

# **Population & Water Use Growth Study for the Hamlet of Arviat**

*prepared for:*

**Department of Community Government & Transportation  
Government of Nunavut  
2<sup>nd</sup> Floor, Oomolik Building  
P. O. Box 490  
Rankin Inlet, Nunavut  
X0C 0G0**

*prepared by:*

***FSC Architects & Engineers  
4910 53<sup>rd</sup> Street  
Yellowknife, NT  
X1A 2P4***

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## 1.0 INTRODUCTION

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FSC Architects & Engineers were contracted to complete a population and water use growth study for the Hamlet of Arviat. This study is part of the pre-design services for the design, construction services and non-resident engineering services of a new cell for the Arviat sewage lagoon. The purpose of this study is to:

- ❑ Reconcile differences in current population numbers from Statistics Canada and the GN; and
- ❑ Determine the annual sewage volume and quality generated in Arviat from 2003 to 2023.

## **2.0 COMMUNITY INFORMATION**

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### **2.1 GENERAL**

Arviat is located on the northern shore of a narrow peninsula on the west coast of Hudson Bay, at 61°05' N latitude, 94°00' W longitude. It is 265 air km north of Churchill and 241 air km south-west of Rankin Inlet.

Arviat is situated on a low-lying peninsula, which slopes into Hudson Bay. Shallow lakes or ponds cover one-third of the peninsula and it contains three eskers.

### **2.2 GEOLOGY AND TERRAIN**

The Community is in the Hudson Bay Lowland Physiographic Region. Low topographic variation, occasional bedrock outcrops and a thick mantle of glacial and glacio-fluvial debris characterize this region. Features include till, fine-grained marine deposits, and extensive beaches. The permafrost is continuous, extending to depths from 30 m to over 100 m. The active layer varies between 0.5 m and 0.3 m.

### **2.3 VEGETATION**

Vegetation consists of mosses and lichens growing on rocky outcrops, with hardy grasses growing in more sheltered areas. Sage marshes grow in swampy locations.

### **2.4 CLIMATE**

The Kivalliq Region has a continental climate whose temperatures are affected by the rapid warming and cooling of the land. In winter, ship access through Hudson Bay becomes constricted by the accumulation of pack ice. February and March are the coldest months, while August is normally the warmest month. Cooler water temperatures cause local cloud and fog conditions along coastal areas.

Arviat receives 16.0 cm of rainfall and 118 cm of snowfall per year. The average total precipitation is 27.8 cm. July mean high and low temperatures are 13.1° C and 4.5° C. January mean high and low temperatures are -27.9° C and -35.0° C. The winds are generally north and annually average 21 km/h.

## 3.0 BACKGROUND

### 3.1 POPULATION

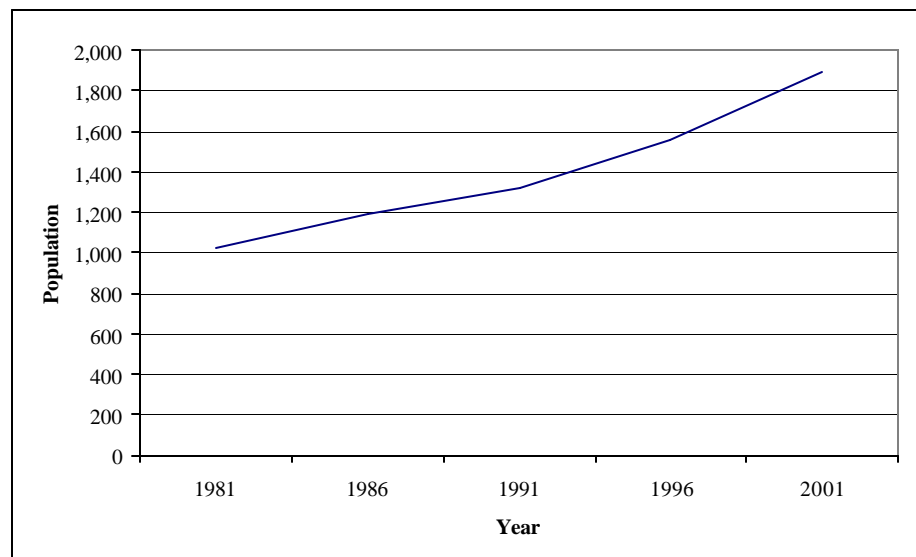
Population information was collected from the GN, Evaluation and Statistics Division, Department of Executive and Intergovernmental Affairs website, [www.stats.gov.nu.ca](http://www.stats.gov.nu.ca). This website provided census information from 1981 to 2001 for all Nunavut communities.

The 20-year census information was used to calculate the average annual percent increase in population. The calculated average annual percent increase for Arviat is 2.86%. This will be used in the Projections section to predict the population increase for the next 20 years.

The following table and graph show a summary of the census data from 1981 to 2001.

