

**Halifax Watershed Advisory Board
February 20, 2013**

TO: Chair and Members of Halifax Watershed Advisory Committee

Original Signed

SUBMITTED BY:

Jane Fraser, Director Planning and Infrastructure

DATE:

January 23, 2013

SUBJECT:

Lake Echo Watershed Servicing Study Final Report

ORIGIN

This Study was initiated as background for future community planning.

LEGISLATIVE AUTHORITY

Section 229 (1)(g) of the Halifax Charter enables a Municipal Planning Strategy to require studies to be carried out prior to undertaking specified developments or developments in specified areas. This Study was initiated pursuant to Policy E-17 of the Regional Plan.

RECOMMENDATION

It is recommended that the Halifax Watershed Advisory Board recommend to the Harbour East-Marine Drive Community Council, that the Lake Echo Watershed Serving Study be accepted as background for future community planning.

BACKGROUND

In January 2010, HRM issued a contract to CBCL Limited to undertake three watershed studies to provide background information for future community planning in Lake Echo and Porter's Lake. The studies are required pursuant to Policy E-17 of the Regional Plan to determine the carrying capacity of these watersheds for future secondary planning processes. This report presents the Lake Echo Watershed Servicing Study as the first of the three studies to be presented to the Halifax Watershed Advisory Board, and the respective community councils, for final acceptance.

The Lake Echo Watershed Servicing Study was commissioned to determine the extent of future development that may occur within the watershed without exceeding desired water quality objectives for Lake Echo, and what areas were best suited for development in terms of land capability. To accomplish this, the Consultants were required to:

- Identify opportunities for development within the Study Area (Attachment 1);
- Provide a range of servicing schemes for wastewater collection, treatment and dispersal (excluding sanitary sewerage), stormwater management, and water for those lands;
- Discuss the level of development various schemes will support and the impacts on the surrounding environment of various servicing schemes; and
- Develop a site specific plan showing all land suitable for development, complete with potential development densities and the services required to allow these densities to be realized.

After the issuance of the contract, the terms of reference were amended at the request of the former Marine Drive Valley and Canal Community Council (MDVCCC) to commission CBCL to undertake an assessment of the impacts of the proposed development of a modular home development by PJC Development Limited, on the assimilative capacity of Lake Echo.

The PJC Land Development Limited proposal is for a retirement home village on a parcel of land situated at the north end of Lake Echo, adjacent to the Wonderland Mobile Home Park (Attachment 2). Phase 1 of the development was proposed for approximately 190 units in a Classic Open Space Design concept. Phase 2 was for the development of a hybrid (large lot) open space design concept. The potential buildout of the Phase 2 portion of the parcel (126.7 hectares, was estimated to yield 126 units.

DISCUSSION

The Lake Echo Watershed Servicing Study Final Report has been reviewed by the Halifax Regional Municipality and the Halifax Regional Water Commission Steering Committee and deemed to have met the terms of reference of RFP #10-017. A summary of the key findings of the Study are presented in Attachment 3. A full copy of the study can be viewed at <http://www.halifax.ca/regionalplanning/regionalplanstudies>.

On the basis of the recommended water quality objectives - to maintain water quality suitable for aquatic life - the Study found that:

- McCoy's Pond and its tributaries have no assimilative capacity for additional development due to its trophic status (phosphorus and chlorophyll A concentrations) and E coli concentrations;
- There is no assimilative capacity in Lake Echo due to its trophic status (phosphorus and chlorophyll A concentrations) or E coli at the upper end of the lake, as a result of the loads from existing development. Low pH is also a concern; and
- Low pH in the upstream tributaries to Lake Echo, including Lewis Lake and Jack Weeks Lake, indicate that there is no assimilative capacity for additional acid loads to these lakes. Additional development in the watersheds to these lakes will reduce their capacity to assimilate additional phosphorous loads as well.¹

Future development within the areas tributary to Lake Echo may also exceed the Regional Plan water quality objectives, since Lake Echo is on the boarder-line of the mesotrophic and meso-eutrophic range and it is the objective of the Regional Plan to prevent the decline of lakes from the process of eutrophication. According to the Study "additional development anywhere in the watersheds tributary to Lake Echo has potential to generate larger nutrient loads to Lake Echo and increase the risk of algae. From a watershed perspective, development for the near future (until the phosphorus loads generated upstream can be reduced) would be best suited in watershed lands that discharge downstream of Lake Echo into Lawrencetown Lake."² This is intended to build in a buffer to prevent any worsening effect in trophic status.

