SEPTAGE MANAGEMENT OPTIONS

prepared

for

TOWNSHIP OF ALGONQUIN HIGHLANDS

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1.0 INTRODUCTION

The Township of Algonquin Highlands (Township) currently owns and operates one (1) hauled sewage disposal site within its geographical boundaries, which is known as the McClintock Septage Lagoon. The McClintock Septage Lagoon is located on Lot 1, Plan 19R-4134 and Lots 1 & 2, Plan 19R-7214 (known as Part of Lots 14 & 15, Concession 2, in the geographic township of McClintock), Township of Algonquin Highlands, County of Haliburton (Site).

The Site operates under the amended Ontario Ministry of the Environment (MOE) Environmental Compliance Approval (ECA) number 3746-8RRM8C, which came into effect on March 14, 2012. The newly amended ECA includes an allowance for the installation of a concrete screening box with a design capacity of 3.4 cubic metres (m^3), comprised of a gravity drained concrete tank with two (2) compartments divided by a steel bar screen to prevent non-sewage waste from entering the lagoon. As per the current ECA, the maximum allowable volume of septage to be received at the McClintock Site in a given year is 2,470 cubic m^3; however, according to operational records, the 10-year average for the amount of septage received at the lagoon is only 1,162 m^3, which is consistent with the calculated anticipated generation rate of 1,116 m^3 that is based on the population of the Township.

Considering that the 10 year average rate of septage received at the lagoon is only approximately one half of the design capacity of the lagoon, it was assumed that the existing lagoon was being underutilized due to the poor rate of exfiltration being insufficient to accommodate the rate of input. It is understood that the volume of septage disposed of into the lagoon was based on volumes reported by the septage haulers; however these volumes could not be verified. In September 2012, the Township instituted a policy where septage haulers could only dispose of septage by appointment so a representative of the Township could verify the volumes. Since this new policy was enacted, the lagoon has not been utilized by the haulers. According to the Township, the volume of the lagoon has decreased substantially during this time which leads to the speculation that the lagoon system may have been operated over its operation capacity before the appointment policy; however this is only speculation and cannot be verified.

It is unknown if the existing lagoon is functioning properly considering its perceived history of not operating at its design capacity and therefore being underutilized. Considering that the lagoon is not being utilized at this time and lagoon capacity is available, it may be prudent to verify if the lagoon could operate at its functional capacity.

Due to the perceived reduced operational capacity within the lagoon, the Township retained Cambium to study other options for managing septage within its geographical boundaries. This feasibility study builds from previous studies completed by the Township for septage management as well as offering some possible solutions for septage disposal at the McClintock lagoon site and adjacent lands.

1.1 BACKGROUND

The Township of Algonquin Highlands is a rural municipality located in Haliburton County in south central Ontario, approximately 30 kilometers (km) east of Huntsville. The Township was formed through the amalgamation of six (6) geographic Townships (Stanhope, Sherborne, McClintock, Livingstone, Lawrence and Nightingale) and occupies a total land area of 1,002 square kilometres (km^2). The Township is classified as a rural community, and according to Statistics Canada data from the 2011 Census, the permanent population is approximately 2,156; however, the seasonal population is estimated to be approximately five (5) times the permanent population. This yields an equivalent population of approximately 4,851 persons. There are 3,878 private dwellings in the Township; of those, 992 dwellings are occupied by permanent residents (Statistics Canada, 2011).

Currently the Township does not own or operate a municipal sewage or wastewater treatment plant and there are no municipally serviced areas for sewage in the Township. Septage is collected, transported and disposed of by private haulers. Septage is waste from a septic system tank, holding tank or portable toilet and is characterized as raw and untreated sewage that includes both the solids and liquids. While the Township owns and operates five (5) solid waste disposal facilities, neither septage or biosolids are accepted at any of these facilities. The only facility in the Township that operates as an approved sewage works for municipal and private septage is the McClintock Septage Lagoon.

1.2 SEPTAGE QUANTITY

The quantity of septage currently generated by the residents in the Township is estimated to be approximately 1,116 cubic metres (m^3) per year. The estimate was calculated by multiplying the equivalent population of the Township, as referenced in Section 1.1, by the average volume of 0.23 m^3 septage generated per person per year (CBCL Ltd. , November 2001). This rate is in line with the 10-year average for septage disposal in the Township. A previous rate of 12,956 m^3 was proposed in the 2005 Environmental Assessment undertaken by the Township which was determined by multiplying the average volume of a septic tank and how often the residents pumped their tanks by the number of residences found within the Township. The discrepancy between the rates is likely due to the number of seasonal residences within the Township and how often they would actually pump out their septic or holding tanks. Considering the 10-year average rate of reported septage disposal, the higher rate presented in the 2005 study may be too over-estimated, but could be deemed as an upset limit.

Using the documented rate of population increase of 9.1 percent (%) between 2006 and 2011, the equivalent population of the Township is projected to increase to 7,498 by 2036 (25 year planning horizon). With the increase in population, the volume of septage generated in the Township is predicted to increase to 1,725 m^3 over the same period. The existing McClintock lagoon/site has an approved capacity of 2,470 m^3; therefore it is in the best interests of the Township to not decrease the capacity for septage disposal with the Township. It is unknown at this time if the existing lagoon was in fact underutilized due to its perceived lack of operational effectiveness or

if the volumes disposed of in the lagoon were under reported. As such, any new option for septage disposal should be based on the existing capacity of the McClintock Lagoon with a possible option to expand the facility if the extra capacity is warranted.

1.3 REPORT OBJECTIVES

The objective of this report is to explore and present a list of potentially suitable options that will allow the Township to manage the septage generated within its boundaries over the long-term. The Township has expressed an explicit interest in utilizing the infrastructure already in place at the McClintock Site, by improving the overall operation and functionality of the existing system, expanding the existing lagoon, or implementing an alternative technology on the same Site. In addition to exploring these options, this report will also identify alternative solutions for consideration by the Township.

1.3.1 RELEVANT SOURCES OF INFORMATION

Several documents were accessed to obtain background information about the McClintock Site, which included:

- *2012 Performance Report for the McClintock Septage Lagoon* (Cambium Environmental Inc., March 2013)
- *McClintock Septage Lagoon Treatment Enhancement Feasibility Study* (Cambium Environmental Inc., October, 2011)
- *Environmental Study Report, Municipal Class Environmental Assessment, Hauled Sewage Management System* (SGS Lakefield Research Limited, August 2005)

2.0 REGULATORY PROCESS

2.1 ENVIRONMENTAL ASSESSMENT PROCESS

The Ontario Environmental Assessment Act, R.S.O. 1990 (EAA), is intended to ensure the betterment of the people of Ontario by providing for the protection, conservation, and wise management of Ontario's environment. The EAA provides a means by which the public can actively participate in planning and decision making for projects that have the potential to generate stakeholder interest, by providing local information and identifying local areas of concern. The public participation component also provides a mechanism whereby the proponent undertaking the project can provide detailed information about the project to the public.

In addition to the public consultation component, input is also sought from ministries and agencies which represent the public interest, such as the local conservation authority having jurisdiction, the health unit, public and catholic school boards, utilities, together with neighbouring municipalities, and applicable federal and provincial departments/ministries. The EAA applies to "enterprises or activities or proposals, plans or programs" undertaken for, or by public bodies and municipalities. It also applies to commercial and business enterprises and activities designated in the Regulations of the EAA.