**Table 3.1 Summary of Statistics Canada Census Information 1981 –2001**

1981	1,022
1986	1,189
1991	1,323
1996	1,559
2001	1,899



### 3.2 WATER USE

For planning purposes, FSC assumes sewage generation to be equal to water use.

Water Use information was collected from the Department of Community Government and Transportation (CG&T) in Rankin Inlet, Kivalliq Region Water and Sewage Subsidy Program. The raw data sent to FSC can be found in Appendix A, the following is a summary of the information.

**Table 3.2 Historical Water Consumption, Arviat**

<b>Water Consumption by User (l)</b>					
<b>Year</b>	<b>Commercial</b>	<b>Residential</b>	<b>Subsidized</b>	<b>Non Subsidized</b>	<b>Total (All Users)</b>
1998-99	2,261,811	17,056,764	19,318,575	24,202,138	<b>43,520,713</b>
2000-01	2,630,027	21,804,582	24,434,610	28,346,915	<b>52,781,525</b>
2002-03	2,739,517	26,216,068	28,955,584	33,587,894	<b>62,543,479</b>

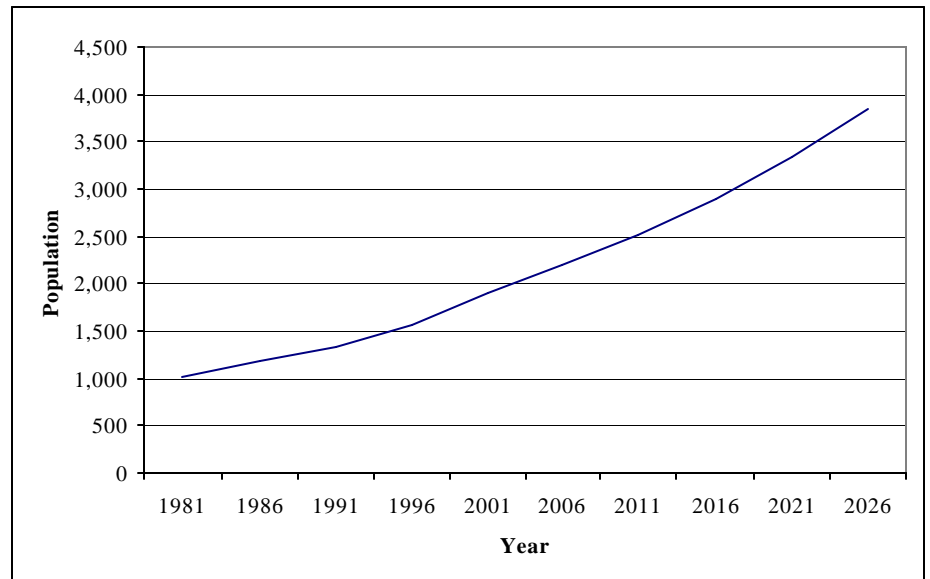
## 4.0 PROJECTIONS

### 4.1 POPULATION

Based on the Census information described above, the annual percent increase in population was determined to be 2.86%. The population of Arviat was projected to 2023 by increasing the 2001 Census population by 2.86% per year and is shown in the table and graph below.

**Table 4.1 Population Projection for Arviat**

2001	1,899
2002	1,953
2003	2,009
2004	2,067
2005	2,126
2006	2,187
2007	2,249
2008	2,314
2009	2,380
2010	2,448
2011	2,518
2012	2,590
2013	2,664
2014	2,740
2015	2,819
2016	2,899
2017	2,982
2018	3,067
2019	3,155
2020	3,245
2021	3,338
2022	3,434
2023	3,532



The GN estimates the current population of Arviat to be 2,200. Based on the FSC projection the population in 2003 would be 2,009 people. This is a 9% difference in



population. However, the GN also estimates the population to be approximately 3,500 in 2023. According to the FSC projection the population in 2023 will be 3,532.

Since the purpose of this study is to predict the population for a 20-year design of a new sewage treatment system and the population in 2023 will determine the volume of the lagoon, the FSC projection is acceptable and will be used.

## 4.2 SEWAGE GENERATION

As mentioned in the background section, it is assumed that the sewage generation will equal the total water use of all consumers. Both the GNWT and GN planning guidelines suggest that the increase in the projected per capita water use in a community should be modelled through equations (1) and (2) below. Equation (1) is valid for trucked water and sewer systems and equation (2) is valid for piped systems.

**Per Capita Water Use =**

$$\text{RWU} \times (1.0 + (0.00023 \times \text{Population})) \quad \text{Population} < 2000 \quad (1)$$

$$\text{RWU} \times (-1.0 + (0.323 \times \ln(\text{Population}))) \quad 2000 < \text{Population} < 10,000 \quad (2)$$

Where:

- RWU or residential water use is estimated to be 90 litres per capita (lpcd) for populations lower than 2000 using a trucked delivery system.
- Ln is the natural logarithm.

The population of Arviat does not fall into the population range for a trucked system. Therefore, water use information was collected from CG&T, as discussed in Section 3.2. This information was then used to modify Equation (1).

