CITY OF YELLOWKNIFE

March 28, 2013

Mackenzie Valley Land and Water Board
Box 2130, 7th Floor - 4910 50th Avenue
Yellowknife, NT X1A 2P6

Attention: Crystal Thomas, Regulatory Officer

RE: Water Licence No. MV2009L3-0007
2012 Annual Water Licence Report

Dear Ms. Thomas,

Submitted herein is the City's 2012 Annual Report. This submission includes the following documents and management plans:

- 2012 City of Yellowknife Annual Water Licence Report
- 2012 Biotreatment Pad Annual Report
- Landfill Operations and Maintenance Manual – March 2013 Revision (for approval)
- Landfill Hazardous Waste Management Plan – March 2013 Revision (for approval)
- Spill Contingency Plan – March 2013 Revision (for approval)

Also submitted, under separate cover letter, is the City's Stormwater Management Plan – March 2013 Revision.

Should you have any questions, comments, or require additional information, please contact me at 920-5689 or by email at walexander@yellowknife.ca.

Sincerely,

Wendy Alexander, P. Eng.
Municipal Works Engineer
Public Works and Engineering

Encl:
1. 2012 City of Yellowknife Annual Water Licence Report
2. 2012 Biotreatment Pad Annual Report
3. Landfill Operations and Maintenance Manual – March 2013 Revision (for approval)
4. Landfill Hazardous Waste Management Plan – March 2013 Revision (for approval)
5. Spill Contingency Plan – March 2013 Revision (for approval)

(Docs#358717)

Water Licence MV2009L3-0007

City of Yellowknife

2012 Annual Report

Submitted to:
Mackenzie Valley Land and Water Board

By:
Department of Public Works & Engineering
March 2013

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Introduction

This report is being submitted by the City of Yellowknife to the Mackenzie Valley Land and Water Board as part of the requirements of Water Licence MV2009L3-0007. The numbering for each section is based on Schedule 1 – General Conditions of the licence.

a) Monthly and Annual Water Quantities

The following table summarizes the monthly and annual water quantities taken from the Yellowknife River and Yellowknife Bay.

Month	Yellowknife River (m^3)	Yellowknife Bay (m^3)
January	247,921	0
February	233,444	0
March	246,181	0
April	232,619	0
May	253,466	0
June	302,843	0
July	300,878	0
August	269,152	0
September	226,616	0
October	217,153	0
November	212,728	0
December	229,639	0
Total	**2,972,640**	0

b) Monthly and Annual Waste Quantities

1) Wastes Discharged to Lagoon

The following table summarizes the monthly and annual sewage quantities discharged from Lift Stations 5 and 6 into the lagoon.

Month	Lift Station 5 (m^3)	Lift Station 6 (m^3)	Total (m^3)
January	327,221	29,998	357,219
February	301,687	27,778	329,466
March	333,743	28,758	362,501
April	336,416	33,558	369,974
May	415,109	54,735	469,844
June	360,098	48,753	408,852
July	361,888	43,652	405,540

Month	Lift Station 5 (m^3)	Lift Station 6 (m^3)	Total (m^3)
August	350,539	39,479	390,019
September	226,616	35,923	262,539
October	330,130	42,848	372,978
November	302,338	32,775	335,113
December	305,544	29,634	**335,178**
Total	**3,951,331**	**447,890**	**4,399,221**

2) Wastes Received at Solid Waste Facility

The following tables summarize the monthly and annual quantities for bulk wastes received at the Solid Waste Facility (SWF).

Waste Type	Weight (tn)						
	Jan.	Feb.	Mar.	Apr.	May	June	Six Month Subtotal
Mixed Solid Waste	978.4	1,029	1,046	1,108	1,649	1,302	***7,112***
Cooking Grease	4.6	4	6.4	7	3.4	2.8	***28.2***
Asbestos	0.65	0	0.28	0.56	0	2.1	***3.59***
Construction/Demolition	157	231.6	212	374.2	419	403	***1,797***
Asphalt	0	0	0	7.1	20.5	3.7	***31.3***
Concrete	2.1	16.7	7.6	0.47	33.2	97.4	***157.47***
Wood	43.7	40.8	46.6	59.6	76.5	51.7	***318.9***
Cardboard	319	179	205	128.6	104	107	***1042.6***
Boxboard & Paper	30.2	78.7	61.3	42.5	40.2	32.1	***285***
Newspaper	11.6	9.6	33.8	16.3	17.6	13.8	***102.7***
Glass	26.7	29.8	30.4	11.4	0.68	2	***100.98***
Mixed Recycling	16.2	9.5	15.2	19.8	11.8	21.7	***94.2***
Tree Branches	0.38	0	1.3	0.98	16.8	17.3	***36.76***
Ash – Pellet Stoves	0.85	1.2	2	1.5	24.7	17.5	***47.75***
Scrap Metal	15.9	25.5	83.6	22.2	44	50.8	***242***
Total	**1,607**	**1,655**	**1,751**	**1,800**	**2,461**	**2,125**	***11,401***

Waste Type	Weight (tn)						
	Aug.	Sept.	Oct.	Nov.	Dec.	Six Month Subtotal	Yearly Total
Mixed Solid Waste	1,300	1,293	1,395	1,242	1055	***1,048***	**7,333**
Cooking Grease	4.8	3.3	3	4.7	5.2	***4.7***	**25.7**
Asbestos	4.1	1.2	0.59	0.09	1.2	***0***	**7.18**
Construction/Demolition	423	637	315	365	230.6	***124***	**2,095**
Asphalt	0	18.7	11	331	3.6	***24.5***	**388.8**
Concrete	9.5	342	109	19.4	2.2	***0.67***	**483**
Wood	46	81.2	33	53.2	34.7	***13.7***	**262**
Cardboard	128	110	120	105	114	***130***	**707**
Boxboard & Paper	35.9	26.6	23	30.1	39.7	***38.7***	**194**
Newspaper	12.4	13.1	11	9.4	17.7	***8.9***	**72.5**
Glass	1.6	4.6	1.5	3.2	5.4	***66***	**82.3**
Mixed Recycling	17.2	23.7	23.5	17.9	15.3	***20.7***	**118.3**
Tree Branches	13	25.5	4.2	49.7	2.6	***0***	**95**
Ash – Pellet Stoves	40.7	0	16.1	5.7	8.8	***0.59***	**71.89**
Scrap Metal	42.7	71.9	55	82.2	40.4	***9.7***	**301.9**
Total	**2,079**	**2,652**	**2,121**	**2,319**	**1,576**	***1,490***	**12,237**

The following tables summarize the monthly and annual quantities for individual wastes received at the Solid Waste Facility (SWF).

Waste Type	Number Received						
	Jan.	Feb.	Mar.	Apr.	May	June	Six Month Subtotal
Automotive Batteries	20	59	66	72	180	95	***492***
Tires (Regular)	164	387	414	462	726	646	***2799***
Tires (Oversized)	22	22	1	73	121	27	***266***
Appliance (With Freon)	31	43	36	35	91	71	***307***
Appliance (Without Freon)	163	197	160	174	284	257	***1235***
Animal Carcass (small)	0	0	0	39	24	7	***70***
Animal Carcass (Large)	0	0	0	24	2	0	***26***
Vehicle	6	8	0	3	16	25	***58***
Oil Tank	1	2	0	1	24	4	***32***

Waste Type	Number Received							
	Jul.	Aug.	Sept.	Oct.	Nov.	Dec.	Six Month Subtotal	Yearly Total
Automotive Batteries	128	62	212	73	43	42	***560***	**1052**
Tires (Regular)	746	643	543	581	770	461	***3744***	**6543**
Tires (Oversized)	96	25	35	10	49	56	***271***	**537**
Appliance (With Freon)	75	79	70	66	31	26	***347***	**654**
Appliance (Without Freon)	201	211	212	238	145	152	***1159***	**2394**
Animal Carcass (small)	2	0	0	0	0	1	***3***	**73**
Animal Carcass (Large)	1	0	0	0	0	0	***1***	**27**
Vehicle	14	10	8	13	3	6	***54***	**112**
Oil Tank	3	2	10	6	2	2	***25***	**57**

c) Annual Waste Quantities Removed From Solid Waste Facility

The following tables summarize the annual quantities of specific wastes shipped from the SWF.

Waste Type	Amount Shipped						
	Jan.	Feb.	Mar.	Apr.	May	June	Six Month Subtotal
Cardboard (tn)	20.31	202	72	62	0	15	***372***
Boxboard (Mixed Paper) (tn)	0	41.2	27.98	1.76	0	14.32	***85.26***
Newspaper (tn)	0	0	51.46	8.72	0	0	***60.18***
Mixed Recycling, Plastics (tn)	0	2.53	0	0	0	0	***3***
Scrap Metal, including appliances (tn)							***0***
Vehicles (#)							***0***
Lead-Acid Batteries (#)	0	0	0	0	0	0	***0***

Waste Type	Amount Shipped							
	Jul.	Aug.	Sep.	Oct.	Nov.	Dec.	Six Month Subtotal	Yearly Total
Cardboard (tn)	151	55	81	32	68.25	51	***439***	**727**
Boxboard (Mixed Paper) (tn)	49.7	16.38	13.96	9.86	21.78	27.99	***139.67***	**224.93**
Newspaper (tn)	16.3	6.94	2.2	0	17.85	10.55	***53.84***	**114.02**
Mixed Recycling, Plastics (tn)	0	6.19	2.57	0	0	0	***9***	**11**

d) Modifications and Major Maintenance Work at Water and Waste Facilities

1) Work at Water Supply Facilities

In 2012 the City performed the following work on its water supply facilities and associated infrastructure:

- Continuation of the annual water and sewer main (and services) replacement program.
- Continuation of upgrades to water meters to WWMR/AMR compatible types.
- Continuation of installation and upgrades to back-up power units at pump houses and lift stations.
- Upgrades to infrastructure and continuation of design for the City of Yellowknife's new water treatment plant.
- Continuation of assessment of monitors and controls in pump houses and lift stations for upgrading.

2) Work on Sewage Infrastructure

In 2012 the following work was done on the sewage disposal system for the City:

- Lagoon control structure repairs (leak repair).

3) Work at Solid Waste Facility

In 2012 the following work was done at the SWF:

- Continuation of shaping areas of the landfill to final contours in preparation for closure.
- Completion of Pilot Composting Project.
- Re-organization of hazardous waste storage areas

e) Summaries of SNP Data

1) Lagoon Test Results

Sampling occurred at SNP Stations 0032-F1, 0032-F3 and 0032-10 according to the following table.

SNP Station	Sampling Frequency		
	Monthly	**Weekly***	**Bi-Weekly**
0032-F1	January through May	May 30th through June 27th & August 29th through December 27th	July 11th through August 22nd
0032-F3			
0032-10			
**Sampling at 32-10 ended on November 21st due to safety hazards at the lagoon control structure due to cold temperatures.*			

The following tables summarize the lagoon test results for SNP stations 0032-F1, 0032-F3 and 0032-10.

Parameter	Unit	18-Jan		15-Feb		14-Mar		18-Apr	
		F1	F3	F1	F3	F1	F3	F1	F3
Alkalinity, Total (as CaCO3)	mg/L	115	137	135	164	154	217	154	211
Sp. Conductivity (@25°C)	µS/cm	349	451	391	512	424	640	423	615
pH		7.06	7.21	7.06	7.18	6.95	7.02	6.97	7.34
Solids, Total Dissolved	mg/L	284	280	252	294	294	406	286	368
Solids, Total Suspended	mg/L	4	2	10	8	<3	118	10	6
Ammonia as Nitrogen	mg/L	0.41	2.34	0.87	3.58	1.49	5.2	1.59	6.07
Biological Oxygen Demand	mg/L	<2	2	3	9	4	20	5	12
CBOD	mg/L	2	<2	3	2	3	10	5	4
Organic Carbon, Total	mg/L	23.6	23.6	27.2	26.3	33.6	57.1	33.7	32.1
Ortho-Phosphate as Phosphorus	mg/L	30.1	37.7	36.8	46.9	41.4	58.1	40.6	53.6
Calcium	mg/L	29.7	41.7	31.8	42.8	36.2	57.7	32.9	51.7
Chloride	mg/L	0.3	0.5	0.3	0.4	0.3	0.7	0.5	0.7
Fluoride	mg/L	120	142	135	167	165	218	165	201
Hardness	mg/L	10.9	11.7	10.4	12.1	15	17.7	15.3	16.3
Magnesium	mg/L	0.03	0.08	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
Nitrite as Nitrogen	mg/L	7.3	11.5	7.3	11	8.6	16.9	7.9	15.7
Potassium	mg/L	21.4	30.6	20	24.8	25	42.6	23.1	40.5
Sodium	mg/L	13	20	9	20	8	13	4	9
Sulphate	mg/L	1	<1	1	<1	3	<1	3	9
Coliforms, Fecal	CFU/100mL	3.1	1	1	2	1	4.1	1	<1
Fecal Streptococcus	MPN/100mL	2	<1	7.9	<2	6.2	3.8	<2	<2
Hexane Extractable Material	mg/L	1.91	4.36	2.37	6	3.14	7.77	3.5	8.1
Kjeldahl Nitrogen, Total	mg/L	1.4	3.03	1.37	4.2	2.8	5.6	0.91	5.3
Phosphorous, Dissolved	mg/L	1.47	3.18	1.47	4.02	1.56	5.8	1	5.6
Phosphorous, Total	mg/L	1.83	3.35	2.22	4.61	4.69	7.8	3.01	6.6

Parameter	Unit	16-May		30-May			6-Jun		
		F1	F3	F1	F3	32-10	F1	F3	32-10
Alkalinity, Total (as CaCO3)	mg/L	34.8	27.8	43.9	53.4		51.1	57.7	
Sp. Conductivity (@25°C)	µS/cm	113	86	131	173		154	181	
pH		7.02	7.06	7.34	9.94	7.13	7.12	9.32	7.23
Solids, Total Dissolved	mg/L	104	98	80	104		106	116	
Solids, Total Suspended	mg/L	6	<3	16	18	60	<3	6	26
Ammonia as Nitrogen	mg/L	0.1	0.28	<0.01	0.01	20.6	<0.01	0.02	19.4
Biological Oxygen Demand	mg/L	3	3	4	8	67	2	3	50
CBOD	mg/L	3	3	4	8		<2	5	
Organic Carbon, Total	mg/L	21.2	17.6	26.9	35.2		18.1	18.7	
Ortho-Phosphate as Phosphorus	mg/L	10.2	7.4	12	15.3		15.4	17.2	
Calcium	mg/L	7.8	5.1	10.5	13.5		12.8	16.7	
Chloride	mg/L	0.1	<0.1	0.1	0.2		0.2	0.2	
Fluoride	mg/L	41.6	29.6	49.5	59.3		63.1	66.8	
Hardness	mg/L	3.9	2.7	4.7	5.1		6	5.8	
Magnesium	mg/L	0.04	0.05	<0.01	0.01		<0.01	<0.01	
Nitrite as Nitrogen	mg/L	2.5	1.9	2.9	4		3.5	5	
Potassium	mg/L	6.1	4.4	7.8	10.3		9.6	12.8	
Sodium	mg/L	3	2	3	6		4	6	
Sulphate	mg/L	2	<1	4	<1	1410	2	12	600
Coliforms, Fecal	CFU/100mL	2	1	<1	52.9	9800	7.2	125	4100
Fecal Streptococcus	MPN/100mL	<2	<2	<2	4.3	2.5	<2	<2	<2
Hexane Extractable Material	mg/L	1.11	1.4	1.4	1.83		1	1.1	
Kjeldahl Nitrogen, Total	mg/L	0.28	0.33	0.48	0.83		0.69	1.12	
Phosphorous, Dissolved	mg/L	0.299	0.366	0.51	0.88		0.59	1.03	
Phosphorous, Total	mg/L	0.365	0.435	0.66	1.3	3.59	0.69	1.29	3.26

Parameter	Unit	13-Jun			20-Jun			27-Jun		
		F1	F3	32-10	F1	F3	32-10	F1	F3	32-10
Alkalinity, Total (as CaCO3)	mg/L	54.4	60.8		56.4	62.5		56.9	62.8	
Sp. Conductivity (@25°C)	µS/cm	161	191		166	194		163	192	
pH		7.27	7.64	7.26	7.43	8.26	7.28	7.35	8.39	7.5
Solids, Total Dissolved	mg/L	122	142		112	132		98	100	
Solids, Total Suspended	mg/L	4	<3	42	<3	<3	18	6	10	22
Ammonia as Nitrogen	mg/L	<0.01	0.08	21.2	<0.01	<0.01	21.6	0.02	0.03	20.3
Biological Oxygen Demand	mg/L	<2	2	43	<2	3	43	<2	4	25
CBOD	mg/L	2	2		<2	2		<2	4	
Organic Carbon, Total	mg/L	25.7	23		27	25.7		29	26.5	
Ortho-Phosphate as Phosphorus	mg/L	15.5	17.4		15	17.6		15.6	17.4	
Calcium	mg/L	12.4	15.8		12	15.9		11.4	15.8	
Chloride	mg/L	0.2	0.2		0.2	0.2		0.2	0.2	
Fluoride	mg/L	62.5	67.2		61.6	68.3		63.5	67.9	
Hardness	mg/L	5.8	5.8		5.9	5.9		5.9	5.9	
Magnesium	mg/L	<0.01	0.01		<0.01	<0.01		<0.01	<0.01	
Nitrite as Nitrogen	mg/L	3.2	4.7		2.8	4.5		2.1	4.1	
Potassium	mg/L	9.4	12		9.4	12.3		9.4	12.4	
Sodium	mg/L	3	6		3	4		2	3	
Sulphate	mg/L	1	1	2600	2	2	12700	1	750	1600
Coliforms, Fecal	CFU/ 100mL	3.1	41.4	1010	2	65.7	8360	7.4	313	310
Fecal Streptococcus	MPN/ 100mL	<2	<2	3.9	<2	<2.0	<2	<2.0	<2.0	3.2
Hexane Extractable Material	mg/L	1	1.08		1	1		1	1	
Kjeldahl Nitrogen, Total	mg/L	0.91	1.06		0.78	1.53		0.84	1.67	
Phosphorous, Dissolved	mg/L	1.2	1.2		0.79	1.05		0.81	1.62	
Phosphorous, Total	mg/L	1.2	1.9	4.3	2.95	1.37	0.74	0.87	1.74	3.19

