Sanitary Sewer System 2016 Annual Report

Town of Oliver

April 2017

Project No. 306-088-004

TRUE CONSULTING

ENGINEERING ■ PLANNING ■ URBAN DESIGN

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

Distribution List

# of Hard Copies	PDF Required	Association / Company Name
0	1	Ministry of Environment, Penticton, BC
2	1	Town of Oliver
2	1	TRUE Consulting, Kamloops, BC

Revision Log

Revision #	Revised by	Date	Issue / Revision Description

Report Submission

Report Prepared By:

Natalie Alteen

Natalie Alteen, EIT
Project Engineer

Report Reviewed By:

Terry Underwood, P. Eng.
Project Engineer

R:\Clients\300-399\306\306-088-004\05 Reports\2016 Sanitary Sewer Annual Report\306-088-004 - Sanitary Sewer System - 2016 Annual Report - April 2017.docx

Table of Contents

List of Tables

List of Figures

1.0 Operational Data

Paragraphs following summarize the operational data for the Town of Oliver Sanitary Sewer System for 2016. The operational report for 2016 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

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 treatment are presented monthly in Appendix A. The total volume pumped to the aerated lagoons in 2016 was 639,794 m^3, which equates to an average daily flow of 1,753 m^3/day. For comparison, total influent flows for the period 1996 to 2016 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)
1996	654,361	1,788
1997	682,480	1,870
1998	666,322	1,826
1999	688,193	1,885
2000	702,688	1,920
2001	678,052	1,858
2002	726,354	1,990
2003	751,139	2,058
2004	766,048	2,093
2005	783,947	2,148
2006	829,413	2,272

Year	Total Influent Volume (m^3)	Average Daily Flow (m^3/d)
2007	823,011	2,255
2008	777,154	2,123
2009	758,308	2,078
2010	701,475	1,922
2011	693,045	1,899
2012	658,002	1,798
2013	697,377	1,911
2014	634,649	1,739
2015	679,542	1,862
2016	639,794	1,753

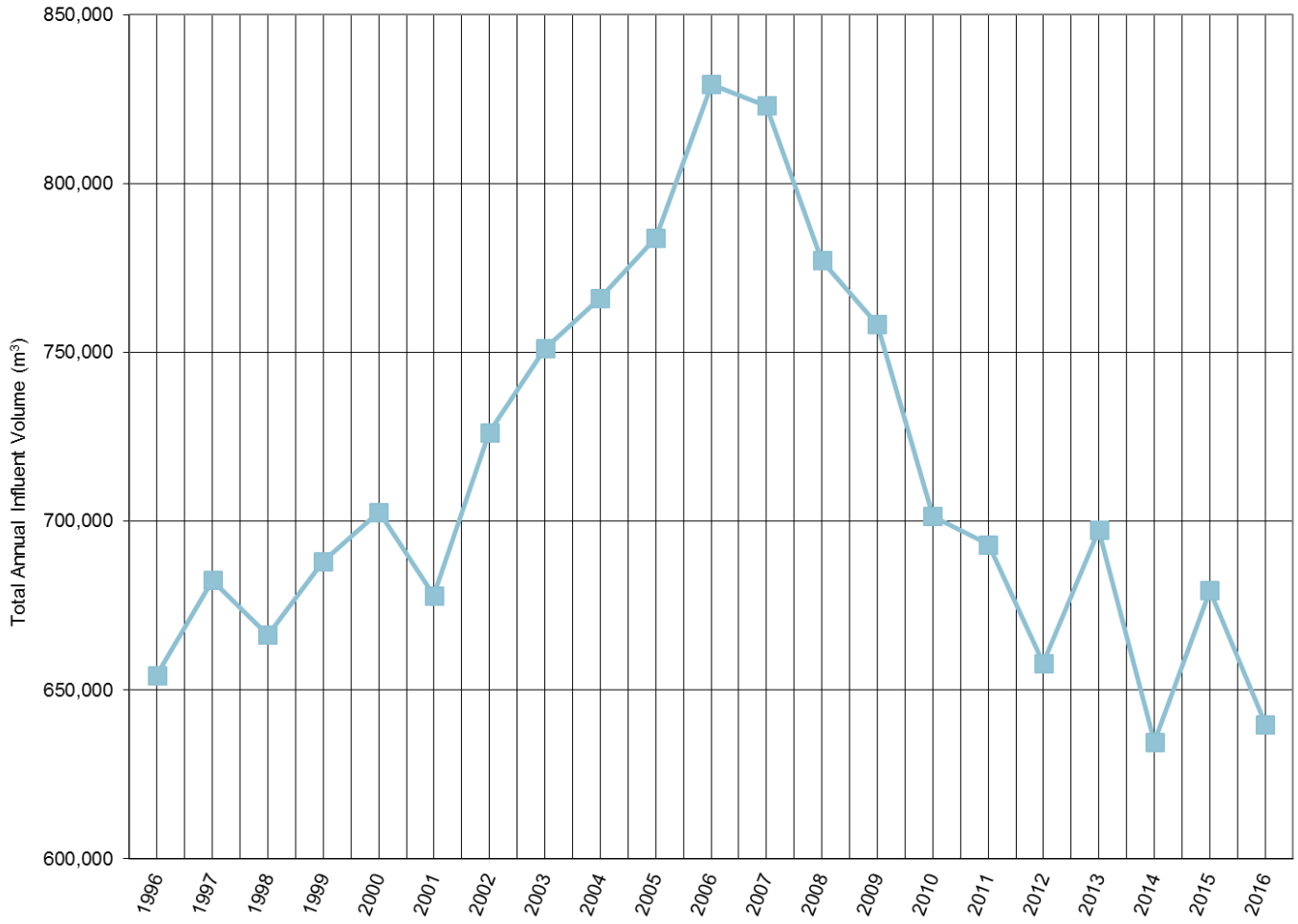


FIGURE 1-1: TOTAL ANNUAL INFLUENT SEWAGE FLOWS FOR 1996 TO 2016

The total influent flow for 2016 was 639,794 m^3, which is a decrease of 39,750 m^3 (6%) compared to 2015.

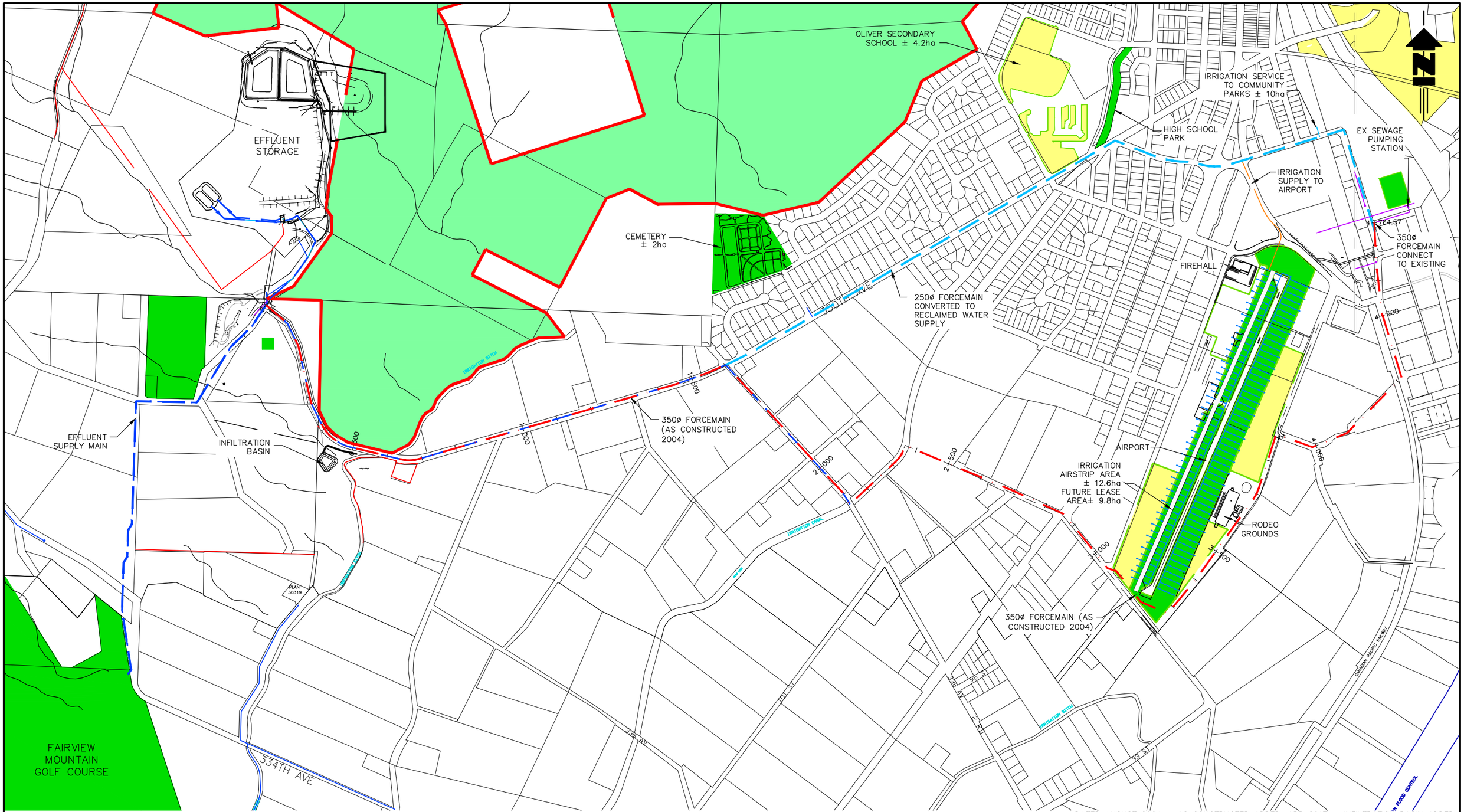
1.1.2 Influent Wastewater Sampling (OC 6.1)

Influent sampling data for phosphorus (dissolved and total) are presented in Appendix B. Total phosphorus is a measure of dissolved phosphate and insoluble phosphorus. The average result in 2016 for total phosphorous and orthophosphate was 3.26 mg/L and 0.79 mg/L, respectively. The 2016 average concentration for total phosphorous and orthophosphate were lower than the historical average.

