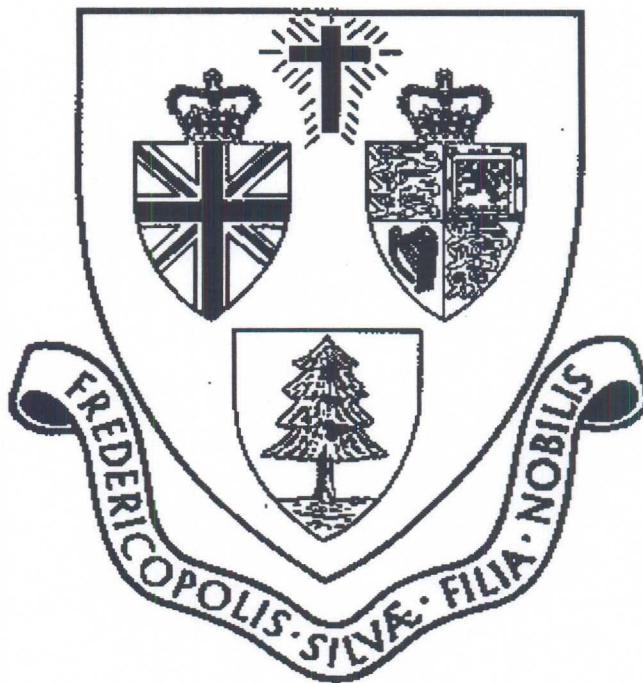


ANNUAL REPORT OF THE ENGINEERING AND PUBLIC WORKS DEPARTMENT

1999



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TO HIS WORSHIP THE MAYOR AND COUNCILORS OF THE CITY OF FREDERICTON

I submit herewith this report which is a statement of work done under the supervision of the Director of Engineering and Public Works.

This report covers the period from 1999 01 01 to 1999 12 31 and is written for the purpose of maintaining an accurate record on file of the activities and costs associated with the various operations.

During the year, along with regular maintenance, City forces and Contractors constructed the following works:

Concrete Curb and Gutter		13.731 km
Sidewalk		8.001 km
New Street Construction		2.686 km
*	New Pavement - Type "B" Asphalt Concrete	4.133 km
	Resurface - Type "D" & "C" Asphalt Concrete	14.234 km
	Gravity Sanitary Sewer Mains	5.860 km
	Storm Sewer Mains	3.583 km
	Water Mains	6.435 km
	Sanitary Sewer Force main	0.845 km

* Type "D" asphalt concrete was also placed on streets in new subdivisions. This was paid for by developers under Local Improvement Agreements.

ALSO

- 204 Water services were installed
- 207 Sanitary sewer services were installed
- 192 Storm sewer services were installed
- 1144 New water meters were installed

At the end of 1999, the City of Fredericton Roads and Streets and Utility infrastructure quantities were as follows:

Note: Quantities shown are reasonably accurate.

Infrastructure Item	Quantity
Local Streets	388.449 lane km
Collector Streets	122.642 lane km
Arterial Streets	34.436 lane km
Concrete Curb & Gutter	443.888 km (municipal)
Concrete Curb & Gutter	48.410 km (provincial designated and regional)
Concrete Sidewalk	188.449 km
Decorative Sidewalk	4.535 km or 18600 sq. metres
Water Distribution Mains	208.518 km
Water Transmission Mains	130.352 km
Collector Sewer	216.656 km
Trunk Sewer	79.459 km
Force Main Sewer	12.025 km
Storm Sewer	237.504 km
Water Wells (Production)	8
Water Wells (Standby)	13
Water Booster Stations	9
Water Reservoir Cells	20
Water Treatment Plants	1
Sewage Lift Stations	28
Sewage Treatment Plants	1
Sewage Lagoons	2
Water & Sewer Services	14 072

Note: Provincially Designated Highways are shown as part of the street's inventory.

Contractors under contract with the Engineering and Public Works Department of the City of Fredericton in 1999 supplied materials, completed construction or began construction, as follows:

Elm City Paving Ltd.	- Supply of Asphalt Concrete for Patching
Capital City Gardeners Ltd.	- Placement of Topsoil
Fairville Construction Ltd.	- Silverwood Trunk Water and Sanitary Sewer Contract 1
Diamond Construction (1961) Limited	- Supply and Delivery of Granular Material
Charmac Construction Company Limited	- Supply and Delivery of Bedding Sand
Envirem Technologies Inc.	- Supply and Delivery of Subsoil
Hazen Thomas & Sons Contracting Ltd.	- Brunswick Street Trunk Sewer and Water Main Upgrading Phase 11
Charmac Construction Company Limited	- Silverwood Trunk Water and Sanitary Sewer Contract 2
LaFarge Canada Inc.	- Supply and Delivery of Concrete
Hogan Paving Ltd.	- Supply and Placement of Asphalt Concrete
Sandi-Co Inc.	- Supply and Delivery of Winter Sand
Cargill Salt	- Supply and Delivery of Highway Salt
Laurentide Atlantic Limited	- Supply of Traffic Lane Striping Paint
Trius Disposal Systems Ltd.	- Garbage Collection Services
MIRA Construction Ltd.	- Installation of Curb and Gutter and Sidewalk
K-Line Construction Ltd.	- Contract Services
Hazen Thomas & Sons Contracting Ltd.	- Water and Sewer Services Douglas Area Phase 10
K-Line Construction Ltd.	- Silverwood Trunk Water and Sanitary Sewer Contract 3
Elm City Paving Ltd.	- Supply and Placement of Asphalt Concrete on Municipal Trenches

- | | | |
|--------------------------------------|---|---|
| A & J Construction Ltd. | - | Silverwood Booster Station |
| Goodfellow's Trucking Ltd. | - | College Brook Phase 2
(Regent St. to York Street)
Sanitary Sewer & Storm Sewer |
| Cardinal Construction Inc. | - | Well House #5 Expansion |
| Charmac Construction Company Limited | - | College Brook Phase 3
(University Avenue Area)
Installation of Storm Sewer |
| M.E. Phillips & Son Ltd. | - | North side Ring Road Connector
(Two Nations Crossing)
Contract 1 - St. Marys St. to Gabriel Dr. |
| Charmac Construction Company Limited | - | Jasper Street, Ruby Street, Barton Crescent,
Bridge Street - Road Preparation |

General Fund expenditures for the period 1999 01 01 to 1999 12 31 were as follows:

ITEM	BUDGET	NET EXPENDITURE	OVER	UNDER
Common Services				
Administration	\$ 44 229	\$ 45 744	\$ 1 515	-
Engineering Services	\$ 478 339	\$ 552 848	\$ 74 509	-
General Equipment	\$ 1 390 097	\$ 1 469 908	\$ 79 811	-
Regent Street Depot	\$ 131 046	\$ 112 944	-	\$ 18 102
St. Mary's Street Depot	\$ 192 339	\$ 164 503	-	\$ 27 836
Sign Shop	\$ 17 970	\$ 17 813	-	\$ 157
Safety & Benefits	\$ 898 742	\$ 838 270	-	\$ 60 472
Road Transport				
Administration	\$ 243 781	\$ 226 346	-	\$ 17 435
Roadway Surfaces:				
(a) Paved Streets Maintenance	\$ 396 428	\$ 337 248	-	\$ 59 180
(b) Curb & Gutter Repair	\$ 108 762	\$ 61 673	-	\$ 47 089
(c) Rights-of-way Maintenance	\$ 164 231	\$ 175 618	\$ 11 387	-
Sidewalk Maintenance	\$ 165 994	\$ 78 649	-	\$ 87 345
Sidewalk – Special Projects	\$ 350 000	\$ 486 236	\$ 136 236	-
Recovery from other Accounts-	(\$ 105 000)	(\$ 105 000)	-	-
Sidewalk				
Culverts; Ditching	\$ 55 846	\$ 53 474	-	\$ 2 372
Storm Sewer Maintenance	\$ 141 942	\$ 184 496	\$ 42 554	-
Street Cleaning	\$ 422 844	\$ 423 633	\$ 789	-
Snow Control	\$ 879 662	\$ 772 665	-	\$ 106 997
Sanding & Salting	\$ 508 217	\$ 646 010	\$ 137 793	-
Street Lights	\$ 767 052	\$ 796 638	\$ 29 586	-
Traffic Services				
(a) Street Signs	\$ 111 969	\$ 116 737	\$ 4 768	-
(b) Paint Division	\$ 129 908	\$ 120 490	-	\$ 9 418
(c) Traffic Signals	\$ 174 766	\$ 214 862	\$ 40 096	-
Environmental Health Services				
Garbage & Waste Collection	\$ 473 210	\$ 471 167	-	\$ 2 043
Garbage & Waste Disposal	\$ 576 000	\$ 621 850	\$ 45 850	-
Recycling	\$ 134 880	\$ 128 305	-	\$ 6 575
Hazardous Waste	\$ 5 336	\$ 4 900	-	\$ 436
Recycling Recovery	(\$ 7 000)	(\$ 6 606)	-	(\$ 394)
TOTALS	\$8 851 590	\$9 011 421	\$ 604 894	\$445 063

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Utility Fund expenditures for the period 1999 01 01 to 1999 12 31 were as follows:

ITEM	BUDGET	NET EXPENDITURE	OVER	UNDER
<i>Common Services</i>				
General Equipment	\$ 561 292	\$ 764 286	\$ 202 994	-
Safety & Benefits	\$ 404 479	\$ 366 286	-	\$ 38 193
Administration	\$ 270 426	\$ 340 959	\$ 70 533	-
Utility Retirement	\$ 0	\$ 55 938	\$ 55 938	-
<i>Water</i>				
Purification & Treatment	\$ 370 197	\$ 324 244	-	\$ 45 953
Source of Supply	\$ 412 051	\$ 429 742	\$ 17 691	-
Power & Pumping	\$ 48 553	\$ 58 120	\$ 9 567	-
Maintenance of Equipment (Plant)	\$ 61 222	\$ 52 567	-	\$ 8 655
Transmission & Distribution (Oper)	\$ 262 052	\$ 273 975	\$ 11 923	-
Transmission & Distribution(Maint)	\$ 799 348	\$ 696 262	-	\$ 103 086
Billing & Collection	\$ 158 226	\$ 143 355	-	\$ 14 871
Meters	\$ 414 382	\$ 428 862	\$ 14 480	-
<i>Sanitary Sewer</i>				
Operation (Lift Stations)	\$ 101 648	\$ 93 910	-	\$ 7 738
Maintenance	\$ 556 626	\$ 439 914	-	\$ 116 712
Treatment & Disposal	\$1 573 633	\$1 375 058	-	\$ 198 575
<i>Fiscal Services</i>				
Funding (Current Year's Capital Projects and Capital Reserve)	\$4 495 000	\$4 961 365	\$ 466 365	-
TOTAL	\$10 489 135	\$10 804 843	\$849 491	\$533 783

*Surplus/deficit does not take into account revenues (budgeted or actual)

Following is a table giving total kilometrage (as of 99 12 31) of municipal roads and streets, provincial designated and regional highways and provincial by-passes & ramps divided with respect to type of surface on the various streets.

LOCATION	MUNICIPAL ROADS & STREETS				DESIGNATED & REGIONAL HIGHWAYS (Asphalt)	T.C.H. BY-PASSES RAMPS & OTHER PROVINCIAL (Asphalt)
	Asphalt	Gravel	Chip Seal	Total		
Fredericton	110.887	1.355	3.423	115.665	19.058	38.499
SouthFredericton	24.054	0.029	0.578	24.329	7.878	2.783
North Nashwaaksis	58.979	0.480	1.700	61.159	2.320	8.854
Marysville	24.930	0.304	0.518	25.752	5.363	3.712
Barker's Point	8.485	-	-	8.485	1.837	4.323
Silverwood	4.612	-	-	4.612	-	-
Garden Creek	18.343	0.975	1.514	20.832	-	-
Douglas	4.268	0.191	0.282	4.741	2.560	-
Lincoln	3.754	0.502	0.599	4.855	4.249	4.904
Lower St. Marys	1.970	-	-	1.970	-	2.681
TOTALS	260.282	3.836	8.614	272.732	43.265	65.756

TOTAL (Municipal, Designated & Regional Highways) = 315.997 km

Following in the body of this report is a detailed statement of the work done, associated expenditures and unit costs for the various operations. The report of any particular division may be found by referring to the index.

Immediately following in this report is a summary of key issues developed by the Engineering and Public Works Department for the year 1999 and the status of these issues.

Respectfully submitted,

Garnet Hetherington, P. Eng.

To facilitate proper planning, the Department developed Key Issues for 1999. Following are the issues that were established.