Parameter	Unit	11-Jul			25-Jul			8-Aug		
		F1	F3	32-10	F1	F3	32-10	F1	F3	32-10
Alkalinity, Total (as CaCO3)	mg/L	56	63.3		59.1	60.3		63.2	57.6	
Sp. Conductivity (@25°C)	µS/cm	158	201		164	199		171	192	
pH		7.37	7.57	7.2	7.44	8.1	7.32	7.25	8.72	7.38
Solids, Total Dissolved	mg/L	214	218		104	128		132	140	
Solids, Total Suspended	mg/L	8	<3	26	14	<3	48	4	<3	48
Ammonia as Nitrogen	mg/L	<0.01	0.07	21.2	0.03	0.05	15.2	0.02	0.02	6.99
Biological Oxygen Demand	mg/L	4	<2	27	<2	2	82	2	<2	79
CBOD	mg/L	4	<2		2	2		2	2	
Organic Carbon, Total	mg/L	28.4	23.9		25.1	21.5		29.4	25	
Ortho-Phosphate as Phosphorus	mg/L	16.7	19.3		17.5	18.2		17.7	17	
Calcium	mg/L	10.2	16.6		10.5	17.1		11.3	17.5	
Chloride	mg/L	0.2	0.2		0.2	0.2		0.2	0.2	
Fluoride	mg/L	68.4	75.3		70.3	72.3		71.3	68.5	
Hardness	mg/L	6.5	6.6		6.4	6.5		6.6	6.3	
Magnesium	mg/L	<0.01	<0.01		<0.01	<0.01		<0.01	0.17	
Nitrite as Nitrogen	mg/L	0.6	4.8		1.1	4.1		1.9	3.4	
Potassium	mg/L	9.6	13.4		9.9	13.9		10.1	14.2	
Sodium	mg/L	2	4		2	5		2	5	
Sulphate	mg/L	3	22	7000	90	120	300	5	10	690
Coliforms, Fecal	CFU/ 100mL	26.6	21.6	1560	75.2	4.1	63	13.5	29.2	249
Fecal Streptococcus	MPN/ 100mL	<2.0	<2.0	3	<2	<2	2.1	<2	<2	2.1
Hexane Extractable Material	mg/L	1.2	1.2		1.2	1.3		1.12	1.29	
Kjeldahl Nitrogen, Total	mg/L	0.6	1.6		0.53	1.26		0.53	1.15	
Phosphorous, Dissolved	mg/L	0.6	1.6		0.55	1.35		0.55	1.15	
Phosphorous, Total	mg/L	1.5	1.8	3.6	0.71	1.36	2.86	0.68	1.22	3.05

Parameter	Unit	22-Aug			29-Aug			5-Sep		
		F1	F3	32-10	F1	F3	32-10	F1	F3	32-10
Alkalinity, Total (as CaCO3)	mg/L	64.7	56.8		68.9	58.6		67.7	59.4	
Sp. Conductivity (@25°C)	µS/cm	179	191		178	188		184	198	
pH		7.53	9.19	7.6	7.49	8.96	7.34	7.39	8.21	7.15
Solids, Total Dissolved	mg/L	132	136		142	136		136	134	
Solids, Total Suspended	mg/L	<3	8	28	<3	4	32	4	6	22
Ammonia as Nitrogen	mg/L	0.01	0.09	0.03	0.02	0.05	0.174	0.022	0.05	0.047
Biological Oxygen Demand	mg/L	<2	<2	29	2	3	27	2	3	22
CBOD	mg/L	2	<2		<2	<2		2	3	
Organic Carbon, Total	mg/L	28.5	23.6		28.8	24		23.2	20.4	
Ortho-Phosphate as Phosphorus	mg/L	18	16.2		17.5	16.2		18	16.4	
Calcium	mg/L	11.1	17.6		11.6	17.8		11.8	18	
Chloride	mg/L	0.2	0.3		0.2	0.3		0.2	0.3	
Fluoride	mg/L	72.6	66.5		72.6	66.6		71.6	66	
Hardness	mg/L	6.7	6.3		7	6.3		6.5	6.1	
Magnesium	mg/L	<0.01	<0.01		<0.01	<0.01		<0.01	<0.01	
Nitrite as Nitrogen	mg/L	2.2	3.3		2.3	3.4		2.4	3.3	
Potassium	mg/L	10.2	14.3		10.3	14.4		9.9	13.7	
Sodium	mg/L	2	4		2	4		2	4	
Sulphate	mg/L	<1	tntc	50	<1	2	2700	<1	8	200
Coliforms, Fecal	CFU/ 100mL	9.7	397	52	8.4	10.5	6020	17.9	39.3	52
Fecal Streptococcus	MPN/ 100mL	<2	7.2	6.8	<2	<2	2.6	<2	<2	<2
Hexane Extractable Material	mg/L	1.2	1.5		1	1.2		1	1.3	
Kjeldahl Nitrogen, Total	mg/L	0.535	1.3		0.545	1.48		0.507	1.57	
Phosphorous, Dissolved	mg/L	0.56	1.5		0.57	1.51		0.502	1.51	
Phosphorous, Total	mg/L	0.63	1.56	2.92	0.619	1.66	2.86	0.602	1.63	2.94

Parameter	Unit	12-Sep			19-Sep			26-Sep		
		F1	F3	32-10	F1	F3	32-10	F1	F3	32-10
Alkalinity, Total (as CaCO3)	mg/L	70.3	59.8		67.4	62		66.6	68.1	
Sp. Conductivity (@25°C)	µS/cm	179	192		182	200		205	221	
pH		7.29	7.89	7.18	7.55	7.79	7.27	7.44	7.9	7.41
Solids, Total Dissolved	mg/L	140	130		102	120		136	160	
Solids, Total Suspended	mg/L	<3	<3	24	4	4	22	<3	16	16
Ammonia as Nitrogen	mg/L	0.066	0.064	0.257	0.06	0.06	0.24	0.211	0.025	0.028
Biological Oxygen Demand	mg/L				<2	<2	21	<2	<2	24
CBOD	mg/L				<2	<2		<2	3	
Organic Carbon, Total	mg/L	32.7	27.5		23.1	19.1		22.5	18.7	
Ortho-Phosphate as Phosphorus	mg/L	19.2	17.8		20.6	19.6		20.7	22.5	
Calcium	mg/L	12.4	18.7		12.2	17.9		17.4	19.9	
Chloride	mg/L	0.2	0.3		0.2	0.3		0.2	0.3	
Fluoride	mg/L	78	71.7		80.5	76.8		82.2	86.8	
Hardness	mg/L	7.3	6.6		7.1	6.8		7.4	7.4	
Magnesium	mg/L	<0.01	<0.01		<0.01	<0.01		0.02	0.01	
Nitrite as Nitrogen	mg/L	2.8	3.7		2.9	4.3		4.2	5.5	
Potassium	mg/L	10.6	14.8		10.5	14.1		13.8	15.6	
Sodium	mg/L	2	4		2	5		6	9	
Sulphate	mg/L	78	13	800	1	4	900	<1	8	2500
Coliforms, Fecal	CFU/ 100mL	26.9	15.6	20	2	23.2	<10	7.3	7.3	<100
Fecal Streptococcus	MPN/ 100mL	<2	<2	<2	<2	<2	<2	<2	<2	<2
Hexane Extractable Material	mg/L	1.3	1.2		1.16	1.31		1.76	1.43	
Kjeldahl Nitrogen, Total	mg/L	0.534	1.43		0.484	1.4		0.794	1.82	
Phosphorous, Dissolved	mg/L	0.56	1.46		0.56	1.39		0.74	1.53	
Phosphorous, Total	mg/L	0.776	1.55	3.24	0.63	1.5	3.15	0.83	2.06	3.19

Parameter	Unit	3-Oct			10-Oct			17-Oct		
		F1	F3	32-10	F1	F3	32-10	F1	F3	32-10
Alkalinity, Total (as CaCO3)	mg/L	67.2	70.8		68.1	72.1		62.4	53	
Sp. Conductivity (@25°C)	µS/cm	221	238		225	243		207	172	
pH		7.32	7.88	7.25	7.48	8.03	7.45	7.27	7.64	7.36
Solids, Total Dissolved	mg/L	140	134		136	158		128	100	
Solids, Total Suspended	mg/L	4	4	22	8	<3	18	6	8	28
Ammonia as Nitrogen	mg/L	0.02	0.037	0.121	<0.005	<0.005	3.18	0.014	0.014	8.65
Biological Oxygen Demand	mg/L	7	8	38	3	4	35	8	6	34
CBOD	mg/L	7	9		3	4		7	9	
Organic Carbon, Total	mg/L	19.2	18.1		18.5	16.9		26.3	20.9	
Ortho-Phosphate as Phosphorus	mg/L	29.5	23.4		20.4	23		19.6	17.3	
Calcium	mg/L	32.6	22.4		20.7	23.1		19.4	15	
Chloride	mg/L	0.5	0.4		0.2	0.3		0.3	0.3	
Fluoride	mg/L	105	88.5		81.9	87.9		75.7	65.2	
Hardness	mg/L	7.5	7.3		7.5	7.4		6.5	5.3	
Magnesium	mg/L	0.27	0.01		<0.01	<0.01		<0.01	<0.01	
Nitrite as Nitrogen	mg/L	9.9	6.3		5.3	6.4		5	4.2	
Potassium	mg/L	24.5	17		15.7	17.4		14.4	11.5	
Sodium	mg/L	15	11		9	11		8	8	
Sulphate	mg/L	1	11	500	2	7	5900	4	22	7900
Coliforms, Fecal	CFU/ 100mL	8.5	5.2	10	3.1	8.5	987	36.4	45.7	8360
Fecal Streptococcus	MPN/ 100mL	<2	<2	<2	<2	<2	<2	<2	<2	2.5
Hexane Extractable Material	mg/L	1.2	1.25		1	1.4		2	1.9	
Kjeldahl Nitrogen, Total	mg/L	0.94	1.51		0.85	1.42		0.613	0.866	
Phosphorous, Dissolved	mg/L	1	1.54		0.911	1.47		0.67	0.947	
Phosphorous, Total	mg/L	1.06	1.63	3.32	1.01	1.57	3.24	0.814	1.34	3.58

Parameter	Unit	24-Oct			31-Oct			7-Nov		
		F1	F3	32-10	F1	F3	32-10	F1	F3	32-10
Alkalinity, Total (as CaCO3)	mg/L	70.1	73		77.6	82.6		77.8	82.2	
Sp. Conductivity (@25°C)	µS/cm	246	267		263	284		280	302	
pH		7.5	7.67	7.18	7.4	7.94	7.22	7.14	7.61	7.03
Solids, Total Dissolved	mg/L	198	220		122	140		128	148	
Solids, Total Suspended	mg/L	6	8	36	4	14	32	4	10	28
Ammonia as Nitrogen	mg/L	<0.005	0.071	15.6	0.017	<0.005	25.2	0.068	0.15	32.8
Biological Oxygen Demand	mg/L	4	4	53	3	15	76	<2	10	82
CBOD	mg/L	4	4		4	13		<2	11	
Organic Carbon, Total	mg/L	19.2	19.3		17.9	22.1		17.2	21.3	
Ortho-Phosphate as Phosphorus	mg/L	22.5	24.5		24.9	26.5		24.8	27	
Calcium	mg/L	23.8	26.2		26.3	28.7		27.1	29.7	
Chloride	mg/L	0.3	0.5		0.3	0.6		0.4	0.5	
Fluoride	mg/L	87.7	92.6		94.8	100		95.1	102	
Hardness	mg/L	7.6	7.6		7.9	8.2		8.1	8.4	
Magnesium	mg/L	0.02	0.01		0.03	0.03		0.03	0.01	
Nitrite as Nitrogen	mg/L	6.1	7.1		6.6	7.7		6.9	8.1	
Potassium	mg/L	17.5	19.3		19.2	21.2		19.7	21.8	
Sodium	mg/L	11	14		13	14		14	16	
Sulphate	mg/L	<1	6	TNTC	2	9	131000	1	6	200000
Coliforms, Fecal	CFU/ 100mL	1	2	57900	3.1	86.5	10100	11	3.1	57900
Fecal Streptococcus	MPN/ 100mL	<2	<2	4	<2	<2	7.5	<2	<2	10.1
Hexane Extractable Material	mg/L	1.3	1.45		2.08	0.8		1.15	1.73	
Kjeldahl Nitrogen, Total	mg/L	1.02	1.48		1.12	1.6		1.21	1.59	
Phosphorous, Dissolved	mg/L	1.03	1.51		1.15	1.66		1.23	1.66	
Phosphorous, Total	mg/L	1.13	1.59	3.75	1.18	1.75	4.15	1.29	1.7	3.7

Parameter	Unit	14-Nov			21-Nov			28-Nov	
		F1	F3	32-10	F1	F3	32-10	F1	F3
Alkalinity, Total (as CaCO3)	mg/L	86.4	91.7		88.5	97.1		91.2	99.4
Sp. Conductivity (@25°C)	µS/cm	296	318		303	338		323	358
pH		7.15	7.63	7.1	7.1	7.51	7	7.2	7.57
Solids, Total Dissolved	mg/L	172	222		214	244		192	214
Solids, Total Suspended	mg/L	6	4	22	<3	4	32	6	<3
Ammonia as Nitrogen	mg/L	0.088	0.253	34.5	0.134	0.366	33.3	0.13	0.443
Biological Oxygen Demand	mg/L	<2	3	81	<2	3	133	3	<2
CBOD	mg/L	2	3		<2	3		<2	2
Organic Carbon, Total	mg/L	19.2	21		18.7	19.8		18.4	19.9
Ortho-Phosphate as Phosphorus	mg/L	26.8	29.3		27.9	30.4		28.1	31
Calcium	mg/L	29.2	32.7		30.5	33.1		31.3	34.3
Chloride	mg/L	0.4	0.5		0.6	0.5		0.5	0.5
Fluoride	mg/L	102	110		106	115		109	117
Hardness	mg/L	8.6	9		8.8	9.4		9.4	9.7
Magnesium	mg/L	<0.01	<0.01		0.05	0.01		0.04	0.02
Nitrite as Nitrogen	mg/L	7.4	9		7.8	9.4		8.1	9.6
Potassium	mg/L	21.1	23.8		22	24.6		22.5	25.1
Sodium	mg/L	15	17		16	17		16	16
Sulphate	mg/L	4	1	410000	1	11	550000	3	<1
Coliforms, Fecal	CFU/ 100mL	2	<1	120000	7.4	2	130000	6.2	2
Fecal Streptococcus	MPN/ 100mL	<2	<2	7.4	<2	<2	6.1	<2	<2
Hexane Extractable Material	mg/L	1.4	1.53		1.49	1.86		1.17	1.63
Kjeldahl Nitrogen, Total	mg/L	1.3	1.82		1.35	1.97		1.52	2.32
Phosphorous, Dissolved	mg/L	1.32	1.82		1.33	1.95		1.55	2.32
Phosphorous, Total	mg/L	1.39	1.84	3.94	1.46	2.04	3.97	1.66	2.38

Parameter	Unit	5-Dec		12-Dec		19-Dec		27-Dec	
		F1	F3	F1	F3	F1	F3	F1	F3
Alkalinity, Total (as CaCO3)	mg/L	142	104	99.1	95.9	104	109	104	110
Sp. Conductivity (@25°C)	µS/cm	492	359	336	339	363	381	374	401
pH		7.21	7.41	7.12	7.42	7.04	7.29	6.87	7.09
Solids, Total Dissolved	mg/L	420	206	236	220	198	188	232	242
Solids, Total Suspended	mg/L	<3	<3	4	4	<3	4	6	<3
Ammonia as Nitrogen	mg/L	0.217	0.456	0.179	0.645	0.184	0.752	0.244	0.92
Biological Oxygen Demand	mg/L	<2	<2	<2	<2	<2	<2	<2	<2
CBOD	mg/L	<2	2	2	<2	<2	<2	2	<2
Organic Carbon, Total	mg/L	42.8	22.3	21.3	20.8	24.4	24.4	25.3	25.3
Ortho-Phosphate as Phosphorus	mg/L	42.3	31.4	30.1	27.6	31.6	32.9	32.2	33.9
Calcium	mg/L	28.1	33.5	31.5	30.8	33.7	34.8	34.7	36.3
Chloride	mg/L	0.6	0.5	0.4	0.5	0.4	0.5	0.5	0.5
Fluoride	mg/L	163	119	114	104	120	124	123	128
Hardness	mg/L	13.8	9.8	9.5	8.5	10	10.2	10.5	10.5
Magnesium	mg/L	0.02	0.01	0.01	0.01	<0.01	0.01	0.03	0.02
Nitrite as Nitrogen	mg/L	12.9	9.6	8.5	8.5	9	10	9.3	10.4
Potassium	mg/L	35.4	25.2	23.5	23.2	25.2	26.2	25.8	27.3
Sodium	mg/L	22	16	14	14	16	15	17	16
Sulphate	mg/L	1	<1	3	<1	3	<1	3	<1
Coliforms, Fecal	CFU/100mL	5.2	<1	12	<1	6.3	3	4.1	<1
Fecal Streptococcus	MPN/100mL	<2	<2	<2	<2	<2	<2	<2	<2
Hexane Extractable Material	mg/L	2.35	1.91	1.36	2.01	1.66	2.38	1.84	2.85
Kjeldahl Nitrogen, Total	mg/L	3.14	2.49	1.73	2.36	1.84	2.64	1.89	2.75
Phosphorous, Dissolved	mg/L	3.1	2.49	1.75	2.37	1.86	2.79	1.92	2.86
Phosphorous, Total	mg/L	3.4	2.58	1.93	2.48	2.19	2.93	2.31	3.07

2) Solid Waste Facility Test Results

i) Solid Waste Facility

Since September 2010, the City has been sampling SNP stations 0032-13, 0032-13A, 0032-14, 0032-15A and 0032-16 which surround the SWF.

Due to a dry season, sampling of all SNP stations was not possible at either of the 2012 sampling events. In June, stations 0032-13A, 0032-14 and 0032-16 were sampled, and in September, stations 0032-13A, 0032-14, and 0032-15 were sampled. The remaining stations were either dry or inaccessible at the time of sampling.

The following table summarizes the sampling results.

