Lake Rosalind Concerned Property Owner: Recommendation for Brockton Municipality to conserve and improve Environmentally Protected zones around Lake Rosalind and Marl Lake

Reference:

County of Bruce: File # BCOPA236-18.34

Municipality of Brockton: File # Z-50-18.34

Resident

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Ontario Water Wastewater Certification Office Operator ID: 90064920

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1. Introduction

This document was produced in an effort to preserve land zoned as Environmentally Protected or Hazardous within the Lake Rosalind watershed. The Lake Rosalind watershed consists of surface water used for recreation and domestic plumbing for residents living on and around Lake Rosalind. Additionally there are approximately 68 residents that are connected to the municipal well system along Road 4, of which at least one non-permitted private water supply is located in the same area.

The Clean Water Act was introduced by the Province of Ontario to ensure that all residents have access to safe drinking water. The capacity of the water supply system in the Community has been recognized as a significant risk to not support the existing and future water demands for the community (Melchin et al., 2016).

2. Rationale

There was an application put forth on lot 496 Lake Rosalind Road 4 to reduce the Hazardous area and rezone it for residential. The developer has proposed to split the lot into two separate properties, requiring municipal water services. It was recommended by the Saugeen Valley Conservation Authority, Environmental Planning Technician to further reduce the EP zone. The reasoning was based off of zoning changes previously approved on the property with no scientific evidence to support the decision that it will not negatively impact the area. After reviewing the publically available documents and incorporating “best practice” scientific principles, there is an overwhelming amount of evidence to support that past zoning changes have negatively impacted both surface and ground water in the area.

3. Objectives

The purpose of this document is to demonstrate how water related negative consequences are impacted by the reduction of Environmentally Protected Hazardous zones to replace with the construction of more residents that will require municipal water supply. Specifically, how the local ground and surface water supply and quality are linked to the management of storm water and waste water and other land use practices using

reports submitted to the municipality by professionals in relation to the Lake Rosalind watershed.

3.1 Drinking Water

Demand

The existing water supply has been noted that it cannot meet the current demand at all times of the year. To increase the demand of a well that struggles to supply, would jeopardize the security of clean water for the residents that currently rely on it. This point has been discussed in the Inspection Reports conducted in 2017, and 2018. “Well #1 has been clearly impacted by drought, with shown effects of reduced well yield during seasons that lack precipitation over extended periods of time” (Shannon, 2017; Shannon 2018). Additional confirmation can be found in the Tier Three Water Budget and Local Area Risk Assessment. The impact of climate change has resulted in recent droughts that have negatively impacted the supply of the current drinking water system.

The two wells that supply water to the Community of Lake Rosalind have had historical issues with meeting the existing residential demands. As recently as the summer of 2012, the water levels in both wells fell below safe operating levels and the wells were unable to supply demand to the community (Melchin et al., 2016). Well #1 is a shallow dug well that extends less than 4 m below surface and is vulnerable from both water quality and quantity perspectives. Well #3 is a deeper well that extends 23 m below surface; however, the static water levels in Well #3 vary dramatically (up to 7 m) from one year to the next and fall to depths below the pump intake, which lies over 16 m below surface. It was interpreted that during these periods, the well could not service the demands of the community (Melchin et al. 2016).

The Tier Three Assessment establishes the risk that a community's sources of water will not be able to meet allocated water demands, taking into consideration climate and other water uses. Land use in the Study Area is primarily agricultural with natural areas such as forests and wetlands scattered throughout. Urban areas exist along the shores of Lake Rosalind and Marl Lake (Melchin et al., 2016). As Local Area B (Lake Rosalind Wells)

was assigned a Significant Risk Level, all consumptive demands or areas of recharge reduction (due to land use development) within this area are classified as Significant Water Quantity Threats (Melchin et al, 2016).

Quality

The data below was sourced from the Walkerton Drinking Water System Summary Reports from 2010 to 2018, prepared by Veolia Water in accordance with Schedule 22, Ontario Regulation 170/03. These documents are publically available and reflect the quality of the drinking water over the past 8 years. The reports indicate that the municipal system, which consists of Well #1 and Well #3, provides the community with water that meets the Drinking Water Quality Standards in Ontario Regulation 169/03 with the exception of sodium, which often exceeds the value found in the regulation.

