

CITY OF FORT ST. JOHN

LIQUID WASTE MANAGEMENT PLAN UPDATE



February 14, 2014

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City of Fort St. John
10631 100 Street
Fort St. John, BC V1J 3Z5

Attention: Victor Shopland, Director of Infrastructure and Capital Works

RE: FINAL REPORT – LIQUID WASTE MANAGEMENT PLAN

Please find attached the final report for the City of Fort St. John's Liquid Waste Management Plan (LWMP). This report reviews the previous commitments of the 2004 LWMP, identifies new issues, updates the LWMP to reflect current regulatory standards, and considers the potential for new resource recovery options.

We trust that the attached report fulfills the City's requirements. Please do not hesitate to contact us if you have any questions.

Yours truly,

URBAN SYSTEMS LTD.



Chad Carlstrom, EIT

/cc

Attach.

cc: Don Demers, City of Fort St. John
Jeremy Garner, City of Fort St. John



Dr. Joanne Harkness, R.P. Bio.
Water and Wastewater Specialist

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1.0 INTRODUCTION

The City of Fort St. John developed a Liquid Waste Management Plan (LWMP) in 2004 which was endorsed by Council and signed by the BC Ministry of Environment. Since the completion of the LWMP, the City has continued to work diligently to implement the commitments made in the Plan.

In 2010, water users in the oil and gas industry began to express an interest in obtaining reclaimed wastewater from the City for industrial uses. The City's existing LWMP does not discuss reclaimed wastewater for oil and gas purposes. The BC Ministry of Environment (BC MoE) has indicated that the Plan needed to be updated. Also, the LWMP should be reviewed and updated every 5 years to 10 years. For these reasons, the City initiated a review of its LWMP in February 2011.

The primary objectives of this review are to:

- Review progress on all of the commitments made in the 2004 LWMP;
- Consult with technical (government agencies) and public individuals to identify issues that have developed since the last LWMP;
- Update the LWMP to reflect current regulatory standards; and
- Consider the potential for new resource recovery options such as reclaimed water or microhydro power generation from the lagoon outfalls.

2.0 CONSULTATION PROCESS

One of the key components of the LWMP review process was to obtain input from the public and government agencies. This community dialogue included the formation of committees to solicit input and feedback, as well as to complete direct consultation with the public.

2.1 Steering Committee

The LWMP process was initiated by forming a Steering Committee. This committee provided overall direction for the LWMP review and included representation from the Council and staff of the City of Fort St. John.

2.2 Single Advisory Committee

Government agencies, members of the public, and City staff were invited to participate in a Single Advisory Committee (SAC). Members of the SAC were responsible to provide input on all aspects of the plan from both a technical and public perspective. This included identifying governing design criteria, brainstorming solutions and providing technical input to ensure the LWMP is technically sound. The advisory committee also provided input on the acceptability of various issues and options from a public perspective.

The following agencies/individuals were invited to participate on the SAC:

- City of Fort St. John – Victor Shopland, Director of Infrastructure and Capital Works; Garland Durnford, Water/Sewer Treatment Operator; Jeremy Garner, Utilities Superintendent; Dianne Hunter, City Manager; Mayor Lori Ackerman; Councillor Gord Klassen; Don Demers, Director of Public Works and Utilities; and Marty Paradine, Energy Manager;
- BC Ministry of Environment – the initial contact was Cameron Eggleston, but different contacts have been identified over the LWMP review process due to personnel changes (retirement, illness and changes in position). During the City's LWMP review process, the following people have acted as the BC MoE contact: Cameron Eggleston, Environmental Protection Officer; Robert Andrews, Section Head; Dean Cherkas, Regional Manager; Edward Hoffman, Regional Director; Maureen Bilawchuk, Section Head; Ann Godon, Environmental Protection Officer; and Li Wan, Sr. Environmental Protection Officer.
- Agricultural Land Commission – Martin Collins, Okanagan, Interior, Northern Regional Planner;

- Ministry of Community, Sport and Cultural Development – Catriona Weidman, Senior Infrastructure Engineer;
- Ministry of Environment – Water Stewardship Office – Robert Piccini, Section Head;
- Northern Health Authority – Madhu Nair, Environmental Health Officer;
- North Peace Regional Airport – Moira Green, Managing Director;
- Peace Valley OSB – Lindsay Sahaydak, Environmental Manager;
- Peace River Regional District - Shannon Anderson, Deputy Chief Administrative Officer, General Manager of Environmental Services;
- Northern Environmental Action Team (NEAT) – Dzenko Mzengeza, Executive Director;
- Fort St. John Links Golf Course – Len Holland, General Manager;
- Energy Services BC – Art Jarvis, Executive Director South;
- Peace Valley Environmental Association – Andrea Morison, Executive Director;
- Department of Fisheries and Oceans – John Summers, Senior Habitat Biologist, Major Projects/MPMO;
- Ministry of Agriculture, Food and Fisheries – Julie Robinson, Regional Agrologist;
- BC Oil and Gas Commission – Allan Chapman, Hydrologist;
- Tervita (formerly CCS Corporation) – Curtis Whitford, Representative;
- Treaty 8 Tribal Association – Kieran Broderick, Land and Resources Director;
- Environment Canada – Snehal Lakhani, Senior Engineer;
- Urban Systems – Kristin Bayet, P.Eng; Dr. Joanne Harkness, R.P.Bio; Pam Robertson, BA, CTDP, ABC; and
- Public Members – Jaclyn Mersereau, Rhys Mersereau, Allan Zackodnik, Jay Morrison;

Four SAC meetings have been held over the course of the LWMP review process. Copies of notes from each meeting are included in Appendix A. The dates and purposes of each meeting were as follows:

1. *SAC Meeting #1 - September 21, 2011.* The purpose of this meeting was to introduce the SAC to the LWMP including reviewing the Background Report, SAC Terms of Reference, and LWMP Guiding Principles. The SAC was also able to tour the Fort St. John south

sanitary sewer and storm sewer systems to enhance their collective knowledge of the processes. The concept of reclaimed water was also reviewed.

2. *SAC Meeting #2 - November 8th, 2011.* An update on reclaimed water was provided as well as a review of the 2004 LWMP commitments. Public Consultation strategies were considered and discussed.
3. *SAC Meeting #3 - April 19th, 2012.* A more detailed review/discussion of the concepts of reclaimed water and utilizing the South Lagoon outfall line as a source of electricity through a micro hydropower project were the focus of this meeting. An outline for a draft new LWMP report was reviewed as well.
4. *SAC Meeting #4 – November 21st, 2012.* The purpose of the final SAC meeting was to review the draft plan commitments in detail and get feedback from the committee members.

2.3 Public Consultation

In addition to feedback from the committees, engagement with the public was completed in one phase.

2.3.1 Phase 1

In Phase 1, early engagement provided an initial opportunity for community members to learn about the LWMP review process and provide input on current wastewater management issues. Phase 1 consultation activities included:

- An article about the LWMP process with an invite to join the SAC was included in the City's *Energizer* newsletter. This newsletter was distributed to each household and posted on the City's website in the fall of 2011;
- Community Information Sheets – One sheet provided information to raise awareness about the need for the LWMP review, the importance of consultation and link to an on-line survey. Three other information sheets outlining how each of the City's sewer and storm systems work were also created. The information sheets were distributed in May 2012 at an information booth at the City's Municipal Government Day event and on the City's website; and
- Survey #1 – The goal of this survey was to gather feedback on liquid waste related values and issues important to the community and to identify how they want to be engaged. The

survey was available in May 2012 at an information booth at the City's Municipal Government Day event and on the City's website.

Copies of all the Phase 1 consultation materials and any feedback received can be found in Appendix B.

2.4 Identified Issues

Throughout meetings with the Single Advisory Committee and public consultation, new issues concerning the City's liquid waste were identified. These items included:

- Reducing infiltration and inflow into the City's sanitary system;
- Ensuring discharge from the oriented strand board (OSB) plant is managed appropriately according to the City's treatment system design capacity for flow and water quality.
- Enabling the City to pursue resource recovery options if economically feasible;
- Ensuring effluent quality compliance with Federal and Provincial regulations, operation certificates, and environmental impact assessments;
- Ensuring the City is able to recover the costs of providing commercial dumping services and that commercial dumping does not negatively affect the treatment system;
- Investigating the storm water impacts to the City and developing a storm water management plan (SWMP); and
- Creating a database of private sanitary and storm infrastructure to monitor their condition and compliance with the City's bylaws (e.g. grease traps, catchbasins, oil/grit separators).

3.0 COMMUNITY PROFILE

This Plan covers all land within the City’s boundaries in addition to infrastructure and drainage paths located outside the City’s boundaries (e.g. the North Lagoons, sewer outfall lines, storm drainage paths, etc.). The City’s boundaries cover approximately 2,300 hectares, with approximately 1,700 hectares of this land developed to an “urban” standard.

The sewage collection system serves all developed properties within the City boundaries. There are no “unsewered” portions of the City except where development has not yet occurred. In addition to serving the City, the City’s North Lagoon treatment facilities also serves the Fort St. John Airport Subdivision, however, this collection system is maintained by the Peace River Regional District and the airport. The City also accepts trucked-in sewage from rural residents and industry at a designated receiving station near the South Lagoons; however, this operation will only be permitted until the facility is closed, with the closure scheduled to be December 31, 2014

Design criteria for future sewage flows are based on population and regional growth projections. It is assumed that industrial and commercial growth within the City limits will keep pace with population growth. A projection rate of 3% growth per year is used to determine the future population that will be served by the sewer system and is outlined in Table 3.1. The 3% annual growth rate projection aligns with the City’s recently completed Official Community Plan. Over the past ten years, Statistics Canada reported an average yearly population growth of 2.1%. The future population to be served by the sewer system can be variable based on possible boundary expansion or large scale industry projects.

Table 3.1: Population Projections

Year	City Population at 3% Growth
2011	20,867
2014	22,802
2016	24,190
2021	28,043
2031	37,688

* Population estimates are projected based on a baseline FSJ population of 18,000 in 2006; this is consistent with previous City population estimates used in other reports. In January 2012, BC Stats estimated a Fort St. John population of 20,408 in 2011.

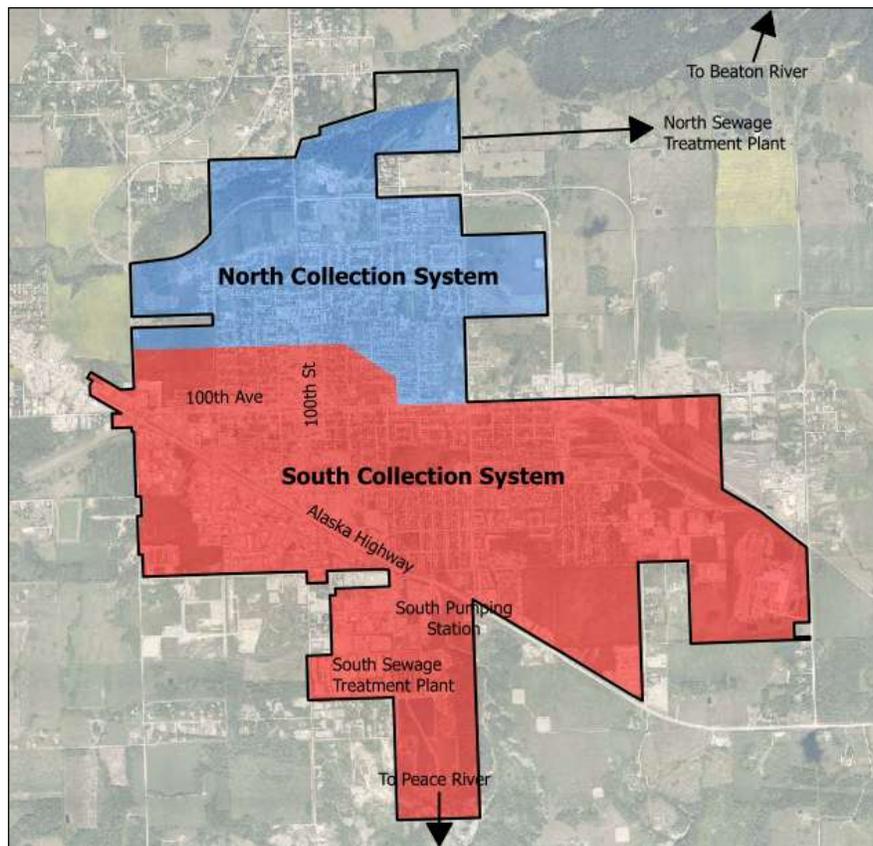
4.0 EXISTING SYSTEMS

The City of Fort St. John collects raw sewage from all lots within the City boundary and conveys the flows through pipes to one of two sewage treatment plant locations – the North Lagoons and the South Lagoons. The North Lagoons also receive sewage directly from the Fort St. John Airport Subdivision. Discharge from the North Lagoons is into the Beaton River during spring and fall only. Discharge from the South Lagoons is to the Peace River, and occurs year-round. The City also has a separate stormwater system that collects and conveys water runoff from rainfalls and snowmelt.

4.1 Sanitary Sewer Collection System

Figure 4.1 illustrates the two collection systems that comprise the City’s sanitary sewer system. In total there are approximately 7,000 lots within the City that are connected to the sanitary sewer system, with 74% of the flow to the South Lagoons and 26% to the North Lagoons.

Figure 4.1 – Fort St. John Sanitary Sewer System



The North system is primarily a gravity collection system with some pressurized collection areas such as the Fort St. John Airport Subdivision. The overall flow from these pipes is not measured before the sewage enters the North Lagoons so there is no inflow data for the North Lagoons. Effluent flow data is measured at the North Lagoons outlet, but long term storage at the North Lagoons results in evaporation and precipitation which prevents the effluent flow data from accurately approximating the inflow data. However, based on averaging the effluent flow data it is estimated that in 2011 the influent flow averaged 1,716 m³/d.

Due to its elevation, the South Lagoons collects sewage from a nearby lift station. The south collection network collects sewage by gravity to one lift station where the sewage is pumped to the South Lagoons. Flow data is measured both at the lift station and at the South Lagoon outlet. South sanitary sewer flows as measured at the lift station from 2007-2012 are outlined in Table 4.1.

Table 4.1: Flows into the South Lagoons

Year	Total	Maximum	Minimum	Average
	(m ³)	(m ³ /d)	(m ³ /d)	(m ³ /d)
2007	2,399,418	15,849	4,156	6,574
2008	2,179,476	12,471	3,640	5,955
2009*	770,956	9,202	0	2,112
2010	1,738,341	10,874	2,201	4,763
2011	2,116,074	31,054	2,940	5,797
2012	1,747,437	11,053	3,039	4,774

* 2009 is missing daily data due to a flow meter error. Effluent flows were still collected.

Inflow and infiltration (I/I) is an issue with regards to the sanitary sewer collection system. Flooding and sewer backups have historically been problematic in various areas of the City when long duration rainfall events occur because I/I causes high flows in the sewer pipes, which the collection system does not always have the capacity to convey. However, successfully completed commitments from the 2004 LWMP to undertake piping upgrades in the North collection system have reduced the sewer backups during storm events. During the extreme storm events in the summer of 2011, the only area which flooded due to the collection system capacity was in areas of the south system in Matthew's Park. Additional pipe upgrades have since been completed in the south collection system in 2011 and 2012.

4.2 Sewage Treatment Plants

4.2.1 Operational Certificate

The City of Fort St. John operates the two sewage treatment plants under an operational certificate (ME-17748). The conditions of the operational certificate include permitted flows, effluent quality, timing and volume of the discharge, along with miscellaneous operational, monitoring and reporting requirements. The operational certificate was based largely on the old permit and commitments in the 2004 LWMP. The operational certificate was issued in October 2005 and has not been amended since this date. The requirements of the operational certificate are outlined in Table 4.2. There are two forms of 5 day biochemical oxygen demand (BOD₅): total BOD₅ which is the measure of all readily biodegradable material which will result in an oxygen demand, and carbonaceous BOD₅ (CBOD₅), which is the measure of the portion of readily biodegradable material which consists of carbon-related organics. Therefore, CBOD₅ does not measure the oxygen demand due to nitrogenous compounds such as ammonia and urea. Historically in BC, the focus has been to monitor total BOD₅, however, changes at both the provincial and federal level has resulted in the standard being to monitor CBOD₅. In October 2013, confirmation was received from the BC Ministry of Environment that the reference to BOD₅ in the City's operational certificate relates to CBOD₅, not total BOD₅.

Table 4.2: Summary of Regulatory Requirements (ME)17748

Parameter	South Lagoons	North Lagoons
Flow	≤15,000 m ³ /d, based on an average period of 1 calendar month	≤1,200,000 m ³ /year with the discharge period to be from April 15 th to June 30 th and September 1 st to October 31 st
Effluent CBOD ₅ (mg/L)	≤45 (maximum)	≤45 (maximum)
Effluent Total Suspended Solids (TSS) (mg/L)	≤60 (maximum)	≤60 (maximum)
Minimum Dilution	100:1 (Peace River:Effluent)	100:1 (Beaton River:Effluent)

4.2.2 Regulatory Changes

Since the operational certificate was issued, there have been changes at both the federal and provincial level with respect to the regulatory framework.

With respect to the federal changes, the Wastewater Systems Effluent Regulations (WSER) was finalized and published in June, 2012. This regulation focuses on all discharges $\geq 100 \text{ m}^3/\text{d}$ to surface waters in Canada. The regulation enforces the following National Performance Standards:

- $\text{CBOD}_5 \leq 25 \text{ mg/L}$ (average);
- $\text{TSS} \leq 25 \text{ mg/L}$ (average);
- Un-ionized ammonia $< 1.25 \text{ mg/L}$ (maximum); and
- Total chlorine residual $\leq 0.02 \text{ mg/L}$ (average)

The regulation also outlines monitoring and reporting requirements, in addition to indicating the timing required to upgrade a facility to meet the above standards. The timing of the upgrade requirements is based on a risk factor, which is calculated for each facility.

With respect to the provincial changes, since the completion of the 2004 LWMP, there has been an update to the Municipal Sewage Regulation (MSR), which was the governing legislation for sewage treatment and discharge in British Columbia. In April 2012, the MSR was repealed and replaced with the Municipal Wastewater Regulation (MWR). This is now the governing legislation in British Columbia for sewage treatment and discharge. Although there have been changes between the MSR and MWR, many of the concepts remain the same.

4.2.3 North Lagoons – Operations and Effluent Quality

Treatment of raw sewage at the North Lagoons is provided by four anaerobic cells and one facultative cell. Treated effluent is stored during non-discharge periods in four holding cells. The effluent quality for the 2007 to 2011 time period is summarized in Table 4.3. Although the lagoons are designed for the treatment of CBOD_5 and TSS only, and these are the two parameters which have regulatory limits identified in the Operational Certificate, a range of parameters are included in the regular monitoring schedule. The data include the pre-discharge samples and, in the events where the BOD_5 and TSS concentrations were above the levels stipulated in the operational certificate, this does not necessarily mean that the sample was out of compliance. Pre-discharge samples are taken before the discharge commences in order to confirm that it is acceptable for the effluent to be released. In the event that the effluent TSS and BOD_5 data are elevated for a pre-discharge sample, the effluent is stored until the concentrations reduce to a level which is below that stipulated in the operational certificate.

Table 4.3: Summary of Effluent Quality Data (2007 to 2011)

Parameter	Concentration			Number of Data Points
	Minimum	Average	Maximum	
TSS (mg/L)	3	30	350	77
Total BOD ₅ (mg/L)	< 5	25	128	73
CBOD ₅ (mg/L)	2.2	24.6	122.0	21
Total nitrogen (mg/L)	2.5	20.3	49.4	13
Ammonia (mg/L)	< 0.02	16.3	47.9	76
Un-ionized ammonia (mg/L)	0.004	0.5793	7.8739	51
Organic nitrogen (mg/L)	0	4	32	18
Nitrate (mg/L)	< 0.005	0.873	5.170	16
Nitrite (mg/L)	< 0.001	0.091	0.511	16
Total phosphate (mg/L)	1.13	4.21	8.20	16
Total dissolved phosphate (mg/L)	1.05	3.76	6.14	16
Orthophosphate (mg/L)	1.19	3.79	7.22	16
Faecal coliforms (#/100 mL)	< 1	725	8,200	76
pH	6.60	7.87	9.30	52

With respect to the two regulated parameters, there have been 6 occasions when the TSS concentration was higher than that stipulated in the operational certificate and 4 occasions for the CBOD₅. As indicated above, the elevated concentration does not necessarily represent the effluent quality during the discharge, as the data also include the pre-discharge samples. However, the number of occasions when there is an increase in the concentration has been becoming more frequent over time, especially with regards to the BOD₅. In both 2011 and 2012, this resulted in an extended period of time when the initiation of the discharge release was delayed, until there was a decrease in the BOD₅ concentration. At the time, the focus was on total BOD₅ as a measure of effluent quality, rather than CBOD₅. In addition, in 2012, the spring discharge period was terminated early, due to an increase in the TSS concentration to levels which were above the operational certificate requirements. In January 2012, a sludge survey was completed for the North Lagoons, and indicated that some of the lagoons contained significant volumes of sludge. Sludge accumulation can result in a decrease in the treatment capacity of a lagoon system and is likely one of the major contributing factors to the effluent quality issues.

From the data which are available, it is possible to estimate if upgrades will be required in order to meet the federal wastewater regulation. Under this regulation, the need for/timing of upgrades are based on a risk category evaluation. The risk category is calculated from a range of different factors, each of which is assigned a number of points. The total number of points which are calculated for each site determines if the site is in the low, medium or high risk category. The factors which are used to calculate the risk are: volume of effluent released in a period of 1 year, average CBOD₅ and TSS concentrations, presence of a chlorine residual in the effluent, risk of acute aquatic toxicity as a result of the presence of un-ionized ammonia, and the type of receiving environment including the dilution potential. The risk category for an intermittent discharge is based on 12 consecutive months of data, with the data span relating to the time period immediately before the submission of an authorization request which will allow a facility to discharge a non-compliant effluent for a period of time until the date of the upgrade requirements is reached. Using the data from 2011 only, the average TSS concentration was 18 mg/L and the average CBOD₅ concentration was 12.2 mg/L. In addition, there was one occasion when the effluent un-ionized ammonia concentration was > 1.25 mg/L. From this information, the North Lagoons would be classified as a medium risk facility and would therefore require upgrades to meet the National Performance Standards before December 31st, 2030.

With respect to the upgrade requirements, the primary focus for this site would be CBOD₅ and TSS only. No upgrades will be required for ammonia in order to meet the National Performance Standard, as the Federal wastewater regulation allows for either an end of pipe concentration or end of dilution zone concentration. Given the discharge regime for this site and the allowance for a minimum dilution ratio to be achieved in the Beatton River, there are no concerns with the end of dilution ratio concentration being exceeded. The scope of the upgrades to meet the required effluent criteria needs to be developed.

Several nitrogen parameters are measured at the North Lagoons, with the most important parameter being ammonia, as this is the main form of nitrogen associated with sewage and can also result in aquatic toxicity. There are two forms of ammonia – ionized and un-ionized, with the predominant form being largely dependent on pH. It is the un-ionized form which is the most toxic to fish. With the new Federal wastewater regulation, there is a requirement to assess if the un-ionized ammonia concentration of 1.25 mg/L has been exceeded in the effluent. This is the concentration of un-ionized ammonia which is toxic to fish and can result in fish deaths. For the data from 2007 to 2011, there were 5 occasions when this concentration was exceeded. The elevated concentrations of un-ionized ammonia were not necessarily related to the ammonia concentration, but by the pH, which can change naturally in a lagoon system, due to

algal growth. Unfortunately, the tendency in a lagoon system is for the pH to increase naturally, which results in a higher concentration of un-ionized ammonia and the increased possibility of this concentration being toxic to fish. However, as indicated above, as long as sufficient dilution is achieved in the dilution zone to meet the chronic ammonia concentration indicated in the federal wastewater regulation, treatment for ammonia should not be required.

With respect to the other nitrogen parameters, the data indicate that ammonia continues to predominate throughout the sewage lagoons, and that there is little to no onset of nitrification (biological ammonia treatment). This is expected for a lagoon system.

The minimal change in the phosphorus concentrations is also expected for a lagoon system. Phosphorus in the raw sewage will be utilised by the micro-organisms which treat sewage. However, this will not guarantee low concentrations of phosphorus in the effluent throughout the year.

The faecal coliforms vary throughout the year. It is quite common for lagoon processes to produce low concentrations of faecal coliforms without a disinfection process. The reduction in faecal coliforms is due to a number of factors, including the duration of time in the lagoons, UV light from the sun, competition from other micro-organisms and a lack of food for the faecal coliforms. As the lagoon process is not designed for disinfection, consistently low concentrations of faecal coliforms cannot be guaranteed throughout the year.

As a generalization, the effluent from the North Lagoons is of a higher quality during the late summer/early fall discharge period than during the spring period. This is considered to be related to the increase in biological activity in the lagoons as the ambient temperature increases through the spring and into the summer.

An environmental impact study has been completed for the discharge to the Beaton River and it is discussed in Section 6.2.1.

4.2.4 South Lagoons – Operations and Effluent Quality

The South Lagoons were upgraded in 1999 to provide secondary treatment from a previous configuration that utilized multiple anaerobic cells. This upgrade included the construction of a

complete mixed aerated tank and two partially mixed aerated lagoons. Additional upgrades were constructed in 2009 and 2010 that included an extended outlet pipe, second complete mix tank and a grit chamber. The extended outlet pipe allowed the City to avoid using a storage lagoon that periodically caused a deterioration in the effluent quality (primarily as TSS), through algal growth. The second complete mix tank provided the City with two independent treatment trains.

The effluent quality for the 2007 to 2011 time period is summarized in Table 4.4. Although the lagoons are designed for the treatment of CBOD₅ and TSS only, and these are the two parameters which have regulatory limits identified in the Operational Certificate, a range of parameters are included in the regular monitoring schedule.