As shown in the table following, for planning purposes the RWU was reduced to 60.5 lpcd for the projected yearly volume in 2002 to be the same as the actual value. The projected annual volume below is 62,513,0896 litres and the actual volume was 62,543,479 litres.

**Table 4.2 Projected Water Use Information, Arviat NU**

Census Population	1,899
Census Year	2001
% Population Increase	2.86
Residential Water Use (RWU)	60.5 lpcd

Planning Year	Calendar Year	Total Population	Projected Water Use	Projected Volume	Projected Volume
			(lpcd)	(litres/day)	(litres/year)
	2001	1899	86.9	165,070	60,250,472
	2002	1953	87.7	171,269	62,513,086
0	2003	2009	88.5	177,731	64,871,706
	2004	2067	89.3	184,468	67,330,896
	2005	2126	90.1	191,494	69,895,454
	2006	2187	90.9	198,823	72,570,424
	2007	2249	91.8	206,469	75,361,117
5	2008	2314	92.7	214,447	78,273,117
	2009	2380	93.6	222,773	81,312,302
	2010	2448	94.6	231,465	84,484,856
	2011	2518	95.5	240,541	87,797,289
	2012	2590	96.5	250,018	91,256,453
10	2013	2664	97.6	259,917	94,869,563
	2014	2740	98.6	270,258	98,644,213
	2015	2819	99.7	281,064	102,588,400
	2016	2899	100.8	292,358	106,710,548
	2017	2982	102.0	304,163	111,019,526
15	2018	3067	103.2	316,506	115,524,678
	2019	3155	104.4	329,413	120,235,847
	2020	3245	105.7	342,913	125,163,404
	2021	3338	107.0	357,036	130,318,275
	2022	3434	108.3	371,814	135,711,974
20	2023	3532	109.6	387,278	141,356,636

### 4.3 SEWAGE QUALITY

Sewage quality is described using the following parameters:

- ❑ Biological Oxygen Demand (BOD);
- ❑ Total Suspended Solids (TSS);
- ❑ Total Phosphates (T-PO<sub>4</sub>);
- ❑ Total Kjeldahl Nitrogen (TKN); and
- ❑ Faecal Coliforms (FC).

In all municipal sewage treatment planning, FSC uses the following per capita values for Northern community sewage quality projection.

**Table 4.3 Typical Per Capita Normals for Raw Domestic Sewage Parameters**

Parameter	Value	Units
BOD	45	grams/person/day
TSS	48	grams/person/day
T-PO <sub>4</sub>	2.3	grams/person/day
TKN	12	grams/person/day
FC	$9.50 \times 10^{10}$	No. of colony forming units/person/day

(Potential Impact of Wastewater from Communities in the Liard, Peel, and Mackenzie Rivers. AESL. 1978)

Sludge generation should also be projected when planning for the design of a sewage lagoon. FSC experience has shown that the per capita sludge generation rate of 50 grams/person/day to be a reasonable estimate.

The projected sewage generation is described in Table 4.4 on the following page.

**Table 4.4 Projected Sewage Generation, Arviat NU**

Census Population	1,899
Census Year	2001
% Population Increase	2.86
Residential Water Use	60.5 lpcd
Sludge Generation Rate	50 grams/cd
BOD	45 grams/cd
SS	48 grams/cd
T-PO4	2.3 grams/cd
TKN	12 grams/cd
FC	9.50E+10 #/cd

Planning Year	Calendar Year	Total Population	Projected Water Use	Projected Volume	Projected Sludge Volume	Accumulated Sludge Volume	BOD	TSS	T-PO4	TKN	FC
			(lpcd)	(litres/year)	(m3/yr)	(m3)	(mg/l)	(mg/l)	(mg/l)	(mg/l)	(#/dl)
	2001	1,899	86.9	60,250,472	35	35	518	552	26	138	1.1E+08
	2002	1,953	87.7	62,513,086	36	70	513	547	26	137	1.1E+08
0	2003	2,009	88.5	64,871,706	37	107	509	543	26	136	1.1E+08
	2004	2,067	89.3	67,330,896	38	145	504	538	26	134	1.1E+08
	2005	2,126	90.1	69,895,454	39	183	500	533	26	133	1.1E+08
	2006	2,187	90.9	72,570,424	40	223	495	528	25	132	1.0E+08
	2007	2,249	91.8	75,361,117	41	264	490	523	25	131	1.0E+08
5	2008	2,314	92.7	78,273,117	42	307	485	518	25	129	1.0E+08
	2009	2,380	93.6	81,312,302	43	350	481	513	25	128	1.0E+08
	2010	2,448	94.6	84,484,856	45	395	476	508	24	127	1.0E+08
	2011	2,518	95.5	87,797,289	46	441	471	502	24	126	9.9E+07
	2012	2,590	96.5	91,256,453	47	488	466	497	24	124	9.8E+07
10	2013	2,664	97.6	94,869,563	49	537	461	492	24	123	9.7E+07
	2014	2,740	98.6	98,644,213	50	587	456	487	23	122	9.6E+07
	2015	2,819	99.7	102,588,400	51	638	451	481	23	120	9.5E+07
	2016	2,899	100.8	106,710,548	53	691	446	476	23	119	9.4E+07
	2017	2,982	102.0	111,019,526	54	745	441	471	23	118	9.3E+07
15	2018	3,067	103.2	115,524,678	56	801	436	465	22	116	9.2E+07
	2019	3,155	104.4	120,235,847	58	859	431	460	22	115	9.1E+07
	2020	3,245	105.7	125,163,404	59	918	426	454	22	114	9.0E+07
	2021	3,338	107.0	130,318,275	61	979	421	449	22	112	8.9E+07
	2022	3,434	108.3	135,711,974	63	1,042	416	443	21	111	8.8E+07
20	2023	3,532	109.6	141,356,636	64	1,106	410	438	21	109	8.7E+07

