



DRAFT REPORT

City of Fernie



Liquid Waste Management Plan

Stage 1 Report

Executive Summary

1043.0049.01 / April, 2009

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EXECUTIVE SUMMARY

1.0 INTRODUCTION

The purpose of a Liquid Waste Management Plan (LWMP) is to establish direction for the safe and environmentally sustainable treatment and disposal of municipal wastewater (sewage). In particular, a LWMP will identify issues and concerns, provide potential solutions and select the preferred solution. Public participation is a key component of a LWMP.

A LWMP is a problem-solving, planning process, aimed at coming up with practical solutions that will work and are tailored to local conditions. A LWMP is carried out in three stages as follows:

Stage 1 - Problem definition, identify options.

Stage 2 - Develop and evaluate the preferred options, prepare implementation strategy.

Stage 3 - Plan approval process, leading to final approval by the Minister of Environment.

One of the key components of the LWMP process is to obtain input from the public and review agencies through each stage of the process. This community dialogue includes the formation of the following three committees to solicit input and feedback on formulation of the plan:

Steering Committee: Provides overall direction and includes representation from the community's political leaders and senior staff.

Public Advisory Committee: Provides input on all aspects of the plan, focusing on the anticipated acceptability of various options from a broad public perspective and provide on-going liaison with the public.

Technical Advisory Committee: Assists in identifying problems as well as developing and evaluating options from a technical perspective. It includes representation from staff, government agencies and consultants.

In 2006, the City was awarded funding from the BC government towards the upgrades proposed for the sewage treatment plant. These upgrades were intended primarily to address the capacity of the sewage treatment plant and the need for frequent direct river discharge. The regulatory pathway for the sewage treatment plant as a result of the proposed upgrades was not clear. The upgrades were of such a scope that a permit amendment was not possible. Registration under the Municipal Sewage Regulation would



have resulted in the need for significant upgrades to be completed, and this would not address the other issues which the City was facing. Discussions with the BC Ministry of Environment (BC MoE) indicated that the optimal approach would be the completion of a LWMP. This would allow the development of a community-specific solution, and would recognise the influence of inflow and infiltration on the sanitary sewer system.

2.0 COMMUNITY PROFILE

The City's population consists of permanent residents and a shadow population, who have a secondary residence within the City of Fernie but live outside of the City boundary. The City's records indicate total population of 6,294, which consists of 4,217 permanent residents, and 2,077 shadow residents. Growth projections have been estimated for both populations for a 20 year horizon, based on an assumed growth rate of 0.63% for the permanent population and a growth rate of 0.63% with a 50% occupancy for the shadow population.

West Fernie is a small unincorporated community located adjacent to the City boundary. It is planned that this community will be incorporated in the future. The population of West Fernie is estimated to be 460, but growth is expected in the future once the requirement for on-site sewage systems are replaced with connections to the City's sewer system. For the purpose of population estimates, it has been assumed that 140 additional lots will be developed over the next 20 years, with the average number of residents for each new lot being 2.4. Therefore in 20 years, the population estimate is:

- Permanent population, including West Fernie: 5,558
- Shadow population: 1,785
- Total population: 7,343

3.0 EXISTING SEWAGE SYSTEM

3.1 On-Site Sewage Systems

There are 11 properties within the City boundary that are not connected to the centralised sewer system, but use individual on-site system which consist of a septic tank and disposal field. The properties within the Castle Mountain area are large rural lots; the properties in the Ghost rider area are commercial in nature. All other residences and commercial properties are served by City sewer.

3.2 Community Sewage System

The City's community sewage system consists of the following components:



- A collection system with one main lift station and several minor lift stations, and provisions for flow measurement
- A bar screen
- One complete mix aerated lagoon
- Two aerated lagoons (in 2009, aeration is to be added to the new lagoon)
- One facultative lagoon
- Four rapid infiltration (RI) basins for the primary route of effluent discharge
- An outfall to the Elk River, for use during periods of high groundwater when the RI basins are unable to operate at normal design capacity.

