TECHNICAL MEMORANDUM

Sewage Capacity
Municipality of Callander

Prepared for:
Municipality of Callander

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TECHNICAL MEMORANDUM REGARDING SEWAGE CAPACITY

FOR THE MUNICIPALITY OF CALLANDER

Executive Summary

Meridian has proceeded to review the sewage capacity issue for the Municipality of Callander. Previous reports prepared by Earth Tech have been reviewed along with recent draft approval and building permit information. Based on work completed by Earth Tech and estimates generated, there appears to be very little remaining capacity in the sewage lagoon system in Callander. Using a best-case scenario based on the certificate of approval design capacity of the lagoon there is capacity to serve approximately 190 additional residential units. Utilizing the most conservative assumptions there is insufficient capacity to service the remaining approved residential units in the municipality. Resolving the infiltration problems to the sewage system could however provide additional capacity to serve the existing draft approved residential units in addition to 235 residential units.

Background

The Municipality of Callander is in the process of updating their Official Plan. To assist the Municipality in their growth management objectives it is necessary to examine servicing capacity issues. The issue of servicing capacity has been discussed at recent Official Plan review meetings with representatives from the Ministry of Municipal Affairs and Housing (MMAH) and Ministry of the Environment (MOE). Correspondence has also been received from MMAH requesting information on remaining capacity available.

Managing and allocating capacities in the municipal Water Supply System and Sewage Treatment System is the responsibility of the Municipality of Callander. Municipal staff have authorized Meridian Planning to complete this Technical Memorandum to address the current available sewage capacity remaining in the Municipality's sewage lagoon.

In August 2004, Earth Tech (Canada) Inc. prepared a sewage lagoon capacity and sanitary sewer analysis for the Municipality of Callander. The report provided a summary of infiltration/inflow to the lagoon, sources of infiltration/inflow, reserve capacity of the lagoon, and potential impact of reduction of infiltration/inflow to the lagoon and potential increased lagoon capacity. In February 2005 a subsequent memo was provided by Earth Tech, modifying the original estimated uncommitted hydraulic capacity of the sewage lagoon. This information, along with updated building statistics is used to arrive at a reasonable estimate of uncommitted hydraulic capacity of the sewage lagoon.

Methodology

The calculation of available capacities must be completed in accordance with MOE Procedure D-5-1. The MOE Procedure D-5-1 (attached as Appendix “A”) sets out a methodology for calculating the uncommitted reserve capacity at Sewage Treatment and Water Supply Plants. The principle of the Procedure is that existing and committed development should not exceed the design capacity of the sewage and/or water

treatment systems. Municipalities should not recommend approval for development if the uncommitted reserve calculation has not been prepared and submitted according to the principles set out in the guideline.

The formulae contained in the Procedure accounts for non-residential (commercial, industrial and institutional) flows through the use of per capita flow volumes that include flows from all types of lands uses. Therefore, when calculating capacities for existing systems it is generally not required to calculate individual flows from non-residential land uses and developments.

A report prepared by Meridian in February 2005 on servicing capacity for the new elementary school in Callander examined the potential flows based on an estimated figure provided by Piotrowski Consultants Ltd. consulting on behalf of the Nipissing-Parry Sound Catholic District School Board. It was anticipated that the elementary school would generate flows of 34 m3/day. A review the water meter intake of the elementary school has found that the water flows, despite being less than effluent flows are substantially less than values projected for the facility. The flows actually generated are approximately 2.4 m3/day. This may partially be accounted for by the lower enrolment when the school was first occupied (less than 100 students) and the current population of 216 versus the maximum capacity of 279.

This assessment models the capacity after the Procedure D-5-1 guideline and account for the institutional use by means of a per capita flow figure of 450 l/day. The calculation of capacity therefore for the purposes of this assessment will continue to include all non-residential land uses within the capacity envelope.

Reserve Capacity Calculations-Earth Tech

Earth Tech Canada Inc. was requested by the municipality to complete a calculation of the uncommitted reserve capacities in the Callander Water Treatment Plan and Sewage Treatment Lagoon in accordance with MOE Procedure D-5-1. Earth Tech's (2004) report is attached as Appendix "B".

Earth Tech (2004) estimated the unreserved hydraulic capacity of the lagoon using two scenarios. The first scenario used the design capacity of the lagoon according to the Certificate of Approval (1,444 m3/d), and the second scenario used the available average daily capacity as determined by a survey conducted in May 2004 (1,260 m3/d). Earth Tech used an average daily per capita flow of 489 l/day and identified a population of 1,725 as currently connected to sewer and water services.

