HALIFAX WATERSHED ADVISORY BOARD
RECOMMENDATIONS:
Sewage Treatment Plant on Nine Mile River **July 2004**

Issue: The Westgate Community and Golf Course Development proposes to access the STP on Nine Mile River for sewage treatment. In a report, Nine Mile River Assimilation Study, prepared by Dillon Consulting Ltd. in February 2003, it was indicated that the STP would have to be upgraded in order to process the additional sewage volume. The STP is owned by the HRM and any upgrading would be the responsibility of the HRM. The Halifax Watershed Advisory Board has previously reviewed and provided advice on the Westgate Community and Golf Course Development proposal to the HRM. This report is intended as an advisory to the HRM pertaining to environmental aspects related to the existing STP and enhancements which might be considered.

1) With increasing daily effluent limits (to 2 mgd, and possibly later to 3 mgd) the Board **recommends** that measures should be taken to ensure phosphorus loading does not exceed current levels, unless or until studies are done to prove that Nine Mile River is not adversity affected.

2) Currently on-site sewage systems in the Nine Mile River Watershed upstream of the proposed Westgate Community are also contributing to the effluent loading on the river. If additional residential development occurs employing on–site systems, the loading of the river will increase; such increases would further reduce the capacity of the river to absorb the effluent from the STP, in its current or enhanced configuration. The Board **recommends** that HRM should therefore ensure adequate mitigation is employed to additional residential development in the Nine Mile Watershed to mitigate negative impacts. This could mean that new residential development might require central sewage treatment.

3) The report indicated uncertainty related to the impact of going from 1 to 2 mgd (or to 3 mgd in future) of effluent and indicated the need to monitor and study the impact at 2 mdg before any further expansion. The Board **recommends** that this evaluation be conducted; monitoring of nutrient loading on the river on a monthly basis for at least a full year prior to consideration of expansion would be required.
The Board would like to review and comment on the results of any such study prior to any expansion being permitted beyond 2 mgd.

4) Information provided by the proponent of the Westgate Community Development and the Dillon Study indicate that the STP currently experiences occasional overflows events. The Board **recommends** that this situation be investigated and remediated as necessary. For example, mitigation might be achieved by creating, or increasing, reserve holding capacity; or by creating emergency power generating capability at the plant and/ or any pumping stations, if the overflow events occur due to power outages.

5) The Dillon Study notes that the current STP system also suffers from inflow and infiltration problems. This would exacerbate the occasional overflow situation and the Board **recommends** that these problems be investigated and corrected as necessary.

6) The proposal includes replacement of the chlorinated purification system with an ultra-violet system. The Board **recommends** that this conversion be implemented since it will remove significant chlorine input into the Nine Mile River.

7) The NSDE&L reference dilution rate for sewage effluent entering streams or rivers is a 5 to 1 dilution rate. The proposed expansion would result in an effluent release of up to 2mgd associated with the current proposal and possibly up to 3mgd in the future. It does not appear that the water flow rate in Nine Mile River during periods of low flow periods would be adequate for this requirement.

   The 2003 Dillon report indicates that at 1 mgd of sewage effluent discharge, at certain times of the year (e.g. summer) the volume of effluent entering the Nine Mile River could equal or exceed the original volume of water in the river. At 2 or 3 mgd the effluent could be double or triple the original river volume. Comparison of the simulated conditions described in the report suggests that at low flow the current effluent output of the STP exceeds the rivers absorptive capacity. For instance the tables show dilution ratios significantly below the 5 to 1 dilution rate guideline; in almost all simulated scenarios (even for the lowest simulated discharge rate of 0.54 mgd) the BOD appears to exceed the dissolved oxygen content of the river and the ammonia loading exceeds the absorptive capacity of the river. If this is correct, then the DO in the river will be severely depleted; it appears that even the current situation is resulting in severe DO depletion at low flow periods. Even with upgrading the sewage treatment to tertiary levels, the simulations indicate that the increased discharge volumes will result in the BOD requirements continuing to exceed the absorptive capacity of the Nine Mile River during low flow periods. As the report indicates, these scenarios do not account for additional upstream development, which is already occurring. That will only make the situation worse for DO levels in the river. The Board **recommends** that the effluent constituents are monitored regularly (e.g. at least quarterly) to ensure that the aquatic life CCME limits are not exceeded to ensure sustained protection of water quality in the river.

8) It is undetermined what impact this increased water volume entering the river will have on the dynamics of water flow in the river. For example shoreline erosion could result and a significant and change in seasonality of the river high and low flow rates could alter the ecosystem constituents.

9) The Board is concerned with the potential impact of the sewage effluent on the Nine Mile River as outlined above; however the Board is also uncertain that its interpretation of the available data on river water volumes is correct. As well, the analysis of information available in the reports is not comprehensive; for instance it does not indicate the ammonia levels in the effluent leaving the STP. The impact of ammonia on receiving waters is complex, with receiving water temperature and pH substantially influencing the impact ammonia will have on the water quality.

Hence the Board **recommends** that qualified limnologist review the available information to evaluate the potential impact of increased sewage effluent on the Nine Mile River, and provide advice on action required to ensure significant impact on water quality and aquatic life of the Nine Mile River does not occur.

10) The Board also **recommends** that a site specific study of the volume of receiving water should be conducted (hydrological analysis) to enhance the existing information if necessary to determine what dilution rate can be achieved at all seasons, and to re-examine the potential impact that the dramatic increase of water/effluent volume will have on the river dynamics and ecosystem relationships, and suggest appropriate mitigation if required to protect the chemical and physical integrity of the Nine Mile River.

Background: The proposed Westgate Community is within the headwaters of the Nine Mile River watershed. The Timberlea/Lakeside/Beechville area is serviced with a sewage collection system and treatment facility operated by the HRM. The STP provides secondary sewage treatment with nutrient removal and discharges into the Nine Mile River. The intention is to direct the Westgate Community sewage to the plant.

In 2003, Dillon Consulting Ltd. conducted a study of the sewage treatment plant capacity (Nine Mile River Assimilation Study). While the study indicates an increase in processing demand to 2 mgd associated with the Westgate development and a potential increase to 3 mgd, the study does not discuss the potential impact of an increase to 3 mgd. The study indicated that the plant was currently servicing a population of 8,000, but projected a population in the order of 20,000 when Westgate Community was completed and indicated that upgrading the STP (to process 2 mgd (million gallons per day) would be necessary to service that population size. The report indicated that current STP objectives for wastewater discharge were effluent limits of 15 mg/L BOD (Biological Oxygen Demand), 20 mg/L suspended solids, 3 mg/L ammonia and 1 mg/L phosphorus, and indicates that these parameter levels require secondary treatment with nitrification and phosphorus removal. In order to increase the capacity of the STP to service 2 mgd of effluent, and keep nutrient loading on Nine Mile River at the same level as pre-development of the Westgate Community, the report recommended that maximum wastewater discharge effluent levels of 5 mg/L BOD, 10 mg/L suspended solids, 3 mg/L ammonia and 0.5 mg/L phosphorus (ie. upgrade the STP to tertiary treatment).