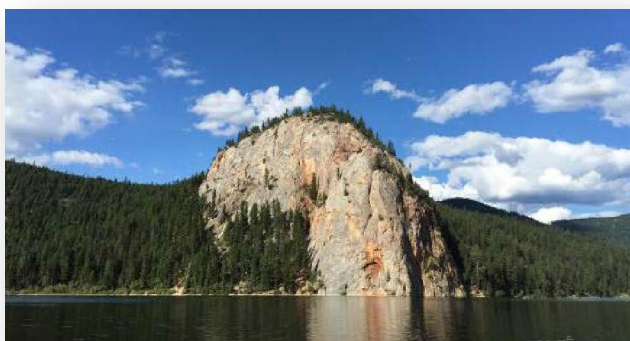


Paul Lake Wastewater Master Plan

Thompson Nicola Regional District



The Region of BC's Best



ENGINEERING ■ PLANNING ■ URBAN DESIGN ■ LAND SURVEYING

April 2018

Project No. 379-491

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Table of Contents

Executive Summary	v
1.0 Background	1
1.1 Influent Flows.....	3
1.2 Sludge Production.....	5
1.3 Effluent Quality Analysis	6
1.4 Regulatory Agency Certificates and Approvals	8
1.4.1 BC Ministry of Environment.....	8
1.4.2 Environment Canada	9
2.0 Capacity and Condition of Sewer System	10
2.1 Sewer Network	10
2.2 Lift Station.....	12
3.0 Treatment.....	15
3.1 Equalization/Sludge Storage Tank	15
3.2 Rotating Biological Contactor.....	18
3.3 Secondary Clarifier	23
3.4 Sand Filter	25
3.5 Miscellaneous	27
4.0 Effluent Disposal	28
5.0 Controls and Electrical	31
6.0 Rights of Way	33
7.0 Improvement Plan	34
7.1 General.....	34
7.2 Sewer Network	34
7.3 Lift Station.....	35
7.4 Treatment	36
7.5 Control System	39
8.0 Cost Summary	40

APPENDICES

Appendix A – Effluent Monitoring Results

Appendix B – Permit to Operate

Appendix C – Park Use Permit

List of Tables

Table 1-1: Paul Lake WWTP – Annual Flow Summary	4
Table 1-2: Sludge Disposal by Month (m ³)	5
Table 1-3: Effluent Analysis – Relative to Permit	6
Table 1-4: Effluent Analysis - Upper Monitoring Well (Up-Gradient of TNRD Disposal Field)	7
Table 1-5: Effluent Analysis - Lower Monitoring Well (Down-Gradient of TNRD Disposal Field)	7
Table 1-6: Reliability Requirements Category III Plant	9
Table 3-1: Original Design Criteria	18
Table 3-2: RBC Equipment Details	19
Table 4-1: TNRD Reported Monitoring Well Depth (m)	30
Table 7-1: Estimated Sewer Inspection Cost	35
Table 7-2: Estimated Lift Station Upgrade Cost	35
Table 7-3: Estimated Treatment Upgrade Costs	36
Table 7-4: Estimated SCADA Implementation Cost	39
Table 8-1: Recommended Upgrades and Estimated Costs	40

List of Figures

Figure 1-1: Location Plan	2
Figure 1-2: Annual Flow Trend – Paul Lake Community Sewer System.....	3
Figure 2-1: Paul Lake Sanitary Sewers	11
Figure 2-2: Lift Station – Paul Lake Road.....	12
Figure 2-3: Lift Station Pumps.....	13
Figure 2-4: Lift Station Activated Carbon Air Filter.....	13
Figure 3-1: Paul Lake Sewage Treatment Plant Site Plan.....	16
Figure 3-2: Plastic Sludge Storage / Settling Tank	17
Figure 3-3: RBC with Treatment Building in Background.....	19
Figure 3-4: RBC Media at Inlet end.....	20
Figure 3-5: Corroded Vent Cover	20
Figure 3-6: Drive Mechanism	21
Figure 3-7: Clarifier	23
Figure 3-8: Clarifier Scum Baffle and Effluent Weir	24
Figure 3-9: Alum Dosing System.....	24
Figure 3-10: Sand Filter Feed Tank.....	26
Figure 3-11: Sand Filter System.....	26
Figure 4-1: Dosing Siphon	29
Figure 4-2: View Towards Effluent Disposal Area from the Paul Lake Recreation Area.	29
Figure 5-1: Onan 20ES 79297G Generator supplied by Wesco	32
Figure 7-1: Paul Lake Sewage Treatment Plant – Proposed Improvements – Site Plan.....	37
Figure 7-2: Paul Lake Sewage Treatment Plant – Proposed Improvements – Details.....	38

List of Acronyms

GSC	Geodetic Survey of Canada
IHA	Interior Health Authority
TNRD	Thompson Nicola Regional District
TRUE	TRUE Consulting

Units of Measure

ft	feet
lgpm	Imperial gallons per minute
km	kilometre
L/d	Litres per day
L/m	Litres per minute
L/s	Litres per second
lpcd	Litres per capita per day
m	metre
mg/L	milligrams per Litre
mm	millimetre
NTU	Nephelometric Turbidity Units
psi	pounds per square inch
USgpm	US gallons per minute

Referenced Reports

- 1 Paul Lk Sewer System Operating and Maintenance Manual. 1996.
- 2 Permit PE-13506. Ministry of Environment Land and Parks. 1995.

Executive Summary

The Thompson Nicola Regional District has commissioned a master plan assessment of its water and sewer infrastructure. The master plans will enable better planning for the future of the communities and set out priorities for improvements to the systems to ensure safe, clean, reliable and affordable water and wastewater services.

The master plans list recommended upgrades with estimated costs to enable the TNRD to prepare a financial plan with the general objective of compliance with regulatory requirements and capacity for future growth.

The analysis of the Paul Lake Community Sewer System has identified a need for the following key improvements;

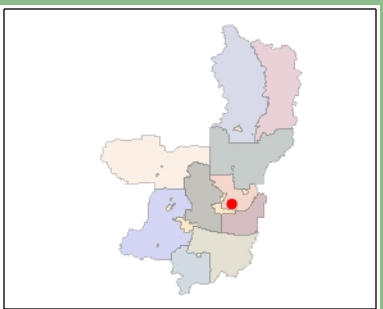
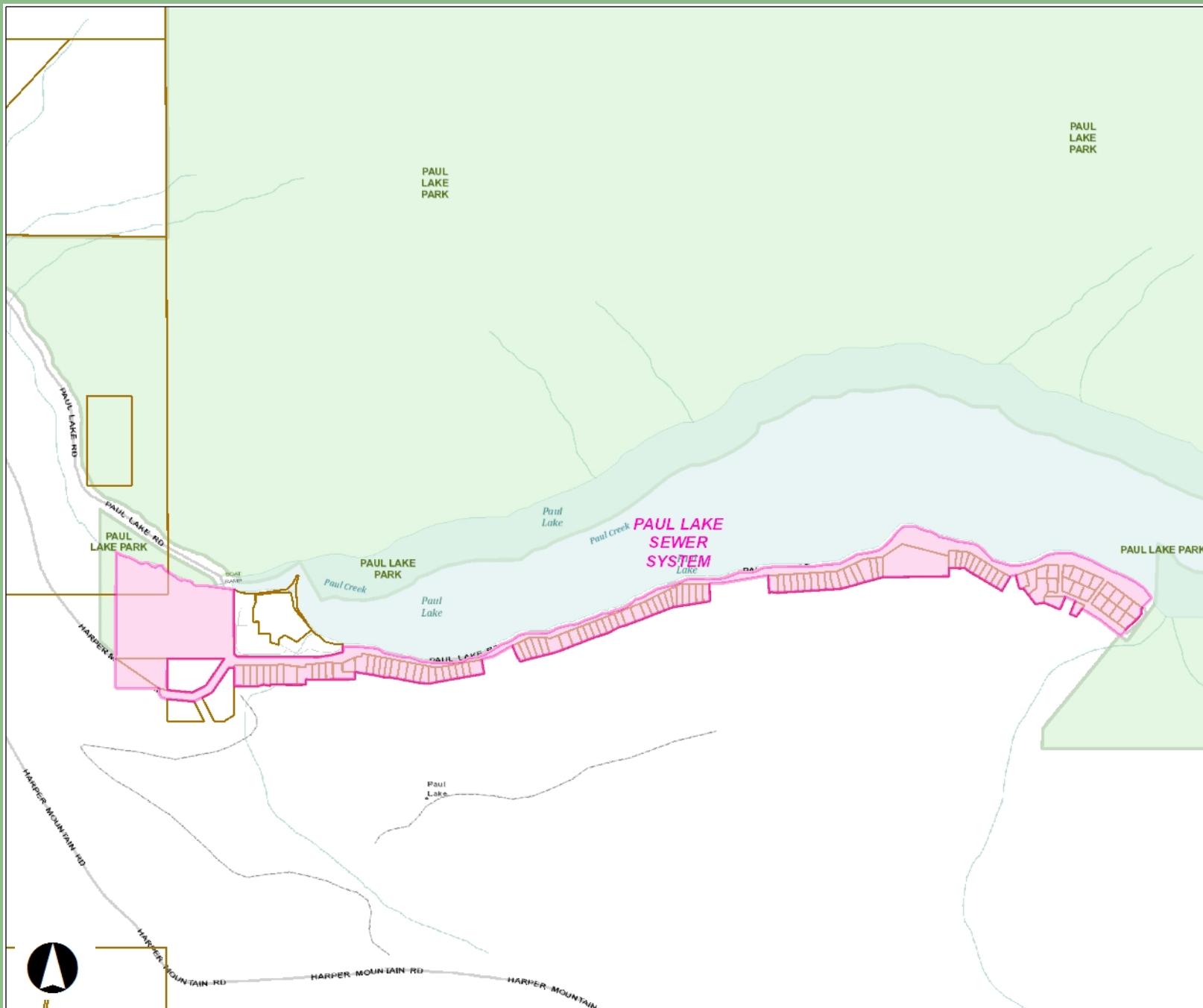
- Lift station guide rails
- A spare RBC shaft to enable quick recovery from a failure.
- Dedicated coagulation / flocculation tanks with mixers
- Control system upgrade (PLC / SCADA)
- Washroom building and water supply
- Duplex sand filter upgrade
- Extension of the equalization and sludge holding tank, potentially including influent heating.

1.0 Background

Constructed	1995
Customers	105 (approximately)
Location	12 km North East of Central Kamloops
Discharge Location	Paul Lake Recreational Area
Treatment Process	Secondary treatment and infiltration

Paul Lake is located approximately 10 km North East of central Kamloops on the north side of the South Thompson River (See Figure 1-1). Property records indicate that the community was developed between 1961 and 1996. The Deerwood strata was gazetted in 1980. This is not part of the serviced area.

The lots in the serviced area are small and steep, without suitable land for a septic system disposal field. The community takes drinking water from the lake, with the houses along the lake having individual intakes. As result, a community sewer and treatment system was installed by the TNRD in 1996.

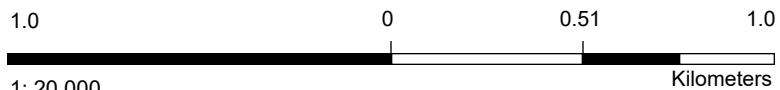


Legend

- Library Services
- Library
- Bookmobile Stop
- Waste Disposal and Recycling
- Eco-Depot
- Recycle Depot
- Product Stewardship Depot
- Landfill
- Transfer Station
- Septage Pit
- TNRD Sewer System
- Emergency Services
- Police Station
- Ambulance Station
- Fire Station
- Hospital
- Local Authority Office
- Parcel
- TNRD Boundary (Outline)
- Administrative Boundary (Outline)
- First Nations Reserve (Outline)
- Provincial Parks & Protected Areas



Paul Lake Community Sewer System



Projection: WGS_1984_Web_Mercator_Auxiliary_Sphere

November 14, 2017

THIS IS NOT A LEGAL SURVEY PLAN. This map is a user generated static output from the Thompson-Nicola Regional District Internet Mapping site and is provided on an "as is" and "as available" basis, without warranties of any kind, either expressed or implied. The information was generated from Geographic Information System (GIS) data maintained by different source agencies. Information contained in the map may be approximate, and is not necessarily complete, accurate or current. While all reasonable efforts have been made to ensure the accuracy of the data, reliance on this information without verification from original records is done at the user's own risk.

