Greater Sudbury Watershed Alliance

The GSWA mission
is to protect, promote and advocate for sustainable improvements in water quality and healthy watersheds.
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Greater Sudbury Watershed Alliance (GSWA) response to the Ramsey Lake Subwatershed Study and Master Plan Phase 2 Report

The Ramsey Lake Subwatershed Study is a substantial document; lengthy, detailed and listing many important recommendations. It includes goals and objectives for the protection and enhancement of water quality, aquatic and terrestrial ecosystems and the watershed ecosystem. It includes objectives for protecting groundwater to support drinking water supply.

The Subwatershed Study also proposes:

- Low impact development (LID) for public roads to improve Ramsey Lake water quality.
- It identifies where oil grit separators (OGS) should be installed on the existing storm sewer network that feeds into Ramsey Lake to reduce pollutants from existing development.
- It recommends stormwater remediation measures on private property, lake and river shoreline improvement and terrestrial ecologic and stream restoration.
- Under the City of Greater Sudbury Operating Plan (OP), subdivision and site plan approvals will require more stringent stormwater management in accordance with the Subwatershed Study.

As an interdependent and mutually reinforcing system, these proposals support the overarching goal of this study, to "develop a Subwatershed Management Plan to protect, maintain and enhance the surface water, groundwater and natural resources of Ramsey Lake and its tributaries through environmentally sound policy and management actions. ''

It is instructive to read at the beginning of this document, the recommendations from the previous reports and studies that predate the Ramsey Lake Subwatershed Study and Master Plan Phase 2 Report.

- The Ramsey Lake Community Improvement Plan (1994) states that one of its key goals is to "maintain high water quality in Ramsey Lake through preventative and remedial measures in the entire watershed. Recommendations are put forth with respect to the compatibility of land uses, urban development, and restrictions on hazardous materials to ensure water quality is protected. Reductions or elimination of the use of road salt and pollution from storm drainage is also recommended."

- The City's Official Plan notes that Ramsey Lake "is to be maintained as one of the main drinking water sources for the city, and documents key stormwater management planning objectives for future urban development applications such as water quality, erosion and flood controls. " "The OP emphasizes protecting local species and important habitats including wetlands and wildlife habitat in order to preserve their environment and their ecological and social benefits."

- The Official Plan Stormwater Background Study 2006 identifies primary stormwater issues in the Ramsey Lake subwatershed including the "potential negative impact on water quality due to uncontrolled stormwater discharges from urban issues, winter salting of roads," and again stresses that Ramsey Lake is a major municipal drinking water source.

- The Development and Application of a Water Quality Model for Lakes in the City of Greater Sudbury 2014, states Ramsey Lake's existing phosphorus load to be "50% greater than the natural background load" and recommends "enhanced" water quality management and the prevention of any additional phosphorus load.

So, how successful have these reports, studies and City documents been in fostering urban development practices that maintain high water quality in Ramsey Lake since it is one of the main drinking water sources for the city? What data is available to respond to that question?

Figure 3.40 in the Ramsey Lake Subwatershed Study shows an increase in the sodium levels from 40 mg/L in 1994, to almost 60 mg/L in 2013 with a current level of around 50 mg/L. Chloride levels have also risen from 70 mg/L in 1994, to 98 mg/L in 2013 to a current level of about 90 mg/L. The sodium level is 2 ½ times greater than the level requiring notice to the local Medical Officer of Health. The chloride level is approaching the chronic exposure guideline of 120 mg/L. Increasing sodium and chloride levels are undoubtedly due to the use of road salt during the winter months and clearly demonstrate that water quality in Ramsey Lake is not being maintained.

The Subwatershed Study also states that "runoff from urban land use has resulted in an increase in phosphorus concentrations" although missing data makes it impossible to observe a trend. The authors do state however, that high concentrations of phosphorus are related to cyanobacteria blooms reported in 2008, 2010, 2011 and 2012(City of Greater Sudbury, 2014).

Cyanobacteria or blue-green algae are a serious threat because when they die, they can release cyanotoxins that pose risks to the domestic water supply. What is not included in the Subwatershed Study is data from The Public Health Sudbury and District's website identifying Ramsey Lake cyanobacteria blooms in 2013 (2), 2014, 2015, 2016, 2017, 2018 and 2019. By combining both data sets, we see there are ten sequential years of cyanobacteria activity in one of the City's major sources of drinking water. And what does Public Health recommend when cyanobacteria blooms are present in a water body?

- Avoid using the water for drinking, bathing, or showering, and do not allow children, pets, or livestock to drink or swim in the bloom.
- Be aware that shallow drinking water intake pipes can pump in blue-green algae.
- Do not boil the water or treat it with a disinfectant, like bleach, because it breaks open the algae cells, which releases more toxins into the water.

- Avoid cooking with the water because food may absorb toxins from the water during cooking.
- Exercise caution with respect to eating fish caught in water where blue-green algal blooms occur. Residents should not eat the liver, kidneys, and other organs of fish caught in the water.
- Do not rely on water jug filtration systems as they may not protect against the toxins.

If any of the aforementioned reports have had a significant impact on City Council planning and policy decisions, it is not readily apparent today. While all of the documents from 1994 onward stress the importance of maintaining the water quality of Ramsey Lake, it has continued to degrade over the years. Will this Subwatershed Study finally convince City Council to pass urban development bylaws that protect this drinking water source? We remain somewhat doubtful, especially since the planned new developments (i.e., Kingsway Entertainment District - KED) in the Ramsey Lake subwatershed will continue to further diminish Ramsey Lake water quality on a regular basis.

The Subwatershed Study states that "the primary objective of the groundwater management plan for the Ramsey Lake watershed should be on the preservation of groundwater recharge within the Significant Groundwater Recharge Area (SGRA) zones. The SGRA zones provide baseflow support for the riparian zones as well as storm flow runoff attenuation." Furthermore, "the simulations indicate that a buffer of approximately 200 m around the SGRA zones would preserve the majority of the overland runoff that inflows to the SGRA features. Where streams enter the SGRA zones, this buffer should extend as much as 300 m upgradient of the SGRA zone. This will preserve riparian inflows into the SGRA zone." The Study emphasizes the importance of preserving groundwater recharge within a SGRA zone and the requirement of significant buffers around the zone to preserve its integrity.

Unfortunately, the recently approved KED project will be built not only on the buffer surrounding an SGRA zone but some of it will be constructed overtop of the SGRA zone (figure 8.4). Much of the area will become impermeable with newly constructed parking lots and buildings even though "maintaining infiltration in SGRAs … is essential for the ecological health of the stream systems." Why is the City permitting development in this area? Will the KED project be required to meet the important new site-specific stormwater policies identified in the Subwatershed Study for new development? Will the KED parking lots be built using permeable pavement that will increase infiltration and that require less salt to maintain safe conditions? The Study stresses that "the main concern will be chloride loading to the groundwater as a result of salt application for winter maintenance." Is the addition of more sodium and chloride entering Ramsey Lake on a yearly basis a wise decision? Will it not continue to diminish the quality of the drinking water source for 50,000 city residents?

It is unfortunate that as the Public Works strives to reduce the amount of salt used on city roads, new development and roadways within the watershed will counteract that initiative and increase the amount of salt required. The City's 2016 Salt Management Plan identifies a number of improvements the City has undertaken to lower its uses of salt. These include the use of electronic control spreaders, on-board pre-wetting tanks, infrared

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thermometers to monitor pavement temperature, covered storage areas for de-icing salt, and annual equipment calibration and training for winter maintenance staff.

However, there is much more that needs to be done. The use of magnesium chloride winter liquids would reduce the amount of liquid required by 50%, and the use of direct liquid application would reduce the amount of chlorides required by up to 10 times. We are surprised that the Study indicates that only 1% of the fleet has this capability. If this figure is accurate, it means that the City has extremely limited capacity to implement a procedure that would significantly reduce salt use. We would strongly encourage the City to both dramatically increase this capacity and switch to the use of magnesium chloride. These changes would lead to a dramatic reduction in the amount of chloride entering the environment.

Monitoring groundwater and recharge areas, another important recommendation, would provide the City with critical data necessary to identify chloride concentrations and inform City personnel of any additional improvements that would be required. “Climate change forecasts for the City predict that winter temperatures could be 3.5 degrees C higher than historical trends and this will likely result in higher salt application rates.” All the more reason to take aggressive action and make the recommended changes now.

The Study also notes that “generally 40% of the salt used in urban areas is placed on parking lots and sidewalks at commercial, industrial, and institutional areas.” Obviously, this is a large amount of salt entering the environment that currently has no mitigation plan. The “Smart about Salt” program “is unique in specifically addressing parking lot and sidewalk salting issues. Opportunities for training certification in this program have generated little interest from local snow removal companies. The GSWA feels strongly that snow removal companies operating in the Ramsey Lake Subwatershed should be required to be certified under this program. If this requirement becomes too unwieldy to implement through bylaw, then all contractors operating within the City should have this certification. The City’s reduction of salt use is commendable. However, it only responds to 60% of the problem. The remaining 40% of salt used in urban areas, a very significant amount of salt applied to private commercial/industrial/institutional areas, must also be reduced.

The Study also addresses the issue of private septic systems and notes that “leaking or damaged septic beds can be a source of groundwater contamination, including bacterial loading, nitrates and phosphates. Leaking septic systems frequently go unnoticed, due to unawareness of the potential issue, and the fact that most septic systems are below ground and therefore cannot be easily inspected.” “A regular inspection program helps to identify leaks, deteriorating systems” and “helps to protect against future leaks, as issues are identified as they develop.”

The GSWA has long advocated for mandatory inspection of the septic systems installed in the 19% of unserviced lots in the City of Greater Sudbury since the “management of private septic systems helps to protect groundwater from contamination and identifies sources of contamination that can be mitigated.” The Waterfront and Rural Background Study (WRBS) for the Official Plan 2004, provided an implementation plan for various methods of monitoring of septic systems and suggested that “priority be given to areas of higher risk …

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and with time the program would expand to include all septic systems." "At the time the WRBS was completed, the inspection program had been identified as a long-term, ongoing commitment." After 16 years we believe it is time to honour that commitment.

Public Health Sudbury and Districts is designated the "Principal Authority" and has complete jurisdiction over septic systems. Public Health does inspect septic systems within the Ramsey Lake subwatershed on a rotating 5-year basis. The GSWA has met with Public Health on a number of occasions but we have been unable to convince them to extend that inspection program to septic systems outside of the subwatershed.

However, the City is a partner in the Biosolids Management Facility where all septic pumpout waste must now be processed. Pumpout contractors could be tasked with completing a septic system evaluation check list that would identify any problem areas requiring remediation. That information could then be provided to Public Health for corrective action. This approach would not infringe on Public Health jurisdiction and the inspection costs to the contractor could be included in the overall fee charged for septic waste disposal.

The Study does recommend updating the GIS systems stating that "maintaining a digital, spatial database of all septic information can be useful in identifying potential sources and paths contamination." The database could merge current Public Health permit information identifying all of the septic systems in the Greater City of Sudbury with pump out dates and system evaluation. Gathered over several years, the data would provide pump out frequency (should be every 3 -5 years), record problem areas and remediation information, and flag property owners who may not be following appropriate septic system maintenance. Commencing this program would be a significant step in responding to septic system issues and the protection of the environment.

Thank you for the opportunity to respond to the Ramsey Lake Subwatershed Study and Master Plan Phase 2 Report. We feel the report identifies many important remediation improvements that would positively influence the protection and enhancement of water quality, aquatic and terrestrial ecosystems, and the watershed ecosystem. However, as stated, there have been numerous reports and City documents that have previously identified many of these same issues and recommended appropriate solutions. What has been lacking is the political will to implement the recommendations. We hope the current city government has the foresight and courage to initiate a radical departure from the former inaction and implement policies that actually protect and enhance water quality within the Ramsey Lake subwatershed. The time to act is now. The use of Ramsey Lake as a drinking water source is in serious jeopardy.

