RESORT MUNICIPALITY OF WHISTLER

LIQUID WASTE MANAGEMENT PLAN 2018 UPDATE

OCTOBER 2018

Appendix A

LIQUID WASTE MANAGEMENT PLAN 2018 UPDATE

RESORT MUNICIPALITY OF WHISTLER

PROJECT NO.: D-179A3.00
DATE: OCTOBER 2018

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QUALITY MANAGEMENT

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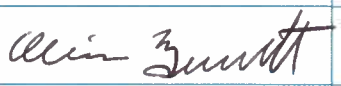
Signature				
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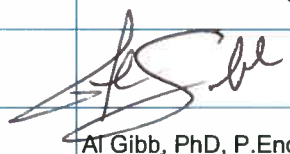
Signature				
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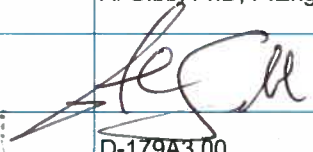
Signature				
Project number	D-179A3.00			

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APPENDICES

1 INTRODUCTION

This 2018 Liquid Waste Management Plan (LWMP) update is a confirmation and extension of the original 1993 plan, the subsequent 2004 LWMP Update and the interim draft 2015 LWMP Update. The purpose of the 2018 LWMP Update is to review the LWMP program progress, and to revise the LWMP if necessary to suit new conditions that may now impact the earlier Plan.

1.1 BACKGROUND

The Resort Municipality of Whistler (RMOW) initiated a Liquid Waste Management Plan (LWMP) in 1990, to meet the needs of population growth and to protect water quality in the Cheakamus River (D&K 1990a, 1990b, 1992 and 1993). The LWMP was completed in May 1993, and was approved by the B.C. Ministry of Environment (formerly called the Ministry of Environment, Lands and Parks and the Ministry of Water, Land and Air Protection, and hereafter referred to as the MOE) in September 1993. By the year 2000, many of the provisions of the 1993 LWMP were either in place or in progress, but some items required reappraisal. The RMOW determined at that time to update the LWMP, to ensure that water conservation and wastewater treatment strategies and technologies remained current. The resulting LWMP Update was completed and approved by the MOE in 2004 (D&K 2004). In 2014, the RMOW initiated this second update of the LWMP. A draft of the 2015 LWMP Update Report was submitted to the MOE for review in January of 2016. The draft 2015 Update Report was not finalized, and was subsequently updated again as this 2018 LWMP Update Report

A primary goal of developing a LWMP according to the Guidelines for Developing a LWMP (published by the MOE in 1992 and subsequently revised in draft form in 2001 and again in 2004) is to mitigate and minimize the adverse environmental impacts of development according to the Official Community Plan (OCP). The Guidelines specify extensive stakeholder and public consultation in developing a LWMP (this was undertaken during development of the 1993 RMOW LWMP, and also during the subsequent 2004 LWMP Update).

The study area for the 2018 LWMP update is shown on Figure 1-1.

1.1 LWMP PROCESS

1.1.1 *1993/2004 LWMP*

The Guidelines for Developing a LWMP suggest a three-stage process, each involving meaningful public consultation. Stage 1 is intended to identify existing conditions, and to consider a range of treatment and disposal options. Treatment and disposal options that have merit are advanced to Stage 2 for more detailed evaluation. Finally, the selected option is described and costed, the implementation schedule is developed, and draft operational certificates are prepared in Stage 3. When the Stage 3 plan is approved by the Minister, the local government has the authority to implement the Plan without further approvals being sought from the electorate. An approved LWMP should be updated from time to time (e.g. every 5 to 10 years), to monitor progress, review commitments, and evaluate changing conditions and new technologies.

The 2004 update of the 1993 LWMP was done according to the 1992 LWMP Guidelines, in that Technical and Local Advisory Committees representing regulatory agencies and community and downstream interests were formed. The Advisory Committees met to discuss and provide input to the LWMP update.

R A N G E S

P A C I F I C

M O U N T A I N S)

C Ô T I È R E)

WHISTLER RESORT
MUNICIPALITY

LEGEND

STUDY AREA BOUNDARY

RESORT MUNICIPALITY OF WHISTLER
LIQUID WASTE MANAGEMENT PLAN
2015 UPDATE - STUDY AREA

FIGURE 1-1

OPUS DAYTONKNIGHT
North Vancouver Office
604-990-4800
210-889 Harbourside Drive
North Vancouver BC
V7P 3S1, Canada
DRAWN BY: RB
DWG. No. D-179A3.00

Plot Date: 17 Apr 2015 @ 10:54 AM Path:G:\D3&K CAD Drawings\DKSERVER P Share\PRODWGS\WHISTLER\D-179A3-00\FIGURES\d-179A3-00 FIG 1-1.dwg FIGURE 1-1 PLOT SCALE: 1:1 PLOTTED BY: Richard Blackman LAST SAVED BY: vcrisp0

Since the 2004 project was primarily an update from the existing 1993 RMOW LWMP, the process was undertaken in one comprehensive stage as approved by the MOE.

Since this report contains an update of the existing (1993/2004) LWMP, it does not include the three stage planning process that is required to undertake a new plan. The updated LWMP is required to undergo review by the MOE Regional Office in Surrey, BC, and to receive RMOW Council approval prior to submission to the Minister of the Environment for approval.

1.1.2 *2018 LWMP UPDATE*

Depending on the scope of any revisions proposed in a LWMP Update, extensive stakeholder and public consultation may not be required. If a major amendment is proposed, then formation of stakeholder committees and extensive public consultation will be required before the LWMP update can be approved by the MOE (this was the case for the 2004 Update of the RMOW LWMP). If only minor amendments are required, this can normally be undertaken in direct consultation with the regional office of the MOE, and consultation is typically limited to dissemination of information to the community at large. Major amendments could include relocation of treatment facilities or significant changes to service areas, where minor amendments could include updating of schedules and growth projections, minor changes to service areas, cost updates, etc.

For the purpose of the RMOW LWMP 2018 Update, a two-phased approach was adopted. Phase 1 involved review of the 2004 LWMP schedule of commitments, with identification of items completed and any proposed updates and amendments. A first draft LWMP Update Report summarizing current progress and proposed amendments was then developed in consultation with the RMOW and submitted to the MOE for review in January of 2016. This second draft incorporates the 2018 update of the 2015 Report. A meeting with MOE held on June 6, 2018, to discuss MOE comments on the initial 2015 Update Report, and to confirm the requirements for completion of the update; the minutes from that meeting are attached in Appendix A.

Phase 2 of the 2018 LWMP Update was to depend on the outcome of Phase 1. If the LWMP 2018 Update is determined to include only minor amendments or updates, Phase 2 will not be necessary, and public and stakeholder consultation can be limited to dissemination of summary information informing the community at large (e.g., a newsletter, RMOW website, etc.). As determined at the June 6, 2018 meeting with the MOE and based on the initial draft 2015 LWMP Report, this 2018 LWMP Update entails only minor updates and edits, and implementation of Phase 2 is not necessary.

2 OFFICIAL COMMUNITY PLAN

2.1 LAND USE AND DEVELOPMENT

The RMOW Official Community Plan (OCP) is a provincially-mandated regulatory document containing a set of high-level plans and policies, such as land use designations that guide land use planning, social, economic, and environmental policies, and civic infrastructure investments.

The RMOW OCP (RMOW, 1993) is a bylaw that establishes the legal framework for regulation of land development, servicing, and environmental protection.

Various zoning amendments made in conformance with the 1993 OCP have resulted in a build-out capacity (built plus approved future development) of 61,285 Bed Units (BU). Growth in developed BU since 2004 according to information provided by the RMOW is summarized in Table 2-1.

Table 2-1: RMOW Accommodation Capacity, 2004 to 2016

YEAR	DEVELOPED BED UNITS
2004	49,868[1]
2005	50,502[2]
2006	51,136[2]
2007	51,770[2]
2008	52,404[2]
2009	53,038[1]
2010	53,098[1]
2011	53,312[1]
2012	53,526[1]
2013	53,746[1]
2014	53,940[1]
2015	54,135[1]
2016	54,652[1]

1 Provided by RMOW.
2 Extrapolated value.

2.2 WASTEWATER FLOWS

The wastewater flow rates recorded by the plant effluent flowmeter at the Whistler wastewater treatment plant (WWTP) during the period 2004 to 2017 are summarized in Table 2-2. (Note that the earlier 2015 draft of this LWMP Update used the recorded plant influent flows, but it was subsequently discovered that the plant influent flow meter includes internal plant recycle streams, and so does not give an accurate record of wastewater flows into the WWTP). The unit flow rates per developed BU are shown in Table 2-3. The unit wastewater flow rates were calculated by dividing the reported number of developed BU in a given year (from RMOW) into the corresponding average daily flow rate recorded at the WWTP. These flow rates include wastewater contributions from permanent residents, seasonal employees, day visitors, hotels, and commercial/industrial establishments, as well as storm runoff and groundwater (inflow and infiltration) entering the sewer collection system.

In reviewing the unit (per BU) flows, it is important to keep in mind that the calculation is based on the estimated number of developed BU, and that not all of the BU are not necessarily occupied, depending on the season and scheduled events in the area. In contrast to systems where high flows at the WWTP are typically caused solely by precipitation runoff events, high flows at the RMOW WWTP may be more influenced by high Village occupancy (see additional discussion in Section 2.3).

