

**Committee of the Whole Working Session
December 13, 2021**

(Deferred from Committee of the Whole Working Session of December 1, 2021)

Report #PD-2021-59

Municipal Comprehensive Review - Proposed Forecast, Settlement Boundary Expansion Criteria, and Future Servicing Capacity

Recommendation

That Report #PD-2021-59 be received;

And further that Report #PD-2021-59 be forwarded along with notes on discussion to the County of Simcoe to represent the Town of New Tecumseth's comments on the County of Simcoe proposed Land Needs Assessment;

And further that staff be directed to apply the Settlement Boundary Expansion Criteria as part of the Town's Land Needs Assessment when identifying potential lands to be included in the urban settlement boundaries of Alliston, Beeton, and Tottenham for Council's consideration.

Objective

The purpose of this report is to provide Council with an update on the County of Simcoe Municipal Comprehensive Review proposed Land Needs Assessment and how it impacts the Town's growth forecast and requirement for settlement boundary expansion, and to present Council with the final draft of the Settlement Boundary Expansion Criteria to be used to consider boundary expansions for the three urban settlements of Alliston, Beeton, and Tottenham. As planning for growth is strongly tied to the ability to service it, Council will be presented with a high-level preliminary assessment of the Town's wastewater servicing capacity and how the systems have the potential to be expanded to accommodate some future growth.

Background

Overview of Municipal Comprehensive Review

This report provides an update on the proposed County of Simcoe's Draft Land Needs Assessment that includes an updated growth forecast for New Tecumseth as part of the Municipal Comprehensive Review (MCR) as outlined in Attachment #1. The province has allocated population and employment growth to Simcoe County to the year 2051 in accordance with A Place to Grow: Growth Plan for the Greater Golden Horseshoe 2020 (Growth Plan). The MCR exercise is based on the policies of the Growth Plan where planning for this growth and evaluation of settlement area expansions to accommodate this growth occurs.

Simcoe County has been allocated by the province a 2051 population and employment target of 555,000 people and 198,000 jobs where the provincial growth allocations are minimum targets. This represents an approximate increase of 55% and 68% respectively from 2021 to 2051. A significant component of the MCR is to complete a provincial Land Needs Assessment (LNA) based on a prescribed methodology. The LNA exercise is utilized to determine whether the County and each of the 16 lower-tier municipalities has sufficient developable land available to accommodate this future population and employment growth. The draft LNA has demonstrated that more lands will be necessary to accommodate growth in New Tecumseth. Simcoe County staff at this time are seeking input from its local municipalities in terms of if there are any significant concerns with meeting these growth targets.

Settlement Boundary Expansion Principles

At the September 13, 2021 Committee of the Whole meeting, planning staff presented a list of principles for the consideration into the settlement boundary expansion exercise of the MCR. The evaluation criteria will provide Council with the tools to assess where settlement boundary expansion should occur. It is anticipated that not all landowner requests can be accommodated in order to meet the Growth Plan policies with the intent of planning for complete communities in addition to not exceeding the population and employment forecast to 2051.

Further to this meeting, Council members provided additional principles, input into the proposed principles and weighting of the principles as presented at the September 27, 2021 meeting. Staff were directed to further refine these draft principles into settlement boundary expansion criteria to evaluate the results of the draft LNA.

Comments and Considerations

Highlights of Simcoe County Land Needs Assessment

In order to develop growth forecasts, the County was divided into two regional market areas of the north and south. The share of the market growth for the southern regional market area includes New Tecumseth representing 19.1% of population growth along with Bradford West Gwillimbury (20.9%), Innisfil (20.4%), Adjala-Tosorontio (0.3%) and Essa (5.3%). The County experienced accelerated growth over the past 20 years with a surge in the south and especially in the municipalities of New Tecumseth, Innisfil and Bradford West Gwillimbury. It is anticipated that this trend will continue based upon the analysis presented in the draft LNA.

The County has identified that by 2051, there will be a deficit of approximately 18,900 residential units or at least 350 hectares and 7,500 jobs or a minimum of 375 hectares. Through further analysis, it is anticipated that the total amount of land is expected to change. The focus is to enlarge the existing settlement areas where servicing including transportation, water and wastewater have potential to be expanded. As a result, not all settlement areas are equally suitable for growth and there is a recognition that different employment needs have different land needs.

Although there is a shift to higher density housing in the form of townhouses and apartments, there is still strong market demand for single detached homes for the family forming population and working age. Currently, the County has a 35% intensification rate applied to the built boundary of communities and for the DGA (Designated Greenfield Area) the density ranges from 45 to 55 persons and jobs per hectare. As part of the Draft LNA, the County is proposing to increase the intensification rate and density targets in settlement areas to accommodate the projected growth.

In New Tecumseth, the employment growth will be located in the existing urban centres on well-located employment lands. Most employment growth is anticipated to be located in Alliston given its status of a Provincially Significant Employment Zone (PSEZ). Significant employment growth will be directed to the southern regional market area with New Tecumseth representing 18.3% of the growth.

The LNA exercise is meant to establish long-term land needs and once confirmed by the provincial approval of the updated County Official Plan, implementation of the actual growth on new lands will be undertaken by the Town guided by secondary plans. The growth is expected to be realized over a 30 year time frame and will not be immediately developed and will be supported by community-based guidance documents and updated policies in the Town's Official Plan.

Proposed Forecast

In August 2021, the County of Simcoe provided the Town of New Tecumseth with a preliminary 2051 population target of 86,100 people, 35,320 housing units, and an employment target of 31,650 jobs. In 2021, it is estimated that New Tecumseth has a population of 43,450 with approximately 15,600 housing units, and approximately 20,570 jobs. Alliston is identified as a Primary Settlement Area (PSA) where there is clear direction in the Growth Plan to prioritize growth to PSA's compared to other settlement areas.

More recently, the County has released further refined population and employment growth forecasts as part of the draft LNA for New Tecumseth in Attachment #1. The population forecast to 2051 has been updated to 81,530 resulting in an increase of 37,590 residents from 2021 representing a 85.5% increase planned over the next thirty years. The employment growth numbers increased slightly to 35,780 representing an increase of 71.5% from 2021 to 2051.

Staff have assessed these results and discussed preliminary feedback with County staff and offer the following:

- Given the current limited water capacity until 2026, staff advise that the population and employment forecast be reflected to account for short-term servicing challenges
- It was unclear if the former Flato MZO (Main Street Meadows Beeton) lands were accounted for in the forecast and the County confirmed that these lands will be

incorporated into the population and employment forecast to 2051 given their recent timing of the submission of a plan of subdivision

- A significant portion of the growth will be directed to Alliston given that it is identified as a Primary Settlement Area in the Growth Plan with some growth appropriated to Beeton and Tottenham
- Market demand for housing in the form of single and semi detached units of 69%, however the draft LNA results identify that the Town would need a housing mix on a go forward basis of 42% singles/semis, 16% rows/townhouses, and 42% apartments to achieve the targets of the Draft LNA of a density of 55 people and jobs per hectare and intensification target of 45%
 - The proposed housing mix is a notable departure from the traditional market in New Tecumseth, but reflects closer to the housing mix currently in active planning applications
 - The trend of this proposed housing mix supports a more compact and efficient built form and will limit new land requirements onto agricultural lands
 - Town staff support the direction of the Draft LNA proposed housing mix to support planning for complete communities with a full mix and range of housing options
 - Many of the current housing developments in New Tecumseth are building out to between 45 and 60 people and jobs per hectare thereby meeting Official Plan growth targets
- The employment by type is almost equally split between population-related (retail, services, education, etc.) and employment uses (manufacturing, offices, wholesaling, etc.) with a limited amount of rural employment growth
 - Population-related employment growth found in such sectors retail, services, health-care, education, office use and business will support the residential growth
- In New Tecumseth, the employment growth will be in the urban centres on well-located employment lands. The majority is anticipated to be located in Alliston given its status of a PSEZ

Preliminary Land Needs Assessment

The draft LNA in New Tecumseth proposes that the majority of the unit allocation type will be apartment units (80%) in the built up areas in Alliston, Beeton and Tottenham. Apartment units include both apartment and/or condominium buildings as well as accessory dwelling units including basement apartments. In the DGA, the housing mix proposes the majority being in the form of single and semi-detached units representing approximately 75% of the total housing type. Staff again has concerns with the proposed housing mix with the emphasis placed upon single and semi detached units and this should be reviewed to ensure that the Town will be achieving complete communities. For rural lands, the unit composition would come mostly in the form of apartment units representing accessory dwelling units.

Intensification Targets

On May 31, 2021, Council confirmed the growth targets set out in the Official Plan of 50 people and jobs/ha for lands within the Designated Greenfield Areas and a rate of 40% intensification within the Built-up Area within the communities of Alliston, Beeton and Tottenham. In the recent County Draft LNA, there is a proposed increase in the intensification rate to 45% for all of New Tecumseth. This is in recognition that Alliston as a Primary Settlement Area (PSA) will support increased levels of intensification compared to other communities. An increase in the intensification rate helps to mitigate urban sprawl onto prime agricultural lands. However, these targets deviate from the Council established targets in the Town's 2019 Official Plan where there was significant analysis into determining the appropriate growth targets.

Designated Greenfield Area Targets

Similarly, the County is also proposing to increase the DGA target to 55 people and jobs per hectare for New Tecumseth with the understanding that it will provide opportunity to increase the housing mix and still continue to allow for a significant portion to be in the form of single and semi-detached units. Staff recognize that the target is distributed across Alliston, Beeton and Tottenham, however with Alliston being a PSA it will need to support increased levels of growth compared to the other two communities. As previously noted in previous staff reports on the MCR, the majority of the subdivisions in New Tecumseth are building out between 40 and 50 people/jobs per hectare under the current Official Plan target of fifty. Town staff reiterate the same comment as above that the 50 people and jobs per hectare target was approved by Council to be appropriate for the Town. Further, the Town's current target exceeds the Growth Plan policy for the Simcoe County target of 40 people/jobs per hectare. The County noted that the proposed target is applied over the next 30 years so some developments could be lower than 55 people/jobs per hectare while others are greater to achieve the overall proposed target.

