

Nipissar Lake Volume Study and Environmental Variable Study

Rankin Inlet, NU

GN Project # 09-3009

FSC Project # 2009-1310

April 20, 2010

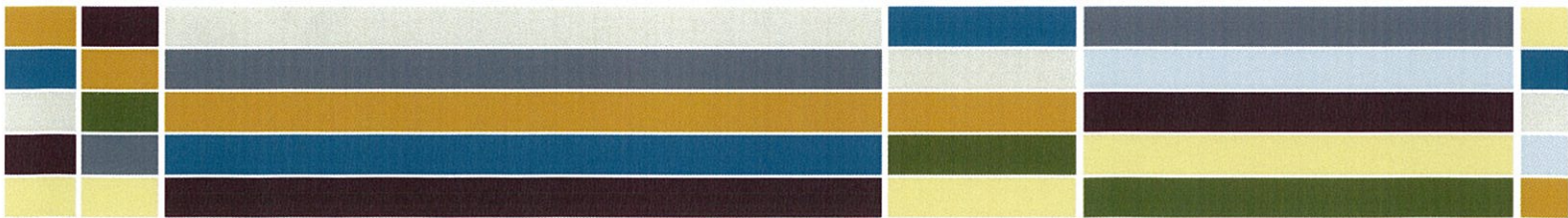
Prepared for:

The Office of the Regional Director
Kivalliq Region
Dept. of Community and Government Services
Government of Nunavut
Delivered to Project Management/O&M Building
P.O. Bag #002, Rankin Inlet, Nunavut X0C 0G0
Attn: Dawn Brigham, Project Officer

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LISTEN. DESIGN. MANAGE.



FSC File: 2009-1310
April 20, 2010

Government of Nunavut
Dept. of Community & Government Services
Public Works Building, PO Bag 002
Rankin Inlet, Nunavut X0C 0G0

Attn: Dawn Brigham, Project Officer

Re: Water Supply Capacity, Consumption & Conservation Study

Dear Ms. Brigham,

Please find attached our Final Report on the volume calculation of Nipissar Lake and the affecting climatic variables.

You asked the following questions of an earlier draft; our answers follow your questions.

When will Nipissar Lake fail to be an adequate water source for Rankin Inlet? *Ans: As early as 2015*

What is the maximum consumption rate per day Nipissar Lake can provide? *Ans: 854,000 litres/day*

When do you estimate Rankin will reach the maximum consumption rate? *Ans: It has been reached now.*

Please contact us should you have any questions regarding this report.

Sincerely,

FSC ARCHITECTS & ENGINEERS



Kevin Hodgins, P. Eng., Principal
Civil Engineering



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1 Definitions

LCPD	Litres per capita per day, the total daily volume of water supplied to the community divided by the population of the community.
Evapotranspiration	Discharge of water from the earth's surface to the atmosphere by evaporation from lakes, streams, and soil surfaces and by transpiration from plants.
ILI	Infrastructure Leakage Index, ratio of CARL/UARL.
Apparent Losses	Volume of water from unauthorised consumption (theft) and metering inaccuracies (calibration and accounting errors).
CARL	Current Annual Real Losses, the water supplied and deducting the calculated authorized consumption and apparent losses.
UARL	Unavoidable Annual Real Losses, volume of leakage within the CARL that includes small leaks and weeps that is either undetectable in practice, or not economic to find and repair.
Minimum Pumping Volume	Volume of Nipissar Lake required to submerge pumping equipment for withdrawal.
Maximum Annual Withdrawal Rate	Estimated recharge rate to Nipissar Lake from inputs such as precipitation, and is therefore the restricting volume of water that can be withdrawn without forcing the overall annual Lake volume to decrease.



2 Understanding of Project

In this report FSC has three important tasks that were asked for in the RFP. These were:

1. Determine the volume of Nipissar Lake and calculate any losses compared to the Bathymetry and Topographical survey that was completed in 1995 by Vista Engineering.
2. Complete an environmental assessment of climate variables affecting the Nipissar Lake watershed capacity and report on how these might be affecting the long-term storage potential of the reserve.
3. Complete a review of historical precipitation and evapo-transpiration rates to establish if the current volume reduction of Nipissar Lake is a result of climatic variables or municipal consumption/wastage.



3 Volume Calculations

To accurately calculate the current volume of Nipissar Lake, a survey was completed of the water level on September 26, 2009. This information was used to determine the volume of Nipissar Lake.

To make sure that the volume calculation in 2009 was consistent with the Vista survey done in 1995, the two drawings were compared to each other. Vista's original reference point could not be located at the time of FSC's 2009 survey. FSC's reference point (TBM 1) was generated from Canada Control Markers (CCMs) established for the fuel project.

A scan of the mapping from the Vista 1995 survey was inserted into the current base drawing as provided by the Government of Nunavut and scaled to match existing features such as roadways and lake outlines. However, Vista's mapping is from 1994 and this older technology now shows as very pixilated, rather than as smooth line.

The shoreline from the FSC 2009 survey fit neatly into the outline of the lake from the earlier Vista mapping. The reference point (TBM 1) established in the FSC 2009 survey was noted to fall slightly above a contour line from the Vista survey mapping.

The elevation of the reference point was 12.72 m and the contour line from the Vista survey map was approximately 15.00 m.

As the elevations did not match exactly, a correction factor of 2.36 m (i.e. + 0.08 m) was selected to consider the pixilated nature of the mapping and the slightly elevated location of FSC TBM 1.

The correction factor was then applied to the bathymetric survey elevations and several major contours were traced from the scanned mapping. These major contours were used to estimate the total volume of the lake.

The current volume of the Lake is 2,809,259.60 cubic meters. Appendix A contains drawings for more detail.

Table 3.1: Nipissar Lake Volume

Survey	Volume
1995 survey	3,469,780.00 m ³
2009 survey	2,809,259.60 m ³
Difference	- 660,520.40 m ³



4 Climate Variables

Rankin Inlet is located in the continuous permafrost mid-Arctic region of the Canadian Shield, on the west coast of Hudson Bay. Topographic relief is low. The regional terrain consists of a high proportion of bedrock, glacial till, clay, outwash gravels and peat forming the scattered soil in the region. Vegetation is of the tundra type.

Climatic data in the Rankin Inlet area is characterized, in the terms of long-term normals, by the published data from Environment Canada between the year of 1981 and 2008. A summary of this data as well as information from the 1996 Stanley Report is provided below.

Table 4.1: Climatic Data

Climatic Parameter	Average Value	
	2009 Report	1996 Report
Annual Rainfall	180.39643 mm	146 mm
Annual Snowfall	128.7393 cm	113 cm
Annual Precipitation	305.425 mm	259 mm ¹
Days with Snow	77.8	66
Days with Rain	46.9	36
Daily Average Temperature	-11 C °C	- 11.6 °C
Daily Maximum Temperature	-7.3 °C	- 7.9 °C
Daily Minimum Temperature	-14.7 °C	- 15.2 °C°C
Start Date of Snowcover	mid October	mid October
Finish Date of Snowcover	mid June	mid June
Average Snow Depth	16 cm	No data
Lake freeze over Date	mid October	mid October
Lake Ice-Free Date	mid July	mid July
Lake Ice Thickness	Approx 200 cm	200 cm

Based on the comparison between the climatic parameters of the 1996 report and the 2009 report, there is a slight difference between the two sets of data. The 2009 data shows an 18 % increase in days with snow. This same data shows an increase of 30 % of days with rain. This information is constant with the annual rainfall and snowfall being greater then in the 1996 Report. Because the rainfall and snowfall have increased from the earlier report, an increase into the potential input into Nipissar Lake may occur.

The temperature difference between the 2009 report and the 1996 report vary on an average of 5% between the Daily Average, Daily Maximum and the Daily Minimum. The 2009 report temperatures are

¹ The Stanley report of 1996 used mean annual precipitation from Chesterfield Inlet for their data. This report used mean annual precipitation from Rankin Inlet. Rankin inlet and Chesterfield Inlet are only 80 km apart and for the basis for this report the geographic difference will be considered irrelevant. The 1996 Report chose Chesterfield Inlet because of the similarity to Rankin Inlet.



all warmer than the 1996 report temperatures. The slight increase could lead to more evaporation in the warmer months and thus more water loss.

Because of the short time span that this report looks at temperature, the difference could be based on the lack of data for the area. To see a 5% increase in temperature in 27 years appears to be very dramatic. Global climate change has seen only a fraction of a degree increase over the last century.

The start and finish dates of snowcover are the same from the 2009 report to the 1996 report. Although this date varies from year to year, snowcover can be generally expected in mid October. This has not changed from the earlier Stanley report. The same can be said about the lake freezing dates.

