Sanitary Sewer System
2014 Annual Report

Town of Oliver

May 2015

Project No. 306-088-002

TRUE CONSULTING

ENGINEERING ■ PLANNING ■ URBAN DESIGN

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0	1	Ministry of Environment, Penticton, BC
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2	1	TRUE Consulting Group, Kamloops, BC

Revision Log

Revision #	Revised by	Date	Issue / Revision Description
R1	TRU	May 12, 2015	Final - Issued to Town of Oliver

Report Submission

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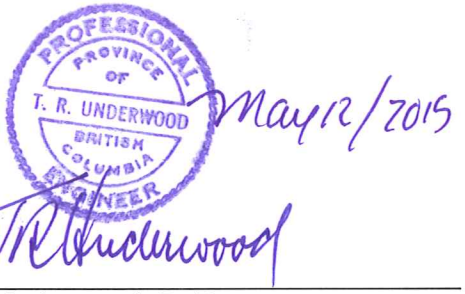

Terry Underwood, P. Eng.
Project Engineer

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1.0 Operational Data

Paragraphs following summarize the operational data for the Town of Oliver Sanitary Sewer System for 2014. The operational report for 2014 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 of this annual report in assessing the system operational data, the following drawings are included on pages following:

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

Figure 1-2: Aerated Lagoon Treatment System

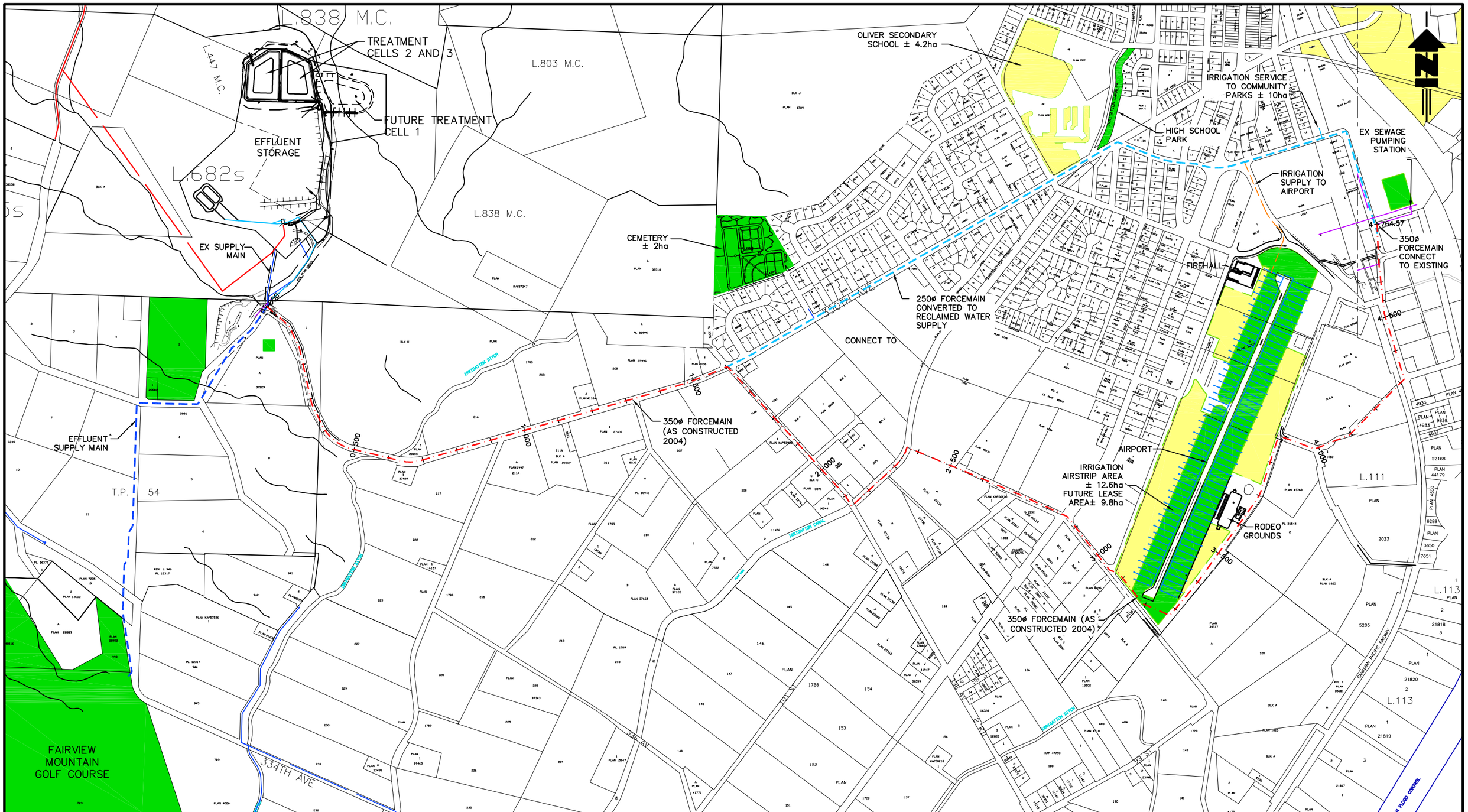
1.1 Influent

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 on a monthly basis in Appendix A. The total volume pumped to the aerated lagoons in 2014 was 634,649 m^3 which equates to an average daily flow of 1,739 m^3/day. For comparison, total influent flows for the period 1996 to 2014 are summarized in Table 1-1 and Figure 1-3 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
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



UPDATED AUGUST 2004 – AS CONSTRUCTED ADDED

LEGEND

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

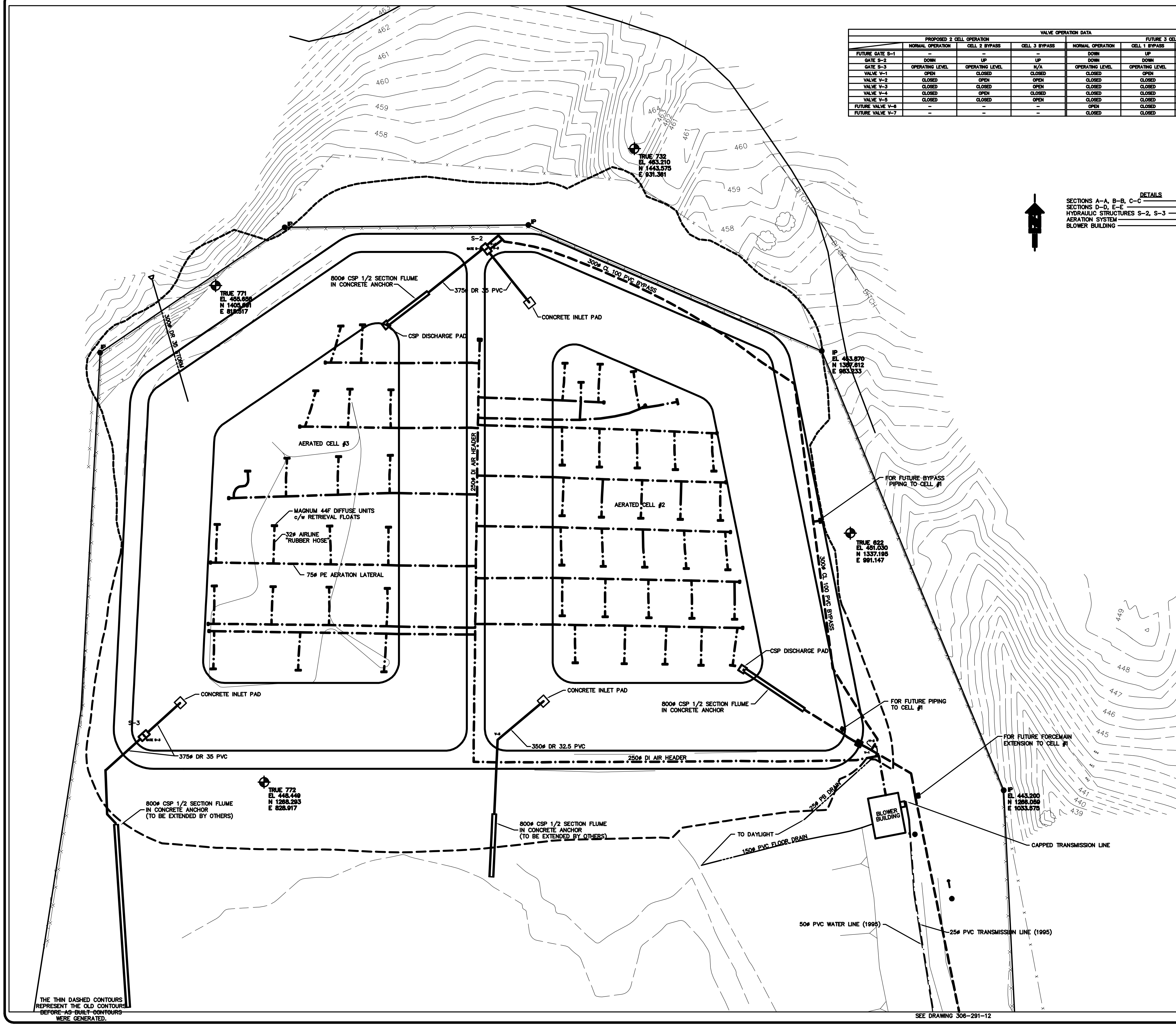
ACAD FILENAME: 306-082.DWG

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

TRUE CONSULTING GROUP

DSGN BY:	TRU
DATE:	JAN 2006
SCALE:	1:10,000
DWN. BY:	DL
DATE:	
FIGURE	1-1
REV.:	

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



SEE DRAWING 306-291-12

No.	DATE	DESCRIPTION	BY	APP'D
9				
8				
7				
6				
5				
4				
3	APR 28'98	AS CONSTRUCTED FINALIZED	TT	TRU
2	FEB 12'98	WATER AND ELECTRICAL LINES ADDED	TT	TRU
1	MAR 31'95	AS CONSTRUCTED	TT	TRU

