2019

WATER

Submitted by:

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Town of Osoyoos
Annual Water Report

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1.0 Introduction to the Town Water Systems

The Town of Osoyoos operates water systems within its municipal boundary (Municipal Water System) and within Electoral area A (Agricultural Irrigation Systems) on the west side of Osoyoos Lake both north and south of the town's municipal boundary. The service areas of both systems are illustrated on the following maps (Pages 4 and 5). The municipal system provides service to the majority of residential, commercial and industrial lands within the municipal boundaries and is supplied by wells. The Agricultural Irrigation System is primarily an irrigation water supply system using two intakes in Osoyoos Lake.

2.0 Municipal Water System

2.1 Water Supply Wells

A total of six wells supply groundwater to the Town's municipal water system. The water supply wells range in capacity from 18 L/sec (295 USgpm) to 75 L/sec (1200 USgpm) and are listed following.

Well No. 1	Jack Shaw Gardens
Well No. 3	Maple Drive
Well No. 4	Cottonwood Park
Well No. 5	Cottonwood Park
Well No. 6	Wye in Lacey Point Area
Well No. 8	Kingfisher Drive at 83rd Street



Wells No. 4 and No. 5



Well No. 1

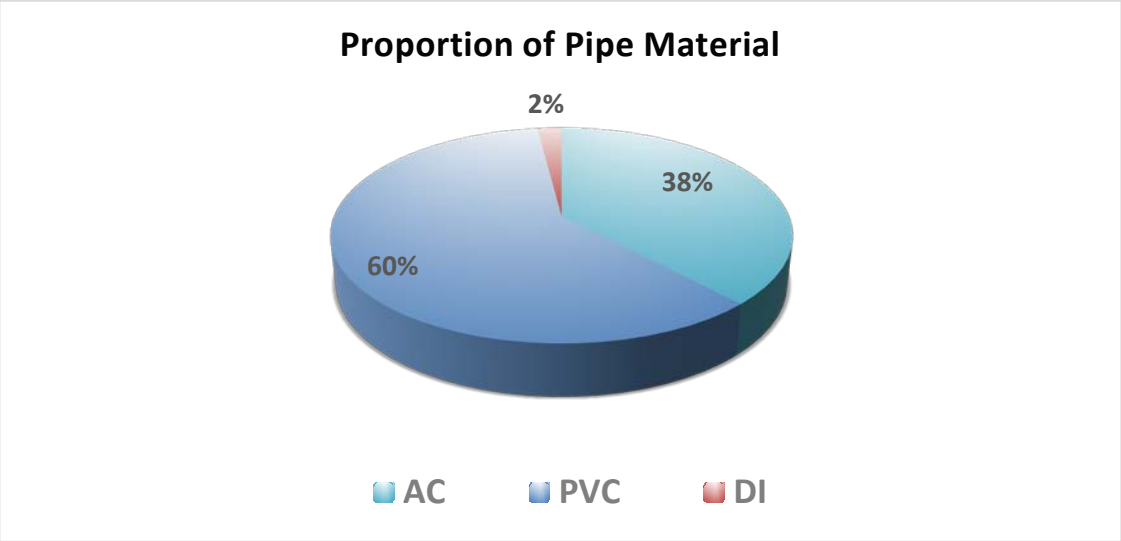
In addition, the Town has a drilled and capped a well (designated No. 7) north of Well No. 6 in the Lacey Point area. The Interior Health Authority has not approved Well No. 7 as a drinking water source at this time.

The Town of Osoyoos and True Consulting Ltd. are investigating strategies to address the concerns of the Interior Health Authority with the goal of transforming Well No. 7 into a full production well by 2020. The locations of the water supply wells are shown on the following map (Page 4) of the municipal water system.

2.2 Water Distribution System

The municipal water distribution system comprises about 58.9 km of water main ranging in size from 50 mm (2") to 400mm (16"). Pipe materials comprise:

- 22.2 km of asbestos cement pipe installed in the period up to 1980
- 0.9 km of ductile iron pipe installed in the 1980's
- 35.8 km of PVC pipe installed since 1980