Upgrades to the sewage treatment plant are currently underway, and include upgrades to the Main Lift Station, upgrades to the flow measurements at the Main Lift Station, new lagoons and additional aeration, modifications to the rapid infiltration basins and the addition of blowers and an electrical building. These upgrades will be completed in 2009.

The City's treatment and disposal works are governed by Permit PE-08182 issued by the BC Ministry of Environment, which was last updated on December 12th, 1994.

4.0 DEFINING THE PROBLEMS

4.1 Regulatory Pathway

The permit is now out of date, as it does not incorporate the recent upgrades. The permit cannot be amended, as the upgrades which have been completed are too extensive. If a permit cannot be amended, a community has two options: registration under the Municipal Sewage Regulation (MSR) or the completion of a LWMP. For registration under the MSR, all conditions of the regulation must be met, and the discharger must complete an environmental impact study to determine effluent criteria and address health and environmental concerns. Without completing extensive additional construction at the sewage treatment plant, it is known that the City will be unable to meet the requirements of the MSR with respect to sub-surface travel time to the property boundary, high flows as a result of inflow and infiltration (I/I) and effluent discharge requirements to the Elk River.

A Liquid Waste Management Plan takes precedence over the MSR. The development of a Liquid Waste Management Plan will help the City to develop a site-specific strategy which can be implemented in phases. This customised strategy is intended to protect public health and the environment. There is also the need to consider the recently published Canada-wide Municipal Wastewater Strategy, which will



form the basis of a regulation under the Federal Fisheries Act. This Strategy applies to discharges to a surface water, which may not be relevant for the City of Fernie.

4.2 Unsewered Areas

There are no significant concerns with the unsewered properties within the City of Fernie boundary. The number of properties is limited to 11 and they are all located on large lots, with no indication of concerns with the integrity of these systems. However, it is the intent for these properties to be eventually connected to the City sewer. Once these lots are connected to the City sewer, they will contribute additional flow to the system.

4.3 Expansion of Services/Boundary

Although the City's statistics indicate a decline in permanent residents, this does not necessarily translate to a decrease in the sewage production, due to the influence of secondary and temporary residences in the area. In addition, the City is considering future annexation options and the potential for accepting sewage from non-incorporated areas. The community of West Fernie is the largest area which may be incorporated into the City in the future, and there are existing concerns with the integrity of the on-site sewer systems for this community. It is expected that the incorporation of West Fernie into the City boundary, followed by connection to City sewer will result in the sub-division of lots which are currently not able to sustain development through additional on-site sewer systems. Therefore, although growth is currently limited in West Fernie, this may not be the case in the future.

4.4 Flows

Under the conditions of the permit, the average annual discharge allowed is 4,500 m³/d with a maximum discharge of 13,600 m³/d. This maximum is in recognition of the inflow and infiltration which is received at the sewage treatment plant. In recent years, the maximum and average flow requirements have both been exceeded.

The flow and population data indicate that the current per capita usage is 747 L/person/day for average dry weather flow conditions and 3,448 L/person/day for maximum daily flows. These projected usages are very high for a community. The maximum day flows indicate that the per capita flows increase by 4.5 times that experienced during dry weather conditions. The MSR indicates that the maximum average daily flow during a storm or snowmelt event must not exceed 2.0 times the average dry weather flow. The per capita flows for the City of Fernie are high, compared with other communities. This elevated flow is likely due to inflow and infiltration, which increases in volume during periods of rain, snow melt or high groundwater conditions. The elevated flows will impact the City's sanitary collection system, treatment and effluent discharge.



The 20 year flows have been estimated on the following assumptions:

- West Fernie is connected to sewer and experiences some development as a result of the sub-dividing of larger lots.
- There are no changes in the per capita flows calculated for dry weather conditions.
- There is no corresponding increase in the maximum day flow as a result of new connections being installed in a manner which will not increase the rate of I/I.

Based on these assumptions, it is estimated that in 20 years, the average dry weather flow will be approximately 5,400 m³/d, with the maximum day flow in the order of 21,000 m³/d.