KEY ISSUES FOR 1999 ENGINEERING AND PUBLIC WORKS

	ISSUE	NARRATIVE / EXPECTATIONS	STATUS
1.	Condition Survey, Asphalt, Concrete Curb & Sidewalk	The objective is to do a condition survey of all asphalt and concrete infrastructure in the City. The data from the survey would then go on a database. This is a joint project between Engineering and UNB.	a) Software design completed. b) Street data entered. c) Survey completed.
2.	Capital Program Delivery	The objective is to complete the entire capital program on time. As well, we want to <u>communicate</u> what is in the program, as well as status. We will create a visual display in a prominent place in Engineering which will indicate status.	a) Program delivery under Roads & Streets Superintendent seemed to work well. b) Status charts in "War" room.
3.	Aquifer Protection	We plan to work with NBDOE on this. We expect to prepare a precise plan for the future, and get started on implementation in 1999.	a) Reviewed NBDOE Wellfield Protection Plan. b) Created long-term (5 year) Aquifer Protection Program, complete with cash flows
4.	Y2K	We will work with the Corporate Y2K Coordinator, to ensure our systems are Y2K compliant. (particularly Water and Traffic systems). Plan "A" is to "fix" the non Y2K compliant systems. Plan "B" is to have contingencies in place in case outside systems (i.e. electrical power) fail.	a) All systems assessed. b) Non Y2K systems were fixed. c) Contingency plans in place.
5.	Re-Do Offices	The objective is to provide a more professional workspace. We will do a general clean-up, build a new "front counter", and buy new furniture, as appropriate.	a) Engineering workspace done. b) Property Services indicate they will build a new front counter this fall. Counter yet to be built.
6.	Water Quality Plan	The plan will explain procedures used to ensure water quality, and will provide contingencies to address problems encountered.	Water Quality Plan completed in March
7.	Training (General)	The objective is to produce a comprehensive 1999 Training Calendar for Engineering and Public Works. This will serve as a model for future years.	a) Comprehensive Training Calendar in place. b) Training according to comprehensive calendar.

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	ISSUE	NARRATIVE / EXPECTATIONS	STATUS
8.	Health & Safety Audit Training	Training on how to do Safety Audits	a) <u>Training completed.</u>
9.	Water Distribution/Wastewater Collection Assessment	The Water Distribution/Wastewater Collection Master Plans were last revised in the early 1980's. This assessment is part of 1999 Capital, and will include computer modeling of the water system.	a) Water Distribution Plan completed. b) Wastewater Collection Plan completed.
10.	Traffic Study	The Traffic Study is part of the 1999 Capital Program, and will include a computer model of the traffic system.	a) Consultant selected. b) Traffic Engineer, Planner and Traffic Technician have had training on computer model. c) Final Study expected Dec. 31 st .
11.	Clean-up/BBQ	Similar to the one in 1998.	a) Done
12.	EMO	Director of Engineering and Public Works will be City's EMO Coordinator. The objective is to produce an up to date by-law and EMO Plan, and to exercise the plan.	a) Revised By-law approved by Council. b) Revised EMO Plan approved by Council. c) EMO Plan exercised in July, another fall exercise is planned.
13.	Natural Gas	The plan is to get ready for natural gas coming to Fredericton. We have to have specs. ready, and know what we will allow distributors to do.	a) Report by Engineering Technician completed.
14.	Mail outs (quarterly)	We will continue our mail-outs with the quarterly bills. 1 st Quarter – Budget and Programs 2 nd Quarter - (?) conservation 3 rd Quarter - ?? 4 th Quarter – Water Quality Report	a) 1 st Quarter – Budget & Programs. b) 2 nd Quarter – Conservation c) 3 rd Quarter – Organization of Water & Sewer d) 4 th Quarter - Water Quality
15.	Traffic Management Committee	Traffic Engineer has taken on the Chair of this committee. The plan is to streamline the handling of traffic issues.	
16.	Computers in Depots	The plan is to install networked computers at St. Mary's Depot and Regent St. Depot. The objective then is to give all Engineering and Public Works supervisors (including Foremen) access to e-mail.	a) Computers now in St. Mary's and Regent Street. b) All, or most, of Supervisors and Foremen have e-mail access.
17.	All-Supervisors Meeting	We will continue with our twice/year all-supervisors meetings (one in the Spring and one in the Fall).	a) Spring Meeting held on May 11 th , 1999. b) Fall Meeting scheduled for Nov. 17.

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	ISSUE	NARRATIVE / EXPECTATIONS	STATUS
18.	Replace Finance Clerk.	Finance Clerk retires in April – Staff early enough for overlap	a) Position filled. b) Overlap of 12 weeks provided.
19.	Review of Snow Control Plan/Procedures	The plan was established in 1998. The plan will need to be reviewed in 1999, and changes made.	a) Joint committee of Management and Union looked at procedures, issued joint communique. b) Route by route review still needs to be done.
20.	Revitalize Back-in-Action	This will involve retraining on Back-in-action procedures.	a) Superintendent of Parks & Trees has agreed to champion this. b) Exercises now being done in all depots.
21.	Attendance Management	On-going- Do attendance awards. Continue with interviews. Compare statistics 97-98	a) Attendance awards made. b) Interviews continuing. c) Committee compiling and circulating statistics.
22.	Dispatch Upgrade	Make dispatch Y2K compliant, improve speed.	a) Final completion date – October, 1999.
23.	Lift Station Inventories	Record information on lift stations, including pump size, manufacturer, etc.	
24.	Risk Assessment (Traffic)	Frank Wilson agreed to work with a UNB student to do a "risk assessment" of Fredericton's transportation System.	a) Report received from Transportation Group at UNB. b) Director, Traffic Engineer and Traffic Technician following up with UNB.
25.	Alarms in Facilities	We would like to have intrusion/fire alarms at St. Mary's Depot and Regent Depot.	a) St. Mary's Depot alarm was installed.
26.	Sewer Drawing	We need a drawing showing all services in the City, and this should be color-coded according to which station they flow to.	a) Completed by Engineering Technician.
27.	Cross-connection Control Program	We want to revitalize our program when Meter Supervisor returns from Aquillium training	a) Terms of Reference established by Murray. b) Meter Supervisor preparing draft plan assisted by outside expertise.
28.	Signaling Manual	We want our own manual on how to sign jobs for safety.	a) Signage Manual circulated by Traffic Engineer. b) Supervisors have been asked to provide comments for our revised Signage Manual in the year 2000.
29.	Septage Receiving	Septage Receiving is a problem. We need to get a proper facility or get out of the business.	a) NBDOE has selected a private septage receiving contractor. b) Melanson's establishing septage receiving site off Wilsey Road.
30.	Composting	FAPCC has asked that we look at composting biosolids.	

	ISSUE	NARRATIVE / EXPECTATIONS	STATUS
31.	Recycling	Recycling is an issue for FSWC and the Province. What will the City do?	<ul style="list-style-type: none">a) Recycling Evaluation Committee established.b) Recycling "Open House" held on June 9th, 1999.c) Final recommendations submitted to Transportation Committee on Sept. 16th.

GENERAL FUND

COMMON SERVICES

The total net expenditure under this heading was **\$ 3 202 028** made up as follows:

Administration	\$ 45 744	
Engineering Services	\$ 532 847	
General Equipment	\$1 469 907	
Service Depots		
Regent Street	\$ 112 944	
St. Mary's Street	\$ 164 503	
Sign Shop	\$ 17 813	
Safety & Benefits	<u>\$ 838 270</u>	\$ 3 202 028

(a) **Administration:**

The net expenditure of **\$45 744** was made up as follows:

Personnel Costs	\$ 36 933	
Office Supplies	\$ 5 986	
Miscellaneous	<u>\$ 2 825</u>	\$ 45 744
(Equipment Repairs, Printing, Local Business Expenses, Office Furniture & Equipment)		

(b) **Engineering Services:**

The net expenditure of **\$532 847** was made up as follows:

Personnel Costs	\$ 473 395	
Engineering and Office Supplies	\$ 9 521	
Equipment Repairs & Maintenance	\$ 2 394	
Professional Services	\$ 22 623	
Use of Equipment	\$ 9 314	
Purchases (Computers and Related Purchases; Office Furniture and Equipment)	<u>\$ 35 601</u>	\$ 532 847

(c) **General Equipment:**

The net expenditure of **\$1 469 907** was made up as follows:

Fuels	\$ 243 171	
Small Tools	\$ 8 682	
Vehicle Repairs (Parts)	\$ 598 802	
Use of Equipment	\$ 10 302	
General Equipment (New Purchases)	<u>\$ 608 950</u>	\$ 1 469 907

(d) **Regent Street Depot:**

The net expenditure of **\$112 944** was made up as follows:

Personnel Costs	\$ 22 921
Furnace Oil & Supplies	\$ 22 804
Communications (Telephone)	\$ 4 549
Building Repairs & Maintenance	\$ 14 574
Equipment Repairs & Maintenance	\$ 8 258
Insurance	\$ 2 800
Use of Equipment	\$ -
Water & Sewer Rates	\$ 573
Lights and Power	\$ 10 246
Provincial Taxes	<u>\$ 26 219</u>
	\$ 112 944

(e) **St. Mary's Street Depot:**

The net expenditure of **\$164 503** was made up as follows:

Personnel Costs	\$ 10 958
Furnace Oil & Supplies	\$ 30 105
Small Tools	\$ 5 916
Communications (Telephone)	\$ 6 344
Building Repairs & Maintenance	\$ 13 353
Equipment Repairs & Maintenance	\$ 21 460
Insurance	\$ 1 400
Use of Equipment	\$ 27
Water & Sewer Rates	\$ 1 620
Lights and Power	\$ 32 518
Provincial Taxes	<u>\$ 40 802</u>
	\$ 164 503

(f) **Sign Shop:**

The net expenditure of **\$17 813** was made up as follows:

Personnel Costs	\$ 204
Furnace Oil & Supplies	\$ 3 435
Communications (Telephone)	\$ 2 238
Building Repairs & Maintenance	\$ 4 152
Equipment Repairs & Maintenance	\$ -
Insurance	\$ 800
Water & Sewer Rates	\$ 270
Lights and Power	\$ 2 119
Provincial Taxes	<u>\$ 4 595</u>
	\$ 17 813

(g) **Safety & Benefits:**

The net expenditure of **\$ 838 270** was made up as follows:

Personnel Costs	\$ 717 695
Materials (Barricades & Signs)	\$ 6 005
Protective Clothing	\$ 13 370
Protective Equipment	\$ 6 208
Communications (Radio & Telephone)	\$ 26 338
Insurance	\$ 44 443
Medicals	\$ 600
Conferences	\$ 23 611
	\$ 838 270

ROAD TRANSPORT SERVICES

The Road Transport Services net expenditure of **\$4 589 775** was made up of the following items:

Administration	\$ 226 346
Roads & Streets	\$3 114 702
Street Lighting	\$ 796 638
Traffic Services	\$ 452 089
	\$ 4 589 775

- (a) **Administration:** The total net expenditure under this heading amounted to **\$ 226 346** for personnel costs, general services, etc.
- (b) **Roads & Streets:** The total net expenditure under this item was made up as follows:

(1) Roadway Surfaces (maintenance)	\$ 574 539
(2) Sidewalk Maintenance	\$ 459 885
(3) Culverts & Ditching	\$ 53 474
(4) Storm Sewer Maintenance	\$ 184 496
(5) Street Cleaning	\$ 423 633
(6) Winter Maintenance	\$ 1 418 675
	\$ 3 114 702

The expenditures for the above items, as well as a brief description of work done, are summarized as follows:

(1) **Roadway Surfaces (Maintenance)**

The net expenditure of **\$ 574 539** was made up as follows:

Paved Streets Maintenance	\$ 337 248
Curb & Gutter Repair	\$ 61 673
Right-of-way Maintenance	\$ 175 618
	\$ 574 539

Paved Streets	This includes the patching and repairing of pavement and the asphalt concrete resurfacing program.
----------------------	--

Costs for streets or portions of streets resurfaced in 1999 fell under Capital Infrastructure Renewal–Resurfacing. (See list of streets resurfaced under Capital Accounts Paving on Page 42 of this report).

(2) Sidewalk Maintenance

The net expenditure of **\$ 459 885*** for sidewalk repairs was made up as follows:

Personnel Costs	\$ 128 642
Materials, use of equipment & contract services	\$ 436 243
Recovery	<u>(\$105 000)</u> \$ 459 885

*Includes costs of \$381 236 associated with Special Projects - Sidewalk Maintenance and also reflect recovery from other accounts of \$105 000 associated with these projects.

(3) Culverts and Ditching - The maintenance and installation of culverts and ditches.

The net expenditure of **\$ 53 474** was made up as follows:

Personnel Costs	\$ 26 952
Materials	\$ 7 592
General Services (use of equipment & contract services)	<u>\$ 18 930</u> \$ 53 474

(4) Storm Sewer Maintenance - The flushing of mains, cleaning and repair of catch basins and the repair of mains.

The net expenditure of **\$ 184 496** was made up as follows:

Personnel Costs	\$ 107 801
Materials	\$ 18 349
General Services (use of equipment & contract services)	<u>\$ 58 346</u> \$ 184 496

(5) Street Cleaning and Flushing

The City of Fredericton used a number of sweepers, trackless units and a Vac-all unit for street cleaning purposes in 1999.

The net expenditure under this heading amounted to **\$ 423 633** and was made up as follows:

Personnel Costs	\$ 261 639
General Services (use of equipment & contract services)	\$ 144 972
Goods (brooms, litter cans, dust control)	<u>\$ 17 022</u> \$ 423 633

(6) Winter Maintenance**(a) Sanding and Salting Streets and Sanding Sidewalks**

Storing sand and salt in winter storage piles and spreading same on slippery streets and sidewalks.

(b) Snow Control

Blowing, shoveling and hauling snow, plowing or scraping roads, cleaning gutters, thawing catch basins and any other means of snow control.