Table 4.4: Summary of Effluent Quality Data (2007 to 2011)

Parameter	Concentration			Number of Data Points
	Minimum	Average	Maximum	
TSS (mg/L)	< 3	18	121	176
Total BOD ₅ (mg/L)	< 5	21	80	255
CBOD ₅ (mg/L)	2	13	42	46
Total nitrogen (mg/L)	9.8	29.6	68.7	54
Ammonia (mg/L)	< 0.02	24.45	64.30	255
Un-ionized ammonia (mg/L)	< 0.001	0.585	6.522	186
Organic nitrogen (mg/L)	0	6	39	62
Nitrate (mg/L)	< 0.005	0.321	3.320	61
Nitrite (mg/L)	< 0.001	0.106	0.864	60
Total phosphate (mg/L)	2.34	4.29	6.39	62
Total dissolved phosphate (mg/L)	1.71	3.73	5.79	61
Orthophosphate (mg/L)	1.53	3.58	5.30	62
Faecal coliforms (#/100 mL)	< 1	10,669	320,000	227
pH	6.10	7.69	9.06	216

With respect to the two regulated parameters, there have been 3 occasions when the TSS concentration was higher than that stipulated in the operational certificate and no occasions for the CBOD₅. In 2011, there were effluent issues, likely as a result of a prolonged discharge from

the local OSB plant. This resulted in a period of time when the effluent discharge was terminated and the effluent was directed to one of the storage ponds. Therefore, the elevated data do not necessarily represent an effluent quality which was discharged to the Peace River.

There are limited data for CBOD₅, as this parameter has only recently been recognized for use to determine effluent quality in British Columbia. From the data which are available, it is possible to estimate if upgrades will be required in order to meet the federal wastewater regulation and, based on the risk category evaluation, the timing of the upgrades can also be estimated. As indicated above, the risk category (low, medium or high) is calculated from a range of different factors, each of which is assigned a number of points. The factors which are used to calculate the risk are: volume of effluent released in a period of 1 year, average CBOD₅ and TSS concentrations, presence of a chlorine residual in the effluent, risk of acute aquatic toxicity as a result of the presence of un-ionized ammonia, and the type of receiving environment including the dilution potential. In the federal wastewater regulation, the risk category is based on a data span relating to the time period immediately before the submission of an authorization request which will allow a facility to discharge a non-compliant effluent for a period of time until the date of the upgrade requirements is reached. Using the data from 2011 only, the average TSS concentration was 25.4 mg/L and the average CBOD₅ concentration was 19.2 mg/L. In addition, there were five occasions when the effluent un-ionized ammonia concentration was > 1.25 mg/L. From this information, the South Lagoons would be classified as a medium risk facility and would require upgrades to meet the National Performance Standards before December 31st, 2030.

With respect to the upgrade requirements, the primary focus for this site would be CBOD₅ and TSS only. No upgrades will be required for ammonia in order to meet the National Performance Standard, as the federal wastewater regulation allows for either an end of pipe concentration or end of dilution zone concentration. Given the dilution which is achieved in the Peace River, there are no concerns with the end of dilution ratio concentration being exceeded. The scope of the upgrades to meet the required effluent criteria needs to be developed.

The availability of CBOD₅ data was important in the summer of 2012, when laboratory data indicated extremely high concentrations of total BOD₅ in the effluent from the South Lagoons. The issue was first observed at the end of July, 2012, with the immediate response from the City being to cease all discharge to the Peace River. Additional monitoring (increased frequency, increased parameters and split tests) was implemented. From the data, there was clear indication that the concentration of total BOD₅ was not consistent with any of the other effluent parameters. For example, the concentration of total BOD₅ reached approximately 200

mg/L, but the corresponding CBOD₅ concentration was in the order of 10 to 20 mg/L. This situation was outlined in a letter to the BC Ministry of Environment, dated September 26th, 2012, with further correspondence summarizing more recent data in an email dated October 5th, 2012 (Appendix C). A summary of the situation and outcomes is presented below:

- Although the concentration of total BOD₅ was reported to be elevated and non-compliant with the conditions of the operational certificate, the data indicated that the irregular elevation in the total BOD₅ concentration was related to a nitrogenous oxygen demand, and was not an actual reflection of poor effluent treatment. In contrast to the total BOD₅ data, but in consistency with the other effluent data (TSS, CBOD₅, chemical oxygen demand, ammonia, nitrate and LC50 rainbow trout bioassay), a high level of treatment was being achieved at the South Lagoons; and
- If the terms of the operational certificate were focused on the CBOD₅ concentration, which is the most current standard, both federally and provincially, there would have been no concern with respect to a lack of compliance. As such, one of the recommendations in the letter to the BC Ministry of Environment was that the operational certificate be amended to focus on effluent criteria for CBOD₅, instead of total BOD₅. This is consistent with current federal and provincial wastewater regulations.

The City restarted the effluent release to the Peace River in September, 2012. The released effluent currently consists of a blend of effluent from the aerated lagoon and the two storage cells. Although the effluent from the aerated lagoon continued to have elevated total BOD₅ concentrations, all other parameters indicate that treatment is being achieved in the complete mix cells and the aerated lagoons. In addition, the quality of the blended effluent is within the conditions of the operational certificate. Similar issues were also observed during the summer of 2013, and resulted in the BC Ministry of Environment confirming that all reference to BOD₅ in the operational certificate was to be interpreted as CBOD₅, rather than total BOD₅.

Several nitrogen parameters are measured, with the most important parameter being ammonia, as this is the main form of nitrogen associated with sewage and can also result in aquatic toxicity. There are two forms of ammonia – ionized and un-ionized, with the predominant form being largely dependent on pH. It is the un-ionized form which is the most toxic to fish. With the new federal wastewater regulation, the un-ionized ammonia concentration must be calculated to determine if the threshold concentration of 1.25 mg/L has been exceeded in the effluent. This is the concentration of un-ionized ammonia which is toxic to fish and can result in fish deaths. For the data from 2007 to 2011, there were 20 occasions when this concentration

was exceeded. The elevated concentrations of un-ionized ammonia were not necessarily related to the ammonia concentration, but to the pH, which can change naturally in a lagoon system, due to algal growth. Unfortunately, the tendency in a lagoon system is for the pH to increase naturally, which results in a higher concentration of un-ionized ammonia and the increased possibility of this concentration being toxic to fish.

With respect to the other nitrogen parameters, the data indicate that ammonia continues to predominate throughout the sewage lagoons, and that there is little to no onset of nitrification (biological ammonia treatment). This is expected for a lagoon system.

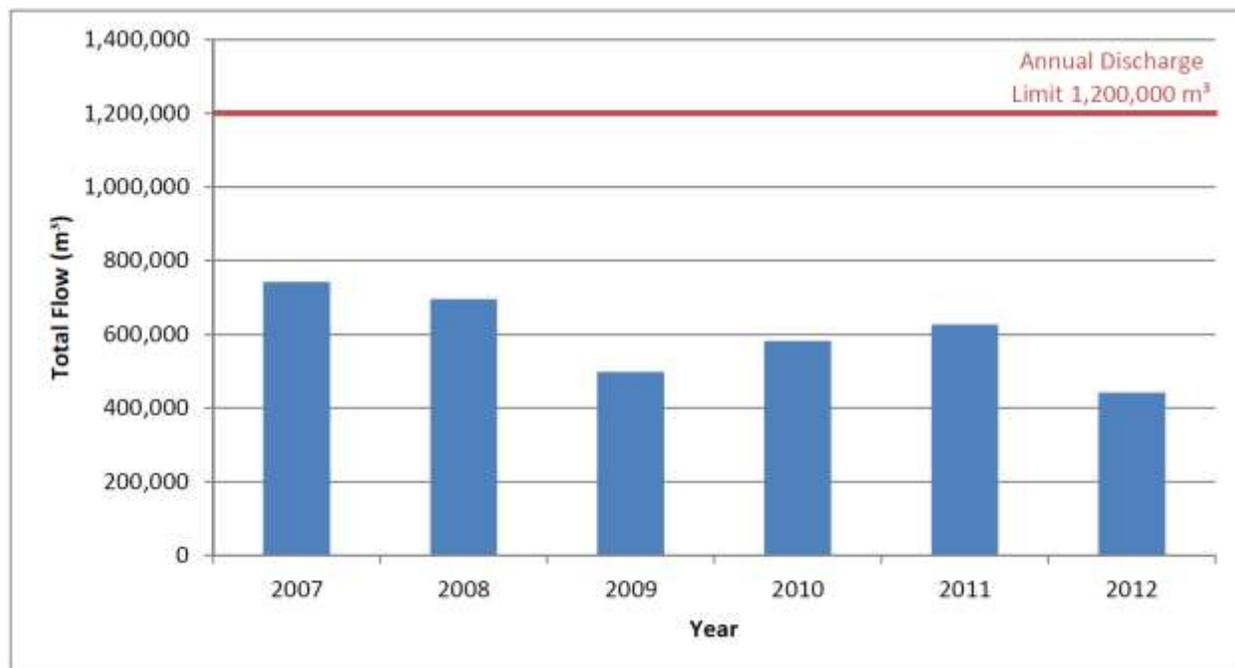
The minimal change in the phosphorus concentrations is also expected for a lagoon system. Phosphorus in the raw sewage will be utilised by the micro-organisms which treat sewage. However, this will not guarantee low concentrations of phosphorus in the effluent throughout the year.

The faecal coliform data vary, with the lower concentrations being associated with the time period when the effluent was disinfected. The disinfection process was chlorination, and was terminated January 2008 in response to mandates set by the Canadian Environmental Protection Act (CEPA). Chlorinated wastewater effluents were declared toxic to the environment under the CEPA. As a result, Environment Canada developed a management strategy which applied to all sewage treatment plants that used chlorine for disinfection and discharged > 5,000 m³/d to surface water. The South Lagoons met these criteria and as a result had to demonstrate the ability to produce an effluent with a total chlorine residual of < 0.02 mg/L before December 2008. At the time, the City was collecting data for the completion of an environmental impact study to determine appropriate effluent criteria for discharge to the Peace River. The completion of the EIS was a commitment under the LWMP and the timing of completion was inconsistent with the timing set out in the CEPA for compliance with effluent total chlorine residual concentrations. As a result of the disparity between the federal and provincial processes, authorization was received from the BC Ministry of Environment to by-pass the chlorination system in order to meet the Federal CEPA deadline, with the understanding that the effluent and river bacteriological data would be used as part of the EIS in order to determine if disinfection would be needed. The EIS is discussed in Section 6.2.2 which states disinfection is not required.

4.3 Effluent Discharge

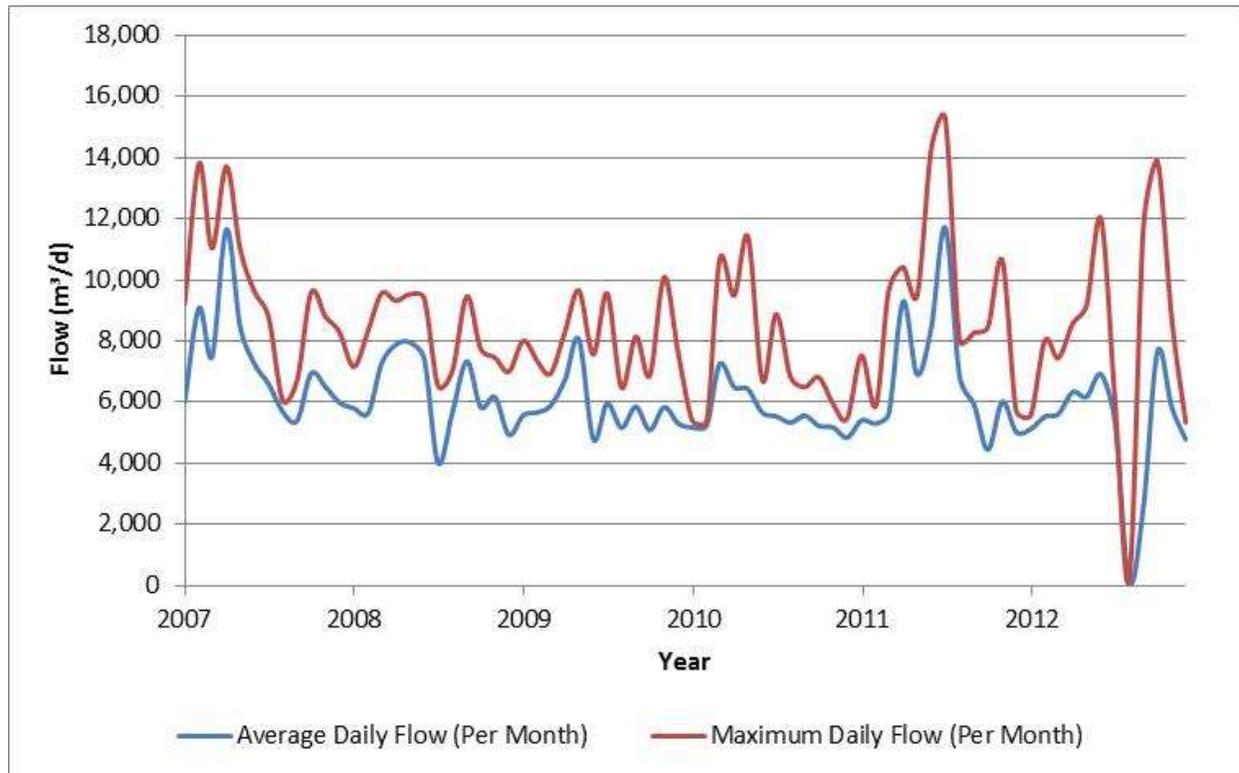
Discharge of treated effluent from the North Lagoons to the Beatton River is permitted from April 15th to June 30th and from September 1st to October 31st to a maximum of 1,200,000 m³/year. During this time period, the dilution ratio in the river must be maintained at greater than 100:1. The annual discharge volumes from the North Lagoons are shown in Figure 4.2, and indicates that flows from the North Lagoons were reducing in 2007/2008 likely due to the City's implementation of water meters. Following this period the flows are increasing slightly. Fluctuations could be a factor of the accumulation of stored effluent rather than reflective of flows into the sewage treatment plant. In addition, the elevated flows in 2010 and 2011 may be attributed to large rainfall events during the summers of both years.

Figure 4.2: Discharge Summary for the North Lagoons (2007 to 2012)



Discharge of treated effluent to the Peace River from the South Lagoons is continuous year round. The estimated annual dilution ratio ranges from 7,000:1 to 30,000:1, with the variation being a factor of the flows in the Peace River, rather than effluent release rates. The flows in the Peace River are controlled by dams used for the generation of hydroelectric power. The flow rates associated with the South Lagoons are shown in Figure 4.3, and indicate that trends generally show a reduction in flows.

Figure 4.3: Discharge Summary for the South Lagoons (2007 to 2012)



4.4 Stormwater System

The City of Fort St. John's stormwater system collects and manages the water run-off from melting snow and rain. It consists of a formal network of pipes, manholes and catchbasins as well as a less formal system that runs overland via roadways and ditches. Some of the City's stormwater flows to Fish Creek (Stoddart Creek) in the north. However, the majority of stormwater, from the south half of the City, drains to the Bouffieux Coulee and the Peace River. Steps have been taken in recent years to improve stormwater management in the City. In terms of stormwater quality, some of the City's industrial lots and all new parking lots are required to treat stormwater run-off on site by using an underground oil separator. Stormwater runoff at the site is diverted into the oil separator tank. As oil is lighter than water, it floats to the top of the tank. Any solids (gravel, sand, etc.) naturally settle to the bottom. The water flows out the middle of the tank and to the nearest stormwater outlets.

Stormwater management also has to be considered for all new development sites in the City as outlined in the City's Subdivision and Development Servicing Bylaw. The major system flow

paths are established and enforced through detailed lot grading plans to prevent flooding. Developments are also required to control the rate of runoff to pre-development flows by using on-site detention or retention systems. Stormwater is stored in underground tanks, oversized pipes, or in large ponds. This allows the intense flows from heavy rain falls or spring freshets to be stored on-site and released more slowly after the rain to help minimize the downstream impact of the runoff from the site.

Overall citywide stormwater planning is an ongoing commitment and goal for the City. The City has affirmed their stormwater support by initiating a stormwater master plan in 2012. The initial stages of the stormwater master plan are focused on reviewing the stormwater system capacity, mapping major system drainage paths, identifying problem areas, and developing potential solutions. The end goal of the City's stormwater planning process is to provide clear direction and approach to stormwater management that can also be used to develop and support long term capital planning and budgeting for any required stormwater projects and improvements. It is recognized that stormwater management is an integral part of liquid waste management. The intention would be to incorporate the findings of the City's stormwater master plan into the next LWMP update.

5.0 WHAT WERE THE COMMITMENTS OF THE 2004 LWMP?

In 2004, City Council endorsed a list of commitments as part of the Liquid Waste Management Plan Stage 3 report. The commitments were grouped into categories and assigned a timeframe. Since 2004, the City has completed or begun work on a number of these commitments. The following sections summarize the commitments and the progress that has been made so far on each commitment.

5.1 Sanitary Sewage Flow Commitments

1-2 Year Timeframe:

- Increase manhole condition monitoring and repair as necessary to reduce inflow.
 - *Annual manhole rehabilitation programs were completed from 2003 to 2008.*
- Increase level of public education about the inflow problem from residences and on reducing and reusing water and improper uses of the sanitary sewer system.
 - *Information has been available at City events and open houses.*
- Continue to mandate PVC manholes for all new sanitary sewer installations.
 - *Ongoing; this is implemented through the City's Subdivision and Servicing Bylaw*
- Monitor manholes on an on-going basis with a flow meter to determine the capacity bottlenecks and where more flow reduction initiatives should take place.
 - *Ongoing; the City owns four portable flow meters that they use for this purpose.*

3-5 Year Timeframe:

- Install residential water meters to lower both water and sewer flows.
 - *Completed - Meters were installed in 2007.*
- Mandate that the proposed OSB plant provide sufficient detention facilities so that the City pipe network is not over capacity.
 - *Any flows > 5 l/s requires permission. Discharge from on-site ponds only allowed after samples have been provided to check quality of effluent. There have been issues with downstream quality and odours in past years.*

As of spring 2013, the OSB plant has been using aeration and bacterial treatment to improve the quality of the discharge sent to the City's treatment system. Construction of another storage pond to increase capacity of the detention facilities is planned for 2014, to reduce the amount of discharge sent to the City's South Lagoons.

- Upgrade sewer mains in the northwest corner of the City to increase capacity of pipes to North Lagoons.
 - *Completed – Mains have been twinned by the college, 114A Ave, 100 St, and along 93rd Street. Flow monitoring is ongoing to monitor the need for any additional upgrades.*

5-10 Year Timeframe:

- Upgrade or twin the North Lagoon trunkmain to increase capacity.
 - *Completed in 2010.*

20 Year Timeframe:

- If the BC Building Code does not mandate lower flow fixtures in the next few updates, the City will impose a local bylaw to regulate lower flow fixtures.
 - *The BC Building Code now specifies maximum water flow rates for supply fittings and contains a low flush or dual flush toilet requirement.*
- If approached by local farmers, consider offering effluent for spray irrigation.
 - *No demand to date from farmers, but there has been inquiries from Oil and Gas users for effluent.*
- Construct additional drying facilities for sludge adjacent to existing lagoons when space becomes limited at either the North or South Lagoons.
 - *Not required to date.*

5.2 Sanitary Sewage Treatment Commitments

1-2 Year Timeframe:

- Maintain effluent quality for discharge into the Peace River and Beatton River as sewage flows increase as per the Municipal Sewage Regulation.

EFFLUENT CRITERIA REQUIRED

Parameter	South Lagoons	North Lagoons
Minimum Dilution in River	100:1	100:1
BOD ₅	45	45
TSS	60	60
Discharge Dates	Continuous	April 15 to June 30, Sept 1 to Oct 31

- *The City continues to meet these requirements. Discharge for 2011 from the North Lagoons was delayed due to elevated BOD₅ levels. At the time, the focus was for the effluent BOD₅ to be based on the total BOD₅ concentration, rather than the CBOD₅ concentration. Confirmation has recently been received from the BC Ministry of Environment that all reference to BOD₅ in the operational certificate is to be interpreted as CBOD₅, rather than total BOD₅.*
- Test monthly for ammonia, phosphorus, ortho-phosphate, and chlorine residual before discharge to both rivers, and pH of the rivers.
 - *The City implemented a monitoring program in 2005, including the submission of an annual report since then to the BC MoE summarizing effluent and receiving environment conditions.*
- Undertake an Environmental Impact Study to determine the effect of phosphorus, ortho-phosphate, ammonia and toxicity on the Peace River and Beatton River. Also include effect of proposed TSS and BOD levels.
 - *The EIS for the North Lagoons was completed and submitted in April 2010 (refer to Section 6.2.1).*
 - *The EIS for the South Lagoons was completed and submitted in December, 2011 (refer to Section 6.2.2).*
- Increase public education about what is allowed in the sewer system.
 - *Public education for source control has focused on the trucked waste haulers, rather than information for the community in general. Public education for the general community is planned, with the monthly water bills, City website and Facebook being the primary avenues for communication.*
- Set up a formal inspection program of all garage sumps and grease traps to ensure they are operating properly. Impose fines if they are not.
 - *The implementation of actions relating to this commitment faced challenges regarding available man-power and access to private property. As such, there has not been a formal inspection program, but the activities have focused on spot checks, formal checks*

in response to complaints, specific investigations as a result of issues in the sewer mains and the implementation of fines in accordance with the new Sewer Use Bylaw.

- Increase public education about the proper disposal of drugs and the effects they may have on the environment.
 - *This has not been initiated, as the focus for the public education materials has been more pressing issues such as water conservation and flood-proofing homes. Public education on the disposal of drugs and the related effects in the environment is planned, with the monthly water bills, City website and Facebook being the primary avenues for communication.*
- Ensure zoning in the City and the PRRD does not allow residences in areas surrounding the lagoons.
 - *The South Lagoons are surrounded by Light Industrial and service commercial zoning. The North Lagoons are surrounded by PRRD agricultural properties.*
- Construct a new diffuser pipe for outfall from the South Lagoons to the Peace River.
 - *Completed Fall of 2006. No observed difference in the downstream water quality compared with upstream since the installation.*
- Investigate the feasibility of alternative discharge options from the south system instead of discharge directly into the Peace River.
 - *Alternate discharge options such as rapid infiltration were considered during the pre-design process for the new outfall. The Peace River was chosen as the best option, with a diffuser and a more appropriate location to allow for better mixing.*

3-5 Year Timeframe:

- Monitor the quality of effluent from the proposed OSB plant from a station built by the plant on their site.
 - *The OSB plant must provide samples and test the quality of effluent before discharge is allowed from log-yard runoff ponds. Regular effluent quality is not monitored.*

As of spring 2013, the OSB plant has been using aeration and bacterial treatment to improve the quality of the discharge sent to the City's treatment system. Construction of another storage pond to increase capacity of the detention facilities is planned for 2014, to reduce the amount of discharge sent to the City's South Lagoons.

5-10 Year Timeframe:

- Install a de-chlorination system at the downstream end of the chlorination station for the South Treatment Plant.
 - *Chlorination was discontinued in January 2008 as a result of the status of the environmental impact study process and deadlines relating to the management of chlorinated wastewater effluents under the Canadian Environmental Protection Act. The agreement was that the need for disinfection would be evaluated as part of the environmental impact study process. In the event that the outcome of the environmental impact study indicates that disinfection is required, dechlorination will be implemented to meet the requirements of the Canadian Environmental Protection Act, if chlorination is the disinfection process of choice.*
- Remove ammonia with tertiary treatment, if required by legislation or EIS.
 - *Both environment impact studies have stated that the removal of ammonia is not required to meet new federal and provincial regulations.*

10-20 Year Timeframe:

- Install a second complete mix cell or an upgrade at the South Lagoons depending on influent flow rates and quality.
 - *A second complete mix tank was installed in 2010. A detailed engineering study is required.*
- Increase treatment to remove phosphorus, if required by EIS.
 - *Phosphorus removal is not required by both environmental impact studies.*
- Upgrade or increase size of North Lagoons when flows dictate.
 - *Not required to date, however a detailed engineering study is required.*
- Consider offering effluent for spray irrigation, if approached by local farmers.
 - *No demand to date from farmers, but there are current requests from industry for treated effluent.*

5.3 Future Treatment Location Commitments

20 Year Timeframe:

- Use existing zoned areas for treatment plant upgrades. If problems arise in the future, investigate satellite treatment options at that time.
 - *Upgrades completed within existing facility zoned areas to date.*
- Do not allow commercial dumping of anything other than septage to the City's sewer system at the dumping station.
 - *The facility operates on a cardlock basis to limit access to registered users only. Regulations are posted at the facility. Cameras are also in place to help discourage illegal dumping. The Sewer Use Bylaw has fines for non-compliance with procedures at the transfer station.*

5.4 Certification of Facilities and Operators Commitments

1-2 Year Timeframe:

- Continue to mandate that plants and operators be certified as recommended under the Environmental Operators Certification Program and as outlined in the existing operational certificate.
 - *Ongoing.*

5.5 Servicing Neighbouring Communities Commitments

1-2 Year Timeframe

- City should decide how much the PRRD would have to pay to connect to the system.
 - *City of Fort St. John policy to date has been that service will not be provided to any additional properties outside its boundaries. Therefore, no action was required regarding this commitment.*
- Let the PRRD take the initiative on whether they want to connect water and sewer to the City or not.

