LITTLE SHUSWAP LAKE INDIAN BAND

1886 Little Shuswap Lake Road • Chase BC • V0E 1M2
tel 250.679.3203 • **fax** 250.679.[illegible]

BAND COUNCIL RESOLUTION

The Council of the: **LITTLE SHUSWAP LAKE INDIAN BAND**	**Band Council Resolution Number** **3278**
Agency: **CENTRAL** Province: **BRITISH COLUMBIA**	A quorum for this Band is: **TWO**
Dated at: **SQUILAX this 19th day of August AD 2014**	

DO HEREBY RESOLVE AND ADOPT THE FOLLOWING:

LITTLE SHUSWAP LAKE INDIAN BAND
SCOTCH CREEK INDIAN RESERVE NO. 4
COMMUNITY SEWAGE TREATEMENT GOVERNANCE BYLAW
No. 2014.01

WHEREAS there has been a historic need for a community sewage treatment facility for the leased residential lake shore properties (the "Leaseholds") on Scotch Creek Indian Reserve No. 4 (the "Reserve");

AND WHEREAS the Little Shuswap Lake Indian Band ("the Band") used its own resources to retain qualified waste water engineers, currently AllNorth Consulting Limited, (the "Design Engineers") to design and supervise the construction of a community sewage treatment facility (the "Facility") for the Leaseholds on the Reserve;

AND WHEREAS the Facility has been constructed on the Reserve and most of the Leaseholds have connected to the Facility;

AND WHEREAS the Band has entered into a five year contract with Kala Geosciences Ltd. (the "Monitoring Engineers") for the monitoring of well sampling and reporting of groundwater quality, effluent quality and effluent flows;

AND WHEREAS, in conjunction with the Design Engineers and with Monitoring Engineers, the Band has adopted an operating plan (the "Operating Plan") (attached as Appendix "A" to this Bylaw) for the Facility;

AND WHEREAS, in conjunction with the Design Engineers and with Monitoring Engineers, the Band has adopted an emergency response plan (the "ERP") (attached as Appendix "B" to this Bylaw) for the Facility

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AND WHEREAS the Design Engineers have certified in a Post Construction Report dated May 13, 2014 ("Post Construction Report") (attached as Appendix "C" to this Bylaw) that:

a. **the design of the Facility and associated documentation meets with the requirements of the provincial regulations, including the British Columbia *Environment Municipal Sewage Regulation* (now the *Municipal Wastewater Regulation*);**
b. **the work was completed substantially in conformance with the design;**
c. **the proposed discharge of the Facility will meet the requirements of the regulations;**
d. **all required environmental impact studies were conducted in accordance with the regulations;**
e. **the Operating Plan for the Facility is adequate;**
f. **the Facility was commissioned during the period of May 2012 to August 2012 and that the Facility was totally complete on August 20, 2012 and that the Facility has been operating with effluent discharge parameters for nearly two years now;**

AND WHEREAS the Band has required that a number of its members undertake the British Columbia Environmental Operators Certification Program ("EOCP") and that these members maintain their certification;

AND WHEREAS the Band wishes to adopt a formal oversight process for the Facility, its operation and its monitoring;

AND WHEREAS the Chief and Council of the Band have reviewed the Facility, the reports of the Design Engineers and the Monitoring Engineers and other available information respecting the operation and monitoring of the Facility;

AND WHEREAS there is a need to clearly identify the governing body in charge of overseeing the operation of the Facility:

AND THEREFORE, be it resolved that:

1. **Little Shuswap Lake Indian Band hereby adopts this Scotch Creek Indian Reserve No. 4 Community Sewage Treatment Facility Governance Bylaw, No. 2014.01**

2. **The Band's Director of Public Works (the "Director") will have general oversight and management of all facets of the operation and monitoring of the Facility.**

3. **At all times, the Band will have at least three (3) of its members complete successfully the EOCP and maintain their certification with the EOCP. The duly certified members are referred to as "Operators" in this Resolution. They will be employed by the Band as Operators and will report directly to the Director.**

4. **The Band will require that the Facility be operated by the Director and Operators in accordance with British Columbia *Municipal Wastewater Regulation* (the "*Regulation*") (with changes as are necessary due to the fact that the Facility is not**

located on provincial lands), the Operating Plan, the ERP and the Post Construction Report.

5. **Operators will conduct effluent monitoring in accordance with the *Regulation*, the Operating Plan, the ERP and the Post Construction Report.**

6. **The contract with the Monitoring Engineers will either be renewed periodically during the operating life of the Facility, including up to the conclusion of the decommissioning of the Facility at the end of its operating life, or a contract will be entered into with new monitoring engineers qualified in the Province of British Columbia for the monitoring of well sampling and reporting of groundwater quality, effluent quality and effluent flows.**

7. **Reports from the Monitoring Engineers on the operation of the Facility will be commissioned by the Band on an annual basis. Copies of the reports will be sent by the Director of Aboriginal Affairs and Northern Development Canada, the First Nations Health Authority and to the British Columbia Ministry of the Environment, or their successors.**

8. **In the event of a system malfunction or issue, the malfunction or issue is to be reported to the Director. The Director is authorized to seek advice from the Monitoring Engineers and the Design Engineers in any such situation and to take steps as are reasonably necessary to address such a system malfunction or issue.**

9. **The Director is to provide a written report to Chief and Council on a semi-annual basis on the operation of the Facility and, in the event of any system malfunction or issue where public health is or may be a concern, forthwith.**

10. **The Director is hereby authorized and instructed to take whatever steps are reasonably necessary to ensure that the Facility operates in accordance with the provisions of the *Regulation* and in keeping with the requirements outlined in the Operating Plan, the ERP and the Post Construction Report.**

11. **In 2018, the Band will undertake a review of the Operating Plan and the ERP in conjunction with the Design Engineers and the Monitoring Engineers and will update the Operating Plan and ERP if necessary or desirable. This Bylaw will also be reviewed at that time.**

Chief Felix Arnouse

Councilor Brian Finlay

Councilor Dale Marie Tomma

FOR DEPARTMENTAL USE ONLY

grant kovacs norell

litigation counsel

Arthur M. Grant
E-Mail: agrant@gkn.ca
Direct Line: 604-642-6361

July 25, 2014

Via FedEx

Aboriginal Affairs and Northern Development Canada
By-Law Advisory Services Unit
10 Wellington Street
8th Floor
Gatineau (Québec) K1A 0H4

Attention: Véronique Frappier

Dear Ms. Frappier:

Re: Residential Leases for Scotch Creek IR #4
Little Shuswap Lake Indian Band; Our File No. 1005-077

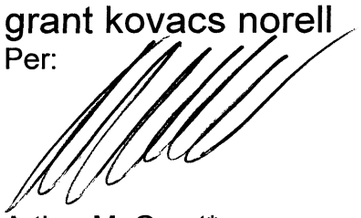
We are legal counsel for the Little Shuswap Lake Indian Band. We refer to your email correspondence of July 15, 2014 with Stewart Adamson, Land Officer of the Little Shuswap Lake Indian Band.

Please find enclosed for your review and consideration an original copy of the Little Shuswap Lake Indian Band Scotch Creek Indian Reserve No. 4 Community Sewage Treatment Governance Bylaw No.2014.01 dated June 2, 2014.

If you have any questions, please do not hesitate to contact the undersigned.

Yours truly,

grant kovacs norell
Per:



Arthur M. Grant*
AMG/ag
Encl
* Personal Law Corporation

Cc Clients

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BAND COUNCIL RESOLUTION

The Council of the: **LITTLE SHUSWAP LAKE INDIAN BAND**	**Band Council Resolution Number** **3265**
Agency: **CENTRAL** Province: **BRITISH COLUMBIA**	A quorum for this Band is: **TWO**
Dated at: **SQUILAX this 2nd day of June AD 2014**	

DO HEREBY RESOLVE AND ADOPT THE FOLLOWING:

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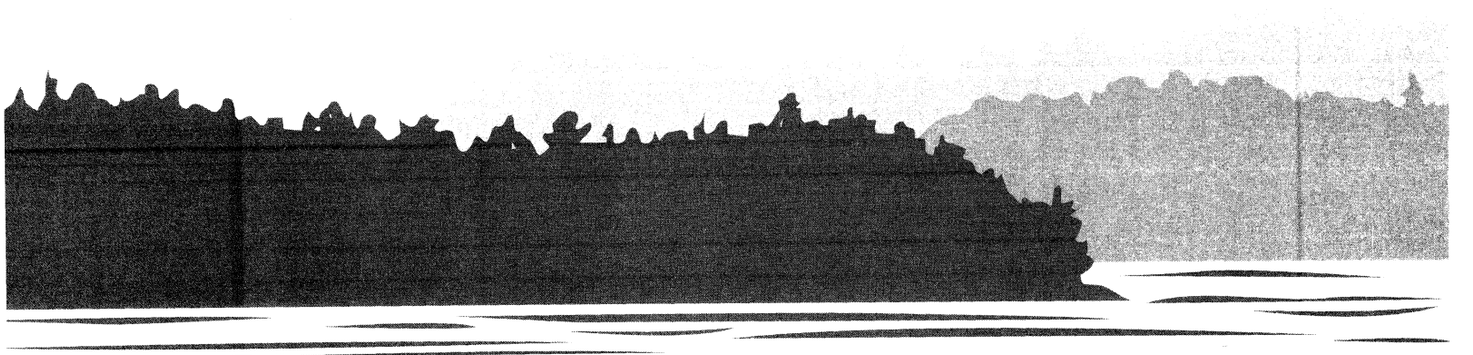

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FOR DEPARTMENTAL USE ONLY

Sewage System Operation, Monitoring & Maintenance Plan **March 12, 2013**

Little Shuswap Lake Indian Band – IR #4 – Scotch Creek – Hilliam Road

Owner: Little Shuswap Lake Indian Band
Planner: Jeff Holm, PEng

1.0 Notice to Owner

The Owner should place and keep this plan in a prominent location:

- maintenance plan,
- make and model of mechanical components and as-constructed details of pumps and dispersal field,
- As-constructed drawings

2.0 Safety Considerations

Wastewater treatment facilities must be treated with care from a safety and public health point of view by operators and the general public alike.