If development does proceed in the area at the north end of Lake Echo, as proposed by PJC Development Limited, or elsewhere on lands tributary to Lake Echo, the Study recommends that it be undertaken at a high standard to prevent an increase in future phosphorus loading and any reduction in pH Levels from the runoff of Sulphide Bearing Slates. The Study advises that if development should proceed on this property, areas of major constraint identified under the Study should be avoided and stormwater management plans should be designed to maintain natural drainage systems. The Study also recommends stormwater best management practices for the local systems and that wastewater treatment systems include a component for phosphorus removal. The Study also recommends grading plans with minimal cut and fill and the preparation of plans for the identification and management of pyretic slates. A copy of the Study recommendations regarding the proposed PJC development is reproduced as Attachment 4.

The Study also recommends a number of measures to address the present pollution control problems in the watershed. Chief among these is a recommendation to undertake a comprehensive sanitary survey of all undersized lots with on-site wastewater systems.³ The Study also recommends that opportunities to reduce phosphorus loading from the Wonderland Mobile Home Park sewage treatment operations, also be examine and that a Waste Water

¹ CBCL Limited. Lake Echo Watershed Servicing Study Final Report. Prepared for Halifax Regional Municipality, January 19, 2013, p. 34.

² CBCL Limited. Lake Echo Watershed Servicing Study Final Report. Prepared for Halifax Regional Municipality, January 19, 2013, p. 30.

³ CBCL Limited. Lake Echo Watershed Servicing Study Final Report. Prepared for Halifax Regional Municipality, January 19, 2013, pp. 51 and 79.

Management District approach be considered for the management of wastewater systems in the area. Many of these recommendations fall within the jurisdiction of the Nova Scotia Department of Environment, the Halifax Regional Municipality and the Halifax Regional Water Commission and will need to be vetted through these various departments for resolution.

It is recommended that this study be recommended to the Harbour East Community Council as a background study for future community planning and the regulation of land use development within the watershed study area.

FINANCIAL IMPLICATIONS

There are no direct financial implications arising from this report. The Study has been prepared as background information for future community planning.

COMMUNITY ENGAGEMENT

The Consultants undertook two community forums at the beginning and at the end of the Study to engage the Lake Echo Community to provide feedback into the development of this Study. The first meeting was held November 29, 2010, to obtain feedback from community and business leaders on the research and potential future development centres within the community. These selected community centres formed the areas for assessment of future growth. The findings of this Study were presented to the Lake Echo Community May 14, 2012. An on-line survey was also undertaken to determine the preferences of individuals for desired future water quality objectives for selected water bodies in the study area.

ENVIRONMENTAL IMPLICATIONS

This Study is required to determine the environmental carrying capacity of Lake Echo to enable the Municipality to plan and set standards of care for future development, and to minimize impacts on the environment.

ALTERNATIVES

There are no alternatives recommended.

ATTACHMENTS

Attachment 1 – Map: Lake Echo Watershed Servicing Study Boundary

Attachment 2 – Map: PJC Proposed Development Area within the Lake Echo Watershed Study Boundary