- *City of Fort St. John policy to date has been that service will not be provided to any additional properties outside its boundaries. Therefore, no action was required regarding this commitment.*

5.6 Storm Sewer Treatment Commitments

1-2 Year Timeframe:

- Develop stormwater treatment guidelines specific for Fort St. John following the guidelines entitled “Stormwater Planning: A Guidebook for British Columbia” and “Best Available Control Technology” to be defined in the future by the Ministry of Water, Land and Air Protection.
 - *This task has not been completed, with the primary focus being amendments in the Subdivision and Servicing Bylaw which require pre-development stormwater conditions to be maintained post development. In addition, stormwater treatment has been implemented in parts of the City through the construction of stormwater ponds, stormceptors, oil and grit removal, rainwater harvesting and underground stormwater storage tanks.*
- Mandate stormwater treatment at all large developments through the Subdivision Servicing Bylaw.
 - *The Subdivision and Servicing Bylaw requires that pre-development stormwater conditions be maintained post development. Stormwater treatment has been implemented in parts of the City through the construction of stormwater ponds, stormceptors, oil and grit removal, rainwater harvesting and underground stormwater storage tanks. Oil separators are required for industrial lots and parking lots with more than 20 stalls.*
- Increase public education about cleaning up oil spills before they enter the drainage system.
 - *Local schools have participated in The Yellow Fish Road program to help educate the public about pollution through storm drains.*
- Initiate a program to clean out private catchbasins.
 - *If the installation of a private catchbasin is required as part of the Subdivision and Servicing Bylaw, there is a requirement that it is maintained.*

- Increase public education about minimizing lawn irrigation.
 - *Public education was initiated during the water meter installation program. There continue to be tips on the City website and in periodic water bill stuffers.*

3-5 Year Timeframe:

- Install in-line pre-treatment facilities to remove silt and oil from the drainage system.
 - *Under the Subdivision and Servicing Bylaw, there is a requirement that pre-development stormwater conditions be maintained post development. Stormwater treatment has been implemented in parts of the City through the construction of stormwater ponds, stormceptors, oil and grit removal, rainwater harvesting and underground stormwater storage tanks. Oil separators are required for industrial lots and parking lots with more than 20 stalls.*

5-10 Year Timeframe:

- Replace existing catchbasins at gas stations and all large developments with Stormceptor style catchbasins to eliminate silt and oil from entering streams.
 - *This is being done on an on-going basis, with the trigger for action being the need for re-development.*

6.0 RECENT STUDIES

This section of the LWMP includes a summary of information related to several studies that have been completed in recent years that are relevant to liquid waste planning. Recent studies have included:

- Determining the projected future design flows for the north and south sewer systems
- Environmental Impact Studies for both the North and South Lagoons
- Sludge Surveys for both the North and South Lagoons
- Assessments of possible future upgrade requirements for the North and South Lagoons
- Feasibility studies for resource recovery options including effluent reuse micro hydropower generation

6.1 Design Flow Rates

20 year design flows were included in the 2004 LWMP report. These sewer flow projections have been updated for the purposes of this report. Sewer projections for the next 20 years have been estimated separately for the north and south systems based on population projections, possible locations for future development and growth, and current City flow data and water usage. The updated design flows have been used for all LWMP technical evaluations.

If the City population grows at 3% as projected in the City's OCP, boundary expansion will need to occur to accommodate the increased number of residents to the year 2031. The City has a good understanding of the number of future residential lots and their locations for development. Based on this, future residential developments within the current City boundaries forecast total additional sewer flows at 7,300 m³/day; the total flows are split between the north and south systems at:

- 4,100 m³/day to the South Lagoons; and
- 3,200 m³/day to the North Lagoons.

All future residential flows thereafter will likely favour distribution and treatment at the North Lagoons.

The 20-year design parameters for the North and South systems were determined by adding the forecasted average annual daily sewer flows to the 2011 average flow rates of each system. The proportions between the average annual day, max month, and peak day flows are assumed to remain constant for the future projections due to probable increases and decreases of I/I. With new development I/I is expected to decrease; however, I/I may increase in the older areas already affected by infiltration and inflow as these systems age. Table 6.1 summarizes the 2011 and 2031 design flow rates for the South and North treatment systems.

Table 6.1: LWMP Design Flow Rates

Design Parameter*	South System		North System	
	2011	2031	2011	2031
Average Annual Daily Flow (m ³ /d)	5,797	9,898	1,716	4,933
Maximum Month Flow (m ³ /d)	9,352	15,968	2,768	7,958
Peak Day Flow (m ³ /d)	15,000	25,612	4,440	12,7645

* Projections are based on an annual growth rate of 3%.

6.2 Environmental Impact Studies

The completion of environmental impact studies for the North and South Lagoon effluent discharges was in accordance with one of the commitments of the City's 2004 LWMP. The purpose of the environmental impact studies was to define effluent criteria for a discharge to the Beatton River (for the North Lagoons) and the Peace River (for the South Lagoons) which will protect public health and the environment. The studies included federal and provincial guidance/regulatory documents, the current uses of the Beatton and Peace Rivers and water quality data (effluent and river), which have been collected through the City's environmental monitoring program.

6.2.1 North Lagoons

The following effluent criteria were recommended in the environmental impact study for a discharge from the North Lagoons to the Beatton River:

- CBOD₅: ≤ 25 mg/L as an average, to allow consistency with the National Performance Standards.;

- TSS: ≤ 25 mg/L as an average, to allow for consistency with the National Performance Standards. (Although, theoretically, an average TSS concentration of 25 mg/L should equate to a TSS concentration of 45 mg/L, the current operational certificate allows a TSS concentration up to 60 mg/L. Therefore, the Federal criterion is more stringent than the existing operational certificate criterion, however for the case of a lagoon system, the Federal regulation does allow for an increase in the TSS concentration over the summer period);
- Nitrogen and ammonia: no treatment required, unless future monitoring indicates otherwise. However, since the completion of the environmental impact study, the federal wastewater regulation has been finalised. There is the need to recognise that, in order to meet this regulation, an effluent un-ionized ammonia concentration of < 1.25 mg/L will be required unless the chronic un-ionized ammonia concentration of < 0.016 mg/L is met after dilution in the Beatton River;
- Phosphorus: no treatment required, unless future monitoring indicates otherwise; and
- Bacteriological: (based on current data) no treatment required to meet a concentration $< 200/100$ mL due to the ability to meet a faecal coliform concentration of $< 200/100$ mL, with the available dilution in the Beatton River.

These effluent criteria are based on a seasonal discharge release, as indicated in the Operational Certificate (April 15th to June 30th and September 1st to October 31st each year), with a minimum dilution ratio of 100:1.

Based on the outcome of the environmental impact study, a revised monitoring program was recommended, and has since been implemented as part of the City's annual monitoring program. As required by the operational certificate, the data continue to be assessed annually to the public health is protected and that no detrimental impacts to the environment result from the effluent release to the Beatton River.

6.2.2 South Lagoons

The following effluent criteria were recommended in the environmental impact study for a discharge from the South Lagoons to the Peace River:

- CBOD₅: ≤ 25 mg/L as an average, to allow consistency with the National Performance Standards.;

- TSS: ≤ 25 mg/L as an average, to allow for consistency with the National Performance Standards. (Although, theoretically, an average TSS concentration of 25 mg/L should equate to a TSS concentration of 45 mg/L, the current operational certificate allows a TSS concentration up to 60 mg/L. Therefore, the Federal criterion is more stringent than the existing operational certificate criterion, however for the case of a lagoon system, the Federal regulation does allow for an increase in the TSS concentration over the summer period);
- Un-ionized ammonia: < 1.25 mg/L as a maximum (expressed as total nitrogen at $15\text{ }^{\circ}\text{C} \pm 1\text{ }^{\circ}\text{C}$), or 0.016 mg/L at the end of the initial dilution zone;
- Phosphorus: no treatment required, unless future monitoring indicates otherwise; and
- Bacteriological: no treatment required to meet a concentration $< 200/100$ mL due to the ability to meet a faecal coliform concentration of $< 200/100$ mL, with the available dilution in the Peace River.

These effluent criteria were based on an estimated 20 year design flow of $8,642\text{ m}^3/\text{d}$ (annual average flow), which assumes that there is no increase in inadvertent inflow and infiltration (I/I). The EIS should be amended to deal with the new 20 year design flow of $9,898\text{ m}^3/\text{d}$.

Based on the outcome of the environmental impact study, a revised monitoring program was recommended, and has since been implemented as part of the City's annual monitoring program. As required by the operational certificate, the data continue to be assessed annually to determine if there have been any detrimental impacts to public health or the environment as a result of the effluent release to the Peace River.

6.3 Sludge Survey

Over time, sludge accumulates in lagoon treatment systems. Periodic removal of this sludge is required to ensure sludge buildup does not affect the treatment and storage capacity. Buildup of sludge was visually evident at the North Lagoons and there were concerns about the possibility of sludge affecting the treatment capacity. At the South Lagoons, sludge buildup around the aeration piping in the partially mixed cells was making it difficult to repair and maintain the aeration piping and diffusers. In January 2012 a sludge survey was conducted of all 9 cells at the North Lagoons and the two partially mixed aerobic cells at the South Lagoons to check the volume, depths, and nature of the sludge present.

At the North Lagoons the survey indicated that the four anaerobic cells have a considerable accumulation of sludge. The facultative treatment cell (aerobic cell) is essentially full of sludge and covered with aquatic plants; this cell has little available volume and would not provide a large retention time for treatment before discharge to the holding cells. Holding cells 1 and 2 were surveyed and also contain significant build-up of sludge. The last two holding cells (3 and 4) were empty and frozen at the time of the survey, so the sludge surface elevation was measured and compared to the original lagoon elevation. Table 6.2 summarizes the sludge percentages in each cell. In September 2012, the four anaerobic cells and Holding Cell No. 1 were desludged. Biosolids volumes are not exact due to variable elevations of the clay surfaces at the bottom of each cell.

Table 6.2 Sludge Quantities in North Lagoon Cells

Cell #	Cell Volume (m ³)	Sludge Volume (m ³)	Sludge (% of Cell Volume)
Anaerobic Cell No. 1	9,770	3,515	36 %
Anaerobic Cell No. 2	9,770	1,140	12 %
Anaerobic Cell No. 3	9,770	2,637	27 %
Anaerobic Cell No. 4	9,770	5,863	60 %
Aerobic Cell	135,683	112,553	83 %
Holding Cell No. 1	130,749	7,833	6 %
Holding Cell No. 2	130,749	17,850	14 %
Holding Cell No. 3	157,886	33,196	21 %
Holding Cell No. 4	157,886	27,183	17 %

At the South Lagoons both partially mixed aerated lagoons were determined to have a considerable accumulation of biosolids. Table 6.3 summarizes the sludge percentages in each cell. Desludging of these lagoons and repairs to the aeration systems is planned for 2013 and 2014.

Table 6.3 Sludge Quantities in South Lagoon Cells

Cell #	Cell Volume (m ³)	Sludge Volume (m ³)	Sludge (% of Cell Volume)
West Cell	95,000	20,500	22 %
East Cell	95,000	19,928	21 %

6.4 Assessment of Upgrade Requirements

6.4.1 North Lagoons

With the development of National Performance Standards and the finalisation the federal wastewater regulation, upgrades will likely be required at the North Lagoons in the next 20 years (likely by 2030 as outlined in Section 4.2). In addition to these regulatory changes the City continues to grow. Increasing sewage flows will put a strain on the treatment capacity of the North Lagoons and could dictate the timing and need for upgrades before the regulatory requirements. Any changes in influent and effluent flow rates and effluent qualities will need to be closely monitored over the coming years to allow the City to determine the timing for determining the upgrade concepts, budgeting, and implementation.

Given the City's ongoing growth, recent issues with the effluent quality, removal of sludge, and the development of National Performance Standards, a comprehensive assessment will need to be completed to determine an optimal approach for upgrades at the North Lagoons. The impacts on effluent quality from the recent removal of sludge need to be monitored in the upcoming years. Another consideration is the relative portion, if any, of effluent desired to go to effluent reuse. Based on 20 year design flows in Table 6.1 and the effluent criteria outlined in the environmental impact study, an independent study should be undertaken to determine the best future treatment approach as various treatment options are available.

As the discharge will continue to be seasonal, storage of treated effluent is required from June 30 to September 1 and November 1 to April 15 each year. As the 2011 annual average day flow was 2,866 m³/d, the equivalent annual total flow is 626,000 m³. Assuming that the remaining lagoons are desludged, the total storage available using the existing holding cells is approximately 577,000 m³. Given the discharge periods, this is adequate for current situations. However, increased storage should be considered as flow to the North Lagoons increases; additional storage could be in the form of excavation rather than desludging.

In addition to the above, it is recommended that a flow meter be added to the influent flows and an automatic valve be installed at the outlet to be controlled by the existing effluent flow meter. This will reduce the operator time needed to manage the effluent release to the Beatton River.

6.4.2 South Lagoons

With the development of National Performance Standards and the finalisation the Federal wastewater regulation, upgrades will be required at the South Lagoons in the next 20 years (likely by 2030 as outlined in Section 4.2). In addition to these regulatory changes, the City continues to grow. The South Lagoons were designed to treat average daily sewage flows of 8,000 m³/day. Increasing sewage flows will put a strain on the treatment capacity of the South Lagoons and could dictate the timing and need for upgrades even before when the regulatory requirements might suggest. Any changes in influent flow rates and effluent qualities will need to be closely monitored over the coming years to allow the City to determine the timing for upgrades, refine any upgrade concepts, and budget for the upgrades.

Given the City's ongoing growth, the development of National Performance Standards, the impacts to effluent quality from the proposed removal of sludge and replacement of aeration systems, the relative quantities of effluent reuse that may be desired by the oil and gas industry, and the many different ways to approach upgrade options, an independent assessment should be completed to determine an optimal upgrade at the South Lagoons.

This assessment should be based on 20 year design flows in Table 6.1, the effluent criteria outlined in the environmental impact study, and consideration to the developing microhydro and effluent reuse possibilities. Further, this design assessment should incorporate a study to determine the biological reaction rate of the complete mix tanks and partial mix lagoons at the South Lagoons following the sludge removal and aeration replacement expected in 2013.

Upgrades could incorporate the conversion of one or two of the complete mix tanks to moving bed bioreactors with the addition of effluent filtration and coagulant addition depending on what effluent criteria, and what quantities, are necessary for reuse applications.

6.5 Waste Transfer Station Closure

The City has experienced issues in meeting their treatment quality parameters at the South Lagoons which resulted in concern of non-domestic wastewater disposal at the City's Waste Transfer Station. After identifying the Waste Transfer Station as a potential source of their treatment issues and as a liability, the City attempted to ensure that only domestic wastewater was disposed by adding additional signage; unfortunately disposal of non-domestic wastewater continued.

Due to liability concerns of users having unlimited access to the Waste Transfer Station and the potential for negative impacts on the treatment system following disposal of non-domestic wastewater, the City decided to close the Waste Transfer Station effective December 31, 2014 and operate with reduced hours until that period starting October 1, 2013.

Following the initial decision to close the Waste Transfer Station by December 31, 2014, Council and City staff met with wastewater transfer station haulers, Peace River Regional District Area Directors, and concerned rural residents to discuss the City's reduced operating hours and subsequent closure of this facility.

After discussing the concerns of the Waste Transfer Station closure, extending the effective date of the reduced hours, and receiving an administration report, Council decided on October 15, 2013 that the Waste Transfer Station will be shut down on December 31, 2014 and further decided to revise the hours of operation to Monday to Saturday from 8:00 am. to 9:00 pm. excluding Statutory Holidays effective November 1, 2013. Council's decision also recommended that staff send notification to the Peace River Regional District and all current users of the facility advising them of this change in operating hours and the requirement to reapply for use of this facility effective November 1, 2013.

Based on similar concerns regarding the potential to impact treatment and the resulting effluent quality at the South Lagoons, City staff and Council plan to meet with the OSB plant to discuss alternative discharge requirements up to, and including, no connection to the City's sewage system.

6.6 Resource Recovery

There are a growing number of resource recovery possibilities available when considering the management of liquid waste. The City of Fort St. John has recently investigated several resource recovery options recently related to using effluent from the City's lagoons. The feasibility of developing a reclaimed water facility at the North or South Lagoons was reviewed. The concept of developing a microhydro facility to generate electricity from the City's sewer outfalls was also evaluated. These studies are summarized below. There may be other feasible resource recovery options available to the City that could be considered in the future.

6.6.1 *Development of a Reclaimed Water Facility*

The City of Fort St. John provides potable water at several bulk filling stations. A number of stakeholders currently use potable water from the City's domestic water system – or fresh surface water from nearby lakes, rivers and streams – for non-potable uses. These non-potable uses include industrial uses, with one of the largest users of the City's potable water being the oil and gas industry. It is possible that effluent from the City's sewage lagoons could be an alternative water source for non-potable uses. An assessment was completed to determine the feasibility of developing a reclaimed water facility for the City of Fort St. John.

The Municipal Wastewater Regulation (MWR) is the governing regulation in BC for sewage disposal and reuse. Under the MWR, reclaimed water is defined by one of four risk categories, as outlined below.

1. **Indirect potable use** is the highest standard of reclaimed water identified in the MWR, as the end use is seen as being of greatest risk. The indirect potable use risk category would apply to an effluent which is being used to replenish a potable water source.
2. **Greater exposure potential** is defined as a reuse where public contact with the effluent is likely, or where there is a risk to the receiving environment. The quality requirements for greater exposure potential are equivalent to the "unrestricted public access" quality outlined in the repealed Municipal Sewage Regulation (MSR). For this type of effluent reuse, the removal of viruses is required, either by storage or chemical addition/filtration, and increased bacteriological monitoring is required, especially if the reclaimed water is being used to irrigate crops which are to be eaten raw.
3. **Moderate exposure potential** is defined as a reuse where public contact with the effluent is likely to be minimal, or where public access to the effluent is restricted and the users are educated as to the risks associated with reclaimed water.
4. **Lower exposure potential** is the lowest standard of reclaimed water and is defined as a reuse where public access is restricted and users are unlikely to come into contact with the reclaimed water. The uses are commercial or industrial in nature and the users must be educated with respect to the risks associated with reclaimed water and the use must have a low risk to the receiving environment. The criteria for Lower exposure potential are equivalent to the "restricted public access" quality outlined in the MSR, with the exception that there is no allowance for the potential TSS concentration of 60 mg/L for a lagoon system.

The quality criteria for the 4 risk categories are outlined in Table 6.4.

Table 6.4: Quality Criteria – Reclaimed Water Categories

Parameter	Quality Requirement			
	Indirect Potable Use	Greater Exposure Potential	Moderate Exposure Potential	Lower Exposure Potential
CBOD ₅	≤ 5 mg/L	≤ 10 mg/L	≤ 25 mg/L	≤ 45 mg/L
TSS	< 5 mg/L	≤ 10 mg/L	≤ 25 mg/L	≤ 45 mg/L
Turbidity	≤ 1 NTU	≤ 2 NTU (average); ≤ 5 NTU (maximum)	Not applicable	Not applicable
Faecal Coliforms	< 1 CFU/100 mL or < 2.2 MPN/100 mL (as median of 5 consecutive samples)	< 1 CFU/100 mL or < 2.2 MPN/100 mL (as median of 5 consecutive samples); Maximum of 14 CFU/100 mL	100 CFU/100 mL (as median of 5 consecutive samples); Maximum of 400 CFU/100 mL	200 CFU/100 mL (as median of 5 consecutive samples); Maximum of 1,000 CFU/100 mL
pH	Site specific	6.5 to 9	6.5 to 9	6.5 to 9

Under the MWR, the typical uses for reclaimed water are based on risk to public health and the environment. Potential opportunities for the use of reclaimed water were discussed for the City of Fort St. John, based on the 6 effluent reuse categories outlined in the repealed MSR (agricultural, urban, recreational, construction, industrial and environmental) plus the new category indirect potable use. Out of these uses, the most promising potential options are the irrigation of pasture lands/fodder crops, uses around the municipality such as irrigation, fire protection, street cleaning and ice-making, and industrial uses such as in the oil and gas industry.

For the feasibility study, assessment was completed to determine the potential upgrades needed to meet the greater exposure potential and lower exposure potential criteria, which are consistent with the quality requirements in the repealed MSR for unrestricted and restricted public access quality, respectively.

For both the North and South Lagoons, the only additional process which would be required to meet the lower exposure potential quality is disinfection. An estimated budget to implement chlorination at the North Lagoons is \$265,000. At the South Lagoons the estimated budget is

\$170,000. These costs are very preliminary and are based on the 2004 design flows. The costs are intended to provide guidance with respect to developing a facility which will be capable of producing an effluent which is suitable for applications which have a lower exposure potential.

For both the North and South Lagoons, additional biological treatment (for BOD₅), filtration (for TSS) and disinfection by chlorination will be required to produce an effluent which would meet the greater exposure potential quality. An estimated budget to produce an effluent which meets this quality at current flows at the North Lagoons is \$6 Million. At the South Lagoons at current average flows the estimated budget is \$4 Million. These costs are very preliminary and are intended to provide guidance with respect to an order of magnitude for the costs to develop a facility which will be capable of producing an effluent which is suitable for application which have a greater exposure potential. The biological treatment process which has been selected to achieve the effluent quality is the moving bed bioreactor (MBBR), however, there are a wide range of processes which are also suitable to provide the additional treatment.

The above information focuses on the treatment costs to produce an effluent which is suitable for reuse at either of the City's sewage treatment plants. If this approach is to be taken further, the following items will also need to be considered:

- The cost estimates outlined above assume that all effluent will be treated for reuse. There may be alternative approaches for only treating a portion of the effluent.
- There is no allocation for effluent storage. It is possible that existing lagoons at either the North or South Lagoons could be used for storage, with the alternative being that the effluent is discharged directly to the Beatton/Peace Rivers in the event that there are time periods when effluent reuse is not possible. There would likely be costs associated with cleaning, deepening and formalizing the existing lagoons for use as effluent storage.
- Costs associated with standby power have not been included on the assumption that effluent can be diverted to the river during power outages.
- There will be additional costs associated with pumping and transmission of the effluent designated for reuse. This could include the development of a filling station. As the type of effluent reuse, location and potential customers are currently not known, these costs have not been included at this time.

6.6.2 Development of a Micro Hydro Opportunity

The second resource recovery concept recently considered by the City is the development of a Micro Hydro project. Micro hydropower projects convert the kinetic energy of water travelling downhill into electricity. A study was conducted in March 2012 to review the feasibility of using the City's lagoon outfall pipes to generate electricity (Appendix D). The concept is that the effluent from the lagoons would be released to the existing discharge pipe (acting as a penstock) to a turbine, and then discharged as normal to the Beatton or Peace Rivers. When the effluent passes through the turbine, it causes the turbine to spin and generate electricity.

Initially two project sites were identified and reviewed: the North and South Lagoons. From the review it was determined that a project at the North Lagoons would likely not be feasible due to the seasonality and low discharge volumes at the site. In contrast, the review indicated that the South Lagoons could potentially support a hydropower project. At the South Lagoons, two microhydro configurations were developed and reviewed in the feasibility study. One configuration included the connection of the system to the BC Hydro power distribution system while the other configuration utilized the power to offset the electricity demand at the City's South Lagoon wastewater facility. Estimated costs for the two options were \$1.07 M and \$1.19 M, respectively. Estimated annual revenues, based on the flow directed to the turbines, vary between \$37,000 and \$91,000.

Based on the findings of the feasibility study, it was recommended that the City consider applying for Gas Tax Funding, complete a conditions assessment of the outfall pipe, conduct a cost-benefit analysis on effluent reuse and hydropower production at the South Lagoons, refine project configurations and initiate preliminary design.

The City applied for Gas Tax Funding for this project in May 2012. The application was successful and the City has received a grant for \$1.1 Million to refine the project configurations, complete preliminary design, and if the project is still feasible, proceed to construction.

7.0 SUMMARY AND RECOMMENDATIONS FOR KEY ISSUES

7.1 Regulatory Changes – Impacts to Operating Certificate

There have been changes in both Federal and Provincial legislation since the development of the City's operational certificate in 2005. Federally, the WSER was finalized in 2012. This regulation enforces the National Performance Standards which outline effluent criteria for CBOD₅, TSS, un-ionized ammonia, and total chlorine residual. The standards also outline monitoring and reporting requirements and the timing required to upgrade facilities to meet the new standards. With respect to the Provincial changes, there has been an update to the Municipal Sewage Regulation (MSR). In April 2012, the MSR was repealed and replaced with the Municipal Wastewater Regulation (MWR), and many of the concepts remain the same.

Given the changes in Federal legislation, it is recommended that the City's operational certificate be reviewed and updated. The City is committed to meet both Federal and Provincial regulatory requirements with respect to sewage treatment and the effluent discharge and reuse. Given that the City is undertaking a LWMP review, other conditions of the operational certificate should be reviewed and amended to ensure consistency with the commitments which are developed during the LWMP review process.

The recent federal regulatory changes may also impact the City in that upgrades to the City's treatment systems may be required (likely by 2030) to meet the new regulations.

7.2 Future Sewage Treatment Upgrades

Given the ongoing growth of the City, recent regulatory changes, recent improvement or soon to be implemented improvements, and the potential for reuse applications, there is a need to complete detailed engineering studies on both the North and South treatment plants to review and evaluate upgrading options. These studies will also be able to predict where upgrades may be required. Any changes in influent flow rates and effluent qualities will need to be closely monitored over the coming years to allow the City to determine the exact timing and need for upgrades, refine any upgrade concepts, and budget for the upgrades.

7.3 Resource Recovery

Some resource recovery options related to the City's liquid waste have been identified and reviewed. Both the concept of developing a reclaimed water facility at the North or South Lagoons and the concept of developing a microhydro facility to generate electricity from the City's south sewer outfalls have been determined to potentially be viable options. There may be other feasible resource recovery options available to the City that could be considered in the future.

For effluent reuse, the provincial MWR defines the categories and required qualities of effluent before the effluent can be used. Depending on the desired quality of effluent, upgrades ranging from adding chlorination to increasing the level of treatment for BOD₅ and TSS would be required. If interested parties/potential users come forward, effluent reuse could be pursued provided the opportunities are technically, practically and economically feasible for the City and the potential user(s).

For micro hydropower, reviews indicated that the South Lagoons could potentially support a feasible hydropower project. Given the City's success in obtaining Gas Tax grant funding, it is recommended that review of this resource recovery option continue, using the grant funding to refine the project configurations, complete preliminary design, and if the project is still feasible, proceed to construction.

8.0 COMMITMENTS

On February 11th, 2014, the City Council endorsed undertaking the following commitments as the outcome of this Liquid Waste Management Plan Review.

In response to the new identified issues summarized in Section 2.4, new commitments are created and distinguished with blue italics.