4.1 PRECIPITATION

Based on the information shown below in Table 4.2, and the Original Stanley data from 1996, the average precipitation shows an increase from the 1996 numbers. The percentage of increase is shown in the table below.

Table 4.2: Precipitation Increases

Item	Percent Increase
Rainfall	+ 24 %
Snowfall	+ 14%
Precipitation	+ 18 %

The amount of rainfall in Rankin Inlet has increased from an average of 146 mm annually to an average of 180 mm annually. This average would mean an increase of available input into Nipissar Lake. The amount of snowfall has also increased 14%, which would mean more snow to be deposited into the watershed area and into the lake in the spring when it melts.

The Stanley Report acquired their parameters for Rankin Inlet from Weather data from 1981 to 1994, a period of only 14 years. For this report, Environment Canada provided information from 1981 to 2008, a period of 28 years. Because of the increased amount of weather data the 2009 parameters will be more historically accurate. Having twice the data set may help to explain why there is such an apparent increase in Rainfall, Snowfall and Precipitation. Additionally, if data from Environment Canada was chosen for years 1981–1994, and compared to that for years 1995-2008, very little difference would be noticed. This is summarized in the table 4.3 below.

Table 4.3: Overall Precipitation Amounts

Years	1981-1994	1995-2008
Rainfall	181.5 mm	179.2 mm
Snowfall	126.6 cm	130.8 cm
Precipitation	302.7 mm	308.1 mm



Table 4.4: Ranking Inlet Annual Precipitation

Year	Total Rain (mm)	Total Snow (cm)	Total Precip. (mm)
1981	199	101.1	297.8
1982	171	108.7	277.3
1983	233.9	97.2	323.4
1984	174.9	102.5	262.2
1985	255.7	209.5	449.2
1986	168.8	103.5	270.1
1987	161.4	189.4	352.5
1988	110.3	117.4	221.4
1989	133.4	68.5	198.1
1990	253.4	162.6	399.9
1991	228.6	165.8	387.8
1992	139.8	113.7	253.2
1993	191.4	121.8	313.2
1994	120	111.1	231.5
1995	197.8	73.6	271.2
1996	159.2	96.2	254.6
1997	139.9	99.6	240.6
1998	189.8	102.6	289.8
1999	268.4	120.6	388
2000	133.3	108	241.7
2001	230.4	145.8	371.8
2002	174.2	115	287.8
2003	158.4	146.8	303.6
2004	156.8	180.4	337.2
2005	163	257.8	417
2006	222.6	152.6	373.6
2007	161.9	92.5	243.2
2008	153.8	140.4	294.2
Average	180.4	128.7	305.4

Looking at the historical precipitation rates from 1981 to 2008 we see dry years and wet years with an average of 180 mm. There are no obvious trends that state historical precipitation is on the increase or decrease. So we must conclude that it is relatively stable. The increased percentage from the 1996 Stanley Report can be explained by the lack of climatic data and the fact that the 1996 report.



4.2 EVAPOTRANSPIRATION

Evapotranspiration is based on evaporation and vegetation. The vegetation in the watershed area has remained constant since 1996 so there would be no difference between then and now.

The rate of evaporation is primarily a function of temperature, pressure, wind speed and direction, relative humidity and surface area. All of these factors interplay.

For the purpose of this study, we will assume that for now and in the future, inflow to the lake and losses from the lake remains stable and evapotranspiration is not a factor in the analysis.



5 AWWA - IWA Water Audit

The Government of Nunavut completed an American Water Works Association (AWWA) / International Water Association (IWA) Water Audit and Water Balance for the Hamlet of Rankin Inlet Water System.

The information determined from the audit was previously used in the Rankin Inlet, Water Consumption and Conservation Study, Draft Report, December 4, 2009 completed by FSC Architects & Engineers and Resource Management Strategies Inc.

The study explained that the World Bank Target Matrix provides performance categories according to a Infrastructure Leakage Index (ILI) shown in Table 5.1. The ILI is based on the ratio of Unavoidable Annual Real Losses (UARL) and Current Annual Real Losses (CARL).²

The CARL is the volume of water remaining after the calculated authorized consumption and apparent losses are subtracted from the total water supplied to the community.

An apparent loss is any volume of water from unauthorized consumption (ex. theft) and metering inaccuracies (ex. calibration and accounting errors).

The UARL is volume of leakage within the CARL that includes small leaks and weeps that is either undetectable in practice, or not economic to find and repair.

Table 5.1: ILI Performance Categories

ILI Range	Performance Category	Real Loss Management
1 – 2	A	Further loss reduction may be uneconomic unless there are shortages; careful analysis needed to identify cost effective improvement
2 – 4	B	Potential for marked improvements; consider pressure management, better active leakage control practices, and better network management
4 – 8	C	Poor leakage record, tolerable only if water is plentiful and cheap; even then, analyze level and nature of leakage and intensify leakage reduction efforts
>8	D	Very inefficient use of resources; leakage reduction programs imperative and high priority.

² Rankin Inlet, Water Consumption and Conservation Study, Draft Report, December 4, 2009, FSC Architects & Engineers, Resource Management Strategies Inc.



6 Results and Discussion

6.1 COMPARISON WITH AWWA - IWA WATER AUDIT

The volume of Nipissar Lake has approximately decreased by 660,520 cubic meters over the past 15 years. As we are not considering climate to be a factor in this exercise, then an increase in population and water usage is the primary cause for the drop in Nipissar Lake.

The Town of Rankin Inlet is currently drawing more water from Nipissar Lake than water is recharged through natural precipitation and other sources. Using the two known water volumes of Nipissar Lake for 1994 and 2009, an average lake decrease of 44,035 m³/year of water was determined. The same procedure was completed in determining an annual water usage of 355,824 m³/year for Rankin Inlet.

The difference between the annual lake decrease and annual water usage is the estimated annual volume of water from recharge to the lake. This volume of water is approximately 311,789 m³/year, and is therefore the maximum rate Rankin Inlet can withdrawal without forcing the lake to continue to deplete.

The second column in Table 6.1 represents the total water supplied to Rankin Inlet, which corresponds to an ILI of 12.62, placing them in performance D category. As stated in the RMSi/FSC Study, being in this category means the Hamlet of Rankin Inlet water system is operating with a very inefficient use of resources; making leakage reduction programs imperative and a high priority.²

Table 6.1 also shows the required management and reduction of the Unaccounted for Water in order to meet performance categories A, B, and C. The reduction of the Unaccounted for Water is not simply the reassigning of the water volume to a different water use sector; rather it is the elimination of that loss. Determining how to eliminate the Unaccounted for Water in Rankin Inlet's water system is beyond the scope of this project.

Table 6.1: Water Consumption Data for 2009 Population of 2499

Item	Current Water Use Sector ³ (m ³)	Category C Performance (m ³)	Category B Performance (m ³)	Category A Performance (m ³)
Total Billed Consumption	155,173	155,173	155,173	155,173
IWA Accounted For Water	90,956	90,956	90,956	90,956
Unaccounted for Water	181,640	112,000	56,000	28,000
Total Water Supplied	427,770	358,129	302,129	274,129
LCPD	469	393	331	301

Table 6.1 further shows that Rankin Inlet has already surpassed the maximum withdrawal rate Nipissar Lake can provide without continuing to decrease in volume. If the Unaccounted for Water were reduced to meet category B performance or better, Rankin Inlet could meet the maximum withdrawal rate of Nipissar Lake with its current population in 2009.

³ Rankin Inlet, Water Consumption and Conservation Study, Draft Report, December 4, 2009, FSC Architects & Engineers, Resource Management Strategies Inc.



However, as the population increases, water use increases correspondingly. Therefore, there will come a point where the Unaccounted for Water cannot be decreased any further and Rankin Inlet's water consumption rate will once again be greater than the Nipissar Lake maximum annual withdrawal rate of 311,789 m³/year.

Figures 6.1 to 6.3 depict the projected water volume decrease in Nipissar Lake corresponding to population increases and the management of the Unaccounted for Water. All data and calculations are found in spreadsheets in Appendix B.

The objective of this exercise was to portray visually the effect of:

- Managing the Unaccounted for Water loss;
- When the lake would continue to be depleted; and
- When it will fail completely.

The projected year when Nipissar Lake will fall below the current volume can be estimated when each line intersects the Current Lake Volume line. The years at which this occurs is summarized in Table 6.2.

Table 6.2: Projected Year of Lake Depletion Below Current Volume

Population Increase	Category D Performance (Current)	Category C Performance	Category B Performance	Category A Performance
2.04%	Immediate	Immediate	2011	2019
2.5%	Immediate	Immediate	2011	2017
3.0%	Immediate	Immediate	2011	2016

The projected year when Nipissar Lake will completely fail to be an adequate source of water for Rankin Inlet can be estimated as the location when each line intersects the Minimum Pumping Volume line. The years at which this occurs is summarized in Table 6.3.

