Sanitary Sewer System 2017 Annual Report

Town of Oliver

July 2018

Project No. 306-088-005

ENGINEERING ■ PLANNING ■ URBAN DESIGN ■ LAND SURVEYING

201-2079 Falcon Rd | Kamloops BC | V2C 4J2 | www.true.bc.ca | tel 250.828.0881 | fax 250.828.0717

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Revision Log

Revision #	Revised by	Date	Issue / Revision Description
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Report Submission

Report Prepared By:

Natalie Alteen, EIT
Project Engineer

Report Reviewed By:

PROFESSIONAL ENGINEER
PROVINCE OF BRITISH COLUMBIA
T. R. UNDERWOOD

Terry Underwood, P. Eng.
Project Engineer

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1.0 Operational Data

The paragraphs following summarize the operational data for the Town of Oliver's Sanitary Sewer System for 2017. The operational report for 2017 is formatted in a "source" to "final disposal" format. Each section also includes a reference to the appropriate sections of the Operational Certificate (OC) for the system. Appendix F of this report contains a complete copy of the Operational Certificate for PE 13717 issued by the Ministry of Environment. To assist the reader in assessing the system operational data, the following drawings are included:

Figure 1-2: Overall Plan - Reclaimed Water Supply System and Irrigation Areas

Figure 1-3: Aerated Lagoon Treatment System

1.1 Influent

1.1.1 Influent Flow Data (OC 7.1.2 and 7.2.4.7)

Daily flow data for wastewater volumes pumped from the equalization basin to the aerated lagoons for treatment are presented in Appendix A. The total volume pumped to the aerated lagoons in 2017 was 689,098 m^3, which equates to an average daily flow of 1,888 m^3/day. This is an increase of 49,300 m^3 (7%) compared to 2016. For comparison, total influent flows for the period 1996 to 2017 are summarized in Table 1-1 and Figure 1-1 as follows:

TABLE 1-1: ANNUAL TOTAL AND AVERAGE DAILY INFLUENT FLOW DATA

Year	Total Influent Volume (m^3)	Average Daily Flow (m^3/d)	Year	Total Influent Volume (m^3)	Average Daily Flow (m^3/d)
1996	654,361	1,788	2007	823,011	2,255
1997	682,480	1,870	2008	777,154	2,123
1998	666,322	1,826	2009	758,308	2,078
1999	688,193	1,885	2010	701,475	1,922
2000	702,688	1,920	2011	693,045	1,899
2001	678,052	1,858	2012	658,002	1,798
2002	726,354	1,990	2013	697,377	1,911
2003	751,139	2,058	2014	634,649	1,739
2004	766,048	2,093	2015	679,542	1,862
2005	783,947	2,148	2016	639,794	1,753
2006	829,413	2,272	2017	689,098	1,888

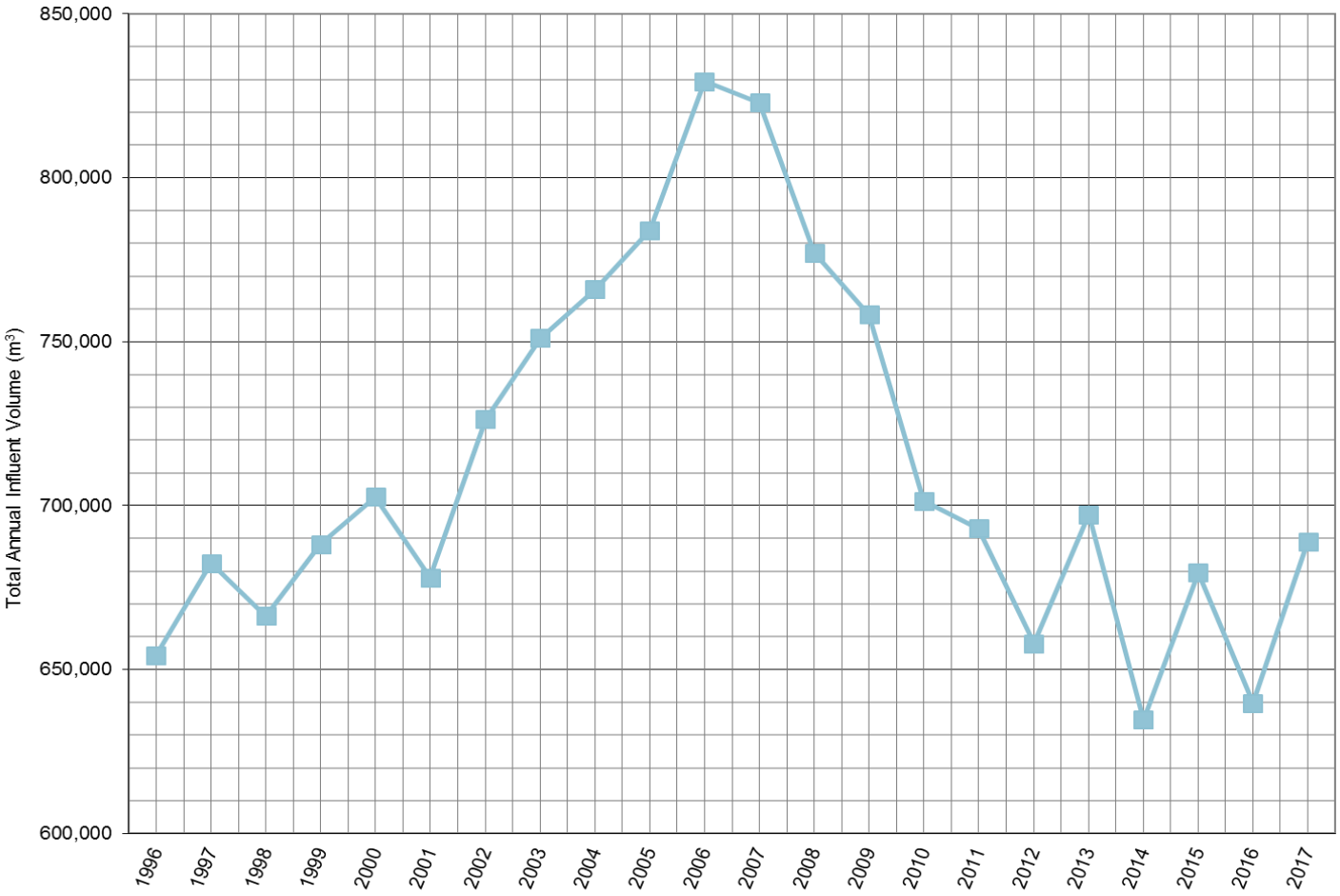


FIGURE 1-1: TOTAL ANNUAL INFLUENT SEWAGE FLOWS FOR 1996 TO 2017

1.1.2 Influent Wastewater Sampling (OC 6.1)

Influent sampling data for total phosphorus and orthophosphate concentrations is presented in Table 1-2. The average total phosphorous and orthophosphate concentrations from sampling in March and September 2017 was 4.23 mg/L and 2.28 mg/L, respectively. The 2017 average concentration for total phosphorous and orthophosphate was higher than that measured in 2016, but generally within the historical range observed for influent wastewater (see Table 1-2).

TABLE 1-2: INFLUENT SEWAGE QUALITY DATA

Year	Date	Total Phosphorus (mg/L)	Ortho Phosphate (mg/L)
1996	Mar. 22 Sep. 12	5.44 5.18	
1997	Mar. 19	5.87	
1998	Mar. 18 Sep. 9	5.6 5.89	
1999	Mar. 11 Sep. 23	6.66 4.89	
2000	Mar. 23 Sep. 28	6.48 8.67	4.69 3.04
2001	Mar. 22 Sep. 19	4.57 4.13	2.3 1.88
2002	Mar. 19 Sep. 10	4.53 4.52	3.84 2.55
2003	Mar. 10 Sep. 30	3.78 4.48	3.78 4.38
2004	Mar. 16 Sep. 14	5.23 5.15	4.76 3.75
2005	Mar. 22 Oct. 5	5.24 6.74	4.63 5.58
2006	Sep. 14	7.05	5.96
2007	Mar. 13 Sep. 11	5.03 6.03	6.43* 5.03
2008	Sep. 3	7.44	3.3
2009	Mar. 5 Sep. 1	8.18 5.31	3.84 1.38
2010	Mar. 9 Sep. 2	4.26 3.36	0.558 2.16
2011	Mar. 8 Sep. 8	4.9 11	0.316 0.859
2012	Mar. 1 Sep. 11	6.16 7.76	2.23 3.72
2013	Mar. 7 Sep. 11	5.75 4.62	2.57 1.89
2014	Mar. 5 Sep. 17	4.28 3.82	0.82 not tested
2015	Mar. 11 Sep. 16	5.36 4.55	2.66 2.96
2016	Mar. 7 Sep. 6	4.17 2.35	1.21 0.36*
2017	Mar. 7 Sept. 6	3.77 4.69	2.42 2.13
Average for Period of Record		**5.44**	**2.94**

TREATMENT CELLS 2 AND 3

PROPOSED FUTURE TREATMENT CELL 1

EFFLUENT STORAGE

HUGGINS ±4 ha

EX SUPPLY MAIN

ALONSO ±1 ha

CEMETERY ±2.0 ha

OLIVER SECONDARY SCHOOL ±1.6 ha

KIWANIS PARK ±0.6 ha

PARK ±0.6 ha

HIGH SCHOOL PARK ± 0.6 ha

OLIVER PARKS &RECREATION BALL DIAMONDS ±8.6 ha

IRRIGATION SERVICE TO COMMUNITY PARKS ±10 ha

PUBLIC WORKS YARD ±0.6 ha

IRRIGATION SUPPLY TO AIRPORT

FAIRVIEW PARK ±0.3 ha

350Ø FORCEMAIN CONNECT TO EXISTING

250Ø FORCEMAIN CONVERTED TO RECLAIMED WATER SUPPLY

350Ø FORCEMAIN (AS CONSTRUCTED 2004)

IRRIGATION AIRSTRIP AREA ±12.6 ha
FUTURE LEASE AREA ±9.8 ha

RODEO GROUNDS

350Ø FORCEMAIN (AS CONSTRUCTED 2004)

RAPID INFILTRATION BASIN

EFFLUENT SUPPLY MAIN

FAIRVIEW MOUNTAIN GOLF COURSE

SAWMILL RD (91st ST)

SIMILKAMEEN AVE

CESSNA ST (96th ST)

MAPLE AVE (91A ST)

OMA AVE (94th AVE)

IRRIGATION DITCH

IRRIGATION CANAL

CANADIAN PACIFIC RAILWAY

L.110

L.111

L.113

L.992 PLAN 22065

PLAN 30319

LEGEND

EXISTING RECLAIMED WATER IRRIGATION AREAS (2006)

RECLAIMED WATER IRRIGATION EXPANSION AREAS

0 250

No.	DATE	DESCRIPTION	BY	APVD

ISSUES / REVISIONS

CONSULTANT SEAL

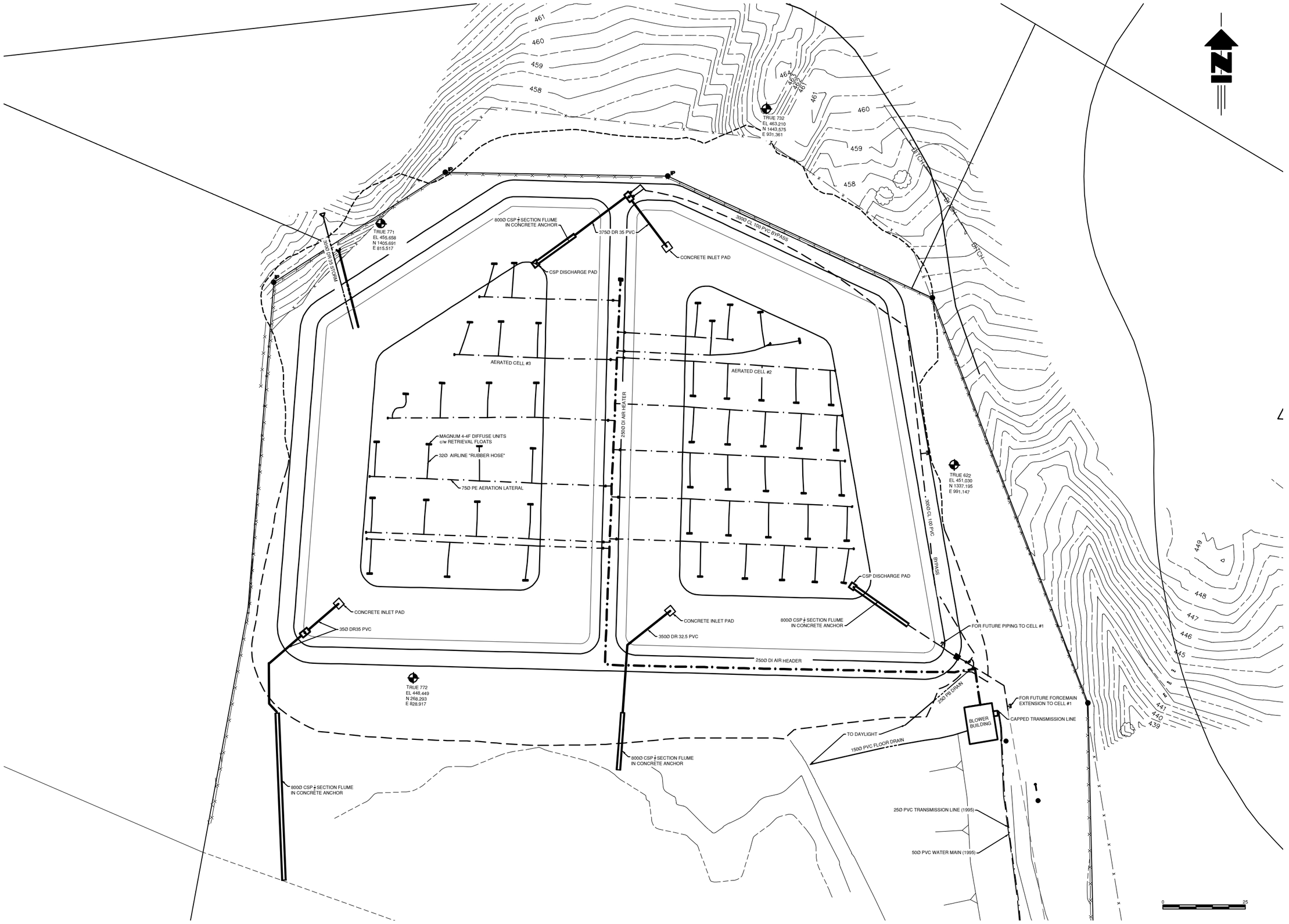
TRUE CONSULTING
201 - 2079 Falcon Road ■ Kamloops BC ■ V2C 4J2
tel 250.828.0881 ■ fax 250.828.0717
info@TRUE.bc.ca

Town of Oliver

SANITARY SEWER ANNUAL REPORT

OVERALL PLAN RECLAIMED WATER SYPPLY SYSTEM AND IRRIGATION AREAS

SCALE	N.T.S. (11x17)
DESIGN BY	TRU
DRAWN BY	NA
DATE	JANUARY 2018
PROJECT REFERENCE No.	306-088-005
DRAWING No.	FIG 1-2
SHEET	1 OF 1
ISSUE/REV.	



No.	DATE	DESCRIPTION	BY	APP'D

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CONSULTANT SEAL

TRUE CONSULTING

201 - 2079 Falcon Road ▪ Kamloops BC ▪ V2C 4J2
tel 250.828.0881 ▪ fax 250.828.0717
info@TRUE.bc.ca

BRITISH COLUMBIA Town of Oliver

SANITARY SEWER ANNUAL REPORT

AREATED LAGOON TREATMENT SYSTEM LAYOUT AND INTERCELL PIPING

SCALE	1:500 (24x36)
DESIGN BY	TRU
DRAWN BY	NA
DATE	JANUARY 2018
PROJECT REFERENCE No.	306-088-005
DRAWING No.	FIG 1-3
SHEET	1 OF 1
ISSUE/REV.	

1.2 Wastewater Treatment (OC 6.2 and 7.1.2)

Effluent sampling results from the aerated lagoon system (Cell No. 3) prior to reservoir storage are tabulated in Table 1-3. Exceedances above the OC limit of ≤ 45mg/L for BOD_5 was observed in March, April and June. Exceedances above the OC limit of ≤ 60mg/L for TSS was observed in March.

Exceedances in March and April are attributed to draining down Cell #2 and #3 for excess sludge removal from Cell #2. This caused the detention time to decrease and increased the concentration of organic material flowing through the lagoons. June exceedances were caused by cleaning of the grit chambers, during which time influent was diverted into holding cells and then drained the following day, temporarily increasing influent flows.