REVISIONS

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

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 1-2 REV. 5

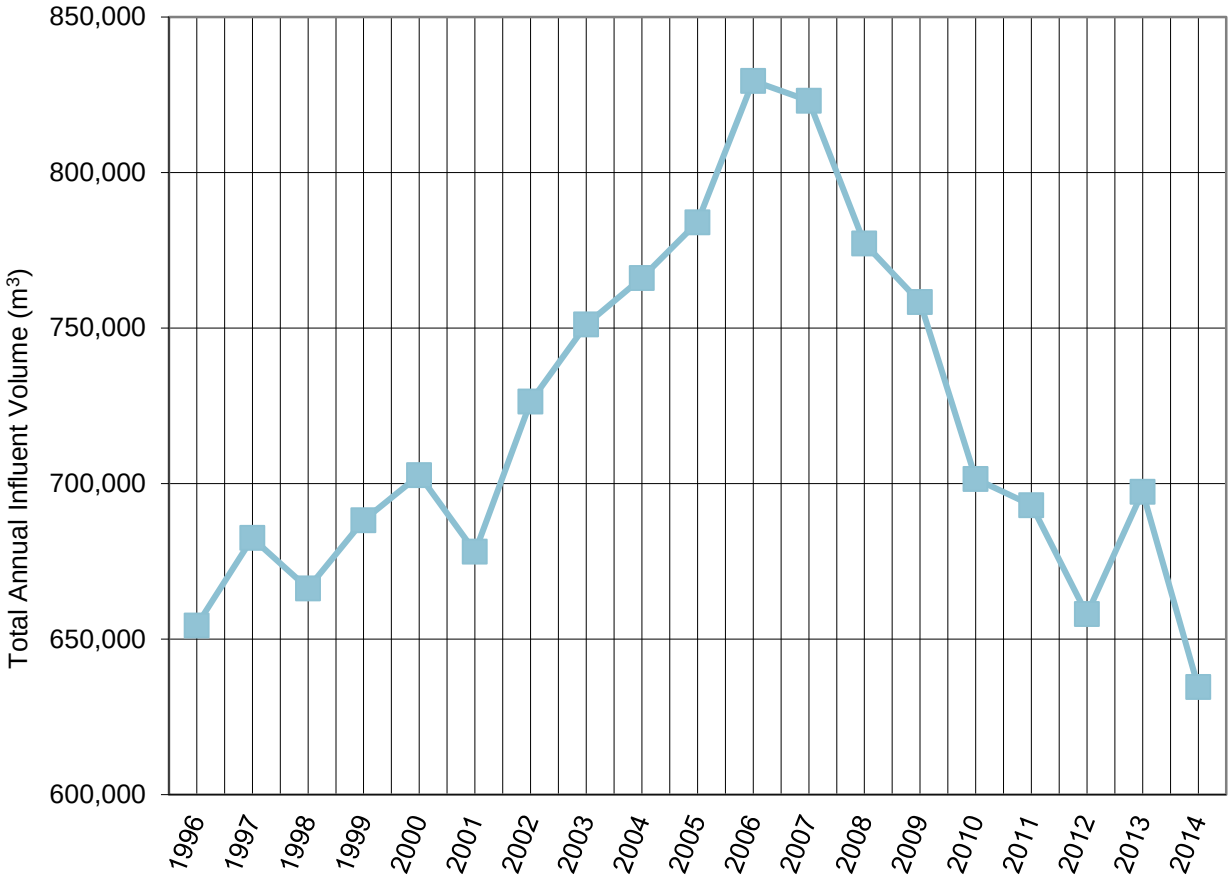


FIGURE 1-3: TOTAL ANNUAL INFLUENT SEWAGE FLOWS FOR 1996 TO 2014

For the period from 1996 to 2014, the total annual influent sanitary sewer flow recorded for 2014 is the lowest volume that has been recorded.

The total annual influent sanitary sewer flow for 2014 is consistent with the trend for the period from 2006 to 2012, for which a decline in the total annual flow has been observed. In 2013, an increase in the total annual influent was observed, however in 2014 the decreasing trend did resurface. The 2014 influent volume of 634,649 m^3 was about 23,353 m^3 or 3.7% lower than 2012, and about 62,728 m^3 or 9.0% lower than 2013.

1.1.2 Influent Wastewater Sampling (OC 6.1)

Influent sampling data for phosphorus (dissolved and total) are presented in Appendix B. The average result for 2014 of 4.05 mg/L for total phosphorus is below the average from 1996 to 2014. In 2014, ortho phosphorus was only sampled once in March, at a concentration of 0.82 mg/L, which is below the average from 1996 to 2014 of 3.07 mg/L.

TABLE 1-2: INFLUENT SEWAGE QUALITY DATA

Year	Date	Total Phosphorus (mg/L)	Ortho Phosphorus (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*
Average for Period of Record		**5.66**	**3.07**

** Suspected error in reporting - not included in average.*

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. In 2014, all sample results for BOD and TSS as measured at the outlet of aerated Cell No. 3, complied with the OC maximums of 45 mg/L and 60 mg/L, respectively.

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

Date	BOD_5 (mg/L)	TSS (mg/L)
OC Limits	***45***	***60***
Jan-08 (2014)	15	13
Feb-20 (2014)	20	11
Mar-05 (2014)	19	15
Apr-15 (2014)	23	9
May-06 (2014)	25	18
Jun-04 (2014)	39	21
Jul-18 (2014)	< 10	12
Aug-13 (2014)	12	15
Sep-16 (2014)	18	12
Oct-16 (2014)	40	7
Nov-05 (2014)	36	6
Dec-16 (2014)	23	16

Sampling data for nitrogen and phosphorus at the outlet of Cell No. 3 are contained in Appendix B. The 2014 results for nitrogen with comparison to historical data are presented in Table 1-4 following for which only one sample was taken for 2014, in March 2014.

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

The total nitrogen recorded in March 2014, of 32.8 mg/L is well above average for all readings observed since 1997. It is consistent with the accepted range for total nitrogen in domestic wastewater; 20 to 50 mg/L.

Up to 2002, a significant component of the ammonia nitrogen was nitrified through the aerated lagoons as evidenced by low September/October ammonia concentrations (as N) up to and including 2002. In 2003, the Town began accepting wastewater from Vincor after which nitrification of ammonia in the treatment lagoons has been modest. In January 2012, the Vincor pretreatment system was placed into service resulting in a 90%+ reduction in BOD concentrations in wastewater accepted by the Town. The apparent nitrogen removal as indicated by the September 2012 and September 2013 samples are indicative of reduced loadings from Vincor and consistent with pre Vincor data in the period 1997 to 1999.

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 has been attached in Appendix G. The operation of the storage reservoir in 2014 is summarized in Table 1-5, on the page following, with comparisons to data for the period 1998 to 2013.

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

Winter effluent storage reservoir year-end, maximum and minimum operating elevations for the period 2007 to 2014 inclusive are illustrated graphically in Figure 1-4 following. The graph illustrates that operation of the reservoir over the last 6 years has been very consistent. Referring to Figure 1-4:

- The maximum elevation for 2014 (446.06 m on March 31, 2014) is the highest that it has been since 2007.
- The 2014 year end volume in storage of 223,000 m^3 is consistent with previous years. From December 31, 2013 to December 29, 2014, the decrease of volume in storage was 61,000 m^3.
- The 2014 minimum elevation (441.39 m on Sept 15, 2014) is only slightly lower than the 2013 minimum elevation (441.67 m on August 21, 2013). For both years, the minimum elevations have been experienced earlier in the season, whereas the minimum is typically realized in September to October, at the end of the irrigation season. The monthly rainfall for August and September 2013, and October 2014 were more than two times greater than the historical monthly average. The higher precipitation near the end of the irrigation season may be attributing to the minimum elevations being experienced earlier in the season.

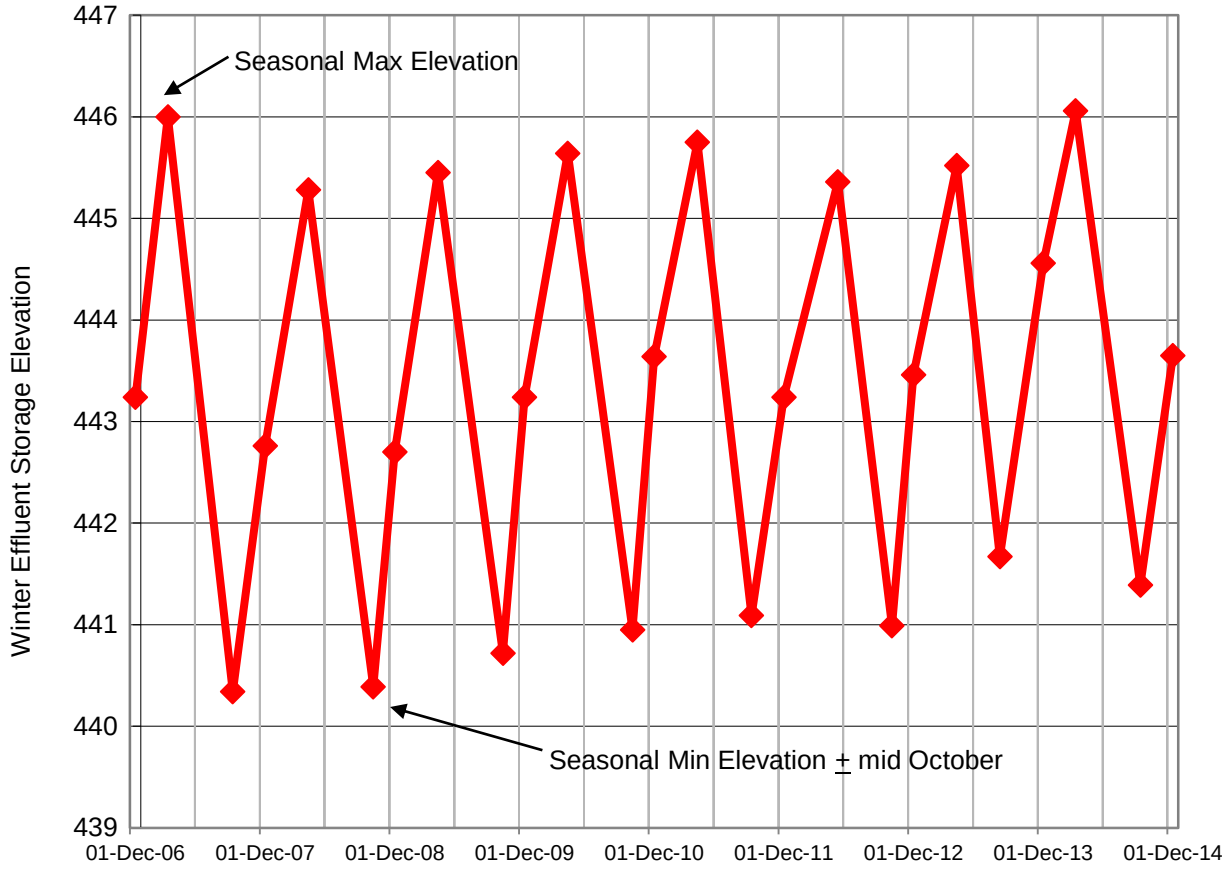


FIGURE 1-4: EFFLUENT STORAGE RESERVOIR LEVELS FOR 2007 TO 2014

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 at the booster station adjacent to the reclaimed water storage reservoir. Meters are in place at the Cemetery, Linear park, Airport, Public Works Yard, Alonso property and Huggins property for the purposes of measuring total reclaimed water use for irrigation purposes 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 seven users.

