WLCC Report on Water Flow in the Williams Lake Watershed - November 25, 2020

Prepared for the WLCC by Melanie Dobson and members of the WLCC Executive Committee

Williams Lake is an urban lake that gives more than it gets. Water levels in the lake have been getting lower over the past 20 years. The Williams Lake Conservation Company (WLCC), a non-profit volunteer community-based organization, has had a stewardship role with the lake for the past 50+ years, which includes monitoring lake levels and water quality. Recent summers have seen Williams Lake water levels fall lower than ever before (See Figure 1).

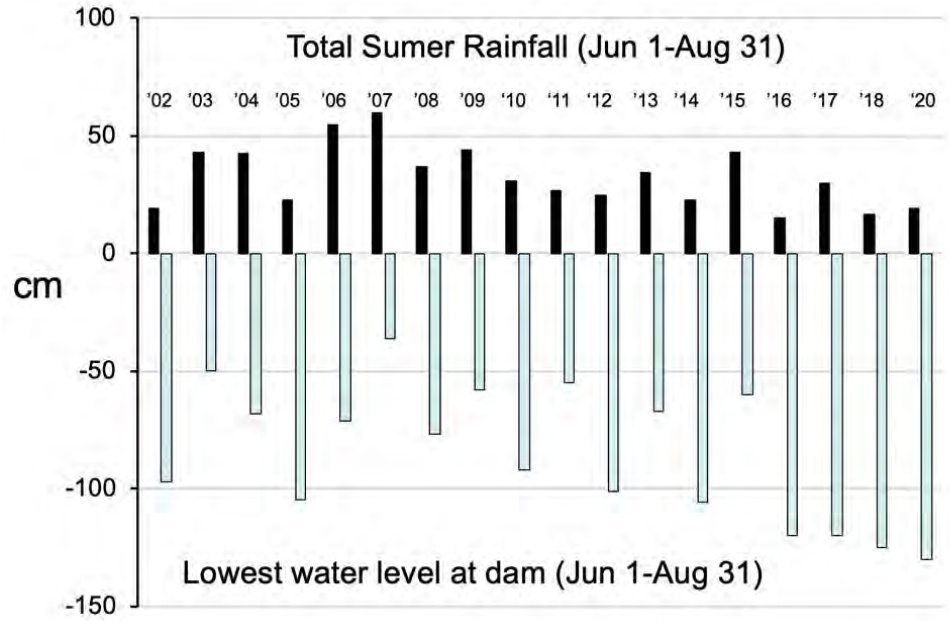


Figure 1. Measurements by the WLCC taken during the summer from 2002-2020 show that Williams Lake levels are lower in summers with less rain but also that levels have been falling significantly lower than in past (~1 inch lower /year).

The level of the water and the health of the lake are dependent on many factors. These include the dam at the eastern end (see Figure 2), in need of repair, the changing climate, and on water flow through the watershed. This report focuses on that water flow which needs to be maintained and not further compromised. WLCC analyses and observations by many long-time users of the lake have indicated that sources of the water that are the lifeblood of the lake may have been re-routed elsewhere. In search of some answers, WLCC executive members have been in contact with HRM. Unfortunately, engineers and planners at HRM seem to have lost track of the changes to water flow in the Williams Lake watershed. In recent correspondence, an HRM Water Resources Specialist in Planning and Development (July 15, 2020) reported to the WLCC that Halifax Water has "found that, in reviewing their data for the area, it is out of date, incomplete, and inaccurate. They do not feel that it would be appropriate to provide you with a map based on data known to have these shortcomings." Despite this lack of information, HRM has approved numerous developments in the watershed in recent years that have affected water flow in the Williams Lake watershed.

To overcome this lack of information, Dr. Melanie Dobson, on behalf of the WLCC, has undertaken an investigation to establish where water routes have changed and what sources of water remain to feed

the lake. The following is Dr. Dobson's summary of her work. This summary helps us to understand the impact of development with unconstrained changes to the water sources for Williams Lake.

Water Flow in the Watershed

The Williams Lake Watershed is surprisingly extensive, reaching from far north along Dunbrack Drive, west and south into Spryfield and beyond the Shaw Wilderness Park on the south and east (See Figure 2 for overview of water flow and Figure 3 for more detail on the water courses and the location of recent developments in the watershed). See the Appendix for photographs of sites within the watershed.