TABLE 1-2: INFLUENT SEWAGE QUALITY DATA

Year	Date	Total Phosphorus (mg/L)	Ortho Phosphate (mg/L)
1996	Mar. 22	5.44	
	Sep. 12	5.18	
1997	Mar. 19	5.87	
1998	Mar. 18	5.6	
	Sep. 9	5.89	
1999	Mar. 11	6.66	
	Sep. 23	4.89	
2000	Mar. 23	6.48	4.69
	Sep. 28	8.67	3.04
2001	Mar. 22	4.57	2.3
	Sep. 19	4.13	1.88
2002	Mar. 19	4.53	3.84
	Sep. 10	4.52	2.55
2003	Mar. 10	3.78	3.78
	Sep. 30	4.48	4.38
2004	Mar. 16	5.23	4.76
	Sep. 14	5.15	3.75
2005	Mar. 22	5.24	4.63
	Oct. 5	6.74	5.58
2006	Sep. 14	7.05	5.96
2007	Mar. 13	5.03	6.43*
	Sep. 11	6.03	5.03
2008	Sep. 3	7.44	3.3
2009	Mar. 5	8.18	3.84
	Sep. 1	5.31	1.38
2010	Mar. 9	4.26	0.558
	Sep. 2	3.36	2.16
2011	Mar. 8	4.9	0.316
	Sep. 8	11	0.859
2012	Mar. 1	6.16	2.23
	Sep. 11	7.76	3.72
2013	Mar. 7	5.75	2.57
	Sep. 11	4.62	1.89
2014	Mar. 5	4.28	0.82
	Sep. 17	3.82	not tested
2015	Mar. 11	5.36	2.66
	Sep. 16	4.55	2.96
2016	Mar. 7	4.17	1.21
	Sep. 6	2.35	0.36*
Average for Period of Record		**5.50**	**2.99**

* Suspected error



DATED AUGUST 2004 – AS CONSTRUCTED ADDED, APR 2017 – INFILTRATION BASIN ADDED

LEGEND

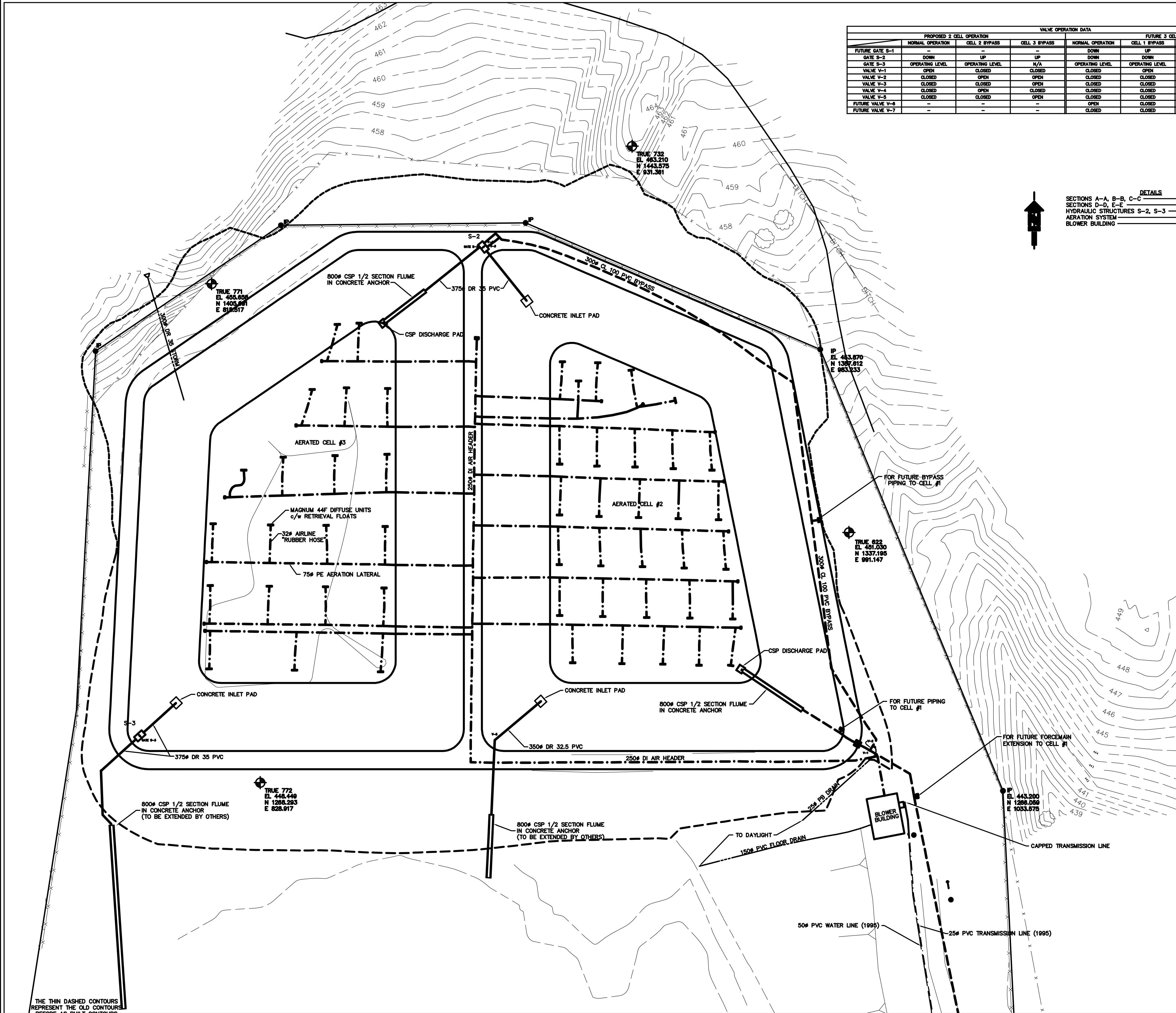
- EXISTING RECLAIMED IRRIGATION AREAS (2006)
- RECLAIMED WATER IRRIGATION EXPANSION AREAS

ACAD FILENAME: 306-082.DWG

TOWN OF OLIVER
OVERALL PLAN
RECLAIMED WATER SUPPLY SYSTEM AND IRRIGATION AREAS

TRUE CONSULTING

DSGN BY: TRU	
DATE: JAN 2006	
SCALE: 1:10,000	
DWG. NO.: FIGURE 1-2	REV.:
DWN. BY: DL	
DATE:	



DETAILS
SECTIONS A-A, B-B, C-C — 306-291-14
SECTIONS D-D, E-E — 306-291-15
HYDRAULIC STRUCTURES S-2, S-3 — 306-291-16
AERATION SYSTEM — 306-291-17
BLOWER BUILDING — 306-291-20 TO 306-291-25
TRUE 732
EL 463.210
N 1443.575
E 931.381
TRUE 771
EL 455.658
TRUE 622
EL 451.030
N 1337.195
E 991.147
TRUE 772
EL 448.449
N 1288.293
E 828.917
IP
EL 443.200
N 1286.059
E 1033.575
S-2
S-3
800⌀ CSP 1/2 SECTION FLUME IN CONCRETE ANCHOR
375⌀ DR 35 PVC
CONCRETE INLET PAD
CSP DISCHARGE PAD
300⌀ CL 100 PVC BYPASS
300⌀ DR 35 PVC
AERATED CELL #3
AERATED CELL #2
250⌀ DI AIR HEADER
MAGNUM 44F DIFFUSE UNITS c/w RETRIEVAL FLOATS
32⌀ AIRLINE "RUBBER HOSE"
75⌀ PE AERATION LATERAL
FOR FUTURE BYPASS PIPING TO CELL #1
FOR FUTURE PIPING TO CELL #1
FOR FUTURE FORCEMAIN EXTENSION TO CELL #1
350⌀ DR 32.5 PVC
800⌀ CSP 1/2 SECTION FLUME IN CONCRETE ANCHOR (TO BE EXTENDED BY OTHERS)
250⌀ PB DRAIN
BLOWER BUILDING
TO DAYLIGHT
150⌀ PVC FLOOR DRAIN
CAPPED TRANSMISSION LINE
50⌀ PVC WATER LINE (1995)
25⌀ PVC TRANSMISSION LINE (1995)
DITCH
THE THIN DASHED CONTOURS REPRESENT THE OLD CONTOURS BEFORE AS BUILT CONTOURS WERE GENERATED.