Parameter	Unit	20-Jun			13-Sep		
		13A	14	16	13A	14	15
Total Ammonia	mg/L	0.28	<.01	<0.01	0.712	0.028	0.045
Nitrate and Nitrite	mg/L	0.08	3.48	<0.01	0.15	0.06	0.04
Faecal Coliform	CFU/100mL	265	<1	<1	70	<1	68
BOD5	mg/L	<2	<2	<2	5	4	6
Total Phenols	mg/L	<0.001	<0.001	<0.001	<0.002	0.004	<0.002
methyl-tert-butyl ether	µg/L	<1	<1	<1	<1	<1	<1
Benzene	mg/L	<0.005	<0.005	<0.005	<0.001	<0.001	<0.001
Ethylbenzene	mg/L	<0.005	<0.005	<0.005	<0.001	<0.001	<0.001
Toluene	mg/L	<0.005	<0.005	<0.005	<0.001	<0.001	<0.001
m/p Xylene	mg/L	<0.005	<0.005	<0.005			
o-Xylene	mg/L	<0.005	<0.005	<0.005			
Total Petroleum Hydrocarbons							
Fraction 2 (>C10-C16)	mg/L	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2
Fraction 3 (>C16-C34)	mg/L	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2
Fraction 4 (>C34)	mg/L	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2
Hydrocarbons, Total Purgeable	mg/L	<0.05	<0.05	<0.05	0.01	0.02	0.03
Hexane Extractable Material	mg/L	<2	<2	<2	<2	<2	<2
Field Parameters							
pH		7.93	7.54	7.25	7.71	7.64	7.72
Conductivity	µS/cm	291	1500	683	362	1250	1140
Major Ions							
Calcium	mg/L	27.9	135	55.2	48	136	88.3
Chloride	mg/L	41.1	197	87.3	34.8	141	188

Parameter	Unit	20-Jun			13-Sep		
		13A	14	16	13A	14	15
Alkalinity	mg/L	73.2	230	212	115	207	85
Magnesium	mg/L	1.2	26.3	18.6	4	25	18.5
Sodium	mg/L	26.4	134	56.8	21.6	85.4	109
Fluoride	mg/L	0.1	<.01	<0.1	0.2	0.1	0.1
Potassium	mg/L	3.5	17.2	7.6	5.2	12.6	8.4
Sulphate	mg/L				16	226	184
Total Dissolved Solids	mg/L	176	922	400	246	812	678
Total Hardness	mg/L	74.7	446	214	136	441	296
ICP-MS Metal Scan (Total)							
Aluminum	µg/L	2110	223	18	933	5040	4360
Arsenic	µg/L	4.5	24.7	52.5	32	209	31.1
Beryllium	µg/L	<0.1	<0.1	<0.1	<0.1	0.1	<0.1
Boron	µg/L	15.7	596	90.8	10.6	277	24.8
Cadmium	µg/L	<0.10	<0.10	<0.10	<0.5	<0.5	<0.5
Chromium	µg/L	3	0.6	0.2	2.8	6.7	12.4
Cobalt	µg/L	1	0.9	0.2	2.3	9.6	4
Copper	µg/L	5.7	2.3	<0.2	5	20.7	16.9
Iron	µg/L	1970	1070	21	8800	18400	6450
Lead	µg/L	4.5	<0.1	<0.1	3.3	3.4	14.2
Manganese	µg/L	61.6	28.6	8.7	658	349	152
Mercury	µg/L	<0.01	<0.01	<0.01	0.02	0.03	0.04
Molybdenum	µg/L	1.1	0.7	0.2	2.8	0.6	2.1
Nickel	µg/L	2.9	7.2	3	5.5	16.6	11.8
Selenium	µg/L	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
Silver	µg/L	<0.1	<0.1	<0.1	0.1	0.3	0.2
Strontium	µg/L	40.6	283	162	67.1	253	226
Vanadium	µg/L	3.5	0.5	0.4	7.6	12.8	19.2
Zinc	µg/L	22	<5	<5	12	25	34

Samples were also taken of surface water in the new landfill cell by the leachate collection manhole, on May 23rd, and September 13th for the same parameters as the landfill SNP Stations. Results of the tests are shown in the following table.

Parameter	Unit	New Landfill Cell	
		23-May	13-Sep
Total Ammonia	mg/L	8.6	3.5
Nitrate and Nitrite	mg/L	0.12	0.44
Faecal Coliform	CFU/100mL	TNTC	330000
BOD5	mg/L	25	71
Total Phenols	mg/L	0.002	<0.002
methyl-tert-butyl ether	µg/L	<1	<1
Benzene	mg/L	<0.005	<0.001
Ethylbenzene	mg/L	<0.005	<0.001
Toluene	mg/L	<0.005	<0.001
m/p Xylene	mg/L	<0.005	
o-Xylene	mg/L	<0.005	
Total Petroleum Hydrocarbons			
Fraction 2 (>C10-C16)	mg/L		<0.1
Fraction 3 (>C16-C34)	mg/L		<0.2
Fraction 4 (>C34)	mg/L		<0.2
Hydrocarbons, Total Purgeable	mg/L	<0.05	0.02
Hexane Extractable Material	mg/L	2	3.6
Field Parameters			
pH		7.81	7.67
Conductivity	µS/cm	580	2690
Major Ions			
Calcium	mg/L	73.7	364
Chloride	mg/L	20.3	162
Alkalinity	mg/L	134	434
Magnesium	mg/L	4.7	76.7
Sodium	mg/L	17.4	153
Fluoride	mg/L	<0.1	0.1
Potassium	mg/L	6.7	52.8
Sulphate	mg/L	122	931
Total Dissolved Solids	mg/L	300	2180
Total Hardness	mg/L	204	1220
ICP-MS Metal Scan (Total)			

Parameter	Unit	New Landfill Cell	
		23-May	13-Sep
Aluminum	µg/L	509	480
Arsenic	µg/L	2.3	50.4
Beryllium	µg/L	<0.1	<0.1
Boron	µg/L	29.2	319
Cadmium	µg/L	<0.05	<0.5
Chromium	µg/L	1.3	3.4
Cobalt	µg/L	2.4	2.5
Copper	µg/L	8.8	7.5
Iron	µg/L	1930	5230
Lead	µg/L	1.1	1.2
Manganese	µg/L	744	2450
Mercury	µg/L	<0.01	0.04
Molybdenum	µg/L	1.3	0.8
Nickel	µg/L	16.9	16.9
Selenium	µg/L	0.4	<0.5
Silver	µg/L	0.1	0.8
Strontium	µg/L	71.4	514
Vanadium	µg/L	2	12.5
Zinc	µg/L	6.8	9

ii) Compost Facility

No testing of leachate was done at the compost facility in 2012 as all leachate generated was used in the composting process.

iii) Biotreatment Pad

Information related to the Biotreatment Pad is provided in the 2012 Annual Biotreatment Pad Report which was submitted as a separate document with this report.

f) Abandonment and Restoration

1) Work Completed in 2012

The City continued contouring the existing landfill for closure.

2) Work Anticipated in 2013

The City will continue contouring areas of the existing landfill as well as making operational changes to the land use for several areas during 2013.

g) Study Summaries

1) Completed Studies

i) Solid Waste Facilities Drainage Study (Item D.14)

In 2010 the City began working on the Solid Waste Facilities Drainage Study. This study was completed in February 2012 and the report submitted to the MVLWB on March 8, 2012. Approval for this study was received August 2, 2012.

ii) Lagoon pH Study (Item D.19)

The contract for this study was awarded late in 2010. The sampling program for the report began in 2011 and was completed in February 2012. The report was submitted on May 29, 2012. Approval for this study was received August 2, 2012.

iii) Biotreatment Pad Treated Water Discharge Area Study (Item D22)

The contract for this study was awarded in late 2011. The field portion of the study was conducted in the summer and fall of 2012, with the report submitted on March 28, 2013.

2) Ongoing Studies

i) Lagoon Effluent CBOD and BOD Study (Item D.21)

The City began testing for CBOD when the current water licence came into effect in May 2010. Testing for CBOD and BOD will continue through 2012 and 2013 with a final report to be submitted by March 31, 2014.

3) Future Studies

i) Lagoon Effluent Characterization Study (Item D.20)

The sampling program for the report began in 2011 and was completed in February 2012. The submission date of the report was changed from March 31, 2012, to October 31, 2012. Due to issues with conflicting information from Lift Station #5, the final study has not been completed.

The study will be submitted once the issues with Lift Station #5 have been resolved and the remaining project work can be completed.

ii) Lagoon Phosphorous Study (Schedule 2, Item 3d)

Work on this item has been performed in conjunction with the Lagoon pH Study and the Lagoon Effluent Characterization Study. The phosphorous study will form part of the Fiddler's Lake Treatment System Plan which had the submission date changed from March 31, 2012 to October 31, 2012. As this study is also affected by the issues with Lift Station #5, the study will not be submitted until the issues have been resolved and the remaining work can be completed.

iii) Surface Water Metal Concentrations Surrounding SWF (Item D.23)

This study is anticipated to begin in 2013 with the report submission date changed from March 31, 2013 to March 31, 2014.

h) Unauthorized Discharges

The week of May 28th, 2012 a small leak was discovered at the control structure at the lagoon. Weekly sampling at SNP stations 0032-F1, 0032-F3 and 0032-10 began on May 30th and continued until June 27th. Biweekly sampling then occurred until August 25th when the lagoon overflowed the control structure. Weekly sampling occurred again from August 29th through decant.

i) Solid Waste Facility Storage Volumes

In 2012 the City used roughly 15,000 m^3 of the remaining volume in the existing landfill for the disposal of waste. This volume consisted of bulky construction waste which was used in the contouring of the site. It is estimated there is an additional 15,000 m^3 of volume remaining in the existing landfill, which is dependent on final contouring of the site.

The new landfill cell was used exclusively for the disposal of bales of waste in 2012. Approximately 14,560 m^3 of space was used, leaving roughly 60,000 m^3 in the new cell for the disposal of waste.

It is important to note that the volume of space in both the old and new landfill areas is an approximate measurement that is dependent on the final elevations and contours of each site. As the closure plan for the landfill has not been completed yet, the actual remaining volume of each site may be larger than what has been reported here.

j) Monthly and Annual Compost Quantities

1) Organic Wastes Received

The following table summarizes the amount of organic wastes received, carbon amendment products used, and unsuitable materials removed from the compost facility in 2012.

	Amount of Materials Accepted (kg)				Material Removed (kg)
Month	**Food Waste**	**Yard Waste**	**Shredded Paper**	**Woodchips**	**Garbage**
Jan.	9,150	3,240	576	2,700	
Feb.	8,690	2,880	512	2,400	
Mar.	10,050	3,240	576	2,700	
April	10,010	3,420	608	2,850	
May	13,360	4,680	832	3,900	730
June	12,350	3,960	704	3,300	1,000
July	13,603	4,680	832	3,900	
Aug.	12,662	4,320	768	3,450	
Sept.	8,590	3,600	480	3,000	
Oct.	10,720	4,320	576	3,600	12,000
Nov.	7,920	2,880	512	2,400	
Dec.	8,336	2,880	512	2,400	
2012 Total	**125,441**	**44,100**	**7,488**	**36,600**	**13,730**

2) Compost Produced and Distributed

Approximately 79,380 kg (88 m^3) of finished compost was produced in 2012. The majority of the compost was sold to the public in the fall, with 4 m^3 left on the pad to be sold as part of the 2013 sale.

k) Biotreatment Pad Liner Inspections

Please refer to the Annual Biotreatment Pad Report submitted with this report.

l) Stormwater Management Plan

The City's Stormwater Management Plan (SWMP) was submitted to the MVLWB on August 8, 2011 as per item D.10 of the water licence. The Plan was approved on September 29, 2011. In March 2012, a revised SWMP was submitted to the MVLWB which was revised to include:

- A revised stormwater effluent monitoring program
- Reference to the Spill Contingency Plan with respect to handling sewage spills

- Results of the stormwater effluent monitoring program

Based on the reviewer comments received on the revised SWMP, a meeting was held between the City, MVLWB, WLWB, Environment Canada and Aboriginal Affairs and Northern Development Canada (AANDC) on February 27, 2013, in order to discuss the status of the SWMP and to address the conflicting comments received on the March 2012 version of the SWMP. Submitted under a separate letter is a revised SWMP based on both the requirements under the current approval letter, and the outcome of the February 27th meeting. Included with the revised SWMP is a request to change the requirements of the SWMP based on the meeting outcomes. A copy of the covering letter for the revised SWMP, and a list of the changes made, is included in Appendix A of this report.

Stormwater Infrastructure Maintenance

Annual flushing of the City's stormwater system occurred between June and July 2012. The following table summarizes the work that was done. The amount of the system flushed was relatively small in 2012 due to equipment break-downs.

Item	% Flushed	Water Used (L)	Debris Content (%)
Catch Basins	90	94,600	10
Storm Sewer Mains	2	41,600	25

The flushed materials were taken to the Fiddler's Lake Lagoon where they were disposed of at the truck dump area. The material was placed along the bank of the lagoon and allowed to drain into the lagoon.

The trash interceptor was installed at the school draw outlet end of May and removed early in October. When the screen was installed in May, roughly one 77L garbage bag of trash was removed from the ditch in the area. The screen on the interceptor was cleaned once, when it was removed in October. The total amount of debris cleaned from the screen during the season was approximately 0.011 m^3.

m) Sewage Disposal Facilities Operation and Maintenance Plan

An interim copy of the City's Sewage Disposal Facilities Operation and Maintenance Plan was be submitted to the MVLWB by May 31, 2012. Submission of the final O&M Plan is dependent on information from both the Lagoon Effluent Characterization Study, and the Lagoon Phosphorous Study which are stalled due to a problem with the flow meter at Lift Station #5.

n) Spill Contingency Plan

The current Spill Contingency Plan was reviewed and some revisions were made. Appendix B lists the changes that were made to the plan. A copy of the revised Plan, including the list of revisions from Appendix B of this report, was submitted to the MVLWB with this report.

o) Solid Waste Disposal Facilities Operation and Maintenance Plan

The City's Solid Waste Disposal Facilities Operation and Maintenance Plan was reviewed and some revisions made. Appendix C lists the changes that were made to the Plan. A copy of the revised plan, including the list of changes from Appendix C of this report, was submitted to the MVLWB with this report.

p) Biotreatment Pad Operation and Maintenance Plan

The Biotreatment Pad Operation and Maintenance Plan was reviewed. No changes were made to the plan since the submission of the April 2012 revision.

q) Hazardous Waste Management Plan

The City's Hazardous Waste Management Plan was reviewed and a list of the revisions is included in Appendix D. A copy of the revised plan, including the list of changes from Appendix D of this report, was submitted to the MVLWB with this report.

r) Stormwater Effluent Data

The following tables summarize the stormwater effluent data for 2012. The data can also be found in Appendix H of the March 2013 revision of the City's Stormwater Management Plan which has been submitted with this report.

Range Lake Outfall	**Units**	**2012**	
		13-Jun	**20-Sep**
Microbiology			
BOD	mg/L	2	<2
Escherichia Coli (E. Coli)	MPN/100mL	12	27.5
Fecal Coliforms	CFU/100mL	11	41
Physicals			
Alkalinity, Total (as $CaCO_3$)	mg/L	135	107
Specific Conductivity	µS/cm	416	375
pH		7.06	7.99
Total Dissolved Solids	mg/L	278	258
Total Suspended Solids	mg/L	108	<3
Nutrients			
Ammonia as Nitrogen	mg/L	0.05	0.04
Nitrate+Nitrite as Nitrogen	mg/L	<0.01	<0.01

Range Lake Outfall	Units	2012	
		13-Jun	20-Sep
Total Phosphorus	mg/L	0.15	0.02
Major Ions			
Calcium	mg/L	54.8	46.8
Chloride	mg/L	29.4	10.9
Fluoride	mg/L	0.2	0.3
Hardness	mg/L	181	183
Magnesium	mg/L	10.7	16.1
Nitrate as Nitrogen	mg/L	<0.01	<0.01
Nitrite as Nitrogen	mg/L	<0.01	<0.01
Potassium	mg/L	4.2	5.1
Sodium	mg/L	13.2	8.5
Sulphate	mg/L	31	67
Organic Parameters			
Benzene	mg/L	<0.005	<0.001
Ethylbenzene	mg/L	<0.005	<0.001
F2: C10-C16	mg/L	<0.2	<0.2
F3: C16-C34	mg/L	<0.2	<0.2
F4: C34-C50	mg/L	<0.2	<0.2
Hydrocarbons, Total Extractable	mg/L		<0.2
Hydrocarbons, Total Purgeable	mg/L	<0.05	<0.01
m/p-xylene	mg/L	<0.005	<0.001
o-xylene	mg/L	<0.005	<0.001
Toluene	mg/L	<0.005	<0.001
Trace Metals, Total			
Aluminum	µg/L	2430.0	25.0
Antimony	µg/L	2.2	1.0
Arsenic	µg/L	41.4	25.5
Barium	µg/L	60.0	31.2
Beryllium	µg/L	<0.1	<0.1
Cadmium	µg/L	0.3	<0.1
Cesium	µg/L	0.3	<0.1
Chromium	µg/L	9.6	0.6
Cobalt	µg/L	3.7	<0.1
Copper	µg/L	60.9	1.5
Iron	µg/L	5080.0	66.0
Lead	µg/L	8.0	<0.1
Lithium	µg/L	10.4	10.6

Range Lake Outfall	Units	2012	
		13-Jun	20-Sep
Manganese	µg/L	347.0	23.8
Mercury	µg/L	0.0	<0.01
Molybdenum	µg/L	1.5	1.6
Nickel	µg/L	10.7	1.6
Rubidium	µg/L	10.3	5.1
Selenium	µg/L	<0.5	<0.5
Silver	µg/L	0.1	<0.1
Strontium	µg/L	110.0	91.8
Thallium	µg/L	<0.1	<0.1
Titanium	µg/L	101.0	0.9
Uranium	µg/L	4.7	2.3
Vandium	µg/L	7.6	0.9
Zinc	µg/L	219.0	<5