Table 6.3: Projected Year of Failure of Nipissar Lake as Adequate Water Source

Population Increase	Category D Performance (Current)	Category C Performance	Category B Performance	Category A Performance
2.04%	2022	2027	2033	2038
2.5%	2021	2025	2031	2033
3.0%	2020	2024	2028	2031

For example, if the current consumption of water continues as is (Category D), and a population increase of 2.04% is realized, Figure 6.1 suggests that Nipissar Lake will fail to be an adequate source of water as early as 2022. However, water quality and the ability to pump water from under the ice will have impacted production at least 5 years before that in 2017.



Figure 6.1: Lake Volume with 2.04% Population Increase

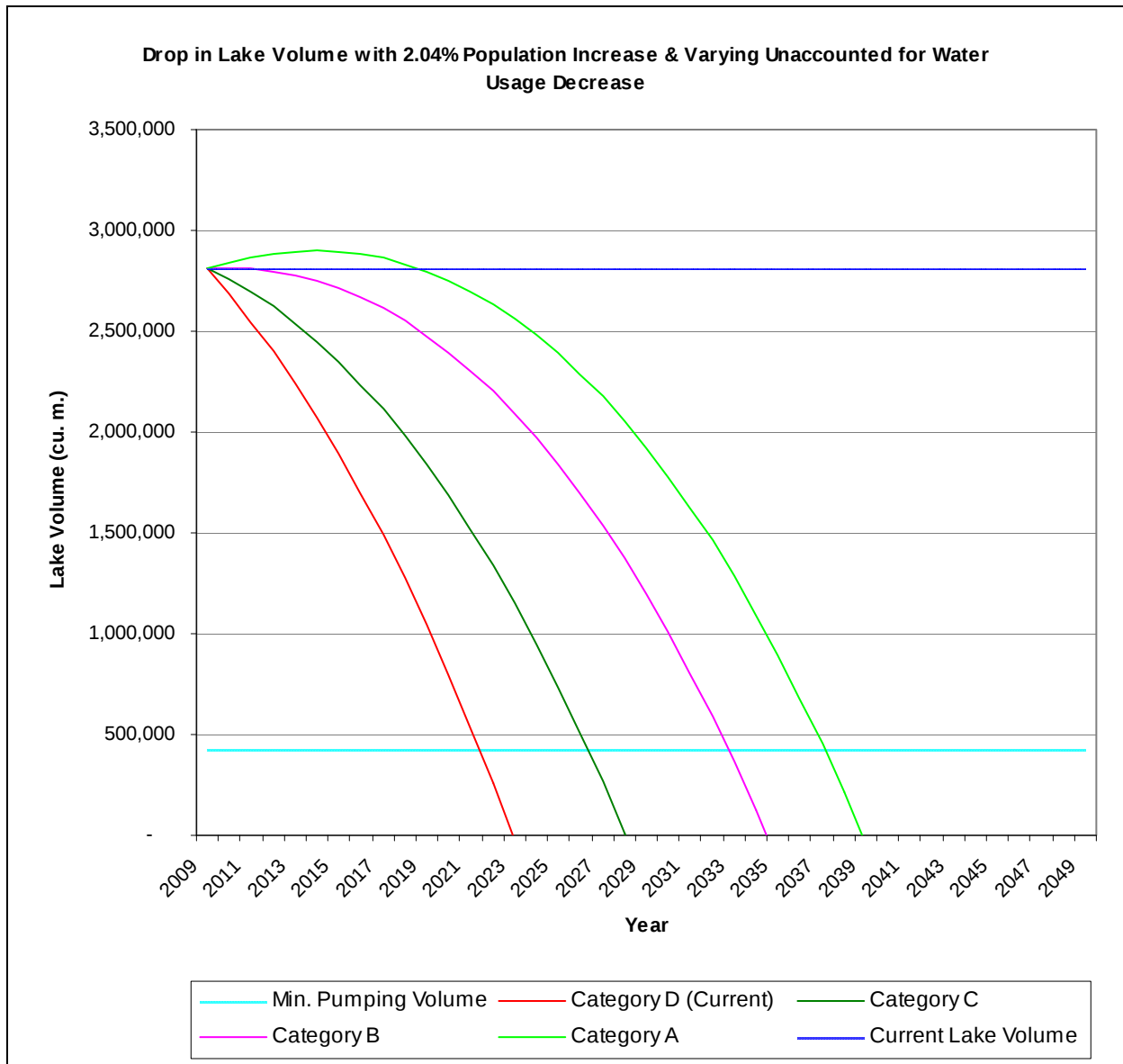




Figure 6.2: Lake Volume with 2.5% Population Increase

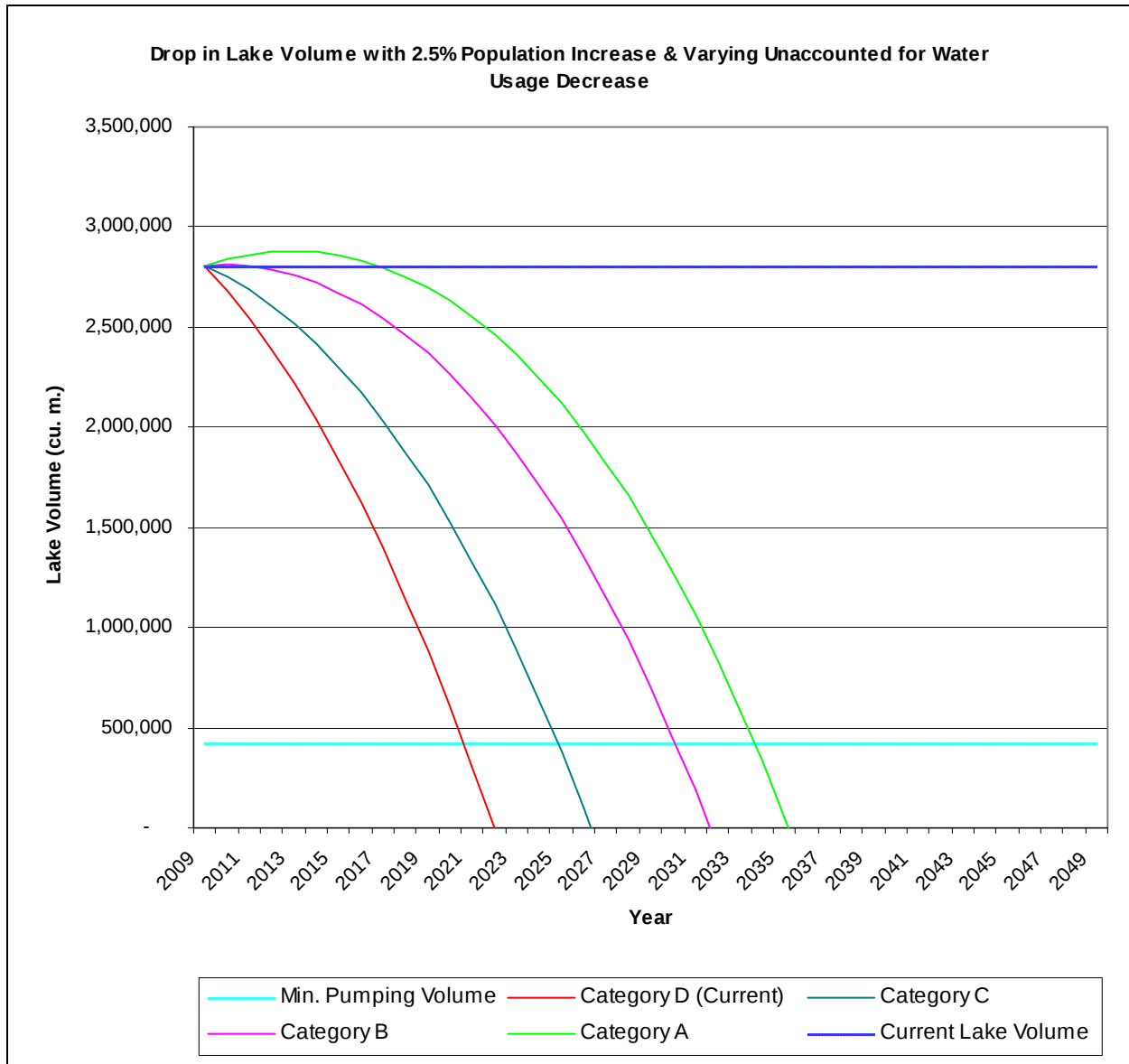
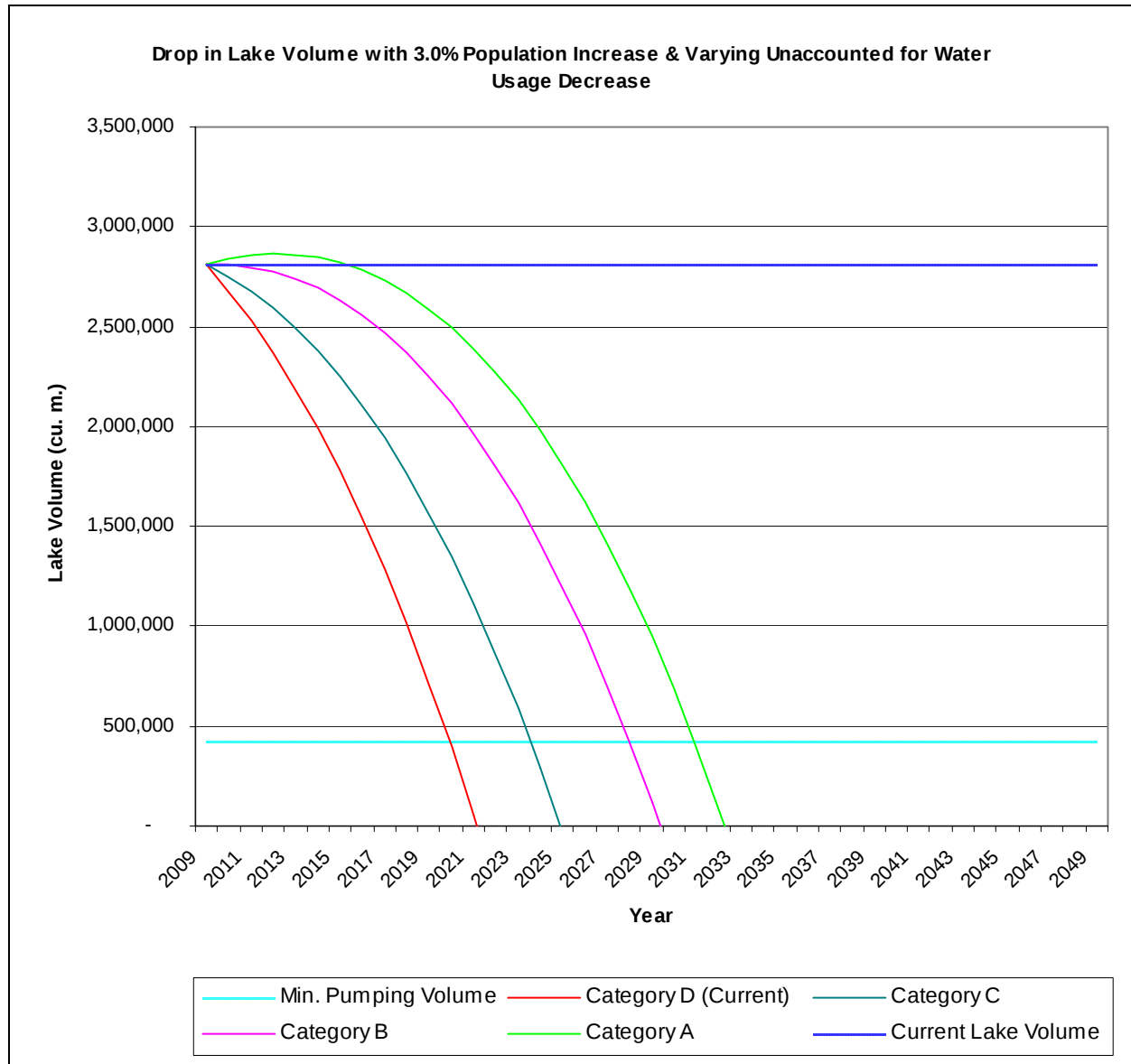