Sincerely,

Richard Witham

Chair, GSWA

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Errors

Table 3.12 – the second column is mislabeled, it should be “with climate change.”

Figure 9.20 Keast Creek is mistakenly labelled as Frobisher Creek

Figure 9.22 – Salt route roadways highlighted, it should also include 2 sections of the Kingsway within the watershed and South Bay Road.

Many of the graphs and diagrams are too small to read and when they are enlarged, the font becomes too distorted to read. They should all be in much higher resolution 1.2, 3.14, 3.17, 3.25 etc.

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Comments and recommendations with respect to the Ramsey Lake Subwatershed Study and Master Plan – Phase Two Report – February 2020 – Submitted: April 27th 2020 by John Lindsay, President, Minnow Lake Restoration Group – www.minnowlake.ca. info.minnowlake@gmail.com

The Ramsey Lake Subwatershed Study is a very comprehensive technical report focused primarily on storm and surface water control and treatment measures together with reference to septic systems and other lake pollutants. **These comments will relate and refer to important environmental and aesthetic matters** subject of several studies over many decades and are available online at: www.greatersudbury.ca/cms/index.cfm?app=div_planning&lang=en&currID= 731. **Specifically, we will deal with the Northern and Eastern sections of the Ramsey Lake Watershed** which have been of interest to the Minnow Lake Restoration Group for over 40 years. The Group is an incorporated and registered environmental charity and a member of the Greater Sudbury Watershed Alliance.

Background:

In the 100 Year Vision report in the Ramsey Lake and Watershed Community Improvement Plan (Moriyama and Eshima Planners Ltd – Toronto – 1991) it was stated that **"Ramsey Lake and its watershed are an ecological region, a domain of nature and water that is shared by and belongs to all members of the community"**. In the 1994 Ramsey Lake Community Improvement Plan, Official Plan Policies quoted the objectives of Council were **"to protect ground water resources and natural water bodies and to improve water quality in areas where degradation exists"**.

Ramsey Lake has had a challenging history: Some highlights from the **East End of Ramsey Lake Master Plan 2001**:

1883 – CPR construction in Sudbury Region and along north shore of Ramsey Lake
1897 – Ramsey Lake is designated a town water supply – no swimming is permitted
1956 – Iron plant pollution creates "orange red grease cover on lake; area beaches are closed
1961 – Algae bloom closes beaches and creates "stinking and foul tasting water"
1965 – Second major algae bloom; blue green algae on Lake believed to be caused by septic beds and Minnow and Laurentian Lake inorganic nutrient loading
1987 – Ramsey Lake identified as Community Improvement Area and extensive public consultation process beings.
1992 – Ramsey Lake Community Improvement Plan Adopted (By-law 92-382)

Also from the Master Plan Report: **"The water quality goal for Ramsey Lake is to maintain a fully functional, clear aquatic ecosystem".** Specific objectives include: **1. To maintain forever the lake as a potable water drinking source for over 50,000 city residents 2. Maintain swimming opportunities in all sections of the Lake 3. Maintain water which is free from abnormal algae growth, sediment and turbidity"**

The quoted objectives of the Master Plan for the East End of the Lake **"1. Protect the aquifer system at Moonlight Beach;** 2. Maintain the natural qualities of the East End of Ramsey Lake 3. Continue to provide the public with recreational opportunities at the East End of Ramsey Lake that are compatible with the previous two objectives

Included in the guiding principles of the Master Plan it was stated that **"the ecological integrity of Ramsey Lake must be preserved and enhanced for future generations and that Ramsey Lake must continue to be an environmental focus and that the Watershed is a domain of nature and water that is shared by and belongs to all ALL members of the community"**

Policies suggested in the Master Plan include **"Land uses that would damage the integrity of the ecological system within the Ramsey Lake Watershed which would impair the water quality or reduce the water quality of Ramsey Lake itself should be prohibited"** and **"Based on the results of ecological and hydrological studies the City Secondary Plan may be amended to restrict land uses within the watershed that would be detrimental to Ramsey Lake"**

Comments:

We are pleased to note that the current Subwatershed Study paid particular attention to what are called **Significant Groundwater Recharge Areas** (SGRA). To quote from the report: "The primary objective of the groundwater management plan for the Ramsey Lake watershed should be on the preservation of groundwater recharge within the SGRA zones. **The SGRA zones provide base flow support for the riparian zones as well as storm flow runoff attenuation".**

The areas of special concern are noted in the northeast area: "The change in land use in and around the SGRA zone near the headwaters of Eugene Creek will produce complex changes to the water budget. **The proposed land development in the upland areas around the Eugene SGRA zone will increase runoff due to both an increase in imperviousness and a reduction in ET**. A portion of this will move downslope and be available to infiltrate within the SGRA zone**. Land development within the SGRA zone will, to a degree, limit this new recharge and generate additional runoff**. With more water entering the SGRA zone, the net change will be both an increase in recharge and an increase in runoff (as indicated in the Eugene Creek SGRA zone). **The ecological impact of this additional runoff entering the SGRA zone will depend on whether the runoff water quality includes road salt"**. Note: The study does discuss the issue of road salt and recognizes that salt cannot be removed from the environment, however suggests holding ponds might mitigate the problem of salt entering the watershed. Other studies indicate this might not be the solution and can be found at this site: **https://phys.org/news/2017-06-stormwater-retention-ponds-surface-road.html#jCp**

The Ramsey Lake Subwatershed study contains a number of excellent watershed maps including the one on the following page

This map shows the "proposed Kingsway development, including a new arena, hotel and casino, is planned to cover a portion of the SGRA zone located at the headwaters of Eugene Creek"

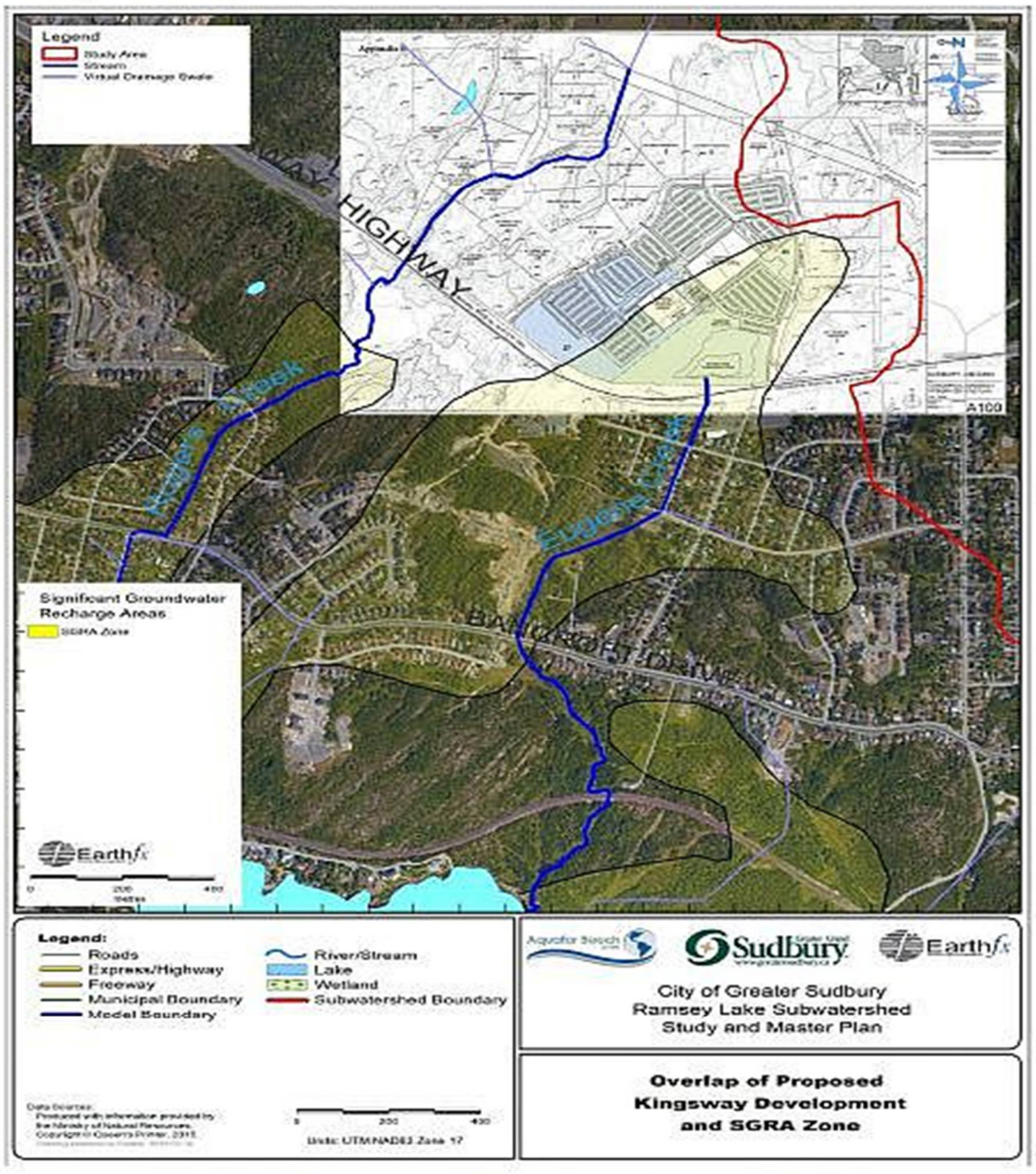

Figure 8.4: Overlap of proposed Kingsway development and SGRA Zone

The map shows the large proposed parking area which would contribute substantial runoff into the watershed including salt.

The Subwatershed report suggests that: "Significant change in runoff and recharge is predicted to occur in and around the wetlands north of Frobisher Creek. Air photos indicate that there is already infilling of wetlands at the east end of Frobisher Street and at the south end of Westbourne Street. **Further infilling of wetlands, as indicated by the land use change, will increase runoff and reduce groundwater infiltration"** and **"**In general, land development increases runoff, and in a significant portion of the watershed area northeast of Highway 17. Portions of this area include lowland/wetland areas that may or may not be infilled or preserved during re-development. **Further, the proposed Kingsway development, including a new arena, hotel and casino, is planned to cover a portion of the SGRA zone located at the headwaters of Eugene Creek"**

Recommendations:

All study recommendations are based on the findings that "The northeast portion of the watershed, including the Frobisher, Rogers and Eugene Creeks and the surrounding SGRA zones, may exhibit **measurable impact** under future land use in the Kingsway development area".

We support the recommendations in the report that: **"The primary objective of the groundwater management plan for the Ramsey Lake watershed should be on the preservation of groundwater recharge within the SGRA zones. The SGRA zones provide base flow support for the riparian zones as well as storm flow runoff attenuation"**

As it is predicted in the study: **"**Significant change in runoff and recharge is predicted to occur in and around the wetlands north of Frobisher Creek" and **"Further infilling of wetlands, as indicated by the land use change, will increase runoff and reduce groundwater infiltration"** and "There is also reason to believe, based on the depositional model of the glacial sediments, that a number of the wetlands may also overlie overburden sediments and locally significant aquifer system**. These overburden deposits may provide both baseflow and deeper fracture flow throughout the year**. For example, the groundwater upwelling noted in Moonlight Bay is likely supported by wetland and overburden storage that reaches the bay through the fracture and fault network"

Therefore we recommend as it is suggested: "Expanding the monitoring of surface water flows and both groundwater and lake levels is essential to improving the understanding and long term management of the water budget. **A priority should be placed on the monitoring of Frobisher, Rogers and Eugene Creek, as the water budget simulations indicate that they are all at risk of impact from the Kingsway development"**

We recommend that serious consideration be given to any mitigation methods that might be considered with respect to development in the SGRA zones. Based on the figures provided with respect to those areas of low permeability the construction of holding ponds and buffer areas as suggested **would be problematic** from a both a practical as well as financial standpoint as would be "end of pipe" solutions.