Figure 1-1: Location Plan

1.1 Influent Flows

The Paul Lake sewer system currently services a total of 105 single family lots, which are typically between 600 and 1000m² in size. Many lots with small holiday homes have had the original building replaced with a significantly larger dwelling. This may affect the extent of peak flows when the community population swells in summer and around the holidays, such as Christmas break.

The plant has no automatic logging of flow meter data, so data is limited to monthly readings. Total monthly flows are relatively stable through the year, with the peaks typically occurring in the summer months and December.

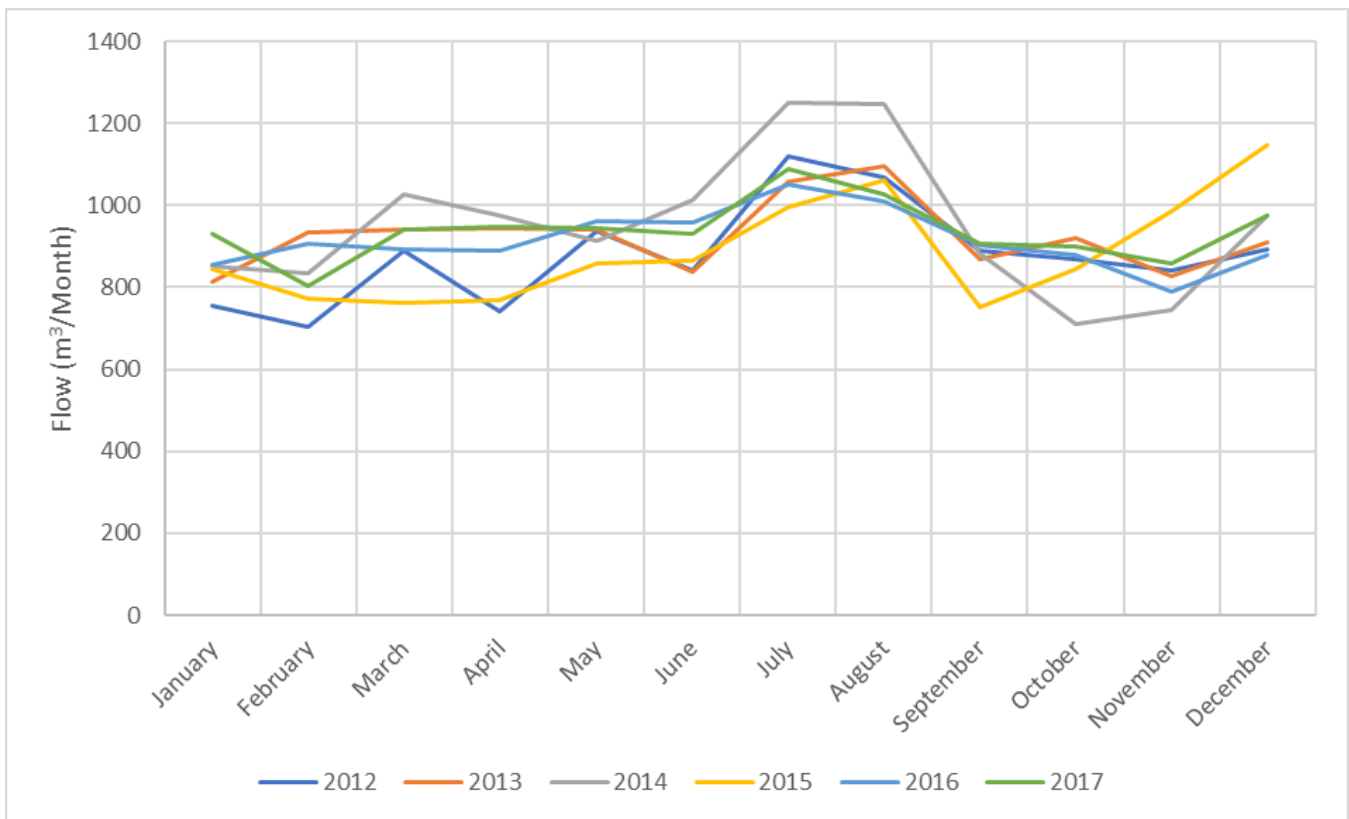


FIGURE 1-2: ANNUAL FLOW TREND – PAUL LAKE COMMUNITY SEWER SYSTEM

It can be seen that annual flows have been very stable in the period from 2012 to 2017.

TABLE 1-1: PAUL LAKE WWTP – ANNUAL FLOW SUMMARY

Year	WWTP Effluent Flow m³/annum (m³/day)
2012 ¹	10,550 (29)
2013	11,097 (30)
2014	11,428 (30)
2015	10,658 (29)
2016	10,976 (30)
2017	11,560 (32)

¹ Daily influent flow was calculated by multiplying lift station pump hours by rate of pump discharge (12.72 m³/hour), until June 29, 2012. A flow meter was installed June 29, 2012, and quantity of effluent discharged was measured and recorded from the new flow meter since.

1.2 Sludge Production

The plant currently averages 80m³ of sludge per annum, although the total was only 60m³ in 2016. The rate of sludge disposal varies reasonably evenly through the year and represents approximately 0.5 – 0.9% of the total annual flow. Sludge disposal volumes are minimized by supplementary sedimentation in an above ground plastic tank.

TABLE 1-2: SLUDGE DISPOSAL BY MONTH (M³)

	2012	2013	2014	2015	2016	2017
January					24	
February	12	12	12	12		
March						
April		12	12	12		
May	24				12	
June		12	12			12
July		12	12	24		12
August	24	12	12	24		12
September						
October	12	12	12		12	
November	12	12	12	12	12	12
December				12		
Total	84	84	84	96	60	48

The TNRD report that the household septic tanks were pumped out in the fall of 2014. The reduced sludge production in 2016 and 2017 may be a result of improved removal by septic tanks and allowing sludge to concentrate in the storage tank at the treatment plant.

Sludge disposal volumes generally appear to be spread evenly through the year.

1.3 Effluent Quality Analysis

Paul Lake WWTP effluent quality testing shows that, under the present loading, the plant generally achieves permit requirements for BOD and TSS (Refer to Table 1-3). Treatment performance reduces in the winter months. Effluent quality improves as temperatures warm. Part of the performance concern is reported to be with cold water filamentous bacteria that settle poorly and are small enough to pass through the sand filter. Alum dosing is also turned off in winter.

Generally, the plant is achieving full nitrification (conversion of ammonia to nitrate). High effluent ammonia levels in March 2016 were attributed to cold water temperatures. Wastewater temperatures in this system can be expected to be somewhat lower than a typical sewage treatment system, due to the extended periods of storage in septic tanks prior to treatment.

TABLE 1-3: EFFLUENT ANALYSIS – RELATIVE TO PERMIT

Date	BOD, 5-day	Total Suspended Solids	Ammonia (as N)	Nitrite + Nitrate	Phosphorus, Total (as P)
Permit Limit	10	10	NA	NA	NA
15/03/2016	<10	11	19.1	19.7	1.4
02/06/2016	<7	6	1.1	28.5	0.773
31/08/2016	<7	9	1.67	27.7	1.55
03/11/2016	8	<2	1.27	34.6	0.283
31/08/2017	<6.9		1.08	34.6	0.1

Sample analysis from the monitoring wells indicates improved effluent quality as a result of the infiltration process, primarily in terms of the total nitrogen concentration (Refer to Table 1-4 and Table 1-5). The average total nitrogen values fall from 19 - 35mg/L in the treatment plant effluent to 0.1 - 1mg/L in the wells. The improvement in total phosphorus follows a less consistent pattern, but appears to show acceptable results.

It should be noted that the upper monitoring well would include the effect of the Deerwood strata effluent disposal field. The TNRD does not monitor upgradient of the Deerwood strata disposal field.

TABLE 1-4: EFFLUENT ANALYSIS - UPPER MONITORING WELL (UP-GRADIENT OF TNRD DISPOSAL FIELD)

Date	Ammonia (as N)	Nitrite + Nitrate	Phosphorus, Total (as P)	Fecal Coliforms	E coli
15/03/2016	0.059	0.345	0.078	<1	<1
02/06/2016	0.028	0.73	0.285	2	<1
31/08/2016	<0.02	0.176	0.036	<1	<1
03/11/2016	0.095	0.217	0.121	<1	<1
31/08/2017	0.028	1.09	0.14	<1	<1

TABLE 1-5: EFFLUENT ANALYSIS - LOWER MONITORING WELL (DOWN-GRADIENT OF TNRD DISPOSAL FIELD)

Date	Ammonia (as N)	Nitrite + Nitrate	Phosphorus, Total (as P)	Fecal Coliforms	E coli
15/03/2016	0.039	0.107	0.099	<1	<1
02/06/2016	<0.02	0.13	0.088	<1	<1
31/08/2016	<0.02	0.222	0.039	3	<1
03/11/2016	0.042	0.011	0.194	<1	<1
31/08/2017	0.025	0.212	0.243	<1	<1

1.4 Regulatory Agency Certificates and Approvals

The principal regulatory agency certificates, licenses and approvals which combine to provide approval for the construction and operation of the water system are summarized following.

1.4.1 BC Ministry of Environment

The system is not registered under the Municipal Wastewater Regulation. Instead, the system operation is authorized by MOE Permit Number 13506 dated April 6, 1995. The authorized works consist of a septic tank at each residence, a lift station and a central rotating biological contactor unit, dosing siphons, sand filter, dual tile disposal fields and related appurtenances. The maximum rate of discharge is 60 m³/d.

The permit conditions require that the concentration of the contaminants discharged shall not exceed;

Biochemical Oxygen Demand	10 mg/l
---------------------------	---------

Total Suspended Solids	10 mg/l
------------------------	---------

The Permittee shall obtain grab samples in February, May, August and November.

MWR Registration

The 10/10 effluent quality criteria are very stringent for a system which doesn't directly discharge to a waterway. The justification for these criteria isn't clear. The TNRD may wish to consider applying for registration under the Municipal Wastewater Regulation with less stringent effluent quality criteria based on the existing system performance, and measured environmental impacts. The application requires significant preparation. Some key documentation required would include;

- Completed registration form
- Updated facility operating plan
- Treatment plant contingency plan
- Environmental impact study covering the effluent receiving environment, impact of overflows and the operation of the facility.
- Information on redundancy.
- An inflow and infiltration study (depending on the measured extent of this issue).
- Proof of a capital replacement fund.

Alternatively, the Ministry may allow the amendment of the existing permit with an updated operational certificate. However, as the objective is to relax treatment criteria, the Ministry can be expected to have similar reporting requirements as for registration.

Reliability Criteria

The current Municipal Wastewater Regulation requires that particular treatment processes be duplicated, depending on the consequences of failure. This treatment plant would most likely be classified as reliability Category III. Under Category III, no permanent or unacceptable damage to the receiving environment would be caused by long term effluent degradation. Table 1-6 shows that the Regulation is not being fully complied with. Adding a filter unit has been discussed in this plan. At this stage, the installation of an additional final sedimentation basin is not proposed. This would only be explored in response to a specific requirement from MoE.

TABLE 1-6: RELIABILITY REQUIREMENTS CATEGORY III PLANT

Components	Minimum Redundancy Requirement	Backup Power Source	Compliant
Trickling Filters ¹	No backup	Not required	Yes
Final Sedimentation	2 minimum. Plant capable of 50% of design max flow with largest unit out of service.	Not required	No
Effluent Filters	2 minimum. Plant capable of 75% of design max flow with largest unit out of service.	Required	No

¹ Trickling filters are the nearest equivalent to a rotating biological contactor.

1.4.2 [Environment Canada](#)

The Wastewater Systems Effluent Regulation (WSER) does not apply to wastewater systems where the effluent is not deposited to water or where average flow collected is less than 100 m³/d.

2.0 Capacity and Condition of Sewer System

2.1 Sewer Network

Description

The sewer network was constructed in 1996 and is constructed in modern durable materials.