Figure 6.3: Lake Volume with 3.0% Population Increase





6.2 COMPARISON TO MACA PLANNING STANDARDS

MACA developed design usage rates for specific populations that have stood the test of time for planning purposes; the MACA usage rate for Rankin Inlet at its current 2009 population is found to be 344 LCPD.

Comparing the MACA planning rate (344 LCPD) to the proposed Category B Performance usage rate (331 LCPD) for the year 2009 suggests that continuing population increases will continue to deplete the water storage in Nipissar Lake regardless of conservation and the further elimination of the Unaccounted for Water.

This then suggests that meeting the Category B Performance or better will delay but not eliminate the need to recharge Nipissar Lake artificially.



7 Conclusions

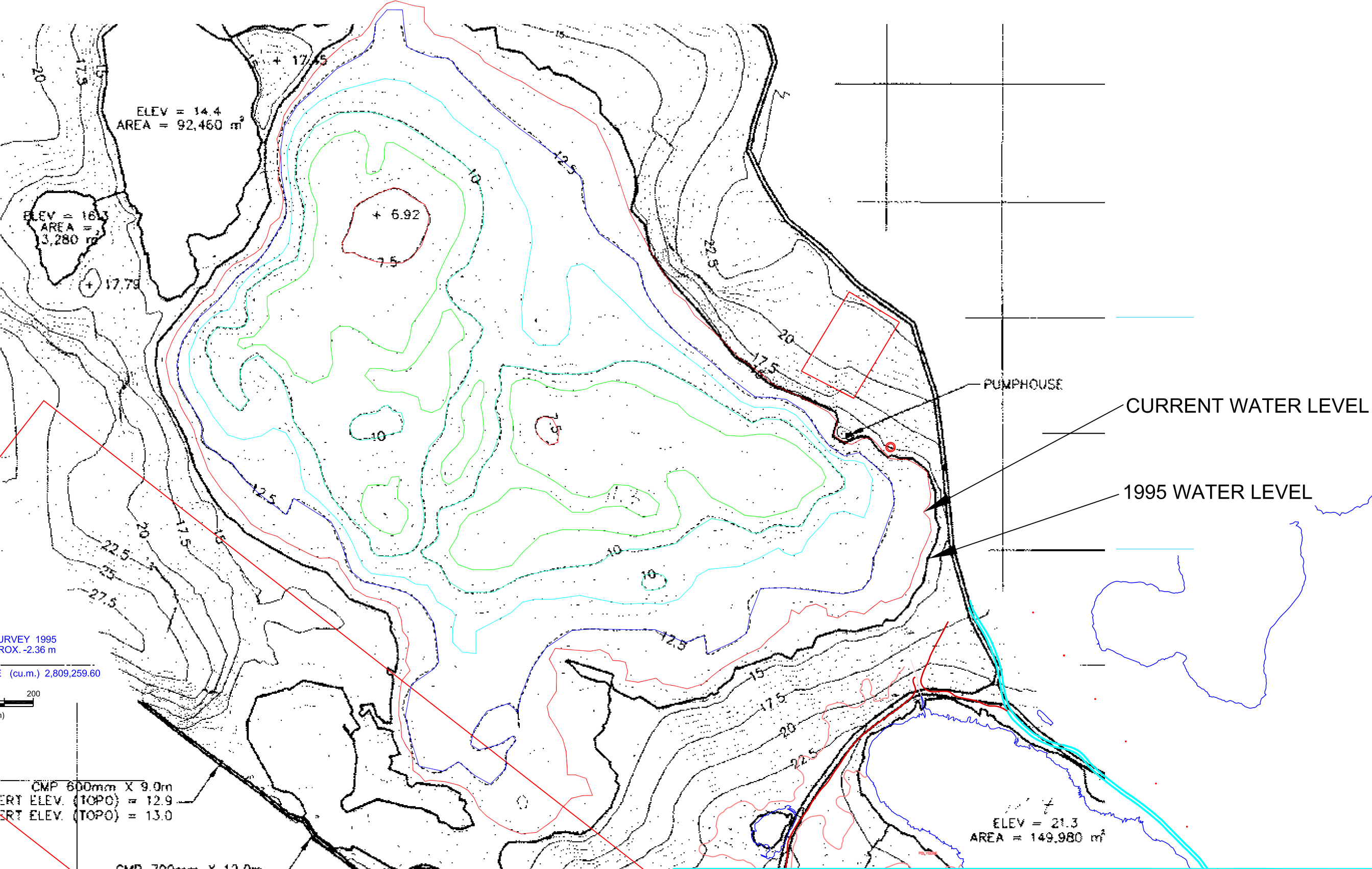
1. The maximum rate that Nipissar Lake can provide without forcing the Lake to continue to deplete is estimated to be 311,789 m³/year (854,000 litres/day).
2. Rankin Inlet has already surpassed the maximum withdrawal rate Nipissar Lake can provide without forcing the Lake to continue to deplete. The following table summarizes the projected year Nipissar Lake will begin to decrease from its current volume:

