



THE REGIONAL MUNICIPALITY OF NIAGARA
PUBLIC WORKS COMMITTEE
AGENDA

PWC 11-2020

Tuesday, December 8, 2020

9:30 a.m.

Meeting will be held by electronic participation only

This electronic meeting can be viewed on Niagara Region's Website at:

<https://www.niagararegion.ca/government/council/>

Due to efforts to contain the spread of COVID-19 and to protect all individuals, the Council Chamber at Regional Headquarters will not be open to the public to attend Committee meetings until further notice. To view live stream meeting proceedings, visit:
[niagararegion.ca/government/council](https://www.niagararegion.ca/government/council/)

	Pages
1. <u>CALL TO ORDER</u>	
2. <u>DISCLOSURES OF PECUNIARY INTEREST</u>	
3. <u>PRESENTATIONS</u>	
4. <u>DELEGATIONS</u>	
5. <u>ITEMS FOR CONSIDERATION</u>	
5.1. <u>PW 53-2020</u> Niagara Specialized Transit Service Agreement Amendment 2021 A presentation will precede the consideration of this item.	3 - 20
5.2. <u>PW 52-2020</u> Niagara Region Transit Service Agreement Renewal	21 - 24
5.3. <u>PW 44-2020</u> Award of Contract 2020-T-116 Port Dalhousie Wastewater Treatment Plant (WWTP) Upgrades Contract 1	25 - 34

5.4. PW 51-2020 35 - 40
Amendment to Purchase Order for Tender 2019-T-157 Regional Road 38
(Martindale Road)

5.5. PWC-C 50-2020
Recommendations for Consideration from the Linking Niagara Transit
Committee meeting held November 25, 2020

To be distributed.

6. CONSENT ITEMS FOR INFORMATION

6.1. PWC-C 47-2020 41 - 50
COVID-19 Response and Business Continuity in Public Works

6.2. PW 50-2020 51 - 132
Annual Water and Wastewater Quality Management System Update
A presentation will precede the discussion of this item.

6.3. PWC-C 46-2020 133 - 139
Short Form Offences and Set Fine Schedule

6.4. PWC-C 48-2020 140 - 144
Update on the Waste Management Contract Implementation

6.5. PWC-C 49-2020 145 - 258
Response to Councillor Information Request re 2020-T-116 Port
Dalhousie Wastewater Treatment Plant Upgrades

7. OTHER BUSINESS

8. NEXT MEETING
The next meeting will be held on Tuesday, January 12, 2021 at 9:30 a.m.

9. ADJOURNMENT

If you require any accommodations for a disability in order to attend or participate in meetings or events, please contact the Accessibility Advisor at 905-980-6000 ext. 3252 (office), 289-929-8376 (cellphone) or accessibility@niagararegion.ca (email).

Niagara Specialized Transit Timeline

Public Works Committee
PW 53-2020

December 8, 2020

Robert Salewytsch, Transit Services Program Manager

A background graphic featuring a network of interconnected nodes and lines, resembling a molecular or digital structure. The nodes are represented by circles of varying sizes, and the lines are thin and light gray. The overall color scheme is dark gray with teal accents.

MOVING TRANSIT FORWARD

CONNECTING MORE PEOPLE TO MORE POSSIBILITIES

Niagara Specialized Transit

PW 53-2020



**MOVING
TRANSIT
FORWARD**

CONNECTING MORE PEOPLE TO MORE POSSIBILITIES

Niagara  **Region**

Niagara Specialized Transit (NST)

- Hours of Operation – 7:00 a.m. to 10:00 p.m., Monday to Saturday
- Shared-ride, pre-booked subset of Niagara Region's transit services designed to provide inter-municipal transportation options to those riders who may require additional levels of accommodation
- The service was created at a time before conventional transit vehicles were mandated to have accessibility features such as wheelchair ramps/lifts, priority seating, and audio/visual announcement systems

Service Levels – Statistics

Details	2019 Budget	2019 Actual	2018 Actual	Var \$ 2019A vs 2019B FAV/(UNFAV)	Var % 2019A vs 2019B FAV/(UNFAV)	Explanation
# of Trips	31,200	28,680	30,057	(2,520)	(8%)	Renegotiated contract terms
Operator Payments	\$2,212,918	\$1,987,695	\$2,627,753	\$225,223	10%	
Fare Revenue	\$(132,600)	\$(120,670)	\$(151,123)	\$(11,930)	(9%)	
Net Expense	\$2,080,318	\$1,867,024	\$2,476,630	\$213,294	10%	

NST Timeline – 2006 - 2015

2006-2015

- Service Delivered by The Red Cross
 - Fleet owned and maintained by Niagara Region

2015

- Contract awarded to The BTS Network after competitive bid process (RFP)
 - Fleet owned and maintained by Service Provider

NST Timeline - 2017-2018

- Changes in AODA (i.e. fare parity, operating hours = conventional transit) lead to significant ridership growth (PW 51-2017)
- As a direct result, NST operating budget grew substantially year over year to accommodate spike in ridership
- Program still ran over-budget despite increases/program changes
- High Trip Threshold provision from Agreement met – triggering renegotiation (PW 40-2018)
- NST Operational Review + Specialized Transit Study began as part of Niagara Transit Governance Review (LNTC 9-2018)

NST Timeline - 2019

- Amending Agreement Authorized by Council (PW 40-2019)
 - New terms provide greater control and oversight thus resolving the budget crisis
 - Two-year agreement with option to extend four times (1 year per extension)
 - Strategically intended to align contract termination with future (potential) governance transition
- Specialized Transit Study recommends service improvements (PW 39-2019)
 - Remove need for applications
 - Allow same day booking
 - Enable online booking and payment
 - Co-mingling of riders (specialized and conventional)
- NRT OnDemand authorized by Council (PW 60-2019)

NST Timeline - 2020

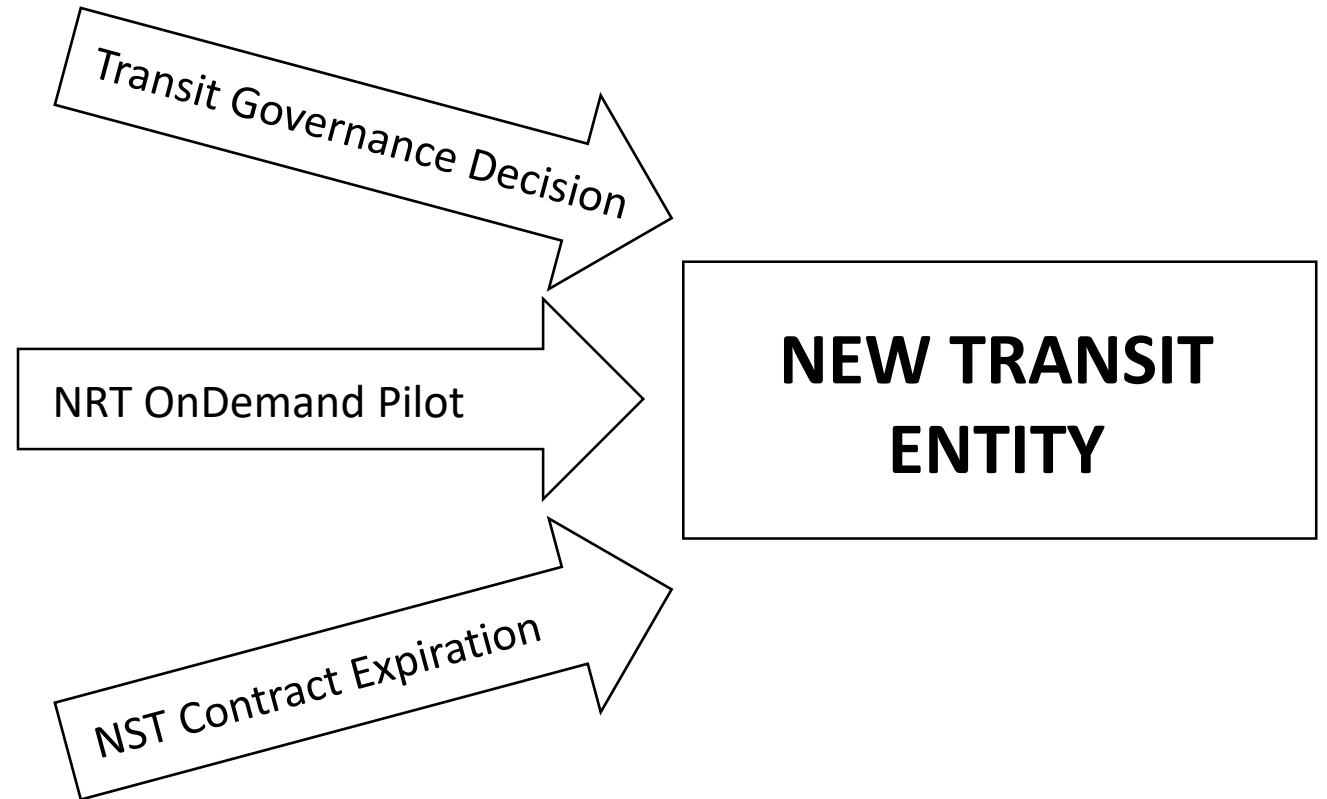
- COVID-19
 - Delays Niagara Transit Governance Study decision to 2021
 - Delays launch of NRT OnDemand from April to August
 - Delays implementation of fare payment technology to 2021
- NRT OnDemand Pilot launches August 17
 - Service includes recommendations from Specialized Transit Study
 - Service expansion into Niagara-on-the-Lake launches November 23

Creating Social & Transit Equity

- NRT OnDemand Pilot testing co-mingling of riders (mobility challenged and conventional users on the same service)
- Accessibility advocates long desire co-mingling to break down social and equity barriers
- Early NRT OnDemand results showing significant positive results
- If successful, would eliminate need for separate specialized division
- Vision is to enable a single service to meet social, financial and rider experience expectations employing a fully accessible fleet, booked and paid for with web-based, customizable profiles, using on-demand, co-mingled service delivery for all rural or underserved areas of Niagara

Achieving Strategic Alignment

Renew NST Amending Agreement per terms previously approved (PW 40-2019 & PW 53-2020) to allow transit governance decision/ transition, NRT OnDemand pilot and NST contract expiry to strategically align



Questions?

Subject: Niagara Specialized Transit Service Agreement Amendment 2021

Report to: Public Works Committee

Report date: Tuesday, December 8, 2020

Recommendations

1. That the Chief Administrative Officer **BE AUTHORIZED** to execute the Niagara Specialized Transit (NST) Service Delivery Amending Agreement 2021 between the Regional Municipality of Niagara and The BTS Network Inc. such that the Agreement meets the approval of the Director of Niagara Region Legal and Court Services.
2. That the Chief Administrative Officer also **BE AUTHORIZED** to execute any necessary extensions such that those extensions support a potential transition to a single transit entity resulting from the ongoing Niagara Transit Governance Study.

Key Facts

- The purpose of this report is to seek Council's approval to renew an extension to the NST Service Delivery Amending Agreement 2019-2020 for the year 2021.
- The 2019-2020 Service Delivery Agreement was compliant with the Region's Procurement By-law and was intended to ensure service continuity while a transit governance decision was sought in Q1/Q2 2020 (PW 4-2019).
- The onset of COVID-19 delayed the governance work with the new decision expected in Q2 2021.
- The 2019-2020 Service Delivery Agreement contained provisions to extend the contract four times for up to 12 months per extension.
- The terms and conditions of the current Agreement are favourable to Niagara Region as they place ceilings on maximum expenditures and permit the service to remain within budget and avoid any minimum spending thresholds.

Financial Considerations

Prior to the 2019-2020 Service Agreement, the NST service had been running over budget by as much as 30%. This was due to the fact that the service provider was paid on a per trip basis combined with the terms and conditions not placing a ceiling on the maximum number of trips that could be delivered in a single year, resulting in annual budget deficits. The original contract did include a trip threshold provision to trigger a

renegotiation. This exposure to the Region under the previous terms provision was triggered in 2018 which lead to an amending agreement to be signed for 2019 and 2020. This amending agreement contained terms and conditions which ensured that NST was delivered within budget and included some operational improvements for the service. Table 1 below illustrates how the terms of the current amending agreement changed the trajectory of this program.

Table 1: 2018-2019 NST Budget to Actual

Details	2019 Budget	2019 Actual	2018 Budget	2018 Actual
# of Trips	31,200	28,680	25,700	30,057
Operator Payments*	\$2,212,918	\$1,987,695	\$2,008,384	\$2,627,753
Fare Revenue	\$(132,600)	\$(120,670)	\$(101,336)	\$(151,123)
Net Expense	\$2,080,318	\$1,867,024	\$1,907,048	\$2,476,630

With COVID-19 reducing ridership significantly in 2020, the service is projecting a net savings of roughly \$750,000 (37%) due to the contract model currently employed. Transit agencies across Ontario are projecting extremely slow growth in the return to typical ridership, thus maintaining this agreement should allow NST to remain within budget for 2021 as well.

Analysis

The NST Service Delivery Amending Agreement 2019-2020 was structured as an amendment to the original Service Delivery Agreement (2015) as a means of simplifying the process, the expectations of both parties, and ensuring compliance with Niagara Region's Procurement By-law as that original Agreement was placed through a competitive bid process.

The Region recently launched NRT OnDemand, a dynamically routed, shared-ride transit pilot program in the western municipalities of Niagara, namely Grimsby, Lincoln, Pelham, Wainfleet and West Lincoln. A number of the features of the current NRT OnDemand service align with the recommendations from the Specialized Transit

Service Review (2018/2019) which is a component of the larger ongoing Transit Governance Study. Some examples of these features are:

- Same day booking
- App/Digital booking
- App/Digital payment
- Elimination of the need for applications
- Co-mingling of specialized passengers and non-specialized passengers

The NRT OnDemand pilot was originally intended to launch in 2019, but staff were directed to re-engage with local municipalities to seek out partnership opportunities to deliver both intra and inter-municipal trips. The pilot was then further delayed from April 2020 to August 2020 due to COVID-19's impact on the vehicle manufacturing industry.

Based on the early, positive trends seen with NRT OnDemand and the co-mingling of specialized and non-specialized riders using the Wheelchair Accessible Vehicle (WAV) shared-ride service, there is a strong potential for alignment between the NRT OnDemand pilot and the existing separate NST system. Accessibility advocates have long called for a transit system which provides social and transit equity – enabling both specialized and non-specialized riders to simultaneously utilize the same system, thereby eliminating social barriers and creating significant improvements to transit mobility and social determinants of health.

If NRT OnDemand remains on its current trajectory for the duration of the pilot, this alignment would likely yield a significant opportunity to leverage future long-term value and service delivery efficiencies rather than providing two distinct, but similar systems. However, the NRT OnDemand pilot has only been operating since August 2020 (three months at the time of writing) which is insufficient time to confirm its successes nor to identify concerns or areas for improvement.

Moreover, the Niagara Transit Governance Study (NTGS) was originally seeking a decision in Q2 of 2020; but due to COVID-19, the new timeline is approximately Q2 2021. With these two issues combined, staff feels that service continuity should be prioritized by renewing with the current provider so as to not potentially need to change service providers multiple times between now and when/if a new transit entity is formed. This would also ensure that when the new combined service does go through a competitive process, that staff is able to adequately articulate the desired parameters of the service. This strategy of not entering into long term agreements during the governance review has been agreed to, recommended and employed by all of the

transit properties that make up the Inter-Municipal Transit Working Group (IMTWG), including things such as labour relations, service contracts, and operating agreements.

Alternatives Reviewed

Only one alternative truly exists for the NST service delivery, and that would be to put out an RFP for the contract in a competitive bidding process. However, this option is fraught with significant challenges as outlined below, and thus not recommended by staff at this time.

Impacts of COVID-19 – The current contract with the service provider only requires payment for delivered trips, and thus is providing Niagara Region some much needed financial flexibility due to a significant drop in ridership since late March. In a scenario where an RFP is required, any potential bidders would almost certainly be seeking a minimum revenue to offset their operating costs, regardless of the amount of service delivered. It is also expected that due to the significant capital upstart costs for a new provider to bring new fleet and technology online, Niagara Region would likely need to front-load funds to a new provider. To offset this, private sector service providers typically seek a 5-10 year agreement in order to maximize asset lifecycle replacement and amortize their costs over a longer period of time. With transit consolidation under consideration, staff are not recommending any long-term agreements that would unnecessarily bind the new transit entity into any financially disadvantageous position.

Integration with NRT OnDemand – As outlined in the Analysis section of this report, the current NRT OnDemand pilot is testing a number of features which came as recommendations from the Specialized Transit Service Review. Ideally, staff would like to let the pilot run its course before attempting to integrate those features into specialized transit. Or as is more likely, integrate the two services together in order to leverage value and service delivery efficiencies rather than providing two distinct, but similar and overlapping systems. This value would be obtained through a competitive bidding process once a timeline is established through the governance work.

Transit Consolidation – When the terms of the current agreement with the service provider were negotiated, it was done so with the NTGS timeframe in mind. Staff was attempting to align the termination of the specialized transit contract with the governance decision. However, staff was mindful to include provisions which would allow that agreement to be extended so that the NST program would not have to undergo multiple changes in service providers prior to the governance decision should it be delayed. With COVID-19 impacting the work of the NTGS, and thus ultimately

delaying the decision from Q2 2020 to a projected Q2 2021, staff feels that renewing with the current provider using the terms set out in the current agreement is the appropriate choice.

In summary, the multi-year vision for the Region's specialized transit is to extend the current status quo NST program for another 12 months; enable the NRT OnDemand pilot to run its full 24 months; transit consolidation occurs in 2021 creating a single transit entity to govern and align all services – all three contracts/decisions intersecting at the same time to create an optimal situation whereby a new transit entity is able to create a combined on-demand and specialized service operating seamlessly either in-house or via a service provider under a multi-year long term contract.

Relationship to Council Strategic Priorities

Provision and extension of NST directly aligns with the Council Strategic Priority: Responsible Growth and Infrastructure Planning (Objective 3.1) through advancing regional transit and GO rail services and facilitating the movement of people and goods.

Other Pertinent Reports

- PW 40-2019 – NST Service Amending Agreement 2019-2020
- PW 39-2019 – NST Operations Review
- PW 23-2019 – NRT and NST 2018 Ridership and Revenue Summary
- LNTC 9-2018 – Niagara Specialized Transit Service Review Terms of Reference
- PW 40-2018 – NST Negotiations and Program Changes
- PW 51-2017 – NST Program Change Options
- CAO 8-2017 – Niagara Region's Transit Service Delivery and Governance Strategy

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Recommended by:

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Commissioner of Public Works (Interim)
Public Works Department

Submitted by:

Ron Tripp, P.Eng.
Acting Chief Administrative Officer

This report was prepared in consultation with Catherine Lam, Program Financial Analyst; Brian McMahon, Program Financial Specialist; and reviewed by Heather Talbot, Financial and Special Projects Consultant, and Matt Robinson, Director, GO Implementation Office.

Appendices

None.

Subject: Niagara Region Transit Service Agreement Renewal

Report to: Public Works Committee

Report date: Tuesday, December 8, 2020

Recommendations

1. That Regional Council **APPROVE** the renewal of the Niagara Region Transit (NRT) 2018 Service Agreement using the terms and conditions contemplated in the original agreement, subject to the approval of the City of Niagara Falls, the City of Welland, and the St. Catharines Transit Commission; and
2. That the Regional Chair and the Regional Clerk **BE AUTHORIZED** to execute a renewal of the 2018 NRT Service Agreement between Niagara Region, the City of Niagara Falls, the City of Welland, and the St. Catharines Transit Commission (Service Providers), upon terms satisfactory to the Commissioner of Public Works, the Commissioner of Corporate Services/Treasurer, and the Director of Legal & Court Services.

Key Facts

- The purpose of this report to seek Council's endorsement to renew the current NRT 2018 Service Agreement to enable continued delivery of NRT service while the transit governance work continues.
- In 2010, Niagara Region entered into a Pilot Project Agreement with the City of Niagara Falls, the City of Welland, and the St. Catharines Transit Commission to facilitate an inter-municipal transit pilot project; the current agreement expires December 31, 2020.
- In July 2017, Niagara Region obtained jurisdiction to operate conventional, inter-municipal transit services on a non-exclusive basis through a triple majority process.
- In January 2018, all four aforementioned parties signed a Memorandum of Understanding to work collaboratively through governance discussions outlined in the *Niagara Transit Service Delivery and Governance Strategy* while maintaining, integrating and improving current transit services.
- In May 2018, all four parties signed a Service Agreement (PW 19-2018) extending the current inter-municipal transit service by three (2018, 2019 and 2020 inclusively) years with an option to renew for an additional 2 years.

- The renewal of the 2018 NRT Service Agreement for an additional two-year period will ensure that inter-municipal transit services continue while the current transit governance discussions are completed.

Financial Considerations

For 2021 and 2022, NRT service hours are not expected to increase beyond pre-COVID levels and thus the net cost to operate NRT is not expected to rise. Staff continue to work with the Service Providers to ensure that sufficient service is provided to meet ridership demand while also remaining within budget.

Future hourly rates are subject to negotiations by all four parties and are affected by inflation, fuel prices, and labour costs associated with collective agreement obligations.

Increases associated with anticipated contract payments will be accommodated within future year budgets.

Analysis

Since the inception of NRT, Niagara Region has maintained agreements with the St. Catharines Transit Commission, the City of Welland, and the City of Niagara Falls to deliver the service on the Region's behalf. These agreements were extended multiple times before expiring in 2018. With Regional transit being formalized via triple majority in 2017 and having completed the IMT Service Implementation Strategy with support from the Linking Niagara Transit Committee (LNTC), the parties collaboratively sought out to revise the terms of the agreement to better support the now permanent NRT service.

That new agreement, endorsed by Regional Council in PW 19-2018, carries the parties through to the end of 2020. It also contemplated a two-year extension using the same terms and conditions so that the governance discussion could be completed before potentially altering the way services are being delivered. As the governance work is well underway with a decision expected in 2021, maintaining the status quo carries the least amount of risk while also providing the most reliability in terms of service delivery, consistency, asset protection and customer service. The terms and conditions of this renewal remain the same as the current iteration of the agreement and thus meets the criteria of being extended as outlined in the current agreement.

Members of the Inter-municipal Transit Coordination Committee, representing the NRT delivery partners, have provided input into the consideration of this extension and jointly recommend proceeding under the terms outlined in this report.

Alternatives Reviewed

The only reasonable alternative option would be to bring all of the conventional transit operations in-house at the Region. As NRT is currently delivered by existing local transit providers, the Region is able to deliver services with limited amounts of capital infrastructure necessary to operate NRT. Inherent costs incurred by operating the Region's own in-house system includes operating dedicated maintenance facilities/garage, hiring/managing its own unionized bus operators, carrying fleet insurance, among others.

This alternative is not recommended due to the significant cross-departmental costs of bringing those items in-house. Beyond the prohibitive capital and operating costs to bringing operations in-house at this time, the recommended extension allows for continuation of the ongoing transit governance discussion as Niagara continues to consider a single entity to deliver transit. Any alternative to that would compromise the recommended trajectory to a single transit provider.

Exploration of other alternative methods of transit delivery beyond conventional services delivered by the Region's municipal partners through the NRT operating agreement remain active. Regional staff continue to review innovative, efficient alternative methods of transit service delivery, particularly in the current pandemic, with the deployment of the NRT OnDemand system in west Niagara in August 2020 as one example of innovative alternative transit delivery. Although early signs are the on-demand delivery model is very effective for the lower density, geographically distanced areas, transit riders and services found in more dense areas of Niagara – where moving significant volumes of ridership, requiring faster service and larger fleet accommodations are needed – conclude that NRT continues to warrant the conventional transit model employed through the NRT operating agreement for these areas of service.

Relationship to Council Strategic Priorities

Supporting NRT's continuation directly aligns with the Council Strategic Priority: Responsible Growth and Infrastructure Planning (Objective 3.1) through advancing regional transit and GO rail services and facilitating the movement of people and goods.

Other Pertinent Reports

- CAO 8-2017 Niagara Region's Transit Service Delivery and Governance Strategy
- LNTC-C 21-2018 Inter-Municipal Transit (IMT) Service Implementation Strategy
- LNTC-C 22-2018 Inter-Municipal Transit Financial Impact Analysis
- LNTC-C 23-2018 Inter-Municipal Transit Capital Plan, 2019
- PW 19-2018 Niagara Region Transit 2018 Service Agreement

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Recommended by:

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Commissioner of Public Works (Interim)
Public Works Department

Submitted by:

Ron Tripp, P.Eng.
Acting Chief Administrative Officer

This report was prepared in consultation with Catherine Lam, Program Financial Analyst; Brian McMahon, Program Financial Specialist; and reviewed by Heather Talbot, Financial and Special Projects Consultant, and Matt Robinson, Director, GO Implementation Office.

Subject: Award of Contract 2020-T-116 Port Dalhousie WWTP Upgrades Contract 1

Report to: Public Works Committee

Report date: Tuesday, December 8, 2020

Recommendations

1. That Contract 2020-T-116 Port Dalhousie WWTP Upgrades Contract 1 in the City of St Catharines **BE AWARDED** to Maple Reinders Constructors Ltd. at their bid price of \$36,836,870 (including 13% HST); and
2. That the current approved Contract amount of \$1,153,785.37 (including 13% HST) awarded to Hatch Corp. **BE INCREASED** by \$1,568,511.19 (including 13% HST), for a total revised Contract of \$2,722,296.56 (including 13% HST) for Port Dalhousie WWTP Upgrades for the provision of Contract Administration and Inspection Services for Port Dalhousie WWTP Upgrades Contract 1.

Key Facts

- The purpose of this report is to seek Council's approval for the award of Contract 2020-T-116 Port Dalhousie WWTP Upgrades Contract 1 to Maple Reinders Constructors Ltd. at their bid price of \$32,599,000.00 (excluding 13% HST) and to seek Council's approval for the increase in the current approved contract amount of \$1,021,049 (excluding 13% HST) awarded to Hatch Corp. for 2016-RFP-14 Port Dalhousie WWTP Upgrades by \$1,388,063 (excluding 13% HST) for a total revised Contract of \$2,409,112 (excluding 13% HST).
- Schedule B of the Niagara Region Procurement By-law 02-2016 as amended February 28, 2019 requires Council approval for all tender awards in excess of \$5,000,000 (Recommendation 1) and for any Single Source award where the increase puts the total award value over \$1,000,000 (Recommendation 2).
- Proposed works include two new fine bubble aeration tanks with associated blower building, all associated yard piping, RAS pumping system upgrades, power supply & distribution system and process control & SCADA system upgrades including process control panels to support the process upgrades.
- Construction is scheduled from February 2021 to March 2023 with a contract completion date of March 3, 2023.
- Five (5) General Contractors were Prequalified in a competitive public pre-qualification process (2020-RFPQ-47) and were invited to bid on 2020-T-116 Port Dalhousie WWTP Upgrades Contract 1.

- On August 28, 2020, Niagara Region initiated a competitive public tender process (2020-T-116), to solicit bids from those prequalified companies to compete for these works. The tender closed on November 5, 2020 and four bid submissions were received and opened with the lowest compliant bid being received from Maple Reinders Constructors Ltd. in the amount of \$32,599,000.00 (excluding 13% HST).
- As part of a competitive bid process (2016-RFP-14), Hatch Corp was awarded the contract to provide engineering services for the Port Dalhousie WWTP Upgrades. Contract Administration and Inspection services were evaluated as provisional items in the 2016-RFP-14 bid process in the amount of \$696,441 but were not awarded. Hatch Corp. has provided revised fees for the provisional items for Contract Administration and Inspection services which increases the provisional amount by \$691,622 to include the extension in the contract duration, additional contract administration hours for proper oversight on a Tier 1 project as well as scope change requests for extra design efforts requested by Niagara Region for a total addition to the current Purchase Order of \$1,388,063.00 (excluding 13% HST). The Region has changed our construction services standards since 2016 to put more rigor into contract administration and inspection on Tier 1 projects to reduce risk during construction and improve oversight. The revised provisional fees for contract administration and inspection reflect our changed standards.

Financial Considerations

This project will be constructed in two phases; Contract 1 and Contract 2. The budget for Contract 1 has been previously approved under Project 20000201 Port Dalhousie WWTP Upgrades for a total of \$39,500,000.

Project 20000201 Port Dalhousie WWTP Upgrades has actual and committed expenses of \$1,426,308 as of November 6, 2020. The total estimated project cost after the award of Contract 2020-T-116 and contract amount increase for contract administration and inspection is \$39,500,000 (inclusive of 1.76% non-refundable HST), as detailed in Appendix 1 – Total Estimated Project Cost.

The total estimated project cost for Contract 2 is \$15,000,000. The funds for Contract 2 will be requested as part of the 2023 capital budget. The projected combined total cost for both contracts is \$54,500,000.

Analysis

The Port Dalhousie Wastewater Treatment Plant (WWTP) is owned and operated by Niagara Region and is located at 40 Lighthouse Road in the City of St. Catharines, north of Lakeshore Road. The plant was constructed in 1969 and has undergone various upgrades to provide a treatment capacity of 61,300 m³/d average flow, and a peak primary treatment capacity of 122,700m³/d. The plant services the City of St. Catharines and the City of Thorold. Refer to Appendix 3 for the Key Plan.

The Port Dalhousie WWTP requires sustainability improvements throughout the plant. Major components of the upgrades include replacement of the deteriorating plant inlet/overflow chamber, installation of a screening washer/compactor conveyance system, replacement of the aged aeration system with a new fine bubble diffuser system including new tanks, blower building and associated pumps and piping, refurbishment of the non-effective biofilter system, Master Control Centre (MCC) upgrades/replacements, plant-wide SCADA upgrades, construction of a new administration building and other miscellaneous process upgrades.

The construction of the works will be phased under two separate contracts. Contract 1 is scheduled for construction from 2021 to 2023 and Contract 2 construction is scheduled from 2023 to 2025.

The following scope of work is associated with Contract 1 of this project:

- Construction of two new aeration tanks consisting of fine bubble diffuser system, coarse bubble channel and chamber aeration, aeration tanks influent chamber, and aeration tanks Mixed Liquor Suspended Solids (MLSS) chamber;
- Construction of a new blower building and installation of new blowers and controls;
- Replacement of existing secondary clarifier 5 RAS pumps and associated piping and instrumentation with new;
- Modifications to existing primary clarifier distribution chamber;
- modifications to the existing power distribution system, addition of a new switchgear, transformer and generator;
- Installation of new Remote Programmable Unit (RPU) and SCADA upgrades;
- Decommissioning of the existing aeration system.

The following is the scope of work for Contract 2 of this project:

- Construction of new inlet/bypass channels with flow measurement;
- Modifications to existing screen building including installation of new screening conveyance system;
- Modifications to the chlorine contact tank inlet and gates;
- Refurbishment of the existing biofilter;
- Construction of a new administration building;
- Demolition of a portion of the existing administration building;
- Plant-wide MCC replacement/rehabilitation; and
- Plant-wide RPU replacement.

In accordance with Niagara Region Procurement By-law 02-2016 as amended on February 28, 2019 and under the guidance of the Region's Procurement Department, Niagara Region initiated a competitive public tender process (2020-T-116), on August 28, 2020 to solicit bids from those prequalified companies to complete these works. The tender closed on November 5, 2020 and four (4) bid submissions were received and opened with the lowest compliant bid being received from Maple Reinders Constructors Ltd. in the amount of \$32,599,000.00 (excluding 13% HST).

Niagara Region's Procurement Department has reviewed and checked all opened tenders to confirm they included acknowledgement of the correct number of Addenda and requisite Bid Security (tender deposit) and Surety (Agreement to Bond).

A summary of the bid submissions is included in Appendix 2.

Hatch Corp was retained by Niagara Region through a competitive bidding process, 2016-RFP-14, to complete the detailed design, tendering and contract administration and inspection services for the Port Dalhousie WWTP Upgrades project. Contract administration and inspection services were provisional items in the 2016-RFP-14 procurement. Fees for the provisional items were received and evaluated as part of the competitive bid process, however they were not awarded. Hatch has provided revised fees for contract administration and inspection services based on the current construction requirements as well as a scope change request for additional design efforts requested by Niagara Region.

The 2016 Request for Proposal (2016-RFP-14) stipulated a specific number of hours for Contract Administration for the construction period which amounted to 8 hours per week. Niagara Region's Water and Wastewater standards for construction support have since increased the required hours for contract administration and years of experience for the contract administrator and site inspector on Tier 1 projects. This

increase in support from the consultant provides the Region with proper oversight and inspection during construction to ensure that the project is constructed in compliance with the drawings and specifications.

The Port Dalhousie WWTP Upgrades project is a large, complex undertaking which includes the requirement for bypass pumping, groundwater dewatering, temporary power and careful construction sequencing to ensure the WWTP remains active and in-service throughout construction. The Region requested that Hatch update their original construction services provisional fees based on our new standards. Ensuring proper construction support by Hatch will reduce risk and help ensure a successful project completion.

The additional engineering fees associated with the increase in contract administration and inspection services is an extension of the work that was originally competitively bid. The fees now reflect the construction support and oversight required from the consultant based on the project's complexity. Extending the assignment to the current engineering firm rather than competitively procuring the additional services ensures consistency throughout the entire design phase; therefore, reducing any need for re-visiting the initial design and reducing the risk to the Region of inconsistency between designers. Risk is also reduced by having consistency from the design phase to the construction inspection and administration phase.

In addition to increases in the contract administration and inspection services required, additional design efforts are also necessary. Niagara Region identified operational flexibility concerns with the existing sludge piping and additional required process improvements which directly relate to the project. The process piping changes will allow the operator's flexibility to step-feed the aeration tanks during high storm flows to prevent an activated sludge washout. The additional process changes included modifications to the decommissioning plans and site drainage improvements in the area of the new aeration tanks. Hatch was requested to modify their design drawing set and contract documents to include the change.

Contract award requires resources from Legal Services and Corporate Services in order to execute the required contract documents and amending agreement. Water and Wastewater Engineering staff will be providing resources throughout the project in order to manage the contract with assistance from Corporate Services on contract/project payments.

Alternatives Reviewed

1. Proceed with the Contract Award and Proceed with Contract Amount Increase –
This alternative would enable staff to proceed with contract award to Maple Reinders Constructors Ltd. to construct Port Dalhousie WWTP Upgrades Contract 1 and to proceed with contract amount increase to Hatch Corp. to meet the Niagara Region's objective of providing proper treatment of sewage. The project will provide a sustainability upgrade to the existing process equipment, prolong the service life of the secondary treatment system, reduce energy consumption from obsolete equipment and ensure Niagara Region continues to meet or exceed the Ministry of Environment, Conservation and Parks (MECP) effluent quality requirements.
2. Do Nothing –This alternative does not adequately address the operation and maintenance issues currently experienced at the Port Dalhousie WWTP.

Staff recommend Alternative 1 to proceed with contract award to Maple Reinders Constructors Ltd. and contract amount increase to Hatch Corp.

Relationship to Council Strategic Priorities

This recommendation is related to the Responsible Growth and Infrastructure Planning, Objective 3.3: Maintaining Existing Infrastructure. Through asset management planning, the Port Dalhousie WWTP upgrades project is required to ensure sustainable investments in the infrastructure needed to provide proper treatment of wastewater which meets or exceeds MECP effluent quality requirements.

Other Pertinent Reports

Not Applicable

Prepared by:

Lindsay Jones, P.Eng.
Senior Project Manager
Public Works Department

Recommended by:

Bruce Zvaniga, P.Eng.
Commissioner of Public Works (Interim)
Public Works Department

Submitted by:

Ron Tripp, P.Eng.
Acting Chief Administrative Officer

This report was prepared in consultation with Tony Cimino, C.E.T., Associate Director, W-WW Engineering; and Pamela Hamilton, Program Financial Specialist W-WW, and reviewed by Joseph Tonellato, P.Eng, Director W-WW and Dan Ane, Manager, Program Financial Support, Bart Menage, Director Procurement and Strategic Acquisitions.

Appendices

Appendix 1	Total Estimated Project Cost
Appendix 2	Summary of Bids
Appendix 3	Key Plan

PW 44 - 2020 APPENDIX 1
Total Estimated Project Cost
Contract Award

Contract 2020-T-116 - Port Dalhousie WWTP Upgrade Contract 1

	Council Approved Budget	Budget Increase/ Reallocation	Revised Council Approved Budget	Expended & Committed as of 11/06/20	Contract Award/ Forecast	Budget Remaining
	(A)	(B)	(C) = (A) + (B)	(D)	(E)	(F) = (C)-(D)-(E)
Total Estimated Project Cost (20000201)*						
(a) Construction (includes contract contingency)**	32,743,250	460,332	33,203,582	30,840	33,172,742	-
(b) Project Contingency	4,535,000	(1,557,066)	2,977,934	-	2,977,934	-
(c) Consulting Engineering Services (Design, Contract Administration, & Inspection) ***	1,350,000	1,496,733	2,846,733	1,334,240	1,512,493	-
(d) Project Management & Internal Costs	871,750	(400,000)	471,750	61,228	410,522	-
Total Estimated Project Cost	39,500,000	(0)	39,500,000	1,426,308	38,073,691	-

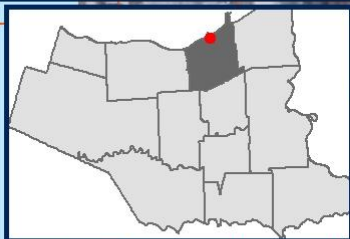
*All costs include 1.76% non-refundable HST

** Total Construction Contract Award is equal to i) \$32,599,000 before tax; ii) \$33,172,742 including 1.76% non-refundable HST; iii) \$36,836,870 including 13% HST

*** Total CA & Inspection Award is equal to i) \$1,388,063 before tax; ii) \$1,412,493 including 1.76% non-refundable HST; iii) \$1,568,511 including 13% HST. In addition to the award, \$100,000 of additional engineering services are included in the forecast

PW 44-2020 Appendix 2 – Summary of Bids (2020-T-116)

Vendor	Total Tender Price (excluding HST)
Maple Reinders Constructors Ltd.	\$32,599,000.00
ROMAG Contracting Ltd.	\$34,570,000.00
Kenaidan Contracting Ltd.	\$34,672,500.00
North America Construction (1993) Ltd.	\$36,453,000.00



Lake Ontario

Port Dalhousie W.W.T.P.

WWTP

Legend

 Wastewater Treatment Plant

1:1,750

0 12.5 25 50m



Subject: Amendment to Purchase Order for Tender 2019-T-157 Regional Road 38 (Martindale Road)

Report to: Public Works Committee

Report date: Tuesday, December 8, 2020

Recommendations

1. That the original Contract amount of \$10,366,851.65 (including 13% HST) awarded to Rankin Construction Inc. **BE INCREASED** by \$1,300,000.00 (including 13% HST), for a total revised Contract of \$11,666,851.65 (including 13% HST) for the Reconstruction of Regional Road 38 (Martindale Road) from Fourth Avenue to Barton Street, in the City of St. Catharines.

Key Facts

- Contract 2019-T-157 was awarded by Regional Council to Rankin Construction Inc. on June 20, 2019, at a bid price of \$9,174,205.00 (excluding taxes).
- The current Purchase Order 0000062464 in the amount of \$9,174,205.00 (excluding taxes), requires an amendment to increase the Purchase Order amount by \$1,150,442.48 (excluding taxes) to address items requested by the Ministry of Transportation (MTO) in the amount of \$821,334.29 (excluding taxes) and additional safety measures required on the construction staging on Highway 406 on behalf of the Niagara Region in the amount of \$329,108.19 (excluding taxes)
- A budget adjustment was recently performed by staff in accordance with the budget control by law to reflect the additional MTO cost sharing associated with this Purchase Order increase request in the amount of \$821,334.29
- There are sufficient funds in the project budget 10RC0627 to cover the Purchase Order amendment request.
- This project is nearing completion and this Purchase Order increase is required to complete this project.

Financial Considerations

The Purchase Order 0000062464 was issued to Rankin Construction Inc. in the amount of \$9,335,671.01 (including 1.76% non-refundable HST), following Regional Council approval for the award of Contract 2019-T-157 on June 20, 2019. The \$9,335,671.01 (including 1.76% non-refundable HST) represented Rankin's bid submission in

response to the Region's Request for Tender; including an 8.5% contingency value of \$800,000 (excluding taxes).

The original tender award cost sharing (including 1.76% non-refundable HST) was as follows:

- Niagara Region share - \$7,937,231.94,
- Ministry of Transportation share - \$826,702.31, and
- City of St. Catharines share - \$571,736.76.

The work associated with this Purchase Order amendment includes an overhead gantry sign structure, additional paving on Highway 406 and additional safety measures required on the construction staging on Highway 406. The overhead gantry sign structure and additional paving on Highway 406 was requested by the Ministry of Transportation and these costs will be recovered from them. The Ministry's portion of the change Purchase Order request is \$835,789.77 (including 1.76% non-refundable HST) which fully addresses the above mentioned items. The Region's portion of the change Purchase Order request is \$334,900.50 (including 1.76% non-refundable HST) to address additional safety measures required on the construction staging on Highway 406.

The Purchase Order increase request in the amount of \$1,170,690.27 (including 1.76% non-refundable HST), will bring the total construction amount to \$10,506,361.28 (including 1.76% non-refundable HST).

The estimated cost sharing (including 1.76% non-refundable HST) on the revised construction completion amounts are:

- Niagara Region share - \$8,272,132.44,
- Ministry of Transportation share - \$1,662,492.08, and
- City of St. Catharines share - \$571,736.76.

These funds will be required to complete the construction and finalize the Contract between the Region and Rankin Construction Inc. There are sufficient funds available in project 10RC0627 to address the Purchase Order amendment.

A full budget breakdown can be found in Appendix 2 – Total Estimated Project Costs.

Regional staff will be completing a budget reduction on project 10RC0627 in the amount of \$1.0M, to address the budget remaining from this project.

Analysis

Majority of this increase is the inclusion of the Ministry's request for an overhead gantry sign structure. The Ministry identified the need for this overhead gantry sign structure during construction and, for efficiency purposes, requested the Region include this item in the current contract. The Ministry has committed to reimbursing the Region for this work once completed on the Ministry's behalf. The Region will be required to compensate Rankin Construction for this work, under the current contract, and invoice the Ministry for this work accordingly.

The additional construction staging on Highway 406 was required for safety purposes to allow the construction of the centre pier for the new Regional Road 38 (Martindale Road) Bridge structure which falls under the Region's financial responsibility. The cost sharing identified above includes this work in the Region's portion of the cost share.

Alternatives Reviewed

The Region discussed the options of having the Ministry construct this overhead sign structure outside this contract by another contractor. The Ministry and the Region agreed it would be more efficient to complete this work as part of the Region's current contract. There would be less impact to the motoring public; provide improved safety, and result in a better asphalt roadway at completion of the project.

For the Regional component of the work, the project team looked at a variety of construction options to complete the required centre pier safely. All safe options required additional staging on Highway 406. Work carrying into 2020 was necessary to ensure quality mandates of the Ministry were achieved for the work on Highway 406. Many weather dependant operations such as concrete curing, and placement of top asphalt were not possible in 2019 due to inclement fall/winter conditions.

Relationship to Council Strategic Priorities

- Responsible Growth and Infrastructure Planning

Other Pertinent Reports

PW29-2019 - Award of Tender 2019-T-157 Reconstruction of Regional Road 38 (Martindale Road) from Fourth Avenue to Barton Street, in the City of St. Catharines.

PW40-2020 - Regional Road 38 (Martindale Road) Amending Agreement with Engineering Consultant Wood

Prepared by:

Mike Wilson, A.Sc.T., PMP
Senior Project Manager
Transportation Engineering

Recommended by:

Bruce Zvaniga, P.Eng.
Commissioner of Public Works (Interim)
Public Works Department

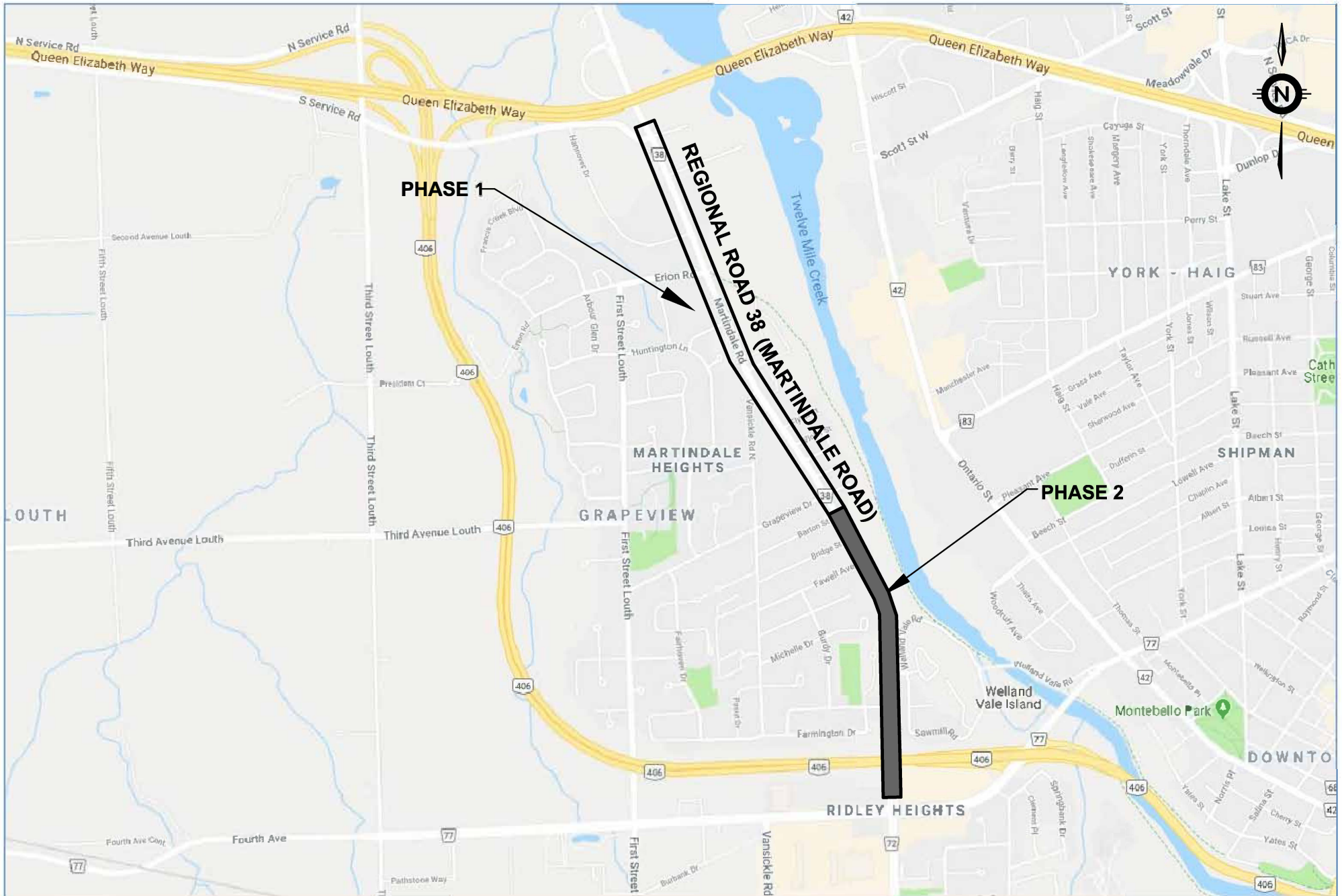
Submitted by:

Ron Tripp, P.Eng.
Acting Chief Administrative Officer

This report was prepared in consultation with Brian McMahon, Program Financial Specialist, Frank Tassone, Associate Director, Transportation Engineering, reviewed by Carolyn Ryall, Director, Transportation Services and Donna Gibbs, Director, Legal and Court Services.

Appendices

Appendix 1	Key Plan
Appendix 2	Project Financial Summary



PW 51-2020 APPENDIX 2
Total Estimated Project Cost
Purchase Order Amendment
Tender 2019-T-157 Regional Road 38 (Martindale Road) Barton St. to Fourth Ave.

	Council Approved Budget	Budget Increase/ Reallocation	Council Approved Budget for revised Purchase Order	Expended & Committed as of 11/10/20	Forecast	Budget Remaining
	(A)	(B)	(C) = (A) + (B)	(D)	(E)	(F) = (C)-(D)- (E)
<u>Total Estimated Project Cost (10RC0627)*</u>						
(a) Construction (including Construction Contingency)**						
i. Niagara Region	13,592,631	334,900	13,927,531	13,918,346	9,185	-
ii. Cost Sharing - City of St. Catharines	571,738	-	571,738	374,695	197,043	-
iii. Cost Sharing - MTO	1,662,492	-	1,662,492	87,791	1,574,700	-
(b) Project Contingency	1,150,000	165,100	1,315,100	-	315,100	1,000,000
(c) Property Acquisition	821,065	500,000	1,321,065	822,937	498,128	-
(d) Consulting Engineering Services						
i. Detailed Design	1,332,524	(400,000)	932,524	878,565	53,959	-
ii. Contract Administration & Inspection	-	900,000	900,000	589,827	310,173	-
iii. Geotechnical Service-Quality Control	-	200,000	200,000	107,890	92,110	-
(e) Project Management (In-House) and Operations	1,489,439	(900,000)	589,439	264,279	325,160	-
(f) Traffic Signals and Signs	836,955	-	836,955	458,231	378,724	-
(g) Utility Relocation	2,535,212	(800,000)	1,735,212	1,546,367	188,845	-
Total Estimated Project Cost	23,992,055	-	23,992,055	19,048,928	3,943,127	1,000,000

*All costs include 1.76% non-refundable HST.

** Adjusted Purchase Order included in construction costs is equal to i) \$10,324,647.48 before tax; ii) \$10,506,361.27 including 1.76% non-refundable HST; iii) \$11,666,851.65 including 13% HST.

MEMORANDUM

PWC-C 47-2020

Subject: COVID-19 Response and Business Continuity in Public Works

Date: December 8, 2020

To: Public Works Committee

From: Bruce Zvaniga, P.Eng., Commissioner of Public Works (Interim)

As reported previously, Public Works has remained focused on keeping the critical public infrastructure operational while responding to the COVID19 pandemic. Departmental staff continue to ensure that the community has: safe drinking water, reliable wastewater systems, recycling and waste collection/disposal, regional specialized and regular transit and a well-maintained regional road system. Public Works staff recognize and are dedicated to the essential role they play ensuring that healthcare, social services, emergency responders and the community-at-large can depend upon the reliable availability of these core municipal services.

Public Works leadership is actively participating in the Municipal Emergency Control Group. Working with all other departments, the Business Continuity Plan and staff redeployment strategy is monitored and adjusted to respond to changing conditions. Public Works staff who have been re-deployed outside of the department delivering essential services are returning to their home positions to address the increased needs in Public Works and to prepare for winter maintenance readiness.

The Department Leadership team continue to actively participating in virtual meetings with their counterparts in the Local Area Municipalities, and provincial committees to share our successes and learn how others have overcome challenges.

The following provides a brief highlight from each of the four (4) divisions on their respective status, service changes, actions taken and future outlook.

Water & Wastewater Services

Current Status of Operations

High quality, safe and reliable water and wastewater services in accordance with health regulations and standards continue to be provided.

Both the Drinking Water and Wastewater Quality Management Systems (QMS) remain active. Capital infrastructure projects are deemed essential and continue to be delivered.