2.2 MUNICIPAL CLASS ENVIRONMENTAL ASSESSMENT PROCESS

The Ministry of the Environment (MOE) has adopted a Class Environmental Assessment (EA) process, developed by the Municipal Engineers Association (MEA) (October 2000, as amended in 2007 & 2011). Under the MEA Class EA process, municipal road, water and wastewater projects can be planned, designed, constructed, operated, maintained, rehabilitated, and retired, without having to obtain project specific approval under the EAA. The Class EA approval process is the mechanism for ensuring that the process is followed carefully and is adequately documented.

The process provides for the identification, evaluation, and selection of a Preferred Alternative Solution for addressing deficiencies, problems, and opportunities, giving due regard to the need to protect the environment. The process includes the evaluation of several Alternative Options, determination of a Preferred Alternative Solution and identification and selection of a Preferred Design Option to implement the chosen solution.

There are four (4) Schedules under the MEA Class EA process, which correspond to the complexity of projects and the potential for environmental effects. Those projects with the greatest potential for environmental effects are classified as Schedule C, decreasing in complexity, cost and potential for environmental effects through Schedule B, Schedule A+ and Schedule A projects. Schedule A and A+ projects have limited potential for negative effects; therefore the requirements for these projects are minimal; however the proponent is required to notify the public of Schedule A+ projects. Public consultation is required for Schedule B and Schedule C projects.

2.2.1 SCHEDULE A OR A+ - PRE-APPROVED ACTIVITIES

The wastewater management project activities for which a proponent may proceed without following the procedures set out in the MEA Class EA document include the following (identified per the MEA Class EA document numbering):

1. Expand / refurbish / upgrade sewage treatment plant including outfall up to existing rated capacity where no land acquisition is required.
2. Install chemical or other process equipment for operational or maintenance purposes in existing sewage collection system or existing sewage treatment facility.
3. Provide additional treatment facilities in existing lagoons, such as aeration, chemical addition, post treatment, including expanding lagoon capacity up to existing rated capacity, provided no land acquisition nor additional lagoon cells are required.
4. Expansion of the buffer zone between a lagoon facility or land treatment area and adjacent uses where the buffer zone is entirely on the proponent's land.
5. Dispose of, utilize, or manage biosolids on an interim basis (e.g. further treatment in drying beds, composting, temporary holding at transfer stations), at:
   a) An existing sewage treatment plant where the biosolids is generated, or
   b) An existing landfill site, incinerator or organic soil conditioning site, where the biosolids is to be utilized or disposed of.

2.2.2 SCHEDULE B - ACTIVITIES SUBJECT TO THE SCREENING PROCESS

The Schedule B activities for wastewater management projects (identified by their numbering per the MEA Class EA document), having completed Phases 1 and 2 of the planning process, are included to be approved subject to Screening. If the screening process, through Phases 1 and 2, results in other requirements of this Class EA being applicable, then those requirements must also be fulfilled. Note that two points of contact with the public are mandatory under the screening process.

1. No. 4 - Establish sewage flow equalization tankage in existing sewer system or at existing sewage treatment plants, or at existing pumping stations for influent and/or effluent control.
2. No. 5 - Add additional lagoon cells or establish new lagoons, or install new or additional sewage storage tanks at an existing sewage system, where land acquisition is required but existing rated capacity will not be exceeded.
3. No. 27 - A new holding tank that is designed for the total retention of all sanitary sewage disposed into it and requires periodic emptying.

2.2.3 SCHEDULE C - ACTIVITIES SUBJECT TO THE FULL PLANNING PROCESS OF THE CLASS EA

The following Schedule C activities for wastewater projects are required to follow the planning procedure outlined in the MEA Class EA document (as per their listed numbering):

1. Construct new sewage system, including outfall to receiving water body and/or a constructed wetland for treatment.
2. Construct new sewage treatment plant or expand existing sewage treatment plant beyond existing rated capacity including outfall to receiving water body.
3. Establish new lagoons or expand existing lagoons or install new or additional sewage storage tanks which will increase beyond existing rated capacity.
4. Provide for land application of sewage effluent through spray irrigation system or overland flow.

Discharge of sewage from lagoons or dewatering trenches would be deemed overland flow in Activity 4.

2.3 PROVINCIAL APPROVALS

In Ontario, sewage systems are approved either under the Ontario Water Resources Act (OWRA) or under the Environmental Protection Act (EPA). In general, a sewage system which discharges treated effluent to a surface water requires approval under Section 53 of the OWRA. Handling, transportation and storage of sewage and septage are regulated under Part V of the EPA, whereby generators/haulers of untreated septage are required to obtain approval to collect, transport and treat hauled sewage.

The MOE imposes standards and conditions under Ontario Regulation 347 (O. Reg. 347) for untreated septage, which is regulated as a waste under the EPA through the Environmental Compliance Approval (ECA) process. A Waste Management System ECA is required to transport sewage biosolids and septage and for the land application of untreated hauled sewage. An ECA or an amendment to an existing ECA is required for storage and disposal of septage at a waste disposal site.

Other approvals that are indirectly related to waste management systems may apply depending on the type of facility or operations selected. Air emission controls require an ECA (Air) under the EPA, stormwater management projects may require an ECA under the Ontario Water Resources Act (OWRA), for example. Outside of the requirements of the EPA, additional approvals are required for land application of sewage biosolids under the Nutrient Management Act.

2.4 MUNICIPAL APPROVALS

The Municipal Act and the Planning Act define the powers and responsibilities of municipalities under which they may operate. The Municipal Act provides the municipality with the ability to manage septage generated within its

geographical boundaries, while the Planning Act establishes the requirement for municipalities to provide sewage services.

According to the Township Official Plan (OP), the current McClintock Site is zoned as Waste Management Industrial, while the surrounding lands are zoned as Wilderness, indicating that these lands owned by the Crown. The Site and surrounding lands are also located in an area identified as Mineral Aggregate Resources. The OP permits the establishment of waste or sanitary landfill sites including sewage treatment sites and hauled sewage disposal sites within both of these zones. Section 5.7.5 of the OP goes on to state that "no waste disposal facility will be located within 500 metres of development other than compatible uses, such as an aggregate operation, a forestry use or a suitable industrial use, after the evaluation of the presence and impact of any adverse effects or risks to health and safety and the identification of any necessary remedial measures has been completed". As referenced in Section 5.7.6, waste disposal assessment areas will be identified as lands within 500 metres of the perimeter of an existing or previous waste disposal site to ensure that any future development will occur in a manner which is cognizant with the historical use. The implementation of these sections of the OP serves to encourage the expansion of waste disposal sites, rather than the development of new sites, provided that there are not incompatible land uses within the immediate vicinity of an existing site that would infringe upon the 500m buffer of a proposed expansion. It should be noted that there are no identified settlement areas in the vicinity of the Site (within 1,000 m) and the closest area identified as waterfront development is approximately 1,000 m from the limit of the Waste Assessment Area, which is a 500 m buffer around the existing McClintock Septage lagoon.

An expansion of the existing McClintock Site outside of its approved boundaries or the establishment of a new site adjacent to the Site for the storage, treatment or disposal of septage, would require an amendment to the Township OP and the Zoning By-law.

3.0 PREVIOUS CLASS EA PROCESS

In 2005, the Township completed a MEA Class EA process to determine the most suitable solution to manage hauled sewage generated in the Township (SGS Lakefield Research Limited, August 2005). At that time, the process was completed as a Schedule C project according to the MEA process. Through the previous Class EA process, several alternative solutions were screened and subsequently evaluated. For a variety of reasons, some of the alternatives were determined to be unsuitable for the Township at that time.