As shown in Table 2-3, the annual unit average day flow (ADF) over the period of record ranged from 177 L/BU/d to 240 L/BU/d (overall average 208 L/BU/d). This is lower than the flows recorded during 1993 to 2003 (overall average 240 L/d/developed BU, range 223 L/d/developed BU to 256 L/d/developed BU – see D&K, 2004). There is evidence that the unit flow rates (L/d/developed BU) have declined slightly compared to those recorded from 1993 to 2003. This may be due to reduction of infiltration and inflow of precipitation and snow melt into the wastewater collection system, and/or to water conservation measures, and/or the change to using plant effluent flows rather than influent flows as noted above.

Table 2-2: Whistler WWTP Effluent Flows, 2004 to 2017

YEAR	FLOW (M^3/DAY)				RATIO MDF:ADWF
	ADF[1]	ADWF[2]	AWWF[3]	MDF[4]	
2004	11,982	9,728	15,905	20,402	2.10
2005	11,792	9,051	17,589	24,150	2.67
2006	12,100	8,803	16,970	19,731	2.24
2007	12,426	9,673	17,097	24,247	2.51
2008	11,492	9,085	14,513	17,736	1.95
2009	9,387	6,240	14,556	17,859	2.86
2010	9,785	8,298	14,824	18,951	2.28
2011	10,889	8,264	14,418	19,472	2.36
2012	10,792	7,804	14,782	20,575	2.64
2013	10,324	7,566	14,315	19,351	2.56
2014	10,138	7,693	12,728	25,070	3.26
2015	10,245	7,862	14,943	25,019	3.18
2016	10,828	8,152	15,247	21,284	2.61
2017	10,553	7,529	14,265	19,852	2.64

1 ADF – average day flow for each year.
2 ADWF – Average Dry Weather Flow is the minimum 30-day rolling average of daily flows in each year.
3 AWWF – Average Wet Weather Flow is the maximum 30-day rolling average of daily flows in each year.
4 MDF – maximum daily flow recorded in each year.

Table 2-3: Whistler WWTP Unit Flows 2004 to 2016

YEAR	DEVELOPED BU	UNIT FLOW (L/DAY/DEVELOPED BU)			
		ADF[1]	ADWF[2]	AWWF[3]	MDF[4]
2004	49,868	240	195	319	409
2005	50,502	234	179	348	478
2006	511,356	237	172	332	386
2007	51,770	240	187	330	468
2008	52,404	219	173	277	338
2009	53,038	177	118	274	337
2010	53,098	184	156	279	357
2011	53,312	204	155	270	365
2012	53,526	201	146	276	384
2013	53,746	192	141	266	360
2014	53,940	188	143	236	465
2015	54,135	189	145	276	462
2016	54,652	198	149	279	389
Average		**208**	**158**	**289**	**400**

1 ADF – average day unit flow in each year.
2 ADWF – Average Dry Weather unit flow is the minimum 30-day rolling average of daily unit flows in each year.
3 AWWF – Average Wet Weather unit flow is the maximum 30-day rolling average of daily unit flows in each year.
4 MDF – maximum daily unit flow in each year.

Based on the information developed above, the projected AWWF (Maximum 30-Day Average Flow) for the build-out capacity of 61,285 BU at 289 L/c/d is approximately 17,800 m^3/d; this is compared to the design capacity of the existing wastewater treatment facility in Section 2.3.2.

2.1 WASTEWATER SYSTEM

2.2.1 *WASTEWATER COLLECTION SYSTEM*

The two areas within the RMOW that relied on ground disposal systems when the 1993 LWMP was completed were Emerald Estates and the west side of Alta Lake. These areas were known to be problematic for ground disposal, due to poor soil conditions, rock outcrops, steep slopes, etc. A commitment was made in the 1993 LWMP to provide sanitary sewers to connect Emerald Estates and the west side of Alta Lake to the Whistler WWTP.

Provision of sanitary sewers to Emerald Estates was completed in 2002.

Alta Lake Road is the last area in Whistler not completely serviced by sanitary sewer. In 2015 after reviewing sewer alignment options and public feedback, the RMOW concluded that the most cost-effective approach to connecting the remaining 32 properties on Alta Lake Road to the sewer system was to construct a shallow bury sewer along Alta Lake Road. Project costs were estimated to be approximately $2.4 million. Due to the lack of support from the property owners, the RMOW made the decision to place the project on hold. The recent history of RMOW initiatives to provide sewer service to the properties on Alta Lake Road is shown below.

- 2012: The RMOW explored different alignments and configurations to provide sewer services to the Alta Lake Road properties as instructed by Council.
- 2013: A resident information poll was mailed to Alta Lake Road residents to gather information about each property's sewers and septic fields.
- 2013: A ground survey was conducted by a local surveyor to gather elevation and topographical data. Pre-design models and cost estimates were developed to determine the lowest cost design option.
- 2013: An open house was held to present the configurations and cost estimates. The event was well attended with lots of constructive feedback. An open house feedback form was distributed at the event and mailed to residents to collect additional feedback.
- 2014: Five lots were connected to the municipal sewer system.
- 2015: Council supported a recommendation on August 11, 2015, to proceed using the shallow road alignment option.
- 2015: The RMOW communicated the substantially reduced cost to the impacted property owners.
- 2016: Based on lack of support from all property owners, the project was put on hold.

The RMOW has made numerous applications to senior government for funding support to service this area, but none of the applications have been successful.

2.2.2 *INFLOW AND INFILTRATION*

All wastewater collection systems are subject to some level of inflow and infiltration (I&I) of rainwater and/or snow melt. Inflow is defined as storm runoff that enters the collection from the surface through manhole covers, roof drains, or other surface openings. Infiltration is subsurface water that enters the collection system through leaky joints, pipe fractures and other subsurface openings. Either may increase in response to rainfall or snowmelt. Infiltration may also occur if the sewer intercepts a continuous groundwater flow; in this case, infiltration may last year round and contribute to the base flow. Where collection systems are subject to high I&I, large precipitation events can cause shock hydraulic loads at the WWTP, reducing treatment effectiveness and possibly resulting in spills or effluent permit exceedances.

The ratio of plant maximum daily flow (MDF) to average dry weather flow (ADWF) during periods of substantial precipitation is often used as an indicator of the degree of I&I in the collection system. The Municipal Wastewater Regulation (MWR) specifies that for treatment plants with contributory populations of 10,000 persons or greater, the discharger must ensure that the MDF:ADWF does not exceed 2:1 during storm or snowmelt events with less than a 5-year return period, unless the discharger addresses how I&I can be reduced as part of a LWMP. (This ratio is useful only where the ADWF does not already include high continuous infiltration flows.)

As noted in the previous section, the flow pattern at the RMOW WWTP differs from many other systems, in that Village occupancy has a significant impact on wastewater flows. Therefore, minimum flows at the RMOW WWTP may not correspond to dry weather, but to periods with low Village occupancy. However, for the purpose of determining the MDF:ADWF ratio, the ADWF was assumed to be the Minimum Month Flow as defined in Section 2.2. As shown in Table 2-2 in Section 2.2, on this basis the MDF: ADWF (Minimum Month) ratio has exceeded 2:1 in 13 of the last 14 years.

The flows at the Whistler WWTP and the daily rainfall and daily total precipitation (rainfall plus snowfall) recorded at Environment Canada Whistler Weather Station were analyzed during the 2004 LWMP Update, to evaluate the degree of I&I in the collection system. The analysis showed that in any given year, the period of typically low total precipitation coincided with the end of spring shoulder season and the early part of the fall shoulder season, when the occupancy at the Village was low. In general, high influent flows at the WWTP did not coincide with days of high rainfall or high total precipitation. The analysis showed that for the period of record studied, the Whistler WWTP was not normally subject to

excessive I&I during wet weather, and that precipitation events did not typically cause the MDF:ADWF (Minimum Month) ratio to exceed 2:1. High flows at the Whistler WWTP (i.e., MDF: Minimum Month >2:1) were typically associated with high Village occupancy during winter holiday periods and ski events, and not with precipitation. The dry weather diurnal low flows also suggested that little continuous infiltration (base flow) was occurring to influence plant flows during dry weather.

The 2004 analysis carried out to assess wet weather flows was updated using recent data for this 2018 LWMP Update. Days where precipitation exceeded 25 mm during the 2004 to 2017 period were compared to daily flows at the WWTP. The updated analysis was largely consistent with that carried out for the 2004 LWMP (i.e., high plant flows were not consistently correlated to significant precipitation events). During the 2004 to 2017 period, there were 149 days in total where the precipitation exceeded 25 mm; during the same period, there were a total of 210 days where the Maximum Day effluent flow (MDF) at the WWTP exceeded twice the Average Dry Weather (Minimum Month) Flow, but only 19 of those high flow days (9 %) coincided with the high precipitation days. However, the recorded MDF at the WWTP coincided with days where precipitation exceeded 35 mm in 5 of the 11 years from 2004 to 2017. Further, of the relatively high MDF's recorded in the years 2004, 2005, 2007, 2014 and 2015 (Table 2-2), heavy precipitation events (45 mm to 89 m) coincided with the MDF in 2005, 2007, and 2014, while the MDF in 2004 occurred on December 31 (maximum Village occupancy); no rainfall data was available for the MDF in 2015. This indicates that major precipitation events during winter (i.e., rain on snow) may periodically cause high flows at the WWTP, although other high flow events may be caused by high Village occupancy.