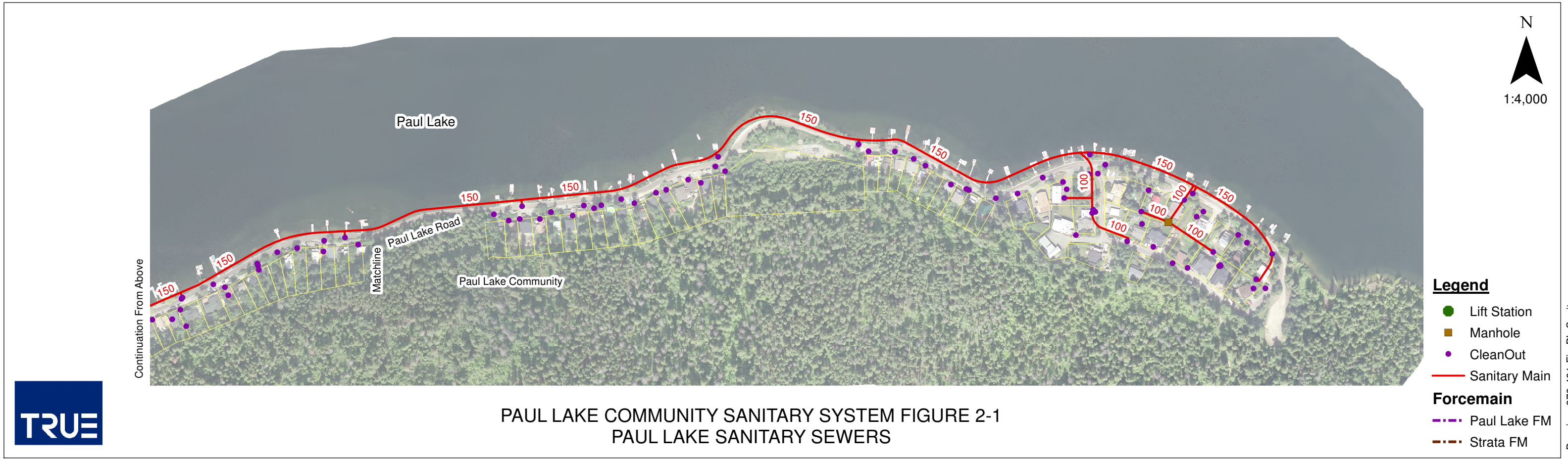
There are 105 lots, each having a septic tank with a minimum volume of 3.6m³. The septic tank effluent is discharged to a 50mm dia. service to the property line and then a 100mm dia PVC service to the sewer. The step up in sewer size means that large solids will be retained on the lot. The TNRD service the household systems to remove the solids.

The sewers comprise approximately 1,390m of 150Ø DR35 PVC and 1,010m of 100Ø DR28 PVC gravity sewers. The network is designed to gravitate to a lift station on Paul Lake Road. The system includes twelve 100 mm diameter sewer main cleanouts and a single manhole.

Assessment

Due to the lakeside topography and the shallow groundwater table the sewers have been laid shallow and flat. The septic tanks on each property are necessary to prevent blockage of the gravity sewer with solids and floatable material, including grease. They also significantly reduce the load on the treatment system. The tanks have been sized to extend the pump-out frequency for a design period of 5 to 8 years.

Cleaning and CCTV inspection of the sewer system is recommended. TNRD staff suspect a possibility of bellies having developed, which would typically be detected by this inspection. While flow records don't indicate a significant infiltration issue, it would be beneficial to complete the inspection during the period of peak lake level in order to locate any infiltration issues.



PAUL LAKE COMMUNITY SANITARY SYSTEM FIGURE 2-1
PAUL LAKE SANITARY SEWERS



2.2 Lift Station

Description

The sewage lift station is a 1524mm diameter package FRP station with duty-standby 3.5hp 230 V, 3 phase KSB model KRTF 40-160/22 submersible pumps. One pump was replaced in 2017. Pumped flow is reported to be 12.7 m³/hour (3.5 L/s) ².

A 950m long 100Ø PVC sanitary forcemain connects the lift station to the wastewater treatment plant.

An automatic aeration system was installed and the fan was replaced at the lift station in 2012.

The original odour control system was a soil filter which was adversely affected by a periodic high water table. It has been replaced with a charcoal filter manufactured by TNRD staff.



FIGURE 2-2: LIFT STATION – PAUL LAKE ROAD

² 2012 Annual Report



FIGURE 2-3: LIFT STATION PUMPS



FIGURE 2-4: LIFT STATION ACTIVATED CARBON AIR FILTER

Assessment

FRP lift stations are non-corrodible and long lasting, apart from the metal fittings which tend to require occasional replacement depending on the nature of the atmosphere in the chamber. This chamber was in generally good condition, with the exception of metallic components. Corrosion of the aluminum ladder was noted. An FRP ladder would be more durable.

There are cables, but no guide rails, installed in the pump well to locate the pumps correctly and aid retrieval. Guide rails would be a beneficial addition.

Septic tank effluent has a powerful odour. The TNRD are having to seal the manhole with tarpaulins to prevent odour escaping. The lid seal arrangement is effective, but should be improved.

3.0 Treatment

3.1 Equalization/Sludge Storage Tank

Description

The wastewater first enters a 5.5m³ equalization/sludge storage tank. The EQ tank is baffled to enhance solids settling.

Wastewater is pumped from the equalization/sludge storage tank by a bucket lift located after the first stage in the Rotating Biological Contactor (RBC).

Sludge is pumped to the EQ tank from the clarifier and the filter backwash. The EQ tank must be pumped out when the sludge level gets too high.

An above ground 25,000 litre plastic tank is used to settle and concentrate the EQ tank sludge in order to minimize sludge disposal costs. This tank can only be used in summer, as it freezes in the winter.

The EQ tank head space is vented into the RBC enclosure which is equipped with an activated charcoal filter for odour control.

Assessment

The TNRD have indicated that the size of the equalization tank is less than optimal for the WWTP operation. A second tank is proposed adjacent to the existing tank.

The existing above ground 25,000L plastic tank is working well for sludge consolidation and it is proposed that this method does not need to change.

The TNRD are considering a submersible heater in the influent equalization tank to improve treatment in the colder months. Any equipment in the equalization tank will need to be rated for a hazardous atmosphere. Self-regulating tubular heating cable systems are used for sewer and septic tank freeze protection and could be installed in the equalization tank.



FIGURE 3-2: PLASTIC SLUDGE STORAGE / SETTLING TANK

3.2 Rotating Biological Contactor

Description

A Hannah Environmental Klargestar rotating biological contactor (RBC) biodegrades organic material in the wastewater.

The RBC consists of plastic discs mounted on a long, horizontal, rotating shaft. A biological slime grows on the media. The filter media rotates into the settled wastewater and then emerges into the atmosphere, where the microorganisms receive oxygen that helps them to biodegrade organic materials in the wastewater.

The RBC was originally designed for the following criteria.

TABLE 3-1: ORIGINAL DESIGN CRITERIA

Average daily flow	60 m ³ /d
Peak flow (flow balanced)	7.5 m ³ /h
Influent BOD	9 kg/d
Influent BOD after settling (est)	6.3 kg/d
Influent suspended solids	9 kg/d
Effluent BOD (avg.)	20 mg/L
Effluent suspended solids (avg)	20 mg/L
Temperature	7 – 12 °C

While rotating biological contactors are an old technology they remain popular in small communities. This is because the RBC process has a number of advantages particularly applicable to small systems, including;

- There is little need for operator adjustments. Biomass on the RBC media varies in response to the organic load, making the process self-regulating.
- Rotating biological contactors have low energy requirements, compared to alternative processes.
- Odours from the plant are easily contained.
- The equipment has very low noise levels and relatively low maintenance requirements.

A rotation sensor will activate an alarm if the RBC stops turning for whatever reason.

The RBC has an exhaust fan with an intake louver rated at 1350 cfm. The fan has 2 speed options - higher speed for summer and slower speed for winter. Operation of the fan in the winter should be monitored to determine the effect of the cold air on the treatment process. There are two heaters c/w thermostats inside the RBC to ensure freezing conditions are avoided.

Inside the RBC, mounted on the suction side of the exhaust fan is an activated carbon filter. This filter adsorbs odorous compounds such as hydrogen sulphide. The activated carbon needs to be replaced from time to time.

The RBC system equipment is as follows;

TABLE 3-2: RBC EQUIPMENT DETAILS

Bio Support Media Diameter	2.15m
Bio Support Media Area	1626 m ²
Disc Loading	3.9 g/m ²
Chamber Length	6.54m
Chamber Width	2.66m
Media	Rigid polypropylene media on steel frame
System Serial number	K16521
Product Model	DF 11 BFP
Motor/Gearbox	0.5 hp 230V 1Ø Flender Power Trans. Inc Model K60Q (56C)
Klargester Sludge Return Pump	Hydromatic SP40M1



FIGURE 3-3: RBC WITH TREATMENT BUILDING IN BACKGROUND



FIGURE 3-4: RBC MEDIA AT INLET END



FIGURE 3-5: CORRODED VENT COVER



FIGURE 3-6: DRIVE MECHANISM

Assessment

The existing rotating biological contactor system is currently performing effectively. The system is lightly loaded compared to a typical plant. As a result, the biological growth on the media is a fairly thin film.

Rotating biological contactors have an expected service life of 20 years. The shaft is subject to mechanical stresses that eventually lead to shaft fatigue failure. The media also tends to wear out at the supports largely due the shifting weight of the biomass. Mechanical equipment such as bearings and drive mechanisms also wear out, but can be replaced relatively easily as a part of normal maintenance.

The rotor unit at Paul Lake appears to be in good condition for it's age. The media did not appear to be shifting or worn, including at the more heavily loaded inlet end.

It was not possible to determine the condition of the shaft based on the site visit. Shaft failure results from material fatigue and can occur without warning. Because there is a long lead time for the manufacture of a replacement shaft, some permits require that a spare shaft be stored by the owner. The TNRD does not own a spare shaft or media. It is recommended that a replacement shaft be purchased and stored so that a fatigue failure can be repaired quickly. Replacement media should be purchased when inspections indicate that it is nearing the end of it's useful life.

3.3 Secondary Clarifier

Description

Sloughed biological solids falling from the RBC discs are settled out of the main flow in a simple 2800mm diameter hopper bottom clarifier. Alum is dosed at the inlet to aid settling and improve phosphorus removal.

The clear supernatant passes to the filter feed chamber. The settled solids are pumped back to the equalization/sludge storage tank.



FIGURE 3-7: CLARIFIER



FIGURE 3-8: CLARIFIER SCUM BAFFLE AND EFFLUENT WEIR



FIGURE 3-9: ALUM DOSING SYSTEM

3.4 Sand Filter

Description

A sand filter provides a final barrier to suspended solids prior to discharge to the dosing chamber. It replaced the original Klargestor Triangel TF12P 80-micron filter.

Duty / Standby filter feed pumps deliver effluent to the filter. Backwash solids are directed to the equalization tank/sludge storage tank.

Assessment

The existing filter is a small unit designed primarily for swimming pool use. Nevertheless, it performs adequately. The unit is showing signs of external corrosion and internal condition should be monitored.

The filter struggles to meet the permit TSS level in winter. Alum dosing is shut down in winter when the water temperature falls below 8°C. Performance has improved since the backwash activation was changed from pressure differential to an adjustable timer cycle. Peak flows over the 2012 Christmas holidays are reported to have exceeded filter capacity.

The coagulant is currently added with no rapid mixing or flocculation. As a result, it cannot be expected to achieve optimal results. Installing separate coagulation and flocculation upstream of the clarifier should enhance clarifier and filter performance and may mean that the existing equipment can achieve permit levels if dosing continues into the winter months.

A future filter upgrade is recommended. The TNRD are considering a larger filter or parallel filters to prevent future hydraulic overload events. Duplication of the filter system would enable the plant to meet the Component and Reliability Requirements outlined in the Municipal Wastewater Regulations and provide better filtration under peak load conditions.

As an alternative, it has become common to use cloth media filters for this application. These filter solids through a disk or sheet of thick pile fabric. These units have a small footprint, are relatively easy to maintain and tolerate wastewater solids. Maintenance requirements are similar to the existing sand filter unit.



FIGURE 3-10: SAND FILTER FEED TANK



FIGURE 3-11: SAND FILTER SYSTEM

3.5 Miscellaneous

The WWTP has no water supply or washroom facilities. WCB regulations require that a sufficient number of plumbed washroom facilities are readily available for workers. The TNRD have provided a portable toilet as an interim measure.

An eyewash bottle is needed for eye protection in the event of an alum spill. There are no corrosive chemicals on-site that would necessitate a safety shower / eyewash.

A new washroom with a non-potable water supply is proposed for the plant. A groundwater well was drilled on site in 2015 to provide water for the site, including the washroom.

4.0 Effluent Disposal

Description

Filtered effluent is discharged to a 15m³ underground dosing chamber located outside the treatment building. A dosing siphon controls the release of treated effluent into the disposal field. Dosing is at a flow rate high enough to ensure an even distribution of flow. The siphon activates and flows at 10 L/s when the depth of the effluent reaches 660mm from the bottom of the tank.