It should be noted, that in the previous Class EA, the volume of hauled sewage was estimated to be significantly greater than the currently documented average for the Township of 1,116 m^3. The volume used in the previous Class EA did not differentiate between seasonal and permanent residents, and estimates were based on the maximum design capacity for septic systems for all residences, rather than the population of the Township. The current estimates are considered to be accurate of conditions in the Township, and are appropriately conservative for planning purposes.

The table below includes a summary of alternatives that were screened under the previous Class EA, as well as a brief description of the suitability of each option as determined through that study.

Table 1 Options from 2005 MCEA – Hauled Sewage Management System

Alternative Solution	Description of Suitability	Viable Option in 2005
Do Nothing	Did not address the problem statement.	No
Export Hauled Sewage		
To the Minden Hills Sewage Treatment Plant	The Township of Minden Hills Council passed a resolution to restrict the acceptance of hauled sewage from the Township of Algonquin Highlands.	No
To the Dysart et al Sewage Treatment Plant	The Township of Dysart et al provided written confirmation that the use of their treatment facility would not be open to the Township of Algonquin Highlands.	No
To the Leslie M. Frost Centre Sewage Treatment Plant	Facility was determined to be out of date and not in compliance with MOE standards.	No
To the Centre for Alternative Wastewater Treatment (CAWT) at Sir Sandford Fleming College	A partnership with the CAWT would allow the Township a means to treat wastewater in the short-term, and the CAWT would have access to the substantial volume of hauled sewage necessary to conduct research.	Yes; as a short term/interim solution
Cooperate in the Development of a Centralized Treatment Facility	The Townships of Dysart et al, Minden Hills and Highlands East own and operate wastewater treatment facilities within their jurisdictions to service their residents. As such, none of these Townships could foresee a benefit in cooperating with the Township of Algonquin Highlands to develop a central treatment facility and declined any involvement.	No
Construct a Facility on Lands in the Township of Algonquin Highlands		
Barry Line Site	Incompatible with the existing land use designations.	No
North Shore Aggregate Pit	Incompatible with the existing land use designations.	No
Bell Aggregate Pit #2	Incompatible with the existing land use designations.	No
Mason Site	Incompatible with the existing land use designations.	No

Hawk Lake Waste Disposal Site	Appropriate zoning.	Yes
Maple Lake Waste Disposal Site	Appropriate zoning	Yes
Construct a Facility on Lands in Another Municipality		
Pine Springs Waste Disposal Site	Initial screening determined the site suitable due to land ownership, appropriate zoning, and no residential uses nearby. Considerable public opposition.	Yes
Hindon Access Road Site	Suggested by a member of the public. Location unknown.	No

As a result of the screening of the options listed above, two (2) preliminary preferred solutions were identified as follows:

- OPTION "A" - A short-term alternative involving the construction of a transfer facility for initial collection and settling of solid and liquids, prior to the transport of effluent for treatment at the CAWT. The transfer station would be constructed at the Hawk Lake, Maple Lake, or Pine Springs waste disposal sites.
- OPTION "B" - A long-term alternative involving the construction a hauled sewage treatment facility at the Hawk Lake, Maple Lake, or Pine Springs waste disposal sites.

Through further evaluation, due to capacity restrictions at the CAWT, Option A was determined to be unsuitable; therefore, the remaining option that was evaluated under the previous Class EA was Option B.

Hawk Lake was deemed to not be suitable due to several residents being in close proximity (300 m) to the site. The Pine Springs WDS was a favourable technical selection, however was not selected as it is located just outside the Municipality and there was a strong public opposition to this option.

Several alternatives for the hauled sewage treatment facility were investigated, and included lagoons, constructed wetlands and advanced treatment systems (ATS; i.e. package plants). Ultimately, the preferred solution identified in the previous Class EA was for the construction of an ATS at the Maple Lake Site. However due to the limited area for the disposal system at this location, the construction of the ATS did not proceed at the Maple Lake Site.

4.0 ALTERNATIVE SOLUTIONS

The following alternative solutions address the various options for septage management in the Township of Algonquin Highlands. To date there already has been considerable effort completed by the Township to find a solution for septage management in previous studies; however no viable solutions presently exist from the previous studies to increase the capacity for management of septage generated within the Township. The alternative solutions presented herein focus on either upgrading or expanding the existing McClintock Lagoon site; providing alternative methods for disposal of septage sludge from the lagoon (to be used in conjunction with dewatering or treatment at the McClintock site); or transport of septage to an approved facility for disposal.

4.1 DO NOTHING (STATUS QUO)

The "Do Nothing" scenario is required to be considered under the EA process in Ontario for MEA Class EA's and individual EA's. In this case, the "Do Nothing" solution would be to continue to rely on private septage haulers to service residents. The private haulers would continue to be required to secure a solution for septage treatment, storage or disposal, which may or may not include use of the McClintock Site. The McClintock Site would continue to operate in its limited capacity, with periodic unscheduled closures due to the perceived issue of the reduced rate of exfiltration.

The "Do Nothing" Alternative Solution does not address concerns regarding increasing the storage capacity and treatment of hauled sewage generated within the Township and will leave many residents and haulers with few cost effective options for disposal of their hauled sewage.

4.2 OPTIONS FOR EXPANSION OR UPGRADE AT THE MCCLINTOCK SEWAGE LAGOON SITE

4.2.1 EXPANSION OF EXISTING STABILIZATION LAGOON

Stabilization lagoons are designed to treat septage to MOE standards and are considered a suitable option for treating septage in rural settings. The existing lagoon facility is owned and operated by the Township for use by local septage haulers. There is no electrical service currently at the McClintock Site. Haulers are required to pay a disposal fee in order to utilize the Site, and to make a disposal appointment with the Township each time they intend to deposit septage at the Site.

In order for the Township to increase the capacity of the McClintock lagoon, by increasing the volume of the lagoon or constructing an additional lagoon cell, an amendment to the site ECA is required. As per the MOE documents entitled the *Introductory Guide to Applying for an Environmental Compliance Approval* (Ministry of the Environment, 2011) and the *Guide for Approval of a Hauled Sewage (Septage) or Processed Organic Waste*

(Biosolids) Waste Disposal Site (Ministry of the Environment, 1999), the following supporting documentation is required to accompany all ECA applications for sewage works, at a minimum:

- Operational Plan including Water Monitoring Program
- Hydrogeological Assessment
- Closure Plan
- Contingency Plan

Due to the existing lagoon at the McClintock Site, several of these documents may have already been prepared; however, they would need to be updated to reflect any proposed expansion, especially if there is a capacity expansion or additional land is incorporated into the site.

An expansion could include increasing the volume of the existing lagoon, or constructing an additional lagoon cell adjacent to the current lagoon or in an alternate location on the Site.

The Ministry of the Environment is currently working on a guideline document for septage lagoon design; however this is not available at this time. A two (or more) celled lagoon system would allow for the settlement of solids in the primary lagoon and exfiltration of effluent in disposal cell(s). The primary lagoon would be required to be lined to allow for the treatment of the septage to the required MOE criteria prior to discharge to the environment through surface water or an engineered exfiltration cell(s). The effluent criteria for septage treatment prior to exfiltration would be established through a hydrogeological assessment reviewed and approved by the MOE.

Power requirements for a lagoon system depend on the type of system. A facultative lagoon system does not require power, while aerated lagoons require at a minimum single-phase power. Lagoon systems can be designed to be gravity fed between cells. In order to gravity feed the cells, an elevation drop in the landscape is necessary. If the natural landscape does not account for an elevation drop, it is possible to build the elevation drop into the system by distancing the individual lagoon cells from each other, increasing the amount of land required.