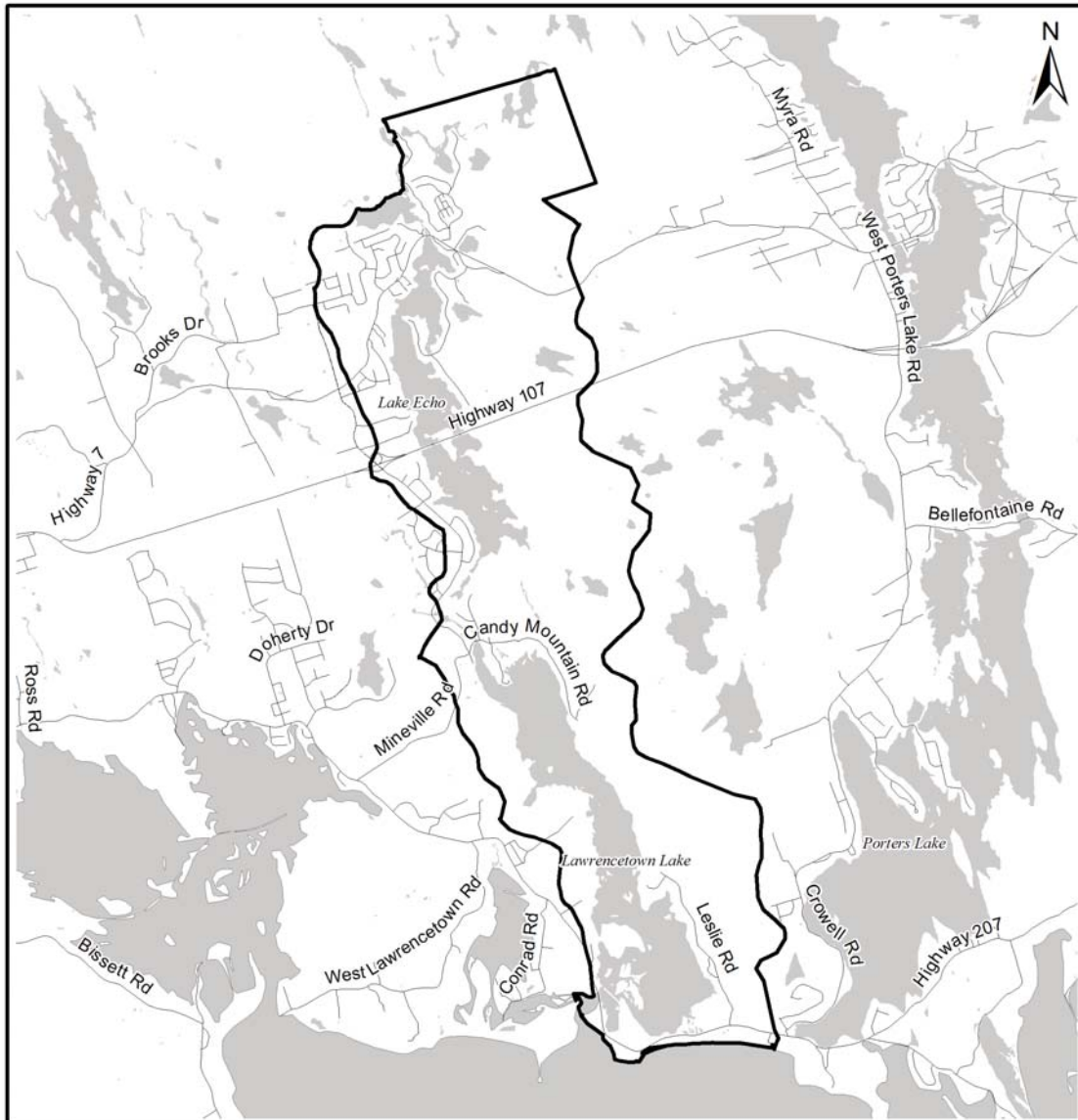
Attachment 3 - CBCL Watershed Servicing Report Conclusions and Recommendations

Attachment 4 - CBCL Watershed Servicing Report Chapter 6 – Impact Assessment of Lake Echo, Case 01278


A copy of this report can be obtained online at <http://www.halifax.ca/commcoun/cc.html> then choose the appropriate Community Council and meeting date, or by contacting the Office of the Municipal Clerk at 490-4210, or Fax 490-4208.

Report Prepared by: Maureen Ryan, Senior Planner, Planning and Infrastructure, 490-4799
Original Signed

Report Approved by: Austin French, Manager, Planning and Infrastructure, 490-6717