Population Increase	Category D Performance (Current)	Category C Performance	Category B Performance	Category A Performance
2.04%	Immediate	Immediate	2011	2019
2.5%	Immediate	Immediate	2011	2017
3.0%	Immediate	Immediate	2011	2016

3. The projected year when Nipissar Lake will fail completely can be estimated as the location when each line intersects the Minimum Pumping Volume line in Figures 6.1 to 6.3.
4. With the current consumption of water, and with a population increase of 2.04% realized, Figure 6.1 suggests that Nipissar Lake will fail completely as early as 2022. However, water quality and the ability to pump water from under the ice will have impacted production at least 5 years before that in 2017. The worst-case scenario for a 3.0% population increase is the year 2015, at which time water quality is expected to degrade.
5. If the Unaccounted for Water were reduced to meet Category B performance or better (≤ 331 LCPD), Rankin Inlet could meet the maximum withdrawal rate of Nipissar Lake with its current 2009 population.
6. According to MACA design usage rates, Rankin Inlet requires 344 LCPD using its current 2009 population. This is a higher usage rate than that of Category B Performance, and therefore suggests that reducing the Unaccounted for Water to meet Category B Performance may be moot.
7. Continuing population increases will continue to deplete the water storage in Nipissar Lake regardless of conservation and the further elimination of unaccounted water. This then suggests that meeting the Category B Performance or better will delay but not eliminate the need to recharge Nipissar Lake artificially within the next five years.



Appendix A: Drawings



PROJECT TITLE NIPISSAR LAKE VOLUME STUDY		CLIENT PROJECT NO. -	FSC PROJECT NO. 2009--1310
LOCATION RANKIN INLET, NU		DRAWN BY IGM	CHECKED BY CP
DRAWING TITLE NIPISSAR LAKE BATHYMETRIC AND VOLUME		SCALE 2009--1310	DATE 2010 JAN
		DRAWING NO.	

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Appendix B: Spreadsheet Data & Calculations

Population Increase Rate 2.04%
Water Management Category A
Water Use (LPCD) 196

Year	Population	LCPD	Cu. M./ Year	Volume of Lake
1994	1845	450	303,041	3,469,780
1995	1883	450	309,232	3,464,452
1996	1921	450	315,550	3,453,688
1997	1960	450	321,997	3,437,376
1998	2000	450	328,575	3,415,403
1999	2041	450	335,288	3,387,653
2000	2083	450	342,138	3,354,008
2001	2126	450	349,128	3,314,349
2002	2169	450	356,260	3,268,551
2003	2213	450	363,539	3,216,490
2004	2259	450	370,966	3,158,037
2005	2305	450	378,545	3,093,063
2006	2352	450	386,278	3,021,433
2007	2400	450	394,170	2,943,012
2008	2449	459	410,704	2,857,661
2009	2499	469	427,749	2,809,260
2010	2550	301	279,716	2,841,333
2011	2602	302	286,685	2,866,437
2012	2655	303	293,783	2,884,443
2013	2709	304	301,051	2,895,181
2014	2765	306	308,494	2,898,476
2015	2821	307	316,115	2,894,151
2016	2879	308	323,918	2,882,022
2017	2938	310	331,909	2,861,902
2018	2998	311	340,091	2,833,600
2019	3059	312	348,468	2,796,921
2020	3121	313	357,046	2,751,664
2021	3185	315	365,829	2,697,624
2022	3250	316	374,822	2,634,591
2023	3317	317	384,030	2,562,351
2024	3384	319	393,457	2,480,683
2025	3454	320	403,109	2,389,363
2026	3524	321	412,992	2,288,160
2027	3596	322	423,110	2,176,839
2028	3670	324	433,469	2,055,160
2029	3745	325	444,074	1,922,874
2030	3821	326	454,933	1,779,730
2031	3899	327	466,049	1,625,470
2032	3979	329	477,430	1,459,829
2033	4060	330	489,081	1,282,537
2034	4143	331	501,009	1,093,317
2035	4228	333	513,221	891,885
2036	4314	334	525,722	677,952
2037	4402	335	538,520	451,221
2038	4492	336	551,621	211,389
2039	4584	338	565,033 -	41,855
2040	4678	339	578,762 -	308,828

2041	4773	340	592,817 -	589,856
2042	4871	342	607,205 -	885,272
2043	4970	343	621,933 -	1,195,415
2044	5072	344	637,009 -	1,520,635
2045	5175	345	652,441 -	1,861,287
2046	5281	347	668,239 -	2,217,737
2047	5389	348	684,409 -	2,590,358
2048	5499	349	700,962 -	2,979,530
2049	5611	351	717,905 -	3,385,646

Population Increase Rate 2.04%
Water Management Category B
Water Use (LPCD) 216

Year	Population	LPCD	Cu. M./ Year	Volume of Lake
1994	1845	450	303,041	3,469,780
1995	1883	450	309,232	3,464,452
1996	1921	450	315,550	3,453,688
1997	1960	450	321,997	3,437,376
1998	2000	450	328,575	3,415,403
1999	2041	450	335,288	3,387,653
2000	2083	450	342,138	3,354,008
2001	2126	450	349,128	3,314,349
2002	2169	450	356,260	3,268,551
2003	2213	450	363,539	3,216,490
2004	2259	450	370,966	3,158,037
2005	2305	450	378,545	3,093,063
2006	2352	450	386,278	3,021,433
2007	2400	450	394,170	2,943,012
2008	2449	459	410,704	2,857,661
2009	2499	469	427,749	2,809,260
2010	2550	331	308,286	2,812,762
2011	2602	333	315,939	2,808,613
2012	2655	334	323,761	2,796,641
2013	2709	335	331,771	2,776,660
2014	2765	337	339,973	2,748,476
2015	2821	338	348,371	2,711,894
2016	2879	340	356,971	2,666,712
2017	2938	341	365,777	2,612,724
2018	2998	343	374,794	2,549,719
2019	3059	344	384,026	2,477,482
2020	3121	345	393,479	2,395,792
2021	3185	347	403,159	2,304,422
2022	3250	348	413,069	2,203,142
2023	3317	350	423,216	2,091,715
2024	3384	351	433,606	1,969,898
2025	3454	352	444,243	1,837,445
2026	3524	354	455,134	1,694,100
2027	3596	355	466,284	1,539,605
2028	3670	357	477,700	1,373,693
2029	3745	358	489,388	1,196,094
2030	3821	359	501,354	1,006,529
2031	3899	361	513,605	804,713
2032	3979	362	526,147	590,354
2033	4060	364	538,988	363,156
2034	4143	365	552,133	122,812
2035	4228	367	565,590 -	130,989
2036	4314	368	579,367 -	398,567
2037	4402	369	593,471 -	680,249
2038	4492	371	607,909 -	976,369
2039	4584	372	622,689 -	1,287,269
2040	4678	374	637,820 -	1,613,300

2041	4773	375	653,309 -	1,954,819
2042	4871	376	669,164 -	2,312,195
2043	4970	378	685,395 -	2,685,801
2044	5072	379	702,010 -	3,076,021
2045	5175	381	719,017 -	3,483,249
2046	5281	382	736,426 -	3,907,887
2047	5389	383	754,247 -	4,350,345
2048	5499	385	772,488 -	4,811,044
2049	5611	386	791,160 -	5,290,416

Population Increase Rate 2.04%
Water Management Category C
Water Use (LPCD) 256

Year	Population	LPCD	Cu. M./ Year	Volume of Lake
1994	1845	450	303,041	3,469,780
1995	1883	450	309,232	3,464,452
1996	1921	450	315,550	3,453,688
1997	1960	450	321,997	3,437,376
1998	2000	450	328,575	3,415,403
1999	2041	450	335,288	3,387,653
2000	2083	450	342,138	3,354,008
2001	2126	450	349,128	3,314,349
2002	2169	450	356,260	3,268,551
2003	2213	450	363,539	3,216,490
2004	2259	450	370,966	3,158,037
2005	2305	450	378,545	3,093,063
2006	2352	450	386,278	3,021,433
2007	2400	450	394,170	2,943,012
2008	2449	459	410,704	2,857,661
2009	2499	469	427,749	2,809,260
2010	2550	393	365,427	2,755,621
2011	2602	394	374,446	2,692,964
2012	2655	396	383,716	2,621,037
2013	2709	398	393,210	2,539,616
2014	2765	399	402,930	2,448,475
2015	2821	401	412,884	2,347,380
2016	2879	403	423,077	2,236,092
2017	2938	404	433,513	2,114,367
2018	2998	406	444,200	1,981,957
2019	3059	408	455,142	1,838,604
2020	3121	409	466,346	1,684,047
2021	3185	411	477,818	1,518,018
2022	3250	413	489,563	1,340,244
2023	3317	414	501,590	1,150,443
2024	3384	416	513,903	948,329
2025	3454	418	526,510	733,608
2026	3524	419	539,418	505,980
2027	3596	421	552,633	265,136
2028	3670	423	566,163	10,761
2029	3745	424	580,016 -	257,465
2030	3821	426	594,198 -	539,874
2031	3899	428	608,717 -	836,802
2032	3979	429	623,582 -	1,148,595
2033	4060	431	638,800 -	1,475,606
2034	4143	433	654,380 -	1,818,197
2035	4228	434	670,329 -	2,176,737
2036	4314	436	686,657 -	2,551,605
2037	4402	438	703,373 -	2,943,189
2038	4492	439	720,485 -	3,351,885
2039	4584	441	738,002 -	3,778,098
2040	4678	443	755,935 -	4,222,243