For any of these scenarios there appears to be insufficient contaminant attenuation zone (CAZ) to allow for natural attenuation of potential pollutants on the Site; therefore, additional land surrounding the current site would need to be acquired for this purpose. Considering the close proximity of the road and the existing down-gradient property boundary, the location of any additional lagoons/cells would likely have to be situated further away from the existing road, and likely within 500 m of the current lagoon; however this distance is arbitrarily based on capitalizing on the historical presence of the existing lagoon with the surrounding land users who may object if a new disposal system is located in a new area instead of being perceived as an expansion or replacement of the existing system. Topography of the site could support a gravity fed system from a primary lagoon/cell to a

secondary lagoon/cell and/or addition disposal system to an area away from the road, subject to this land being acquired.

In order to expand the existing lagoon system or construct a replacement system on adjacent lands, a Schedule C Class EA would be required to be completed.

A hydrogeological assessment for the site would be required to determine the suitability of utilizing an exfiltration facultative lagoon for septage disposal. The purpose of the hydrogeological assessment is to determine the following:

1. On-site soils are suitable for exfiltration from the lagoon;
2. The base of the lagoon can meet the minimum separation distance of 1.5 m that is required to be between the water table and the bottom of the lagoon to allow for effective effluent treatment;
3. Water quality will comply with all applicable MOE water quality protection policies during Site operation.

An intrusive investigation will have to be undertaken in the proposed area where the proposed lagoon would be constructed to assess the items above. The surrounding geological conditions have been investigated for the existing lagoon site and are described in the Annual Monitoring Report. The McClintock Lagoon is situated within a glacio-fluvial deposit consisting primarily of sand with some silty and gravely layers, as determined through interpretation of the borehole logs. Depth to bedrock is greater than 11.5 metres. Water table elevation in the immediate vicinity of the lagoon cell is between 3.0 and 4.0 meters below ground. At distances from 55 to 100 meters down-gradient from the lagoon cell the water table is between 1.0 and 2.0 meters below ground.

Facultative lagoons are is usually 1.2 m to 1.5 m deep with an aerobic water layer overlying an anaerobic layer, which contains the settled sludge. According to available information on surficial soils in the area, exfiltration cells or a subsurface disposal system for the new lagoon would be feasible. According to MOE guidance, the primary treatment lagoon would have to be lined to allow for treatment of the septage in the lagoon, with exfiltration cell(s) disposing of the treated effluent.

The lagoon would be required to have a capacity suitable for the projected annual septage rate from the municipality of 2,470 m^3/year. Considering that the lagoon would have a minimum operating depth of 1.2 m, this equates to an area of 2,058 m^2, or with a diameter of 51.2 m.

A hydrogeological assessment should be completed to confirm the soil stratigraphy in the vicinity of the proposed new lagoons, as well as the percolation rate of the native soils and the approximate depth to the water table, or conversely, to ensure that the water table is not located within 1.5 m of the ground surface. The hydrogeological assessment would also have to establish the effluent criteria for septage treatment within the lagoon, to allow for discharge of the treated effluent to the environment.

4.2.2 EXISTING LAGOON ENHANCEMENTS

Enhancements to the existing lagoon would be intended to reduce the amount of septage solids in the lagoon; thereby, allowing the current system to operate at the original design capacity, assuming that the existing lagoon is underperforming. Additionally, there are several new and existing technologies to minimize or eliminate the heavy layers of 'scum' that have been observed by municipal staff on the lagoon surface, allowing for more efficient breakdown of the solids in the lagoon.

Several technologies currently available to enhance the exfiltration rate of the lagoon were identified in the document entitled "*McClintock Septage Lagoon Treatment Enhancement Feasibility Study*" (Cambium Environmental Inc., October, 2011). Two of the options were implemented at the Site, including the installation of two (2) Geotubes and the use of the Bio-Dissolve additive. The remaining options include the following:

- Blue Frog™ Technology
- Little River Pond Mill® Technology

A brief description of each of the technologies is included below.

4.2.2.1 BLUE FROG™ TECHNOLOGY

The Blue Frog™ system, is promoted as an efficient mixer and passive aerator for septage that provides a flow through the system of up to 26,500 m^3 (5,828,717 imp. gal) per day, and has the ability to layer the treated water. The system operates by a gear motor that is rated at 3 horsepower (HP) and the suppliers claim the units reduce biochemical oxygen demand (BOD), ammonia, total suspended solids (TSS) and pathogens, and promote in situ sludge reduction. It is reported that by reducing the thickness of the top sludge layer (i.e. surface scum), the rate of sludge digestion is controlled.

There are several modifications to this system that can be added on to the base unit for site specific optimization of treatment. This technology would require an electrical connection be installed at the Site.

4.2.2.2 LITTLE RIVER POND MILL® TECHNOLOGY

The Little River Pond Mill® Technology (LRPM) offers a variety of circulator units that force the septage liquid to flow through a circuit. The supplier claims that the LRPM technology exceeds the performance of similar equipment with respect to energy conversion, flow volumes, and efficiency/effectiveness. As with the previous two enhancement options, the LRPM units are installed across Canada including municipal wastewater facilities in Ontario. While there are solar, wind, and electrical options available for this technology, due to site conditions at the McClintock lagoon, the electric system would be the most suitable for the Township, however an electrical connection would have to be installed at the Site.

4.2.3 DEWATERING TRENCH SYSTEM

Septage dewatering trenches are commonly used in rural Ontario, and consist of a single or series of long narrow trenches that are excavated in permeable soils for the purpose of dewatering septage prior to final disposal. The dewatered solids remaining in the trenches after exfiltration of liquid into the permeable soils can be disposed of in an approved landfill or can be processed further to allow for land application.

As compared with some of the other potential alternative solutions, the cost to construct and operate a trench system is relatively low. Technical requirements are also minimal, provided that soil conditions are conducive to exfiltration. A large footprint is required to support a trench system, since the trenches are significantly shallower than a lagoon. Maintenance of trenches is simpler than maintenance of a lagoon, due to the cyclical clean-out schedule of trenches and the more rapid exfiltration time. A trench system could be designed to provide adequate future capacity at a new site or as an expansion to the existing lagoon facility, and could be managed by the Township. Additionally, trench systems do not require electrical power to function; therefore, are well suited to remote sites, such as the McClintock Site, that do not have power connections. Furthermore, due to the modular nature of the trenches, additional capacity can be added to the site in the future if this is required by increased growth within the Township; therefore the capital expenditure for constructing the system is less than other options such as lagoons or an ATS, as the system could be designed to a smaller capacity and increased at a later date if required.

The installation of a trench system at the Site could be used as a separate treatment system, or could serve as a secondary treatment process following primary settling of septage within the existing lagoon. While it may be possible to establish a gravity fed connection between the two treatment types, operationally, the system would have to be more accurately controlled by scheduled inputs of septage to each trench. Typically, approvals for trench sites involve conditions such as a maximum volume of septage that can be discharged to a trench within a given period, a minimum rest period for each trench, and a trench clean-out schedule ensuring that the permeability of the underlying soils is maintained. For these reasons, a gravity fed system connected to the existing lagoon may be challenging to control adequately considering that there is no electrical connection at the site however manual or solar powered controls may be possible to implement. Using the trench system as a secondary treatment option, whereby the liquid from the lagoon would be transferred to the trenches as required, would allow for more regular maintenance of the lagoon as well as rapid infiltration of the previously settled liquid within the trenches. Importantly, the existing infrastructure surrounding the existing lagoon (i.e. trash screen) would remain effective, and there would be little change for haulers who would continue to discharge septage at that single receiving point.