Attachment 1
Lake Echo Watershed Servicing Study Boundary: Case 01278

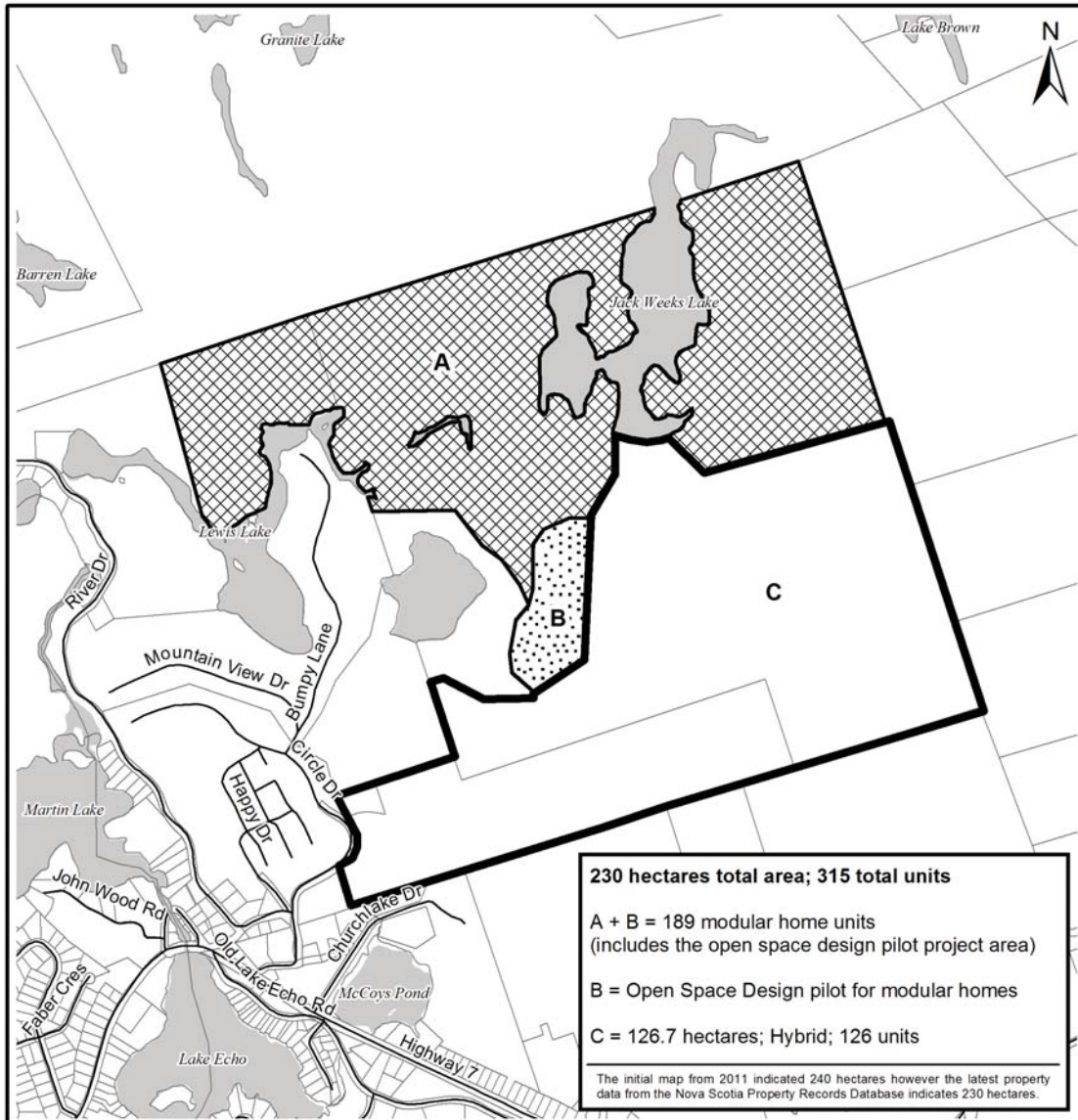
 Study Boundary

HALIFAX
REGIONAL MUNICIPALITY
REGIONAL AND COMMUNITY
PLANNING SERVICES



Planning Districts 8 & 9
Plan Area

HRM does not guarantee the accuracy of any representation on this plan. Date of map is not indicative of the date of data creation.



Attachment 2
 Lake Echo: Case 01278

- Modular Homes
- Open Space Design Pilot - Modular Homes
- Hybrid

Property Boundaries



Planning Districts 8 & 9
 Plan Area

HRM does not guarantee the accuracy of any representation on this plan. Date of map is not indicative of the date of data creation.

Attachment 3
Excerpt from the Executive Summary CBCL Limited's
Lake Echo Watershed Servicing Final Report

A copy of the key water quality findings and conclusions and recommendations from the Executive Summary of the CBCL Report is presented below. A full copy of the Final Report may be reviewed on-line at <http://www.halifax.ca/regionalplanning/regionalplanstudies.html>

Water Quality Objectives

An online survey of interested stakeholders was completed to assess the importance of water quality in local water bodies and to determine desired uses of them. A questionnaire was developed and made available online from July 18 to September 16, 2011. There were 111 responses to the survey. In response to the question, "**Are you concerned about the water quality of the water bodies?**" more than 90 percent of the respondents were concerned with the water quality in the lakes in the watershed.

When asked: "**At what level would you be satisfied with future water quality?**" more than 90 percent of those responding indicated that the lakes should at least be suitable as fish and wildlife habitat and of those 20 to 25 percent indicated that the waters should be of the highest possible quality.

