Ministry of Natural Resources and Forestry

Ministère des Richesses naturelles et des Forêts

Guelph District
1 Stone Road West
Guelph, Ontario
N1G 4Y2

Telephone: (519) 826-4955
Facsimile: (519) 826-4929

Ontario

June 12, 2018

Preya Balgobin, P. Eng.
Senior Project Manager
Ainley Group

Re: Town of Erin Urban Centre Wastewater Servicing Class Environmental Assessment – Environmental Study Report – Town of Erin, County of Wellington – MNRF Comments

Dear Ms. Balgobin,

The Ministry of Natural Resources and Forestry (MNRF) Guelph District Office can confirm receipt of the documents provided in support of Town of Erin Urban Centre Wastewater Servicing Class Environmental Assessment (Class EA) Notice of Study Completion. It is understood that this Class EA has been undertaken for a municipal wastewater treatment plant (WWTP) and collection system for Hillsburgh and the Village of Erin. MNRF staff previously reviewed the Natural Environment Report (NER), in addition to the Wastewater Treatment Plant Site Selection Technical Memorandum, Effluent Outfall Site Selection Technical Memorandum, and Pumping Stations and Forcemains Technical Memorandum to better understand the potential impacts and footprints of the proposed project.

MNRF previously provided comments on March 16, 2018. Since then, we have received a response to our comments, along with the Assimilative Capacity Study, from Ainley Group on April 10, 2018, and met with the project team on May 3, 3018. MNRF staff has since received and reviewed the Environmental Study Report (ESR) and Notice of Study Completion. MNRF staff can offer the following comments, including comments from MNRF Aurora District staff and MNRF Southern Region staff.

In general, MNRF staff continues to express concerns with the proposed outfall locations and proposed facility location in proximity to a high quality brook trout fishery in the West Credit River. It is understood the location for the WWTP (Winston Churchill Blvd.) was chosen through the previous Servicing and Settlement Master Plan (SSMP) process.

Based on the information in the ESR and previous documentation provided, MNRF staff is of the opinion that uncertainty remains in terms of the baseline water quality collection, subsequent modelling and assessment (detailed comments below) and fish habitat impact assessment. In addition, the technical memorandum for overflow risk management (April 2018) does not appear to fully describe the types of infrastructure failure risks and recommends that a risk assessment be undertaken in the future. MNRF staff also notes that the risk of exceeding key water quality parameters, such as chloride, ammonia and nitrate does not appear to have been assessed in the context of proposed urban growth.

MNRF Comments

Location of WWTP Alternatives

- The treatment plant alternatives are limited to three sites located at the same intersection – 10th Line and Regional Road 52. MNRF maintains the recommendation that alternatives at different intersections across the subwatershed, with different aquatic sensitivities, be explored within the Town of Erin.

Aggregate Resources

- As discussed at the meeting, MNRF notes that two of the proposed WWTP locations (2A and 2B, both south of Wellington Road 52) appear to be within a proposed *Aggregate Resources Act* (ARA) licence area. In addition, the proponent for the ARA licence has already registered their proposed activities related to Barn Swallow, Bobolink and Eastern Meadowlark under the *Endangered Species Act* (ESA). It is unclear to MNRF staff how these two locations proposed for the WWTP are compatible with the proposed ARA licence, and how the commitments made under the ESA registrations for Barn Swallow, Bobolink and Eastern Meadowlark would be impacted.

Species at Risk

- It is MNRF's understanding that little or no tree removal will occur for this project. If significant tree removal is required for this project, MNRF recommends conducting acoustic surveys to determine SAR Bat Habitat Suitability. For additional SAR survey information, please contact ESAGUELPH@ontario.ca for more information. Please note: the timing window for no tree removal is from April 1st to September 30th.

Licence to Collect Fish

- This project may require a licence to collect fish if any work conducted will require dewatering of the watercourse and fish removal. Please contact MNRF for details.

Crown Land Easement

- MNRF staff note that this project may require a crown land easement for the effluent outfall. Please contact Jennifer Harvard, Lands and Waters Technical Specialist at 519-826-4933 for more information.