All W-WW staff and contractors continue to be reminded of their obligations to comply with the Niagara Region mask by-law and other pandemic mitigation policies and procedures.

Service/Operational Change Highlights

- Nothing new to report this month

Significant Initiatives or Actions undertaken

- As per the October 15 CAO Directive 'Expanding the use of face-coverings at work', face shields, half mask respirators and surgical masks are being used by both staff and non-employees (i.e. contractors, consultants, etc.) at all times while indoors, except in the following circumstances:
 - While at their desk, workstation, or in an office with at least two metres of physical distance from another person, or
 - While attending an employee-only meeting and seated in a designated seating location with at least two metres of physical distance from another person.
- Masks continue to be used outdoors if physical distancing cannot be maintained.
- Current protocols remain compliant with Niagara Region face covering by-law (By-law 2020-46) and Ontario Regulations 364/20 - Rules of Areas in Stage 3.

Operational Outlook

1 month

- Implementing phased W-WW Pandemic Re-Opening Plan in accordance with Public Health advisement and direction from the Region's Emergency Operations Centre.

3 months

- Implementing phased W-WW Pandemic Re-Opening Plan in accordance with Public Health advisement and direction from the Region's Emergency Operations Centre.

6 months

- The focus continues to be on the maintenance of all key components, the sustainable supply of key chemicals and materials and most importantly on the well-being of the staff managing these essential systems.

Transportation Services

Current Status of Operations

Essential bridge, culvert and roadway works, forestry, traffic control, pavement markings and signage are critical services which continue to be provided.

Design, construction management and environmental assessments continue from engineering staff and consultants.

Staff continue to monitor all material shipments, supplies and construction contracts experiencing delays to understand larger impacts to ongoing construction project schedules.

Service/Operational Changes

- Nothing new to report this month

Significant Initiatives or Actions undertaken

- Separation of field staff in vehicles where possible is being administered. Vehicle assignment to specific staff with the responsibility to clean / maintain on a daily basis.
- Face masks and shields have been ordered for additional staff protection in certain circumstances.
- Staff continue to monitor supplies out of Fleet stores such as wipes, hand sanitizer, N95 masks and are supporting other Divisions with resources as required.
- Screening signage, screening protocol and limited door access have been implemented at all yards and the service center. Daily reports of staff well-being and screening are being provided to management for recording and documentation purposes.
- Screening protocol for all vendors and contractors also implemented at yards and service centers.

- Constructors at various worksites have put into place proper distancing, working measures and PPE for the well-being of all staff.
- Updated protocols based on provincial regulations/guidelines for working on construction sites has been sent to Heavy Construction Association of the Region of Niagara to notify their members that they must adhere to these measures.
- IT equipment to assist with working from home has been provided where applicable.
- A number of Transportation Staff have already been trained and redeployed to assist other Departments where needed. In assisting with the redeployments to LTC, Staff manufactured personal screening barriers for screener positions at entry points of the homes as an additional safety measure.
- In meeting essential service levels throughout the pandemic, management continue to review staffing; in particular the redeployment numbers and will be phasing the return of Transportation staff throughout Q4. Key operations (i.e. Winter Operations) will require staff to be recalled for training and availability to meet legislated service level requirements in keeping Niagara's roads safe.

Operational Outlook

1 month

- Essential and critical project interpretation based on Provincial announcements will affect the delivery of projects and levels of service to residents of Niagara region. This continues to be under review. The Business Continuity Plan with Redeployment Strategy of staff for the Division will be administered accordingly.

3 months

- Essential and critical project interpretation based on Provincial announcements will affect the delivery of projects and levels of service to residents of Niagara region. This continues to be under review. The Business Continuity Plan with Redeployment Strategy of staff for the Division will be administered accordingly.

6 months

- Contractors have shared their concern that once non-essential work can recommence, there will be shortage within the trades due to demand. Contracts are continuing to be monitored by staff with regards to any shortages (supplies and trades) and updates will be highlighted.

Waste Management Services

Current Status of Operations

Restrictions to the curbside collection program and at the landfill sites/drop off depots have been lifted with minor restrictions still in place as noted below.

An online tool was successfully implemented in June to provide residents the ability to purchase garbage tags, CFC stickers and recycling and organic bins on line. Garbage tags and CFC stickers are mailed to the residents. For recycling and organic bins, payment is made on line and residents can pick up the bins at one of the Regional distributions centres. Some local municipalities have begun to sell or distribute recycling boxes and green bins, by appointment.

Strategic initiatives are continuing such as the MRF Opportunity Review, administration of new collection contracts and services levels, Strategy Plan, construction projects, and operational tenders.

Service/Operational Changes

Landfill Service Changes

Preferred methods of payment are debit and credit, using the tap option.

Limited the number of people on the drop-off pad.

Some /Green Bin Distribution Locations Remain Closed

For more information on [waste management services](https://www.niagararegion.ca/waste), visit <https://www.niagararegion.ca/waste>.

Community Events

Presentations, sites tours and special events recycling have been postponed until further notice. Requests for participation in 'modified' Santa Claus parade and staff will comply with Public Health protocols.

Significant Initiatives or Actions undertaken

- Screening signage, screening protocol and limited door access have been implemented at all facilities. Daily reports of staff well-being and screening are being provided to management for recording and documentation purposes.
- Screening protocol for all vendors and contractors has also been implemented at all facilities and sites.
- Staggering breaks and lunch to reduce amount of people taking breaks at one time at the Recycling Centre.
- Increased cleaning being completed at night and during the day (i.e. between lunch breaks and in high traffic areas).
- Installed plexi-glass between sorters on the processing line, and at the scale houses located at the landfill sites/drop off depots.
- Staff are travelling in separate vehicles to maintain physical distancing per health guidelines.

Operational Outlook

1 month

- Continue to work through transition of new collection contracts and service levels.
- RFP will be issued for the division's Long-term Strategic Plan.
- 2021 operational budgets to be finalized.
- Further work to be completed on draft Blue Box Final Regulations.

3 months

- Recommendations brought forth as a result of the NRFP MRF Opportunity Review.
- Award work for Strategic Plan

6 months

- Work to continue to on strategic initiatives.
- Preparation for the start of the new Humberstone contract.

Niagara Region Transit/Specialized Transit & GO Implementation

Current Status of Operations

As of November 23, 2020, every transit service in Niagara has reduced its onboard passenger capacity to 50% of the vehicle's seated capacity rating. For Niagara Region, this includes NRT, NST and NRT OnDemand. These capacity changes were agreed upon by the transit providers at the weekly IMTWG teleconference and align with Niagara's move to "Orange". This capacity reduction will likely remain in place if Niagara moves to "Red" and could possibly be reduced further.

Niagara Region Transit (NRT) is operating at a reduced level of service when compared to a typical September through December schedule. This is due to Brock University being 95% online, and Niagara College having significant enrollment reductions combined with many online programs and lower Niagara-based student residency:

- Express routes 40a, 40b, 45a, 45b, 60a, 65a were reinstated but only during morning and afternoon peak periods, 70a, 75a) effective March 23
- 7:00 a.m. - 11:00 p.m. operating hours effective Sept 7 (back up from 7:00 a.m. - 9:00 p.m. from May 4 to Sept 6)
- Hourly service (60 minutes) on most routes except 60 and 65 as those are typically well utilized student routes.

Niagara Specialized Transit (NST) continues operating at the normal level of service, except for trips whose origins or destinations are to/from a location with reported cases of COVID-19 are not being provided. Reducing hours of operation is not a necessity in this case as Niagara Region only pays for trips delivered, rather than an hourly rate. Overall, NST trip requests are significantly reduced, however NST continues to deliver all requested trips within the capacity available. Ridership has continued to show small signs of recovery but still sits at approximately 40-50% of typical usage.

NRT OnDemand service operates in Grimsby, Lincoln, Pelham, Wainfleet and West Lincoln from Monday to Saturday, 7 a.m. - 10 p.m. Now two months in, NRT OnDemand has continued to see significant growth despite challenges stemming from COVID-19.

Mandatory mask usage is required as per the Region's Face Covering By-law.

Service/Operational Changes

Despite the reduction of vehicle capacity, there is no need to return to rear door boarding as each vehicle has a partition separating the operator/driver from the passengers.

The "Rear door boarding" policy enacted on March 23 to temporarily limit driver contact and respect physical distancing has been lifted on July 2. Because Niagara's transit providers have installed plexi-glass bio-barriers across the entire fleet of vehicles to protect bus operators, even if COVID-19 numbers increase, there will not be a need to return to rear door boarding and thus fare collection will be maintained as well.

A lower than typical service level began on September 7, however staff elected to maintain an adequate amount of express service as the student demand from Niagara College was unclear.

Significant Initiatives or Actions undertaken

- All NRT, and NST fleet vehicles continue to be professionally cleaned/disinfected/sanitized well beyond regular protocols, and Aegis antimicrobial spray was applied to all interior surfaces. This work was completed by the local transit service providers as they manage and operate the NRT fleet as part of their own.
- Due to the low volume of trips, BTS has made every effort to deliver trips with only a single occupant in each vehicle, although this has not been formalized as a public policy.
- NRT OnDemand does not permit the use of the front passenger seat in order to maintain distance between the drivers and passengers.

Operational Outlook

1 month

- Staff will continue to monitor the COVID-19 numbers and categorization for Niagara. Service adjustments may be required as the situation worsens.
- NRT staff continue to review ridership data closely in order to determine appropriate levels of service.
- Staff continues to work with Brock University and the Brock University Student Union to maintain the U-Pass Program for the 2020-2021 academic year.

Niagara College terminated the U-Pass agreement in response to COVID-19 and thus students will be purchasing monthly passes in September.

3 months

- Schedules for January through April 2021 have already been set. Due to the extremely low ridership, the loss of the bulk U-Pass revenue (i.e from Niagara College) and increasing COVID-19 numbers, the service level has been significantly scaled back as of January.
- Possible further service adjustments based on ridership and in reaction to any provincial changes. Staff will continue to work with the IMTWG in reviewing the available data to ensure that adequate service is being provided while being mindful of the financial challenges faced by each municipality.
- The Niagara Transit Governance Study report will be complete by summer 2020. Introduction of the final report to LNTC with recommendation on a new governance model by the Project Team and study consultants will be done in consultation with the CAO Working Group and the LNTC Chair.

6 months

- The IMTWG will begin working towards the implementation of a new fare payment technology through the funding provided by the Investing in Canada Infrastructure Program (ICIP). Due to the complexity of the program, an implementation date in 2021 is most likely. Staff will continue to provide updates once a timeline has been established and at the major milestones.

As both the Province and Region move through the recovery process, staff at each of Niagara's transit providers will continue to collaborate in monitoring service levels, processes, and policies to ensure the safety of the residents and employees remain a priority and that decisions are made and communicated jointly wherever possible.

Respectfully submitted and signed by,

Bruce Zvaniga, P.Eng.
Commissioner of Public Works (Interim)

Other Pertinent Reports

CAO 10-2020, April 23, 2020 COVID-19 Response and Departmental Updates

PWC-C 13-2020, May 12, 2020 COVID-19 Response and Business Continuity in Public Works

PWC-C 20-2020, June 16, 2020 COVID-19 Response and Business Continuity in Public Works

PWC-C 24-2020, July 14, 2020 COVID-19 Response and Business Continuity in Public Works

PWC-C 27-2020, August 4, 2020 COVID-19 Response and Business Continuity in Public Works

PWC-C 33-2020, September 8, 2020 COVID-19 Response and Business Continuity in Public Works

PWC-C 37-2020, October 13, 2020 COVID-19 Response and Business Continuity in Public Works

PWC-C 41-2020, November 10, 2020 COVID-19 Response and Business Continuity in Public Works

Annual Water & Wastewater Quality Management Systems Update

Public Works Committee
PW 50-2020

December 8, 2020

Rachel Whyte, P.Eng. – W-WW Quality Management Specialist



Annual Water and Wastewater Quality Management Systems Update

(Report PW 50-2020)

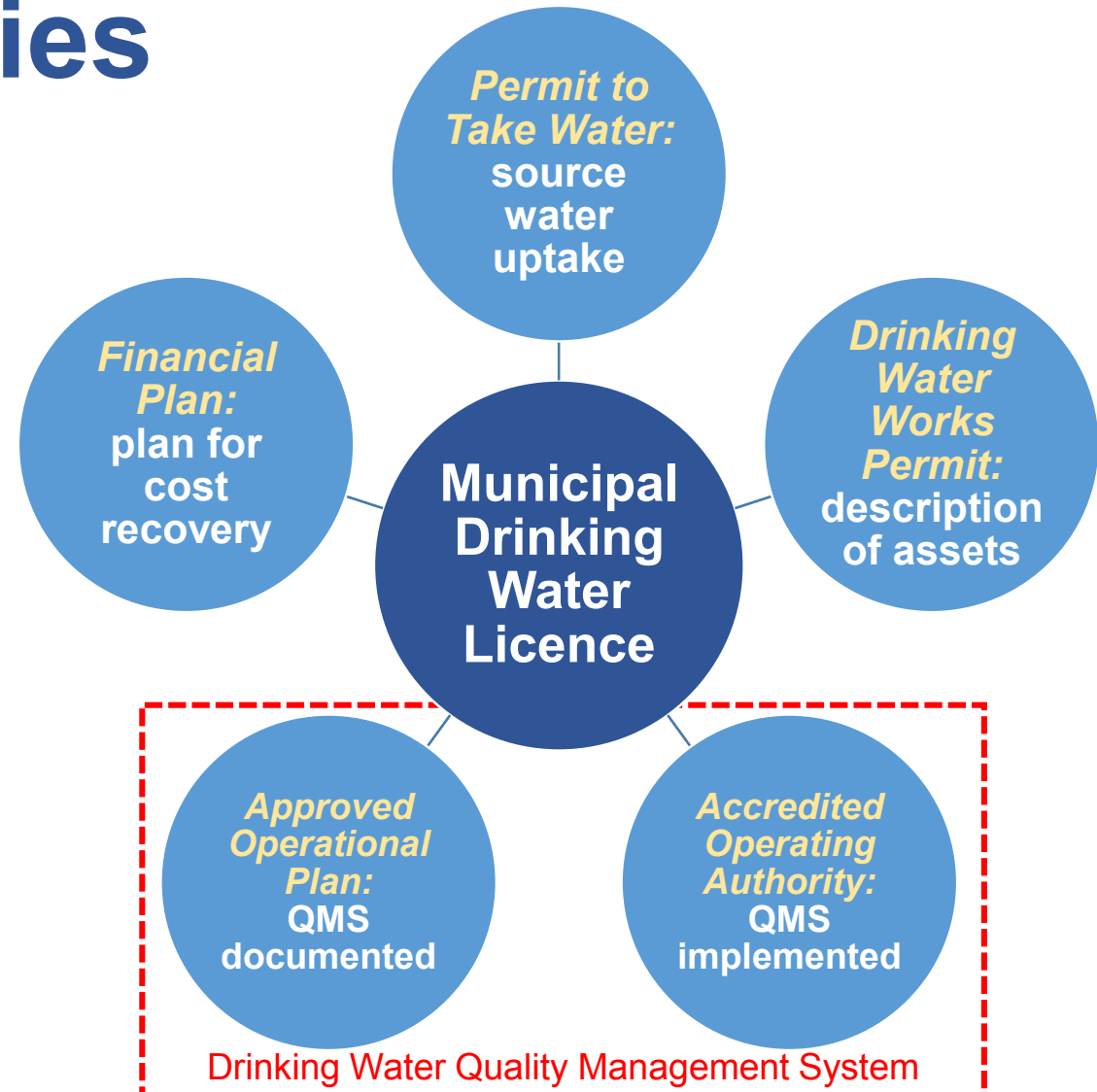
December 8, 2020

Rachel Whyte, P. Eng.
Water and Wastewater Quality Management Specialist

Water Quality Management System (Water QMS)

Water QMS Activities

- Approved QMS Operational Plan and QMS accreditation are required under the *Safe Drinking Water Act*
- Milestones required to maintain accreditation



Water QMS Internal Audit

- Completed March 2020
- Findings:
 - 10 non-conformances
 - 7 opportunities for continual improvement
 - 14 best practices for evaluation
- Corrective action plans identified by management and staff; implementation ongoing



Water QMS External Audit

- Audit completed May-July 2020
 - Off-site document review
 - On-site reaccreditation audits
- Findings:
 - 1 non-conformance (resolved)
 - 8 opportunities for continual improvement



Water Systems Risk Assessment

- Risk assessment reviews completed for all water systems
- Three high-scoring risks identified: to be addressed through capital projects and adjustments to operating practices
- Critical control points remain unchanged
- Reassessment due in 2021



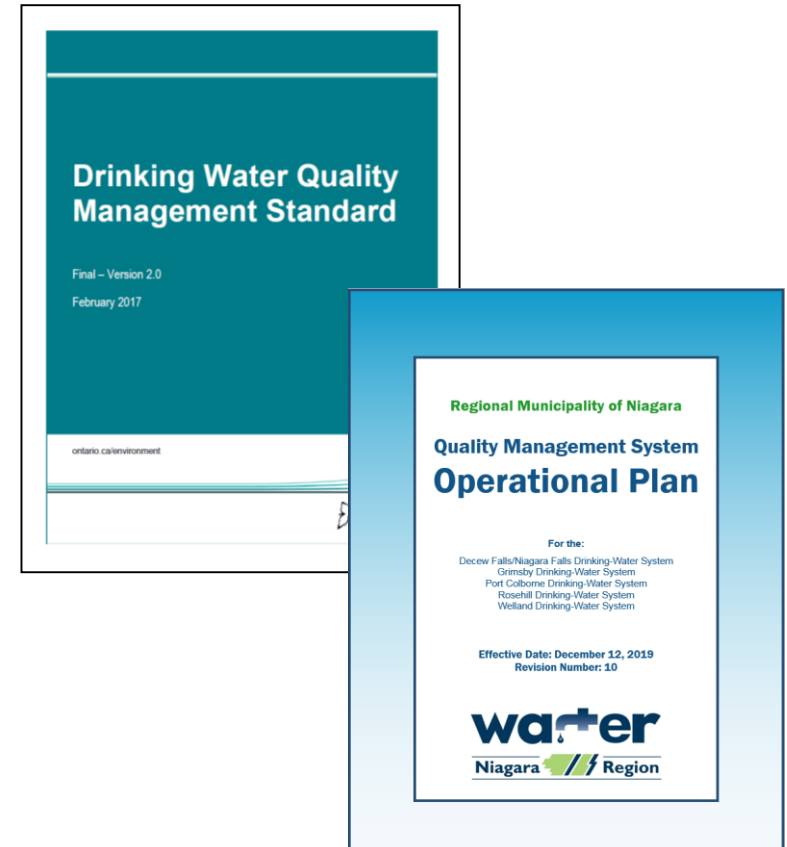
Water QMS Management Review

- Part 1 completed in May
- Part 2 anticipated in December
- Three action items issued since previous update; resolutions in progress



Changes Impacting Water QMS/ Operational Plan

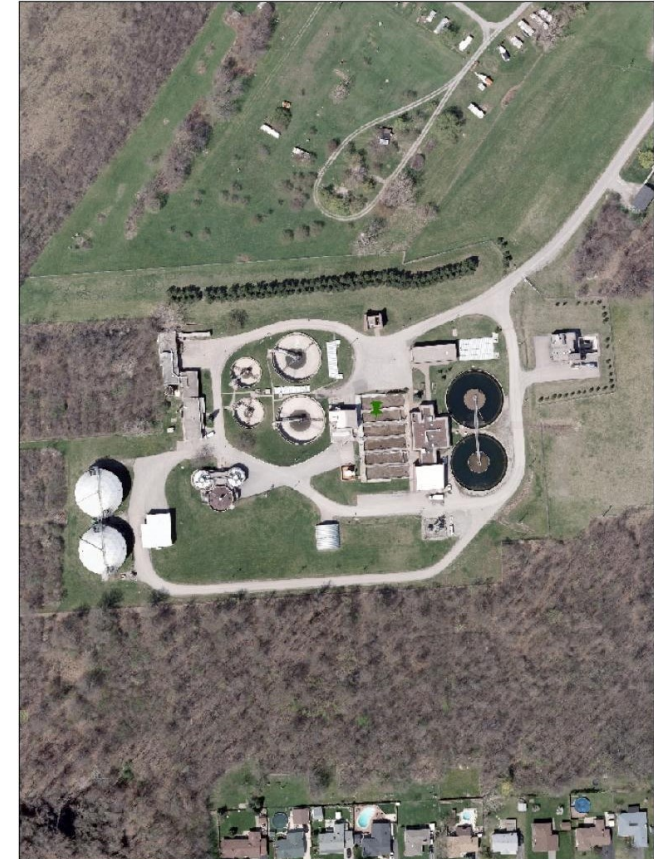
- No anticipated changes impacting QMS
- Changes impacting Operational Plan:
 - Minor changes to organizational structure
 - Minor revisions to address opportunities for improvement identified through external audits



Wastewater Quality Management System (Wastewater QMS)

Wastewater QMS Internal Audit

- Completed November 2020
- Findings:
 - 9 non-conformances
 - 9 opportunities for continual improvement
- Corrective action plans identified by management and staff; implementation ongoing



Wastewater Systems Risk Assessment

- Risk assessment reviews completed in 2019 and 2020
 - 2019: 91 high-risk items
 - 2020: 86 high-risk items
- 58 high-scoring risks to be mitigated through capital improvements
- Next full re-assessment in 2021



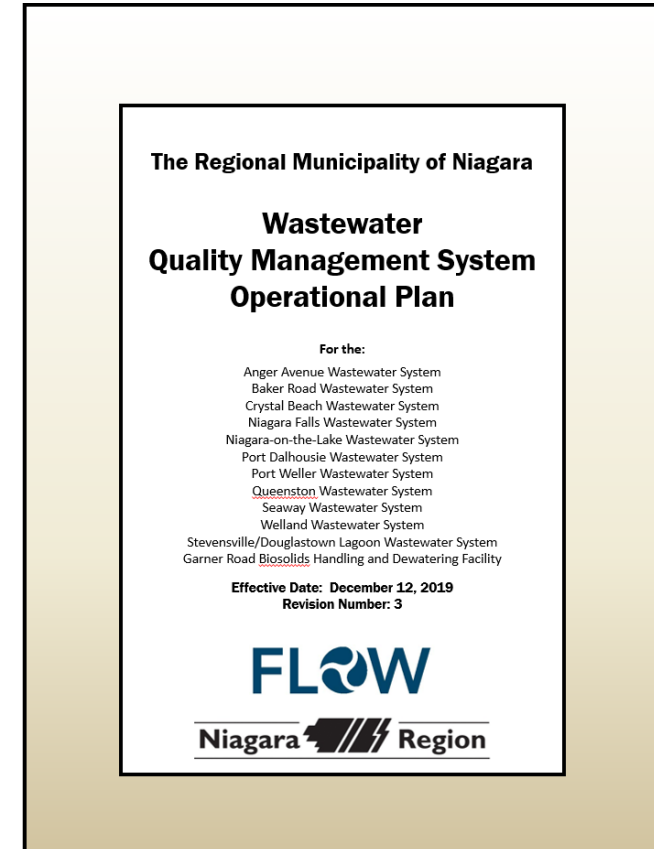
Wastewater QMS Management Review

- Part 1 completed in June;
Part 2 completed in November
- Four action items issued
since previous update;
resolutions complete or in progress



Changes Impacting Wastewater QMS/ Operational Plan

- Changes impacting QMS:
 - New standard in development
 - Adoption will be voluntary
- Changes impacting Operational Plan:
 - Minor changes to organizational structure
 - Minor revisions to address opportunities for improvement identified through external audits



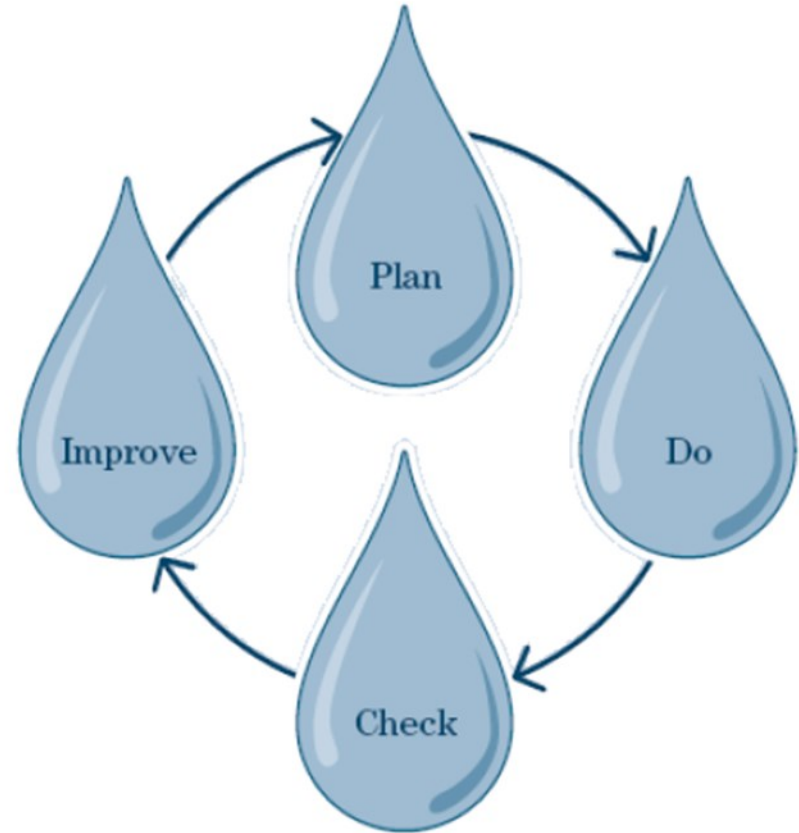
Questions

Rachel Whyte, P. Eng.

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Subject: Annual Water and Wastewater Quality Management System Update

Report to: Public Works Committee

Report date: Tuesday, December 8, 2020

Recommendations

1. That Report PW 50-2020 **BE RECEIVED** for information as the Annual Water and Wastewater Quality Management System Update; and
2. That the 2020 Water QMS Internal Audit Report, 2020 Water QMS External Audit Report, and 2020 Wastewater QMS Internal Audit Report **BE RECEIVED** for information.

Key Facts

- The purpose of this report is to provide a summary outlining the main processes and work performed internally to support the Water-Wastewater Division's Water QMS and Wastewater QMS.
- The *Drinking Water Quality Management Standard* was created under the *Safe Drinking Water Act, 2002* and requires Drinking Water System Owners to implement and maintain an accredited Water QMS. Niagara Region has maintained accreditation of its Water QMS since 2009.
- Niagara Region is not legally mandated to implement a QMS for wastewater services, however, the division has elected to do so as a due diligence measure.
- The Water QMS and the Wastewater QMS Operational Plans were previously endorsed by Council on December 12, 2019 under PW 67-2019, Annual Water-Wastewater Quality Management System Update.
- Minor administrative changes have been made to the Water QMS and Wastewater QMS Operational Plans, and these have been submitted to the Commissioner of Public Works for approval on behalf of Council as per the delegated authority granted to the Commissioner under Report PW 109-2008.

Financial Considerations

A total of approximately \$32,500 (including non-recoverable HST) has been expended in quality management system program costs in 2020 to-date; these routine costs include annual maintenance and support fees for software used in support of the QMS, as well as consulting fees for an on-site, third-party accreditation audit of the Water

QMS. These costs were included in the 2020 approved operating budget for Water Operations. An additional estimated \$27,000 has been committed in 2020 for an upgrade to the Water-Wastewater Services Division's QMS software.

Expected expenses of \$30,000 have been included in the proposed 2021 operating budget; these expenses include consulting fees for an offsite third-party Water QMS audit and an annual QMS software maintenance and support fee.

Analysis

This annual update summarizes the outcomes of significant quality management activities that are conducted in support of the Water QMS and Wastewater QMS, as well as internal and/or external changes that may impact either QMS.

Water QMS

The *Safe Drinking Water Act, 2002* mandates the development, implementation, and accreditation of a drinking water quality management system as a condition of issuance of a municipal drinking water licence. Niagara Region holds five municipal drinking water licences, one for each of its drinking water systems; thus, we are legally required to maintain accreditation of our Water QMS.

Roles and Responsibilities – Water QMS

Key Water QMS roles are described in Table 1.

Table 1: Roles and Responsibilities – Water QMS

Role	Assignment
System Owner	Niagara Region (represented by Regional Council)
Operating Authority	Niagara Region (represented by staff of the Water and Wastewater Services Division)
Top Management	Commissioner of Public Works Director, Water and Wastewater Services Division Associate Director, Water Operations & Maintenance Associate Director, Water-Wastewater Engineering Associate Director, Water-Wastewater Integrated Systems Associate Director, Water-Wastewater Asset Management

Role	Assignment
QMS Representatives	Water-Wastewater Quality Management Specialist, reporting to Associate Director, Water Operations & Maintenance (<i>primary</i>) Water-Wastewater Quality Management Specialist, reporting to Manager, Wastewater Quality & Compliance (<i>backup</i>)

Owner Roles and Responsibilities – Water QMS

An owner endorsement of the Water QMS Operational Plan is a requirement of our Water QMS accreditation. The Water QMS Operational Plan was last endorsed by the current term of Regional Council on December 12, 2019 under PW 67-2019, 2019 Annual Water and Wastewater QMS Update.

As Owners of Niagara Region's drinking water systems, Regional Council has specific responsibilities as defined within the *Safe Drinking Water Act, 2002*. A significant one of these is the "Standard of Care" clause (section 19 of the *Act*); the clause requires Councillors to "exercise the level of care, diligence and skill in respect of a municipal drinking water system that a reasonably prudent person would be expected to exercise in a similar situation" and to "act honestly, competently and with integrity, with a view to ensuring the protection and safety of the users of the municipal drinking water system".

Internal Audits of the Water QMS

The Water QMS is subject to annual internal audits by water and wastewater staff. All internal auditors have completed applicable training led by a qualified and competent trainer. Through the audit process, internal auditors assess conformance of the division's Water QMS with Ontario's *Drinking Water Quality Management Standard* and with divisional policies and procedures.

Three processes were selected for internal auditing in 2020:

- Competencies and training;
- Top Management communication;
- Capital project implementation and hand-off.

The division's internal audits are more rigorous and thorough than the external audit process, and the number and detail of audit findings demonstrates this. The internal audit findings include 10 non-conformances, 7 potential non-conformances/

opportunities for improvement, and 14 best practices. These findings are detailed in the Water QMS Internal Audit Report (Appendix 1 to this report).

External Audits of the Water QMS

The Water QMS is also subject to external auditing by a third-party auditor as a means to achieve and maintain accreditation to the *Standard*. Accreditation of the Water QMS is a condition of the Region's Municipal Drinking Water Licences: without continued accreditation, these licences would be revoked.

A third-party auditor conducted an off-site document review in May 2020 to confirm that Water QMS documents satisfy all requirements of the Standard. No non-conformances were identified during this document review; five minor opportunities for improvement were recorded and are being addressed through updates to QMS documentation.

Following the document review, in July 2020, the third-party auditor conducted an on-site reaccreditation audit to confirm that the Water QMS adequately addresses the requirements of all 21 elements of the Standard. The Water QMS External Audit Reports (Appendix 2) provide details of the external auditor's findings. The auditor recommended that Niagara Region maintain its accreditation as a Drinking Water System Operating Authority, identifying one non-conformance and three opportunities for improvement to the QMS. The Water-Wastewater Services Division has resolved the identified non-conformance and is continuing to address the opportunities for improvement.

Water QMS Risk Assessment

An internal risk assessment is required every 36 months for each of Niagara Region's water systems, with complementary risk assessment reviews to be completed at 12 and 24 months between the assessments. The last full risk assessment for the Water QMS was completed in 2018, with reviews completed in 2019 and 2020.

The following high-scoring risks were identified during the 2020 review:

- *Failure of raw water intake (Rosehill Water Treatment Plant):* This was identified as a risk due to the age of the intake pipe, which was installed in 1960. The intake shows signs of age-related failure. An environmental assessment has been initiated to replace the intake, with plans to extend it further into Lake Erie.
- *Failure of filter backwash pumps (Rosehill Water Treatment Plant):* This was a temporary risk relating to the ongoing capital upgrade at the plant. The upgrade

included replacement of both of the plant's backwash pumps, and pumping redundancy was temporarily lost in order to complete each replacement. The new pumps are now in service, and it is expected that this risk score will be significantly reduced at the next risk assessment.

- *Function of sodium bisulphite systems (Decew Falls Water Treatment Plant and Grimsby Water Treatment Plant):* This was identified as a risk due to ongoing issues with the performance of the sodium bisulphite dosing systems at the two subject treatment plants. Sodium bisulphite is used to dechlorinate process waste streams before they are discharged to the environment. There is a potential for chlorinated water to be discharged to the environment if the dosing system fails; such an event could have environmental impacts in the receiving water body and/or compliance impacts for Niagara Region. It is important to note that the sodium bisulphite systems treat waste streams only; thus, they do not impact the safety of treated drinking water. Dechlorination processes were modified in Fall 2020 to allow for sodium bisulphite dosing based on laboratory testing; the new processes were implemented in late October, with review of results planned for late November.

The Region's "critical control points", representing critical process steps, remain unchanged following the 2020 risk assessment review. They include:

- Coagulant feed;
- Filter effluent turbidity;
- Disinfectant feed;
- Primary disinfection;
- Secondary disinfection.

Risks associated with these critical control points are all low-scoring, as they are well-controlled with existing preventive measures and monitoring/response procedures.

Water QMS Management Review

Water QMS Top Management and the QMS Representative meet twice per year to complete a QMS Management Review as required by the *Standard*. At these meetings, Top Management reviews the status of the QMS and identifies corrective actions and continual improvement opportunities to enhance the QMS and associated operations.

Part 1 of the 2020 Management Review was completed on May 28, 2020; Part 2 is scheduled to be completed on December 3, 2020.

Action items identified at the Management Review meetings are summarized in Table 2.

Table 2: Management Review Meetings and Results – Water QMS

Review Meeting	Date	Results
Part 1 – 2019	May 31, 2019	<i>Previously reported in 2019 QMS Update to PWC</i>
Part 2 – 2019	Dec. 2, 2019	Two new action items relating to: <ul style="list-style-type: none"> • Infrastructure review • Continual improvement
Part 1 – 2020	May 28, 2020	One new action item relating to: <ul style="list-style-type: none"> • Changes impacting QMS
Part 2 – 2019	Dec. 3, 2020	To be reported in 2021 QMS Update to PWC

Changes Impacting the Water QMS

No forthcoming changes have been identified that may impact the Water QMS.

Wastewater QMS

The Water-Wastewater Services Division has opted to develop and implement a Wastewater QMS as a due diligence exercise. The benefits of the Wastewater QMS are numerous and include documentation of policies and procedures, a formalized risk assessment program, incorporation of compliance requirements into standard operating procedures, and an audit program that promotes continual improvement of quality management practices.

Roles and Responsibilities – Wastewater QMS

Key wastewater QMS roles are described in Table 3.

Table 3: Roles and Responsibilities – Wastewater QMS

Role	Assignment
System Owner	Niagara Region (represented by Regional Council)
Operating Authority	Niagara Region (represented by staff of the Water and Wastewater Services Division)

Role	Assignment
Top Management	Commissioner of Public Works Director, Water and Wastewater Services Division Associate Director, Wastewater Operations & Maintenance Associate Director, Water-Wastewater Engineering Associate Director, Water-Wastewater Integrated Systems Associate Director, Water-Wastewater Asset Management
QMS Representatives	Water-Wastewater Quality Management Specialist, reporting to Manager, Wastewater Quality & Compliance (<i>primary</i>) Water-Wastewater Quality Management Specialist, reporting to Associate Director, Water Operations & Maintenance (<i>backup</i>)

Internal Audits of the Wastewater QMS

Like the Water QMS, annual internal audits of the Wastewater QMS are also undertaken by water and wastewater staff. All internal auditors have completed applicable training led by a qualified and competent trainer. Through the audit process, internal auditors assess conformance of the division's Water QMS with Ontario's *Drinking Water Quality Management Standard* (as modified to suit wastewater operations) and with divisional policies and procedures. As Niagara Region is not legally required to implement a Wastewater QMS, internal audits of the QMS are undertaken strictly as a best practice.

The approach to the Wastewater QMS internal audit was modified this year in response to the ongoing challenges posed by the COVID-19 pandemic. In an attempt to maintain physical distancing and limit treatment plant access to only the most essential of staff and visitors, the audit has been reduced in scope. It is being conducted as a remote desktop audit that examines a subset of the QMS elements and favours online meetings over in-person visits to treatment facilities. This approach respects the seriousness of COVID-19 while allowing the division to maintain conformance with the requirements of the Wastewater QMS.

The internal audit findings include 9 non-conformances and 9 opportunities for improvement. These findings are detailed in the Wastewater QMS Internal Audit Report (Appendix 3 to this report).

External Audits of the Wastewater QMS

There is no requirement for the Wastewater QMS to be audited and accredited by an external body. Therefore, no external audits are performed.

Wastewater QMS Risk Assessment

An internal risk assessment is completed every 36 months for each of Niagara Region's wastewater systems, with complementary risk assessment reviews to be completed at approximately 12 and 24 months between the assessments. The last full risk assessment for the Wastewater QMS was completed in fall 2018, with reviews initiated in November 2019 and September 2020.

91 high-risk items were identified during the 2019 review; this list was reduced to 86 high-risk items during the 2020 review. The significant number of high-scoring risks is reflective of the region's massive inventory of wastewater assets (12 treatment facilities, a bio-solids treatment facility, and 112 sewage pumping stations) and the critical need for infrastructure improvement in wastewater operations. 58 of the 86 high-scoring items from the 2020 risk assessment will be mitigated through ongoing or planned capital projects, further highlighting the need for capital improvements to wastewater system infrastructure.

Wastewater QMS Management Review

Wastewater QMS Top Management and the QMS Representative meet twice per year to complete a QMS Management Review as required by the Standard. At these meetings, Top Management reviews the status of the QMS and identifies corrective actions and continual improvement opportunities to enhance the QMS and associated operations.

Part 1 of the 2020 Management Review was completed on June 22, 2020; Part 2 is scheduled to be completed on November 12, 2020.

Action items identified at the Management Review meetings are summarized in Table 4 (next page).

Table 4: Management Review Meetings and Results – Wastewater QMS

Review Meeting	Date	Results
Part 1 – 2019	Mar. 27, 2019	<i>Previously reported in 2019 QMS Update to PWC</i>
Part 2 – 2019	Nov. 12, 2019	Four new action items relating to: <ul style="list-style-type: none"> • Infrastructure review (2) • Wastewater compliance (2)
Part 1 – 2020	Jun. 22, 2020	No new action items identified.
Part 2 – 2020	Nov. 12, 2020	<i>To be reported in 2020 QMS Update to PWC</i>

Changes Impacting the Wastewater QMS

The Ministry of the Environment, Conservation, and Parks (MECP) has indicated that a quality management standard will be developed for wastewater systems. Unlike the *Drinking Water Quality Management Standard*, conformance and accreditation to the Wastewater Management Standard will be voluntary. Development of the Wastewater Management Standard is industry-driven and is still in very early stages; as such, there is no forecasted date for its publication.

Governmental Partners

Drinking water system Operating Authority staff work closely with the MECP to ensure that comments and concerns related to current and future drafts of the Drinking Water Quality Management Standard have been considered. When changes are made to the Standard, they are incorporated into the Region's Water QMS and are also considered for incorporation into the Wastewater QMS as relevant and/or feasible.

Water and Wastewater Operating Authority staff meet quarterly with Area Municipal counterparts to share resources, experiences, and best practices pertaining to water and wastewater quality management and compliance.

Public and/or Service Users

The Water QMS Policy, Water QMS accreditation information, and Wastewater QMS Policy are available to the public and service users via the Niagara Region's external website.

The most current approved versions of Operational Plans are available upon request to a Water-Wastewater Quality Management Specialist (rachel.whyte@niagararegion.ca or michelle.max@niagararegion.ca).

Updates to the Water and Wastewater QMS Operational Plans

The Water QMS Operational Plan and Wastewater QMS Operational Plan were revised in late 2019 and were re-endorsed by Regional Council on December 12, 2019 under Report PW 67-2019, Drinking Water Compliance and Water-Wastewater Quality Management System Endorsement. Since that time, there have been administrative updates to both Operational Plans that capture minor changes to the division's organizational structure as well as recommendations for improvement received during the 2020 external accreditation audit of the Water QMS. These changes have been submitted to the Commissioner of Public Works for approval via delegated authority previously granted to the Commissioner under Report PW 109-2008.

Alternatives Reviewed

The Ministry of the Environment, Conservation, and Parks has appointed two accreditation bodies who are authorized to conduct external audits of Drinking Water Quality Management Systems under Part IV of the Safe Drinking Water Act, 2002. Niagara Region appointed QMI-SAI Global for Water QMS accreditation services in 2013. QMI-SAI continues to act as the Region's external auditor for the Water QMS.

Relationship to Council Strategic Priorities

Niagara Region's Water and Wastewater Quality Management Systems, and associated audit processes, relate directly to Council's Strategic Priority 4.1 of committing to "high quality, efficient and coordinated core services". The Water QMS and Wastewater QMS are used to drive continual improvement within the Water and Wastewater Services Division; they increase accountability by defining clear roles and responsibilities for divisional staff, and they increase data accessibility through documented standard operating procedures and associated record-keeping practices.

The Water QMS and Wastewater QMS also relate to Council's Strategic Priority 4.2 of committing to "enhanced communication". The continued accreditation of the Region's Water QMS, and the due diligence established through the Region's Wastewater QMS, provide residents with assurance that their drinking water is safe and that the associated systems are competently managed.

Other Pertinent Reports

- PWA 109-2008, DWQMS Update (October 29, 2008).
- PW 67-2019, 2019 Annual Water and Wastewater Quality Management System Update (December 3, 2019).

Prepared by:

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Public Works Department

Recommended by:

Bruce Zvaniga, P. Eng.
Commissioner of Public Works (Interim)
Public Works Department

Submitted by:

Ron Tripp, P.Eng.
Acting Chief Administrative Officer

This report was prepared in consultation with Michelle Max, B. Sc., C. Tech., W-WW Quality Management Specialist, and Pamela Hamilton, Program Financial Specialist. It was reviewed by Jason Oatley, B.Sc., C. Chem., Manager, Wastewater Quality and Compliance; John Brunet, Associate Director, Water Operations and Maintenance; Doug Johnson, Associate Director, Wastewater Operations and Maintenance; and Joe Tonellato, P. Eng., Director of Water & Wastewater Services.

Appendices

Appendix 1	Water QMS Internal Audit Report
Appendix 2	Water QMS External Audit Reports
Appendix 3	Wastewater QMS Internal Audit Report

INTERNAL AUDIT REPORT

Competencies and Training

Top Management Communication

Capital Project Implementation
and Hand-Off

General

Niagara Region All Drinking Water Systems Internal Audit

Operations
Top Management
Maintenance
QMS Representative
Support Staff

March 2 – 12, 2020

1.0 INTRODUCTION

1.1 Purpose

The 2020 internal audit was undertaken:

- To verify the continued conformance of the Water-Wastewater (W-WW) Division's Water QMS (Quality Management System) with the requirements of the DWQMS (Drinking Water Quality Management Standard) and the Water QMS Operational Plan; and
- To verify the effective implementation and maintenance of the Water QMS for all five of Niagara Region's drinking water systems.

Audits were completed between March 2nd and 12th, 2020; **an additional remote audit was conducted in June 2020**. Audits were conducted at four water treatment plants (WTPs), including the Niagara Falls WTP (Area 1), the Welland WTP (Area 2), and the DeCew Falls and Grimsby WTPs (Area 3). Internal audits were also conducted with members of Top Management and with staff of the W-WW Integrated Systems, W-WW Engineering, and W-WW Asset Management groups.

NOTE: This audit report was amended in July 2020 to capture an additional audit conducted for Element 8 – Risk Assessment Outcomes. The amendments are identified in red font throughout the report.

1.2 Scope

The 2020 internal audit was conducted as a process audit; in this type of audit, auditors examine the elements of the DWQMS as they relate to a selected process. The processes selected to be audited included:

- Competencies and training;
- Top Management communication;
- Capital project implementation and hand-off; and
- General elements not otherwise covered.

The following elements were examined as part of this internal audit:

- Element 1 – Quality Management System
- Element 2 – Quality Management Policy

- Element 4 – QMS Representative
- Element 5 – Documents and Records Control
- Element 6 – Drinking Water System
- **Element 8 – Risk Assessment Outcomes (audited June 2020)**
- Element 9 – Organizational Structure, Roles, Responsibilities and Authorities
- Element 10 – Competencies
- Element 11 – Personnel Coverage
- Element 12 – Communications
- Element 13 – Essential Supplies and Services
- Element 14 – Review and Provision of Infrastructure
- Element 15 – Infrastructure Maintenance, Rehabilitation and Renewal
- Element 16 – Sampling, Testing and Monitoring
- Element 17 – Measurement & Recording Equipment Calibration and Maintenance
- Element 20 – Management Review
- Element 21 – Continual Improvement

Elements 3 (Commitment and Endorsement), 7 (Risk Assessment), 18 (Emergency Management), and 19 (Internal Audits) were not audited during the 2020 internal audit. These elements will be included in future internal audits.

1.3 Selection of Internal Audit Team

Internal auditors for the 2020 audit were:

- **Area 1:** Dawn MacArthur, Rhonda McCabe
- **Area 2:** Rachel Whyte, Andrew Braham
- **Area 3:** Deanna Barrow, Michelle Max
- **General Elements:** Jen Croswell, Janet Rose, Rachel Whyte
- **Risk Assessment Outcomes:** Rachel Whyte

All internal auditors have completed Internal Auditor Training as required by the **Internal Audit Procedure** (QMS-WT-ALL-P-190, rev9, effective 3Feb2020).

1.4 Criteria and Methodology

Audit criteria included the following:

- **Internal Audit Procedure** (QMS-WT-ALL-P-190, rev9, effective 3Feb2020);
- **Niagara Region Water Operational Plan** (QMS-WT-ALL-MAN-010, rev9, effective 12Dec2019) and supporting procedures; and
- Internal audit training materials (various auditor training courses).

Audits were conducted by assigned auditors as noted in Section 1.3 of this report. Selected members of Top Management and other support staff were also interviewed by assigned auditors. An opening meeting was held at each of the audit interviews. Auditor checklists were completed and reviewed with the Lead Auditor. These checklists are not attached to this audit report, but are retained as per **Document & Records Control** (QMS-WT-ALL-P-050, rev8, effective 6Jan2020).

1.5 Summary of New Internal Audit Findings

Findings are categorized as follows and are summarized in Table 1 below.

- **Non-conformance:** A requirement of the Drinking Water Quality Management Standard or a documented Standard Operating Procedure is not being met. These findings require **corrective action**.
- **Potential non-conformance:** A non-conformance has not yet occurred, but a trend or pattern indicates that occurrence of a non-conformance is likely. These findings require **preventive action**.
- **Best practice for evaluation:** A best practice behaviour or opportunity for improvement is identified. These findings are brought forward to the appropriate level of management for review and consideration, and those requiring Top Management direction or input are reviewed at the annual Management Review.

Table 1: Summary of Internal Audit Findings – Number and Type

Element	NC	PNC	BP	Total
Document and Records Control (5)	4	1	1	6
Drinking Water System (6)			1	1
Risk Assessment Outcomes (8)	2		1	3
Org Structure, Roles, Responsibilities, and Authorities (9)		1		1
Competencies (10)	1	1	2	4
Communications (12)			2	2
Review and Provision of Infrastructure (14)	3	4	3	10
Infrastructure Maintenance, Rehab, and Renewal (15)			3	3
Continual Improvement (21)			1	1
Total	10	7	14	31

Details of all findings are provided in Table 2 (see Section 1.8 of this Audit Report).



1.6 Review of Previous Internal Audit Findings

No previous audit findings were reviewed during this internal audit, as much work was done in advance of the internal audits to address and close open corrective actions from the previous internal audit in 2019. These efforts were summarized in a memo to Public Works Committee ([PWC-C 8-2020, 10March2020](#)).

1.7 Review of Previous External Audit Findings

No findings were identified in the 2019 external audit.

Internal Audit Results

1.8 Summary of QMS Internal Audit Findings

Table 2 provides a summary of findings from the QMS Internal Audit. In reviewing Table 2, the following acronyms should be noted:

Acronym	Definition
C	Conformance
NC	Non-Conformance
PNC	Potential Non-Conformance
BP	Best Practice for Evaluation
N/A	Not applicable – did not audit this element

Table 2 is provided below.