TABLE 1-3: CELL NO. 3 EFFLUENT - BOD AND TSS

Date	BOD_5 (mg/L)	TSS (mg/L)
OC Limits	**45**	**60**
Jan-10 (2017)	21	14
Feb-14 (2017)	21	13
Mar-07 (2017)	67	81
Apr-05 (2017)	48	36
May-01 (2017)	42	20
Jun-05 (2017)	76	24
Jul-05 (2017)	10	31
Aug-02 (2017)	<8	19
Sep-06 (2017)	<9	10
Oct-03 (2017)	33	8
Nov-15 (2017)	14	11
Dec-12 (2017)	23	14

The total sampling program for Cell #3 effluent in 2017 is contained in Appendix B. A summary of semi-annual sampling for total nitrogen, ammonia and nitrate from 1997-2017 is presented in Table 1-4. Sampling was completed on March 7th and September 6th in 2017.

TABLE 1-4: CELL NO. 3 EFFLUENT - NITROGEN

Year	September/October			March
	Total Nitrogen (mg/L)	Ammonia (mg/L)	Nitrate (mg/L)	Total Nitrogen (mg/L)
1997	9.34	0.006	7.7	20.7
1998	10.8	0.005	8.89	25.1
1999	11.3	0.46	8.31	23.9
2000	No Data	0.48	9.77	29.1
2001	34.3	4.37	7.92	31.3
2002	17.7	0.013	16.3	23.6
2003	No Data	0.71	3.9	26.9
2004	9.8	8.46	0.29	17.2
2005	26.4	14.2	No Data	36.4
2006	12.1	0.78	5.97	No Data
2007	20	13.2	0.92	25.7
2008	10	9.55	0.297	24.1
2009	17	14	1	No Data
2010	16.3	8.44	3.6	27.8
2011	26	13.7	3.27	33.5
2012	5.28	1.95	2.17	32.2
2013	10.10	0.289	9.43	43.7
2014	No Data	No Data	No Data	32.8
2015	19.10	17.6	0.966	No Data
2016	12.80	1.82	5.33	33.2
2017	18.50	0.384	14.7	32

The generally accepted range for total nitrogen in domestic wastewater is 20 to 50 mg/L. Total nitrogen was within this range for both the September/October and March sampling dates.

Historically, from 1997 to 2002, a significant proportion of ammonia and nitrogen was nitrified through the Town's aerated lagoon system. From 2003 to 2015, the Town accepted wastewater influent from Vincor, resulting in modest levels of nitrification. In January 2012, Vincor implemented a pre-treatment system, resulting in a 90%+ reduction in BOD. This resulted in reduced loadings which in turn resulted in increased nitrification, indicated by the total nitrogen concentrations of less than 15 mg/L in 2013 and 2016. As of July 1, 2015, Vincor has been disconnected from the Town's wastewater treatment system.

1.3 Winter Effluent Storage Reservoir (OC 6.5)

Storage reservoir level data, largely daily information, is presented in Appendix A. All elevations given are relative to geodetic datum. The elevation data has been converted to total volume in storage above the minimum 60-day storage level. The calibration curve is attached in Appendix G. The operation of the storage reservoir in 2017 is summarized in Table 1-5. This includes a comparative summary from 2001 to 2017.

TABLE 1-5: EFFLUENT STORAGE RESERVOIR LEVEL DATA

Year	Date	Elevation (m)	Volume (m^3)
2001	Max. 01-Apr-01	444.48	282,000
	Min. 15-Oct-01	439.33	9,000
	End 24-Dec-01	441.19	82,000
2002	Max. 22-Apr-02	443.73	228,000
	Min. 16-Sep-02	440.05	34,000
	End 23-Dec-02	441.35	90,000
2003	Max. 22-Apr-03	443.96	240,000
	Min. 22-Sep-03	440.66	59,000
	End 29-Dec-03	443.46	213,000
2004	Max. 19-Apr-04	445.77	377,000
	Min. 06-Dec-04	444.22	260,500
	End 31-Dec-04	444.35	272,000
2005	Max. 18-Apr-05	446.4	390,000
	Min. 24-Oct-05	441.18	81,000
	End 27-Dec-05	443.38	205,000
2006	Max. 24-Apr-06	446.2	380,000
	Min. 30-Oct-06	440.81	67,000
	End 31-Dec-06	443.24	199,000
2007	Max. 30-Mar-07	446	370,000
	Min. 23-Sep-07	440.34	40,000
	End 31-Dec-07	442.76	170,000
2008	Max. 13-Apr-08	445.28	339,000
	Min. 29-Oct-08	440.39	49,000
	End 31-Dec-08	442.7	167,000
2009	Max. 14-Apr-09	445.45	344,000
	Min. 11-Oct-09	440.72	61,000
	End 31-Dec-09	443.24	198,000
2010	Max. 06-Apr-10	445.64	352,000
	Min. 21-Oct-10	440.95	71,000
	End 31-Dec-10	443.64	222,000
2011	Max. 11-Apr-11	445.75	357,000
	Min. 26-Sep-11	441.09	76,000
	End 31-Dec-11	443.24	197,000
2012	Max. 02-May-12	445.36	338,000
	Min. 10-Oct-12	440.99	72,000
	End 31-Dec-12	443.46	211,000
2013	Max. 25-Apr-13	445.52	355,000
	Min. 21-Aug-13	441.67	106,000
	End 31-Dec-13	444.56	284,000
2014	Max. 31-Mar-14	446.06	374,000
	Min. 15-Sep-14	441.39	92,000
	End 29-Dec-14	443.65	223,000
2015	Max. 07-Apr-15	445.62	351,000
	Min. 07-Oct-15	441.52	101,000
	End 04-Jan-16	443.5	214,000
2016	Max. 04-Apr-16	445.47	343,000
	Min. 19-Sep-16	441.60	105,000
	End 19-Dec-16	444.02	247,000
2017	Max. 22-May-17	446.17	379,000
	Min. 16-Oct-17	442.75	167,000
	End 18-Dec-17	444.43	275,000

Winter effluent storage reservoir year-end, maximum and minimum operating elevations for the period 2008 to 2017 are illustrated graphically in Figure 1-4. As seen, operation of the reservoir over the last 9 years has been very consistent. Referring to Figure 1-4:

- The maximum elevation for 2017 (446.17 m on May 22,2017) is the highest observed in the 11-year period of record.
- The 2017-year end volume in storage of 275,000 m^3 is the second highest in 11 years.

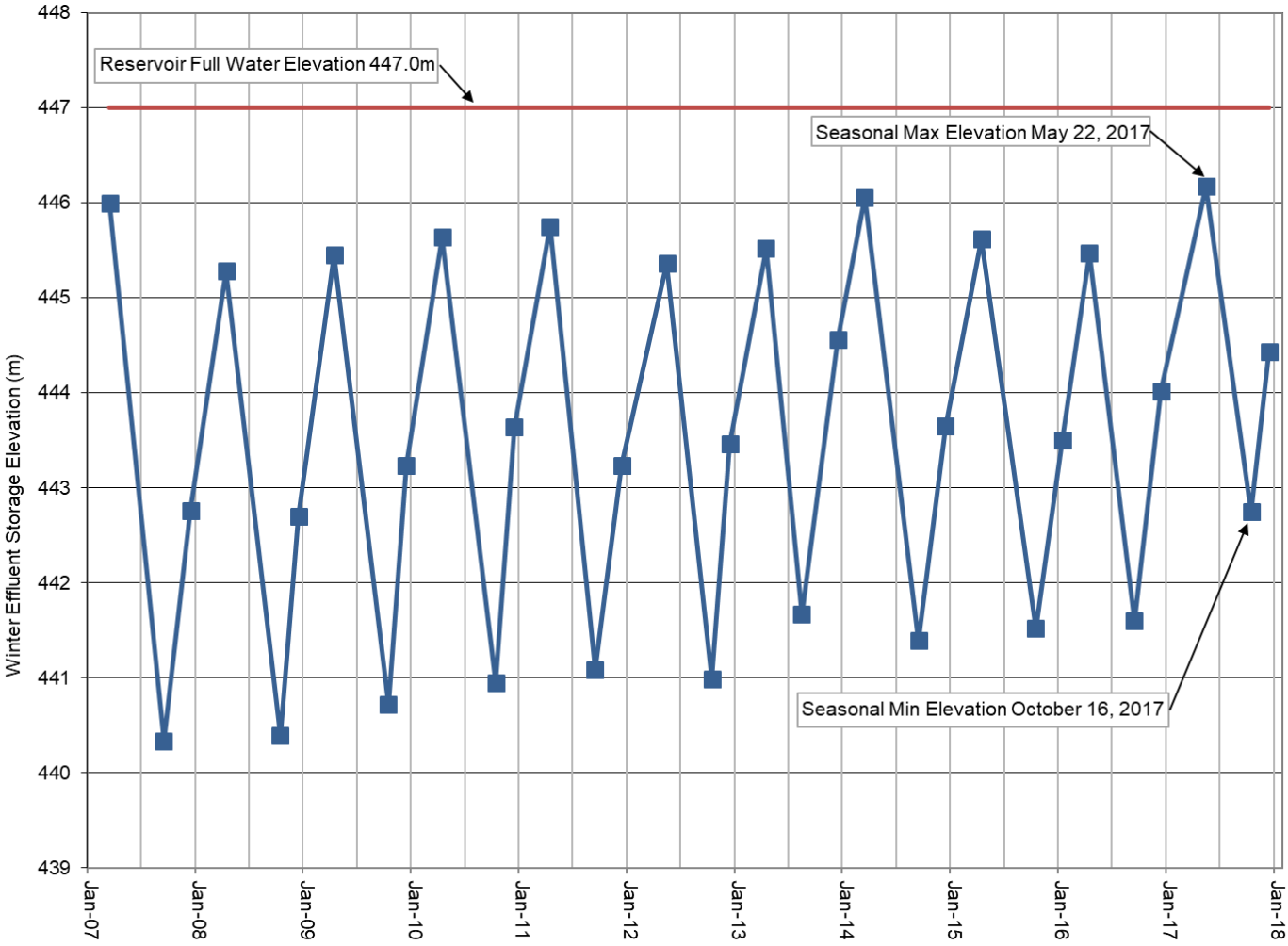


FIGURE 1-4: EFFLUENT STORAGE RESERVOIR LEVELS FOR 2007 TO 2017

1.4 Reclaimed Water Quantities and Quality

1.4.1 Irrigation Volumes (OC 7.2.4.2 and 6.4)

Total reclaimed water usage is measured by a flow meter located at the booster station, adjacent to the reclaimed water storage reservoir. Meters are also installed at the Cemetery, Linear park, Airport, Public Works Yard, Alonso property, Southern Okanagan Secondary School and Huggins property for the purposes of measuring total reclaimed water use at each location. In 2015, the Town began using reclaimed water at Fairview Park. A SCADA system will be installed at his location, with metering to begin in 2018. There is no flow meter on the irrigation service to the Fairview Mountain Golf Course. Usage at Fairview Mountain Golf Course and Fairview Park are therefore calculated as the total annual irrigation volume, less all other metered usage. Table1-6 summarizes reclaimed irrigation water usage by the seven users.

TABLE 1-6: ANNUAL RECLAIMED WATER USE BY CUSTOMER

Location	2011	2012	2013	2014	2015	2016	2017
Fairview Mt. Golf Course and Fairview Park	290,036	297,875	248,521	316,368	346,520	322,048	311,899
Cemetery	16,339	14,607	19,160	15,996	14,354	14,843	13,400
Gala Street[2] Linear Park	6,232	6,622	8,051	8,749	7,647	8,360	1030.6*
Airport	147,688	153,841	185,687	124,892	115,743	98,511	101,780
Public Works Yard	5,164	6,409	7,086	7,393	7,380	8,095	8,341
Alonso[1]	1,671	7,015	6,715	3,893	3,851	2,364	2,498
Huggins[1]	3,787	2,872	1,290	0	8,554	0	0
Southern Okanagan Secondary School	0	0	0	4,874	0	0	2
Infiltration Basin	0	0	0	0	0	0	23,322
Total Use	470,917	489,241	476,510	482,164	504,049	454,221	461,241

[1] Reclaimed water usage is unknown prior to 2010 since water meters were not installed on the Alonso and Huggins reclaimed water services until fall of 2009
[2] Gala Street was previously described as 103rd Street
* September and October only

From flow data contained in Appendix A, reclaimed water quantities for each “user” is described as follows:

1. **Lot 723, Plan 2361 - Fairview Mountain Golf Course**

Total Usage	309,899 m^3
Crop Type	Turf and rough areas
Irrigated Area	45 ha
Irrigation Application Rate	0.69 m
Irrigation Period	April to October

2. **PID 012-869-929 – Fairview Park**

Total Usage	2000 m^3
Crop Type	Lawn, trees & shrubs
Irrigated Area	0.289 ha
Irrigation Application Rate	0.69 m
Irrigation Period	April to October

3. **Lot A, Plan 24065 - Oliver Cemetery**

Total Usage	13,400 m^3
Crop Type	Lawn, trees & shrubs
Irrigated Area	2.3 ha
Irrigation Application Rate	0.58 m
Irrigation Period	April to October

4. **Gala Street Linear Park**

Total Usage	1,031 m^3
Crop Type	Lawn & trees
Irrigated Area	0.8 ha
Irrigation Application Rate	N/A
Irrigation Period	September and October

The irrigation application rate for reclaimed water was not computed for 2017, as Linear Park was only irrigated in September and October.

5. **Lot A, Plan 38173 – Oliver Airport**

Total Usage	101,780 m^3
Crop Type	Forage Crops
Irrigated Area	12.6 ha
Irrigation Application Rate	0.81 m
Irrigation Period	April to October

6. Lot A, Plan 33094 – Oliver Public Works Yard

Total Usage	8,341 m^3
Crop Type	Lawn, landscaping, compost piles
Irrigated Area	0.6 ha
Irrigation Application Rate	N/A
Irrigation Period	April to October

The principal use of reclaimed water at the Public Works Yard is for the composting operation. Because composting use is not separately metered, application rates for the lawn and landscaping areas cannot be calculated.

7. Lot A, Plan 37929 – Alonso (former Moir)

Total Usage	2,498 m^3
Crop Type	Vineyard
Irrigated Area	approximately 1.0 ha
Irrigation Application Rate	0.25 m
Irrigation Period	April to October

Over the years of record, reclaimed water use on the Fairview Mountain Golf Course has varied significantly on a year to year basis. From Appendix C, Table 1-7 has been prepared adding seasonal precipitation to reclaimed water usage to derive an annual total. The tabulation shows that the sum of seasonal precipitation and reclaimed water use for 2017 is 0.82 m applied. This is consistent with 2016 usage.

The decrease in application rate since 2009 is partially due to the metering of the Alonso and Huggins properties, recognizing the water use for the golf course is approximated as the total annual irrigation volume less all other metered usage. Prior to 2010, Huggins and Alonso usage were assumed to be modest and included in the estimated volume supplied to the Fairview Mountain Golf Course. As noted, the remaining usage includes Fairview Park, until scheduled meter installation in 2018.

1.4.2 Rapid Infiltration

In 2017, the Town discharged effluent from the reclaimed water system to the rapid infiltration basin (see location Figure 1-2). A total volume of 23,322 m^3 was discharged beginning November 1, 2017 and ending December 15, 2017.

TABLE 1-7: ANNUAL TOTAL APPLICATION RATE AT THE FAIRVIEW MOUNTAIN GOLF COURSE

Year	Total Usage (m^3)	Application Rate (m)	Seasonal Precipitation (mm)	Total (m)
1995	413,000	0.92	124	1.04
1996	426,000	0.95	216	1.16
1997	345,000	0.77	324	1.09
1998	430,580	0.96	214	1.17
1999	342,424	0.76	162	0.92
2000	362,353	0.81	126	0.93
2001	376,353	0.84	178	1.01
2002	433,620	0.96	83	1.05
2003	401,022	0.89	94	0.98
2004	329,575	0.73	231	0.96
2005	373,292	0.83	131	0.96
2006	362,055	0.80	144	0.95
2007	414,225	0.92	88	1.01
2008	417,228	0.93	74	1.00
2009	358,375	0.80	161	0.96
2010	274,877	0.61	221	0.83
2011	290,036	0.64	151	0.80
2012	297,875	0.66	223	0.88
2013	248,521	0.55	180	0.73
2014	316,367	0.70	175	0.88
2015	346,520	0.77	136	0.91
2016	332,048	0.74	166	0.90
2017	311,899	0.69	133	0.82

1.4.3 Hydraulic Balance (OC 7.2.4.1)

The overall system hydraulic balance for the period January 1 to December 31 in 2009 to 2017 are summarized as follows:

TABLE 1-8: HYDRAULIC BALANCE DATA FOR 2009-2017

	2009	2010	2011	2012	2013	2014	2015	2016	2017
Volume in Storage on Jan. 1	167,000	200,000	223,000	197,000	211,000	284,000	223,000	214,000	247,000
(+) Total Influent	758,308	701,475	693,045	658,002	697,377	634,649	679,500	639,793	689,098
(-) Effluent Irrigation	520,530	519,803	470,917	489,241	476,510	482,164	504,049	454,221	437,919
(-) Rapid Infiltration	0	0	0	0	0	0	0	0	23,322
(-) Unaccounted Losses	206,778	159,672	248,128	154,761	147,867	213,485	184,451	152,572	199,857
Net Storage at Year-End (m^3)	198,000	222,000	197,000	211,000	284,000	223,000	214,000	247,000	275,000

In the above tabulation, unaccounted losses include evaporation losses from the treatment lagoons and storage reservoir, seepage losses from both the treatment and storage cells, and flow meter inaccuracies. Unaccounted losses of 199,857 m^3 for 2017 are consistent with previous years.