Assimilative Capacity Study

As part of this review process, MNRF District staff requested the support of MNRF Southern Region expertise for the purposes of reviewing the Assimilative Capacity Study, and related reports. Previously, MNRF recommended that *"alternatives at different intersections across the subwatershed, with different aquatic sensitivities, be explored."* Although MNRF staff has received additional rationale for the preferred final effluent discharge point (Winston Churchill Blvd.), MNRF staff continue to note potential fish impact/habitat concerns. In light of this review, MNRF staff can offer the following technical comments on the Assimilative Capacity Study.

- The 7Q20 low flow statistic has been applied; it is understood that this is a standard (conservative) approach for receiving water assessments. In this circumstance, data for 10th Line has been used

(data from July 2013 to December 2015). It is noted by the consultant that 10 years of flow management data is ideal. It may be appropriate for the proponent to compare local weather data during the time period when flow data was obtained (for the purpose of determining if any anomalies are present in the data).

- Primary concern with the QUAL2K and CORMIX modelling is that uncertainty in estimated outputs is not made explicit. Variability in receiving water and effluent water quality parameters does not appear to have been accounted for. Models should be run for the full range of expected variability (i.e., diurnal and seasonal) in these estimates (in particular those that influence ammonia speciation—e.g., pH and temperature), in order to provide an indication of the range/uncertainty in outputs. At present, model outcomes are presented as deterministic rather than probabilistic, which is problematic given the inherent uncertainty associated with these types of models, and the numerous assumptions that were made within the models themselves. It is recommended that the project team simulate responses for a range of input variables (i.e., not just 75th percentile value) and showing variability in water quality response parameters under different scenarios.

- Modelling input value for stream pH was 8.21 which was noted as being the "75th percentile of CVC hydrolab data (June and Aug 2008)". From the Appendices presented in the Erin Servicing and Settlement Master Plan, 2011, it is understood that this data was collected during two sets of diurnal monitoring at a site within the West Credit d/s of 10th Line, wherein pH was recorded every 30 minutes for a period of 5 days in June 2008, and a period of 4 days in late August 2008.

  From the raw data, it is clear that there was significant diurnal variation in stream pH during both sampling periods—which is to be expected for this particular parameter (e.g., ranged from 8.02 to 8.36 in the June 2008 sampling, and from 7.93 to 8.32 in Aug 2008). Given this variation, it would be preferable to have a longer continuous sampling period (i.e., more than just 5 days within a month) and more recent diurnal pH data monitoring results to ensure that model inputs are indeed representative of current stream water chemistry.

  Furthermore, for mass balance, assimilation, and mixing zone modelling, it would be more appropriate to model un-ionized ammonia concentrations under the full range of stream pH values, in particular the higher values that are reached for several hours in the mid-late afternoon periods (i.e., not just the 75th percentile value), as derived from longer, more continuous, and more recent stream water quality monitoring at the sites of interest within the West Credit River. In particular, diurnal monitoring of pH and temperature should be conducted in July—and these higher values be included as model input parameters--as per the recommendation by B.M. Ross (2014):

  > *"Note: It is recognized that lower 7Q20 flow amounts have been calculated for the months of August and September, however the river temperature and pH values during those months result in an un-ionized fraction of the total ammonia that is much less than what would occur during the month of July.* ***For this reason and based on modelling results, July has been assumed to be the worst case scenario for reviewing the end of pipe mixing zone and un-ionized ammonia impacts in the river****."*

Given the above, MNRF would appreciate clarification on why the worst-case was modelled for August (i.e., using August 2016 HESL temp logger data for temperature, and June and August pH values). MNRF staff would also recommend mixing zone modelling for chloride.

- CORMIX2 modelling for multi-port discharges simulated a "5m long multi-port diffuser running parallel to the south bank of the West Credit River…" This is not the typical diffuser port design orientation which is generally located perpendicular to the net current to maximize dilution. It is stated that this configuration "was set based on model runs to minimize the size of the mixing zone, while allowing for fish passage along the bank opposite to the diffuser". These model output results are not presented, so this is difficult to validate.