It is necessary to follow all occupational health and safety requirements as applicable when working on the onsite system. These requirements include confined space entry, trenching and shoring, electrical hazards, or any other conditions as set out by WorkSafeBC, the B.C. Safety Authority, Health Canada or other agency.

Listed below are factors that a safety conscious operator must keep in mind:

(a) Personal Hygiene:

(i) discuss possible immunizations with your family doctor;
(ii) do not smoke while working around sewage lagoons;
(iii) after working around a sewage facility do not wear dirty coveralls to your home;
(iv) always clean any equipment such as safety belts, face masks, gloves, etc., after using. You or someone else may want to use it again;
(v) always wear rubber or plastic coated gloves when cleaning out pumps, handling hoses or working anywhere around the lagoon; and
(vi) see your doctor for all injuries. When working with wastewater the smallest cut or scratch is potentially dangerous.

(b) Public Health

Sewage ponds are facilities for treating human wastes and as such people should be advised to keep away from them. Be especially careful with vehicles and lawn mowers on lagoon dykes.

3.0 General Background

The intent of this document is to provide guidance to follow for the operation, maintenance and sampling procedures during treatment of wastewater in a two-cell Rapid infiltration Basin. *Wastewater*, also known as *sewage*, is essentially the water supply of a community after it has been fouled by various uses. It is composed of a combination of domestic wastewater (human wastes and stormwater (runoff resulting from precipitation).

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If untreated wastewater is allowed to accumulate, the decomposition of organic materials it contains can lead to the production of large quantities of unpleasant gases. In addition, untreated wastewater contains numerous pathogenic (disease-causing) microorganisms that dwell in the intestinal tract or that may be present in certain industrial waste. For these reasons, good wastewater treatment is necessary to prevent disease and nuisance conditions and to protect the environment.

3.1 Physical Description of the STEP Collection Treatment system

The two treatment trains used for wastewater treatment are not simply two holes in the ground into which wastewater is discharged. This wastewater treatment is designed and constructed for the purpose of providing the right environmental conditions for bacteriological processes to proceed. They should be easily and safely operated without causing any adverse effects to the environment.

The requirements of good wastewater treatment are met by the following:

i. Control seepage to groundwater. This is accomplished by lining the ponds with an impervious material.
ii. Have sloped and grassed dykes. This makes it easier to maintain the dyke, cut the grass and helps reduce erosion. The slope of the outer face of the dyke is 1 metre vertical to 3 metres horizontal.
iii. Have dykes of at least 3 metres top width to provide a good access road around the cells for inspection purposes.
iv. Have a fence that encloses the entire cell area to prevent trespassing by man or animal.
v. Have the inlet piping in the primary cell located so as to prevent short circuiting.
vi. Have an outlet pipe from the secondary cell located as near as possible to the receiving area for treated wastewater.

The first lined pond is the treatment cell (secondary treatment via oxidation). The size of the cell depends upon the sewage strength and flow rate of the wastewater discharged by the community. Treatment cells should not be designed to operate at depths (liquid level) greater than 1.5 metres. Greater depths reduce treatment efficiency and odour problems could result.

The second lined pond is the holding cell. The capacity is based on a minimum 4 day retention period before discharge to the Rapid Infiltration Basin (RIB).

The third unlined pond is the Rapid Infiltration Basin (RIB). This pond is designed to be flooded periodically with the treated effluent seeping to ground within a 4 hour period.

3.2 Wastewater Treatment Steps

This process is carried out by breaking down of organic matter by the bacteria present in the wastewater. There are three types of bacteria that work in this process: aerobic, anaerobic and facultative bacteria.

The treatment facility receives coarse filtered septic fluid that has already undergone primary anaerobic treatment in the septic tank. This primary effluent is discharged to the oxidation ditch where Aerobic bacteria acquire oxygen to live and grow.

Oxygen must be provided for the aerobic bacteria in the oxidation ditch. Nature does this in two ways:.

i. by interaction on the water surface mixing air into the wastewater; and
ii. by photosynthesis – a process by which sunlight is utilized as an energy source by small green plants called algae to convert carbon dioxide and nutrients into new cell growth and produce oxygen.

If future test results indicate that additional oxygen is required for secondary treatment, mechanical agitators or pumped air diffusers can be installed at that time. Note that this will require a power source.

4.0 Roles & Responsibilities

4.1 System Owner – The Little Shuswap Lake Indian Band

Regulations require that an owner ensures that a sewerage system on the owner's land is maintained in accordance with the maintenance plan provided for the sewerage system. In addition the owner must keep records of maintenance carried out according to the maintenance plan and report audited test results annually to the Authority having jurisdiction, Health Canada and others as required. The owner is ultimately responsible to ensure that all aspects of maintenance and monitoring are achieved.

Regulations indicate that an owner commits an offence if the sewerage system is operated without a properly qualified operator. For this system, classified as a small treatment system serving under 500 persons, a qualified operator would be certified as a Small System Operator or higher under EOCP http://www.eocp.ca/facilities/small-systems/.

4.2 Sewage System Operator – Maintenance Provider

Regulations indicate that a person commits an offence if the person maintains a sewerage system without proper qualifications, i.e., without being a certified operator or other authorized person. The Maintenance Provider should use methods of assessing, reporting and cleaning as described or reviewed in current approved maintenance provider certification courses such as the ECOP Small Wastewater System operator.

Typically, small wastewater collection, or wastewater treatment facilities have Operators who are not required for full-time daily attention. The systems are relatively simple, serve only a small population, and/or are operating for only a portion of any given year.

Most operators of such facilities are not able to meet the minimum requirements for Level 1 to 4 certification; in particular, achieving the operating experience (1,800 hours) required to write a Level I exam in a reasonable period of time. Small System Classification and Operator Certification is intended to insure the competency of

operators who work on systems that may not normally fit within the regular certification process.

The criteria for Small System Classification and Operator Certification have been developed in conjunction with other jurisdictions in Canada and the United States, and follow the guidelines as identified with the Association of Boards of Certification.

1. The facility/system serves a maximum population of 500 people;
2. The operator has at least six (6) calendar months of hands-on experience operating the facility/system or one equivalent to it or higher;
3. The operator has a minimum of 50 hours of hands-on experience operating the facility/system or one equivalent to it or higher; and
4. The operator must have completed appropriate training for which a minimum of 1.2 continuing education units (CEU's) have been awarded by the EOCP.

The Maintenance Provider should:

- observe and document the physical condition and performance of the entire system and not just selected portions;
- determine if any Performance Malfunction, Health or Safety Hazard, or any other issues may be present;
- review the current and expected usage and compare the system's plan/design and current condition to the current usage;
- ensure that a suitable maintenance plan is in place and that the owner understands their responsibilities and how to follow the plan;
- carry out any maintenance and repairs as is necessary for proper operation;
- manage the maintenance and monitoring of the entire onsite system. MP's can utilize the services of others, such as engineers, electricians, septic pumping services and service technicians for system components if needed; and,
- educate the homeowner or users as required.

The Certified Operator must provide a written report that includes, at a minimum:

- the date maintenance and monitoring was carried out, a file or reference number, the name of the client/owner, the address of the site, and MP's signature;
- an evaluation of the system as found and the current usage in relation to the maintenance plan or original permit information;
- a general description of the type and components of the system that summarize what was located and tested as well as anything that was not located or tested and explain the reason why it was not;
- an evaluation of the system's current performance summarizing the results of the testing in an easy to understand way;
- a listing of required repairs and/or recommended improvements, what problems were found, how minor or serious these are, how soon these should or need to be corrected, and the reason why it should or needs to be done;

Any Authorized Person who makes a repair or alteration to a sewerage system must provide the owner with an amendment to the maintenance plan if:

- the work is not already covered by the existing maintenance plan in the filing of the sewerage system with the Health Authority; and,

- the maintenance plan in the filing is, if followed, no longer sufficient to ensure that the sewerage system does not cause, or contribute to, a health hazard.

5.0 Design & Installation

See attached Design Report and As-Constructed drawings. This system has been designed in accordance with Health Canada and the BC Municipal Wastewater Regulations (MWR).

5.1 Design Summary

This system is designed as a Septic Tank Effluent Pump (STEP) system to collect normal domestic type D effluent, secondary treatment to type C and discharge to ground via Rapid Infiltration Basins (RIB).

