read to provide relief from regulatory requirements in accordance with section 46 of the SDWA, except as expressly provided in the licence or the drinking water works permit.

10.0 Adverse Effects

10.1 Nothing in this licence or the drinking water works permit shall be read as to permit:

10.1.1 The discharge of a contaminant into the natural environment that causes or is likely to cause an adverse effect; or

10.1.2 The discharge of any material of any kind into or in any waters or on any shore or bank thereof or into or in any place that may impair the quality of the water of any waters.

10.2 All reasonable steps shall be taken to minimize and ameliorate any adverse effect on the natural environment or impairment of the quality of water of any waters resulting from the operation of the drinking water system including such accelerated or additional monitoring as may be necessary to determine the nature and extent of the effect or impairment.

10.3 Fulfillment of one or more conditions imposed by this licence or the drinking water works permit does not eliminate the requirement to fulfill any other condition of this licence or the drinking water works permit.

11.0 Change of Owner or Operating Authority

11.1 This licence is not transferable without the prior written consent of the Director.

11.2 The owner shall notify the Director in writing at least 30 days prior to a change of any operating authority identified in Schedule A of this licence.

11.2.1 Where the change of operating authority is the result of an emergency situation, the owner shall notify the Director in writing of the change as soon as practicable.

12.0 Information to be Provided

12.1 Any information requested by a Director or a provincial officer concerning the drinking water system and its operation, including but not limited to any records required to be kept by this licence or the drinking water works permit, shall be provided upon request.

13.0 Records Retention

13.1 Except as otherwise required in this licence or the drinking water works permit, any records required by or created in accordance with this licence or the drinking water works permit, other than the records specifically referenced in section 12 of O. Reg. 170/03, shall be retained for at least 5 years and made available for inspection by a provincial officer, upon request.

14.0 Chemicals and Materials

14.1 All chemicals and materials used in the alteration or operation of the drinking water system that come into contact with water within the system shall meet all applicable standards set by both the American Water Works Association ("AWWA") and the American National Standards Institute ("ANSI") safety criteria standards NSF/60, NSF/61 and NSF/372.

14.1.1 In the event that the standards are updated, the owner may request authorization from the Director to use any on hand chemicals and materials that previously met the applicable standards.

14.1.2 The requirement for the owner to comply with NSF/372 shall come into force no later than August 2, 2018.

14.2 The most current chemical and material product registration documentation from a testing institution accredited by either the Standards Council of Canada or by the American National Standards Institution ("ANSI") shall be available at all times for each chemical and material used in the operation of the drinking water system that comes into contact with water within the system.

14.3 Conditions 14.1 and 14.2 do not apply in the case of the following:

14.3.1 Water pipe and pipe fittings meeting AWWA specifications made from ductile iron, cast iron, PVC, fibre and/or steel wire reinforced cement pipe or high density polyethylene (HDPE);

14.3.2 Articles made from stainless steel, glass, HDPE or Teflon®;

14.3.3 Cement mortar for watermain lining and for water contacting surfaces of concrete structures made from washed aggregates and Portland cement;

14.3.4 Gaskets that are made from NSF approved materials;

14.3.5 Food grade oils and lubricants, food grade anti-freeze, and other food grade chemicals and materials that are compatible for drinking water use; or

14.3.6 Any particular chemical or material where the owner has written documentation signed by the Director that indicates that the Ministry of the Environment and Climate Change is satisfied that the chemical or material is acceptable for use within the drinking water system and the chemical or material is only used as permitted by the documentation.

15.0 Drawings

15.1 All drawings and diagrams in the possession of the owner that show any treatment subsystem as constructed shall be retained by the owner unless the drawings and diagrams are replaced by a revised or updated version showing the subsystem as constructed subsequent to the alteration.

15.2 Any alteration to any treatment subsystem shall be incorporated into process flow diagrams, process and instrumentation diagrams, and record drawings and diagrams within one year of the substantial completion of the alteration.

15.3 Process flow diagrams and process and instrumentation diagrams for any treatment subsystem shall be kept in a place, or made available in such a manner, that they may be readily viewed by all persons responsible for all or part of the operation of the drinking water system.

16.0 Operations and Maintenance Manual

16.1 An up-to-date operations and maintenance manual or manuals shall be maintained and applicable parts of the manual or manuals shall be made available for reference by all persons responsible for all or part of the operation or maintenance of the drinking water system.

16.2 The operations and maintenance manual or manuals, shall include at a minimum:

16.2.1 The requirements of this licence and associated procedures;

16.2.2 The requirements of the drinking water works permit for the drinking water system;

16.2.3 A description of the processes used to achieve primary and secondary disinfection within the drinking water system, including where applicable:

a) A copy of the CT calculations that were used as the basis for primary disinfection under worst case operating conditions; and

b) The validated operating conditions for UV disinfection equipment, including a copy of the validation certificate;

16.2.4 Procedures for monitoring and recording the in-process parameters necessary for the control of any treatment subsystem and for assessing the performance of the drinking water system;

16.2.5 Procedures for the operation and maintenance of monitoring equipment;

16.2.6 Contingency plans and procedures for the provision of adequate equipment and material to deal with emergencies, upset conditions and equipment breakdown;

16.2.7 Procedures for dealing with complaints related to the drinking water system, including the recording of the nature of the complaint and any investigation and corrective action taken in respect of the complaint;

16.3 Procedures necessary for the operation and maintenance of any alterations to the drinking water system shall be incorporated into the operations and maintenance manual or manuals prior to those alterations coming into operation.