Addendum: The Ramsey Lake Subwatershed study is a very large document and deserves attention of all citizens. The addendum that follows is not intended to cover all aspects of the study but provides some relevant segments highlights. For the complete document go to:
https://www.greatersudbury.ca/live/environment-and-sustainability1/lake-health/watershed-study/

Addendum: This is a summary of the Ramsey Lake Subwatershed Study February 2020 – Phase 2 as compiled by the Minnow Lake Restoration Group. It is not intended to be inclusive but to provide some pertinent observations. All material is taken directly form the document and all statements and findings described are directly quoted from the document, however some portions have been highlighted as significant in the opinion of the Minnow Lake Restoration Group.

As stated in Section 1.2 the overall goal of this study is to: Develop a Subwatershed Management Plan to protect, maintain and enhance the surface water, groundwater, and natural resources of Ramsey Lake and its tributaries through environmentally sound policy and management actions.

3.3.7.2 Constraints Ramsey Lake is a key municipal drinking water source for the City of Greater Sudbury, and as such, water quality has a significant human implication. Sodium concentrations have, like chloride, been increasing over time due to the use of de-icing salt. As seen in Figure 3.40, sodium concentration increased steeply between 1991 and 2001, but have largely stabilized since then at concentrations close to 50 mg/L, with a few exceptions in 2008, 2012, 2013 and 2018. The most recent sodium result was 48.5 mg/L in September 2019, which was in excess of 20 mg/L, a concentration that triggers consideration by Public Health Sudbury and Districts, given that Ramsey Lake is the main water supply for the City of Greater Sudbury**. Rising sodium concentrations are thus an additional constraint in the Ramsey Lake watershed.** The lake has historically experienced blooms of cyanobacteria that produce cyanotoxins, and algae that cause taste and odor problems with the water supply. Existing internal and external loadings of phosphorus to Ramsey Lake are therefore a significant consideration for future additional development. Phosphorus concentrations in Ramsey Lake are currently below the PWQO of 20 µg/L, but the lake experiences significant oxygen depletion during summer stratification (MECP, 2019). The lake also has a significant challenge related to extensive beds of aquatic plants. The plants have been a significant sink nutrient including phosphorus, and over time with mitigation Ramsey Lake Subwatershed Study and Master Plan February 2020 City of Greater Sudbury 180 of external nutrient loads to the lake, macrophytes can be expected to become a source of nutrients as the plants senesce. As seen in Figure 3.40, chloride concentrations in Ramsey Lake have increased substantially since 1991, although most of this increase occurred between 1991 and 2001. Since 2010, chloride concentrations have generally fluctuated between 85 and 98 mg/L. Chloride concentrations are currently below 120 mg/L, the concentration that poses risks to aquatic life. **However, as climate change increases average air temperatures, salt application rates will likely increase (see Section 9.3.10.1). Increasing chloride concentrations are therefore a constraint in this watershed.** Constraints to development may also include the location of significant natural features "and areas" as defined by the City of Greater Sudbury Official Plan (2016), SAR and other species of conservation concern and their habitats, and SWH, pending further investigation and field studies at later planning phases.

The surface area of Ramsey Lake is 792 ha. Development along the shoreline of the lake is extensive, including more than 800 private dwellings as well as public spaces such as Bell Park, Moonlight Beach, and Lake Laurentian Conservation Area (Sarrazin-Delay, 2014). The lake drains a watershed that is 43 km2 in size.

The shoreline of Ramsey Lake has been heavily developed and altered by infilling and the construction of break walls and docks Large portions of the shoreline including the areas adjacent to the Canadian National Railway tracks, the eastern end of the Lake and shoreline adjacent to the Lake Laurentian Conservation Area have remained natural. Excessive aquatic vegetation growth is evident in shallow portions of the lake adjacent to

heavily urbanized areas. Vegetation within these dense beds (milfoil and Canada waterweed) appears to be heavily coated with algae.

Related to high concentrations of phosphorus and increasing concentrations of sodium, Ramsey Lake has been subject to subject blooms of cyanobacteria, which upon die off can result in the release of cyanotoxins. The released toxins pose risks to the domestic water supply. Blooms of cyanobacteria were reported from the lake in 2008, 2010, 2011 and 2012 (City of Greater Sudbury, 2014).

3.3.6.2 Soils According to the Ramsey Lake and Watershed Community Improvement Plan, the Ramsey Lake watershed is comprised of rock outcrops and narrow valleys that resulted from the Wisconsin glaciation. Recently, anthropogenic influences (e.g. fire, logging, mining, and urban development) have caused widespread erosion on the thin soils, resulting in exposed knobs and valleys of Precambrian bedrock (Moriyama & Teshima, 1991). Remaining soils have low organic material, and soil, wetlands, riverbeds, and lake sediments all have high levels of metals and sulphates – the residues of mining and smelting (Watershed Advisor Panel Input, 2016). **On the north side of Ramsey Lake streams have been channelized, causing an increase of siltation into the lake and further degrading wetland communities. The small lakes, Bethel and Minnow, that flow into Ramsey Lake act as settling ponds for silt and reservoirs for nutrients**. **Where possible, improvements to water quality in these lakes should be sought. New development in these sub-catchments should be managed so that further deterioration of water quality is prevented**. Improvements in water quality will be reflected in Lily Creek and the natural environment downstream of Ramsey Lake. Soils within the sub-watershed are thin, and have been removed in some areas due to logging, mining, and urban development. Remaining soils have low organic content, and have high levels of metals and sulfates as a result of the abovementioned anthropogenic influences.

Corridors along the north shore of Ramsey Lake are subject to more severe development pressure when compared to the large tract of land south of Ramsey Lake, and therefore have high conservation value. Protection and/or further reforestation of lands north of Highway 55 (Kingsway) would preserve and potentially promote wildlife passage between natural areas to the north, and the north shore of Ramsey Lake. Wildlife underpasses beneath major road arteries (e.g. Highway 55 – Kingsway, Highway 67 – Howey Drive/Bancroft Drive) would be most beneficial to wildlife that are restricted by roads, or experience high rates of road mortality when migrating (e.g., turtles). Ramsey Lake Subwatershed Study and Master Plan February 2020 City of Greater Sudbury. There are numerous opportunities throughout the sub-watershed to ecologically restore areas that have been damaged or degraded due to logging, fires, and from the effects of mining. A focus on areas where exposed bedrock persists despite past regreening activities or natural regeneration may be particularly beneficial in terms of wildlife value. Areas where urban development pressure already exists or is projected to occur (e.g. north of Ramsey Lake or within existing subdivisions) may be candidate priority areas to relieve some development driven habitat loss, or increase the value of existing habitat qualitatively and quantitatively. Examples include the aforementioned habitat found surrounding the Greenwood Drive neighbourhood, and land surrounding Frenchman's Bay or CPR Bay, as they are already documented as functional habitat for wildlife. Recent aerial imagery of the existing natural areas north of Highway 55 (Kingsway) appear to show both wooded and wetland habitat, but exposed ground appears evident and the forest mosaic is patchy. These areas have been a focus of regreening efforts in the past, but continued restoration would likely contribute to more complete vegetation cover throughout these areas and are likely to provide high quality

habitat for a wide variety of species types that may use either wetlands, wooded areas, or both. Details on how the Sudbury Regreening Program intends to address restoration initiatives is described in Section 6.1.5. Increased vegetation coverage is also likely to have the added value of buffering flows during storm events in areas where there is a high content of man-made impervious surfaces. Similar to areas highlighted for wildlife habitat restoration, existing green spaces surrounding Greenwood, Frenchman's Bay, and CPR Bay neighbourhoods are likely already acting as flow controls during stormwater events, but could be improved by reducing the amount of exposed rock remaining in these areas. These areas in particular, along with all other thin strips of vegetation surrounding the Lake and associated watercourses also likely play a role in contaminant catchment, ultimately minimizing the flow of hydrocarbons, sediments and other anthropogenic substances, as well as reducing quantities of superheated water flowing from paved surfaces into the coldwater Lake Ramsey. This is ultimately expected to improve water quality in the lake, benefiting both ecological systems and urban communities alike.

Environmental concerns described for the Ramsey Lake Sub-Watershed included: Recommendation for control of boats on the lake because of potential for pollution and introduction of invasive species; Suggestion that all septic system locations be identified as potential phosphorus loading sources; Impact of development (particularly the industrial development in the northeast portion of the watershed) upon wetlands, water quality, habitat and species at risk. A caution to carefully evaluate the effectiveness of stormwater management systems that are applied, ensuring the recommended system meets desired standards. • Recommendations to address key sub-watershed issues include: Implementation of a boat launching fee, cleaning station and restriction of the number of boats on the lake at any one time; **Mandatory septic system inspections and re-inspections**; Identify areas within the watershed that should not be developed; Identify opportunities for Low Impact Development and to maintain green infrastructure assets; Set watershed targets for wetland and vegetative cover areas; To the extent possible, apply natural / low impact methods for stormwater management; and build on the City's reputation of re-greening to take an approach that keeps the Lake blue, not green.

The broad range of management actions recommended for the Ramsey Lake Watershed area are summarized • Low Impact Development (LID) of Public Roads during Reconstruction • Oil Grit Separators (OGS) or Stormwater Management Facilities • Restoration Measures on Private Property • Shoreline Works to Improve Habitat • Ecological Restoration Works within the Watershed • Stream Restoration • Groundwater Protection • Flood Mitigation • Salt Management • Management of Septic Systems Rams

Stormwater Management: The "state-of-the-art" in stormwater management has been evolving rapidly. The MECP's Stormwater Management Planning and Design Manual (SWMPDM) provide a more integrated approach, as compared to its predecessors. The SWMPDM incorporates water quantity and erosion considerations. The SWMPDM provides technical and procedural guidance for the planning, design, and review of stormwater management practices. The focus of the manual was broadened to incorporate the current multi-objective approach to stormwater facility planning to address targets related to hazards, water quality, fish habitat and recreation. Fundamental stormwater management objectives which are included in the 2003 SWMPDM include: Groundwater and baseflow characteristics are preserved; Water quality will be protected; Watercourse will not undergo undesirable and costly geomorphic change; o There will not be any increase in flood damage potential; and ultimately That an appropriate diversity of aquatic life and opportunities for human uses will be

maintained. A central theme of the SWMPDM is the application of a "treatment train", a term that is used to describe the combination of controls – source, conveyance and end-of-pipe controls - usually required in an overall stormwater management strategy to ensure that objectives are achieved. The SWMPDM states that: Ramsey Lake Subwatershed Study and Master Plan February 2020 City of Greater Sudbury "the recommended strategy for stormwater management is to provide an integrated treatment train approach to water management that is premised on providing control at the lot level and in conveyance (to the extent feasible) followed by end-of-pipe controls. This combination of controls is the only means of meeting the multiple criteria for water balance, water quality, erosion control and water quantity." The SWMPDM remains the go-to reference material for end-of-pipe stormwater management criteria and design requirements for wet ponds, constructed wetlands, hybrid wet pond/wetland systems, dry ponds and centralized infiltration facilities