Table 2: Summary of Findings – 2020 Internal Audit

Element #	Finding	DWQMS Standard Element	Number
1	C	QMS conforms to the requirements of this element.	
2	C	QMS conforms to the requirements of this element.	
3	N/A	<i>Not reviewed during this internal audit.</i>	
4	C	QMS conforms to the requirements of this element.	
5	NC	Document and Records Control (QMS-WT-ALL-P-050, rev8, 6Jan2020) specifies retention locations and times for key drinking water system records. The procedure does not include direction for retention of capital project records.	WTCAR-20-001
5	NC	The external-facing Niagara Region website contains a link to access the corporate Contractor Safety Program (C3-H17, 1Sep2013) . However, the internal corporate policy library includes an updated version of Contractor Safety Program (C-HS-001-002, 8Oct2019) that is not accessible to contractors.	WTCAR-20-002
5	NC	Section 5.5.3 of Document and Records Control (QMS-WT-ALL-P-050, rev8, 6Jan2020) specifies that “controlled printed documents that are obsolete are removed from use and replaced with the current printed version”. Auditors examined printed Emergency Response Plans at Welland WTP, Decew WTP, and Grimsby WTP, and a significant number of these binders were found to have obsolete copies of the Emergency Contact List (ERP-ALL-ALL-T-002, rev17, 21Feb2020) .	WTCAR-20-003

Element #	Finding	DWQMS Standard Element	Number
5	NC	Section 5.4.2 of Document and Records Control (QMS-WT-ALL-P-050, rev8, 6Jan2020) specifies that “the majority of QMS documents are typically reviewed every three years unless otherwise indicated in the document header”. No evidence was found to support this statement.	WTCAR-20-004
5	PNC	A directive was issued from the AD, Engineering to all Senior Project Managers and Project Managers to update the Project List on Vine at least once monthly. Many records in the Project List are missing key information (project numbers, contract numbers, etc.) and are not populated with current information. No formal procedure exists to document the use and maintenance of the Project List; at present, it is expected that Senior Project Managers remember to communicate this requirement to new Project Managers.	2020-001-Audit Internal
5	BP	All controlled procedures include a reference to Personal Protective Equipment (HS-ALL-ALL-P-029) ; however, the document link does not work. It may be beneficial to update Personal Protective Equipment (HS-ALL-ALL-P-029) in EtQ to render these links functional.	2020-002-Audit Internal
6	BP	The Operating Authority may wish to add process control narratives (PCNs) to the list of project deliverables identified in Approvals and Change Management for Infrastructure Changes in a Drinking Water System (rev5, 28Feb2020) . While PCNs are not explicitly required by legislation, in general, they help to satisfy the requirement to document drinking water system operation as required by Schedule B, Section 16, of the Municipal Drinking Water Licence. PCNs can also form part of each system’s QMS drinking water system description.	2020-003-Audit Internal
7	N/A	<i>Not reviewed during this internal audit.</i>	---

Element #	Finding	DWQMS Standard Element	Number
8	NC	<i>Drinking Water System Risk Assessment (QMS-WT-ALL-P-070, rev9, 5Feb2020)</i> specifies that risk action items/plans must be initiated for any risks with scores of 15 or greater. Risk action items/plans were not initiated in EtQ for high-scoring risks from the 2020 assessment reviews.	WTCAR-20-009
8	NC	<i>Tracking Critical Control Limit Deviations (OP-WT-ALL-P-028, rev2, 24Oct2019)</i> specifies requirements for logging details of CCL alarms in SCADA. The SCADA log for the high turbidity alarm at Filter 5300 on 31Oct2019 does not include any comments.	WTCAR-20-010
8	BP	<i>CCP - Filter Effluent Turbidity (OP-WT-ALL-P-008, rev8, 21Apr2020)</i> does not include a reference to <i>Tracking Critical Control Limit Deviations (OP-WT-ALL-P-028, rev2, 24Oct2019)</i> . This reference should be included in order to create a linkage between the two processes.	2020-021-Audit Internal
9	PNC	There is an opportunity to establish a process for notifying key stakeholders when new positions are created within the Division so that key documents (e.g., Operational Plan, Competencies Table, etc.) and key systems (e.g., myLearning, EtQ, etc.) can be updated. As an example, the new Project Coordinator position is not listed in the Operational Plan or the Competencies Table.	2020-004-Audit Internal
10	NC	<i>“MOECC Operator Certificate/Licence Renewal Monitoring and Notification” (ADM-WWW-ALL-P-001, rev6, 2Aug2017)</i> does not reflect current practice. The use of automated PeopleSoft reminders/flags is not captured in the procedure.	WTCAR-20-005

Element #	Finding	DWQMS Standard Element	Number
10	PNC	Review and Revision of Water Operations Manuals (rev0, 11Jun2019) was created to define responsibilities and processes for water operations manuals. The Engineering auditee was not aware of this procedure.	2020-005-Audit Internal
10	BP	There is an opportunity to reference “MOECC Operator Certificate/Licence Renewal Monitoring and Notification” (ADM-WWW-ALL-P-001, rev6, 2Aug2017) in “Competencies” (QMS-WT-ALL-P-100, rev6, 19Sep2016) to ensure that the critical certificate renewal process is captured within the competencies program documentation.	2020-006-Audit Internal
10	BP	It is recommended that key conference dates (i.e., SCOWWA, OWWA, WEAO) be considered when scheduling training courses for staff.	2020-007-Audit Internal
11	C	QMS conforms to the requirements of this element.	---
12	BP	Consider formalizing the administration and use of ThinkTank in a controlled procedure. Procedure to include details of how suggestions are received and routed to the appropriate subject matter expert, how suggestions are evaluated, and how responses are posted.	2020-008-Audit Internal
12	BP	It may be beneficial to expand the scope of information shared via the Project List on Vine. At present, there is no common location for project files (e.g., RFP, design drawings, etc.) that project stakeholders can access easily. These documents are stored in engineering project folders, and there may be risk in directing stakeholders to these directories. The Engineering group may wish to consider adding additional fields to the Project List pages to include links to the RFP, design drawings, commissioning plans, etc.	2020-009-Audit Internal
13	C	QMS conforms to the requirements of this element.	---



Element #	Finding	DWQMS Standard Element	Number
14	NC	<p><i>Approvals and Change Management for Infrastructure Changes in a Drinking Water System (rev5, 28Feb2020)</i> specifies the following due dates for deliverables:</p> <ul style="list-style-type: none"> - Relevant Operations Manuals must be updated within 6 months of placing infrastructure in service; - New asset information must be uploaded to EAM upon the in-service date; - As-built drawings and record drawings must be provided within 12 months of the in-service date. <p>Upgrades to the Kent Avenue Reservoir were completed in August 2018.</p> <ul style="list-style-type: none"> - The corresponding Operations Manual section (<i>Niagara Falls WTP - E.30 - Storage & Transmission - Off-Site Storage, OP-WT-NF-MAN-E.30, rev3, 26Sep2017</i>) has not been updated to reflect the changes in operation. - The project contractor provided X28 asset information to Group EAM, but this information was not uploaded accordingly. - As-built drawings for the project are available electronically in DMD, but are not available in print at the Niagara Falls WTP. 	<u>WTCAR-20-006</u>



Element #	Finding	DWQMS Standard Element	Number
14	NC	<i>Approvals and Change Management for Infrastructure Changes in a Drinking Water System (rev5, 28Feb2020)</i> specifies that new asset information must be uploaded to EAM upon the in-service date. The King Street Elevated Tank decommissioning is complete and the project is in warranty phase, however, there were 11 assets remaining in EAM for this project. Additionally, the procedure focuses on addition of new assets, but equally important is the removal of existing assets that are no longer installed. It may be beneficial to modify the wording of the subject procedure to reflect this.	<u>WTCAR-20-007</u>
14	NC	Contractor specifications for Section 3.1 of the <i>Water Treatment Filter Media</i> contract document (GAC replacement) states that "the Engineer/Owner will collect GAC samples and provide these to the suppliers for performance testing". One of these samples was due to be collected at Decew Falls WTP in late 2019. No evidence was provided to indicate that this sample was collected and submitted to the supplier.	<u>WTCAR-20-008</u>

Element #	Finding	DWQMS Standard Element	Number
14	PNC	<p>There is an opportunity to clarify responsibilities for staff training in capital projects, specifically, whether these responsibilities fall to the consultant or the contractor. Auditors reviewed the <i>W-WW RFP Template (ENG-PM-ALL-F-003, rev9, 14Nov2019)</i> outlining consultant deliverables and the <i>Niagara Peninsula Standard Contract Document – Front-End Template (ENG-STD-ALL-F-001, rev12, 24Jan2020)</i> outlining contractor deliverables and did not find evidence that responsibilities for staff training on new infrastructure are clearly assigned in either document.</p> <p>Additionally, there is an opportunity to clarify responsibilities for the development of preventive maintenance schedules in <i>W-WW RFP Template (ENG-PM-ALL-F-003, rev9, 14Nov2019)</i> and/or <i>Niagara Peninsula Standard Contract Document – Front-End Template (ENG-STD-ALL-F-001, rev12, 24Jan2020)</i>. There are compliance implications if maintenance activities and calibrations that are required by regulation are not scheduled appropriately in EAM and completed on time in the field.</p>	2020-010-Audit Internal
14	PNC	<p><i>“Approvals and Change Management for Infrastructure Changes in a Drinking Water System” (rev5, 28Feb2020)</i> outlines processes for identifying the types of regulatory approvals required for a project. These approval requirements are established at the beginning of a project. As a project progresses, any changes in scope may impact the project’s approval requirements. There is a potential for non-compliance issues if projects are not re-evaluated when scopes change. It may be beneficial for the Operating Authority to establish a process for this.</p>	2020-011-Audit Internal

Element #	Finding	DWQMS Standard Element	Number
14	PNC	The 10-Year Capital Forecast is updated annually and provides an overview of planned capital works. In an ideal year, every project that is planned for the year is initiated on schedule; however, it happens often that planned projects are bumped or delayed. The auditors found evidence that new projects in a current year are sometimes initiated before the deferred ones from previous years are initiated.	2020-012-Audit Internal
14	PNC	The auditors found a memo on the Vine Divisional Memorandum Search page titled Clarification on Repair Responsibilities – Doors, Locks, Fence and Security Systems (MEMO-180419) . The memo divides labour for maintenance and renewal of security infrastructure. It may be beneficial to formalize the contents of this memo in a controlled procedure.	2020-013-Audit Internal
14	BP	There is an opportunity for Engineering Project Managers to communicate capital project timelines more clearly and consistently, and in a format that all stakeholders can access.	2020-014-Audit Internal
14	BP	There is an opportunity to more clearly define ownership and assignment of PIRs and identify who is following up on open requests.	2020-015-Audit Internal

Element #	Finding	DWQMS Standard Element	Number
14	BP	It may be beneficial to examine current expectations for upload of asset information as phases of capital projects are completed. At present, the expectation is that asset information be uploaded to EAM upon the in-service date of the full project; this often means that all asset data is provided at once at the end of a project. In reality, some assets are brought online as the project progresses, and these assets may come due for preventive maintenance/calibration before the project is complete. However, this work cannot be planned and scheduled in EAM if the assets have not been added.	2020-016-Audit Internal
15	BP	It may be beneficial to develop a documented procedure (or procedures) that outlines the key steps in project implementation and delivery, including but not limited to: <ul style="list-style-type: none"> - Responsibilities and process for RFP and tender development; - Communication requirements over the course of the project; - Typical project milestones, including situations where Operations may require deliverables in advance of legislated due dates; - Development of preventive maintenance schedules for new assets, including roles and responsibilities, requirements, timelines, and submission requirements; - Roles, responsibilities, training, and other activities involved in handing over completed projects to Water Operations, and any forms and templates that may be required. 	2020-017-Audit Internal



Element #	Finding	DWQMS Standard Element	Number
15	BP	It may be beneficial to require Engineering Project Managers to provide capital project contractors with a list of current assets in the area of the planned capital work so that they can identify, with more certainty, the assets that are removed during construction.	2020-018-Audit Internal
15	BP	It may be beneficial to include GAC as an asset in EAM so that relevant specifications, lifecycle history, and other information can be properly tracked.	2020-019-Audit Internal
16	C	QMS conforms to the requirements of this element.	---
17	C	QMS conforms to the requirements of this element.	---
18	N/A	<i>Not reviewed during this internal audit.</i>	---
19	N/A	<i>Not reviewed during this internal audit.</i>	---
20	C	QMS conforms to the requirements of this element.	---
21	BP	There is an opportunity to define a process for communicating the outcomes of non-conformances, potential non-conformances, and opportunities for improvement to staff, and to apply this process consistently.	2020-020-Audit Internal

Prepared by: Rachel Whyte

Date: July 16, 2020 (rev1)

Audit Report

Systems Audit for

The Regional Municipality of Niagara

1631650-02

Audited Address:

3501 Schmon Parkway, Thorold, Ontario, CAN, L2V 4T7

Start Date: May 27, 2020 End Date: May 29, 2020

Type of audit - System

Issue Date: May 29, 2020

Revision Level: Final

BACKGROUND INFORMATION

SAI Global conducted an audit of The Regional Municipality of Niagara beginning on May 27, 2020 and ending on May 29, 2020 to DRINKING WATER QUALITY MANAGEMENT STANDARD VERSION 2 - 2017.

The purpose of this audit report is to summarise the degree of compliance with relevant criteria, as defined on the cover page of this report, based on the evidence obtained during the audit of your organization. This audit report considers your organization's policies, objectives, and continual improvement processes. Comments may include how suitable the objectives selected by your organization appear to be in regard to maintaining customer satisfaction levels and providing other benefits with respect to policy and other external and internal needs. We may also comment regarding the measurable progress you have made in reaching these targets for improvement.

SAI Global audits are carried out within the requirements of SAI Global procedures that also reflect the requirements and guidance provided in the international standards relating to audit practice such as ISO/IEC 17021-1, ISO 19011 and other normative criteria. SAI Global Auditors are assigned to audits according to industry, standard or technical competencies appropriate to the organization being audited. Details of such experience and competency are maintained in our records.

In addition to the information contained in this audit report, SAI Global maintains files for each client. These files contain details of organization size and personnel as well as evidence collected during preliminary and subsequent audit activities (Documentation Review and Scope) relevant to the application for initial and continuing certification of your organization.

Please take care to advise us of any change that may affect the application/certification or may assist us to keep your contact information up to date, as required by SAI Global Terms and Conditions.

This report has been prepared by SAI Global Limited (SAI Global) in respect of a Client's application for assessment by SAI Global. The purpose of the report is to comment upon evidence of the Client's compliance with the standards or other criteria specified. The content of this report applies only to matters, which were evident to SAI Global at the time of the audit, based on sampling of evidence provided and within the audit scope. SAI Global does not warrant or otherwise comment upon the suitability of the contents of the report or the certificate for any particular purpose or use. SAI Global accepts no liability whatsoever for consequences to, or actions taken by, third parties as a result of or in reliance upon information contained in this report or certificate.

Please note that this report is subject to independent review and approval. Should changes to the outcomes of this report be necessary as a result of the review, a revised report will be issued and will supersede this report.

Standard:	DRINKING WATER QUALITY MANAGEMENT STANDARD VERSION 2 - 2017		
Scope of Certification:	Full Scope - Treatment and Distribution System		
Drinking Water System Owner:	Regional Municipality of Niagara		
Operating Authority:	Regional Municipality of Niagara		
Population Services:	400,000		
Activities:	Treatment Distribution Decew Falls / Niagara Falls Drinking Water System, Municipal Drinking Water Licence # 007-102, Issue 5 Grimsby Drinking Water System, Municipal Drinking Water Licence # 007-105, Issue 3		
Drinking Water Systems	Port Colborne Drinking Water System, Municipal Drinking Water Licence # 007-101, Issue 3 Welland Drinking Water System; Municipal Drinking Water Licence # 007-104, Issue 3 Rosehill Drinking Water System, Municipal Drinking Water Licence # 007-103, Issue 5		
Total audit duration:	Person(s): 1	Day(s): 2.25	
Audit Team Member(s):	Team Leader Marco Brunato		

Definitions and action required with respect to audit findings

Major Non-conformance:

Based on objective evidence, the absence of, or a significant failure to implement and/or maintain conformance to requirements of the applicable standard. Such issues may raise significant doubt as to the capability of the management system to achieve its intended outputs (i.e. the absence of or failure to implement a complete Management System clause of the standard); or

A situation which would on the basis of available objective evidence, raise significant doubt as to the capability of the Management System to achieve the stated policy and objectives of the customer.

NOTE: The "applicable Standard" is the Standard which SAI Global are issuing certification against, and may be a Product Standard, a management system Standard, a food safety Standard or another set of documented criteria.

Action required: This category of findings requires SAI Global to issue a formal NCR; to receive and approve client's proposed correction and corrective action plans; and formally verify the effective implementation of planned activities. Correction and corrective action plan should be submitted to SAI Global prior to commencement of follow-up activities as required. Follow-up action by SAI Global must 'close out' the NCR or reduce it to a lesser category **within 90 days for initial certification and within 60 days for surveillance or re-certification audits, from the last day of the audit.**

If significant risk issues (e.g. safety, environmental, food safety, product legality/quality, etc.) are detected during an audit these shall be reported immediately to the Client and more immediate or instant correction shall be requested. If this is not agreed and cannot be resolved to the satisfaction of SAI Global, immediate suspension shall be recommended.

In the case of initial certification, failure to close out NCR within the time limits means that the Certification Audit may be repeated.

If significant risk issues (e.g. safety, environmental, food safety, product legality/quality, etc.) are detected during an audit these shall be reported immediately to the Client and more immediate or instant correction shall be requested. If this is not agreed and cannot be resolved to the satisfaction of SAI Global, immediate suspension shall be recommended.

In the case of an already certified client, failure to close out NCR within the time limits means that suspension proceedings may be instituted by SAI Global.

Follow-up activities incur additional charges.

Minor Non-conformance:

Represents either a management system weakness or minor issue that could lead to a major nonconformance if not addressed. Each minor NC should be considered for potential improvement and to further investigate any system weaknesses for possible inclusion in the corrective action program

Action required: This category of findings requires SAI Global to issue a formal NCR; to receive and approve client's proposed correction and corrective action plans; and formally verify the effective implementation of planned activities at the next scheduled audit.

Opportunity for Improvement:

A documented statement, which may identify areas for improvement however shall not make specific recommendation(s).

Action required: Client may develop and implement solutions in order to add value to operations and management systems. SAI Global is not required to follow-up on this category of audit finding.

Audit Type and Purpose - Systems Audit:

A desktop audit of the operational plan for the subject systems to assess whether the documented QMS meets the PLAN requirements of the DWQMS V2.

Audit Objectives

The objective of the audit was to determine whether the drinking water Quality Management System (QMS) of the subject system conforms to the requirements of the Ontario Ministry of the Environment & Climate Change (MOECC) Drinking Water Quality Management Standard (DWQMS V2).

The audit was also intended to gather the information necessary for SAI Global to assess whether accreditation can continue or be offered to the operating authority.

Audit Scope

The operational plan and processes associated with the operating authority's QMS were objectively evaluated to determine a) whether the quality management activities and related results conform with the DWQMS V2 PLAN requirements.

Audit Criteria:

- The Drinking Water Quality Management Standard Version 2
- Current QMS manuals, procedures and records implemented by the Operating Authority
- SAI Global Accreditation Program Handbook

Confidentiality and Documentation Requirements

The SAI Global stores their records and reports to ensure their preservation and confidentiality. Unless required by law, the SAI Global will not disclose audit records to a third party without prior written consent of the applicant. The only exception will be that the SAI Global will provide audit and corrective action reports to the Ontario Ministry of the Environment. For more information, please refer to the SAI Global Accreditation Program Handbook.

As part of the SAI Global Terms, it is necessary for you to notify SAI Global of any changes to your Quality Management System that you believe are significant enough to risk non-conformity with DWQMS V2: For more information, please refer to the SAI Global Accreditation Program Handbook.

Review of any changes

There have been no noted changes to the system.

EXECUTIVE OVERVIEW

The objective of this System audit (Stage 1) was to review the management system and processes, confirm the scope for certification, and determine the organization's preparedness for the onsite verification audit (Stage 2). In addition, it allowed for the review of the adequacy of the SAI Global audit program and resources for the audit including confirming and preparing the draft audit plan.

The results of this System (Stage 1) audit indicate that the organization is now ready for an onsite accreditation (Stage 2) audit.

Recommendation

Based on the results of this audit it has been determined that the management system is effectively implemented and maintained and meets the PLAN requirements of the standard relative to the scope of certification identified in this report; a recommendation for continued certification will be submitted to SAI Global review team pending the outcome of the onsite verification audit.

Opportunities for Improvement:

The following opportunities for improvement have been identified for the identified clauses;

- 3 - Consider clarifying the role of the CAO as an Owner representative endorsing the Operational Plan
- 3 - Consider referencing section 9 to identifying/specifying the top management by position title.
- 9 - Consider defining the roles, responsibility and authority of the ORO and an OIT (Operator in Training) if such a role exists or is being planned.
- 10 - Consider expanding the definition of Competency beyond knowledge from (training) requirements defined in the table to also included education, experience and/or skills (as might be defined in position descriptions or job postings)
- 10 - Consider documenting the process by which initial and ongoing competency is assessed.
- 16 - Consider including within the scope of each procedure a clarification regarding relevant sampling, testing or monitoring activities, that may or may not take place, upstream of the subject system (that is before water enters the DWS).
- 18 - Consider reviewing the 5-year frequency to assess if the frequency may be too long between changes of people, processes, equipment, hazards and the frequency of actual events.

It is suggested that the opportunities for improvement be considered by management to further enhance the Operating Authority's Quality Management System and performance.

Management System Documentation

The management systems operational plan Rev 10 was reviewed and found to be in conformance with the PLAN requirements of the standard.

Management Review

The procedure for management review was found to meet the PLAN requirements of the standard.

Internal Audits

The procedure for Internal audits was found ensure conformance to PLAN arrangements, the requirements of the standard and the established management system.

Corrective, Preventive Action & Continual Improvement Processes

The procedure for implementing an effective process for the continual improvement of the management system through the appropriate management of corrective and preventive actions and management reviews was found to meet the PLAN requirement of the standard.

Summary of Findings

1. Quality Management System	Conforms
2. Quality Management System Policy	Conforms
3. Commitment and Endorsement	Conforms/OFI
4. Quality Management System Representative	Conforms
5. Document and Records Control	Conforms
6. Drinking-Water System	Conforms/****
7. Risk Assessment	Conforms
8. Risk Assessment Outcomes	Conforms
9. Organizational Structure, Roles, Responsibilities and Authorities	Conforms/OFI/****
10. Competencies	Conforms/OFI
11. Personnel Coverage	Conforms
12. Communications	Conforms
13. Essential Supplies and Services	Conforms
14. Review and Provision of Infrastructure	Conforms
15. Infrastructure Maintenance, Rehabilitation & Renewal	Conforms
16. Sampling, Testing and Monitoring	Conforms
17. Measurement & Recording Equipment Calibration and Maintenance	Conforms/****
18. Emergency Management	Conforms/OFI
19. Internal Audits	Conforms
20. Management Review	Conforms
21. Continual Improvement	Conforms
Major NCR #	Major non-conformity. The auditor has determined one of the following: (a) a required element of the DWQMS has not been incorporated into a QMS; (b) a systemic problem with a QMS is evidenced by two or more minor non-conformities; or (c) a minor non-conformity identified with a corrective action request has not been remedied.
Minor NCR #	Minor non-conformity. In the opinion of the auditor, part of a required element of the DWQMS has not been incorporated satisfactorily into a QMS.
OFI	Opportunity for improvement. Conforms to requirement, but there is an opportunity for improvement.
Conforms	Conforms to requirement.
NANC	Not applicable/Not Covered during this audit.
****	Additional comment added by auditor in the body of the report.

PART D. Audit Observations, Findings and Comments

DWQMS Reference:	1 Quality Management System
Client Reference:	Operational Plan QMS-WT-ALL-MAN-010 Rev 10 dated Dec 12, 2019
Details: <i>The operational plan details all requirements of the standard</i>	

DWQMS Reference:	2 Quality Management System Policy
Client Reference:	Operational Plan QMS-WT-ALL-MAN-010 Rev 10 Section 2
Details: <i>The policy is outlined in its commitments to W-A-T-E-R and addresses all required commitments. The W-A-T-E-R poster is a format that communicates to OA personnel, the Owner and the Public.</i>	

DWQMS Reference:	3 Commitment and Endorsement
Client Reference:	Operational Plan QMS-WT-ALL-MAN-010 Rev 10 Section 3
<p>Details: <i>Owner Representatives of Niagara Regional Council; The Regional Chair and Regional Clerk endorse the Operational plan through direct sign off the Operational Plan in Section 3. Operating Authority top management representatives sign off via the Commitment and Endorsement Memorandum.</i></p> <p><i>Per Section 9 Top Management includes the</i></p> <ul style="list-style-type: none"> <i>Commissioner of Public Works</i> <i>Director of Water and Wastewater</i> <i>Associate Director, Water Operations, Maintenance, and Staff Development</i> <p>OFI - Consider clarifying the role of the CAO as an owner representative endorsing the Operational Plan</p> <p>OFI – Consider referencing section 9 to identifying/specifying the top management by position title.</p>	

DWQMS Reference:	4 Quality Management System Representative
Client Reference:	Operational Plan QMS-WT-ALL-MAN-010 Rev 10 Section 4 & Section 9
<p>Details: <i>Top Management has appointed the Water-Wastewater Quality Management Specialist (reporting to the Manager, Quality & Compliance – Water) as the QMS Representative for Niagara Region's drinking water systems. The representatives' responsibilities with respect to the DWQMS are defined in Section 4. The role is also reflected in Section 9 of the operational plan</i></p>	

DWQMS Reference:	5 Document and Record Control
Client Reference:	Operational Plan QMS-WT-ALL-MAN-010 Rev 10 Section 5 Procedure - Document and Records Control (QMS-WT-ALL-P-050) Rev 8
<p>Details: <i>Section 5 of the Operational plan references the procedure which provides full details of the document and records control.</i></p> <p><i>Table 1 of the Procedure identifies "other documents" required in support of the DWQMS i.e. Records Retention Bylaw, Niagara Region Purchasing Bylaw, External Sampling testing & Monitoring Reference documents</i></p> <p><i>The Operational Plan includes hyperlinks to references procedures, appendices, tables and forms.</i></p> <p><i>The EtQ database is used to track document reviews and approvals.</i></p> <p><i>Read only documents are available via the Niagara Region Employee Portal VINE and the SOP & Controlled Document Search page.</i></p> <p><i>The procedure also references the Corporate Records Retention By-Law and Schedule. In addition, information outlined in Table 2 of the procedure identifies records relevant to the DWQMS in electronic or printed format, record owner, storage and retention.</i></p>	

DWQMS Reference:	6 Drinking Water System
Client Reference:	Operational Plan QMS-WT-ALL-MAN-010 Rev 10 Section 6 Decew Falls DWS QMS-WT-DN-P-060 Rev 7 Grimsby DWS QMS-WT-GR-P-060 Rev 4 Port Colborne DWS QMS-WT-PC-P-060 Rev 5 Rosehill DWS QMS-WT-RH-P-060 Rev 9 Welland DWS QMS-WT-WE-P-060 Rev 7
<p>Details:</p> <p><u>DECEW Falls DWS includes the following described assets:</u></p> <ul style="list-style-type: none"> • Decew Falls Water Treatment Plant (source Lake Erie & Lake Gibson) • Niagara Falls Water Treatment Plant (source Lake Erie, Niagara River via Welland River/Chippewa Creek) • Lundy's Lane Tower (Elevated Tank) • Brock Street (Brock High Lift) Booster Pumping Station • Glendale Pumping Station & Glendale Meter Chamber • Kent Avenue Reservoir & Booster Pumping Station • Vineland Booster Pumping Station • Fifth Avenue Reservoir & Re-Chlorination Station • Montrose Road Re-Chlorination Station • Line 2 Re-Chlorination Station • Niagara-On-The-Lake Analyzer Station • Carlton Street Reservoir (not in service) • Port Robinson Re-Chlorination Station • St. David's Re-Chlorination Station, St. David's Standpipe • Stanley Avenue Re-Chlorination Station • Thorold South Elevated Tank (Zone 3) • Virgil Elevated Tank • Zone 2 Standpipe (St. Catharine's) <p>Source water characteristics are reflected in table 1 and 2. Table 3 describes common event driven fluctuation. Water treatment process include pre-chlorination, coagulation, flocculation and sedimentation, filtration (activated carbon and silica sand) & UV disinfection, Primary disinfection – chlorination; Secondary disinfection – chlorination in the distribution system. Table 4 identifies distribution systems connected and the Owner/Operating authorities.</p> <p>Process Schematic QMS-WT-DN-V-060 Rev 3</p> <p><u>Grimsby DWS assets include:</u></p> <ul style="list-style-type: none"> • Grimsby Water Treatment Plant (source Lake Ontario) • Hixon Street Reservoir • Lincoln / Grimsby Booster Pumping Station • Park Road Reservoir & Booster Pumping Station • Smithville Elevated Tank, Reservoir & Booster Pumping Station <p>Source water characteristics are reflected in table 1 Table 2 describes common event driven fluctuation. Water treatment process include pre-chlorination, coagulation, flocculation and sedimentation, filtration (activated carbon and silica sand) & UV disinfection, Primary disinfection – chlorination; Secondary disinfection – chlorination in the distribution system. Table 3 identifies distribution systems connected and the Owner/Operating authorities.</p> <p>Process Schematic QMS-WT-GR-V-060 Rev 3</p> <p><u>Port Colborne DWS assets include:</u></p> <ul style="list-style-type: none"> • Port Colborne Water Treatment Plant (source Lake Erie) • Fielden Avenue Reservoir & Pumping Station; • Barrick Road Elevated Tank; <p>Source water characteristics are reflected in table 1 Table 2 describes common event driven fluctuation. Water treatment process include pre-chlorination, coagulation, flocculation and sedimentation, filtration (activated carbon and silica sand) & UV disinfection, Primary disinfection – chlorination; Secondary disinfection – chlorination in the distribution system. Table 3 identifies distribution systems connected and the Owner/Operating authority (City of Port Colbourne/Distribution System).</p> <p>Process Schematic QMS-WT-PC-V-060 Rev 4</p> <p><u>Rosehill DWS assets include:</u></p> <ul style="list-style-type: none"> • Rosehill Water Treatment Plant; (Source Lake Erie) • Central Avenue Elevated Tank; • Erie Road Re-Chlorination Station; • Ridgeway Standpipe; • Stevensville Reservoir & Pumping Station. <p>Source water characteristics are reflected in table 1 (Comment: table 1 is duplicate in section 5.2.2 and 5.2.3) Table 2 describes common event driven fluctuation. Water treatment process include pre-chlorination, coagulation, flocculation and sedimentation, filtration (activated carbon and silica sand) & UV disinfection, Primary disinfection – chlorination; Secondary disinfection – chlorination in the distribution system.</p>	

Table 3 identifies distribution systems connected and the Owner/Operating authority (Town of Fort Erie/Fort Erie Distribution)

Process Schematic QMS-WT-RH-V-060 Rev 5

Welland DWS assets include:

- Welland Water Treatment Plant; (source Lake Erie)
- Bemis Park Elevated Tank;
- Pelham Elevated Tank;
- Shoalts Drive Reservoir and Pumping Station;

Source water characteristics are reflected in table 1 (**Comment: table 1 is duplicate in section 5.2.2 and 5.2.3**)

Table 2 describes common event driven fluctuation.

Water treatment process include pre-chlorination, coagulation, flocculation and sedimentation, filtration (activated carbon and silica sand) & UV disinfection, Primary disinfection – chlorination; Secondary disinfection – chlorination in the distribution system.

Table 3 identifies distribution systems connected and the Owner/Operating authorities.

Process Schematic QMS-WT-WE-V-060 Rev 6

Comment: There appears to be no specific mention of lake turnover as seasonal or event driven fluctuations in except for the Rosehill DWS description in Table 2.

DWQMS Reference:	7 Risk Assessment
Client Reference:	Operational Plan QMS-WT-ALL-MAN-010 Rev 10 Section 7 Procedure - Drinking Water System Risk Assessment (QMS-WT-ALL-P-070) Rev 9
<p>Details: The procedure outlines the risk assessment method and criteria. Risk assessment outcome are documented in Risk Assessment Outcomes Table (QMS-WT-ALL-T-080) and stored in the EtQ portal.</p> <p>Risk assessment is completed annually.</p> <p>Risk Assessment Review Form - Water (QMS-WT-ALL-F-070 Rev 0) is used to update the completed Risk Assessment Outcomes Table with changes as applicable. A rank of >15 denotes the need for action.</p> <p>Appendix A of the procedure defines the risk assessment scoring criteria;</p> <p>Table A1 Likelihood (1-5; 1=Rare, 5=Very Likely);</p> <p>Table A2 Severity impact water quality (1-5; 1=Insignificant, 5=Catastrophic);</p> <p>Table A3 Severity impact on system capacity (1-5; 1=Insignificant, 5=Catastrophic);</p> <p>Table A4 Severity impact on compliance (1-5; 1=Insignificant, 5=Catastrophic);</p> <p>Table A5 Severity impact on the environment (1-5; 1=Insignificant, 5=Catastrophic);</p> <p>Table A6 Severity impact financial (1-5; 1=Insignificant, 5=Catastrophic);</p> <p>Table A4 Severity impact on reputation (1-5; 1=Insignificant, 5=Catastrophic);</p>	

DWQMS Reference:	8 Risk Assessment Outcomes
Client Reference:	Operational Plan QMS-WT-ALL-MAN-010 Rev 10 Section 8
<p>Details:</p> <p>Risk Outcomes Table QMS-WT-ALL-T-080 Rev 4</p> <p>CCPs for Niagara Region's drinking water systems are identified as:</p> <ul style="list-style-type: none"> • CCP: Coagulant (Aluminum Sulphate) Feed (OP-WT-ALL-P-006) • CCP: Secondary Disinfection (Distribution Chlorine) (OP-WT-ALL-P-007) • CCP: Filter Effluent Turbidity (OP-WT-ALL-P-008) • CCP: Primary Disinfectant (Sodium Hypochlorite) Feed (OP-WT-ALL-P-009) • CCP: Verification of Primary Disinfection (OP-WT-ALL-P-010) 	

DWQMS Reference:	9 Organizational Structure, Roles, Responsibility and Authorities
Client Reference:	Operational Plan QMS-WT-ALL-MAN-010 Rev 10 Section
<p>Details: Roles, responsibilities and authorities are defined in table 3. The organizational chart Figure 2 identifies the interrelationship of the various roles and lines of reporting.</p> <p>Comment: The reverse of the statement actually seems to be true for Figure 2 and table 3 "Positions that are greyed in Table 3 are have been deemed to not directly impact drinking water quality."</p> <p>OFI: Consider defining the roles, responsibility and authority of the ORO and an OIT (Operator in Training) if such a role exists or is being planned.</p> <p>Roles and responsibilities in an emergency are delegated/reflected by title. They are documented in section 4 of ERP-ALL-ALL-P-001.</p>	

DWQMS Reference:	10 Competencies
Client Reference:	Operational Plan QMS-WT-ALL-MAN-010 Rev 10 Section 10 Procedure – Competencies QMS-WT-ALL-P-100 Rev 7
<p>Details: Competencies have been documented in the Competency table QMS-ALL-ALL-T-100 Rev 8</p> <p><i>OFI – Consider expanding the definition of Competency beyond knowledge from (training) requirements defined in the table to included education, experience and/or skills (as might be defined in position descriptions or job postings)</i></p> <p><i>OFI - Consider documenting the process by which initial and ongoing competency is assessed.</i></p>	

DWQMS Reference:	11 Personnel Coverage
Client Reference:	Operational Plan QMS-WT-ALL-MAN-010 Rev 10 Section 11 Procedure - Personnel Coverage QMSWT-ALL-P-110 Rev 8
<p>Details: Coverage of Water Operations Staff, the Manager-on-call and ORO and OIC, Water Maintenance and Technical Trades is defined. Details for schedules are reflected in the Manager-On-Call Schedule. On Call schedule change process is defined per the On-Call Scheduling procedure ADM-ALL-ALL-P-005.</p>	

DWQMS Reference:	12 Communications
Client Reference:	Operational Plan QMS-WT-ALL-MAN-010 Rev 10 Section 12 & 3.3 Procedure - Communications QMS-WT-ALL-P-120 Rev 6
<p>Details: Procedure defines communications between top management and</p> <ul style="list-style-type: none"> • Council (Owner) • Operating Authority Personnel • Suppliers • Area Municipalities • General Public • External Agencies <p>Communication from Top Management to the Owner is conducted through an annual report to Council that summarizes: Operational Plan updates, Internal Audit results, Management Review results.</p> <p>Communications from the Owner to Top Management occur via Public Works Committee meetings.</p> <p>Communications with Suppliers occurs via Niagara Region's Corporate Services Department and the W-WW Contract Administrators to ensure that tendered essential suppliers receive relevant information.</p> <p>Water Servicing Memoranda of Understanding with each are municipality defines the communication expectations between the region and municipality.</p> <p>Communication with the Public occurs via the external newsletter GreenScene and the DWQMS link in the Regions Website. The "Contact us" link on the public website also provides an avenue for public communications with Top management.</p>	

DWQMS Reference:	13 Essential Supplies and Services
Client Reference:	Operational Plan QMS-WT-ALL-MAN-010 Rev 10 Section 13 Procedure - Essential Supplies and Services QMS-WTALL-P-130 Rev 9
<p>Details:</p> <p>Procedure references the Essential Supplies and Services page on Vine. Chemical, laboratory and calibration services are included. Sections 5.2, 5.3, 5.4 and 5.5. define the means for ensuring requirements are met.</p> <p>For chemical suppliers the procedure Bulk Chemical Deliveries OP-ALL-ALL-P-001 defines supplier requirements</p> <p>Contract requirements for essential supplies and/or services can be found referenced in the applicable Request for Tender or Request for Quotation from Niagara Region's Purchasing Services. The Purchasing By-Law defines purchasing policies and procedures for Niagara Region.</p> <p>Essential Supplies and Services associated with capital expenses are described in Water-Wastewater Project Design Manual (ENG-PM-ALL-MAN-001).</p>	

DWQMS Reference:	14 Review and Provision of Infrastructure
Client Reference:	Operational Plan QMS-WT-ALL-MAN-010 Rev 10 Section 14 Procedure - Review, Rehabilitation, and Renewal of Infrastructure QMS-WT-ALL-P-140 Rev 9
<p>Details: Procedure outlines a process for the annual review of drinking water system infrastructure to ensure its continued adequacy. It details how capital-funded drinking-water infrastructure rehabilitation and renewal projects are initiated, approved and communicated to the Owner.</p> <p>Various means for review include</p> <ul style="list-style-type: none"> • W-WW working group staff meetings (Operations, Maintenance, Quality & Compliance, Engineering, Capital Planning, others) • DLT Meetings • Condition Assessment Studies • Master Servicing Plan (identifies short and long-term infrastructure needs) • Detailed Servicing Studies (can be from lower tier municipalities) • Risk Assessment workshops and reviews • MOECC inspections • Process studies • Observations made during regular system operation <p>Project Initiation Request is used to identify a potential infrastructure need. Annual Capital validation Process defined and reflected in Figure 1 process overview.</p>	

DWQMS Reference:	15 Infrastructure Maintenance, Rehabilitation and Renewal
Client Reference:	Operational Plan QMS-WT-ALL-MAN-010 Rev 10 Section 15 Procedure - Maintenance QMS-WT-ALL-P-150 Rev 5
<p>Details:</p> <p>The procedure defines planned and unplanned maintenance requirements per Figure 1. Table 1 defines maintenance service by team. The use of the Operations Work Request Process MTCE-WT-ALL-P-002 is used when staff recognize need for non-emergency work. Area Managers are responsible for development of Preventive maintenance Schedules. Work orders are generated weekly. Procedure for unplanned maintenance and maintenance after hours have been established. i.e. Procedure - Maintenance After-Hours Call-In Process - Water (OP-WT-ALL-V-001)</p>	

DWQMS Reference:	16 Sampling, Testing and Monitoring
Client Reference:	Operational Plan QMS-WT-ALL-MAN-010 Rev 10 Section 16 Procedure -Sampling, Testing and Monitoring QMS-WT-ALL-P-160 Rev 5
<p>Details:</p> <p>Details for Sampling, Testing and Monitoring Activities in each DWS are reflected the following procedures;</p> <ul style="list-style-type: none"> • Rosehill WTP QMS-WT-RH-T-160 Rev 6 • Niagara Falls QMS-WT-NF-T-160 Rev 6 • Welland QMS-WT-RH-T-160 Rev 7 • Port Colborne QMS-WT-PC-T-160 Rev 7 • Grimsby QMS-WT-GR-T-160 Rev 6 • DeCew Falls QMS-WT-DF-T-160 Rev6 <p>The tables within each of the listed procedures includes a column for challenging conditions.</p> <p>OFI: Consider including within the scope of each procedure a clarification regarding relevant sampling, testing or monitoring activities that may or may not take place upstream of the subject system (that is before water enters the DWS).</p> <p>Sample are collected by and analysed by a certified Water Operator according to the procedures. The Operator records internal testing results on the Plant Log Sheet. Which are reviewed at least once every 72 hours.</p> <p>Key process parameters for each drinking water system are continuously monitored using a SCADA system.</p> <p>External testing includes analyses that are performed by an external, Ministry-licenced drinking-water laboratory as defined in the above noted procedures. External testing covers Microbiological, Chemical, Radiological and Inorganic Parameters as defined in the referenced regulations.</p>	

DWQMS Reference:	17 Measurement and Recording Equipment Calibration and Maintenance
Client Reference:	Operational Plan QMS-WT-ALL-MAN-010 Rev 10 Section 17 Procedure - Measurement and Recording Equipment Calibration and Maintenance QMS-WT-ALL-P-170 Rev 6
<p>Details: <i>The procedure defines calibration and maintenance programs for instrumentation and equipment used in Niagara Region's drinking water systems. Additional calibration and verification activities are referenced in Table 1 for handheld and benchtop chlorine analyzers and turbidity meters.</i> <i>Table 2 provides maintenance/calibration requirements for verification or calibration (reference vs confirmation vs calibration.</i> <i>Table 3 defines functional uses of equipment (information vs control vs regulatory)</i> <i>The EAM PM Schedule controls and hold calibration and verification records of measuring equipment.</i> <i>In house Instrumentation Technicians are responsible for completion of online instrumentation calibrations and verifications</i> <i>Comment: What are the competency requirements for in house Instrumentation Technicians – see OFI under Clause 10 above</i></p>	

DWQMS Reference:	18 Emergency Management
Client Reference:	Operational Plan QMS-WT-ALL-MAN-010 Rev 10 Section 18 Water and Wastewater Emergency Response Plan ERP-ALL-ALL-P-001 Rev 7
<p>Details: <i>Section 2 of the ER Procedure lists the procedure in response to the listed specified potential emergency situations</i> <i>Section 3 describes the communication tree per figure 1. In addition, the Emergency Response Contact List (ERP-ALL-ALL-T-002) is also included as part of the ERP Manual. And exists as a separate document.</i> <i>The Emergency & Debrief Reporting Form (ERP-ALL-ALL-F-001) is used to capture debriefing notes following an emergency event. Details of the debriefing process are outlined in procedure Post-Event Debriefing (ADM-ALL-ALL-P-009).</i> <i>Section 6 documents requirements for training which included both orientation sessions and ERP documentation reviews via e-learning and table top workshops.</i> <i>Section 7 documents the requirements for testing (table top of full scale)</i> <i>The procedure documents that drills are held at least every five years and that real emergencies may be used to evaluate and revise emergency response.</i> <i>OFI – Consider reviewing the 5-year frequency to assess if the frequency may be too long between changes of people, processes, equipment, hazards and the frequency of actual events.</i> <i>Niagara Region's Water-Wastewater Services Division has signed a Mutual Aid & Assistance Agreement with OnWARN of which participation requirements are detailed in procedure OnWARN Emergency Response Assistance (OP-ALL-ALL-P-002).</i> <i>Other documentation in support of this element include</i> <ul style="list-style-type: none"> • Various checklist for spills, contamination within a treatment plant or system, source water quality compromise, inability to meet water demand, adverse water quality results and sewage spills • Evacuation procedures • Watermain shutdown and repair • Watermain breaks • Adverse water quality results handling • Emergency lab services for non-bacteriological sampling • Source water protection zone maps • Sewage spill clean up </p>	

DWQMS Reference:	19 Internal Audits
Client Reference:	Operational Plan QMS-WT-ALL-MAN-010 Rev 10 Section 19 Procedure Internal Auditing QMS-WT-ALL-P-190 Rev 9
<p>Details: <i>The procedure documents the criteria (Section 1), scope (Section 5.2) and frequency of internal audits (Section 5.3) ; that all 21 elements are assessed at least every 3 calendar years and that each DWS facility is audited at least every 2 calendar years.</i> <i>Records keeping is defined in section 5.6 reporting and references the Document and Records Control procedure QMS-WT-ALL-P-050.</i> <i>Section 5.4.3 refers to the review of results of previous audits in preparation for the audit.</i> <i>Section 5.6.3 defines the use of the Corrective Action procedure QMS-WT-ALL-P-210 for identification and initiation of corrective actions.</i></p>	

DWQMS Reference:	20 Management Review
Client Reference:	Operational Plan QMS-WT-ALL-MAN-010 Rev 10 Section 20 Procedure - Management Review QMS-WT-ALL-P-200 Rev 7
Details: <i>The procedure specifies a management review once per calendar by means of a Q2 and a Q4 meeting with all requirements discussed over course of the 2 meetings. In section 5.3.1, the procedure defines the specific items to be discussed in each of the respective meetings. All required inputs have been specified.</i>	

DWQMS Reference:	21 Continual Improvement
Client Reference:	Operational Plan QMS-WT-ALL-MAN-010 Rev 10 Section 21 Procedure - Corrective Action, Preventive Action, and Best Practices QMS-WT-ALL-P-210 Rev 8
Details: <i>EtQ is the Management system software tool used to track and monitor corrective and preventive actions. EtQ is also used record the root cause analysis.</i> <i>Best Practices are also part of the procedure. The procedure specifies that at least once every 36 months the QMS representative will review best practices published by the MECF.</i> <i>The procedure describes activities for handling both corrective actions and preventive actions. Handling of best practices and preventive action are addressed in Section 5.4 of the procedure with Figure 2 providing an overview of the process</i>	

This report was prepared by:



Marco Brunato
SAI Global Management Systems Auditor

The audit report is distributed as follows:

- SAI Global
- Operating Authority
- Owner
- MOECC

Notes

Copies of this report distributed outside the organization must include all pages.

Audit Report

Re Accreditation Audit for

The Regional Municipality of Niagara

1631650-02

Audited Address: 3501 Schmon Parkway, Thorold, Ontario, CAN,
L2V 4T7

Start Date: Jul 06, 2020 End Date: Jul 10, 2020

Type of audit – Re-accreditation Verification Audit

Issue Date: July 24, 2020

Revision Level:

BACKGROUND INFORMATION

SAI Global conducted an audit of The Regional Municipality of Niagara beginning on Jul 06, 2020 and ending on Jul 10, 2020 to DRINKING WATER QUALITY MANAGEMENT STANDARD VERSION 2 - 2017.

The purpose of this audit report is to summarise the degree of compliance with relevant criteria, as defined on the cover page of this report, based on the evidence obtained during the audit of your organization. This audit report considers your organization's policies, objectives, and continual improvement processes. Comments may include how suitable the objectives selected by your organization appear to be in regard to maintaining customer satisfaction levels and providing other benefits with respect to policy and other external and internal needs. We may also comment regarding the measurable progress you have made in reaching these targets for improvement.

SAI Global audits are carried out within the requirements of SAI Global procedures that also reflect the requirements and guidance provided in the international standards relating to audit practice such as ISO/IEC 17021-1, ISO 19011 and other normative criteria. SAI Global Auditors are assigned to audits according to industry, standard or technical competencies appropriate to the organization being audited. Details of such experience and competency are maintained in our records.

In addition to the information contained in this audit report, SAI Global maintains files for each client. These files contain details of organization size and personnel as well as evidence collected during preliminary and subsequent audit activities (Documentation Review and Scope) relevant to the application for initial and continuing certification of your organization.

Please take care to advise us of any change that may affect the application/certification or may assist us to keep your contact information up to date, as required by SAI Global Terms and Conditions.

This report has been prepared by SAI Global Limited (SAI Global) in respect of a Client's application for assessment by SAI Global. The purpose of the report is to comment upon evidence of the Client's compliance with the standards or other criteria specified. The content of this report applies only to matters, which were evident to SAI Global at the time of the audit, based on sampling of evidence provided and within the audit scope. SAI Global does not warrant or otherwise comment upon the suitability of the contents of the report or the certificate for any particular purpose or use. SAI Global accepts no liability whatsoever for consequences to, or actions taken by, third parties as a result of or in reliance upon information contained in this report or certificate.

Please note that this report is subject to independent review and approval. Should changes to the outcomes of this report be necessary as a result of the review, a revised report will be issued and will supersede this report.

Standard:	DRINKING WATER QUALITY MANAGEMENT STANDARD VERSION 2 - 2017
Scope of Certification:	Treatment and Distribution System
Drinking Water System Owner:	Regional Municipality of Niagara
Operating Authority:	Regional Municipality of Niagara
Population Services:	400,000
Activities:	Treatment Distribution Decew Falls / Niagara Falls Drinking Water System, Municipal Drinking Water Licence # 007-102, Issue 5 Grimsby Drinking Water System, Municipal Drinking Water Licence # 007-105, Issue 3 Port Colborne Drinking Water System, Municipal Drinking Water Licence # 007-101, Issue 3 Welland Drinking Water System; Municipal Drinking Water Licence # 007-104, Issue 3 Rosehill Drinking Water System, Municipal Drinking Water Licence # 007-103, Issue 5
Drinking Water Systems	
Total audit duration:	Person(s): 1 Day(s): 4.50
Audit Team Member(s):	Team Leader Marco Brunato

Definitions and action required with respect to audit findings

Major Non-conformance:

Based on objective evidence, the absence of, or a significant failure to implement and/or maintain conformance to requirements of the applicable standard. Such issues may raise significant doubt as to the capability of the management system to achieve its intended outputs (i.e. the absence of or failure to implement a complete Management System clause of the standard); or

A situation which would on the basis of available objective evidence, raise significant doubt as to the capability of the Management System to achieve the stated policy and objectives of the customer.

NOTE: The "applicable Standard" is the Standard which SAI Global are issuing certification against, and may be a Product Standard, a management system Standard, a food safety Standard or another set of documented criteria.

Action required: This category of findings requires SAI Global to issue a formal NCR; to receive and approve client's proposed correction and corrective action plans; and formally verify the effective implementation of planned activities. Correction and corrective action plan should be submitted to SAI Global prior to commencement of follow-up activities as required. Follow-up action by SAI Global must 'close out' the NCR or reduce it to a lesser category **within 90 days for initial certification and within 60 days for surveillance or re-certification audits, from the last day of the audit.**

If significant risk issues (e.g. safety, environmental, food safety, product legality/quality, etc.) are detected during an audit these shall be reported immediately to the Client and more immediate or instant correction shall be requested. If this is not agreed and cannot be resolved to the satisfaction of SAI Global, immediate suspension shall be recommended.

In the case of initial certification, failure to close out NCR within the time limits means that the Certification Audit may be repeated.

If significant risk issues (e.g. safety, environmental, food safety, product legality/quality, etc.) are detected during an audit these shall be reported immediately to the Client and more immediate or instant correction shall be requested. If this is not agreed and cannot be resolved to the satisfaction of SAI Global, immediate suspension shall be recommended.

In the case of an already certified client, failure to close out NCR within the time limits means that suspension proceedings may be instituted by SAI Global.

Follow-up activities incur additional charges.

Minor Non-conformance:

Represents either a management system weakness or minor issue that could lead to a major nonconformance if not addressed. Each minor NC should be considered for potential improvement and to further investigate any system weaknesses for possible inclusion in the corrective action program

Action required: This category of findings requires SAI Global to issue a formal NCR; to receive and approve client's proposed correction and corrective action plans; and formally verify the effective implementation of planned activities at the next scheduled audit.

Opportunity for Improvement:

A documented statement, which may identify areas for improvement however shall not make specific recommendation(s).

Action required: Client may develop and implement solutions in order to add value to operations and management systems. SAI Global is not required to follow-up on this category of audit finding.

Audit Type and Purpose

On-site Verification Audit:

An onsite audit to assess whether a QMS has been implemented for the subject system that meets the “DO” requirements of the DWQMS V2.

This audit was conducted remotely for part of the audit but on site for assessment of the conditions at the treatment plants per the audit plan.

Audit Objectives

The objective of the audit was to determine whether the drinking water Quality Management System (QMS) of the subject system conforms to the requirements of the Ontario Ministry of the Environment & Climate Change (MOECC) Drinking Water Quality Management Standard (DWQMS V2).

The audit was also intended to gather the information necessary for SAI Global to assess whether accreditation can continue or be offered or to the operating authority.

Audit Scope

The facilities and processes associated with the operating authority’s QMS were objectively evaluated to obtain audit evidence and to determine a) whether the quality management activities and related results conform with DWQMS V2 requirements, and b) if they have been effectively implemented and/or maintained.

Audit Criteria:

- The Drinking Water Quality Management Standard Version 2
- Current QMS manuals, procedures and records implemented by the Operating Authority
- SAI Global Accreditation Program Handbook

Confidentiality and Documentation Requirements

The SAI Global stores their records and reports to ensure their preservation and confidentiality. Unless required by law, the SAI Global will not disclose audit records to a third party without prior written consent of the applicant. The only exception will be that the SAI Global will provide audit and corrective action reports to the Ontario Ministry of the Environment. For more information, please refer to the SAI Global Accreditation Program Handbook.