Additional Residential and Employment Land Requirements

In terms of land deficit, the County has calculated that there is a need for an additional residential lands and employment lands in New Tecumseth beyond the initial calculations. Ongoing analysis shows that the DGA land needs are expected to be greater than anticipated even if the residential allocation remains the same as the current draft population. In order to address this deficiency, the Draft LNA supports the higher intensification and density targets including a wide range and mix of housing units and employment land sizes. It was observed by staff that the Rural lands mix has a high proportion of single/semi detached units. County staff clarified that this included the lands adjacent to Alliston being the Briar Hill, Green Briar and Belterra/Treetops developments. It is anticipated as part of the Draft LNA exercise that these lands will be incorporated into the Alliston settlement boundary and this will contribute to addressing the shortfall in residential land needs.

Settlement Boundary Expansion Criteria

Evaluation criteria has been developed based upon input and feedback received from both Council and County staff since September 2021, included as Attachment #2. The criteria was originally developed from the policies the Provincial Growth Plan and LNA Methodology and has been refined to provide additional local context for New Tecumseth. Each criterion was weighted based upon its level of importance ranging from slightly important to very important. The weighting was based upon the policy context of the provincial documents and local context of New Tecumseth. For example, criterion #3 'Close proximity to the Primary Settlement Area of Alliston' is weighted as very important as there is direct reference in the Growth Plan that significant growth is to be directed to PSAs.

Potential Development of County Evaluation Criteria

In discussions with County staff, there is an appetite for the County to implement minimum threshold of settlement boundary expansion evaluation criteria to eliminate any settlement boundary requests that do not meet specific criteria. If a settlement boundary request (including landowner requests) meets this minimum threshold, then the request is evaluated against the local municipal criteria. Any criteria developed from the County, will be based upon the Growth Plan and LNA Methodology so will be consistent with New Tecumseth's approach.

Application of a Climate Change Lens

The Growth Plan is based upon the guiding principles of creating complete communities and integrating climate change into planning and managing growth. To ensure that the Town in its LNA for future boundary expansion considerations, staff has applied a climate change lens to the proposed settlement boundary evaluation criteria relating to the following areas:

- Growth Management - grow in a compact manner while promoting complete communities to assist in not contributing to higher GHG emissions (greenhouse gas)
- Servicing infrastructure - invest in resilient water, wastewater and stormwater infrastructure to mitigate impacts of a changing climate
- Transportation - support transit and active transportation to reduce auto-dependence and the clustering of employment uses around major goods corridors
- Agriculture - emphasis on the importance of the protection of prime agricultural lands to support food and economic resilience
- Natural Heritage System - protect the Natural Heritage System and its features as a valuable carbon sink

Each of the criterion were also assessed against the climate change factors as outlined in Attachment #2. From this review, each of the criterion contributed to addressing one or more of the climate change factors. This demonstrates that the future settlement boundary expansion exercise to be conducted over the next few months will evaluate

landowner requests and staff proposed settlement boundary changes through a climate change lens for Council consideration.

Staff recommend to Council that the draft criteria as outlined in Attachment #2 be used to assess any proposals for settlement boundary expansion to the communities of Alliston, Beeton and Tottenham.

Integrated Planning Incorporates Water and Wastewater Servicing

An integrated planning approach takes into consideration many aspects including but not limited to servicing availability and the future of servicing, proximity to resources, environmental constraints, transit, and avoids a piece-meal approach to growth. Staff retained the services of R.V. Anderson Associates Limited (RVA) to assess at a high-level, the performance and capacity of the Town's wastewater treatment facilities to provide preliminary results for the purposes to potentially accommodate future growth associated with the County's proposed forecast as included as Attachment #3.

This assessment was conducted as a high level preliminary review and is the first of many steps in assessing wastewater capacity and will be further used to support the sanitary system master plan. It is anticipated that this information will also help inform draft growth scenarios for Alliston, Beeton and Tottenham as the work progresses on the MCR.

The Town owns and operates three wastewater treatment plants (WWTPs) to service the three communities and these function as systems:

- Alliston-Beeton System comprises both the Regional WWTP and Alliston WWTP
- Tottenham System includes the WWTP serving Tottenham

Current Status of the Wastewater Systems

RVA completed a scan of the current way effluent is processed and utilized historic performance. The individual WWTPs were assessed based upon their current design, land size and applicable regulations. The following is a summary of the current assessment of the WWTPs:

- Regional WWTP
 - designed to allow for the ultimate capacity and expansion as some components were built to full size
 - property is large enough to accommodate a plant expansion
 - outlet to the Nottawasaga River can handle additional flow from the plant (also know as assimilative capacity of the outlet)
- Alliston WWTP
 - limited in size for expansion and is located in the flood plain so limited ability for expansion due to Ministry of Environment, Conservation and Parks regulations
 - limited opportunity for enhancement based upon its age of originally built in 1973 with upgrades in 1988

- outlet to the Boyne River has the ability to only handle some additional flow from the plant
- Tottenham WWTP
 - originally a lagoon system but upgraded in 1987 and was further upgraded and expanded in 1995 to handle additional capacity
 - portion of the original plant decommissioned and demolished in 2016
 - operates under the average daily rated capacity
 - outlet to the Beeton Creek has the ability to only handle some additional flow from the plant

Assessment of the Wastewater Systems Using Existing Technology and Performance

RVA assessed the current wastewater systems in terms of using existing technology and performance. This assessment was also based upon assumptions of specific flow allocation to ICI (institutional, commercial, institutional) and residential uses and using the current per capita wastewater flows for each system. Based upon the current rated capacity and then determining maximum achievable capacity results in additional capacity for both ICI and residential lands.

The Town has traditionally not separated the wastewater flows for the residential and ICI components. RVA divided the flows to ensure there was additional capacity for the ICI portion and it is anticipated using these existing technology and performance, 44% of the additional capacity should be allocated to the Alliston-Beeton system and 23% for the Tottenham system. This ensures that any future ICI proposals up to 2041 can be accommodated based upon this proposed assessment. The additional capacity can also be converted into additional population, whereby the Alliston-Beeton could potentially accommodate a total population of 10,455 around 2041 and Tottenham an additional 1,658 persons. This potential total population may accommodate around 12,112.

Assessment of the Wastewater Systems with Performance Optimization and Technology Upgrades

RVA also evaluated the wastewater systems at a high-level making assumptions based upon applying technology upgrades and maximizing the performance. The proposed actions can be applied in three stages and are summarized as follows:

- Application of the best available technology performance of the wastewater systems in terms of Total Phosphorous effluent can be achieved if the plants are expanded and upgraded where operation can be optimized
 - One of the significant factors to determine potential future capacity is reviewing the maximum allowable Total Phosphorous loading limits for the potential additional treatment capacity. Total Phosphorous is typically used as one of the primary in factors when assessing treatment capacity of a system where there are maximum loading capacity based upon MECP standards

- Stress test on the systems to confirm the potential for additional capacity after the plants are at design capacity
- Thirdly to achieve the best effluent Total Phosphorous standards by updating the technology and considering applying another technology such as ultrafiltration

Any proposed actions will result in additional costs and further, the MECP may require an update with more recent stream health data to determine the appropriate assimilative capacity assessment for the system which could impact the future capacity. Next steps may require the Town to conduct a capital needs assessment and planning for the wastewater systems to assist with determining future capacity. RVA concluded that if the systems are expanded, other limits for other pollutants can be mitigated.

Preliminary Results of Applying Performance Optimization and Technology Upgrades

RVA used the same assumptions for ICI as above with 44% of additional capacity for the Alliston-Beeton system and 23% for the Tottenham system, however the capacity increases significantly based upon the amount of cubic metres per day. The additional capacity can also be converted into additional population, whereby the Alliston-Beeton could potentially accommodate a total population of 73,600 around 2051 and Tottenham an additional 6,600 persons. This potential total population may accommodate around 80,200 which is comparable to the proposed residential growth forecast in 2051 of 81,530.

As this proposed assessment is based on maximum capacities with performance optimization and technology updates for the systems while meeting MECP and supplier requirements. Going beyond what was assessed may involve reverse osmosis, however it is very expensive and not likely financially viable for the Town. Any type of upgrade to the systems will need to be assessed in terms of financial viability for the Town as it is responsible for infrastructure upgrades. Depending on the type of optimization measures assessed, the total achievable population may be less than proposed. Any development of draft growth scenarios must align to water and wastewater capacity.

Future Water Capacity

It is anticipated that the upgraded Collingwood water treatment plant will be commissioned in 2025, to meet the current needs of the Town to 2031. The Collingwood plant has additional expansion capacity that could be available to accommodate some future growth. Confirmation of the availability of this future capacity in the Collingwood plant will need to be confirmed through future discussions with the Town of Collingwood. Additional water supply solutions will also be explored as part of a Town master servicing solution to support the MCR exercise.

Next Steps on MCR Growth Management Component

Town staff will continue to work with the County on refinement of the Draft LNA and forecast, however comments from local municipalities are due to the County by

December 3, 2021. It is proposed that the report and summary of Committee discussion will be forwarded to Simcoe County staff and will be followed by the ratification of this report and Council minutes from the December 13, 2021 meeting. The County will be refining the Draft LNA on updated numbers followed by the initiation of formal consultation with provincial staff. Phase 1 of the County Draft LNA will be brought to County Council in late spring to ensure there is adequate time for consultation.