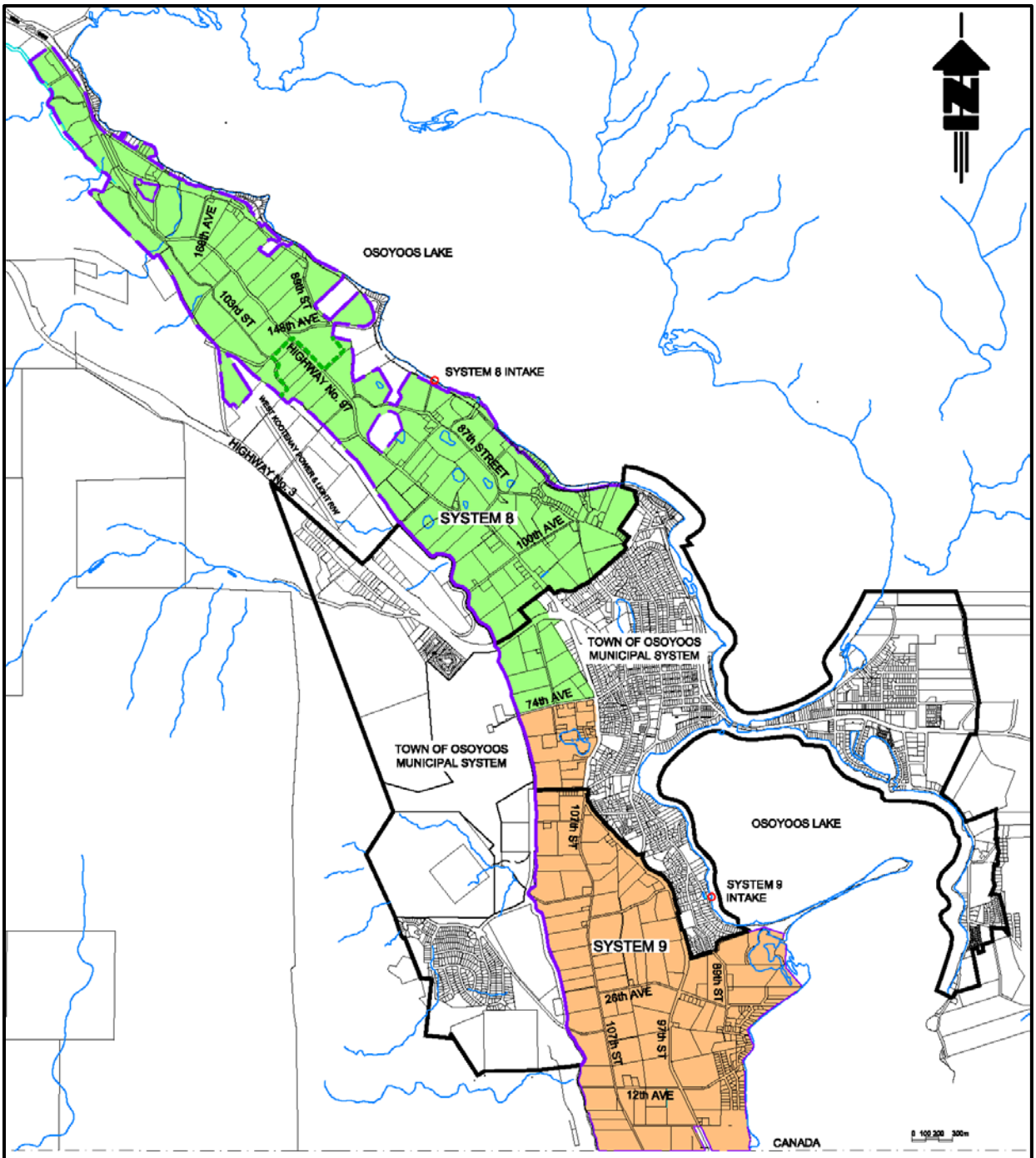
2.3 Reservoirs and Pressure Zones

The municipal water system comprises a total of 3 pressure zones each at successively higher elevations servicing areas on the west side of Osoyoos Lake. The pressures zones and reservoirs in each pressure zone are listed following.

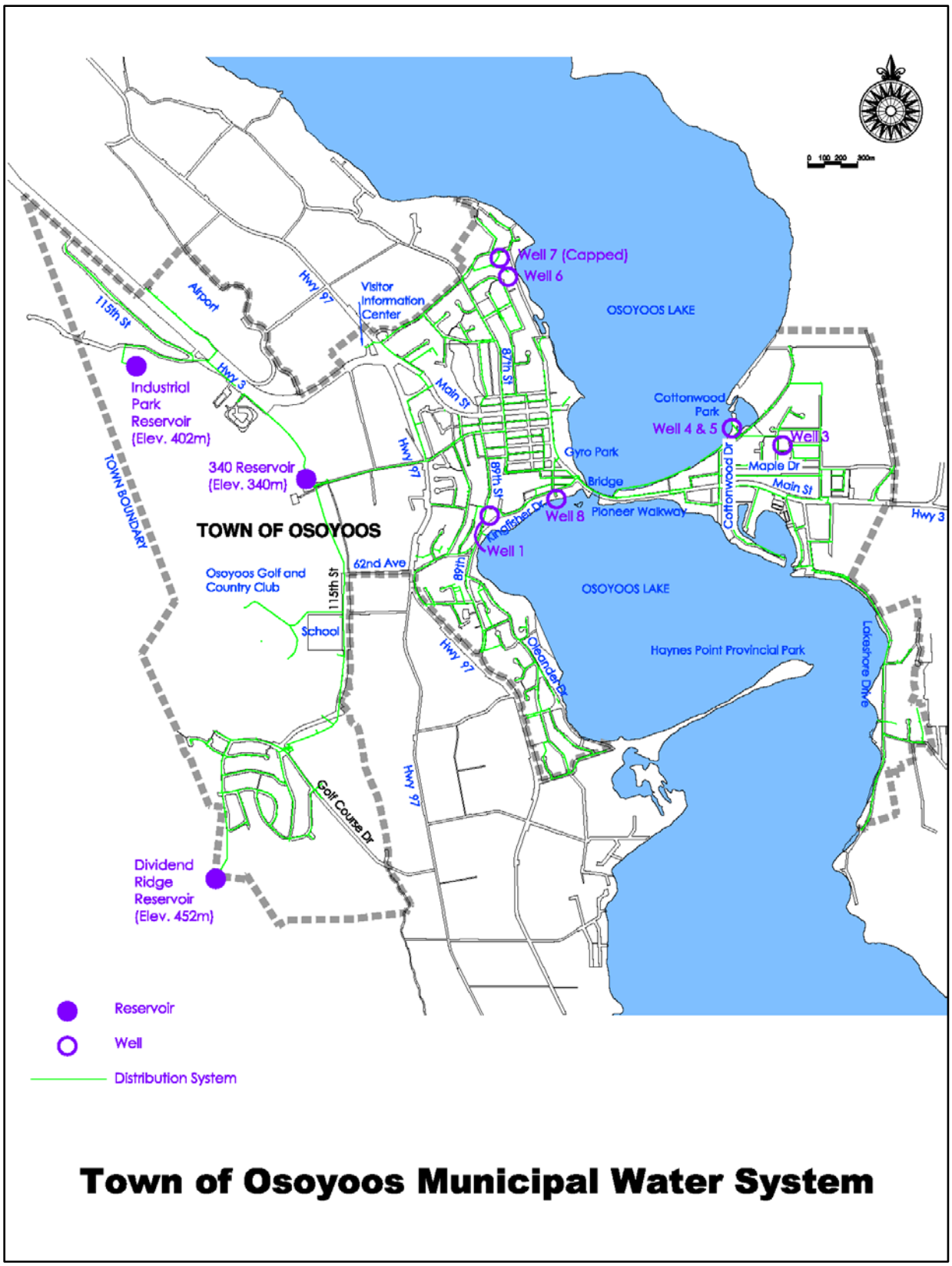
- 340 Zone – 2 Reservoirs having a combined capacity of 3,910,000 L (1,000,000 USgal). The service areas include all areas of the Town east of Highway 97 including East Osoyoos.
- Industrial Park Reservoir having a capacity of 1,000,000 L (260,000 USgal). The service area includes the Industrial Park, secondary school and Desert Park.
- Dividend Ridge Reservoir having a capacity of 1,140,000 L (300,000 USgal). The service area includes the Dividend Ridge neighbourhood and the golf course clubhouse.