4.4.1 Inflow and Infiltration (I/I)

Much of the City of Fernie's sewer collection system is located in the lower-lying areas, and is likely to be under the influence of groundwater. Groundwater elevations are influenced by a number of factors including high river flows, mountain snow/run-off, storm/melt events, the spring freshet and underlying impermeable clays. The City has long known that I/I plays a significant role in influencing the flows received at the sewage treatment plant. The I/I events are closely associated with precipitation and snow melt. As a result, there have been much work studies completed in order to manage the I/I within the City of Fernie. This work commenced in 1978 and is still on-going.

Although the City has reduced much of the known inflow to the system, the extent of I/I during critical periods remains extremely high. Based on the remediative work which has been undertaken by the City to reduce inflow, until recently it was assumed that the high flows were mainly as a result of infiltration with the events during the winter months being shorter in duration and the summer events being over longer periods. However, a review of the flow monitoring data from 2008 has indicated that inflow may still be problematic for the City of Fernie. The high flow events are problematic to the sewer system, including negative impacts on the biological treatment processes and the hydraulic overloading of the plant and the RI basins. There is the need to address these high flows.

4.5 Sewer System Capacity – Collection

From the information which has been reviewed, there is no indication that there are concerns with the capacity of the sanitary sewer collection system. The City has an existing program whereby any proposed additional flows through new development are modelled to predict the impact on the existing system. This assists the City in deciding actions that are needed to ensure that the collection system remains effective. Although there are no concerns with the capacity of the collection system, the high I/I



indicates that this system is leaking. The periods of high flows will also increase the risk that an overflow event may occur, which could result in members of the public coming into direct contact with raw sewage or a release of raw sewage into the Elk River. Any system capacity which is being used for I/I will detract from capacity which is available for future growth and development within the area which is served by the City.

4.6 Sewer System Capacity – Treatment

There are no data available on the performance of the upgraded sewage treatment plant, due to the timing of the completion of these upgrades. The historical effluent data indicate that a good quality was being achieved for both total suspended solids (TSS) and 5 day biochemical oxygen demand (BOD₅). Prior to the upgrades, both of these parameters were in consistent compliance with the permit requirements. As the upgrades accommodate both TSS and BOD₅ reduction, there is no concern that the effluent concentrations will be of concern once the upgrades are complete.

Pathogens and nutrients are not regulated under the permit. As disinfection is not practiced, there can be elevated concentrations of faecal bacteria in the effluent, although the data indicate that there is a natural die-off of faecal bacteria during the sewage treatment plant process. Nitrogen and phosphorus are not regulated as part of the permit, and there is no consistent reduction in these parameters during the sewage treatment process.

4.7 Sewer System Capacity – Disposal

The City has two methods of effluent disposal: discharge to ground via rapid infiltration basins and a discharge to the Elk River. The original intent was for the RI basins to be used as the standard method of effluent discharge with the Elk River outfall only to be used on rare occasions. However, under conditions of high river levels or groundwater, the capacity of the RI basins is reduced. The discharge rate via the RI is also impacted during periods of I/I, when the incoming flows exceed the infiltration capacity. Since 1995, discharge to the Elk River has been required for approximately 30 to 50 days each year. The City currently has no ability to measure the flows discharged to the Elk River, so the actual flows which are discharged through the outfall are unknown.

4.8 Effluent Criteria – RI Basins

The standard discharge from the City of Fernie sewage treatment plant is to ground via the rapid infiltration basins. Data from the effluent monitoring wells indicate that the effluent is measurable in the groundwater, but that the concentrations decrease with an increase in distance from the RI basins. This is typical for a ground discharge system, with the decrease in concentrations likely to be a factor of dilution, dispersion with some reduction through the interaction with soils or biological uptake.