To meet these water quality objectives for water bodies in the Study Area, water quality in the lakes should meet the CCME Guidelines for human consumption of fish.

Receiving Water Quality

A receiving water sampling program was completed for the study based on the following parameters:

- Water samples were collected in spring, summer and fall of 2010, during dry conditions as well as following rain events; and
- Samples were analysed for evidence of sewage (E coli, BOD5 and Total Suspended Solids) and typical indicators of eutrophication (nitrogen (in various forms), total phosphorous and Chlorophyll A).

Results of sampling and modelling indicate:

- On an **annual basis** the trophic status of the lakes in the study area is mesotrophic or better, meaning that there is generally plenty of oxygen and that biological oxygen demand is low. The exception is McCoy's Pond in which the trophic status was considered meso-eutrophic to hyper-eutrophic in all sample sets analysed. Water of poor quality is discharged from the pond to Lake Echo but does not account for water quality observed in the Lake on its own, other sources must be contributing;
- Lake Echo experiences **incidents** of high concentrations of nutrients (nitrogen and phosphorous) and chlorophyll A, indicating meso to hyper - eutrophic conditions during the summer and fall. It also experiences incidents of high E coli concentrations; and
- Low pH (the result of acid rain and runoff) also limits the suitability of Lake Echo as habitat for species at risk.

These conditions can change with changes in climate and land use in the tributary areas.

Conclusions and Recommendations

Conclusions about the state of existing development and its impacts on the environment as well as recommendations to improve existing conditions and to reduce the risks of additional negative impacts on the environment from potential future development are summarized as follows:

Water Quality

- Lake water quality is a concern to the majority of respondents to a survey of water quality. Any additional development in the Study Area should address potential impacts on water quality in McCoy's Pond and Lake Echo in particular;
- Some participants in the Community Focus Group meetings indicated that they felt that failed onsite wastewater systems were the primary sources of the pollutants. Participation in the testing of sample onsite wastewater treatment systems was low. None of the tests completed provided direct evidence that failed on-site systems were the sources of pollutants. Other potential sources **such as** stormwater, **including** lawn care products, pet wastes, etc., should be investigated;
- The minimum water use objectives for the water bodies in the Study Area should be that all lakes be suitable as fish and wildlife habitat and should meet CEME Guidelines for human consumption of fish; and
- Based on comparisons of the water quality necessary to facilitate the desired uses to existing water quality, McCoy's Pond is unsuitable for desired uses at most times and Lake Echo is unsuitable for desired uses at times in the summer and fall. On this basis, there is no assimilative capacity to receive any additional pollutant loads in McCoy's Pond or in Lake Echo.

For the water bodies in the Study Area to be used according to the preferences indicated in the water quality survey, measures must be taken to improve existing water quality. Future development in the Study Area should minimize the risk of generating additional sources of pollutants and improve existing water quality where feasible. To allow additional development in any of the areas tributary to the waterbodies with no assimilative capacity, requires implementing measures to reduce current pollutant loads to these waterbodies in an amount at least equivalent to:

- the existing loads in excess of the amount required to meet water quality objectives set by current guidelines for the objective water uses established through the survey; plus
- pollutant loads expected from additional development in the watersheds tributary to each waterbody.

Recommended measures to reduce pollutant loads from existing development and minimize potential loads from future development to improve existing water quality in the Study Area include:

- implement public education programs relating property owners' actions to water quality to reduce pollutant loads from individual properties;
- encourage and assist with the development of stewardship programs for the lakes in the community as well as the adjacent shoreline;

- identify deficiencies with existing wastewater and stormwater systems and design and construct retrofits to these systems;
- design, construct, operate and maintain wastewater collection and treatment systems, as well as stormwater collection and treatment systems, to minimize potential pollutant loads generated by these systems; and
- an on-going lake water quality monitoring program. Baseline conditions have been developed for the upper end of Lake Echo using information provided from HRM's 2006 - 2011 Monitoring Program. To ensure successful development, this program should be continued and expanded to include watershed lakes that may also be impacted by proposed development (Martins Lake, McCoy's Pond, Lawrencetown Lake and possibly Jack Weeks Lake and Lewis Lake). Regulators and managers of future development should make allowances to conduct sampling on a quarterly basis to establish baseline conditions in the lakes most likely to be impacted by development in the Study Area, and to follow development progress and its impacts. Assessment of the ongoing data should be used to verify that the plan is achieving the desired reduction in pollutant loads and to modify development plans in response to unpredicted impacts.