## 5.0 CONCLUSION

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Based on the research conducted and data provided by the GN, the following conclusions were reached:

- ❑ The Hamlet of Arviat's projected population in 2023 will be 3,532. This projection is in the region of the GN's estimation of the 2023 population to be approximately 3,500.
- ❑ The projected annual water use for the Hamlet of Arviat in 2023 is 141,356,636 litres.
- ❑ The projected sludge accumulation from 2003 to 2023 is 1,106 m<sup>3</sup>.
- ❑ The projected raw sewage quality is:
  - BOD, 410 mg/l
  - TSS, 438 mg/l
  - T-PO<sub>4</sub>, 21 mg/l
  - FC,  $8.7 \times 10^7$  #/dl

## 6.0 REFERENCES

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AESL. 1978. Potential Impact of Wastewater from Communities on the Liard, Peel, and Mackenzie Rivers.

Cold Climate Sewage Lagoons, Environment Canada, Report EPS 3/NR/1 April 1987

Smith, D. W. 1996. Cold Regions Utilities Monograph, Third Edition, ASCE/CSCE.

Ferguson Simek Clark (FSC). 2002b. *Nunavut Water Board Municipal Effluent Guidelines Revision Background Report*. Prepared for the Nunavut Water Board.

Guidelines for the Discharge of Treated Municipal Wastewater in the Northwest Territories. 1992. Northwest Territories Water Board.

# APPENDIX A

## WATER USE DATA

Keewatin Region  
Water & Sewage Subsidy Program  
For Fiscal Year April 01, 1998 to March 31, 1999

Water & Sewage Subsidy Program Block Funding for April 01, 1998 to March 31, 1999

Community	April	May	June	July	Aug	Sept	Oct	Nov	Dec	Jan	Feb	March	Total
Rankin Inlet	21,828.53	21,821.00	21,821.00	21,821.00	21,821.00	21,821.00	21,821.00	21,821.00	21,821.00	21,821.00	21,821.00	21,821.00	261,859.53
Arviat	18,997.99	18,996.00	18,996.00	18,996.00	18,996.00	18,996.00	18,996.00	18,996.00	18,996.00	18,996.00	18,996.00	18,996.00	227,953.99
Chesterfield	12,005.50	11,999.00	11,999.00	11,999.00	11,999.00	11,999.00	11,999.00	11,999.00	11,999.00	11,999.00	11,999.00	11,999.00	143,994.50
Baker Lake	23,272.00	23,269.00	23,269.00	23,269.00	23,269.00	23,269.00	23,269.00	23,269.00	23,269.00	23,269.00	23,269.00	23,269.00	279,231.00
Coral Harbour	13,992.75	13,986.00	13,986.00	13,986.00	13,986.00	13,986.00	13,986.00	13,986.00	13,986.00	13,986.00	13,986.00	13,986.00	167,838.75
Repulse Bay	12,101.00	8,903.00	8,903.00	8,903.00	8,903.00	8,903.00	8,903.00	8,903.00	8,903.00	8,903.00	8,903.00	8,903.00	110,034.00
Whale Cove	9,694.86	9,694.00	9,694.00	9,694.00	9,694.00	9,694.00	9,694.00	9,694.00	9,694.00	9,694.00	9,694.00	9,694.00	116,328.86
GRAND TOTAL:	111,892.63	108,668.00	108,668.00	108,668.00	108,668.00	108,668.00	108,668.00	108,668.00	108,668.00	108,668.00	108,668.00	108,668.00	1,307,240.63