SEE DRAWING 306-291-12

VALVE OPERATION DATA							
	PROPOSED 2 CELL OPERATION			FUTURE 3 CELL OPERATION			
	NORMAL OPERATION	CELL 2 BYPASS	CELL 3 BYPASS	NORMAL OPERATION	CELL 1 BYPASS	CELL 2 BYPASS	CELL 3 BYPASS
FUTURE GATE S-1	–	–	–	DOWN	UP	DOWN	UP
GATE S-2	DOWN	UP	UP	DOWN	DOWN	UP	UP
GATE S-3	OPERATING LEVEL	OPERATING LEVEL	N/A	OPERATING LEVEL	OPERATING LEVEL	OPERATING LEVEL	N/A
VALVE V-1	OPEN	CLOSED	CLOSED	CLOSED	OPEN	CLOSED	CLOSED
VALVE V-2	CLOSED	OPEN	OPEN	CLOSED	CLOSED	CLOSED	CLOSED
VALVE V-3	CLOSED	CLOSED	OPEN	CLOSED	CLOSED	CLOSED	OPEN
VALVE V-4	CLOSED	OPEN	CLOSED	CLOSED	CLOSED	OPEN	CLOSED
VALVE V-5	CLOSED	CLOSED	OPEN	CLOSED	CLOSED	CLOSED	OPEN
FUTURE VALVE V-6	–	–	–	OPEN	CLOSED	OPEN	OPEN
FUTURE VALVE V-7	–	–	–	CLOSED	CLOSED	OPEN	OPEN

No.	DATE	DESCRIPTION	BY	APP'D
9				
8				
7				
6				
5				
4				
3	APR 26'96	AS CONSTRUCTED FINALIZED	TT	TRU
2	FEB 12'96	WATER AND ELECTRICAL LINES ADDED	TT	TRU
1	MAR 31'95	AS CONSTRUCTED	TT	TRU

REVISIONS

SCALE 1:500
DESIGN BY TRU
DWN. BY DB
DATE JULY 1994
CHK. BY
DATE

TRUE T.R.UNDERWOOD ENGINEERING KAMLOOPS, B.C.

TOWN OF OLIVER

AERATED LAGOON TREATMENT SYSTEM

AERATION SYSTEM LAYOUT AND INTER CELL PIPING

SHEET No. OF

FIGURE 1-3

REV. 5

1.2 Wastewater Treatment (OC 6.2 and 7.1.2)

Effluent sampling results from the aerated lagoon system (Cell No. 3) prior to storage are tabulated in Table 1-3. As seen, effluent quality complies with OC requirements that BOD_5 does not exceed 45 mg/L and TSS does not exceed 60 mg/L.

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

Date	BOD_5 (mg/L)	TSS (mg/L)
OC Limits	**45**	**60**
Jan-06 (2016)	23	23
Feb-03 (2016)	34	24
Mar-07 (2016)	36	16
Apr-06 (2016)	9	12
May-05 (2016)	17	7
Jun-08 (2016)	26	13
Jul-06 (2016)	9	10
Aug-09 (2016)	7	16
Sep-06 (2016)	21	18
Oct-06 (2016)	23	9
Nov-08 (2016)	42	17
Dec-06 (2016)	28	13

Sampling data for nitrogen and phosphorus at the outlet of Cell No. 3 are contained in Appendix B. The 2016 results for nitrogen for a sample taken on September 13, 2016 with comparison to historical data are presented in Table 1-4.

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

The acceptable range for total nitrogen in domestic wastewater is 20 to 50 mg/L, with sampling to occur semi-annually. Total nitrogen was within range for the September/October and March sampling period.

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 and allowed for increased nitrification, which is indicated by the nitrogen removal data in September 2012 and September 2013. As of July 01, 2015, Vincor has been connected to the Osoyoos Indian Band Wastewater Treatment Plant.

1.3 Winter Effluent Storage Reservoir (OC 6.5)

Storage reservoir level data, largely daily information, are 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 2016 is summarized in Table 1-5, on page 9. This includes a comparative summary from 1998 to 2016.

TABLE 1-5: EFFLUENT STORAGE RESERVOIR LEVEL DATA

Year	Date	Elevation (m)	Volume (m^3)
1998	Max. 06-Apr-98	445.34	340,000
	Min. 13-Oct-98	439.8	27,000
	End 29-Dec-98	441.83	116,000
1999	Max. 11-Apr-99	444.44	277,000
	Min. 25-Oct-99	440.915	71,000
	End 29-Dec-99	442.88	172,000
2000	Max. 10-Apr-00	445.07	321,000
	Min. 16-Oct-00	441.83	114,000
	End 28-Dec-00	443.33	202,000
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

Winter effluent storage reservoir year-end, maximum and minimum operating elevations for the period 2008 to 2016 are illustrated graphically in Figure 1-4. As seen, the operation of the reservoir over the last 9 years has been very consistent. Referring to Figure 1-4:

- The maximum elevation for 2016 (445.47 m on April 4, 2016) is comparable to the seasonal maximums for 2008 to 2015 inclusive.
- The 2016-year end volume in storage of 247,000 m^3 is consistent with previous years.

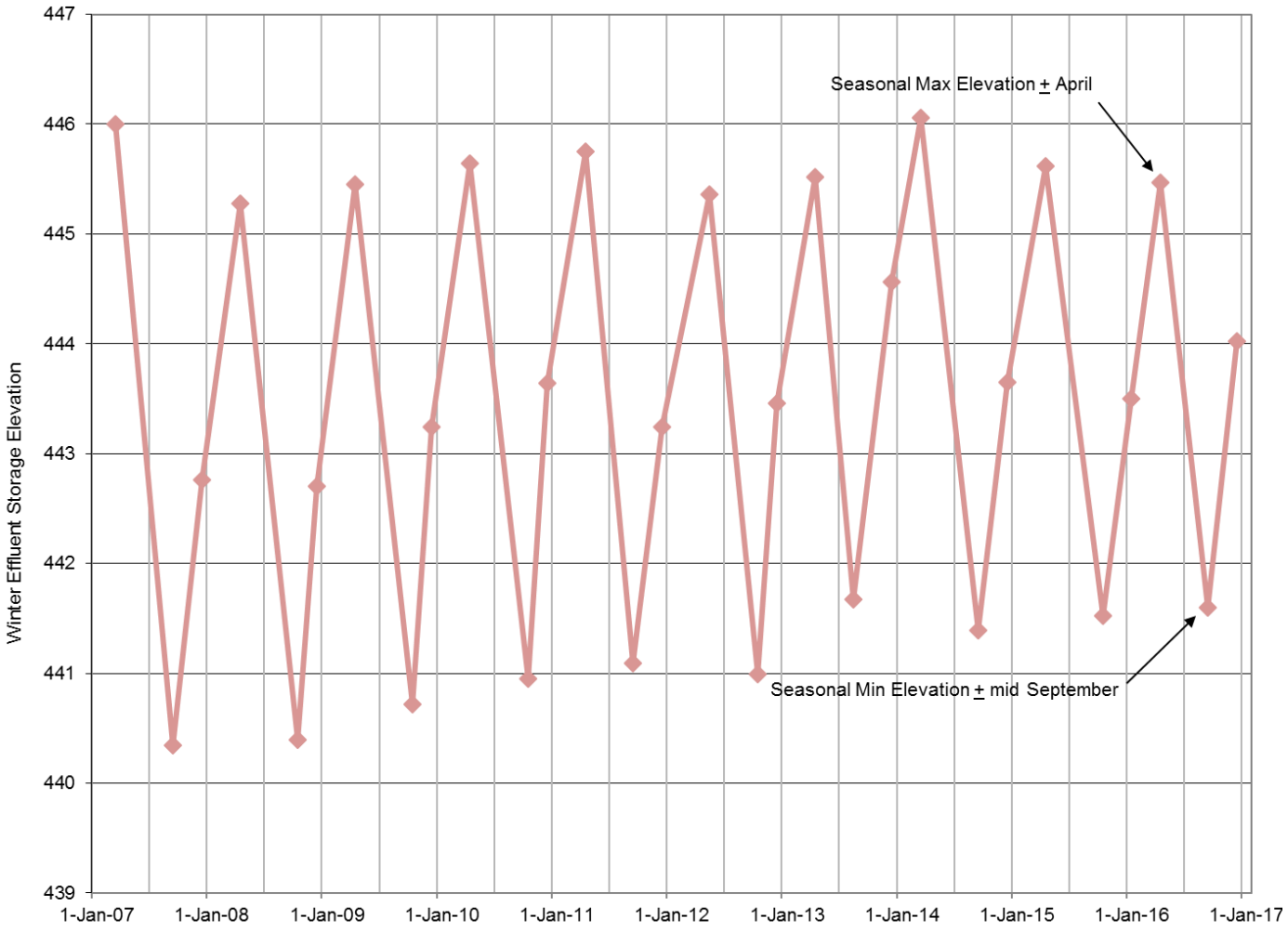


FIGURE 1-4: EFFLUENT STORAGE RESERVOIR LEVELS FOR 2007 TO 2016

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 in place at the Cemetery, Linear park, Airport, Public Works Yard, Alonso property, secondary school and Huggins property for the purposes of measuring total reclaimed water use. This water is used for irrigation at each of these sites. There is no meter on the irrigation service to the Fairview Mountain Golf Course. Usage by the Fairview Mountain Golf Course is therefore calculated as the total annual irrigation volume less all other metered usage. The following table 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
Fairview Mt. Golf Course	290,036	297,875	248,521	316,368	346,520	322,048
Cemetery	16,339	14,607	19,160	15,996	14,354	14,843
Gala Street[3] Linear Park	6,232	6,622	8,051	8,749	7,647	8,360
Airport	147,688	153,841	185,687	124,892	115,743	98,511
Public Works Yard	5,164	6,409	7,086	7,393	7,380	8,095
Alonso[2]	1,671	7,015	6,715	3,893	3,851	2,364
Huggins[2]	3,787	2,872	1,290		8,554	0
Southern Okanagan Secondary School				4,874	0	0
Total Use	470,917	489,241	476,510	482,164	504,049	454,221

[1] Cemetery disconnected from Reclaimed Water Supply System on September 20, 2006 due to available quantity concerns.