4.9 Effluent Criteria – Direct River Discharge

Under conditions of reduced infiltration capacity as a result of high ground or surface water conditions, the City of Fernie is permitted to discharge effluent directly to the Elk River, by-passing the rapid infiltration basins. During these events, the river is monitored upstream and downstream of the point of discharge. There can be an increase in concentrations at the monitoring location downstream of the point of discharge. A measurable change between the upstream and downstream sites does not necessarily translate to a detrimental impact. This may be particularly the case if a direct river discharge occurs under a storm or flood event. However, the current outfall will result in poor mixing between the effluent and the river, which will contribute to the times when increased concentrations are observed at the downstream monitoring site. Calculations based on the river flows at the time of discharge have indicated that the change in concentrations for these parameters was likely to be immeasurable if adequate mixing between the river and effluent was achieved.

4.9.1 Aquatic Toxicity

For the City's effluent, the primary concern for acute aquatic toxicity would relate to ammonia. This is the case for sewage lagoons that receive domestic sewage and do not use chlorine for disinfection. Therefore, the potential for toxicity impacts in the Elk River focused solely on the acute response to ammonia. The acute toxicity of ammonia is related to pH, with the toxicity increasing as the pH increases. Lagoon systems are often subject to high effluent pH values due to the activity of algae.

The effluent toxicity data for the City of Fernie indicate that there has been no failure of the LC₅₀ 96 hour rainbow trout bioassay for this discharge. The risk of acute ammonia toxicity can also be calculated using a methodology which was developed by Environment Canada. The application of this calculation for the City of Fernie indicated that although the ammonia concentration can be close to the calculated toxic threshold for the measured pH concentrations, there were no instances when the effluent ammonia concentration would have been classed as acutely toxic. This risk could be lowered further with the recent upgrades.

Ammonia toxicity has been addressed as part of the Canada-wide Municipal Wastewater Strategy. The document will become the framework for a federal regulation under the Federal Fisheries Act, which will address all surface water discharges from sewage treatment plants in Canada. However, it is currently unclear whether the City of Fernie will need to comply with this future regulation, due to the periodic nature of the discharge to the Elk River. If compliance is needed, both acute and chronic toxicity will need to be assessed, and along with improved mixing between the effluent and the Elk River.



4.10 Septage

Any trucked wastes which would be received by the City of Fernie would originate mainly from outside the City jurisdiction. There is no policy, based on the capacity of the sewage system, which will enable the City to make appropriate decisions in the future regarding the receipt of trucked wastes. The cost of such a service is also unknown, as it is important to ensure that the City tax payers are not subsidizing non-City residents. At present there are no septage receiving facilities at the sewage treatment plant.

4.11 Sludge/Biosolids

The sludge/biosolids which are produced at the sewage treatment plant accumulate slowly in the lagoons over a prolonged period of time. In this type of system, it is quite normal for desludging to only be required once every 15 to 20 years, and desludging should now be undertaken as part of the upgrades which are currently being completed. There is no management pathway for the desludging activities, including the estimation of volumes, timing and costs.

4.12 Sewer By-Law

The City of Fernie has a Consolidated Sewer Connection and User Charge By-law (By-law No. 1593). This by-law provides for the imposition of charges against the owner or occupier of real property for the connection to and use of the City's sanitary sewage collection and treatment process. The by-law was last updated in February 2002, with the focus being on user charges. There are no restrictions in the by-law with regards to discharge volume or quality.

5.0 RESPONSES TO THE PROBLEMS

5.1 Regulatory Pathway

The City will complete an LWMP which will address the management of I/I and solve the legal issues with regard to the MSR. The LWMP will develop an approach for the City of Fernie which will not result in public health or environmental concerns, and will recognise the implications of the Canada-wide Municipal Wastewater Strategy, where applicable.

5.2 Unsewered Areas

To date, there have been no complaints regarding the integrity of the on-site sewer systems for the few properties that are within the City boundary but are not connected to the community sewer system. These lots will be connected to City sewer, and the City needs to ensure that capacity for these future connections is already allocated within the system. There is no timeline set for the connections to occur



and, unless problems are experienced with the integrity of these systems, it is expected that the timing of the connections will be based on the development of the lot or the adjacent properties. There is no intent from the City to encourage future development that is served by on-site sewer systems.