As part of the SAI Global Terms, it is necessary for you to notify SAI Global of any changes to your Quality Management System that you believe are significant enough to risk non-conformity with DWQMS V2: For more information, please refer to the SAI Global Accreditation Program Handbook.

Review of any changes

Changes to the Operating Authority since last audit include: No Changes

EXECUTIVE OVERVIEW

The results of this onsite verification audit (Stage 2) indicate that the management system does not fully meet the requirements of the standard based on the area(s) of non-conformance identified during the audit and as documented in the attached Non-conformance Report(s). As discussed during the closing meeting a recommendation for certification to the standard and to the scope of certification identified in this report is on hold pending the receipt, review and acceptance of the corrective action taken. For re-certification, failure to address the nonconformances within the 60-day timeframe may lead to suspension.

Nonconformance

Minor NCR 2020-01

- Element 17 Measurement & Recording Equipment Calibration and Maintenance

Opportunities for Improvement:

The following opportunities for improvement have been identified.

- 6 – Consider the addition of the map indicating the 3 operating areas with the associated assets for which the areas are responsible
- 17 – Consider recording the lot number referenced on decanted PH buffers used to calibrate PH meters/sensors.
- 18 - Consider addition of MetroLinx (GO) to Emergency contacts list considering the increased frequency of trips between Niagara Falls and Hamilton.

It is suggested that the opportunities for improvement be considered by management to further enhance the Operating Authority's Quality Management System and performance.

Management System Documentation

The management systems operational plan(s) was reviewed and found to be in conformance with the requirements of the standard.

Management Review

Records of the most recent management review meetings were verified and found to meet the requirements of the standard. All inputs were reflected in the records and appear suitably managed as reflected by resulting actions and decisions.

Internal Audits

Internal audits are being conducted at planned intervals to ensure conformance to planned arrangements, the requirements of the standard and the established management system.

Corrective, Preventive Action & Continual Improvement Processes

The Operating Authority is implementing an effective process for the continual improvement of the management system through the use of the quality policy, quality objectives, audit results, data analysis, the appropriate management of corrective and preventive actions and management review.

Summary of Findings

1. Quality Management System	Conforms
2. Quality Management System Policy	Conforms
3. Commitment and Endorsement	Conforms
4. Quality Management System Representative	Conforms
5. Document and Records Control	Conforms
6. Drinking-Water System	Conforms/OFI
7. Risk Assessment	Conforms
8. Risk Assessment Outcomes	Conforms
9. Organizational Structure, Roles, Responsibilities and Authorities	Conforms
10. Competencies	Conforms
11. Personnel Coverage	Conforms
12. Communications	Conforms
13. Essential Supplies and Services	Conforms
14. Review and Provision of Infrastructure	Conforms
15. Infrastructure Maintenance, Rehabilitation & Renewal	Conforms
16. Sampling, Testing and Monitoring	Conforms
17. Measurement & Recording Equipment Calibration and Maintenance	Minor NCR 2020-01 & OFI
18. Emergency Management	Conforms/OFI
19. Internal Audits	Conforms
20. Management Review	Conforms
21. Continual Improvement	Conforms
Major NCR #	Major non-conformity. The auditor has determined one of the following: (a) a required element of the DWQMS has not been incorporated into a QMS; (b) a systemic problem with a QMS is evidenced by two or more minor non-conformities; or (c) a minor non-conformity identified with a corrective action request has not been remedied.
Minor NCR #	Minor non-conformity. In the opinion of the auditor, part of a required element of the DWQMS has not been incorporated satisfactorily into a QMS.
OFI	Opportunity for improvement. Conforms to requirement, but there is an opportunity for improvement.
Conforms	Conforms to requirement.
NANC	Not applicable/Not Covered during this audit.
****	Additional comment added by auditor in the body of the report.

PART D. Audit Observations, Findings and Comments

DWQMS Reference:	1 Quality Management System
Client Reference:	Operational Plan QMS-WT-ALL-MAN-010 Rev 10 dated Dec 12, 2019
<p>Details: <i>The operational plan details all requirements of the standard. All systems in place all treatment plants; all plants follow similar sops and for the smaller treatments sites. Policies & procedures established in all locations – few procedures plant specific. Operational Plan Rev 10</i></p>	

DWQMS Reference:	2 Quality Management System Policy
Client Reference:	Operational Plan QMS-WT-ALL-MAN-010 Rev 10 Section 2
<p>Details: <i>The policy is outlined in its commitments to W-A-T-E-R and addresses all required commitments. The W-A-T-E-R poster is a format that communicates to OA personnel, the Owner and the Public.</i></p> <p><i>Associate Director Water operations and maintenance John Brunet</i></p> <ul style="list-style-type: none"> - Constant updates - Ensure a dedicated resource for policy and procedure updates and understanding by the staff - New policies and engineering (contractors and capital projects) and asset management - Water succession; brain drain in last 5-10years; new young staff with high educational levels i.e. environmental studies - 12 municipal customers/partners and end users - Water quality high, - Still high capacity for growth - Compliance regulations – guides <p><i>Associate Water & Integration Systems – support group on water and ops, maintenance; specialized tech groups. H&S. Public outreach – campaigns - wastewater flushable; water festival; water wagon at large events (>500 people)</i></p> <p><i>Associate Asset Management Richard Pinder</i> <i>Director of Water and waste water services Joe – future development; few complaints; timing of new capital projects; Succession in stable.</i> <i>Communication with the owners; more spend on water services.</i> <i>Owners awareness of need to maintain infrastructure;</i> <i>Sustainability –</i> <i>Risk Assessment – Environmental hazards; GHG, Source protection.</i></p> <p><i>Associate Direct Engineering – deliver capital program; ensure budget and funding – meets compliance; asset increasing and budget about; local municipalities</i> <i>Virtual Water Festival – included a 4-day lesson plan</i></p>	

DWQMS Reference:	3 Commitment and Endorsement
Client Reference:	Operational Plan QMS-WT-ALL-MAN-010 Rev 10 Section 3
<p>Details: <i>Owner Representatives of Niagara Regional Council; The Regional Chair and Regional Clerk endorse the Operational plan through direct sign off the Operational Plan in Section 3. Operating Authority top management representatives sign off via the Commitment and Endorsement Memorandum.</i></p> <p><i>Per Section 9 Top Management includes the</i></p> <ul style="list-style-type: none"> • Commissioner of Public Works • Director of Water and Wastewater • Associate Director, Water Operations, Maintenance, and Staff Development <p><i>Commitment & endorsement from the Regional Level and divisional level from the Water Services</i> <i>PW 19-2019 March 19, 2019 Request for Endorsement;</i> <i>Ownership; Regional Chair, PW Commissioner; carried by council March 19, 2019</i> <i>Per Memorandum submitted by R Whyte QMS Oct 11, 2019</i> <i>Top Management i.e. Rich Pinder Associate Director Asset management Oct 15, 2019</i></p>	

DWQMS Reference:	4 Quality Management System Representative
Client Reference:	Operational Plan QMS-WT-ALL-MAN-010 Rev 10 Section 4 & Section 9
<p>Details: Top Management has appointed the Water-Wastewater Quality Management Specialist (reporting to the Manager, Quality & Compliance – Water) as the QMS Representative for Niagara Region’s drinking water systems. The representatives’ responsibilities with respect to the DWQMS are defined in Section 4. The role is also reflected in Section 9 of the operational plan</p> <p>WW QM Specialist responsible for the system maintenance Interface with all departments i.e. Integrated Systems; Asset Management Least connected with Engineering; interface needs to be managed by the WW Specialist Compliance awareness shared with water compliance specialist; Communications via training course “This is how we do it” mandatory compliance course Displayed Rev June 2019 Revised – look at the responsibilities of the various work groups; aligned the learning objectives Contractors and Consultants also receive awareness training of Quality & Compliance - completed Standard of Care for top Management, Ops Managers & Mtce Managers; once per council cycle and as required.</p>	

DWQMS Reference:	5 Document and Record Control
Client Reference:	Operational Plan QMS-WT-ALL-MAN-010 Rev 10 Section 5 Procedure - Document and Records Control (QMS-WT-ALL-P-050) Rev 8
<p>Details: Vine portal demonstrated; Public services link is home page – Water Wastewater Services Division links EtQ login – to Reliance Link to SOP & Controlled Document Search (Pulls from EtQ) Emergency Response documents also linked as a main EtQ indicates the current approved and revision level</p> <p>QMS Records retained in EtQ records management module from the Portal link to Records Management; index identifies the disposition/retention dates; management review and internal audits also available and retained for up to 10 years</p> <p>Bylaw 63-2013 Region Niagara retention and destruction of records</p>	

DWQMS Reference:	6 Drinking Water System
Client Reference:	Operational Plan QMS-WT-ALL-MAN-010 Rev 10 Section 6 Decew Falls DWS QMS-WT-DN-P-060 Rev 7 Grimsby DWS QMS-WT-GR-P-060 Rev 4 Port Colborne DWS QMS-WT-PC-P-060 Rev 5 Rosehill DWS QMS-WT-RH-P-060 Rev 9 Welland DWS QMS-WT-WE-P-060 Rev 7
<p>Details: Physical onsite observations were made of the assets located below. All sites are consistent with the drinking water description provided</p> <p><u>DECEW DWS assets observed included:</u></p> <ul style="list-style-type: none"> Niagara Falls Water Treatment Plant (source Lake Erie, Niagara River via Welland River/Chippewa Creek) Lundy’s Lane Tower (Elevated Tank) Kent Avenue Reservoir & Booster Pumping Station Stanley Avenue Re-Chlorination Station Queenston Heights Pumping Station <p>Process Schematic QMS-WT-DN-V-060 Rev 3</p> <p><u>Grimsby DWS assets observed included:</u></p> <ul style="list-style-type: none"> Grimsby Water Treatment Plant (source Lake Ontario) Hixon Street Reservoir Lincoln / Grimsby Booster Pumping Station <p>Process Schematic QMS-WT-GR-V-060 Rev 3</p> <p><u>Welland DWS assets observed included:</u></p> <ul style="list-style-type: none"> Welland Water Treatment Plant; (source Lake Erie) Bemis Park Elevated Tank; Shoalts Drive Reservoir and Pumping Station; <p>Process Schematic QMS-WT-WE-V-060 Rev 6</p>	

DWQMS Reference:	7 Risk Assessment
Client Reference:	Operational Plan QMS-WT-ALL-MAN-010 Rev 10 Section 7 Procedure - Drinking Water System Risk Assessment (QMS-WT-ALL-P-070) Rev 9
<p>Details: The procedure outlines the risk assessment method and criteria. Risk assessment outcome are documented in Risk Assessment Outcomes Table (QMS-WT-ALL-T-080) and stored in the EtQ portal.</p> <p>Risk assessment is completed annually.</p> <p>Risk Assessment Review Form - Water (QMS-WT-ALL-F-070 Rev 0) is used to update the completed Risk Assessment Outcomes Table with changes as applicable. A rank of >15 denotes the need for action.</p> <p>Appendix A of the procedure defines the risk assessment scoring criteria;</p> <p>Table A1 Likelihood (1-5; 1=Rare, 5=Very Likely);</p> <p>Table A2 Severity impact water quality (1-5; 1=Insignificant, 5=Catastrophic);</p> <p>Table A3 Severity impact on system capacity (1-5; 1=Insignificant, 5=Catastrophic);</p> <p>Table A4 Severity impact on compliance (1-5; 1=Insignificant, 5=Catastrophic);</p> <p>Table A5 Severity impact on the environment (1-5; 1=Insignificant, 5=Catastrophic);</p> <p>Table A6 Severity impact financial (1-5; 1=Insignificant, 5=Catastrophic);</p> <p>Table A4 Severity impact on reputation (1-5; 1=Insignificant, 5=Catastrophic);</p> <p>Risk assessment completed as per procedure.</p>	

DWQMS Reference:	8 Risk Assessment Outcomes
Client Reference:	Operational Plan QMS-WT-ALL-MAN-010 Rev 10 Section 8
<p>Details:</p> <p>Risk Outcomes Table QMS-WT-ALL-T-080 Rev 4</p> <p>CCPs for Niagara Region's drinking water systems are identified as:</p> <ul style="list-style-type: none"> • CCP: Coagulant (Aluminum Sulphate) Feed (OP-WT-ALL-P-006) • CCP: Secondary Disinfection (Distribution Chlorine) (OP-WT-ALL-P-007) • CCP: Filter Effluent Turbidity (OP-WT-ALL-P-008) • CCP: Primary Disinfectant (Sodium Hypochlorite) Feed (OP-WT-ALL-P-009) • CCP: Verification of Primary Disinfection (OP-WT-ALL-P-010) <p>Discussions with the control room/SCADA operator confirmed alarms established per the critical control points. No incidents of alarm conditions were observed during the on-site audit of the treatment plants visited as identified in element 6 above</p>	

DWQMS Reference:	9 Organizational Structure, Roles, Responsibility and Authorities
Client Reference:	Operational Plan QMS-WT-ALL-MAN-010 Rev 10 Section
<p>Details: Roles, responsibilities and authorities are defined in table 3. The organizational chart Figure 2 identifies the interrelationship of the various roles and lines of reporting.</p> <p>Regional Council</p> <p>CAO – Owner representative</p> <p>Comm. of Public works</p> <p>Manager Water & Quality Compliance – position will not be filled</p> <p>WW specialist report directly to the AD Water Operations & Maintenance</p> <p>All ADs sit in the Environmental Centre (Schmon Parkway)</p> <p>Water Ops includes – 3 operating areas defined by</p> <p>3 Operations Manager and Maintenance Manager responsible for 3 plants each</p> <p>Area 1 NF & Rosehill</p> <p>Area 2 Welland & PC</p> <p>Area 3 Decew (3 plants on one site) & Grimsby</p>	

DWQMS Reference:	10 Competencies
Client Reference:	Operational Plan QMS-WT-ALL-MAN-010 Rev 10 Section 10 Procedure – Competencies QMS-WT-ALL-P-100 Rev 7
<p>Details: Competencies have been documented in the Competency table QMS-ALL-ALL-T-100 Rev 8</p> <p>Interview with the Training Advisor</p> <p>Reg 128 – operators require set hours of training</p> <p>“Director approved” – reviewed by MECF and approved + on the job training</p> <p>150 hours, with up to 108 of those as “on the job”</p>	

*"On the Job hours" – i.e. organized class room, lunch and learned, commissioning training from project managers, tail gate talks.
i.e. Tail gate talks*

Learning Calendar Winder Spring 2020 issued 2x per year.

*Class 4 facilities – require for highest level for facility level
Approximately 175 certified water and Wastewater*

*Peoplesoft notifies staff via email flags several times to notify the operator.
Learning calendar published.
Mandatory related to OHS requirements*

*1 course counted 1 once in the three year renewal
Quality & Compliance 101
Q & C in water Operations*

*Competencies for all staff confirmed during the audit
i.e. Grimsby Jeff Carl Level IV #58702 Expire Sept 2021
i.e. N. fall B. Weaver Level III #16433 Expiry April 2022
i.e. Welland A. Ritter, J Carl, B. Haley verified IV*

*Certifications verified on the daily log sheets used in each of the SCADA control rooms; log sheet indicates class and expiry
Training requirements verified for operators specifically designated for sampling and for maintenance operators designated for instrumentation calibration. i.e. R. Bochaar Instrumentation Technician verified per Competency table Rev 8; Job Description ID 6TE4J*

Memo MECP March 24, 2020 re Certified Operator Relief Blanket MECP per O. Reg 75/20

DWQMS Reference:	11 Personnel Coverage
Client Reference:	Operational Plan QMS-WT-ALL-MAN-010 Rev 10 Section 11 Procedure - Personnel Coverage QMSWT-ALL-P-110 Rev 8
<p>Details: Coverage of Water Operations Staff, the Manager-on-call and ORO and OIC, Water Maintenance and Technical Trades is defined. Details for schedules are reflected in the Manager-On-Call Schedule. On Call schedule change process is defined per the On-Call Scheduling procedure ADM-ALL-ALL-P-005.</p> <p>Niagara Falls WTP -minimum 1 person on shift -on call ORO -2020 Ops/MTCE schedules reviewed – 4 operators on different shifts -N Falls dedicated staff + floaters may be called in -2020 Area 2 Ops + MTCG schedule Jul-Dec 2020 COVID 19 coverage – self isolation impact – no sampler & no A shift; 3 operators self-isolated</p> <p>COVIS SharePoint site developed; communications included memo on Temporary absence and work from home plans.</p> <p>Welland WTP Area 2 Schedule 2020 reviewed Grimsby WTP Area 3 Schedule 2020 reviewed</p>	

DWQMS Reference:	12 Communications
Client Reference:	Operational Plan QMS-WT-ALL-MAN-010 Rev 10 Section 12 & 3.3 Procedure - Communications QMS-WT-ALL-P-120 Rev 6
<p>Details: <i>Procedure outlines means to communicate policy and procedures</i> <i>Interview with Engagement & Education Coordinator</i></p> <p><i>Management to Owner</i></p> <ul style="list-style-type: none"> - annual report to council – late Nov/Dec. – public document; regional website; report is attached as - public works memos to communications to municipality - councilor standard of care – changeover of councilor <p><i>Internal communication of QMS</i></p> <ul style="list-style-type: none"> - intranet policy and links, QMS Rep; verified on VINE. - Controlled document portal. - Posters at facilities - Security ide cards included policy - Divisional newsletter 3 X per year. Dec 2019 - Employee portal to communication to top management - suggestions for CI and concerns <p><i>VINE – And suggestion screens shared Think Tank for suggestions; suggestions reviewed by area responsible manager and then divisional leadership; reviewed monthly</i> <i>These feed the management review suggestions from employees</i></p> <p><i>Vine is main portal for electronic communication</i></p> <ul style="list-style-type: none"> - Provided link to all procedures (EtQ) and ESS - Water compliance page <p><i>Niagara Region webpage – used for public communications – DWQMS</i> <i>Water quality reports</i> <i>Newsletter – Green Scene</i></p>	

DWQMS Reference:	13 Essential Supplies and Services
Client Reference:	Operational Plan QMS-WT-ALL-MAN-010 Rev 10 Section 13 Procedure - Essential Supplies and Services QMS-WTALL-P-130 Rev 9
<p>Details: <i>Interview with Security and Contracts Administrator</i> <i>Chemicals, calibration services, lab services</i> <i>CofA for chemicals required – AWWA standards. Sample and C of A.</i> <i>Liquid Alum tender just closed; RFT 2018 Appx D includes specifications and CofA requirements; response to chemical spills.</i> <i>Work with procurement to develop scopes</i> <i>Stakeholders provided the specific product or service requirements; into a tender document;</i> <i>Corporate services group – Procurement; most 1 year with option for 2 years;</i> <i>Lowest compliant bid</i> <i>W & WW Emergency Contact list includes water haulers and main break repairs and suppliers</i> <i>Hazardous waste – spill responders</i> <i>Emergency fuel suppliers are also on the ESS effective Sept 25, 2019; Canada Clean Fuels is supplier – fuel purchase consortium</i></p>	

DWQMS Reference:	14 Review and Provision of Infrastructure
Client Reference:	Operational Plan QMS-WT-ALL-MAN-010 Rev 10 Section 14 Procedure - Review, Rehabilitation, and Renewal of Infrastructure QMS-WT-ALL-P-140 Rev 9
<p>Details: <i>Procedure outlines a process for the annual review of drinking water system infrastructure to ensure its continued adequacy. It details how capital-funded drinking-water infrastructure rehabilitation and renewal projects are initiated, approved and communicated to the Owner.</i></p> <p><i>Capital budget completed in Jan</i> <i>EAM system input</i> <i>Meeting with ops and maintenance; process works</i> <i>End of life;</i> <i>Parts availability considered</i> <i>Capital projects some years off; what is the mitigation to keep asset operational</i></p> <p><i>Year capital plan approved by council; with a 10-year plan;</i> <i>2020 approved Nov 2019</i></p> <p><i>Condition assessment studies – update yearly; last completed</i></p> <p><i>Municipalities meeting annually to discuss infrastructure work and number of projects</i></p> <p><i>PtC – second source of water – as connections between NFalls and PtC</i> <i>Master Servicing Plan – currently being update and based on growth of the systems and new developments (infrastructure planning group) look at sustainability</i></p> <p><i>DECEW – several projects in next 3 years – \$90 Million worth.</i></p> <p><i>10 Year plan for water Operations Draft 2021</i> <i>Rosehill Ne Intake</i> <i>New Fort Erie Elevated Tank</i> <i>Chemical system upgrade program</i> <i>Generator replacement program</i> <i>Roof replacements</i> <i>Master meter replacement program</i> <i>Watermain evaluation and replacement program</i></p>	

DWQMS Reference:	15 Infrastructure Maintenance, Rehabilitation and Renewal
Client Reference:	Operational Plan QMS-WT-ALL-MAN-010 Rev 10 Section 15 Procedure - Maintenance QMS-WT-ALL-P-150 Rev 5
<p>Details: <i>The procedure defines planned and unplanned maintenance requirements per Figure 1. Table 1 defines maintenance service by team. The use of the Operations Work Request Process MTCE-WT-ALL-P-002 is used when staff recognize need for non-emergency work. Area Managers are responsible for development of Preventive maintenance Schedules. Work orders are generated weekly. Procedure for unplanned maintenance and maintenance after hours have been established. i.e. Procedure - Maintenance After-Hours Call-In Process - Water (OP-WT-ALL-V-001)</i></p> <p><i>Interview with Associate Director for Asset Management</i> <i>Maintenance – EAM work management – tracks assets and work performed generates the work orders., replacement allows retire of old piece – warranty tracking</i> <i>Capital upgrades tracked.</i> <i>Criticality for each asset – Id which are run to failure; maintain shelf spares</i></p> <p><i>Maintenance has up to 80% of asset included; remaining 20% up to facilities;</i> <i>Facilities now under responsibility of Asset Management</i></p> <p><i>Replacement of assets – i.e. Anger Avenue WW Plant.</i></p> <p><i>4 of 6 intakes require replacement – approvals are in, Rosehill intake – age failure; Grimsby, Niagara Falls</i></p>	

DWQMS Reference:	16 Sampling, Testing and Monitoring
Client Reference:	Operational Plan QMS-WT-ALL-MAN-010 Rev 10 Section 16 Procedure -Sampling, Testing and Monitoring QMS-WT-ALL-P-160 Rev 5

Details:

Details for Sampling, Testing and Monitoring Activities in each DWS are reflected the following procedures;

- Rosehill WTP QMS-WT-RH-T-160 Rev 6
- Niagara Falls QMS-WT-NF-T-160 Rev 6
- Welland QMS-WT-RH-T-160 Rev 7
- Port Colborne QMS-WT-PC-T-160 Rev 7
- Grimsby QMS-WT-GR-T-160 Rev 6
- DeCew Falls QMS-WT-DF-T-160 Rev6

The tables within each of the listed procedures includes a column for challenging conditions.

OFI: Consider including within the scope of each procedure a clarification regarding relevant sampling, testing or monitoring activities that may or may not take place upstream of the subject system (that is before water enters the DWS).

Sample are collected by and analysed by a certified Water Operator according to the procedures. The Operator records internal testing results on the Plant Log Sheet. Which are reviewed at least once every 72 hours.

Key process parameters for each drinking water system are continuously monitored using a SCADA system.

External testing includes analyses that are performed by an external, Ministry-licenced drinking-water laboratory as defined in the above noted procedures. External testing covers Microbiological, Chemical, Radiological and Inorganic Parameters as defined in the referenced regulations.

For each of Niagara Falls WTP, Welland WTP & Grimsby WTP the daily log sheets as maintained by the control room operator were review Jan – March 2020, indicating checks every 8 hours; including CI residuals, turbidity and water chemistry.

Sampling completed as per schedule and include weekly Bacteriological and microcystin. testing

DWQMS Reference:	17 Measurement and Recording Equipment Calibration and Maintenance
Client Reference:	Operational Plan QMS-WT-ALL-MAN-010 Rev 10 Section 17 Procedure - Measurement and Recording Equipment Calibration and Maintenance QMS-WT-ALL-P-170 Rev 6

Details:

The procedure defines calibration and maintenance programs for instrumentation and equipment used in Niagara Region's drinking water systems. Additional calibration and verification activities are referenced in Table 1 for handheld and benchtop chlorine analyzers and turbidity meters.

Table 2 provides maintenance/calibration requirements for verification or calibration (reference vs confirmation vs calibration).

Table 3 defines functional uses of equipment (information vs control vs regulatory)

The EAM PM Schedule controls and hold calibration and verification records of measuring equipment.

In house Instrumentation Technicians are responsible for completion of online instrumentation calibrations and verifications

Niagara Falls WTP equipment calibrations

- Turbidity meter on inlet to UV 7/209
- UV 3/2020
- Cl Analyser 42722 4/2020 wo 689253
- Ph analyser 39878 4/2020 wo 689255 (buffer 4 & 7 lot?)
- Cl analyser 38783 4/2020
- Inline Alum injection #41448 – PM not completed
- Lab alum analyser 6/2020

NCR 2020-01 Alum flow meters have not been calibrated annually (as per PM10511) since installation in 2017

Stanley Ave. CI Booster Station

- 2019 log verified for CI residuals, Hypo pump check and tank level
- Maintenance logs indicate quarterly chlorine analyser calibration
- Post Cl analyser \$427224 cal 7/2020
- Pre Cl-analyser #42193
- Ph meter

Lundy's lane ET

- 2019 log – CI residuals free & total checked every other day
- Maintenance log chamber inspections and monthly station checks

Kent Street Booster & ReChlor station

- Maintenance log Cl analyser cal Apr 3, 2020
- Hypo tank vented
- Cl analyser # 38688 cal 7/2020
- Cl Hach #36192 cal May 2020

Queenston Heights Station

<ul style="list-style-type: none"> - Cl analyser #42895 cal 4/2020
Welland WTP
<ul style="list-style-type: none"> - Lab spectrophotometer #41455 cal 5/2020 - Lab Turbidity meter #9259 cal 5/2020 wo 683000 - UV bulbs #42121 wo 705627 - Post Cl analyser 42394 cal 4/2020 wo 689542 - Ph meter 42123 cal 4/2020 - Turbidity meter 42169 wo 690964
Beamis
<ul style="list-style-type: none"> - Cl analyser cal 4/2020 per logbook quarterly
Shoalts Dr Reservoir
<ul style="list-style-type: none"> - Mtce logbook up to date - Post Cl analyser 36798 cal 4/2020
Grimsby WTP
<ul style="list-style-type: none"> - Flow meter 42857 wo 9328 - Alum flow side B41906 cal 12/2019, flow side A 41907 cal 12/2019; asset numbers reversed - See NCR 2020-01 - Raw water turbidity meter 32935 cal 4/2020 - Settled water turbidity meter 36144 cal 4/2020 wo 691491 - Cl analyser contact tank outlet 15442 cal 4/2020 - Venturi flowmeter 45531 WO 694456 - Cl analyser reservoir outlet 15771 cal 5/2020 wo 690934
Lincoln Booster pumping station
<ul style="list-style-type: none"> - Cl analyser 14972 cal 7/2020 wo 692358 - Mtce logbook include generator inspection, degas hypo tank and CL analyser calibration; Cl residuals every other day - Ops logbook up to date
Hixon Reservoir
<ul style="list-style-type: none"> - Cl analyser 36846 cal 2/2020 wo 684698

DWQMS Reference:	18 Emergency Management
Client Reference:	Operational Plan QMS-WT-ALL-MAN-010 Rev 10 Section 18 Water and Wastewater Emergency Response Plan ERP-ALL-ALL-P-001 Rev 7
<p>Details: ERP manual for Water & Wastewater systems ERPs individual for each potential emergency</p> <p>Per manual 5-year frequency but in practice done annually. Done off site as a desk top involving all personnel and with the municipalities</p> <p>i.e. 2019 Held at Balls Falls March 22, 2019</p> <ul style="list-style-type: none"> - Niagara Region EOC - Emergency Drinking Water Provision Plan - Town of Grimsby Lessons Learned <p>Mock Emergency Workshop modules/scenarios</p> <ul style="list-style-type: none"> - Communication breakdown - Blame it of the rain - Gone, gone, gone – (Pelham ET) - I want to break free – water main break - Help I need somebody <p>2018 Mock Drill – water on road close to CN rail tracks</p> <p>OFl Consider addition of MetroLinx (GO) to Emergency contacts list considering the increased frequency of trips between Niagara Falls and Hamilton.</p> <p>Actual Events - June 19, 2019 – Emergency & Debriefing Reporting Form actual event May 31, 2019 Lincoln BPS– inability to meet water demand – watermain break</p>	

DWQMS Reference:	19 Internal Audits
Client Reference:	Operational Plan QMS-WT-ALL-MAN-010 Rev 10 Section 19 Procedure Internal Auditing QMS-WT-ALL-P-190 Rev 9
Details: <i>The procedure documents the criteria (Section 1), scope (Section 5.2) and frequency of internal audits (Section 5.3) ; that all 21 elements are assessed at least every 3 calendar years and that each DWS facility is audited at least every 2 calendar years. Records keeping is defined in section 5.6 reporting and references the Document and Records Control procedure QMS-WT-ALL-P-050. Internal audit conducted all at once – with all requirements covered. Initiated planning Jan 2020 Meeting held to develop audit plan; training refresher on audit objectives Determine what areas need to be audited based 3 processes selected; Competencies & training, Top Management Communications and Capital Projects All elements once every 3 years; All 3 areas covered; each plant once every 2 years. Audit Report March 2-12, 2020 issued April 7, 2020 by the WW & Q Specialist. Audits conducted in pairs one more experienced audit and one less experienced</i>	

DWQMS Reference:	20 Management Review
Client Reference:	Operational Plan QMS-WT-ALL-MAN-010 Rev 10 Section 20 Procedure - Management Review QMS-WT-ALL-P-200 Rev 7
Details: <i>The procedure specifies a management review once per calendar by means of a Q2 and a Q4 meeting with all requirements discussed over course of the 2 meetings. In section 5.3.1, the procedure defines the specific items to be discussed in each of the respective meetings. All required inputs have been specified.</i>	

DWQMS Reference:	21 Continual Improvement
Client Reference:	Operational Plan QMS-WT-ALL-MAN-010 Rev 10 Section 21 Procedure - Corrective Action, Preventive Action, and Best Practices QMS-WT-ALL-P-210 Rev 8
Details: <i>EtQ is the Management system software tool used to track and monitor corrective and preventive actions. EtQ is also used record the root cause analysis. Best Practices are also part of the procedure. The procedure specifies that at least once every 36 months the QMS representative will review best practices published by the MECP. The procedure describes activities for handling both corrective actions and preventive actions. Handling of best practices and preventive action are addressed in Section 5.4 of the procedure with Figure 2 providing an overview of the process</i> <i>Currently 25 open in the system with 8 open from the internal audits QMR follows up for implementation and verification of the actions Annual update includes internal audit results</i> <i>WTCAR-20-008 Element 15 PWC -c-8-2020 Internal Audit Findings Per report PW-67-2019 Council update – of CA progress Dec 3, 2019</i> <i>WTCAR-20-006 open WTCAR-19-007 completed Jan 31, 2020 CAR Action 247 & 248 WTCAR-19-025 RCA and action developed CAR Action 172 completed Dec 1, 2017; CAR Action 173 completed April 27, 2018; CAR Action 174 completed April 29, 2020.</i> <i>Compliance obligations/MECP Inspections Adverse i.e. AWQI 150198; Notice of Adverse June 10, 2020, Resolution June 12, 2020 Noncompliance – Beamis disinfection issue April 8, 2019 Event log 247</i>	

Details regarding the personnel interviewed and objective evidence reviewed are maintained on file at SAI Global.

This report was prepared by:

Marco Brunato
SAI Global Management Systems Auditor

The audit report is distributed as follows:

- SAI Global
- Operating Authority
- Owner
- MOECC

Notes

Copies of this report distributed outside the organization must include all pages.

INTERNAL AUDIT REPORT

General Elements

Niagara Region All Wastewater Systems

Internal Audit

October 29 – November 9, 2020

1.0 INTRODUCTION

1.1 Purpose

The 2020 internal audit was undertaken:

- To verify that the Wastewater QMS conforms to the requirements of the DWQMS¹ and the requirements of the Wastewater QMS Operational Plan; and
- To verify the effective implementation and maintenance of the Wastewater QMS for all Niagara Region's wastewater systems.

Audits were completed between November 2 and November 9, 2020. Due to the emergence of COVID-19, a decision was made to perform the 2020 internal audit as a remote desktop audit. This decision came from evaluating current working arrangements and the protocols that are currently in place in visiting Regional sites, limiting the unnecessary risk to wastewater staff in visiting remote sites and continuing to uphold our responsibility in providing effective wastewater treatment for the community. Wastewater internal audits are not a legislative requirement, but are performed annually out of due diligence and best practice. Internal audits were conducted remotely with Operating Authority personnel, as required.

1.2 Scope

The wastewater internal audit for 2020 was conducted as a desktop elemental audit, with the auditors focusing on specific elements of the standard that could be audited remotely. The following elements were examined as part of this internal audit:

- Element 1 – Quality Management System
- Element 3 – Commitment and Endorsement
- Element 7 – Risk Assessment
- Element 9 – Organizational Structure, Roles, Responsibilities and Authorities
- Element 10 – Competencies
- Element 17 – Instrument Calibration
- Element 18 – Emergency Management
- Element 19 – Internal Audit
- Element 20 – Management Review

¹ As modified by Niagara Region to suit our wastewater services.

1.3 Selection of Internal Audit Team

Internal auditors for the 2020 audit were:

- Element 1 – Quality Management System: Michelle Max
- Element 3 – Commitment & Endorsement: Michelle Max
- Element 7 – Risk Assessment: Rachel Whyte
- Element 9 – Organizational Structure, Roles, Responsibilities and Authorities: Michelle Max
- Element 10 – Competencies: Dawn MacArthur
- Element 17 – Instrument Calibration: Rachel Whyte
- Element 18 – Emergency Management: Michelle Max
- Element 19 – Internal Audit: Dawn MacArthur
- Element 20 – Management Review: Dawn MacArthur

All internal auditors have completed Internal Auditor Training as required by the **Internal Auditing** (QMS-WW-ALL-P-190, rev1, effective 30Sep2019).

1.4 Criteria and Methodology

Audit criteria included the following:

- **Internal Auditing** (QMS-WW-ALL-P-190, rev1, effective 30Sep2019);
- **Niagara Region Wastewater Operational Plan** (QMS-WW-ALL-MAN-010, rev3, effective 12Dec2019) and supporting procedures; and
- Internal audit training materials (various auditor training courses).

Audits were conducted by assigned auditors as noted in Section 1.3 of this report. Operating Authority personnel were also interviewed by assigned auditors. Auditor checklists were completed and reviewed with the Lead Auditor; the checklists are not attached, but are filed as per the **Document & Records Control Procedure** (QMS-WW-ALL-P-050, rev1, effective 30Sep2019).

1.5 Summary of New Internal Audit Findings

Findings are categorized as follows and are summarized in Table 1 below.

- **C – Conformance:** Audit interviews and sampled records indicate that QMS requirements are met and applicable procedures are implemented as written.

- **NC – Non-conformance:** Audit interviews and sampled records indicate that a requirement of the QMS Standard was not met or a documented procedure was not implemented as written. These findings require **corrective action**.
- **OFI – Opportunity for Improvement:** Conformance was generally observed, but there may be an opportunity to enhance existing processes.

Table 1: Summary of Internal Audit Findings – Number and Type

Element	NC	OFI	Total
Quality Management System (Element 1)	-	-	-
Commitment and Endorsement (Element 3)	-	-	-
Document and Records Control (Element 5)	2	-	2
Risk Assessment (Element 7)	1	-	1
Organizational Structure, Roles, Responsibilities and Authorities (Element 9)	-	-	-
Competencies (Element 10)	1	1	2
Instrument Calibration (Element 17)	-	4	4
Emergency Management (Element 18)	2	3	5
Internal Audits (Element 19)	2	1	3
Management Review (Element 20)	1	-	1
Total	9	9	18

Details of all findings are provided in Table 2 (see Section 2.1 of this Audit Report).

1.6 Review of Previous Internal Audit Findings

No previous audit findings were reviewed during this internal audit, as much work was done in advance of the internal audits to address and close open corrective actions from the previous internal audit in 2019. These efforts were summarized in a memo to Public Works Committee ([PWC-C 8-2020, 10March2020](#)).

1.7 Review of Previous External Audit Findings

Not applicable. The Wastewater QMS is not subject to external auditing at this time.

2.0 INTERNAL AUDIT RESULTS

2.1 Summary of QMS Internal Audit Findings

Table 2 provides a summary of findings from the QMS Internal Audit. In reviewing Table 2, the following acronyms should be noted:

Acronym	Definition
C	Conformance
NC	Non-Conformance
OFI	Opportunity for Improvement
N/A	Not applicable – did not audit this element

Table 2 is provided below.

NOTE: Recurring findings are not noted in the list below, as corrective action activities are already in progress and the required records have already been opened in EtQ.

Table 2: Summary of Findings – 2020 Internal Audit

Element #	Type	Details	Number
1	C	QMS conforms to the requirements of this element.	
2	N/A	<i>Not reviewed during this internal audit.</i>	
3	C	QMS conforms to the requirements of this element.	
4	N/A	<i>Not reviewed during this internal audit.</i>	
5	NC	Document and Records Control (QMS-WW-ALL-P-050, rev1, 30-Sept-2019) , Section 5.3.1 states both a table of revision and footer statement “printed documents are uncontrolled” be included in internally-controlled QMS documentation. The Niagara-on-the-Lake WWTP System Schematic (OP-WW-NL-V-061, rev5, 29-Aug-2016) is not on the proper document template and did not include the proper document header and relevant information required, nor does the schematic include a footer statement “printed documents are uncontrolled” or a table of revisions.	<u>WWCAR-20-001</u>

Element #	Type	Details	Number
5	NC	Document Records Control (QMS-WW-ALL-P-050, rev1, 30-Sep-2019) , Section 5.2.3 indicates that other documents, including procedures, tables, forms and guidance documents, are typically identified by a document header, including specific details of what should be included in the header. The header of the Emergency Contact List (ERP-ALL-ALL-T-002, rev21, 30-Sep-2020) does not contain the revision number, effective date or document ID.	WWCAR-20-002
6	N/A	<i>Not reviewed during this internal audit.</i>	
7	NC	Wastewater System Risk Assessment (QMS-WW-ALL-P-070, rev3, 6Feb2020) , Section 5.4.1 specifies that action plans are developed for “high-scoring risks (greater than 10)”. In a sampling of 9 high-scoring risks recorded/updated during the 2020 review, the auditor had identified that 4 of the 9 records were found to have no associated risk action item.	WWCAR-20-003
8	N/A	<i>Not applicable to the Wastewater QMS.</i>	
9	C	QMS conforms to the requirements of this element.	
10	NC	Section 5.4.1 of Competencies procedure (QMS-WW-ALL-P-100, Rev1, 22-Sept-2020) states records of training attendance are stored in PeopleSoft. Document and Records Control (QMS-WW-ALL-P-050, Rev1, 30-Sept-2019) , Section 5.7 – Table 2 states training attendance records are stored in MyLearning. These are two separate software programs.	WWCAR-20-004
10	OFI	In reviewing Competencies (QMS-WW-ALL-100, rev1, 22-Sep-2020) the auditor noted a gap in defining who is responsible to ensure staff enroll in and complete mandatory training. Training & Professional Development (ADM-ALL-ALL-P-017, Rev1, 29-Jul-2020) identifies the positions that are responsible for ensuring staff are enrolled in various types of training (Health and Safety, Mandatory and Other). It would be beneficial to include a reference in Competencies to Training & Professional Development .	2020-022-Audit Internal

Element #	Type	Details	Number
11	N/A	<i>Not reviewed during this internal audit.</i>	
12	N/A	<i>Not reviewed during this internal audit.</i>	
13	N/A	<i>Not reviewed during this internal audit.</i>	
14	N/A	<i>Not reviewed during this internal audit.</i>	
15	N/A	<i>Not reviewed during this internal audit.</i>	
16	N/A	<i>Not reviewed during this internal audit.</i>	
17	OFI	It is strongly recommended that the Wastewater Calibration Procedure (QMS-WW-ALL-170, rev0, 16Jun2014) be updated to align with the current organizational structure and available tools. The procedure references Sherpa, the previous version of Regional intranet that no longer exists; it also references the CMMS scheduler position that was eliminated in 2016. Additionally, the procedure does not clearly define the instrument types to be calibrated under the “process equipment” category.	2020-023-Internal Audit
17	OFI	It may be beneficial to identify meters that are used for billing vs. compliance vs. process control in the Asset Management Software. While these meters are somewhat identifiable by virtue of their inclusion under associated preventative maintenance’s (PM), there is no means of ensuring that the asset list for each PM is complete. Furthermore, some meters that are used for both billing and compliance will fall under only the billing PM, not the compliance PM, essentially losing their identification as a compliance meter.	2020-024-Internal Audit
17	OFI	It may be helpful to identify on each of the wastewater facilities billing schematic, which flows are calculated (e.g., hauled waste, trucked solids, etc.) vs. which flows are metered.	2020-025-Internal Audit
17	OFI	It may be beneficial to open up access to data fields, views, and prepared reports in the Enterprise Asset Management (EAM) software to ensure that all users have access to the same information. During the audit, it was identified that the auditor and auditee have access to different data fields under the same asset.	2020-026-Internal Audit

Element #	Type	Details	Number
18	NC	Water and Wastewater Emergency Response Plan – Front End (ERP-ALL-ALL-P-001, rev7, 22-Oct-2019) , Section 6.1 states that new staff are introduced to the Emergency Response Plan (ERP) through Water and Wastewater New Employee Orientation and quality management e-learning modules. Evidence indicates that W-WW orientation has been deferred due to the pandemic; thus, new staff starting between March and October 2020 have not been introduced to the Emergency Response Plan through orientation. An auditee communicated to the auditor that a Water-Wastewater orientation e-learning module has been developed and will include information on the ERP program. The module is scheduled to be rolled out to new W-WW staff in December 2020. The auditor did observe that several Emergency Response Plan e-learning modules have been assigned to wastewater staff over the course of the year.	WWCAR-20-005
18	NC	The Spill of Sewage (ERP-WW-ALL-P-001, rev2, 22-Oct-2019) and Spill or Chemical Leak On-Site (ERP-ALL-ALL-P-005, rev2, 22-Oct-2019) emergency response procedures reference a requirement to “review the Spill Contingency Plan to determine if a spill is reportable”. The auditor could not find any wastewater-related Ministry of the Environment, Conservation and Parks (MECP) Spill Contingency Plans.	WWCAR-20-006
18	OFI	The Complaints-Wastewater (OP-WW-ALL-P-005, rev5, 17-Apr-2020) procedure does not mention a timeframe for an assignee to complete the incident investigation and does not include details on what is required if an investigation is deemed ongoing. Consider modifying Complaints-Wastewater to discuss assignment via task profile, the timeframe to complete investigations, and what is required if an investigation is deemed ongoing.	2020-027-Internal Audit

Element #	Type	Details	Number
18	OFI	Section 5.3.1 of the Post-Event Debriefing (ADM-ALL-ALL-P-009, rev4, 1-Apr-2020) identifies that a debrief meeting should be completed no later than five (5) calendar days following resolution of the unusual event. The auditor reviewed a wastewater debriefing record REC-00154 from 2019; the event occurred on 21-May-2018 and the debrief meeting was held 12-Jun-2019. It was not clearly indicated on the Emergency Debrief & Reporting form what day the event was resolved. Consider including a date of resolution field on the Emergency & Debrief Reporting Form (ERP-ALL-ALL-F-001) .	2020-028-Internal Audit
18	OFI	The Water & Wastewater Emergency Response Plan – Front End (ERP-ALL-ALL-P-001, rev7, 22-Oct-2019) , “Section 7.0 – Emergency Management”, outlines requirements for emergency drills. In reviewing historical records of mock emergency drills, the auditor observed that these records reside on the L: drive. Consider storing mock emergency records in EtQ’s Records module to ensure protection from tampering, damage, or deterioration and ease of record retrieval. Document & Records Control (QMS-WW-ALL-P-050) may require updating to reflect updates of the storage of records, if considered.	2020-029-Internal Audit
19	NC	According to the Internal Audit (QMS-WW-ALL-P-190, rev1, 30-Sept-2019) procedure, Section 5.1.3, the Lead Auditor is responsible for ensuring timely and effective corrective action follow-up from the internal audit. The auditor selected five (5) random corrective actions from the 2019 internal audit for review: <ul style="list-style-type: none"> – WWCAR-19-001, WWCAR-19-006, 2019-034-Audit Internal, WWCAR-19-009, WW-CAR-010, were reviewed – In general, of the 5 records reviewed, all 5 had been closed (< one year) While reviewing WWCAR-19-009, it was noted that it was closed as it was a duplicate to WWCAR-17-005 already existing in the system. WWCAR-17-005 was reviewed. The CAR was created November 20, 2017 and currently sits in the	WWCAR-20-007

Element #	Type	Details	Number
		“Investigation and Root Cause” phase. Nothing has been added to the action except the initial findings, nor has it been assigned to anyone for action. It is in the opinion of the auditor that this corrective action follow-up is not being completed in timely manner.	
19	NC	<p>Corrective Action, Preventative Action & Best Practices (QMS-WW-ALL-P-210, Rev1, 1-Apr-2020), Section 5.1.7 states “The QMS Representative monitors the effectiveness of the corrective action by assigning a date for follow-up and verifying the effectiveness of the corrective action on or immediately before that date.”</p> <p>All four (4) of the corrective action records reviewed by the auditor did not have the “Approval and Closure” section completed under the Corrective Action form in EtQ despite the corrective actions being closed. In reviewing the records, it was unclear to the auditor if the corrective actions were implemented effectively. The Corrective Action procedure also states that if the corrective action is found to be ineffective, the corrective action report (CAR) is closed and a new corrective action report is initiated. It would be difficult to determine if these corrective action records were closed because they were deemed satisfactory or if another corrective action was opened to further address any outstanding issues.</p>	WWCAR-20-008
19	OFI	<p>Internal Auditing (QMS-WW-ALL-P-190, Rev1, 30-Sept-2019), Section 5.6.1 states “audit notes should include the date of the audit, the name of the auditors, and the location(s) of the audit”. The auditor reviewed the Area 1 auditor checklist stored as record # REC-00163 in EtQ. The auditor name, audit location, and audit date of the audit were not entered at the top of the checklist in the provided cells. It was also noted that selected cells have drop downs where an SOP can be selected. Without unlocking the sheet, an auditor would be unable to change the value of these cells. If using this checklist in the future, consider reformatting these cells to easily capture this information.</p>	2020-030-Internal Audit

Element #	Type	Details	Number
20	NC	<p>Management Review SOP (QMS-WW-ALL-P-200, Rev1, 26-Mar-2019), Section 5.2.1 states “The QMS Rep or delegate provides a summary presentation of the listed items to management review meeting attendees at least seven (7) days prior to the meeting”.</p> <ul style="list-style-type: none"> – A review of Outlook provided evidence that the meeting package for Part 2 Management Review 2019 was provided to attendees via email on November 7, 2019. The meeting was held November 12, 2019. This does not meet the documented requirement. <p>The meeting package for Part 1 Management Review 2020 was provided to attendees via email on June 4, 2020. Although the review meeting was held on June 22, 2020, the meeting package was sent out for the original meeting request of June 9, 2020. This did not meet the documented timeline for the originally scheduled meeting date.</p>	WWCAR-20-009

Prepared by: Michelle Max

Date: November 9, 2020 (rev0)

MEMORANDUM

PWC-C 46-2020

Subject: Short Form Offences and Set Fine Schedule

Date: Tuesday, December 8, 2020

To: Public Works Committee

From: Susan McPetrie, Waste Management Services Advisor

This memorandum is intended to advise Committee members that the Short Form Offences and Set Fine Schedule, to be enforced under the amended Solid Waste Management By-law No. 2017-56 has been approved, with amendments, by the Chief Justice of the Ontario Court (Provincial Division). The order took effect October 19, 2020 (Appendix 1).

Background

On August 13, 2020, Regional Council approved the recommendations of the Public Works Committee to amend Solid Waste Management By-law No. 2017-56 to reflect the updates outlined in Report PW 34-2020. Council also approved the recommendation to forward the Short Form Offences and Set Fines Schedule as proposed in Report PW 34-2020 to the Chief Justice of the Ontario Court for approval, as required under the Provincial Offences Act. The forwarded Set Fines Schedule included the revisions as proposed in Committee's friendly amendment to increase the set fine amount for illegal dumping from \$500 to \$1000.

Submission to Ontario Court of Justice

The amended by-law was approved at the Regional Council meeting held on September 17, 2020. On October 2, 2020, the proposed Short Form Offences and Set Fines Schedule was submitted to the Chief Justice. The submission included a rationale for the increased set fine amount that emphasized Niagara Region's commitment to addressing illegal dumping (Appendix 2). It noted that with the start of the new collection contract and service level changes, including every-other-week garbage collection, limitations on large item collection and discontinuation of large appliance and metal household item collection, the higher set fine amount would provide a greater deterrent to illegal dumping. As a result, the impacts of illegal dumping, such as contamination of

the natural environment, the creation of aesthetically displeasing areas and the financial and resource burden for investigation and clean-up would be reduced. The submission also included a proposed new short order offence, failure to comply with an order. This new offence and associated set fine will facilitate enforcement of orders to correct contraventions of the by-law.

Approval with Amendments

On October 19, 2020, the Office of the Regional Senior Justice, Ontario Court of Justice sent notification to Niagara Region that the Schedule of Set Fines had been approved with amendments as shown below.

Table 1: Proposed and Approved Set Fine Amounts

Item	Short Form Wording	Proposed Set Fine Amount	Approved Set Fine Amount
32	Illegal Dumping	\$1000	\$750
37	Failure to Comply with an Order	\$500	\$300

Refer to Appendix 3 for the full schedule of approved Short Form Offences and Set Fines, which took effect October 19, 2020.

Respectfully submitted and signed by

Susan McPetrie
Waste Management Services Advisor

Appendices

Appendix 1	Order from Chief Justice of the Ontario Court
Appendix 2	Set Fine Application Explanation
Appendix 3	Short Form Offences and Set Fines Schedule

PROVINCIAL OFFENCES ACT

Part I

IT IS ORDERED pursuant to the provisions of the *Provincial Offences Act* and the rules for the Ontario Court of Justice, that the amount set opposite each of the offences in the schedule of offences under the Provincial Statutes and Regulations thereunder and Municipal By-law No. 2017-56, as amended, for The Regional Municipality of Niagara, attached hereto is the set fine for that offence. This Order is to take effect October 19, 2020.

Dated at Hamilton, this 19th day of October 2020.



Paul R. Currie
Regional Senior Justice
Central West Region



Corporate Services

Legal and Court Services

1815 Sir Isaac Brock Way, Thorold, ON L2V 4T7
905-980-6000 Toll-free: 1-800-263-7215 Fax: 905-685-7931

VIA E-MAIL ONLY TO Devyani.Anandjit@ontario.ca

October 7, 2020

Ministry of the Attorney General
Crown Law Office-Criminal
720 Bay Street, 10th Floor
Toronto, Ontario M7A 2S9
Attention: Devyani Anandjit

Dear Ms. Anandjit:

Re: **The Regional Municipality of Niagara – Set Fine Application
Part 1, *Provincial Offences Act*
A By-law to Regulate the Use of the Waste Management System
for The Regional Municipality of Niagara**

Further to your request of October, 5, 2020, enclosed please find a revised Consolidated Set Fine Schedule.