The system is sized for an average daily flow of 120 m3/day as based on the attached calculations. Filtered effluent is delivered by individual STEP systems to a central pumping station where it is pumped on demand to the Sewage Treatment area.

6. Operation and Maintenance

Proper operation and maintenance of the ponds is essential for efficient wastewater treatment. If the treatment system is well operated and maintained, the stored wastewater in the pond should have a green colour and no unpleasant odour.

(a) Operation: To properly operate the treatment system, the operator is mainly concerned with the following:

i. .When to discharge: Under maximum operating conditions, the storage pond will be discharged to the RIB at a 4 day minimum interval when the freeboard approaches 600mm. This period may be longer. Treatment trains should be alternated monthly.

ii. Discharge to the RIB is done in the following sequence:
- open the gate valve between the two ponds and discharge the storage pond. When discharge is completed, close the discharge valve;

iii. Odour Control: Odour problems created by anaerobic conditions may be controlled by adding air to the oxidation ditch by mechanical methods using a surface aerator or subsurface diffused air tubing.

iv. **Removal of Floating Debris:** Plants with floating leaves and scum formation on the water surface reduce the amount of sunlight available, and therefore reduce the amount of oxygen produced by the algae. Floating debris can be removed with a rake as required.

v. **Operational Records:** The operator should keep the following records:
- dates of discharge;
- amount of time that was required to discharge;
- colour of wastewater in each cell prior to discharging;

- odour;
- dates of collecting and submitting samples to an analytical laboratory;
- specific locations of the collected samples; and
- pond levels before and after discharge.

(b) Maintenance: Periodic maintenance must be followed to ensure that the sewage treatment will function properly.

(i) **Dyke Maintenance:** Dyke maintenance includes:

(a) **Rodent control** – periodic checks should be made to see that burrowing animals such as muskrats have not damaged the dyke. Rodent control may be achieved by trapping or shooting. After the rodents have been eliminated, the operator should repair any dyke damage.

(b) **Seepage control** – the ground around the toe of the dyke should be checked frequently to determine if seepage is occurring. Seepage through the dyke can weaken it leading to structural failure. When seepage is suspected, the lagoon operator should advise Health Canada and contact an engineering firm for advice.

(c) **Erosion control** – erosion can take place on either the inner sloped side or the outer sloped side due to surface runoff. Erosion may be controlled by the use of rip-rap material. Rip rap can be placed above and below the waterline around the affected area. Surface runoff around the perimeter of the pond should be controlled to prevent exterior dyke erosion. This can be done by proper grading.

(ii) **Removal of Sludge Mounts:** During winter operation, solids may build up in a mound around the inlet. This can cause objectionable odours. Solids accumulation could also lead to a blockage in the inlet pipe. A sludge mound can be dispersed manually or by high pressure hosing.

(iii) **Maintenance of Flow:** The flow between the primary and secondary ponds must be monitored and well maintained. Overtopping the dyke can result in breaching of the dyke and eventually complete dyke failure.

(iv) **Fence and Gate Repairs:** The fence and gate must be kept in good condition to help prevent trespassing by unauthorized personnel and to keep out livestock.

(v) **Vegetation Control:** A well-kept lagoon is not a good breeding place for mosquitoes. This means keeping the grass cut on the dyke and eliminating any vegetation growing at the waters edge. Growth can be cut or burned, but it should be done regularly. Any weeds and bulrushes in the RIB must also be kept cut. This can be done with a hand scythe or weed whacker. from a boat. Trees should also be cut in proximity around the cells, particularly for larger pond systems. Trees limit wind action. Wind assists in introducing dissolved oxygen into the cells. Certain tree species may be beneficial in limiting or remediating seepage from lagoons, however location is also important so as not to limit proper wind action. In situations where system usage is significantly below capacity, tree removal may be less critical, however growth in immediate proximity to the wastewater should be properly managed.

(vi) **Liquid Waste Haulers:** Periodic sludge removal will be required with waste disposal to an approved receiving facility.

7. Sampling and Laboratory Control

Several laboratory tests are normally required to gauge treatment system performance. These tests can include: pH, dissolved oxygen (DO), biochemical oxygen demand (BOD), total suspended solids (TSS), and total and fecal coliform tests. Other parameters are sometimes analyzed as well, to determine the effluents impact on the receiving environment. Specific required tests for this treatment system are described below.

The pH test is to measure the intensity of acidity or alkalinity of the wastewater. Its value ranges between 0 and 14. If the pH is less than 7, we say that the wastewater is acidic. If the pH is greater than 7, we say that the wastewater is alkaline.

The DO test is to measure the amount of dissolved oxygen in the wastewater. Remember that DO in wastewater is essential for aerobic bacteria to live and treat the wastewater. Normal pond DO ranges are 5 to 20 milligrams per litre (mg/L). If the DO drops below 5 mg/L, then corrective action can be taken by installing supplementary aeration equipment.

Samples for pH and DO tests should be taken during late afternoon (pH and DO are maximum in late afternoon and minimum at sunrise). The BOD test is to measure the organic strength of the wastewater. Normal raw sewage varies between 150 and 250 mg/L.

The TSS test is to measure the amount of solid particles which are in suspension in the wastewater. Suspended solids are normally removed by the process of sedimentation or settling.

The coliform test is an indicator of the amount of potential disease causing (pathogenic) bacteria in the wastewater.

Samples for wastewater analysis should be collected periodically as described below. To obtain a representative sample, collect it about half-way through the discharge period. Use a clean, well-rinsed 2.5 litre plastic container for pollution control parameters and a 250 millilitre sterile container for bacteriological analysis.

8.0 Monitoring Requirements

8.1 Quantity - Discharge Rate

The effluent pump station has cumulative hour meters to record the average daily flow. These pump hour meters should be recorded periodically (approx. twice weekly) to form the discharge record. The dosing pumps were selected to discharge at a rate of approximately 65 USgpm (240 litres/min or 14.8 m3/hr) at 35' TDH. The actual pumping rate should be checked periodically by direct observation of the pump tank.

On June 26, 2012, the pumps were calibrated at an average pump rate of 73 USgpm (400m3/day). Pump hour meter readings should be recorded approximately twice weekly and converted to periodic daily discharge rates.

Average Daily Flow (ADF) should not exceed 120 m3/day.

8.2 Effluent Discharge Quality

Discharge to the oxidation ditch should be aged coarse filtered septage effluent. After oxidation and settling/de-nitrification, the effluent is periodically discharged to the Rapid Infiltration Basins (RIB). Treated effluent at the point of discharge must not exceed BC MWR Class C requirements of 45 BOD and 45 TSS. Samples should be grabbed monthly from the discharge pipe to the RIB and tested with results reviewed and reported annually by a qualified practioner (QP) to Health Canada.

Table 7 BCMWR - Effluent Monitoring Requirements MDF ≥ 50 m^3/d and < 500 m^3/d

	Class C
flow frequency (pump hour meters)	twice/week
BOD_5, TSS frequency and type	Monthly grab samples
fecal coliform frequency and type	none
turbidity frequency and type	none
nitrogen total, and NO_3 (as N frequency and type)	none

8.3 Groundwater Quality Monitoring (from the Environmental Assessment)

Each of the monitoring wells should be assessed for groundwater levels semi-annually; once in May and once in early September of each year. Three down gradient and one up gradient wells should be sampled. Each sample should be analyzed for the following parameters as a minimum at a BC certified analytical laboratory:

- PH
- TDS
- Turbidity
- Sulphates
- Nitrate (N)
- Nitrite (N)
- Chlorides
- Ammonia
- Total phosphorous
- TOC & ORP
- Total coliforms
- E. Coli

9.0 Pond Observations

By observing the colour changes within the lagoon, the operator can interpret effluent conditions. Listed below are cell wastewater colours, and the conditions that each colour indicates:

- **Dark Sparkling Green:** good; high pH and DO.
- **Dull Green to Yellow:** not so good; pH and DO are dropping; blue-green algae are becoming established.
- **Gray to Black:** bad, pond is anaerobic.
- **Purple:** not so good; presence of purple sulphur bacteria (anaerobic conditions).

- **Pink colour throughout the cell:** not so good. An overabundance of Daphnia can also cause problems since they use algae for food and hence lower the oxygen content of the cell.
- **Tan to Brown:** okay, if caused by type of algae bloom. Not good if due to bank erosion or silt.

10.0 Other Factors

Other factors should be routinely monitored and recorded as appropriate including;

- nuisance factors, such as odours or user complaints;
- mechanical malfunction within the component including problems with valves or other mechanical or plumbing components;
- notation of electrical connection problems such as corrosion, lose connections, exposed wiring, excessive moisture that could create arcing (where applicable);
- confirmation of alarm function and/or operation (where applicable);
- material fatigue or failure, including durability or corrosion as related to construction or structural design; and,
- neglect or improper use, such as overloading the design flow, poor maintenance of vegetative cover, or inappropriate activity in the dispersal system and the receiving area.

11.0 Maintenance Requirements

The required maintenance for this sewage treatment system should be relatively simple and straightforward as described below:

1. Record and log the effluent lift station pump hour-meter readings on a twice weekly basis. Determine that the field is not receiving greater than the average daily (ADF) flow of 120 m3/day.

2. Respond to any lift station alarms. Determine the problem and rectify. This may include pump failure or clogging. The pump station is fully redundant and can operate with only pump while the second pump is being replaced. Note that emergency power has not been provided as effluent will not be delivered to the lift station if local power is out.