[2] 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

[3] Gala Street was previously described as 103rd Street

From flow data contained in Appendix A, reclaimed water quantities for each "user" are described as follows:

(1) Lot 723, Plan 2361 - Fairview Mountain Golf Course

Total Usage	322,048
Crop Type	Turf and rough areas
Irrigated Area	45 ha
Irrigation Application Rate*	0.72 m
Irrigation Period	April to October

* Does not include seasonal precipitation

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 for 2016 is 0.90 m applied. This is consistent with 2015 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 was assumed to be modest and was included in the estimated volume supplied to the Fairview Mountain Golf Course.

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

(2) Lot A, Plan 24065 – Oliver Cemetery

Total Usage	14,843 m^3
Crop Type	Lawn, trees & shrubs
Irrigated Area	2.3 ha
Irrigation Application Rate	0.65 m
Irrigation Period	April to October

(3) Gala Street Linear Park

Total Usage	8,360 m^3
Crop Type	Lawn & trees
Irrigated Area	0.8 ha
Irrigation Application Rate	1.05 m
Irrigation Period	April to October

(4) Lot A, Plan 38137 – Oliver Airport

Total Usage	98,511 m^3
Crop Type	Forage crops
Irrigated Area	12.6 ha
Irrigation Application Rate	0.78 m
Irrigation Period	April to October

Reclaimed water use on the Airport Site in 2016 was less than 2015. This decreased volume is attributed to a reduction in the area used for forage crop production.

(5) Lot A, Plan 33094 – Oliver Public Works Yard

Total Usage	8,095 m^3
Crop Type	Lawn, landscaping, composting 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.

(6) Lot A, Plan 37929 – Alonso (former Moir)

Total Usage	2,364 m^3
Crop Type	Vineyard
Irrigated Area	approximately 1.0 ha
Irrigation Application Rate	0.24 m
Irrigation Period	April to October

A meter was installed on the Alonso reclaimed water service in the fall of 2009. The service was originally constructed in the mid-1990s to Lot A Plan 37929 to enable the property owner to maintain a “green belt” around his home as a fire protection measure. Around 2005, the property owner planted a vineyard with irrigation from the Town’s reclaimed water system and in 2009 the vineyard was expanded.

(7) Southern Okanagan Secondary School Irrigation

Total Usage	0
Crop Type	Lawn and Trees
Irrigated Area	approximately 0.7 ha
Irrigation Application Rate	0
Irrigation Period	April to October

The School District did not use any reclaimed water in 2016.

1.4.2 Hydraulic Balance (OC 7.2.4.1)

Overall system hydraulic balances for the period January 1 to December 31 for the years 2009 to 2016 are summarized as follows:

TABLE 1-8: HYDRAULIC BALANCE DATA FOR 2009-2016

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

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 152,572 m^3 for 2016 are consistent with previous years.

1.4.3 Irrigation Water Quality Data (OC 6.3)

Effluent quality data for reclaimed water prior to irrigation is presented in Appendix B. Item 6.3 of the OC requires a maximum limit of 2.2 MPN/100mL for fecal coliforms. Results for the 2016 irrigation season 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 2016. Data for these parameters are tabulated in Appendix B.

Seasonal (April to October) averages for total phosphorus, total nitrogen and sodium sampled at the Chlorine Contact Basin for the period 2000 to 2016 are summarized as follows:

TABLE 1-9: IRRIGATION 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

As seen, the average total phosphorus levels in 2016 are consistent with values from previous years. The total nitrogen levels decreased compared to 2014 and 2015, to more closely resemble pre-2014 readings. In 2016, sodium concentrations were consistent with the concentrations between 2011 to 2015. 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 2016 are illustrated graphically in Figure 1-5.

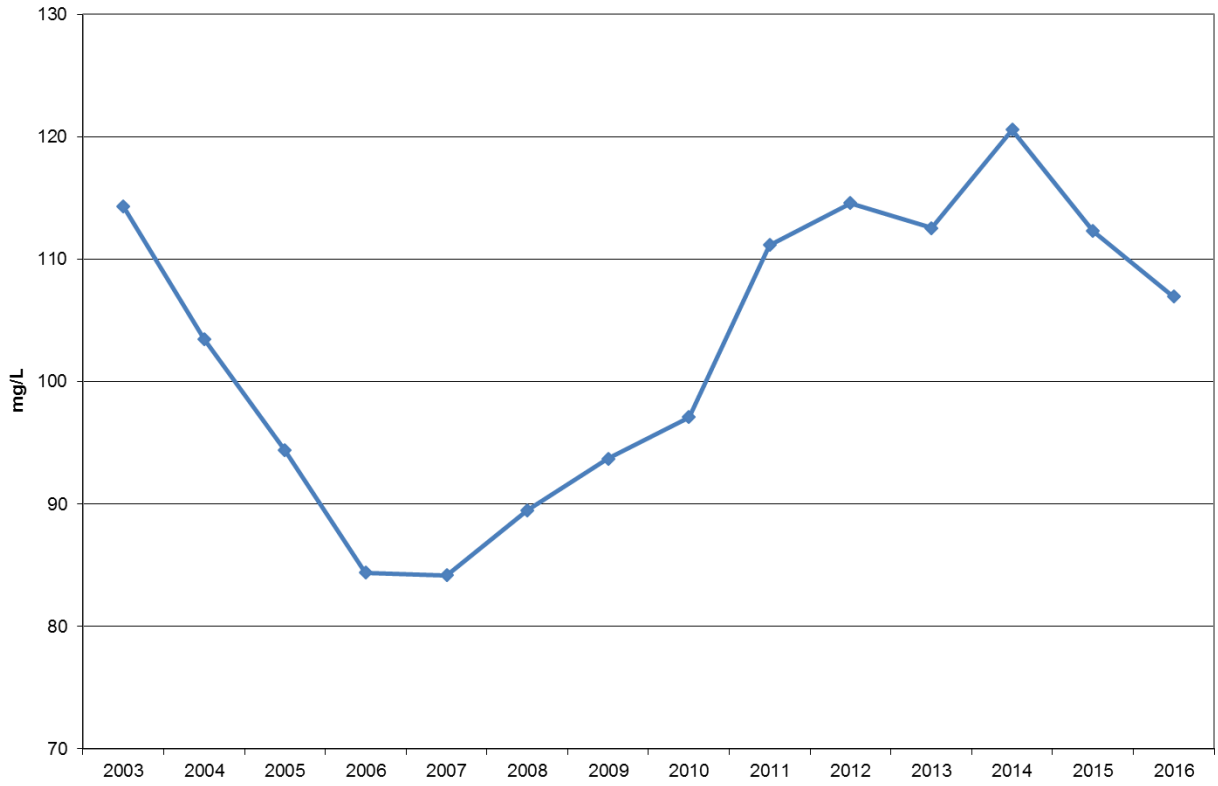


FIGURE 1-5: AVERAGE SEASONAL SODIUM CONCENTRATIONS FOR 2003 TO 2016

1.5 Summary of 2016 Operational Data

Operation of the Town of Oliver's wastewater collection, treatment and reclaimed water system for 2016 is summarized as follows:

- Total influent quantities were 639,800 m^3, a decrease of 23,400 m^3 or 4% as compared to 2015. The 2016 annual influent quantity is comparable to 2014.
- Wastewater effluent quality from the Town's aerated lagoons in 2016 complied with the OC requirements for BOD_5 and TSS.
- 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 II
Ryan Seiling	Wastewater Treatment Level I
	Wastewater Collection Level I
Martin Schori	Wastewater Treatment Level I
	Wastewater Collection Level I
Adrian Zandvliet	Wastewater Treatment Level I
	Wastewater Collection Level I

2.2 Capital Improvements

In 2016, the grit channel liner was replaced and a sewer condition assessment (Phase 1) was completed. This pipe assessment was accomplished using pipe inspection cameras and allowed for a conditions assessment of older infrastructure.

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. There was no influent received from Vincor in 2016.

Section 3.1 of the OC specifies that the Town has Operation and Maintenance Manuals on file for inspection by the Regional Waste Manager.

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 are discussed in paragraphs following.

2.5.1 Airport Monitoring Wells No. 1 to 3

There is a total of three monitoring wells at the airport site that are all down gradient from the reclaimed water use area (refer to Figure 2-1). Groundwater level data and water quality data from Appendix E are summarized as follows in Table 2-1:

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
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
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

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

Overall, the average groundwater table elevation in the Air Cadet well was greater than that measured in 2015. The Rodeo Grounds and 91A Street's average depths were less than observed in 2015. All three well locations had water depths within the historical range.

HWY 97

340th AVE

AIRPORT

93 rd ST

91st ST

TOWN MW
AIR CADET
N 5450056.46
E 314330.99
TOC ELEV 308.52

TOWN MW
RODEO GROUNDS
N 5449579.38
E 314155.26
TOC ELEV 306.56

TOWN MW
91A ST.
N 5449834.34
E 314453.92
TOC ELEV 295.00

TOWN OF OLIVER
AIRPORT AREA GROUNDWATER MONITORING WELL SITE PLAN

TRUE CONSULTING GROUP

DSGN BY: TRU	
DATE:	
SCALE: 1:5000	
DWG. NO.: FIGURE 2-1	REV.: 1
DWN. BY: NG	
DATE: SEPT 2006	

Sampling of the three monitoring wells in the vicinity of and at the airport was initiated by the Town in September 2007. The following table summarizes the groundwater quality data for the three airport area monitoring wells.