MECP LID Stormwater Management Guidance Manual Since the publication of the 2003 SWMPDM, advancements have been made in the approaches used to manage stormwater and the technologies available to the stormwater practitioner. **It is now understood that to effectively mitigate the impacts from urbanization, stormwater strategies must include a means to reduce runoff volume with the objective of maintaining the pre-development water balance**. To meet the multiple objectives of stormwater management on a broad-scale, it is expected that a combination of source, conveyance and end of pipe controls will be required within Ontario's stormwater systems. To encourage stormwater solutions that treat stormwater as a resource and provide a high level of stormwater quality control, the MECP is in the process of finalizing a LID Stormwater Management Guidance Manual. The draft manual outlines a Runoff Volume Control Target (RVCT) to be used for new development. The Runoff Volume Control Target (RVCT) corresponds to the runoff generate from the regionally specific 90th percentile rainfall event**. As a result, new projects in the Ramsey Lake subwatershed will have a water quality target corresponding to the runoff volume generated from the local 90th percentile event (i.e. the runoff generated from a 28 mm event).** The runoff generated from a 28 mm rainfall event should be controlled using a control hierarchy whereby retention via LID retention technologies which utilize the mechanisms of infiltration, evapotranspiration and or reuse are preferred. The control hierarchy is applied to take into consideration the reality that site conditions can limit the application of these preferred mechanisms, and allows for the implementation of capture and release, or other detention and release as needed

Following this approach new development areas within the Ramsey Lake subwatershed are recommended to follow the following water quality strategy: 1. The local water balance of the development area will be maintained at pre-development conditions by providing infiltration opportunities of source and/or conveyance control measures. Water balance modelling results which are summarized in Appendix I indicate that proposed development has little impact to infiltration due to the surface conditions in the watershed. Given the potential for project specific opportunities and constraints including depth to bedrock, varying native soils, and varying groundwater table depths, the water balance target will be developed during a site-level analysis for each new development area. As each new development area may vary significantly from areas of shallow bedrock to sand deposits in the Significant Groundwater Recharge Areas, it is not feasible to develop a watershed-based water balance target. 2. The remainder of the runoff volume generated form the 28 mm rainfall event will be treated Ramsey Lake Subwatershed Study and Master Plan February 2020 City of Greater Sudbury 287 using capture and release LID filtration practices. 3. Where technical constraints prevent infiltration and filtration practices from treating the runoff generated from the 28 mm event, conventional end-of-pipe systems including oil and grit

separators and stormwater management facilities will be implemented to provide the appropriate level of treatment (enhanced-level corresponding to a log-term TSS load reduction of 80%). Proposed Development Lands Within the Ramsey Lake subwatershed, there are several undeveloped areas that are at different stages of the land use planning process. Figure 7.2 was created based on GIS data provided by the City and on discussions with planning and engineering staff. The evaluation of alternatives for proposed development lands focuses on development sites that are greater than five (5) ha in total area. Stormwater management for development sites that are smaller than five (5) ha will be addressed through site plan or draft plan of subdivision; however, a similar approach should be taken. On development sites that are smaller than five (5) ha, end-of-pipe alternatives may be limited due to the inability to support a stormwater management facility with a permanent pool.

Wet ponds and or hybrid wetland-wet ponds use active storage detention and elongated flow paths through the facility to settle suspended sediments and associated pollutants. Both facility types require a forebay for pre-treatment and easier maintenance. While both facilities can be designed to meet MECP's enhanced level of water quality treatment corresponding to a long-term sediment removal efficiency of 80%, the wetland component of a hybrid design provides enhanced biological removal during the summer months. Individual design guidance for wet ponds and wetland-wet pond hybrids can be found in the 2003 MECP Stormwater Management Planning and Design Manual. Sizing requirements from the manual are summarized in Table 7.2.

While the change in the water budget is small, **the local effects of the land development are more visible at select locations** in the distributed model. In general, land development increases runoff, as illustrated in Figure 8.2 , and a significant portion of the watershed area northeast of Highway 17 will change to "General Industrial" (Figure 8.3). Portions of this area include lowland/wetland areas that may or may not be infilled or preserved during re-development. Further, **the proposed Kingsway development, including a new arena, hotel and casino, is planned to cover a portion of the Significant Groundwater Recharge Area (SGRA) zone located at the headwaters of Eugene Creek** (Figure 8.4)

While the exposed bedrock in this area has a naturally high runoff potential, two aspects of the change to "general industrial" are of note: **1. Significant change in runoff and recharge is predicted to occur in and around the wetlands north of Frobisher Creek**. Air photos indicate that there is already infilling of wetlands at the east end of Frobisher Street and at the south end of Westbourne Street. Further infilling of wetlands, as indicated by the land use change, will increase runoff (Figure 8.7) and reduce groundwater infiltration (Figure 8.8). Recommendations for wetland protection and enhancement can be found in Sections 6.1.5 and 9.3.6. 2. **The change in land use in and around the SGRA zone near the headwaters of Eugene Creek will produce complex changes to the water budget**. The proposed land development in the upland areas around the Eugene SGRA zone will increase runoff (Figure 8.7) due to both an increase in imperviousness and a reduction in ET. A portion of this will move downslope and be available to infiltrate within the SGRA zone. Land development within the SGRA zone will, to a degree, limit this new recharge and generate additional runoff. With more water entering the SGRA zone, the net change will be both an increase in recharge and an increase in runoff (as indicated in the Eugene Creek SGRA zone (Figure 8.8). The ecological impact of this additional runoff entering the SGRA zone will depend on whether the runoff water quality includes de-icing salt.

The analysis of the Ramsey Lake watershed indicates that there will not, on a watershed basis, be any major changes in the overall water budget under the future land use conditions. **The northeast portion of the watershed, including the Frobisher, Rogers and Eugene Creeks and the surrounding SGRA zones, may, however, exhibit measurable impact under future land use in the Kingsway development area.** Therefore, a site-specific water balance target should be developed for these new developments as described in Section 7.2.4 and 9.3.1.2. Land development in the upland areas around the wetlands and SGRA zones will likely increase runoff (due to both an increase in imperviousness and a reduction in ET), and depending on how the lowland wetlands and SGRA zones are managed and modified, groundwater recharge and headwater flows may be adversely affected. The enhanced runoff from the upland areas may locally increase downslope groundwater recharge, and the water quality of the runoff may be detrimental to the ecology of the headwaters if the runoff contains de-icing salt.

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The results show that the LID implementation does not significantly decrease the future peak flows at different nodes along the creeks which is mainly due to soil texture and rock lands in the subwatershed. A subwatershed-level modelling exercise was conducted to determine the impact of Low Impact Development and SWM facilities on flow rates at specific nodes. The results show that under scenario of “SWM ponds + LIDs”, The peak flows can be reduced to match the predevelopment conditions (Table 8.6).

9.2.1 Water Quality Targets Per Section 7.2.3 and 7.2.4, a hierarchical approach should be taken to providing water quality control in new development areas. The general water quality approach to be taken for each development is outlined in the MECP’s Stormwater Management Guidance Manual (2018 Draft). The hierarchical approach to providing water quality control will be as follows for each new development area: 1. Retention Volume: Retain a volume of water, equivalent to the pre-development water balance volume contributing to infiltration, on site via LID infiltration techniques. Note: Retention volume will vary across the study area based on site specific conditions including but not limited to soil type, depth to bedrock and depth to groundwater table. 2. Filtration Volume: Capture and treat via LID filtration a water quality volume equivalent to the runoff volume generated from the 90th percentile event minus the retention volume. 3. End of Pipe Water Quality Volume Control: For the runoff volume corresponding to the runoff generated from the 90th percentile event minus the sum of the retention volume and the filtration volume, end-of-pipe water quality control in the form of a wet ponds or hybrid facilities should be implemented to provide an enhanced level of water quality protection per the 2003 MECP Stormwater Management Planning and Design Guide. These facilities will also

have the design objective of providing peak flow control for storm events from the 1:2-year through the 1:100-year. Water Quality in SGRAs In section 8.3.1 the impact to local water balance from proposed development was discussed. Modelling indicated that based on proposed development in the headwater areas of Eugene and Ramsey Lake Subwatershed Study and Master Plan February 2020 City of Greater Sudbury 314 Rogers Creeks, runoff volumes will increase as a result of decreased evapotranspiration as well as land grading and the development of urban drainage works. **The modelling however did indicate that groundwater recharge will also likely increase in many areas of the Eugene Creek SGRA as a result of increased inflows from upstream development areas. This is especially evident in the proposed Kingsway development where much of the proposed parking is outside of the SGRA but stormwater is proposed to be conveyed to a SWM facility in the SGRA. Although site plans were not available for proposed development areas in the headwaters to Rogers Creek, it is possible that development in these areas will have a similar impact on runoff volume and groundwater recharge.** Maintaining infiltration in these SGRAs will ensure baseflow contributions to the annual flow regime are maintained which is essential for the ecological health of the stream systems. Water quality degradation is possible if proactive measures are not taken during development. The main concern will be chloride loading to the groundwater as a result of salt application for winter maintenance. Salt management planning and contractor certification for development areas in and draining to the headwater SGRAs will be essential to maintain water quality.

Quantity Control "Increased peak flow rates due to new development must be controlled before being discharged to approved outlets. **In general, post-development peak flow rates must not exceed pre-development peak flow rates**, or if a subwatershed plan exists, the peak flow rates identified in the subwatershed plan. A stormwater management report must detail how the peak flow rates will be controlled to satisfy downstream constraints and the requirements of the subwatershed plan if one exists. In the absence of specific recommendations regarding peak flow control, the minimum level of peak flow control shall be control of the post-development 2-year design storm peak flow rate to pre-development levels prior to discharge into the minor system (storm sewers), and control of the post-development Regional or 100-year design storm peak flow rate (whichever is larger) to pre-development levels prior to discharge into the major system (surface drainage system)." Quality Control "In addition to peak flow control, stormwater quality control must be provided. Stormwater quality control options shall be subject to a selection process. The rationale for the selection of the recommended alternative for a specific site must be provided**. In each case, on-site quality control shall be considered first as part of an integrated design. As a minimum, the proponent shall consider the use of wet ponds, constructed wetlands, infiltration techniques, and batch dry detention facilities for end-of-pipe stormwater quality control** On-Site Quality Control "It is preferred that stormwater quality be addressed as close to the source of runoff as possible. On-site controls are much more flexible and may include infiltration, oil grit separators (for commercial or industrial sites with high imperviousness), buffer strips, enhanced swales, or bio-retention areas. A preliminary assessment of feasible alternatives to address stormwater quality on-site shall be performed and then reviewed with the City prior to finalizing design.