If gravity feed is not possible at the site connecting the lagoon with the trench system, the trench system would likely have to be operated independently of the lagoon system or alternatively, the effluent would have to be pumped from the lagoon to the trenches. Although electrical service would be the easiest method to power the

pumping system, it would not necessarily be required to establish a pumping system of this type; the necessary pumping from the lagoon to the trenches could be accomplished using a generator powered pump.

In order for the Township to construct a trench system at the McClintock Site, an amendment to the site ECA would be required. As per the MOE documents entitled the *Introductory Guide to Applying for an Environmental Compliance Approval* (2011) and the *Guide to Disposal of Septage in Dewatering Trenches* (2008), the following supporting documentation is required to accompany all ECA applications for a septage dewatering trench system, at a minimum:

- Operational Plan including Water Monitoring Program
- Hydrogeological Assessment
- Closure Plan
- Contingency Plan

The suitability of the McClintock Site for the trench expansion has not yet been determined; however if this site is determined to be suitable, a Schedule C Class EA would be required to be completed. A Schedule C EA is required to allow for land application of sewage through spray irrigation or overland flow, which includes the activities associated with operating a trench facility. For the installation of trenches to be suitable at the McClintock Site, the acquisition of additional land surrounding the existing facility would be required to situate the trench system and to provide an adequate CAZ.

A hydrogeological assessment for the site would be required to determine the suitability of utilizing dewatering trenches for septage disposal. The purpose of the hydrogeological assessment is to determine the following:

1. On-site soils are suitable for dewatering trench operations;
2. The trench can meet the minimum separation distance of 1.5 m that is required to be between the water table and the bottom of the trenches to allow for effective effluent treatment;
3. Water quality will comply with all applicable MOE water quality protection policies during Site operation.

An intrusive investigation will have to be undertaken in the proposed area where the trenches would be constructed to assess the items above. The surrounding geological conditions have been investigated for the existing lagoon site and are described in the Annual Monitoring Report. The McClintock Lagoon is situated within a glacio-fluvial deposit consisting primarily of sand with some silty and gravely layers, as determined through interpretation of the borehole logs. Depth to bedrock is greater than 11.5 metres. Water table elevation in the immediate vicinity of the lagoon cell is between 3.0 and 4.0 meters below ground. At distances from 55 to 100 meters down-gradient from the lagoon cell the water table is between 1.0 and 2.0 meters below ground.

If the soils are consistently similar in the area where the trenches would be located with the soils identified at the existing lagoon, then dewatering trenches would be feasible. The assumed percolation rate for the soils would 10 min/cm, which would result in a maximum single application rate per week of 75 L/m^2.

Dewatering trenches should be long and narrow to be most effective, with a separation distance of 5 to 10 m between the trenches. According to MOE design Guidelines, trenches should be no longer than 75 m, no wider than 3 m and no deeper than 1 m (MOE, 2008). The bottom of all trenches should be graded to slope away from the location where septage is discharged into the trench. A splash plate or chute is required to dissipate the energy of the liquid entering the trench as well as a screen to ensure that foreign objects are separated from the septage. A minimum separation distance of 1.5 m between the bottom of the trench and the water table is required. The volume of the septage discharged into each trench should not exceed five (5) times the trench holding capacity within a 12 month period. After the 12 month period, the trench should lie dormant for a period of 12 months to allow the septage to dewater after with the dried residue can be removed and disposed of at an approved waste disposal facility. Approved waste disposal facilities include:

1. A landfill approved for the final disposal of septage or dewatered septage residue;
2. A waste processing site approved to receive septage or dewatered setage solids residue;
3. An organic soil conditioning site approved for land application of dewatered septage as a soil conditioner for agricultural purposes;
4. A farm field included as part of an approved Nutrient Management Plan to receive land applied nutrients in accordance with the Nutrient Management Regulation.

The volume of septage to be created in the Municipality annually is projected to be 2,470 m^3/year. Assuming a maximum trench size of 75 m long, 1 m wide and 1 m deep, a total of 20 trenches would be required to provide enough capacity for the projected annual volume of septage. With the required separation distances between the trenches, an area of 8,625 m^2 (75 m x 115 m) would be required, with an additional minimum separation distance of 100 m from the nearest property lot line.

An on-site intrusive investigation should be completed to confirm the soil stratigraphy in the vicinity of the proposed septage trenches, as well as the percolation rate of the soil at a depth of 1 m and the approximate depth to the water table, or conversely, to ensure that the water table is not located within 2.5 m of the ground surface.

4.2.4 ADVANCED TREATMENT SYSTEMS

Advanced Treatment Systems (ATS), or package plants, rely on aerobic digestion processes for the treatment of the primary effluent. In an ATS, the sewage is initially collected in a primary tank to settle out the solids. This allows the ‘liquor”, or effluent, to be filtered prior to flowing into a dosing tank. There are a variety of ATS systems available. Each system uses a different bioreactor and media.

Aerobic digestion is a process in which suspended and dissolved organic matter is broken down by micro-organisms in an oxygenated environment. In addition to the breakdown of organic matter, the aerobic digestion process reduces the presence of pathogenic micro-organisms. Most organisms found in wastewater thrive in the human digestive system, an anaerobic environment in which oxygen is not prevalent. These same pathogens are not well adapted to oxygenated conditions and therefore die in an aerobic environment as a result of exposure to oxygen. Aerobic systems are often used because they can treat high quality effluent, which may be disposed of through conventional disposal trenches, drip irrigation, or sprayed on top of the ground.

In order for the Township to construct an ATS at the McClintock Site, an amendment to the site ECA would be required. As per the MOE documents entitled the *Introductory Guide to Applying for an Environmental Compliance Approval* (2011) and the *Guide for Approval of a Hauled Sewage (Septage) or Processed Organic Waste (Biosolids) Waste Disposal Site* (Ministry of the Environment, 1999), the following supporting documentation is required to accompany all ECA applications for sewage works, at a minimum:

- Operational Plan including Water Monitoring Program
- Hydrogeological Assessment
- Closure Plan
- Contingency Plan

The following sections provide a general description of two types of advanced treatment systems, the Waterloo Biofilter® and the Fixed Activated Sludge Treatment (FAST)™ System package plants. These systems have only been identified as representative technologies, capable of effectively treating highly concentrated hauled sewage, it should be noted that a specific type of ATS has not been recommended. The examples are given merely to provide a context for discussions involving ATS. Previously an ATS was selected as the preferred option at the Maple Lake WDS. The lands adjacent the McClintock Lagoon site would also be suitable for the installation of an ATS; however it should be noted that all of these ATS technologies will require an electrical connection to operate as they require pumping systems and air blowers to oxygenate the effluent.

4.2.4.1 WATERLOO BIOFILTER®

Dr. Craig Jowett at the University of Waterloo, in Waterloo, Ontario developed the Waterloo Biofilter in 1991. Through extensive laboratory and field testing it was determined that a non-biodegradable foam filter media could provide an effective medium for treating wastewater. The Waterloo Biofilter® is a patented trickle-filter type treatment system which uses the foam filter medium to treat residential and industrial wastewater. Wastewater is sprayed intermittently onto the medium and is allowed to drain through by gravity. Organic biomass grows quickly within the medium after start-up, oxidizing organic material and nitrifying ammonia in the wastewater as it passes over the biomass layer. Because the Biofilter medium is contained in a tank, it is effective under all soil or

drainage conditions. The technology accommodates specific add-ons to remove nitrogen, phosphorus, and pathogens.