1.4.4 Irrigation Water Quality Data (OC 6.3)

Effluent quality data for reclaimed water prior to irrigation is presented in Table 1-9. Item 6.3 of the OC requires a maximum limit of 2.2 MPN/100mL for fecal coliforms. As seen, results for the 2017 irrigation season, as presented in Table 1.9, are consistent with the OC requirements.

To provide background data to assist with future soil assessment studies, the Town of Oliver continued with an expanded monitoring programme to include phosphorus, nitrogen, chloride and sodium through 2017. Data for these parameters are tabulated in Table 1-9.

Seasonal (April to October) averages for total phosphorus, total nitrogen and sodium sampled at the Chlorine Contact Basin for the period 2000 to 2017 are summarized in Table 1-10.

TABLE 1-9: SUMMARY OF RECLAIMED WATER QUALITY DATA

	Date	Fecal Coliforms	Total Coliforms	Total P	Total N	Chloride	Sodium	Free CL Res
OC Limit		**#2.2 MPN/100 ml**	**n/a**	**n/a**	**n/a**	**n/a**	**n/a**	**n/a**
Unit		**MPN/100ml**	**MPN/100ml**	**mg/L**	**mg/L**	**mg/L**	**mg/L**	**mg/L**
April	5	<2.2	<2.2	4.86	9.2	147	102	0.20
May	1	<2.2	>16	4.11	20.9	143	103	0.16
June	5	holding time extended, no results		4.71	20.1	145	106	0.27
July	5	<2.2	<2.2	4.56	20.6	146	105	0.31
August	2	<2.2	<2.2	4.21	16.8	135	124	0.29
September	6	<2.2	<2.2	4.52	16.0	136	109	0.30
October	3	<2.2	<2.2	4.85	15.0	161	107	0.24

TABLE 1-10: HISTORICAL RECLAIMED WATER QUALITY DATA

Year	Seasonal Average Total Phosphorus (mg/L)	Seasonal Average Total Nitrogen (mg/L)	Seasonal Average Sodium (mg/L)
2000	2.92	12.5	
2001	2.46	14.1	
2002	2.75	13.4	
2003	1.2	6.8	114.3
2004	1.36	9.3	103.5
2005	2.87	11.9	94.4
2006	2.4	11.6	84.4
2007	3.91	11.9	84.2
2008	3.93	14.2	89.5
2009	3.27	12.1	93.7
2010	3.61	13.8	97.1
2011	3.88	16.9	111.2
2012	4.01	14.3	114.6
2013	4.77	19.4	112.6
2014	5.90	26.6	120.6
2015	4.04	20.3	112.3
2016	4.0	14.9	107.0
2017	4.5	16.9	108.0

As seen, the average total phosphorus concentration in 2017 is consistent with values seen in previous years. As with 2016, the total nitrogen levels decreased compared to 2014 and 2015. Concentrations are similar pre-2014 readings.

In 2017, sodium concentrations were consistent with the concentrations between 2011 to 2016. Concerns regarding elevated sodium concentrations in the reclaimed water have been expressed by the Fairview Mountain Golf Course. Average seasonal sodium concentrations for the period 2003 to 2017 are illustrated graphically in Figure 1-5.

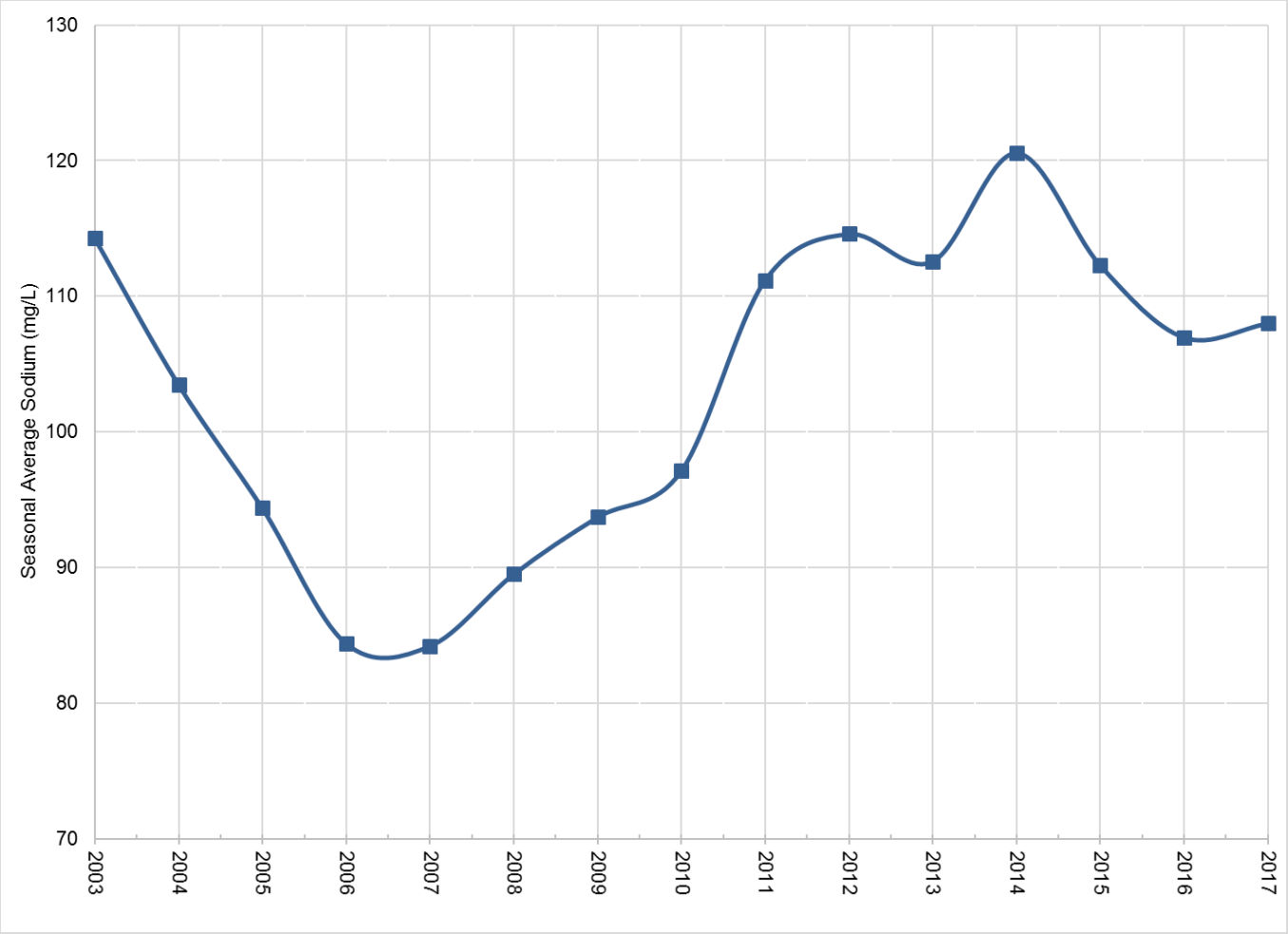


FIGURE 1-5: AVERAGE SEASONAL SODIUM CONCENTRATIONS FOR 2003 TO 2017

1.5 Summary of 2017 Operational Data

Operation of the Ton of Oliver's wastewater collection, treatment and reclaimed water system for 2017 is summarized as follows:

- Total influent quantities were 689,100 m^3, an increase of 49,300 m^3 or 7% as compared to 2016. The 2017 annual influent quantity is comparable to previous years.
- Wastewater effluent quality for BOD_5 and TSS in the Town's aerated lagoons had exceedances above the OC limits for BOD_5 ≤ 45mg/L and TSS ≤ 60mg/L. These were observed in March, April and June for BOD_5 and in March for TSS.
- Reservoir storage maximum water level was 446.2m. This is the highest observed for the period of record.
- Reclaimed water quality prior to irrigation complied with the OC requirements for bacteriological quality.

2.0 Supplemental Information

2.1 Operator Certification (OC 3.3)

In compliance with OC Section 3.3 operator certification is summarized as follows:

Arvid Bensler	Wastewater Treatment Level I
Darren Bjornson	Wastewater Collection Level I
Ryan Seiling	Wastewater Treatment Level I
	Wastewater Collection Level I
Martin Schori	Wastewater Treatment Level II
	Wastewater Collection Level I
Adrian Zandvliet	Wastewater Treatment Level I
	Wastewater Collection Level I

2.2 Capital Improvements

Capital improvements completed in 2017 include the following:

- Completion of Phase 1 and 2 of the Sewer Condition Assessment. This included assessment of all asbestos cement, vitrified clay and concrete pipe. Phase 3 of the condition assessment will include PVC piping.
- Initiation of an update to the Liquid Waste Management Plan. To carry forward for completion in 2018.

2.3 Influent Waste Bylaw (OC 3.6 and 7.2.4.4)

Sanitary Sewer System Use Bylaw No. 547 is included in its entirety in Appendix 5 of the 1997 Annual Report. In January 2002, the Town of Oliver received an application from Vincor requesting approval to connect its winery located on the Osoyoos Indian Reserve, north of the Town boundaries, to the Town's sewerage system. This application relates to both process water and normal domestic sewage and was approved by the Town.

Vincor was connected to the Town's sewerage system from October 2002 to July 01, 2015. During this period, Vincor's wastewater was sampled by the Town at least twice per month to confirm compliance with the terms and conditions of the connection agreement and for invoicing purposes. Since 2015, there has been no influent received from Vincor.

2.4 Sludge Management Plan

Consistent with historical practices, the Town undertook sampling of the sludge in Aerated Lagoon Cell No. 2 (presented in Appendix D).

2.5 Groundwater Monitoring Plan (OC 6.8)

The Town of Oliver has approved groundwater monitoring plans for the airport and Fairview Mountain Golf Course sites, the two largest users of reclaimed water. Groundwater table measurements and sampling data are contained in Appendix E and discussed in paragraphs following. Figure 2-1 provides a site plan of the groundwater monitoring wells in the airport area.

2.5.1 Airport Monitoring Wells No. 1 to 3

There is a total of three monitoring wells at the airport site. These wells are all located down gradient from the reclaimed water use area (see Figure 2-1). In 2011, streets were renamed in the Town. Historic street names are referenced in parenthesis. Groundwater level data and water quality data from Appendix E are summarized in Table 2-1.

Overall, the average groundwater table elevation in the Air Cadet and 91A Street were similar to that measured in 2016. It is also observed that the groundwater level in 91A Street well has increased by an average of 0.58 m since 2007. All three well locations had groundwater depths within the historical range.

Sampling of the three monitoring wells, in the vicinity of and at the airport, was initiated by the Town in September 2007. Table 2-2 summarizes the groundwater quality data for the three airport area monitoring wells from 2007-2017.

TABLE 2-1: SUMMARY OF GROUNDWATER DEPTHS FOR AIRPORT MONITORING WELLS

Monitoring Well	Year	Minimum Depth (m)	Maximum Depth (m)	Average Depth* (m)	Range of Depth (m)
Air Cadet (Well #1)	2007	9.59	10.68	10.18	1.09
	2008	10.52	10.79	10.69	0.27
	2009	10.77	11.40	10.93	0.63
	2010	10.31	11.03	10.76	0.72
	2011	10.33	10.80	10.55	0.47
	2012	9.84	10.78	10.50	0.94
	2013	9.78	10.44	10.11	0.66
	2014	9.98	10.58	10.33	0.60
	2015	10.01	10.51	10.28	0.50
	2016	10.21	10.5	10.36	0.29
	2017	9.9	10.59	10.32	0.69
Rodeo Grounds (Well #2)	2007	5.89	6.40	6.10	0.51
	2008	6.11	6.38	6.25	0.27
	2009	5.83	6.54	6.20	0.71
	2010	5.69	6.35	6.04	0.66
	2011	5.84	6.34	6.09	0.50
	2012	5.84	6.54	6.20	0.70
	2013	5.62	6.24	5.91	0.62
	2014	5.84	6.27	6.08	0.43
	2015	5.69	6.66	6.08	0.97
	2016	5.66	5.97	5.82	0.31
	2017	5.98	6.3	6.16	0.32
91A St. (Well #3)	2007	1.52	2.19	1.81	0.67
	2008	1.50	2.34	1.78	0.84
	2009	1.47	2.05	1.77	0.58
	2010	1.45	1.64	1.54	0.19
	2011	1.31	1.55	1.46	0.24
	2012	1.38	1.54	1.46	0.16
	2013	1.20	1.39	1.27	0.19
	2014	1.11	1.65	1.37	0.54
	2015	1.21	1.66	1.41	0.45
	2016	1.13	1.43	1.28	0.30
	2017	1.06	1.38	1.23	0.32

**Depth indicates the measurement from the top of casing to the water level.*

No.	DATE	DESCRIPTION	BY	APVD

ISSUES / REVISIONS

CONSULTANT SEAL

TRUE CONSULTING

201 - 2079 Falcon Road ▪ Kamloops BC ▪ V2C 4J2
tel 250.828.0881 ▪ fax 250.828.0717
info@TRUE.bc.ca

BRITISH COLUMBIA Town of Oliver

SANITARY SEWER ANNUAL REPORT

AIRPORT AREA GROUNDWATER MONITORING WELLS SITE PLAN

SCALE	N.T.S (11x17)
DESIGN BY	TRU
DRAWN BY	NA
DATE	JANUARY 2018
PROJECT REFERENCE No.	306-088-005
DRAWING No.	FIG 2-1
SHEET	1 OF 1
ISSUE/REV.	

TABLE 2-2: SUMMARY OF WATER QUALITY DATA FOR THE AIRPORT MONITORING WELLS

Monitoring Well	Sample Date	Chloride	Ammonia	Nitrate/Nitrite	Total Hardness	Sodium
Air Cadet (Well #1)	Sep-19-2007	24.6	< 0.02	7.71	535	13.9
	Apr-09-2008	9.97	0.09	2.84	773	24.1
	Sep-11-2008	12.6	0.04	1.3	817	21.7
	Apr. 07, 2009	11.1	0.02	0.7	1220	27.3
	Sep-18-2009	9.23	0.02	2.3	437	17.7
	May-19-2010	13.5	0.06	12.7		
	Sep-07-2010	13.8	< 0.02	12	383	22.1
	Apr-28-2011	17.5	0.15	12.1	217	9.33
	Sep-28-2011	12.7	0.12	7.87	400	18.4
	Apr-24-2012	16.4	0.04	7.59	464	20.0
	Oct-16-2012		0.034	9.7	481	19.8
	Apr-09-2013		0.034	10.1	384	18.5
	Sep-09-2013		< 0.020	20.2	383	17
	Apr-16-2014		0.027	21.6	542	18.1
	Sep-04-2014	19.8	< 0.020	23.9	402	19.5
	Apr-14-2015	20.7	0.102	24.4	485	20.5
	Sep-16-2015	15.9	0.079	20.5	590	23.5
	Sept-13-2016	13.7	0.032	15	386	19.1
	Apr-10-2017	14.2	0.033	12	388	19.5
	Sep-11-2017	10.4	<0.020	6.97	392	18
Rodeo Grounds (Well #2)	Sep-19-2007	9.24	< 0.02	0.25	2330	
	Apr-09-2008	7.76	0.03	0.5	1690	23.7
	Sep-11-2008	12.7	0.08	1.14	890	21.7
	Apr. 07, 2009	10.2	< 0.02	1.28	346	15.2
	Sep-18-2009	9.01	< 0.02	0.36	677	19.1
	May-19-2010	9.69	0.04	0.08		
	Sep-07-2010	8.93	< 0.02	0.26	686	22.3
	Apr-28-2011	11.9	0.05	0.05	531	9.13
	Sep-28-2011	9.33	0.02	2.18	491	16.1
	Apr-24-2012	10.6	0.01	0.749	572	17.4
	Oct-16-2012		0.021	0.263	661	17.8
	Apr-09-2013		0.047	0.121	384	18.4
	Sep-09-2013		0.023	0.115	889	18
	Apr-16-2014		0.024	0.123	392	15.9
	Sep-04-2014	8.47	0.02	0.584	370	15.9
	Apr-14-2015	9.05	0.094	0.865	494	18.5
	Sep-16-2015	6.56	0.037	0.3	1120	31.6
	Sept-13-2016	6.54	0.032	0.628	1110	19.2
	Apr-10-2017	7.6	0.072	0.343	914	20.4
	Sep-11-2017	6.1	0.02	0.124	959	17.1
91A St. (Well #3)	Sep-19-2007	7.46	0.06	0.05	7340*	15.1
	Apr-09-2008	10	0.03	0.05	972	27.5
	Sep-11-2008	14.9	0.12	0.04	5010	38.4
	Apr-07-2009	11.8	0.02	0.026	1270	31.6
	Sep-18-2009	9.39	0.11	< 0.02	1070	24.6
	May-19-2010	12.2	0.06	< 0.02		
	Sep-07-2010	15.1	0.35	0.35	2300	37.7
	Apr-28-2011	23.1	0.04	0.44	633	15.3
	Sep-28-2011	18.5	0.1	0.32	1160	36.8
	Apr-24-2012	18.4	0.09	0.270	1470	36.9
	Oct-16-2012		0.04	0.033	924	31.6
	Apr-09-2013		0.049	0.074	834	23.9
	Sep-09-2013		0.07	0.101	1430	24.6
	Apr-16-2014		0.028	0.058	399	16.9
	Sep-04-2014	125	0.023	0.032	438	21.8
	Apr-14-2015	8.99	0.086	0.106	631	18.9
	Sep-16-2015	7.59	0.047	0.035	496	18.5
	Sept-13-2016	8.01	0.032	0.214	389	17.2
	Apr-10-2017	8.07	0.059	0.334	366	16.7
	Sep-11-2017	7.64	<0.020	0.042	346	15.2

* Suspected error.