Servicing

Specific recommendations for changes to traditional servicing to reduce potential pollutant loads to the water bodies in the Study Area are provided in Chapter 4. Generalized recommended are listed below:

WASTEWATER COLLECTION, TREATMENT AND DISPERSAL

- Ensure routine maintenance and monitoring of onsite wastewater treatment systems. This is currently the responsibility of homeowners to maintain on-site systems and is regulated by the NSE. The NSE has no program for routine maintenance and inspection for individual onsite systems. As an alternative to ensure proper maintenance and monitoring, a wastewater management district may be formed. There are none currently in operation in the community. The District, if formed, should include all areas in the Lake Echo watershed that have onsite wastewater treatment systems on individual properties. Typically in Nova Scotia, the Municipality (HRM) takes the role of forming the district and managing its operation to ensure the systems are operating as required to maintain desired water quality in the lakes and allow future development in the community; and
- Routine maintenance, monitoring and reporting on the operation of cluster wastewater treatment systems. This is already required under current provincial regulations.

STORMWATER COLLECTION, TREATMENT AND DISPERSAL

Objectives for Stormwater Management Plans to rectify existing water quality issues and limit the risks of creating new risks should include:

- Minimize changes in runoff at source, including each building;
- Maintain peak runoff flows at or below existing flows from all areas;
- Promote infiltration of the cleanest runoff (from rooftops, etc.) for groundwater recharge; and
- Provide treatment of all other runoff and infiltration facilities.

Low impact development should be considered for all new developments and modifications of existing development. In any servicing situation, to achieve stormwater water quality objectives, the following should be considered:

- Low impact site development, minimizing the affected footprint and providing measures to minimize the collection of stormwater. Where it is necessary to collect stormwater, decrease the efficiency of the collection systems, particularly on private properties;
- Decrease the efficiency of local collection systems using swales with flow limiting culverts between them to encourage detention and infiltration. Filling of ditches should not be allowed; and
- Treatment of remaining runoff in centralized wet ponds and constructed wetlands with built in retention capacity. Co-use of detention storage with other public use lands such as parkland or recreation fields will lower the overall costs of this requirement as the costs of land can be significant.

WATER

- Groundwater supplies to service individual properties as well as clusters systems to service up to ten (10) properties are feasible. A combination of wells in bedrock and surficial aquifers is recommended. Treatment of these supplies may be required for removal of naturally occurring arsenic, iron and/or manganese, to levels that meet current CDWQGs. Testing of individual wells is required to determine treatment requirements; and
- Groundwater supplies for a central water service area for those areas with underlying pyretic slate bedrock near the existing community center, as well as the Wonderland Mobile Home Park and some of the proposed future development to the northeast, may be achievable. However, given the uncertainties with locating individual wells and minimizing interference between them, alternate sources such as from Lake Echo were investigated and appear feasible as well.

GENERAL

- Monitoring of construction activities with particular attention paid to assuring that erosion prevention and sediment control plans are implemented and components are maintained during construction and properly retired at the end of construction activities; and
- Condominium associations are required for ongoing responsibility of clustered water and wastewater services where these are considered.

Future Development

AREAS SUITABLE FOR DEVELOPMENT

Generally development should avoid “No Go” areas including:

- Water bodies, watercourses and designated wetlands;
- Coastal buffers;
- Provincial parks, reserves, and provincial crown lands;
- Cemeteries;
- All lands below elevation 2.5 metres and less than 2 metres above all local lakes;
- Significant wildlife and endangered species habitat as per map 5 of the Regional Municipal Planning Strategy;

- Areas of elevated archaeological potential as per map 11 of the Regional Municipal Planning Strategy; and
- Lands of high cultural significance as per category 5 on map 10 in the Regional Municipal Planning Strategy.

Certain areas within the Study Area are considered unsuitable for development on the basis of the lack of assimilative capability in the receiving waters including all areas directly tributary to McCoys Pond and Lake Echo. All areas outside the “No Go” areas are considered available for development. Figure ES1.2.4 [see main report on-line] illustrates the relative desirability for residential development of areas within the Study Area outside of the “No Go” areas. The areas required under the low, medium and high growth scenarios using onsite cluster servicing systems, may be readily accepted in areas considered well suited for development in the Study Area (see Figure ES1.2.4). There is no need to develop areas considered less than most suitable for the planned development. The medium growth scenario requires approximately 200 hectares (28% of the most suitable area within the Study Area) and the high growth requires approximately 260 hectares (52% of the most suitable area within the Study Area).