4.2.4.2 FAST SYSTEM™

FAST™ is an acronym for Fixed Activated Sludge Treatment. Within the FAST™ system, a colony of bacteria, also known as the biomass, breaks down the biodegradable waste into carbon dioxide and water. The system is a fixed film aerated system utilizing a combination of attached and suspended growth that is capable of performing nitrification and denitrification. An above ground blower pumps large amounts of air into the treatment tank. The air forces the wastewater up over the honeycomb shaped plastic media. The bacteria become fixed to the media surface and feed on the incoming waste. The FAST™ wastewater treatment system is a pre-engineered modular wastewater treatment system designed to treat high strength wastewater.

4.3 OPTIONS FOR SEPTAGE SLUDGE OR RESIDUE DISPOSAL

Many of the options presented above separate the solid component from the septage during the dewatering treatment process, leaving a residue of organic material behind (i.e. dewatering trenches or Geotube). This organic residue is required to be disposed of. The storage and treatment of septage in a lagoon would also lead to the accumulation of sludge material, which would have to be intermittently pumped out and removed from the lagoon. The following options are offered for disposal of the dewatered septage residue or sludge.

4.3.1 LANDFILL DISPOSAL

In many ways landfill disposal offers the simplest solution for septage residue or sludge management as they utilize a pre-existing disposal facility. The capital outlay for landfill disposal is also less than constructing a new disposal facility; however, over the long term landfilling may not be the most cost effective option as it reduces the landfill capacity.

Septage sludge or residue is disposed of at landfill sites more often than raw septage as raw septage requires a treatment and disposal system at the site. Landfill disposal (including raw septage, sludge or residue) does have significant disadvantages, although the dewatering process utilizing dewatering methods (lagoons, Geotubes or trenches) does eliminate or lessen several of these, which include:

- the potential for public complaints as a result of odours from waste site users
- the consistency of septage that has not been dewatered may create operational issues at the disposal site depending on the frequency and volume of material disposed

- the beneficial nutrient and organic material content of the septage is lost (as compared with composting of land application)
- an increase in methane gas production within the waste mound
- potential for groundwater or surface water impacts
- use of valuable waste disposal site capacity
- an amendment to the ECA for the receiving waste site(s) would be required

As discussed in Section 3.0, several landfill sites were previously investigated as options to manage septage generated in the Township, and included Maple Lake, Hawk Lake and Pine Springs waste disposals sites. The intent of the previous study was to collect, treat and dispose of the septage at one single location. While under the previous EA the alternatives evaluated included the construction of an advanced treatment facility at these existing waste disposal sites for the treatment and disposal of the septage, the information obtained through that process remains relevant, and can also be updated to reflect changes that have occurred at these sites since 2005. The summary below provides relevant information with respect to the suitability of each of the previously considered waste disposal sites for the development of a hauled sewage management facility.

Maple Lake No restrictions were identified in the 2005 EA, however after completion, it was deemed that there was not enough land area available to support the ATS system at the Maple Lake WDS therefore this option was considered to be no longer viable.

Hawk Lake Residential dwellings located approximately 300 metres (m) from this site. Due to close proximity to residences, this site was determined not to be suitable.

Pine Springs The evaluation completed in 2005 concluded that the adjacent provincially significant Pine Springs Wetland Complex limits the area available for development as a hauled sewage facility at this site. There was considerable public opposition to the establishment of a facility at this location; which combined with the environmental limitations make this site unsuitable for a hauled sewage facility.

While none of the available landfill sites appear to be viable solutions for the installation of a septage management facility based on various technical reasons (Maple Lake WDS) or public opposition (Hawk Lake and Pine Springs), these locations are suitable options for the disposal of septage sludge or dewatered solid material as waste material within the landfill. An amendment to the landfill CofA may be required to accept the dewatered septage residue.

4.3.2 LAND APPLICATION

The Nutrient Management Act (2002) and Ontario Regulation 267/03 (O. Reg. 267/03, as amended) regulate the agricultural land application of materials which contain nutrients, including non-agricultural source materials (NASM) that can be used as a soil amendment (i.e. septage sludge). Untreated septage cannot be applied to agricultural land in Ontario, and the MOE is considering a complete ban on the land application of untreated septage. At present, O. Reg 267/03 (as amended) states that the land application of untreated septage can only be approved in accordance with an ECA issued under Part V of the EPA. Under the Guide for Applying for Approval of a Hauled Sewage (Septage) Waste Disposal Site (Ministry of the Environment, 1999), the MOE District Office may grant approval for proposed land application or disposal sites. It is estimated that there are approximately one million septic systems in Ontario, and that 60% of the septage generated is land applied. The remaining 40% is treated at municipal wastewater treatment facilities, or dedicated septage processing facilities.

Many of the septage management options discussed in the preceding Sections result in the production of septage sludge that requires management in the form of further processing, storage or disposal. The septage sludge is primarily generated through the dewatering of septage. The NMA regulations prohibit the application of treated septage and sewage sludge (biosolids) to land between December 1 and March 31, or at any other time when the soil of the land is snow covered or frozen. Due to this prohibition, a processing and storage facility is required if land application is the primary means of septage disposal.

At present, all land application of septage within the Township is managed by private haulers. While there may be land application taking place within the Township, at this time there is no estimate as to the volume of material that is land applied, or where. Should the Township choose to proceed with land application as a primary means of septage disposal, it is recommended that the Township require reports to be provided from the haulers to identify the quantity and quality of septage applied, and to what lands. An active monitoring program should be implemented concurrently with a land application program, to ensure that haulers are obtaining the necessary approvals under the EPA and NMA, and that the septage has achieved an appropriate level of treatment.

The cost of this method of treatment and disposal is estimated to be less than the cost of operating a sewage treatment plant, however costs vary depending on private landowner agreements for disposal. This method would also be used in conjunction with the existing septage lagoon for disposal of septage sludge. Furthermore, this method has been in practice in areas with large agricultural areas, and there may be a lack of suitable sites to adequately dispose of the capacity of the treated septage from the Municipality.

4.3.3 ALKALINE STABILIZATION

Treatment of the septage is required to make the material suitable for land application. One method to treat the septage (dewatered or raw) is using alkaline stabilization, which involves the addition of lime or alkali to the septage to increase the pH to at least 12 for a time period of thirty (30) minutes to effectively reduce pathogen

content and odour emissions. Alkaline stabilization can take place at a stationary storage facility or within a specially designed septage haulage truck. Mixing is required to ensure even distribution of the lime or alkali throughout the septage, and based on the consistency of the material, screening can be provided to prevent the inadvertent transfer of waste materials (i.e. paper, feminine products) to the land application site.

Alkaline stabilization has been implemented successfully in the United States for many years, and the MOE released a Draft Guide to Alkaline Stabilization of Domestic Septage (Ministry of the Environment, September 2008), however, the document was never formally published. While the process does effectively manage odours and treat pathogen content, alkaline stabilization does not effectively reduce other constituents such as solids and metals. In general, alkaline stabilization is a suitable option for treatment of domestic septage, and the process is considered to be cost effective and reliable, but operational inefficiencies have been cited by some municipalities using or considering use of this treatment method (R.J. Burnside and Associates Ltd., October 2012). Although this is an option to use in conjunction with land application, more research is required to determine if this option is feasible and cost effective for the Township.