5.3 Expansion of Services/Boundary

Three areas have been identified as potentially being served by City sewer in the future: a newly incorporated but undeveloped area located to the south west, West Fernie, a developed area which is already served by City water and an area to the immediate north of the City which consists of large developed lots. Given the situation at West Fernie, it is reasonable to assume that this area will be connected to the City sewer in the future. The City is committed to managing the sewage that is produced from any new development within the City boundary. However, the City does experience high flows which are related to I/I rather than sewage flows. These high flows result in capacity, treatment and discharge concerns.

Therefore, the City needs to accommodate for future growth, both within and outside of the existing boundary. Estimates of the projected flows from the undeveloped areas are required to ensure that this capacity is built into the sanitary sewer system.

5.4 Flows

5.4.1 Flow Criteria

The 20 year design flows are 5,500 m³/d (average dry weather flows) and 21,200 m³/d (maximum day flow), which accommodates:

- Flow projections based on 747 L/capita/day;
- A permanent community growth of 0.63%;
- A shadow community growth of 0.63%, assuming 50% occupancy of 4 people/home;
- Incorporation of the flows from West Fernie, assuming that an additional 140 lots are developed over the 20 year period.
- All future connections will be conducted in a manner which will not result in an increase in I/I.

5.4.2 Flow Reduction Through the Management of Releases

Flow reduction through the management of inflow and infiltration has been a leading initiative with the City of Fernie since the late 1970's. In 1978, the problem with inflow was fully identified and resulted in



the City implementing a program by which all roof leaders would be disconnected from the sanitary sewer. This program has been very successful and there are only a few remaining properties in the Maintown/Annex areas that are still connected to the sanitary system. The City is now focusing on the reduction of infiltration and the identification of other sources of inflow. The approach to managing I/I needs to be systematic and sustained in order to address the following issues:

- Identifying defects in the City system;
- Repairing defects in the City system;
- Co-incidentally identifying sources of I/I emanating from private property;
- Documenting each of the above.

The program to manage and reduce I/I needs to be continued into the future. There City must get its "house in order" before focusing on private properties. This approach has a good public perception and is a good basis for moving forward with an I/I program onto lands which affect private properties. Once the City's house is in order, the next stage would be to elicit voluntary participation (in known I/I source locations) in a defect identification and repair program on private property. Council would need to establish policies with respect to testing and repair costs.

In addition to I/I, the City is aware of other situations where sources of "clean" water could be discharged. Existing discharges would include the condensate from gas furnaces or swamp coolers. Potential future discharges include the release from open loop geothermal units. The release from an open loop geothermal system would largely consist of clean water with a very low concentration of contaminants. The volume of discharge would be different in each case, being a factor of the type of system and the size of the property. Concerns have already been raised by the City regarding allowing such releases. Based on these concerns, the focus for the City is not to accept any discharges which consist primarily of "clean" water. This includes the discharges from open loop geothermal units. It is important that the City does not commit to further inputs to the sewage system without ensuring that there is capacity available and that the new inputs will not increase the I/I issue or increase the frequency and duration of direct river discharge.

5.4.3 Flow Reduction Through the Implementation of Public Programs

The Provincial government is promoting in-home water reduction for two primary reasons - first, it reduces the water supply requirements and second, it reduces the amount of wastewater that needs to be treated and disposed. It is common now for municipalities to outline their water conservation measures in applications for infrastructure grants. The implementation of such programs and a



demonstration of a reduction in water usage/wastewater production is one of the considerations when awarding funding requests.

The City of Fernie has started to implement water conservation measures through addressing water uses and wastewater production within the City buildings and practices, promoting commercial water meters and amending the building by-law. The City needs to ensure that its own house is in order before looking to further measures being implemented by members of the public. However, the City also recognises the need to move forward with water conservation and flow reduction programs throughout the community. The per capita flow can be reduced over time through implementation of an "in the home" water conservation program. An "in the home" program should include a public education component which explains how much water is used by each fixture in the home and how changes can be made to reduce their contribution. In addition, prescriptive aspects could be included such as all new construction (including businesses) and retro-fits requiring a building permit to use ultra-low flush toilets.