The RMOW conducts an ongoing program to maintain the sanitary sewer system and minimize I&I. Enhancements to reduce I&I have been aimed at eliminating potential entry points for surface runoff and groundwater. The annual RMOW budget for reduction of I&I is identified in Section 8 of this report. Further work is being done monitor flows in the sewer system, to analyze residual carrying capacity (KWL, 2000), and a comprehensive analysis of the sewer system capacity is planned for the near future. Inspection work is carried out to identify cross connections between the sanitary and storm sewer systems. The RMOW also completed an upgrade to the Spruce Grove Wastewater Pump Station in 2015 to improve the reliability of the pump station, and to reduce the risk of sewage overflows.

2.2.3 *WASTEWATER TREATMENT PLANT*

The Whistler Wastewater Treatment Plant (WWTP) was first constructed in 1976-1977 for a capacity of 4,500 m^3/d (9,000 BU), and it has been expanded through several biological and solids handling upgrades to a current capacity of 20,000 m^3/d maximum month flow (55,935 BU) according to Stantec (2007). The most recent upgrade was completed in 2010. As discussed in Section 2.2, the projected AWWF (maximum 30-day average flow) for the build-out capacity of 61,285 BU based on analysis of WWTP flows over the past 10 years was about 18,000 m^3/d (i.e., within the stated design capacity of the existing WWTP facilities).

The WWTP includes preliminary treatment to remove trash and grit, primary sedimentation, and advanced biological treatment to remove phosphorus and nitrogen. Disinfection of the treated effluent is undertaken using UV light prior to discharge to the Cheakamus River. Waste primary and biological solids are dewatered and used to manufacture compost (see Section 5.1 for more detail). Recovery of low-grade heat from the wastewater stream is used in a District Energy System to provide space and water heating for the nearby Cheakamus Crossing neighbourhood.

2.2.4 *OPERATIONAL CERTIFICATE*

The discharge from the Whistler WWTP is regulated under Operational Certificate ME-01452 (copy attached as Appendix B), which sets out the following requirements:

- Section 1.1.1: The maximum authorized rate of discharge is 16,000 cubic metres per day from May 15 to September 15, inclusive, and 25,000 cubic metres per day for the remainder of the year.
- Section 1.1.2: The characteristics of the discharge shall be:
  - 5-day carbonaceous biochemical oxygen demand (BOD_5) 30 mg/L, maximum
  - Total suspended solids (non-filterable residue) (TSS) 40 mg/L maximum
  - Acute Toxicity, LT_{50} 96 hours, minimum
  - Orthophosphate (as phosphorus) 1.75 mg/L maximum
  - The effluent quality is subject to review at the discretion of the Regional Waste Manager based on discharge and/or receiving environment monitoring data, progress and success of reduce, reuse, and recycle initiatives, and the availability of new cost-effective technologies.
- Section 1.1.3: The nutrient loading of the discharge from May 15 to September 15, inclusive, shall be:
  - Orthophosphate (as phosphorus) 36.6 kg/month, maximum
  - The orthophosphate loading criteria are subject to future review based on environmental assessment and river monitoring studies.
- Section 1.1.4: The existing treatment works approximately located as shown on Site Plan A are:
  - screening and grit removal facilities;
  - primary sedimentation tanks;
  - secondary treatment plant, including trickling filter/solids contact with secondary clarifiers;
  - chemical phosphorus removal facilities;
  - disinfection facilities;
  - sludge treatment by autothermal aerobic digestion with dewatering; and
  - a river outfall.
- Section 1.1.5: The proposed treatment works are biological phosphorus removal facilities and must be complete and in operation on or before December 31, 2007. The upgrading implementation schedule will be reviewed within five years of this operational certificate (circa 2005) or at an earlier date at the discretion of the director based on discharge and/or receiving environment monitoring data, progress and success of reduce, reuse and recycle initiatives and the availability of new cost-effective technologies.
- Section 2.9: Disinfection. The effluent shall be disinfected from May 15 to October 15 inclusive. If chlorine is used, maintain a chlorine residual (at the point of discharge or prior to dichlorination) between 0.1 mg/L and 1.0 mg/L at all times, and provide a contact time not less than 1 hour at average flow rates. Effluent shall be dechlorinated prior to discharge to reduce the chlorine residual below detection limits.
- Section 3.1: Effluent sampling frequency is as follows (samples are 24-hour composite unless otherwise noted):
  - $cBOD_5$ twice/week
  - TSS five times/week
  - Orthophosphate five times/week
  - Total Phosphorus weekly
  - Iron (dissolved) monthly
  - Toxicity, 96 hour LC50, % twice/year (grab samples)

- Fecal coliforms — twice/week during chlorination period (grab sample)
- Chlorine residual — daily during chlorination period (grab sample)
- Flow — daily

As noted elsewhere in this report, the treatment facilities were upgraded in 2010, and some of the works were replaced with alternative processes. As a result, the following edits to the Operational Certificate are needed as a component of this 2018 LWMP update:

- Section 1.1.4: Delete the references to trickling filter/solids contact secondary treatment and chemical phosphorus removal and replace these two bullets with a reference to activated sludge treatment designed for biological phosphorus removal with secondary clarifiers.
- Section 1.1.4: Delete the reference to autothermal aerobic digestion and replace this bullet with dewatering of waste solids with subsequent use to manufacture compost.
- Section 1.1.4: Add a bullet identifying the facilities to recover heat from the treated wastewater stream for use in a District Energy System to provide space heating and water heating for the nearby Cheakamus Crossing neighbourhood.
- Section 1.1.5: Delete this entire section and renumber Sections 1.1.6 and 1.1.7.
- Section 2.9: Delete the paragraph referring to chlorine and dichlorination since UV disinfection was implemented in 2010.
- Section 3.1.1: Delete chlorine residual as a monitoring parameter since chlorination is no longer practiced.

2.2.5 *WWTP PERFORMANCE*

The RMOW WWTP consistently produces a high quality effluent for discharge to the Cheakamus River. However, the effluent concentration limits set out in the Operational Certificate for BOD_5, TSS and orthophosphate are occasionally exceeded, as shown in Table 2-4. The effluent maximum monthly seasonal (summer) mass loading of orthophosphate to the Cheakamus River has also been occasionally exceeded (Table 2-5).

Table 2-4: RMOW WWTP Summary of Compliance with Operational Certificate

YEAR	EFFLUENT $CBOD_5$			EFFLUENT TSS			EFFLUENT $P\text{-}PO_4$		
	Exceedances[1]	Maximum Value Recorded		Exceedances[2]	Maximum Value Recorded		Exceedances[3]	Maximum Value Recorded	
		mg/L	Date		mg/L	Date		mg/L	Date
2004	2	33	29-12-2004	0	0	n/a	0	1.49	01-02-2004
2005	1	40	02-11-2005	3	65	01-01-2005	0	1.36	26-02-2005
2006	0	27	03-01-2006 & 26-12-2006	6	63	31-12-2006	0	1.50	03-11-2006
2007	3	42	02-01-2007	19	238	28-11-2007	0	0.29	06-08-2007
2008	7	58	03-01-2008	18	90	21-12-2008	0	0.41	22-12-2008
2009	8	72	04-02-2009	15	179	21-02-2009	42	10.59	19-04-2009
2010	0	23	02-02-2010	0	39	16-06-2010	0	1.60	25-07-2010
2011	1	48	26-08-2011	3	291	25-08-2011	10	3.84	23-09-2011
2012	0	11	31-05-2012	2	152	18-02-2012	0	1.16	29-10-2012
2013	2	57	30-10-2013	0	35	28-03-2013	0	1.71	07-12-2013
2014	0	17	19-02-2014	1	77	29-03-2014	0	1.72	16-01-2014
2015	0	12	25-03-2015	0	23	16-10-2015	0	1.43	28-02-2015
2016	0	28	26-10-2016	0	35	14-02-2016	1	1.88	12-10-2016
2017	2	40	18-01-2017	3	87	18-01-2017	9	3.32	17-12-2017

1 Exceedances: number of days allowable maximum BOD5 concentration of 30 mg/L was exceeded.
2 Exceedances: number of days allowable maximum TSS concentration of 40 mg/L was exceeded.
3 Exceedances: number of days allowable maximum P-PO4 concentration of 1.75 mg/L was exceeded.

Table 2-5: WWTP Effluent Orthophosphate Load May 15 to September 15

YEAR	EFFLUENT ORTHOPHOSPHATE MASS LOAD AS P (KG/30-DAYS)[1]			
	May 15 to June 14	**June 15 to July 15**	**July 16 to Aug 15**	**Aug 16 to Sep 15**
2004	20	22	30	20
2005	26	24	**54**	28
2006	15	23	36	32
2007	22	25	**51**	33
2008	11	22	24	23
2009	**106**	**41**	**62**	29
2010	31	13	**66**	26
2011[2]	**44**	**72**	**82**	**85**
2012	26	22	12	18
2013	13	10	17	**74**
2014	18	21	28	24
2015	25	32	32	30
2016	33	27	**41**	**42**
2017	23	18	20	11

1 Values in **bold** are those that exceed the Operational Certificate Maximum of 36.6 kg/month.
2 Orthophosphate loading exceedances in 2011 was due to process upsets because of turnover in operations staff.

3 ENVIRONMENTAL MONITORING

Monitoring of environmental conditions is an important aspect of LWMP's. Monitoring provides information regarding baseline conditions, so that environmental resources and potential problem areas can be identified, priorities for action can be set, and the effectiveness of LWMP strategies can be evaluated. The 1993 LWMP included a commitment to begin monitoring studies of the Cheakamus River. The results of river monitoring are discussed below.