16.4 The operations and maintenance manual or manuals shall be updated within three months of any change to the treatment process that results in a change to the CT calculations.

16.5 The requirement for the owner to comply with condition 16.2.3 shall come into force on February 2, 2017.

Schedule C: System-Specific Conditions

System Owner	**The Corporation of the Township of Ignace**
Licence Number	**227-101**
Drinking Water System Name	**Ignace Drinking Water System**
Schedule C Issue Date	**August 2, 2016**

1.0 System Performance

Rated Capacity

1.1 For each treatment subsystem listed in column 1 of Table 1, the maximum daily volume of treated water that flows from the treatment subsystem to the distribution system shall not exceed the value identified as the rated capacity in column 2 of the same row.

Table 1: Rated Capacity

Column 1 Treatment Subsystem Name	Column 2 Rated Capacity (m^3/day)
Ignace Water Treatment Plant	2,730

Maximum Flow Rates

1.2 For each treatment subsystem listed in column 1 of Table 2, the maximum flow rate of water that flows into a treatment subsystem component listed in column 2 shall not exceed the value listed in column 3 of the same row.

Table 2: Maximum Flow Rates

Column 1 Treatment Subsystem Name	Column 2 Treatment Subsystem Component	Column 3 Maximum Flow Rate (L/s)
Not Applicable	Not Applicable	Not Applicable

1.3 Despite conditions 1.1 and 1.2, a treatment subsystem may be operated temporarily at a maximum daily volume and/or a maximum flow rate above the values set out in column 2 of Table 1 and column 3 of Table 2 respectively for the purposes of fighting a large fire or for the maintenance of the drinking water system.

1.4 Condition 1.3 does not authorize the discharge into the distribution system of any water that does not meet all of the requirements of this licence and all other regulatory requirements, including compliance with the Ontario Drinking Water Quality Standards.

Residue Management

1.5 In respect of an effluent discharged into the natural environment from a treatment subsystem or treatment subsystem component listed in column 1 of Table 3:

1.5.1 The annual average concentration of a test parameter identified in column 2 shall not exceed the value in column 3 of the same row; and

1.5.2 The maximum concentration of a test parameter identified in column 2 shall not exceed the value in column 4 of the same row.

Table 3: Residue Management

Column 1 Treatment Subsystem or Treatment Subsystem Component Name	Column 2 Test Parameter	Column 3 Annual Average Concentration (mg/L)	Column 4 Maximum Concentration (mg/L)
Not Applicable	Not Applicable	Not Applicable	Not Applicable

UV Disinfection Equipment Performance

1.6 For each treatment subsystem or treatment subsystem component listed in column 1 of Table 4, and while directing water to the distribution system:

1.6.1 The UV disinfection equipment shall be operated such that a continuous pass-through UV dose is maintained throughout the life time of the UV lamp(s) that is at least the minimum continuous pass-through UV dose set out in column 2 of the same row at the maximum design flow rate for the equipment;

1.6.2 In addition to any other sampling, analysis and recording that may be required, the ultraviolet light disinfection equipment shall test for the test parameters set out in column 4 of the same row at a testing frequency of once every five (5) minutes or less and record the test data at a recording frequency of once every four (4) hours or less;

1.6.3 If there is a UV disinfection equipment alarm, the test parameters set out in column 4 of the same row shall be recorded at a recording frequency of once every five minutes or less until the alarm condition has been corrected;

1.6.4 A monthly summary report shall be prepared at the end of each calendar month which sets out the time, date and duration of each UV equipment alarm, the volume of water treated during each alarm period and the actions taken by the operating authority to correct the alarm situation;

Table 4: UV Disinfection Equipment			
Column 1 Treatment Subsystem or Treatment Subsystem Component Name	**Column 2 Minimum Continuous Pass-Through UV Dose (mJ/cm^2)**	**Column 3 Control Strategy**	**Column 4 Test Parameter**
Not Applicable	Not Applicable	Not Applicable	Not Applicable

2.0 Flow Measurement and Recording Requirements

2.1 For each treatment subsystem identified in column 1 of Table 1 and in addition to any other flow measurement and recording that may be required, continuous flow measurement and recording shall be undertaken for:

2.1.1 The flow rate and daily volume of treated water that flows from the treatment subsystem to the distribution system.

2.1.2 The flow rate and daily volume of water that flows into the treatment subsystem.

2.2 For each treatment subsystem component identified in column 2 of Table 2 and in addition to any other flow measurement and recording that may be required, continuous flow measurement and recording shall be undertaken for the flow rate and daily volume of water that flows into the treatment subsystem component.