Site-specific Policies 1. For all new developments, an overland flow route must be clearly defined to provide continuous overland drainage of major system flows to the nearest major watercourse. **The overland flow route (major system) shall be entirely contained within the road right-of-way or easements. Conveyance of the 1:100-year or Regional design storm peak flow is required.** 2. Applications for industrial development in areas

where there are no municipal stormwater services will require a Stormwater Management Report. 3. Applications for draft plan approval of subdivisions and site plan approvals in areas where a subwatershed plan has been completed will demonstrate, through a Stormwater Management Report, how the proposed development will provide stormwater management in accordance with the subwatershed plan. 4. Applications for draft plan approval of subdivisions in areas where a subwatershed plan has not been finalized will include a Stormwater Management Report containing sitespecific details as required by the City. Ramsey Lake Subwatershed Study and Master Plan February 2020 City of Greater Sudbury 283 5. A Stormwater Management Report shall contain the following: a. The overall drainage plan for the site, indicating upstream drainage areas conveyed across the site and the ultimate outlet (major overland flow route) from the site to the municipal drainage system; b. A plan of proposed on-site stormwater quantity control measures that will satisfy downstream capacity issues. Post-development peak flow rates from the site will be limited to pre-development peak flow rates, unless detailed analysis shows that such storage is not required; c. A plan for erosion control; d. A description of the measures proposed to control stormwater quality on-site. In particular, special measures must be proposed where a site is intended for industrial development; and, e. A general grading plan, illustrating conformance with the City's overall stormwater management objectives. 6. The City will identify opportunities where retrofits can be effectively utilized to remedy existing stormwater problems. 7. For areas where a subwatershed plan has not advanced in sufficient detail to define regional downstream stormwater management facilities or where a development will result in unacceptable peak flow increases downstream, onsite stormwater management (storage) facilities for peak flow control will be required. 8. For small sites where it is impractical to implement on-site stormwater management measures (due to size or local site conditions), Council may collect cash-in-lieu of on-site stormwater management facilities to apply toward any regional stormwater facilities required. 9. Developers are required to construct, maintain and monitor the operation of all on-site quality ponds at their expense for a minimum period of two years after completion of housing. On-site stormwater management facilities will be designed in a manner that is compatible with the surrounding environment. Where appropriate, such facilities should Ramsey Lake Subwatershed Study and Master Plan February 2020 City of Greater Sudbury 284 be connected to recreational trails. 10. Maintenance will consist of annual monitoring of sediment accumulation in the pond forebay and quarterly inspections for trash removal as well as sediment removal and lawn mowing as required. 11. Stormwater management facilities for subdivisions will be on lands transferred at no cost to the City, in addition to any lands required to be dedicated for park purposes under the Planning Act.

Keast Creek: 6.2.3.3.4 Preferred Alternative Based on the evaluation, the preferred alternative solution for stream restoration works at erosion site ES-K-01, is alternative 3, hardened bank treatments. This solution provides the most protection to the South Bay road embankment while still enhancing the aquatic and terrestrial habitat within Reach 1 of Keast Creek.

Septic Beds: Due to the multiple levels of stakeholders involved in the preservation of water quality and septic system regulation, there will need to collaboration between multiple parties to ensure adaptive monitoring and outreach is effective. In general, Public Health Sudbury and Districts will be responsible for the following with support from the City of Greater Sudbury: • Developing information sessions, literature, websites, public service announcements, interpretive signage & direct landowner contact to promote the proper maintenance of existing septic systems. • Investigation of the feasibility of a tax reduction incentive or grant program for

upgrading faulty septic systems. • Upgrading and maintaining a digital, spatial database (GIS) of all septic information including approvals and sizing data. • Updating building permit application policy so that any expansions to the habitable living area or improvements to the plumbing would be conditional upon the sewage system meeting current standards. Ramsey Lake Subwatershed Study and Master Plan February 2020 City of Greater Sudbury • Developing an inspection program to identify and concern potential sources of groundwater contamination, especially in high risk areas (e.g., lake front properties, properties with previous complaints to the Health Unit). • Analyze existing water quality data for high levels of bacteria, chlorides, phosphorous, nitrates and TKN and cross reference the results against land use data to prioritize areas for education outreach and restoration. • Coordinating with the City for the development of the GIS septic database and keeping the database up-to-date through the transfer of inspection information. • Identifying areas of high-risk based on complaints. • Coordinating upgrade requirements and conducting inspections as required through building permit applications.

Wetland enhancements can also consist of invasive species management. Removal and management of invasive species, including and not limited to the aggressive exotic giant reed grass (Phragmites australis subspecies australis), presents opportunities for the establishment of native flora and, ergo, native wildlife. Given the ongoing maintenance often required for invasive species management, opportunities for partnerships between the City and Conservation Sudbury, VALE Living with Lakes Centre, Junction Creek Stewardship Committee, and volunteer groups, etc. is strongly encouraged. According to the MNRF, the "MNRF is concerned about the threat that invasive Phragmites poses to our natural resources, our biodiversity, and the economy of Ontario. The boundaries of its northern distribution and spread have not been determined, however, stands of invasive Phragmites have previously been reported in Sudbury..." (Turl, 2017). Identification and eradication of Phragmites within urban and suburban will likely aid in controlling the spread of the invasive grass into natural areas.

Salt 6.1.8 De-icing salt is used to control snow and ice formation, making winter driving safer and more efficient. It is used extensively in Canada because it is effective, relatively easy to transport and use, and low in cost (TRCA, 2018). De-icing salt enters the environment from the salt storage and snow disposal sites and through runoff and splash from the roadways. Due to concerns about the large quantities of chlorides being released to the environment, de-icing salts underwent a comprehensive five-year scientific assessment under the Canadian Environmental Protection Act, Ramsey Lake Subwatershed Study and Master Plan February 2020 City of Greater Sudbury 219 1999. **This assessment concluded that de-icing salt is entering the environment in quantities that may pose immediate or long-term environmental risks. Elevated concentrations of chloride salts may cause adverse effects to aquatic life, terrestrial vegetation, soil structure, and drinking water (TRCA, 2018).** A Code of Practice for the Environmental Management of Road Salts was created to reduce environmental contamination by road salts while maintaining road safety. This Code is applicable for any organizations that uses more than 500 tonnes of road salts per year and have vulnerable areas in their territory that could potentially be impacted by the road salts. **The City of Greater Sudbury is required to follow this Code as an average of 19,876 tonnes of bulk coarse highway salt (NaCl) is used per season (GHD, 2017). Commercial operators responsible for clearing snow and ice from parking lots have the potential to use larger amounts of salt, in part because the commercial operators are compensated on the basis of use** (Kilgour, 2014). According to Table 5 of the Salt Management Plan, at temperatures below -12ºC, no salt is applied to any roads. However, climate change forecasts for the City of Greater Sudbury predict that winter temperatures could be 3.5ºC higher than the historical trends (City of Greater Sudbury, 2013).Treatment methods including Salt Management Plans and education programs have been implemented across Ontario to minimize the impacts of salt contamination

on the surrounding environment. Salt Management Plans Approximately 60% of municipalities have source protection plans implemented with specific policies and regulations for salt management. As part of the City of Greater Sudbury's 2006 Official Plan, a Salt Management Plan was implemented to address issues surrounding the application of de-icing salt. The City's Salt Management Plan is routinely updated, most recently in 2017, and outlines the objectives, policies, winter maintenance program, materials used annually, continuous improvement practices and strategies, and monitoring and updating. Smart About Salt The Regional Municipality of Waterloo (RMOW) created "Smart About Salt" as part of a groundwater salt loading reduction strategy. This program is designed to promote improved safe snow and ice control practices on parking lots and sidewalks in an effort to reduce the amount of de-icing salt entering the environment. **Generally, 40% of the salt used in urban areas is placed on Ramsey Lake Subwatershed Study and Master Plan February 2020 City of Greater Sudbury 220 parking lots and sidewalks at commercial, industrial, and institutional areas.** As the climate in Sudbury differs from Waterloo, the proportion of salt applied may be different as 91% of the roads in the Ramsey Lake Subwatershed are sanded. While the Code of Practice addresses the use of salts on roadways, the Smart About Salt program is unique in specifically addressing parking lot and sidewalk salting issues. To accomplish this, Smart About Salt provides training for companies in the snow control business and operators. Their training addressees the first two aspects of salt management by: • promoting ice minimization strategies and best salt management practices; and, • promoting proper salt storage and handling practices. To ensure proper salt storage, salt must be stored on impermeable pads and covered. Liquid deicing chemicals must also be stored on impermeable pads in tanks with collision protection. For a facility to be certified they must review their operations with the purpose of identifying high salt use areas, and with that information developing improvements to reduce the salt requirement. 10 aspects of companies' operations are analyzed for this purpose, including: 1. Equipment calibration 2. Material Applications Rates 3. Material Tracking 4. Use of Liquids 5. Use of Low or Non-chloride Materials 6. Salt Storage 7. Sand/salt Mix Storage 8. Liquid Storage 9. Plowing 10. Salt management Training The facility has a year to improve any of the above aspects that need improvement to continue their certification eligibility. A facility must also use a Smart About Salt Certified Contractor to maintain the site to ensure the best salt management practices are used.

9.3.8.3 Future Studies. Expanding the monitoring of surface water flows and both groundwater and lake levels is essential to improving the understanding and long-term management of the water budget. **A priority should be placed on the monitoring of Frobisher, Rogers and Eugene Creek, as the water budget simulations indicate that they are all at risk of impact from the Kingsway development.** Ramsey Lake Subwatershed Study and Master Plan February 2020 City of Greater Sudbury 384 The results from the simulations, particularly around the headwaters of Eugene Creek, indicate the complex hydrologic response to land development that can occur in this watershed**. Both recharge and runoff are predicted to locally increase, and the resulting increase in groundwater levels may affect drainage patterns, storm water pond design, and groundwater seepage across a larger area**. Additional surface and groundwater investigations and simulations are necessary at the site plan design stage to confirm and mitigate these effects. The City should consider compiling a central database of high-quality borehole logs and water levels to supplement and expand on the MECP water well record database.

3.2.5.3 Minnow Lake A sawmill mill on Minnow Lake operated for a 23-year period between 1885 and 1908, during which time sawdust and wood waste were dumped in the southwest bay of the lake. Prior to the early 1960's, when sanitary sewers were installed in the Minnow Lake area, water quality was also impacted by runoff from private septic systems. Today the largest impact on water quality is from surface runoff from the catchment. A recently installed large OGS will treat runoff from north of the lake, and may improve water quality entering the lake. Water quality in Minnow Lake is 'poor'. Visibility in the lake is low (Secchi disc depth 0.9 m; City of Greater Sudbury, 2007). Phosphorus concentrations have recently varied between about 20 and

60 µg/L (Figure 3.43). Dissolved oxygen concentrations have been low, related in part to the decay of a layer of sawdust on the bottom of the lake that is 1 to 2 m in thickness (Minnow Lake Community Improvement Plan, 1991; Pearson et al., 2002). In an effort to improve bioavailable oxygen in the lake, a fountain was installed in 2000, which helps to aerate the water (Bergeron, 2012). Dissolved oxygen in 2010 as measured by the Ministry of the Environment, Lake Partner program, was between 7.8 and 10.1 mg/L, and which is high enough to support a fish community. Water is slightly alkaline water (pH 7.9) and moderate conductivity (612 µS/cm). Metals levels also tend to be high in Minnow Lake (7.7 µg Cu/L; 31.2 µg Ni/L), both of which exceed their respective PWQO's (MOE: Lake Partner Program; Minnow Lake Community Improvement Plan, 1991; MECP, 2019). Chloride levels in Minnow Lake are high, likely due to the de-icing activities on the many paved roads surrounding Ramsey Lake Subwatershed Study and Master Plan February 2020 City of Greater Sudbury 120 the lake. Chloride levels as measured by the MOE, Lake Partner Program in 2010 varied between 110 and 169 mg/L, frequently exceeding the CCME (2001) guideline of 120 mg/L.

Constraints The impacts from historic activities continue to impact water quality. High sawdust loading into Minnow Lake and the historical metals loads being stored and released throughout the watershed continue to result in impaired water quality. Stored metals will continue to be released into water bodies by contaminated sediments and it will be a slow process to bury these sediments with cleaner sediments. Especially in lakes such as Minnow Lake, where the largest threat to water quality is currently due to surface runoff from the catchment, the new sediments deposited in the lake may continue to impair water quality. The application of de-icing salts throughout the subwatershed will continue to result in elevated chloride concentrations since there is no way to removed dissolved chloride from water.