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
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
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

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

- The three wells have varying hardness concentrations consistent with aquifers that have modest recharge and low transmissivity. These wells do not have suitable water quality for domestic purposes, given that the major aquifers used by the Town for water supply have relatively consistent hardness concentrations of 300 to 400 mg/L.
- 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 in nitrate/nitrite concentrations in the Air Cadet well of 5.5 mg/L. 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. Average concentrations for the Air Cadet well are higher than this, suggesting nitrate accumulation in the groundwater and the influence of reclaimed water. The nitrate concentrations downgradient of this well at 91A St. are well below this range, with an average concentration of 0.089 mg/L over the four-year period.
- The monitoring wells were not sampled in April 2016 due to an operator error regarding the sample collection date.

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, 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 in the vicinity of these wells being discontinued in the mid-1990s, the Town does not sample or measure groundwater elevations MW 1 to 3. Groundwater depth and quality data for MW 4 to 7 are presented in Appendix E and summarized following.

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
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
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)*			

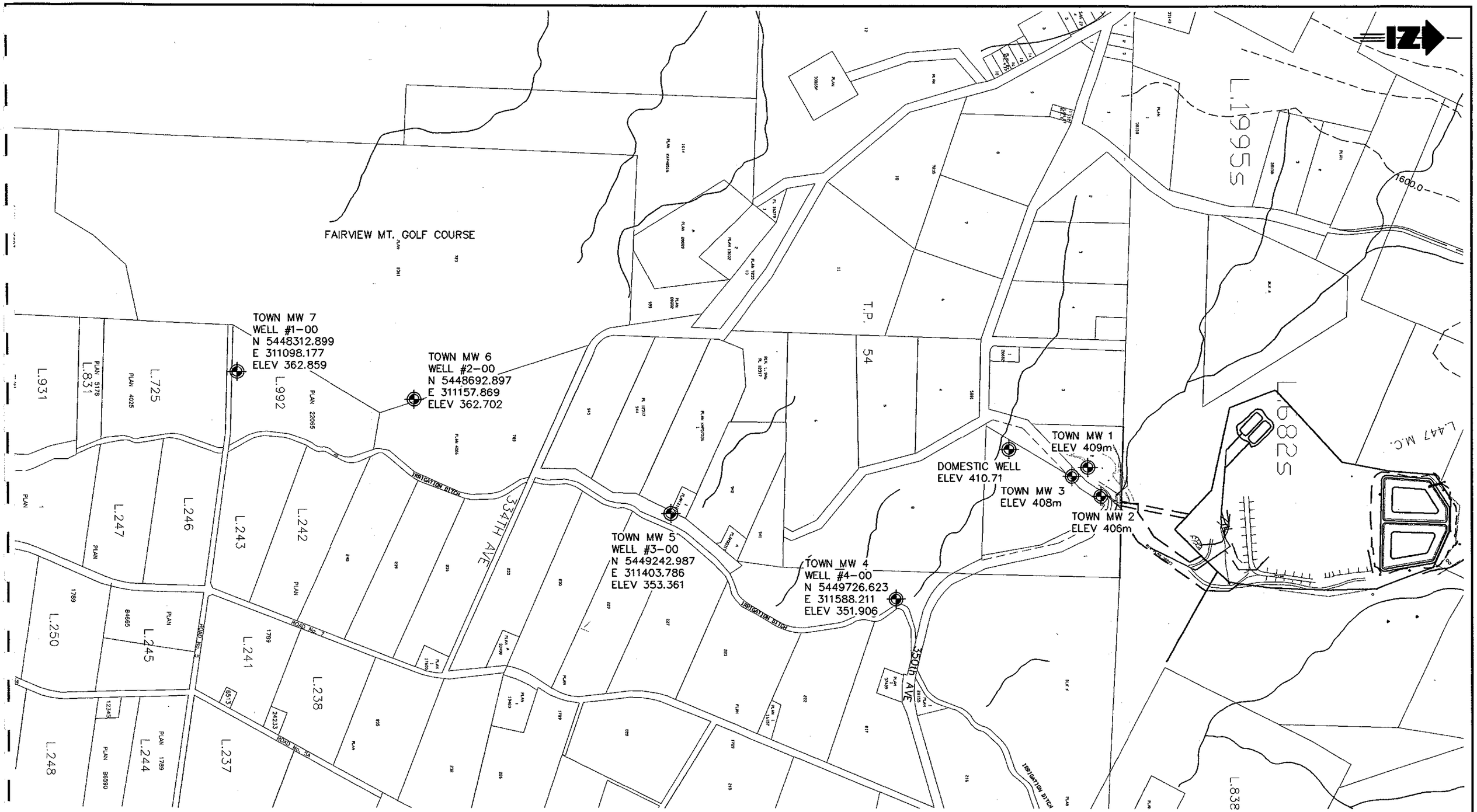
Sampling of MW 4 and 5 for water quality was completed in 2016, with results tabulated in Table 2-6 and attached in Appendix E. A comparison of 2003 to 2016 sampling data for chloride, nitrate/nitrite, and sodium (parameters generally accepted to be indicative of the influence from reclaimed water) is presented following. It should be noted that MW 6 and 7 were dry throughout 2016.

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
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

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. As mentioned, there was no sampling in April 2016 due to an operator error regarding the sample collection date.



LOCATION OF MONITORING WELL CONSTRUCTED AUG 2000

TOWN OF OLIVER

GROUNDWATER MONITORING WELL SITE PLAN

TRUE CONSULTING GROUP

DSGN BY: TRU	
DATE:	
SCALE: 1:7500	
DWG. NO.: FIGURE 2-2	REV.:
DWN. BY: SJU	
DATE:	

APPENDIX A

Flow and Storage Reservoir Level Data

2016 - 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	1,326			0		
2	2,476			0		
3	1,310			0		
4	505			0		
5	1,650			0		
6	1,533			0		
7	1,680			0		
8	1,564			0		
9	2,526			0		
10	1,450			0		
11	209			0		
12	1,873			0		
13	1,458			0		
14	1,623			0		
15	1,638			0		
16	2,359			0		
17	1,620			0		
18	684			0		
19	1,696			0		
20	1,676			0		
21	1,487			0		
22	1,640			0		
23	2,779			0		
24	1,369			0		
25	631			0		
26	1,746			0		
27	1,516			0		
28	1,597			0		
29	1,476			0		
30	2,627			0		
31	1,547			0		
		49272	1589		0.0	0
	OC Limit	n/a	2050m3/day		n/a	n/a

2016 - 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	207			0		
2	1,660			0		
3	1,841			0		
4	1,473			0		
5	1,665			0		
6	2,278			0		
7	1,442			0		
8	576			0		
9	1,549			0		
10	1,591			0		
11	1,460			0		
12	1,604			0		
13	2,401			0		
14	1,550			0		
15	266			0		
16	1,770			0		
17	1,585			0		
18	1,751			0		
19	1,567			0		
20	2,413			0		
21	1,677			0		
22	211			0		
23	1,845			0		
24	1,625			0		
25	1,622			0		
26	1,538			0		
27	2,162			0		
28	1,413			0		
29	862					
30						
31						
		43604	1504		0.0	0
	OC Limit	n/a	2050m3/day		n/a	n/a

2016 - 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	1,296					
2	1,851					
3	1,465					
4	1,620					
5	1,939					
6	1,646					
7	1,180					
8	1,560					
9	1,624					
10	1,851					
11	1,408					
12	2,676					
13	1,652					
14	235					
15	1,756					
16	1,754					
17	1,579					
18	1,653					
19	2,151					
20	1,721					
21	917					
22	1,519					
23	1,770			0		
24	1,585			791		
25	1,673			0		
26	2,140			0		
27	2,043			0		
28	594			0		
29	1,840			2,605		
30	1,698			0		
31	1,772			711		
		50167	1618		4106.2	456
	OC Limit	n/a	2050m3/day		n/a	n/a

2016 - 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	1,693			5		
	2	1,388			809		
	3	1,748			625		
	4	797			298		
	5	1,801			698		
	6	1,546			0		
	7	1,786			1,508		
	8	1,818			1,465		
	9	2,349			1,402		
	10	1,705			151		
	11	813			2,078		
	12	1,523			1,860		
	13	1,582			2,130		
	14	1,812			1,851		
	15	1,751			791		
	16	2,203			749		
	17	1,512			0		
	18	1,111			2,206		
	19	1,823			2,070		
	20	1,776			3,616		
	21	1,827			4,099		
	22	1,661			3,658		
	23	3,202			3,271		
	24	1,607			758		
	25	915			724		
	26	2,165			2,682		
	27	2,066			3,540		
	28	2,158			2,869		
	29	2,095			4,162		
	30	3,065			2,286		
	31						
			53300	1777		52362.3	1745
		OC Limit	n/a	2050m3/day		n/a	n/a

2016 - 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	2,008			2,241		
	2	913			3,660		
	3	2,056			2,663		
	4	2,566			4,701		
	5	2,450			2,598		
	6	2,201			2,054		
	7	3,122			2,624		
	8	2,663			1,574		
	9	906			2,608		
	10	2,154			2,490		
	11	2,186			2,527		
	12	2,277			2,450		
	13	2,186			1,556		
	14	3,164			2,593		
	15	2,661			1,381		
	16	798			3,196		
	17	2,108			3,711		
	18	1,918			4,280		
	19	2,008			698		
	20	2,055			2,764		
	21	2,815			2,228		
	22	1,982			0		
	23	1,031			1,098		
	24	2,038			1,896		
	25	1,832			2,426		
	26	1,911			3,628		
	27	1,871			3,750		
	28	2,747			2,179		
	29	2,003			1,546		
	30	1,101			2,471		
	31	1,700			3,552		
			63430	2046		77141.9	2488
		OC Limit	n/a	2050m3/day		n/a	n/a