  Has this diffuser orientation been used elsewhere? MNRF would appreciate clarification on whether there is precedent for using this particular design orientation, and if there is evidence to demonstrate that it is preferable for fish passage. Would fish otherwise avoid the area of mixing and therefore not be able to move/migrate upstream of the diffuser? Is there evidence that fish will selectively use the proposed "passage" area outside of the mixing zone? Please clarify and provide rationale.

  MNRF notes the concern that siting the effluent discharge location at the Winston Churchill site may create a barrier to further upstream movement of fish and impact access to spawning sites upstream. The assimilative capacity study indicates that for 10th Line discharge site, 40% of the width of the river will be available for fish passage with the inclusion of the modelled diffuser design.

- Most of the impacted area or "mixing zone" identified through modelling is predicted to occur along the south shore (likely reflecting simulated discharge from a diffuser running parallel to the south bank of the W.C. River). Have field observations confirmed whether sensitive species use habitat along the south shore in the projected mixing zone either for spawning, upstream migration, or for other life processes? Was the choice of a south shore discharge based on field reconnaissance which measured the relative amount and quality of habitat available on the south vs. north banks of the river? Would this be expected to be the same if the discharge site was located at Winston Churchill Blvd? MNRF would appreciate the opportunity to review the results of mixing zone modelling described within the context of actual in-stream habitat characteristic of impacted reaches.

- All modelling was conducted for 10th line potential outfall location, which is not the "preferred" alternative (i.e., indicated that Winston Churchill site is preferred). Will the mixing zone extent still be 153m downstream of that site? Will the southern shore still be the most impacted area downstream? What about differences in fluvial geomorphology between the reaches downstream of 10th line vs. downstream of W.C. Blvd? Will these not influence flow dynamics and therefore mixing zone extent for different water quality parameters of environmental significance (i.e., ammonia, chloride)? If the effluent diffuser is located at Winston Churchill Blvd. will there still be 40% of the river width available for fish passage at Full Build Out? This would seem highly

dependent on site-specific stream morphology. Need to conduct dye tracer study at the Winston Churchill station to validate modelling for this site.

- MNRF staff would appreciate clarification on how, for both the Phase 1 diffuser scenario and the Full Build Out diffuser scenario at 72m downstream, the PWQO was met at exactly the same distance (6.5 m) from the closest bank—leaving 40% of the width of the river for safe fish passage in both cases.

- How will beaver-dams impact mixing zone extent? Given that this was shown to influence flow measurements within the proposed discharge study area, are there plans to mitigate such impacts?

- Chloride assessment (Page 56)

  "*The predicted downstream fully mixed chloride concentrations in the West Credit River are 121 mg/L and 180 mg/L for Phase 1 and Full Build Out respectively using the maximum effluent chloride concentration of 534 mg/L and 7Q20 conditions. The Phase 1 concentration is just above the chronic (long-term) CWQG of 120 mg/L, and the Full Build Out concentration of 180 mg/L is 60 mg/L above the chronic CWQG. Using average effluent chloride concentrations, the predicted chloride concentrations in the West Credit River are below the CWQG of 120 mg/L for Phase 1 (100 mg/L, Table 20), and 22 mg/L above the CWQG for Full Build Out (142 mg/L, Table 20). Under both conditions, the predicted receiver concentrations are well* ***below*** *the acute toxicity threshold of 640 mg/L*."

  Chloride assessment (Page 71)

  "*From the mass balance modelling, the resulting downstream fully mixed chloride concentrations in the West Credit River were 121 mg/L and 180 mg/L at Phase 1 and Full Build Out Effluent 7Q20 flows, respectively. Both fully mixed concentrations were* ***above*** *the chronic CWQG of 120 mg/L, but below the acute CWQG of 640 mg/L and not likely to impair aquatic life*."