Minnow Lake has a surface area of 20.9 hectares. Minnow Lake has a total shoreline length of 2.1 km approximately 50 percent of which has been disturbed. Much of the shoreline of the lake is occupied by a narrow ring of emergent vegetation, primarily cattail (Typha) and bulrushes (Scirpus) (Figure 3.51 through Figure 3.54). The southern shoreline appears to have undergone some infilling. Minnow Lake is shallow, with a maximum depth of 3.0 m (Figure 3.55). A Secchi disc depth reading of 0.9 m was recorded in 2007, which is indicative of low water clarity (City of Greater Sudbury, 2007). In 2010 the mean Secchi disc depth during the open water season was 1.6 (Bergeron, 2012). There is extensive aquatic vegetation growth in the southern portion of the Lake which, in addition to shoreline vegetation, likely provides important spawning and nursery habitats to resident fish (Figure 3.56 and Figure 3.57). Eurasian water milfoil. (Myriophyllum spicatum), an invasive aquatic plant, has proliferated in Minnow Lake.

The lake catchment is highly urbanized and is surrounded by many private dwellings and public roads as well as a boardwalk along Bancroft Drive. Riparian vegetation often consists of open grass areas and cattails with limited buffer zones. Approximately 56 percent of the shoreline is protected by a buffer of terrestrial and/or aquatic vegetation although the width of this buffer is variable. Eurasian water milfoil (an invasive, non-native species) has been known to be prevalent in Minnow Lake (Bergeron, 2012). There is currently no in-water development in Minnow Lake and no beaches or boat launches are present. Outboard motors are not permitted on the Lake. A fisheries assessment conducted in 1989 by the Ontario Ministry of Natural Resources documented the presence of Yellow Perch, Pumpkinseed, Fathead Minnows, Golden Shiners, Iowa Darters, Rock Bass, Northern Pike, Brown Bullhead and common White Suckers (Poulin et al, Ramsey Lake Subwatershed Study and Master Plan February 2020 City of Greater Sudbury 145 1991. The most abundant species captured

were Yellow Perch and Bullhead. Only Yellow Perch, Brown Bullhead, common White Sucker and Golden Shiner presence was documented during an assessment conducted by the Freshwater Cooperative Unit (City of Greater Sudbury 2006a). No fish community assessment has been completed since 2007 and the current status of resident fish populations is unknown. Water quality in Minnow Lake is poor, the result of historical land use (e.g. the former sawmill) and surface run-off. Minnow Lake is nutrient enriched and has high chloride concentrations. Ramsey Lake has lower levels of both nutrients and chloride than Minnow Lake. The outflow to Minnow Lake is located in the southwest corner of the lake. Water levels are maintained at a constant elevation. The stream connecting Minnow Lake with Ramsey Lake is approximately 400 m in length. It is low gradient except for a 4-m high bedrock outcrop that the stream flows over, immediately downstream of the CP Railway tracks. Substrate in the stream consists mainly of sand and gravel. The channel is deeply incised and is less than 0.5 m in width. Riparian vegetation provides extensive shading along most of the length of the creek (Figure 3.56). At low water, water depth is less than 0.20 m. The stream flows through culverts at Howey Drive, the CP railway track bed and Northshore Road before emptying into Ramsey Lake. No pool habitats were observed along the length of this stream. It is highly unlikely that the stream supports fish year-round. The benthic invertebrate community was sampled in Minnow Creek in 2014 (Sarrazin-Delay, 2014). The community was dominated by Chironomidae and Hydropsychidae caddisflies. Subdominant taxa included Ceratopogonids, and molluscs including fingernail clams and snails. Mayflies were present, but they were only represented by the genus Caenis, a reasonably tolerant form. Larvae of dragonflies and damselflies were also present. Total abundances of benthic invertebrates were considered low in the creek. Stoneflies (being a sensitive group requiring cold water - groundwater) were absent from the creek potentially indicating degraded conditions.

This is not intended to be a complete summary of the Ramsey Lake Subwatershed Study. It is suggested to access the whole report at: https://www.greatersudbury.ca/live/environment-and-sustainability1/lake-health/watershed-study/

Are storm water ponds effective in removing salt?

The city has indicated in their documentation with respect to the Kingsway Entertainment District (KED) that "directing water towards stormwater catchments can prevent it from entering the subsurface or nearby watercourses leading to Lake Ramsey".

However, researchers at Virginia Tech and Towson University in Maryland say that the types of chemicals used to treat roads in winter, particularly **road salts, are not being effectively absorbed as intended by mitigation measures and may be reaching waterways.** Stormwater management practices such as stormwater retention ponds are designed to intercept water runoff from roads and parking lots before pollutants reach surface waters where they may harm wildlife and human health.

The research team recently completed a study, published in ***Environmental Science and Technology***, to determine how well current stormwater management practices mitigate the effects of road salts and how those salts might be impacting both the surface and groundwaters

The researchers tested water samples from stormwater ponds to compare the concentrations of sodium and chloride ions in groundwater between stormwater ponds and streams. Water in the ponds gradually soaks into the ground and moves downslope toward streams. If the stormwater ponds were working as some claim then little sodium chloride would be found because it would have been retained in the ponds.

In fact, the opposite seemed to be true. The researchers discovered that routing runoff contaminated with road salts to stormwater ponds actually resulted in plumes of highly contaminated groundwater moving from the ponds to streams. In addition, **high levels of contamination were not only present during winter months but in the summer months as well,** meaning that some of the road salts are being retained within the groundwater close to the surface and released to streams little by little.

On top of that, the road salts are entering these bodies of water in a fashion that causes salt levels in streams to remain elevated year-round. **Elevated salt levels in groundwater and surface waters can have negative impacts on wildlife and humans.** If salt levels continue to increase in freshwater areas, many fish and amphibians will stop breeding and eventually die. On the human side**, added salt in the water system can change the taste and color of water and eventually stop providing potable water.**

"People may end up drinking water containing sodium levels that exceed those recommended for people on low-sodium diets. **Municipal water supplies may also become contaminated"**

Read more at: **https://phys.org/news/2017-06-stormwater-retention-ponds-surface-road.html#jCp**

These findings confirm other reputable sources that **salt cannot be effectively or economically removed from the environment** and Ramsey Lake should not be subjected to the tons of additional salt that would enter the lake from the large parking areas and related road and pedestrian walk ways in the KED. **Ramsey Lake already has sodium levels three times the limit for those on salt restricted diets and chloride levels approaching levels harmful to aquatic life**

This was the environmental reason for the **appeal to the LPAT** by the Minnow Lake Restoration Group, however the developer together with the city and Gateway Casinos filed a motion to have the MLRG appeal dismissed which was unfortunately successful – justice and science denied?

John Lindsay, President, Minnow Lake Restoration Group – 705-607-6037 info.minnowlake@gmail.com

Coalition for a Liveable Sudbury

Making connections. Working toward sustainability.

April 30, 2020

Coalition for a Liveable Sudbury
Written submission – Ramsey Lake Subwatershed Study and Stormwater Master Plan

Thank you for the opportunity to provide feedback on the Ramsey Lake Subwatershed Study and Master Plan. Here are our main comments.

The overall goal of the study is to "Develop a Subwatershed Management Plan to protect, maintain and enhance the surface water, groundwater, and natural resources of Ramsey Lake and its tributaries through environmentally sound policy and management actions." Many good objectives are listed, including preventing eutrophication, algae growth and erosion, and protecting and enhancing water quality, aquatic and terrestrial ecosystems, and the watershed ecosystem (using an integrated approach of natural areas, habitats and linkages).

Some important objectives are missing, most notably:

- Climate resilience of the watershed (natural and built environment)
- Protection of drinking source water quality (groundwater is referenced, however the largest source of drinking water, Ramsey Lake, is surface water)
- Objectives for percent vegetative cover and percent permeable surfaces within the watershed
- Protection and enhancement of the community value of Ramsey Lake (which includes aesthetic, recreational, and identity as a 'jewel' in the heart of the City)

Climate Change should be integral to this study

Resilience to climate change should be integral to this study. Climate resilience of the watershed (natural and built environment) should be a main objective, and considered in every aspect of the recommendations and implementation. Unfortunately, this is not the case.

Volume control should prepare for the large storm events expected with climate change. Planning for a 1:100 year storm (which can now be expected every few years) is not sufficient to protect people, infrastructure and water quality from flooding. This study plans only for 1:100 year storm events for end of pipe volume control and conveyance control measures.

Climate change was incorporated to some extent in flood risk modelling, but was based on 2006 data (15% increase). The most up to date climate data and predictions should be used.

The increased stresses on water quality and ecosystem health (aquatic and terrestrial) from climate change also needs to be incorporated into the recommendations of this study in order to meet the goal "to protect, maintain and enhance the surface water, groundwater, and natural resources of Ramsey Lake and its tributaries."

Recommendations should not be restricted to existing land use designations

Because the scope of this study was limited to existing land use designations, **this study cannot answer the fundamental question "what areas of the watershed should be left undeveloped."** It does not identify areas currently zoned for development that would be best left undeveloped to protect water quality and watershed health, nor provide recommendations or tools to prevent development that would harm the watershed. The benefits of leaving some areas natural (e.g. SGRA's) are left unknown. The study states, "existing natural areas provide valuable ecological services, such as quality and quantity treatment of stormwater at no cost," but there is no measure of the natural ecosystem functions of existing wetlands and vegetated areas in the watershed. By failing to consider the option of maintaining natural areas, this study omits potentially the best solutions in terms of outcomes and/or cost.

The study lists many constraints for future development on Ramsey Lake, including its status as a drinking water source, sodium levels, blue-green algae blooms, extensive beds of aquatic plants, chloride levels, and the location of naturally significant features in the Official Plan (pending further study, since they were not identified as part of this study). However, under existing and recommended policies, no development would be denied on the basis of these constraints. In total, there are 24 new development sites within the Ramsey Lake subwatershed that are greater than five (5) ha in total area, adding to already high urbanization impacts.

The study identifies some specific areas that are zoned for development, where development could clearly be harmful. The most obvious example of this is the protection of Significant Groundwater Recharge Areas (SGRA). The study states, "the primary objective of the groundwater management plan for the Ramsey Lake watershed should be on the preservation of groundwater recharge within the SGRA zones." A recharge area is considered significant when it helps maintain the water level in an aquifer that supplies a community with drinking water. Significant Groundwater Recharge Areas in the Ramsey Lake subwatershed maintain water levels in Ramsey Lake, important not only for a main source of drinking water, but also for swimming, fishing, boating, shoreline habitat and spawning, and lakeside enjoyment and property values.

An obvious recommendation to meet the objective of protection of groundwater recharge within the SGRA zones in the Ramsey Lake subwatershed would be to maintain SGRA's in a natural state (with wetlands and vegetation). Instead, the study is limited to existing land use designations. The proposed Kingsway development (KED) would cover a portion of the Significant Groundwater Recharge Area, and have a negative impact, producing "complex changes to the water budget." According to this study, impacts could include reduced groundwater infiltration, increased run-off, ecological impacts, and decreased water quality (e.g. from road salt run-off from the proposed parking area).

The study does make several recommendations to mitigate impact. These include a 200m buffer zone around SGRA zones, extending to 300m where streams enter, and buffers around wetlands. However, no policy changes are suggested to implement these recommendations, which are not compatible with current development plans for the area. These buffer zones for SGRA's and wetlands should be required in the Official Plan.

Another example is the identification of a high conservation value for natural corridors north of the Kingsway: "Corridors along the north shore of Ramsey Lake are subject to more severe development pressure when compared to the large tract of land south of Ramsey Lake, and therefore have high conservation value." The study states that these areas "may be candidate priority areas to relieve some development driven habitat loss, or increase the value of existing habitat qualitatively and quantitatively." However, these are not protected lands, and no policy tools are recommended to achieve this.