TABLE 1-6: ANNUAL RECLAIMED WATER USE BY CUSTOMER

Location	2010	2011	2012	2013	2014
Fairview Mt. Golf Course	274,877	290,036	297,875	248,521	316,367
Cemetery	13,311	16,339	14,607	19,160	15,996
Gala Street Linear Park	5,377	6,232	6,622	8,051	8,749
Airport	201,050	147,688	153,841	185,687	124,892
Public Works Yard	6,156	5,164	6,409	7,086	7,393
Alonso	3,495	1,671	7,015	6,715	3,893
Huggins	15,537	3,787	2,872	1,290	
Southern Okanagan Secondary School					4,874
Total Use	519,803	470,917	489,241	476,510	482,164

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

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

Total Usage	316,367 m^3
Crop Type	Turf and rough areas
Irrigated Area	45 ha (see attached Site Plan SK-1)
Irrigation Application Rate*	0.70 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 2014 is 0.88 m applied.

The decrease in application rate after 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

(2) Lot A, Plan 24065 – Oliver Cemetery

Total Usage	15,996 m^3
Crop Type	Lawn, trees & shrubs
Irrigated Area	2.3 ha
Irrigation Application Rate	0.70 m
Irrigation Period	April to October

(3) Gala Street Linear Park

Total Usage	8,749 m^3
Crop Type	Lawn & trees
Irrigated Area	0.8 ha
Irrigation Application Rate	1.09 m
Irrigation Period	April to October

(4) Lot A, Plan 38137 – Oliver Airport

Total Usage	124,892 m^3
Crop Type	Forage crops
Irrigated Area	12.6 ha
Irrigation Application Rate	0.99 m
Irrigation Period	April to October

As compared to 2013, usage of reclaimed water on the airport in 2014, for forage crop production has decreased by about 60,000 m^3. The 2014 total also presents as the lowest annual volume of reclaimed water use at the airport recorded since 2005. Prior to 2011, volumes reflected use of the airport irrigation system to address surpluses of reclaimed water.

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

Total Usage	7,393 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	3,893 m^3
Crop Type	Vineyard
Irrigated Area	approximately 1.0 ha
Irrigation Application Rate	0.39 m
Irrigation Period	April to October

A meter was installed on the Alonso reclaimed water service in the fall of 2009, therefore reclaimed water usage is unknown prior to 2010. 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	4,874 m^3
Crop Type	Lawn and Trees
Irrigated Area	approximately 0.7 ha
Irrigation Application Rate	0.70 m
Irrigation Period	April to October

2014 was the first year that the reclaimed water system was used for irrigation at the Southern Okanagan Secondary School. The reclaimed water is used to irrigate a 0.7 ha land area at the southwest corner of the Southern Okanagan Secondary School property (at the corner of 107th St and 350th Ave).

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 2007 to 2014 are summarized as follows:

TABLE 1-8: HYDRAULIC BALANCE DATA FOR 2007-2014

	2007	2008	2009	2010	2011	2012	2013	2014
Volume in Storage on Jan. 1	197,000	170,000	167,000	200,000	223,000	197,000	211,000	284,000
(+) Total Influent	823,011	777,154	758,308	701,475	693,045	658,002	697,377	634,649
(-)Effluent Irrigation	649,320	606,743	520,530	519,803	470,917	489,241	476,510	482,164
(-)High Rate Irrigation	0	0	0	0	0	0	0	0
(-)Rapid Infiltration	0	0	0	0	0	0	0	0
(-)Unaccounted Losses	200,691	173,411	206,778	159,672	248,128	154,761	147,867	213,485
Net Storage at Year-End (m^3)	170,000	167,000	198,000	222,000	197,000	211,000	284,000	223,000

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 213,485 m^3 for 2014 is 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 of fecal coliforms, which was complied with throughout 2014. 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 2014. Data for these parameters are also tabulated in Appendix B.

Seasonal (April to September) average total phosphorus, total nitrogen and sodium data as sampled at the Chlorine Contact Basin for the period 2000 to 2014 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	4.08*	17.6*	119*

**Seasonal average not including October 16, 2014 sample data*

In the October 2014 sample, the results for nitrogen and phosphorus are ten times the concentration for September suggesting a reporting error. With the October sample removed, the data is more consistent with previous years.

As shown above, average total phosphorus levels for 2014 (with the October sample removed) are consistent with values from previous years. The total nitrogen levels over the last few years has been elevated, and above the historical average. In 2014, sodium concentrations are consistent with the concentrations from 2011 to 2013. Concerns about the elevated sodium concentration in the reclaimed water have been expressed by the Fairview Mountain Golf Course. Average seasonal sodium concentrations for the period 2003 to 2014 are illustrated graphically in Figure 1-5.

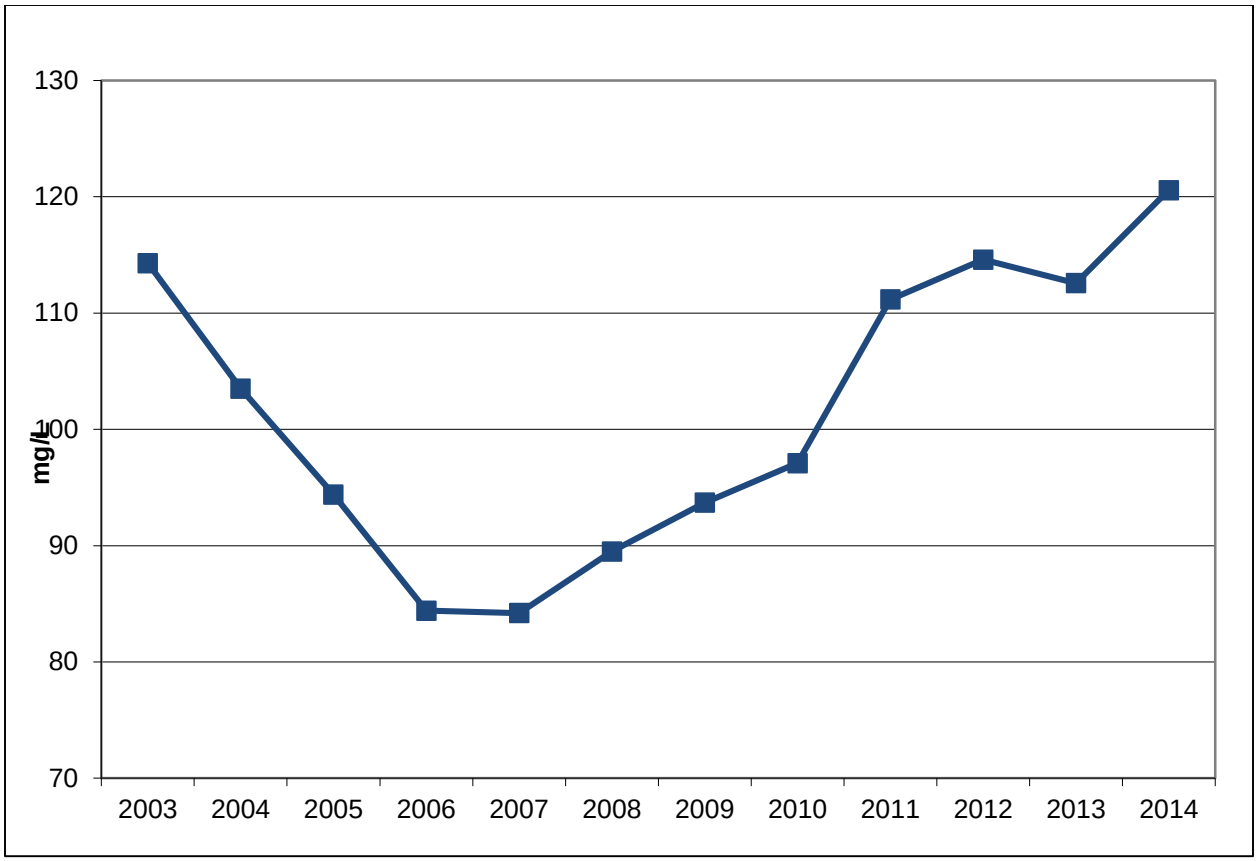


FIGURE 1-5: AVERAGE SEASONAL SODIUM CONCENTRATIONS FOR 2003 TO 2014

1.5 Summary of 2014 Operational Data

The operation of the Town of Oliver's wastewater collection, treatment and reclaimed water system for 2014 may be summarized as follows:

- Total influent quantities were 634,649 m^3, down 23,353 m^3 or 3.7% as compared to 2012, and about 62,728 m^3 or 9.0% lower than 2013.
- Wastewater effluent quality from the Town's aerated lagoons in 2014 consistently complied with the OC requirements for BOD_5 and TSS.
- Reclaimed water quality prior to irrigation consistently complied with the OC requirements for bacteriological quality.
- Available treated wastewater quantities in 2014 were fully utilized for irrigation purposes.

2.0 Supplemental Information

2.1 Operator Certification (OC 3.3)

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

Arvid Bensler	Wastewater Treatment Level I
Darren Bjornson	Wastewater Collection Level I
Seigfried Held	Wastewater Treatment Level II
	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 2014, no major capital improvement projects were completed. Some smaller sanitary sewer projects were completed in 2014, such as the Toasted Oak Alley sewer replacement.

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 05 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 as follows:

TABLE 2-1: AVERAGE MONTHLY LIMITS FOR VINCOR INFLUENT

Month	Average Flow (m^3/d)	Average BOD Loading (kg/d)
February to August (inclusive)	10	23
September	100	276
October	100	517
November	100	586
December	75	440
January	75	362
Total Annual	15,860 m^3	72,400 kg

Vincor was connected to the Town's sewerage system in October 2002. The Vincor wastewater is sampled by the Town at least twice a month to confirm compliance with the terms and conditions of the connection agreement and for invoicing purposes. Sampling data for the Vincor wastewater in 2014 is tabulated in Appendix B and is summarized following:

TABLE 2-2: SUMMARY OF 2014 VINCOR FLOWS AND BOD LOADINGS

	2014			
Month	**Monthly Flow (m^3)**	**Daily Flow (m^3/d)**	**BOD_5 (mg/L)**	**Monthly BOD (kg)**
January	2,002	65	283	567
February	1,843	66	110	203
March	2,033	66	116	236
April	2,445	82	170	416
May	2,003	65	106	212
June	2,197	73	106	233
July	2,519	81	71	179
August	1,663	54	61	101
September	2,919	97	175	511
October	2,957	95	200	591
November	3,056	102	168	513
December	1,845	60	250	461
Total	27,482			4,223

TABLE 2-3: COMPARISON OF VINCOR'S ANNUAL TOTALS

Year	Total Flow (m^3)	Total BOD (kg)
2003	36,500	170,700
2004	51,952	201,148
2005	38,189	112,565
2006	40,418	120,155
2007	38,125	135,987
2008	36,811	114,271
2009	40,489	95,353
2010	35,958	118,860
2011	27,910	95,593
2012	31,924	8,300
2013	32,362	4,579
2014	27,482	4,223

As compared to 2013:

- The 2014 Vincor total annual flow was 4,880 m^3 lower which represents a decrease of 15.1%.
- The 2014 total BOD received from the Vincor flow was 356 kg less compared to 2013, which represents a decrease of 8%.