Related to the water quality data for the airport area groundwater monitoring wells:

- The influence of reclaimed water on groundwater quality is generally reflected in ammonia and/or nitrate concentrations in the monitoring wells. Since 2007, the three wells have not had any samples with ammonia concentrations significantly above background.
- Since 2015, there has been a decrease of approximately 50% in nitrate/nitrite concentrations in the Air Cadet well. It should be noted that background concentrations for nitrate in water wells influenced by the agricultural industry are typically in the range of 6 to 10 mg/L. The nitrate concentrations downgradient of this well at 91A St. are well below this range, with an average concentration of 0.14 mg/L over the eleven-year period.

2.5.2 Fairview Monitoring Wells No. 1 to 7

In compliance with the approved groundwater monitoring plan, the Town of Oliver has seven groundwater wells down gradient of the Fairview area. Referring to Figure 2-2, Monitoring wells (MW) 1 to 3 are located south of the Town's effluent storage site in an area used for infiltration in the mid-1990s. With infiltration of effluent near these wells being discontinued in the mid-1990s, the Town does not sample or measure groundwater elevations in MW 1 to 3. Groundwater depth and quality data for MW 4 to 7 are presented in Appendix E and summarized in Table 2-3.

MW 4 and 5 for water quality were sampled for water quality in 2017, with results tabulated in Table 2-4 and attached in Appendix E. A comparison of 2003 to 2017 sampling data for chloride, nitrate/nitrite, and sodium (parameters generally accepted to be indicative of the influence from reclaimed water) is presented following. It should be noted that MW 6 and 7 were dry throughout 2017.

Test Well #4 is influenced by surface water from the toe drain of the reclaimed water storage reservoir dam and therefore has chloride and sodium levels that are comparable to reclaimed water.

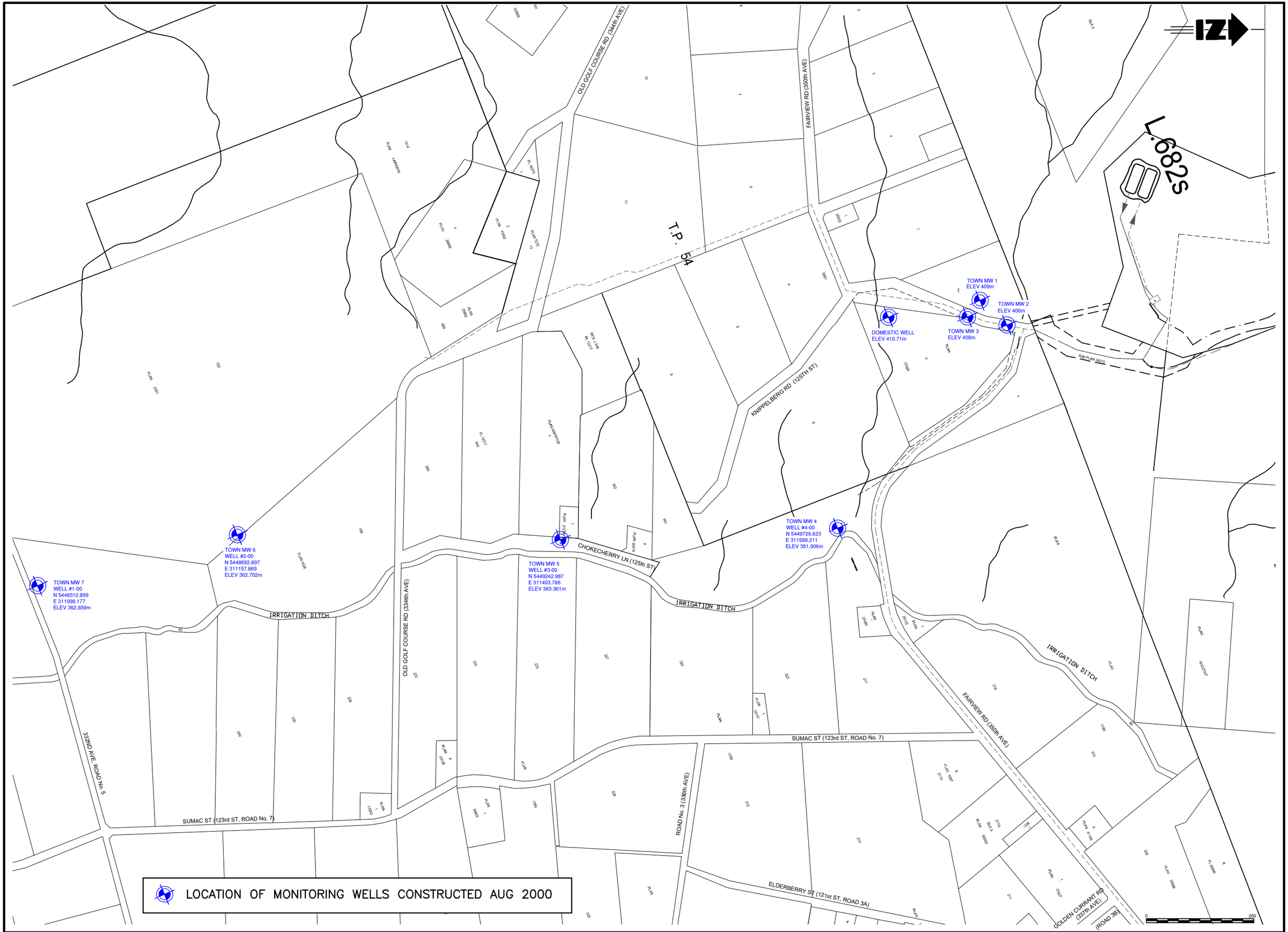
No infiltration of reclaimed water on lands up gradient of Test Well #5 has occurred since 2004 and water quality at Test Well #5 is considered representative of background conditions. The nitrite/nitrate and chloride concentrations continue to be indicative of agricultural land use in the area and are consistent with historical data.

TABLE 2-3: SUMMARY OF GROUNDWATER DEPTHS FOR FAIRVIEW MONITORING WELLS

Monitoring Well	Year	Minimum Depth (m)	Maximum Depth (m)	Average Depth (m)	Range of Depth (m)
Test Well #4 (Sand Pit)	2003	9.24	11.13	9.76	1.89
	2004	8.16	9.56	8.77	1.40
	2005	8.12	10.33	8.91	2.21
	2006	8.35	11.16	9.45	2.82
	2007	8.55	11.36	10.06	2.81
	2008	8.70	11.34	10.06	2.64
	2009	8.80	11.30	10.15	2.50
	2010	8.28	10.61	9.32	2.33
	2011	8.36	11.24	9.74	2.88
	2012	8.48	10.85	9.79	2.37
	2013	8.21	10.64	8.89	2.43
	2014	7.43	9.62	8.57	2.19
	2015	8.08	10.20	8.92	2.12
	2016	7.79	8.98	8.38	1.19
	2017	6.24	8.33	7.71	2.09
Test Well #5 (125th Street)	2003	7.30	9.48	8.68	2.18
	2004	7.95	10.59	9.57	2.64
	2005	7.77	10.22	9.25	2.45
	2006	7.44	9.74	8.83	2.30
	2007	7.64	9.92	8.99	2.28
	2008	9.57	11.32	10.41	1.75
	2009	10.17	10.81	10.47	0.64
	2010	8.26	11.97	10.20	3.71
	2011	5.38	9.69	8.12	4.31
	2012	6.41	9.54	8.48	3.13
	2013	5.59	9.23	7.95	3.64
	2014	8.13	9.77	9.04	1.64
	2015	-	-	-	-
	2016	4.57	9.90	7.70	5.33
	2017	4.56	10.57	7.93	6.01
Test Well #6	2003-2016	*13.92 (Dry)*			
Test Well # 7 (Road No. 5)	2003	25.87	25.89	25.88	0.02
	2004	25.89	25.89	25.89	0.00
	2005	25.44	25.89	25.86	0.45
	2006	25.00	*25.91 (Dry)*	25.56	0.91
	2007-2016	*25.91 (Dry)*			

TABLE 2-4: SUMMARY OF THE WATER QUALITY DATA FOR FAIRVIEW MONITORING WELLS

Monitoring Well	Sample Date	Chloride	Nitrate/Nitrite	Sodium	Ammonia	Total Hardness
Test Well #4 (Sand Pit)	Apr. 22, 2003	72	0.52	55.8	0.05	1060
	Sep. 30, 2003	94	0.39	80.3	0.08	1370
	Apr. 20, 2004	111	0.97	73.1	0.04	1130
	Sep. 4, 2004	123	0.35	108	0.02	3280
	Apr. 12, 2005	102	1.44	85.1	<0.01	1060
	Apr. 9, 2008	103	2.46	104	<0.02	1170
	Apr. 7, 2009	128	2.21	103	<0.02	1030
	Sep. 16, 2009	108	0.74	125	0.09	4980
	May. 19, 2010	137	2.43		0.02	
	Sep. 7, 2010	135	1.02	128	0.03	1310
	Apr. 28, 2011	135	2.95	108	0.08	1020
	Apr. 24, 2012	130	2.39	101	0.04	1110
	Oct. 16, 2012		0.691	119	0.034	1420
	Apr. 9, 2013		1.78	118	0.091	1070
	Sep. 9, 2013		2.06	146	0.156	1350
	Apr. 16, 2014		3.02	115	0.073	1050
	Sep. 4, 2014	125	1.68	127		
	Apr. 14, 2015	141	3.56	120		
	Sep. 16, 2015	135	1.53	127	0.023	1440
	Sep. 13,2016	129	1.63	19.2	0.021	1700
	Apr. 10, 2017	121	10.2	108	0.084	820
	Sept. 11, 2017	110	3.05	11.5	<0.020	387
Test Well #5 (125th Street)	Apr. 22, 2003	36.1	3.9	29.5	<0.01	367
	Sep. 30, 2003	29.2	3.9	29	0.02	391
	Apr. 20, 2004	30.4	3.6	23.8	0.03	395
	Sep. 4, 2004	22.3	6.52	32.4	0.02	447
	Apr. 12, 2005	34.2	5.81	25.5	<0.01	409
	Sep. 7, 2005	46.5	12.4	25.7	<0.01	537
	Jun. 15, 2006	34.8	8.62	27	<0.01	543
	Sep. 21, 2006	34.6	6.05	28	1.65	399
	May. 1, 2007	34.4	2.15	26	0.41	355
	Sep. 13, 2007	27.5	2.95	30.2	0.03	388
	Apr. 9, 2008	29.1	3.62	35.9	0.08	399
	Sep. 11, 2008	36	2.8	33.7	0.13	512
	Apr. 7, 2009	76	6.1	35.1	<0.02	407
	Sep. 16, 2009	77.7	5.72	21.6	<0.02	480
	May. 19, 2010	53.9	3.03		0.03	
	Sep. 7, 2010	37.3	1.03	29.2	0.03	467
	Apr. 28, 2011	26.3	2.1	41	0.04	639
	Sep. 28, 2011	38.5	2.75	48.7	0.35	423
	Apr. 24, 2012	48.8	3.19	22.4	1.9	460
	Oct. 16, 2012		2.94	19.3	0.025	446
	Apr. 9, 2013		1.11	15.9	0.036	381
	Sep. 9, 2013		0.652	12.4	0.071	398
	Apr. 16, 2014		0.577	13.1	0.022	465
	Sep. 4, 2014	14.7	0.683	14		
	Apr. 14, 2015	16.7	1.31	14.7		
	Sep. 16, 2015	27.7	0.794	31.6	< 0.020	456
	Sep. 13,2016	23.9	1.11	20.4	0.022	960
	Apr. 10, 2017	17	1.21	14.1	0.052	481
	Sept. 11, 2017	16.5	1.11	88.4	0.089	917



No.	DATE	DESCRIPTION	BY	APVD

ISSUES / REVISIONS

CONSULTANT SEAL

TRUE CONSULTING
201 - 2079 Falcon Road ■ Kamloops BC ■ V2C 4J2
tel 250.828.0881 ■ fax 250.828.0717
info@TRUE.bc.ca

Town of Oliver

SANITARY SEWER ANNUAL REPORT

AIRPORT AREA GROUNDWATER MONITORING WELLS SITE PLAN

SCALE	N.T.S. (11x17)
DESIGN BY	TRU
DRAWN BY	NA
DATE	JANUARY 2018
PROJECT REFERENCE No.	306-088-005

DRAWING No.

FIG 2-2

SHEET 1 OF 1

ISSUE-REV.