2016 - 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	1,726			4,879		
2	1,779			4,211		
3	1,748			3,807		
4	2,936			4,279		
5	1,889			3,727		
6	925			2,880		
7	1,653			3,872		
8	1,678			3,577		
9	1,746			4,898		
10	1,764			2,869		
11	2,474			600		
12	2,418			0		
13	467			803		
14	1,750			2,212		
15	1,872			2,345		
16	1,827			2,091		
17	1,754			2,562		
18	2,358			1,585		
19	1,631			1,166		
20	1,169			1,418		
21	1,618			2,537		
22	1,654			3,490		
23	1,696			2,653		
24	1,691			1,851		
25	2,659			0		
26	1,832			618		
27	893			1,344		
28	1,671			2,339		
29	1,891			523		
30	1,967			2,708		
31						
		53133	1771		71841.9	2395
	OC Limit	n/a	2050m3/day		n/a	n/a

2016 - 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 m3/day (3)	Total Monthly m3/day	Monthly Average m3/day
	1	1,599			2,995		
	2	3,181			2,995		
	3	2,461			2,827		
	4	979			2,983		
	5	2,195			2,964		
	6	2,005			1,887		
	7	2,541			2,522		
	8	2,572			3,620		
	9	2,660			0		
	10	2,453			691		
	11	1,038			608		
	12	1,923			3,664		
	13	2,038			4,336		
	14	2,233			4,348		
	15	2,260			4,277		
	16	3,029			2,837		
	17	2,091			679		
	18	575			1,978		
	19	1,750			2,621		
	20	2,258			4,328		
	21	1,694			5,728		
	22	1,712			4,243		
	23	3,284			2,817		
	24	1,929			3,265		
	25	1,155			4,523		
	26	1,749			4,824		
	27	1,968			3,912		
	28	2,240			3,136		
	29	1,893			4,554		
	30	2,969			3,104		
	31	2,550			3,006		
			64983	2096		96273.7	3106
	OC Limit		n/a	2050m3/day		n/a	n/a

2016 - Town of Oliver Sewer Flows - PE - 13717

August	High Lift Station			Chlorine Booster Station		
	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	710			5,031		
2	1,746			4,768		
3	2,077			3,397		
4	1,875			4,327		
5	2,379			3,361		
6	3,164			3,968		
7	2,014			3,915		
8	618			4,179		
9	1,733			3,976		
10	2,011			2,621		
11	2,234			2,942		
12	1,715			3,004		
13	2,894			3,381		
14	1,754			3,342		
15	1,127			3,118		
16	1,755			3,337		
17	1,743			3,136		
18	1,995			1,933		
19	1,470			3,129		
20	2,911			3,089		
21	1,750			2,707		
22	716			3,113		
23	1,694			3,429		
24	1,961			4,361		
25	1,668			3,419		
26	2,219			4,281		
27	2,992			2,821		
28	1,819			995		
29	147			2,872		
30	1,660			3,287		
31	1,669			2,915		
		56219	1814		104153.1	3360
	OC Limit	n/a	2050m3/day		n/a	n/a

2016 - 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	2,390			2,875		
2	1,903			2,424		
3	2,882			0		
4	1,864			0		
5	764			720		
6	1,851			0		
7	1,620			681		
8	1,925			433		
9	1,776			1,901		
10	2,625			1,797		
11	1,605			1,853		
12	1,175			1,908		
13	1,756			1,687		
14	1,788			1,809		
15	2,063			2,213		
16	1,968			2,422		
17	2,416			1,265		
18	1,879			442		
19	443			1,062		
20	1,782			600		
21	1,538			1,372		
22	1,821			625		
23	1,768			0		
24	2,518			0		
25	1,609			0		
26	507			716		
27	1,644			595		
28	1,657			1,851		
29	1,718			2,036		
30	1,705			2,254		
31						
		52963	1765		35539.2	1185
	OC Limit	n/a	2050m3/day		n/a	n/a

2016 - 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	2,479			2,305		
2	1,741			1,892		
3	948			2,229		
4	1,720			2,110		
5	1,675			669		
6	1,641			1,667		
7	1,423			872		
8	2,411			0		
9	1,284			0		
10	1,110			0		
11	1,668			0		
12	1,637			694		
13	1,694			0		
14	1,786			0		
15	2,586			0		
16	1,651			0		
17	896			0		
18	1,658			0		
19	1,681			0		
20	1,713			0		
21	1,671			0		
22	2,359			0		
23	1,559			0		
24	1,150			0		
25	1,637			24		
26	1,634			339		
27	1,656			0		
28	1,641			0		
29	2,593			0		
30	1,521			0		
31	1,031			0		
		51856	1673		12802.9	413
	OC Limit	n/a	2050m3/day		n/a	n/a

2016 - 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	1,688			0		
2	1,509			0		
3	1,651			0		
4	1,541			0		
5	2,612			0		
6	1,589			0		
7	795			0		
8	1,747			0		
9	1,387			0		
10	1,698			0		
11	1,822			0		
12	2,387			0		
13	1,515			0		
14	737			0		
15	1,623			0		
16	1,833			0		
17	1,725			0		
18	1,678			0		
19	2,699			0		
20	1,643			0		
21	226			0		
22	1,741			0		
23	1,888			0		
24	1,741			0		
25	1,875			0		
26	2,480			0		
27	1,612			0		
28	376			0		
29	1,848			0		
30	1,432			0		
31						
		49098	1637		0.0	0
	OC Limit	n/a	2050m3/day		n/a	n/a

2016 - 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	1,889			0		
2	1,681			0		
3	2,543			0		
4	1,671			0		
5	409			0		
6	1,841			0		
7	1,678			0		
8	1,651			0		
9	1,656			0		
10	2,380			0		
11	1,585			0		
12	625			0		
13	1,848			0		
14	1,725			0		
15	1,587			0		
16	1,803			0		
17	2,438			0		
18	1,679			0		
19	534			0		
20	1,870			0		
21	1,792			0		
22	1,684			0		
23	1,475			0		
24	2,744			0		
25	1,544			0		
26	401			0		
27	1,617			0		
28	1,654			0		
29	1,630			0		
30	1,678			0		
31	2,458			0		
		51768	1670		0.0	0
	OC Limit	n/a	2050m3/day		n/a	n/a

2016 - 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	49,272	1,589	0	0
Feb	43,604	1,504	0	0
Mar	50,167	1,618	4,106	456
Apr	53,300	1,777	52,362	1,745
May	63,430	2,046	77,142	2,488
Jun	53,133	1,771	71,842	2,395
Jul	64,983	2,096	96,274	3,106
Aug	56,219	1,814	104,153	3,360
Sep	52,963	1,765	35,539	1,185
Oct	51,856	1,673	12,803	413
Nov	49,098	1,637	0	0
Dec	51,768	1,670	0	0
Total	639,794		454,221	15,148
Average	1,753		1,244	1,262

2016 - 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	49272.18406	0.0		
Feb	43604.06358	0.0		
Mar	50166.94562	4106.2		
Apr	53299.94925	52362.3		
May	63430.10108	77141.9		
Jun	53133.37978	71841.9		
Jul	64983.02462	96273.7		
Aug	56218.70993	104153.0538		
Sep	52962.56686	35539.16437		
Oct	51855.72381	12802.9213		
Nov	49098.48665	0.0		
Dec	51768.45871	0.0		
Total	639793.594	454221.2	0	0

Summary:

In storage Dec.31/	+	Inflow	- Water used	- Losses	= In storage Dec.31/
160,000 cu. M.	+	_____ cu. m.	- _____ cu. m.	- _____ cu.m.	= _____ cu. m.

Notes:

- Source of losses includes seepage and evaporation.
- Inaccurate reservoir volumes of meter readings may be a factor in the loss calculation that hasn't been considered.
- No allowance has been made for storm inflow.

2016 - 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			444.17	256,000				
2								
3								
4							445.47	343,000
5								
6								
7	443.57	218,000			444.89	309,000		
8			444.31	266,000				
9								
10								
11							445.45	342,000
12	443.68	224,000						
13								
14					445.1	322,000		
15								
16								
17			444.49	279,000				
18	443.83	233,000					445.3	335,000
19								
20								
21					445.29	334,000		
22			444.62	288,000				
23								
24								
25								
26							445.03	318,000
27								
28								
29			444.74	295,000	445.44	342,000		
30								
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							442.78	169,000
2	444.86	306,000						
3								
4								
5					443.61	220,000		
6			444.1	252,000				
7								
8							442.43	149,000
9	444.73	295,000						
10								
11					443.64	222,000		
12								
13			443.98	245,000				
14								
15							442.17	133,000
16	444.63	289,000						
17								
18					443.42	208,000		
19								
20			443.88	237,000				
21								
22							441.93	120,000
23								
24	444.54	283,000						
25					443.11	189,000		
26								
27			443.82	233,000				
28								
29							441.67	108,000
30	444.4	273,000						
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								
3								
4								
5							443.72	227,000
6	441.65	107,000						
7					443.64	222,000		
8								
9								
10								
11			441.72	110,000				
12	441.65	107,000					443.88	237,000
13								
14					443.21	195,000		
15								
16								
17			441.93	120,000				
18								
19	441.6	105,000					444.02	247,000
20								
21					443.37	204,000		
22								
23								
24			442.13	131,000				
25								
26	441.72	110,000						
27								
28					443.57	218,000		
29								
30								
31			442.84	173,000				