In 2011 Vincor contracted with the Corval Group and EcoLab to supply and construct a pretreatment system having the objective of reducing Vincor organic loadings to values consistent with the 2002 agreement. The pretreatment plant was placed into service in early 2012. Average monthly Vincor BOD concentrations for the period 2011 to 2014 are presented graphically in Figure 2-1.

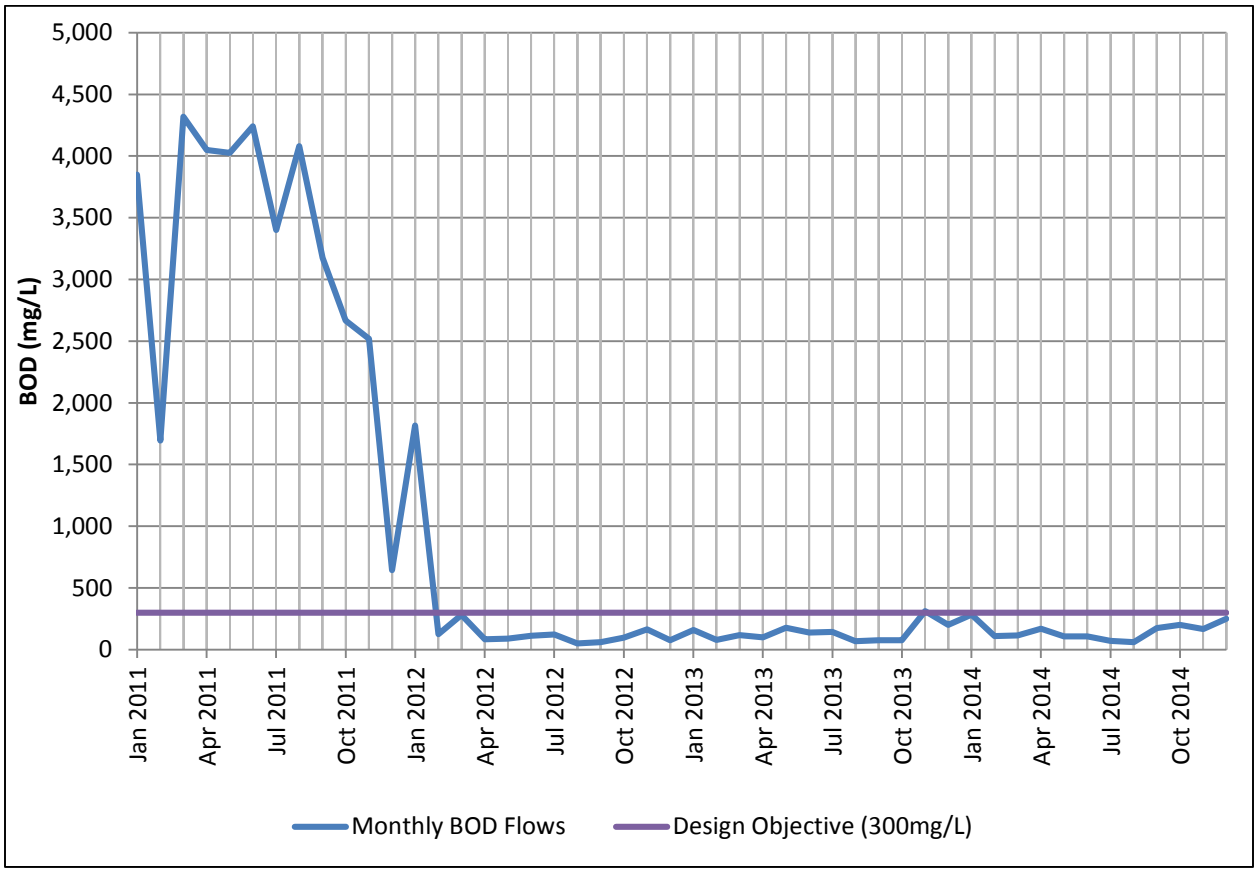


FIGURE 2-1: VINCOR WASTEWATER AVERAGE MONTHLY BOD

2.4 Operation and Maintenance Manuals (OC 3.1, 3.7, and 7.2.4.5)

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

2.5 Sludge Management Plan

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

2.6 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.

2.6.1 Airport Monitoring Wells No. 1 to 3

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

TABLE 2-4: 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
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
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

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

Overall, the groundwater table elevations in the Air Cadet, Rodeo Grounds and the 91A Street Wells were all consistently lower in 2014 as compared to 2013, with average depth changes increasing by 0.22 m, 0.17 m and 0.10 m, respectively.

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 2-2
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 2-5: SUMMARY OF WATER QUALITY DATA FOR THE AIRPORT MONITORING WELLS

Monitoring Well	Sample Date	Chloride	Ammonia	Nitrate/Nitrite	Total Hardness	Sodium
Air Cadet (MW #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
Rodeo Grounds (MW #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
91A St. (MW #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

* Suspected error.

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 has any sample with ammonia concentrations significantly above background. Only the Air Cadet Well samples in 2010 to 2013 indicated some impact by reclaimed water, with an average nitrite/nitrate concentration of 11.5 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, suggesting that the nitrate levels in the Air Cadet Well are comparable to background concentrations in the Oliver area, with an increasing trend in the years since 2010. The increased nitrate/nitrite concentration observed in Sept. 2013 (20.2 mg/L), April 2014 (21.6 mg/L) and Sept. 2014 (23.9 mg/L) may suggest the influence of reclaimed water.
- The sampling of the Air Cadet Well in 2014 for nitrate/nitrate concentrations averaged 22.8 mg/L, which is almost double the average for the period from 2010 to 2013. This suggests that since Sept. 2013, the influence of reclaimed water is more apparent.

2.6.2 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 2-3, 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 since 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 2-6: 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
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
Test Well #6	2003-2014	*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
	2007-2014	*25.91 (Dry)*			

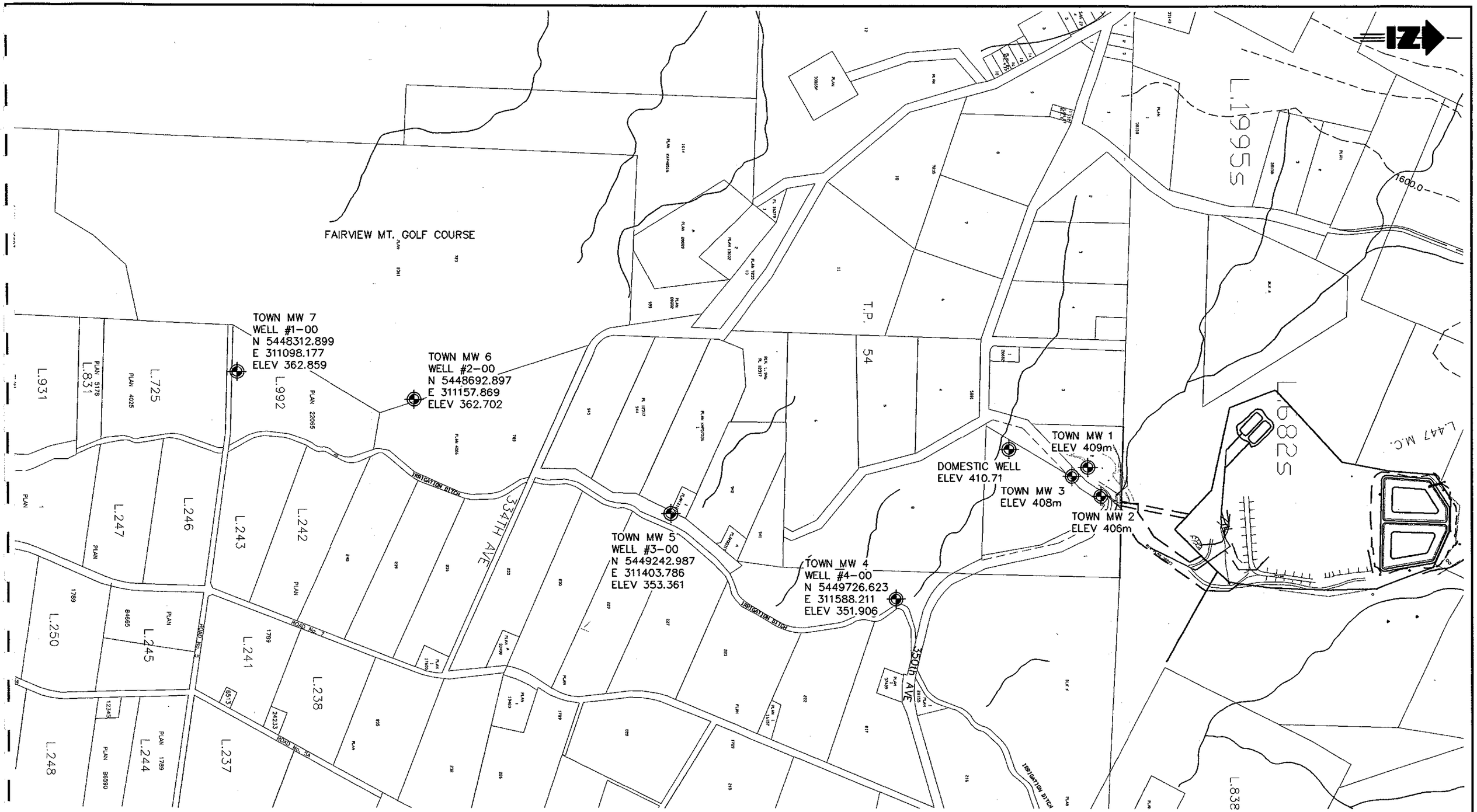
Sampling of MW 4 and 5 for water quality was completed in 2014, with results tabulated in Table 2-7, and attached in Appendix E. A comparison of 2003 to 2014 sampling data for chloride, nitrate/nitrite, and sodium (parameters generally accepted to be indicative of the influence from reclaimed water) is presented following. It should be noted that MW 6 and 7 were dry throughout 2014, and were not therefore sampled in 2014.

