

REVIEW OF FIRST SUBMISSION: Environmental Impact Study, Bray Lake, Machar
PROJECT: 220-053
APPROVAL AUTHORITIES: Township of Machar, District of Parry Sound
DATE: October 17, 2024

APPLICATIONS: 1st Draft Submission
Lots 19 and 20, Concession 11 and Lots 18, 19 and 20 Concession 12, Township of Machar

		PEER REVIEW COMMENT	APPLICANT RESPONSE	PEER REVIEWER RESPONSE	RIVERSTONE 2 nd REPLY (WHERE REQUIRED)
Agency: Township of Machar Representative: Hutchinson Environmental Sciences Limited (HESL)	1	“The subject property contains steep slopes. These are located at the back of the proposed severed lots and will leave room for future property development” (p. ii). The utilization of the Provincial Water Quality Objective of 20 µg/L allows for the development of 229 additional extended seasonal lots according to RiverStone’s Lakeshore Capacity Model. Please indicate what future property development is being considered and if so, how a responsible development capacity can be determined given modelling inaccuracies.	For clarification, the intent was to note that although there are areas of steep slopes on the property, there is considerable room outside of this constraint for the future development of the proposed lots. There is no intent at this time to further subdivide the property that would create additional lots that would contribute to the Lakeshore Capacity Assessment calculations.	Acknowledged. No further response is required.	N/A
	2	“Development Proposed: Consent application to create twenty (20) single residential lots (15 waterfront, 5 backlot).” (i) “In this case, the proposal is to add an additional 14 lots with shoreline access and 6 backlots.” (p. 12) Please confirm, is the proposed development for 14 or 15 shoreline lots and 5 or 6 backlots?	Acknowledged. The development plan proposed fourteen (14) shoreline lots and six (6) backlots as noted on Figure 3. Each of the backlots are within 300m of the shoreline and were therefore included in the Lakeshore Capacity Modeling.	Acknowledged. No further response is required.	N/A
	3	The catchment area is 1017 ha according to the Ontario Watershed Information Tool (OWIT) which replaced the Ontario Flow Assessment Tool reference cited in Table 2. Please measure the lake in GIS and indicate if 940 ha from the Lake Fact Sheet or 1017 from OWIT is more accurate and appropriate to utilize.	Measuring the watershed area from Provincial contour data (5m) using GIS resulted in a watershed area of 975 ha; in comparison to 940 ha from the Provincial lake fact sheet and 1017 from the Provincial OWIT mapping tool. As expected, a greater watershed area increases the inflow of phosphorus to the lake through the model, thereby increasing the lake TP concentrations. Applying 975 ha watershed area results in the modeled TP concentration, following the proposed development, from 8.03 ug/L to 8.13 ug/L. The results of our initial model noted that the difference between the predicted concentration and measured concentrations were too far apart to validate the use of the model to accurately reflect the lake. If a larger watershed area is considered in the model, this outcome does not change.	Acknowledged. No further response is required.	N/A

	4	The wetland % in the catchment is 2.3% according to OWIT. Please provide a figure to showcase manual wetland delineation that was completed with Ontario Base maps as indicated in Table 2, and the subsequently high 15% wetland input utilized.	The value we used for wetlands in the model was an error. In review of our notes, the correct wetland value is 2.3% and was therefore an oversight on our part when calculating the model. When the same model is run, using 2.3% for wetlands in place of 15%, the predicted TP concentration for the current level of development decreases from 6.89 ug/L to 5.23 ug/L. This is expected as wetlands are exporters of TP into downstream lakes. This change in wetland value then further increases the gap between modeled and measured data, resulting in the same conclusion that the model does not validate.	Please ensure that modelling errors are corrected when predicting future TP concentrations and comparing modelled concentrations to the PWQO of 10 µg/L.	Please see the answer provided for peer review comment 10 below, as the expectation was to have the two correct values included in the model to see how this result compares to the target of 10ug/L.
	5	A phosphorus settling velocity of 12.4 m/y is listed in Table 2 but it appears that an anoxic settling coefficient of 7.2 m/y was used in the Lakeshore Capacity Model. No late summer dissolved oxygen profiles are presented or referenced to justify the selection of an appropriate settling coefficient. Please describe how an anoxic settling coefficient was selected.	It is acknowledged that the report table does show a settling velocity of 12.4 m/y, while our model used 7.2 m/y. Our error was in the table. As noted in Paterson et al. (2006), settling velocity can be estimated as 12.4 m·yr ⁻¹ for dimictic, oligotrophic lakes on the Precambrian Shield with oxic hypolimnia. In lakes that experience prolonged periods of anoxia during the ice-free season, the settling velocity should be reduced to 7.2 m·yr ⁻¹ . It is correct that we did not have the advantage of late summer oxygen profile to guide the selection of the appropriate value; however, if the model is calculated using 12.4 m/y as the settling velocity, the resulting TP concentration is reduced, moving further away from the measured values. As a result, it seemed logical to proceed using the anoxic value.	Acknowledged. No further response is required.	N/A
	6	Please provide information on the reference used to derive model inputs used for precipitation, lake evaporation and runoff (Hydrological Atlas of Canada (1978)). Information on the reference is not included in the references section. Based on our experience, the MECP Runoff Lookup Table is typically used to determine mean annual runoff and embedded formulas in the Lakeshore Capacity Model are used to derive lake outflow discharge based on mean annual runoff.	An error was made leaving old references in the report. The MECP Runoff Lookup Table is the correct reference to the data used to determine the Mean Annual Runoff; however, we did notice a difference in the value used in the model and that from the lookup table when checked (0.518). inserting this value into the model changed the result by 0.03mg/L (higher), which does not alter the conclusions of the model. Other data was derived from the online Provincial Watershed Information Tool.	Please ensure that modelling errors are corrected when predicting future TP concentrations and comparing modelled concentrations to the PWQO of 10 µg/L.	Please see the answer provided for peer review comment 10 below, as the expectation was to have the two correct values included in the model to see how this result compares to the target of 10ug/L.
	7	Please provide additional information on what lot fabric was utilized to count lots and how vacant lots of record were determined	Land Information Ontario data was used as a lot fabric to count shoreline lots, and backlot that fit within a 300m setback from the lake, established through GIS. Aerial photography was used to note whether the lots were developed or vacant. All backlots within 300 m were included as a developed lot.	Acknowledged. No further response is required.	N/A
	8	“Measured values were collected by Lake Partner Program volunteers in 2007 and 2008. Water samples are collected by lake resident	We were not aware of any other data when the report was completed. Or they would have been included in the calculations and analysis. Although the data were old,	Acknowledged. No further response is required.	N/A