LOCATION OF DEVELOPMENT

The assumption that growth in the area will be based on the use of cluster servicing systems, creates a large degree of flexibility in the location of future development. Unlike central systems that require a certain level of density to be concentrated in one area to make the systems cost effective, cluster systems can be cost-effectively developed separately in a variety of areas, allowing developments throughout the Study Area to come on-line as desired.

Formation of a Wastewater Management District is recommended to improve the effectiveness of onsite wastewater treatment systems by providing monitoring, reporting and potentially maintenance and replacement (when necessary) of existing onsite systems in the study area. Expansion of the Wastewater Management District is straight forward with the use of cluster systems. Each subdivision/condominium corporation will build and own the infrastructure, and the Wastewater Management District will only need to add additional staff and their supporting equipment for overseeing and analysing additional information from the additional cluster systems. The owners of the additional clusters will compensate Wastewater Management District for these services as each new development comes on-line. No large investments in infrastructure or new plants will be required.

FORM OF DEVELOPMENT

Any additional development should ensure minimal degradation of stormwater, or preferably improved stormwater quality, in an effort to improve receiving water quality. Improving the design and construction as well as maintenance and monitoring of onsite wastewater and stormwater systems, will produce improvements in water quality. Additional improvements may be made by improving the process of locating and laying out development and selecting appropriate types of development.

It is recommended that classic open space subdivision designs be used to keep a significant portion of the Study Area free of development. Based on the *Conservation Design (CSD) Workshop Discussion Paper*, distributed at a session hosted by HRM on 5 November 2010, classic open space design allows an overall density of one lot per 0.4 hectares (one lot per acre) with the requirement that the landowner preserves culturally and environmentally significant lands by retaining at least 60% of the parcel as open space. Within an overall development parcel, development may occur in the areas outside the no go areas defined above.

Within individual house lots, responsible site planning, design and construction should be encouraged to mitigate the creation of impermeable surfaces (such as paved driveways, rooftops) through a variety of approaches such as the provision of multiuse land areas for recharge. Lawn areas, for example, can be designed to act as surface runoff detention areas, as well as aesthetic and recreational areas. Driveways can be designed to be more permeable through the use of unit pavers or gravel, and roof drains can be designed to discharge into soft landscaped areas or “rain gardens”. In other cases, it may be more desirable to have impermeable surfaces directing runoff to recharge areas, depending on the situation. The point is that in each case the question of stormwater runoff and recharge needs to be addressed at the community level as well as on each property. Responsible design also incorporates the use of native landscape, topography and native vegetation into the site development. Rather than stripping a site bare and completely reforming the topography, buildings should be placed in the landscape and the areas disturbed for construction should be limited to the smallest reasonable footprint.

MINIMUM LOT SIZE

Based on the screening level assessment for water supply by wells, the minimum lot size for residential development should generally be based on a requirement for a minimum of 5,854 square metres of permeable surface for each 1 cubic metre per day of demand, which is approximately equivalent to the demand for one dwelling unit. This should be added to the area taken by all impermeable surfaces on the property and the total compared to the minimum lot size required for the onsite wastewater treatment and dispersal system. The larger size should be used to establish a minimum property size on a site by site basis.

This minimum area of 5,854 square metres of permeable surface, plus impermeable surfaces, is for areas with a soil depth exceeding 300 mm. In locations with soil depths of 150 to 299 mm, the minimum lot size should be 6,800 square metres and in locations with soil depths less than 149 mm, the minimum lot size should be 9,000 square metres to meet NS Department of Environment technical guidelines for onsite sewage disposal systems⁴. In the water service area where wastewater services are provided by onsite systems, the minimum lot size will be determined by these onsite wastewater guidelines.

⁴ Nova Scotia Environment, April 2009. *On-Site Sewage Disposal Systems Technical Guideline: Minimum Lot Size requirements For Development Utilizing On-Site Sewage Disposal Systems*. Table 2.4.