The aesthetic objective for sodium in drinking water is 200 mg/L at which it can be detected by a salty taste and is not toxic. A maximum acceptable concentration (MAC) for sodium in drinking water has not been specified. Persons suffering from hypertension or congestive heart disease may require a sodium-restricted diet, in which case, the intake of sodium from drinking water could become significant. It is therefore recommended that the measurement of sodium levels be included in routine monitoring programs of water supplies. The local Medical Officer of Health should be notified when the sodium concentration exceeds 20 mg/L, so that this information may be passed on to local physicians. (MOECC, 2006)

The other important parameter that should cause concern noted in the public water supply reports is the increasing trend associated with the concentration of nitrates (Figure 1). The MAC of nitrates in drinking water is 10 mg/L as nitrogen (MOECC, 2006). Nitrates are present in water (particularly ground water) as a result of decay of plant or animal material, the use of agricultural fertilizers, domestic sewage or treated wastewater contamination, or geological formations containing soluble nitrogen compounds (MOECC, 2006).

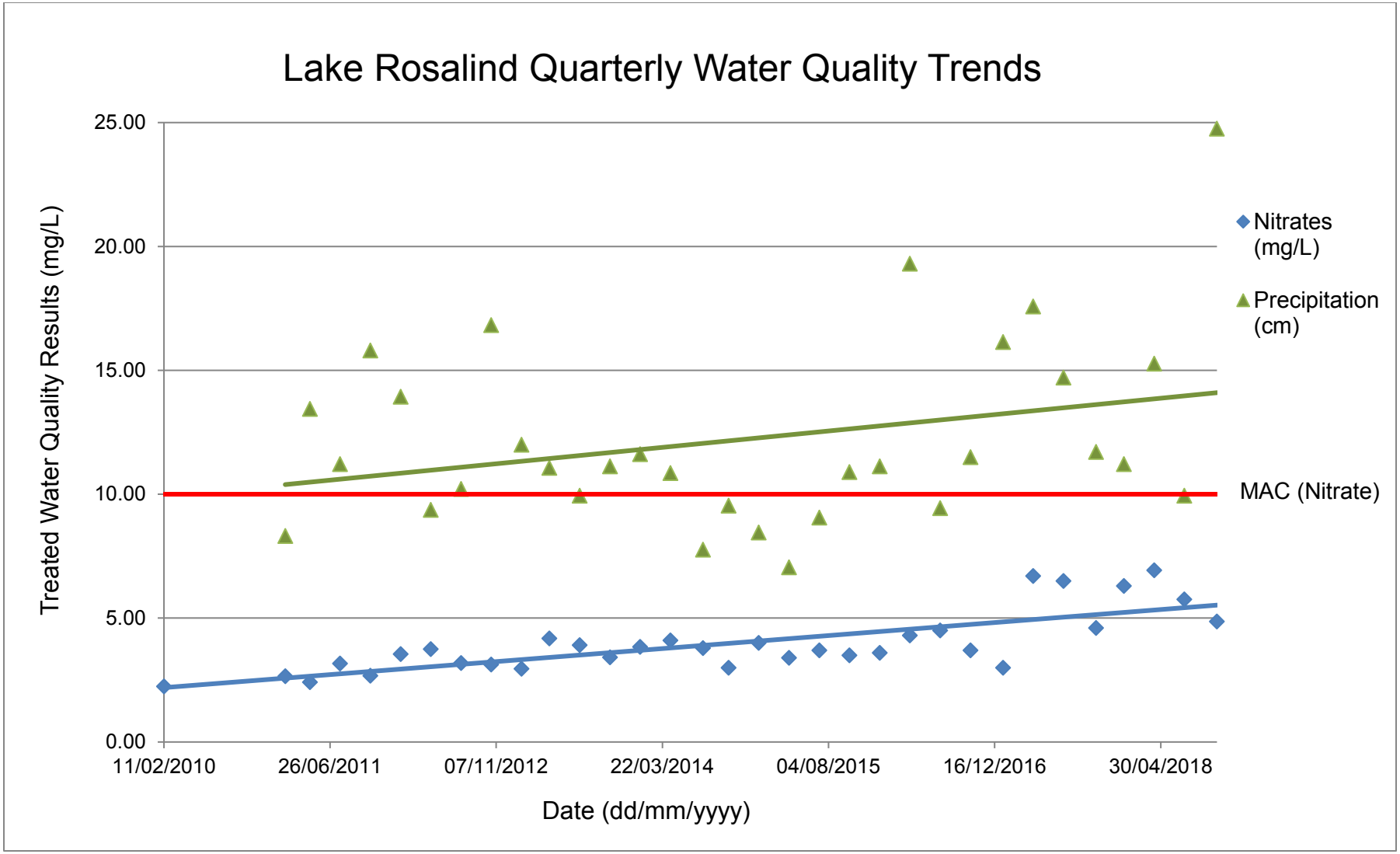

Figure 1. Information Sourced from Lake Rosalind Drinking Water System 2010 – 2018 Summary Reports and precipitation data available for Walkerton, Ontario:Sourced https://www.worldweatheronline.com/lang/en-ca/walkerton-weather-averages/ontario/ca.aspx accessed April 25th 2019.