Based on the design capacity, Earth Tech indicated that the Callander sewage lagoon had an uncommitted hydraulic reserve capacity of 492 m3/d. Using the survey data, the uncommitted hydraulic reserve capacity was 308 m3/d.

Earth Tech estimated the unreserved hydraulic capacity of the lagoon at 308 m3/day could accommodate a population of 630 or 210 dwellings based on a household size of 3 persons.

It was concluded that reduction of the infiltration/inflow to the sanitary sewer system

could substantially increase the lagoon's uncommitted hydraulic reserve capacity by up to 448 m3/day.

In a revised memo, dated February 15, 2005 (Appendix C) from David Caverson, Project Manager from Earth Tech, the Callander sewage lagoon hydraulic reserve capacity estimates were modified. Based on the design capacity, the lagoon had an uncommitted hydraulic reserve capacity in February 2005 of 291m3/d. Using the survey data from May 2004 the uncommitted hydraulic reserve capacity was 107m3/d**.** The remaining capacity could accommodate a population of 238 or 95 residential dwellings.

Uncommitted Lagoon Reserve Capacity Forecast

The following table identifies the uncommitted lagoon reserve capacity as generated by Meridian. Calculations generated by Earth Tech in 2004 and 2005 with different assumptions are also provided.

	Hydraulic Reserve Capacity (m3/d)	**Existing Connected Population**	**Number of Households or Existing Residential Connections**	**Average Daily Per Capita Flow (m3/capita/ day)**	**Number of Unconnected Lots**	**Uncommitted Hydraulic Reserve Capacity (m3/d)**	**Potential Lots remaining based on reserve capacity**
Meridian Estimate 2005	1,444	1568	627	.450	336	214	190
Earth Tech Report 2004							
Scenario 1	1,444	1725	575	.489	74	492	175
Scenario 2	1,260***	1725	575	.489	74	308	12**
Earth Tech Memo 2005							
Scenario 1	1,444	1500	600	.569	210	291	133
Scenario 2	1,260***	1500	600	.569	210	107	0*

*Using 336 lots to be connected subtract 210 for 2005 and 30 homes connected in 2006 and 2007 (96 x2.5 per household size x 450l/day)

**Using 336 lots to be connected subtract 74 for 2004 and 51 homes connected in 2005, 2006 and 2007 (211 x 2.5 x 450l/d)

***Using survey data generated by Earth Tech

We have generated estimates of uncommitted hydraulic reserve capacity based on revised assumptions regarding per capita usage, connected population and household size. The 1,444 m3/day COA design capacity of the lagoon was used as a benchmark for calculating subsequent development.

The 2006 Statistics Canada population figure of 1,568 within the urban service area of Callander was initially used however a recent update of Stats Can figures indicate that the actual number is likely 10 per cent higher (1,725). This figure is the same as that Earth Tech used in their original estimates and higher than the 1,500 used in the February 2005 estimate. It would be most appropriate to use that population figure.

Estimated daily flows for a population of 1,568 was estimated to be 705,600 l/day

utilizing 450l/day per capita. Earth Tech utilized a 489 l/day per capita for 2004 and 569l/day per capita for 2005, which is higher than the 450 l/day per capita generally, estimated for usage. Earth Tech generated these numbers based on the surveyed infiltration to the sewage treatment facility.

Despite the Municipality incorporating some improvements with respect to infiltration and inflow to the sanitary sewer system the average daily per capita flow rate was increased by Earth Tech, which would appear to indicate that the infiltration problem had remained the same or worsened from 2004 to 2005. More precipitation in 2005 may account for the difference.

Earth Tech allocated 210 unconnected lots in their calculations for 2005 and only 74 unconnected lots in 2004.

According to the MOE Procedure D-5-1 guideline, in calculating the uncommitted hydraulic reserve capacity, municipalities should ensure that all unconnected servicing commitments such as the following are accounted for:

- vacant lots/units in registered plans of subdivision and condominium;
- lots/units in draft approved plans of subdivision/condominium;
- the maximum development potential of land (ie. Scale and density) as permitted under existing zoning;
- registered plans of condominium; and
- vacant lots created by consent in serviced areas.

We have reviewed all sewage commitments based on information provided by the Municipality and confirmed with MMAH. The following Plans of subdivision including Bay Ridge, Discovery Bay, Shannondale, and the New Osprey Development, and Osprey Links have been accounted for in the Callander Sewage Treatment System spreadsheet as attached in Appendix "D".