There is a Bull Run Valve™ to direct flow to either the west disposal field or the east disposal field via the distribution boxes. Each disposal field is approximately 30m wide x 60m long with 21 trenches at 3.0m spacings. Three distribution boxes per field are laid level with seven outlets each. Each outlet drains to one 27m long absorption trench.

There is an adjacent 30m x 60m standby area set aside for another disposal field. This could be used for a system expansion or to replace a failed field.

Six observation ports are scattered around the disposal field so that ponding can be observed in the trenches.

There are also two monitoring wells (MW-1 and MW-2) from which samples are regularly taken for testing and reporting groundwater quality. MW-1 is just upgradient of the Paul Lake field and MW-2 is downgradient of the Paul Lake field.

The Deerwood Strata is not connected to the TNRD system. Their disposal area is located in the lot to the east of the wastewater treatment plant and south of the Paul Lake field. There is a monitoring well located upgradient of the Deerwood Strata field.

Assessment

There are no barriers to prevent the parking of heavy vehicles on top of the dosing chamber. It is recommended that concrete barriers be placed around the perimeter to indicate the presence of the tank.

No issues have been reported with the disposal field. The TNRD reported a relatively high water depth in the upper monitoring well in March and June of 2016, which declined by August / November (see Table 4-1). This well is uphill from the disposal area, so it is more indicative of general groundwater flows than disposal field conditions. Water levels downhill from the disposal field were stable.



FIGURE 4-1: DOSING SIPHON



FIGURE 4-2: VIEW TOWARDS EFFLUENT DISPOSAL AREA FROM THE PAUL LAKE RECREATION AREA.

TABLE 4-1: TNRD REPORTED MONITORING WELL DEPTH (M)

	Upper Monitoring Well (MW-1)	Lower Monitoring Well (MW-2)
15/03/2016	3.94	1.92
02/06/2016	3.31	1.81
31/08/2016	2.09	1.3
03/11/2016	1.9	1.2

The wastewater system disposal area is positioned to avoid polluting the local water supply. The residences along Paul Lake Road take their drinking water directly from the lake. Similarly, the Deerwood Stata has a deep-water intake located in the lake. There also appears to be a well linked to the Deerwood water system located directly south of the Deerwood disposal field.

There is a hand pumped well in the day use area in the Paul Lake Recreation Area, down gradient from the disposal field. There is a sign on the well indicating that the water is non-potable. As this is a group site for the Provincial Park, and is used for camping, the water will be used for drinking after boiling. The wells database was consulted and the well appears to have been installed in 1996, the same year that the wastewater system was constructed. The well's horizontal separation from the disposal field to the well is approximately 50m which exceeds the minimum 30m setback (Sewerage System Standard Practice Manual. Version 3).

With disposal fields, the effluent eventually begins surfacing and a new field is needed. Disposal field failure commonly results from one of the following issues;

- Poor flow distribution, with excessive flow to problem areas.
- Blockage of holes in the distribution pipes.
- Excessive biomat formation.
- Clogging of the soil interface with solids from discharges of latex paint, grease, oil, or other foreign substances.

A typical septic field can operate for several decades and with the high level of wastewater treatment at Paul Lake, a significantly longer than normal period of service is expected.

5.0 Controls and Electrical

Description

The control system comprises:

- Pump control panel at the lift station with floats for pump starting and high and low level alarms.
- Buried telemetry cable linking the lift station with WWTP.
- WWTP relay logic control panel with pump and motor controls for the various components.
- Dialer and modem for transmission by telephone of alarm conditions to the water system operator. Alarm conditions that can be forwarded to the operator by telephone include low well level, low/high reservoir level and low temperature in the pumphouse.

The WWTP has a 60A 600V three phase electrical service. There is a standby generator at the WWTP site, but not at the lift station. Explosion proof electrical equipment has been used inside the RBC hood.

The system control philosophy is described in the WWTP Operating Manual.

Assessment

The Paul Lake system is the only TNRD system still operating with a relay logic control panel and without SCADA. It is proposed that the control panel be updated with a PLC based control panel and SCADA.

While there have been issues with mouse infestations in the WWTP generator enclosure, there are no concerns with generator capacity or condition.

There is no standby generator at the lift station. It would be appropriate to install a transfer switch to enable a temporary generator to be used when needed.



FIGURE 5-1: ONAN 20ES 79297G GENERATOR SUPPLIED BY WESCO

6.0 Rights of Way

In accordance with the terms of reference for this assessment study, the status of rights of way covering components of the wastewater system have been reviewed.

Sewer System and Pump Station

The sewers are inside the traffic lane within the MOTI road right of way on Plan 29420 and Plans 6T1730, 7T1730, 8T1730 and DL5861, DL5862, DL5863.

The pump station is located in within the MOTI road right of way on Plan 7T1730.

Wastewater Treatment Plant

The wastewater treatment plant occupies Crown land (DL6358).

Disposal Field

The effluent disposal field is inside the Paul Lake Recreational Area, which is part of the Paul Lake Provincial Park. The Ministry of Environment and Climate Change Strategy has issued permission for land use / occupancy by means of a Park Use Permit (Permit No 102739). The permit is included as Appendix C.

7.0 Improvement Plan

7.1 General

In Section 7 of this report, improvements to the water system are described based on an assessment of regulatory standards and operating condition. Aside from infrastructure improvements the TNRD are working on the development of a variety of other tasks that will enhance the management of the wastewater systems. These include;

- GIS data collection (completed)
- Asset management plan (completed)
- Long term life cycle financial planning (in progress)

7.2 Sewer Network

The only work proposed for the sewer network is a camera inspection.

There would be issues with cleaning and inspecting the 100mm pipe sections. A motorized camera tractor is too big to fit into the 100mm pipe. A push rod can be used for distances up to 45m. This method is more time consuming and less reliable (higher chance of incomplete videos) than with the tractor. The 100m pipe is also too small for the normal cleaning methods. A 3/4" high pressure hose and nozzle won't navigate 100mm pipe. Jet rodding would need to be completed by hand, which is more difficult and time consuming.

It may be that the cleaning and inspection of 100mm mains is best limited to the gravity main on Paul Lake Road to the West of the Lift Station.

TABLE 7-1: ESTIMATED SEWER INSPECTION COST

Description	Unit Price	Number	Subtotal
Clean 100mm pipe by jet rodding	\$10	1,010m	\$10,000
Inspect 100mm pipe by push rod camera	\$10	1,010m	\$10,000
Clean 150mm pipe by high pressure hose	\$4	1,390m	\$5,500
Inspect 150mm pipe by motorized camera tractor	\$3	1,390m	\$4,200
Engineering and Contingency		50%	\$14,900
TOTAL			\$45,500

7.3 Lift Station

Work at the lift station would be limited to sealing of the chamber lid.

TABLE 7-2: ESTIMATED LIFT STATION UPGRADE COST

Description	Unit Price	Number	Subtotal
Install rubber seal on chamber lid	\$2000		\$2,000
Engineering and Contingency		50%	\$1,000
TOTAL			\$3,000

7.4 Treatment

The equalization and sludge holding tank duplication cost is based on the purchase and installation of a standard prefabricated concrete septic tank. A heating cable would be installed in both equalization tanks.

An insulated coagulation tank and flocculation tank with mixers located adjacent to the RBC has been proposed. The system would be installed in a similar fashion to the RBC with an insulated removable cover.

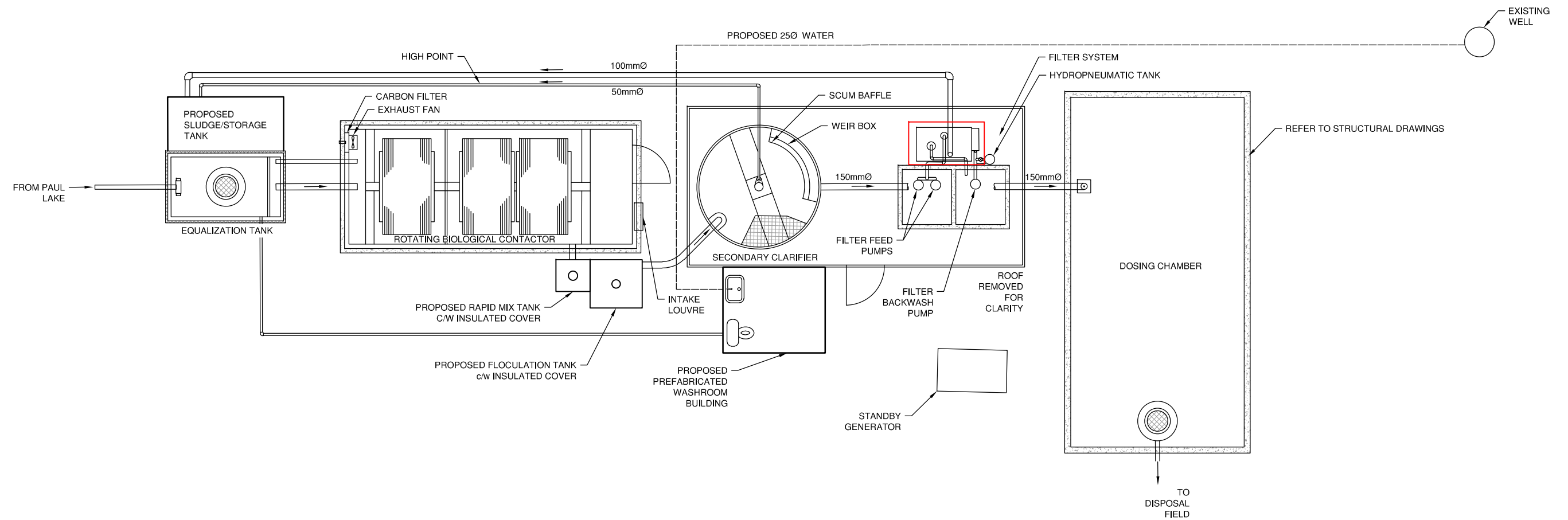
The standby RBC shaft is based on a replacement unit from Hannah Environmental designed to match the existing shaft.

The WWTP requires a washroom in order to meet workplace standards. In order to avoid a requirement for a sewage lift pump, the proposed design is based on a prefabricated washroom unit with heating and insulation installed next to the inlet works.

Upgrading the sand filter to a deeper bed duplex system is proposed on the basis that reduced filter loading rates and improved coagulation operating throughout the year should achieve the required treatment performance. This would be confirmed once the coagulation system improvements were completed. As an alternative to sand filtration the cost for a cloth media disk filtration unit in a painted steel tank, including supplier start-up supervision services has been priced at around \$160,000, plus the costs for design and installation. The existing system would be retained as a backup filter in order to meet the component and reliability requirements outlined in the Municipal Wastewater Regulations. The cloth media filter has a larger footprint and would partly cover the clarifier effluent and backwash tanks.

TABLE 7-3: ESTIMATED TREATMENT UPGRADE COSTS

Description	Unit Price	Number	Subtotal
Insulated coagulation / flocculation tanks with mixers	\$40,000		\$40,000
Standby RBC shaft	\$30,000		\$30,000
Washroom building and water supply	\$50,000		\$50,000
Duplex sand filter unit located inside existing building	\$55,000		\$55,000
Cast in Place Equalization and Sludge Holding Tank with heating cable.	\$95,000		\$95,000
Engineering and Contingency (50%)			\$135,000
TOTAL			\$405,000



TNRD MASTER PLAN PAUL LAKE SEWAGE TREATMENT PLANT PROPOSED IMPROVEMENTS - DETAILS



DRAWN BY: MK
DATE: Dec 2017

DESIGN BY: RW
SCALE: 1:100 (11x17)
DWG NO.:
REV:
Fig. 7-2
379-491

FILE: c:\clients\300-399\379-491\03 drawings\cad\02 design drawings\cad\379-491-pitchard-paul-civil.dwg

FIGURE 7-2: PAUL LAKE SEWAGE TREATMENT PLANT – PROPOSED IMPROVEMENTS – DETAILS

7.5 Control System

The costs to implement SCADA at Paul Lake are estimated based on the work completed at other TNRD sites including the Pritchard Sewage Treatment System. The existing relay logic system would be replaced with a programmable logic control system and SCADA system communicating to the main TNRD office.

TABLE 7-4: ESTIMATED SCADA IMPLEMENTATION COST

Description	Unit Price	Number	Subtotal
Control Panel Replacement and SCADA Setup/Programming			\$45,000
Engineering and Contingency		50%	\$22,500
TOTAL			\$67,500

8.0 Cost Summary

Cost estimates for the Paul Lake Sewer System upgrades are summarized in this section.