As noted in the Tier 3 assessment, the area around the municipal wells is primarily agricultural with some medium density residential. Based on the counts of the fecal indicator *E.coli* measured in Well #1 primarily during the fall months compounded with the increasing trend of nitrates and precipitation, strongly suggests the source of pollution is livestock manure and/or domestic wastewater, and influencing nitrate concentrations (Figure 2). Microbial Source Tracking (MST), MECP Method E3499 could be performed to confirm the source. Walkerton quarterly precipitation data (used due to data availability and proximity radius) was plotted along the same time period and shares a similar and parallel trend with the nitrate levels, suggesting that flooding effects from climate change are correlated with nitrate levels.

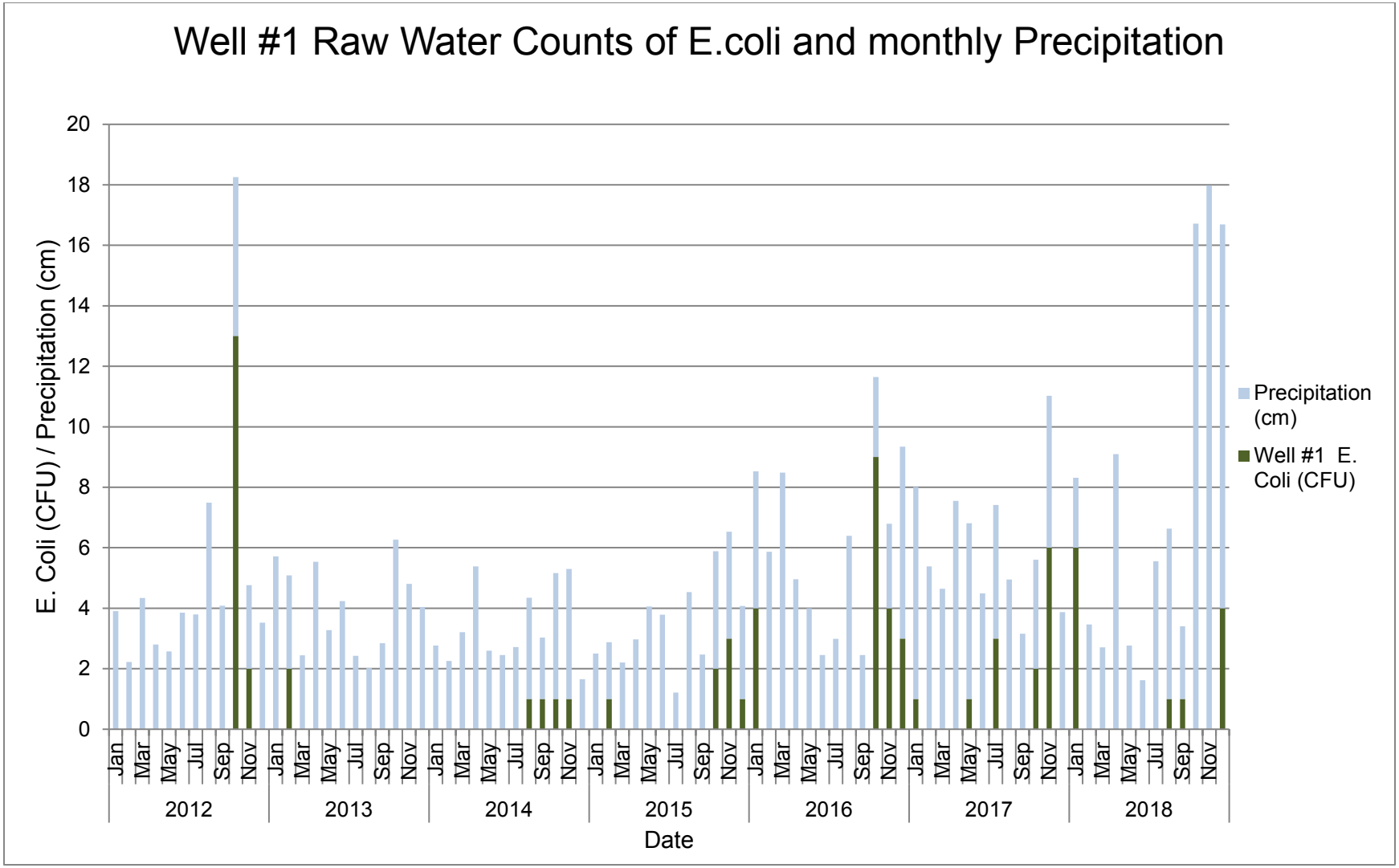

Figure 2. Information Sourced from Lake Rosalind Drinking Water System 2012 – 2018 Summary Reports and precipitation data available for Walkerton, Ontario: Sourced https://www.worldweatheronline.com/lang/en-ca/walkerton-weather-averages/ontario/ca.aspx accessed April 25th 2019.

3.2 Storm Water

Storm water is water that originates during precipitation events and during snow/ ice melt. Storm water will either soak or infiltrate into the ground, be held on the surface and evaporate or runoff and end up in the watershed, ultimately Lake Rosalind. Due to the location and slope of the land of lot 496 Lake Rosalind Road 4 and adjacent properties, a stream is continuously flowing all year as reported by neighbours. Additionally, storm water is also being directed to the lake from this location due to the topography of the area. The Environmentally Protected and Hazardous zone located on the property (and others around the lake) are necessary for storm water management to not only protect residential infrastructure, but also the water quantity and quality of the lake and in the water table. Past reduction of the EP zone to construct a garage has contributed to a displacement and diversion of water and nutrients from the riparian buffer zone to directly into the lake. Results from water quality testing completed by the Lake Rosalind Water Quality Committee in that area, (location 5 and area) show elevated nutrient loading over a number of years and has been identified as a problem area.

The riparian zone is noted as the interface between land and a body of water. It is known as a terrestrial biome of the earth, where plant habitats and communities along the banks are characterized as hydrophilic. If constructed and undisturbed, this zone acts as a buffer to control, trap, and treat storm water as it travels by gravity to lower elevation. These zones are necessary to reduce the velocity of storm water, allowing it to infiltrate the ground, increase the water table, control erosion, reduce turbidity, and reduce nutrient concentrations as it travels down and enters the body of water.