340 North Reservoir under Construction 2011



Town of Osoyoos Water System Service Areas



Town of Osoyoos Municipal Water System

3.0 Agriculture Irrigation Systems

Up to 1990, irrigation systems 8 and 9 were owned and operated by the South Okanagan Lands Irrigation District (SOLID). In 1990, the Province dissolved SOLID and transferred ownership of irrigation systems 8 and 9 to the Town. The Osoyoos Water District provides irrigation water to about 670 hectares (1,660 acres) of agricultural land and about 500 domestic connections.



Irrigation System 8 Intake/Pump house

3.1 Osoyoos Lake Intakes

During the irrigation season, mid-April to mid-October annually, irrigation systems 8 and 9 are supplied from separate intakes in Osoyoos Lake. The System 8 intake is located south of the old BC Tree Fruits Packinghouse while the System 9 intake is on Acadia Court. At both intakes, water disinfection is provided by chlorination.



Irrigation System 9 Intake/Pump house

Outside of the irrigation system (mid-October to mid-April annually) the lake intakes are not operated except for emergency conditions. In this off-season period, water to domestic connections in the service area of Systems 8 and 9 are supplied groundwater from the Town's municipal system.

3.2 Surface Water Supply Systems

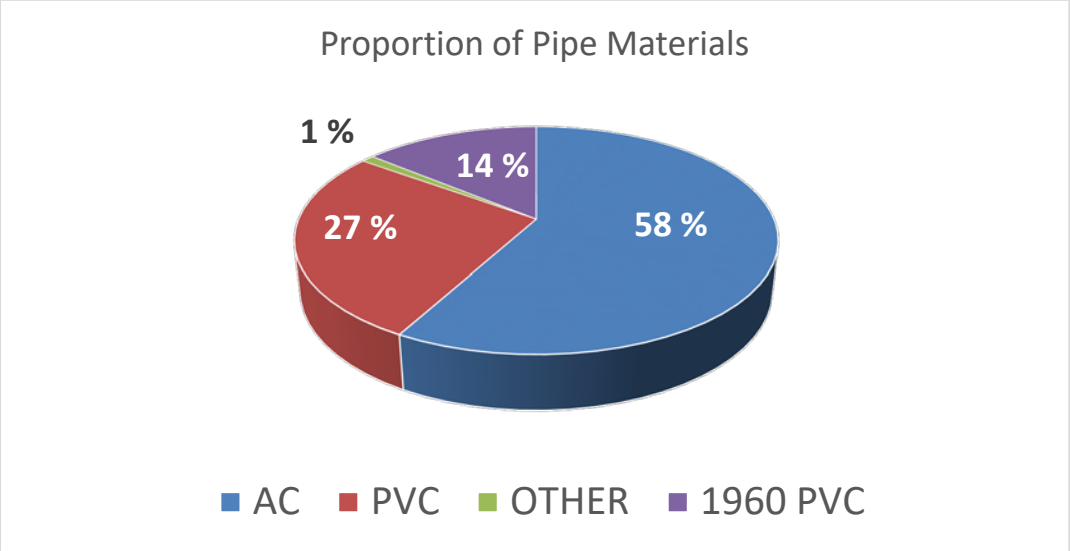
The System 8 and 9 water distribution systems were constructed in the 1960's when flood irrigation supplied from the irrigation canal was replaced with pressurized systems. Starting in September of 2016 the Town of Osoyoos began expanding its municipal water distribution system into Irrigation System No. 8 (north of Town). The pipe material and sizes installed in Contract No. 3 (2018) of this project are as follows:

- 1.2 km of 250mm diameter PVC pipe
- 0.4 km of 200mm diameter PVC pipe

Water distribution systems for Systems 8 and 9 comprise:

	System 8	System 9	Total
Small dia. PVC installed 1960's	3,875 m	1,953 m	5,828 m
Asbestos Cement	12,130 m	12,197 m	24,327 m
Ductile Iron and Concrete Cylinder	280 m	321 m	601 m
PVC installed since 1991	9,822 m	1,769 m	11,591 m
Totals	26,107 m	16,240 m	42,347 m

The total distribution main length is 42.3 km of which 24.3 km, 58%, is asbestos cement pipe.



3.3 Winter Reservoir

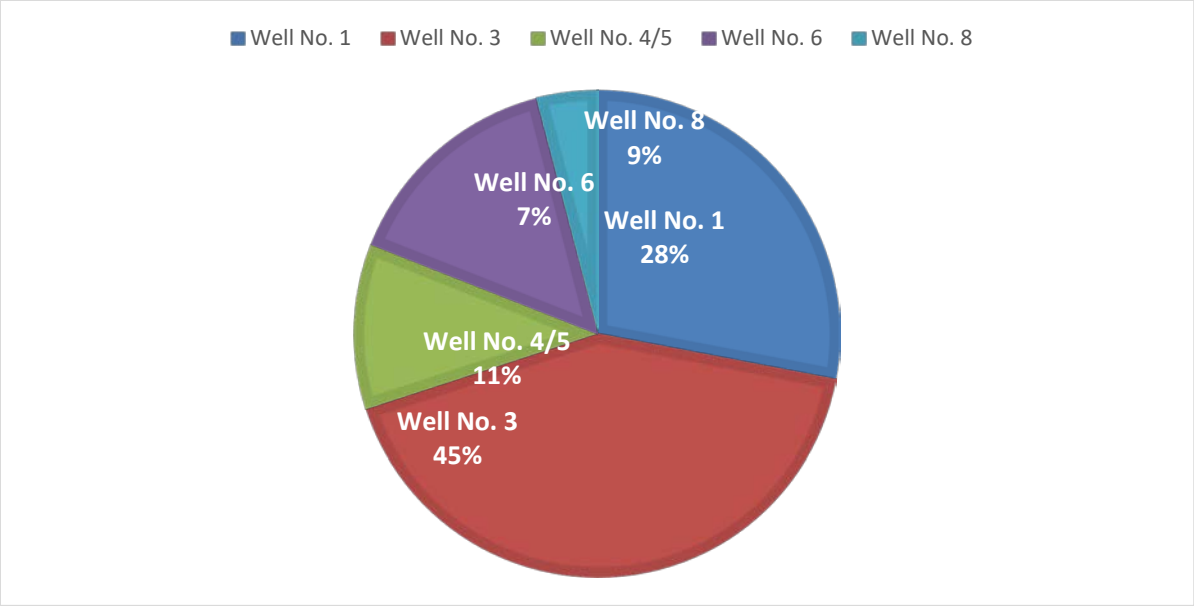
During the irrigation season, Systems 8 and 9 are operated / controlled by system pressure. Pressure monitors in each pump house start and stop supply pumps as required to maintain a set supply pressure. In the winter months, mid-October to mid-April annually, a reservoir located on the Osoyoos West Bench south and adjacent to the municipal 340 reservoir is put into service. This reservoir has an operating capacity of 482,000 L (130,000 USgal). In the winter months, water is supplied by Well No. 6 which is controlled by reservoir level.