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

	Max	Min
Jan	443.83	443.57
Feb	444.74	444.17
Mar	445.44	444.89
Apr	445.47	445.03
May	444.86	444.4
Jun	444.1	443.82
Jul	443.64	443.11
Aug	442.78	441.67
Sep	441.72	441.6
Oct	442.84	441.72
Nov	443.64	443.21
Dec	444.02	443.72
Overall	445.47	441.6
Date	04-Apr-16	19-Sep-16
Volume	343,000	105,000

APPENDIX B

Influent and Effluent Sampling Data

2016 - TOWN OF OLIVER

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

	Date	BOD5	TSS	ToT P	Ortho P	Tot Diss P	Tot N	Ammonia N	Nitrate N	Nitrite N	Organic N	Kjedahl N
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-annually	semi-annually	semi-annually	semi-annually	semi-annually	semi-annually	semi-annually	semi-annually	semi-annually
January	6	23	23									
February	3	34	24									
March	7			4.14	1.9	3.85	33.2	31.2	1.05	0.175	<1.00	32
March	7	36	16									
March	7			4.17	1.21							
April	6	9	12									
May	5	17	7									
June	8	26	13									
July	6	9	10									
August	9	7	16									
September	6			4.25	1.27	3.9	12.8	1.82	5.33	1.84	3.79	5.61
September	6			2.35	0.36							
September	6	21	18									
October	5	23	9									
November	8	42	17									
December	6	28	13									

PE - 13717 - Influent Sampling - Equalization Basin - EMS ID E222152
Influent Sampling

Semi Annual Testing

2016 - 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	6	<2.2	<2.2	4.69	20.8	151	105	0.34
May	9	<2.2	<2.2	2.94	18.5	160	100	0.35
June	8	<2.2	<2.2	3.66	17.4	153	89.8	0.37
July	6	<2.2	<2.2	4.12	15.4	159	111	0.33
August	9	<2.2	<2.2	4.16	11.3	152	101	0.34
September	6	<2.2	<2.2	3.38	8.79	163	115	0.31
October	5	<2.2	<2.2	5.34	12.4	165	127	0.31

* 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.

APPENDIX C

Seasonal Precipitation Data

Seasonal Precipitation Summary: 1992-2016

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
Avg.	21.1	33.1	38.6	23.1	14.6	16.9	23.6	170.9

1992 to 1996 data from Environment Canada
1997 - 2005 data compiled from Town of Oliver daily records

APPENDIX D

Sludge Monitoring (Quality) Data

2016 - TOWN OF OLIVER
PE-13717 - Effluent Sludge - Cell #2 - Sample 1 & 2

ANALYTICAL REPORT - Sampled on November 8, 2016

			WALP Guidelines			
Parameter	***Unit***	**CELL 2 EFF SLUDGE-1**	**Agricultural Low Grade**	**Agricultural High Grade**	**Retail Low Grade**	**Retail High Grade**
Aluminum	ug/g	11000				
Antimony	ug/g	1.8				
Arsenic	ug/g	10	75	75	75	75
Barium	ug/g	230				
Beryllium	ug/g	0.3				
Bismuth	ug/g	22				
Cadmium	ug/g	2.2	25	20	20	5-20
Calcium	ug/g	20000				
Chromium	ug/g	45				
Cobalt	ug/g	3.9	150	150	150	150
Copper	ug/g	1500				
Iron	ug/g	12000				
Lead	ug/g	41	1000	500	500	500
Magnesium	ug/g	3800				
Manganese	ug/g	240				
Mercury	ug/g	5.1	10	5	5	5
Molybdenum	ug/g	22	20	20	20	20
Nickel	ug/g	23	200	180	180	180
Phosphorus	ug/g	9500				
Potassium	ug/g	1300				
Selenium	ug/g	14	14	14	14	14
Silver	ug/g	42				
Sodium	ug/g	1600				
Strontium	ug/g	290				
Tellurium	ug/g	>0.1				
Thallium	ug/g	>0.1				
Tin	ug/g	29				
Titanium	ug/g	91				
Vanadium	ug/g	26				
Zinc	ug/g	1100	2500	1850	1850	1850
Zirconium	ug/g	6				

Total Solids	%	5.6
Volatile Solids	%	46.1

APPENDIX E

Groundwater Monitoring Data

2016 - TOWN OF OLIVER

GROUNDWATER MONITORING WELL #1 (AIR CADET)

Parameters

				Nitrogen				Phosphorus		Metals		
Sample Date	**Total Hardness**	**Specific Conductance**	**Chloride**	**Ammonia**	**Nitrite**	**Nitrate**	**Nitrate/Nitrite**	**Dissolved Phosphorus**	**Total Phosphorus**	**Calcium**	**Magnesium**	**Sodium**
April sampling not done in 2016												
Sept 13	386	746	13.7	0.032	0.272	14.7	15	0.033	0.154	119	21.7	19.1

GROUND WATER MONITORING WELL #2 (RODEO GROUNDS)

Parameters

				Nitrogen				Phosphorus		Metals		
Sample Date	**Total Hardness**	**Specific Conductance**	**Chloride**	**Ammonia**	**Nitrite**	**Nitrate**	**Nitrate/Nitrite**	**Dissolved Phosphorus**	**Total Phosphorus**	**Calcium**	**Magnesium**	**Sodium**
April sampling not done in 2016												
Sept 13	1110	573	6.54	0.032	<0.010	0.628	0.628	0.007	0.745	371	43.9	19.2

GROUND WATER MONITORING WELL #3 (BULK FUEL)

Parameters

				Nitrogen				Phosphorus		Metals		
Sample Date	**Total Hardness**	**Specific Conductance**	**Chloride**	**Ammonia**	**Nitrite**	**Nitrate**	**Nitrate/Nitrite**	**Dissolved Phosphorus**	**Total Phosphorus**	**Calcium**	**Magnesium**	**Sodium**
April sampling not done in 2016												
Sept 13	389	661	8.01	0.032	<0.010	0.214	0.214	0.009	1.58	94.5	37.2	17.2

GROUND WATER MONITORING WELL #4 (SAND PIT)

Parameters

				Nitrogen				Phosphorus		Metals		
Sample Date	**Total Hardness**	**Specific Conductance**	**Chloride**	**Ammonia**	**Nitrite**	**Nitrate**	**Nitrate/Nitrite**	**Dissolved Phosphorus**	**Total Phosphorus**	**Calcium**	**Magnesium**	**Sodium**
April sampling not done in 2016												
Sept 13	1700	1950	129	0.021	<0.010	1.63	1.63	0.017	0.082	371	43.9	19.2

GROUND WATER MONITORING WELL #5 (125TH STREET)

Parameters

				Nitrogen				Phosphorus		Metals		
Sample Date	**Total Hardness**	**Specific Conductance**	**Chloride**	**Ammonia**	**Nitrite**	**Nitrate**	**Nitrate/Nitrite**	**Dissolved Phosphorus**	**Total Phosphorus**	**Calcium**	**Magnesium**	**Sodium**
April sampling not done in 2016												
Sept 13	960	770	23.9	0.022	<0.010	1.11	1.11	0.072	0.196	251	80.7	20.4

2016 - 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)	91A Street (Well #3)	Test Well #2 (Corner 350th/T.L.)	Test Well #4 (Sand Pit)	Test Well #5 (Chokecherry)	Test Well #6 (Golf Course)	Test Well #7 (Road #5 West)
January	13	10.35	5.9	1.3	fenced off	8.42	9.53	3.92 (dry)	25.91 (dry)
February	25	10.4	5.88	1.22	fenced off	7.87	9.8	3.92 (dry)	25.91 (dry)
March	18	10.41	5.86	1.15	fenced off	7.79	9.90	3.92 (dry)	25.91 (dry)
April	13	10.42	5.92	1.29	fenced off	8.07	7.92	3.92 (dry)	25.91 (dry)
May	6	10.42	5.81	1.32	fenced off	8.36	4.57	3.92 (dry)	25.91 (dry)
June	9	10.5	5.8	1.33	fenced off	8.67	5.78	3.92 (dry)	25.91 (dry)
July	8	10.41	5.73	1.35	fenced off	8.7	6.75	3.92 (dry)	25.91 (dry)
August	8	10.32	5.68	1.43	fenced off	8.28	7.23	3.92 (dry)	25.91 (dry)
September	2	10.34	5.66	1.38	fenced off	8.98	7.34	3.92 (dry)	25.91 (dry)
	14	10.32	5.74	1.3		8.73	7.45		
October	6	10.28	5.76	1.31	fenced off	8.67	7.65	3.92 (dry)	25.91 (dry)
November	15	10.21	5.9	1.19	fenced off	8.19	8.01	3.92 (dry)	25.91 (dry)
December	6	10.29	5.97	1.13	fenced off	8.21	8.22	3.92 (dry)	25.91 (dry)
Max		10.50	5.97	1.43		8.98	9.90		
Min		10.21	5.66	1.13		7.79	4.57		
Average		10.36	5.82	1.28		8.38	7.70		
Range									

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.

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

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.

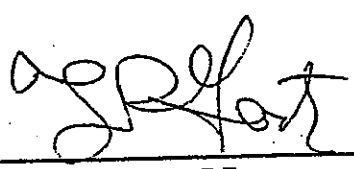
7.2.4.4 Records of efforts to administer the Influent Wastes By-law(s) for inspection by the Regional Waste Manager or his designate. Include as an attachment, any amendments to the Influent Wastes By-law(s) that have been made during the past year.

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.



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

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.