TABLE 2-7: SUMMARY OF THE WATER QUALITY DATA FOR FAIRVIEW MONITORING WELLS

Monitoring Well	Sample Date	Chloride	Nitrate/Nitrite	Sodium
Test Well #4 (Sand Pit)	Apr. 22, 2003	72	0.52	55.8
	Sep. 30, 2003	94	0.39	80.3
	Apr. 20, 2004	111	0.97	73.1
	Sep. 4, 2004	123	0.35	108
	Apr. 12, 2005	102	1.44	85.1
	Apr. 9, 2008	103	2.46	104
	Apr. 7, 2009	128	2.21	103
	Sep. 16, 2009	108	0.74	125
	May. 19, 2010	137	2.43	
	Sep. 7, 2010	135	1.02	128
	Apr. 28, 2011	135	2.95	108
	Apr. 24, 2012	130	2.39	101
	Oct. 16, 2012		0.691	119
	Apr. 9, 2013		1.78	118
	Sep. 9, 2013		2.06	146
	Apr. 16, 2014		3.02	115
	Sep. 4, 2014	125	1.68	127
Test Well #5 (125th Street)	Apr. 22, 2003	36.1	3.9	29.5
	Sep. 30, 2003	29.2	3.9	29
	Apr. 20, 2004	30.4	3.6	23.8
	Sep. 4, 2004	22.3	6.52	32.4
	Apr. 12, 2005	34.2	5.81	25.5
	Sep. 7, 2005	46.5	12.4	25.7
	Jun. 15, 2006	34.8	8.62	27
	Sep. 21, 2006	34.6	6.05	28
	May. 1, 2007	34.4	2.15	26
	Sep. 13, 2007	27.5	2.95	30.2
	Apr. 9, 2008	29.1	3.62	35.9
	Sep. 11, 2008	36	2.8	33.7
	Apr. 7, 2009	76	6.1	35.1
	Sep. 16, 2009	77.7	5.72	21.6
	May. 19, 2010	53.9	3.03	
	Sep. 7, 2010	37.3	1.03	29.2
	Apr. 28, 2011	26.3	2.1	41
	Sep. 28, 2011	38.5	2.75	48.7
	Apr. 24, 2012	48.8	3.19	22.4
	Oct. 16, 2012		2.94	19.3
	Apr. 9, 2013		1.11	15.9
	Sep. 9, 2013		0.652	12.4
	Apr. 16, 2014		0.577	13.1
	Sep. 4, 2014	14.7	0.683	14

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 to be 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.



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	
DWN. BY: SJU	DWG. NO.: FIGURE 2-3
DATE:	REV.:

APPENDIX A

Flow and Storage Reservoir Level Data

2014 - 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	1,800.62			0		
2	444.36			0		
3	1,291.69			0		
4	2,567.59			0		
5	1,562.41			0		
6	1,330.19			0		
7	1,805.61			0		
8	1,797.82			0		
9	1,910.47			0		
10	827.68			1		
11	0.00			45		
12	3,175.23			45		
13	2,507.40			45		
14	1,837.71			45		
15	1,665.15			45		
16	0.00			45		
17	1,375.74			45		
18	3,350.34			45		
19	1,615.78			45		
20	1,394.44			45		
21	564.87			45		
22	1,345.95			45		
23	2,838.19			45		
24	1,745.74			45		
25	1,435.21			45		
26	1,639.72			45		
27	1,234.05			45		
28	536.84			45		
29	1,304.49			45		
30	2,987.06			45		
31	1,813.22			45		
		49706	1603		945.5	30
	OC Limit	n/a	2050m3/day		n/a	n/a

2014 - Town of Oliver Sewer Flows - PE - 13717

	High Lift 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	1579.82			45		
2	1436.00			45		
3	1290.53			45		
4	1792.46			45		
5	1815.46			45		
6	1796.71			45		
7	1868.16			45		
8	736.68			45		
9	1705.49			45		
10	1564.17			45		
11	1818.33			45		
12	1956.32			45		
13	477.72			45		
14	1258.46			45		
15	2662.30			45		
16	1509.91			45		
17	1207.96			45		
18	1841.54			45		
19	1406.89			45		
20	1771.14			26		
21	1783.37			0		
22	1440.97			0		
23	1535.56			0		
24	1513.66			0		
25	1812.22			0		
26	1826.10			0		
27	1915.68			0		
28	714.21			0		
29						
30						
31						
		44038	1573		880.4	31
	OC Limit	n/a	2050m3/day		n/a	n/a

2014 - Town of Oliver Sewer Flows - PE - 13717

	High Lift 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	1,906.28			0		
2	2,072.51			0		
3	1,282.80			0		
4	1,837.16			0		
5	1,769.07			0		
6	1,443.87			0		
7	1,024.10			0		
8	2,391.00			0		
9	1,778.48			0		
10	1,550.29			0		
11	1,797.22			0		
12	1,814.13			0		
13	1,409.80			0		
14	1,762.09			0		
15	2,064.61			0		
16	1,559.91			0		
17	1,405.84			0		
18	1,744.16			0		
19	1,767.60			0		
20	510.89			0		
21	1,399.20			0		
22	3,404.93			0		
23	1,800.74			0		
24	1,217.07			0		
25	1,837.09			0		
26	1,772.59			0		
27	1,427.87			0		
28	1,543.18			0		
29	1,905.51			0		
30	1,507.11			0		
31	1,242.89			0		
		51950	1676		0.3	0
	OC Limit	n/a	2050m3/day		n/a	n/a

2014 - Town of Oliver Sewer Flows - PE - 13717

	High Lift Station					
April	Daily Flow m3/day	Total Monthly m3/day	Monthly Average m3/day	Total Daily m3/day (3)	Total Monthly m3/day	Monthly Average m3/day
1	2,051.68			0		
2	1,798.90			550		
3	1,645.10			1450		
4	1,484.23			1149		
5	2,025.12			0		
6	1,616.42			0		
7	1,507.91			1342		
8	1,690.99			832		
9	1,749.62			2899		
10	1,449.99			2683		
11	1,524.42			2615		
12	2,224.87			2204		
13	1,663.31			883		
14	1,350.55			2583		
15	1,436.09			3617		
16	1,532.72			3332		
17	1,595.54			3265		
18	2,086.12			3185		
19	1,784.87			2884		
20	1,595.63			787		
21	1,191.09			3067		
22	1,826.51			2819		
23	1,807.94			0		
24	1,286.31			0		
25	1,668.75			0		
26	2,269.99			1015		
27	1,628.68			0		
28	1,593.75			0		
29	1,350.03			1017		
30	1,686.41			568		
31						
		50124	1671		44746.1	1492
	OC Limit	n/a	2050m3/day		n/a	n/a

2014 - Town of Oliver Sewer Flows - PE - 13717

	High Lift 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	2194			2527		
2	1395			3181		
3	2114			2482		
4	1690			0		
5	1442			0		
6	1850			0		
7	1474			2173		
8	1408			3861		
9	2333			3363		
10	2102			0		
11	1583			973		
12	2042			1316		
13	1817			4941		
14	1855			5030		
15	1757			3780		
16	1896			4254		
17	2202			1951		
18	1880			577		
19	2108			2629		
20	1789			4004		
21	2012			4818		
22	1990			5121		
23	2045			4149		
24	2436			2483		
25	2038			2458		
26	1997			2310		
27	2002			556		
28	2084			1917		
29	2136			1717		
30	1959			137		
31	2576			1859		
		60206	1942		74567.0	2405
	OC Limit	n/a	2050m3/day		n/a	n/a

2014 - Town of Oliver Sewer Flows - PE - 13717

	High Lift 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	2,121			2536		
2	1,451			4085		
3	2,165			5895		
4	1,983			3655		
5	1,894			2852		
6	1,899			2434		
7	2,241			3172		
8	1,497			1441		
9	1,942			2888		
10	1,817			2947		
11	1,871			3086		
12	1,444			2827		
13	1,795			2791		
14	1,935			0		
15	1,702			0		
16	1,352			0		
17	1,832			985		
18	1,784			0		
19	1,826			2312		
20	1,874			2573		
21	1,923			2056		
22	1,844			2845		
23	1,222			2761		
24	1,902			2792		
25	1,861			2920		
26	1,792			5777		
27	1,876			2087		
28	2,064			2757		
29	1,629			2431		
30	1,678			2670		
31						
		54218	1807		75573.7	2519
	OC Limit	n/a	2050m3/day		n/a	n/a

2014 - Town of Oliver Sewer Flows - PE - 13717

	High Lift 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	1641			5542		
2	1924			4420		
3	1965			5485		
4	1793			4582		
5	2274			3667		
6	1827			2675		
7	1620			3860		
8	1946			5711		
9	1826			5115		
10	1881			5940		
11	2013			4908		
12	2402			3095		
13	1638			2810		
14	1712			4581		
15	1845			5851		
16	1940			5433		
17	1870			5723		
18	1947			5893		
19	2337			4751		
20	1932			3094		
21	1987			3154		
22	1745			3220		
23	1682			3853		
24	2097			3241		
25	1818			66		
26	2421			1859		
27	1749			1736		
28	1136			2264		
29	1794			2513		
30	2509			2702		
31	1947			2492		
		59218	1910		120236.1	3879
	OC Limit	n/a	2050m3/day		n/a	n/a

2014 - Town of Oliver Sewer Flows - PE - 13717

	High Lift Station					
August	Daily Flow m3/day	Total Monthly m3/day	Monthly Average m3/day	Total Daily m3/day (3)	Total Monthly m3/day	Monthly Average m3/day
1	1977			2413		
2	2172			2943		
3	1784			2835		
4	1688			2666		
5	1880			3575		
6	1883			5509		
7	745			5071		
8	1161			4635		
9	3863			3251		
10	1970			3316		
11	1522			4575		
12	1870			5434		
13	1877			5820		
14	2108			5167		
15	1882			2399		
16	2663			2211		
17	1884			1111		
18	1240			1818		
19	1982			5988		
20	1942			5285		
21	1848			3516		
22	1985			1098		
23	2176			1014		
24	1697			0		
25	1739			2188		
26	757			4023		
27	1159			2366		
28	2932			2371		
29	2442			2708		
30	2257			2895		
31	1703			1552		
		58788	1896		99751.5	3218
	OC Limit	n/a	2050m3/day		n/a	n/a