4.0 Water Consumption

4.1 Municipal System

Consumption in the service area of the municipal water system in 2019 totaled 2,244 ML. Water supplied by each well is tabulated following.

Well No. 1	650 ML	(28%)
Well No. 3	934 ML	(42%)
Well No. 4/5	258 ML	(11%)
Well No. 6	343 ML	(15%)
Well No. 8	59 ML	(4%)
Total	2,244 ML	



2019 annual and maximum day water consumption are compared to historical data on *Figure 1*. From *Figure 1*,

- total annual water consumption in 2019 was about 29 ML (0.013%) higher than 2018. This slight increase could be attributed to reduced domestic irrigation demand as a result of cooler, wetter Spring weather.

- the maximum day demand in 2019 occurred on September 4th (13 ML) was 1 ML (12%) higher than the maximum day demand in 2018 (Maximum Day Demand = 12 ML on July 29, 2017).

- over the last 10 years, the total annual water consumption has remained relatively constant in the range of 2,100 to 2,500 ML/year. In this period the permanent population of the Town as measured by the census increased by 16% from 4,295 in 2001 to 5,050 in 2016.

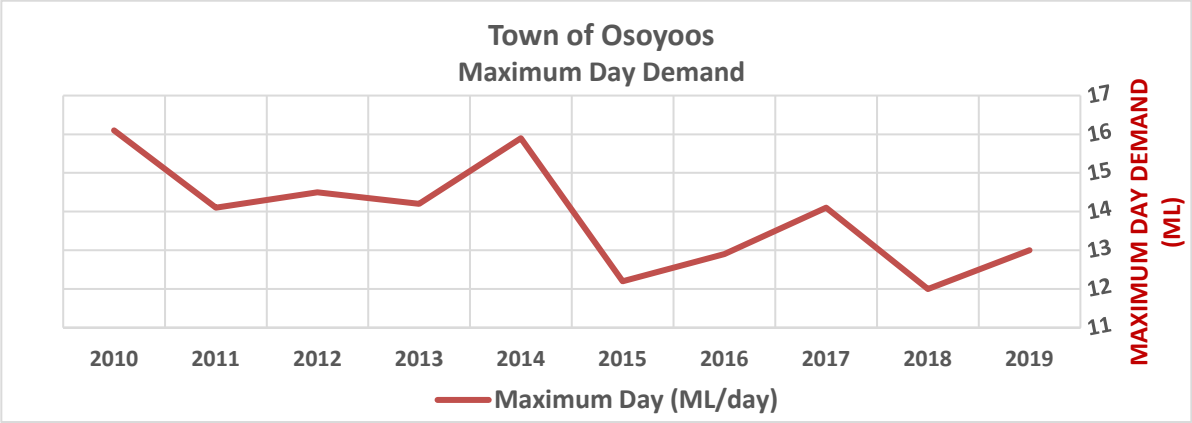
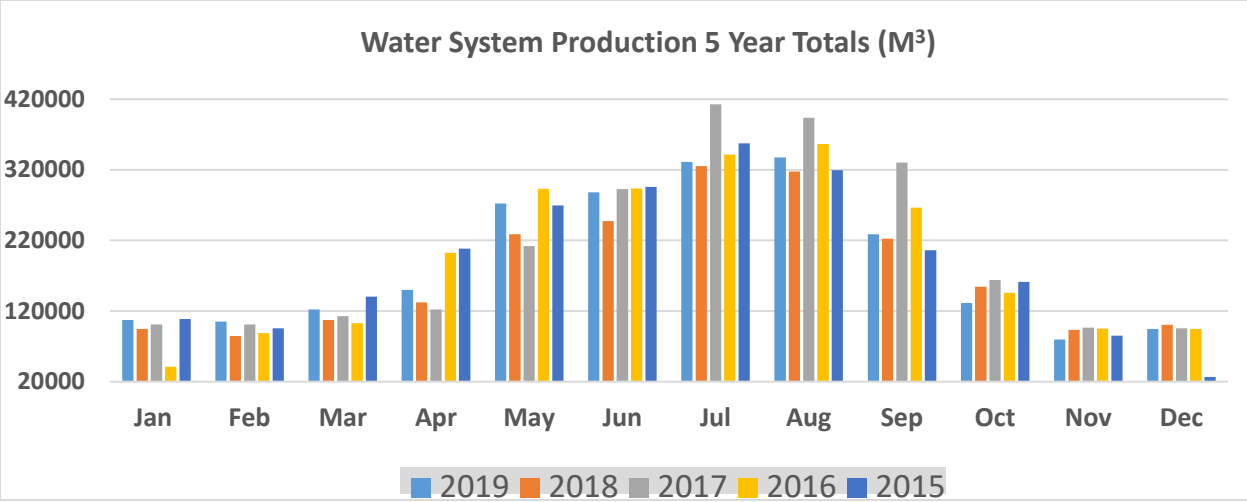
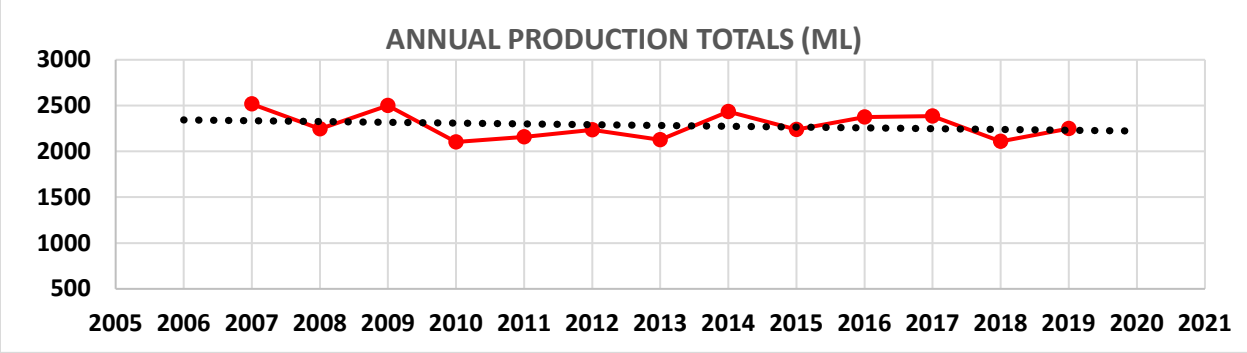