2.3 Where a rated capacity from Table 1 or a maximum flow rate from Table 2 is exceeded, the following shall be recorded:

2.3.1 The difference between the measured amount and the applicable rated capacity or maximum flow rate specified in Table 1 or Table 2;

2.3.2 The time and date of the measurement;

2.3.3 The reason for the exceedance; and

2.3.4 The duration of time that lapses between the applicable rated capacity or maximum flow rate first being exceeded and the next measurement where the applicable rated capacity or maximum flow rate is no longer exceeded.

3.0 Calibration of Flow Measuring Devices

3.1 All flow measuring devices that are required by regulation, by a condition in the Drinking Water Works Permit, or by a condition otherwise imposed by the Ministry of the Environment and Climate Change, shall be checked and calibrated in accordance with the manufacturer's instructions.

3.2 If the manufacturer's instructions do not indicate how often to check and calibrate a flow measuring device, the equipment shall be checked and calibrated at least once every 12 months during which the drinking water system is in operation.

3.2.1 For greater certainty, if condition 3.2 applies, the equipment shall be checked and calibrated not more than 30 days after the first anniversary of the day the equipment was checked and calibrated in the previous 12-month period.

4.0 Additional Sampling, Testing and Monitoring

Drinking Water Health and Non-Health Related Parameters

4.1 For each treatment subsystem or treatment subsystem component identified in column 1 of Tables 5 and 6 and in addition to any other sampling, testing and monitoring that may be required, sampling, testing and monitoring shall be undertaken for a test parameter listed in column 2 at the sampling frequency listed in column 3 and at the monitoring location listed in column 4 of the same row.

Table 5: Drinking Water Health Related Parameters

Column 1 Treatment Subsystem or Treatment Subsystem Component Name	Column 2 Test Parameter	Column 3 Sampling Frequency	Column 4 Monitoring Location
Not Applicable	Not Applicable	Not Applicable	Not Applicable

Table 6: Drinking Water Non-Health Related Parameters

Column 1 Treatment Subsystem or Treatment Subsystem Component Name	Column 2 Test Parameter	Column 3 Sampling Frequency	Column 4 Monitoring Location
Not Applicable	Not Applicable	Not Applicable	Not Applicable

Environmental Discharge Parameters

4.2 For each treatment subsystem or treatment subsystem component identified in column 1 of Table 7 and in addition to any other sampling, testing and monitoring that may be required, sampling, testing and monitoring shall be undertaken for a test parameter listed in column 2 using the sample type identified in column 3 at the sampling frequency listed in column 4 and at the monitoring location listed in column 5 of the same row.

4.3 For the purposes of Table 7:

4.3.1 Manual Composite means the mean of at least three grab samples taken during a discharge event, with one sample being taken immediately following the

commencement of the discharge event, one sample being taken approximately at the mid-point of the discharge event and one sample being taken immediately before the end of the discharge event; and

4.3.2 Automated Composite means samples must be taken during a discharge event by an automated sampler at a minimum sampling frequency of once per hour.

4.4 Any sampling, testing and monitoring for the test parameter Total Suspended Solids shall be performed in accordance with the requirements set out in the publication "Standard Methods for the Examination of Water and Wastewater", 21st Edition, 2005, or as amended from time to time by more recently published editions.

Table 7: Environmental Discharge Parameters

Column 1 Treatment Subsystem or Treatment Subsystem Component Name	Column 2 Test Parameter	Column 3 Sample Type	Column 4 Sampling Frequency	Column 5 Monitoring Location
Not Applicable	Not Applicable	Not Applicable	Not Applicable	Not Applicable

4.5 Pursuant to Condition 10 of Schedule B of this licence, the owner may undertake the following environmental discharges associated with the maintenance and/or repair of the drinking water system:

4.5.1 The discharge of potable water from a watermain to a road or storm sewer;

4.5.2 The discharge of potable water from a water storage facility or pumping station:

4.5.2.1 To a road or storm sewer; or

4.5.2.2 To a watercourse where the discharge has been dechlorinated and if necessary, sediment and erosion control measures have been implemented.

4.5.3 The discharge of dechlorinated non-potable water from a watermain, water storage facility or pumping station to a road or storm sewer;

4.5.4 The discharge of raw water from a groundwater well to the environment where if necessary, sediment and erosion control measures have been implemented; and

4.5.5 The discharge of raw water, potable water or non-potable water from a treatment subsystem to the environment where if necessary, the discharge has been dechlorinated and sediment and erosion control measures have been implemented.

5.0 Studies Required

5.1 Not Applicable

6.0 Source Protection

6.1 Not Applicable

Schedule D: Conditions for Relief from Regulatory Requirements

System Owner	**The Corporation of the Township of Ignace**
Licence Number	**227-101**
Drinking Water System Name	**Ignace Drinking Water System**
Schedule D Issue Date	**August 2, 2016**

1.0 Lead Regulatory Relief

1.1 Any relief from regulatory requirements previously authorized by the Director in respect of the drinking water system under section 38 of the SDWA in relation to the sampling, testing or monitoring requirements contained in Schedule 15.1 of O. Reg. 170/03 shall remain in force until such time as Schedule 15.1 of O. Reg. 170/03 is amended after June 1, 2009.