3.1 CHEAKAMUS RIVER

The treated effluent from the Whistler Wastewater Treatment Plant (WWTP) is discharged to the Cheakamus River, which has significant environmental and fisheries values. The Cheakamus River flows into the Daisy Lake Reservoir approximately 10 km downstream of the WWTP. The Daisy Lake Dam, which is operated by BC Hydro, divides the Cheakamus River into two distinct reaches in terms of stream flow, nutrient availability, and biological populations. The reach of the river upstream of the reservoir is generally referred to as the Upper Cheakamus, while the reach downstream of the dam is called the Lower Cheakamus. Tributaries to the Upper Cheakamus between the WWTP discharge and Daisy Lake include Millar Creek and Callaghan Creek. Brandywine Creek flows into the north end of Daisy Lake. Tributaries to the Lower Cheakamus include Rubble Creek, Chance Creek, Culliton Creek, Swift Creek, and the Cheekeye River. The Lower Cheakamus joins the Squamish River approximately 28 km downstream of the dam.

In the 1980's, the MOE determined that phosphorus controlled the accrual of periphyton biomass (mainly benthic algae but also including bacteria and fungi) in the Cheakamus River (MELP, 1989). That finding implied that any loading of phosphorus in a biologically available form to the river was a major factor determining periphyton biomass. Periphyton is an important component of the aquatic food web in the river, but excessive growth (periodic blooms) of algae can cause a deterioration in water quality, reduce the quality of fish habitat, and degrade aesthetic values. Phosphorus is discharged to the Cheakamus River from the Whistler WWTP and it is introduced from natural sources via tributary inflows (Perrin 1998).

3.2 WATER DIVERSION AT THE DAISY LAKE DAM

Water is diverted at the outlet of Daisy Lake Dam to the Squamish River as part of water management for power production by B.C. Hydro. In May of 1997, the Department of Fisheries and Oceans (DFO) issued an Order to B.C. Hydro to maintain a flow release schedule for the Cheakamus River below the Daisy Lake Dam. The order stated that the flow be "sufficient to protect the fish and spawning habitats downstream" of the Daisy Lake Dam on the Cheakamus River.

In July of 1998, a Cheakamus working group composed of B.C. Hydro, DFO, the MOE, the B.C. Ministry of Fisheries, the Squamish First Nations, and the Steelhead Society of B.C. met to develop a flow regime agreeable to all parties. Consensus was reached on a flow agreement that provided an average release of 45% of inflows over a 7-day period based on the previous day inflows. A minimum flow of 5 m^3/s was to be provided at all times.

Further review of the B.C. Hydro operations occurred with a Consultative Committee under the Water Use Planning process, and adjustments to the above flow agreement resulted as of 2006 (Nishi, 2015). According to B.C. Hydro's report 'Cheakamus Project Water Use Plan' (BC Hydro, 2005), the agreed minimum flow releases from Daisy Lake Dam to the Cheakamus River have increased during summer months and are now:

— 3 m^3/s from November 1st to December 31st,

— 5 m^3/s from January 1st to March 31st and,
— 7 m^3/s from April 1st to October 31st.

There is also an agreement to release additional flow when required to maintain a minimum flow at the Brackendale gauge (08GA043) of:

— 15 m^3/s from November 1st to March 31st,
— 20 m^3/s from April 1st to June 30th,
— 38 m^3/s from July 1st to August 15th,
— 20 m^3/s from August 16th to August 31st (or 38 m^3/s for recreational use at the discretion of the Comptroller), and;
— 20 m^3/s from September 1st to October 31st.

The revised flow agreement is meant to more closely resemble historical flow regimes and accommodate the multiple interests in this watershed.

The processes in the Daisy Lake Reservoir have the net effect of retaining soluble phosphorus and limiting phosphorus transport to the lower Cheakamus River. MELP (1989) speculated that algae blooms observed in the Lower Cheakamus River in the 1980's was caused by phosphorus discharged from the Daisy Lake Reservoir. Actual evidence from field sampling and phosphorus transport calculations (Perrin 1998) showed the net effect of the reservoir was to retain phosphorus, an effect that caused natural sources of phosphorus from tributaries (e.g. Rubble Creek) to be more important than phosphorus from the WWTP in contributing to accrual of algal biomass observed in reaches of the Lower Cheakamus River.

3.3 CHEAKAMUS RIVER STUDIES

A study was commissioned in 1996, to gain insight into the relative importance of the WWTP discharge and nutrient transport in the Daisy Lake reservoir on algae growth in the Lower Cheakamus River. The study was aimed at determining the sources of phosphorus loading to the river, and determining the impacts of phosphorus in the WWTP discharge on the accrual of periphytic (algae) biomass upstream and downstream of the Daisy Lake Reservoir.

A second study was commissioned by RMOW and BC Hydro in 2000 to expand on data collected in 1996 as part of a process of planning water releases to the lower Cheakamus River from the Daisy Lake Reservoir. Methods of data collection and the list of parameters measured were the same as in the 1996 study, but new sampling sites on the main stem were added in 2000 to increase the extent of the study area from upstream of the WWTP to the confluence with the Squamish River. Data collected in 2000 supported new phosphorus transport calculations (phosphorus concentration multiplied by water flow in a given period of time). Results confirmed the 1996 findings that phosphorus discharge from the WWTP is greatly diluted over the downstream gradient. This attenuation of phosphorus from the plant relative to other sources is particularly evident downstream of the Daisy Lake Dam, because of relatively large contributions of water and phosphorus from tributary streams.

A more detailed summary of the two studies noted above can be found in the 2004 LWMP update report (D&K, 2004).

A third Cheakamus River monitoring study was completed in 2014, following upgrades to the WWTP (Perrin & Bennett, 2014). The 2014 study was designed to assess the relative proportions of nitrogen and phosphorus originating from the WWTP, and their impact on downstream algae growth. Results from the study indicate that the WWTP is generally effective at maintaining algal growth in the Cheakamus River at less than the Provincial Criterion of 10 µg-chl-a cm^2 in the summer.

However, during the winter of 2013/2014, when the study was conducted, phosphorus concentrations downstream of the WWTP exceeded those known to cause algae growth. This was due to normal

phosphorus loading from the WWTP discharge and low winter flows, resulting in low dilution. The phosphorus and nitrogen concentrations supported algae growth downstream of the plant that was more than double the Provincial Criterion. However, the algal growth was not considered harmful to the river, nor was it aesthetically unpleasant, as the water was well oxygenated and suspended solids concentrations were found to be low. The algal growth was, in fact, considered to be beneficial to fish, particularly salmonids that rear in the Cheakamus River. This conclusion is supported by other studies conducted in British Columbia and Alaskan rivers (Deegan et al., 1997; Johnston et al., 1990).

The RMOW intends to complete a monitoring study again in 2019. The results of this study, will be added to the existing model that determines the impact on the Cheakamus River associated with seasonal discharges from the WWTP.

The monitoring study and the updated model can be used to re-evaluate the WWTP discharge quality that may be required to protect the receiving environment, and consequently to assess the potential need for additional improvements to the WWTP.

4 WATER CONSERVATION

Water conservation can be used to reduce wastewater flow rates, although this has no effect on the mass loading of contaminants at the wastewater treatment plant. The RMOW began working towards universal water metering and flow reduction in 1995, when Council adopted a bylaw requiring that all new construction be fitted with water meters. This applies to all land uses, and requires individual meters in each condominium hotel unit if that condo-hotel has single-point service to each unit (i.e., if each unit has its own hot water heater). As well, the Whistler 2020 document sets water conservation as a priority and aims to reduce water consumption to 425 L/c/d from the 2011 consumption of 536 L/c/d.

Presently, approximately 36% of service connections are metered (RMOW maintains the meters) however only twelve (12) of them are used for volumetric billing.

Since the 1990's, various water conservation programs have been in stages of implementation including:

- irrigation source program for Whistler Golf Courses (late 1990's), and municipal parks (2003-2004) $540,000 over 2 years;
- low flow plumbing fixture bylaw (RMOW Bylaw No. 1618, 2003);
- reduction of unaccounted for water losses including low flow meter installation ($160,000 over 3 years) and detailed subflow monitoring ($200,000 over 3 years); and
- enforcement of irrigation/sprinkling through the Outdoor Potable Water Use Bylaw is ongoing, (RMOW Bylaw No. 2198, 2018, 2001);

The water conservation strategy for the RMOW is presently steered by the Comprehensive Water Conservation and Supply Plan 2015 (RMOW, 2015). The plan evaluated the effectiveness of a number of water conservation programs. In 2015, the programs in Table 4-1 were prioritized based on a cost-benefit analysis to reduce water demand.

Table 4-1: Recommended priority for Water Conservation and Supply Programs (2015)

PRIORITY	PROGRAM NAME
C1	Once-Through Water Use By-law
C2	Update Comprehensive Water Usage bylaw
C3	Water Use bylaw - Outreach
C4	Water Leakage Reduction Program
C5	Public Education
S1	Spring Creek Booster Station

5 RESOURCE RECOVERY

5.1 BENEFICIAL USE OF WWTP SOLIDS

At the time, the 2004 LWMP Update was completed, the Whistler WWTP included autothermal thermophilic aerobic digestion (ATAD) of waste solids to produce a Class A biosolids product suitable for use as a soil conditioner. The biosolids management strategies considered at that time focused on beneficial use of Class A biosolids (see D&K, 2004 for more detail).