Figure 1





4.2 Agriculture Irrigation System

Water consumption in 2019 in the service area of Irrigation Systems 8 and 9 is summarized as follows.

Irrigation Season		
System 8		3,104.2 ML
System 9		2,539.8 ML
	Total	5,165.0 ML

The consumption of 5,165 ML in the irrigation season equates to an average application rate of 0.92 l / m2 based on 672 ha (1660 ac) of irrigation in the service area.

Figure 2 illustrates Irrigation Systems 8 and 9 consumption in the period 2010 to 2019. As compared to 2018, irrigation system consumption decreased by 988 ML (16%) in 2019. This decrease in consumption may be attributed to the conversion of agricultural land from fruit production to grape production. Orchards typically utilized a wide spray broadcast system for crop irrigation while vineyards typically use a drip irrigation system which consumes less water. 2017 and 2018 also had less precipitation throughout the growing season than what was recorded for 2019.

Irrigation Season Water Consumption
Irrigation Systems 8 and 9

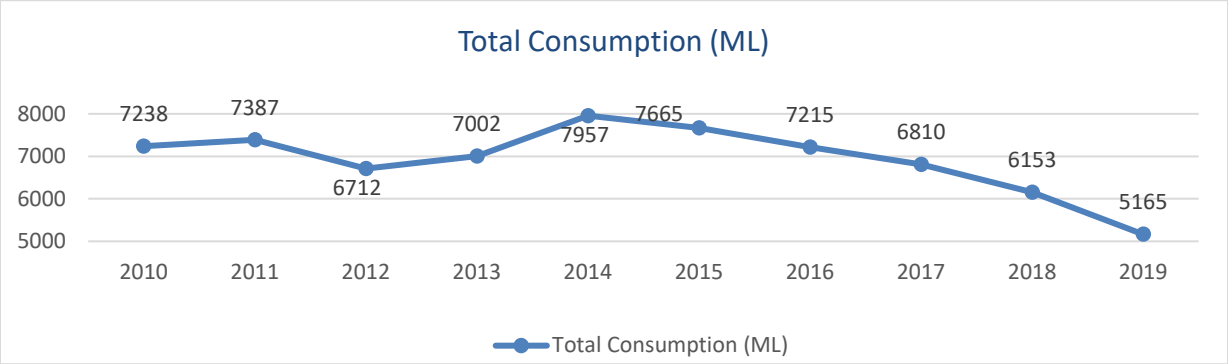


Figure 2

5.0 Water Sampling and Testing

5.1 Bacteriological Testing

The Town undertakes sampling for bacteriological analysis of both the irrigation and municipal systems. Sampling is undertaken weekly with the sampling locations listed following.

Municipal System Sampling Locations:

5202 Lombardy Lane	8707 78th Avenue	6418 Chickadee
4220 Lobelia Drive	6610 Chickadee	6812 89th
6601 89th		

Irrigation System Sampling Locations:

System 9

5001 107th Street	10021 42nd Avenue	3201 107th

System 8

25723 103rd	20835 103rd	17202 103rd

Bacteriological sampling results for 2019 are tabulated in Appendix A and summarized as follows.

Municipal System

- Total No. of Samples – 100
- Number of Positive Results for E.Coli – 0
- Number of Positive Results for Total Coliform – 1

Irrigation Systems

- Total No. of Samples – 100
- Number of Positive Results for E.Coli – 0
- Number of Positive Results for Total Coliform – 6

Note: The Drinking Water Protection Act states in Schedule a Water Quality Standards for Potable Water that:

When positive results for EColi or Total Coliforms are discovered the Town's procedure is to thoroughly flush the area where the results were obtained and then re-sample. This has always resulted in the elimination of positive E.Coli and Total Coliform test results.

Beginning in September of 2018, the Town implemented the practice of introducing chlorine into the municipal water system at Wells No. 1 & 3 on a continuous basis. Bacteriological Test results and the monthly Water reports that are sent to Interior Health are available online at www.osoyoos.ca.

5.2 Agriculture Irrigation System Trihalomethane Testing

Trihalomethanes are a group of organic chemicals that are formed by the reaction of chlorine and organic materials which may be present in the water. Organic materials typically include algae, colour, and other natural organic matter. Trihalomethanes are described as disinfection by-products with the concentration being dependent on a number of factors including concentration of organic materials (usually measured as total organic carbon), chlorine dose and retention time in the distribution system.

Irrigation Systems 8 and 9 are sampled annually for trihalomethane. The sample results for 2019 are presented as follows.