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		volunteers and analysed for a number of parameters, including phosphorus by MECP. The duplicate samples from May 2007 were reported as 10.6 ug/L and 10.6 ug/L, while July 2008 samples were reported as 12.7 and 11.0 ug/L.” (p. 12) The phosphorus data are 16 and 17 years old. Please indicate if more recent data are available from other potential sources and comment on the suitability of utilizing old data	they were the only data available for which to test the validity of the model. These remain the only data available for comparison.		
	9	Please indicate how Best Management Practices will be implemented (e.g. Site Plan Control or the recent equivalent in the Township of Machar). Also, leaching bed soil requirements are ambiguous; indicate if more specific soil requirements could be developed.	Best management practices are best implemented through site plan control. Although the Province removed this possibility, it was reinstated for waterfront properties and can therefore be administered on these created lots. In regard to leaching beds, where development is proposed on highly sensitive lakes, we provide very specific recommendations for soil characteristics, such as >1% iron and aluminum and <1% calcium carbonate, similar to the native soil requirements for development on lake trout lakes at capacity. These soils would be used as a 0.25m thick base under the filter/area bed for new septic systems. Given that it was shown that Bray Lake is not at capacity, our recommendations were less specific, while attempting to provide additional TP removal. We would support the revision of the leaching bed recommendation to read as follows: Sewage treatment systems to service the proposed lots should meet Ontario Building Code requirements. Systems designed to maximize the degree of TP attenuation should be required, such as the Waterloo Biofilter with EC-P unit, EcoFlo Biofilter or the use of a tank and bed system that incorporates soils that are high in phosphorus retention, aluminum and iron, and low in calcium carbonate	Acknowledged. No further response is required.	N/A
	10	We agree that the Lakeshore Capacity Assessment commonly does not accurately predict phosphorus concentrations and that there is limited and often contradictory guidance from MECP on how to proceed in such situations. Since modelled total phosphorus concentrations are <10 ug/L, we recommend that modelled total phosphorus concentrations shouldn’t increase above 10 ug/L instead of 20 ug/L as part of a conservative approach to lake management.	We are in agreement with the conclusions of the peer review report, including the guidance to restrict development to 10ug/L as opposed to 20ug/L as was previously allowed by the Province. As noted, the development proposal for 20 new lots will not move the lake beyond capacity. The implementation of best management practices will be included in site plan control and will ensure their implementation.	Please ensure that modelling errors are corrected when predicting future TP concentrations and comparing modelled concentrations to the PWQO of 10 µg/L.	The model was re-run with updated values for wetland area (2.3%) and for mean annual runoff (0.518 from MECP lookup table). IN addition, the watershed Area for Bray Lake was updated to 975ha as noted above in comment 3. The reason for re-running the model was to determine if these updated values would “correct” the model when comparing the modeled vs measured TP concentration, as was concluded in the original modeling.

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		Other considerations such as recreational capacity calculations and in-depth review of water quality in Bray Lake could also be completed to inform the capacity assessment. Regardless, the modelled future total phosphorus concentration of 8.03 µg/L associated with the proposed development of 20 lots is less than 10 ug/L.			The results of re-running the model confirmed that updating these values did not change the conclusions. Original Modeling: TP 6.89ug/L (existing development) Updated Modeling (wetland and runoff): TP 5.29ug/L The conclusion that the modeled and measured values for TP is still valid. The original model noted the difference was 33.1%. The updated model is further separated from the measured TP concentration (47.4%). This confirms that the use of the interim PWQO is suitable, also supporting the further restriction noted in comment 9 above, only supporting development to a maximum modeled concentration of 10ug/L. The updated modeling results show that the expected change in TP concentration following the addition of 20 total new homes (permanent) is elevated from 5.23 ug/L to 6.43 ug/L, below a modeled concentration of 10ug/L.
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