With respect to the proposed increased set fine of \$1,000 for illegal dumping, we note that Niagara Region is entering into a new waste management contract with service changes including every-other-week garbage collection, limitations on large item collection and discontinuation of large appliance and metal household item collection. The proposed increased fines are intended to provide a greater deterrent in the face of these service changes. Illegal dumping remains an ongoing and serious problem within the Region and the increased set fine confirms Niagara Region's commitment to change the attitude of future dumpers.

Illegal dumping has both an economic and environmental impact on local communities. Property values may decrease if neighboring vacant lots or rural areas are aesthetically displeasing and foul-smelling due to regular illegal dumping. Such illegal dumpsites pollute the natural environment through soil and water contamination and wildlife disruption. In deterring would-be illegal dumpers with an increased set fine amount, the Region's financial and resource burden required to investigate and clean up illegal dumping issues for both Niagara Region and the local area municipalities would be eased.

Should you require anything further, please advise.

Yours truly,

Patricia D'Souza

Patricia D'Souza
Legal Counsel, Legal & Court Services
PD/ek
Encl.

**The Regional Municipality of Niagara
Part 1 Provincial Offences Act
By-law 2017-56 Waste Management By-law, as amended by By-law 2020-62**

Short Form Offences and Set Fines

Item	COLUMN 1 Short Form Wording	COLUMN 2 Provision creating or defining offence	COLUMN 3 Set Fine
1.	Set-out of Non-Collectable Material	s. 14.1 (a)	\$100
2.	Set-out of Non-Compliant Material	s. 14.1 (b)	\$100
3.	Setting out hazardous or pathological Material for collection	s. 14.1 (a)	\$500
4.	Not securing animal to ensure collection worker safety	s. 14.6	\$100
5.	Depositing Material into a collection vehicle	s. 14.8	\$100
6.	Obstructing road or sidewalk with Material	s. 15.1	\$250
7.	Setting out Material at premises other than your own	s. 15.3	\$100
8.	Permitting Material at any time in the Care and Control of an Owner to be located otherwise than on their own Premises or in a permitted Collection location	15.4	\$100
9.	Setting out waste contrary to specified times	s. 16.1	\$75
10.	Failing to remove containers and Material after collection	s. 16.2	\$75
11.	Failing to set out an acceptable container	s. 17.1	\$75
12.	Failing to ensure containment of Material set out for collection	s. 18.1	\$100
13.	Dropping off unacceptable Material at Regional Drop-Off Location	s. 22.1	\$500
14.	Depositing Garbage into recycling bins or composting areas at Regional Drop-Off Location	s. 32.1 (l)	\$200
15.	Depositing recyclable Material in Garbage bin or landfill areas at Regional Drop-Off Location	s. 32.1 (m)	\$100

Item	COLUMN 1 Short Form Wording	COLUMN 2 Provision creating or defining offence	COLUMN 3 Set Fine
16.	Trespassing at Regional Drop-Off Location by illegal entry	s. 33.1	\$500
17.	Trespassing at Regional Drop-Off Location or closed landfill or perimeter when closed	s. 33.2	\$500
18.	Trespassing at Regional Drop-Off Location or perimeter with vehicle	s. 33.3	\$500
19.	Failing to drop off only acceptable Material at RDOL	s. 34.1 (a)	\$200
20.	Failing to comply with Regional Drop-Off Location staff directions	s. 34.1 (b)	\$200
21.	Failing to obey signs at Regional Drop-Off Location	s. 34.1 (c)	\$200
22.	Failing to separate and deposit Material properly at Regional Drop-Off Location	s. 34.1 (d)	\$200
23.	Failing to remove covers as directed at Regional Drop-Off Location	s. 34.1 (f)	\$200
24.	Failing to remove loose Material after unloading at Regional Drop-Off Location	s. 34.1 (g)	\$200
25.	Failing to secure vehicle after unloading at Regional Drop-Off Location	s. 34.1 (h)	\$200
26.	Failing to ensure child under 12 stays in vehicle at Regional Drop-Off Location	s. 34.1 (i)	\$200
27.	Failing to ensure children act responsibly at Regional Drop-Off Location	s. 34.1 (j)	\$200
28.	Failing to ensure animal stays in vehicle at Regional Drop-off Location	s. 34.1 (k)	\$200
29.	Failing to pay fees before departing Regional Drop-Off Location	s. 34.1 (m)	\$200
30.	Failing to refrain from smoking on Regional Drop-Off Location	s. 34.1 (o)	\$200
31.	Transporting insecure load	s. 36.1	\$100
32.	Illegal dumping	s. 37.1	\$1000 \$750.00

Item	COLUMN 1 Short Form Wording	COLUMN 2 Provision creating or defining offence	COLUMN 3 Set Fine
33.	Dumping privately generated Material into public Litter bin	s. 37.2	\$150
34.	Illegal dumping Care and Control	s. 37.3	\$250
35.	Scavenging Material set out for collection	s. 38.1	\$100
36.	Scavenging at a Regional Drop-Off Location	s. 38.2	\$250
37.	Failure to comply with an Order	s. 48.3	\$500 \$300.00



Note: The general penalty provision for the offences listed above is Section 61 of the *Provincial Offences Act*, R.S.O. 1990, c. P. 33.

MEMORANDUM

PWC-C 48-2020

Subject: Update on the Waste Management Contract Implementation

Date: Tuesday December 8, 2020

To: Public Works Committee

From: Susan McPetrie, Waste Management Services Advisor

On October 19, 2020, Niagara Region began new curbside waste collection contracts with Green For Life Environmental Inc. (GFL) and Miller Waste Systems Inc. (Miller). With the start of these new contracts, service level changes including every-other-week garbage collection, a four (4) - item limit on large household item collection and the discontinuation curbside collection of metal household items also took effect. This memorandum is intended to provide Committee members with an overview of metrics related to the initial implementation of these contracts. Staff will provide another update in Q1 2021.

Tonnages

One of the key service level changes that started on October 19, 2020 was the shift to every-other-week garbage collection for all residential properties and businesses outside of the Designated Business Areas. It is anticipated that this change will encourage service users to divert food and organic waste from the garbage to the Green Bin, which continues to be collected weekly. Although only two weeks into the new services, data indicates that the tonnage for collected garbage decreased 30.8 percent compared to the same time period in 2019. Recycling tonnage increased 9.1 percent compared to 2019. Due to leaf and yard waste and the separate collection of branches and leaf and yard waste occurring a week later in 2020 compared to 2019, at this time organic waste tonnages can not be directly compared. It should be noted that there has been an overall increase in tonnages collected in 2020 compared to 2019 and analysis of longer term data will be required to confirm a relationship between every-other-week garbage collection and increased diversion, which has been experienced in other jurisdictions.

Container Distribution

Another indicator of increased diversion efforts by service users is container distribution data. Green Bin distribution has shown a marked increase since June 2020. A total of 7,623 Green Bins were provided to distribution locations from June to the end of October 2020, a 116 percent increase from the same period in 2019. This increase coincides with the extensive public education campaign efforts to communicate the upcoming changes, which promoted getting a Green Bin to prepare for every-other-week garbage collection.

There was also an increase in Blue and Grey Box distribution. Overall, for the period of June to October, distribution of Blue and Grey Boxes increased 44 percent in 2020 compared to 2019. Although Blue and Grey Box distribution totals varied month by month, the average number of Boxes distributed in 2020 (2,955) was higher than the average for 2019 (2,047).

Waste Info-Line Calls

In the first two weeks of the new contracts, Niagara Region's Waste Info-Line experienced a high volume of calls. The Waste Info-Line, in addition to the Region's website, was promoted throughout the public education campaign as a resource for residents and business looking for more information and details about collection services (refer to PWC-C 29-2020 for summary of campaign activities). In preparation for this increased number of calls, the hours were temporarily extended from 5 p.m. to 6 p.m. As a result of the increased calls to the Waste Info-Line an online reporting tool was implemented as another means for residents to report missed collections. Overall there was a 240 percent increase in the number of calls compared to the same time period in 2019. Table 1 shows a comparison of total calls received and percent change from 2019 to 2020 for that two week period.

Table 1: Number of Calls to Waste Info-Line

Date Range	Number of Calls	% Change 2019 to 2020
October 21 – October 25, 2019	868	329% Increase
October 19 – October 23, 2020	3,720	

Date Range	Number of Calls	% Change 2019 to 2020
October 28 – November 1, 2019	1,149	172% Increase
October 26 – October 30, 2020	3,131	
Total for October 21- November 1, 2019	2,017	240% Increase
Total for October 19 – October 30, 2020	6,851	

Table 2 shows the top three (3) recorded enquiries by the Waste Info-Line Customer Service Representatives for August-October 2020. These are general enquiry calls to the Waste Info-Line and do not include collection service issues for follow-up with contractors. The most common service issue is missed material or collection.

Table 2: Most Common Enquiries to Waste Info-Line August to October 2020

August 2020	September 2020	October 2020
1. Large item bookings 2. Landfill enquiries 3. How to dispose of a specific item	1. Large item bookings 2. How to dispose of a specific item 3. Landfill enquiries	1. Large item bookings 2. Container purchase/exchange 3. Every-other-week collection enquiries

Exemptions

To address one of the key concerns about every-other-week garbage collection, the management of diapers and waste due to medical conditions, the existing exemption program that allowed additional garbage bags for eligible properties was expanded to allow collection of these materials on non-garbage collection weeks. The diaper exemption program was also expanded to include households with one child under four (4) in diapers. Promotion of this expanded exemption program began at the end of June 2020. There was an immediate uptick in the number of exemption applications in July, with 850 applications submitted that month. Prior to this, the number of exemptions in a typical month was 40. Since July, more than 2,940 exemption applications have been received. As shown in Table 3, the increased level of applications continued throughout the summer and into September, jumping again in October with the start of the new contracts.

Table 3: Exemption Applications for July to October 2020

Exemption Program	July 2020	August 2020	September 2020	October 2020	Total
Diaper Exemptions	850	151	442	1,216	2,659
Medical Exemptions	48	66	41	83	238
Daycare Exemptions	5	0	6	20	31
Group Home Exemptions	0	1	3	10	14
Total Exemptions					2,942

Web and Mobile App

In September 2020, Niagara Region launched a new web and mobile app that allows residents and businesses to find their collection schedule, set up reminders and notifications and search how to divert or dispose of items. The following section provides the metrics from September 1 to November 8, 2020 for both the web and mobile app.

Web Calendar

- **48,120** - Total number of users with unique addresses that searched for their collection calendars.
- **180,924** - Total number of calendar/schedule views by all visitors.
- **85,650** - Total amount of unique visitors to the calendar web app tab.
- **17,898** - Total number of unique addresses that are using reminders.

Disposal of Items Search Tool

- **109,812** - Total number of all material views by visitors, both unique and non-unique.
- **28,415** – Total amount of unique visitors to the disposal of items search tool tab in both the web and mobile apps. Approximately 40% of these visits were through the mobile app and 60% were through the web.

Mobile App

- **22,357** – The number of times the mobile application was downloaded and installed on an Android or iOS device.
- **17,959** - The number of devices where push notifications have been enabled. This includes people signed up for reminders and/or service alerts.
- **81,855** - The number of times an app has been opened.

Contractor Performance

During the first two weeks of the new contract, both GFL Environmental Inc. and Miller Waste Systems were able to complete all routes each day. There were a few “missed” areas but this is to be expected during a transition period. Additionally, property owners also had to adjust to new collection times, and this contributed to “missed collection” calls coming into the Waste Info-Line. Both Contractors had additional resources in place during the first two weeks of the new contract, and continue to carry additional resources during the fall yard waste collection period.

Next Steps

While it is early in the implementation process to draw definitive conclusions, the data related to the implementation of the new contracts and service level changes is positive. Initial tonnage data and container distribution numbers suggest that shift to every-other-week garbage collection may encourage greater participation in the diversion programs. Residents and businesses are aware of and taking advantage of the resources available to support them in the transition, including the new web and mobile app, the exemption programs as well as the customer service assistance through the Waste Info-Line. Staff will continue to monitor and update Committee on the status of the new contracts.

Respectfully submitted and signed by

Susan McPetrie
Waste Management Services Advisor

MEMORANDUM

PWC-C 49-2020

Subject: Response to Councillor Information Request re 2020-T-116 Port Dalhousie Wastewater Treatment Plant Upgrades

Date: December 8, 2020

To: Public Works Committee

From: Bruce Zvaniga, P.Eng., Commissioner of Public Works (Interim)

This memo provides the additional information requested by Committee on November 10, 2020 concerning Tender 2020-T-116 - Port Dalhousie Wastewater Treatment Plant (WWTP) Upgrades.

In doing so, given that this is still an active procurement process and in order to preserve and support the integrity and transparency of that process, Staff also wishes to remind Council of the following lobbying restrictions contained within section 31 of the Region's Procurement By-law No. 02-2016, as amended:

31. (a) Suppliers, their staff members, or anyone involved in preparing a Bid, shall not engage in any form of political or other Lobbying whatsoever or seek to influence the outcome of the Bid Solicitation process or subsequent Award. This restriction extends to all of the Corporation's staff and anyone involved in preparing a Bid Solicitation or participating in a Bid evaluation process, and members of Council.

(c) During a Bid Solicitation process, all communications shall be made through Procurement and Strategic Acquisitions. No Supplier or person acting on behalf of a Supplier or group of Suppliers, shall contact any elected official, consultant or any employee of the Corporation to attempt to seek information or to influence the Award.

(d) Elected officials shall refer any inquiries about a Bid Solicitation process to the Commissioner of Corporate Services /Treasurer.

Staff also note that suppliers who believe they have been treated unfairly in a bid solicitation process can refer to the bid dispute process outlined in Section 30 of the Procurement By-law.

Niagara Region retained Hatch Corporation through a competitive bidding process (2016-RFP-14) to complete the detailed design, tendering, contract administration and inspection services for the Port Dalhousie WWTP Upgrades project.

Five (5) General Contractors were Prequalified in a competitive public pre-qualification process (2020-RFPQ-47) and were invited to bid on 2020-T-116 Port Dalhousie WWTP Upgrades Contract 1. In accordance with Niagara Region Procurement By-law 02-2016, as amended, and under the guidance of the Region's Procurement Department, Niagara Region initiated a competitive public tender process (2020-T-116) on August 28, 2020 to solicit bids from those prequalified companies. The tender closed on November 5, 2020 and four (4) bid submissions were received and opened. Report PW 44-2020 has been submitted to Council for consideration and includes staff recommendations to award to the lowest compliant bidder.

Project Design Manual and Approved Product and Equipment List (APEL)

Since 2005, the W-WW Services Division has used the Water-Wastewater Project Design Manual (Appendix A) which provides design preferences and guidelines for staff and consulting engineers involved in the implementation of W-WW capital works projects within the Niagara Region. Included in this manual is a section pertaining to product and equipment selection and the use of an Approved Product and Equipment List (Appendix B).

The APEL is used to ensure that equipment specified in water and wastewater design and construction projects is appropriate in nature, and when possible, is similar to equipment already in use. This evaluation and limitation of products and equipment allows the Region to: ensure compatibility of individual components to the complete system; reduce the amount of spare parts needed in inventory; and, limit the number of different pieces of equipment that staff must be familiar with in order to provide effective maintenance and time-sensitive emergency repairs. Designers refer to the APEL to determine which products and equipment are included in design and contract specifications. In producing a complete design, the designers choose components to produce an entire functional system. This process frequently results in a number of components which must be specified to a single product in order to ensure compatibility.

The W-WW Product Review Committee (PRC) was formed to update and maintain the APEL on an on-going basis. The PRC is currently comprised of 18 W-WW staff members representing various subject matter experts from across the division. For some specialized equipment categories (e.g. SCADA software and controllers) it is paramount that equipment be standardized to ensure compatibility with existing

infrastructure and to ensure staff have the required tools and product specific training to effectively troubleshoot and maintain this equipment.

The current version of the W-WW PRC Terms of Reference (Appendix C), the APEL and the product Request for Consideration form are posted on the Niagara Region's public website.

Turbo Blowers

Turbo Blowers remain a relatively new technology for the W-WW industry. They are most often used in wastewater treatment aeration processes as a high efficiency alternative for meeting the oxygen demand and providing the necessary mixing action for efficient biological wastewater decomposition.

The Region has had limited experience utilizing turbo blowers that resulted in some operational challenges. As a result, in 2015 the PRC, at the direction of the Director of W-WW Services of the time, temporarily removed the turbo blower sub-category and the two previously approved manufacturers from the APEL. Staff were directed to re-design all on-going capital works projects to use conventional blowers where feasible. The Director agreed to proceed with the installation of turbo blowers at the Niagara-on-the-Lake WWTP as a trial study to continue to test the technology and because the plant was already under construction. He made this decision based on the substantial cost and time delay for the Region to change the design specifications at that phase of the project. The installation of the APG Neuros turbo blowers at the Niagara-on-the-Lake WWTP was agreed to be a 12-month trial study to assess and evaluate the performance of this product with consideration to reinstate them on the APEL if the equipment performed well. The plant was put in to service in January 2020. The trial study is expected to conclude in January of 2021 at which time the PRC will review operational records and render its decision whether to reinstate APG Neuros on the APEL by the end of Q1 of 2021.

Recent advances in turbo blowers, specifically the introduction of the magnetic bearing technology, has led to new potential for the use of this technology in wastewater. On April 26, 2018 the PRC reviewed a submission for Sulzer ABS Turbo Blowers where the committee decided that the product would remain under evaluation during the completion of a 12-month pilot study. A key factor in this decision was the unique design features of the product, specifically the use of magnetic bearing technology in comparison to air bearings used by the Region's previous turbo blower manufacturers. The benefits of magnetic bearing technology include extended life and service intervals, no need for additional cooling systems, built in condition/vibration monitoring system,

high bearing damping and overload capacity and enhanced operational flexibility. The PRC identified an upcoming capital project at a facility suitable for the pilot. Similar to the approach with the Niagara on the Lake WWTP and the APG Neuros product, the Port Dalhousie Wastewater Treatment Plant was chosen as a suitable test site and Sulzer ABS Turbo Blowers were included as the sole acceptable turbo blower manufacturer in Tender 2020-T-116 to facilitate the pilot study. Staff would note that as a practical matter this is not a direct purchase of the turbo blowers by the Region; but rather they are a component of a larger project that was competitively procured by the Region; and it is the contractor who is responsible for retaining the necessary subcontractors and equipment to undertake the project (and they are not bound to follow the Region's procurement policies in doing so in any event). Staff would however further note that the testing/trial use of a good or a service is a supportable basis for a single source purchase in alignment with the Procurement by-law:

18. (a) Bid Solicitations are not required for Single Source Purchases, provided that any of the following conditions apply:

(ii) a Good or Service is Purchased for testing or trial use;

Port Dalhousie WWTP Upgrades Contract 1 project was executed through a competitive public tender process (2020-T-116) with included detailed specifications for this new blower technology adhering to the approved Product Review Committee (PRC) Terms of Reference. Phase II Upgrades scheduled for 2023 will also be issued as a competitive procurement process.

Staff acknowledge that the above actions were not accurately reflected on the APEL at the outset of Tender 2020-T-116. These errors were identified and corrected in Addendum #1 dated September 21, 2020 and a clarification communication was issued to the impacted equipment manufacturer on October 7, 2020.

Given the potential benefits, the PRC remains committed to adopting turbo blowers onto the APEL. While it is uncommon for the PRC to undertake a pilot study of this scale, the PRC determined that it was necessary to prevent risk to plant operations and to have conclusive evidence of acceptable performance of the different turbo blower technologies. The pilot study adheres to the approved PRC Terms of Reference and is consistent with the previous large scale pilot study initiated in 2016 for the Fujiwara Automatic Scum Removal System at the Niagara-on-the-Lake WWTP. If the results of the trial studies of the two types of turbo blowers are found to be acceptable, this equipment will be reinstated on the APEL.

Other Pertinent Reports

PW 44-2020 Award of Contract 2020-T-116 Port Dalhousie WWTP Upgrades Contract 1 (December 8, 2020)

Respectfully submitted and signed by

Bruce Zvaniga, P.Eng.
Commissioner of Public Works (Interim)
Public Works Department

Appendices

Appendix A W-WW Project Design Manual

Appendix B W-WW Approved Product and Equipment List (APEL)

Appendix C W-WW Product Review Committee Terms of Reference



WATER-WASTEWATER PROJECT DESIGN MANUAL
(ENG-PM-ALL-MAN-001)

REVISION 2
EFFECTIVE AUGUST 2019

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Introduction

The Water and Wastewater Services of Niagara Region have developed this Project Design Manual as a guide for staff and consulting engineers involved in the implementation of water and wastewater capital works projects within the Niagara Region. This manual provides design preferences and guidelines that must be used as minimum requirements of Niagara Region. Design consulting engineers shall ensure all applicable legislations, codes, bylaws and standards are met for the project along with design preferences described within this document. Niagara Region encourages all designers to utilize sound professional judgment, industry best practices, innovation, creativity and ingenuity within their designs.

Any project specific deviations to this manual shall be discussed and approved by Niagara Region staff prior to implementation.

SECTION A - GENERAL

A.1 Document Scope

This document is intended to be used for all water and wastewater projects implemented by the Capital Works Program of the Public Works Department of Niagara Region. Niagara Region expects that all staff and design consulting engineers will comply with the design preferences described within this manual unless otherwise noted within the specific project Terms of Reference or unless written approval has been received from Niagara Region.

This document does not supersede or replace any effective legislation standards and regulations governing the design of water and wastewater infrastructure.

A.2 Reference Documents

This document is intended to be read in conjunction with the latest version of the following Niagara Region documents:

1. [Niagara Region Water and Wastewater Master Servicing Plan](#)
2. *Niagara Region Water and Wastewater Security Technical Specifications*
3. *Regional Municipality of Niagara Integrated SCADA Standards Manual*
4. *Niagara Region Biosolids Management Master Plan*
5. *Niagara Region Water and Wastewater Services Commissioning Guideline*
6. *Niagara Region Water and Wastewater Services Specification for Maintenance Hole Rehabilitation.*
7. [Niagara Peninsula CAD Standards](#)
8. [Niagara Peninsula Standard Contract Documents \(NPSCD\)](#)
9. *Niagara Region's Approved Product and Equipment List (APEL)*
10. *Niagara Region Water and Wastewater Operations Manual template*
11. *Niagara Region Chemical System Design Standard*
12. *Niagara Region Filter Media Replacement Specification*
13. *Niagara Region Water and Wastewater Services Working at Heights Procedure*
14. *Niagara Region Lighting Standards*
15. *Niagara Region's Standard Operating Procedure for Turbidity*
16. *Niagara Region's Quality Management System*
17. *Niagara Region Policy for Lettering on Steel Water Storage Tanks and Stand Pipes*
18. *Niagara Region Sewer Use Bylaw*

A.3 Designer Responsibilities

Design of water and wastewater infrastructure shall comply with the latest version of all applicable acts, codes, bylaws, regulations, guidelines and standards including Niagara Region's *Drinking Water Quality Management System* and *Wastewater Quality Management System*.

All sections of the Project Design Manual (PDM) are related, and each section of the PDM is not necessarily complete in itself. The Designer shall read each section, in conjunction with all other sections, to ensure a complete design, and that all project requirements are met.

A.3.1 Approvals and Permits

The designer will be responsible for the preparation of all applicable approval/ permit applications necessary to construct the facility (including initial submission, follow-up and securing of all approvals and permits).

A.3.2 Non-Compliance with Design Manual

If the designer deems that deviation from this manual is in the best interest of the project, then the designer is required to make a formal request to Niagara Region's Project Manager with a memorandum identifying the deviations with an explanation of the benefits to the project.

A.3.3 Level of Service and Backup (Redundant) Equipment

The level of redundancy for process and equipment shall be in compliance with regulatory objectives, generally with sufficient backup devices to be able to meet peak instantaneous demand following failure (or maintenance) of one largest capacity unit. The designer shall ensure that the flow to any treatment process unit out-of-service can be routed to remaining units in service with minimum impact on their performance.

A.3.4 Risk Assessment

The designer is expected to complete and maintain a risk assessment in the form of a risk register which includes, but is not limited to, the following information.

1. List of all potential risks with unique identification number
2. Date risk was identified
3. Description of risk
4. Type of risk (safety, environmental, financial, social, contractual, technical, schedule, liability, etc.)
5. Stage at which project risk may occur
6. Evaluation of the probability/ likelihood and impact/ consequence of the risk
7. Ranking of the risks
8. Description of potential mitigation measures (accept, avoid, transfer, reduce)

9. Final decisions and status of risk

10. The risk analysis shall address the following questions.

- a) What is the criticality of each asset that is to be taken out of service?
- b) Is the facility to remain in operation while the upgrades are taking place?
- c) What contingency plans will be implemented to mitigate the risks?
- d) What costs are associated with each contingency plan?

A risk analysis meeting involving all potentially affected parties shall be required. The designer shall determine if the area municipality(ies) can be considered to be potentially affected party(ies).

A.3.5 Hazard and Operability Review

The designer is required to complete the Hazard and Operability Review (HAZOP), which is a systematic, critical examination of the process and engineering design of the facility/ plant. The designer will audit this review through workshops at specified stages of the project. The intent of the review is to assess the potential hazard of the failure of individual equipment and the consequential effects on the facility as a whole and its potential for negative impact on the environment. The HAZOP review will identify potential hazards associated with the operation of the facility/ plant and will provide recommendations to be incorporated into the design reports relating to the following.

1. Finished water quality
2. Effluent water quality
3. Hydraulic overload
4. Emergency overflows
5. Module by-pass
6. Equipment hazards
7. Equipment failure hazards
8. Odour hazards
9. Health and safety review
10. High/low nutrient load
11. Spills to the environment
12. Specific hazards for elevated tanks

A.3.6 Health and Safety

In addition to current health and safety guidelines and regulations, Niagara Region has the following requirements for all water and wastewater projects:

1. Roofing designs must include requirements for anchors tie-offs, or other approved means of fall restraint and fall arrest.
2. A general requirement to design facilities to eliminate confined spaces. Where the design cannot eliminate all confined spaces, all reasonable efforts must be made to reduce the quantity of confined spaces and hazards within any confined space. The space must be designed for ease of ingress, prompt egress, and have appropriate fall arrest and retrieval safeguards.
3. To allow Niagara Region to update its Confined Space Entry database accordingly.
4. Under the Health & Safety Review requirement, Niagara Region's Project Manager will coordinate with the Water/Wastewater Health & Safety Coordinator who will be involved in the design review process.
5. Access hatches to be designed with secondary fall protection grating and have four-sided protection.
6. Designs must address travel restriction, fall restriction and fall arrest for work that may be required while working at heights.
7. Designs must identify how Niagara Region's operation and maintenance staff will be protected.
8. Hazardous gas monitoring in potentially hazardous areas shall be conducted using personal, portable devices.
9. Electrical safety considerations must be made according to all applicable acts, codes, standards, and guidelines.
10. Adequate designs must integrate lock-out/tag-out requirements for all sources of energy. The location of disconnects shall be in the most logically safe location for access and operation.
11. Designs must mitigate excessive noise to the environment and to workers.
12. Where possible, designs must identify atmospheric hazards, assess these hazards with respect to incompatible emissions, and provide adequate ventilation.
13. Emergency eyewash and deluge shower stations shall be provided in the vicinity of the chemical storage areas or other potential exposure risks. The water supply should be tepid water and be compliant with American National Standards Institute (ANSI) Standard Z358.1. The water supply and eyewash/ shower facilities shall be protected from freezing.
14. With respect to the area and function of the environment, designs must provide for adequate illumination for worker safety.
15. A Designated Substance Survey (DSS) must be conducted during the design phase.
16. Prior to final commissioning, conduct Pre-Start Health and Safety Reviews as required as per Ontario regulations.

A.3.7 Security

All water and wastewater facilities shall be designed to comply with the requirements of the Niagara Region Water and Wastewater Security Technical Specifications.

1. This shall apply to perimeter fences and gates, site property and access roads, doors, windows, access hatches, ventilation louvers, overflows and outfall sewers.
2. Site specific considerations from the local municipality must also be followed.

A.3.8 Tender Documents

All tenders for construction will be based on the *NPSCD*. The front end of the tender document will be prepared using the latest version of Niagara Region's standard template at the time of preparation. No deviations from the standard template will be permitted without the express approval of the Project Manager and Procurement Department. In all instances the current version of the NPSCD specification sections to be included in the Tender documents and not merely referenced. In all instances the Tender Documents will contain all relevant sections and specifications and not refer to outside or third party documents.

For linear projects, Special Provisions – Contract Items (SPCI) in the *NPSCD* shall be used. Where there is no specific item specification in the SPCI, or a specification requires modification, the designer will provide the required specification, or modification, in the Special Provisions – Contract Items Supplementary (SPCIS) section.

For facility projects, a combination of SPCI, SPCIS and *Canadian National Master Construction Specification (NMS)* (16 Divisions) are to be used.

For facility and linear projects a combination of the above standards will be required.

The designer shall prepare a commissioning plan as per the *Niagara Region Water and Wastewater Services Commissioning Guidelines*, which shall be included in the tender documents.

A.3.9 Operations Manual

The Operations Manual is a written description that provides a basis for operator training, highlighting the operation of the facility and describing the function of the facility and all associated processes. The designer shall prepare, or update, the Operations Manual in accordance with the latest version of the *Niagara Region Water and Wastewater Operations Manual template*.

A.3.10 Energy Efficient Design

The design of any new system, building, or unit process should consider alternatives to reduce energy costs while still meeting overall objectives for operations, performance and longevity. Wherever practical and cost-effective, these ideas should be incorporated into the design.

The designer will include an energy audit benchmark for the consumption of existing equipment and unit processes to evaluate potential energy savings of an upgrade or retrofit.

The designer will select equipment and vendors that meet the performance specifications while having lower energy consumption requirements.

Refer to Section C for specific energy efficient design approaches pertaining to wastewater treatment plants.

A.4 Design Disciplines

A.4.1 General

The main components of facilities shall be designed for the following minimum service life targets.

Item Description	Minimum Service Life(years)
Structures	100 (post disaster)
Piping and Fittings	>80
Pumps	25
Valves	25
Paints and Coating Systems	25
Electrical	15
Controls and SCADA	10

Niagara Region Integrated Services Group will review shop drawings during the construction phase for electrical, control and SCADA equipment.

A.4.2 Civil

A.4.2.1 Design Vision

Buried infrastructure shall efficiently convey water and wastewater, and its installation and maintenance shall have minimal long-term negative impacts on the existing landscape once restoration is complete.

A.4.2.2 Design Basis

Buried infrastructure shall be designed to meet *Ministry of the Environment Conservation and Parks (MECP) Guidelines*, to be structurally sound subject to all dead and live loading, to be capable of withstanding all thrust forces and surge and transient pressures and burial depths, and to minimize maintenance requirements. Buried infrastructure shall consist of suitable materials as specified in this manual.

A.4.2.3 System Layout

Buried infrastructure shall be located within the public right-of-way and shall not conflict with area municipality infrastructure or with buried utilities.

Buried infrastructure on Niagara Region property shall be located so as not to hinder future expansion of facility operations, shall be accessible for repairs or maintenance when required and shall not conflict with existing buried infrastructure.

Buried chemical feed lines in the public right-of-way and at facilities are to be installed in carrier conduits with tracer wire.

A.4.2.4 Facility Layout

The designer shall comply with the following requirements when expanding or upgrading treatment plants and remote facilities.

1. Provide adequate space between existing and new equipment for operation and maintenance requirements.
2. Ensure that installed equipment can be easily removed.
3. Provide flexibility in facility design to accommodate future possible changes in operation.
4. Ensure that the facility is designed to allow for future expansion works.
5. Give consideration to full site build-out conditions.
6. Give consideration to accommodating future capacity increases within the life expectancy of the asset.
7. Avoid confined spaces where possible.
8. Provide reasonable access to all areas of the site.
9. Provide low maintenance landscaping.
10. Bollards must be included to protect equipment, generators, building or other critical site components.

A.4.2.5 Valve Chambers

The designer shall take the following requirements for valve chambers into consideration.

1. A minimum size of 1800 mm x 2400 mm rectangular valve chamber is to be used in all combinations.
2. Chamber size shall be selected to adequately accommodate all pipe and valves
 - a) Provide minimum clearances of 1.0m on both sides of pipe and 0.30m below pipe to allow sufficient space for servicing and/ or removal of valves when required.
 - b) Valve chambers with valves too large to be removed through man-access openings shall be provided with removable access covers or with removable ceiling panels.

- c) The preference is have valve chambers installed in boulevard areas
 - d) Valve chambers located outside of vehicular traffic areas are to have exposed chamber roofs with removable access covers or hatches for equipment maintenance.
3. Valve chambers shall be designed with head room of 2.1m at a minimum and a maximum of 0.60m clearance from bottom of forcemain pipe to chamber benching.
 4. Valve chambers located in gravel shoulders shall be provided with a paved area sufficient for parking of one vehicle.
 5. All concrete valve chambers shall be provided with adequate thrust restraint, approved waterproofing, sealed joints, and must be insulated from the ground surface to below the frost depth.
 6. Adjustment units, as per OPS, shall be provided for grade adjustment(s).
 7. Chambers shall include a sump located in the vicinity of the access hatch with an appropriate discharge point.
 8. All chambers containing electrical equipment shall be provided with a float controlled sump pump which shall discharge to a sewer where possible. If discharge to a sewer is not possible then flow will be discharged to the surface, and directed away from the structure. All sump pumps shall be intrinsically safe.
 9. All access hatch drains to be piped to the sump.

A.4.2.6 Tracer Wire

1. All buried linear and facility piping including: watermains; forcemains; hydrant laterals; service laterals; chemical feed lines; and all other buried facility piping shall be provided with tracer wire as per the tracer wire requirements contained in this Manual.
2. Tracer wire shall not be installed through chambers, but must be placed around the outside ensuring continuity.
3. Tracer wire is not required on gravity storm and sanitary sewers.
4. Tracer wire shall be 10-gauge TWU copper wire with thermoplastic insulation recommended for direct burial.
5. For directional drilling, auguring or boring installations, three #12 AWG Solid Extra High Strength Copper Clad Steel Conductor (EHS-CCS) shall be installed with the pipe and connected to the tracer wire at both ends, or cad welded to the existing iron pipe at both ends.
6. Tracer wire shall be extended below grade in a PVC conduit to dedicated tracer wire test stations.
7. Tracer wire test stations are to be no more than 300m apart, and the location of all tracer wire test stations shall be indicated on all engineering drawings.
8. Tracer wire test stations shall be located at the property line.

A.4.3 Architectural

A.4.3.1 Design Vision

Buildings for water and wastewater facilities shall be designed to match aesthetic requirements of the surrounding neighbourhood and meet the following requirements.

1. Have minimal maintenance requirements.
2. Complement the surrounding environment.
3. Provide access that meets the requirements of the Accessibility for Ontarians with Disabilities Act (AODA) where appropriate.
4. Be designed to post-disaster standards.
5. Ensure that all openings in the exterior walls are equipped with insect screens and vandal proof louvers.

A.4.3.2 Roofing Design

Design roofs with the following considerations:

1. Sloped roofs only.
2. Give preference to metal roofs over asphalt shingles.
3. All metal roofs shall be provided with lightning rods and grounding.
4. Provide snow guards, eaves and downspouts.
5. Downspouts to be located and oriented such that water is directed away from the structure by the shortest path possible.

A.4.3.3 Windows and Doors

Windows and doors must comply with Niagara Region Water and Wastewater Security Technical Specifications.

A.4.3.4 Wall Finishes

Interior and exterior walls shall be provided with the following finishes:

1. All interior walls shall be architecturally coordinated to provide a level of finish selected for the use or service intended. Additional consideration shall be given to humid environments typically encountered within water and wastewater facilities.
2. Painting for aesthetic purposes shall be limited to areas intended for human occupancy.
3. For bathrooms and washrooms, ceramic tile finishes will be provided on walls.
4. Graffiti resistant materials shall be considered for all exterior exposed walls and/or surfaces.

A.4.3.5 Floor Finishes

The floor shall be finished in accordance with the following criteria:

1. Office, laboratories, computer control rooms, lunchrooms and other general-use rooms shall be provided with non-slip ceramic tile floor finishes.
2. Concrete floors within process areas shall be provided with a slip resistant epoxy finish.
3. All other concrete floors shall be provided with non-coloured floor concrete hardener complete with floor sealer.

A.4.3.6 Handrails

1. All ladders, handrails and guardrails, shall be stainless steel Type 316L, aluminum 6063-T6 (acceptability of NSF-61 approved fiberglass-reinforced plastic (FRP) will be reviewed on a case by case basis) based on location of installation unless otherwise stated herein.
2. FRP will only be acceptable indoors and not at Wastewater facilities.

A.4.3.7 Landscaping

Landscaping shall be designed to minimize maintenance requirements and to meet the Municipality Site Plan Approval requirements. Preference shall be given to native plant or tree species in Ontario, which require minimal watering. Xeriscaping shall be considered in landscaping design where applicable.

A.4.3.8 Fencing, Gates and Signs

For the requirements pertaining to the facility fencing, gates and signs, refer to Niagara Region Water and Wastewater Security Technical Specifications.

A.4.3.9 Lighting

See Electrical Section below.

A.4.4 Structural

A.4.4.1 Design Vision

The designer is to construct all structures with the overall lowest life cycle cost. All structures shall to be designed to post-disaster standards.

A.4.4.2 Basis of Design

Complete structural designs in accordance with the following criteria:

1. All below grade structures shall be constructed with reinforced concrete complete with water stops and Zemdren (Type II) formwork liner for all exposed surfaces.
2. Structures shall be insulated from the surface to below the frost level (minimum 1.7m) and buried structures waterproofed.

3. All miscellaneous metals within water and wastewater structures shall be type 316 L stainless steel. Fiberglass reinforced plastic may be substituted for 316 L stainless steel where deemed appropriate by the designer.
4. All materials in contact with potable water shall be American National Standards Institute / National Sanitation Foundation – 61 (ANSI/NSF-61) certified.
5. Stairway access into below grade structures is preferred. Where stairway access is not possible, access hatches shall be provided.
6. All water retaining structures shall contain a minimum of two independent cells. Each cell must be capable of being isolated for inspection and maintenance purposes without affecting the operation of the other cell(s). Each cell shall be provided with a minimum of two entry/exit points.
7. Concrete water retaining structures shall be constructed of high-performance low-shrinkage concrete. Shrinkage bar testing shall be required.
8. In addition to the Zemdren liner, a crystalline or epoxy coating system shall be considered to improve the long term durability and performance of the concrete structure in contact with water.
9. Coatings shall be designed to withstand normal operating conditions including corrosive and potentially high-chlorine environments. Minimum expected service life of coating shall be 25 years.
10. All expansion joint and caulking material must be protected from exposure to chlorine both during normal operation and during the disinfection process.
11. All ground level, partially buried and underground water retaining structures top shall be above the 100 year flood or the highest flood on record.
12. The area surrounding a ground level or below grade water retaining structure shall be graded to be free of standing water for a minimum distance of 15 metres.
13. Where a water retaining structure base slab is below the pre-construction original finished grade it is preferable to install the base slab above the ground water table.
 - a) Consideration must be given to fluctuations in the water table, therefore, a sub-structure drainage layer of granular material drained to atmosphere or a gravity drained storm sewer is required.
 - b) Maintenance hole access shall be provided at changes in directions along the drainage sewer for access and clean outs.
 - c) In the case where a gravity drainage solution is not possible, a pump dewatering system shall be provided.
14. In the event that the groundwater is expected to be unavoidable, hold down anchors shall be considered.
 - a) Pressure relieve valves shall not be used.

- b) It is the expectation of Niagara Region that a comprehensive plan which addresses buoyancy concerns and/or groundwater removal shall be developed by the designer.
 - c) Such plans shall include comprehensive operational and logistical procedures for draining the water retaining structure for inspection purposes while being mindful of groundwater conditions adjacent to the structure.
15. The designer shall provide a minimum separation of 15 metres between potable water retaining structures and sewers, drains, septic tanks and tile fields.
16. Drains, sewers and other piping located within 15 metres shall be constructed of piping material with a pressure rating suitable for a pressure test of at least 350 kPa. Such pressure tests will have zero leakage.
17. Hydraulic gradients for water retaining structures shall be compatible with specified service levels. Gradients shall be designed to accommodate water retaining structure draw down levels of current Master Servicing Plans plus a 100% allowance for future demand.

A.4.5 Process Mechanical

A.4.5.1 Design Vision

Mechanical systems shall be designed to provide ease of operation and maintenance with an emphasis on efficiency and energy conservation.

A.4.5.2 Equipment Tagging

1. Flat surfaces shall be provided with lamacoid nameplates.
2. Valves and equipment having curved surfaces shall be supplied with stainless steel engraved tags complete with stainless steel chain affixed to the equipment.

A.4.5.3 Piping

1. The designer shall ensure that all process piping can withstand all expected internal and external pressures, loads, thrust forces and transient pressures.
2. All exposed process pressure piping in water and wastewater facilities shall be, at a minimum, type 316 L schedule 10 stainless steel.
3. All piping in contact with potable water shall be ANSI/NSF-61 certified.
4. Chemical feed piping shall be Teflon.
5. All process piping shall be provided with colour-coded labels to comply with the latest edition of the *ANSI/ASME A13.1 Pipe Labeling Requirements*.
6. Colour-coded arrows shall be provided indicating the direction of flow.
7. Pipe sweating shall be controlled with ventilation and insulation.
8. Only standard pipe sizes will be used.

9. Adequate supports for all piping shall be designed and shown on drawings with appropriate details.
10. Long radius elbows are preferred.
11. Sample taps shall be installed on all suction and discharge headers.

A.4.5.4 Valves

1. Main process valves shall be stainless steel or cast/ductile iron complete with internal and external fusion bonded epoxy (FBE) coating, or two part liquid epoxy coating.
2. Valves shall comply with *American Water Works Association (AWWA) Specifications and Standards*.
3. All valves in contact with potable water shall be ANSI/NSF-61 certified.
4. All valves shall be of the correct type for the transmitted fluid, pressure expected and the valve use (ie. shut-off, modulating, etc.).
5. Valves and valve operators shall be oriented to meet the following requirements.
 - a) Ease of operation
 - b) Limited interference with structures and with any other equipment or piping
 - c) Space allowance requirement for maintenance and disassembly
 - d) Valves mounted higher than 2 m shall be provided with a chain operator.
6. Butterfly valves in critical locations shall be provided with a redundant gate valve.
7. Valve systems associated with water pumps with more than 100 mm of discharge shall consist of a suction isolation butterfly valve, discharge check valve, motorized butterfly valve and isolation gate valve prior to connection to the discharge header.
 - a) Ball valves, 50 mm in size, shall be located at the top and bottom of the suction and discharge piping.
8. In potable water facilities, non-buried valve type and materials shall be as follows:
 - a) Valves less than 50 mm shall be stainless steel ball valves.
 - b) Valves 75 mm to 300 mm shall be rising stem gate valves.
 - c) Valves greater than 300 mm shall be butterfly valves except for valves whose purpose is to isolate a butterfly valve. These may be gate valves.
 - d) Check valves shall be cast/ductile iron fusion bonded epoxy (inside and out) complete with stainless steel hardware.
 - e) Air release valves shall be cast iron fusion bonded epoxy (inside and out) complete with stainless steel hardware and an anti-slam device. The designer shall provide a flood protection double check valve on a vent within chambers. Air release valves associated with water systems may be direct-bury.

- f) Globe style pressure relief, surge or pressure control valves shall be cast iron fusion bonded epoxy (inside and out) with stainless steel pilots and stainless steel sensing lines complete with anti-cavity trim as required.
 - g) Sluice gates shall be fabricated from 316L stainless steel. Operators shall be located at ground level.
9. For water transmission systems, valve type and materials shall be as follows:
- a) Gate valves conforming to AWWA C509 or AWWA C515 shall be provided on transmission mains up to and including 300 mm diameter.
 - b) Butterfly valves conforming to AWWA C504 shall be provided on transmission mains 400 mm in diameter and larger.
 - c) All valves shall be housed in approved, adequately designed watertight chambers unless specified otherwise.
 - d) All valves require valve boxes and are to open left (counter clockwise) and shall have a 50 mm square standard AWWA operating nut.
 - e) Where possible, valves shall be located outside of the travelled portion of the road and intersections.
10. In wastewater facilities, non-buried valve type and materials shall be as follows:
- a) Valves 50 mm and less shall be stainless steel ball valves.
 - b) Valves 75 mm and larger shall be stainless steel knife gate or fusion bonded epoxy (inside and out) plug valves.
 - c) Knife gate valves shall be selected to meet the anticipated maximum design pressure for each side (i.e. uni-directional vs bi-directional). Specifications for bi-directional knife gate valves shall identify the anticipated maximum design pressure for each side of the valve.
 - d) Check valves shall be cast/ductile iron fusion bonded epoxy (inside and out) complete with stainless steel hardware.
 - e) Air release valves shall be cast iron fusion bonded epoxy (inside and out) with stainless steel hardware or stainless steel body. Flushing ports must be provided to clean the air valve. Direct buried air release valves are not permitted on wastewater systems.
 - f) Sluice gates shall be fabricated from 316 L stainless steel. Operators shall be located at ground level.
11. For wastewater forcemains, all direct bury valves shall be gate or plug valves.

A.4.5.5 Pumps and Motors

1. All equipment and motors shall be supplied with corrosion resistant metal nameplates fitted securely in a location which can be easily read.

2. Pumps and other rotating equipment shall be provided with bearings selected on the basis of a B-10 life expectancy as defined by the Anti-Friction Bearing Manufacturers Association at rated conditions of service of at least 150,000 working hours. Conventional lubricating points shall be specified.
3. Bearings for electric motors shall be constructed of double seal bearings.

A.4.5.6 Equipment Operating Characteristics

1. All pumps furnished shall operate satisfactorily without excessive wear, excessive lubrication or undue attention required by the operating staff. All rotating parts shall be in true dynamic balance and operate without vibration caused by mechanical defects, faulty design or misalignment of parts. The designer shall take these factors into consideration and design a system that is within acceptable tolerances.
2. To ensure that the vibration level is within the specified limit the designer shall ensure that vibration analysis for all pumps, generally 75 KW (100 HP) and up, is carried out as part of the startup procedure of the equipment and also at the end of the three month operating period. The results of the vibration analysis at the startup procedure shall be included in the Contractor-supplied Equipment Maintenance Manual.

A.4.5.7 Equipment Acceptance Testing

1. Pumps shall be acceptance-tested according to Hydraulic Institute Guidelines Level "A" tolerances as per the following.
 - a) Pumps less than 50 hp (37 kW) are to be supplied with a standard performance curve certified by a factory trained technician or a professional engineer.
 - b) For pumps 50 to 300 hp (37 to 224 kW), a certified factory acceptance test (FAT) is required including sign-off by a professional engineer.
 - c) For pumps greater than 300 hp (224 kW), a witnessed FAT is preferred including sign-off by a licensed professional engineer.
2. FATs shall be conducted prior to releasing such equipment for delivery to site. FATs shall be conducted with the actual motor to be used rather than a shop motor.

A.4.5.8 Equipment Guards

1. Equipment guards shall be provided for all rotating components, couplings, belts, chain drives and extended shafts.
2. Equipment guards shall be hot-dip galvanized steel painted yellow or stainless steel.
3. All equipment shall meet the requirements of the Ontario Health and Safety Act.

A.4.5.9 Equipment Maintenance Requirements

1. The designer shall provide a minimum of 1 m of clear space around all equipment for maintenance work or more as directed by the equipment supplier.

2. Equipment that requires removal for maintenance shall be provided with electrical and mechanical isolation devices to allow for removal without interfering with the operation of the process or facility.
3. In designing the layout of the equipment, the designer shall make provisions for its removal including providing a suitable lifting mechanism.
4. All equipment shall be mounted on a concrete pad with a minimum height of 100mm.

A.4.6 Heating, Venting and Air Conditioning (HVAC)

A.4.6.1 Design Vision

1. HVAC systems shall provide the necessary environmental controls to maximize the performance of the equipment in the facility, while providing comfort heating and cooling to occupants. As most facilities are largely unoccupied, the environment required for optimal equipment performance typically takes precedence.
2. Provide heating, ventilation and air conditioning equipment that meet energy efficiency requirements.
 - a) Overly complicated schemes with limited efficiency gains shall be avoided.
 - b) Heat Recovery and Energy Recovery systems shall only be included in a design where they will provide a good return on investment, have reasonable life expectancy, and require minimal maintenance.
3. Preference shall be given to the use of natural gas heating in place of electric heat.

A.4.6.2 Design Features

1. Under no circumstances shall fans be relied on to declassify newly constructed hazardous spaces on a continuous basis.
2. The National Fire Protection Association 820 (NFPA 820) guidelines shall be followed if older hazardous spaces must be de-rated by ventilation.
3. In a hazardous space, all permanent equipment shall be rated for the unventilated environment.
4. Ventilation shall be available when the hazardous space is occupied as follows.
 - a) Air handling unit (AHU) changeable from 3 Air Changes per hour (ACPH) to 6 ACPH controlled via a door contact switch separate from the security system.
 - b) Once the switch has been tripped the AHU will change from 3 to 6 ACPH.
 - c) Motion sensors will be located within the classified area to maintain operation at 6 ACPH.
 - d) If no motion is sensed for a period of time (i.e. 30 to 60 min) the AHU will revert to 3 ACPH. A local audible alarm will pulse on and off for 30 seconds (configurable) prior to reverting back to 3 ACPH to alert current stationary occupants of the transition.

- e) A fault in the AHU that does not allow the switch from 3 to 6 ACPH, or back to 3 ACPH, will activate a local audible alarm.
 - f) The alarm will be acknowledged locally via a button, but a fault indicator will remain on until the fault is corrected. If the alarm is not acknowledged, the local audible alarm will automatically shut off after 5 to 10 minutes (configurable) but the local fault indicator (pilot light) will remain active.
 - g) Faults within the AHU will be monitored locally and through SCADA at the receiving WWTP.
 - h) Ability for "LOCAL Control" via manual override to activate the mechanical ventilation from 3 to 6 ACPH shall be provided.
5. The heating and cooling requirements for each zone shall be achieved by a dedicated control unit linked to the master control system. However, the zone control unit must be capable of being overridden manually from the HVAC master control system.
6. Design shall consider the environment of specific areas and consider dehumidification if required for the environment and to protect equipment.

A.4.7 Standby Power

A.4.7.1 Design Vision

Sufficient backup power must be provided at all critical facilities to maintain a full level of service for at least two days following a loss of grid power. Preference is for a packaged, stand-alone system consisting of an air-cooled diesel-powered generator in a self-contained sound attenuating skin tight outdoor enclosure.

Standby power shall be provided to the following key facilities:

1. Wastewater Treatment Plants and Remote Facilities.
 - a) All facility essential loads must be capable of being fed from the plant's standby generator(s) at peak hour flow conditions in order to meet Environmental Compliance Approval (ECA) requirements.
2. Water Treatment Plants and Remote Facilities.
 - a) All facility essential loads must be capable of being fed from the plant's standby generator(s) to enable the water treatment plant to meet average day demand.
 - b) In a closed loop system where pressurized system storage is not available, the generator shall be sized to meet the pumping system power requirement for maximum day plus fire flow demand.
3. Chlorine Booster Stations. To be reviewed at the pre-design stage of the project and subject to the final decision of the design team.
 - a) All essential equipment (i.e. PLC, analyzers, flow meter, heater(s) and some lights) are to be provided with standby power.
4. Remote Storage Facilities including Elevated Water Tanks and Reservoirs.