Jan Stirling Outfall	Units	2012	
		13-Jun	20-Sep
Microbiology			
BOD	mg/L	<2	<2
Escherichia Coli (E. Coli)	MPN/100mL	6.3	3
Fecal Coliforms	CFU/100mL	11	10
Physicals			
Alkalinity, Total (as $CaCO_3$)	mg/L	145	119
Specific Conductivity	µS/cm	708	489
pH		7.74	7.93
Total Dissolved Solids	mg/L	504	312
Total Suspended Solids	mg/L	<3	4
Nutrients			
Ammonia as Nitrogen	mg/L	0.04	0.03
Nitrate+Nitrite as Nitrogen	mg/L	1.23	0.51
Total Phosphorus	mg/L	0.037	0.03
Major Ions			
Calcium	mg/L	98.2	69.1
Chloride	mg/L	46.4	23.6
Fluoride	mg/L	0.3	0.3
Hardness	mg/L	322	230
Magnesium	mg/L	18.6	13.9
Nitrate as Nitrogen	mg/L	1.23	0.51
Nitrite as Nitrogen	mg/L	<0.01	<0.01
Potassium	mg/L	6.1	5.3
Sodium	mg/L	19.5	12.5
Sulphate	mg/L	150	93
Organic Parameters			
Benzene	mg/L	<0.005	<0.001
Ethylbenzene	mg/L	<0.005	<0.001
F2: C10-C16	mg/L	<0.2	<0.2
F3: C16-C34	mg/L	<0.2	<0.2
F4: C34-C50	mg/L	<0.2	<0.2
Hydrocarbons, Total Extractable	mg/L		<0.2
Hydrocarbons, Total Purgeable	mg/L	<0.05	<0.01
m/p-xylene	mg/L	<0.005	<0.001
o-xylene	mg/L	<0.005	<0.001

Jan Stirling Outfall	Units	2012	
		13-Jun	20-Sep
Toluene	mg/L	<0.005	<0.001
Trace Metals, Total			
Aluminum	µg/L	25	35
Antimony	µg/L	2.1	7
Arsenic	µg/L	26.6	76.3
Barium	µg/L	50.6	30.8
Beryllium	µg/L	<0.1	<0.1
Cadmium	µg/L	<0.1	<0.1
Cesium	µg/L	<0.1	<0.1
Chromium	µg/L	0.2	0.9
Cobalt	µg/L	0.8	0.4
Copper	µg/L	4.8	7.6
Iron	µg/L	460	290
Lead	µg/L	<0.1	<0.1
Lithium	µg/L	9.7	9.8
Manganese	µg/L	148	52.2
Mercury	µg/L	<0.01	0.04
Molybdenum	µg/L	1.4	1.2
Nickel	µg/L	7.2	6.8
Rubidium	µg/L	4.7	4.4
Selenium	µg/L	<0.5	<0.5
Silver	µg/L	<0.1	0.2
Strontium	µg/L	210	145
Thallium	µg/L	<0.1	<0.1
Titanium	µg/L	0.9	1
Uranium	µg/L	12.1	4.5
Vandium	µg/L	0.5	0.7
Zinc	µg/L	148	131

School Draw Outfall	Units	2012	
		13-Jun	20-Sep
Microbiology			
BOD	mg/L	<2	<2
Escherichia Coli (E. Coli)	MPN/100mL	<1.0	11
Fecal Coliforms	CFU/100mL	<1	7
Physicals			
Alkalinity, Total (as $CaCO_3$)	mg/L	153	164
Specific Conductivity	µS/cm	928	625
pH		7.47	7.53
Total Dissolved Solids	mg/L	670	380
Total Suspended Solids	mg/L	16	4
Nutrients			
Ammonia as Nitrogen	mg/L	<0.01	0.02
Nitrate+Nitrite as Nitrogen	mg/L	2.39	0.98
Total Phosphorus	mg/L	0.029	<0.01
Major Ions			
Calcium	mg/L	139	98.1
Chloride	mg/L	56.7	22
Fluoride	mg/L	0.3	0.4
Hardness	mg/L	453	315
Magnesium	mg/L	25.4	16.9
Nitrate as Nitrogen	mg/L	2.39	0.98
Nitrite as Nitrogen	mg/L	<0.01	<0.01
Potassium	mg/L	5.8	5.1
Sodium	mg/L	20.5	11.8
Sulphate	mg/L	252	134
Organic Parameters			
Benzene	mg/L	<0.005	<0.001
Ethylbenzene	mg/L	<0.005	<0.001
F2: C10-C16	mg/L	<0.2	<0.2
F3: C16-C34	mg/L	<0.2	<0.2
F4: C34-C50	mg/L	<0.2	<0.2
Hydrocarbons, Total Extractable	mg/L		<0.2
Hydrocarbons, Total Purgeable	mg/L	<0.05	<0.01
m/p-xylene	mg/L	<0.005	<0.001
o-xylene	mg/L	<0.005	<0.001

School Draw Outfall	Units	2012	
		13-Jun	20-Sep
Toluene	mg/L	<0.005	<0.001
Trace Metals, Total			
Aluminum	µg/L	11	8.6
Antimony	µg/L	2	2.2
Arsenic	µg/L	3.5	3.3
Barium	µg/L	38.8	29.8
Beryllium	µg/L	<0.1	<0.1
Cadmium	µg/L	<0.1	<0.05
Cesium	µg/L	<0.1	<0.1
Chromium	µg/L	0.1	0.1
Cobalt	µg/L	0.2	0.1
Copper	µg/L	10.6	9.5
Iron	µg/L	28	21
Lead	µg/L	<0.1	<0.1
Lithium	µg/L	13.6	15.1
Manganese	µg/L	3.7	1
Mercury	µg/L	0.01	<0.01
Molybdenum	µg/L	1.2	0.9
Nickel	µg/L	14.4	13.1
Rubidium	µg/L	4	3.9
Selenium	µg/L	0.8	0.3
Silver	µg/L	0.2	<0.1
Strontium	µg/L	251	176
Thallium	µg/L	<0.1	<0.1
Titanium	µg/L	0.4	0.2
Uranium	µg/L	15.7	9
Vandium	µg/L	0.3	<0.1
Zinc	µg/L	9	8.6

Back Bay Outfall	Units	2012	
		13-Jun	20-Sep
Microbiology			
BOD	mg/L	6	<2
Escherichia Coli (E. Coli)	MPN/100mL	<1	13.1
Fecal Coliforms	CFU/100mL	3	11
Physicals			
Alkalinity, Total (as $CaCO_3$)	mg/L	219	251
Specific Conductivity	µS/cm	819	845
pH		7.49	7.59
Total Dissolved Solids	mg/L	568	560
Total Suspended Solids	mg/L	296	50
Nutrients			
Ammonia as Nitrogen	mg/L	0.12	0.41
Nitrate+Nitrite as Nitrogen	mg/L	1.45	0.69
Total Phosphorus	mg/L	0.29	0.05
Major Ions			
Calcium	mg/L	113	123
Chloride	mg/L	59.7	77.5
Fluoride	mg/L	0.1	0.2
Hardness	mg/L	373	392
Magnesium	mg/L	21.9	20.9
Nitrate as Nitrogen	mg/L	1.45	0.69
Nitrite as Nitrogen	mg/L	<.01	<0.01
Potassium	mg/L	10.1	9.2
Sodium	mg/L	22.2	21.8
Sulphate	mg/L	115	74
Organic Parameters			
Benzene	mg/L	<0.005	<0.001
Ethylbenzene	mg/L	<0.005	<0.001
F2: C10-C16	mg/L	<0.2	<0.2
F3: C16-C34	mg/L	<0.2	<0.2
F4: C34-C50	mg/L	<0.2	<0.2
Hydrocarbons, Total Extractable	mg/L		<0.2
Hydrocarbons, Total Purgeable	mg/L	<0.05	<0.01
m/p-xylene	mg/L	<0.005	<0.001
o-xylene	mg/L	<0.005	<0.001

Back Bay Outfall	Units	2012	
		13-Jun	20-Sep
Toluene	mg/L	<0.005	<0.001
Trace Metals, Total			
Aluminum	µg/L	4860	44
Antimony	µg/L	1.6	0.9
Arsenic	µg/L	74	4.2
Barium	µg/L	104	59.1
Beryllium	µg/L	0.1	<0.1
Cadmium	µg/L	0.3	<0.1
Cesium	µg/L	0.6	<0.1
Chromium	µg/L	14.5	0.6
Cobalt	µg/L	20.5	3.7
Copper	µg/L	39.4	11
Iron	µg/L	12300	1960
Lead	µg/L	16.4	<0.1
Lithium	µg/L	14.1	5.5
Manganese	µg/L	1280	399
Mercury	µg/L	0.03	<0.1
Molybdenum	µg/L	1	0.7
Nickel	µg/L	23.1	13.2
Rubidium	µg/L	10.2	5.3
Selenium	µg/L	<0.5	<0.5
Silver	µg/L	<0.1	0.1
Strontium	µg/L	312	478
Thallium	µg/L	<0.1	<0.1
Titanium	µg/L	168	1.4
Uranium	µg/L	4.5	3
Vandium	µg/L	14.1	0.7
Zinc	µg/L	1430	700

Niven Lake Outfall	Units	2012	
		13-Jun	20-Sep
Microbiology			
BOD	mg/L	<2	<2
Escherichia Coli (E. Coli)	MPN/100mL	<1	4.1
Fecal Coliforms	CFU/100mL	<1	9
Physicals			
Alkalinity, Total (as $CaCO_3$)	mg/L	186	121
Specific Conductivity	µS/cm	1120	1230
pH		7.45	7.68
Total Dissolved Solids	mg/L	800	862
Total Suspended Solids	mg/L	164	14
Nutrients			
Ammonia as Nitrogen	mg/L	0.02	0.03
Nitrate+Nitrite as Nitrogen	mg/L	1.21	0.33
Total Phosphorus	mg/L	0.072	0.09
Major Ions			
Calcium	mg/L	153	192
Chloride	mg/L	122	149
Fluoride	mg/L	0.2	0.1
Hardness	mg/L	518	572
Magnesium	mg/L	32.8	22.4
Nitrate as Nitrogen	mg/L	1.2	0.33
Nitrite as Nitrogen	mg/L	<0.01	<0.01
Potassium	mg/L	8	10.1
Sodium	mg/L	28.1	23.8
Sulphate	mg/L	218	296
Organic Parameters			
Benzene	mg/L	<0.005	<0.001
Ethylbenzene	mg/L	<0.005	<0.001
F2: C10-C16	mg/L	<0.2	<0.2
F3: C16-C34	mg/L	<0.2	<0.2
F4: C34-C50	mg/L	<0.2	<0.2
Hydrocarbons, Total Extractable	mg/L		<0.2
Hydrocarbons, Total Purgeable	mg/L	<0.05	<0.01
m/p-xylene	mg/L	<0.005	<0.001
o-xylene	mg/L	<0.005	<0.001

Niven Lake Outfall	Units	2012	
		13-Jun	20-Sep
Toluene	mg/L	<0.005	<0.001
Trace Metals, Total			
Aluminum	µg/L	167	46
Antimony	µg/L	0.6	0.7
Arsenic	µg/L	4.6	2.2
Barium	µg/L	66.3	72.3
Beryllium	µg/L	<0.1	<0.1
Cadmium	µg/L	<0.1	<0.1
Cesium	µg/L	<0.1	<0.1
Chromium	µg/L	0.9	0.5
Cobalt	µg/L	0.8	0.8
Copper	µg/L	8.5	8.7
Iron	µg/L	434	136
Lead	µg/L	0.4	<0.1
Lithium	µg/L	12.5	27.1
Manganese	µg/L	64.2	38.4
Mercury	µg/L	<0.01	<0.01
Molybdenum	µg/L	1.5	1.3
Nickel	µg/L	14.5	14.8
Rubidium	µg/L	7.7	7.7
Selenium	µg/L	<0.5	<0.5
Silver	µg/L	<0.1	<0.1
Strontium	µg/L	419	818
Thallium	µg/L	<0.1	<0.1
Titanium	µg/L	7	2
Uranium	µg/L	24.4	17.4
Vandium	µg/L	0.9	0.6
Zinc	µg/L	49	22

Frame Lake Outfall	Units	2012	
		13-Jun	20-Sep
Microbiology			
BOD	mg/L	<2	<2
Escherichia Coli (E. Coli)	MPN/100mL	1	14.4
Fecal Coliforms	CFU/100mL	<1	3
Physicals			
Alkalinity, Total (as $CaCO_3$)	mg/L	122	115
Specific Conductivity	µS/cm	531	500
pH		7.86	7.92
Total Dissolved Solids	mg/L	352	312
Total Suspended Solids	mg/L	4	4
Nutrients			
Ammonia as Nitrogen	mg/L	<0.01	0.03
Nitrate+Nitrite as Nitrogen	mg/L	0.95	0.79
Total Phosphorus	mg/L	0.026	<0.01
Major Ions			
Calcium	mg/L	70.6	77.9
Chloride	mg/L	39.2	19.3
Fluoride	mg/L	0.3	0.5
Hardness	mg/L	230	243
Magnesium	mg/L	12.9	11.7
Nitrate as Nitrogen	mg/L	0.95	0.79
Nitrite as Nitrogen	mg/L	<0.01	<0.01
Potassium	mg/L	4.4	3.5
Sodium	mg/L	17.9	10.3
Sulphate	mg/L	84	108
Organic Parameters			
Benzene	mg/L	<0.005	<0.001
Ethylbenzene	mg/L	<0.005	<0.001
F2: C10-C16	mg/L	<0.2	<0.2
F3: C16-C34	mg/L	<0.2	<0.2
F4: C34-C50	mg/L	<0.2	<0.2
Hydrocarbons, Total Extractable	mg/L		<0.2
Hydrocarbons, Total Purgeable	mg/L	<0.05	<0.01
m/p-xylene	mg/L	<0.005	<0.001
o-xylene	mg/L	<0.005	<0.001

Frame Lake Outfall	Units	2012	
		13-Jun	20-Sep
Toluene	mg/L	<0.005	<0.001
Trace Metals, Total			
Aluminum	µg/L	28	36
Antimony	µg/L	0.6	0.4
Arsenic	µg/L	6.8	2.7
Barium	µg/L	35.9	30.3
Beryllium	µg/L	<0.1	<0.1
Cadmium	µg/L	<0.1	<0.1
Cesium	µg/L	<0.1	<0.1
Chromium	µg/L	0.3	0.3
Cobalt	µg/L	0.6	0.3
Copper	µg/L	8.9	6.2
Iron	µg/L	165	136
Lead	µg/L	<0.1	<0.1
Lithium	µg/L	6.4	6.5
Manganese	µg/L	82.1	86.9
Mercury	µg/L	0.01	<0.01
Molybdenum	µg/L	1.1	0.9
Nickel	µg/L	7.3	6.4
Rubidium	µg/L	6	5.5
Selenium	µg/L	<0.5	<0.5
Silver	µg/L	<0.1	<0.1
Strontium	µg/L	135	118
Thallium	µg/L	<0.1	<0.1
Titanium	µg/L	0.9	1.2
Uranium	µg/L	5.9	6.5
Vandium	µg/L	0.4	0.6
Zinc	µg/L	54	72

Kam Lake Outfall	Units	2012	
		13-Jun	20-Sep
Microbiology			
BOD	mg/L	<2	<2
Escherichia Coli (E. Coli)	MPN/100mL	1	4.1
Fecal Coliforms	CFU/100mL	3	1
Physicals			
Alkalinity, Total (as $CaCO_3$)	mg/L	211	85.5
Specific Conductivity	µS/cm	1140	312
pH		8.06	8.16
Total Dissolved Solids	mg/L	768	184
Total Suspended Solids	mg/L	44	4
Nutrients			
Ammonia as Nitrogen	mg/L	0.08	0.01
Nitrate+Nitrite as Nitrogen	mg/L	3.17	0.1
Total Phosphorus	mg/L	0.074	0.09
Major Ions			
Calcium	mg/L	133	42
Chloride	mg/L	147	26.6
Fluoride	mg/L	0.2	0.1
Hardness	mg/L	468	145
Magnesium	mg/L	33.2	9.8
Nitrate as Nitrogen	mg/L	3.15	0.1
Nitrite as Nitrogen	mg/L	0.02	<0.01
Potassium	mg/L	8.6	3
Sodium	mg/L	50.9	11.6
Sulphate	mg/L	154	31
Organic Parameters			
Benzene	mg/L	<0.005	<0.001
Ethylbenzene	mg/L	<0.005	<0.001
F2: C10-C16	mg/L	<0.2	<0.2
F3: C16-C34	mg/L	<0.2	<0.2
F4: C34-C50	mg/L	<0.2	<0.2
Hydrocarbons, Total Extractable	mg/L		<0.2
Hydrocarbons, Total Purgeable	mg/L	<0.05	<0.01
m/p-xylene	mg/L	<0.005	<0.001
o-xylene	mg/L	<0.005	<0.001

Kam Lake Outfall	Units	2012	
		13-Jun	20-Sep
Toluene	mg/L	<0.005	<0.001
Trace Metals, Total			
Aluminum	µg/L	75	18
Antimony	µg/L	2.5	11.1
Arsenic	µg/L	5.3	214
Barium	µg/L	76.6	24.5
Beryllium	µg/L	<0.1	<0.1
Cadmium	µg/L	0.2	<0.1
Cesium	µg/L	<0.1	<0.1
Chromium	µg/L	0.6	0.6
Cobalt	µg/L	2.7	0.1
Copper	µg/L	11.3	8.5
Iron	µg/L	183	119
Lead	µg/L	0.4	<0.1
Lithium	µg/L	12.9	5.8
Manganese	µg/L	64.6	53.7
Mercury	µg/L	0.01	<0.01
Molybdenum	µg/L	2.9	0.7
Nickel	µg/L	17.8	3.6
Rubidium	µg/L	7.1	2.5
Selenium	µg/L	<.5	<0.5
Silver	µg/L	<.1	<0.1
Strontium	µg/L	282	215
Thallium	µg/L	<.1	<0.1
Titanium	µg/L	3.6	0.8
Uranium	µg/L	18.2	1
Vandium	µg/L	1	1
Zinc	µg/L	1170	<5