One factor driving the completion of subwatershed studies in Greater Sudbury was public opposition to development in urban watersheds when information was lacking on where and how development could happen while maintaining a healthy watershed and good water quality now and into the future. This has not been resolved. Since this study does not address the question of where development can happen in the watershed, public opposition to some proposed developments can expect to continue on this basis.

Stormwater management standards and approaches have been improved

We are pleased to see that the general water quality approach in the subwatershed study is the one outlined in the MECP's Stormwater Management Guidance Manual (2018 Draft): a hierarchical approach to (i) retain water on-site with low-impact development features (LID) equivalent to the pre-development water balance volume contributing to infiltration, (ii) filter water on-site with LID, and (iii) end of pipe water quality control for the remaining water (enhanced-level corresponding to a log-term TSS load reduction of 80%).

As per the Official Plan, new developments in the subwatershed will have to demonstrate accordance with this plan for stormwater management.

We are concerned that direct discharge of stormwater into Ramsey/Bethel Lakes is permitted for some new developments (in 24 new development areas).

A number of approaches are also recommended to improve stormwater management on already urbanized lands. This is very important because of the large area of the watershed that is already developed. We especially support:

- Road right-of-way (ROW) LID retrofits. Many good information resources are provided to install these. Clarification is needed on whether ROW-LID retrofits are being recommended for rural roads only, or both rural and urban roads. We submit that they are most needed on urban roads in the watershed.
- Restoration measures on private property. Good information is provided to prepare an effective community engagement plan. Adequate resources will be needed for implementation.

Data collection should be done to monitor impact, and choose informed priorities of where lot level controls will make the most difference.

- Shoreline works. Good information is provided for next steps to move forward in partnership with NDCA and community groups. Adequate resources (including staff time) will need to be allocated to be effective.
- Terrestrial ecological restoration. Healthy land equals healthy water, and we fully support the recommendation "that the identification of priority areas for a) reforestation, b) wetland enhancement, c) establishment of connections between Natural Heritage Features, and d) enhancement of degraded ecosystems be guided by a science-based approach administered/implemented by the City of Greater Sudbury and Conservation Sudbury in partnership with the VALE Living with Lakes Centre and local community organizations." Many data gaps will need to be filled. In regards to reforestation, priority should be given to shorelines (within 300m of waterbodies/waterways) to improve water quality.
- Groundwater protection.

We also support improved salt management in the watershed, including the measures listed, but preferring even stronger measures and quicker timelines.
Stronger measures are also needed for management of septic systems.

We are disappointed that 'stream restoration' measures focus on erosion control and waterways as stormwater conveyance, not natural stream restoration.

The Master Plan lists several new stormwater management facilities that will assist in treating stormwater from existing developments. It is positive that "the water quality target associated with of end-of-pipe stormwater management facilities will be designed to provide an enhanced level of water quality protection corresponding to a long-term sediment removal efficiency of 80%." It is important to note that these facilities cannot remove road salt.
Some of these projects need further scrutiny and analysis. For example, McNaughton Terrace is a popular park location, and the water table is high. A fuller analysis is needed before approval as a Class B EA project.

Identification of a Natural Heritage System is lacking

The Junction Creek Subwatershed Study identifies core natural areas and linkages for a Natural Heritage System. The Ramsey Lake subwatershed was the missing piece in the Junction Creek watershed – unfortunately, this study does not fill in that piece. This leaves an important gap in holistic planning and protection of ecological health of the watershed. This data gap should be filled.

For those areas that are identified as important in the study, there should be recommendations included in the implementation plan to protect and enhance these areas. These areas include wetlands, and a linkage corridor north of the Kingsway.

This Plan needs to be better integrated with other guiding policy documents

The Ramsey Lake Subwatershed Study and Stormwater Master Plan should be better integrated with other relevant guiding documents such as the Official Plan, the Water and Wastewater Master Plan, the Drinking Water Source Protection Plan, etc.

Specifically, it is important that this study identify any of the sensitive natural features that would trigger protective policies in the appropriate section of the OP. Currently, it does not do this.

It is also important that details such as salt routes, mapping of watercourses, etc are accurate in this study. Please verify.

Poor water quality needs to be better addressed

Water quality is very poor in most waterways and water bodies in this watershed. Historic loading has resulted in high metals in the water and sediments (which will continue to release metals into the water). Urban impacts have led to high phosphorus, sodium and chloride levels. Climate change does and will aggravate water quality impacts, including blue-green algae blooms.

More public awareness is needed on the water quality data and challenges within the watershed, and on the historical impacts still very much affecting watershed health (e.g. thin soils, ecologically limited ecosystems, etc). For example, many residents would be surprised to learn that Copper and Nickel concentrations in sediments in Ramsey Lake were higher than the severe effects level (SEL) prescribed within Provincial Sediment Quality Guidelines.

There are many measures in this study that will assist in improving water quality. It is specifically stated that improvements to water quality should be sought. However, there are no quantitative targets for specific water quality measures. Quantitative targets and specific actions and timelines to meet those targets are needed in the implementation plan. Natural measures of water quality (e.g. presence of sensitive species, etc) should be part of water quality monitoring

A clear implementation plan is needed

The implementation section of this plan needs to be clarified and given more detail. It should document clear next steps, clear priorities and recommended actions, timelines, and resources needed.

There are many good recommendations in this report, but next steps are not clearly laid out. Priorities are not identified, and recommendations are sometimes unclear (e.g. it is sometimes unclear if the evaluation recommends going ahead, and there is sometimes conflicting information in the analysis and implementation section).

In addition, an overview (big picture) analysis of the best combination of measures is needed (since measures will have additive as well as interactive effects).

Maintenance and monitoring are a key part of implementation (e.g. for continued effectiveness of stormwater management facilities).

The importance of community engagement

Ramsey Lake is very highly valued by the community, and is a primary drinking water source. Yet, community engagement on this study was very poor, both for the general public, and for stakeholders. As this study identifies, collaboration and community buy-in are essential for implementation. Engagement with the public and stakeholders will need to dramatically improve to achieve this.

Regards,
Naomi Grant
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1 May 2020

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By email: Paul.Javor@greatersudbury.ca

Re: Ramsey Lake Subwatershed Study and Master Plan – Phase 2 Report

Dear Sir:

The Vermilion River Stewardship (VRS) is pleased to comment on the Ramsey Lake Subwatershed Study and Master Plan (MP), Phase 2 Report. We wish to thank you for extending the comment period during these very challenging times.

VRS has reviewed the Report and wishes to express our support for its implementation, subject to the following recommendations:

Climate Resilience:

If the design objective is to meet and provide peak flow control for storm events, it is necessary to plan beyond the 1:100-year peak flow, and instead plan for the new norm of a 1:1000-year flood event. Planning for the appropriate peak flow is crucial to building climate resilience and meeting the demand over the full lifecycle of the infrastructure. If an inadequate peak flow formula is used it could result in significant additional costs to the City if it has to repair or tear up failing infrastructure to rebuild and increase capacity before it has reached its end-life. "*Even a 1000-year return period has a 5% risk of being equalled or exceeded in a 50-year period*."[1]

We are moving further and further out of the norm in a warming climate that is bringing increased uncertainty and risk. Overall, temperatures in Ontario are expected to jump by 2.4 C in summer and 5.3 C in winter, with warming in the northern part of the province likely to be more than twice as great as that in the south.[2]

[1] *Technical Guide-River and Stream Systems: Flooding Hazard Limit – 2002. P-16*
[2] *What Climate Change has in Store for Ontario*

The MP was based on stormwater criteria and design and capacity standards from the *Official Plan Stormwater Background Study (City of Great Sudbury, January 2006).* However, climate change has advanced significantly over the last 14 years and will continue to advance and increase in intensity unless a miracle happens, and the world gets a handle on it. In fact, a climate study should have been done before any of the subwatershed studies were undertaken, to help predict how climate change will impact on the entire Sudbury District over the next 40 or 50 years.

Additionally, the MP reports that "*As part of the development of design storms for the City of Greater Sudbury, a 15% increase in rainfall depth was suggested (Hengeveld, 2000; Ciarmatiori et al, 2000; Watt et al, 2003). The sensitivity to climate change was analyzed with a focus on the impacts of flood rates, and was achieved through adjustment to the IDF curves by an increase of 15% based on assessment of local data*."[3] Again, these studies are 20 years old, several years before the increasing impacts of climate change became a pressing and immanent threat.

The Junction Creek Subwatershed Study indicated that "*the anticipated influence of climate change on precipitation is steeped in uncertainty with future projections ranging from a minimal increase to almost a 250% increase*", and yet the stormwater planning only ranges from a 1:5 to a 1:100-year flood event. It also admitted that "*this range represents a significant challenge to the municipality to understand and integrate into its planning decision making process*". So isn't it better to over-estimate than to under-estimate when faced with these uncertainties?

The City of Toronto had similar uncertainties and commissioned a Future Weather and Climate Driver Study in 2012 to help inform their present and future infrastructure and service decisions. By improving the level of certainty regarding the magnitude and frequency of expected climate change effects, and particularly extreme weather events, the City wanted to reduce the risk of unsustainable investment and loss associated with infrastructure construction, maintenance and operations. The study revealed that on average in 2040-2049, warmer annual average temperatures of 4.4$_{o}$C are expected. Less snow and more rain in the winters and fewer rainstorm events per year, but more extreme rainstorms and marked rainfall increases in July (80%+) and in August (50%+). Toronto had three 1:100-year storms in less than 12 years, from July 2000 to July 2012. In 2,000 it had the wettest summer in 53 years, with 13% more precipitation than normal, and in July of 2004, 4 billion litres of water came down in 5 hours – a 200 year event.[4] These are compelling reasons to seriously consider Climate Change and its cumulative effects in planning and decision-making regarding infrastructure.

The subwatershed studies so far have not mentioned building resilience to climate change into the new or upgraded infrastructure. Therefore, this MP will not meet the conditions that are very likely in the coming years. It is of the utmost importance that the MP emphasize and plan for climate resilient communities.

The MP also reports on the necessity to provide stormwater detention storage within the end-of-pipe stormwater ponds or within site-level detention control features for sites less than 5 hectares; however, to ensure required storage volumes are sufficient it will be necessary to plan using a 1:1000-year flood return.

Recommendations:

1. The MP use 1:1000-year flood return for its long-term planning for stormwater storage and any infrastructure requirements.

[3] *Ramsey Lake Subwatershed Study and Master Plan – Phase 2 Report, 3.2.2.3 Climate Change, P-73.*
[4] *Toronto's Future Weather & Climate Driver Study: Outcomes Report.*

2. The MP must address the need for climate resilient communities, infrastructure and waterways through effective climate impact assessment, planning, policies and action.
3. The City commission a Sudbury Future Weather and Climate Driver Study to help inform their decisions on future infrastructure and service decisions.

Groundwater Protection:

The MP reports that a primary objective is to protect groundwater, and yet a significant groundwater recharge area will be placed at high risk from runoff of road salt and other contaminants from the proposed Kingsway Entertainment District (KED) development. The MP identifies that risk; however, it does not offer any mitigation options to eliminate or even reduce that risk.

Recommendation:

4. The MP address the risk that the proposed KED development poses to the groundwater recharge area and recommend effective mitigation measures to alleviate that risk.

Salt Management:

The VRS is very pleased that the City is using the "Smart About Salt Program" and the 2016 Salt Management Report; however, there should be stronger measures in and around sensitive and vulnerable drinking water lakes and recharge areas. It is well known that sodium and chloride levels in Ramsey Lake are already extremely high, so it is crucial that the City ensures that both private and City storage yards and snow disposal sites located in environmentally sensitive/ vulnerable areas have some form of saltwater retention/treatment area installed. Increasing sodium and chloride levels in our freshwater is a major concern to the public. Although the need for a Saltwater retention/treatment area is lamented in the MP, "*this option is a long-term goal that has no implementation date set*".