Attachment 4
Excerpt from Chapter 6 – Impact Assessment of Lake Echo Case 01278
CBCL Limited's
Lake Echo Watershed Servicing Final Report

6.7 Actions Required to Accommodate the Proposed Development

For the proposed development to proceed, the developer would need to have plans that:

- Produce no net increase in the concentrations of water quality parameters that limit the assimilative capacity of Jack Weeks Lake, Lewis Lake or Lake Echo (nutrients, heat, and acid); and
- Consistently provide safe drinking water for all units in the development. Treatment to remove iron and manganese is expected to be required for most wells; arsenic removal will be required in some wells.

6.7.1 Required Plans for Development

Plans for the proposed development must include the following:

- Onsite wastewater collection, treatment and dispersal systems with adequate capacity for soil conditions in all areas of the proposed development (see the evaluations completed and recommendations in Appendix I). On-site and cluster treatment systems should include components for phosphorous removal to ensure that if the soil dispersal systems are unable to accommodate all effluent from the treatment system, phosphorous loads in overland flows will be minimal. A plan for monitoring individual onsite systems as well as systems for clusters of units should be required to ensure that the systems function as designed. A wastewater management district as described in section 5.3.6.3 would perform this function;
- Stormwater management plans for the proposed sub-division should include maintaining existing natural drainage systems with existing wetlands and their proposed buffers as “No Go” areas. Local collection systems, comprising swales adjacent each street should include integrated infiltration capacity, runoff detention and constructed wetland treatment prior to discharging into the natural drainage systems to maintain existing peak runoff flows and runoff quality. Similarly, infiltration, detention storage and treatment of runoff should be included on individual properties in the subdivision through the use of rain gardens, rain barrels and other applicable stormwater best management practices (see section 3.6);
- Grading plans with minimal cut and fill and minimal disturbance of pyretic slate bedrock (see section 3.8);
- Identification and management plans for acid generating pyretic slates on the development site that have already been exposed or disturbed and that may be exposed or disturbed during the construction process;
- Siting plans to ensure that “No Go” areas including riparian buffers are maintained in an undisturbed state (see Figure 6.3). Areas of elevated archeological significance should be investigated prior to development. The siting plans should make efforts to reduce the phosphorous loads from the proposed development areas by locating streets and building lots in areas that are currently clear cut and not clear cutting more areas than are absolutely necessary; CBCL Limited Impact Assessment of Lake Echo Case 01278 101
- Erosion and sediment control plans to minimize impacts on water quality in the water systems adjacent the development;
- Reduction of existing pollutant loads to adjacent water bodies to make assimilative capacity available to offset any additional loads that will be generated by the proposed development. Potential reduction projects are limited in the proposed development area but should be in areas

immediately adjacent the development area or upstream of the proposed development. They could include:

- Upgrades to the existing wastewater treatment plant at the Wonderland Mobile Home Park to reduce phosphorous and E coli counts in the effluent;
- Identification of failed onsite systems in the areas tributary to the upper end of Lake Echo and upgrades to these systems or provision of alternate treatment systems such as a community treatment system as discussed in section 4.1.1;
- Stormwater treatment systems for lands tributary to Jack Weeks Lake, Lewis Lake and Lake Echo with existing development and areas that have been recently clear cut; and
- Any other projects that can be shown to reduce nutrient loads and increase the pH of inflows to the lakes adjacent the proposed development.

6.7.2 Safe Drinking Water

It would be undesirable to allow the creation of up to 315 new wells (or alternatively 20 cluster wells in Areas A + B and 96 individual wells in Area C) with water that does not meet current drinking water standards. Two alternatives for the provision of safe drinking water were considered in Chapter 4:

- Provide water to individual properties and clusters of up to 10 units. It was recommended in section 3.1 that the wells should be a mix of wells in the surficial aquifer (where a significant depth of surficial materials are available) and wells in the bedrock aquifer (where the bedrock is not pyretic slates). Each unit would likely have to be provided with a water treatment system designed to remove iron and manganese as a minimum, and in some cases arsenic. All drinking water consumed should be from the tap with the “point of use” treatment system. If multiple points of use are required, multiple treatment units would be required. A monitoring program would be required to ensure that the treatment systems perform as required. A water management district is recommended to ensure adequate water treatment is achieved to meet current drinking water quality guidelines for all water quality parameters; and
- Provide a central water supply system. The capital costs of a central water system were estimated to be comparable to the costs of cluster water supply if all of the residences in the potential water service area participate in the central system. The costs of operating a water management district to ensure adequate water quality will offset a portion of the additional capital cost for a central system.

A central water supply system for the new development should be considered a more sustainable approach than constructing onsite wells with potential water quality issues to be resolved by onsite treatment.