The subsequent WWTP upgrade completed in 2010 involved de-commissioning of the solids digestion (ATAD) process. Waste solids are now dewatered and used to manufacture compost according to the Organic Matter Recycling Regulation (OMRR). The composting facility accepts residential and commercial wood waste, as well as waste solids from the regions WWTP's Squamish, Pemberton and Whistler. Sea to Sky Soils also accepts a small amount of these waste solids. Compost is for sale at the RMOW Waste Transfer Station, the Squamish landfill and at Sea to Sky Soils.

The RMOW is currently undertaking measures to increase the capacity of the composting facility, and is also undertaking a study to assess biosolids management options.

5.2 RECLAIMED WATER (TREATED EFFLUENT WATER)

Reclaimed effluent is not presently used for non-potable applications within the WWTP at this time. The system installed is not able to be utilized. The RMOW is looking at what system upgrades would be required to bring the system online in 2019.

5.3 HEAT RECOVERY

As noted earlier, heat recovered from the WWTP effluent is used to provide space and water heating in a District Energy System (DES) for the nearby Cheakamus Crossing neighbourhood. The DES is reported to provide up to 90% of the space heating and domestic water heating for approximately 2,000 users occupying 85,000 m^2 of space. The annual capacity of the DES is 11,000 MWh of building energy, 80% of which is provided from the WWTP (the other 20% is provided from the BC Hydro grid to operate the heat pumps). The annual reported reduction in greenhouse gas emissions compared to conventional heating is 2,000 tCO_2e/year.

6 SOURCE CONTROL

Source control for the purpose of this 2018 LWMP Update refers to the prevention of contaminants from entering sanitary sewers and storm drains by reducing or eliminating those contaminants at the source, and through elimination of on-site sewage disposal systems. It is important to emphasize that it is essential to prevent unauthorized discharges of industrial, toxic, and/or dangerous wastes to the WWTP and/or to the receiving environment.

Source control is also important for protecting waste solids quality to enhance reuse options. Monitoring of waste solids quality is a good indicator of problem contaminants being discharged to the sewer system, since many contaminants (e.g., many metals and some hazardous organic compounds) tend to associate with solids. The waste solids produced at the Whistler WWTP meet the most restrictive (Class A) limits for trace elements. This indicates that discharges to the collector sewers do not contain significant quantities of trace metals. This is consistent with the fact that Whistler is a resort community, and it does not contain the large industrial or agricultural base typically associated with non-point source pollution problems.

The RMOW enacted Public and Private Sewer Usage Regulation Bylaw No. 551 in 1987. An update to this bylaw in conjunction with a bylaw for grease reduction is planned for review in 2020.

The following recommendations for source control activities are carried over from the 2004 LWMP Update:

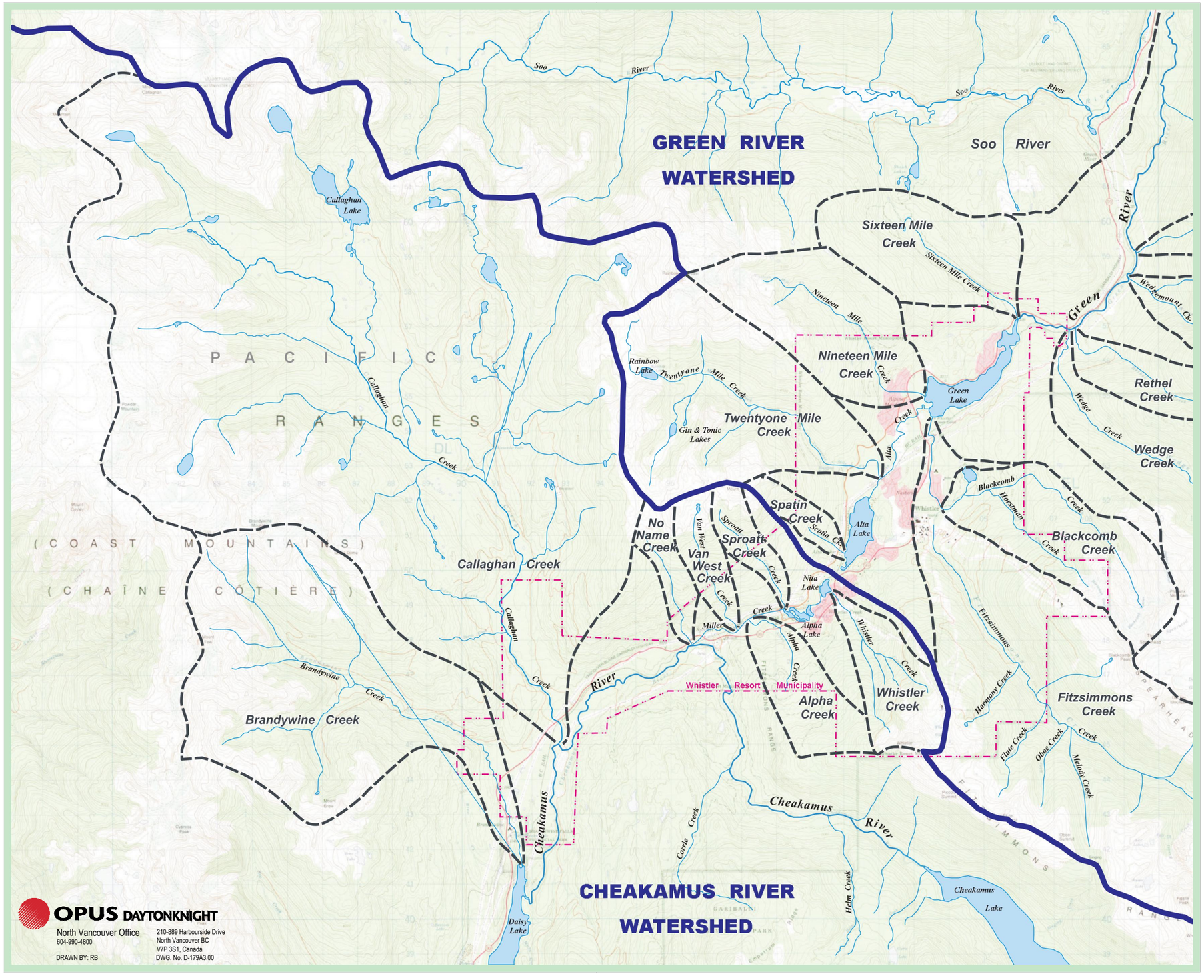
- Continue to periodically review and update the Sanitary Sewer Use Bylaw to stay current with successful approaches elsewhere. Monitor waste solids quality to detect any significant increases in trace elements being discharged to the sanitary sewer system.
- Continue to periodically monitor the pumper truck discharges and other potentially problematic wastes entering the WWTP. Random sampling and analysis of pumper truck contents is recommended, to assess the nature of the waste being discharged to the plant and to discourage unauthorized discharges.
- Continue to identify industries in the study area that may be of concern from a source control perspective, and identify specific contaminants associated with those industries (e.g., oil and grease from the restaurant industry). Aside from oil and grease from restaurants, focus initial efforts on the Function Junction area, where most of the local industry is located.
- Continue to focus source control efforts on areas where potential problems are identified.

7 STORMWATER MANAGEMENT

This section contains a brief review of initiatives within the RMOW that were determined to be applicable to the management of storm runoff for the LWMP 2018 Update. More detail can be found in the documents referenced.

The storm drainage system in the RMOW is separate from the sanitary sewer collection system. Collected stormwater runoff is not carried to the Whistler Wastewater Treatment Plant (WWTP), except for surface runoff and groundwater that finds its way into the sanitary sewer system through manholes and gaps in subsurface pipes (see Section 2.3.1). From the standpoint of water quality, storm drainage is of concern primarily for the potential impact of urban contaminants carried by surface runoff to streams, lakes, wetlands, and groundwater. From the standpoint of water quantity, storm runoff is of concern for protection of life and property (flooding, erosion and slope stability), and protection of aquatic habitat (erosion and sedimentation). The boundaries of stream basins and watercourses that lie partly or wholly within the RMOW) are illustrated on Figure 7-1. It is generally assumed in the Whistler valley that fish are either present in the watercourses, or that the watercourse are connected to fish-bearing watercourses.

The water conservation strategy for the RMOW is steered by the Whistler Integrated Stormwater Management Study (KWL, 2010). This study contains a stormwater strategy which contains elements to assist the RMOW in planning and controlling the impacts for public safety and environment.



OPUS DAYTONKNIGHT

North Vancouver Office
604-990-4800

210-889 Harbourside Drive
North Vancouver BC
V7P 3S1, Canada

DRAWN BY: RB

DWG. No. D-179A3.00

LEGEND

- Resort Municipality of Whistler Boundary
- Watershed Boundary
- Sub-Catchment Boundary
- Creeks

Resort Municipality of Whistler 2015 Liquid Waste Management Plan Update Watershed Boundaries

Figure 7-1

Plot Date: 17 Apr 2015 @ 10:53 AM Path: G:\D&K CAD Drawings\DKSERVER P Share\PRODWGS\WHISTLER\D-179A3-00\FIGURES\d-179A3-00 FIG 7-1.dwg FIGURE 7-1 PLOT SCALE: 1:1 PLOTTED BY: Richard Blackman LAST SAVED BY: vcs80

8 UPDATED IMPLEMENTATION PLAN

The RMOW commitments and schedule for the LWMP 2018 Update are summarized in Table 8-1. Line items are included for specific LWMP components, based on current budgets and the RMOW Five Year Financial Plan. The last column in Table 8-1 shows the current status of each line item.