Based upon the discussion at this meeting, over the next few months, staff will be developing growth scenarios based upon the Draft LNA and population/employment forecast, water and wastewater potential capacity and settlement boundary evaluation criteria for Council consideration.

Financial Considerations

There are no financial considerations at this time.

Respectfully submitted:



Jennifer Best MCIP, RPP
Director Planning and Building

Attachments:

- [Attachment 1 New Tecumseth Draft Land Needs Assessment](#)
- [Attachment 2 Draft Settlement Boundary Evaluation Criteria with Climate Changes Lens](#)
- [Attachment No. 3 Wastewater Technical Memorandum](#)

Approved By:

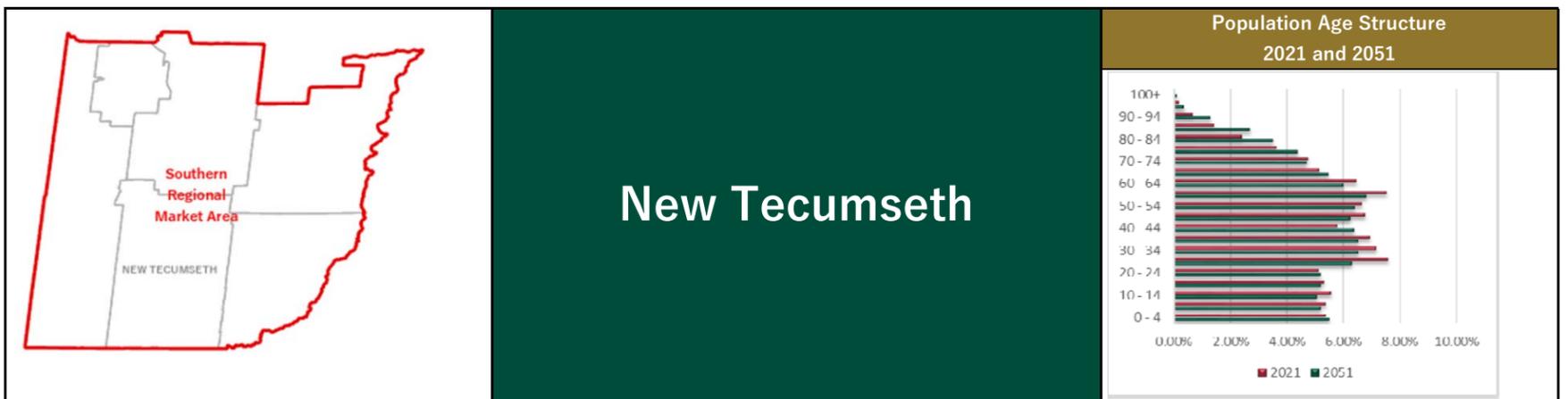
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Planning
Infrastructure and Development
Division
CAO

Status:

Approved - 08 Dec 2021
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FORECAST RESULTS

Year	Population			Share of Growth	Housing By Type				
	Total	Growth	Annual Rate		Single/Semi	Rows	Apartments	Total	Growth
2011	31,090				8,840	890	1,590	11,320	
2016	35,440	4,350	2.7%	14.5%	10,130	1,040	1,750	12,920	1,600
2021	43,940	8,500	4.4%	19.8%	11,990	1,420	2,480	15,890	2,970
2026	49,880	5,940	2.6%	19.8%	14,080	1,900	3,040	19,020	3,130
2031	55,670	5,790	2.2%	19.6%	16,140	2,340	3,570	22,050	3,030
2036	62,140	6,470	2.2%	18.9%	18,310	2,830	4,040	25,180	3,130
2041	68,540	6,400	2.0%	19.6%	20,530	3,310	4,510	28,350	3,170
2046	75,360	6,820	1.9%	18.1%	22,400	3,780	4,870	31,050	2,700
2051	81,530	6,170	1.6%	18.6%	24,230	4,240	5,220	33,690	2,640
2021-51 Growth		37,590	2.1%	15.7%	12,240	2,820	2,740	17,800	

Year	Employment			Share of Growth	Employment By Type				
	Total	Growth	Annual Rate		Major Office	Pop-Related	Emp. Land	Rural	Total
2016	19,600				0	6,650	10,600	2,350	19,600
2021	20,860	1,260	1.3%	19.6%	0	7,840	10,660	2,360	20,860
2026	23,100	2,240	2.1%	17.6%	0	9,110	11,610	2,380	23,100
2031	25,150	2,050	1.7%	17.7%	0	10,310	12,440	2,400	25,150
2036	27,570	2,420	1.9%	18.2%	0	11,440	13,700	2,430	27,570
2041	29,970	2,400	1.7%	18.3%	0	12,540	14,980	2,450	29,970
2046	33,140	3,170	2.0%	19.4%	0	13,870	16,810	2,450	33,130
2051	35,780	2,640	1.5%	18.5%	0	15,100	18,210	2,460	35,770
2021-51 Growth		14,920	1.8%	18.3%	-	7,260	7,550	100	14,910

LAND NEEDS ASSESSMENT

Community Area (Housing) Needs

Policy Area	Single/Semi	Row	Apartment	Total	Community Area Assumptions	
Delineated Built Up Area (BUA)						
Unit Allocation (%)	3.0%	17.0%	80.0%	100%	BUA Intensification Rate:	45%
Unit Allocation (#)	240	1,360	6,406	8,006	BUA Units Needed:	8,006
Supply Potential						
In Planning Process	74	147	122	343	DGA Persons and Jobs per ha:	55
On Vacant Land	32	63	52	146	Resulting DGA Land Need (ha):	(203.8)
Accessory Units	304	0	0	304		
Total	409	210	174	793	Rural Share of Growth:	1%
Intensification Potential Required (Shortfall)	169	(1,150)	(6,231)	(7,212)		
Designated Greenfield Area (DGA)						
Unit Allocation (%)	74.8%	15.2%	10.0%	100%	Employment Area Needs	
Unit Allocation (#)	7,186	1,460	961	9,607	Long-Term Land Supply (ha)	88.1
Supply Potential						
In Planning Process	2,082	637	1,209	3,928	Provincial Strategic Employment Area (ha)	0.0
On Vacant Land	39	12	23	74	Total Land Supply (ha)	88.1
Total	2,121	649	1,232	4,002	Assumed Employment Land Density (jobs/ha)	20
Unit Excess (Shortfall)	(5,065)	(811)	271	(5,605)	Employment Land Capacity (jobs)	1,762
Rural Lands						
Unit Allocation (%)	0.0%	0.0%	100.0%	100%	Employment Land Employment Growth, 2021 - 2051 (jobs)	7,556
Unit Allocation (#)	0	0	178	178	Sufficiency of Supply (ha)	(289.7)
Supply Potential						
In Planning Process	0	0	48	48		
On Vacant Land	0	0	25	25		
Total	0	0	73	73		
Unit Excess (Shortfall)	0	0	(105)	(105)		
Market Housing Mix (According to Market Demand):	69%	16%	15%	100%		
Housing Mix in Planning Process:	38%	28%	34%	100%		
Policy Housing Mix (Required to Achieve Growth Plan):	42%	16%	42%	100%	Surplus (Shortfall) of jobs	(5,795)

Town of New Tecumseth
Draft Settlement Boundary Evaluation Criteria with
Application of Climate Change Lens

No.	Criterion	Level of Importance	Climate Change Lens
1	Achieves the Town's Official Plan target of 50 people/jobs per hectare in conjunction with the Growth Plan 2051 horizon population and employment forecast	Very Important	Increased compact design will help to lower GHG emissions from buildings and transportation where there are increased forms of denser development in the DGA
2	Lands will not result in the Town exceeding Growth Plan 2051 horizon of the approved population and employment forecast	Very Important	Lands are planned to the horizon of 2051 as to not result in urban sprawl onto prime agricultural lands
3	Close proximity to the Primary Settlement Area of Alliston	Very Important	Supports growth centre planning for the community to be transit-supportive, walkable and well serviced to reduce auto dependency and decrease GHG emissions
4	The three downtowns of Alliston, Beeton and Tottenham are preserved and remain unique	Very Important	Supports walkable downtowns for pedestrians, reduces auto dependency. Also supports use/reuse or redevelopment of existing structures and lands to reduce GHG emissions
5	New development supports the unique characteristics of the corresponding community	Very Important	Supports use/reuse or redevelopment of existing structures and lands to reduce GHG emissions where development can reflect the vernacular characteristics of each community. Preservation of natural heritage features enhances the communities. Protection of farmland between the communities will keep them separate and distinct

			from one another
6	Sufficient identified capacity to service the lands with full municipal water and wastewater within the Growth Plan horizon to 2051	Very Important	Resilient water, wastewater and stormwater management infrastructure will help to mitigate impacts of a changing climate including being proactive to manage severe weather
7	Sufficient capacity available for full life cycle cost of facilities and infrastructure, and is financially viable over the full life cycle of these assets	Important	Resilient water, wastewater and stormwater management infrastructure will help to mitigate impacts of a changing climate including being proactive to manage severe weather so that the assets achieve their planned full life cycle and are financially viable
8	Lands are contiguous with existing settlement area boundaries of Alliston, Beeton and Tottenham, and do not contribute to a leap-frogging effect	Important	Planning for compact multi-modal, fully serviced complete communities will mitigate contributing to higher GHG emissions and loss of prime agricultural land by reducing sprawl
9	Promotes a mix and range of housing types for people of all ages and assists the Town with achieving the overall Town intensification target of 40% as identified in the Official Plan	Very Important	Complete communities offer a mix and range of housing and when built in a more compact form help to mitigate GHG emissions
10	Supports the Town's Multi-Modal Transportation Master Plan by being located near existing or planned future transit	Slightly Important	Supports transit and active transportation for residents to reduce auto dependency and mitigate GHG emissions
11	Within close or reasonable proximity to existing or future public service facilities	Important	Complete communities contain public service facilities to meet the needs of residents and with multi-modal transportation options help to reduce auto dependency and mitigate GHG emissions
12	Proposed developable lands are not located within natural heritage features or areas of natural heritage significance, and not within areas identified as environmentally protected within the Town's Official Plan	Very Important	Protection of the Natural Heritage System features will help to mitigate climate change impacts as this system functions as a valuable carbon sink