  Note: MNRF staff did not see hardness included in the suite of parameters used for samples collected from the WCR. Literature (article attached in email) indicates that in areas where water hardness is higher, the toxicity of chloride may be reduced. EA documents indicate that the Municipal communal water supply (groundwater) has elevated hardness. It is understood a groundwater source influences temperature in the WCR in between 10th line and WC Boulevard. Since there is no indication of a hydraulic connection between that Municipal groundwater supply and the WCR, MNRF staff cannot assume water in the WCR has elevated hardness. The proponent may wish to examine this further.

- Per comments from MOECC (March 2018), a recommendation has been made to include a condition for the monitoring for Chloride in the WWTP influent, effluent and receiving waters. MNRF supports this condition.

- Total Ammonia Nitrogen (TAN) assessment (Page 71)

  "Mass balance modelling of total ammonia nitrogen (TAN) and nitrate were also completed as a "starting point" in determining effluent limits for these parameters using the Phase 1 and Full Build Out effluent flows which were derived from the TP mass balance modelling. The mass balance modelling found that at summer temperatures, a TAN concentration of 1.2 mg/L (Phase 1) and 0.6 mg/L (Full Build Out) resulted in fully mixed downstream TAN concentrations that equated to un-ionized ammonia concentrations that were below the PWQO for un-ionized ammonia."

  "Winter effluent TAN concentrations (of 2 mg/L at both Phase 1 and Full Build Out flows) were also checked to determine the corresponding concentration of un-ionized ammonia. Since speciation of ammonia to its un-ionized state is driven by increasing temperature and pH, un-ionized ammonia at winter temperatures is rarely of concern. In this case, the Phase 1 and Full Build Out flows corresponded with winter un-ionized ammonia concentrations of 0.003 mg/L and 0.006 mg/L, respectively, assuming a water temperature of 4°C. Therefore, the winter effluent TAN concentrations are acceptable."

  MNRF recommends that final effluent and the receiving waters be sampled and tested for un-ionized ammonia concentrations as a condition of the ECA. Similar to the following condition:

  The temperature and pH of the effluent from the Works as well as samples collected from the receiving waters shall be determined in the field at the time of sampling for Total Ammonia Nitrogen. The concentration of un ionized ammonia shall be calculated using the total ammonia concentration, pH and temperature using the methodology stipulated in "Ontario's Provincial Water Quality Objectives" dated July 1994, as amended, for ammonia (unionized).

- MNRF staff recommends that final effluent be sampled and tested for Acute Lethality (Rainbow Trout and Daphnia Magna) on a **minimum** quarterly basis. Testing should be in accordance with (example condition):

  the Environment Canada publications "Biological Test Method: Reference Method for Determining Acute Lethality of Effluents to Rainbow Trout", July 1990 and "Biological Test Method: Reference Method for Determining Acute Lethality of Effluents to Daphnia magna ", July 1990.

  To confirm that the final effluent is non-acutely lethal, toxicity testing should be undertaken on a quarterly basis, as indicated in Table _ in accordance with the most current procedures published by Environment Canada. The Water Supervisor may reduce the testing frequency to annual following twenty four (24) months of consistent passes.

- MNRF staff recommends that final effluent be sampled and tested for Chronic toxicity in light of concerns related to chloride discharges (modelling predicts exceedance of chronic toxicity criteria for chloride).

- It is not clear how the effluent targets for water quality parameters will be achieved and ensured. No models have been presented for the proposed treatment alternatives to indicate: the estimated diurnal/monthly/seasonal raw wastewater concentrations of water quality parameters of interest; treatment effectiveness/efficiencies of proposed alternatives for these parameters; calculated post-treatment concentrations/measures given the former.

  What is the proposed response to exceedences in effluent parameters? Will these critical water quality parameters be monitored and quantified in the effluent continuously? If not, how frequently? Will exceedence result in re-routing of effluent for further treatment? What measures will be taken to ensure compliance with proposed effluent limits?