4.3.4 COMPOSTING

Ontario Compost Quality Standards have been issued by the MOE (last amendment July, 2012), and define the quality of septage required to make the material eligible for composting in the province. The Standards apply to compost produced by aerobic composting on non-hazardous organic materials, including dewatered domestic septage. The establishment and operation of a composting facility will require a minimum of one ECA, possibly more depending on the process (i.e. air ECA for odour may be required). The Standards require that all compost produced be tested for a variety of parameters after the maturation date is complete, and prior to the release of the compost material to the marketplace. In addition to the Compost Quality Standards, MOE has also published a Guideline for the Production of Compost in Ontario (Ministry of the Environment, July 2012), to assist in the siting, design and operation of compost facilities.

There are three (3) categories of compost; Categories AA, A and B. Only Category A and B allow septage content, with an allowable content of 25% and unlimited, respectively. To process a large volume of septage, the resulting compost would be a Category B material. Category B compost is considered a waste under Part V of the EPA; therefore approvals are required for the transportation and management of this compost type. Typically Category B compost would be used in the following circumstances:

- Organic soil conditioning in a variety of non-agricultural settings such as land reclamation, mining rehabilitation and reforestation, subject to ECA requirements.
- Agricultural land use provided the compost meets the criteria of O. Reg 267/03.

- Alternative daily or intermediate landfill cover, at a landfill that permits the use of Category B compost for this purpose.

A composting facility would be most easily established at an existing waste disposal site or the McClintock Site, and an amendment to the ECA for the selected site would be required for this purpose. To clarify, this option is presented as an alternative disposal method for septage sludge, however must be used in conjunction with a dewatering system for the effluent, such as exfiltration trenches or lagoons or similar effluent disposal system.

4.3.5 THERMAL TREATMENT - INCINERATION

Incineration can be an effective means to process septage because it effectively reduces the volume of material, kills pathogens, destroys most organic chemicals and may be outfitted to capture energy in the process. Septage is required to be dewatered before it can be incinerated; therefore, incineration is not a stand-alone treatment option, but can be used to dispose of dewatered septage sludge. Incinerators are extremely costly to construct and operate, and the approvals process is expensive and lengthy; however, there may be options in Ontario for incineration of septage in the near future.

While there is no feasible option available at this time for incineration of septage sludge, the Township may decide to monitor developments in the Peel and Durham Regions, where incinerators are proposed to become active over the next several years. Despite the proposed operation of these facilities, it is not guaranteed that this option would be cost effective or logistically feasible for the Township; therefore, incineration is not considered to be one of the feasible options for septage management at this time.

4.4 OTHER OPTIONS FOR DISPOSAL OF SEPTAGE

4.4.1 NEW SEWAGE TREATMENT PLANT

Currently the Township does not own or operate a municipal sewage or wastewater treatment plant and there are no municipally serviced areas for sewage in the Township. As will be discussed further in Section 4.4.2, there are two (2) operational municipal sewage treatment systems in the County of Haliburton that accept sewage from the Town of Haliburton in the Township of Dysart et al, and the Town of Minden in the Township of Minden Hills. Both of these facilities have been established in population centres to allow for efficient transport of septage and regular flows to the treatment plants from the municipally serviced areas.

The construction of a new municipal sewage plant is considered to be extremely costly to implement and operate. It is estimated to cost at least $5 million to build a stand-alone facility. The operating and maintenance cost would be very high relative to the other options, and a substantial capital investment would be required. The Sewage Treatment Plant option would be time intensive to implement as it would need to satisfy the MEA Class EA

Schedule C requirements; therefore, extensive studies, design and public consultation would be required before it could be commissioned.

In order to reduce the cost of this alternative, the Township may contact adjacent municipalities to gauge interest in a partnership for the construction and operation of the facility. If no such partnership options are available, the establishment of a new sewage treatment plant is likely not fiscally appropriate for the Township.

4.4.2 EXPORTATION TO AN APPROVED TREATMENT FACILITY

To implement this alternative, the Township would need to enter into an agreement with an approved facility, which would involve administrative, negotiation and legal fees for the Township and the receiving municipality. Infrastructure upgrades to the existing facility that will receive the material may also be required. An amendment to the ECA or Certificate of Approval (C of A) for these facilities would likely be required to allow for acceptance of hauled sewage from outside of their respective jurisdictions (i.e. townships).

Due to the concentrated quality of septage, the facilities may not be willing to accept the hauled sewage from the Township due to a variety of factors that may include capacity, sewage/septage quality and the potential influence the hauled sewage may have on the existing treatment process. Typically, hauled septage has a much higher solid to liquid ratio as compared with municipal sewage because septic tanks are designed to disperse liquids into a leaching bed and detain solids. The dewatered septage must be pumped out periodically and disposed of by a hauler, and is the material that is typically managed as hauled septage. Septage may be 6 to 80 times more concentrated than typical municipal wastewater; therefore, it has the potential to upset plant treatment operations or process performance or both if the plant is not designed to handle septage. Some of the potential impacts of septage addition to wastewater treatment plants include (US Environmental Protection Agency, September 1994):

- Increased odour emissions and potential resulting complaints from the public
- Increased volume of grit, scum and screenings
- Increased organic loading to biological processes resulting in potential toxic shock
- Potential odour and foaming problems in aerated basins
- Increased loading to sludge handling facilities
- Increased volumes of sludge requiring final disposal
- Increased housekeeping requirements

Despite the possible limitations outlined above, the potential to export septage to neighboring facilities on a permanent or contingency basis should be investigated.

There are two (2) wastewater treatment plants operating in the County of Haliburton. The facilities include:

- The Township of Minden Hills Sewage Treatment Plant in Minden
- The Township of Dysart et al Sewage Treatment Plant in the Village of Haliburton

Previously in 2005, both Municipalities confirmed that they would not accept hauled sewage from the Township of Alqonquin Highlands.

The Municipality of Hastings Highlands completed a Septage Management Strategy Class Environmental Assessment in June, 2011 (Jp2g Consultants Inc.), and it was estimated that it would be possible for that municipality to buy into the Town of Bancroft facility for approximately $2 million. The Bancroft facility, while located outside of Haliburton County, is proximate to the Township, and a similar buy-in option may be open to the Township should exportation of septage be determined to be a preferred option.

5.0 REGULATORY REQUIREMENTS OF ALTERNATIVE SOLUTIONS

The table below includes a summary of the regulatory and approximate financial requirements for each of the alternative solutions identified in Section 4.0 that were determined to be potentially suitable based on the current regulatory environment. The financial requirements are the estimated capital costs of constructing these facilities, and do not include the costs for the technical studies (Class Environmental Assessment, site specific studies, installation of monitoring wells, etc.) that would have to be completed for approval of the site; the estimated cost of completed a Class Environmental Assessment is $85,000, which the hydrogeological assessment would be $18,000. The estimated capital costs also do not include the cost of the purchase of land where required as the amount of land required for some of these options will have to be determined through the assessment of the required contamination attenuation zone in the hydrogeological study and may vary significantly between the options.