13	Developable lands on designated Rural lands in the Town's Official Plan compared to being located on Prime Agricultural lands	Very Important	Supports the emphasis placed on the importance of protecting valuable prime agricultural lands to support food and economic resilience
14	Complies with Minimum Distance Separation (MDS) to existing livestock facilities	Slightly Important	Supports the emphasis placed on the importance of protecting valuable prime agricultural lands to support food and economic resilience
15	No adverse effects on the agri-food network	Slightly Important	Supports the emphasis placed on the importance of protecting valuable prime agricultural lands to support food and economic resilience
16	Meets the policy intent of the Town Official Plan	Important	Supports all climate change factors including growth management, servicing infrastructure, transportation, agricultural and natural heritage system

Criteria Used for Employment Purposes

Note: The following criteria apply in addition to the criteria used for all settlement boundary considerations

No.	Criterion	Level of Importance	Climate Change Lens
1	Within close or reasonable proximity to the Provincially Significant Employment Zone in Alliston and/or other designated employment areas in the communities of Beeton and Tottenham within the Town's Official Plan	Very Important	Planning for compact multi-modal, fully serviced complete communities that include employment lands will mitigate contributing to higher GHG emissions and loss of prime agricultural land by reducing sprawl.
2	Not within close proximity to sensitive land uses	Important	Complete communities promote healthy communities where residents are not adversely impacted by employment uses that produce adverse effects from contaminant discharges
3	Located near or in close proximity to major goods corridor (i.e., Highway 89 or CP rail)	Important	Supports complete communities where there are a variety of land uses including employment uses and are clustered around major goods corridors
4	Provide a range and size that is suitable to meet market choice including strategic investment sites to attract employment investment	Slightly Important	Complete communities support a diversity of land uses including employment lands of a variety of locations and sizes and are on full municipal services to mitigate impacts of a changing climate



New Tecumseth WWTPs Assessment Technical Memorandum

FINAL

November 18, 2021

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November 18, 2021

RVA 215922

Town of New Tecumseth
10 Wellington St. E.
Alliston, ON L9R 1A1

Attention: Rick Vatri, C.E.T., Director of Engineering and Development

Re: New Tecumseth WWTPs Assessment
Technical Memorandum - Final

We are pleased to provide the enclosed Technical Memorandum for New Tecumseth WWTPs Assessment.

We appreciate the opportunity to work with the Town on this project and look forward to continuing our work together.

Should you have any questions or require additional information, please contact the undersigned.

Yours very truly,

R.V. ANDERSON ASSOCIATES LIMITED



Harpreet Rai, PhD, P.Eng., BCEE
Senior Associate, Process Engineer

Encl: Technical Memorandum (Final)

New Tecumseth WWTPs Assessment – Technical Memorandum

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1.0 INTRODUCTION AND OBJECTIVES

1.1 Project Background

The Town of New Tecumseth (the Town) owns and operates three wastewater treatment plants (WWTPs) to provide sewage treatment services to serviced areas in the community, namely:

- The Regional WWTP and the Alliston WWTP (formerly called the Sir Frederick Banting WWTP), serving the communities of Alliston and Beeton; and
- The Tottenham WWTP, serving the community of Tottenham.

The Regional WWTP (RWWTP) was commissioned in 1998 with a design average day flow (ADF) capacity of 5,063 m³/d. An upgrade and expansion completed in 2009 included a conversion from a Sequential Batch Reactor plant to an Extended Aeration plant and an increased rated capacity of 11,400 m³/d. The Ministry of Environment and Conservation of Parks (MECP) issued an amended CofA for a rated capacity of 7,595 m³/d with the provision that the facility will be rerated to 11,400 m³/d when it has been demonstrated that the performance data for the expanded facility meets the effluent limits of the CofA for a period of 12 months with an ADF in excess of 5,063 m³/d. The ultimate site capacity is 23,000 m³/d.

The Alliston WWTP was commissioned in 1973 and further expanded in 1988 to an ADF capacity of 5,681 m³/d including the addition of three proprietary treatment trains comprising concentric tanks.

The Tottenham WWTP was originally a lagoon system that was upgraded to an extended aeration process in 1987 and was subsequently upgraded and expanded to treat an ADF of 4,082 m³/d in 1995. The existing plant was decommissioned and demolished in 2016.

The Town has retained R.V. Anderson Associates Limited (RVA) to conduct a high-level review of the performance and capacity of the existing wastewater treatment plants in the Town of New Tecumseth with a view to understanding the potential for expansion to accommodate future growth in the Town of New Tecumseth.

1.2 Project Objectives and Approach

The objectives of this technical memorandum are to:

- Review background information including existing ECAs, Class EAs and develop an understanding of the processes and historic performance at the Regional, Alliston, and Tottenham Wastewater Treatment Plants;
- Assess the additional capacities that could be achieved at the WWTPs considering the effluent objective limits of the receiver and different flow scenarios;
- Assess the population equivalent to the estimated additional capacities for the individual WWTPs and for the overall additional treatment capacity in the Town; and
- Prepare a Draft Technical Memorandum (TM) documenting the investigation.

The capacity review of the existing WWTPs is based primarily on the maximum allowable Total Phosphorus loading to the receiver because the potential discharge

criteria for phosphorus, that may be required in the future, are approaching the performance limitations of current technology.

The approach for capacity assessment of the WWTPs in this TM is based on the best achievable TP limit either via expansion and optimization with the existing WWTP configurations, or with the application of technology upgrades. The assessment considers these options using the current TP loading limits for the individual plants within the context of the overall receiving watershed at higher capacities. This approach is based on the MECP's anticipated requirement of not exceeding the existing TP loading limit in respect to any future expansion of WWTPs.

It is important to recognize that the loading limits do not apply as strictly to the other pollutant parameters - cBOD₅, TSS, and TAN - such that the concentration limits and objectives for these parameters are usually not lowered in direct proportion to the increase in capacity as in the case of TP. As such, the loading limits and effluent criteria for other pollutant parameters are not considered limiting and are not addressed in this assessment.

It is important to note that any increase in capacity implies an expansion of the WWTPs in terms of new tankage and equipment. The nature and configuration of such expansions has not been investigated in this memo, being outside the scope of this study.

The historic performance of the Town's existing WWTPs has been reviewed based on the annual reports and operating data, with an objective to establish best Total Phosphorus standards achievable at each plant on a consistent basis, either with the currently installed treatment systems or with some enhancement.

The residual capacities for individual plants, established using TP loading limits, have been translated into population equivalents and residential units based on the historic per capita flow values.

2.0 EXISTING PLANT OPERATIONS

2.1 Regional Wastewater Treatment Plant

The RWWTP is an extended aeration process consisting of inlet works with three screening channels, two with self-cleaning screens and one with a manually cleaned screen, two vortex grit chambers, three aeration tanks, four secondary clarifiers, two ballasted floc clarifiers (Actiflo) for effluent polishing, alum addition for phosphorous removal, an equalization tank, six deep-bed continuous backwash filters, ultraviolet disinfection, three sludge digesters, two thickening tanks and two glass lined biosolid storage tanks. Biosolids are further stabilized prior to land application. Effluent is discharged through a post-aeration chamber to elevate dissolved oxygen concentration and continues through a 600 mm diameter outfall sewer with a cistern distribution pipe and surface overflow to the Nottawasaga River.

The sewage works is designed and approved to treat sewage at an average daily flow of 11,400 m³/day with a peak flow of 30,000 m³/day. The plant shall not exceed an average flow rate of 7,595 m³/day until the effluent limits (for the flow range of 7,595 – 11,400 m³/d) have not been exceeded for twelve consecutive months at a flow greater than 5,063 m³/day. The current flow rate is 4,403 m³/day with an approximate served population of 7,185 capita.

2.2 Alliston Wastewater Treatment Plant

The Alliston WWTP is an extended aeration facility that provides tertiary level treatment of wastewater for a portion of the community of Alliston. The plant has a rated average day capacity of 5,681 m³/day and a peak day capacity of 14,203 m³/day.

The flows to the Alliston WWTP are conveyed through a grinder system and then into the aerated grit tank. Flow is measured by Parshall flume prior to entering a splitter box which splits the flows between Plant 1 & 2. Plant #1 is comprised of two aeration tanks and two clarifiers with design capacity of 1,597 m³/day; Plant #2 is comprised of three combined treatment units (CTU) with design capacity of 4,084 m³/day. The clarified effluents from each of these modules are combined before a sand and anthracite polishing filter, an ultraviolet disinfection system and phosphorous removal process using alum addition. At the time of expansion, a 600 mm diameter effluent outfall was constructed which discharges to the Boyne River. Biosolids are collected and partially stabilized in an aerobic digester / aerated holding tank (capacity of 480 m³) prior to being pumped to the Regional WWTP for additional stabilization and storage prior to land application. The current average daily flow is 4,428 m³/day with approximate serviced population of 12,000 capita.