8.1 Sanitary Sewage Flows

8.1.1 1-5 Years

- Continue manhole condition monitoring and repair as necessary to reduce inflow.
- Provide public education about options for reducing storm water inflow into the sanitary sewer system from residences.
- Provide public education about what is allowed to be disposed of in the sanitary sewer system.
- Mandate watertight manholes for all new sanitary sewer installations.
- Monitor sanitary sewer flows within the collection system on an on-going basis to determine the capacity bottlenecks and where more flow reduction initiatives or pipe upgrades should take place.
- Continue to mandate water meters for all new construction to help reduce water and sewer flows.
- Ensure regular maintenance of sanitary mains to ensure capacity of existing pipes is not compromised by root intrusions or buildup of grease, solids, etc. in pipes.
- Investigate condition of older sanitary mains and repair as required.
- *Review the agreement with the OSB plant to ensure discharge from the OSB plant is managed appropriately according to the City's treatment system design capacity for flow and water quality.*
- *Allow for resource recovery options from sanitary sewer system if technically, practically and economically feasible (e.g. microhydro, reclaimed water).*

- *If there is a demand from industrial, agricultural, or other users, allow for effluent reuse. Appropriate effluent quality to be developed, based on the proposed intended use and potential risks. Opportunities for reuse should be technically, practically and economically feasible.*

8.2 Sanitary Sewage Treatment

8.2.1 1-5 Years

- Maintain effluent quality for discharge into the Peace River and Beatton River in accordance with the conditions set out in the environmental impact studies.
- *Review and update the operational certificate to reflect changes developed through the LWMP review.*
- *Monitor effluent as indicated in the Environmental Impact Studies (and/or revised operational certificate). Review monitoring program as part of annual report and amend if required.*
- *Complete sludge removal from the partial mix lagoons and replacement of aeration systems. Once complete, sample and calculate the microbiological reaction rates of the complete mix tanks and the partial mix lagoons – these can then be used to quantify upgrades.*
- *Monitor sludge levels and desludge North and South Lagoons as required to maintain effluent quality and ensure adequate storage space. Construct additional drying facilities for sludge adjacent to existing lagoons when space for disposal becomes limited at either the North or South Lagoons. Sludge to be disposed of in accordance with appropriate regulatory framework or reused in accordance with the Organic Matter Recycling Regulation.*
- *For as long as the City is willing and able, allow commercial dumping of septage only at the City's sewer system provided that the full costs of providing this service are recovered and that the City's sanitary system is not negatively affected.*
- *For as long as the City continues to receive trucked waste, review and tabulate quantities of trucked waste discharged to the City's sanitary sewer system. Where appropriate, undertake measures to confirm compliance with City sewer by-law.*
- *Compile database of private garage sumps and grease traps.*

8.2.2 10-20 Years

- *Upgrades to be completed at the South Lagoons as required in order to maintain the effluent criteria outlined in the EIS, operational certificate, and federal wastewater regulation.*
- *Upgrade treatment process at the North Lagoons when required in order to maintain the effluent criteria outlined in the EIS, operational certificate and federal wastewater regulation. Increase seasonal storage volume at the North Lagoons as required.*
- *Require private owners to submit annual reporting of maintenance.*

8.3 Future Treatment Locations

8.3.1 1-5 Years

- *New sanitary system connections that request to dispose of anything other than wastewater from domestic sources to be reviewed on a case by case basis as per the Sewer Use Bylaw.*
- *Undertake a detailed engineering study for each of the North and South Lagoon systems, taking into consideration new and larger design flows, reuse quantities and qualities, effluent criteria established in the latest environmental impact studies, and the impact of desludging/upgrading aeration systems.*

8.3.2 10-20 Years

- *Use existing zoned areas for treatment plant upgrades. Depending on future circumstances, investigate satellite treatment options at that time.*

8.4 Storm Sewer Treatment

8.4.1 1-5 Years

- *Review storm water liquid waste management requirements under a separate integrated storm water management plan (ISMP). Incorporate the findings of the ISMP in the next LWMP update.*
- *Continue to mandate stormwater management under the development by-law.*
- *Compile database of private catchbasins.*

- *Compile database of private oil/grit separators.*

8.4.2 6-10 Years

- *Require private owners to submit annual reporting of maintenance for private catch basins.*
- *Require private owners to submit annual reporting of maintenance for private oil/grit separators.*

Appendix A

Single Advisory Committee Meeting Notes



MEETING NOTES

subject: Liquid Waste Management Plan - Single Advisory Committee Start-up Meeting
date: October 7, 2011
meeting date: September 21, 2011
location: City of Fort St. John Public Works Building
file: 1958.0332.01-M
prepared by: Kristin Bayet, P.Eng
distribution: All SAC Members

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<u>ITEM</u>	<u>DISCUSSION</u>	<u>Presenter</u>
1	Welcome & Introductions	Victor Shopland
2	Explanation of the LWMP Process and Requirements Joanne reviewed the information covered in the Background Report to Committee Members, focusing on: <ul style="list-style-type: none">• What is liquid waste?• What is an LWMP and why are they completed?• The status of the current LWMP completed in 2004• Why the LWMP is being updated now• The proposed LWMP Review process	Joanne Harkness
3	Review of Single Advisory Committee (SAC) Terms of Reference Pam identified the groups/agencies represented on the SAC and reviewed highlights from the TOR document (previously circulated to committee members). The group discussed the role and expectations of committee members and the protocol for working together.	Pam Robertson
4.	Site Tour The group toured the Fort St John south sanitary sewer and storm sewer systems to enhance their collective knowledge of the processes. They also received handouts that provide a diagram and description of the steps involved in the north and south sanitary sewer systems as well as the stormwater system. Special thanks to Northern Health for providing our tour bus.	Victor Shopland Kristin Bayet Joanne Harkness
5.	Review of LWMP Guiding Principles Victor emphasized that the issues and opportunities around liquid waste management in Fort St. John are unique, and therefore, the best responses are those that are tailored to fit local circumstances. This is the #1 principle that council adopted as outlined in the Guiding Principles document (circulated to SAC members prior to the meeting). Victor reviewed and expanded on each of the principles contained in the document: <ul style="list-style-type: none">1. Tailored response2. Effectiveness3. Consider effluent a resource4. Financial sustainability5. Transparency, responsiveness and community acceptability6. Cooperation with senior government agencies and legal acceptability7. Technical feasibility8. Equity and fairness9. Pollution prevention	Victor Shopland
6.	Reclaimed Water Kristin explained that reclaimed water refers to effluent being used for other purposes instead of just discharging it to river. Reclaimed water can be used	Kristin Bayet



<u>ITEM</u>	<u>DISCUSSION</u>	<u>Presenter</u>
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for firefighting, dust control, street cleaning, sewer flushing cooling/process water, equipment washing, hydraulic fracturing (process used in the oil & gas industry). Effluent has to be of a certain quality to re-use.

Why is the CFSJ interested in this opportunity?

- drinking water is currently being used by oil and gas & industry for non-potable uses
- places a high demand on water system – uses up capacity that is meant for current & future city residents
- reusing effluent would provide an alternate source of water for users that do not need drinking water
- to reduce amount of effluent discharged to rivers

Kristin also reviewed the status of the commitments from the 2004 LWMP (these are outlined in the Background Report to the Committee).

Kristin also reviewed a couple of concerns the City has that may need to be included in the LWMP review. The main concern is the quality and quantity of waste from two main sources:

- Trucked waste that is dumped at transfer station (includes the management of septic tank wastes and the challenges in controlling the sources/release of trucked wastes)
- OSB Plant runoff (odours & quality of runoff - affecting the treatment process at lagoons)

6. QUESTIONS GENERATED DURING THE MEETING

Committee members had questions throughout the meeting that generated good discussion. We have tried to capture them here as a way of sharing that discussion with those who were not able to attend the meeting, and as a resource that may be tailored to assist with future public engagement.

Q. Is effluent reuse the only driver for this LWMP Review?

A. While it is a main driver it is not the only one. The impact of other wastes, such as trucked waste and industrial wastewater will also be included in the review, along with other items that may be raised during the LWMP review process. A LWMP review is supposed to occur 5 years after its completion to assess how the commitments are being implemented.

Q. While SAC members are representing the public in the process, will the public at large be engaged?

A. Yes. We will be developing a communication plan that will set out a strategy for effectively engaging the public. It may identify methods such as face-to-face meetings, media information and the City's Facebook site. SAC will be involved in developing the communication plan and are encouraged to participate in public meetings.

Q: What is the usual feedback/participation from communities during the LWMP process?

A: Interest can be limited and it is often challenging to generate community interest. However, a requirement of the LWMP is that it is developed in consultation with the community. Part of the SAC role will be to help generate public interest and involvement.



Q. Fort St. John water is quite hard. Does the City have any intention of providing water softening? What is the impact of putting softened water back into the system?

A. While the City has not currently pursued the idea of softening due to the high cost of such as system, this possibility could potentially be included in the LWMP review process.

Q. What's the opportunity to reclaim the polishing pond?

A. The polishing pond is part of the lagoon process (South Lagoons) and effluent can be directed to the pond during periods of high flow. This occurred in the summer of 2011 during the periods of heavy rainfall.

Q. Does the CFSJ test the effluent before it reaches the river?

A. The City tests the discharge before it reaches the river (Peace River and Beatton River) and also does testing up-stream and down-stream to evaluate if the effluent is having any impact.

Q. Some cities are using effluent to irrigate crops. Has FSJ considered that?

A. This was considered in the 2004 LWMP process. There has not been any interest to date from any local farmers. The City currently does not have its own crop land to irrigate. We invited the golf course representatives to be a part of SAC because of this potential opportunity.

Q. What happens to the sludge being accumulated in the lagoons?

A. It stays in the pond, as it accumulates very slowly. When desludging is needed, it will be moved to drying beds which are located at the sewage treatment plant site.

Q. Is refuse taken out of the stormwater system before it reaches the creeks?

A. No. There is no process for screening out any trash or other items that make their way into the system. Oil and grit separators are present for some newer parking lots to help reduce the amount of parking lot contaminants entering the stormwater system.

Q. Regarding the oil separators used at some sites to treat stormwater, how is the oil collected in this system disposed of?

A. Any contaminated waste is taken to a hazardous waste management site for disposal.

Q. Were the Guiding Principles taken from the first LWMP?

A. Council used the first guiding principles as a basis for developing the current ones and adopted them through a workshop in July 2011.

Q. Is there a particular criterion that defines restricted and unrestricted effluent?

A. Yes. Each type of effluent carries with it parameters that stipulate the quality it must maintain for certain uses (e.g. potential for public contact, etc.). These parameters are set out in the BC Municipal Sewage Regulation.

Q. Does the City have current data for how much potable water is currently being used by industry?

A. The City has data on what is being trucked away. It also has some data, through water metering, of in-town industrial use. Northern Health policy requires separate facilities for water designated for potable use, compared with that designated for non-potable use. Therefore, the City has a good understanding of how much water is being trucked for non-potable purposes. The amount of effluent that is currently being generated is much more than the volume of water currently being used by industry from the City's filling stations. If the City is going to pursue effluent reuse in a significant way, we would need to identify a client base.



Q. At this point, if the City was to sell effluent for industrial use, would it require further treatment?

A. That depends on what it will be used for. We will be discussing these possibilities with potential users and attempting to identify what level of treatment would be required for each user.

Q. Does the City have a business plan in place for developing a market for effluent reuse?

A. This is being addressed as part of the feasibility assessment for the effluent reuse study, which is being conducted in parallel to the LWMP review process.

Q. Does the oil and gas industry truck waste to the FSJ system?

A. Some operations have their own wastewater treatment systems but some liquid waste from local industry is coming into the system.

Q. Can the City put into place bylaws that regulate petroleum products in the waste entering the system?

A. The City has a Sewer Use bylaw that regulates what can be disposed of in the sewer system; however, it can be difficult to enforce. Once the City accepts the sewage we are responsible for it and have to ensure that the final effluent meets the standard and quality set out by the BC Ministry of Environment.

Q. Is there any way to inspect the trucked waste before accepting it?

A. The City has a process for inspecting waste but it is limited in effectiveness. The truck operators have a fob that identifies who they are and the waste is metered. Truck operators are required to fill out a manifest disclosing what they are discharging, but this is very difficult to verify.

Q. Does the City have any idea of what the reclaimed water would cost users?

A. No, we have not worked out those details yet and will need much more information from potential users (e.g. level of treatment, etc.) in order to set rates. The costs could vary significantly depending on what quality of effluent is required.

Q. Has the City thought about the possibility of separating residential wastewater into grey water (sinks & showers) and black water (toilets)? Grey water could be applied to other uses – like flushing toilets.

A. This idea came up in a recent Sustainable Neighborhood Charrette. However, this concept needs to be discussed with the development community and industry that may use the grey water.

Ideas generated through this session:

Identifying possibilities and opportunities for new or improved ways of managing liquid waste is part of the role of the SAC. Below are some initial ideas that SAC members contributed during this meeting.

- Using reclaimed water for a truck/bus washing station either run by the City or private company.
- Using reclaimed water for fighting forest fires. Tankers at the airport are currently filled with potable water.



- Pilot project for a new development to separate residential wastewater into black water (sewage) and grey water (sinks, showers, laundry). Grey water to be used for toilet flushing.
- An issue of using reclaimed water for irrigation is that the volume of use would decrease significantly in the winter – idea around using ice storage.

7 Next Meeting

- Update on reclaimed water process
- Discuss issues brought forth at today's meeting
- Discuss new commitments for the LWMP
- Discuss public engagement and communications

The preceding is the writer's interpretation of the proceedings and any discrepancies and/or omissions should be reported to the writer.

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Kristin Bayet, P.Eng

/KB

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MEETING NOTES

subject: Liquid Waste Management Plan - Single Advisory Committee Meeting 2
date: November 8, 2011
meeting date: November 8, 2011
location: City of Fort St. John Public Works Building
file: 1958.0332.01-M
prepared by: Chad Carlstrom, EIT
distribution: All SAC Members

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<u>ITEM</u>	<u>DISCUSSION</u>	<u>Presenter</u>
1	Welcome & Introductions	Victor Shopland
2	<p>Explanation of the LWMP Process and Requirements</p> <p>Joanne reviewed the information presented at the last meeting, as a refresher, focusing on:</p> <ul style="list-style-type: none">• What is a LWMP and why are they completed?• Why the LWMP is being updated now• The role of the Advisory Committee	Joanne Harkness
3	<p>Reclaimed Water Update</p> <p>Kristin updated the group on the status of the Reclaimed Water initiative – stating that it is generally quiet but that there was some interest. A RFEI document was forwarded to the Canadian Association for Petroleum Producers (CAPP) water users group monthly meeting. One company inquired for more information as a result. Other possible opportunities will be explored by contacting various oil and gas companies directly and with the OSB plant.</p> <p>Dianne Hunter noted that there is little interest when the costs of alternative water are low. If the use of potable water is discouraged by pricing it higher, and reclaimed water lower, reclaimed water could provide industry with an alternative option.</p> <p>Lori Ackerman noted that there is currently Research and Development within the oil and gas industry to decrease water use as an industry.</p> <p>Kristin discussed how Reclaimed Water relates to the LWMP process. Since the current plan does not consider uses beyond irrigation, any new uses such as for industry or oil and gas need to be identified in the plan. The quality required for these uses and any resulting impacts to level of treatment and associated costs should also be identified in the new plan. The City does not need to move forward with Reclaimed Water as a means of effluent discharge – it will only be driven by industry interest.</p>	Kristin Bayet
4.	<p>Plan Commitment Review</p> <p>Kristin directed the attendees to form three predetermined groups to review each issue, solution, and commitment outlined in the Plan Commitment Worksheet in detail. The following questions were to be considered for each issue and related commitments:</p> <ol style="list-style-type: none">1. Has the commitment been met?2. If yes, is the task complete or should it be an ongoing commitment that the City needs to continue to meet?3. If no:<ol style="list-style-type: none">a. Why hasn't the commitment been met?b. Is the issue still there?c. Does the commitment need to be updated?d. Do you have any ideas on how the City can meet this goal?4. Are there any other new issues related to liquid waste to consider?	Kristin Bayet



ITEM	DISCUSSION	Presenter
	<p>One group considered each of the following topics:</p> <ul style="list-style-type: none"> • Group 1 - Sanitary Sewage Flow • Group 2 - Sanitary Sewage Treatment • Group 3 - Storm Water Treatment and Servicing Neighbouring Communities. <p>After the separate group discussions, Victor gathered everyone together and asked for each group representative to share the items discussed. The following notes summarize the discussion for each group.</p>	
	<p>Group 1 Discussion Points – Sanitary Sewage Flows (numbering as per attached Plan Commitment Worksheet – see Worksheet for more detail on each commitment)</p> <p>1) <i>Issue – High Sanitary Sewage Flows from Inflow & Infiltration</i></p> <p>(a) Manhole Condition Monitoring</p> <ul style="list-style-type: none"> • Keep this commitment. Previous efforts to repair MH's were based on a 5 year program recommended as a result of an Epcor study. Most of the major repairs were completed but a new list should be compiled and a portion of MH repairs completed each year. <p>(b) Individual Lot Drainage</p> <ul style="list-style-type: none"> • Was not a commitment in previous plan. Do not add a commitment to this plan. <p>(c) Public Education about drainage problems from individual lots</p> <ul style="list-style-type: none"> • Keep this commitment. Suggested that local contractors be educated about the issue so they can discuss with homeowners when completing other home repairs. The City's water meter installer could talk to homeowners when visiting homes to change water meter batteries. A video could be posted to City website showing the types of problems for homeowners to look for/how to fix. <p>(d) Flow Monitoring</p> <ul style="list-style-type: none"> • Keep this commitment. Consider setting up permanent monitoring stations. <p>(e) PVC Manholes</p> <ul style="list-style-type: none"> • Keep this commitment. Possibly make wording more flexible to allow for different types of waterproof manholes. <p>2) <i>Issue – Reduce Sewer Flows & Reuse – Consumer Focused</i></p> <p>(a) Low Flow Fixtures</p> <ul style="list-style-type: none"> • Keep this commitment. Building Code has made improvements so City does not necessarily need to mandate low flow fixtures. Make wording more flexible and focussed on toilet rebate program and similar initiatives as opposed to bylaws. <p>(b) Water Meters</p> <ul style="list-style-type: none"> • Installs complete but keep commitment to mandate meters for new construction. Consider how to use meters for leak detection. <p>(c) Public Education re: reducing water usage and reducing sewer flows.</p> <ul style="list-style-type: none"> • Keep this commitment. Use the City website and bill stuffers to get info to public. Reword commitment because it's difficult to understand. <p>3) <i>Issue – Reduce Sewer Flows & Reuse – City Operations</i></p> <p>(a) Reusing Effluent</p> <ul style="list-style-type: none"> • Keep this commitment and update to reflect other uses other than irrigation. 	<p>Kristin Bayet</p>



ITEM	DISCUSSION	Presenter
	<p>(b) Sludge Removal</p> <ul style="list-style-type: none"> • Keep this commitment. City is working to quantify the amount of sludge in the lagoons and budget for periodic removal. Previous desludging was completed in the late 80's. • Sludge re-use was considered but the volumes of sludge available are small, there hasn't been a demand to date and it's costly to treat sludge to a standard that can be reused. <p>4) <i>Control OSB Plant Discharge</i></p> <p>(a) Mandate Maximum Flows</p> <ul style="list-style-type: none"> • Keep this commitment. Work with OSB Plant to ensure that flows aren't exceeded and update the overall agreement with OSB Plant on how their flows are handled. <p>5) <i>Pipe Capacity</i></p> <p>(a) to (d)</p> <ul style="list-style-type: none"> • All existing plan commitments for sewermain upgrades have been completed. New upgrades such as the Alaska Highway Sewer Trunkmain (Phase 1 currently under construction) should be added to the new plan. • Consider adding a commitment re: ensuring regular maintenance of sanitary mains to ensure capacity of existing pipes isn't compromised by root intrusions or build up grease, solids, etc in pipes. 	
	<p>Group 2 Discussion Points – Sanitary Sewage Treatment</p> <p>1) <i>Issue – Increase Effluent Quality Criteria</i></p> <ul style="list-style-type: none"> • A requirement under Federal and Provincial legislation. • Commitment is to maintain the effluent criteria as outlined in the Environmental Impact Studies. • Upgrades to be completed, as required, in a timely manner in order to maintain the effluent criteria outlined in the Environmental Impact Studies. • Effluent monitoring to be undertaken, as indicated in the Environmental Impact Studies. • Effluent monitoring to be reviewed in the annual report and amended to ensure that the monitoring is still relevant. <p>2) <i>Issue – Increase Dilution in Beatton River</i></p> <ul style="list-style-type: none"> • Commitment is to maintain effluent dilution, as outlined in the Environmental Impact Studies. • Environmental monitoring to be undertaken, as indicated in the Environmental Impact Study. • Monitoring to be reviewed in the annual report and amended to ensure that the monitoring is still relevant. <p>3) <i>Issue – Increase Dispersion in Peace River</i></p> <ul style="list-style-type: none"> • Commitment is to maintain effluent dilution, as outlined in the Environmental Impact Studies. • Environmental monitoring to be undertaken, as indicated in the Environmental Impact Study. • Monitoring to be reviewed in the annual report and amended to ensure that the monitoring is still relevant. 	Joanne Harkness



ITEM	DISCUSSION	Presenter
	<p>4) <i>Issue – Prevent Toxic Substances Entering Sewer</i></p> <ul style="list-style-type: none">• Several sources and types of substances were discussed. Two concerns: the receipt of trucked waste and discharges from commercial operations to sewer. For trucked waste, this operation is largely uncontrolled and could be the source of several substances entering the sewer. For commercial sewer connections, there are periodic problems which are thought to be from unsuitable materials being discharged to sewer.• The City needs to decide if trucked waste from outside of the City will continue to be received in the future.• It was recognised that by receiving trucked waste, the City is accepting the responsibility and liability for its treatment and discharge.• If trucked waste is accepted in the future, the current policy to accept only domestic waste would still apply.• If trucked waste is accepted in the future, a higher level of control is needed – e.g. restricted opening hours and increased staffing.• If trucked waste is accepted in the future, the facility would need to cover all costs, with no subsidies from sewer residents/commercial customers.• Need to increase awareness for commercial/industrial connections of what should and should not be discharged to the sanitary sewer system.• For sewer commercial connections, there needs to be an increased understanding of what can and cannot be discharged to sewer, and an increased understanding of installation and maintenance of oil and gas separators. This includes fats, oils and greases from the hospitality industry.• More information is needed on the opportunities for reuse of oils and greases – e.g. the Newalta collection points. <p>5) <i>Issue – Prevent Prescription Drugs in Sewer</i></p> <ul style="list-style-type: none">• There is still a lack of understanding of the effects/magnitude of effects of drugs in the sewer.• Need to increase information to the public to discourage disposing excess drugs to the sanitary sewer system.• Need to increase the available information on the pharmacy collection program for excess drugs and medication. <p>6) <i>Issue – Reduce Odours</i></p> <ul style="list-style-type: none">• Limited complaints in specific areas of the City. Areas noted were:<ul style="list-style-type: none">• Some in Matthew's Park (closest Residential to lagoons)• Shops venting tanks• Old Fort outfall complaints – from manholes• Commit to look at the specific areas to see if any actions can be taken to reduce the odours. E.g. if a lift station is vented to the outside, is it possible to vent through a simple biofilter bed. <p>7) <i>Issue – Control Quality of OSB Plant Discharge</i></p> <ul style="list-style-type: none">• OSB plant provides samples and lab analysis• OSB plant notifies the City before a discharge and aims to manage flows so as not to overwhelm the sewage treatment plant• OSB is looking to improve water quality, and the study should be completed early next year. This could include increased containment or	



ITEM	DISCUSSION	Presenter
	<p>pre-treatment, such as aeration.</p> <ul style="list-style-type: none"> • Hydrogen sulphide measured twice daily. • Increased sampling of discharge required, as the quality of the discharge changes as the pond is drawn down. • It was recognised that there are other industries which discharge to sewer and that there is also the possibility for new industries to connect in the future. These also need to be managed in order to control the quality of the discharge and limit the potential for a discharge to sewer which could result in a plant upset and an unacceptable decrease in the final effluent quality. <p>8) <i>Issue – Future Treatment Locations</i></p> <ul style="list-style-type: none"> • Footprint for both sites considered sufficient to accommodate future treatment requirements. • Where adjacent lands are in the City boundary, focus on land usage being industrial or commercial. • Recognised that some adjacent lands are outside of the City boundary and the City has no control over the designated uses. • For Item 8b – vacuum truck dumping site – this was addressed in item 4 – trucked waste and contaminant sources. <p>9) <i>Issue – Certification – Facilities and Operators</i></p> <ul style="list-style-type: none"> • Legal requirement and is outlined in the Operational Certificate – no further action needed. <p>10) <i>Other Topic Discussed – Sludge</i></p> <ul style="list-style-type: none"> • It is expected that the lagoons will need to be desludged in the near future. This raised questions: <ul style="list-style-type: none"> • What will the end use of the sludge be? • How will the City manage extended periods of time with no sludge production (i.e. removed from the lagoons) followed by a short period of time where significant quantities of sludge will need to be managed? • Will treatment be needed? • How will the City need to manage its finances to ensure that there is sufficient money available as and when sludge management (desludging, treatment, reuse/disposal) is required? • The following comments were raised during the discussion: <ul style="list-style-type: none"> • Could the sludge be used on land? (This now requires a formal Land Application Plan under the BC Organic Matter Recycling Regulation.) • What about composting? Is the sludge suitable for composting? Could it be composted on site? How would this work with the long periods of time with no sludge being available for composting? Are there other waste streams (inside and outside of the City) which are also suitable for composting – e.g. animal carcasses? • What about energy recovery? Is there the opportunity to amalgamate the sludge with other waste streams, given the long periods of time where no sludge would be available? Is burning really the best use of sludge, given the nutrient value 	



ITEM	DISCUSSION	Presenter
	<p>(land application approach)?</p> <ul style="list-style-type: none"> • How much sludge needs to be managed? • Is there sufficient room on the sewage treatment plant sites to accommodate sludge management? • How does sludge management tie in with other City initiatives, such as the sustainability plan? • What is the real magnitude of methane and carbon dioxide production in relation to sludge? • What is the business case for sludge management initiatives? • Green initiatives must be practical. 	
	<p>Group 3 Discussion Points – Storm Water Treatment & Servicing Neighbouring Communities</p> <p>1) <i>Issue - Storm Water Treatment</i></p> <p>(a) Reduce Contaminates Discharged to Creeks</p> <ul style="list-style-type: none"> • Encouraged that CFSJ should develop a stormwater treatment guideline, noting that this is becoming an increasingly more important issue and that senior levels of government may, in time, require it. • The current stormwater treatment as per the Subdivision Servicing Bylaw should be kept, but it should review the justification of the 20 stall threshold. Perhaps revision depending on zoned use. • Yellow Fish Road program should continue. NEAT offered to act as a director to ensure the program continues and to increase public information about contaminants. • Pomeroy Sport Centre noted as a good example of a pre-treatment facility. Suggested that stormwater quality tests should be done prior to committing to install on-line pre-treatment facilities. • Replacing existing catch basins with Stormceptor style, where appropriate, was agreed to be a good movement. Suggested that baseline information to be provided to determine which existing developments require replacement. <p>(b) Reduce Silt Entering System</p> <ul style="list-style-type: none"> • Program for cleanout of City catch basins, but not for private. • Possible business opportunity to provide service to private sector. • City should look at creating a database of private catch basins and require an annual report stating that they have been cleaned/serviced, similar to a sewer check valve. <p>(c) Reduce Over Watering</p> <ul style="list-style-type: none"> • With the implementation of water meters, this issue generally seems to be resolved. No future action was thought to be necessary. <p>2) <i>Issue - Servicing Neighbouring Communities</i></p> <p>(a) Tie In Neighbouring Communities:</p> <ul style="list-style-type: none"> • From the PRRD's perspective, they encourage the City to keep the dialogue open. <p>(b) Provide Facilities for Septic Haulers:</p> <ul style="list-style-type: none"> • More studies to ensure true costs of this service are met, as current charge is \$2.50/m³. A private company, CCS, has stated that they would require a charge of \$16.00/m³ to start up. 	Chad Carlstrom



ITEM	DISCUSSION	Presenter
6.	<p>Public Engagement</p> <p>Kristin talked about the next upcoming steps, notably Public Consultation and the need to construct a Public Engagement Draft Plan. She noted that the public would be consulted before the new LWMP is drafted to help identify any concerns. The public would also be consulted after a new LWMP is drafted to review the proposed commitments and any associated costs.</p> <p>To help brainstorm ideas about how to approach public consultation, the following questions about each issue and commitment from the worksheet were considered:</p> <ol style="list-style-type: none"> 1. Who may be interested in the issue? 2. Who will be impacted by the issue? 3. Who will be impacted as a result of the commitment? 4. What concerns may effected or interested individuals or groups have? 5. What is the most effective way to reach interested or affected groups to find out if they have any concerns and solicit their feedback? <p>Some ideas and discussions regarding outreach to the public were:</p> <ul style="list-style-type: none"> • CFSJ Facebook Page – don't know if feedback is from non-residents • Open House; low success in the past • CFSJ Website; use Facebook to start as a pointer to the website • Flyer; incorporate survey into water bill • Pizza Party discussion was somewhat successful with OCP process • Work with college • Email / Email Newsletter; can track who opens • On-line Survey; SurveyMonkey <ul style="list-style-type: none"> ○ Few minutes to complete ○ Short and sweet ○ Multiple choice and response option • CFSJ Twitter • Winter is hard as it is a busy season • Radio / newspaper / business sector • Who are the public? Business, residents – approach differently? 	Kristin Bayet Victor Shopland
7.	<p>General Discussion about Reclaimed Water</p> <p>In regards to Reclaimed Water, discussed recent Global TV news of 'water that ignited' due to fracturing. OGC plans to publish what is being used chemically in fracking process. USEPA has a guideline for fracking water.</p> <p>Discussed how to enforce water use in BC – lack of framework to enforce.</p> <p>Need input from oil and gas companies. Devon currently has water licences for Charlie Lake (12 cu.ft./s) – contact will be made with Devon to discuss water resources and requirements. Encana and Talisman in 5-7 years may possibly open up; they are curious on the success of Shell in Dawson Creek. Current moratorium in Quebec on fracking.</p> <p>With regards to Reclaimed Water for agriculture use, no approach to farmers as no</p>	Various



ITEM	DISCUSSION	Presenter
	irrigation in area. No appetite for use with rural lagoons (Regional District). It is not pressing to irrigate with short growing season and clay soils. However, the Hutterites are testing an irrigation system on ¼ of land to get 3 cuts of hay per year (water from the Peace River).	
8.	<p>Next Meeting</p> <p>Thank you to everyone who attended. Next meeting will be in the new year (2012). The following items will be covered at the next meeting:</p> <ul style="list-style-type: none">• Review Reclaimed Water Outline Concept• Review Public Engagement Draft Plan• Discuss New LWMP commitments	Kristin Bayet

The preceding is the writer's interpretation of the proceedings and any discrepancies and/or omissions should be reported to the writer.