Actual Residential Consumption for April 01, 1998 to March 31, 1999

Community	April	May	June	July	Aug	Sept	Oct	Nov	Dec	Jan	Feb	March	Total
Rankin Inlet	652,095	599,130	627,936	958,631	955,319	912,791	595,368	386,207	366,016	296,460	310,158	36,559	6,696,670
Arviat	1,369,242	1,355,073	1,315,806	1,494,896	1,487,315	1,413,940	1,420,503	1,362,099	1,510,198	1,440,138	1,344,235	1,543,319	17,056,764
Chesterfield	372,880	328,470	351,790	388,174	498,979	248,880	412,440	345,573	306,838	329,265	334,076	415,846	4,333,211
Baker Lake	964,678	1,032,309	932,356	985,683	1,043,406	1,022,282	1,074,831	1,036,143	1,050,134	993,522	937,273	1,059,998	12,132,615
Coral Harbour	804,736	700,372	723,807	551,239	1,010,053	895,603	815,927						5,501,737
Repulse Bay	380,807	366,418	315,421	358,987	426,991	432,905	432,862	404,186	414,506	435,751	388,055	440,204	4,797,093
Whale Cove	258,847	288,650	279,363	278,682	301,885	269,817	316,218	268,911	298,701	305,946	259,754	255,884	3,382,658
GRAND TOTAL:	4,803,285	4,670,422	4,546,479	5,016,292	5,723,948	5,196,218	5,068,149	3,803,119	3,946,393	3,801,082	3,573,551	3,751,810	53,900,748

Actual Commerial Consumption for April 01, 1998 to March 31, 1999

Community	April	May	June	July	Aug	Sept	Oct	Nov	Dec	Jan	Feb	March	Total
Rankin Inlet	87,852	132,699	87,353	160,864	156,280	175,554	108,807	122,216	78,378	94,412	85,433	106,214	1,396,062
Arviat	152,445	182,239	169,106	245,077	254,566	251,724	214,622	142,380	100,212	123,598	202,754	223,088	2,261,811
Chesterfield	24,818	22,523	38,713	40,667	63,310	68,337	49,635	52,891	23,120	23,120	29,714	33,780	470,628
Baker Lake	489,561	514,176	564,434	705,525	658,944	587,888	478,528	560,296	458,233	444,396	503,103	564,705	6,529,789
Coral Harbour	102,928	91,027	85,356	82,696	126,335	116,241	76,340						680,923
Repulse Bay	129,423	85,531	56,220	47,641	95,380	101,172	86,889	70,143	53,868	50,315	73,822	59,476	909,880
Whale Cove	25,053	26,839	41,573	30,476	80,562	124,216	72,495	28,544	19,674	23,328	21,753	19,904	514,417
GRAND TOTAL:	1,012,080	1,055,034	1,042,755	1,312,946	1,435,377	1,425,132	1,087,316	976,470	733,485	759,169	916,579	1,007,167	12,763,510



Keewatin Region  
Water & Sewage Subsidy Program  
For Fiscal Year April 01, 1998 to March 31, 1999  
**Actual Total Subsidized Consumption for April 01, 1998 to March 31, 1999**

Community	April	May	June	July	Aug	Sept	Oct	Nov	Dec	Jan	Feb	March	Total
Rankin Inlet	739,947	731,829	715,289	1,119,495	1,111,599	1,088,345	704,175	508,423	444,394	390,872	395,591	142,773	8,092,732
Arviat	1,521,687	1,537,312	1,484,912	1,739,973	1,741,881	1,665,664	1,635,125	1,504,479	1,610,410	1,563,736	1,546,989	1,766,407	19,318,575
Chesterfield	397,698	350,993	390,503	428,841	562,289	317,217	462,075	398,464	329,958	352,385	363,790	449,626	4,803,839
Baker Lake	1,454,239	1,546,485	1,496,790	1,691,208	1,702,350	1,610,170	1,553,359	1,596,439	1,508,367	1,437,918	1,440,376	1,624,703	18,662,404
Coral Harbour	907,664	791,399	809,163	633,935	1,136,388	1,011,844	892,267	-	-	-	-	-	6,182,660
Repulse Bay	510,230	451,949	371,641	406,628	522,371	534,077	519,751	474,329	468,374	486,066	461,877	499,680	5,706,973
Whale Cove	283,900	315,489	320,936	309,158	382,447	394,033	388,713	297,455	318,375	329,274	281,507	275,788	3,897,075
GRAND TOTAL:	5,815,365	5,725,456	5,589,234	6,329,238	7,159,325	6,621,350	6,155,465	4,779,589	4,679,878	4,560,251	4,490,130	4,758,977	66,664,258

**Actual Total Non-Subsidized (Economic Rate) Consumption for April 01, 1998 to March 31, 1999**

Community	April	May	June	July	Aug	Sept	Oct	Nov	Dec	Jan	Feb	March	Total
Rankin Inlet	109,026	125,494	114,400	454,487	456,055	464,112	420,946	413,950	250,364	509,915	444,483	570,634	4,333,866
Arviat	2,095,497	2,035,259	1,978,959	2,184,406	2,213,933	2,059,849	2,035,611	1,833,210	1,976,966	1,901,409	1,799,953	2,087,086	24,202,138
Chesterfield	384,070	394,886	325,445	474,207	472,662	468,268	427,975	465,955	361,988	352,385	424,914	450,466	5,003,221
Baker Lake	2,171,181	2,202,417	2,198,873	2,359,425	2,257,233	2,427,527	2,388,387	2,287,540	2,323,246	2,286,135	2,224,597	2,604,016	27,730,577
Coral Harbour	1,184,710	1,217,507	1,334,265	1,050,157	1,475,462	1,308,202	1,191,230						8,761,533
Repulse Bay	1,254,546	1,128,863	1,108,933	1,159,677	1,153,489	1,245,142	1,252,526	1,245,832	1,223,959	1,238,548	1,129,747	1,234,178	14,375,440
Whale Cove	508,549	421,561	590,619	383,245	519,590	545,534	522,165	457,323	514,302	505,714	463,987	536,878	5,969,467
GRAND TOTAL:	7,707,579	7,525,987	7,651,494	8,065,604	8,548,424	8,518,634	8,238,840	6,703,810	6,650,825	6,794,106	6,487,681	7,483,258	90,376,242