2.3 Tottenham Wastewater Treatment Plant

The Tottenham WWTP utilizes an extended aeration process with tertiary treatment. Wastewater comes into the plant from the headworks building where it flows through a 6 mm screens equipped with screen washer/compactors and a vortex grit separator. Once the grit is removed the water flows into two aeration tanks equipped with fine bubble air diffuser systems. After the aeration tanks, water travels to the secondary clarifiers for the sludge to settle out and be removed to the aerobic digester or returned to aeration tanks. The clarified water moves through a V notch weir to remove algae before it travels to the tertiary treatment where a coagulant, in the form of Alum, as well as polymer is added and mixed. Silica Sand is added as a binding agent to assist the fine particles to settle out. The water then moves through a shallow-bed sand media filter and into an open

channel UV disinfection system. The final effluent is discharged into the Beeton Creek. During high flow emergencies, such as a storm event or snow melt, water can be diverted to the effluent storage lagoons and later pumped back to the headworks of the plant. The aerobic digester has a coarse bubble mixing system and is equipped with decant pumps to bring the supernatant to the aeration tanks. Sludge from the aerobic digester is moved to the sludge storage pond, where it can be hauled. The sludge storage pond is equipped with decant pumps so the supernatant can be brought back to the headworks of the plant.

The sewage works is designed and approved to treat sewage at an average daily rated capacity of 4,082 m³/day and a peak flow of 17,021 m³/day. The current average daily flow is 2,658 m³/day with approximate served population of 5,143 capita (based on 2016 Census Data)

2.4 Current Populations and Wastewater Flows

Table 2.1 summarizes the historic (2018-2020) populations for Alliston and Beeton and the flows treated by the Regional and Alliston WWTPs. The wastewater flows and population data translate into a per capita flow of 374 L/d for these communities. Similarly, Table 2.2 summarizes the historic population and flow values for Tottenham, which translate into a per capita flow of 316 L/d.

Table 2.1 – Alliston and Beeton Populations and Wastewater Flows

Parameter	2018	2019	2020
Alliston population	21,431	21,781	22,030
Beeton population	4,327	4,327	4,395
Briar Hill Population ¹	-2,855	-2,889	-2,918
Total population (Alliston + Beeton)	22,903	23,219	23,507
Combined average flows at Regional and Alliston WWTPs (m ³ /d) ²	8,650	8,562	8,831
Per capita wastewater flow (LPCD)	378	369	376
Average per capita flow (LPCD)	374		

1. Briar Hill Population deducted from total population, being already counted in Alliston
 2. Briar Hill flows not counted in total flows as it has its own WWTP

Table 2.2 – Tottenham Population and Wastewater Flows

Parameter	2018	2019	2020
Tottenham population	7,725	7,938	8,216
Average flows Tottenham WWTP (m ³ /d)	2,451	2,436	2,658
Per capita wastewater flow (LPCD)	317	307	324
Average per capita flow (LPCD)	316		

3.0 INFLUENT AND EFFLUENT CHARACTERISTICS

The following sections provide summaries of historic influent and effluent characteristics (2018- 2020) for the three WWTPs in the Town.

3.1 Regional WWTP

Regional WWTP has a rated capacity of 11,400 m³/day and rated peak flow of 30,000 m³/day. Table 3.1 illustrates the averaged influent flows and characteristics of 2018, 2019, and 2020 of Regional WWTP

Table 3.1 – Regional WWTP Influent Flows and Characteristics

Regional WWTP Influent flows and Characteristics	Unit	2018 Value	2019 Value	2020 Value	Average Value
Average day Flow (ADF)	m ³ /d	4,304	4,202	4,403	4,303
Peak Day Flow (PDF)	m ³ /d	8,888	7,896	8,376	8,387
cBOD ₅	mg/L	160	225	231	205
TSS	mg/L	195	316	237	249
TKN	mg/L	31	45	41	39
TP	mg/L	3.5	5.2	3.7	4.1

Table 3.2 illustrates the averaged effluent characteristics of 2018, 2019, and 2020 of Regional WWTP.

Table 3.2 – Regional WWTP Effluent Characteristics

Regional WWTP Effluent Characteristics	Unit	2018 Avg	2019 Avg	2020 Avg	Current Average Conc	Current Max Conc
cBOD ₅	mg/L	2.55	2.82	2.52	2.63	6.20
TSS	mg/L	3.68	4.78	3.62	4.03	6.25
TAN Winter	mg/L	0.21	0.14	0.12	0.16	0.53
TAN Summer	mg/L	0.17	0.21	0.12	0.16	0.32
TP	mg/L	0.05	0.05	0.04	0.05	0.08

3.2 Alliston WWTP

Alliston WWTP has a rated capacity of 5,681 m³/day and rated peak flow of 14,203 m³/day. Table 3.3 illustrates the averaged influent flows and characteristics of 2018, 2019, and 2020 of Alliston WWTP

Table 3.3 – Alliston WWTP Influent Flows and Characteristics

Alliston WWTP Influent Flows and Characteristics	Unit	2018 Value	2019 Value	2020 Value	Average Value
Average day flow (ADF)	m ³ /d	4,346	4,360	4,428	4,378
Peak day flow (PDF)	m ³ /d	7,201	7,875	11,134	8,737
cBOD ₅	mg/L	352	378	267	332
TSS	mg/L	383	396	229	336
TKN	mg/L	39	40	36	38
TP	mg/L	5.9	5.4	4.6	5.3

Table 3.2 illustrates the averaged effluent characteristics of 2018, 2019, and 2020 of Alliston WWTP.

Table 3.4 – Alliston WWTP Effluent Characteristics

Alliston WWTP Effluent characteristics	Unit	2018 Avg	2019 Avg	2020 Avg	Current Avg Conc	Current Max Conc
cBOD ₅	mg/L	2.10	2.33	2.23	2.38	3.80
TSS	mg/L	2.10	3.23	3.14	3.86	8.60
TAN Winter	mg/L	0.11	0.41	2.17	0.74	4.70
TAN Summer	mg/L	0.10	0.17	0.38	0.20	1.20
TP	mg/L	0.10	0.13	0.09	0.16	0.24

3.3 Tottenham WWTP

Tottenham WWTP has a rated capacity of 4,082 m³/day and rated peak flow of 17,021 m³/day. Table 3.3 illustrates the averaged influent flows and characteristics of 2018, 2019, and 2020 of Tottenham WWTP

Table 3.5 – Tottenham WWTP Influent Flows and Characteristics

Tottenham WWTP Influent flow and Characteristics	Unit	2018 Value	2019 Value	2020 Value	Average Value
Average day flow (ADF)	m ³ /d	2,451	2,436	2,658	2,515
Peak day flow (PDF)	m ³ /d	-	-	10,289	10,289
cBOD ₅	mg/L	147	196	175	172
TSS	mg/L	151	212	194	186
TKN	mg/L	30	33	37	33
TP	mg/L	3.8	3.7	3.6	3.7

Table 3.6 illustrates the averaged effluent characteristics of 2018, 2019, and 2020 of Tottenham WWTP.

Table 3.6 – Tottenham WWTP Effluent Characteristics

Tottenham Effluent Characteristics	Unit	2018 Avg	2019 Avg	2020 Avg	Current Average Conc	Current Max Conc
cBOD ₅	mg/L	2.43	2.10	2.18	2.59	3.75
TSS	mg/L	2.64	2.86	5.34	4.17	8.60
TAN (Nov 1 to Mar 31), 5 months	mg/L	2.62	0.14	0.10	2.19	7.83
TAN (Apr 1 to Apr 30), 1 month	mg/L	4.48	0.10	0.10	1.85	4.48
TAN (May 1 to Sep 30), 5 months	mg/L	0.11	0.13	0.10	0.13	0.23
TAN (Oct 1 to Oct 31), 1 month	mg/L	0.10	0.14	0.10	0.12	0.14
TP	mg/L	0.05	0.04	0.06	0.06	0.16

4.0 PERFORMANCE AND CAPACITY ASSESSMENT OF THE WWTPS

4.1 Regional WWTP

Historic data from 2018- 2020 for influent flows, effluent characteristics, and loadings of Regional WWTP were analyzed and are summarized in Table 4.1. As indicated, all effluent parameters are within the plant ECA objective concentrations and loadings. The current ADF of 4,303 m³/d is approximately 38% of its higher rated capacity of 11,400 m³/d. However, in comparison, the current effluent loadings for all parameters are lower than 38% of the corresponding loading limits, indicating availability of potential additional capacity at the WWTP.

The monthly effluent TP concentrations from 2018- 2020 have been plotted and compared with the TP limits and objectives for a rated capacity of 11,400 m³/d per the existing ECA. See Figure 4.1 for details.

Based on the historic performance at the current loadings, the plant is capable of maintaining the effluent TP concentration below 0.085 mg/L on a consistent basis. While this is possible with the current flows at 38% of the rated capacity of plant, maintaining the same effluent TP quality with higher flows and loadings in future will depend on controlling the soluble and particulate fractions of TP. While the increase in soluble P load can be controlled via a corresponding increase in chemical dosing, controlling the particulate fraction will be dependent on efficiency of the tertiary filtration which is the final physical barrier for the solids. In that regard, while the TSS load to the tertiary filter would increase at design loadings and lead to more frequent backwashing, the filtration efficiency, being primarily dictated by the pore size is expected to remain unchanged. Based on this argument, the current effluent TP standards could be maintained at the design loadings of the plant. This conclusion is also supported by several WWTPs achieving lower than 0.085 mg/L TP levels with similar tertiary treatment (tertiary clarifier followed by a sand filter) cited in a Report entitled “Advanced Treatment to Achieve Low Concentration of Phosphorus” (April 2007), by US Environmental Protection Agency (EPA).

The above observation also means that this limit can be achieved at higher than current capacity of the WWTP provided the unit processes are expanded to maintain the existing design values of the operating parameters.

Further, based on the current objective to limit ratio, the projected TP objective for this limit would be 0.06 mg/L as indicated in Figure 4.1. With 31 out of 36 monthly average values lower than this value at the current loading, this objective could potentially be achieved with the current consistency based on the rationale discussed above and performance of similar plants per the cited EPA Report.