TABLE 8-1: RECOMMENDED UPGRADES AND ESTIMATED COSTS

Schedule	Description	Estimated Cost
Sewage Collection System		
2018	Sewer cleaning and inspection	\$45,500
2020	Lift station lid seal	\$3,000
Treatment		
2019	Control system upgrade	\$67,500
2025	Insulated coagulation / flocculation tanks with mixers	\$60,000
2025	Standby RBC shaft	\$45,000
2025	Duplex sand filter unit located inside existing building	\$82,500
2025	Cast in Place Equalization and Sludge Holding Tank with heating cable.	\$142,500
2030	Washroom building and water supply	\$75,000

Cost estimates are developed to the Class 'C' level, per Engineers and Geoscientists British Columbia (EGBC) Budget Guidelines for Consulting Engineering Services, Class 'C' estimates are defined as follows:

Class C estimate ($\pm 25\text{-}40\%$): An estimate prepared with limited site information and based on probable conditions affecting the project. It represents the summation of all identifiable project elemental costs and is used for program planning, to establish a more specific definition of client needs and to obtain preliminary project approval.

APPENDIX A

Effluent Monitoring Results

Paul Lake WWTP
Quarterly Effluent Testing

CLIENT ID			Chloride	pH	BOD, 5-day	Total Suspended Solids	Nitrogen, Total	Nitrogen, Total Kjeldahl	Ammonia, Total	Nitrate + Nitrite	Nitrate	Nitrite	Phosphorus, Total	Phosphorus, Total Dissolved	Phosphorus, Dissolved Reactive	Coliforms, Total	Background Colonies	Coliforms, Fecal	E. coli	Well Depth
	LAB ID	DATE SAMPLED	mg/L		mg/L	mg/L	mg/L	mg/L as N	mg/L as N	mg/L as N	mg/L as N	mg/L as N	mg/L as P	mg/L as P	mg/L as P	CFU/ 100 mL	CFU/ 100 mL	CFU/ 100 mL	CFU/ 100 mL	m
Final Effluent	6031124-01	15/03/2016			<10	11			19.1	19.7	19.5	0.245	1.4	0.232						
Upper Monitoring Well	6031124-02	15/03/2016	16.7	7.74				0.19	0.059	0.345	0.345	<0.010	0.078	0.004		<1	4	<1	<1	3.94
Lower Monitoring Well	6031124-03	15/03/2016	18.1	7.75				0.14	0.039	0.107	0.107	<0.010	0.099	0.011		<1	<1	<1	<1	1.92
Final Effluent	6060283-01	02/06/2016			<7	6			1.1	28.5	28	0.459	0.773	0.197						
Upper Monitoring Well	6060283-02	02/06/2016	22	7.2				0.41	0.028	0.73	0.73	<0.010	0.285	0.011		2	<1	2	<1	3.31
Lower Monitoring Well	6060283-03	02/06/2016	26.8	7.1				0.32	<0.02	0.13	0.13	<0.010	0.088	0.008		<1	7	<1	<1	1.81
Final Effluent	6090056-01	31/08/2016			<7	9			1.67	27.7	27.4	0.347	1.55	0.843						
Upper Monitoring Well	6090056-02	31/08/2016	15.5	7.91				0.08	<0.02	0.176	0.176	<0.010	0.036	0.014		<1	32	<1	<1	2.09
Lower Monitoring Well	6090056-03	31/08/2016	30.8	7.89				0.18	<0.02	0.222	0.222	<0.010	0.039	0.013		3	12	3	<1	1.3
Final Effluent	6110383-01	03/11/2016			8	<2			1.27	34.6	34.3	0.309	0.283	0.09						
Upper Monitoring Well	6110383-02	03/11/2016	12.7	6.96				0.3	0.095	0.217	0.217	<0.010	0.121	0.004		<1	39	<1	<1	1.9
Lower Monitoring Well	6110383-03	03/11/2016	31.1	7.07				0.24	0.042	0.011	0.011	<0.010	0.194	0.006		<1	13	<1	<1	1.2
Final Effluent	7090071-01	31/08/2017			<6.9				1.08	34.6	34.6	<0.010	0.1	0.0607	2.6					
Upper Monitoring Well	7090071-02	31/08/2017	34.9			7.83	1.35	0.253	0.028	1.09	1.09	<0.010	0.14	0.138		1	140	<1	<1	
Lower Monitoring Well	7090071-03	31/08/2017	18.9			7.77	0.539	0.327	0.025	0.212	0.212	<0.010	0.243	<0.0020		<1	1100	<1	<1	

APPENDIX B

Permit to Operate

PROVINCE OF
BRITISH COLUMBIA



Environmental Protection
1259 Dalhousie Drive
Kamloops
British Columbia V2C 5Z5
Telephone: (604) 371-6200

MINISTRY OF ENVIRONMENT,
LANDS AND PARKS AND MINISTER
RESPONSIBLE FOR MULTICULTURALISM
AND HUMAN RIGHTS

**PERMIT
PE-13506**

Under the Provisions of the Waste Management Act

Thompson Nicola Regional District

is authorized to discharge effluent to the ground from an existing 105-unit residential development located at Paul Lake, British Columbia, subject to the conditions listed on the following pages. Contravention of any of these conditions is a violation of the Waste Management Act and may result in prosecution.

This Permit 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 Permittee.

Date Issued: 1995
Amendment Date: April 6, 1995

Page: 1 of 7

A handwritten signature in ink, appearing to read 'H H Henderson'.

H H Henderson B.Sc., R.P.Bio.,
Regional Waste Manager

PERMIT NO. : PE 13506

1. AUTHORIZED DISCHARGES

1.1 The discharge authorized shall originate from an existing 105-unit residential development as shown on the attached site plan (page 7).

1.1.1 The maximum authorized rate of discharge is 60 cubic metres per day. The authorized discharge period is 24 hours/day, 7 days/week.

1.1.2 The characteristics of the discharge shall be equivalent to or better than:

Biochemical Oxygen Demand	10 mg/l
Non-Filterable Residue	10 mg/l

1.1.3 The authorized works are: septic tank at each residence, followed by a central Rotating Biological Contactor unit, dosing siphons, sand filter, dual tile disposal fields and related appurtenances located approximately as shown on the site plan.

1.1.4 The location of the point of discharge is immediately West of the North Portion of Township 20, Range 16, Section 28, District Lot 1781, Kamloops Division Yale District, West of the Sixth Meridian.

2. GENERAL REQUIREMENTS

2.1 Maintenance of Works and Emergency Procedures

The Permittee shall inspect the pollution control works regularly and maintain them in good working order. In the event of an emergency, bypass of the designated works, or condition which prevents continuing operation of the approved method of pollution control, the Permittee shall immediately notify the Regional Waste Manager and take appropriate remedial action.

2.2 Process Modifications

The Permittee shall notify the Regional Waste Manager prior to implementing changes to any process that may affect the quality and/or quantity of the discharge.

2.3 Treatment System Sand, Sludge and Scum Removal

Sludge and scum from the residential septic tanks and the Rotating Biological Contactor unit as well as sand from the sand-filter unit shall be removed at frequencies acceptable to the Regional Waste Manager, for disposal at a suitable site. The disposal arrangements require the consent of the Regional Waste Manager. Records of sludge, sand and scum removal shall be maintained for inspection by Environmental Protection staff.

2.4 Standby Facilities

The Permittee shall set aside a standby area equivalent to 50% of the total installed disposal field area. The standby area shall be held in reserve for future use as a disposal field and shall be maintained free of any permanent structure.

2.5 Plans - New Works

Plans of the designated pollution control works shall be submitted for the approval of the Regional Waste Manager. The works shall be constructed in accordance with such plans.

As-built drawings of the works sealed by a professional engineer licensed to practise in British Columbia shall be submitted for the approval of the Regional Waste Manager before discharge begins.

2.6 Tile Field Installation and Operation

The disposal tile shall be installed so that a minimum soil separation of **one metre** shall be maintained between the highest groundwater elevation and the tile invert.

The Permittee shall alternate the use of the tile disposal fields. Changing the alternating period requires the consent of the Regional Waste Manager.

Tile fields shall be kept free of buildings or hard-surfacing of any kind and shall not be put to uses (e.g. parking, horse and cattle pasture etc.) which may cause damage to the system or interfere with its operation.

2.7 Groundwater Monitoring Wells

The Permittee shall install not more than 4 groundwater monitoring wells. The number, locations and structural design of these facilities require the consent of the Regional Waste Manager.

2.8 Sewage Treatment Plant & Operator Certification

The Permittee shall have the Sewage Treatment Plant (STP) classified with the *British Columbia Water and Wastewater Operators Certification Program Society (BCWWOCPS)*. The application for such certification shall be submitted to the BCWWOCPS by October 1, 1995.

The Permittee shall retain the services of a STP operator certified with the BCWWOCPS who will oversee the operation of the STP.

2.9 Upgrading

The Permittee may be required to provide additional treatment works if in the opinion of the Regional Waste Manager any component in the effluent is adversely impacting the environment. The Permittee shall undertake such improvements when so directed by the Regional waste Manager.

3. MONITORING AND REPORTING REQUIREMENTS

3.1 Discharge and Receiving Environment Monitoring

3.1.1 Grab Sampling

The Permittee shall identify sampling locations acceptable to the Regional Waste Manager and obtain grab samples of the discharged effluent in **February, May, August and November**. A grab sample of the monitoring wells shall be obtained at the same time.

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

3.1.2 Analyses

Obtain analyses of the samples as follows:

a) Discharged Effluent

Biochemical Oxygen Demand
Non-Filterable Residue
Nitrogen (nitrate, nitrite and ammonia)
Phosphorus (dissolved and total)

b) Monitoring Well Water

pH
Nitrogen (nitrate, nitrite, ammonia and total kjeldahl)
Phosphorus (dissolved and total)
Chloride
Fecal Coliforms, E. Coli
Water elevation in one monitoring well relative to a known datum.

3.1.3 Flow Measurement

Provide and maintain a suitable flow measuring device and record once per month the total effluent volume discharged over a 30-day period.

3.2 Monitoring Procedures

3.2.1 Sampling and Flow Measurement Procedures

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 suitable alternative procedures as authorized by the Regional Waste Manager.

Copies of the above manual are available from the Environmental Protection Division, Ministry of Environment, Lands and Parks, 777 Broughton Street, Victoria, British Columbia, V8V 1X5, and are also available for inspection at all Environmental Protection Program Offices.

3.2.2 Chemical Analyses

Analyses are to be carried out in accordance with procedures described in the latest version of "*British Columbia Environmental Laboratory Manual for the Chemical Analysis of Water, Wastewater, Sediment and Biological Materials, (March 1994 Permittee Edition)*", or by suitable alternative procedures as authorized by the Regional Waste Manager.

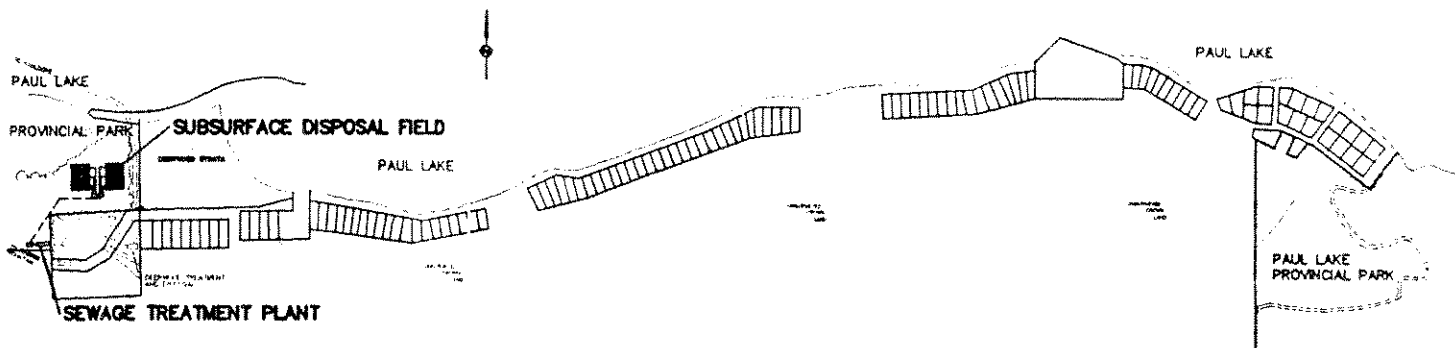
Copies of the above manual may be purchased from the Queens Printer Publications Centre, 2nd Floor, 563 Superior Street, Victoria, British Columbia V8V 4R6 (1-800-663-6105) and are also available for inspection at any Environmental Protection Program Office.