2.0 Other Regulatory Relief

2.1 Not Applicable

Schedule E: Pathogen Log Removal/Inactivation Credits

System Owner	**The Corporation of the Township of Ignace**
Licence Number	**227-101**
Drinking Water System Name	**Ignace Drinking Water System**
Schedule E Issue Date	**August 2, 2016**

1.0 Primary Disinfection Pathogen Log Removal/Inactivation Credits

Ignace Water Treatment Plant

Kekwanzik Lake [SURFACE WATER]

Minimum Log Removal/ Inactivation Required	Cryptosporidium Oocysts	Giardia Cysts [a]	Viruses [b]
Ignace Water Treatment Plant	2	3	4

[a] At least 0.5 log inactivation of Giardia shall be achieved by the disinfection portion of the overall water treatment process.
[b] At least 2 log inactivation of viruses shall be achieved by disinfection.

Log Removal/Inactivation Credits Assigned [c]	Cryptosporidium Oocysts	Giardia Cysts	Viruses
Membrane Filtration	2 [d]	3	0
Chlorination [CT: Clearwell]	-	-	4+

[c] Log removal/inactivation credit assignment is based on each treatment process being fully operational and the applicable log removal/inactivation credit assignment criteria being met.
[d] Applies only when the treatment process has been specifically tested and confirmed for the specified removal/inactivation of Cryptosporidium Oocysts or the removal of surrogate particles.

Treatment Component	Log Removal/Inactivation Credit Assignment Criteria
Membrane Filtration	1. Effective backwash procedures shall be maintained including filter-to-waste or an equivalent procedure to ensure that the effluent turbidity requirements are met at all times; 2. Membrane integrity shall be monitored by continuous particle counting or by an equivalently effective means such as intermittent pressure decay measurements; 3. Filtrate turbidity shall be continuously monitored; 4. Performance criterion for filtered water turbidity of less than or equal to 0.1 NTU in 99% of the measurements each month shall be met for each filter train; and 5. Membrane filtration process shall be specifically tested and confirmed by an independent testing agency or the approving Director for 2-log removal or inactivation of *Cryptosporidium* oocysts or removal of surrogate particles.
Chlorination	1. Sampling and testing for free chlorine residual shall be carried out by continuous monitoring equipment in the treatment process at or near a location where the intended contact time has just been completed in accordance with the Ministry's *Procedure for Disinfection of Drinking Water in Ontario*; and 2. At all times, CT provided shall be greater than or equal to the CT required to achieve the log removal credits assigned.
Primary Disinfection Notes	

Operations Report

February 2021

Ignace Drinking Water System

IGNACE
Explore Our Possibilities

Prepared for the Township of Ignace
Prepared by NWI – Ignace
405 Railway Street, Ignace ON
Tel: 807.934.6672
Fax: 807.934.2805
Email: ignace@nwi.ca

NORTHERN
WATERWORKS INC.

1 Introduction

This Operations Report has been prepared by Northern Waterworks Inc. (NWI) to summarize the operation of the Ignace Drinking Water System. Operations Managers are responsible for generating this report on a monthly basis, and the data summarized herein is provided in a year-to-date format. The submission of this report is one of the methods used by NWI to communicate information about system performance to the Township of Ignace. Any questions or concerns regarding the content of this document may be directed to the local Operations Manager or to NWI's Compliance Department.

Classified as a large municipal residential system, the Ignace DWS is composed of the Raw Water Pumping Station (RWPS), the Ignace Water Treatment Plant (WTP) and the Ignace water distribution system. Potential pathogenic organisms are removed and inactivated by membrane filtration and primary disinfection using free chlorine.

Low lift pumps located at the RWPS transfer raw water from its source at Kekwanzik Lake to the Ignace WTP. Upon transfer to the WTP, polyaluminum chloride (primary coagulant) is added to the raw water upstream from the flocculation tanks. The application of coagulant causes impurities in the raw water to cluster together and form floc, which in turn facilitates membrane filtration. Water is then directed from the flocculation tanks to one of four Zenon membrane filtration units located at the WTP. Permeate is drawn through the membrane filters via an applied vacuum and is transferred to the treated water storage reservoirs. Sodium hypochlorite (disinfectant) is added to the filtrate water upon transfer to the reservoirs.

The chlorinated water is held in the treated water storage reservoirs to allow for the necessary time required to achieve primary disinfection. Treated water is then transferred to the distribution system using high lift pumps located at the WTP. Secondary disinfection requirements in the distribution system are achieved by maintaining a free chlorine residual at all locations. Sodium hydroxide (pH adjustment) is also added as water is transferred to the distribution system in order to increase finished water pH to a level that will not cause corrosion.