- a) All essential equipment (i.e. PLC, analyzers, flow meter, navigation beacons, heater(s) and some lights) are to be provided with standby power.

A.4.7.2 Design Features

Emergency standby power systems shall be designed with the following features:

1. Diesel powered generators are preferred over natural gas.
2. Emergency standby power systems shall be registered through the MECP Environmental Activity and Sector Registry (EASR) system and shall meet requirements regarding air and noise levels as per Part III of Ontario Regulation 346/12.
3. Grounding shall be installed around the generator.
4. Radiator air cooled engines only.
5. The fuel system shall consist of a double walled tank with minimum storage capacity suitable for 48-hour operation at a full generator load starting at 75% full tank. A fuel level indicating transmitter wired to the programmable logic controller (PLC), a low and high float switch, vent whistle and a fuel leakage alarm must be provided.
6. Variances for equipment not meeting the requirements of the B139.ON code must be obtained.
7. The ventilation system shall be complete with fans, dampers, etc. to meet the required air volume for engine combustion and ventilation requirements.
 - a) The engine ventilation system shall be designed to operate with and without local utility power and also for testing of the various modes of operating conditions.
 - b) Combustion Air Ventilation dampers must be fully open before the diesel engine is permitted to start. Obtain variance from the Technical Standards and Safety Authority (TSSA) if the designer and owner choose not to meet this requirement at critical stations where it is necessary for the generator to start even if the damper fails to open.
 - c) Dampers shall "fail safe" in the open position.
 - d) All ventilators shall be vented to the exterior of the enclosure and shall be equipped with an insect screen.
8. The engine shall be started by an electrical cranking motor with power provided from storage batteries, which shall be a 24 volts system.
 - a) Provide sufficient amperage for three cycles of three cranking periods of 15 seconds duration.
 - b) The starting system shall be capable of providing three complete cranking cycles without overheating.

- c) The system shall include a fully automated battery charger to maintain the battery in a fully charged state, with an alarm to supervisory control and data acquisition (SCADA) in the event of malfunction or low battery voltage.
 - d) Storage batteries shall be provided with quick-disconnects.
9. The generator set shall be provided with a microprocessor-based control system which is designed to provide automatic starting, monitoring and control functions.
- a) The control system shall also be designed to allow local monitoring and control of the generator set and remote monitoring and control, suitable for the intended operating environment.
10. An emergency stop red mushroom head button must be provided.
11. Load bank(s) and if needed, automatic load bank controller, shall be considered for safely testing the generator. Load cell shall be automatic type, or staged cells so that during testing, generator is not subject to insufficient loading. Load bank requirements to be reviewed at the pre-design stage of the project and will be subject to the final decision of the design team. Region preference is to not use proprietary controllers on equipment.
12. The generator shall be installed on a concrete pad complete with a sub base fuel tank.
13. The following apply specifically to indoor generator installations.
- a) To eliminate hazards to personnel, safety guards shall be provided around all hot surfaces, belts, shafts, gears, rotating equipment and other moving parts.
 - b) All generator exhaust components, from the engine to the exhaust stack lagging, shall be provided with removable non-absorbent mineral wool blanket insulation.
 - c) The designer shall provide stairs and a landing to assist filling of above grade fuel tanks.

A.4.8 Electrical

A.4.8.1 Design Vision

Electrical systems shall be designed to support the process, control and monitoring infrastructure that relies on them. The design shall focus on reliability and performance needs of equipment, risk reduction, and safety. Electrical equipment shall be provided in protected locations, of sufficient quality and redundancy, so that critical processes are protected from nuisance and catastrophic failures due to electrical malfunction.

1. Seek simplicity where possible.
 - a) Utilize soft starters in place of variable frequency drives (VFDs), where feasible.
 - b) Preference for electrical panels/equipment to be placed in indoor electrical rooms, if the applicable indoor space is not available then an outdoor bus shelter-type kiosk is to be utilized,

- c) Use outdoor stand-alone generators in place of engineered buildings, where feasible,
 - d) Keep electrical equipment out of hazardous spaces, and;
 - e) Provide backup soft starters for pumps larger than 100Hp; to be reviewed at the design stage of the project and subject to the final decision of the design team.
 - f) Group essential and non-essential loads to facilitate simplistic load shedding schemes for utility power failures
2. Load shedding schemes shall be deployed to automatically shed non-essential loads during a utility power failure. Load shedding shall not be dependent on any proprietary controllers or equipment not explicitly listed in the W&WW Division's Approved Product and Equipment list (APEL) or Automation (SCADA) Standards.
 3. Important electrical equipment shall be kept separate from chlorine storage, to prevent accelerated corrosion.
 4. Electrical equipment placed in underground chambers shall be protected with a sump pump, the chamber shall be waterproofed, and devices shall meet NFPA 820 rules (explosion proof heaters, etc.). SCADA equipment shall not be placed in chambers.
 5. An electrical system coordination study must be completed to confirm electrical system protection and setting of protective devices under normal utility and facility standby power.
 6. Where VFD equipment is being used, a harmonics study is required.
 7. The designer is responsible for the updating and production of all single line diagrams in the facility where they have changed or modified the electrical power supply system.

A.4.8.2 Design Features

Electrical systems shall be designed with the following features:

1. Lamacoid nameplates shall be provided for all electrical equipment.
2. All wiring must be identified with permanent indelible machine printed identifying wire markers on both ends of the phase conductors of feeders and branch circuit wiring.
 - a) The phase sequence and colour coding must be maintained throughout, complying with the Canadian Standards Association C22.1 (CSA C22.1) colour code.
 - b) The control wiring must have an identical tag at both ends, including the junction box. The junction box shall have a terminal box.
3. All electric motors greater than 7.5 KW (10 HP) shall be high efficiency motors. For motors greater than 89.5 KW (120 HP), the minimum efficiency shall not be less than 94% at the specified operating point. However, the final determination shall be made based on life cycle costing analysis.
4. Multilins must be provided for motors greater than 89.5 KW (120 HP).

5. The service entrance shall be protected via transient voltage surge suppression (TVSS) and lightning arresters.
6. Power monitoring on incoming feeders must be provided and connected to SCADA.
7. For critical facilities, two separate feeds (with tie breaker) shall be installed to allow for the isolation of one feed while maintaining 75% of the total station load.
8. Single line diagrams shall be “arch D” size, water resistant, plaque mounted and must be posted in all buildings.
9. Motor control centres (NEMA ICS 2-322) must be provided for all 600V and 4160V equipment.
 - a) Indoor MCCs shall be NEMA/EEMAC 1A gasket enclosure and outdoor NEMA/EEMAC 3R enclosures.
 - b) Evaluate the cost benefit of NEMA/EEMAC 4X outdoor enclosures on a project specific basis.
 - c) A main breaker and individual lockage disconnects shall be provided for each starter, complete with removal buckets.
 - d) Arc flash labels shall be provided.
 - e) Lockable equipment disconnects at MCC shall be provided.
 - f) Local disconnects shall also be provided unless their location would be prone to flooding and damage.
10. All electrical equipment including MCCs and control panels shall be located on the main floor of a facility or if outdoors on a concrete pad all above the regional flood line.
11. Concrete pad shall be 150mm high and sized to include a 1m walkway around the enclosure.
12. Insulation resistance tests shall be performed for all wiring and equipment installed.
13. Electrical junction boxes and panels shall be mounted above flood plain elevations or potential submergence levels.
14. A free standing automatic transfer switch shall be provided for all facilities with permanent generators.
15. A free standing manual transfer switch shall be provided for all facilities without permanent generators.
16. The transfer switch and its controls shall be stand alone, independent and not integrated into the electrical switchgear and protective devices.
17. All conduits within driveways or roadways must be concrete encased complete with a 50% spare conduit capacity.

18. The preferred luminaire type for indoor and outdoor applications is light-emitting diode (LED). Photocell control for all outdoor lighting applications must be provided.
19. Outdoor light fixtures shall comply with the Niagara Region Water and Wastewater Security Technical Specifications, latest revision, for security lighting standards, as well as the Dark Skies Compliant Energy Efficiency Standards.
20. For indoor lighting fixtures, the following shall be provided.
 - a) Lighting shall be energy efficient.
 - b) The designer shall be responsible for conducting a photometric assessment to confirm the necessary number of units and optimum locations.
 - c) Locating light fixtures on high ceilings shall be avoided. For light fixtures that must be located on very high ceilings, access shall be provided for servicing by crane or other practical alternate means of accessibility.
 - d) For energy savings, occupancy sensors shall be provided for indoor lighting where reasonably practical.
21. Emergency lighting shall be provided for each building during regular operation and maintenance duties.
22. All electrical equipment shall be designed for 1m clearance for workability and maintenance purposes.

A.4.9 Instrumentation and Control

A.4.9.1 Design Vision

All instruments shall be installed in a location that is safe for workers, easily accessible, serviceable and efficiently calibrated. Devices shall be suitable for their intended environment.

A.4.9.2 Design Features

In general, the following instruments shall be a standard:

1. Flow measurement instruments within pressure pipe systems shall be with electromagnetic flow meters.
2. Ultrasonic level transmitters with a flume are preferred for flow measurement in open channels or gravity pipelines.
3. Level measurement shall be by pressure, ultrasonic, or radar sensors.
 - a) Provide backup float system.
 - b) Preference shall be given to ultrasonic sensors.
 - c) Level measurement design, and selected technology, shall take into account atmospheric conditions (i.e. steam, mist, etc.), floating debris, foam, loss of echo potential, etc.

- d) Ensure that the face of the sensor does not make contact with the liquid during flooding, or high-level conditions, where the sensor may be submerged (i.e. provide flood cap, etc.).
- 4. Pressure transmitters shall be utilized instead of pressure switches.
- 5. Heat detectors shall be implemented in generator building rooms instead of smoke detectors.

SECTION B - **Water**

B.1 Water Treatment Plants

B.1.1 Design Vision

Niagara Region's goal is to produce potable water that not only complies with the requirements of the Ontario Drinking Water Quality Standards (ODWQS), but also meets treated water quality objectives that in certain cases may be more stringent than the ODWQS. Internal plant operating objectives (working levels) identified in this section have been developed for various treated water quality parameters for Niagara Region's Water Treatment Plants (WTPs).

The construction of a new water treatment plant will likely be specific to the treatment needs of the source water. Typically, it is considered more practical to supply new service areas from existing treatment plants rather than constructing a new treatment plant.

The goal of a water treatment plant is to provide efficient and reliable removal and/or inactivation of contaminants and/or pathogens from the source water and supply treated water to the storage facilities. Treatment plants shall have sufficient backup controls and devices to allow for effective maintenance of all equipment without upset to treatment processes or impacts to the storage and distribution system.

B.1.2 Basis of Design

1. Niagara Region's water treatment plants must be capable of meeting the mandated requirements as stipulated in the *Drinking Water System Regulation (O. Reg. 170/03)* as well as the conditions specified in the Drinking Water Works Permit (DWWP) and Municipal Drinking Water License (MDWL) issued by *MECP* for these facilities.
 - a) All equipment contacting water must be NSF approved (NSF International) as stipulated in the MDWL. This includes but is not limited to NSF-61 and NSF-372.
 - b) Any water residuals that are to be discharged to the sewer or wastewater treatment plant must consider and adhere to Niagara Region's, or local, Sewer Use Bylaw.

B.1.3 Facility Layout

In designing the layout of water treatment plants, consideration shall be given for future expansions of the plant to its ultimate site capacity in order to maximize use of available space on the property.

1. The designer shall in all cases give consideration to maximizing the site ultimate capacity in planning the plant layout, which may be higher than capacity requirements as identified in the Water and Wastewater Master Servicing Plan.
2. Design of the expansion works shall be carried out to permit the orderly construction of the facility economically with minimal disruption of the existing facility.
3. Works must be designed for proper flow splitting at each step in the overall treatment train. Interconnections between equivalent treatment processes from different stages of overall plant development shall be incorporated into the design wherever possible.

4. No equipment, heating pipes, chemical pipes / tubing, or other pipes / tubing / conduits containing material that could cause contamination shall be installed directly over tanks, filters, etc. (i.e. open water).

B.1.4 Treatment Processes and Equipment

B.1.4.1 Water Source

Designer must also take into consideration the latest version of the *Source Protection Plan* for the Niagara Peninsula Source Protection Area prepared under the Clean Water Act and the established intake protection zones (IPZ's) described in that document. Furthermore, designers must take into consideration policies and procedures put in place to minimize potential threats to raw water quality in the design of new water sources and modifications to existing sources or intakes.

Where necessary the designer must provide revisions to the *Source Protection Plan*.

B.1.4.2 Water Intakes

The designer shall take into account the Region of Niagara requirement for pre chlorination at all raw water intake sites for the prevention of Zebra Mussel colonization of these structures and associated piping.

Design of water intakes and associated structures shall take into consideration the potential for formation of frazil ice which can sink and block intakes. The designer shall include features or means to address the formation of frazil ice.

Intakes shall have a minimum of 600mm of clearance from the water bed unless shown that a lesser clearance will not impact the function of the intake.

B.1.4.3 Low Lift Pumping

Low lift pumping stations shall be equipped with vertical turbine pumps and shall be designed without the use of foot valves.

The designer is required to comply with the general intent of Section B, Item 3.0 Water Booster Pumping Stations.

B.1.4.4 Disinfection Processes

In an effort to reduce the formation of disinfection byproducts (DBP's) such as Trihalomethanes (THM) and Haloacetic acids (HAA), the Niagara Region has adopted the following disinfection process which the designer is required to comply with in all future upgrades and expansion of water treatment facilities.

1. Disinfection will be provided using ultraviolet and/or a liquid chlorine solution (sodium hypochlorite) and operating with a free chlorine residual.
2. Disinfection shall meet the plant's Environmental Compliance Approval (ECA) treatment capacity and the required level of redundancy.
3. Adequate chlorine contact time (CT) must be achieved on the plant property rather than relying on a transmission main for CT.

4. Processes such as chemically-assisted filtration shall be provided that will be designed to enhance organics removal in order to reduce DBP formation potential.
5. It is recommended that a multi-barrier approach be used for cyst or oocyst removal/inactivation as a matter of good design practice and as a highly favourable approach with regulatory agencies including MECP and the United States Environmental Protection Agency (USEPA).
 - a) As a primary barrier of treatment, conventional treatment technologies (coagulation, flocculation, sedimentation, and filtration) shall be optimized to ensure high solids removal efficiency.
 - b) Generally, chlorination following conventional treatment is an effective disinfection strategy for giardia inactivation removal, meeting the MECP CT requirement.
 - c) Niagara Region's Water Treatment Plants shall be designed to achieve at least 99% (2-log) removal of cryptosporidium oocysts, 99.9% (3-log) removal of giardia cysts, and 99.99% (4-log removal) of viruses through conventional filtration (or alternative technology) and primary disinfection.

B.1.4.5 Taste and Odour Reduction

Performance requirements for taste and odour reduction systems will depend on the Methyl Isoborneol (MIB) and Geosmin concentrations, expressed in ng/L (nanograms per litre) present in the influent to the water plant. The following table indicates recommended performance requirements for MIB and Geosmin removal.

Influent Water MIB or Geosmin Concentrations (ng/L)	Treated Water MIB Maximum Concentration (ng/L) or Minimum Percentage Removal	Treated Water Geosmin Maximum Concentration (ng/L) or Minimum Percentage Removal
< 100 ng/L	< 10 ng/L	< 10 ng/L
100 ng/L or greater	90%	90%

For plants using granular activated carbon (GAC), the system design shall take into consideration selection of the appropriate type of media, loading rates, empty bed contact times (EBCT), mass transfer zones (MTZ), and absorption factors in order to meet Region design objectives. Pilot testing of new systems or new media shall be conducted to confirm the basis for detailed system design. Refer to the *Niagara Region Filter Media Replacement Specification*.

B.1.4.6 Coagulation and Flocculation

The designer shall evaluate and recommend the most appropriate coagulant chemicals and system configuration in consultation with Niagara Region.

1. The designer shall provide a minimum of two trains, sized such that with one train out of service the remaining train(s) are sized to handle a minimum of one half of the ECA capacity. Each train shall be capable of operating independently.
2. Wherever possible, flocculation tanks shall be designed to optimize g-forces provided by mechanical mixing devices.
3. Flocculation of raw water prior to sedimentation shall be achieved by mechanical mixing.

B.1.4.7 Sedimentation

Sedimentation tanks shall be designed for the efficient removal of particulate matter using plate settlers. A minimum of two trains shall be provided, sized such that with one train out of service the remaining train(s) are sized to handle a minimum of one half of the ECA capacity. Each train shall be capable of operating independently. Alternative technologies for the removal of particulate matter may be used if agreed to by, or identified by, Niagara Region.

For efficient operation of sedimentation processes, ensure that:

1. Sedimentation tanks shall be provided with potable water hose stations for cleaning and removal of sludge. Alternative cleaning technologies shall also be considered.
2. Automated sludge removal is the preferred solution where feasible.
3. The bottom of sedimentation tanks shall be sloped to a sump for periodic sludge removal. It is preferable that the sump shall be provided with a drainage pipe for discharge of wastewater by gravity where a suitable gravity outlet is available.
4. Where gravity outlet is not feasible, sumps shall be sized and oriented for operation with a portable submersible pump. All electrical connections required for such an operation shall be included. An appropriate location for the outlet must be selected for the removal of sludge by discharge to local sanitary sewer where available.
5. A means of isolating individual sedimentation tanks must be provided.
6. Process residuals shall be directed to the sedimentation tanks to settle out as much solids as possible.

B.1.4.8 Filtration

General

The *MECP Procedure for Disinfection of Drinking Water in Ontario* includes acceptable minimum standards for the design and operation of a conventional surface water treatment plant using coagulation, mixing, flocculation and sedimentation followed by filtration. In order to produce potable water with the lowest turbidity level, the following is required in all Region water treatment plant filtration systems.

1. Turbidity on each filter effluent line must be monitored to predict filter breakthrough and begin backwashing prior to breakthrough.

2. Air scour and backwash water systems shall be provided.
3. Plant performance shall be monitored for compliance with regulations to receive disinfection credits.
4. The unit process performance within the WTP shall be monitored.
5. Any filtered water that does not meet operational objectives for filter effluent must be rejected to waste.
6. Microbial removal must be maximized.
7. Halogenated DBP formation when chlorine is added must be minimized.
8. Chlorine addition must be minimized by removing material that increases chlorine demand.

Filter Design Objectives

Niagara Region has adopted the operating objective of 0.15 nephelometric turbidity units (NTUs) or lower for filter effluent turbidity. Based on this requirement, the designer shall design the filtration treatment process train to ensure that each filter shall produce water with filtered water turbidity of 0.15 NTU or less. Any filter effluent water that does not meet filtered water objectives must be diverted to waste. For turbidity control set points see the current version of *Niagara Region's Standard Operating Procedure (SOP) for Turbidity*.

Filter Operation

1. The designer shall provide design details of the filter operation in the pre-design report which shall, at a minimum, include the following components.
 - a) Filter Operation Description
 - b) Filter Layout and Cross-section Drawing(s)
 - c) Filter Instrumentation and Control
 - d) Filter Media
 - e) Backwash Pump and Motor Data
 - f) Backwash Wastewater Holding Tank
 - g) Air Scour System
 - h) Underdrain
2. At a minimum, the filters shall be provided with instrumentation for the monitoring of the following to ensure proper operation.
 - a) Loss of head indicator
 - b) Filtration Runtime
 - c) Flow from each filter effluent line

- d) Flow from each filter-to-waste line
 - e) Backwash flow rate to each filter
 - f) Effluent turbidity monitoring on each filter effluent line
3. Filters shall be provided with the characteristics for normal automatic operation as stipulated in *Niagara Region's SOP for Turbidity*. A detailed process description of filter operation and conditions that would trigger initiation of a backwash sequence shall be defined in the Process Control Narrative and the Operations Manual for the plant.
 4. The backwash method for filter media shall include the air scour method as part of backwash. No other filter backwash method will be accepted.
 5. Granular filter media shall comply with AWWA B100 Granular Filter Material and the *Niagara Region Filter Media Replacement Specification*.

B.1.4.9 High Lift Pumping

High lift pumping must comply with the general intent of Section B, Item 3.0 Water Booster Pumping Stations.

B.1.4.10 Chemical Feed Systems

The designer shall refer to the latest edition of the *Niagara Region Chemical System Design Standard*.

1. For monitoring flow of sodium hypochlorite and de-chlorination chemicals, Niagara Region prefers the use of flow switches. The design shall accommodate Niagara Region's critical control points for no-flow conditions and for compliance with *Niagara Region's Quality Management System*. For coagulant chemicals, Niagara Region prefers the use of magnetic flow meters.
2. In chemical filling areas, a spill containment area shall be designed to include the vehicle loading area and hose connections.
3. Monitoring equipment shall be designed to allow for the measurement of residual chlorine to 0.02 milligrams per liter (mg/l) to allow for appropriate disinfection dosage.

B.1.4.11 Residuals Management

Niagara Region requires that settled sludge from the treatment of residuals be discharged to a local sanitary sewer where available or the supernatant de-chlorinated prior to being discharged to the environment.

B.1.4.12 SCADA

The following water treatment processes shall be fully automated.

1. Inlet Works
2. Low Lift Pumping system to meet plant throughput demand
3. Flocculation System

4. Sedimentation System
5. Filtration including:
 - a) Flow equalization of flocculated raw water to each required filter
 - b) Rate of Filtration
 - c) Filter Backwashing
 - d) Air Scour Backwash System
6. High Lift Pumping system to meet water distribution system demand
7. Chemical System for:
 - a) Coagulation
 - b) Taste and Odour Control (if applicable)
 - c) Disinfection
 - d) Zebra mussel control
 - e) pH Adjustment
 - f) Chlorination of backwash water
8. UV Disinfection System
9. Residual Waste Management System
10. Distribution Monitoring

B.2 Water Transmission Systems

B.2.1 Design Vision

Niagara Region's vision is to design a reliable, energy efficient, structurally sound water transmission system that can sustain all operating and surge pressures, accommodate future growth, minimize the water age, and can be easily serviced by maintenance staff while minimizing the need for confined space entries.

B.2.2 Basis of Design

This section outlines the minimum requirements for the design of water supply transmission systems.

B.2.2.1 Design Water Demand

The system shall be designed to meet the following criteria.

1. Peak hourly demand plus fire flow.
2. Pressure in a transmission main is not to be less than 275 kilopascals (kPa) / 40 pounds per square inch (psi) during peak hour demands at hydrant elevation.

3. Pressure in a transmission main under the condition of simultaneous peak hour flow and fire flow demands is to be not less than 140 kPa (20 psi) at the point in our system where the fire flow is being drawn.

B.2.2.2 Fire Flow

Fire flow requirements to be specified by the area municipalities.

B.2.2.3 Equivalent Population

Please refer to the current *Niagara Region's Water and Wastewater Master Servicing Plan* for estimation of water service demand for the different types of development in the design of water transmission systems.

B.2.2.4 Design Factors

For average daily demand values, maximum day factors and maximum hourly demand peaking factors, refer to the current version of *Niagara Region's Water and Wastewater Master Servicing Plan*.

B.2.2.5 Pressure

Transmission mains shall be designed to withstand all surge and transient pressures and full vacuum without consideration for benefit provided by air/ vacuum valves. That is, transmission mains shall be designed as if air/ vacuum valves are not operational.

Transient analyses shall be part of the engineering scope for all transmission mains.

B.2.3 System Layout

B.2.3.1 Transmission System

The transmission system shall be designed to ensure flexibility of operation and to minimize the area of the community affected by shutdowns during water transmission network repairs. The designer shall demonstrate that water quality can be maintained throughout the transmission system. The designer shall consider the following in the design of the water transmission system.

The use of easements to loop transmission mains shall be minimized.

B.2.3.2 Location

B.2.3.3 Separation from Sewer and Wastewater Mains

The designer shall design transmission mains to ensure adequate horizontal and vertical separation between sewers and watermains.

1. Where transmission mains crossing above or below sanitary and storm sewers have insufficient cover and/or separation, the transmission main shall be completely encased with a minimum of 50mm of polystyrene insulation wrap. Insulation shall be designed to provide a minimum time to ice development after flow stoppage of 48 hours assuming the sewer is at minimum ambient temperature.

2. Where the specified vertical separation cannot be achieved, the storm and/or sanitary sewer shall be constructed of material and with joints that will comply with watermain construction standards and shall be pressure tested to ensure water tightness.

B.2.3.4 Private Service Connections

1. Private service connections are prohibited on transmission mains.

B.2.4 Pipe Requirements

B.2.4.1 Pipe Sizes, Material and Valves

1. All pipes shall have a minimum designed pressure rating of 1034 kPa (150 psi).
2. Transmission mains shall be sized for future growth as per the most current version of *Niagara Region's Water and Wastewater Master Servicing Plan*. Designers shall size transmission mains so as to maintain water quality but avoid unacceptable future changes in the pressure zone hydraulic grade line. All pipes shall have a maximum designed velocity of 1.5 m/s at peak hour demand.
3. The size, functionality and operational philosophy of the transmission main shall be reviewed with operations and engineering staff and determined at the preliminary design stage.
4. The designer shall include as part of the pre-design report the reasons for the selection of the proposed pipe material for the project. Where an alternative material is acceptable, the designer shall indicate this in the report and include a cost/benefit analysis of the acceptable alternative.
5. The following pipe materials are acceptable for transmission mains
 - a) Standard poly-vinyl chloride (PVC)
 - b) Fusible PVC
 - c) Molecularly oriented PVC (PVCO)
 - d) Concrete pressure pipe (CPP)
 - e) HDPE
 - f) The pipe shall transition to stainless steel prior to all underground chambers
6. In determining the suitable pipe class to be used, thrust force, internal pressure, surge pressure, live load, dead load, soil type and trench conditions shall be considered in the calculation. The above calculations and pipe manufacturer's recommendations shall be incorporated into the design.
7. Maximum allowable pipe joint deflection shall be 70% of the manufacturer's specifications. Pipe barrel bending/deflection will not be permitted.

Pipe and Fitting Materials

Material	Joint Type	Specification	Fittings
Polyvinyl Chloride	Gasketed Bell & Spigot	AWWA C900 & C905, CSA B137.3	PVC: AWWA C900, C905, C907, CSA B137.2, B137.3
Fusible Polyvinyl Chloride	Fused joints	AWWA C900 & C905, CSA B137.3	PVC: AWWA C900, C905, C907, CSA B137.2, B137.3
Molecularly-oriented PVCO	Gasketed Bell & Spigot	AWWA C909	PVC: AWWA C900, C905, C907, CSA B137.2, B137.3
Stainless Steel	Welded	ASTM A312, Grade 316L, minimum Schedule 10S	Stainless Steel, Type 316, ASTM A403
High Density Polyethylene (HDPE)	Butt fused	AWWA C906	HDPE - AWWA C906 Electrofusion
Pre-tensioned Conc. Cylinder Pipe	Gasketed Bell & Spigot with wrap-around cement mortar diaphragms	AWWA C303	Concrete – AWWA C303
Pre-stressed Concrete, Lined Cylinder Pipe	Gasketed Bell & Spigot with wrap-around cement mortar diaphragms	AWWA C301 & C304	Concrete – AWWA C301 & C304
Pre-stressed Concrete, Embedded Cylinder Pipe	Gasketed Bell & Spigot with wrap-around cement mortar diaphragms	AWWA C301 & C304	Concrete – AWWA C301 & C304

ASTM – American Society for Testing and Materials

B.2.4.2 Thrust Restraint

1. All transmission mains and thrust restraints shall be designed to withstand the maximum operating pressure plus the surge pressure to which it will be subjected. The design pressure shall not be less than that specified in Ontario Provincial Standard Specification 441 (OPSS.MUNI 441) as amended.

2. All plugs, caps, tees and bends will have approved mechanical thrust restraints. Concrete thrust blocks shall not be allowed other than in chambers.

B.2.4.3 Pipe Depth

1. Transmission mains shall not be less than 1.8m deep.
2. Transmission mains shall be deep enough to provide sufficient head room in valve chambers.
3. Under open ditch or unimproved roads, a minimum cover of 2.4m shall be provided to allow for future road improvements or lowering of the road profile.
4. In areas where minimum cover cannot be achieved, special provision shall be considered to protect pipe from live loading and freezing.

B.2.4.4 Bedding and Backfill

1. The bedding requirements for the transmission mains will depend upon the type and the class of pipe used.
2. Water transmission mains shall be provided with bedding and cover as per the Ontario Provincial Standard Drawings.
3. Bedding and cover material shall be Granular 'A' crushed limestone.
4. For all pipe, bedding shall be compacted to 100% Standard Proctor Maximum Dry Density (SPMDD).
5. The type of backfill material will usually be determined from the location of the transmission main within the right-of-way (ROW). Approved granular backfill shall be used within all road bases.

B.2.4.5 Valves

1. Under normal circumstances on transmission mains, three valves shall be provided on a tee intersection and four valves shall be provided on a cross intersection.
2. Line valves shall be spaced a maximum of 500m apart and shall be the same size as the transmission main.
3. All chambers shall be equipped with a flushing port or drain valve.
4. Drain valves shall be provided at each significant low point for transmission mains 400 mm and larger. All drain valves are to be located in a chamber. The valves shall have a stem to chamber roof in order to operate from the surface.
5. Air release valves shall be provided at all significant high points on large diameter transmission mains (400 mm and larger). Where air release valves are located in chambers, they shall be provided with vent lines that include a double check valve assembly for flood protection.
6. The inclusion of pressure reducing or pressure sustaining valves into transmission main will be considered on a project-specific basis.

B.2.4.6 Corrosion Prevention

The designer shall ensure that all metallic components in the water transmission system are protected from corrosion with appropriate protection measures.

1. As a minimum, buried metallic components shall be protected from corrosion using three-part petrolatum tape meeting International Organization for Standardization 9001 (ISO 9001 standards).
2. All components of the corrosion protection shall be supplied by the same manufacturer/ supplier.
3. All exposed metallic components shall be protected from corrosion with a suitable high performance epoxy coating. Specifications must fully identify repairs to damaged surfaces prior to and during installation.

B.2.4.7 Tracer Wire

Refer to General Section – Civil.

B.3 Water Booster Pumping Stations

B.3.1 Design Vision

The overall objective is to design booster pumping stations that are reliable, safe, flexible, energy efficient and simple to operate and easy to maintain, meet all applicable standards, and provide a high level of service to Region customers.

B.3.2 Basis of Design

Designers shall take into consideration the following features at a minimum when designing water pumping stations:

1. The requirements of the Hydraulic Institute with respect to overall hydraulic design shall be followed. The designer shall pay particular attention to suction conditions for all pumps to avoid cavitation under all anticipated operating conditions.
2. Underground flow meter chambers shall be equipped with power supply, means of access and egress that are compliant with the Occupational Health and Safety Administration (OHSA) requirements, flood detection, and communications.
 - a) Control cabinets shall be installed above ground adjacent to the flow meter chamber.
 - b) Control cabinets shall be weatherproof stainless steel enclosures to avoid the need for confined space entry.
 - c) Chamber structures shall be provided with approved waterproofing.
3. Pipe sizing must accommodate future expansion.
4. The pumps selected shall cover the entire expected range of flows, including minimum flows and maximum day plus fire flows.

5. Flow circulation and water temperature rise shall be considered and evaluated for all stations during all combinations of possible demand scenarios including fire flow.
6. The advantages and disadvantages of available pump station configurations shall be evaluated, including storage with re-pumping. In-line booster pumping is not to be considered.
7. The designer shall allow the ability to isolate individual pumps.
8. Station bypass complete with check valve shall be provided.
9. For larger stations, costs and benefits of more than one discharge watermain shall be assessed.
10. A means of flood protection, detection, and alarming shall be provided.
11. The designer shall provide surge relief valves and piping and assess the need for surge tanks.
12. Energy management shall be an integral part of the design of water pumping stations. Refer to Section A on Energy Efficient Design.
13. A flow meter shall be provided on each watermain leaving the station. A pressure transmitter shall be provided on each watermain entering and leaving the station.

B.3.3 Facility Layout

Facilities shall consider the following:

1. The layout shall provide access for emergency vehicles and cranes.
2. The potential for flooding especially in flood plains must be considered.
3. Sufficient parking for maintenance and operational vehicles must be provided.
4. The design must consider noise controls.

B.3.4 Process Equipment

B.3.4.1 Pumps

The following shall apply to pumping systems:

1. The designer shall refer to the Hydraulics Institute for the design of pumping and piping systems. Particular attention shall be given to pump suction conditions and suction piping. Velocity in pump suction header must be 1.0 m/s or less.
2. Pumping systems shall be designed to have adequate available net positive suction head (NPSHA) that is greater than required net positive suction head (NPSHR) and include a 1.5 m safety margin applied to NPSHA.
3. Pumps shall typically be equipped with soft starters and shall be designed without the use of foot valves. VFDs will be considered only on a case-by-case basis and shall be agreed to by Niagara Region.

4. The designer shall size pumps and appurtenances according to the flows expected during the lifecycle of the facility and shall consider staging of pump sizes where applicable.

B.3.4.2 Surge Protection

Surge protection on a pump's discharge header shall be provided, and water shall be recirculated back to the reservoir where a reservoir exists or to the environment as applicable. Surge protection shall be designed on a site-specific basis and will include drainage to a local storm sewer or discharge to the environment with an air gap and de-chlorination.

B.3.5 Process Control

All instrumentation, appurtenances and a control system shall be provided as necessary to meet Niagara Region's requirement that the water booster pumping station be fully capable of unmanned automatic operation.

B.4 Potable Water Storage

B.4.1 Basis for Design (all Storage)

1. Niagara Region's goal is to provide potable water storage that is watertight, energy efficiency, integrates well with the overall water supply and distribution systems, maintains a high level of water quality, maintains uniform water quality, and provides a high level of service to Region customers.
2. Overall system storage as well as individual storage reservoirs shall be sized to have storage components for operational needs, demand balancing (Max-Day demand), LAM fireflow requirements, and emergency storage. Reservoir capacity at the Water Treatment Plants prior to CT time are not to be used in the calculation of these storage components.
3. Where possible, new, retrofits and rehabilitation of reservoirs should consider the triple bottom line (Economic, Social, and Environmental) comparison of status quo versus a change to operational flow philosophy and to ensure water quality and minimize water age. True life cycle costs are to be assessed including any differences in pumping requirements at water treatment plants, other storage reservoirs and booster pump stations.
4. For elevated storage tanks, the designer shall complete the site layout for the facility as well as the design of the tank in terms of capacity, hydraulic levels, operating range, instrumentation, and general tank configuration. The detailed design of the tank including structural design and mixing/circulation systems (including Computational Fluid Dynamic Modelling) is to be undertaken as a design-build contract by a specialty contractor with experience in elevated water storage tanks.
5. Where a chlorination booster system is required it shall be designed per the requirements of Section B5 – Chlorine Booster System

6. The designer shall ensure that all water reservoirs are adequately mixed, have sufficient overflow capacity, sufficient ventilation capacity, and are watertight with reasonable access for maintenance.

B.4.2 Basis for Design (Non-Elevated Storage)

1. Non-elevated reservoirs should only be used in cases where their use, instead of an elevated reservoir, can be completely substantiated, in economic, environmental and social terms. The Region prefers to pump and add chlorine to potable water only once.
2. In-ground reservoirs shall contain a minimum of two operationally independent cells. Each cell shall be capable of full and independent operation of the pumping station/reservoir system while the other cell is in isolation.

B.4.3 Process Equipment

B.4.3.1 Process and Equipment Redundancy

1. For single reservoir systems, valving, appurtenances and controls should be provided at the WTP high lift pumping station to allow for safely pressurizing of the system (with pressure relief and related controls) during reservoir maintenance/cleaning.
2. Alternatively, for systems where multiple storage facilities are in use or proposed, the designer must show how individual storage facilities can be taken offline for maintenance/cleaning while not affecting the ability to supply water throughout the expected demand scenarios.

B.4.3.2 Reservoir Distribution Centre

A Reservoir Distribution Centre (RDC) is recommended to house electrical panels, chlorine analyzers, valves and other control devices.

3. RDC shall contain all reservoir and yard piping process control devices including valves, check valves, motorized inlet control valves, valve operators, process drains and other ancillary process control and/or instrumentation.
4. RDC shall include stairs or hatches with ladder access to the reservoir and adequate ventilation. Additional yard piping chambers shall be eliminated and/or reduced to a minimum.
5. Isolation valves shall not be submerged within the reservoir.

B.4.3.3 Circulation of Fresh Water

1. All inlet, outlet and piping within the potable water reservoir cells shall be designed to allow the circulation of fresh potable water within the reservoir cells.
2. A hydrodynamic mixing system (HMS) shall be included to provide uniform water age. Baffling is not acceptable as a means for mixing within distribution reservoirs. I.E.: Separate inlet and outlet piping must be provided.
3. Rubber “duck-bill” type check valves are a preferred method for mixing in reservoirs. Where required, (and shown by the designer to be effective), recirculation pumping shall be provided to maintain water age and temperature.

4. Reservoirs at the Water Treatment Plant shall be provided with baffling to achieve at least a T_{10}/T of 0.7. It is mandatory that the baffling be designed in accordance with the Computational Fluid Dynamic (CFD) modeling technique.

B.4.3.4 Storage Cell Isolation (Non-Elevated Storage)

All necessary piping and valving must be provided to allow for the bypassing of any reservoir's cell to be taken off-line for maintenance work.

1. A minimum of a two-cell reservoir must be used, with the ability to isolate any one of the reservoir's cells.
2. For water treatment reservoirs, isolation of one cell shall not impact the minimum required CT value.
1. Manually operated butterfly valves shall be provided, as required, as well as piping to permit the isolation of the potable water reservoir cell(s) for maintenance or construction work without having to shut down the entire reservoir.
3. Sufficient valves must be included to allow reservoir cell isolation to facilitate disinfection without impacting operation of other components of the system that must remain in service.

B.4.3.5 Washdown Piping (Non-Elevated Storage)

1. Washdown piping inside the potable water reservoirs shall be sized for two hoses operating at any one time.
2. A stainless steel wash down header must be provided.
3. Connection points must be provided at 30m intervals to cover the entire reservoir floor area.
4. The reservoir washdown system shall be protected by a dedicated backflow preventer.

B.4.3.6 Reservoir Drainage

1. The full capacity of the potable water reservoir shall be designed to be drained by gravity with controlled discharge to the municipal storm drainage system.
2. The drainage system shall incorporate a means of dechlorination prior to discharge to the storm drainage system.

B.4.3.7 Process Control

Process control for potable water storage facilities shall be designed to meet the following requirements:

2. The designer shall ensure that the full depth of the potable water reservoir is available for operation.
3. The flow of potable water out of a reservoir shall be metered and chlorine residual monitored.

4. An engineered potable water sampling station shall be provided. A sampling station shall be complete with 10 mm stainless steel piping complete with appropriate stainless steel valves and sink in order to permit samples to be taken at the desired location quickly. The location of sampling points is to be identified at the pre-design phase of the project.

B.4.3.8 Emergency Overflow

An overflow from portable water reservoirs / elevated tanks is generally not permitted at any time unless emergency conditions arise. The following requirements shall be implemented concerning emergency overflows:

1. A separate instrumentation and control system shall be provided exclusively for this function to alarm and warn of an overflow.
2. Reservoirs shall be equipped with an overflow system sized to convey 150% of the firm capacity of the upstream pumping capacity in the *Niagara Region Water and Wastewater Master Servicing Plan*. Overflow system include all overflow piping, appurtenances, chamber(s) and receiving infrastructure, from the reservoir to the receiving body. Consideration for future flow capacity shall be given. While the use of an overflow weir is not preferable, head on overflow weirs shall not exceed 200 mm.
3. For a multiple cell reservoir, the overflow system shall be capable of handling the full overflow capacity noted above, with one cell offline, regardless of which cell is offline.
4. The overflow is to be directed to an overflow chamber. Where connection from the chamber to a sewer is not possible, flows from the chamber will be directed to an overland drainage ditch, and in any case, the ultimate discharge point and/or receiving body will be identified for compliance purposes.
5. The overflow chamber will be complete with a suitable air gap, duckbill type check valve on the upstream discharge.
6. The overflow chamber shall incorporate a de-chlorination system on the downstream discharge comprising of an aluminum basket c/w stainless steel chain connected to a winch system.
7. Site grading shall take into consideration the effects of potential overflow from the reservoir drainage system. Management of overflow energy must be taken into account during the design of the facility.
8. Overflows shall not operate as vents.

B.4.3.9 Elevated Tanks

In addition to the requirements elsewhere in this document, elevated water storage tanks shall be designed to meet the following requirements:

1. Designed to supply peak demand rates at constant system pressures
2. Designed to include capacity for operational volume, flow equalization volume, fire storage volume and emergency volume.

3. All tanks to be designed as per latest AWWA standard.
4. Provide a painters rail and drip edge for the elevated tank.
5. Install a watertight access hatch of minimum 600mm diameter at bottom of tank, inside the support pedestal.
6. Provide a safety railing surrounding the top of the tank.
7. Circular reinforced concrete pedestal to support reservoir tank including all piping, valves and instruments at base.
8. Provide a recirculation pump system that has the capability to be manually started at the pump.
9. Provide sample points on the intake and discharge pipes. The sample points will be directed to the outer wall using stainless steel tubing, and will be complete with a shutoff valve. The sample point discharges will be routed to the chlorine analyzer(s).
10. Provide a stairway to the mezzanine level.
11. Provide a drainage system to allow for tank cleaning without contaminating riser pipe(s), and connect system into overflow pipe.
12. Provide an appropriate dehumidification system in the valve room.
13. Provide vacuum relief and overflow in tank.
14. Provide separate inlet and outlet piping.
15. Mixing system shall be provided to ensure consistent chlorine residuals and minimize water age.
16. Tank inlet elevation shall be determined at the time of mixing system design.
17. Provide double door entrance at pedestal base.
18. Seal all floors with a slip resistant coating.
19. Provide a minimum 900mm diameter access tube from the top of the pedestal to the reservoir roof.
20. Install aluminum ladders and platforms inside the pedestal and access tube.
21. The design of elevated tanks shall incorporate a central antenna base support structure for the mounting of communications systems on the top of the elevated storage tank.
22. Minimum 2mm corrosion allowance.
23. Elevated tank painting and logos shall be consistent with the Niagara Region Policy for Lettering on Steel Water Storage Tanks & Stand Pipes. Submit three variations of art work to Niagara for review and approval.

B.4.3.10 Structural and layout (Non-Elevated Storage)

The designer shall include the following structural and layout requirements in the design:

1. The design of a buried reservoir roof shall be based on cast-in-place reinforced concrete or pre-cast double tee concrete structure all complete with a membrane overlay. The membrane overlay shall have a 25 year roof warranty. The reservoir roof shall be covered with insulation and soil to a minimum depth of 400 mm.
2. In-ground reservoirs shall be designed with the roof slab sloped to promote drainage, and include a granular zone above the roof, below the cover material.
3. The reservoir base slab floor shall be sloped to sump pit(s).
4. The designer shall ensure that a maximum 50m egress distance is maintained from any location in each cell.

B.4.3.11 Reservoir Hardware (Non-Elevated Storage)

The designer shall include the following mechanical requirements in the design:

1. The overflow pipe shall be secured with a non-corrodible mesh screen installed within the pipe at a location least susceptible to damage by vandalism.
2. Hardware inside the reservoir, including ladders, handrails, etc., shall be stainless steel Type 316L or NSF-61 approved fiberglass-reinforced plastic (FRP).
3. Two aluminum access hatches, at minimum, shall be provided into each cell.
4. Where possible, access hatches shall be located adjacent to driveways or access roads for convenient access by service vehicles and cranes.
5. Submarine reservoir access hatches shall not be used.
6. Hatches shall be equipped with perimeter drains and limit switches.

B.4.3.12 Ventilation

1. Vents shall be designed to prevent vacuum. At no time shall a reservoir have air space pressurized or under partial vacuum.
2. Vent shall be located at least 900 mm above finished grade and be fitted with stainless steel screens to prevent entry of vermin, birds, and insects.

B.4.3.13 Instrumentation and Control

The designer shall include the following instruments and control systems in the design:

1. Ultrasonic level sensor in each reservoir cell.
2. Reservoir low, high and overflow alarm float in each cell.
3. Groundwater level high alarm.
4. Access house and RDC fire alarm.
5. Access house and RDC smoke alarm.

6. Access house and RDC intrusion alarm.
7. RDC flood alarm.
8. RDC low temperature alarm.

B.5 Chlorination Booster Systems

B.5.1 Design Vision

1. The overall objective is to design chlorination systems that are reliable, safe and simple to operate and meet all applicable design and safety standards. Niagara Region currently uses only liquid chlorine (sodium hypochlorite) at its water facilities.

B.5.2 Basis of Design

1. This section relates primarily to Chlorination Booster Systems and post-chlorination for the purposes of secondary disinfection. Chlorination for the purpose of primary disinfection is addressed under Section B.1 Water Treatment Plants.
2. The designer shall refer to the latest edition of the *Niagara Region Chemical System Design Standard*.

B.5.3 Facility Layout

1. Chemical feed systems shall be in separate areas or rooms to prevent impacts from passive off-gassing from chemicals on sensitive equipment.
2. Spill containment for the chemical filling area must be included in the design. The spill containment area shall include the vehicle loading area and hose connections.

B.5.4 Process Equipment

B.5.4.1 Chemical Metering System Design Features

1. The metering pump panel shall be pre-mounted on high-density polyethylene board, pre-piped, pre-wired and pressure tested with Duty/Standby with Remote Control chemical feed capability. The metering panel shall include spill containment for 110% capacity of the storage tank.
2. The metering pump shall be a solenoid driven diaphragm metering pump or a peristaltic type pump complete with the following components where applicable.
 - a) A minimum of two metering pumps sized for maximum day plus fire flow demand.
 - b) A redundant chemical metering pump piped into the delivery panel must be provided that can be put into service immediately by operating the appropriate valves.
 - c) Microprocessor based electronics.
 - d) LCD display of operating status.
 - e) 4-20 mA external analog control.

- f) Meet the required metering capacity at the specified back pressure.
 - g) Auto-degassing liquid end.
 - h) Fault annunciation relay.
 - i) On/Off Keypad.
 - j) Remote On/Off capability.
 - k) Manual stroke length adjustment 0-100% with electrical readout.
 - l) Diaphragm of polytetrafluoroethylene-faced ethylene propylene diene monomer (PTFE-faced EPDM) with nylon reinforcement and steel core.
 - m) Liquid crystal display (LCD) that shows flow rate in litres per hour, frequency, stroke rate, and stroke length.
 - n) Foot valve and injection valve and a 2 m control cable.
3. The accessories package shall include the following components.
- a) Pre-mounted backpressure valve.
 - b) Pressure relief valves.
 - c) Isolation ball valves.
 - d) Pre-mounted pressure gauge complete with diaphragm isolator.
 - e) Pre-mounted calibration column.
 - f) Isolation valves, as required, for isolation of metering system and/or equipment.
 - g) Flow monitors.
 - h) Corporation stop.
 - i) Bleed valve assembly.
4. The chemical shall be contained in a vertical cylindrical tank with the following operating requirements.
- a) The sodium hypochlorite solution shall have a concentration of 12 to 14%.
 - b) The storage tank shall be equipped with a site glass, 19mm diameter, sch. 40 PVC pipe. The ball valves shall be PVC and shall meet ASTM D-1784.
 - c) A vent shall be provided as required and piped to the exterior of the building or structure.
 - d) All seals must be chlorinated polyethylene (CPE).
 - e) A separate fill opening shall be provided and 50mm pipe fill line shall be connected from the opening to the exterior of the building or reservoir complete with quick connector and cap.

- f) An ultrasonic level measuring system shall be provided.
 - g) Chemical storage and dosing facilities shall be provided, with sufficient storage and pumping capacity to meet peak and minimum flow rates and dosing targets for two weeks without refilling, where possible.
5. The chemical feed system shall be sized to provide an increase to the free chlorine residual to 1.0 mg/l at the maximum rate of flow of water into the reservoir or through the facility.
 6. The control and operation of the chemical feed system operation shall be managed by a PLC which is integrated with the plant SCADA system.
 7. The chemical shall be injected by a metering pump into the inlet and/or outlet pipe.
 8. Chemical injection points shall be positioned to promote mixing, mitigate the possibility of damage, and shall not to impede access to surrounding piping and equipment.
 9. The sodium hypochlorite tank(s) shall be located in a containment area. Requirements for the containment area are as follows:
 - a) The minimum volume of the containment area shall be equal to 110% of the total volume of the sodium hypochlorite storage.
 - b) The containment area shall be rectangular and designed to safely contain sodium hypochlorite at a 12% to 14% strength solution. The containment area will be provided with a chemical resistant coating appropriate for the chemical used.
 - c) A float level and alarm sensor shall be provided to detect liquid in the containment area. The float level shall be installed in the lowest part of the area. A digital signal complete with suitable transducer and transmit sensor cables shall be supplied with the signal sent to the PLC.
 10. The level of the chemical in the tank(s) shall be monitored by the PLC field instrumentation, which is connected to the plant SCADA system for monitoring the level from the treatment plant.
 11. An electronic read-out of the sodium hypochlorite liquid level indicator(s) must be provided at the loading station.
 12. The sealed chemical tank(s) shall be vented to the exterior of the building.
 13. The designer shall locate metering pumps within the volume of the chemical spill containment.
 14. A sanitary drain must be provided for samples containing chlorine. If a sanitary drain is not available, provisions must be made to de-chlorinate the sample flow prior to discharge to the environment.
 15. Provide a stainless steel work area complete with stainless steel sample sink.
 16. A safety eye wash and shower station must be provided as per OHSA.

SECTION C - **Wastewater**

C.1 Wastewater Linear Systems

C.1.1 Design Vision

The goal of Niagara Region's wastewater linear system is a reliable wastewater collection system that can accommodate future growth and minimize maintenance requirements.

Forcemains shall be designed to avoid fouling and plugging and to minimize turbulence and generation of hydrogen sulphide.

C.1.2 Basis of Design

This section outlines the minimum requirements for the design of wastewater collection systems.

C.1.2.1 Flow Calculations

Terms related to dry and wet weather flows are defined as the following.

1. Design RDII (Rain Derived Inflow and Infiltration)

$$\text{RDII} = \text{Catchment Area} \times 0.286 \text{ l/s/ha}$$

2. Design Dry Weather Flow (DWF)

$$\text{DWF} = \text{Average Sanitary Flow} + \text{Dry Weather Infiltration}$$

3. Design Peak Dry-Weather Flow (Peak DWF)

$$\text{Peak DWF} = \text{DWF} \times \text{Peaking Factor}$$

4. Design Wet-Weather Flow (WWF)

$$\text{WWF} = \text{DWF} + \text{Inflow and All Infiltration (Dry Weather and Rain Derived)}$$

5. Design Peak Wet-Weather Flow (Peak WWF)

$$\text{Peak WWF} = \text{Peak DWF} + \text{Design RDII (Catchment Area} \times 0.286 \text{ l/s/ha)}.$$

6. The peaking factors to be applied to the average flow rates such as to determine the peak flow rates are dependent on the type of development.

a) Residential – depending on population using Harmon Formula

b) Industrial, Commercial, and Institutional – expressed in equivalent population and combined with residential population, then using Harmon Formula.