2014 - Town of Oliver Sewer Flows - PE - 13717

	High Lift 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	1,453.36			2136.82		
2	1,778.14			723.50		
3	1,724.22			2284.49		
4	529.53			562.95		
5	1,396.09			2177.52		
6	3,176.71			2396.45		
7	1,746.52			1363.52		
8	1,634.00			2423.94		
9	1,942.45			1483.91		
10	585.02			2378.75		
11	1,385.54			2037.91		
12	2,992.98			2045.10		
13	2,333.69			2250.32		
14	1,518.16			1785.56		
15	1,418.76			2449.92		
16	1,911.78			3014.36		
17	2,051.07			4986.54		
18	1,774.57			4446.31		
19	1,712.37			3081.44		
20	2,035.78			1663.40		
21	1,532.46			0.00		
22	1,859.13			1070.73		
23	1,821.07			18.78		
24	546.52			1057.81		
25	1,296.84			0.00		
26	2,716.04			0.00		
27	2,707.34			0.00		
28	1,735.40			0.00		
29	1,297.99			47.46		
30	1,870.34			0.00		
		52484	1749		47887.5	1596
	OC Limit	n/a	2050m3/day		n/a	n/a

2014 - Town of Oliver Sewer Flows - PE - 13717

	High Lift 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	1810.33			0.00		
2	1673.22			996.23		
3	1960.35			258.71		
4	1907.11			965.69		
5	1793.13			114.62		
6	1436.94			1399.98		
7	1386.60			1306.61		
8	2240.50			1258.81		
9	1731.93			356.88		
10	1697.38			1542.56		
11	2154.71			1109.46		
12	1644.95			1325.48		
13	1251.85			1294.76		
14	1799.82			0.00		
15	1670.50			0.00		
16	1905.83			320.66		
17	1792.67			654.60		
18	1966.46			112.88		
19	1715.41			1438.28		
20	1212.39			1523.30		
21	1957.41			1549.25		
22	1784.06			0.00		
23	1667.73			0.00		
24	1747.07			0.00		
25	2051.05			0.00		
26	1463.43			0.00		
27	1514.41			0.00		
28	1669.59			0.00		
29	1777.64			44.19		
30	1714.74			0.00		
31	1826.41			2.55		
		53926	1740		17575.5	567
	OC Limit	n/a	2050m3/day		n/a	n/a

2014 - Town of Oliver Sewer Flows - PE - 13717

	High Lift 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	2219			0		
2	1712			0		
3	1238			0		
4	1772			0		
5	1663			0		
6	1866			0		
7	1662			0		
8	2068			0		
9	1642			0		
10	1062			0		
11	1988			0		
12	1718			0		
13	1643			0		
14	1691			0		
15	1792			0		
16	1556			0		
17	1108			0		
18	1597			0		
19	1882			0		
20	1692			0		
21	1724			0		
22	1875			0		
23	1564			0		
24	1166			0		
25	1865			0		
26	1877			0		
27	1747			0		
28	1787			0		
29	1863			0		
30	1352			0		
		50392	1680		0.3	0
	OC Limit	n/a	2050m3/day		n/a	n/a

2014 - Town of Oliver Sewer Flows - PE - 13717

	High Lift 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	1562.9			0.0		
2	1704.2			0.0		
3	1720.7			0.0		
4	1710.0			0.0		
5	1726.9			0.0		
6	1591.5			0.0		
7	1703.8			0.0		
8	1142.6			0.0		
9	1829.2			0.0		
10	1664.5			0.0		
11	1684.8			0.0		
12	1872.3			0.0		
13	1955.8			0.0		
14	1536.5			0.0		
15	1141.1			0.0		
16	1846.0			0.0		
17	1681.0			0.0		
18	1687.2			0.0		
19	1672.6			0.0		
20	1754.5			0.0		
21	1406.9			0.0		
22	1333.6			0.0		
23	1607.1			0.0		
24	1692.3			0.0		
25	1674.6			0.0		
26	1731.6			0.0		
27	882.3			0.0		
28	1604.1			0.0		
29	1171.9			0.0		
30	1659.0			0.0		
31	1650.8			0.0		
		49602	1600		0.0	0
	OC Limit	n/a	2050m3/day		n/a	n/a

2014 - TOWN OF OLIVER
Summary of Monthly Sewer Flows

	High Lift Station		Chlorine Booster Station			
	Total Monthly m3/day	Monthly Average m3/day	Irrigation m3/day (1)	Rapid Infiltration m3/day (2)	Total Daily m3 (3)	Monthly Average m3/day
Jan	49706	1603			945	30
Feb	44038	1573			880	31
Mar	51950	1676			0	0
Apr	50124	1671			44746	1492
May	60206	1942			74567	2405
Jun	54218	1807			75574	2519
Jul	59218	1910			120236	3879
Aug	58788	1896			99751	3218
Sep	52484	1749			47887	1596
Oct	53926	1740			17575	567
Nov	50392	1680			0	0
Dec	49602	1600			0	0
Total	634649		0	0	482164	
Average	1739				1321	

Notes:

(1) These readings have been calculated by subtracting the flows read at the rapid infiltration site, from the flows read on the main meter in the Chlorine Booster Station. Both the irrigation flows and the rapid infiltration flows travel through this meter.

(2) **ADD NEW NOTE IN 2010**

(3) These are the flows that have been read at the main meter located in the Chlorine Booster Station.

2014 - 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.
Jan	49706	945.5		
Feb	44038	880.4		
Mar	51950	0.3		
Apr	50124	44746.1		
May	60206	74567.0		
Jun	54218	75573.7		
Jul	59218	120236.1		
Aug	58788	99751.5		
Sep	52484	47887.5		
Oct	53926	17575.5		
Nov	50392	0.3		
Dec	49602	0.0		
Total	634649.2412	482163.7	0	0

Summary:

In storage Dec.31/2013	+ Inflow	- Water used	- Losses	= In storage Dec.31/2014
284,000 cu. m.	+ 634,649 cu. m.	- 482,164 cu. m.	- 213,485 cu.m.	= 223,000 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.

2014 - TOWN OF OLIVER
STORAGE RESERVOIR
LEVEL DATA

	JANUARY		FEBRUARY		MARCH		APRIL	
DAY	ELEVATION	VOLUME IN STORAGE*	ELEVATION	VOLUME IN STORAGE*	ELEVATION	VOLUME IN STORAGE*	ELEVATION	VOLUME IN STORAGE*
1								
2								
3			445.32	336,000	445.81	360,000		
4								
5								
6								
7	444.69	292,000					445.84	362,000
8								
9								
10					445.83	361,000		
11			445.45	342,000				
12								
13	444.79	299,000						
14								
15								
16								
17			445.57	348,000	445.9	365,000		
18								
19								
20	444.98	315,000						
21							445.5	345,000
22								
23								
24			445.69	354,000	445.94	367,000		
25								
26								
27	445.11	322,000						
28							445.49	344,000
29								
30								
31					446.06	374,000		

* 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								
2								
3								
4								
5	445.35	337,000						
6								
7					443.74	228,000		
8								
9			444.48	279,000				
10								
11								
12								
13								
14					443.36	204,000		
15								
16			444.43	275,000				
17								
18							441.94	121,000
19	445.04	319,000						
20								
21					442.82	172,000		
22								
23			444.32	267,000				
24								
25								
26								
27								
28								
29								
30			444.12	253,000			441.77	112,000
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	441.58	104,000						
3					442.09	129,000		
4								
5								
6			441.53	101,000				
7								
8	441.5	100,000						
9								
10					442.28	139,000		
11								
12							443.22	196,000
13								
14			441.6	105,000				
15	441.39	92,000					443.31	201,000
16								
17					442.43	149,000		
18								
19								
20			441.7	109,000				
21								
22							443.48	212,000
23								
24					442.62	161,000		
25								
26								
27			441.89	118,000				
28								
29	441.41	94,000					443.65	223,000
30								
31								

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

APPENDIX B

Influent and Effluent Sampling Data

2014 - TOWN OF OLIVER
PE - 13717 - Influent Sampling - Equalization Basin - EMS ID E222152

Sampling Date	Semi-annual (mg/3) Total Phosphorus	Semi-annual (mg/3) Ortho Phosphorus
March 5	4.28	0.82
Sept 17	3.82	not tested

2014 - 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	8	15	13									
February	20	20	11									
March	5	19	15	5.10	1.86	4.10	32.80	31.20	0.046	0.034	1.49	32.70
April	15	23	9									
May	6	25	18									
June	4	39	21									
July	18	<10	12									
August	13	12	15									
September	16	18	12									
October	16	40	7									
November	5	36	6									
December	16	23	16									

Influent Sampling

March	5			4.28	0.82							
September	17			3.82		2.58						

2014 - 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	15	<2.2	<2.2	4.78	22.1	147	111	0.17
May	7	<2.2	<2.2	4.47	21.3	137	115	0.23
June	4	<2.2	<2.2	5.13	23.6	148	115	0.23
July	17	<2.2	<2.2	4.08	17.2	160	129	0.31
August	13	<2.2	<2.2	4.72	13.2	159	120	0.26
September	9	<2.2	<2.2	1.31	8.45	166	126	0.18
October	16	<2.2	<2.2	16.80	80.0	161	128	0.17

* 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.