3. Routinely inspect the collection, treatment and discharge systems. We recommend that this be performed at least twice a week as the pump hour meters are recorded.

4. Manually operate the gate valve to discharge the settling pond to the Rapid Infiltration Basin as required. This could be as often as twice weekly during peak periods.

5. Alternate the treatment trains on a monthly basis to allow resting time for each side.

6. Periodically inspect the ponds for solids accumulation. Pump and haul to an approved sanitary disposal as required. We recommend that this be performed twice annually, in the spring and fall as required.

Where there is a complaint or malfunction, this could also trigger a monitoring and maintenance visit. Individual lot septic tanks need to be pumped regularly to ensure proper functioning.

12.0 Limitations

If this system is operated and maintained as set out in the maintenance plan, the sewerage system will not cause or contribute to a health hazard.

This Operations & Maintenance report was prepared by AC Eagle for the Little Shuswap Lake Indian Band. The information in it reflects AC Eagle's reasonable judgment in light of the information available at the time of preparation. Any use which a third party makes of this report, or any reliance on or decisions made based on it, are the responsibility of such third parties.

AC Eagle Enterprises Ltd.

Jeff Holm, PEng

Allnorth

EMERGENCY RESPONSE PLAN

Little Shuswap Indian Band
Sewerage System
Scotch Creek IR#4

June 2014

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A. System Information

Effluent collection

Location:

The system is on the north shoreline of Shuswap Lake, in the Scotch Creek alluvial fan, and located in the community of Skwylax. The system services lots that are lakefront along the southern boundary of the Little Shuswap IR#4. The sewer is brought up to the compound along Hilliam Road. The dispersal ponds are located centrally and to the Eastern side of the reserve.

System Details:

Filtered septic sewage effluent is collected from individual septic tanks via a small pump chamber located at each residence (individual effluent pumps by others). These STEP systems are sealed and vented to above the 1:20 year food return level of 349.2m elevation. Filtered septic tank effluent is pumped into a low pressure force main located in the Hilliam Road ROW. Effluent is collected into an effluent lift station located near the new intersection of Hilliam Road north. From this lift station effluent is pumped up approximately 7 metres in height along Hilliam Road north to the treatment facility location. Emergency power is not required as septage effluent is not supplied to the lift station when local power is out.

As the STEP collection system relies on low pressure individual pumps, the flow velocities are lower than that expected in a conventional sewage force main. A minimum force main diameter of 100mm was specified to collect the filtered effluent and have periodic valved cleanouts that permit force main flushing if required for future maintenance.

At the north (highest elevation) end of the effluent transmission system, the main transitions to a gravity main with standard manholes. This is to permit the acceptance of potential future off-site effluent which will require further design.

As this is aged septic effluent it may be both moderately aggressive and odiferous. The main lift station is designed to accommodate septic effluent and further odor control measures that may be required if this becomes a complaint issue. We note that either activated carbon filters or UV treatment for odour control may be retrofitted if required.

Effluent Treatment

This design report references the previously submitted Kala Report R09078 "Little Shuswap Indian Band (LSIB) IR4 Proposed Onsite Wastewater Disposal System (OWDS) Municipal Sewage Disposal Regulation Environmental Impact Study (EIS)", dated May, 2010. The sewage effluent disposal is effectively achieved using a Class C (secondary) treatment and de-nitrification with disposal to ground via Rapid Infiltration Basins. The method of treatment from septic effluent to Class C (45 BOD, 45 TSS, 10 mg/L nitrite) is economically achieved using conventional sewage ponds with a treatment train of aeration, de-nitrification and clarification. This is accomplished using an oxidation ditch to aerate and a storage pond to de-nitrify the septic effluent. This conventional process is economical to construct and operate but occupies a significant land area. This process is often characterized as fit and forget as it is simple and non-complex once established.

Note that from the high elevation point the sewage treatment and disposal system is designed to be operated under gravity only with no pumping required. The treatment and disposal trains are fully redundant with each train fully capable of the phase 1 design flows. A 100% reserve area is identified

.

Oxidation Channel

This is a simple shallow triangular lined ditch designed for detained plug flow of the anoxic effluent at MDF. Required BOD_5 reduction is estimated to be ~100 mg/L to reduce from an initial class D (<150 mg/L) to class C effluent (<45mg/L). Initially, BOD reduction is achieved through air to surface flow contact with the aged effluent. If subsequent testing indicates that further BOD reduction is required then air may be easily introduced using traditional methods including mechanical rotors or air diffusion.

The calculated air input at full build-out is approximately 10 cfm at MDF. This is easily achievable with either a 3 HP air diffuser or more traditionally with a mechanical rotor apparatus at approximately 7 HP. Power will need to be supplied to the site if effluent testing indicates additional BOD reduction.

Storage/De-nitrification/Clarification Ponds

From the oxidation channel the effluent flows by gravity into the lined storage ponds that denitrify and provide clarification by settling. Note that some periodic sludge removal maintenance will have to be performed likely by suction truck. Removed sludge requires disposal either off-site to an approved area or to an on-site landfill to be developed.

Treated Effluent Disposal – Rapid Infiltration Basins

After the effluent has been treated through a secondary process to a Class C effluent it is periodically discharged to Rapid Infiltration Basins (RIB). The EIS reports that the Scotch Creek fan provides adequate permeability to suit this disposal method. The RI basins are designed to be flooded approximately every 4 days and are permitted to dry out in-between effluent application. As the basins are located approximately 900m upstream of the receiving water (Shuswap Lake) the Environmental Impact Assessment (EIA) determined that there is ample renovation time for the discharged effluent

.

Operation and Maintenance Manual

Allnorth Consultants Ltd courtesy of Jeff Holm, has supplied an Operation and Maintenance Manual (O&M). The O&M is to be stored in the maintenance building along with this emergency response plan and contact list. The contact list is to be stored in all service vehicles, and updated annually in June to ensure accuracy and prevent outdated information.

Attached to the O&M, there are drawings of all components and detailed outline of system operational procedures. Please refer to that document for all system details including:

1. Description of the system
2. Safety considerations
3. Outlines roles and responsibilities of the system owner, and the maintenance provider(certified environmental Operator)
4. Design drawings and design report
    a. 12KM0067-300-1100-001 - Layout of ponds and basins. Includes:
        i. Maintenance building layout detail
        ii. Sludge facility section and details
        iii. Work platform details
        iv. Volumes of oxidation, storage, and infiltration basins
        v. Site plan; and
        vi. Access road profile.
        vii. Location of proposed sludge facility to the east.
    b. 12KM0067-300-1100-002 - Basin cross sections

B. Wastewater Emergency Response Plan

Extended Power outage

Actions:

- ☐ Notify the Chief and Council.
- ☐ Call BC Hydro.
- ☐ Notify all users of interruption of service if back-up not capable of carrying away the flow.
- ☐ Estimate the quantity of sewage spilled if any.
- ☐ Determine the level of emergency.
- ☐ Take further Actions and make contact as per tables in appendix based on the level of emergency.

Pump/siphon failure

Actions

- ☐ Notify the Chief and Council.
- ☐ Call for repair service and/or equipment supplier.
- ☐ Call circuit rider for advice if needed.
- ☐ Replace with spare pump or hook up to a portable pump if available.
- ☐ Notify all users of interruption service for minimizing washing and flushing activities.
- ☐ Estimate the quantity of sewage spilled if any.
- ☐ Determine the level of emergency
- ☐ Take further Actions and make contact as per tables in appendix based on the level of emergency.

Electrical Control malfunctioning

Actions

- ☐ Notify the Chief and Council.
- ☐ Call for repair service.
- ☐ Call circuit rider for advice if needed.
- ☐ Estimate the quantity of sewage spilled if any.
- ☐ Determine the level of emergency
- ☐ Take further Actions and make contact as per tables in appendix based on the level of emergency.

Broken sewer main

Actions

- ☐ Notify the Chief and Council.
- ☐ Call for repair service.
- ☐ Call circuit rider for advice if needed.
- ☐ Contain the spill as much as possible.
- ☐ Notify upstream sewer users for minimizing their washing and flushing activities until further notice.
- ☐ Notify downstream spill receptors.
- ☐ Arrange alternate sewage disposal if necessary, i.e. divert the spill into downstream manhole if possible, pump and haul, emergency storage, etc.
- ☐ Estimate the quantity of sewage spilled if any.
- ☐ Determine the level of emergency
- ☐ Take further Actions and make contact as per tables in appendix based on the level of emergency.

Malfunctioning wastewater treatment plant

Actions

- ☐ Notify the Chief and Council.
- ☐ Locate the parts that are malfunctioning if can.
- ☐ Call for repair service or order replacement parts.
- ☐ Call circuit rider for advice if needed.
- ☐ Notify sewer users for minimizing washing and flushing activities until further notice.
- ☐ Monitor the performance of the wastewater treatment plant.
- ☐ Take effluent quality samples once per week while parts are malfunctioning.
- ☐ Determine the impact of the malfunctioning and level of emergency.
- ☐ Take further Actions and make contact as per tables in appendix based on the level of emergency.