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Kristin Bayet, P.Eng

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MEETING NOTES

Subject: City of Fort St. John Liquid Waste Management Plan – SAC Meeting #3
Date: April 19, 2012
Meeting Time: 9:00am – 12:00pm
Location: City of Fort St John – Public Works Building
File: 1958.0332.01
Prepared By: Chad Carlstrom
Distribution: All SAC members

Attendees

Don Demers
 Garland Durnford
 Jeremy Garner
 Dianne Hunter
 Victor Shopland
 Kristin Bayet
 Chad Carlstrom
 Dr. Joanne Harkness
 Pam Robertson
 Moira Green
 Rhys Mersereau
 Jaclyn Mersereau
 Dzenko Mzengeza
 Madhu Nair
 Lindsay Sahaydak

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 CFSJ
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MEETING NOTES

Subject: Liquid Waste Management Plan – SAC Meeting #3
 Meeting Date: April 19, 2012
 File: 1958.0332.01
 Page: 2 of 4



Item	Discussion	Presenter
1.	Introduction to meeting by Kristin Bayet. Reviewed where the LWMP process is at and outlined the next steps of the LWMP process.	KB
2.	Joanne Harkness presented on reclaimed water. Discussed restricted vs. unrestricted access and reuse opportunities. Presented estimated capital costs to implement processes to produce reclaimed water at the South and North Lagoons.	JH
3.	<p>Discussion of reclaimed water began.</p> <ul style="list-style-type: none"> - Dianne questioned about using reclaimed water for ice making. JH replied that it would need to be of unrestricted quality for recreational activities. - The cost estimates were discussed and clarified: <ul style="list-style-type: none"> o Infrastructure capital costs for treatment only, not operating costs o Treatment assumed that effluent was meeting criteria for river discharge o Possible requirement for storage, with the alternative being river discharge during non-reuse periods. Numbers are conservative with 50% contingency o There is no allowance for delivery of effluent to reuse location (e.g. pipeline or truck-fill station) o Dianne commented that this compares favourably to the expected order of magnitude. o Dawson Creek's facility is about \$10M. It requires higher treatment than FSJ will need, due to effluent quality produced by the lagoons. Facility in DC has high capital and low operating costs. - What quality of effluent would be needed? <ul style="list-style-type: none"> o Depends on the end user. More opportunities with unrestricted, but oil and gas industry may not need that quality. 	JH
4.	<p>Dianne asked for group feedback about the City going down this road for a \$3-5M investment.</p> <ul style="list-style-type: none"> - Rhys questioned about the economics of this project. What can we sell the reclaimed water for? Where do we break even at for sales? - Dianne agreed this information would be good to have. How the City prices its potable water will motivate people to use the non-potable water option. - Moira added on a moral and ethical level we should do this and only use potable for water for potable uses. What's the impact on the existing water system capacity by doing this? - Dianne added that if implementing reclaimed water reduces demands from their potable water system, it could reduce costs to build a new water treatment facility and reduce water pumping costs from the Peace River. It then starts to make a business case. - Jaclyn noted there could be cost savings if there was a guaranteed user of the reclaimed water. Dianne added the City uses about 40% of the water produced. Don agreed that some of the City's water use could be non-potable. Rhys gave an example of pipeline companies that will not construct infrastructure without any commitments to using it. Recommended you need 	DH

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to convince industry to use this reclaimed water instead of getting a water diversion from lakes and rivers.

- Dianne discussed funding for this project and that it would come from user rates, possible grants – but there are no grants that the City's aware of. Gas Tax was discussed as an option for funding. Emphasized the need to change water price point or regulations to motivate users to use reclaimed water as access to potable water and freshwater is cheap. Contrasted to Dawson Creek – there was not any access to water so industries were motivated. Rhys added you will not be able to change the Oil & Gas Commission regulation which allows access to water sources such as rivers and lakes.
 - The option to 'turn off the tap' to industry was brought up by Dianne. It would be a political position to take, but it was never the City's intention to provide industry with bulk water via their bulk water filling station. Kristin added there are also high water users within the City that directly provide to the oil and gas industry.
 - Lindsay identified the OSB plant as a high water user and that using reclaimed water would have to be cost effective. Likely would need unrestricted water quality. Jeremy questioned partnering with the adjacent sawmill. Dianne reminded they are outside of City limits, but that if 2 industries were using reclaimed water it may make it more viable.
 - Jaclyn introduced pricing potable water in such a way to charge more for those who use more than a normal household. This would make reclaimed water more attractive to industries with high water use. Dianne talked about block pricing – another pricing system.
 - Madhu and Jaclyn supported the thoughts of BC Hydro as a possible user of reclaimed water for dust suppression during the construction of the proposed Site C Dam. Dianne indicated that the City is in discussion with BC Hydro and will make a note of it.
 - Victor noted that industrial water use is 5-10% of total City water. South Lagoons discharge 70% of total wastewater volume. There is a larger volume of wastewater available than is currently used by industry, so may not be able to develop a reuse opportunity for all of the wastewater without new users. A good lead into the next topic.
-
5. Microhydro opportunity to create electricity from the South Lagoon outfall line was introduced to the group by Joanne. The opportunity for the North Lagoons is limited due to the lower flows at this site. The estimated energy production from the South Lagoons is 400-500 MW/year. Some confusion as to what the 400-500 MW/year means in a real life example. This would be clarified in the assessment report. JH
- Rhys noted that without capital cost and revenue projection it is difficult to comment on this. Others agreed that it would be good to see the numbers and economic calculations on this.
 - Dianne talked about the big picture and the financial benefit to the community as well as using our resources well. It will come back to the

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numbers.

- Discussion on whether power generation would be City owned or contracted out. Again back to economics, but Dianne noted the City has been already been approached by people seeking the rights to the wastewater.

6. Kristin presented the proposed outline for the new LWMP indicating the content and proposed changes. Dianne added that the City does not plan to make firm and concise commitments to the effluent reuse and microhydro projects in the plan, but will focus instead on generalities to allow flexibility in the future . KB

7. Pam presented the public communications and engagement part of the LWMP. She discussed the public engagement objective, tools, timeline, distribution methods and measures of success. Also introduced draft LWMP information sheet and survey questionnaire. PR

Discussions on public engagement occurred and the survey questionnaire sheet was critiqued. Some outcomes of the discussion:

- First face-to-face public engagement opportunity will be during Municipal Day on May 30, 2012. It was felt this would be more effective than fliers, newspaper and radio –which have had a poor response in the past. Rain barrel(s) contest will be used as an incentive for people to fill out questionnaires.
- Public will also be notified of the LWMP via the City's website, Facebook page, and the NEAT website. Online surveys will also be posted A one page bill stuffer could be implemented and sent to residents with their water meter bills – but in the past this method has not seen great returns.
- Feedback was received on the draft survey – the questions will be changed based on the comments provided. Focus should be on generic questions for potable water alternatives for non-potable use. Refrain from using sensitive examples such as hydraulic fracturing in the oil and gas industry.
- Most agreed the questionnaire should be simple and short. One question per category suggestion was indicated to be suitable.
- Recommended to be consistent with the language and terms used.

8. Kristin concluded the meeting and reviewed the next stages. KB

- Rhys suggested the next meeting to be in the afternoon as a preference for better attendance and convenience. Dianne noted this and will find an alternative venue if necessary.

The preceding is the writer's interpretation of the proceedings and any discrepancies and/or omissions should be reported to the writer.

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Date: November 21, 2012
Meeting Time: 1:30pm – 4:30pm
Location: City of Fort St John – Public Works Building
File: 1958.0332.01
Prepared By: Chad Carlstrom
Distribution: All SAC members

Attendees

Don Demers
 Garland Durnford
 Jeremy Garner
 Victor Shopland
 Kristin Bayet
 Chad Carlstrom
 Dr. Joanne Harkness
 Shannon Anderson
 Moira Green
 Rhys Mersereau
 Allan Zackodnik
 Dzenko Mzengeza
 Madhu Nair
 Lindsay Sahaydak
 Ann Godon

Organization

CFSJ
 CFSJ
 CFSJ
 CFSJ
 Urban Systems
 Urban Systems
 Urban Systems
 PRRD
 FSJ Airport
 Member at Large
 Member at Large
 N.E.A.T.
 Northern Health Authority
 Peace Valley OSB
 BC MOE

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Absent

Lori Ackerman
 Gord Klassen
 Marty Paradine
 Len Holland
 Art Jarvis
 Jay Morrison
 David Toews
 Jaclyn Mersereau

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 CFSJ, Councillor
 CFSJ
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 Energy Services BC
 Spectra Energy
 Colteran Developments
 Spectra Energy

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Minutes Only

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 Allan Chapman
 Dean Cherkas
 Martin Collins
 Snehal Lakhani
 Julie Robinson

 John Summers
 Curtis Whitford

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 BC Oil & Gas Commission
 BC MOE
 Agricultural Land Commission
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**Item Discussion****Presenter****1. Welcome and Introductions**

Kristin Bayet

Kristin welcomed and introduced the attendees, distributed handouts for the meeting, and reviewed the agenda. The LWMP process is approximately 80% complete. The remaining steps of the LWMP process were outlined.

The focus of this meeting is on the new plan commitments. This plans to be the last committee meeting unless the committee wants to meet again.

Kristin presented an introduction presentation and reminded attendees that the LWMP emphasizes on 20 year planning and is closely related to population projections at 2% or 3% growth.

2. New LWMP Commitments

Kristin lead the discussion as the attendees reviewed the “Plan Commitments” handout, line-by-line. The commitments are open to discussion by all members.

Ref #	Comments on Commitment
SANITARY SEWAGE FLOWS	
1 – High Sanitary Sewage Flows from Infiltration and Inflow	
1a	<i>Manhole Condition Monitoring</i> No comments.
1b	<i>Individual Lot Drainage</i> Item is removed as it is covered in the City’s existing by-law and is no longer needed.
1c	<i>Public Education</i> No comments. The change aimed to provide clearer wording.
1d	<i>Flow Monitoring</i> Rhys: Has every manhole been looked at? Kristin: Monitoring has been done in zones and is on-going. A good sanitary computer model has been developed and a report was completed this summer.
1e	<i>PVC Manholes</i> There has been a push back from contractors on PVC products to focus on intent rather than defined approach. Rhys: What are other options? Don: Heat shrink to seal concrete manholes is one option. The City tested this method and the test manhole is now 6 years old and appears to be durable.
2 – Reduce and Reuse – Consumer Focused	
2a	<i>Low Flow Fixtures</i> No comments.
2b	<i>Residential Water Meters</i> Lindsay: What is the amount of water reduced through the water meter implementation? Garland: About 25% reduction of water use was achieved. Ann: Are industrial users metered? Kristin: Yes; the outlier was residential which was implemented through the last LWMP.
2c	<i>Public Education</i> Based on committee conversations, the focus is to be on water not sewer.

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3 – Reduce and Reuse – City Operations	
3a	<p><i>Re-Using Effluent</i></p> <p>The previous LWMP had duplication of commitments; this new plan will try to streamline the focus of commitments.</p> <p>The new plan incorporates “resource recovery” as a broader term which can encompass effluent reuse, micro-hydro, and gives the City flexibility for other future projects.</p> <p>Important terms are: technically, practically, and economically feasible</p> <p>Shannon: The commitment is kept broad so the wording is good.</p> <p>Kristin: The business case is line is important.</p>
3b	<p><i>Sludge Treatment</i></p> <p>Joanne spoke about the recent Lambourne Environmental biosolids survey that was completed on the City’s lagoons and offered copies for those who wish to read it</p> <p>Madhu: Are any liners used in the lagoons?</p> <p>Joanne: No, the lagoons use a natural clay liner. The current practice is to de-sludge and dry the sludge on site. Disposal off-site would likely be the PRRD landfill, if available.</p> <p>Madhu: Can the sludge be reused instead of disposed?</p> <p>Ann: As these are Class B biosolids there are limited reuse options. Restrictions would be needed with reuse as the sludge temperature is not high enough.</p> <p>Applying it to farms can be political; signage is required for re-use.</p> <p>Allan: Can sludge naturally heat, like manure?</p> <p>Ann: Yes. But the sludge must demonstrate time and temperature requirements to meet Class A biosolids, so monitoring is required.</p> <p>Lindsay: The Taylor mill biosolids are applied to land.</p> <p>Ann: FSJ has the ability and space to store their biosolids.</p> <p>Joanne: Some southern BC communities compost biosolids but it is not the most economical. Reuse is also possible through energy recovery – there must be a reduction in the moisture content for this to be viable.</p>
4 – Control OSB Plant Discharge	
4	<p><i>Mandate Maximum Flows</i></p> <p>Ann: Is there a sewer use by-law in place?</p> <p>Jeremy: Yes; the City does have a sewer by-law in place.</p> <p>Kristin: Should we have an agreement in the LWMP or should it be addressed in the by-law?</p> <p>Shannon: What does the current agreement entail?</p> <p>Kristin: It has flow and quality specifications.</p> <p>Rhys: Is the existing agreement inadequate?</p> <p>City and Lindsay: There are problems with the OSB meeting the agreement, specifically the 5 L/s discharge.</p> <p>Lindsay: There are other discharge approaches – e.g. longer discharge but cleaner, but the current agreement does not have the flexibility to do this.</p> <p>Rhys: What is the goal of the new agreement? Is this needed for the commitment wording?</p> <p>Don: Perhaps a better approach is though the by-law so the City does not need to re-open the LWMP.</p> <p>Lindsay: The open wording on “not negatively affect the City’s systems” is good.</p> <p>Kristin: This is the only real discharge recognised to the City sewer.</p> <p>Lindsay: Further discussions are needed with the OSB, Jeremy, and the City.</p>

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5 – Pipe Capacity	
5a	<p><i>Trunkmain to South Lift Station</i> Kristin: All projects in Section 5 have been completed. Al: Who pays for the upgrades? Kristin: Sewer projects are funded by development, grants, tax payers, and borrowing. There can be all different means for upgrades. Future pipes are needed by development. Madhu: What are other examples around the world to manage capacity? Kristin: The City is using standard engineering practices to manage the flows.</p>
5b	<p><i>Upgrade North Lagoon Trunk Main</i> Project complete; discussed in 5a.</p>
5c	<p><i>Upgrade 93rd St/North Bypass Road Trunkmain</i> Project complete; discussed in 5a.</p>
5d	<p><i>Upgrade Trunkmain for North-West Corner</i> Project complete; discussed in 5a.</p>
SANITARY SEWAGE TREATMENT	
1 – Increase Effluent Quality Criteria	
1a	<p><i>Maintain Existing Discharge Permit Requirements</i> Joanne: If possible, change the focus from total BOD to carbonaceous BOD, which is consistent with current provincial and federal legislation. For monitoring, the goal is to simplify and give flexible direction to the City – less prescriptive. Recognizes that an update to the MOE Operational Certificate (OC) will be required. Current process cannot quickly change the monitoring program if needed. Ann: Expect that a letter may still be required in the future regarding monitoring. Needs to ensure that monitoring is reflective of the OC. The Director may amend the monitoring permit as they see fit. The Ministry will review the OC accordingly once the Minister has signed off on the LWMP report. They would like to include bioassay and toxicity concepts, and focus on MWR concepts. The City may also want to bring in wording about toxicity monitoring in the commitments or wording in OC. Lindsay: It's easier to issue a letter than amend the OC. Ann: The City may end up with minimum requirements in the OC or have a clause; there are some ways flexibility can be built in.</p>
1b	<p><i>Upgrade Complete Mix Tank</i> Project complete.</p>
1c	<p><i>Upgrade North Lagoons</i> Ann: What are the thoughts for the North Lagoon upgrades? Kristin: Similar to South Lagoons – aeration is to be added. The focus on timing will be based on city growth. Rhys: Upgrade “when required”? How is this determined? Joanne: Federal requirements have different criteria: low risk 2040; medium risk 2030; high risk 2020. Deal with averages to determine risk. Dzenko: What does it cost for the upgrades? Should we be planning financially for the future? Kristin: The draft plan includes cost estimates based on treatment upgrades. Joanne discussed treatment of ammonia and its definition as toxic, through the CCME process and the development of the federal wastewater regulation. Cost implications were considered by the federal government when developing direction on the management of ammonia. There was a balance between the potential for impacts and the economics associated with ammonia treatment.</p>

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1d	<i>Treat for Phosphorous</i> No commitment required; City will still do this – just reducing number of commitments.
1e	<i>Treat for Ammonia</i> No commitment required; City will still do this – just reducing number of commitments.
1f	<i>De-Chlorination</i> No commitment required; City will still do this – just reducing number of commitments.
2 – Increase Dilution in the Beaton River	
2a	<i>Upgrade North Lagoons</i> No comments.
2b	<i>Pump from North to South Systems</i> No comments.
2c	<i>Effluent on Adjacent Fields</i> Kristin: This is similar to the “resource recovery” wording as used with the South Lagoons. This will not be duplicated in the new plan; rather, it is just a formatting placement for explanation when comparing it to the old table.
2d	<i>Pump to Water Injection Wells</i> No comments.
3 – Increase Dispersion in Peace river	
3	Completed – no longer required.
4 – Prevent Toxic Substances Entering Sewer	
4	Rhys: Who compiles the data base (for private garage sumps and grease traps)? Kristin: The City is to do this and has a reasonable idea of issues and locations. Lindsay: Who reviews the information? Kristin: It needs to be defined, but it is expected to be less effort than the current process. Rhys suggested to add a target into the timeline instead of “periodic”. Ann agreed with Rhys’ target timeframe suggestion. Kristin further added that a timeframe needs to be added to all commitments.
5 – Prevent Prescription Drugs in Sewer	
5	Rhys: There is value of adding target – e.g. 1 communication a year. It provides something tangible to focus on. Ann agreed – good comment. Kristin: We will review and add something. Shannon: This is a fine line – we need to be specific but have flexibility. Kristin: For the final report we will make the table easier to understand with better background information behind each commitment.
6 – Reduce Odours	
6	Rhys: The original commitment was thinking of future boundaries. Perhaps think of the importance to recognise the potential for future incorporation, but operator focus is equally important. Shannon: OCPs will take sewage treatment plant location into consideration. However, odours are odours – they can travel and zoning may not control all odours. Moira: The north lagoon area has development potential for large homes; we should take care of this issue now. It is a desirable area for homes with river valley views. Kristin: Does the old commitment work? Moira: Would future upgrades take care of the odours? General: Upgrades would help, but it does not solve the problem.

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	<p>Moira: This issue may arise with property resale – the owner wants to sell but cannot due to odour. Al: It's also a density issue – should avoid big developments. Shannon: We can check the by-law to see if the zoning works. Victor: The prevailing wind is away from development. The City's plan is to stick with industrial in the area, but it's not the case for the PRRD. Rhys: Would we need to reopen the plan if it still retained the worded commitment? Moira: Any ability to table this issue and review later? Kristin: We can do this and review this issue as the boundary expands. Al wants to see something in the plan. Kristin noted that it is important to consider odours in the plan and that it can be reviewed and addressed in the future.</p>
7 – Control Quality of Proposed OSB Plant Discharge	
7	<p>Lindsay: A station was never built on site; it was not in their agreement but it was in the plan. Kristin: This statement is part of the previous item about the OSB (Sanitary Sewage Flows – Item 4).</p>
8 – Future Treatment Locations	
8a	<p><i>Plan Location of Treatment Plant Expansions</i> Kristin: There's uncertainty to how the City will expand (direction)</p>
8b	<p><i>Vacuum Truck Dumping Site</i> Kristin: Currently only septic sewage is allowed at the disposal site. Madhu: What else is dumped there? Kristin: It may contain some older material from a previous collection. Victor: Dumping can cause shock to the sewage treatment plant due to the concentrated nature of material. Rhys: Is there an outcome of the commitment referring to the costs? Kristin: The City attempts to recovers costs; they have increased the rates. Moira: Is there a holding tank? Kristin: No, there is not a holding tank. It discharges directly to the treatment plant. Jeremy: It is challenging to handle. Victor: The City's preference is to avoid handling trucked sewage as it is a challenge and it settles in the lagoons; this increases sludge accumulation. It would be ideal to have a separate lagoon. Moira: Is a holding tank the answer? Kristin: The wording allows the City to manage this situation. Ann questioned the wording "negatively affected" and how it can be measured? Is it true at the moment? Rhys: It is probably affected already. Victor: The current system costs money and is a challenge. The City wants wording to help manage these costs. Ann: Should we add wording to monitor the dumping? Rhys suggests wording to allow the City to recover costs and allow the City to decide when the City does not want to operate this due to issues. The holding tank approach will allow a gentle feed rather than batches. He likes the general set up and cannot think of better wording. Kristin: We will ponder this one. Ann: A shut down is not realistic. Shannon: The full cost is being recovered and it is a benefit. It has to work and if not work, then we must fix it.</p>

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	<p>Madhu: Illegal dumping increases and is a risk if the station is shut down, such as illegal dumping in the woods. Joanne: Illegal also includes dumping into manholes. Al suggests adding concepts of “impacting costs of maintenance”. Kristin/Moira: What is negatively affected? Jeremy: The City can easily raise the rates. Kristin: We will look at the wording.</p>
9 – Certification of Facilities and Operators	
9	<p>Ann: It would be nice to keep the wording. Kristin: The City has to do it anyway, but it is nice to reiterate in the commitments.</p>
STORM WATER TREATMENT	
1a	<p><i>Reduce Contaminants Discharged to Creeks</i> Al: Is there value to incorporating this in the servicing by-law? Victor: Work was done in the by-law for flow mitigation with post development flow = pre-development flow. Also underground storage tanks are installed at some sites to catch grit and slow down flow. Al: Will this be in the LWMP? Kristin: The LWMP cannot ignore stormwater – it is a requirement of the LMWP. But we want more than a token statement so that is why we want to do an integrated stormwater management plan.</p>
1b	<p><i>Reduce Silt Entering System</i> As above</p>
1c	<p><i>Reduce Overwatering</i> Handled in the water side of things. No comment</p>
SERVICING NEIGHBOURING COMMUNITIES	
1a	<p><i>Tie-In Neighbouring Communities with Sewer Service</i> The City’s policy is to not service outside the City’s boundary. Shannon: It would be great to see something broad such that if the City’s policy changes there may be potential in the future for negotiation. Victor: The old commitment wording is restrictive. Joanne: cannot think of anything in the plan which would not allow you to serve outside the City without opening the plan. Rhys suggests adding a broad statement to provide guidance on something which may happen in the next 5 years. Kristin: The Steering Committee may have a different approach. Lindsay: Payment recovery is needed. Moira: The City’s boundaries may change sooner than expected. Need consideration for regional growth not just City growth. Perhaps address servicing through development cost charges or agreement. Kristin: This is different to growth and could affect the LWMP and change its concept and direction. Moira: Is there more influence here from the PRRD than the City? Kristin: We will see if we can work on wording here. Shannon: The PRRD may end up on a stand-alone system outside City, but it’s nice to keep the door open. He recognises that the Steering Committee is the final decision maker on the plan.</p>
1b	<p><i>Provide Facilities for Septic Haulers</i> No comments</p>

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- 3. General Discussion about New LWMP Commitments** Kristin Bayet
- Kristin asked if there were any other additions to add. No further comments were received. Kristin reminded attendees that additions can be made after the draft is circulated.
-
- 4. Public Engagement – Getting Feedback on the New LWMP** Kristin Bayet
- Kristin resumed the presentation that was started at the beginning of the meeting. This second part of the presentation was focused on Public Consultation and the next steps to come. Discussion followed:
- Ann: What is the timing of the public consultation?
 - Kristin: The first step is to get feedback from the MOE before going to the public. Likely to be public after Christmas. We can do SAC and MOE feedback at the same time, and will finalize the LWMP afterwards.
 - Ann: Who is on the Steering Committee?
 - Kristin: Council and senior City staff. Don, Victor, Dianne. Members of the Steering Committee are also at SAC meeting, but it was not possible for council members to attend this one.
 - Lindsay: Did the survey go out on Facebook?
 - Victor: Yes, the survey was on the City's website and link through the City's Facebook page.
 - Don: Public meetings may turn up 3 people. The City receives much better feedback and higher numbers through Facebook.
 - Victor: About 2,500 people on the City's Facebook.
 - Kristin: The feedback is not anonymous so it tends to be more realistic on Facebook.
 - Don: How do you reach outside the 29 year old male who uses Facebook?
 - Kristin: This will be the last formal meeting unless the SAC wants to meet again. Please do send feedback to us, plus feedback on the draft report. Focus on concepts, not grammar.
 - Victor: We received good feedback on Municipal Day
 - Madhu spoke about community based changes, professionals on behavioural changes, and community based social marketing. Referenced Dr. MacKenzie Moore as a good tool/resource.
 - Shannon: He has seen good plans and bad plans. Timelines, budgets, staff input are important. If staff says it is doable – this is what makes a good plan.
-
- 5. Closing Remarks** Kristin Bayet / Victor Shopland
- Kristin and Victor both thanked the SAC members for their attendance and input.
-

The preceding is the writer's interpretation of the proceedings and any discrepancies and/or omissions should be reported to the writer.
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Appendix B

Phase 1 – Public Consultation Material

energizer

The City of Fort St. John's Community Newsletter

fall 2011



FORT ST. JOHN
The Energetic City

The Edible City

What is a Liquid Waste Management Plan?