2041	4773	444	774,292 -	4,684,746
2042	4871	446	793,084 -	5,166,041
2043	4970	448	812,320 -	5,666,572
2044	5072	449	832,011 -	6,186,794
2045	5175	451	852,168 -	6,727,173
2046	5281	453	872,802 -	7,288,186
2047	5389	454	893,922 -	7,870,320
2048	5499	456	915,542 -	8,474,072
2049	5611	458	937,671 -	9,099,955

Population Increase Rate 2.04%
 Water Management Category D (Current)
 Water Use (LPCD) 306

Year	Population	LPCD	Cu. M./ Year	Volume of Lake
1994	1845	450	303,041	3,469,780
1995	1883	450	309,232	3,464,452
1996	1921	450	315,550	3,453,688
1997	1960	450	321,997	3,437,376
1998	2000	450	328,575	3,415,403
1999	2041	450	335,288	3,387,653
2000	2083	450	342,138	3,354,008
2001	2126	450	349,128	3,314,349
2002	2169	450	356,260	3,268,551
2003	2213	450	363,539	3,216,490
2004	2259	450	370,966	3,158,037
2005	2305	450	378,545	3,093,063
2006	2352	450	386,278	3,021,433
2007	2400	450	394,170	2,943,012
2008	2449	459	410,704	2,857,661
2009	2499	469	427,749	2,809,260
2010	2550	469	436,488	2,684,561
2011	2602	471	447,580	2,548,770
2012	2655	473	458,661	2,401,898
2013	2709	475	470,008	2,243,679
2014	2765	477	481,628	2,073,840
2015	2821	479	493,526	1,892,103
2016	2879	481	505,709	1,698,183
2017	2938	483	518,184	1,491,788
2018	2998	485	530,958	1,272,620
2019	3059	487	544,037	1,040,372
2020	3121	489	557,429	794,732
2021	3185	491	571,141	535,379
2022	3250	493	585,181	261,987
2023	3317	495	599,556 -	25,780
2024	3384	497	614,275 -	328,266
2025	3454	499	629,344 -	645,821
2026	3524	501	644,773 -	978,804
2027	3596	503	660,569 -	1,327,585
2028	3670	505	676,742 -	1,692,538
2029	3745	507	693,300 -	2,074,049
2030	3821	509	710,252 -	2,472,512
2031	3899	511	727,607 -	2,888,330
2032	3979	513	745,375 -	3,321,916
2033	4060	515	763,566 -	3,773,693
2034	4143	517	782,188 -	4,244,092
2035	4228	519	801,253 -	4,733,556
2036	4314	521	820,770 -	5,242,537
2037	4402	523	840,750 -	5,771,498
2038	4492	525	861,204 -	6,320,913
2039	4584	527	882,143 -	6,891,267
2040	4678	529	903,578 -	7,483,056

2041	4773	531	925,521 -	8,096,788
2042	4871	533	947,983 -	8,732,982
2043	4970	535	970,976 -	9,392,169
2044	5072	537	994,514 -	10,074,894
2045	5175	539	1,018,608 -	10,781,712
2046	5281	541	1,043,271 -	11,513,194
2047	5389	543	1,068,517 -	12,269,922
2048	5499	545	1,094,359 -	13,052,491
2049	5611	547	1,120,810 -	13,861,513

Population Increase Rate 2.50%
Water Management Category A
Water Use (LPCD) 196

Year	Population	LCPD	Cu. M./ Year	Volume of Lake
1994	1845	450	303,041	3,469,780
1995	1883	450	309,232	3,464,452
1996	1921	450	315,550	3,453,688
1997	1960	450	321,997	3,437,376
1998	2000	450	328,575	3,415,403
1999	2041	450	335,288	3,387,653
2000	2083	450	342,138	3,354,008
2001	2126	450	349,128	3,314,349
2002	2169	450	356,260	3,268,551
2003	2213	450	363,539	3,216,490
2004	2259	450	370,966	3,158,037
2005	2305	450	378,545	3,093,063
2006	2352	450	386,278	3,021,433
2007	2400	450	394,170	2,943,012
2008	2449	459	410,704	2,857,661
2009	2499	469	427,770	2,809,260
2010	2561	301	280,982	2,840,066
2011	2626	302	289,818	2,862,037
2012	2691	304	298,599	2,875,227
2013	2758	306	307,638	2,879,378
2014	2827	307	316,942	2,874,224
2015	2898	309	326,520	2,859,494
2016	2971	310	336,377	2,834,905
2017	3045	312	346,524	2,800,170
2018	3121	313	356,968	2,754,991
2019	3199	315	367,717	2,699,063
2020	3279	316	378,781	2,632,070
2021	3361	318	390,168	2,553,691
2022	3445	320	401,888	2,463,592
2023	3531	321	413,950	2,361,430
2024	3619	323	426,364	2,246,855
2025	3710	324	439,140	2,119,504
2026	3803	326	452,288	1,979,005
2027	3898	327	465,819	1,824,975
2028	3995	329	479,744	1,657,020
2029	4095	331	494,074	1,474,735
2030	4197	332	508,821	1,277,703
2031	4302	334	523,996	1,065,495
2032	4410	335	539,612	837,672
2033	4520	337	555,682	593,779
2034	4633	338	572,217	333,351
2035	4749	340	589,232	55,908
2036	4868	342	606,740 -	239,043
2037	4989	343	624,756 -	552,010
2038	5114	345	643,293 -	883,514
2039	5242	346	662,366 -	1,234,090
2040	5373	348	681,991 -	1,604,292

2041	5507	349	702,183 -	1,994,685
2042	5645	351	722,958 -	2,405,854
2043	5786	352	744,333 -	2,838,399
2044	5931	354	766,326 -	3,292,935
2045	6079	356	788,952 -	3,770,099
2046	6231	357	812,231 -	4,270,541
2047	6387	359	836,181 -	4,794,933
2048	6546	360	860,821 -	5,343,965
2049	6710	362	886,170 -	5,918,346

Population Increase Rate 2.50%
Water Management Category B
Water Use (LPCD) 216

Year	Population	LPCD	Cu. M./ Year	Volume of Lake
1994	1845	450	303,041	3,469,780
1995	1883	450	309,232	3,464,452
1996	1921	450	315,550	3,453,688
1997	1960	450	321,997	3,437,376
1998	2000	450	328,575	3,415,403
1999	2041	450	335,288	3,387,653
2000	2083	450	342,138	3,354,008
2001	2126	450	349,128	3,314,349
2002	2169	450	356,260	3,268,551
2003	2213	450	363,539	3,216,490
2004	2259	450	370,966	3,158,037
2005	2305	450	378,545	3,093,063
2006	2352	450	386,278	3,021,433
2007	2400	450	394,170	2,943,012
2008	2449	459	410,704	2,857,661
2009	2499	469	427,770	2,809,260
2010	2561	331	309,682	2,811,366
2011	2626	333	319,392	2,803,764
2012	2691	335	329,069	2,786,484
2013	2758	337	339,030	2,759,243
2014	2827	338	349,283	2,721,749
2015	2898	340	359,838	2,673,700
2016	2971	342	370,702	2,614,788
2017	3045	344	381,884	2,544,693
2018	3121	345	393,393	2,463,088
2019	3199	347	405,240	2,369,638
2020	3279	349	417,432	2,263,994
2021	3361	351	429,982	2,145,802
2022	3445	352	442,897	2,014,693
2023	3531	354	456,190	1,870,292
2024	3619	356	469,871	1,712,211
2025	3710	357	483,950	1,540,050
2026	3803	359	498,440	1,353,399
2027	3898	361	513,352	1,151,836
2028	3995	363	528,698	934,927
2029	4095	364	544,490	702,226
2030	4197	366	560,741	453,274
2031	4302	368	577,465	187,598
2032	4410	369	594,675 -	95,288
2033	4520	371	612,384 -	395,883
2034	4633	373	630,607 -	714,701
2035	4749	375	649,358 -	1,052,270
2036	4868	376	668,653 -	1,409,134
2037	4989	378	688,506 -	1,785,851
2038	5114	380	708,935 -	2,182,996
2039	5242	382	729,954 -	2,601,161
2040	5373	383	751,581 -	3,040,954