As such, based on the premise of not exceeding the existing TP loading limit for a higher capacity, the lowest achievable TP limit of 0.85 mg/L with current plant configuration translates into a maximum plant capacity of 13,412 m³/d, which is approximately 18% increase over the existing capacity of 11,400 m³/d.

It is further noted that the best effluent TP quality reported in the EPA Report with tertiary treatment similar to the RWWTP, is 0.06 mg/L. Given that the RWWTP currently achieves average effluent TP of 0.05 mg/L, there is a potential to optimize the TP removal performance in future to lower the compliance limit to 0.06 mg/L, thereby achieving a corresponding ultimate rated capacity of 19,000 m³/d, which is 67% higher than the current capacity.

Table 4.1 – Historic Effluent Quality and Loadings at RWWTP

Parameter	Effluent Concentrations (mg/L)						Effluent loadings (kg/d)	
	2018	2019	2020	Current average	Effluent Objective	Effluent Limit	Current average	Loading Limit
cBOD ₅	2.55	2.82	2.52	2.63	10.00	15.00	11.3	76.0
TSS	3.68	4.78	3.62	4.03	10.00	15.00	17.3	76.0
TAN Winter	0.21	0.14	0.12	0.16	3.00	3.30	0.7	22.8
TAN Summer	0.17	0.21	0.12	0.16	0.35	0.50	0.7	2.7
TP	0.05	0.05	0.04	0.05	0.10	0.15	0.2	0.76

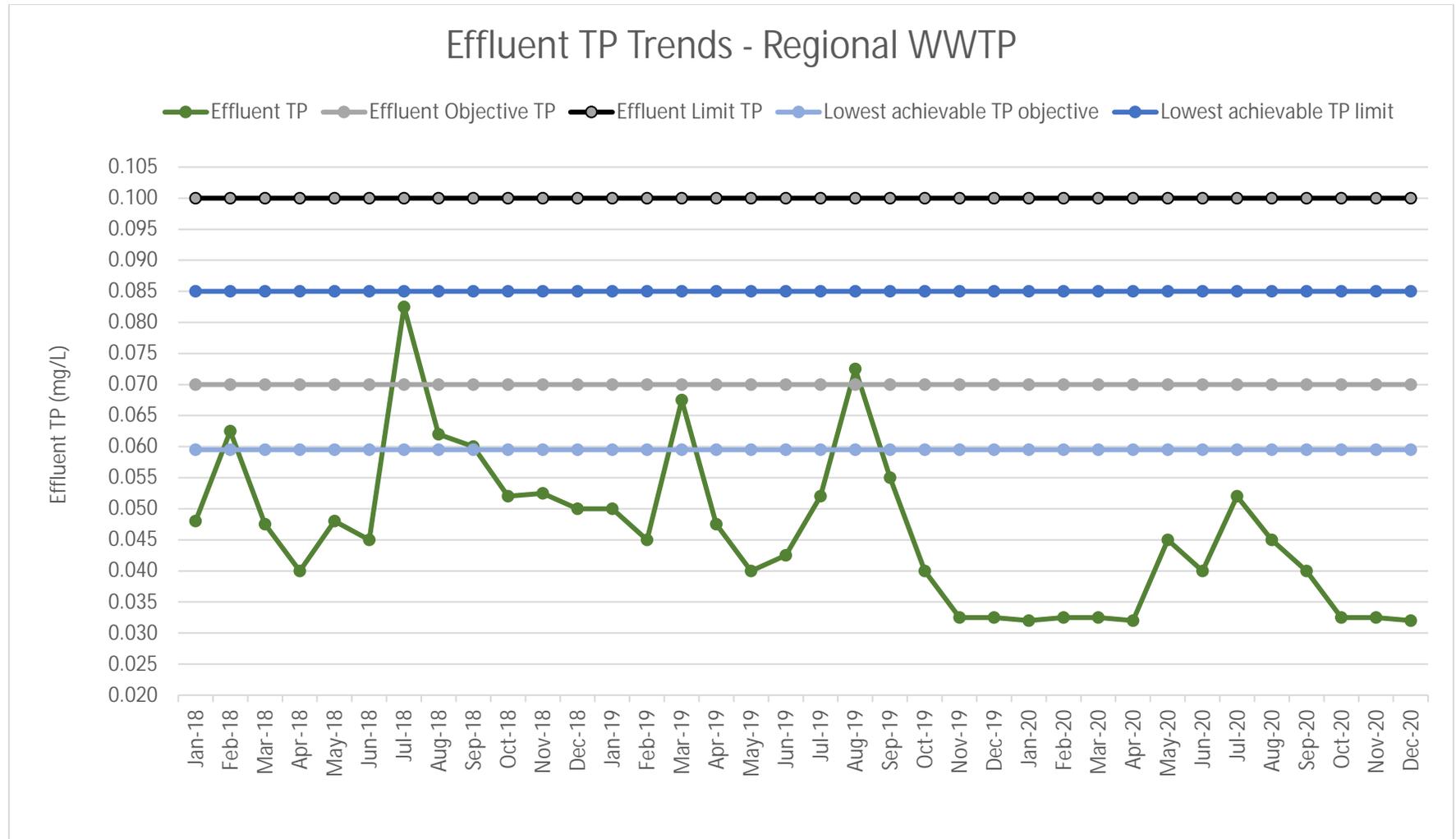


Figure 4.1 – Regional WWTP Effluent TP Trends – 2018-2020

4.2 Alliston WWTP

Historic data from 2018- 2020 for influent flows, effluent characteristics, and loadings of Alliston WWTP were analyzed and are summarized in Table 4.2. As indicated, all effluent parameters are within the plant ECA objective concentrations and loadings. The current ADF of 4,378 m³/d is 77% of its rated capacity of 5,681 m³/d. However, , in comparison, the current effluent loadings for all parameters range between 10-25% of the corresponding loading limits, indicating availability of significant additional capacity at the WWTP.

The monthly effluent TP concentrations from 2018- 2020 have been plotted and compared with the TP limits and objectives for a rated capacity of 5,681 m³/d per the existing ECA. See Figure 4.2 for details.

Based on the historic performance at the current loadings, the plant is capable of maintaining the effluent TP concentration below 0.27 mg/L on a consistent basis. With the current flows at 77% of the rated capacity of plant, the current effluent TP standards are likely to be maintained at the design loads, particularly in light of the current average effluent TP level of 0.11 mg/L. This conclusion is also supported by several WWTPs achieving lower than 0.1 mg/L TP levels with similar tertiary filtration per the EPA Report referenced in Section 4.1.

The above observation also means that this limit can be achieved at higher than current capacity of the WWTP provided the unit processes are expanded to maintain the existing design values of the operating parameters.

Further, based on the current objective to limit ratio, the projected TP objective for this limit would be 0.16 mg/L as indicated in Figure 4.2. With 28 out of 36 monthly average values lower than this value at the current loading, this objective could potentially be achieved with the current consistency based on the rationale discussed above and performance of similar plants per the cited EPA Report.

As such, based on the premise of not exceeding the existing TP loading limit for a higher capacity, the lowest achievable TP limit translates into a maximum plant capacity of 10,652 m³/d, which is approximately 88% increase over the existing capacity of 5,681 m³/d.

It is further noted that the best quality for effluent TP reported in the EPA Report with dual-media tertiary filtration is 0.06 mg/L. Given that the Alliston WWTP currently achieves average effluent TP of 0.11 mg/L, there is a potential to further optimize the TP removal performance in future to further lower the compliance limit to a minimum of 0.06 mg/L , thereby achieving a corresponding ultimate rated capacity of up to 47,342 m³/d.

Table 4.2 – Historic Effluent Quality and Loadings at Alliston WWTP

Parameter	Effluent Concentrations (mg/L)						Effluent loadings (kg/d)	
	2018	2019	2020	Current average	Effluent Objective	Effluent Limit	Current average	Loading Limit
cBOD ₅	2.10	2.33	2.23	2.22	10.00	15.00	9.7	85.2
TSS	2.10	3.23	3.14	2.82	10.00	15.00	12.3	85.2
TAN Winter	0.11	0.41	2.17	0.90	2.00	3.00	3.9	17.0
TAN Summer	0.10	0.17	0.38	0.22	0.80	1.00	0.9	5.7
TP	0.10	0.13	0.09	0.11	0.30	0.50	0.47	2.84