2 Flow Monitoring Results

Table 1 provides selected flow statistics for the Ignace DWS. Raw and treated water flows are continuously monitored at the Ignace WTP, and Operators review flow trends and collect totalized volumes on a daily basis. Limits concerning the amount of raw water that may be taken and the amount of treated water that may be directed to the distribution system are provided within system approvals. As per the Municipal Drinking Water Licence, calibration for flow monitoring devices is verified on an annual basis to ensure that the flowrate is measured with an accuracy to within plus or minus 5% of the actual flowrate for the entire design range of the device.

Table 1: Total volumes, daily flows and capacity assessments[1]

Month	Raw Water			Treated Water			Capacity Assessments[2]	
	TMV (m^3)	ADF (m^3/day)	MDF (m^3/day)	TMV (m^3)	ADF (m^3/day)	MDF (m^3/day)	ADF	MDF
Jan	25,052	808	977	22,716	733	799	27%	29%
Feb	25,325	904	1,112	21,694	775	861	28%	32%
Mar	—	—	—	—	—	—	—	—
Apr	—	—	—	—	—	—	—	—
May	—	—	—	—	—	—	—	—
Jun	—	—	—	—	—	—	—	—
Jul	—	—	—	—	—	—	—	—
Aug	—	—	—	—	—	—	—	—
Sep	—	—	—	—	—	—	—	—
Oct	—	—	—	—	—	—	—	—
Nov	—	—	—	—	—	—	—	—
Dec	—	—	—	—	—	—	—	—
Total	50,377	—	—	44,411	—	—	—	—
Avg	25,189	856	—	22,205	754	—	28%	—

1. TMV = Total Monthly Volume; ADF = Average Daily Flow; MDF = Maximum Daily Flow.
2. Capacity assessments compare average and maximum daily treated water flows to the rated capacity of the treatment facility (2,730 m^3/day), as provided within the system's approval.

3 Water Quality

NWI employs an in-house water quality analysis program that includes several water quality indicators and extends beyond minimum regulatory requirements. **Table 2** provides monthly average results for selected water quality parameters, as derived from the in-house water quality analysis program. The table also summarizes filter performance against the performance criterion contained within the system's Municipal Drinking Water Licence. Specifically, filtrate turbidity must be less than or equal to 0.1 NTU in at least 99% of the measurements each calendar month for the treatment facility to receive pathogen removal credits. The values in the table correspond to the proportion of filtrate turbidity measurements that were equal to or less than 0.1 NTU.

Table 2: Water quality summary and filter performance[1]

Month	Treated Water					Filtrate Turbidity Compliance			
	Turbidity (NTU)	UVT (%)	pH	FCR (mg/L)	Alum Residual (mg/L)	Filter 1 (%)	Filter 2 (%)	Filter 3 (%)	Filter 4 (%)
Objective	**< 0.2**	**> 85.0**	**7.0 - 8.0**	**1.1 - 1.6**	**< 0.050**	**> 99.0%**	**> 99.0%**	**> 99.0%**	**> 99.0%**
Jan	0.06	94.2	7.2	1.38	0.016	100.0	99.9	100.0	100.0
Feb	0.06	94.4	7.2	1.51	0.011	100.0	100.0	100.0	100.0
Mar	—	—	—	—	—	—	—	—	—
Apr	—	—	—	—	—	—	—	—	—
May	—	—	—	—	—	—	—	—	—
Jun	—	—	—	—	—	—	—	—	—
Jul	—	—	—	—	—	—	—	—	—
Aug	—	—	—	—	—	—	—	—	—
Sep	—	—	—	—	—	—	—	—	—
Oct	—	—	—	—	—	—	—	—	—
Nov	—	—	—	—	—	—	—	—	—
Dec	—	—	—	—	—	—	—	—	—
Avg	**0.06**	**94.3**	**7.2**	**1.44**	**0.013**	—	—	—	—

1. UVT = Ultraviolet Transmittance; FCR = Free Chlorine Residual

Analyses of microbiological, organic, and inorganic parameters are conducted externally by an accredited laboratory. Results of these analyses are summarized in a separate *Annual Report*; NWI is available to provide sampling results prior to the release of the Annual Report. Any adverse results will be included within section 6 (Notable Operational Events) of this report.

4 Membrane Integrity Test Results

The membrane integrity test (MIT) is conducted daily by Operators to ensure that the membrane filtration units are performing as designed. To meet the manufacturer's guidelines and to guarantee pathogen removal, the MIT results must achieve a Log Removal Value (LRV) of at least 4.00. LRVs are also used to determine when membrane cleaning and repairs may be required. **Table 3** summarizes monthly LRV results. A more detailed analysis of log removal values and membrane filter integrity is provided within the annual *Management Review Report* .