**Actual Total Consumption by All Users for April 01, 1998 to March 31, 1999**

Community	April	May	June	July	Aug	Sept	Oct	Nov	Dec	Jan	Feb	March	Total
Rankin Inlet	848,973	857,323	829,689	1,573,982	1,567,654	1,552,457	1,125,121	922,373	694,758	900,787	840,074	713,407	12,426,598
Arviat	3,617,184	3,572,571	3,463,871	3,924,379	3,955,814	3,725,513	3,670,736	3,337,689	3,587,376	3,465,146	3,346,942	3,853,493	43,520,714
Chesterfield	781,768	745,879	715,948	903,048	1,034,951	785,485	890,050	864,419	691,946	704,770	788,704	900,092	9,807,060
Baker Lake	3,625,420	3,748,902	3,695,663	4,050,633	3,959,583	4,037,697	3,941,746	3,883,979	3,831,613	3,724,053	3,664,973	4,228,719	46,392,981
Coral Harbour	2,092,374	2,008,906	2,143,428	1,684,092	2,611,850	2,320,046	2,083,497	-	-	-	-	-	14,944,193
Repulse Bay	1,764,776	1,580,812	1,480,574	1,566,305	1,675,860	1,779,219	1,772,277	1,720,161	1,692,333	1,724,614	1,591,624	1,733,858	20,082,413
Whale Cove	792,449	737,050	911,555	692,403	902,037	939,567	910,878	754,778	832,677	834,988	745,494	812,666	9,866,542
GRAND TOTAL:	13,522,944	13,251,443	13,240,728	14,394,842	15,707,749	15,139,984	14,394,305	11,483,399	11,330,703	11,354,358	10,977,811	12,242,235	157,040,501

For 1998-1999 Non-subsidized + subsidized = total consumption

Kivalliq Region  
Water & Sewage Subsidy Program  
For Fiscal Year April 01, 2002 to March 31, 2003

Water & Sewage Subsidy Program Block Funding for April 01, 2002 to March 31, 2003

Community	April	May	June	July	Aug	Sept	Oct	Nov	Dec	Jan	Feb	March	Total
Rankin Inlet			\$67,630.00										67,630.00
Arviat			\$59,976.00										59,976.00
Chesterfield			\$39,294.00										39,294.00
Baker Lake			\$72,003.00										72,003.00
Coral Harbour			\$50,006.00										50,006.00
Repulse Bay			\$28,678.00										28,678.00
Whale Cove			\$30,304.00										30,304.00
AND TOTAL:	-	-	\$ 347,891.00	-	-	-	-	-	-	-	-	-	347,891.00

Actual Residential Consumption from April 1, 2002 to March 31, 2003

Community	April	May	June	July	Aug	Sept	Oct	Nov	Dec	Jan	Feb	March	Total
Rankin Inlet	18,408	16,244	14,334	14,786	15,533	14,844	14,179	14,987	14,837	16,301	19,896	20,471	194,820
Arviat	2,185,487	2,209,956	2,119,838	2,240,183	2,341,402	2,221,075	2,273,546	2,154,759	2,169,899	2,253,234	1,895,688	2,151,001	26,216,068
Chesterfield	241,397	264,848	282,345	262,497	298,389	313,339	306,143	272,752	326,941	315,557	254,504	325,587	3,464,297
Baker Lake	1,209,613	1,233,068	1,086,372	1,230,743	1,315,293	1,255,752	1,389,240	1,305,753	1,327,349	1,256,111	1,261,483	1,319,845	15,190,619
Coral Harbour	802,243	793,210	639,224	795,380	797,154	765,348	809,347	797,557	780,456	798,916	730,327	806,582	9,315,745
Repulse Bay	466,584	446,733	354,855	425,011	492,314	453,196	482,481	430,732	354,402	478,930	398,006	431,683	5,214,927
Whale Cove	285,153	320,016	305,148	314,945	319,541	320,203	337,311	293,801	298,653	323,341	281,574	341,083	3,740,769
AND TOTAL:	5,208,886	5,284,076	4,802,115	5,283,545	5,579,626	5,343,755	5,612,247	5,270,341	5,272,537	5,442,389	4,841,476	5,396,252	63,337,244