5.5 Sewer System Capacity – Collection

The capacity of the collection system and risks associated with overflows are both a factor of I/I. There are no additional responses required for the collection system.

5.6 Sewer System Capacity – Treatment

The sewage treatment plant upgrades will provide additional capacity for BOD₅ and TSS removal to up to flows of 8,000 m³/d. The resulting effluent concentrations are consistent with the requirements under the MSR for discharge to ground or flowing surface waters, such as the Elk River. The concentrations should also be consistent with the requirements of the Canada-wide Municipal Wastewater Strategy. As the upgrades are still being completed, there are no data relating to the effluent quality with all the treatment processes in place. Monitoring will be required to establish process performance once the upgrades are complete.

5.7 Sewer System Capacity – Disposal

The capacity of the RI basins is affected by seasonal environment factors, but was increased during the recent upgrades to the sewage treatment plant (additional infiltration area and increased storage capacity). These upgrades will serve to further reduce the need for direct river discharge during high I/I events or periods of reduced percolation capacity. However, there is the need to ensure that there is an alternative route of discharge, under conditions where the RI basins cannot adequately discharge all of the incoming flows. This alternative discharge is to the Elk River, which has the potential to occur on a temporary or permanent basis.



The following options are available to the City:

- Determine the capacity of the existing RI basins under different environmental conditions.
- Optimise the RI basin operation, e.g. through storage, wet/dry cycles, maintenance schedules, media assessment, or modification of the RI basins through underdrains.
- Pursue additional RI basins both on-site or through alternative RI discharge locations. This is to be based on the capacity of the existing basins and the projected growth/impacts as a result of I/I.
- Evaluate temporary effluent discharge to the Elk River.
- Evaluate river discharge as being the primary method of effluent release.

5.8 Effluent Criteria – RI Basins

As part of the 2006 environmental impact study, the data from the effluent and monitoring wells were reviewed with respect to the BC Water Quality Guidelines. It is clear that effluent is impacting the groundwater in this area, but it does not appear to be a public health or environmental risk. Therefore, the continued discharge of effluent to ground is acceptable for the City of Fernie for the following effluent criteria, which were defined as part of the 2006 environmental impact study:

- BOD₅ < 45 mg/L;
- TSS < 60 mg/L;
- Ammonia removal not required;
- Nitrate removal not required;
- Total phosphorus removal not required;
- Orthophosphate not required; and
- Disinfection not required.

Monitoring requirements were also outlined for the RI discharge. One of the recommendations in the environmental impact study was that the effluent and environmental monitoring outlined in the permit be replaced with a modified program. The monitoring program is based on the requirements outlined in the existing permit and the MSR (Part 7 and Schedule 6), and uses the criteria requirement for flows > 500 m³/d and the discharge of a Class C effluent to ground. The monitoring parameters were based on the effluent quality, removing the need to monitor the parameters which were not present in the effluent and focusing on parameters which were present and could be of environmental concern. Parameters which could also be used as tracers to track the effluent pathway and dispersion were also included.



5.9 Effluent Criteria – Direct River Discharge

There are two options which are available to the City:

- Periodic/temporary release during periods when the discharge to the RI basins is not optimal.
- Convert to a river discharge as the primary mechanism for effluent release.

5.9.1 *Periodic Direct River Discharge*

The City currently releases effluent to the river on a frequent basis, when the percolation rate of the RI basins is not capable of handling the incoming flows. This is standard for a rapid infiltration system, where there is the need for a back-up method of release. The following are needed for this discharge option:

- The intent would be for an alternative discharge location in the event of a reduced ability to discharge to the RI basins. The effluent would have passed through all of the treatment processes at the sewage treatment plant.
- The primary point of discharge would be to ground, with the City taking proactive measures to reduce the frequency and duration of a direct river discharge, including the assessment of developing additional RI basins.
- There are currently no effluent criteria for a temporary river discharge and the monitoring requirements can change between events. An environmental impact study would need to be completed which would define the discharge characteristics and conditions which would not compromise public health or the environment. The environmental impact study would focus on the intent of the release, which would be under high river flow conditions.
- Modifications to the outfall would be required to ensure that there is optimal mixing in the Elk River. This will include mixing requirements, outfall structure and outfall location.