Figure 2. Water flow in the Williams Lake Watershed. Key sources of water supply to Williams Lake with the direction of water flow indicated with arrows. Water courses directed through culverts/underground pipes are indicated with grey rectangles. The boundary of the Williams Lake watershed is shown in red (mapping data courtesy of Dr. Patricia Manuel) and indicates the land where precipitation would normally be fed towards Williams Lake through streams and other water bodies and by percolating through the ground. The lands owned by the Church of Christ Development Corporation (C of C Dev. Property) and the Shaw Wilderness Park are outlined (black and green lines, respectively). Sites referred to in the text of the report are numbered on the map.

Water originating on the hillside east of Dunbrack and from ditches along the road is piped under the junction with the Old Sambro Road (1) and feeds into Catamaran Pond (2). Water then flows through a wetland to a second pond at the end of Lewis Street (3). Water from this pond flows into a culvert in the Feruz Crescent Development behind the Sobeys store on Herring Cove Road. From there, the water is piped underground and eventually discharges (with other storm drain run-off from Herring Cove Road and the top part of Williams Lake Road) from a large diameter pipe outlet in the woods (5) below the parking lot of the church on the corner of Williams Lake and Herring Cove Roads. This is now

considered the beginning of Governor's Brook (presumably in past before development in the area, it would have flowed overland from the Lewis Street pond).

Governor's Brook is fed by other streams and water originating in the C of C Lands (6) and discharges into Colpitt Lake (7). Colpitt Lake is a major water supply for Williams Lake (9). The stream connecting the two (8) lies in the C of C Lands and flows year-round, even in hot dry summers when lake levels have been low, supplemented by water coming from other parts of the C of C land.

Williams Lake also receives water from a stream at the end of Acorn Avenue (10) where there is a public boat launch area. Water supply from this stream has been significantly reduced in recent years by infill on Acorn and the Sagewood Avenue and Ravenscraig Developments (See Figure 3).

A major source of water at the western end of Williams Lake is delivered through a culvert under the Williams Lake Road from a duck pond on the north side of the road (11). The pond was originally designed to prevent storm drain run-off from the Purcell's Cove Road end of the Williams Lake Road from entering the lake too quickly. The pond was enlarged as part of the work done when the open ditches along the eastern end of Williams Lake Road were converted to a piped collection system in ~1999 (13). The pond also receives the water that now runs westward from the extended Forward Avenue Development, and eastward off the Ravenscraig Development (12). Prior to the development of Ravenscraig, there was a year-round stream flowing at the western side of the site that delivered water to Williams Lake and to a wetland higher up on Williams Lake Road. That water is now channeled through a series of engineered open swales behind the houses on the lower part of the Development and along the playing fields. The engineered swales and another wetland (beyond the playing field above the detention pond (12), and the detention pond itself, have become overgrown and it is not clear they are filtering and clearing the water as well as originally intended. WLCC monitoring of water quality at the west end of Williams Lake has shown a significant deterioration in quality relative to water sampled at the eastern end of the lake.

A year-round stream at the eastern end of Williams Lake (14) is another major and important source of water supply to the Lake. This stream is maintained by rain and ground water absorbed from the large wilderness area of Shaw Park that rises above the lake on that side.

Water leaves Williams Lake through Lawson's Creek at the far eastern end (15) and flows under the Purcells Cove Road and through a grated culvert under a bridge at the Royal Nova Scotia Yacht Squadron and into the Northwest Arm. A dam has existed at the outflow into Lawson's Creek since the 1700's, allowing the lake to be maintained at a level that could provide water power, later, a supply of ice for the city, and more recently as a recreational resource for HRM residents, while still ensuring enough outflow to keep Lawson's Creek running. The dam has been repaired many times over the years and is now again in need of remediation.

The Cunard Pond portion of Williams Lake hosts a registered HRM beach and receives water from the main body of the lake through a culvert running under Wyndrock Drive (16). This water supply to the Pond is cut off when Williams Lake levels become low, as they have in recent hot summers, compromising the quality of the Pond water. Some water reaches the Pond indirectly from the north side of Williams Lake Road, but this has been significantly reduced since the changes to the storm drainage system along the Road in 1999.

Impact of Developments in the Williams Lake Watershed

Multiple significant housing developments have been built in the Williams Lake Watershed in the past 20 years, many of which have altered natural water courses (See Figure 3). Developments have included: St.Michael's (1997-2009), Governor's Brook (early phases 2010-2012 and later phases 2012-ongoing) (Sobey's and the Feruz Crescent neighbourhood 2000-2007)), (Ravenscraig 2006-2012), Sagewood 2008-2009), Forward Avenue Extension (2002-2009), and Long Lake Village (2016-current). These developments represent a significant loss of permeable surface in the watershed due to the addition of driveways, roads and parking lots. Rather than be retained and percolating slowly through the ground, rainwater captured by storm drains moves rapidly through the watershed. Sediments do not have time to settle and hydrocarbons do not readily evaporate in closed systems, making the water that is delivered into streams and lakes more highly contaminated. Blasting to level building sites changes elevations and disrupts normal water flow and in some cases, water has been diverted away from the watershed (for example, early phases of the Governor's Brook Development directly impacted water supply to the Williams Lake Watershed, by having storm drains designed to divert run-off away from Colpitt Lake and towards the MacIntosh Run, a different watershed).