Malfunctioning wastewater disposal facilities (retention and infiltration basins, outfalls)

Actions

- ☐ Notify the Chief and Council.
- ☐ Locate the areas that are malfunctioning if can.
- ☐ Call for repair service or order replacement parts.
- ☐ Call circuit rider for advice if needed.
- ☐ Determine the impact of the malfunctioning and level of emergency.
- ☐ Take further actions and make contact as per tables in appendix based on the level of emergency.

Flooding, Earthquake, snow/windstorm, Fire, act of vandalism

Actions

- ☐ Notify the Chief and Council.
- ☐ Call fire fighters for fire, RCMP for vandalism.
- ☐ Advise all sewer users for minimizing their washing and flushing activities if sewer spill has occurred or is imminent.
- ☐ Take necessary Actions as per tables in appendix based on the level of emergency.
- ☐ Work together with Band Chief and Council and village maintenance personnel and water system operator for collaborated response.
- ☐ Contact media and phone trees for public notification.

C. Emergency Response Activity Record and Reporting Template

1. Date Checklist entered (yyyy/mm/dd): _____
2. Name of the person recorded _____
3. Title of the person recorded: _____
4. WW System operator _____
5. Band Manager _____
6. Other (specify) _____

1. Description of Cause(s) of the incident

- ☐ Power Outage, note area affected _____
- ☐ Pump Failure, Location _____
- ☐ Electrical Control malfunctioning, Location _____
- ☐ Broken sewer main, Location _____
- ☐ Blocked sewer main, Location _____
- ☐ Malfunctioning of wastewater treatment plant
  - o Describe _____
- ☐ Malfunctioning of wastewater disposal facilities (i.e. ground disposal fields, outfalls) _____
- ☐ Flooding
- ☐ Earthquake
- ☐ Snow/wind storm
- ☐ Fire
- ☐ Act of vandalism, terrorism or sabotage (e.g., explosions) causing massive system disruption. _____
- ☐ Others, Specify _____

2. Effect of the incident observed:

_____

_____

_____

_____

_____

_____

3. Has any spill occurred?

- ☐ Yes
- ☐ No.

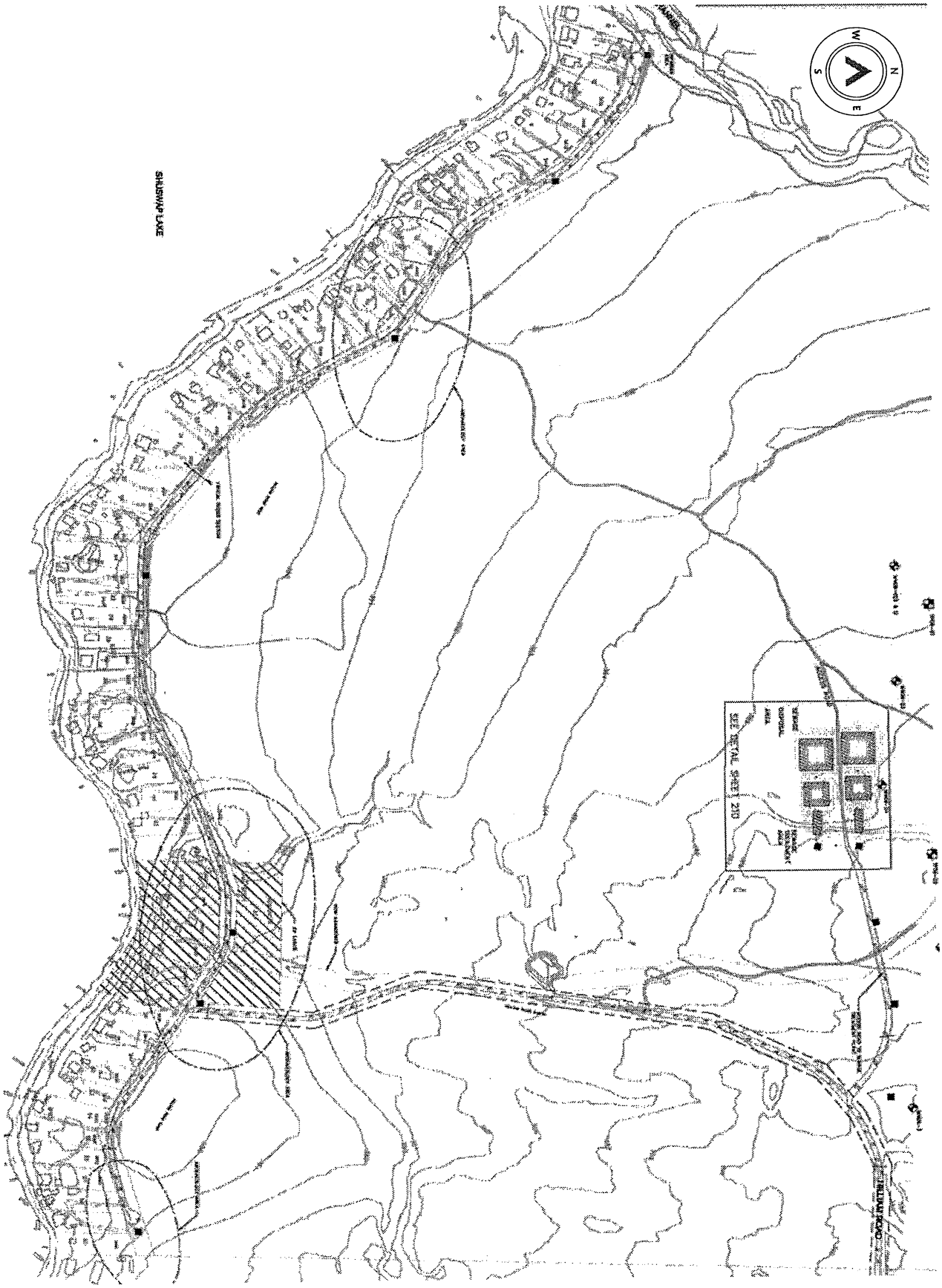
**If No, skip Sections 4-10.*

4. Amount of spill estimated

Litres._____

5. Location of the spill

(Attach a copy of the site plan marked with the spill location).


SHUSWAP LAKE
SEE DETAIL SHEET 2.0

6. Location of the affected downstream area:

- ☐ Drinking water source, specify location_____
- ☐ Well, specify (location)_____
- ☐ House or other buildings, specify location _____
- ☐ Fish bearing stream, specify location _____
- ☐ Swimming/recreational water body, specify location _____

_____

- ☐ High traffic area, specify location_____
- ☐ Other, specify _____

7. Duration of spill:

From:_____(Day)_____(Hour)

Through: _____(Day)_____(Hour)

8. Type of spill:

- ☐ Raw sewage
- ☐ Septic tank effluent
- ☐ WW treatment plant effluent

9. Samples taken:

1. **Location 1** (locate on spill map),
    a. Date (yyyy/mm/dd): _____ Time:_____,
    b. CBOD_____ mg/L,
    c. TSS _____mg/L,
    d. Fecal Coliform _____ MPN/100 mL, LC50*

2. **Location 2** (locate on spill map),
    a. Date (yyyy/mm/dd): _____ Time:_____,
    b. CBOD_____ mg/L,
    c. TSS _____mg/L,
    d. Fecal Coliform _____ MPN/100 mL, LC50*

3. **Location 3** (locate on spill map),
    a. Date (yyyy/mm/dd): _____ Time:_____,
    b. CBOD_____ mg/L,
    c. TSS _____mg/L,
    d. Fecal Coliform _____ MPN/100 mL, LC50*

4. **Location 4** (locate on spill map),
    a. Date (yyyy/mm/dd): _____ Time:_____,
    b. CBOD_____ mg/L,
    c. TSS _____mg/L,
    d. Fecal Coliform _____ MPN/100 mL, LC50*

Note: * Sampling for fish bioassay LC50 is required only if spill leads to a fish bearing water body)

10. Level of Impact (See Section 6.2 for ranking criteria):

☐ Level 1 – Minor

☐ Level 2 – Significant

☐ Level 3 – Major

11. Other Actions taken:

12. Persons Contacted:

Date	Name	Phone No.