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 solutions.

Public participation is a key component of a LWMP to allow the issues, concerns, and views of citizens to be considered in the plan. The City of Fort St. John's current LWMP was developed in 2004.

Why is the City updating its LWMP?

The City is undertaking a review in order to fulfill provincial guidelines that suggest a LWMP review be held after 5 years.

Additionally, a number of stakeholders currently use "potable" water from the City's domestic water system – or fresh surface water from nearby lakes, rivers and streams – for "non-potable" uses. The oil and gas industry is one of the largest users of the City's "potable" water. In order to reduce the demand on the City's potable water system, the City is considering using municipal wastewater as a reliable alternative for some of the oil and gas industry's "non-potable" water needs (hydraulic fracturing, dust control, mud preparation, etc.). The LWMP needs to be updated in order to allow for this significant change in how the City's wastewater is disposed of.

What "YOU" can do...

As part of the public consultation process for the LWMP update, a Public Advisory Committee is being formed. The City of Fort St. John is inviting any interested citizens to join the Public Advisory Committee. The Committee will meet approximately 4 times over the coming months and review the current and proposed LWMP. If you are interested in participating in the committee, or providing comments to the committee, please contact Victor Shopland, Director of Capital Works and Infrastructure, at 250.787.8150 or vshopland@fortstjohn.ca.





What is a LWMP?

The purpose of a Liquid Waste Management Plan (LWMP) is to establish direction for the safe and environmentally sustainable treatment and discharge of municipal wastewater (sewage and stormwater). In particular, a LWMP identifies the issues and concerns, provides potential options and selects the preferred solutions.

The City of Fort St. John's current LWMP was developed in 2004.



Why is the City updating its LWMP?

The City is undertaking a review of its LWMP to fulfill provincial guidelines that suggest a LWMP review be conducted periodically.

Additionally, a number of stakeholders currently use potable water from the City's domestic water system – or fresh surface water from nearby lakes, rivers and streams – for non-potable uses. Industry is one of the largest users of the City's potable water.

In order to reduce the demand on the City's potable water system, the City is considering promoting municipal wastewater as a reliable alternative for non-potable water needs for industrial and other large scale water users. The LWMP needs to be updated in order to allow for this significant change in how the City's wastewater is used/discharged.

Your involvement is important

We are targeting to have the review process complete by Fall 2012, but we need your help. Public participation is a key component of any LWMP process. It allows citizens to voice their concerns and views about how the City manages its waste water and to have their views considered before the LWMP plan is finalized.

We want to find out your views on a number of waste water topics. We invite you to take a few minutes to complete the attached survey – or to complete the survey on-line on the City's website at www.fortstjohn.ca.



You could win!

Individuals who complete the LWMP Review Survey can have their names put into a draw to win a rain barrel.

Connecting a rain barrel to your roof runoff spout will help to keep stormwater out of the sewer system and may save you money on your water bill. Because the water comes from your rooftop, the water is relatively clean and its uses are versatile.



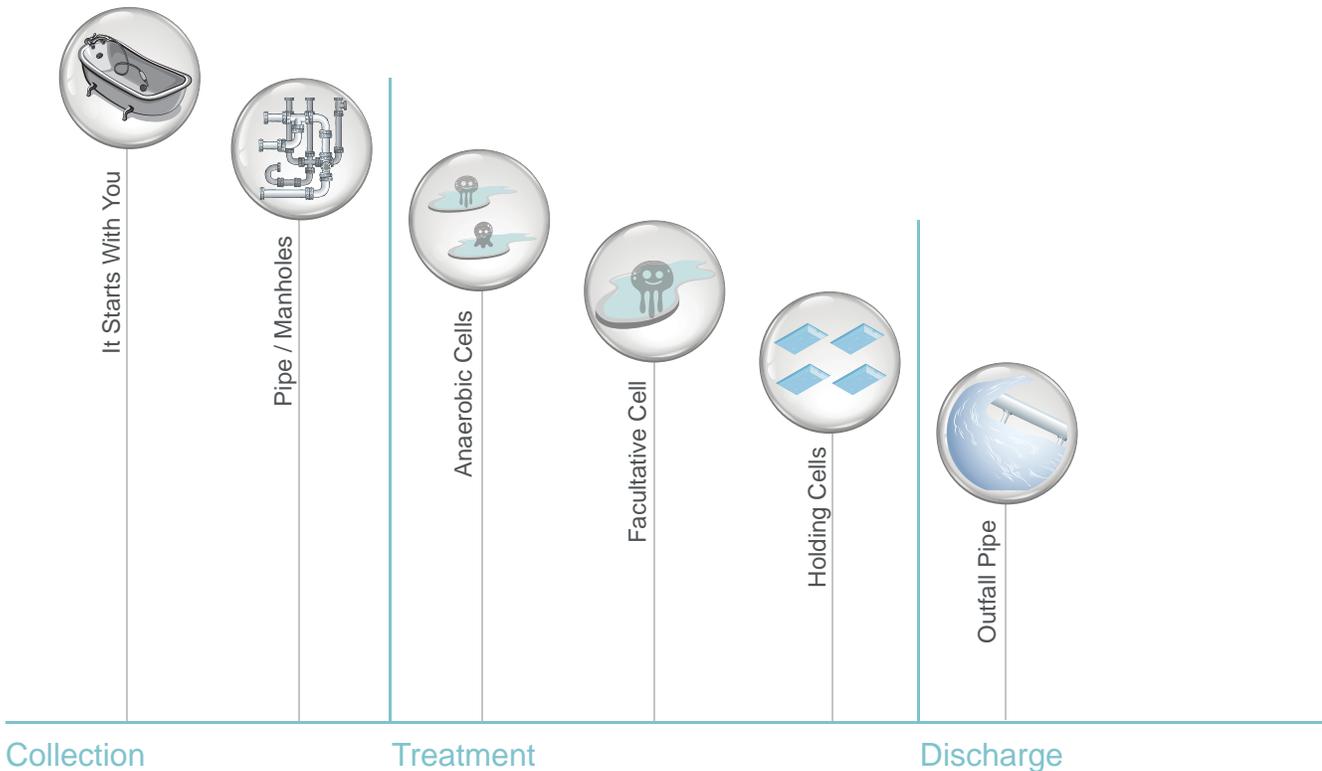
Rain barrels provide naturally softened water that is ideal for delicate houseplants, cleaning your car and washing your windows. They also create a backup source of water during times of drought or between rainfalls.

Don't forget to include your name and contact information when filling out the survey.



Fort St. John Sewer System

The City of Fort St. John collects raw sewage from all lots within its boundary – about 5,000 houses and businesses. The sewage is conveyed through a network of pipes and manholes to one of two treatment locations – the South Lagoons or the North Lagoons.



North Sewer System



1. It Starts With You

The North sanitary collection system collects approximately 23 percent of the flow from all of the City of Fort St. John's residences and businesses – liquid waste from the toilets, sinks and showers of approximately 1150 lots. The system covers City lots north of 105th Avenue.

Commitments We've Met Since the 2004 LWMP

- » We've increased the capacity of system by building new pipes in the NW corner of the City and twinning the pipe to the North Lagoons.



2. Pipe/Manholes

A network of pipes conveys the sewage to the North Lagoons. Most of the sewage in this system is conveyed via gravity and a small amount through a Septic Tank Effluent Pressure (STEP) system in the Northwest corner of the City.



3. Anaerobic Cells

The sewage flows into four anaerobic (without air) holding cells. Like the South Lagoon system, microscopic bugs consume the nutrients in the sewage. But unlike the South system, these bugs do not require air to thrive and do their job. However, they still create water and gasses as waste. Unlike the bugs in the south system, the anaerobic micro-organisms in this process produce methane and hydrogen sulfide gases – recognizable by their rotten egg smell.



4. Facultative Cell

The partially treated sewage from the anaerobic cells makes its way to the facultative cell, a larger but also much shallower pond (1.5 m deep). Facultative means having the ability to live in more than one set of environmental conditions. It refers to the types of micro-organisms at work in this pond. These microscopic bugs can do their job with or without air.

The shallowness of the ponds means that air can easily permeate into the water. In winter, when ice covers the pond, no

atmospheric air is dissolved in the liquid. While the bugs continue to munch on nutrients and produce gasses, the ice prevents it from dissipating into the air. That's why there is often a stronger odour coming from the facultative ponds during the Spring melt.



5. Holding Cells

Treated effluent from the facultative cell flows to four holding cells (ponds) where it is stored during non-discharge periods. Effluent is discharged during only two time periods during the year.



6. Outfall Pipe

Effluent travels via gravity through the outfall pipe to the river. Only after the treated effluent has been checked to ensure it meets Ministry of Environment quality standards can it be discharged to the Beatton River. Even then, it's discharged only during two windows during the year: between April 15 and June 30 and September 1 to October 31. It is typically during these times that the river flow is high enough to ensure adequate dilution of the effluent.



3. Grit Removal Chamber

To protect the pumps at the lift station, a grit removal chamber was installed in 2010 upstream of the main lift station. As its name suggests, grit (like sand and gravel) settles in the bottom of the grit chamber. The sewage, minus all the grit, continues to flow into the lift station.



4. Lift Station

At the lift station, three large pumps ensure all the sewage collected here makes its way -- up hill this time -- to the south lagoons for treatment. Sewage is also trucked to the lift station (mainly from Peace River Regional District properties) where it is screened to remove non-biodegradable materials before entering the system.



5. Complete Mix Tanks - A Bug's Life

After passing through the lift station, the sewage is split into two complete mix tanks. Air is pumped into the bottom of the tank to provide oxygen and vigorous mixing. The oxygen and mixing stimulates aerobic organisms (microscopic bugs) to eat the waste and grow. While we eat food and create waste, these bugs eat our waste and create water and gasses as a waste product.



6. Aerated Lagoons

These lagoons introduce less intense air flow to further treat the sewage. The treatment is much slower through this stage with the sewage taking 3 to 4 weeks to flow via gravity through the lagoons. The microscopic bugs continue to consume the nutrients (waste to us), get bigger and eventually settle to the bottom of the lagoons. We call this settled material sludge.



7. Outfall Pipe

After the lagoons, the sewage treatment is complete. The treated wastewater (called effluent) flows through a pipe to a building where the flow rate is measured. The effluent is also tested to ensure it meets the quality requirements set out by the Ministry of Environment.

From here, the effluent flows down an outfall pipe to the Peace River. A diffuser on the outlet in the river disperses the flow through a series of smaller pipes to allow mixing with the river flows.

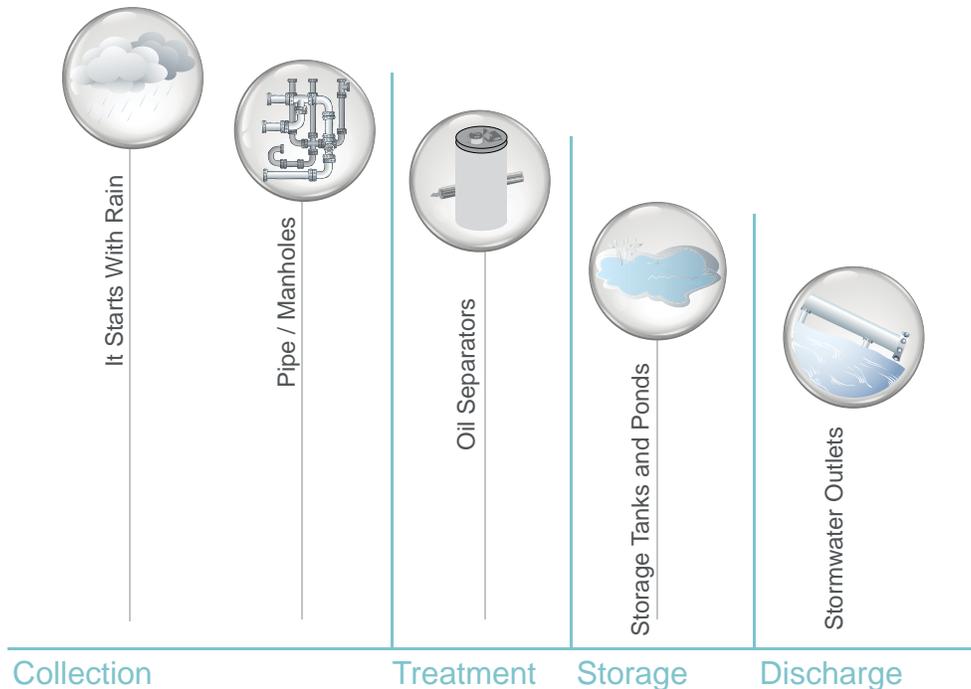
Sewage Treatment Commitments Met Since the 2004 LWMP

- » Met effluent quality requirements prior to discharge to the Peace and Beatton Rivers. Monitoring of quality is ongoing.
- » Completed Environmental Impact Studies for both the north and south lagoons to review the impacts of discharge to the Peace and Beatton Rivers.
- » Built a new outfall and diffuser to ensure better effluent mixing in the Peace River.
- » Built a new complete mix tank for the south system to accommodate increased sewage volumes.

There are no major outstanding issues or commitments for the sanitary treatment systems.

Fort St. John Stormwater System

The City of Fort St. John's stormwater system collects and manages the water runoff caused by melting snow and rain. It consists of a formal network of pipes, manholes and catchbasins as well as a less formal system that runs overland via roadways and ditches. Like the City's sanitary sewer system, the stormwater system is split into north and south networks.



1. It Starts With Rain

You've seen it a hundred times. It rains hard and soon stormwater is draining overland across lots and flowing along roadways and ditches. Most areas in the City (but not all) have catchbasins that help collect the rainwater and divert it to storm sewer pipes.



2. Pipes/Manholes

A network of pipes and manholes take the stormwater runoff to various outlets around the City.

What's Been Done Since the 2004 LWMP?

- » While not exactly a commitment in the 2004 LWMP, the City began requiring oil separators to be installed to treat stormwater runoff at all new industrial lots and parking lots with more than 20 stalls.
- » Stormwater flow rate control was not a commitment, but is something the City is requiring for all new developments. What it means is that any new development must maintain the same or less rate of runoff as pre-development rates.

Which Stormwater Issues Continue to Challenge Us?

- » The City has yet to develop stormwater treatment guidelines.
- » Beyond the need for oil separators, no stormwater treatment has been mandated for large developments..



3. Oil Separator

Many of the City's industrial lots and parking lots of more than 20 stalls treat stormwater runoff on site by using an underground oil separator. Stormwater runoff at the site is diverted into the oil separator tank. Because oil is lighter than water, it floats to the top of the tank. Any solids (gravel, sand, etc.) naturally settle to the bottom. The water flows out the middle of the tank and to the nearest stormwater outlets.



4. Storage Tanks and Ponds

To lessen the intensity of run-off, some sites have reduced stormwater runoff to pre-development flows by using on-site storage or ponds. Rather than flowing from the site or development, stormwater is stored in underground tanks, oversized pipes, or in large ponds. This allows the intense flows from heavy rainfalls to be stored on-site and released more slowly after the rain to minimize the downstream impact of the runoff from the site



5. Stormwater Outlets

Stormwater travels through pipes and ponds to stormwater outlets (pipes or culverts). Some of the City's stormwater flows to Fish Creek in the North. However, the majority of stormwater, from the south half of the City, drains to the Bouffieux Coulee and the Peace River.

The Pomeroy Sports Centre is a good example of how stormwater is being managed for new developments. The storm system at the centre has been designed to:

- » Provide treatment of stormwater runoff from the site (through an oil separator).
- » Negate the use of potable water for irrigation by using rooftop runoff to irrigate the lawns and plants.
- » Reduce the intensity of stormwater runoff into the system.

The roof runoff from the Pomeroy Sports Centre is diverted into a stormwater storage cistern. The Centre uses this water to irrigate its landscaped areas. The irrigation system only operates when moisture sensors, buried in the soil, indicate dry soil conditions. When needed, the irrigation system pumps water out of the cistern rather than from the City's water system. The Pomeroy also has a second storage tank for parking lot runoff and oversized pipes to store additional water.

Pomeroy Sports Centre



Provide your input and enter your name to win a rain barrel!

The City of Fort St. John is conducting a review of its Liquid Waste Management Plan (LWMP) and we need your help! A LWMP provides a strategy for how the City will collect and treat its sewage and stormwater. The plan identifies any issues with the current systems, sets out improvements needed to address them and estimates the associated costs. This survey is one way the City is gathering input that will help us to recognize our wastewater issues and identify sound, affordable solutions that meet our community's needs.



Please take a few minutes to complete the questions below.

1. Do you live in or have property in Fort St. John? Y N

2. The current LWMP (2004) identified a number of upgrades that have already been implemented to improve the system, such as sewer treatment plant upgrades, fixing the outfall to the Peace River, Environmental Impact Studies to monitor the effects of effluent on the Peace and Beatton rivers, twinning undersized pipes, and installing water meters.

However, there continue to be issues with the storm and sewer systems. Addressing these issues often results in costs to taxpayers. Please rate how important addressing each of these issues is to you.

1=not important, 2=somewhat important, 4=very important, DN=don't know

- | | 1 | 2 | 3 | DN |
|---|--------------------------|--------------------------|--------------------------|--------------------------|
| a) Basements flooding during heavy rains. | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| b) Illegal dumping of potentially toxic substances (such as oil, grease, chemicals, paint, and prescription drugs) into the sewer system. | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| c) The high volume of untreated storm water (causing drainage channel erosion and potential negative effects on streams and rivers). | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| d) Aging sewer and stormwater pipes (causing leaking and requiring frequent repairs or service disruptions). | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| e) Industry and other large scale water users using potable (drinking) water for non-potable purposes (irrigation, industrial processes, etc.). | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| f) Planning for future growth of the City. | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |

Continued on p. 2

What other liquid waste issues do you believe should be considered in the new plan?

3. How important is it to you that the City investigates the feasibility of providing the City's effluent (treated wastewater) to industrial and other large scale water users as an alternative to using potable (drinking) water for non-potable purposes?

- Not at all important
- Somewhat important
- Very important
- Don't know

Please comment on your response.

4. Because the City's south sewage treatment process includes a significant change in elevation between the lagoons and the river, there may be an opportunity for the City to generate power using a turbine. How important is it to you that the City investigates the feasibility of using the sewage treatment process to generate additional energy for the City?

- Not at all important
- Somewhat important
- Very important
- Don't know

Please comment on your response.

Continued on p. 3

5. A draft of the revised LWMP will be provided to the public this summer/fall for comments and review. Please indicate your preferred methods to learn about the new plan and to provide your input? Please check all that apply:

- Information posted on the City's website
- Social media dialogue (e.g. Facebook announcements, Twitter posts)
- Face-to-face community information session (open house)
- Information insert in the newspaper
- Information mailed to your home (e.g. City's *Energizer* publication)
- On-line survey
- Mail in survey
- Other (please describe)

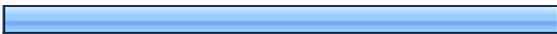
6. Please provide any additional comments you have regarding the City's LWMP review of the sewer or stormwater systems.

If you would like to enter the draw for a rain barrel, please provide your name, email, and phone number. The City will not use your contact information for any purpose other than to contact you if you win our contest.

Name: _____

Email: _____ Phone: _____

1. Do you live in or have property in Fort St. John?

		Response Percent	Response Count
Yes		83.8%	31
No		16.2%	6
answered question			37
skipped question			3

2. Please rate how important addressing each of these issues is to you. 1 = not important, 2 = somewhat important, 3 = very important, DN = don't know

	1	2	3	DN	Response Count
Basements flooding during heavy rains.	17.5% (7)	22.5% (9)	57.5% (23)	2.5% (1)	40
Illegal dumping of potentially toxic substances (such as oil, grease, chemicals, paint, and prescription drugs) into the sewer system.	5.1% (2)	7.7% (3)	84.6% (33)	2.6% (1)	39
The high volume of untreated storm water (causing drainage channel erosion and potential negative effects on streams and rivers).	5.0% (2)	32.5% (13)	60.0% (24)	2.5% (1)	40
Aging sewer and stormwater pipes (causing leaking and requiring frequent repairs or service disruptions).	7.5% (3)	20.0% (8)	67.5% (27)	5.0% (2)	40
Industry and other large scale water users using potable (drinking) water for non-potable purposes (irrigation, industrial processes, etc.)	5.0% (2)	20.0% (8)	70.0% (28)	5.0% (2)	40
Planning for future growth of the City.	5.0% (2)	7.5% (3)	85.0% (34)	2.5% (1)	40

What other liquid waste issues do you believe should be considered in the new plan? 18

answered question 40

skipped question 0

3. How important is it to you that the City investigates the feasibility of providing the City's effluent (treated wastewater) to industrial and other large scale water users as an alternative to using potable (drinking) water for non-potable purposes?

		Response Percent	Response Count
Not at all important		5.0%	2
Somewhat important		37.5%	15
Very important		55.0%	22
Don't Know		2.5%	1

Please comment on your response. 10

answered question 40

skipped question 0

4. How important is it to you that the City investigates the feasibility of using the sewage treatment process to generate additional energy for the City?

		Response Percent	Response Count
Not at all important		10.0%	4
Somewhat important		17.5%	7
Very important		62.5%	25
Don't know		10.0%	4

Please comment on your response 12

answered question 40

skipped question 0

5. Please indicate your preferred methods to learn about the new plan and to provide your input. Please check all that apply:

		Response Percent	Response Count
Information posted on the City's website		42.5%	17
Social media dialogue (e.g. Facebook announcements, Twitter posts)		32.5%	13
Face-to-face community information session (open house)		30.0%	12
Information insert in the newspaper		27.5%	11
Information mailed to your home (e.g. City's Energizer publication)		40.0%	16
On-line survey		25.0%	10
Mail in survey		15.0%	6
Other (please describe)		10.0%	4
		answered question	40
		skipped question	0

6. Please provide any additional comments you have regarding the City's LWMP review of the sewer or stormwater systems.

	Response Count
	5
answered question	5
skipped question	35

7. If you would like to enter the draw for a rain barrel, please provide your name, email, and phone number. The City will not use your contact information for any purpose other than to contact you if you win our contest.

		Response Percent	Response Count
Name:	<input type="text"/>	100.0%	40
Email:	<input type="text"/>	0.0%	0
Phone Number:	<input type="text"/>	0.0%	0
		answered question	40
		skipped question	0

Page 3, Q2. Please rate how important addressing each of these issues is to you.

1 = not important, 2 = somewhat important, 3 = very important, DN = don't know

1	Run off drainage use somehow	Jun 14, 2012 11:56 AM
2	?	Jun 14, 2012 11:52 AM
3	Don't Know	Jun 14, 2012 11:47 AM
4	Fracking (ban it!)	Jun 14, 2012 11:42 AM
5	Industry waste especially where civilians have to live or travel	Jun 14, 2012 11:39 AM
6	Oil Patch issues	Jun 14, 2012 11:37 AM
7	Providing easily accessible dump sites for the general public.	Jun 14, 2012 11:36 AM
8	?	Jun 14, 2012 11:35 AM
9	Stagnant Rain Water	Jun 14, 2012 11:29 AM
10	Stagnant pond water	Jun 14, 2012 9:14 AM
11	Human waste	Jun 14, 2012 9:12 AM
12	Snow melt along 93 ave and 100th Ave (north east area) and Snow melt along 86th street (south east area)	Jun 14, 2012 9:08 AM
13	Radon	Jun 14, 2012 9:07 AM
14	Antifreeze/cooland Used oil	Jun 14, 2012 9:02 AM
15	Waste into the river.	Jun 14, 2012 8:59 AM
16	?	Jun 14, 2012 8:58 AM
17	D.K.	Jun 14, 2012 8:57 AM
18	Not sure	Jun 14, 2012 8:52 AM

Page 4, Q3. How important is it to you that the City investigates the feasibility of providing the City's effluent (treated wastewater) to industrial and other large scale water users as an alternative to using potable (drinking) water for non-potable purposes?