The City of Fredericton was responsible for plowing, sanding and salting 339.483 km of roads and streets in 1999 (162.040 km on the north side and 177.443 km on the south side). Included in these figures is the Westmorland Street Bridge along with adjacent highways and ramps which are maintained through an agreement with the Department of Transportation.

During the winter months of 1999, 192.984 km of sidewalk were plowed and sanded. (76.366 km on the north side and 116.618 km on the south side).

Streets:

The total net cost for **plowing streets** amounted to **\$ 648 788** and was made up as follows:

Personnel Costs	\$ 425 237
General Services (use & maintenance of equipment)	\$ 195 894
Contract Services	\$ 14 123
General Equipment	<u>\$ 13 534</u>
	\$ 648 788

The total net cost of **sanding and salting streets** amounted to **\$ 564 060** and was made up as follows:

Personnel Costs	\$ 201 786
General Services (use & maintenance of equipment)	\$ 80 995
Materials (salt and sand)	<u>\$ 281 279</u>
	\$ 564 060

The overall net expenditure of **\$ 1 212 848** for **plowing, sanding and salting** City roads and streets was made up as follows:

Personnel Costs	\$ 627 023
General Services (use & maintenance of equipment)	\$ 276 889
General Equipment	\$ 13 534
Materials (salt & sand)	\$ 281 279
Contract Services	<u>\$ 14 123</u>
	(1)
	\$1 212 848

Sidewalks:

The total net expenditure for **plowing sidewalks** amounted to \$ 123 877 and was made up as follows:

Personnel Costs	\$ 85 047
General Services (use & maintenance of equipment)	\$ 38 830
	\$ 123 877

The total net expenditure for **sanding sidewalks** amounted to \$ 81 952 and was made up as follows:

Personnel Costs	\$ 40 357
General Services (use & maintenance of equipment)	\$ 16 153
Materials (sand)	\$ 12 323
General Equipment	\$ 13 119
	\$ 81 952

The overall net expenditure for **snow plowing and sanding of sidewalks** was \$ 205 829 and was made up as follows:

Personnel Costs	\$ 125 404
General Services (use & maintenance of equipment)	\$ 54 983
Materials (sand)	\$ 12 323
General Equipment	\$ 13 119
	\$ 205 829

TOTAL NET COST OF WINTER MAINTENANCE - ADD (1) & (2) \$1 418 677

Snowfall in Fredericton for the last five years was as follows:

1995	Airport Weather Office	292.7 cm
1996	Airport Weather Office	214.8 cm
1997	Airport Weather Office	350.4 cm
1998	Airport Weather Office	232.0 cm
1999	Airport Weather Office	224.6 cm

(c) Street Lighting

The total street lighting costs for 1999 were as follows:

Salaries & Benefits	\$ 337
Multiple Lighting System Contract	\$794 842
General Services (Standards & contract services)	\$ 924
New Bulbs	<u>\$ 534</u>
	\$ 796 637

As of December 31st, 1999, the **Multiple Street Lighting System** contract was made up as follows:

503	-	100 watt HPS light only
405	-	100 watt HPS light with wood pole
1554	-	150 watt HPS light only
35	-	150 watt HPS light with concrete pole
606	-	150 watt HPS light with wood pole
21	-	150 watt HPS power usage only
3	-	175 watt MV light with wood pole
411	-	200 watt HPS light only
1	-	200 watt HPS light with concrete pole
160	-	200 watt HPS light with wood pole
3	-	250 watt HPS light only
4	-	400 watt MV light with wood pole
40	-	400 watt HPS light only
1	-	400 watt HPS light with wood pole
8	-	flashing lights
4	-	sign lights
10	-	beacons
2	-	traffic control
1	-	100 watt HPS dusk to dawn

(d) Traffic Services

The expenditure under this heading is made up as follows:

- 1) Street Signs
- 2) Paint Division
- 3) Traffic Signals

(1) Street Signs

Purchasing, repairing and installing street signs on City Streets.

The net expenditure under this heading amounted to \$ 116 737 made up as follows:

Personnel Costs	\$60 824
Contract Services	\$ 391
General Services (use of equipment & equipment repairs)	\$ 9 309
Goods (posts, street sign purchases, etc.)	<u>\$46 213</u>
	\$ 116 737

(2) Paint Division

The net expenditure under this heading was \$ 120 490 made up as follows:

Personnel Costs	\$78 472
General Services (use & maintenance of equipment & contract services)	\$10 074
Goods (paint & miscellaneous supplies)	\$27 979
General Equipment	<u>\$ 3 965</u>
	\$ 120 490

(3) Traffic Signals

The net expenditure under this heading was \$ 214 862 made up as follows:

Personnel Costs	\$61 617
General Services (use & maintenance of equipment & contract services)	\$19 368
Government Services (electric power)	\$91 389
Goods (materials)	\$28 513
Computer & related purchases; modem, training	\$10 783
General Equipment	<u>\$ 3 192</u>
	\$ 214 862

ENVIRONMENTAL HEALTH SERVICES

The following items are included under the above heading.

- 1) Garbage and Waste Collection
- 2) Garbage and Waste Disposal
- 3) Recycling
- 4) Hazardous Waste

(1) Garbage and Waste Collection

In 1999, the net amount paid for the garbage and waste collection operation was \$ 471 167 made up as follows:

Garbage Collection Contract	\$ 466 389	
Advertising	<u>\$ 4 778</u>	\$ 471 167

(2) Garbage and Waste Disposal

The net expenditure under this section was \$ 621 850 made up as follows:

Solid Waste Commission payments	\$ 613 709	
Professional Services	\$ 7 180	
Provincial Taxes	<u>\$ 961</u>	\$ 621 850

(3) Recycling

The net expenditure under this section was \$ 121 699 made up as follows:

Personnel Costs	\$ 344	
Goods (Composters)	\$ 7 702	
General Services (Recycling Collection Contract)	\$ 117 875	
General Services (Blue Boxes)	\$ 2 384	
Recycling Recovery	<u>\$ (6 606)</u>	\$ 121 699

(4) Hazardous Waste

Cleanup of oil spills from accidents, etc.

The net expenditure under this section was \$ 4 900 made up as follows:

Personnel Costs	\$ 384	
Materials	\$ 1 302	
Contract Services	\$ 3 417	
Use of Equipment	<u>\$ (203)</u>	\$ 4 900

UTILITY FUND

The above item is made up of the following headings:

1. Common Services
2. Sanitary Sewer
3. Water

(1) COMMON SERVICES

In 1999 the net expenditure for this item was \$1 527 469 made up as follows:

a) General Equipment

Personnel Costs	\$ 46 181
Fuel	\$ 76 149
Parts	\$ 124 014
Insurance	\$ 15 500
General Equipment	\$ 230 347
General Equipment - Sewer Cleaner	<u>\$ 272 095</u> \$ 764 286

b) Safety & Benefits

Personnel Costs	\$ 330 328
Barricades; Signs; Clothing; Protective Equipment	\$ 16 136
Communications (Radio & Telephone)	\$ 18 396
Medicals	<u>\$ 1 426</u> \$ 366 286

c) Administration

Personnel Costs	\$ 213 544
Computer Supplies	\$ 273
Audit Fees & Professional Services	\$ 73 738
Conferences	\$ 25 354
Computers & Related Purchases	<u>\$ 28 050</u> \$ 340 959

d) Utility Retirement

Allowance	<u>\$ 55 938</u>	<u>\$ 55 938</u>
	TOTAL	\$1 527 469

(2) SANITARY SEWER

In 1999 the net expenditure for this item was \$ 1 908 882 made up as follows:

Operating: Lift Stations

Personnel Costs	\$ 40 370
General Services (use & maintenance of equipment)	\$ 19 758
Government Services (light & power)	\$ 33 200
Goods (materials)	<u>\$ 582</u> \$ 93 910

Maintenance:

Personnel Costs	\$ 299 907
General Services (use & maintenance of equipment & contract services)	\$ 67 094
Goods (repair parts & tools)	\$ 58 915
Contract Services	<u>\$ 13 998</u> \$ 439 914

Sewage Treatment & Disposal

Personnel Costs	\$ 25 457
General Services (use & maintenance of equipment)	\$ 23 262
(Treatment (F.A.P.C.C.))	\$ 1 293 333
Government Services -Water & Sewer rates	\$ 1 234
- Lights & Power	\$ 31 311
Goods (Miscellaneous Supplies)	<u>\$ 461</u> <u>\$1 375 058</u>

TOTAL **\$1 908 882**

The Fredericton sanitary sewer system consists of approximately 308 kilometres of mains made up as follows:

SIZE	SILVERWOOD GARDEN CREEK	NASHWAAKSIS DOUGLAS	MARYSVILLE	LR.ST.MARY'S BARKER'S PT.	FREDERICTON	TOTAL
100mm	-	0.158	-	-	-	0.158
100mm F.M.	0.013	-	-	-	1.103	1.116
150mm	-	1.433	0.314	-	0.316	2.063
150mm F.M.	0.031	1.071	0.539	0.712	3.008	5.361
200mm	16.353	44.832	18.567	10.864	123.819	214.435
200mm F.M.	1.099	0.463	0.314	-	0.064	1.940
250mm	1.959	6.676	0.955	0.298	10.247	20.135
250mm F.M.	1.178	-	-	-	-	1.178
300mm	1.532	4.301	1.006	1.868	18.624	27.331
300mm F.M.	0.420	0.489	-	-	0.739	1.648
350mm	0.287	0.843	-	-	0.713	1.843
350mm F.M.	-	-	0.528	-	0.254	0.782
375mm	1.871	5.503	0.500	0.174	1.915	9.963
400mm	0.018	0.147	-	-	0.210	0.375
450mm	1.721	0.117	1.350	-	3.289	6.477
500mm	2.979	-	-	-	-	2.979
525mm	-	2.420	-	-	0.310	2.730
600mm	1.215	0.964	-	-	3.693	5.872
750mm	-	-	-	-	0.322	0.322
900mm	-	-	-	-	1.432	1.432
TOTALS	30.676	69.417	24.073	13.916	170.058	308.140

NOTE:

Fredericton includes the Lincoln area.

The above figures do not include mains at the Fredericton Exhibition Grounds, U.N.B. and St. Anne's Point on the Woodstock Road or the Fredericton Area Pollution Control Commission sewer system which has approximately 11.4 kilometres of main.

(3) WATER

Until November 1999 the City of Fredericton had two separate municipal water supply systems comprised of 22 wells (9 active), 20 reservoir tanks or cells on 13 reservoir sites, 8 active booster stations and the Water Treatment Plant. There are, within these two systems, at year's end, 15 separately monitored water pressure zones. In November 1999, the Silverwood Water Supply System was taken off line and the Silverwood area was fed from the main City of Fredericton System.

The Water Treatment Plant treats the water from the eight Wilmot Park wells, which provide 99% of the City's water. The following describes the 15 water zones and their normal sources.

ZONE	SOURCE	STORAGE
South Low	7 wells via W.T.P. 1 emergency standby well	18180 kL
North Low	South Low via River Crossing (same top reservoir elevations) 5 emergency wells	8540 kL
South Intermediate	South Low via Booster	9090 kL
South High	South Intermediate via Booster	4540 kL
Golf Club Road	South High via Pressure Reducing Valve	0 kL
Rosewood	South Low via Booster	0 kL
Lincoln	South Low via Booster	3750 kL
Alison	South High via Pressure Reducing Valve	0 kL
Hanwell	South High via Pressure Reducing Valve 1 Emergency Well	460 kL
Silverwood	2 Wells Direct	2250 kL
Rainsford	Golf Club road via Booster 1 Emergency Well	0 kL
Killarney	South Low via Booster 2 Emergency Wells	3750 kL
Marysville	North Low Via Booster 3 Emergency Wells	6600 kL
Canterbury	South High via Altitude Valve	1070 kL
Diamond	North Low via Booster	0 kL

The water account includes all expenditures other than capital expenditures for water.

Water costs for the City of Fredericton were made up as follows:

1. Water Administration (Billing & Collection)	\$ 143 355
2. Water Ordinary (including meters)	\$1 399 099
3. Water Production Costs	<u>\$ 864 673</u>
	\$ 2 407 127

(1) WATER ADMINISTRATION (BILLING & COLLECTION)

The net expenditure of \$ 143 355 was made up as follows:

Personnel Costs	\$ 96 847
General Services (Postage, Professional Services, Rental of Equipment, Computer External Services)	\$ 40 304
Goods (Computer & Office Supplies)	<u>\$ 6 204</u>
	\$ 143 355

(2) WATER ORDINARY (INCLUDING METERS)

The net expenditure of \$1 399 099 was made up as follows:

Transmission & Distribution (Operation)

Personnel Costs	\$ 59 227
General Services	\$ 47 107
(use & maintenance of equipment)	
Government Services (light & power, provincial taxes)	\$ 165 732
Goods (materials)	\$ 1 909
	\$ 273 975

Transmission & Distribution (Maintenance)

Personnel Costs	\$ 474 239
General Services (use & maintenance of equipment & hydrants & contract services)	\$ 117 411
Goods (fuels & lubricants, tools, materials, parts)	\$ 104 612

Meters

Personnel Costs	\$ 226 476
Goods (meter parts, miscellaneous supplies & tools)	\$ 11 434
General Services (use of equipment)	\$ 39 834
Fixed Assets (new meters)	<u>\$ 151 118</u>
	\$ 428 862

TOTAL **\$1 399 099**

At the end of 1999 there were 13 906 water services on meter and 166 on flat rate, making a total of 14 072. There were also 32 services which are seasonal.