Table 3: Results summary for Log Removal Values

Month	Membrane Filter 1		Membrane Filter 2		Membrane Filter 3		Membrane Filter 4	
	Average LRV	Minimum LRV	Average LRV	Minimum LRV	Average LRV	Minimum LRV	Average LRV	Minimum LRV
Jan	4.29	4.05	4.22	4.05	4.12	3.98	4.39	4.16
Feb	4.27	4.03	4.37	4.01	4.15	3.93	4.56	4.22
Mar	—	—	—	—	—	—	—	—
Apr	—	—	—	—	—	—	—	—
May	—	—	—	—	—	—	—	—
Jun	—	—	—	—	—	—	—	—
Jul	—	—	—	—	—	—	—	—
Aug	—	—	—	—	—	—	—	—
Sep	—	—	—	—	—	—	—	—
Oct	—	—	—	—	—	—	—	—
Nov	—	—	—	—	—	—	—	—
Dec	—	—	—	—	—	—	—	—
Avg	4.28	---	4.30	---	4.13	---	4.47	---
Min	---	4.03	---	4.01	---	3.93	---	4.16

5 Chemical Usage

In addition to adjusting chemical dosages in response to variations in source water quality and to maintain effective treatment processes, Operators are responsible for monitoring and recording chemical consumptions and dosages on a daily basis. **Table 4** summarizes total chemical consumptions and monthly average dosages for treatment chemicals used at the Ignace WTP. All chemicals used in the treatment process are NSF/ANSI 60 certified for use in potable water.

Table 4: Chemical consumptions and average dosages

Month	Sodium Hypochlorite (Disinfection)		Polyaluminum Chloride (Coagulant)		Sodium Hydroxide (pH Adjustment)	
	Amount Used (L)	Average Dosage (mg/L)	Amount Used (L)	Average Dosage (mg/L)	Amount Used (L)	Average Dosage (mg/L)
Jan	566	2.8	673	11	146	4.6
Feb	606	3.1	366	6	132	4.3
Mar	—	—	—	—	—	—
Apr	—	—	—	—	—	—
May	—	—	—	—	—	—
Jun	—	—	—	—	—	—
Jul	—	—	—	—	—	—
Aug	—	—	—	—	—	—
Sep	—	—	—	—	—	—
Oct	—	—	—	—	—	—
Nov	—	—	—	—	—	—
Dec	—	—	—	—	—	—
Total	1,172	—	1,039	—	278	—
Avg	586	3.0	520	9	139	4.4

6 Notable Operational Events

Table 5 (Abnormal Operations Summary) summarizes abnormal operational events which occurred during the reporting period. Abnormal operational events include, but are not limited to, unplanned and emergency maintenance and repair, alarm conditions, watermain breaks and distribution system repairs, adverse water quality incidents, and complaints and other public inquiries received and actions taken.

Table 5: Abnormal operations summary

Incident Date	Event Description	Corrective Action	Resolution Date
01-Feb-21	There was a low transmembrane pressure alarm condition on membrane filter units no. 2 & 4.	Manual backwashes were completed on both filter units. The recovery rate on both units was also reduced until a clean could be completed. A citric acid clean on filter unit no. 4 was completed on February 2; a citric acid clean on filter unit no. 2 was completed on February 3.	03-Feb-21
12-Feb-21	There was a low water level condition in the floc tanks.	This is a recurring incident caused by a delay when the RWPS PLC activates the raw water pumps to initiate water production. The responding Operator reset alarm systems and confirmed normal facility operation.	12-Feb-21
25-Feb-21	There was a high turbidity alarm condition on membrane filter unit no. 2 on February 25 and again on February 27.	On both occasions filtrate was diverted to waste. The treatment unit was placed back into service after turbidity values normalized.	28-Feb-21

Table 6 (Other Notable Events) summarizes any notable operational events which occurred during the reporting period. For clarification, other notable operational events include, but are not limited to, regulatory issues, including inspection results, orders, and reports filed with regulators, planned maintenance and repair, health and safety issues, and status updates concerning capital projects.

Table 6: Other notable events

Date	Event Description
03-Feb-21	The automation service provider (Digital Engineering) was on site to assess problems with the programmable logic controller (PLC), including problems with pump and chemical dosage control. On February 10, the problem was resolved by replacing the analog output modules in the PLC.
09-Feb-21	Operations staff assisted Public Works in thawing a private water line at 99 Balsam Street.
11-Feb-21	Operations staff assisted Public Works in thawing a private water line at 311 East Street.
28-Feb-21	Operations staff assisted Public Works in thawing a private water line at 119 Willow Street.

Operations Report

February 2021

Ignace Water Pollution Control Plant

IGNACE
Explore Our Possibilities

Prepared for the Township of Ignace
Prepared by NWI – Ignace
405 Railway Street, Ignace ON
Tel: 807.934.6672
Fax: 807.934.2805
Email: ignace@nwi.ca

NORTHERN
WATERWORKS INC.

1 Introduction

This Operations Report has been prepared by Northern Waterworks Inc. (NWI) to summarize the operation of the **Ignace Water Pollution Control Plant**. Operations Managers are responsible for generating this report on a monthly basis, and the data summarized herein is provided in a year-to-date format. The submission of this report is one of the methods used by NWI to communicate information about system performance to the Township of Ignace. Any questions or concerns regarding the content of this report may be directed to the local Operations Manager or to NWI's Compliance Department.