3.3 **Reporting**

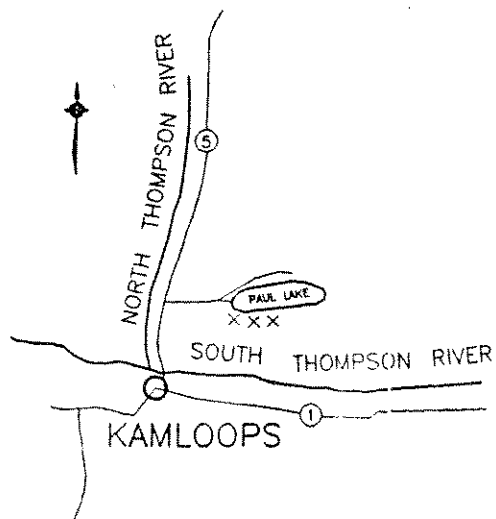
Maintain data of analyses, groundwater elevation and flow measurements for inspection by Environmental Protection staff and submit the data, suitably tabulated, to the Regional Waste Manager for the previous year. The first report is to be submitted by January 31 1996. All subsequent reports shall be submitted within 30 days of the end of the calendar year.



SITE PLAN



LOCATION MAP



Thompson Nicola Regional District

(Name of applicant(s))
November 25, 1994
(Date)

(Signature of applicant(s) or agent)

(FOR OFFICE USE ONLY)

April 6, 1995
Date Issued

Date Amended

Appendix PAGE 7 to Permit No. PE 13506

Approval No.

APPENDIX C

Park Use Permit

PARK USE PERMIT

LAND USE / OCCUPANCY

This Park Use Permit No. **102739** (the "Permit") is issued under the authority of the *Park Act*

(the "Park")

See "**Management Plan Schedule, Permit Area Description**" for a complete list of Parks and Protected Areas

FROM:

HER MAJESTY THE QUEEN IN RIGHT OF THE PROVINCE OF BRITISH COLUMBIA, represented by the Minister responsible for the *Park Act* (the "Province") at the following address:

**Ministry of Environment and Climate Change Strategy
BC Parks
Thompson Cariboo Region - Thompson
1259 Dalhousie Drive
Kamloops BC V2C 5Z5**

TO:

Thompson-Nicola Regional District

(the "Permittee") at the following address:

**300 - 465 Victoria St
Kamloops
BC V2C 2A9**

THE PROVINCE AND THE PERMITTEE AGREE AS FOLLOWS:

ARTICLE I - GRANT OF PERMIT

- 1.01 The Province, on the terms and conditions of this Permit, grants to the Permittee permission to enter upon and use that part of the Park (the "Permit Area") described, and for the purposes described, in the Management Plan Schedule.

ARTICLE II - TERM

- 2.01 The duration of this Permit is for a term of **10 years** commencing on **January 1, 2015** (the "Commencement Date") and ending on **December 31, 2025** (the "Expiration Date"), unless cancelled, terminated or renewed in accordance with the terms and conditions of this Permit.

ARTICLE III - FEES

- 3.01 The Permittee must pay to the Province a minimum fee (the "Permit Fee") of **\$500.00 (plus applicable taxes)** prior to Commencement date and on each anniversary of the commencement date during the term of this Permit.
- 3.02 The Province may, by notice to the Permittee not less than 30 days prior to each anniversary of the Commencement Date, increase the Permit Fee to an amount solely determined by the Province at its discretion, and the Permittee must pay the increased amount.
- 3.03 The Permittee must pay interest to the Province on money payable by the Permittee and owing to the Province under this Permit, at the rate of interest prescribed by the *Financial Administration Act* in respect of money owing to the Province, which interest will be calculated from the date that the money becomes payable to the Province.

ARTICLE IV - INDEMNITY

- 4.01 The Permittee will indemnify and save harmless the Province, its servants, employees and agents against all losses, claims, damages, actions, costs and expenses that the Province, its servants, employees and agents may sustain, incur, suffer or be put to at any time arising, directly or indirectly, from any act or omission of the Permittee, its employees, agents, contractors and licensees under this Permit, except for any liability arising from any independent, negligent act of the Province.

ARTICLE V – SECURITY AND INSURANCE

- 5.01 On the Commencement Date, you will deliver to us Security in the amount of **\$0.00** which will:
- (a) guarantee the performance of your obligations under this Permit;
 - (b) be in the form required by us; and
 - (c) remain in effect until we certify, in writing, that you have fully performed your obligations under this Permit.
- 5.02 Despite section 5.01, your obligations under that section are suspended for so long as you maintain in good standing other security acceptable to us to guarantee the performance of your obligations under this Permit and all other Dispositions held by you.
- 5.03 We may use the Security for the payment of any costs and expenses incurred by us to perform any of your obligations under this Permit that are not performed by you and, if such event occurs, you will, within 30 days of that event, deliver further Security to us in an amount equal to the amount drawn down by us.
- 5.04 After we certify, in writing, that you have fully performed your obligations under this Permit, we will return to you the Security maintained under section 5.01, less all amounts drawn down by us under section 5.03.
- 5.05 You acknowledge that we may, from time to time, notify you to
- (a) change the form or amount of the Security; and
 - (b) provide and maintain another form of Security in replacement of or in addition to the Security posted by you under this Permit;
- and you will, within 60 days of receiving such notice, deliver to us written confirmation that the change has been made or the replacement or additional form of Security has been provided by you.
- 5.06 You must
- (a) without limiting your obligations or liabilities under this Permit, at your expense, effect and keep in force during the Term the following insurance with insurers licensed to do business in Canada:
 - (i) **Commercial General Liability** insurance in an amount of not less than **two million dollars \$2,000,000 inclusive per occurrence** insuring against liability for personal injury, bodily injury (including death) and property damage, including coverage for all accidents or occurrences on the Permit Area or any improvements. Such policy will include cross liability, liability assumed under contract, provision to provide 30 days advance notice to us of material change or cancellation, and include us as an additional insured; **See Attached Schedule**
 - (b) ensure that all insurance required to be maintained by you under this Permit is primary and does not require the sharing of any loss by any of our insurers;
 - (c) within 10 working days of the Commencement Date of this Permit, provide to us evidence of all required insurance in the form of a completed "Province of British Columbia Certificate of Insurance";

- (d) if the required insurance policy or policies expire or are cancelled before the end of the Term of this Permit, provide within 10 working days of the cancellation or expiration, evidence of new or renewal policy or policies of all required insurance in the form of a completed "Province of British Columbia Certificate of Insurance";
- (e) notwithstanding subsections (c) or (d) above, if requested by us, provide to us certified copies of the required insurance policies to be maintained by you under this Permit.

5.07 We may, acting reasonably, from time to time, require you to

- (a) change the amount of insurance set out in subsection 5.06(a); and
- (b) provide and maintain another type or types of insurance in replacement of or in addition to the insurance previously required to be maintained by you under this Permit;

and you will, within 60 days of receiving such notice, cause the amounts and types to be changed and deliver to us a completed "Province of British Columbia Certificate of Insurance" for all insurance then required to be maintained by you under this Permit.

5.08 You shall provide, maintain, and pay for any additional insurance which you are required by law to carry, or which you consider necessary to insure risks not otherwise covered by the insurance specified in this Permit in your sole discretion.

5.09 You waive all rights of recourse against us with regard to damage to your own property.

ARTICLE VI - COVENANTS OF THE PERMITTEE

6.01 The Permittee must:

- (a) pay the Permit Fee and other money payable under this Permit when due at the address of the Province first written above or at such place as the Province may specify from time to time;
- (b) pay when due all taxes, levies, charges and assessments that relate to operations of the Permittee under this Permit;
- (c) comply with all laws, bylaws, orders, directions, ordinances and regulations of any competent governmental authority in any way affecting the Permit Area, the Park, its use and occupation or the Permittee's operations under this Permit;
- (d) advise its employees, contractors, licensees, and agents of the laws and regulations respecting provincial parks and recreation areas and the conditions of this Permit respecting conduct in the permit Area;
- (e) keep the Permit Area in a safe, clean and sanitary condition to the satisfaction of the Province and make safe, clean and sanitary any portion of the Permit Area that the Province may direct by notice in writing to the Permittee;
- (f) remove from the Permit Area and the Park all garbage, debris and effluent resulting from its use of the Park and Permit Area under this Permit, except as otherwise permitted in the Management Plan Schedule;
- (g) comply with all orders and directions made, verbally or in writing, by a park officer (as defined in the *Park Act*) relating to the Park, this Permit or the Permit Area;
- (h) not construct, erect, place, repair, maintain or alter any building, fixture, equipment, structure or improvement in the Permit Area except as may be permitted by this Permit or with the prior written consent of the Province;
- (i) take all reasonable precautions to prevent and suppress fires in the Permit Area;
- (j) not interfere with free public access through, across and upon the Permit Area, unless otherwise specified in the Management Plan Schedule;
- (k) not interfere with or disrupt the activities and operations of other Permittee's or users in the Park;

- (l) use and occupy the Permit Area only in accordance with the provisions of this Permit;
- (m) not remove, destroy, damage, disturb or exploit any natural resource (as that term is defined in the *Park Act*) or any archaeological or cultural artefact found in or on the Permit Area except as may be permitted by this Permit, and only then in accordance with the *Park Act* and all other applicable laws;
- (n) not commit or allow any wilful or voluntary waste, damage or destruction in or upon the Permit Area;
- (o) pay for or repair, as determined by the Province, any damage caused to the property of the Province by the Permittee, its employees, agents, contractors, or licensees;
- (p) upon the expiration, cancellation or termination of this Permit:
 - (i) peaceably quit and deliver up possession of the Permit Area to the Province,
 - (ii) remove all chattels and improvements of the Permittee from the Permit Area within 30 days of the expiration, cancellation or sooner termination of this Permit, unless otherwise advised in writing, by the Province,
 - (iii) deliver to the Province possession of all equipment, furnishings, fixtures, chattels and improvements owned by the Province in a state of good repair and working order, and
 - (iv) restore the Permit Area to the satisfaction of the Province;
 - (v) and to the extent necessary, this covenant will survive the expiration, cancellation or termination of this Permit; and
- (q) comply with all provisions of the schedules to this Permit.

ARTICLE VII - RIGHTS OF THE PROVINCE

- 7.01 The Province retains all rights in respect of the Park and Permit Area which are not expressly granted to the Permittee under this permit, including, without limitation:
- (a) the right at all times for the Province, its authorized representatives, employees, and agents to have unimpeded access over and along all portions of the Permit Area and to inspect any portions of the Permit Area;
 - (b) the right at all times to construct, repair, alter and maintain buildings, equipment, structures and improvements upon the Permit Area; and
 - (c) the right to grant further rights in respect of the Park and Permit Area, provided that such rights do not unreasonably impede, obstruct or compete with the rights of the Permittee under this Permit.

ARTICLE VIII - NOTICE

- 8.01 Any notice required to be given by either party to the other will be deemed to be given if it is in writing and is delivered by hand or prepaid registered mail to the address first written above or any other address that may be specified in writing by a party and a notice will be deemed to be delivered, if mailed, eight days after the time of mailing except, in the case of a postal interruption, actual receipt is required.
- 8.02 Notwithstanding section 8.01, any written notice to be given by the Province to the Permittee under this Permit will be effectively given if it is posted in a conspicuous place on the Permit Area.

ARTICLE IX - RENEWAL

- 9.01 Not later than 140 days prior to the Expiration Date, the Permittee may, by notice in writing delivered to the Province, apply to the Province for a renewal of this Permit.
- 9.02 Provided that the Permittee is not in default under this Permit and subject to the terms of the *Park Act*, the Province may renew this Permit upon the terms and conditions determined by the Province.

- 9.03 The Permittee acknowledges that nothing in this Permit obligates the Province to renew this Permit and the Province's decision in that respect is entirely within its discretion.

ARTICLE X - TRANSFER

- 10.01 The Permittee must not assign, transfer, sublicense or grant any of the rights or privileges granted by this Permit without the prior written consent of, and on the terms and conditions determined by, the Province.
- 10.02 If the Permittee is a corporation then a change in the control (as that term is defined in subsection 2(3) of the *Business Corporations Act*) of the Permittee without the prior written consent of the Province is deemed to be a breach of section 10.01.