225 new meters (new construction and former flat rate) were installed in 1999.

In 1999, 17 discontinued services were excavated and shut off at the main and 14 frozen meters were replaced. There were also 905 meters replaced due to their age.

At the end of 1999 there were 6 329 units on the Automated Meter Reading (AMR) System.

There are in the City, as of 1999 12 31, 1845 hydrants situated in the following areas:

Fredericton South	816
Fredericton North	173
Nashwaaksis/Douglas	398
Marysville	157
Barker's Point/Lower St. Marys	85
Silverwood/Garden Creek	45
SUB TOTAL	1674
LOCATED ON PRIVATE PROPERTY	171
TOTAL	1845

Hydrants were installed at the following locations in 1999:

<u>Location</u>	<u>Number</u>
Bliss Carman Drive	4
Dora Drive	4
Grasse Circle	4
Merrithew Avenue	2
Rebecca Drive	2
Silverwood Trunk	18
10 Gillis Rd. (Bayview International)-Private	1
TOTAL	35

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The Fredericton distribution system consists of approximately 339 kilometres of water main, made up as follows:

SIZE	MARYSVILLE	NASHWAAKSIS DOUGLAS	LR. ST. MARYS BARKER'S POINT	SILVERWOOD GARDEN CREEK	FREDERICTON	TOTAL
32mm	-	0.153	-	-	-	0.153
38mm	-	0.072	-	-	0.153	0.225
50mm	-	-	-	0.154	-	0.154
75mm	-	-	-	-	0.205	0.205
100mm	0.753	2.232	-	2.508	11.172	16.665
150mm	12.619	21.629	4.053	4.917	57.024	100.242
200mm	7.424	26.646	2.266	7.812	46.726	90.874
250mm	3.431	9.410	5.169	1.171	26.617	45.798
300mm	3.296	12.815	1.070	7.844	32.939	57.964
350mm	-	0.840	-	3.486	6.605	10.931
400mm	-	2.241	-	-	7.303	9.544
450mm	-	-	-	-	1.965	1.965
500mm	-	-	-	-	3.577	3.577
600mm	-	-	-	-	0.427	0.427
Unknown	0.146	-	-	-	-	0.146
TOTALS	27.669	76.038	12.558	27.892	194.713	338.870

Figures for Marysville, Nashwaaksis, Barker's Point and Silverwood are approximate only, due to measurement from maps in some instances.

The above figures do not include water mains installed at the Exhibition Grounds; the University of New Brunswick and St. Anne's Point Barracks on the Woodstock Road.

(3) **WATER PRODUCTION COSTS**

The net expenditure of **\$ 864 673** was made up as follows:

Source of Supply

Personnel Costs	\$ 118 154
Use of Equipment	\$ 16 550
Maintenance - Wells & Leased Line	\$ 38 984
Power - Wells	\$ 256 006
Materials - Wells	\$ 48
	\$ 429 742

Power & Pumping (Plant)

Personnel Costs	\$ 50 045
Communications	\$ 507
Light & Power	\$ 7 429
Supplies	\$ 139
	\$ 58 120

**Water Treatment Plant (Purification and Treatment
And Plant and Equipment Maintenance)**

Personnel Costs	\$ 64 446
Insurance	\$ 18 622
Maintenance	\$ 113 315
Power	\$ 26 359
Taxes	\$ 36 453
Goods (Chlorine, Soda Ash, Lime, etc.)	\$ 117 616
	\$ 376 811
	TOTAL
	\$ 864 673

The total amount of water pumped into the City's distribution systems from 1999 01 01 to 1999 12 31 for the entire City was 9099 megalitres. The average daily demand for the City is 24.4 megalitres.

The following table gives a comparison of water production costs for the last ten years:

WATER PRODUCTION COSTS

YEAR	MEGALITRES PRODUCED	PRODUCTION EXPENDITURE	PRODUCTION COST PER MEGALITRE
1990	8600	\$679 440	\$79
1991	8450	\$823 353	\$97
1992	8570	\$828 783	\$97
1993	8023	\$794 406	\$99
1994	8340	\$874 562	\$105
1995	8160	\$839 058	\$103
1996	8270	\$827 735	\$100
1997	8560	\$827 339	\$97
1998	8660	\$758 124	\$88
1999	9099	\$864 673	\$95

The total net expenditure for transmission and distribution of water for the City from 1999 01 01 to 1999 12 31 was determined from the following:

Transmission & Distribution:

Operation	\$ 273 975	
Maintenance	<u>\$ 696 262</u>	\$ 970 237

Therefore, the net expenditure for transmission and distribution of one megalitre of water from 1999 01 01 to 1999 12 31 was:

$$\frac{\$ 970 237}{9099} = \$ 106.63$$

The following table gives a comparison of net expenditures for transmission and distribution of one megalitre of water for the last ten years:

TRANSMISSION AND DISTRIBUTION COSTS

YEAR	NET EXPENDITURE PER MEGALITRE
1990	\$ 106
1991	\$ 117
1992	\$ 121
1993	\$ 147
1994	\$ 125
1995	\$ 114
1996	\$ 127
1997	\$ 116
1998	\$ 107
1999	\$ 107

The total net expenditure for water administration costs for the City from 1999 01 01 to 1999 12 31 was determined from the following:

Water Administration

(1) Billing & Collection	\$ 143 355	
(2) Meters (Installation, Reading, Repairs)	<u>\$ 428 862</u>	<u>\$ 572 217</u>

Administration costs per megalitre of water produced:

$$\frac{\$ 572 217}{9099} = \$62.89$$

The following table gives a comparison of administration costs and debt charges, per megalitre of water produced, for the last ten years:

**ADMINISTRATION COSTS AND DEBT CHARGES PER MEGLITRE
(Rounded to nearest dollar)**

YEAR	ADMINISTRATION (BILLING & COLLECTION & METERS)	DEBT CHARGES
1990	\$ 44	\$ 43
1991	\$ 45	\$ 43
1992	\$ 46	\$ 38
1993	\$ 62	\$ 24
1994	\$ 63	\$ 19
1995	\$ 67	\$ 12
1996	\$ 70	\$ -
1997	\$ 58	\$ -
1998	\$ 61	\$ -
1999	\$ 63	\$ -

The following table gives a comparison of total water costs, per megalitre of water produced, for the last ten years:

TOTAL COSTS PER MEGLITRE

YEAR	PRODUCTION COSTS	TRANSMISSION & DISTRIBUTION COSTS	ADMINISTRATION	DEBT CHARGES	*TOTAL
1990	\$ 79	\$ 106	\$ 44	\$ 43	\$ 272
1991	\$ 97	\$ 117	\$ 45	\$ 43	\$ 302
1992	\$ 97	\$ 121	\$ 46	\$ 38	\$ 302
1993	\$ 99	\$ 147	\$ 62	\$ 24	\$ 332
1994	\$ 105	\$ 125	\$ 63	\$ 19	\$ 312
1995	\$ 103	\$ 114	\$ 67	\$ 12	\$ 296
1996	\$ 100	\$ 127	\$ 70	\$ -	\$ 297
1997	\$ 97	\$ 116	\$ 58	\$ -	\$ 271
1998	\$ 88	\$ 107	\$ 61	\$ -	\$ 256
1999	\$ 95	\$ 107	\$ 63	\$ -	\$ 265

***TOTAL COST = Production Costs + Transmission & Distribution Costs
+ Administration Costs + Debt Charges**

SUMMARY**WATER AND SEWER REVENUE & EXPENDITURES
1999**

ITEM	NET EXPENDITURE	REVENUE
<u>COMMON SERVICES (WATER & SEWER)</u>		
General Equipment	\$ 764 286	\$ 60 815
Safety & Benefits	\$ 366 286	
Administration	\$ 340 959	
Utility Retirement	\$ 55 938	
<u>WATER</u>		
Water Administration (Billing & Collection)	\$ 143 355	\$ 5 738 091
Water Ordinary (Including Meters)	\$ 1 399 099	
Water Treatment Facility & Well Production Costs	\$ 864 673	
<u>SANITARY SEWER</u>		
Operating & Maintenance	\$ 533 824	
Sewage Treatment & Disposal	\$1 375 058	\$4 347 858
TOTAL	\$ 5 843 478	\$10 146 764

1999 SURPLUS: \$4 303 286

PLUS: SECOND PREVIOUS YEAR'S SURPLUS @ BEGINNING OF YEAR \$ 555 840

OVERALL SURPLUS: \$4 859 126
LESS: CAPITAL PROJECT FUNDING \$4 961 365

NET SURPLUS (DEFICIT) \$(102 239)

NOTE: \$ 4 611 365 of the above noted overall surplus was appropriated for utility capital expenditures and \$350 000 was transferred to the Capital Reserve Fund giving a total of \$4 961 365 for Capital projects.

CAPITAL PROGRAMS

The following gives brief descriptions of capital projects begun or completed in 1999.

WATER

In 1999, water mains were installed on Merrithew Avenue, Grasse Circle and along the walking trail to Silverwood under the Infrastructure Extension Program. Water mains were also installed on Brunswick Street between Northumberland Street and Smythe Street under the Infrastructure Rebuilding Program.

Hanson Street, between Albert Street and Kings College Road, had new water main installed under the Infrastructure Renewal Program. An alternate power source for the Wilmot Park well field was also installed under this program.

Funding for the beginning of a valve replacement program, which will be an ongoing program, was also allocated in 1999 with a number of valves replaced in the Town Plat area of the City.

New mains were also installed in another phase of the Chippin's Limited Lincoln Heights Subdivision (Dora Drive; Leah Drive; Rebecca Drive; Spiro Drive) by the developer under a Local Improvement Agreement.

The following are lengths and sizes of water mains installed in 1999.

LENGTH OF MAINS - metres

LOCATION	150mm D.I. P.V.C.	200mm D.I. & P.V.C.	250mm D.I.	300mm D.I.	350mm D.I.	500mm D.I.
(4) Merrithew Avenue/Grasse Circle	49	436			635	
(4) Silverwood Trunk	82			205	68	3 486
(3) Brunswick Street (Northumberland to Smythe)	4			7	11	175
(1) Hanson Street (Albert to Kings College)	8	353				
(2) Lincoln Hts. Subdivision (Dora;Leah;Rebecca;Spiro)	27	307		538		
(5) College Brook (Regent St. to York St.)		44				
TOTALS	170	1 140	212	1 252	3 486	175

OVERALL TOTAL – 6 435 metres = 6.435 kilometres

- (1) Done under Infrastructure Renewal system replacement and oversizing.
- (2) Paid for by the developer through Local Improvement Agreement.
- (3) Done under Infrastructure Rebuilding
- (4) Done under Infrastructure Extensions
- (5) Done in conjunction with the Car/N.B. Infrastructure Program for storm sewer.

SANITARY SEWER:

In 1999, sanitary sewer mains were installed on Merrithew Avenue, Grasse Circle and along the walking trail to Silverwood under the Infrastructure Extensions Program. Sanitary sewer mains were also installed on Brunswick Street between Northumberland Street and Smythe Street under the Infrastructure Rebuilding Program.

Hanson Street, between Albert Street and Kings College Road, had new sanitary sewer installed under the Infrastructure Renewal Program. The Prospect Street Lift Station also had new pumps and electronic controls replaced under this program.

In conjunction with the Federal/Provincial Infrastructure Program, new sanitary sewer mains were installed along side the new storm sewer system on College Brook between Regent Street and York Street. This project was carried over from the 1998 program.

New mains were also installed in another phase of the Chippin's Limited Lincoln Heights Subdivision (Dora Drive; Leah Drive; Rebecca Drive; Spiro Drive) by the developer under a Local Improvement Agreement.

The following are lengths and sizes of sanitary sewer mains installed in 1999.

LOCATION	LENGTH OF MAINS - metres				
	200mm PVC	200mm F.M.	300mm PVC	375mm PVC & D.I.	450 mm P.V.C.
(4) Merrithew Avenue/Grasse Circle	940				
(4) Silverwood Trunk	308	845	265	733	682
(3) Brunswick St. (Northumberland to Smythe)					1 059
(1) Hanson St. (Albert to Kings College)	386		46		200
(5) College Brook (Regent to York)	23			17	435
(2) Lincoln Heights Subdivision (Dora Dr.; Leah Dr.; Rebecca Dr.; Spiro Dr.)	766				
TOTALS	2 423	845	311	750	1 317
					1 059

OVERALL TOTAL – 6 705 metres = 6.705 kilometres

Done under Infrastructure Renewal System Replacement and Oversizing

- (1) Paid for by the developer through Local Improvement Agreements
- (2) Done under Infrastructure Rebuilding
- (3) Done under Infrastructure Extensions
- (4) Done in conjunction with the Can/N.B. Infrastructure Program for storm sewer.