C.1.2.2 Design Capacity

The design capacity of a gravity sewer shall be the maximum flow that can be carried by a sewer without surcharging when the sewer is full.

1. The capacity of a gravity sewer is designed to meet either one of the following:

- a) The Peak WWF when it is located upstream of combined sewer overflow (CSO) storage or when no storage exists
 - b) The Peak DWF when it is located downstream of CSO storage (appropriately sized).
2. The design capacity of a gravity sewer is assumed to be over committed when it runs surcharged during Design Peak DWF, or when it runs surcharged during Design Peak WWF with a peak hydraulic grade line less than 1.8 metres below ground elevation where basements exist or could exist.

C.1.2.3 Average Dry Weather Flow

The designer shall perform the wastewater design flow calculations based on the design parameters provided, using population densities by development type and loads, as published in the most current version of *Niagara Region's Water and Wastewater Master Servicing Plan*. In all cases these parameters are to be confirmed/revised as necessary prior to start of preliminary design.

Individual studies may be required for special commercial establishments, major commercial areas, special industrial areas, and major industrial areas

C.1.2.4 Peak Wastewater Flow Factor

The designer shall refer to the most current version of *Niagara Region's Water and Wastewater Master Servicing Plan* for peak flow factors.

C.1.2.5 Infiltration Allowance

Designers shall use an infiltration rate consistent with that provided in the most current version of *Niagara Region's Water and Wastewater Master Servicing Plan*.

C.1.2.6 Flow Velocities

The maximum velocity shall not be greater than 3.0 m/s with the pipe flowing full, the minimum velocity shall not be less than 0.60 m/s with average dry weather flow and is preferred to be above 1.0 m/s during Peak DWF. Oversized sewers shall not be used in an attempt to justify using flatter slopes

The pipe diameter and slope shall be selected to obtain the greatest practical velocities to minimize solids settling.

C.1.2.7 Bedding and Backfill

1. At a minimum, sewers shall be provided with Type B bedding using Granular 'A' crushed limestone.
2. For all pipe, bedding shall be compacted to 100% SPMDD.
3. The type of backfill material will usually be determined from the location of the sewer within the ROW. Approved granular backfill shall be used within all road bases.

C.1.2.8 Rehabilitation of Existing Sewers and Maintenance Holes (Liners)

Where existing sewers are to be rehabilitated the following shall be required.

1. Maintenance Hole rehabilitation shall incorporate corrosion protection and leak tightness against external ground water pressure.
 - a) The amount of time that the maintenance hole is out of service shall be minimized and the proposed bypass pumping plan shall utilize sufficient capacity to accommodate the design Peak WWF. The proposed bypass plan shall be submitted to Niagara Region for review and approval prior to implementation.
 - b) Condition assessments shall, at a minimum, be according to the most current version of the National Association of Sewer Service Companies' Pipeline Assessment Certification Program (NASSCO PACP).
 - c) Material and application specifications for grout shall be adequate to ensure a sound substrate on which to install the liner.
 - d) Specifications for liner properties shall require that the liner meet minimum standards for thickness, structural strength and elasticity and chemical resistance as outlined in *Niagara Region's Water and Wastewater Services Specification for Maintenance Hole Rehabilitation*.
 - e) Minimum requirements for quality control and liner testing shall be specified.
 - f) The rehabilitation design submission shall be stamped by a professional engineer licensed to practice in the Province of Ontario.
2. In the case of structural lining of existing sewers, the designer shall require that the proposed structural liner submission include calculations and measures as follows:
 - a) The amount of time that the sewer is out of service shall be minimized and the proposed bypass pumping plan shall be sized to accommodate the full Peak WWF as per the updating design. The proposed bypass plan shall be submitted to Niagara Region for review and approval prior to implementation.
 - b) CCTV inspections shall at a minimum, be according to the most current version of NASSCO PACP.
 - c) Material and application specifications for grout shall be adequate to ensure a sound substrate on which to install the liner.
 - d) Specifications for liner properties shall require that the liner meet minimum standards for thickness, structural strength and elasticity, and chemical resistance.
 - e) Minimum requirements for quality control and liner testing shall be specified.
 - f) The liner design submission shall be stamped by a professional engineer licensed to practice in the Province of Ontario.

C.1.3 System Layout

C.1.3.1 Location of Trunk Sewers

1. All new trunk sewers shall be located within the road allowance.

C.1.3.2 Pipe Depth

1. The top of the trunk sewer pipe shall be at a sufficient depth that it does not conflict with local infrastructure, where it can accept gravity flow from the area it services and such that the pipe contents are not susceptible to freezing.

C.1.3.3 Service Connections

1. Sewer services from residential, commercial, industrial, institutional and community facilities shall be connected to the nearest local area municipal sewer and not the Regional sewer main.

C.1.4 Pipe Material

1. The preferred pipe materials for trunk sewers are polyvinyl chloride (PVC) and reinforced concrete pipe (RCP).
2. The designer shall determine the best pipe material for use depending on the application. Other materials may be considered provided that the designer provides sufficient justification for their use.
3. The designer shall include as part of the pre-design report the reasons for the selection of the proposed pipe material for the project. Where alternative materials are acceptable, the designer shall indicate this in the report and include a full life-cycle cost/benefit analysis of all the acceptable alternatives.
4. Prior to comparisons of pipe materials, the designer shall use commercially available software or other design techniques, to determine the appropriate class of RCP required.

Pipe Specification

Material	Joint Type	Specification
Polyvinyl Chloride	Gasketed Bell & Spigot	Maximum dimensional ratio – DR 35 CSA B182.2, OPSS 1841
Reinforced Concrete Pipe	Gasketed Bell & Spigot. Maximum joint deflection – 13 mm.	CAN/CSA A-257, OPSS.MUNI 1820; registered with Ontario Concrete Pipe Association (OPCA)

C.1.5 Maintenance Holes

All maintenance holes shall be designed to eliminate heaving/lifting and other movement and to prevent infiltration, based on the following criteria:

1. All maintenance holes shall conform to the *Ontario Provincial Standard Specifications (OPSS's)* and *Ontario Provincial Standard Drawings (OPSD's)* and *CAN/CSA A-257*.
2. At maintenance holes where pipe sizes change from a smaller pipe size to a larger downstream pipe size, the pipe's obvert elevations shall be matched. It is not permissible for the downstream pipe size to be designed to be smaller than the upstream pipe size.

3. Drop maintenance holes shall be provided where the invert elevation of a sewer entering a maintenance hole is 0.9 m above the invert of the outlet sewer.
 - a) Maintenance holes with internal drops will be designed to accommodate person access. Internal drops are preferred to external drops due to servicing issues with external drops. Vortex units or approved equivalents shall be considered for maintenance holes requiring internal drops.
 - b) The drop pipe shall be one nominal size smaller than the wastewater main.
 - c) The economic feasibility of providing deeper wastewater mains versus excessive invert drops, drop maintenance holes, or excessively steep benching shall be ascertained prior to finalizing the design.
 - d) Prefabricated drops internal to the maintenance hole are only permitted on 1500 mm diameter or larger maintenance holes.
 - e) Where the maintenance hole depth exceeds 5m, safety grating must be provided. Additional safety gratings must be provided every 5m as appropriate. The minimum maintenance hole diameter in such instances shall be 1500 mm.
4. When the rate of flow and the depth of the drop are of such a magnitude that there is potential for significant entrainment of air, then the drop shaft and lower connection shall be designed to provide for release of the entrained air and ventilation of the drop shaft.
5. Where significant sections of wastewater mains are provided with watertight covers at access maintenance holes, extended vents may be required which shall be determined by the designer on a case-by-case basis. Wherever possible, the designer shall avoid placing maintenance holes in low-lying areas. Locating maintenance holes in low-lying areas will only be accepted where no other option is available and in such locations, the top of the maintenance hole shall be above the expected water level during a 10-year rain event.
6. Maintenance holes shall be provided with monolithic bases and watertight joints. Adjustment units, as per OPS, shall be provided for grade adjustment(s).
7. Tee maintenance holes may be used for wastewater mains 1200 mm or larger in diameter.
8. For institutional, commercial and industrial establishments, an inspection maintenance hole must be placed at the property line for access to the service connection in accordance with the *Niagara Region Sewer Use Bylaw (see Niagara Standard Drawing (RSD S001-R01))*.

C.1.6 Forcemains

C.1.6.1 General

1. Forcemains shall be designed to withstand maximum operating pressure plus all surge and transient pressures and expected vacuum conditions without consideration

for benefit provided by air/vacuum valves. That is, forcemains shall be designed as if all air/ vacuum valves are non-functional.

2. Transient analyses shall be part of the engineering design scope for all forcemains, and shall take into account the number and timing of the pump cycles to which the main(s) will be subjected.
3. A hydraulic transient analysis shall be undertaken as part of the design process considering the worst-case failure scenario involving the most critical pump and forcemain-in-service combination. The analysis will be completed using hydraulic models based on the final sizes and layout of pumps and forcemains including locations of air/vacuum release valves.

Based on the hydraulic transient analysis, provide devices, if necessary, to protect the forcemain such as, but not limited to, air/vacuum breaker, surge valves, surge tanks, etc. Hydraulic transient analysis shall be redone for any change in the forcemain material, class, alignment, or profile.

4. Wherever feasible, the designer shall design forcemains' profiles such that they rise continuously from the pumping station to the termination point. Ideally, local high points or low points shall be avoided. Under special cases, with the approval of Niagara Region, combination air valves will be permitted at local high points in the profile if the depth of the forcemain is impractical and tunneling techniques have been evaluated and discounted.
5. All low points in the forcemain (if provided) shall be equipped with drain chambers for maintenance.
6. For new construction, wherever possible, the designer shall provide redundant pipes/ conduits/ casings for pipeline crossings of major roads or waterways.
7. Forcemains shall be designed such that provisions for cleaning are provided.
8. Forcemains shall be pressure-tested to zero leakage.
9. Isolation valves should be considered where forcemains connect into a common forcemain. Cleanouts at low points and chambers for pig launching and catching should be considered for any forcemain to facilitate inspection and maintenance.

C.1.6.2 Forcemain Pipe Material

The designer shall comply with the following requirements.

1. In determining the suitable pipe class to be used, live load, dead load, soil type and trench conditions shall be considered in the calculation. The pipe manufacturer's recommendations shall be incorporated into the design.
2. The following pipe materials are acceptable for forcemains.
 - a) Standard PVC
 - b) Fusible PVC

- c) Molecularly oriented PVC (PVCO)
- d) Concrete pressure pipe (CPP)
- e) HDPE.
- f) The pipe shall transition to stainless steel at all underground chambers

Forcemain Pipe and Fitting Materials

Material	Joint Type	Specification	Fittings
Polyvinyl Chloride	Gasketed Bell & Spigot	AWWA C900 & C905, CSA B137.3	PVC: AWWA C900, C905, C907, CSA B137.2, B137.3
Fusible Polyvinyl Chloride	Fused joints	AWWA C900 & C905, CSA B137.3	PVC: AWWA C900, C905, C907, CSA B137.2, B137.3
Molecularly-oriented PVCO	Gasketed Bell & Spigot	AWWA C909	PVC: AWWA C900, C905, C907, CSA B137.2, B137.3
Stainless Steel	Welded	ASTM A312, Grade 316L, minimum Schedule 10S	Stainless Steel, Type 316, ASTM A403
High Density Polyethylene	Butt fused	AWWA C906	HDPE - AWWA C906 Electrofusion
Pre-tensioned Conc. Cylinder Pipe	Gasketed Bell & Spigot with wrap-around cement mortar diaphragms	AWWA C303	Concrete – AWWA C303
Pre-stressed Concrete, Lined Cylinder Pipe	Gasketed Bell & Spigot with wrap-around cement mortar diaphragms	AWWA C301 & C304	Concrete – AWWA C301 & C304
Pre-stressed Concrete, Embedded Cylinder Pipe	Gasketed Bell & Spigot with wrap-around cement mortar diaphragms	AWWA C301 & C304	Concrete – AWWA C301 & C304

C.1.6.3 Thrust Restraint

1. Forcemain thrust restraints shall be designed to withstand the maximum operating pressure from the transient analysis. Adequate thrust restraint must be provided to account for all flow conditions.
2. All plugs, tees and bends shall be provided with approved mechanical thrust restraints. Concrete thrust blocks shall not be allowed.

C.1.6.4 Pipe Size

1. Forcemains shall be sized to have a flow velocity in the range of 1.0 m/s to 2.5 m/s, with the lower limit being preferred for the initial phase.
2. The minimum size for forcemains shall be 150 mm diameter.

C.1.6.5 Pipe Depth

1. Forcemains shall under no circumstances be less than 1.8m deep.
2. Forcemains shall be deep enough to provide sufficient head room in valve chambers.
3. Under open ditch or unimproved roads, a minimum cover shall be provided to allow for future road improvements or lowering of the road profile.
4. In areas where minimum cover cannot be achieved, special provision(s) shall be considered to protect pipe from live loads and freezing.

C.1.6.6 Bedding and Backfill

1. The bedding requirements for the forcemains will depend upon the type and the class of pipe used. For all pipe, bedding shall be compacted to 100% Standard Proctor Maximum Dry Density (SPMDD).
2. Forcemains shall be provided with bedding and cover as per the Ontario Provincial Standard Drawings except for above compaction requirement.
3. Bedding material shall be Granular 'A' crushed limestone.
4. The type of backfill material will usually be determined from the location of the forcemain within the right-of-way. Approved granular backfill shall be used within all road bases.

C.1.6.7 Valves

1. All air valves are to be suitable for use with wastewater and shall be low-pressure double acting types.
2. Air relief valves shall be installed over a riser with a minimum diameter of 100 mm.
3. Air valves shall be located on roadway shoulders and out of intersections.
4. Direct-buried valves are prohibited.

5. The minimum drain valve size shall be 150 mm. The valve shall have operator stem extended to the chamber roof in order to be operable from the surface. Drain pipe shall include an appropriate camlock fitting for connecting a hose to the surface.
6. Chambers, pits or access holes containing valves, blow-offs, meters or other such appurtenances to the wastewater system, shall not be located in areas subject to flooding or in areas of high groundwater

C.1.6.8 Corrosion Prevention

In general, it is preferred to not use buried metallic fittings in the forcemain. The designer shall ensure that all metallic components of the forcemain are protected from corrosion with appropriate protection measures.

1. As a minimum, buried metallic components shall be protected from corrosion using three-part petrolatum tape meeting ISO 9001 standards.
2. All components of the corrosion protection shall be supplied by the same manufacturer/ supplier.

C.1.6.9 Tracer Wire

Refer to General Section – Civil.

C.1.6.10 Forcemain Outlets / Transition Maintenance Holes

The designer shall make provisions for a smooth transition from forcemain pressure flow to gravity sewer flow.

1. All sewage forcemains must terminate in a transition maintenance hole on a gravity sewer. The transition maintenance hole must permit a smooth flow transition to the receiving gravity sewer maintenance hole. The forcemain shall enter the transition maintenance hole at a point not more than 0.3 m (1 ft) above the invert.
2. No other gravity sewers shall enter the transition maintenance hole.
3. The gravity main from the transition manhole to the next maintenance hole shall be at least one size larger than the forcemain and shall have sufficient capacity for all design flows.
4. Forcemain transition maintenance holes shall have a corrosion protective coating.
5. Turbulence in the outlet of the transition maintenance hole must be minimized.
6. At a minimum, the last 6 m of forcemain from the outlet shall be one nominal size larger than the forcemain.

C.2 Wastewater Pumping Stations

C.2.1 Design Vision

Wastewater pumping stations shall provide reliable, safe, energy efficient and low maintenance operation with low visual impact to the surrounding community.

1. Preference will be given to housing electrical equipment in outdoor MCCs and control cabinets protected from the elements including a bus shelter-type enclosure.
2. Niagara Region wastewater pumping stations shall use submersible pumps unless specified otherwise in the Request for Proposal or unless a strong case can be made for a dry well / wet well configuration by the designer.
3. Wet wells shall be designed to minimize turbulence, odour problems, frequency of maintenance, and to maximize pump life.
4. DWFs, WWFs and all operational requirements shall be confirmed prior to start of any preliminary design.
5. Pump stop levels should be designed to minimize the volume of sewage remaining in the wet well after each pump cycle.

C.2.2 Basis of Design

Pumping station configuration shall be designed to provide the most efficient layout of pumps, equipment and piping with consideration for ease of access and maintenance.

1. All pumping station designs, both new stations and retro-fits, shall aim at eliminating (or minimizing where elimination is not feasible) the need for confined space entries into classified areas.
2. Pumps shall be selected based on the most optimal combination of pump efficiency, and full life-cycle (capital, operating and maintenance) costs.

C.2.2.1 Wet Wells

Wet wells shall be designed with the following considerations:

1. Wet wells shall be designed to meet Hydraulic Institute guidelines and to prevent dead zones and debris accumulation. Slope of floor benching shall be preferred 2:1 and a minimum 1:1 (other than the pump footprint).
2. Wet well capacity shall have 2 hours reserve capacity from the last duty pump start level to the invert of the inlet.
3. The depth of the wet well shall be sufficient to ensure adequate control bands for each pump within a maximum of six (6) starts per hour.
4. Pump run time shall be a minimum of 5 minutes at Design DWF. Wet well fill time shall be a maximum of 30 minutes at Design DWF.
5. Means for wet well cleaning must be provided. Provide a 50mm diameter yard hydrant complete with approved RPZ backflow preventer located near the wet well for wash down. When RPZ is located within a chamber, ensure the chamber is water tight and include a sump pump.
6. Access hatches for entry, equipment/ instrument removal, and maintenance must be provided. Hatches will have safety grating under the lid that need to be opened

separately from the lid. Drip trays on access hatches shall only drain to the ground surface.

7. Wet wells shall be water tight with zero visible leakage.
8. Other than pumps, only corrosion resistant concrete and stainless steel (316) are permitted in wet wells.
9. The wet well roof (where hatches are located) shall be at least 200 mm above the 100-year regional flood line.

C.2.2.2 Wet Well Ventilation

1. Declassification of classified areas by means of ventilation will not be accepted.
2. Ventilation of wet well shall meet the following requirements.
 - a) Passive ventilation is required for all wet wells complete with Schedule 10S stainless steel minimum 316L gooseneck outlet and screen. All ventilation ducts in wet well shall be stainless steel.
 - b) For entry into the wet well for maintenance and/ or operational functions, the preferred method of providing ventilation is to use portable fans implemented by operations staff.
 - c) The requirement for a positive forced air ventilation fan shall be on a project specific basis.
 - d) Ventilation fan shall be explosion proof and corrosion resistant.
 - e) Ventilation exhausts shall be directed away from nearby properties as much as practical to reduce the chance of nuisance odours.

C.2.2.3 Valve Room Ventilation

For stations where a valve room is required, the following shall apply.

1. Permanent ventilation equipment and duct work is required.
2. Provide positive ventilation system complete with motorized intake and exhaust dampers and fans with automatic and manual control.
3. It is not permissible to use ventilation equipment to de-rate valve room space.

C.2.2.4 Electrical

Electrical requirements for sewage pumping stations shall be as follows.

1. All electrical equipment shall be designed appropriately for the area classification. Where possible, for ease of service and operation, equipment must be installed in an unclassified area.
2. The designer shall ensure there are two 20A ground fault interrupt (GFI) external electrical outlets located close to the wet well and valve chamber access point.

3. Pumps with temperature and leakage sensors tied to the SCADA alarm system are required.
4. The electrical utility box shall be compact and low profile to complement the aesthetics of the location.
5. For a submersible pumping station where the electrical cabinet is located in in a shelter, the cabinet shall be sized, oriented and located to permit safe maintenance work.
6. A junction box equipped with terminal strip shall be provided on the exterior of the station to facilitate changes of the float regulators.
7. A separate junction box is required for pump power supply and to enable the removal and installation of the pump.

C.2.2.5 Odour Control

All sewage pumping stations shall be designed to minimize the escape of odours from the wet well. The designer shall provide engineering calculations of potential for hydrogen sulfide generation in the forcemain and provide recommendations to prevent generation of odours and for odour control.

C.2.2.6 Wet-weather Storage and Overflows

The need for wet-weather storage at pumping stations for both new stations as well as retro-fits is to be identified by the designer during the pre-design stage.

1. Sewage Overflows must discharge to a water body, municipal drain or storm sewer. Discharge to a storm water detention pond is not permitted. Overflow lines shall be equipped with a backflow preventing valve.
2. Reserve capacity of wet well (highest pump start to overflow level) is preferred to be a minimum of 2 hours during Design Peak DWF. Designer must show wherever this is not possible.
3. The discharge from overflows is required to be monitored and measured for compliance reporting to the MECP.
 - a) The design shall incorporate a method to measure the time, duration and the quantity of overflowed sewage to meet this requirement.

C.2.2.7 Sewage Pumping Station Classification

	Pumping Station Capacity	Type	Wet Well Storage Capacity	Number of Primary Duty Pumps Required	Standby Pump Requirement	Type of Drives	Standby Power
1	Inflow: 0 to 120 L/s.	Submersible pumping station with single wet well and bypass inlet maintenance hole. Outdoor sound-attenuating enclosure for the standby generator. Outdoor control panel and MCC complete with bus type shelter.	Storage requirements to be discussed on a project-specific basis.	One or more pumps with a combined capacity equal to design flow. Pumping system shall be designed for the most efficient configuration under average day flow conditions.	One pump rated at peak flow.	Soft starters are preferred. VFDs only as approved by Niagara Region.	Emergency generator sized to handle design flow and all other essential loads required.
2	Inflow greater than 120 L/s.	Submersible pumping station with divided wet well. Outdoor sound-attenuating enclosure for the standby generator. Outdoor control panel and MCC complete with bus type shelter or superstructure for housing controls and MCC.	Storage requirements to be discussed on a project-specific basis.	Two or more pumps with a combined capacity equal to design flow. Pumping system shall be designed for the most efficient configuration under average day flow conditions.	One standby pump rated at the same capacity of the largest unit.	Soft starters are preferred. VFDs only as approved by Niagara Region.	Emergency generator sized to handle design flow and all other essential loads required.

C.2.3 Facility Layout

C.2.3.1 Control Building

1. For projects where a building is required, provide a building to house electrical equipment and pump controls, mechanical ventilation equipment and lighting equipment.
2. Motorized intake and exhaust louvers shall be provided for ventilation requirements.
3. Control buildings shall be equipped with wheel chair accessible washrooms.
4. Floor elevation (including base slabs for outdoor shelters) must be at least 150 mm above regional 100-year flood line.

C.2.3.2 Site Requirements

A paved access driveway and parking area shall be provided with adequate space for access and maneuvering by sewage hauling tanker trucks and fuel delivery trucks.

C.2.4 Process Equipment

C.2.4.1 Pumps

Pumps shall be provided with the following requirements.

1. Pumps shall be high efficiency, explosion-proof, submersible, a non-clog impeller type suitable for fluid to be pumped.
2. The use of grinder pumps is only acceptable for flow rates less than 10 L/s.
3. Vibration and harmonic analysis must be conducted for pumps if installed in dry wells.
4. Pumps shall be equipped with thermal and leak detection devices.
5. Pumps must be removable from the surface utilizing guide rails.
6. Lifting equipment shall be provided for all pumps.

C.2.4.2 Valves

1. All valves must be installed horizontally. Vertical installations are not acceptable.
2. Valves must be located in a separate water tight valve chamber or valve room. Valves located in the wet well are not acceptable.
3. All valves shall be supplied with fully restrained dismantling coupling.
4. Each pump will be provided with a separate air release valve on its discharge pipe.

C.2.4.3 Process Piping and Fittings

In the design of sewage pumping station piping, the designer shall comply with the following criteria.

1. All appurtenances and connectors shall be corrosion-resistant and compatible with the piping material.

2. Piping layout shall be designed with “Y”s and not “T”s.
3. Flushing connections to facilitate cleaning of plugged lines or pumps shall be provided. Flushing connections shall be a minimum of 75mm diameter.
4. A means for draining the forcemain into the wet well is required. Drain connection is to be located prior to the isolation valve on the forcemain.
5. Flow metering shall be provided for all forcemains.

C.2.4.4 Surge Protection

It is preferable that the designer address flow velocities and pressures within the lift station piping and forcemain to eliminate the possibility of pressure transients and dangerous surge pressures. However, if, given the profile of the forcemain and pipe sizes are such that surges cannot be eliminated, the designer shall include a provision for adequate surge control on a pump’s main discharge header. The designer must review this on a project by project basis.

C.2.4.5 Instrumentation

As a minimum, the following instrumentation shall be provided:

1. Wet well level ultrasonic transmitter.
2. Wet well level backup level ultrasonic transmitter.
3. Wet well operating backup floats, high level float and overflow float.
4. Flow meter on each forcemain.
5. Pressure gauge connections on each pump discharge as well as each forcemain, and, for dry well arrangements, on each pump suction.
6. Flood floats to be provided in all chambers.
7. Pump power monitor.
8. Provide temperature, smoke and fire alarms in all buildings.

C.2.5 Process Pump Controls

Operation of the pumps is to be controlled by an ultrasonic level control tied to the station Programmable Logic Controller (PLC) or remote programmable unit (RPU).

C.2.6 Wet Well / Dry Well Pumping Stations

In rare instances where the design calls for a wet well / dry well-type pumping station, the following provisions shall apply.

1. Dry well shall be physically separated from electrical room, which shall be a non-classified area.
2. Pumps are to be supplied with downstream air valves located prior to check valves to ensure priming. Suction pipe cleanouts shall be provided.

3. Wet well suction inlets shall be bell-mouth (flared) type.
4. A surge pressure relief valve with relief pipe extending from the discharge header through the dividing wall and into the wet well above the TWL. Orientation and routing of this relief pipe shall allow the pipe to drain by gravity to the wet well.
5. Flood floats shall be provided in the dry well.
6. Pressure gauge connections shall be provided on each pump suction line.
7. Permanent dry well ventilation equipment and duct work is required. Provide positive ventilation system in the dry well, complete with motorized intake and exhaust dampers and fans with automatic and/or manual control.
8. It is not permissible to use ventilation equipment to de-rate drywell space.

C.3 Wastewater Treatment Plants

C.3.1 Design Vision

Niagara Region's goal is to produce effluent from each of its wastewater treatment plants that meets the effluent quality limits and objectives stipulated in each Environmental Compliance Approval (ECA).

Wastewater treatment plants and upgrades shall be designed to provide for reliable, safe, energy efficient and low maintenance operation while minimizing impacts on the surrounding community.

Internal plant operating objectives (working levels) identified in this section have been developed for various operational parameters for Niagara Region's Wastewater Treatment Plants.

Treatment plants shall have sufficient backup controls and devices to allow for effective maintenance of all equipment without upset to the process or impacts on final effluent or biosolids quality.

C.3.2 Facility Layout

In designing the layout of wastewater treatment plants, consideration shall be given for future expansions of the plant to its ultimate site capacity in order to maximize the utilization of the available space of the property.

1. Works must be designed for proper flow splitting at each step in the overall treatment train. Interconnections between equivalent treatment processes from different stages of overall plant development shall be incorporated into the design wherever possible.
2. Facility layout shall provide sufficient space for complete servicing, removal, and replacement of all process equipment without impacting operation of the facility.

C.3.3 Treatment Processes and Equipment

C.3.3.1 Process and Equipment Redundancy

The designer shall consider multiple parallel treatment trains for each major process treatment step in the overall plant.

C.3.3.2 Inlet Works

The inlet works shall be housed in a building and designed for ease of operation for the removal of collection bins, process equipment, and cleanup of the facility so as to promote a positive working environment for the operators.

At a minimum, it shall include the following.

1. Inlet works shall be sized to handle actual peak WWF into the facility
2. Automatically cleaned screens shall be provided at all headworks. Preference shall be given to multi-rake, travelling bar screens.
3. A manually operable bypass weir gate and associated channel/piping for emergency operation shall be provided.
4. A screening compactor for the compaction of screening waste material shall be provided. Generally, the same manufacturer shall be selected for both screens and compactors to ensure compatibility.
5. Grit removal equipment shall be provided.
6. Grit and screenings shall be deposited in separate bins.
7. All wastewater originating from the grit cyclone and classifier and compactor shall be piped for return to the plant process stream.
 - a) Grit removal area and grit bins shall be designed and sized to minimize the manual labour involved with moving bins.
 - b) Preference is to have the bins as close to an exterior door and driveway as possible and in the correct orientation to allow the bin removal truck access to the bins.
8. Grit removal shall utilize aerated grit tanks or vortex grit separators without the use of air lift pumps, with preference given to aerated grit tanks. Note: Vortex grit separators are suitable when footprint is a limitation.
9. Odour control with appropriate ventilation system shall be designed to minimize the odour level in the inlet works working area.
10. Detection equipment and instrumentation is required for monitoring the operation of process equipment with a fail-safe feature that would be employed in the presence of combustible gases.
11. Parshall Flumes shall be provided in the influent and by-pass channels for flow measurement.

12. A means for the interception and removal of grease at the headworks shall be provided as well as a separate bin for the temporary storage of grease.
13. Where a septage receiving station is required, it shall be located at the head of the plant and shall include the following requirements:
 - a) Be capable of receiving hauled sewage loads from a variety of truck sizes.
 - b) An actuated valve to allow for the disposal to be directed to either the headworks or to the digesters.
 - c) Provision for source separation of hauled waste as some wastes must pass through the entire treatment process while other wastes may be directed straight to the digesters.
 - d) The septage receiving station shall be provided with a kiosk for the deposit and storage of hauled sewage manifests, a refrigerator for storage of collected samples, a writing area to allow completion of manifest information, an electric space heater, and a wash-up sink for disposal of samples and hand washing.
 - e) There shall be no classifications in this area and it shall be designed for human occupancy.
 - f) Septage receiving stations shall be laid out so that:
 - there is adequate room for septage hauling trucks to effectively maneuver
 - spills will be contained to the area surrounding the vehicle and hose connection, and
 - the entire receiving area can be hosed down to a CB connected to the influent channel. See C.3.3.9 for requirements of containment area.

C.3.3.3 Primary Clarification

The designer shall provide a minimum of two primary clarifiers, sized such that with one clarifier out of service, the remaining capacity is more than the Design DWF (ECA capacity). Design HRT shall be no more than 2 hours for low ADF days. Design shall include for even flow splitting between clarifier units. Surface scum collector troughs shall be provided.

C.3.3.4 Aeration

Aeration system design shall include the following features:

1. The designer shall provide a minimum of two aeration tanks.
2. Systems shall utilize high efficiency fine bubble aeration
3. Where applicable, aeration tanks shall be designed assuming a Plug Flow reaction and to have step feed capability.

4. The aeration system is required to meet the minimum oxygen concentration and mixing requirements. Aeration systems shall be capable of achieving, at any point in the aeration tanks, a minimum dissolved oxygen (DO) concentration of 2.0 mg/L at all times. Aeration systems shall also be capable of providing sufficient mixing to maintain all mixed liquor solids in suspension for each aeration zone, with an aeration zone defined as an area of diffuser density different from a neighboring zone.
5. A flow metering device shall be provided at the main air header. For all branch air headers, each branch shall be provided with a flow meter, an isolation valve and a pressure gauge. Isolation valves shall not be used as balancing devices. Any diffuser zone will need a separate device from the isolation valve to balance airflow, if required by the design.
6. The designer shall provide required field instrumentation (including DO sensors) for the measuring of dissolved oxygen levels in each tank at mid-tank and at end of tank (2 DO sensors per tank).
 - a) The field instrumentation and related control system shall be tied to a fully automated dissolved oxygen (DO) control system which links actual DO level to blower(s) capacity and will automatically vary the air output from the blower(s) in direct response to measured DO, with the intent to keep the DO above 2 mg/L throughout the aeration process.
 - b) The type of dissolved oxygen (DO) meter shall be reviewed at the pre-design stage.

C.3.3.5 Secondary Clarification

1. The designer shall provide a minimum of two secondary clarifiers, sized such that with one clarifier out of service, the remaining capacity is more than the Design DWF (ECA capacity).
2. Sludge return capacity shall be designed for 100% return sludge capacity and all activated sludge flows, both return and waste, shall be metered and recorded.
3. A surface scum collector trough shall be provided.
4. Scum collector shall be fully and easily adjustable by hand with minimal tools.
5. All metal parts in clarifiers are to be stainless steel.

C.3.3.6 Sludge Pumping

Sludge pumps, including raw sludge pumps, return activated sludge (RAS) pumps and waste activated sludge (WAS) pumps, must be suitable for handling sludge and gritty material.

1. Each clarifier shall have a dedicated RAS pump.
2. RAS pumps are required to be sized to meet the full range of flow defined in Table 12-1 of the MECP Design Guidelines for Sewage Works (2008).
3. An on-line sludge total solids (TS) meter shall be provided and tied into SCADA.

C.3.3.7 Effluent Disinfection

Current practice at Niagara Region is to disinfect plant effluent with liquid chlorine (sodium hypochlorite) followed by de-chlorination with injection of a second chemical. The objective is to have no presence of free chlorine in the final effluent at the outfall to the receiving stream.

C.3.3.8 Sludge Digestion

1. The primary digesters shall be circular reinforced concrete tanks with conical floors, with one sidewall access bulkhead into the digester for inspection and cleaning.
 - a) The exterior of the tank shall be complete with pre-cast concrete panel veneer or aluminum cladding.
 - b) An insulated fixed steel cover is required for the primary digester.
 - c) Mixing equipment shall be provided for the primary digester. Secondary to primary digester volume ratios shall not be greater than 1:1.
2. Secondary digesters shall be circular reinforced concrete tanks with conical floors with one sidewall access bulkhead into the digester for inspection and cleaning.
 - a) The exterior of the tank shall also be complete with pre-cast concrete panel veneer or aluminum cladding.
 - b) An insulated steel floating cover for secondary digesters.
 - c) A supernatant line, equipped with a flow meter, shall be provided, and TS metering shall be required on all digested sludge lines leaving the secondary digester.

C.3.3.9 Sludge Loading Station

The sludge loading station shall be designed for minimum interference to the operation of the plant during the sludge loading operation.

1. Access to the sludge loading station shall be designed to permit trucks to enter and leave the station directly without backing into or out of the station. (i.e.: drive through access)
2. A fully curbed sludge containment area shall be provided at the loading station with a catch basin in the middle of the containment area.
3. The containment area shall drain to a holding tank.
4. A hosing station shall be provided for the cleaning of spilled sludge off the truck or the containment area.
5. The sludge loading arm shall be heat traced on all outside pipe sections.
6. A lockable remote control at the sludge loading station must be provided for the starting and stopping of the sludge loading pump.
7. A magnetic flow meter in a building or chamber shall be provided to measure the volume of the sludge being pumped into the truck.

- a) An electronic readout at the sludge loading station is required to indicate the volume of sludge pumped into the truck.
- b) The electronic readout shall be visible to the driver of the tanker truck.
- c) Pumped volume data shall be date and time stamped and shall be captured and recorded by the SCADA system.

C.3.3.10 Sampling Stations

Automatic sampling stations are required to perform discrete or composite, flow proportional and time proportional sampling.

1. The sampler enclosure shall be weatherproof, corrosion resistant, insulated, and complete with forced air heater and thermostat, locking door and bolt down base.
2. The refrigerated sample compartment must be lockable.
3. The controller must be programmable with an LCD display.
4. In the event of a power failure, program settings and stored information shall be maintained by an internal lithium battery.
5. The installation of samplers in classified environments is to be avoided.

C.3.3.11 High Pressure Effluent Water System

The designer shall provide a high pressure effluent water system where required as determined by operations staff for the cleaning of process equipment and general site maintenance.

1. The high pressure effluent water system shall consist of a minimum of two pumps and a hydro-pneumatic tank to maintain system pressure when the pumps are not running. All effluent water needs to be screened/filtered to 500 micron size prior to pumping. Designer to use self-cleaning screens/filters.
2. The system shall be fully automatic with the pumps delivering the required flow and pressure at the furthest post yard hydrant of the high pressure effluent water system.
3. Yard hydrants shall be self-draining and non-freezing. Yard hydrants shall be installed above an engineered granular/geomembrane soakaway. Soakaway to be located above the higher seasonal ground water level.
4. Potable water may be provided with the same function if the effluent water cannot be used, as determined by the operations staff. All potable water service to yard hydrants shall include a RPZ backflow preventer located near the potable water service entrance to the property. Where potable water is connected, no connection shall be made to effluent water. RPZ backflow preventers must be installed in a location to prevent freezing, flooding and mechanical damage with adequate space to facilitate maintenance and testing. RPZ backflow preventers must not be installed in a vault, pit or enclosed space. There shall be no type of interconnection between the effluent water system and the potable water system. Drainage for backflow prevention

assemblies shall be provided for all installations of RPZs to accommodate discharge during testing or draining of the unit and for RPZ relief valve discharges.

5. Where effluent water is used, a nameplate shall be permanently fastened on or near every new and existing hose bib, faucet, hydrant or sill cock located on the water system.
 - a) The nameplate shall read 'Caution Non-Potable Water'.
 - b) Nameplates shall be of the lamacoid type.
 - c) Lettering shall be white, 15 mm high, and on a black background.

C.3.3.12 Low Pressure Hot Water Heating Systems

Low pressure piping and hot water systems shall meet the following criteria:

1. The layout of piping shall provide an expansion and contraction allowance of 100°C in water temperature to ambient at a working pressure of 860 kPa or as required to meet system requirements.
2. All heating pipes shall be installed in such a way that all high points have air relief valves and all low points have drain valves and necessary piping/facility for drainage of full system volume.
3. Piping shall be installed so that there will be no interference with the operation or installation of equipment or other piping systems, ducts, etc.
4. Piping shall ensure noiseless water circulation.
5. Pipes shall not be routed over electrical panels/ transformers.
6. An appropriate location in the heating system shall be provided for the injection of chemical into the hot water system.
7. Balancing and flow control valves shall be provided on hot water return piping from each heating unit or equipment and on the supply and return of each primary and secondary circuit. Immediately after the system is started up and prior to being put into operation, the entire system is to be balanced.

C.3.3.13 Circulating Pump

1. Circulating pumps are to be centrifugal pumps or close coupled vertical in-line pumps.
2. Pump installations should include a shut-off valve, and suction guide in pump suction piping; and a combination check-balance-shut-off valve assembly on the discharge.
3. A pressure gauge shall be included at the discharge side of all pumps.

C.3.3.14 Boiler

1. Boilers heating systems shall consist of dual gas fired boilers and have a minimum energy rating of 85% efficiency.
2. All boilers shall use tube-in-tube heat exchangers (HX).

C.3.3.15 Instrumentation and Control

In addition to the requirements specified by the *MECP Guidelines for the Design of Sewage Works*, latest edition, the following shall apply.

1. Flow meters shall be provided on each raw influent stream, including hauled waste, final effluent, internal return or recycle lines, and side streams from sludge processing steps. The objective is to monitor flow to and from all processes sufficiently to allow for an accurate flow balance to be performed across the entire plant.
2. Total solids (TS) meters and flow meters shall be provided on all primary sludge, secondary sludge (RAS), and waste sludge (WAS) lines. The objective is to monitor all process flow sufficiently to allow for an accurate solids mass balance to be performed across the entire plant.

C.3.4 Energy Efficient Treatment Plant (this section must be followed in addition to the above clauses when specified in the design requirements)

In addition to the following, the designer shall review Section A of this manual for general guidelines pertaining to energy efficient design.

C.3.4.1 Primary Treatment

The designer shall consider the potential use of chemically enhanced primary treatment (CEPT) with the goal of reducing energy costs. The designer is to perform a full cost-benefit analysis of this and other options.

C.3.4.2 Anoxic Selectors

Anoxic zones shall be considered for all tanks to improve settling and to allow for denitrification to reduce process aeration costs.

C.3.4.3 Return Activated Sludge Pumps

RAS pumps shall be provided with variable frequency drives and controllers that pace flow based on wastewater flow rate to allow for maximum turndown and energy savings.

C.3.4.4 Disinfection

The designer shall evaluate the cost/benefit of UV versus chemical disinfection for the application. If ultraviolet (UV) irradiation is recommended for disinfection, only low pressure systems offering the highest UV efficiency shall be used.

C.3.4.5 Digestion

The largest energy users in anaerobic digestion include sludge heating and sludge mixing. The designer shall consider the following opportunities to reduce energy use.

1. The cost/ benefit of alternative mixing systems with respect to energy consumption and life-cycle costs shall be considered, including newer technologies (e.g., linear motion mixers). On-off timers for hydraulic mixing systems shall be provided to reduce energy costs, while maintaining performance with slow settling anaerobic biosolids.

2. The thickening of WAS and/or primary sludge to maximize the sludge feed thickness to digestion shall be considered, resulting in lower heating costs and a smaller digester footprint for mixing.
3. Boilers with the ability to utilize both natural and digester gas shall be provided.
4. Appropriate gas metering is required to monitor the performance of gas production.
5. An incoming sludge solids meter and flow meter shall be provided.
6. Sludge pre-conditioning technologies to maximize sludge stabilization and gas production should be provided.
7. The designer should provide a sludge-to-sludge heat exchanger to recover energy from the digested sludge (typically 35 degrees C in a mesophilic digester) by pre-heating the sludge feed (typically 10 to 20 degrees C).

C.3.4.6 Thickening and Dewatering

Low energy technologies (gravity belt thickener, rotary drum thickener, etc.) should be used to thicken WAS or primary sludge. Effluent water should be utilized, wherever feasible, for belt/ drum cleaning.

1. The total life-cycle cost benefit analysis should be performed and considered when selecting the preferred dewatering technology including power, labour, maintenance, cake dryness, solids capture, biosolids haulage and disposal.
2. When dewatering centrifuges are preferred, structure procurement documents to favour equipment with the lowest total power requirements.
3. Polymer systems should be designed to make down at the highest possible concentration (typically 1%) to minimize potable water consumption. Effluent water should be utilized for secondary dilution to the concentration required for the thickening or dewatering process (typically 0.2 – 0.5%).
4. Consideration shall be given to specifying automated sludge thickening and dewatering equipment.

C.3.4.7 Drying

The following opportunities for maximizing the energy efficiency of a drying facility should be considered.

1. Dewatering technologies and/or digester feed conditioning systems should be selected to maximize the dewatering cake solids concentration to drying (i.e., minimize the energy required for evaporation).
2. Opportunities to recover waste heat or energy should be considered (e.g., digester gas, jacket and exhaust heat from co-generation facilities, etc.) in the treatment plant to off-set the costs of natural gas.
3. The feasibility of solar drying to minimize fossil fuel use should be reviewed.

C.3.4.8 Energy Recovery

The designer shall review opportunities for digester gas energy recovery either through co-generation, micro-turbines or gas purification to natural gas quality for injection to the local grid or for use as vehicle fuel.

1. For any co-generation facility, jacket heat recovery shall be provided at a minimum, and potentially exhaust and jacket recovery shall be provided to allow heating of the feed solids to digestion without supplemental fuels.
2. Alternative digestion pre-conditioning systems shall be reviewed to maximize gas production for co-generation or purification.
 - a) For these systems, an energy balance evaluation (i.e., energy in vs. energy out) shall be completed to determine the effectiveness of the conditioning system.
 - b) Only conditioning systems that offer a net positive energy benefit shall be utilized.

C.3.4.9 Other Considerations

Other considerations for energy efficiency in preliminary treatment include the following opportunities:

1. Enclosed equipment and channels with dedicated draw-off to odour control unit may be utilized to reduce air changes required in the main building area.
2. Equipment with lower overall headroom requirements shall be selected to minimize building height and ventilation air volumes.
3. Areas having Class 1, Division 1 classifications shall be designed, where appropriate. The designer may consider a system with flexibility for lower ventilation rates during winter months.
4. The designer may consider the use of heat recovery ventilators suitable for a classified environment.
5. Opportunities to minimize potable water consumption throughout the plant shall be reviewed.
6. The highest potential for headworks energy savings lies in the design of the HVAC system and area classification to reduce heating demand.

C.3.5 Biosolids Management

Refer to *Niagara Region's Biosolids Management Master Plan*, the latest version, for details.