Sample Date/Location	August 6 System 9 – 10021 42nd	August 6 System 8 – 20835 103rd	CDWQ Standard
Total Trihalomethanes	0.043 mg/L	0.050 mg/L	0.1 mg/L MAC
Bromodichloromethane	0.002	0.003	n/a
Bromoform	<0.001	<0.001	n/a
Chloroform	0.040	0.047	n/a
Dibromochloromethane	<0.001	<0.001	n/a

The sample results are below the maximum acceptable standard as set in the Guidelines for Canadian Drinking Water Quality.

5.3 Agriculture Irrigation System Boil Water Advisory

Treatment provided for water supplied from the Systems 8 and 9 water intakes in Osoyoos Lake does not meet the Provincial Drinking Water Treatment Objectives. The principal deficiencies are:

- inadequate chlorine contact time to services in proximity to the two pump houses
- there is no treatment, typically filtration, for the removal or inactivation of parasites, most common being giardia and cryptosporidium

In accordance with instructions from IHA, the Town annually issues a boil water advisory for residents within the service area of Irrigation Systems 8 and 9. The boil water advisory was issued in April 2019 at the start of the irrigation season and rescinded in November at the end of the irrigation system.

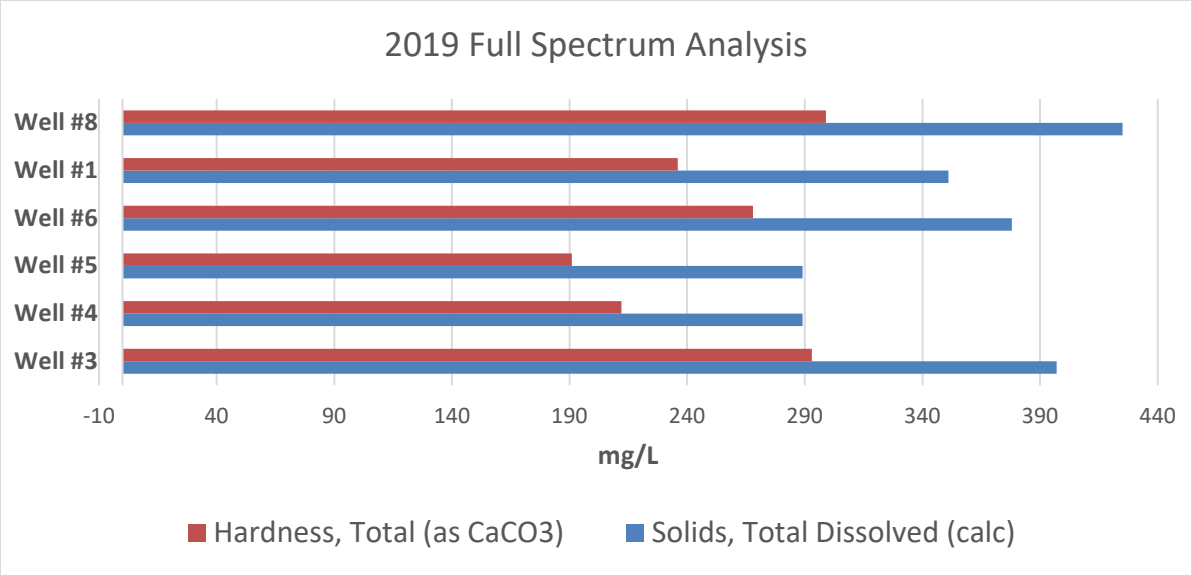
Residents in the service area of irrigation systems 8 and 9 are advised of the Boil Water Advisory by notices published in the Osoyoos Times and posted on the Town's website. Notices are published in the Osoyoos Times:

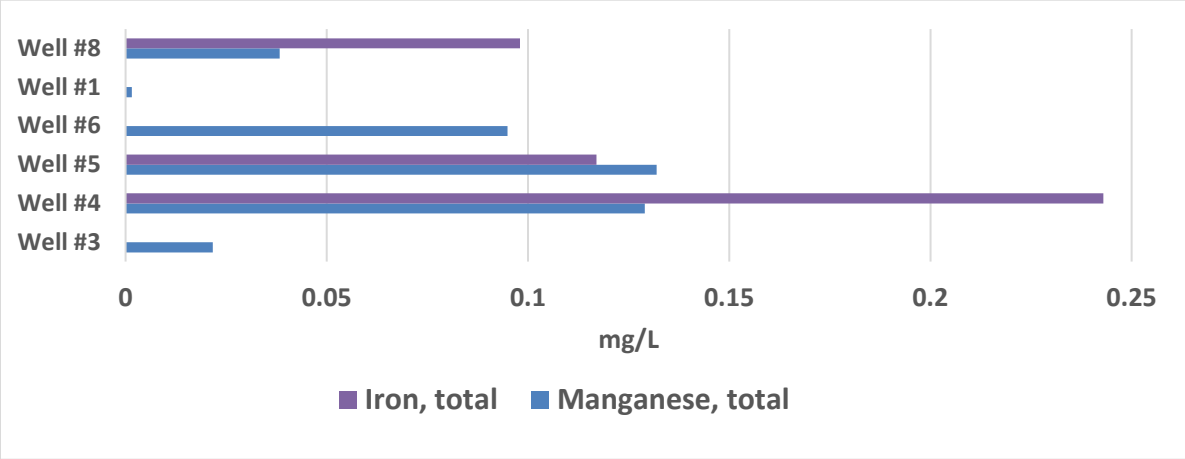
- end of March or first week of April – Advanced Notice
- weekly in April
- monthly – May, June, July, August and September