**Actual Commercial Consumption from April 1, 2002 to March 31, 2003**

<b>Community</b>	<b>April</b>	<b>May</b>	<b>June</b>	<b>July</b>	<b>Aug</b>	<b>Sept</b>	<b>Oct</b>	<b>Nov</b>	<b>Dec</b>	<b>Jan</b>	<b>Feb</b>	<b>March</b>	<b>Total</b>
Rankin Inlet	58,630	58,361	70,486	76,752	77,057	54,337	89,881	62,985	58,539	59,326	65,308	67,488	<b>799,150</b>
Arviat	220,101	199,882	194,931	197,831	218,030	271,303	280,305	251,469	209,975	200,164	208,939	286,589	<b>2,739,517</b>
Chesterfield	115,186	142,080	149,556	159,986	160,827	148,867	168,257	129,275	147,590	163,120	158,920	212,035	<b>1,855,698</b>
Baker Lake	455,815	459,211	576,361	546,003	775,297	647,522	574,563	587,850	506,059	466,018	492,204	493,996	<b>6,580,898</b>
Coral Harbour	96,935	121,126	59,465	93,665	78,412	98,554	71,132	71,694	72,097	68,879	51,379	45,983	<b>929,320</b>
Repulse Bay	73,285	87,168	101,659	88,267	183,177	129,395	121,382	148,197	80,952	130,451	139,742	134,416	<b>1,418,090</b>
Whale Cove	29,656	21,281	33,348	54,626	77,367	61,928	61,715	30,700	18,998	23,032	43,569	22,698	<b>478,916</b>
<b>AND TOTAL:</b>	<b>1,049,607</b>	<b>1,089,109</b>	<b>1,185,806</b>	<b>1,217,129</b>	<b>1,570,166</b>	<b>1,411,906</b>	<b>1,367,235</b>	<b>1,282,168</b>	<b>1,094,210</b>	<b>-</b>	<b>1,160,060</b>	<b>1,263,205</b>	<b>14,801,588</b>

**Actual Total Subsidized Consumption from April 1, 2002 to March 31, 2003**

<b>Community</b>	<b>April</b>	<b>May</b>	<b>June</b>	<b>July</b>	<b>Aug</b>	<b>Sept</b>	<b>Oct</b>	<b>Nov</b>	<b>Dec</b>	<b>Jan</b>	<b>Feb</b>	<b>March</b>	<b>Total</b>
Rankin Inlet	77,038	74,605	84,820	91,538	92,590	69,181	104,060	77,972	73,376	75,627	85,204	87,959	<b>993,970</b>
Arviat	2,405,588	2,409,839	2,314,769	2,438,014	2,559,432	2,492,377	2,553,851	2,406,228	2,379,873	2,453,398	2,104,627	2,437,590	<b>28,955,584</b>
Chesterfield	356,583	406,928	431,900	422,483	459,216	462,206	474,399	402,027	474,530	478,676	413,424	537,622	<b>5,319,995</b>
Baker Lake	1,665,428	1,692,279	1,662,733	1,776,746	2,090,589	1,903,274	1,963,803	1,893,602	1,833,408	1,722,128	1,753,687	1,813,840	<b>21,771,517</b>
Coral Harbour	899,178	914,336	698,688	889,045	875,567	863,903	880,479	869,250	852,554	867,795	781,706	852,566	<b>10,245,065</b>
Repulse Bay	539,869	533,901	456,514	513,278	675,491	582,591	603,864	578,928	435,355	609,380	537,747	566,099	<b>6,633,016</b>
Whale Cove	314,809	341,298	338,496	369,571	396,907	382,130	399,026	324,501	317,651	346,373	325,143	363,780	<b>4,219,685</b>
<b>AND TOTAL:</b>	<b>6,258,493</b>	<b>6,373,185</b>	<b>5,987,920</b>	<b>6,500,674</b>	<b>7,149,792</b>	<b>6,755,661</b>	<b>6,979,482</b>	<b>6,552,509</b>	<b>6,366,747</b>	<b>6,553,377</b>	<b>6,001,537</b>	<b>6,659,456</b>	<b>78,138,832</b>