ARTICLE XI - CANCELLATION

- 11.01 In the event that
- (a) the Permittee defaults in the payment of the Permit Fee or other money payable under this Permit, and the default continues for 7 days after the giving of written notice of the default by the Province to the Permittee;
 - (b) the Permittee fails to perform or observe any of the terms or conditions of this Permit, other than the payment of money, and the failure is not remedied within a period specified by the Province;
 - (c) the Permittee has wilfully misrepresented information:
 - (i) on the application form which led to the granting of this Permit, or
 - (ii) required to be provided under the terms and conditions of this Permit;
 - (d) the Permit Area is damaged or destroyed by any cause whatsoever;
 - (e) the Park is closed by the Province;
 - (f) the Permittee files a petition in bankruptcy, is adjudged bankrupt, is petitioned into bankruptcy, makes an assignment for the benefit of its creditors, becomes insolvent or takes the benefit or protection of any statute for bankrupt or insolvent debtors;
 - (g) any of the Permittee's assets is seized in execution from the Permit Area;
 - (h) the Permittee, its employees, agents, contractors or licensees performs any act which in the opinion of the Province, affects the good standing or reputation of the Park, or adversely affects any other permit holder or park user within the Park;
- the Province may cancel this Permit immediately by written notice to the Permittee.
- 11.02 In the event that the Permittee and the Province mutually agree in writing to terminate this Permit, the parties will be released and discharged from their obligations under this Permit, except as otherwise provided in this Permit.
- 11.03 The obligation of the Permittee
- (a) to pay the Permit Fee and other money payable under this Permit; and
 - (b) to comply with Sections 4.01, 6.01(e), 6.01(o) and 6.01(p);
- will survive the expiration, cancellation or termination of this Permit.
- 11.04 The Permittee will not be entitled to any compensation from the Province, in damages or otherwise, in respect of a cancellation or termination of this Permit.

ARTICLE XII - MISCELLANEOUS

- 12.01 This Permit may be inspected by the public at such times and at such places as the Province may determine.
- 12.02 Time is of the essence in this Permit.

- 12.03 Nothing in this Permit will be considered to have been waived by the Province unless such waiver is in writing.
- 12.04 During the term of this Permit, the Permittee will be an independent contractor and not the agent, employee or partner of the Province.
- 12.05 The Province will not be liable for any loss, damage, cost or expense resulting from the destruction of or damage to the Permittee's property or a disruption of the Permittee's operations under this Permit which result from strikes, flooding or other acts of God, vandalism, or any other interference to the Permittee's operation or property.

ARTICLE XIII- INTERPRETATION

- 13.01 In this Permit, unless the context otherwise requires, the singular includes the plural and the masculine includes the feminine, a corporation and body politic.
- 13.02 The captions and headings contained in the Permit are for convenience only and are not to be construed as defining or in any way limiting the scope or intent of the provisions of this Permit.
- 13.03 In this Permit, a reference to an enactment of the Province of British Columbia or of Canada includes a reference to any subsequent enactment of like effect, and unless the context otherwise requires, all statutes referred to in this Permit are enactments of the Province of British Columbia.
- 13.04 If any part of this Permit is found to be illegal or unenforceable, that part will be considered separate and severable and the remaining parts will be enforceable to the fullest extent permitted by law.
- 13.05 If all or part of the Permit Area is in a recreation area established or continued under the *Park Act*, this Permit is deemed to be a resource use permit as that term is defined in the *Park Act*.
- 13.06 All schedules to this Permit form an integral part of this Permit.

IN WITNESS WHEREOF the parties have duly executed this Permit.

SIGNED and DELIVERED on behalf of the **Province** by a duly authorized representative of the Province.



Duly Authorized Representative

Jeff Leahy

Print Name

Regional Director

Print Title

February 26, 2018

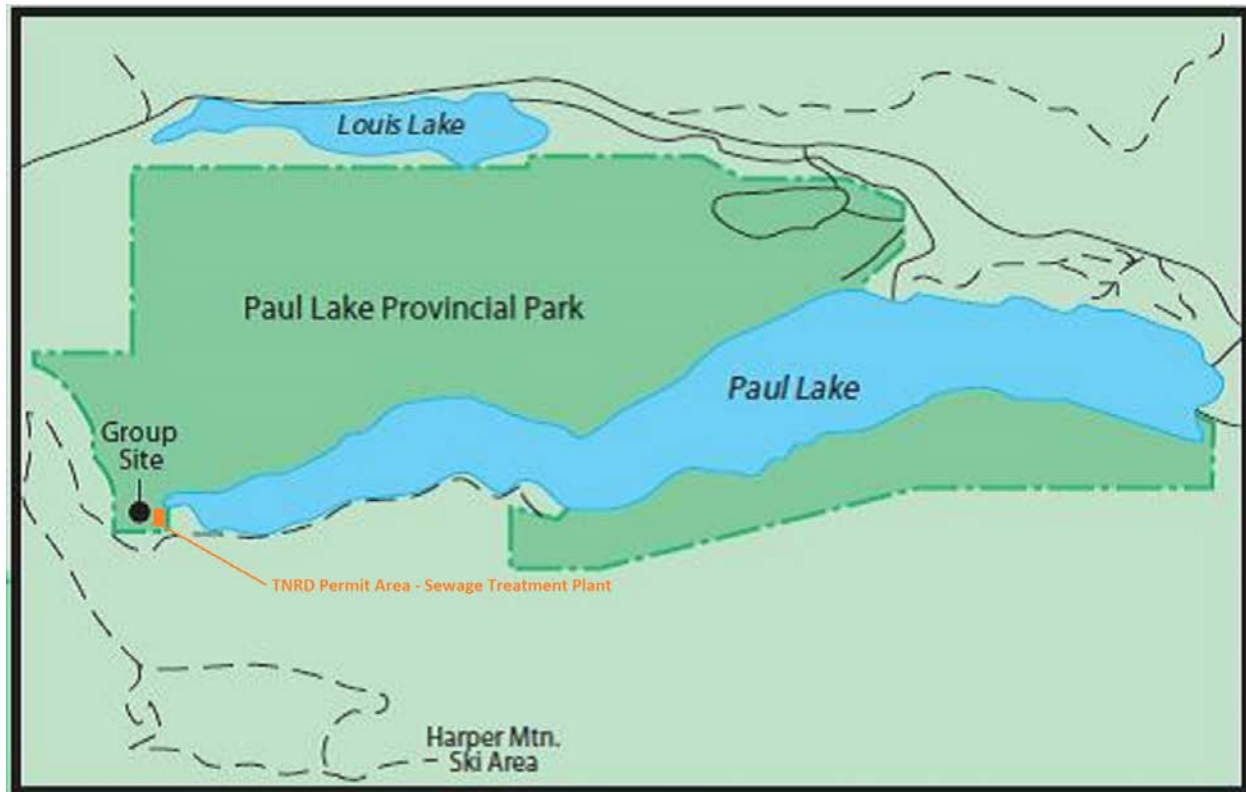
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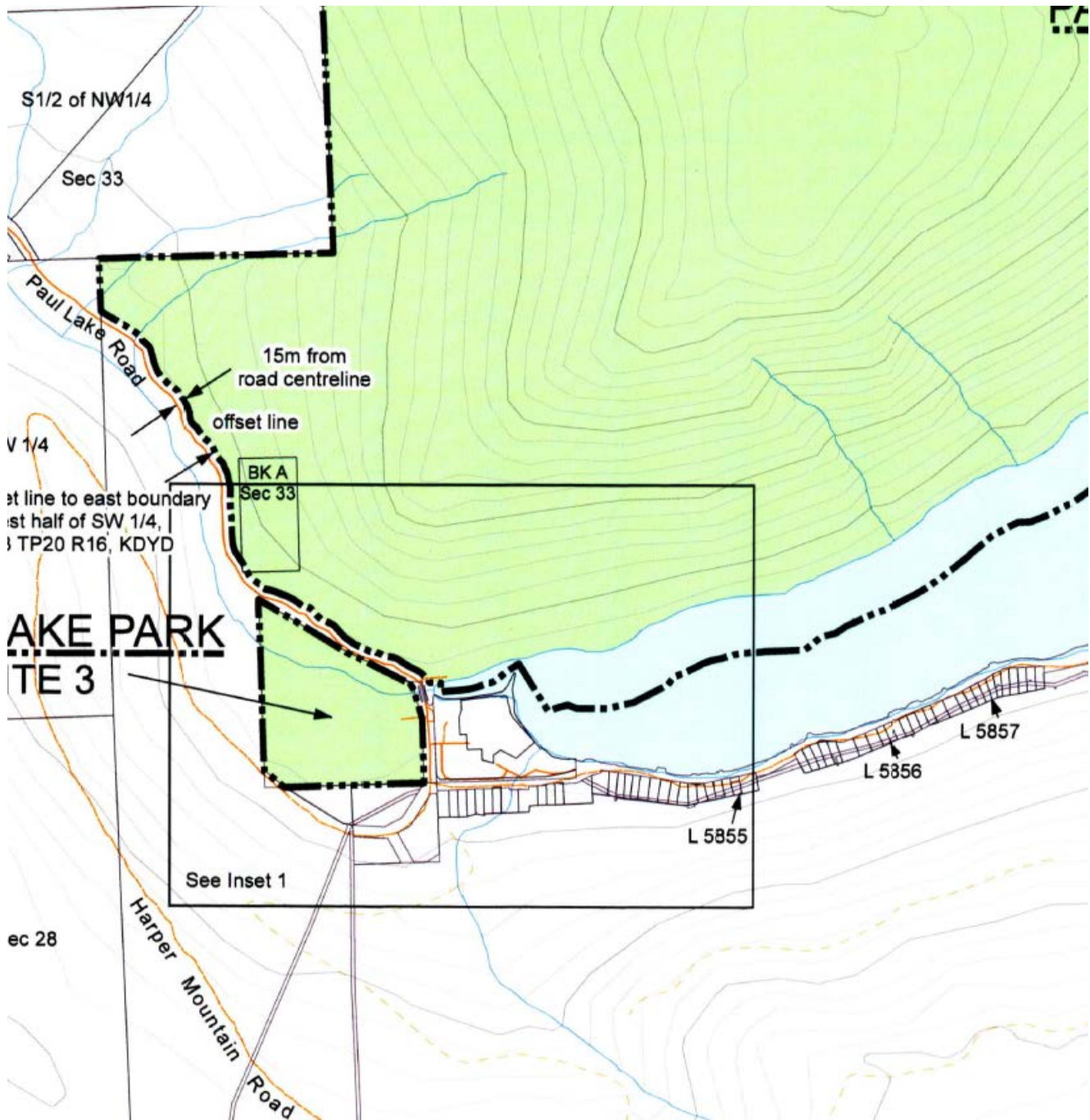
MANAGEMENT PLAN SCHEDULE

PERMIT AREA DESCRIPTION

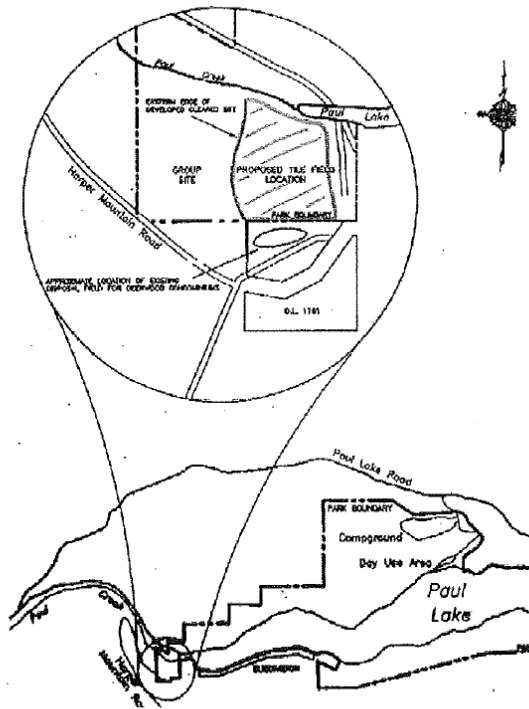
The Permittee is authorized to enter the Permit Area described below and outlined on the attached maps.

- **Paul Lake Park**





(from previous Park Use Permit – 2005 – 2015; Auth. #: TR9710063)



Google Earth Image (2016):



FEE(s)

Protected Land: Paul Lake Park

Activities: Waterlines/Sewers, Utilities

Purpose: Rights of way and miscellaneous land use without structures - The use of a defined area for a power line, telephone line, pipeline or other service or utility right of way and other miscellaneous land use without structures - Company or local government. Fee charged for this purpose is for each protected land.