STORM SEWER:

In 1999, storm sewer mains were installed on Merrithew Avenue, Grasse Circle and on College Brook in the University Avenue area under the Infrastructure Extensions Program. Storm sewer mains were also installed on Brunswick Street between Northumberland Street and Smythe Street under the Infrastructure Rebuilding Program.

Hanson Street, between Albert Street and Kings College Road, had new storm sewer main installed under the Infrastructure Renewal Program.

In conjunction with the Federal/Provincial Infrastructure Program, new storm sewer mains were installed on College Brook between Regent Street and York Street. This project was carried over from the 1998 program.

Some new mains were also installed on Two Nations Crossing to facilitate the construction of the road between St. Marys Street and Highland Avenue.

New mains were also installed in another phase of the Chippin's Limited Lincoln Heights Subdivision (Dora Drive; Leah Drive; Rebecca Drive; Spiro Drive) by the developer under a Local Improvement Agreement.

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The following are lengths and sizes of storm sewer mains installed in 1999.

LOCATION	200mm	250mm	300mm	375mm	450mm	525mm	600mm	750mm	900mm	1050mm	1200mm	1500mm
(5) Merrithew Avenue/Grasse Circle	146	344	123	116	47							
(5) College Brook (University Avenue Area)	19		6							37	8	
(4) Brunswick St. (Northumberland to Smythe)	19	56										
(1) Hanson St. (Albert to Kings College Rd.)	33		298				100					
(6) College Brook (Regent to York)		82							119			
(3) Two Nations Crossing	105	312	105	73				32	60			
(2) Lincoln Hts. Subdivision (Dora Dr.; Leah Dr.; Rebecca Dr.; Spiro Dr.)	106	689		64								
TOTALS	19	409	1 483	532	253	47	251	- 97	8	10	390	84

OVERALL TOTAL - 3 583 metres = 3.583 kilometres

- (1) Done under Infrastructure Renewal System Replacement and Upgrading
- (2) Paid for by developer through Local Improvement Agreement
- (3) Done under Special Projects
- (4) Done under Infrastructure Rebuilding
- (5) Done under Infrastructure Extensions
- (6) Done under the Can./N.B. Infrastructure Program

CURB AND GUTTER:

Concrete curb and gutter was constructed at the following locations in 1999. (Notes indicate budget item under which work was done)

	Location	Length (metres)
(1)	Barton Crescent (Civic 106 to Civic 182)	500
(5)	Beaverbrook Street (Between Regent and Tweedsmuir)	173
(4)	Bridge Street (Downing to Coronation)	203
(5)	Bridge Street (River to Downing)	257
(1)	Brunswick Street (Northumberland to Smythe)	374
(2)	Canada Street (Civic 135 to Gregory)	425
(5)	Canterbury Drive (Forest Hill to Surrey)	310
(3)	Cliffe Street (MacLaren to Leo Hayes High School)	1 814
(2)	Douglas Area (Ruby St./Jasper St.)	1 154
(2)	Duval Court	438
(5)	Forest Hill Road (Canterbury to Biggs - North side)	580
(5)	George Street (York to Carleton)	396
(5)	George Street (Carleton to Regent)	395
(5)	MacLaren Avenue (Sewell to McEvoy)	460
(5)	McEvoy Street (MacLaren to Noble)	205
(5)	Mill Street	420
(5)	Neill Street (Dobie to Union)	451
(6)	Park Street	200
(4)	Regent Street (McLeod to Beaverbrook)	235
(5)	Saunders Street (Smythe to Northumberland)	440
(5)	Shore Street	465
(5)	Smythe Street (Connaught to Edinburgh)	312
(5)	St. Marys Street (Dedham to Highland)	95
(5)	Studholm Street (Eglinton to Lynhaven)	214
(3)	Two Nations Crossing (St. Marys to Highland)	1 127
(2)	University Avenue (Alexandra to Beaverbrook)	94
(5)	University Avenue (Waterloo to Shore)	600
(5)	Watters Drive (Islands)	290
(5)	Woodstock Road (Odell to Brookmount)	656
(5)	York Street (Brunswick to George)	177
(5)	York Street (Pederson to Massey)	271
		TOTAL
		13 731

- 1) Done under Infrastructure Rebuilding
- 2) Done under Infrastructure Extensions
- 3) Done under Special Projects
- 4) Done under Designated Provincial Routes
- 5) Done under Infrastructure Renewal
- 6) Done in conjunction with the Park Street School grounds upgrade

PAVING:

In 1999, **Hogan Paving Ltd.** was awarded a contract to supply and place asphalt concrete on a number of City Streets.

The street preparatory work was done by City forces.

The paving program required the supply and placement of the following grades of asphalt concrete:

- 1) Binder Course - Clase I Type "B" @ \$32.00 plus H.S.T. per tonne in place
 Class II Type "B" @ \$36.00 plus H.S.T. per tonne in place
- 2) Surface Course - Class I Type "C" @ \$32.00 plus H.S.T. per tonne in place
 Class II Type "D" @ 36.00 plus H.S.T. per tonne in place

BINDER COURSE - TYPE "B"

The following streets were paved with Class I or Class II Type "B" asphalt concrete in 1999.

	Location	Length (metres)
(1)	Barton Crescent (Civic 106 to Civic 182)	245
(4)	Bridge Street (Downing to Coronation)	430
(1)	Brunswick Street (Northumberland to Smythe)	204
(3)	Cliffe Street (MacLaren to Leo Hayes High)	860
(2)	Douglas Area (Jasper Street; Ruby Street)	732
(2)	Duval Court	223
(4)	Regent Street (McLeod to Beaverbrook)	160
(5)	Shore Street	223
(3)	Two Nations Crossing (St. Marys to Highland)	713
(2)	University Avenue (Alexandra to Beaverbrook)	43
(1)	Wilsey Road South (Selected Section)	<u>300</u>
TOTAL		4 133

1. Done under Infrastructure Rebuilding. Included both binder and surface courses.
2. Paid for under Infrastructure Extensions.
Type "D" or "C" Asphalt was also placed on these streets.
3. Done under Special Projects. Included both binder and surface courses.
4. Done under Capital Designated Provincial Routes.
5. Done under Infrastructure Renewal

SURFACE COURSE – TYPE “C” AND TYPE “D”

The following streets were paved with Class I Type “C” or Class II Type “D” asphalt concrete in 1999.

Location	Length (metres)
Acacia Court	200
Bates Street	309
Bessborough Street	347
Birch Crescent	479
Birmingham Court	235
Bridgeview Court	198
Brookside Drive (Selected Sections)	1084
Brookside Drive/Main Street Intersection	202
Canterbury Drive (Liverpool to Essex)	295
Carman Avenue (Colwell to the end)	557
Chandler Drive (Pugsley to the end)	40
Chase Street	152
Cherry Avenue (MacFarlane to Kilburn)	143
Colonial Heights	550
Colwell Drive	555
Dunns Crossing Road (at end of the street)	50
Dunns Crossing Road (Lincoln to Biggs)	430
Ebony Drive	423
Edgewood Drive	300
Emmerson Street (Blair to Civic 52)	174
Folkestone Court	91
Forest Hill/Beaverbrook Intersection (South Approach)	302
Glasier Road (Lincoln to Legere)	442
Hachey Avenue	320
Hawkins Street (Brookside to Ebony)	172
Hilton Road (Whiting to MacKenzie)	122
Jenning Drive	237
King Street (Church to St. John)	195
Legere Street	135
Lincoln Road near Experimental Farm	45
Liverpool Street (Vanier to Canterbury)	485
Longwood Drive (Woodmount to MacDonald)	482
Lynhaven Court	75
Lynhaven Street	256
MacLaren Avenue (Sewell to McEvoy)	250
Pugsley Street	403
Queen Street (Church to St. John)	235
River Street (Selected sections)	228
Riverside Drive/Watters Drive Intersection	237
Rowan Street	165
Scully Street	192

Continued..... Surface Course - Type "C" and Type "D"

Location	Length (metres)
Shore Street	223
Stanley Street	392
Starview Street	198
Studholm Street	100
St. Marys Street (Selected sections)	692
Union Street/Gibson Street Intersection	121
Whiting Road (Selected sections)	86
Wilcox Street	354
Wilsey Road/Lincoln Road Intersection	185
Wilsey Road/McNair Drive/Hubbard Road Intersection	<u>91</u>
TOTAL	14 234

CONCRETE SIDEWALKS:

New sidewalks were constructed or reconstructed at the following locations in 1999.

	Location	Length (metres)
(1)	Argyle Street (Smythe to Northumberland)	355
(1)	Beaverbrook Street (Regent to Tweedsmuir)	150
(2)	Brunswick Street (Northumberland to Smythe)	157
(1)	Canterbury Drive (Forest Hill to lower Surrey)	80
(1)	Church Street (Charlotte to Aberdeen)	218
(3)	Cliffe Street (MacLaren to Leo Hayes High School)	873
(4)	Douglas Avenue (Various locations)	398
(5)	Douglas Avenue near Main Street	38
(1)	Forest Hill Road (Canterbury to Forest Hill Towers)	396
(1)	Forest Hill Road (Forest Hill Towers to Biggs Street)	449
(4)	Fulton Avenue near Douglas Avenue	70
(1)	George Street (Carleton to Regent)	393
(1)	George Street (York to Carleton)	220
(1)	Hayes Street	67
(6)	MacDonald Avenue (adjacent to Park Street School)	118
(1)	MacLaren Avenue (Sewell to Medley)	281
(4)	McGregor Street (Selected sections)	71
(1)	McEvoy Street (Noble to Neill)	184
(1)	McNair Drive (Civic 49 to Civic 133)	237
(1)	Neill Street (Union to Dobie)	210
(6)	Park Street	130
(7)	Regent Street (McLeod to Beaverbrook - East side)	116
(1)	Saunders Street (Smythe to Northumberland)	265
(1)	Saunders Street (Smythe to Rookwood)	419
(1)	Shore Street	429
(1)	Smythe Street (Connaught to Edinburgh)	375
(1)	Stanley Street (Massey to the south)	166
(1)	St. Marys Street near Co-op Hardware	73
(1)	Studholm Street (Eglinton to Lynhaven)	110
(8)	University Avenue (Alexandra to Beaverbrook)	82
(1)	University Avenue (area between George and Charlotte)	124
(1)	University Avenue (Waterloo to Shore)	325
(1)	Watters Drive (Islands)	66
(1)	Woodstock Road (Smythe to Odell)	181
(1)	York Street (Brunswick to George)	175
TOTAL		8 001

- 1) Capital Sidewalk Construction done under O & M Budget
- 2) Done in conjunction with Infrastructure Rebuilding of street
- 3) Done under Special Projects
- 4) Paid for by Developer through Local Improvement Agreement
- 5) Done under O & M Budget
- 6) Done in conjunction with Park Street School grounds upgrade
- 7) Done in conjunction with Capital Designated Routes program
- 8) Done in conjunction with Infrastructure Extension of College Brook storm sewer

NEW STREET CONSTRUCTION:

The following new streets or portions of streets were constructed in 1999.

Location	Length (metres)
Ascot Drive	60
Bliss Carman Drive	434
Dora Drive	482
Leah Drive	65
Patience Lane	227
Rebecca Drive	174
Spiro Drive	140
Two Nations Crossing	<u>1 104</u>
TOTAL	2 686

2 686 metres = 2.686 kilometres

PROVINCIAL DESIGNATED AND REGIONAL HIGHWAYS

In 1999 the City of Fredericton had a total of 49.634 km of provincial designated and regional highways within its boundaries. In 1999, the Provincial Government paid \$312.13 (winter) and \$78.76 (summer) per lane kilometre towards maintenance of the routes. If any improvements such as new curb and gutter, paving or storm sewer installations are done to these routes, authorization by the Department of Transportation is required.

The following authorized projects were undertaken in 1999.