APPENDIX A

Flow and Storage Reservoir Level Data

2017 - Town of Oliver Sewer Flows - PE - 13717

	High Lift Station			Chlorine Booster Station		
January	Daily Flow m3/day	Total Monthly m3/day	Monthly Average m3/day	Total Daily m3/day (3)	Total Monthly m3/day	Monthly Average m3/day
1	1,485			0		
2	624			0		
3	1,777			0		
4	1,574			0		
5	1,621			0		
6	1,736			0		
7	2,286			0		
8	1,600			0		
9	627			0		
10	1,740			0		
11	1,621			0		
12	1,602			0		
13	1,676			0		
14	2,519			0		
15	1,631			0		
16	369			0		
17	1,891			0		
18	1,514			0		
19	1,670			0		
20	1,655			0		
21	2,792			0		
22	1,786			0		
23	729			0		
24	1,759			0		
25	1,602			0		
26	1,575			0		
27	1,699			0		
28	2,485			0		
29	1,572			0		
30	358			0		
31	1,752			0		
		49327	1591		0.0	0
	OC Limit	n/a	2050m3/day		n/a	n/a

2017 - Town of Oliver Sewer Flows - PE - 13717

	High Lift Station			Chlorine Booster Station		
February	Daily Flow m3/day	Total Monthly m3/day	Monthly Average m3/day	Total Daily m3/day (3)	Total Monthly m3/day	Monthly Average m3/day
1	1,557			0		
2	1,619			0		
3	1,567			0		
4	2,564			0		
5	1,584			0		
6	405			0		
7	1,853			0		
8	1,492			0		
9	1,615			0		
10	1,588			0		
11	2,456			0		
12	1,491			0		
13	583			0		
14	1,643			0		
15	1,742			0		
16	1,872			0		
17	1,784			0		
18	2,460			0		
19	1,568			0		
20	435			0		
21	1,872			0		
22	1,575			0		
23	1,690			0		
24	1,625			0		
25	2,571			0		
26	1,630			0		
27	302			0		
28	1,861			0		
29						
30						
31						
		45002	1607		0.0	0
	OC Limit	n/a	2050m3/day		n/a	n/a

2017 - Town of Oliver Sewer Flows - PE - 13717

	High Lift Station			Chlorine Booster Station		
March	Daily Flow m3/day	Total Monthly m3/day	Monthly Average m3/day	Total Daily m3/day (3)	Total Monthly m3/day	Monthly Average m3/day
1	1,644			0		
2	1,527			0		
3	1,586			0		
4	2,567			0		
5	1,644			0		
6	401			0		
7	1,759			0		
8	1,724			0		
9	1,709			0		
10	1,673			0		
11	2,564			0		
12	1,593			0		
13	372			0		
14	1,755			0		
15	1,610			0		
16	1,620			0		
17	1,767			0		
18	2,427			0		
19	1,647			0		
20	589			0		
21	1,724			0		
22	1,677			0		
23	1,724			0		
24	1,700			0		
25	2,609			0		
26	1,694			0		
27	407			332		
28	1,751			2,253		
29	2,008			597		
30	1,709			12		
31	1,705			0		
		50886	1641		3193.7	103
	OC Limit	n/a	2050m3/day		n/a	n/a

2017 - Town of Oliver Sewer Flows - PE - 13717

	High Lift Station			Chlorine Booster Station		
April	Daily Flow m3/day	Total Monthly m3/day	Monthly Average m3/day	Total Daily m3/day (3)	Total Monthly m3/day	Monthly Average m3/day
1	2,719			0		
2	1,851			0		
3	414			0		
4	1,786			423		
5	1,765			15		
6	1,710			0		
7	2,098			0		
8	2,680			0		
9	1,867			0		
10	533			0		
11	1,693			329		
12	1,877			0		
13	2,052			0		
14	1,730			0		
15	2,707			329		
16	1,714			0		
17	802			0		
18	1,911			3		
19	1,581			327		
20	1,795			0		
21	1,815			479		
22	2,406			0		
23	2,119			0		
24	390			479		
25	1,725			0		
26	1,723			0		
27	1,587			0		
28	1,771			0		
29	2,878			0		
30	1,861			743		
31						
		53562	1785		3127.4	104
	OC Limit	n/a	2050m3/day		n/a	n/a

2017 - Town of Oliver Sewer Flows - PE - 13717

		High Lift Station			Chlorine Booster Station		
May		Daily Flow m3/day	Total Monthly m3/day	Monthly Average m3/day	Total Daily m3/day (3)	Total Monthly m3/day	Monthly Average m3/day
	1	724			728		
	2	1,810			1,691		
	3	1,853			330		
	4	1,987			1,951		
	5	1,975			1,936		
	6	3,126			1,657		
	7	2,690			1,609		
	8	606			1,872		
	9	2,188			1,998		
	10	2,103			1,960		
	11	1,831			1,840		
	12	2,808			213		
	13	3,770			0		
	14	2,152			0		
	15	1,359			736		
	16	2,339			210		
	17	2,518			221		
	18	1,743			1,095		
	19	3,012			828		
	20	3,803			1,702		
	21	2,864			1,663		
	22	777			1,913		
	23	1,984			1,624		
	24	2,999			1,801		
	25	3,241			2,283		
	26	2,840			3,127		
	27	3,018			3,276		
	28	2,531			2,812		
	29	2,103			3,493		
	30	3,599			2,485		
	31	2,514			4,255		
			72867	2351		51309.6	1655
		OC Limit	n/a	2050m3/day		n/a	n/a

2017 - Town of Oliver Sewer Flows - PE - 13717

	High Lift Station			Chlorine Booster Station		
June	Daily Flow m3/day	Total Monthly m3/day	Monthly Average m3/day	Total Daily m3/day (3)	Total Monthly m3/day	Monthly Average m3/day
1	3,037			2,382		
2	2,286			0		
3	3,692			2,507		
4	2,876			216		
5	1,152			2,014		
6	2,071			2,159		
7	2,430			2,361		
8	2,954			2,208		
9	2,408			2,206		
10	3,488			1,583		
11	2,386			956		
12	1,515			1,917		
13	2,072			2,001		
14	2,760			2,376		
15	2,366			3,974		
16	2,259			3,967		
17	3,432			2,443		
18	2,896			2,679		
19	663			3,901		
20	2,371			2,537		
21	2,444			3,889		
22	2,378			2,717		
23	2,339			3,920		
24	3,534			2,766		
25	2,483			2,708		
26	1,264			4,848		
27	2,449			3,225		
28	2,379			4,411		
29	2,305			2,983		
30	2,511			4,476		
31						
		73204	2440		80331.3	2678
	OC Limit	n/a	2050m3/day		n/a	n/a

2017 - Town of Oliver Sewer Flows - PE - 13717

	High Lift Station			Chlorine Booster Station		
July	Daily Flow m3/day	Total Monthly m3/day	Monthly Average m3/day	Total Daily	Total Monthly m3/day	Monthly Average m3/day
1	3,517			2,992		
2	2,305			3,451		
3	1,239			4,583		
4	2,126			3,178		
5	2,531			3,879		
6	2,429			3,508		
7	2,407			4,483		
8	3,699			3,229		
9	2,862			3,626		
10	497			4,688		
11	2,356			2,624		
12	2,351			4,728		
13	2,316			3,438		
14	2,394			4,643		
15	3,775			3,667		
16	2,335			3,449		
17	982			3,589		
18	2,044			3,470		
19	2,278			3,577		
20	2,270			3,246		
21	2,289			3,543		
22	3,669			3,259		
23	2,843			2,894		
24	379			3,544		
25	2,206			4,593		
26	2,324			4,406		
27	2,332			3,505		
28	2,332			4,543		
29	3,610			3,290		
30	2,794			3,164		
31	556			5,025		
		72046	2324		115809.4	3736
	OC Limit	n/a	2050m3/day		n/a	n/a

2017 - Town of Oliver Sewer Flows - PE - 13717

	High Lift Station			Chlorine Booster Station		
August	Daily Flow m3/day	Total Monthly m3/day	Monthly Average m3/day	Total Daily m3/day (3)	Total Monthly m3/day	Monthly Average m3/day
1	2,290			4,629		
2	2,160			3,373		
3	2,250			4,704		
4	2,330			4,934		
5	3,646			3,566		
6	2,312			3,877		
7	913			5,221		
8	2,108			4,611		
9	2,304			3,454		
10	2,160			4,919		
11	2,223			4,617		
12	3,391			853		
13	2,161			2,858		
14	725			4,154		
15	1,954			4,379		
16	2,255			2,351		
17	1,940			3,661		
18	2,185			4,427		
19	3,115			3,938		
20	1,970			2,878		
21	1,056			4,001		
22	1,854			4,149		
23	1,713			4,837		
24	1,921			3,201		
25	2,311			4,522		
26	2,924			3,182		
27	2,061			2,767		
28	444			3,785		
29	1,791			1,923		
30	1,853			2,440		
31	1,781			1,060		
		64102	2068		113269.3	3654
	OC Limit	n/a	2050m3/day		n/a	n/a

2017 - Town of Oliver Sewer Flows - PE - 13717

	High Lift Station			Chlorine Booster Station		
September	Daily Flow m3/day	Total Monthly m3/day	Monthly Average m3/day	Total Daily m3/day (3)	Total Monthly m3/day	Monthly Average m3/day
1	2,221			2,835		
2	3,082			2,306		
3	1,857			2,506		
4	629			2,490		
5	1,773			1,284		
6	1,766			1,641		
7	1,825			531		
8	1,837			0		
9	2,869			570		
10	1,807			872		
11	871			1,400		
12	2,033			0		
13	2,099			337		
14	1,776			2,611		
15	1,827			3,449		
16	2,766			831		
17	1,891			2,751		
18	484			4,207		
19	1,782			2,718		
20	1,840			1,016		
21	1,742			2,508		
22	1,760			1,888		
23	2,576			664		
24	1,662			1,941		
25	371			3,459		
26	1,848			1,884		
27	1,681			1,671		
28	1,616			1,268		
29	1,692			3,226		
30	2,718			0		
31						
		54700	1823		52864.5	1762
	OC Limit	n/a	2050m3/day		n/a	n/a

2017 - Town of Oliver Sewer Flows - PE - 13717

	High Lift Station			Chlorine Booster Station		
October	Daily Flow m3/day	Total Monthly m3/day	Monthly Average m3/day	Total Daily m3/day (3)	Total Monthly m3/day	Monthly Average m3/day
1	1,732			625		
2	270			1,891		
3	1,819			1,771		
4	1,731			2,449		
5	1,616			3,388		
6	1,710			3,161		
7	2,639			0		
8	1,653			0		
9	337			425		
10	1,778			0		
11	1,604			595		
12	1,712			4,706		
13	1,790			3,140		
14	2,771			115		
15	1,747			2,067		
16	244			3,037		
17	1,745			1,508		
18	1,711			0		
19	1,587			0		
20	1,674			0		
21	2,434			0		
22	1,541			0		
23	728			1,243		
24	1,724			2,912		
25	1,576			3,023		
26	1,633			3,180		
27	1,649			2,100		
28	2,537			0		
29	1,664			0		
30	545			2		
31	1,714			0		
		49616	1601		41336.2	1333
	OC Limit	n/a	2050m3/day		n/a	n/a

2017 - Town of Oliver Sewer Flows - PE - 13717

	High Lift Station			Chlorine Booster Station		
November	Daily Flow m3/day	Total Monthly m3/day	Monthly Average m3/day	Total Daily m3/day (3)	Total Monthly m3/day	Monthly Average m3/day
1	1,619			0		
2	1,634			0		
3	1,707			0		
4	2,588			0		
5	1,657			0		
6	253			0		
7	1,648			0		
8	1,636			0		
9	1,653			0		
10	1,758			0		
11	2,597			0		
12	1,664			0		
13	620			0		
14	2,169			0		
15	5,139			0		
16	4,360			0		
17	1,282			0		
18	2,563			0		
19	1,694			0		
20	440			0		
21	1,621			0		
22	1,665			0		
23	1,589			0		
24	1,656			0		
25	2,536			0		
26	1,621			0		
27	486			0		
28	1,685			0		
29	1,623			0		
30	1,633			0		
31						
		54796	1827		0.0	0
	OC Limit	n/a	2050m3/day		n/a	n/a

2017 - Town of Oliver Sewer Flows - PE - 13717

	High Lift Station			Chlorine Booster Station		
December	Daily Flow m3/day	Total Monthly m3/day	Monthly Average m3/day	Total Daily m3/day (3)	Total Monthly m3/day	Monthly Average m3/day
1	1678			0		
2	2532			0		
3	1631			0		
4	548			0		
5	1694			0		
6	1704			0		
7	1540			0		
8	1553			0		
9	2377			0		
10	1546			0		
11	419			0		
12	1715			0		
13	1571			0		
14	1618			0		
15	1564			0		
16	2392			0		
17	1546			0		
18	498			0		
19	1718			0		
20	1671			0		
21	1523			0		
22	1560			0		
23	2448			0		
24	1575			0		
25	480			0		
26	1382			0		
27	1511			0		
28	1545			0		
29	1574			0		
30	2369			0		
31	1504			0		
		48989	1580		0.0	0
	OC Limit	n/a	2050m3/day		n/a	n/a

2017 - TOWN OF OLIVER
STORAGE RESERVOIR
LEVEL DATA

	JANUARY		FEBRUARY		MARCH		APRIL	
DAY	ELEVATION	VOLUME IN STORAGE*	ELEVATION	VOLUME IN STORAGE*	ELEVATION	VOLUME IN STORAGE*	ELEVATION	VOLUME IN STORAGE*
1								
2								
3	444.36	271,000						
4								
5							445.77	358,000
6					445.47	343,000		
7								
8			445.09	321,000				
9	444.5	280,000						
10							445.93	366,000
11								
12								
13					445.62	351,000		
14			445.16	326,000				
15								
16								
17							446.07	374,000
18								
19								
20			445.3	335,000	445.71	355,000		
21								
22								
23	444.81	301,000						
24							446.16	378,000
25								
26								
27			445.38	339,000	445.9	365,000		
28								
29								
30	444.95	314,000						
31								

* Volume in Storage above Elevation 439.00
Elevation 439.00 is minimum 60 day average operating level

DAY	MAY		JUNE		JULY		AUGUST	
	ELEVATION	VOLUME IN STORAGE*	ELEVATION	VOLUME IN STORAGE*	ELEVATION	VOLUME IN STORAGE*	ELEVATION	VOLUME IN STORAGE*
1	446.14	377,000						
2								
3								
4								
5			446.06	373,000	445.31	335,000		
6								
7								
8	446.04	372,000					443.93	240,000
9								
10								
11								
12			446.04	372,000				
13								
14							443.78	230,000
15	446.11	376,000						
16								
17					444.88	308,000		
18								
19			445.87	363,000				
20								
21							443.49	213,000
22	446.17	379,000						
23								
24					444.64	290,000		
25								
26								
27								
28							443.22	196,000
29	446.06	373,000						
30								
31								

* Volume in Storage above Elevation 439.00
Elevation 439.00 is minimum 60 day average operating level

DAY	SEPTEMBER		OCTOBER		NOVEMBER		DECEMBER	
	ELEVATION	VOLUME IN STORAGE*	ELEVATION	VOLUME IN STORAGE*	ELEVATION	VOLUME IN STORAGE*	ELEVATION	VOLUME IN STORAGE*
1								
2			442.87	174,000				
3								
4								
5	443.06	185,000					444.29	265,000
6					443.53	216,000		
7								
8								
9								
10			442.82	172,000				
11							444.39	272,000
12	443.14	191,000						
13								
14								
15								
16			442.75	167,000				
17								
18	443	182,000					444.43	275,000
19								
20								
21								
22					443.69	225,000		
23								
24								
25	442.91	176,000						
26								
27					444.14	254,000		
28								
29								
30			442.8	171,000				
31								

* Volume in Storage above Elevation 439.00
Elevation 439.00 is minimum 60 day average operating level

2017 - TOWN OF OLIVER
Summary of Monthly Sewer Flows

	High Lift Station		Chlorine Booster Station	
	Total Monthly m3/day	Monthly Average m3/day	Total Daily m3/day	Monthly Average m3/day
Jan	49,327	1,591	0	0
Feb	45,002	1,607	0	0
Mar	50,886	1,641	3,194	103
Apr	53,562	1,785	3,127	104
May	72,867	2,351	51,310	1,655
Jun	73,204	2,440	80,331	2,678
Jul	72,046	2,324	115,809	3,736
Aug	64,102	2,068	113,269	3,654
Sep	54,700	1,823	52,865	1,762
Oct	49,616	1,601	41,336	1,333
Nov	54,796	1,827	0	0
Dec	48,989	1,580	0	0
Total	689,098		461,241	15,025
Average	1,888		1,264	1,252

2017 - TOWN OF OLIVER
PE - 13717 - Balance of Storage Reservoir Volumes

Month End	In Flow - Metered at High Lift Station - cu. m.	Out Flow - Metered at Chlorine Booster Station - cu. m.	Reservoir Elevation metres	Volume in Storage cu. m.
			As of Dec. 31/06	As of Dec.31/06
Jan	49327.11	0.00		
Feb	45002.46	0.00		
Mar	50886.10	3193.72		
Apr	53562.08	3127.39		
May	72867.07	51309.58		
Jun	73204.05	80331.34		
Jul	72045.87	115809.41		
Aug	64101.50	113269.28		
Sep	54700.20	52864.51		
Oct	49616.08	41336.19		
Nov	54795.53	0.00		
Dec	48989.50	0.00		
Total	689097.55	461241.43	0	0

APPENDIX B

Influent and Effluent Sampling Data

2017 - TOWN OF OLIVER
PE - 13717 - Chlorine Contact Chamber Prior to Irrigation - EMS ID E222150

	Date	Fecal Coliforms	Total Coliforms	Total P	Total N	Total Chloride	Sodium	Free CL Res
OC Limit		#2.2 MPN/100 ml	n/a	n/a	n/a	n/a	n/a	n/a
Unit		MPN/100ml	MPN/100ml	mg/L	mg/L	mg/L	mg/L	mg/L
Frequency		monthly	monthly	monthly	monthly	monthly	monthly	weekly
April	5	<2.2	<2.2	4.86	9.2	147	102	0.20
May	1	<2.2	>16	4.11	20.9	143	103	0.16
June	5	holding time extended, no results		4.71	20.1	145	106	0.27
July	5	<2.2	<2.2	4.56	20.6	146	105	0.31
August	2	<2.2	<2.2	4.21	16.8	135	124	0.29
September	6	<2.2	<2.2	4.52	16.0	136	109	0.30
October	3	<2.2	<2.2	4.85	15.0	161	107	0.24
				4.5	16.9		108.0	

* Note: The operational permit limit for fecal coliform in re-claimed water applied to agricultural land is 200 MPN per 100mL. Most of the re-claimed water in Oliver is applied on the Fairview Mountain Golf Course which is classified as high public use, hence the lower limit of 2.2 MPN per 100 mL.