Deh Cho Blvd. at Kam Lake Road	Units	2012	
		13-Jun	20-Sep
Microbiology			
BOD	mg/L	<2	<2
Escherichia Coli (E. Coli)	MPN/100mL	17.1	14.6
Fecal Coliforms	CFU/100mL	3	6
Physicals			
Alkalinity, Total (as $CaCO_3$)	mg/L	109	195
Specific Conductivity	µS/cm	382	824
pH		7.69	7.94
Total Dissolved Solids	mg/L	268	548
Total Suspended Solids	mg/L	4	4
Nutrients			
Ammonia as Nitrogen	mg/L	0.02	0.05
Nitrate+Nitrite as Nitrogen	mg/L	0.84	1.22
Total Phosphorus	mg/L	0.042	0.02
Major Ions			
Calcium	mg/L	48.2	109
Chloride	mg/L	20.6	71
Fluoride	mg/L	0.2	0.2
Hardness	mg/L	172	387
Magnesium	mg/L	12.5	28.1
Nitrate as Nitrogen	mg/L	0.83	1.22
Nitrite as Nitrogen	mg/L	<0.01	<0.01
Potassium	mg/L	3.3	6.2
Sodium	mg/L	9.7	21.9
Sulphate	mg/L	49	126
Organic Parameters			
Benzene	mg/L	<0.005	<0.001
Ethylbenzene	mg/L	<0.005	<0.001
F2: C10-C16	mg/L	<0.2	<0.2
F3: C16-C34	mg/L	<0.2	<0.2
F4: C34-C50	mg/L	<0.2	<0.2
Hydrocarbons, Total Extractable	mg/L		<0.2
Hydrocarbons, Total Purgeable	mg/L	<0.05	<0.01
m/p-xylene	mg/L	<0.005	<0.001
o-xylene	mg/L	<0.005	<0.001

Deh Cho Blvd. at Kam Lake Road	Units	2012	
		13-Jun	20-Sep
Toluene	mg/L	<0.005	<0.001
Trace Metals, Total			
Aluminum	µg/L	128	35
Antimony	µg/L	1	0.9
Arsenic	µg/L	13.6	6.4
Barium	µg/L	28.3	60.1
Beryllium	µg/L	<0.1	<0.1
Cadmium	µg/L	<0.1	<0.1
Cesium	µg/L	<0.1	<0.1
Chromium	µg/L	0.4	0.6
Cobalt	µg/L	0.2	0.3
Copper	µg/L	8.2	5
Iron	µg/L	341	311
Lead	µg/L	0.3	<0.1
Lithium	µg/L	6.6	12
Manganese	µg/L	45.1	131
Mercury	µg/L	<0.01	<0.01
Molybdenum	µg/L	0.9	0.8
Nickel	µg/L	2.2	3
Rubidium	µg/L	3.4	5.2
Selenium	µg/L	<0.5	<0.5
Silver	µg/L	<0.1	<0.1
Strontium	µg/L	112	272
Thallium	µg/L	<0.1	<0.1
Titanium	µg/L	3.8	1.8
Uranium	µg/L	4.1	10.5
Vandium	µg/L	0.6	0.7
Zinc	µg/L	79	73

s) Stormwater Effluent Trends

1) Biological

With the exception of the fall 2010 sampling event for Deh Cho Boulevard and the School Draw outlet, tests for Ecoli and Fecal Coliforms have been below the Canadian Water Quality Guidelines for Recreational Use. The two areas that had test results above the guidelines did not have elevated levels in either the 2011 or the 2012 sampling program. It is thought the results from the fall 2010 sampling were due to a one-time event and are not indicative of the general

composition of stormwater at either of these sites. As such, no mitigative measures are required at this time.

2) Heavy Metals

The Canadian Water Quality Guidelines for the Protection of Aquatic Life give limits for the metals shown in the following table.

	Unit	Lower Limit	Upper Limit
Aluminum	µg/L		100
Arsenic	µg/L		5
Cadmium	µg/L		0.017
Copper	µg/L	2	4
Iron	µg/L		300
Lead	µg/L	1	7
Mercury	µg/L		0.026
Molybdenum	µg/L		73
Nickel	µg/L	25	150
Selenium	µg/L		1
Silver	µg/L		0.1
Thallium	µg/L		0.8
Uranium	µg/L	15	33
Zinc	µg/L		30

Yellowknife is situated in a mineral rich area which translates to high values of certain metals in the rocks and sediments of the area. Typical samples from the stormwater outlets show concentrations of aluminum, arsenic, copper, iron, and zinc which are higher than the guidelines. As background metal information is not known, it cannot be said whether the current values are of concern or are representative of naturally occurring levels.

t) SNP Data Analysis

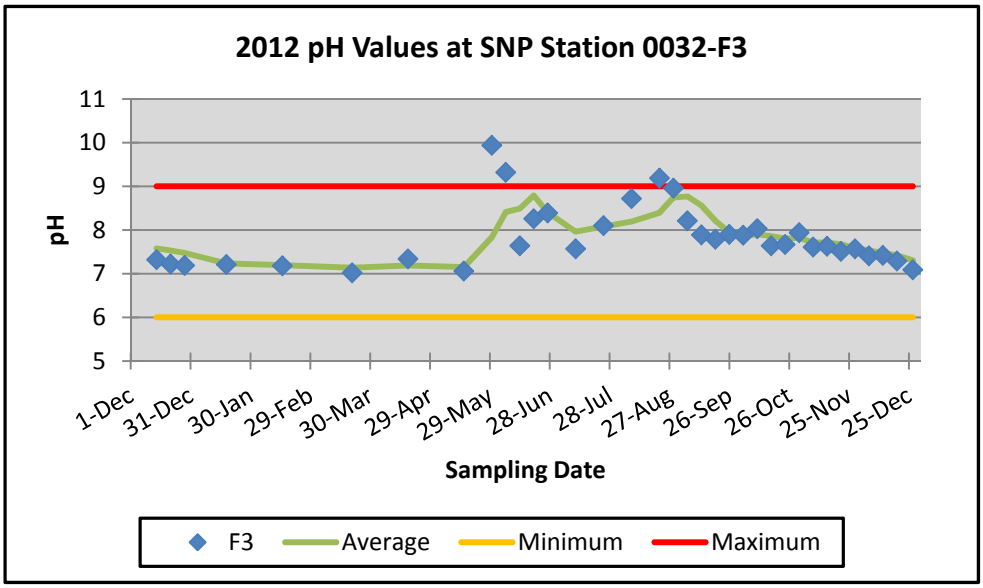
The following sections discuss the trends seen in the data collected through the SNP.

1) Lagoon Compliance Point 0032-F3

i) pH Analysis

The following graph shows the pH values at the compliance point along with the maximum and minimum values outlined by the water licence. Also shown is the running average of the pH values.

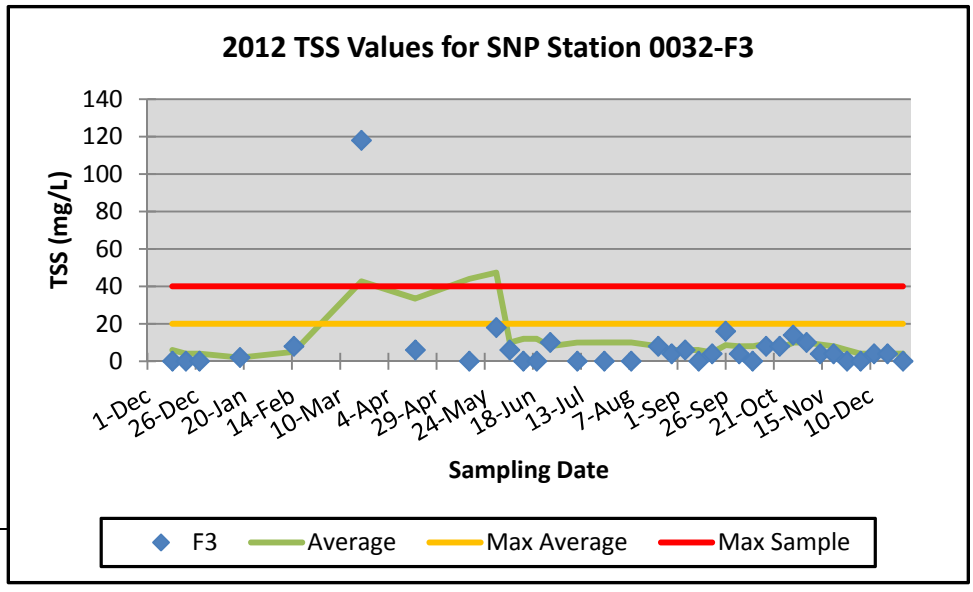
As can be seen, the pH generally stays within the licence criteria, except for spikes occurring in the summer. As mentioned in Section g, the City submitted a report regarding the cause of these high pH occurrences at 0032-F3 on May 29, 2012.



ii) Total Suspended Solids Analysis

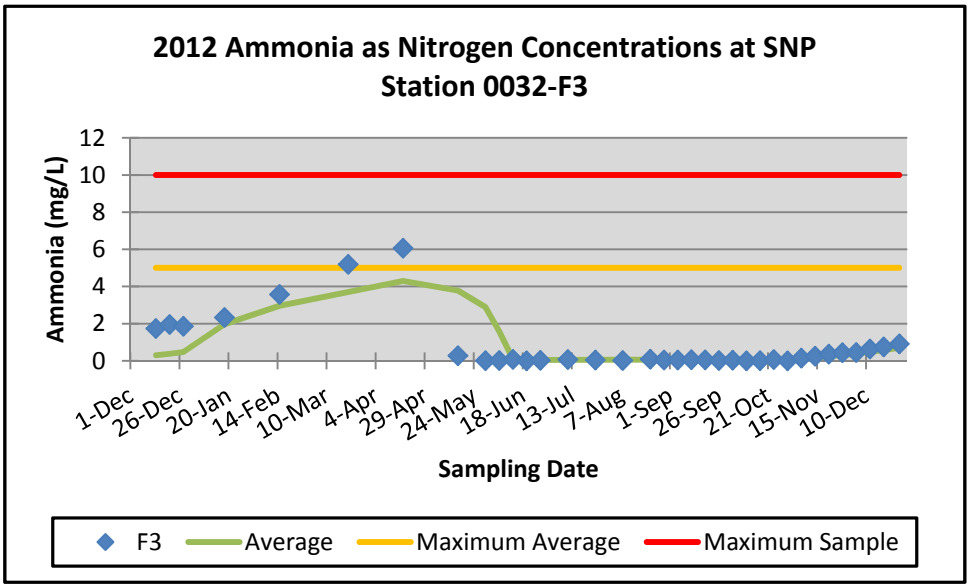
The following graph shows the Total Suspended Solids (TSS) values at the compliance point along with maximum average and maximum grab sample values as set out in the water licence. Also shown is the running average of the TSS values.

As can be seen in the graph, there has only been one sampling event that was outside of the water licence criteria. Generally, TSS are below the limits set out in the water licence.



iii) Ammonia Analysis

The following graph shows Ammonia as Nitrogen values at the compliance point along with maximum average and maximum grab sample discharge objectives as set out in the water licence. Also shown is the running average of the values.

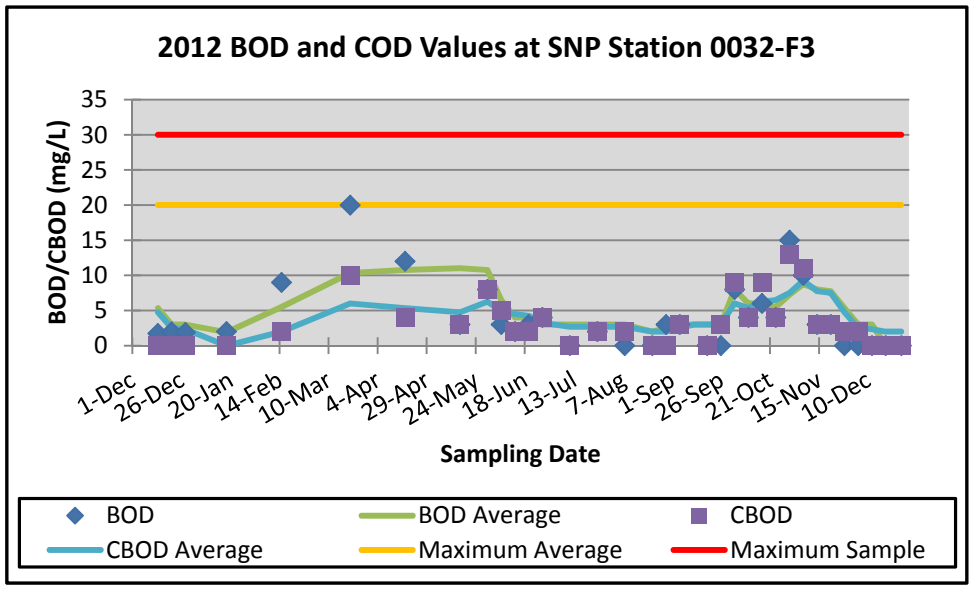


As can be seen in the graph, ammonia values increase during the winter when the water is stagnant. With the exception of two sampling events, the values for 2012 were below the maximum average sample discharge objective.

iv) BOD Analysis

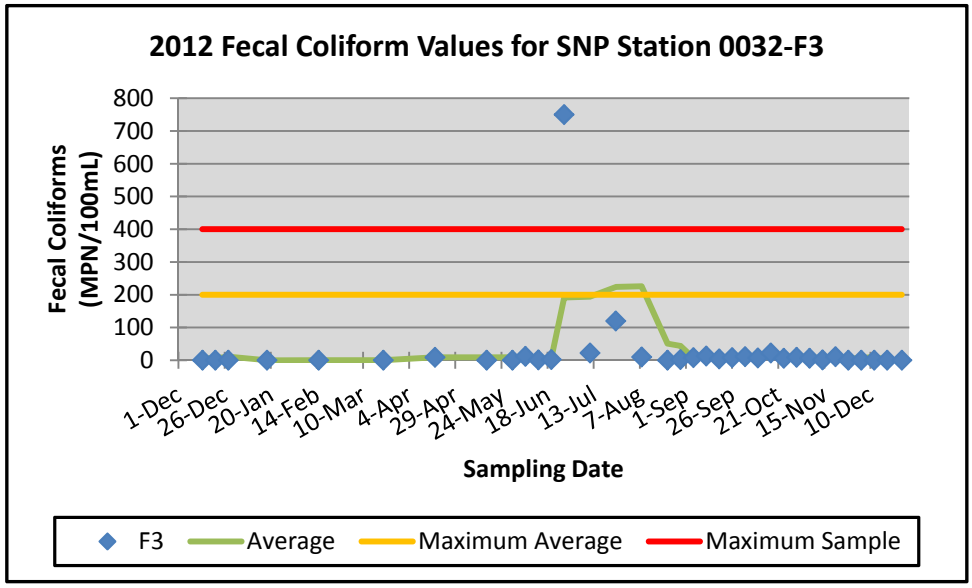
The graph on the following page shows the BOD values at the compliance point along with maximum average and maximum grab sample values as set out in the water licence. Also shown is the running average of the values. The graph also includes the CBOD values for the compliance point.

As can be seen in the graph, all samples to date have been below the water licence criteria.



v) Fecal Coliform Analysis

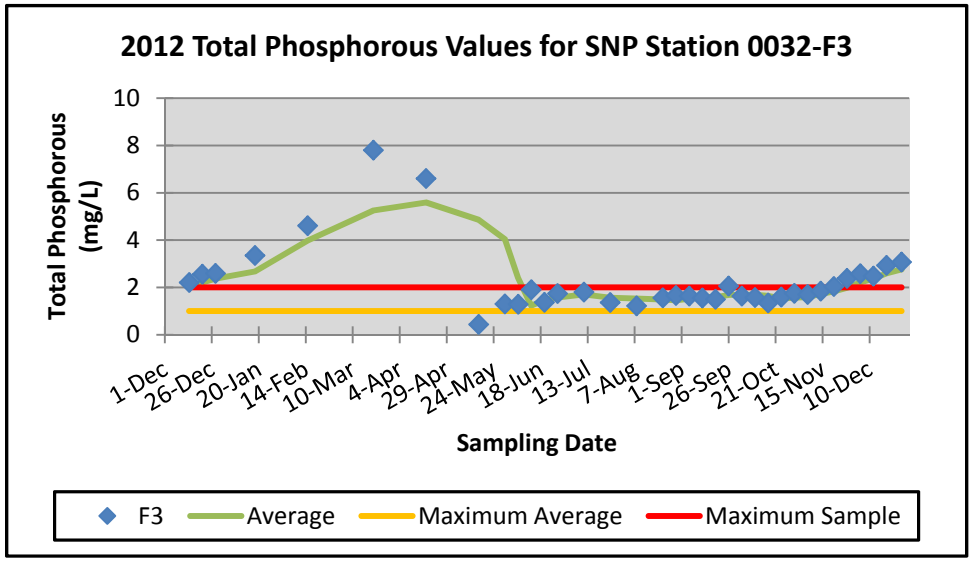
The following graph shows the Fecal Coliform values at the compliance point along with maximum average and maximum grab sample values as set out in the water licence. Also shown is the running average of the values.



As can be seen in the graph, with the exception of one sampling event in June, all results are well below the maximum average concentration value as set by the water licence.

vi) Phosphorous Analysis

The following graph shows the phosphorous concentrations at the compliance point along with maximum average and maximum grab sample discharge objectives set out in the water licence. Also shown is the running average of the values.



As can be seen in the graph, the phosphorous concentrations tend to spike in the winter when the water is stagnant.

As part of the City's Fiddler's Lake Treatment System Plan, the City will be including discussion of how phosphorous treatment will be completed to meet the discharge objective.

u) Formal Written Correspondence with Inspector

There was no formal written correspondence with the inspector in 2012.

v) Additional Information Requests from MVLWB

No additional information was requested by the MVLWB.

Appendix A

Stormwater Management Plan
Cover Letter and Summary of Changes

CITY OF YELLOWKNIFE

March 28, 2013

Mackenzie Valley Land and Water Board
Box 2130, 7th Floor - 4910 50th Avenue
Yellowknife, NT X1A 2P6

Attention: Crystal Thomas, Regulatory Officer

Dear Ms. Thomas,

RE: Water Licence No. MV2009L3-0007 – Stormwater Management Plan

As per the requirements of the City's water licence, submitted herein is a copy of the updated Stormwater Management Plan (SWMP).