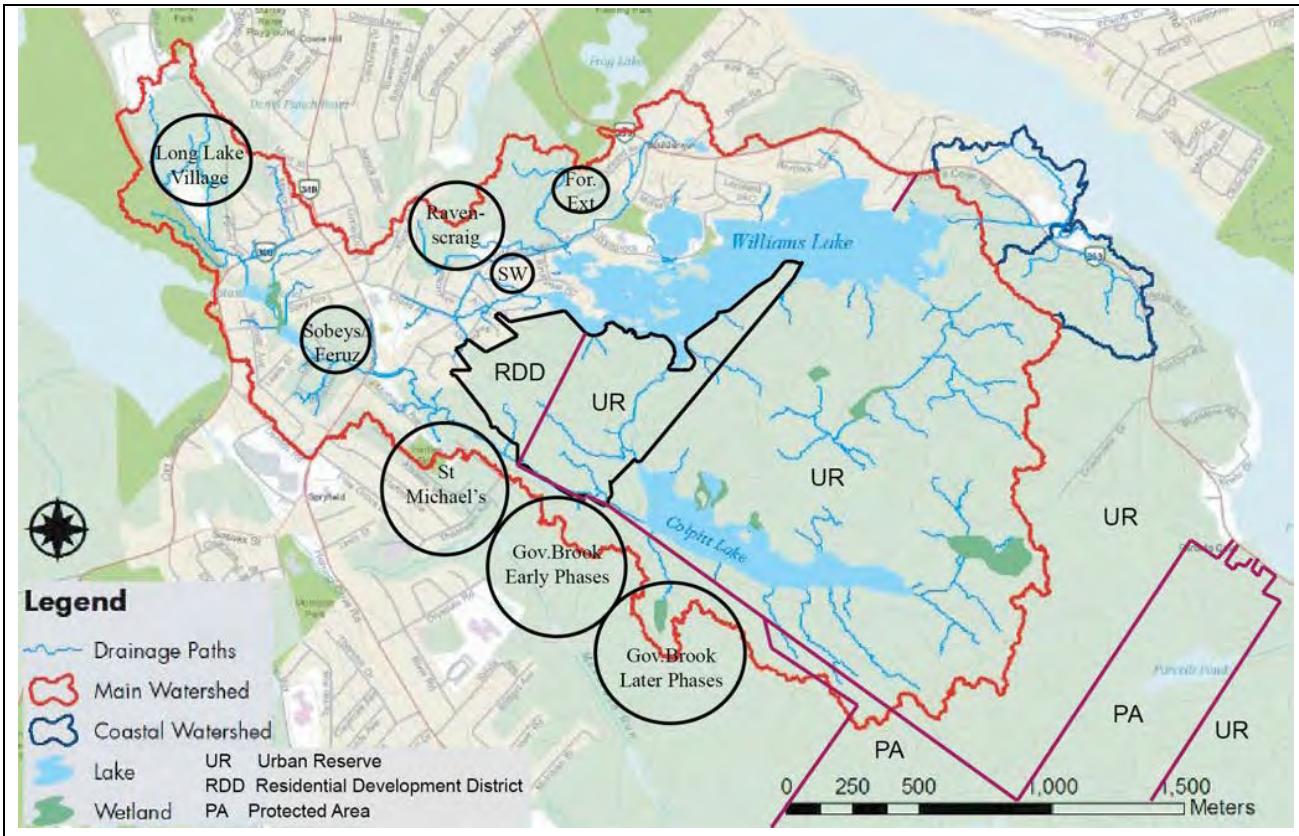


Figure 3. Positions of Recent Developments in the Williams Lake Watershed (2000-current) and Current Zoning of Undeveloped Land. Watershed Map is courtesy of Dr. Patricia Manuel. Developments indicated are Governor's Brook Early Phases (2010) and Later Phases (2012-), Feruz Crescent/Lovell Lane) (2003-2007), Sobeys (2000-2003), Ravenscraig (2006-2012), Forward Avenue Extension (For. Ext)(2002-2009), Sagewood Avenue (SW)(2008-2009), St. Michaels Early Phase (1997) and Later Phase (2004-2009), Long Lake Village (2016-current).