2017 - TOWN OF OLIVER

PE-13717 - Effluent Sampling - Cell #3, prior to storage reservoir - EMS ID E222151

	Date	BOD5	TSS	Nitrate (as N)	Nitrite (as N)	Phosphate (as P)	Ammonia (as N)	N Tot Kjedahl	Phosphorus Tot P	Phosphorus Tot Diss	N Tot	N Organic
OC Limit		45 mg/L	60 mg/L									
Units		mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L
Frequency		monthly	monthly	semi-annual	semi-annual	semi-annual	semi-annual	semi-annual	semi-annual	semi-annual	semi-annual	semi-annual
January	10	21	14									
February	14	21	13									
March	7	67	81									
March	7					2.42			3.77			
March	7			0.019	<0.010	3.00	23.40	32	4.36	3.35	32	8.62
April	5	48	36									
May	1	41.6	19.7									
June	5	75.8	24									
July	5	9.7	30.5									
August	2	<7.85	18.5									
September	6	<8.6	10									
September	6					2.13			4.69			
September	6			14.7	0.629	3.3	0.384	3.13	4.34	4.41	18.5	2.75
October	3	33.3	8									
November	15	14.4	10.7									
December	12	22.5	14									

Influent Sampling

Semi- Annual

APPENDIX C

Seasonal Precipitation Data

Seasonal Precipitation Summary: 1992-2017

Oliver STP

YEAR	APR	MAY	JUNE	JULY	AUG	SEPT	OCT	SEASON TOTAL (mm)
1992	41.4	8.0	64.8	62.0	9.8	2.2	11.8	200.0
1993	50.6	34.5	48.0	67.9	39.5	18.4	14.8	273.7
1994	42.4	30.8	37.8	12.2	33.9	17.4	24.8	199.3
1995	17.5	17.9	37.6	10.2	22.6	7.5	10.6	123.9
1996	15.8	62.2	27.9	24.2	5.2	52.3	28.2	215.8
1997	35.3	41.8	87.9	47.6	18.5	63.4	29.0	323.5
1998	29.4	79.1	31.2	25.1	12.3	2.9	33.7	213.7
1999	20.1	28.9	40.3	15.5	44.1	1.2	11.7	161.8
2000	10.4	24.8	25.8	26.7	4.5	14.4	19.6	126.2
2001	37.6	16.4	39.4	32.2	15.0	13.6	24.1	178.3
2002	8.7	43.0	4.8	9.8	0.3	9.4	7.3	83.3
2003	29.4	18.4	12.9	0	0.0	11.4	21.7	93.8
2004	27.9	30.7	56.0	7.8	27.7	32.3	48.9	231.3
2005	12.4	41.1	48.4	2.9	1.3	2.9	22.4	131.4
2006	20.8	52.0	36.0	14.2	0.1	8.7	12.4	144.2
2007	4.9	3.2	24.1	29.0	2.8	12.2	11.6	87.8
2008	5.0	3.65	27.5	5.0	19.9	2.7	9.9	73.7
2009	4.8	26.8	13.4	28.6	27.8	20.2	39.5	161.1
2010	20.0	55.9	68.3	14.6	9.1	38.9	13.7	220.5
2011	12.5	69.6	24.4	18.7	0.0	3.4	22.4	151.0
2012	39.9	14.8	78.7	46	0.3	2	40.8	222.5
2013	16.5	30.5	35.0	8.6	36.6	47.5	5.6	180.3
2014	15.3	24.4	42.8	25	12.2	19.3	35.9	174.9
2015	2.2	54.4	13.2	17	19.9	3	26.3	136.0
2016	5.8	14.9	38.5	25.9	1.2	16.4	62.8	165.5
2017	40.5	61.2	21.2	0	0.0	4.8	5.3	133.0
Avg.	21.8	34.2	37.9	22.2	14.0	16.5	22.9	169.5

1992 to 1996 data from Environment Canada
1997 - present data compiled from Town of Oliver daily records

APPENDIX D

Sludge Monitoring (Quality) Data

2017 - TOWN OF OLIVER
PE-13717 - Effluent Sludge - Cell #2 - Sample 1 & 2

ANALYTICAL REPORT - Sampled on November 15, 2017

			WALP Guidelines			
Parameter	***Unit***	**CELL 2 EFF SLUDGE-1**	**Agricultural Low Grade**	**Agricultural High Grade**	**Retail Low Grade**	**Retail High Grade**
Aluminum	ug/g	8390				
Antimony	ug/g	1.67				
Arsenic	ug/g	8.68	75	75	75	75
Barium	ug/g	303				
Beryllium	ug/g	0.24				
Bismuth	ug/g	23.4				
Cadmium	ug/g	2.43	25	20	20	5-20
Calcium	ug/g	16800				
Chromium	ug/g	48.4				
Cobalt	ug/g	3.25	150	150	150	150
Copper	ug/g	1420				
Iron	ug/g	9650				
Lead	ug/g	32.4	1000	500	500	500
Magnesium	ug/g	3270				
Manganese	ug/g	162				
Mercury	ug/g	3.59	10	5	5	5
Molybdenum	ug/g	21	20	20	20	20
Nickel	ug/g	23.9	200	180	180	180
Phosphorus	ug/g	8280				
Potassium	ug/g	1180				
Selenium	ug/g	14.5	14	14	14	14
Silver	ug/g	18.7				
Sodium	ug/g	1750				
Strontium	ug/g	235				
Tellurium	ug/g	<0.10				
Thallium	ug/g	<0.10				
Tin	ug/g	28.1				
Titanium	ug/g	73.9				
Vanadium	ug/g	22.1				
Zinc	ug/g	1230	2500	1850	1850	1850
Zirconium	ug/g	4.6				

APPENDIX E

Groundwater Monitoring Data

GROUND WATER MONITORING WELL #3 (MAPLE AVENUE)

Parameters

	Anions			General Parameters				Calculated Parameters		Metals		
Sample Date	**Chloride**	**Nitrate (as N)**	**Nitrite (as N)**	**Ammonia Total (as N)**	**Conductivity (EC)**	**Phosphorus Total (as P)**	**Phosphorus Total Dissolved**	**Hardness Total (as CaCO3)**	**Nitrate/Nitrite (as N)**	**Calcium Total**	**Magnesium Total**	**Sodium Total**
April 10	8.07	0.334	<0.010	0.059	608	0.0511	0.0077	366	0.334	88.9	34.9	16.7
Sept 11	7.64	0.042	<0.010	<0.020	649	0.693	<0.0020	346	0.042	85.4	32.2	15.2

GROUND WATER MONITORING WELL #4 (SAND PIT)

Parameters

	Anions			General Parameters				Calculated Parameters		Metals		
Sample Date	**Chloride**	**Nitrate (as N)**	**Nitrite (as N)**	**Ammonia Total (as N)**	**Conductivity (EC)**	**Phosphorus Total (as P)**	**Phosphorus Total Dissolved**	**Hardness Total (as CaCO3)**	**Nitrate/Nitrite (as N)**	**Calcium Total**	**Magnesium Total**	**Sodium Total**
April 10	121	10.2	<0.010	0.084	1490	0.0189	0.0054	820	10.2	212	70.2	108
Sept 11	110	3.05	<0.010	<0.020	1670	0.29	0.0032	387	3.05	115	24	11.5

GROUND WATER MONITORING WELL #5

Parameters

	Anions			General Parameters				Calculated Parameters		Metals		
Sample Date	**Chloride**	**Nitrate (as N)**	**Nitrite (as N)**	**Ammonia Total (as N)**	**Conductivity (EC)**	**Phosphorus Total (as P)**	**Phosphorus Total Dissolved**	**Hardness Total (as CaCO3)**	**Nitrate/Nitrite (as N)**	**Calcium Total**	**Magnesium Total**	**Sodium Total**
April 10	17	1.20	0.011	0.052	665	0.164	0.0078	481	1.21	136	34.2	14.1
Sept 11	16.5	1.11	<0.010	0.089	662	0.443	0.106	917	1.11	241	76.5	88.4

2017 - TOWN OF OLIVER

GROUNDWATER MONITORING WELL READINGS
(Note: The value recorded indicates the measurement from the top of casing to the water level expressed in meters.)

Month	Day	Air Cadet (Well #1)	Rodeo Grounds (Well #2)	Maple Ave (Well #3)	Test Well #2 (Corner 350th/T.L.)	Test Well #4 (Sand Pit)	Test Well #5	Test Well #6 (Golf Course)	Test Well #7 (Road #5 West)
January	13	10.46	6.12	1.36	fenced off	8.28	10.57	3.92 (dry)	25.91 (dry)
February	20	10.53	6.19	1.14	fenced off	7.47	8.61	3.92 (dry)	25.91 (dry)
March	16	10.58	6.26	1.19	fenced off	7.65	10.57	3.92 (dry)	25.91 (dry)
April	10	10.59	6.3	1.08	fenced off	7.56	8.07	3.92 (dry)	25.91 (dry)
May	15	10.48	6.21	1.06	fenced off	7.38	4.59	3.92 (dry)	25.91 (dry)
June	6	10.35	6.24	1.07	fenced off	7.65	5.03	3.92 (dry)	25.91 (dry)
July	20	10.32	6.19	1.35	fenced off	8.18	6.93	3.92 (dry)	25.91 (dry)
August	10	10.26	6.16	1.38	fenced off	8.25	7.28	3.92 (dry)	25.91 (dry)
September	11	10.06	5.98	1.27	fenced off	8.31	7.58	3.92 (dry)	25.91 (dry)
October	10	9.9	6.02	1.34	fenced off	8.33	8.08	3.92 (dry)	25.91 (dry)
November	29	10.11	6.13	1.21	fenced off	7.19	8.89	3.92 (dry)	25.91 (dry)
December	15	10.18	6.16	1.26	fenced off	6.24	9.00	3.92 (dry)	25.91 (dry)

APPENDIX F

Operational Certificate for PE 12717

Province of British Columbia

MINISTRY OF ENVIRONMENT, LANDS AND PARKS

BC Environment

Environmental Protection
#201-3547 Skaha Lake Rd.
Penticton, British Columbia
V2A 7K2
Telephone: (604) 490-8200
Fax: (604) 492-1314

RECEIVED
DEC 20 1995
TOWN OF OLIVER

Date: December 14, 1995 File: 76750-40/PE-13717 (01)

REGISTERED MAIL

The Corporation of the Town of Oliver
PO Box 638
Oliver BC V0H 1T0

Attention: Tom Szalay, Administrator

LE:
OUTING:

OMMENTS:

OPIES:

Enclosed is a copy of the Operational Certificate No. PE-13717 issued under the provisions of the Waste Management Act. This Operational Certificate supersedes Permit PE-00102 which is cancelled in accordance with Section 16(13) of the Waste Management Act. Your attention is respectfully directed to the terms and conditions outlined in the Operational Certificate. An annual Permit fee will be determined according to the Waste Management Permit Fee Regulation.

This Operational Certificate does not authorize entry upon, crossing over, or use for any purpose of private or Crown lands or works, unless and except as authorized by the owner of such lands or works. The responsibility for obtaining such authority shall rest with the Operational Certificate holder.

This Operational Certificate is issued pursuant to the provisions of the Waste Management Act to ensure compliance with Section 34(3) of that statute, which makes it an offence to discharge waste without proper authorization. It remains the responsibility of the Operational Certificate holder to ensure that all activities conducted under this authorization comply with any other applicable legislation which may be in force from time to time.

The administration of this Operational Certificate will be carried out by staff from our Regional Office located in Penticton, (telephone 490-8200). Plans, data and reports pertinent to the Operational Certificate are to be submitted to the Environmental Protection office, Suite 201, 3547 Skaha Lake Road, Penticton, British Columbia, V2A 7K2. - 30th Street, Vernon, British Columbia, V1T 9G3.

This decision may be appealed by any person(s) who considers themselves aggrieved by this decision, in accordance with Part 5 of the Waste Management Act. Written notice of intent to appeal must be received by the Regional Waste Manager within twenty-one (21) days of the date of notification of this decision.

Yours truly,

T.R. Forty, P.Eng.
Assistant Regional Waste Manager
Okanagan Sub-Region

Enclosure

PROVINCE OF
BRITISH COLUMBIA

Environmental Protection
#201 - 3547 Skaha Lake Road
Penticton
British Columbia, V2A 7K2
Telephone: (604) 490-8200

MINISTRY OF ENVIRONMENT,
LANDS AND PARKS

OPERATIONAL CERTIFICATE

PE 13717

Under the Provisions of the Waste Management Act

TOWN OF OLIVER

P.O. Box 638

Oliver, British Columbia

V0E 1T0

is authorized to discharge reclaimed wastewater to the ground by irrigation, from a municipal sewage collection and aerated lagoon sewage treatment facility located at Oliver, British Columbia, subject to the conditions listed below. Contravention of any of these conditions is a violation of the Waste Management Act and may result in prosecution.

1. SPECIFIC AUTHORIZED DISCHARGES AND RELATED REQUIREMENTS

The discharge of effluent to which this sub-section is applicable is from a municipal sewage treatment facility located approximately as shown on the attached Site Plan A and Site Plan B. The reference number (S.E.A.M. site number) for this discharge is E222150.

1.1 Discharge Quantity

1.1.1 The maximum authorized rate of effluent to be discharged from the aerated lagoon sewage treatment system to the reclaimed wastewater storage reservoir, averaged on a monthly basis:

1995 - 1950 m^3 per day
1996 - 2000 m^3 per day
1997 - 2050 m^3 per day
1998 - 2100 m^3 per day
1999 - 2150 m^3 per day
2000 - 2200 m^3 per day

T.R. Forty, P.Eng.
Assistant Regional Waste Manager

Date Issued: December 14, 1995
Amendment Date:
(most recent)

1.1.2 There is no maximum authorized rate of reclaimed wastewater to be discharged from the storage reservoir for beneficial use as irrigation water.

1.2 Discharge Quality

1.2.1 It is recommended that to ensure reclaimed wastewater is adequately renovated prior to irrigation, the characteristics of the effluent discharged from the aerated lagoon treatment system to the reclaimed wastewater storage reservoir not exceed:

5 Day Biochemical Oxygen Demand, 45 mg/L; and

Total Suspended Solids - 60 mg/L.

1.3 Permit Fee Calculations for Reclaimed Wastewater Discharge to Land

1.3.1 The characteristics of the reclaimed wastewater discharged from the storage reservoir and beneficially used for irrigation, for the purposes of permit fee calculations, the following discharge factors have been assumed:

5 Day Biochemical Oxygen Demand, 10 mg/L; and

Total Suspended Solids - 10 mg/L.

1.4 Authorized Works

The works authorized are: sewage collection system, sewage treatment plant concrete tankage for emergency containment, influent screen, flow equalization basin, pumping station, pressure forcemain to aerated lagoons, aerated lagoon treatment system, reclaimed wastewater storage reservoir sized to provide a minimum retention time of 60 days prior to spray irrigation, post storage chlorination, pressure forcemain to the golf course and related irrigation supply mains and sprinkler irrigation equipment, infiltration basin, and other related appurtenances, approximately as shown on the attached Site Plan A.

1.5 Source of Discharge

The source of discharge and sewage collection system services the Town of Oliver and surrounding area.

T.R. Forty, P.Eng.
Assistant Regional Waste Manager

1.6 Location of Works

The location of the sewage collection, flow equalization basin and effluent pumping station is: Block 47 of District Lot 2450s, Similkameen Division of Yale District.

The location of the effluent aerated lagoon treatment facilities, reclaimed wastewater storage reservoir, chlorination and withdrawal facilities is: District Lot 763s, and Block B, District Lot 682s, Similkameen Division of Yale District. The location of the potential infiltration basin sites: Block K, Plan 1789 (Town Sand Pit) and Lot 2, Plan 5881 (Town Gravel Pit).

1.7 Location of Discharge

The location where reclaimed wastewater may be irrigated is described generally as Oliver and the surrounding area.

1.8 Irrigation Plan

Submit for review, and obtain written authorization from the Regional Waste Manager, an "Irrigation Plan" of all new areas of land to be irrigated prior to commencement of irrigation with reclaimed wastewater. Areas for effluent irrigation are as indicated in the Oliver Waste Management Plan and as indicated on Site Plan A.

2. GENERAL REQUIREMENTS

2.1 Maintenance of Works, Emergency Procedures and Noncompliance Reporting

Inspect the pollution control works regularly and maintain them in good working order. In the event of an emergency or any condition which prevents continuing operation of the approved method of pollution control or results in noncompliance with the terms and conditions of this Operational Certificate, immediately notify the Regional Waste Manager and take appropriate remedial action.

2.2 Bypasses

The discharge of effluent which has bypassed the designated treatment works is prohibited, unless the consent of the Regional Waste Manager is obtained and confirmed in writing.