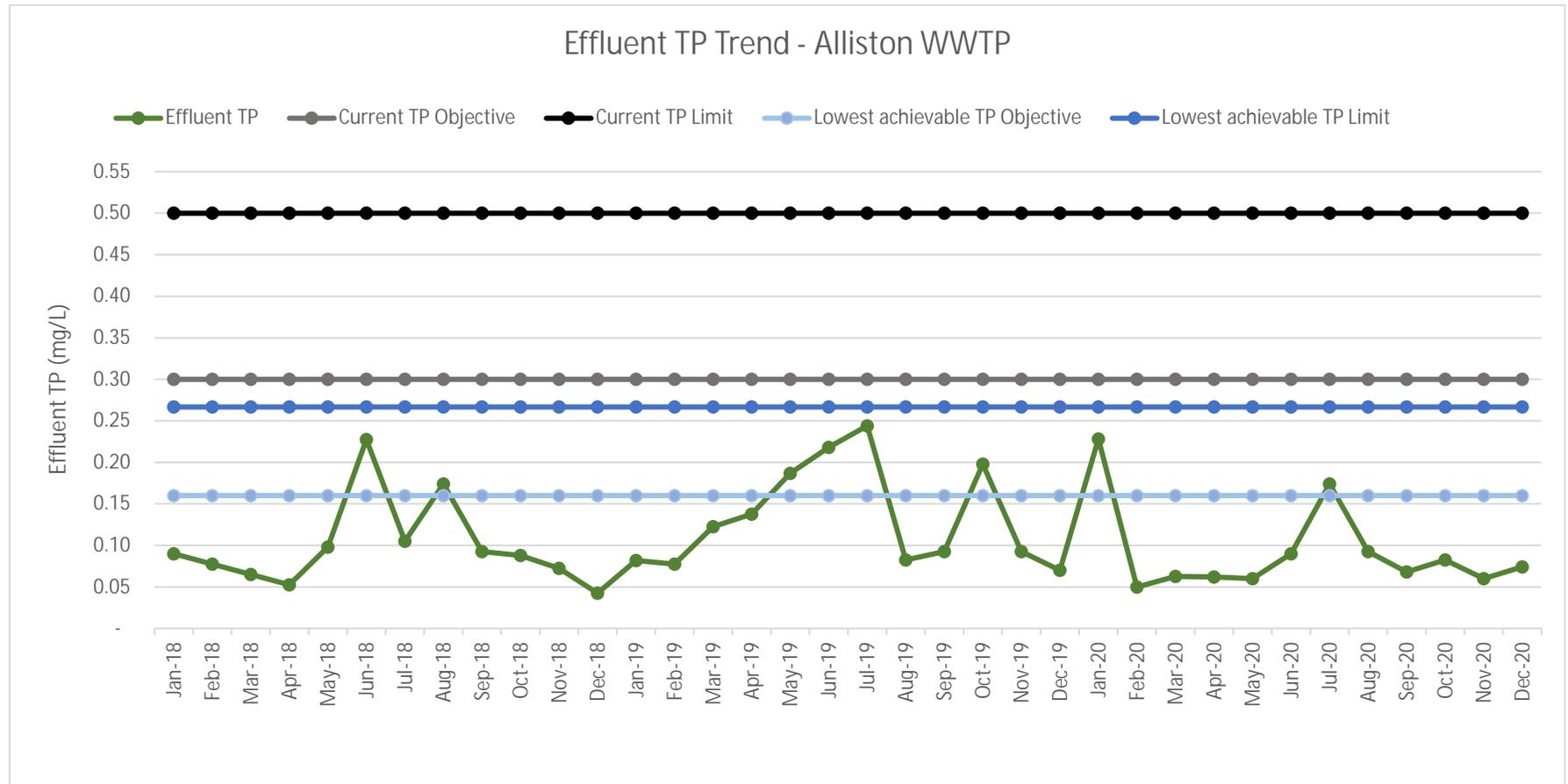


Figure 4.2 – Alliston WWTP Effluent TP Trends – 2018-2020

4.3 Tottenham WWTP

Historic data from 2018- 2020 for influent flows, effluent characteristics, and loadings of Alliston WWTP were analyzed and are summarized in Table 4.3. As indicated, all effluent parameters are within the plant ECA objective concentrations and loadings. The current ADF of 2,515 m³/d is 62% of its rated capacity of 4,082 m³/d. However, in comparison, the current effluent loadings for all parameters range between 5-35% of the corresponding loading limits, indicating availability of additional capacity at the WWTP.

The monthly effluent TP concentrations from 2018- 2020 have been plotted and compared with the TP limits and objectives for a rated capacity of 4,082 m³/d per the existing ECA. See Figure 4.3 for details.

Based on the historic performance at the current loadings, the plant is capable of maintaining the effluent TP concentration below 0.086 mg/L on a consistent basis. While this is possible with the current flows at 65% of the rated capacity of plant, maintaining the same effluent TP quality with higher flows and loadings in future will depend on controlling the soluble and particulate fractions of TP. Using the rationale discussed in Section 4.1 for the RWWTP, the current effluent TP standards at the Tottenham WWTP could be maintained at the design loadings of the plant. This conclusion is also supported by several WWTPs achieving lower than 0.086 mg/L TP levels with sand-media tertiary filtration, per the EPA Report referenced in Section 4.1.

The above observation also means that this limit can be achieved at higher than current capacity of the WWTP provided the unit processes are expanded to maintain the existing design values of the operating parameters.

Further, based on the current objective to limit ratio, the projected TP objective for this limit would be 0.06 mg/L as indicated in Figure 4.3. With 28 out of 36 monthly average values lower than this value at the current loading, this objective could potentially be achieved with the current consistency based on the rationale discussed above and performance of similar plants per the cited EPA Report.

As such, based on the premise of not exceeding the existing TP loading limit for a higher capacity, the lowest achievable TP limit translates into a maximum plant capacity of 4,747 m³/d, which is approximately 16% increase over the exiting capacity of 4,082 m³/d.

It is further noted that the best quality for effluent TP reported in the EPA Report with tertiary treatment similar to the Tottenham WWTP is 0.06 mg/L. Based on that, and given that the Tottenham WWTP currently achieves compliance with TP limit of 0.10 mg/L, there is a potential to further optimize the TP removal performance in future to further lower the compliance limit to a minimum of 0.06 mg/L , thereby achieving a corresponding ultimate rated capacity of up to 6,803 m³/d.

Table 4.3 – Historic Effluent Quality and Loadings at Tottenham WWTP

Parameter	Effluent Concentrations (mg/L)						Effluent loadings (kg/d)	
	2018	2019	2020	Current average	Effluent Objective	Effluent Limit	Current average	Loading Limit
cBOD ₅	2.43	2.10	2.18	2.23	5.00	6.00	5.5	24.5
TSS	2.64	2.86	5.34	3.61	10.00	15.00	13.4	61.2
TAN Winter	2.62	0.14	0.10	0.95	3.00	3.30	0.3	13.5
TAN Summer	4.48	0.10	0.10	1.56	1.00	1.20	0.3	4.9
TP ¹	0.11	0.13	0.10	0.11	0.07	0.10	0.3	2.0

1. TP objectives and limits are variable, and the indicated values represent the minimum requirements during the year

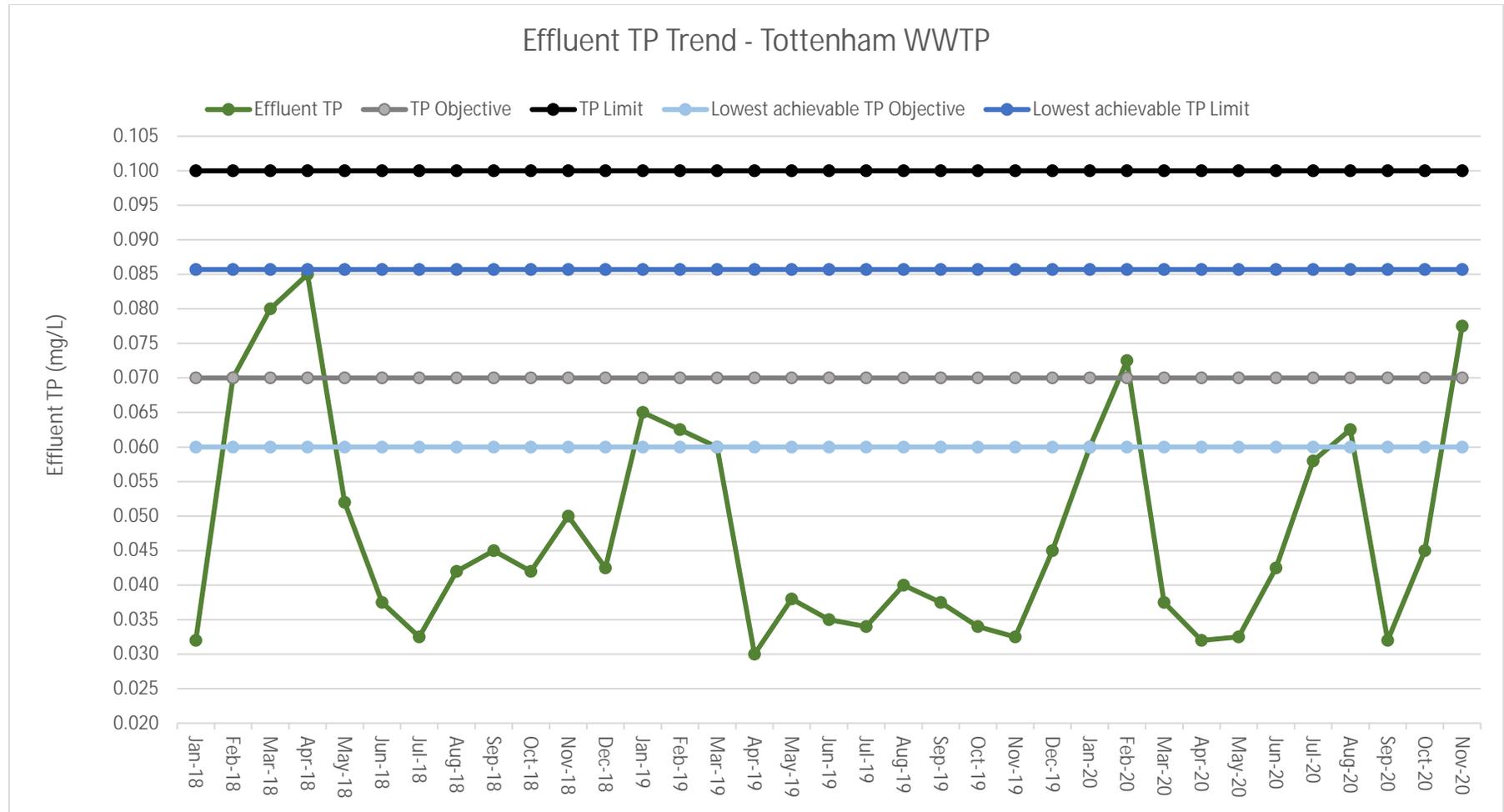


Figure 4.3 – Tottenham WWTP Effluent TP trend vs Objective and Limit TP

5.0 CONCLUSIONS AND SUMMARY

5.1 Performance of WWTPs

- The current average effluent TP concentrations at each WWTP are lower than their respective ECA objectives, despite the existing stringent criteria for TP.
- The existing TAN limits are also quite stringent even by current regulatory standards. The effluent ammonia concentrations in the effluent from all three plants have been consistently low (0.1-0.3 mg/L) throughout the year regardless of temperature with a few exceptions at Tottenham and Alliston WWTPs. These plants have exceeded their limits on occasion, but those instances were attributed to operational issues related to blowers and were assumed to be abnormalities not attributable to performance shortcomings. As such, operating normally, all three plants have demonstrated an ability to maintain exceptionally low TAN numbers on a consistent basis at current flows and influent loadings and therefore carry significant buffer for lower ammonia objectives that could be used if the future higher capacities of the WWTPs require this.
- The cBOD₅ and TSS limits are higher than typically expected of tertiary plants. However, with the WWTPs capable of meeting significantly lower numbers than the current cBOD₅/TSS criteria (based on historic data), future lowering of these is not expected to be a concern. Future lowering of limits for these pollutants will be mitigated by the fact that the plants will have to undergo some expansion to handle increasing capacities.