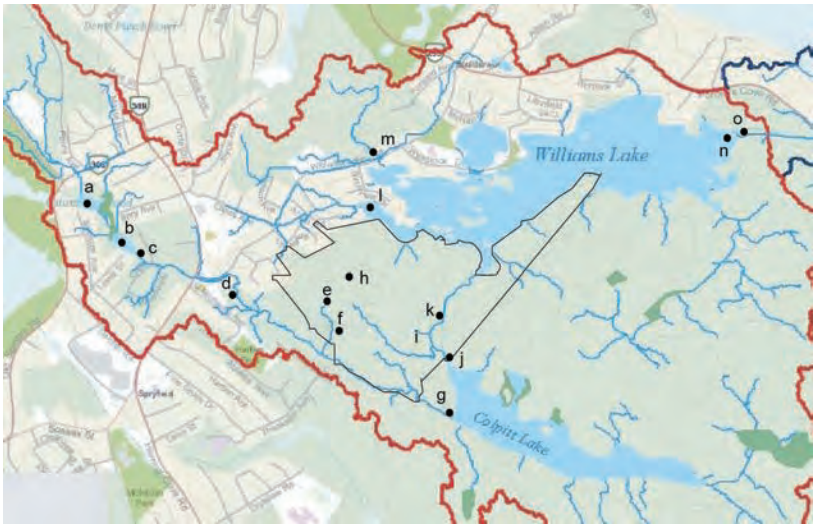
The western end of Williams Lake has already been severely compromised by several Developments that have directly impacted the water flow into that end of the Lake both in terms of quality and quantity (See Figure 3). Reconfiguration of the junction of Dunbrack with the Old Sambro Road when the Northwest Arm Drive was upgraded, and the housing development of Feruz Crescent/Lovell Lane immediately adjacent to the ponds behind the Sobeys store, and the large car parks at Sobeys and the adjacent Shoppers Drugmart, have increased water capture to storm drains and decreased water quality reaching Governor's Brook. The WLCC water quality monitoring program has noted changes in some chemical parameters for Governor's Brook outflow samples that may reflect these impacts.

The Church of Christ Development Corporation Lands are of particular concern. These lands hold the major stream connecting Colpitt and Williams Lake, a vital supply of water to Williams Lake. The land also holds other smaller water courses, some seasonal, and wetlands that feed into Governor's Brook and the connector stream to William's Lake (See Figure 3 and Appendix). These supplies of water are essential for the health of Governor's Brook and in turn of Williams Lake.

There is a considerable length of shoreline on Williams Lake that is contained in the C of C lands. The topography of the land which borders the lake is extremely rugged and sloped as it contains large granite outcroppings. Dispersed throughout are large and small vernal pools and streams of water which flow directly into the lake. Any disturbance of this land would be extremely detrimental to the water quality. The amount of development which has already taken place in the Watershed and directly on the lake has had a severe effect. A tipping point has been reached. Any further development would likely push the lake past its capacity to survive as a lake which would support wildlife and recreational activities. Fortunately, the creation of the Shaw Wilderness Park has secured a kilometre of the shoreline. All efforts to ensure there is no further development on the lake must be made to prevent the demise of this significant urban lake.

Appendix - WLCC Water Flow Report 2020

Sites mentioned in the report are indicated on the map by letters with photos taken at those locations below. Photos courtesy of Melanie Dobson and Stephen Drage, were all taken in 2020 on thes dates shown for each.



a. Catamaran Pond, Sept 13

b. Lewis St/Feruz Crescent Pond, Sept 13

c. Lewis St. Pond outlfow culvert, left, dry on Oct 12, right, some flow, Oct 25, 2020

d. Start of Governor's Brook, large pipe in woods, Oct 2

e. Vernal pool on C of C land, Oct 31

f. Stream on C of C land, Oct 31

g. Colpitt Lake as seen from Governor's Brook outflow, Jul 30

h. Stream on C of C land, Oct 31

i. Stream running in to Colpitt Lake from C of C land, Oct 31

j. Colpitt Lake as seen from outflow to stream connecting to Williams Lake, Sept13

k. Colpitt Lake- Williams Lake connector stream, Oct 31,2020

l. Williams Lake from Birchview looking toward Acorn Drive shoreline, Sept 21 (left) and from Acorn Drive after some fall rain, Oct 28 (right)

m. Detention pond on Williams Lake Road, Nov 25

n. Williams Lake dam, (left) on Sept 10, and (right) on Nov 15

o. Lawson Creek below dam, Sept. 10,