<u>Temperature Assessment</u>:

- Climate change: It is noted that a "correction" was applied to 7Q20 to account for climate change, but what about for stream temperatures? Given the importance of temperature to Brook Trout life history, as well as the influence of temperature on ammonia speciation, MNRF recommends that this should also be considered and simulated.

- Assumptions about effluent temperature: based on Elora WWTP—does this facility service the same number of residents? Employ the same treatment technology as what is being proposed for Erin WWTP?

- MNRF staff recommend modelling for full range of effluent temperature scenarios—include diurnal/seasonal variation in effluent temperature—not just 75th percentile.

- No mitigation for potential thermal impacts appears to have been identified. Is there an option to cool the effluent before discharging into the river?

- Predicted distance to upper threshold temperatures during Full Build Out are 715m in October—this would be during Brook Trout spawning season, and raises concerns.

<u>Natural Environment Report</u>

- The effluent outfall assessment appears to be limited to downstream of Erin Village. The consultant (Ainley, April 2018) reports the following:

  > "*A proposed outfall at Winston Churchill Blvd is preferred over the 10th Line for a number of sound environmental reasons as discussed in the Natural Environment Report and ACS, including:*
  >
  > 1. *It provides greater dilution (9-32% higher flows) than 10th Line;*

2. *Has greater ability to assimilate treated effluent and avoid thermal impacts to aquatic biota due to lower nutrient concentrations and cooler water temperatures;*
3. *Supports less Brook Trout spawning habitat and a lower quality benthic assemblage; and*
4. *The 45m long culvert directly downstream of the proposed outfall at Winston Churchill Blvd. represents degraded habitat compared to a location at the 10th Line. The culvert is permanently shaded and limits the form of the stream bed and width of the channel, and 30% of the near-field mixing zone will be contained within culvert.*

We completed a thorough assessment of thermal impacts and have reviewed comments from MOECC, CVC, MNRF and the County of Wellington on the Natural Environment Report, and continue to recommend that Winston Churchill Blvd is the more appropriate effluent outfall location."

Rationale for "preferred" outfall location at Winston Churchill Boulevard it "*Supports less Brook Trout spawning habitat and a lower quality benthic assemblage*" seems to be unsupported.

Differences in mean %EPT and Diversity between the 2 potential outfall sites, as presented in Table 5 of the Natural Environment Report, were not statistically significant (student's t-test p-values were 0.187 and 0.280, respectively). Therefore, it is MNRF's opinion that statements cannot be made about differences in sensitive biota between the two sites. OBB data appears to have been collected during a single monitoring event and therefore may not be representative of natural variability in community structure — either seasonally, or annually.

- It is also MNRF's opinion that assumptions about differences in Brook Trout spawning habitat between the two sites also cannot be validated based on a single sampling event. Brook Trout spawning may last several weeks, and surveys should be conducted repeatedly prior to spawning and at regular intervals throughout the spawning period until no new redds are observed. Baseline quantification of spawning habitat should be acquired over multiple years to account for inter-annual variation.

- Do not recommend placing effluent outfall site at an area of known upwelling—areas of upwelling are preferred Brook Trout spawning sites. Concern that 5 m long diffuser that is to be placed on the river bed could in fact destroy sensitive Brook Trout spawning sites.

- See comment above—placing the outfall site at Winston Churchill Blvd. could prevent safe fish passage to known spawning sites immediately upstream.

<u>Overflow Risk Management</u>

- The memorandum (titled "Urban Centre Wastewater Servicing Class Environmental Assessment Technical Memorandum Overflow Risk Management", produced by Ainley, dated April 2018) fails to include consideration for the probability of increased frequency and intensity of storm events as a

result of climate change, which would increase the risk of spills or overflow events. How will this be accounted for in estimating the facility storage capacity necessary to accommodate these events?

- While the capacity during Phase 1 may not be an issue, there is likely a much greater risk of overflows or spills at Full Build Out. Also, the infrastructure at this phase will be older (possibly more susceptible to leaks/breaks, etc.).