T.R. Forty, P.Eng.
Assistant Regional Waste Manager

2.3 Process Modifications

Notify the Regional Waste Manager, and his written consent obtained, prior to implementing changes to any process that may affect the quality and/or quantity of the discharge.

2.4 Alternate Water Supply

Provide alternate water supplies if any privately owned well is adversely affected by the land disposal scheme as determined by the Regional Waste Manager.

2.5 Plans - New Works

2.5.1 Plans of modifications and/or extensions to the existing works shall be signed and sealed by a Professional Engineer licensed to practise in the Province of British Columbia.

2.5.2 Copies of all "as-built" plans and drawings for the effluent treatment system, signed and sealed by a Professional Engineer licensed to practise in the Province of British Columbia, shall be submitted to the Regional Waste Manager on completion of construction.

2.5.3 Plans and specifications of any proposed new works, modifications or additions to the works authorized in this Operational Certificate, including the infiltration basin plans, and with the exception of the sewage collection system, shall be submitted to the Regional Waste Manager, and his written consent obtained before construction commences. The works shall be constructed in accordance with such plans.

2.5.4 Retain a copy of all "as-built", plans of modifications and/or extensions to the sewage collection system for perusal by the Regional Waste Manager, or his designate, upon request.

2.5.5 Plans for modifications of, and/or extensions to, the existing reclaimed wastewater irrigation system shall be approved by a person qualified in the design of irrigation systems.

2.5.6 Design and construct the irrigation works in accordance with best current agricultural practice and:

The "Pollution Control Guidelines for Municipal Effluent Application to Land", dated January 1983, and any amendments thereto, issued by the Ministry of Environment of British Columbia.

T.R. Forty, P.Eng.
Assistant Regional Waste Manager

The "B.C. Sprinkler Irrigation Manual" 1989 issue, prepared by the B.C. Ministry of Agriculture and Fisheries.

The "Health and Safety Criteria for the Use of Reclaimed Wastewater", 1991, developed by the Ministry of Health and the Ministry of Environment.

3. GENERAL REQUIREMENTS - ALL DISCHARGES

3.1 Operation and Maintenance

Develop and maintain both an Operational and Maintenance Manual for the sewage collection, sewage treatment and reclaimed wastewater utilization. A copy of the Operational and Maintenance Manuals shall be retained at the treatment facility for inspection by the Regional Waste Manager or their designate.

3.2 Facility Classification

Maintain the wastewater treatment facility classification as authorized in Section 1.4 with the "British Columbia Water and Wastewater Operators Certification Program Society" (BCWWOCPS). The new aerated lagoon treatment facility is presently classified as a Level II facility.

3.3 Operator Certification

3.3.1 All operators in training (OIT) working at this Level II facility classified by the BCWWOCPS shall be required to successfully pass an OIT examination within three (3) months of commencement of employment at the facility. The OIT certificate shall be valid for fifteen (15) months from the date of issue. Prior to the expiry date of the OIT certificate, but not sooner than twelve (12) months from the date when the OIT commenced facility operation, the OIT shall successfully complete a Class I certification examination in order to continue to operate at the facility.

3.3.2 The facility is currently classified by the BCWWOCPS at Level II. Designate at least one operator to be the "Chief Operator" of the facility by **December 1, 1996.** The "Chief Operator" shall be certified at a Class II level, at a minimum.

After **December 1, 1996,** no person shall have "Direct Responsible Charge", as defined by the BCWWOCPS, of a municipal wastewater

T.R. Forty, P.Eng.
Assistant Regional Waste Manager

treatment facility classified at Level II or higher unless they possess a valid operator's certificate not more than one level below the classification level of the facility. **"Direct Responsible Charge" is the "Chief Operator" of the facility, the identifiable senior person who is in charge of the plant.**

3.3.3 Should the facility be reclassified by the BCWWOCPS at Level III, designate a "Chief Operator", certified at a Class III level by **December 1, 1998.**

3.3.4 Should the facility be reclassified by the BCWWOCPS at Level IV, designate a "Chief Operator", certified at a Class IV level by **December 1, 1998.**

3.4 Water Conservation

Establish a water conservation program to encourage a reduction in the volume of domestic and industrial wastewaters discharged to the sewage collection system.

3.5 Sewage Collection System - Groundwater Infiltration, Inflow and Cross Connections

Inspect and maintain the sewage collection system works so as to minimize the possibility of cross connections between the storm sewer and the sanitary sewer systems, to minimize infiltration of groundwater, to minimize inflow of water from basement sump pumps and roof drains, and minimize exfiltration of the collected sewage from the sewage collection system to the ground.

3.6 Influent Wastes Bylaw

Subject to being declared a Sewage Control Area under Section 17 of the Waste Management Act, and in order to minimize the potential effect of heavy metals or other toxic materials in the effluent and/or sludge, prepare, implement and/or amend an Influent Wastes Bylaw, Building Bylaw, or other similar bylaws, to regulate the input of such wastes to the sewage collection system. Devices to process household putrescible waste for disposal to the sewage collection system shall be prohibited.

3.7 Contingency Plan

Prepare a Contingency Plan that will address the appropriate course of action to be taken in any particular preconceived emergency situation. The Contingency Plan shall include chlorine leaks and any potential point of concern in the collection, treatment and disposal systems. Attention is to be given to public

T.R. Forty, P.Eng.
Assistant Regional Waste Manager

safety and the protection of the environment. The Contingency Plan is to be continually updated as necessary to reflect the current operation. A copy of the Contingency Plan shall be forwarded to the Regional Waste Manager on or before December 31, 1997.

3.8 Sludge Management Plan

The rationale of sludge management, including frequency of withdrawal of sludge from the sewage treatment plant and the location(s) used for disposal and/or utilization shall be developed into a Sludge Management Plan. The Sludge Management Plan shall be prepared and submitted to the Regional Waste Manager for approval on or before December 31, 1996.

3.9 Odours

Should odours become objectionable, additional works shall be provided when so directed in writing by the Regional Waste Manager.

3.10 Fencing

Erect a fence around the sewage treatment facility, storage reservoir and such other areas as required by the Regional Waste Manager. The height and type of fencing shall meet the approval of the Regional Waste Manager.

3.11 Surface Water Diversionary Works

Surface water shall be intercepted and diverted away from the effluent treatment facilities to the greatest extent possible.

3.12 Signage

3.12.1 A suitable sign erected at the main entrance to the site shall have the appropriate emergency phone numbers for use by the general public and others.

3.12.2 Prominent "NO TRESPASSING", signs shall be erected around agricultural and silvicultural sites irrigated with reclaimed wastewater, warning persons of the possible health hazard during the irrigation season and advising that the water used for irrigation is NOT POTABLE. The wording shall be in language or symbols readily comprehensible by the general public. eg. "NO TRESPASSING - RECLAIMED WASTEWATER - DO NOT DRINK"

T.R. Forty, P.Eng.
Assistant Regional Waste Manager

4. GENERAL REQUIREMENTS - EFFLUENT STORAGE RESERVOIR

4.1 Leakage

Operate and maintain the reclaimed wastewater storage reservoir to minimize fluid leakage. Leakage shall not aggravate or produce soil or bedrock instability or erosion elsewhere or contaminate ground or surface water.

5. GENERAL REQUIREMENTS - EFFLUENT IRRIGATION

5.1 Disinfection - Chlorination

5.1.1 Adequate chlorination shall be maintained and provide not less than one hour's contact time at average flow rates in the reclaimed wastewater discharging from the chlorination facility to the irrigation system.

5.1.2 Reclaimed wastewater utilized for irrigation shall conform to the effluent irrigation guidelines developed by the B.C. Ministry of Health. Fecal coliforms shall not exceed 200 MPN per 100 mL for agricultural, silvicultural and low public use lands, or exceed 2.2 MPN per 100 mL for high public use lands.

5.2 Annual Irrigation

5.2.1 The authorized discharge period for irrigation is during the period March 15 to October 31, inclusive.

5.2.2 With the written authorization of the Regional Waste Manager, the irrigation schedule may be extended on a weekly basis beyond these limits. Any extension will be considered only upon receipt of a substantiated written request.

5.3 Buffer Zones

5.3.1 The requirement for formal buffer zones surrounding lands irrigated with reclaimed wastewater is no longer in effect, however, a buffer zone may be specified by the Regional Waste Manager.

5.3.2 Reclaimed wastewater applied by irrigation shall not be applied to the ground any closer than 15 metres from the edge of flowing streams or bodies of water.

5.3.3 There shall be no reclaimed wastewater irrigated within 30 metres of any well or inground reservoir for domestic supply.

T.R. Forty, P.Eng.
Assistant Regional Waste Manager

5.4 Surface Runoff

There shall be no surface runoff of irrigated reclaimed wastewater from the irrigated lands.

5.5 Surfacing Reclaimed Wastewater

Irrigation shall be managed in such a fashion as to preclude surfacing of irrigation tail water down slope of the point of irrigation.

5.6 Spray Irrigation Drift

The reclaimed wastewater irrigation system shall be managed in such a fashion as to preclude aerosol drift from leaving the irrigated lands.

5.7 Irrigation Rates

5.7.1 Irrigation rates shall not exceed the rates given in "B.C. Sprinkler Irrigation Manual", dated 1989, prepared by the B.C. Ministry of Agriculture and Fisheries.

5.7.2 Soils of the irrigated lands shall be monitored to prevent saturation, erosion, and instability.

5.8 Agricultural Products Lag Time

5.8.1 A three day lag time is required before uninspected livestock intended for human consumption are permitted on areas irrigated with reclaimed wastewater. No lag time is required if livestock are subjected to the federal meat inspection program.

5.8.2 A six day lag time is required before dairy cattle are permitted in areas irrigated with reclaimed wastewater.

5.8.3 A three day lag time, after irrigation has ceased, is required before a crop intended for animal feed is harvested.

T.R. Forty, P.Eng.
Assistant Regional Waste Manager

6. MONITORING REQUIREMENTS

6.1 Influent Sampling Program - (Equalization Basin)

6.1.1 Install and maintain a suitable sampling facility at the equalization basin outlet, (S.E.A.M. site number E222152), and obtain a grab sample of the plant influent **semi-annually** (a proportional continuous sampler may be used).

6.1.2 Obtain analyses of the influent sample for the following:

total phosphorus and ortho phosphorus, expressed as P in mg/L;

6.2 Effluent Sampling Program - (Cell #3, prior to storage reservoir)

6.2.1 Install and maintain a suitable sampling facility on the outlet of the aerated treatment lagoon, Cell #3, (S.E.A.M. site number E222151), and obtain a grab sample of the effluent before it is discharged to the storage reservoir, for analysis by a suitably accredited laboratory, a proportional continuous sampler may be used, provided that prior written approval has been obtained from the Regional Waste Manager.

6.2.2 Obtain analyses of the effluent sample for the following:

total suspended solids (non-filterable residue), (**monthly** analysis), mg/L;

5-day biochemical oxygen demand, (**monthly** analysis), mg/L;

total phosphorus, ortho phosphorus and total dissolved phosphorus, (**quarterly analysis during 1996, and semi-annually** analysis, thereafter), all expressed as mg/L P; and

total nitrogen, ammonia nitrogen, nitrate nitrogen, nitrite nitrogen, and organic nitrogen, (**quarterly analysis during 1996, and semi-annually analysis thereafter**), all expressed as mg/L N.

6.2.3 Occasional full chemical analysis of the main cations and anions and other characteristics may be required at the discretion of the Regional Waste Manager.

T.R. Forty, P.Eng.
Assistant Regional Waste Manager

Date Issued: December 14, 1995
Amendment Date:

6.3 Effluent Irrigation Sampling Program - (Chlorine Contact Chamber, prior to Irrigation)

6.3.1 Install a suitable sampling facility after the chlorine contact chamber, prior to irrigating, (S.E.A.M. site number E222150) and obtain a grab sample of the reclaimed wastewater during the irrigation season.

6.3.2 Obtain analyses of the sample, parameters and frequency as follows:

faecal coliforms, M.P.N./100ml, on a monthly basis;

total coliforms, M.P.N./100ml, on a monthly basis;

total phosphorus, mg/L, on a monthly basis;

total nitrogen, mg/L, on a monthly basis; and

chlorine residual, mg/L, on a weekly basis.

6.3.3 Occasional full chemical analysis of the main cations and anions and other characteristics may be required at the discretion of the Regional Waste Manager.

6.4 Effluent Irrigation Monitoring Program

6.4.1 Provide and maintain a suitable flow measuring device to measure total volume of reclaimed wastewater irrigated annually and record the areas where it is utilized.

6.4.2 Provide and maintain a suitable flow measuring device to measure the amount of fresh water make-up from Okanagan River to the equalization basin in m^3/day, and totalize this make up water volume on an annual basis in m^3/year.

6.4.3 Provide and maintain a suitable flow measuring device and record once per day the reclaimed wastewater volume irrigated over a 24-hour period. Record the flows for each calendar month and for each calendar year.

6.5 Storage Reservoir Level Monitoring Program

6.5.1 Provide a suitable staff gauge or other similar device as approved by the Regional Waste Manager in the storage reservoir and take weekly measurements of the water level in the storage reservoir on a year round basis.

T.R. Forty, P.Eng.
Assistant Regional Waste Manager

6.6 Sampling and Analytical Requirements

6.6.1 Proper care should be taken in sampling, storing and transporting the samples to adequately control temperature and avoid contamination, breakage, etc.

6.6.2 Occasional full chemical analysis of the main cations and anions and other characteristics may be required at the discretion of the Regional Waste Manager.

6.6.3 Analyses are to be carried out in accordance with procedures described in the second edition of "A Laboratory Manual for the Chemical Analysis of Waters, Wastewaters, Sediments and Biological Materials, (March 1994 Permittee Edition)", or by suitable alternative procedures as authorized by the Regional Waste Manager.

The above manual may be purchased from Queens Printer Publications Centre, 2nd Floor, 563 Superior Street, Victoria, B.C., V8V 4R6, 1-800-663-6105. The manual may also be reviewed at any Environmental Protection Program Office.

6.6.4 Sampling and flow measurement shall be carried out in accordance with the procedures described in "Field Criteria for Sampling Effluents and Receiving Waters", April 1989, 17 pp., or by other suitable alternative procedures as authorized by the Regional Waste Manager.

6.6.5 The Permittee is required to follow the terms and conditions of the Quality Assurance Regulation (EQDA). Ten percent of the samples collected shall be duplicated to provide data quality assurance. Quality control information generated by the Permittee lab while analyzing parameters required by this Permit shall also be provided with the data required to be reported.

6.7 Sludge Sampling and Monitoring Program

Develop and maintain a record keeping system for measuring and recording the depth of sludge collecting in the lagoons and volume of sludge removed from the treatment lagoons during desludging operations, the location where the sludge was discharged, and the amount of sludge discharged at each location. The Regional Waste Manager is to be notified in writing at least two weeks prior to the commencement of desludging operations. Analysis of the sludge may be required by the Regional Waste Manager.

T.R. Forty, P.Eng.
Assistant Regional Waste Manager

6.8 Groundwater Monitoring Program

A Groundwater Monitoring Program, shall be submitted to the Regional Waste Manager. The Groundwater Monitoring Program shall be designed by a Professional Engineer or a Hydrogeological Technologist licensed to practice in the Province of British Columbia, to establish with acceptable scientific accuracy, the groundwater flow pattern and nutrient removal capability of the soil to ensure reasonable notice of impending high phosphorus or nitrate levels that may adversely affect surface water, groundwater or domestic waterwells. The sampling, measurement frequency and analyses shall be conducted in accordance with the Groundwater Monitoring Program upon its written authorization by the Regional Waste Manager. The Groundwater Monitoring Program to be submitted to the Regional Waste Manager by December 31, 1997.

6.9 Soils Assessment Program

A ground assessment of any new areas to be irrigated, as shown in the "Irrigation Plan", shall be performed by a suitably qualified professional, using best current climate and soils data to substantiate that the land is capable of accepting reclaimed wastewater for irrigation purposes. This assessment is to include any suggested restrictions or recommendations that the suitably qualified professional deems necessary. This Soils Assessment shall be submitted to the Regional Waste Manager for review prior to the initial commencement of irrigation annually. Further review and ongoing soils assessments may be required by the Regional Waste Manager.

7. REPORTING

7.1 General Reporting

7.1.1 Maintain the monitoring data required in Section 6 for inspection.

7.1.2 The influent/effluent water quality analyses and flow data is to be submitted to the Regional Waste Manager such that they are received by the Regional Waste Manager within 30 days of the results being sent out by the testing agency.

7.1.3 Monitoring data shall be submitted in an electronic and/or printed format satisfactory to the Regional Waste Manager.

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7.2 Annual Reporting

7.2.1 Submit an Annual Report which includes a summary of the results of all sampling and monitoring programs as specified in this permit, data interpretation and trend analyses by a suitably qualified professional.