Of the 276 units in the Osprey Links Development, 188 have received final approval with 88 units remaining. Of the 188 that were final approved only 133 have been built (2006) which would result in a further 55 units requiring capacity, in addition to the 88 for a total of 143 units.

Allocation has been included for the Discovery Bay development despite there not being a municipal development agreement in place. Sewage allocation was withdrawn in April 2005 but there was no lapsing date on the plan of subdivision. The units are identified as requiring allocation.

The Shannondale development has been included in the capacity allocations. Sixteen of the original 40 approved units are now built. The developer chose to construct single-family dwellings on seven of the lots that were intended for semi-detached units. As a result, there are only 11 lots remaining, 5 of which are considered for singles and 6 lots, which are considered for 12 semi-detached units, for a total of 17 units. For Block 25, a single unit has been allocated. The total allocation has therefore been reduced to 18 units remaining requiring capacity.

There are 42 units in the New Osprey Development which will required servicing

capacity.

Lots/units remaining to be serviced through the approval of planning applications have also been included. Infill development has been included since 2004, accounting for 15 new units. Anticipated further infill development has been suggested to be 100 units. The total number of unconnected approved units in the municipality is 336.

Based on the assumptions above, and the 336 approved but unconnected units and 100 infill units, there is a theoretical estimated uncommitted hydraulic reserve capacity of 214 m3/d remaining in the sewage treatment system. This capacity can accommodate 190 dwelling units. This estimate however, does not acknowledge infiltration/inflow effects on sewage flows.

If we are to acknowledge performance issues with the treatment facility, and estimate that only 50% of the above capacity is available there would be remaining capacity for approximately 95 units.

The remaining capacity of 308 m3/day generated by Earth Tech in 2004 accounted for only 74 units approved units that were not connected to the plant. Current calculations of 336 approved but unconnected units and the 51 units were connected in the past three years result in capacity to serve 12 additional residential units in the sewage treatment system (in addition to the 336 units already committed).

The remaining capacity of 107 m3/day generated by Earth Tech in 2005 was based on 210 units approved but not connected to the plant. Using this capacity figure based on 336 outstanding units to be connected and acknowledging that 37 units were connected in the past two years, no remaining capacity remains.

In their calculations and survey work Earth Tech has determined that there is substantial infiltration that is reducing the capacity of the sewage treatment facility. As a result, annual capacity calculations will vary directly with precipitation and infiltration.

Earth Tech (2005) concluded that reduction of infiltration/inflow to the sanitary sewer system would increase the lagoon's uncommitted hydraulic reserve capacity by up to 448 cu/m/d which could accommodated a growth of 915 people or 305 dwellings. Improvements to the collection system were completed in 2006, reducing infiltration in the collection system, however inflow from roof leaders and sump pumps has not been removed from the system. For the purposes of this calculation we have assumed that system related infiltration represents one half of the total infiltration flow (224 cu/m/d). For the purposes of determining an appropriate capacity for future planning purposes an infiltration reserve of 224 cu/m/d should be used.

Conclusions

Based on theoretical estimates we have generated and work completed by Earth Tech there appears to be very little remaining capacity in the sewage lagoon system in Callander.

A best case scenario using the C of A design capacity of the lagoon (1,444 cu/m/d) as a

benchmark and a standard of 450l/d per person, 336 approved and unconnected units and 100 infill units generates a capacity to service potentially 190 additional dwelling units. However recent studies indicate that this calculation may be optimistic.

Utilizing the most conservative assumptions, including an infiltration reserve of (224 cu/m/d) and a lower capacity rating (1,260 cu/m/d) for the sewage lagoons, the known unconnected approved lots (336), there is insufficient capacity to service the committed units as the remaining capacity in the plant is only sufficient to service 230 of the 336 approved units.

It is acknowledged that there are performance factors in the system that need to be further monitored which may ultimately impact the remaining reserve capacity available to the Municipality. Resolving the infiltration issues could provide the Municipality with sufficient capacity to accommodate 235 additional residential units, in addition to those currently committed. It is very important to continue to address infiltration issues and to install a flow metre to measure total flows into the plant.

Municipalities are required to produce an annual report within 90 days of the end of each calendar year based on the calculations set out in the Ministry guideline. It is recommended that this memorandum be forwarded to the Ministry of Municipal Affairs and Housing for their review.