13. Person/agencies on the scene

Date	Name	Agency

D. Wastewater/Receiving Water Sampling Instruction

Sampling for CBOD 5 and TSS:

- Use a 1 L clean plastic bottle, (preferably sent from the lab that you will be using)
- Fill the sample completely to the top, squeeze out any air bubbles and cap tightly. Samples must be stored in a cooler with an ice pack and delivered to the lab as soon as possible.
- **The maximum storage time before measurement is 48 hours.**

Sampling for Fecal Coliform:

- Use a 500 mL plastic sterilized bottle (preferably sent from the lab that you will be using).
- Samples must be stored in a cooler with an ice pack and delivered to the lab as soon as possible.
- **The maximum storage time before measurement is 24 hours.**

Sampling for Fish Bioassay LC50 96 hours:

- Use 2 x 20 L plastic containers unpreserved (preferably sent from the lab that you will be using).
- Plastic collapsible drinking water containers or clean fuel jerry cans can be used.
- Containers should be purchased new and rinsed out at least twice with the sample before filling (to rinse out manufacturing residues).
- There is no need to store the sample in a cooler. In fact, you should not allow the samples to freeze.
- **The maximum holding time before measurement is 72 hours (3 days)**

E. Responses based on impact levels of emergency

Impact Levels	What it Means	Actions	Personnel/ Agency to Notify
Level 1 ***Minor Emergency***	o Lower risk situation that requires minimal outside assistance, o There has been no spill or the spill size is less than o 200L and there is no threat to drinking water or to a water body o The situation is not likely to cause public health or environmental problems, o The risks of personnel injury are relatively small, o This type of problem can normally be solved within 24 hours.	o Call BC Hydro for power failure. o Call circuit rider for advice if needed. o Start back-up generator if power is out. o Arrange alternate sewage disposal if necessary, ie divert into downstream manhole if you can, pump and haul, emergency storage, etc. o Repair minor problems if you can. o Call for repair service and/or equipment supplier. o Notify downstream receptors. o Estimate the quantity of sewage spilled. o Advise upstream users to postpone and minimize their washing and flushing activities until further notice. o Record your emergency response activities o (See Appendix B). o Record the time and duration of the spill. o Report to your circuit rider and AANDC FSO. o Recover the damage after resuming to normal operation o Notify users.	o Chief and o Council o Circuit rider o Equipment supplier if necessary o First Nations Health Authority – environmental Health officer o AANDC

Impact Levels	What it Means	Actions	Personnel/ Agency to Notify
Level 2 ***Significant Emergency***	o The system experiences a significant spill or discharge (larger than 200 L) or major disruption that requires external coordination and/or issuance of a health advisory, o The spill will be impacting drinking water or a water body, the risk of personnel injury and impact on public health or environment is elevated, o Will likely take more than 24 hours to resolve.	o All of Level 1 Actions. o Notify Provincial Emergency Program (PEP) if a spill larger than 200L has occurred to a water body. o Take necessary steps to stop the spill and protect life, property and the environment. o Isolate the sewer line, if possible, to stop, contain, or minimize the spill, or divert the spill to low risk areas. o Identify spill receptors (ie downstream drinking water source, business or farming water users). o Notify water system operators, business and farming water users immediately if they could be affected. o Record the time and duration of the sewage spill. o Record and report to AANDC and PEP the incident including the following information (See Appendix B) o Follow up with the affected receptors after emergency has been lifted. o Secure the spill site to prevent contact by the public until the site has been thoroughly cleaned. o Clean up the spill thoroughly after it is stopped. o Where necessary, disinfect and /or deodorize the site using lime or other type of chemicals deemed appropriate. o If spill is into a body of water that bears fish or other aquatic life, do not apply bleach or other disinfectant. o Contact PEP for specific instructions.	o All of Level 1 contacts o PEP if spill to the environment has occurred. o All upstream sewer users for stopping or minimizing the discharge to sewers. o All downstream property owners o Downstream users of the affected areas o Water system operators if source water is effected o First Nations Health Authority – environmental Health officer.

Impact Levels	What it Means	Actions	Personnel/ Agency to Notify
Level 3 ***Major Emergency***	o Earthquake, massive flooding, storm or act of vandalism/ terrorism causing massive disruption to the wastewater systems throughout the community. o Immediate notification of local and other emergency management services is required to aid in efficient response Actions, and of law enforcement if act of vandalism is suspected, o Effective communication with communities is necessary to prevent injury or loss of life, o May take several days or weeks to resolve.	o All of Levels 1 and 2 Actions as appropriate. o Work together with the Band Chief and Council, Village maintenance personnel and water operator for collaborated response. o Contact media and phone trees for public notification.	o All of Levels 1 and 2 contacts. o Local fire fighters o RCMP if emergency caused by vandalism, terrorism or sabotage.

F. Contact List:

	Organization	Name/Address	Contact	
Band	**Operator**	James Tomma	Office	250.679.1107
			Cell	250.851.6173
			Email	
			Fax	250.679.3220
	Staff or 2nd operator	Les Anthony	Office	250.679.1107
			Cell	778.220.4743
			Email	
			Fax	250.679.3220
	Operations Manager	Kevin Potter	Office	250.679.1107
			Cell	250.319.2919
			Email	kpotter@lslib.com
			Fax	250.679.3220
	Band Administrator	Nicolette Keith	Office	250.679.3203
			Cell	250.215.3257
			Email	nkeith@lslib.com
			Fax	
	Band Chief	Felix Arnouse	Office	250.679.3203
			Cell	250.851.6149
			Email	farnouse@lslib.com
	Band Councillor	Brian Finlay	Office	250.679.3203
			Cell	250.320.2625
			Email	bfinlay@lslib.com
	Band Councillor	Dale Tomma	Office	250.679.3203
			Cell	778.220.2022
			Email	dtomma@lslib.com
	Circuit Rider	George Geisbrecht	Cell	250.267.2040

	Organization	Name/Address	Contact	
Emergency Personnel	**RCMP**	Chase	Local Emerg.	250.679.3221 911
	BC Ambulance		Emerg.	911
	Fire - LSIB VFD	Squilax	Emerg.	250.679.3206
	Provincial Emergency Program (PEP)		Office	1-800-663-3456
Regulatory Authorities	Provincial Ministry of Environment Regional Office			
	1st Nations Health Authority	Priscilla Cheung	Office	250-851-4980
			Cell	250-318-1455
	Health Canada			
	Dept. of Fisheries & Ocean			
Utilities/ Media	Hydro			800-224-9376
	Gas		Emerg	800-663-9911
	Newspaper	North Shuswap Kicker	Editor	250-955-0039
Suppliers and Contractors	Nearest environmental lab 1	CARO environmental	Office	250.765.9646
	Nearest environmental lab 2	Eco-tech labs. Ltd	Office	250;573.5700
	Pump rentals	Cardinal Rentals	Office	250.833.0064
	Sewage pump/haul service	Aardvark Pumping	Cell	250.852.9057
	Pump system servicing	Aardvark Pumping	Cell	250.852.9057
	Pump supplier	Andrew Sheret Ltd	Office	250.803.0220
	Electrician	SunPower Elec.	Cell	250.833.6685
	Excavation	Lessard Excavating	Cell	250.517.0908
	Plumbing	North Shuswap Plmb.	Office	250.679.3373
	General rental	Cardinal Rentals	Office	250.833.0064
	Engineer	Jeff Holm, PEng	Office	250-374-5331
		Allnorth Consultants	Cell	250-318-5769
		#301 – 7 St. Paul Street West	Email	jholm@allnorth.com
		Kamloops, BC V2C 1E9	Fax	250-374-5332

Date this list completed June 4, 2014
Name of person who completed list: **Jeff Holm, PEng**
Date for next updating (every 12 months recommended) June 4, 2015

ALLNORTH CONSULTING LIMITED *Our File:* 12-KM-0067-301

Land, Water & Civil Engineering
#301 – 7 St. Paul Street West, Kamloops, BC V2C 1E9
Phone: (250) 374-5331
Fax: (250) 374-5332

POST-CONSTRUCTION REPORT

PROJECT: Scotch Creek IR #4 ***DATE:*** 2014/05/13

CLIENT: Little Shuswap Lake Indian Band (LSLIB)

SUBJECT: Sewage Effluent Collection, Treatment & Disposal for Hilliam Road IR #4 – Scotch Creek - Phase 1 – Revision 4 – Post Construction

1. Introduction

This design report, Revision 3, May 13, 2014, has been prepared at the request of the Little Shuswap Lake Indian Band (LSLIB) to specifically confirm the following:

1. Engineer of record qualifications
2. Design Summary, including as-constructed design drawings
3. Certification of construction, commissioning and compliance statement
4. Sealed as-constructed drawings

Report revision 2 was prepared on June 8, 2013, post construction as requested to tie together the various design elements as developed for this project. This design report generally follows the format as per the INAC Design Guidelines for Wastewater Systems, British Columbia Region, November 2008. Revision 4 issued to clarify the annual reporting requirements.

Appendix C Community sewage Treatment Governance Bylaw No. 2014.01

1.1 Background

As of October 2012, Allnorth Consulting Limited (Allnorth) was retained to deal with ongoing issues concerning the regulation of the sewage treatment and discharge. This followed work completed by AC Eagle Enterprises Ltd. and others over the preceding years to design and certify a community septic tank effluent pumping (STEP) collection, treatment and disposal system. This work follows on feasibility and preliminary design as performed by Jeff Holm, P.Eng, over a number of years in conjunction with various other design firms including, RD Lewis & Associates, Focus Corporation and MMM Group.

This project was primarily concerned with servicing the existing 66 recreational lease lots on Scotch Creek IR#4, adjacent to Shuswap Lake, although future expansion was also considered. This report identifies and discusses key development concerns and should be read in conjunction with the Environmental Impact Study (Kala R12246) and design drawings to collect, treat and dispose sewage effluent with comments regarding other servicing issues including roads and access, water, drainage and flood protection.

Allnorth

EMERGENCY RESPONSE PLAN

Little Shuswap Indian Band
Sewerage System
Scotch Creek IR#4

June 2014

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A. System Information

Effluent collection

Location:

The system is on the north shoreline of Shuswap Lake, in the Scotch Creek alluvial fan, and located in the community of Skwylax. The system services lots that are lakefront along the southern boundary of the Little Shuswap IR#4. The sewer is brought up to the compound along Hilliam Road. The dispersal ponds are located centrally and to the Eastern side of the reserve.