**Actual Total Non-Subsidized (Economic Rate) Consumption from April 1, 2002 to March 31, 2003**

<b>Community</b>	<b>April</b>	<b>May</b>	<b>June</b>	<b>July</b>	<b>Aug</b>	<b>Sept</b>	<b>Oct</b>	<b>Nov</b>	<b>Dec</b>	<b>Jan</b>	<b>Feb</b>	<b>March</b>	<b>Total</b>
Rankin Inlet	100,998	158,485	102,763	98,814	103,483	185,010	117,778	106,911	113,573	97,619	90,495	121,524	<b>1,397,453</b>
Arviat	2,713,303	2,736,169	2,754,833	2,878,461	3,066,925	2,846,874	2,874,724	2,720,031	2,776,848	2,797,236	2,574,383	2,848,108	<b>33,587,894</b>
Chesterfield	454,866	535,124	538,281	512,877	579,218	532,077	574,297	569,659	604,065	598,918	580,290	725,627	<b>6,805,299</b>
Baker Lake	2,823,727	2,861,322	2,490,032	2,918,122	3,020,367	2,977,860	3,143,298	2,977,478	2,947,799	2,917,655	2,717,192	2,977,054	<b>34,771,906</b>
Coral Harbour	1,318,556	1,277,391	1,172,399	1,429,540	1,299,714	1,328,053	1,363,890	1,240,390	1,279,943	1,302,154	1,294,629	1,443,517	<b>15,750,175</b>
Repulse Bay	1,267,488	1,242,238	1,087,931	1,188,621	1,286,445	1,306,500	1,379,848	1,297,655	986,542	1,345,123	1,245,963	1,404,741	<b>15,039,096</b>
Whale Cove	568,742	599,745	621,156	712,516	603,077	599,795	607,886	587,520	600,345	636,532	544,324	636,030	<b>7,317,667</b>
<b>AND TOTAL:</b>	<b>9,247,679</b>	<b>9,410,474</b>	<b>8,767,396</b>	<b>9,738,952</b>	<b>9,959,227</b>	<b>9,776,168</b>	<b>10,061,720</b>	<b>9,499,645</b>	<b>9,309,115</b>	<b>9,695,237</b>	<b>9,047,276</b>	<b>10,156,602</b>	<b>114,669,491</b>

**Actual Total Consumption by All Users for the period of April 01, 2002 to March 31, 2003**

<b>Community</b>	<b>April</b>	<b>May</b>	<b>June</b>	<b>July</b>	<b>Aug</b>	<b>Sept</b>	<b>Oct</b>	<b>Nov</b>	<b>Dec</b>	<b>Jan</b>	<b>Feb</b>	<b>March</b>	<b>Total</b>
Rankin Inlet	178,036	233,090	187,583	190,352	196,073	254,191	221,838	184,883	186,949	173,246	175,699	209,483	<b>2,391,423</b>
<b>Arviat</b>	<b>5,118,890</b>	<b>5,146,008</b>	<b>5,069,603</b>	<b>5,316,475</b>	<b>5,626,357</b>	<b>5,339,251</b>	<b>5,428,574</b>	<b>5,126,259</b>	<b>5,156,722</b>	<b>5,250,635</b>	<b>4,679,009</b>	5,285,698	<b>62,543,479</b>
Chesterfield	811,449	942,052	970,182	935,360	1,038,433	994,283	1,048,696	971,687	1,078,595	1,077,594	993,714	1,263,249	<b>12,125,294</b>
Baker Lake	4,489,155	4,553,601	4,152,765	4,694,868	5,110,956	4,881,134	5,107,101	4,871,081	4,781,208	4,639,783	4,470,879	4,790,894	<b>56,543,423</b>
Coral Harbour	2,217,734	2,191,727	1,871,088	2,318,585	2,175,280	2,191,955	2,244,369	2,109,641	2,132,496	2,169,948	2,076,334	2,296,083	<b>25,995,240</b>
Repulse Bay	1,807,357	1,776,139	1,544,445	1,701,900	1,961,936	1,889,091	1,983,712	1,876,583	1,421,897	1,954,504	1,783,710	1,970,841	<b>21,672,113</b>
Whale Cove	883,551	941,042	959,652	1,082,087	999,984	981,925	1,006,912	912,021	917,996	982,904	869,467	999,811	<b>11,537,351</b>
<b>AND TOTAL:</b>	<b>15,506,172</b>	<b>15,783,658</b>	<b>14,755,316</b>	<b>16,239,627</b>	<b>17,109,019</b>	<b>16,531,829</b>	<b>17,041,202</b>	<b>16,052,154</b>	<b>15,675,862</b>	<b>16,248,614</b>	<b>15,048,812</b>	<b>16,816,058</b>	<b>192,808,323</b>

Arviat Water Use Data from  
Kivalliq Region  
Water & Sewage Subsidy Program  
For Fiscal Year April 01, 2000 to March 31, 2001

	April	May	June	July	August	September	October	November	December	January	February	March	Total	Total from CG&T
Commercial	171,141	230,341	216,235	198,585	272,278	240,752	200,897	248,035	168,876	204,018	241,251	237,617	2,630,026	2,630,027
Subsidized	1,825,902	1,971,333	2,026,873	2,071,094	2,253,362	2,144,834	2,132,295	2,128,814	1,899,539	2,016,721	1,875,722	2,088,121	24,434,610	24,434,609
Non-Subsidized	2,118,636	2,165,347	2,353,440	2,600,856	2,714,170	2,511,737	2,508,120	2,377,113	2,204,131	2,357,302	2,097,066	2,338,997	28,346,915	28,346,915
Residential	1,654,761	1,740,992	1,810,638	1,872,509	1,981,084	1,904,082	1,931,398	1,880,778	1,730,663	1,812,702	1,634,471	1,850,504	21,804,582	21,804,582