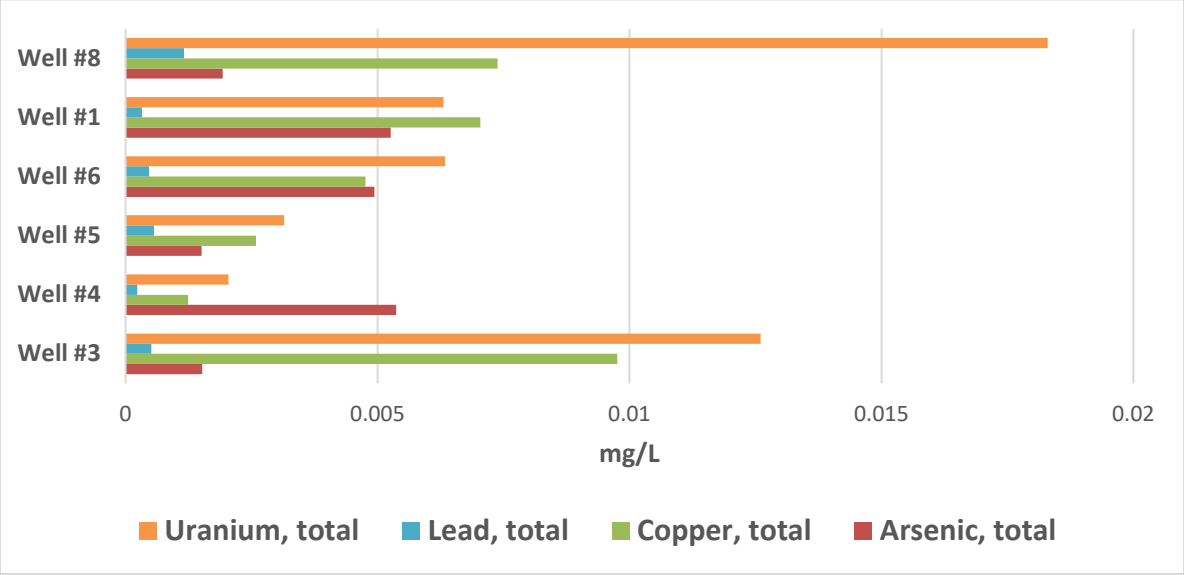
5.4 Municipal System Full Spectrum Analysis

In addition to bacteriological testing as described in 5.1, the Town samples annually all six water supply wells for a full spectrum analysis. In 2019 full spectrum water quality testing was conducted in June and October and is available online at www.osoyoos.ca.

Analyte	Well #3	Well #4	Well #5	Well #6	Well #1	Well #8	Units	Std (CDWQG)
Solids, Total Dissolved (calc)	397	289	289	378	351	425	mg/L	AO<=500
Hardness, Total (as CaCO3)	293	212	191	268	236	299	mg/L	N/A
Manganese, total	0.0217	0.129	0.132	0.0949	0.00159	0.0383	mg/L	MAC=0.12
Arsenic, total	0.00152	0.00537	0.00151	0.00494	0.00526	0.00193	mg/L	MAC=0.01
Copper, total	0.00976	0.00124	0.00259	0.00476	0.00704	0.00738	mg/L	MAC=2
Iron, total	<0.010	0.243	0.117	<0.010	<0.010	0.098	mg/L	AO<=0.3
Lead, total	0.00051	0.00023	0.00056	0.00047	0.00033	0.00116	mg/L	MAC=0.005
Uranium, total	0.0126	0.00204	0.00315	0.00634	0.00631	0.0183	mg/L	MAC=0.02
Turbidity	<0.10	0.59	0.67	<0.10	<0.10	0.11	NTU	OG<1
pH	7.97	8.16	8.06	8.05	7.98	8.06	pH units	7.0-10.5
Conductivity (EC)	678	503	528	648	609	742	uS/cm	N/A


2019 Full Spectrum Analysis
Well #8
Well #1
Well #6
Well #5
Well #4
Well #3
-10
40
90
140
190
240
290
340
390
440
mg/L
Hardness, Total (as CaCO3)
Solids, Total Dissolved (calc)


Well #8
Well #1
Well #6
Well #5
Well #4
Well #3
0
0.05
0.1
0.15
0.2
0.25
mg/L
Iron, total
Manganese, total

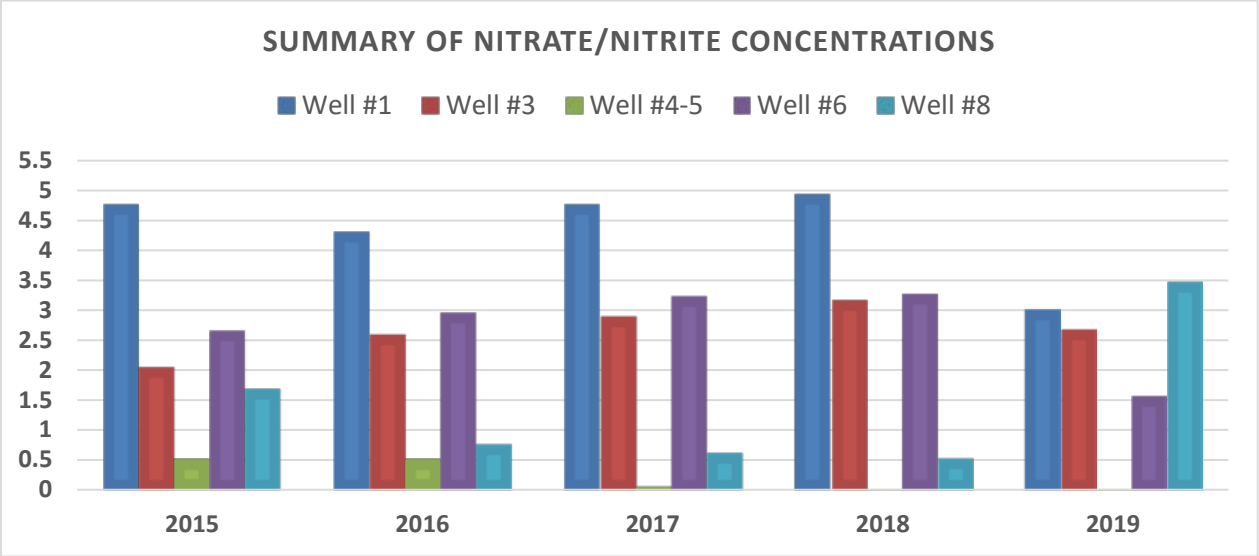

Well #8
Well #1
Well #6
Well #5
Well #4
Well #3
0
0.005
0.01
0.015
0.02
mg/L
Uranium, total
Lead, total
Copper, total
Arsenic, total

5.5 Groundwater Source Nitrate Monitoring

High nitrate concentrations in groundwater is experienced throughout the South Okanagan area. High nitrate concentrations are attributable to fertilizer use by the agricultural industry. The Town monitors nitrate concentration in all six of the water supply wells used as water sources. The data is summarized in the charts below.