Fee Description: \$500 or \$60 per hectare whichever is greater

Schedule K Ref: Part 3, Column 2, Item 4(b)

Fees:

Item	Number	Rate	Total
Minimum Fee	1	\$500.00	\$500.00
Hectares	1	\$60.00	\$60.00
Sub Total (based on Fee Description above):			\$500.00

Sub Total: \$500.00

Minimum Fee Required: \$500.00
(plus applicable taxes)

SPECIAL PROVISIONS

1. Purpose

This Permit is issued to the Permittee for the purpose **of the continuation of maintaining a sewer treatment facility that services the community of Paul Lake (as physically defined in the Permit Area Description).**

Sewer Treatment Facilities:

1. Sewer Treatment Plant:

- Coordinates (from Google Earth):
 - Latitude: 50° 44'2.08"N
 - Longitude: 120° 9'44.52"W
- Buildings/Structures (including):
 - Rotating biological contractor
 - Secondary clarifier and filter
 - Dosing tank
- Pipes:
 - to/from the lift station – approximately 950 metres

2. Lift Station:

- Coordinates (from Google Earth):
 - Latitude: 50° 44'5.52"N
 - Longitude: 120° 8'58.69"W

3. Disposal Field:

- which includes piping to/from the treatment plant – approximately 128 metres

4. Total Pipe Length: approximately 2.72 km in total

Summary of Operation:

- 2.** Every service has its own septic tank which feeds into the TNRD service line.

3. Permittee Designated Representative

The Permittee appoints the following representative to be responsible for liaison between BC Parks and the Permittee:

Name: Arden Bolton, Manager of Utility Services, Thompson-Nicola Regional District
Address: 300–465 Victoria Street, Kamloops, BC, V2C 2A9
Telephone: (250) 377-8673
Fax: (250) 372-5048
Email: abolton@tnrd.ca

4. BC Parks Contact Information

The Designated Representative must contact the Area Supervisor with any requirements or questions regarding this Park Use Permit. To determine the Area Supervisor responsible for the protected land(s) listed below, contact the associated regional office for this information.

Park, Protected Area or Conservancy Name	Contact Information
Paul Lake Park	Ministry of Environment and Climate Change Strategy, BC Parks Thompson Cariboo Region - Thompson 1259 Dalhousie Drive Kamloops BC V2C 5Z5 <i>Regional Office:</i> (250) 371-6200 <i>Fax:</i> (250) 828-4000

5. Maintenance for Intended Purpose

The Permittee shall maintain all authorized improvements within the permit area in an adequate state of repair for the purpose for which they are intended.

6. Site Maintenance

The Permittee shall be responsible for ensuring a minimum 30 metre buffer between the sewer treatment area and the area adjacent to the condominiums – across Paul Lake Road/Harper Mountain Road. This is to provide a vegetation screen between the permit area and the Paul Lake community. As well, efforts must be made to provide a buffer between the permit area and Paul Lake Provincial Park's Group Use Area (to the west). Maintenance of vegetation (including trees) on the site will be the responsibility of the Permittee – maintenance activities include the removal of trees (if necessary) and their off-site disposal.

7. Emergency Repair Access

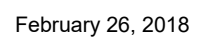
The Permittee shall be free to enter upon the permit area to implement repairs without prior consultation with the Province, but shall notify the Province at the first available opportunity of such actions.

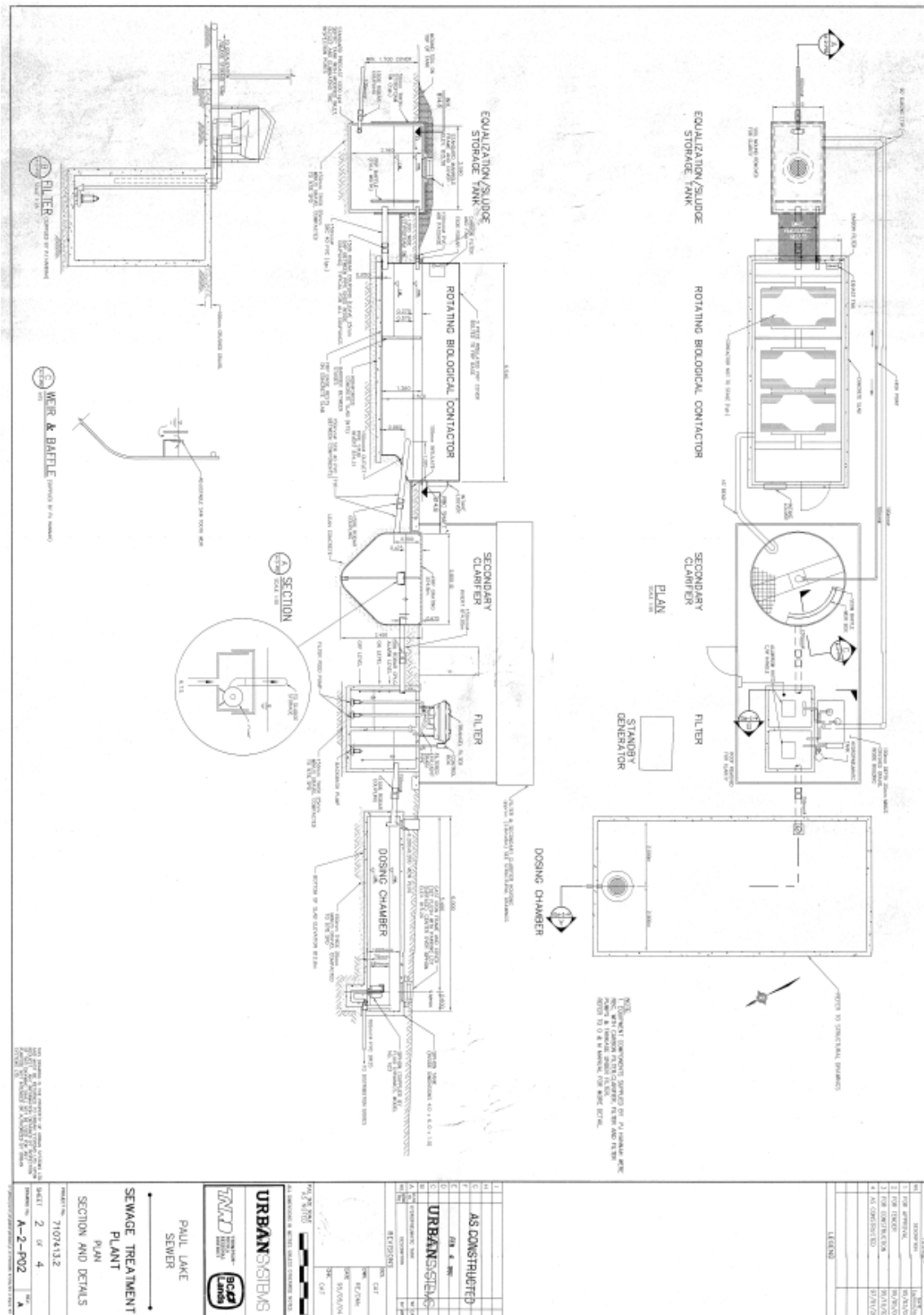
8. Notification Prior to Major Works

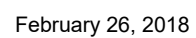
The Province must be notified prior to any major works being undertaken. Major works is considered to be any work where mechanical equipment is required.

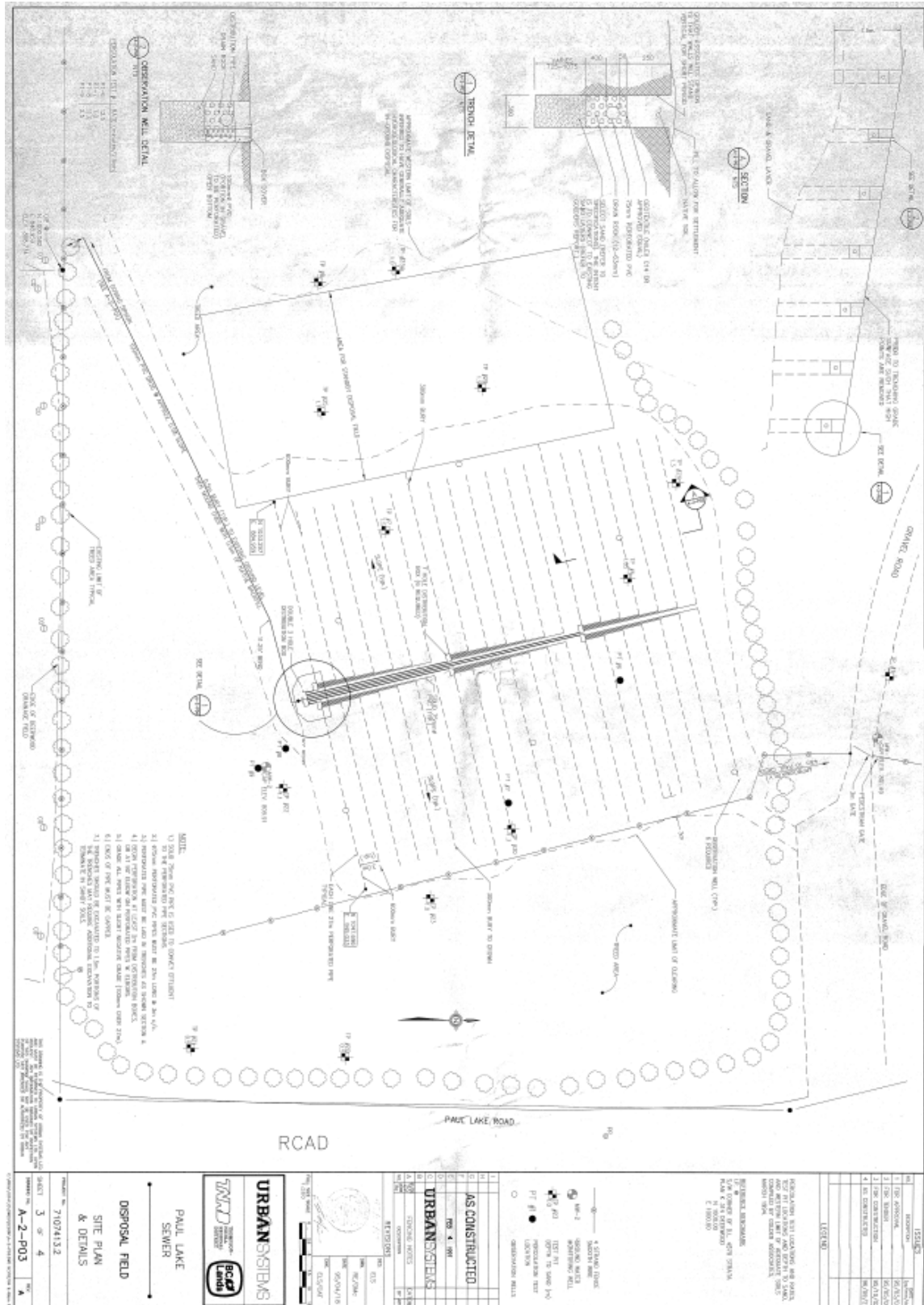
9. Responsibility for Employees

The Permittee shall be responsible for the actions and conduct of his employees and agents both on and off duty while within the Park and any violation of the provisions of this agreement by an employee or by an agent of the Permittee shall be deemed to be a violation by the Permittee.









INSURANCE SCHEDULE

- 1.1 The Permittee will, during the term of this Permit, maintain and pay for, with insurers licensed in British Columbia, the following insurance:

Comprehensive General Liability Insurance in an amount not less than **\$2,000,000.00 inclusive per occurrence** against personal injury, property damage and liability assumed under contract. **The Province is to be added as an additional insured under this policy and policy must include a cross liability clause.**
- 1.2 All insurance required to be maintained by the Permittee under this Permit will be primary and not require any insurer of the Province to share or contribute to any loss.
- 1.3 On or before the Commencement Date, the Permittee will provide the Province with a "Province of British Columbia Certificate of Insurance" that has been completed by the Permittee's insurer in respect of all insurance required to be maintained by the Permittee under this Permit. When requested by the Province, the Permittee will provide to the Province certified copies of the insurance policies.
- 1.4 All policies of insurance required to be maintained by the Permittee under this Permit must be endorsed with a requirement that the Province be provided 30 days' prior written notice of cancellation of or a material change to the policy.
- 1.5 The Permittee waives all rights of recourse against the Province with regard to damage to the property of the Permittee.
- 1.6 The Province may, by notice in writing to the Permittee, require the Permittee to change the form, amount, deductible or other term of any insurance required to be maintained under this Permit and the Permittee must change the insurance accordingly within 30 days of such notice.