Table 8-1: LWMP Financial Commitments and Schedule

LWMP COMPONENT	LWMP UPDATE SCHEDULE	ESTIMATED COSTS	STATUS
1. UPDATE LWMP			
— Review LWMP progress, update as required and identify financial commitments and schedule (every 5 years)	2004, 2018	$37,000 for 2018 Update	Underway 2014/18
— Review LWMP progress, update as required and identify financial commitments and schedule (every 5 years)	2022	$250,000	Future
2. UPGRADE WWTP			
— Completion of WWTP upgrade to advanced biological treatment	2004 to 2010	$37 million	Completed 2011
— Ongoing operational and capital improvements[1]	Annual	$270,000	Ongoing
— Whistler WWTP condition assessment	2015, 2020	$50,000	Underway
— Whistler WWTP effluent filtration (pending monitoring studies)	Future	Future	Future
— Wastewater flow equalization in WWTP primary tanks	2015	$200,000	Completed, 2017
— Update Operational Certificate to reflect existing facilities	2019	$50,000	Future
3. ENVIRONMENTAL MONITORING AND MODELING			
— Cheakamus river monitoring	2008	$150,000	Completed
— Cheakamus river monitoring	2013/2014	$74,000	Completed
— Cheakamus river monitoring	2019/2020	$180,000	Future
4. UPGRADE SEWER COLLECTION SYSTEM			
— Sewer reconstruction	Annual	$200,000	On-going
— Sewer service Emerald Estates	2002	$7.7 million	Completed
— Sewer service to 5 properties on west side of Alta Lake	2014	$268,000	Completed
— Sewer service to remaining 19 properties on west side of Alta Lake	Future	$3.6 million	On-going
— Master Sewer Study (confirm capacity of pump station and sewer lines, provide a capital improvement program)	2014/2015	$50,000	Completed 2015
— Replacement upgrade for Alta Vista (sewer, drainage)	2020-2023	$4 million	Underway (design phase awarded)
5. WATER CONSERVATION AND WASTEWATER FLOW REDUCTION			
— Comprehensive Water Conservation and Supply Plan 2015	2014, 2015	Internal	Completed
— Review Water Conservation and Supply Plan progress, update as required and	2019	$50,000	2019

LWMP COMPONENT	LWMP UPDATE SCHEDULE	ESTIMATED COSTS	STATUS
identify financial commitments and schedule (every 5 years)			
6. BIOSOLIDS MANAGEMENT			
— Cover for dry wood storage at composting site	2014	$325,000	Completed
— Increasing capacity of sludge composting system	Future	TBD	Future
— Study to assess biosolids management options (phase 1)	2015	$40,000	Completion 2015
— Study to assess biosolids management options (phase 2)	2019	$40,000	Future
— Additional improvements to dry wood storage at composting site	2019	$1.4 million	Completion 2019
7. SOURCE CONTROL			
— Updated Source Control Bylaw (includes grease reduction)	2020	TBD	Future
8. STORM WATER MANAGEMENT			
— Review Whistler Integrated Storm Water Management Study progress, update as required and identify financial commitments and schedule (every ten (10) years)	2020	$100,000	Future

1 Includes improvements to dewatering capacity, headworks, administration building and odour control

8.1 COST PER USER

There is no expected increase to the Sewer User Fees, at set out in Bylaw 2183 Sewer User Fee, other than those for inflation. The commitments outlined in Table 8-1 are in the current financial plans.

8.2 PUBLIC CONSULTATION FOR 2018 LWMP UPDATE

At the June 6, 2018 meeting with a MOE representative, the discussion with respect to specific items in the draft 2015 LWMP resulted in an acknowledgment that the 2018 submission may be considered an update rather than an amendment. As a result public and stakeholder consultation was limited to dissemination of summary information to inform the community at large (e.g., a newsletter, RMOW website, etc.).

Information was disseminated through the following channels and events:

- Website page (https://www.whistler.ca/services/water-and-wastewater/wastewater/liquid-waste-management-plan)
- The September 25, 2018 Open House event, advertised in the local paper and via Whistler Today and the RMOW Event Calendar.

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APPENDIX

A MINUTES OF JUNE 6, 2018 MEETING WITH MINISTRY OF ENVIRONMENT

MEETING NOTES

JOB TITLE	RMOW – Liquid Waste Management Plan Update – D-179A3.00		
PROJECT NUMBER	D-179A3.00	**DATE**	June 6, 2018
TIME	10:30 am	**VENUE**	MOE office, 10470 – 152nd Street, Surrey, BC
SUBJECT	Client Requirements for Completion of LWMP Update		
CLIENT	RMOW		

ATTENDEES			
Name	**Company**	**Phone**	**Email**
Trevor Hamelin	MOE		
Gillian Woodward	RMOW		
Al Gibb	WSP	604-990-4800	Al.gibb@opusinternational.ca
Aline Bennett	WSP	604-990-4800	Aline.bennett@opusinternational.ca

ITEM		**INFORMATION**
1.0	**2015 DRAFT LWMP UPDATE REPORT**	The 2015 draft LWMP Update Report was submitted to MOE for review in January 2016. The items identified below are based on comments provided by MOE after reviewing the 2015 draft report.
2.0	**COMPLETION OF SEWER SERVICE TO ALTA LAKE**	RMOW has tried numerous times to obtain grant funding to support this project but all applications have been refused. There is no evidence to establish that there is harm to the lake from ground disposal systems. RMOW will continue to pursue this project but timing for implementation is uncertain. This will be noted in the LWMP Update Report.
3.0	**WWTP EFFLUENT FILTRATION STUDY**	The need for this study depends on river monitoring (Item 3). If it is shown that additional measures at the WWTP are needed to protect the river then the study will be implemented. This is noted in the draft LWMP Update Report.
4.0	**CHEAKAMUS RIVER MONITORING PROGRAM**	The results of the current monitoring program are summarized in the draft LWMP Update Report. There is at this time no evidence that the WWTP discharge is negatively impacting the River. This is summarized in the LWMP Update Report.

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MEETING NOTES

5.0	**CHANGE IN WASTE SOLIDS MANAGEMENT FROM 2004 LWMP**	A summary description of the current solids handling and management program will be added to the LWMP Update Report. The description of works in the plant Operational Certificate also needs to be updated.
6.0	**SOURCE CONTROL BYLAW**	The schedule for implementing a Source Control Bylaw will be noted in the LWMP Update Report
7.0	**PUBLIC CONSULATION**	The community has to be informed about the LWMP Update. RMOW to undertake this via a website update or if deemed appropriate a Public Open House. This will be summarized in the LWMP Update Report.
8.0	**PER USER COSTS**	The community has to be informed if per user costs will increase. The commitments in this LWMP Update will not result in increased cost to user. This will be noted in the LWMP Update report.
9.0	**FREQUENCY OF LWMP UPDATES**	The MOE would like an indication that the LWMP is being followed. It was agreed that the 5 year update cycle is reasonable.
10.0	**SCOPE OF LWMP UPDATE/AMENDMENT**	This appears to be an update rather than an amendment. RMOW to submit revised draft 2018 LWMP Update Report to the MOE for review.
11.0	**SCHEDULE**	The RMOW needs to complete the 2018 LWMP Update by September 2018 to meet grant funding deadlines.

These minutes are considered to be accurate recording of all items discussed. Written notice of discrepancies, errors or omission must be given within seven (7) days, otherwise the minutes will be accepted as written.

NEXT MEETING

An invitation will be issued if an additional meeting is required.

APPENDIX

B RMOW WWTP OPERATIONAL CERTIFICATE

BRITISH COLUMBIA

2010 VANCOUVER

File: ME-01452

Date: OCT 05 2005

REGISTERED MAIL

RESORT MUNICIPALITY OF WHISTLER
4325 Blackcomb Way
Whistler, British Columbia V0N 1B4

Dear Operational Certificate Holder:

Notice of Corrections to Operational Certificate **ME-01452**
RESORT MUNICIPALITY OF WHISTLER dated April 6, 2005

This to advise you that the following corrections have been made to the subject operational certificate:

Letter of Transmittal

Correction to the postal code, change from 'March' to 'April' in the first sentence and where appropriate from 'permit' to 'operational certificate'.

Page 1 of 9

from '*March*' to '*April*' in the first sentence

Page 2 of 9 - 1.1.2

from: Toxicity LT50, 96 hours, minimum;

to: Fish bioassay (rainbow trout), 96 hour LC50, 100 %;

Ministry of Water, Land and Air Protection
Regional Operations
Lower Mainland Region
Mailing/Location Address:
10470 152 Street
SURREY BC V3R 0Y3
Telephone: (604) 582-5200
Facsimile: (604) 930-7119
http://www.gov.bc.ca/
http://www.gov.bc.ca/wlap/

Date: OCT 05 2005

ME-01452

Page 8 of 9 - 3.4. Outfall Inspections

in the first sentence from 'ten' to '**five**'

Please destroy the original operational certificate package and replace it with the enclosed revised operational certificate package.