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2014 - TOWN OF OLIVER
Vincor International

2014 - Influent Sampling

	Monthly Total	Daily Average		PH	TSS	BOD5	COD	SODIUM
Units	m3	m3/day	Date	ph units	mg/L	mg/L	mg/L	mg/L
January			7	7.48	1030	699	1150	621
January			16	7.8	728	175	3580	373
January			21	8.04	226	152	284	329
January			28	7.94	200	107	322	269
February			5	8.03	160	79	341	326
February			12	7.92	343	92	556	376
February			19	8.04	917	156	848	290
February			25	7.98	447	116	739	421
March			4	7.82	326	113	464	379
March			11	8.12	445	125	475	369
March			18	8.06	523	112	725	304
March			25	7.98	1780	378	2980	263
April			2	7.89	331	209	599	270
April			8	7.93	790	198	526	315
April			15	8.02	354	136	392	357
April			23	8.01	440	167	445	470
April			29	7.86	575	141	407	339
May			6	7.86	226	79	225	323
May			13	7.9	317	121	336	335
May			21	8.05	193	85	263	351
May			27	8.06	346	141	413	275
June			3	8.09	197	123	290	368
June			11	8.18	111	56	146	376
June			18	7.61	372	176	193	341
June			24	7.94	204	68	227	261
July			3	7.78	280	107	483	303
July			9	7.93	122	44	299	250
July			15	8.13	57	27	140	295
July			23	7.98	222	83	397	250
July			29	7.78	235	95	327	273
August			6	8.05	203	93	356	238
August			12	8.07	64	46	206	504
August			19	8.17	73	51	139	267
August			26	8.02	152	52	218	255
September			3	7.99	1730	292	3740	270
September			9	7.88	152	179	384	400
September			16	8.19	464	114	556	294
September			23	8.2	473	162	370	443
September			30	8.16	297	130	405	419

October			7	8.12	327	283	406	458
October			15	8	977	247	1500	298
October			21	7.69	299	100	421	318
October			28	8	494	173	828	197
November			4	8.05	391	115	658	298
November			13	8.14	358	173	793	236
November			19	8.01	328	127	649	269
November			25	8.02	910	258	836	221
December			3	7.97	653	301	495	256
December			9	7.83	603	269	980	251
December			16	7.3	475	180	593	152

TOWN OF OLIVER
Vincor International Actual & Projected Flow of COD & BOD Loadings
2010 - 2014

Influent Sampling

	2012	2013	2014	2012	2013	2014	PROJ *	2012	2013	2014	2015	PROJ *	2012	2013	2014	2015	PROJ *
	Monthly Total	Monthly Total	Monthly Total	Daily Avg	Daily Avg	Daily Avg	Daily Avg	BOD6	BOD6	BOD6	BOD6	BOD5	COD	COD	COD	COD	COD
Units	m3	m3	m3	m3/day	m3/day	m3/day	m3/day	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L
January	893	2336	2002	29	75	65	75	1815	158	283			2681	309	1269		
February	1999	2117	1843	69	76	66	10	125	78	110			242	236	621		
March	1874	3004	2033	60	97	66	10	282	117	116			638	534	554		
April	2678	2720	2445	89	91	82	10	84	99	170			542	374	1646		
May	3239	2852	2003	104	92	65	10	90	176	106			287	816	919		
June	2505	2563	2197	84	85	73	10	113	139	106			458	299	237		
July	3190	2019	2519	103	65	81	10	123	144	71			529	670	329		
August	2437	3074	1663	79	99	54	10	50	68	61			309	281	262		
September	2558	2384	2919	85	79	97	100	61	76	175			295	312	TBR		
October	3407	3365	2957	110	109	95	100	97	75	200			433	407	789		
November	5098	4027	3056	170	134	102	100	165	311	168			325	2998	734		
December	1472	1902	1845	47	61	60	75	75	200	250			308	711	689		

* Projected flows/values provided by Vincor/EarthTech when the agreement between the Town & Vincor wa TBR - Lab error at CARO

APPENDIX C

Seasonal Precipitation Data

Seasonal Precipitation Summary: 1992-2014

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
Avg.	22.5	33.0	39.7	23.2	14.9	17.6	21.8	172.7

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

APPENDIX D

Sludge Monitoring (Quality) Data

2014 - TOWN OF OLIVER
PE-13717 - Effluent Sludge - Cell #2 - Sample 1 & 2

ANALYTICAL REPORT - Sampled on December 4, 2014

			WALP Guidelines			
Parameter	***Unit***	**CELL 2 EFF SLUDGE-1**	**Agricultural Low Grade**	**Agricultural High Grade**	**Retail Low Grade**	**Retail High Grade**
Aluminum	ug/g					
Antimony	ug/g					
Arsenic	ug/g	12	75	75	75	75
Barium	ug/g					
Beryllium	ug/g					
Bismuth	ug/g					
Cadmium	ug/g	2.30	25	20	20	5-20
Calcium	ug/g					
Chromium	ug/g					
Cobalt	ug/g	3.6	150	150	150	150
Copper	ug/g	1500				
Iron	ug/g					
Lead	ug/g	41	1000	500	500	500
Magnesium	ug/g					
Manganese	ug/g					
Mercury	ug/g	4.80	10	5	5	5
Molybdenum	ug/g	27	20	20	20	20
Nickel	ug/g	24.0	200	180	180	180
Phosphorus	ug/g					
Potassium	ug/g					
Selenium	ug/g	18	14	14	14	14
Silver	ug/g					
Sodium	ug/g					
Strontium	ug/g					
Tellurium	ug/g					
Thallium	ug/g					
Tin	ug/g					
Titanium	ug/g					
Vanadium	ug/g					
Zinc	ug/g	1300	2500	1850	1850	1850
Zirconium	ug/g					

Total Solids	%	4.8
Volatile Solids	%	45.6

APPENDIX E

Groundwater Monitoring Data

2014 - TOWN OF OLIVER

GROUND WATER 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 16	542	759		0.027	<0.010	21.6	21.6	0.03	1.02	168	29.6	18.1
Sept 4	402	781	19.8	<0.020	<0.010	23.9	23.9	<0.01	0.14	122	23.7	19.5

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 16	392	639		0.024	<0.010	0.123	0.123	0.01	5.14	129	16.9	15.9
Sept 4	370	581	8.47	0.02	<0.010	0.584	0.584	0.02	2.44	118	18.4	15.9

GROUND WATER MONITORING WELL #3 (91A 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 16	399	696		0.028	<0.010	0.058	0.058	0.05	5.98	100	36.1	16.9
Sept 4	438	744	10.1	0.046	<0.010	0.032	0.032	0.02	2.41	104	43	21.8

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 16	1050	2010		0.073	<0.010	3.02	3.02	0.02	2.09	285	82.7	115

Sept 4	1440	2040	125	0.023	<0.010	1.68	1.68	0.02	11.8	391	112	127

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 16	465	704		0.022	<0.010	0.577	0.577	0.03	2.35	145	25.0	13.1
Sept 4	456	734	14.7	<0.020	<0.010	0.683	0.683	0.01	9.95	132	30.4	14.0

2014 - TOWN OF OLIVER

GROUND WATER 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 (125th Street)	Test Well #6 (Golf Course)	Test Well #7 (Road #5 West)
January	8	10.23	5.93	1.41	fenced off	8.65	9.39	3.92 (dry)	25.91 (dry)
February	3	10.3.5	6.05	1.39	fenced off	8.24	9.39	3.92 (dry)	25.91 (dry)
March	4	10.46	6.14	1.33	fenced off	7.96	9.45	3.92 (dry)	25.91 (dry)
April	16	10.57	6.27	1.39	fenced off	8.02	9.47	3.92 (dry)	25.91 (dry)
May	5	10.54	6.18	1.37	fenced off	8.23	9.40	3.92 (dry)	25.91 (dry)
June	11	10.58	6.24	1.43	fenced off	8.78	8.70	3.92 (dry)	25.91 (dry)
July	3	10.54	6.14	1.48	fenced off	8.74	8.43	3.92 (dry)	25.91 (dry)
August	7	10.35	6.05	1.65	fenced off	9.4	8.13	3.92 (dry)	25.91 (dry)
September	4	10.14	5.90	1.30	fenced off	9.4	8.13	3.92 (dry)	25.91 (dry)
October	8	9.98	5.84	1.35	fenced off	9.62	8.94	3.92 (dry)	25.91 (dry)
November	5	10.01	6.06	1.28	fenced off	7.43	9.32	3.92 (dry)	25.91 (dry)
December	15	10.18	6.14	1.11	fenced off	8.37	9.77	3.92 (dry)	25.91 (dry)

APPENDIX F

Operational Certificate for PE 12717

Province of British Columbia

MINISTRY OF ENVIRONMENT, LANDS AND PARKS

BC Environment

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

RECEIVED
DEC 20 1995
TOWN OF OLIVER

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

REGISTERED MAIL

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

Attention: Tom Szalay, Administrator

LE:
OUTING:

OMMENTS:

OPIES:

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

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

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

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

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

Yours truly,

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

Enclosure

PROVINCE OF
BRITISH COLUMBIA

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

MINISTRY OF ENVIRONMENT,
LANDS AND PARKS

OPERATIONAL CERTIFICATE

PE 13717

Under the Provisions of the Waste Management Act

TOWN OF OLIVER

P.O. Box 638

Oliver, British Columbia

V0E 1T0

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

1. SPECIFIC AUTHORIZED DISCHARGES AND RELATED REQUIREMENTS

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

1.1 Discharge Quantity

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

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

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

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

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

1.2 Discharge Quality

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

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

Total Suspended Solids - 60 mg/L.

1.3 Permit Fee Calculations for Reclaimed Wastewater Discharge to Land

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

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

Total Suspended Solids - 10 mg/L.

1.4 Authorized Works

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

1.5 Source of Discharge

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

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

1.6 Location of Works

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

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

1.7 Location of Discharge

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

1.8 Irrigation Plan

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

2. GENERAL REQUIREMENTS

2.1 Maintenance of Works, Emergency Procedures and Noncompliance Reporting

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

2.2 Bypasses

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

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

2.3 Process Modifications

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

2.4 Alternate Water Supply

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

2.5 Plans - New Works

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

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

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

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

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

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

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

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

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

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

3. GENERAL REQUIREMENTS - ALL DISCHARGES

3.1 Operation and Maintenance

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

3.2 Facility Classification

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

3.3 Operator Certification

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

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

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

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

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

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

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

3.4 Water Conservation

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

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

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

3.6 Influent Wastes Bylaw

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

3.7 Contingency Plan

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

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

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

3.8 Sludge Management Plan

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

3.9 Odours

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

3.10 Fencing

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

3.11 Surface Water Diversionary Works

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

3.12 Signage

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

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

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

4. GENERAL REQUIREMENTS - EFFLUENT STORAGE RESERVOIR

4.1 Leakage

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

5. GENERAL REQUIREMENTS - EFFLUENT IRRIGATION

5.1 Disinfection - Chlorination

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

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

5.2 Annual Irrigation

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

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

5.3 Buffer Zones

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

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

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

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

5.4 Surface Runoff

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

5.5 Surfacing Reclaimed Wastewater

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

5.6 Spray Irrigation Drift

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

5.7 Irrigation Rates

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

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

5.8 Agricultural Products Lag Time

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

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

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

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

6. MONITORING REQUIREMENTS

6.1 Influent Sampling Program - (Equalization Basin)

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

6.1.2 Obtain analyses of the influent sample for the following:

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

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

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

6.2.2 Obtain analyses of the effluent sample for the following:

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

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

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

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

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

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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.

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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.

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6.8 Groundwater Monitoring Program

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

6.9 Soils Assessment Program

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

7. REPORTING

7.1 General Reporting

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

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

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

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7.2 Annual Reporting

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

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

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

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

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

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

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

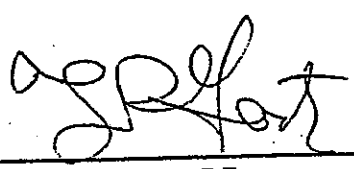
7.2.4.4 Records of efforts to administer the Influent Wastes By-law(s) for inspection by the Regional Waste Manager or his designate. Include as an attachment, any amendments to the Influent Wastes By-law(s) that have been made during the past year.