2041	5507	385	773,834 -	3,502,999
2042	5645	387	796,729 -	3,987,939
2043	5786	388	820,286 -	4,496,436
2044	5931	390	844,522 -	5,029,169
2045	6079	392	869,458 -	5,586,837
2046	6231	394	895,112 -	6,170,161
2047	6387	395	921,506 -	6,779,877
2048	6546	397	948,660 -	7,416,748
2049	6710	399	976,596 -	8,081,555

Population Increase Rate 2.50%
Water Management Category C
Water Use (LPCD) 256

Year	Population	LPCD	Cu. M./ Year	Volume of Lake
1994	1845	450	303,041	3,469,780
1995	1883	450	309,232	3,464,452
1996	1921	450	315,550	3,453,688
1997	1960	450	321,997	3,437,376
1998	2000	450	328,575	3,415,403
1999	2041	450	335,288	3,387,653
2000	2083	450	342,138	3,354,008
2001	2126	450	349,128	3,314,349
2002	2169	450	356,260	3,268,551
2003	2213	450	363,539	3,216,490
2004	2259	450	370,966	3,158,037
2005	2305	450	378,545	3,093,063
2006	2352	450	386,278	3,021,433
2007	2400	450	394,170	2,943,012
2008	2449	459	410,704	2,857,661
2009	2499	469	427,770	2,809,260
2010	2561	393	367,082	2,753,966
2011	2626	395	378,538	2,687,217
2012	2691	397	390,007	2,608,999
2013	2758	399	401,813	2,518,975
2014	2827	401	413,966	2,416,798
2015	2898	403	426,474	2,302,113
2016	2971	405	439,350	2,174,552
2017	3045	407	452,603	2,033,738
2018	3121	409	466,244	1,879,283
2019	3199	411	480,284	1,710,788
2020	3279	413	494,735	1,527,842
2021	3361	415	509,608	1,330,023
2022	3445	417	524,915	1,116,897
2023	3531	420	540,670	888,016
2024	3619	422	556,884	642,922
2025	3710	424	573,571	381,140
2026	3803	426	590,744	102,185
2027	3898	428	608,417 -	194,442
2028	3995	430	626,605 -	509,258
2029	4095	432	645,321 -	842,791
2030	4197	434	664,583 -	1,195,584
2031	4302	436	684,403 -	1,568,198
2032	4410	438	704,800 -	1,961,209
2033	4520	440	725,788 -	2,375,208
2034	4633	442	747,386 -	2,810,805
2035	4749	444	769,609 -	3,268,626
2036	4868	446	792,477 -	3,749,314
2037	4989	448	816,007 -	4,253,532
2038	5114	450	840,219 -	4,781,962
2039	5242	452	865,131 -	5,335,304
2040	5373	454	890,763 -	5,914,278

2041	5507	456	917,136 -	6,519,625
2042	5645	458	944,272 -	7,152,108
2043	5786	460	972,191 -	7,812,510
2044	5931	462	1,000,915 -	8,501,636
2045	6079	464	1,030,468 -	9,220,315
2046	6231	466	1,060,874 -	9,969,400
2047	6387	469	1,092,155 -	10,749,766
2048	6546	471	1,124,338 -	11,562,314
2049	6710	473	1,157,447 -	12,407,972

Population Increase Rate 2.50%

Water Management Category D (Current)

Water Use (LPCD) 306

Year	Population	LPCD	Cu. M./ Year	Volume of Lake
1994	1845	450	303,041	3,469,780
1995	1883	450	309,232	3,464,452
1996	1921	450	315,550	3,453,688
1997	1960	450	321,997	3,437,376
1998	2000	450	328,575	3,415,403
1999	2041	450	335,288	3,387,653
2000	2083	450	342,138	3,354,008
2001	2126	450	349,128	3,314,349
2002	2169	450	356,260	3,268,551
2003	2213	450	363,539	3,216,490
2004	2259	450	370,966	3,158,037
2005	2305	450	378,545	3,093,063
2006	2352	450	386,278	3,021,433
2007	2400	450	394,170	2,943,012
2008	2449	459	410,704	2,857,661
2009	2499	469	427,770	2,809,260
2010	2561	469	438,464	2,682,584
2011	2626	472	452,471	2,541,902
2012	2691	475	466,180	2,387,511
2013	2758	477	480,292	2,219,007
2014	2827	479	494,818	2,035,978
2015	2898	482	509,770	1,837,997
2016	2971	484	525,161	1,624,625
2017	3045	487	541,002	1,395,412
2018	3121	489	557,307	1,149,894
2019	3199	492	574,090	887,593
2020	3279	494	591,363	608,020
2021	3361	497	609,141	310,668
2022	3445	499	627,438 -	4,981
2023	3531	501	646,269 -	339,461
2024	3619	504	665,650 -	693,322
2025	3710	506	685,596 -	1,067,129
2026	3803	509	706,123 -	1,461,463
2027	3898	511	727,248 -	1,876,922
2028	3995	514	748,988 -	2,314,122
2029	4095	516	771,361 -	2,773,694
2030	4197	519	794,384 -	3,256,288
2031	4302	521	818,076 -	3,762,575
2032	4410	523	842,456 -	4,293,242
2033	4520	526	867,544 -	4,848,997
2034	4633	528	893,360 -	5,430,568
2035	4749	531	919,924 -	6,038,702
2036	4868	533	947,258 -	6,674,171
2037	4989	536	975,384 -	7,337,766
2038	5114	538	1,004,324 -	8,030,301
2039	5242	540	1,034,102 -	8,752,614
2040	5373	543	1,064,740 -	9,505,565

2041	5507	545	1,096,265 -	10,290,041
2042	5645	548	1,128,700 -	11,106,952
2043	5786	550	1,162,071 -	11,957,234
2044	5931	553	1,196,406 -	12,841,851
2045	6079	555	1,231,732 -	13,761,794
2046	6231	558	1,268,075 -	14,718,080
2047	6387	560	1,305,467 -	15,711,758
2048	6546	562	1,343,935 -	16,743,904
2049	6710	565	1,383,510 -	17,815,625

Population Increase Rate 3.00%
Water Management Category A
Water Use (LPCD) 196

Year	Population	LCPD	Cu. M./ Year	Volume of Lake
1994	1845	450	303,041	3,469,780
1995	1883	450	309,232	3,464,452
1996	1921	450	315,550	3,453,688
1997	1960	450	321,997	3,437,376
1998	2000	450	328,575	3,415,403
1999	2041	450	335,288	3,387,653
2000	2083	450	342,138	3,354,008
2001	2126	450	349,128	3,314,349
2002	2169	450	356,260	3,268,551
2003	2213	450	363,539	3,216,490
2004	2259	450	370,966	3,158,037
2005	2305	450	378,545	3,093,063
2006	2352	450	386,278	3,021,433
2007	2400	450	394,170	2,943,012
2008	2449	459	410,704	2,857,661
2009	2499	469	427,770	2,809,260
2010	2574	301	282,353	2,838,696
2011	2651	303	293,249	2,857,236
2012	2731	305	303,912	2,865,113
2013	2813	307	314,950	2,861,952
2014	2897	309	326,377	2,847,364
2015	2984	311	338,207	2,820,946
2016	3073	312	350,452	2,782,283
2017	3166	314	363,128	2,730,944
2018	3261	316	376,249	2,666,485
2019	3358	318	389,830	2,588,443
2020	3459	320	403,888	2,496,344
2021	3563	322	418,438	2,389,695
2022	3670	324	433,498	2,267,986
2023	3780	325	449,085	2,130,691
2024	3893	327	465,216	1,977,263
2025	4010	329	481,912	1,807,140
2026	4130	331	499,191	1,619,739
2027	4254	333	517,072	1,414,456
2028	4382	335	535,577	1,190,667
2029	4513	337	554,727	947,729
2030	4649	339	574,545	684,973
2031	4788	340	595,052	401,711
2032	4932	342	616,272	97,228
2033	5080	344	638,230 -	229,213
2034	5232	346	660,950 -	578,374
2035	5389	348	684,460 -	951,045
2036	5551	350	708,785 -	1,348,041
2037	5718	352	733,954 -	1,770,206
2038	5889	354	759,995 -	2,218,412
2039	6066	355	786,938 -	2,693,561
2040	6248	357	814,813 -	3,196,586