Yours truly,

M.F. Younie, P.Geo., P.Ag.
for Director, *Environmental Management Act*
Lower Mainland Region

Enclosure

cc: Environment Canada
Dr. Dean Shiskowski, Associated Engineering (B.C.) Ltd.

BRITISH COLUMBIA

2010 VANCOUVER

File: ME-01452

Date: APR 06 2005

REGISTERED MAIL

RESORT MUNICIPALITY OF WHISTLER
4325 Blackcomb Way
Whistler, British Columbia V0N 1B4

Dear Operational Certificate Holder:

Enclosed is Amended Operational Certificate ME-01452 issued under the provisions of the *Environmental Management Act* and in accordance with the Resort Municipality of Whistler 2004 Liquid Waste Management Plan, dated April 2004. Your attention is respectfully directed to the terms and conditions outlined in the operational certificate. An annual fee will be determined according to the Permit Fees 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 rests with the operational certificate holder. It is also the responsibility of the operational certificate holder to ensure that all activities conducted under this authorization are carried out with regard to the rights of third parties, and comply with other applicable legislation that may be in force.

This decision may be appealed to the Environmental Appeal Board in accordance with Part 8 of the *Environmental Management Act*. An appeal must be delivered within 30 days from the date that notice of this decision is given. For further information, please contact the Environmental Appeal Board at (250) 387 3464.

Ministry of Water, Land and Air Protection
Regional Operations
Lower Mainland Region
Mailing/Location Address
10470 - 152 Street
Surrey, BC, V3R 0Y3
Telephone: (604) 582-5200
Facsimile: (604) 584-9751
http://www.gov.bc.ca/
http://www.gov.bc.ca/wlap

Administration of this operational certificate will be carried out by staff from the Lower Mainland Region. Plans, data and reports pertinent to the operational certificate are to be submitted to the Regional Manager, Environmental Protection, at Ministry of Water, Land and Air Protection, Regional Operations, Lower Mainland Region, 10470 - 152 Street, Surrey, BC, V3R 0Y3.

Yours truly,

M. F. Younie, P.Geo., P.Ag.
for Director, *Environmental Management Act*
Lower Mainland Region

Enclosure

cc: Environment Canada

OPERATIONAL CERTIFICATE
ME-01452

Under the Provisions of the Environmental Management Act and in accordance with the Resort Municipality of Whistler 2004 Liquid Waste Management Plan Update, dated April 2004

RESORT MUNICIPALITY OF WHISTLER
4325 Blackcomb Way
Whistler, British Columbia
V0N 1B4

shall operate a municipal wastewater treatment plant located approximately 7 kilometres south of Village Centre, Whistler, British Columbia, subject to the conditions listed below. Contravention of any of these conditions is a violation of the *Environmental Management Act* and may result in prosecution. This operational certificate supercedes Operational Certificate PE-01452.

1. AUTHORIZED DISCHARGE

1.1. This section applies to the discharge of effluent to the Cheakamus River from a wastewater treatment plant serving Whistler sewerage area including Emerald Estates, Westside of Alta Lake including proposed Rainbow Park area, leachate from the Whistler municipal landfill and occasionally trucked wastes from other areas within the Squamish Lillooett Regional District. The site reference number for this discharge is E100929.

1.1.1 The maximum authorized rate of discharge is 16,000 cubic metres per day from May 15 to September 15 inclusive and 25,000 cubic metres per day for the remainder of the year.

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1.1.2 The characteristics of the discharge shall be:

5-day carbonaceous biochemical oxygen demand ($CBOD_5$)	30. mg/L, maximum;
Total suspended solids (nonfilterable residue) (TSS)	40. mg/L, maximum;
Fish bioassay (rainbow trout), 96 hour LC50,	100 %;
Orthophosphate (as phosphorus)	1.75 mg/L, maximum.

The effluent quality is subject to review at the discretion of the director based on discharge and/or receiving environment monitoring data, progress and success of reduce, reuse and recycle initiatives and the availability of new cost effective technologies.

1.1.3 The nutrient loading for the discharge from May 15 to September 15 inclusive shall be:

Orthophosphate (as phosphorus)	36.6 kg/month, maximum.

The orthophosphate loading limit is subject to future review at the discretion of the director based on environmental assessment and river monitoring studies.

1.1.4 The existing treatment works, approximately located as shown on Site Plan A are:

- screening and grit removal facilities;
- primary sedimentation tanks;
- secondary treatment plant, including trickling filter/solids contact with secondary clarifiers;
- chemical phosphorus removal facilities;
- disinfection facilities;
- sludge treatment by autothermal aerobic digestion with dewatering; and
- a river outfall.

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1.1.5 The proposed treatment works are advanced biological phosphorus removal facilities and must be complete and in operation on or before **December 31, 2007**.

The upgrading implementation schedule will be reviewed within five years of this operational certificate or at an earlier date at the discretion of the director based on discharge and /or receiving environment monitoring data, progress and success of reduce, reuse and recycle initiatives and the availability of new cost effective technologies.

1.1.6 The location of the facilities from which the discharge originates is Lot 3638, CL 0336383, Lease #236865, G.P.1, NWD.

1.1.7 The location of the point of discharge is the Cheakamus River adjacent to Lot 3638, CL 0336383, Lease #236865, G.P.1, NWD.

2. GENERAL REQUIREMENTS

2.1. Definition

"manager" means the Regional Environmental Protection Manager.

"director" means the Director or a person delegated to act on behalf of the Director, as defined under the *Environmental Management Act.*

2.2. Maintenance of Works

The operational certificate holder shall inspect the designated works regularly and maintain them in good working order. Notify the manager of any malfunction of these works.

2.3. Bypasses

The discharge of effluent which has bypassed the designated works is prohibited unless the approval of the director is obtained and confirmed in writing.

2.4. Process Modifications

The manager shall be notified prior to implementing changes to any process that may adversely affect the quality and/or quantity of the discharge.

2.5. Emergency Procedures

In the event of an emergency which prevents compliance with a requirement of this operational certificate, that requirement shall be suspended for such time as the emergency continues or until otherwise directed by the director provided that:

(a) Due diligence was exercised in relation to the process, operation or event which caused the emergency and that the emergency occurred notwithstanding this exercise of due diligence;

(b) The manager is immediately notified of the emergency; and

(c) It can be demonstrated that every thing possible is being done to restore compliance in the shortest possible time.

Notwithstanding (a), (b) and (c) above, the director may require the operation to be suspended or production levels to be reduced to protect the environment while the situation is corrected.

2.6. Plans - New Works

Maintain a copy of the plans of the proposed works in section 1.1, certified by a qualified professional, for inspection.

2.7. Facility Classification and Operator Certification

The operational certificate holder shall have the works authorized by this operational certificate classified (and the classification shall be maintained) by the Environmental Operators Certification Program Society (Society). The works shall be operated and maintained by persons certified within and according to the program provided by the Society. Certification must be completed to the satisfaction of the director. In addition, the manager shall be notified of the classification level of the facility and certification levels of the operators, and changes of operators and/or operator certification levels within 30 days of any change.

Alternatively, the works authorized by this operational certificate shall be operated and maintained by persons who the operational certificate holder can demonstrate to the satisfaction of the director, are qualified in the safe and proper operation of the facility for the protection of the environment.

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2.8. Posting of Outfall

A sign shall be erected along the alignment of the outfall above high water mark. The sign shall identify the nature of the works. The wording and size of the sign shall be acceptable to the director.

2.9. Disinfection

The effluent shall be disinfected from May 15 to October 15 inclusive.

If chlorine is used, maintain a chlorine residual (at the point of discharge or prior to dechlorination) between 0.1 and 1.0 mg/L at all times and provide not less than one hour's contact time at average flow rates. The effluent shall be dechlorinated prior to discharge to reduce the chlorine residual below detectable limits.

2.10. Sludge Wasting and Disposal or Utilization

Efforts should be made to beneficially utilize the sludge wasted from the treatment plant. Sludge shall be managed as authorized by the Organic Matter Recycling Regulation or disposed at a facility authorized by the director.

2.11. Trucked Wastes

The operational certificate holder shall not accept Special Waste as defined in the Special Waste Regulation under the *Environmental Management Act* for disposal at the treatment plant. Tests shall be conducted as deemed necessary to ensure that unacceptable wastes are identified.

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3. MONITORING AND REPORTING REQUIREMENTS

3.1. Discharge Monitoring

3.1.1 Sampling and Analyses

Suitable sampling facilities shall be installed and maintained and composite or grab samples of the effluent authorized by section 1.1 shall be obtained for analyses as indicated below. A composite sample is to consist of a sample composited in proportion to flow over a 24 hour period (or approved flow proportional continuous sampler may be used). Proper care should be taken in sampling, storing and transporting the samples to adequately control temperature and avoid contamination, breakage, etc.

Parameter	Frequency	Sampling Type
Chlorine residual*, mg/L	daily	grab
TSS, mg/L	5 times/week	composite
Orthophosphate (as phosphorus), mg/L	5 times/week	composite
$CBOD_5$**, mg/L	2 times/week	composite
Fecal coliform*, MPN/100 mL	2 times/week	grab
Total phosphorus, mg/L	weekly	composite
Iron (total), mg/L	monthly	composite
Fish bioassay (rainbow trout), 96 hour LC50, %	2 times/year	grab

*if chlorine is used between May 15 and October 15 only
**COD may be used in place of $CBOD_5$ if $CBOD_5$ is examined with every fifth sample.