- Many recommendations are presented, e.g.:
    - Overflow pipes/chambers not recommended in collection system; MNRF supports provided that sufficient capacity is provided within collection system (e.g. wet wells) and/or treatment system to address high flow periods even at full build-out.
    - It is recommended that the proponent consider the feasibility of establishing infrastructure at the WWTP (e.g. inflow & infiltration tanks) to accommodate peak flows and therefore prevent bypasses.
    - A commitment to redundancies for a power supply and pumping equipment identified in the Ainley report (often standard in wastewater collection systems) should be included as part of the wastewater collection system design to prevent spills
    - "Other inflow and infiltration minimizing measures, such as leak-free manhole lids in low-lying areas, *should also be adopted*" …
    - "As the system ages, the potential or risk of high flows exceeding the peak capacity of the wastewater treatment plant or pumping stations will increase. This *can be managed by increasing storage throughout the system either by constructing addition wet wells at pumping station sites or storage tanks at critical locations* such as the last pumping station before the wastewater treatment plant."

  However, MNRF staff note that it is not explicit if or how the stated recommendations for the wastewater collection system will be implemented. In order to prevent spills which would likely impact sensitive brook trout habitat and downstream SAR habitat, MNRF staff requests that strong consideration be given to the above recommendations in the form of action items and next steps.

<u>Additional concerns about WWTP effluent outfall in habitat with sensitive fisheries</u>

- There is a growing body of scientific evidence indicating that there is an association between municipal wastewater treatment plant outfalls and the feminization of male fish, resulting from exposure to endocrine-disrupting compounds (EDCs) that are routinely measurable in municipal WWTP effluents.

  While these compounds are not regulated by MOECC, from a fish health perspective, exposure to EDCs poses a risk of reduced reproductive success, and therefore raises serious concerns where WWTP effluent may discharge into fish-bearing waters. For these reasons, in order to protect aquatic species from potential negative impacts of EDCs, it is necessary to reduce exposure by ensuring that municipal WWTP operational processes remove these compounds.

  A municipal WWTP in Kitchener, ON recently underwent significant upgrades that included the conversion from a carbonaceous activated sludge to a nitrifying activated sludge treatment process,

as well as more efficient aeration and higher solids retention time of >5 days. In a recently published, peer-reviewed scientific study, Hicks et al. (2016)* reported that these upgrades *not only significantly improved the removal of ammonia*, but also *significantly reduced total effluent estrogenicity*. Furthermore, these upgrades resulted in a reduction from 70-100% intersex incidence in male Rainbow Darter in proximity to the WWTP outfall, down to <10%.

It is strongly recommended that the Erin WWTP include these operational processes and treatment technologies in order to ensure the removal of compounds with estrogenic properties, as well as ammonia, in order to protect aquatic species in receiving waters.

* Keegan A. Hicks, Meghan L. M. Fuzzen, Emily K. McCann, Maricor J. Arlos, Leslie M. Bragg, Sonya Kleywegt, Gerald R. Tetreault, Mark E. McMaster, and Mark R. Servos (2017) Reduction of Intersex in a Wild Fish Population in Response to Major Municipal Wastewater Treatment Plant Upgrades. *Environmental Science & Technology 51* (3), 1811-1819.

Closing

The Ministry appreciates the opportunity to review and provide comments on Town of Erin Urban Centre Wastewater Servicing Class Environmental Assessment Environmental Study Report. In general, MNRF staff recommends that the surveys and data gaps above be addressed.

If further comment or clarification is required please contact the undersigned. MNRF staff is also available for a meeting to discuss the above comments.

Regards,

TMcKenna

Tara McKenna, District Planner
Ministry of Natural Resources and Forestry, Guelph District
1 Stone Road West
Guelph, ON, N1G 4Y2
Phone: (519) 826-4912
Email: tara.mckenna@ontario.ca

cc: Ian Thornton, MNRF Guelph District
Darren Ungar, MNRF Guelph District
Mark Heaton, MNRF Aurora District
Barbara Slattery, MOECC
Liam Marray, CVC