System Details:

Filtered septic sewage effluent is collected from individual septic tanks via a small pump chamber located at each residence (individual effluent pumps by others). These STEP systems are sealed and vented to above the 1:20 year food return level of 349.2m elevation. Filtered septic tank effluent is pumped into a low pressure force main located in the Hilliam Road ROW. Effluent is collected into an effluent lift station located near the new intersection of Hilliam Road north. From this lift station effluent is pumped up approximately 7 metres in height along Hilliam Road north to the treatment facility location. Emergency power is not required as septage effluent is not supplied to the lift station when local power is out.

As the STEP collection system relies on low pressure individual pumps, the flow velocities are lower than that expected in a conventional sewage force main. A minimum force main diameter of 100mm was specified to collect the filtered effluent and have periodic valved cleanouts that permit force main flushing if required for future maintenance.

At the north (highest elevation) end of the effluent transmission system, the main transitions to a gravity main with standard manholes. This is to permit the acceptance of potential future off-site effluent which will require further design.

As this is aged septic effluent it may be both moderately aggressive and odiferous. The main lift station is designed to accommodate septic effluent and further odor control measures that may be required if this becomes a complaint issue. We note that either activated carbon filters or UV treatment for odour control may be retrofitted if required.

Effluent Treatment

This design report references the previously submitted Kala Report R09078 "Little Shuswap Indian Band (LSIB) IR4 Proposed Onsite Wastewater Disposal System (OWDS) Municipal Sewage Disposal Regulation Environmental Impact Study (EIS)", dated May, 2010. The sewage effluent disposal is effectively achieved using a Class C (secondary) treatment and de-nitrification with disposal to ground via Rapid Infiltration Basins. The method of treatment from septic effluent to Class C (45 BOD, 45 TSS, 10 mg/L nitrite) is economically achieved using conventional sewage ponds with a treatment train of aeration, de-nitrification and clarification. This is accomplished using an oxidation ditch to aerate and a storage pond to de-nitrify the septic effluent. This conventional process is economical to construct and operate but occupies a significant land area. This process is often characterized as fit and forget as it is simple and non-complex once established.

Note that from the high elevation point the sewage treatment and disposal system is designed to be operated under gravity only with no pumping required. The treatment and disposal trains are fully redundant with each train fully capable of the phase 1 design flows. A 100% reserve area is identified

Oxidation Channel

This is a simple shallow triangular lined ditch designed for detained plug flow of the anoxic effluent at MDF. Required BOD_5 reduction is estimated to be ~100 mg/L to reduce from an initial class D (<150 mg/L) to class C effluent (<45mg/L). Initially, BOD reduction is achieved through air to surface flow contact with the aged effluent. If subsequent testing indicates that further BOD reduction is required then air may be easily introduced using traditional methods including mechanical rotors or air diffusion.

The calculated air input at full build-out is approximately 10 cfm at MDF. This is easily achievable with either a 3 HP air diffuser or more traditionally with a mechanical rotor apparatus at approximately 7 HP. Power will need to be supplied to the site if effluent testing indicates additional BOD reduction.

Storage/De-nitrification/Clarification Ponds

From the oxidation channel the effluent flows by gravity into the lined storage ponds that denitrify and provide clarification by settling. Note that some periodic sludge removal maintenance will have to be performed likely by suction truck. Removed sludge requires disposal either off-site to an approved area or to an on-site landfill to be developed.

Treated Effluent Disposal – Rapid Infiltration Basins

After the effluent has been treated through a secondary process to a Class C effluent it is periodically discharged to Rapid Infiltration Basins (RIB). The EIS reports that the Scotch Creek fan provides adequate permeability to suit this disposal method. The RI basins are designed to be flooded approximately every 4 days and are permitted to dry out in-between effluent application. As the basins are located approximately 900m upstream of the receiving water (Shuswap Lake) the Environmental Impact Assessment (EIA) determined that there is ample renovation time for the discharged effluent

Operation and Maintenance Manual

Allnorth Consultants Ltd courtesy of Jeff Holm, has supplied an Operation and Maintenance Manual (O&M). The O&M is to be stored in the maintenance building along with this emergency response plan and contact list. The contact list is to be stored in all service vehicles, and updated annually in June to ensure accuracy and prevent outdated information.

Attached to the O&M, there are drawings of all components and detailed outline of system operational procedures. Please refer to that document for all system details including:

1. Description of the system
2. Safety considerations
3. Outlines roles and responsibilities of the system owner, and the maintenance provider(certified environmental Operator)
4. Design drawings and design report
    a. 12KM0067-300-1100-001 - Layout of ponds and basins. Includes:
        i. Maintenance building layout detail
        ii. Sludge facility section and details
        iii. Work platform details
        iv. Volumes of oxidation, storage, and infiltration basins
        v. Site plan; and
        vi. Access road profile.
        vii. Location of proposed sludge facility to the east.
    b. 12KM0067-300-1100-002 - Basin cross sections

B. Wastewater Emergency Response Plan

Extended Power outage

Actions:

- ☐ Notify the Chief and Council.
- ☐ Call BC Hydro.
- ☐ Notify all users of interruption of service if back-up not capable of carrying away the flow.
- ☐ Estimate the quantity of sewage spilled if any.
- ☐ Determine the level of emergency.
- ☐ Take further Actions and make contact as per tables in appendix based on the level of emergency.

Pump/siphon failure

Actions

- ☐ Notify the Chief and Council.
- ☐ Call for repair service and/or equipment supplier.
- ☐ Call circuit rider for advice if needed.
- ☐ Replace with spare pump or hook up to a portable pump if available

Broken sewer main

Actions

- ☐ Notify the Chief and Council.
- ☐ Call for repair service.
- ☐ Call circuit rider for advice if needed.
- ☐ Contain the spill as much as possible.
- ☐ Notify upstream sewer users for minimizing their washing and flushing activities until further notice.
- ☐ Notify downstream spill receptors.
- ☐ Arrange alternate sewage disposal if necessary, i.e. divert the spill into downstream manhole if possible, pump and haul, emergency storage, etc.
- ☐ Estimate the quantity of sewage spilled if any.
- ☐ Determine the level of emergency
- ☐ Take further Actions and make contact as per tables in appendix based on the level of emergency.

Malfunctioning wastewater treatment plant

Actions

- ☐ Notify the Chief and Council.
- ☐ Locate the parts that are malfunctioning if can.
- ☐ Call for repair service or order replacement parts.
- ☐ Call circuit rider for advice if needed.
- ☐ Notify sewer users for minimizing washing and flushing activities until further notice.
- ☐ Monitor the performance of the wastewater treatment plant.
- ☐ Take effluent quality samples once per week while parts are malfunctioning.
- ☐ Determine the impact of the malfunctioning and level of emergency.
- ☐ Take further Actions and make contact as per tables in appendix based on the level of emergency.

Malfunctioning wastewater disposal facilities (retention and infiltration basins, outfalls)

Actions

- ☐ Notify the Chief and Council.
- ☐ Locate the areas that are malfunctioning if can.
- ☐ Call for repair service or order replacement parts.
- ☐ Call circuit rider for advice if needed.
- ☐ Determine the impact of the malfunctioning and level of emergency.
- ☐ Take further actions and make contact as per tables in appendix based on the level of emergency.

Flooding, Earthquake, snow/windstorm, Fire, act of vandalism

Actions

- ☐ Notify the Chief and Council.
- ☐ Call fire fighters for fire, RCMP for vandalism.
- ☐ Advise all sewer users for minimizing their washing and flushing activities if sewer spill has occurred or is imminent.
- ☐ Take necessary Actions as per tables in appendix based on the level of emergency.
- ☐ Work together with Band Chief and Council and village maintenance personnel and water system operator for collaborated response.
- ☐ Contact media and phone trees for public notification.

C. Emergency Response Activity Record and Reporting Template

1. Date Checklist entered (yyyy/mm/dd): _____
2. Name of the person recorded _____
3. Title of the person recorded: _____
4. WW System operator _____
5. Band Manager _____
6. Other (specify) _____

1. Description of Cause(s) of the incident

- ☐ Power Outage, note area affected _____
- ☐ Pump Failure, Location _____
- ☐ Electrical Control malfunctioning, Location _____
- ☐ Broken sewer main, Location _____
- ☐ Blocked sewer main, Location _____
- ☐ Malfunctioning of wastewater treatment plant
  - o Describe _____
- ☐ Malfunctioning of wastewater disposal facilities (i.e. ground disposal fields, outfalls) _____
- ☐ Flooding
- ☐ Earthquake
- ☐ Snow/wind storm
- ☐ Fire
- ☐ Act of vandalism, terrorism or sabotage (e.g., explosions) causing massive system disruption. _____
- ☐ Others, Specify _____

2. Effect of the incident observed:

_____

_____

_____

_____

_____

_____

3. Has any spill occurred?

- ☐ Yes
- ☐ No.

**If No, skip Sections 4-10.*

4. Amount of spill estimated

Litres._____

5. Location of the spill

(Attach a copy of the site plan marked with the spill location).