The approval for the previous SWMP (July 2011 revision) required the following (note: items have been numbered for ease of reference):

1. *An updated stormwater effluent monitoring program by March 31, 2012;*
2. *A proposed sampling location to monitor run-off at the Deh Cho snow dump by March 31, 2012;*
3. *An update on the investigation of the elevated levels of biological parameters detected at Deh Cho Blvd and the School Draw outlet and the evaluation of mitigation measures by March 31, 2013;*
4. *An update on the investigation of elevated levels of aluminum, arsenic, cadmium, copper, iron and zinc and treatment options by March 31, 2013;*
5. *An update on current and future sediment control measures (on an annual basis);*
6. *A specific reference to the Spill Contingency Plan (including section and page numbers) with respect to handling sewage spills; and*
7. *Results of the stormwater effluent monitoring program (on an annual basis).*

The City submitted a revised SWMP in March 2012, which was sent out for comment. Due to the comments received, the revised SWMP was not submitted to the Board for approval. A meeting was held on February 27th, 2013 between the MVLWB, WLWB, AANDC, EC and the City to discuss issues with the revised SWMP. A copy of the agenda and the outcome from this meeting is attached.

Based on the outcomes of the meeting, the City has again revised the SWMP and is requesting changes to the approval requirements. The responses and requests for each required item (#1-7 above) are summarized in the following table.

<table>
<tr>
<td>1. An updated stormwater effluent monitoring program by March 31, 2012;</td>
<td><u>Response:</u> An updated monitoring program was provided in the March 2012 revision of the SWMP, however it was not approved or implemented.

At the February 27th, 2013 meeting, a sampling program was agreed upon by all parties present. The program which will be put in place beginning in 2013 is as follows:

<table>
<tr><th rowspan="2">Outlet</th><th colspan="3">Sampling Events</th><th rowspan="2">Total # of Samples</th></tr>
<tr><th>Spring[1]</th><th>Summer[2]</th><th>Fall[3]</th></tr>
<tr><td>Jan Stirling</td><td>✔</td><td>✔</td><td>✔</td><td>3</td></tr>
<tr><td>Back Bay</td><td>✔</td><td>✔</td><td>✔</td><td>3</td></tr>
<tr><td>School Draw</td><td>✔</td><td>✔</td><td>✔</td><td>3</td></tr>
<tr><td>Deh Cho Blvd</td><td>✔</td><td></td><td>✔</td><td>2</td></tr>
<tr><td>Kam Lake</td><td>✔</td><td></td><td>✔</td><td>2</td></tr>
<tr><td>Frame Lake</td><td>✔</td><td></td><td></td><td>1</td></tr>
<tr><td>Niven Lake</td><td>✔</td><td></td><td></td><td>1</td></tr>
<tr><td>Range Lake</td><td>✔</td><td></td><td></td><td>1</td></tr>
<tr><td colspan="5">1. Late May/Early June
2. Late July/Early August
3. Mid-September</td></tr>
</table>
</td>
</tr>
<tr>
<td>2. A proposed sampling location to monitor run-off at the Deh Cho snow dump by March 31, 2012;</td>
<td><u>Response:</u> As reported in the 2011 AWLR, the City did not find an appropriate sampling point for the Deh Cho snow dump by March 31, 2012. An inspection of the area in spring 2012 showed that the snow dump primarily drains towards the stormwater drainage ditch along Deh Cho Blvd. Roughly 10% of the snow dump area drains through the wetlands towards the rear of the site. As the majority of the drainage from the site flows through the existing Deh Cho Blvd. stormwater sampling point, an additional sampling point specifically for the snow dump is not felt to be necessary at this time.

<u>Request:</u> That the requirement for a sampling location for the Deh Cho Blvd snow dump be removed from the SWMP.</td>
</tr>
</table>

3. An update on the investigation of the elevated levels of biological parameters detected at Deh Cho Blvd and the School Draw outlet and the evaluation of mitigation measures by March 31, 2013;	**Response:** included in 2012 Annual Water Licence Report is the following information: *With the exception of the fall 2010 sampling event for Deh Cho Boulevard and the School Draw outlet, tests for Ecoli and Fecal Coliforms have been below the Canadian Water Quality Guidelines for Recreational Use. The two areas that had test results above the guidelines did not have elevated levels in either the 2011 or the 2012 sampling program. It is thought the results from the fall 2010 sampling were due to a one-time event and are not indicative of the general composition of stormwater at either of these sites. As such, no mitigative measures are required at this time.*
4. An update on the investigation of elevated levels of aluminum, arsenic, cadmium, copper, iron and zinc and treatment options by March 31, 2013;	**Response:** included in 2012 Annual Water Licence Report is the following information: *Yellowknife is situated in a mineral rich area which translates to high values of certain metals in the rocks and sediments of the area. As background metal information is not known, it cannot be said whether the current values are of concern or are representative of naturally occurring levels.*
5. An update on current and future sediment control measures (on an annual basis);	**Response:** Sediment control measures remain unchanged at this time. **Request:** That this requirement be removed from the SWMP and added to the AWLR. As the SWMP is a plan and not a report, the AWLR is a better tool for reporting this information.
6. A specific reference to the Spill Contingency Plan (including section and page numbers) with respect to handling sewage spills; and	**Response:** References to SCP included in SWMP. **Request:** That references be to sections only as future revisions of the SCP may effect page numbers which would then require the SWMP to be updated. There are already numerous documents to be reviewed on a yearly basis and requiring approvals because page numbers changed seems a little ridiculous.

7. Results of the stormwater effluent monitoring program (on an annual basis).	**Response:** Appendix in SWMP with results updated to include 2012 values. **Request:** That this requirement be removed from the SWMP as it is a Plan and as such is not an appropriate place for reporting information. This information should be reported in the AWLR as follows: • Summary table of all test results from the first sampling event be included as an appendix to the AWLR. • Stormwater section of AWLR to include visual observations of each sampling site for each sampling event. • Stormwater section of AWLR to include summary of monthly precipitation amounts for Yellowknife.

Also discussed at the February 27th meeting was the current known information regarding stormwater composition and the requirement for treatment. As there is limited data available, it is difficult to determine at this time whether the existing stormwater composition is having an adverse reaction on the receiving environment. It was discussed that a detailed trend analysis report be conducted after 3 years of data has been collected under the revised sampling program. The City is in agreement with this request and would recommend the detailed trend report be submitted to the MVLWB by March 31, 2016.

In addition to the above changes, the City also requests that the requirement for annual review of the SWMP be changed to a review once every 3 years, with the next review being March 2016, which would coincide with the detailed trend analysis report. Each year the City has numerous plans, manuals and reports to be reviewed and submitted by March 31. The time it takes to get each document out for review, comments back, responses to comments and final approval is significant. As the content of the SWMP has changed very little in the last 2 years it seems appropriate to extend the length of time between review periods.

Should you have any questions or comments about the above information, please contact me at 920-5689 or by email at walexander@yellowknife.ca.

Sincerely,

Wendy Alexander, P. Eng.
Municipal Works Engineer, Public Works and Engineering

Encl: 1. Stormwater Management Plan – March 2013 Revision
2. February 27, 2013 Meeting Agenda and Outcomes

(Docs#358348)

CITY OF YELLOWKNIFE

WATER LICENCE MV2009L3-0007
STORMWATER MANAGEMENT PLAN
MEETING AGENDA

Date/Time Wednesday, February 27, 2013, 1:00 - 2:30pm

Location MVLWB Meeting Room, 7th Floor YK Centre

Objectives

1. To finalize the stormwater monitoring program in order to have the sites added to the Surveillance Network Program
2. To resolve manner in which sampling results are reported
3. To review treatment methods and determine their relevancy to Yellowknife
4. To discuss parameter thresholds for items of concern

Background

- Stormwater Management Plan (SWMP) was approved September 29, 2011 after close to 3 years of revisions
- Latest revised SWMP (March 2012) was not sent to the MVLWB for approval due to conflicting comments by reviewers.

Issue #1: Sampling Program

- Current program samples at 8 outlets twice a year (early June & mid-September)
- Revision to program proposed in March 2012 version of SWMP
  - Same number of samples taken (16 total), but different timing of events
  - Sites of concern would be sampled 3 times a year, while others would only be sampled in the spring
  - Attachment #1: Stormwater Outlet Quality Analysis (Parameters of Concern)
  - Attachment #2: Stormwater Outlet Risk Analysis
- City does not have staff or budget to increase stormwater sampling at this time

Recommendation:

- Choose one of the three sampling options as laid out in attachment #2 and add stations and sample timing to Surveillance Network Program

Issue #2 Reporting of Sampling Results

- The SWMP is a Plan, not a report, and is not an appropriate place to be reporting information
- Generally, Plans are not revised on an annual basis. They are reviewed to ensure what is in the Plan is in fact what is happening, but revisions to Plans should not be made on an annual basis
- Approval of the SWMP requires all stormwater data to be reported in the SWMP annually (Attachment #3: SWMP Approval Letter)
- The City is already required to report all stormwater data in the Annual Water Licence Report, including trends for biological and heavy metal data.

Recommendation:

- Remove the requirement for yearly data reporting in the SWMP
- Include a running tabulation of stormwater data (either in table or chart form) as an appendix to the Annual Water Licence Report
- Update the SWMP as required, and include results of the stormwater sampling program either with each update or at least once every 5 years

Issue #3: Stormwater Treatment

- Yellowknife stormwater generally has:
  - very low Total Suspended Solids (TSS) values
  - high total metal content for various metals
- Current stormwater treatment methods focus on the removal of suspended solids (lowering TSS)
- As Yellowknife does not have a concern with TSS, the treatment methods currently available will not significantly improve the quality of stormwater
- Additional issue with current treatment methods is the requirement for large retention ponds
  - Area required for these is not easily attained at any of the existing outlets

Recommendation:

- As there are currently no viable stormwater treatment methods for use in Yellowknife, continue to research new methods
- Report on research information at least once every 5 years

Discussion: Parameter Thresholds

- The City currently tests stormwater for 57 parameters (Attachment #4: Parameter Guidelines for Stormwater)
- Stormwater quality is compared to the current Canadian Water Quality Guidelines for both Recreational Use and the Protection of Aquatic Life
- Discussion of possible parameter threshold limits and associated mitigative measures (sample table below for Arsenic)

Parameter	CCME Limit	Avg to date	Site Min.	Site Max.	Action Level
Arsenic	100 u/L	150 ug/L	80 ug/L	170 ug/L	200 ug/L

- Note: Turnaround for sample results is at least 2 weeks. By the time results are received, the water quality at the stormwater outlet has changed.

Please let me know if you have any questions or comments regarding the agenda. We'd like to get these issues resolved during the meeting so we can move ahead with the SWMP. Please contact me at 920-5689 or by email at walexander@yellowknife.ca.

Attachments

Attachment #1: Stormwater Outlet Quality Analysis (Parameters of Concern)
Attachment #2: Stormwater Outlet Risk Analysis
Attachment #3: Stormwater Management Plan Approval Letter
Attachment #4: Parameter Guidelines for Stormwater

City of Yellowknife Stormwater Quality Analysis*

	E. Coli	pH	Aluminum	Arsenic**	Cadmium	Copper	Iron	Lead	Silver	Zinc
Jan Stirling	no issues	no issues	high spring 2009 and both 2011 events	above limits, under 100 since fall 2010	below lab detection limit	high with exception of fall 2009	high spring 2009, fall 2011, and spring 2012	no issues	high fall 2012	high, values remain consistent
Frame Lake	no issues	no issues	high in spring 2010 and fall 2011, below limit at other events	above limit in fall 2009, both 2011 events and spring 2012, but well below 100	below lab detection limit	high since fall 2009	high in fall 2010 and both 2011 events	no issues	no issues	high, values remain consistent
Back Bay	no issues	no issues	high in spring 2009, fall 2010, and spring 2012	above limits, but consistently under 100	high spring 2012	high with the exception of fall 2009	high since 2010	high spring 2012	no issues	high, values remain consistent
Deh Cho Blvd	high fall 2010	no issues	high in spring 2010, spring 2011, and spring 2012	above limits, but consistently under 100	below lab detection limit	high with the exception of fall 2011, values are consistent	high	no issues	high fall 2011, below lab detection limit otherwise	high
Kam Lake	no issues	no issues	high in fall 2009, extremely high in spring 2011	below 100 in 2011 and spring 2012, over 100 for other sampling events	high in spring 2011 and spring 2012, below lab detection limit otherwise	high with the exception of fall 2011	high in spring 2009 and both 2011 samples, below limit otherwise	high spring 2011, below limit otherwise	high fall 2011, below lab detection limit otherwise	high spring 2011 and spring 2012, below limit otherwise
School Draw	high fall 2010	no issues	high 2010	above limits in fall 2010 but below 100, all other values below limit	below lab detection limit	high since spring 2009	high in 2010, below limit otherwise	no issues	high spring 2012	high in 2010, below limit otherwise
Niven Lake	no issues	no issues	high in 2011 and spring 2012	above limit in fall 2010 and spring 2011, all values below 100	high in spring 2010 and spring 2011, below lab detection limit otherwise	high since spring 2010	high in spring 2011 and spring 2012, below limit otherwise	no issues	no issues	high spring 2010, spring 2011, and spring 2012, below limit otherwise
Range Lake	no issues	high in spring 2011 by 0.1	high in spring 2009, and spring 2012	over 100 in spring 2009, consistent values well below 100 since	high in spring 2009 and spring 2012, under lab detection limit otherwise	high in spring 2009 and spring 2012	high in spring 2009 and spring 2012	high spring 2012	no issues	high in spring 2009 and spring 2012, well below limit otherwise

*Only parameters that have been above the Canadian Water Quality Guidelines for either Recreational Use or the Protection of Aquatic Life criteria limits are discussed here

**Naturally occurring levels of arsenic in Yellowknife soils is approximately 150ppm (ug/g), with an upper limit of 300ppm (ug/g).

City of Yellowknife Stormwater Outlet Risk Analysis

	Limit			Number of Exceedances													
	value	unit	Weight	Range Lake		Frame Lake		Niven Lake		Kam Lake		Back Bay		Deh Cho Blvd		School Draw		Jan Stirling	
E. Coli	200	MPN/100mL	10	0	0%	0	0%	0	0%	0	0%	0	0%	1	17%	1	13%	0	0%
pH	8.5		2	1	13%	0	0%	0	0%	0	0%	0	0%	0	0%	0	0%	0	0%
Aluminum	100	µg/L	7	2	25%	2	25%	3	38%	2	29%	3	38%	3	50%	2	25%	3	38%
Arsenic	100	µg/L	1	1	13%	0	0%	0	0%	4	57%	0	0%	0	0%	0	0%	3	38%
Cadmium	0.017	µg/L	3	2	25%	0	0%	2	25%	2	29%	1	13%	0	0%	0	0%	0	0%
Copper	4	µg/L	5	2	25%	7	88%	6	75%	6	86%	7	88%	5	83%	8	100%	7	88%
Iron	300	µg/L	6	2	25%	3	38%	2	25%	3	43%	5	63%	5	83%	2	25%	3	38%
Lead	7	µg/L	9	1	13%	0	0%	0	0%	3	43%	1	13%	0	0%	0	0%	0	0%
Silver	0.1	µg/L	4	0	0%	0	0%	0	0%	1	14%	0	0%	1	17%	1	13%	1	13%
Zinc	30	µg/L	8	2	25%	8	100%	3	38%	2	29%	7	88%	6	100%	2	25%	8	100%
Weighted Score				70		131		93		119		154		138		96		145	
Ranking				**8**		**4**		**7**		**5**		**1**		**3**		**6**		**2**	

Outlet	Risk	Rank	Sampling Frequency		
			Current	Option 1	Option 2*
Back Bay	154	1	2	2	3
Jan Stirling	145	2	2	3	3
Deh Cho Blvd	138	3	2	3	3
Frame Lake	131	4	2	1	1
Kam Lake	119	5	2	2	1
School Draw	96	6	2	3	3
Niven Lake	93	7	2	1	1
Range Lake	70	8	2	1	1
Total Samples			**16**	**16**	**16**

*March 2012 Proposed Program

Sampling Times: 1 Sample - Late May/Early June
2 Samples - Early June, Mid-September
3 Samples - Early June, July rain event, Mid-September

Mackenzie Valley Land and Water Board
7th Floor - 4910 50th Avenue • P.O. Box 2130
YELLOWKNIFE, NT X1A 2P6
Phone (867) 669-0506 • FAX (867) 873-6610

September 29, 2011 File: MV2009L3-0007

Ms. Wendy Alexander, P.Eng.
Municipal Works Engineer
City of Yellowknife
P.O. Box 580
YELLOWKNIFE NT X1A 2N4 Email: walexander@yellowknife.ca

Dear Ms. Alexander:

Water Licence Plan Approval – Stormwater Management Plan

The Mackenzie Valley Land and Water Board (the Board) met on September 29, 2011 and reviewed the Municipal Stormwater Management Plan (MSWMP or Plan) dated July 2011. The Board has approved the Plan as submitted; however, the Plan needs to be revised as a whole as updates are made and submitted in March of each year to coincide with the submission date of the Annual Report.

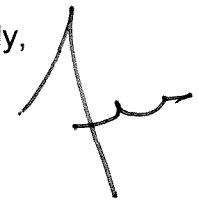
In future revisions of the Plan for approval by the Board, the City is to include:

- An updated stormwater effluent monitoring program by March 31, 2012;
- A proposed sampling location to monitor run-off at the Deh Cho snow dump by March 31, 2012.
- An update on the investigation of the elevated levels of biological parameters detected at Deh Cho Blvd and the School Draw outlet and the evaluation of mitigation measures by March 31, 2013;
- An update on the investigation of elevated levels of aluminum, arsenic, cadmium, copper, iron, and zinc and treatment options by March 31, 2013;
- An update on current and future sediment control measures (on an annual basis);
- A specific reference to the Spill Contingency Plan (including section and page numbers) with respect to handling sewage spills; and
- Results of the stormwater effluent monitoring program (on an annual basis).

In the Annual Report, the City is to report observations during maintenance and to include any changes to the maintenance schedule in future revisions of the Plan.

If you have any questions or concerns, please contact Miki Ehrlich at (867) 766-7469 or email mehrlich@mvlwb.com.