Recommendations:

5. Implementation of the monitoring of groundwater and recharge areas.
6. Both City and private stockpiles and snow disposal sites be located outside of vulnerable areas, and/or a saltwater retention/treatment area be mandatory at all road salt and snow storage yards.

Management of Septic Systems:

The MP noted that leaking or damaged septic beds frequently go unnoticed, and can be a source of groundwater contamination, including bacterial loading, nitrates and phosphates. The MP lays out the need for collaboration between multiple parties to ensure effective adaptive monitoring and outreach for the preservation of water quality and septic system regulation; however, didn't go so far as to recommend a plan or timeline to implement the suggested measures be pursued.

Recommendations:

7. The MP include strong recommendations that the adaptive monitoring and outreach measures listed in section 9.3.11.3 Implementor/Approvals be initiated.
8. Include a mandatory 5-year septic system inspection and maintenance program.

Natural Heritage Systems:

The MP has some good general comments about Natural Heritage Systems; however, the required mapping and data collection has not been done. Ecological restoration is suggested, but no specific tools are offered.

The Junction Creek Subwatershed Study identified core natural heritage areas, ecological features and linkages for a Natural Heritage System; however, the Ramsey Lake subwatershed was the missing piece. Unfortunately, this MP doesn't fill in this piece.

Recommendations:

9. Ensure that key natural heritage and ecological features have an implementation plan to protect and enhance these features and includes a linkage corridor.
10. Ensure that sensitive natural heritage and ecological features will trigger protective policies in the Official Plan.
11. Tie together the Natural Heritage Systems of the Junction Creek Subwatershed Study, the Ramsey Lake Subwatershed Study and other guiding policy documents, so there are no gaps.

Water Quality

The MP shows that water quality is very poor in most water bodies in this subwatershed, with high phosphorus, sodium, chloride and metals; and there are also high phosphorus and metal loads in the sediment that will continue to be released into the water column. Climate change will only intensify the negative effects of this pollution, and result in more blue-green algae, ever-increasing sodium and chloride levels, and perhaps an unswimmable and undrinkable Ramsey Lake.

As stated above, there must also be better integration of information between this MP and the Junction Creek Subwatershed Study and Master Plan on water quality risks from wastewater treatment (e.g. bypasses) and septic systems. There must also be measures provided for protection of private drinking water sources, and other risks, such as the railway passing along the Ramsey Lake shoreline.

Recommendations:

12. It is essential that quantitative actions and specific timelines and targets are clearly set out in the MP.
13. A better integration of water quality risks between this MP with the Junction Creek Subwatershed Study and Master Plan.
14. Protection of private drinking water sources must also be substantively addressed in the MPs.

Conclusion:

In closing, there are many good suggestions in the Plan; however, without a clear action plan with specific timelines, targets and next steps the MP's goals and objectives will not live up to its potential.

In addition, a foundational flaw in the MPs is underestimating peak flow. This will prove to be a costly mistake for the City over the long-term, especially when this error has been repeated in each of the Subwatershed MPs to date.

Thank you for this opportunity to comment.

Sincerely,

Linda Heron
Chair, Vermilion River Stewardship

Citizen John Gaul Feedback to the Subwatershed Study for Ramsey Lake
April 26, 2020

Mr. Javor, (If you are not the intended recipient of this email then please pass it on to the appropriate individual). I am sending a copy of this email to my councillor, Fern Cormier.

Thank you for alerting me to the extended time for comments. First, I am not an engineer but I have a degree in Geography with an emphasis on physical geography. I also took urban geography and several urban and regional planning courses as well. I moved to Greater Sudbury from Burlington Ontario 16 years ago. I chose to retire here. The natural environment in and around this city made it an easy choice for me in that I use the outdoors recreationally in all four seasons. So, I am concerned with all aspects of the wellbeing of this city including water quality.

As for Ramsey Lake, my interest is twofold. First, I am a resident of the City of Sudbury and my drinking water comes from the Ramsey L reservoir. Second, I also live close to Bell Park and enjoy the aesthetic qualities of the lake for its own sake. I paddle on it and walk along its shores regularly.

From a drinking water perspective (my major concern), I became concerned about Ramsey Lake within the first year of arriving here. The level of development around the lake and the lack of naturalized shoreline; the type of activities allowed on its surface; the density of the road network in its watershed and the obvious intention to develop more properties within the watershed were signs that this drinking water reservoir was threatened.

The thin soils and steep drainage into the lake makes mitigation of pollutants from surrounding land uses almost impossible. Within my first year living here my conclusion was that this lake is totally unsuitable as a drinking water reservoir. I have never seen another drinking water reservoir like it! The density of development around it and the inappropriate activity allowed on and near its waters make it next to impossible to maintain a high level of source water quality!

A few years after moving here I experienced frequent blue/green algae outbreaks in the summer months, there were beach closings as a result of those algae blooms and bacteriological levels. They are almost annual events now. These are aesthetic problems as well as water quality problems. There are toxins associated with these blooms. About the same time, I became aware that the drinking water from Ramsey Lake was non-compliant in terms of sodium levels (20 ppm) for those sensitive to excessive levels and those over 50 years of age.

It is clear, that given the high salt levels and the unprotected nature of this so called drinking water reservoir, that Ramsey Lake is unsuitable for that purpose. Action should have been taken years ago to protect its water quality. That was not done. I found that the responses to my letters and emails of concern from the city government, from the province and from our own Health Department suggested a lack of interest!

Reading though the Ramsey Lake Subwatershed Report with its massive amount of data, I am impressed but, feel that, in general, the situation regarding Ramsey and other lakes has been revealed years ago by other reports from the city and many other interested groups. Why have we not already acted adequately on what we already knew? The reality of our present situation, revealed by phase 2 of this report and previous ones,

leaves me with the impression that we will not be able to bring Ramsey Lake up to the standard necessary for a drinking water reservoir without spending tens of millions of dollars -money well spent in my opinion.

Unfortunately , the city seems more intent on spending on wants – KED, which, if built, will be another significant source of salt for the lake, than on needs such as mitigating and reversing the damage to Ramsey and all the other lakes in our Greater City. We seem incapable, in this city, of distinguishing between the two (wants vs needs). I fear the necessary money will not be spent.

Still I believe that the Subwatershed Study Phase Two accurately captures the present state of Lake Ramsey and points to the substantial challenges that have to be overcome to make this Lake a fit drinking water reservoir and to preserve its impressive but degraded aesthetic qualities. We need to use this report and its identified mitigations to move forward and solve the problems identified in it.

I offer further suggestions which are as follows:

First, Draw additional water from Lake Wanapitei which has a much lower sodium level and use it to dilute our drinking water from Ramsey Lake to an acceptable level under 20 ppm.

Second, work hard to reduce, as much as possible, the sodium and chloride levels in Ramsey Lake using the measures outlined in the Phase Two Subwatershed Report. Chloride levels are really high and could create conditions in the lake that would favour more frequent blue green algae blooms. This would be a threat to the already threatened aesthetic values for the lake side residents and the general public who use the lake. I have already mentioned the health risk to residents from high sodium levels. Toxins from blue green algae add another threat.

Third, restrict or eliminate inappropriate uses of the lake. For example, Ice fishing (oil/gas from parked vehicles) and grey and dark-water sent into the lake by those using the ice huts.

Other actions that would help water quality and aesthetics would be to:

Drastically reduce number and horse power of power boats.

Eliminate all pre-existing septic systems from residences in the watershed and along the lakeshore. Do not allow any new septic systems within the Ramsey Lake watershed.

Require lakeshore residents to naturalize all the shoreline on their properties as voluntary appeals have not worked.

Forbid all future development immediately around the lake itself and require that all more distant development must have all storm water mitigations in place paid for by the developer.

If we really care about the drinking water quality of over 50 000 people who are supplied by Ramsey Lake and if we care about the aesthetic qualities of the lake that are already clearly at risk then we will take all necessary actions and pay the cost.

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28th April, 2020.

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Dear Mr. Javor.

Re: Ramsey Lake Watershed Study

Please note my comments regarding the recently published Ramsey Lake Watershed Study.

My observation is that this study report offers quite a thorough outline of the issues and problems associated with the salt contamination of Ramsey Lake. It is very apparent that the development projects around Ramsey Lake, without proper and appropriate planning and environmental considerations have precipitated the current dilemma.

One study reference was missing. Circa 1969/70 Klem Dembek, the City of Sudbury Planner, identified a serious concern about the contamination of Ramsey Lake in a report about the township of Broder (now part of Ward 9 and Lo Ellen Park). He noted that due to the subsurface rock formations there was a tendency for groundwater drainage from septic tanks and fertilizers (ammonia nitrate etc) entering Ramsey Lake.

Due to glaciation the Pre-Cambrian rock structure has been subjected to gouging of the rock surface leaving areas of lakes but also channels for groundwater drainage.

This glaciation left very little surface soil cover hence a very shallow topsoil. A student of geophysics would readily observe this and its influence on drainage systems….

There are solutions. It is apparent that municipal engineering does not apply the same consideration to storm water contamination as it does to sanitary sewage. And yet failure to properly manage either has its consequences – disease on one hand and undrinkable fresh water on the other

Another observation is the influences of salt in the various fresh water systems, lakes, rivers, aquifers and marshes. Salt influences the anaerobic levels in some of these systems and causes the release of the carbon sequestered in these layers. And the persistent and extensive in-filling of marshes is of great concern. Marshes are a vital element in the bio-systems. The overall salt contamination of our lake(s) (Ramsey Lake etc.) also upsets the vital chemical balance that influences all the biological systems.

SOLUTION: Once salt is diluted in water it cannot be removed by simple filtering. Neither does biological control work effectively and biological control is of more value controlling other contaminants. **You may be pleased to refer to my paper entitled "Keeping An Eye On The Growing Problem of Road Salt" The Ontario Technologist magazine, January/February 2020 edition (vol. 62 No 1).** This is an abridged version. Obviously there is much more engineering, planning, design and management detail. The science of removing water from salt brine is relatively straight forward. And the whole process can be made "economically neutral" with proper design and management. Such a system would enable the continuing use of road salt while at the same time offering considerable if not approaching total protection of the environment.

Parallel to this solution would be the requirement to paying a much closer attention to home, subdivision and building construction as well as road and highway construction.

Further, ALL future development not only around Ramsey Lake but ALL fresh water sources cannot and must not be built over or adjacent too fresh water ground

water recharge and aquifers. Proper and appropriate skilled planning surely must be the order of the day.
NOTE: All salt laden water that is allowed to enter the storm waters systems and even the sewer systems not only contaminates Ramsey Lake it ultimately all drains into Lake Huron and the Great Lakes system.

Conclusion: My experience and expertise extends to work in the uranium mining industry. One role that I performed was the design and installation of a water treatment system for an underground uranium mine in Saskatchewan – that had to be approved by the Canadian Atomic Energy Board and the Saskatchewan Environment Ministry.

I also served on the (Ontario) Ministry of the Environment Regional Liaison Committee (Sudbury Region). This group reviewed many aspects including ammonia nitrate contamination of some waterways and systems, as well as sewer systems and much more.

I am available for consultation.

Respectfully

Sincerely

Lionel W. F. Rudd. C.E.T.

Xc Mayor & Council
City of Greater Sudbury.
Jamie West. MPP Sudbury.
France Gelinas MPP Nickel Belt
John Lindsay, President, Minnow Lake Restoration Group.
City of Greater Sudbury (Clerks Office)