Appendix A - Glossary

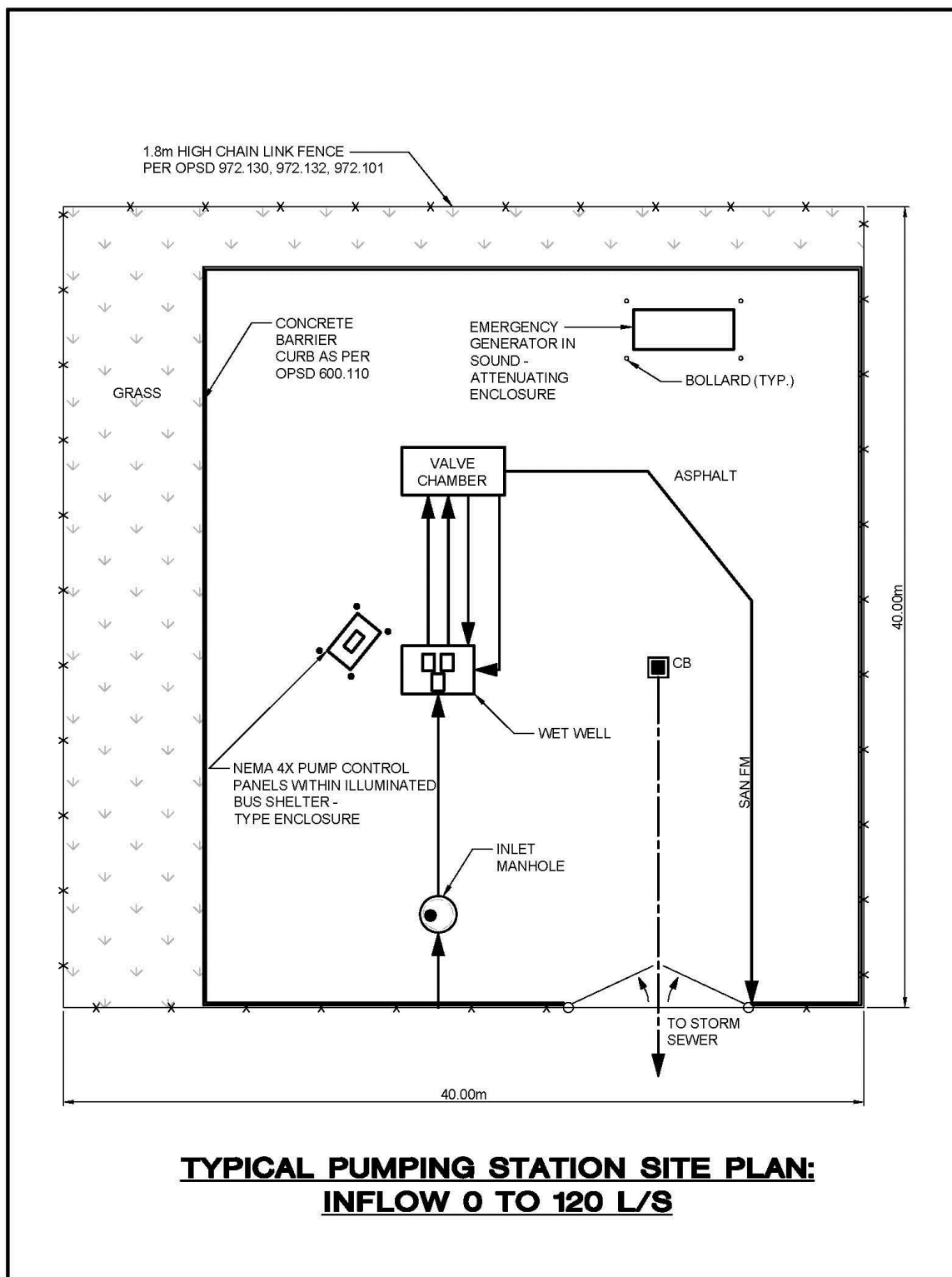
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ACI	American Concrete Institute		
AFBMA	American Friction Bearing Manufacturers	CD-ROM	Compact Disc Read-Only Memory
AGMA	American Gear Manufacturers Association	CGA	Canadian Gas Association
AISI	American Iron and Steel Institute	CGE	Canadian General Electric
AMCA	Air Moving and Control Association	CGSB	Canadian General Specification Board
ANSI	American National Standards Institute	CFD	Computational Fluid Dynamics
AODA	Accessibility for Ontarians with Disabilities Act	CPM	Critical Path Method
APEL	Approved Product and Equipment List	CPP	Concrete Pressure Pipe
ASA	American Standards Association	CPU	Central Processing Unit
ASC	Application Specific Controller	CPVC	Chlorinated polyvinyl chloride
ASCE	American Society of Civil Engineers	CRI	Colour Rendering Index
ASHRAE	American Society of Heating, Refrigerating and Air Conditioning Engineers, Inc.	CRN	Canadian Registration Number
ASTM	American Society for Testing and Materials	CSA	Canadian Standards Association
AWWA	American Waterworks Association	CSO	Combined Sewer Overflows
BOD	Biochemical Oxygen Demand	CT	Concentration Time
BUNA-N	Nitrile	DBP	Disinfection By-Products
C/W	Complete With	DC	Direct Current
C.T.	Current Transformer	DI	Digital Input
CAD	Computer Aided Design	DO	Dissolved Oxygen
		DTC	Direct Torque Control
		DWF	Dry Weather Flow
		DWWP	Drinking Water Works Permit
		EASR	Environmental Activity and Sector Registry
		ECA	Environmental Compliance Approval
		EMI	Electromagnetic Interference

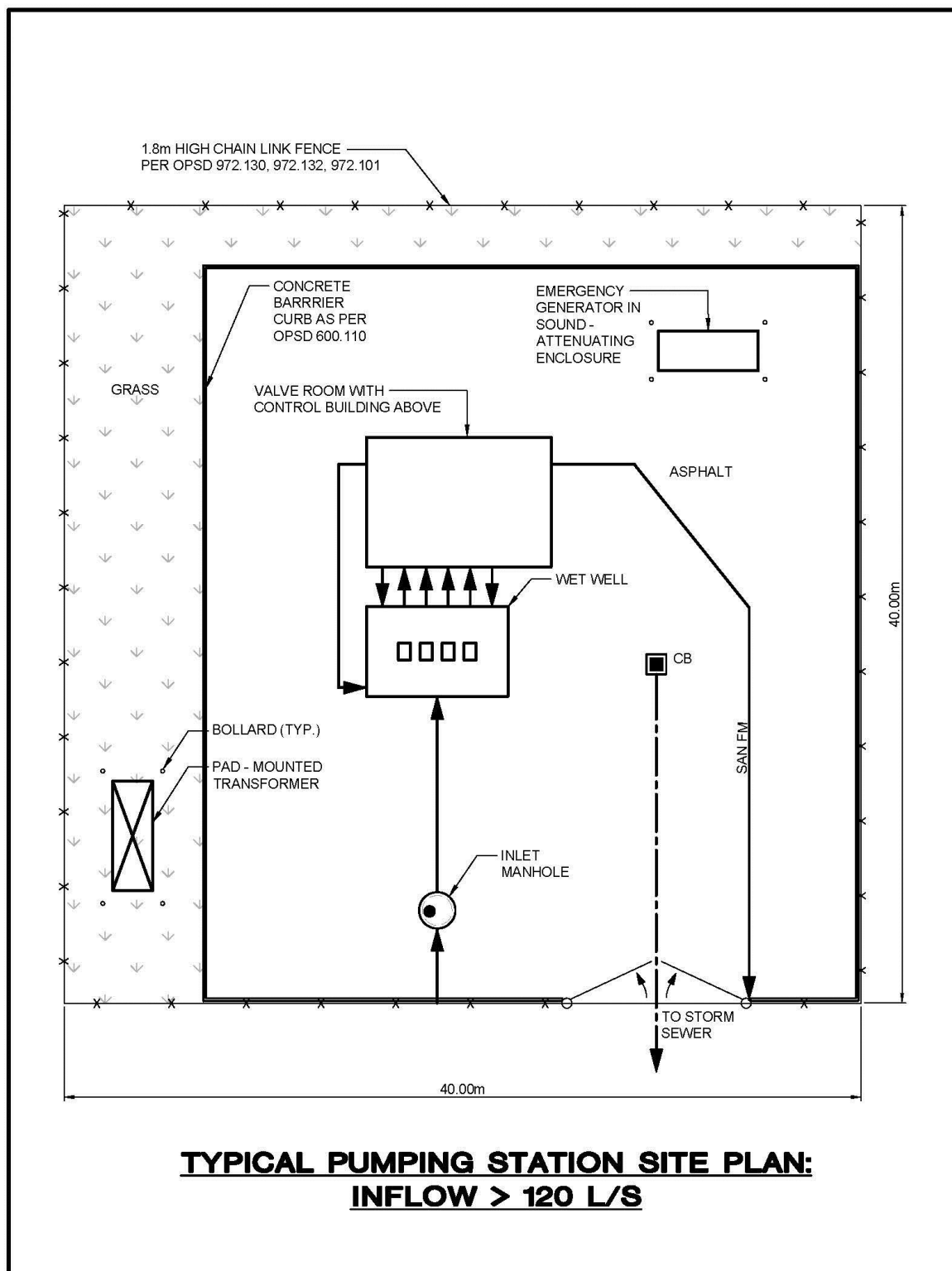
EPA	Environmental Protection Act	IEEE	Institute of Electrical and Electronic Engineers
E.T.M.	Elapsed Time Meter	IGBT	Isolated Gate Bipolar Transistor
EEMAC	Electrical and Electronics Manufacturers Association of Canada	IRQ	Interrupt Request
EEPROM	Electrically Erasable Programmable Read-Only-Memory	ISO	International Standard
EPROM	Electrically Programmable Read-Only-Memory	KPA	Kilopascals
ESA	Electrical Safety Authority	LAN	Local Area Network
FAT	Factory Acceptance Test	LCD	Liquid Crystal Display
FOM	Facility Operation Manual	LED	Light Emitting Diode
FRP	Fibreglass Reinforced Plastic	LCP	Local Control Panel
GAC	Granular Activated Carbon	LL	Low Level
GE Canada	General Electric Canada	LOS	Loss of Signal
GFI	Ground Fault Interrupt	MAC	Maximum Acceptable Concentration
GUI	Graphic User Interface	MAUA	Multi-Attribute Utility Analysis
HAA	Haloacetic Acid	MCC	Motor Control Centre
HAZOP	Hazard and Operability Review	MDWL	Municipal Drinking Water License
HDPE	High Density Polyethylene	MIB	Methyl Isoborneol
HHL	High High Level	MIGD	Million Imperial Gallons per Second
HID	High Intensity Discharge	MNR	Ministry of Natural Resources, Ontario
HMI	Human Machine Interface	MECP	Ontario Ministry of the Environment Conservation and Parks
HP	Horsepower	MOL	Ministry of Labour
HVAC	Heating, Ventilation and Air Conditioning	MOV	Metal Oxide Varistor
HWL	High Water Level	MSDS	Material Safety Data Sheet
Hz	Hertz	MSP	Master Servicing Plan
I/O	Input/Output	MTO	Ontario Ministry of Transportation
I&C	Instrumentation & Control	NASSCO	National Association of Sewer Service Companies' Pipeline
ICI	Industrial, Commercial and Institutional	PACP	
ID	Inside Diameter		

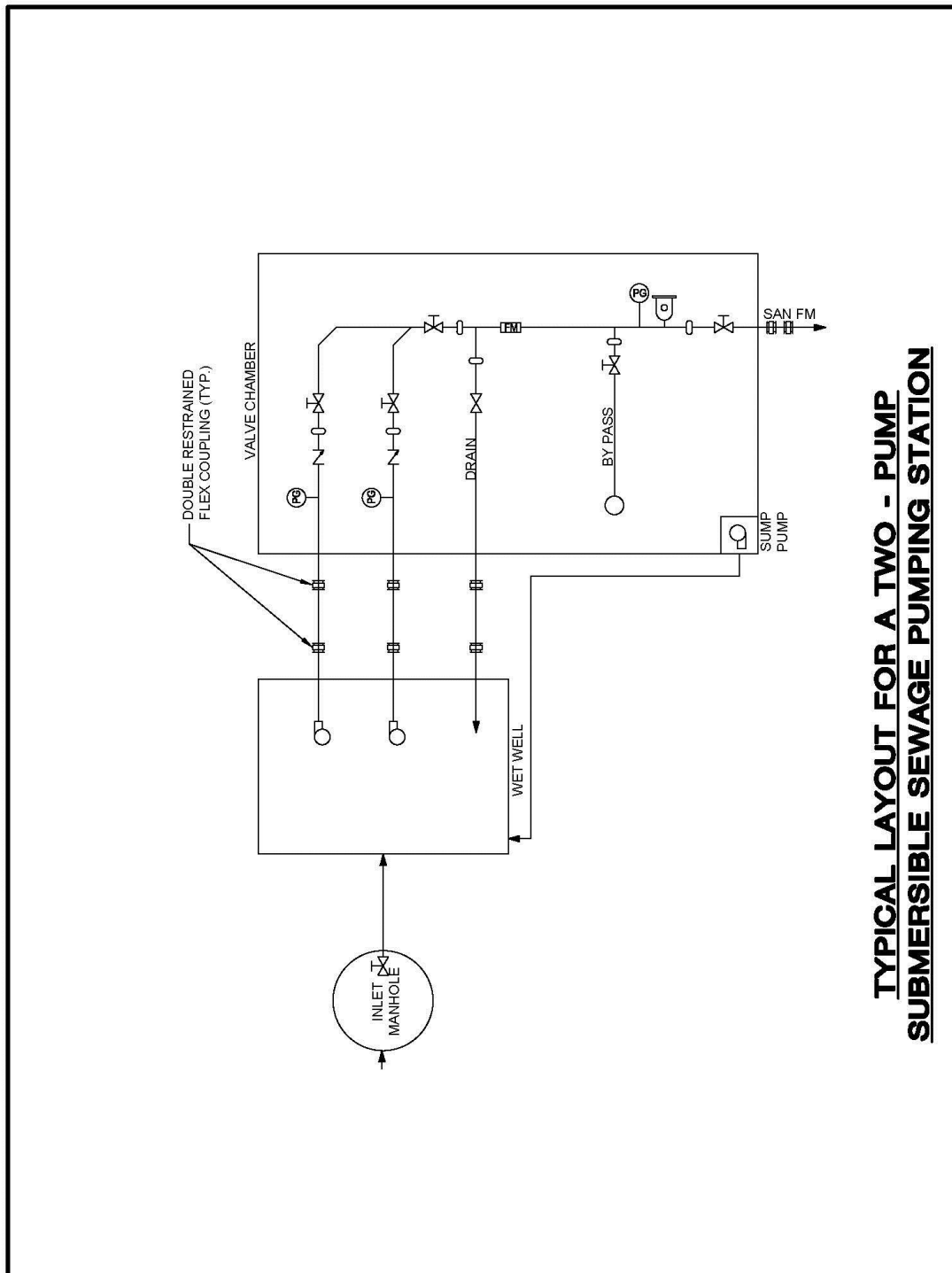
	Assessment and Certification Program	PLC	Programmable Logic Controller
		PMG	Permanent Magnet Alternator
N.C.	Normally Closed		
N.O.	Normally Open	PS	Pumping Station
N.P.T.	Nominal Pipe Thread	PSI	Pounds Per Square Inch
NEMA	National Electrical Manufacturers Association	PTC	Positive Temperature Coefficient
NFPA	National Fire Protection Association	PVC	Polyvinyl chloride
NPC	Noise Pollution Control	PVCO	Molecularly oriented polyvinyl chloride
NPSCD	Niagara Peninsula Standard Contract Document	PWM	Pulse Width Modulated
NSF	National Sanitary Foundation	R.R.O.	Revised Regulations of Ontario
NTU	Nephelometric Turbidity Unit	RAM	Random Access Memory
OBC	Ontario Building Code	RBC	Rotating Biological Contactor
O.D.	Outside Diameter	RCP	Reinforced Concrete Pipe
ODWS	Ontario Drinking Water Standards	Region	Niagara Region
OHS	Occupational Health and Safety Act	RFI	Radio Frequency Interference
		RLC	Resistive Capacitance Inductance
OESC	Ontario Electrical Safety Code	RMS	Root Mean Square
OPS	Ontario Provincial Standards	RPM	Rotations Per Minute
OPSD	Ontario Provincial Standard Drawings	RPU	Remote Programmable Unit
OPSS	Ontario Provincial Standard Specifications	SAE	Society of Automotive Engineer
OWRA	Ontario Water Resources Act	SAT	Site Acceptance Test
P&IDs	Process & Instrumentation Diagrams	SCADA	Supervisory Control and Data Acquisition
PAC	Powdered Activated Carbon	SMACNA	Sheet Metal and Air Conditioning Contractors National Association
PCB	Polychlorinatedbiphenols	SO2	Sulfur Dioxide
PEO	Professional Engineers Ontario	SOP	Standard Operating Procedure
PID	Process and Instrumentation Drawing	SPS	Sewage Pumping Station
		SQL	Structural Query Language

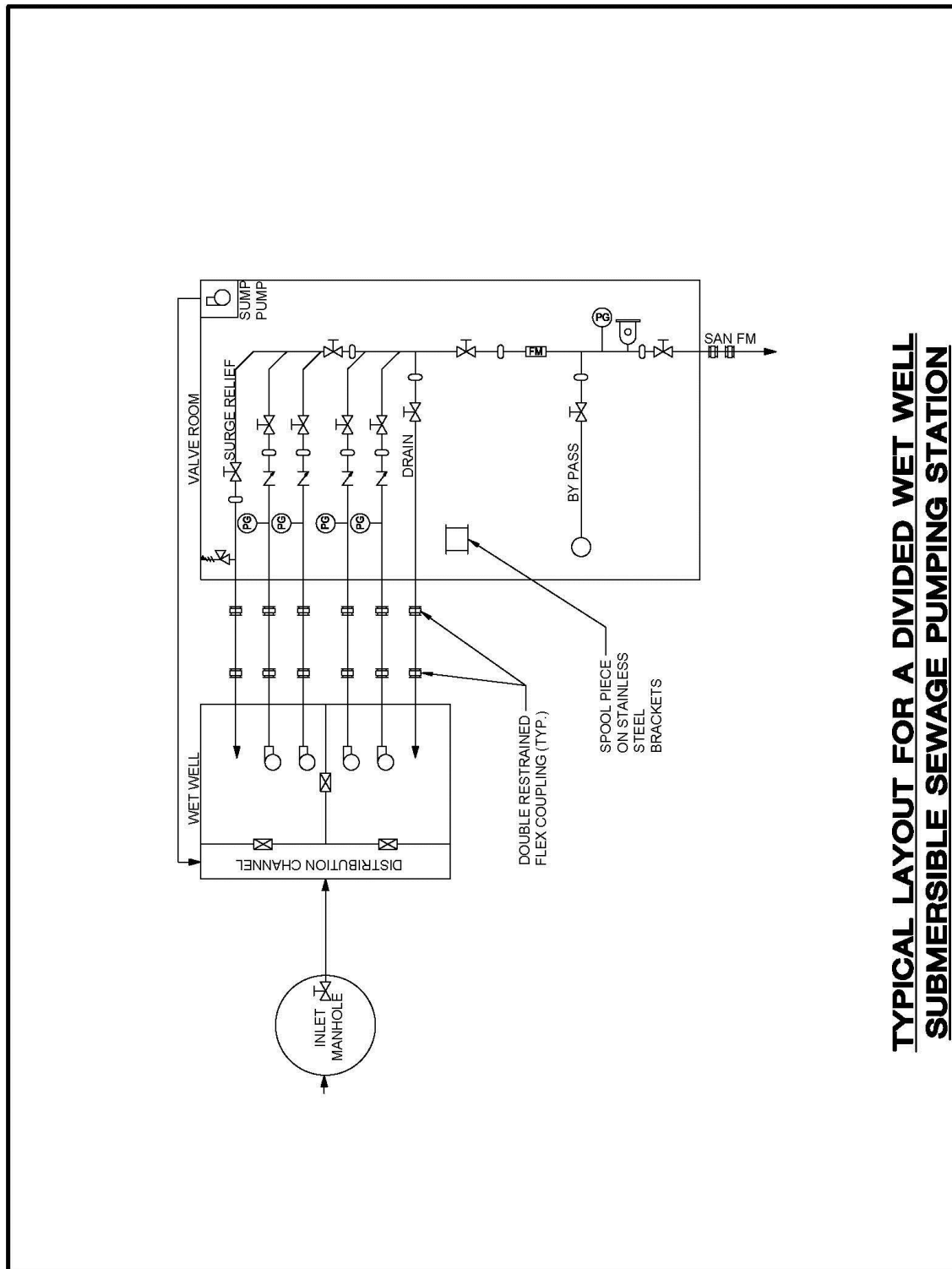
SUE	Subsurface Utility Engineering	UL	Underwriters Laboratories
T&O	Taste and Odour	USEPA	United States Environmental Protection Agency
TC/TC	Tungsten Carbide/Tungsten Carbide	UV	Ultra-Violet
THD	Total Harmonic Distortion	VAC	Voltage Alternating Current
THM	Trihalomethane	VDC	Voltage Direct Current
TS	Total Solids	VFD	Variable Frequency Drive
TSE	Technical and Scientific Equipment	WAN	Wide Area Network
TSSA	Technical Standards and Safety Authority	WEAO	Water Environment Association of Ontario
TTHM	Total Trihalomethanes	WHMIS	Workplace Hazardous Material Information System
TWH, TWU	Type of Wire, Refer to Code, Indicates Thermoplastic Vinyl-Coated Wire that is Moisture-Resistant	WWF	Wet Weather Flow
		WWTP	Wastewater Treatment Plant
		WTP	Water Treatment Plant
TWL	Top Water Level	XO	Neutral

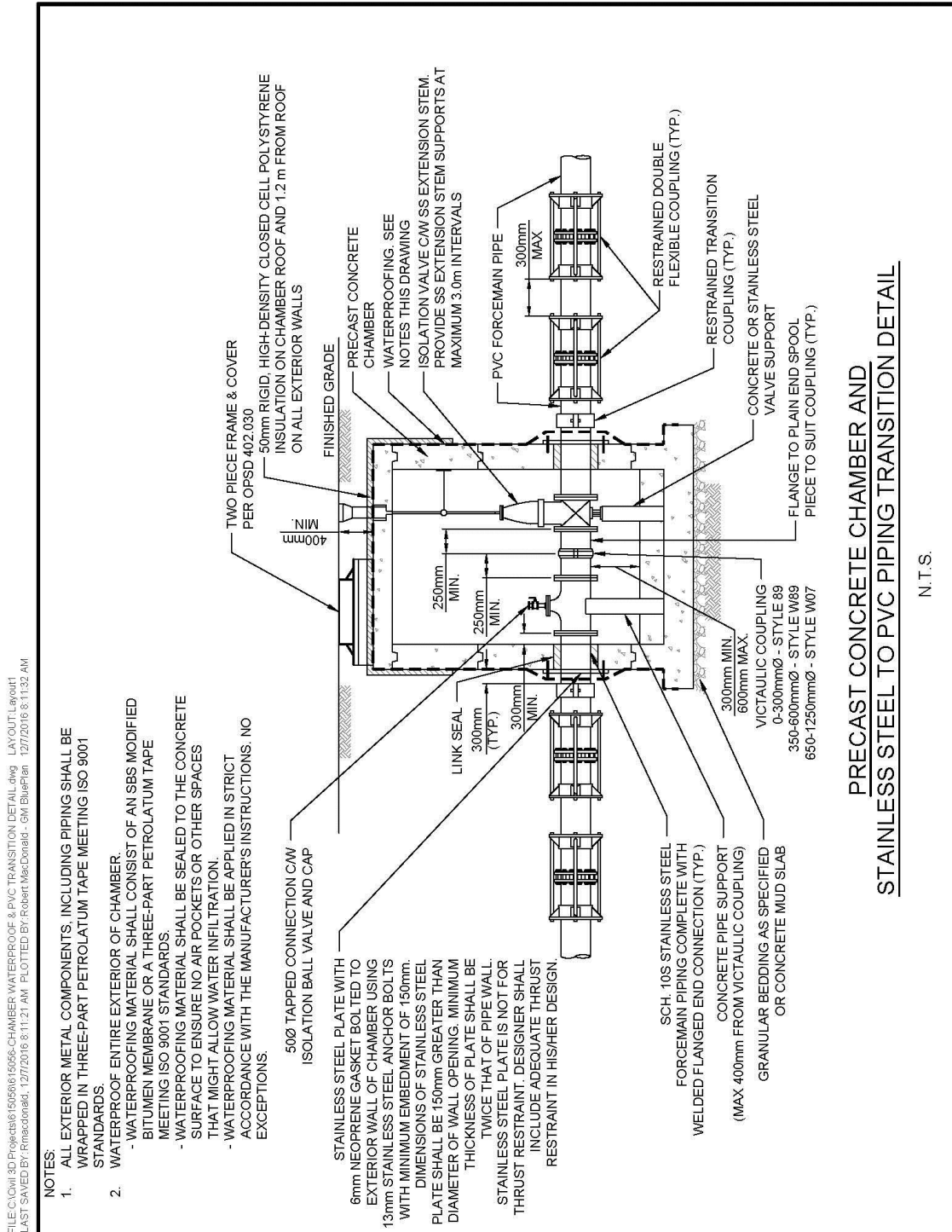
Appendix B - Schematics











Appendix C - Acts, Codes, Standards and Guidelines

Designs shall meet the following acts, codes, standards and guidelines.

1. Ontario Ministry of the Environment Conservation and Parks (MECP) Design Guidelines
 - a) Design Guidelines for Drinking-Water Systems
 - b) Procedure for Disinfection of Drinking Water in Ontario
 - c) Design Guidelines for Sewage Works
 - d) Stormwater Management Planning and Design Manual
 - e) Water and Energy Conservation Guidance Manual for Sewage Works
 - f) Guidelines for Environmental Protection Measures at Chemical and Waste Storage Facilities
 - g) Information to be Submitted for Approval of Stationary Sources of Sound, Publication NPC-233, latest revision
2. Clean Water Act
3. Ontario Safe Drinking Water Act
4. Ontario Water Resources Act
5. Ontario Provincial Standards Specifications
6. Ontario Environmental Assessment Act
7. Ontario Environmental Protection Act
8. Ontario Building Code
9. Accessibility for Ontarians with Disabilities Act
10. Wastewater Systems Effluent Regulations
11. National Building Code of Canada
12. National Fire Code of Canada
13. National Plumbing Code
14. Canadian Standards Association
15. Guidelines for Canadian Drinking Water Quality, Health Canada
16. National Sanitary Foundation (NSF) – NSF 60 and NSF 61
17. Applicable National Fire Protection Association (NFPA) Standards
18. American National Standards Institute (ANSI)
19. American Waterworks Association (AWWA) Standards
20. Canadian Gas Association CGA B105 – Digester Gas Systems

21. Institute of Electrical and Electronic Engineers (IEEE)
22. The Instrumentation, Systems and Automation Society (ISA)
23. Canadian Electrical Code
24. Ontario Electrical Safety Code
25. Ontario Underground Infrastructure Notification Systems Act
26. American Society of Civil Engineers Standard Guideline for the Collection and Depiction of Existing Subsurface Utility Data
27. Local Area Municipal By-Laws

Niagara Approved Product and Equipment List

DISCLAIMER: Inclusion onto the Approved Product and Equipment List (APEL) does not constitute mandatory use of the product in the Region's contract documents. The approved manufacturer(s) on the APEL must meet the specifications as outlined in Niagara Region's tender or quotation. Products are not necessarily listed in preferential order. Niagara Region reserves the right to list manufacturer(s) for specialized equipment and applications outside the APEL in tender or quotation specifications. All materials used in the alteration or operation of a Niagara Region drinking water system that come into contact with water within the system must meet all applicable standards set by both the American Water Works Association ("AWWA") and the American National Standards Institute ("ANSI") including NSF 61 and NSF 372.

Control and Instrumentation

Equipment Type	Equipment Sub-Type	Water/Wastewater	Brand Name	Owner Name	Model	Code, Criteria and Restrictions
Automatic Sampler		Wastewater	Hach			
Chlorine Residual Analyzer	Continuous online	Water	Prominent		DAC	
		Water	Rosemount	Emerson	FCL-56	
Conductivity Level Switches		Water	Warrick	Gems Sensors and Controls		
Diaphragm Seal for Pressure Gauges		Water/wastewater	WIKA			
		Water/wastewater	ABB			
		Water/wastewater	Rosemount	Emerson		
Dissolved Oxygen Sensor / Analyzer		Wastewater	Aysix Technologies			
		Wastewater	Hach			
Gas Monitoring	Fixed combustible gas	Wastewater	MSA		Infrared	
Level Switch	Float	Water/wastewater	Sulzer			
	Float	Water/wastewater	Xylem			

Equipment Type	Equipment Sub-Type	Water/Wastewater	Brand Name	Owner Name	Model	Code, Criteria and Restrictions
	Paddle	Water/wastewater	Siemens			
Liquid Level Transmitter	Pressure	Water/wastewater	Rosemount	Emerson	3051S Series HART Compatible	
	Radar	Water/wastewater	Rosemount	Emerson		Non-contact
	Ultrasonic	Water/wastewater	Miltronics			
	Ultrasonic	Water/wastewater	Pulsar Process Measurement			
	Ultrasonic	Water/wastewater	Rosemount	Emerson		
Magnetic Flow Meter	Chemical dosing	Water/wastewater	Krohne		OptiFlux	
		Water/wastewater	Kohen		EnviroMag	
		Water/wastewater	Rosemount	Emerson		
Mass Flow Meter		Wastewater	Aysix Technologies			
		Wastewater	Fox Thermal Technologies			
		Wastewater	Kruz Instruments	SPD Sales	Series 545FTB and 504FTB	
pH Measurement	In-line analyzer	Water/wastewater	Rosemount	Emerson		
Pressure Transmitter		Water/wastewater	ABB			
		Water/wastewater	Rosemount	Emerson		
Temperature Transmitter		Water/wastewater	Ashcroft			
		Water/wastewater	Honeywell			

Equipment Type	Equipment Sub-Type	Water/Wastewater	Brand Name	Owner Name	Model	Code, Criteria and Restrictions
		Water/wastewater	Rosemount	Emerson		
Thermostat	Low temperature thermostat	Water/wastewater	Honeywell			
Total Solids Analyzer		Wastewater	Metso Kajaani	Valmet		
Turbidity Meter	Online	Water	Hach		TU5300	
Ultrasonic Flow Meter		Water/wastewater	Endress and Hauser		Proline Prosonic	
Uninterruptible Power Supply		Water/wastewater	APC	Schneider Electric		Minimum UPS capacity to be equal to 150 per cent of system full load.
		Water/wastewater	Powerware	Eaton		
		Water/wastewater	SOLAHD	Emerson		
Voltage and Current Transducer		Water/wastewater	Phoenix Contact			
		Water/wastewater	Pribusin			

Crane and Hoist

Equipment Type	Brand Name	Owner Name	Model	Code, Criteria and Restrictions
Trolleys, Hoist, Chain, and Controls		Columbus McKinnon		
		Demag		
		Richards-Wilcox		
		Zelus	Steelway Material Handling	

Electric

Equipment Type	Brand Name	Owner Name	Model	Code, Criteria and Restrictions
Control Relay	GE Multilin Relays			
Electric Motor	Baldor			For all applications
	TECO Westinghouse Motors			1. Service Factor: 1.15 2. Frame and Bracket: Cast Iron 3. Enclosure >40°C Ambient <90°C, ODP >40°C Ambient <80°C, TEFC
	Toshiba			4. Electric motor used for VFD application must be inverter rated 5. Guaranteed minimum full load efficiency. Typical efficiency values are now in the range of 92-95% depending on model selected. 6. The motor is to meet or exceed the following % Guarantee Minimum Full Load Power Factor: 88.3 7. Inverter duty motor rating. Motor meeting all applicable requirements of NEMA MG 1, Section IV, Parts 30 and 31 8. 75 kW and larger to be suitable for solid state reduced voltage starting
	U.S. Motors	Nidec Motor Corp.		
Motor Control Centre	Allen-Bradley	Rockwell Automation		All analog signals to be split out in a separate area of the panel. Arc Resistant per IEEE C37.20.7 Low voltage MCC IP20 Finger Safe
	Eaton		Freedom 2100 Motor Control Centre	
	Siemens			
	Square D	Schneider Electric		
Soft Start/Soft Stop Controls	Allen-Bradley	Rockwell Automation		

Equipment Type	Brand Name	Owner Name	Model	Code, Criteria and Restrictions
	Benshaw			
	Eaton			
Surge Protection Device	Total Protection Solution Canada	Innosys Power		
Variable Frequency Drives	ABB			
	Allen-Bradley	Rockwell Automation		
	Danfoss			

Emergency Standby Power

Equipment Type	Brand Name	Owner Name	Model	Code, Criteria and Restrictions
Automatic Transfer Switch	ASCO	Emerson		
	Thomson Power Systems			
Engine/Generator	Caterpillar			Standard prime mover is diesel engine. Natural gas engine to be used by exception only.
	Cummins			
	MTU			
Switchgear	ABB			
	Eaton			
	SandC			
	Square D	Schneider Electric		

Process Equipment

Sub Category	Equipment Type	Equipment Sub-Type	Water / Wastewater	Brand Name	Owner Name	Model	Code, Criteria and Restrictions
Aeration	Air Blower	Centrifugal	Wastewater	Hibon	Ingersoll-Rand		
			Wastewater	Hoffman and Lamson	Gardner Denver		
		Positive Displacement	Wastewater	Aerezen			
			Wastewater	HSI	Atlas Copco		
			Wastewater	Hibon	Ingersoll-Rand		
		Turbo Blower	Water/wastewater				
	Boilers	Dual Gas System	Wastewater	Cleaver-Brook			
			Wastewater	Boiler Smith			
	Fine Bubble Aeration System		Wastewater	Aquarius			
			Wastewater	OTT			
			Wastewater	Sanitaire	Xylem		
			Wastewater	Tideflex	Syntec Process Equipment	Tideflex Bubble Aeration	
Clarifier	Collector Chain	Non-Metallic	Wastewater	Envirex/Viking	Evoqua		
			Wastewater	Polychem	Brentwood		
			Wastewater	Banyan			
	Sludge and Scum Removal Equipment		Wastewater	Envirex	Evoqua		
			Wastewater	WesTech		COP WW Clarifier	

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Sub Category	Equipment Type	Equipment Sub-Type	Water / Wastewater	Brand Name	Owner Name	Model	Code, Criteria and Restrictions
			Wastewater	Ovivo	Ovivo	Type C3(Diagonal Plow) Type C4D (Spiral Blade) Type C3D (Suction Header) Type C3S (Suction Pipe)	
Digester	Digester Cover		Wastewater	OTI			
			Wastewater	Westech			
	Digester Waste Gas Burner	Enclosed Gas Burner	Wastewater	Varec	Westech		
			Wastewater	Shand and Jurs	Vector Process Equipment	97311T Enclosed Burner with Touch Screen Control Pad	
	Heat Exchanger	Rectangle	Wastewater	DDI			
		Tube-in-tube	Wastewater	Claro			
			Wastewater	Napier Reid			
	Sludge Dewatering/ Thickening	Gravity Belt Thickener	Wastewater	Andritz			
			Wastewater	Alfa-Laval			
		Gravity Belt Thickener and Belt Filter Press	Wastewater	Charter Machine Company			
		Spiral Dewatering Press	Wastewater	Arlat			
			Wastewater	Phoenix Process Equipment		Belt Filter Press Models LC,MC, WX-E/G/H, WXG-W, WXH-W	

Sub Category	Equipment Type	Equipment Sub-Type	Water / Wastewater	Brand Name	Owner Name	Model	Code, Criteria and Restrictions
Headworks	Bar Screens	Multi Rake	Wastewater	Duperon			
			Wastewater	Headworks		Mahr Bar Screen	
			Wastewater	Huber Technology Inc.		Rake Max-Multi Rake	
	Grinder/ Comminutor		Wastewater	Franklin Miller			
			Wastewater	Netzsch Macerator Grinder	Syntec Process Equipment		
			Wastewater	JWC		Muffin Monster	
			Wastewater	Moyno		For light duty applications	
			Wastewater	Vogelsang		For light duty applications	
	Grit Collection Systems	Shaftless Screw	Wastewater	Arlat			
			Wastewater	Mabarec		Vistex Grit Removal Classifier	
			Wastewater	Metcan	Veolia	MectanV	
			Wastewater	WEMCO	Weir		
			Wastewater	Claro Environmental	Claro Environmental	Claro Fine Step Screen	
				WTP Equipment Corp.		Vortex Grit Removal System	

Pumps

Sub Category	Equipment Type	Water / Wastewater	Brand Name	Owner Name	Model	Code, Criteria and Restrictions
Displacement Rotary Pumps	Electronically Actuated Diaphragm	Water/wastewater	Grundfos			Reciprocating, for chemical metering
			Prominent			
	Multiple Rotor	Wastewater	Netzsch – Tornado Rotary Lobe Pump	Syntec Process Equipment	T2	
			Vogelsang			Lobe
			LobePro Rotary Pumps	LobePro Rotary Pumps		Lobe
	Progressive Cavity	Wastewater	Moyno			Screw
			Seepex			
		Water/Wastewater	Netzsch – Nemo	Syntec Process Equipment		
			Watson Marlow			
Dynamic Centrifugal Pumps	Chopper	Wastewater	Hayward Gordon		CHOPX Chopper Pump	
			Vaughan			
			WSP	Weir		
	Modified Radial Flow: Vertical Turbine	Wastewater	Byron Jackson	Flowserve		
		Water/wastewater	Sulzer			
		Water	Peerless	Grundfos		
			Ruhrpumpen			
			Worthington	Flowserve		

Sub Category	Equipment Type	Water / Wastewater	Brand Name	Owner Name	Model	Code, Criteria and Restrictions
	Radial Flow, Mixed Flow and Standard Centrifugal	Wastewater	Gorman Rupp			
			Grundfos			
			Hayward Gordon		Torus Recessed Impeller Vortex Pump	
		Water	Ruhrpumpen		Horizontal Split Case	
	Screw	Wastewater	Hayward Gordon		XCS	
			Hidrostal			
			WEMCO	Trillium Flow Technologies		
	Submersible Pump	Water	Hidrosta			For dry and wet pit
		Water/wastewater	Grundfos			
			Sulzer			
			Xylem			

Valves

Sub Category	Equipment Type	Water / Wastewater	Brand Name	Owner Name	Model	Code, Criteria and Restrictions
Check Valves	Duck Bill	Water/wastewater	EVR			
		Water/wastewater	Tideflex	Red Valve		
	Flexible Disc	Wastewater	Crispin		Rubber Flapper	

Sub Category	Equipment Type	Water / Wastewater	Brand Name	Owner Name	Model	Code, Criteria and Restrictions
		Water/wastewater	Pratt		RD Series	
		Water/wastewater	Val-Matic		Swing Flex Check Valve	
	Tilting Disc	Water	Pratt			
		Water	APCO			
		Water	GA Industries			
		Water	Val-Matic			
	Inline	Water/wastewater	WaPro	Devine and Associates Limited	Inline WaStop DN300 Check Valve	
		Water/wastewater	Tideflex Technologies	Syntec Process Equipment	Tideflex Checkmate Inline Check Valve	
Isolation Valves	Ball	Water/wastewater	Chemline			PVC
		Water/wastewater	Ipex			
		Water/wastewater	Asahi/America			
	Butterfly AWWA	Water/wastewater	Clow			Replaceable/Adjustable seat required for valves greater than or equal to 600mm.
		Water/wastewater	Dezurik			
		Water/wastewater	Pratt			
		Water/wastewater	Val-Matic			
		Water/wastewater	At Controls			

Sub Category	Equipment Type	Water / Wastewater	Brand Name	Owner Name	Model	Code, Criteria and Restrictions
	Butterfly Valves Aeration	Water/wastewater	Dezurik			
		Water/wastewater	Sure Seal			
	Gate	Water	AVK			6" and larger
		Water	Clow			
		Water	J&S			
		Water	Mueller			
	Globe	Water/wastewater	Jenkins	Crane Co.	≤75mm Fig. 106A ≤75mm Fig. 108A (Angle) ≥75mm Fig. 142 (Angle)	
	Knife Gate	Wastewater	Dezurik		Styles KGC-BD & KGN- RSB	
		Wastewater	Orbinox			
		Wastewater	Stafsjo		MV-A	
		Wastewater	Trueline			
	Plug	Wastewater	Dezurik			
		Wastewater	Homestead		Eccentric Plug Valve	
		Wastewater	Milliken	Pratt		
		Wastewater	Val-Matic			
	Sluice/Slide Gate	Wastewater	B.N.W			Product is NOT NSF-61 Approved (but uses 316 S.S)

Sub Category	Equipment Type	Water / Wastewater	Brand Name	Owner Name	Model	Code, Criteria and Restrictions
		Water/wastewater	Fontaine Aquanox		Series S	Product is NSF Approved
		Water/wastewater	Orbinox	Devine and Associates Limited	MU, CC, RB, AG, SL, RC, RR	Approved NSF 61 and NSF 372
Miscellaneous Valves	Air	Water/wastewater	A.R.I.			
		Water/wastewater	Cla-Val			
		Water/wastewater	Val-Matic			
		Water/wastewater	H-Tec	Syntec Process Equipment	Model 992 HaVent Auto Air Valve Set	
		Water/wastewater	Vent-Tech Air Valves	Devine and Associates Limited	SWG-145 psi Series C WTW-363 psi Series C	
	Hydraulic Control Valves	Water	Cla-Val			
		Water	Singer			
	Backflow Preventer	Wastewater	Watts			
	Electric Valve Actuator	Water/wastewater	Auma			
		Water/wastewater	Limitorque	Flowserve		
		Water/wastewater	Rotork			
	Inflow Preventer	Water	Val-Matic	Syntec Process Equipment	Floodsafe	
	Relief	Water	Cla-Val			Distribution
		Water	Singer	Syntec Process Equipment		Distribution
		Water/wastewater	Singer			

Ventilation / Heating Equipment

Equipment Type	Brand Name	Owner Name	Model	Code, Criteria and Restrictions
Air Conditioning/Heating	Carrier	United Technologies		
	Trane	Igersoll Rand		
	Engineered Air		FW / DJ	
Air Vents (Recirculation System)	Armstrong			
	Spirax-Sarco			
Custom Air Handling and Energy Recovery Ventilators	Engineered Air			
	Haakon			
Motorized Damper	Belimo			cUL (CSA 22.2) CSA Class 4813 certified
	Honeywell			

Miscellaneous Equipment

Equipment Type	Brand Name	Owner Name	Model	Code, Criteria and Restrictions
Hatch Covers	Bilco			
	EJ			
	MSU Mississauga Limited			

Terms of Reference for the Product Review Committee for Water and Wastewater

1.0 General

Niagara Region has approved the use of the Approved Product and Equipment List referenced in the Water and Wastewater Project Design Manual. The intent is to ensure that equipment that is specified in future contracts is appropriate in nature, represents best value and whenever possible, is similar to the equipment that is already incorporated in these facilities.

This reduces the number of spare parts that the Region must keep on hand in order to maintain its facilities working efficiently as well as to be able to respond effectively for emergency repairs. At the same time, it reduces the number of different equipment types that the maintenance staff must be familiar with in order to provide effective repair and maintenance services. Consultants shall specify which equipment, where applicable, in design and contract specifications.

2.0 Product Review Committee

The Product Review Committee stated purpose is to review and potentially approve new equipment materials for design purposes, equipment replacement and new equipment installations at the Regional water and wastewater treatment plants, water storage reservoirs, pumping stations, bio-solids works and other facilities within the division.

To provide timely responses to requests for product reviews, the chairperson will convene quarterly meetings to review any new submissions. Meetings to hear presentations from suppliers and equipment manufacturers and product reviews will be scheduled on a minimum quarterly basis, or more frequently as deemed necessary by the Product Review Committee chairperson. The committee's administration assistant and chair will meet one week prior to the quarterly meetings to review current and ongoing matters and to confirm quorum will be met.

Product Review Committee quorum is defined as eight members. If there's no prospect of there being a quorum, the chairperson will announce that there is no quorum and confirm that no official business will be conducted. The chair may then move to adjourn the meeting and reschedule it for another date. In the event that no quorum is present, the administrative assistant should reflect in the minutes how many members were present, that quorum was not achieved, the date and time of the rescheduled meeting and make not of any non-binding discussions that were held.

The structure of the committee allows input from the engineering, operations, maintenance and integrated systems section of the division. The associate director of water and wastewater engineering shall be the chair for the committee and the committee shall be comprised of 18 representatives from across the water and wastewater division as follow:

- Chair
- Administrative assistant (one)
- Engineering (one)
- Water operations and maintenance (six)
- Wastewater operations and maintenance (six)
- Integrated system (three)

These categories may include but aren't limited to:

- Electrical and Instrumentation
- SCADA
- Process
- Compliance
- Laboratory
- Mechanical
- Health and safety

Each subcommittee will meet at the direction of the Product Review Committee chair (frequency ultimately depends upon the quantity of products to be reviewed) in order to ensure timely consideration of submitted products for evaluation. Each subcommittee will review the product and submit a report to the Product Review Committee with its recommendations. The Product Review Committee will accept this report and render its decision within 30 days. Consensus by the committee is required to accept any new product.

Other interested Regional staff, not sitting on these committees, may become involved in the Product Review Process with specific products of interest to them. While non-committee members can be invited to attend committee meetings to offer their feedback, they won't carry an official vote with regards to committee approvals.

3.0 New Product Definition

New equipment and/or new material is defined as any product, which has not been included in the Water and Wastewater Project Design Manual. No new product shall be included on the Approved Product Equipment List in the Water Wastewater Project Design Manual without review and written approval by the Product Review Committee.

The Approved Product Equipment List applies to replacement and installation of equipment, as performed by plant operations, plant maintenance, and construction

projects under the capital project program at the Regional water and wastewater treatment plants, water storage reservoirs, pumping stations, bio-solids works, and other facilities within the division.

During emergency repairs required to restore services, products and materials not included on the Approved Product Equipment List may be used.

4.0 Lunch and Learn

Lunch and Learn or other information presentations and training sessions are considered external to the product review process. Suppliers and/or manufacturers of new products must follow the review process as defined in the terms of reference.

5.0 Requests for Consideration

To initiate a product review, complete and submit a request for consideration form. This can be done by water and wastewater staff, consultants, sales representatives or other interested parties. Submit one form per product. The Product Review Committee will review only one application for a specific product, regardless of applicant, once within a one year time frame.

The request for consideration must be accompanied by an information package before the product can be brought to the Product Review Committee for consideration. The request for consideration must consist of the online application with product attachments containing the following information:

1. Suppliers / manufacturer's company name and address including parent company information
2. Applicant contact name and information
3. Product name
4. Designed or intended use for the product
5. Manufacturer's brochure that provides a component-level understanding of the product
6. Product standards and specifications
7. Material safety data sheets, if applicable
8. Listing of applicable standards and the products status with regard to approval with reference numbers (American Water Works Association, American Society for Testing and Materials, American National Standards Institute, National Fire Protection Association and National Sanitation Foundation)
9. Test results showing compliance with applicable standards, including independent laboratory test results, if requested
10. Information on installation, use and product specifications
11. A brief history of the product manufacturer (ex: length of time in business, market and quality objectives, etc.)

12. A brief history of the product(s), (ex: length of time in production, modifications, compatibility with other similar products, how long the manufacturer expects to continue product(s) production)
13. Maintenance requirements, special equipment and procedures, recommended maintenance schedules, availability of service and training required
14. A statement on the availability of the product(s) and replacement parts (ex: supplier names and locations, origin of parts, size of inventory, maximum delivery time, etc.)
15. Cost to supply and maintain product, if applicable
16. Product references (municipal or public users within the Province of Ontario and in applicable industry) shall include users' name, address and telephone number, product application and number of years in use, and name and telephone number of a contact person having knowledge of the particular usage.)
17. Explanation of how the product benefits the division in terms of prolonged service life, reduced maintenance, reduced life-cycle cost and other relevant aspects.
18. Indicate if there are any special conditions (such as pipe size) for optimal performance of the product. Specify conditions or requirements for optimal performance. Where appropriate, include the engineering data required for proper application of the product. Indicate relevant safety factors, and pressure, temperature, or environmental limits.
19. Provide information relating to patents, licenses, user fees and/or franchises held on the product.
20. Provide any other related information

Only complete submissions will be considered by the Product Review Committee. If the submission is incomplete as determined by the committee subject matter expert, the applicant will be advised and provided an opportunity to update the information submitted.

Although not required, application submittal may include other data to assist the Product Review Committee in evaluating the product. This information could include brochures, videos, product samples and/or photographs. The Product Review Committee cannot be responsible for return of these materials. (One copy of video/media and product samples is sufficient for committee review.)

The applicant's request for consideration shall be submitted at least 30 days prior to a Product Review Committee meeting. The Product Review Committee's workload and the number of requests received will dictate the timeline for resolution. After a general review of the applications, one of five decisions will be reached if the product:

- Is not approved as per Section 5.1
- Is under evaluation
- Contains insufficient information to classify
- Is conditionally approved
- Is accepted for use as per Section 7.0

5.1 Not approved

The Product Review Committee may deem the product not approved based on the following:

1. The product isn't within the jurisdiction of the Product Review Committee
2. The Product Review Committee fails to find a value in the product
3. The number of similar products currently listed in the Water and Wastewater Project Design Manual is sufficient and additional products aren't needed
4. Other considerations dictate that the product not be approved

The proceedings will cease and the applicant will be notified specifying the reason for refusal.

If the product is not approved, the applicant, or any other person, must wait for one year from the date of decision before re-submission. The one year waiting period is to ensure that the manufacturer adequately reviews and assesses their product for significant changes to warrant re-submission.

5.2 Under evaluation

The Product Review Committee will further investigate the product as described in Section 6.0.

6.0 In-Depth Review Procedure

For products considered under evaluation under Section 5, an in-depth review will be conducted. The investigation may consist of any of the following:

- Presentation before Committee
- Reference checks
- Samples as appropriate
- In office or site demonstration
- In field application performed by municipal staff
- Site visit to previous installations or manufacturing facilities
- Laboratory testing
- Pilot study
- Other tests or demonstrations deemed necessary by the Committee
- Other information requirements as determined

6.1 Presentation

Following review of the submittals the Product Review Committee may request a presentation by the representative at a regularly scheduled Product Review Committee meeting to demonstrate the product or provide additional information. In addition, submitters may request time for a formal presentation to the Committee. This would be

especially beneficial for products or procedures that are unique or are significantly different from those currently approved or used. Such requests should be made through the Product Review Committee chairperson. Formal presentations, including questions, are limited to no more than 30 minutes.

Representatives at the meeting should be in a position to offer any type of background on product use and locations, design, and reference checks. These representatives should also have the authority to approve a trial run in the Niagara. When additional information is desired by the Product Review Committee, it may request additional information from the sales representative, or that they work with members of the Product Review Committee or their appointees to develop an in-depth study.

6.2 Product demonstration

The need for product demonstration or sample may be determined by sales representatives to better promote their product, or may be at the request of the Product Review Committee to gain a better understanding of the product. All costs associated with the supply and delivery of the product demonstrations purposes will be incurred by the supplier.

6.3 Field tests (less than six month duration)

Some products may require a test period to evaluate the field performance of the product. The requirement for test installations will generally be requested by the Product Review Committee during their review. The duration of the field test will be determined by the Product Review Committee for each individual product. The chairperson or his designate will serve as study coordinator in the development and presentation of these reports to the Product Review Committee. Procedures for testing or evaluation shall be as agreed upon between the supplier and the Product Review Committee. Results will become a part of the product file and will be made available to the supplier upon request.

All costs associated to the trial test period shall be borne by the applicant. These include but are not limited to: installation costs, the costs to remove or expose the product (in some cases), laboratory testing, and any other costs that may be deemed necessary by the Product Review Committee to fully monitor and evaluate the product. If the Region, after completing adequate field tests approves the product, the Region may reimburse the supplier for the cost of the product only. No compensation will be provided for a product that is not approved.

6.4 Pilot study (six months duration or greater)

If the Product Review Committee determines that a long term field test is required to adequately assess the product, a pilot study may be requested. The applicant may arrange for other municipalities to participate in the pilot study. The pilot study must be

fully documented to the satisfaction of the Product Review Committee and the participating municipality.

The trial test site location(s) will be recommended by the applicant for consideration by the Product Review Committee and the participating municipality. More than one test site location may be selected for trial. The performance of the product is to be evaluated at the end of the probationary period. The probationary period shall be of a minimum duration determined by the Product Review Committee. At any time the Product Review Committee reserves the right to extend this probationary period, as deemed necessary.

Procedures for testing or evaluation and cost sharing shall be as agreed upon between the supplier and the Product Review Committee. Results will become a part of the product file and will be made available to the supplier upon request.

7.0 Selection Criteria

Acceptance of the new product or equipment for addition into the Approved Product Equipment List will be guided based on performance, maintenance requirements, life cycle costs, availability of spare parts and response of vendor to the Region, as well as achieving successful field trial(s). In a similar manner, existing products or equipment may be de-listed based on the established criteria.

8.0 Approvals

Following the Product Review Committee review, and provided no further information is required, a letter outlining the Product Review Committee's decision will be sent to the applicant and other interested parties. The letter will also outline the reasons for that decision. This is the final step in the product review process. The decision rendered will be one of the following:

1. The product/equipment is accepted for use. The product/equipment is approved for general use and will become part of the Approved Product Equipment List of the Water Wastewater Product Design Manual when the subsequent issue of the specifications are released.
2. The product/equipment is conditionally approved. The Committee may choose to allow the use of a product, but with certain restrictions. The use of a product/equipment may be limited to pre-approved applications. If conditions or restrictions are imposed, the reasoning will be provided. The product shall be listed in the Approved Product Equipment List of the Water and Wastewater Project Design Manual with all applicable restrictions/conditions clearly noted.
3. The product/equipment is not approved. The product/equipment may not be used in the Division's systems. Notification will be sent to the applicant indicating that the product/equipment is not approved. Reasons will be provided.

The approval for a product or equipment is limited to the stated model(s), conditions or standards/specifications at the date of approval. Any modifications require additional review and approval. Products previously granted approval will not be required to be re-reviewed by the Product Review Committee for minor changes that do not impact the functionality of the product, unless it is determined that the changes may affect how the product performs for its intended use.

9.0 Maintenance of the Approved Product Lists

Once products have been approved, a letter will be sent to the product representative and other interested parties. The review process will be documented and kept on file by the Product Review Committee.

Products in use by the Region are subject to ongoing consideration and evaluation by the Product Review Committee.

A copy of the Approved Product Equipment List will be posted on the Product Review Committee SharePoint site and the Water and Wastewater division's external Product Review Committee website.

10.0 Removal of Products

Existing equipment may be de-listed as deemed necessary, by the Product Review Committee.

Products may be removed from the list for any of the following reasons:

1. The division changes specifications or standards that preclude the use of any particular product
2. Vendors fail to satisfactorily respond to inquiries or service requests
3. Non-use of a product for a period of two years or more may result in the removal from the list
4. Products will be removed from the list when they: are deemed obsolete by the Product Review Committee, are no longer manufactured, are requested to be removed by the vendor, or if the Product Review Committee deems the product has changed significantly enough to warrant a new submission
5. The product is found to be defective
6. Repeated or likely installation errors
7. Performance problems
8. No satisfactory action has been taken by the manufacturer to correct a defect or associated problems with a product
9. Parts or service has become difficult to obtain or is cost prohibitive
10. If the product no longer meets the relevant standards. For example, the current Ontario Provincial Standard Drawing or current Ontario Provincial Standard Specifications; American Water Works Association standards and amendments,

Canadian Standards Association, American Society for Testing and Materials, National Sanitation Foundation; other applicable standards

11. Local Municipal or Regional by-laws
12. Health or safety issues
13. Regulatory non-compliance
14. Process reliability

Any interested parties may notify the Product Review Committee of issues regarding the performance of new and existing products used in the field. Negative feedback shall be submitted to the Product Review Committee for review. Should it become necessary to consider a removal of a product from the Approved Product Equipment List, the procedure shall be as follows:

1. The review process will be initiated when a member of the Product Review Committee tables a motion for a product removal consideration.
2. The chairperson will notify the manufacturer or the supplier that consideration is being given to remove the product from the Water Wastewater Project Design Manual. The product manufacturer and/or its supplier representative will be given an opportunity to appear before the Committee.
3. Upon the completion of the Committee's review, the chairperson will remove the product (if so decided) from the Approved Product Equipment List and will notify the interested parties that the use of the product will be discontinued.

If the reason is health or safety related, regulatory non-compliance or process upset; removal from the Approved Product Equipment List may be issued prior to notifying a representative of the manufacturer. A notification will also be circulated to the users of the Water Wastewater Project Design Manual.

11.0 Moratorium

Products or equipment that are not approved may be reconsidered, if the applicant can supply additional information that may influence the stated basis for the Product Review Committee's decision. However, the Product Review Committee reserves the right to not approve any product or equipment deemed to be incompatible with our current methods and materials and to limit the number of approved manufacturers or models of any particular types of products. Ultimately the best interests of Niagara will be paramount in its decision.

The applicant, or any other person, must wait for one year from the date of rejection before re-application. The one year waiting period is to ensure that the manufacturer adequately reviews and assesses their product prior to re-submission.

If the product is removed from the Approved Product Equipment List, the manufacturer and supplier must wait for two years from the date of removal before re-submission, unless otherwise approved by the chairperson. The application for re-submission must

include a written statement outlining improvements/changes made to the product and/or its supply.

12.0 Tender Specifications

Once a product has been granted approval by the Product Review Committee, the product may be named in tender or quotation specifications. In case of any inconsistency, conflict, or differences by design decisions between the products named in the Approved Product Equipment List and the tender or quotation specifications, the tender or quotation specifications shall govern. Any specifications that deviate from the Approved Product Equipment List must be accompanied by a technical memorandum justifying the proposed deviation for Niagara Region project stakeholder review and approval.

Inclusion of a product into the Approved Product Equipment List does not constitute mandatory use of the product.

The Water Wastewater Project Design Manual and the Product Review Committee terms of reference are living documents and will be updated as required.