Yours sincerely,



Willard Hagen
MVLWB Chair

Copied to: Distribution List
Miki Ehrlich, Regulatory Officer, MVLWB

Parameter Guidelines for Stormwater

Parameter[1]	Units	Guideline Values[2]	
		Lower Limit	Upper Limit
Microbiology			
BOD	mg/L		
Escherichia Coli (E. Coli)	MPN/100mL		200
Fecal Coliforms	CFU/100mL		200
Physicals			
Alkalinity, Total (as $CaCO_3$)	mg/L		
Specific Conductivity	µS/cm		
pH		6.5	8.5
Total Dissolved Solids	mg/L		
Total Suspended Solids	mg/L		
Nutrients			
Ammonia as Nitrogen	mg/L		
Nitrate+Nitrite as Nitrogen	mg/L		
Total Phosphorus	mg/L		4,000
Major Ions			
Calcium	mg/L		
Chloride	mg/L		
Fluoride	mg/L		
Hardness	mg/L		
Magnesium	mg/L		
Nitrate as Nitrogen	mg/L		
Nitrite as Nitrogen	mg/L		
Potassium	mg/L		
Sodium	mg/L		
Sulphate	mg/L		
Organic Parameters			
Benzene	mg/L		370,000
Ethylbenzene	mg/L		90,000
F2: C10-C16	mg/L		
F3: C16-C34	mg/L		
F4: C34-C50	mg/L		
Hydrocarbons, Total Extractable	mg/L		
Hydrocarbons, Total Purgeable	mg/L		
m/p-xylene	mg/L		
o-xylene	mg/L		
Toluene	mg/L		

Parameter[1]	Units	Guideline Values[2]	
		Lower Limit	Upper Limit
Trace Metals, Total			
Aluminum	µg/L		100
Antimony	µg/L		
Arsenic[3]	µg/L		5
Barium	µg/L		
Beryllium	µg/L		
Cadmium	µg/L		0.017
Cesium	µg/L		
Chromium	µg/L		
Cobalt	µg/L		
Copper	µg/L	2	4
Iron	µg/L		300
Lead	µg/L	1	7
Lithium	µg/L		
Manganese	µg/L		
Mercury	µg/L		0.026
Molybdenum	µg/L		73
Nickel	µg/L	25	150
Rubidium	µg/L		
Selenium	µg/L		1
Silver	µg/L		0.1
Strontium	µg/L		
Thallium	µg/L		0.8
Titanium	µg/L		
Uranium	µg/L		
Vandium	µg/L		
Zinc	µg/L		30

Notes

1. All parameters which stormwater is currently tested for are shown.
2. E. Coli, Fecal Coliforms and pH from Canadian Water Quality Guidelines for Recreational Use. Other values from Canadian Water Quality Guidelines for the Protection of Aquatic Life
3. Naturally occurring levels of arsenic in Yellowknife soils is approximately 150ppm (ug/g), with an upper limit of 300ppm (ug/g). (From Risklogic Scientific Services 2002 Report, Determining Natural (Background) Arsenic Soil Concentrations in Yellowknife)

MV2009L3-0007 - City of Yellowknife – Stormwater Management Plan Meeting
Meeting Outcomes
February 27, 2013, 1-2:30pm MVLWB Boardroom

Attendees:
Jeanne Arsenault – Aboriginal Affairs and Northern Development Canada
Anne Wilson – Environment Canada (teleconference)
Wendy Alexander – City of Yellowknife
Kathy Racher – Wek'eezhii Land and Water Board
Tyree Mullaney – Mackenzie Valley Land and Water Board
Crystal Thomas - Mackenzie Valley Land and Water Board

Issue 1: Sampling Program
Outcomes

- Sampling Program - Option 1 as outlined in the meeting agenda, is preferred by all as a compromise to ensure the total annual samples do not exceed 16. Two updates to option 1 were agreed upon - the addition of one sampling event at Back Bay, bringing the total annual sampling events at Back Bay to three, and the reduction of sampling events at Deh Cho Blvd, to bring the total annual sampling events at Deh Cho Blvd to two.
- Inclusion in SNP – All agreed that the monitoring program should not yet be included in the SNP. As changes are still being made, flexibility is required.
- Annual precipitation should be reported on a monthly basis and included with the monitoring results.
- A visual qualitative analysis of the sampling location should be logged while taking the samples and included with the results.

Issue 2: Reporting of Sampling Results
Outcome

- All agreed that sampling results can be removed from the Stormwater Management Plan and included as an Appendix to the Annual Report. Important to include all results dating back to when samples were first taken for comparison sake.

Required Action

- City will need to request to the Board that the requirement to include sampling results as part of the Stormwater Management Plan is not necessary as results will be included in the Annual Report – include in cover letter for next version of the Stormwater Management Plan.

Issue 3 & 4: Stormwater Treatment and Parameter Thresholds
Outcome

- At this point in time, because sampling program is again changing, no treatment methods are expected.
- All agreed that a three year report will be required to be submitted by the City. The three year report should be a more in depth look at trends since sampling began in 2009, give estimates of potential impact to the watercourses, what does the data actually mean in terms of effect to the watercourse, what is being affected (focus on fish bearing watercourses), any research and reports on background data, if necessary what treatments are being researched.

Stormwater Management Plan

Summary of Changes for March 2013 Revision

Section	Change
Foreword	New Section ***In order to facilitate ease of reading, items that were revised in this version of the Stormwater Management Plan are shown in bold italic font, including names of Figures and Appendices. A summary list of the changes made to this document is included in Appendix A.***
7 Snow Disposal	Revision to Deh Cho Blvd. snow dump drainage map in ***Appendix E***
	Revisions to paragraph on Dech Cho Blvd snow dump: The snow dump off of Deh Cho Blvd. drains ***primarily towards the stormwater drainage ditch along Deh Cho Blvd. Roughly 10% of the snow dump area drains through the wetlands towards the rear of the site. As the majority of the drainage from the site flows through the existing Deh Cho Blvd. stormwater sampling point, an additional sampling point specifically for the snow dump is not felt to be necessary at this time.***
8.5 Back-up Power Units	Revisions to page numbers in Spill Contingency Plan for info on back up power units: Back-up power units have been connected to all but one of the City's Liftstations, which handle sewage disposal throughout the City. In the event of a power disruption, these units are activated and provide power until the functionality of the City's power grid returns. These units ensure that raw sewage continues to flow to the sewage lagoon for treatment. Sections 3.1 and 5.1 of the SCP, located on ***pages 10 and 16*** respectively, contain information on the City's sewage system.

<table>
<tr><th>Section</th><th>Change</th></tr>
<tr><td>10 Monitoring Program</td><td>
<u>Revisions to sampling event information:</u>

The original sampling program consisted of sampling each station twice a year – once in the spring and again in the fall. As data for the stations has been gathered, it has become apparent that certain outlets would benefit from additional sampling events. Based on a meeting with regulatory agencies that was held in February 2013, the City intends to modify the sampling program as per the following table. This will increase sampling at places where concern has been show, and decrease sampling in places where there is little concern.
<table>
<tr><th rowspan="2">Outlet</th><th colspan="3">Sampling Events</th><th rowspan="2">Total # of Samples</th></tr>
<tr><th>Spring[1]</th><th>Summer[2]</th><th>Fall[3]</th></tr>
<tr><td>Jan Stirling</td><td>✔</td><td>✔</td><td>✔</td><td>3</td></tr>
<tr><td>Back Bay</td><td>✔</td><td>✔</td><td>✔</td><td>3</td></tr>
<tr><td>School Draw</td><td>✔</td><td>✔</td><td>✔</td><td>3</td></tr>
<tr><td>Deh Cho Blvd</td><td>✔</td><td></td><td>✔</td><td>2</td></tr>
<tr><td>Kam Lake</td><td>✔</td><td></td><td>✔</td><td>2</td></tr>
<tr><td>Frame Lake</td><td>✔</td><td></td><td></td><td>1</td></tr>
<tr><td>Niven Lake</td><td>✔</td><td></td><td></td><td>1</td></tr>
<tr><td>Range Lake</td><td>✔</td><td></td><td></td><td>1</td></tr>
<tr><td colspan="5">1. Late May/Early June
2. Late July/Early August
3. Mid-September</td></tr>
</table>

<u>Updates to Appendix H with 2012 sampling results</u>
</td></tr>
<tr><td>12 Public Education</td><td>
<u>Revision to information on City's website</u>

As the City's website has become a popular place for residents to gather information, a page dedicated to stormwater has been created. The webpage contains general information about stormwater as well as the above mentioned brochure. The address of the webpage is below.

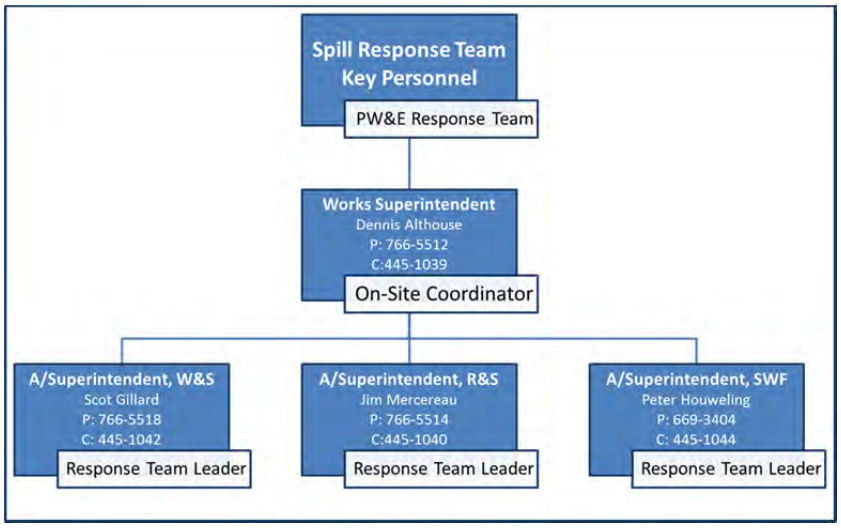
http://www.yellowknife.ca/City_Hall/Departments/Public_Works___Engineering/WaterandSewerSystem/StormwaterInformation.html
</td></tr>
</table>

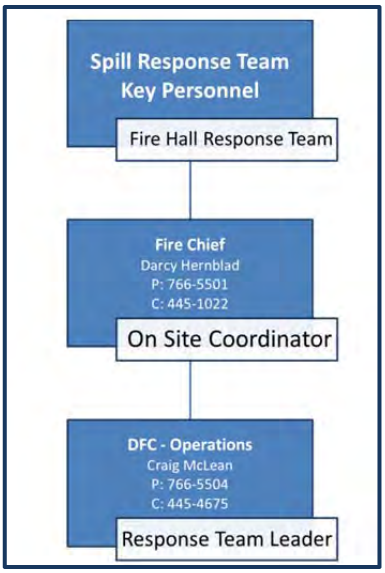
Appendix B
Summary of Changes to Spill Contingency Plan

Spill Contingency Plan
Summary of Changes for March 2013 Revision

Section	Change
Entire Plan	General formatting changes which affect page numbers.
Foreword	New Section ***In order to facilitate ease of reading, items that were revised in this version of the Landfill Operations and Maintenance Manual are shown in bold italic font, including names of Figures and Appendices. A summary list of the changes made to this document is included in Appendix A.***
Preamble	Addition to internal distribution list i) City of Yellowknife (internally) - Mayor - Senior Administrative Officer - Director of Public Safety - City Fire Chief - Deputy Fire Chief - Director of Public Works & Engineering - Works Superintendent - Roads and Sidewalks Assistant Superintendent - Water and Sewer Assistant Superintendent - ***Solid Waste Facility Assistant Superintendent*** - Pumphouse/Liftstation Supervisor
	Removal of "***Technical Advisory Committee to the MVLWB***" from list of government agencies

<table>
<tr><th>Section</th><th>Change</th></tr>
<tr><td>2 Reporting Procedures</td><td>
<u>Updates to contact numbers for City of Yellowknife</u>
<table>
<tr><th></th><th>Telephone</th><th>Cellular</th></tr>
<tr><td>Dispatch</td><td>920-5699</td><td></td></tr>
<tr><td>Director of PW & E</td><td>920-5639</td><td>445-1037</td></tr>
<tr><td>Manager of PW & E</td><td>920-5637</td><td>445-6147</td></tr>
<tr><td>Engineer of PW & E</td><td>920-5689</td><td>445-1038</td></tr>
<tr><td>Public Works Superintendent</td><td>766-5512</td><td>445-1039</td></tr>
<tr><td>W/S Assistant Superintendent</td><td>766-5518</td><td>445-1042</td></tr>
<tr><td>R/S Assistant Superintendent</td><td>766-5514</td><td>445-1040</td></tr>
<tr><td>SWF Assistant Superintendent</td><td>669-3404</td><td>445-1044</td></tr>
<tr><td>W/S Supervisor</td><td>766-5516</td><td>445-1043</td></tr>
<tr><td>R/S Supervisor</td><td>766-5517</td><td>445-1041</td></tr>
<tr><td>PH/LS Supervisor</td><td>766-5515</td><td></td></tr>
<tr><td>O&M Secretary</td><td>766-5511</td><td></td></tr>
<tr><td>Director of Public Safety</td><td>920-5685</td><td>445-1034</td></tr>
<tr><td>Fire Chief</td><td>766-5501</td><td>445-1022</td></tr>
<tr><td>Deputy Fire Chief - Operations</td><td>766-5504</td><td>445-4675</td></tr>
</table>
<u>Revisions to contact list for Additional Information or Assistance:</u>
<table>
<tr><td>GNWT–ENR Environment and Natural Resources, Yellowknife</td><td>873-7654</td></tr>
<tr><td>Aboriginal Affairs and Northern Development Canada, Yellowknife Regional Office</td><td>669-2501</td></tr>
<tr><td>Aboriginal Affairs and Northern Development Canada, Yellowknife, District Office</td><td>669-2761</td></tr>
<tr><td>Environment Canada, Yellowknife</td><td>1-866-845-6037</td></tr>
<tr><td>Stanton Regional Health Board</td><td>669-8979</td></tr>
<tr><td>Fisheries and Oceans, Canada</td><td>669-4900</td></tr>
</table>
</td></tr>
</table>

Section	Change
2 Reporting Procedures (cont'd)	Addition of appendix with Communication Tools for alerting residents of a spill ***Appendix C Contains the City's Communication Tools which will be used in the event of a spill.***
2.1. Effectiveness of Plan and Training Information	Addition of heading for section which includes training information
2.4 Response Team Organization	Revision of section to include flow charts for response team organization. Paragraph referencing figures is as follows: ***The following figures show the response team organization depending on which department is responsible for the clean-up of the spill.*** ***Response Team – Public Works & Engineering*** 

Section	Change
2.4 Response Team Organization (cont'd)	***Response Team – Fire Hall*** 

Section	Change
3.1.1 Sewage Lift Stations	Entire section reworked as follows: ***Lift stations are located at points in the sewage collection system where it is necessary to lift sewage from a lower elevation to a higher elevation in order to maintain flows in the system. There are 11 lift stations currently in use. All lift stations are monitored 24 hours a day, seven days a week via the SCADA system at Pumphouse #1. Lift Stations #1, #4, #5, #6, & #7 are checked once a day, seven days a week by City staff, while all other lift stations are checked daily during normal operating hours. The templates for check sheets used at each lift station are included in Appendix D.*** ***At lift stations #1, #4, #5 and #7, sewage enters the lift station and passes through a communitor which grinds solids in the sewage before it drops into the wet well. Sewage is then pumped from the wet well back into the sewage system. At lift stations #2, #3, #6, #8, #9, #10 and #11, Flygt submersible pumps are used which grind solids in the sewage as it is pumped into the sewage force mains.*** ***All lift stations, with the exception of Lift Station #11, are equipped with a back-up power system which provides a high level of redundancy and reduces the risk of a sewage spill. There are currently two types of back-up systems in use. The most common back-up system consists of an Uninterruptible Power System (UPS) and a diesel back-up generator. The UPS is used to provide power to monitoring and control components during the time it takes for the generator to kick-in. Once the generator is operating, it is used to provide power to the entire lift station and the UPS returns to its idle state. The second back-up system consists of a UPS and diesel driven pump. In this system the UPS is used to provide continuous power to monitoring and control components.***

Section	Change
3.1.1 Sewage Lift Stations (cont'd)	***All diesel pumps and back-up generators are visually inspected routinely in conjunction with the scheduled facility inspections. Each unit is test run once per week to ensure proper operation. During the test run, all necessary component checks are completed and fluid levels adjusted as required. All back-up systems are set on a routine service schedule and necessary repairs are noted and scheduled for completion as soon as possible.*** ***All back-up generators at City facilities are operated and test run as per CSA Standards for back-up generators.*** ***The following table shows the components of each lift station.***

LS #	Location	Type	Pump	Commun-itor	Back-Up System	Communic-ation with PH#1
1	School Draw Ave. near Franklin Ave.	Building	3 total	Yes	Diesel Generator	Yes
2	Matonabee St.	Manhole	2 total	No	Diesel Generator	Yes
3	Albatross Ct.	Manhole	2 total	No	Connected to LS#2 diesel generator	Yes
4	Rycon Dr.	Building	3 total 1 diesel	Yes	Diesel Generator	Yes
5	Taylor Rd. (behind City garage)	Building	3 total	Yes	Diesel Generator	Yes
6	Bagon Dr. & Balsillie Ct.	Building	3 total	No	Diesel Generator	Yes
7	49th St. at 52nd Ave.	Building	3 total 1 diesel	Yes	Diesel driven pump	Yes
8	Borden Dr. at Rivett Cres.	Building	2 total	No	Diesel Generator	Yes
9	Borden Dr. behind Stanton Plaza	Building	2 total	No	Diesel Generator	Yes
10	Niven Dr.	Manhole	2 total	No	Connected to PH#6 diesel generator	Yes
11	deWeerdt Dr.	Manhole	2 total	No	Vactor Truck	Yes

<table>
<tr><th>Section</th><th>Change</th></tr>
<tr><td>3.1.1 Sewage Lift Stations (cont'd)</td><td>
Lift station #11, located on deWeerdt Drive, is the only lift station that does not have a back-up generator. In the event of a power outage, accompanied by a high level alarm from Lift Station #11, Pumphouse 1 dispatchers are instructed to initiate two call outs – one for maintenance personnel, and one for a vactor truck – to insure sewage levels are controlled and a spill does not occur.