(1)	Route 8 - Bridge Street (Downing to Coronation) Street Reconstruction	\$102 378
(2)	Route 101 Regent Street (McLeod to Beaverbrook) Curb and Gutter and Paving	\$ 50 866
	TOTAL	\$153 244

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UTILITY FUND	ITEM	BUDGET	EXPENDITURE	REMARKS
System Replacement & Oversizing-Water & Sanitary Sewer	\$ 600 000	\$ 628 143		
Brunswick St. Trunk (Northumberland to Smythe) Water & Sanitary Sewer	\$ 200 000	\$ 179 100		
Fredericton North High School - Water & Sanitary Sewer	\$ 245 000	\$ 192 246		
Automation of Meter Reading - Water	\$ 100 000	\$ 72 303		
Vanier Highway (Wilsey to Van. Industrial Drive-Sanitary Sewer	\$ 100 000	\$ 28 003		
Douglas Area (Merrithew/Grasse)-Water & Sanitary Sewer	\$ 380 000	\$ 377 896		
Silverwood Trunk-Water & Sanitary Sewer	\$2 700 000	\$2 402 128		
Aquifer Protection Program - Water	\$ 50 000	\$ 33 158		
System Assessment-Water & Sanitary Sewer	\$ 70 000	\$ 77 055		
Bourque Lane Solution - Sanitary Sewer	\$ 50 000	\$ -		
College Brook (Regent to York) - Sanitary Sewer	\$ 150 000	\$ 178 688		
GENERAL FUND				
Infrastructure Renewal - Curb & Gutter	\$ 700 000	\$ 641 428		
Infrastructure Renewal (System Replacement & Upgrading) Storm Sewer	\$ 300 000	\$ 227 404		
Infrastructure Resurfacing	\$ 800 000	\$ 677 622		
Infrastructure Renewal - Conventional Sidewalk	\$ 300 000	\$ 461 085	Various Streets. Funding from other sources.	
Infrastructure Renewal - Decorative Sidewalk	\$ 50 000	\$ 23 863	Various Locations.	
Infrastructure Renewal - Traffic Controllers	\$ 70 000	\$ 78 370		
Reconstruction Investigations - Infrastructure Rebuilding	\$ 150 000	\$ 171 205		
Brunswick Street(Northumberland to Smythe) - Infrastructure Rebuilding	\$ 190 000	\$ 134 515		
Wilsey Road South - Infrastructure Rebuilding	\$ 100 000	\$ 71 996		
Barton Crescent Phase 1-Infrastructure Rebuilding	\$ 160 000	\$ 126 326		
Railroad Crossing Improvements-Infrastructure Rebuilding	\$ 50 000	\$ 17 362		

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ITEM	BUDGET	EXPENDITURE	REMARKS
GENERAL FUND (Continued)			
Infrastructure Extensions			
Douglas Area (Jasper/Ruby) - Curb & Gutter; Paving; Granulars	\$ 410 000	\$ 215 924	
Duval Court - Curb & Gutter & Paving	\$ 90 000	\$ 44 033	
Canada Street (Civic #135 to Gregory Ave.)-Curb & Gutter	\$ 40 000	\$ 49 346	
Fredericton North High School-Storm Sewer	\$ 190 000	\$ 144 106	
Douglas Area (Merrithew/Grasse) - Storm Sewer	\$ 220 000	\$ 190 476	
College Brook (University Ave. Area) - Storm Sewer	\$ 400 000	\$ 432 036	
Right-of-way Control - Crosswalk Overhead Signs	\$ 30 000	\$ 32 378	
Traffic Management - Traffic Study	\$ 200 000	\$ 222 601	
Special Projects			
Fredericton North High School- Curb & Gutter; Pavng; Sidewalk	\$ 400 000	\$ 227 440	
Main Street - Land; Appraisals; Surveys; Legal	\$ 400 000	\$ 25 432	To be finalized in 2000
G.I.S. System Improvement	\$ 90 000	\$ 54 687	
Designated Provincial Routes			
Regent Street - McLeod Ave. to Beaverbrook St.- Curb & Gutter; Pavng; Sidewalk	\$ 90 000	\$ 50 866	
Bridge St.- Downing St. to Coronation St. - Curb & Gutter; Paving; Granulars	\$ 160 000	\$ 102 378	

CITY OF FREDERICTON
1999 WATER PUMPING RECORD

WATER SUPPLY

Until November 5th, 1999 the City of Fredericton had two separate municipal water supply systems. Construction in the summer of 1999 connected the Greater Fredericton Water System to Silverwood. When the new booster station was commissioned in November, the two Silverwood supply wells were taken off line. At that time, the Wilmot Park wells, fed by the South Fredericton Aquifer, supplied the entire City with potable water through the Water Treatment Plant. These wells supply water for 99% of the City.

The water supply for the City of Fredericton is removed from the aquifer that is located under the downtown region. There are presently eight supply wells; four in Wilmot Park and four located on Saint Anne's Point. These wells supply water to a population of approximately 46 000 people in greater Fredericton.

Each well, excluding Well #4, can pump 68 litres of water per second from the aquifer. Well #4 can pump 20 to 40 litres per second. The amount of water removed from the aquifer is controlled by the demand of the system. A computer system operated at the Water Treatment Plant, controls which wells are being pumped and for how long. The system demand is approximately 23 million litres per day. The City of Fredericton also has stand-by wells that can be put into service at any time to supplement the park wells in the event of an emergency. The stand-by wells are located on both sides of the Saint John River, and do not receive treatment, other than disinfection, before entering the distribution system.

Until November, Silverwood was the only portion of the city water system, which was not supplied with water from the Wilmot Park wellfield. The Silverwood water system had two supply wells; one at the intersection of Mountain Drive and Fairview Drive, and another above Silverwood, off Mary Ellen Drive, outside the City limits. Once the connection to the greater Fredericton Water System was complete, one Silverwood well was decommissioned while the other was put into stand-by mode.

The water analysis and 1999 pumpage for all wells are compiled in the last section of this report.

THE FREDERICTON WATER TREATMENT PLANT

The Water Treatment Plant was put on line in July of 1984. It initially treated water from five Wilmot Park wells. A sixth well was fully developed and running in January 1991, a seventh well was in production in May 1993 and an eighth well was constructed during 1998.

The Water Treatment Plant filter room was doubled in size during 1992, with equipment to double capacity added over the next two years, bringing capacity to 50 ML/d. The plant removes iron and manganese, stabilizes sulfur compounds, decreases corrosiveness, and provides water with a free chlorine residual which meets federal and provincial drinking water guidelines.

DISTRIBUTION ZONES

For the majority of 1999, the distribution system comprised two water systems; one with fourteen (14) pressure zones, and a second with two pressure zones. Together they made up the following statistics:

Total kilometres of mains	-	339
Hydrants	-	
City owned	-	1 674
Private	-	<u>171</u>
Total	-	1 845
Water Services	-	14 072
Sprinkler Services	-	198
Total Storage, ML	-	58

Detailed system descriptions follow:

City of Fredericton System

The City of Fredericton water distribution system is composed of fourteen (14) zones, with thirteen of these being major areas which are individually metered and pressure regulated by reservoirs or specialty pressure regulating valves. The other two zones are small areas attached to larger metered zones with pressure reducing valves in place to limit excessive pressures.

The fourteen zones consist of approximately 334 kilometres of water transmission and distribution mains. Kilometridge of mains:

125 km transmission (pipe >200mm in diameter)
209 km distribution (pipe ≤ 200mm in diameter)

The pressure in each zone is controlled by reservoirs, booster stations, pressure reducing valves or altitude valves. The objective is to maintain the zone pressures between 550 kPa (80 psi) and 275 kPa (40 psi). The water system has twenty water reservoir cells located on thirteen sites around the City. These reservoirs can store, approximately 56 million litres of water.

1. South Low Zone

The South Low zone services the south side of the City between the river and Kings College Road and from Monteith Drive to the Fredericton Boat Club on the Lincoln Road. There is one emergency stand-by well in this zone called the Duval Well. It is located opposite Angelview Court on the Woodstock Road. Pressure control and storage for this zone is provided by a 18180 kilolitre in-ground three cell reservoir, adjacent to Smythe Street, just above Kings College Road. Thirteen other water zones are directly or indirectly supplied by this zone. The Wilmot Park well field and the Water Treatment Plant are located in this zone.

2. South Intermediate Zone

The South Intermediate zone serves an area generally bounded by Kings College Road, Montgomery Street, Odell Park and the eastern side of the University of New Brunswick. The water is received via the Smythe Street Booster Station which draws water from the South Low zone. Pressure control and storage are provided by two 4545 kilolitre above-ground reservoirs located in Odell Park opposite the end of Montgomery Street. A large flow diesel pump is housed at Smythe Booster Station for power failure situations.

3. South High Zone

The Montgomery Street Booster Station draws water from the South Intermediate zone to supply the area of the City above Montgomery Street. The South High zone stretches from Hanwell Road to Kimble Drive and extends to the City's Regent Street Depot, including the upper portion of the Forest Hill area. Pressure control and storage are provided by two 2270 kilolitre tower reservoirs, one at the top of Smythe Street and a second one at the intersection of Regent Street and Prospect Street. A large capacity diesel pump at Montgomery Booster is available for emergency pumping situations.

4. Lincoln Zone

The Lincoln zone receives its water supply from the South Low zone, through the Lincoln Booster Station situated across from the Fredericton Boat Club on Lincoln Road. The zone extends eastward, almost to the City boundary, and includes the Vanier Industrial Park and the Wilsey Road area. The storage for this zone is provided by the 3750 kilolitre above-ground stand pipe style reservoir on Flemming Road. A backup diesel pump is located at the Lincoln Booster in case of power failure.

5. Forest Hill Zone (Canterbury)

The Forest Hill zone is supplied from the South High zone through an altitude valve at the Canterbury Reservoir which is located on Canterbury Drive opposite Bradford Street. The valve maintains the water level within the two underground cells, with a total capacity of 1070 kilolitres. This zone serves lower Skyline Acres, Dunns Crossing Road and the area eastward, to and including Wetmore Road.

6. Rosewood Zone

The Rosewood Booster Station draws water from the South Low Zone for use by the upper elevations of the Rosewood and Monteith Subdivisions. As the Rosewood Zone has no reservoir, a jockey pump system has been installed to maintain normal domestic pressure with larger capacity electric and diesel pumps for fire and power outage situations.

7. North Low Zone

In November 1987, a 600mm water main crossing the St. John River was activated and the North Low Zone began receiving water from the South Low Zone. This zone serves all areas of Fredericton North below Maple Street and includes Greater Nashwaaksis, Douglas, Devon and Barkers Point. Pressure control and storage for this zone is provided by three reservoir sites. There is a 4550 kilolitre underground reservoir with two cells near the new Fredericton North High School, a 1140 kilolitre above-ground reservoir at Dewitt Acres and two above-ground reservoirs north of Longwood Drive near the Nashwaaksis Junior High School, with a storage capacity of 2850 kilolitres.

There are five stand-by wells available in this zone for emergency situations. They are Nasis #1 Well, located on Fulton Avenue, Nasis #3 Well, located on Maple Street near Douglas Avenue, Highland Well, located adjacent to the Highland Reservoir, Cliffe Street Well and the Barker's Point #2 Well located near Dewitt Acres. As well, a pressure reducing valve can be activated to provide water to the North Low Zone from the North High Zone on an emergency basis.

8. North High Zone

The Longwood Booster Station, adjacent to the Longwood Reservoirs, pumps water to this zone from the North Low Zone. Storage for the North High Zone is provided by a 3800 kilolitre reservoir on the south side of Killarney Lake. This zone serves St. Mary's Street, Brookside Drive and Nashwaaksis above Maple Street. Longwood Booster Station houses an emergency back-up diesel pump.

Two emergency stand-by wells are situated on the west side of St. Mary's Street, 2.8 kilometres north of Maple Street. These wells are referred to as K-1 and K-10.

9. Hanwell Zone

A section of Hanwell Road, the upper reaches of Colonial Heights and Cameron, Foley, Burnham and Eagle Courts are served by the Hanwell zone. Supply is via a combined altitude/pressure reducing valve which allows water from the South High zone to flow down into this zone. Pressure control is also provided by a 460 kilolitre above-ground reservoir connected to the zone above Cameron Court.

A well located on Cameron Court provides emergency supply, although in the Summer of 1999, this emergency well was removed from service because of possible petroleum contamination.

10. Marysville Zone

The Marysville Zone is supplied with water from the North Low Zone via the Young's Crossing Booster Station. Storage for this zone is provided by the 6600 kilolitre above-ground Tower Road Reservoir. A back-up diesel pump at the Youngs Crossing Booster Station can pump water during power failures.

Two wells on Tower Road and one on McGloin Street serve as emergency supply wells for this zone. Also, a check valve separates this zone from the North Low Zone, on Irvine Street, and can provide water to a limited portion of Marysville should the booster station be out of service.

11. Rainsford Zone

The Rainsford zone supplies the Rainsford Park Subdivision only and has no reservoir. Prior to 1983, this zone was supplied by a privately owned single well which has since been decommissioned. Construction in 1991 provided a tie between this zone and the Golf Club Road Zone. This connection provides domestic flow through a small booster station located on Duncan Lane near the Trans Canada Highway and lower pressure fire flows through a full pipe size check valve.

12. Vanier South Zone (Alison Boulevard)

The Vanier South zone is an unmetered water zone along Alison Boulevard and is PRV regulated to control pressures. The water for this zone is supplied through a pressure reducing valve from the South High zone.

13. Golf Club Road/Glengarry Zone

The Golf Club Road/Glengarry zone serves the general area of Golf Club Road and Glengarry Place. It serves the same elevations as the South Intermediate zone, but presently has no storage. The zone receives water from the South High zone through a pressure reducing valve assembly in a vault near the Prospect/Hanwell intersection. This assembly has been designed to provide metered domestic flow with the capacity for reasonable fire protection.

14. Diamond Zone

The Diamond zone supplies the Diamond Street Subdivision only, and has no reservoir. It is supplied water from the North Low Zone via the Diamond Street Booster Station. The booster station uses a jockey pump system for domestic supply, plus a diesel pump for fire protection and power failures. There is a PRV on the discharge side of the diesel pump to control pressure.

15./16. Silverwood System

The Silverwood System is comprised of one reservoir, two pressure zones and 5 kilometres of distribution mains. After November, the Silverwood Booster Station pumped water from the South Low Zone into this system. A 2200 kilolitre two cell underground reservoir is located on the corner of Mary Ellen Drive and Team Drive. Presently, for better turn-over of storage to assure fresher domestic water, only one cell is in use. Pressure reducing control valves, halfway down Orchard Drive and Fairview Drive, separate the system into two zones, allowing both to maintain a reasonable static pressure and adequate fire protection.