7.2.2 This report is to be in a format which is suitable for review by the public and/or other government agencies.

7.2.3 The first report is due on or before 60 days of the end of a calendar year for that year's monitoring. Raw data are to be attached as appendices to the report.

7.2.4 Maintain and submit records of the following as a part of the annual report:

7.2.4.1 Records of reclaimed wastewater balance, that is, the flows to and from the storage reservoir. This balance, must also include the freshwater make-up.

7.2.4.2 Records of the duration, intensity, property owner, acreage, location, and type of reclaimed wastewater irrigation.

7.2.4.3 Records of efforts to reduce infiltration, inflow and cross connections for inspection by the Regional Waste Manager or his designate.

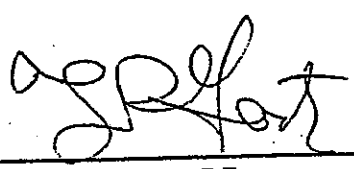
7.2.4.4 Records of efforts to administer the Influent Wastes By-law(s) for inspection by the Regional Waste Manager or his designate. Include as an attachment, any amendments to the Influent Wastes By-law(s) that have been made during the past year.

7.2.4.5 Copy of the Contingency Plan.

7.2.4.6 Copy of the Sludge Management Plan.

7.2.4.7 Copy of the Annual Flow Summaries.

7.2.4.8 Copy of the Annual Irrigation Summaries.



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APPENDIX A

Requirements of Reclaimed Wastewater Users

The holder of this Operational Certificate (The reclaimed wastewater supplier) shall be responsible for ensuring that the contractual agreement with the Reclaimed Wastewater User is in accordance with the Operational Certificate. A copy of this Appendix is to be provided to each user prior to the commencement of irrigation EACH YEAR.

1 GENERAL REQUIREMENTS

1.1 Plans - New Works

1.1.1 Plans for modifications and/or extensions to the existing reclaimed wastewater irrigation system shall be approved by a person qualified in the design of irrigation systems.

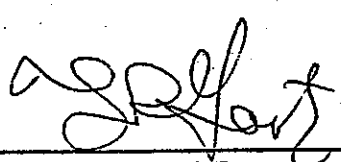
1.1.2 Design and construct the irrigation works in accordance with best current agricultural practice and the "Pollution Control Guidelines for Municipal Effluent Application to Land", dated January 1983, and any amendments thereto, issued by the Ministry of Environment of British Columbia, and also in accordance with the "B.C. Sprinkler Irrigation Manual", dated 1989, prepared by the B.C. Ministry of Agriculture and Fisheries.

1.2 Construction Criteria

1.2.1 All reclaimed water user valves, shall be of a type or secured in a manner that permits operation by only personnel authorized by each wastewater user. All piping, valves and outlets should be marked to differentiate reclaimed wastewater from domestic water. All reclaimed wastewater controllers, valves, etc., shall be affixed with reclaimed wastewater warning signs.

1.2.2 Use or installation of hose-bibbs on any irrigation system presently operating, or designated to operate with reclaimed wastewater, regardless of the hose-bibb construction or identification, is not permitted.

1.2.3 There shall be at least a 3 metre horizontal and a 0.3 metre vertical separation (with domestic water pipeline above the reclaimed water pipeline) between all pipelines transporting reclaimed water and those transporting domestic water.



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1.2.4 There shall be no connection between a potable water supply, irrigation water or industrial well, and piping containing reclaimed wastewater, except through an air gap separation or reduced pressure principle device.

1.3 Fencing

The Reclaimed Wastewater User MAY be required by the Regional Waste Manager to erect a fence around the disposal area to restrict public access. The height and type of fencing shall meet the approval of the Regional Waste Manager.

1.4 Signage

1.4.1 Prominent "NO TRESPASSING", signs shall be erected around agricultural and silvicultural sites irrigated with reclaimed wastewater, warning persons of the possible health hazard during the irrigation season and advising that the water used for irrigation is NOT POTABLE. The wording shall be in language or symbols readily comprehensible by the general public. eg. "NO TRESPASSING - RECLAIMED WASTEWATER - DO NOT DRINK"

1.4.2 Warning signs shall be posted in sufficient numbers and size and at strategic locations to advise the public that reclaimed water is being used. Additional signage may be required as directed by the Regional Waste Manager.

2 GENERAL REQUIREMENTS - RECLAIMED WASTEWATER IRRIGATION

2.1 Buffer Zones

2.1.1 The requirement for formal buffer zones surrounding lands irrigated with reclaimed wastewater is no longer in effect, however, a buffer zone may be specified by the Regional Waste Manager.

2.1.2 Reclaimed wastewater applied by irrigation shall not be applied to the ground any closer than 15 metres from the edge of flowing streams or bodies of water.

2.1.3 There shall be no reclaimed wastewater irrigated within 30 metres of any well or inground reservoir for domestic supply.

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2.2 Surface Runoff

2.2.1 There shall be no surface runoff of irrigated reclaimed wastewater from the irrigated lands.

2.2.2 The maximum ground slope shall not exceed 20% without the written consent of the Regional Waste Manager.

2.3 Surfacing Reclaimed Wastewater

2.3.1 Irrigation shall be managed in such a fashion as to preclude surfacing of irrigation tail water down slope of the point of irrigation.

2.3.2 Irrigation shall be managed as to prevent ponding.

2.4 Spray Irrigation Drift

2.4.1 Reclaimed wastewater shall be confined to the area designated and approved for reclamation. The reclaimed wastewater irrigation system shall be managed in such a fashion as to prevent aerosol drift from leaving the irrigated lands.

2.4.2 Precautions shall be taken to ensure that reclaimed water will not have contact with any facility or area not designated for reclamation, such as passing vehicles, buildings, domestic water facilities, fruit and vegetable gardens, or food handling facilities.

2.4.3 Drinking water facilities shall be protected from direct or wind blown reclaimed wastewater spray.

2.5 Irrigation Rates

2.5.1 Irrigation rates shall not exceed the rates given in "B.C. Sprinkler Irrigation Manual", dated 1989, prepared by the B.C. Ministry of Agriculture and Fisheries.

2.5.2 Soils of the irrigated lands shall be monitored periodically or as otherwise directed by the Regional Waste Manager or the Town of Oliver, to prevent saturation, erosion, and instability .

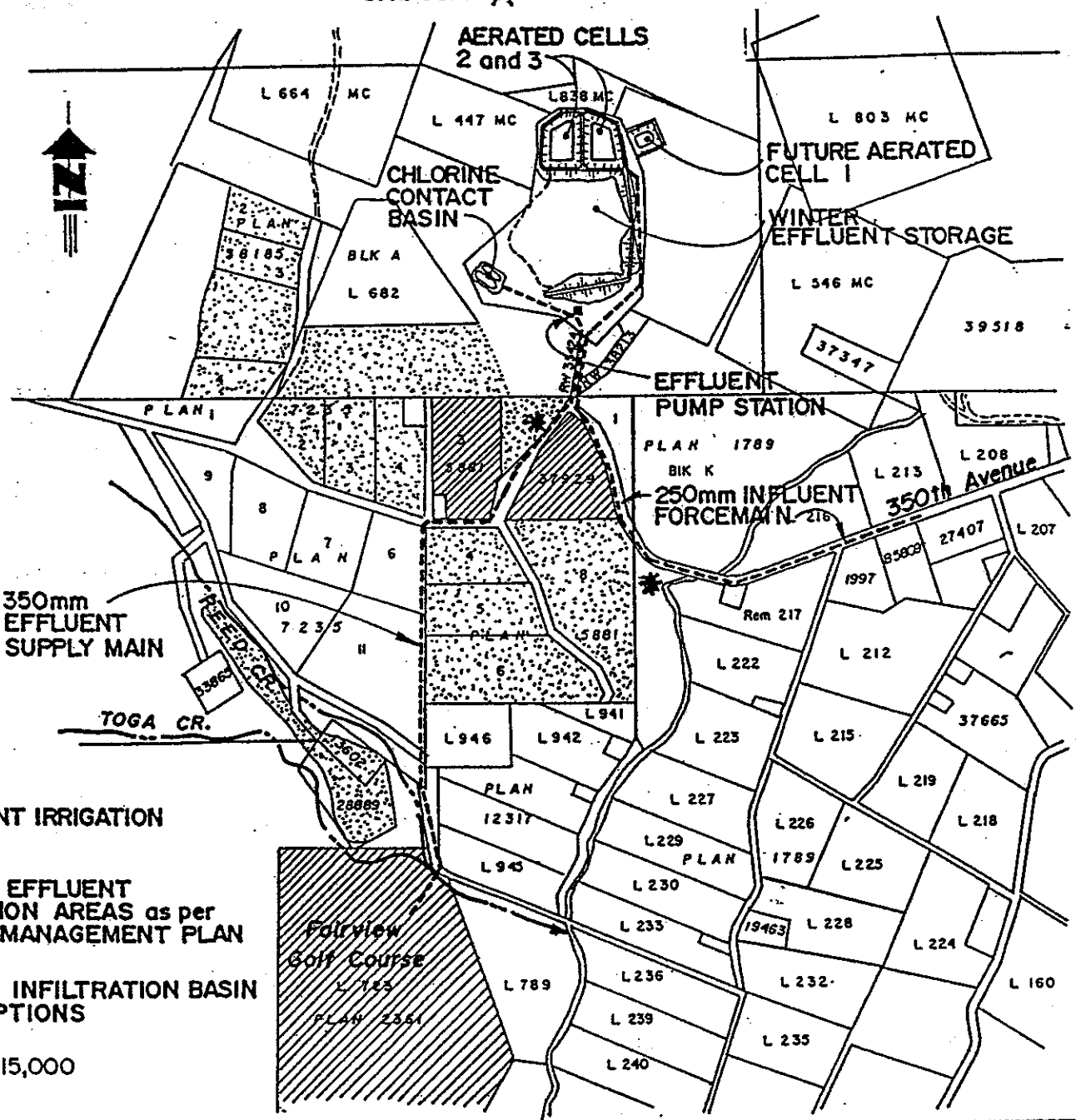
T.R. Forty, P.Eng.
Assistant Regional Waste Manager

Province of
British Columbia
Ministry of Environment,
Lands and Parks

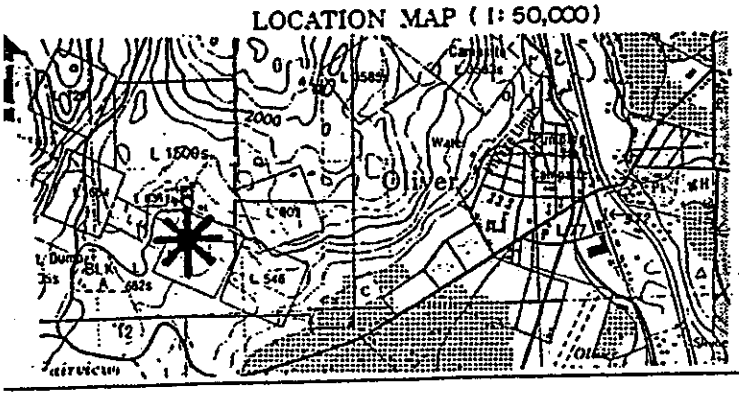
BC Environment

ENVIRONMENTAL PROTECTION DIVISION

SITE PLAN A



LOCATION MAP (1: 50,000)



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December 14, 1995
Date Issued

Date Amended

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Permit No./Approval No. PE 13717

2.6 Agricultural Products Lag Time

2.6.1 A three day lag time is required before uninspected livestock intended for human consumption are permitted on areas irrigated with reclaimed wastewater. No lag time is required if livestock are subjected to the federal meat inspection program.

2.6.2 A six day lag time is required before dairy cattle are permitted in areas irrigated with reclaimed wastewater.

2.6.3 A three day lag time, after irrigation has ceased, is required before a crop intended for animal feed is harvested.

2.7 Insect and Vector Control

Adequate measures shall be taken to prevent the breeding of insects and other vectors of health significance, and the creation of odors, slimes or unsightly deposits.

2.8 Irrigation of Public Areas

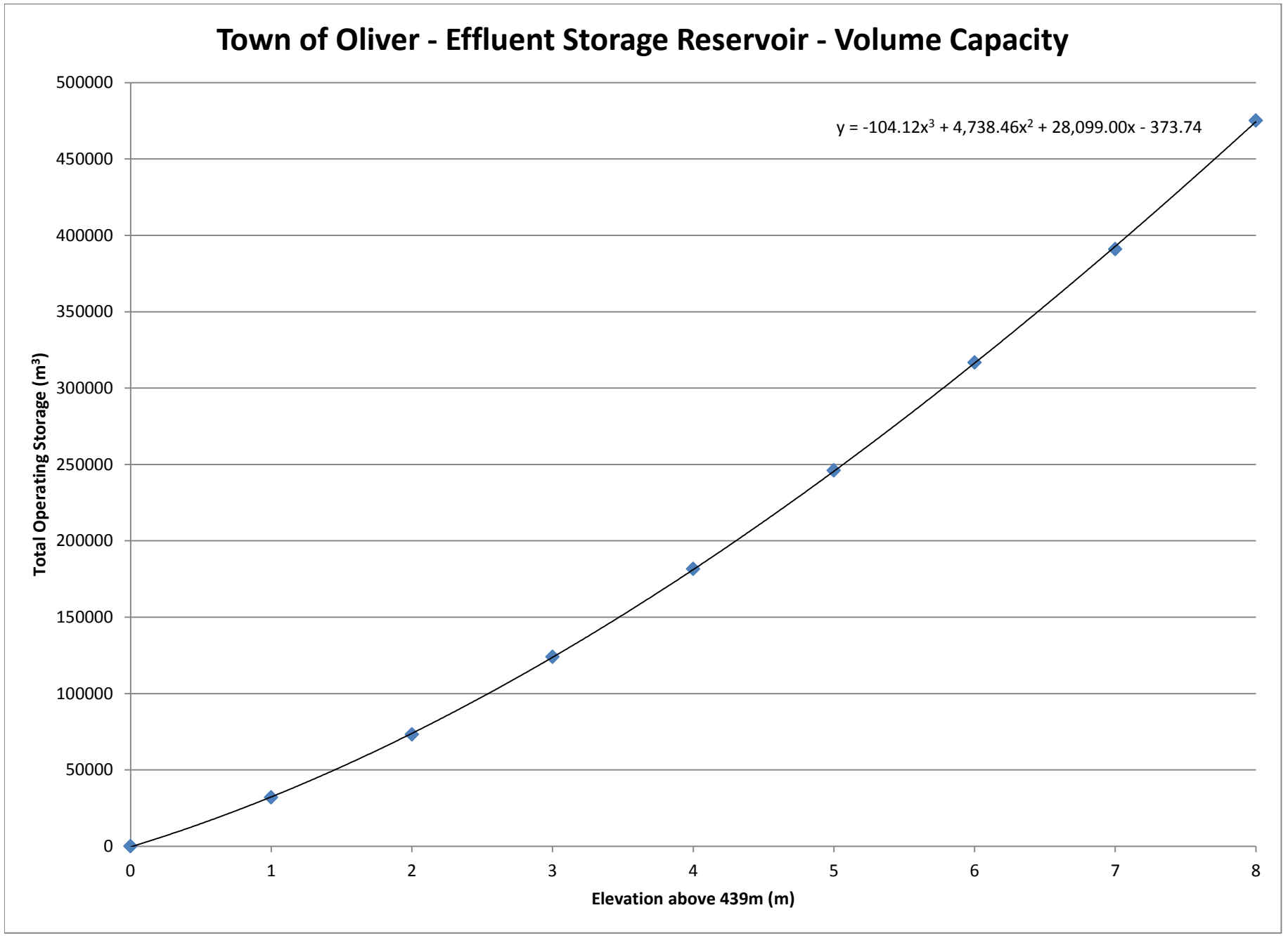
2.8.1 Irrigation on golf courses or cemeteries shall only be practised when the public are not present.

2.8.2 Golf score cards shall indicate that reclaimed wastewater is used for irrigation on the golf course lands.

T.R. Forty, P.Eng.
Assistant Regional Waste Manager

APPENDIX G

Effluent Storage Reservoir - Volume Calibration Curve



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Town of Oliver - Effluent Storage Reservoir - Volume Capacity

Reservoir Elevation (m)	Elevation above 439m (m)	Measured Volume (m^3)	Calculated Volume (m^3)	% Difference from Measured
439	0	0	-374	N/A
440	1	32000	32360	1%
441	2	73300	73945	1%
442	3	124000	123758	0%
443	4	181600	181174	0%
444	5	246000	245568	0%
445	6	316800	316315	0%
446	7	391000	392791	0%
447	8	475200	474370	0%