3.1.2 Toxicity Failures

If two consecutive toxicity tests are failed, monitoring is to be conducted six times per year until three consecutive toxicity tests are passed, after which testing reverts to two times per year.

3.1.3 Flow Measurements

Provide and maintain a suitable flow measuring device and record once per day the effluent volume discharge over a 24-hour period.

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3.2. Receiving Environment Monitoring

The operational certificate holder shall maintain two sampling stations, and a grab sample of the river water shall be obtained three times per year corresponding to winter low flow, spring freshet and fall flow regimes. Proper care should be taken in sampling, storing and transporting the samples to adequately control temperature and avoid contamination, breakage, etc.

3.2.1 Analyses

Obtain analyses of the grab samples for the following:

pH
Conductivity, µmho/cm
Turbidity, TU
Orthophosphate (as phosphorus), mg/L
Nitrate nitrogen, mg/L
Nitrite nitrogen, mg/L
Ammonia nitrogen, mg/L

3.3. Monitoring Procedures

3.3.1 Sampling Procedures

Sampling is to be carried out in accordance with the procedures described in the "British Columbia Field Sampling Manual for Continuous Monitoring Plus the Collection of Air, Air-Emission, Water, Wastewater, Soil, Sediment, and Biological Samples, 2003 Edition (Permittee)", or most recent edition, or by suitable alternative procedures as authorized by the director.

A copy of the above manual may be purchased from the Queen's Printer Publications Centre, P. O. Box 9452, Stn. Prov. Gov't. Victoria, British Columbia, V8W 9V7 (1-800-663-6105 or (250) 387-6409). A copy of the manual is also available for inspection at all Environmental Protection offices.

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3.3.2 Chemical Analysis

Analyses are to be carried out in accordance with procedures described in the "British Columbia Laboratory Methods Manual for the Analysis of Water, Wastewater, Sediment, Biological Materials and Discrete Ambient Air Samples (2003 Permittee Edition)", or the most recent edition, or by suitable alternative procedures as authorized by the director.

A copy of the above manual may be purchased from the Queen's Printer Publications Centre, P. O. Box 9452, Stn. Prov. Gov't. Victoria, British Columbia, V8W 9V7 (1-800-663-6105 or (250) 387-6409), and are also available for inspection at all Environmental Protection offices.

3.3.3 Toxicity

Analyses for determining the toxicity of liquid effluent to fish shall be carried out in accordance with the procedures described in the "British Columbia Laboratory Methods Manual for the Analysis of Water, Wastewater, Sediment, Biological Materials and Discrete Ambient Air Samples (2003 Permittee Edition)", or the most recent edition, or by suitable alternative procedures as authorized by the director.

A copy of the above manual may be purchased from the Queen's Printer Publication Centre, P.O. Box 9452, Stn. Prov. Govt. Victoria, British Columbia, V8W 9V7, (1-800-663-6105 or (250) 387-6409). The manual is also available for review at all Environmental Protection offices.

3.3.4 Quality Assurance

All data of analyses required to be submitted by the operational certificate shall be conducted by a laboratory acceptable to the director. At the request of the director, the operational certificate holder shall provide the laboratory quality assurance data, associated field blanks and duplicate analysis results along with the submission of data required under section 3.1 of the operational certificate.

3.4. Outfall Inspections

The operational certificate holder shall have the outfall inspected once every **five** years by independent qualified personnel to ensure that it is in good condition. An inspection report shall be submitted to the manager within 30 days after the inspection date. The first report shall be submitted by **January 31, 2010**.

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3.5. Trucked Wastes Recording

The operational certificate holder shall maintain up to date records in hard copy or electronic format of trucked wastes received and rejected at the treatment plant. The records shall be available for inspection and shall include:

Date received or rejected;
Source(s) of waste;
Type of waste (general description);
Estimated quantity of waste, m^3;
Name of carrier.

3.6. Reporting

Maintain data of analyses, monthly orthophosphate loadings and flow measurements, suitably tabulated, for inspection and post the data quarterly on the operational certificate holder's Internet web site. Notify the manager quarterly of any data that is in noncompliance with requirements of this operational certificate.

Submit an annual report, prepared by a qualified professional, that includes a compendium of both discharge and receiving environment data and include a trend analysis review and interpretation of analytical data for results over the past year and comparisons with past years in terms of potential impact to the receiving environment. The report shall also include the past year's achievements regarding source control and water conservation programs and reduce, reuse and recycle initiatives. The report shall be received by the manager by **April 30th** of the year following the reporting period.

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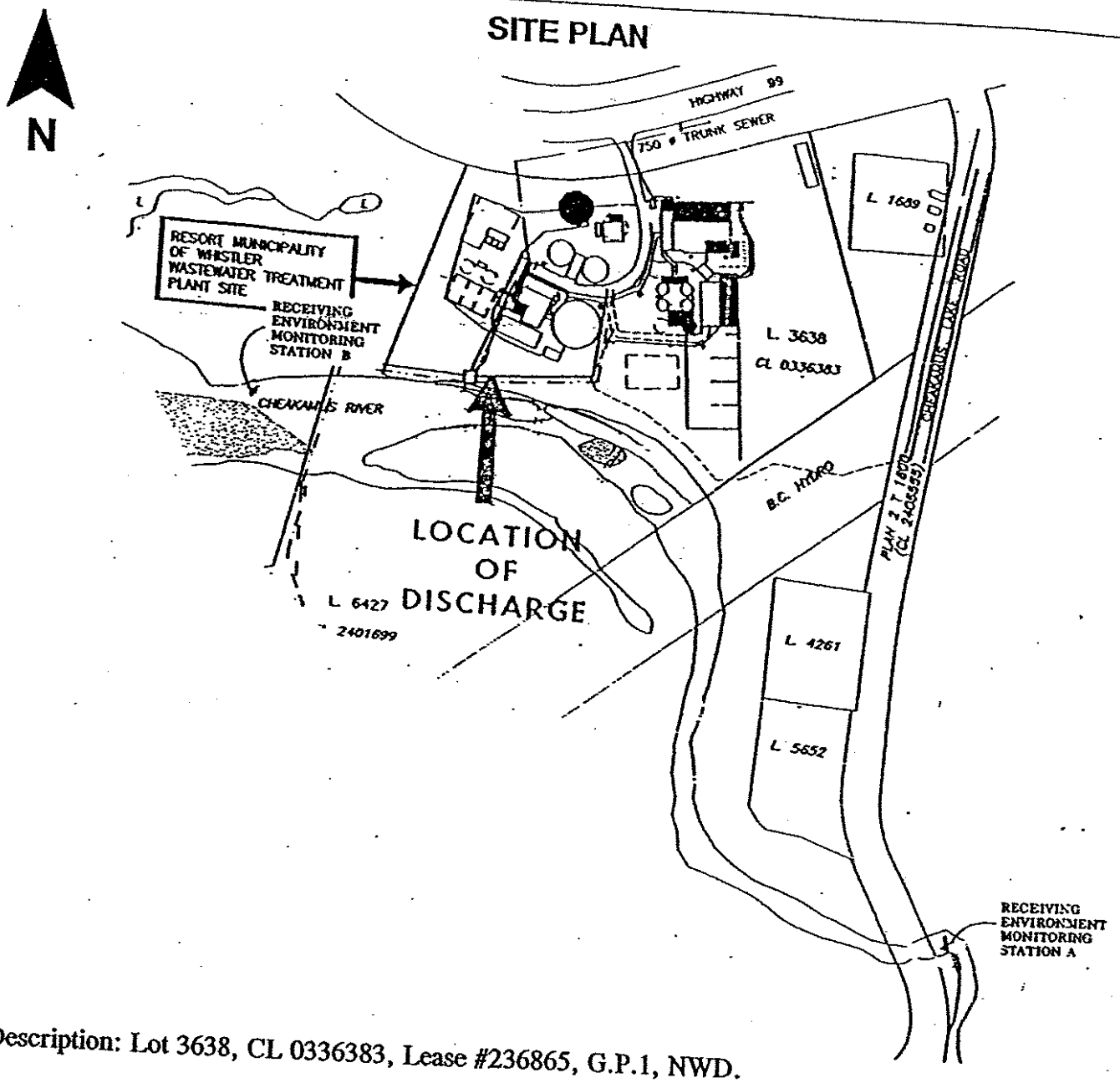
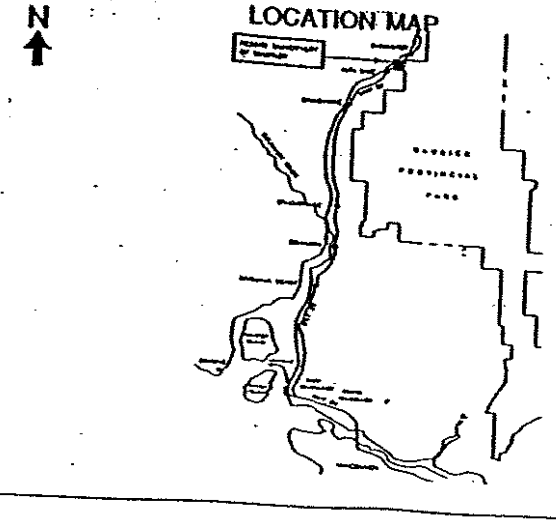
PROVINCE OF
BRITISH COLUMBIA

Environmental Protection

SITE PLAN



Legal Description: Lot 3638, CL 0336383, Lease #236865, G.P.1, NWD.



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Site Plan: A | OC ME-01452

Date: APR 0 6 2005

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