The Ignace Water Pollution Control Plant (WPCP) is a component of the sewage works that service the community of Ignace. Designed for the treatment and disposal of sewage, the facility has an average daily rated capacity of 2,536 m^3/day and a peak flow rated capacity of 7,500 m^3/day. The facility consists of inlet works designed for preliminary treatment, two circular secondary treatment units each containing an aeration tank, clarifier, and chlorine contact chamber, an aerobic digester, and an outfall sewer discharging effluent to Agimak Creek. The facility also includes a control building housing a laboratory, air supply equipment, a standby power system and chemical feed systems.

As an extended aeration facility the Ignace WPCP utilizes a biological treatment method that relies upon microorganisms to process influent wastewater. Aluminum sulphate, sodium hydroxide and sodium hypochlorite are also used at the facility for phosphorus reduction, pH/alkalinity adjustment and effluent disinfection, respectively. The overall goal of the treatment process is to reduce or remove contaminants from influent wastewater to a level that will not adversely impact or impair receiving waters, including preventing the introduction of pathogens that could affect downstream users.

The facility is currently regulated by the terms and conditions within amended Environmental Compliance Approval No. 0923-9V7JCC (the ECA), issued to the Corporation of the Township of Ignace on April 29, 2015. This approval provides the operating parameters for the facility and includes requirements related to monitoring and recording, water quality (i.e. effluent objectives and compliance limits), operations and maintenance, reporting and bypass/overflow events. The facility is also regulated under additional provincial and federal legislation, such as the *Ontario Water Resources Act* and Canada's *Wastewater Systems Effluent Regulations* (WSER).

2 Flow Monitoring Results

Table 1 provides flow statistics for the Ignace WPCP. Operators review flows and collect totalized volumes from flow monitoring equipment on a daily basis. The regulatory approval for the facility requires that the Owner and Operating Authority use best efforts to operate the works within the facility's rated capacity (2,536 m^3/day – calculated over a calendar year). Flow monitoring results are also used to determine effluent parameter loadings that are discharged to the environment. As per the ECA, calibration for flow monitoring devices is verified on an annual basis to ensure that the flowrate is measured with an accuracy to within plus or minus 15% of the actual flowrate for the entire design range of the device.

Table 1: Total volumes, daily flows and capacity assessments[1]

Month	Influent (Raw Sewage) Flows			Capacity Assessments[2]		Effluent Flows		
	TMV (m^3)	ADF (m^3/day)	MDF (m^3/day)	ADF vs. Rated Capacity	MDF vs. Rated Capacity	TMV (m^3)	ADF (m^3/day)	MDF (m^3/day)
Jan	27,076	873	1,059	34%	14%	29,349	947	1,549
Feb	24,886	889	1,203	35%	16%	24,450	873	1,361
Mar	—	—	—	—	—	—	—	—
Apr	—	—	—	—	—	—	—	—
May	—	—	—	—	—	—	—	—
Jun	—	—	—	—	—	—	—	—
Jul	—	—	—	—	—	—	—	—
Aug	—	—	—	—	—	—	—	—
Sep	—	—	—	—	—	—	—	—
Oct	—	—	—	—	—	—	—	—
Nov	—	—	—	—	—	—	—	—
Dec	—	—	—	—	—	—	—	—
Total	51,962	—	—	—	—	53,799	—	—
Avg	25,981	881	—	35%	—	26,900	910	—

1. TMV = Total Monthly Volume; ADF = Average Daily Flow; MDF = Maximum Daily Flow.
2. Capacity assessments compare average and maximum daily influent wastewater flows to the rated capacity (2,536 m^3/day) and peak flow rate (7,500 m^3/day) of the treatment facility, respectively.

3 Water Quality

Operators verify the effectiveness of treatment processes by performing a variety of in-house analyses, including tests for dissolved oxygen, temperature, pH and suspended solids. Operators are also responsible for collecting samples and submitting them to an accredited laboratory for analysis. Specifically, the Ignace WPCP employs a monitoring program that is both consistent with its system-specific Environmental Compliance Approval and with the federal Wastewater Systems Effluent Regulations (WSER). **Table 2** below summarizes the results of tests submitted to the laboratory in the current calendar year and compares the results to effluent objectives and compliance limits contained within the ECA.