5.2 Maximum Capacities with Existing Technology and Performance

The maximum capacities in this section represent the values that can be received at the plants by maintaining the existing TP loading limits. The underlying assumption in achieving these capacities is that the plants will have to be expanded to maintain the operating parameters within the MECP and/or equipment suppliers' guidelines to maintain the current performance in respect to effluent TP. Table 5.1 summarizes the current and maximum achievable capacities at the individual WWTPs in New Tecumseth, as well as the total additional treatment capacity made available in the municipality with this approach.

Further, the additional capacities gained are divided into ICI and residential portions based on the historic ICI and residential flow distribution, provided by the town for each community.

Finally, the additional capacity gained for residential growth has been converted to additional population values based on the historic per capita wastewater flows determined in Section 2.4.

Table 5.1 – WWTPs Capacities Summary – Existing Technology and Performance

WWTP	Capacity (m ³ /d)				Additional capacity – Residential portion ²	Additional population ³
	Current rated capacity	Maximum achievable capacity	Additional capacity gained	Additional capacity - ICI portion ¹		
Regional	11,400	13,412	2,012	885	1,127	3,012
Alliston	5,681	10,652	4,971	2,187	2,784	7,443
Tottenham	4,082	4,762	680	156	524	1,658
Total	21,163	28,826	7,663	3,229	4,434	12,112

1. Based on 2020 flow allocation of 44% to ICI in Alliston and Beeton, and 23% in Tottenham
2. Based on 2020 flow allocation of 56% to residential in Alliston and Beeton, and 77% in Tottenham
3. Based on per capita wastewater flows of 374 L/d for Regional and Alliston WWTPs and 316 L/d for Tottenham

5.3 Maximum Capacities with Performance Optimization and Technology Upgrades

The maximum capacities in this section represent the values that can be achieved via the applying best available technology performance in terms of effluent TP. This would improve on the performance achieved currently. The underlying assumption in achieving these capacities is that the plants will have to be expanded/upgraded to maintain the operating parameters within the MECP and/or equipment supplier guidelines and the operation will be optimized to achieve the best TP standards.

RWWTP and Tottenham WWTPs have two stage tertiary treatment comprising ballasted clarification followed by sand filtration, while the Alliston plant has dual media filtration. As indicated in Sections 4.1 to 4.4, both configurations have been shown to meet a TP compliance limit/objective of up to 0.06/0.04 mg/L at several WWTPs in USA according to a Report by Environmental Protection Agency (EPA) on P control at WWTPs. Typically, TP limits/objectives below 0.1 mg/L are well within the reach of membrane filtration (using ultrafiltration) which is perceived as the best available technology to meet stringent effluent limits.

As such a TP limit/objective of 0.06/0.04 mg/L represents the lowest achievable criterion with either the existing filtration technologies or the currently perceived best available technology of membrane filtration for achieving such low TP objectives. Based on that the projected capacities with this TP limit/objective of 0.06/0.04 mg/L represent the ultimate values achievable at the WWTPs based on the current TP loading limits. Table 5.2 summarizes the current and maximum achievable capacities at the individual WWTPs in New Tecumseth, as well as the total additional treatment capacity made available in the municipality with this approach.

The additional capacities gained for ICI and residential growth and the additional residential population potential achieved is calculated similar to section 5.2, with this approach.

Table 5.2 – WWTPs Capacities Summary – Performance Optimization and Technology Upgrades

WWTP	Capacity (m ³ /d)					Additional population
	Current rated capacity	Maximum achievable capacity	Additional capacity gained	Additional capacity - ICI portion	Additional capacity – Residential portion	
Regional	11,400	19,000	7,600	3,344	4,256	11,379
Alliston	5,681	47,342	41,661	18,331	23,330	62,374
Tottenham	4,082	6,803	2,721	626	2,095	6,633
Total	21,163	73,145	51,982	22,301	29,681	80,385

1. Based on 2020 flow allocation of 44% to ICI in Alliston and Beeton, and 23% in Tottenham
2. Based on 2020 flow allocation of 56% to residential in Alliston and Beeton, and 77% in Tottenham
3. Based on per capita wastewater flows of 374 L/d for Regional and Alliston WWTPs and 316 L/d for Tottenham

Any further improvement in effluent quality beyond TP limit/objective of 0.06/0.04 mg/L would approach the capabilities of reverse osmosis (RO) technology which is typically used at water reclamation facilities where the treated effluent needs to meet the standards of drinking water due to scarcity of drinking water resources. The technology is prohibitively expensive and is not thought to be financially sustainable for the Town, and therefore not considered as an option for higher capacity. On the other hand, the Town could consider implementing pilot-scale test(s) of other advanced filtration technologies to see if a lower P discharge could be achieved.

Based on the existing P loading limit and the lowest achievable TP discharge concentration with the existing technology at the RWWTP, the maximum capacity achievable capacity is 19,000 m³/d (based on a TP limit of 0.06 mg/L and objective 0.04 mg/L), which is lower than the projected ultimate expansion to 23,000 m³/d per the 2010 Class EA amendment. The Class EA projected the ultimate capacity value 23,000 m³/d based on limiting growth in the communities served by the other two plants. This would mean that the Regional plant could grow to the 23,000 m³/d with the overall TP loading in the receiving watershed remaining unchanged. This approach is dependent on the Town being willing to restrict growth at the other plants, and having growth restricted to the areas serviced by the RWWTP. In addition, the ultimate capacity could also be possible if:

- Future more effective technology are developed that can achieve a lower TP limit compared to the current best achievable limits.
- The assimilative capacity for the watershed is re-assessed and it identifies future more relaxed P loadings.

6.0 NEXT STEPS

6.1 Approach

As indicated in the capacity assessment summary in Section 5.0, the Alliston WWTP presents the highest capacity potential followed by RWWTP and Tottenham WWTP. It must be remembered that consideration of wastewater conveyance has not been considered. We are suggesting a three-staged approach to maximize the potential for growth in the Town while providing an achievable cash flow projection. The first stage is maintaining the current effluent TP standards, allowing a total additional treatment capacity of 4,434 m³/d for residential growth in the Town, with Regional, Alliston and Tottenham WWTPs contributing 25%, 63% and 12% respectively.

Once flows are at 70% of capacity an interim or second stage would be to conduct a stress test at the plant to make sure that the maximum possible flow capacity is achieved. This will need to be a complete stress test of secondary and tertiary treatment.

The third stage, is based on achieving the best effluent TP standards by updating the technology applying another technology, allows additional treatment capacity of 29,681 m³/d for residential growth in the Town, with Regional, Alliston and Tottenham WWTPs contributing 14%, 79% and 7% respectively.

Since both Alliston and Regional WWTPs serve the community of Alliston, the additional capacity potential at the Alliston WWTP can be shifted to Regional plant which has a better potential for expansion. While this will increase the individual TP loading from the RWWTP, the overall TP loading in the receiving watershed will be kept the same.

Going forward, the Town's Wastewater Master Plan would identify the additional capacity for the growth planning horizon. The additional treatment capacity projected by the Master plan and the assimilative capacity of the receiver will govern the effluent TP levels required at the WWTPs. The existing assimilative capacity is more than ten years old and the MECP would likely require either an update (at a minimum) with more recent stream pollution data, or a new study altogether if higher TP loading limits are sought. While the MECP has traditionally not sought fresh assimilative capacity assessment where no increased loading is necessary, there is no guarantee of this.

Further, given that the effluent TP limits/objective in both approaches are theoretical (although supported to some level with the historic performance), the ability of the WWTPs to achieve these effluent values at higher capacities will have to be demonstrated to the Ministry particularly in the case of retaining the existing tertiary treatment systems. This requirement however may be exempted in the case of an upgrade to a new and/or established technology like MBR which is known to meet such effluent standards and may be procured with a performance guarantee.

6.2 Planning and Engineering Steps

The following are the engineering and planning studies that could be implemented to strategically advance the plan for growth above the design capacities of the plants:

1. Assessment of potential ICI growth in the Town to review potential types, sizes, locations to arrive at a tentative growth plan to incorporate into future thinking.
2. Consultation with MECP to develop an understanding of their thinking and confirm that they are willing to support growth with the maintenance of the

- current TP loadings and determine if they have any plans to adopt other nutrient control initiatives.
3. Conveyance considerations for diverting new wastewater flows in Alliston to the Regional Plant including life cycle cost considerations for pumping versus expanding Alliston plant with no pumping.
 4. Capital needs assessment and planning, including footprint and layout considerations, for all three plants.
 5. After plants are at design capacity, carry out stress testing to confirm potential for additional capacity.
 6. Begin pilot testing of tertiary treatment technologies to meet more stringent effluent limits.
 7. Expand and upgrade plants based on treatment technology evaluation to meet the ultimate projected flow.