In a worst case scenario where a back-up power system fails, a lift station will eventually overflow to a designated low lying area or body of water. The following table shows the lift stations and the body of water or lift station that will receive sewage overflows in the event of a catastrophic system failure (see Figures 3 through 11 in Appendix B):

<table>
<tr><th>Lift Station</th><th>Receiving Environment</th></tr>
<tr><td>Lift Station No. 1</td><td>Yellowknife Bay</td></tr>
<tr><td>Lift Station No. 2</td><td>Frame Lake</td></tr>
<tr><td>Lift Station No. 3</td><td>Frame Lake</td></tr>
<tr><td>Lift Station No. 4</td><td>Rat Lake</td></tr>
<tr><td>Lift Station No. 5</td><td>Kam Lake</td></tr>
<tr><td>Lift Station No. 6</td><td>Kam Lake via storm drainage ditch</td></tr>
<tr><td>Lift Station No. 7</td><td>Liftstation No. 1</td></tr>
<tr><td>Lift Station No. 8</td><td>Liftstation No. 5 via discharge main</td></tr>
<tr><td>Lift Station No. 9</td><td>Frame Lake</td></tr>
<tr><td>Lift Station No. 10</td><td>Back Bay</td></tr>
<tr><td>Lift Station No. 11</td><td>Niven Lake</td></tr>
</table>
</td></tr>
</table>

<table>
<tr><th>Section</th><th>Change</th></tr>
<tr><td>3.2 Fuel and Gasoline Storage</td><td><u>Updates to fuel tank list:</u>
<table>
<tr><th>City Facility</th><th>Tank Type</th><th>Tank Size (L)</th></tr>
<tr><td>City Hall</td><td>Underground</td><td>10,000</td></tr>
<tr><td>Multiplex</td><td>Above Ground</td><td>25,000</td></tr>
<tr><td>Back-Up Power (Multiplex,</td><td>Above Ground</td><td>1,125</td></tr>
<tr><td>Field House, Lift Station #5)</td><td>Above Ground</td><td>9,400</td></tr>
<tr><td>Field House</td><td>Above Ground</td><td>10,000</td></tr>
<tr><td>Ruth Inch Memorial Pool</td><td>Above Ground</td><td>11,000</td></tr>
<tr><td>Yellowknife Community Arena</td><td>Underground</td><td>10,000</td></tr>
<tr><td>Baling Facility</td><td>Above Ground</td><td>15,000</td></tr>
<tr><td>Refuelling Station (Diesel)</td><td>Above Ground</td><td>4,100</td></tr>
<tr><td>City Garage</td><td>Above Ground</td><td>4,500</td></tr>
<tr><td>Generator Fuel</td><td>Above Ground</td><td>1,125</td></tr>
<tr><td>Refuelling Station (Gasoline)</td><td>Above Ground</td><td>4,500</td></tr>
<tr><td>Refuelling Station (Diesel)</td><td>Above Ground</td><td>4,500</td></tr>
<tr><td>Pine Point Shop (2 tanks)</td><td>Above Ground</td><td>1,125</td></tr>
<tr><td>Pumphouse #1</td><td>Above Ground</td><td>24,000</td></tr>
<tr><td>Day Tanks (4 tanks)</td><td>Above Ground</td><td>1,125</td></tr>
<tr><td>Pumphouse #2</td><td>Above Ground</td><td>1,125</td></tr>
<tr><td>Pumphouse #3</td><td>Above Ground</td><td>1,125</td></tr>
<tr><td>Back-Up Power</td><td>Above Ground</td><td>1,125</td></tr>
<tr><td>Fire Pump</td><td>Above Ground</td><td>400</td></tr>
<tr><td>Pumphouse #4</td><td>Above Ground</td><td>4,500</td></tr>
<tr><td>Pumphouse #6</td><td>Above Ground</td><td>2,000</td></tr>
<tr><td>Boiler Tanks (inside)</td><td>Above Ground</td><td>1,125</td></tr>
<tr><td>Lift Station #1</td><td>Above Ground</td><td>2,275</td></tr>
<tr><td>Back-Up Generator</td><td>Above Ground</td><td>1,125</td></tr>
<tr><td>Lift Station #2</td><td>Above Ground</td><td>900</td></tr>
<tr><td>Lift Station #4</td><td>Above Ground</td><td>2,275</td></tr>
<tr><td>Lift Station #5</td><td>Above Ground</td><td>2,275</td></tr>
<tr><td>Lift Station #6</td><td>Above Ground</td><td>1,125</td></tr>
<tr><td>Lift Station #7</td><td>Above Ground</td><td>1,125</td></tr>
<tr><td>Lift Station #8</td><td>Above Ground</td><td>900</td></tr>
<tr><td>Lift Station #9</td><td>Above Ground</td><td>900</td></tr>
</table></td></tr>
<tr><td>3.4 Sodium Hypochlorite</td><td><u>Addition of appendix for MSDS information, including information for sodium hypochlorite</u></td></tr>
</table>

Section		Change
3.5	**Chlorine Gas**	Addition of appendix for MSDS information, including information for chlorine gas
4	**Response Team, Action and Equipment**	Appendix G Updated with current position information
7.1	**Spill Equipment Inventory**	Revisions to entire section including addition of appendix with list of City fleet ***The City has a fleet of light and heavy equipment available for use in case of a spill. A complete list of the City's fleet is included in Appendix I.*** ***There are also spill kits located in various facilities including:*** • ***City Hall*** • ***Multiplex*** • ***Yellowknife Community Arena*** • ***Pumphouse #1*** • ***All Lift Stations*** • ***Yellowknife Solid Waste Facility*** ***The Spill Kits are of varying size depending on the size of the facility, and all contain varying amounts of the following items:*** ***Spill Response Kit Contents*** • ***Oil Absorbent Pads*** • ***Oil Absorbent Booms*** • ***Chemi-Pro Gloves*** • ***Clear Safety Goggles*** • ***Containment Drum, Metal*** • ***Oil Absorbent Socks*** • ***Temporary Disposal Bags*** • ***Disposable Coveralls*** • ***Strong Steel Gapseal***

Appendix C

Summary of Changes to Solid Waste Facility Operations and Maintenance Manual

Solid Waste Facility Operations and Maintenance Manual

Summary of Changes for March 2013 Revision

Section	Change
Foreword	New Section ***In order to facilitate ease of reading, items that were revised in this version of the Landfill Operations and Maintenance Manual are shown in bold italic font, including names of Figures and Appendices. A summary list of the changes made to this document is included in Appendix A.***
1.2 Site Information	Changed wording for reference to Biotreatment Pad ***Biotreatment Pad (Hydrocarbon Contaminated Soil & Water Treatment Facility).***
1.2.1 Baling Facility	Revision to second paragraph to include information about wire tying bales: After compaction, the bales ***are tied with wire to maintain their shape, then exit the baler at the lower section, where they are*** loaded onto a tandem dump truck by a front-end loader with fork attachments
	Addition of the following paragraph: ***As baling compacts MSW, liquids contained in the waste mass leach out and are collected in the sump area of the baler. The sludge is sucked out of the sump by a vactor truck approximately once every six months. It is then taken to the City's sewage lagoon for disposal. This practice was implemented when the first baler was installed in 1993.***
1.2.2 Balefill/Landfill	Removal of the word ***"granular"*** from the description of cover material.
	Revision of the following paragraph: As the liner is not accessible, the integrity of the liner will be determined through monitoring of groundwater upstream and downstream of the facility. Monitoring wells for this purpose will be constructed ***at the same time as the next landfill cell (approximately 2015).***

1.2.2 Balefill/Landfill (cont'd)	Revision of the following paragraph: The leachate collection system consists of a series of pipes which collect liquids generated in the cell and transport them to the leachate collection sump, located in a manhole at the low point of the cell. Each individual collection pipe is equipped with a cleanout pipe. When the level of leachate in the sump reaches a pre-determined level, samples will be taken and analyzed, ***with the results sent to the MVLWB for review. Once approval for disposal of the leachate has been received from the MVLWB, the leachate will be pumped out and disposed of at the Fiddler's Lake Sewage Lagoon using a vactor truck.***
1.2.4 Compost Facility	Revision of the following paragraph: Leachate and run-off from the compost facility is collected in a lined pond. Liquids collected in the pond are used to add moisture to the actively curing windrows when necessary. ***Should disposal of the liquids in the pond be necessary, samples will be taken for analysis with results sent to the MVLWB for review and approval. Once approval for disposal has been received, the leachate will be pumped out using a vactor truck, and taken to the Fiddler's Lagoon.***
1.2.5 Tipping Fees	Revision of Appendix C for 2013 tipping fees
2 Site Personnel	Revision of Figure 2.1 for changes to position titles for Baling Facility Attendants
	Revision to second paragraph: The City SAO is ultimately responsible for the operation of the SWF. ***Under the general direction of the Works Superintendent***, the overall operation of the SWF is performed by the Assistant Superintendent – Solid Waste Facility, with the SWF Supervisor responsible for the daily operation and maintenance of the facility. Baling Facility Attendants are responsible for performing the required day to day tasks as assigned by the SWF Supervisor.

2.1 Duties and Responsibilities	Addition of Works Superintendent information: ***Works Superintendent*** ***The Works Superintendent is responsible for the following:*** • ***Liaison between SAO and A/Superintendent SWF*** • ***The Works Superintendent shall:*** 1. ***Provide approval of budgets and equipment purchases*** 2. ***Write service standards including Safe Work Practices*** 3. ***Suggest changes to by-laws*** 4. ***Ensure operations at the SWF are done in accordance with applicable legislation, are in compliance with WSCC requirements and adhere to City policies*** 5. ***Work with other City departments and levels of government***
	Addition of responsibility for SWF Supervisor: **4.** ***Ensure work orders are accurately completed for use in tracking of items such as waste volumes and operational costs.***
	Addition of responsibility for Baling Facility Attendants: **2.** ***Accurately fill out work orders for tracking purposes***
2.2 Personnel Training	Addition of paragraph for SWANA training: ***SWF Staff receive training through courses with the Solid Waste Association of North America (SWANA). Generally, the Landfill Operator Course and Manager of Landfill Operations (MOLO) Certification are the training courses taken. The training and certification for each position is as follows:*** ***Works Superintendent..... MOLO Certification*** ***A/Superintendent SWF..... MOLO Certification*** ***SWF Supervisor..... MOLO Certification & Operator's Course*** ***Baling Facility Attendants ..... Operator's Course***

3.2 Disposal Methods	Revision to Figure 3.2.1 for current designated waste areas ***Areas changed:*** ***D Recyclables*** ***E Yard Waste*** ***G Used Oil*** ***I Honey Bags & Pet Waste*** ***P Tires*** ***Q Scrap Vehicles*** ***R Construction & Demolition Debris***
3.2.3 General Household Waste Balefill	Removal of the word "granular" from the description of cover material.
3.2.4 Recyclables	Revision of information for glass bottles and containers: Upon delivery, the bins of glass bottles and containers are emptied in a designated area of the landfill. The stockpiled glass is crushed by the track ***dozer and used for final contouring of the landfill.***
3.2.7 White Goods (Appliances)	Revision of first sentence of paragraph: White goods are household appliances ***including*** fridges, freezers, stoves, washers, dryers and hot water heaters.
3.2.9 Honey Bags and Animal Waste	Removal of following sentence: *The City is currently working to eliminate the collection of honey bags from within the City Limits.*

4.3 Equipment Maintenance	<u>Information changed as follows:</u> Regular maintenance is performed on all City-owned equipment as per the ***original manufacturer's suggested specifications, and*** the City's Service Standards. This includes but is not limited to regular: • cleaning • oil changes • fluid changes • greasing • checking of tire pressure • brake pad replacement • ***preventative maintenance*** • ***breakdown maintenance as required to operate equipment safely***
4.4 Facility Maintenance	<u>Revision of the following paragraph:</u> The SWF has four (4) main buildings – the Baling Facility, Scale House, E-Waste Shelter, and 3 Cell Information & Inspection Shelter, ***and the Hazardous Waste Storage Building***. These buildings are inspected ***monthly*** by the SWF Supervisor to observe signs of building deterioration or problems with heating, roofing, etc. Any problems are immediately reported to the A/Superintendent SWF.

4.4.1 Baling Facility	<u>Information updated to include Fire Suppression System and Wood Pellet Boiler. Wood Pellet Boiler info removed from Mechanical Systems information and put into own section as follows:</u> The baling facility requires periodic maintenance due to scattered debris and normal operations. Maintenance is subdivided as follows: • Entry Doors • Mechanical Systems • Equipment Maintenance • Control Room and Change Rooms • ***Fire Suppression*** • ***Wood Pellet Boiler*** **…** **Mechanical Systems** The boilers and sump pumps require little maintenance. The systems are checked on a weekly basis and receive semi-annual servicing to prevent any potential problems from occurring. Building air flow uses Make-up Air Units, which form a critical component in odour control. These air units control fresh-air percentages, which are usually set at 10% during the winter and 90% - 100% during the summer. The filters within this system are replaced every three to four months. Preventative maintenance checks are completed on a daily basis. ***Fire Suppression*** ***The Fire Suppression system undergoes annual maintenance by a system specialist.*** ***Wood Pellet Boiler*** ***The Baling Facility is heated using a wood pellet boiler which is maintained by the City's Facilities Tradesperson. All regular and emergency maintenance is performed by this employee. The silo that holds the pellets as well as the boiler undergo weekly checks to ensure they are operating smoothly.***

4.4.5 Hazardous Waste Storage Building	Addition of the following section: ***4.4.5 Hazardous Waste Storage Building*** ***The Hazardous Waste Storage Building is located in the 3 Cell area. It is a small building that is used to house bulk bins of hazardous wastes. Access to the building is restricted to authorized personnel. The building is mopped and swept by SWF Staff as needed.***
4.5.1 Leachate Collection System Maintenance	Revision to second paragraph: The manhole housing the sump for the cell is to be checked on a regular basis to determine the level of leachate. These checks are to be done on a weekly basis during the spring freshet and monthly during the rest of the year. It is anticipated that the sump will be pumped out on an annual basis***. Prior to disposal of the leachate, the leachate will be sampled and sent to a lab for analysis. Section 5 contains details of the SWF's sampling and monitoring program, including sampling parameters. Results of the tests will be sent to the MVLWB for review and approval prior to disposing of the leachate at the Fiddler's Lake Sewage Lagoon***
4.7.1 Access Road Maintenance	Revision of winter maintenance sentence as follows: • During the winter, snow is to be removed ***and the road regularly sanded*** Revision of to ensure unrestricted access to the site for vehicles.
5 Sampling and Monitoring Program	Removal of groundwater monitoring from first paragraph. Paragraph now reads: The City has put in place the Surveillance Network Program (SNP) for monitoring runoff from the SWF upstream and downstream of the facility as per the requirements of the City's water licence.
	Revision to Figure 5.1 to include catchment areas and flow direction

5.1 Leachate Sampling – New Landfill Cell	Revision to second paragraph: Samples taken from the sump will be analysed for the same parameters as listed for SNP stations 0032-13 through 0032-16 and 0032-18. ***Sampling will occur prior to disposal of the leachate with results submitted to the MVLWB for review and approval. Upon receiving approval, the leachate will be disposed of at the City's sewage lagoon.***
8.2 Contact Numbers	Addition of contact info for Works Superintendent: ***Works Superintendent..... (867) 445-1039***
	Revision to phone number for A/Superintendent SWF: Assistant Superintendent – SWF: .... ***(867) 445-1044***

Appendix D

Summary of Changes to Hazardous Waste Management Plan

Hazardous Waste Management Plan

Summary of Changes for March 2013 Revision

Section	Change
Foreword	New Section ***In order to facilitate ease of reading, items that were revised in this version of the Hazardous Waste Management Plan are shown in bold italic font, including names of Figures and Appendices. A summary list of the changes made to this document is included in Appendix A***.
1.0 Introduction	Appendix C updated for 2013 tipping fees
1.1 Waste Handling in Yellowknife	Additional paragraph added to include information about Household Hazardous Waste days ***The City does provide two (2) Household Hazardous Waste collection days each year, during which residents of Yellowknife may bring hazardous wastes to a collection point and SWF staff will arrange for disposal. For more information on Household Hazardous Waste collection days, please see section 2.6.***
1.2 Training	Addition of information on SWANA training ***Managers and Operators at the SWF are provided with training for SWANA (Solid Waste Association of North America) certification.***
1.3 Site Locations and Maps	Removal of ***propane canisters*** from list of buried waste.
	Addition of the following sentence: ***The Hazardous Waste Storage Building shown in Figure 2 houses glycols, batteries, oil debris, ozone depleting substances and used oil.***
	Revisions to ***Figure 2*** for locations of hazardous wastes.
2.1 Asbestos	Change to the Landfill Location: ***Northwest corner of the new landfill cell***

Section	Change
2.1 Asbestos (cont'd)	Change to Record Keeping, mapping & reporting: location in existing landfill varies ***due to location of active face of landfill. Disposal area identified in New Landfill Cell on Figure 2.*** Records filed on site and kept as per regulatory requirements.
2.4 Glycols (Antifreeze)	Revision to methods used to store glycols: Glycols are stored in the containers in which they are dropped off (provided they are not leaking) and are transferred to larger containers, ***located inside the Hazardous Waste Storage Building***, for shipping.
2.9 Oily Debris	Methods used to store oily debris updated to: ***debris stored in large container inside the Hazardous Waste Storage Building***
	Methods used to prevent spills & Leaks updated to: ***Stored in large container in a building***
	Methods used to prevent drainage from entering or leaving the site updated to: ***Stored in large container in a building***
2.11 Paint	Plan for ultimate disposal updated to: ***All paints are sent to KBL Environmental Ltd. for disposal.***
2.12 Propane Tanks	Plan for ultimate disposal updated to: ***Tanks are shipped to a facility in Edmonton for recertification and recycling.***
2.14 Used Oils	Methods used to store used oil updated to: ***Used oil is initially collected in a small holding tank inside the Hazardous Waste Storage Building***

Section	Change
2.14 Used Oils (cont'd)	Methods used to prevent spills and leaks updated to: ***The area is monitored on a daily basis***
	Methods used to prevent drainage from entering or leaving the site updated to: ***The current holding tank is stored upright in an enclosed building.***
3.1 Lands Maintenance	Information added to first paragraph: Litter from the site is often blown about the entrance road and the building, as well as around the recycling bins. These areas are cleaned in the spring as well as when the amount of litter becomes excessive. ***Additional fencing is used in places where windblown litter is excessive in order to contain it. This fencing is moveable.***