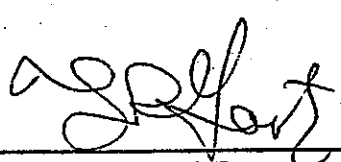
1.1.2 Design and construct the irrigation works in accordance with best current agricultural practice and the "Pollution Control Guidelines for Municipal Effluent Application to Land", dated January 1983, and any amendments thereto, issued by the Ministry of Environment of British Columbia, and also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



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

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.

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

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 .

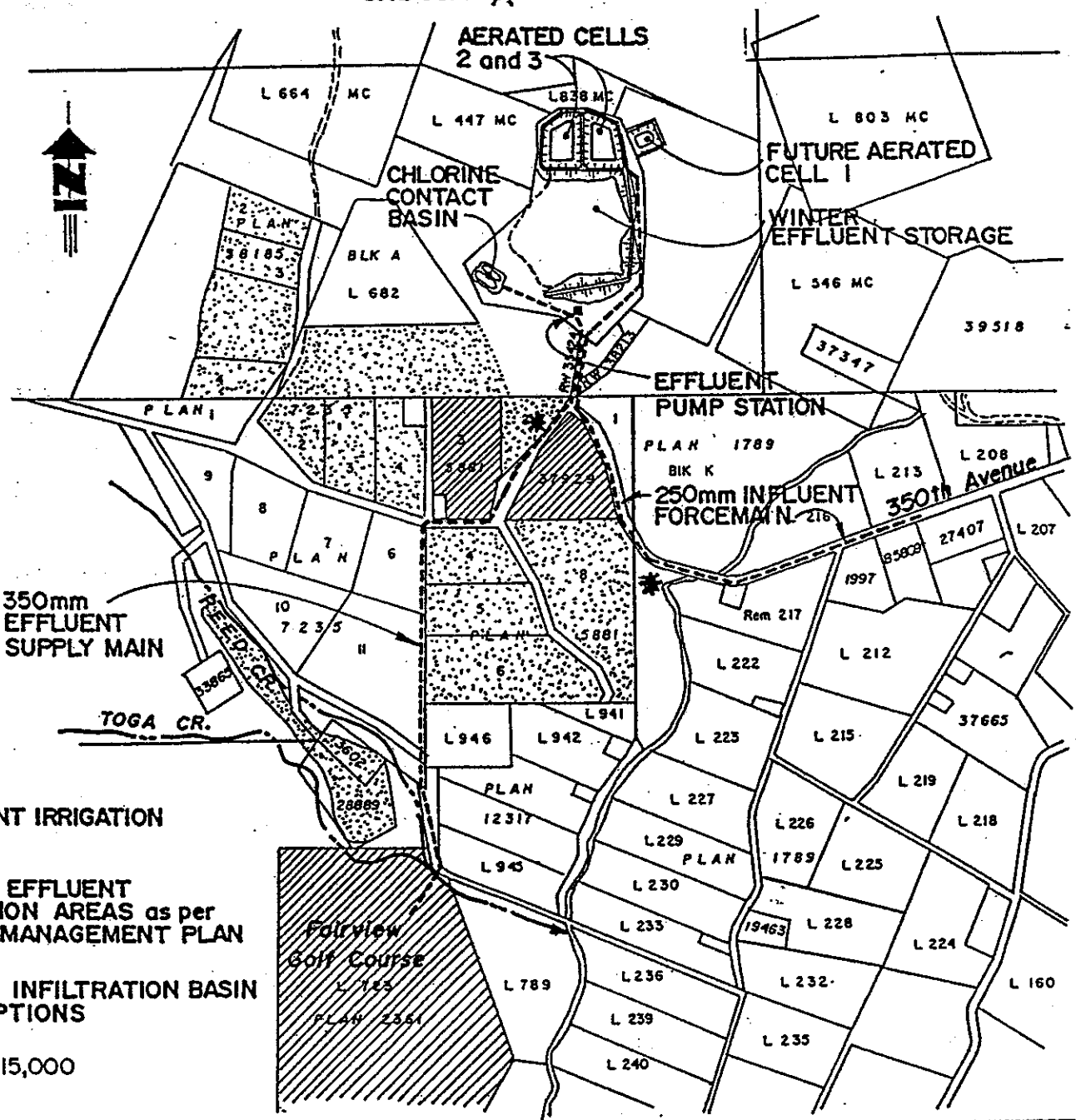
T.R. Forty, P.Eng.
Assistant Regional Waste Manager

Province of
British Columbia
Ministry of Environment,
Lands and Parks

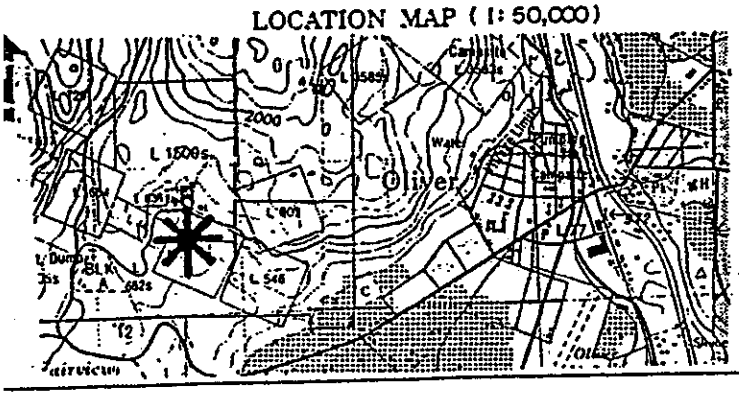
BC Environment

ENVIRONMENTAL PROTECTION DIVISION

SITE PLAN A



LOCATION MAP (1: 50,000)



(FOR OFFICE USE ONLY)

December 14, 1995
Date Issued

Date Amended

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

Page

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

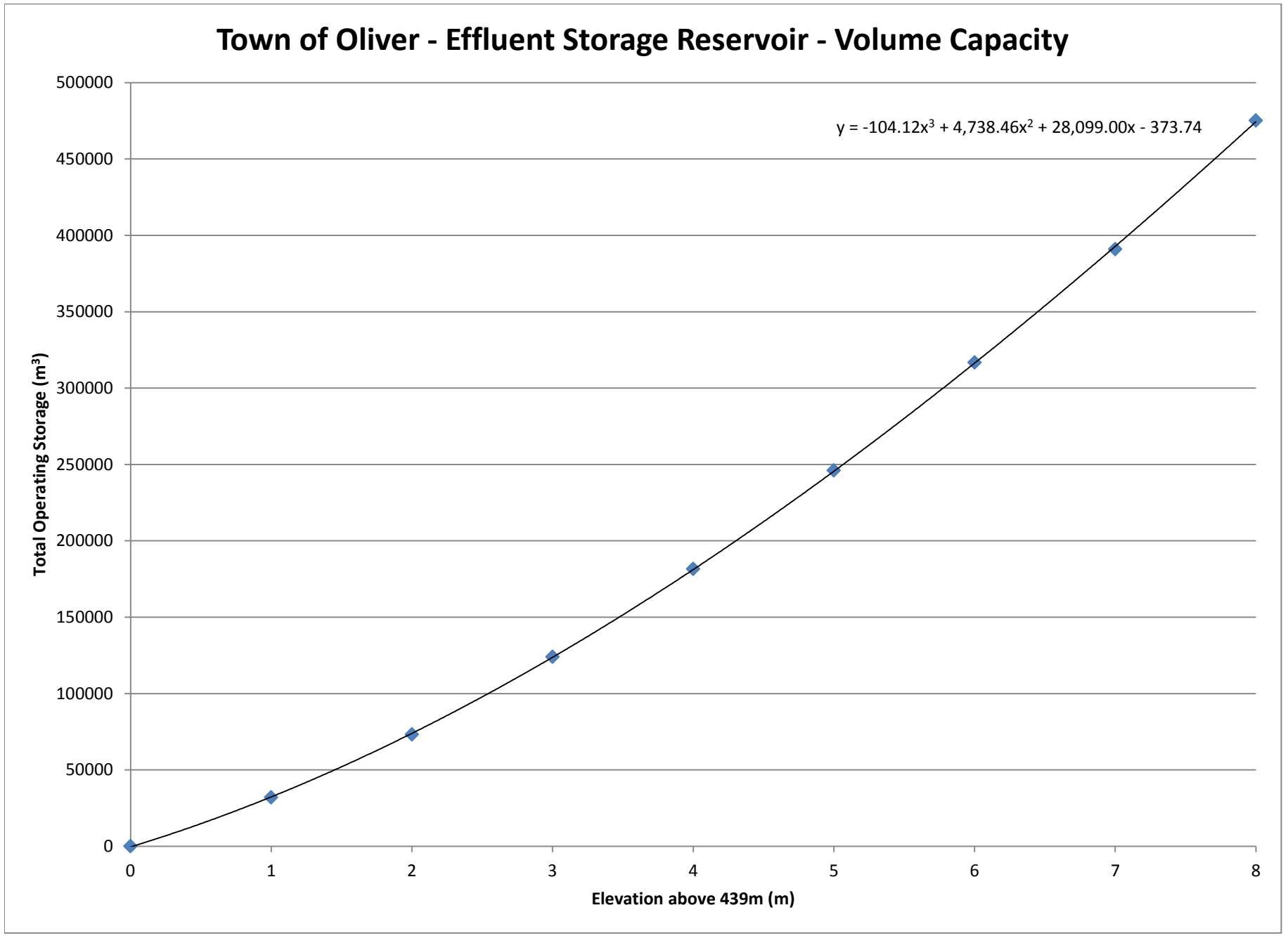
2.8.1 Irrigation on golf courses or cemeteries shall only be practised when the public are not present.

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



R:\Clients\300-399\306\306-084\04 Design\Effluent Storage Reservoir Calculation.xlsx

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%