7.2.4.5 Copy of the Contingency Plan.

7.2.4.6 Copy of the Sludge Management Plan.

7.2.4.7 Copy of the Annual Flow Summaries.

7.2.4.8 Copy of the Annual Irrigation Summaries.



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APPENDIX A

Requirements of Reclaimed Wastewater Users

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

1 GENERAL REQUIREMENTS

1.1 Plans - New Works

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

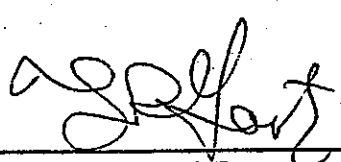
1.1.2 Design and construct the irrigation works in accordance with best current agricultural practice and the "Pollution Control Guidelines for Municipal Effluent Application to Land", dated January 1983, and any amendments thereto, issued by the Ministry of Environment of British Columbia, and also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

1.2 Construction Criteria

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

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

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



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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.

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2.2 Surface Runoff

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

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

2.3 Surfacing Reclaimed Wastewater

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

2.3.2 Irrigation shall be managed as to prevent ponding.

2.4 Spray Irrigation Drift

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

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

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

2.5 Irrigation Rates

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

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

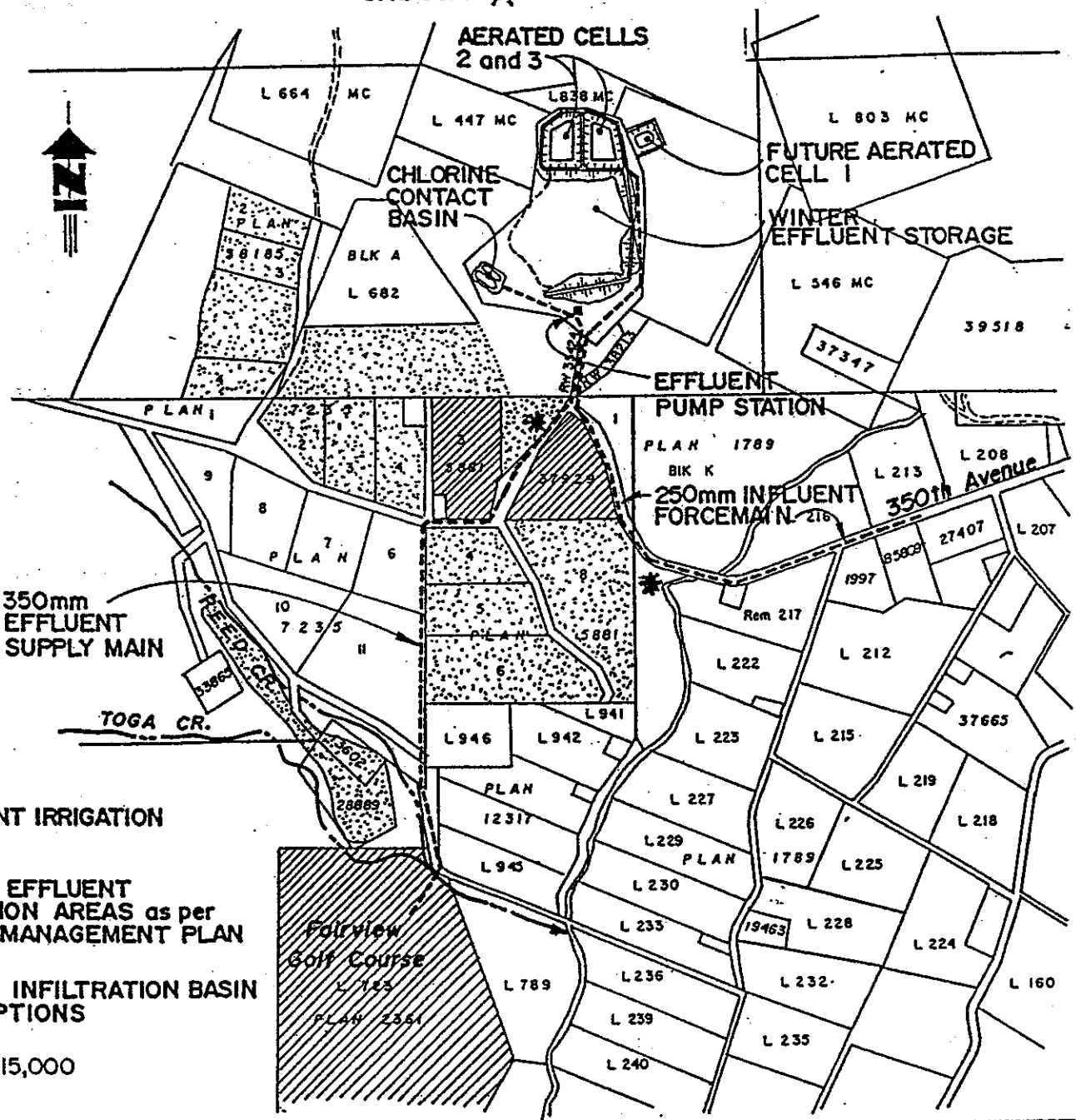
T.R. Forty, P.Eng.
Assistant Regional Waste Manager

Province of
British Columbia
Ministry of Environment,
Lands and Parks

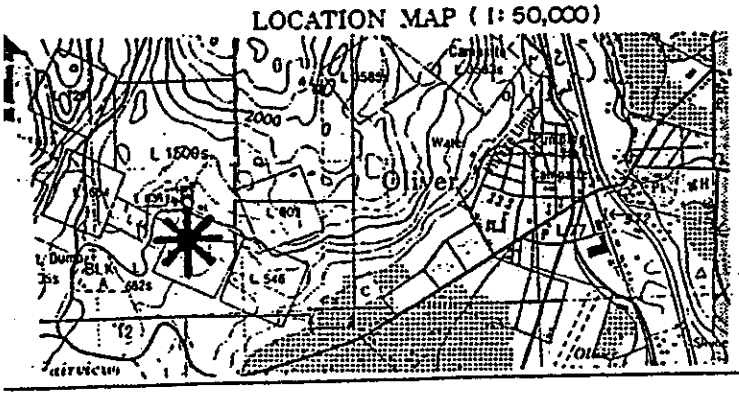
BC Environment

ENVIRONMENTAL PROTECTION DIVISION

SITE PLAN A



LOCATION MAP (1: 50,000)



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December 14, 1995
Date Issued

Date Amended

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Permit No./Approval No. PE 13717

2.6 Agricultural Products Lag Time

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

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

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

2.7 Insect and Vector Control

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

2.8 Irrigation of Public Areas

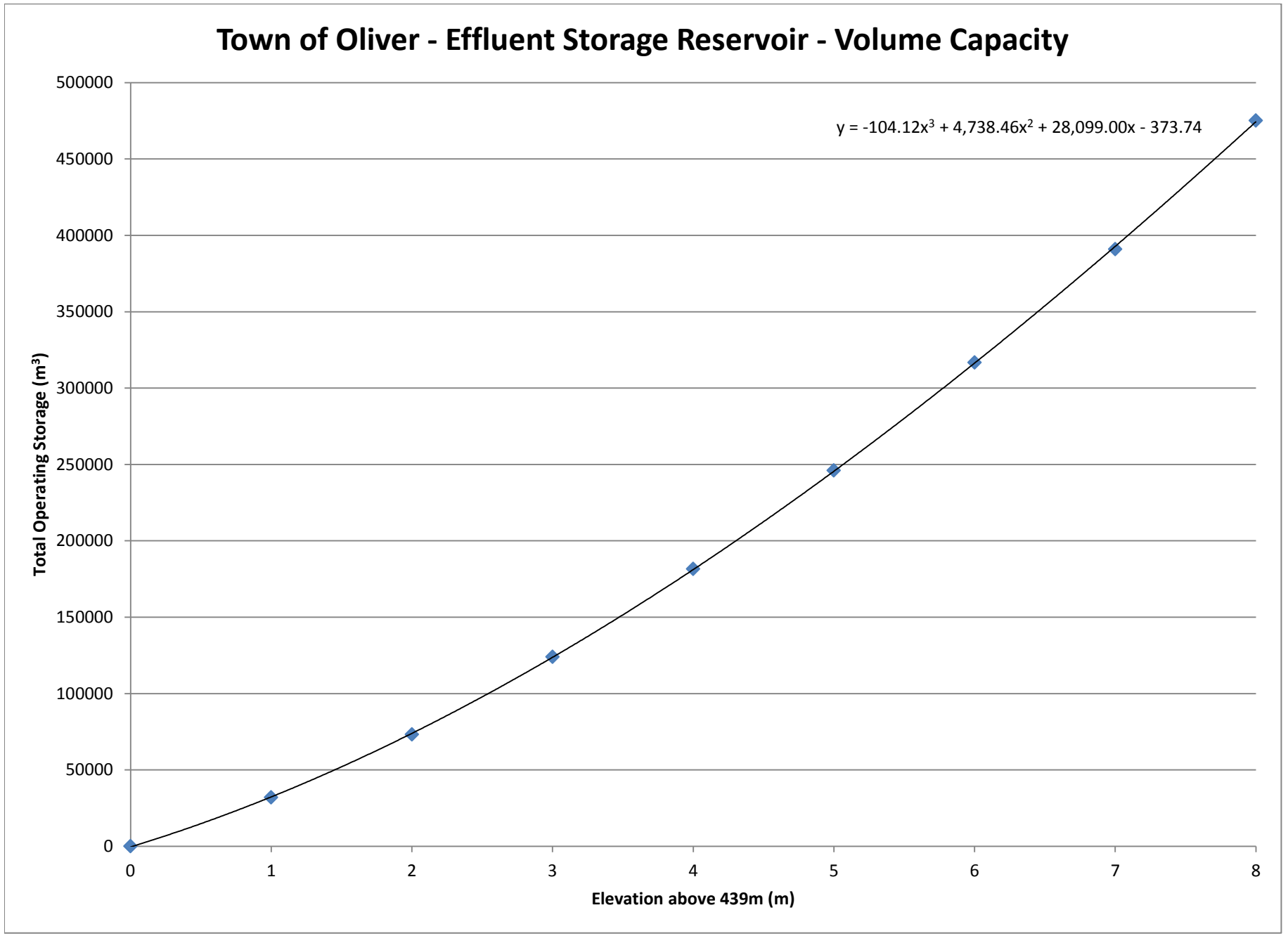
2.8.1 Irrigation on golf courses or cemeteries shall only be practised when the public are not present.

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

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

APPENDIX G

Effluent Storage Reservoir - Volume Calibration Curve



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Town of Oliver - Effluent Storage Reservoir - Volume Capacity

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