TABLES

The following pages provide the pumpage from Wilmot Park Wells, the Net System Demands, the Annual Chemical Dosages and Costs for the Water Treatment Plant.

1999 PUMPAGE - WILMOT PARK WELLS, ML

MONTH	WELL 1	WELL 2	WELL 3	WELL 4	WELL 5	WELL 6	WELL 7	WELL 8	MONTHLY TOTALS
January	161.3	115.9	84.6	12.4	151.0	109.7	117.3	0.0	752.2
February	109.7	138.8	112.8	0.0	136.2	108.7	90.6	0.0	696.8
March	93.8	105.9	127.3	0.2	150.3	85.7	95.9	80.0	739.1
April	111.0	66.5	125.3	1.6	135.1	106.7	90.1	80.5	716.8
May	149.7	158.4	123.2	5.6	103.9	104.9	113.1	24.4	783.2
June	128.4	165.3	98.6	23.5	61.4	170.6	60.4	107.0	815.2
July	120.2	136.8	116.1	25.9	102.8	126.8	5.0	170.8	804.4
August	125.7	156.3	89.0	23.7	109.3	109.7	37.6	118.4	769.7
September	89.0	171.6	89.2	14.4	104.9	101.3	54.3	160.4	785.1
October	121.1	171.4	77.1	15.6	14.5	113.6	72.7	176.9	762.9
November	113.0	168.0	83.9	32.7	61.7	101.1	26.7	158.2	745.3
December	97.9	131.2	63.5	19.2	49.1	124.2	108.6	134.7	728.4
TOTALS	1420.8	1686.1	1190.6	174.8	1180.2	1363.0	872.3	1211.3	9099.1

1999 NET SYSTEM DEMANDS, ML

SYSTEM ZONE	QUARTERS, 1999				AVERAGE DAILY DEMAND (ML)
	1ST	2ND	3RD	4TH	
SOUTH LOW	807.3	836.4	883.5	819.4	3346.6
SOUTH INTERMEDIATE	239.1	226.6	235.5	237.8	939.0
SOUTH HIGH	175.7	201.0	191.2	182.0	749.9
CANTERBURY	82.5	83.6	80.8	77.7	324.6
LINCOLN	68.7	76.4	77.7	73.4	296.2
ROSEWOOD	10.8	12.6	13.6	14.0	51.0
GLENGARRY	13.9	16.2	17.5	16.7	64.3
HANWELL	3.0	9.4	11.5	9.5	33.4
RAINSFORD	3.6	4.5	4.7	4.3	17.1
SILVERWOOD	15.1	16.2	17.8	16.4	65.5
NORTH LOW	531.6	564.4	577.8	561.7	2235.5
NORTH HIGH	95.3	121.1	118.3	92.8	427.5
MARYSVILLE	90.7	97.5	86.6	82.5	357.3
DIAMOND	1.7	2.3	2.5	2.0	8.5
QUARTERLY TOTALS	2137.2	2265.9	2316.5	2190.3	8916.4
					24.4

**FREDERICTON WATER TREATMENT PLANT
CHEMICAL DOSAGE AND COSTS, 1999**

CHEMICAL	UNIT COST \$/t	ANNUAL USAGE, t	ANNUAL COST \$	DOSAGE mg/L	COST / ML OF WATER	AVERAGE COST / DAY \$
CHLORINE	865.68	31.1	28700	3.4	3.15	79
SULFUR DIOXIDE	2490.00	4.7	12500	0.5	1.37	34
LIME	133.78	183.9	26200	20.2	2.88	72
SODA ASH	327.75	25.5	8900	2.8	0.98	24
TOTALS			76200		8.37	209

NOTES:

- (1) DOSAGES ARE BASED ON PLANT INFLOW: 9099 ML
- (2) ANNUAL COSTS ARE CALCULATED INCLUDING HST (Minus HST Rebate)
- (3) Chlorine is measured in tons (short)
- (4) In a cylinder of sulfur dioxide, there are 67.9 kg of the product.

WATER QUALITY - 1999

General

Fredericton's Water Treatment Plant was put into service in July 1984, and with the commissioning of the pipeline to Fredericton North in late 1987, the commissioning of the Longwood Booster Station in late 1990, Young's Crossing Booster Station in January 1998, Diamond Street Booster in 1998, and Silverwood Booster Station in 1999, is now treating approximately 99% of the City supply. The plant removes iron and manganese and raises the pH to approximately 8 pH units, thus reducing the damage by corrosion to the water system, and controlling the leaching of harmful heavy metals from plumbing. The chlorine content of the treated water is 1.0-1.4 mg/L as it leaves the Water Treatment Plant measured as free chlorine. This water is odourless, colourless, and has an agreeable taste.

Bacterial Analysis

Coliform bacteria counts are accepted as a good index of the degree of bacteriologic safety of water. Although they are not themselves disease producers, coliform bacteria are found in densities roughly proportional to the degree of fecal pollution in polluted water. When members of the coliform group are present, other kinds of microorganisms capable of causing disease may also be present. The absence of coliform bacteria from water is an indication that water is bacteriologically safe for human consumption, since coliform bacteria are harder than disease-causing bacteria.

Ten (10) locations related to supply and treatment, thirty (30) distribution system locations, and twelve (12) emergency supply wells are each sampled by water operators, once per month. All samples are tested for total coliform using the membrane filtration technique, by the water operators, and results are monitored by the New Brunswick Department of Health and Community Services.

The test results indicated that all water which was delivered in 1999, was biologically safe. Further, tests done in conjunction with sampling indicate that a stable free chlorine residual was maintained within the distribution system.

Of special note was the positive coliform results found in one of the Silverwood wells. Since the Silverwood water system is chlorinated, coliform found in the well posed no threat to the customers. Increased monitoring of the system was required by Water Treatment Plant staff until the construction of the Silverwood Booster Station and Fredericton to Silverwood water main was completed. The well, which had shown a positive coliform count, was then removed from service, and the Wilmot Park wells began supplying water to the Silverwood area.

WATER QUALITY 1999

Inorganic Analysis

The Wilmot park wells are sampled quarterly for Inorganic parameters, while ten (10) locations at the extremities of the distribution system are sampled bi-annually. The samples were analyzed by the N.B. Department of the Environment Central Laboratory. Results are displayed on the following pages. All water delivered to the distribution system meets the Guidelines for Canadian Drinking Water Quality, Health & Welfare Canada.

Organic Analysis

All active raw water sources are sampled quarterly for organic parameters and ten (10) locations at the ends of the distribution system are sampled bi-annually. The N.B. Department of the Environment analyses these samples. The results are displayed in the following table.

NOTE: Organic and inorganic analysis for stand-by wells is completed every other year (June).

City of Fredericton
Inorganic Water Sampling Results
2000

June Sampling Event	Health Advisory Limit	Units	Wilmett Well #1	Wilmett Well #2	Wilmett Well #3	Wilmett Well #4	Wilmett Well #5	Wilmett Well #6	Wilmett Well #7	Wilmett Well #8	Silverwood Well #1	Silverwood Well #2	Diamond Mined Station	Hy-Pass Irving	WTP Firth Goff Club	WTP Effluent	WTP Influent	San Cassidy Rehab	Report Depot	St. Marys Depot	Howard Johnsons	NBDOE Central Lab	Atlantic Traction & Earth
Hardness	200	mg/L	60.1	87.5	128.7	85.6	47.1	45.8	56.2	43.8	205.3	110.3	4.8	94.5	73.5	96.2	98.3	97.9	97.1	91.9	98.4	98.2	0.33
Nitrate	50	mg/L	<0.025	<0.025	<0.025	<0.025	<0.025	<0.025	<0.025	<0.025	<0.025	<0.025	<0.025	<0.025	<0.025	<0.025	<0.025	<0.025	<0.025	<0.025	<0.025	<0.025	<0.025
Aluminum	500	mg/L	54.2	48.5	85.6	46.2	41.7	38.5	1.5	1.5	1.5	1.5	1.5	1.5	1.5	1.5	1.5	1.5	1.5	1.5	1.5	1.5	1.5
Arsenic	25	ug/L	<1.5	<1.5	<1.5	<1.5	<1.5	<1.5	<1.5	<1.5	<1.5	<1.5	<1.5	<1.5	<1.5	<1.5	<1.5	<1.5	<1.5	<1.5	<1.5	<1.5	<1.5
Boron	5	mg/L	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20
Bromide	1	mg/L	0.014	0.087	0.046	<0.01	0.012	0.016	0.019	0.019	0.019	0.019	0.019	0.019	0.019	0.022	0.022	0.023	0.024	0.024	0.024	0.024	0.024
Calcium	200	mg/L	<1.00	<1.00	<1.00	<1.00	<1.00	<1.00	<1.00	<1.00	<1.00	<1.00	<1.00	<1.00	<1.00	<1.00	<1.00	<1.00	<1.00	<1.00	<1.00	<1.00	<1.00
Cadmium	5	ug/L	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
Chloride	250	mg/L	17.0	42.2	54.3	45.2	3.4	5.5	1.9	3.78	4.5	23.4	1.04	33.7	32.6	32.7	32.4	33.3	33.1	33.3	33.6	33.4	33.4
Conductivity	0.05	useq/cm	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
Chromium	0.05	mg/L	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1
Copper	1	mg/L	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1
Fluoride	1.5	mg/L	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05
Iron/Fer	0.3	mg/L	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05
Potassium	150	mg/L	2.65	4.21	5.23	3.86	1.93	1.91	2.49	1.91	25.3	12.6	3.64	3.72	3.55	3.62	3.59	3.52	3.34	3.53	3.59	3.59	3.59
Manganese	0.05	mg/L	1.33	2.65	0.36	0.0886	0.212	0.389	0.019	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005
Sodium	270	mg/L	8.87	16.1	21.2	25.7	3.93	3.69	4.71	3.77	15.2	3.05	52	11.3	11.2	11	11.6	11.1	11.4	9.17	10.9	10.9	10.9
Nitrite-Nitrate	1	mg/L	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05
Led	10	ug/L	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0
pH	6.5-8.5		7.61	7.61	7.1	7.59	7.28	7.66	7.7	7.69	7.58	8.21	8.25	8.29	8.11	8.16	7.45	8.13	8.15	8.21	8.18	8.14	8.18
Antimony	6	ug/L	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0
Seleniurn	10	ug/L	<1.5	<1.5	<1.5	<1.5	<1.5	<1.5	<1.5	<1.5	<1.5	<1.5	<1.5	<1.5	<1.5	<1.5	<1.5	<1.5	<1.5	<1.5	<1.5	<1.5	<1.5
Sulfate	900	mg/L	11.1	22.2	24.1	7.67	7.05	9.34	8.94	24.3	11.8	11.7	14.2	15.3	15.1	13.8	14.4	15.1	15.1	14.6	13.1	14.6	14.6
Thallium	1	NTU	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0
Turbidity	5	mg/L	0.013	0.054	0.012	0.029	0.025	0.006	0.0089	0.005	0.007	0.023	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005
TDS																							

Sampled : September 9, 1999

	Health Advisory Limit	Units	Wilmett Well #1	Wilmett Well #2	Wilmett Well #3	Wilmett Well #4	Wilmett Well #5	Wilmett Well #6	Wilmett Well #7	Wilmett Well #8	Wilmett Well #9	Wilmett Well #10	Wilmett Well #11	Wilmett Well #12	Wilmett Well #13	Wilmett Well #14	Wilmett Well #15	Wilmett Well #16	Wilmett Well #17	Wilmett Well #18	Wilmett Well #19	Wilmett Well #20	
Alkalinity	500	mg/L	<0.025	<0.025	<0.025	<0.025	<0.025	<0.025	<0.025	<0.025	<0.025	<0.025	<0.025	<0.025	<0.025	<0.025	<0.025	<0.025	<0.025	<0.025	<0.025	<0.025	
Ardenity	6	ug/L	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	
Boron	25	ug/L	<1.5	<1.5	<1.5	<1.5	<1.5	<1.5	<1.5	<1.5	<1.5	<1.5	<1.5	<1.5	<1.5	<1.5	<1.5	<1.5	<1.5	<1.5	<1.5	<1.5	
Burium	1	mg/L	0.012	0.077	0.047	0.045	0.045	0.045	0.045	0.045	0.045	0.045	0.045	0.045	0.045	0.045	0.045	0.045	0.045	0.045	0.045	0.045	
Boron	5	mg/L	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	
Cadmium	5	ug/L	<0.100	<0.100	<0.100	<0.100	<0.100	<0.100	<0.100	<0.100	<0.100	<0.100	<0.100	<0.100	<0.100	<0.100	<0.100	<0.100	<0.100	<0.100	<0.100	<0.100	
Chloride	250	mg/L	8.62	27.2	54.1	54.1	128	5.6	6.55	128	5.6	6.55	128	5.6	6.55	128	5.6	6.55	128	5.6	6.55	128	5.6
Chromium	0.05	mg/L	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
Guanium	0.05	mg/L	<0.05	0.4	0.84	3.4	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05
Nitrile-Nitrate	10	mg/L	<0.05	0.4	0.84	3.4	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05
Nitrite-Nitrate	1	mg/L	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1
Ph	6.5-8.5		7.44	6.79	7.36	6.66	7.33	7.22	7.45	7.25	7.45	7.22	7.45	7.25	7.45	7.22	7.45	7.25	7.45	7.25	7.45	7.25	7.45
Potassium	10	mg/L	0.848	0.982	2.97	4.51	0.895	0.92	1.92	1.92	1.92	1.92	1.92	1.92	1.92	1.92	1.92	1.92	1.92	1.92	1.92	1.92	1.92
Selenium	150	ug/L	2.36	4.13	5.48	4.31	2.3	6.87	4.46	4.46	4.46	4.46	4.46	4.46	4.46	4.46	4.46	4.46	4.46	4.46	4.46	4.46	4.46
Sulfide	500	mg/L	1.22	2.16	0.036	0.033	0.391	615	128	125	125	125	125	125	125	125	125	125	125	125	125	125	125
Total Hardness	200	mg/L	54.4	82.4	133.2	133.2	111.4	48.9	3.45	3.45</td													