1	Depends on costs	Jun 14, 2012 11:52 AM
2	It seems a huge waste to be supplying them with good water	Jun 14, 2012 11:45 AM
3	The lives of the citizens are at risk and later the government will have to compensate	Jun 14, 2012 11:40 AM
4	It's just responsible	Jun 14, 2012 11:36 AM
5	Industry should pay for their own water treatment	Jun 14, 2012 11:29 AM
6	Industry should pay for their own water treatment	Jun 14, 2012 9:14 AM
7	No comment	Jun 14, 2012 9:12 AM
8	Its important to be safe	Jun 14, 2012 9:07 AM
9	Industrial users requests can only be considered if we have a large margin of surplus water.	Jun 14, 2012 9:02 AM
10	So we have cleaner water	Jun 14, 2012 8:52 AM

Page 5, Q4. How important is it to you that the City investigates the feasibility of using the sewage treatment process to generate additional energy for the City?

1	Cost effectance	Jun 14, 2012 11:57 AM
2	We can always use new power sources	Jun 14, 2012 11:54 AM
3	Depends on costs	Jun 14, 2012 11:53 AM
4	Use all means of green resources	Jun 14, 2012 11:42 AM
5	Not sure if cost effective	Jun 14, 2012 11:29 AM
6	Not sure if it would cost effective	Jun 14, 2012 9:26 AM
7	No comment	Jun 14, 2012 9:12 AM
8	greatly needed	Jun 14, 2012 9:06 AM
9	This is a good idea I have not considered until today. Thanks!	Jun 14, 2012 9:03 AM
10	Water makes a great energy source	Jun 14, 2012 9:00 AM
11	Site C is coming	Jun 14, 2012 8:58 AM
12	Not sure	Jun 14, 2012 8:52 AM

Page 6, Q5. Please indicate your preferred methods to learn about the new plan and to provide your input.

Please check all that apply:

1	Or email	Jun 14, 2012 11:43 AM
2	Time efficiency	Jun 14, 2012 11:41 AM
3	Brian Ruddell 10416 - 104 St FSJ V1J 4C7	Jun 14, 2012 9:03 AM
4	So it can be explained!	Jun 14, 2012 8:53 AM

Page 7, Q6. Please provide any additional comments you have regarding the City's LWMP review of the sewer or stormwater systems.

1	I hope it is effective in saving longterm health hazards	Jun 14, 2012 11:41 AM
2	The survey could be on less paper if you use both sides :)	Jun 14, 2012 9:13 AM
3	N/A	Jun 14, 2012 9:12 AM
4	How about turbine use on north lagoon?	Jun 14, 2012 9:03 AM
5	I'd really like to learn more aobut it more knowledge!!	Jun 14, 2012 8:53 AM

Page 8, Q7. If you would like to enter the draw for a rain barrel, please provide your name, email, and phone number. The City will not use your contact information for any purpose other than to contact you if you win our contest.

	1	
Name:	MGD	Jun 14, 2012 11:57 AM
	2	
Name:	MGD	Jun 14, 2012 11:56 AM
	3	
Name:	MGD	Jun 14, 2012 11:55 AM
	4	
Name:	MGD	Jun 14, 2012 11:54 AM
	5	
Name:	MGD	Jun 14, 2012 11:53 AM
	6	
Name:	MGD	Jun 14, 2012 11:52 AM
	7	
Name:	MGD	Jun 14, 2012 11:51 AM
	8	
Name:	MGD	Jun 14, 2012 11:47 AM
	9	
Name:	MGD	Jun 14, 2012 11:46 AM
	10	
Name:	MGD	Jun 14, 2012 11:46 AM
	11	
Name:	MGD	Jun 14, 2012 11:45 AM
	12	
Name:	MGD	Jun 14, 2012 11:44 AM
	13	
Name:	MGD	Jun 14, 2012 11:43 AM
	14	

Page 8, Q7. If you would like to enter the draw for a rain barrel, please provide your name, email, and phone number. The City will not use your contact information for any purpose other than to contact you if you win our contest.

Name:	MGD	Jun 14, 2012 11:41 AM
	15	
Name:	MGD	Jun 14, 2012 11:38 AM
	16	
Name:	MGD	Jun 14, 2012 11:37 AM
	17	
Name:	MGD	Jun 14, 2012 11:36 AM
	18	
Name:	MGD	Jun 14, 2012 11:35 AM
	19	
Name:	MGD	Jun 14, 2012 11:34 AM
	20	
Name:	MGD	Jun 14, 2012 11:32 AM
	21	
Name:	MGD	Jun 14, 2012 11:31 AM
	22	
Name:	MGD	Jun 14, 2012 11:31 AM
	23	
Name:	MGD	Jun 14, 2012 11:30 AM
	24	
Name:	MGD	Jun 14, 2012 9:26 AM
	25	
Name:	MGD	Jun 14, 2012 9:13 AM
	26	
Name:	MGD	Jun 14, 2012 9:12 AM
	27	
Name:	MGD	Jun 14, 2012 9:11 AM

Page 8, Q7. If you would like to enter the draw for a rain barrel, please provide your name, email, and phone number. The City will not use your contact information for any purpose other than to contact you if you win our contest.

	28	
Name:	MGD	Jun 14, 2012 9:10 AM
	29	
Name:	MGD	Jun 14, 2012 9:09 AM
	30	
Name:	MGD	Jun 14, 2012 9:07 AM
	31	
Name:	MGD	Jun 14, 2012 9:06 AM
	32	
Name:	MGD	Jun 14, 2012 9:05 AM
	33	
Name:	MGD	Jun 14, 2012 9:04 AM
	34	
Name:	MGD	Jun 14, 2012 9:03 AM
	35	
Name:	MGD	Jun 14, 2012 9:01 AM
	36	
Name:	MGD	Jun 14, 2012 8:59 AM
	37	
Name:	MGD	Jun 14, 2012 8:58 AM
	38	
Name:	MGD	Jun 14, 2012 8:57 AM
	39	
Name:	MGD	Jun 14, 2012 8:55 AM
	40	
Name:	MGD	Jun 14, 2012 8:53 AM

Appendix C

BC Ministry of Environment Correspondence
Re: Elevated BOD₅ Concentration

September 26, 2012

File: 1958.0242.12

BC Ministry of Environment
325 1011 4th Avenue
Prince George, BC V2L 3H9

Attention: Edward Hoffman, Regional Director

RE: CITY OF FORT ST. JOHN – EFFLUENT BOD₅ SUMMARY FOR THE SOUTH LAGOONS (ME-17748)

As discussed, please find below a summary of the information relating to the recent increase in the effluent total five day biochemical oxygen demand (BOD₅) concentration for City's South Lagoons.

1. BACKGROUND INFORMATION

The City operates two sewage treatment plants under an operational certificate (ME-17748). The South Lagoons is the larger of the two sites and discharges on a continual basis to the Peace River.

Data from the 24th July, 2012 sampling event indicated that the effluent total BOD₅ concentration was higher than that stipulated in the operational certificate (45 mg/L). The City responded immediately by terminating the discharge to the Peace River and diverting the effluent to the holding cells, which are intended primarily to manage stormwater flows. The reported increase in the effluent total BOD₅ concentration was unexpected as, prior to the sampling event on the 24th of July, there had been no concerns with regards to plant operations. In addition to domestic wastewater, the City does receive wastewater from the OSB plant at this site. The wastewater from the OSB plant is from the site's stormwater storage pond and, in 2011, there were effluent quality issues at the South Lagoon which were considered to be related to the prolonged discharge from the OSB plant. In order to address this concern, earlier in the summer of 2012, measures to reduce and regulate the flow released from the OSB plant were implemented. As a result, the OSB plant now only discharges for a maximum duration of 2 hours in the morning and 2 hours in the afternoon. Under this discharge rate, the daily contribution from the OSB plant to the City's hydraulic and organic loads are balanced with the incoming domestic sewage in order to minimise the potential for overloading the South Lagoons.

Since receiving data which indicated an elevated effluent total BOD₅ concentration, increased monitoring has been implemented in order to evaluate the cause of the increase. The increased monitoring includes a higher sampling frequency, split samples to different laboratories and the inclusion of additional parameters for analysis.

2. DATA SUMMARY AND DISCUSSION

Effluent data from the South Lagoons are summarised in Table 2.1. The data focus on the time period from the 5th June through to the last received data point (10th September). All data from before the 24th July were in compliance with the conditions of the operational certificate. The data are discussed further below.

Table 2.1: Data Summary – South Lagoon Effluent

Sample Date	Total BOD ₅ (mg/L)	CBOD ₅ (mg/L)	COD (mg/L)	Ammonia (mg/L)	TKN (mg/L)	Nitrate (mg/L)	Nitrite (mg/L)	Total Nitrogen (mg/L)	TSS (mg/L)	Dissolved Oxygen (mg/L)	Temp. (°C)
5-Jun-12	22	6.8	-	28.8	-	0.055	0.085	38.1	20.0	3.0	15.6
12-Jun-12	22.9	13.5	-	28.2	-	-	-	-	26.7	1.2	16.7
16-Jun-12	16.0	10.8	-	-	-	-	-	-	60.2	-	-
19-Jun-12	13.3	13.0	-	35.6	38.0	<0.050	0.016	38.0	52.0	1.5	16.5
3-Jul-12	21.3	12.3	-	34.3	-	-	-	-	36.5	0.32	18.6
10-Jul-12	19.6 ¹	8.1	-	-	-	-	-	-	34.7	2.05	21.1
24-Jul-12	87.6 ¹	9.1	-	-	-	-	-	-	30.7	1.33	21.0
31-Jul-12	72.4 ¹	14.1	-	25.9	-	-	-	-	39.3	0.85	21.0
	37.0 ²	11	-	26.7	-	-	-	-	37.0	-	-
8-Aug-12	52.6 ¹	26.6	101	19.2	-	-	-	-	48.0	4.33	20.9
	60.3 ³	-	-	-	-	-	-	-	-	-	-
13-Aug-12	147	9.3	91	19.4	-	-	-	-	32.9	5.26	19.4
21-Aug-12	132 ¹	12.1	76	21.0	-	-	-	-	22.2	4.57	20.0
	127 ¹	-	-	-	-	-	-	-	-	-	-
	203 ³	-	-	-	-	-	-	-	-	-	-
	199 ³	-	-	-	-	-	-	-	-	-	-
	196 ²	16	68	-	-	-	-	-	18	-	-
27-Aug-12	135	12	72	-	-	-	-	-	33	4.55	18.0
4-Sep-12	78.0 ¹	5.5	122	17.8	24.8	14.7	0.207	39.7	51.0	-	-
	38 ⁴	19	87	-	-	-	-	-	44	-	-
10-Sep-12	121	16	82	16	22.3	-	-	30.4	33	-	-

¹ Duplicate sample analysed at ALS Vancouver

² Duplicate sample analysed at AGAT Laboratories, Calgary

³ Duplicate sample analysed at ALS Calgary

⁴ Duplicate sample analysed a AGAT laboratories, Vancouver

2.1 Data Before July 24th

Prior to the recorded increase in effluent total BOD₅ on the 24th July, the data indicate that the effluent total BOD₅ concentration ranged from 13.3 to 22.9 mg/L (average 19.1 mg/L; n=6) with the effluent carbonaceous BOD₅ (CBOD₅) concentration ranging from 6.8 to 13.5 mg/L (average 10.8 mg/L; n=6). Therefore, the total BOD₅ concentration was significantly lower than the requirements stipulated in the operational certificate. There are no chemical oxygen demand (COD) data for this time period, as this parameter is not monitored as part of the standard operations.

With respect to the other parameters, the total suspended solids (TSS) concentration ranged from 20.0 to 60.2 mg/L (average 38.4 mg/L; n=6). The increase in the TSS concentration to 60.2 mg/L occurred on the 16th June, but there was no corresponding increase in the effluent total or carbonaceous BOD₅ concentrations. This concentration is at the maximum stipulated in the operational certificate, and was considered to be either a sampling error or related to spring turn-over of the lagoon. The effluent ammonia concentration ranged from 28.2 to 35.6 mg/L, with trace concentrations of nitrate and nitrite. This is as expected for the effluent nitrogen concentrations, due to the nature of the treatment facility. The effluent dissolved oxygen concentration ranged from 0.32 to 3.0 mg/L. An increase in the water temperature coincided with a decrease in the dissolved oxygen concentration, which would be expected, given the relationship between these two parameters. The operations can be modified somewhat through blower operation in order to increase or decrease the dissolved oxygen concentration, as conditions dictate.

Therefore, prior to July 24th, the effluent quality was as expected, given the nature of the treatment facility (lagoon which is transitioning to operation in the warmer seasons, and is designed to treat organic matter and solids, but not nitrogen).

2.2 Data From July 24th Onwards

For the time period from July 24th through to the last data received (September 10th), the total BOD₅ concentration ranged from 37 mg/L to 203 mg/L, with an average of 112 mg/L (n=15). Out of these 15 data points, 2 were below the concentration stipulated in the operational certificate. The data represent single samples analysed at the City's standard laboratory (ALS Vancouver) and split samples analysed at 4 different laboratories (ALS Vancouver, ALS Calgary, AGAT Vancouver and AGAT Calgary). With respect to the dates when split samples were tested at the different laboratories, there was consistency between the data for the August 8th and August 21st events, and all total BOD₅ concentrations were elevated and exceeded the requirements of the operational certificate. However for the July 31st and September 4th events, the data from ALS Vancouver were higher than the maximum stipulated in the operational certificate, but the data from AGAT indicated that the effluent total BOD₅ concentration was in

compliance. The most recent data (September 10th from AGAT Vancouver) indicates that the effluent total BOD₅ concentration exceeds the operational certificate requirements.

With respect to the CBOD₅ concentration for the same time period and the same samples, the concentration ranged from 5.5 mg/L to 26.6 mg/L, with an average of 13.7 mg/L (n=11). On all occasions, there was no concern with the effluent CBOD₅ concentration and the data indicated that there was no concern with respect to the plant operations. The operational certificate for this site focuses on the total BOD₅ concentration, not the CBOD₅ concentration which is recognised in the Municipal Wastewater Regulation (MWR), recently updated permits/operational certificates and the Federal Wastewater Systems Effluent Regulations (WSER). The effluent concentrations for CBOD₅ are compliant with both the requirements of the MWR and the WSER. The City is currently undertaking a Liquid Waste Management Plan (LWMP) review and one of the directions which has been set is to request that the operational certificate recognise CBOD₅ rather than total BOD₅.

Due to the elevated total BOD₅ concentrations, additional sampling was also completed for COD, which is not part of the standard monitoring program for the City's effluent. The data for COD are limited and indicate that the concentrations ranged from 68 mg/L to 122 mg/L (average 87 mg/L; n=8). Spilt tests were completed for COD on August 21st and September 4th.

The standard relationship for COD, total BOD₅ and CBOD₅ is:

$$\text{COD} > \text{total BOD}_5 > \text{CBOD}_5$$

However, while this relationship was observed for total BOD₅ and CBOD₅, this was not the case for COD and total BOD₅. Out of the 8 data points, there were 5 occasions when the concentration of total BOD₅ was higher than that recorded for COD. One of these events was for the spilt test for the August 21st sampling event. These data indicate that there is an oxygen demand which is affecting the outcome of the total BOD₅ test, but not the COD or the CBOD₅ tests. This oxygen demand is likely due to the presence of a reduced form of nitrogen (e.g. ammonia).

Since July 24th, the ammonia concentration has ranged from 16 mg/L to 26.7 mg/L, with an average concentration of 20.9 mg/L (n=7). For the sampling events, there was one occasion when the data represented a spilt sample (July 31st). Taking the historical data from 2007, the concentration of ammonia in the effluent is typically in the 25 to 35 mg/L range, although there have been occasions when very low concentrations of ammonia (e.g. < 5 mg/L) have been recorded. Although there has been the possibility of nitrification (biological ammonia reduction) occurring over the warmer months, this has never corresponded with an increase in the nitrate concentration. Therefore, it was assumed that if nitrification had been occurring then it was also coupled with the onset of denitrification. On most occasions, the historical decrease in ammonia was considered to be a factor of dilution through snowmelt

or incoming stormwater. However, data from September 4th indicate an effluent nitrate concentration of 14.7 mg/L with a corresponding decrease in the ammonia concentration from approximately 30 mg/L (early summer data) to 16 mg/L (recorded on September 4th). This is indicating that nitrification is occurring at the South Lagoons. Nitrifying bacteria are highly sensitive to environmental conditions, and require high dissolved oxygen concentrations, elevated water temperatures and low concentrations of organic matter (i.e. CBOD₅). All of these conditions are currently being recorded at the South Lagoons.

With respect to the other parameter which is stipulated in the operational certificate, the effluent TSS concentration since July 24th has ranged from 18 to 51 mg/L, with an average of 35.5 mg/L (n=11). The data include 3 split samples which were analysed at two different laboratories. The data were in compliance with the conditions of the operational certificate.

As a precaution, samples of the OSB discharge were taken on the 5th and 10th September, in order to determine if there were any factors which may have contributed to the increase in the total BOD₅ concentration for the South Lagoon effluent. The data (Table 2.2) indicated that the TSS and ammonia concentrations were low, and unlikely to affect the operation of the sewage treatment plant. The concentrations of total BOD₅, CBOD₅ and COD were higher than the typical domestic sewage which is received at the South Lagoons, but were not elevated to a concentration where operational problems would be expected (when considering both the measured concentration and the loading rate to the South Lagoons). In addition, the concentrations of these three parameters were at the proportions expected for a wastewater or effluent (i.e. CBOD₅ < total BOD₅ < COD).

Table 2.2: Data Summary – OSB Plant Discharge

Sample Date	Total BOD ₅ (mg/L)	CBOD ₅ (mg/L)	COD (mg/L)	Ammonia (mg/L)	Total Nitrogen (mg/L)	TSS (mg/L)
5-Sep-12	315	290	949	0.831	9.38	29.0
	305	254	899	0.72	-	33.5
	347	341	946	1.02	7.28	42
10-Sep-12	290	298	918	0.54	6.77	57

2.3 Conclusions

From the above information, the following conclusions can be drawn:

- The concentration of total BOD₅ is elevated and is non-compliant with the conditions of the operational certificate, which still is focused on total BOD₅, rather than CBOD₅, as with more recently published regulatory requirements.

- There is no concern with respect to the other parameters which have been measured in the effluent.
- There is no concern with respect to the operation of the South Lagoons, and the elevated total BOD₅ concentration, in this case.
- The data indicate that the irregular elevation in the total BOD₅ concentration is related to a nitrogenous oxygen demand. Nitrification is occurring at the site, and the presence/activity of nitrifying bacteria is an indication of a high effluent quality, based on the sensitivity of these micro-organisms to environmental conditions. It has also been reported that it is the presence of nitrifiers in the sample which can have a greater effect on the outcome of the total BOD₅ test than the presence of ammonia¹.
- The City has been storing the effluent in the holding cells from the receipt of the July 24th data through to the 19th of September. Therefore, no effluent has been released to the Peace River over this time period. However, given the typical dilution for this time of year (11,000:1), the dispersion and fast flowing nature of the Peace River, plus the low potential for a nitrogenous oxygen demand to cause a depression in a riverine dissolved oxygen concentration (naturally low numbers of nitrifiers in a riverine environment and the low reaction rate of these micro-organisms), the potential for an environmental impact as a result of the release is expected to be extremely low.
- If the terms of the operational certificate were focused on the CBOD₅ concentration, which is the most current standard, both Federally and Provincially, there would be no concern with respect to a lack of compliance.

3. NEXT STEPS

The following outline the next steps for this site:

- It is recommended that increased monitoring is undertaken on a weekly basis for the following parameters: TSS, total BOD₅, CBOD₅, COD and ammonia. The increased monitoring should continue until two consecutive samples indicate that the concentration of total BOD₅ is below the requirements of the operational certificate, after which the monitoring should return to the frequency and parameters outlined in the standard monitoring program.
- There is no requirement for any further split samples to different laboratories.
- The effluent criterion of total BOD₅ should be amended to CBOD₅ in the operational certificate. It is assumed that this will be undertaken after the LWMP review is complete.

¹ WEF (1998) Design of Municipal Wastewater Treatment Plants – Fourth Edition

- The City has been storing effluent for over 1 month, and is close to reaching the maximum storage capacity. The holding cells are intended to be used during storm events, and the lack of available capacity in these cells is placing the City in a vulnerable position in the case that there is a major storm event or a true operational/treatment issue. The release to the Peace River was initiated on the 19th September and consists of a blend of effluent from the aerated lagoons and the stored effluent from the holding cells.

4. CLOSURE

We trust that the above information provides a full summary of the total BOD₅ issue. However, please do not hesitate to contact us if you require clarification on any of the above.

Sincerely,

URBAN SYSTEMS LTD.

Dr. Joanne Harkness, R.P.Bio.
Water and Wastewater Specialist

/jh

cc: Ann Godon, BC Ministry of Environment
Victor Shopland – City of Fort St John
Don Demers – City of Fort St John
Jeremy Garner – City of Fort St John
Garland Durnford – City of Fort St John
Kristin Bayet – Urban Systems Ltd

U:\Projects_FSJ\1958\0242\12\5084 - Misc. Engineering\2012-09-26-LET South Lagoons BOD.docx

Chad Carlstrom

From: Joanne Harkness
Sent: October-05-12 11:26 AM
To: 'Godon, Ann M ENV:EX'
Cc: 'vshopland@fortstjohn.ca'; 'ddemers@fortstjohn.ca'; 'Garland Durnford <GDurnford@fortstjohn.ca> (GDurnford@fortstjohn.ca)'; Kristin Bayet; 'edhoffman@gov.bc.ca'; 'jgarner@fortstjohn.ca'
Subject: RE: re. City of Fort St John - summary letter regarding recent effluent data

Ann,

Thanks for the email. I also left a message for James and Bruce, just in case either of them was available to talk, as I will be away from the office next week.

We have recently received two more data sets (samples taken September 17th and 24th) which further support the earlier observations that the elevated total BOD₅ concentration is relating to nitrogenous oxygen demand and the activity of nitrifying bacteria. I believe that the City has already forwarded these data on to you.

The September 17th data indicate a decreasing concentration of ammonia and increasing concentration of nitrate. As with the earlier data, the total BOD₅ continues to be elevated, with no related elevated concentration for CBOD₅. The total BOD₅ concentration is also higher than the COD concentration. For this data set, we asked the lab to test for ammonia before and after the BOD test, and the data indicate that there was a decrease in the ammonia concentration through the duration of the test.

For September 24th, the data from the end of the aerated lagoons continues to indicate elevated concentrations of total BOD₅, again with low concentrations of CBOD₅ and ammonia (which continues to decrease in concentration). The total BOD₅ is reported to be higher than the COD. This data set also include samples of stored effluent (polishing cell and overflow cell), which show low concentrations for total BOD₅, CBOD₅ and ammonia. The lack of elevated total BOD₅ for these two samples would be expected as there is no nitrogenous oxygen demand given the low ammonia concentrations.

The City continues to release effluent, which consists of a blend of the aerator cell, polishing cell and overflow cell. The lab is currently analysing a blended sample and these data will be forwarded to you, once they are available.

As a heads up, we may see a spike in the effluent TSS concentration. If an increase occurs, this is not due to inadequate solids removal or treatment, but the presence of invertebrates such as *Daphnia* which are currently accumulating in the final effluent ponds.

The data continue to support the conclusion that the sewage treatment plant is working well and is producing an effluent of high quality.

Regards,

Joanne

Dr. Joanne Harkness, R.P.Bio
Water and Wastewater Specialist

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Toll free: 1-877-748-4498
jharkness@urbansystems.ca
urbansystems.ca

-----Original Message-----

From: Godon, Ann M ENV:EX [mailto:Ann.Godon@gov.bc.ca]
Sent: October-04-12 8:01 AM
To: jgarner@fortstjohn.ca
Cc: 'vshopland@fortstjohn.ca'; 'ddemers@fortstjohn.ca'; 'Garland Durnford <GDurnford@fortstjohn.ca> (GDurnford@fortstjohn.ca)'; Kristin Bayet; Joanne Harkness; edhoffman@gov.bc.ca
Subject: RE: re. City of Fort St John - summary letter regarding recent effluent data

Jeremy,

With regard to my email below, the best way to really demonstrate that this discharge is having a minimal environmental impact is to conduct an LC50 test on an effluent sample. I would recommend that you conduct this test IMMEDIATELY.

Unfortunately I will be out of the office today and tomorrow and will NOT be checking my emails. I will contact you next week to discuss this situation

Ann Godon

From: Godon, Ann M ENV:EX
Sent: Monday, October 01, 2012 12:17 PM
To: 'Joanne Harkness'; Hoffman, Edward A ENV:EX
Cc: 'vshopland@fortstjohn.ca'; 'ddemers@fortstjohn.ca'; 'jGarner@fortstjohn.ca'; 'Garland Durnford <GDurnford@fortstjohn.ca> (GDurnford@fortstjohn.ca)'; 'Kristin Bayet'
Subject: RE: re. City of Fort St John - summary letter regarding recent effluent data

Joanne,

Thank-you for the report. As a first scan I have the following comments:

- effluent should also be sampled and analyzed for resin acids and for LC50. The LC50 test should be conducted immediately.
- Incoming effluent from the OSB plant should also be sampled for resin acids
- The ammonia levels in this effluent are very high (>20 mg/L) and for this reason BOD should continue to remain as the parameter for compliance
- In my experience with other lagoon systems, TSS values > 25 mg/L would be a concern, especially during the summer season

- I agree that the discrepancy between BOD and COD is puzzling

I am still concerned about this discharge. I will be passing this report onto one of our impact assessment biologists for their comments.

Can you provide me with more contact information (names, positions, phone No) for the City so that I can include them on future correspondence.

Overall, the City took the right steps in immediately suspending the discharge. Our office needs to be notified immediately and in person regarding any exceedances of the operational certificate. I will send along a contact list for Regional Office notification once I have more contact information for the City.

Given the recent restrictions in government hiring, it is likely that I will be continuing to handle this file for the next several months.

Ann Godon, P.Eng.
Environmental Protection Officer
Ministry of Environment, Omineca and Peace Regions
T 250.565.6451 F 250.565.6629

BC Pollution Free

From: Joanne Harkness [mailto:jharkness@urbansystems.ca]
Sent: Friday, September 28, 2012 1:07 PM
To: Hoffman, Edward A ENV:EX
Cc: Godon, Ann M ENV:EX; 'vshopland@fortstjohn.ca'; 'ddemers@fortstjohn.ca'; jGarner@fortstjohn.ca; Garland Durnford <GDurnford@fortstjohn.ca> (GDurnford@fortstjohn.ca); Kristin Bayet
Subject: re: City of Fort St John - summary letter regarding recent effluent data

Please find attached a letter summarising the recent effluent data for the City's South Lagoons.