2041	6435	359	843,653 -	3,728,450
2042	6628	361	873,490 -	4,290,151
2043	6827	363	904,358 -	4,882,720
2044	7032	365	936,291 -	5,507,222
2045	7243	367	969,327 -	6,164,761
2046	7460	369	1,003,503 -	6,856,474
2047	7684	370	1,038,856 -	7,583,541
2048	7914	372	1,075,427 -	8,347,179
2049	8152	374	1,113,258 -	9,148,648

Population Increase Rate 3.00%
 Water Management Category B
 Water Use (LPCD) 216

Year	Population	LPCD	Cu. M./ Year	Volume of Lake
1994	1845	450	303,041	3,469,780
1995	1883	450	309,232	3,464,452
1996	1921	450	315,550	3,453,688
1997	1960	450	321,997	3,437,376
1998	2000	450	328,575	3,415,403
1999	2041	450	335,288	3,387,653
2000	2083	450	342,138	3,354,008
2001	2126	450	349,128	3,314,349
2002	2169	450	356,260	3,268,551
2003	2213	450	363,539	3,216,490
2004	2259	450	370,966	3,158,037
2005	2305	450	378,545	3,093,063
2006	2352	450	386,278	3,021,433
2007	2400	450	394,170	2,943,012
2008	2449	459	410,704	2,857,661
2009	2499	469	427,770	2,809,260
2010	2574	331	311,193	2,809,856
2011	2651	334	323,172	2,798,472
2012	2731	336	334,923	2,775,339
2013	2813	338	347,088	2,740,040
2014	2897	340	359,681	2,692,148
2015	2984	342	372,718	2,631,219
2016	3073	344	386,213	2,556,796
2017	3166	346	400,182	2,468,403
2018	3261	348	414,642	2,365,550
2019	3358	350	429,609	2,247,731
2020	3459	353	445,101	2,114,419
2021	3563	355	461,136	1,965,072
2022	3670	357	477,732	1,799,128
2023	3780	359	494,910	1,616,008
2024	3893	361	512,688	1,415,109
2025	4010	363	531,087	1,195,812
2026	4130	365	550,128	957,472
2027	4254	367	569,835	699,427
2028	4382	369	590,228	420,988
2029	4513	371	611,332	121,444
2030	4649	373	633,172 -	199,938
2031	4788	375	655,771 -	543,920
2032	4932	377	679,157 -	911,288
2033	5080	379	703,355 -	1,302,854
2034	5232	381	728,394 -	1,719,460
2035	5389	383	754,303 -	2,161,973
2036	5551	386	781,110 -	2,631,295
2037	5718	388	808,847 -	3,128,353
2038	5889	390	837,546 -	3,654,110
2039	6066	392	867,238 -	4,209,558
2040	6248	394	897,958 -	4,795,727

2041	6435	396	929,740 -	5,413,678
2042	6628	398	962,622 -	6,064,511
2043	6827	400	996,639 -	6,749,361
2044	7032	402	1,031,831 -	7,469,404
2045	7243	404	1,068,238 -	8,225,853
2046	7460	406	1,105,901 -	9,019,965
2047	7684	408	1,144,862 -	9,853,037
2048	7914	410	1,185,165 -	10,726,413
2049	8152	412	1,226,856 -	11,641,480

Population Increase Rate 3.00%
 Water Management Category C
 Water Use (LPCD) 256

Year	Population	LPCD	Cu. M./ Year	Volume of Lake
1994	1845	450	303,041	3,469,780
1995	1883	450	309,232	3,464,452
1996	1921	450	315,550	3,453,688
1997	1960	450	321,997	3,437,376
1998	2000	450	328,575	3,415,403
1999	2041	450	335,288	3,387,653
2000	2083	450	342,138	3,354,008
2001	2126	450	349,128	3,314,349
2002	2169	450	356,260	3,268,551
2003	2213	450	363,539	3,216,490
2004	2259	450	370,966	3,158,037
2005	2305	450	378,545	3,093,063
2006	2352	450	386,278	3,021,433
2007	2400	450	394,170	2,943,012
2008	2449	459	410,704	2,857,661
2009	2499	469	427,770	2,809,260
2010	2574	393	368,873	2,752,176
2011	2651	396	383,019	2,680,946
2012	2731	398	396,946	2,595,789
2013	2813	401	411,363	2,496,215
2014	2897	403	426,289	2,381,715
2015	2984	406	441,739	2,251,765
2016	3073	408	457,733	2,105,821
2017	3166	410	474,290	1,943,320
2018	3261	413	491,427	1,763,682
2019	3358	415	509,166	1,566,305
2020	3459	418	527,527	1,350,567
2021	3563	420	546,531	1,115,825
2022	3670	423	566,201	861,412
2023	3780	425	586,560	586,642
2024	3893	428	607,630	290,801
2025	4010	430	629,436 -	26,846
2026	4130	432	652,004 -	367,061
2027	4254	435	675,360 -	730,631
2028	4382	437	699,530 -	1,118,372
2029	4513	440	724,542 -	1,531,125
2030	4649	442	750,426 -	1,969,762
2031	4788	445	777,210 -	2,435,183
2032	4932	447	804,926 -	2,928,320
2033	5080	450	833,606 -	3,450,137
2034	5232	452	863,282 -	4,001,631
2035	5389	454	893,989 -	4,583,830
2036	5551	457	925,760 -	5,197,801
2037	5718	459	958,634 -	5,844,646
2038	5889	462	992,647 -	6,525,504
2039	6066	464	1,027,837 -	7,241,552
2040	6248	467	1,064,246 -	7,994,009

2041	6435	469	1,101,914 -	8,784,135
2042	6628	472	1,140,885 -	9,613,231
2043	6827	474	1,181,202 -	10,482,644
2044	7032	476	1,222,911 -	11,393,766
2045	7243	479	1,266,060 -	12,348,037
2046	7460	481	1,310,697 -	13,346,945
2047	7684	484	1,356,873 -	14,392,029
2048	7914	486	1,404,640 -	15,484,880
2049	8152	489	1,454,051 -	16,627,143

Population Increase Rate 3.00%
 Water Management Category D (Current)
 Water Use (LPCD) 306

Year	Population	LPCD	Cu. M./ Year	Volume of Lake
1994	1845	450	303,041	3,469,780
1995	1883	450	309,232	3,464,452
1996	1921	450	315,550	3,453,688
1997	1960	450	321,997	3,437,376
1998	2000	450	328,575	3,415,403
1999	2041	450	335,288	3,387,653
2000	2083	450	342,138	3,354,008
2001	2126	450	349,128	3,314,349
2002	2169	450	356,260	3,268,551
2003	2213	450	363,539	3,216,490
2004	2259	450	370,966	3,158,037
2005	2305	450	378,545	3,093,063
2006	2352	450	386,278	3,021,433
2007	2400	450	394,170	2,943,012
2008	2449	459	410,704	2,857,661
2009	2499	469	427,770	2,809,260
2010	2574	469	440,603	2,680,446
2011	2651	473	457,827	2,534,407
2012	2731	476	474,474	2,371,722
2013	2813	479	491,708	2,191,803
2014	2897	482	509,548	1,994,044
2015	2984	485	528,017	1,777,817
2016	3073	488	547,134	1,542,471
2017	3166	491	566,924	1,287,336
2018	3261	494	587,409	1,011,716
2019	3358	496	608,612	714,893
2020	3459	499	630,560	396,122
2021	3563	502	653,276	54,635
2022	3670	505	676,787 -	310,363
2023	3780	508	701,122 -	699,696
2024	3893	511	726,307 -	1,114,214
2025	4010	514	752,373 -	1,554,798
2026	4130	517	779,349 -	2,022,358
2027	4254	520	807,266 -	2,517,834
2028	4382	523	836,156 -	3,042,202
2029	4513	526	866,054 -	3,596,467
2030	4649	529	896,993 -	4,181,671
2031	4788	532	929,009 -	4,798,891
2032	4932	534	962,139 -	5,449,241
2033	5080	537	996,420 -	6,133,871
2034	5232	540	1,031,892 -	6,853,974
2035	5389	543	1,068,596 -	7,610,781
2036	5551	546	1,106,573 -	8,405,565
2037	5718	549	1,145,867 -	9,239,643
2038	5889	552	1,186,523 -	10,114,377
2039	6066	555	1,228,587 -	11,031,175
2040	6248	558	1,272,107 -	11,991,492

2041	6435	561	1,317,132 -	12,996,835
2042	6628	564	1,363,714 -	14,048,761
2043	6827	567	1,411,906 -	15,148,877
2044	7032	570	1,461,761 -	16,298,849
2045	7243	572	1,513,337 -	17,500,398
2046	7460	575	1,566,693 -	18,755,302
2047	7684	578	1,621,887 -	20,065,400
2048	7914	581	1,678,983 -	21,432,594
2049	8152	584	1,738,046 -	22,858,851