Table 2: Effluent monitoring results summary and comparison with limits and objectives[1]

Month	CBOD5		TSS		Total P		TAN	E. Coli	pH	
	MAC[2] (mg/L)	MAL[3] (mg/L)	MAC (mg/L)	MAL (mg/L)	MAC (mg/L)	MAL (mg/L)	MAC (mg/L)	MGMD (MPN/ 100mL)	Minimum Result	Maximum Result
Objectives	**15**	**n/a**	**15**	**n/a**	**0.5**	**n/a**	**3.0 or 5.0[4]**	**150**	**6.5**	**9.0**
Limits	**25**	**63.4**	**25**	**63.4**	**1.0**	**2.54**	**6.0 or 10.0[4]**	**200**	**6.0**	**9.5**
Jan	2.3	2.2	5.0	4.7	0.26	0.25	0.91	10	6.7	7.3
Feb	2.7	2.4	8.5	7.4	0.36	0.31	0.04	10	6.7	7.4
Mar	—	—	—	—	—	—	—	—	—	—
Apr	—	—	—	—	—	—	—	—	—	—
May	—	—	—	—	—	—	—	—	—	—
Jun	—	—	—	—	—	—	—	—	—	—
Jul	—	—	—	—	—	—	—	—	—	—
Aug	—	—	—	—	—	—	—	—	—	—
Sep	—	—	—	—	—	—	—	—	—	—
Oct	—	—	—	—	—	—	—	—	—	—
Nov	—	—	—	—	—	—	—	—	—	—
Dec	—	—	—	—	—	—	—	—	—	—

1. CBOD5 = Carbonaceous Biochemical Oxygen Demand; TSS = Total Suspended Solids; Total P = Total Phosphorus; TAN = Total Ammonia Nitrogen; MAC = Monthly Average Concentration; MAL = Monthly Average Loading; MGMD = Monthly Geometric Mean Density
2. Monthly Average Concentration means the arithmetic mean of all daily concentrations during a calendar month.
3. Monthly Average Loading means the value obtained by multiplying the MAC of a contaminant by the Monthly Average Daily Flow (effluent) over the same calendar month.
4. The objective and limit for total ammonia nitrogen are seasonal. The objective is 3.0 mg/L and the limit is 6.0 mg/L between May 1 and October 31; the objective is 5.0 mg/L and the limit is 10.0 mg/L between November 1 and April 30.

4 Chemical Usage & Total Chlorine Concentrations

Operators are responsible for monitoring and recording chemical consumptions and dosages, and chemical dosages are adjusted accordingly to maintain effective treatment processes. **Table 3** summarizes total chemical consumptions and provides monthly average dosages for treatment chemicals used at the Ignace WPCP. The facility uses aluminum sulphate for phosphorus reduction, sodium hydroxide for pH/alkalinity adjustment and sodium hypochlorite for effluent disinfection. Effluent total chlorine residual results are also summarized in the table. As per Canada's *Wastewater Systems Effluent Regulations,* average concentrations of total chlorine calculated over a calendar quarter must be less than or equal to 0.02 mg/L.

Table 3: Chemical consumptions and average dosages

Month	Sodium hypochlorite (effluent disinfection)				Aluminum sulphate (phosphorus reduction)		Sodium hydroxide (alkalinity adjustment)	
	Amount Used (L)	Average Dosage (mg/L)	Average Effluent Total Chlorine Residual (mg/L)	Maximum Effluent Total Chlorine Residual (mg/L)	Amount Used (L)	Average Dosage (mg/L)	Amount Used (L)	Average Dosage (mg/L)
Jan	598	2.4	0.03	0.27	224	5	846	24
Feb	543	2.6	0.02	0.13	200	5	643	20
Mar	—	—	—	—	—	—	—	—
Apr	—	—	—	—	—	—	—	—
May	—	—	—	—	—	—	—	—
Jun	—	—	—	—	—	—	—	—
Jul	—	—	—	—	—	—	—	—
Aug	—	—	—	—	—	—	—	—
Sep	—	—	—	—	—	—	—	—
Oct	—	—	—	—	—	—	—	—
Nov	—	—	—	—	—	—	—	—
Dec	—	—	—	—	—	—	—	—
Total	1,141	—	—	—	424	—	1,489	—
Avg	571	2.5	0.02	—	212	5	745	22

5 Notable Operational Events

Table 4 (Abnormal Operations Summary) summarizes abnormal operational events which occurred during the reporting period. Abnormal operational events include, but are not limited to, spills, bypass and overflow events, unplanned and emergency maintenance and repair, alarm conditions, sewer blockages and backups, and complaints and other public inquiries received and actions taken.

Table 4: Abnormal operations summary

Incident Date	Event Description	Corrective Action	Resolution Date
03-Feb-21	The alum chemical feed line to the smaller treatment unit froze, interfering with chemical application.	A temporary line was installed until the main line can be thawed.	03-Feb-21
09-Feb-21	The effluent chamber on the smaller treatment unit began to freeze over.	A temporary air line was installed to aerate the chamber and prevent freezing.	09-Feb-21

Table 5 (Other Notable Events) summarizes any notable operational events which occurred during the reporting period. For clarification, other notable operational events include, but are not limited to, regulatory issues, including inspection results, orders, and reports filed with regulators, planned maintenance and repair, health and safety issues, and status updates concerning capital projects.

Table 5: Other notable events

Date	Event Description
18-Feb-21	Operations staff assisted Public Works with flushing the sanitary sewer on Tapsey Street.
24-Feb-21	Operations staff assisted Public Works with thawing two (2) frozen sewer service lines on Willow Street.