Please do not hesitate to contact me if you have any questions or if you require an original copy of the letter.

Regards,

Dr. Joanne Harkness, R.P.Bio
Water and Wastewater Specialist

[cid:image001.png@01CD9FCE.B9240F80]

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October 03, 2013

File: 1958.0242.13

BC Ministry of Environment
325 1011 4th Avenue
Prince George, BC V2L 3H9

Attention: Li Wan, M.A.Sc., P.Eng., Senior Environmental Protection Officer

RE: CITY OF FORT ST. JOHN – ELEVATED EFFLUENT BOD₅ CONCENTRATION AT THE SOUTH LAGOONS (ME-17748)

In August 2013, the City received data which indicated that the effluent total five day biochemical oxygen demand (BOD₅) concentration was elevated. Similar data were also received during the summer of 2012, and resulted in the City terminating the effluent discharge and undertaking additional analyses in order to understand the cause of the increase and implement any actions which would be required to reduce the total BOD₅ concentration to acceptable levels. The outcomes of the 2012 situation were summarised in a letter to the BC Ministry of Environment, dated September 26th, 2012. The information presented in the 2012 letter indicated that the irregular elevation in the total BOD₅ concentration was related to a nitrogenous oxygen demand, and was not indicative of a process issue, a treatment issue or poor effluent quality. This is also the case for the recently observed increase in the total BOD₅ concentration.

Please find below a summary of the current situation, an outline of the steps which have been taken by the City, and recommendations on the way forward.

1. CURRENT SITUATION FOR THE SOUTH LAGOONS

Data from the 13th August, 2013 sampling event indicate that the effluent total BOD₅ concentration had increased to 103 mg/L. After the 13th of August, the next three monitoring events indicated that the total BOD₅ concentration remained elevated. Although the concentration of total BOD₅ decreased during the early/middle of September, the most recent laboratory report indicates that the concentration of total BOD₅ is again elevated. The data are summarised in Table 1.1, and include the data from the August 7th monitoring event, which was immediately prior to the first observed concentration increase. Note that there are no data for the August 26th carbonaceous BOD₅ concentration due to a laboratory error. There are additional data for an LT50 bioassay for the September 9th monitoring event. The outcome of the LT50 test indicates that the effluent was not acutely toxic to fish; all of the fish survived the test period. There are also ammonia data available for the September 9th, 16th and 23rd samples, taken after the 5 day duration of the BOD test. These data indicate that there was minimal change between the measured ammonia concentration before and after the BOD₅ test, with the greatest change being for the September 23rd test (a reduction of 1.5 mg/L in the ammonia concentration). The data for the ammonia concentrations before and after the BOD₅ test were approximately 11 mg/L (September 9th), 15 mg/L

(September 16th) and 13 mg/L (September 23rd). (Note that the concentrations indicated in the laboratory report relate to a 50% dilution, rather than the undiluted “as-received” sample.)

The City terminated all effluent release to the Peace River on August 27th, and the effluent was diverted to a storage lagoon. The effluent release was re-initiated on receiving data which indicated that the total BOD₅ concentration was below 45 mg/L. However, this release has since been terminated, after receiving the September 23rd monitoring data.

As a precaution, the OSB plant was notified to cease discharge starting from August 26th, although the discharge from the OSB plant was indicated to have a low BOD₅ concentration.

Table 1.1: Data Summary – August 2013

Sample Date	Total BOD ₅ (mg/L)	Carbonaceous BOD ₅ (mg/L)	COD (mg/L)	Ammonia (mg/L)	TSS (mg/L)
7-Aug-13	15.3	2.3	68	24.2	14.5
13-Aug-13	103	6.9	88	25.5	22.1
20-Aug-13	119	3.5	56	No data	21.3
26-Aug-13	106	Unavailable	73	12.1	21.2
03-Sep-13	127	6.7	84	5.54	20.7
09-Sep-13	27.5	13.9	68	10.4	32.7
16-Sep-13	17.0	10.7	76	14.5	26.5
23-Sep-13	125	9.8	95	13.9	39.7

From Table 1.1, the data indicate that, prior to August 13th, the quality was as expected, given that the lagoons are designed to treat for total suspended solids (TSS) and carbonaceous BOD₅. The data from August 7th indicate that the concentrations for BOD₅ and TSS in the City’s effluent were indicative of an excellent effluent quality for a lagoon system. The effluent quality requirements of the operational certificate (ME-17748) focus on TSS and BOD₅ (which is assumed to relate to total BOD₅). The effluent criteria were below the quality requirements of the operational certificate (i.e. TSS ≤ 60 mg/L and BOD₅ ≤ 45 mg/L).

From August 13th, while the concentrations of carbonaceous BOD₅, chemical oxygen demand (COD), ammonia and TSS remained low, there was an increase in the total BOD₅ concentration. This increase was not aligned with the other parameters. For the samples with the elevated total BOD₅ concentration, there was also a consistent irregularity with respect to the relationship between total BOD₅ and COD, with the standard relationship for COD, total BOD₅ and carbonaceous BOD₅ being:

$$\text{COD} > \text{total BOD}_5 > \text{carbonaceous BOD}_5$$

The increase in the concentration of total BOD₅ with no corresponding increase in either COD or carbonaceous BOD₅ is indicative of an additional oxygen demand which is affecting the outcome of the total BOD₅ test, but not the COD or the carbonaceous BOD₅ tests. This oxygen demand is likely due to the presence of a reduced form of nitrogen (e.g. ammonia) causing a nitrogenous oxygen demand during the 5 day period for the total BOD₅ test.

From the above information, the following conclusions can be drawn:

- For the events when the concentration of total BOD₅ was elevated, there was no corresponding increase for any of the other parameters which were monitored. There was a significant decrease in the ammonia concentration starting with the August 26th data set, which is likely due to the onset of nitrification. With the exception of the total BOD₅ data, all other data indicate a treatment plant which is operating well and producing an excellent quality of effluent for a lagoon system.
- On the assumption that the reference to BOD₅ in the operational certificate is intended to mean total BOD₅, the effluent is non-compliant when the concentration exceeds 45 mg/L. However, if the reference to BOD₅ in the operational certificate is intended to mean carbonaceous BOD₅, the effluent is compliant for all of the above monitoring events. This effluent is also compliant with the Federal wastewater regulation (carbonaceous BOD₅ ≤ 25 mg/L, although this intended to be an average over a sample period, not an absolute concentration) and the BC Municipal Wastewater Regulation (carbonaceous BOD₅ ≤ 45 mg/L, maximum).
- There is no concern with respect to the other parameters which have been measured in the effluent.
- The data indicate that the irregular elevation in the total BOD₅ concentration is related to a nitrogenous oxygen demand. Nitrification is occurring at the site, and the presence/activity of nitrifying bacteria is an indication of an excellent effluent quality, based on the sensitivity of these micro-organisms to environmental conditions. It has also been reported that it is the presence of nitrifiers in the sample which can have a greater effect on the outcome of the total BOD₅ test than the presence of ammonia¹.
- Given that this issue is related to the presence of nitrifiers, the elevated total BOD₅ concentrations will decrease into the fall, as a result of the impact of cooler weather on nitrification and the growth of nitrifying bacteria. Due to the nature of a lagoon system, there is little that the City can implement with respect to managing this situation through amending process operations.

¹ WEF (1998) Design of Municipal Wastewater Treatment Plants – Fourth Edition

2. NEXT STEPS

The following recommendations are made with respect to this issue:

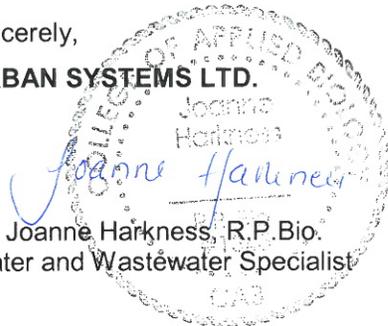
- It is recommended that a request be made to the BC Ministry of Environment to interpret the reference to BOD₅ in the operational certificate as carbonaceous BOD₅. As a result, all future effluent assessments should be based on carbonaceous BOD₅, which will allow consistency with both Federal and Provincial standards.
- In the interim, until this clarification is received, a protocol should be developed for implementation immediately on receiving data which indicate that the concentration for total BOD₅ is elevated, but that there is no corresponding elevation in any of the other monitored parameters – especially carbonaceous BOD₅ and COD. This protocol will focus on monitoring requirements in order to confirm that the increase in the total BOD₅ concentration is related to analytical limitations related to the total BOD₅ test, rather than an effluent or treatment issue.

3. CLOSURE

We trust that the above information provides a full summary of the total BOD₅ issue. However, please do not hesitate to contact us if you require clarification on any of the above.

Sincerely,

URBAN SYSTEMS LTD.



Dr. Joanne Harkness, R.P.Bio.
Water and Wastewater Specialist

/jh

cc: Victor Shopland – City of Fort St John
Don Demers – City of Fort St John
Jeremy Garner – City of Fort St John
Garland Durnford – City of Fort St John

Connie Blair

From: Wan, Li ENV:EX <Li.Wan@gov.bc.ca>
Sent: October-04-13 10:10 AM
To: Joanne Harkness
Cc: Saraswat, Arvind ENV:EX; 'vshopland@fortstjohn.ca'; 'ddemers@fortstjohn.ca'; 'jGarner@fortstjohn.ca'; 'Garland Durnford <GDurnford@fortstjohn.ca> (GDurnford@fortstjohn.ca)'
Subject: RE: Summary information - City of Fort St John elevated total BOD

Moring Joanne, Jeremy and Garland,

Please keep this email on your file as the Ministry of Environment's clarification for interpretation of BOD₅ in OC-17748.

In order to be consistent with current federal and provincial legislation (WSER- Wastewater Systems Effluent Regulation and MWR- Municipal Wastewater Regulation), BOD₅ in OC-17748 shall be interpreted as **Carbonaceous BOD₅—CBOD₅** for monitoring and compliance from now on.

If you have any questions regarding this, please let me know.

Best Regards,

Li

Li Wan, MAsc. PEng

Sr.EPO, Omineca/Peace Region
Ministry of Environment
#325 1011 4th Avenue, Prince George BC V2L 3H9
Email: Li.Wan@gov.bc.ca
P: (250) 565-6209, F: (250) 565-6629

Provincial Emergency Program: 1-800-663-3456

From: Joanne Harkness [<mailto:jharkness@urbansystems.ca>]
Sent: Thursday, October 3, 2013 12:11 PM
To: Wan, Li ENV:EX
Cc: 'vshopland@fortstjohn.ca'; 'ddemers@fortstjohn.ca'; jGarner@fortstjohn.ca; Garland Durnford <GDurnford@fortstjohn.ca> (GDurnford@fortstjohn.ca)
Subject: Summary information - City of Fort St John elevated total BOD

Li,

Please find attached three documents relating to the recent elevated total BOD₅ concentrations at the City's South Lagoons:

1. A summary of the data and interpretations of the elevated concentration.
2. A proposed action plan for future occasions when the total BOD₅ is elevated compared with the other monitored parameters.
3. A request for clarification on the interpretation of "BOD₅" in the operational certificate.

Please do contact me if you need clarification or further discussion.

Regards,

Joanne

Dr. Joanne Harkness, R.P.Bio

Water and Wastewater Specialist



200 – 286 St. Paul Street

Kamloops, BC V2C 6G4

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Appendix D

Microhydro Study

MEMORANDUM



Date: March 04, 2013
To: Victor Shopland, Director of Infrastructure and Capital Works
Marty Paradine, Corporate Sustainability Manager
cc: Rob Close and John Kenney, Urban Systems
From: Chantal Richard, Urban Systems
File: 1958.0368.01
Subject: SMALL HYDRO POWER PROJECT – IMPACT OF REDUCED FLOW ON POWER GENERATION POTENTIAL

In May 2012, Urban Systems provided a preliminary feasibility study to the City of Fort St. John that outlined the potential for power generation at the South Lagoon outfall. The project evaluated the economics of two project scenarios and determined that a small hydropower project is likely to be feasible under the conditions referenced and assumed in that study.

It is our understanding that the City has successfully secured a grant from the Gas Tax program to undertake the design and construction of the proposed small hydropower facility. We also understand that since that application was submitted the City is more seriously exploring the potential of a reclaimed water facility. This facility would divert a portion of the South Lagoon's available effluent to provide a water supply for regional oil and gas sector. Such a diversion would in turn reduce the available flow for power generation.

This memorandum is meant to explore the potential impact of diverting a portion of the flow to a reclaimed water facility on power generation at the proposed small hydropower facility. To understand how a reduction in flow may impact the facility, seven scenarios were considered:

- Scenario 1 – the base case, where no flow is diverted;
- Scenario 2 – 1000 m³/day is diverted from the lagoons;
- Scenario 3 – 2000 m³/day is diverted from the lagoons;
- Scenario 4 – 3000 m³/day is diverted from the lagoons;
- Scenario 5 – 4000 m³/day is diverted from the lagoons;
- Scenario 6 – 5000 m³/day is diverted from the lagoons;
- Scenario 7 – the equivalent of 4000 m³/day is diverted from the lagoons, however the timing is controlled so a continuous 2500 m³/day runs through the hydro turbine.

Scenarios 2 to 6 assume that the flow diverted to the reclaimed facility first, and the rest of the flow will run through the small hydropower facility. Scenario 7 assumes the flow through the hydropower facility is regulated at 2500 m³/day, and all of the additional flow is diverted to the reclaimed facility. Table 1 (below) summarizes the expected impact on the power output from the small hydropower facility and associated revenue under each scenario described above. The scenarios above assume that the size of the proposed facility will have the same power generation capacity as originally defined in the Gas Tax the application (i.e. a design flow of 0.07 m³/s and power capacity of 123 kW) and therefore the cost to construct the project is assumed to remain constant for each scenario. The annual revenue assumes an electricity export rate of \$97.67/MWh. Note: operation and maintenance and other on-going costs are not considered in this memorandum, but were accounted for in the preliminary feasibility assessment.

MEMORANDUM

Date: March 04, 2013
 File: 1958.0368.01
 Subject: SMALL HYDRO POWER PROJECT – IMPACT OF REDUCED FLOW ON
 POWER GENERATION POTENTIAL
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Table 1: Potential Power Generation for Given Diversion Scenarios

Scenario	Design Flow (m ³ /s)	Electricity Exported to Grid (MWh)	Estimated Annual Revenue
<i>Scenario 1 - No Diversion</i>	0.07	932	\$ 91,028.44
<i>Scenario 2 - Divert 1000 m³/day</i>	0.07	840	\$ 82,042.80
<i>Scenario 3 - Divert 2000 m³/day</i>	0.07	706	\$ 68,955.02
<i>Scenario 4 - Divert 3000 m³/day</i>	0.07	550	\$ 53,718.50
<i>Scenario 5 - Divert 4000 m³/day</i>	0.07	373	\$ 36,430.91
<i>Scenario 6 - Divert 5000 m³/day</i>	0.07	211	\$ 20,608.37
<i>Scenario 7 - Constant Flow (2500 m³/day)</i>	0.07	379	\$ 37,016.93

The analysis presented in Table 1 is based on very preliminary calculations, and will be refined once the details of the reclaimed water facility are better defined. Once defined, an effort should be undertaken to review key project parameters to optimize power production and development costs. For example, size of the turbine and options for controlling the outlet to provide an optimal flow only in order to operate the turbine at maximum efficiency, but over a shorter period each day.

Dependable Turbines Ltd. was consulted to determine the flexibility of the turbine under different flow conditions. They have indicated that the turbine can function and produce power at much lower flows than the design flows (70% efficiency at 10% flows). Therefore, even a wide variation in flow will still allow for reasonably efficient power generation.

We trust this memo has provided you with some preliminary information regarding how the reduction in flows could impact the power generation at the proposed small hydropower facility. It is recommended that a more in depth analysis of how to optimize power production be completed once the City has a better understanding of what may be proposed to be diverted to the reclaimed water facility.

URBAN SYSTEMS LTD.

Chantal Richard, E.I.T.
 Project Engineer

/cmr

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MEMORANDUM

date: March 8, 2012
to: Dianne Hunter, Victor Shopland, City of Fort St. John
cc: Dr. Joanne Harkness, R.P.Bio., Kristin Bayet, P.Eng.
from: John Kenney, Environmental Professional, Urban Systems Ltd.
file #: 1958.0242.12
subject: **OVERVIEW AND UPDATE TO MICRO HYDROPOWER CONCEPT**

1. BACKGROUND

Micro hydropower projects convert the kinetic energy of water travelling downhill into electricity. Micro hydropower projects are comprised of two main components: civil works, and electrical and mechanical equipment. For most hydropower projects, the civil works usually include a diversion dam or weir, water passages, and powerhouse. The primary electrical and mechanical components of a micro hydropower plant are the turbines and generators. Water is directed into a canal, tunnel or penstock by the diversion dam or weir, and passes through a turbine. The water passing through the turbine causes the turbine to spin and generate electricity. Water then flows back into the stream through the tailrace.

In the context of the conceptualized micro hydropower project, the treated water from the lagoons would be released to the existing discharge pipe (acting as a penstock) to a turbine, and then discharged into the Beatton or Peace Rivers, depending on whether the discharge was from the North or the South Lagoons.

The feasibility of the conceptualized wastewater micro hydropower project is dependent on many factors. In particular, the feasibility will be dependent on the project's potential energy output relative to the costs of development.

Energy output is dependent on two major factors: the stream flow (how much water runs through the system) and the drop (or head), which is the vertical distance the water will fall through the water turbine. The feasibility is also largely dependent on site conditions such as: proximity to the electrical grid, ease of access to site, and local topography. Generally, the turbine size is determined by the amount of flow through the turbine. For projects with higher head, more energy can be generated with less flow. Thus, the generating equipment for high head projects is typically less expensive than for low head projects of the same capacity.

The purpose of this memorandum is twofold:

- To provide the City with guidance as to the potential for creating electricity from the effluent discharge; and
- To outline the next steps, if the City chooses to pursue this opportunity.

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2. GRID INTERCONNECTION AND STAND ALONE OPTIONS

There are two primary options for using the produced power from the conceptualized project. These options are: interconnecting to the BC Hydro power system, and isolating the project from the BC Hydro power system as a stand-alone project to meet some the power demands of the City of Fort St. John.

Option 1—Grid Interconnection:

Most micro hydropower projects in British Columbia are connected to the BC Hydro power grid. By interconnecting to the power system, the City of Fort St. John could sell the produced power to BC Hydro. Given the likely size of the project, it is probable that interconnection would be through a Net Metering agreement or an Electricity Purchase Agreement.

Option 2— Stand Alone:

It is also possible to use the produced power to meet some of the City's existing electricity demand profile. This option is typically most appropriate for areas that are too isolated to connect to the BC Hydro power system. Nevertheless, if the City wishes to enhance the energy security of key infrastructure, it is possible to link the conceptualized power project to critical water pumps, filtration systems, etc. as a back-up power supply.

It should be noted that it is possible to blend both of these options so the project is connected to the BC Hydro power grid, but also have the project act as a back-up power supply for critical infrastructure within close proximity to the lagoons.

3. NORTH AND SOUTH LAGOON REVIEW

The following offers a preliminary review of the potential advantages and disadvantages of the North and South Lagoons. The concept of generating electricity from the discharge is not new to the City. The concept was discussed briefly several years ago, focusing on the South Lagoons.

3.1 North Lagoons

Based on a review of the local topography of the North Lagoons, it is evident that there is approximately 225 metres of head between the lagoons and the Beatton River. This is a sufficient head to generate electricity. However, from the discharge data, it is evident that North Lagoons do not offer a sufficient discharge flow to operate a feasible micro hydropower project. This is primarily a result of the intermittency of the flow over the course of the year. The site has an annual average discharge of approximately 0.022 m³/s, or an average monthly discharge of approximately 0.065 m³/s during the months¹ in which discharges can occur from the North Lagoons.

Therefore, while there is sufficient head at the project site, the intermittency of the discharge flow inhibits the possibility of developing a feasible project. It is recommended that no further analysis should be conducted on developing a small hydropower system at this site.

¹ Discharge Periods for the North Lagoons typically fall between April 15 to June 30, and September 1 to October 31.

3.2 South Lagoons

In contrast, the South Lagoons have a constant flow profile and larger discharge flow, relative to the North Lagoon System. The average annual discharge from this lagoon system is 0.074 m³/s. Similar to the North Lagoon System, there is approximately 250 metres of head at the project site.

Since the effluent flow at this site is constant and the head is sufficient to support a micro hydropower project, it is recommended that further analysis be conducted to determine if it is feasible to develop a micro hydropower system at the South Lagoons. This is discussed in further detail below.

4. SUPPORTING POLICIES AND FUNDING PROGRAMS

4.1 Supporting Policies

There are a number of Federal and Provincial policies in place to support the development of community-based clean energy projects.

The key Provincial Policies include:

- The BC Energy Plan: A Vision for Clean Energy Leadership;
- The BC Climate Action Plan; and,
- BC Hydro Sustainable Communities Program.

The key applicable Federal Policies include:

- Turning the Corner: Canada's Action on Climate Change;
- ecoENERGY Program; and,
- Decentralized Energy Production Initiative.

4.2 Funding Programs

There are a number of funding programs available to support local governments in BC to develop clean energy projects, such as the conceptualized micro hydropower project for the City of Fort St. John South Lagoons. These funding programs are outlined below.

4.2.1 Federation of Canadian Municipalities – Green Municipal Fund

As of December 1, 2011 the Federation of Canadian Municipalities (FCM) is accepting new applications for feasibility studies, including clean energy project feasibility studies. **The Green Municipal Fund currently offers funding for up to 50% of the eligible costs to a maximum of \$175,000.**

4.2.2 Gas Tax Agreement – Community Works and Innovations Funds

The Gas Tax – Community Works and Innovations Funds pay for certain capital projects including community energy projects. The funding is split into the following two funds:

1. Community Works Fund

This fund was established to support local priorities in alignment with the desired outcomes of reduced greenhouse emissions, cleaner air and cleaner water. The program provides funding directly to eligible local governments, with no application required. **A total reserve of \$191 million is available for the 5 years.**

2. Gas Tax Agreement – Innovations Fund

The Innovations Fund is established to support projects that reflect an innovative approach to achieving the intended outcomes of reduced greenhouse emissions, cleaner air and cleaner water. **The funding will cover up to 100% of project costs, from a total reserve \$32 million over 5 years; \$1.6 million is reserved for capacity building and integrated community sustainability planning.**

4.2.3 Towns for Tomorrow

The Province is providing \$21 million for BC's smaller communities to improve local infrastructure. Grants are available for capital investments that enhance community infrastructure, including environmental energy improvements. **Eligible costs under this program include engineering, design, capacity-building and construction costs. Although the program covers up to 75 per cent of the eligible project costs, with a maximum contribution of \$375,000, the City of Fort St. John would not be eligible for funding, as the funding program is focused on communities with < 15,000 residents.**

4.2.4 ecoENERGY Innovation Initiative

The ecoENERGY Innovation Initiative (ecoEII) is a new \$97 million funding program, for research and development (R&D) and demonstration projects. The program's objective is to support energy technology innovation to produce and use energy in a more clean and efficient way. **Funding is determined on a case-by-case basis and can be used to support the purchase of clean energy equipment.**

4.2.5 Innovative Clean Energy Fund (ICE Fund)

The Province is funding innovative clean energy projects throughout BC. Applications to the ICE Fund represent a broad range of technologies and sectors, including: ocean tidal and wave, solar, geothermal, wind, biomass, wastewater, energy conservation and liquid biofuel production. **The available funding varies by project to a maximum of 75% of project costs.**

4.2.6 Northern Development Initiative Trust

The Northern Development Initiative Trust offers funding to municipalities, regional districts, First Nations, not-for-profit organizations and public authorities to support sustainable economic

development and diversification throughout central and northern British Columbia. The available funding is up to \$20,000 for feasibility studies.

5. RECOMMENDATIONS AND NEXT STEPS

Most clean energy projects follow a number of key steps in their development. These key steps have been summarized in Figure 5.1. This memorandum is representative of the completion of the "site identification" step and, therefore, should the City of Fort St. John be interested in exploring this project opportunity further, the next step will be the completion of a preliminary feasibility study.

Figure 5.1: Key Steps in the Development of a Clean Energy Project



A preliminary feasibility study would establish a preliminary site layout and define the main project characteristics. More specifically, a preliminary feasibility study will provide an initial characterization of the conceptualized hydropower project including:

- Gross head;
- Design flow;
- Head losses; and
- Turbine and generator sizing.

Once the project has been characterized, the preliminary feasibility study would assess the economic and financial characteristics of the conceptualized project, including:

- Annual revenues;
- Green power production incentives;
- Engineering and design costs;
- Project capital costs including access and transmission costs;

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- Operation and maintenance costs; and
- Anticipated return on investment.

6. CONCLUSION

A micro hydropower project at the South Lagoons would capture the energy from releasing the effluent through the outfall pipe to the Peace River. The treated effluent would fall approximately 250 metres through the existing discharge pipe to a small power turbine. Based on a very preliminary review, by capturing this energy, the City of Fort St. John could potentially generate approximately 400-650 megawatt hours of electrical power per year².

Prior to investing any capital into the conceptualized project, it is recommended that preliminary study be completed in order to fully understand the key costs and benefits associated with such a project. If the City is willing, we will be pleased to develop a detailed work program and budget for the completion of a preliminary study, along with the appropriate applications for funding, where applicable.

URBAN SYSTEMS LTD.



John Kenney
Environmental Professional

/JK

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² This is a very preliminary power output estimate that makes a number of assumptions and should be used for discussion purposes only.

Appendix E

Council Endorsement



CERTIFIED RESOLUTION

Regular Council Meeting – February 11, 2014

Administration Report No. 0030/14
Liquid Waste Management Plan

RESOLUTION NO. 57/14
MOVED/SECONDED

"THAT, Council approves the Liquid Waste Management Plan as presented."

CARRIED

I CERTIFY THIS TO BE A TRUE AND CORRECT
COPY OF THE RESOLUTION PASSED BY THE
FORT ST. JOHN CITY COUNCIL AT THE REGULAR
MEETING OF FEBRUARY 11, 2014

LAURA HOWES
DEPUTY CITY CLERK