City of Fredericton
Inorganic Water Sampling Results
2000

December Sampling Event (9-12-15)	Health Advisory Limit	Units	LOQ	Wilmett Well #1	Wilmett Well #2	Wilmett Well #3	Wilmett Well #4	Wilmett Well #5	Wilmett Well #6	Wilmett Well #7	Wilmett Well #8	Silverwood Model	Diamond Booster Station	By-Pass Irving	Fran Gulf Club	Stan Cassidy Rehab	Regent Depot	St. Mary's Depot	Howard Johnsons	NBDOE Central Lab	Atlantic Tractors & Equip.
Alkalinity	500	mg/L	0.025	61	48.5	85.3	47.9	45.4	55.2	42	82.2	81.6	80.5	79.4	81.3	82	83.6	85.9	83.7	77.7	
Aluminum		mg/L	1																		
Antimony	6	ug/L																			
Arsenic	25	ug/L	0.01	0.016	0.089	0.052	0.35	0.011	0.016	0.019	0.013		0.023		0.028	0.025	0.024	0.024	0.024	0.024	0.023
Barium	1	mg/L	0.2																		
Boron	5	mg/L	0.1																		
Bromide		mg/L	0.1																		
Cadmium	5	ug/L	0.5	0.1	19.7	27.5	44.7	32.6	16.8	20.5	15.6	1.38	35.2	39.8	34.8	35	35.5	36.9	37.1	35.4	
Calcium	200	mg/L	0.05	8.35	40.4	50.2	78.6	3.85	3.72	5.72	3.84	20.1	21.9	26.3	21.5	21.8	21.1	22.3	22.3	22.9	24.5
Chloride	250	mg/L	0.05	0.01																	
Chromium	0.05	mg/L	0.05																		
Conductivity		usec/cm		171	288	407	437	128	124	152	119	267	269	293	262	271	266	274	279	276	274
Cooper	1	mg/L	0.01																		
Fluoride	1.5	mg/L	0.1																		
Iron/Fer	0.3	mg/L	0.05																		
Lead	10	ug/L	1																		
Magnesium	150	mg/L	2.52	4.31	2.52	2.85	1.93	1.99	2.7	1.88		3.97	4.03	3.55	3.67	3.67	3.67	4	3.84	3.86	4.44
Manganese	0.05	mg/L	0.005	1.24	2.01	0.043	0.049	0.418	0.35	0.484	0.231		0.18	0.2	0.26	0.23	0.22	0.22	0.2	0.22	0.24
Nitrate		mg/L	0.05																		
Nitrate-nitrite	10	mg/L	0.05																		
Nitrite	1	mg/L	0.05																		
pH	6.5-8.5	pH	7.39	6.89	7.37	7.13	7.37	7.43	7.52	7.3	8.35	8.22	8.05	8.06	8.08	8.14	8.12	8.13	8.1		
Potassium		mg/L	0.1	1.07	1.12	3.07	2.84	0.96	0.733	0.653	0.869	0.536	1.42	1.27	1.33	1.32	1.24	1.1	1.36	1.4	
Selenium	10	ug/L	1.5																		
Sodium	270	mg/L	0.2	8.51	17.2	22.6	39.2	4.4	3.75	4.65	4.31	56.7	11.3	12.7	11.9	11.6	11.4	11.8	11.7	12	12.9
Sulfite		mg/L	0.05	9.53	19.3	21.7	19.4	7.69	8.12	10.4	7.5	13.2	13	15.6	13	13.2	13.2	13.2	13.6	13.6	14.3
Thallium		ug/L	1																		
Total Hardness	200	mg/L	1	59.6	86.4	133.7	97.1	49.9	50.1	62.3	46.7	4.3	104.2	116	101.5	102	102.5	105.1	107.9	108.5	106.7
Total Organic Carbon		mg/L	2.68	2.11	1.78	1.84	4.06	3.76	3	3.56	3.1	2.53	2.75	2.88	2.44	2.78	2.65	2.65	2.6		
Turbidity	1	NTU	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
Zinc	5	mg/L	0.005	0.019	0.071	0.031	0.013	0.028	0.0072	0.023									0.006		

City of Fredericton
Organic Sampling Analysis Results
2000

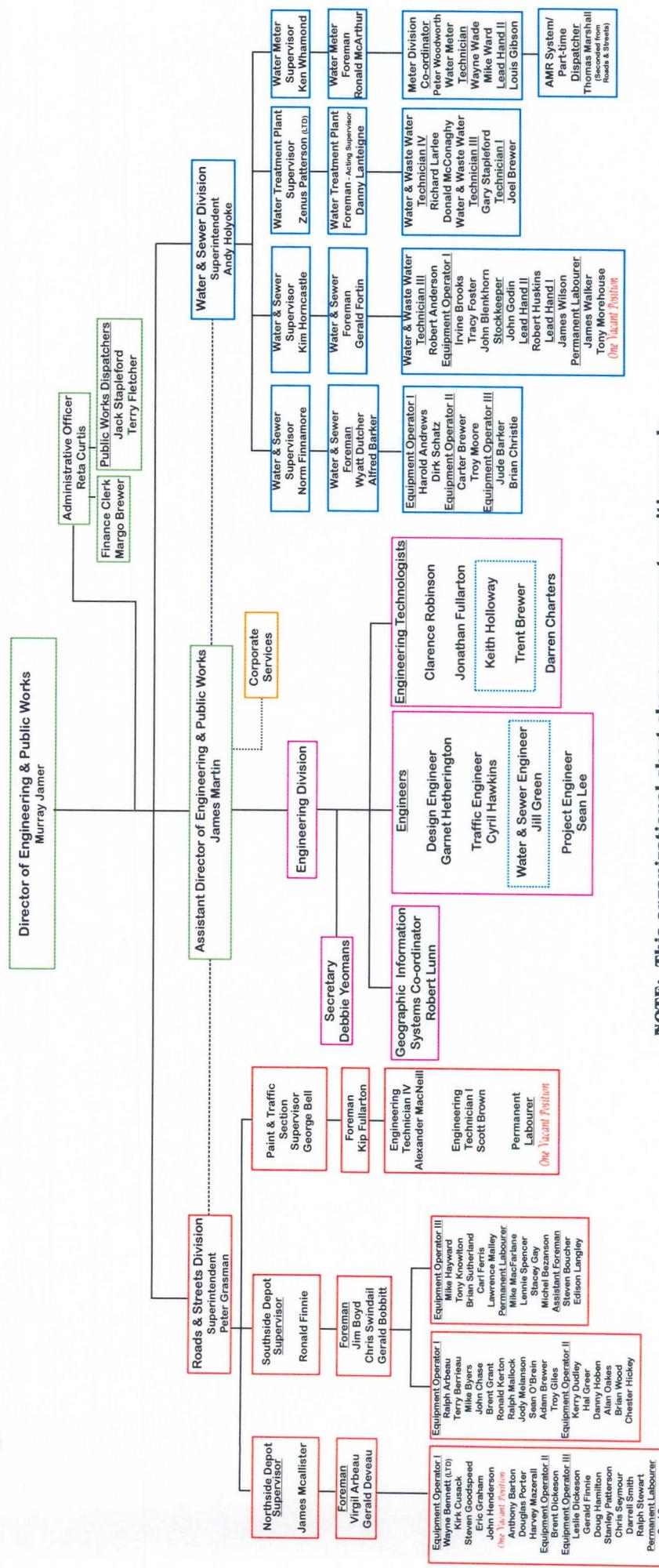
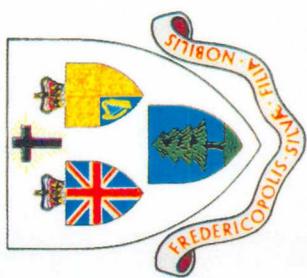
June Sampling Event	Health Advisory Limit	Units	Wilmett Well #1	Wilmett Well #2	Wilmett Well #3	Wilmett Well #4	Wilmett Well #5	Wilmett Well #6	Wilmett Well #7	Wilmett Well #8	Silverwood Model Well #3	Silverwood Model Well #8	Diamond Booster Station	By-pass Irving	Fran Golf Club	WTP Influent	WTP Effluent	Stan Cassidy Rehab	Regent Depot	St. Mary's Depot	Howard Johnsons	NBDOE Central Lab
Benzene	5 ug/l	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	
Carbon Tetrachloride	5 ug/l	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	
1,2-Dichlorobenzene	200 ug/l	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	
1,4-Dichlorobenzene	5 ug/l	ug/l	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND									
1,2-Dichloroethane	5 ug/l	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	
Dichloromethane	50 ug/l	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	
Ethyl Benzene	2.4 ug/l	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	
Tetrachloroethylene	3 ug/l	ug/l	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND									
Total Trihalomethanes	100 ug/l	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	
Total Xylenes	300 ug/l	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	
Toluene	24 ug/l	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	
Trichloroethylene	50 ug/l	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	
Vinyl Chloride	20 ug/l	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	
Benz(e)Pyrrole	0.01 ug/l	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	
Pentachlorophenol	60 ug/l	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	

September Sampling Event (9/09/22)	Health Advisory Limit	Units	Wilmett Well #1	Wilmett Well #2	Wilmett Well #3	Wilmett Well #4	Wilmett Well #5	Wilmett Well #6	Wilmett Well #7	Wilmett Well #8	Silverwood Model Well #3	Silverwood Model Well #8	Diamond Booster Station	By-pass Irving	Fran Golf Club	WTP Influent	WTP Effluent	Stan Cassidy Rehab	Regent Depot	St. Mary's Depot	Howard Johnsons	NBDOE Central Lab
Benzene	5 ug/l	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	
Carbon Tetrachloride	5 ug/l	ug/l	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND									
1,2-Dichlorobenzene	200 ug/l	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	
1,4-Dichlorobenzene	5 ug/l	ug/l	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND									
1,2-Dichloroethane	50 ug/l	ug/l	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND									
Dichloromethane	50 ug/l	ug/l	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND									
Ethyl Benzene	2.4 ug/l	ug/l	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND									
Tetrachloroethylene	3 ug/l	ug/l	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND									
Total Trihalomethanes	100 ug/l	ug/l	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND									
Total Xylenes	300 ug/l	ug/l	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND									
Toluene	24 ug/l	ug/l	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND									
Trichloroethylene	50 ug/l	ug/l	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND									
Vinyl Chloride	20 ug/l	ug/l	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND									
Benz(e)Pyrrole	0.01 ug/l	ug/l	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND									
Pentachlorophenol	60 ug/l	ug/l	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND									

* Total Trihalomethanes in the form of chloroform. Could be due to airborne contamination (ie. Operator was exposed to it at the plant before taking the sample)

December Sampling Event (9-12-15)	Health Advisory Limit	Units	Wilmett Well #1	Wilmett Well #2	Wilmett Well #3	Wilmett Well #4	Wilmett Well #5	Wilmett Well #6	Wilmett Well #7	Wilmett Well #8	Silverwood Model Well #3	Silverwood Model Well #8	Diamond Booster Station	By-pass Irving	Fran Golf Club	WTP Influent	WTP Effluent	Stan Cassidy Rehab	Regent Depot	St. Mary's Depot	Howard Johnsons	NBDOE Central Lab
Benzene	5 ug/l	ug/l	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND									
Carbon Tetrachloride	5 ug/l	ug/l	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND									
1,2-Dichlorobenzene	200 ug/l	ug/l	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND									
1,4-Dichlorobenzene	5 ug/l	ug/l	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND									
1,2-Dichloroethane	5 ug/l	ug/l	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND									
Dichloromethane	50 ug/l	ug/l	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND									
Ethyl Benzene	2.4 ug/l	ug/l	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND									
Tetrachloroethylene	3 ug/l	ug/l	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND									
Total Trihalomethanes	100 ug/l	ug/l	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND									
Total Xylenes	300 ug/l	ug/l	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND									
Toluene	24 ug/l	ug/l	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND									
Trichloroethylene	50 ug/l	ug/l	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND									
Vinyl Chloride	20 ug/l	ug/l	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND									
Benz(e)Pyrrole	0.01 ug/l	ug/l	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND									
Pentachlorophenol	60 ug/l	ug/l	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND									

ORGANIZATIONAL CHART ENGINEERING AND PUBLIC WORKS DEPARTMENT



NOTE: This organizational chart shows permanent positions only.