Tori Waugh, Agriculture Outreach Coordinator for the Saugeen Valley Conservation Authority, presented a widely accepted scientific method to improve the health of inland lakes which follows a three step approach. Step 1 to avoid and prevent; Step 2 to control, trap, and treat water using grassed waterways, tree planting, storm water retention ponds, swales and berms; Step 3 to manage riparian zones through the construction of wetlands and natural channel designs (modified from Tomer et al. 2013)

As it relates to the municipal water system, groundwater recharge refers to the amount of water that infiltrates and seeps through the unsaturated zone and ultimately reaches the water table. The rate of groundwater recharge is dependent on a number of factors including precipitation, evapotranspiration, land use and vegetation, surficial soil type (geology), and physiography. Recharge is enhanced in areas where the ground surface is hummocky and direct runoff to nearby creeks and rivers is inhibited (Melchin et al. 2016). As Well #1 is largely influenced by the water table, inhibiting runoff in that area using the three step approach above would improve the well recharge rate and water security for the future.

3.3 Waste Water

A tertiary septic system that complies with the Effluent Quality Criteria as regulated by the Ontario Building Code (table 8.6.2.2.A) releases a reduced strength effluent from a normal residential waste count of 120-150 mg/L BOD5 to ~ 15 mg/L (Septic Systems Ontario, 2019). However, the average water usage of a 4 person residence is ~ 1000 L/day, and with two residences, 30 000 mg/day of BOD5 would be entering the watershed and consuming oxygen as it is broken down in the lake. Although this system performs better than a traditional system, there is a waste product being generated where persistent harmful algal blooms exist. Furthermore, prior to the previous zoning changes, the area of the lot was wetland and is completely saturated with a continuous flow of water passing through two locations on the property. The performance of a septic system under saturated conditions may not meet the targets presented by the septic manufacturer. Lastly, detergents and soaps that contain surfactants and water softener brine high in sodium also are not treated by septic systems.

4. References

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