Table 2 Summary of Possible Options and Implementation Requirements

Alternative Solution	EA Requirements	Other Approvals	Anticipated Time to Implement	Additional Requirements	Approximate Capital Cost
Options for Expansion or Upgrade at the McClintock Sewage Lagoon Site					
Expansion of Existing Facility	MEA Class EA - Schedule C	ECA Amendment Land use/zoning change	M	Supporting studies may be required: • Hydrogeological Study • Natural Heritage Study • Archaeological Study	$350,000
Existing Lagoon Enhancements	MEA Class EA - Schedule A – B	ECA Amendment *(depending on technology selected)*	S	Options will require an electrical connection to operate.	$450,000 (*includes electrical connection*)
Dewatering Trench System	MEA Class EA - Schedule C	ECA Application / Approval	M	Supporting studies required for Schedule C Class EA: • Hydrogeological Study • Natural Heritage Study • Archaeological Study	$180,000
Advanced Treatment System (ATS)	MEA Class EA - Schedule C	ECA Application / Approval	M	Supporting studies required for Schedule C Class EA: • Hydrogeological Study • Natural Heritage Study • Archaeological Study	$675,000 (*includes electrical connection*)
Options for Septage Sludge or Residue Disposal					
Landfill Disposal of Dewatered Material or Residual Solids *(existing facility)*	N/A	ECA Amendment	S	Feasibility Study to determine most suitable disposal site	Standard disposal rates

Land Application	Schedule C *(spray irrigation or overland flow only)*	ECA Application / Approval or Amendment *and/or* NASM Plan	M	Supporting studies may be required: • Hydrogeological Study • Odour Impact Assessment • Emission Summary and Dispersion Modelling Report • Drainage Study Pre-treatment of septage required for agricultural land application	Varies depending on land application agreements with land holders
Composting Facility *(at an existing waste disposal site or lagoon site)*	MEA Class EA – Schedule A - B	ECA Application / Approval	M	Supporting studies may be required: • Hydrogeological Study • Design and Operations Report • Odour Impact Assessment • Emission Summary and Dispersion Modelling Report • Acoustic Assessment Report • Drainage Study Prior dewatering of septage is required	$2,000,000

Other Options for Disposal of Septage

New Municipal Sewage Treatment Plant	MEA Class EA - Schedule C	ECA Application / Approval	L	Supporting studies required: • Design and Operations Report • Odour Impact Assessment • Emission Summary and Dispersion Modelling Report Possibly Natural Heritage Study and Archaeological Study	$5,000,000 to $15,000,000
Exportation to an Approved Facility	Schedule C *(if existing rated capacity is to be exceeded by acceptance of additional septage)*	ECA Amendment	S	Formal agreement to be signed by both parties for an agreed upon term	$2,000,000

Note: "S" = short –term (0-2 years)
"M" = medium-term (2-5 years)
"L" = long-term (> 5 years)

5.1 CONCLUSIONS

Although all of the options presented in Table 2 are technically feasible, the capital costs of some of the options would preclude them from being fiscally viable for the Municipality. The two (2) most viable options based on their lower capital costs and suitability for the scale of disposal are constructing dewatering trenches or a lagoon system on the lands adjacent to the McClintock lagoon. The adjacent lands are Crown Land owned by the Ministry of Natural Resources and could likely be obtained for expansion at the Site. There is a large amount of Crown Land available with no apparent size constraints. The geology at the Site (sandy soils) appears to be favourable for subsurface disposal through dewatering trenches or exfiltration lagoons; however this would have to be verified through on-site investigation and testing. There are also no adjacent land owners or sensitive ecological features in close proximity to the Site, and the existing historical use of septage disposal at the McClintock Lagoon which would likely reduce public opposition for constructing a similar disposal site adjacent to the existing lagoon.

6.0 RECOMMENDATIONS

Cambium offers the following recommendations for your consideration:

1. A capacity study should be completed on the existing McClintock Septage Lagoon to determine if the rate of exfiltration from the lagoon correlates to its design capacity.
2. An intrusive hydrogeological assessment should be completed on the lands adjacent to the McClintock septage lagoon to verify the site suitability for septage disposal through either dewatering trenches or a lagoon treatment system.
3. The hydrogeological assessment should include the investigation of the native soil composition and depth, depth to bedrock, water table position, direction of shallow groundwater flow and the water quality of the shallow groundwater aquifer. An assessment of the hydraulic conductivity of the native soils should be undertaken and include determining the hydraulic conductivity of the soils through slug testing, grainsize analysis and in-situ percolation testing. Water quality samples should be obtained to determine the suitability for using the site for septage disposal.
4. A Class Environmental Assessment will have to be undertaken to obtain approval for using the lands adjacent to the McClintock Lagoon site for septage disposal. The Class EA framework should be based on the screening criteria presented below for the options presented in Table 2.

6.1 RECOMMENDED SCREENING CRITERIA FOR CLASS ENVIRONMENTAL ASSESSMENT

In order to objectively determine the septage management solution that will be the most suitable for the Township, each solution should be evaluated against a set of criteria. The following is a list of select criteria that have been used by other municipalities in Ontario when assessing options for septage management.

- **Annualized Cost:** Incorporates capital and annual operational costs over the life time of the solution. Long term planning periods (i.e. 25 years) should be used to obtain an accurate annualized cost.
- **Ease of Implementation:** Considers the ease of construction, approvals and time to implement each alternative.
- **Environmental Considerations:** Evaluates the potential risk to water, air and land resources.
- **Land Needs:** Evaluates the availability, ease of acquisition (i.e. purchase, easement, expropriation) and the footprint of land required to implement each alternative.
- **Potential for Future Expansion:** Considers the flexibility for future upgrades, retrofits and physical expansions of each solution.

- **EA Approval Requirements:** Considers the requirements under the Environmental Assessment Act and Municipal Class EA.
- **Owner Manageability:** Evaluates the ability of the Township to have control over the undertaking, which allows for greater long-term security.
- **Social Acceptance:** Identifies the actual or perceived public response to the alternative.

7.0 CLOSING

At such time that the Township initiates further study to determine the most suitable solution for septage management, a review of the information presented in this report should be completed in light of regulatory or technological advancements that may have occurred in the interim.

If you have questions or comments regarding this document, please do not hesitate to contact the undersigned at (705) 742-7900 ext. 202.

CAMBIUM ENVIRONMENTAL INC.

ORIGINAL SIGNED BY

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GLOSSARY OF TERMS

Alkaline: Typically exhibiting a high pH (well above neutral 7).

Biosolids: Organic solids, derived from municipal sewage (sludge) and septage treatment processes. The term is generally used to refer to those solids that have been stabilized to enable beneficial reuse.

Composting: The aerobic decomposition of organic constituents at elevated temperatures (50 to 70°C) to produce a highly stable humus like material. Active composting time may be 21 to 28 days. Several composting techniques may be used.

Holding tank: A single compartment tank used to collect and store domestic wastewater from a residence, building, institution or development. Holding tanks do not have any discharge points and require emptying by vacuum truck.

Lagoon: An excavated basin or natural depression that contains water, wastewater or sludge.

Land Application: Disposal of wastewater or municipal solids onto land under controlled conditions.

Landfill: A waste disposal area that has been approved for the purpose of solid waste disposal and has approval from the Ontario Ministry of the Environment.

Organic loading: The amount of organic matter applied to a treatment process.

Organic matter: Substances containing carbon compounds, usually of animal or vegetable origin.

Septage: A liquid or solid material removed from a septic tank, holding tank, pit toilet (pit privy), or similar system that receives only domestic wastes. This does not include wastes from grease traps, industrial or commercial processes.

Septage Receiving Facility: The point at which the transfer of septage from hauling vehicles to septage management facilities takes place.

Septage Treatment Facility: The processing facility that treats septage to render it acceptable for discharge to a municipal wastewater treatment facility or to the environment.

Septic tank: A two-compartment digestion chamber in which sewage sludge is retained in the first compartment, and the effluent is discharged from the second.

Sludge: Accumulated and concentrated solids generated within the wastewater treatment process that have not undergone a stabilization process.

Stabilization: Stabilization is a treatment method designed to reduce levels of pathogenic organisms.