5.9.2 *Convert to Direct River Discharge*

There is the option for the City to abandon the RI basins and divert 100% of the flow to the Elk River. In order to pursue this direction, the following would need to be considered:

- The RI basins have been utilised by the City of Fernie as the primary method of effluent release since the sewage treatment plant was originally built in the early 1990's. Due to concerns which have



been raised in the past regarding such a large permanent discharge to the Elk River, the City has recently upgraded the RI basins to allow additional infiltration capacity and storage capabilities. This investment would be lost if there is a decision to pursue a direct river discharge.

- A direct river discharge would fall under the CCME Municipal Wastewater Strategy and the future Federal wastewater regulation. This would require increased monitoring, the possible participation in a 12 month effluent characterisation study and the development of effluent criteria using a risk assessment model which must consider acute and chronic toxicity. If the existing process does not meet any of the required criteria, a timeline for upgrading would be set under the Federal wastewater regulation.
- Dilution potential: based on the average monthly flow data from the Water Survey Canada gauging station 08NK002, Elk River at Fernie (1925 to 2007) and using the current average annual flow data from the sewage treatment plant, the dilution potential with the Elk River would range from 209:1 to 2,681:1, with an average of 784:1. Therefore, there is the potential for dilution to be available in the Elk River. However, this would need to be confirmed using the statistical river flow criteria and projected future flows from the sewage treatment plant. This would also need to include flows which are experienced at the sewage treatment plant as a result of inflow and infiltration. The flow criteria would be based on the CCME strategy, which refers to both the existing Provincial requirements under the MSR (2 year return period 7 day low flow) and a more stringent 7 day low flow over 10 years.
- Modifications to the outfall would be required to ensure that there is optimal mixing in the Elk River.
- An environmental impact study would need to be completed to determine appropriate effluent criteria which would not result in impacts to public health or the environment. The greatest concern which has been raised by the BC MoE in the past is the nutrient loading to the Elk River. Therefore, it is likely that nutrient removal would be required, which has significant capital and operational cost implications.

Based on the previous direction from the BC MoE for direct discharges to the Elk River, there is a significant risk that the pursuit of a direct river discharge and abandonment of the RI basins will result in significant capital and operational investment for this option to be viable to the City of Fernie. With the recent upgrades and existing infrastructure in place for discharge to ground, the benefit of pursuing this option is questionable.



5.10 Septage

The following need to be addressed with regards to the development of a long-term policy for the receipt of septage and other trucked wastes:

- Accept the septage from the small number of non-sewered properties within the City boundary. This is a low volume compared with the sewer flows.
- Determine if there is still the need for a facility to serve the Regional District, and if there is the need, examine the feasibility of developing a septage facility at the City of Fernie sewage treatment plant, including volumes, costs and cost recovery.

5.11 Sludge/Biosolids

The following need to be addressed for the City's sludge/biosolids:

- Determine a management pathway for the 2009 desludging activities – including options for further treatment, disposal versus reuse, and compliance with the Organic Matter Recycling Regulation.
- Predict timing of any future desludging, along with volume and solids content of solids.
- Determine a management pathway for any future desludging activities – including options for further treatment, disposal versus reuse, and compliance with the Organic Matter Recycling Regulation.
- Determine budgetary requirements and develop strategy to ensure funds are available when desludging is required.

5.12 Sewer By-Law

The current sewer by-law needs to be updated to reflect discharge volume and quality requirements. This should also reflect current Federal and Provincial legislation and the context of the Canada-wide Municipal Wastewater Strategy. The update to the by-law should also address other discharges, including septage, industrial discharges and the discharge from open loop geothermal systems.

6.0 RECOMMENDATIONS

The following recommendations are made with respect to each section outlined in the “Responses to the Problems”.