	Nitrate-Nitrite
Canadian Drinking Water Quality Maximum Acceptable Concentration	10 mg/L
Ten Year Averages (2010 to 2019)	
Well No. 1	4.74 mg/L
Well No. 3	2.87 mg/L
Wells No. 4 & 5	1.09 mg/L
Well No. 6	2.10 mg/L
Well No. 8	0.86 mg/L

The following graph illustrates the nitrate-nitrite concentrations in all Wells. *Note: Data from Wells 4/5 may not show on chart due to the low results.*



5.6 Water Quality Complaints and Operational Incidents

On any given year the Town of Osoyoos receives concerns with regards to water quality, they range from issues with water colour, taste, and odour. These concerns are addressed as they are presented to the Town.

In order to better understand and address water quality issues, the Town is in the process of developing a better means of tracking these concerns. We will look collect and tabulate this data in order review any patterns or ongoing water quality concerns. This collection of data has was initialized in January 2020.

6.0 Operation and Maintenance

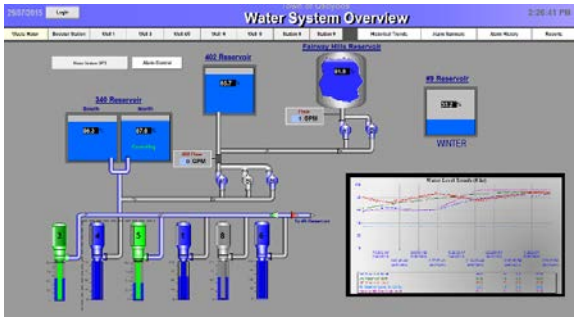
6.1 Routine Maintenance Program

- **Water Supply Wells**
  - daily check of all wells to confirm satisfactory operation. Operating parameters including discharge pressure, flow, running time, and service voltage are logged.
  - pumped lubrication and packing are checked and adjusted as required.
  - annual water sampling.
- **Irrigation Systems 8 and 9 Intake/Pump house**
  - daily check during the irrigation season. Operating parameters are logged.
  - pump lubrication and packing are checked and adjusted as required.
  - chlorine residual and turbidity analyser calibration is checked monthly.
  - chlorine cylinders are removed when empty and replaced with full cylinder.
  - pump house maintenance on an as required basis.
- **Booster Stations 402 and Fairway Hills**
  - daily inspections to check securing and record operating parameters.
  - pump lubrication and packing are checked and adjusted as required.
- **Reservoirs**
  - all reservoirs are inspected daily, excluding weekends, to confirm site and reservoir structure security.
- **Distribution System**
  - Water main flushing to maintain chlorine residuals
  - Weekly bacteriological sampling
  - Weekly chlorine residual monitoring
  - Uni-directional flushing to clean pipes

6.2 SCADA (Supervisory Control and Data Acquisition) System

A SCADA computer control and monitoring system is used by the Town to control major components of the water systems.

System capabilities include:



- Water Supply Wells and Intakes
  - pump operational status
  - flow, elapsed running times
  - well levels where applicable
  - chlorine residuals at irrigation intake

- Booster Stations
    - pump operational status
    - flow and elapsed running time
- Reservoirs
    - reservoir level
    - pump start/stop and alarm set points
    - intruder alarms

The Town has an ongoing program to upgrade the capabilities of the SCADA system.

6.3 Major Maintenance – 2019

No major maintenance projects were undertaken in 2019.

6.4 Cross Connection Control Program

A cross connection is most commonly a plumbing system in a building that represents the risk of backflow into the Town's water distribution system thereby representing the potential of adversely affecting water quality. The Town has a program for identifying cross connections and requiring the installation and maintenance of backflow prevention devices to prevent reverse flow from a service connection to the Town's water distribution system.

The implementation and administration of the Town's cross connection program is contracted to Mr. Wayne Muzyka of Personnel Development & Consulting of Vernon. The Town's cross connection control program includes a total of 232 devices which include:

- 94 are classified as high hazard
- 75 are classified as medium hazard
- 47 are classified as low hazard

To the end of December 2019, a total of 191 of the backflow devices have been surveyed which comprises an inspection of the premises and backflow prevention devices. Of the high hazard group, 99% have been surveyed. At the end of December 2019, compliance with the Town's cross connection control program is summarized as follows.

Hazard Category			Compliant	
		Surveyed	Number	%
High	94	93	65	70%
Medium	75	60	41	68%
Low	48	37	15	41%

Non-compliance generally means a deficient (or lack of) backflow prevention device or failure by the property owner to provide certification of annual testing.

6.5 Emergency Response Plan

The Town has an emergency response plan for the water and sanitary sewer utilities which is available for public viewing at Operational Services. The plan describes strategies to respond to a wide range of water related events including source and distribution system contamination, high turbidity events in Osoyoos Lake, broken water main, chlorination failure, vandalism and extended interruption in electrical service.

7.0 Capital Program

7.1 Municipal System

Completed Capital Projects for 2019

- Uni-directional Flushing Program Development, Test Area Plan complete
- Review of domestic water source for community, surface or ground water
- Add chlorine injection capability to Wells 4 & 5

Budgeted Capital Projects for 2020

- Continuing upgrades to the Town's Supervisory Control and Data Acquisition (SCADA) System
- Municipal Water System extension to the south of the community
- Water Quality Improvements; Sampling stations, flushing equipment
- Pre-Design work for ground water treatment facility
- Universal Water Metering Implemenation Plan

7.2 Agriculture Irrigation Systems

Completed Projects in 2019

- Installation of 136 water meters in the areas which have received domestic water connections as a result of the System No. 8 Rural Water Twinning projects

Budgeted Capital Projects for 2020

- Replace discharge headworks for Agriculture Irrigation Surface Water Intake # 8