[redacted]

6. Location of the affected downstream area:

- ☐ Drinking water source, specify location_____
- ☐ Well, specify (location)_____
- ☐ House or other buildings, specify location _____
- ☐ Fish bearing stream, specify location _____
- ☐ Swimming/recreational water body, specify location _____

_____

- ☐ High traffic area, specify location_____
- ☐ Other, specify _____

7. Duration of spill:

From:_____(Day)_____(Hour)

Through: _____(Day)_____(Hour)

8. Type of spill:

- ☐ Raw sewage
- ☐ Septic tank effluent
- ☐ WW treatment plant effluent

9. Samples taken:

1. **Location 1** (locate on spill map),
   a. Date (yyyy/mm/dd): _____ Time:_____,
   b. CBOD_____ mg/L,
   c. TSS _____mg/L,
   d. Fecal Coliform _____ MPN/100 mL, LC50*

2. **Location 2** (locate on spill map),
   a. Date (yyyy/mm/dd): _____ Time:_____,
   b. CBOD_____ mg/L,
   c. TSS _____mg/L,
   d. Fecal Coliform _____ MPN/100 mL, LC50*

3. **Location 3** (locate on spill map),
   a. Date (yyyy/mm/dd): _____ Time:_____,
   b. CBOD_____ mg/L,
   c. TSS _____mg/L,
   d. Fecal Coliform _____ MPN/100 mL, LC50*

4. **Location 4** (locate on spill map),
   a. Date (yyyy/mm/dd): _____ Time:_____,
   b. CBOD_____ mg/L,
   c. TSS _____mg/L,
   d. Fecal Coliform _____ MPN/100 mL, LC50*

Note: * Sampling for fish bioassay LC50 is required only if spill leads to a fish bearing water body)

10. Level of Impact (See Section 6.2 for ranking criteria):

☐ Level 1 – Minor

☐ Level 2 – Significant

☐ Level 3 – Major

11. Other Actions taken:

12. Persons Contacted:

Date	Name	Phone No.

13. Person/agencies on the scene

Date	Name	Agency

D. Wastewater/Receiving Water Sampling Instruction

Sampling for CBOD 5 and TSS:

- Use a 1 L clean plastic bottle, (preferably sent from the lab that you will be using)
- Fill the sample completely to the top, squeeze out any air bubbles and cap tightly. Samples must be stored in a cooler with an ice pack and delivered to the lab as soon as possible.
- **The maximum storage time before measurement is 48 hours.**

Sampling for Fecal Coliform:

- Use a 500 mL plastic sterilized bottle (preferably sent from the lab that you will be using).
- Samples must be stored in a cooler with an ice pack and delivered to the lab as soon as possible.
- **The maximum storage time before measurement is 24 hours.**

Sampling for Fish Bioassay LC50 96 hours:

- Use 2 x 20 L plastic containers unpreserved (preferably sent from the lab that you will be using).
- Plastic collapsible drinking water containers or clean fuel jerry cans can be used.
- Containers should be purchased new and rinsed out at least twice with the sample before filling (to rinse out manufacturing residues).
- There is no need to store the sample in a cooler. In fact, you should not allow the samples to freeze.
- **The maximum holding time before measurement is 72 hours (3 days)**

E. Responses based on impact levels of emergency

Impact Levels	What it Means	Actions	Personnel/ Agency to Notify
Level 1 ***Minor Emergency***	o Lower risk situation that requires minimal outside assistance, o There has been no spill or the spill size is less than o 200L and there is no threat to drinking water or to a water body o The situation is not likely to cause public health or environmental problems, o The risks of personnel injury are relatively small, o This type of problem can normally be solved within 24 hours.	o Call BC Hydro for power failure. o Call circuit rider for advice if needed. o Start back-up generator if power is out. o Arrange alternate sewage disposal if necessary, ie divert into downstream manhole if you can, pump and haul, emergency storage, etc. o Repair minor problems if you can. o Call for repair service and/or equipment supplier. o Notify downstream receptors. o Estimate the quantity of sewage spilled. o Advise upstream users to postpone and minimize their washing and flushing activities until further notice. o Record your emergency response activities o (See Appendix B). o Record the time and duration of the spill. o Report to your circuit rider and AANDC FSO. o Recover the damage after resuming to normal operation o Notify users.	o Chief and o Council o Circuit rider o Equipment supplier if necessary o First Nations Health Authority – environmental Health officer o AANDC

Impact Levels	What it Means	Actions	Personnel/ Agency to Notify
Level 2 ***Significant Emergency***	o The system experiences a significant spill or discharge (larger than 200 L) or major disruption that requires external coordination and/or issuance of a health advisory, o The spill will be impacting drinking water or a water body, the risk of personnel injury and impact on public health or environment is elevated, o Will likely take more than 24 hours to resolve.	o All of Level 1 Actions. o Notify Provincial Emergency Program (PEP) if a spill larger than 200L has occurred to a water body. o Take necessary steps to stop the spill and protect life, property and the environment. o Isolate the sewer line, if possible, to stop, contain, or minimize the spill, or divert the spill to low risk areas. o Identify spill receptors (ie downstream drinking water source, business or farming water users). o Notify water system operators, business and farming water users immediately if they could be affected. o Record the time and duration of the sewage spill. o Record and report to AANDC and PEP the incident including the following information (See Appendix B) o Follow up with the affected receptors after emergency has been lifted. o Secure the spill site to prevent contact by the public until the site has been thoroughly cleaned. o Clean up the spill thoroughly after it is stopped. o Where necessary, disinfect and /or deodorize the site using lime or other type of chemicals deemed appropriate. o If spill is into a body of water that bears fish or other aquatic life, do not apply bleach or other disinfectant. o Contact PEP for specific instructions.	o All of Level 1 contacts o PEP if spill to the environment has occurred. o All upstream sewer users for stopping or minimizing the discharge to sewers. o All downstream property owners o Downstream users of the affected areas o Water system operators if source water is effected o First Nations Health Authority – environmental Health officer.

Impact Levels	What it Means	Actions	Personnel/ Agency to Notify
Level 3 ***Major Emergency***	o Earthquake, massive flooding, storm or act of vandalism/ terrorism causing massive disruption to the wastewater systems throughout the community. o Immediate notification of local and other emergency management services is required to aid in efficient response Actions, and of law enforcement if act of vandalism is suspected, o Effective communication with communities is necessary to prevent injury or loss of life, o May take several days or weeks to resolve.	o All of Levels 1 and 2 Actions as appropriate. o Work together with the Band Chief and Council, Village maintenance personnel and water operator for collaborated response. o Contact media and phone trees for public notification.	o All of Levels 1 and 2 contacts. o Local fire fighters o RCMP if emergency caused by vandalism, terrorism or sabotage.

F. Contact List:

	Organization	Name/Address	Contact	
Band	**Operator**	James Tomma	Office	250.679.1107
			Cell	250.851.6173
			Email	
			Fax	250.679.3220
	Staff or 2nd operator	Les Anthony	Office	250.679.1107
			Cell	778.220.4743
			Email	
			Fax	250.679.3220
	Operations Manager	Kevin Potter	Office	250.679.1107
			Cell	250.319.2919
			Email	kpotter@lslib.com
			Fax	250.679.3220
	Band Administrator	Nicolette Keith	Office	250.679.3203
			Cell	250.215.3257
			Email	nkeith@lslib.com
			Fax	
	Band Chief	Felix Arnouse	Office	250.679.3203
			Cell	250.851.6149
			Email	farnouse@lslib.com
	Band Councillor	Brian Finlay	Office	250.679.3203
			Cell	250.320.2625
			Email	bfinlay@lslib.com
	Band Councillor	Dale Tomma	Office	250.679.3203
			Cell	778.220.2022
			Email	dtomma@lslib.com
	Circuit Rider	George Geisbrecht	Cell	250.267.2040

	Organization	Name/Address	Contact	
Emergency Personnel	**RCMP**	Chase	Local Emerg.	250.679.3221 911
	BC Ambulance		Emerg.	911
	Fire - LSLIB VFD	Squilax	Emerg.	250.679.3206
	Provincial Emergency Program (PEP)		Office	1-800-663-3456
Regulatory Authorities	Provincial Ministry of Environment Regional Office			
	1st Nations Health Authority	Priscilla Cheung	Office	250-851-4980
			Cell	250-318-1455
	Health Canada			
	Dept. of Fisheries & Ocean			
Utilities/ Media	Hydro			800-224-9376
	Gas		Emerg	800-663-9911
	Newspaper	North Shuswap Kicker	Editor	250-955-0039
Suppliers and Contractors	Nearest environmental lab 1	CARO environmental	Office	250.765.9646
	Nearest environmental lab 2	Eco-tech labs. Ltd	Office	250;573.5700
	Pump rentals	Cardinal Rentals	Office	250.833.0064
	Sewage pump/haul service	Aardvark Pumping	Cell	250.852.9057
	Pump system servicing	Aardvark Pumping	Cell	250.852.9057
	Pump supplier	Andrew Sheret Ltd	Office	250.803.0220
	Electrician	SunPower Elec.	Cell	250.833.6685
	Excavation	Lessard Excavating	Cell	250.517.0908
	Plumbing	North Shuswap Plmb.	Office	250.679.3373
	General rental	Cardinal Rentals	Office	250.833.0064
	Engineer	Jeff Holm, PEng	Office	250-374-5331
		Allnorth Consultants	Cell	250-318-5769
		#301 – 7 St. Paul Street West	Email	jholm@allnorth.com
		Kamloops, BC V2C 1E9	Fax	250-374-5332

Date this list completed June 4, 2014
Name of person who completed list: **Jeff Holm, PEng**
Date for next updating (every 12 months recommended) June 4, 2015