6.1 Regulatory Pathway

- Complete the LWMP incorporating the implications of the Canada-wide Municipal Wastewater Strategy/future federal regulation, where applicable.
- Develop an operational certificate to replace the current permit.

6.2 Unsewered Areas

- Allocate for the connection of unsewered lots within the City boundary.
- Connect unsewered lots if problems develop with the on-site systems, or align with lot development or development of adjacent areas.
- Do not encourage on-site septic systems for future development within the City boundary.

6.3 Expansion of Services/Boundary

- Allow for the connection of areas within a modified City boundary, including West Fernie.
- Continue with the existing practice to model the impact of new development within the City boundary prior to the approval of development.

6.4 Flows

- Continue implementing the program to reduce inflow and infiltration, along with periodic reviews to monitor its effectiveness and progress.
- Develop a policy which will not permit any point sources of “clean” water to be discharged to the sanitary sewer.
- Develop a long-term program in order to reduce flows within City buildings and privately-owned properties.
- Develop a by-law requiring all new construction and household retrofits to use ultra-low flow fixtures.

6.5 Sewer System Capacity – Collection

- Continue with modelling to identify any collection system needs prior to the development of new connections.
- Review measures which can be implemented to further reduce the risk of overflow from the collection system.



6.6 Sewer System Capacity – Treatment

- Develop monitoring programs to allow the on-going evaluation of process efficiency and effluent quality.
- Monitor carbonaceous BOD₅ to confirm consistency with the CCME Municipal Wastewater Strategy and the future Federal Regulation.

6.7 Sewer System Capacity – Disposal

- Evaluate and document the advantages and disadvantages of RI discharge versus river discharge (permanent and intermittent).
- Determine the capacity of the RI basins under different environmental conditions.
- Develop RI basin requirements to optimise this route of discharge, if the discharge to ground is to remain the primary method of effluent release for the City. This should include operations, maintenance and the timing for the expansion of the RI system.

6.8 Effluent Criteria – RI Basins

- Accept the effluent criteria and monitoring requirements presented in the environmental impact study as part of the LWMP in the case where there is a continued discharge to ground through the RI basins.
- Implement flow monitoring in order to accurately record discharge flows to the RI basins.

6.9 Effluent Criteria – Direct River Discharge

- Assess the effluent criteria and monitoring requirements for a permanent and intermittent river discharge.
- Assess the outfall conditions and upgrade requirements.
- Implement flow monitoring to enable accurate measurement of the effluent release from the river outfall.

6.10 Septage

- Accept septage from the unsewered City lots at the sewage treatment plant.
- Evaluate the need for a regional facility and the feasibility of developing such a system within the City of Fernie.



6.11 Sludge/Biosolids

- Determine a management pathway for the 2009 desludging activities – including options for further treatment, disposal versus reuse, and compliance with the Organic Matter Recycling Regulation.
- Predict timing of any future desludging, along with volume and solids content of solids.
- Determine a management pathway for any future desludging activities – including options for further treatment, disposal versus reuse, and compliance with the Organic Matter Recycling Regulation.
- Determine budgetary requirements and develop strategy to ensure funds are available when desludging is required.

6.12 Sewer By-Law

- Update the by-law to reflect the following aspects:
 - Current Federal and Provincial legislation and the Canada-wide Municipal Wastewater Strategy.
 - Discharge volumes and quality requirements.
 - Non-sewage, industrial and septage discharges.

7.0 STAGE 2 ACTIVITIES

The following are to be completed in Stage 2 of the LWMP process:

- Define the inflow and infiltration program in detail, including costs.
- Define an in-house water conservation program, including costs.
- Assess whether the sewer system requires upgrades to meet the regulations under design flows, including upgrade options and costs.
- Identify location and costs associated with flow monitoring.
- Undertake an environmental impact study for intermittent and permanent river discharge scenarios, including an evaluation of effluent toxicity.
- Develop a program to manage the City's biosolids, including costs.
- Identify if a septage facility is required and, if so, define the scope and costs.
- Review the by-law and define which aspects require re-writing. Re-write the by-law, if appropriate.